APPENDICES

1.1 Notice of Preparation

CITY OF SAN BERNARDINO
COMMUNITY DEVELOPMENT DEPARTMENT
NOTICE OF PREPARATION

FROM: CITY OF SAN BERNARDINO
Community Development Department
300 North "D" Street, 3rd Floor
San Bernardino, CA 92418

TO: Office of Planning and Research
P.O. Box 3044
Sacramento, CA 98512-3044

SUBJECT: Notice of Preparation of Draft Environmental Impact Report for the Rancho Palma Project; Project Applicant: Strata Palma LLC

Acting as a lead agency for the California Environmental Quality Act (CEQA), the Community Development Department of the City of San Bernardino is issuing this Notice of Preparation for the proposed Rancho Palma project, located just north of West Little League Drive in the city of San Bernardino. Discretionary approvals from state and local agencies are required; therefore, the project is subject to CEQA environmental review requirements.

A Draft Environmental Impact Report (EIR) will be prepared to evaluate the potential impacts of the proposed project, including short- and long-term direct, indirect, and cumulative effects on the environment. The EIR will identify potentially significant impacts, identify feasible mitigation measures to reduce or eliminate potentially significant environmental impacts, and discuss potentially feasible alternatives to the project that may accomplish basic project objectives while lessening or eliminating the project's significant impacts.

It is anticipated that the proposed project may result in significant environmental impacts with regard to the following issue areas, as identified in the CEQA Appendix G Environmental Checklist Form. These issue areas will therefore be evaluated in the EIR. Key issues areas are anticipated to include traffic/circulation and aesthetics.

- Aesthetics
- Agriculture and Forestry Resources
- Air Quality
- Biological Resources
- Cultural Resources
- Geology and Soils
- Greenhouse Gas Emissions
- Hazards and Hazardous Materials
- Hydrology/Water Quality
- Land Use/Planning
- Mineral Resources
- Noise
- Population/Housing
- Recreation
- Transportation/Traffic
- Utilities/Public Services

This Notice of Preparation is intended to provide a brief description of the proposed project and to solicit comments from responsible agencies; trustee agencies; federal, State, and local agencies; and the general public with regard to the scope and content of the EIR. Relevant comments received in response to this Notice of Preparation will be reviewed and considered by the lead agency in preparation of the environmental document.

Pursuant to Public Resources Code Section 21080.4 and CEQA Guidelines Section 15082, **the 30-day public review period for this Notice of Preparation will extend from March 28, 2016, to April 28, 2016.** All comments must be received by no later than 5:00 p.m. on April 28, 2016. **Please send written comments to the City of San Bernardino, Community Development Department, 300 North "D" Street, 3rd Floor, San Bernardino, CA, 92418, Attention: Oliver Mujica, or via e-mail at mujica_ol@sbcity.org.** Please include the name, phone number, and e-mail address of a contact person in all responses submitted.

PROJECT LOCATION: The approximately 42-acre project site is located north of West Little League Drive and west of Palm Avenue in the Verdemont Heights area in the city of San Bernardino, San Bernardino County, California. (Figure 1) The County Assessor's Parcel Numbers (APNs) associated with the project include 0261-181-01, 0261-181-13, 0261-181-14, 0261-181-15, and 0261-182-10.

PROJECT DESCRIPTION: The Rancho Palma project proposes a Specific Plan to allow the future development of up to 120 single-family residential dwelling units and up to 98,000 square feet of commercial uses. (Figure 2) In addition, two private parks and a paseo are proposed within the residential area, along with a recreational vehicle storage lot. Approximately 0.5 acre of parkland will also be dedicated as part of the project for the expansion of the existing Ronald Reagan Park. The project is intended to provide a mixed-use neighborhood that will offer additional shopping and commercial services within walking distance for residents of Rancho Palma and the Verdemont Heights neighborhood, as well as to capture regional traffic along the adjacent Interstate 215. Access to the project site will be provided via West Little League Drive and (proposed) Magnolia Avenue. (Figure 3)

EXISTING CONDITIONS: The subject property is presently undeveloped. (Figure 4) Access to the site is currently provided from West Little League Drive, which forms the southwestern border of the Rancho Palma Specific Plan area. To the south lie an existing commercial center at the intersection of Palm Avenue and West Little League Drive. To the northeast are the Cable Creek Channel, Ronald Reagan Park, and the Verdemont Heights neighborhood. To the north lie Al Guhin Park, Cesar E. Chavez Middle School, North Verdemont Elementary School, and the Little League Baseball Western Region Headquarters. To the southwest of the site is West Little League Drive, which is located adjacent to the Barstow Freeway (Interstate 215). To the southeast are existing commercial businesses, Palm Avenue and the Palm Avenue/Interstate 215 interchange, the Verdemont Heights neighborhood, and industrial uses.

PUBLIC SCOPING MEETING: A public scoping meeting is scheduled for Tuesday, April 5, 2016, from 5:00 to 7:00 p.m. in the City Council Chambers, City Hall, Mezzanine, 300 North "D" Street in San Bernardino to solicit public comment on the project.

Signature: _____ **Date:** MARCH 23, 2016

Oliver Mujica, Planning Division Manager
Community Development Department

STATE OF CALIFORNIA
NATIVE AMERICAN HERITAGE COMMISSION
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Edmund G. Brown Jr., Governor

RECEIVED
MAR 31 2016
BY:

March 25, 2016

Oliver Mujica, Planning Division Manager
City of San Bernardino, Community Development Department
300 North "D" Street
San Bernardino, CA 92418

Number of pages: 4

RE: SCH# 2016031080 Rancho Palma Project Draft EIR, City of San Bernardino, San Bernardino County, California

Dear Mr. Mujica:

The Native American Heritage Commission has received the Notice of Preparation (NOP) for the project referenced above. The California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 et seq.), specifically Public Resources Code section 21084.1, states that a project that may cause a substantial adverse change in the significance of an historical resource is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.1; Cal. Code Regs., tit.14, § 15064.5 (b) (CEQA Guidelines Section 15064.5 (b)). If there is substantial evidence, in light of the whole record before a lead agency, that a project may have a significant effect on the environment, an environmental impact report (EIR) shall be prepared. (Pub. Resources Code § 21080 (d); Cal. Code Regs., tit. 14, § 15064 subd.(a)(1) (CEQA Guidelines § 15064 (a)(1)). In order to determine whether a project will cause a substantial adverse change in the significance of a historical resource, a lead agency will need to determine whether there are historical resources with the area of project effect (APE).

CEQA was amended significantly in 2014. Assembly Bill 52 (Gatto, Chapter 532, Statutes of 2014) (AB 52) amended CEQA to create a separate category of cultural resources, "tribal cultural resources" (Pub. Resources Code § 21074) and provides that a project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a significant effect on the environment. (Pub. Resources Code § 21084.2). Public agencies shall, when feasible, avoid damaging effects to any tribal cultural resource. (Pub. Resources Code § 21084.3 (a)). **AB 52 applies to any project for which a notice of preparation or a notice of negative declaration or mitigated negative declaration is filed on or after July 1, 2015.** If your project involves the adoption of or amendment to a general plan or a specific plan, or the designation or proposed designation of open space, on or after March 1, 2005, it may also be subject to Senate Bill 18 (Burton, Chapter 905, Statutes of 2004) (SB 18). **Both SB 18 and AB 52 have tribal consultation requirements**. If your project is also subject to the federal National Environmental Policy Act (42 U.S.C. § 4321 et seq.) (NEPA), the tribal consultation requirements of Section 106 of the National Historic Preservation Act of 1966 (154 U.S.C. 300101, 36 C.F.R. § 800 et seq.) may also apply.

The NAHC recommends consultation with California Native American tribes that are traditionally and culturally affiliated with the geographic area of your proposed project as early as possible in order to avoid inadvertent discoveries of Native American human remains and best protect tribal cultural resources. Below is a brief summary of portions of AB 52 and SB 18 as well as the NAHC's recommendations for conducting cultural resources assessments. **Consult your legal counsel about compliance with AB 52 and SB 18 as well as compliance with any other applicable laws.**

AB 52

AB 52 has added to CEQA the additional requirements listed below, along with many other requirements:

1. Fourteen Day Period to Provide Notice of Completion of an Application/Decision to Undertake a Project: Within fourteen (14) days of determining that an application for a project is complete or of a decision by a public agency to undertake a project, a lead agency shall provide formal notification to a designated contact of, or tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, to be accomplished by at least one written notice that includes:
    - **a.** A brief description of the project.
    - **b.** The lead agency contact information.
    - **c.** Notification that the California Native American tribe has 30 days to request consultation. (Pub. Resources Code § 21080.3.1 (d)).
    - **d.** A "California Native American tribe" is defined as a Native American tribe located in California that is on the contact list maintained by the NAHC for the purposes of Chapter 905 of Statutes of 2004 (SB 18). (Pub. Resources Code § 21073).

2. Begin Consultation Within 30 Days of Receiving a Tribe's Request for Consultation and Before Releasing a Negative Declaration, Mitigated Negative Declaration, or Environmental Impact Report: A lead agency shall begin the consultation process within 30 days of receiving a request for consultation from a California Native American tribe that is traditionally and culturally affiliated with the geographic area of the proposed project. (Pub. Resources Code § 21080.3.1, subds. (d) and (e)) and prior to the release of a negative declaration, mitigated negative declaration or environmental impact report. (Pub. Resources Code § 21080.3.1(b)).
    - **a.** For purposes of AB 52, "consultation shall have the same meaning as provided in Gov. Code § 65352.4 (SB 18). (Pub. Resources Code § 21080.3.1 (b)).

3. Mandatory Topics of Consultation If Requested by a Tribe: The following topics of consultation, if a tribe requests to discuss them, are mandatory topics of consultation:
    - **a.** Alternatives to the project.
    - **b.** Recommended mitigation measures.
    - **c.** Significant effects. (Pub. Resources Code § 21080.3.2 (a)).

4. Discretionary Topics of Consultation: The following topics are discretionary topics of consultation:
   a. Type of environmental review necessary.
   b. Significance of the tribal cultural resources.
   c. Significance of the project's impacts on tribal cultural resources.
   d. If necessary, project alternatives or appropriate measures for preservation or mitigation that the tribe may recommend to the lead agency. (Pub. Resources Code § 21080.3.2 (a)).

5. Confidentiality of Information Submitted by a Tribe During the Environmental Review Process: With some exceptions, any information, including but not limited to, the location, description, and use of tribal cultural resources submitted by a California Native American tribe during the environmental review process shall not be included in the environmental document or otherwise disclosed by the lead agency or any other public agency to the public, consistent with Government Code sections 6254 (r) and 6254.10. Any information submitted by a California Native American tribe during the consultation or environmental review process shall be published in a confidential appendix to the environmental document unless the tribe that provided the information consents, in writing, to the disclosure of some or all of the information to the public. (Pub. Resources Code § 21082.3 (c)(1)).

6. Discussion of Impacts to Tribal Cultural Resources in the Environmental Document: If a project may have a significant impact on a tribal cultural resource, the lead agency's environmental document shall discuss both of the following:
   a. Whether the proposed project has a significant impact on an identified tribal cultural resource.
   b. Whether feasible alternatives or mitigation measures, including those measures that may be agreed to pursuant to Public Resources Code section 21082.3, subdivision (a), avoid or substantially lessen the impact on the identified tribal cultural resource. (Pub. Resources Code § 21082.3 (b)).

7. Conclusion of Consultation: Consultation with a tribe shall be considered concluded when either of the following occurs:
   a. The parties agree to measures to mitigate or avoid a significant effect, if a significant effect exists, on a tribal cultural resource; or
   b. A party, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached. (Pub. Resources Code § 21080.3.2 (b)).

8. Recommending Mitigation Measures Agreed Upon in Consultation in the Environmental Document: Any mitigation measures agreed upon in the consultation conducted pursuant to Public Resources Code section 21080.3.2 shall be recommended for inclusion in the environmental document and in an adopted mitigation monitoring and reporting program, if determined to avoid or lessen the impact pursuant to Public Resources Code section 21082.3, subdivision (b), paragraph 2, and shall be fully enforceable. (Pub. Resources Code § 21082.3 (a)).

9. Required Consideration of Feasible Mitigation: If mitigation measures recommended by the staff of the lead agency as a result of the consultation process are not included in the environmental document or if there are no agreed upon mitigation measures at the conclusion of consultation, or if consultation does not occur, and if substantial evidence demonstrates that a project will cause a significant effect to a tribal cultural resource, the lead agency shall consider feasible mitigation pursuant to Public Resources Code section 21084.3 (b). (Pub. Resources Code § 21082.3 (e)).

10. Examples of Mitigation Measures That, If Feasible, May Be Considered to Avoid or Minimize Significant Adverse Impacts to Tribal Cultural Resources:
    a. Avoidance and preservation of the resources in place, including, but not limited to:
       I. Planning and construction to avoid the resources and protect the cultural and natural context.
       II. Planning greenspace, parks, or other open space, to incorporate the resources with culturally appropriate protection and management criteria.
    b. Treating the resource with culturally appropriate dignity, taking into account the tribal cultural values and meaning of the resource, including, but not limited to, the following:
       I. Protecting the cultural character and integrity of the resource.
       II. Protecting the traditional use of the resource.
       III. Protecting the confidentiality of the resource.
    c. Permanent conservation easements or other interests in real property, with culturally appropriate management criteria for the purposes of preserving or utilizing the resources or places.
    d. Protecting the resource. (Pub. Resource Code § 21084.3 (b)).
    e. Please note that a federally recognized California Native American tribe or a nonfederally recognized California Native American tribe that is on the contact list maintained by the NAHC to protect a California prehistoric, archaeological, cultural, spiritual, or ceremonial place may acquire and hold conservation easements if the conservation easement is voluntarily conveyed. (Civ. Code § 815.3 (c)).
    f. Please note that it is the policy of the state that Native American remains and associated grave artifacts shall be repatriated. (Pub. Resources Code § 5097.991).

11. Prerequisites for Certifying an Environmental Impact Report or Adopting a Mitigated Negative Declaration or Negative Declaration with a Significant Impact on an Identified Tribal Cultural Resource: An environmental impact report may not be certified, nor may a mitigated negative declaration or a negative declaration be adopted unless one of the following occurs:
    a. The consultation process between the tribes and the lead agency has occurred as provided in Public Resources Code sections 21080.3.1 and 21080.3.2 and concluded pursuant to Public Resources Code section 21080.3.2.
    b. The tribe that requested consultation failed to provide comments to the lead agency or otherwise failed to engage in the consultation process.
    c. The lead agency provided notice of the project to the tribe in compliance with Public Resources Code section 21080.3.1 (d) and the tribe failed to request consultation within 30 days. (Pub. Resources Code § 21082.3 (d)).

    This process should be documented in the Cultural Resources section of your environmental document.

The NAHC's PowerPoint presentation titled, "Tribal Consultation Under AB 52: Requirements and Best Practices" may be found online at: http://nahc.ca.gov/wp-content/uploads/2015/10/AB52TribalConsultation_CalEPAPDF.pdf

SB 18

SB 18 applies to local governments and requires local governments to contact, provide notice to, refer plans to, and consult with tribes prior to the adoption or amendment of a general plan or a specific plan, or the designation of open space. (Gov. Code § 65352.3). Local governments should consult the Governor's Office of Planning and Research's "Tribal Consultation Guidelines," which can be found online at: https://www.opr.ca.gov/docs/09_14_05_Updated_Guidelines_922.pdf

Some of SB 18's provisions include:

1. Tribal Consultation: If a local government considers a proposal to adopt or amend a general plan or a specific plan, or to designate open space it is required to contact the appropriate tribes identified by the NAHC by requesting a "Tribal Consultation List." If a tribe, once contacted, requests consultation the local government must consult with the tribe on the plan proposal. **A tribe has 90 days from the date of receipt of notification to request consultation unless a shorter timeframe has been agreed to by the tribe.** (Gov. Code § 65352.3 (a)(2)).
2. No Statutory Time Limit on SB 18 Tribal Consultation. There is no statutory time limit on SB 18 tribal consultation.
3. Confidentiality: Consistent with the guidelines developed and adopted by the Office of Planning and Research pursuant to Gov. Code section 65040.2, the city or county shall protect the confidentiality of the information concerning the specific identity, location, character, and use of places, features and objects described in Public Resources Code sections 5097.9 and 5097.993 that are within the city's or county's jurisdiction. (Gov. Code § 65352.3 (b)).
4. Conclusion of SB 18 Tribal Consultation: Consultation should be concluded at the point in which:
    a. The parties to the consultation come to a mutual agreement concerning the appropriate measures for preservation or mitigation; or
    b. Either the local government or the tribe, acting in good faith and after reasonable effort, concludes that mutual agreement cannot be reached concerning the appropriate measures of preservation or mitigation. (Tribal Consultation Guidelines, Governor's Office of Planning and Research (2005) at p. 18).

Agencies should be aware that neither AB 52 nor SB 18 precludes agencies from initiating tribal consultation with tribes that are traditionally and culturally affiliated with their jurisdictions before the timeframes provided in AB 52 and SB 18. For that reason, we urge you to continue to request Native American Tribal Contact Lists and "Sacred Lands File" searches from the NAHC. The request forms can be found online at: http://nahc.ca.gov/resources/forms/

NAHC Recommendations for Cultural Resources Assessments

To adequately assess the existence and significance of tribal cultural resources and plan for avoidance, preservation in place, or barring both, mitigation of project-related impacts to tribal cultural resources, the NAHC recommends the following actions:

1. Contact the appropriate regional California Historical Research Information System (CHRIS) Center (http://ohp.parks.ca.gov/?page_id=1068) for an archaeological records search. The records search will determine:
    a. If part or all of the APE has been previously surveyed for cultural resources.
    b. If any known cultural resources have been already been recorded on or adjacent to the APE.
    c. If the probability is low, moderate, or high that cultural resources are located in the APE.
    d. If a survey is required to determine whether previously unrecorded cultural resources are present.

2. If an archaeological inventory survey is required, the final stage is the preparation of a professional report detailing the findings and recommendations of the records search and field survey.
    a. The final report containing site forms, site significance, and mitigation measures should be submitted immediately to the planning department. All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum and not be made available for public disclosure.
    b. The final written report should be submitted within 3 months after work has been completed to the appropriate regional CHRIS center.

3. Contact the NAHC for:
    a. A Sacred Lands File search. Remember that tribes do not always record their sacred sites in the Sacred Lands File, nor are they required to do so. A Sacred Lands File search is not a substitute for consultation with tribes that are traditionally and culturally affiliated with the geographic area of the project's APE.
    b. A Native American Tribal Consultation List of appropriate tribes for consultation concerning the project site and to assist in planning for avoidance, preservation in place, or, failing both, mitigation measures.

4. Remember that the lack of surface evidence of archaeological resources (including tribal cultural resources) does not preclude their subsurface existence.
    a. Lead agencies should include in their mitigation and monitoring reporting program plan provisions for the identification and evaluation of inadvertently discovered archaeological resources per Cal. Code Regs., tit. 14, section 15064.5(f) (CEQA Guidelines section 15064.5(f)). In areas of identified archaeological sensitivity, a certified archaeologist and a culturally affiliated Native American with knowledge of cultural resources should monitor all ground-disturbing activities.
    b. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the disposition of recovered cultural items that are not burial associated in consultation with culturally affiliated Native Americans.
    c. Lead agencies should include in their mitigation and monitoring reporting program plans provisions for the treatment and disposition of inadvertently discovered Native American human remains. Health and Safety Code section 7050.5, Public Resources Code section 5097.98, and Cal. Code Regs., tit. 14, section 15064.5,

subdivisions (d) and (e) (CEQA Guidelines section 15064.5, subds. (d) and (e)) address the processes to be followed in the event of an inadvertent discovery of any Native American human remains and associated grave goods in a location other than a dedicated cemetery.

Please contact me if you need any additional information at gayle.totton@nahc.ca.gov.

Sincerely,

Gayle Totton, M.A., PhD.
Associate Governmental Program Analyst

cc: State Clearinghouse

State of California - Natural Resources Agency
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EDMUND G. BROWN, Jr., Governor
CHARLTON H. BONHAM, Director

April 18, 2016

Oliver Mujica
Planning Division Manager
City of San Bernardino
300 North D Street
San Bernardino, CA 92418

Subject: Notice of Preparation of a Draft Environmental Impact Report
Rancho Palma Project
State Clearinghouse No. 2016031080

Dear Mr. Mujica:

The Department of Fish and Wildlife (Department) appreciates the opportunity to comment on the Notice of Preparation (NOP) of a Draft Environmental Impact Report (DEIR) for the Rancho Palma Project (project) [State Clearinghouse No. 2016031080]. The Department is responding to the NOP as a Trustee Agency for fish and wildlife resources (California Fish and Game Code Sections 711.7 and 1802, and the California Environmental Quality Act [CEQA] Guidelines Section 15386), and as a Responsible Agency regarding any discretionary actions (CEQA Guidelines Section 15381), such as the issuance of a Lake or Streambed Alteration Agreement (California Fish and Game Code Sections 1600 *et seq.*) and/or a California Endangered Species Act (CESA) Permit for Incidental Take of Endangered, Threatened, and/or Candidate species (California Fish and Game Code Sections 2080 and 2080.1).

The approximately 42-acre project site is located northeast of the 215 freeway, southwest of Irvington Avenue, northwest of Palm Avenue, and southeast of Guhin Park, within the Verdemont Heights area of the City of San Bernardino, San Bernardino County, California; latitude 34°11'46.76", longitude -117°21'57.08". The project proposes a Specific Plan to allow the future development of up to 120 single-family residences, up to 98,000 square feet of commercial uses, two private parks, a paseo, a recreational vehicle storage lot, and approximately 0.5-acre of parkland to extend the existing Ronald Reagan Park.

COMMENTS AND RECOMMENDATIONS

The Department has jurisdiction over the conservation, protection, and management of fish, wildlife, native plants, and the habitat necessary for biologically sustainable populations of those species (i.e., biological resources); and administers the Natural

Community Conservation Planning Program (NCCP Program). The Department offers the comments and recommendations presented below to assist the City of San Bernardino (City; the CEQA lead agency) in adequately identifying and/or mitigating the project's significant, or potentially significant, impacts on biological resources. The comments and recommendations are also offered to enable the Department to adequately review and comment on the proposed project with respect to impacts on biological resources. The Department recommends that the forthcoming DEIR address the following:

Assessment of Biological Resources

Section 15125(c) of the CEQA Guidelines states that knowledge of the regional setting of a project is critical to the assessment of environmental impacts and that special emphasis should be placed on environmental resources that are rare or unique to the region. To enable Department staff to adequately review and comment on the project, the DEIR should include a complete assessment of the flora and fauna within and adjacent to the project footprint, with particular emphasis on identifying rare, threatened, endangered, and other sensitive species and their associated habitats. The Department recommends that the DEIR specifically include:

1. An assessment of the various habitat types located within the project footprint, and a map that identifies the location of each habitat type. The Department recommends that floristic, alliance- and/or association based mapping and assessment be completed following *The Manual of California Vegetation*, second edition (Sawyer et al. 2009). Adjoining habitat areas should also be included in this assessment where site activities could lead to direct or indirect impacts offsite. Habitat mapping at the alliance level will help establish baseline vegetation conditions;

2. A general biological inventory of the fish, amphibian, reptile, bird, and mammal species that are present or have the potential to be present within each habitat type onsite and within adjacent areas that could be affected by the project. The Department's California Natural Diversity Database (CNDDB) in Sacramento should be contacted at (916) 322-2493 or bdb@wildlife.ca.gov to obtain current information on any previously reported sensitive species and habitat, including Significant Natural Areas identified under Chapter 12 of the Fish and Game Code, in the vicinity of the proposed project. The Department recommends that CNDDB Field Survey Forms be completed and submitted to CNDDB to document survey results. Online forms can be obtained and submitted at: http://www.dfg.ca.gov/biogeodata/cnddb/submitting_data_to_cnddb.asp

   Please note that the Department's CNDDB is not exhaustive in terms of the data it houses, nor is it an absence database. The Department recommends that it be used as a starting point in gathering information about the *potential presence* of species within the general area of the project site.

3. A complete, *recent* inventory of rare, threatened, endangered, and other sensitive species located within the project footprint and within offsite areas with the potential to be effected, including California Species of Special Concern (CSSC) and California Fully Protected Species (Fish and Game Code § 3511). Species to be addressed should include all those which meet the CEQA definition (CEQA Guidelines § 15380). The inventory should address seasonal variations in use of the project area and should not be limited to resident species. Focused species-specific surveys, completed by a qualified biologist and conducted at the appropriate time of year and time of day when the sensitive species are active or otherwise identifiable, are required. Acceptable species-specific survey procedures should be developed in consultation with the Department and the U.S. Fish and Wildlife Service, where necessary. Note that the Department generally considers biological field assessments for wildlife to be valid for a one-year period, and assessments for rare plants may be considered valid for a period of up to three years. Some aspects of the proposed project may warrant periodic updated surveys for certain sensitive taxa, particularly if the project is proposed to occur over a protracted time frame, or in phases, or if surveys are completed during periods of drought.

4. A thorough, recent, floristic-based assessment of special status plants and natural communities, following the Department's *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (see https://www.wildlife.ca.gov/Conservation/Plants);

5. Information on the regional setting that is critical to an assessment of environmental impacts, with special emphasis on resources that are rare or unique to the region (CEQA Guidelines § 15125[c]);

Analysis of Direct, Indirect, and Cumulative Impacts to Biological Resources

The DEIR should provide a thorough discussion of the direct, indirect, and cumulative impacts expected to adversely affect biological resources as a result of the project. To ensure that project impacts to biological resources are fully analyzed, the following information should be included in the DEIR:

1. A discussion of potential impacts from lighting, noise, human activity, and wildlife-human interactions created by zoning of development projects or other project activities adjacent to natural areas, exotic and/or invasive species, and drainage. The latter subject should address project-related changes on drainage patterns and water quality within, upstream, and downstream of the project site, including: volume, velocity, and frequency of existing and post-project surface flows; polluted runoff; soil erosion and/or sedimentation in streams and water bodies; and post-project fate of runoff from the project site.

2. A discussion of potential indirect project impacts on biological resources, including resources in areas adjacent to the project footprint, such as nearby public lands (e.g.

National Forests, State Parks, etc.), open space, adjacent natural habitats, riparian ecosystems, wildlife corridors, and any designated and/or proposed reserve or mitigation lands (e.g., preserved lands associated with a Natural Community Conservation Plan, or other conserved lands).

3. An evaluation of impacts to adjacent open space lands from both the construction of the project and long-term operational and maintenance needs.

4. A cumulative effects analysis developed as described under CEQA Guidelines § 15130. Please include all potential direct and indirect project related impacts to riparian areas, wetlands, vernal pools, alluvial fan habitats, wildlife corridors or wildlife movement areas, aquatic habitats, sensitive species and other sensitive habitats, open lands, open space, and adjacent natural habitats in the cumulative effects analysis. General and specific plans, as well as past, present, and anticipated future projects, should be analyzed relative to their impacts on similar plant communities and wildlife habitats.

Mitigation Measures for Project Impacts to Biological Resources

The DEIR should include appropriate and adequate avoidance, minimization, and/or mitigation measures for all direct, indirect, and cumulative impacts that are expected to occur as a result of the construction and long-term operation and maintenance of the project. When proposing measures to avoid, minimize, or mitigate impacts, the Department recommends consideration of the following:

1. *Fully Protected Species*: Fully Protected Species (Fish and Game Code § 3511) may not be taken or possessed at any time. Project activities described in the DEIR should be designed to completely avoid any fully protected species that have the potential to be present within or adjacent to the project area. The Department also recommends that the DEIR fully analyze potential adverse impacts to fully protected species due to habitat modification, loss of foraging habitat, and/or interruption of migratory and breeding behaviors. The Department recommends that the Lead Agency include in the analysis how appropriate avoidance, minimization and mitigation measures will reduce indirect impacts to fully protected species.

2. *Sensitive Plant Communities*: The Department considers sensitive plant communities to be imperiled habitats having both local and regional significance. Plant communities, alliances, and associations with a statewide ranking of S-1, S-2, S-3, and S-4 should be considered sensitive and declining at the local and regional level. These ranks can be obtained by querying the CNDDB and are included in *The Manual of California Vegetation* (Sawyer et al. 2009). The DEIR should include measures to fully avoid and otherwise protect sensitive plant communities from project-related direct and indirect impacts.

3. *Mitigation*: The Department considers adverse project-related impacts to sensitive species and habitats to be significant to both local and regional ecosystems, and the DEIR should include mitigation measures for adverse project-related impacts to these resources. Mitigation measures should emphasize avoidance and reduction of project impacts. For unavoidable impacts, onsite habitat restoration and/or enhancement should be evaluated and discussed in detail. If onsite mitigation is not feasible or would not be biologically viable and therefore not adequately mitigate the loss of biological functions and values, offsite mitigation through habitat creation and/or acquisition and preservation in perpetuity should be addressed.

   The DEIR should include measures to perpetually protect the targeted habitat values within mitigation areas from direct and indirect adverse impacts in order to meet mitigation objectives to offset project-induced qualitative and quantitative losses of biological values. Specific issues that should be addressed include restrictions on access, proposed land dedications, long-term monitoring and management programs, control of illegal dumping, water pollution, increased human intrusion, etc.

4. *Habitat Revegetation/Restoration Plans*: Plans for restoration and revegetation should be prepared by persons with expertise in southern California ecosystems and native plant restoration techniques. Plans should identify the assumptions used to develop the proposed restoration strategy. Each plan should include, at a minimum: (a) the location of restoration sites and assessment of appropriate reference sites; (b) the plant species to be used, sources of local propagules, container sizes, and seeding rates; (c) a schematic depicting the mitigation area; (d) a local seed and cuttings and planting schedule; (e) a description of the irrigation methodology; (f) measures to control exotic vegetation on site; (g) specific success criteria; (h) a detailed monitoring program; (i) contingency measures should the success criteria not be met; and (j) identification of the party responsible for meeting the success criteria and providing for conservation of the mitigation site in perpetuity. Monitoring of restoration areas should extend across a sufficient time frame to ensure that the new habitat is established, self-sustaining, and capable of surviving drought.

   The Department recommends that local onsite propagules from the project area and nearby vicinity be collected and used for restoration purposes. Onsite seed collection should be initiated in the near future in order to accumulate sufficient propagule material for subsequent use in future years. Onsite vegetation mapping at the alliance and/or association level should be used to develop appropriate restoration goals and local plant palettes. Reference areas should be identified to help guide restoration efforts. Specific restoration plans should be developed for various project components as appropriate.

   Restoration objectives should include protecting special habitat elements or re-creating them in areas affected by the project; examples could include retention of woody material, logs, snags, rocks, and brush piles.

5. *Nesting Birds and Migratory Bird Treaty Act:* Please note that it is the project proponent's responsibility to comply with all applicable laws related to nesting birds and birds of prey. Migratory non-game native bird species are protected by international treaty under the federal Migratory Bird Treaty Act (MBTA) of 1918, as amended (16 U.S.C. 703 *et seq.*). In addition, sections 3503, 3503.5, and 3513 of the Fish and Game Code (FGC) also afford protective measures as follows: Section 3503 states that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by FGC or any regulation made pursuant thereto; Section 3503.5 states that is it unlawful to take, possess, or destroy any birds in the orders Falconiformes or Strigiformes (birds-of-prey) or to take, possess, or destroy the nest or eggs of any such bird except as otherwise provided by FGC or any regulation adopted pursuant thereto; and Section 3513 states that it is unlawful to take or possess any migratory nongame bird as designated in the MBTA or any part of such migratory nongame bird except as provided by rules and regulations adopted by the Secretary of the Interior under provisions of the MBTA.

   The Department recommends that the DEIR include the results of avian surveys, as well as specific avoidance and minimization measures to ensure that impacts to nesting birds do not occur. Project-specific avoidance and minimization measures may include, but not be limited to: project phasing and timing, monitoring of project-related noise (where applicable), sound walls, and buffers, where appropriate. The DEIR should also include specific avoidance and minimization measures that will be implemented should a nest be located within the project site. The Department recommends that pre-construction bird surveys be required no more than three (3) days prior to vegetation clearing or ground disturbance activities, as instances of nesting could be missed if surveys are conducted sooner. Because different species commence nesting at different times of the year, the Department does not recommend relying on seasonal restrictions to preclude impacts to nesting birds. Rather, we recommend that pre-construction surveys be required regardless of the time of year.

6. *Moving out of Harm's Way:* The proposed project is anticipated to result in the clearing of natural habitats that support native species. To avoid direct mortality, the Department recommends that the lead agency condition the DEIR to require that a Department-approved qualified biologist be retained to be onsite prior to and during all ground- and habitat-disturbing activities to move out of harm's way special status species or other wildlife of low or limited mobility that would otherwise be injured or killed from project-related activities. Movement of wildlife out of harm's way should be limited to only those individuals that would otherwise by injured or killed, and individuals should be moved only as far a necessary to ensure their safety (i.e., the Department does not recommend relocation to other areas). Furthermore it should be noted that the temporary relocation of onsite wildlife does not constitute effective mitigation for the purposes of offsetting project impacts associated with habitat loss.

7. *Translocation of Species*: The Department generally does not support the use of relocation, salvage, and/or transplantation as mitigation for impacts to rare, threatened, or endangered species as studies have shown that these efforts are experimental in nature and largely unsuccessful. Translocation

California Endangered Species Act

The Department is responsible for ensuring appropriate conservation of fish and wildlife resources including threatened, endangered, and/or candidate plant and animal species, pursuant to the California Endangered Species Act (CESA). The Department recommends that a CESA ITP be obtained if the project has the potential to result in "take" (California Fish and Game Code Section 86 defines "take" as "hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill") of State-listed CESA species, either through construction or over the life of the project. CESA ITPs are issued to conserve, protect, enhance, and restore State-listed CESA species and their habitats.

The Department encourages early consultation, as significant modification to the proposed project and avoidance, minimization, and mitigation measures may be necessary to obtain a CESA ITP. Please note that the proposed avoidance, minimization, and mitigation measures must be sufficient for the Department to conclude that the project's impacts are fully mitigated and the measures, when taken in aggregate, must meet the full mitigation standard. Revisions to the California Fish and Game Code, effective January 1998, require that the Department issue a separate CEQA document for the issuance of a CESA ITP unless the Project CEQA document addresses all Project impacts to listed species and specifies a mitigation monitoring and reporting program that will meet the requirements of a CESA permit.

Lake and Streambed Alteration Program

Fish and Game Code section 1602 requires an entity to notify the Department prior to commencing any activity that may do one or more of the following: Substantially divert or obstruct the natural flow of any river, stream or lake; Substantially change or use any material from the bed, channel or bank of any river, stream, or lake; or Deposit debris, waste or other materials that could pass into any river, stream or lake. Please note that "any river, stream or lake" includes those that are episodic (i.e., those that are dry for periods of time) as well as those that are perennial (i.e., those that flow year round). This includes ephemeral streams, desert washes, and watercourses with a subsurface flow. It may also apply to work undertaken within the flood plain of a body of water.

Upon receipt of a complete notification, the Department determines if the proposed project activities may substantially adversely affect existing fish and wildlife resources and whether a Lake and Streambed Alteration (LSA) Agreement is required. An LSA Agreement includes measures necessary to protect existing fish and wildlife resources.

CDFW may suggest ways to modify your project that would eliminate or reduce harmful impacts to fish and wildlife resources.

The Department's issuance of an LSA Agreement is a "project" subject to CEQA (see Pub. Resources Code 21065). To facilitate issuance of an LSA Agreement, if necessary, the DEIR should fully identify the potential impacts to the lake, stream, or riparian resources, and provide adequate avoidance, mitigation, and monitoring and reporting commitments. Early consultation with the Department is recommended, since modification of the proposed project may be required to avoid or reduce impacts to fish and wildlife resources. To obtain a Lake or Streambed Alteration notification package, please go to https://www.wildlife.ca.gov/Conservation/LSA/Forms.

Additional Comments and Recommendations

California is experiencing one of the most severe droughts on record. To ameliorate the water demands of this project, the Department recommends incorporation of water-wise concepts in project landscape design plans. In particular the Department recommends xeriscaping with locally native California species, and installing water-efficient and targeted irrigation systems (such as drip irrigation). Local water agencies/districts, and resource conservation districts in your area may be able to provide information on plant nurseries that carry locally native species, and some facilities display drought-tolerant locally native species demonstration gardens (for example the Riverside-Corona Resource Conservation District in Riverside). Information on drought-tolerant landscaping and water-efficient irrigation systems is available on California's Save our Water website: http://saveourwater.com/what-you-can-do/tips/landscaping/

Further Coordination

The Department appreciates the opportunity to comment on the NOP of a DEIR for the Rancho Palma Project (SCH No. 2016031080) and recommends that the City address the Department's comments and concerns in the forthcoming DEIR. If you should have any questions pertaining to the comments provided in this letter, or wish to schedule a meeting and/or site visit, please contact Gabriele Quillman at (909) 980-3818 or at gabriele.quillman@wildlife.ca.gov.

Sincerely,

Leslie MacNair
Regional Manager

Literature Cited

Sawyer, J. O., T. Keeler-Wolf, and J. M. Evens. 2009. A manual of California Vegetation, 2nd ed. California Native Plant Society Press, Sacramento, California. http://vegetation.cnps.org/

South Coast
Air Quality Management District
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(909) 396-2000 ♦ www.aqmd.gov

April 13, 2016

mujica_ol@sbcity.org
Oliver Mujica, Planning Division Manager
City of San Bernardino
300 North "D" Street, 3rd Floor
San Bernardino, CA 92418

Notice of Preparation of a CEQA Document for the
Rancho Palma Project

The South Coast Air Quality Management District (SCAQMD) staff appreciates the opportunity to comment on the above-mentioned document. The SCAQMD staff's comments are recommendations regarding the analysis of potential air quality impacts from the proposed project that should be included in the draft CEQA document. Please send the SCAQMD a copy of the CEQA document upon its completion. Note that copies of the Draft EIR that are submitted to the State Clearinghouse are not forwarded to the SCAQMD. Please forward a copy of the Draft EIR directly to SCAQMD at the address in our letterhead. **In addition, please send with the Draft EIR all appendices or technical documents related to the air quality and greenhouse gas analyses and electronic versions of all air quality modeling and health risk assessment files. These include original emission calculation spreadsheets and modeling files (not Adobe PDF files). Without all files and supporting air quality documentation, the SCAQMD will be unable to complete its review of the air quality analysis in a timely manner. Any delays in providing all supporting air quality documentation will require additional time for review beyond the end of the comment period.**

Air Quality Analysis

The SCAQMD adopted its California Environmental Quality Act (CEQA) Air Quality Handbook in 1993 to assist other public agencies with the preparation of air quality analyses. The SCAQMD recommends that the Lead Agency use this Handbook as guidance when preparing its air quality analysis. Copies of the Handbook are available from the SCAQMD's Subscription Services Department by calling (909) 396-3720. More recent guidance developed since this Handbook was published is also available on SCAQMD's website here: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ceqa-air-quality-handbook-(1993). SCAQMD staff also recommends that the Lead Agency use the CalEEMod land use emissions software. This software has recently been updated to incorporate up-to-date state and locally approved emission factors and methodologies for estimating pollutant emissions from typical land use development. CalEEMod is the only software model maintained by the California Air Pollution Control Officers Association (CAPCOA) and replaces the now outdated URBEMIS. This model is available free of charge at: www.caleemod.com.

The Lead Agency should identify any potential adverse air quality impacts that could occur from all phases of the project and all air pollutant sources related to the project. Air quality impacts from both construction (including demolition, if any) and operations should be calculated. Construction-related air quality impacts typically include, but are not limited to, emissions from the use of heavy-duty equipment from grading, earth-loading/unloading, paving, architectural coatings, off-road mobile sources (e.g., heavy-duty construction equipment) and on-road mobile sources (e.g., construction worker vehicle trips, material transport trips). Operation-related air quality impacts may include, but are not limited to, emissions from stationary sources (e.g., boilers), area sources (e.g., solvents and coatings), and vehicular trips (e.g., on- and off-road tailpipe emissions and entrained dust). Air quality impacts from indirect sources, that is, sources that generate or attract vehicular trips should be included in the analysis.

The SCAQMD has also developed both regional and localized significance thresholds. The SCAQMD staff requests that the lead agency quantify criteria pollutant emissions and compare the results to the recommended regional significance thresholds found here: http://www.aqmd.gov/docs/default-source/ceqa/handbook/scaqmd-air-quality-significance-thresholds.pdf. In addition to analyzing regional air quality impacts, the SCAQMD staff recommends calculating localized air quality impacts and comparing the results to localized significance thresholds (LSTs). LSTs can be used in addition to the recommended regional significance thresholds as a second indication of air quality impacts when preparing a CEQA document. Therefore, when preparing the air quality analysis for the proposed project, it is recommended that

the lead agency perform a localized analysis by either using the LSTs developed by the SCAQMD or performing dispersion modeling as necessary. Guidance for performing a localized air quality analysis can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/localized-significance-thresholds.

In the event that the proposed project generates or attracts vehicular trips, especially heavy-duty diesel-fueled vehicles, it is recommended that the lead agency perform a mobile source health risk assessment. Guidance for performing a mobile source health risk assessment ("*Health Risk Assessment Guidance for Analyzing Cancer Risk from Mobile Source Diesel Idling Emissions for CEQA Air Quality Analysis*") can be found at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mobile-source-toxics-analysis. An analysis of all toxic air contaminant impacts due to the use of equipment potentially generating such air pollutants should also be included.

In addition, guidance on siting incompatible land uses (such as placing homes near freeways) can be found in the California Air Resources Board's *Air Quality and Land Use Handbook: A Community Perspective*, which can be found at the following internet address: http://www.arb.ca.gov/ch/handbook.pdf. CARB's Land Use Handbook is a general reference guide for evaluating and reducing air pollution impacts associated with new projects that go through the land use decision-making process.

Mitigation Measures

In the event that the project generates significant adverse air quality impacts, CEQA requires that all feasible mitigation measures that go beyond what is required by law be utilized during project construction and operation to minimize or eliminate these impacts. Pursuant to CEQA Guidelines §15126.4 (a)(1)(D), any impacts resulting from mitigation measures must also be discussed. Several resources are available to assist the Lead Agency with identifying possible mitigation measures for the project, including:

- Chapter 11 of the SCAQMD *CEQA Air Quality Handbook*
- SCAQMD's CEQA web pages at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/mitigation-measures-and-control-efficiencies.
- CAPCOA's *Quantifying Greenhouse Gas Mitigation Measures* available here: http://www.capcoa.org/wp-content/uploads/2010/11/CAPCOA-Quantification-Report-9-14-Final.pdf.
- SCAQMD's Rule 403 – Fugitive Dust, and the Implementation Handbook for controlling construction-related emissions
- Other measures to reduce air quality impacts from land use projects can be found in the SCAQMD's Guidance Document for Addressing Air Quality Issues in General Plans and Local Planning. This document can be found at the following internet address: http://www.aqmd.gov/docs/default-source/planning/air-quality-guidance/complete-guidance-document.pdf.

Data Sources

SCAQMD rules and relevant air quality reports and data are available by calling the SCAQMD's Public Information Center at (909) 396-2039. Much of the information available through the Public Information Center is also available via the SCAQMD's webpage (http://www.aqmd.gov).

The SCAQMD staff is available to work with the Lead Agency to ensure that project emissions are accurately evaluated and mitigated where feasible. If you have any questions regarding this letter, please contact me at jcheng@aqmd.gov or call me at (909) 396-2448.

Sincerely,

Jillian Wong

Jillian Wong, Ph.D.
Program Supervisor
Planning, Rule Development & Area Sources

JC:JW
SBC160329-01
Control Number

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April 28, 2016

Mr. Oliver Mujica, Planning Division Manager
City of San Bernardino, Community Development Department
300 North D Street, Third Floor
San Bernardino, California 92418
E-mail: mujica_ol@sbcity.org

RE: SCAG Comments on the Notice of Preparation of a Draft Environmental Impact Report for the Rancho Palma Project [SCAG NO. IGR8815]

Dear Mr. Mujica,

Thank you for submitting the Notice of Preparation of a Draft Environmental Impact Report for the Rancho Palma Project ("proposed project") to the Southern California Association of Governments (SCAG) for review and comment. SCAG is the authorized regional agency for Inter-Governmental Review (IGR) of programs proposed for federal financial assistance and direct development activities, pursuant to Presidential Executive Order 12372. Additionally, SCAG reviews the Environmental Impact Reports of projects of regional significance for consistency with regional plans pursuant to the California Environmental Quality Act (CEQA) and CEQA Guidelines.

SCAG is also the designated Regional Transportation Planning Agency under state law, and is responsible for preparation of the Regional Transportation Plan (RTP) including the Sustainable Communities Strategy (SCS) pursuant to Senate Bill (SB) 375. As the clearinghouse for regionally significant projects per Executive Order 12372, SCAG reviews the consistency of local plans, projects, and programs with regional plans.[1] Guidance provided by these reviews is intended to assist local agencies such as local jurisdictions and project proponents to take actions that help contribute to the attainment of the regional goals and policies in the RTP/SCS.

SCAG staff has reviewed the Notice of Preparation of a Draft Environmental Impact Report for the Rancho Palma Project in San Bernardino County. The proposed project includes a Specific Plan to allow the future development of up to 120 single-family residential dwelling units and up to 98,000 square feet of commercial uses on 42 acres. Two private parks and a paseo are also proposed within the residential area.

When available, please send environmental documentation to SCAG's *office in Los Angeles or by email to sunl@scag.ca.gov* providing, at a minimum, the full public comment period for review. If you have any questions regarding the attached comments, please contact the Inter-Governmental Review (IGR) Program, attn.: Lijin Sun, Senior Regional Planner, at (213) 236-1882 or sunl@scag.ca.gov. Thank you.

Sincerely,

Ping Chang

Ping Chang
Acting Manager, Compliance and Performance Monitoring

---

[1] Lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the 2016 RTP/SCS for the purpose of determining consistency for CEQA. Any "consistency" finding by SCAG pursuant to the IGR process should not be construed as a determination of consistency with the 2016 RTP/SCS for CEQA.

The Regional Council consists of 86 elected officials representing 191 cities, six counties, six County Transportation Commissions, one representative from the Transportation Corridor Agencies, one Tribal Government representative and one representative for the Air Districts within Southern California.

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COMMENTS ON THE NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RANCHO PALMA PROJECT [SCAG NO. IGR8815]

CONSISTENCY WITH RTP/SCS

SCAG reviews environmental documents for regionally significant projects for their consistency with the adopted RTP/SCS. For the purpose of determining consistency with CEQA, lead agencies such as local jurisdictions have the sole discretion in determining a local project's consistency with the RTP/SCS.

2016 RTP/SCS GOALS

The SCAG Regional Council adopted the 2016 RTP/SCS in April 2016. The 2016 RTP/SCS seeks to improve mobility, promote sustainability, facilitate economic development and preserve the quality of life for the residents in the region. The long-range visioning plan balances future mobility and housing needs with goals for the environment, the regional economy, social equity and environmental justice, and public health (see http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx). The goals included in the 2016 RTP/SCS may be pertinent to the proposed project. These goals are meant to provide guidance for considering the proposed project within the context of regional goals and policies. Among the relevant goals of the 2016 RTP/SCS are the following:

SCAG 2016 RTP/SCS GOALS	
RTP/SCS G1:	*Align the plan investments and policies with improving regional economic development and competitiveness*
RTP/SCS G2:	*Maximize mobility and accessibility for all people and goods in the region*
RTP/SCS G3:	*Ensure travel safety and reliability for all people and goods in the region*
RTP/SCS G4:	*Preserve and ensure a sustainable regional transportation system*
RTP/SCS G5:	*Maximize the productivity of our transportation system*
RTP/SCS G6:	*Protect the environment and health for our residents by improving air quality and encouraging active transportation (e.g., bicycling and walking)*
RTP/SCS G7:	*Actively encourage and create incentives for energy efficiency, where possible*
RTP/SCS G8:	*Encourage land use and growth patterns that facilitate transit and active transportation*
RTP/SCS G9:	*Maximize the security of the regional transportation system through improved system monitoring, rapid recovery planning, and coordination with other security agencies**
	**SCAG does not yet have an agreed-upon security performance measure.*

For ease of review, we encourage the use of a side-by-side comparison of SCAG goals with discussions of the consistency, non-consistency or non-applicability of the goals and supportive analysis in a table format. Suggested format is as follows:

SCAG 2016 RTP/SCS GOALS		
	Goal	Analysis
RTP/SCS G1:	*Align the plan investments and policies with improving regional economic development and competitiveness*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
RTP/SCS G2:	*Maximize mobility and accessibility for all people and goods in the region*	*Consistent: Statement as to why;* *Not-Consistent: Statement as to why;* *Or* *Not Applicable: Statement as to why;* *DEIR page number reference*
etc.		etc.

2016 RTP/SCS STRATEGIES

To achieve the goals of the 2016 RTP/SCS, a wide range of land use and transportation strategies are included in the 2016 RTP/SCS. Technical appendances of the 2016 RTP/SCS provide additional supporting information in detail. To view the 2016 RTP/SCS, please visit: http://scagrtpscs.net/Pages/FINAL2016RTPSCS.aspx. The 2016 RTP/SCS builds upon the progress from the 2012 RTP/SCS and continues to focus on integrated, coordinated, and balanced planning for land use and transportation that the SCAG region strives toward a more sustainable region, while the region meets and exceeds in meeting all of applicable statutory requirements pertinent to the 2016 RTP/SCS. These strategies within the regional context are provided as guidance for lead agencies such as local jurisdictions when the proposed project is under consideration.

DEMOGRAPHICS AND GROWTH FORECASTS

Local input plays an important role in developing a reasonable growth forecast for the 2016 RTP/SCS. SCAG used a bottom-up local review and input process and engaged local jurisdictions in establishing the base geographic and socioeconomic projections including population, household and employment. At the time of this letter, the most recently adopted SCAG jurisdictional-level growth forecasts that were developed in accordance with the bottom-up local review and input process consist of the 2020, 2035, and 2040 population, households and employment forecasts. To view them, please visit http://www.scag.ca.gov/Documents/2016GrowthForecastByJurisdiction.pdf. The growth forecasts for the region and applicable jurisdictions are below.

	Adopted SCAG Region Wide Forecasts			Adopted City of San Bernardino Forecasts		
	Year 2020	**Year 2035**	**Year 2040**	**Year 2020**	**Year 2035**	**Year 2040**
Population	19,663,000	22,091,000	22,138,800	229,700	256,400	257,400
Households	6,458,000	7,325,000	7,412,300	68,900	76,600	77,100
Employment	8,414,000	9,441,000	9,871,500	102,500	125,200	128,900

MITIGATION MEASURES

SCAG staff recommends that you review the Final Program Environmental Impact Report (Final PEIR) for the 2016 RTP/SCS for guidance, as appropriate. SCAG's Regional Council certified the Final PEIR and adopted the associated Findings of Fact and a Statement of Overriding Considerations (FOF/SOC) and Mitigation Monitoring and Reporting Program (MMRP) on April 7, 2016 (please see: http://scagrtpscs.net/Pages/FINAL2016PEIR.aspx). The Final PEIR includes a list of project-level performance standards-based mitigation measures that may be considered for adoption and implementation by lead, responsible, or trustee agencies in the region, as applicable and feasible. Project-level mitigation measures are within responsibility, authority, and/or jurisdiction of project-implementing agency or other public agency serving as lead agency under CEQA in subsequent project- and site- specific design, CEQA review, and decision-making processes, to meet the performance standards for each of the CEQA resource categories.

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SAN BERNARDINO COUNTY

Department of Public Works

Environmental & Construction • Flood Control
Operations • Solid Waste Management
Surveyor • Transportation

Gerry Newcombe
Director

April 28, 2016

File: 10(ENV)-4.01

City of San Bernardino
Attn: Oliver Mujica
Community Development Department
Planning Division
300 North "D" Street
San Bernardino, CA. 92418
Mujica_ol@sbcity.org

RE: CEQA - NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT FOR THE RANCHO PALMA PROJECT FOR THE CITY OF SAN BERNARDINO

Dear Mr. Mujica:

Thank you for giving the San Bernardino County Department of Public Works the opportunity to comment on the above-referenced project. **We received this request on March 29, 2016** and pursuant to our review, the following comments are provided:

Permits/Operations Support Division (Melissa Walker, Chief, 909-387-7995):

1. Any works affecting the San Bernardino County Flood Control District (District) right-of-way would need a Flood Control Permit since this right-of-way is for Cable Creek system which is an existing interim facility

Flood Control Planning Division (David Lovell, PWE III, 909-387-7964):

1. The project impacts to the District will include the area that borders Cable Creek. We request that consideration in the NOP be given to the Cable Creek flood control works and that the CSDP #7 be consulted for any development in the area.

Environmental Management Division (Brandy Wood, Ecological Resource Specialist, 909-387-7971):

1. The proposed project area is adjacent to United States Fish and Wildlife Service designated critical habitat for San Bernardino Kangaroo Rat (SBKR). It is recommended that protocol trapping for SBKR is conducted and project impacts to the species analyzed.

BOARD OF SUPERVISORS
ROBERT A. LOVINGOOD Vice Chairman, First District | JANICE RUTHERFORD Second District | JAMES RAMOS Chairman, Third District | CURT HAGMAN Fourth District | JOSIE GONZALES Fifth District
GREGORY C. DEVEREAUX Chief Executive Officer

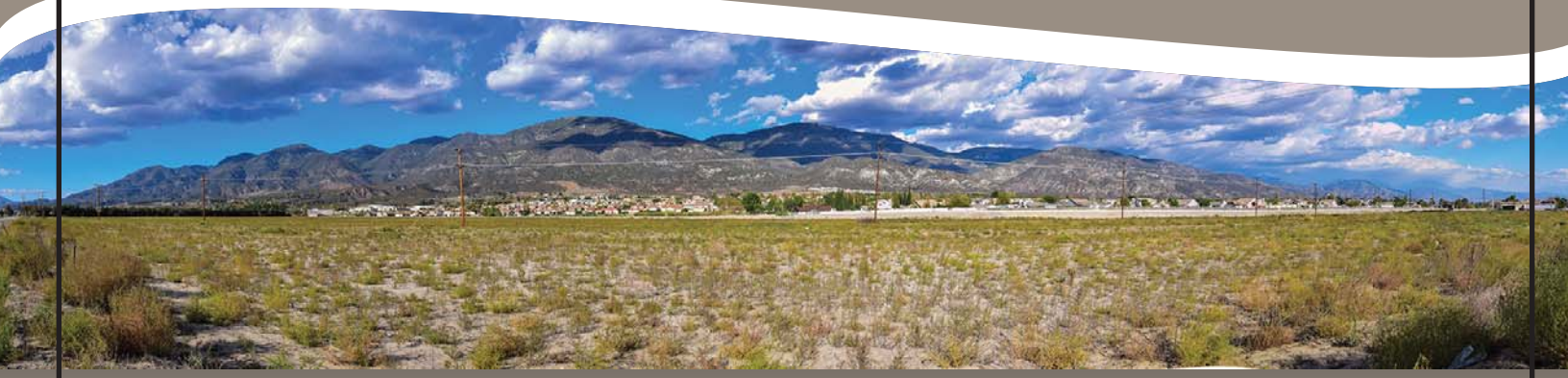
If you have any questions, please contact the individuals who provided the specific comment, as listed above.

Sincerely,

NIDHAM ARAM ALRAYES, MSCE, PE, QSD/P
Public Works Engineer III
Environmental Management

2.1 RANCHO PALMA SPECIFIC PLAN

RANCHO PALMA



Specific Plan

City of San Bernardino

November 2015

Rancho Palma Specific Plan

Prepared for:

City of San Bernardino
300 North “D” Street
San Bernardino, CA 92418

Applicant:

Strata Palma LLC
4370 La Jolla Village Dr. Suite 960
San Diego, CA 92122
Contact:
Eric Flodine

Prepared by:

FORMA Design, Inc.
3050 Pullman Street
Costa Mesa, CA 92626
Contact:
Gene Hsieh

November 2015

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1 INTRODUCTION

1.1 Overview and Vision

The Rancho Palma Project is dedicated to create a mixed use neighborhood that respects the surrounding community by type and quality of development. The project provides additional shopping and commercial services to the area within walking distance to residents of Rancho Palma and the Verdemont Heights Community.

Rancho Palma has established the following Four Cornerstones guiding the design philosophy of the project:

1.1.1 City's Heritage

1. Establish a California-focused theme and character.
2. Create a landscape palette that is "California Friendly" incorporating native species and drought tolerant plants.
3. Provide for a compatible and quality development.

1.1.2 Neighborhood Centered

1. Provide parks as gathering places for the neighborhood.
2. Create a walkable environment to parks and commercial uses.
3. Incorporate a variety of home sizes and architectural styles.
4. Provide safe streets and a wholesome living environment.

1.1.3 Green and Healthy Lifestyle

1. Promote a healthy lifestyle with walkable park and shopping opportunities.
2. Include a commercial center near the freeway for local goods, services, and job creation, and to reduce traffic.
3. Promote energy and water conservation, and utilize California-friendly plants to reduce landscape irrigation.

1.1.4 Fiscally Responsible

1. Structure Rancho Palma's development so that it is financially self-sufficient, and does not require any new funding from the City.
2. Increase population to support existing and future businesses.
3. Provide additional sales tax revenue for the City's General fund.
4. Promote savings in the improvement of existing streets.
5. Provide for the operation and maintenance of parks and streets.

1.2 Location and Surrounding Environment

Rancho Palma is located in the City of San Bernardino's Verdemont Heights Community at the base of the San Bernardino Mountains (see Figures 1-1, Regional Map, and 1-2 Vicinity Map). The site takes access from West Little League Drive, which forms the southwest border of the specific plan area. Cable Creek Channel forms the northeast border of the site, except for an approximate one-half acre portion that is adjacent to Ronald Reagan Park. Just south of the site is an existing commercial center at the intersection of Palm Avenue and West Little League Drive.

Northeast of Rancho Palma is the Cable Creek Channel, Ronald Reagan Park and the Verdemont Heights Community. North of the site is Al Guhin Park, Chavez Middle School, North Verdemont Elementary School, and the Little League Baseball Western Region Headquarters. Southwest of the site is West Little League Drive, which is adjacent to the Barstow Freeway (Interstate 215). Southwest of the freeway are existing residences, industrial areas, and Historic Route 66. Southeast of Rancho Palma are existing commercial businesses, Palm Avenue, and the Palm Avenue/Interstate 215 interchange, the Verdemont Heights Community and industrial uses.

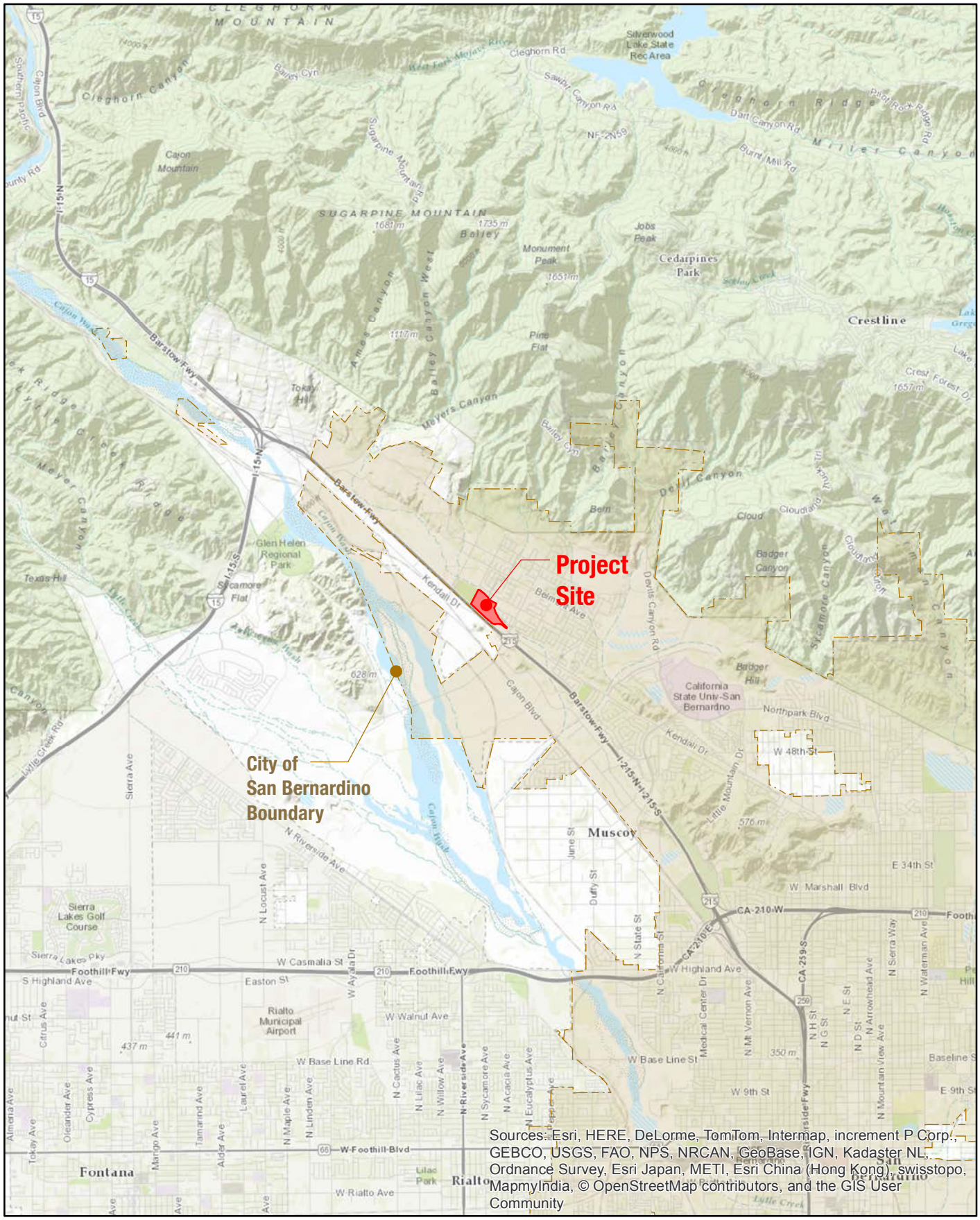

Figure 1-1

RANCHO PALMA

Regional Map

Strata Palma, LLC

N

8,000 Feet

FORMA

November 2015

Figure 1-2

RANCHO PALMA

Vicinity Map

Strata Palma, LLC

N

2,000 Feet

FORMA

November 2015

2 DEVELOPMENT PLAN

2.1 Project Objectives

1. Establish a mixed use community for the Verdemont Heights Community with a balance of land uses including commercial, single family housing, and recreation.
2. Deliver an appropriately sized neighborhood commercial center that provides a mix of retail uses with employment growth and increased sales tax for San Bernardino.
3. Provide new single family housing in the Verdemont Heights Community with two lot size categories and corresponding home sizes to serve a variety of future resident lifecycles.
4. Increase the Verdemont Heights Community's recreation opportunities by expanding the size and/or amenities of Ronald Reagan Park.
5. Adopt appropriate standards and design guidelines to implement the development to insure compatibility to surrounding neighborhoods.
6. Promote a sense of community and character by providing neighborhood signage and monumentation.
7. Create a pedestrian environment with walkable parks and commercial uses.
8. Provide for a fiscally sound project that provides for ongoing maintenance and operation of neighborhood parks and project streets with the additional sales tax revenues from the commercial uses.
9. Improve circulation in the Verdemont Heights Community with improvements of West Little League Drive and Magnolia Avenue adjacent to the project.
10. Facilitate additional public parking with the improvement of West Little League and Magnolia Avenue.
11. Reduce the need for overnight parking of RV units on the street or driveways with the provision of a RV storage yard.
12. Reduce the water consumption thru the use of native, drought tolerant landscaping and "smart" irrigation systems.
13. Promote a "Green" project with water and energy saving measures as defined by the Sustainable Guidelines.

2.2 Land Use Plan

2.2.1 Land Use Concept

The project allows up to 120 single family dwelling units located within two residential planning areas, and up to 98,000 square feet of commercial uses in one planning area. Figure 2-1, Land Use Plan, depicts the land uses within Rancho Palma. The residential areas are designed to provide a gated single family community with access to a variety of recreational opportunities, while the commercial planning area is designed to provide retail opportunities for local residents, as well as to take advantage of the adjacent regional traffic along Interstate 215.

In addition to the residential and commercial components, two private parks and a paseo are provided within the residential portion, along with a recreational vehicle storage lot, and approximately one-half acre of parkland will be dedicated for the expansion of Ronald Reagan Park. Table 2-1, Land Use Plan Summary Table, depicts the acreage of each of the Rancho Palma land uses.

Table 2-1
Land Use Plan Summary Table

Land Use	Acres	Planned Units	Maximum[1] Units
Planning Area 1 (Residential – 7,000 sf)	15.6	63	70
Planning Area 2 (Residential – 5,000 sf)	11.3	57	62
Planning Area 3 (Commercial)	9.3		
Public Park (Ronald Reagan Park Expansion)	0.5		
Private Park (Linear Park)	1.4		
Open Space (Cable Creek Channel)	3.5		
Total	41.6	120	120

2.2.2 Residential Land Uses

Rancho Palma provides for a maximum of 120 single family dwelling units in two lot sizes; 5,000 square foot and 7,000 square foot. These lot sizes are consistent with other residential areas in the Verdemont Heights Community. Planning Area 1 is designed to contain 63 dwelling units with a maximum of 70 dwelling units and a minimum lot size of 7,000 square feet. Planning Area 2 is designed to contain 57 dwelling units with a maximum of 62 dwelling units and a minimum lot size of 5,000 square feet. These residential areas will be gated, with access taken from West Little League Drive and Magnolia Avenue.

[1] Total Permitted dwelling units within a residential Planning Area may be lesser or greater that the planned number if: a) the maximum units are not exceeded for any Planning Area, and b) the overall Specific Plan does not exceed 120 units.

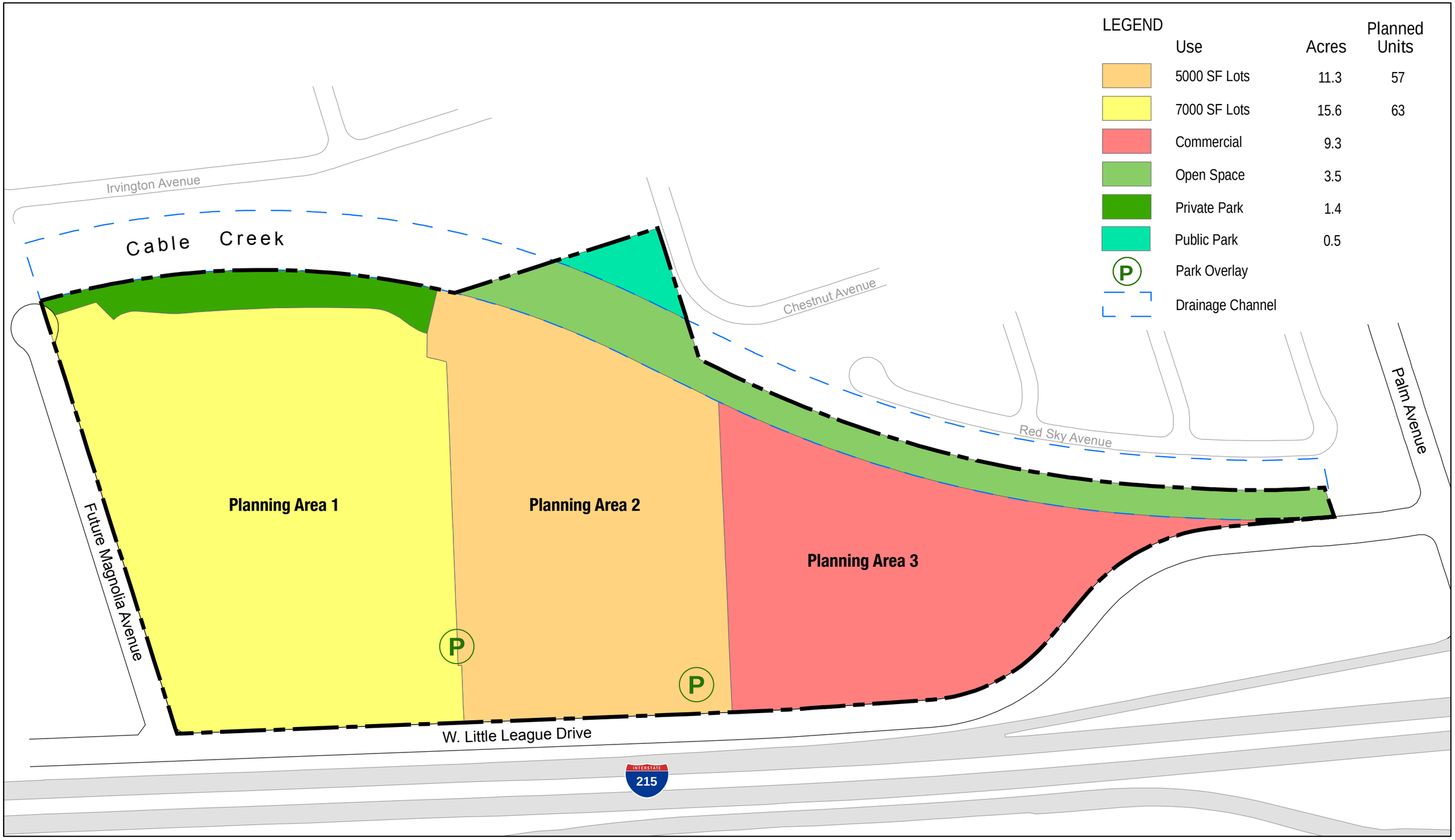

Figure 2-1

RANCHO PALMA

Land Use Plan

Strata Palma, LLC

200 Feet

FORMA

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In addition to the dwelling units, a private pocket park and paseo will be provided, along with a recreational vehicle storage lot, and a drainage basin. Conceptual designs for the pocket park and paseo are located in Chapter 4, Design Guidelines. The final location of the pocket park, paseo, recreational storage lot and drainage basin will be determined during the site planning process.

2.2.3 Commercial Land Uses

Planning Area 3 is designated Commercial and is intended to provide retail and service opportunities for the Verdemont Heights Community as well as the regional traffic along the adjacent Interstate 215. These uses will also provide additional sales tax revenue and employment opportunities for the City of San Bernardino. The maximum amount of commercial uses permitted in the Planning Area 3 is 98,000 square feet.

2.2.4 Public and Private Parks

Two areas are designated as Park on the Rancho Palma Land Use Plan. The public park is an expansion of the existing Ronald Reagan Park, located east of the Cable Creek Channel. This parcel will be dedicated to the City of San Bernardino. The private park is a neighborhood park located adjacent to Planning Area 1. A conceptual design of the park is located in Chapter 4, Design Guidelines.

The City of San Bernardino requires 5 acres of parkland for every 1,000 residents. Using the City's formula of 3.48 residents per dwelling unit, the park requirements for Rancho Palma is approximately 91, 000 square feet. The Ronald Reagan expansion site and the Neighborhood Park total approximately 83,000 square feet. The pocket park and paseo are anticipated to be approximately 13,000 square feet bringing the total park area provided at 96,000 square feet. The linear park, pocket park, and paseo will be fully improved and will be maintained by the Homeowners Association.

2.2.5 Open Space

The Open Space designation is for the area within the existing Cable Creek Channel. This area is operated and maintained by the San Bernardino County Flood Control District.

2.3 Circulation Plan

The Circulation Plan, shown on Figure 2-2, Circulation Plan, establishes a general layout and design standard of roadways for Rancho Palma to meet safely the transportation needs of the community.

The commercial component of Rancho Palma takes access from Little League Drive, west of Palm Avenue. This location provides easy access to Interstate 215 via the Palm Avenue interchange. It is anticipated that there will be one primary entrance to the commercial center along Little League Drive, and one delivery entrance.

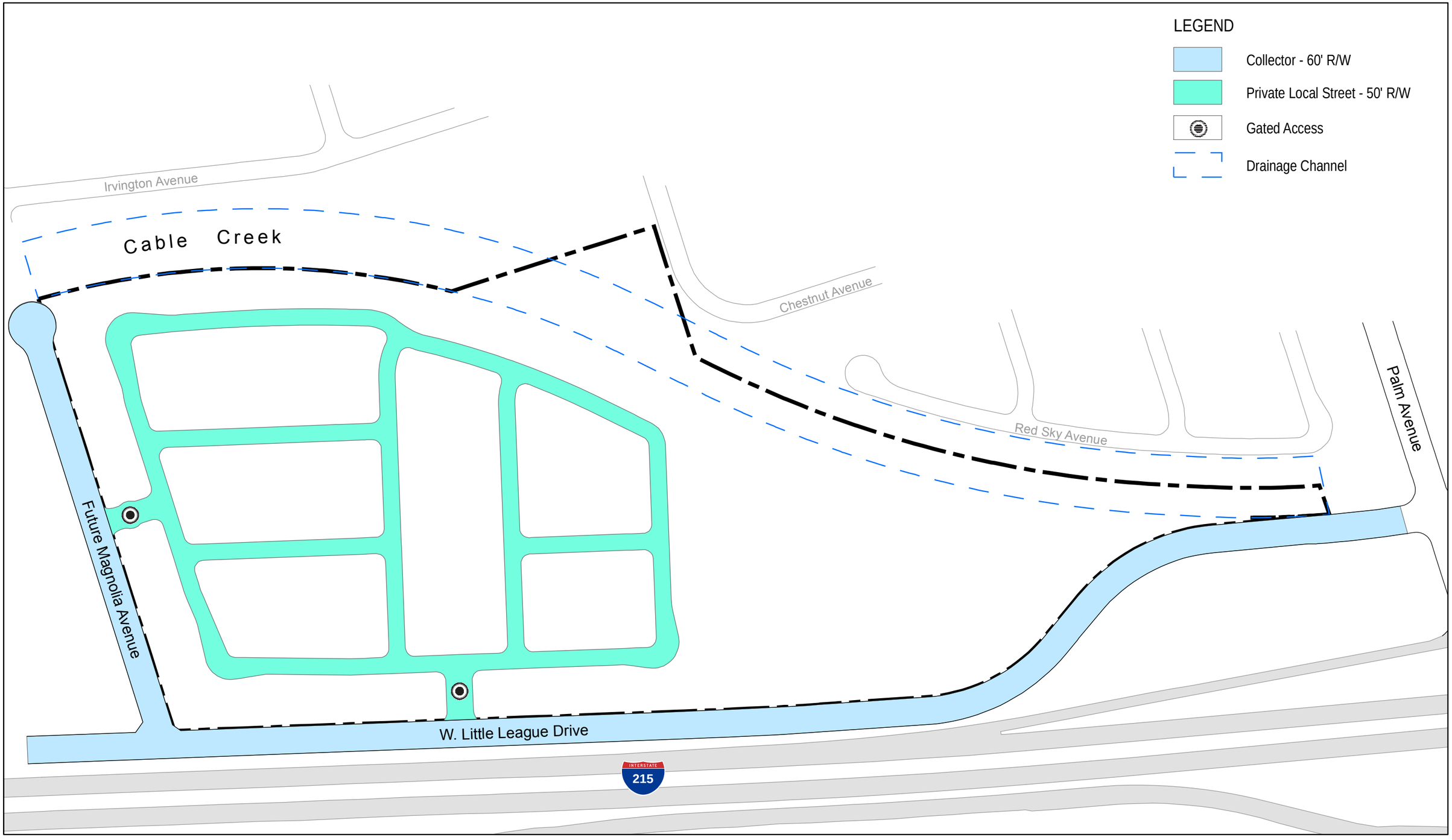


Figure 2-2

RANCHO PALMA

Circulation Plan

Strata Palma, LLC

200 Feet

FORMA

November 2015

Access to the residential component of Ranch Palma will be taken from Little League Drive and Magnolia Avenue. Both of these streets are designated as Collector Roads. West Little League Drive has a 60-foot right of way, while Magnolia Avenue has an additional 5-foot landscape area, for a 65-foot total right of way. Five foot pedestrian sidewalks will be provided along both collectors. Figure 2-3, Street Sections, depicts the street sections for Rancho Palma.

Magnolia Avenue currently exists east of Cable Creek Channel. Magnolia will be improved along the northern property line of Rancho Palma from Little League Drive to a cul de sac, west of Cable Creek Channel.

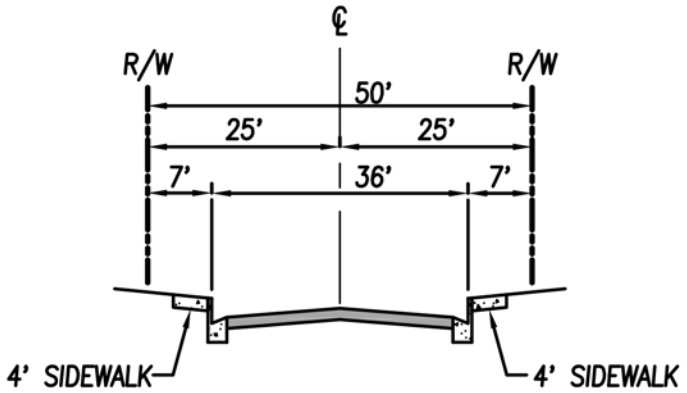
The entrances to the residential component are off Little League Drive and Magnolia Avenue. Both of these entrances will be gated. The interior roadway system will utilize Local Streets (50-foot right of way, see Figure 2-3, Street Sections) and contain 4-foot sidewalks on each side. This will allow residents pedestrian access throughout the community to the interior parks within Rancho Palma, as well as nearby community parks and school, and the adjacent commercial center. On-street parking will also be available along the Local Streets.

2.4 Water Plan

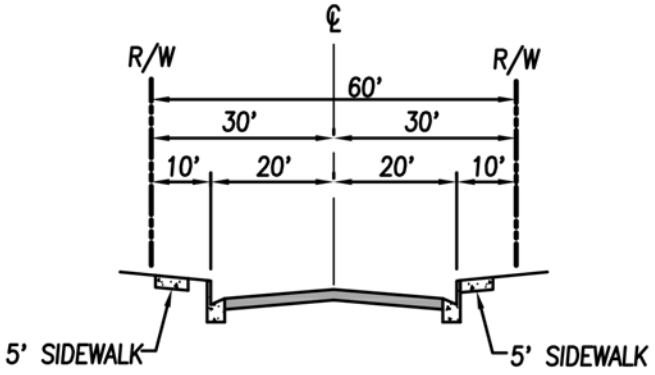
Domestic water service for the Ranch Palma Specific Plan area will be provided by the City of San Bernardino Municipal Water Department. The Conceptual Water Master Plan is depicted on Figure 2-4, Water Plan. A proposed water line will be installed within Little League Drive, connecting to an existing 24-inch water line located just south of the Magnolia Avenue/Little League Drive intersection, to an existing 16-inch water line located adjacent to the proposed commercial component, north of Palm Avenue. The residential units will access water through a proposed 8-inch looped water system located within the Local Streets. A looped water system will also be provided in the commercial center.

2.5 Wastewater Plan

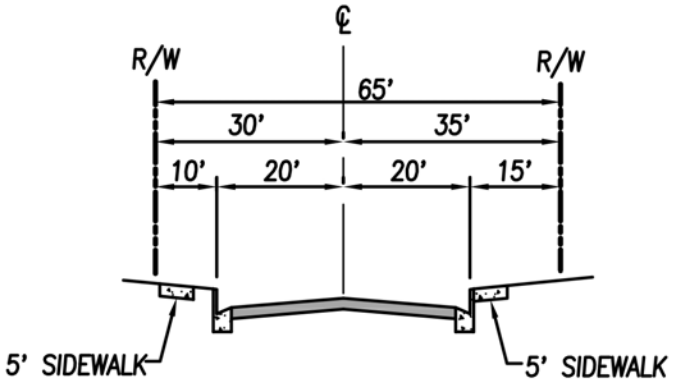
Wastewater service for the Ranch Palma Specific Plan area will be provided by the City of San Bernardino Public Works Department. The Conceptual Wastewater Master Plan is depicted on Figure 2-5, Wastewater Plan. An existing 15-inch sewer line is located within the right of way of Little League Drive. The proposed residential units will access this sewer line through a proposed 8-inch system located within the Local Streets. The commercial center will also tie in to this existing 15-inch sewer line.



LOCAL STREET
50' R/W
N.T.S.



LITTLE LEAGUE DRIVE
COLLECTOR- 60' R/W
N.T.S.



MAGNOLIA AVENUE
COLLECTOR- 65' R/W
N.T.S.

Figure 2-3

RANCHO PALMA

Street Sections

Strata Palma, LLC

Not to Scale

FORMA

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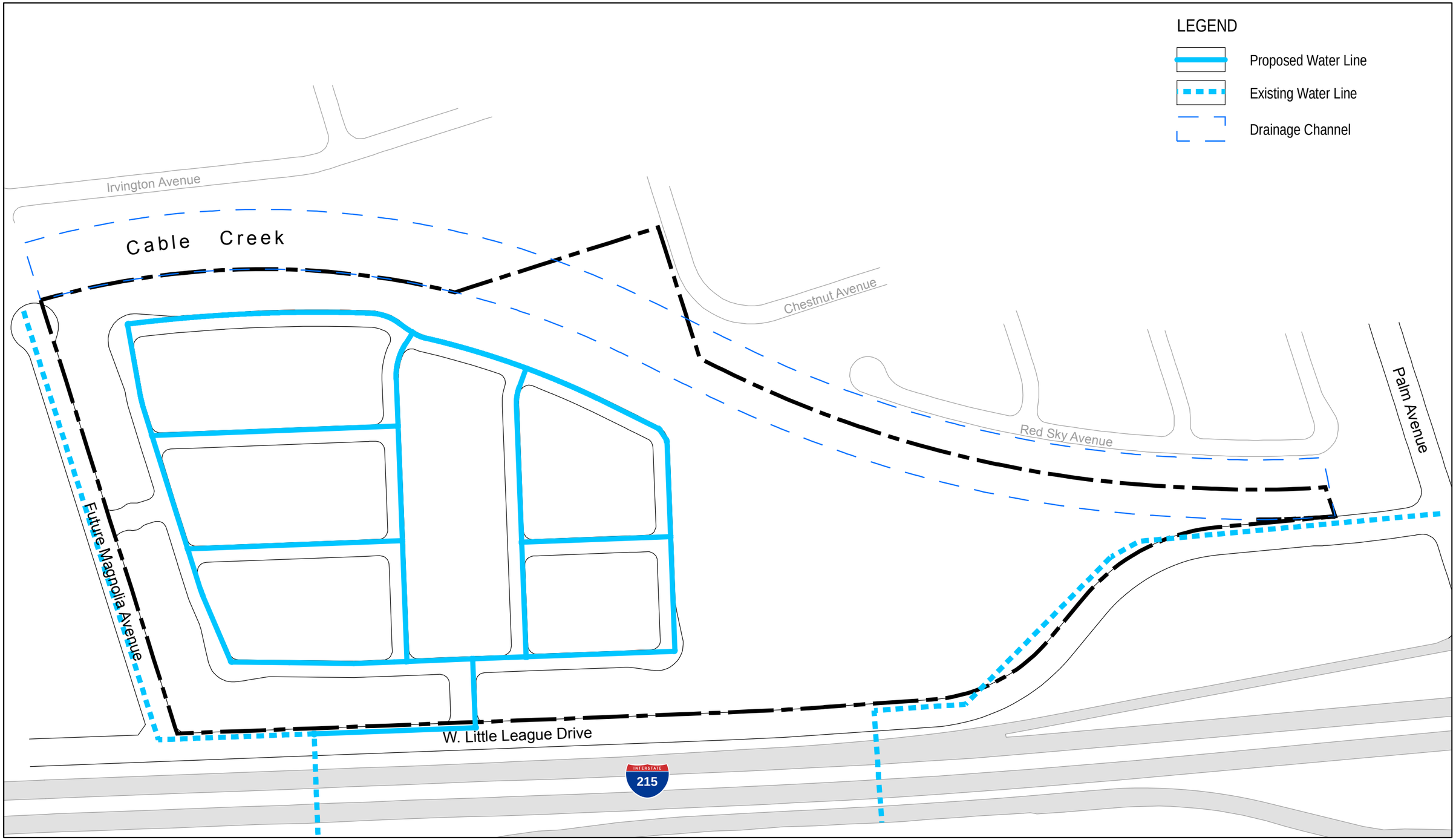


Figure 2-4

RANCHO PALMA

Water Plan

Strata Palma, LLC

200 Feet

FORMA

November 2015

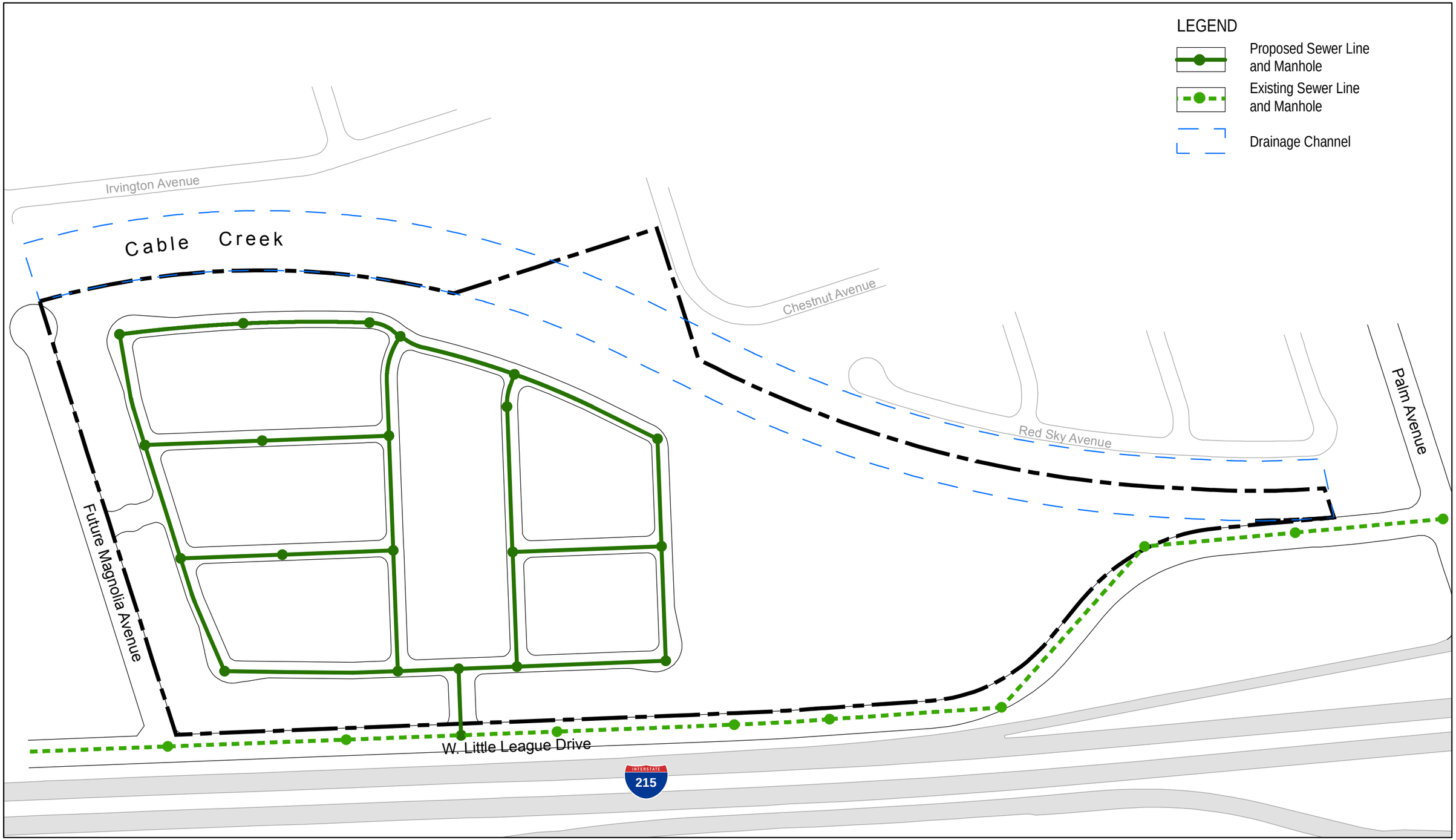


Figure 2-5

RANCHO PALMA

Wastewater Plan

Strata Palma, LLC

200 Feet

FORMA

November 2015

2.6 Drainage Plan

Flood protection of the site is provided by Cable Creek Channel. The channel is owned, operated, and maintained by the San Bernardino County Flood Control District.

The site currently drains to the intersection of Palm Avenue and Little League Drive. Drainage is carried overland and in a roadside swale to a catch basin and pipe connection to Cable Creek at the Pam Avenue bridge. The area experiences flooding and debris deposition in the roadway doe to these flows, and the nature of the roadside swales. The project will size appropriately the connection to Cable Creek and extend a storm drain upstream in Little League to collect flows from the development.

Flows will be delivered to the storm drain through a series of catch basins and reinforced concrete pipes.

The proposed drainage system for the Rancho Palma Specific Plan area is depicted on Figure 2-6, Drainage Plan. The stormwater will be collected from the local streets and transported in storm drains to a new basin located in the southwest portion of the residential area. An additional storm drain will transport the stormwater within a new storm drain in the right of way of Little League Drive, to connect to existing facilities located at Palm Drive and Cable Creek Channel.

Prior to entering the creek, the water will be cleaned of pollutants consistent with the current MS4 permit with the County and City. The residential flows are expected to be cleaned with an infiltration basin located adjacent to Little League Drive, and the Commercial site will clean the flows with a variety of options that may include basins within landscaped areas, underground chambers, dry well, and/or porous concrete.

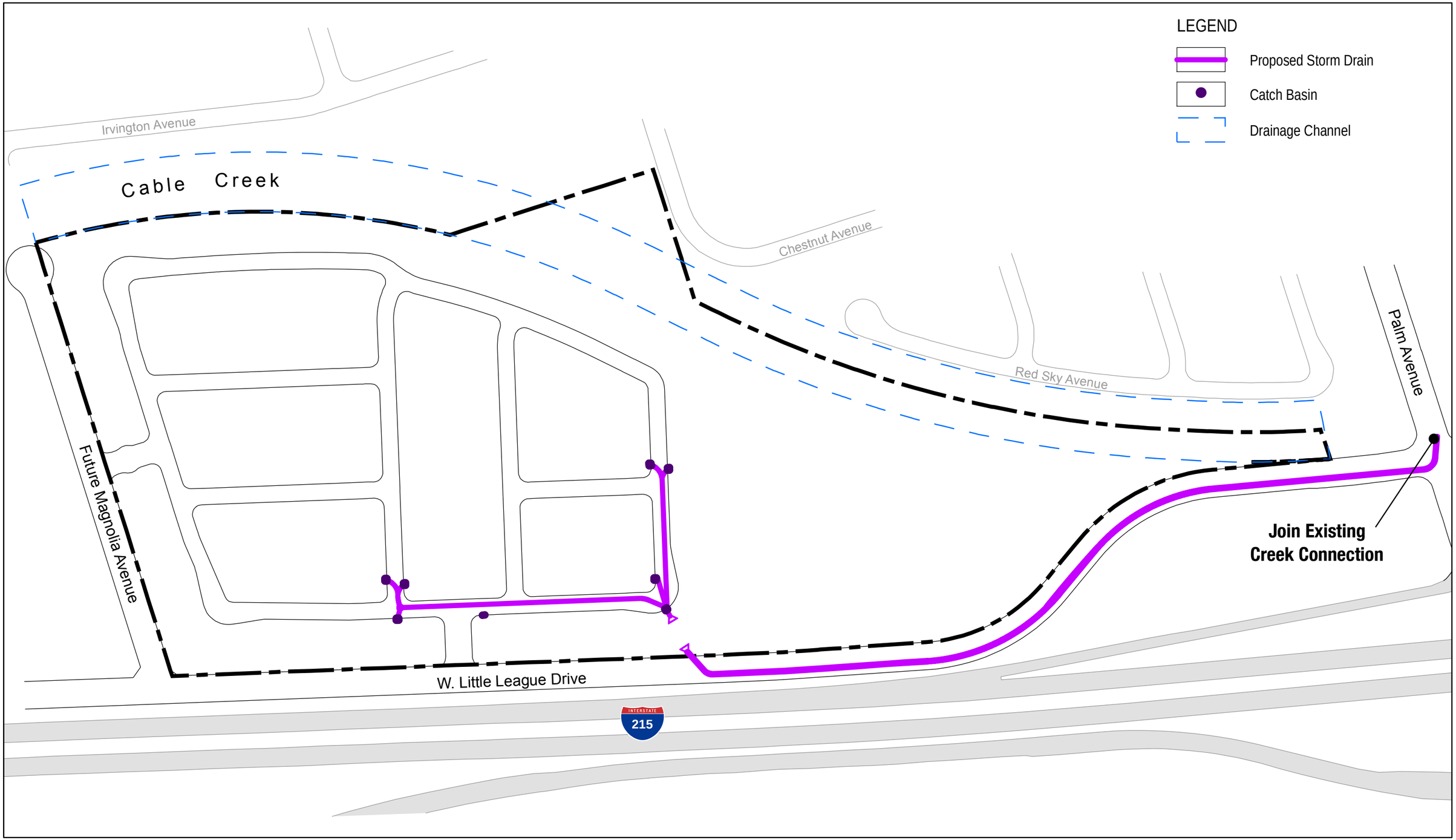


Figure 2-6

RANCHO PALMA

Drainage Plan

Strata Palma, LLC

200 Feet

FORMA

November 2015

3 DEVELOPMENT CRITERIA

3.1 Development Standards

The purpose of this section is to specify regulations governing the use of land within the Specific Plan area. Development projects within the Specific Plan area shall comply with these regulations. Where no regulations are specified, provisions of the City Development Code will govern.

The following standards apply to development of residential, commercial, and open space/recreation areas. All such development within Rancho Palma shall conform to the development standards as set forth in the Specific Plan for the permitted uses. Locations of all proposed permitted uses shall be as designated on the Land Use Plan, Exhibit 2-1.

These regulations and general site planning provisions are further augmented by the Design Guidelines described in Chapter 4 and the Sustainable Guidelines in Chapter 5. The Design and Sustainable Guidelines are aimed at enabling users of the Specific Plan to understand its intent and apply provisions for flexibility in the plan in accordance with the City's desires.

3.1.1 Residential Development Criteria – Planning Areas 1 and 2

The following standards apply to residential development areas (Planning Areas 1 and 2) for Rancho Palma.

1. Site Development Standards as described in Table 3-1, Residential Site Development Standards Summary.
2. Development shall comply with the Design Guidelines described in Chapter 4 and the Sustainable Guidelines in Chapter 5.

Table 3-1
RESIDENTIAL SITE DEVELOPMENT STANDARDS SUMMARY[1]

	PA 1	PA 2
Planned Number of Units	63	57
Maximum Number of Units[2]	70	62
Minimum Lot Area	7,000 sq. ft.	5,000 sq. ft.
Minimum Lot Width at front yard setback, standard lot	55 feet	45 feet
Minimum Lot width at front yard setback, knuckle	20 Feet	20 Feet
Minimum Lot Depth, standard lot	90 feet	90 feet
Maximum Height (two stories)[3]	35 feet	35 feet
Minimum Front Setback to dwelling unit living area or side entry Garage	15 feet	15 feet
Minimum Driveway Depth (front on garage)	20 feet	20 feet
Minimum Front Setback to porch	10 feet	10 feet
Minimum Interior Side Setback	5 feet	5 Feet
Minimum Street Side Setback	9 feet	9 feet
Minimum Rear Setback[4]	20 feet	20 Feet

[1] All setbacks shall be measured from property line to the main structure.

[2] Total permitted dwelling units within a residential Planning Area may be lesser or greater than the planned number if: a) the maximum units are not exceeded for any Planning Area, and b) the overall Specific Plan does not exceed 120 units.

[3] Measured from top of slab to roof. Tower features and other structures, chimneys and architectural projections may exceed the maximum building height, subject to approval by the Planning department.

[4] For lots along a knuckle or cul de sac, the rear setback can be calculated by averaging the distance between both rear corners of the lot and the dwelling unit provided the average is not less than 20 feet.

2. Permitted Uses

The following uses are permitted in Planning Areas 1 and 2:

a. Single-family detached dwellings.
b. Active and passive open space.
c. Utility easements or rights of way.
d. Drainage Facilities.
e. Recreational Vehicle Storage.
f. Public and Private Recreational Facilities as described in the Rancho Palma Specific Plan.
g. Other uses which are found by the Planning Director to be consistent with the purpose and intent of the Residential designation and which are found to be compatible with the uses stated above.

3. Accessory Uses

a. Home occupations, as specified in the San Bernardino Development Code, Chapter 19.04.
b. Small- and large-family, day-care homes per San Bernardino Development Code, Chapter 19.04.
c. Model homes and corresponding signage and facilities.
d. Secondary residential units subject to approval per San Bernardino Development Code, Chapter 19.04.
e. Garages, carports, accessory buildings, structures and uses where related and ancillary to the primary residence subject to the provisions of San Bernardino Development Code, Chapter 19.04.

4. Prohibited Uses

a. Commercial Uses
b. Manufacturing Uses

3.1.2 Parks Development Criteria

1. Permitted Uses

a. Sports Courts including basketball, tennis, soccer, or baseball.
b. Gazebos
c. Tot lots.
d. Dog park.
e. Picnic areas and associated facilities, including bar-b-ques.
f. Restroom facilities.
g. Access and service roads.
h. Remedial grading.
i. Trails.

j. Utility easements or rights of way.

k. Drainage Facilities.

l. Public Facilities.

m. Other uses, which are found by the Planning Director to be consistent with the purpose and intent of the Park designation and which are found compatible with the uses stated above.

2. <u>Prohibited Uses</u>

a. Residential Uses

b. Commercial Uses

c. Manufacturing Uses

3. <u>Development Standards</u>

a. Lot Area: No minimum

b. Maximum Building Height: 15 feet.

c. Minimum Building Setbacks:

i. Front Setback 10 feet

ii. Side Setback 10 feet

iii. Rear Setback 15 feet

3.1.3 Open Space Development Criteria

1. <u>Permitted Uses</u>

a. Access and service roads.

b. Remedial grading.

c. Trails.

d. Utility easements or rights of way.

e. Drainage Facilities.

f. Public Facilities.

g. Other uses, which are found by the Planning Director to be consistent with the purpose and intent of the Open Space designation and which are found compatible with the uses stated above.

2. <u>Prohibited Uses</u>

a. Residential Uses

b. Commercial Uses

c. Manufacturing Uses

3. <u>Development Standards</u>

a. Lot Area: No minimum

b. Maximum Building Height: 15 feet.

c. Minimum Building Setbacks:
   i. Front Setback 10 feet
   ii. Side Setback 10 feet
   iii. Rear Setback 15 feet

3.1.4 Commercial Development Criteria – Planning Area 3

A commercial site is located at the southern portion of Rancho Palma, adjacent to an existing commercial center and Interstate 215. (Planning Area 3). This Planning Area will contain retail and service uses for the future residents of Rancho Palma, existing residents, and travelers. This area shall also be designed to function architecturally as a gateway into the project. The maximum amount of commercial uses permitted in Planning Area 3 98,000 square feet.

1. <u>Permitted Uses</u>

a. Those uses permitted in the CG-1 (Commercial General) Zone of the San Bernardino Development Code, Chapter 19.06.
b. Remedial grading.
c. Utility easements or rights of way.
d. Drainage Facilities.
e. Public Facilities.
f. Other uses, which are found by the Planning Director to be consistent with the purpose and intent of the Commercial designation and which are found compatible with the uses stated above.

2. <u>Conditional Uses</u>

a. Those uses conditionally permitted in the CG-1 (Commercial General) Zone of the San Bernardino Development Code, Chapter 19.06.

3. <u>Prohibited Uses</u>

a. Those uses prohibited in the CG-1 (Commercial General) Zone of the San Bernardino Development Code, Chapter 19.06.

4. <u>Development Standards</u>

a. Lot Area: 10,000 square feet minimum.
b. Maximum Building Height: 30 feet.
c. Minimum Building Setbacks:
   i. Front Setback 10 feet
   ii. Side Setback 10 feet
   iii. Rear Setback 0 feet
d. Maximum Lot Coverage: 50 percent

5. Signage

Commercial signage shall be consistent with Chapter 19.22 of the San Bernardino Development Code as well as Section 4.5, Commercial Signage Guidelines within the Rancho Palma Specific Plan, with the following exceptions:

a. One Freeway Multi-Tenant Center Identification Sign is permitted in Planning Area 3

b. The maximum sign area for the Multi-Tenant Center Identification sign shall be 150 square feet per face.

4 DESIGN GUIDELINES

4.1 Introduction

The Design Guidelines will be utilized to direct the future physical development of the Rancho Palma Specific Plan. In order to create a unique neighborhood structure, these neighborhood guidelines will provide a framework for site planning and architectural themes. The Design Guidelines are not intended to be interpreted as a rigid formula for design, but are to encourage creativity and cohesion of architecture and landscape design.

4.1.1 Purpose

The Design Guidelines for the Rancho Palma Specific Plan are intended to establish neighborhood guidelines and standards for the Project to allow the creation of a quality and aesthetically pleasing environment. The use of these guidelines will serve to direct the overall design of the Rancho Palma Specific Plan and assure a quality neighborhood character, appearance and land use compatibility.

These Guidelines will also serve as design criteria for use by planners, architects, landscape architects, engineers, builders and future property owners. They will provide a viable framework and clear direction during the development process, without limiting innovative design. The result will be a neighborhood with a strong sense of identity, character and cohesiveness.

Through cohesive neighborhood design and quality site planning, the Rancho Palma Specific Plan will offer a diverse living environment for its residents. The Rancho Palma property will be identified by unified design elements such as architecture, landscaping, trail networks, walls, fencing and entry treatments, all of which will contribute to a quality neighborhood environment.

The guidelines have been crafted to ensure compatibility and continuity within the Specific Plan. Variation of building designs are encouraged to allow the neighborhood to establish its' own design character, yet maintain continuity throughout the development. The following guidelines should be incorporated to provide a variety of quality housing types, adequate infrastructure and a pedestrian network that integrates into the City of San Bernardino:

1. Provide the City of San Bernardino with necessary assurances that the Rancho Palma neighborhood will be developed in accordance with the quality and character proposed within this Specific Plan.
2. Design a neighborhood that acknowledges the topographic, geologic and hydrologic opportunities and constrains of the land.
3. Design neighborhoods that integrate into the regional alternate transportation system, including bus and bicycle systems.
4. Plan neighborhoods that connect with the larger neighborhood, yet are sensitive to the human scale and encourage pedestrian activity.

5. Design a neighborhood that incorporates neighborhood parks, trails, and open spaces where neighbors can meet and children can play.
6. Create a neighborhood that reflects anticipated marketing needs and public demand by providing a range of housing types, which will be marketable and compatible with the adjacent neighborhoods of the City of San Bernardino.
7. Provide planning provisions for a safe and efficient circulation system composed of a network of planned local roadways designed for appropriate traffic and user needs.
8. Establish a standard in neighborhood design and implement it consistently over an entire new neighborhood creating an identifiable place.

The intent of these Design Guidelines is to be flexible to respond to market conditions, but not compromise quality site development. The flexibility of these Design Guidelines is intended to allow for changes in lifestyles, desired housing types, economic conditions, and overall market influences.

4.1.2 Design Intent and Elements of a "Great Neighborhood"

The goal of the Design Guidelines is to promote both visual compatibility and variety in a neighborhood setting achieved by utilizing a number of compatible traditional and contemporary styles. The principal design criteria and architectural styles are not intended to be restrictive, but are meant to assist in the design process.

1. <u>Recommended Concepts</u>

The following parameters are recommended concept designs:

a. Create quality architecture designs and execute them consistently throughout the residential and commercial uses of the neighborhood.
b. Create neighborhood designs that integrate architecture, site planning and landscape.
c. Ensure that streetscapes and street spaces are attractive and comfortable.
d. Encourage the specific use and selection of details that correlate well with the designed floor plan.

2. <u>Discouraged Concepts</u>

The following parameters are to be avoided in concept design:

a. Harsh contrasts of materials and/or colors.
b. Inappropriate scale.
c. Poor selection and execution of details.
d. Extreme interpretations of the characteristics for each style.
e. Lack of window treatments or articulation, which result in flat, blank walls specifically on the rear elevations and side elevations, visible from public views.

4.2 Residential Architectural Guidelines

4.2.1 Architecture Styles

The residential architectural styles chosen for the Rancho Palma Specific Plan reflect the Verdemont Community's heritage. They are appropriate to the climate zone and are capable of contemporary interpretation and variation. Their inherent attractiveness, informality, and charm have enabled these styles to remain popular over a long period of time.

It should be emphasized that the renderings provided for the architectural styles on the following pages are representative of design concepts and architectural features envisioned for the Rancho Palma Specific Plan. The photographs shown are not intended to be exact duplicates of the future product types for Rancho Palma, but they are intended to reflect design elements.

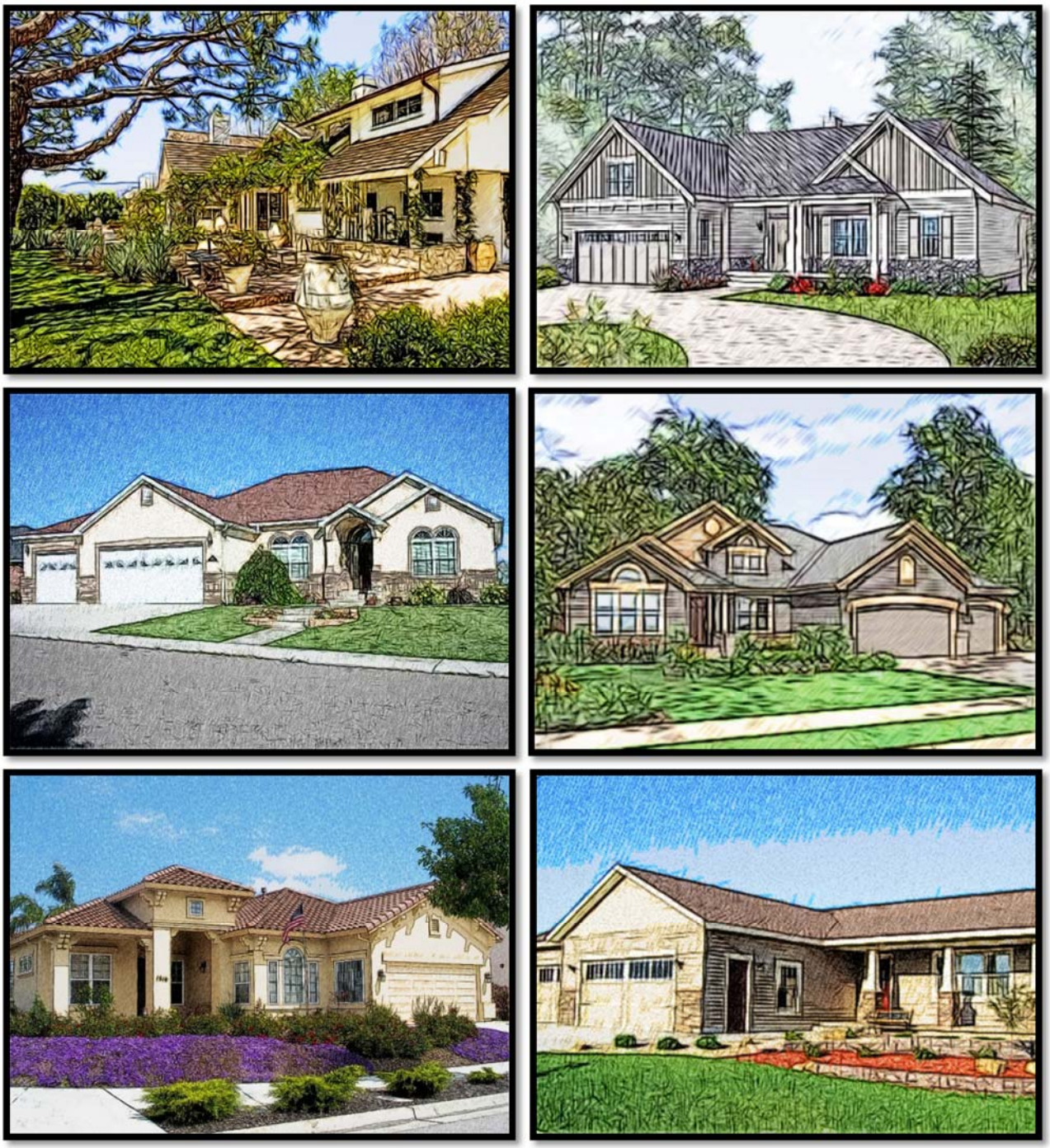
The proposed architectural styles include, but are not limited to the following:

- California Ranch
- Craftsman
- Spanish

1. California Ranch

Elements	Style Features	Enhanced Features
FORM	Low horizontal rambling profile arranged linearly and relating to outdoor spaces (gardens, courts, patios, etc.)	
ROOF	4:12 standard, low pitch gable and hip 25% opposing and 75% parallel hips Composition shingle or concrete tile with a shake texture 12 inch rake overhang Wide projecting eaves with exposed rafters and/or fascia boards	Roof Dormers
WALLS	Light to medium stucco sand finish	Full brick on stone walls
WINDOWS	Multi-paned windows in varying sizes and types, sometimes configured in horizontal bands Proportions more horizontal in nature	Wood windows Shutters
CHIMNEYS	Stone or brick detail, same as façade accent material	All masonry chimney

Elements	Style Features	Enhanced Features
DOORS	Entry and surrounding will be covered by the front porch Front door shall be cross pattern with or without windows in upper half	Dutch doors Windows in top panels
COLORS	Trim – Soft tinted whites, in subtle contrast to the body color. Fascia and garage doors maybe in the same soft white or contrasting color. Body – Soft, light to mid-value hues of beige, tan, yellow, gray, and green.	
DETAILS	Wood knee braces at porch posts Decorative trim at gables or rooftop details such as cupolas Simple door and window trim Wood posts at guardrails All spark arrestors shall be low profile	Masonry door and window surrounds Masonry wainscots at wall plates

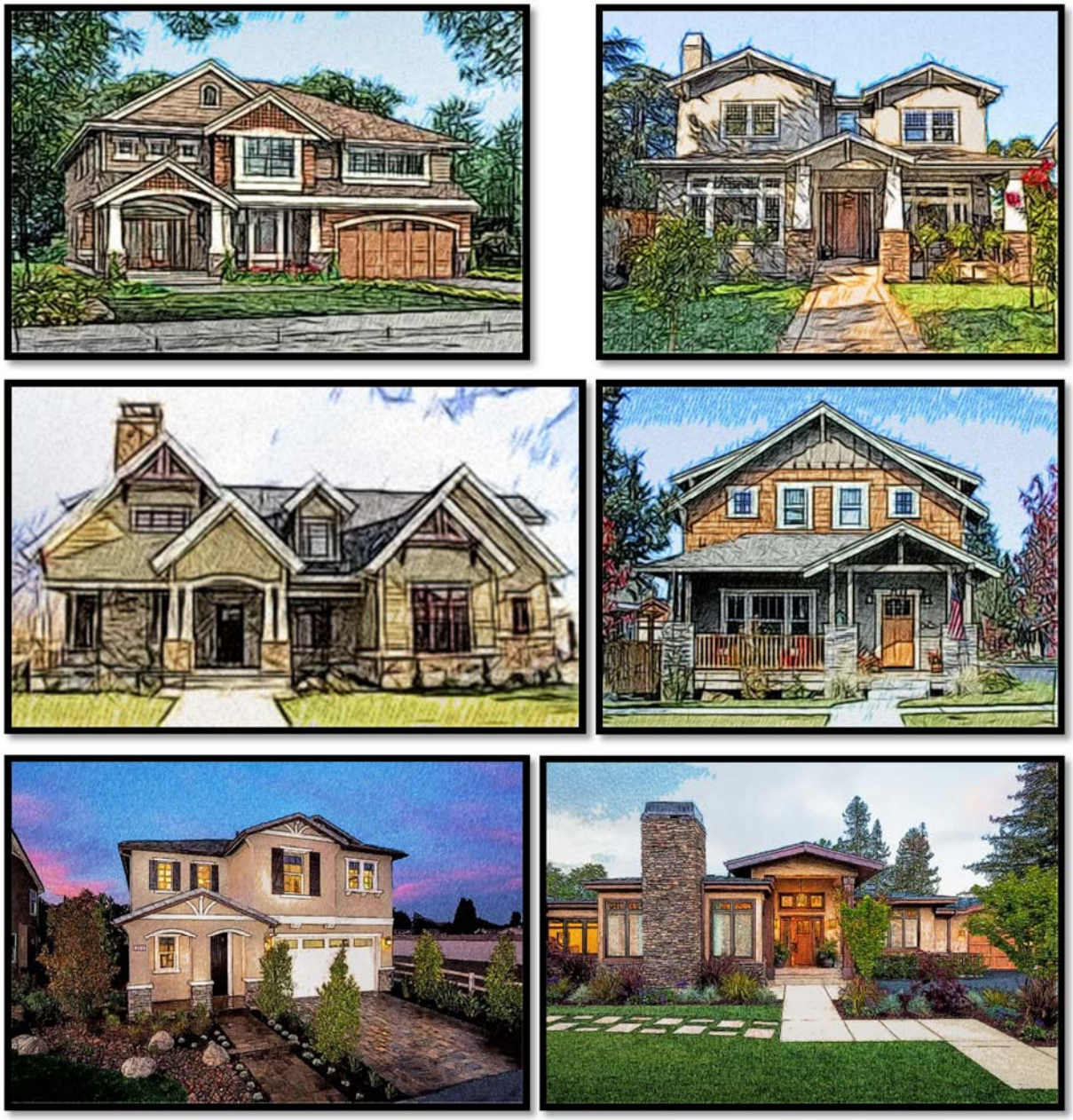


California Ranch

2. Craftsman

Elements	Style Features	Enhanced Features
FORM	Simple two story box plan form with Vertical and horizontal breaks	Varied plan shapes
ROOF	Basic gable roof with side-to-side or front-to-back with cross gables Roof Pitch from 3 ½:12 to 8: 12 Architectural composition shingles (20 year minimum quality) or shake texture flat concrete tiles 12” to 18” overhangs at rakes 18” to 24” overhangs at eaves	Varied porch roofs – shed or gabled 18” to 36” overhangs at eaves Open eaves overhangs with shaped roof rafter tails Decorative gable ends with wood or cementious trim accents
WALLS	Light to medium sand finish stucco Wood or wood-like lap or shingle siding inside gables on front elevation	Stone base accent
WINDOWS	Vertically hung upper mullioned windows at front elevation and in high visibility areas Often arranged in pairs Vinyl windows	Single hung windows in front elevation Feature three or more ribbon windows Layered wood trim at doors and windows
CHIMNEYS	Trim element at crown of stucco chimney	Blended stone or brick chimney
DOORS	Two to six paneled doors	Dutch doors with window in top panel.
COLORS	Body – Medium to dark value earth tones Trim – Dark value browns that are reminiscent of stained wood and mid value whites	

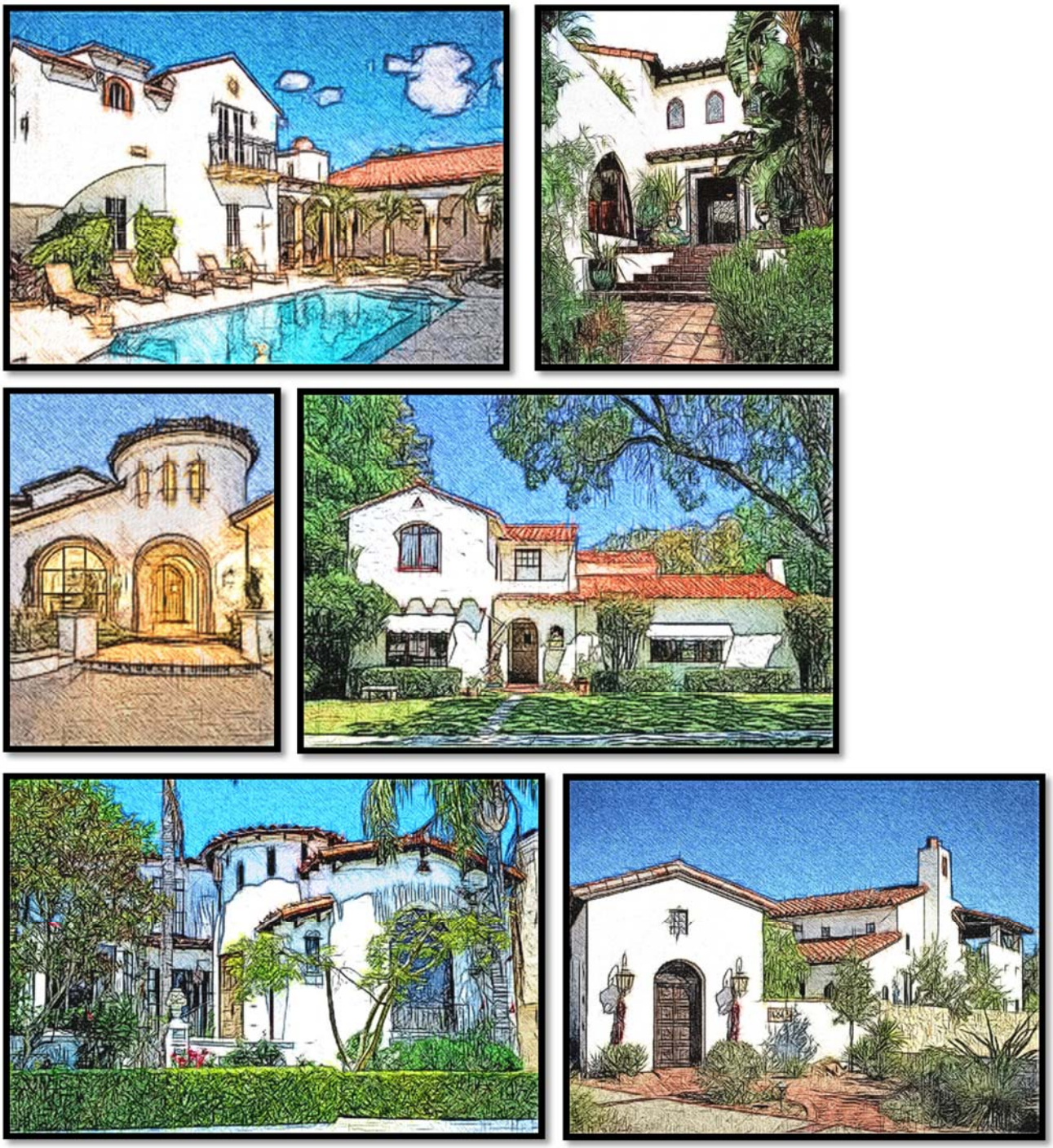
Elements	Style Features	Enhanced Features
	Accent – Earthy medium to dark shades of green and burgundy	
DETAILS	Entry porches with heavy square columns or posts on stone or brick piers Arts and crafts style lighting Shaped wood header trim at windows and doors All spark arrestors shall be low profile	Full porches with heavy square columns or posts on stone piers. Battered style columns Stone and brick base accents Decorative ridge beams Triangulated knee braces



Craftsman

3. Spanish

Elements	Style Features	Enhanced Features
FORM	Simple one or two stories massing	Round or square tower element.
ROOF	Simple hip or gable roof with one or more intersecting gable roof(s) 3 ½ : 12 to 4 : 12 roof pitch Barrel or "s" shaped concrete roof tiles Flush to 12 inch overhangs at rakes 12 to18 inch overhangs at eaves	Shed roof over porch Boosted tiles with mudded bird stops
WALLS	Light to medium stucco sand finish	Smooth stucco finish
WINDOWS	Multi-grid lines in windows approximately 12" by 12" One (1) two inch minimum recessed feature window at front elevation All front and visible windows to have stucco or wood trim Vinyl windows	Feature recessed arched window Arched windows Windows in garage doors Shutter with decorative hardware
CHIMNEYS	Trim element at crown of stucco chimney	Tile or clay architectural element on vertical surface
DOORS	6-8 paneled doors.	Heavy plank doors
COLORS	Body – Light value, warm hues and off whites Trim – Mid to dark value brown tones reminiscent of stained wood Accent – Clear shades of blue, green, rust and burgundy	
DETAILS	Decorative grilles Wooden Posts (6 inch X 6 inch minimum or iron balcony on front elevation 4 inch header trim minimum Spanish style lighting All spark arrestors shall be low profile	Shaped rafter tails at feature areas Balconettes Arched stucco column porches Shutters at front or visible elevations



Spanish

4.2.2 Garage Placement

A variety of garage placement solutions are recommended to be incorporated into the overall design of the homes. The type of garage placement will be dictated by lot size, lot width, depth, and product placement. It should be noted that not each garage condition is appropriate for each lot size or configuration. The following garage placements could be implemented within Rancho Palma:

1. Forward Garages - Forward garages are located at least 5' (10' maximum) in front of the front elevation living space.
2. Shallow-Recessed Garage - Shallow recessed garages are located 5' or more behind the front elevation living space.
3. Mid-Recessed Garage- Mid-recessed garages are located 12' or more behind the front elevation/living space.
4. Swing-In Garage - Garage doors on swing-in garages are located on the side of the home, as opposed to the front. This garage placement may be located at the front, side, or rear of a plan or split, thereby reducing the impact of garage door faces on the streetscape.
5. Corner with Side-Street Entry Garage - This garage type allows the option of entering from the side street, thereby eliminating the front facing garage and driveway.
6. Porte Cocheres - An additional, partially covered parking space that also serves as an occasional outdoor private space.

4.2.3 Street Scene: Design Variation Requirements

The front setbacks of both the garage and living space of adjacent buildings shall vary to provide visual interest along street scene.

1. A variety of setbacks at porches, living spaces or covered entries are encouraged.
2. To provide visual interest along the street scene, a variety of garage placements with varying setbacks are recommended. Strict compliance with the minimum garage setback is discouraged so as not to contribute to a repetitious and monotonous appearance along the street.
3. Varying roof planes are encouraged, when appropriate, given the architectural style of the home.
4. Variable lot sizes may be used to increase selection and variety in house and lot size configurations.

4.2.4 Building Elevations

The building design should be sensitive to the visual character of the elevations, the street scene and the pedestrian. In addition, the building facades should be detailed to avoid long, plain surfaces. A combination of the following Design Guidelines should be incorporated to create building relief and quality building elevations:

1. Wall surfaces should contain a variety of articulations, such as offsets, projections, penetrations, or change of surface textures to reduce the apparent scale and provide visual interest.
2. Exposed side and rear elevations shall have articulation such as, but not limited to, modulated facades, window treatment, second story projections and balconies.
3. One-story massing on exposed side and front elevations is encouraged on corner side lots.
4. Entries should be covered, recessed or projected from the building to be clearly defined and add relief to the front elevation.
5. Architecturally appropriate design features, such as pillars, columns, trellises, bay windows, and other architectural features should be incorporated into the building elevations.
6. Second stories on front elevations should be stepped back or have projected elements to add relief to the higher building elevations.
7. Recessed doors, windows, and wall openings should be used to create a sense of depth and shadowing for visual variety and interest.
8. Balconies and porches are encouraged to articulate and enhance the building elevations.
9. Ornamental features including wrought iron and exterior light features should be utilized to create interest.
10. Detail elements such as shutters, exposed rafter tails or cross beams, decorative grille work, decorative stucco or clay pipe vents, decorative ceramic tile and/or other similar features are encouraged to provide articulation.
11. Varied street scenes can be achieved by varying roof planes in size and pitch
12. Intercepting hip or gable roofs are encouraged based on the architectural style of the home.
13. Attention should be given to the composition of the building mass. Box-like designs are discouraged, except when appropriate to the architectural style.
14. Vary the height and roof levels of the residence so that it appears to be divided into smaller massing elements. Architectural projections could be used to achieve this goal.
15. Articulate building forms and elevations with varying rooflines, roof overhangs, and intermediate roof elements to create strong patterns of shade and shadow.
16. Just as stepping the second story mass improves the side yard, it can be used to improve the front yard scene. As an example, the second story should be set back in relationship to the garage face or living space below it.

17. The designer should envision the building form as a series of interlocking masses rather than a rectangular or "L" shaped box. Therefore, achieving a more aesthetic design solution.

4.2.5 Architectural Elements

Architectural elements will play a significant role in the establishment of an architectural style. Therefore, attention should be given to the application of such elements. These elements include architectural detailing, colors and materials. The encouraged architectural elements are described below:

1. <u>Unit Entries</u>

a. The entry serves several important architectural functions: it identifies and frames the front doorway; it acts as an interface between the public and private spaces; and it acts as an introduction to the structure while creating an initial impression.

b. The entry should be designed and located so as to readily emphasize its prime functions. Accent materials are encouraged to be used to further emphasize the entries.

c. Courtyard entries at the front elevation are encouraged to break up the building's mass and to provide private internal outdoor space

d. If the front door location is not obvious or visible because of building configuration, the entry should direct and draw the observer in the desired path. The design of the entry area in merchant-built housing should be strong enough to mitigate the impact of the garage on the facade.

e. Entry doors and doorways should be proportional to the architectural style of the structure.

f. Front porches are encouraged in order to create an inviting neighborhood street scene and promote friendly interaction among neighbors.

g. Porches and balconies shall be designed as an integral component of the building's architecture.

2. <u>Doors</u>

a. Emphasis should be placed on the design and type of entry door used. It functions as the major introduction to the interior of the house and shall be compatible with the architectural style of the home.

b. Recessed door, window and wall openings are encouraged at all front elevations, and other side or rear elevations as viewed from public streets, when appropriate given the architectural style of the home.

c. The door may be covered by an overhead element or recessed into the wall plane.

d. The entire door assembly should be treated as a single design element including surrounding frame, molding and glass sidelights.

e. Wood may be used for the entry door. Wood grain texture and raised or recessed panels contribute to the appeal of the door. Greater use is being made of metal entry doors but in order to be acceptable, they should possess the same residential "feel" provided by the wood grain and panels.

f. Doorways may be rectangular or round-headed and fully recessed. Spiral columns, arches, pilaster, stonework, decorative tiles, or other sculptural details are encouraged be integrated into the doorway design to enhance the visual importance of the entry door.

g. The use of glass in the door and overall assembly is encouraged. It opens the entry and provides a sense of welcome and human scale. It can be incorporated into the door panels or expressed as single sidelights, double sidelights, transom glass or fan windows.

h. Flexibility is allowed concerning the color of the door. It may match or contrast the accent trim, but is encouraged to be differentiated from the wall color.

3. <u>Windows</u>

a. Typically, the location of windows is determined by the practical consideration of room layout, possible furniture placement, view opportunities and concern for privacy. Greater design emphasis should be directed to ensure that window placement and organization will positively contribute to the exterior architectural character.

b. All windows are encouraged to be consistent with the architectural style of the building.

c. Non-recessed windows should be surrounded with articulated architectural elements such as wood trim, stucco surrounds, shutters or recessed openings, shutters, pot shelves, ledges, sills, plant-ons, and rails, or other similar elements that complement the architecture.

d. Proper window design and placement on rear and side elevations is encouraged. Since side elevations and second story rear windows are frequently visible, greater design effort and budget prioritization should be given to these elevations.

4. <u>Garage Doors</u>

a. Garage types should complement the architecture, door designs, and plotting techniques. This approach will minimize the potential for repetitious garage doors framing both sides of a residential street. Variations may include, but are not limited, to the following:

i. Employment of second-story feature windows above the garage.

ii. Strong architectural entry elements.

iii. Designs with a mix of 2 and 3 car garages.

iv. The use of tandem garages incorporated into the building design.

v. Garage plans with a double door and a single door plan. These plans are recommended not to be placed next to each other.

b. If applicable, where lot width permits, some plans should include swing-in or side entry garages with reduced front yard setbacks.

c. The design of the garage door should relate to the overall architectural design of the residence. Colors should be complimentary to the main structure.

d. Ornamentation of garage doors should be provided to add visual interest from the street scene when appropriate given the architectural style.

e. The use of the sectional, wood or metal, rolling garage door is recommended since it maximizes the availability of useable driveway length.

f. Several different panel designs are encouraged to be utilized. Metal doors should only be used when they include either texture or raised panels of a "residential" nature. The use of window elements is encouraged.

5. <u>Shade and Shadow</u>

Homes should be situated on site to maximize shade. Therefore, the following considerations should be incorporated to maximize the benefits of proper building orientation and environmental opportunities of the site:

a. Buildings should be oriented to take advantage of the natural light, heat, shade, and shadow, which will help reduce energy consumption and encourage energy conservation.

b. Lot size and configuration should consider future orientation of a structure to take advantage of shade and prevailing winds.

c. Covered entries, balconies and porches should be incorporated to provide shadow and shade for each residential unit.

d. Windows should be framed with compatible materials to create well-defined edge treatments and are encouraged to be designed to provide distinctive shadows on the building facades.

4.2.6 Residential Roof Form

1. <u>Roof Pitch</u>

a. Roof pitches shall be consistent with the proposed architectural style.

b. A single roof pitch should be used on opposite sides of a ridge. Shallow pitches tend to lessen the apparent building mass.

2. Roof Types

a. The use of different roof types will add variety and interest to the street scene. Changing the roof form also helps break up a building's mass and apparent scale. However, the roof characteristics should be consistent with the architectural style that is chosen.

b. Hip, gable and shake-like material may be used separately or together on the same roof. Avoid a canyon effect in side yards when both buildings have front-to-rear gables, by providing dormer or hip elements. Repetitious gable ends along rear elevations should be avoided. Roof forms with pitch changes at a porch or projection are encouraged where it is style appropriate.

c. Roof forms having dual pitches such as Gambrel or Mansard should not be used.

d. Maximize variations in rooflines by offsetting roof planes and combining single-story elements with two-story elements. Long uninterrupted rooflines should be avoided.

e. Mechanical equipment is not permitted on roofs.

3. Overhang Projects and Covered Porches

a. Substantial overhangs are encouraged as a response to solar and climatic conditions, as well as architectural enhancement.

b. The inclusion of covered porches and entries are encouraged as part of the product mix. They expand sheltered living space, create entry statements and provide visual relief.

c. Rear covered porches may differ from the roof in both pitch and material, but front porches should retain at least one of these two characteristics.

4. Stepping the Roof Form

a. Steps in the roof respond to the interior room arrangement and provide visual relief and interest.

b. A vertical step within the ridgeline should be at least 12" – 18" in order to create visual impact and allow for adequate weatherproofing.

5. Solar Panels

a. The frames should either match the roof or fascia color.

b. Support equipment shall be enclosed and screened from view.

4.2.7 Accessory Items

1. Patio Covers, Trellises

a. Patio covers, trellises, pergolas or similar exterior structures when used are encouraged to reflect the character, color and materials of the building to which they are related.

b. Supports and framing members should conform to the guideline criteria for columns and posts.

c. Materials of accessory structures should be limited to, and compatible with, the dwelling's exterior siding, trim and roof material.

2. Air Conditioning Units

All mechanical equipment should be ground mounted and screened from public view. Further consideration should be given as to air conditioning unit pad placement within the rear yard to minimize impact on yard use and layout.

3. Awnings

Canvas awning of solid accent color may be permitted with moderation. Metal awnings are permitted as long as they are complimentary to the architecture. The decision to provide awnings should include consideration of their maintenance and deterioration for projects without maintenance associations. The continuous maintenance of the awning is recommended to be required through the HOA or CC&Rs to ensure their intended appearance.

4.2.8 Materials and Colors

1. General

a. The appropriate selection of materials and colors will produce homes that possess their own individual identity, while remaining compatible with the surrounding residences and contributing to the overall quality of the neighborhood.

b. Exterior plaster (stucco) is an acceptable exterior building material.

c. Use of wood, pre-cast concrete, stone/stone veneer, and tile is acceptable, when in conformance with the overall building design.

d. Exterior surfaces should have only a limited number of colors, one or two base colors and two or three trim accent colors.

e. Exterior building materials are recommended to be compatible with the surrounding environment and the architectural style, yet varied enough to create distinct neighborhood identities.

f. Accent colors are encouraged which are lighter or darker to highlight the character of the structure. Bright and non-earth tone colors are not recommended except as accents.

2. Roof Material

a. It is neither necessary nor desirable that the neighborhood should have a single type or color of roof. Use of a single color or roof type creates a sense of monotony that contributes to a monolithic appearance when viewed from a distance. Clay tile, concrete tile

and comparable appearing materials are acceptable roofing materials. Fiberglass and aluminum roofing is not allowed.

b. Roof colors should relate to the wall and fascia color.

c. Roofs should be of a generally neutral tone

d. Tile roofs are encouraged to be a consistent blend, with one color being more neutral. Medium to strong color contrasts within the blend should be avoided, unless warranted due to the architectural style of the home.

e. Roof vents should be the same color as the surrounding roof surface.

4.2.9 Residential Site Design

The following Site Design Guidelines will be used in the development of the residential component of Rancho Palma. To ensure quality site planning is achieved, the following elements should be incorporated and implemented consistently throughout the residential areas:

1. <u>Street Scene</u>

a. Vary building setbacks and plotting to create visual interest along the street scene. Enhanced landscaping should occur at the entries to identify the points of entry and set the tone for the development. The landscape plantings at these areas should be designed to complement the road edge transition and clearly emphasize the entry into the neighborhood.

b. Pedestrian walkways should incorporate bollards, or similar type of pedestrian level lighting techniques, that is uniform, unobtrusive and complementary to the architecture and entry monumentation of the Rancho Palma Specific Plan.

2. <u>Building Placement</u>

Buildings should be oriented with sensitivity to the streetscape and with consideration to the interface between structures. In addition, homes should be plotted to encourage pedestrian movement throughout the neighborhood, allowing areas for sidewalks. Placement should also allow the opportunities for parks within the neighborhood to provide a place where neighbors can meet and children can play. The following are elements that should be incorporated into building placement:

a. Create a distinct sense of neighborhood and place by designing attractive and comfortable street scenes and street spaces.

b. Develop compatible relationships between topography, building placement, and existing open spaces.

c. Incorporate connectivity through sidewalks throughout the neighborhood where feasible given the site's overall layout.

d. Place buildings that allow architectural forward, recessed garages or a variety of garage conditions to create a visually interesting, varied and pleasing streetscape.

e. Private outdoor spaces are encouraged to be designed with consideration for privacy.

4.3 Commercial Guidelines

The Rancho Palma Commercial Center is designed to provide retail sales and services to the Verdemont Community as well as the regional traveler along Interstate 215. These commercial guidelines are not intended to be interpreted as a rigid formula for design, but are to encourage creativity and cohesion of architecture and design.

4.3.1 Architectural Character and Design

The Rancho Palma Commercial Architectural guidelines below provides for the ability to create an inviting environment that considers the enhanced pedestrian experience goal. This section offers successful principles to promote and create visually interesting and balanced architectural elements that maintain a distinct quality and cohesive built pattern. Figure 4-1, Commercial Architectural Themes, depicts the commercial architectural themes envisioned for Rancho Palma. These themes will be compatible to the proposed residential architecture and will be tied together with the landscape design.

The following Architectural Design elements will help maintain architectural quality while providing great flexibility and promoting individual style.

1. Building and Massing

The intent is that the building forms should be treated in a three dimensional, sculptural way with the possibility of a variety of roof forms through the following guidelines:

a. Varying building massing with appropriate “human” scale.
b. Building heights should result in varied roof lines.
c. Encourage overhangs to screen summer sun and allow for solar gain in the winter.

2. Exterior Colors and Materials

The intent is to design buildings with colors and material that are varied.

a. Provide variety in varying materials, colors and texture.
b. Avoid reflective materials that produces glare.
c. Avoid large areas of dark colors that tend to absorb heat. Provide for thicker walls and/or insulation to retain heat for winter cooler temperatures.
d. Encourage a variety of materials such as:
   i. Stone
   ii. Brick
   iii. Wood
   iv. Tile
   v. Concrete
e. Regionally-appropriate and compatible materials shall be used. Materials and colors shall be compatible with the existing environment, with the intent of reducing reflected heat and glare into exterior public areas.

Figure 4-1

RANCHO PALMA

Commercial Design Themes

Strata Palma, LLC

Not to Scale

FORMA

November 2015

3. Entrances and Fenestrations

The purpose of doors and windows are to provide entry, light to the inside, and provide outside view of displays.

a. Entry doors should be transparent as possible.

b. Openings should be at least 30% of the total façade area.

c. Openings should be designed to maximize natural light into the building and to allow visibility of the interior display from the outside.

d. Fenestrations should also have an aesthetics role by providing shade and shadows on façades.

e. Fenestrations should be set back from the front façades to get visual relief.

4.3.2 Circulation and Parking

The majority of the commercial center patrons come by car and without easily accessible parking, many potential visitors, may be attracted to other commercial and entertainment centers with more convenient parking. Thus, the continued vitality and future economic success of the center depends heavily on providing access to convenient, strategically located parking.

1. Streetscapes

Streets and streetscapes must be designed with both cars and pedestrians in mind to ensure a healthy and vibrant commercial center.

a. All the elements – buildings, signs, landscaping and furniture – together should create a unified and coherent visual identity and public space.

b. Colorful and themed awnings and outdoor sidewalk umbrellas can add a great deal of vitality and excitement to an area as well as provide important sources of shade for pedestrians and customers.

c. Patterned pavement and special paving materials should be used to designate intersections, pedestrian crossings, entries, parking plazas, and places of special interest.

d. Bike racks should be installed.

e. Bollards or other approved elements shall be placed between noted pedestrian and vehicular zones.

2. Parking

Provide adequate access and parking.

a. Allow and promote uses to have shared parking.

b. Where feasible, separate employee parking and delivery areas from customer parking.

4.3.3 Lighting Design

Lighting will be used to enhance, unify and reinforce the character of the overall commercial center design theme. Lighting elements should promote safety, provide functionality, and be efficient. Lighting should also be complementary to building and streetscape character. The following lighting design elements will promote appropriate lighting solutions.

1. <u>Lighting</u>

Locate lighting to be functional and aesthetically pleasing.

a. Lighting and street furniture should contain consistent, unifying elements throughout the area.

b. All lighting fixtures shall be appropriate in scale, intensity, and height to the use it is serving. There should be taller lighting fixtures for vehicular traffic and shorter lighting fixtures for pedestrian movement.

c. Avoid lighting fixtures that create direct glare. Light pollution shall be minimized through the use of low lighting profiles, recessed luminaires and minimal luminance levels, where street light is cast downward.

d. Provide lighting that is attractive and complementary to building character.

e. Utilize a variety of lighting to accent, provide direction and to add to the vitality of the place.

f. Use lighting to highlight and showcase landscape elements.

g. Encourage the use of solar powered lights when feasible.

2. <u>Exterior Building Lighting</u>

Exterior lighting should be complementary to the commercial buildings.

a. Exterior lighting should illuminate the overall building and focus on prominent features such as display and entry.

b. Building design should exploit the use of natural light with windows, skylights, light shelves and similar devices, minimizing dependence on artificial light.

c. Materials and lighting that causes glare and unwanted reflections at eye level should be avoided. Indirect light can be used to illuminate buildings, walkways and public spaces without glare.

3. <u>Prohibited Lighting Types</u>

a. Blinking, flashing or changing intensity lighting is prohibited, except for temporary holiday displays.

b. Any light that may be confused with a traffic control device.

c. Beacon or search lights are prohibited except as a one-time or a special event feature.

4.3.4 Signage Design

The way finding and identity graphics of the commercial center is an important role in the unification of the project area as a whole. With the numerous varied program elements signage works to link the elements together, not necessarily to create a feeling of one large development, but rather to help the visitor navigate through the environment. The signage and graphics help to create a sense of orientation and direction for the first time visitor, and a sense of familiarity and comfort for residents that return often. Conceptual designs of the signage for Rancho Palma are located in Section 4.4, Landscape Guidelines. The following signage design guidelines will help define and preserve the character of the overall project as well as create a sense of excitement and activity.

1. <u>Overall Character</u>

Encourage a variety of signage type and character to function, enhance, and support the use and activity.

a. Signs should be visually interesting and informative. They should be distinctive and eye-catching yet simple, avoiding cluttered designs and excess advertising.

b. Signs should complement the architecture of the building and also provide a unifying element along the streetscape.

c. Utilize clear and understandable graphics.

d. Locate signs to complement and not dominant the architecture or the aesthetics of the building.

e. Design signs that are in concert with the style, character, landscaping and street furniture to enhance the sense of place.

f. Window signs, where lettering is affixed directly on the glass, can be attractive and eye-catching provided that the style is in keeping with the scale and style of the building.

g. Undesirable signs are plastic, flashing signs, billboards, generic trademark signs, and any sign temporarily affixed to ground floor windows.

h. Generally, signs should be externally lit with downward facing lights to avoid excessive nighttime glare.

i. Signs should be located so that they do not interfere with pedestrian movement or block the sight lines along the road or pedestrian pathways.

2. Entrance Signage

Character and purpose of the sign is for guiding visitors to the commercial center.

a. Readable from vehicles traveling on Interstate 215.
b. Individual dimensional letter and logo will identify the commercial center.
c. Letters and logo may be internally illuminated.

3. Tenant Signage

Individual tenants will be encouraged to use a mixture of signage techniques.

a. Storefront.
b. Awnings.
c. Signage on glass store front and entrances.
d. Dimensional blade sign.
e. Wall plaques.
f. Floor signs.
g. Fascia signs.

4. Prohibited signs

Certain signs that would detract from the pedestrian experience will be prohibited.

a. Formed plastic.
b. Surface mounted box cabinet signage.
c. Freestanding signs and portable signs such as any sign designed to be portable, except during holiday periods.
d. Balloon or inflatable sign.
e. Signs which emit sounds or odor.
f. Signs with exposed raceways, conduit junction boxes, transformers.
g. Fluorescent or reflective sign or color.
h. Simulated materials such as wood grained, plastic laminate, wall coverings, paper, cardboard or Styrofoam.
i. Plexi-face channel letters.

4.4 Landscape Guidelines

Rancho Palma's landscape design embraces a California vineyard theme reflective of the region's agricultural heritage. Through thoughtful, sensitive design, Rancho Palma can be developed to conserve valuable resources and create a noteworthy community within the City of San Bernardino. Sustainable landscape design links natural and built systems to achieve balanced environmental, social, and economic outcomes. In addition, it improves the quality of life, long-term health of communities, and the environment. Sustainable landscape balances and benefits both the needs of people and the environment. Figure 4-2 depicts the Master Landscape Plan for Rancho Palma. The following is a list of various 'sustainable' features and practices to be used and/or considered:

- Due to extreme drought conditions, be mindful to choose low water, drought tolerant, and/or native plants that match the local micro climate, and soil conditions. (Refer to Plant Palette herein)
- Select plants that are "non-invasive" according to the current California Invasive Plant Inventory, published by the California Invasive Plant Council.
- Design landscape and plant spacing to allow for plants to reach mature size. Using appropriate sizes and the thoughtful placing of plants prevents overgrowth and future thinning, reducing the amount of material sent to the landfill.
- Locate plants to ensure proper drainage and to reduce potential damage to buildings.
- Increase tree cover to provide shade in developed areas to reduce energy demand, mitigate solar heat gain into buildings, and to reduce the amount of heat absorbed by paved areas.
- Plant deciduous trees on the south side of buildings to allow for increased solar heat gain in winter months (thereby reducing energy needed for heating interiors) and shading in summer months (thereby reducing energy needed for cooling interiors).
- Create natural looking designs to reduce maintenance required.
- Reuse soils from the site, if appropriate, as horticultural soils.
- Maintain and/or improve soil health through responsible management including nurturing soil with organic matter, reducing synthetic fertilizer use, and restoration to sustain protected and future ecosystems.
- Use integrated pest management to control or eliminate pesticide and toxic chemical use.
- Use nitrogen-fixing plants to reduce fertilizer use.
- Create and/or maintain wildlife habitat.
- Use sustainable materials in landscape construction and site furnishing selections including, but not limited to, recycled materials, environmentally preferable/responsible products, materials that can be recycled, certified "green" products, and locally available or locally manufactured products.
- Encourage the use of low toxic wood preservatives (no CCA), or naturally rot-resistant wood for landscaping.

Figure 4-2

RANCHO PALMA

Master Landscape Plan

Strata Palma, LLC

200 Feet

FORMA

November 2015

- Utilize weather and climate-smart irrigation controllers.
- Design irrigation zones to suit plant requirements and incorporate high-efficiency nozzles.
- Incorporate water conservation measures (xeriscape, rain gardens, grouping plants with similar requirements) into the landscape.
- Control water runoff (bioswales, rain gardens, green roofs).

4.4.1 Community Design Theme/Landscape Character

Landscape design plays an important role in establishing the visual identity and character of the Rancho Palma community. The ability to create consistency in theme and the application of major community-level design elements allows for a unified and cohesive community. Enhanced entries with monumentation and signage, upgraded hardscape and decorative entry gates provides a sense of arrival. Perimeter landscape and upgraded walls and pilasters will provide an attractive visual buffer to the various existing uses surrounding the project. The community interface with improved edge conditions, and site-specific plant materials is designed to be maintained throughout Rancho Palma to communicate and enhance the community's identity.

Rancho Palma embraces a California vineyard theme (see Figure 4-2, Master Landscape Plan). Careful thought has been given to integrate the structural and aesthetic elements of a balanced, cohesive community. To ensure that these design guidelines are implemented in a manner that will provide a sense of its own character and ambiance, a central theme embracing the classic California vineyards has been developed. This theme is consistent with the community vision and tie the community together while enabling the neighborhoods and commercial area to further develop their individual character through their own unique elements.

Several identifying design and landscape elements will be incorporated throughout the community and will generally include:

- Wood beams, stacked stone, and poured-in-place concrete are incorporated into monumentation and accessory structures.
- Natural landscaped areas blended with manicured landscaping.
- Low water, drought-tolerant and native tree and shrub materials.
- Natural materials such as stone, wood, and boulders, complemented by an earthtone color palette.

Rancho Palma is a planned community that is inspired by the California vineyard and recognizes this historical character. Like California itself, the design intent and architecture is an eclectic and colorful mix of various influences from across the United States. This community offers its residents an environment in which pedestrian connectivity, recreational activity, and social interaction are fostered. The residential neighborhood within Rancho Palma focuses on these aspects by residences oriented to the street, pathways throughout the development, public gathering spaces, and local parks with recreational amenities.

Thematic elements are major project improvements that occur at the community or neighborhood level, and assist in establishing the overall design theme for the Rancho Palma community. These major thematic elements will be reinforced within the following:

- Monumentation/ Signage
- Streetscape Landscape
- Enhanced Masonry Vertical Elements
- Enhanced Hardscape
- Enhanced Community Edge Conditions
- Parks and Recreation Facilities
- Lighting/ Street Furniture Family
- Walls and Fences
- Landscaping/Plant Palette

These thematic elements will commonly occur throughout the community and will unite Rancho Palma under a common design vocabulary. General design guidelines and design criteria for the community theme elements are contained in the sections that follow.

4.4.2 Parks, Water Quality Basin, and RV Storage Lot

One neighborhood park, one pocket park and a paseo connection to the commercial center are located within the residential neighborhood. Rancho Palma is also providing a half acre expansion of the existing Ronald Reagan Park, located across Cable Creek Channel. Conceptual designs for the parks are depicted in Figure 4-3, Neighborhood Park Concept, Figure 4-4, Pocket Park Concept, and Figure 4-5, Ronald Reagan Park Expansion Concept.

The neighborhood park is proposed to have open play turf areas along with paths, picnic nodes, and a playground area. A horseshoe court or other activity may also be provided. The Pocket park is designed for passive activities and may include bocce ball, or similar type recreation. The paseo connection will include landscape screening, benches, and gated access to the commercial center.

The Water Quality Basin will be fenced and gated for maintenance access (see Figure 4-6, Water Quality Basin and Paseo). The recreational vehicle parking lot will also be landscaped to screen views from adjacent properties (see Figure 4-7, RV Parking Concept).

DISCOVERY TOT LOT

OPTIONAL PLAYGROUND SURFACING:	PLAYGROUND EQUIPMENT:
• SAND • ENGINEERED WOOD FIBER • RUBBERIZED	• TO BE DETERMINED

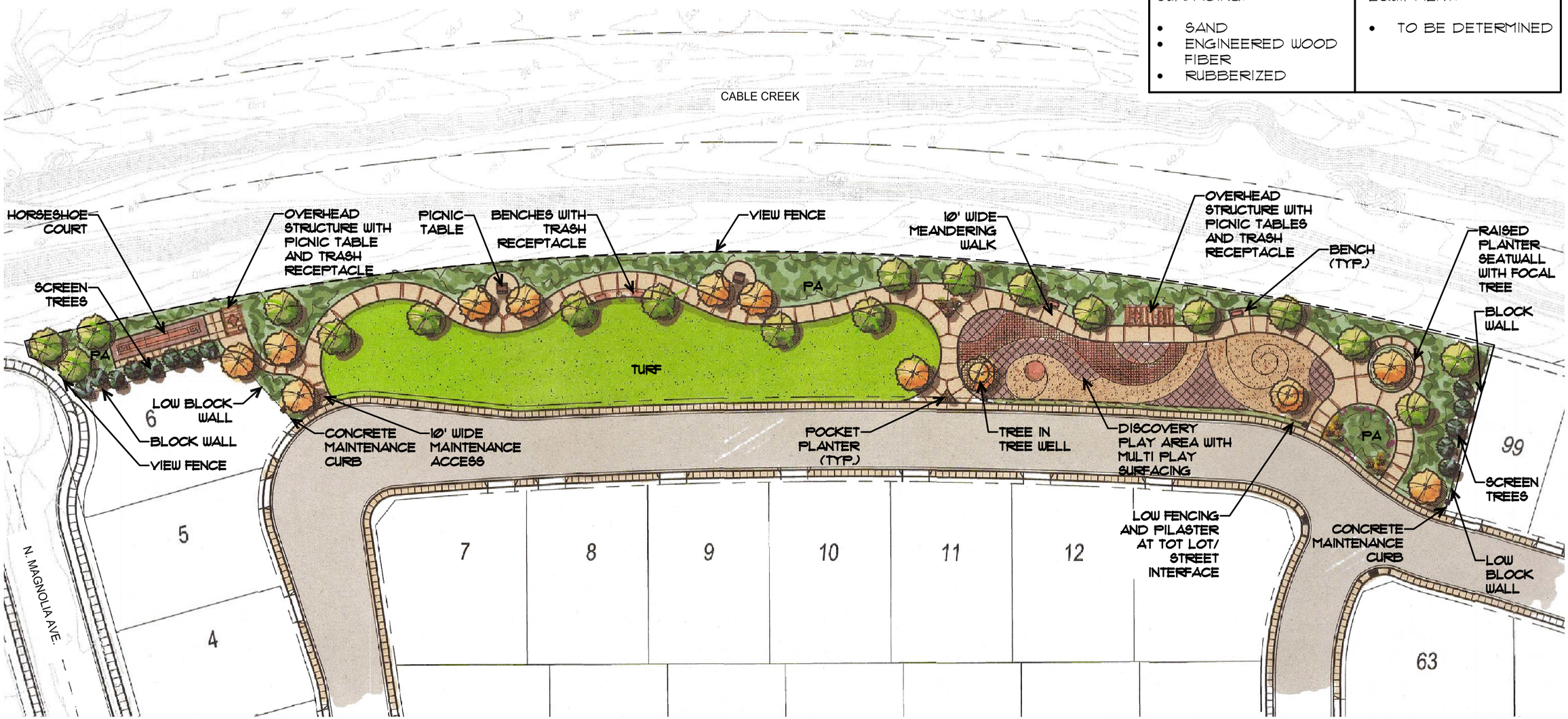


Figure 4-3

RANCHO PALMA

Neighborhood Park Concept

Strata Palma, LLC

60 Feet

FORMA

November 2015

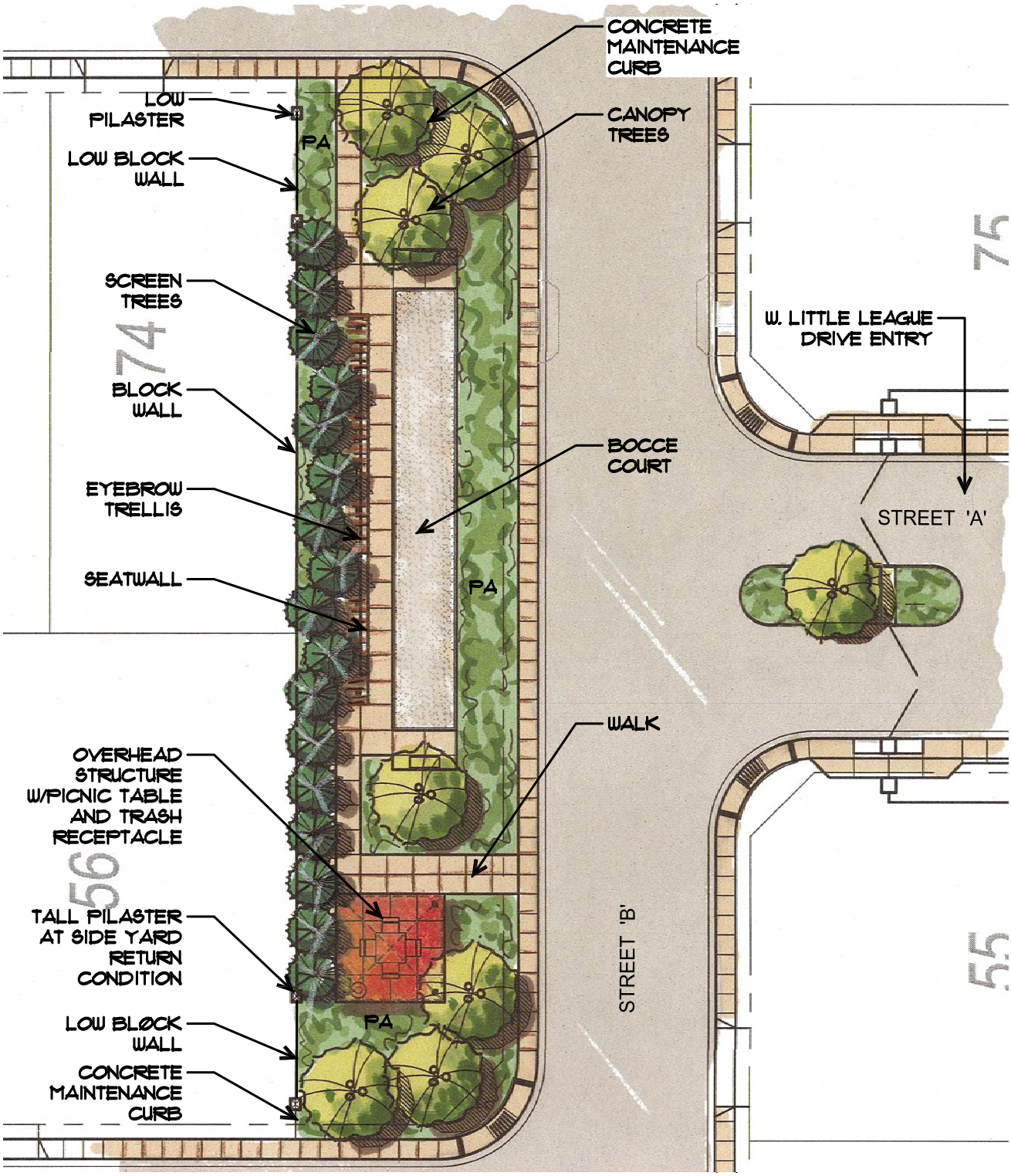


Figure 4-4

RANCHO PALMA

Pocket Park Concept

Strata Palma, LLC

30 Feet

FORMA

November 2015

Figure 4-5

RANCHO PALMA

Ronald Reagan Park Expansion Concept

Strata Palma, LLC

30 Feet

FORMA

November 2015

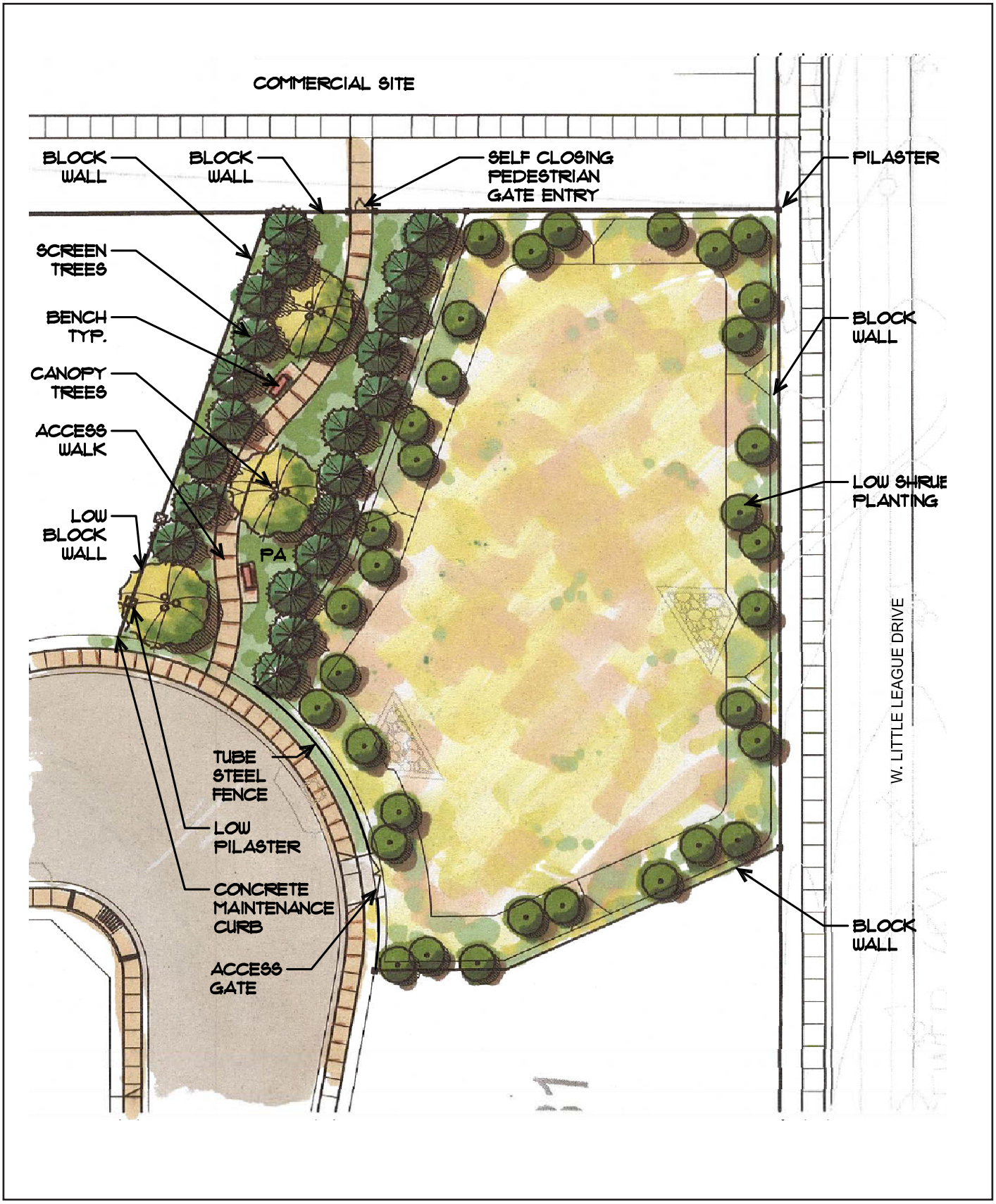


Figure 4-6

RANCHO PALMA

Water Quality Basin and Paseo

Strata Palma, LLC

30 Feet

FORMA

November 2015

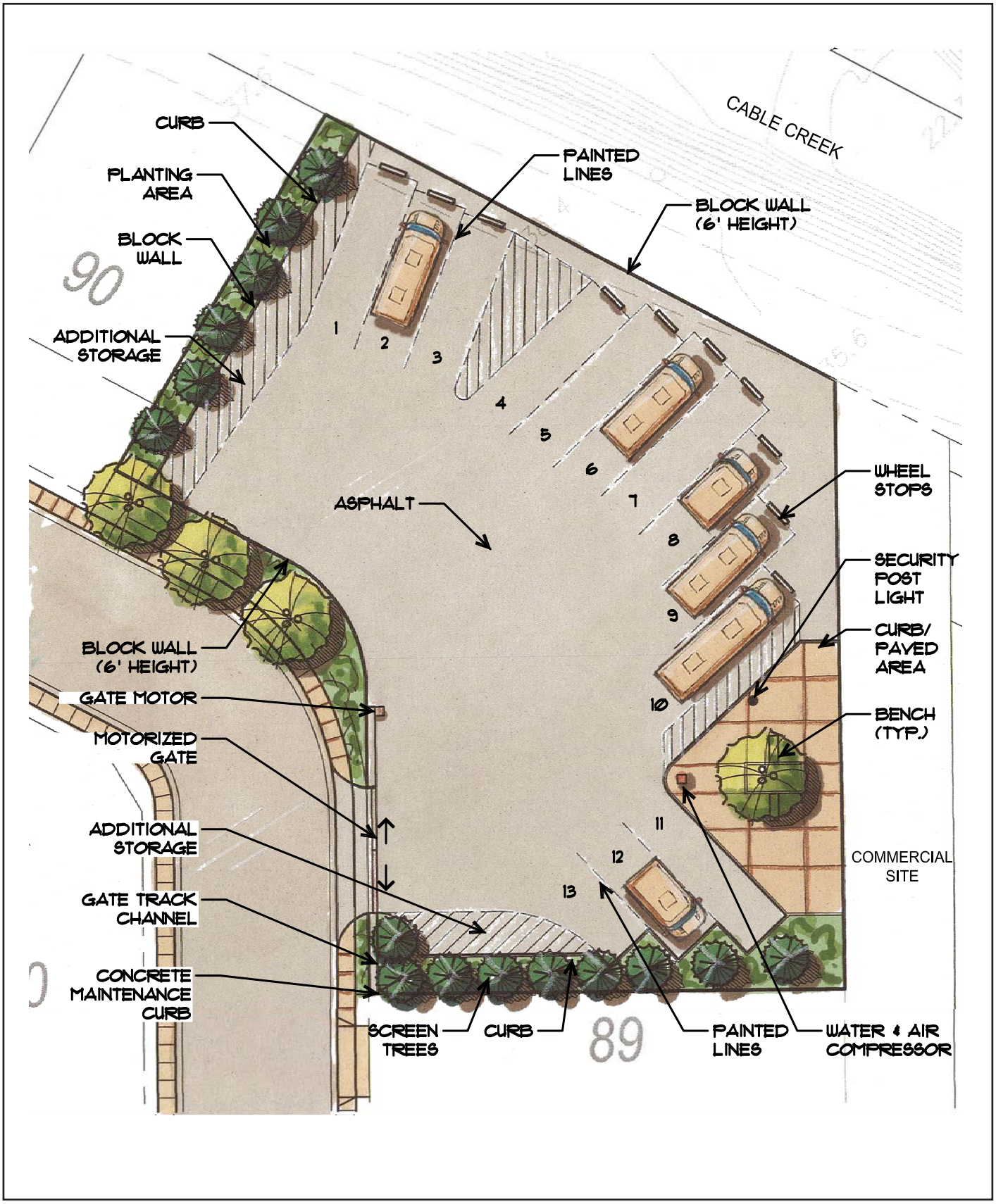


Figure 4-7

RANCHO PALMA

RV Parking Concept

Strata Palma, LLC

30 Feet

FORMA

November 2015

4.4.3 Streets and Entries

Streets and entries are important elements for the design of Rancho Palma. These areas serve as the gateways to both the commercial and residential components of the community. Figure 4-8, Street Sections depicts the conceptual street sections for West Little League Drive, Magnolia Avenue, and the private, residential local streets.

The residential neighborhood entries at West Little League Drive and Magnolia Avenue have been designed to provide a formal arrival to the neighborhood and be an extension of the overall landscape theme. These entries are gated and are depicted in Figure 4-9, Project Entry at Magnolia Avenue Concept, Figure 4-10, Project Entry at West Little League Drive Concept, and Figure 4-11, Project Entry Gate Concept.

4.4.4 Community Identity Plan/Monumentation

Appropriate community and commercial thematic identification is important for the establishment of a new community and maintaining the overall Rancho Palma theme. Identification and monumentation provides a system for community development and gives directional information to residents and visitors.

Entry monument signage, through decorative typefaces and symbolic graphics, will inform the visitor that they are entering a planned community. Monument signage will be consistent with the character of the project, but flexible enough to respond to individual project contexts. Logos, type styles, color schemes, and architectural features should be consistent throughout the area being identified. Monument signs may vary in size and detail in a manner that reflects their relative importance within the signage hierarchy, but will incorporate all the materials proposed within the major community monumentation.

Materials:

- Dry stacked stone monument bases, or manufacturer's dry stacked stone product application on monument bases.
- Community logo panel
- Natural wood or metal horizontal member components
- Poured-in-place concrete components
- Stucco veneer to match adjacent architecture

Three types of monumentation have been conceptually designed for Rancho Palma; Residential Entry Monumentation, Primary Commercial Monumentation, and Primary Commercial Marquee. The locations for these monuments are depicted on Figure 4-12, Monumentation Plan, with Figure 4-13, Residential Entry Monumentation, Figure 4-14, Primary Commercial Monumentation and Figure 4-15, Primary Commercial Marquee, depicting the monumentation.

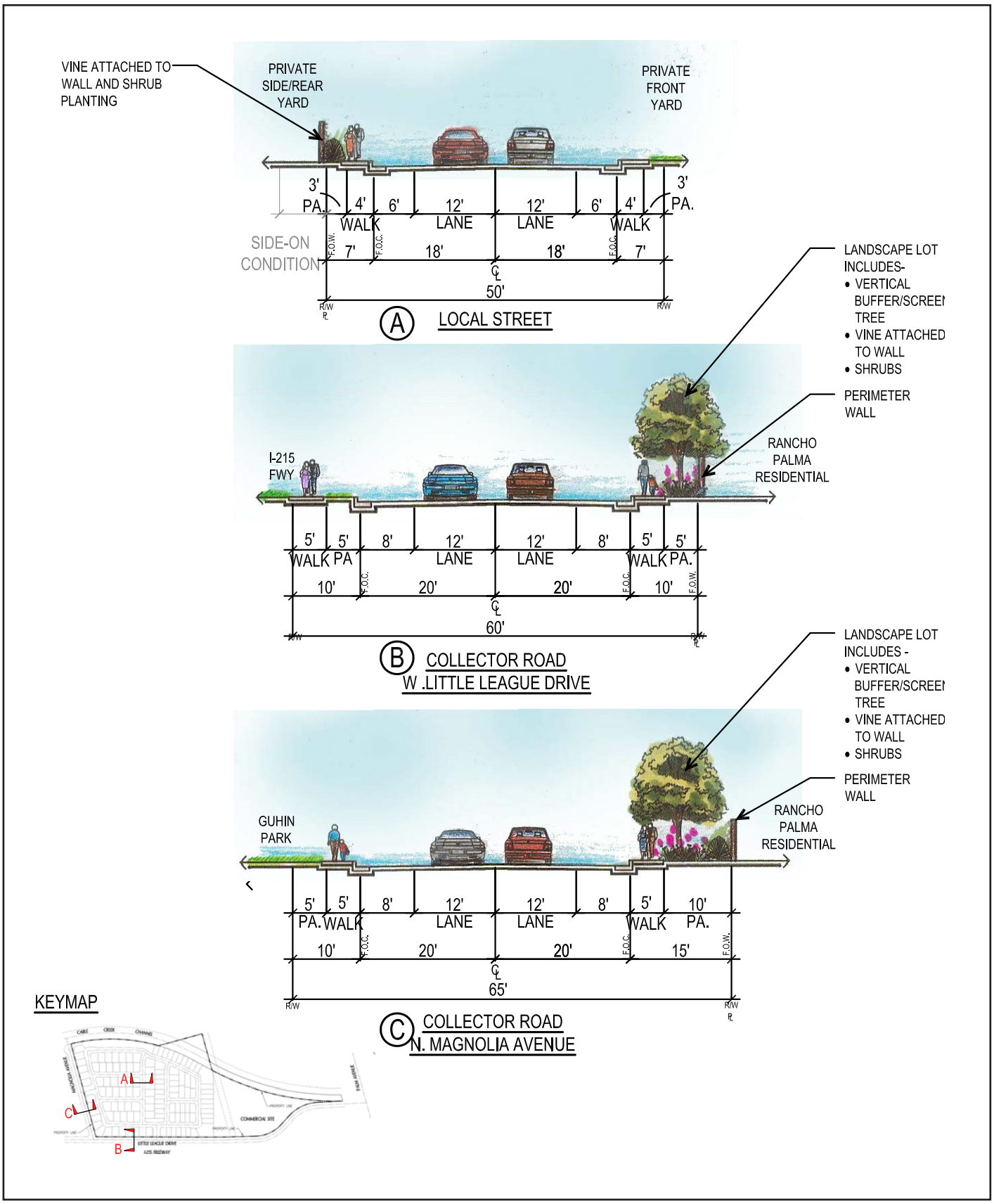


Figure 4-8

RANCHO PALMA

Streetscape Sections

Strata Palma, LLC

20 Feet

FORMA

November 2015

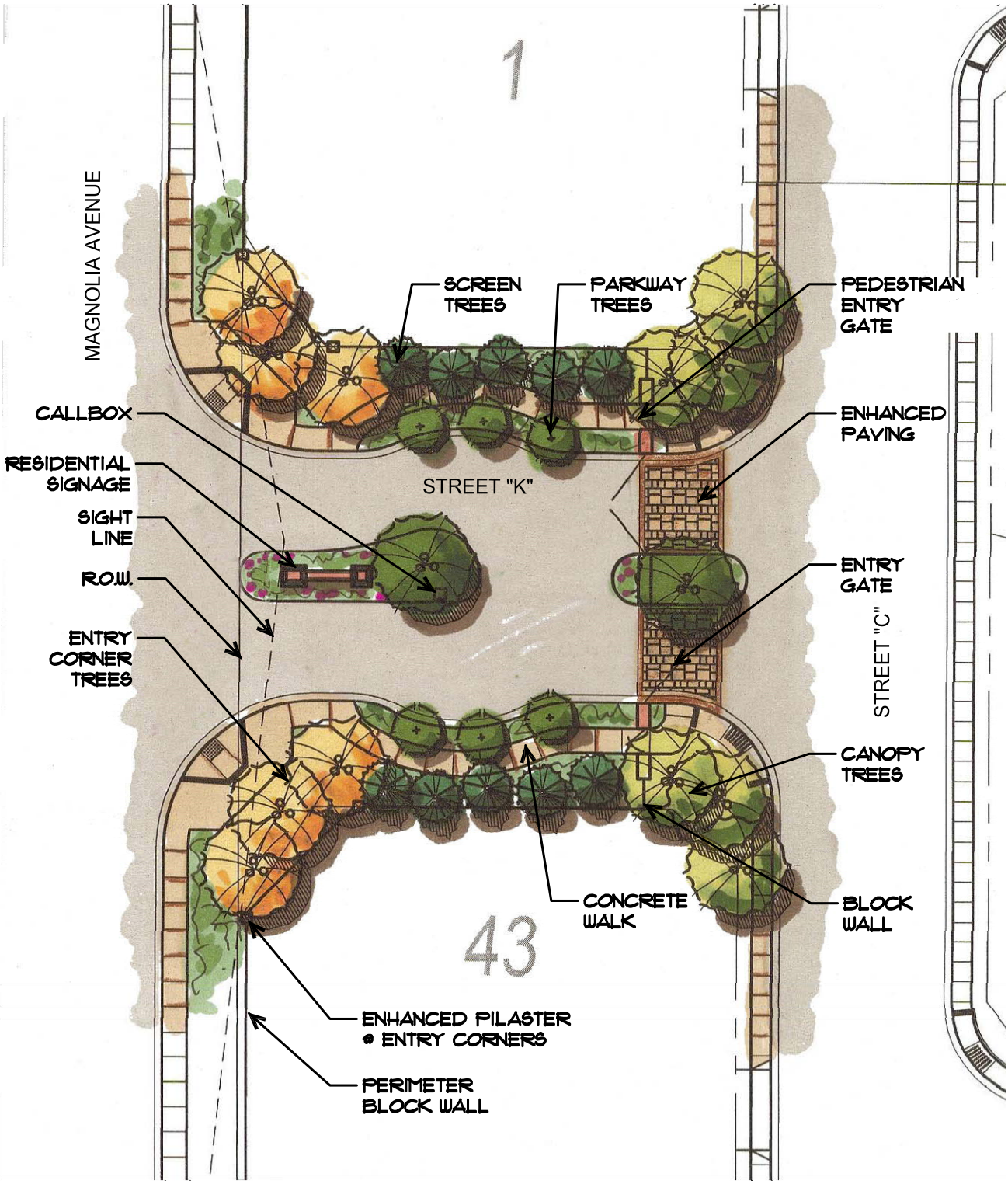


Figure 4-9

Project Entry Concept at Magnolia Avenue

RANCHO PALMA

Strata Palma, LLC

20 Feet

FORMA

November 2015

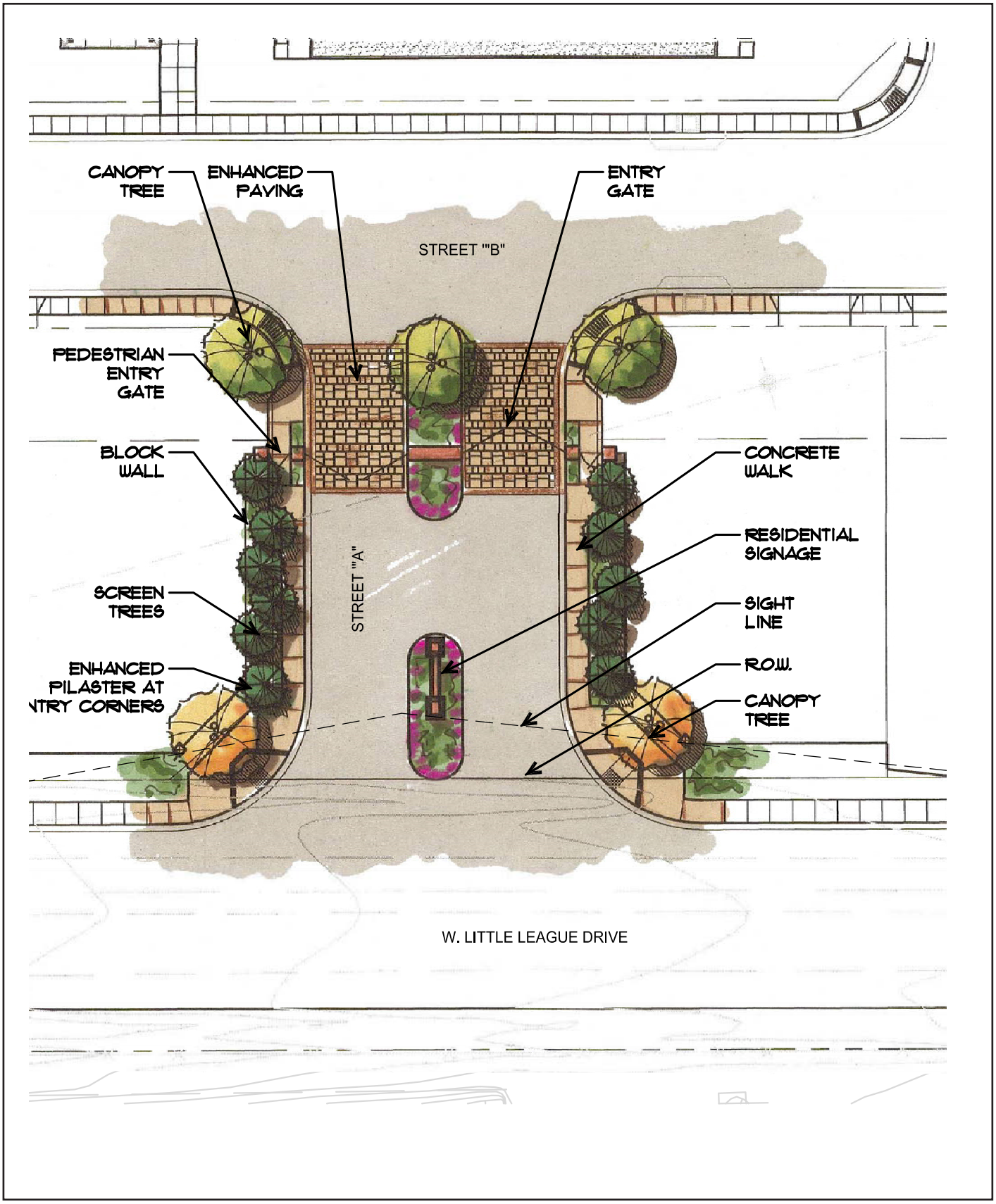


Figure 4-10

Project Entry Concept at W. Little League Drive

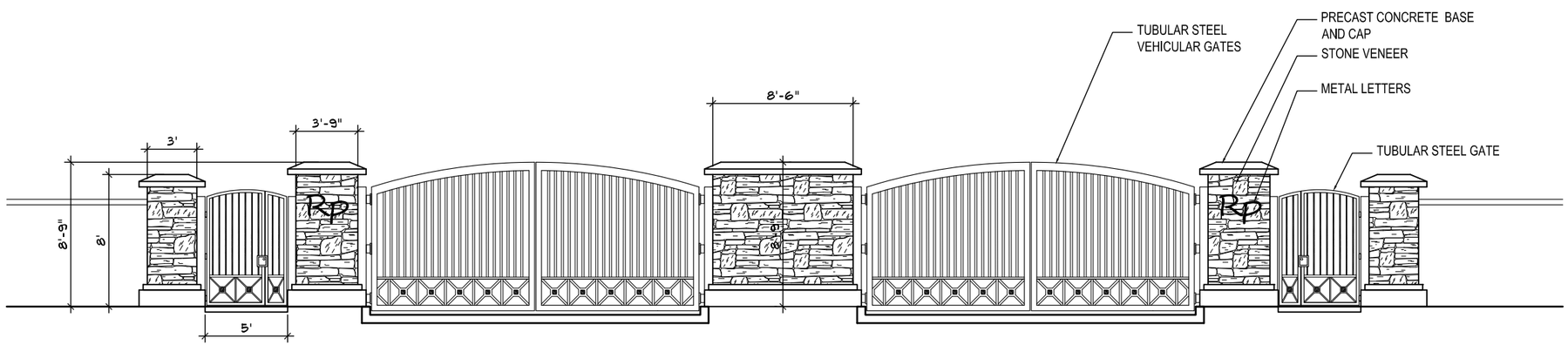
RANCHO PALMA

Strata Palma, LLC

20 Feet

FORMA

November 2015



ENTRY GATE MANIFOLD

Figure 4-11

RANCHO PALMA

Project Entry Gate

Strata Palma, LLC

30 Feet

FORMA

November 2015

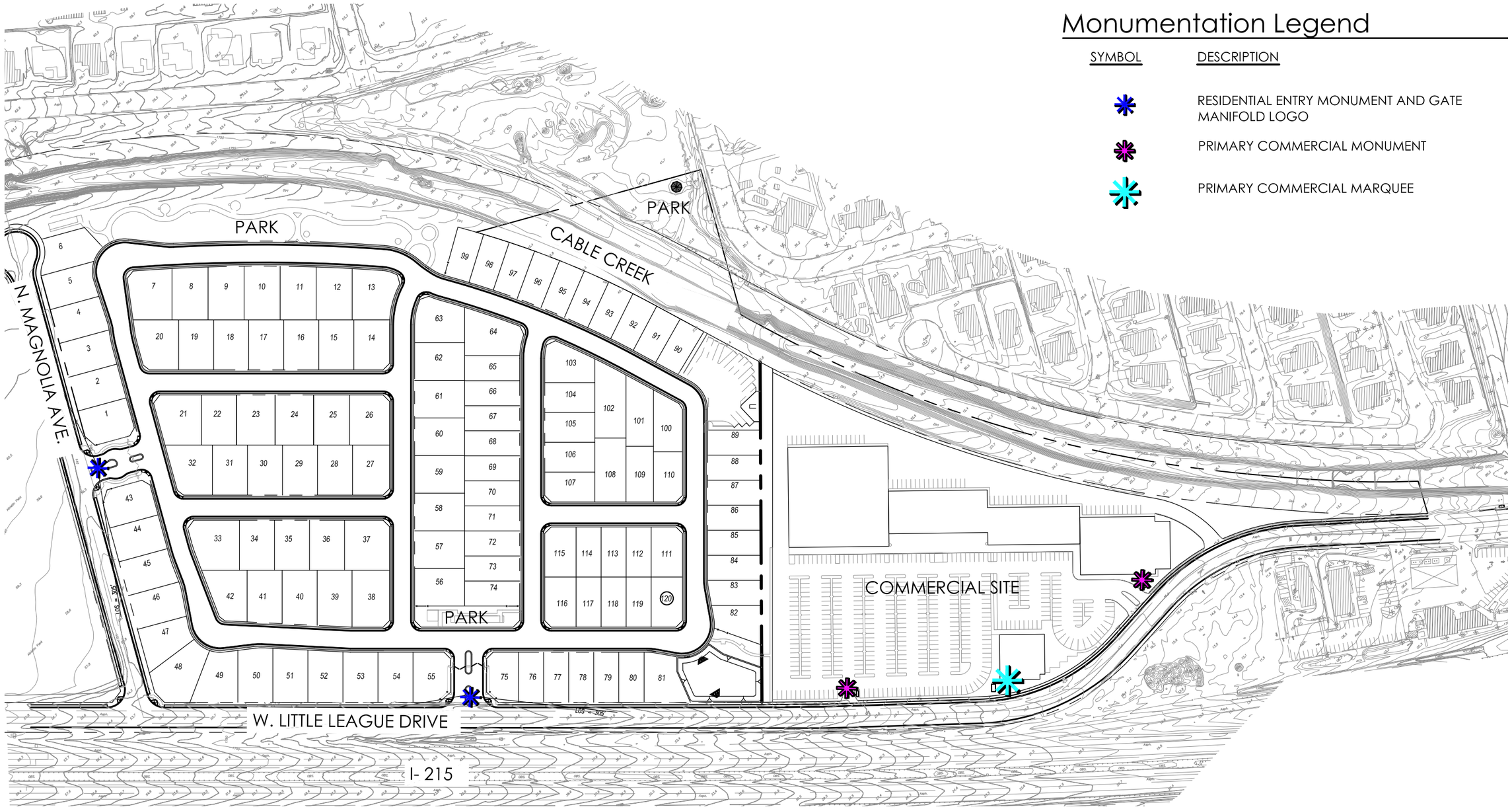


Figure 4-12

RANCHO PALMA

Monumentation Plan

Strata Palma, LLC

200 Feet

FORMA

November 2015

NOT TO SCALE

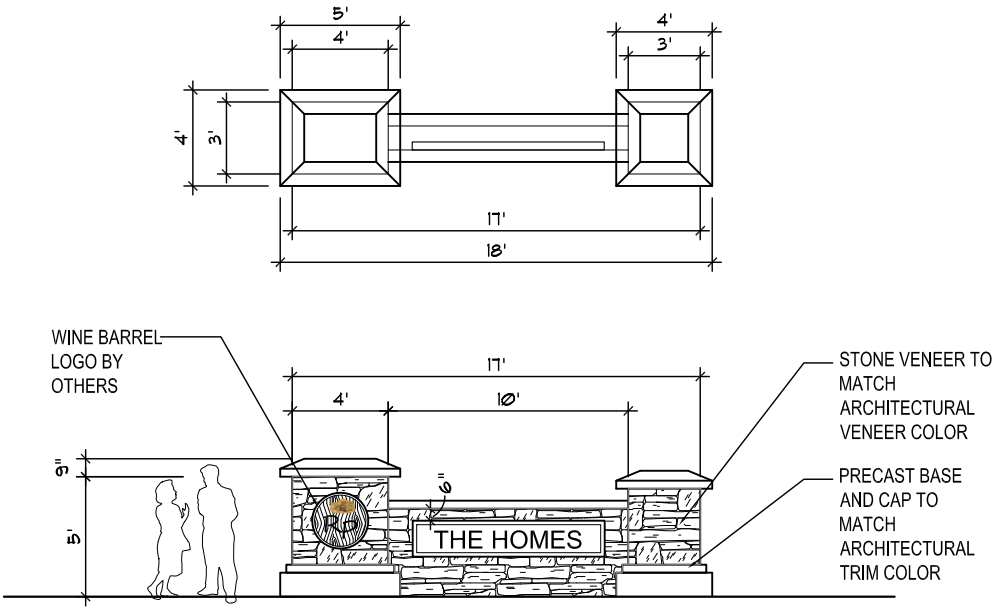


Figure 4-13

RANCHO PALMA

Residential Entry Monumentation

Strata Palma, LLC

FORMA

Feet

November 2015

NOT TO SCALE

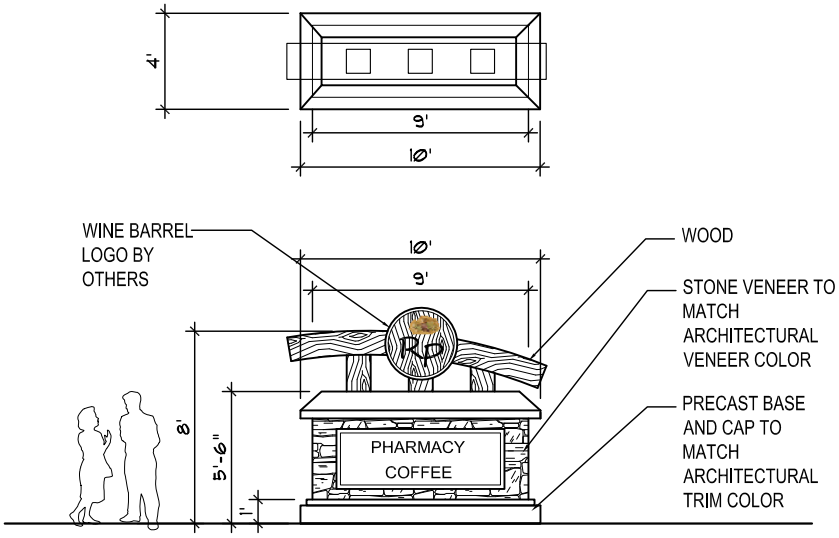


Figure 4-14

RANCHO PALMA

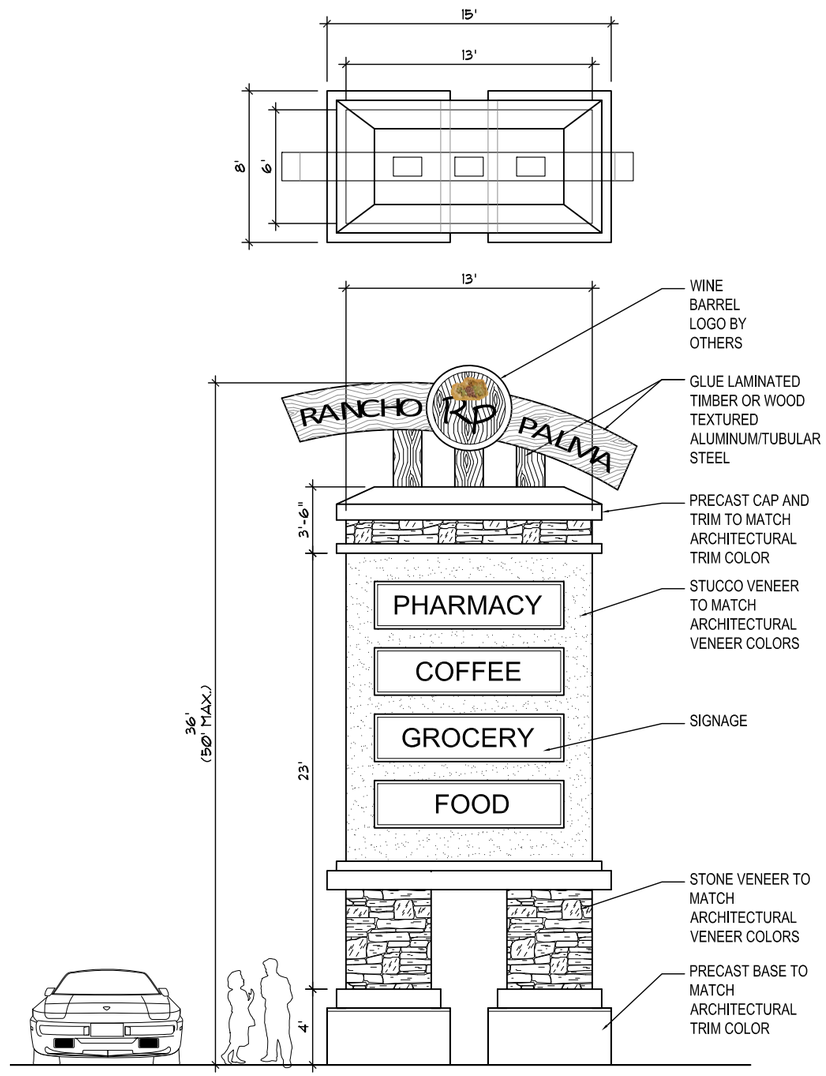
Primary Commercial Monumentation

Strata Palma, LLC

FORMA

Feet

November 2015



RETAIL SIGNAGE

NOT TO SCALE

Figure 4-15

Primary Commercial Marquee

RANCHO PALMA

Strata Palma, LLC

8 Feet

FORMA

November 2015

4.4.5 Wall and Fence Guidelines

Maintaining quality and character of all aspects of the public realm is a key place-making principle. The wall and fence design criteria is intended to provide variety and privacy for each lot while providing continuity and unity within the community.

Walls and fencing will be used throughout the community to complement the overall design theme, establish community identity, provide protection from roadway and other noise, and allow privacy and security in residential areas. The use of walls and fences can also serve to accentuate neighborhood features in addition to screening streets and adjacent uses.

The following types of walls and fences (open and largely transparent) have been selected for possible use within different areas of the project site. All wall and fence heights are measured from the highest grade elevation on either side of the wall or fence. An overall community wall program is provided to help unify and reinforce community character.

- Decorative walls and/or screen walls shall be integrated with the architecture of community buildings, as well as the overall landscape design.
- All community theme walls and fences shall be consistent in design.
- The community wall will be colored split face block with a 4” precision block cap.
- Interior/side yard or any wall not visible to the public realm shall be precision block with precision cap.
- Vines and/or shrubs should be planted along community walls to soften the visual character. An extensive use of vines is encouraged.

Figure 4-16 depicts the Rancho Palma Wall and Fence Master Plan, and Figure 4-17 depicts Wall and Fence Details.

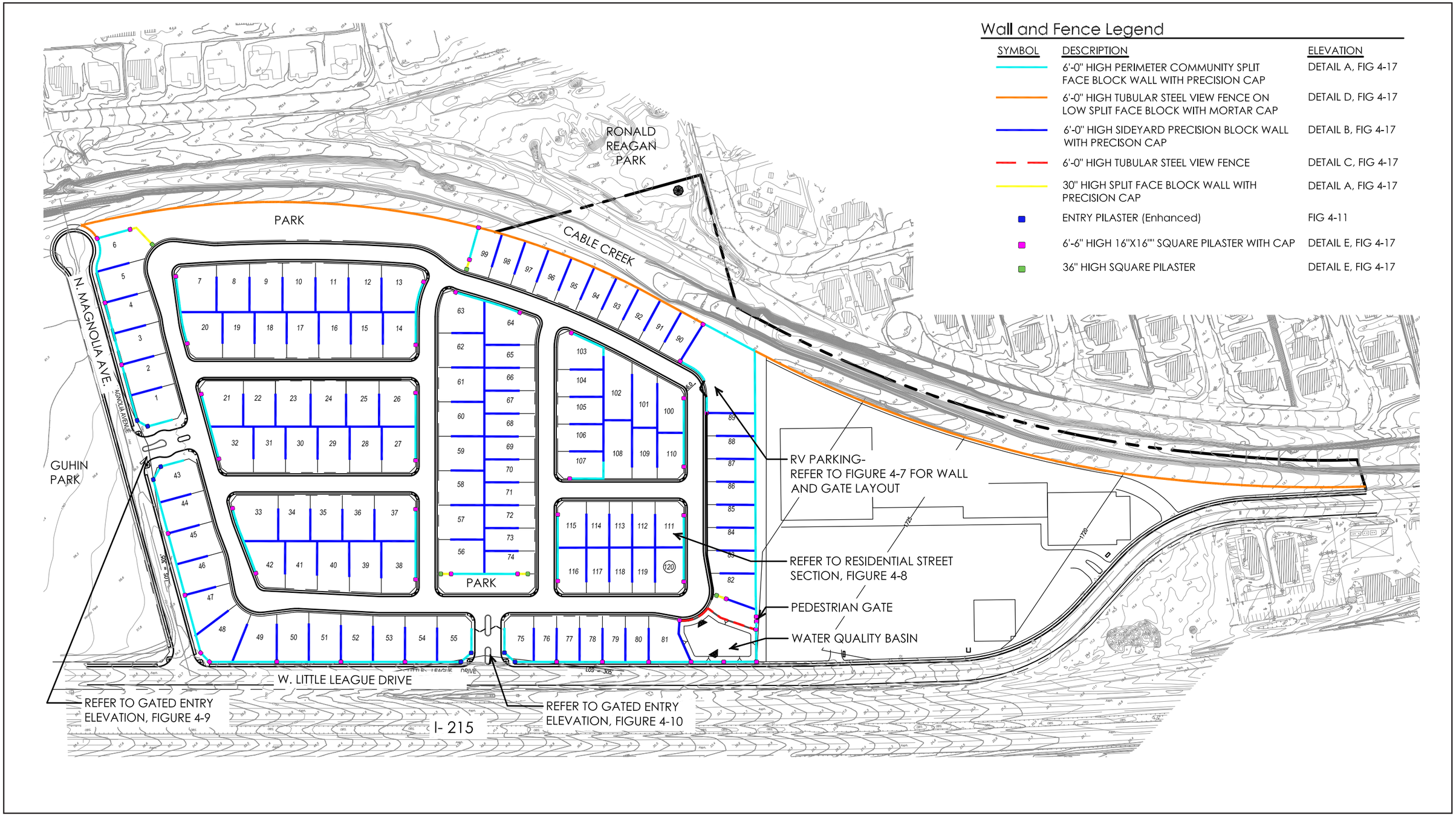


Figure 4-16

RANCHO PALMA

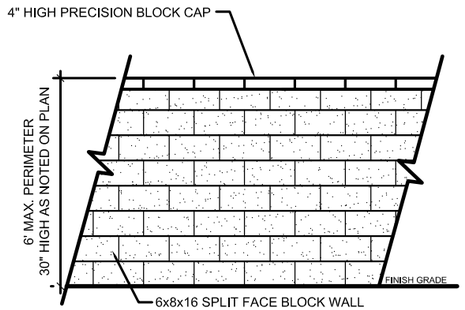
Wall and Fence Master Plan

Strata Palma, LLC

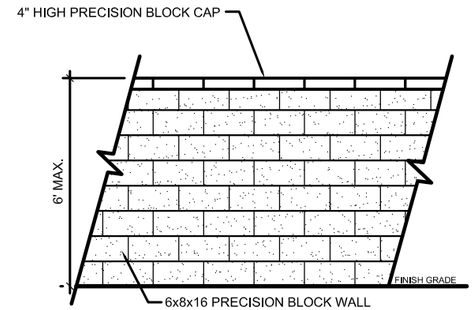
200 Feet

FORMA

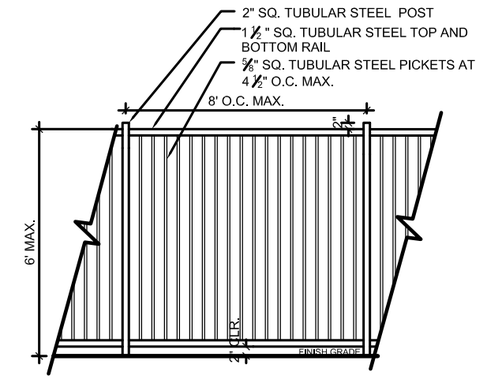
November 2015



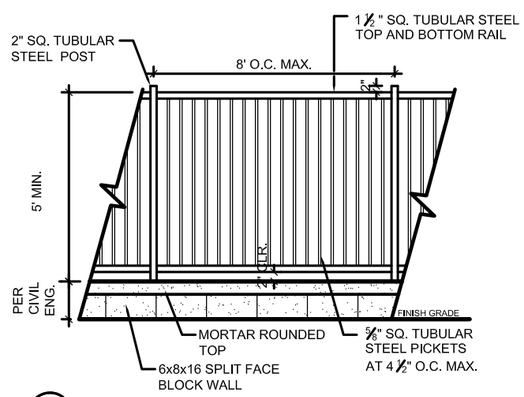
A SPLIT FACE BLOCK WALL



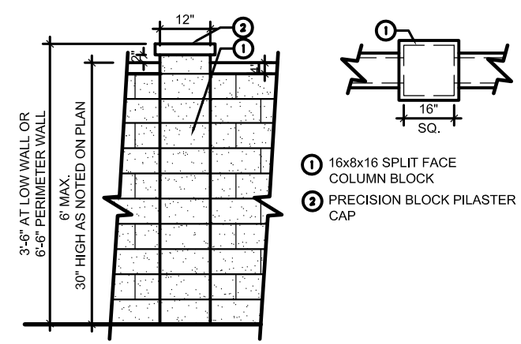
B PRECISION BLOCK WALL



C TUBULAR STEEL FENCE



D SPLIT FACE BLOCK LOW WALL WITH TUBULAR STEEL VIEW FENCE



E PERIMETER SPLIT FACE BLOCK PILASTER

Figure 4-17

RANCHO PALMA

Wall and Fence Details

Strata Palma, LLC

N.T.S.

Feet

FORMA

November 2015

4.4.6 Landscape Irrigation

All common landscape areas will be permanently irrigated using an automatic, underground irrigation system or drip system. The irrigation system will be separated into several systems based on water requirements of each hydrozone. Hydrozone separations will be based on sun orientation and water requirements of the plant material.

Irrigation of required landscaped areas shall be by either automatic, overhead, high-efficiency spray nozzle or drip irrigation and matched precipitation rate, low gallonage sprinkler heads, bubblers, and timing devices. Landscape areas less than 6' wide shall be irrigated with drip irrigation. Timing devices shall include soil moisture sensors and rain sensing override devices. Sprinkler popup heights shall range from 6" high in turf areas and 12" high in shrub/groundcover beds where a drip system may not be applicable. The irrigation system shall be capable of operating automatically by incorporating an electric weather-based and climate-smart irrigation controller or advanced solar technology components and low voltage electric remote control valves. Quick coupling valves, as required, shall be strategically located to provide supplemental water to plant material and for wash down purposes. All remote control and quick coupling valves shall be located and installed within the shrub beds wherever possible.

4.4.7 Plant Palette

The plant list for this project was developed to reinforce the community theme and to create some seasonal change with a mixture of low water use, drought-tolerant, deciduous, and evergreen plants while maintaining a well-balanced landscape. Many plants on this list are considered as low water use and are drought-tolerant species. These were chosen based on their specific growth characteristics, including flowering and foliage color, texture and form.

The following items should be considered in the community landscape design process:

- Extensive use of trees, vines and shrubs to soften the perimeter community theme wall and fencing and to provide a buffer to the adjacent land uses.
- Recognition of existing natural conditions and situations.
- Use of both "formal" and "informal" planting arrangements, depending upon the particular condition.
- Layering of the shrub understory to create depth, variety and interest.

Arbutus unedo

Cercis occidentalis

Chilopsis linearis

Cupaniopsis anacardiodes

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
TREES									
Abies spp. (limited varieties are native)	Fir	●						Moderate	
Acacia spp.	Acacia	●						Low	
Agonis flexuosa	Peppermint Tree	●						Low	
Albizia julibrissin	Silk Tree	●	●			●		Low	
Araucaria araucana	Monkey Puzzle Tree	●						Moderate	
Araucaria bidwillii	Bunya-Bunya	●						Moderate	
Araucaria heterophylla	Norfolk Island Pine	●						Moderate	
Arbutus "Marina"	Marina Arbutus	●	●	●	●	●	●	Moderate	
Arbutus unedo	Strawberry Tree	●	●	●	●	●	●	Low	
Bauhinia variegata (purpurea)	Purple Orchid Tree	●	●					Moderate	
Brachychiton populneus	Bottle Tree	●	●	●	●	●		Low	
Callistemon citrinus	Bottle Brush	●						Low	
Calocedrus decurrens	Incense Cedar	●						Moderate	●
Cassia leptophylla	Gold Medallion Tree	●	●	●	●	●		Moderate	
Castanospermum australe	Moreton Bay Chestnut	●				●		Moderate	
Casuarina cunninghamiana	River She-Oak	●						Low	
Catalpa bignonioides	Bean Tree	●						Moderate	
Catalpa speciosa	Western Catalpa	●				●		Moderate	
Celtis occidentalis	Common Hackberry	●	●	●				Moderate	
Celtis sinensis	Chinese Hackberry	●						Moderate	
Ceratonia siliqua	Carob	●	●	●	●	●		Low	
Cercis canadensis	Eastern Redbud	●						Moderate	
Cercis mexicana	Mexican Redbud	●						Moderate	
Cercis occidentalis	Western Redbud	●	●	●	●	●		Low	●
Chilopsis linearis	Desert Willow	●						Low	●
Chionanthus retusus	Chinese Fringe Tree	●						Moderate	
Cinnamomum camphora	Camphor Tree	●	●	●	●	●		Moderate	
Citrus spp.	Orange, Lemon Etc.	●		●		●		Moderate	
Cupaniopsis anacardioides	Carrotwood	●	●	●	●	●		Moderate	
Cupressus sempervirens	Italian Cypress	●		●	●			Low	
Dracaena draco	Dragon Tree	●						Low	

Eriobotrya deflexa

Ginkgo biloba 'Autumn Gold'

Jacaranda mimosifolia

Koelreuteria paniculata

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Eriobotrya deflexa	Bronze Loquat	●	●	●	●	●		Moderate	
Eriobotrya japonica	Loquat	●						Moderate	
Erythrina coralloides	Naked Coral Tree	●						Moderate	
Erythrina crista-galli	Cockspur Coral Tree	●						Low	
Ficus florida	Florida Fig	●	●	●	●	●		Moderate	
Ficus macrophylla	Moreton Bay Fig	●		●	●			Moderate	
Ficus microcarpa (F. retusa nitida)	Indian Laurel Fig/ Laurel Fig	●		●	●			Moderate	
Ficus rubiginosa (F. microphylla)	Rusty Leaf Fig	●	●	●	●	●		Moderate	
Fraxinus angustifolia "Raywood" (F. oxycarpa)	Raywood Ash	●				●		Moderate	
Fraxinus dipetala	Foothill Ash	●						Low	●
Fraxinus uhdei	Evergreen Ash	●				●	●	Moderate	
Fraxinus velutina	Arizona Ash	●				●	●	Moderate	●
Fraxinus velutina "Modesto"	Modesto Ash	●				●	●	Moderate	●
Geijera parviflora	Australian Willow	●	●		●	●		Moderate	
Ginkgo biloba	Maiden Hair Tree	●		●	●			Moderate	
Gleditsia triacanthos	Honey Locust	●	●			●		Low	
Grevillea robusta	Silk Oak	●				●		Low	
Handroanthus chrysotrichus (Tabebuia chrysotricha)	Golden Trumpet Tree	●	●	●	●	●		Moderate	
Handroanthus impetiginosus (Tabebuia impetiginosa)	Pink/Lavender Trumpet Tree	●	●	●	●	●		Moderate	
Hesperocyparis spp.	Cypress	●						Very Low	
Hymenosporum flavum	Sweet Shade	●			●	●		Moderate	
Jacaranda mimosifolia	Jacaranda	●		●	●	●		Moderate	
Juglans californica	California Black Walnut	●						Low	●
Juglans hindsii	Northern California Black Walnut	●						Low	●
Juniperus spp.	Juniper	●		●	●	●		Moderate	
Juniperus scopulorum	Rocky Mountain Juniper	●						Moderate	
Koelreuteria bipinnata	Chinese Flame Tree	●	●	●	●	●		Moderate	
Koelreuteria elegans	Chinese Flame Tree	●						Moderate	
Koelreuteria paniculata	Golden Rain Tree	●	●	●	●	●		Low	
Lagerstroemia spp., hybrids	Crape Myrtle	●	●	●	●	●		Moderate	
Laurus nobilis	Sweet Bay	●	●		●			Low	

Liquidambar styraciflua

Magnolia grandiflora

Pistacia chinensis

Parkinsonia 'Desert Museum'

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Leptospermum "Dark Shadows"	Dark Shadows Tea Tree	●						Low	
Leptospermum laevigatum	Australian Tea Tree	●						Low	
Leptospermum petersonii	Lemon Scented Tea Tree	●						Low	
Liquidambar styraciflua	Sweet Gum	●	●	●	●	●		Moderate	
Lonicera hispidula	California Honeysuckle	●						Very Low	●
Lophostemon confertus (Tristania conferta)	Brisbane Box	●	●	●	●	●	●	Moderate	
Lyonothamnus spp.	Ironwood	●						Low	●
Magnolia grandiflora	Southern Magnolia	●	●	●	●	●		Moderate	
Magnolia x soulangeana	Saucer Magnolia	●		●	●			Moderate	
Melaleuca linariifolia	Flax Leaf Paper Bark	●	●	●	●	●		Low	
Melaleuca nesophila	Pink Melaleuca	●						Low	
Melaleuca viridiflora var. rubriflora (M. quinquenervia)	Cajeput Tree	●						Moderate	
Metrosideros excelsa (M. tomentosa)	New Zealand Christmas Tree	●			●	●		Moderate	
Morus alba	White Mulberry	●						Moderate	
Olea europaea	Olive	●	●	●	●	●		Low	
Olneya tesota	Desert Ironwood	●						Low	●
Parkinsonia spp.	Mexican Palo Verde/ Jerusalem Thorn	●	●	●	●	●		Low	
Parkinsonia "Desert Museum" (Cercidium)	Desert Museum Palo Verde	●	●	●	●	●		Low	●
Parkinsonia florida (Cercidium florida)	Blue Palo Verde	●						Very Low	●
Parkinsonia microphylla (Cercidium microphyllum)	Little Leaf Palo Verde	●						Low	●
Pinus spp.	Pine	●	●	●	●	●	●	Low	●
Pinus attenuata	Knobcone Pine	●	●	●	●	●		Low	●
Pinus coulteri	Coulter Pine	●	●	●	●	●		Low	●
Pinus edulis	Pinyon Pine	●	●	●	●	●		Low	●
Pinus monophylla	Single Leaf Pinyon Pine	●	●	●	●	●		Low	●
Pinus ponderosa	Ponderosa Pine	●	●	●	●	●		Low	●
Pinus sabiniana	Foothill Pine	●	●	●	●	●		Low	●
Pistacia chinensis	Chinese Pistache	●	●	●	●	●		Moderate	
Platanus acerifolia "Bloodgood"	London Plane Tree								

Platanus racemosa

Prosopis spp.

Quercus agrifolia

Robinia 'Purple Robe'

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Platanus acerifolia "Columbia"	London Plane Tree								
Platanus racemosa	California Sycamore	●	●	●	●	●	●	Moderate	●
Podocarpus henkelii	Long Leaf Yellow Wood	●		●	●	●		Moderate	
Podocarpus macrophyllus	Yew Pine	●		●	●	●		Moderate	
Populus fremontii	Western Cottonwood	●				●	●	Moderate	●
Populus nigra "Italica"	Lombardy Poplar	●				●	●	Moderate	
Prosopis spp.	Mesquite	●				●	●	Low	
Prunus spp.	Stone Fruit	●		●	●	●		Moderate	
Prunus caroliniana	Carolina Laurel Cherry	●		●	●	●		Moderate	
Prunus ilicifolia	Holly Leaf Cherry	●						Very Low	●
Prunus ilicifolia lyonii	Catalina Cherry	●					●	Low	●
Psidium littorale var. longipes (P. cattleianum)	Strawberry Guava	●				●		Moderate	
Pyrus calleryana cultivars	Callery Pear	●						Moderate	
Pyrus kawakamii	Evergreen Pear	●			●			Moderate	
Quercus spp. (limited varieties are native)	Coast Live Oak	●	●	●	●		●	Low	●
Quercus agrifolia	Coast Live Oak	●	●	●	●			Low	●
Quercus douglasii	Blue Oak	●	●	●	●			Low	●
Quercus engelmannii	Mesa Oak	●	●	●	●			Low	●
Quercus kelloggii	California Black Oak	●	●	●	●			Moderate	●
Quercus lobata	Valley Oak	●	●	●	●		●	Moderate	●
Quercus wislizeni	Interior Live Oak	●	●	●	●		●	Very Low	●
Robinia pseudoacacia	Black Locust	●						Low	
Robinia x ambigua	Locust	●						Low	
Schinus molle	California Pepper Tree	●				●		Low	
Schinus terebinthifolius	Brazilian Pepper Tree	●			●	●		Moderate	
Senna spectabilis (Cassia excelsa)	Senna/Cassia (Spectabilis/Excelsa)	●						Moderate	
Sequoiadendron giganteum	Giant Sequoia	●				●		Moderate	●
Stenocarpus sinuatus	Firewheel Tree	●						Moderate	
Styphnolobium japonicum ((Sophora japonica)	Japanese Pagoda Tree	●						Moderate	
Taxus baccata	English Yew	●			●			Moderate	

Tipuana tipu

Zelkova serrata

Chamaerops humilis

Phoenix reclinata

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Taxus baccata "Fastigiata"	Irish Yew	●						Moderate	
Thuja plicata	Western Red Cedar	●						Moderate	●
Tipuana tipu	Tipu Tree	●	●	●	●	●		Moderate	
Tristaniopsis laurina	Little Leaf Myrtle	●						Moderate	
Ulmus americana	American Elm	●						Moderate	
Ulmus parvifolia	Chinese Evergreen Elm	●	●	●	●	●		Low	
Ulmus pumila	Siberian Elm	●						Low	
Umbellularia californica	California Bay	●	●			●		Moderate	●
x Chitalpa tashkentensis	Chitalpa	●						Low	
Zelkova serrata	Saw Leaf Zelkova	●	●	●	●	●		Moderate	
PALMS									
Archontophoenix cunninghamiana	King Palm	●			●	●		Moderate	
Brahea armata	Blue Hesper Palm	●		●	●			Low	
Brahea brandegeei	San Jose Hesper Palm	●						Low	
Brahea edulis	Guadalupe Palm	●			●			Low	●
Butia odorata (B. capitata)	Pindo Palm	●			●			Low	
Chamaerops humilis	Mediterranean Fan Palm	●		●	●	●		Low	
Cycas revoluta	Sago Palm	●		●	●	●		Moderate	
Howea forsteriana	Kentia Palm	●			●			Moderate	
Phoenix canariensis	Canary Island Date Palm	●			●	●		Low	
Phoenix dactylifera	Date Palm	●			●	●		Low	
Phoenix reclinata	Senegal Date Palm	●			●	●		Moderate	
Phoenix roebelenii	Pigmy Date Palm	●		●	●	●		Moderate	
Ravenea rivularis	Majesty Palm	●						Moderate	
Rhapis excelsa	Lady Palm	●			●			Moderate	
Rhapis humilis	Slender Lady Palm	●			●			Moderate	
Sabal spp.	Palmetto	●			●	●		Moderate	
Syagrus romanzoffiana (Arecastrum romanzoffiana)	Queen Palm	●			●	●		Moderate	
Trachycarpus fortunei	Windmill Palm	●			●	●		Low	
Washingtonia filifera	California Fan Palm	●			●	●	●	Low	●
Washingtonia robusta	Mexican Fan Palm	●			●	●	●	Low	

Abelia x grandifolia

Acanthus mollis

Asclepias spp.

Baccharis 'Centennial'

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
SHRUBS									
Abelia chinensis	Chinese Abelia	●						Moderate	
Abelia floribunda	Mexican Abelia	●						Moderate	
Abelia parvifolia (A. longituba)	Schuman Abelia	●						Moderate	
Abelia x grandiflora	Glossy Abelia	●	●	●	●	●		Moderate	
Abutilon palmeri	Indian Mallow	●						Low	●
Acacia spp.	Acacia	●					●	Low	
Acacia greggii	Catclaw Acacia	●						Low	●
Acacia podalyriifolia	Pearl Acacia	●						Moderate	
Acanthus mollis (shade in the desert) (dormant in summer in CV)	Bear's Breech	●			●	●		Moderate	
Acca sellowiana (Feijoa sellowiana)	Pineapple Guava	●				●		Moderate	
Adenostoma fasciculatum	Chamise	●						Very Low	●
Aesculus californica	California Buckeye	●					●	Low	●
Alyogyne huegelii	Blue Hibiscus	●		●	●	●		Low	
Anisodontea X hypomandarum	South African Mallow	●						Moderate	
Aquilegia spp. (CA native and non-native spp.)	Columbine	●						Moderate	●
Arctostaphylos spp.	Manzanita	●		●	●	●	●	Low	●
Arctostaphylos hookeri "Ken Taylor"	Ken Taylor Manzanita	●		●	●	●	●	Low	●
Arctostaphylos hookeri "Wayside"	Wayside Manzanita	●		●	●	●	●	Low	●
Artemisia spp. (shrubby)	Sagebrush	●						Low	
Artemisia californica	California Sagebrush	●						Very Low	●
Artemisia californica "Canyon Gray"	Canyon Gray Sagebrush	●						Very Low	●
Artemisia californica "Montara"	Montara Sagebrush	●						Very Low	●
Artemisia douglasiana	California Mugwort	●						Low	●
Asclepias (CA native species)	Milk/Silk Weed	●						Low	●
Asclepias subulata	Desert Milkweed	●						Low	●
Atriplex CA native species	Saltbush	●						Very Low	●
Aucuba japonica (SHADE)	Japanese Aucuba	●			●	●		Moderate	
Baccharis spp.	Baccharis	●	●	●	●	●	●	Low	●
Baccharis "Centennial"	Centennial Baccharis	●			●	●	●	Low	●
Baccharis salicifolia	Mule Fat	●						Moderate	●

Berberis spp.

Bougainvillea spp.

Buddleja davidii

Ceanothus spp.

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Bambusa spp.	Bamboo (Bambusa)	●			●	●		Moderate	
Berberis spp.	Berberis	●					●	Low	●
Berberis "Golden Abundance" (Mahonia)	Golden Abundance Mahonia	●						Moderate	●
Berberis nevinii	Nevin Mahonia	●						Low	●
Berberis x stenophylla "Irwinii"	Barberry	●						Moderate	
Bougainvillea spp.	Bougainvillea	●		●	●			Low	
Brunfelsia pauciflora	Yesterday Today And Tomorrow	●						Moderate	
Buddleja davidii and hybrids	Butterfly Bush	●				●		Moderate	
Buxus microphylla japonica	Japanese Boxwood	●	●	●	●	●		Moderate	
Caesalpinia gilliesii	Desert Bird Of Paradise	●						Low	
Caesalpinia mexicana	Mexican Bird Of Paradise	●						Low	
Calliandra californica	Baja Fairy Duster	●				●		Low	●
Calliandra eriophylla	Fairy Duster	●				●		Very Low	●
Calliandra haematocephala	Pink Powder Puff	●						Moderate	
Calliandra tweedii	Trinidad Flame Bush	●						Low	
Callistemon spp.	Bottlebrush	●						Low	
Calycanthus occidentalis (in shade)	Western Spice Bush	●						Moderate	●
Camellia japonica (SHADE IN DESERT)	Camellia	●			●			Moderate	
Camellia sasanqua (SHADE IN DESERT)	Sasanqua Camellia	●			●	●		Moderate	
Carissa spp.	Natal Plum	●	●	●	●	●		Moderate	
Carpenteria californica	Bush Anemone	●						Moderate	●
Ceanothus spp.	Ceanothus	●	●	●	●	●	●	Low	●
Ceanothus arboreus	Island Ceanothus	●	●	●	●	●	●	Moderate	●
Ceanothus "Gloire de Versailles"	Gloire De Versailles Ceanothus	●	●	●	●	●	●	Moderate	
Ceanothus "Joyce Coulter"	Joyce Coulter Ceanothus	●	●	●	●	●	●	Moderate	●
Ceanothus thyrsiflorus "El Dorado"	El Dorado Ceanothus	●	●	●	●	●	●	Moderate	●
Ceanothus thyrsiflorus "Skylark"	Skylark Ceanothus	●	●	●	●	●	●	Moderate	●
Cephalanthus occidentalis	Button Bush	●						Moderate	●

Coloenema pulchellum

Coprosma repens

Dodonaea viscosa 'Purpurea'

Echium candicans

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Cistus spp.	Rockrose	●		●	●	●		Low	
Cocculus laurifolius	Laurel Leaf Cocculus	●						Moderate	
Coleonema album	White Breath Of Heaven	●	●	●	●			Moderate	
Coleonema pulchellum (C. pulchrum)	Breath Of Heaven	●	●	●	●			Moderate	
Convolvulus cneorum	Bush Morning Glory	●			●	●		Low	
Coprosma repens	Mirror Plant	●	●	●	●	●		Moderate	
Coprosma x kirkii	Creeping Coprosma	●	●	●	●	●		Moderate	
Cordyline australis	New Zealand Cabbage Tree	●						Moderate	
Cordyline hybrids	Cordyline Hybrids	●						Moderate	
Cordyline stricta	Palm Lily	●						Moderate	
Correa spp.	Australian Fuchsia	●						Low	
Cotinus coggygria	Smoke Tree	●	●		●			Low	
Cotoneaster spp. (shrubs)	Cotoneaster	●		●				Moderate	
Cotoneaster coriaceus (C. lacteus, C.parneyi))	Red Clusterberry	●						Moderate	
Cotoneaster salicifolius	Willowleaf Cotoneaster	●						Moderate	
Crassula spp.	Crassula	●						Low	
Cuphea "David Verity" (all Hybrids)	Large Firecracker Plant	●						Moderate	
Cuphea hyssopifolia	False Heather	●						Moderate	
Cuphea ignea	Cigar Plant	●			●	●		Moderate	
Cuphea llavea	Bat-Faced Cuphea	●			●	●		Moderate	
Cuphea "Strybing Sunset"	Stribing Sunset Cigar Plant	●						Moderate	
Dalea bicolor	Dalea (Bicolor)	●						Low	
Dendromecon harfordii	Island Bush Poppy	●					●	Low	●
Dendromecon rigida	Tree Poppy	●					●	Very Low	●
Dodonaea viscosa	Hopseed Bush	●	●	●	●	●		Moderate	
Dodonaea viscosa "Purpurea"	Purple Hopseed Bush	●		●	●	●		Moderate	
Dryopteris arguta	Coastal Wood Fern	●						Low	●
Dryopteris filix-mas	Male Fern	●						Moderate	●
Echium candicans (fastuosum)	Pride Of Madeira	●		●	●	●		Low	
Elaeagnus pungens	Silverberry	●			●			Low	

Encelia californica

Fremontodendron spp.

Heuchera micrantha

Lantana camara

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Encelia actoni	Mountain Bush Sunflower	●						Low	●
Encelia californica	Coast Sunflower	●					●	Low	●
Encelia farinosa	Brittle Bush	●					●	Very Low	●
Encelia frutescens	Green Brittlebush	●						Low	●
Erigeron glaucus	Beach Aster	●						Moderate	●
Eriogonum spp. (CA native and non-native spp.)	Buckwheat	●					●	Low	●
Escallonia spp.	Escallonia	●	●	●	●			Moderate	
Euonymus japonicus	Evergreen Euonymus	●	●	●	●	●		Moderate	
Fatsia japonica (SHADE)	Japanese Aralia	●	●	●	●	●		Moderate	
Forestiera pubescens	Desert Olive	●						Low	●
Fremontodendron spp.	Flannel Bush	●						Very Low	●
Galvezia juncea	Baja Bush-Snapdragon	●						Low	●
Gardenia spp.	Gardenia	●		●	●	●		Moderate	
Garrya elliptica	Coast Silktassel	●						Moderate	●
Garrya veatchii	Silk Tassel Bush	●						Very Low	●
Grevillea spp.	Grevillea	●		●	●	●		Low	
Hebe spp.	Hebe	●	●	●	●	●		Moderate	
Heteromeles arbutifolia	Toyon	●	●			●	●	Low	●
Heuchera elegans	Urn Flowered Alum Root	●	●	●	●			Low	●
Heuchera hirsutissima	Idyllwild Rock Flower	●	●	●	●			Low	●
Heuchera maxima	Island Alum Root	●	●	●	●			Moderate	●
Heuchera micrantha	Crevice Alum Root	●	●	●	●		●	Moderate	●
Hibiscus rosa-sinensis	Chinese Hibiscus	●						Moderate	
Hydrangea paniculata hybrids	Peegee Hydrangea	●		●	●	●		Moderate	
Ilex spp.	Holly	●						Moderate	
Iris douglasiana	Douglas Iris	●				●	●	Moderate	●
Iris Pacific Coast hybrids	Pacific Coast Hybrids	●		●		●	●	Moderate	●
Isocoma spp. (Haplopappus)	Goldenbush	●						Very Low	●
Juniperus spp.	Juniper	●	●	●	●	●		Moderate	
Juniperus californica	California Juniper	●	●	●	●	●		Low	●
Justicia brandegeana	Shrimp Plant	●						Moderate	
Justicia californica (Beloperone californica)	Chuparosa	●						Low	●
Lantana spp.	Lantana	●	●	●	●	●		Low	

Lavatera maritima

Lobelia laxiflora

Mimulus aurantiacus

Oenothera speciosa

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Lavandula spp.	Lavender	●	●	●	●	●		Low	
Lavatera maritima	Bush Mallow	●						Moderate	
Leonotis leonurus	Lion's Tail	●						Low	
Leptospermum spp.	Tea Tree	●						Low	
Leptosyne gigantea (Coreopsis gigantea)	Giant Coreopsis	●						Low	●
Leptosyne maritima (Coreopsis maritima)	Sea Dahlia	●						Low	●
Leucadendron spp, hybrids	Conebush	●				●	●	Moderate	
Leucophyllum spp.	Sage	●						Low	
Leucospermum spp	Pincushion Bush	●						Moderate	
Ligustrum japonicum	Japanese Privet	●	●	●	●	●		Moderate	
Lobelia laxiflora	Mexican Lobelia	●		●	●			Low	
Loropetalum chinense	Fringe Flower	●			●			Moderate	
Magnolia figo (Michelia figo)	Banana Shrub	●						Moderate	
Magnolia stellata	Star Magnolia	●						Moderate	
Malacothamnus spp.	Bush Mallow	●						Low	●
Malosma laurina (Rhus laurina)	Laurel Sumac	●						Low	●
Malva assurgentiflora (Lavatera assurgentiflora)	Tree Mallow	●						Low	●
Melianthus major	Honey Flower	●						Moderate	
Mimulus aurantiacus (Diplacus arachnoideus)	Sticky Monkey Flower	●						Very Low	●
Mimulus aurantiacus var. puniceus	Red Bush Monkey Flower	●						Very Low	●
Mimulus hybrids (shrubby) (Diplacus)	Monkey Flower	●						Low	●
Myoporum laetum	Coast Myoporum	●	●	●	●	●		Moderate	
Myrsine africana	African Boxwood	●	●	●	●	●		Moderate	
Myrtus communis	True Myrtle	●						Moderate	
Nandina domestica	Heavenly Bamboo	●			●			Moderate	
Nandina domestica "Purpurea"	Heavenly Bamboo (Nana)	●			●			Moderate	
Nerium oleander	Oleander	●			●			Low	
Oenothera caespitosa	Tufted (White) Evening Primrose	●						Low	●
Oenothera californica	California Evening Primrose	●						Very Low	●
Oenothera elata (E. hookeri)	Hooker's Evening Primrose	●						Low	●
Oenothera speciosa (O. berlandieri)	Mexican Evening Primrose	●						Low	
Osmanthus spp.	Sweet Olive/Osmanthus	●			●			Moderate	

Penstemon spectabilis

Pittosporum tenuifolium

Pyracantha coccinea

Rhamnus ilicifolia

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Otatea acuminata (aztecorum)	Mexican Weeping Bamboo	●			●			Moderate	
Pachycereus marginatus	Mexican Fence Post Cactus	●						Very Low	
Pedilanthus bracteatus	Tall Slipper Plant	●						Low	
Penstemon spp. (SW native)	Penstemon (SW Natives)	●					●	Low	●
Philodendron "Xanadu"	Xanadu Philodendron	●		●	●			Moderate	
Phlomis spp.	Phlomis	●						Low	
Phlox spp.	Phlox	●						Moderate	●
Photinia x fraseri	Fraser's Photinia	●	●	●	●	●		Moderate	
Phyllostachys spp.	Bamboo (Phyllostachys)	●			●			Moderate	
Pittosporum crassifolium	Evergreen Pittosporum	●	●	●	●	●		Moderate	
Pittosporum tenuifolium	Tawhiwhi	●	●	●	●	●	●	Moderate	
Pittosporum tobira	Mock Orange	●	●	●	●	●		Moderate	
Plumbago auriculata (capensis)	Cape Plumbago	●						Moderate	
Polygala fruticosa "Petite Buttterfly"	Petite Butterfly Pea Shrub	●						Moderate	
Polygala X dalmaisiana	Sweet Pea Shrub	●						Moderate	
Punica granatum	Dwarf Pomegranate	●		●		●		Low	
Pyracantha spp.	Firethorn	●						Moderate	
Ranunculus californicus	California Buttercup	●						Very Low	●
Rhamnus alaternus	Italian Buckthorn	●						Moderate	
Rhamnus crocea	Redberry	●						Low	●
Rhamnus ilicifolia	Hollyleaf Redberry	●						Low	●
Rhaphiolepis indica	Indian Hawthorne	●	●	●	●	●		Moderate	
Rhaphiolepis "Majestic Beauty"	Majestic Beauty	●	●	●	●	●		Moderate	
Rhaphiolepis umbellata	Yeddo Hawthorne	●						Moderate	
Rhus integrifolia	Lemonade Berry	●						Low	●
Rhus ovata	Sugar Bush	●					●	Low	●
Ribes spp.	Bitter Gooseberry	●						Low	●
Ribes californicum	Hillside Gooseberry	●						Low	●

Ribes speciosum

Romneya coulteri

Salvia leucantha

Senna artemesioides

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Ribes menziesii	Canyon Gooseberry	●						Low	●
Ribes sanguineum varieties	Red Flowering Currant	●					●	Moderate	●
Ribes speciosum	Fuchsia Flowering Gooseberry	●					●	Moderate	●
Roldana oaxacana (Senecio christobalensis)	Red Leafed Velvet Senecio	●						Moderate	
Roldana petasitis (Senecio petasitis)	Velvet Groundsel	●						Moderate	
Romneya coulteri	Matilija Poppy	●					●	Very Low	●
Rosa californica	California Wild Rose	●		●				Low	●
Rosa "Cecile Brunner"	Cecile Brunner Rose	●		●		●		Moderate	
Rosa hybrids spp.	Rose	●	●	●	●	●		Moderate	
Rosmarinus officinalis	Rosemary	●	●	●	●	●		Low	
Ruellia spp.	Petunia	●						Moderate	
Russelia equisetiformis	Coral Fountain	●			●	●		Moderate	
Salvia spp. (limited varieties are native)	Sage	●	●	●	●	●		Low	
Sambucus spp. (CA native and non-native spp.)	Elderberry	●						Low	●
Santolina spp.	Lavender Cotton	●						Low	
Sarcococca ruscifolia	Fragrant Sarcococca	●						Moderate	
Senecio cineraria (Jacobaea maritima)	Dusty Miller	●						Low	
Senecio flaccidus var. douglasii	Douglas Groundsel	●						Low	●
Senna artemisioides (Cassia artemisioides)	Feathery Cassia/Senna	●						Low	
Senna nemophila (Cassia nemophila)	Desert Cassia	●						Low	
Solanum umbelliferum	Blue Witch	●						Low	●
Spiraea spp. (CA native and non native spp.)	Spiraea	●						Moderate	●
Strelitzia nicolai (shade in desert)	Giant Bird Of Paradise	●	●	●	●	●		Moderate	
Strelitzia reginae (shade in desert)	Bird Of Paradise	●	●	●	●	●		Moderate	
Strelitzia reginae var juncea	Narrow-Leafed Bird Of Paradise	●	●	●	●	●		Low	
Symphoricarpos albus (SHADE)	Snowberry	●						Low	●
Symphoricarpos longiflorus (SHADE)	Desert Snowberry	●						Low	●
Symphoricarpos mollis (SHADE)	Creeping Snowberry	●						Low	●

Teucrium fruticans

Xylosma congestum

Aeonium arborescens

Agave 'Blue Glow'

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Tecoma spp.	Tecoma	●				●		Low	
Tecomaria capensis	Cape Honeysuckle	●	●	●	●	●		Moderate	
Ternstroemia gymnanthera	Japanese Ternstroemia	●						Moderate	
Teucrium chamaedrys	Germander	●						Low	
Teucrium fruticans	Bush Germander	●						Low	
Thevetia peruviana	Yellow Oleander	●				●		Moderate	
Thuja occidentalis	American Arborvitae	●						Moderate	
Trichostema lanatum	Woolly Blue Curls	●						Low	●
Trichostema parishii	Mountain Blue Curls	●						Low	●
Verbena gooddingii (Glandularia gooddingii)	Goodding Verbena	●	●	●	●			Low	●
Verbena stricta	Hoary Vervain	●						Moderate	
Viburnum japonicum	Japanese Viburnum	●	●	●	●	●		Moderate	
Viburnum suspensum	Sandanqua Viburnum	●	●	●	●	●		Moderate	
Viburnum tinus	Laurustinus	●	●	●	●	●		Moderate	
Westringia brevifolia	Small-Leafed Westringia	●						Moderate	
Westringia fruticosa (rosmariniformis) & hybrids	Coast Rosemary	●	●	●	●	●	●	Low	
Westringia longifolia	Winged Westringia	●						Moderate	
Westringia "Wynyabbie Gem"	Wynyabbie Gem Westringia	●	●	●	●	●	●	Low	
Woodwardia fimbriata	Giant Chain Fern	●						Moderate	●
Xylosma congestum	Shiny Xylosma	●	●	●	●	●		Moderate	
Zamia furfuracea	Cardboard Fern/Palm	●						Moderate	
SUCCULENTS									
Aeonium spp.	Canary Island Rose	●	●	●	●	●		Low	
Agave americana	Agave	●	●	●	●			Very Low	
Agave attenuata	Agave	●	●	●	●	●		Low	
Aloe spp. (CA native and non-native)	Aloe	●	●	●	●	●		Low	●
Beaucarnea recurvata (Nolina recurvata)	Ponytail Palm	●			●			Low	
Beschorneria yuccoides	Mexican Lily	●	●	●	●	●		Moderate	
Dasylirion spp.	Desert Spoon	●			●			Low	

Echeveria x imbricata

Sedum rubrotinctum

Aristida purpurea

Carex pansa

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Dudleya spp.	Dudleya, Live Forever	●						Low	●
Echeveria spp.	Hens And Chickens	●	●	●	●			Low	
Echinocactus spp. (CA native and non-native spp.)	Barrel Cactus	●						Low	●
Euphorbia spp.	Euphorbia	●						Low	
Euphorbia cotinifolia	Carribean Copper Plant	●						Moderate	
Euphorbia x martinii	Euphorbia	●						Moderate	
Ferocactus spp. (CA native and non-native spp.)	Barrel Cactus	●						Low	●
Fouquieria splendens	Ocotillo	●						Very Low	●
Hesperaloe spp.	Hesperaloe	●	●	●	●	●		Low	
Hesperoyucca spp. (Yucca whipplei, Yucca californica)	Yucca	●	●	●	●			Low	●
Kalanchoe spp.	Kalanchoe	●	●	●	●	●		Low	
Kleinia repens (Senecio repens)	Blue Chalksticks	●	●	●	●	●		Low	
Nolina spp. (CA natives and non-natives)	Bear Grass	●						Very Low	●
Opuntia spp.	Prickly Pear/Cholla	●						Very Low	●
Plectranthus neochilus	Lobster Flower	●						Moderate	
Portulacaria afra	Elephant's Food	●	●	●	●	●		Low	
Sansevieria spp.	Mother-In-Law's Tongue	●	●	●	●			Low	
Sedum spp. (some are Hylotelephium)	Stone Crop	●	●	●	●	●		Low	●
Senecio cylindricus spp.	Chalksticks	●						Low	
Senecio mandraliscae (Kleinia mandraliscae)	Kleinia	●	●	●	●	●		Low	
Senecio serpens	Blue Chalksticks	●	●	●	●	●		Low	
Yucca spp.	Yucca	●	●	●	●			Very Low	
Yucca baccata	Banana Yucca	●	●	●	●			Very Low	●
Yucca brevifolia	Joshua Tree	●	●	●	●			Very Low	●
Yucca schidigera (Y. californica, Y. mohavensis)	Mojave Yucca	●	●	●	●			Very Low	●
GRASSES									
Aristida purpurea	Purple Three-Awn	●	●	●	●	●	●	Low	●
Bouteloua curtipendula	Sideoats Grama	●	●	●	●	●	●	Low	●
Bouteloua gracilis	Blue Grama	●	●	●	●	●	●	Low	●
Calamagrostis x acutiflora cvs. e.g. Karl Foerster	Feather Reed Grass	●	●	●	●	●	●	Moderate	
Carex pansa (grasses)	Sand Dune Sedge	●	●	●	●	●	●	Moderate	●

Juncus effusus

Miscanthus sinensis

Muhlenbergia rigens

Sisyrhinchium bellum

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Carex praegracilis (grasses)	California Field Sedge	●	●	●	●	●	●	Moderate	●
Carex spissa	San Diego Sedge	●	●	●	●	●	●	Low	●
Carex tumulicola	Berkeley Sedge	●	●	●	●	●	●	Low	●
Elymus clnereus (Leymus cinereus)	Basin Wild Rye	●	●	●	●	●	●	Low	●
Elymus condensatus (Leymus condensatus)	Giant Wild Rye	●	●	●	●	●	●	Low	●
Elymus triticoides (Leymus triticoides)	Creeping Wild Rye	●	●	●	●	●	●	Low	●
Festuca amethystina	Sheep's Fescue	●	●	●	●	●	●	Moderate	
Festuca glauca	Blue Fescue	●	●	●	●	●	●	Moderate	
Festuca idahoensis	Idaho Fescue	●	●	●	●	●	●	Moderate	●
Festuca mairei	Maire's Fescue	●	●	●	●	●	●	Moderate	
Festuca muelleri	Mueller's Fescue	●	●	●	●	●	●	Moderate	
Festuca ovina	Sheep Fescue	●	●	●	●	●	●	Moderate	
Festuca "Siskiyou Blue"	Siskiyou Blue Fescue	●	●	●	●	●	●	Low	
Helictotrichon sempervirens	Blue Oat Grass	●	●	●	●	●	●	Moderate	
Imperata cylindrica	Blood Grass	●	●	●	●	●	●	Moderate	
Juncus acutus	Spiny Rush	●	●	●	●	●	●	Moderate	●
Juncus aquatic spp. (native and non-native spp.)	Rush	●	●	●	●	●	●	Moderate	●
Juncus effusus	Softrush	●	●	●	●	●	●	Moderate	●
Juncus patens	California Grey Rush	●	●	●	●	●	●	Low	●
Leymus arenarius	Sand Ryegrass	●	●	●	●	●	●	Moderate	
Melica imperfecta	Coast Range Onion Grass	●	●	●	●	●	●	Moderate	●
Miscanthus sinensis	Eulalia Grass	●	●	●	●	●	●	Moderate	
Miscanthus transmorrisonensis	Evergreen Eulalia	●	●	●	●	●	●	Moderate	
Muhlenbergia capillaris	Hairy Awn Muhly	●	●	●	●	●	●	Low	
Muhlenbergia dumosa	Bamboo Muhly	●	●	●	●	●	●	Low	
Muhlenbergia lindheimeri	Lindheimer Muhly	●	●	●	●	●	●	Moderate	
Muhlenbergia rigens	Deer Grass	●	●	●	●	●	●	Moderate	●
Nassella gigantea	Giant Needle Grass	●	●	●	●	●	●	Low	
Phalaris spp.	Ribbon Grass	●	●	●	●	●	●	Moderate	
Sesleria spp.	Moor Grass	●	●	●	●	●	●	Moderate	
Sisyrinchium bellum	Blue-Eyed Grass	●	●	●	●	●	●	Very Low	●
Sisyrinchium californicum	Golden-Eyed Grass	●	●	●	●	●	●	Moderate	●
Sporobolus airoides	Alkalai Sacaton	●	●	●	●	●	●	Low	●

Achellia millefolium

Aptenia cordifolia

Armeria maritima

Berberis aquifolium var. repens

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Sporobolus wrightii	Big Sacaton	●	●	●	●	●	●	Low	●
Stipa cernua (Nassella cernua)	Nodding Needlegrass	●	●	●	●	●	●	Very Low	●
Stipa comata	Needle And Thread Grass	●	●	●	●	●	●	Low	●
Stipa lepida (Nassella lepida)	Foothill Needlegrass	●	●	●	●	●	●	Very Low	●
Stipa pulchra (Nassella pulchra)	Purple Needlegrass	●	●	●	●	●	●	Very Low	●
Stipa tenuissima (Nassella tenuissima)	Mexican Feather Grass	●	●	●	●	●	●	Low	
Zoysia tenuifolia	Korean Grass	●	●	●	●	●	●	Moderate	
GROUNDCOVER									
Acacia redolens	Prostrate Acacia	●			●	●		Low	
Achillea millefolium (non-native hybrids)	Yarrow (Non-Native Hybrids)	●		●				Low	
Achillea millefolium (CA native cultivars)	Yarrow	●		●				Low	●
Achillea tomentosa	Woolly Yarrow	●					●	Moderate	
Ajuga reptans (shade)	Carpet Bugle	●						Moderate	
Aptenia cordifolia	Ice Plant (Aptenia)	●	●	●	●			Low	
Aptenia "Red Apple"	Ice Plant (Red Apple)	●	●	●	●			Low	
Arctostaphylos edmundsii "Bert Johnson"	Bert Johnson Manzanita	●					●	Moderate	●
Arctostaphylos edmundsii "Big Sur"	Big Sur Manzanita	●						Low	●
Arctostaphylos edmundsii cvs	Manzanita Carmel Sur Etc.	●						Low	●
Arctostaphylos "Emerald Carpet"	Emerald Carpet Manzanita	●		●			●	Moderate	●
Arctostaphylos hookeri "Monterey Carpet"	Monterey Carpet Manzanita	●		●				Low	●
Arctostaphylos "Pacific Mist"	Pacific Mist Manzanita	●						Low	●
Arctostaphylos "Winterglow"	Winter Glow Manzanita	●					●	Moderate	●
Armeria maritima	Sea Pink	●	●	●	●	●		Moderate	●
Baccharis pilularis cvs.	Dwarf Coyote Brush	●	●	●	●	●		Low	●
Berberis aquifolium var. repens (shade)	Creeping Mahonia	●						Low	●
Campanula spp.	Bell Flower	●	●	●	●			Moderate	

Campanula poscharskyana

Ceanothus 'Yankee Point'

Convolvulus mauritanicus

Fragaria chiloensis

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Campanula poscharskyana	Serbian Bell Flower	●	●	●	●			Moderate	
Ceanothus gloriosus spp.	Ceanothus	●	●	●	●	●		Moderate	●
Ceanothus gloriosus "Emily Brown"	Emily Brown Ceanothus	●	●	●	●	●		Moderate	●
Ceanothus gloriosus "Heart's Desire"	Heart's Desire Ceanothus	●	●	●	●	●		Moderate	●
Ceanothus gloriosus v. porrectus "Mt. Vision"	Mt. Vision Ceanothus	●	●	●	●	●		Moderate	●
Ceanothus maritimus "Frosty Dawn"	Frosty Dawn Ceanothus	●						Low	●
Ceanothus maritimus "Popcorn"	Popcorn CA Lilac	●						Low	●
Ceanothus maritimus "Pt. Sierra"	Pt Sierra Ceanothus	●						Low	●
Ceanothus maritimus "Valley Violet"	Valley Violet Ceanothus	●						Low	●
Ceanothus thyrsiflorus var griseus "Carmel Creeper"	Carmel Creeper Ceanothus	●						Moderate	●
Ceanothus thyrsiflorus var. griseus "Diamond Heights"	Diamond Heights Ceanothus	●						Moderate	●
Ceanothus thyrsiflorus var. griseus "Yankee Point"	Yankee Point Ceanothus	●						Moderate	●
Cerastium tomentosum	Snow In Summer	●			●			Moderate	
Convolvulus mauritanicus	Ground Morning Glory	●					●	Low	
Coprosma petriei "Verde Vista"	Verde Vista Coprosma	●			●			Moderate	
Cotoneaster dammeri var.	Cotoneaster	●						Moderate	
Dichondra micrantha	Dichondra	●	●	●	●			Moderate	
Dichondra sericea	Silver Leaf Pony's Foot	●	●	●	●			Moderate	
Dymondia margaretae	Dymondia	●	●	●	●	●		Low	
Eschscholzia californica (annual in the desert)	California Poppy	●	●	●			●	Very Low	●
Euonymus fortunei	Purple Winter Creeper	●						Moderate	
Fragaria spp. (CA native and non-natives species)	Strawberry	●	●	●	●	●		Moderate	●
Gazania spp.	Gazania	●	●	●	●	●		Moderate	
Geranium spp.	Cranesbill	●	●	●	●			Moderate	
Hypericum calycinum	Aaron's Beard	●						Moderate	
Isotoma axillaris	Rock Isotoma	●						Moderate	
Lampranthus spp.	Ice Plant (Lampranthus)	●	●	●	●			Low	

Lantana 'New Gold'

Myoporum parvifolium

Pelargonium peltatum

Vinca minor

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Lantana camara	Lantana	●	●	●	●	●		Low	
Lantana hybrids	Hybrid Lantana	●	●	●	●	●		Low	
Lantana montevidensis (sellowiana)	Trailing Lantana	●	●	●	●	●		Low	
Lantana "New Gold"	New Gold Lantana	●	●	●	●	●		Low	
Muehlenbeckia axillaris	Creeping Wire Vine	●						Moderate	
Myoporum parvifolium	Myoporum	●	●	●	●			Low	
Myoporum X "Pacificum"	Pacifica Saltbush	●	●	●	●		●	Moderate	
Osteospermum spp.	African Daisy	●	●	●	●	●		Low	
Parthenocissus henryana	Silver Vein Creeper	●			●			Moderate	
Pelargonium peltatum	Ivy Geranium	●			●	●		Moderate	
Rosmarinus	Trailing Rosemary	●	●	●	●	●		Low	
Salvia "Bee's Bliss"	Bee's Bliss Sage	●	●	●		●		Low	●
Salvia "Dara's Choice"	Sonoma Sage	●	●	●		●		Low	●
Salvia "Mrs. Beard"	Mrs. Beard Sage	●	●	●		●		Low	●
Scaevola "Mauve Clusters"	Fan Flower	●	●	●				Moderate	
Thymus spp.	Thyme	●	●	●	●	●		Moderate	
Trachelospermum asiaticum	Asian Star Jasmine	●	●	●	●	●		Moderate	
Verbena peruviana	Peruvian Verbena	●	●	●	●			Low	
Vinca minor	Periwinkle	●	●	●	●		●	Moderate	
VINES									
Antigonon leptopus	Coral Vine	●	●	●	●			Low	
Asarina antirrhiniflora	Snapdragon Vine	●	●	●	●			Low	
Beaumontia grandiflora	Easter Lily Vine	●	●	●	●			Moderate	
Bignonia capreolata	Cross Vine	●	●	●	●			Moderate	
Bougainvillea spp.	Bougainvillea	●	●	●	●	●		Low	
Cissus antarctica	Kangaroo Vine	●	●	●	●			Moderate	
Clematis armandii	Evergreen Clematis	●	●	●	●			Moderate	
Clematis lasiantha	Pipestem Clematis	●	●	●	●			Low	●
Clematis ligusticifolia	Western Virgin's Bower	●	●	●	●			Low	●
Clematis pauciflora	Small Flowered Clematis	●	●	●	●			Low	●
Clytostoma callistegioides	Violet Trumpet Vine	●	●	●	●		●	Moderate	

Distictis buccinatoria

Gelsemium sempervirens

Hardenbergia violacea

Trachelospermum asiaticum

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Distictis buccinatoria	Blood Red Trumpet Vine	●	●	●	●	●		Moderate	
Distictis "Rivers"	Royal Trumpet Vine	●	●	●	●	●		Moderate	
Euonymus fortunei radicans	Winter Creeper	●	●	●	●			Moderate	
Fallopia baldschuanica (Polygonum aubertii)	Fleeceflower	●	●	●	●			Low	
Ficus pumila (repens)	Creeping Fig	●	●	●	●	●		Moderate	
Gelsemium sempervirens	Carolina Jessamine	●	●	●	●			Moderate	
Grewia occidentalis	Lavender Star Flower	●	●	●	●			Moderate	
Hardenbergia comptoniana	Western Australia Coral Pea	●	●	●	●			Moderate	
Hardenbergia violacea	Lilac Vine	●	●	●	●	●		Moderate	
Hedera canariensis	Algerian Ivy	●	●	●	●		●	Moderate	
Hedera helix	English Ivy	●	●	●	●			Moderate	
Hibbertia scandens	Guinea Gold Vine	●	●	●	●	●		Moderate	
Jasminum polyanthum	Pink Jasmine	●	●	●	●	●		Moderate	
Lonicera spp.	Honeysuckle	●	●	●	●			Moderate	●
Macfadyena unguis-cati	Cat's Claw	●	●	●	●			Low	
Mandevilla laxa (M. suavelolens)	Chilean Jasmine	●	●	●	●			Moderate	
Pandorea jasminoides	Bower Vine	●	●	●	●			Moderate	
Parthenocissus quinquefolia	Virginia Creeper	●	●	●	●			Moderate	
Parthenocissus tricuspidata	Boston Ivy	●	●	●	●	●		Moderate	
Passiflora spp.	Passion Vine	●	●	●	●		●	Moderate	
Pyrostegia venusta	Flame Vine	●	●	●	●	●		Moderate	
Rosa banksiae	Lady Banks Rose	●	●	●	●			Moderate	
Rosa hybrids	Climbing Roses	●	●	●	●			Moderate	
Solandra maxima	Cup-Of-Gold Vine	●	●	●	●			Moderate	
Solanum laxum (jasminoides)	Potato Vine	●	●	●	●			Moderate	
Stephanotis floribunda	Madagascar Jasmine	●	●	●	●			Moderate	
Thunbergia spp.	Black Eyed Susan	●	●	●	●			Moderate	
Trachelospermum asiaticum	Asian Star Jasmine	●	●	●	●			Moderate	
Trachelospermum jasminoides	Star Jasmine	●	●	●	●			Moderate	
Vigna caracalla	Snail Vine	●	●	●	●			Moderate	
Vitis californica	California Wild Grape	●	●	●	●		●	Low	●
Vitis girdiana	Desert Grape	●	●	●	●			Low	●

Vigna caracalla

Vitis 'Roger's Red'

Wisteria sinensis

X Fatshedera lizeii

Botanical Name	Common Name	Residential	Streetscapes	Entries	Commercial	Parks	Drainage Basins	Water Use	Native
Vitis "Roger's Red"	Roger's Red Grape	●	●	●	●		●	Low	●
Wisteria spp.	Wisteria	●	●	●	●	●		Moderate	
X Fatshedera lizei	Botanical Wonder	●	●	●	●			Moderate	

4.5 Commercial Plaza

A pedestrian-scale plaza brings an inviting feel to the commercial center by providing space for shoppers and workers to rest and congregate. This area can also be used for outdoor dining, as well as space for special events. A concept plan for the Commercial Plaza is depicted on Figure 4-18, Commercial Plaza Concept, with the overall Commercial Concept depicted on Figure 4-19.

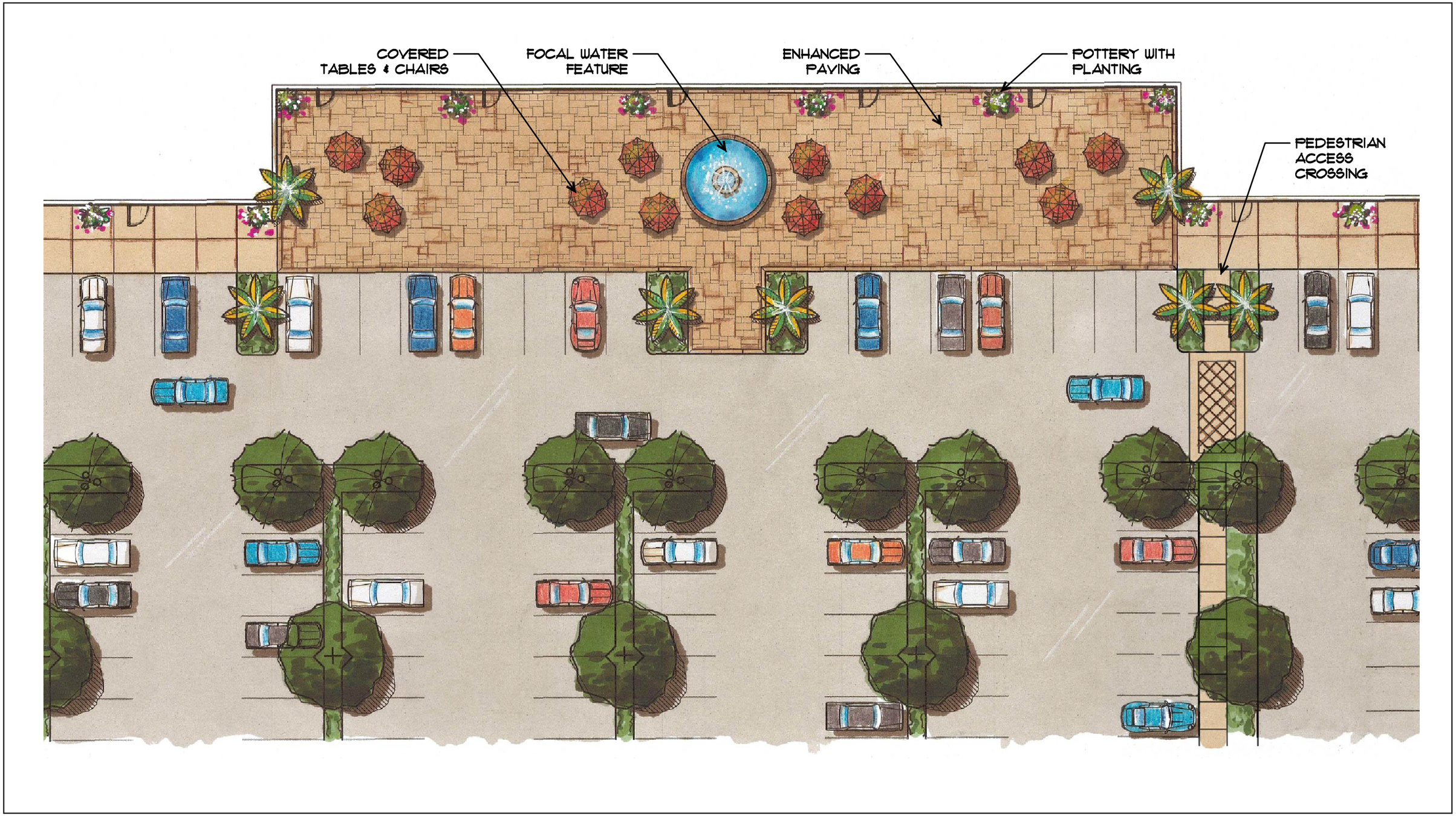


Figure 4-18

RANCHO PALMA

Commercial Plaza Concept

Strata Palma, LLC

20 Feet

FORMA

November 2015

Figure 4-19

RANCHO PALMA

Commercial Concept

Strata Palma, LLC

200 Feet

FORMA

November 2015

5 SUSTAINABLE GUIDELINES

5.1 Introduction

One of the goals of the Rancho Palma Specific Plan is to provide a quality development that is designed to limit the use of unrenewable resources. This chapter provides a menu of options that can be utilized to provide a more sustainable project in all facets of the development.

5.2 Green Infrastructure

1. Use pervious paving materials wherever possible to reduce the negative effects of stormwater runoff and to facilitate groundwater recharge.
2. Consider open grid paving – such as dual track driveways in the residential neighborhood for localized drainage.
3. Divert runoff into detention basins to allow water recharge, reduce drainage runoff, and control the rate of storm flows from the site.
4. Encourage the use of stormwater management practices such as the incorporation of infiltration basins and bioswales.
5. When feasible promote dual uses for detention basins for recreation purposes.
6. Utilize bioswales, particularly with native or drought- tolerant grasses, to collect and filter water runoff.

5.3 Landscaping

1. Plant selection shall be based on species that are native, drought tolerant, heat resistant, and hardy.
2. Prohibit the use of large turf areas in landscaping by substituting water-conserving native groundcovers or perennial grasses, shrubs, and trees.
3. For common landscape areas, install Evapo Transpiration based controllers which are weather based controllers providing greater efficiency.
4. Promote the use of mulch and environmentally friendly fertilizers to promote healthy soil condition for healthy growing conditions.
5. Provide landscaping for shade and micro climate control.
6. Provide a landscape palette that includes only non-evasive plants.
7. Encourage the use of deciduous trees to allow sunlight during the winter.
8. Install high efficiency, xeriscape irrigation systems to reduce the amount of water devoted to landscaped areas, such as drip and bubbler irrigation and low-angle, low-flow nozzles on spray heads.
9. To reduce the amount of water used, install programmed automated irrigation systems.
10. Utillize moisture sensors and other similar irrigation technology to ensure that landscaping is watered only as needed.

5.4 Building Materials

1. Consider using 20 percent locally manufactured and produced building materials, defined as materials manufactured or produced within 500 miles of the project.
2. Strive to use rapidly renewable or recycled building materials and products for at least 5 percent of the total value of materials. Flooring alternatives like bamboo, wheatboard, and cork are rapidly renewable materials. Linoleum, exposed concrete, and recycled- content ceramic tiles are also desirable materials.
3. Encourage the installation of insulation with at least 75 percent recycled content, such as cellulose, newspaper, or recycled cotton.

5.5 Indoor Air Quality

1. Use flooring and insulation products that are low emitters of volatile organic compounds (VOC) and formaldehyde.
2. Use low- and zero-VOC paints, finishes, adhesives, caulks, and other substances to improve indoor air quality and reduce the harmful health effects of off-gassing.
3. In compliance with Air Quality Management District Rule 445, new homes are prohibited from permanently installing wood- burning devices unless: they are Environmental Protection Agency (EPA) Phase II-Certified, pellet-fueled, masonry heaters; meet US EPA emission standards, or are dedicated gaseous-fueled fireplaces.

5.6 Lighting

1. Encourage the use of low-contrast lighting and use low-voltage fixtures and energy-efficient bulbs, such as compact fluorescent and light emitting diode bulbs
2. Promote the use automated occupancy sensors in nonresidential buildings that automatically shut off lights when rooms are unoccupied.
3. Utilize solar landscape lights for energy saving when possible.
4. Use shielded fixtures, avoiding overhead lighting of areas such as walkways.

5.7 Building Envelope

1. Install radiant barriers to reduce summer heat gain and winter heat loss.
2. Reduce the amount of energy needed for cooling by using natural ventilation techniques, such as operable windows, to take advantage of airflow for cooling interiors.
3. As practical, design taller windows that start close to the ceiling to optimize daylighting of interiors.
4. Reduce heat gain with the use of “cool roofs,” at the commercial center which are painted with a highly reflective coating or employ light-colored materials.

5. Utilize water- and energy-saving fixtures and appliances, such as showerheads, toilets, washing machines, clothes dryers, refrigerators, and dishwashers certified as Energy Star compliant.
6. Consider recirculating hot water systems to reduce the need to heat water, or tankless water heaters that heat water as needed instead of storing hot water in tanks, thus reducing standby energy use.
7. To reduce the need of additional heating and cooling, utilize a minimum insulation value of R30 in ceilings.
8. To provide for more efficient and effective heating and cooling, utilize programmable thermostats.

5.8 Water Conservation

1. Use low-water-consumption, Energy Star–compliant appliances and fixtures to reduce water consumption
2. For the commercial area, install sensor-operated faucets in public restrooms.
3. Utilize dual flush or other toilets using less than 1.6 gallons per flush.
4. Consider waterless urinals in public restrooms in nonresidential buildings.

5.9 Energy Conservation

1. To reduce energy used, utilize energy-efficient windows, such as models with spectrally selective low-e glass and with wood, vinyl, or fiberglass frames.
2. Utilize efficient building materials that take advantage of heat storage or thermal mass to reduce energy needed for heating and cooling interiors.
3. Promote reduced energy used by installing energy saving appliances and fixtures.
4. To reduce heat gain, minimize the number and area of east and west facing windows.
5. To reduce the amount of heat loss, domestic hot water pipes should be insulated.
6. To reduce both the need of cooling and heating, attics should be insulated.
7. To provide for more efficient windows, dual pane and window tinting should be considered.

5.10 Heating, Ventilation and Air Conditioning

1. Design and install HVAC systems according to the standards provided by the Air Conditioning Contractors of America handbooks or other comparable high-performance HVAC standards.
2. Install sealed-combustion/sealed-duct furnaces and water heaters for increased efficiency and indoor air quality.

3. Install only EnergyStar–qualified ceiling fans to circulate air, improve comfort, and reduce the demand on heating and cooling systems.
4. Locate windows and provide operable windows to promote natural cross ventilation.
5. Promote smart climate controls for both residential and commercial buildings to efficiently regulate temperature controls.

5.11 Solar Power and Building Orientation

1. Provide additional roof structure to support solar panels.
2. Provide south facing roof planes to optimize solar use.
3. Encourage overhangs to shade and protect windows from direct sunlight.

6 IMPLEMENTATION

6.1 Authority and Scope

The adoption of the Rancho Palma Specific Plan by the City of San Bernardino is authorized by the California Government Code, Title 7, Division 1, Chapter 3, Article 8, Sections 65450 through 65457. As set forth by the Government Code and the City of San Bernardino Development Code, Chapter 19.64, Specific Plans must contain the information outlined below in either text and/or exhibits. References to the location of this information within the Rancho Palma Specific Plan are shown in **bold**.

- The distribution, location, and extent of the uses of land, including open space, within the area covered by the plan. **(Chapter 2)**
- The proposed distribution, location, extent and intensity of major components of public and private transportation, sewage, water drainage, solid waste disposal, energy, and other essential facilities proposed to be located within the area covered by the plan and needed to support the land uses described in the plan. **(Chapter 2)**
- Standards and criteria by which development will proceed, and standards for the conservation, development, and utilization of natural resources where applicable. **(Chapter 3)**
- A program of implementation measures including regulations, public works projects, and financing measures necessary to carry out the above items. **(Chapter 6)**
- A statement of the relationship of the specific plan to the General Plan. **(Chapter 7)**

The Rancho Palma Specific Plan serves both a planning function and a regulatory function. It is the device, which implements the City of San Bernardino General Plan on this property. The plan contains all applicable land use regulations and constitutes the zoning for the Rancho Palma property; the development standards contained in the Specific Plan will take precedence over any other provisions of the Municipal Code. However, where the Specific Plan remains silent, the regulations of the San Bernardino Development Code shall apply.

6.2 Purpose of the Specific Plan

Development of the Rancho Palma property will be achieved through the adoption and implementation of this Specific Plan, which will serve as the comprehensive development control document for the project. The Specific Plan establishes the type, location, intensity, character of development, and the required infrastructure for development of the proposed Planned Community.

The Rancho Palma Specific Plan accommodates the unique planning opportunities related to providing a quality development of needed housing, recreation, and commercial uses for the City of San Bernardino's Verdemont Heights Community.

The Rancho Palma Specific Plan is a regulatory plan, which will serve as the zoning ordinance for this property. Proposed development plans or agreements, tentative tract maps or parcel maps and any other development approval must be consistent

with this Specific Plan. If there is a conflict found between this Specific Plan and other provisions the City's Zoning Ordinance, the contents of this Specific Plan shall prevail.

6.3 Relationship of the Specific Plan to the General Plan

Pursuant to California Government Code Section 65454, a specific plan shall be consistent with the local jurisdiction's General Plan. The Rancho Palma Specific Plan provides regulations, guidelines, and standards that are consistent with and implement the goals and policies of the City of San Bernardino General Plan. Consistency with the City's General Plan is demonstrated in Chapter 7. Rancho Palma components, which are found to be consistent with the Specific Plan, shall be deemed consistent with the General Plan.

6.4 California Environmental Quality Act (CEQA) Compliance

The Rancho Palma Specific Plan Environmental Impact Report (EIR) was prepared by the City of San Bernardino during the adoption process for the Specific Plan in compliance with CEQA. This document addresses the environmental aspects of the site and impacts due to the implementation of the Specific Plan.

This environmental review is also applicable to future residential and commercial development projects (Precise Plans, Tentative Tract Maps, etc.), which are processed in conformance with this Specific Plan, thus requiring no further environmental documentation except as noted in Sections 15182 and 15162 of the State Guidelines to CEQA.

6.5 Amendments

6.5.1 Requirements and Procedures

This Specific Plan may be amended at any time in the same manner and by the same process by which the plan was originally adopted, as described in Chapter 19.64, Specific Plans, of the City of San Bernardino Development Code. The City's standard environmental review procedures shall be followed.

6.5.2 Administrative Actions

Certain minor changes to provisions in the Specific Plan may be made administratively by the Director of Development Services, subject to appeal to the Planning Commission and subsequently, the City Council. Such amendments do not require additional environmental review. These changes include but are not limited to:

1. The addition of new information to the Specific Plan maps or text that does not change the effect of any concepts or regulations.
2. Changes to the community infrastructure, such as drainage, streets, water, and sewer systems which do not have the effect of increasing or decreasing development capacity in the Specific Plan area, nor change the concepts of the Specific Plan.

3. Boundary adjustments, easement locations, and minor design feature changes.
4. Minor land use district boundary adjustments.
5. Land use area acreage adjustments for acreages shown on the Land Use Plan Summary Table by no more than fifteen percent of the affected area.
6. Other items determined to be appropriate by the Director of Development Services.

6.6 Severability

If any provision of this Specific Plan or the application thereof to any persons or circumstances is held invalid, such invalidity shall not affect other provisions or applications of this Specific Plan, which can be given effect without the invalid provisions or application thereof, and to this end, the provisions of this Specific Plan are severable.

6.7 Effect on Conflicting Provisions

Whenever the provisions of this Specific Plan permit greater flexibility than, or establish regulations different than those imposed or required by the San Bernardino Development Code, the provisions of this Specific Plan shall prevail.

6.8 Phasing

It is intended that the Rancho Palma Specific Plan will be constructed in two phases. Phase 1 will include Planning Areas 1 and 2, as well as the private parks, and dedication of the Ronald Reagan Park expansion to the City of San Bernardino. Phase 2 will include Planning Area 3. Figure 6-1, Phasing Plan, depicts the proposed Phasing Plan. This phasing does not preclude the ability to construct all of the backbone infrastructure in the first phase, nor does it preclude the ability to develop Phases 1 and 2 simultaneously.

6.9 Maintenance

Rancho Palma Homeowners Association will be created. This association will be responsible for the maintenance of the private streets, private parks, gate access, walls/fences, and drainage basin.

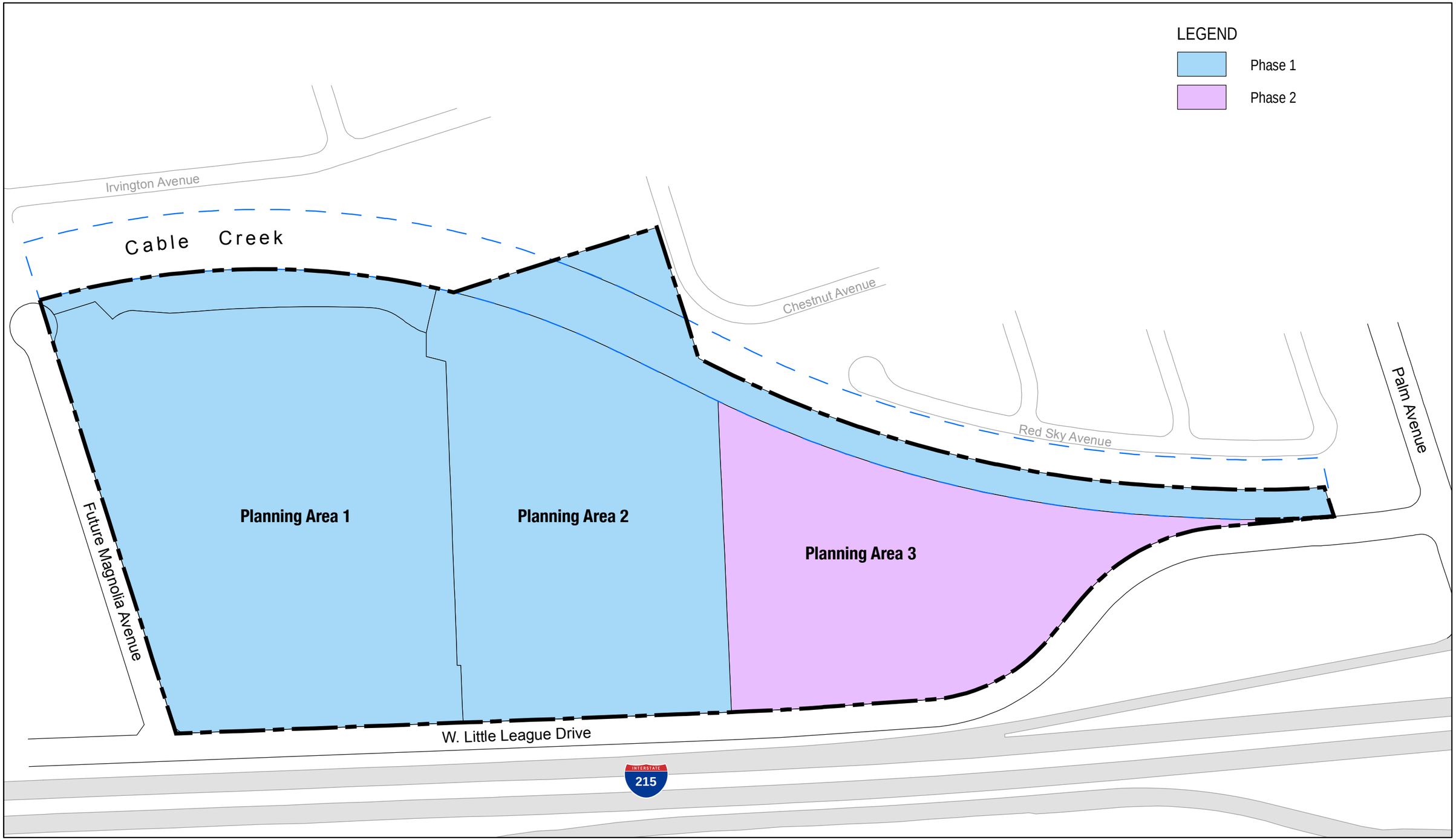


Figure 6-1

RANCHO PALMA

Phasing Plan

Strata Palma, LLC

200 Feet

FORMA

November 2015

7 APPENDICES

7.1 General Plan Consistency Analysis

The Rancho Palma Specific Plan serves as the implementation tool for the City of San Bernardino General Plan for this property. Below is a discussion of how this Specific Plan implements the goals of the General Plan. ***The General Plan goals are bold and italicized.***

7.1.1 Land Use Goals

2.1 Preserve and enhance San Bernardino's unique neighborhoods.

The Rancho Palma Land Use Plan is designed to be compatible with the surrounding residential and commercial uses within the Verdemont Heights Community.

2.2 Promote development that integrates with and minimizes impacts on surrounding land uses.

The residential uses proposed are separated from the adjacent existing residential uses by the Cable Creek Channel.

2.3 Create and enhance dynamic, recognizable places for San Bernardino's residents, employees, and visitors.

The Specific Plan Design Guidelines provide for the creation of unique, quality residential and commercial development.

2.4 Enhance the quality of life and economic vitality in San Bernardino by strategic infill of new development and revitalization of existing development.

Rancho Palma is an infill development on a previously disturbed site.

2.5 Enhance the aesthetic quality of land uses and structures in San Bernardino.

The Specific Plan Design Guidelines provide for the creation of unique, quality residential and commercial development.

7.1.2 Housing Goals

Goal 3.1 Facilitate the development of a variety of types of housing to meet the needs of all income levels in the City of San Bernardino.

Rancho Palma provides for two residential lot sizes and corresponding living areas to meet the needs a variety of income levels and resident lifecycles.

7.1.3 Economic Development Goals

Goal 4.1 Encourage economic activity that capitalizes upon the transportation and locational strengths of San Bernardino.

The commercial component of the Specific Plan takes advantage of the site's proximity to the Interstate 215 / Palm Avenue interchange.

7.1.4 Community Design Goals

Goal 5.3 Recognize unique features in individual districts and neighborhoods and develop a program to create unifying design themes to identify areas throughout the City.

The Specific Plan Design Guidelines provide for the creation of unique, quality residential and commercial development.

Goal 5.4 Ensure individual projects are well designed and maintained.

The Specific Plan Design Guidelines provide for the creation of unique, quality residential and commercial development and the residential homeowners association will be responsible for the maintenance of the private streets, parks, and gate houses.

Goal 5.5 Develop attractive, safe, and comfortable single family neighborhoods.

The Specific Plan Design Guidelines provide for the creation of unique, quality residential development.

Goal 5.7 Develop attractive and safe commercial, office, and industrial projects that are creatively designed and intelligently sited.

The Specific Plan Design Guidelines provide for the creation of unique, quality commercial development.

7.1.5 Circulation Goals

Goal 6.1 Provide a well-maintained street system.

The interior local roads will be maintained by the Rancho Palma homeowners association.

7.1.6 Parks, Recreation, and Trails Goals

Goal 8.1 Improve the quality of life in San Bernardino by providing adequate parks and recreation facilities and services to meet the needs of our residents.

The Rancho Palma Specific Plan provides for a variety of private parks, as well as the expansion of the existing Ronald Reagan Park.

Goal 8.4 Provide adequate funding for parkland and trails acquisition, improvements, maintenance, and programs.

The private parks will be improved by the developer and maintained by the homeowners association. The Ronald Reagan expansion parcel will be dedicated to the City of San Bernardino.

7.1.7 Utilities Goals

Goal 9.1 Provide a system of wastewater collection and treatment facilities that will adequately convey and treat wastewater generated by existing and future development in the City's service area.

The Rancho Palma Specific Plan provides for the creation of a wastewater system that will tie into existing facilities.

Goal 9.3 Provide water supply, transmission, distribution, storage, and treatment facilities to meet present and future water demands in a timely and cost effective manner.

The Rancho Palma Specific Plan provides for the creation of a water system that will tie into existing facilities.

Goal 9.4 Provide appropriate storm drain and flood control facilities where necessary.

The Rancho Palma Specific Plan provides for the creation of a drainage system that will tie into existing facilities.

Goal 9.10 Ensure that the costs of infrastructure improvements are borne by those who benefit.

The infrastructure improvements required by the Rancho Palma Specific Plan will be financed by the builder.

7.1.8 Safety Goals

Goal 10.5 Reduce urban run-off from new and existing development.

The Specific Plan Design Guidelines provide a variety of measures to reduce urban run-off, including a drainage basin and bio-swales.

7.1.9 Energy and Water Conservation Goals

Goal 13.1 Conserve scarce energy resources.

The Rancho Palma Specific Plan contains a chapter on Sustainable Guidelines to reduce energy and water use and conserve natural resources.

7.1.10 Noise Goals

Goal 14.1 Ensure that residents are protected from excessive noise through careful land planning.

Through site planning and constructions techniques, Rancho Palma residents will be protected from excessive noise.

7.2 Tentative Tract Map

(to be provided upon approval)

3.2-1 AIR QUALITY IMPACT ANALYSIS

Rancho Palma

AIR QUALITY IMPACT ANALYSIS

CITY OF SAN BERNARDINO

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NOVEMBER 24, 2015

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LIST OF ABBREVIATED TERMS

(1)	Reference
µg/m3	Microgram per Cubic Meter
AADT	Annual Average Daily Trips
AQIA	Air Quality Impact Analysis
AQMD	Air Quality Management District
AQMP	Air Quality Management Plan
ARB	California Air Resources Board
BACM	Best Available Control Measures
CAA	Federal Clean Air Act
CAAQS	California Ambient Air Quality Standards
CalEEMod	California Emissions Estimator Model
Caltrans	California Department of Transportation
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resources Board
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CO	Carbon Monoxide
EPA	Environmental Protection Agency
LST	Localized Significance Threshold
NAAQS	National Ambient Air Quality Standards
NO2	Nitrogen Dioxide
NOx	Oxides of Nitrogen
Pb	Lead
PM10	Particulate Matter 10 microns in diameter or less
PM2.5	Particulate Matter 2.5 microns in diameter or less
PPM	Parts Per Million
Project	Rancho Palma
ROG	Reactive Organic Gases
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SIPs	State Implementation Plans
SRA	Source Receptor Area
TAC	Toxic Air Contaminant
TIA	Traffic Impact Analysis
TOG	Total Organic Gases

VMT	Vehicle Miles Traveled
VOC	Volatile Organic Compounds

EXECUTIVE SUMMARY

Short-Term Construction

Regional Impacts

Project construction-source emissions would not exceed the numerical regional thresholds of significance established by the South Coast Air Quality Management District (SCAQMD). Notwithstanding, best available control measures (BACM) AQ-1 is recommended to further reduce the severity of the impacts. Thus a less than significant impact would occur for Project-related construction-source emissions both with and without implementation of BACM AQ-1.

Localized Impacts

Without BACMs, emissions during construction activity has the potential to exceed the SCAQMD's localized significance threshold for $PM_{2.5}$ only. BACM AQ-1 is recommended to reduce the impacts to less than significant levels. After implementation of BACM AQ-1, construction-source emissions will not exceed SCAQMD's localized significance thresholds for any applicable pollutants and a less than significant impact will occur.

Project construction-source emissions would not conflict with the applicable Air Quality Management Plan (AQMP).

Odors

Established requirements addressing construction equipment operations, and construction material use, storage, and disposal requirements act to minimize odor impacts that may result from construction activities. Moreover, construction-source odor emissions would be temporary, short-term, and intermittent in nature and would not result in persistent impacts that would affect substantial numbers of people. Potential construction-source odor impacts are therefore considered less-than-significant.

Long-Term Operational

Regional Impacts

For regional emissions, the Project has the potential to exceed the numerical thresholds of significance established by the SCAQMD for emissions of NO_x. MM AQ-1 and MM AQ-2 are recommended to reduce the impacts to less than significant levels. After implementation of MM AQ-1 and MM AQ-2, a less than significant impact would occur for Project-related operational-source emissions.

Localized Impacts

Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the operational LSTs section of this report. The proposed Project would not result in a significant CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as

discussed in Section 3.8, thus a less than significant impact to sensitive receptors during operational activity is expected. Lastly, Project operational-source emissions would not conflict with the applicable AQMP.

ODORS

Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential sources of operational odors generated by the Project would include disposal of miscellaneous residential and commercial refuse. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances (1) . Consistent with City requirements, all Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations. Potential operational-source odor impacts are therefore considered less-than-significant.

1 INTRODUCTION

This report presents the results of the air quality impact analysis (AQIA) prepared by Urban Crossroads, Inc., for the Rancho Palma Project (referred to as "Project"), which is located in the City of San Bernardino northeast of W. Little League Drive and northwest of Palm Avenue, as shown on Exhibit 1-A.

The purpose of this AQIA is to evaluate the potential impacts to air quality associated with construction and operation of the proposed Project, and recommend measures to mitigate impacts considered potentially significant in comparison to established regulatory thresholds.

1.1 PROJECT OVERVIEW

The Project is proposed to include the development of 120 single family detached residential dwelling units and 98,000 square feet of commercial retail use, as shown on Exhibit 1-B. The Project site is currently vacant and not emitting any emissions. For the purposes of this analysis, potential impacts have been assessed for two development phases. The two phases and their anticipated opening years are as follows:

- Phase 1 (2018) – 120 single family detached residential dwelling units (Western Half)
- Phase 2 (2019) – 98,000 square feet of commercial retail use (Eastern Half)

For the purposes of this AQIA, it is assumed that the Project will be constructed and at full occupancy by 2019.

EXHIBIT 1-A: LOCATION MAP

LEGEND:

EXHIBIT 1-B: SITE PLAN

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2 AIR QUALITY SETTING

This section provides an overview of the existing air quality conditions in the Project area and region.

2.1 SOUTH COAST AIR BASIN

The Project site is located in the South Coast Air Basin (SCAB) within the jurisdiction of SCAQMD (2). The SCAQMD was created by the 1977 Lewis-Presley Air Quality Management Act, which merged four county air pollution control bodies into one regional district. Under the Act, the SCAQMD is responsible for bringing air quality in areas under its jurisdiction into conformity with federal and state air quality standards. As discussed above, the Project site is located within the South Coast Air Basin, a 6,745-square mile subregion of the SCAQMD, which includes portions of Los Angeles, Riverside, and San Bernardino Counties, and all of Orange County. The larger South Coast district boundary includes 10,743 square miles.

The SCAB is bound by the Pacific Ocean to the west and the San Gabriel, San Bernardino, and San Jacinto Mountains to the north and east. The Los Angeles County portion of the Mojave Desert Air Basin is bound by the San Gabriel Mountains to the south and west, the Los Angeles / Kern County border to the north, and the Los Angeles / San Bernardino County border to the east. The Riverside County portion of the Salton Sea Air Basin is bound by the San Jacinto Mountains in the west and spans eastward up to the Palo Verde Valley.

2.2 REGIONAL CLIMATE

The regional climate has a substantial influence on air quality in the SCAB. In addition, the temperature, wind, humidity, precipitation, and amount of sunshine influence the air quality.

The annual average temperatures throughout the SCAB vary from the low to middle 60s (degrees Fahrenheit). Due to a decreased marine influence, the eastern portion of the SCAB shows greater variability in average annual minimum and maximum temperatures. January is the coldest month throughout the SCAB, with average minimum temperatures of 47°F in downtown Los Angeles and 36°F in San Bernardino. All portions of the SCAB have recorded maximum temperatures above 100°F.

Although the climate of the SCAB can be characterized as semi-arid, the air near the land surface is quite moist on most days because of the presence of a marine layer. This shallow layer of sea air is an important modifier of SCAB climate. Humidity restricts visibility in the SCAB, and the conversion of sulfur dioxide to sulfates is heightened in air with high relative humidity. The marine layer provides an environment for that conversion process, especially during the spring and summer months. The annual average relative humidity within the SCAB is 71 percent along the coast and 59 percent inland. Since the ocean effect is dominant, periods of heavy early morning fog are frequent and low stratus clouds are a characteristic feature. These effects decrease with distance from the coast.

More than 90 percent of the SCAB's rainfall occurs from November through April. The annual average rainfall varies from approximately nine inches in Riverside to fourteen inches in downtown Los Angeles. Monthly and yearly rainfall totals are extremely variable. Summer rainfall usually consists of widely scattered thunderstorms near the coast and slightly heavier shower activity in the eastern portion of the SCAB with frequency being higher near the coast.

Due to its generally clear weather, about three-quarters of available sunshine is received in the SCAB. The remaining one-quarter is absorbed by clouds. The ultraviolet portion of this abundant radiation is a key factor in photochemical reactions. On the shortest day of the year there are approximately 10 hours of possible sunshine, and on the longest day of the year there are approximately 14 1/2 hours of possible sunshine.

The importance of wind to air pollution is considerable. The direction and speed of the wind determines the horizontal dispersion and transport of the air pollutants. During the late autumn to early spring rainy season, the SCAB is subjected to wind flows associated with the traveling storms moving through the region from the northwest. This period also brings five to ten periods of strong, dry offshore winds, locally termed "Santa Anas" each year. During the dry season, which coincides with the months of maximum photochemical smog concentrations, the wind flow is bimodal, typified by a daytime onshore sea breeze and a nighttime offshore drainage wind. Summer wind flows are created by the pressure differences between the relatively cold ocean and the unevenly heated and cooled land surfaces that modify the general northwesterly wind circulation over southern California. Nighttime drainage begins with the radiational cooling of the mountain slopes. Heavy, cool air descends the slopes and flows through the mountain passes and canyons as it follows the lowering terrain toward the ocean. Another characteristic wind regime in the SCAB is the "Catalina Eddy," a low level cyclonic (counterclockwise) flow centered over Santa Catalina Island which results in an offshore flow to the southwest. On most spring and summer days, some indication of an eddy is apparent in coastal sections.

In the SCAB, there are two distinct temperature inversion structures that control vertical mixing of air pollution. During the summer, warm high-pressure descending (subsiding) air is undercut by a shallow layer of cool marine air. The boundary between these two layers of air is a persistent marine subsidence/inversion. This boundary prevents vertical mixing which effectively acts as an impervious lid to pollutants over the entire SCAB. The mixing height for the inversion structure is normally situated 1,000 to 1,500 feet above mean sea level.

A second inversion-type forms in conjunction with the drainage of cool air off the surrounding mountains at night followed by the seaward drift of this pool of cool air. The top of this layer forms a sharp boundary with the warmer air aloft and creates nocturnal radiation inversions. These inversions occur primarily in the winter, when nights are longer and onshore flow is weakest. They are typically only a few hundred feet above mean sea level. These inversions effectively trap pollutants, such as NOX and CO from vehicles, as the pool of cool air drifts seaward. Winter is therefore a period of high levels of primary pollutants along the coastline.

2.3 WIND PATTERNS AND PROJECT LOCATION

The distinctive climate of the Project area and the SCAB is determined by its terrain and geographical location. The Basin is located in a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant with high mountains forming the remainder of the perimeter.

Wind patterns across the south coastal region are characterized by westerly and southwesterly on-shore winds during the day and easterly or northeasterly breezes at night. Winds are characteristically light although the speed is somewhat greater during the dry summer months than during the rainy winter season. However, during the dry summer months there are seasonal "Santa Ana" winds, which are strong, extremely down-slope winds, that move through the region. See section 2.2 Regional Climate for additional information.

2.4 EXISTING AIR QUALITY

Existing air quality is measured at established SCAQMD air quality monitoring stations. Monitored air quality is evaluated and in the context of ambient air quality standards. These standards are the levels of air quality that are considered safe, with an adequate margin of safety, to protect the public health and welfare. National Ambient Air Quality Standards (NAAQS) and California Ambient Air Quality Standards (CAAQS) currently in effect are shown in Table 2-1 (3).

The determination of whether a region's air quality is healthful or unhealthful is determined by comparing contaminant levels in ambient air samples to the state and federal standards presented in Table 2-1. The air quality in a region is considered to be in attainment by the state if the measured ambient air pollutant levels for O3, CO, SO2, NO2, PM10, and PM2.5 are not equaled or exceeded at any time in any consecutive three-year period; and the federal standards (other than O3, PM10, PM2.5, and those based on annual averages or arithmetic mean) are not exceeded more than once per year. The O3 standard is attained when the fourth highest eight-hour concentration in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when 99 percent of the daily concentrations, averaged over three years, are equal to or less than the standard.

TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (1 OF 2)

Ambient Air Quality Standards						
Pollutant	Averaging Time	California Standards [1]		National Standards [2]		
		Concentration [3]	Method [4]	Primary [3,5]	Secondary [3,6]	Method [7]
Ozone (O_3)[8]	1 Hour	0.09 ppm (180 µg/m^3)	Ultraviolet Photometry	—	Same as Primary Standard	Ultraviolet Photometry
	8 Hour	0.070 ppm (137 µg/m^3)		0.070 ppm (137 µg/m^3)		
Respirable Particulate Matter (PM10)[9]	24 Hour	50 µg/m^3	Gravimetric or Beta Attenuation	150 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	20 µg/m^3		—		
Fine Particulate Matter (PM2.5)[9]	24 Hour	—	—	35 µg/m^3	Same as Primary Standard	Inertial Separation and Gravimetric Analysis
	Annual Arithmetic Mean	12 µg/m^3	Gravimetric or Beta Attenuation	12.0 µg/m^3	15 µg/m^3	
Carbon Monoxide (CO)	1 Hour	20 ppm (23 mg/m^3)	Non-Dispersive Infrared Photometry (NDIR)	35 ppm (40 mg/m^3)	—	Non-Dispersive Infrared Photometry (NDIR)
	8 Hour	9.0 ppm (10 mg/m^3)		9 ppm (10 mg/m^3)	—	
	8 Hour (Lake Tahoe)	6 ppm (7 mg/m^3)		—	—	
Nitrogen Dioxide (NO_2)[10]	1 Hour	0.18 ppm (339 µg/m^3)	Gas Phase Chemiluminescence	100 ppb (188 µg/m^3)	—	Gas Phase Chemiluminescence
	Annual Arithmetic Mean	0.030 ppm (57 µg/m^3)		0.053 ppm (100 µg/m^3)	Same as Primary Standard	
Sulfur Dioxide (SO_2)[11]	1 Hour	0.25 ppm (655 µg/m^3)	Ultraviolet Fluorescence	75 ppb (196 µg/m^3)	—	Ultraviolet Flourescence; Spectrophotometry (Pararosaniline Method)
	3 Hour	—		—	0.5 ppm (1300 µg/m^3)	
	24 Hour	0.04 ppm (105 µg/m^3)		0.14 ppm (for certain areas)[10]	—	
	Annual Arithmetic Mean	—		0.030 ppm (for certain areas)[10]	—	
Lead[12,13]	30 Day Average	1.5 µg/m^3	Atomic Absorption	—	—	High Volume Sampler and Atomic Absorption
	Calendar Quarter	—		1.5 µg/m^3 (for certain areas)[12]	Same as Primary Standard	
	Rolling 3-Month Average	—		0.15 µg/m^3		
Visibility Reducing Particles[14]	8 Hour	See footnote 13	Beta Attenuation and Transmittance through Filter Tape	No National Standards		
Sulfates	24 Hour	25 µg/m^3	Ion Chromatography			
Hydrogen Sulfide	1 Hour	0.03 ppm (42 µg/m^3)	Ultraviolet Fluorescence			
Vinyl Chloride[12]	24 Hour	0.01 ppm (26 µg/m^3)	Gas Chromatography			

See footnotes on next page …

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (10/1/15)**

TABLE 2-1: AMBIENT AIR QUALITY STANDARDS (2 OF 2)

1. California standards for ozone, carbon monoxide (except 8-hour Lake Tahoe), sulfur dioxide (1 and 24 hour), nitrogen dioxide, and particulate matter (PM10, PM2.5, and visibility reducing particles), are values that are not to be exceeded. All others are not to be equaled or exceeded. California ambient air quality standards are listed in the Table of Standards in Section 70200 of Title 17 of the California Code of Regulations.
2. National standards (other than ozone, particulate matter, and those based on annual arithmetic mean) are not to be exceeded more than once a year. The ozone standard is attained when the fourth highest 8-hour concentration measured at each site in a year, averaged over three years, is equal to or less than the standard. For PM10, the 24 hour standard is attained when the expected number of days per calendar year with a 24-hour average concentration above 150 $\mu g/m^3$ is equal to or less than one. For PM2.5, the 24 hour standard is attained when 98 percent of the daily concentrations, averaged over three years, are equal to or less than the standard. Contact the U.S. EPA for further clarification and current national policies.
3. Concentration expressed first in units in which it was promulgated. Equivalent units given in parentheses are based upon a reference temperature of 25°C and a reference pressure of 760 torr. Most measurements of air quality are to be corrected to a reference temperature of 25°C and a reference pressure of 760 torr; ppm in this table refers to ppm by volume, or micromoles of pollutant per mole of gas.
4. Any equivalent measurement method which can be shown to the satisfaction of the ARB to give equivalent results at or near the level of the air quality standard may be used.
5. National Primary Standards: The levels of air quality necessary, with an adequate margin of safety to protect the public health.
6. National Secondary Standards: The levels of air quality necessary to protect the public welfare from any known or anticipated adverse effects of a pollutant.
7. Reference method as described by the U.S. EPA. An "equivalent method" of measurement may be used but must have a "consistent relationship to the reference method" and must be approved by the U.S. EPA.
8. On October 1, 2015, the national 8-hour ozone primary and secondary standards were lowered from 0.075 to 0.070 ppm.
9. On December 14, 2012, the national annual PM2.5 primary standard was lowered from 15 $\mu g/m^3$ to 12.0 $\mu g/m^3$. The existing national 24-hour PM2.5 standards (primary and secondary) were retained at 35 $\mu g/m^3$, as was the annual secondary standard of 15 $\mu g/m^3$. The existing 24-hour PM10 standards (primary and secondary) of 150 $\mu g/m^3$ also were retained. The form of the annual primary and secondary standards is the annual mean, averaged over 3 years.
10. To attain the 1-hour national standard, the 3-year average of the annual 98th percentile of the 1-hour daily maximum concentrations at each site must not exceed 100 ppb. Note that the national 1-hour standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the national 1-hour standard to the California standards the units can be converted from ppb to ppm. In this case, the national standard of 100 ppb is identical to 0.100 ppm.
11. On June 2, 2010, a new 1-hour SO_2 standard was established and the existing 24-hour and annual primary standards were revoked. To attain the 1-hour national standard, the 3-year average of the annual 99th percentile of the 1-hour daily maximum concentrations at each site must not exceed 75 ppb. The 1971 SO_2 national standards (24-hour and annual) remain in effect until one year after an area is designated for the 2010 standard, except that in areas designated nonattainment for the 1971 standards, the 1971 standards remain in effect until implementation plans to attain or maintain the 2010 standards are approved.

    Note that the 1-hour national standard is in units of parts per billion (ppb). California standards are in units of parts per million (ppm). To directly compare the 1-hour national standard to the California standard the units can be converted to ppm. In this case, the national standard of 75 ppb is identical to 0.075 ppm.
12. The ARB has identified lead and vinyl chloride as 'toxic air contaminants' with no threshold level of exposure for adverse health effects determined. These actions allow for the implementation of control measures at levels below the ambient concentrations specified for these pollutants.
13. The national standard for lead was revised on October 15, 2008 to a rolling 3-month average. The 1978 lead standard (1.5 $\mu g/m^3$ as a quarterly average) remains in effect until one year after an area is designated for the 2008 standard, except that in areas designated nonattainment for the 1978 standard, the 1978 standard remains in effect until implementation plans to attain or maintain the 2008 standard are approved.
14. In 1989, the ARB converted both the general statewide 10-mile visibility standard and the Lake Tahoe 30-mile visibility standard to instrumental equivalents, which are "extinction of 0.23 per kilometer" and "extinction of 0.07 per kilometer" for the statewide and Lake Tahoe Air Basin standards, respectively.

For more information please call ARB-PIO at (916) 322-2990 **California Air Resources Board (10/1/15)**

2.5 REGIONAL AIR QUALITY

The SCAQMD monitors levels of various criteria pollutants at 30 monitoring stations throughout the air district. In 2013, the federal and state ambient air quality standards (NAAQS and CAAQS) were exceeded on one or more days for ozone, PM10, and PM2.5 at most monitoring locations (4). No areas of the SCAB exceeded federal or state standards for NO2, SO2, CO, sulfates or lead. See Table 2-2 for attainment designations for the SCAB (5). Appendix 3.1 provides geographic representation of the state and federal attainment status for applicable criteria pollutants within the SCAB.

2.6 LOCAL AIR QUALITY

Relative to the Project site, the nearest long-term air quality monitoring site for Ozone (O_3), Carbon Monoxide (CO), Nitrogen Dioxide (NO_2), Inhalable Particulates (PM_{10}) and Ultra-Fine Particulates ($PM_{2.5}$) is the South Coast Air Quality Management District Central San Bernardino Valley 2 monitoring station, located approximately 9.2 miles southeast of the Project site in the City of San Bernardino (SRA 34) (8).

The most recent three (3) years of data available is shown on Table 2-3 and identifies the number of days ambient air quality standards were exceeded for the study area, which is was considered to be representative of the local air quality at the Project site (6). Additionally, data for SO2 has been omitted as attainment is regularly met in the South Coast Air Basin and few monitoring stations measure SO2 concentrations.

Criteria pollutants are pollutants that are regulated through the development of human health based and/or environmentally based criteria for setting permissible levels. Criteria pollutants, their typical sources, and effects are identified below (7):

- Carbon Monoxide (CO): Is a colorless, odorless gas produced by the incomplete combustion of carbon-containing fuels, such as gasoline or wood. CO concentrations tend to be the highest during the winter morning, when little to no wind and surface-based inversions trap the pollutant at ground levels. Because CO is emitted directly from internal combustion engines, unlike ozone, motor vehicles operating at slow speeds are the primary source of CO in the Basin. The highest ambient CO concentrations are generally found near congested transportation corridors and intersections.
- Sulfur Dioxide (SO2): Is a colorless, extremely irritating gas or liquid. It enters the atmosphere as a pollutant mainly as a result of burning high sulfur-content fuel oils and coal and from chemical processes occurring at chemical plants and refineries. When SO2 oxidizes in the atmosphere, it forms sulfates (SO4). Collectively, these pollutants are referred to as sulfur oxides (SOX).

TABLE 2-2: ATTAINMENT STATUS OF CRITERIA POLLUTANTS IN THE SOUTH COAST AIR BASIN (SCAB)

Criteria Pollutant	State Designation	Federal Designation
Ozone - 1hour standard	Nonattainment	No Standard
Ozone - 8 hour standard	Nonattainment	Nonattainment
PM_{10}	Nonattainment	Attainment
$PM_{2.5}$	Nonattainment	Nonattainment
Carbon Monoxide	Attainment	Attainment
Nitrogen Dioxide	Attainment	Attainment
Sulfur Dioxide	Attainment	Attainment
Lead[1]	Attainment	Attainment

Source: State/Federal designations were taken from http://www.arb.ca.gov/desig/adm/adm.htm
Note: See Appendix 3.1 for a detailed map of State/National Area Designations within the South Coast Air Basin

[1] The Federal nonattainment designation for lead is only applicable towards the Los Angeles County portion of the SCAB.

TABLE 2-3: PROJECT AREA AIR QUALITY MONITORING SUMMARY 2012-2014

POLLUTANT	STANDARD	YEAR		
		2012	2013	2014
Ozone (O_3)				
Maximum 1-Hour Concentration (ppm)		0.124	0.139	0.121
Maximum 8-Hour Concentration (ppm)		0.109	0.112	0.099
Number of Days Exceeding State 1-Hour Standard	> 0.09 ppm	41	22	38
Number of Days Exceeding State 8-Hour Standard	> 0.07 ppm	74	53	76
Number of Days Exceeding Federal 1-Hour Standard	> 0.12 ppm	0	2	0
Number of Days Exceeding Federal 8-Hour Standard	> 0.075 ppm	54	36	51
Number of Days Exceeding Health Advisory	≥ 0.15 ppm	0	0	0
Carbon Monoxide (CO)				
Maximum 1-Hour Concentration (ppm)		--	--	4.0
Maximum 8-Hour Concentration (ppm)		1.70	1.7	2.4
Number of Days Exceeding State 1-Hour Standard	> 20 ppm	0	0	--
Number of Days Exceeding Federal / State 8-Hour Standard	> 9.0 ppm	0	0	--
Number of Days Exceeding Federal 1-Hour Standard	> 35 ppm	0	0	--
Nitrogen Dioxide (NO_2)				
Maximum 1-Hour Concentration (ppm)		0.067	0.072	0.073
Annual Arithmetic Mean Concentration (ppm)		0.019	0.018	0.018
Number of Days Exceeding State 1-Hour Standard	> 0.18 ppm	0	0	0
Particulate Matter ≤ 10 Microns (PM_{10})				
Maximum 24-Hour Concentration (µg/m^3)		53	102	136
Number of Samples		55	60	60
Number of Samples Exceeding State Standard	> 50 µg/m^3	1	3	4
Number of Samples Exceeding Federal Standard	> 150 µg/m^3	0	0	0
Particulate Matter ≤ 2.5 Microns ($PM_{2.5}$)				
Maximum 24-Hour Concentration (µg/m^3)		34.8	55.3	73.9
Annual Arithmetic Mean (µg/m^3)		11.8	11.41	--
Number of Samples Exceeding Federal 24-Hour Standard	> 35 µg/m^3	0	1	1

--= Data not available from either SCAQMD or EPA

- Nitrogen Oxides (Oxides of Nitrogen, or NOx): Nitrogen oxides (NOx) consist of nitric oxide (NO), nitrogen dioxide (NO2) and nitrous oxide (N2O) and are formed when nitrogen (N2) combines with oxygen (O2). Their lifespan in the atmosphere ranges from one to seven days for nitric oxide and nitrogen dioxide, to 170 years for nitrous oxide. Nitrogen oxides are typically created during combustion processes, and are major contributors to smog formation and acid deposition. NO2 is a criteria air pollutant, and may result in numerous adverse health effects; it absorbs blue light, resulting in a brownish-red cast to the atmosphere and reduced visibility. Of

the seven types of nitrogen oxide compounds, NO2 is the most abundant in the atmosphere. As ambient concentrations of NO2 are related to traffic density, commuters in heavy traffic may be exposed to higher concentrations of NO2 than those indicated by regional monitors.

- Ozone (O3): Is a highly reactive and unstable gas that is formed when volatile organic compounds (VOCs) and nitrogen oxides (NOX) undergo slow photochemical reactions in the presence of sunlight. Ozone concentrations are generally highest during the summer months when direct sunlight, light wind, and warm temperature conditions are favorable to the formation of this pollutant.
- PM10 (Particulate Matter less than 10 microns): A major air pollutant consisting of tiny solid or liquid particles of soot, dust, smoke, fumes, and aerosols. The size of the particles (10 microns or smaller, about 0.0004 inches or less) allows them to easily enter the lungs where they may be deposited, resulting in adverse health effects. PM10 also causes visibility reduction and is a criteria air pollutant.
- PM2.5 (Particulate Matter less than 2.5 microns): A similar air pollutant consisting of tiny solid or liquid particles which are 2.5 microns or smaller (which is often referred to as fine particles). These particles are formed in the atmosphere from primary gaseous emissions that include sulfates formed from SO2 release from power plants and industrial facilities and nitrates that are formed from NOX release from power plants, automobiles and other types of combustion sources. The chemical composition of fine particles highly depends on location, time of year, and weather conditions. PM2.5 is a criteria air pollutant.
- Volatile Organic Compounds (VOC): Volatile organic compounds are hydrocarbon compounds (any compound containing various combinations of hydrogen and carbon atoms) that exist in the ambient air. VOCs contribute to the formation of smog through atmospheric photochemical reactions and/or may be toxic. Compounds of carbon (also known as organic compounds) have different levels of reactivity; that is, they do not react at the same speed or do not form ozone to the same extent when exposed to photochemical processes. VOCs often have an odor, and some examples include gasoline, alcohol, and the solvents used in paints. Exceptions to the VOC designation include: carbon monoxide, carbon dioxide, carbonic acid, metallic carbides or carbonates, and ammonium carbonate. VOCs are a precursor to O3, which is a criteria pollutant. The SCAQMD uses the terms VOC and ROG (see below) interchangeably.
- Reactive Organic Gases (ROG): Similar to VOC, Reactive Organic Gases (ROG) are also precursors in forming ozone. Smog is formed when ROG and nitrogen oxides react in the presence of sunlight. The SCAQMD uses the terms ROG and VOC (see previous) interchangeably.
- Lead (Pb): Lead is a heavy metal that is highly persistent in the environment. In the past, the primary source of lead in the air was emissions from vehicles burning leaded gasoline. As a result of the removal of lead from gasoline, there have been no violations at any of the SCAQMD's regular air monitoring stations since 1982. Currently, emissions of lead are largely limited to stationary sources such as lead smelters. It should be noted that the Project is not anticipated to generate a quantifiable amount of lead emissions. Lead is a criteria air pollutant.

Health Effects of Air Pollutants

Ozone

Individuals exercising outdoors, children, and people with preexisting lung disease, such as asthma and chronic pulmonary lung disease, are considered to be the most susceptible sub-

groups for ozone effects. Short-term exposure (lasting for a few hours) to ozone at levels typically observed in Southern California can result in breathing pattern changes, reduction of breathing capacity, increased susceptibility to infections, inflammation of the lung tissue, and some immunological changes. Elevated ozone levels are associated with increased school absences. In recent years, a correlation between elevated ambient ozone levels and increases in daily hospital admission rates, as well as mortality, has also been reported. An increased risk for asthma has been found in children who participate in multiple sports and live in communities with high ozone levels.

Ozone exposure under exercising conditions is known to increase the severity of the responses described above. Animal studies suggest that exposure to a combination of pollutants that includes ozone may be more toxic than exposure to ozone alone. Although lung volume and resistance changes observed after a single exposure diminish with repeated exposures, biochemical and cellular changes appear to persist, which can lead to subsequent lung structural changes.

Carbon Monoxide

Individuals with a deficient blood supply to the heart are the most susceptible to the adverse effects of CO exposure. The effects observed include earlier onset of chest pain with exercise, and electrocardiograph changes indicative of decreased oxygen supply to the heart. Inhaled CO has no direct toxic effect on the lungs, but exerts its effect on tissues by interfering with oxygen transport and competing with oxygen to combine with hemoglobin present in the blood to form carboxyhemoglobin (COHb). Hence, conditions with an increased demand for oxygen supply can be adversely affected by exposure to CO. Individuals most at risk include fetuses, patients with diseases involving heart and blood vessels, and patients with chronic hypoxemia (oxygen deficiency) as seen at high altitudes.

Reduction in birth weight and impaired neurobehavioral development have been observed in animals chronically exposed to CO, resulting in COHb levels similar to those observed in smokers. Recent studies have found increased risks for adverse birth outcomes with exposure to elevated CO levels; these include pre-term births and heart abnormalities.

Particulate Matter

A consistent correlation between elevated ambient fine particulate matter (PM10 and PM2.5) levels and an increase in mortality rates, respiratory infections, number and severity of asthma attacks and the number of hospital admissions has been observed in different parts of the United States and various areas around the world. In recent years, some studies have reported an association between long-term exposure to air pollution dominated by fine particles and increased mortality, reduction in life-span, and an increased mortality from lung cancer.

Daily fluctuations in PM2.5 concentration levels have also been related to hospital admissions for acute respiratory conditions in children, to school and kindergarten absences, to a decrease in respiratory lung volumes in normal children, and to increased medication use in children and adults with asthma. Recent studies show lung function growth in children is reduced with long-term exposure to particulate matter.

The elderly, people with pre-existing respiratory or cardiovascular disease, and children appear to be more susceptible to the effects of high levels of PM10 and PM2.5.

Nitrogen Dioxide

Population-based studies suggest that an increase in acute respiratory illness, including infections and respiratory symptoms in children (not infants), is associated with long-term exposure to NO2 at levels found in homes with gas stoves, which are higher than ambient levels found in Southern California. Increase in resistance to air flow and airway contraction is observed after short-term exposure to NO2 in healthy subjects. Larger decreases in lung functions are observed in individuals with asthma or chronic obstructive pulmonary disease (e.g., chronic bronchitis, emphysema) than in healthy individuals, indicating a greater susceptibility of these sub-groups.

In animals, exposure to levels of NO2 considerably higher than ambient concentrations results in increased susceptibility to infections, possibly due to the observed changes in cells involved in maintaining immune functions. The severity of lung tissue damage associated with high levels of ozone exposure increases when animals are exposed to a combination of ozone and NO2.

Sulfur Dioxide

A few minutes of exposure to low levels of SO2 can result in airway constriction in some asthmatics, all of whom are sensitive to its effects. In asthmatics, increase in resistance to air flow, as well as reduction in breathing capacity leading to severe breathing difficulties, are observed after acute exposure to SO2. In contrast, healthy individuals do not exhibit similar acute responses even after exposure to higher concentrations of SO2.

Animal studies suggest that despite SO2 being a respiratory irritant, it does not cause substantial lung injury at ambient concentrations. However, very high levels of exposure can cause lung edema (fluid accumulation), lung tissue damage, and sloughing off of cells lining the respiratory tract.

Some population-based studies indicate that the mortality and morbidity effects associated with fine particles show a similar association with ambient SO2 levels. In these studies, efforts to separate the effects of SO2 from those of fine particles have not been successful. It is not clear whether the two pollutants act synergistically or one pollutant alone is the predominant factor.

Lead

Fetuses, infants, and children are more sensitive than others to the adverse effects of Pb exposure. Exposure to low levels of Pb can adversely affect the development and function of the central nervous system, leading to learning disorders, distractibility, inability to follow simple commands, and lower intelligence quotient. In adults, increased Pb levels are associated with increased blood pressure.

Pb poisoning can cause anemia, lethargy, seizures, and death; although it appears that there are no direct effects of Pb on the respiratory system. Pb can be stored in the bone from early

age environmental exposure, and elevated blood Pb levels can occur due to breakdown of bone tissue during pregnancy, hyperthyroidism (increased secretion of hormones from the thyroid gland) and osteoporosis (breakdown of bony tissue). Fetuses and breast-fed babies can be exposed to higher levels of Pb because of previous environmental Pb exposure of their mothers.

Odors

The science of odor as a health concern is still new. Merely identifying the hundreds of VOCs that cause odors poses a big challenge. Offensive odors can potentially affect human health in several ways. First, odorant compounds can irritate the eye, nose, and throat, which can reduce respiratory volume. Second, studies have shown that the VOCs that cause odors can stimulate sensory nerves to cause neurochemical changes that might influence health, for instance, by compromising the immune system. Finally, unpleasant odors can trigger memories or attitudes linked to unpleasant odors, causing cognitive and emotional effects such as stress.

2.7 REGULATORY BACKGROUND

2.7.1 FEDERAL REGULATIONS

The U.S. EPA is responsible for setting and enforcing the NAAQS for O3, CO, NOx, SO2, PM10, PM2.5, and lead (3). The U.S. EPA has jurisdiction over emissions sources that are under the authority of the federal government including aircraft, locomotives, and emissions sources outside state waters (Outer Continental Shelf). The U.S. EPA also establishes emission standards for vehicles sold in states other than California. Automobiles sold in California must meet the stricter emission requirements of the CARB.

The Federal Clean Air Act (CAA) was first enacted in 1955, and has been amended numerous times in subsequent years (1963, 1965, 1967, 1970, 1977, and 1990). The CAA establishes the federal air quality standards, the NAAQS, and specifies future dates for achieving compliance (8). The CAA also mandates that states submit and implement State Implementation Plans (SIPs) for local areas not meeting these standards. These plans must include pollution control measures that demonstrate how the standards will be met.

The 1990 amendments to the CAA that identify specific emission reduction goals for areas not meeting the NAAQS require a demonstration of reasonable further progress toward attainment and incorporate additional sanctions for failure to attain or to meet interim milestones. The sections of the CAA most directly applicable to the development of the Project site include Title I (Non-Attainment Provisions) and Title II (Mobile Source Provisions). Title I provisions were established with the goal of attaining the NAAQS for the following criteria pollutants O3, NO2, SO2, PM10, CO, PM2.5, and lead. The NAAQS were amended in July 1997 to include an additional standard for O3 and to adopt a NAAQS for PM2.5. Table 2-1 (previously presented) provides the NAAQS within the basin.

Mobile source emissions are regulated in accordance with Title II provisions. These provisions require the use of cleaner burning gasoline and other cleaner burning fuels such as methanol and natural gas. Automobile manufacturers are also required to reduce tailpipe emissions of

hydrocarbons and nitrogen oxides (NOx). NOx is a collective term that includes all forms of nitrogen oxides (NO, NO2, NO3) which are emitted as byproducts of the combustion process.

2.7.2 CALIFORNIA REGULATIONS

The CARB, which became part of the California EPA in 1991, is responsible for ensuring implementation of the California Clean Air Act (AB 2595), responding to the federal CAA, and for regulating emissions from consumer products and motor vehicles. The California CAA mandates achievement of the maximum degree of emissions reductions possible from vehicular and other mobile sources in order to attain the state ambient air quality standards by the earliest practical date. The CARB established the CAAQS for all pollutants for which the federal government has NAAQS and, in addition, establishes standards for sulfates, visibility, hydrogen sulfide, and vinyl chloride. However at this time, hydrogen sulfide and vinyl chloride are not measured at any monitoring stations in the SCAB because they are not considered to be a regional air quality problem. Generally, the CAAQS are more stringent than the NAAQS (9) (3).

Local air quality management districts, such as the SCAQMD, regulate air emissions from commercial and light industrial facilities. All Basins have been formally designated as attainment or non-attainment for each CAAQS.

Non-attainment areas are required to prepare air quality management plans that include specified emission reduction strategies in an effort to meet clean air goals. These plans are required to include:

- Application of Best Available Retrofit Control Technology to existing sources;
- Developing control programs for area sources (e.g., architectural coatings and solvents) and indirect sources (e.g. motor vehicle use generated by residential and commercial development);
- A District permitting system designed to allow no net increase in emissions from any new or modified permitted sources of emissions;
- Implementing reasonably available transportation control measures and assuring a substantial reduction in growth rate of vehicle trips and miles traveled;
- Significant use of low emissions vehicles by fleet operators;
- Sufficient control strategies to achieve a five percent or more annual reduction in emissions or 15 percent or more in a period of three years for ROGs, NOx, CO and PM10. However, air basins may use alternative emission reduction strategy that achieves a reduction of less than five percent per year under certain circumstances.

2.7.3 AIR QUALITY MANAGEMENT PLANNING

Currently, the NAAQS and CAAQS are exceeded in most parts of the SCAB. In regards to the NAAQS, the Project region within the SCAB is in nonattainment for ozone (8-hour) and PM2.5. For the CAAQS, the Project region within the SCAB is in nonattainment for ozone (1-hour and 8-hour), PM10, and PM2.5. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards (7). AQMPs are updated regularly in order to more effectively reduce emissions, accommodate

growth, and to minimize any negative fiscal impacts of air pollution control on the economy. A detailed discussion on the AQMP and Project consistency with the AQMP is provided in Section 3.9.

2.8 EXISTING PROJECT SITE AIR QUALITY CONDITIONS

Existing air quality conditions at the Project site would generally reflect ambient monitored conditions as presented previously at Table 2-3.

3 PROJECT AIR QUALITY IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will violate an air quality standard or contribute to an existing or projected air quality violation. The Project has also been evaluated to determine conformity with the CAA. Additionally, the Project has been evaluated to determine if it will result in a cumulatively considerable net increase of a criteria pollutant for which the SCAB is non-attainment under an applicable federal or state ambient air quality standard. The significance of these potential impacts is described in the following section.

3.2 STANDARDS OF SIGNIFICANCE

The criteria used to determine the significance of potential Project-related air quality impacts are taken from the Initial Study Checklist in Appendix G of the State CEQA Guidelines (14 California Code of Regulations §§15000, et seq.). Based on these thresholds, a project would result in a significant impact related to air quality if it would (10):

- Conflict with or obstruct implementation of the applicable air quality plan.
- Violate any air quality standard or contribute to an existing or projected air quality violation.
- Result in a cumulatively considerable net increase of any criteria pollutant for which the project region is in non-attainment under an applicable federal or state ambient air quality standard (including releasing emissions, which exceed quantitative thresholds for ozone precursors).
- Expose sensitive receptors to substantial pollutant concentrations.
- Create objectionable odors affecting a substantial number of people.

The SCAQMD has also developed regional and localized significance thresholds for other regulated pollutants, as summarized at Table 3-1 (11). The SCAQMD's CEQA Air Quality Significance Thresholds (March 2011) indicate that any projects in the SCAB with daily emissions that exceed any of the indicated thresholds should be considered as having an individually and cumulatively significant air quality impact.

TABLE 3-1: MAXIMUM DAILY EMISSIONS THRESHOLDS

Pollutant	Construction	Operations
Regional Thresholds		
NOx	100 lbs/day	55 lbs/day
VOC	75 lbs/day	55 lbs/day
PM10	150 lbs/day	150 lbs/day
PM2.5	55 lbs/day	55 lbs/day
Sox	150 lbs/day	150 lbs/day
CO	550 lbs/day	550 lbs/day
Lead	3 lbs/day	3 lbs/day
Localized Thresholds		
CO	1,359 lbs/day (Site Preparation)	N/A
	1,488 lbs/day (Grading)	
NOx	220 lbs/day (Site Preparation)	N/A
	237 lbs/day (Grading)	
PM10	11 lbs/day (Site Preparation)	N/A
	12 lbs/day (Grading)	
PM2.5	6 lbs/day (Site Preparation)	N/A
	7 lbs/day (Grading)	

Note: lbs/day – pounds per day. Localized thresholds for construction emissions are based on the SCAQMD look-up tables for a four acre disturbance with the nearest sensitive receptor 25 meters away.

3.3 PROJECT-RELATED SOURCES OF POTENTIAL IMPACT

Land uses such as the Project affect air quality through construction-source and operational-source emissions.

On October 2, 2013, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2013.2.2. The purpose of this model is to calculate construction-source and operational-source criteria pollutant (NO_x, VOC, PM_{10}, $PM_{2.5}$, SO_x, and CO) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures. Accordingly, the latest version of CalEEMod™ has been used for this Project to determine construction and operational air quality emissions. Output from the model runs for both construction and operational activity are provided in Appendix 3.2.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the Project will result in emissions of CO, VOCs, NOx, SOx, PM10, and PM2.5. Construction related emissions are expected from the following construction activities:

- Site Preparation
- Grading
- Building Construction
- Paving
- Architectural Coating
- Construction Workers Commuting

Construction is expected to commence in January 2017 and will last through May 31 2019. Construction duration by phase is shown on Table 3-2. The construction schedule utilized in the analysis represents a "worst-case" analysis scenario should construction occur any time after the respective dates since emission factors for construction decrease as time passes and the analysis year increases due to emission regulations becoming more stringent.[2] The duration of construction activity and associated equipment represents a reasonable approximation of the expected construction fleet as required per CEQA guidelines. Site specific construction fleet may vary due to specific project needs at the time of construction. The duration of construction activity and construction equipment were based CalEEMod 2013.2.2 defaults. Please refer to specific detailed modeling inputs/outputs contained in Appendix 3.2 of this analysis. A detailed summary of construction equipment assumptions by phase is provided at Table 3-3.

Dust is typically a major concern during rough grading activities. Because such emissions are not amenable to collection and discharge through a controlled source, they are called "fugitive emissions". Fugitive dust emissions rates vary as a function of many parameters (soil silt, soil moisture, wind speed, area disturbed, number of vehicles, depth of disturbance or excavation, etc.). The CalEEMod model was utilized to calculate fugitive dust emissions resulting from this phase of activity. The Project site is currently vacant and will not require demolition. It is our understanding the site will balance (will not require soil import/export).

Construction emissions for construction worker vehicles traveling to and from the Project site, as well as vendor trips (construction materials delivered to the Project site) were estimated based on information CalEEMod model defaults.

[2] As shown in the California Emissions Estimator Model (CalEEMod) User's Guide Version 2013.2, Table 3.4 "OFFROAD Equipment Emission Factors" as the analysis year increases, emission factors for the same equipment pieces decrease due to the natural turnover of older equipment being replaced by newer less polluting equipment and new regulatory requirements.

TABLE 3-2: CONSTRUCTION DURATION

Phase Name	Start Date	End Date	Days
Phase 1			
Site Preparation	01/01/2017	01/13/2017	10
Grading	01/14/2017	04/28/2017	75
Building Construction	04/29/2017	06/22/2018	300
Architectural Coating	11/25/2018	06/22/2018	150
Paving	06/23/2018	07/20/2018	20
Phase 2			
Site Preparation	07/21/2018	07/27/2018	5
Grading	07/28/2018	09/07/2018	30
Building Construction	09/08/2018	05/17/2019	180
Architectural Coating	02/02/2019	05/17/2019	75
Paving	05/18/2019	05/31/2019	10

TABLE 3-3: CONSTRUCTION EQUIPMENT ASSUMPTIONS (PHASE 1&2)

Activity	Equipment	Number	Hours Per Day
Site Preparation	Rubber Tired Dozers	3	8
	Crawler Tractors	4	8
Grading	Excavators	2	8
	Graders	1	8
	Rubber Tired Dozers	1	8
	Scrapers	2	8
	Crawler Tractors	2	8
Building Construction	Cranes	1	8
	Forklifts	3	8
	Generator Sets	1	8
	Tractors/Loaders/Backhoes	3	8
	Welders	1	8
Architectural Coating	Air Compressor	1	8
Paving	Pavers	2	8
	Paving Equipment	2	8
	Rollers	2	8

3.4.1 CONSTRUCTION EMISSIONS SUMMARY

Impacts without BACMS

SCAQMD Rules that are currently applicable during construction activity for this Project include but are not limited to: Rule 1403 (Asbestos); Rule 1113 (Architectural Coatings) (12); Rule 431.2 (Low Sulfur Fuel) (13); Rule 403 (Fugitive Dust) (14); and Rule 1186 / 1186.1 (Street Sweepers) (15). It should be noted that Best Available Control Measures (BACMs) are not mitigation as they are standard regulatory requirements. Notwithstanding, credit for Rule 403 has not been taken.

The estimated maximum daily construction emissions without mitigation are summarized on Table 3-4. Detailed construction model outputs are presented in Appendix 3.2. Under the assumed scenarios, emissions resulting from the Project construction would not exceed applicable SCAQMD regional thresholds of significance. Therefore, a less than significant impact would occur.

TABLE 3-4: EMISSIONS SUMMARY OF CONSTRUCTION (WITHOUT BACMS)

Year	Emissions (pounds per day)					
	VOC	**NOx**	**CO**	**SOx**	**PM10**	**PM2.5**
2017	37.36	81.72	48.73	0.07	21.02	12.52
2018	36.74	71.00	43.95	0.07	20.63	12.16
2019	68.67	29.91	35.75	0.07	4.16	2.22
Maximum Daily Emissions	**68.67**	**81.72**	**48.73**	**0.07**	**21.02**	**12.52**
SCAQMD Regional Threshold	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Impacts with BACMS

The estimated maximum daily construction emissions with BACMs are summarized on Table 3-5. Detailed construction model outputs are presented in Appendix 3.2. Under the assumed scenarios, emissions resulting from the Project construction would not exceed applicable SCAQMD regional thresholds of significance. Implementation of BACM AQ-1 would further reduce the severity of the impacts and a less than significant impact would occur for construction emission.

TABLE 3-5: EMISSIONS SUMMARY OF CONSTRUCTION (WITH BACMS)

Year	Emissions (pounds per day)					
	VOC	NOx	CO	SOx	PM10	PM2.5
2017	37.36	81.72	48.73	0.07	10.00	6.46
2018	36.74	71.00	43.95	0.07	9.61	6.10
2019	68.67	29.91	35.75	0.07	4.16	2.22
Maximum Daily Emissions	**68.67**	**81.72**	**48.73**	**0.07**	**10.00**	**6.46**
SCAQMD Regional Threshold	75	100	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of ROG, NOX, CO, SOX, PM10, and PM2.5. Operational emissions would be expected from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions

3.5.1 AREA SOURCE EMISSIONS

Architectural Coatings

Over a period of time the buildings that are part of this Project will be subject to emissions resulting from the evaporation of solvents contained in paints, varnishes, primers, and other surface coatings as part of Project maintenance. The emissions associated with architectural coatings were calculated using the CalEEMod model.

Consumer Products

Consumer products include, but are not limited to detergents, cleaning compounds, polishes, personal care products, and lawn and garden products. Many of these products contain organic compounds which when released in the atmosphere can react to form ozone and other photochemically reactive pollutants. The emissions associated with use of consumer products were calculated based on defaults provided within the CalEEMod model.

Hearths/Fireplaces

The emissions associated with use of hearths/fireplaces were calculated based on assumptions provided in the CalEEMod model. The Project is required to comply with SCAQMD Rule 445, which prohibits the use of wood burning stoves and fireplaces in new development. In order to account for the requirements of this Rule, the unmitigated CalEEMod model estimates were adjusted to remove wood burning stoves and fireplaces. As the project is required to comply with SCAQMD Rule 445, the removal of wood burning stoves and fireplaces is not considered "mitigation".

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

Electricity and natural gas are used by almost every project. Criteria pollutant emissions are emitted through the generation of electricity and consumption of natural gas. However, because electrical generating facilities for the Project area are located either outside the region (state) or offset through the use of pollution credits (RECLAIM) for generation within the SCAB, criteria pollutant emissions from offsite generation of electricity is generally excluded from the evaluation of significance and only natural gas use is considered. The emissions associated with natural gas use were calculated using the CalEEMod model.

3.5.3 MOBILE SOURCE EMISSIONS

Vehicles

Project operational (vehicular) impacts are dependent on both overall daily vehicle trip generation and the effect of the Project on peak hour traffic volumes and traffic operations in the vicinity of the Project. The Project related operational air quality impacts derive primarily from vehicle trips generated by the Project. CalEEMod default trip characteristics were utilized in this analysis. Trip generation rates from The Institute of Transportation Engineers Trip Generation Handbook, 9th Edition were also used in the analysis.

Fugitive Dust Related to Vehicular Travel

Vehicles traveling on paved roads would be a source of fugitive emissions due to the generation of road dust inclusive of tire wear particulates. The emissions estimates for travel on paved roads were calculated using the CalEEMod model.

3.5.4 OPERATIONAL EMISSIONS SUMMARY

Impacts without Mitigation

The estimated total maximum daily operation emissions for phase 1 and 2 without mitigation are summarized on Table 3-6. Detailed operation model outputs are presented in Appendix 3.2. Under the assumed scenarios, emissions resulting from the Project operational activities would exceed applicable SCAQMD regional thresholds of significance for emissions of NO_x.

TABLE 3-6: SUMMARY OF PEAK OPERATIONAL EMISSIONS (WITHOUT MITIGATION)

Operational Activities – Summer Scenario	Emissions (pounds per day)					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Phase 1						
Area Source	7.41	0.12	9.98	5.20E-04	0.22	0.21
Energy Source	0.11	0.97	0.41	0.01	0.08	0.08
Mobile Source	4.22	13.22	50.31	0.13	8.81	2.48
Total Maximum Daily Emissions	11.74	14.31	60.70	0.14	9.11	2.77
Phase 2						
Area Source	13.98	0.12	10.02	5.30E-04	0.22	0.21
Energy Source	0.12	1.02	0.46	0.01	0.08	0.08
Mobile Source	20.50	52.76	206.69	0.54	35.60	10.02
Total Maximum Daily Emissions	**34.60**	**53.90**	**217.17**	**0.55**	**35.90**	**10.31**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Operational Activities – Winter Scenario	Emissions (pounds per day)					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Phase 1						
Area Source	7.41	0.12	9.98	5.20E-04	0.22	0.21
Energy Source	0.11	0.97	0.41	6.18E-03	0.08	0.08
Mobile Source	4.07	13.81	46.72	0.12	8.81	2.48
Total Maximum Daily Emissions	11.59	14.90	57.11	0.13	9.11	2.77
Phase 2						
Area Source	13.98	0.12	10.02	5.30E-04	0.22	0.21
Energy Source	0.12	1.02	0.46	6.49E-03	0.08	0.08
Mobile Source	19.85	54.93	198.27	0.5	35.6	10.02
Total Maximum Daily Emissions	**33.95**	**56.07**	**208.75**	**0.51**	**35.90**	**10.31**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**YES**	**NO**	**NO**	**NO**	**NO**

Impacts with Mitigation

The estimated total maximum daily operation emissions for phase 1 and 2 with mitigation are summarized on Table 3-7. Detailed operation model outputs are presented in Appendix 3.2. MM AQ-1 and MM AQ-2 are recommended to reduce the severity of the impacts. After implementation of the MMs, emissions resulting from the Project operational activities would not exceed applicable SCAQMD regional thresholds of significance for any criteria pollutant. Therefore, project operational-source emissions are considered less than significant.

TABLE 3-7: SUMMARY OF PEAK OPERATIONAL EMISSIONS (WITH MITIGATION)

Operational Activities – Summer Scenario	Emissions (pounds per day)					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Phase 1						
Area Source	7.41	0.12	9.98	5.20E-04	0.22	0.21
Energy Source	0.11	0.97	0.41	6.18E-03	0.08	0.08
Mobile Source	4.21	13.14	50.03	0.13	8.75	2.46
Total Maximum Daily Emissions	11.73	14.23	60.42	0.14	9.05	2.75
Phase 2						
Area Source	13.98	0.12	10.02	5.30E-04	0.22	0.21
Energy Source	0.12	1.02	0.46	6.49E-03	0.08	0.08
Mobile Source	19.44	44.26	177.52	0.43	28.46	8.01
Total Maximum Daily Emissions	**33.54**	**45.40**	**188.00**	**0.44**	**28.76**	**8.30**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

Operational Activities – Winter Scenario	Emissions (pounds per day)					
	VOC	NO_x	CO	SO_x	PM_{10}	$PM_{2.5}$
Phase 1						
Area Source	7.41	0.12	9.98	5.20E-04	0.22	0.21
Energy Source	0.11	0.97	0.41	6.18E-03	0.08	0.08
Mobile Source	4.06	13.72	46.48	0.12	8.79	2.46
Total Maximum Daily Emissions	11.58	14.81	56.87	0.13	9.09	2.75
Phase 2						
Area Source	13.98	0.12	10.02	5.30E-04	0.22	0.21
Energy Source	0.12	1.02	0.46	6.49E-03	0.08	0.08
Mobile Source	18.85	45.98	173.78	0.4	28.46	8.02
Total Maximum Daily Emissions	**32.95**	**47.12**	**184.26**	**0.41**	**28.76**	**8.31**
SCAQMD Regional Threshold	55	55	550	150	150	55
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**

3.6 LOCALIZED SIGNIFIANCE - CONSTRUCTION ACTIVITY

BACKGROUND ON LOCALIZED SIGNIFICANCE THRESHOLDS (LSTS)

The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (Methodology) (17). The SCAQMD has established that impacts to air quality are significant if there is a potential to contribute or cause localized exceedances of the federal and/or state ambient air quality standards (NAAQS/CAAQS). Collectively, these are referred to as Localized Significance Thresholds (LSTs).

The significance of localized emissions impacts depends on whether ambient levels in the vicinity of any given project are above or below State standards. In the case of CO and NO2, if ambient levels are below the standards, a project is considered to have a significant impact if project emissions result in an exceedance of one or more of these standards. For the nonattainment pollutants PM_{10} and $PM_{2.5}$, background ambient concentrations already exceed state and/or federal standards. LSTs for PM_{10} and $PM_{2.5}$ are therefore based on SCAQMD Rules 403/1303 (construction-source/operational-source emissions respectively) and are established as an allowable change in concentration. Background concentrations are irrelevant.

The SCAQMD established LSTs in response to the SCAQMD Governing Board's Environmental Justice Initiative I-4. LSTs represent the maximum emissions from a project that will not cause or contribute to an exceedance of the most stringent applicable federal or state ambient air quality standard at the nearest residence or sensitive receptor. The SCAQMD states that lead agencies can use the LSTs as another indicator of significance in its air quality impact analyses. The analysis makes use of methodology included in the SCAQMD *Final Localized Significance Threshold Methodology* (18). For this Project, the appropriate Source Receptor Area (SRA) for the LST analysis is the Central San Bernardino Valley 2 Monitoring Station (SRA 34). LSTs apply to carbon monoxide (CO), nitrogen dioxide (NO_2), particulate matter ≤ 10 microns (PM_{10}), and particulate matter ≤ 2.5 microns ($PM_{2.5}$).

EMISSIONS CONSIDERED

SCAQMD's Methodology clearly states that "off-site mobile emissions from the Project should NOT be included in the emissions compared to LSTs (19)." Therefore, for purposes of the construction LST analysis only emissions included in the CalEEMod "on-site" emissions outputs were considered.

Sensitive Receptors

Some people are especially sensitive to air pollution and are given special consideration when evaluating air quality impacts from projects. These groups of people include children, the elderly, persons with preexisting respiratory or cardiovascular illness, and athletes and others who engage in frequent exercise. Structures that house these persons or places where they gather to exercise are defined as "sensitive receptors".

The nearest sensitive receptor is the residential community located approximately 151 feet/46 meters east to the Project site. Therefore, LSTs for receptors located at 46 meters were used.

APPLICABILITY OF LSTS FOR THE PROJECT

For this Project, the appropriate Source Receptor Area (SRA) for the LST is the Central San Bernardino Valley 2 monitoring station (SRA 34). LSTs apply to carbon monoxide (CO), nitrogen dioxide (NO2), particulate matter ≤ 10 microns (PM10), and particulate matter ≤ 2.5 microns (PM2.5). The SCAQMD produced look-up tables for projects less than or equal to 5 acres in size.

In order to determine the appropriate methodology for determining localized impacts that could occur as a result of Project-related construction, the following process is undertaken:

- The CalEEMod model is utilized to determine the maximum daily on-site emissions that will occur during construction activity.
- The SCAQMD's Fact Sheet for Applying CalEEMod to Localized Significance Thresholds (33) is used to determine the maximum site acreage that is actively disturbed based on the construction equipment fleet and equipment hours as estimated in CalEEMod.
- If the total acreage disturbed is less than or equal to five acres per day, then the SCAQMD's screening look-up tables are utilized to determine if a Project has the potential to result in a significant impact (the SCAQMD recommends that Projects exceeding the screening look-up tables undergo dispersion modeling to determine actual impacts). The look-up tables establish a maximum daily emissions threshold in pounds per day that can be compared to CalEEMod outputs.
- If the total acreage disturbed is greater than five acres per day, then the SCAQMD recommends dispersion modeling to be conducted to determine the actual pollutant concentrations for applicable LSTs in the air. In other words, the maximum daily on-site emissions as calculated in CalEEMod are modeled via air dispersion modeling to calculate the actual concentration in the air (e.g., parts per million or micrograms per cubic meter) in order to determine if any applicable thresholds are exceeded.

MAXIMUM DAILY DISTURBED-ACREAGE

Table 3-8 is used to determine the maximum daily disturbed-acreage for use in determining the applicability of the SCAQMD's LST look-up tables. Based on Table 3-8, the maximum acres the Project could actively disturb are approximately 3.5 acres per day during the peak site preparation phase and 4 acres per day during the peak grading phase.

TABLE 3-8: MAXIMUM DAILY DISTURBED ACREAGE

Construction Phase	Equipment Type	Equipment	Acres graded per 8 hour day	Operating Hours per Day	Acres graded per day
Site Preparation	Rubber Tired Dozers	3	0.5	8	1.5
	Crawler Tractors	4	0.5	8	2
	Graders	0	0.5	8	0
	Scrapers	0	1	8	0
Total acres graded per day during Site Preparation					**3.5**

Construction Phase	Equipment Type	Equipment	Acres graded per 8 hour day	Operating Hours per Day	Acres graded per day
Grading	Rubber Tired Dozers	1	0.5	8	0.5
	Crawler Tractors	2	0.5	8	1
	Graders	1	0.5	8	0.5
	Scrapers	2	1	8	2
Total acres graded per day during Grading					**4**

CONSTRUCTION-SOURCE EMISSIONS LST ANALYSIS

Since the Project's maximum daily disturbed acreage is less than 5 acres per day, SCAQMD's LST Look-up Tables are used in determining localized impacts. This methodology is consistent with recent recommendations made by SCAQMD planning staff.

Impacts without BACMs

Table 3-9 identifies the localized impacts at the nearest receptor location in the vicinity of the Project. As shown, emissions during construction activity without BACMs has the potential to exceed the SCAQMD's localized significance thresholds for emissions of $PM_{2.5}$ only.

TABLE 3-9: LOCALIZED SIGNIFICANCE SUMMARY CONSTRUCTION (WITHOUT BACMS) (1 OF 2)

On-Site Site Preparation Emissions	Emissions (pounds per day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Phase 1	51.75	39.40	20.82	12.46
Phase 2	45.61	36.23	20.43	12.11
Maximum Daily Emissions	**51.75**	**39.4**	**20.82**	**12.46**
SCAQMD Localized Threshold	246	1,838	29	8
Threshold Exceeded?	**NO**	**NO**	**NO**	**YES**

TABLE 3-9: LOCALIZED SIGNIFICANCE SUMMARY CONSTRUCTION (WITHOUT BACMS) (2 OF 2)

On-Site Grading Emissions	Emissions (pounds per day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Phase 1	81.62	47.50	13.28	6.98
Phase 2	70.92	42.84	12.78	6.51
Maximum Daily Emissions	**81.62**	**47.50**	**13.28**	**6.98**
SCAQMD Localized Threshold	263	1,989	33	8
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

Impacts with BACMs

Table 3-10 identifies the localized impacts at the nearest receptor location in the vicinity of the Project. As shown, emissions during construction activity with BACMs would not exceed SCAQMD's localized significance thresholds and a less than significant impact would occur.

TABLE 3-10: LOCALIZED SIGNIFICANCE SUMMARY CONSTRUCTION (WITH BACMS) (1 OF 2)

On-Site Site Preparation Emissions	Emissions (pounds per day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Phase 1	51.75	39.40	9.80	6.41
Phase 2	45.61	36.23	9.41	6.05
Maximum Daily Emissions	**51.75**	**39.40**	**9.80**	**6.41**
SCAQMD Localized Threshold	246	1,838	29	8
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

TABLE 3-10: LOCALIZED SIGNIFICANCE SUMMARY CONSTRUCTION (WITH BACMS) (2 OF 2)

On-Site Grading Emissions	Emissions (pounds per day)			
	NO_x	CO	PM_{10}	$PM_{2.5}$
Phase 1	81.62	47.50	7.35	4.71
Phase 2	70.92	42.84	6.84	4.25
Maximum Daily Emissions	**81.62**	**47.50**	**7.35**	**4.71**
SCAQMD Localized Threshold	263	1,989	33	8
Threshold Exceeded?	**NO**	**NO**	**NO**	**NO**

3.7 LOCALIZED SIGNIFICANCE – LONG-TERM OPERATIONAL ACTIVITY

The proposed project involves the construction and operation of 120 single family detached residential dwelling units and 98,000 square feet of commercial retail. According to SCAQMD LST methodology, LSTs would apply to the operational phase of a proposed project, if the project includes stationary sources, or attracts mobile sources that may spend long periods queuing and idling at the site (e.g., warehouse or transfer facilities). The proposed project does

not include such uses, and thus, due to the lack of stationary source emissions, no long-term localized significance threshold analysis is needed.

3.8 CO "HOT SPOT" ANALYSIS

As discussed below, the Project would not result in potentially adverse CO concentrations or "hot spots." Further, detailed modeling of Project-specific carbon monoxide (CO) "hot spots" is not needed to reach this conclusion.

It has long been recognized that adverse localized CO concentrations ("hot spots") are caused by vehicular emissions, primarily when idling at congested intersections. In response, vehicle emissions standards have become increasingly stringent in the last twenty years. Currently, the allowable CO emissions standard in California is a maximum of 3.4 grams/mile for passenger cars (there are requirements for certain vehicles that are more stringent). With the turnover of older vehicles, introduction of cleaner fuels, and implementation of increasingly sophisticated and efficient emissions control technologies, CO concentrations in the Project vicinity have steadily declined, as indicated by historical emissions data presented previously at Table 2-3.

A CO "hotspot" would occur if an exceedance of the state one-hour standard of 20 ppm or the eight-hour standard of 9 ppm were to occur. At the time of the 1993 Handbook, the SCAB was designated nonattainment under the California AAQS and National AAQS for CO (21). As identified within SCAQMD's 2003 AQMP and the 1992 Federal Attainment Plan for Carbon Monoxide (1992 CO Plan), peak carbon monoxide concentrations in the SCAB were a result of unusual meteorological and topographical conditions and not a result of congestion at a particular intersection (21). To establish a more accurate record of baseline CO concentrations affecting the SCAB, a CO "hot spot" analysis was conducted in 2003 for four busy intersections in Los Angeles at the peak morning and afternoon time periods. This hot spot analysis did not predict any violation of CO standards, as shown on Table 3-11. Traffic volumes generating the CO concentrations for the analysis are shown on Table 3-12. It can therefore be reasonably concluded that projects (such as the proposed Rancho Palma development) that are not subject to the extremes in vehicle volumes and vehicle congestion that was evidenced in the 2003 Los Angeles hot spot analysis would similarly not create or result in CO hot spots. Similar considerations are also employed by other Air Districts when evaluating potential CO concentration impacts. More specifically, the Bay Area Air Quality Management District (BAAQMD) concludes that under existing and future vehicle emission rates, a given project would have to increase traffic volumes at a single intersection by more than 44,000 vehicles per hour—or 24,000 vehicles per hour where vertical and/or horizontal air does not mix—in order to generate a significant CO impact (22). The proposed Project considered herein would not produce the volume of traffic required to generate a CO hotspot either in the context of the 2003 Los Angeles hot spot study, or based on representative BAAQMD CO threshold considerations, as shown on Table 3-13. Therefore, CO hotspots are not an environmental impact of concern for the proposed Project. Localized air quality impacts related to mobile-source emissions would therefore be less than significant.

TABLE 3-11: CO MODEL RESULTS

Intersection Location	Carbon Monoxide Concentrations (ppm)		
	Morning 1-hour	Afternoon 1-hour	8-hour
Wilshire-Veteran	4.6	3.5	4.2
Sunset-Highland	4	4.5	3.9
La Cienega-Century	3.7	3.1	5.8
Long Beach-Imperial	3	3.1	9.3

Notes: ppm- parts per million

TABLE 3-12: TRAFFIC VOLUMES FOR INTERSECTIONS EVALUATED IN AQMP

Intersection Location	Peak Traffic Volumes (vph)				
	Eastbound (AM/PM)	Westbound (AM/PM)	Southbound (AM/PM)	Northbound (AM/PM)	Total (AM/PM)
Wilshire-Veteran	4,954/2,069	1,830/3,317	721/1,400	560/933	8,062/7,719
Sunset-Highland	1,417/1,764	1,342/1,540	2,304/1,832	1,551/2,238	6,614/5,374
La Cienega-Century	2,540/2,243	1,890/2,728	1,384/2,029	821/1,674	6,634/8,674
Long Beach-Imperial	1,217/2,020	1,760/1,400	479/944	756/1,150	4,212/5,514

Source: 2003 AQMP
Notes: vph- vehicles per hour

TABLE 3-13: PROJECT PEAK TRAFFIC VOLUMES

Intersection Location	Peak Traffic Volumes (vph)				
	Northbound (AM/PM)	Southbound (AM/PM)	Eastbound (AM/PM)	Westbound (AM/PM)	Total (AM/PM)
Palm Ave and W. Little League Dr/ Kendall Dr.	971/1,179	1,000/499	402/458	697/818	3,070/2,954
Palm Ave/ I-215 NB Ramps	623/707	1,433/896	0/0	659/899	2,715/2,502
Palm Ave & Kendall Dr./I-215 SB Ramps	269/617	1,227/928	132/117	658/374	2,196/2,036
University Pkwy & Kendall Dr.	1,295/1,484	446/1,333	903/739	731/760	3,375/4,316

Source: Rancho Palma Traffic Impact Analysis (2015)
Notes: vph- vehicles per hour

3.9 AIR QUALITY MANAGEMENT PLANNING

The Project site is located within the SCAB, which is characterized by relatively poor air quality. The SCAQMD has jurisdiction over an approximately 10,743 square-mile area consisting of the four-county Basin and the Los Angeles County and Riverside County portions of what use to be referred to as the Southeast Desert Air Basin. In these areas, the SCAQMD is principally responsible for air pollution control, and works directly with the Southern California Association of Governments (SCAG), county transportation commissions, local governments, as well as state and federal agencies to reduce emissions from stationary, mobile, and indirect sources to meet state and federal ambient air quality standards.

Currently, these state and federal air quality standards are exceeded in most parts of the Basin. In response, the SCAQMD has adopted a series of Air Quality Management Plans (AQMPs) to meet the state and federal ambient air quality standards. AQMPs are updated regularly in order to more effectively reduce emissions, accommodate growth, and to minimize any negative fiscal impacts of air pollution control on the economy.

The Final 2012 AQMP was adopted by the AQMD Governing Board on December 7, 2012 (23) (7). The 2012 AQMP incorporates the latest scientific and technological information and planning assumptions, including the 2012 Regional Transportation Plan/Sustainable Communities Strategy and updated emission inventory methodologies for various source categories.

Similar to the 2007 AQMP, the 2012 AQMP was based on assumptions provided by both CARB and SCAG in the latest available EMFAC model for the most recent motor vehicle and demographics information, respectively. The air quality levels projected in the 2012 AQMP are based on several assumptions. For example, the 2012 AQMP has assumed that development associated with general plans, specific plans, residential projects, and wastewater facilities will be constructed in accordance with population growth projections identified by SCAG in its 2012 RTP. The 2012 AQMP also has assumed that such development projects will implement strategies to reduce emissions generated during the construction and operational phases of development. The Project's consistency with the 2012 AQMP is discussed as follows:

Criteria for determining consistency with the AQMP are defined in Chapter 12, Section 12.2 and Section 12.3 of the SCAQMD's CEQA Air Quality Handbook (1993) (24). These indicators are discussed below:

- Consistency Criterion No. 1: The proposed Project will not result in an increase in the frequency or severity of existing air quality violations or cause or contribute to new violations, or delay the timely attainment of air quality standards or the interim emissions reductions specified in the AQMP.

Construction Impacts

Consistency Criterion No. 1 refers to violations of the CAAQS and NAAQS. CAAQS and NAAQS violations would occur if LSTs were exceeded. As evaluated as part of the Project LST analysis

(previously presented), the Project's localized construction-source emissions would not exceed applicable LSTs.

Operational Impacts

The Project regional analysis demonstrates that Project operational-source emissions would not exceed applicable thresholds, and would therefore not result in or cause violations of the CAAQS and NAAQS.

On the basis of the preceding discussion, the Project is determined to be consistent with the first criterion.

- Consistency Criterion No. 2: The Project will not exceed the assumptions in the AQMP based on the years of Project build-out phase.

Overview

The 2012 AQMP demonstrates that the applicable ambient air quality standards can be achieved within the timeframes required under federal law. Growth projections from local general plans adopted by cities in the district are provided to the Southern California Association of Governments (SCAG), which develops regional growth forecasts, which are then used to develop future air quality forecasts for the AQMP. Development consistent with the growth projections in the City of San Bernardino General Plan is considered to be consistent with the AQMP.

Construction Impacts

Peak day emissions generated by construction activities are largely independent of land use assignments, but rather are a function of development scope and maximum area of disturbance. Irrespective of the site's land use designation, development of the site to its maximum potential would likely occur, with disturbance of the entire site occurring during construction activities.

Operational Impacts

The Project site currently has a land use designation of Commercial General -1, which is intended for retail, personal service, entertainment, office, and related commercial uses to service the needs of the residents (26). The Project proposes to construct residential and commercial land uses. It should be noted that the proposed development would not exceed regional or local thresholds and would therefore be considered to have a less than significant impact. As such, development proposed by the Project is consistent with the growth projections in the General Plan and is therefore considered to be consistent with the AQMP.

On the basis of the preceding discussion, the Project is determined to be consistent with the second criterion.

AQMP Consistency Conclusion

The proposed project would not result in or cause NAAQS or CAAQS violations. The Project's proposed land use designation for the subject site is not materially different than the development intensities as reflected in the adopted General Plan. The Project is therefore considered to be consistent with the AQMP.

3.10 POTENTIAL IMPACTS TO SENSITIVE RECEPTORS

The potential impact of Project-generated air pollutant emissions at sensitive receptors has also been considered. Sensitive receptors can include uses such as long term health care facilities, rehabilitation centers, and retirement homes. Residences, schools, playgrounds, child care centers, and athletic facilities can also be considered as sensitive receptors.

Results of the LST analysis indicate that the Project will not exceed the SCAQMD localized significance thresholds during construction. Therefore sensitive receptors would not be subject to a significant air quality impact during Project construction.

The proposed Project would not result in a CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as discussed in Section 3.8. Thus a less than significant impact to sensitive receptors during operational activity is expected.

3.11 ODORS

The potential for the Project to generate objectionable odors has also been considered. Land uses generally associated with odor complaints include:

- Agricultural uses (livestock and farming)
- Wastewater treatment plants
- Food processing plants
- Chemical plants
- Composting operations
- Refineries
- Landfills
- Dairies
- Fiberglass molding facilities

The Project does not contain land uses typically associated with emitting objectionable odors. Potential odor sources associated with the proposed Project may result from construction equipment exhaust and the application of asphalt and architectural coatings during construction activities and the temporary storage of typical solid waste (refuse) associated with the proposed Project's (long-term operational) uses. Standard construction requirements would minimize odor impacts from construction. The construction odor emissions would be temporary, short-term, and intermittent in nature and would cease upon completion of the

respective phase of construction and is thus considered less than significant. It is expected that Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with the County's solid waste regulations. The proposed Project would also be required to comply with SCAQMD Rule 402 to prevent occurrences of public nuisances. Therefore, odors associated with the proposed Project construction and operations would be less than significant and no mitigation is required.

3.12 CUMULATIVE IMPACTS

The Project area is designated as an extreme non-attainment area for ozone, and a non-attainment area for PM_{10} and $PM_{2.5}$.

CRITERION 1; REGIONAL ANALYSIS

Construction Impacts

The Project-specific evaluation of emissions presented in the preceding analysis demonstrates that Project construction-source air pollutant emissions will not result in exceedances of regional thresholds. Therefore, Project construction-source emissions would be considered less than significant on a project-specific and cumulative basis.

Operational Impacts

Project operational-source emissions will not exceed applicable SCAQMD regional thresholds. Therefore, Project operational-source emissions would be considered less than significant on a project-specific and cumulative basis.

CRITERION 2; LIST APPROACH

A list approach is used, in accordance with Section 15130(b) of the CEQA Guidelines, which states the following:

> *The following elements are necessary to an adequate discussion of significant cumulative impacts: 1) Either: (A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or (B) A summary of projections contained in an adopted general plan or related planning document, or in a prior environmental document which has been adopted or certified, which described or evaluated regional or area wide conditions contributing to the cumulative impact.*

The SCAQMD has recognized that there is typically insufficient information to quantitatively evaluate the cumulative contributions of multiple projects because each project applicant has no control over nearby projects. Nevertheless, the potential cumulative impacts from the Project and other projects are discussed below and have been quantified to the extent practical. A cumulative project list was developed for this analysis and is shown in Table 3-14.

The cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the City of San Bernardino, the cumulative project list

includes known and foreseeable projects that are anticipated to contribute emissions to the air basin in the vicinity of the Project.

Cumulative projects could contribute to an existing or projected air quality exceedance because the Basin is currently nonattainment for ozone, PM10, and PM2.5.

The AQMD has published a report on how to address cumulative impacts from air pollution: *White Paper on Potential Control Strategies to Address Cumulative Impacts from Air Pollution* (39). In this report the AQMD clearly states (Page D-3):

"…the AQMD uses the same significance thresholds for project specific and cumulative impacts for all environmental topics analyzed in an Environmental Assessment or EIR. The only case where the significance thresholds for project specific and cumulative impacts differ is the Hazard Index (HI) significance threshold for toxic air contaminant (TAC) emissions. The project specific (project increment) significance threshold is HI > 1.0 while the cumulative (facility-wide) is HI > 3.0. It should be noted that the HI is only one of three TAC emission significance thresholds considered (when applicable) in a CEQA analysis. The other two are the maximum individual cancer risk (MICR) and the cancer burden, both of which use the same significance thresholds (MICR of 10 in 1 million and cancer burden of 0.5) for project specific and cumulative impacts.

Projects that exceed the project-specific significance thresholds are considered by the SCAQMD to be cumulatively considerable. This is the reason project-specific and cumulative significance thresholds are the same. Conversely, projects that do not exceed the project-specific thresholds are generally not considered to be cumulatively significant."

Therefore, this analysis assumes that individual projects that do not generate operational or construction emissions that exceed the SCAQMD's recommended daily thresholds for project-specific impacts would also not cause a cumulatively considerable increase in emissions for those pollutants for which the Basin is in nonattainment, and, therefore, would not be considered to have a significant, adverse air quality impact. Alternatively, individual project-related construction and operational emissions that exceed SCAQMD thresholds for project-specific impacts would be considered cumulatively considerable.

For this Project, a less than significant project-specific and thus less than cumulatively considerable impact would occur since the Project's emissions do not exceed the applicable SCAQMD thresholds for construction and on-going operational activity.

TABLE 3-14: CUMULATIVE DEVELOPMENT LIST

#	Project/Location	Land Use[1]	Quantity	Units[2]
City of San Bernardino				
CSB1	DP206-28	Distribution Center	678.275	TSF
CSB2	ADP15-05	Market	18.000	TSF
CSB3	The Colonies at University Park	SFDR	22	DU
CSB4	The Promenade at University Park	Student Housing	104	DU
CSB5	CUP12-06	Fast Food Restaurant with Drive-Thru	2.300	TSF
CSB6	CUP14-04	Water Treatment Plant	63.000	TSF
CSB7	CUP14-08	Gas Station / Commercial	5.000	TSF
CSB8	CUP14-19	Car Wash	3.650	TSF
CSB9	CUP14-21	Church	121.000	TSF
CSB10	Harbor Flight Tools (DP-D14-18)	Retail	17.541	TSF
CSB11	CUP15-03	Restaurants with Drive-Thru	5.422	TSF
CSB12	DP-D15-02	Warehouse	155.000	TSF
CSB13	DP-P13-07	SFDR	39	DU
CSB14	CUP11-08	Home Improvement	136.090	TSF
		Retail / Restaurant	68.630	TSF
County of San Bernardino				
SBC1	P201400536	Recreational Facility Expansion		
SBC2	P201200390	Truck Terminal	4.298	TSF
SBC3	Silverleaf at Rosena Ranch (P201400397)	SFDR		
SBC4	P201400346	Vehicle Service Shop Expansion	1.462	TSF

[1] SFDR = Single Family Detached Residential

[2] TSF = Ten Thousand Square Feet; DU = Dwelling Unit

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4 FINDINGS & CONCLUSIONS

4.1 CONSTRUCTION-SOURCE EMISSIONS

REGIONAL IMPACTS

Project construction-source emissions would not exceed the numerical regional thresholds of significance established by the South Coast Air Quality Management District (SCAQMD). Notwithstanding, BACM AQ-1 is recommended to further reduce the severity of the impacts. Thus a less than significant impact would occur for Project-related construction-source emissions both with and without implementation of BACM AQ-1.

LOCALIZED IMPACTS

Without BACMs, emissions during construction activity has the potential to exceed the SCAQMD's localized significance threshold for $PM_{2.5}$ only. BACM AQ-1 is recommended to reduce the impacts to less than significant levels. After implementation of BACM AQ-1, construction-source emissions will not exceed SCAQMD's localized significance thresholds for any applicable pollutants and a less than significant impact will occur.

Project construction-source emissions would not conflict with the applicable AQMP.

ODORS

Established requirements addressing construction equipment operations, and construction material use, storage, and disposal requirements act to minimize odor impacts that may result from construction activities. Moreover, construction-source odor emissions would be temporary, short-term, and intermittent in nature and would not result in persistent impacts that would affect substantial numbers of people. Potential construction-source odor impacts are therefore considered less-than-significant.

4.2 OPERATIONAL-SOURCE EMISSIONS

REGIONAL IMPACTS

For regional emissions, the Project has the potential to exceed the numerical thresholds of significance established by the SCAQMD for emissions of NO_x. MM AQ-1 and MM AQ-2 are recommended to reduce the impacts to less than significant levels. After implementation of MM AQ-1 and MM AQ-2, a less than significant impact would occur for Project-related operational-source emissions.

LOCALIZED IMPACTS

Project operational-source emissions would not result in or cause a significant localized air quality impact as discussed in the operational LSTs section of this report. The proposed Project would not result in a significant CO "hotspot" as a result of Project related traffic during ongoing operations, nor would the Project result in a significant adverse health impact as

discussed in Section 3.8, thus a less than significant impact to sensitive receptors during operational activity is expected. Lastly, Project operational-source emissions would not conflict with the applicable AQMP.

ODORS

Substantial odor-generating sources include land uses such as agricultural activities, feedlots, wastewater treatment facilities, landfills or various heavy industrial uses. The Project does not propose any such uses or activities that would result in potentially significant operational-source odor impacts. Potential sources of operational odors generated by the Project would include disposal of miscellaneous residential and commercial refuse. Moreover, SCAQMD Rule 402 acts to prevent occurrences of odor nuisances (1) . Consistent with City requirements, all Project-generated refuse would be stored in covered containers and removed at regular intervals in compliance with solid waste regulations. Potential operational-source odor impacts are therefore considered less-than-significant.

4.3 CONSTRUCTION AND OPERATIONAL-SOURCE BEST AVAILABLE CONTROL MEASURES AND MITIGATION MEASURES

BACM AQ-1

The following measures shall be incorporated into Project plans and specifications as implementation of Rule 403 (4):

- All clearing, grading, earth-moving, or excavation activities shall cease when winds exceed 25 mph per SCAQMD guidelines in order to limit fugitive dust emissions.
- The contractor shall ensure that all disturbed unpaved roads and disturbed areas within the Project are watered at least three (3) times daily during dry weather. Watering, with complete coverage of disturbed areas, shall occur at least three times a day, preferably in the mid-morning, afternoon, and after work is done for the day.
- The contractor shall ensure that traffic speeds on unpaved roads and Project site areas are reduced to 15 miles per hour or less.

MM AQ-1

Provide direct, safe, attractive pedestrian access from project to transit stops and adjacent development.

MM AQ-2

Provide safe, direct bicycle access to adjacent bicycle routes and connect bicycle lanes/paths to city-wide network to encourage non-auto modes of transportation.

5 REFERENCES

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4. **Environmental Protection Agency.** Monitor Values Report. [Online] [Cited: September 17, 2014.] http://www.epa.gov/airdata/ad_rep_mon.html.
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6 CERTIFICATION

The contents of this air study report represent an accurate depiction of the environmental impacts associated with the proposed Rancho Palma Project. The information contained in this air quality impact assessment report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 217.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

Bachelor of Arts in Environmental Analysis and Design
University of California, Irvine • June, 2006

PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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APPENDIX 3.1:

STATE/FEDERAL ATTAINMENT STATUS OF CRITERIA POLLUTANTS

2013
Area Designations for State Ambient Air Quality Standards
OZONE

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

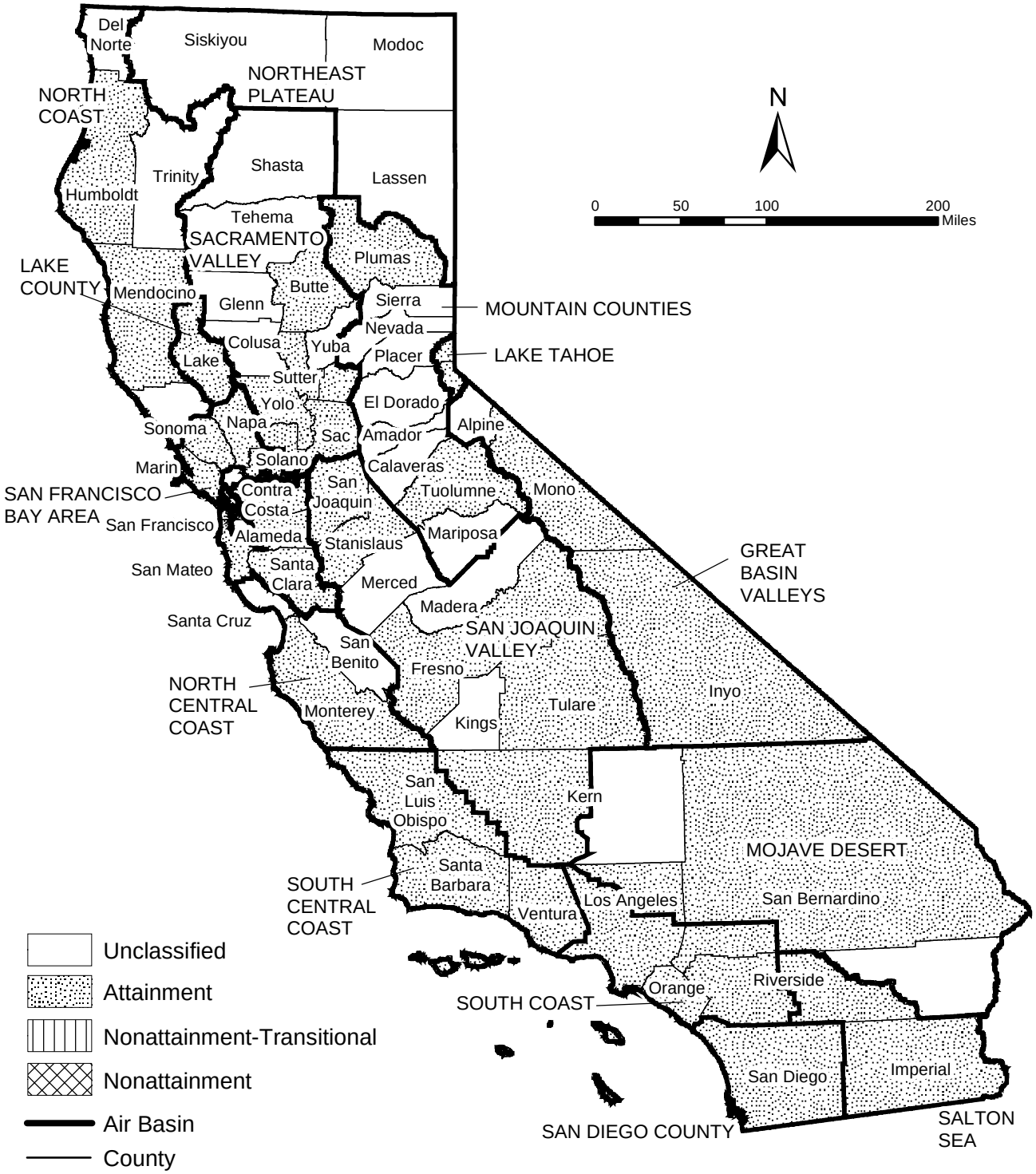
2013
Area Designations for State Ambient Air Quality Standards
PM10

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

2013
Area Designations for State Ambient Air Quality Standards
PM2.5

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

2013
Area Designations for State Ambient Air Quality Standards
CARBON MONOXIDE



Source Date:
June 2013
Air Quality Planning Branch, AQPSD

2013
Area Designations for State Ambient Air Quality Standards
NITROGEN DIOXIDE

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

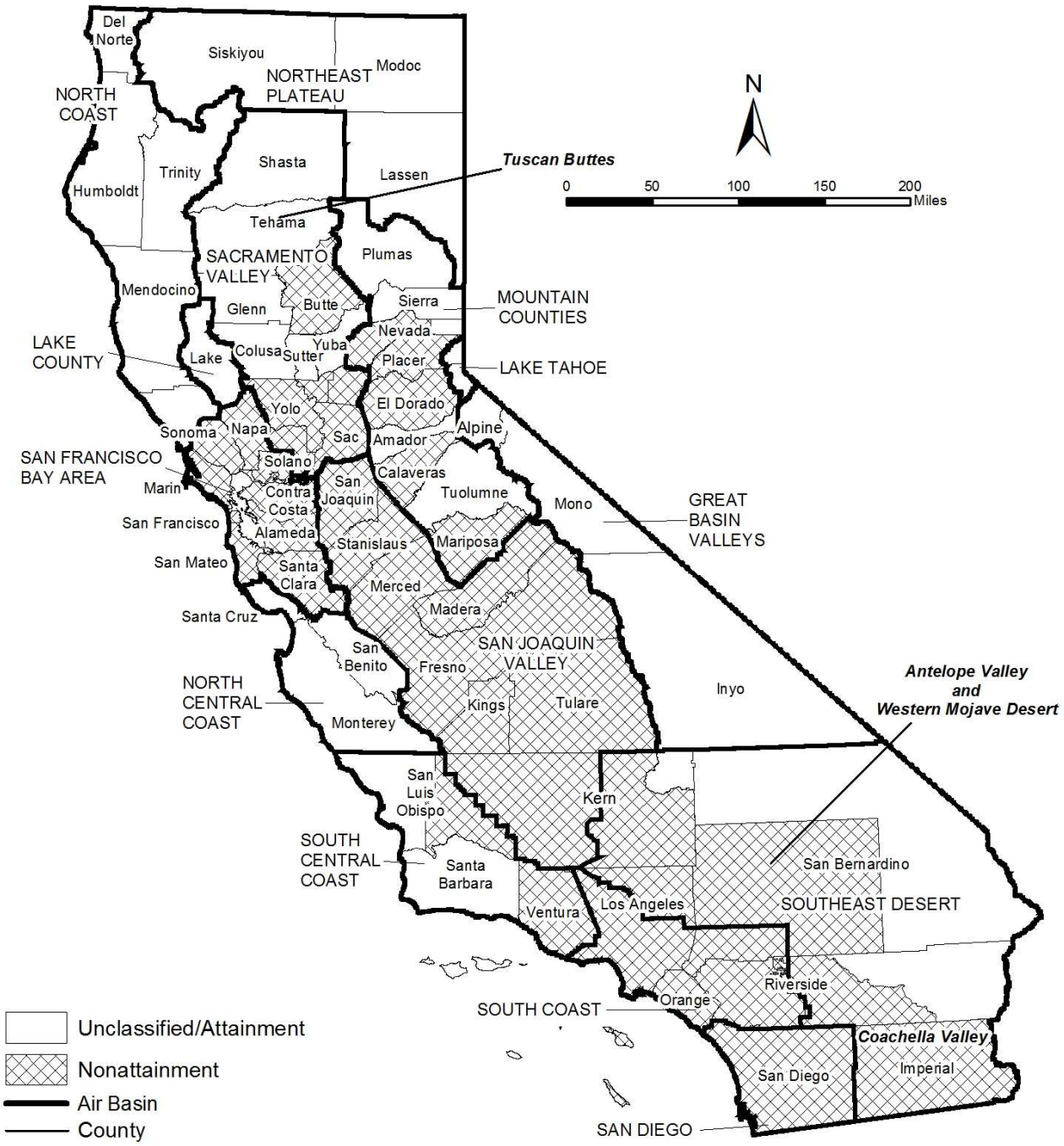
2013
Area Designations for State Ambient Air Quality Standards
SULFUR DIOXIDE

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

2013
Area Designations for State Ambient Air Quality Standards
LEAD

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Area Designations for National Ambient Air Quality Standards 8-HOUR OZONE



Source Date:
June 2013
Air Quality Planning Branch, AQPSD

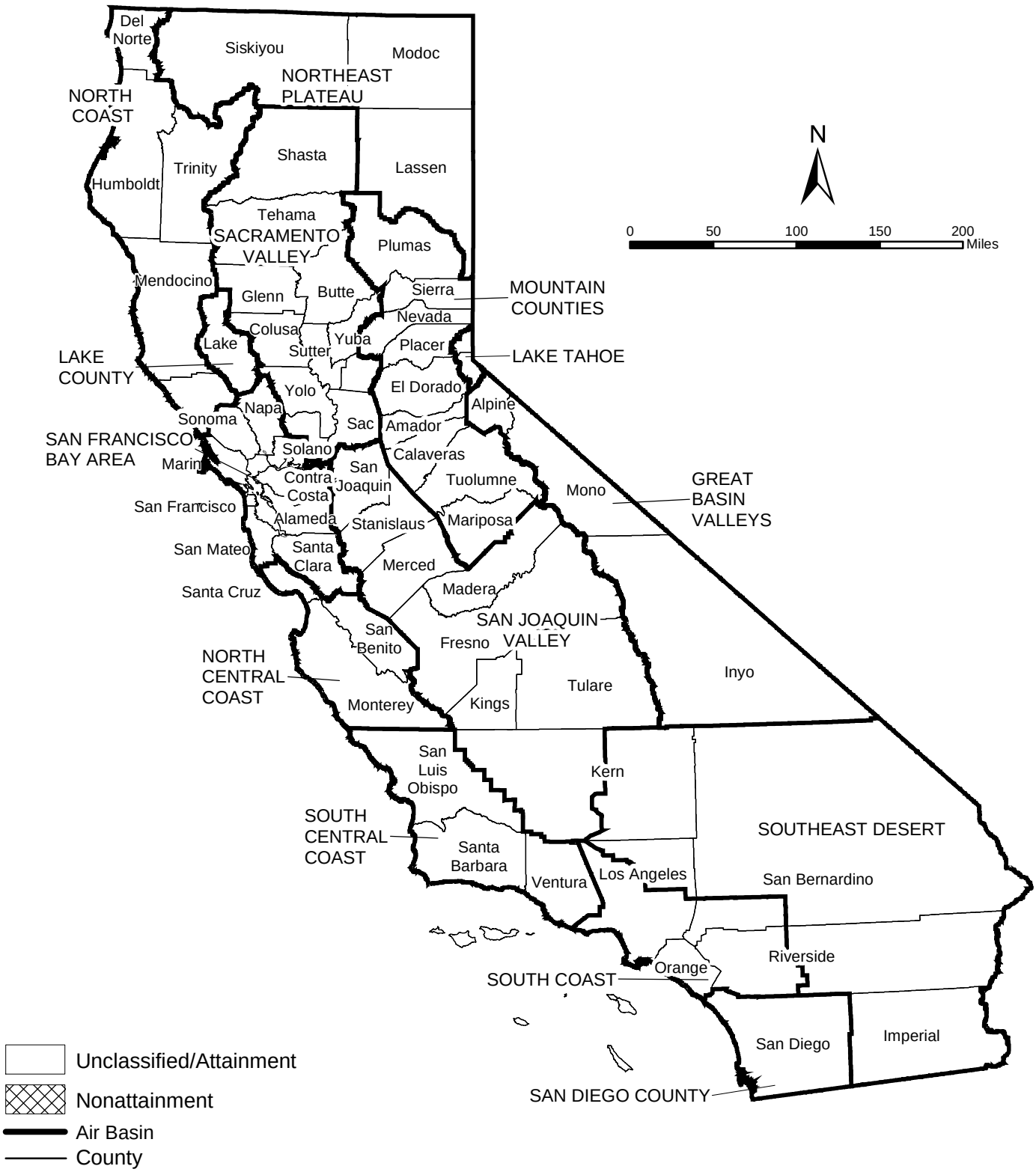
Area Designations for National Ambient Air Quality Standards PM10

Source Date:
September 2013
Air Quality Planning Branch, AQPSD

Area Designations for National Ambient Air Quality Standards PM2.5

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Area Designations for National Ambient Air Quality Standards CARBON MONOXIDE

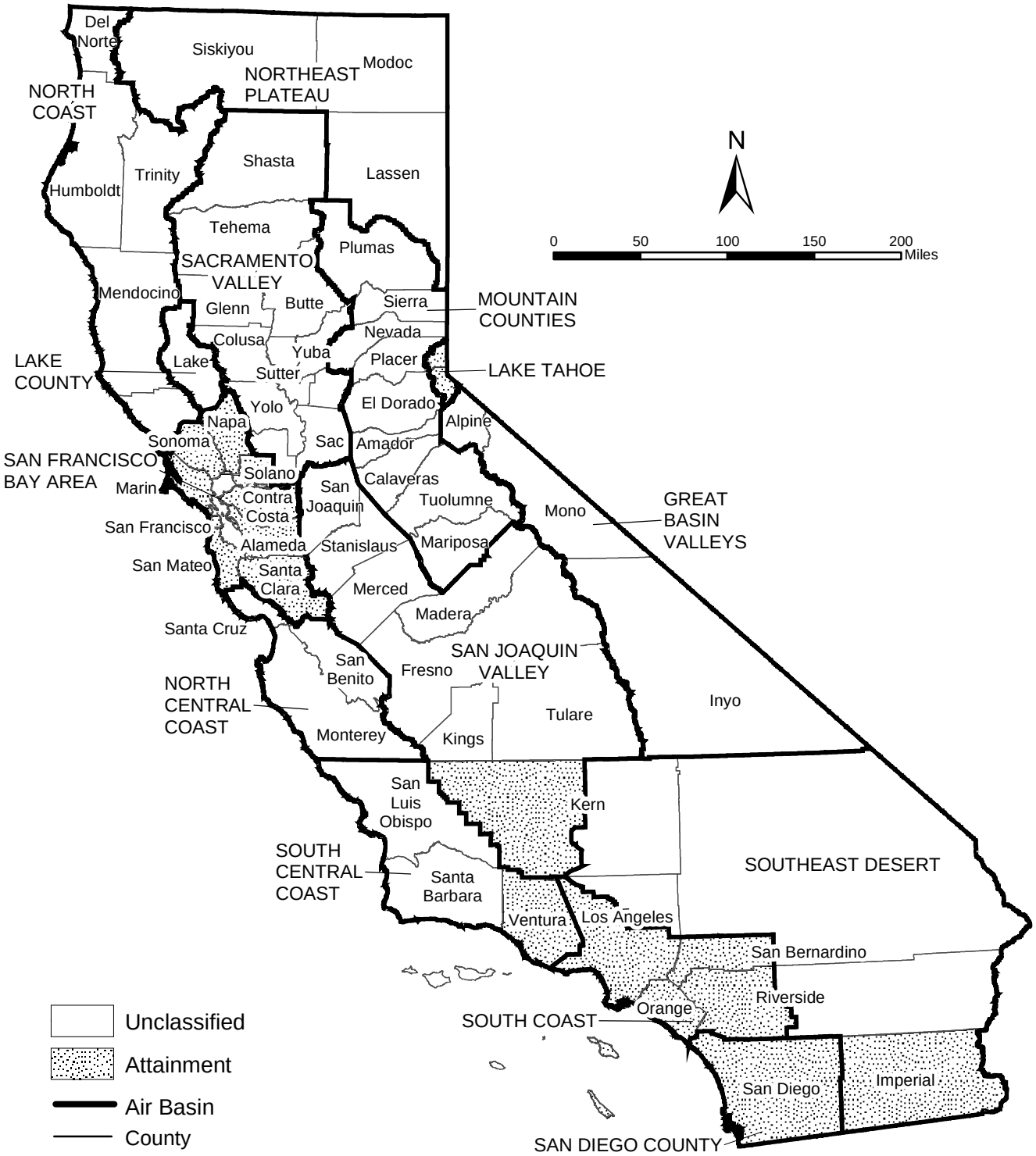


Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Area Designations for National Ambient Air Quality Standards NITROGEN DIOXIDE

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Area Designations for National Ambient Air Quality Standards SULFUR DIOXIDE



Source Date:
June 2013
Air Quality Planning Branch, AQPSD

Area Designations for National Ambient Air Quality Standards LEAD

Source Date:
June 2013
Air Quality Planning Branch, AQPSD

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APPENDIX 3.2:

CALEEMOD EMISSIONS MODEL OUTPUTS

Rancho Palma (Construction)-Unmitigated

San Bernardino-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	500.00	Space	4.50	200,000.00	0
Single Family Housing	120.00	Dwelling Unit	28.40	313,200.00	343
Regional Shopping Center	98.00	1000sqft	4.70	98,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	479.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Total Lot Acreage: 37.6; Average home size is 2,610 SF based on a 50% maximum lot coverage

Construction Phase - Based on past project experience

Off-road Equipment - 8 hour workdays

Off-road Equipment - 8 hour workdays

Off-road Equipment - 8 hour workdays

Off-road Equipment - 8 hour workdays

Off-road Equipment - Based on past project experience

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Construction Off-road Equipment Mitigation -

Grading -

Trips and VMT -

Off-road Equipment - Based on past project experience

Vehicle Trips - Construction run only

Vechicle Emission Factors - Construction run only

Vechicle Emission Factors - Construction run only

Vechicle Emission Factors - Construction run only

Woodstoves - Construction run only

Consumer Products - Construction run only

Area Coating - Construction run only

Landscape Equipment - Construction run only

Energy Use - Construction run only

Water And Wastewater - Construction run only

Solid Waste - Construction run only

Table Name	Column Name	Default Value	New Value
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstructionPhase	NumDays	55.00	150.00
tblConstructionPhase	NumDays	55.00	75.00
tblConstructionPhase	NumDays	740.00	300.00
tblConstructionPhase	NumDays	740.00	180.00
tblConstructionPhase	NumDays	75.00	30.00
tblConstructionPhase	NumDays	55.00	10.00
tblConstructionPhase	NumDays	55.00	20.00
tblConstructionPhase	NumDays	30.00	10.00
tblConstructionPhase	NumDays	30.00	5.00
tblConstructionPhase	PhaseEndDate	1/18/2019	6/22/2018
tblConstructionPhase	PhaseEndDate	8/30/2019	5/17/2019
tblConstructionPhase	PhaseStartDate	6/23/2018	11/25/2017
tblConstructionPhase	PhaseStartDate	5/18/2019	2/2/2019
tblConsumerProducts	ROG_EF	1.98E-05	1E-09
tblEnergyUse	LightingElect	0.88	0.00
tblEnergyUse	LightingElect	7.62	0.00
tblEnergyUse	LightingElect	1,608.84	0.00
tblEnergyUse	NT24E	2.44	0.00
tblEnergyUse	NT24E	5,089.81	0.00
tblEnergyUse	NT24NG	0.30	0.00
tblEnergyUse	NT24NG	5,950.14	0.00
tblEnergyUse	T24E	5.60	0.00
tblEnergyUse	T24E	980.99	0.00
tblEnergyUse	T24NG	2.02	0.00
tblEnergyUse	T24NG	27,816.78	0.00
tblFireplaces	NumberGas	102.00	0.00

tblFireplaces	NumberNoFireplace	12.00	0.00
tblFireplaces	NumberWood	6.00	0.00
tblLandscapeEquipment	NumberSummerDays	250	1
tblLandUse	LandUseSquareFeet	216,000.00	313,200.00
tblLandUse	LotAcreage	38.96	28.40
tblLandUse	LotAcreage	2.25	4.70
tblOffRoadEquipment	LoadFactor	0.43	0.43
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tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	479.9
tblProjectCharacteristics	OperationalYear	2014	2019
tblSolidWaste	SolidWasteGenerationRate	102.90	0.00
tblSolidWaste	SolidWasteGenerationRate	140.63	0.00
tblVehicleEF	HHD	0.04	0.00
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2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	37.3601	81.7185	48.7347	0.0737	18.2675	3.5527	21.0231	9.9840	3.2685	12.5193	0.0000	7,473.7552	7,473.7552	2.2318	0.0000	7,520.6236
2018	36.7373	71.0005	43.9541	0.0737	18.2675	3.0466	20.6343	9.9840	2.8029	12.1615	0.0000	7,349.8107	7,349.8107	2.2307	0.0000	7,396.6555
2019	68.6740	29.9057	35.7515	0.0727	2.5244	1.6331	4.1574	0.6774	1.5423	2.2197	0.0000	6,393.4557	6,393.4557	0.8137	0.0000	6,410.5438
Total	**142.7713**	**182.6248**	**128.4404**	**0.2200**	**39.0593**	**8.2323**	**45.8148**	**20.6455**	**7.6136**	**26.9004**	**0.0000**	**21,217.0216**	**21,217.0216**	**5.2763**	**0.0000**	**21,327.8228**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	37.3601	81.7185	48.7347	0.0737	7.2470	3.5527	10.0027	3.9263	3.2685	6.4615	0.0000	7,473.7552	7,473.7552	2.2318	0.0000	7,520.6236
2018	36.7373	71.0005	43.9541	0.0737	7.2470	3.0466	9.6139	3.9263	2.8029	6.1038	0.0000	7,349.8107	7,349.8107	2.2307	0.0000	7,396.6554
2019	68.6740	29.9057	35.7515	0.0727	2.5244	1.6331	4.1574	0.6774	1.5423	2.2197	0.0000	6,393.4557	6,393.4557	0.8137	0.0000	6,410.5438
Total	**142.7713**	**182.6248**	**128.4404**	**0.2200**	**17.0185**	**8.2323**	**23.7740**	**8.5300**	**7.6136**	**14.7850**	**0.0000**	**21,217.0216**	**21,217.0216**	**5.2763**	**0.0000**	**21,327.8228**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.43**	**0.00**	**48.11**	**58.68**	**0.00**	**45.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3110	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547	0.0000	17.9572	17.9572	0.0179	0.0000	18.3321
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.3110**	**0.1158**	**10.0108**	**5.3000e-004**	**0.0000**	**0.0547**	**0.0547**	**0.0000**	**0.0547**	**0.0547**	**0.0000**	**17.9572**	**17.9572**	**0.0179**	**0.0000**	**18.3321**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3110	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547	0.0000	17.9572	17.9572	0.0179	0.0000	18.3321
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.3110**	**0.1158**	**10.0108**	**5.3000e-004**	**0.0000**	**0.0547**	**0.0547**	**0.0000**	**0.0547**	**0.0547**	**0.0000**	**17.9572**	**17.9572**	**0.0179**	**0.0000**	**18.3321**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation 1	Site Preparation	1/1/2017	1/13/2017	5	10	
2	Grading 1	Grading	1/14/2017	4/28/2017	5	75	
3	Building Construction 1	Building Construction	4/29/2017	6/22/2018	5	300	
4	Architectural Coating 1	Architectural Coating	11/25/2017	6/22/2018	5	150	
5	Paving 1	Paving	6/23/2018	7/20/2018	5	20	
6	Site Preparation 2	Site Preparation	7/21/2018	7/27/2018	5	5	
7	Grading 2	Grading	7/28/2018	9/7/2018	5	30	
8	Building Construction 2	Building Construction	9/8/2018	5/17/2019	5	180	
9	Architectural Coating 2	Architectural Coating	2/2/2019	5/17/2019	5	75	
10	Paving 2	Paving	5/18/2019	5/31/2019	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 634,230; Residential Outdoor: 211,410; Non-Residential Indoor: 156,000; Non-Residential Outdoor: 52,000 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation 1	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation 1	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading 1	Excavators	2	8.00	162	0.38
Grading 1	Graders	1	8.00	174	0.41
Grading 1	Rubber Tired Dozers	1	8.00	255	0.40
Grading 1	Scrapers	2	8.00	361	0.48
Grading 1	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction 1	Cranes	1	8.00	226	0.29
Building Construction 1	Forklifts	3	8.00	89	0.20
Building Construction 1	Generator Sets	1	8.00	84	0.74
Building Construction 1	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction 1	Welders	1	8.00	46	0.45
Architectural Coating 1	Air Compressors	1	8.00	78	0.48
Paving 1	Pavers	2	8.00	125	0.42
Paving 1	Paving Equipment	2	8.00	130	0.36
Paving 1	Rollers	2	8.00	80	0.38
Site Preparation 2	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation 2	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading 2	Excavators	2	8.00	162	0.38
Grading 2	Graders	1	8.00	174	0.41
Grading 2	Rubber Tired Dozers	1	8.00	255	0.40
Grading 2	Scrapers	2	8.00	361	0.48
Grading 2	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction 2	Cranes	1	8.00	226	0.29
Building Construction 2	Forklifts	3	8.00	89	0.20
Building Construction 2	Generator Sets	1	8.00	84	0.74
Building Construction 2	Tractors/Loaders/Backhoes	3	8.00	97	0.37

Building Construction 2	Welders	1	8.00	46	0.45
Architectural Coating 2	Air Compressors	1	8.00	78	0.48
Paving 2	Pavers	2	8.00	125	0.42
Paving 2	Paving Equipment	2	8.00	130	0.36
Paving 2	Rollers	2	8.00	80	0.38
Grading 1	Crawler Tractors	2	8.00	208	0.43
Grading 2	Crawler Tractors	2	8.00	208	0.43

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation 1	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading 1	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction 1	9	159.00	62.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating 1	1	32.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving 1	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation 2	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading 2	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction 2	9	159.00	62.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating 2	1	32.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving 2	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation 1 - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.8382	51.7535	39.3970	0.0391		2.7542	2.7542		2.5339	2.5339		4,003.0859	4,003.0859	1.2265		4,028.8432
Total	**4.8382**	**51.7535**	**39.3970**	**0.0391**	**18.0663**	**2.7542**	**20.8205**	**9.9307**	**2.5339**	**12.4646**		**4,003.0859**	**4,003.0859**	**1.2265**		**4,028.8432**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0688	0.0844	1.1138	2.5300e-003	0.2012	1.4400e-003	0.2026	0.0534	1.3300e-003	0.0547		201.9558	201.9558	9.5700e-003		202.1568
Total	**0.0688**	**0.0844**	**1.1138**	**2.5300e-003**	**0.2012**	**1.4400e-003**	**0.2026**	**0.0534**	**1.3300e-003**	**0.0547**		**201.9558**	**201.9558**	**9.5700e-003**		**202.1568**

3.2 Site Preparation 1 - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.0458	0.0000	7.0458	3.8730	0.0000	3.8730			0.0000			0.0000
Off-Road	4.8382	51.7535	39.3970	0.0391		2.7542	2.7542		2.5339	2.5339	0.0000	4,003.0859	4,003.0859	1.2265		4,028.8432
Total	**4.8382**	**51.7535**	**39.3970**	**0.0391**	**7.0458**	**2.7542**	**9.8001**	**3.8730**	**2.5339**	**6.4069**	**0.0000**	**4,003.0859**	**4,003.0859**	**1.2265**		**4,028.8432**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0688	0.0844	1.1138	2.5300e-003	0.2012	1.4400e-003	0.2026	0.0534	1.3300e-003	0.0547		201.9558	201.9558	9.5700e-003		202.1568
Total	**0.0688**	**0.0844**	**1.1138**	**2.5300e-003**	**0.2012**	**1.4400e-003**	**0.2026**	**0.0534**	**1.3300e-003**	**0.0547**		**201.9558**	**201.9558**	**9.5700e-003**		**202.1568**

3.3 Grading 1 - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.7338	0.0000	9.7338	3.7110	0.0000	3.7110			0.0000			0.0000
Off-Road	6.8168	81.6248	47.4972	0.0709		3.5511	3.5511		3.2670	3.2670		7,249.3599	7,249.3599	2.2212		7,296.0049
Total	**6.8168**	**81.6248**	**47.4972**	**0.0709**	**9.7338**	**3.5511**	**13.2849**	**3.7110**	**3.2670**	**6.9780**		**7,249.3599**	**7,249.3599**	**2.2212**		**7,296.0049**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0764	0.0937	1.2375	2.8100e-003	0.2236	1.6000e-003	0.2252	0.0593	1.4700e-003	0.0608		224.3953	224.3953	0.0106		224.6187
Total	**0.0764**	**0.0937**	**1.2375**	**2.8100e-003**	**0.2236**	**1.6000e-003**	**0.2252**	**0.0593**	**1.4700e-003**	**0.0608**		**224.3953**	**224.3953**	**0.0106**		**224.6187**

3.3 Grading 1 - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.7962	0.0000	3.7962	1.4473	0.0000	1.4473			0.0000			0.0000
Off-Road	6.8168	81.6248	47.4972	0.0709		3.5511	3.5511		3.2670	3.2670	0.0000	7,249.3599	7,249.3599	2.2212		7,296.0049
Total	**6.8168**	**81.6248**	**47.4972**	**0.0709**	**3.7962**	**3.5511**	**7.3473**	**1.4473**	**3.2670**	**4.7143**	**0.0000**	**7,249.3599**	**7,249.3599**	**2.2212**		**7,296.0049**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0764	0.0937	1.2375	2.8100e-003	0.2236	1.6000e-003	0.2252	0.0593	1.4700e-003	0.0608		224.3953	224.3953	0.0106		224.6187
Total	**0.0764**	**0.0937**	**1.2375**	**2.8100e-003**	**0.2236**	**1.6000e-003**	**0.2252**	**0.0593**	**1.4700e-003**	**0.0608**		**224.3953**	**224.3953**	**0.0106**		**224.6187**

3.4 Building Construction 1 - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3022	28.5087	19.3714	0.0287		1.9099	1.9099		1.7914	1.7914		2,831.3094	2,831.3094	0.7084		2,846.1853
Total	**3.3022**	**28.5087**	**19.3714**	**0.0287**		**1.9099**	**1.9099**		**1.7914**	**1.7914**		**2,831.3094**	**2,831.3094**	**0.7084**		**2,846.1853**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4854	4.9238	5.8366	0.0135	0.3896	0.0800	0.4695	0.1112	0.0735	0.1848		1,329.6123	1,329.6123	9.4100e-003		1,329.8098
Worker	0.6077	0.7453	9.8382	0.0223	1.7772	0.0127	1.7900	0.4713	0.0117	0.4831		1,783.9427	1,783.9427	0.0846		1,785.7187
Total	**1.0931**	**5.6690**	**15.6748**	**0.0358**	**2.1668**	**0.0927**	**2.2595**	**0.5826**	**0.0852**	**0.6678**		**3,113.5550**	**3,113.5550**	**0.0940**		**3,115.5284**

3.4 Building Construction 1 - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3022	28.5087	19.3714	0.0287		1.9099	1.9099		1.7914	1.7914	0.0000	2,831.3094	2,831.3094	0.7084		2,846.1853
Total	**3.3022**	**28.5087**	**19.3714**	**0.0287**		**1.9099**	**1.9099**		**1.7914**	**1.7914**	**0.0000**	**2,831.3094**	**2,831.3094**	**0.7084**		**2,846.1853**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4854	4.9238	5.8366	0.0135	0.3896	0.0800	0.4695	0.1112	0.0735	0.1848		1,329.6123	1,329.6123	9.4100e-003		1,329.8098
Worker	0.6077	0.7453	9.8382	0.0223	1.7772	0.0127	1.7900	0.4713	0.0117	0.4831		1,783.9427	1,783.9427	0.0846		1,785.7187
Total	**1.0931**	**5.6690**	**15.6748**	**0.0358**	**2.1668**	**0.0927**	**2.2595**	**0.5826**	**0.0852**	**0.6678**		**3,113.5550**	**3,113.5550**	**0.0940**		**3,115.5284**

3.4 Building Construction 1 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8383	25.0811	18.7173	0.0287		1.6002	1.6002		1.5023	1.5023		2,798.2338	2,798.2338	0.6973		2,812.8775
Total	**2.8383**	**25.0811**	**18.7173**	**0.0287**		**1.6002**	**1.6002**		**1.5023**	**1.5023**		**2,798.2338**	**2,798.2338**	**0.6973**		**2,812.8775**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4493	4.5144	5.5084	0.0134	0.3895	0.0752	0.4647	0.1112	0.0692	0.1804		1,306.8593	1,306.8593	9.3400e-003		1,307.0555
Worker	0.5429	0.6727	8.8928	0.0223	1.7772	0.0124	1.7896	0.4713	0.0115	0.4828		1,716.5428	1,716.5428	0.0781		1,718.1828
Total	**0.9921**	**5.1872**	**14.4011**	**0.0358**	**2.1667**	**0.0876**	**2.2543**	**0.5825**	**0.0807**	**0.6632**		**3,023.4021**	**3,023.4021**	**0.0874**		**3,025.2383**

3.4 Building Construction 1 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8383	25.0811	18.7173	0.0287		1.6002	1.6002		1.5023	1.5023	0.0000	2,798.2338	2,798.2338	0.6973		2,812.8775
Total	**2.8383**	**25.0811**	**18.7173**	**0.0287**		**1.6002**	**1.6002**		**1.5023**	**1.5023**	**0.0000**	**2,798.2338**	**2,798.2338**	**0.6973**		**2,812.8775**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4493	4.5144	5.5084	0.0134	0.3895	0.0752	0.4647	0.1112	0.0692	0.1804		1,306.8593	1,306.8593	9.3400e-003		1,307.0555
Worker	0.5429	0.6727	8.8928	0.0223	1.7772	0.0124	1.7896	0.4713	0.0115	0.4828		1,716.5428	1,716.5428	0.0781		1,718.1828
Total	**0.9921**	**5.1872**	**14.4011**	**0.0358**	**2.1667**	**0.0876**	**2.2543**	**0.5825**	**0.0807**	**0.6632**		**3,023.4021**	**3,023.4021**	**0.0874**		**3,025.2383**

3.5 Architectural Coating 1 - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	32.3994					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4431	2.9134	2.4908	3.9600e-003		0.2311	0.2311		0.2311	0.2311		375.2641	375.2641	0.0396		376.0961
Total	**32.8425**	**2.9134**	**2.4908**	**3.9600e-003**		**0.2311**	**0.2311**		**0.2311**	**0.2311**		**375.2641**	**375.2641**	**0.0396**		**376.0961**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1223	0.1500	1.9800	4.5000e-003	0.3577	2.5600e-003	0.3602	0.0949	2.3600e-003	0.0972		359.0325	359.0325	0.0170		359.3899
Total	**0.1223**	**0.1500**	**1.9800**	**4.5000e-003**	**0.3577**	**2.5600e-003**	**0.3602**	**0.0949**	**2.3600e-003**	**0.0972**		**359.0325**	**359.0325**	**0.0170**		**359.3899**

3.5 Architectural Coating 1 - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	32.3994					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4431	2.9134	2.4908	3.9600e-003		0.2311	0.2311		0.2311	0.2311	0.0000	375.2641	375.2641	0.0396		376.0961
Total	**32.8425**	**2.9134**	**2.4908**	**3.9600e-003**		**0.2311**	**0.2311**		**0.2311**	**0.2311**	**0.0000**	**375.2641**	**375.2641**	**0.0396**		**376.0961**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1223	0.1500	1.9800	4.5000e-003	0.3577	2.5600e-003	0.3602	0.0949	2.3600e-003	0.0972		359.0325	359.0325	0.0170		359.3899
Total	**0.1223**	**0.1500**	**1.9800**	**4.5000e-003**	**0.3577**	**2.5600e-003**	**0.3602**	**0.0949**	**2.3600e-003**	**0.0972**		**359.0325**	**359.0325**	**0.0170**		**359.3899**

3.5 Architectural Coating 1 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	32.3994					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3982	2.6743	2.4723	3.9600e-003		0.2007	0.2007		0.2007	0.2007		375.2647	375.2647	0.0357		376.0135
Total	**32.7976**	**2.6743**	**2.4723**	**3.9600e-003**		**0.2007**	**0.2007**		**0.2007**	**0.2007**		**375.2647**	**375.2647**	**0.0357**		**376.0135**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1093	0.1354	1.7897	4.5000e-003	0.3577	2.4900e-003	0.3602	0.0949	2.3100e-003	0.0972		345.4677	345.4677	0.0157		345.7978
Total	**0.1093**	**0.1354**	**1.7897**	**4.5000e-003**	**0.3577**	**2.4900e-003**	**0.3602**	**0.0949**	**2.3100e-003**	**0.0972**		**345.4677**	**345.4677**	**0.0157**		**345.7978**

3.5 Architectural Coating 1 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	32.3994					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3982	2.6743	2.4723	3.9600e-003		0.2007	0.2007		0.2007	0.2007	0.0000	375.2647	375.2647	0.0357		376.0135
Total	**32.7976**	**2.6743**	**2.4723**	**3.9600e-003**		**0.2007**	**0.2007**		**0.2007**	**0.2007**	**0.0000**	**375.2647**	**375.2647**	**0.0357**		**376.0135**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1093	0.1354	1.7897	4.5000e-003	0.3577	2.4900e-003	0.3602	0.0949	2.3100e-003	0.0972		345.4677	345.4677	0.0157		345.7978
Total	**0.1093**	**0.1354**	**1.7897**	**4.5000e-003**	**0.3577**	**2.4900e-003**	**0.3602**	**0.0949**	**2.3100e-003**	**0.0972**		**345.4677**	**345.4677**	**0.0157**		**345.7978**

3.6 Paving 1 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635		2,245.2695	2,245.2695	0.6990		2,259.9481
Paving	0.5895					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.2009**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**		**2,245.2695**	**2,245.2695**	**0.6990**		**2,259.9481**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0512	0.0635	0.8389	2.1100e-003	0.1677	1.1700e-003	0.1688	0.0445	1.0800e-003	0.0456		161.9380	161.9380	7.3700e-003		162.0927
Total	**0.0512**	**0.0635**	**0.8389**	**2.1100e-003**	**0.1677**	**1.1700e-003**	**0.1688**	**0.0445**	**1.0800e-003**	**0.0456**		**161.9380**	**161.9380**	**7.3700e-003**		**162.0927**

3.6 Paving 1 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635	0.0000	2,245.2695	2,245.2695	0.6990		2,259.9481
Paving	0.5895					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.2009**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**	**0.0000**	**2,245.2695**	**2,245.2695**	**0.6990**		**2,259.9481**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0512	0.0635	0.8389	2.1100e-003	0.1677	1.1700e-003	0.1688	0.0445	1.0800e-003	0.0456		161.9380	161.9380	7.3700e-003		162.0927
Total	**0.0512**	**0.0635**	**0.8389**	**2.1100e-003**	**0.1677**	**1.1700e-003**	**0.1688**	**0.0445**	**1.0800e-003**	**0.0456**		**161.9380**	**161.9380**	**7.3700e-003**		**162.0927**

3.7 Site Preparation 2 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.2921	45.6088	36.2346	0.0391		2.3654	2.3654		2.1762	2.1762		3,939.7731	3,939.7731	1.2265		3,965.5297
Total	**4.2921**	**45.6088**	**36.2346**	**0.0391**	**18.0663**	**2.3654**	**20.4317**	**9.9307**	**2.1762**	**12.1069**		**3,939.7731**	**3,939.7731**	**1.2265**		**3,965.5297**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0615	0.0762	1.0067	2.5300e-003	0.2012	1.4000e-003	0.2026	0.0534	1.3000e-003	0.0547		194.3256	194.3256	8.8400e-003		194.5113
Total	**0.0615**	**0.0762**	**1.0067**	**2.5300e-003**	**0.2012**	**1.4000e-003**	**0.2026**	**0.0534**	**1.3000e-003**	**0.0547**		**194.3256**	**194.3256**	**8.8400e-003**		**194.5113**

3.7 Site Preparation 2 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.0458	0.0000	7.0458	3.8730	0.0000	3.8730			0.0000			0.0000
Off-Road	4.2921	45.6088	36.2346	0.0391		2.3654	2.3654		2.1762	2.1762	0.0000	3,939.7731	3,939.7731	1.2265		3,965.5297
Total	**4.2921**	**45.6088**	**36.2346**	**0.0391**	**7.0458**	**2.3654**	**9.4113**	**3.8730**	**2.1762**	**6.0491**	**0.0000**	**3,939.7731**	**3,939.7731**	**1.2265**		**3,965.5297**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0615	0.0762	1.0067	2.5300e-003	0.2012	1.4000e-003	0.2026	0.0534	1.3000e-003	0.0547		194.3256	194.3256	8.8400e-003		194.5113
Total	**0.0615**	**0.0762**	**1.0067**	**2.5300e-003**	**0.2012**	**1.4000e-003**	**0.2026**	**0.0534**	**1.3000e-003**	**0.0547**		**194.3256**	**194.3256**	**8.8400e-003**		**194.5113**

3.8 Grading 2 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.7338	0.0000	9.7338	3.7110	0.0000	3.7110			0.0000			0.0000
Off-Road	6.0104	70.9159	42.8356	0.0709		3.0450	3.0450		2.8014	2.8014		7,133.8934	7,133.8934	2.2209		7,180.5318
Total	**6.0104**	**70.9159**	**42.8356**	**0.0709**	**9.7338**	**3.0450**	**12.7789**	**3.7110**	**2.8014**	**6.5124**		**7,133.8934**	**7,133.8934**	**2.2209**		**7,180.5318**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0683	0.0846	1.1186	2.8100e-003	0.2236	1.5600e-003	0.2251	0.0593	1.4400e-003	0.0607		215.9173	215.9173	9.8200e-003		216.1236
Total	**0.0683**	**0.0846**	**1.1186**	**2.8100e-003**	**0.2236**	**1.5600e-003**	**0.2251**	**0.0593**	**1.4400e-003**	**0.0607**		**215.9173**	**215.9173**	**9.8200e-003**		**216.1236**

3.8 Grading 2 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.7962	0.0000	3.7962	1.4473	0.0000	1.4473			0.0000			0.0000
Off-Road	6.0104	70.9159	42.8356	0.0709		3.0450	3.0450		2.8014	2.8014	0.0000	7,133.8934	7,133.8934	2.2209		7,180.5318
Total	**6.0104**	**70.9159**	**42.8356**	**0.0709**	**3.7962**	**3.0450**	**6.8412**	**1.4473**	**2.8014**	**4.2487**	**0.0000**	**7,133.8934**	**7,133.8934**	**2.2209**		**7,180.5318**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0683	0.0846	1.1186	2.8100e-003	0.2236	1.5600e-003	0.2251	0.0593	1.4400e-003	0.0607		215.9173	215.9173	9.8200e-003		216.1236
Total	**0.0683**	**0.0846**	**1.1186**	**2.8100e-003**	**0.2236**	**1.5600e-003**	**0.2251**	**0.0593**	**1.4400e-003**	**0.0607**		**215.9173**	**215.9173**	**9.8200e-003**		**216.1236**

3.9 Building Construction 2 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8383	25.0811	18.7173	0.0287		1.6002	1.6002		1.5023	1.5023		2,798.2338	2,798.2338	0.6973		2,812.8775
Total	**2.8383**	**25.0811**	**18.7173**	**0.0287**		**1.6002**	**1.6002**		**1.5023**	**1.5023**		**2,798.2338**	**2,798.2338**	**0.6973**		**2,812.8775**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4493	4.5144	5.5084	0.0134	0.3895	0.0752	0.4647	0.1112	0.0692	0.1804		1,306.8593	1,306.8593	9.3400e-003		1,307.0555
Worker	0.5429	0.6727	8.8928	0.0223	1.7772	0.0124	1.7896	0.4713	0.0115	0.4828		1,716.5428	1,716.5428	0.0781		1,718.1828
Total	**0.9921**	**5.1872**	**14.4011**	**0.0358**	**2.1667**	**0.0876**	**2.2543**	**0.5825**	**0.0807**	**0.6632**		**3,023.4021**	**3,023.4021**	**0.0874**		**3,025.2383**

3.9 Building Construction 2 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8383	25.0811	18.7173	0.0287		1.6002	1.6002		1.5023	1.5023	0.0000	2,798.2338	2,798.2338	0.6973		2,812.8775
Total	**2.8383**	**25.0811**	**18.7173**	**0.0287**		**1.6002**	**1.6002**		**1.5023**	**1.5023**	**0.0000**	**2,798.2338**	**2,798.2338**	**0.6973**		**2,812.8775**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4493	4.5144	5.5084	0.0134	0.3895	0.0752	0.4647	0.1112	0.0692	0.1804		1,306.8593	1,306.8593	9.3400e-003		1,307.0555
Worker	0.5429	0.6727	8.8928	0.0223	1.7772	0.0124	1.7896	0.4713	0.0115	0.4828		1,716.5428	1,716.5428	0.0781		1,718.1828
Total	**0.9921**	**5.1872**	**14.4011**	**0.0358**	**2.1667**	**0.0876**	**2.2543**	**0.5825**	**0.0807**	**0.6632**		**3,023.4021**	**3,023.4021**	**0.0874**		**3,025.2383**

3.9 Building Construction 2 - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5006	22.5762	18.2643	0.0287		1.3747	1.3747		1.2908	1.2908		2,765.9458	2,765.9458	0.6865		2,780.3623
Total	**2.5006**	**22.5762**	**18.2643**	**0.0287**		**1.3747**	**1.3747**		**1.2908**	**1.2908**		**2,765.9458**	**2,765.9458**	**0.6865**		**2,780.3623**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4259	4.1459	5.3430	0.0133	0.3894	0.0721	0.4616	0.1112	0.0664	0.1775		1,276.9752	1,276.9752	9.0300e-003		1,277.1647
Worker	0.4940	0.6131	8.0658	0.0222	1.7772	0.0121	1.7894	0.4713	0.0112	0.4826		1,644.3352	1,644.3352	0.0720		1,645.8473
Total	**0.9199**	**4.7590**	**13.4088**	**0.0356**	**2.1667**	**0.0842**	**2.2509**	**0.5825**	**0.0776**	**0.6601**		**2,921.3104**	**2,921.3104**	**0.0810**		**2,923.0120**

3.9 Building Construction 2 - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5006	22.5762	18.2643	0.0287		1.3747	1.3747		1.2908	1.2908	0.0000	2,765.9458	2,765.9458	0.6865		2,780.3623
Total	**2.5006**	**22.5762**	**18.2643**	**0.0287**		**1.3747**	**1.3747**		**1.2908**	**1.2908**	**0.0000**	**2,765.9458**	**2,765.9458**	**0.6865**		**2,780.3623**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4259	4.1459	5.3430	0.0133	0.3894	0.0721	0.4616	0.1112	0.0664	0.1775		1,276.9752	1,276.9752	9.0300e-003		1,277.1647
Worker	0.4940	0.6131	8.0658	0.0222	1.7772	0.0121	1.7894	0.4713	0.0112	0.4826		1,644.3352	1,644.3352	0.0720		1,645.8473
Total	**0.9199**	**4.7590**	**13.4088**	**0.0356**	**2.1667**	**0.0842**	**2.2509**	**0.5825**	**0.0776**	**0.6601**		**2,921.3104**	**2,921.3104**	**0.0810**		**2,923.0120**

3.10 Architectural Coating 2 - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	64.7989					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717		375.2641	375.2641	0.0317		375.9297
Total	**65.1541**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**		**375.2641**	**375.2641**	**0.0317**		**375.9297**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0994	0.1234	1.6233	4.4700e-003	0.3577	2.4400e-003	0.3601	0.0949	2.2600e-003	0.0971		330.9354	330.9354	0.0145		331.2397
Total	**0.0994**	**0.1234**	**1.6233**	**4.4700e-003**	**0.3577**	**2.4400e-003**	**0.3601**	**0.0949**	**2.2600e-003**	**0.0971**		**330.9354**	**330.9354**	**0.0145**		**331.2397**

3.10 Architectural Coating 2 - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	64.7989					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717	0.0000	375.2641	375.2641	0.0317		375.9297
Total	**65.1541**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**	**0.0000**	**375.2641**	**375.2641**	**0.0317**		**375.9297**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0994	0.1234	1.6233	4.4700e-003	0.3577	2.4400e-003	0.3601	0.0949	2.2600e-003	0.0971		330.9354	330.9354	0.0145		331.2397
Total	**0.0994**	**0.1234**	**1.6233**	**4.4700e-003**	**0.3577**	**2.4400e-003**	**0.3601**	**0.0949**	**2.2600e-003**	**0.0971**		**330.9354**	**330.9354**	**0.0145**		**331.2397**

3.11 Paving 2 - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4259	14.9353	14.3652	0.0223		0.8094	0.8094		0.7447	0.7447		2,208.9731	2,208.9731	0.6989		2,223.6499
Paving	1.1790					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.6049**	**14.9353**	**14.3652**	**0.0223**		**0.8094**	**0.8094**		**0.7447**	**0.7447**		**2,208.9731**	**2,208.9731**	**0.6989**		**2,223.6499**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0466	0.0578	0.7609	2.1000e-003	0.1677	1.1400e-003	0.1688	0.0445	1.0600e-003	0.0455		155.1260	155.1260	6.7900e-003		155.2686
Total	**0.0466**	**0.0578**	**0.7609**	**2.1000e-003**	**0.1677**	**1.1400e-003**	**0.1688**	**0.0445**	**1.0600e-003**	**0.0455**		**155.1260**	**155.1260**	**6.7900e-003**		**155.2686**

3.11 Paving 2 - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4259	14.9353	14.3652	0.0223		0.8094	0.8094		0.7447	0.7447	0.0000	2,208.9731	2,208.9731	0.6989		2,223.6499
Paving	1.1790					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.6049**	**14.9353**	**14.3652**	**0.0223**		**0.8094**	**0.8094**		**0.7447**	**0.7447**	**0.0000**	**2,208.9731**	**2,208.9731**	**0.6989**		**2,223.6499**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0466	0.0578	0.7609	2.1000e-003	0.1677	1.1400e-003	0.1688	0.0445	1.0600e-003	0.0455		155.1260	155.1260	6.7900e-003		155.2686
Total	**0.0466**	**0.0578**	**0.7609**	**2.1000e-003**	**0.1677**	**1.1400e-003**	**0.1688**	**0.0445**	**1.0600e-003**	**0.0455**		**155.1260**	**155.1260**	**6.7900e-003**		**155.2686**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	0.00	0.00	0.00		
Single Family Housing	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	35	11
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3110	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547	0.0000	17.9572	17.9572	0.0179	0.0000	18.3321
Unmitigated	0.3110	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547	0.0000	17.9572	17.9572	0.0179	0.0000	18.3321

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.1000e-004					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.3104	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547		17.9572	17.9572	0.0179		18.3321
Total	**0.3110**	**0.1158**	**10.0108**	**5.3000e-004**		**0.0547**	**0.0547**		**0.0547**	**0.0547**	**0.0000**	**17.9572**	**17.9572**	**0.0179**	**0.0000**	**18.3321**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.1000e-004					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.3104	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547		17.9572	17.9572	0.0179		18.3321
Total	**0.3110**	**0.1158**	**10.0108**	**5.3000e-004**		**0.0547**	**0.0547**		**0.0547**	**0.0547**	**0.0000**	**17.9572**	**17.9572**	**0.0179**	**0.0000**	**18.3321**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Rancho Palma (Construction)- Unmitigated

San Bernardino-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	500.00	Space	4.50	200,000.00	0
Single Family Housing	120.00	Dwelling Unit	28.40	313,200.00	343
Regional Shopping Center	98.00	1000sqft	4.70	98,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	479.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Total Lot Acreage: 37.6; Average home size is 2,610 SF based on a 50% maximum lot coverage

Construction Phase - Based on past project experience

Off-road Equipment - 8 hour workdays

Off-road Equipment - 8 hour workdays

Off-road Equipment - 8 hour workdays

Off-road Equipment - 8 hour workdays

Off-road Equipment - Based on past project experience

Off-road Equipment -

Off-road Equipment -

Off-road Equipment -

Construction Off-road Equipment Mitigation -

Grading -

Trips and VMT -

Off-road Equipment - Based on past project experience

Vehicle Trips - Construction run only

Vechicle Emission Factors - Construction run only

Vechicle Emission Factors - Construction run only

Vechicle Emission Factors - Construction run only

Woodstoves - Construction run only

Consumer Products - Construction run only

Area Coating - Construction run only

Landscape Equipment - Construction run only

Energy Use - Construction run only

Water And Wastewater - Construction run only

Solid Waste - Construction run only

Table Name	Column Name	Default Value	New Value
tblAreaCoating	ReapplicationRatePercent	10	0
tblConstructionPhase	NumDays	55.00	150.00
tblConstructionPhase	NumDays	55.00	75.00
tblConstructionPhase	NumDays	740.00	300.00
tblConstructionPhase	NumDays	740.00	180.00
tblConstructionPhase	NumDays	75.00	30.00
tblConstructionPhase	NumDays	55.00	10.00
tblConstructionPhase	NumDays	55.00	20.00
tblConstructionPhase	NumDays	30.00	10.00
tblConstructionPhase	NumDays	30.00	5.00
tblConstructionPhase	PhaseEndDate	1/18/2019	6/22/2018
tblConstructionPhase	PhaseEndDate	8/30/2019	5/17/2019
tblConstructionPhase	PhaseStartDate	6/23/2018	11/25/2017
tblConstructionPhase	PhaseStartDate	5/18/2019	2/2/2019
tblConsumerProducts	ROG_EF	1.98E-05	1E-09
tblEnergyUse	LightingElect	0.88	0.00
tblEnergyUse	LightingElect	7.62	0.00
tblEnergyUse	LightingElect	1,608.84	0.00
tblEnergyUse	NT24E	2.44	0.00
tblEnergyUse	NT24E	5,089.81	0.00
tblEnergyUse	NT24NG	0.30	0.00
tblEnergyUse	NT24NG	5,950.14	0.00
tblEnergyUse	T24E	5.60	0.00
tblEnergyUse	T24E	980.99	0.00
tblEnergyUse	T24NG	2.02	0.00
tblEnergyUse	T24NG	27,816.78	0.00
tblFireplaces	NumberGas	102.00	0.00

tblFireplaces	NumberNoFireplace	12.00	0.00
tblFireplaces	NumberWood	6.00	0.00
tblLandscapeEquipment	NumberSummerDays	250	1
tblLandUse	LandUseSquareFeet	216,000.00	313,200.00
tblLandUse	LotAcreage	38.96	28.40
tblLandUse	LotAcreage	2.25	4.70
tblOffRoadEquipment	LoadFactor	0.43	0.43
tblOffRoadEquipment	LoadFactor	0.43	0.43
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentType		Crawler Tractors
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	6.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblOffRoadEquipment	UsageHours	7.00	8.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	479.9
tblProjectCharacteristics	OperationalYear	2014	2019
tblSolidWaste	SolidWasteGenerationRate	102.90	0.00
tblSolidWaste	SolidWasteGenerationRate	140.63	0.00
tblVehicleEF	HHD	0.04	0.00
tblVehicleEF	HHD	0.04	0.00
tblVehicleEF	HHD	0.04	0.00
tblVehicleEF	LDA	0.47	0.00
tblVehicleEF	LDA	0.47	0.00
tblVehicleEF	LDA	0.47	0.00

tblVehicleEF	LDT1	0.07	0.00
tblVehicleEF	LDT1	0.07	0.00
tblVehicleEF	LDT1	0.07	0.00
tblVehicleEF	LDT2	0.17	0.00
tblVehicleEF	LDT2	0.17	0.00
tblVehicleEF	LDT2	0.17	0.00
tblVehicleEF	LHD1	0.06	0.00
tblVehicleEF	LHD1	0.06	0.00
tblVehicleEF	LHD1	0.06	0.00
tblVehicleEF	LHD2	9.0560e-003	0.00
tblVehicleEF	LHD2	9.0560e-003	0.00
tblVehicleEF	LHD2	9.0560e-003	0.00
tblVehicleEF	MCY	4.9860e-003	0.00
tblVehicleEF	MCY	4.9860e-003	0.00
tblVehicleEF	MCY	4.9860e-003	0.00
tblVehicleEF	MDV	0.16	0.00
tblVehicleEF	MDV	0.16	0.00
tblVehicleEF	MDV	0.16	0.00
tblVehicleEF	MH	2.9520e-003	0.00
tblVehicleEF	MH	2.9520e-003	0.00
tblVehicleEF	MH	2.9520e-003	0.00
tblVehicleEF	MHD	0.02	0.00
tblVehicleEF	MHD	0.02	0.00
tblVehicleEF	MHD	0.02	0.00
tblVehicleEF	OBUS	1.1120e-003	0.00
tblVehicleEF	OBUS	1.1120e-003	0.00
tblVehicleEF	OBUS	1.1120e-003	0.00
tblVehicleEF	SBUS	6.8600e-004	0.00

tblVehicleEF	SBUS	6.8600e-004	0.00
tblVehicleEF	SBUS	6.8600e-004	0.00
tblVehicleEF	UBUS	1.3360e-003	0.00
tblVehicleEF	UBUS	1.3360e-003	0.00
tblVehicleEF	UBUS	1.3360e-003	0.00
tblVehicleTrips	ST_TR	49.97	0.00
tblVehicleTrips	ST_TR	10.08	0.00
tblVehicleTrips	SU_TR	25.24	0.00
tblVehicleTrips	SU_TR	8.77	0.00
tblVehicleTrips	WD_TR	42.94	0.00
tblVehicleTrips	WD_TR	9.57	0.00
tblWater	IndoorWaterUseRate	7,259,107.11	0.00
tblWater	IndoorWaterUseRate	7,818,483.07	0.00
tblWater	OutdoorWaterUseRate	4,449,130.16	0.00
tblWater	OutdoorWaterUseRate	4,929,043.68	0.00
tblWoodstoves	NumberCatalytic	6.00	0.00
tblWoodstoves	NumberNoncatalytic	6.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	37.3440	81.7249	48.5524	0.0734	18.2675	3.5527	21.0231	9.9840	3.2685	12.5193	0.0000	7,453.7329	7,453.7329	2.2318	0.0000	7,500.6013
2018	36.7210	71.0062	43.7863	0.0734	18.2675	3.0466	20.6343	9.9840	2.8029	12.1615	0.0000	7,330.5235	7,330.5235	2.2307	0.0000	7,377.3683
2019	68.6599	30.0578	35.1916	0.0702	2.5244	1.6337	4.1581	0.6774	1.5429	2.2202	0.0000	6,206.1445	6,206.1445	0.8140	0.0000	6,223.2391
Total	**142.7248**	**182.7888**	**127.5302**	**0.2170**	**39.0593**	**8.2330**	**45.8154**	**20.6455**	**7.6142**	**26.9010**	**0.0000**	**20,990.4010**	**20,990.4010**	**5.2766**	**0.0000**	**21,101.2086**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2017	37.3440	81.7249	48.5524	0.0734	7.2470	3.5527	10.0027	3.9263	3.2685	6.4615	0.0000	7,453.7329	7,453.7329	2.2318	0.0000	7,500.6013
2018	36.7210	71.0062	43.7863	0.0734	7.2470	3.0466	9.6139	3.9263	2.8029	6.1038	0.0000	7,330.5235	7,330.5235	2.2307	0.0000	7,377.3683
2019	68.6599	30.0578	35.1916	0.0702	2.5244	1.6337	4.1581	0.6774	1.5429	2.2202	0.0000	6,206.1445	6,206.1445	0.8140	0.0000	6,223.2390
Total	**142.7248**	**182.7888**	**127.5302**	**0.2170**	**17.0185**	**8.2330**	**23.7746**	**8.5300**	**7.6142**	**14.7856**	**0.0000**	**20,990.4010**	**20,990.4010**	**5.2766**	**0.0000**	**21,101.2086**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**56.43**	**0.00**	**48.11**	**58.68**	**0.00**	**45.04**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3110	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547	0.0000	17.9572	17.9572	0.0179	0.0000	18.3321
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.3110**	**0.1158**	**10.0108**	**5.3000e-004**	**0.0000**	**0.0547**	**0.0547**	**0.0000**	**0.0547**	**0.0547**	**0.0000**	**17.9572**	**17.9572**	**0.0179**	**0.0000**	**18.3321**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	0.3110	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547	0.0000	17.9572	17.9572	0.0179	0.0000	18.3321
Energy	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Mobile	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.3110**	**0.1158**	**10.0108**	**5.3000e-004**	**0.0000**	**0.0547**	**0.0547**	**0.0000**	**0.0547**	**0.0547**	**0.0000**	**17.9572**	**17.9572**	**0.0179**	**0.0000**	**18.3321**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Site Preparation 1	Site Preparation	1/1/2017	1/13/2017	5	10	
2	Grading 1	Grading	1/14/2017	4/28/2017	5	75	
3	Building Construction 1	Building Construction	4/29/2017	6/22/2018	5	300	
4	Architectural Coating 1	Architectural Coating	11/25/2017	6/22/2018	5	150	
5	Paving 1	Paving	6/23/2018	7/20/2018	5	20	
6	Site Preparation 2	Site Preparation	7/21/2018	7/27/2018	5	5	
7	Grading 2	Grading	7/28/2018	9/7/2018	5	30	
8	Building Construction 2	Building Construction	9/8/2018	5/17/2019	5	180	
9	Architectural Coating 2	Architectural Coating	2/2/2019	5/17/2019	5	75	
10	Paving 2	Paving	5/18/2019	5/31/2019	5	10	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 634,230; Residential Outdoor: 211,410; Non-Residential Indoor: 156,000; Non-Residential Outdoor: 52,000 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Site Preparation 1	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation 1	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading 1	Excavators	2	8.00	162	0.38
Grading 1	Graders	1	8.00	174	0.41
Grading 1	Rubber Tired Dozers	1	8.00	255	0.40
Grading 1	Scrapers	2	8.00	361	0.48
Grading 1	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction 1	Cranes	1	8.00	226	0.29
Building Construction 1	Forklifts	3	8.00	89	0.20
Building Construction 1	Generator Sets	1	8.00	84	0.74
Building Construction 1	Tractors/Loaders/Backhoes	3	8.00	97	0.37
Building Construction 1	Welders	1	8.00	46	0.45
Architectural Coating 1	Air Compressors	1	8.00	78	0.48
Paving 1	Pavers	2	8.00	125	0.42
Paving 1	Paving Equipment	2	8.00	130	0.36
Paving 1	Rollers	2	8.00	80	0.38
Site Preparation 2	Rubber Tired Dozers	3	8.00	255	0.40
Site Preparation 2	Tractors/Loaders/Backhoes	4	8.00	97	0.37
Grading 2	Excavators	2	8.00	162	0.38
Grading 2	Graders	1	8.00	174	0.41
Grading 2	Rubber Tired Dozers	1	8.00	255	0.40
Grading 2	Scrapers	2	8.00	361	0.48
Grading 2	Tractors/Loaders/Backhoes	0	8.00	97	0.37
Building Construction 2	Cranes	1	8.00	226	0.29
Building Construction 2	Forklifts	3	8.00	89	0.20
Building Construction 2	Generator Sets	1	8.00	84	0.74
Building Construction 2	Tractors/Loaders/Backhoes	3	8.00	97	0.37

Building Construction 2	Welders	1	8.00	46	0.45
Architectural Coating 2	Air Compressors	1	8.00	78	0.48
Paving 2	Pavers	2	8.00	125	0.42
Paving 2	Paving Equipment	2	8.00	130	0.36
Paving 2	Rollers	2	8.00	80	0.38
Grading 1	Crawler Tractors	2	8.00	208	0.43
Grading 2	Crawler Tractors	2	8.00	208	0.43

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Site Preparation 1	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading 1	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction 1	9	159.00	62.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating 1	1	32.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving 1	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Site Preparation 2	7	18.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Grading 2	8	20.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Building Construction 2	9	159.00	62.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Architectural Coating 2	1	32.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT
Paving 2	6	15.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

Water Exposed Area

3.2 Site Preparation 1 - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.8382	51.7535	39.3970	0.0391		2.7542	2.7542		2.5339	2.5339		4,003.0859	4,003.0859	1.2265		4,028.8432
Total	**4.8382**	**51.7535**	**39.3970**	**0.0391**	**18.0663**	**2.7542**	**20.8205**	**9.9307**	**2.5339**	**12.4646**		**4,003.0859**	**4,003.0859**	**1.2265**		**4,028.8432**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0644	0.0901	0.9496	2.3000e-003	0.2012	1.4400e-003	0.2026	0.0534	1.3300e-003	0.0547		183.9357	183.9357	9.5700e-003		184.1368
Total	**0.0644**	**0.0901**	**0.9496**	**2.3000e-003**	**0.2012**	**1.4400e-003**	**0.2026**	**0.0534**	**1.3300e-003**	**0.0547**		**183.9357**	**183.9357**	**9.5700e-003**		**184.1368**

3.2 Site Preparation 1 - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.0458	0.0000	7.0458	3.8730	0.0000	3.8730			0.0000			0.0000
Off-Road	4.8382	51.7535	39.3970	0.0391		2.7542	2.7542		2.5339	2.5339	0.0000	4,003.0859	4,003.0859	1.2265		4,028.8432
Total	**4.8382**	**51.7535**	**39.3970**	**0.0391**	**7.0458**	**2.7542**	**9.8001**	**3.8730**	**2.5339**	**6.4069**	**0.0000**	**4,003.0859**	**4,003.0859**	**1.2265**		**4,028.8432**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0644	0.0901	0.9496	2.3000e-003	0.2012	1.4400e-003	0.2026	0.0534	1.3300e-003	0.0547		183.9357	183.9357	9.5700e-003		184.1368
Total	**0.0644**	**0.0901**	**0.9496**	**2.3000e-003**	**0.2012**	**1.4400e-003**	**0.2026**	**0.0534**	**1.3300e-003**	**0.0547**		**183.9357**	**183.9357**	**9.5700e-003**		**184.1368**

3.3 Grading 1 - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.7338	0.0000	9.7338	3.7110	0.0000	3.7110			0.0000			0.0000
Off-Road	6.8168	81.6248	47.4972	0.0709		3.5511	3.5511		3.2670	3.2670		7,249.3599	7,249.3599	2.2212		7,296.0049
Total	**6.8168**	**81.6248**	**47.4972**	**0.0709**	**9.7338**	**3.5511**	**13.2849**	**3.7110**	**3.2670**	**6.9780**		**7,249.3599**	**7,249.3599**	**2.2212**		**7,296.0049**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0716	0.1001	1.0551	2.5600e-003	0.2236	1.6000e-003	0.2252	0.0593	1.4700e-003	0.0608		204.3730	204.3730	0.0106		204.5964
Total	**0.0716**	**0.1001**	**1.0551**	**2.5600e-003**	**0.2236**	**1.6000e-003**	**0.2252**	**0.0593**	**1.4700e-003**	**0.0608**		**204.3730**	**204.3730**	**0.0106**		**204.5964**

3.3 Grading 1 - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.7962	0.0000	3.7962	1.4473	0.0000	1.4473			0.0000			0.0000
Off-Road	6.8168	81.6248	47.4972	0.0709		3.5511	3.5511		3.2670	3.2670	0.0000	7,249.3599	7,249.3599	2.2212		7,296.0049
Total	**6.8168**	**81.6248**	**47.4972**	**0.0709**	**3.7962**	**3.5511**	**7.3473**	**1.4473**	**3.2670**	**4.7143**	**0.0000**	**7,249.3599**	**7,249.3599**	**2.2212**		**7,296.0049**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0716	0.1001	1.0551	2.5600e-003	0.2236	1.6000e-003	0.2252	0.0593	1.4700e-003	0.0608		204.3730	204.3730	0.0106		204.5964
Total	**0.0716**	**0.1001**	**1.0551**	**2.5600e-003**	**0.2236**	**1.6000e-003**	**0.2252**	**0.0593**	**1.4700e-003**	**0.0608**		**204.3730**	**204.3730**	**0.0106**		**204.5964**

3.4 Building Construction 1 - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3022	28.5087	19.3714	0.0287		1.9099	1.9099		1.7914	1.7914		2,831.3094	2,831.3094	0.7084		2,846.1853
Total	**3.3022**	**28.5087**	**19.3714**	**0.0287**		**1.9099**	**1.9099**		**1.7914**	**1.7914**		**2,831.3094**	**2,831.3094**	**0.7084**		**2,846.1853**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5160	5.0533	6.7481	0.0134	0.3896	0.0807	0.4703	0.1112	0.0742	0.1855		1,318.4319	1,318.4319	9.7000e-003		1,318.6355
Worker	0.5689	0.7956	8.3883	0.0203	1.7772	0.0127	1.7900	0.4713	0.0117	0.4831		1,624.7655	1,624.7655	0.0846		1,626.5414
Total	**1.0848**	**5.8489**	**15.1364**	**0.0337**	**2.1668**	**0.0934**	**2.2602**	**0.5826**	**0.0860**	**0.6685**		**2,943.1973**	**2,943.1973**	**0.0943**		**2,945.1769**

3.4 Building Construction 1 - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	3.3022	28.5087	19.3714	0.0287		1.9099	1.9099		1.7914	1.7914	0.0000	2,831.3094	2,831.3094	0.7084		2,846.1853
Total	**3.3022**	**28.5087**	**19.3714**	**0.0287**		**1.9099**	**1.9099**		**1.7914**	**1.7914**	**0.0000**	**2,831.3094**	**2,831.3094**	**0.7084**		**2,846.1853**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.5160	5.0533	6.7481	0.0134	0.3896	0.0807	0.4703	0.1112	0.0742	0.1855		1,318.4319	1,318.4319	9.7000e-003		1,318.6355
Worker	0.5689	0.7956	8.3883	0.0203	1.7772	0.0127	1.7900	0.4713	0.0117	0.4831		1,624.7655	1,624.7655	0.0846		1,626.5414
Total	**1.0848**	**5.8489**	**15.1364**	**0.0337**	**2.1668**	**0.0934**	**2.2602**	**0.5826**	**0.0860**	**0.6685**		**2,943.1973**	**2,943.1973**	**0.0943**		**2,945.1769**

3.4 Building Construction 1 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8383	25.0811	18.7173	0.0287		1.6002	1.6002		1.5023	1.5023		2,798.2338	2,798.2338	0.6973		2,812.8775
Total	**2.8383**	**25.0811**	**18.7173**	**0.0287**		**1.6002**	**1.6002**		**1.5023**	**1.5023**		**2,798.2338**	**2,798.2338**	**0.6973**		**2,812.8775**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4769	4.6304	6.4273	0.0133	0.3895	0.0759	0.4654	0.1112	0.0698	0.1810		1,295.8431	1,295.8431	9.6400e-003		1,296.0456
Worker	0.5063	0.7175	7.5584	0.0203	1.7772	0.0124	1.7896	0.4713	0.0115	0.4828		1,563.2096	1,563.2096	0.0781		1,564.8496
Total	**0.9832**	**5.3479**	**13.9857**	**0.0337**	**2.1667**	**0.0883**	**2.2550**	**0.5825**	**0.0813**	**0.6638**		**2,859.0527**	**2,859.0527**	**0.0877**		**2,860.8952**

3.4 Building Construction 1 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8383	25.0811	18.7173	0.0287		1.6002	1.6002		1.5023	1.5023	0.0000	2,798.2338	2,798.2338	0.6973		2,812.8775
Total	**2.8383**	**25.0811**	**18.7173**	**0.0287**		**1.6002**	**1.6002**		**1.5023**	**1.5023**	**0.0000**	**2,798.2338**	**2,798.2338**	**0.6973**		**2,812.8775**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4769	4.6304	6.4273	0.0133	0.3895	0.0759	0.4654	0.1112	0.0698	0.1810		1,295.8431	1,295.8431	9.6400e-003		1,296.0456
Worker	0.5063	0.7175	7.5584	0.0203	1.7772	0.0124	1.7896	0.4713	0.0115	0.4828		1,563.2096	1,563.2096	0.0781		1,564.8496
Total	**0.9832**	**5.3479**	**13.9857**	**0.0337**	**2.1667**	**0.0883**	**2.2550**	**0.5825**	**0.0813**	**0.6638**		**2,859.0527**	**2,859.0527**	**0.0877**		**2,860.8952**

3.5 Architectural Coating 1 - 2017

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	32.3994					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4431	2.9134	2.4908	3.9600e-003		0.2311	0.2311		0.2311	0.2311		375.2641	375.2641	0.0396		376.0961
Total	**32.8425**	**2.9134**	**2.4908**	**3.9600e-003**		**0.2311**	**0.2311**		**0.2311**	**0.2311**		**375.2641**	**375.2641**	**0.0396**		**376.0961**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1145	0.1601	1.6882	4.0900e-003	0.3577	2.5600e-003	0.3602	0.0949	2.3600e-003	0.0972		326.9968	326.9968	0.0170		327.3542
Total	**0.1145**	**0.1601**	**1.6882**	**4.0900e-003**	**0.3577**	**2.5600e-003**	**0.3602**	**0.0949**	**2.3600e-003**	**0.0972**		**326.9968**	**326.9968**	**0.0170**		**327.3542**

3.5 Architectural Coating 1 - 2017

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	32.3994					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.4431	2.9134	2.4908	3.9600e-003		0.2311	0.2311		0.2311	0.2311	0.0000	375.2641	375.2641	0.0396		376.0961
Total	**32.8425**	**2.9134**	**2.4908**	**3.9600e-003**		**0.2311**	**0.2311**		**0.2311**	**0.2311**	**0.0000**	**375.2641**	**375.2641**	**0.0396**		**376.0961**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1145	0.1601	1.6882	4.0900e-003	0.3577	2.5600e-003	0.3602	0.0949	2.3600e-003	0.0972		326.9968	326.9968	0.0170		327.3542
Total	**0.1145**	**0.1601**	**1.6882**	**4.0900e-003**	**0.3577**	**2.5600e-003**	**0.3602**	**0.0949**	**2.3600e-003**	**0.0972**		**326.9968**	**326.9968**	**0.0170**		**327.3542**

3.5 Architectural Coating 1 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	32.3994					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3982	2.6743	2.4723	3.9600e-003		0.2007	0.2007		0.2007	0.2007		375.2647	375.2647	0.0357		376.0135
Total	**32.7976**	**2.6743**	**2.4723**	**3.9600e-003**		**0.2007**	**0.2007**		**0.2007**	**0.2007**		**375.2647**	**375.2647**	**0.0357**		**376.0135**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1019	0.1444	1.5212	4.0900e-003	0.3577	2.4900e-003	0.3602	0.0949	2.3100e-003	0.0972		314.6082	314.6082	0.0157		314.9383
Total	**0.1019**	**0.1444**	**1.5212**	**4.0900e-003**	**0.3577**	**2.4900e-003**	**0.3602**	**0.0949**	**2.3100e-003**	**0.0972**		**314.6082**	**314.6082**	**0.0157**		**314.9383**

3.5 Architectural Coating 1 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	32.3994					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3982	2.6743	2.4723	3.9600e-003		0.2007	0.2007		0.2007	0.2007	0.0000	375.2647	375.2647	0.0357		376.0135
Total	**32.7976**	**2.6743**	**2.4723**	**3.9600e-003**		**0.2007**	**0.2007**		**0.2007**	**0.2007**	**0.0000**	**375.2647**	**375.2647**	**0.0357**		**376.0135**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.1019	0.1444	1.5212	4.0900e-003	0.3577	2.4900e-003	0.3602	0.0949	2.3100e-003	0.0972		314.6082	314.6082	0.0157		314.9383
Total	**0.1019**	**0.1444**	**1.5212**	**4.0900e-003**	**0.3577**	**2.4900e-003**	**0.3602**	**0.0949**	**2.3100e-003**	**0.0972**		**314.6082**	**314.6082**	**0.0157**		**314.9383**

3.6 Paving 1 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635		2,245.2695	2,245.2695	0.6990		2,259.9481
Paving	0.5895					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.2009**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**		**2,245.2695**	**2,245.2695**	**0.6990**		**2,259.9481**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0478	0.0677	0.7131	1.9200e-003	0.1677	1.1700e-003	0.1688	0.0445	1.0800e-003	0.0456		147.4726	147.4726	7.3700e-003		147.6273
Total	**0.0478**	**0.0677**	**0.7131**	**1.9200e-003**	**0.1677**	**1.1700e-003**	**0.1688**	**0.0445**	**1.0800e-003**	**0.0456**		**147.4726**	**147.4726**	**7.3700e-003**		**147.6273**

3.6 Paving 1 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.6114	17.1628	14.4944	0.0223		0.9386	0.9386		0.8635	0.8635	0.0000	2,245.2695	2,245.2695	0.6990		2,259.9481
Paving	0.5895					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.2009**	**17.1628**	**14.4944**	**0.0223**		**0.9386**	**0.9386**		**0.8635**	**0.8635**	**0.0000**	**2,245.2695**	**2,245.2695**	**0.6990**		**2,259.9481**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0478	0.0677	0.7131	1.9200e-003	0.1677	1.1700e-003	0.1688	0.0445	1.0800e-003	0.0456		147.4726	147.4726	7.3700e-003		147.6273
Total	**0.0478**	**0.0677**	**0.7131**	**1.9200e-003**	**0.1677**	**1.1700e-003**	**0.1688**	**0.0445**	**1.0800e-003**	**0.0456**		**147.4726**	**147.4726**	**7.3700e-003**		**147.6273**

3.7 Site Preparation 2 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					18.0663	0.0000	18.0663	9.9307	0.0000	9.9307			0.0000			0.0000
Off-Road	4.2921	45.6088	36.2346	0.0391		2.3654	2.3654		2.1762	2.1762		3,939.7731	3,939.7731	1.2265		3,965.5297
Total	**4.2921**	**45.6088**	**36.2346**	**0.0391**	**18.0663**	**2.3654**	**20.4317**	**9.9307**	**2.1762**	**12.1069**		**3,939.7731**	**3,939.7731**	**1.2265**		**3,965.5297**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0573	0.0812	0.8557	2.3000e-003	0.2012	1.4000e-003	0.2026	0.0534	1.3000e-003	0.0547		176.9671	176.9671	8.8400e-003		177.1528
Total	**0.0573**	**0.0812**	**0.8557**	**2.3000e-003**	**0.2012**	**1.4000e-003**	**0.2026**	**0.0534**	**1.3000e-003**	**0.0547**		**176.9671**	**176.9671**	**8.8400e-003**		**177.1528**

3.7 Site Preparation 2 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					7.0458	0.0000	7.0458	3.8730	0.0000	3.8730			0.0000			0.0000
Off-Road	4.2921	45.6088	36.2346	0.0391		2.3654	2.3654		2.1762	2.1762	0.0000	3,939.7731	3,939.7731	1.2265		3,965.5297
Total	**4.2921**	**45.6088**	**36.2346**	**0.0391**	**7.0458**	**2.3654**	**9.4113**	**3.8730**	**2.1762**	**6.0491**	**0.0000**	**3,939.7731**	**3,939.7731**	**1.2265**		**3,965.5297**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0573	0.0812	0.8557	2.3000e-003	0.2012	1.4000e-003	0.2026	0.0534	1.3000e-003	0.0547		176.9671	176.9671	8.8400e-003		177.1528
Total	**0.0573**	**0.0812**	**0.8557**	**2.3000e-003**	**0.2012**	**1.4000e-003**	**0.2026**	**0.0534**	**1.3000e-003**	**0.0547**		**176.9671**	**176.9671**	**8.8400e-003**		**177.1528**

3.8 Grading 2 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					9.7338	0.0000	9.7338	3.7110	0.0000	3.7110			0.0000			0.0000
Off-Road	6.0104	70.9159	42.8356	0.0709		3.0450	3.0450		2.8014	2.8014		7,133.8934	7,133.8934	2.2209		7,180.5318
Total	**6.0104**	**70.9159**	**42.8356**	**0.0709**	**9.7338**	**3.0450**	**12.7789**	**3.7110**	**2.8014**	**6.5124**		**7,133.8934**	**7,133.8934**	**2.2209**		**7,180.5318**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0637	0.0903	0.9508	2.5600e-003	0.2236	1.5600e-003	0.2251	0.0593	1.4400e-003	0.0607		196.6301	196.6301	9.8200e-003		196.8364
Total	**0.0637**	**0.0903**	**0.9508**	**2.5600e-003**	**0.2236**	**1.5600e-003**	**0.2251**	**0.0593**	**1.4400e-003**	**0.0607**		**196.6301**	**196.6301**	**9.8200e-003**		**196.8364**

3.8 Grading 2 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Fugitive Dust					3.7962	0.0000	3.7962	1.4473	0.0000	1.4473			0.0000			0.0000
Off-Road	6.0104	70.9159	42.8356	0.0709		3.0450	3.0450		2.8014	2.8014	0.0000	7,133.8934	7,133.8934	2.2209		7,180.5318
Total	**6.0104**	**70.9159**	**42.8356**	**0.0709**	**3.7962**	**3.0450**	**6.8412**	**1.4473**	**2.8014**	**4.2487**	**0.0000**	**7,133.8934**	**7,133.8934**	**2.2209**		**7,180.5318**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0637	0.0903	0.9508	2.5600e-003	0.2236	1.5600e-003	0.2251	0.0593	1.4400e-003	0.0607		196.6301	196.6301	9.8200e-003		196.8364
Total	**0.0637**	**0.0903**	**0.9508**	**2.5600e-003**	**0.2236**	**1.5600e-003**	**0.2251**	**0.0593**	**1.4400e-003**	**0.0607**		**196.6301**	**196.6301**	**9.8200e-003**		**196.8364**

3.9 Building Construction 2 - 2018

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8383	25.0811	18.7173	0.0287		1.6002	1.6002		1.5023	1.5023		2,798.2338	2,798.2338	0.6973		2,812.8775
Total	**2.8383**	**25.0811**	**18.7173**	**0.0287**		**1.6002**	**1.6002**		**1.5023**	**1.5023**		**2,798.2338**	**2,798.2338**	**0.6973**		**2,812.8775**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4769	4.6304	6.4273	0.0133	0.3895	0.0759	0.4654	0.1112	0.0698	0.1810		1,295.8431	1,295.8431	9.6400e-003		1,296.0456
Worker	0.5063	0.7175	7.5584	0.0203	1.7772	0.0124	1.7896	0.4713	0.0115	0.4828		1,563.2096	1,563.2096	0.0781		1,564.8496
Total	**0.9832**	**5.3479**	**13.9857**	**0.0337**	**2.1667**	**0.0883**	**2.2550**	**0.5825**	**0.0813**	**0.6638**		**2,859.0527**	**2,859.0527**	**0.0877**		**2,860.8952**

3.9 Building Construction 2 - 2018

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.8383	25.0811	18.7173	0.0287		1.6002	1.6002		1.5023	1.5023	0.0000	2,798.2338	2,798.2338	0.6973		2,812.8775
Total	**2.8383**	**25.0811**	**18.7173**	**0.0287**		**1.6002**	**1.6002**		**1.5023**	**1.5023**	**0.0000**	**2,798.2338**	**2,798.2338**	**0.6973**		**2,812.8775**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4769	4.6304	6.4273	0.0133	0.3895	0.0759	0.4654	0.1112	0.0698	0.1810		1,295.8431	1,295.8431	9.6400e-003		1,296.0456
Worker	0.5063	0.7175	7.5584	0.0203	1.7772	0.0124	1.7896	0.4713	0.0115	0.4828		1,563.2096	1,563.2096	0.0781		1,564.8496
Total	**0.9832**	**5.3479**	**13.9857**	**0.0337**	**2.1667**	**0.0883**	**2.2550**	**0.5825**	**0.0813**	**0.6638**		**2,859.0527**	**2,859.0527**	**0.0877**		**2,860.8952**

3.9 Building Construction 2 - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5006	22.5762	18.2643	0.0287		1.3747	1.3747		1.2908	1.2908		2,765.9458	2,765.9458	0.6865		2,780.3623
Total	**2.5006**	**22.5762**	**18.2643**	**0.0287**		**1.3747**	**1.3747**		**1.2908**	**1.2908**		**2,765.9458**	**2,765.9458**	**0.6865**		**2,780.3623**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4522	4.2495	6.2507	0.0132	0.3894	0.0728	0.4622	0.1112	0.0669	0.1781		1,266.1238	1,266.1238	9.3300e-003		1,266.3198
Worker	0.4604	0.6535	6.8441	0.0202	1.7772	0.0121	1.7894	0.4713	0.0112	0.4826		1,497.4394	1,497.4394	0.0720		1,498.9515
Total	**0.9125**	**4.9029**	**13.0948**	**0.0335**	**2.1667**	**0.0849**	**2.2516**	**0.5825**	**0.0782**	**0.6607**		**2,763.5632**	**2,763.5632**	**0.0813**		**2,765.2713**

3.9 Building Construction 2 - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	2.5006	22.5762	18.2643	0.0287		1.3747	1.3747		1.2908	1.2908	0.0000	2,765.9458	2,765.9458	0.6865		2,780.3623
Total	**2.5006**	**22.5762**	**18.2643**	**0.0287**		**1.3747**	**1.3747**		**1.2908**	**1.2908**	**0.0000**	**2,765.9458**	**2,765.9458**	**0.6865**		**2,780.3623**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.4522	4.2495	6.2507	0.0132	0.3894	0.0728	0.4622	0.1112	0.0669	0.1781		1,266.1238	1,266.1238	9.3300e-003		1,266.3198
Worker	0.4604	0.6535	6.8441	0.0202	1.7772	0.0121	1.7894	0.4713	0.0112	0.4826		1,497.4394	1,497.4394	0.0720		1,498.9515
Total	**0.9125**	**4.9029**	**13.0948**	**0.0335**	**2.1667**	**0.0849**	**2.2516**	**0.5825**	**0.0782**	**0.6607**		**2,763.5632**	**2,763.5632**	**0.0813**		**2,765.2713**

3.10 Architectural Coating 2 - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	64.7989					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717		375.2641	375.2641	0.0317		375.9297
Total	**65.1541**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**		**375.2641**	**375.2641**	**0.0317**		**375.9297**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0927	0.1315	1.3774	4.0700e-003	0.3577	2.4400e-003	0.3601	0.0949	2.2600e-003	0.0971		301.3715	301.3715	0.0145		301.6758
Total	**0.0927**	**0.1315**	**1.3774**	**4.0700e-003**	**0.3577**	**2.4400e-003**	**0.3601**	**0.0949**	**2.2600e-003**	**0.0971**		**301.3715**	**301.3715**	**0.0145**		**301.6758**

3.10 Architectural Coating 2 - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Archit. Coating	64.7989					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Off-Road	0.3553	2.4472	2.4551	3.9600e-003		0.1717	0.1717		0.1717	0.1717	0.0000	375.2641	375.2641	0.0317		375.9297
Total	**65.1541**	**2.4472**	**2.4551**	**3.9600e-003**		**0.1717**	**0.1717**		**0.1717**	**0.1717**	**0.0000**	**375.2641**	**375.2641**	**0.0317**		**375.9297**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0927	0.1315	1.3774	4.0700e-003	0.3577	2.4400e-003	0.3601	0.0949	2.2600e-003	0.0971		301.3715	301.3715	0.0145		301.6758
Total	**0.0927**	**0.1315**	**1.3774**	**4.0700e-003**	**0.3577**	**2.4400e-003**	**0.3601**	**0.0949**	**2.2600e-003**	**0.0971**		**301.3715**	**301.3715**	**0.0145**		**301.6758**

3.11 Paving 2 - 2019

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4259	14.9353	14.3652	0.0223		0.8094	0.8094		0.7447	0.7447		2,208.9731	2,208.9731	0.6989		2,223.6499
Paving	1.1790					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.6049**	**14.9353**	**14.3652**	**0.0223**		**0.8094**	**0.8094**		**0.7447**	**0.7447**		**2,208.9731**	**2,208.9731**	**0.6989**		**2,223.6499**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0434	0.0617	0.6457	1.9100e-003	0.1677	1.1400e-003	0.1688	0.0445	1.0600e-003	0.0455		141.2679	141.2679	6.7900e-003		141.4105
Total	**0.0434**	**0.0617**	**0.6457**	**1.9100e-003**	**0.1677**	**1.1400e-003**	**0.1688**	**0.0445**	**1.0600e-003**	**0.0455**		**141.2679**	**141.2679**	**6.7900e-003**		**141.4105**

3.11 Paving 2 - 2019

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	1.4259	14.9353	14.3652	0.0223		0.8094	0.8094		0.7447	0.7447	0.0000	2,208.9731	2,208.9731	0.6989		2,223.6499
Paving	1.1790					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**2.6049**	**14.9353**	**14.3652**	**0.0223**		**0.8094**	**0.8094**		**0.7447**	**0.7447**	**0.0000**	**2,208.9731**	**2,208.9731**	**0.6989**		**2,223.6499**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0434	0.0617	0.6457	1.9100e-003	0.1677	1.1400e-003	0.1688	0.0445	1.0600e-003	0.0455		141.2679	141.2679	6.7900e-003		141.4105
Total	**0.0434**	**0.0617**	**0.6457**	**1.9100e-003**	**0.1677**	**1.1400e-003**	**0.1688**	**0.0445**	**1.0600e-003**	**0.0455**		**141.2679**	**141.2679**	**6.7900e-003**		**141.4105**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Unmitigated	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	0.00	0.00	0.00		
Single Family Housing	0.00	0.00	0.00		
Total	0.00	0.00	0.00		

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	54	35	11
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000	0.000000

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
NaturalGas Unmitigated	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Regional Shopping Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Total		**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	0.3110	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547	0.0000	17.9572	17.9572	0.0179	0.0000	18.3321
Unmitigated	0.3110	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547	0.0000	17.9572	17.9572	0.0179	0.0000	18.3321

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.1000e-004					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.3104	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547		17.9572	17.9572	0.0179		18.3321
Total	**0.3110**	**0.1158**	**10.0108**	**5.3000e-004**		**0.0547**	**0.0547**		**0.0547**	**0.0547**	**0.0000**	**17.9572**	**17.9572**	**0.0179**	**0.0000**	**18.3321**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.0000					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.1000e-004					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Landscaping	0.3104	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547		17.9572	17.9572	0.0179		18.3321
Total	**0.3110**	**0.1158**	**10.0108**	**5.3000e-004**		**0.0547**	**0.0547**		**0.0547**	**0.0547**	**0.0000**	**17.9572**	**17.9572**	**0.0179**	**0.0000**	**18.3321**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Rancho Palma (Phase 1)

San Bernardino-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	120.00	Dwelling Unit	28.40	313,200.00	343

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2018
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	497.64	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Total lot acreage: 28.40; Average home size is 2,610 SF based on 50% maximum lot coverage

Construction Phase - Operation run only

Off-road Equipment - Operation run only

Vehicle Trips - Trip rate based on ITE Trip Generation Handbook, 9th Edition

Woodstoves - Gas stoves only

Energy Use - Title-24 Electricity Energy Intensity and Title-24 Natural Gas Energy Intensity were adjusted by 36.4% and 6.5% respectively, to reflect 2013 Title 24 requirements. Source: Impact Analysis California's 2013 Building Energy Efficiency Standards (CEC 2013)

Mobile Land Use Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	30.00	1.00
tblEnergyUse	T24E	980.99	623.91
tblEnergyUse	T24NG	27,816.78	26,008.69
tblFireplaces	NumberGas	102.00	120.00
tblFireplaces	NumberNoFireplace	12.00	0.00
tblFireplaces	NumberWood	6.00	0.00
tblLandUse	LandUseSquareFeet	216,000.00	313,200.00
tblLandUse	LotAcreage	38.96	28.40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	497.64
tblProjectCharacteristics	OperationalYear	2014	2018
tblVehicleTrips	ST_TR	10.08	9.91
tblVehicleTrips	SU_TR	8.77	8.62
tblVehicleTrips	WD_TR	9.57	9.52
tblWoodstoves	NumberCatalytic	6.00	0.00
tblWoodstoves	NumberNoncatalytic	6.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.4128	0.1157	9.9829	5.2000e-004		0.2154	0.2154		0.2137	0.2137	0.0000	2,559.0028	2,559.0028	0.0664	0.0466	2,574.8389
Energy	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Mobile	4.2190	13.2207	50.3136	0.1322	8.6205	0.1917	8.8122	2.3024	0.1766	2.4789		10,928.8194	10,928.8194	0.3719		10,936.6289
Total	**11.7451**	**14.3047**	**60.7085**	**0.1389**	**8.6205**	**0.4853**	**9.1058**	**2.3024**	**0.4685**	**2.7709**	**0.0000**	**14,723.9413**	**14,723.9413**	**0.4619**	**0.0693**	**14,755.1097**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.4128	0.1157	9.9829	5.2000e-004		0.2154	0.2154		0.2137	0.2137	0.0000	2,559.0028	2,559.0028	0.0664	0.0466	2,574.8389
Energy	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Mobile	4.2085	13.1373	50.0255	0.1312	8.5570	0.1903	8.7474	2.2854	0.1753	2.4607		10,850.3681	10,850.3681	0.3694		10,858.1249
Total	**11.7346**	**14.2213**	**60.4204**	**0.1379**	**8.5570**	**0.4840**	**9.0410**	**2.2854**	**0.4673**	**2.7527**	**0.0000**	**14,645.4900**	**14,645.4900**	**0.4594**	**0.0693**	**14,676.6058**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.09**	**0.58**	**0.47**	**0.68**	**0.74**	**0.28**	**0.71**	**0.74**	**0.26**	**0.66**	**0.00**	**0.53**	**0.53**	**0.54**	**0.00**	**0.53**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	162	0.38
Demolition	Rubber Tired Dozers	0	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Improve Pedestrian Network

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.2085	13.1373	50.0255	0.1312	8.5570	0.1903	8.7474	2.2854	0.1753	2.4607		10,850.3681	10,850.3681	0.3694		10,858.1249
Unmitigated	4.2190	13.2207	50.3136	0.1322	8.6205	0.1917	8.8122	2.3024	0.1766	2.4789		10,928.8194	10,928.8194	0.3719		10,936.6289

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	1,142.40	1,189.20	1034.40	3,873,879	3,845,353
Total	1,142.40	1,189.20	1,034.40	3,873,879	3,845,353

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.470490	0.065594	0.173154	0.156076	0.056237	0.009050	0.016623	0.041711	0.001119	0.001337	0.004965	0.000700	0.002944

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
NaturalGas Unmitigated	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	10507	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Total		**0.1133**	**0.9683**	**0.4120**	**6.1800e-003**		**0.0783**	**0.0783**		**0.0783**	**0.0783**		**1,236.1191**	**1,236.1191**	**0.0237**	**0.0227**	**1,243.6419**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	10.507	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Total		**0.1133**	**0.9683**	**0.4120**	**6.1800e-003**		**0.0783**	**0.0783**		**0.0783**	**0.0783**		**1,236.1191**	**1,236.1191**	**0.0237**	**0.0227**	**1,243.6419**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.4128	0.1157	9.9829	5.2000e-004		0.2154	0.2154		0.2137	0.2137	0.0000	2,559.0028	2,559.0028	0.0664	0.0466	2,574.8389
Unmitigated	7.4128	0.1157	9.9829	5.2000e-004		0.2154	0.2154		0.2137	0.2137	0.0000	2,559.0028	2,559.0028	0.0664	0.0466	2,574.8389

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	6.2014					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.2329	1.0000e-005	0.0127	0.0000		0.1609	0.1609		0.1593	0.1593	0.0000	2,541.1765	2,541.1765	0.0487	0.0466	2,556.6417
Landscaping	0.3073	0.1157	9.9702	5.2000e-004		0.0544	0.0544		0.0544	0.0544		17.8263	17.8263	0.0177		18.1973
Architectural Coating	0.6712					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**7.4128**	**0.1157**	**9.9829**	**5.2000e-004**		**0.2154**	**0.2154**		**0.2137**	**0.2137**	**0.0000**	**2,559.0028**	**2,559.0028**	**0.0664**	**0.0466**	**2,574.8389**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	6.2014					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.2329	1.0000e-005	0.0127	0.0000		0.1609	0.1609		0.1593	0.1593	0.0000	2,541.1765	2,541.1765	0.0487	0.0466	2,556.6417
Landscaping	0.3073	0.1157	9.9702	5.2000e-004		0.0544	0.0544		0.0544	0.0544		17.8263	17.8263	0.0177		18.1973
Architectural Coating	0.6712					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**7.4128**	**0.1157**	**9.9829**	**5.2000e-004**		**0.2154**	**0.2154**		**0.2137**	**0.2137**	**0.0000**	**2,559.0028**	**2,559.0028**	**0.0664**	**0.0466**	**2,574.8389**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Rancho Palma (Phase 1)

San Bernardino-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Single Family Housing	120.00	Dwelling Unit	28.40	313,200.00	343

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2018
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	497.64	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Total lot acreage: 28.40; Average home size is 2,610 SF based on 50% maximum lot coverage

Construction Phase - Operation run only

Off-road Equipment - Operation run only

Vehicle Trips - Trip rate based on ITE Trip Generation Handbook, 9th Edition

Woodstoves - Gas stoves only

Energy Use - Title-24 Electricity Energy Intensity and Title-24 Natural Gas Energy Intensity were adjusted by 36.4% and 6.5% respectively, to reflect 2013 Title 24 requirements. Source: Impact Analysis California's 2013 Building Energy Efficiency Standards (CEC 2013)

Mobile Land Use Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	30.00	1.00
tblEnergyUse	T24E	980.99	623.91
tblEnergyUse	T24NG	27,816.78	26,008.69
tblFireplaces	NumberGas	102.00	120.00
tblFireplaces	NumberNoFireplace	12.00	0.00
tblFireplaces	NumberWood	6.00	0.00
tblLandUse	LandUseSquareFeet	216,000.00	313,200.00
tblLandUse	LotAcreage	38.96	28.40
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	497.64
tblProjectCharacteristics	OperationalYear	2014	2018
tblVehicleTrips	ST_TR	10.08	9.91
tblVehicleTrips	SU_TR	8.77	8.62
tblVehicleTrips	WD_TR	9.57	9.52
tblWoodstoves	NumberCatalytic	6.00	0.00
tblWoodstoves	NumberNoncatalytic	6.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.4128	0.1157	9.9829	5.2000e-004		0.2154	0.2154		0.2137	0.2137	0.0000	2,559.0028	2,559.0028	0.0664	0.0466	2,574.8389
Energy	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Mobile	4.0740	13.8052	46.7191	0.1231	8.6205	0.1924	8.8129	2.3024	0.1772	2.4796		10,224.0323	10,224.0323	0.3723		10,231.8506
Total	**11.6001**	**14.8892**	**57.1140**	**0.1298**	**8.6205**	**0.4861**	**9.1066**	**2.3024**	**0.4692**	**2.7715**	**0.0000**	**14,019.1542**	**14,019.1542**	**0.4624**	**0.0693**	**14,050.3315**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	7.4128	0.1157	9.9829	5.2000e-004		0.2154	0.2154		0.2137	0.2137	0.0000	2,559.0028	2,559.0028	0.0664	0.0466	2,574.8389
Energy	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Mobile	4.0641	13.7175	46.4772	0.1222	8.5570	0.1911	8.7481	2.2854	0.1760	2.4614		10,150.6787	10,150.6787	0.3698		10,158.4444
Total	**11.5902**	**14.8015**	**56.8721**	**0.1289**	**8.5570**	**0.4847**	**9.0417**	**2.2854**	**0.4679**	**2.7533**	**0.0000**	**13,945.8006**	**13,945.8006**	**0.4599**	**0.0693**	**13,976.9253**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.09**	**0.59**	**0.42**	**0.69**	**0.74**	**0.28**	**0.71**	**0.74**	**0.26**	**0.66**	**0.00**	**0.52**	**0.52**	**0.54**	**0.00**	**0.52**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	162	0.38
Demolition	Rubber Tired Dozers	0	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Improve Pedestrian Network

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	4.0641	13.7175	46.4772	0.1222	8.5570	0.1911	8.7481	2.2854	0.1760	2.4614		10,150.6787	10,150.6787	0.3698		10,158.4444
Unmitigated	4.0740	13.8052	46.7191	0.1231	8.6205	0.1924	8.8129	2.3024	0.1772	2.4796		10,224.0323	10,224.0323	0.3723		10,231.8506

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Single Family Housing	1,142.40	1,189.20	1034.40	3,873,879	3,845,353
Total	1,142.40	1,189.20	1,034.40	3,873,879	3,845,353

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.470490	0.065594	0.173154	0.156076	0.056237	0.009050	0.016623	0.041711	0.001119	0.001337	0.004965	0.000700	0.002944

5.0 Energy Detail

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
NaturalGas Unmitigated	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	10507	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Total		**0.1133**	**0.9683**	**0.4120**	**6.1800e-003**		**0.0783**	**0.0783**		**0.0783**	**0.0783**		**1,236.1191**	**1,236.1191**	**0.0237**	**0.0227**	**1,243.6419**

5.2 Energy by Land Use - NaturalGas

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	10.507	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Total		**0.1133**	**0.9683**	**0.4120**	**6.1800e-003**		**0.0783**	**0.0783**		**0.0783**	**0.0783**		**1,236.1191**	**1,236.1191**	**0.0237**	**0.0227**	**1,243.6419**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	7.4128	0.1157	9.9829	5.2000e-004		0.2154	0.2154		0.2137	0.2137	0.0000	2,559.0028	2,559.0028	0.0664	0.0466	2,574.8389
Unmitigated	7.4128	0.1157	9.9829	5.2000e-004		0.2154	0.2154		0.2137	0.2137	0.0000	2,559.0028	2,559.0028	0.0664	0.0466	2,574.8389

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	0.6712					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	6.2014					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.2329	1.0000e-005	0.0127	0.0000		0.1609	0.1609		0.1593	0.1593	0.0000	2,541.1765	2,541.1765	0.0487	0.0466	2,556.6417
Landscaping	0.3073	0.1157	9.9702	5.2000e-004		0.0544	0.0544		0.0544	0.0544		17.8263	17.8263	0.0177		18.1973
Total	**7.4128**	**0.1157**	**9.9829**	**5.2000e-004**		**0.2154**	**0.2154**		**0.2137**	**0.2137**	**0.0000**	**2,559.0028**	**2,559.0028**	**0.0664**	**0.0466**	**2,574.8389**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Consumer Products	6.2014					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.2329	1.0000e-005	0.0127	0.0000		0.1609	0.1609		0.1593	0.1593	0.0000	2,541.1765	2,541.1765	0.0487	0.0466	2,556.6417
Landscaping	0.3073	0.1157	9.9702	5.2000e-004		0.0544	0.0544		0.0544	0.0544		17.8263	17.8263	0.0177		18.1973
Architectural Coating	0.6712					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Total	**7.4128**	**0.1157**	**9.9829**	**5.2000e-004**		**0.2154**	**0.2154**		**0.2137**	**0.2137**	**0.0000**	**2,559.0028**	**2,559.0028**	**0.0664**	**0.0466**	**2,574.8389**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Rancho Palma (Phase 2)

San Bernardino-South Coast County, Summer

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	500.00	Space	4.50	200,000.00	0
Single Family Housing	120.00	Dwelling Unit	28.40	313,200.00	343
Regional Shopping Center	98.00	1000sqft	4.70	98,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	479.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Total Lot Acreage: 37.6; Average home size is 2,610 SF based on 50% maximum coverage

Construction Phase - Operation run only

Off-road Equipment - Operation run only

Vehicle Trips - Trip Rate based on Traffic Study; Weekend Trip Rates based on ITE Trip Generation Handbook, 9th Edition. Credit for Internal Capture and Pass-By Trips have been taken.

Woodstoves - Gas Stoves Only

Energy Use - Title-24 Energy Intensity for Electricity & Natural Gas were adjusted by 21.8% & 16.8% respectively, for Non-Residential, and by 36.4% & 6.5%, respectively, for Residential. Impact Analysis California's 2013 Building Energy Efficiency Standards (CEC).

Mobile Land Use Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	50.00	1.00
tblEnergyUse	T24E	5.60	4.38
tblEnergyUse	T24E	980.99	623.91
tblEnergyUse	T24NG	2.02	1.68
tblEnergyUse	T24NG	27,816.78	26,008.69
tblFireplaces	NumberGas	102.00	120.00
tblFireplaces	NumberNoFireplace	12.00	0.00
tblFireplaces	NumberWood	6.00	0.00
tblLandUse	LandUseSquareFeet	216,000.00	313,200.00
tblLandUse	LotAcreage	38.96	28.40
tblLandUse	LotAcreage	2.25	4.70
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	479.9
tblProjectCharacteristics	OperationalYear	2014	2019
tblVehicleTrips	DV_TP	35.00	0.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	PR_TP	54.00	66.00
tblVehicleTrips	ST_TR	49.97	46.20
tblVehicleTrips	ST_TR	10.08	5.53
tblVehicleTrips	SU_TR	25.24	23.34
tblVehicleTrips	SU_TR	8.77	4.81
tblVehicleTrips	WD_TR	42.94	63.23
tblVehicleTrips	WD_TR	9.57	5.31
tblWoodstoves	NumberCatalytic	6.00	0.00
tblWoodstoves	NumberNoncatalytic	6.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.9766	0.1158	10.0235	5.3000e-004		0.2157	0.2157		0.2140	0.2140	0.0000	2,559.1336	2,559.1336	0.0666	0.0466	2,574.9737
Energy	0.1190	1.0204	0.4558	6.4900e-003		0.0823	0.0823		0.0823	0.0823		1,298.6622	1,298.6622	0.0249	0.0238	1,306.5657
Mobile	20.4968	52.7586	206.6879	0.5371	34.8211	0.7785	35.5996	9.2998	0.7175	10.0173		43,087.1111	43,087.1111	1.4373		43,117.2936
Total	**34.5924**	**53.8948**	**217.1672**	**0.5441**	**34.8211**	**1.0764**	**35.8975**	**9.2998**	**1.0138**	**10.3136**	**0.0000**	**46,944.9070**	**46,944.9070**	**1.5287**	**0.0704**	**46,998.8330**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.9766	0.1158	10.0235	5.3000e-004		0.2157	0.2157		0.2140	0.2140	0.0000	2,559.1336	2,559.1336	0.0666	0.0466	2,574.9737
Energy	0.1190	1.0204	0.4558	6.4900e-003		0.0823	0.0823		0.0823	0.0823		1,298.6622	1,298.6622	0.0249	0.0238	1,306.5657
Mobile	19.4398	44.2550	177.5198	0.4330	27.8220	0.6333	28.4554	7.4305	0.5838	8.0143		34,737.1447	34,737.1447	1.1815		34,761.9552
Total	**33.5355**	**45.3913**	**187.9992**	**0.4401**	**27.8220**	**0.9313**	**28.7533**	**7.4305**	**0.8800**	**8.3105**	**0.0000**	**38,594.9406**	**38,594.9406**	**1.2729**	**0.0704**	**38,643.4946**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**3.06**	**15.78**	**13.43**	**19.13**	**20.10**	**13.49**	**19.90**	**20.10**	**13.19**	**19.42**	**0.00**	**17.79**	**17.79**	**16.73**	**0.00**	**17.78**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	162	0.38
Demolition	Rubber Tired Dozers	0	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Improve Pedestrian Network

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	19.4398	44.2550	177.5198	0.4330	27.8220	0.6333	28.4554	7.4305	0.5838	8.0143		34,737.1447	34,737.1447	1.1815		34,761.9552
Unmitigated	20.4968	52.7586	206.6879	0.5371	34.8211	0.7785	35.5996	9.2998	0.7175	10.0173		43,087.1111	43,087.1111	1.4373		43,117.2936

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	6,196.54	4,527.60	2287.32	12,327,577	9,849,740
Single Family Housing	637.20	663.60	577.20	2,161,007	1,726,646
Total	6,833.74	5,191.20	2,864.52	14,488,584	11,576,385

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	66	0	34
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.469745	0.065359	0.173284	0.156374	0.056542	0.009056	0.016508	0.042061	0.001112	0.001336	0.004986	0.000686	0.002952

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.1190	1.0204	0.4558	6.4900e-003		0.0823	0.0823		0.0823	0.0823		1,298.6622	1,298.6622	0.0249	0.0238	1,306.5657
NaturalGas Unmitigated	0.1190	1.0204	0.4558	6.4900e-003		0.0823	0.0823		0.0823	0.0823		1,298.6622	1,298.6622	0.0249	0.0238	1,306.5657

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	10507	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	531.616	5.7300e-003	0.0521	0.0438	3.1000e-004		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003		62.5431	62.5431	1.2000e-003	1.1500e-003	62.9237
Total		**0.1190**	**1.0204**	**0.4558**	**6.4900e-003**		**0.0823**	**0.0823**		**0.0823**	**0.0823**		**1,298.6622**	**1,298.6622**	**0.0249**	**0.0238**	**1,306.5657**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	10.507	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	0.531616	5.7300e-003	0.0521	0.0438	3.1000e-004		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003		62.5431	62.5431	1.2000e-003	1.1500e-003	62.9237
Total		**0.1190**	**1.0204**	**0.4558**	**6.4900e-003**		**0.0823**	**0.0823**		**0.0823**	**0.0823**		**1,298.6622**	**1,298.6622**	**0.0249**	**0.0238**	**1,306.5657**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	13.9766	0.1158	10.0235	5.3000e-004		0.2157	0.2157		0.2140	0.2140	0.0000	2,559.1336	2,559.1336	0.0666	0.0466	2,574.9737
Unmitigated	13.9766	0.1158	10.0235	5.3000e-004		0.2157	0.2157		0.2140	0.2140	0.0000	2,559.1336	2,559.1336	0.0666	0.0466	2,574.9737

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.3315					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	12.1018					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.2329	1.0000e-005	0.0127	0.0000		0.1609	0.1609		0.1593	0.1593	0.0000	2,541.1765	2,541.1765	0.0487	0.0466	2,556.6417
Landscaping	0.3104	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547		17.9572	17.9572	0.0179		18.3321
Total	**13.9766**	**0.1158**	**10.0236**	**5.3000e-004**		**0.2157**	**0.2157**		**0.2140**	**0.2140**	**0.0000**	**2,559.1336**	**2,559.1336**	**0.0666**	**0.0466**	**2,574.9737**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.3315					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	12.1018					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.2329	1.0000e-005	0.0127	0.0000		0.1609	0.1609		0.1593	0.1593	0.0000	2,541.1765	2,541.1765	0.0487	0.0466	2,556.6417
Landscaping	0.3104	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547		17.9572	17.9572	0.0179		18.3321
Total	**13.9766**	**0.1158**	**10.0236**	**5.3000e-004**		**0.2157**	**0.2157**		**0.2140**	**0.2140**	**0.0000**	**2,559.1336**	**2,559.1336**	**0.0666**	**0.0466**	**2,574.9737**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Rancho Palma (Phase 2)

San Bernardino-South Coast County, Winter

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	500.00	Space	4.50	200,000.00	0
Single Family Housing	120.00	Dwelling Unit	28.40	313,200.00	343
Regional Shopping Center	98.00	1000sqft	4.70	98,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2019
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	479.9	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Total Lot Acreage: 37.6; Average home size is 2,610 SF based on 50% maximum coverage

Construction Phase - Operation run only

Off-road Equipment - Operation run only

Vehicle Trips - Trip Rate based on Traffic Study; Weekend Trip Rates based on ITE Trip Generation Handbook, 9th Edition. Credit for Internal Capture and Pass-By Trips have been taken.

Woodstoves - Gas Stoves Only

Energy Use - Title-24 Energy Intensity for Electricity & Natural Gas were adjusted by 21.8% & 16.8% respectively, for Non-Residential, and by 36.4% & 6.5%, respectively, for Residential. Impact Analysis California's 2013 Building Energy Efficiency Standards (CEC).

Mobile Land Use Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	50.00	1.00
tblEnergyUse	T24E	5.60	4.38
tblEnergyUse	T24E	980.99	623.91
tblEnergyUse	T24NG	2.02	1.68
tblEnergyUse	T24NG	27,816.78	26,008.69
tblFireplaces	NumberGas	102.00	120.00
tblFireplaces	NumberNoFireplace	12.00	0.00
tblFireplaces	NumberWood	6.00	0.00
tblLandUse	LandUseSquareFeet	216,000.00	313,200.00
tblLandUse	LotAcreage	38.96	28.40
tblLandUse	LotAcreage	2.25	4.70
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	479.9
tblProjectCharacteristics	OperationalYear	2014	2019
tblVehicleTrips	DV_TP	35.00	0.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	PR_TP	54.00	66.00
tblVehicleTrips	ST_TR	49.97	46.20
tblVehicleTrips	ST_TR	10.08	5.53
tblVehicleTrips	SU_TR	25.24	23.34
tblVehicleTrips	SU_TR	8.77	4.81
tblVehicleTrips	WD_TR	42.94	63.23
tblVehicleTrips	WD_TR	9.57	5.31
tblWoodstoves	NumberCatalytic	6.00	0.00
tblWoodstoves	NumberNoncatalytic	6.00	0.00

2.0 Emissions Summary

2.1 Overall Construction (Maximum Daily Emission)

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	lb/day										lb/day					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.9766	0.1158	10.0235	5.3000e-004		0.2157	0.2157		0.2140	0.2140	0.0000	2,559.1336	2,559.1336	0.0666	0.0466	2,574.9737
Energy	0.1190	1.0204	0.4558	6.4900e-003		0.0823	0.0823		0.0823	0.0823		1,298.6622	1,298.6622	0.0249	0.0238	1,306.5657
Mobile	19.8505	54.9271	198.2662	0.5006	34.8211	0.7824	35.6034	9.2998	0.7211	10.0209		40,334.7656	40,334.7656	1.4398		40,365.0007
Total	**33.9461**	**56.0634**	**208.7456**	**0.5076**	**34.8211**	**1.0803**	**35.9014**	**9.2998**	**1.0173**	**10.3171**	**0.0000**	**44,192.5615**	**44,192.5615**	**1.5312**	**0.0704**	**44,246.5401**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Area	13.9766	0.1158	10.0235	5.3000e-004		0.2157	0.2157		0.2140	0.2140	0.0000	2,559.1336	2,559.1336	0.0666	0.0466	2,574.9737
Energy	0.1190	1.0204	0.4558	6.4900e-003		0.0823	0.0823		0.0823	0.0823		1,298.6622	1,298.6622	0.0249	0.0238	1,306.5657
Mobile	18.8533	45.9844	173.7797	0.4038	27.8220	0.6372	28.4593	7.4305	0.5873	8.0179		32,523.6933	32,523.6933	1.1840		32,548.5564
Total	**32.9489**	**47.1207**	**184.2590**	**0.4108**	**27.8220**	**0.9352**	**28.7572**	**7.4305**	**0.8836**	**8.3141**	**0.0000**	**36,381.4891**	**36,381.4891**	**1.2754**	**0.0704**	**36,430.0957**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**2.94**	**15.95**	**11.73**	**19.08**	**20.10**	**13.44**	**19.90**	**20.10**	**13.15**	**19.41**	**0.00**	**17.68**	**17.68**	**16.71**	**0.00**	**17.67**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	162	0.38
Demolition	Rubber Tired Dozers	0	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

3.2 Demolition - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000	0.0000		0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**		**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Improve Pedestrian Network

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	18.8533	45.9844	173.7797	0.4038	27.8220	0.6372	28.4593	7.4305	0.5873	8.0179		32,523.6933	32,523.6933	1.1840		32,548.5564
Unmitigated	19.8505	54.9271	198.2662	0.5006	34.8211	0.7824	35.6034	9.2998	0.7211	10.0209		40,334.7656	40,334.7656	1.4398		40,365.0007

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	6,196.54	4,527.60	2287.32	12,327,577	9,849,740
Single Family Housing	637.20	663.60	577.20	2,161,007	1,726,646
Total	6,833.74	5,191.20	2,864.52	14,488,584	11,576,385

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	66	0	34
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.469745	0.065359	0.173284	0.156374	0.056542	0.009056	0.016508	0.042061	0.001112	0.001336	0.004986	0.000686	0.002952

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
NaturalGas Mitigated	0.1190	1.0204	0.4558	6.4900e-003		0.0823	0.0823		0.0823	0.0823		1,298.6622	1,298.6622	0.0249	0.0238	1,306.5657
NaturalGas Unmitigated	0.1190	1.0204	0.4558	6.4900e-003		0.0823	0.0823		0.0823	0.0823		1,298.6622	1,298.6622	0.0249	0.0238	1,306.5657

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	10507	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	531.616	5.7300e-003	0.0521	0.0438	3.1000e-004		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003		62.5431	62.5431	1.2000e-003	1.1500e-003	62.9237
Total		**0.1190**	**1.0204**	**0.4558**	**6.4900e-003**		**0.0823**	**0.0823**		**0.0823**	**0.0823**		**1,298.6622**	**1,298.6622**	**0.0249**	**0.0238**	**1,306.5657**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	lb/day										lb/day					
Single Family Housing	10.507	0.1133	0.9683	0.4120	6.1800e-003		0.0783	0.0783		0.0783	0.0783		1,236.1191	1,236.1191	0.0237	0.0227	1,243.6419
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	0.531616	5.7300e-003	0.0521	0.0438	3.1000e-004		3.9600e-003	3.9600e-003		3.9600e-003	3.9600e-003		62.5431	62.5431	1.2000e-003	1.1500e-003	62.9237
Total		**0.1190**	**1.0204**	**0.4558**	**6.4900e-003**		**0.0823**	**0.0823**		**0.0823**	**0.0823**		**1,298.6622**	**1,298.6622**	**0.0249**	**0.0238**	**1,306.5657**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	lb/day										lb/day					
Mitigated	13.9766	0.1158	10.0235	5.3000e-004		0.2157	0.2157		0.2140	0.2140	0.0000	2,559.1336	2,559.1336	0.0666	0.0466	2,574.9737
Unmitigated	13.9766	0.1158	10.0235	5.3000e-004		0.2157	0.2157		0.2140	0.2140	0.0000	2,559.1336	2,559.1336	0.0666	0.0466	2,574.9737

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.3315					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	12.1018					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.2329	1.0000e-005	0.0127	0.0000		0.1609	0.1609		0.1593	0.1593	0.0000	2,541.1765	2,541.1765	0.0487	0.0466	2,556.6417
Landscaping	0.3104	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547		17.9572	17.9572	0.0179		18.3321
Total	**13.9766**	**0.1158**	**10.0236**	**5.3000e-004**		**0.2157**	**0.2157**		**0.2140**	**0.2140**	**0.0000**	**2,559.1336**	**2,559.1336**	**0.0666**	**0.0466**	**2,574.9737**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	lb/day										lb/day					
Architectural Coating	1.3315					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Consumer Products	12.1018					0.0000	0.0000		0.0000	0.0000			0.0000			0.0000
Hearth	0.2329	1.0000e-005	0.0127	0.0000		0.1609	0.1609		0.1593	0.1593	0.0000	2,541.1765	2,541.1765	0.0487	0.0466	2,556.6417
Landscaping	0.3104	0.1158	10.0108	5.3000e-004		0.0547	0.0547		0.0547	0.0547		17.9572	17.9572	0.0179		18.3321
Total	**13.9766**	**0.1158**	**10.0236**	**5.3000e-004**		**0.2157**	**0.2157**		**0.2140**	**0.2140**	**0.0000**	**2,559.1336**	**2,559.1336**	**0.0666**	**0.0466**	**2,574.9737**

7.0 Water Detail

7.1 Mitigation Measures Water

8.0 Waste Detail

8.1 Mitigation Measures Waste

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

3.2-2 Mobile Source Air Toxic Health Risk Assessment

Rancho Palma

MOBILE SOURCE AIR TOXIC HEALTH RISK ASSESSMENT
CITY OF SAN BERNARDINO

PREPARED BY:

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DECEMBER 11, 2015

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LIST OF ABBREVIATED TERMS

(1)	Reference
AADT	Annual Average Daily Traffic Volumes
ARB	Air Resources Board
CAAQS	California Ambient Air Quality Standards
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CO	Carbon Monoxide
CPF	Cancer Potency Factor
EPA	Environmental Protection Agency
HRA	Health Risk Assessment
LDA	Light Duty Auto
LDT	Light Duty Truck
LHD	Light Heavy Duty
MCY	Motorcycle
MDV	Medium Duty Vehicle
NO2	Nitrogen Dioxide
OBUS	Other Bus
PM10	Particulate Matter 10 microns in diameter or less
PM2.5	Particulate Matter 2.5 microns in diameter or less
PPM	Parts per Million
Project	Rancho Palma
PVMRM	Plume Volume Molar Ratio Methods
REL	Reference Exposure Level
RME	Reasonable Maximum Exposure
SBUS	School Bus
SCAQMD	South Coast Air Quality management District
TACs	Toxic Air Contaminants
TOP	The Ontario Plan
UBUS	Urban Bus
URF	Unit Risk Factor
UTM	Universal Traverse Mercator

1 INTRODUCTION

In 2005, the California Air Resources Board (ARB) promulgated an advisory recommendation to avoid setting sensitive land uses within 500 feet of a freeway, urban roads with 100,000 vehicles per day or rural roads with 50,000 vehicles per day. According to the ARB, the increased cancer risk is 300 to 1,700 per million within this domain. The strongest association of traffic related emissions with adverse health outcomes was seen within 300 feet of roadways with high truck densities. Notwithstanding, the ARB notes that a site specific analysis would be required to determine the actual risk near a particular land use and should consider factors such as prevailing wind direction, local topography and climate.

Additionally, the California Code of Regulations, Title 14, Section 15126.2(a) recommends that significant environmental effects of a project be assessed when a project brings development and people into an affected area (1). For the proposed project, adjoining freeway emissions are a potential concern and relevant thresholds and standards exist to determine the impact of vehicular emissions on an exposed population. As such, a health risk assessment was prepared to assess the impact of these emissions on individuals residing at the proposed project site.

In consideration of the above referenced requirement, the assessment and dispersion modeling methodologies used in the preparation of this report were composed of all relevant and appropriate procedures presented by the U.S. Environmental Protection Agency, California Environmental Protection Agency and South Coast Air Quality Management District (SCAQMD). The methodologies and assumptions offered under this regulatory guidance were used to ensure that the assessment effectively quantified residential exposures associated with the generation of contaminant emissions from adjacent mobile source activity.

This report summarizes the protocol used to evaluate contaminant exposures and presents the results of the health risk assessment (HRA) prepared by Urban Crossroads, Inc., for the proposed Rancho Palma project (referred to as “Project).

1.1 SITE LOCATION

The proposed Rancho Palma Project is located northeast of West Little League Drive and northwest of Palm Avenue in the City of San Bernardino, as shown on Exhibit 1-A. The Interstate 215 (I-215) Freeway right-of-way is located approximately 75 feet south of the Project site. Existing residential land uses in the Project study area are located north of the Project site on Irvington Avenue, Chestnut Avenue, and Loredo Street. The Guhin and Verdemont Parks are located west and north of the Project site, respectively. North of the Project site are the Cesar E. Chavez Middle School on Magnolia Avenue, and the Little League Baseball Western Region Headquarters on North Little League Drive. The existing commercial retail Palm Travel Center is located south of the Project site on West Little League Drive.

1.2 PROJECT DESCRIPTION

The Project is proposed to include the development of up to 120 single-family detached residential dwelling units and 98,000 square feet of commercial retail use, as shown on Exhibit 1-B. For the purposes of this analysis, potential impacts have been assessed for two development phases. The two phases and their anticipated opening years are as follows:

- Phase 1 (2018) – 120 single family detached residential dwelling units (Western Half);
- Phase 2 (2019) – 98,000 square feet of commercial retail use (Eastern Half).

Additionally, as part of the project design, the Project applicant has agreed to implement the following:

1. All single-family units within the project site shall include the installation and maintenance of air filtration systems with efficiencies equal to or exceeding a Minimum Efficiency Reporting Value (MERV) 14 as defined by the American Society of Heating, Refrigerating and Air Conditioning Engineers (ASHRAE) Standard 52.2 (2)[1].

1.3 SUMMARY OF FINDINGS

For carcinogenic exposures, the summation of risk for the maximum exposed residential receptor totaled 8.91E-06 (8.91 in one million) for the 30 year and 2.67E-06 (2.67 in one million) for the 9 year exposure scenarios. In comparison to the threshold level of 10 in one million, carcinogenic risks will not exceed the applicable thresholds for both the 30 and 9 year exposure scenario. Therefore, carcinogenic exposures are calculated to be within acceptable limits and are less than significant.

For chronic noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one for both the 30 year and 9 year exposure scenarios. For acute exposures, the hazard indices for the identified averaging times did not exceed unity. Therefore, noncarcinogenic hazards are calculated to be within acceptable limits and a less than significant impact would occur.

For the maximum exposed residential receptor, results of the analysis predicted freeway emissions will produce PM10 concentrations of 0.74 μg/m3 and 0.49 μg/m3 for the 24-hour and annual averaging times. These values will not exceed the SCAQMD significance thresholds of 2.5 μg/m3 and 1.0 μg/m3, respectively.

1 The use of MERV filtration systems to reduce DPM and particulates has been successfully implemented by several lead agencies, including, but not limited to: City of Los Angeles, City of Claremont, City of Irvine, City of Glendale, City of Berkley, City of Oakland, and the Los Angeles Unified School District (LAUSD).

The average particle size efficiency (PSE) removal based on ASHRAE Standard 52.2 for MERV 14 is approximately 75% for 0.3 to 1.0 $\mu g/m^3$(DPM) and 90% for 1.0 to 10 $\mu g/m^3$(PM_{10} and $PM_{2.5}$) (2).

EXHIBIT 1-A: LOCATION MAP

LEGEND:

EXHIBIT 1-B: SITE PLAN

For PM2.5, a maximum 24-hour average concentration of 0.245 μg/m3 was predicted. This value also will not exceed the identified significance threshold of 2.5 μg/m3.

The maximum modeled 1-hour average concentration for CO of 0.22 parts per million (ppm) (255.84 μg/m3), when added to an existing background concentration of 4.0 ppm, would equal a total Project concentration of 4.22 ppm. This would not cause an exceedance of the California Ambient Air Quality Standards (CAAQS) of 20 ppm. For the 8-hour averaging time, the maximum predicted concentration of 0.18 ppm (207.64 μg/m3), when added to an existing background level of 2.4 ppm, would equal a total Project concentration of 2.58 ppm. This would not cause an exceedance of the CAAQS of 9 ppm.

For NO2, a maximum one hour concentration of 0.023 ppm (44.01 μg/m3) was predicted. This concentration, when added to a background concentration of 0.073 ppm, would equal a total Project concentration of 0.096 ppm. This would not cause an exceedance of the CAAQS of 0.18 ppm.

As noted, short duration (i.e., 1 and 8-hour) exposures associated with both toxic and criteria pollutants are within acceptable limits. As such, less than significant impacts are anticipated to residents who access and utilize outdoor amenities.

1.4 MITIGATION MEASURES

No significant impacts would occur, thus no mitigation is required.

2 SOURCE IDENTIFICATION

The California Department of Transportation (Caltrans), Traffic and Vehicle Data Systems Unit collects and maintains traffic volume counts for vehicles traversing the California state highway system. Discrete data sets are available for main highway segments and adjoining freeway ramp volumes. Table 2-1 presents the annual average daily traffic volumes (AADT) for the roadway segments considered in the assessment. Data for mainline AADTs on Route 215 was obtained from the Project's Traffic Study for Year 2035 conditions. Data for the northbound and southbound on/off ramps along Palm Avenue were obtained from the Caltrans Traffic and Vehicle Data Systems Unit (3).

TABLE 2-1 FREEWAY TRAFFIC VOLUMES

Roadway Segment	Annual Average Daily Traffic (AADT)
I-215 Freeway	81,160
NB On / Pine Avenue	6,700
NB Off / Pine Avenue	5,500
SB On / Pine Avenue	5,500
SB Off / Pine Avenue	6,700

3 SOURCE CHARACTERIZATION

In urban communities, vehicle emissions contribute significantly to localized concentrations of air contaminants. Typically, emissions generated from these sources are characterized by vehicle mix, the rate pollutants are generated during the course of travel and the number of vehicles traversing the roadway network.

Currently, emission factors are generated from a series of computer based programs to produce a composite emission rate for vehicles traveling at various speeds within a defined geographical area or along a discrete roadway segment. To account for the emission standards imposed on the California fleet, the ARB has developed the EMFAC2014 emission factor model. EMFAC2014 was utilized to identify pollutant emission rates for total organic gases (TOG), diesel particulates, particulates (PM10 and PM2.5), carbon monoxide (CO) and nitrogen oxide (NOx) compounds (4). To produce a representative vehicle fleet distribution, the assessment utilized ARB's San Bernardino County population estimates for the 2020 calendar year as a conservative measure. This approach provides an estimate of vehicle mix associated with operational profiles at the link or intersection level. Table 3-1 lists the identified fleet mix considered in the assessment.

Based upon the freeway traffic volumes and population profiles noted above, discrete traffic counts were identified for each roadway segment. Diesel vehicles account for 5.12 percent of the on-road mobile fleet. For chronic (long term) and acute (e.g., 1-hour) exposures, AADT values were averaged to produce representative hourly traffic volumes. Table 3-2 presents the hourly traffic volumes considered in the assessment.

TABLE 3-1: VEHICLE FLEET MIX PROFILE

Vehicle class	San Bernardino County		
	Fuel	Population	Percent
LDA	Diesel	3406	0.14
LDA	Gas	1066571	45.06
LDT1	Diesel	218	0.01
LDT1	Gas	168279	7.11
LDT2	Diesel	211	0.01
LDT2	Gas	420165	17.75
LHD1	Diesel	37466	1.58
LHD1	Gas	63985	2.70
LHD2	Diesel	11287	0.48
LHD2	Gas	5472	0.23
MCY	Gas	43045	1.82
MDV	Diesel	384	0.02
MDV	Gas	453630	19.17
MH	Diesel	7800	0.33
MH	Gas	31534	1.33
T6	Diesel	13217	0.56
T6	Gas	3297	0.14
T7	Diesel	32892	1.38
T7	Gas	402	0.02
OBUS	Diesel	525	0.02
OBUS	Gas	808	0.03
SBUS	Diesel	981	0.04
SBUS	Gas	515	0.02
UBUS	Diesel	504	0.02
UBUS	Gas	459	0.02

Note: Vehicle category descriptions can be found on the California Air Resources Board website at http://www.arb.ca.gov/msei/modeling.htm.

TABLE 3-2: HOURLY FREEWAY TRAFFIC VOLUMES

Roadway Segment	Average Traffic Volume		
	All	Gas	Diesel
Route 215 NB	1,690.8	1,604.3	86.5
Route 215 SB	1,690.8	1,604.3	86.5
NB On / Palm Avenue	279.2	264.9	14.3
NB Off / Palm Avenue	229.2	217.4	11.7
SB On / Palm Avenue	229.2	217.4	11.7
SB Off / Palm Avenue	279.2	264.9	14.3

Posted route speeds were assumed for vehicles traversing the main highway link (Route 215). Emissions associated with acceleration and deceleration (i.e., on/off ramps) were based upon vehicle speeds of 45 and 5 miles per hour, respectively. These values were subsequently adjusted utilizing the modal algorithms presented in the California Line Source Dispersion Model (5).

For particulates (PM10 and PM2.5), emissions were quantified through the reentrainment of paved roadway dust. The predictive emission equation developed by the U.S. Environmental Protection Agency (AP-42, Section 13.2.1) was utilized to generate particulate source strength (6). To account for the mass rate of emissions entrained from the roadway surface, the contribution from exhaust, break and tire wear were added to the AP-42 emission factor equation.

A list of compounds associated with mobile source emissions is presented in Table 3-3. Appendix 3.1 presents the on-road emission rate calculation worksheets for the freeway segments considered in the assessment.

TABLE 3-3: COMPOUNDS EMITTED FROM ON ROAD MOBILE SOURCE ACTIVITY

Source	Pollutant
State Route 215	Benzene Formaldehyde 1,3-Butadiene Acetaldehyde Acrolein Diesel Particulates Reentrained Particulates (PM10, PM2.5) Carbon Monoxide Nitrogen Dioxide

4 EXPOSURE QUANTIFICATION

In order to assess the impact of emitted compounds on individuals who reside at the proposed apartment complex, air quality modeling utilizing the AMS/EPA Regulatory Model AERMOD was performed to assess the downwind extent of mobile source emissions located within a ¼ mile radius of the project site. AERMOD's air dispersion algorithms are based upon a planetary boundary layer turbulence structure and scaling concepts, including the treatment of surface and elevated sources in simple and complex terrain.

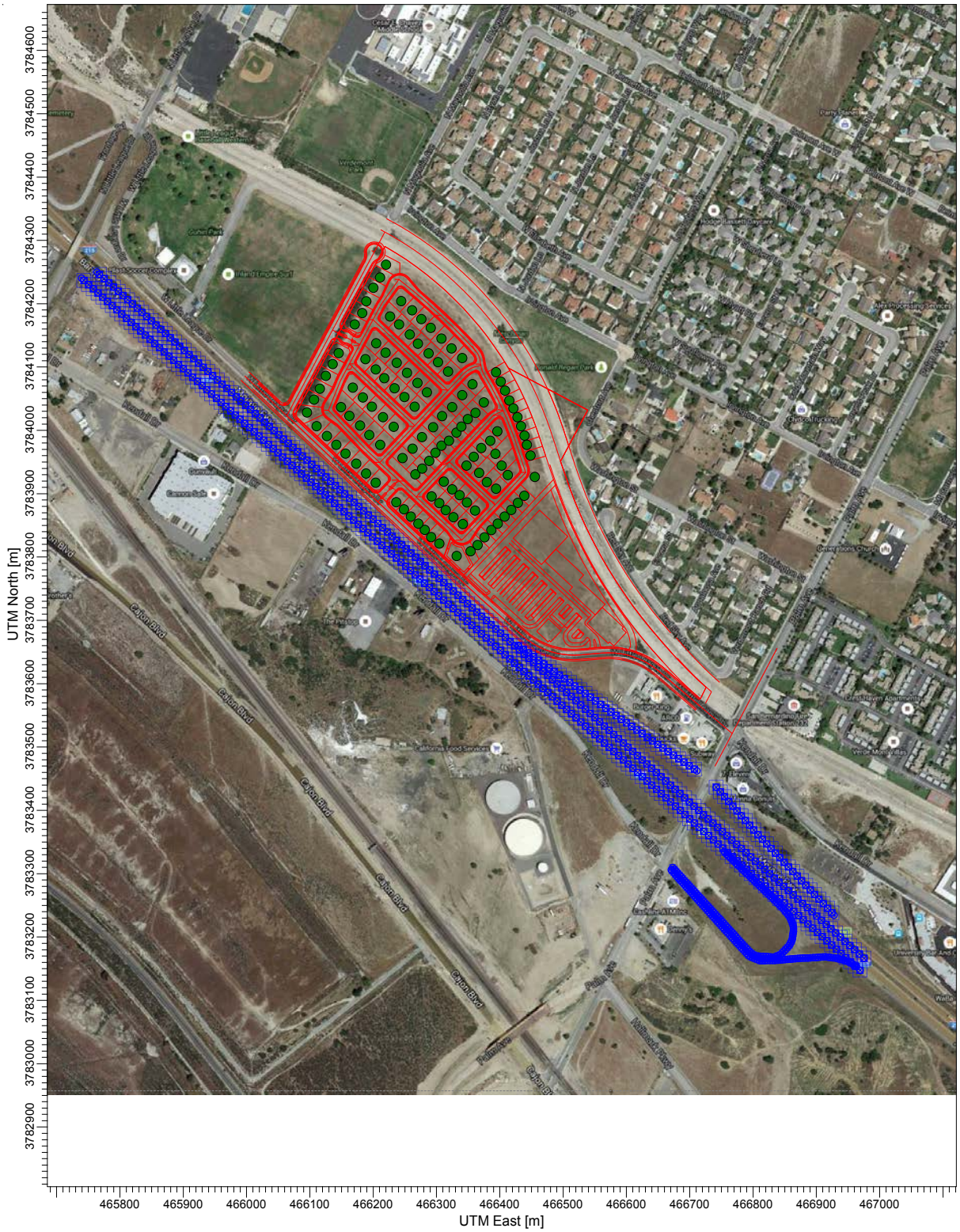
The model offers additional flexibility by allowing the user to assign initial vertical and lateral dispersion parameters for sources representative of a localized mobile fleet. For this assessment, the volume source algorithm was utilized to model the emissions generated from on-road mobile source activity. Although the freeway is located predominantly below grade, the assessment followed guidance promulgated by the U.S. Environmental Protection Agency (U.S. EPA, 2009) whereby the model was programmed to assume flat, level terrain (7). This was done to avoid underestimating pollutant concentrations for conditions involving low-level, non-buoyant sources in up-sloping terrain. Notwithstanding, to account for the discrepancy in terrain elevation, vertical (sigma z) dispersion parameters were developed for each source location by approximating mixing zone residence time and quantifying the initial vertical term as performed in the California Line Source Dispersion Model Caline3 (5). The horizontal (sigma y) parameters were generated by dividing the source separation distance by a standard deviation of 2.15. It should be noted that Caline3 was not used for dispersion modeling calculations, rather Caline3 modeling guidance was used for determining initial vertical mixing parameters which were input into AERMOD.

Air dispersion models require additional input parameters including pollutant emission data and local meteorology. Due to the their sensitivity to individual meteorological parameters such as wind speed and direction, the U.S. Environmental Protection Agency recommends that meteorological data used as input into dispersion models be selected on the basis of relative spatial and temporal conditions that exist in the area of concern. In response to this recommendation, the nearest meteorological data available from the SCAQMD San Bernardino station (Source Receptor Area 34), which is located approximately 9 miles southeast of the project site, was used to represent local weather conditions and prevailing winds. Five years (2008-2012) of available AERMOD meteorological data was utilized in the modeling.

The modeling analysis also considered the spatial distribution of mobile source activity traversing the freeway in relation to the proposed site. To accommodate a Cartesian grid format, direction dependent calculations were obtained by identifying the universal transverse mercator (UTM) coordinates for each volume source location. On-site receptors were placed to provide coverage across the identified project boundary. A graphical representation of the source-receptor grid network is presented in Exhibit 4-A.

Air dispersion model input/output files are summarized in Appendix 3.3.

EXHIBIT 4-A: SOURCE RECEPTOR GRID NETWORK



5 RISK CHARACTERIZATION

5.1 CARCINOGENIC CHEMICAL RISK

Carcinogenic compounds are not considered to have threshold levels (i.e., dose levels below which there are no risks). Any exposure, therefore, will have some associated risk. As a result, the State of California has established a threshold of one in one hundred thousand (or ten in one million) (1.0E-05) as a level posing no significant risk for exposures to carcinogens regulated under the Safe Drinking Water and Toxic Enforcement Act (Proposition 65). This threshold is also consistent with the maximum incremental cancer risk established by the SCAQMD for projects prepared under the auspices of the California Environmental Quality Act (CEQA). The SCAQMD *CEQA Air Quality Handbook* (1993) states that emissions of toxic air contaminants (TACs) are considered significant if a health risk assessment shows an increased risk of greater than ten in one million (8).

Health risks associated with exposure to carcinogenic compounds can be defined in terms of the probability of developing cancer as a result of exposure to a chemical at a given concentration. Under a deterministic approach (i.e., point estimate methodology), the cancer risk probability is determined by multiplying the chemical's annual concentration by its unit risk factor (URF). The URF is a measure of the carcinogenic potential of a chemical when a dose is received through the inhalation pathway. It represents an upper bound estimate of the probability of contracting cancer as a result of continuous exposure to an ambient concentration of one microgram per cubic meter (μg/m3) over a 70 year lifetime. The URFs utilized in the assessment and corresponding cancer potency factor were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (9).

To effectively quantify dose, the procedure requires the incorporation of several discrete exposure variates. Once determined, contaminant dose is multiplied by the cancer potency factor (CPF) in units of inverse dose expressed in milligrams per kilogram per day (mg/kg/day)-1 to derive the cancer risk estimate. Therefore, to assess exposures associated with the proposed residential population, the following dose algorithm was utilized.

$$CDI = (Cair \times EF \times ED \times IR) / (BW \times AT)$$

Where:

CDI = chronic daily intake (mg/kg/day)

Cair = concentration of contaminant in air (mg/m3)

EF = exposure frequency (days/year)

ED = exposure duration (years)

IR = inhalation rate (m3/day)

BW = body weight (kg)

AT = averaging time (days)

To represent residential exposures, the assessment employed the U.S. Environmental Protection Agency's guidance to develop viable dose estimates based on reasonable maximum exposures (RME). Specifically, activity patterns for population mobility recommended by the U.S. Environmental Protection Agency and presented in the Exposure Factors Handbook were utilized. As a result, lifetime risk values for residents were adjusted to account for an exposure duration of 350 days per year for 30 years (i.e., 95th percentile). A 9 year exposure duration was additionally assessed to identify risk estimates associated with the average time individuals are reported to reside at a given residence. These values are consistent with the California Environmental Quality Act which considers the evaluation of environmental effects of proposed projects in a manner that reflects both reasonable and feasible assumptions. For body weight and inhalation, the assessment employed average adult values of 70 kilograms and 20 cubic meters per day, respectively.

Appendix 3.2, Tables A1 and A2, columns f-g, present the URF's and corresponding cancer potency factors for carcinogens considered in the assessment. The cancer risk attributed to each compound and summation of those risks are presented in column h.

For carcinogenic exposures, the summation of risk for the maximum exposed residential receptor totaled 8.91E-06 (8.91 in one million) for the 30 year and 2.67E-06 (2.67 in one million) for the 9 year exposure scenarios. In comparison to the threshold level of ten in one million, carcinogenic risks will not exceed the applicable thresholds for both the 30 and 9 year exposure scenario. Therefore, carcinogenic exposures were predicted to be within acceptable limits and are less than significant.

5.2 NON-CARCINOGENIC HAZARDS

An evaluation of the potential noncancer effects of contaminant exposures was also conducted. Under the point estimate approach, adverse health effects are evaluated by comparing the concentration of each compound with the appropriate Reference Exposure Level (REL). Available REL's presented in the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values were considered in the assessment.*

To quantify noncarcinogenic impacts, the hazard index approach was used. The hazard index assumes that subthreshold exposures adversely affect a specific organ or organ system (i.e., toxicological endpoint). For each discrete pollutant exposure, target organs presented in regulatory guidance were utilized.

To calculate the hazard index, the pollutant concentration or dose is divided by the appropriate toxicity value. For compounds affecting the same toxicological endpoint, this ratio is summed. Where the total equals or exceeds one (i.e., unity), a health hazard is presumed to exist. For chronic exposures, REL's were converted to units expressed in mg/kg/day to accommodate the above referenced intake algorithm. To assess acute noncancer impacts, the maximum pollutant concentration is divided by the REL for the corresponding averaging time (e.g., 1-hour). No exposure adjustments are considered for short duration exposures.

Appendix 3.2, Tables A1 and A2, columns i-j, present the REL's and corresponding reference dose values used in the evaluation of chronic noncarcinogenic exposures. The noncancer hazard quotient for identified compounds generated from each source and a summation for each toxicological endpoint are presented in columns k-r. Tables A3 through A4, column e present the REL's for the assessment of acute exposures. Columns f-m identify each compound's hazard quotient and corresponding index for each endpoint.

For chronic noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one for both the 30 year and 9 year exposure scenarios. For acute exposures, the hazard indices for the identified averaging times did not exceed unity. Therefore, acute and chronic non-carcinogenic hazards were predicted to be within acceptable limits and are less than significant.

5.3 CRITERIA POLLUTANT EXPOSURES

The State of California has promulgated strict ambient air quality standards for various pollutants. These standards were established to safeguard the public's health and welfare with specific emphasis on protecting those individuals susceptible to respiratory distress, such as asthmatics, the young, the elderly and those with existing conditions which may be affected by increased pollutant concentrations. However, recent research has shown that unhealthful respiratory responses occur with exposures to pollutants at levels that only marginally exceed clean air standards. Table 5-1 presents the CAAQS for the criteria pollutants considered in the assessment.

TABLE 5-1: CALIFORNIA AMBIENT AIR QUALITY STANDARDS

Pollutant	Standard	Health Effects
Particulates (PM10)	>50 μg/m3 (24 hr avg.) >20 μg/m3 (Annual)	1) Excess deaths from short-term exposures and the exacerbation of symptoms in sensitive individuals with respiratory disease. 2) Excess seasonal declines in pulmonary function especially in children.
Particulates (PM2.5)	>12 μg/m3 (Annual)	1) Excess deaths and illness from long-term exposures and the exacerbation of symptoms in sensitive individuals with respiratory and cardio pulmonary disease.
Carbon Monoxide (CO)	>9.0 ppm (8 hr avg.) >20.0 ppm (1 hr avg.)	1) Aggravation of angina pectoris and other aspects of coronary heart disease. 2) Decreased exercise tolerance in persons with peripheral vascular disease and lung disease. 3) Impairment of central nervous system functions. 4) Possible increased risk to fetuses.
Nitrogen Dioxide (NO2)	>0.18 ppm (1 hr avg.)	1) Potential to aggravate chronic respiratory disease and respiratory symptoms in sensitive groups. 2) Risk to public health implied by pulmonary and extra-pulmonary biochemical and cellular changes and pulmonary structural changes.

Abbreviations: ppm: parts per million; μg/m3: micrograms per cubic meter.
Source: California Code of Regulations, Title 17, Section 70200.

Pollutant emissions are considered to have a significant effect on the environment if they result in concentrations that create either a violation of an ambient air quality standard, contribute to an existing air quality violation or expose sensitive receptors to substantive pollutant concentrations. Should ambient air quality already exceed existing standards, the SCAQMD has established significance criteria for selected compounds to account for the continued degradation of local air quality. Background concentrations are based upon the highest observed value for the most recent three year period.

For PM_{10} emissions, background concentrations representative of the project area exceed the CAAQS for the 24-hour and annual averaging times. As a result, a significant impact is achieved when pollutant concentrations produce a measurable change over existing background levels. Although background concentrations exceed the CAAQS annual averaging time for fine particulates, no measurable change criteria currently exists. As a result, the SCAQMD significance threshold of 2.5 $\mu g/m^3$ for the 24-hour averaging time is used to assess $PM_{2.5}$ impacts.

For the CO 1 and 8-hour averaging times and NO_2 1-hour averaging time, background concentrations are below the current air quality standards. As such, significance is achieved when pollutant concentrations add to existing levels and create an exceedance of the CAAQS. Table 5-2 shows the pollutant concentrations collected at the nearest available monitoring sites to the Project for the last three years of available data. The nearest long-term air quality monitoring site in relation to the project for Particulate Matter ≤ 10 Microns (PM_{10}), Particulate

Matter ≤ 2.5 Microns ($PM_{2.5}$), Carbon Monoxide (CO), and Nitrogen Dioxide (NO_2) is carried out by the South Coast Air Quality Management District (SCAQMD) at the Central San Bernardino Valley 2 monitoring station, located approximately 9 miles southeast of the Project site in the City of San Bernardino (SRA 34) (10). Table 5-2 outlines the relevant significance thresholds considered to affect local air quality.

TABLE 5-2: SAN BERNARDINO MONITORING SUMMARY (SRA 34)

Pollutant/ Averaging Time	Year			
	2012	**2013**	**2014**	**Maximum**
Particulates (PM_{10}) 24-Hour	53	102	136	136
Particulates ($PM_{2.5}$) 24-Hour	34.8	55.3	73.9	73.9
Carbon Monoxide (CO) 1-Hour 8-Hour	-- 1.7	-- 1.7	4.0 2.4	4.0 2.4
Nitrogen Dioxide (NO_2) 1-Hour	0.067	0.072	0.073	0.073

Note: PM_{10} concentrations are expressed in micrograms per cubic meter ($\mu g/m^3$). All others are expressed in parts per million (ppm).
Source: U.S Environmental Protection Agency and California Air Resources Board.

TABLE 5-3: SCAQMD AIR QUALITY SIGNIFICANCE THRESHOLDS

Pollutant	Averaging Time	Pollutant Concentration
Particulates (PM10) Particulates (PM2.5)	24-Hours	2.5 μg/m3 (operation)
Particulates (PM10)	Annual	1.0 μg/m3
Carbon Monoxide (CO)	1/8-Hours	SCAQMD is in attainment; impacts are significant if they cause or contribute to an exceedance of the following attainment standards 20 ppm (1-hour) and 9 ppm (8-hour).
Nitrogen Dioxide (NO2)	1-Hour	SCAQMD is in attainment; impacts are significant if they cause or contribute to an exceedance of the following attainment standard 0.18 ppm.

Abbreviations: ppm: parts per million; μg/m3: micrograms per cubic meter
Source: South Coast Air Quality Management District.

For the maximum exposed residential receptor, results of the analysis predicted freeway emissions will produce PM10 concentrations of 0.74 μg/m3 and 0.49 μg/m3 for the 24-hour and annual averaging times. These values will not exceed the SCAQMD significance thresholds of 2.5 μg/m3 and 1.0 μg/m3, respectively.

For PM2.5, a maximum 24-hour average concentration of 0.245 μg/m3 was predicted. This value also will not exceed the identified significance threshold of 2.5 μg/m3.

The maximum modeled 1-hour average concentration for CO of 0.22 parts per million (ppm) (255.84 μg/m3), when added to an existing background concentration of 4.0 ppm, would equal a total Project concentration of 4.22 ppm. This would not cause an exceedance of the California Ambient Air Quality Standards (CAAQS) of 20 ppm. For the 8-hour averaging time, the maximum predicted concentration of 0.18 ppm (207.64 μg/m3), when added to an existing background level of 2.4 ppm, would equal a total Project concentration of 2.58 ppm. This would not cause an exceedance of the CAAQS of 9 ppm.

For NO2, a maximum one hour concentration of 0.023 ppm (44.01 μg/m3) was predicted. This concentration, when added to a background concentration of 0.073 ppm, would equal a total Project concentration of 0.096 ppm. This would not cause an exceedance of the CAAQS of 0.18 ppm.

6 CONCLUSION

For carcinogenic exposures, the summation of risk for the maximum exposed residential receptor totaled 8.91E-06 (8.91 in one million) for the 30 year and 2.67E-06 (2.67 in one million) for the 9 year exposure scenarios. In comparison to the threshold level of 10 in one million, carcinogenic risks will not exceed the applicable thresholds for both the 30 and 9 year exposure scenario. Therefore, carcinogenic exposures are calculated to be within acceptable limits and are less than significant.

For chronic noncarcinogenic effects, the hazard index identified for each toxicological endpoint totaled less than one for both the 30 year and 9 year exposure scenarios. For acute exposures, the hazard indices for the identified averaging times did not exceed unity. Therefore, noncarcinogenic hazards are calculated to be within acceptable limits and a less than significant impact would occur.

For the maximum exposed residential receptor, results of the analysis predicted freeway emissions will produce PM10 concentrations of 0.74 μg/m3 and 0.49 μg/m3 for the 24-hour and annual averaging times. These values will not exceed the SCAQMD significance thresholds of 2.5 μg/m3 and 1.0 μg/m3, respectively.

For PM2.5, a maximum 24-hour average concentration of 0.245 μg/m3 was predicted. This value also will not exceed the identified significance threshold of 2.5 μg/m3.

The maximum modeled 1-hour average concentration for CO of 0.22 parts per million (ppm) (255.84 μg/m3), when added to an existing background concentration of 4.0 ppm, would equal a total Project concentration of 4.22 ppm. This would not cause an exceedance of the California Ambient Air Quality Standards (CAAQS) of 20 ppm. For the 8-hour averaging time, the maximum predicted concentration of 0.18 ppm (207.64 μg/m3), when added to an existing background level of 2.4 ppm, would equal a total Project concentration of 2.58 ppm. This would not cause an exceedance of the CAAQS of 9 ppm.

For NO2, a maximum one hour concentration of 0.023 ppm (44.01 μg/m3) was predicted. This concentration, when added to a background concentration of 0.073 ppm, would equal a total Project concentration of 0.096 ppm. This would not cause an exceedance of the CAAQS of 0.18 ppm.

As noted, short duration (i.e., 1 and 8-hour) exposures associated with both toxic and criteria pollutants are within acceptable limits. As such, less than significant impacts are anticipated to residents who access and utilize outdoor amenities.

7 REFERENCES

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2. **American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc.** *Method of Testing General Ventilation Air Cleaning Devices for Removal by Particle Size.* 1999. ANSI/ASHRAE Standard 52.2.
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9. **California Air Resources Board.** Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values. [Online] http://www.arb.ca.gov/toxics/healthval/contable/pdf.
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8 CERTIFICATION

The contents of this air study report represent an accurate depiction of the environmental impacts associated with the proposed Rancho Palma Project. The information contained in this health risk assessment is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 217.

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EDUCATION

Master of Science in Environmental Studies
California State University, Fullerton • May, 2010

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PROFESSIONAL AFFILIATIONS

AEP – Association of Environmental Planners
AWMA – Air and Waste Management Association
ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Environmental Site Assessment – American Society for Testing and Materials • June, 2013
Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

APPENDIX 3.1:

EMISSION RATE CALCULATION WORKSHEETS

Running Rate Emission Summary

Criteria	5 mph	45 mph	65 mph
CO	3.281	1.043	2.087
NOx	0.861	0.586	0.831
PM10	0.046	0.0136	0.0162
PM2.5	0.042	0.0037	0.0149
TOG GAS	0.402	0.102	0.174
TOG DSL	1.565	0.141	0.111
DSL Particulate	0.096	0.045	0.068

TW/BW Emission Summary

	TW	BW	Total
PM10	0.045	0.040	0.085
PM2.5	0.002	0.017	0.019

EMFAC2011 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: Criteria

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	CO_RUNEX (gms/mile)	CO_RUNEX AVE (gms/mile)	NOX_RUNEX (gms/mile)	NOx_RUNEX AVE (gms/mile)	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)	PM10_PMTW (gms/mile)	PM10_PMTW_AVE (gms/mile)	PM10_PMBW (gms/mile)	PM10_PMBW_AVE (gms/mile)
San Bernardino	2020	Annual	LDA	DSL	Aggregated	5	1869.620736	0.0013	1.63396101	0.00208793	0.140868014	0.00018001	0.01104466	0.00001411	0.01104466	0.00001411	0.036749816	0.000046960
San Bernardino	2020	Annual	LDA	GAS	Aggregated	5	676311.8832	0.4622	0.388885075	0.17975830	0.512631562	0.23695889	0.038178762	0.01764776	0.038178762	0.01764776	0.036749814	0.016987240
San Bernardino	2020	Annual	LDT1	DSL	Aggregated	5	134.88275	0.0001	4.147266451	0.00038233	0.402782346	0.00003713	0.018724347	0.00000173	0.018724347	0.00000173	0.036749816	0.000003388
San Bernardino	2020	Annual	LDT1	GAS	Aggregated	5	101185.5326	0.0692	0.594299612	0.04110026	0.601790533	0.04161831	0.07806097	0.00539850	0.07806097	0.00539850	0.036749814	0.002541524
San Bernardino	2020	Annual	LDT2	DSL	Aggregated	5	121.25939	0.0001	2.211657599	0.00018330	0.235659558	0.00001953	0.011471137	0.00000095	0.011471137	0.00000095	0.036749815	0.000003046
San Bernardino	2020	Annual	LDT2	GAS	Aggregated	5	247137.3591	0.1689	0.433088895	0.07315367	0.606343189	0.10241830	0.042878954	0.00724275	0.042878954	0.00724275	0.036749815	0.006207464
San Bernardino	2020	Annual	LHD1	DSL	Aggregated	5	25208.75828	0.0172	4.043867813	0.06967373	0.253930123	0.00437508	0.004900165	0.00008443	0.004900165	0.00008443	0.076439597	0.001317014
San Bernardino	2020	Annual	LHD1	GAS	Aggregated	5	47538.03319	0.0325	3.037043237	0.09867630	3.720863867	0.12089425	0.083639947	0.00271754	0.083639947	0.00271754	0.036749816	0.001194035
San Bernardino	2020	Annual	LHD2	DSL	Aggregated	5	7609.175113	0.0052	2.238986332	0.01164420	0.200781511	0.00104420	0.003441808	0.00001790	0.003441808	0.00001790	0.089179536	0.000463792
San Bernardino	2020	Annual	LHD2	GAS	Aggregated	5	4498.996026	0.0031	2.961705373	0.00910706	3.605873878	0.01108784	0.082409487	0.00025340	0.082409487	0.00025340	0.036749815	0.000113003
San Bernardino	2020	Annual	MCY	GAS	Aggregated	5	41584.70141	0.0284	24.71769052	0.70252556	1.217078548	0.03459178	0.000596026	0.00001694	0.000596026	0.00001694	0.036749449	0.001044492
San Bernardino	2020	Annual	MDV	DSL	Aggregated	5	218.195775	0.0001	3.5644918	0.00053158	0.416308819	0.00006208	0.012602552	0.00000188	0.012602552	0.00000188	0.036749814	0.000005481
San Bernardino	2020	Annual	MDV	GAS	Aggregated	5	252358.7351	0.1725	0.392360143	0.06767432	0.469452337	0.08097119	0.046592791	0.00803633	0.046592791	0.00803633	0.036749815	0.006338612
San Bernardino	2020	Annual	MH	DSL	Aggregated	5	2431.280612	0.0017	7.010467968	0.01164938	0.362017351	0.00060157	0.00584485	0.00000971	0.00584485	0.00000971	0.130339314	0.000216586
San Bernardino	2020	Annual	MH	GAS	Aggregated	5	13561.73574	0.0093	2.313226809	0.02144145	15.32431539	0.14204208	0.374920201	0.00347516	0.374920201	0.00347516	0.036749815	0.000340636
San Bernardino	2020	Annual	T6	DSL	Aggregated	5	13162.03774	0.0090	7.304080554	0.06570665	0.456791649	0.00410924	0.002824517	0.00002541	0.003151388	0.00002835	0.130339319	0.001172517
San Bernardino	2020	Annual	T6	GAS	Aggregated	5	2552.247931	0.0017	2.121127043	0.00370007	6.125609563	0.01068545	0.079685969	0.00013900	0.060595317	0.00010570	0.036749815	0.000064106
San Bernardino	2020	Annual	T7	DSL	Aggregated	5	22269.12415	0.0152	123.4525507	1.87898736	3.425343758	0.05213483	0.015225889	0.00023174	0.0017506	0.00002664	0.061135219	0.000930498
San Bernardino	2020	Annual	T7	GAS	Aggregated	5	294.2198155	0.0002	6.116524961	0.00122998	13.53777275	0.00272232	0.231236538	0.00004650	0.096286237	0.00001936	0.036749815	0.000007390
San Bernardino	2020	Annual	OBUS	DSL	Aggregated	5	440.6269497	0.0003	8.419834014	0.00253568	0.609099752	0.00018343	0.003151388	0.00000095	0.002824517	0.00000085	0.130339319	0.000039252
San Bernardino	2020	Annual	OBUS	GAS	Aggregated	5	733.2853002	0.0005	3.475365508	0.00174178	10.41358567	0.00521908	0.060595317	0.00003037	0.079685969	0.00003994	0.036749814	0.000018418
San Bernardino	2020	Annual	SBUS	DSL	Aggregated	5	1058.466563	0.0007	33.83143174	0.02447475	1.179169555	0.00085305	0.0017506	0.00000127	0.015225889	0.00001101	0.744796108	0.000538809
San Bernardino	2020	Annual	SBUS	GAS	Aggregated	5	203.1956088	0.0001	1.990490103	0.00027644	25.25098266	0.00350682	0.096286237	0.00001337	0.231236538	0.00003211	0.036749815	0.000005104
San Bernardino	2020	Annual	UBUS	DSL	Aggregated	5	350.6148485	0.0002	45.76174481	0.01096613	3.318322148	0.00079519	0.006761242	0.00000162	0.006761242	0.00000162	0.841815676	0.000201729
San Bernardino	2020	Annual	UBUS	GAS	Aggregated	5	284.0042077	0.0002	8.092312554	0.00157079	21.1801737	0.00411126	0.546961623	0.00010617	0.546961623	0.00010617	0.036749814	0.000007133
							1463118.0	1.0		3.281		0.861		0.046		0.045		0.040

EMFAC2011 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG GAS

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
San Bernardino	2020	Annual	LDA	GAS	Aggregated	5	676311.8832	0.4872	0.167092348	0.0814
San Bernardino	2020	Annual	LDT1	GAS	Aggregated	5	101185.5326	0.0729	0.385938988	0.0281
San Bernardino	2020	Annual	LDT2	GAS	Aggregated	5	247137.3591	0.1780	0.225519997	0.0401
San Bernardino	2020	Annual	LHD1	GAS	Aggregated	5	47538.03319	0.0342	0.409134136	0.0140
San Bernardino	2020	Annual	LHD2	GAS	Aggregated	5	4498.996026	0.0032	0.218395607	0.0007
San Bernardino	2020	Annual	MCY	GAS	Aggregated	5	41584.70141	0.0300	5.195983468	0.1556
San Bernardino	2020	Annual	MDV	GAS	Aggregated	5	252358.7351	0.1818	0.402124252	0.0731
San Bernardino	2020	Annual	MH	GAS	Aggregated	5	13561.73574	0.0098	0.436966581	0.0043
San Bernardino	2020	Annual	T6	GAS	Aggregated	5	2552.247931	0.0018	0.651191243	0.0012
San Bernardino	2020	Annual	T7	GAS	Aggregated	5	294.2198155	0.0002	4.027191561	0.0009
San Bernardino	2020	Annual	OBUS	GAS	Aggregated	5	733.2853002	0.0005	0.74171332	0.0004
San Bernardino	2020	Annual	SBUS	GAS	Aggregated	5	203.1956088	0.0001	4.000791991	0.0006
San Bernardino	2020	Annual	UBUS	GAS	Aggregated	5	284.0042077	0.0002	6.225860968	0.0013
							1388243.9	1.0		0.402

PM2_5_RUNEX (gms/mile)	PM2_5_RUNEX_AVE (gms/mile)	PM2_5_PMTW (gms/mile)	PM2_5_PMTW_AVE (gms/mile)	PM2_5_PMBW (gms/mile)	PM2_5_PMBW_AVE (gms/mile)
0.010244376	0.000013091	0.00199999	0.000002556	0.01574992	0.000020126
0.035124462	0.016235937	0.00199999	0.000924476	0.01574992	0.007280245
0.017367232	0.000001601	0.00199999	0.000000184	0.01574992	0.000001452
0.071816096	0.004966619	0.00199999	0.000138314	0.015749919	0.001089225
0.010640254	0.000000882	0.00199999	0.000000166	0.015749919	0.000001305
0.03944864	0.006663326	0.00199999	0.000337821	0.01574992	0.002660342
0.004541286	0.000078244	0.002999984	0.000051688	0.032759827	0.000564435
0.076948752	0.002500135	0.00199999	0.000064981	0.01574992	0.000511729
0.00318979	0.000016589	0.002999985	0.000015602	0.038219796	0.000198768
0.075816729	0.000233132	0.00199999	0.000006150	0.01574992	0.000048430
0.000509313	0.000014476	0.001999975	0.000056843	0.015749763	0.000447639
0.011670213	0.000001740	0.00199999	0.000000298	0.015749919	0.000002349
0.04286537	0.007393423	0.00199999	0.000344958	0.01574992	0.002716548
0.005406602	0.000008984	0.002999985	0.000004985	0.055859693	0.000092823
0.344926595	0.003197147	0.00199999	0.000018538	0.01574992	0.000145987
0.002905428	0.000026137	0.002999984	0.000026988	0.055859708	0.000502507
0.055747691	0.000097246	0.00199999	0.000003489	0.01574992	0.000027474
0.00161348	0.000024558	0.00891184	0.000135641	0.026200808	0.000398785
0.088583338	0.000017813	0.00199999	0.000000402	0.01574992	0.000003167
0.002620686	0.000000789	0.002999984	0.000000903	0.055859708	0.000016822
0.073311092	0.000036742	0.00199999	0.000001002	0.01574992	0.000007894
0.013930387	0.000010078	0.002999984	0.000002170	0.319198332	0.000230918
0.212737615	0.000029545	0.00199999	0.000000278	0.01574992	0.000002187
0.006273318	0.000001503	0.00199999	0.000000479	0.360778114	0.000086455
0.503204718	0.000097677	0.00199999	0.000000388	0.01574992	0.000003057
	0.042		0.002		0.017

EMFAC2011 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG DSL

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
San Bernardino	2020	Annual	LDA	DSL	Aggregated	5	1869.620736	0.0250	0.062086656	0.0016
San Bernardino	2020	Annual	LDT1	DSL	Aggregated	5	134.88275	0.0018	0.11263324	0.0002
San Bernardino	2020	Annual	LDT2	DSL	Aggregated	5	121.25939	0.0016	0.071426065	0.0001
San Bernardino	2020	Annual	LHD1	DSL	Aggregated	5	25208.75828	0.3367	0.424307731	0.1429
San Bernardino	2020	Annual	LHD2	DSL	Aggregated	5	7609.175113	0.1016	0.404215752	0.0411
San Bernardino	2020	Annual	MDV	DSL	Aggregated	5	218.195775	0.0029	0.068432198	0.0002
San Bernardino	2020	Annual	MH	DSL	Aggregated	5	2431.280612	0.0325	1.628510671	0.0529
San Bernardino	2020	Annual	T6	DSL	Aggregated	5	13162.03774	0.1758	1.371146941	0.2410
San Bernardino	2020	Annual	T7	DSL	Aggregated	5	22269.12415	0.2974	3.511421562	1.0444
San Bernardino	2020	Annual	OBUS	DSL	Aggregated	5	440.6269497	0.0059	2.08523457	0.0123
San Bernardino	2020	Annual	SBUS	DSL	Aggregated	5	1058.466563	0.0141	1.490976176	0.0211
San Bernardino	2020	Annual	UBUS	DSL	Aggregated	5	350.6148485	0.0047	1.628105228	0.0076
							74874.0	1.0		1.565

EMFAC2011 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: DSL Particulate

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)
San Bernardino	2020	Annual	LDA	DSL	Aggregated	5	1869.620736	0.0250	0.038178762	0.0010
San Bernardino	2020	Annual	LDT1	DSL	Aggregated	5	134.88275	0.0018	0.07806097	0.0001
San Bernardino	2020	Annual	LDT2	DSL	Aggregated	5	121.25939	0.0016	0.042878954	0.0001
San Bernardino	2020	Annual	LHD1	DSL	Aggregated	5	25208.75828	0.3367	0.083639947	0.0282
San Bernardino	2020	Annual	LHD2	DSL	Aggregated	5	7609.175113	0.1016	0.082409487	0.0084
San Bernardino	2020	Annual	MDV	DSL	Aggregated	5	218.195775	0.0029	0.046592791	0.0001
San Bernardino	2020	Annual	MH	DSL	Aggregated	5	2431.280612	0.0325	0.374920201	0.0122
San Bernardino	2020	Annual	T6	DSL	Aggregated	5	13162.03774	0.1758	0.060595317	0.0107
San Bernardino	2020	Annual	T7	DSL	Aggregated	5	22269.12415	0.2974	0.096286237	0.0286
San Bernardino	2020	Annual	OBUS	DSL	Aggregated	5	440.6269497	0.0059	0.079685969	0.0005
San Bernardino	2020	Annual	SBUS	DSL	Aggregated	5	1058.466563	0.0141	0.231236538	0.0033
San Bernardino	2020	Annual	UBUS	DSL	Aggregated	5	350.6148485	0.0047	0.546961623	0.0026
							74874.0	1.0		0.096

EMFAC2014 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2035
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: Criteria

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	CO_RUNEX (gms/mile)	CO_RUNEX AVE (gms/mile)	NOX_RUNEX (gms/mile)	NOx_RUNEX AVE (gms/mile)	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)	PM10_PMTW (gms/mile)	PM10_PMTW_AVE (gms/mile)	PM10_PMBW (gms/mile)	PM10_PMBW_AVE (gms/mile)
San Bernardino	2020	Annual	LDA	DSL	Aggregated	45	1869.620736	0.0013	0.921828856	0.00117794	0.087074161	0.00011127	0.001262068	0.00000161	0.007999959	0.00001022	0.036749816	0.000046960
San Bernardino	2020	Annual	LDA	GAS	Aggregated	45	676311.8832	0.4622	0.115377461	0.05333210	0.361944334	0.16730521	0.011625019	0.00537355	0.007999958	0.00369790	0.036749814	0.016987240
San Bernardino	2020	Annual	LDT1	DSL	Aggregated	45	134.88275	0.0001	2.068756635	0.00019072	0.226901345	0.00002092	0.0022862	0.00000021	0.007999959	0.00000074	0.036749816	0.000003388
San Bernardino	2020	Annual	LDT1	GAS	Aggregated	45	101185.5326	0.0692	0.15549935	0.01075394	0.419358847	0.02900180	0.022418609	0.00155041	0.007999958	0.00055326	0.036749814	0.002541524
San Bernardino	2020	Annual	LDT2	DSL	Aggregated	45	121.25939	0.0001	1.237830563	0.00010259	0.143103183	0.00001186	0.001327091	0.00000011	0.007999958	0.00000066	0.036749815	0.000003046
San Bernardino	2020	Annual	LDT2	GAS	Aggregated	45	247137.3591	0.1689	0.128875744	0.02176859	0.426292545	0.07200569	0.012875683	0.00217485	0.007999959	0.00135128	0.036749815	0.006207464
San Bernardino	2020	Annual	LHD1	DSL	Aggregated	45	25208.75828	0.0172	0.746641247	0.01286424	0.355948871	0.00613281	0.000570528	0.00000983	0.011999938	0.00020675	0.076439597	0.001317014
San Bernardino	2020	Annual	LHD1	GAS	Aggregated	45	47538.03319	0.0325	0.577367617	0.01875920	2.182284813	0.07090442	0.023619181	0.00076741	0.007999959	0.00025993	0.036749816	0.001194035
San Bernardino	2020	Annual	LHD2	DSL	Aggregated	45	7609.175113	0.0052	0.405914875	0.00211102	0.278031286	0.00144595	0.00039618	0.00000206	0.011999938	0.00006241	0.089179536	0.000463792
San Bernardino	2020	Annual	LHD2	GAS	Aggregated	45	4498.996026	0.0031	0.563322937	0.00173218	2.120150433	0.00651933	0.023204363	0.00007135	0.007999958	0.00002460	0.036749815	0.000113003
San Bernardino	2020	Annual	MCY	GAS	Aggregated	45	41584.70141	0.0284	18.39039261	0.52269127	1.204186906	0.03422537	0.000257839	0.00000733	0.00799990	0.00022737	0.036749449	0.001044492
San Bernardino	2020	Annual	MDV	DSL	Aggregated	45	218.195775	0.0001	1.864349682	0.00027803	0.246416505	0.00003675	0.001481296	0.00000022	0.007999958	0.00000119	0.036749814	0.000005481
San Bernardino	2020	Annual	MDV	GAS	Aggregated	45	252358.7351	0.1725	0.116543802	0.02010149	0.340006474	0.05864435	0.013940236	0.00240441	0.007999959	0.00137983	0.036749815	0.006338612
San Bernardino	2020	Annual	MH	DSL	Aggregated	45	2431.280612	0.0017	1.285959692	0.00213689	0.504735318	0.00083872	0.000676112	0.00000112	0.011999938	0.00001994	0.130339314	0.000216586
San Bernardino	2020	Annual	MH	GAS	Aggregated	45	13561.73574	0.0093	0.481349224	0.00446166	5.288217442	0.04901683	0.114836794	0.00106443	0.007999959	0.00007415	0.036749815	0.000340636
San Bernardino	2020	Annual	T6	DSL	Aggregated	45	13162.03774	0.0090	1.347820765	0.01212484	0.638784328	0.00574643	0.000361429	0.00000325	0.011999937	0.00010795	0.130339319	0.001172517
San Bernardino	2020	Annual	T6	GAS	Aggregated	45	2552.247931	0.0017	0.369016784	0.00064371	1.709663757	0.00298232	0.046649404	0.00008137	0.007999958	0.00001396	0.036749815	0.000064106
San Bernardino	2020	Annual	T7	DSL	Aggregated	45	22269.12415	0.0152	23.03673273	0.35062645	4.836708593	0.07361625	0.000208182	0.00000317	0.035647358	0.00054256	0.061135219	0.000930498
San Bernardino	2020	Annual	T7	GAS	Aggregated	45	294.2198155	0.0002	1.026901467	0.00020650	3.453354339	0.00069444	0.071482606	0.00001437	0.007999959	0.00000161	0.036749815	0.000007390
San Bernardino	2020	Annual	OBUS	DSL	Aggregated	45	440.6269497	0.0003	1.636602001	0.00049287	0.895534223	0.00026970	0.000323669	0.00000010	0.011999937	0.00000361	0.130339319	0.000039252
San Bernardino	2020	Annual	OBUS	GAS	Aggregated	45	733.2853002	0.0005	0.583243457	0.00029231	2.899219974	0.00145303	0.053442892	0.00002678	0.007999958	0.00000401	0.036749814	0.000018418
San Bernardino	2020	Annual	SBUS	DSL	Aggregated	45	1058.466563	0.0007	6.074050753	0.00439416	1.635001719	0.00118281	0.001757574	0.00000127	0.011999937	0.00000868	0.744796108	0.000538809
San Bernardino	2020	Annual	SBUS	GAS	Aggregated	45	203.1956088	0.0001	0.333878476	0.00004637	7.785200907	0.00108120	0.041981697	0.00000583	0.007999959	0.00000111	0.036749815	0.000005104
San Bernardino	2020	Annual	UBUS	DSL	Aggregated	45	350.6148485	0.0002	8.230311465	0.00197227	4.579895617	0.00109751	0.000780472	0.00000019	0.007999959	0.00000192	0.841815676	0.000201729
San Bernardino	2020	Annual	UBUS	GAS	Aggregated	45	284.0042077	0.0002	1.08427816	0.00021047	9.600504008	0.00186354	0.115584714	0.00002244	0.007999959	0.00000155	0.036749814	0.000007133
							1463118.0	1.0		1.043		0.586		0.014		0.009		0.040

EMFAC2014 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG GAS

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
San Bernardino	2020	Annual	LDA	GAS	Aggregated	45	676311.8832	0.4872	0.023113453	0.0113
San Bernardino	2020	Annual	LDT1	GAS	Aggregated	45	101185.5326	0.0729	0.060483214	0.0044
San Bernardino	2020	Annual	LDT2	GAS	Aggregated	45	247137.3591	0.1780	0.031631187	0.0056
San Bernardino	2020	Annual	LHD1	GAS	Aggregated	45	47538.03319	0.0342	0.048831832	0.0017
San Bernardino	2020	Annual	LHD2	GAS	Aggregated	45	4498.996026	0.0032	0.025511203	0.0001
San Bernardino	2020	Annual	MCY	GAS	Aggregated	45	41584.70141	0.0300	2.245962604	0.0673
San Bernardino	2020	Annual	MDV	GAS	Aggregated	45	252358.7351	0.1818	0.056574401	0.0103
San Bernardino	2020	Annual	MH	GAS	Aggregated	45	13561.73574	0.0098	0.052103505	0.0005
San Bernardino	2020	Annual	T6	GAS	Aggregated	45	2552.247931	0.0018	0.078085336	0.0001
San Bernardino	2020	Annual	T7	GAS	Aggregated	45	294.2198155	0.0002	0.490255904	0.0001
San Bernardino	2020	Annual	OBUS	GAS	Aggregated	45	733.2853002	0.0005	0.09243675	0.0000
San Bernardino	2020	Annual	SBUS	GAS	Aggregated	45	203.1956088	0.0001	0.460384873	0.0001
San Bernardino	2020	Annual	UBUS	GAS	Aggregated	45	284.0042077	0.0002	0.718671481	0.0001
							1388243.9	1.0		0.102

PM2_5_RUNEX (gms/mile)	PM2_5_RUNEX_AVE (gms/mile)	PM2_5_PMTW (gms/mile)	PM2_5_PMTW_AVE (gms/mile)	PM2_5_PMBW (gms/mile)	PM2_5_PMBW_AVE (gms/mile)
0.016332504	0.000020870	0.001170302	0.000001495	0.01574992	0.000020126
0.001137142	0.000525633	0.010695017	0.004943667	0.01574992	0.007280245
0.031351655	0.000002890	0.002119904	0.000000195	0.01574992	0.000001452
0.00250246	0.000173064	0.020625122	0.001426381	0.015749919	0.001089225
0.016195212	0.000001342	0.001230587	0.000000102	0.015749919	0.000001305
0.001255286	0.000212032	0.011845629	0.002000862	0.01574992	0.002660342
0.025065852	0.000431872	0.000528732	0.000009110	0.032759827	0.000564435
0.000719021	0.000023362	0.021729646	0.000706016	0.01574992	0.000511729
0.024566565	0.000127762	0.000367153	0.000001909	0.038219796	0.000198768
0.000548529	0.000001687	0.021348014	0.000065644	0.01574992	0.000048430
0.000290481	0.000008256	0.000216682	0.000006159	0.015749763	0.000447639
0.016981342	0.000002532	0.001369439	0.000000204	0.015749919	0.000002349
0.001415741	0.000244187	0.012825018	0.002212060	0.01574992	0.002716548
0.122649701	0.000203808	0.000625423	0.000001039	0.055859693	0.000092823
0.001000658	0.000009275	0.105649855	0.000979275	0.01574992	0.000145987
0.067421206	0.000606513	0.000333334	0.000002999	0.055859708	0.000502507
0.000549445	0.000000958	0.042917451	0.000074865	0.01574992	0.000027474
0.065611216	0.000998624	0.000191491	0.000002915	0.026200808	0.000398785
0.000268292	0.000000054	0.065763997	0.000013225	0.01574992	0.000003167
0.050953073	0.000015345	0.000300312	0.000000090	0.055859708	0.000016822
0.000429135	0.000000215	0.049167461	0.000024642	0.01574992	0.000007894
0.0708501	0.000051255	0.00160803	0.000001163	0.319198332	0.000230918
0.002807845	0.000000390	0.038623161	0.000005364	0.01574992	0.000002187
0.118820438	0.000028474	0.00072415	0.000000174	0.360778114	0.000086455
0.000809755	0.000000157	0.10633794	0.000020641	0.01574992	0.000003057
	0.004		0.013		0.017

EMFAC2014 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG DSL

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
San Bernardino	2020	Annual	LDA	DSL	Aggregated	45	1869.620736	0.0250	0.019303434	0.0005
San Bernardino	2020	Annual	LDT1	DSL	Aggregated	45	134.88275	0.0018	0.033242291	0.0001
San Bernardino	2020	Annual	LDT2	DSL	Aggregated	45	121.25939	0.0016	0.022148574	0.0000
San Bernardino	2020	Annual	LHD1	DSL	Aggregated	45	25208.75828	0.3367	0.120201444	0.0405
San Bernardino	2020	Annual	LHD2	DSL	Aggregated	45	7609.175113	0.1016	0.114665332	0.0117
San Bernardino	2020	Annual	MDV	DSL	Aggregated	45	218.195775	0.0029	0.020980501	0.0001
San Bernardino	2020	Annual	MH	DSL	Aggregated	45	2431.280612	0.0325	0.117188054	0.0038
San Bernardino	2020	Annual	T6	DSL	Aggregated	45	13162.03774	0.1758	0.088869793	0.0156
San Bernardino	2020	Annual	T7	DSL	Aggregated	45	22269.12415	0.2974	0.219844534	0.0654
San Bernardino	2020	Annual	OBUS	DSL	Aggregated	45	440.6269497	0.0059	0.130236831	0.0008
San Bernardino	2020	Annual	SBUS	DSL	Aggregated	45	1058.466563	0.0141	0.082014067	0.0012
San Bernardino	2020	Annual	UBUS	DSL	Aggregated	45	350.6148485	0.0047	0.344053536	0.0016
							74874.0	1.0		0.141

EMFAC2011 Emission Rates
Region Type: County
Region: Los Angeles
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: DSL Particulate

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)
San Bernardino	2020	Annual	LDA	DSL	Aggregated	45	1869.620736	0.0250	0.011625019	0.0003
San Bernardino	2020	Annual	LDT1	DSL	Aggregated	45	134.88275	0.0018	0.022418609	0.0000
San Bernardino	2020	Annual	LDT2	DSL	Aggregated	45	121.25939	0.0016	0.012875683	0.0000
San Bernardino	2020	Annual	LHD1	DSL	Aggregated	45	25208.75828	0.3367	0.023619181	0.0080
San Bernardino	2020	Annual	LHD2	DSL	Aggregated	45	7609.175113	0.1016	0.023204363	0.0024
San Bernardino	2020	Annual	MDV	DSL	Aggregated	45	218.195775	0.0029	0.013940236	0.0000
San Bernardino	2020	Annual	MH	DSL	Aggregated	45	2431.280612	0.0325	0.114836794	0.0037
San Bernardino	2020	Annual	T6	DSL	Aggregated	45	13162.03774	0.1758	0.046649404	0.0082
San Bernardino	2020	Annual	T7	DSL	Aggregated	45	22269.12415	0.2974	0.071482606	0.0213
San Bernardino	2020	Annual	OBUS	DSL	Aggregated	45	440.6269497	0.0059	0.053442892	0.0003
San Bernardino	2020	Annual	SBUS	DSL	Aggregated	45	1058.466563	0.0141	0.041981697	0.0006
San Bernardino	2020	Annual	UBUS	DSL	Aggregated	45	350.6148485	0.0047	0.115584714	0.0005
							74874.0	1.0		0.045

EMFAC2014 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2035
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: Criteria

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	CO_RUNEX (gms/mile)	CO_RUNEX AVE (gms/mile)	NOX_RUNEX (gms/mile)	NOx_RUNEX AVE (gms/mile)	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)	PM10_PMTW (gms/mile)	PM10_PMTW_AVE (gms/mile)	PM10_PMBW (gms/mile)	PM10_PMBW_AVE (gms/mile)
San Bernardino	2020	Annual	LDA	DSL	Aggregated	65	1869.620736	0.0013	0.764460782	0.00097685	0.097752632	0.00012491	0.001503326	0.00000192	0.007999959	0.00001022	0.036749816	0.000046960
San Bernardino	2020	Annual	LDA	GAS	Aggregated	65	676311.8832	0.4622	0.111485359	0.05153301	0.512970524	0.23711558	0.014105454	0.00652011	0.007999958	0.00369790	0.036749814	0.016987240
San Bernardino	2020	Annual	LDT1	DSL	Aggregated	65	134.88275	0.0001	1.811137148	0.00016697	0.277437956	0.00002558	0.002594155	0.00000024	0.007999959	0.00000074	0.036749816	0.000003388
San Bernardino	2020	Annual	LDT1	GAS	Aggregated	65	101185.5326	0.0692	0.157035343	0.01086017	0.60426731	0.04178960	0.022667247	0.00156761	0.007999958	0.00055326	0.036749814	0.002541524
San Bernardino	2020	Annual	LDT2	DSL	Aggregated	65	121.25939	0.0001	1.032292388	0.00008555	0.163702699	0.00001357	0.001577982	0.00000013	0.007999958	0.00000066	0.036749815	0.000003046
San Bernardino	2020	Annual	LDT2	GAS	Aggregated	65	247137.3591	0.1689	0.125130496	0.02113597	0.611322621	0.10325938	0.014892763	0.00251556	0.007999959	0.00135128	0.036749815	0.006207464
San Bernardino	2020	Annual	LHD1	DSL	Aggregated	65	25208.75828	0.0172	1.153558895	0.01987522	0.454090339	0.00782374	0.000485869	0.00000837	0.011999938	0.00020675	0.076439597	0.001317014
San Bernardino	2020	Annual	LHD1	GAS	Aggregated	65	47538.03319	0.0325	0.684734408	0.02224764	3.73471767	0.12134437	0.020103767	0.00065319	0.007999959	0.00025993	0.036749816	0.001194035
San Bernardino	2020	Annual	LHD2	DSL	Aggregated	65	7609.175113	0.0052	0.583157589	0.00303280	0.341892693	0.00177807	0.00032074	0.00000167	0.011999938	0.00006241	0.089179536	0.000463792
San Bernardino	2020	Annual	LHD2	GAS	Aggregated	65	4498.996026	0.0031	0.668196265	0.00205466	3.637013722	0.01118359	0.019688201	0.00006054	0.007999958	0.00002460	0.036749815	0.000113003
San Bernardino	2020	Annual	MCY	GAS	Aggregated	65	41584.70141	0.0284	45.29614725	1.28740593	1.432809754	0.04072328	0.000509717	0.00001449	0.00799990	0.00022737	0.036749449	0.001044492
San Bernardino	2020	Annual	MDV	DSL	Aggregated	65	218.195775	0.0001	1.637886818	0.00024426	0.287565122	0.00004288	0.001750635	0.00000026	0.007999958	0.00000119	0.036749814	0.000005481
San Bernardino	2020	Annual	MDV	GAS	Aggregated	65	252358.7351	0.1725	0.112780501	0.01945239	0.476653363	0.08221322	0.016091928	0.00277554	0.007999959	0.00137983	0.036749815	0.006338612
San Bernardino	2020	Annual	MH	DSL	Aggregated	65	2431.280612	0.0017	1.931297234	0.00320926	0.629599312	0.00104621	0.000560265	0.00000093	0.011999938	0.00001994	0.130339314	0.000216586
San Bernardino	2020	Annual	MH	GAS	Aggregated	65	13561.73574	0.0093	0.558658766	0.00517824	5.46604918	0.05066517	0.194533363	0.00180314	0.007999959	0.00007415	0.036749815	0.000340636
San Bernardino	2020	Annual	T6	DSL	Aggregated	65	13162.03774	0.0090	2.157120294	0.01940520	0.840811646	0.00756384	0.000284721	0.00000256	0.011999937	0.00010795	0.130339319	0.001172517
San Bernardino	2020	Annual	T6	GAS	Aggregated	65	2552.247931	0.0017	0.459980697	0.00080239	1.744981304	0.00304393	0.081568658	0.00014229	0.007999958	0.00001396	0.036749815	0.000064106
San Bernardino	2020	Annual	T7	DSL	Aggregated	65	22269.12415	0.0152	40.27681409	0.61302601	6.93568869	0.10556340	0.000208944	0.00000318	0.035647358	0.00054256	0.061135219	0.000930498
San Bernardino	2020	Annual	T7	GAS	Aggregated	65	294.2198155	0.0002	1.197931196	0.00024089	2.928589087	0.00058891	0.118199792	0.00002377	0.007999959	0.00000161	0.036749815	0.000007390
San Bernardino	2020	Annual	OBUS	DSL	Aggregated	65	440.6269497	0.0003	3.165180509	0.00095321	1.402331065	0.00042232	0.000255655	0.00000008	0.011999937	0.00000361	0.130339319	0.000039252
San Bernardino	2020	Annual	OBUS	GAS	Aggregated	65	733.2853002	0.0005	0.771613891	0.00038672	2.92924836	0.00146808	0.095234979	0.00004773	0.007999958	0.00000401	0.036749814	0.000018418
San Bernardino	2020	Annual	SBUS	DSL	Aggregated	65	1058.466563	0.0007	0.387821666	0.00028056	9.216658156	0.00666763	0.093800279	0.00006786	0.011999937	0.00000868	0.744796108	0.000538809
San Bernardino	2020	Annual	SBUS	GAS	Aggregated	65	203.1956088	0.0001	14.98778965	0.00208148	2.732707072	0.00037951	0.002615772	0.00000036	0.007999959	0.00000111	0.036749815	0.000005104
San Bernardino	2020	Annual	UBUS	DSL	Aggregated	65	350.6148485	0.0002	1.598535747	0.00038307	19.95699044	0.00478240	0.138271145	0.00003313	0.007999959	0.00000192	0.841815676	0.000201729
San Bernardino	2020	Annual	UBUS	GAS	Aggregated	65	284.0042077	0.0002	12.11229066	0.00235110	4.637540536	0.00090019	0.001149511	0.00000022	0.007999959	0.00000155	0.036749814	0.000007133
							1463118.0	1.0		2.087		0.831		0.016		0.009		0.040

EMFAC2014 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG GAS

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
San Bernardino	2020	Annual	LDA	GAS	Aggregated	65	676311.8832	0.4872	0.027974072	0.0136
San Bernardino	2020	Annual	LDT1	GAS	Aggregated	65	101185.5326	0.0729	0.068968526	0.0050
San Bernardino	2020	Annual	LDT2	GAS	Aggregated	65	247137.3591	0.1780	0.037801757	0.0067
San Bernardino	2020	Annual	LHD1	GAS	Aggregated	65	47538.03319	0.0342	0.044548697	0.0015
San Bernardino	2020	Annual	LHD2	GAS	Aggregated	65	4498.996026	0.0032	0.021455767	0.0001
San Bernardino	2020	Annual	MCY	GAS	Aggregated	65	41584.70141	0.0300	4.457312071	0.1335
San Bernardino	2020	Annual	MDV	GAS	Aggregated	65	252358.7351	0.1818	0.06744117	0.0123
San Bernardino	2020	Annual	MH	GAS	Aggregated	65	13561.73574	0.0098	0.04728973	0.0005
San Bernardino	2020	Annual	T6	GAS	Aggregated	65	2552.247931	0.0018	0.076336641	0.0001
San Bernardino	2020	Annual	T7	GAS	Aggregated	65	294.2198155	0.0002	0.537683627	0.0001
San Bernardino	2020	Annual	OBUS	GAS	Aggregated	65	733.2853002	0.0005	0.102337721	0.0001
San Bernardino	2020	Annual	SBUS	GAS	Aggregated	65	203.1956088	0.0001	0.551016239	0.0001
San Bernardino	2020	Annual	UBUS	GAS	Aggregated	65	284.0042077	0.0002	0.684932336	0.0001
							1388243.9	1.0		0.174

PM2_5_RUNEX (gms/mile)	PM2_5_RUNEX_AVE (gms/mile)	PM2_5_PMTW (gms/mile)	PM2_5_PMTW_AVE (gms/mile)	PM2_5_PMBW (gms/mile)	PM2_5_PMBW_AVE (gms/mile)
0.001393915	0.000001781	0.00199999	0.000002556	0.01574992	0.000020126
0.012977018	0.005998499	0.00199999	0.000924476	0.01574992	0.007280245
0.002405176	0.000000222	0.00199999	0.000000184	0.01574992	0.000001452
0.020853868	0.001442201	0.00199999	0.000138314	0.015749919	0.001089225
0.001463103	0.000000121	0.00199999	0.000000166	0.015749919	0.000001305
0.013701343	0.002314313	0.00199999	0.000337821	0.01574992	0.002660342
0.000450236	0.000007757	0.002999984	0.000051688	0.032759827	0.000564435
0.018495464	0.000600934	0.00199999	0.000064981	0.01574992	0.000511729
0.000297166	0.000001545	0.002999985	0.000015602	0.038219796	0.000198768
0.018113146	0.000055697	0.00199999	0.000006150	0.01574992	0.000048430
0.000427943	0.000012163	0.001999975	0.000056843	0.015749763	0.000447639
0.001617638	0.000000241	0.00199999	0.000000298	0.015749919	0.000002349
0.014804574	0.002553494	0.00199999	0.000344958	0.01574992	0.002716548
0.000518283	0.000000861	0.002999985	0.000004985	0.055859693	0.000092823
0.178970687	0.001658891	0.00199999	0.000018538	0.01574992	0.000145987
0.000263177	0.000002368	0.002999984	0.000026988	0.055859708	0.000502507
0.075043165	0.000130905	0.00199999	0.000003489	0.01574992	0.000027474
0.000189865	0.000002890	0.00891184	0.000135641	0.026200808	0.000398785
0.108743809	0.000021867	0.00199999	0.000000402	0.01574992	0.000003167
0.000237205	0.000000071	0.002999984	0.000000903	0.055859708	0.000016822
0.08761618	0.000043911	0.00199999	0.000001002	0.01574992	0.000007894
0.086296256	0.000062429	0.002999984	0.000002170	0.319198332	0.000230918
0.002310707	0.000000321	0.00199999	0.000000278	0.01574992	0.000002187
0.127209456	0.000030484	0.00199999	0.000000479	0.360778114	0.000086455
0.001016797	0.000000197	0.00199999	0.000000388	0.01574992	0.000003057
	0.015		0.002		0.017

EMFAC2014 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: TOG DSL

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	TOG_RUNEX (gms/mile)	TOG_RUNEX AVE (gms/mile)
San Bernardino	2020	Annual	LDA	DSL	Aggregated	65	1869.620736	0.0250	0.024486683	0.0006
San Bernardino	2020	Annual	LDT1	DSL	Aggregated	65	134.88275	0.0018	0.036594277	0.0001
San Bernardino	2020	Annual	LDT2	DSL	Aggregated	65	121.25939	0.0016	0.027791025	0.0000
San Bernardino	2020	Annual	LHD1	DSL	Aggregated	65	25208.75828	0.3367	0.102642865	0.0346
San Bernardino	2020	Annual	LHD2	DSL	Aggregated	65	7609.175113	0.1016	0.098020018	0.0100
San Bernardino	2020	Annual	MDV	DSL	Aggregated	65	218.195775	0.0029	0.025950939	0.0001
San Bernardino	2020	Annual	MH	DSL	Aggregated	65	2431.280612	0.0325	0.134756161	0.0044
San Bernardino	2020	Annual	T6	DSL	Aggregated	65	13162.03774	0.1758	0.068702917	0.0121
San Bernardino	2020	Annual	T7	DSL	Aggregated	65	22269.12415	0.2974	0.156820887	0.0466
San Bernardino	2020	Annual	OBUS	DSL	Aggregated	65	440.6269497	0.0059	0.106983824	0.0006
San Bernardino	2020	Annual	SBUS	DSL	Aggregated	65	1058.466563	0.0141	0.093800279	0.0013
San Bernardino	2020	Annual	UBUS	DSL	Aggregated	65	350.6148485	0.0047	0.138271145	0.0006
							74874.0	1.0		0.111

EMFAC2011 Emission Rates
Region Type: County
Region: San Bernardino
Calendar Year: 2020
Season: Annual
Vehicle Classification: EMFAC2007 Categories
Pollutant Classification: DSL Particulate

Region	CalYr	Season	Veh_Class	Fuel	MdlYr	Speed (miles/hr)	Population (vehicles)	Wt Frac	PM10_RUNEX (gms/mile)	PM10_RUNEX AVE (gms/mile)
San Bernardino	2020	Annual	LDA	DSL	Aggregated	65	1869.620736	0.0250	0.014105454	0.0004
San Bernardino	2020	Annual	LDT1	DSL	Aggregated	65	134.88275	0.0018	0.022667247	0.0000
San Bernardino	2020	Annual	LDT2	DSL	Aggregated	65	121.25939	0.0016	0.014892763	0.0000
San Bernardino	2020	Annual	LHD1	DSL	Aggregated	65	25208.75828	0.3367	0.020103767	0.0068
San Bernardino	2020	Annual	LHD2	DSL	Aggregated	65	7609.175113	0.1016	0.019688201	0.0020
San Bernardino	2020	Annual	MDV	DSL	Aggregated	65	218.195775	0.0029	0.016091928	0.0000
San Bernardino	2020	Annual	MH	DSL	Aggregated	65	2431.280612	0.0325	0.194533363	0.0063
San Bernardino	2020	Annual	T6	DSL	Aggregated	65	13162.03774	0.1758	0.081568658	0.0143
San Bernardino	2020	Annual	T7	DSL	Aggregated	65	22269.12415	0.2974	0.118199792	0.0352
San Bernardino	2020	Annual	OBUS	DSL	Aggregated	65	440.6269497	0.0059	0.095234979	0.0006
San Bernardino	2020	Annual	SBUS	DSL	Aggregated	65	1058.466563	0.0141	0.093800279	0.0013
San Bernardino	2020	Annual	UBUS	DSL	Aggregated	65	350.6148485	0.0047	0.138271145	0.0006
							74874.0	1.0		0.068

Emission Factor Rate Adjustment Worksheet

CO Emissions

Acceleration / On-Ramp (15 - 45 mph)

Emfac (gr/mi) = (emfac at average link speed x 16/60) x (0.027) x (exp (.098 x acceleration speed product)) x (60 min/hr) / (average link speed)

emfac at link speed	2.073
speed (mph)	45.0
acceleration time (sec)	18.0
acceleration rate (mph/sec)	2.50
Emfac (gr/mi)	4.931

Deceleration / Off-Ramp

*Emfac (gr/mi) = (emfac at idle speed * 1.5)*

emfac at idle speed (gr/mi)	4.186
Emfac (gr/mi)	6.279

NOX Emissions

Acceleration / On-Ramp (15 - 45 mph)

Emfac (gr/mi) = (emfac at average link speed x 16/60) x (0.027) x (exp (.098 x acceleration speed product)) x (60 min/hr) / (average link speed)

emfac at link speed	0.396
speed (mph)	45.0
acceleration time (sec)	18.0
acceleration rate (mph/sec)	2.50
Emfac (gr/mi)	0.942

Deceleration / Off-Ramp

*Emfac (gr/mi) = (emfac at idle speed * 1.5)*

emfac at idle speed (gr/mi)	0.812
Emfac (gr/mi)	1.218

Emission Factor Rate Adjustment Worksheet

PM10 Emissions

Acceleration / On-Ramp (15 - 45 mph)

Emfac (gr/mi) = (emfac at average link speed x 16/60) x (0.027) x (exp (.098 x acceleration speed product)) x (60 min/hr) / (average link speed)

emfac at link speed	0.004
speed (mph)	45.0
acceleration time (sec)	18.0
acceleration rate (mph/sec)	2.50
Emfac (gr/mi)	0.010

Deceleration / Off-Ramp

*Emfac (gr/mi) = (emfac at idle speed * 1.5)*

emfac at idle speed (gr/mi)	0.018
Emfac (gr/mi)	0.027

PM2.5 Emissions

Acceleration / On-Ramp (15 - 45 mph)

Emfac (gr/mi) = (emfac at average link speed x 16/60) x (0.027) x (exp (.098 x acceleration speed product)) x (60 min/hr) / (average link speed)

emfac at link speed	0.0037
speed (mph)	45.0
acceleration time (sec)	18.0
acceleration rate (mph/sec)	2.50
Emfac (gr/mi)	0.009

Deceleration / Off-Ramp

*Emfac (gr/mi) = (emfac at idle speed * 1.5)*

emfac at idle speed (gr/mi)	0.016
Emfac (gr/mi)	0.024

Emission Factor Rate Adjustment Worksheet

TOG GAS Emissions

Acceleration / On-Ramp (15 - 45 mph)

Emfac (gr/mi) = (emfac at average link speed x 16/60) x (0.027) x (exp (.098 x acceleration speed product)) x (60 min/hr) / (average link speed)

emfac at link speed	0.119
speed (mph)	45.0
acceleration time (sec)	18.0
acceleration rate (mph/sec)	2.50
Emfac (gr/mi)	0.283

Deceleration / Off-Ramp

*Emfac (gr/mi) = (emfac at idle speed * 1.5)*

emfac at idle speed (gr/mi)	0.505
Emfac (gr/mi)	0.758

TOG DSL Emissions

Acceleration / On-Ramp (15 - 45 mph)

Emfac (gr/mi) = (emfac at average link speed x 16/60) x (0.027) x (exp (.098 x acceleration speed product)) x (60 min/hr) / (average link speed)

emfac at link speed	0.154
speed (mph)	45.0
acceleration time (sec)	18.0
acceleration rate (mph/sec)	2.50
Emfac (gr/mi)	0.366

Deceleration / Off-Ramp

*Emfac (gr/mi) = (emfac at idle speed * 1.5)*

emfac at idle speed (gr/mi)	1.646

Emission Factor Rate Adjustment Worksheet

Emfac (gr/mi)	2.469

DSL Particulate Emissions

Acceleration / On-Ramp (15 - 45 mph)

Emfac (gr/mi) = (emfac at average link speed x 16/60) x (0.027) x (exp (.098 x acceleration speed product)) x (60 min/hr) / (average link speed)

emfac at link speed	0.045
speed (mph)	45.0
acceleration time (sec)	18.0
acceleration rate (mph/sec)	2.50
Emfac (gr/mi)	0.107

Deceleration / Off-Ramp

*Emfac (gr/mi) = (emfac at idle speed * 1.5)*

emfac at idle speed (gr/mi)	0.096
Emfac (gr/mi)	0.144

Source: California Department of Transportation, 1989. Division of New Technology and Research. Caline4 – A Dispersion Model for Predicting Air Pollution Concentrations Near Roadways (Revised). FHWA/CA/TL-84/15.

Emission Factor Profile Worksheet
Chronic Exposure

TOG -Toxic Emissions

Gasoline/Toxic Fractions/Hot Stabilized Exhaust

Year	Benzene	Formaldehyde	1,3-Butadiene	Acetaldehyde	Acrolein
2004	0.028414	0.021422	0.006603	0.005511	0.001533
2005	0.028205	0.021200	0.006551	0.005450	0.001520
2006	0.027938	0.021000	0.006483	0.005350	0.001510
2007	0.027660	0.020700	0.006410	0.005250	0.001490
2008	0.027338	0.020300	0.006326	0.005120	0.001470
2009	0.026849	0.019800	0.006190	0.004870	0.001450
2010	0.026521	0.019400	0.006105	0.004750	0.001430
2011	0.026521	0.019400	0.006105	0.004750	0.001430
2012	0.025656	0.018500	0.005873	0.004370	0.001380
2013	0.025656	0.018500	0.005873	0.004370	0.001380
2014	0.025656	0.018500	0.005873	0.004370	0.001380
2015	0.024349	0.017100	0.005530	0.003850	0.001310
2016	0.024349	0.017100	0.005530	0.003850	0.001310
2017	0.024349	0.017100	0.005530	0.003850	0.001310
2018	0.022182	0.014700	0.004944	0.002860	0.001190
2019	0.022182	0.014700	0.004944	0.002860	0.001130
2020	0.021079	0.013600	0.004659	0.002450	0.001130
2021	0.021079	0.013600	0.004659	0.002450	0.001130
2022	0.021079	0.013600	0.004659	0.002450	0.001130
2023	0.021079	0.013600	0.004659	0.002450	0.001130
2024	0.021079	0.013600	0.004659	0.002450	0.001130
2025	0.021079	0.013600	0.004659	0.002450	0.001130
2026	0.021079	0.013600	0.004659	0.002450	0.001130
2027	0.021079	0.013600	0.004659	0.002450	0.001130
2028	0.021079	0.013600	0.004659	0.002450	0.001130
2029	0.021079	0.013600	0.004659	0.002450	0.001130
2030	0.021079	0.013600	0.004659	0.002450	0.001130

Analysis Year

2017	0.024349	0.017100	0.005530	0.003850	0.001310

TOG Emisson Rate - gr/mi

Speed (MPH)	Acceleration	0.283
	Deceleration	0.758
	65	0.198

Toxic Emission Rate - gr/mi	Acceleration	0.014755
Speed (MPH)	Deceleration	0.039522
	65	0.010324

Weight Fraction / Speciation

Benzene	0.467
Formaldehyde	0.328
1,3-Butadiene	0.106
Acetaldehyde	0.074
Acrolein	0.025

Emission Factor Profile Worksheet
Chronic Exposure

Diesel Particulate Emissions - PM10

PM10 Emission Rate - gr/mi	Acceleration	0.126
Speed (MPH)	Deceleration	0.203
	65	0.080

Source: TOG/toxic fractions from UC Davis-Caltrans Air Quality Project, *Estimating Mobile Source Air Toxic Emissions: A Step-by-Step Project Analysis Methodology.* Task Order No. 61.

Emission Factor Profile Worksheet
Acute Exposure

TOG -Toxic Emissions

Gasoline/Toxic Fractions/Hot Stabilized Exhaust

Year	Benzene	Formaldehyde	1,3-Butadiene	Acetaldehyde	Acrolein
2004	0.028414	0.021422	0.006603	0.005511	0.001533
2005	0.028205	0.021200	0.006551	0.005450	0.001520
2006	0.027938	0.021000	0.006483	0.005350	0.001510
2007	0.027660	0.020700	0.006410	0.005250	0.001490
2008	0.027338	0.020300	0.006326	0.005120	0.001470
2009	0.026849	0.019800	0.006190	0.004870	0.001450
2010	0.026521	0.019400	0.006105	0.004750	0.001430
2011	0.026521	0.019400	0.006105	0.004750	0.001430
2012	0.025656	0.018500	0.005873	0.004370	0.001380
2013	0.025656	0.018500	0.005873	0.004370	0.001380
2014	0.025656	0.018500	0.005873	0.004370	0.001380
2015	0.024349	0.017100	0.005530	0.003850	0.001310
2016	0.024349	0.017100	0.005530	0.003850	0.001310
2017	0.024349	0.017100	0.005530	0.003850	0.001310
2018	0.022182	0.014700	0.004944	0.002860	0.001190
2019	0.022182	0.014700	0.004944	0.002860	0.001130
2020	0.021079	0.013600	0.004659	0.002450	0.001130
2021	0.021079	0.013600	0.004659	0.002450	0.001130
2022	0.021079	0.013600	0.004659	0.002450	0.001130
2023	0.021079	0.013600	0.004659	0.002450	0.001130
2024	0.021079	0.013600	0.004659	0.002450	0.001130
2025	0.021079	0.013600	0.004659	0.002450	0.001130
2026	0.021079	0.013600	0.004659	0.002450	0.001130
2027	0.021079	0.013600	0.004659	0.002450	0.001130
2028	0.021079	0.013600	0.004659	0.002450	0.001130
2029	0.021079	0.013600	0.004659	0.002450	0.001130
2030	0.021079	0.013600	0.004659	0.002450	0.001130

Analysis Year

2017	0.024349	0.017100	0.005530	0.003850	0.001310

TOG Emisson Rate - gr/mi

Speed (MPH)	Acceleration	0.283
	Deceleration	0.758
	65	0.198

Toxic Emission Rate - gr/mi	Acceleration	0.014755
Speed (MPH)	Deceleration	0.039522
	65	0.010324

Weight Fraction / Speciation

Benzene	0.467
Formaldehyde	0.328
1,3-Butadiene	0.106
Acetaldehyde	0.074
Acrolein	0.025

Emission Factor Profile Worksheet
Acute Exposure

TOG -Toxic Emissions

Diesel/Toxic Fractions/Hot Stabilized Exhaust

Year	Benzene	Formaldehyde	1,3-Butadiene	Acetaldehyde	Acrolein
2004	0.020009	0.147133	0.001900	0.073526	0
2005	0.020009	0.147133	0.001900	0.073526	0
2006	0.020009	0.147133	0.001900	0.073526	0
2007	0.020009	0.147133	0.001900	0.073526	0
2008	0.020009	0.147133	0.001900	0.073526	0
2009	0.020009	0.147133	0.001900	0.073526	0
2010	0.020009	0.147133	0.001900	0.073526	0
2011	0.020009	0.147133	0.001900	0.073526	0
2012	0.020009	0.147133	0.001900	0.073526	0
2013	0.020009	0.147133	0.001900	0.073526	0
2014	0.020009	0.147133	0.001900	0.073526	0
2015	0.020009	0.147133	0.001900	0.073526	0
2016	0.020009	0.147133	0.001900	0.073526	0
2017	0.020009	0.147133	0.001900	0.073526	0
2018	0.020009	0.147133	0.001900	0.073526	0
2019	0.020009	0.147133	0.001900	0.073526	0
2020	0.020009	0.147133	0.001900	0.073526	0
2021	0.020009	0.147133	0.001900	0.073526	0
2022	0.020009	0.147133	0.001900	0.073526	0
2023	0.020009	0.147133	0.001900	0.073526	0
2024	0.020009	0.147133	0.001900	0.073526	0
2025	0.020009	0.147133	0.001900	0.073526	0
2026	0.020009	0.147133	0.001900	0.073526	0
2027	0.020009	0.147133	0.001900	0.073526	0
2028	0.020009	0.147133	0.001900	0.073526	0
2029	0.020009	0.147133	0.001900	0.073526	0
2030	0.020009	0.147133	0.001900	0.073526	0

Analysis Year

2017	0.020009	0.147133	0.001900	0.073526	0

TOG Emisson Rate - gr/mi

Speed (MPH)	Acceleration	0.366
	Deceleration	2.469
	65	0.131

Toxic Emission Rate - gr/mi	Acceleration	0.088780
Speed (MPH)	Deceleration	0.598900
	65	0.031776

Weight Fraction / Speciation

Benzene	0.082
Formaldehyde	0.607
1,3-Butadiene	0.008
Acetaldehyde	0.303
Acrolein	0.000

I-215 NB (Sources __ to __)

CO Emissions

Number of Sources	163
Link Length (meters)	1632.0
Volume/Baseline (VPH)	1690.8
Pollutant Mass Emission Rate (gr/mi)	2.869

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	1.36648
Pollutant Emission Rate (gr/sec/source)	8.38E-03

I-215 SB (Sources __ to __)

CO Emissions

Number of Sources	165
Link Length (meters)	1647.8
Volume/Baseline (VPH)	1690.8
Pollutant Mass Emission Rate (gr/mi)	2.869

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	1.37971
Pollutant Emission Rate (gr/sec/source)	8.36E-03

NB ON / Palm Avenue (Sources __ to __)

CO Emissions

Number of Sources	35
Link Length (meters)	347.6
Volume/Baseline (VPH)	279.2
Pollutant Mass Emission Rate (gr/mi)	4.931

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.08260
Pollutant Emission Rate (gr/sec/source)	2.36E-03

NB OFF / Palm Avenue (Sources __ to __)

CO Emissions

Number of Sources	28
Link Length (meters)	277.8
Volume/Baseline (VPH)	229.2
Pollutant Mass Emission Rate (gr/mi)	6.279

On-Road Mobile Sources
Emission Rate Computation

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.06901
Pollutant Emission Rate (gr/sec/source)	2.46E-03

SB ON /Palm Avenue (Sources __ to __)

CO Emissions

Number of Sources	90
Link Length (meters)	360.5
Volume/Baseline (VPH)	229.2
Pollutant Mass Emission Rate (gr/mi)	4.931

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.07033
Pollutant Emission Rate (gr/sec/source)	7.81E-04

SB OFF / Palm Avenue (Sources __ to __)

CO Emissions

Number of Sources	112
Link Length (meters)	447.2
Volume/Baseline (VPH)	279.2
Pollutant Mass Emission Rate (gr/mi)	4.931

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.10627
Pollutant Emission Rate (gr/sec/source)	9.49E-04

I-215 NB (Sources __ to __)

NOx Emissions

Number of Sources	163
Link Length (meters)	1632.0
Volume/Baseline (VPH)	1690.8
Pollutant Mass Emission Rate (gr/mi)	0.488

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.23243
Pollutant Emission Rate (gr/sec/source)	1.43E-03

I-215 SB (Sources __ to __)

NOx Emissions

Number of Sources	165
Link Length (meters)	1647.8
Volume/Baseline (VPH)	1690.8
Pollutant Mass Emission Rate (gr/mi)	0.488

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.23468
Pollutant Emission Rate (gr/sec/source)	1.42E-03

NB ON / Palm Avenue (Sources __ to __)

NOx Emissions

Number of Sources	35
Link Length (meters)	347.6
Volume/Baseline (VPH)	279.2
Pollutant Mass Emission Rate (gr/mi)	0.942

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.01578
Pollutant Emission Rate (gr/sec/source)	4.51E-04

NB OFF / Palm Avenue (Sources __ to __)

NOx Emissions

Number of Sources	28
Link Length (meters)	277.8
Volume/Baseline (VPH)	229.2
Pollutant Mass Emission Rate (gr/mi)	1.218

On-Road Mobile Sources
Emission Rate Computation

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.01339
Pollutant Emission Rate (gr/sec/source)	4.78E-04

SB ON /Palm Avenue (Sources __ to __)

NOx Emissions

Number of Sources	90
Link Length (meters)	360.5
Volume/Baseline (VPH)	229.2
Pollutant Mass Emission Rate (gr/mi)	0.942

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.01343
Pollutant Emission Rate (gr/sec/source)	1.49E-04

SB ON / Palm Avenue (Sources __ to __)

NOx Emissions

Number of Sources	112
Link Length (meters)	447.2
Volume/Baseline (VPH)	279.2
Pollutant Mass Emission Rate (gr/mi)	0.942

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.02030
Pollutant Emission Rate (gr/sec/source)	1.81E-04

I-215 NB (Sources __ to __)

PM2.5 Emissions

Number of Sources	163
Link Length (meters)	1632.0
Volume/Baseline (VPH)	1690.8
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.005
Emfac2011 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.044

Route 60 WB (Sources __ to __)

(Road Surface Silt Loading) $^{0.91}$ *x (Gross Vehicle Weight)* $^{1.02}$ *) + (Emfac2011 Emissions)*

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.020853
PM2.5 Reentrainment Emission Rate (gr/sec/source)	1.28E-04

I-215 SB (Sources __ to __)

PM2.5 Emissions

Number of Sources	165
Link Length (meters)	1647.8
Volume/Baseline (VPH)	1690.8
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.005
Emfac2011 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.044

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x

(Road Surface Silt Loading) $^{0.91}$ *x (Gross Vehicle Weight)* $^{1.02}$ *) + (Emfac2011 Emissions)*

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.021055
PM2.5 Reentrainment Emission Rate (gr/sec/source)	1.28E-04

NB ON / Palm Avenue (Sources __ to __)

PM2.5 Emissions

Number of Sources	35
Link Length (meters)	347.6
Volume/Baseline (VPH)	279.2
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02

Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.009
Emfac2011 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.048

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2011 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.000797
PM2.5 Reentrainment Emission Rate (gr/sec/source)	2.28E-05

NB OFF / Palm Avenue (Sources __ to __)

PM2.5 Emissions

Number of Sources	28
Link Length (meters)	277.8
Volume/Baseline (VPH)	229.2
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.024
Emfac2011 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.063

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2011 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.000688
PM2.5 Reentrainment Emission Rate (gr/sec/source)	2.46E-05

SB ON / Pine Avenue (Sources __ to __)

PM2.5 Emissions

Number of Sources	90
Link Length (meters)	360.5
Volume/Baseline (VPH)	229.2
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.009
Emfac2011 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.048

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2011 Emissions)

On-Road Mobile Sources
Emission Rate Computation

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.000679
PM2.5 Reentrainment Emission Rate (gr/sec/source)	7.54E-06

SB OFF / Pine Avenue (Sources __ to __)

PM2.5 Emissions

Number of Sources	112
Link Length (meters)	447.2
Volume/Baseline (VPH)	279.2
Particle Size Multiplier (g/mi)	0.25
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.009
Emfac2011 Emissions TW/BW (g/mi)	0.019
PM2.5 Reentrainment Mass Emission Rate (gr/mi)	0.048

For PM2.5 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2011 Emissions)

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM2.5 Reentrainment Emission Rate (gr/sec)	0.001025
PM2.5 Reentrainment Emission Rate (gr/sec/source)	9.16E-06

I-215 NB (Sources __ to __)

PM10 Emissions

Number of Sources	163
Link Length (meters)	1632.0
Volume/Baseline (VPH)	1690.8
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.006
Emfac2011 Emissions TW/BW (g/mi)	0.048
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.132

Route 60 WB (Sources __ to __)

(Road Surface Silt Loading) $^{0.91}$ *x (Gross Vehicle Weight)* $^{1.02}$ *) + (Emfac2011 Emissions)*

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.062837
PM10 Reentrainment Emission Rate (gr/sec/source)	3.86E-04

I-215 SB (Sources __ to __)

PM10 Emissions

Number of Sources	165
Link Length (meters)	1647.8
Volume/Baseline (VPH)	1690.8
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.006
Emfac2011 Emissions TW/BW (g/mi)	0.048
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.132

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x

(Road Surface Silt Loading) $^{0.91}$ *x (Gross Vehicle Weight)* $^{1.02}$ *) + (Emfac2011 Emissions)*

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.063446
PM10 Reentrainment Emission Rate (gr/sec/source)	3.85E-04

NB ON / Palm Avenue (Sources __ to __)

PM10 Emissions

Number of Sources	35
Link Length (meters)	347.6
Volume/Baseline (VPH)	279.2
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02

Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.010
Emfac2011 Emissions TW/BW (g/mi)	0.048
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.136

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2011 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.002284
PM10 Reentrainment Emission Rate (gr/sec/source)	6.52E-05

NB OFF / Palm Avenue (Sources __ to __)

PM10 Emissions

Number of Sources	28
Link Length (meters)	277.8
Volume/Baseline (VPH)	229.2
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.027
Emfac2011 Emissions TW/BW (g/mi)	0.048
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.153

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2011 Emissions)
Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.001685
PM10 Reentrainment Emission Rate (gr/sec/source)	6.02E-05

SB ON / Pine Avenue (Sources __ to __)

PM10 Emissions

Number of Sources	90
Link Length (meters)	360.5
Volume/Baseline (VPH)	229.2
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.010
Emfac2011 Emissions TW/BW (g/mi)	0.048
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.136

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2011 Emissions)

On-Road Mobile Sources
Emission Rate Computation

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.001944
PM10 Reentrainment Emission Rate (gr/sec/source)	2.16E-05

SB OFF / Pine Avenue (Sources __ to __)

PM10 Emissions

Number of Sources	112
Link Length (meters)	447.2
Volume/Baseline (VPH)	279.2
Particle Size Multiplier (g/mi)	1.0
Road Surface Silt Loading (g/m2)	0.02
Average Vehicle Weight (tons)	2.7
Emfac2011 Emissions Run (g/mi)	0.010
Emfac2011 Emissions TW/BW (g/mi)	0.048
PM10 Reentrainment Mass Emission Rate (gr/mi)	0.136

For PM10 Reentrainment: Mass Emission Rate (gr/mile) = ((Particulate PM10 Base Emission Factor) x (Road Surface Silt Loading)$^{0.91}$ x (Gross Vehicle Weight)$^{1.02}$) + (Emfac2011 Emissions)

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

PM10 Reentrainment Emission Rate (gr/sec)	0.002938
PM10 Reentrainment Emission Rate (gr/sec/source)	2.62E-05

I-215 NB (Sources __ to __)

TOG DSL Emissions

Number of Sources	163
Link Length (meters)	1632.0
Volume/Baseline (VPH)	86.5
Pollutant Mass Emission Rate (gr/mi)	0.031776

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00077
Pollutant Emission Rate (gr/sec/source)	4.75E-06

I-215 SB (Sources __ to __)

TOG DSL Emissions

Number of Sources	165
Link Length (meters)	1647.8
Volume/Baseline (VPH)	86.5
Pollutant Mass Emission Rate (gr/mi)	0.031776

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00078
Pollutant Emission Rate (gr/sec/source)	4.74E-06

NB ON / Palm Avenue (Sources __ to __)

TOG DSL Emissions

Number of Sources	35
Link Length (meters)	347.6
Volume/Baseline (VPH)	14.3
Pollutant Mass Emission Rate (gr/mi)	0.088780

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00008
Pollutant Emission Rate (gr/sec/source)	2.18E-06

NB OFF / Palm Avenue (Sources __ to __)

TOG DSL Emissions

Number of Sources	28
Link Length (meters)	277.8
Volume/Baseline (VPH)	11.7
Pollutant Mass Emission Rate (gr/mi)	0.598900

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00034
Pollutant Emission Rate (gr/sec/source)	1.20E-05

SB ON /Palm Avenue (Sources __ to __)

TOG DSL Emissions

Number of Sources	90
Link Length (meters)	360.5
Volume/Baseline (VPH)	11.7
Pollutant Mass Emission Rate (gr/mi)	0.088780

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00006
Pollutant Emission Rate (gr/sec/source)	7.18E-07

SB ON / Palm Avenue (Sources __ to __)

TOG DSL Emissions

Number of Sources	112
Link Length (meters)	447.2
Volume/Baseline (VPH)	14.3
Pollutant Mass Emission Rate (gr/mi)	0.088780

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00010
Pollutant Emission Rate (gr/sec/source)	8.75E-07

I-215 NB (Sources __ to __)

TOG GAS Emissions

Number of Sources	163
Link Length (meters)	1632.0
Volume/Baseline (VPH)	1604.3
Pollutant Mass Emission Rate (gr/mi)	0.010324

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00467
Pollutant Emission Rate (gr/sec/source)	2.86E-05

I-215 SB (Sources __ to __)

TOG GAS Emissions

Number of Sources	165
Link Length (meters)	1647.8
Volume/Baseline (VPH)	1604.3
Pollutant Mass Emission Rate (gr/mi)	0.010324

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00471
Pollutant Emission Rate (gr/sec/source)	2.86E-05

NB ON / Palm Avenue (Sources __ to __)

TOG GAS Emissions

Number of Sources	35
Link Length (meters)	347.6
Volume/Baseline (VPH)	264.9
Pollutant Mass Emission Rate (gr/mi)	0.014755

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00023
Pollutant Emission Rate (gr/sec/source)	6.70E-06

NB OFF / Palm Avenue (Sources __ to __)

TOG GAS Emissions

Number of Sources	28
Link Length (meters)	277.8
Volume/Baseline (VPH)	217.4
Pollutant Mass Emission Rate (gr/mi)	0.039522

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00041
Pollutant Emission Rate (gr/sec/source)	1.47E-05

SB ON /Palm Avenue (Sources __ to __)

TOG GAS Emissions

Number of Sources	90
Link Length (meters)	360.5
Volume/Baseline (VPH)	217.4
Pollutant Mass Emission Rate (gr/mi)	0.014755

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00020
Pollutant Emission Rate (gr/sec/source)	2.22E-06

SB OFF / Palm Avenue (Sources __ to __)

TOG GAS Emissions

Number of Sources	112
Link Length (meters)	447.2
Volume/Baseline (VPH)	264.9
Pollutant Mass Emission Rate (gr/mi)	0.014755

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00030
Pollutant Emission Rate (gr/sec/source)	2.69E-06

I-215 NB (Sources __ to __)

DSL Particulate Emissions

Number of Sources	163
Link Length (meters)	1632.0
Volume/Baseline (VPH)	86.5
Pollutant Mass Emission Rate (gr/mi)	0.068

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00166
Pollutant Emission Rate (gr/sec/source)	1.02E-05

I-215 SB (Sources __ to __)

DSL Particulate Emissions

Number of Sources	165
Link Length (meters)	1647.8
Volume/Baseline (VPH)	86.5
Pollutant Mass Emission Rate (gr/mi)	0.068

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00167
Pollutant Emission Rate (gr/sec/source)	1.01E-05

NB ON / Palm Avenue (Sources __ to __)

DSL Particulate Emissions

Number of Sources	35
Link Length (meters)	347.6
Volume/Baseline (VPH)	14.3
Pollutant Mass Emission Rate (gr/mi)	0.107

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00009
Pollutant Emission Rate (gr/sec/source)	2.62E-06

NB OFF / Palm Avenue (Sources __ to __)

DSL Particulate Emissions

Number of Sources	28
Link Length (meters)	277.8
Volume/Baseline (VPH)	11.7
Pollutant Mass Emission Rate (gr/mi)	0.144

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00008
Pollutant Emission Rate (gr/sec/source)	2.89E-06

SB ON /Palm Avenue (Sources __ to __)

DSL Particulate Emissions

Number of Sources	90
Link Length (meters)	360.5
Volume/Baseline (VPH)	11.7
Pollutant Mass Emission Rate (gr/mi)	0.107

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00008
Pollutant Emission Rate (gr/sec/source)	8.66E-07

SB ON / Palm Avenue (Sources __ to __)

DSL Particulate Emissions

Number of Sources	112
Link Length (meters)	447.2
Volume/Baseline (VPH)	14.3
Pollutant Mass Emission Rate (gr/mi)	0.144

Emission Rate (gr/sec) = ((Mass Emission Rate x Volume/Baseline)/(1609.3 m/mile) x (3600 sec/hr)) x (Link Length)

Pollutant Emission Rate (gr/sec)	0.00016
Pollutant Emission Rate (gr/sec/source)	1.42E-06

All	1463118.0
DSL	74874.0

Diesel Fleet Mix (weight fraction) 0.0512

Link Counts	Sources	AADT	VPH all	VPH gas	VPH diesel
MAIN NB		40580	1690.8	1604.3	86.5
MAIN SB		40580	1690.8	1604.3	86.5
NB ON / PALM		6700	279.2	264.9	14.3
NB OFF / PALM		5500	229.2	217.4	11.7
SB ON / PALM		5500	229.2	217.4	11.7
SB OFF / PALM		6700	279.2	264.9	14.3

APPENDIX 3.2:

RISK CALCULATION WORKSHEETS

Table A1
Quantification of Carcinogenic Risks and Noncarcinogenic Hazards
Residential Exposure Scenario (30 Year)

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards / Toxicological Endpoints*									
	(ug/m3)	(mg/m3)			URF (ug/m3)	CPF (mg/kg/day)	RISK	REL (ug/m3)	RfD (mg/kg/day)	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	EYES
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Freeway	0.36546	3.7E-04	4.60E-01	Benzene	2.9E-05	1.0E-01	2.0E-06	6.0E+01	1.7E-02		2.7E-03	2.7E-03				2.7E-03	
			3.32E-01	Formaldehyde	6.0E-06	2.1E-02	3.0E-07	9.0E+00	2.6E-03	1.3E-02							
			1.05E-01	1,3-Butadiene	1.7E-04	6.0E-01	2.7E-06	2.0E+01	5.7E-03							1.8E-03	
			7.80E-02	Acetaldehyde	2.7E-06	1.0E-02	3.3E-08	1.4E+02	4.0E-02	2.0E-04							
			2.50E-02	Acrolein				3.5E-01	1.0E-04	2.5E-02							
	0.03157	3.2E-05	1.00E+00	Diesel Particulates	3.0E-04	1.1E+00	3.9E-06	5.0E+00	1.4E-03	6.1E-03							
Total							8.91E-06			4.4E-02	2.7E-03	2.7E-03	0.0E+00	0.0E+00	0.0E+00	4.5E-03	0.0E+00

* Key to Toxocological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System (e.g., teratogenic and developmental effects)
EYES	Eye irritation and/or other effects

Note: Exposure factors used to calculate contaminant intake

exposure frequency (days/year)	350
exposure duration (years)	30
inhalation rate (m3/day)	20
average body weight (kg)	70
averaging time$_{(cancer)}$ (days)	25550
averaging time$_{(noncancer)}$ (days)	10950

Table A2
Quantification of Carcinogenic Risks and Noncarcinogenic Hazards
Residential Exposure Scenario (9 Year)

Source	Concentration		Weight Fraction	Contaminant	Carcinogenic Risk			Noncarcinogenic Hazards / Toxicological Endpoints*									
					URF	CPF	RISK	REL	RfD	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	EYES
	(ug/m3)	(mg/m3)			(ug/m3)	(mg/kg/day)		(ug/m3)	(mg/kg/day)								
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)	(n)	(o)	(p)	(q)	(r)
Freeway	0.36546	3.7E-04	4.60E-01	Benzene	2.9E-05	1.0E-01	6.0E-07	6.0E+01	1.7E-02		2.7E-03	2.7E-03				2.7E-03	
			3.32E-01	Formaldehyde	6.0E-06	2.1E-02	9.0E-08	9.0E+00	2.6E-03	1.3E-02							
			1.05E-01	1,3-Butadiene	1.7E-04	6.0E-01	8.0E-07	2.0E+01	5.7E-03							1.8E-03	
			7.80E-02	Acetaldehyde	2.7E-06	1.0E-02	1.0E-08	1.4E+02	4.0E-02	2.0E-04							
			2.50E-02	Acrolein				3.5E-01	1.0E-04	2.5E-02							
	0.03157	3.2E-05	1.00E+00	Diesel Particulates	3.0E-04	1.1E+00	1.2E-06	5.0E+00	1.4E-03	6.1E-03							
Total							2.67E-06			4.4E-02	2.7E-03	2.7E-03	0.0E+00	0.0E+00	0.0E+00	4.5E-03	0.0E+00

* Key to Toxocological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System (e.g., teratogenic and developmental effects)
EYES	Eye irritation and/or other effects

Note: Exposure factors used to calculate contaminant intake

exposure frequency (days/year)	350
exposure duration (years)	9
inhalation rate (m3/day)	20
average body weight (kg)	70
averaging time$_{(cancer)}$ (days)	25550
averaging time$_{(noncancer)}$ (days)	3285

Table A3
Quantification of Noncarcinogenic Acute Hazards
1-Hour Exposure / Average Traffic Scenario

Source	Concentration (ug/m3)	Weight Fraction	Contaminant	Noncarcinogenic Hazards / Toxicological Endpoints*								
				REL (ug/m3)	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	EYES
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
Freeway	1.06000	4.60E-01	Benzene	1.3E+03			3.8E-04	3.8E-04			3.8E-04	
TOG		3.32E-01	Formaldehyde	5.5E+01								6.4E-03
		7.80E-02	Acetaldehyde	4.7E+02	1.8E-04							1.8E-04
		2.50E-02	Acrolein	2.5E+00	1.1E-02							1.1E-02
Freeway	0.18014	8.20E-02	Benzene	1.3E+03			1.1E-05	1.1E-05			1.1E-05	
Diesel/TOG		6.07E-01	Formaldehyde	5.5E+01								2.0E-03
		3.03E-01	Acetaldehyde	4.7E+02	1.2E-04							1.2E-04
Total					1.1E-02	0.0E+00	3.9E-04	3.9E-04	0.0E+00	0.0E+00	3.9E-04	1.9E-02

* Key to Toxocological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System (e.g., teratogenic and developmental effects)
EYES	Eye irritation and/or other effects

Table A4
Quantification of Noncarcinogenic Acute Hazards
8-Hour Exposure / Average Traffic Scenario

Source	Concentration (ug/m3)	Weight Fraction	Contaminant	Noncarcinogenic Hazards / Toxicological Endpoints*								
				REL (ug/m3)	RESP	CNS/PNS	CV/BL	IMMUN	KIDN	GI/LV	REPRO	EYES
(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)	(l)	(m)
Freeway TOG	0.63600	3.32E-01	Formaldehyde	9.0E+00	2.3E-02							
		7.80E-02	Acetaldehyde	3.0E+02	1.7E-04							
		2.50E-02	Acrolein	7.0E-01	2.3E-02							
Freeway Diesel/TOG	0.10350	6.07E-01	Formaldehyde	9.0E+00	7.0E-03							
		3.03E-01	Acetaldehyde	3.0E+02	1.0E-04							
Total					5.3E-02	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00	0.0E+00

* Key to Toxocological Endpoints

RESP	Respiratory System
CNS/PNS	Central/Peripheral Nervous System
CV/BL	Cardiovascular/Blood System
IMMUN	Immune System
KIDN	Kidney
GI/LV	Gastrointestinal System/Liver
REPRO	Reproductive System (e.g., teratogenic and developmental effects)
EYES	Eye irritation and/or other effects

APPENDIX 3.3:

AERMOD MODEL OUTPUT SUMMARY FILE

```
*** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\DPM\DPM.isc                       ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        12:24:18

PAGE   1
 **MODELOPTs:   RegDFAULT CONC      ELEV      DRYDPLT   WETDPLT   URBAN

                                            ***     MODEL SETUP OPTIONS
SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **PARTICLE DEPOSITION Data Provided.
 **Model Uses DRY DEPLETION.     DDPLETE  =  T
 **Model Uses WET DEPLETION.     WETDPLT  =  T

 **Model Uses URBAN Dispersion Algorithm for the SBL for   593 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

 **Model Uses Regulatory DEFAULT Options:
         1. Stack-tip Downwash.
         2. Model Accounts for ELEVated Terrain Effects.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
         TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  DPM

 **Model Calculates ANNUAL Averages Only

 **This Run Includes:    593 Source(s);       1 Source Group(s); and
123 Receptor(s)

                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:    593 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 OPENPIT source(s)


 **Model Set To Continue RUNning After the Setup Testing.
```

```
 **The AERMET Input Meteorological Data Version Date:  14134

 **Output Options Selected:
          Model Outputs Tables of ANNUAL Averages by Receptor
          Model Outputs External File(s) of High Values for Plotting
(PLOTFILE Keyword)
          Model Outputs Separate Summary File of High Ranked Values
(SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for
Calm Hours
                                                                  m for
Missing Hours
                                                                  b for
Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   305.00 ;
Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units = GRAMS/SEC
;  Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.8 MB of RAM.

 **Detailed Error/Message File:   DPM.err
 **File for Summary of Results:   DPM.sum
```

**MODELOPTs: RegDFAULT CONC ELEV DRYDPLT WETDPLT URBAN

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING *** (1=YES; 0=NO)

```
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES *** (METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

**MODELOPTs: RegDFAULT CONC ELEV DRYDPLT WETDPLT URBAN

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: ..\snbo8.sfc
Met Version: 14134
Profile file: ..\snbo8.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 3190 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN
Year: 2007 Year: 2007

First 24 hours of scalar data

YR	MO	DY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALB	REF WS	WD	HT	REF TA	HT	IPCOD	PRATE	RH	SFCP	CCVR
07	01	01	01	-0.5	0.030	-9.000	-9.000	-999.	12.	4.4	0.32	1.00	1.00	0.50	27.	9.	279.9	6.***	-9.00	999.	977.	10	
07	01	01	02	-0.5	0.030	-9.000	-9.000	-999.	12.	4.3	0.32	1.00	1.00	0.50	7.	9.	279.2	6.***	-9.00	999.	977.	10	
07	01	01	03	-0.5	0.030	-9.000	-9.000	-999.	12.	4.3	0.32	1.00	1.00	0.50	97.	9.	278.8	6.***	-9.00	999.	977.	10	
07	01	01	04	-0.7	0.030	-9.000	-9.000	-999.	12.	3.1	0.32	1.00	1.00	0.50	148.	9.	278.1	6.***	-9.00	999.	977.	0	
07	01	01	05	-2.4	0.054	-9.000	-9.000	-999.	30.	5.5	0.32	1.00	1.00	0.90	87.	9.	278.1	6.***	-9.00	999.	977.	0	
07	01	01	06	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	1.00	0.90	208.	9.	277.0	6.***	-9.00	999.	977.	10	
07	01	01	07	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	1.00	0.90	156.	9.	277.5	6.***	-9.00	999.	977.	10	
07	01	01	08	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	0.52	0.90	60.	9.	277.5	6.***	-9.00	999.	977.	6	
07	01	01	09	34.6	0.390	0.621	0.005	241.	585.	-149.6	0.32	1.00	0.31	3.10	264.	9.	282.5	6.***	-9.00	999.	977.	4	
07	01	01	10	78.0	0.267	1.066	0.005	541.	341.	-21.3	0.32	1.00	0.24	1.80	242.	9.	289.2	6.***	-9.00	999.	977.	0	
07	01	01	11	112.9	0.612	1.395	0.019	839.	1149.	-176.9	0.32	1.00	0.21	4.90	82.	9.	290.4	6.***	-9.00	999.	977.	0	
07	01	01	12	130.3	0.615	1.611	0.020	1120.	1158.	-155.8	0.32	1.00	0.20	4.90	74.	9.	290.9	6.***	-9.00	999.	977.	0	
07	01	01	13	128.2	0.671	1.662	0.015	1250.	1315.	-204.9	0.32	1.00	0.20	5.40	59.	9.	290.9	6.***	-9.00	999.	977.	0	

```
 07 01 01 14  107.5  0.712  1.575  0.007 1267. 1439.   -292.1 0.32 1.00
0.22    5.80   58.   9.  291.4   6.***  -9.00  999.  977.  0
 07 01 01 15   68.1  0.602  1.356  0.021 1277. 1137.   -279.3 0.32 1.00
0.25    4.90   40.   9.  291.4   6.***  -9.00  999.  977.  0
 07 01 01 16   18.1  0.438  0.872  0.021 1278.  724.   -405.7 0.32 1.00
0.34    3.60  312.   9.  292.0   6.***  -9.00  999.  977.  0
 07 01 01 17  -25.8  0.263 -9.000 -9.000 -999.  353.     61.6 0.32 1.00
0.63    2.70  342.   9.  290.9   6.***  -9.00  999.  977.  0
 07 01 01 18   -4.9  0.077 -9.000 -9.000 -999.  114.      8.1 0.32 1.00
1.00    1.30  256.   9.  289.2   6.***  -9.00  999.  977.  0
 07 01 01 19   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1 0.32 1.00
1.00    1.30  191.   9.  289.9   6.***  -9.00  999.  977.  0
 07 01 01 20   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1 0.32 1.00
1.00    1.30  197.   9.  289.9   6.***  -9.00  999.  977.  0
 07 01 01 21   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1 0.32 1.00
1.00    1.30  190.   9.  289.9   6.***  -9.00  999.  977.  0
 07 01 01 22   -2.4  0.054 -9.000 -9.000 -999.   30.      5.6 0.32 1.00
1.00    0.90  188.   9.  289.2   6.***  -9.00  999.  977.  0
 07 01 01 23   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3 0.32 1.00
1.00    1.80  162.   9.  289.9   6.***  -9.00  999.  977.  0
 07 01 01 24   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3 0.32 1.00
1.00    1.80   42.   9.  289.2   6.***  -9.00  999.  977.  0


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 07 01 01 01    5.5 0 -999.  -99.00   279.9   99.0  -99.00  -99.00
 07 01 01 01    9.1 1   27.    0.50  -999.0   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\DPM\DPM.isc                          ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        12:24:18

PAGE   4
 **MODELOPTs:   RegDFAULT CONC      ELEV      DRYDPLT   WETDPLT   URBAN

                                   *** THE SUMMARY OF MAXIMUM ANNUAL
RESULTS AVERAGED OVER   5 YEARS ***


                                    ** CONC OF DPM      IN
MICROGRAMS/M**3                         **


NETWORK
GROUP ID                       AVERAGE CONC                RECEPTOR  (XR,
YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS       0.12626 AT (  466291.88,
3783831.12,   529.27,  1659.00,    0.00)  DC
          2ND HIGHEST VALUE IS       0.12402 AT (  466304.64,
3783821.25,   528.68,  1659.00,    0.00)  DC
          3RD HIGHEST VALUE IS       0.12181 AT (  466281.57,
3783842.91,   529.61,  1659.00,    0.00)  DC
          4TH HIGHEST VALUE IS       0.12067 AT (  466271.27,
3783852.69,   529.95,  1659.00,    0.00)  DC
          5TH HIGHEST VALUE IS       0.11937 AT (  466259.69,
3783863.76,   530.59,  1659.00,    0.00)  DC
          6TH HIGHEST VALUE IS       0.11706 AT (  466248.62,
3783875.09,   531.34,  1659.00,    0.00)  DC
          7TH HIGHEST VALUE IS       0.11700 AT (  466332.05,
3783801.66,   527.11,  1659.00,    0.00)  DC
          8TH HIGHEST VALUE IS       0.11608 AT (  466236.52,
3783886.42,   532.11,  1659.00,    0.00)  DC
          9TH HIGHEST VALUE IS       0.11294 AT (  466204.08,
3783917.31,   533.22,  1659.00,    0.00)  DC
         10TH HIGHEST VALUE IS       0.11154 AT (  466188.89,
3783931.72,   533.85,  1659.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\DPM\DPM.isc                       ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        12:24:18

PAGE   5
 **MODELOPTs:   RegDFAULT CONC      ELEV      DRYDPLT   WETDPLT   URBAN

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            2 Warning Message(s)
 A Total of         1086 Informational Message(s)

 A Total of        43824 Hours Were Processed

 A Total of           37 Calm Hours Identified

 A Total of         1049 Missing Hours Identified (  2.39 Percent)

 Met Data File Includes       0.00 Millimeters (     0.000 Inches) of
Precipitation


    ******** FATAL ERROR MESSAGES ********
               ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W531    3154       MEOPEN: CAUTION! Met Station ID Missing from
SURFFILE for      SURFDATA
 MX W496   43825         MAIN: Total precipitation in SURFFILE is zero
(0.0) with     WetDepos
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\CO\CO.isc                          ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        11:41:18

PAGE   1
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                              ***     MODEL SETUP OPTIONS
SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   593 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

 **Model Uses Regulatory DEFAULT Options:
         1. Stack-tip Downwash.
         2. Model Accounts for ELEVated Terrain Effects.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
         TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  CO

 **Model Calculates  2 Short Term Average(s) of:   1-HR   8-HR

 **This Run Includes:    593 Source(s);       1 Source Group(s); and
17 Receptor(s)

                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:    593 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 OPENPIT source(s)


 **Model Set To Continue RUNning After the Setup Testing.
```

```
 **The AERMET Input Meteorological Data Version Date:  14134

 **Output Options Selected:
          Model Outputs Tables of Highest Short Term Values by Receptor
(RECTABLE Keyword)
          Model Outputs External File(s) of High Values for Plotting
(PLOTFILE Keyword)
          Model Outputs Separate Summary File of High Ranked Values
(SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for
Calm Hours
                                                                  m for
Missing Hours
                                                                  b for
Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   305.00 ;
Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units = GRAMS/SEC
;  Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.8 MB of RAM.

 **Detailed Error/Message File:   CO.err
 **File for Summary of Results:   CO.sum
```

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***

(1=YES; 0=NO)

```
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***

(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\CO\CO.isc                          ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        11:41:18

PAGE   3
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                    *** UP TO THE FIRST 24 HOURS OF
METEOROLOGICAL DATA ***

   Surface file:   ..\snbo8.sfc
Met Version:  14134
   Profile file:   ..\snbo8.PFL
   Surface format: FREE
   Profile format: FREE
   Surface station no.:     3190                  Upper air station no.:
3190
                  Name: UNKNOWN                                     Name:
UNKNOWN
                  Year:   2007                                      Year:
2007

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0
BOWEN ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - -
 07 01 01   1 01   -0.5  0.030 -9.000 -9.000 -999.   12.      4.4  0.32
1.00   1.00    0.50   27.    9.1  279.9    5.5
 07 01 01   1 02   -0.5  0.030 -9.000 -9.000 -999.   12.      4.3  0.32
1.00   1.00    0.50    7.    9.1  279.2    5.5
 07 01 01   1 03   -0.5  0.030 -9.000 -9.000 -999.   12.      4.3  0.32
1.00   1.00    0.50   97.    9.1  278.8    5.5
 07 01 01   1 04   -0.7  0.030 -9.000 -9.000 -999.   12.      3.1  0.32
1.00   1.00    0.50  148.    9.1  278.1    5.5
 07 01 01   1 05   -2.4  0.054 -9.000 -9.000 -999.   30.      5.5  0.32
1.00   1.00    0.90   87.    9.1  278.1    5.5
 07 01 01   1 06   -1.7  0.054 -9.000 -9.000 -999.   30.      7.8  0.32
1.00   1.00    0.90  208.    9.1  277.0    5.5
 07 01 01   1 07   -1.7  0.054 -9.000 -9.000 -999.   30.      7.8  0.32
1.00   1.00    0.90  156.    9.1  277.5    5.5
 07 01 01   1 08   -1.7  0.054 -9.000 -9.000 -999.   30.      7.8  0.32
1.00   0.52    0.90   60.    9.1  277.5    5.5
 07 01 01   1 09   34.6  0.390  0.621  0.005  241.  585.   -149.6  0.32
1.00   0.31    3.10  264.    9.1  282.5    5.5
 07 01 01   1 10   78.0  0.267  1.066  0.005  541.  341.    -21.3  0.32
1.00   0.24    1.80  242.    9.1  289.2    5.5
 07 01 01   1 11  112.9  0.612  1.395  0.019  839. 1149.   -176.9  0.32
1.00   0.21    4.90   82.    9.1  290.4    5.5
 07 01 01   1 12  130.3  0.615  1.611  0.020 1120. 1158.   -155.8  0.32
1.00   0.20    4.90   74.    9.1  290.9    5.5
 07 01 01   1 13  128.2  0.671  1.662  0.015 1250. 1315.   -204.9  0.32
1.00   0.20    5.40   59.    9.1  290.9    5.5
```

```
 07 01 01   1 14  107.5  0.712  1.575  0.007 1267. 1439.   -292.1  0.32
1.00   0.22    5.80   58.    9.1  291.4    5.5
 07 01 01   1 15   68.1  0.602  1.356  0.021 1277. 1137.   -279.3  0.32
1.00   0.25    4.90   40.    9.1  291.4    5.5
 07 01 01   1 16   18.1  0.438  0.872  0.021 1278.  724.   -405.7  0.32
1.00   0.34    3.60  312.    9.1  292.0    5.5
 07 01 01   1 17  -25.8  0.263 -9.000 -9.000 -999.  353.     61.6  0.32
1.00   0.63    2.70  342.    9.1  290.9    5.5
 07 01 01   1 18   -4.9  0.077 -9.000 -9.000 -999.  114.      8.1  0.32
1.00   1.00    1.30  256.    9.1  289.2    5.5
 07 01 01   1 19   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  191.    9.1  289.9    5.5
 07 01 01   1 20   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  197.    9.1  289.9    5.5
 07 01 01   1 21   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  190.    9.1  289.9    5.5
 07 01 01   1 22   -2.4  0.054 -9.000 -9.000 -999.   30.      5.6  0.32
1.00   1.00    0.90  188.    9.1  289.2    5.5
 07 01 01   1 23   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80  162.    9.1  289.9    5.5
 07 01 01   1 24   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80   42.    9.1  289.2    5.5


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 07 01 01 01    5.5 0 -999.  -99.00   279.9   99.0  -99.00  -99.00
 07 01 01 01    9.1 1   27.    0.50  -999.0   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\CO\CO.isc                         ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        11:41:18

PAGE   4
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                                  *** THE SUMMARY OF
HIGHEST  1-HR RESULTS ***


                                    ** CONC OF CO       IN
MICROGRAMS/M**3                          **

                                                       DATE
NETWORK
GROUP ID                           AVERAGE CONC     (YYMMDDHH)
RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH   1ST HIGH VALUE IS     255.84366  ON 11122720: AT (
466188.89,  3783931.72,   533.85,  1659.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\CO\CO.isc                         ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        11:41:18

PAGE   5
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                                  *** THE SUMMARY OF
HIGHEST  8-HR RESULTS ***


                                   ** CONC OF CO       IN
MICROGRAMS/M**3                         **

                                                        DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)
RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH   1ST HIGH VALUE IS     207.64112m ON 11081508: AT (
466291.88,  3783831.12,   529.27,  1659.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

```
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            1 Warning Message(s)
 A Total of         1086 Informational Message(s)

 A Total of        43824 Hours Were Processed

 A Total of           37 Calm Hours Identified

 A Total of         1049 Missing Hours Identified (  2.39 Percent)


    ******** FATAL ERROR MESSAGES ********
                ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W531    1375       MEOPEN: CAUTION! Met Station ID Missing from
SURFFILE for      SURFDATA
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\NO2\NO2.isc                       ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        11:56:18

PAGE   1
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                            ***     MODEL SETUP OPTIONS
SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   593 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

 **Model Uses Regulatory DEFAULT Options:
         1. Stack-tip Downwash.
         2. Model Accounts for ELEVated Terrain Effects.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
         TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  NOX

 **Model Calculates  1 Short Term Average(s) of:   1-HR

 **This Run Includes:    593 Source(s);       1 Source Group(s); and
17 Receptor(s)

                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:    593 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 OPENPIT source(s)


 **Model Set To Continue RUNning After the Setup Testing.
```

```
 **The AERMET Input Meteorological Data Version Date:  14134

 **Output Options Selected:
          Model Outputs Tables of Highest Short Term Values by Receptor
(RECTABLE Keyword)
          Model Outputs External File(s) of High Values for Plotting
(PLOTFILE Keyword)
          Model Outputs Separate Summary File of High Ranked Values
(SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for
Calm Hours
                                                                  m for
Missing Hours
                                                                  b for
Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   305.00 ;
Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units = GRAMS/SEC
;  Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.8 MB of RAM.

 **Detailed Error/Message File:   NO2.err
 **File for Summary of Results:   NO2.sum
```

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING *** (1=YES; 0=NO)

```
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES *** (METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: ..\snbo8.sfc
Met Version: 14134
Profile file: ..\snbo8.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 3190 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN
Year: 2007 Year: 2007

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
07	01	01	1	01	-0.5	0.030	-9.000	-9.000	-999.	12.	4.4	0.32	1.00	1.00	0.50	27.	9.1	279.9	5.5
07	01	01	1	02	-0.5	0.030	-9.000	-9.000	-999.	12.	4.3	0.32	1.00	1.00	0.50	7.	9.1	279.2	5.5
07	01	01	1	03	-0.5	0.030	-9.000	-9.000	-999.	12.	4.3	0.32	1.00	1.00	0.50	97.	9.1	278.8	5.5
07	01	01	1	04	-0.7	0.030	-9.000	-9.000	-999.	12.	3.1	0.32	1.00	1.00	0.50	148.	9.1	278.1	5.5
07	01	01	1	05	-2.4	0.054	-9.000	-9.000	-999.	30.	5.5	0.32	1.00	1.00	0.90	87.	9.1	278.1	5.5
07	01	01	1	06	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	1.00	0.90	208.	9.1	277.0	5.5
07	01	01	1	07	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	1.00	0.90	156.	9.1	277.5	5.5
07	01	01	1	08	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	0.52	0.90	60.	9.1	277.5	5.5
07	01	01	1	09	34.6	0.390	0.621	0.005	241.	585.	-149.6	0.32	1.00	0.31	3.10	264.	9.1	282.5	5.5
07	01	01	1	10	78.0	0.267	1.066	0.005	541.	341.	-21.3	0.32	1.00	0.24	1.80	242.	9.1	289.2	5.5
07	01	01	1	11	112.9	0.612	1.395	0.019	839.	1149.	-176.9	0.32	1.00	0.21	4.90	82.	9.1	290.4	5.5
07	01	01	1	12	130.3	0.615	1.611	0.020	1120.	1158.	-155.8	0.32	1.00	0.20	4.90	74.	9.1	290.9	5.5
07	01	01	1	13	128.2	0.671	1.662	0.015	1250.	1315.	-204.9	0.32	1.00	0.20	5.40	59.	9.1	290.9	5.5

```
 07 01 01   1 14  107.5  0.712  1.575  0.007 1267. 1439.   -292.1  0.32
1.00   0.22    5.80   58.    9.1  291.4    5.5
 07 01 01   1 15   68.1  0.602  1.356  0.021 1277. 1137.   -279.3  0.32
1.00   0.25    4.90   40.    9.1  291.4    5.5
 07 01 01   1 16   18.1  0.438  0.872  0.021 1278.  724.   -405.7  0.32
1.00   0.34    3.60  312.    9.1  292.0    5.5
 07 01 01   1 17  -25.8  0.263 -9.000 -9.000 -999.  353.     61.6  0.32
1.00   0.63    2.70  342.    9.1  290.9    5.5
 07 01 01   1 18   -4.9  0.077 -9.000 -9.000 -999.  114.      8.1  0.32
1.00   1.00    1.30  256.    9.1  289.2    5.5
 07 01 01   1 19   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  191.    9.1  289.9    5.5
 07 01 01   1 20   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  197.    9.1  289.9    5.5
 07 01 01   1 21   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  190.    9.1  289.9    5.5
 07 01 01   1 22   -2.4  0.054 -9.000 -9.000 -999.   30.      5.6  0.32
1.00   1.00    0.90  188.    9.1  289.2    5.5
 07 01 01   1 23   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80  162.    9.1  289.9    5.5
 07 01 01   1 24   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80   42.    9.1  289.2    5.5


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 07 01 01 01    5.5 0 -999.  -99.00   279.9   99.0  -99.00  -99.00
 07 01 01 01    9.1 1   27.    0.50  -999.0   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\NO2\NO2.isc                      ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        11:56:18

PAGE   4
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                                 *** THE SUMMARY OF
HIGHEST  1-HR RESULTS ***


                                   ** CONC OF NOX      IN
MICROGRAMS/M**3                         **

                                                        DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)
RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH   1ST HIGH VALUE IS      44.01094  ON 11122720: AT (
466188.89,  3783931.72,   533.85,  1659.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

```
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            1 Warning Message(s)
 A Total of         1086 Informational Message(s)

 A Total of        43824 Hours Were Processed

 A Total of           37 Calm Hours Identified

 A Total of         1049 Missing Hours Identified (  2.39 Percent)


    ******** FATAL ERROR MESSAGES ********
                ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W531    1375       MEOPEN: CAUTION! Met Station ID Missing from
SURFFILE for      SURFDATA
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\PM10\PM10.isc                      ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        11:02:55

PAGE   1
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                            ***     MODEL SETUP OPTIONS
SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   593 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

 **Model Uses Regulatory DEFAULT Options:
         1. Stack-tip Downwash.
         2. Model Accounts for ELEVated Terrain Effects.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
         TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  PM_10

 **Model Calculates  1 Short Term Average(s) of:  24-HR
     and Calculates ANNUAL Averages

 **This Run Includes:    593 Source(s);       1 Source Group(s); and
17 Receptor(s)

                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:    593 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 OPENPIT source(s)
```

```
 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date:  14134

 **Output Options Selected:
          Model Outputs Tables of ANNUAL Averages by Receptor
          Model Outputs Tables of Highest Short Term Values by Receptor
(RECTABLE Keyword)
          Model Outputs External File(s) of High Values for Plotting
(PLOTFILE Keyword)
          Model Outputs Separate Summary File of High Ranked Values
(SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for
Calm Hours
                                                                  m for
Missing Hours
                                                                  b for
Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   305.00 ;
Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units = GRAMS/SEC
;  Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.8 MB of RAM.

 **Detailed Error/Message File:   PM10.err
 **File for Summary of Results:   PM10.sum
```

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING ***
(1=YES; 0=NO)

```
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES ***
(METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: ..\snbo8.sfc
Met Version: 14134
Profile file: ..\snbo8.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 3190 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN
Year: 2007 Year: 2007

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
07	01	01	1	01	-0.5	0.030	-9.000	-9.000	-999.	12.	4.4	0.32	1.00	1.00	0.50	27.	9.1	279.9	5.5
07	01	01	1	02	-0.5	0.030	-9.000	-9.000	-999.	12.	4.3	0.32	1.00	1.00	0.50	7.	9.1	279.2	5.5
07	01	01	1	03	-0.5	0.030	-9.000	-9.000	-999.	12.	4.3	0.32	1.00	1.00	0.50	97.	9.1	278.8	5.5
07	01	01	1	04	-0.7	0.030	-9.000	-9.000	-999.	12.	3.1	0.32	1.00	1.00	0.50	148.	9.1	278.1	5.5
07	01	01	1	05	-2.4	0.054	-9.000	-9.000	-999.	30.	5.5	0.32	1.00	1.00	0.90	87.	9.1	278.1	5.5
07	01	01	1	06	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	1.00	0.90	208.	9.1	277.0	5.5
07	01	01	1	07	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	1.00	0.90	156.	9.1	277.5	5.5
07	01	01	1	08	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	0.52	0.90	60.	9.1	277.5	5.5
07	01	01	1	09	34.6	0.390	0.621	0.005	241.	585.	-149.6	0.32	1.00	0.31	3.10	264.	9.1	282.5	5.5
07	01	01	1	10	78.0	0.267	1.066	0.005	541.	341.	-21.3	0.32	1.00	0.24	1.80	242.	9.1	289.2	5.5
07	01	01	1	11	112.9	0.612	1.395	0.019	839.	1149.	-176.9	0.32	1.00	0.21	4.90	82.	9.1	290.4	5.5
07	01	01	1	12	130.3	0.615	1.611	0.020	1120.	1158.	-155.8	0.32	1.00	0.20	4.90	74.	9.1	290.9	5.5
07	01	01	1	13	128.2	0.671	1.662	0.015	1250.	1315.	-204.9	0.32	1.00	0.20	5.40	59.	9.1	290.9	5.5

```
 07 01 01   1 14  107.5  0.712  1.575  0.007 1267. 1439.   -292.1  0.32
1.00   0.22    5.80   58.    9.1  291.4    5.5
 07 01 01   1 15   68.1  0.602  1.356  0.021 1277. 1137.   -279.3  0.32
1.00   0.25    4.90   40.    9.1  291.4    5.5
 07 01 01   1 16   18.1  0.438  0.872  0.021 1278.  724.   -405.7  0.32
1.00   0.34    3.60  312.    9.1  292.0    5.5
 07 01 01   1 17  -25.8  0.263 -9.000 -9.000 -999.  353.     61.6  0.32
1.00   0.63    2.70  342.    9.1  290.9    5.5
 07 01 01   1 18   -4.9  0.077 -9.000 -9.000 -999.  114.      8.1  0.32
1.00   1.00    1.30  256.    9.1  289.2    5.5
 07 01 01   1 19   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  191.    9.1  289.9    5.5
 07 01 01   1 20   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  197.    9.1  289.9    5.5
 07 01 01   1 21   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  190.    9.1  289.9    5.5
 07 01 01   1 22   -2.4  0.054 -9.000 -9.000 -999.   30.      5.6  0.32
1.00   1.00    0.90  188.    9.1  289.2    5.5
 07 01 01   1 23   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80  162.    9.1  289.9    5.5
 07 01 01   1 24   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80   42.    9.1  289.2    5.5


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 07 01 01 01    5.5 0 -999.  -99.00   279.9   99.0  -99.00  -99.00
 07 01 01 01    9.1 1   27.    0.50  -999.0   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
```

```
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                  *** THE SUMMARY OF MAXIMUM ANNUAL RESULTS AVERAGED OVER   5 YEARS ***


                                   ** CONC OF PM_10    IN MICROGRAMS/M**3                           **


NETWORK
GROUP ID                       AVERAGE CONC                RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS       4.89476 AT (  466291.88, 3783831.12,   529.27,  1659.00,    0.00)  DC
          2ND HIGHEST VALUE IS       4.80667 AT (  466304.64, 3783821.25,   528.68,  1659.00,    0.00)  DC
          3RD HIGHEST VALUE IS       4.72449 AT (  466281.57, 3783842.91,   529.61,  1659.00,    0.00)  DC
          4TH HIGHEST VALUE IS       4.68209 AT (  466271.27, 3783852.69,   529.95,  1659.00,    0.00)  DC
          5TH HIGHEST VALUE IS       4.63338 AT (  466259.69, 3783863.76,   530.59,  1659.00,    0.00)  DC
          6TH HIGHEST VALUE IS       4.54491 AT (  466248.62, 3783875.09,   531.34,  1659.00,    0.00)  DC
          7TH HIGHEST VALUE IS       4.53161 AT (  466332.05, 3783801.66,   527.11,  1659.00,    0.00)  DC
          8TH HIGHEST VALUE IS       4.50721 AT (  466236.52, 3783886.42,   532.11,  1659.00,    0.00)  DC
          9TH HIGHEST VALUE IS       4.38755 AT (  466204.08, 3783917.31,   533.22,  1659.00,    0.00)  DC
         10TH HIGHEST VALUE IS       4.33320 AT (  466188.89, 3783931.72,   533.85,  1659.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** THE SUMMARY OF HIGHEST 24-HR RESULTS ***

** CONC OF PM_10 IN MICROGRAMS/M**3 **

NETWORK GROUP ID	RECEPTOR (XR, YR, ZELEV, ZHILL, ZFLAG)	AVERAGE CONC OF TYPE	DATE (YYMMDDHH) GRID-ID
ALL	HIGH 1ST HIGH VALUE IS 7.38349 ON 11111824: AT (466291.88, 3783831.12, 529.27, 1659.00, 0.00) DC		

*** RECEPTOR TYPES: GC = GRIDCART
GP = GRIDPOLR
DC = DISCCART
DP = DISCPOLR

```
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            1 Warning Message(s)
 A Total of         1086 Informational Message(s)

 A Total of        43824 Hours Were Processed

 A Total of           37 Calm Hours Identified

 A Total of         1049 Missing Hours Identified (  2.39 Percent)


    ******** FATAL ERROR MESSAGES ********
                ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W531    1375       MEOPEN: CAUTION! Met Station ID Missing from
SURFFILE for      SURFDATA
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\PM25\PM25.isc                      ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        11:23:26

PAGE   1
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                            ***     MODEL SETUP OPTIONS
SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   593 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

 **Model Uses Regulatory DEFAULT Options:
         1. Stack-tip Downwash.
         2. Model Accounts for ELEVated Terrain Effects.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
         TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  PM_2.5

 **Model Calculates  1 Short Term Average(s) of:  24-HR

 **This Run Includes:    593 Source(s);       1 Source Group(s); and
17 Receptor(s)

                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:    593 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 OPENPIT source(s)


 **Model Set To Continue RUNning After the Setup Testing.
```

```
 **The AERMET Input Meteorological Data Version Date:  14134

 **Output Options Selected:
          Model Outputs Tables of Highest Short Term Values by Receptor
(RECTABLE Keyword)
          Model Outputs External File(s) of High Values for Plotting
(PLOTFILE Keyword)
          Model Outputs Separate Summary File of High Ranked Values
(SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for
Calm Hours
                                                                  m for
Missing Hours
                                                                  b for
Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   305.00 ;
Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units = GRAMS/SEC
;  Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.8 MB of RAM.

 **Detailed Error/Message File:   PM25.err
 **File for Summary of Results:   PM25.sum
```

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING *** (1=YES; 0=NO)

```
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES *** (METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** UP TO THE FIRST 24 HOURS OF METEOROLOGICAL DATA ***

Surface file: ..\snbo8.sfc
Met Version: 14134
Profile file: ..\snbo8.PFL
Surface format: FREE
Profile format: FREE
Surface station no.: 3190 Upper air station no.: 3190
Name: UNKNOWN Name: UNKNOWN
Year: 2007 Year: 2007

First 24 hours of scalar data

YR	MO	DY	JDY	HR	H0	U*	W*	DT/DZ	ZICNV	ZIMCH	M-O LEN	Z0	BOWEN	ALBEDO	REF WS	WD	HT	REF TA	HT
07	01	01	1	01	-0.5	0.030	-9.000	-9.000	-999.	12.	4.4	0.32	1.00	1.00	0.50	27.	9.1	279.9	5.5
07	01	01	1	02	-0.5	0.030	-9.000	-9.000	-999.	12.	4.3	0.32	1.00	1.00	0.50	7.	9.1	279.2	5.5
07	01	01	1	03	-0.5	0.030	-9.000	-9.000	-999.	12.	4.3	0.32	1.00	1.00	0.50	97.	9.1	278.8	5.5
07	01	01	1	04	-0.7	0.030	-9.000	-9.000	-999.	12.	3.1	0.32	1.00	1.00	0.50	148.	9.1	278.1	5.5
07	01	01	1	05	-2.4	0.054	-9.000	-9.000	-999.	30.	5.5	0.32	1.00	1.00	0.90	87.	9.1	278.1	5.5
07	01	01	1	06	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	1.00	0.90	208.	9.1	277.0	5.5
07	01	01	1	07	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	1.00	0.90	156.	9.1	277.5	5.5
07	01	01	1	08	-1.7	0.054	-9.000	-9.000	-999.	30.	7.8	0.32	1.00	0.52	0.90	60.	9.1	277.5	5.5
07	01	01	1	09	34.6	0.390	0.621	0.005	241.	585.	-149.6	0.32	1.00	0.31	3.10	264.	9.1	282.5	5.5
07	01	01	1	10	78.0	0.267	1.066	0.005	541.	341.	-21.3	0.32	1.00	0.24	1.80	242.	9.1	289.2	5.5
07	01	01	1	11	112.9	0.612	1.395	0.019	839.	1149.	-176.9	0.32	1.00	0.21	4.90	82.	9.1	290.4	5.5
07	01	01	1	12	130.3	0.615	1.611	0.020	1120.	1158.	-155.8	0.32	1.00	0.20	4.90	74.	9.1	290.9	5.5
07	01	01	1	13	128.2	0.671	1.662	0.015	1250.	1315.	-204.9	0.32	1.00	0.20	5.40	59.	9.1	290.9	5.5

```
 07 01 01   1 14  107.5  0.712  1.575  0.007 1267. 1439.   -292.1  0.32
1.00   0.22    5.80   58.    9.1  291.4    5.5
 07 01 01   1 15   68.1  0.602  1.356  0.021 1277. 1137.   -279.3  0.32
1.00   0.25    4.90   40.    9.1  291.4    5.5
 07 01 01   1 16   18.1  0.438  0.872  0.021 1278.  724.   -405.7  0.32
1.00   0.34    3.60  312.    9.1  292.0    5.5
 07 01 01   1 17  -25.8  0.263 -9.000 -9.000 -999.  353.     61.6  0.32
1.00   0.63    2.70  342.    9.1  290.9    5.5
 07 01 01   1 18   -4.9  0.077 -9.000 -9.000 -999.  114.      8.1  0.32
1.00   1.00    1.30  256.    9.1  289.2    5.5
 07 01 01   1 19   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  191.    9.1  289.9    5.5
 07 01 01   1 20   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  197.    9.1  289.9    5.5
 07 01 01   1 21   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  190.    9.1  289.9    5.5
 07 01 01   1 22   -2.4  0.054 -9.000 -9.000 -999.   30.      5.6  0.32
1.00   1.00    0.90  188.    9.1  289.2    5.5
 07 01 01   1 23   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80  162.    9.1  289.9    5.5
 07 01 01   1 24   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80   42.    9.1  289.2    5.5


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 07 01 01 01    5.5 0 -999.  -99.00   279.9   99.0  -99.00  -99.00
 07 01 01 01    9.1 1   27.    0.50  -999.0   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\PM25\PM25.isc                     ***        12/11/15
 *** AERMET - VERSION  14134 ***   ***
***        11:23:26

PAGE   4
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                                 *** THE SUMMARY OF
HIGHEST 24-HR RESULTS ***


                                   ** CONC OF PM_2.5   IN
MICROGRAMS/M**3                         **

                                                       DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)
RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH   1ST HIGH VALUE IS       2.45188  ON 11111824: AT (
466291.88,  3783831.12,   529.27,  1659.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

```
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

 *** Message Summary : AERMOD Model Execution ***

  --------- Summary of Total Messages --------

 A Total of            0 Fatal Error Message(s)
 A Total of            1 Warning Message(s)
 A Total of         1086 Informational Message(s)

 A Total of        43824 Hours Were Processed

 A Total of           37 Calm Hours Identified

 A Total of         1049 Missing Hours Identified (  2.39 Percent)


    ******** FATAL ERROR MESSAGES ********
                ***  NONE  ***


    ********   WARNING MESSAGES   ********
 ME W531    1375       MEOPEN: CAUTION! Met Station ID Missing from
SURFFILE for      SURFDATA
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\TOGGAS\TOGGAS.isc                  ***        12/09/15
 *** AERMET - VERSION  14134 ***   ***
***        15:43:06

PAGE   1
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                            ***     MODEL SETUP OPTIONS
SUMMARY       ***
 - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - -

 **Model Is Setup For Calculation of Average CONCentration Values.

   --  DEPOSITION LOGIC  --
 **NO GAS DEPOSITION Data Provided.
 **NO PARTICLE DEPOSITION Data Provided.
 **Model Uses NO DRY DEPLETION.  DRYDPLT  =  F
 **Model Uses NO WET DEPLETION.  WETDPLT  =  F

 **Model Uses URBAN Dispersion Algorithm for the SBL for   593 Source(s),
   for Total of    1 Urban Area(s):
   Urban Population =   2015355.0 ;  Urban Roughness Length =  1.000 m

 **Model Uses Regulatory DEFAULT Options:
         1. Stack-tip Downwash.
         2. Model Accounts for ELEVated Terrain Effects.
         3. Use Calms Processing Routine.
         4. Use Missing Data Processing Routine.
         5. No Exponential Decay.
         6. Urban Roughness Length of 1.0 Meter Assumed.

 **Other Options Specified:
         TEMP_Sub - Meteorological data includes TEMP substitutions

 **Model Assumes No FLAGPOLE Receptor Heights.

 **The User Specified a Pollutant Type of:  TOGGAS

 **Model Calculates  2 Short Term Average(s) of:   1-HR   8-HR
     and Calculates ANNUAL Averages

 **This Run Includes:    593 Source(s);       1 Source Group(s); and
17 Receptor(s)

                with:      0 POINT(s), including
                           0 POINTCAP(s) and      0 POINTHOR(s)
                 and:    593 VOLUME source(s)
                 and:      0 AREA type source(s)
                 and:      0 LINE source(s)
                 and:      0 OPENPIT source(s)
```

```
 **Model Set To Continue RUNning After the Setup Testing.

 **The AERMET Input Meteorological Data Version Date:  14134

 **Output Options Selected:
          Model Outputs Tables of ANNUAL Averages by Receptor
          Model Outputs Tables of Highest Short Term Values by Receptor
(RECTABLE Keyword)
          Model Outputs External File(s) of High Values for Plotting
(PLOTFILE Keyword)
          Model Outputs Separate Summary File of High Ranked Values
(SUMMFILE Keyword)

 **NOTE:  The Following Flags May Appear Following CONC Values:  c for
Calm Hours
                                                                  m for
Missing Hours
                                                                  b for
Both Calm and Missing Hours

 **Misc. Inputs:  Base Elev. for Pot. Temp. Profile (m MSL) =   305.00 ;
Decay Coef. =    0.000     ;  Rot. Angle =     0.0
                  Emission Units = GRAMS/SEC
;  Emission Rate Unit Factor =   0.10000E+07
                  Output Units   = MICROGRAMS/M**3

 **Approximate Storage Requirements of Model =      3.8 MB of RAM.

 **Detailed Error/Message File:   TOGGAS.err
 **File for Summary of Results:   TOGGAS.sum
```

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** METEOROLOGICAL DAYS SELECTED FOR PROCESSING *** (1=YES; 0=NO)

```
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
1   1 1 1 1 1 1 1 1 1 1   1 1 1 1 1 1 1 1 1 1
           1 1 1 1 1 1 1 1 1 1   1 1 1 1 1
```

NOTE: METEOROLOGICAL DATA ACTUALLY PROCESSED WILL ALSO DEPEND ON WHAT IS INCLUDED IN THE DATA FILE.

*** UPPER BOUND OF FIRST THROUGH FIFTH WIND SPEED CATEGORIES *** (METERS/SEC)

1.54, 3.09, 5.14, 8.23, 10.80,

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\TOGGAS\TOGGAS.isc                 ***        12/09/15
 *** AERMET - VERSION  14134 ***   ***
***        15:43:06

PAGE   3
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                    *** UP TO THE FIRST 24 HOURS OF
METEOROLOGICAL DATA ***

   Surface file:   ..\snbo8.sfc
Met Version:  14134
   Profile file:   ..\snbo8.PFL
   Surface format: FREE
   Profile format: FREE
   Surface station no.:     3190                  Upper air station no.:
3190
                  Name: UNKNOWN                                     Name:
UNKNOWN
                  Year:   2007                                      Year:
2007

 First 24 hours of scalar data
 YR MO DY JDY HR     H0     U*     W*  DT/DZ ZICNV ZIMCH  M-O LEN    Z0
BOWEN ALBEDO  REF WS   WD     HT  REF TA     HT
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - -
 07 01 01   1 01   -0.5  0.030 -9.000 -9.000 -999.   12.      4.4  0.32
1.00   1.00    0.50   27.    9.1  279.9    5.5
 07 01 01   1 02   -0.5  0.030 -9.000 -9.000 -999.   12.      4.3  0.32
1.00   1.00    0.50    7.    9.1  279.2    5.5
 07 01 01   1 03   -0.5  0.030 -9.000 -9.000 -999.   12.      4.3  0.32
1.00   1.00    0.50   97.    9.1  278.8    5.5
 07 01 01   1 04   -0.7  0.030 -9.000 -9.000 -999.   12.      3.1  0.32
1.00   1.00    0.50  148.    9.1  278.1    5.5
 07 01 01   1 05   -2.4  0.054 -9.000 -9.000 -999.   30.      5.5  0.32
1.00   1.00    0.90   87.    9.1  278.1    5.5
 07 01 01   1 06   -1.7  0.054 -9.000 -9.000 -999.   30.      7.8  0.32
1.00   1.00    0.90  208.    9.1  277.0    5.5
 07 01 01   1 07   -1.7  0.054 -9.000 -9.000 -999.   30.      7.8  0.32
1.00   1.00    0.90  156.    9.1  277.5    5.5
 07 01 01   1 08   -1.7  0.054 -9.000 -9.000 -999.   30.      7.8  0.32
1.00   0.52    0.90   60.    9.1  277.5    5.5
 07 01 01   1 09   34.6  0.390  0.621  0.005  241.  585.   -149.6  0.32
1.00   0.31    3.10  264.    9.1  282.5    5.5
 07 01 01   1 10   78.0  0.267  1.066  0.005  541.  341.    -21.3  0.32
1.00   0.24    1.80  242.    9.1  289.2    5.5
 07 01 01   1 11  112.9  0.612  1.395  0.019  839. 1149.   -176.9  0.32
1.00   0.21    4.90   82.    9.1  290.4    5.5
 07 01 01   1 12  130.3  0.615  1.611  0.020 1120. 1158.   -155.8  0.32
1.00   0.20    4.90   74.    9.1  290.9    5.5
 07 01 01   1 13  128.2  0.671  1.662  0.015 1250. 1315.   -204.9  0.32
1.00   0.20    5.40   59.    9.1  290.9    5.5
```

```
 07 01 01   1 14  107.5  0.712  1.575  0.007 1267. 1439.   -292.1  0.32
1.00   0.22    5.80   58.    9.1  291.4    5.5
 07 01 01   1 15   68.1  0.602  1.356  0.021 1277. 1137.   -279.3  0.32
1.00   0.25    4.90   40.    9.1  291.4    5.5
 07 01 01   1 16   18.1  0.438  0.872  0.021 1278.  724.   -405.7  0.32
1.00   0.34    3.60  312.    9.1  292.0    5.5
 07 01 01   1 17  -25.8  0.263 -9.000 -9.000 -999.  353.     61.6  0.32
1.00   0.63    2.70  342.    9.1  290.9    5.5
 07 01 01   1 18   -4.9  0.077 -9.000 -9.000 -999.  114.      8.1  0.32
1.00   1.00    1.30  256.    9.1  289.2    5.5
 07 01 01   1 19   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  191.    9.1  289.9    5.5
 07 01 01   1 20   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  197.    9.1  289.9    5.5
 07 01 01   1 21   -4.9  0.077 -9.000 -9.000 -999.   52.      8.1  0.32
1.00   1.00    1.30  190.    9.1  289.9    5.5
 07 01 01   1 22   -2.4  0.054 -9.000 -9.000 -999.   30.      5.6  0.32
1.00   1.00    0.90  188.    9.1  289.2    5.5
 07 01 01   1 23   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80  162.    9.1  289.9    5.5
 07 01 01   1 24   -9.5  0.107 -9.000 -9.000 -999.   84.     11.3  0.32
1.00   1.00    1.80   42.    9.1  289.2    5.5


 First hour of profile data
 YR MO DY HR HEIGHT F  WDIR    WSPD AMB_TMP sigmaA  sigmaW  sigmaV
 07 01 01 01    5.5 0 -999.  -99.00   279.9   99.0  -99.00  -99.00
 07 01 01 01    9.1 1   27.    0.50  -999.0   99.0  -99.00  -99.00

 F indicates top of profile (=1) or below (=0)
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\TOGGAS\TOGGAS.isc                 ***        12/09/15
 *** AERMET - VERSION  14134 ***   ***
***        15:43:06

PAGE   4
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                  *** THE SUMMARY OF MAXIMUM ANNUAL
RESULTS AVERAGED OVER   5 YEARS ***


                                   ** CONC OF TOGGAS   IN
MICROGRAMS/M**3                         **


NETWORK
GROUP ID                      AVERAGE CONC               RECEPTOR  (XR,
YR, ZELEV, ZHILL, ZFLAG)  OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - -

ALL       1ST HIGHEST VALUE IS       0.36546 AT (  466291.88,
3783831.12,   529.27,  1659.00,    0.00)  DC
          2ND HIGHEST VALUE IS       0.35904 AT (  466304.64,
3783821.25,   528.68,  1659.00,    0.00)  DC
          3RD HIGHEST VALUE IS       0.35270 AT (  466281.57,
3783842.91,   529.61,  1659.00,    0.00)  DC
          4TH HIGHEST VALUE IS       0.34946 AT (  466271.27,
3783852.69,   529.95,  1659.00,    0.00)  DC
          5TH HIGHEST VALUE IS       0.34574 AT (  466259.69,
3783863.76,   530.59,  1659.00,    0.00)  DC
          6TH HIGHEST VALUE IS       0.33907 AT (  466248.62,
3783875.09,   531.34,  1659.00,    0.00)  DC
          7TH HIGHEST VALUE IS       0.33619 AT (  466236.52,
3783886.42,   532.11,  1659.00,    0.00)  DC
          8TH HIGHEST VALUE IS       0.32712 AT (  466204.08,
3783917.31,   533.22,  1659.00,    0.00)  DC
          9TH HIGHEST VALUE IS       0.32301 AT (  466188.89,
3783931.72,   533.85,  1659.00,    0.00)  DC
         10TH HIGHEST VALUE IS       0.31722 AT (  466173.19,
3783947.17,   534.01,  1659.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

```
 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\TOGGAS\TOGGAS.isc                 ***        12/09/15
 *** AERMET - VERSION  14134 ***   ***
***        15:43:06

PAGE   5
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                                *** THE SUMMARY OF
HIGHEST  1-HR RESULTS ***


                                   ** CONC OF TOGGAS   IN
MICROGRAMS/M**3                         **

                                                        DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)
RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH   1ST HIGH VALUE IS       0.95901  ON 11122720: AT (
466188.89,  3783931.72,   533.85,  1659.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
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 *** AERMOD - VERSION  15181 ***   *** C:\Lakes\AERMOD View\Rancho
Palma\TOGGAS\TOGGAS.isc                 ***        12/09/15
 *** AERMET - VERSION  14134 ***   ***
***        15:43:06

PAGE   6
 **MODELOPTs:   RegDFAULT CONC      ELEV      URBAN

                                                *** THE SUMMARY OF
HIGHEST  8-HR RESULTS ***


                                   ** CONC OF TOGGAS   IN
MICROGRAMS/M**3                         **

                                                        DATE
NETWORK
GROUP ID                          AVERAGE CONC     (YYMMDDHH)
RECEPTOR  (XR, YR, ZELEV, ZHILL, ZFLAG)    OF TYPE  GRID-ID
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - - -
- - - - - - - - - - - - - - - - - - - - - - - - - - - - - -

ALL      HIGH   1ST HIGH VALUE IS       0.72513m ON 11081508: AT (
466291.88,  3783831.12,   529.27,  1659.00,    0.00)  DC


 *** RECEPTOR TYPES:  GC = GRIDCART
                      GP = GRIDPOLR
                      DC = DISCCART
                      DP = DISCPOLR
```

**MODELOPTs: RegDFAULT CONC ELEV URBAN

*** Message Summary : AERMOD Model Execution ***

--------- Summary of Total Messages --------

A Total of 0 Fatal Error Message(s)
A Total of 1 Warning Message(s)
A Total of 1086 Informational Message(s)

A Total of 43824 Hours Were Processed

A Total of 37 Calm Hours Identified

A Total of 1049 Missing Hours Identified (2.39 Percent)

******** FATAL ERROR MESSAGES ********
*** NONE ***

******** WARNING MESSAGES ********
ME W531 1375 MEOPEN: CAUTION! Met Station ID Missing from SURFFILE for SURFDATA

3.3-1 Burrowing Owl Survey Letter Report

September 1, 2015

Eric Flodine
Strata Equity Group
Real Estate Investments
4370 La Jolla Village Dr. Suite 960
San Diego, CA 92122

RE: Burrowing Owl Survey Report Property on Little League Drive, West of Palm Avenue, Verdemont Area of San Bernardino County

Dear Mr. Flodine,

Jericho Systems, Inc. (Jericho) is pleased to provide this letter report of findings for a protocol burrowing owl (*Athene cunicularia*, [BUOW]) survey conducted for the approximately 40-acre site along Little League Drive, west of Palm Avenue, in the Verdemont area of San Bernardino County.

Summary information:

- *Date report prepared: July 23, 2015*
- *Project site location USGS – San Bernardino North 7.5 Minute Series Quadrangle, Sections 1, 2, and 12, of Township 1 North, Range 5 West*
- *Assessor's Parcel Numbers: 0261-181-01, 0261-181-13, 0261-181-14, 0261-181-15, and 0261-182-10*
- *Owner/Applicant: Strata Equity Group, Inc.*
- *Principal Investigator: Shay Lawrey*
- *Name of person preparing report: Shay Lawrey*
- *Address: 18 E. State Street, Ste. 208, Redlands, CA 92373*
- *Phone: (909) 915-5900*
- *Report Summary: No BUOW individuals, active burrows or BUOW sign was observed during survey. This project will not result in significant impacts to burrowing owl pursuant to the California Environmental Quality Act.*

The approximately 40-acre site is located along the northeast side of West Little League Drive and west of Palm Avenue in the Verdemont Area of San Bernardino County, California The Assessor's Parcel Numbers (APNs) associated with the site include 0261-181-01, 0261-181-13, 0261-181-14, 0261-181-15, and 0261-182-10. The parcels fall within the boundaries of the "Biological Resources Management Area" (BRM) identified in the City of San Bernardino General Plan, which requires that all proposed land uses in the BRM be subject to review by the Environmental Review Committee (ERC). Among other requirements, the City General Plan requires that the proposed project's impact on sensitive species and habitat, especially those that are identified in State and Federal conservation programs, must be addressed before development in the BRM.

Jericho conducted protocol-level focused BUOW surveys to determine the presence or absence of BUOW on the site. The results of Jericho's BUOW focused survey are intended to provide sufficient baseline information to the City of San Bernardino and, if required, to federal and State regulatory agencies, including U.S. Fish and Wildlife Service (USFWS) and California Department of Fish and Wildlife (CDFW), respectively, to determine if impacts will occur and to identify mitigation measures to offset those impacts.

Species Information

The BUOW is a small, long-legged, ground-dwelling bird species, well-adapted to open, relatively flat expanses. In California, preferred habitat is generally typified by short, sparse vegetation with few shrubs, level to gentle topography and well-drained soils (Haug et al. 1993). Grassland, shrub steppe, and desert are naturally occurring habitat types used by the species. In addition, BUOW may occur in some agricultural areas, ruderal grassy fields, vacant lots and pastures, and flood control facilities, if the vegetation structure is suitable and there are useable burrows and foraging habitat in proximity (Gervais et al 2008). Unique among North American raptors, the BUOW requires underground burrows or other cavities for nesting during the breeding season and for roosting and cover, year round. Burrows used by the owls are usually dug by other species termed host burrowers. In California, California ground squirrel (*Spermophilus beecheyi*) and round-tailed ground squirrel (*Citellus tereticaudus*) burrows are frequently used by BUOW but they may use dens or holes dug by other fossorial species. Habitat loss, fragmentation, and alteration of the ecosystem have contributed to burrowing owl declines. BUOW are protected under the Migratory Bird Treaty Act (MBTA) and are considered by CDFW as a Species of Special Concern.

Project Location

The Project site located along the northeast side of West Little League Drive and west of Palm Avenue in the Verdemont Area of San Bernardino County, California and can be found within Sections 1, 2, and 8, of Township 1 North, Range 5 West of the 7.5' U.S. Geological Survey (USGS) – *San Bernardino North* topographic quadrangle. The land is relatively flat with no notable natural features and is situated at an elevation of approximately 1,750 feet above mean sea level (Figures 1-3).

Site Characteristics

The approximately 40-acre site is surrounded entirely by urban development including commercial and residential land uses. Currently, regular disking appears to be occurring onsite as it has apparently occurred onsite for at least the past 12 years (Figure 3). Only bare ground, non-native and ruderal vegetation exists throughout most of the site. The 0.5-acre portion of the site that is adjacent the north side of Cable Creek consists mostly of non-native ruderal species. Native plant species observed onsite include mulefat (*Baccharis salicifolia*), hairy yerba santa (*Eriodictyon trichocalyx*), buckwheat (*Eriogonum fasciculatum*), sunflower (*Helianthus annuus*), and scalebroom (*Lepidospartum squamatum*). The majority of plant species observed onsite were non-native, invasive species including giant reed (*Arundo donax*), star thistle (*Centaurea melitensis*), redstem stork's bill (*Erodium cicutarium*), shortpod mustard (*Hirschfeldia incana*), tree tobacco (*Nicotiana glauca*), Russian thistle (*Salsola tragus*), tamarisk (*Tamarix ramosissima*), and puncturevine (*Tribulus terrestris*). There are also numerous non-native olive trees (*Olea europaea*) lining the northwestern boundary of the site, adjacent to the southeast side of the Magnolia Avenue alignment.

There is a very small patch (less than 2500 square feet) of native alluvial scrub vegetation at the furthest southeast corner of the site consisting of hairy yerba santa, buckwheat, and scalebroom. Much of the northern boundary of the Project site abuts the levee of the south side of Cable Creek and an approximately 475-foot stretch of Cable Creek is located within the northeastern corner of the Project site. The immediately adjacent uses are consistent with the land uses in the general area and include residential and commercial uses.

Methods

An initial BUOW habitat suitability assessment was conducted by a combination of database research and field reconnaissance. All project site research and survey was conducted by Jericho

Ecologist Shay Lawrey. Ms. Lawrey is an Ecologist and Regulatory Specialist who received a B.A. in Environmental Studies from the University of California, Santa Cruz and M.S. in Biology from Occidental College. Ms. Lawrey has over a decade of experience conducting BUOW habitat assessments and focused/protocol surveys for BUOW throughout the desert ecotones of Riverside and San Bernardino Counties.

Background information was gathered prior to visiting the project site to obtain information on rare and listed plant and animal species' occurrences in the vicinity. The reconnaissance-level survey was conducted on November 2, 2014 and included complete coverage of the subject property and surrounding areas when feasible, with special attention focused toward BUOW and those habitats potentially supporting BUOW. The habitat assessment for BUOW included a pedestrian field assessment, review of reported occurrences of the BUOW in the region (CNDDB 2014), and adherence to the "Burrowing Owl Survey Protocol and Mitigation Guidelines" prepared by the California Burrowing Owl Consortium on April 1993 and the March 7, 2012 "California Department of Fish and Game staff report on Burrowing Owl Mitigation". During the site walk over, Ms. Lawrey looked for sign including, burrows, molted feathers, cast pellets, prey remains, and owl white wash. The area was also assessed for soil type and level of friability as well as habitat type and habitat structure. The result of the habitat assessment was that numerous potentially suitable burrows were identified and the habitat onsite is suitable for BUOW. This species has been documented to occur within the general area. No BUOW individuals or sign were observed during the habitat assessment.

Since suitable burrowing owl habitat was found on site, focused surveys were conducted per protocol on March 9th, April 21st, June 1st, and July 14th, 2015. These surveys typically take place during the breeding season (February 1st to August 31st), though they can be conducted out of season. If the surveys are conducted in breeding season, four surveys are required, one of which must occur between February 15th and April 15th, with the other three at least three weeks apart between April 15th and July 15th. Of these final three surveys, one must occur after June 15th. If the surveys are conducted outside of the breeding season (September 1st through January 31st), there must be four surveys on the property site with the timing of the surveys spread evenly throughout the non-breeding season.

Ms. Lawrey followed the BUOW protocols and guidelines stated above. The BUOW survey protocol calls for transects spaced at no more than 100-foot intervals. If signs of historical or recent burrowing owl activity is found on site, then a breeding season survey and census is required. The surveys were conducted on calm weather days, during peak BUOW activity between the morning hours of 6:00 a.m. and 9:30 a.m. and evening hours of 2:30 p.m. to 5:30 p.m. During the site visits, pedestrian surveys covered all open areas of the project site and zone of influence areas (where accessible) to account for any adjacent burrows or foraging habitat. Pedestrian survey transects were spaced to allow 100 percent visual coverage of the ground surface. Natural and non-natural substrates were examined for potential burrow sites. All burrows encountered were examined for shape, scat, pellets, and tracks. Disturbance characteristics and all other animal sign encountered on the site are recorded in the results section. Date time and weather conditions were logged. A hand-held, global positioning system (GPS) unit was used to survey straight transects and record Universal Transverse Mercador (UTM) coordinates (North American Datum - NAD 27), to identify project boundaries, and for other pertinent information. A digital camera was used to take representative photographs, and 2015 Google Earth Pro was accessed to provide recent aerial photographs of the project site and surrounding area.

No limitations significantly affected the results and conclusions given herein. Zone of influence transects could not be surveyed within the areas occupied by existing housing and other development. Surveys were conducted during the appropriate season to observe the target species, in good weather conditions, by a qualified biologist who followed all pertinent protocols.

Results

The Project site has been disturbed by regular disking, pedestrian traffic and canine presence. Only bare ground and ruderal vegetation exists throughout most of the site. The 0.5-acre portion of the site that is adjacent the north side of Cable Creek consists mostly of non-native ruderal species. There are no natural watercourses or wetlands on the site. There are numerous non-native olive trees lining the northwestern boundary of the site, adjacent the southeast side of the Magnolia Avenue alignment. The soils on site are friable and conducive to burrowing.

The focused surveys were structured to detect BUOW. No evidence of BUOW was found in the survey area. There are numerous ground squirrel and other small mammal burrows located throughout the site, particularly along the Cable Creek levee, which borders the north side of the site. No BUOW sign including burrows, molted feathers, cast pellets, prey remains, and owl white wash was observed within the survey area. No BUOW individuals were observed within the survey area.

Conclusions

BUOW are considered absent from the 40-acre project site located along the northeast side of West Little League Drive and west of Palm Avenue in the Verdemont Area of San Bernardino County, California. According to protocol and standard practices, the results of this survey will remain valid for the period of one year, after which time, if the site has not been disturbed in the interim, another survey may be required to determine the presence of BUOW and other sensitive flora and fauna on-site.

As discussed, the BUOW are a CDFW Species of Special Concern and are protected by the MBTA. In general, impacts to BUOW can be avoided by conducting work outside of their nesting season (peak burrowing owl breeding season is identified as April 15th to July 15th), and conducting a worker awareness training. However, if all work cannot be conducted outside of nesting season, a project-specific BUOW protection and/or passive relocation plan can be prepared to determine suitable buffers and/or artificial burrow construction locations.

Regardless of survey results and conclusions given herein, BUOW are protected by applicable State and/or federal laws. As such, if a BUOW is found on-site at the time of construction, all activities likely to affect the animal(s) should cease immediately and regulatory agencies should be contacted to determine appropriate management actions. Importantly, nothing given in this report is intended to authorize any form of disturbance to BUOW. Such authorization must come from the appropriate regulatory agencies, including CDFG and/or USFWS.

Please do not hesitate to contact me at 909-915-5900 should you have any questions or require further information.

Sincerely,

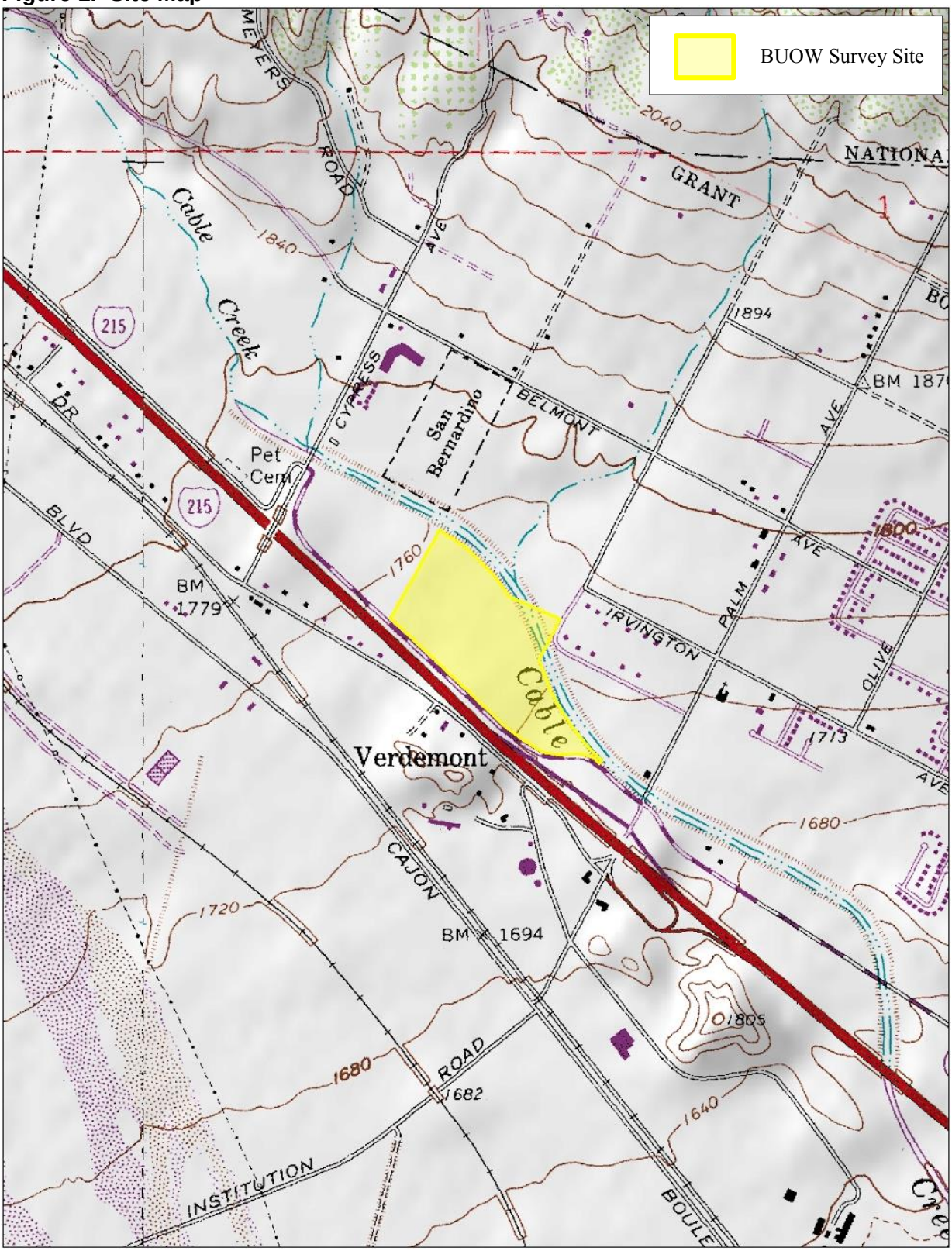
Shay Lawrey, President
Ecologist/Regulatory Specialist

Attachments:

- Figures
  - Project Site Map
  - Aerial Photograph of Site

- Site Photographs 1-2
- Wildlife Species Observed

Figure 1. Site Map



Data use subject to license.

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www.delorme.com

MN (12.0° E)

0 400 800 1200 1600 2000 ft

Data Zoom 13-7

Figure 2. Aerial Photograph of Site

Site Photographs

Photo 1. Study area (facing northwest) from the southeast corner of the site.

Photo 2. Study area (facing north) from southwest corner, showing onsite disturbance.

Photo 3. Northwest corner of Project site, facing east. Site recently disked; Cable Creek levee visible on the upper left side.

Photo 4. Northeast corner of Project site; 0.5-acre portion north of Cable Creek, facing north.

Wildlife Species Observed

Common Name	Scientific Name
Birds	**Class Aves**
Larks	**Alaudidea**
horned lark	*Eremophila alpestris*
Jays, magpies, and crows	**Corvidae**
American row	*Corvus brachyrhynchos*
common raven	*Corvus corax*
Caracaras and falcons	**Falconidae**
American kestrel	*Falco sparverius*
Finches	**Fringillidae**
house finch	*Haemorhous mexicanus*
Swallows	**Hirundinidae**
northern rough-winged swallow	*Stelgidopteryx serripennis*
Starlings and allies	**Sturnidae**
European starling	*Sturnus vulgaris*
Tyrant flycatchers	**Tyrannidae**
Say's phoebe	*Sayornis saya*
Mammals	**Class Mammalia**
Foxes, Wolves, and Relatives	**Canidae**
domestic dog	*Canis lupus familiaris*
Pocket gophers	**Geomyidae**
Botta's pocket gopher	*Thomomys bottae*
Squirrels, Chipmunks, and Marmots	**Sciuridae**
California ground squirrel	*Spermophilus beecheyi*
Reptiles	**Class Reptilia**
Alligator lizards and relatives	**Anguidae**
western side-blotched lizard	*Uta stansburiana elegans*

3.3-2 Biological Resources Report

Biological Resources Report
Rancho Palma Project
San Bernardino, California

USGS 7.5' Series San Bernardino North Quadrangle
Sections 1, 2, and 8, of Township 1 North, Range 5 West

Prepared for:

Strata Equity Group, Inc.
Real Estate Investments
4370 La Jolla Village Dr. Suite 960
San Diego, CA 92122
Contact Person: Eric Flodine

For Submittal to:

City of San Bernardino
Planning Department
300 N. "D" Street - 3rd Floor
San Bernardino, CA 92418

September 01, 2015

Prepared by:

Jericho Systems, Inc
Shay Lawrey, President
18 E. State Street, Suite 208
Redlands, California 92373

Certification

Jericho Systems, Inc
18 E. State Street, Suite 208
Redlands, California 92373
(909) 915-5900

Contact: Shay Lawrey, President and Ecologist/Regulatory Specialist

Certification: I hereby certify that the statements furnished herein, and in the attached exhibits present data and information required for this analysis to the best of my ability, and the facts, statements, and information presented are true and correct to the best of my knowledge and belief. This report was prepared in accordance with professional requirements and standards. Fieldwork conducted for this assessment was performed by me. I certify that I have not signed a non-disclosure or consultant confidentiality agreement with the project proponent and that I have no financial interest in the project.

Shay Lawrey, Ecologist/Regulatory Specialist

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- Figures 1-4
- Site Photos 1-6
- Appendix A: BUOW Survey Report

1 Introduction

Jericho Systems, Inc. (Jericho) performed a general biological resources survey of the property associated with the proposed Rancho Palma Project (Project) to identify any sensitive or protected biological resources that occur within or adjacent to the Project footprint and to determine if any project-related impacts would result in impacts to those resources. This report is designed to address potential effects of the Project to designated critical habitats and/or any species currently listed or formally proposed for listing as endangered or threatened under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA) or species designated as sensitive by the California Department of Fish and Wildlife (CDFW, formerly California Department and Fish and Game) or the California Native Plant Society (CNPS).

Special status species are native species that have been afforded special legal or management protection because of concern for their continued existence. There are several categories of protection at both federal and state levels, depending on the magnitude of threat to the continued existence and existing knowledge of population levels. For example:

- The U.S. Fish and Wildlife Service (USFWS) administers the federal ESA of 1973. The ESA provides a legal mechanism for listing species as either threatened or endangered, and a process of protection for those species listed. Section 9 of the ESA prohibits "take" of threatened or endangered species. The term "take" means to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in such conduct. "Take" can include adverse modification of habitats used by a threatened or endangered species during any portion of its life history. Under the regulations of the ESA, the USFWS may authorize "take" when it is incidental to, but not the purpose of, an otherwise lawful act. Take authorization can be obtained under Section 7 or Section 10 of the act.

- The Migratory Bird Treaty Act protects all native breeding birds, whether or not they are considered sensitive by resource agencies.

- The CDFW administers the state CESA. The State of California considers an endangered species one whose prospects of survival and reproduction are in immediate jeopardy. A threatened species is one present in such small numbers throughout its range that it is likely to become an endangered species in the near future in the absence of special protection or management. And a rare species is one present in such small numbers throughout its range that it may become endangered if its present environment worsens. Rare species applies to California native plants. Further, all raptors and their nests are protected under '3503.5 of the California Fish and Game Code. Species that are California fully protected include those protected by special legislation for various reasons, such as the California condor. Species of Special Concern (SSC) is an informal designation used by CDFW for some declining wildlife species that are not proposed for listing as threatened or endangered. This designation does not provide legal protection, but signifies that these species are recognized as sensitive by CDFW.

In addition to potential impacts to designated critical habitats and special status species, potential impacts to jurisdictional waters must be considered. The Project is located adjacent to Cable Creek. Impacts to jurisdictional waters typically require regulatory approvals from one or more of the following regulatory agencies: U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and/or CDFW.

2 Description of Project Area

The approximately 40-acre Project site is located along the northeast side of West Little League Drive and west of Palm Avenue in the Verdemont Area of San Bernardino County, California and can be found within Sections 1, 2, and 8, of Township 1 North, Range 5 West of the 7.5' U.S. Geological Survey (USGS) – *San Bernardino North* topographic quadrangle. More specifically, the property is identified as Assessor Parcel Numbers (APNs) 0261-181-01, 0261-181-13, 0261-181-14, 0261-181-15, and 0261-182-10.The land is relatively flat with no notable natural features and is situated at an elevation of approximately 1,750 feet above mean sea level (Figures 1-3).

3 Methods

Data regarding biological resources on the project area were obtained through literature review and field investigations. Background information was gathered prior to visiting this site in order to determine which species would be expected in the Area of Potential Effect (APE) for this project. The USFWS Information, Planning, and Conservation System (IPaC) was reviewed for an up to date list of federally-listed species and critical habitats occurring or expected to occur within the Project area. The California Natural Diversity Database (CNDDB) and the California Native Plant Society's (CNPS) Inventory of Rare and Endangered Plants of California were reviewed for the San Bernardino North and Devore U.S. Geological Survey (USGS) quadrangles. The Project site occurs in the west portion of the San Bernardino North USGS quadrangle and the site's close proximity to the Devore USGS quadrangle lead to its inclusion in the review. These databases contain records of reported occurrences of State and/or federally-listed endangered or threatened species, proposed endangered or threatened species, California Species of Concern (CSC), or otherwise sensitive species or habitats that may occur within or in the immediate vicinity of the Project site.

Jericho biologist Shay Lawrey surveyed the Project site on May 15, 2015. Ms. Lawrey is an Ecologist and Regulatory Specialist that is permitted (USFWS permit number TE 094308-3) by the USFWS to trap and handle San Bernardino kangaroo rat (*Dipodomys merriami parvus*) [SBKR]. She received a B.A. in Environmental Studies from the University of California, Santa Cruz and M.S. in Biology from Occidental College. Ms. Lawrey specializes in endangered species surveys and has over fifteen years of biological survey experience throughout San Bernardino and Riverside Counties.

Ms. Lawrey walked the entire Project site as well as a buffer area of approximately 200 feet wherever adjacent habitat was present. The survey encompassed the following objectives: (1) recording of dominant vegetation communities; (2) floristic plant surveys; (3) general wildlife surveys; and habitat assessment for sensitive species. Wildlife species were detected during field surveys by sight, calls, tracks, scat, or other sign. In addition to species actually observed, expected wildlife usage of the site was determined according to known habitat preferences of regional wildlife species and knowledge of their relative distributions in the area. The focus of the faunal species surveys was to identify potential habitat for special status wildlife within the project area. Special attention was focused toward SBKR and burrowing owl (*Athene cunicularia*) [BUOW] and those habitats potentially supporting BUOW and/or SBKR. The habitat assessment for BUOW and SBKR included a pedestrian field assessment and a review of reported occurrences of these species in the region. Field assessment methods adhered to Ms. Lawrey's Section 10a permit for SBKR and to the "Burrowing Owl Survey Protocol and Mitigation Guidelines" prepared by the California Burrowing Owl Consortium on April 1993 and the March 7, 2012 "California Department of Fish and Game staff report on Burrowing Owl Mitigation". Survey transects were spaced to allow 100 percent visual coverage of the ground surface. The bases of perennial shrubs were checked for burrows and signs. Natural and non-natural substrates were examined for potential burrow sites. All

burrows encountered were examined for tail drags, tracks, and scat indicative of kangaroo rats and owl white wash, feathers and castings indicative of BUOW. The soil type and level of friability was assessed, as well as habitat type and habitat structure. Disturbance characteristics and all other animal sign encountered on the site are recorded in the results section. Date time and weather conditions were logged.

Ms. Lawrey also evaluated the property for the presence of jurisdictional waters i.e. waters of the U.S. as regulated by the U.S. Army Corps of Engineers (USACE) and the Regional Water Quality Control Board (RWQCB), and/or jurisdictional streambed and associated riparian habitat as regulated by the California Department of Fish and Wildlife (CDFW). Ms. Lawrey is an experienced and qualified Regulatory Specialists who conducted the routine JD in accordance with regulations set forth in the Fish and Game Code and 33CFR part 328 and the USACE guidance documents. Ms. Lawrey reviewed the pertinent topographic map to identify topographic changes, blue-line features, or visible drainage patterns and she examined historical aerial photographs to gain an understanding of the impact of land-use on natural drainage patterns in the area. The National Wetland Inventory and Environmental Protection Agency (EPA) Water Program "My Waters" data layer was also reviewed to determine whether any hydrologic features and wetland areas had been documented within the vicinity of the site. She systematically inspected on site and adjacent drainage features to determine the jurisdictional status.

4 Results

No limitations or constraints could be identified that could influence the survey results. Surveys were conducted during the appropriate season, in preferable weather conditions, and by a qualified biologist who followed all pertinent protocols and/or guidelines.

4.1 Environmental Setting

The San Bernardino area is subject to both seasonal and annual variations in temperature and precipitation. Average annual maximum temperatures typically peak at 96 degrees Fahrenheit (°F) in August, and fall to an annual minimum temperatures of 41°F in December. Average annual precipitation is greatest from December through March and reaches a peak in February (3.83 inches). Precipitation is lowest in the month of July (0.04 inches). Annual precipitation averages 22.6 inches.

Located east of Cajon Creek Wash and adjacent to the west side of Cable Creek, the 40-acre Project site is on the south side of the San Bernardino Mountains within the Verdemont area of San Bernardino County. An approximately 0.5-acre portion of APN 0261-181-15 exists on the east side of Cable Creek as well. Soils in this area are dominated by Soboba Stony Loamy Sand and Tujunga Gravelly Loamy Sand series. These series are characteristically excessively well drained to somewhat excessively well drained soils formed in alluvium from predominantly granitic rock sources and is usually found in alluvial fans and flood plains. They primarily consist of very stony, gravelly, loamy sand.

Hydrologically, the Verdemont area is located within the Cable Creek Sub-unit (HUC 180702030304) which comprises a 22 square mile drainage area within the larger Santa Ana River Watershed (HUC 18070203). The closest tributary to the Santa Ana River is Lytle Creek Wash, which is located approximately 2 miles southwest of the project site and west of Cajon Wash. Cable Creek is tributary to Cajon Wash which flows adjacent to the project site, approximately 0.63 mile to the west. Cajon Wash converges with Lytle Creek Wash approximately 8.3 miles northwest (upstream) of the Lytle Creek/Santa Ana River Confluence. The Santa Ana River watershed is located in southern California, south and east of the city of Los Angeles. The watershed includes much of Orange County, the northwestern corner of Riverside County, the southwestern corner of San Bernardino County, and a small portion of Los Angeles

County. The watershed is bounded on the south by the Santa Margarita watershed, on the east by the Salton Sea and Southern Mojave watersheds, and on the north/west by the Mojave and San Gabriel watersheds. The watershed is approximately 2,800 square miles in area.

4.2 Habitat within the Project Area

The Project site is completely surrounded by residential and commercial development. Currently, regular disking appears to be occurring onsite as it has apparently occurred onsite for at least the past 12 years (Figure 3). The site is completely disturbed and there is evidence of dumping. Only bare ground, non-native and ruderal vegetation exists throughout most of the site. The 0.5-acre portion of the site that is adjacent the north side of Cable Creek consists mostly of non-native ruderal species. Native plant species observed onsite include mulefat (*Baccharis salicifolia*), hairy yerba santa (*Eriodictyon trichocalyx*), buckwheat (*Eriogonum fasciculatum*), sunflower (*Helianthus annuus*), and scalebroom (*Lepidospartum squamatum*). The majority of plant species observed onsite were non-native, invasive species including giant reed (*Arundo donax*), star thistle (*Centaurea melitensis*), redstem stork's bill (*Erodium cicutarium*), shortpod mustard (*Hirschfeldia incana*), tree tobacco (*Nicotiana glauca*), Russian thistle (*Salsola tragus*), tamarisk (*Tamarix ramosissima*), and puncturevine (*Tribulus terrestris*). There are also numerous non-native olive trees (*Olea europaea*) lining the northwestern boundary of the site, adjacent to the southeast side of the Magnolia Avenue alignment.

There is a very small patch (less than 2500 square feet) of native alluvial scrub vegetation at the furthest southeast corner of the site consisting of hairy yerba santa, buckwheat, and scalebroom. Much of the northern boundary of the Project site abuts the levee of the south side of Cable Creek and an approximately 475-foot stretch of Cable Creek is located within the northeastern corner of the Project site. The immediately adjacent uses are consistent with the land uses in the general area and include residential and commercial uses.

4.3 Common Species

4.3.1 Amphibians and Reptiles

No amphibian species were observed within the project area and none are expected to occur. Reptile species observed within the project area include the side-blotched lizard (*Uta stansburiana*) and Great Basin fence lizard (*Sceloporus occidentalis longipes*).

4.3.2 Birds

Bird species observed in the project area include American crow (*Corvus brachyrhynchos*), common raven (*C. corax*), California horned lark (*Eremophila alpestris actia*), American kestrel (*Falco sparverius*), house finch (*Haemorhous mexicanus*), Say's phoebe (*Sayornis saya*) and European starling (*Sturnus vulgaris*). Other common species expected to occur within the project area include red-tailed hawk (*Buteo jamaicensis*), kildeer (*Charadrius vociferus*), northern mockingbird (*Mimus polyglottos*), black phoebe (*Sayornis nigricans*) and mourning dove (*Zenaida macroura*).

4.3.3 Mammals

Identification of mammals from the project area was generally determined by physical evidence rather than direct visual identification. This is because (1) many of the mammal species that potentially occur onsite are nocturnal and would not have been active during the survey and (2) no mammal trapping was

performed. The project area is heavily disturbed and does not provide many benefits for mammal species for foraging, nesting, burrowing, or wildlife movement. The most common mammals occurring or expected to occur in the project area include domestic dogs, California ground squirrel (*Otospermophilus beecheyi*), desert cottontail (*Sylvilagus audubonii*) and pocket gopher (*Thomomys bottae*),.

4.4 USFWS IPac Species

According to the USFWS IPac list, the Project area is not located within or adjacent any designated critical habitat. The IPac list shows that seven (7) federally listed species are documented in the local area. Those species are as follows:

1. California Condor (*Gymnogyps californianus*)
2. Coastal California gnatcatcher (*Polioptila californica californica*)
3. Least Bell's Vireo (*Vireo bellii pusillus*)
4. Southwestern willow flycatcher (*Empidonax traillii extimus*)
5. Santa Ana River woollystar (*Eriastrum densifolium* ssp. *sanctorum*):
6. Thread-leaved brodiaea (*Brodiaea filifolia*):
7. San Bernardino kangaroo rat (*Dipodomys merriami parvus*) [SBKR]:

Habitat on site is not suitable for any of these species and focused surveys were not warranted.

In November of 2006, LSA, Associates, Inc. conducted focused small mammal live trapping within the boundaries of the proposed project to determine the presence or absence of SBKR. The result was that no SBKR were trapped during the focused survey and that they are presumed absent from the site. Site conditions have not changed significantly since the 2006 SBKR surveys. The project area is not within SBKR critical habitat and the ground cover onsite consists mostly of ruderal vegetation and a very small remnant patch (less than 2,500 square feet) of alluvial sage scrub. Additionally, the site has been disked for weed abatement purposes twice annually since the 2006 surveys.

SBKR are typically associated with alluvial fan scrub habitats and with sandy soils. SBKR are confined to inland valley scrub communities, and more particularly, to scrub communities occurring along rivers, streams and drainage. The primary constituent elements (PCE) defined by the USFWS for SBKR are as follows: (1) Soil series consisting predominantly of sand, loamy sand, sandy loam, or loam; (2) Alluvial sage scrub and associated vegetation, such as coastal sage scrub and chamise chaparral, with a moderately open canopy; (3) River, creek, stream, and wash channels; alluvial fans; floodplains; floodplain benches and terraces; and historic braided channels that are subject to dynamic geomorphological and hydrological processes typical of fluvial systems within the historical range of the San Bernardino kangaroo rat; and (4) Upland areas proximal to floodplains with suitable habitat.

The habitat on site is not considered suitable for SBKR because appropriate vegetative communities do not exist on site and the site is completely surrounded by development and isolated from any suitable or occupied SBKR habitat. Although the soil on site is friable and conducive for burrowing, none of the other PCEs listed for SBKR are present. The nearest location that displays SBKR PCEs is within Cable Creek approximately 2 miles upstream. The nearest documented SBKR occurrence is approximately 1.5 mile west of the site in suitable habitat in Cajon Creek. There is no evidence of SBKR occupation or utilization of the project site (i.e., no burrows for shelter, no vegetation for food or refugia). Given the close proximity to the adjacent residential neighborhood and the presence of domestic predators, as well as the adjacent utility poles that provide perches for avian predators such as owls, any small mammal present within the area would be extremely vulnerable to predation. Therefore, all indications are that SBKR do not occur on the Project site. No potential direct or indirect impacts to SBKR can be identified.

The IPaC also lists several migratory birds of concern that have been documented in the vicinity of the project. Within and adjacent to the APE, however, there is no suitable habitat on site capable of supporting the following 22 migratory bird species:

Bald eagle
Black-chinned sparrow
Brewer's sparrow
California spotted owl
Calliope hummingbird
Cassin's finch
Costa's hummingbird
Flammulated owl
Fox sparrow
Le Conte's thrasher
Least bittern
Lewis's woodpecker
Loggerhead shrike
Nuttall's woodpecker
Oak titmouse
Olive-sided flycatcher
Peregrine falcon
Short-eared owl
Swainson's hawk
Tricolored blackbird
White headed woodpecker
Williamson's sapsucker

The Project site does contain suitable habitat for BUOW. Additionally, some habitat suitable for nesting birds in general exists along the western border of the Project site, which could be considered potentially suitable for Lawrence's goldfinch and possibly Mountain plover.

4.5 CNDDB

According to the CNDDB, 48 sensitive species (23 plant species and 25 animal species) and three (3) sensitive plant communities have been documented to occur in the *San Bernardino North* and *Devore* - USGS 7.5-minute series quadrangles. Of the approximately 48 sensitive species identified in these quadrangles, 11 are State and/or federally-listed as threatened or endangered species, with SBKR, Santa Ana River woolystar, Coastal California gnatcatcher, and least Bell's vireo being reported locally (These species have been addressed above in Section 3.4.2).

Based on required habitat elements and range relative to the current conditions only two species, the BUOW and California horned-lark, have a moderate to high potential to occur in the vicinity of the project site. Focused protocol-level surveys were conducted for BUOW with the result that no BUOW individuals or sign were observed within the Project site during survey. BUOW are considered absent from the Project site. The BUOW survey letter report is provided in Attachment A. California horned-lark were observed onsite during survey.

4.6 CNPS

According to the CNPS, 28 sensitive plant species have been documented to occur in the *San Bernardino North* and *Devore* USGS quads. Those species are:

- Singlewhorl burrobush (*Ambrosia monogyra*)
- Thread-leaved brodea (*Brodiaea filifolia*)
- Catalina mariposa lily (*Calochortus catalinae*)
- Plummer's mariposa lily (*C. plummerae*)
- San Bernardino mountains owl's-clover (*Castilleja lasiorhyncha*)
- Smooth tarplant (*Centromadia pungens* ssp. *laevis*)
- Parry's spineflower (*Chorizanthe parryi* var.
- Southern California black walnut (*Juglans californica*)
- Duran's rush (*Juncus duranii*)
- Ocellated Humboldt lily (*Lilium humboldtii* ssp. *ocellatum*)
- Lemon lily (*L. parryi*)
- Parish's desert-thorn (*Lycium parishii*)
- Rock monardella (*Monardella saxicola*)
- California muhly (*Muhlenbergia californica*)

parryi)
- White-bracted spineflower (*C. xanti* var. *leucotheca*)
- Slender-horned spineflower (*Dodecahema leptoceras*)
- Santa Ana River woollystar (*Eriastrum densifolium* ssp. *sanctorum*)
- Hot springs fimbristylis (*Fimbristylis thermalis*)
- Pine-green gentian (*Frasera neglecta*)
- Johnston's bedstraw (*Galium johnstonii*)
- California satintail (*Imperata brevifolia*)
- Short-joint beavertail (*Opuntia basilaris* var. *brachyclada*)
- Woolly chaparral-pea (*Pickeringia montana* var. *tomentosa*)
- Black bog-rush (*Schoenus nigricans*)
- San Gabrial ragwort (*Senecio astephanus*)
- Laguna Mountains jewel-flower (*Streptanthus bernardinus*)
- Southern jewel-flower (*S. campestris*)
- San Bernardino aster (*Symphyotrichum defoliatum*)

None of these species are documented within or near the Project site and none were observed during the field survey. In fact, no special-status plants were observed in the project area during survey. The occurrence potential for all of the sensitive plant species listed above is low. Focused botanical surveys are not warranted or recommended.

5 Potential Effects of the Project on Special Status Species, Critical Habitat and Jurisdictional Waters

5.1 Federally Designated Critical Habitat

The Project site is not within or adjacent to any USFWS designated critical habitat.

5.2 Special Status Species

The project area lies within the historic range of numerous sensitive species. Of the seven (7) State and/or federally-listed species reported locally, all have a very low potential to occur within the Project area. The habitat on site was determined to be unsuitable for SBKR. No direct or indirect impacts to special status species are identified

Currently, only two sensitive species (BUOW and HOLA) have a moderate to high potential to occur in or adjacent to the Project area. Suitable habitat for BUOW exists on site. Focused breeding season protocol-level surveys were conducted by a qualified biologist in accordance with the "Burrowing Owl Survey Protocol and Mitigation Guidelines" prepared by the California Burrowing Owl Consortium on April 1993 and the March 7, 2012 "California Department of Fish and Game staff report on Burrowing Owl Mitigation" and were structured to detect BUOW. The result of these surveys was that no BUOW individuals or sign were observed within the Project site during survey. The California horned lark is not a State or federally-listed species, but is on the CDFW Watch List. This species was observed within the Project area during survey.

5.3 Jurisdictional Waters

There are potentially jurisdictional waters within the property associated with the Project site. Much of the northern boundary of the Project site abuts the levee of the south side of Cable Creek and an approximately 475-foot stretch of Cable Creek is located within the northeastern corner of the Project site. Cable Creek is an ephemeral stream tributary to Cajon Wash. The stretch of Cable Creek that is adjacent and within the Project site consists of improved and maintained channel. Cable Creek is a jurisdictional

water subject to the Clean Water Act (CWA) and Fish and Game Code under the jurisdictions of U.S. Army Corps of Engineers (USACE), Regional Water Quality Control Board (RWQCB), and CDFW respectively. The Project proposes to make minor modifications as necessary to ensure that the flows remain entrenched in Cable Creek. Any project related impacts to Cable Creek will likely require a Streambed Alteration Agreement from the CDFW, and CWA Sections 401/404 permits from the RWQCB and Corps respectively.

6 Conclusions and Recommendations

The project site does not have appropriate habitat for any of the special status species that occur in the area. It has been determined that the project will not result in direct or indirect impacts to federally or State listed species. The project does not propose land disturbance in or near to areas that support federally or State listed species, and as such this project will not inadvertently result in indirect impacts to listed species. Development on the Project site will not result in direct impacts to any sensitive vegetation community. This project will not affect sensitive biological resources. No evidence was found on site during the 2015 focused surveys of BUOW presence or habitat utilization. The survey results indicate that BUOW is absent from the project site. As such, there will be no effect to BUOW. The project will comply with all applicable laws when implementing this project.

Since most birds are protected by the Migratory Bird Treaty Act, it is recommended that the project include the following measures to avoid or minimize impacts to nesting birds:

1. *A migratory nesting bird survey of the Project's impact footprint shall be conducted by a qualified biologist within two weeks and 3 days prior to initiating vegetation clearing or ground disturbance. If active nests are found during the pre-construction nesting bird surveys, a Nesting Bird Plan (NBP) will be prepared and implemented. At a minimum the NBP will include guidelines for addressing active nests, establishing buffers, monitoring, and reporting. The NBP will include a copy of maps showing the location of all nests and an appropriate buffer zone around each nest sufficient to protect the nest from direct and indirect impact. The size and location of all buffer zones, if required, shall be determined by the biologist in consultation with the CDFW, and shall be based on the nesting species, its sensitivity to disturbance, and expected types of disturbance. The nests and buffer zones shall be field checked weekly by a qualified biological monitor. The approved buffer zone shall be marked in the field with construction fencing, within which no vegetation clearing or ground disturbance shall commence until the qualified biologist has determined the young birds have successfully fledged and a monitoring report has been submitted to the CDFW for review and approval.*

2. *In compliance with the CDFW Staff Report on Burrowing Owl Mitigation (CDFW 2012) the Project proponent shall ensure that a pre-construction burrowing owl survey is conducted at least 30 days prior to construction activities. A qualified Biologist shall conduct the survey to Determine if there are any active burrowing owl burrows within or adjacent to the impact area. If an active burrow is observed outside the nesting season (September 1 to January 31) and the burrow is within the impact area, a Burrowing Owl Exclusion Plan shall be prepared and submitted to CDFW for approval, outlining standard burrowing owl burrow closing procedures used to exclude burrowing owls (e.g., using passive relocation with one-way doors). The loss of any active burrowing owl burrow/territory shall be mitigated through replacement of habitat and burrows at no less than a 1:1 ratio. If an active burrow is observed outside the nesting season (i.e., between September 1 and January 31) and the burrow is not within the impact area, construction work shall be restricted within 160 to 1,605 feet of the burrow depending on the time of year and level of disturbance near the site in accordance with guidelines specified by the CDFW.*

7 References

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Figure 1. Regional Map of Project Location

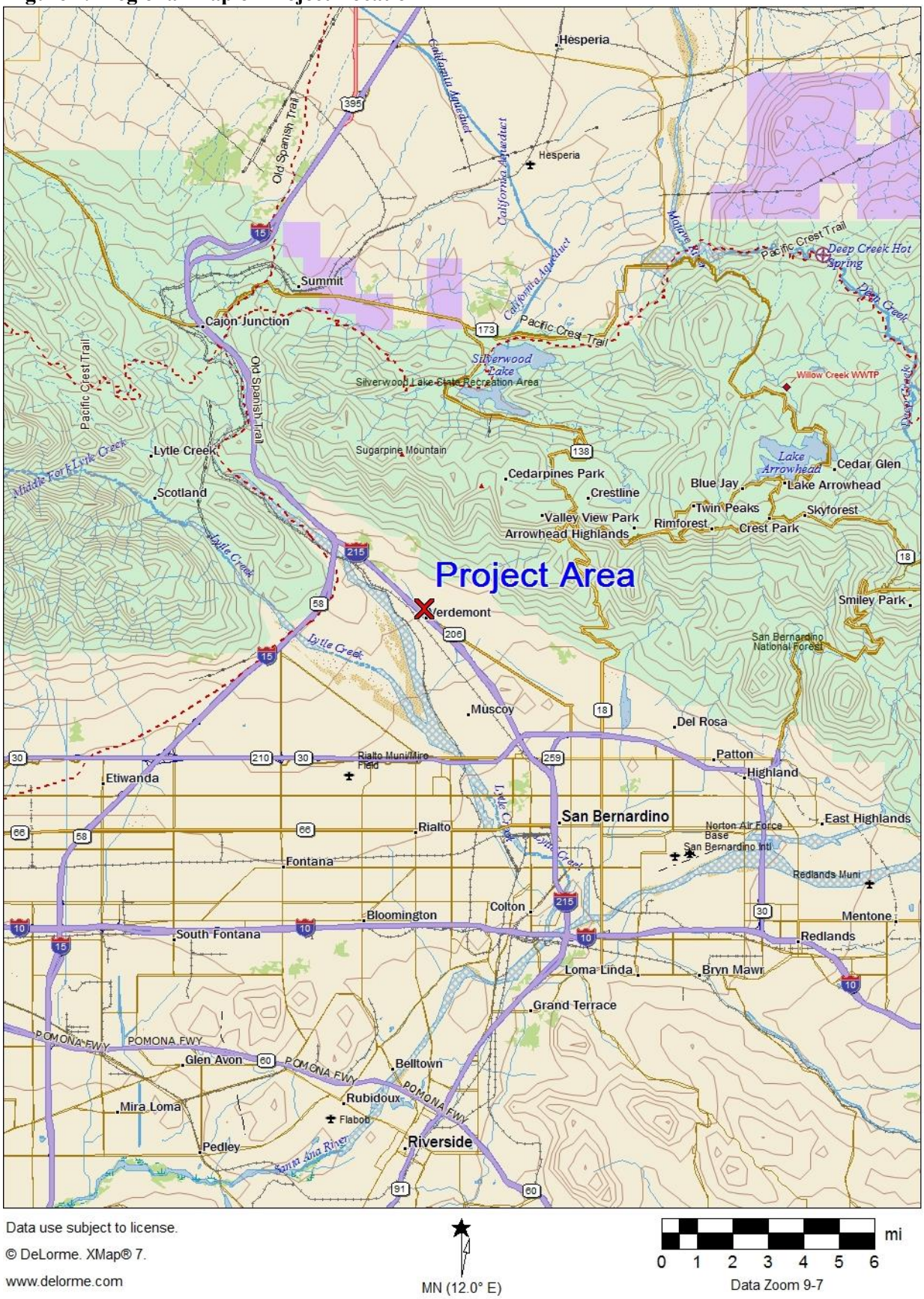
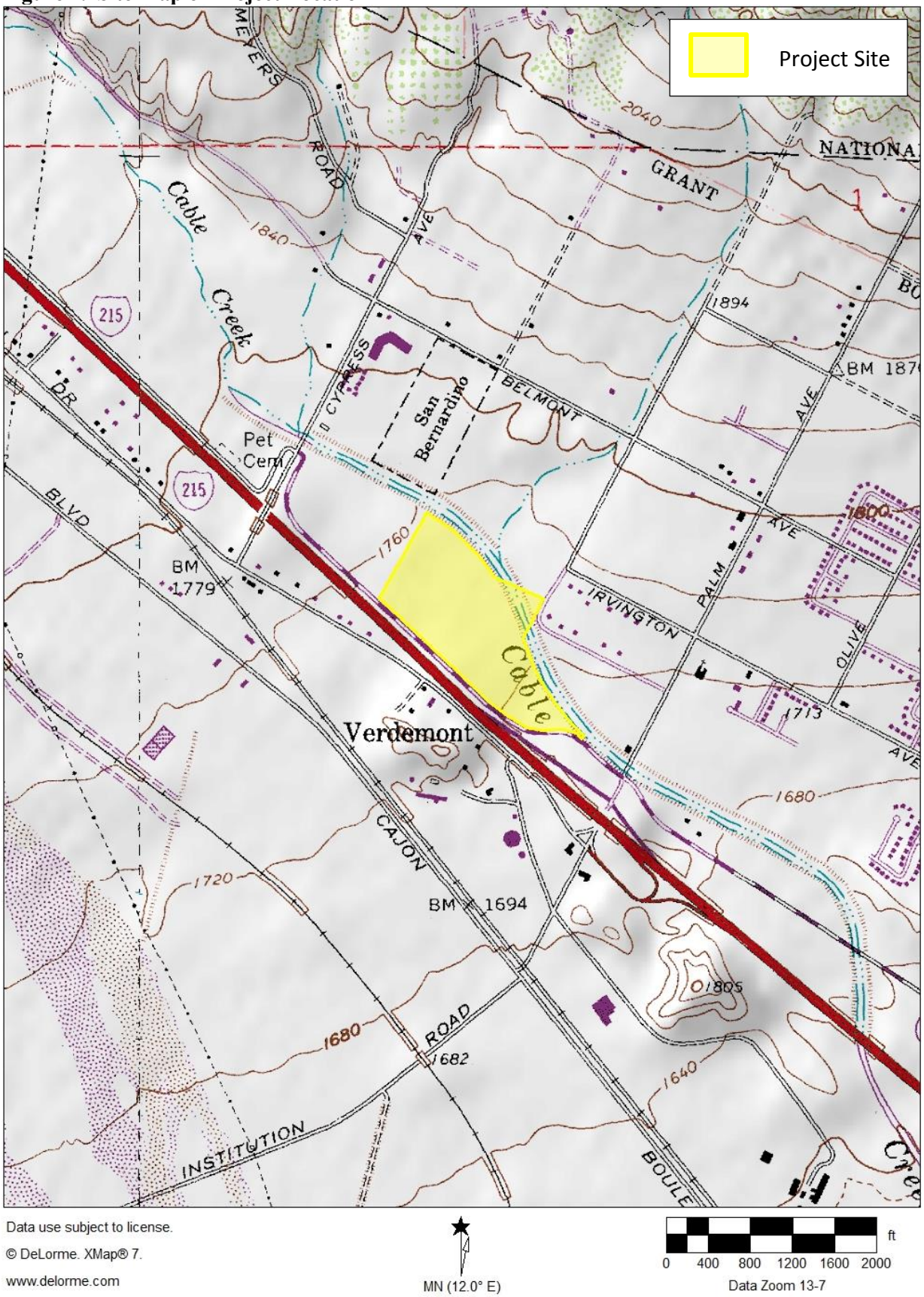


Figure 2. Site Map of Project Location



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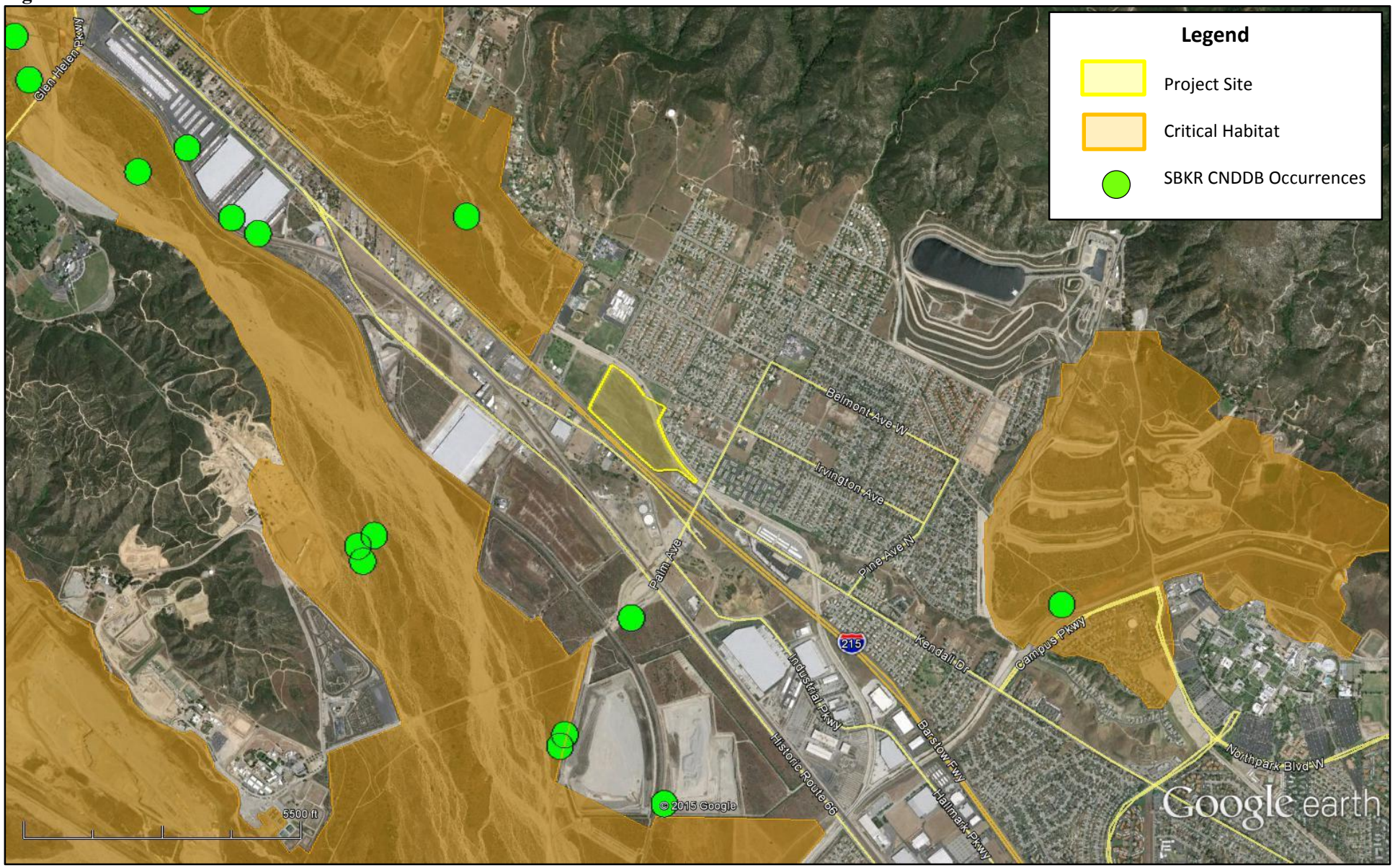
MN (12.0° E)

0 400 800 1200 1600 2000 ft

Data Zoom 13-7

Figure 3. Aerial Photograph of Project Area.

Figure 4. SBKR CNDDB Occurrences and Critical Habitat.



Site Photographs

Photo 1. Subject parcels (facing east) from the northwest corner of the site.

Photo 2. Subject parcels (facing northwest) from the southeast corner of the site.

Photo 3. Subject parcels (facing north) from southwest corner, showing onsite disturbance. Olive trees visible on left hand side of photo.

Photo 4. Project site (facing northwest) from southwestern most corner of site, showing small patch of native alluvial scrub vegetation. Cable Creek levee visible on right hand side of photo.

Photo 5. Northwest corner of Project site, facing east. Site recently disked; Cable Creek levee visible on the upper left side.

Photo 6. Northeast corner of Project site; 0.5-acre portion north of Cable Creek, facing north.

3.3-3 San Bernardino Kangaroo Rat Technical Memo

MEMORANDUM

DATE: 04/29/2016

TO: Environmental Management Division

FROM: Shay Lawrey

RE: San Bernardino County Department of Public Works, Environmental Management Division – Comment on the Notice of Preparation of a Draft Environmental Impact Report for the Rancho Palma Project, for the City of San Bernardino

Dear Ms. Wood,

Thank you for the comments you have provided for the Notice of Preparation of a Draft Environmental Impact Report for the Rancho Palma Project. The following comment was provided by the Environmental Management Division:

1. *The proposed project area is adjacent to United Sates Fish and Wildlife Service designated critical habitat for San Bernardino Kangaroo Rat (SBKR). It is recommended that protocol trapping for SBKR is conducted and project impacts to the species analyzed.*

A Biological Resources Report was prepared for the Rancho Palma Project, which provided an analysis of the proposed project relative to SBKR and U. S. Fish and Wildlife Service (USFWS) designated Critical Habitat for SBKR, as well as any other designated Critical Habitats and/or any species currently listed or formally proposed for listing as endangered or threatened under the federal Endangered Species Act (ESA) and the California Endangered Species Act (CESA) or species designated as sensitive by the California Department of Fish and Wildlife (CDFW) or the California Native Plant Society (CNPS) that may potentially be impacted by the proposed project.

The findings of the Biological Resources Report specific to SBKR and SBKR Critical Habitat were that no direct or indirect impacts to SBKR or SBKR Critical Habitat were identified. The proposed project is not located within any Critical Habitat and the habitat on site is not considered suitable for SBKR because appropriate vegetative communities do not exist on site and the site is completely surrounded by development and isolated from any suitable or occupied SBKR habitat.

Furthermore, in November of 2006, LSA, Associates, Inc. conducted focused small mammal live trapping within the boundaries of the proposed project to determine the presence or absence of SBKR. The result was that no SBKR were trapped during the focused survey and that they are presumed absent from the site. Site conditions have not changed significantly since the 2006 SBKR surveys. Additionally, the site has been disked for weed abatement purposes twice annually since the 2006 surveys.

The comment provided by the San Bernardino County Department of Public Works, Environmental Management Division states that "*The proposed project area is adjacent to United Sates Fish and Wildlife Service designated critical habitat for San Bernardino Kangaroo Rat (SBKR).*" However, as was identified in the Biological Resources Report prepared for the Rancho Palma Project and accompanying figures, the proposed project site is not adjacent USFWS designated Critical Habitat for

SBKR (please refer to the attached figure). "Adjacent" implies a shared border or something next to, adjoining, or abutting. The nearest USFWS designated Critical Habitat boundary is located approximately 0.27 mile west of the project site. Located between the project site and this nearest Critical Habitat unit are the Blast Soccer Complex, Guhin Park, Verdemont Park and the Little League Baseball Western Region Headquarters Little League Park. Therefore, the proposed project site is not adjacent USFWS designated Critical Habitat for SBKR and will not impact Critical Habitat for this species.

The stretch of Cable Creek that is adjacent and within the proposed project site consists of improved and maintained channel, which no longer retains the natural characteristics that would provide suitable habitat for SBKR. The nearest suitable SBKR habitat is within the natural braided channel and alluvial floodplain of City Creek located approximately 0.27 mile west of the project site, within USFWS designated Critical Habitat for this species.

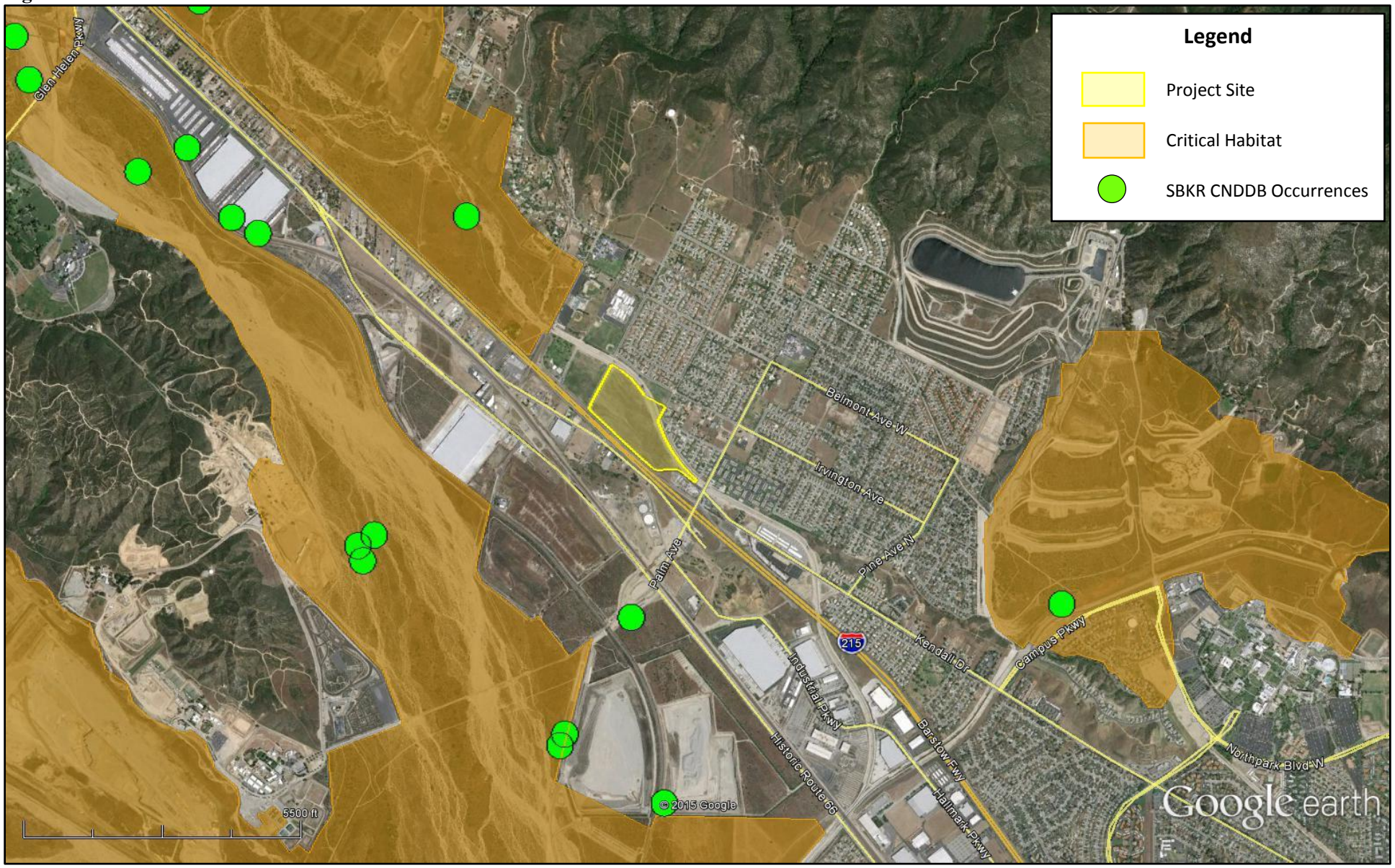
Sincerely,

Shay Lawrey, President
Ecologist/Regulatory Specialist

Attachment:

Biological Resources Report – Figure 4. SBKR CNDDB Occurrences and Critical Habitat

Figure 4. SBKR CNDDB Occurrences and Critical Habitat



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3.4-1 Cultural Resources Assessment

CULTURAL RESOURCES ASSESSMENT

Rancho Palma Project

City of San Bernardino, San Bernardino County, California

Prepared for:

Eric Flodine
Director of Community Development
Strata Equity Group, Inc.
4370 La Jolla Village Drive, Suite 960
San Diego, California 92122

Prepared by:

David Brunzell, M.A., RPA
BCR Consulting LLC
1420 Guadalajara Place
Claremont, California 91711

Project No. STR1501

National Archaeological Data Base Information:
Type of Study: Reconnaissance Cultural Resources Assessment
Resources Recorded: None
Keywords: San Bernardino
USGS Quadrangle: 7.5-minute *San Bernardino North, California* (1996)

BCRCONSULTING LLC

October 9, 2015

MANAGEMENT SUMMARY

BCR Consulting LLC (BCR Consulting) is under contract to Strata Equity Group, Inc. to conduct a Cultural Resources Assessment of the Rancho Palma Project (approximately 38 acres; the subject property) located in the City of San Bernardino (City), San Bernardino County, California. Tasks completed for the scope of work include a cultural resources records search, a reconnaissance-level pedestrian cultural resources field survey, compilation of this technical report, Native American Consultation (Appendix A), and a Paleontological Resources Overview (Appendix B). Photographs are provided in Appendix C. These tasks were performed in partial fulfillment of California Environmental Quality Act (CEQA) requirements. The records search revealed that 38 cultural resources studies have taken place resulting in the recording of 13 cultural resources (all historic-period) within one-mile of the subject property. One of the previous cultural resource studies has assessed the subject property, and no cultural resources have been recorded within its boundaries. One cultural resource (the historic-period Cable Creek Levee) bisects the subject property. This resource will not be subject to any direct impacts, and does not require further consideration.

During the field survey, BCR Consulting archaeologists did not discover any cultural resources, including prehistoric or historic archaeological sites or historic-period buildings, within the subject property boundaries. As a result BCR Consulting recommends that no additional cultural resources work or monitoring is necessary for proposed project activities within the subject property boundaries. However, if previously undocumented cultural resources are identified during earthmoving activities, a qualified archaeologist shall be contacted to assess the nature and significance of the find, diverting construction excavation if necessary.

If human remains are encountered during the undertaking, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC.

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INTRODUCTION

BCR Consulting LLC (BCR Consulting) is under contract to Strata Equity Group, Inc. to conduct a Cultural Resources Assessment of the Rancho Palma Project (approximately 38 acres; the subject property) located in the City of San Bernardino (City), San Bernardino County, California. A reconnaissance-level pedestrian cultural resources survey of the subject property was completed in partial fulfillment of California Environmental Quality Act (CEQA) requirements. The subject property is located in a non-sectioned portion of Township 1 South, Range 5 West, San Bernardino Baseline and Meridian, as depicted on the United States Geological Survey (USGS) *San Bernardino North, California* (1996) 7.5-minute topographic quadrangle (Figure 1).

NATURAL SETTING

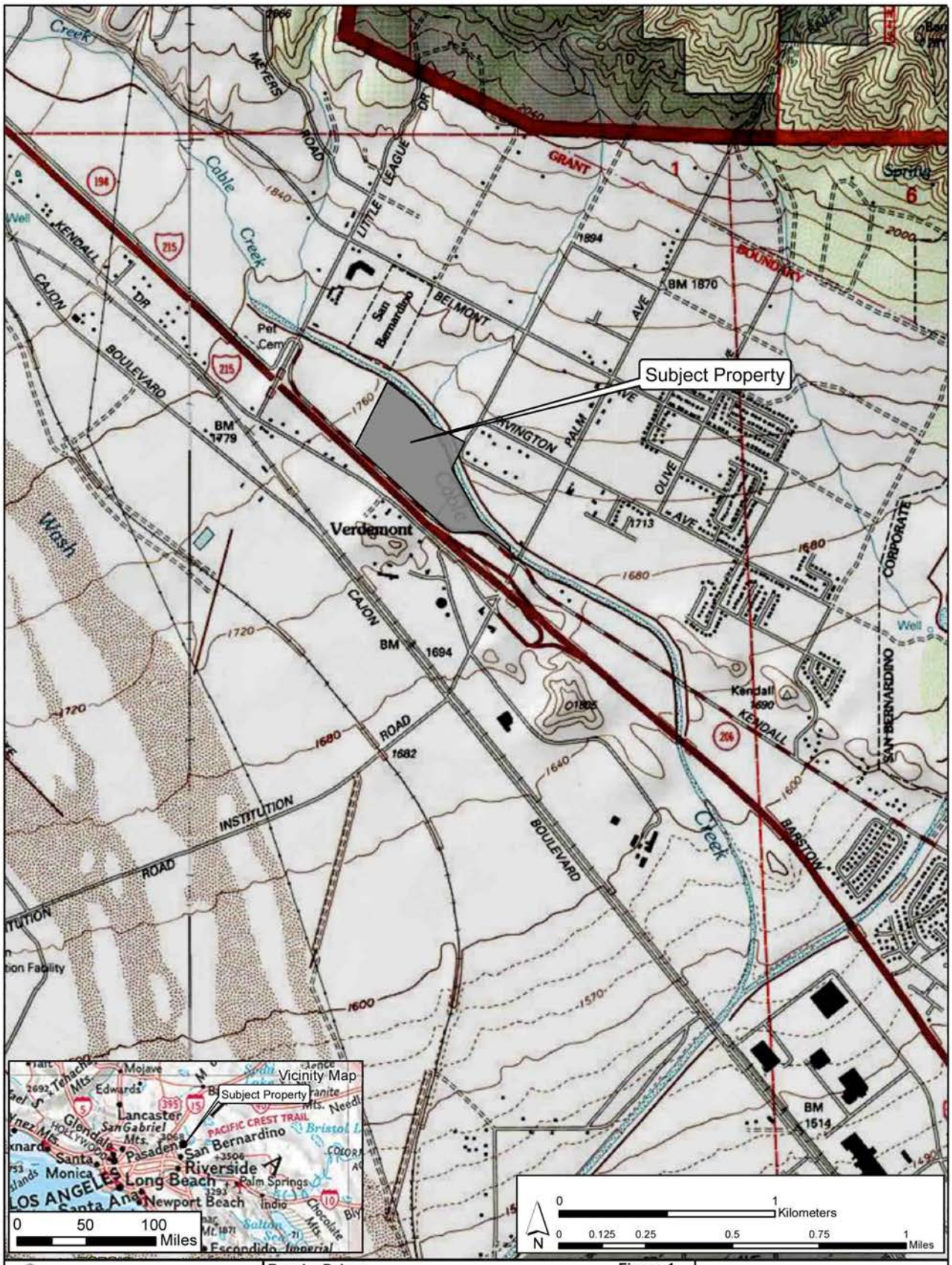
The elevation of the subject property ranges from approximately 1713 to 1750 feet above mean sea level (AMSL). The property has been subject to severe disturbances related to grading for weed abatement and levee construction. The subject property is covered with young alluvial valley deposits (Qya5), and is adjacent to very young wash deposits (Qw and Qw1). These are locally exhibited as fine sands and silty sands deposited by Cable Creek, which currently flows intermittently, bisecting the subject property from northwest to southeast (USGS 1996). The current study has not yielded any evidence that local sediments have produced raw materials used in prehistoric tool manufacture within one mile of the subject property. Local rainfall ranges from 5 to 15 inches annually (Jaeger and Smith 1971:36-37).

Although recent and historical impacts have decimated local vegetation, remnants of a formerly dominant coastal sage scrub vegetation community have been sporadically observed in the area. Signature plant species include black sage (*Salvia mellifera*), California brittlebush (*Encelia californica*), California buckwheat (*Eriogonum fasciculatum*), California sagebrush (*Artemesia californica*), deerweed (*Lotus scoparius*), golden yarrow (*Eriophyllum confertiflorum*), laurel sumac (*Malosma laurina*), lemonadeberry (*Rhus integrifolia*), poison oak (*Toxicodendron diverilobum*), purple sage (*Salvia leucophyla*), sticky monkeyflower (*Mimulus aurantiacus*), sugar bush (*Rhus ovate*), toyon (*Heteromeles arbutifolia*), white sage (*Salvia apiana*), coastal century plant (*Agave shawii*), coastal cholla (*Opuntia prolifera*), Laguna Beach liveforever (*Dudleya stolonifera*), many-stemmed liveforever (*Dudleya multicaulis*), our Lord's candle (*Yucca whipplei*), prickly pear cactus (*Opuntia sp.*) (Williams et al. 2008:118-119). Signature animal species within Coastal Sage Scrub habitat include the kangaroo rat (*Dipodomys sp.*), California horned lizard (*Phrynosoma coronatum frontale*), orange throated whiptail (*Cnemidophorus hyperthrus*), San Diego horned lizard (*Phrynosoma coronatum blainvillii*), brown-headed cowbird (*Molothrus ater*), California gnatcatcher (*Polioptila californica californica*), California quail (*Callipepla californica*), and San Diego cactus wren (*Campylorhynchus brunnecapillus sandiegensis*) (Williams et al. 2008:118-120). Local native groups made use of many of these species (see Lightfoot and Parrish 2008).

CULTURAL SETTING

Prehistoric Context

The local prehistoric cultural setting has been organized into many chronological frameworks (see Warren and Crabtree 1986; Bettinger and Taylor 1974; Lanning 1963;



BCRCONSULTING LLC
Claremont Napa Tehachapi
www.bcrconsulting.net
909-525-7078

Rancho Palma
Subject Property Location

Figure 1

From USGS Quad: *San Bernardino North, California* (1996)

Strata Equity Group, Inc.
San Diego, California

Hunt 1960; Wallace 1958, 1962, 1978; Campbell and Campbell 1935), although there is no definitive sequence for the region. The difficulties in establishing cultural chronologies for western San Bernardino County are a function of its enormous size and the small amount of archaeological excavations conducted there. Moreover, throughout prehistory many groups have occupied the area and their territories often overlap spatially and chronologically resulting in mixed artifact deposits. Due to dry climate and capricious geological processes, these artifacts rarely become integrated in-situ. Lacking a milieu hospitable to the preservation of cultural midden, local chronologies have relied upon temporally diagnostic artifacts, such as projectile points, or upon the presence/absence of other temporal indicators, such as groundstone. Such methods are instructive, but can be limited by prehistoric occupants' concurrent use of different artifact styles, or by artifact re-use or re-sharpening, as well as researchers' mistaken diagnosis, and other factors (see Flenniken 1985; Flenniken and Raymond 1986; Flenniken and Wilke 1989). Recognizing the shortcomings of comparative temporal indicators, this study recommends review of Warren and Crabree (1986), who have drawn upon this method to produce a commonly cited and relatively comprehensive chronology.

Ethnography

Although no previously recorded prehistoric sites have established a local prehistoric ethnographic affiliation, the subject property is situated at an ethnographic nexus peripherally occupied by the Gabrielino and Serrano. Each group consisted of semi-nomadic hunter-gatherers who spoke a variation of the Takic language subfamily. Individual ethnographic summaries are provided below.

Gabrielino. The Gabrielino probably first encountered Europeans when Spanish explorers reached California's southern coast during the 15th and 16th centuries (Bean and Smith 1978; Kroeber 1925). The first documented encounter, however, occurred in 1769 when Gaspar de Portola's expedition crossed Gabrielino territory (Bean and Smith 1978). Other brief encounters took place over the years, and are documented in McCawley 1996 (citing numerous sources). The Gabrielino name has been attributed by association with the Spanish mission of San Gabriel, and refers to a subset of people sharing speech and customs with other Cupan speakers (such as the Juaneño/Luiseño/Ajachemem) from the greater Takic branch of the Uto-Aztecan language family (Bean and Smith 1978). Gabrielino villages occupied the watersheds of various rivers (locally including the Santa Ana) and intermittent streams. Chiefs were usually descended through the male line and often administered several villages. Gabrielino society was somewhat stratified and is thought to have contained three hierarchically ordered social classes which dictated ownership rights and social status and obligations (Bean and Smith 1978:540-546). Plants utilized for food were heavily relied upon and included acorn-producing oaks, as well as seed-producing grasses and sage. Animal protein was commonly derived from rabbits and deer in inland regions, while coastal populations supplemented their diets with fish, shellfish, and marine mammals (Boscana 1933, Heizer 1968, Johnston 1962, McCawley 1996). Dog, coyote, bear, tree squirrel, pigeon, dove, mud hen, eagle, buzzard, raven, lizards, frogs, and turtles were specifically not utilized as a food source (Kroeber 1925:652).

Serrano. Kroeber (1925) applied the generic term "Serrano" to four groups, each with distinct territories: the Kitanemuk, Tataviam, Vanyume, and Serrano. Only one group, in the San Bernardino Mountains and West-Central Mojave Desert, ethnically claims the term Serrano. Bean and Smith (1978) indicate that the Vanyume, an obscure Takic population,

was found along the Mojave River at the time of Spanish contact. The Kitanemuk lived to the north and west, while the Tataviam lived to the west. All may have used the western San Bernardino County area seasonally. Serrano villages consisted of small collections of willow-framed domed structures situated near reliable water sources. A lineage leader administered laws and ceremonies from a large ceremonial house centrally located in most villages. Local Serrano relied heavily on acorns and piñon nuts for subsistence, although roots, bulbs, shoots, and seeds supplemented these. When available, game animals commonly included deer, mountain sheep, antelope, rabbits, small rodents, and various birds –particularly quail (Bean and Smith 1978:571).

History

Historic-era California is generally divided into three periods: the Spanish or Mission Period (1769 to 1821), the Mexican or Rancho Period (1821 to 1848), and the American Period (1848 to present).

Spanish Period. The first European to pass through the area is thought to be a Spaniard called Father Francisco Garces. Having become familiar with the area, Garces acted as a guide to Juan Bautista de Anza, who had been commissioned to lead a group across the desert from a Spanish outpost in Arizona to set up quarters at the Mission San Gabriel in 1771 near what today is Pasadena (Beck and Haase 1974). Garces was followed by Alta California Governor Pedro Fages, who briefly explored the region in 1772. Searching for San Diego Presidio deserters, Fages had traveled through Riverside to San Bernardino, crossed over the mountains into the Mojave Desert, and then journeyed westward to the San Joaquin Valley (Beck and Haase 1974).

Mexican Period. In 1821, Mexico overthrew Spanish rule and the missions began to decline. By 1833, the Mexican government passed the Secularization Act, and the missions, reorganized as parish churches, lost their vast land holdings, and released their neophytes (Beattie and Beattie 1974).

American Period. The American Period, 1848–Present, began with the Treaty of Guadalupe Hidalgo. In 1850, California was accepted into the Union of the United States primarily due to the population increase created by the Gold Rush of 1849. The cattle industry reached its greatest prosperity during the first years of the American Period. Mexican Period land grants had created large pastoral estates in California, and demand for beef during the Gold Rush led to a cattle boom that lasted from 1849–1855. However, beginning about 1855, the demand for beef began to decline due to imports of sheep from New Mexico and cattle from the Mississippi and Missouri Valleys. When the beef market collapsed, many California ranchers lost their ranchos through foreclosure. A series of disastrous floods in 1861–1862, followed by a significant drought further diminished the economic impact of local ranching. This decline combined with ubiquitous agricultural and real estate developments of the late 19th century, set the stage for diversified economic pursuits that have continued to proliferate to this day (Beattie and Beattie 1974; Cleland 1941).

PERSONNEL

David Brunzell, M.A., RPA acted as the Project Manager and Principal Investigator for the current study. He also performed the cultural resources records search at the South Central Coastal Information Center (SCCIC), performed the pedestrian field survey, and compiled

the technical report. Geographic Information System (GIS) Specialist Joseph Brunzell prepared the Figure 1 and initiated Native American Consultation (Appendix A). Dr. Samuel McLeod of the Los Angeles County Natural History Museum performed the Paleontological Resources Overview (Appendix B).

METHODS

Records Search

Prior to fieldwork, BCR Consulting conducted an archaeological records search at the SCCIC. This included a review of all recorded historic and prehistoric cultural resources, as well as a review of known cultural resources, and survey and excavation reports generated from projects completed within one mile of the subject property. In addition, a review was conducted of the National Register of Historic Places (National Register), the California Register of Historical Resources (California Register), and documents and inventories from the California Office of Historic Preservation including the lists of California Historical Landmarks, California Points of Historical Interest, Listing of National Register Properties, and the Inventory of Historic Structures.

Field Survey

An archaeological pedestrian field survey of the subject property was conducted on September 29, 2015. The survey was conducted by walking parallel transects spaced approximately 15 meters apart across 100 percent of the subject property, where accessible. Soil exposures, including natural and artificial clearings were carefully inspected for evidence of cultural resources.

RESULTS

Records Search

Data from the SCCIC revealed that 38 cultural resource studies have taken place resulting in the recording of 13 cultural resources (all historic period) within one mile of the subject property. None of the previous cultural resource studies have assessed the subject property, and no cultural resources have been recorded within its boundaries. One cultural resource (the historic-period Cable Creek Levee, designated P-36-14898) bisects the subject property. This resource will not be subject to any direct impacts, and does not require further consideration. The records search is summarized as follows:

Table A. Cultural Resources and Reports Within One Mile of the Subject Property

USGS 7.5 Minute Quadrangle	Cultural Resources Within One Mile of Subject Property	Cultural Resource Studies Within One Mile of Subject Property
San Bernardino North, California (1996)	CA-SBR-2910, 2973, 10221H P-36-13612, 13613, 13614, 14897, 14898, 20646, 21325, 26791, 26792, 60940	SB-713, 1285, 1821, 1883, 1884, 1885, 1958, 2031, 2040, 2042, 2056, 2073, 2102, 2452, 2717, 3647, 3711, 4081, 4721, 4723, 4366, 4720*, 5272, 5273, 5546, 5897, 6057, 6291, 6446, 6447, 6648, 6650, 6723, 6725, 6770, 7624, 7625, 7636

*Previously assessed subject property.

Field Survey

During the field survey, BCR Consulting staff carefully inspected the subject property, and identified no cultural resources within its boundaries. Surface visibility was approximately 60 percent within the subject property. Ground disturbances were severe and included grading for weed abatement and levee construction.

RECOMMENDATIONS

The records search and field survey did not identify any cultural resources (including prehistoric or historic archaeological sites or historic buildings) within the subject property. Furthermore, records search results combined with surface conditions have failed to indicate sensitivity for buried cultural resources. Based on these results, BCR Consulting recommends that no additional cultural resource work or monitoring is necessary for any earthmoving proposed within the subject property. However, if previously undocumented cultural resources are identified during earthmoving activities, a qualified archaeologist should be contacted to assess the nature and significance of the find, diverting construction excavation if necessary.

If human remains are encountered during the undertaking, State Health and Safety Code Section 7050.5 states that no further disturbance shall occur until the County Coroner has made a determination of origin and disposition pursuant to Public Resources Code Section 5097.98. The County Coroner must be notified of the find immediately. If the remains are determined to be prehistoric, the Coroner will notify the Native American Heritage Commission (NAHC), which will determine and notify a Most Likely Descendant (MLD). With the permission of the landowner or his/her authorized representative, the MLD may inspect the site of the discovery. The MLD shall complete the inspection within 48 hours of notification by the NAHC.

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APPENDIX A

NATIVE AMERICAN CONSULTATION

Subject:	BCR Consulting Rancho Palma Property SLF/List of Tribes Request, San Bernardino, California
From:	David Brunzell (david.brunzell@yahoo.com)
To:	rw_nahc@pacbell.net;
Date:	Wednesday, September 23, 2015 2:45 PM

Hi Rob,

I'd like to request a Sacred Lands File Search and list of potentially interested tribes for the proposed Rancho Palma Project in the city of San Bernardino, San Bernardino County, California. The Project will be located as follows (SBBM; see attached project location map):*

Township 1 North
Range 5 West
Non-sectioned
USGS 7.5 Minute Topographic Quad: *San Bernardino North, California* (1996)

Please send the results and list to my email or the bellow fax number and please get in touch with any questions.

Thanks,

David Brunzell
Principal Investigator/Archaeologist

BCR Consulting LLC
Certified Small Business (SB)
1420 Guadalajara Place
Claremont, California 91711
TEL: 909-525-7078
FAX: 909-992-3095
www.bcrconsulting.net

*See report Figure 1.

NATIVE AMERICAN HERITAGE COMMISSION
1550 Harbor Blvd., Suite 100
West Sacramento, CA 95691
(916) 373-3710
(916) 373-5471 FAX

September 29, 2015

David Brunzell
BCR Consulting
1420 Guadalajara Place
Claremont, CA 91711

Sent by Email: david.brunzell@yahoo.com
Number of Pages: 3

RE: Rancho Palma Project, City and County of San Bernardino

Dear Mr. Brunzell:

Attached is a consultation list of tribes with traditional lands or cultural places located within the boundaries of the above referenced counties. Please note that the intent above reference codes is to mitigate impacts to tribal cultural resources, as defined, for California Environmental Quality Act (CEQA) projects.

As of July 1, 2015, Public Resources Code Sections 21080.1, 21080.3.1 and 21080.3.2 require public agencies to consult with California Native American tribes identified by the Native American Heritage Commission (NAHC) for the purpose mitigating impacts to tribal cultural resources:

> Within 14 days of determining that an application for a project is complete or a decision by a public agency to undertake a project, the lead agency shall provide formal notification to the designated contact of, or a tribal representative of, traditionally and culturally affiliated California Native American tribes that have requested notice, which shall be accomplished by means of at least one written notification that includes a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation pursuant to this section. (Public Resources Code Section 21080.1(d))

The law does not preclude agencies from initiating consultation with the tribes that are culturally and traditionally affiliated with their jurisdictions. The NAHC believes that in fact that this is the best practice to ensure that tribes are consulted commensurate with the intent of the law.

In accordance with Public Resources Code Section 21080.1(d), formal notification must include a brief description of the proposed project and its location, the lead agency contact information, and a notification that the California Native American tribe has 30 days to request consultation. The NAHC believes that agencies should also include with their notification letters information regarding any cultural resources assessment that has been completed on the APE, such as:

1. The results of any record search that may have been conducted at an Information Center of the California Historical Resources Information System (CHRIS), including, but not limited to:

   - A listing of any and all known cultural resources have already been recorded on or adjacent to the APE;
   - Copies of any and all cultural resource records and study reports that may have been provided by the Information Center as part of the records search response;
   - If the probability is low, moderate, or high that cultural resources are located in the APE.
   - Whether the records search indicates a low, moderate or high probability that unrecorded cultural resources are located in the potential APE; and

- If a survey is recommended by the Information Center to determine whether previously unrecorded cultural resources are present.

2. The results of any archaeological inventory survey that was conducted, including:

   - Any report that may contain site forms, site significance, and suggested mitigation measurers.

     All information regarding site locations, Native American human remains, and associated funerary objects should be in a separate confidential addendum, and not be made available for pubic disclosure in accordance with Government Code Section 6254.10.

3. The results of any Sacred Lands File (SFL) check conducted through Native American Heritage Commission. A SFL search was completed with negative results.

4. Any ethnographic studies conducted for any area including all or part of the potential APE; and

5. Any geotechnical reports regarding all or part of the potential APE.

Lead agencies should be aware that records maintained by the NAHC and CHRIS is not exhaustive, and a negative response to these searches does not preclude the existence of a cultural place. A tribe may be the only source of information regarding the existence of a tribal cultural resource.

This information will aid tribes in determining whether to request formal consultation. In the case that they do, having the information beforehand well help to facilitate the consultation process.

If you receive notification of change of addresses and phone numbers from tribes, please notify me. With your assistance we are able to assure that our consultation list contains current information.

If you have any questions, please contact me at my email address: rob.wood@nahc.ca.gov.

Sincerely,

for

Rob Wood
Associate Governmental Program Analyst

Native American Heritage Commission
Tribal Consultation List
San Bernardino County
September 29, 2015

Ramona Band of Cahuilla Mission Indians
Joseph Hamilton, Chairman
P.O. Box 391670 Cahuilla
Anza , CA 92539
admin@ramonatribe.com
(951) 763-4105

Morongo Band of Mission Indians
Robert Martin, Chairperson
12700 Pumarra Rroad Cahuilla
Banning , CA 92220 Serrano
(951) 849-8807
(951) 755-5200

San Manuel Band of Mission Indians
Lynn Valbuena, Chairwoman
26569 Community Center Serrano
Highland , CA 92346
(909) 864-8933

Pechanga Band of Mission Indians
Mark Macarro, Chairperson
P.O. Box 1477 Luiseno
Temecula , CA 92593
mgoodhart@pechanga-nsn.
(951) 770-6100

Soboba Band of Mission Indians
Rosemary Morillo, Chairperson; Attn: Carrie Garcia
P.O. Box 487 Luiseno
San Jacinto , CA 92581 Cahuilla
carrieg@soboba-nsn.gov
(951) 654-2765

Serrano Nation of Mission Indians
Goldie Walker, Chairwoman
P.O. Box 343 Serrano
Patton , CA 92369

(909) 528-9027
(909) 528-9032

San Fernando Band of Mission Indians
John Valenzuela, Chairperson
P.O. Box 221838 Fernandeño
Newhall , CA 91322 Tataviam
tsen2u@hotmail.com Serrano
(661) 753-9833 Office Vanyume
(760) 885-0955 Cell Kitanemuk

Agua Caliente Band of Cahuilla Indians THPO
Patricia Garcia, Tribal Historic Perservation Officer
5401 Dinah Shore Drive Cahuilla
Palm Springs , CA 92264
ACBCI-THPO@aguacliente.net
(760) 699-6907

Agua Caliente Band of Cahuilla Indians
Jeff Grubbe, Chairperson
5401 Dinah Shore Drive Cahuilla
Palm Springs , CA 92262
lavilesaguacliente.net
(760) 699-6800

This list is current only as of the date of this document.

Distribution of this list does not relieve any person of statutory responsibility as defined in Section 7050.5 of the Health and Safety Code, Section 5097.94 of the Public Resources Code and Section 5097.98 of the Public Resources Code.
This list applicable only for consultation with Native American tribes under Public Resources Code Sections 21080.3.1 and 21080.3.2 for the proposed Rancho Palma Project, City and County of San Bernardino.

Native American Consultation Summary for the Rancho Palma Project, San Bernardino, San Bernardino County, California
Native American Heritage Commission replied to BCR Consulting Request on September 29, 2015. Results of Sacred Land File Search did not indicate presence of Native American cultural resources, and recommended that the below groups/individuals be contacted.

Groups Contacted	Letter/Email Date	Response from Tribes
Joseph Hamilton, Chairman Ramona Band of Cahuilla Mission Indians	Letter: 10/2/15 Email: 10/2/15	None
Robert Martin, Chairperson Morongo Band of Mission Indians	Letter: 10/2/15 Email: N/A	10/22/15: Ray Haute responded requesting that a cultural resources assessment be completed, that Morongo participate in that assessment, and that Morongo be allowed to review the cultural resources report (letter attached).
Lynn Valbuena, Chairwoman San Manuel Band of Mission Indians	Letter: 10/2/15 Email: N/A	None
Mark Macarro, Chairperson Pechanga Band of Mission Indians	Letter: 10/2/15 Email: 10/2/15	None
Rosemary Morillo, Chairperson Soboba Band of Mission Indians	Letter: 10/2/15 Email: 10/2/15	10/7/15: Joseph Ontiveros responded for Chairwoman Morillo to request Native American monitoring by representative of the San Manuel Band of Mission Indians.
Goldie Walker, Chairwoman Serrano Nation of Mission Indians	Letter: 10/2/15 Email: N/A	None
John Valenzuela, Chairperson San Fernando Band of Mission Indians	Letter: 10/2/15 Email: 10/2/15	None
Patricia Garcia, Tribal Historic Preservation Officer Agua Caliente Band of Cahuilla Indians	Letter: 10/2/15 Email: 10/2/15	None
Jeff Grubbe, Chairperson Agua Caliente Band of Cahuilla Indians	Letter: 10/2/15 Email: N/A	None

October 2, 2015

Joseph Hamilton
Chairman
Ramona Band of Cahuilla Mission Indians
P.O. Box 391670
Anza, California 92539

Subject: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear Joseph:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. This is a housing development, and the lead agency is the City of San Bernardino. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, and cultural landscapes. The proposed project is located in a non-sectioned portion of Township 1 North, Range 5 West, San Bernardino Baseline and Meridian. The property is depicted on the *San Bernardino North* (1996), *California* 7.5-minute USGS topographic quadrangle, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting LLC, Attn: David Brunzell, 1420 Guadalajara Place, Claremont, California 91711. I request a response by November 6, 2015. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist

Attachment: USGS Map

October 2, 2015

Robert Martin
Chairperson
Morongo Band of Mission Indians
12700 Pumarra Road
Banning, California 92220

Subject: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear Robert:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. This is a housing development, and the lead agency is the City of San Bernardino. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, and cultural landscapes. The proposed project is located in a non-sectioned portion of Township 1 North, Range 5 West, San Bernardino Baseline and Meridian. The property is depicted on the *San Bernardino North* (1996), *California* 7.5-minute USGS topographic quadrangle, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting LLC, Attn: David Brunzell, 1420 Guadalajara Place, Claremont, California 91711. I request a response by November 6, 2015. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist

Attachment: USGS Map

MORONGO CULTURAL HERITAGE PROGRAM
12700 PUMARRA RD BANNING, CA 92220
OFFICE 951-755-5025 FAX 951-572-6004

Date: October 22, 2015

Re: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear,
David Brunzell
BRC Consulting

Thank you for contacting the Morongo Band of Mission Indians regarding the above referenced project(s). The tribe greatly appreciates the opportunity to comment on the project. After reviewing our records and consulting with our tribal elders and cultural experts, we would like to respectfully offer the following comments and/or recommendations:

___ The project is outside of the Tribe's current reservation boundaries and is not within an area considered to be a traditional use area or one in which the Tribe has cultural ties (i.e. Cahuilla or Serrano Territory). We recommend contacting the appropriate tribes who have cultural affiliation to the project area. We have no further comments at this time.

___ The project is outside of the Tribe's current reservation boundaries but within in an area considered to be a traditional use area or one in which the Tribe has cultural ties (i.e. Cahuilla or Serrano Territory). At this time, we are not aware of any cultural resources on the property; however, that is not to say there is nothing present. At this time, we ask that you impose specific conditions regarding all cultural and/or archaeological resources and buried cultural materials on any development plans or entitlement applications (see Standard Development Conditions attachment).

_X_ The project is outside of the Tribe's current reservation boundaries but within in an area considered to be a traditional use area or one in which the Tribe has cultural ties (i.e. Cahuilla or Serrano Territory). At this time we ask that you impose specific conditions regarding all cultural and/or archaeological resources and buried cultural materials on any development plans or entitlement applications (see Standard Development Conditions attachment). Furthermore, we would like to formally request the following:

_X_ A thorough records search be conducted by contacting one of the CHRIS (California Historical Resources Information System) Archaeological Information Centers and have a copy of the search results be provided to the tribe.

_X_ A comprehensive archaeological survey be conducted of the proposed project property and any APE's (Areas of Potential Effect) within the property. We would also like to request that a tribal monitor be present during the initial pedestrian survey and that a copy of the results be provided to the tribe as soon as it can be made available.

___ Morongo would like to request that our tribal monitors be present during any test pit or trenching activities and any subsequent ground disturbing activities during the construction phase of the project.

___ The project is located with the current boundaries of the Morongo Band of Mission Indians Reservation. Please contact the Morongo Band of Mission Indians planning department for further details.

Once again, the Morongo Band of Mission Indians appreciates the opportunity to comment on this project. Please be aware that receipt of this letter does not constitute "meaningful" tribal consultation nor does it conclude the consultation process. This letter is merely intended to initiate consultation between the tribe and lead agency, which may be followed up with additional emails, phone calls or face-to-face consultation if deemed necessary. If you should have any further questions with regard to this matter, please do not hesitate to contact me at your convenience.

Very truly yours,

Raymond Huaute
Cultural Resource Specialist
Morongo Band of Mission Indians
Email: rhuaute@morongo-nsn.gov
Phone: (951) 755-5025

MORONGO BAND OF MISSION INDIANS

A SOVEREIGN NATION

Standard Development Conditions

The Morongo Band of Mission Indians asks that you impose specific conditions regarding cultural and/or archaeological resources and buried cultural materials on any development plans or entitlement applications as follows:

1. If human remains are encountered during grading and other construction excavation, work in the immediate vicinity shall cease and the County Coroner shall be contacted pursuant to State Health and Safety Code §7050.5.

2. In the event that Native American cultural resources are discovered during project development/construction, all work in the immediate vicinity of the find shall cease and a qualified archaeologist meeting Secretary of Interior standards shall be hired to assess the find. Work on the overall project may continue during this assessment period.

    a. If significant Native American cultural resources are discovered, for which a Treatment Plan must be prepared, the developer or his archaeologist shall contact the Morongo Band of Mission Indians.

    b. If requested by the Tribe[1], the developer or the project archaeologist shall, in good faith, consult on the discovery and its disposition (e.g. avoidance, preservation, return of artifacts to tribe, etc.).

[1] The Morongo Band of Mission Indians realizes that there may be additional tribes claiming cultural affiliation to the area; however, Morongo can only speak for itself. The Tribe has no objection if the archaeologist wishes to consult with other tribes and if the city wishes to revise the condition to recognize other tribes.

October 2, 2015

Lynn Valbuena
Chairwoman
San Manuel Band of Mission Indians
26569 Community Center Drive
Highland, California 92346

Subject: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear Lynn:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. This is a housing development, and the lead agency is the City of San Bernardino. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, and cultural landscapes. The proposed project is located in a non-sectioned portion of Township 1 North, Range 5 West, San Bernardino Baseline and Meridian. The property is depicted on the *San Bernardino North* (1996), *California* 7.5-minute USGS topographic quadrangle, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting LLC, Attn: David Brunzell, 1420 Guadalajara Place, Claremont, California 91711. I request a response by November 6, 2015. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist

Attachment: USGS Map

October 2, 2015

Mark Macarro
Chairperson
Pechanga Band of Mission Indians
P.O. Box 1477
Temecula, California 92593

Subject: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear Mark:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. This is a housing development, and the lead agency is the City of San Bernardino. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, and cultural landscapes. The proposed project is located in a non-sectioned portion of Township 1 North, Range 5 West, San Bernardino Baseline and Meridian. The property is depicted on the *San Bernardino North* (1996), *California* 7.5-minute USGS topographic quadrangle, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting LLC, Attn: David Brunzell, 1420 Guadalajara Place, Claremont, California 91711. I request a response by November 6, 2015. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist

Attachment: USGS Map

October 2, 2015

Rosemary Morillo
Chairperson
Soboba Band of Mission Indians
P.O. Box 487
San Jacinto, California 92581

Subject: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear Rosemary:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. This is a housing development, and the lead agency is the City of San Bernardino. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, and cultural landscapes. The proposed project is located in a non-sectioned portion of Township 1 North, Range 5 West, San Bernardino Baseline and Meridian. The property is depicted on the *San Bernardino North* (1996), *California* 7.5-minute USGS topographic quadrangle, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting LLC, Attn: David Brunzell, 1420 Guadalajara Place, Claremont, California 91711. I request a response by November 6, 2015. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist

Attachment: USGS Map

October 7, 2015

Attn: David Brunzell, Principal Investigator/Archaeologist
BCR Consulting LLC
1420 Guadalajara Place
Claremont, CA 91711

Re: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, CA

The Soboba Band of Luiseño Indians appreciates your observance of Tribal Cultural Resources and their preservation in your project. The information provided to us on said project(s) has been assessed through our Cultural Resource Department, where it was concluded that although it is outside the existing reservation, the project area does fall within the bounds of our Tribal Traditional Use Areas. At this time the Soboba Band does not have any specific concerns regarding known cultural resources in the specified areas that the project encompasses, but does request that the appropriate consultation continue to take place between the tribes, project proponents, and government agencies.

Also, working in and around traditional use areas intensifies the possibility of encountering cultural resources during any future construction/excavation phases that may take place. For this reason the Soboba Band of Luiseño Indians requests that approved Native American Monitor(s) be present during any future ground disturbing proceedings, including surveys and archaeological testing, associated with this project. The Soboba Band recommends that you contact the San Manuel Band of Mission Indians. In the event that future monitoring does become necessary and a monitor from the San Manuel Band of Mission Indians is not able to be retained, cultural monitors from the Soboba Band of Luiseño Indians will be available.

Sincerely,

Joseph Ontiveros
Cultural Resource Director
Soboba Band of Luiseño Indians
P.O. Box 487
San Jacinto, CA 92581
Phone (951) 654-5544 ext. 4137
Cell (951) 663-5279
jontiveros@soboba-nsn.gov

Confidentiality: The entirety of the contents of this letter shall remain confidential between Soboba and the BCR Consulting LLC. No part of the contents of this letter may be shared, copied, or utilized in any way with any other individual, entity, municipality, or tribe, whatsoever, without the expressed written permission of the Soboba Band of Luiseño Indians.

October 2, 2015

Goldie Walker
Chairwoman
Serrano Nation of Mission Indians
P.O. Box 343
Patton, California 92369

Subject: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear Goldie:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. This is a housing development, and the lead agency is the City of San Bernardino. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, and cultural landscapes. The proposed project is located in a non-sectioned portion of Township 1 North, Range 5 West, San Bernardino Baseline and Meridian. The property is depicted on the *San Bernardino North* (1996), *California* 7.5-minute USGS topographic quadrangle, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting LLC, Attn: David Brunzell, 1420 Guadalajara Place, Claremont, California 91711. I request a response by November 6, 2015. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist

Attachment: USGS Map

October 2, 2015

John Valenzuela
Chairperson
San Fernando Band of Mission Indians
P.O. Box 221838
Newhall, California 91322

Subject: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear John:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. This is a housing development, and the lead agency is the City of San Bernardino. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, and cultural landscapes. The proposed project is located in a non-sectioned portion of Township 1 North, Range 5 West, San Bernardino Baseline and Meridian. The property is depicted on the *San Bernardino North* (1996), *California* 7.5-minute USGS topographic quadrangle, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting LLC, Attn: David Brunzell, 1420 Guadalajara Place, Claremont, California 91711. I request a response by November 6, 2015. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist

Attachment: USGS Map

October 2, 2015

Patricia Garcia
Tribal Historic Preservation Officer
Agua Caliente Band of Cahuilla Indians
5401 Dinah Shore Drive
Palm Springs, California 92264

Subject: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear Patricia:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. This is a housing development, and the lead agency is the City of San Bernardino. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, and cultural landscapes. The proposed project is located in a non-sectioned portion of Township 1 North, Range 5 West, San Bernardino Baseline and Meridian. The property is depicted on the *San Bernardino North* (1996), *California* 7.5-minute USGS topographic quadrangle, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting LLC, Attn: David Brunzell, 1420 Guadalajara Place, Claremont, California 91711. I request a response by November 6, 2015. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist

Attachment: USGS Map

October 2, 2015

Jeff Grubbe
Chairperson
Agua Caliente Band of Cahuilla Indians
5401 Dinah Shore Drive
Palm Springs, California 92264

Subject: Tribal Consultation for the Rancho Palma Project, San Bernardino, San Bernardino County, California

Dear Jeff:

This is an invitation to consult on a proposed development project at locations with which you have tribal cultural affiliation. This is a housing development, and the lead agency is the City of San Bernardino. The purpose of the consultation is to ensure the protection of Native American cultural resources on which the proposed undertaking may have an impact. In the tribal consultation process, early consultation is encouraged in order to provide for full and reasonable public input from Native American Groups and Individuals, as consulting parties, on potential effect of the development project and to avoid costly delays. Further, we understand that much of the content of the consultation will be confidential and will include, but not be limited to, the relationship of proposed project details to Native American Cultural Historic Properties, such as burial sites, known or unknown, architectural features and artifacts, ceremonial sites, sacred shrines, and cultural landscapes. The proposed project is located in a non-sectioned portion of Township 1 North, Range 5 West, San Bernardino Baseline and Meridian. The property is depicted on the *San Bernardino North* (1996), *California* 7.5-minute USGS topographic quadrangle, (see attached map).

If you know of any cultural resources in the vicinity that may be of religious and/or cultural significance to your community or if you would like more information, please contact me at 909-525-7078 or david.brunzell@yahoo.com. Correspondence can also be sent to BCR Consulting LLC, Attn: David Brunzell, 1420 Guadalajara Place, Claremont, California 91711. I request a response by November 6, 2015. If you require more time, please let me know. Thank you for your involvement in this process.

Sincerely,

BCR Consulting LLC

David Brunzell, M.A./RPA
Principal Investigator/Archaeologist

Attachment: USGS Map

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Street, Apt. No.; or PO Box No. 26569 Community Center Dr.
City, State, ZIP+4 Highland, CA. 92346

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Sent To Rosemary Morillo
Street, Apt. No.; or PO Box No. P.O. Box 487
City, State, ZIP+4 San Jacinto, CA. 92581

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Sent To Robert Morton
Street, Apt. No.; or PO Box No. 12700 Pumora Rd.
City, State, ZIP+4 Banning, CA. 92220

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Total Postage & Fees	$ $3.94

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Sent To Mark Macarro
Street, Apt. No.; or PO Box No. P.O. Box 1477
City, State, ZIP+4 Temecula, CA. 92593

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Total Postage & Fees	$ $3.94

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Sent To Goldie Walker
Street, Apt. No.; or PO Box No. P.O. 343
City, State, ZIP+4 Patton, CA. 92369

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Restricted Delivery Fee (Endorsement Required)	N/A
Total Postage & Fees	$ $0.49
	$3.94

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10/02/2015

Sent To: John Valenzuela
Street, Apt. No.; or PO Box No.: P.O. Box 221538
City, State, ZIP+4: Newhall, CA. 91322

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Restricted Delivery Fee (Endorsement Required)	N/A
Total Postage & Fees	$ $0.49
	$3.94

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10/02/2015

Sent To: Patricia Garcia
Street, Apt. No.; or PO Box No.: 5401 Dinah Shore Dr.
City, State, ZIP+4: Palm Springs, CA. 92264

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Restricted Delivery Fee (Endorsement Required)	N/A
Total Postage & Fees	$ $0.49
	$3.94

0005 11 Postmark Here
10/02/2015

Sent To: Jeff Grubbe
Street, Apt. No.; or PO Box No.: 5401 Dinah Shore Dr.
City, State, ZIP+4: Palm Springs, CA - 92264

PS Form 3800, August 2006 See Reverse for Instructions

APPENDIX B

PALEONTOLOGICAL RESOURCES OVERVIEW

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

Vertebrate Paleontology Section
Telephone: (213) 763-3325
Fax: (213) 746-7431
e-mail: smcleod@nhm.org

6 October 2015

BCR Consulting
1420 Guadalajara Place
Claremont, CA 91711

Attn: David Brunzell, Principal Investigator / Archaeologist

re: Paleontological resources for the proposed Rancho Palma Project, near Verdemont, San Bernardino County, project area

Dear David:

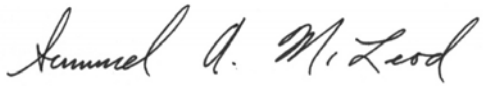
I have conducted a thorough check of our paleontology collection records for the locality and specimen data for the proposed Rancho Palma Project, near Verdemont, San Bernardino County, project area as outlined on the portion of the San Bernardino North USGS topographic quadrangle map that you sent to me via e-mail on 23 September 2015. We do not have any vertebrate fossil localities that lie directly within the proposed project area, but we do have localities farther afield from sedimentary deposits similar to those that may occur subsurface in the proposed project area.

Surface deposits in the entire proposed project area are composed of younger Quaternary Alluvium, derived as alluvial fan deposits from the San Gabriel Mountains to the north, and in particular as fluvial deposits from Cable Creek that currently forms the northeastern boundary of the proposed project area. These deposits typically do not contain significant vertebrate fossils, at least in the uppermost layers, but they may be underlain at relatively shallow depth by older sedimentary deposits that do contain significant fossil vertebrate remains. Our closest fossil vertebrate locality from similar older Quaternary deposits is LACM 7811, quite some distance to the southwest of the proposed project area west of Mira Loma along Sumner Avenue, that produced a fossil specimen of whipsnake, *Masticophis*, at a depth of 9 to 11 feet below the surface. Further to the southwest between Corona and Norco our vertebrate fossil locality LACM 1207 produced a fossil specimen of deer, *Odocoileus*.

Shallow excavations in the younger Quaternary Alluvium exposed throughout the proposed project area are unlikely to encounter significant vertebrate fossils. Deeper excavations in the proposed project area that extend down into older Quaternary deposits, however, may well encounter significant remains of fossil vertebrates. Any substantial and deep excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains while not impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils collected should be placed in an accredited scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,



Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

APPENDIX C

PHOTOGRAPHS

Photo 1: Overview from W Corner (NE View)

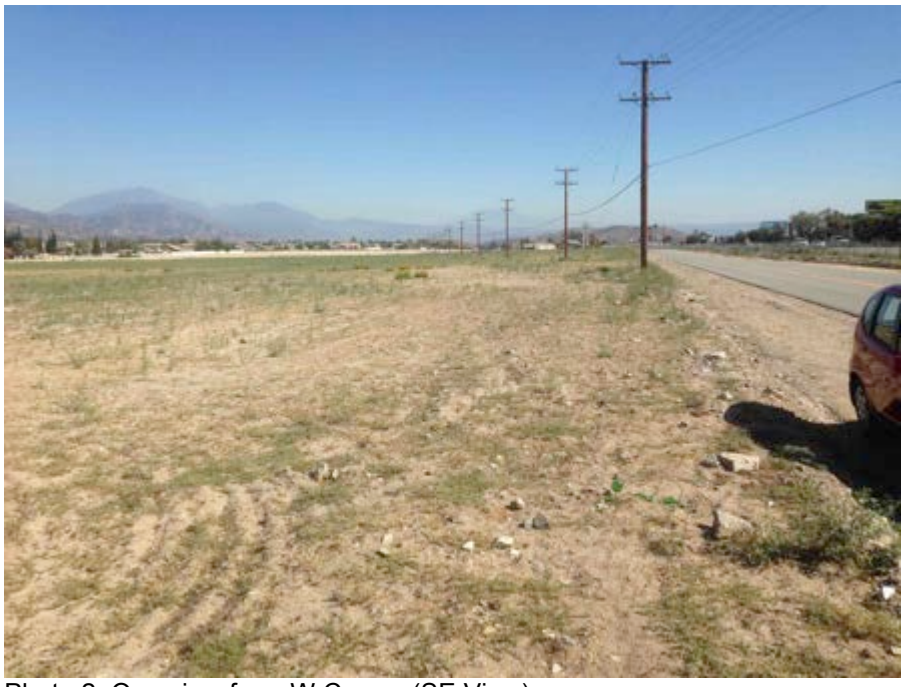


Photo 2: Overview from W Corner (SE View)

Photo 3: Overview of Portion NE of Cable Creek (SW View)

Photo 4: Overview of Portion NE of Cable Creek (W View)

3.5-1 Preliminary Geotechnical Investigation

PRELIMINARY GEOTECHNICAL INVESTIGATION

MIXED USE RESIDENTIAL AND COMMERCIAL DEVELOPMENT VERDEMONT AREA SAN BERNARDINO, CALIFORNIA

GEOCON
WEST, INC.

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

STRATA EQUITY GROUP, INC.
SAN DIEGO, CALIFORNIA

APRIL 20, 2015
PROJECT NO. T2616-22-01

Project No. T2616-22-01
April 20, 2015

Strata Equity Group, Inc.
4370 La Jolla Village Drive, Suite 960
San Diego, California 92122

Attention: Mr. Eric Flodine

Subject: PRELIMINARY GEOTECHNICAL INVESTIGATION
MIXED USE RESIDENTIAL AND COMMERCIAL DEVELOPMENT
VERDEMONT AREA, SAN BERNARDINO, CALIFORNIA

Dear Mr. Flodine:

In accordance with your authorization of Geocon Proposal IE-1333 dated October 27, 2014, and Work Order Authorization dated April 1, 2015, Geocon West, Inc. (Geocon) herein submits the results of our preliminary geotechnical investigation and percolation testing for the subject mixed use residential and commercial development. The accompanying report presents our findings, conclusions and recommendations pertaining to the geotechnical aspects of the proposed development. The study also includes an evaluation of the geologic units and geologic hazards. The recommendations of this study should be reviewed once project plans are developed. Based on the results of this study, it is our opinion the site is considered suitable for the proposed development provided the recommendations of this report are followed.

Should you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCONWEST, INC.

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PRELIMINARY GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of our geotechnical investigation for the proposed mixed used residential and commercial development located in the Verdemont area of San Bernardino, California (see *Vicinity Map*, Figure 1). The purpose of the investigation is to evaluate subsurface soil and geologic conditions at the site and, based on the conditions encountered, provide recommendations pertaining to the geotechnical aspects of developing the property. Development plans are not available at this time. The recommendations of this study should be reviewed once project plans are developed.

The scope of our investigation included review of the previous project report by Levine Fricke (LFR), sequential stereoscopic aerial photographs, geologic mapping, subsurface exploration, percolation testing, laboratory testing, engineering analyses, and the preparation of this report. A summary of the information reviewed for this study is presented in the *List of References*.

Our field investigation included excavation of eleven geotechnical test pits, four percolation tests and two deep percolation excavations. Appendix A presents a discussion of the field investigation and logs of the test pits and percolation test results. The approximate locations of the exploratory excavations are presented on the *Site Map* (Figure 2). We performed laboratory tests on soil samples obtained from the exploratory excavations to evaluate pertinent physical and chemical properties for engineering analysis. The results of the laboratory testing are presented in Appendix B. Geotechnical logs and laboratory test data from the previous geotechnical report by LFR are presented in Appendix C.

References to elevations presented in this report are based on readily available topographic information. Geocon does not practice in the field of land surveying and is not responsible for the accuracy of such topographic information.

2. SITE AND PROJECT DESCRIPTION

The site is an irregularly shaped parcel bounded by Little League Drive on the southeast, Red Sky Avenue, Chestnut Avenue and Irvington Avenue to the northeast, and the Platinum Soccer Complex to the northwest. The Cable Creek Channel runs along the northeast side of the site and crosses through the eastern corner of one of the parcels. An electric transmission line on wooden poles crosses the site from southeast to northwest.

The ALTA/ACSM Land Title Survey by DRC Engineering, Inc. indicates that the site is comprised of parcels with APN Designations of 0261-181-01, 0261-181-13, 0261-181-14, 0261-181-15, and 0261-182-10. The site is located at latitude 34.1958 and longitude -117.3652.

We understand that the site will be developed as a mixed use project with commercial and residential structures. We have assumed that the structures will be either concrete tilt-up or wood frame construction with shallow foundations and concrete slab-on-grade floors. The associated utility, roadway, and flatwork improvements will also be constructed. Infiltration basins are proposed in the southeastern and northwestern portions of the site at depths of five to eight feet below existing grades. Grading or site design documents were not available at the time of this report, however, based on existing grades we anticipate cuts and fills to be on the order of five feet or less.

The site is generally vacant and cleared of vegetation. Our aerial photograph review indicates that the site has been periodically plowed and cleared of vegetation. The original alignment of Cable Creek crossed through the southern portion of the site. The creek was realigned to its current location in about the 1940's in conjunction with grading of the roadway that is now Interstate 215.

Site elevations range from approximately 1765 feet above North American Vertical Datum (NAVD) in the northern end of the site to approximately 1730 feet above sea level at the southern end of the site. The locations and descriptions provided herein are based on a site reconnaissance, our field exploration, and project information provided by the client.

3. BACKGROUND

A geotechnical investigation of the site was performed in 2005 by Levine Fricke (LRF, 2005). They excavated five small diameter geotechnical borings and performed laboratory testing. The boring logs and laboratory test results are presented herein in Appendix C. The locations of the explorations are included on our *Site Map*, Figure 2. They performed the following laboratory tests: in-situ moisture and density testing, maximum density/optimum moisture testing, sieve analyses, direct shear strength, collapse, and corrosion screening. They recommended remedial grading including removal and recompaction of the upper five feet of the site soils. They estimated groundwater on the order of 200 feet below the existing ground surface, and considered the potential for site liquefaction to be low. Their laboratory testing indicated a collapse potential of 0.4 to 0.5 percent in the upper 2 to 11.5 feet when saturated at 1,000 pounds per square foot (psf). They provided a foundation bearing capacity of 6,000 psf for combined live and dead loads, but they did not provide an estimate of settlement or detailed foundation and concrete slab-on-grade recommendations. They also did not provide grading recommendations for earthwork at the site. They recommended that further investigation be performed once the project design has been established.

4. GEOLOGIC SETTING

The project site is located in San Bernardino Valley within the Peninsular Ranges Geomorphic Province. The Peninsular Ranges are bounded on the north by the Transverse Ranges (San Gabriel and San Bernardino Mountains) and on the east by the San Andreas fault. The Peninsular Ranges Province extends southward into Mexico and westward past the Channel Islands. Geologic units within the Peninsular Ranges consist of granitic and metamorphic bedrock highlands and deep and broad alluvial valleys. Specifically, the site is located on an alluvial fan emanating from the San Bernardino Mountains. Several hundred feet of sands with variable amounts of gravels, cobbles, and boulders underlie the site.

5. GEOLOGIC MATERIALS

5.1 General

During our field investigation, we encountered Quaternary-age alluvial deposits and localized previously placed fill. The upper portion of the alluvium has been disturbed by previous grading, clearing or agricultural activities. The descriptions of the soil and geologic conditions are shown on the excavation logs located in Appendix A and described herein in order of increasing age.

5.2 Previously Placed Artificial Fill (Qaf)

Previously placed artificial was encountered in the northeast portion of the site, in Test Pit TP-11. It appears that this fill was placed perhaps in association with the adjacent park grading. As encountered, this unit consists of silty sand that is medium dense, moist, brown, and contained some gravel and cobble. The upper portion of this unit will require remedial grading.

5.3 Quaternary Alluvial Deposits (Qal)

Quaternary-age alluvium is present on the remainder of the site and underlies the site at depth. The soils, as encountered within our excavations, consist of sands and gravels with varying amounts of silt and cobbles. The alluvial deposits are generally medium dense and slightly moist. The upper one to two feet of alluvium was disturbed by previous grading, clearing, or agricultural activities and was loose as a result. The alluvium is considered suitable for support of the proposed site improvements. However, the upper portion of this unit will require remedial grading.

6. GROUNDWATER

We did not encounter groundwater during our exploration to the depths explored of 15.5 feet. Groundwater was not encountered during the LFR investigation in 2005 to a depth of 50.5 feet. The LFR report indicates that groundwater is anticipated to be on the order of 200 feet below the ground surface. It is not uncommon for seepage conditions to develop where none previously existed due to the

permeability characteristics of the geologic units encountered. During the rainy season, localized perched water conditions may develop above silt and clay layers that may require special consideration during grading operations. Groundwater elevations are dependent on seasonal precipitation, irrigation, and land use, among other factors, and vary as a result.

7. GEOLOGIC HAZARDS

7.1 Seismic Design Parameters

We used the computer program *U.S. Seismic Design Maps*, provided by the USGS. Table 7.1.1 summarizes site-specific design criteria obtained from the 2013 California Building Code (CBC; Based on the 2012 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The short spectral response uses a period of 0.2 second. The building structure and improvements should be designed using a Site Class D. We evaluated the Site Class based on the discussion in Section 1613.3.2 of the 2013 CBC and Table 20.3-1 of ASCE 7-10. The values presented in Table 7.1.1 are for the risk-targeted maximum considered earthquake (MCE_R).

TABLE 7.1.1
2013 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2013 CBC Reference
Site Class	D	Section 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	2.375g	Figure 1613.3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	1.152g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.0	Table 1613.3.3(1)
Site Coefficient, F_V	1.5	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	2.375g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	1.728g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.583g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	1.152g	Section 1613.3.4 (Eqn 16-40)

Table 7.1.2 presents additional seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE_G).

TABLE 7.1.2
2013 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.916	Figure 22-7
Site Coefficient, F_{PGA}	1.0	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.916g	Section 11.8.3 (Eqn 11.8-1)

Conformance to the criteria in Tables 7.1.1 and 7.1.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

7.2 Liquefaction

Liquefaction typically occurs when a site is located in a zone with seismic activity, onsite soils are cohesionless/silt or clay with low plasticity, static groundwater is encountered within 50 feet of the surface, and soil relative densities are less than about 70 percent. If the four previous criteria are met, a seismic event could result in a rapid pore-water pressure increase from the earthquake-generated ground accelerations. Seismically induced settlement may occur whether the potential for liquefaction exists or not. Groundwater depths are anticipated to be on the order of 200 feet below ground surface. However, perched water may develop along the channel during a storm event. This condition was used in our liquefaction analysis as a conservative estimate of the liquefaction potential, even though the probability of the occurrence of the design earthquake during a significant storm event is unlikely.

The current standard of practice, as outlined in the "Recommended Procedures for Implementation of DMG Special Publication 117A, Guidelines for Analyzing and Mitigating Liquefaction in California" requires liquefaction analysis to a depth of 50 feet below the lowest portion of the proposed structure. Liquefaction typically occurs in areas where the soils below the water table are composed of poorly consolidated, fine to medium-grained, primarily sandy soil. In addition to the requisite soil conditions, the ground acceleration and duration of the earthquake must also be of a sufficient level to induce liquefaction.

Liquefaction analysis of the soils underlying the site was performed using the spreadsheet template LIQ2_30.WQ1 developed by Thomas F. Blake (1996). This program utilizes the 1996 NCEER method of analysis. The liquefaction potential evaluation was performed by utilizing groundwater elevation at the bottom of the adjacent channel, a magnitude 7.0 earthquake, and the site class modified peak horizontal acceleration for the site from the 2013 CBC. This semi-empirical method is based on a

correlation between values of Standard Penetration Test (SPT) resistance and field performance data. Data from the previous CPT logs was also used to assist in an evaluation of the potential for liquefaction.

Based on the liquefaction analysis, it is anticipated that some of the alluvial soil layers below the level of the high historic groundwater could be prone to settlement during a seismic event. Our analysis indicates that total settlements on the order of up to 2 inches are anticipated with differential settlements on the order of 1 inch over a horizontal distance of 50 feet.

Given the location of the Cable Creek Channel through the planned development, we evaluated the potential for lateral spreading along the side of the channel. Due to the depth of groundwater at the site, the channel slopes would not be subject to lateral spreading unless the design earthquake occurred concurrently with a significant storm event that caused saturation of the soil beneath the Cable Creek Channel side slopes. Given the unlikely possibility of this occurrence, it is our opinion that lateral spreading is not a design consideration.

7.3 Expansive Soil

The geologic units are anticipated to possess a “very low” expansion potential (Expansion Index of 20 or less) when placed at the finish grades beneath the proposed structures. If expansive soils are encountered, these materials can be selectively graded and placed in the deeper fill areas at least three feet below finished grade elevations in order to allow for the placement of the low expansion material at the finish pad grade. Mixing of the silts with the sands during grading will blend the materials and likely result in a reduced overall expansion potential that the original silts.

7.4 Landslides

There are no hillsides on or adjacent to the site. The San Bernardino Mountains are located approximately 1.1 miles northwest of the site. Therefore, the landslide hazard to the site is not a design consideration.

7.5 Slope Stability

We understand that the proposed grading at the project site does not include significant cut or fill slopes as part of the proposed development. However, the existing Cable Creek Channel has embankment slopes estimated to be on the order of 5 to 15 feet in height. In general, it is our opinion that permanent, graded fill slopes constructed of on-site soils with gradients of 2:1 (horizontal to vertical) or flatter and vertical heights of 15 feet or less will possess Factors of Safety of 1.5 or greater (Figure 3). We should re-evaluate the stability of planned slopes once detailed grading plans are available including topographic information for the Cable Creek Channel. Planned cuts into the

existing fill or alluvial materials should be over-excavated and reconstructed with compacted fill. Grading of cut and fill slopes should be designed in accordance with the requirements of the local building codes of the City of San Bernardino and the 2013 California Building Code (CBC).

7.6 Tsunamis and Seiches

A tsunami is a series of long period waves generated in the ocean by a sudden displacement of large volumes of water. Causes of tsunamis include underwater earthquakes, volcanic eruptions, or offshore slope failures. The first order driving force for locally generated tsunamis offshore southern California is expected to be tectonic deformation from large earthquakes (Legg, *et al.*, 2002). The site is located 60 miles from the nearest coastline, therefore, the risk associated with tsunamis is not a design consideration.

A seiche is a run-up of water within a lake or embayment triggered by fault- or landslide-induced ground displacement. The site is not located near to or downstream of a body of water. Therefore the potential of seiches affecting the site or flooding is not a design consideration.

8.0 SITE INFILTRATION

8.1 General

Prior to our percolation testing on the site we contacted San Bernardino Flood Control (SBCF) Planning Engineer to inquire as to the required test method to determine infiltration rates for the site. SBCF referred us to San Bernardino Valley Water District where we attempted to contact their engineering department for the preferred infiltration test method. We did not receive a response from San Bernardino Valley Water District. Therefore, we opted to use a percolation test method commonly used in Riverside County and found in Table 1 Infiltration Basin Option 2 of Appendix A of Riverside County – Low Impact Development BMP Design Handbook (Handbook). We choose not to use the double-ring infiltrometer method for the site because the site soils were sandy and the infiltration rate would likely be too rapid for the testing apparatus to accurately measure the rate. We planned to run the tests in accordance with Section 2.3 Shallow Percolation Test Method. This method requires two percolation tests and one deep (extending 10 feet below percolation test elevation) excavation per basin. Infiltration testing was conducted at each of the proposed infiltration basins. Due to the very granular soil conditions encountered at the test locations, the infiltration rates were too rapid for the test method as described above. Therefore, as a means of determining the infiltration rates, timed intervals were taken to determine the rate that five gallons of water infiltrated into the ground through the prepared test holes.

Site geotechnical conditions as encountered in the excavations consist of Quaternary-age alluvium composed primarily of sands and gravels with varying amounts of silt and cobbles.

Historic well data obtained from the California Department of Water Resources Water Data Library and the Western Municipal Water District Cooperative Well Measuring Program indicate that the depth to ground water in the vicinity of the site is greater than 100 feet.

The site location is depicted on the Vicinity Map, Figure 1. The test pit and percolation test locations are depicted on the *Site Map*, Figure 2. Test pit logs and percolation test data are presented in Appendix A. Descriptions of the proposed basins, the testing procedures, and test results are provided below for each basin.

8.2 Southwest Basin:

The current site elevation in the vicinity of the proposed southwest basin is approximately 1727 feet above MSL. Geocon utilized an extend-a-hoe backhoe to excavate the two percolation test holes (P-1 and P-2) and one deep excavation (TR-1 to depth of 15.5 feet below grade) for the proposed basin. Soils encountered within the excavations consisted primarily of sands and gravels with varying amounts of silt and cobbles. No groundwater or evidence of oxidation-reduction mottling was observed within the deep excavation. The percolation test pits were excavated to 4 and 7 feet below existing grades and an 8-inch diameter test hole was hand excavated an additional 12 inches at the bottom of the test pit. Six-inch and 8-inch diameter PVC pipe was placed in the percolation test holes and approximately 2 inches of gravel was placed at the bottom of the PVC pipe. Gravel backfill was placed outside of the pipe within the excavation. The test locations were pre-saturated with five gallons of water. Two trials were conducted for each test to evaluate if the percolations tests should be run with the Sandy Soil Criteria. However, the water percolated into the ground too fast to run the criteria tests.

Due to the very granular soil conditions encountered at the test locations, the infiltration rates were too rapid for the standardized test method as described above. Therefore, as a means of determining the infiltration rates, timed intervals were taken to determine the rate that five gallons of water infiltrated into the ground through the prepared test holes.

Percolation data sheets are presented at the back of this report (Figures A-14 and A-15). Calculations to convert the percolation test rate to infiltration test rate are based on the Porchet Method as outlined in Section 2.3 of the referenced Handbook are presented in the table below. Please note that the Handbook requires a factor of safety of 3 be applied to these values based on the test method used.

Infiltration Test Rates for Southwest Basin

	P-1	P-2
Soil Type	Sandy	Sandy
Change in head over time: ΔH (in)	18.2	18.2
Time Interval (minutes): Δt (min)	0.52	2.80
Radius of test hole: r (in)	4.5	4.5
Average head over time interval: Havg	9.1	9.1
Tested Infiltration Rate (in/hr): It	419	77

8.3 Eastern Basin:

The current site elevation in the vicinity of the proposed eastern basin is approximately 1714 feet above MSL. Geocon utilized an extend-a-hoe backhoe to excavate the two percolation test holes (P-3 and P-4) and one deep excavation (TR-2 to depth of 15.5 feet below grade) for the proposed basin. Soils encountered within the excavations consisted composed primarily of sands and gravels with varying amounts of silt and cobbles. No groundwater or evidence of oxidation-reduction mottling was observed within the deep excavation. The percolation test pits were excavated to 4 and 7 feet below existing grades and an 8-inch diameter test hole was hand excavated an additional 12 inches at the bottom of the test pit. Six-inch and 8-inch diameter PVC pipe was placed in the percolation test holes and approximately 2 inches of gravel was placed at the bottom of the PVC pipe. Gravel backfill was placed outside of the pipe within the excavation. The test locations were pre-saturated with five gallons of water. Two trials were conducted for each test to evaluate if the percolations tests should be run with the Sandy Soil Criteria. However, the water percolated into the ground too fast to run the criteria tests.

Due to the very granular soil conditions encountered at the test locations, the infiltration rates were too rapid for the standardized test method as described above. Therefore, as a means of determining the infiltration rates, timed intervals were taken to determine the rate that five gallons of water infiltrated into the ground through the prepared test holes.

Percolation data sheets are presented at the back of this report (Figures A-14 and A-15). Calculations to convert the percolation test rate to infiltration test rate are based on the Porchet Method as outlined in Section 2.3 of the referenced Handbook are presented in the table below. Please note that the Handbook requires a factor of safety of 3 be applied to these values based on the test method used.

Infiltration Test Rates for Eastern Basin

	P-3	P-4
Soil Type	Sandy	Sandy
Change in head over time: ΔH (in)	10.2	18.2
Time Interval (minutes): Δt (min)	1.72	1.72
Radius of test hole: r (in)	6.0	4.5
Average head over time interval: Havg	5.1	9.1
Tested Infiltration Rate (in/hr): It	132	126

9. CONCLUSIONS AND RECOMMENDATIONS

9.1 General

9.1.1 It is our opinion that soil or geologic conditions were not encountered during the investigation that would preclude the proposed development of the project provided the recommendations presented herein are followed and implemented during construction.

9.1.2 Potential geologic hazards at the site include seismic shaking and regional ground subsidence. Based on our investigation and available geologic information, active, potentially active, or inactive faults are not present underlying or trending toward the site.

9.1.3 The upper four feet of previously placed fill and alluvium are considered unsuitable for the support of compacted fill or settlement-sensitive improvements based on the dry, loose condition observed during our exploration. Remedial grading of the surficial soil will be required as discussed herein. The alluvium and previously placed fill below a depth of four feet are considered suitable to support additional fill and the proposed structures and improvements.

9.1.4 The test pit excavations performed for this study were backfilled by pushing the soil into the excavation. No moisture conditioning or compactive effort were applied during the backfill process. As such, the test pit locations should be re-excavated during grading and replaced with compacted fill as recommended herein.

9.1.5 The site soils should generally be excavatable with conventional earth moving equipment in good working order. However, much of the site soils have little to no cohesion and are prone to caving. The contractor should take precautionary measures to mitigate caving when excavating into the alluvial materials.

9.1.6 We did not encounter groundwater during our subsurface exploration and we do not expect it to be a constraint to project development. Seepage and perched groundwater conditions may be encountered during the grading operations, especially during the rainy seasons or near the Cable Creek Channel.

9.1.7 In general, slopes should possess calculated factors of safety of at least 1.5 when graded at inclinations of 2:1 (horizontal to vertical), or flatter with maximum heights of 15 feet. Buildings should be set back a horizontal distance of at least 15 feet from the top of the Cable Creek Channel to maintain global stability of the channel slopes. Greater setbacks may be needed to mitigate the potential for erosion of the channel walls if the slope is not protected against erosion with a concrete lining or slope protection rock.

9.1.8 Proper drainage should be maintained in order to preserve the engineering properties of the fill in the sheet-graded pads and slope areas. Recommendations for site drainage are provided herein.

9.2 Soil Characteristics

9.2.1 The soil encountered in the field investigation is considered to be "non-expansive" (Expansion Index [EI] less than 20) as defined by 2013 California Building Code (CBC) Section 1803.5.3. Table 9.2.1 presents soil classifications based on the expansion index.

TABLE 9.2.1
SOIL CLASSIFICATION BASED ON EXPANSION INDEX

Expansion Index (EI)	Expansion Classification	2010 CBC Expansion Classification
0 – 20	Very Low	Non-Expansive
21 – 50	Low	Expansive
51 – 90	Medium	
91 – 130	High	
Greater Than 130	Very High	

9.2.2 The existing fill and alluvium possess a "very low" expansion potential (Expansion Index of 20 or less). Additional testing for expansion potential should be performed once final grades are achieved.

9.2.3 We performed laboratory tests on samples of the site materials to evaluate the percentage of water-soluble sulfate content. Results from the laboratory water-soluble sulfate content tests are presented in Appendix B and indicate that the on-site materials at the locations tested possess a sulfate content of 0.0003% equating to a S0 or negligible sulfate exposure to concrete structures as defined by 2013 CBC Section 1904.3 and ACI 318. Similar sulfate test results (0.002%) were provided by LFR. Table 9.2.3 presents a summary of concrete requirements set forth by 2013 CBC Section 1904.3 and ACI 318. The presence of water-soluble sulfates is not a visually discernible characteristic; therefore, other soil samples from the site could yield different concentrations. Additionally, over time landscaping activities (i.e., addition of fertilizers and other soil nutrients) may affect the concentration.

TABLE 9.2.3
REQUIREMENTS FOR CONCRETE
EXPOSED TO SULFATE-CONTAINING SOLUTIONS

Sulfate Exposure	Exposure Class	Water-Soluble Sulfate Percent by Weight	Cement Type	Maximum Water to Cement Ratio by Weight	Minimum Compressive Strength (psi)
Not Applicable	S0	0.00-0.10	--	--	2,500
Moderate	S1	0.10-0.20	II	0.50	4,000
Severe	S2	0.20-2.00	V	0.45	4,500
Very Severe	S3	> 2.00	V+ Pozzolan or Slag	0.45	4,500

9.2.4 Laboratory testing indicates the site soils have a pH of 7.6, possess 66 parts per million chloride, and have a minimum resistivity of 14,000 ohm-cm. The LFR report indicated a pH of 7.43, 85 parts per million chloride, and a minimum resistivity of 10,500 ohm-cm. The site would not be classified as corrosive to metal improvements in accordance with the Caltrans Corrosion Guidelines (Caltrans, 2012).

9.2.5 Geocon does not practice in the field of corrosion engineering. Therefore, further evaluation by a corrosion engineer may be performed if improvements that could be susceptible to corrosion are planned.

9.3 Grading

9.3.1 Grading should be performed in accordance with the *Recommended Grading Specifications* contained in Appendix D and the City of San Bernardino Grading Ordinance.

9.3.2 Prior to commencing grading, a preconstruction conference should be held at the site with the city inspector, owner or developer, grading contractor, civil engineer, and geotechnical engineer in attendance. Special soil handling and/or the grading plans can be discussed at that time.

9.3.3 Site preparation should begin with the removal of deleterious material, debris and vegetation. The depth of removal should be such that material exposed in cut areas or soil to be used as fill is relatively free of organic matter. Material generated during stripping and/or site demolition should be exported from the site.

9.3.4 Loose and/or dry previously placed fill and alluvium within the limits of grading should be removed to expose competent alluvium. We anticipate these removals will extend four feet

below the existing ground surface across the site and could extend deeper in some areas. The overexcavation should extend to a depth of at least two feet below the planned building foundations. In areas that will be cut to achieve finished grades, the upper four feet of soil should be removed, the bottom scarified and moisture conditioned before replacement with compacted fill. The actual depth of removal should be evaluated by the engineering geologist during grading operations. The bottom of the excavations should be scarified to a depth of at least 1 foot, moisture conditioned as necessary, and properly compacted.

9.3.5 We should observe the removal bottoms to check the exposure of the existing fill or older alluvium. Deeper excavations may be required if dry, loose, or soft materials are present at the base of the removals. Removal bottoms should expose soils which are at least 85 percent of maximum density.

9.3.6 The fill placed within 5 feet of proposed foundations should possess a "low" expansion potential (EI of 50 or less), and be free of rock greater than 6-inches in maximum dimension.

9.3.7 The site should be brought to finish grade elevations with fill compacted in layers. Layers of fill should be no thicker than will allow for adequate bonding and compaction. Fill, including backfill and scarified ground surfaces, should be compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content as determined by ASTM International (ASTM) D 1557. Fill placed with in 12 inches of finish subgrade elevations in pavement areas should be compacted to 95 percent of the laboratory maximum dry density. Fill materials placed below optimum moisture content may require additional moisture conditioning prior to placing additional fill.

9.3.8 Import fill (if necessary) should consist of granular materials with a "low" expansion potential (EI of 50 or less) generally free of deleterious material and rock fragments larger than 6 inches and should be compacted as recommended herein. Geocon should be notified of the import soil source and should perform laboratory testing of import soil prior to its arrival at the site to evaluate its suitability as fill material.

9.3.9 Fill slopes should be overbuilt at least 2 feet and cut back or be compacted by backrolling with a loaded sheepsfoot roller at vertical intervals not to exceed 4 feet to maintain the moisture content of the fill. The slopes should be track-walked at the completion of each slope such that the fill is compacted to a dry density of at least 90 percent of the laboratory maximum dry density near to slightly above optimum moisture content to the face of the

finished slope. Rock greater than 6-inches in maximum dimension should not be placed with three feet of the slope face.

9.3.10 Finished slopes should be landscaped with drought-tolerant vegetation having variable root depths and requiring minimal landscape irrigation. In addition, the slopes should be drained and properly maintained to reduce erosion.

9.4 Earthwork Grading Factors

9.4.1 Estimates of shrinkage factors are based on empirical judgments comparing the material in its existing or natural state as encountered in the exploratory excavations to a compacted state. Variations in natural soil density and in compacted fill density render shrinkage value estimates very approximate. As an example, the contractor can compact the fill to a dry density of 90 percent or higher of the laboratory maximum dry density. Thus, the contractor has an approximately 10 percent range of control over the fill volume. Based on our experience, the shrinkage of the site soil is anticipated to be approximately 10 to 15 percent. Please note that this estimate is for preliminary quantity estimates only. Due to the variations in the actual shrinkage/bulking factors, a balance area should be provided to accommodate variations.

9.5 Settlement of Proposed Fill

9.5.1 The post-grading settlement (hydrocompression) could reach up to 1 inch. We expect the settlement will occur over 20 years depending on the influx of rain and irrigation water into the fill and older alluvium. The settlement will likely be linear from the time the fill is placed to the end of the settlement period depending on the permeability of the fill soil. We do not expect the settlement will impact proposed utilities with gradients of 1 percent or greater. In addition, foundation recommendations are provided herein based on the maximum and differential fill thickness to account for potential fill settlement.

9.6 Commercial Structures - Foundation and Concrete Slabs-On-Grade

9.6.1 The proposed commercial structures can be supported on shallow foundation systems bearing on properly compacted fill soils. Foundations for the structures may consist of either continuous strip footings and/or isolated spread footings. Conventionally reinforced continuous footings should be at least 12 inches wide and extend at least 18 inches below lowest adjacent pad grade. Isolated spread footings should have a minimum width of 2 feet and should extend at least 18 inches below lowest adjacent pad grade. Footings should be dimensioned based on an allowable soil bearing pressure of 4,000 psf. This value may be increased by 300 psf for each additional foot in depth and 200 psf for each additional foot of width to a maximum value of 5,000 psf. The allowable bearing pressure value is for

dead plus live loads and may be increased by one-third when considering transient loads due to wind or seismic forces. Steel reinforcement for continuous footings should consist of at least four No. 5 steel reinforcing bars placed horizontally in the footings, two near the top and two near the bottom. Steel reinforcement for the spread footings should be designed by the project structural engineer.

9.6.2 Figure 4 presents a wall/column footing dimension detail depicting lowest adjacent pad grade.

9.6.3 Footing excavations should be observed by a representative of Geocon prior to placing reinforcing steel or concrete to verify that the excavations are in compliance with recommendations and the soil conditions are as anticipated.

9.6.4 Building interior floor slabs not anticipated to be subjected to forklift loads should be at least 4 inches thick and be reinforced with No. 3 reinforcing bars placed 24 inches on center, in both directions. The reinforcing bars should be placed on chairs at the slab mid-point.

9.6.5 The minimum reinforcement recommendations are based on soil characteristics only and is not intended to replace reinforcement required for structural considerations.

9.6.6 In accordance with the American Concrete Institute's (ACI) Slab Design Manual, concrete slabs-on-grade may be placed directly above a 15 mil Stego or equivalent liner to control vertical vapor transmission. This method should be considered in lieu of a conventional sand-barrier-sand and/or ¾ rock layering system in order to simplify construction and reduce overall cost. More conservative vapor retardant systems may be warranted beneath slabs where post-grading methane gas testing exceeds regulatory action limits, or, where special moisture-sensitive floor coverings are to be used or moisture-sensitive materials are to be stored. If installed, the vapor retarder design should be consistent with the guidelines presented in the American Concrete Institute's (ACI) *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (ACI 302.2R-06). In addition, the membrane should be installed in accordance with manufacturer's recommendations and ASTM requirements and installed in a manner that prevents puncture. The vapor retarder used should be specified by the project architect or developer based on the type of floor covering that will be installed and if the structure will possess a humidity-controlled environment.

9.6.7 If employed, sub-slab bedding sand thickness should be determined by the project foundation engineer, architect, and/or developer. However, we should be contacted to provide recommendations if the bedding sand is thicker than 6 inches. Placement of 3

inches and 4 inches of sand is common practice in Southern California for 5-inch and 4-inch thick slabs, respectively. The foundation engineer should provide appropriate concrete mix design criteria and curing measures that may be utilized to assure proper curing of the slab to reduce the potential for rapid moisture loss and subsequent cracking and/or slab curl. We suggest that the foundation engineer present concrete mix design and proper curing methods on the foundation plans. It is critical that the foundation contractor understands and follows the recommendations presented on the foundation plans.

9.6.8 We estimate the total settlements under the imposed allowable loads to be about 1 inch with differential settlements on the order of ½ inch over a horizontal distance of 40 feet.

9.6.9 Special subgrade presaturation is not deemed necessary prior to placing concrete; however, the exposed foundation and slab subgrade soil should be moisture conditioned, as necessary, to maintain a moist condition as would be expected in such concrete placement.

9.6.10 Where buildings or other improvements are planned near the top of a slope steeper than 3:1 (horizontal to vertical), special foundations and/or design considerations are recommended due to the tendency for lateral soil movement to occur.

- Building footings should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.
- Although other improvements, which are relatively rigid or brittle, such as concrete flatwork or masonry walls, may experience some distress if located near the top of a slope, it is generally not economical to mitigate this potential. It may be possible, however, to incorporate design measures that would permit some lateral soil movement without causing extensive distress. Geocon should be consulted for specific recommendations.

9.6.11 The recommendations of this report are intended to reduce the potential for cracking of slabs due to expansive soil (if present), differential settlement of existing soil or soil with varying thicknesses. However, even with the incorporation of the recommendations presented herein, foundations, walls, and slabs-on-grade placed on such conditions may still exhibit some cracking due to soil movement and/or shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

9.6.12 Geocon should be consulted to provide additional design parameters as required by the structural engineer.

9.7 Residential Structures - Foundation and Concrete Slabs-On-Grade

9.7.1 The foundation recommendations presented herein are for proposed residential structures. We separated the foundation recommendations into two categories based on either the maximum and differential fill thickness or Expansion Index. We anticipate the majority of structures will be Category I due to the low expansion potential and anticipated geometry of the underlying fill and alluvial materials. However, the category may be increased to Category II where expansion potential or fill geometry dictates. The foundation category criteria for the anticipated conditions are presented in Table 9.7.1. Geocon should provide additional recommendations if site conditions warrant Foundation Category III. Final foundation categories will be evaluated once site grading has been completed.

TABLE 9.7.1
FOUNDATION CATEGORY CRITERIA

Foundation Category	Maximum Fill Thickness, T (Feet)	Differential Fill Thickness, D (Feet)	Expansion Index (EI)
I	T<20	D<10	EI≤50
II	20≤T<50	10≤D<20	50<EI≤90

9.7.2 The proposed residential structures can be supported on shallow foundation systems bearing on properly compacted fill soils. Foundations for the structures may consist of either continuous strip footings and/or isolated spread footings. Conventionally reinforced continuous footings should be at least 12 inches wide, and isolated spread footings should have a minimum width of 2 feet. Footings should extend at least 12 inches below lowest adjacent pad grade for Category I foundations and at least 18 inches below lowest adjacent pad grade for Category II foundations.

9.7.3 Table 9.7.3 presents minimum foundation and interior concrete slab design criteria for conventional foundation systems.

TABLE 9.7.3
CONVENTIONAL FOUNDATION RECOMMENDATIONS BY CATEGORY

Foundation Category	Minimum Footing Embedment Depth (inches)	Continuous Footing Reinforcement	Interior Slab Reinforcement
I	12	Two No. 4 bars, one top and one bottom	6 x 6 - 10/10 welded wire mesh at slab mid-point
II	18	Four No. 4 bars, two top and two bottom	No. 3 bars at 24 inches on center, both directions

9.7.4 As an alternative to the conventional foundation recommendations, consideration should be given to the use of post-tensioned concrete slab and foundation systems for the support of the proposed structures. The post-tensioned systems should be designed by a structural engineer experienced in post-tensioned slab design and design criteria of the Post-Tensioning Institute (PTI), Third Edition, as required by the 2013 California Building Code (CBC Section 1808.6). Although this procedure was developed for expansive soil conditions, we understand it can also be used to reduce the potential for foundation distress due to differential fill settlement. The post-tensioned design should incorporate the geotechnical parameters presented on Table 9.7.4 for the particular Foundation Category designated. The parameters presented in Table 9.7.4 are based on the guidelines presented in the PTI, Third Edition design manual. The foundations for the post-tensioned slabs should be embedded in accordance with the recommendations of the structural engineer.

TABLE 9.7.4
POST-TENSIONED FOUNDATION SYSTEM DESIGN PARAMETERS

Post-Tensioning Institute (PTI) Third Edition Design Parameters	Foundation Category	
	I	II
Thornthwaite Index	-20	-20
Equilibrium Suction	3.9	3.9
Edge Lift Moisture Variation Distance, e_M (feet)	5.3	5.1
Edge Lift, y_M (inches)	0.61	1.10
Center Lift Moisture Variation Distance, e_M (feet)	9.0	9.0
Center Lift, y_M (inches)	0.30	0.47

9.7.5 The foundations for the post-tensioned slabs should be embedded in accordance with the recommendations of the structural engineer. A wall/column footing dimension detail is provided on Figure 4. If a post-tensioned mat foundation system is planned, the slab should possess a thickened edge with a minimum width of 12 inches and extend below the clean sand or crushed rock layer.

9.7.6 If the structural engineer proposes a post-tensioned foundation design method other than the 2013 CBC:

- The deflection criteria presented in Table 9.7.4 are still applicable.
- Interior stiffener beams should be used for Foundation Category II.
- The width of the perimeter foundations should be at least 12 inches.

- The perimeter footing embedment depths should be at least 12 inches and 18 inches for foundation categories I and II, respectively. The embedment depths should be measured from the lowest adjacent pad grade.

9.7.7 Our experience indicates post-tensioned slabs are susceptible to excessive edge lift, regardless of the underlying soil conditions. Placing reinforcing steel at the bottom of the perimeter footings and the interior stiffener beams may mitigate this potential. Because of the placement of the reinforcing tendons in the top of the slab, the resulting eccentricity after tensioning reduces the ability of the system to mitigate edge lift. The structural engineer should design the foundation system to reduce the potential of edge lift occurring for the proposed structures.

9.7.8 During the construction of the foundation system, the concrete should be placed monolithically. Under no circumstances should cold joints form between the footings/grade beams and the slab during the construction of the post-tension foundation system.

9.7.9 Category I, or II foundations may be designed for an allowable soil bearing pressure of 4,000 pounds per square foot (psf) (dead plus live load). This bearing pressure may be increased by one-third for transient loads due to wind or seismic forces. We estimate the total settlements under the imposed allowable loads to be about 1 inch with differential settlements on the order of ½ inch over a horizontal distance of 40 feet.

9.7.10 Isolated footings, if present, should have the minimum embedment depth and width recommended above for a particular foundation category. Where this condition cannot be avoided, the isolated footings should be connected to the building foundation system with grade beams.

9.7.11 Slabs that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials should be underlain by a vapor retarder. The vapor retarder design should be consistent with the guidelines presented in the American Concrete Institute's (ACI) *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (ACI 302.2R-06). In addition, the membrane should be installed in accordance with manufacturer's recommendations and ASTM requirements and installed in a manner that prevents puncture. The vapor retarder used should be specified by the project architect or developer based on the type of floor covering that will be installed and if the structure will possess a humidity-controlled environment.

9.7.12 The bedding sand thickness should be determined by the project foundation engineer, architect, and/or developer. However, we should be contacted to provide recommendations

if the bedding sand is thicker than 6 inches. Placement of 3 inches and 4 inches of sand is common practice in southern California for 5-inch and 4-inch thick slabs, respectively. The foundation engineer should provide appropriate concrete mix design criteria and curing measures that may be utilized to assure proper curing of the slab to reduce the potential for rapid moisture loss and subsequent cracking and/or slab curl. We suggest that the foundation engineer present concrete mix design and proper curing methods on the foundation plans. It is critical that the foundation contractor understands and follows the recommendations presented on the foundation plans.

9.7.13 Special subgrade presaturation is not deemed necessary prior to placing concrete; however, the exposed foundation and slab subgrade soil should be moisture conditioned, as necessary, to maintain a moist condition as would be expected in such concrete placement.

9.7.14 Where buildings or other improvements are planned near the top of a slope steeper than 3:1 (horizontal to vertical), special foundations and/or design considerations are recommended due to the tendency for lateral soil movement to occur.

- Building footings should be deepened such that the bottom outside edge of the footing is at least 7 feet horizontally from the face of the slope.
- Geocon should be contacted to review the pool plans and the specific site conditions to provide additional recommendations, if necessary.
- Swimming pools located within 7 feet of the top of cut or fill slopes are not recommended. Where such a condition cannot be avoided, the portion of the swimming pool wall within 7 feet of the slope face be designed assuming that the adjacent soil provides no lateral support
- Although other improvements, which are relatively rigid or brittle, such as concrete flatwork or masonry walls, may experience some distress if located near the top of a slope, it is generally not economical to mitigate this potential. It may be possible, however, to incorporate design measures that would permit some lateral soil movement without causing extensive distress. Geocon should be consulted for specific recommendations.

9.7.15 The recommendations of this report are intended to reduce the potential for cracking of slabs due to expansive soil (if present), differential settlement of existing soil or soil with varying thicknesses. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade placed on such conditions may still exhibit some cracking due to soil movement and/or shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, proper

concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

9.7.16 Geocon should be consulted to provide additional design parameters as required by the structural engineer.

9.8 Exterior Concrete Flatwork

9.8.1 Exterior concrete flatwork not subject to vehicular traffic should be constructed in accordance with the recommendations herein assuming the subgrade materials possess an Expansion Index of 50 or less. Subgrade soils should be compacted to 90 percent relative compaction. Slab panels should be a minimum of 4 inches thick and when in excess of 8 feet square should be reinforced with 6x6-W2.9/W2.9 (6x6-6/6) welded wire mesh or No. 3 reinforcing bars spaced 18 inches center-to-center in both directions to reduce the potential for cracking. In addition, concrete flatwork should be provided with crack control joints to reduce and/or control shrinkage cracking. Crack control spacing should be determined by the project structural engineer based upon the slab thickness and intended usage. Criteria of the American Concrete Institute (ACI) should be taken into consideration when establishing crack control spacing. Subgrade soil for exterior slabs not subjected to vehicle loads should be compacted in accordance with criteria presented in the grading section prior to concrete placement. Subgrade soil should be properly compacted and the moisture content of subgrade soil should be verified prior to placing concrete. Base materials will not be required below concrete flatwork improvements.

9.8.2 Where exterior flatwork abuts the structure at entrant or exit points, the exterior slab should be dowelled into the structure's foundation stemwall. This recommendation is intended to reduce the potential for differential elevations that could result from differential settlement or minor heave of the flatwork. Dowelling details should be designed by the project structural engineer.

9.8.3 The recommendations presented herein are intended to reduce the potential for cracking of exterior slabs as a result of differential movement. However, even with the incorporation of the recommendations presented herein, slabs-on-grade will still crack. The occurrence of concrete shrinkage cracks is independent of the soil supporting characteristics. Their occurrence may be reduced and/or controlled by limiting the slump of the concrete, the use of crack control joints and proper concrete placement and curing. Crack control joints should be spaced at intervals no greater than 12 feet. Literature provided by the Portland Concrete Association (PCA) and American Concrete Institute (ACI) present recommendations for proper concrete mix, construction, and curing practices, and should be incorporated into project construction.

9.9 Conventional Retaining Walls

9.9.1 Retaining walls not restrained at the top and having a level backfill surface should be designed for an active soil pressure equivalent to the pressure exerted by a fluid density of 35 pounds per cubic foot (pcf). Where the backfill will be inclined at no steeper than 2:1 (horizontal to vertical), an active soil pressure of 55 pcf is recommended. These soil pressures assume that the backfill materials within an area bounded by the wall and a 1:1 plane extending upward from the base of the wall possess an EI of 90 or less. For those lots where backfill materials do not conform to the criteria herein, Geocon should be consulted for additional recommendations.

9.9.2 Unrestrained walls are those that are allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall in feet) at the top of the wall. Where walls are restrained from movement at the top, an additional uniform pressure of 15H psf should be added to the active soil pressure for walls 10 feet high or less.

9.9.3 The structural engineer should determine the seismic design category for the project. If the project possesses a seismic design category of D, E, or F, the proposed retaining walls should be designed with seismic lateral pressure added to the active pressure. The seismic load exerted on the wall should be a triangular distribution with a pressure of 20H (where H is the height of the wall, in feet, resulting in pounds per square foot [psf]) exerted at the top of the wall and zero at the base of the wall. We used a site modified peak ground acceleration of 0.916g calculated from the 2013 California Building Code and applied a pseudo-static coefficient of 0.33.

9.9.4 Unrestrained walls will move laterally when backfilled and loading is applied. The amount of lateral deflection is dependent on the wall height, the type of soil used for backfill, and loads acting on the wall. The retaining walls and improvements above the retaining walls should be designed to incorporate an appropriate amount of lateral deflection as determined by the structural engineer.

9.9.5 Retaining walls should be provided with a drainage system adequate to prevent the buildup of hydrostatic forces and waterproofed as required by the project architect. The soil immediately adjacent to the backfilled retaining wall should be composed of free draining material completely wrapped in Mirafi 140 (or equivalent) filter fabric for a lateral distance of 1 foot for the bottom two-thirds of the height of the retaining wall. The upper one-third should be backfilled with less permeable compacted fill to reduce water infiltration. The use of drainage openings through the base of the wall (weep holes) is not recommended where the seepage could be a nuisance or otherwise adversely affect the property adjacent to the base of the wall. The recommendations herein assume a properly compacted backfill

(EI of 50 or less) with no hydrostatic forces or imposed surcharge load. Figure 5 presents a typical retaining wall drainage detail. If conditions different than those described are expected or if specific drainage details are desired, Geocon should be contacted for additional recommendations.

9.9.6 In general, wall foundations having a minimum depth and width of 1 foot may be designed for an allowable soil bearing pressure of 4,000 psf. The proximity of the foundation to the top of a slope steeper than 3:1 could impact the allowable soil bearing pressure. Therefore, Geocon should be consulted where such a condition is expected.

9.9.7 The recommendations presented herein are generally applicable to the design of rigid concrete or masonry retaining walls having a maximum height of 10 feet. In the event that walls higher than 10 feet or other types of walls are planned, Geocon should be consulted for additional recommendations.

9.10 Lateral Loading

9.10.1 To resist lateral loads, a passive pressure exerted by an equivalent fluid weight of 350 pounds per cubic foot (pcf) should be used for the design of footings or shear keys poured neat against formational materials. The allowable passive pressure assumes a horizontal surface extending at least 5 feet, or three times the surface generating the passive pressure, whichever is greater. The upper 12 inches of material in areas not protected by floor slabs or pavement should not be included in design for passive resistance.

9.10.2 If friction is to be used to resist lateral loads, an allowable coefficient of friction between soil and concrete of 0.40 should be used for design.

9.11 Swimming Pool/Spa

9.11.1 If swimming pools or spas are planned, the proposed swimming pool shell bottom should be designed as a free-standing structure and may derive support in newly placed engineered fill or the competent native alluvium. It is recommended that uniformity be maintained beneath the proposed swimming pools where possible. However, swimming pool foundations may derive support in both engineered fill and undisturbed native alluvium.

9.11.2 Swimming pool foundations and walls may be designed in accordance with the Foundation Design and Retaining Wall Design sections of this report. A hydrostatic relief valve should be considered as part of the swimming pool design unless a gravity drain system can be placed beneath the pool shell.

9.11.3 If a spa is proposed it should be constructed independent of the swimming pool and must not be cantilevered from the swimming pool shell.

9.11.4 If the pool is in proximity to the proposed structure, consideration should be given to construction sequence. If the proposed pool is constructed after building foundation construction, the excavation required for pool construction could remove a component of lateral support from the foundations and would therefore require shoring. Once information regarding the pool location and depth becomes available, this information should be provided to Geocon for review and possible revision of these recommendations.

9.12 Preliminary Pavement Recommendations

9.12.1 The final pavement sections for roadways should be based on the R-Value of the subgrade soils encountered at final subgrade elevation. Streets should be designed in accordance with the City of San Bernardino specifications when final Traffic Indices and R-value test results of subgrade soil are completed. A sample of the site soils exhibited an R-value of 71 when tested in accordance with ASTM D2488. We have used an R-value of 50 for on-site soils and an R-Value of 78 for aggregate base materials for the purposes of this preliminary analysis as Caltrans limits the subgrade R-value to 50. Preliminary flexible pavement sections are presented in Table 9.12.1.

TABLE 9.12.1
PRELIMINARY FLEXIBLE PAVEMENT SECTIONS

Location	Assumed Traffic Index	Assumed Subgrade R-Value	Asphalt Concrete (inches)	Crushed Aggregate Base (inches)
Roadways servicing light-duty vehicles	5.5	50	3.0	4.0
Roadways servicing heavy truck vehicles	7.0	50	4.0	5.0
Collector	8.0	50	5.0	5.0

9.12.2 The upper 12 inches of the subgrade soil should be compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content beneath pavement sections.

9.12.3 The crushed aggregated base and asphalt concrete materials should conform to Section 200-2.2 and Section 203-6, respectively, of the *Standard Specifications for Public Works Construction* (Greenbook) and the latest edition of the City of San Bernardino Specifications. Base materials should be compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content.

Asphalt concrete should be compacted to a density of 95 percent of the laboratory Hveem density in accordance with ASTM D 1561.

9.12.4 A rigid Portland cement concrete (PCC) pavement section should be placed in driveway aprons and cross gutters. We calculated the rigid pavement section in general conformance with the procedure recommended by the American Concrete Institute report ACI 330R-08 Guide for Design and Construction of Concrete Parking Lots using the parameters presented in Table 9.12.4.

TABLE 9.12.4
RIGID PAVEMENT DESIGN PARAMETERS

Design Parameter	Design Value
Modulus of subgrade reaction, k	200 pci
Modulus of rupture for concrete, M_R	500 psi
Traffic Category, TC	C and D
Average daily truck traffic, ADTT	100 and 700

9.12.5 Based on the criteria presented herein, the PCC pavement sections should have a minimum thickness as presented in Table 9.12.5.

TABLE 9.12.5
RIGID PAVEMENT RECOMMENDATIONS

Location	Portland Cement Concrete (inches)
Roadways (TC=C)	6.5
Bus Stops (TC=D)	7.0

9.12.6 The PCC pavement should be placed over subgrade soil that is compacted to a dry density of at least 95 percent of the laboratory maximum dry density near to slightly above optimum moisture content. This pavement section is based on a minimum concrete compressive strength of approximately 3,000 psi (pounds per square inch). Base material will not be required beneath concrete improvements.

9.12.7 A thickened edge or integral curb should be constructed on the outside of concrete slabs subjected to wheel loads. The thickened edge should be 1.2 times the slab thickness or a minimum thickness of 2 inches, whichever results in a thicker edge, and taper back to the recommended slab thickness 4 feet behind the face of the slab (e.g., a 9-inch-thick slab

would have an 11-inch-thick edge). Reinforcing steel will not be necessary within the concrete for geotechnical purposes with the possible exception of dowels at construction joints as discussed herein.

9.12.8 To control the location and spread of concrete shrinkage cracks, crack-control joints (weakened plane joints) should be included in the design of the concrete pavement slab. Crack-control joints should not exceed 30 times the slab thickness with a maximum spacing of 15 feet for the 7-inch-thick slabs (e.g., a 9-inch-thick slab would have a 15-foot spacing pattern), and should be sealed with an appropriate sealant to prevent the migration of water through the control joint to the subgrade materials. The depth of the crack-control joints should be determined by the referenced ACI report.

9.12.9 To provide load transfer between adjacent pavement slab sections, a butt-type construction joint should be constructed. The butt-type joint should be thickened by at least 20 percent at the edge and taper back at least 4 feet from the face of the slab. As an alternative to the butt-type construction joint, dowelling can be used between construction joints for pavements of 7 inches or thicker. As discussed in the referenced ACI guide, dowels should consist of smooth, 1-inch-diameter reinforcing steel 14 inches long embedded a minimum of 6 inches into the slab on either side of the construction joint. Dowels should be located at the midpoint of the slab, spaced at 12 inches on center and lubricated to allow joint movement while still transferring loads. In addition, tie bars should be installed at the as recommended in Section 3.8.3 of the referenced ACI guide. The structural engineer should provide other alternative recommendations for load transfer.

9.12.10 The performance of pavement is highly dependent on providing positive surface drainage away from the edge of the pavement. Ponding of water on or adjacent to the pavement surfaces will likely result in pavement distress and subgrade failure. Drainage from landscaped areas should be directed to controlled drainage structures. Landscape areas adjacent to the edge of asphalt pavements are not recommended due to the potential for surface or irrigation water to infiltrate the underlying permeable aggregate base and cause distress. Where such a condition cannot be avoided, consideration should be given to incorporating measures that will significantly reduce the potential for subsurface water migration into the aggregate base. If planter islands are planned, the perimeter curb should extend at least 6 inches below the level of the base materials.

9.13 Site Drainage and Moisture Protection

9.13.1 Adequate site drainage is critical to reduce the potential for differential soil movement, erosion and subsurface seepage. Under no circumstances should water be allowed to pond adjacent to footings. The site should be graded and maintained such that surface drainage is

directed away from structures in accordance with 2013 CBC 1804.3 or other applicable standards. In addition, surface drainage should be directed away from the top of slopes into swales or other controlled drainage devices. Roof and pavement drainage should be directed into conduits that carry runoff away from the proposed structure.

9.13.2 Underground utilities should be leak free. Utility and irrigation lines should be checked periodically for leaks, and detected leaks should be repaired promptly. Detrimental soil movement could occur if water is allowed to infiltrate the soil for prolonged periods of time.

9.13.3 Landscaping planters adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. We recommend that area drains to collect excess irrigation water and transmit it to drainage structures or impervious above-grade planter boxes be used. In addition, where landscaping is planned adjacent to the pavement, we recommend construction of a cutoff wall along the edge of the pavement that extends at least 6 inches below the bottom of the base material.

9.13.4 We understand the property may incorporate storm water management devices that promote water storage but not water infiltration. The existing and planned soil conditions are not conducive to water infiltration and infiltration should not be performed. In addition, if water is allowed to infiltrate the soil, seepage may occur through the planned retaining walls and could cause slope instability. Water storage devices can be installed to reduce the velocity and amount of water entering the storm drain system but liners will be required if water in contact with soil.

9.13.5 If not properly constructed, there is a potential for distress to improvements and properties located hydrologically down gradient or adjacent to these devices. Factors such as the amount of water to be detained, its residence time, and soil permeability have an important effect on seepage transmission and the potential adverse impacts that may occur if the storm water management features are not properly designed and constructed. Based on our experience with similar clayey soil conditions, infiltration areas are considered infeasible due to the poor percolation and lateral migration characteristics. We have not performed a hydrogeology study at the site. Down-gradient and adjacent structures may be subjected to seeps, movement of foundations and slabs, or other impacts as a result of water infiltration.

9.14 Foundation Plan Review

9.14.1 Geocon should review the structural foundation plans for the project prior to final submittal. Additional analyses may be required after review of the foundation plans.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous materials was not part of the scope of services provided by Geocon.

2. This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the date of this report. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

4. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

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N

1"=2,000'

SOURCE: Google Maps, 2014.

VICINITY MAP

GEOCON WEST, INC.
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41571 CORNING PLACE SUITE 101 MURRIETA, CA 92562-7065
PHONE 951-304-2300 FAX 951-304-2392

MIXED USED RESIDENTIAL AND COMMERCIAL DEVELOPMENT
VERDEMONT AREA
SAN BERNARDINO, CALIFORNIA

CER		

APRIL, 2015	PROJECT NO. T2616-22-01	FIG. 1

GEOCON LEGEND

TP11 .....APPROX. LOCATION OF GEOCON TEST PIT

B-5 .....APPROX. LOCATION OF LFR BORING (2005)

P-4 .....APPROX. LOCATION OF GEOCON INFLITRATION TEST

TR-2 .....APPROX. LOCATION OF GECON INFILTRATION EXPLORATORY TRENCH

1”=300’

SOURCE: Google Earth, 2014.

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SITE MAP

MIXED USE RESIDENTIAL AND COMMERCIAL DEVELOPMENT
VERDEMONT AREA
SAN BERNARDINO, CALIFORNIA

APRIL , 2015 | PROJECT NO. T2616-22-01 | FIG. 2

ASSUMED CONDITIONS:

SLOPE HEIGHT	H	=	15 feet
SLOPE INCLINATION	2.0 : 1.0 (Horizontal : Vertical)		
TOTAL UNIT WEIGHT OF SOIL	γ_t	=	125 pounds per cubic foot
ANGLE OF INTERNAL FRICTION	ϕ	=	32 degrees
APPARENT COHESION	C	=	150 pounds per square foot
NO SEEPAGE FORCES			

ANALYSIS:

$\lambda_{c\phi} = \dfrac{\gamma H \tan\phi}{C}$ EQUATION (3-3), REFERENCE 1

$FS = \dfrac{NcfC}{\gamma H}$ EQUATION (3-2), REFERENCE 1

$\lambda_{c\phi}$ = 7.8 CALCULATED USING EQ. (3-3)

Ncf = 28 DETERMINED USING FIGURE 10, REFERENCE 2

FS = 2.2 FACTOR OF SAFETY CALCULATED USING EQ. (3-2)

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SLOPE STABILITY ANALYSIS

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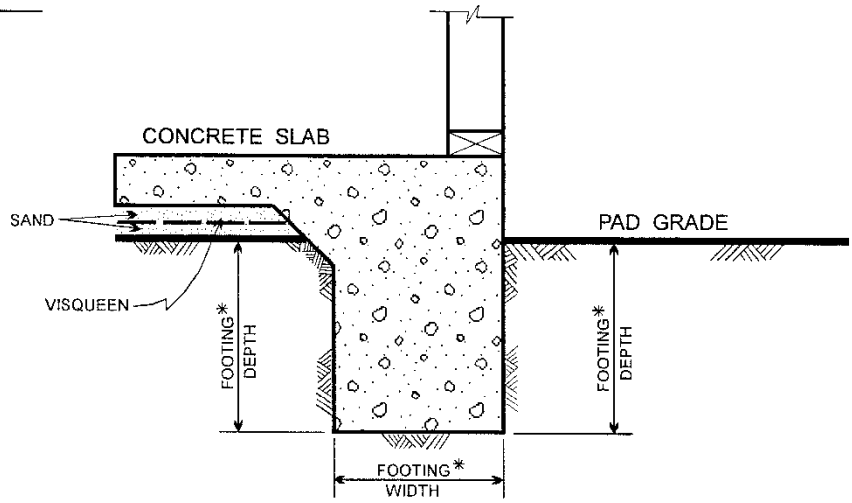
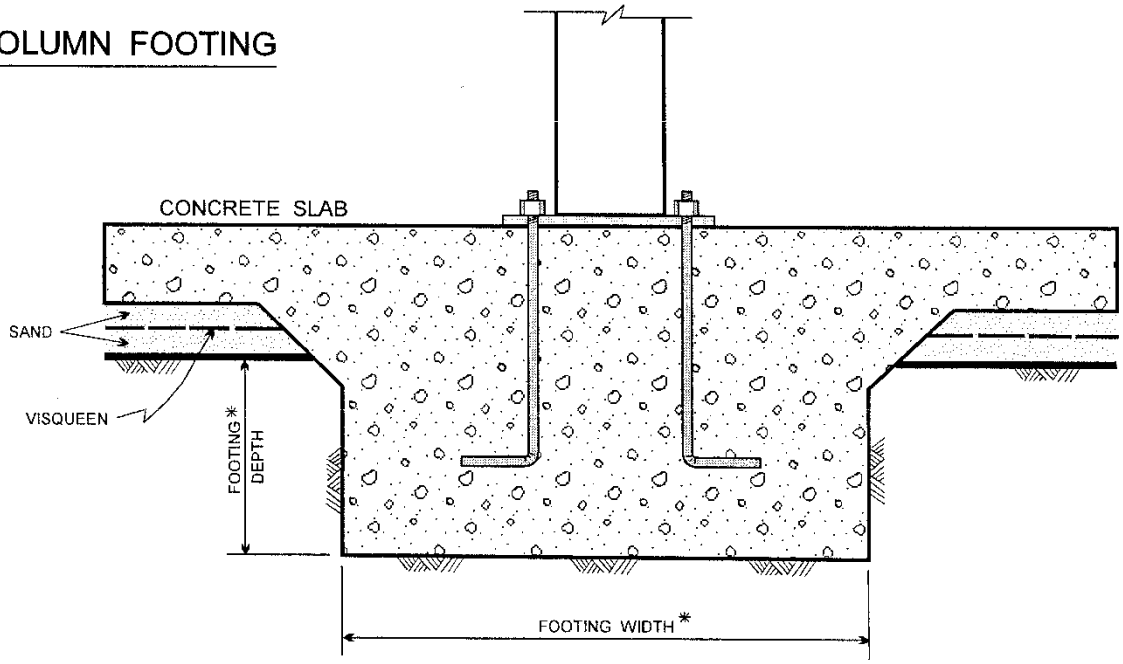
APRIL, 2015	PROJECT NO. T2616-22-01	FIG. 3

WALL FOOTING



COLUMN FOOTING



*.....SEE REPORT FOR FOUNDATION WIDTH AND DEPTH RECOMMENDATION

NO SCALE

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WALL / COLUMN FOOTING DETAIL

MIXED USE RESIDENTIAL AND
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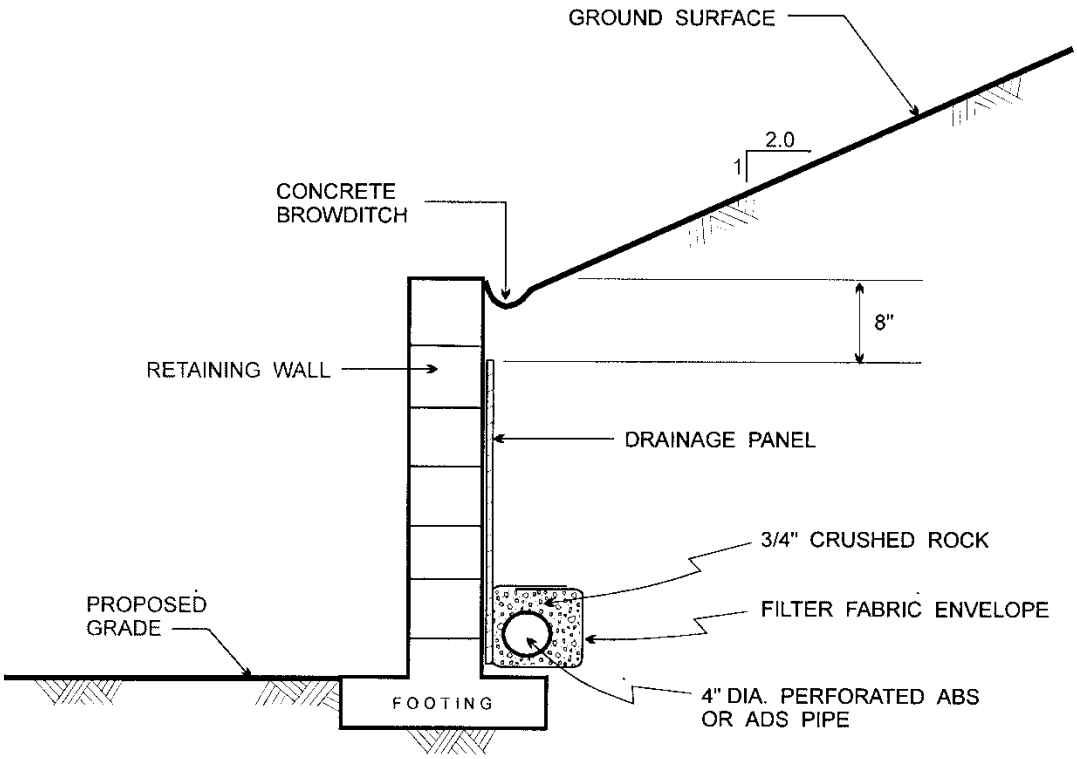
VERDEMONT AREA
SAN BERNARDINO, CALIFORNIA

APRIL, 2015	PROJECT NO. T2616-22-01	FIG. 4



NOTES:

1.....WALL DRAINAGE PANELS SHOULD CONSISTS OF MIRADRAIN 6000 OR EQUIVALENT

2.....FILTER FABRIC SHOULD CONSIST OF MIRAFI 140N OR APPROVED EQUIVALENT

3.....VOLUME OF CRUSHED ROCK SHOULD BE AT LEAST 1 CUBIC FOOT PER FOOT OF PIPE

4.....CONCRETE BROWDITCH RECOMMENDED FOR SLOPE HEIGHTS GREATER THAN 6 FEET

NO SCALE

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WALL DRAINAGE DETAL

MIXED USE RESIDENTIAL AND
COMMERCIAL DEVELOPMENT
VERDEMONT AREA
SAN BERNARDINO, CALIFORNIA

APRIL, 2015	PROJECT NO. T2616-22-01	FIG. 5

APPENDIX A

APPENDIX A

EXPLORATORY EXCAVATIONS

Our subsurface exploration consisted of excavating eleven test pits. We performed the field investigation on November 3, 2014. Percolation testing was performed on April 9, 2015.

The test pits were excavated to depths of up to 15.5 feet to provide exposures of the disturbed surface soil and near surface alluvium. We performed in-situ moisture and density testing of the soils at selected depths with a nuclear moisture/density gauge. We collected representative bag samples of the soils in the test pits. The test pits were loosely backfilled upon completion. These test pit areas should be re-excavated during grading and backfilled with compacted fill. The test pit locations are depicted on the *Site Map*, Figure 2.

We visually examined, classified, and logged the soil conditions encountered in the test pits in general conformance with ASTM International (ASTM) Practice for Description and Identification of Soils (Visual - Manual Procedure D2844). The logs of the test pits are presented on Figures A-1 through A-11 and included herein. The logs depict the various soil types encountered and indicate the depths at which samples were obtained.

Percolation tests were performed within the two proposed basin locations in the southwestern and eastern portions of the site. Tests were performed at depths of five and eight feet in each basin and a 15.5 foot deep excavation was performed to verify no groundwater or impenetrable strata were encountered in the proposed basin areas. Due to the sandy soils at the site we determined that double-ring infiltrometer testing would not be appropriate for the site since the infiltration rate would likely be too high to be measured accurately with the apparatus. Therefore, we planned to perform percolation testing. During pre-saturation, the water infiltrated in less than three minutes. Based on the pre-percolation, the percolation test for sandy soils would not provide sufficient water volume to perform the test. Therefore, we flooded the test locations with five gallons of water and recorded the time for the water to percolate into the soils. Test pit logs and percolation data sheets are presented in Appendix A.

PROJECT NO. T2616-22-01

TEST PIT TP-1

ELEV. (MSL.) **1765** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM (Qal)** Silty SAND, loose, slightly moist, brown; sand is fine to coarse; trace gravel; upper 18 inches is disturbed; sparse vegetation			
2				SP	SAND with Gravel, medium dense, dry, grayish brown; sand is fine to coarse; slight caving; some cobbles			
4					-Increase in cobbles			
6								
8								
10	TP1@10-11							3.2

Total depth: 11 feet
No groundwater encountered
Caving from 1.5' to 11'
Backfilled with cuttings 11-3-2014

Figure A-1,
Log of Test Pit TP-1, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2616-22-01

TEST PIT TP-2

ELEV. (MSL.) **1757** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SP-SM	**ALLUVIUM (Qal)** SAND with Silt, loose, slightly moist, brown; sand is fine to coarse; some gravel; upper 12 inches is disturbed			
				SP	SAND with Gravel, medium dense, slightly moist, grayish brown; sand is fine to coarse; some cobbles, caving			
2								
4				GP	GRAVEL with Sand, medium dense, slightly moist, grayish brown; sand is fine to coarse; with cobbles			
6				SP	SAND with Gravel, medum dense, slightly moist, grayish brown; sand is fine to coarse			
8								
10								

Total depth: 10.5 feet
No groundwater encountered
Caving from 1' to 10.5'
Backfilled with cuttings 11-3-2014

Figure A-2,
Log of Test Pit TP-2, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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PROJECT NO. T2616-22-01

TEST PIT TP-3

ELEV. (MSL.) **1756** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SP-SM	**ALLUVIUM (Qal)** SAND with Silt and Gravel, loose, slightly moist, grayish brown; sand is fine to coarse; upper 12 inches is disturbed -Medium dense, caving		96.3	4.6
2								
4					-Boulder			
6	TP3@6-7							2.8
8								
10								
12					Total depth: 12 feet No groundwater encountered Caving from 1' to 12' Backfilled with cuttings 11-3-2014			

Figure A-3,
Log of Test Pit TP-3, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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PROJECT NO. T2616-22-01

TEST PIT TP-4

ELEV. (MSL.) **1752** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SP	**ALLUVIUM (Qal)** SAND, loose, slightly moist, grayish brown; sand is fine to coarse; some gravel; upper 12 inches is disturbed, trace gravel -With gravel; medium dense -Caving		98.1	3.4
2								
4								
6					-Cobbles			
8								
					Total depth: 9 feet No groundwater encountered Caving from 2' to 9' Backfilled with cuttings 11-3-2014			

Figure A-4,
Log of Test Pit TP-4, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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PROJECT NO. T2616-22-01

TEST PIT TP-5

ELEV. (MSL.) **1755** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SP-SM	**ALLUVIUM (Qal)** SAND with Silt, loose, slightly moist, brown; sand is fine to coarse; some gravel; some gravel			
2				SP	SAND with Gravel, medium dense, slightly moist, grayish brown; sand is fine to coarse; trace cobbles; caving		98.8	5.3
4								
	TP5@5-6							2.6
6								
8								
10					Total depth: 10 feet No groundwater encountered Caving from 2' to 10' Backfilled with cuttings 11-3-2014			

Figure A-5,
Log of Test Pit TP-5, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2616-22-01

TEST PIT TP-6

ELEV. (MSL.) **1756** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM (Qal)** Silty SAND, loose, slightly moist, brown; sand is fine to coarse; micaceous -Medium dense; gravel channel, heading N45E -Some gravel		95.7	4.0
2								
4								
6				SP	SAND, medium dense, slightly moist, grayish brown; sand is fine to coarse; some gravel; trace cobbles; slight caving			
8								
10								
12					Total depth: 12 feet No groundwater encountered Caving from 6' to 12' Backfilled with cuttings 11-3-2014			

Figure A-6,
Log of Test Pit TP-6, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ☐ ... SAMPLING UNSUCCESSFUL
- ◧ ... STANDARD PENETRATION TEST
- ■ ... DRIVE SAMPLE (UNDISTURBED)
- ⊠ ... DISTURBED OR BAG SAMPLE
- ◪ ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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PROJECT NO. T2616-22-01

TEST PIT TP-7

ELEV. (MSL.) **1734** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM (Qal)** Silty SAND, loose, slightly moist, light brown; sand is fine to coarse; trace gravel; upper 12 inches is disturbed -Medium dense			
2	TP7@2-3						93.9	3.0
4				SP	SAND with Gravel, medium dense, slightly moist, grayish brown; sand is fine to coarse; trace cobbles; caving			
6								
8								
10								
12					Total depth: 12 feet No groundwater encountered Caving from 4' to 12'<C>> Backfilled with cuttings 11-3-2014			

Figure A-7,
Log of Test Pit TP-7, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2616-22-01

TEST PIT TP-8

ELEV. (MSL.) **1735** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM (Qal)** Silty SAND, loose, slightly moist, grayish brown; sand is fine to coarse; trace gravel; upper 12 inches is disturbed -Medium dense, gravel channel about 6 inches thick and 12 inches wide, trends east-west		95.6	3.3
2								
4				SP	SAND with Gravel, medium dense, slightly moist, grayish brown; sand is fine to coarse; caving			
6								
8					-Moist; some cobbles			
10								
12					Total depth: 12 feet No groundwater encountered Caving from 4' to 12' Backfilled with cuttings 11-3-2014			

Figure A-8,
Log of Test Pit TP-8, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

☐ ... SAMPLING UNSUCCESSFUL ◧ ... STANDARD PENETRATION TEST ■ ... DRIVE SAMPLE (UNDISTURBED)

⊠ ... DISTURBED OR BAG SAMPLE ◪ ... CHUNK SAMPLE ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2616-22-01

TEST PIT TP-9

ELEV. (MSL.) **1737** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM (Qal)** Silty SAND, loose, slightly moist, grayish brown; sand is fine to coarse; trace gravel -Medium dense			
2								
							95.7	6.2
4				SP	SAND, medium dense, moist, light brown; sand is fine to coarse; some gravel; trace cobbles; slight caving			
6								
8								
10	TP9@10-11							2.3
					Total depth: 11 feet No groundwater encountered Caving from 4' to 11' Backfilled with cuttings 11-3-2014			

Figure A-9,
Log of Test Pit TP-9, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2616-22-01

TEST PIT TP-10

ELEV. (MSL.) **1730** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SP	**ALLUVIUM (Qal)** SAND, loose, slightly moist, grayish brown; sand is fine to coarse -Medium dense; some gravel			
2							90.8	3.2
					-Some silt; sand is fine to medium			
4					-No silt; sand is fine to coarse			
6					-Trace cobbles			
8								
10					Total depth: 10 feet No groundwater encountered Caving from 4' to 10' feet Backfilled with cuttings 11-3-2014			

Figure A-10,
Log of Test Pit TP-10, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2616-22-01

TEST PIT TP-11

ELEV. (MSL.) **1762** DATE COMPLETED **11-3-2014**

EQUIPMENT **BACKHOE** BY: **P. THERIAULT**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ARTIFICIAL FILL (Qaf)** Silty SAND with Gravel, medium dense, moist, brown; sand is fine to coarse; trace cobbles; micaceous			
2	TP11@2-3				-Minor debris		106.9	4.3
4								
6								
8								
				SP	**ALLUVIUM (Qal)** SAND with Gravel, medium dense, slightly moist, grayish brown; sand is fine to coarse; some cobbles			
10								
12					Total depth: 12 feet No groundwater encountered Backfilled with cuttings 11-3-2014			

Figure A-11,
Log of Test Pit TP-11, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2616-22-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH TR-1** ELEV. (MSL.) **1752** DATE COMPLETED **04-09-2015** EQUIPMENT **BACKHOE** BY: **D. LIND**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0					ALLUVIUM (Qal) **Silty SAND, fine to coarse, loose, moist, brown; stratified below distrubed zone in upper 1+/- foot; trace gravel**			
2					SAND, fine to coarse, medium dense, moist, grayish brown; stratified; trace gravel; some caving below 3 feet			
4								
6					cobbles present			
8					more abundanced gravel and cobbles (<6" diameter)			
10					Sand, fine to coarse, medium dense, brown gray brown; some caving; gravel and cobbles some caving			
12								
14								
					Total depth: 15.5 feet No groundwater mottling encountered Caving from 3' to 15.5' Backfilled with native soil			

Figure A-12,
Log of Trench TR-1, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2616-22-01

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**TRENCH TR-2** ELEV. (MSL.) **1735** DATE COMPLETED **04-09-2015** EQUIPMENT **BACKHOE** BY: **D. LIND**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0					**ALLUVIUM (Qal)** Silty SAND, fine to course, loose, slightly moist, grayish brown; upper 12" disturbed			
2					Gravel SAND (channel incision), loose to medium dense, slightly moise, grayish brown			
4					SAND with gravel, fine to coarse, moist, medium dense, brown; stratified			
6					SAND with gravel, fine to coarse, moist, medium dense, brown gray brown; stratified; some cobbles (<6" diameter) present			
8								
10					more cobbles			
12								
14								
					Total depth: 15.5 feet No groundwater or mottling encountered Caving for 4' to 15.5' Backfilled with native soil			

Figure A-13,
Log of Trench TR-2, Page 1 of 1

T2616-22-01 APPENDIX A BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

Percolation Test Data

Proj.	Verdemont								
Proj. No.	T2616-22-01								
Date	4/9/2015								
Test No.	P-1								
Depth of Test:	8	feet							
Test Diameter:	9	in							
Test Radius:	4.5	in							
Hole Area:	63.6	in2							
5 gallon bucket tests									
Time	**Time**	**del T**	**ΔT**	**Vol**	**Vol**	**ΔV**	**Head**	**Havg**	**It**
(H:M:S)	**(H:M:S)**	**(H:M:S)**	**(min)**	**(gal)**	**(in3)**	**(in3)**	**(in)**	**(in)**	**(in/hr)**
11:20:00 AM	0:00:00	0:00:00		5	1155	0	18.2		
11:20:29 AM	0:00:29	0:00:29	0.48	0	0	1155	0	9.1	448
11:22:00 AM	0:00:00	0:00:00		5	1155		18.2		
11:22:31 AM	0:00:31	0:00:31	0.52	0	0	1155	0	9.1	419
Proj.	Verdemont								
Proj. No.	T2616-22-01								
Date	4/9/2015								
Test No.	P-2								
Depth of Test:	5	feet							
Test Diameter:	9	in							
Test Radius:	4.5	in							
Hole Area:	63.6	in2							
5 gallon bucket tests									
Time	**Time**	**del T**	**ΔT**	**Vol**	**Vol**	**ΔV**	**Head**	**Havg**	**It**
(H:M:S)	**(H:M:S)**	**(H:M:S)**	**(min)**	**(gal)**	**(in3)**	**(in3)**	**(in)**	**(in)**	**(in/hr)**
10:57:00 AM	0:00:00	0:00:00		5	1155	0	18.2		
10:59:45 AM	0:02:45	0:02:45	2.75	0	0	1155	0	9.1	79
11:07:00 AM	0:00:00	0:00:00		5	1155		18.2		
11:09:48 AM	0:02:48	0:02:48	2.80	0	0	1155	0	9.1	77
Proj.	Verdemont								
Proj. No.	T2616-22-01								
Date	4/9/2015								
Test No.	P-3								
Depth of Test:	5	feet							
Test Diameter:	12	in							
Test Radius:	6	in							
Hole Area:	113.1	in2							
5 gallon bucket tests									
Time	**Time**	**del T**	**ΔT**	**Vol**	**Vol**	**ΔV**	**Head**	**Havg**	**It**
(H:M:S)	**(H:M:S)**	**(H:M:S)**	**(min)**	**(gal)**	**(in3)**	**(in3)**	**(in)**	**(in)**	**(in/hr)**
1:44:00 PM	0:00:00	0:00:00		5	1155	0	10.2		
1:45:40 PM	0:01:40	0:01:40	1.67	0	0	1155	0	5.1	136
1:48:00 PM	0:00:00	0:00:00		5	1155		10.2		
1:49:43 PM	0:01:43	0:01:43	1.72	0	0	1155	0	5.1	132
Proj.	Verdemont								

Percolation Test Data

Proj. No.	T2616-22-01								
Date	4/9/2015								
Test No.	P-4								
Depth of Test:	8	feet							
Test Diameter:	9	in							
Test Radius:	4.5	in							
Hole Area:	63.6	in2							
5 gallon bucket tests									
Time	**Time**	**del T**	**ΔT**	**Vol**	**Vol**	**ΔV**	**Head**	**Havg**	**It**
(H:M:S)	**(H:M:S)**	**(H:M:S)**	**(min)**	**(gal)**	**(in3)**	**(in3)**	**(in)**	**(in)**	**(in/hr)**
2:00:00 PM	0:00:00	0:00:00		5	1155	0	18.2		
2:01:40 PM	0:01:40	0:01:40	1.67	0	0	1155	0	9.1	130
2:05:00 PM	0:00:00	0:00:00		5	1155		18.2		
2:06:43 PM	0:01:43	0:01:43	1.72	0	0	1155	0	9.1	126

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in general accordance with test methods of ASTM International (ASTM), California test (CT) methods or other suggested procedures. Selected samples were tested for direct shear strength, expansion characteristics, moisture density relationships, corrosivity, R-value, and moisture content. The results of the laboratory tests are summarized in Figures B1 through B3.

SUMMARY OF LABORATORY MAXIMUM DRY DENSITY AND OPTIMUM MOISTURE CONTENT TEST RESULTS ASTM D1557

Sample No.	Description	Maximum Dry Density (pcf)	Optimum Moisture Content (% dry wt.)
TP11 @ 2-3'	Silty Sand	133.0	7.8

SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS ASTM D4829

Sample No.	Moisture Content		Dry Density (pcf)	Expansion Index
	Before Test (%)	After Test (%)		
TP7 @ 2-3'	8.4	14.5	113.5	1

SUMMARY OF CHEMICAL TEST RESULTS

Sample No.	Chloride Content (ppm)	Sulfate Content (%)	pH	Resisitivity (ohm centimeters)
TP7 @ 2-3'	66	0.0003	7.6	14,000

Resistivity and pH determined by Cal Trans Test 643.
Chloride content determined by California Test 422.
Water-soluble sulfate determined by California Test 417.

SUMMARY OF LABORATORY R-VALUE TEST RESULTS ASTM D2844

Sample No.	R-Value
TP7 @ 2-3'	71

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41571 CORNING PLACE SUITE 101 MURRIETA, CA 92562-7065
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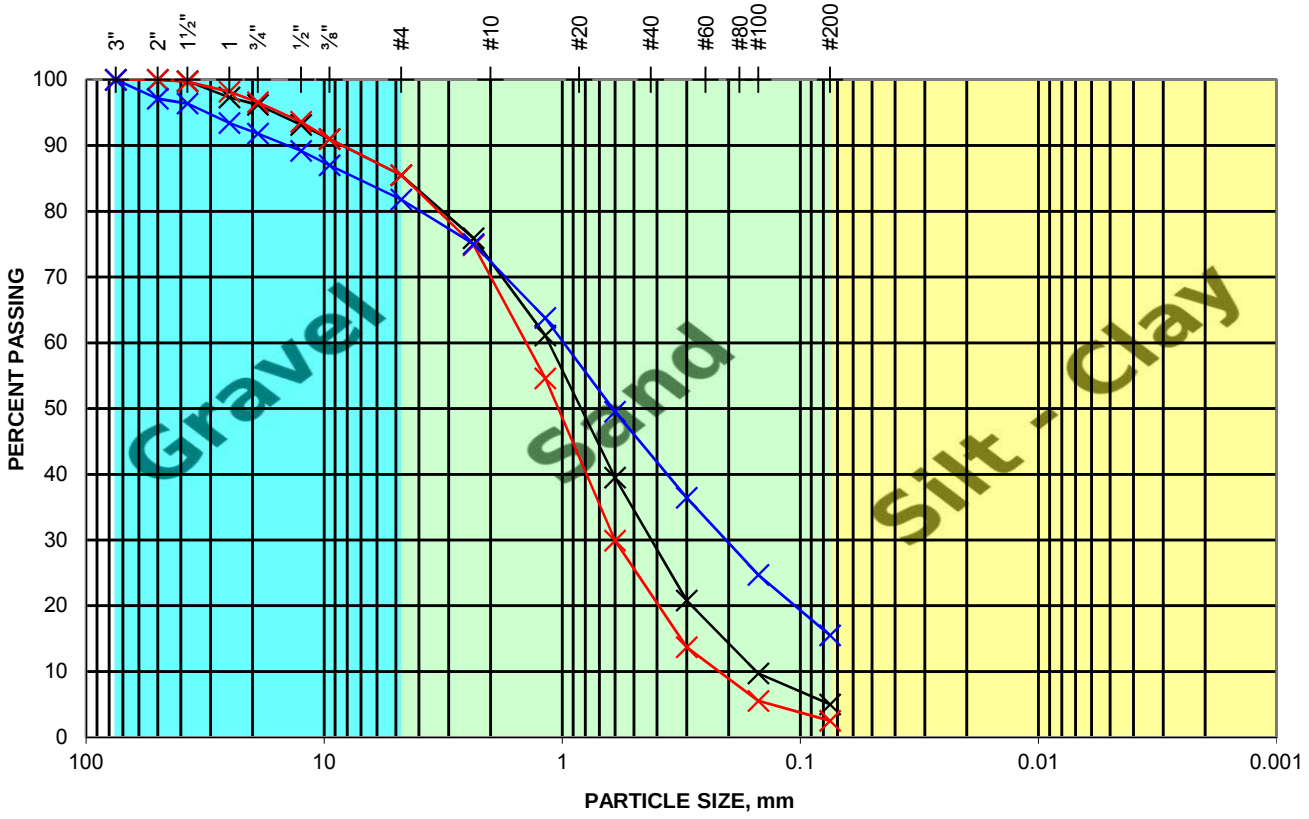
CER

LABORATORY TEST RESULTS

MIXED USED RESIDENTIAL AND COMMERCIAL DEVELOPMENT
VERDEMONT AREA
SAN BERNARDINO, CALIFORNIA

NOVEMBER, 2014 | PROJECT NO. T2616-22-01 | FIG B1



SAMPLE ID	SAMPLE DESCRIPTION
TP3 @ 6-7'	SP-SM SAND with Silt and Gravel
TP5 @ 5-6'	SP - SAND with Gravel
TP11 @ 2-3'	SM - Silty SAND with Gravel

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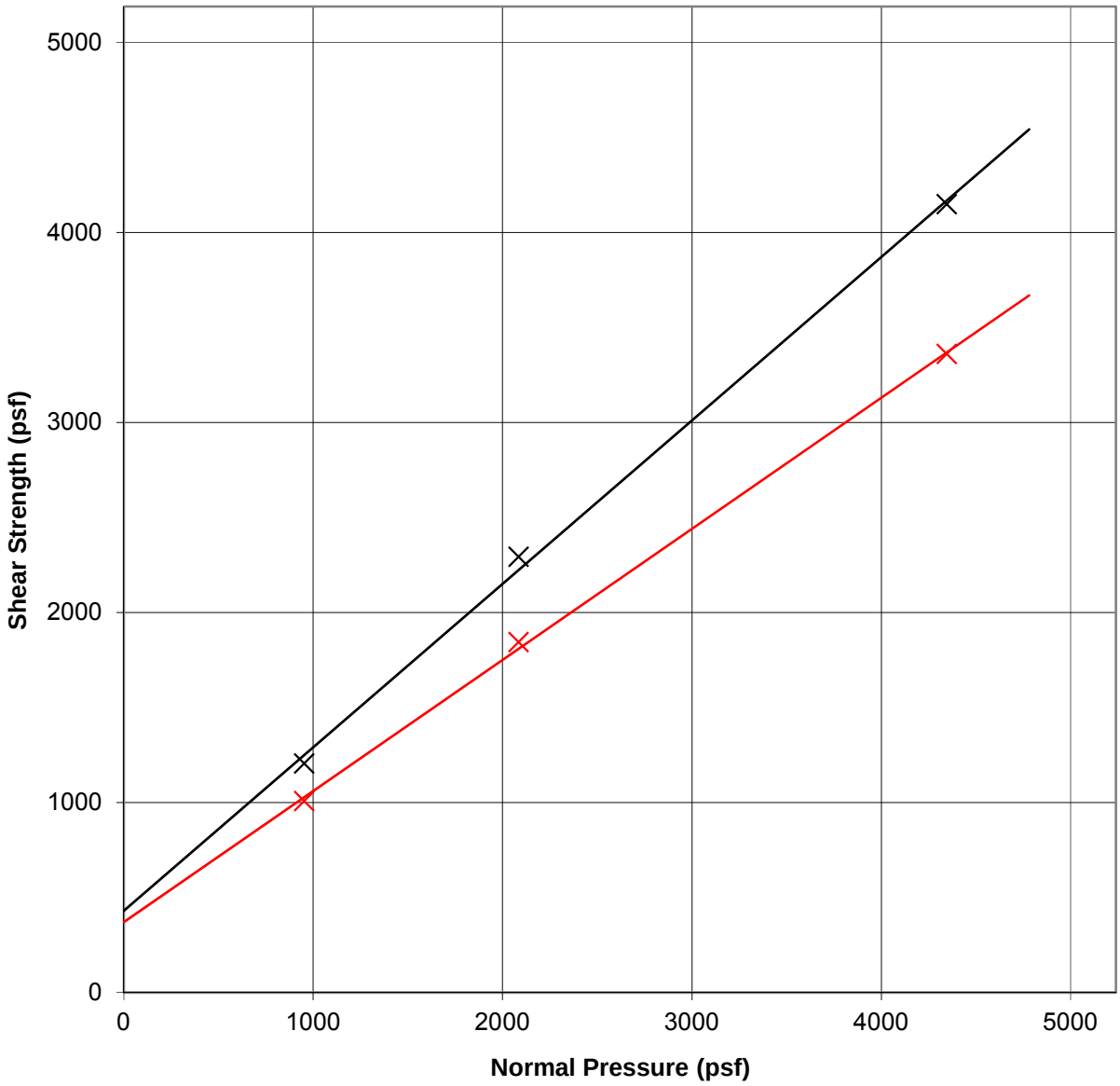
GRAIN SIZE DISTRIBUTION

MIXED USE RESIDENTIAL AND
COMMERCIAL DEVELOPMENT
VERDEMONT AREA
SAN BERNARDINO, CALIFORNIA

NOVEMBER, 2013 | PROJECT NO. T2616-22-01 | FIG B2



SAMPLE ID	SOIL TYPE	DRY DENSITY (PCF)	INITIAL MOISTURE (%)	FINAL MOISTURE (%)	C (psf)	ϕ (deg)
*TP5 @ 5-6'	SM	120.0	7.4	12.1	430	41
*TP11 @ 2-3'	CL	120.2	7.2	12.3	370	35

*sample remolded to approximately 90% of the maximum dry density

GEOCON
WEST, INC.
GEOTECHNICAL CONSULTANTS
41571 CORNING PLACE SUITE 101 MURRIETA, CA 92562-7065
PHONE 951-304-2300 FAX 951-304-2392

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DIRECT SHEAR TEST RESULTS

MIXED USE RESIDENTIAL AND
COMMERCIAL DEVELOPMENT
VERDEMONT AREA
SAN BERNARDINO, CALIFORNIA

NOVEMBER, 2013 | PROJECT NO. T2616-22-01 | FIG B3

APPENDIX C

APPENDIX C

BORING LOGS AND LABORATORY TEST DATA
LFR, 2005

FOR

MIXED USE RESIDENTIAL AND
COMMERCIAL DEVELOPMENT
VERDEMONT AREA
SAN BERNARDINO, CALIFORNIA

PROJECT NO. T2616-22-01

APPENDIX A

Field Exploration and Boring Logs

FIELD EXPLORATION AND BORING LOGS

Five exploratory borings were drilled for geotechnical purposes at the locations shown on the site plan and boring location map (Figure 2). The borings were approximately 20 to 50 feet deep and were drilled on August 19, 2005, using a hollow-stem-auger drill rig operated by 2R Drilling, Inc., of Corona, California. Mr. Chris Nardi, P.E., G.E., LFR Senior Associate Geotechnical Engineer, observed the drilling and sampling operations and logged the borings in the field.

Relatively undisturbed samples of soils encountered in the borings were obtained using a Modified California drive sampler (2½-inch inner diameter) or Standard Penetration Test sampler. The Modified California drive sampler was lined with thin brass tubes. The sampler was driven into the soil with an automatic hammer with the equivalent energy of a 140-pound hammer falling 30 inches. The samplers were driven 18 inches, in most cases, and the blow counts were recorded for the bottom 12 inches of driving. The resulting blow counts are presented at the corresponding sample location on the boring logs.

When the Modified California drive sampler was withdrawn from the boring, the tubes containing the soil samples were removed and carefully sealed to preserve the natural moisture content of the soil. The samples were then delivered to the laboratory for further examination and testing. Preliminary visual soil classifications were made in the field and were verified by further inspection of the samples in the laboratory and by test results. Boring logs were prepared from the field and laboratory data and are included in this appendix. The borings were backfilled with drill cuttings after completion of the borehole.

The test borings were located in the field by pace and compass methods and should be considered approximate.

Depth, feet	Graphic Log	Visual Description (LITHOLOGY)	ID of Samples (Depth) (SAMPLING DATA)	Penetration Rate (Blows/ft)	Moisture Content (%) (LABORATORY DATA)	Dry Density (pcf)	Unconfined Compressive Strength (psf)
		SILTY SAND (SP-SM), medium dense, brown, fine- to coarse-grained, moist, little fine to coarse gravel to 2 inches, subangular to subrounded	B-1-1 (2-2.5)	26			
5		SILTY SAND (SM), loose, dark brown, fine- to medium-grained, wet, trace gravel	B-1-2 (6-6.5)	16	2	105	
		SAND (SP), loose to medium dense, brown, fine- to coarse-grained, moist, trace silt and gravel					
10		less gravel	B-1-3 (11-11.5)	21			
15		SILTY SAND (SM), medium dense, brown, fine- to medium-grained, wet	B-1-4 (15-16.5)	14			
20		SILTY SAND (SP-SM), loose to medium dense, dark brown, medium- to coarse-grained, moist, trace gravel	B-1-5 (20-21.5)	20			
25		with granitic gravel to 1-1/2 inches, few cobbles	B-1-6 (26-26.5)	73	3	130	
30		less coarse-grained sand and gravel 30-31 feet	B-1-7 (30-31.5)	30			
35		trace cobbles					

Continued

LFR Field Staff: C. Nardi

Date Drilled: 8/19/05

Approved by: C. Nardi

Drilling Method: Hollow-Stem Auger (8-in.-OD)

Drilling Company: 2R Drilling, Inc.

▽ Approximate Groundwater Level

EXPLANATION

Clay (CL/CH)

Silt (ML/MH)

Sand (SP/SW)

Gravel (GP/GW)

Modified California Sampler (3.0-inch O.D. unless noted)

Standard Penetration Test Split Spoon Sampler

Shaded Areas Indicate Samples Retained for Geotechnical Analysis

Hammer Wt./ Drop: 140 lb /30 inches

Hammer Type: Automatic

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B-1

LFR LEVINE•FRICKE

Project No. 001-09424-00

HREG / Verdemont Towne Center

9/2/05 C. Nardi/ddi

GEOTECHLFREMV3_DDI HREGVERD.GPJ 9/5/05

LITHOLOGY			SAMPLING DATA			LABORATORY DATA		
Depth, feet	Graphic Log	Visual Description		ID of Samples (Depth)	Penetration Rate (Blows/ft)	Moisture Content (%)	Dry Density (pcf)	Unconfined Compressive Strength (psf)
		SILTY SAND (SP-SM), loose to medium dense, dark brown, medium- to coarse-grained, moist, granitic gravel to 1-1/2 inches, trace cobbles (continued)		B-1-8 (35.5-36)	50/4"			
		increase in cobbles 36-38 feet						
40			40	B-1-9 (40-41)	50/5"			
		increase in coarse-grained sand and cobbles						
		becomes dense to very dense						
45			45	B-1-10 (45-45.5)	50/3"			
50			50	B-1-11 (50-50.5)	50/5"			

Bottom of boring = 50.5 feet bgs
No free water encountered
Boring backfilled with compacted cuttings

LFR Field Staff: C. Nardi
Date Drilled: 8/19/05
Approved by: C. Nardi

Drilling Method: Hollow-Stem Auger (8-in.-OD)
Drilling Company: 2R Drilling, Inc.
▽ Approximate Groundwater Level

EXPLANATION

Clay (CL/CH)
Silt (ML/MH)
Sand (SP/SW)
Gravel (GP/GW)

Modified California Sampler (3.0-inch O.D. unless noted)
Standard Penetration Test Split Spoon Sampler
Shaded Areas Indicate Samples Retained for Geotechnical Analysis
Hammer Wt./ Drop: 140 lb /30 inches
Hammer Type: Automatic

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B-1 (CONTINUED)

Depth, feet	Graphic Log	LITHOLOGY: Visual Description	SAMPLING DATA: ID of Samples (Depth)	SAMPLING DATA: Penetration Rate (Blows/ft)	LABORATORY DATA: Moisture Content (%)	LABORATORY DATA: Dry Density (pcf)	LABORATORY DATA: Unconfined Compressive Strength (psf)
		SILTY SAND (SM), loose, dark brown, fine- to coarse-grained, dry, trace gravel to 1 inch	B-2-1 (3-3.5)	16	3	111	
5		SILTY SAND (SP-SM), medium dense, light brown to brown, fine- to coarse-grained, moist, trace fine to coarse gravel to 2 inches, subangular to subrounded	B-2-2 (6-6.5)	22			
10		less coarse-grained sand and gravel	B-2-3 (11-11.5)	28	3	110	
15		SANDY SILT (ML), medium dense, dark reddish brown, fine-grained, moist to wet, trace clay, micaceous	B-2-4 (16-16.5)	23			
20		SILTY SAND (SP-SM), medium dense, brown, fine- to coarse-grained, moist, trace gravel	B-2-5 (20-21.5)	19			
25			B-2-6 (25-26.5)	12			

Bottom of boring = 26.5 feet bgs
No free water encountered
Boring backfilled with compacted cuttings

LFR Field Staff: C. Nardi
Date Drilled: 8/19/05
Approved by: C. Nardi

Drilling Method: Hollow-Stem Auger (8-in.-OD)
Drilling Company: 2R Drilling, Inc.
▽ Approximate Groundwater Level

EXPLANATION

Clay (CL/CH)
Silt (ML/MH)
Sand (SP/SW)
Gravel (GP/GW)

Modified California Sampler (3.0-inch O.D. unless noted)
Standard Penetration Test Split Spoon Sampler
Shaded Areas Indicate Samples Retained for Geotechnical Analysis
Hammer Wt./ Drop: 140 lb /30 inches
Hammer Type: Automatic

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B-2

LFR LEVINE•FRICKE
Project No. 001-09424-00

HREG / Verdemont Towne Center

9/2/05 C. Nardi/ddi

GEOTECHLFREMV3_DDI HREGVERD.GPJ 9/5/05

Depth, feet	Graphic Log	Visual Description (LITHOLOGY)	ID of Samples (Depth) (SAMPLING DATA)	Penetration Rate (Blows/ft)	Moisture Content (%) (LABORATORY DATA)	Dry Density (pcf)	Unconfined Compressive Strength (psf)
		SILTY SAND (SP-SM), medium dense, light brown, fine- to coarse-grained, dry, trace fine gravel					
			B-3-1 (2-2.5)	33			
5		less coarse-grained sand and gravel, trace cobbles					
			B-3-2 (5.5-6)	20	4	118	
10		SAND (SW), medium dense, light brown to brown, fine- to coarse-grained, dry					
			B-3-3 (11-11.5)	39			
15							
			B-3-4 (15-16.5)	21			
20		becomes medium dense to dense					
			B-3-5 (20-21.5)	36			

Bottom of boring = 21.5 feet bgs
No free water encountered
Boring backfilled with compacted cuttings

LFR Field Staff: C. Nardi
Date Drilled: 8/19/05
Approved by: C. Nardi

Drilling Method: Hollow-Stem Auger (8-in.-OD)
Drilling Company: 2R Drilling, Inc.
▽ Approximate Groundwater Level

EXPLANATION

Clay (CL/CH)
Silt (ML/MH)
Sand (SP/SW)
Gravel (GP/GW)

Modified California Sampler (3.0-inch O.D. unless noted)
Standard Penetration Test Split Spoon Sampler
Shaded Areas Indicate Samples Retained for Geotechnical Analysis
Hammer Wt./ Drop: 140 lb /30 inches
Hammer Type: Automatic

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B-3

LFR LEVINE•FRICKE
Project No. 001-09424-00

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Depth, feet	Graphic Log	LITHOLOGY: Visual Description	SAMPLING DATA: ID of Samples (Depth)	Penetration Rate (Blows/ft)	LABORATORY DATA: Moisture Content (%)	Dry Density (pcf)	Unconfined Compressive Strength (psf)
		SILTY SAND (SP-SM), loose to medium dense, brown, fine- to medium-grained, dry to moist, trace gravel					
		increasing coarse-grained sand with depth					
			B-4-1 (3-3.5)	17	5	102	
5		trace cobbles to 4 inches					
			B-4-2 (6-6.5)	31			
		SAND (SP), medium dense, brown, medium- to coarse-grained, moist, trace silt and fine gravel					
10							
			B-4-3 (11-11.5)	31	5	108	
15		less coarse-grained sand					
			B-4-4 (15-16.5)	18			
20		fine- to coarse-grained sand, trace gravel and cobbles					
			B-4-5 (21-21.5)	66			

Bottom of boring = 21.5 feet bgs
No free water encountered
Boring backfilled with compacted cuttings

LFR Field Staff: C. Nardi
Date Drilled: 8/19/05
Approved by: C. Nardi

Drilling Method: Hollow-Stem Auger (8-in.-OD)
Drilling Company: 2R Drilling, Inc.
▽ Approximate Groundwater Level

EXPLANATION

Clay (CL/CH)
Silt (ML/MH)
Sand (SP/SW)
Gravel (GP/GW)

Modified California Sampler (3.0-inch O.D. unless noted)
Standard Penetration Test Split Spoon Sampler
Shaded Areas Indicate Samples Retained for Geotechnical Analysis
Hammer Wt./ Drop: 140 lb /30 inches
Hammer Type: Automatic

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B-4

LFR LEVINE•FRICKE
Project No. 001-09424-00

HREG / Verdemont Towne Center

9/2/05 C. Nardi/ddi

GEOTECHLFREMV3_DDI HREGVERD.GPJ 9/5/05

Depth, feet	Graphic Log	LITHOLOGY: Visual Description	SAMPLING DATA: ID of Samples (Depth)	SAMPLING DATA: Penetration Rate (Blows/ft)	LABORATORY DATA: Moisture Content (%)	LABORATORY DATA: Dry Density (pcf)	LABORATORY DATA: Unconfined Compressive Strength (psf)
		SILTY SAND (SM), loose, brown, fine-grained, moist to wet, trace coarse-grained sand					
		SANDY SILT (ML) layer, loose, dark brown, moist to wet	B-5-1 (2-2.5)	11			
5		SILTY SAND (SP-SM), loose to medium dense, grayish brown, fine- to coarse-grained, dry to moist, trace gravel, interbedded seams of sandy silt	B-5-2 (6-6.5)	13	7	111	
10			B-5-3 (11-11.5)	30	4	110	
15			B-5-4 (15-16.5)	24			
20		SILTY TO CLAYEY SAND (SM/SC), loose, dark brown, fine- to medium-grained sand, moist to wet, trace to little clay	B-5-5 (20-21.5)	7			
25		cobble	B-5-6 (No Recovery)	50/1"			
		SILTY SAND (SM), medium dense, brown, fine- to medium-grained, moist, trace gravel and cobbles					
30			B-5-7 (30-31)	50/6"			

Bottom of boring = 31.0 feet bgs
No free water encountered
Boring backfilled with compacted cuttings

EXPLANATION

Clay (CL/CH)
Silt (ML/MH)
Sand (SP/SW)
Gravel (GP/GW)

Modified California Sampler (3.0-inch O.D. unless noted)
Standard Penetration Test Split Spoon Sampler
Shaded Areas Indicate Samples Retained for Geotechnical Analysis
Hammer Wt./ Drop: 140 lb /30 inches
Hammer Type: Automatic

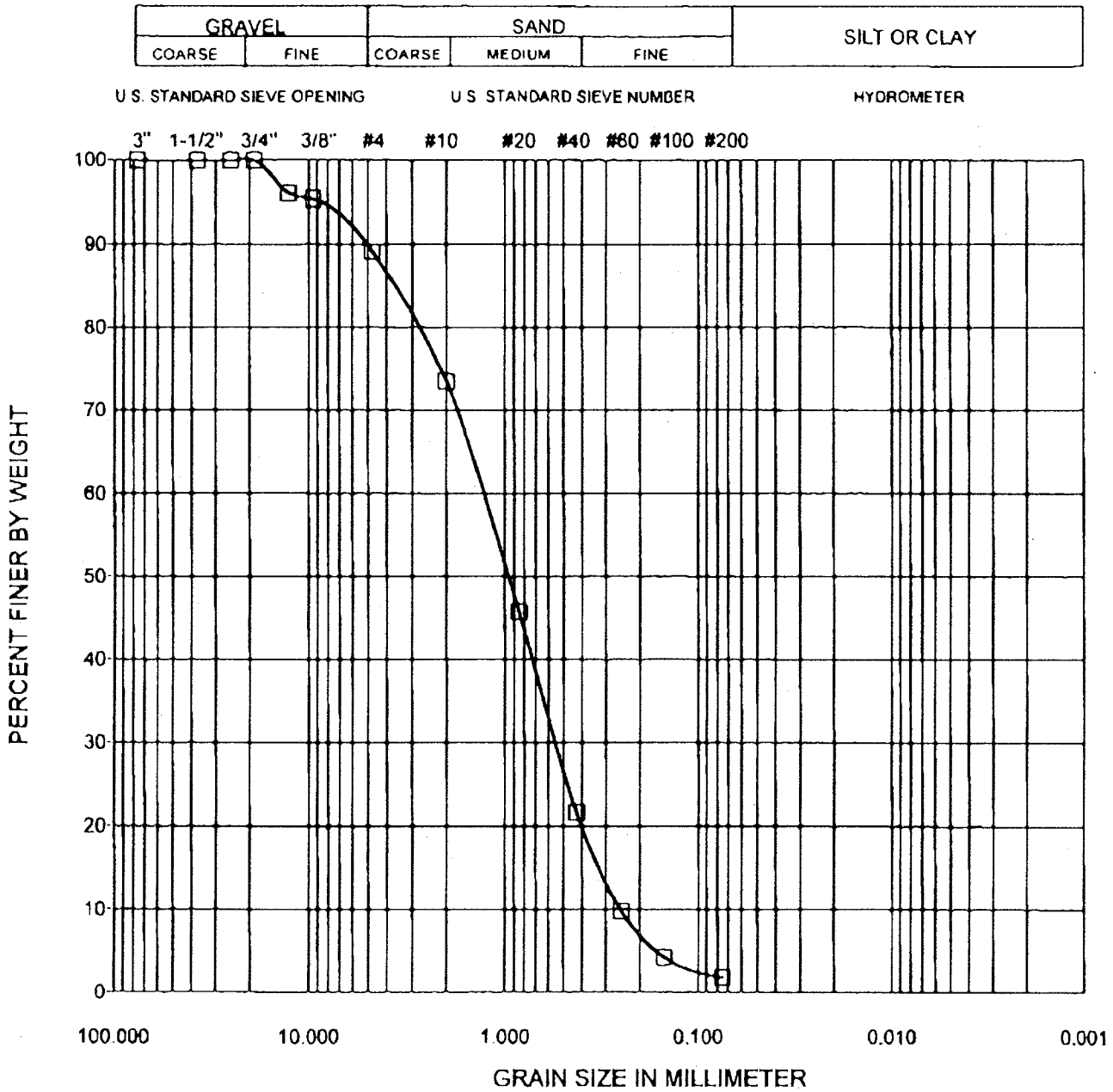
LFR Field Staff: C. Nardi
Date Drilled: 8/19/05
Approved by: C. Nardi

Drilling Method: Hollow-Stem Auger (8-in.-OD)
Drilling Company: 2R Drilling, Inc.
▽ Approximate Groundwater Level

LITHOLOGY AND SAMPLE DATA FOR SOIL BORING B-5

APPENDIX B

Results of Laboratory Testing



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	B-1-2	6-6.5	RING	SP	N/A	N/A

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

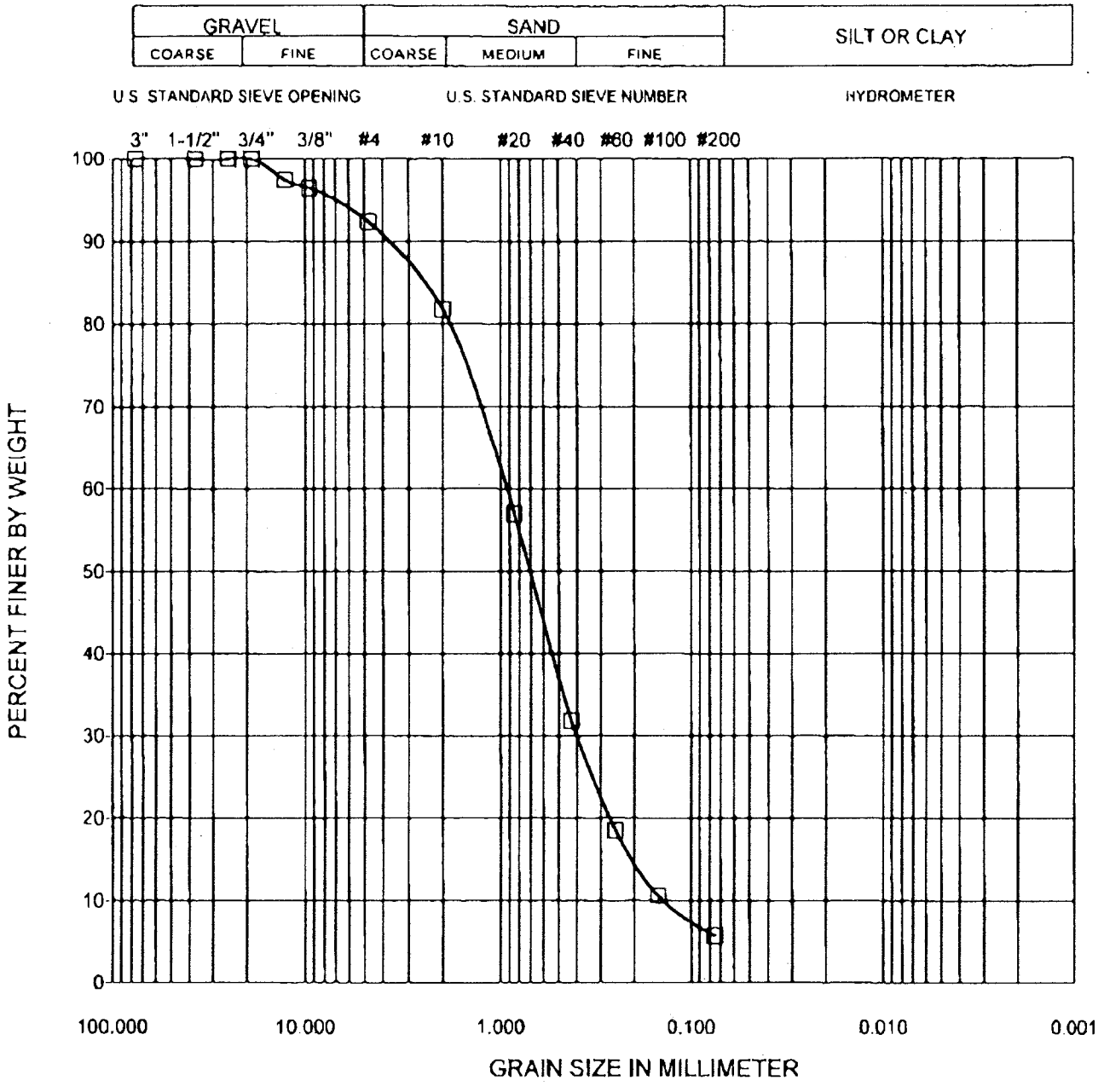
Project Name: Hreg / Verdemont T-C
Client: LFR
Job No.:001-09424-00
EGL Project No.: 05-264-004

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

08/05

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-1	B-1-5	20	BAG	SP-SM	N/A	N/A

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

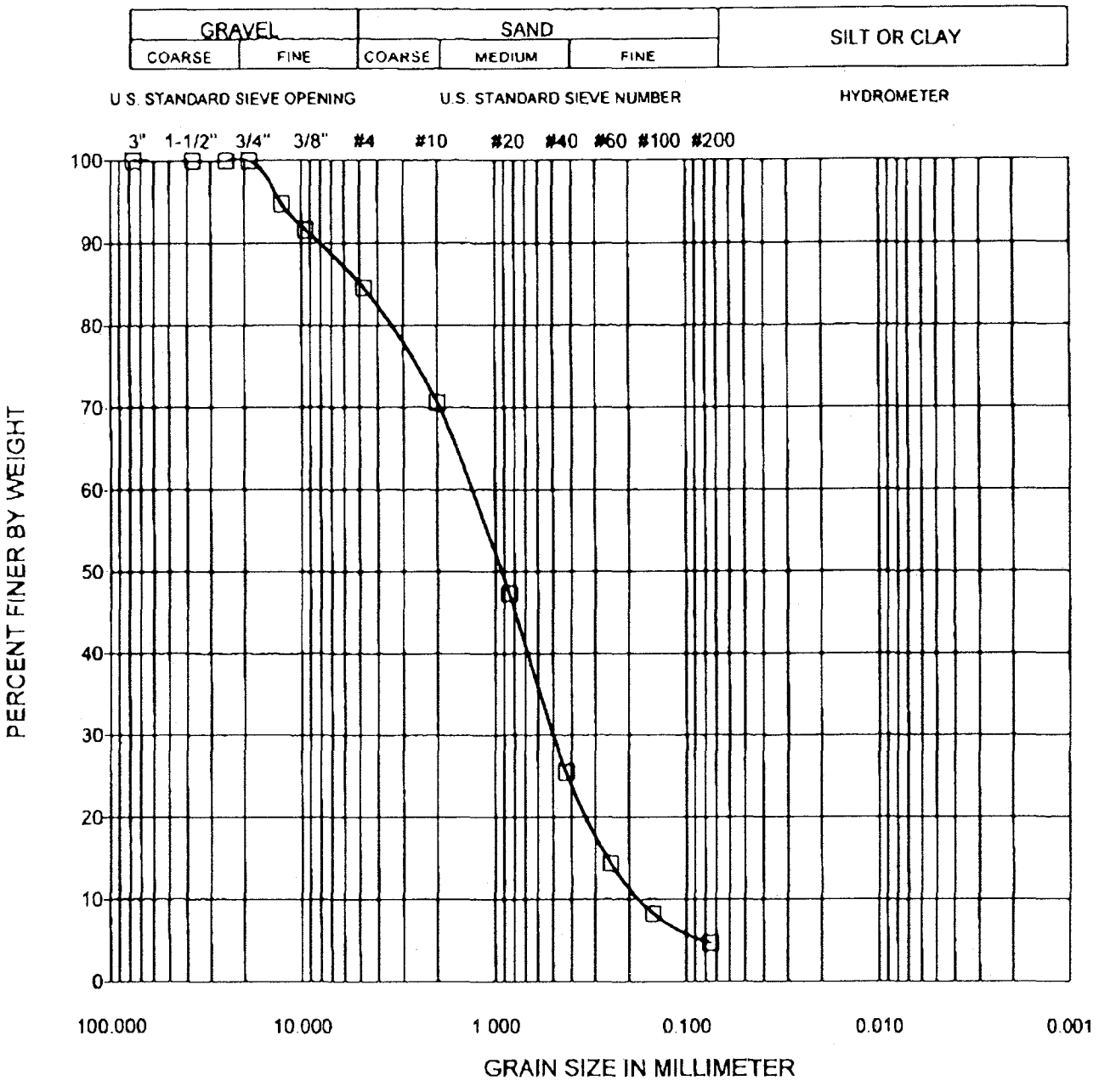
Project Name: Hreg / Verdemont T-C
Client: LFR
Job No.: 001-09424-00
EGL Project No.: 05-264-004

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

08/05

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-3	B-3-4	15-16.5	BAG	SW	N/A	N/A

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

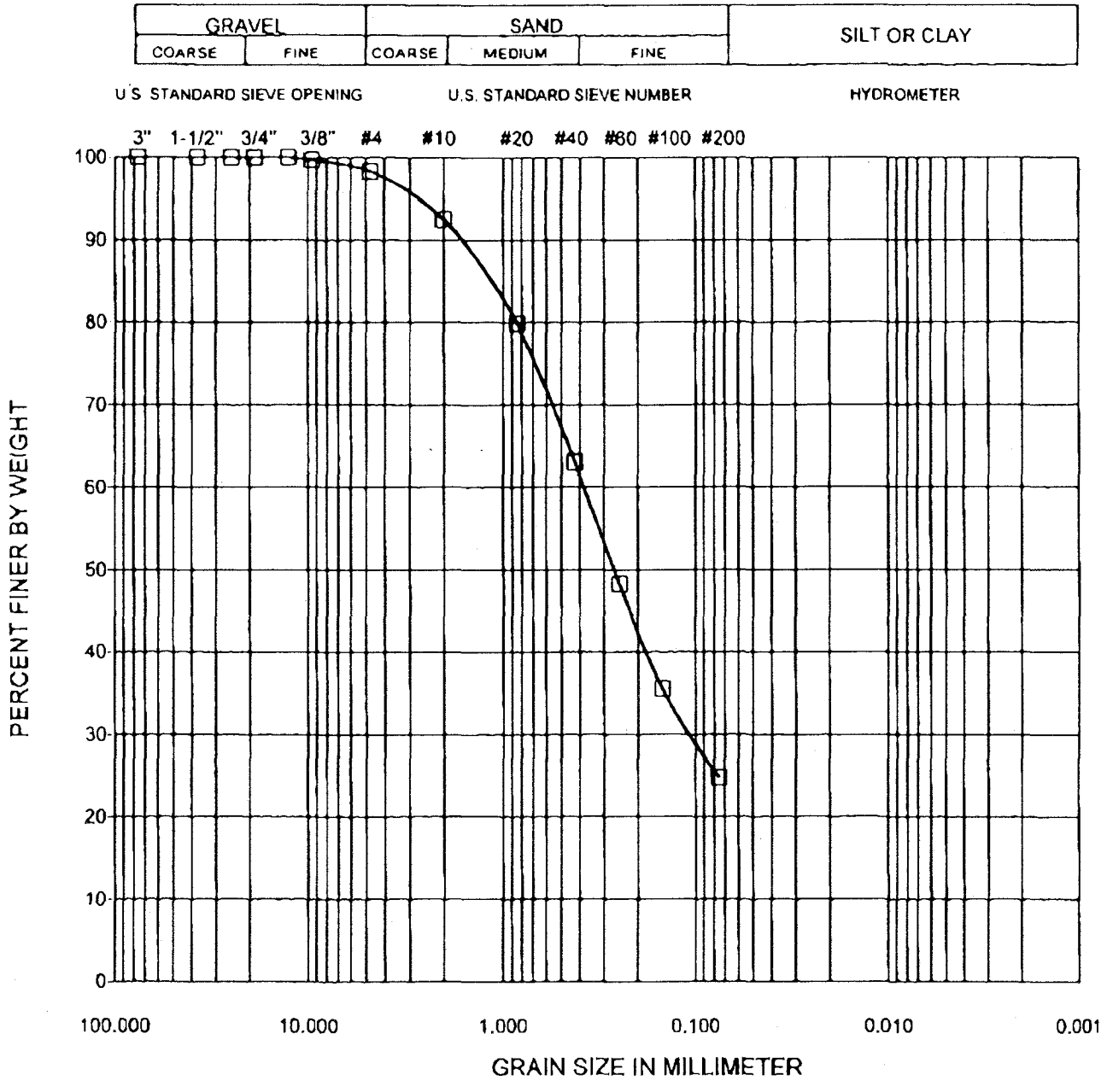
Project Name:
Hreg / Verdemont T-C
Client: LFR
Job No :001-09424-00
EGL Project No.: 05-264-004

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

08/05

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	SOIL TYPE	LIQUID LIMIT	PLASTICITY INDEX
□	B-5	B-5-5	20	BAG	SM	N/A	N/A

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

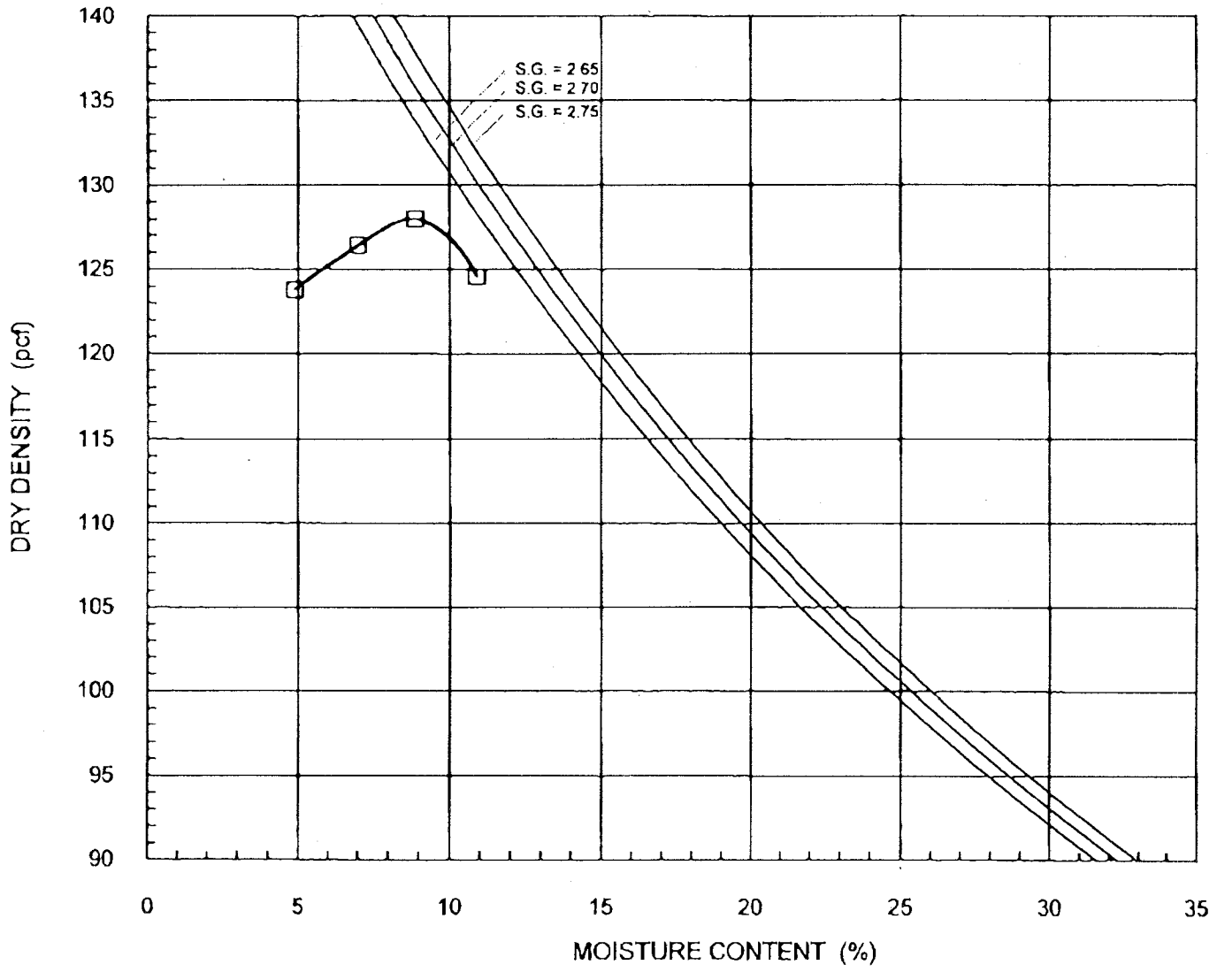
Project Name:
Hreg / Verdemont T-C
Client. LFR
Job No.:001-09424-00
EGL Project No.: 05-264-004

GRAIN SIZE DISTRIBUTION CURVE

(ASTM D422)

08/05

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (ft)	SAMPLE TYPE	VISUAL CLASSIFICATION	OPTIMUM MOISTURE(%)	MAX. DRY DENSITY(pcf)
□	B-1, B-2 B-3, B-4 & B-5	COMP 1-5	0-3	BULK	SM	9.0	128.0

Environmental Geotechnology Laboratory

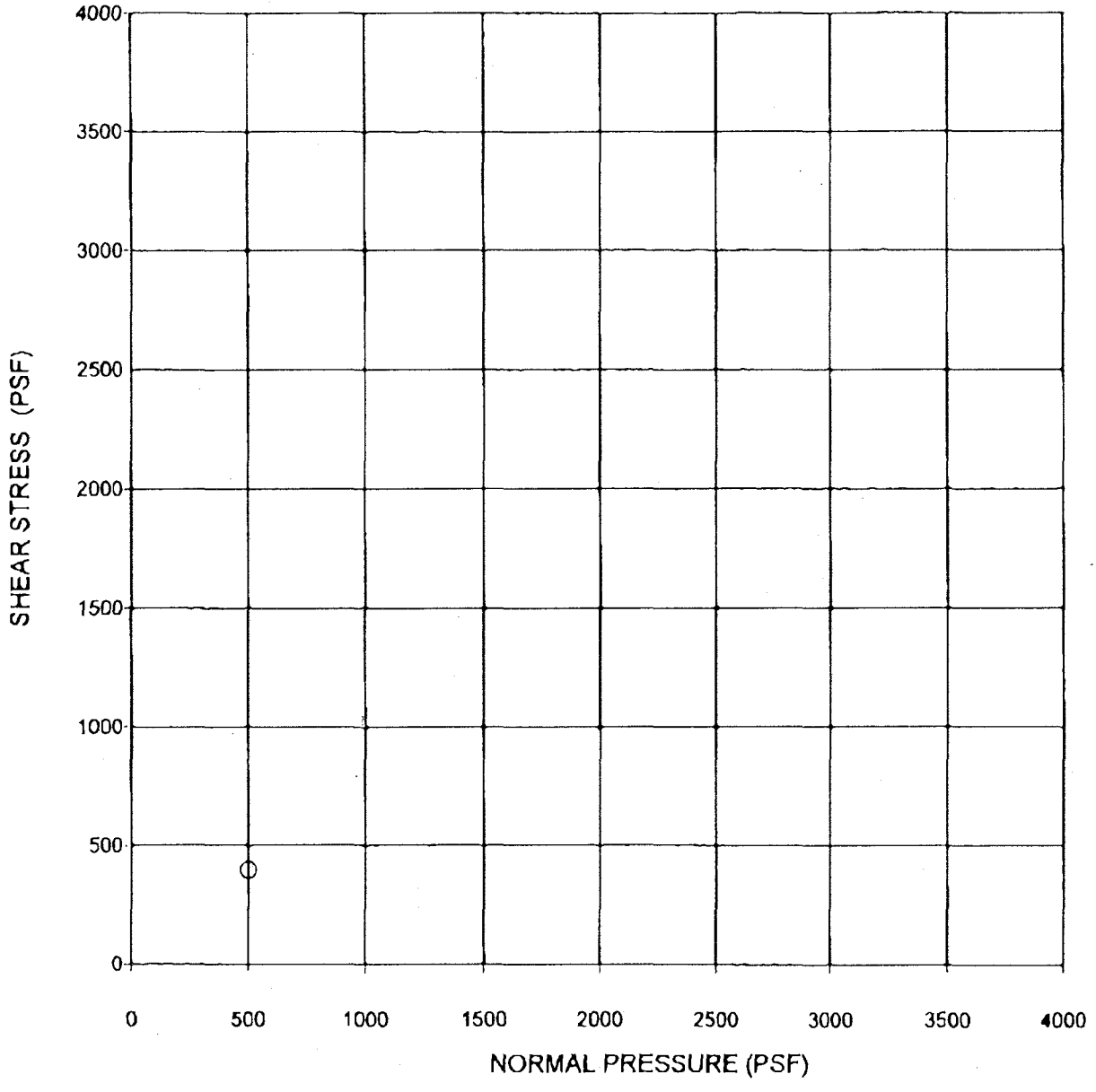
Project Name: Hreg / Verdemont T-C
Client: L.F.R.
Job No.. 001-09424-00
EGL Project No 05-264-004

MODIFIED PROCTOR

(ASTM D1557)

08/05

FIGURE



SYMBOL	BOREHOLE ID	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
○	B-5	B-5-1	2-2.5	RING	SP-SM	---	---

Vertical Loads (PSF)	Moisture Content Before Test (%)	Moisture Content After Test (%)
500	5.2	27.6

Environmental Geotechnology Laboratory

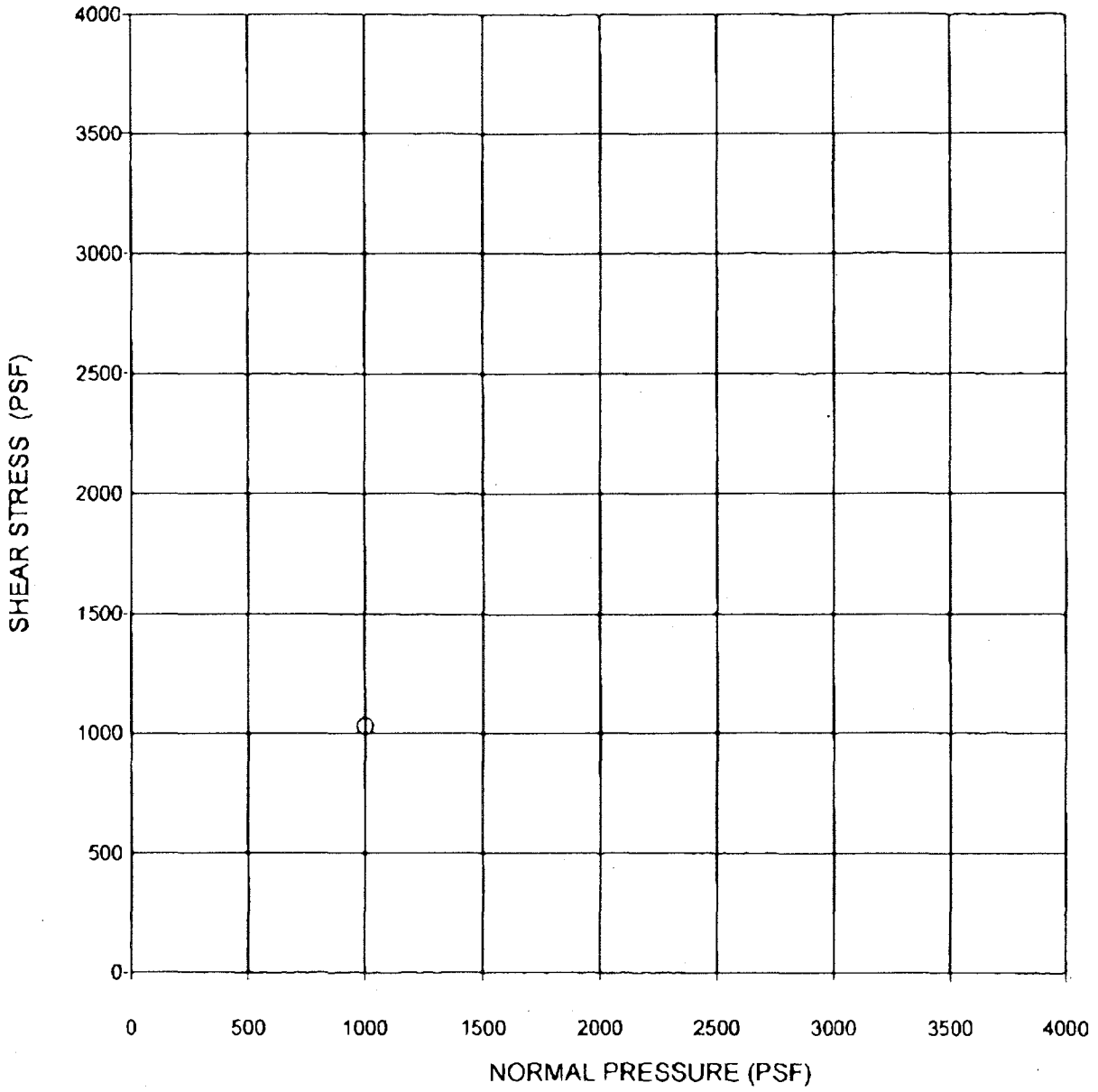
Project Name: Herg / Verdemont T-C
Client: LFR
Job No.: 001-09424-004
EGL Project No.: 05-264-004

DIRECT SHEAR

(ASTM D3080)

08/05

FIGURE



SYMBOL	BOREHOLE ID	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
O	B-1	B-1-2	6-6.5	RING	SP	---	---

Vertical Loads (PSF)	Moisture Content Before Test (%)	Moisture Content After Test (%)
1000	1.9	20.2

Environmental Geotechnology Laboratory

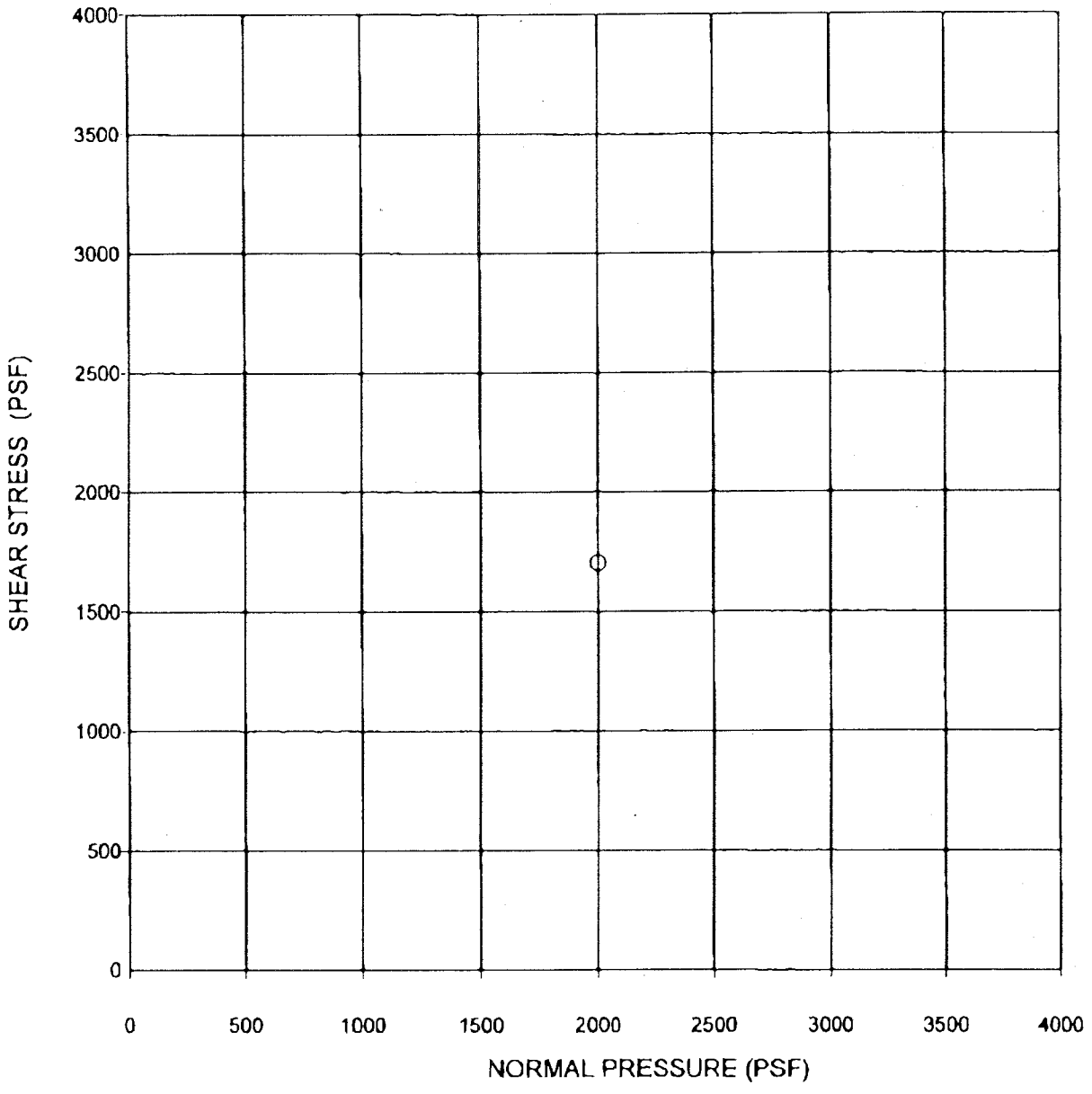
Project Name:
Herg / Verdemont T-C
Client: LFR
Job No.: 001-09424-004
EGL Project No.: 05-264-004

DIRECT SHEAR

(ASTM D3080)

08/05

FIGURE



SYMBOL	BOREHOLE ID	SAMPLE ID	DEPTH (FT)	SAMPLE TYPE	SOIL TYPE	COHESION (PSF)	FRICTION ANGLE (DEG)
O	B-2	B-2-3	11-11.5	RING	SP	---	---

Vertical Loads (PSF)	Moisture Content Before Test (%)	Moisture Content After Test (%)
2000	3.2	19.0

Environmental Geotechnology Laboratory

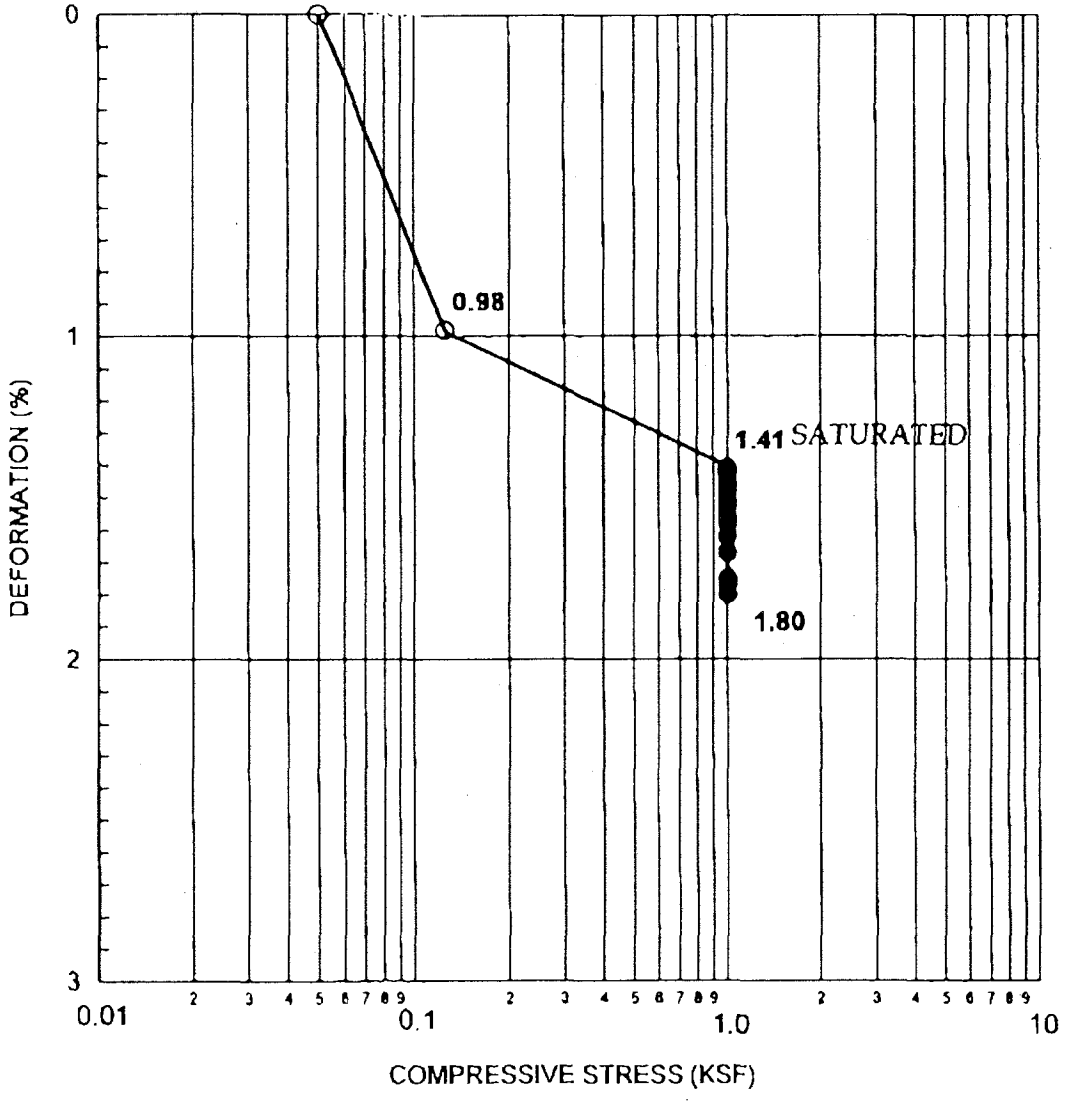
Project Name:
Herg / Verdemont T-C
Client: LFR
Job No.: 001-09424-004
EGL Project No.: 05-264-004

DIRECT SHEAR

(ASTM D3080)

08/05

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (FT)	SOIL TYPE	INIT. MOISTURE CONTENT (%)	INIT. DRY DENSITY (PCF)	INIT. VOID RATIO
O	B-5	B-5-1	2-2.5	Ring	5.2	94.8	0.777

Normal stress on sample: 0.5 ksf

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

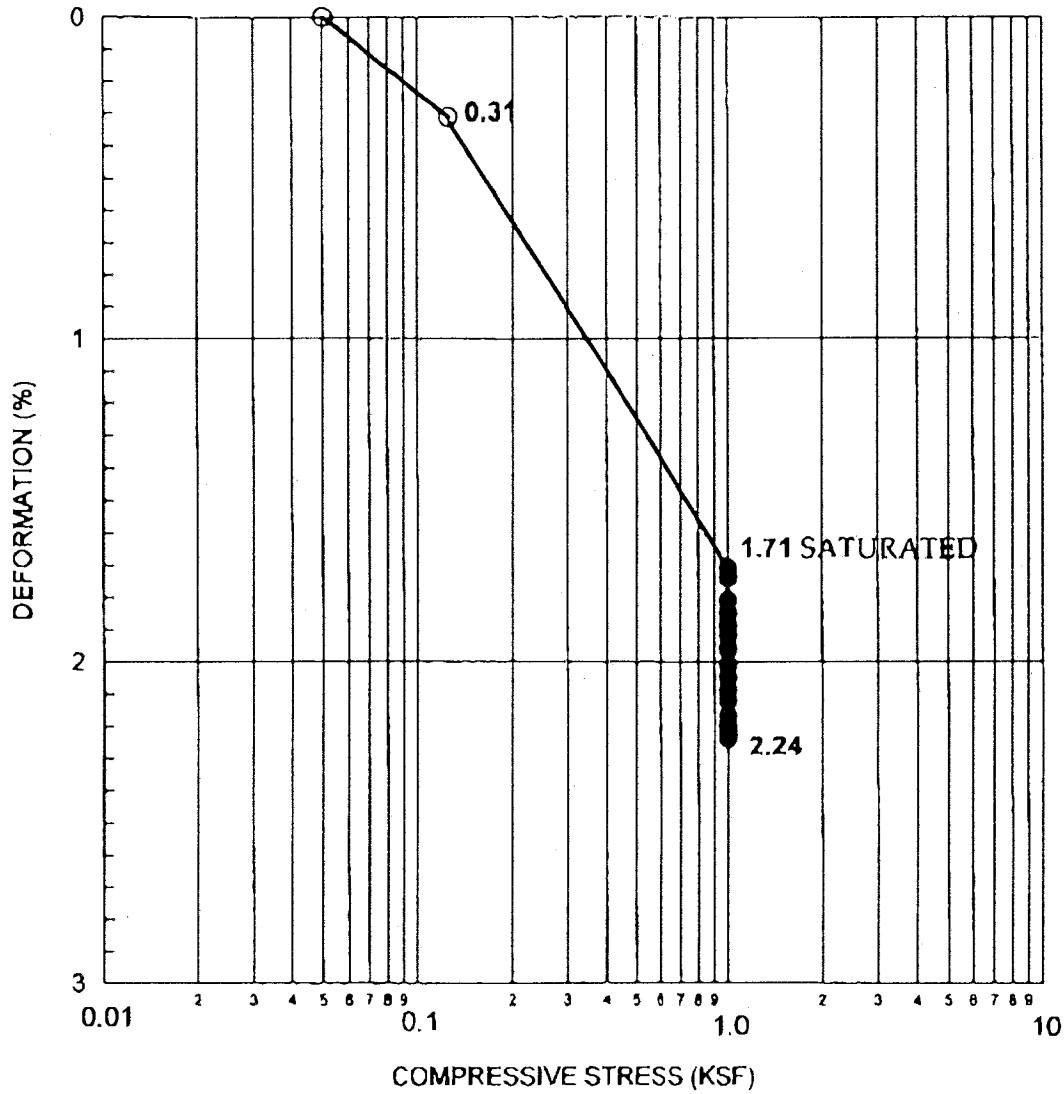
Project Name:
Hreg / Verdemont T-C
Job No.: 001-09424-00
Client: LFR
EGL Project No.: 05-264-004

COLLAPSE POTENTIAL

(ASTM D5333)

08/05

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (FT)	SOIL TYPE	INIT. MOISTURE CONTENT (%)	INIT. DRY DENSITY (PCF)	INIT. VOID RATIO
O	B-1	B-1-2	6-6.5	Ring	19	105.2	0.601

Normal stress on sample: 1.0 ksf

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

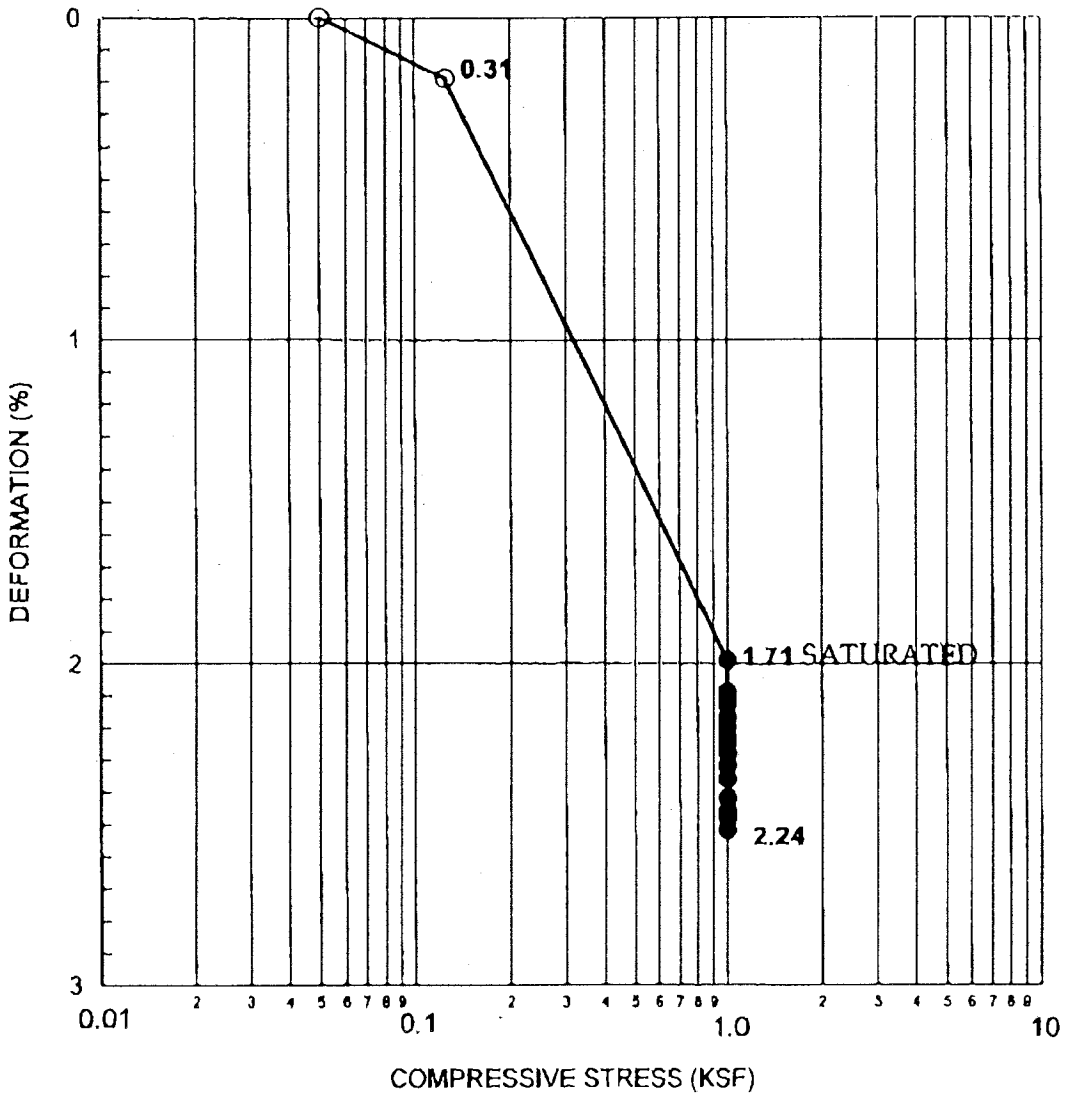
Project Name:
Hreg / Verdemont T-C
Job No.: 001-09424-00
Client: LFR
EGL Project No.: 05-264-004

COLLAPSE POTENTIAL

(ASTM D5333)

08/05

FIGURE



SYMBOL	BORING NO	SAMPLE ID	DEPTH (FT)	SOIL TYPE	INIT. MOISTURE CONTENT (%)	INIT. DRY DENSITY (PCF)	INIT. VOID RATIO
O	B-2	B-2-3	11-11.5	Ring	3.2	109.5	0.538

Normal stress on sample. 2.0 ksf

ENVIRONMENTAL GEOTECHNOLOGY LABORATORY

Project Name:
Hreg / Verdemont T-C
Job No.: 001-09424-00
Client: LFR
EGL Project No.: 05-264-004

COLLAPSE POTENTIAL

(ASTM D5333)

08/05

FIGURE

SUMMARY OF CORROSION TEST RESULTS

PROJECT NAME: Hreg / Verdemont T-C

EGL JOB NO.: 05-264-004

PROJECT NO.: 001-09424-004

CLIENT: LFR

DATE: 08-31-05

SUMMARIZED BY: VW

BORING NO	SAMPLE NO	DEPTH (ft)	pH CALTRANS 643	CHLORIDE CONTENT CALTRANS 422 (ppm)	SULFATE CONTENT CALTRANS 417 (% by weight)	MINIMUM RESISTIVITY CALTRANS 532 (ohm-cm)
N/A	COMP 1-5	0-3	7.43	85	0.002	10500

APPENDIX D

APPENDIX D

RECOMMENDED GRADING SPECIFICATIONS

FOR

MIXED USE RESIDENTIAL AND COMMERCIAL DEVELOPMENT VERDEMONT AREA SAN BERNARDINO, CALIFORNIA

PROJECT NO. T2616-22-01

RECOMMENDED GRADING SPECIFICATIONS

1. GENERAL

1.1 These Recommended Grading Specifications shall be used in conjunction with the Geotechnical Report for the project prepared by Geocon Inland Empire, Incorporated. The recommendations contained in the text of the Geotechnical Report are a part of the earthwork and grading specifications and shall supersede the provisions contained hereinafter in the case of conflict.

1.2 Prior to the commencement of grading, a geotechnical consultant (Consultant) shall be employed for the purpose of observing earthwork procedures and testing the fills for substantial conformance with the recommendations of the Geotechnical Report and these specifications. The Consultant should provide adequate testing and observation services so that they may assess whether, in their opinion, the work was performed in substantial conformance with these specifications. It shall be the responsibility of the Contractor to assist the Consultant and keep them apprised of work schedules and changes so that personnel may be scheduled accordingly.

1.3 It shall be the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the work in accordance with applicable grading codes or agency ordinances, these specifications and the approved grading plans. If, in the opinion of the Consultant, unsatisfactory conditions such as questionable soil materials, poor moisture condition, inadequate compaction, adverse weather, result in a quality of work not in conformance with these specifications, the Consultant will be empowered to reject the work and recommend to the Owner that grading be stopped until the unacceptable conditions are corrected.

2. DEFINITIONS

2.1 **Owner** shall refer to the owner of the property or the entity on whose behalf the grading work is being performed and who has contracted with the Contractor to have grading performed.

2.2 **Contractor** shall refer to the Contractor performing the site grading work.

2.3 **Civil Engineer** or **Engineer of Work** shall refer to the California licensed Civil Engineer or consulting firm responsible for preparation of the grading plans, surveying and verifying as-graded topography.

2.4 **Consultant** shall refer to the soil engineering and engineering geology consulting firm retained to provide geotechnical services for the project.

2.5 **Soil Engineer** shall refer to a California licensed Civil Engineer retained by the Owner, who is experienced in the practice of geotechnical engineering. The Soil Engineer shall be responsible for having qualified representatives on-site to observe and test the Contractor's work for conformance with these specifications.

2.6 **Engineering Geologist** shall refer to a California licensed Engineering Geologist retained by the Owner to provide geologic observations and recommendations during the site grading.

2.7 **Geotechnical Report** shall refer to a soil report (including all addenda) which may include a geologic reconnaissance or geologic investigation that was prepared specifically for the development of the project for which these Recommended Grading Specifications are intended to apply.

3. MATERIALS

3.1 Materials for compacted fill shall consist of any soil excavated from the cut areas or imported to the site that, in the opinion of the Consultant, is suitable for use in construction of fills. In general, fill materials can be classified as *soil* fills, *soil-rock* fills or *rock* fills, as defined below.

3.1.1 **Soil fills** are defined as fills containing no rocks or hard lumps greater than 12 inches in maximum dimension and containing at least 40 percent by weight of material smaller than ¾ inch in size.

3.1.2 **Soil-rock fills** are defined as fills containing no rocks or hard lumps larger than 4 feet in maximum dimension and containing a sufficient matrix of soil fill to allow for proper compaction of soil fill around the rock fragments or hard lumps as specified in Paragraph 6.2. **Oversize rock** is defined as material greater than 12 inches in the maximum dimension.

3.1.3 **Rock fills** are defined as fills containing no rocks or hard lumps larger than 3 feet in maximum dimension and containing little or no fines. Fines are defined as material smaller than ¾ inch in maximum dimension. The quantity of fines shall be less than approximately 20 percent of the rock fill quantity.

3.2 Material of a perishable, spongy, or otherwise unsuitable nature as determined by the Consultant shall not be used in fills.

3.3 Materials used for fill, either imported or on-site, shall not contain hazardous materials as defined by the California Code of Regulations, Title 22, Division 4, Chapter 30, Articles 9 and 10; 40CFR; and any other applicable local, state or federal laws. The Consultant shall not be responsible for the identification or analysis of the potential presence of hazardous materials. However, if observations, odors or soil discoloration cause Consultant to suspect the presence of hazardous materials, the Consultant may request from the Owner the termination of grading operations within the affected area. Prior to resuming grading operations, the Owner shall provide a written report to the Consultant indicating that the suspected materials are not hazardous as defined by applicable laws and regulations.

3.4 The outer 15 feet of *soil-rock* fill slopes, measured horizontally, should be composed of properly compacted *soil* fill materials approved by the Consultant. *Rock* fill may extend to the slope face, provided that the slope is not steeper than 2:1 (horizontal:vertical) and a soil layer no thicker than 12 inches is track-walked onto the face for landscaping purposes. This procedure may be utilized provided it is acceptable to the governing agency, Owner and Consultant.

3.5 Samples of soil materials to be used for fill should be tested in the laboratory by the Consultant to determine the maximum density, optimum moisture content, and, where appropriate, shear strength, expansion, gradation and chemical characteristics of the soil.

3.6 During grading, soil or groundwater conditions other than those identified in the Geotechnical Report may be encountered by the Contractor. The Consultant shall be notified immediately to evaluate the significance of the unanticipated condition

4. CLEARING AND PREPARING AREAS TO BE FILLED

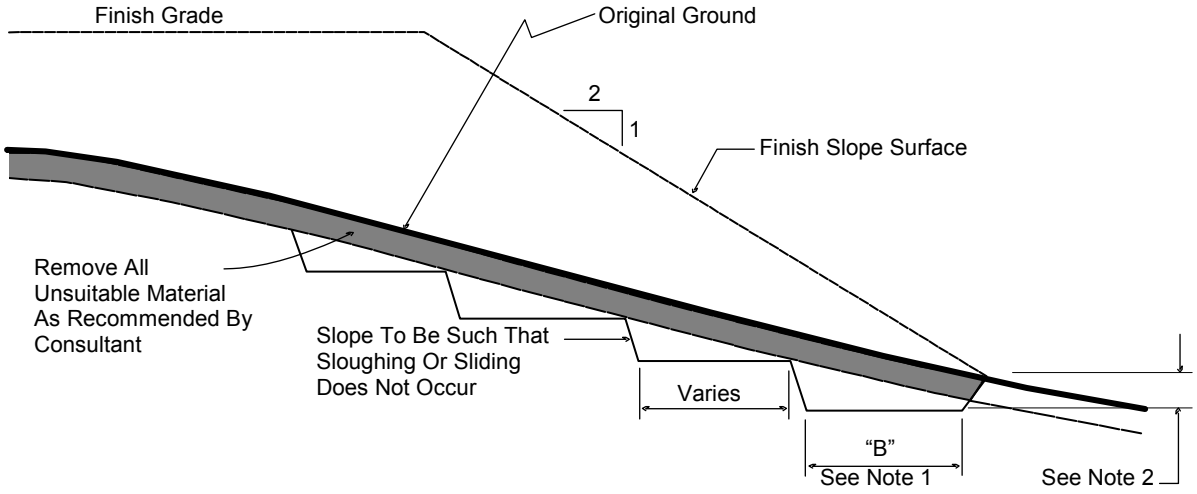
4.1 Areas to be excavated and filled shall be cleared and grubbed. Clearing shall consist of complete removal above the ground surface of trees, stumps, brush, vegetation, man-made structures, and similar debris. Grubbing shall consist of removal of stumps, roots, buried logs and other unsuitable material and shall be performed in areas to be graded. Roots and other projections exceeding 1½ inches in diameter shall be removed to a depth of 3 feet below the surface of the ground. Borrow areas shall be grubbed to the extent necessary to provide suitable fill materials.

4.2 Any asphalt pavement material removed during clearing operations should be properly disposed at an approved off-site facility. Concrete fragments that are free of exposed reinforcing steel may be placed in fills, provided they are placed in accordance with Section 6.2 or 6.3 of this document.

4.3 After clearing and grubbing of organic matter and other unsuitable material, loose or porous soils shall be removed to the depth recommended in the Geotechnical Report. The depth of removal and compaction should be observed and approved by a representative of the Consultant. The exposed surface shall then be plowed or scarified to a minimum depth of 6 inches and until the surface is free from uneven features that would tend to prevent uniform compaction by the equipment to be used.

4.4 Where the slope ratio of the original ground is steeper than 5:1 (horizontal:vertical), or where recommended by the Consultant, the original ground should be benched in accordance with the following illustration.

TYPICAL BENCHING DETAIL



No Scale

DETAIL NOTES:

(1) Key width "B" should be a minimum of 10 feet, or sufficiently wide to permit complete coverage with the compaction equipment used. The base of the key should be graded horizontal, or inclined slightly into the natural slope.

(2) The outside of the key should be below the topsoil or unsuitable surficial material and at least 2 feet into dense formational material. Where hard rock is exposed in the bottom of the key, the depth and configuration of the key may be modified as approved by the Consultant.

4.5 After areas to receive fill have been cleared and scarified, the surface should be moisture conditioned to achieve the proper moisture content, and compacted as recommended in Section 6 of these specifications.

5. COMPACTION EQUIPMENT

5.1 Compaction of *soil* or *soil-rock* fill shall be accomplished by sheepsfoot or segmented-steel wheeled rollers, vibratory rollers, multiple-wheel pneumatic-tired rollers, or other types of acceptable compaction equipment. Equipment shall be of such a design that it will be capable of compacting the *soil* or *soil-rock* fill to the specified relative compaction at the specified moisture content.

5.2 Compaction of *rock* fills shall be performed in accordance with Section 6.3.

6. PLACING, SPREADING AND COMPACTION OF FILL MATERIAL

6.1 *Soil* fill, as defined in Paragraph 3.1.1, shall be placed by the Contractor in accordance with the following recommendations:

6.1.1 *Soil* fill shall be placed by the Contractor in layers that, when compacted, should generally not exceed 8 inches. Each layer shall be spread evenly and shall be thoroughly mixed during spreading to obtain uniformity of material and moisture in each layer. The entire fill shall be constructed as a unit in nearly level lifts. Rock materials greater than 12 inches in maximum dimension shall be placed in accordance with Section 6.2 or 6.3 of these specifications.

6.1.2 In general, the *soil* fill shall be compacted at a moisture content at or above the optimum moisture content as determined by ASTM D 1557-02.

6.1.3 When the moisture content of *soil* fill is below that specified by the Consultant, water shall be added by the Contractor until the moisture content is in the range specified.

6.1.4 When the moisture content of the *soil* fill is above the range specified by the Consultant or too wet to achieve proper compaction, the *soil* fill shall be aerated by the Contractor by blading/mixing, or other satisfactory methods until the moisture content is within the range specified.

6.1.5 After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted by the Contractor to a relative compaction of at least 90 percent. Relative compaction is defined as the ratio (expressed in percent) of the in-place dry density of the compacted fill to the maximum laboratory dry density as determined in accordance with ASTM D 1557-02. Compaction shall be continuous over the entire area, and compaction equipment shall make sufficient passes so that the specified minimum relative compaction has been achieved throughout the entire fill.

6.1.6 Where practical, soils having an Expansion Index greater than 50 should be placed at least 3 feet below finish pad grade and should be compacted at a moisture content generally 2 to 4 percent greater than the optimum moisture content for the material.

6.1.7 Properly compacted *soil* fill shall extend to the design surface of fill slopes. To achieve proper compaction, it is recommended that fill slopes be over-built by at least 3 feet and then cut to the design grade. This procedure is considered preferable to track-walking of slopes, as described in the following paragraph.

6.1.8 As an alternative to over-building of slopes, slope faces may be back-rolled with a heavy-duty loaded sheepsfoot or vibratory roller at maximum 4-foot fill height intervals. Upon completion, slopes should then be track-walked with a D-8 dozer or similar equipment, such that a dozer track covers all slope surfaces at least twice.

6.2 *Soil-rock* fill, as defined in Paragraph 3.1.2, shall be placed by the Contractor in accordance with the following recommendations:

6.2.1 Rocks larger than 12 inches but less than 4 feet in maximum dimension may be incorporated into the compacted *soil* fill, but shall be limited to the area measured 15 feet minimum horizontally from the slope face and 10 feet below finish grade or 3 feet below the deepest utility, whichever is deeper. In the event that placement of oversized rock is planned less than 10 feet below finish grade, 15 feet behind slope face, or 3 feet below deepest utility, Geocon should be consulted for additional recommendations.

6.2.2 Rocks or rock fragments up to 4 feet in maximum dimension may either be individually placed or placed in windrows. Under certain conditions, rocks or rock fragments up to 10 feet in maximum dimension may be placed using similar methods. The acceptability of placing rock materials greater than 4 feet in

maximum dimension shall be evaluated during grading as specific cases arise and shall be approved by the Consultant prior to placement.

6.2.3 For individual placement, sufficient space shall be provided between rocks to allow for passage of compaction equipment.

6.2.4 For windrow placement, the rocks should be placed in trenches excavated in properly compacted *soil* fill. Trenches should be approximately 5 feet wide and 4 feet deep in maximum dimension. The voids around and beneath rocks should be filled with approved granular soil having a Sand Equivalent of 30 or greater and should be compacted by flooding. Windrows may also be placed utilizing an "open-face" method in lieu of the trench procedure, however, this method should first be approved by the Consultant.

6.2.5 Windrows should generally be parallel to each other and may be placed either parallel to or perpendicular to the face of the slope depending on the site geometry. The minimum horizontal spacing for windrows shall be 12 feet center-to-center with a 5-foot stagger or offset from lower courses to next overlying course. The minimum vertical spacing between windrow courses shall be 2 feet from the top of a lower windrow to the bottom of the next higher windrow.

6.2.6 Rock placement, fill placement and flooding of approved granular soil in the windrows should be continuously observed by the Consultant.

6.3 *Rock* fills, as defined in Section 3.1.3, shall be placed by the Contractor in accordance with the following recommendations:

6.3.1 The base of the *rock* fill shall be placed on a sloping surface (minimum slope of 2 percent). The surface shall slope toward suitable subdrainage outlet facilities. The *rock* fills shall be provided with subdrains during construction so that a hydrostatic pressure buildup does not develop. The subdrains shall be permanently connected to controlled drainage facilities to control post-construction infiltration of water.

6.3.2 *Rock* fills shall be placed in lifts not exceeding 3 feet. Placement shall be by rock trucks traversing previously placed lifts and dumping at the edge of the currently placed lift. Spreading of the *rock* fill shall be by dozer to facilitate *seating* of the rock. The *rock* fill shall be watered heavily during placement. Watering shall consist of water trucks traversing in front of the current rock lift face and spraying water continuously during rock placement. Compaction equipment with compactive energy comparable to or greater than that of a 20-ton steel vibratory

roller or other compaction equipment providing suitable energy to achieve the required compaction or deflection as recommended in Paragraph 6.3.3 shall be utilized. The number of passes to be made should be determined as described in Paragraph 6.3.3. Once a *rock* fill lift has been covered with *soil* fill, no additional *rock* fill lifts will be permitted over the *soil* fill.

6.3.3 Plate bearing tests, in accordance with ASTM D 1196-93, may be performed in both the compacted *soil* fill and in the *rock* fill to aid in determining the required minimum number of passes of the compaction equipment. If performed, a minimum of three plate bearing tests should be performed in the properly compacted *soil* fill (minimum relative compaction of 90 percent). Plate bearing tests shall then be performed on areas of *rock* fill having two passes, four passes and six passes of the compaction equipment, respectively. The number of passes required for the *rock* fill shall be determined by comparing the results of the plate bearing tests for the *soil* fill and the *rock* fill and by evaluating the deflection variation with number of passes. The required number of passes of the compaction equipment will be performed as necessary until the plate bearing deflections are equal to or less than that determined for the properly compacted *soil* fill. In no case will the required number of passes be less than two.

6.3.4 A representative of the Consultant should be present during *rock* fill operations to observe that the minimum number of "passes" have been obtained, that water is being properly applied and that specified procedures are being followed. The actual number of plate bearing tests will be determined by the Consultant during grading.

6.3.5 Test pits shall be excavated by the Contractor so that the Consultant can state that, in their opinion, sufficient water is present and that voids between large rocks are properly filled with smaller rock material. In-place density testing will not be required in the *rock* fills.

6.3.6 To reduce the potential for "piping" of fines into the *rock* fill from overlying *soil* fill material, a 2-foot layer of graded filter material shall be placed above the uppermost lift of *rock* fill. The need to place graded filter material below the *rock* should be determined by the Consultant prior to commencing grading. The gradation of the graded filter material will be determined at the time the *rock* fill is being excavated. Materials typical of the *rock* fill should be submitted to the Consultant in a timely manner, to allow design of the graded filter prior to the commencement of *rock* fill placement.

6.3.7 *Rock* fill placement should be continuously observed during placement by the Consultant.

7. OBSERVATION AND TESTING

7.1 The Consultant shall be the Owner's representative to observe and perform tests during clearing, grubbing, filling, and compaction operations. In general, no more than 2 feet in vertical elevation of *soil* or *soil-rock* fill should be placed without at least one field density test being performed within that interval. In addition, a minimum of one field density test should be performed for every 2,000 cubic yards of *soil* or *soil-rock* fill placed and compacted.

7.2 The Consultant should perform a sufficient distribution of field density tests of the compacted *soil* or *soil-rock* fill to provide a basis for expressing an opinion whether the fill material is compacted as specified. Density tests shall be performed in the compacted materials below any disturbed surface. When these tests indicate that the density of any layer of fill or portion thereof is below that specified, the particular layer or areas represented by the test shall be reworked until the specified density has been achieved.

7.3 During placement of *rock* fill, the Consultant should observe that the minimum number of passes have been obtained per the criteria discussed in Section 6.3.3. The Consultant should request the excavation of observation pits and may perform plate bearing tests on the placed *rock* fills. The observation pits will be excavated to provide a basis for expressing an opinion as to whether the *rock* fill is properly seated and sufficient moisture has been applied to the material. When observations indicate that a layer of *rock* fill or any portion thereof is below that specified, the affected layer or area shall be reworked until the *rock* fill has been adequately seated and sufficient moisture applied.

7.4 A settlement monitoring program designed by the Consultant may be conducted in areas of *rock* fill placement. The specific design of the monitoring program shall be as recommended in the Conclusions and Recommendations section of the project Geotechnical Report or in the final report of testing and observation services performed during grading.

7.5 The Consultant should observe the placement of subdrains, to verify that the drainage devices have been placed and constructed in substantial conformance with project specifications.

7.6 Testing procedures shall conform to the following Standards as appropriate:

7.6.1 Soil and Soil-Rock Fills:

7.6.1.1 Field Density Test, ASTM D 1556-02, *Density of Soil In-Place By the Sand-Cone Method.*

7.6.1.2 Field Density Test, Nuclear Method, ASTM D 2922-01, *Density of Soil and Soil-Aggregate In-Place by Nuclear Methods (Shallow Depth).*

7.6.1.3 Laboratory Compaction Test, ASTM D 1557-02, *Moisture-Density Relations of Soils and Soil-Aggregate Mixtures Using 10-Pound Hammer and 18-Inch Drop*.

7.6.1.4. Expansion Index Test, ASTM D 4829-03, *Expansion Index Test*.

7.6.2 Rock Fills

7.6.2.1 Field Plate Bearing Test, ASTM D 1196-93 (Reapproved 1997) *Standard Method for Nonreparative Static Plate Load Tests of Soils and Flexible Pavement Components, For Use in Evaluation and Design of Airport and Highway Pavements.*

8. PROTECTION OF WORK

8.1 During construction, the Contractor shall properly grade all excavated surfaces to provide positive drainage and prevent ponding of water. Drainage of surface water shall be controlled to avoid damage to adjoining properties or to finished work on the site. The Contractor shall take remedial measures to prevent erosion of freshly graded areas until such time as permanent drainage and erosion control features have been installed. Areas subjected to erosion or sedimentation shall be properly prepared in accordance with the Specifications prior to placing additional fill or structures.

8.2 After completion of grading as observed and tested by the Consultant, no further excavation or filling shall be conducted except in conjunction with the services of the Consultant.

9. CERTIFICATIONS AND FINAL REPORTS

9.1 Upon completion of the work, Contractor shall furnish Owner a certification by the Civil Engineer stating that the lots and/or building pads are graded to within 0.1 foot vertically of elevations shown on the grading plan and that all tops and toes of slopes are within 0.5 foot horizontally of the positions shown on the grading plans. After installation of a section of subdrain, the project Civil Engineer should survey its location and prepare an *as-built* plan of the subdrain location. The project Civil Engineer should verify the proper outlet for the subdrains and the Contractor should ensure that the drain system is free of obstructions.

9.2 The Owner is responsible for furnishing a final as-graded soil and geologic report satisfactory to the appropriate governing or accepting agencies. The as-graded report should be prepared and signed by a California licensed Civil Engineer experienced in geotechnical engineering and by a California Certified Engineering Geologist, indicating that the geotechnical aspects of the grading were performed in substantial conformance with the Specifications or approved changes to the Specifications.

3.6-1 GREENHOUSE GAS ANALYSIS

Rancho Palma

GREENHOUSE GAS ANALYSIS

CITY OF SAN BERNARDINO

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NOVEMBER 24, 2015

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LIST OF ABBREVIATED TERMS

(1)	Reference
APS	Alternative Planning Organizations
ARB	California Air Resources Board
CAA	Federal Clean Air Act
CalEEMod	California Emissions Estimator Model
CalEPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CARB	California Air Resource Board
CAT	Climate Action Team
CBSC	California Building Standards Commission
CEC	California Energy Commission
CCR	California Code of Regulations
CEQA	California Environmental Quality Act
CFC	Chlorofluorocarbons
CFR	Code of Federal Regulations
CH4	Methane
CO	Carbon Monoxide
CO2	Carbon Dioxide
CO2e	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
EPA	Environmental Protection Agency
EPS	Emission Performance Standard
GCC	Global Climate Change
GHGA	Greenhouse Gas Analysis
GWP	Global Warming Potential
HFC	Hydrofluorocarbons
LCA	Life-Cycle Analysis
MMs	Mitigation Measures
MMTCO2e	Million Metric Ton of Carbon Dioxide Equivalent
MPOs	Metropolitan Planning Organizations
MTCO2e	Metric Ton of Carbon Dioxide Equivalent
N20	Nitrogen Dioxide
NIOSH	National Institute for Occupational Safety and Health
NOx	Oxides of Nitrogen
PFC	Perfluorocarbons
PM10	Particulate Matter 10 microns in diameter or less

PM2.5	Particulate Matter 2.5 microns in diameter or less
PPM	Parts Per Million
Project	Rancho Palma
RTP	Regional Transportation Plan
SB	Senate Bill
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCS	Sustainable Communities Strategies
UNFCCC	United Nations' Framework Convention on Climate Change
VOC	Volatile Organic Compounds

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EXECUTIVE SUMMARY

The City of San Bernardino does not have an established emissions reduction target for GHG emissions. However, the City of San Bernardino is a participant in the San Bernardino County Associated Governments and Participating San Bernardino County Cities Partnership (Partnership). The Partnership has prepared a Regional Greenhouse Gas Reduction Plan (Reduction Plan) that identifies emissions reduction targets for the City of San Bernardino and the other 20 participating cities within the sub-region. In the Reduction Plan, the City of San Bernardino selected a goal to reduce community GHG emissions to a level that is 15% below its 2008 greenhouse gas (GHG) emissions levels by 2020.

The Project's 2020 GHG emissions levels will amount to a 32.34% reduction from the Project's 2008 GHG emissions levels, as shown on Table ES-1 which is greater than the minimum reduction target identified in the Partnership's Reduction Plan. Thus, project-related emissions would not have a significant direct or indirect impact on GHG and climate change.

TABLE ES-1: 2008 VS 2020 TOTAL PROJECT GREENHOUSE GAS EMISSIONS REDUCTION LEVELS (ANNUAL)

Emission Source	**CO2e Emissions Levels (Metric Tons Per Year)**	
	BAU	**Project**
Annual Construction-related emissions amortized over 30 years	57.78	57.78
Area	31.08	31.07
Energy Use	985.96	742.16
Mobile Sources	7,066.02	4,629.29
Waste	110.79	110.79
Water Usage	105.03	82.68
Total	8,356.66	5,653.77
Total Project Reduction over 2008 levels	**32.34%**	
Project Minimum Improvement	**15%**	
Meets Requirement?	**YES**	

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1 INTRODUCTION

This report presents the results of the greenhouse gas analysis (GHGA) prepared by Urban Crossroads, Inc., for the proposed Rancho Palma (referred to as "Project") "), which is located in the City of San Bernardino northeast of W. Little League Drive and northwest of Palm Avenue, as shown on Exhibit 1-A.

The purpose of this GHGA is to evaluate Project-related construction and operational emissions and determine the level of greenhouse gas (GHG) impacts as a result of constructing and operating the proposed Project.

1.1 PROJECT OVERVIEW

The Project is proposed to include the development of 120 single family detached residential dwelling units and 98,000 square feet of commercial retail use, as shown on Exhibit 1-B. The Project site is currently vacant and not emitting any emissions. For the purposes of this analysis, potential impacts have been assessed for two development phases. The two phases and their anticipated opening years are as follows:

- Phase 1 (2018) – 120 single family detached residential dwelling units (Western Half)
- Phase 2 (2019) – 98,000 square feet of commercial retail use (Eastern Half)

For the purposes of this GHGA, it is assumed that the Project will be constructed and at full occupancy by 2019.

EXHIBIT 1-A: LOCATION MAP

LEGEND:

EXHIBIT 1-B: SITE PLAN

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2 CLIMATE CHANGE SETTING

2.1 INTRODUCTION TO GLOBAL CLIMATE CHANGE

Global Climate Change (GCC) is defined as the change in average meteorological conditions on the earth with respect to temperature, precipitation, and storms. GCC is currently one of the most controversial environmental issues in the United States, and much debate exists within the scientific community about whether or not GCC is occurring naturally or as a result of human activity. Some data suggests that GCC has occurred in the past over the course of thousands or millions of years. These historical changes to the Earth's climate have occurred naturally without human influence, as in the case of an ice age. However, many scientists believe that the climate shift taking place since the industrial revolution (1900) is occurring at a quicker rate and magnitude than in the past. Scientific evidence suggests that GCC is the result of increased concentrations of greenhouse gases in the earth's atmosphere, including carbon dioxide, methane, nitrous oxide, and fluorinated gases. Many scientists believe that this increased rate of climate change is the result of greenhouse gases resulting from human activity and industrialization over the past 200 years.

An individual project like the proposed Project evaluated in this GHGA cannot generate enough greenhouse gas emissions to effect a discernible change in global climate. However, the proposed Project may participate in the potential for GCC by its incremental contribution of greenhouse gasses combined with the cumulative increase of all other sources of greenhouse gases, which when taken together constitute potential influences on GCC. Because these changes may have serious environmental consequences, Section 3.0 will evaluate the potential for the proposed Project to have a significant effect upon the environment as a result of its potential contribution to the greenhouse effect.

2.2 GREENHOUSE GAS EMISSIONS INVENTORIES

Global

Worldwide anthropogenic (man-made) GHG emissions are tracked by the Intergovernmental Panel on Climate Change for industrialized nations (referred to as Annex I) and developing nations (referred to as Non-Annex I). Man-made GHG emissions data for Annex I nations are available through 201. For the Year 201 the sum of these emissions totaled approximately 28,865,994 Gg CO2e[1] (1) (2). The GHG emissions in more recent years may differ from the inventories presented in Table 2-1; however, the data is representative of currently available inventory data.

[1] The global emissions are the sum of Annex I and non-Annex I countries, without counting Land-Use, Land-Use Change and Forestry (LULUCF). For countries without 2005 data, the UNFCCC data for the most recent year were used. United Nations Framework Convention on Climate Change, "Annex I Parties – GHG total without LULUCF,"

United States

As noted in Table 2-1, the United States, as a single country, was the number two producer of GHG emissions in 2012. The primary greenhouse gas emitted by human activities in the United States was CO2, representing approximately 83 percent of total greenhouse gas emissions (3). Carbon dioxide from fossil fuel combustion, the largest source of US greenhouse gas emissions, accounted for approximately 78 percent of the GHG emissions.

TABLE 2-1: TOP GHG PRODUCER COUNTRIES AND THE EUROPEAN UNION[2]

Emitting Countries	GHG Emissions (Gg CO2e)
China	10,975,500
United States	6,665,700
European Union (27 member countries)	4,544,224
Russian Federation	2,322,220
India	3,013,770
Japan	1,344,580
Total	**28,865,994**

State of California

CARB compiles GHG inventories for the State of California. Based upon the 2008 GHG inventory data (i.e., the latest year for which data are available) for the 2000-2008 greenhouse gas emissions inventory, California emitted 474 MMTCO2e including emissions resulting from imported electrical power in 2008 (4). Based on the CARB inventory data and GHG inventories compiled by the World Resources Institute (5), California's total statewide GHG emissions rank second in the United States (Texas is number one) with emissions of 417 MMTCO2e excluding emissions related to imported power.

2.3 GLOBAL CLIMATE CHANGE DEFINED

Global Climate Change (GCC) refers to the change in average meteorological conditions on the earth with respect to temperature, wind patterns, precipitation and storms. Global temperatures are regulated by naturally occurring atmospheric gases such as water vapor, CO2 (Carbon Dioxide), N2O (Nitrous Oxide), CH4 (Methane), hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride. These particular gases are important due to their residence time (duration they stay) in the atmosphere, which ranges from 10 years to more than 100 years. These gases allow solar radiation into the Earth's atmosphere, but prevent radioactive heat from escaping, thus warming the Earth's atmosphere. GCC can occur naturally as it has in the past with the previous ice ages. According to the California Air Resources Board (CARB), the climate change since the industrial revolution differs from previous climate changes in both rate and magnitude (6).

[2] Used http://unfccc.int data for Annex I countries. Consulted the CAIT Climate Data Explorer http://www.wri.org site to reference Non-Annex I countries such as China and India.

Gases that trap heat in the atmosphere are often referred to as greenhouse gases. Greenhouse gases are released into the atmosphere by both natural and anthropogenic (human) activity. Without the natural greenhouse gas effect, the Earth's average temperature would be approximately 61° Fahrenheit (F) cooler than it is currently. The cumulative accumulation of these gases in the earth's atmosphere is considered to be the cause for the observed increase in the earth's temperature.

Although California's rate of growth of greenhouse gas emissions is slowing, the state is still a substantial contributor to the U.S. emissions inventory total. In 2004, California is estimated to have produced 492 million gross metric tons of carbon dioxide equivalent (CO2e) greenhouse gas emissions. Despite a population increase of 16 percent between 1990 and 2004, California has significantly slowed the rate of growth of greenhouse gas emissions due to the implementation of energy efficiency programs as well as adoption of strict emission controls (5).

2.4 GREENHOUSE GASES

For the purposes of this analysis, emissions of carbon dioxide, methane, and nitrous oxide were evaluated (see Table 3-1 later in this report) because these gasses are the primary contributors to GCC from development projects. Although other substances such as fluorinated gases also contribute to GCC, sources of fluorinated gases are not well-defined and no accepted emissions factors or methodology exist to accurately calculate these gases.

Greenhouse gases have varying global warming potential (GWP) values; GWP values represent the potential of a gas to trap heat in the atmosphere. Carbon dioxide is utilized as the reference gas for GWP, and thus has a GWP of 1.

The atmospheric lifetime and GWP of selected greenhouse gases are summarized at Table 2-2. As shown in the table below, GWP range from 1 for carbon dioxide to 23,900 for sulfur hexafluoride.

TABLE 2-2: GLOBAL WARMING POTENTIAL AND ATMOSPHERIC LIFETIME OF SELECT GHGS

Gas	Atmospheric Lifetime (years)	Global Warming Potential (100 year time horizon)
Carbon Dioxide	50-200	1
Methane	12 ± 3	25
Nitrous Oxide	120	298
HFC-23	264	11,700
HFC-134a	14.6	1,300
HFC-152a	1.5	140
PFC: Tetrafluoromethane (CH4)	50,000	6,500
PFC: Hexafluoroethane (C2F6)	10,000	9,200
Sulfur Hexafluoride (SF6)	3,200	23,900
Source: Environmental Protection Agency (EPA) 2013 (URL: http://www.epa.gov/ghgreporting/documents/pdf/2013/documents/2013-data-elements.pdf)		

Water Vapor: Water vapor (H20) is the most abundant, important, and variable greenhouse gas in the atmosphere. Water vapor is not considered a pollutant; in the atmosphere it maintains a climate necessary for life. Changes in its concentration are primarily considered to be a result of climate feedbacks related to the warming of the atmosphere rather than a direct result of industrialization. A climate feedback is an indirect, or secondary, change, either positive or negative, that occurs within the climate system in response to a forcing mechanism. The feedback loop in which water is involved is critically important to projecting future climate change.

As the temperature of the atmosphere rises, more water is evaporated from ground storage (rivers, oceans, reservoirs, soil). Because the air is warmer, the relative humidity can be higher (in essence, the air is able to 'hold' more water when it is warmer), leading to more water vapor in the atmosphere. As a GHG, the higher concentration of water vapor is then able to absorb more thermal indirect energy radiated from the Earth, thus further warming the atmosphere. The warmer atmosphere can then hold more water vapor and so on and so on. This is referred to as a "positive feedback loop." The extent to which this positive feedback loop will continue is unknown as there are also dynamics that hold the positive feedback loop in check. As an example, when water vapor increases in the atmosphere, more of it will eventually also condense into clouds, which are more able to reflect incoming solar radiation (thus allowing less energy to reach the Earth's surface and heat it up).

There are no human health effects from water vapor itself; however, when some pollutants come in contact with water vapor, they can dissolve and the water vapor can then act as a pollutant-carrying agent. The main source of water vapor is evaporation from the oceans (approximately 85 percent). Other sources include: evaporation from other water bodies,

sublimation (change from solid to gas) from sea ice and snow, and transpiration from plant leaves.

Carbon Dioxide: Carbon dioxide (CO2) is an odorless and colorless GHG. Outdoor levels of carbon dioxide are not high enough to result in negative health effects. Carbon dioxide is emitted from natural and manmade sources. Natural sources include: the decomposition of dead organic matter; respiration of bacteria, plants, animals and fungus; evaporation from oceans; and volcanic outgassing. Anthropogenic sources include: the burning of coal, oil, natural gas, and wood. Carbon dioxide is naturally removed from the air by photosynthesis, dissolution into ocean water, transfer to soils and ice caps, and chemical weathering of carbonate rocks (7).

Since the industrial revolution began in the mid-1700s, the sort of human activity that increases GHG emissions has increased dramatically in scale and distribution. Data from the past 50 years suggests a corollary increase in levels and concentrations. As an example, prior to the industrial revolution, CO2 concentrations were fairly stable at 280 parts per million (ppm). Today, they are around 370 ppm, an increase of more than 30 percent. Left unchecked, the concentration of carbon dioxide in the atmosphere is projected to increase to a minimum of 540 ppm by 2100 as a direct result of anthropogenic sources (8).

Methane: Methane (CH4) is an extremely effective absorber of radiation, though its atmospheric concentration is less than carbon dioxide and its lifetime in the atmosphere is brief (10-12 years), compared to other GHGs.

Methane has both natural and anthropogenic sources. It is released as part of the biological processes in low oxygen environments, such as in swamplands or in rice production (at the roots of the plants). Over the last 50 years, human activities such as growing rice, raising cattle, using natural gas, and mining coal have added to the atmospheric concentration of methane. Other anthropocentric sources include fossil-fuel combustion and biomass burning.

Nitrous Oxide: Nitrous oxide (N2O), also known as laughing gas, is a colorless greenhouse gas. Nitrous oxide can cause dizziness, euphoria, and sometimes slight hallucinations. In small doses, it is considered harmless. However, in some cases, heavy and extended use can cause Olney's Lesions (brain damage) (9).

Concentrations of nitrous oxide also began to rise at the beginning of the industrial revolution. In 1998, the global concentration was 314 parts per billion (ppb). Nitrous oxide is produced by microbial processes in soil and water, including those reactions which occur in fertilizer containing nitrogen. In addition to agricultural sources, some industrial processes (fossil fuel-fired power plants, nylon production, nitric acid production, and vehicle emissions) also contribute to its atmospheric load. It is used as an aerosol spray propellant, i.e., in whipped cream bottles. It is also used in potato chip bags to keep chips fresh. It is used in rocket engines and in race cars. Nitrous oxide can be transported into the stratosphere, be deposited on the Earth's surface, and be converted to other compounds by chemical reaction

Chlorofluorocarbons: Chlorofluorocarbons (CFCs) are gases formed synthetically by replacing all hydrogen atoms in methane or ethane (C2H6) with chlorine and/or fluorine atoms. CFCs are

nontoxic, nonflammable, insoluble and chemically unreactive in the troposphere (the level of air at the Earth's surface). CFCs are no longer being used; therefore, it is not likely that health effects would be experienced. Nonetheless, in confined indoor locations, working with CFC-113 or other CFCs is thought to result in death by cardiac arrhythmia (heart frequency too high or too low) or asphyxiation.

CFCs have no natural source, but were first synthesized in 1928. They were used for refrigerants, aerosol propellants and cleaning solvents. Due to the discovery that they are able to destroy stratospheric ozone, a global effort to halt their production was undertaken and was extremely successful, so much so that levels of the major CFCs are now remaining steady or declining. However, their long atmospheric lifetimes mean that some of the CFCs will remain in the atmosphere for over 100 years.

Hydrofluorocarbons: Hydrofluorocarbons (HFCs) are synthetic, man-made chemicals that are used as a substitute for CFCs. Out of all the greenhouse gases, they are one of three groups with the highest global warming potential. The HFCs with the largest measured atmospheric abundances are (in order), HFC-23 (CHF3), HFC-134a (CF3CH2F), and HFC-152a (CH3CHF2). Prior to 1990, the only significant emissions were of HFC-23. HFC-134a emissions are increasing due to its use as a refrigerant. The U.S. EPA estimates that concentrations of HFC-23 and HFC-134a are now about 10 parts per trillion (ppt) each; and that concentrations of HFC-152a are about 1 ppt (10). No health effects are known to result from exposure to HFCs, which are manmade for applications such as automobile air conditioners and refrigerants.

Perfluorocarbons: Perfluorocarbons (PFCs) have stable molecular structures and do not break down through chemical processes in the lower atmosphere. High-energy ultraviolet rays, which occur about 60 kilometers above Earth's surface, are able to destroy the compounds. Because of this, PFCs have very long lifetimes, between 10,000 and 50,000 years. Two common PFCs are tetrafluoromethane (CF4) and hexafluoroethane (C2F6). The U.S. EPA estimates that concentrations of CF4 in the atmosphere are over 70 ppt.

No health effects are known to result from exposure to PFCs. The two main sources of PFCs are primary aluminum production and semiconductor manufacture.

Sulfur Hexafluoride: Sulfur hexafluoride (SF6) is an inorganic, odorless, colorless, nontoxic, nonflammable gas. It also has the highest GWP of any gas evaluated (23,900). The U.S. EPA indicates that concentrations in the 1990s were about 4 ppt. In high concentrations in confined areas, the gas presents the hazard of suffocation because it displaces the oxygen needed for breathing.

Sulfur hexafluoride is used for insulation in electric power transmission and distribution equipment, in the magnesium industry, in semiconductor manufacturing, and as a tracer gas for leak detection.

2.5 EFFECTS OF CLIMATE CHANGE IN CALIFORNIA

Public Health

Higher temperatures may increase the frequency, duration, and intensity of conditions conducive to air pollution formation. For example, days with weather conducive to ozone formation could increase from 25 to 35 percent under the lower warming range to 75 to 85 percent under the medium warming range. In addition, if global background ozone levels increase as predicted in some scenarios, it may become impossible to meet local air quality standards. Air quality could be further compromised by increases in wildfires, which emit fine particulate matter that can travel long distances, depending on wind conditions. The Climate Scenarios report indicates that large wildfires could become up to 55 percent more frequent if GHG emissions are not significantly reduced.

In addition, under the higher warming range scenario, there could be up to 100 more days per year with temperatures above 90ºF in Los Angeles and 95ºF in Sacramento by 2100. This is a large increase over historical patterns and approximately twice the increase projected if temperatures remain within or below the lower warming range. Rising temperatures could increase the risk of death from dehydration, heat stroke/exhaustion, heart attack, stroke, and respiratory distress caused by extreme heat.

Water Resources

A vast network of man-made reservoirs and aqueducts captures and transports water throughout the state from northern California rivers and the Colorado River. The current distribution system relies on Sierra Nevada snowpack to supply water during the dry spring and summer months. Rising temperatures, potentially compounded by decreases in precipitation, could severely reduce spring snowpack, increasing the risk of summer water shortages.

If temperatures continue to increase, more precipitation could fall as rain instead of snow, and the snow that does fall could melt earlier, reducing the Sierra Nevada spring snowpack by as much as 70 to 90 percent. Under the lower warming range scenario, snowpack losses could be only half as large as those possible if temperatures were to rise to the higher warming range. How much snowpack could be lost depends in part on future precipitation patterns, the projections for which remain uncertain. However, even under the wetter climate projections, the loss of snowpack could pose challenges to water managers and hamper hydropower generation. It could also adversely affect winter tourism. Under the lower warming range, the ski season at lower elevations could be reduced by as much as a month. If temperatures reach the higher warming range and precipitation declines, there might be many years with insufficient snow for skiing and snowboarding.

The State's water supplies are also at risk from rising sea levels. An influx of saltwater could degrade California's estuaries, wetlands, and groundwater aquifers. Saltwater intrusion caused by rising sea levels is a major threat to the quality and reliability of water within the southern edge of the Sacramento/San Joaquin River Delta – a major fresh water supply.

Agriculture

Increased temperatures could cause widespread changes to the agriculture industry reducing the quantity and quality of agricultural products statewide. First, California farmers could possibly lose as much as 25 percent of the water supply they need. Although higher CO2 levels

can stimulate plant production and increase plant water-use efficiency, California's farmers could face greater water demand for crops and a less reliable water supply as temperatures rise. Crop growth and development could change, as could the intensity and frequency of pest and disease outbreaks. Rising temperatures could aggravate O3 pollution, which makes plants more susceptible to disease and pests and interferes with plant growth.

Plant growth tends to be slow at low temperatures, increasing with rising temperatures up to a threshold. However, faster growth can result in less-than-optimal development for many crops, so rising temperatures could worsen the quantity and quality of yield for a number of California's agricultural products. Products likely to be most affected include wine grapes, fruits and nuts.

In addition, continued global climate change could shift the ranges of existing invasive plants and weeds and alter competition patterns with native plants. Range expansion could occur in many species while range contractions may be less likely in rapidly evolving species with significant populations already established. Should range contractions occur, new or different weed species could fill the emerging gaps. Continued global climate change could alter the abundance and types of many pests, lengthen pests' breeding season, and increase pathogen growth rates.

Forests and Landscapes

Global climate change has the potential to intensify the current threat to forests and landscapes by increasing the risk of wildfire and altering the distribution and character of natural vegetation. If temperatures rise into the medium warming range, the risk of large wildfires in California could increase by as much as 55 percent, which is almost twice the increase expected if temperatures stay in the lower warming range. However, since wildfire risk is determined by a combination of factors, including precipitation, winds, temperature, and landscape and vegetation conditions, future risks will not be uniform throughout the state. In contrast, wildfires in northern California could increase by up to 90 percent due to decreased precipitation.

Moreover, continued global climate change has the potential to alter natural ecosystems and biological diversity within the state. For example, alpine and subalpine ecosystems could decline by as much as 60 to 80 percent by the end of the century as a result of increasing temperatures. The productivity of the state's forests has the potential to decrease as a result of global climate change.

Rising Sea Levels

Rising sea levels, more intense coastal storms, and warmer water temperatures could increasingly threaten the state's coastal regions. Under the higher warming range scenario, sea level is anticipated to rise 22 to 35 inches by 2100. Elevations of this magnitude would inundate low-lying coastal areas with salt water, accelerate coastal erosion, threaten vital levees and inland water systems, and disrupt wetlands and natural habitats. Under the lower warming range scenario, sea level could rise 12-14 inches.

2.6 HUMAN HEALTH EFFECTS

The potential health effects related directly to the emissions of carbon dioxide, methane, and nitrous oxide as they relate to development projects such as the proposed Project are still being debated in the scientific community. Their cumulative effects to global climate change have the potential to cause adverse effects to human health. Increases in Earth's ambient temperatures would result in more intense heat waves, causing more heat-related deaths. Scientists also purport that higher ambient temperatures would increase disease survival rates and result in more widespread disease. Climate change will likely cause shifts in weather patterns, potentially resulting in devastating droughts and food shortages in some areas (11). Exhibit 2-A presents the potential impacts of global warming.

Water Vapor: There are no known direct health effects related to water vapor at this time. It should be noted however that when some pollutants react with water vapor, the reaction forms a transport mechanism for some of these pollutants to enter the human body through water vapor.

Carbon Dioxide: According to the National Institute for Occupational Safety and Health (NIOSH) high concentrations of carbon dioxide can result in health effects such as: headaches, dizziness, restlessness, difficulty breathing, sweating, increased heart rate, increased cardiac output, increased blood pressure, coma, asphyxia, and/or convulsions. It should be noted that current concentrations of carbon dioxide in the earth's atmosphere are estimated to be approximately 370 parts per million (ppm), the actual reference exposure level (level at which adverse health effects typically occur) is at exposure levels of 5,000 ppm averaged over 10 hours in a 40-hour workweek and short-term reference exposure levels of 30,000 ppm averaged over a 15 minute period (12).

Specific health effects associated with directly emitted GHG emissions are as follows:

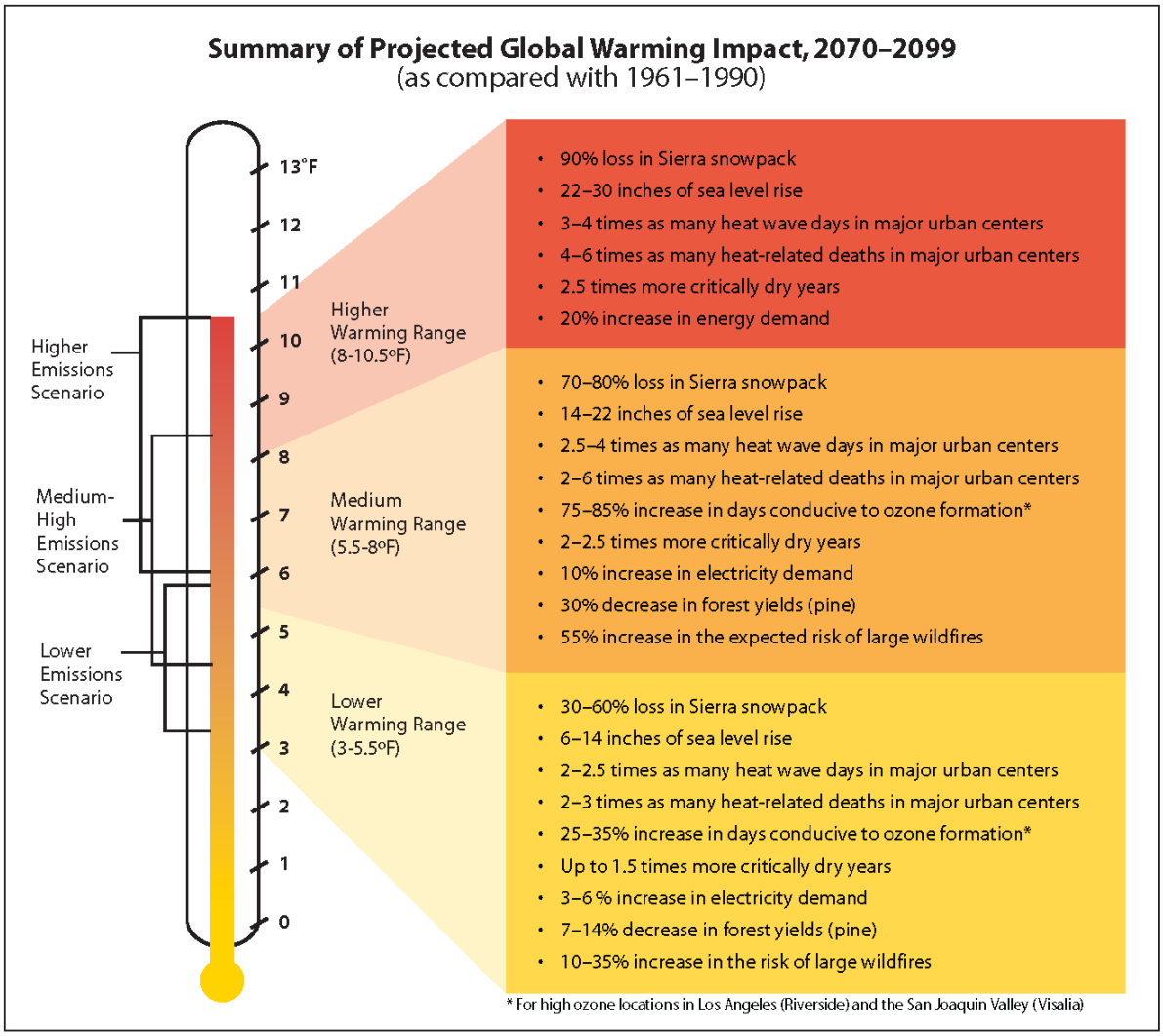
Methane: Methane is extremely reactive with oxidizers, halogens, and other halogen-containing compounds. Methane is also an asphyxiant and may displace oxygen in an enclosed space (13).

Nitrous Oxide: Nitrous Oxide is often referred to as laughing gas; it is a colorless greenhouse gas. The health effects associated with exposure to elevated concentrations of nitrous oxide include dizziness, euphoria, slight hallucinations, and in extreme cases of elevated concentrations nitrous oxide can also cause brain damage (13).

Fluorinated Gases: High concentrations of fluorinated gases can also result in adverse health effects such as asphyxiation, dizziness, headache, cardiovascular disease, cardiac disorders, and in extreme cases, increased mortality (12).

Aerosols: The health effects of aerosols are similar to that of other fine particulate matter. Thus aerosols can cause elevated respiratory and cardiovascular diseases as well as increased mortality (14).

EXHIBIT 2-A: SUMMARY OF PROJECTED GLOBAL WARMING IMPACT



2.7 REGULATORY SETTING

<u>International Regulation and the Kyoto Protocol:</u>

In 1988, the United Nations established the Intergovernmental Panel on Climate Change to evaluate the impacts of global warming and to develop strategies that nations could implement to curtail global climate change. In 1992, the United States joined other countries around the world in signing the United Nations' Framework Convention on Climate Change (UNFCCC) agreement with the goal of controlling greenhouse gas emissions. As a result, the Climate Change Action Plan was developed to address the reduction of GHGs in the United States. The Plan currently consists of more than 50 voluntary programs for member nations to adopt.

The Kyoto protocol is a treaty made under the UNFCCC and was the first international agreement to regulate GHG emissions. Some have estimated that if the commitments outlined in the Kyoto protocol are met, global GHG emissions could be reduced an estimated five percent from 1990 levels during the first commitment period of 2008-2012. Notably, while the

United States is a signatory to the Kyoto protocol, Congress has not ratified the Protocol and the United States is not bound by the Protocol's commitments. In December 2009, international leaders from 192 nations met in Copenhagen to address the future of international climate change commitments post-Kyoto.

Federal Regulation and the Clean Air Act:

Coinciding 2009 meeting in Copenhagen, on December 7, 2009, the U.S. Environmental Protection Agency (EPA) issued an Endangerment Finding under Section 202(a) of the Clean Air Act, opening the door to federal regulation of GHGs. The Endangerment Finding notes that GHGs threaten public health and welfare and are subject to regulation under the Clean Air Act. To date, the EPA has not promulgated regulations on GHG emissions, but it has already begun to develop them.

Previously the EPA had not regulated GHGs under the Clean Air Act (15) because it asserted that the Act did not authorize it to issue mandatory regulations to address global climate change and that such regulation would be unwise without an unequivocally established causal link between GHGs and the increase in global surface air temperatures. In Massachusetts v. Environmental Protection Agency et al. (127 S. Ct. 1438 (2007), however, the U.S. Supreme Court held that GHGs are pollutants under the Clean Air Act and directed the EPA to decide whether the gases endangered public health or welfare. The EPA had also not moved aggressively to regulate GHGs because it expected Congress to make progress on GHG legislation, primarily from the standpoint of a cap-and-trade system. However, proposals circulated in both the House of Representative and Senate have been controversial and it may be some time before the U.S. Congress adopts major climate change legislation. The EPA's Endangerment Finding paves the way for federal regulation of GHGs with or without Congress.

Although global climate change did not become an international concern until the 1980s, efforts to reduce energy consumption began in California in response to the oil crisis in the 1970s, resulting in the unintended reduction of greenhouse gas emissions. In order to manage the state's energy needs and promote energy efficiency, AB 1575 created the California Energy Commission (CEC) in 1975.

Title 24 Energy Standards:

The California Energy Commission (CEC) first adopted Energy Efficiency Standards for Residential and Nonresidential Buildings (16) in 1978 in response to a legislative mandate to reduce energy consumption in the state. Although not originally intended to reduce GHG emissions, increased energy efficiency, and reduced consumption of electricity, natural gas, and other fuels would result in fewer GHG emissions from residential and nonresidential buildings subject to the standard. The standards are updated periodically to allow for the consideration and inclusion of new energy efficiency technologies and methods. The Energy Commission's most recent standard, 2013 Building Energy Efficiency Standard, is 25 percent more efficient than previous standards for residential construction and 30 percent better for nonresidential construction. The Standards, which took effect on January 1, 2014, offer builders better

windows, insulation, lighting, ventilation systems and other features that reduce energy consumption in homes and businesses. Some improved measures in the Standards include:

Residential:

- Solar-ready roofs to allow homeowners to add solar photovoltaic panels at a future date
- More efficient windows to allow increased sunlight, while decreasing heat gain
- Insulated hot water pipes, to save water and energy and reduce the time it takes to deliver hot water
- Whole house fans to cool homes and attics with evening air reducing the need for air conditioning load
- Air conditioner installation verification to insure efficient operation

Nonresidential:

- High performance windows, sensors and controls that allow buildings to use "daylighting"
- Efficient process equipment in supermarkets, computer data centers, commercial kitchens, laboratories, and parking garages
- Advanced lighting controls to synchronize light levels with daylight and building occupancy, and provide demand response capability
- Solar-ready roofs to allow businesses to add solar photovoltaic panels at a future date
- Cool roof technologies

CALGreen

Part 11 of the Title 24 Building Standards Code is referred to as the California Green Building Standards Code (CALGreen Code) (17). The purpose of the CALGreen Code is to “improve public health, safety and general welfare by enhancing the design and construction of buildings through the use of building concepts having a positive environmental impact and encouraging sustainable construction practices in the following categories: (1) Planning and design; (2) Energy efficiency; (3) Water efficiency and conservation; (4) Material conservation and resource efficiency; and (5) Environmental air quality.” The CALGreen Code is not intended to substitute or be identified as meeting the certification requirements of any green building program that is not established and adopted by the California Building Standards Commission (CBSC). The CBSC has released the 2010 California Green Building Standards Code on its Web site. Unless otherwise noted in the regulation, all newly constructed buildings in California are subject of the requirements of the CALGreen Code.

CALGreen contains both mandatory and voluntary measures, for Non-Residential land uses there are 39 mandatory measures including, but not limited to: exterior light pollution reduction, wastewater reduction by 20%, and commissioning of projects over 10,000 sf. There are two tiers of voluntary measures for Non-Residential land uses for a total of 36 additional elective measures.

The 2013 CALGreen includes additions and amendments to the water efficiency standards for non-residential buildings in order to comply with the reduced flow rate table. The 2013

CALGreen has also been rewritten to clarify and definitively identify the requirements and applicability for residential and nonresidential buildings.

California Assembly Bill No. 1493 (AB 1493):

AB 1493 requires CARB to develop and adopt the nation's first greenhouse gas emission standards for automobiles. The Legislature declared in AB 1493 that global warming was a matter of increasing concern for public health and environment in California (18). Further, the legislature stated that technological solutions to reduce greenhouse gas emissions would stimulate the California economy and provide jobs.

To meet the requirements of AB 1493, ARB approved amendments to the California Code of Regulations (CCR) adding GHG emission standards to California's existing motor vehicle emission standards in 2004. Amendments to CCR Title 13 Sections 1900 (CCR 13 1900) and 1961 (CCR 13 1961) and adoption of Section 1961.1 (CCR 13 1961.1) require automobile manufacturers to meet fleet average GHG emission limits for all passenger cars, light-duty trucks within various weight criteria, and medium-duty passenger vehicle weight classes beginning with the 2009 model year. Emission limits are further reduced each model year through 2016.

In December 2004 a group of car dealerships, automobile manufacturers, and trade groups representing automobile manufacturers filed suit against ARB to prevent enforcement of CCR 13 1900 and CCR 13 1961 as amended by AB 1493 and CCR 13 1961.1 (Central Valley Chrysler-Jeep et al. v. Catherine E. Witherspoon, in her official capacity as Executive Director of the California Air Resources Board, et al.). The suit, heard in the U.S. District Court for the Eastern District of California, contended that California's implementation of regulations that in effect regulate vehicle fuel economy violates various federal laws, regulations, and policies. In January 2007, the judge hearing the case accepted a request from the State Attorney General's office that the trial be postponed until a decision is reached by the U.S. Supreme Court on a separate case addressing GHGs. In the Supreme Court Case, Massachusetts vs. EPA, the primary issue in question is whether the federal CAA provides authority for USEPA to regulate CO2 emissions. In April 2007, the U.S. Supreme Court ruled in Massachusetts' favor, holding that GHGs are air pollutants under the CAA. On December 11, 2007, the judge in the Central Valley Chrysler-Jeep case rejected each plaintiff's arguments and ruled in California's favor. On December 19, 2007, the USEPA denied California's waiver request. California filed a petition with the Ninth Circuit Court of Appeals challenging USEPA's denial on January 2, 2008.

The Obama administration subsequently directed the USEPA to re-examine their decision. On May 19, 2009, challenging parties, automakers, the State of California, and the federal government reached an agreement on a series of actions that would resolve these current and potential future disputes over the standards through model year 2016. In summary, the USEPA and the U.S. Department of Transportation agreed to adopt a federal program to reduce GHGs and improve fuel economy, respectively, from passenger vehicles in order to achieve equivalent or greater greenhouse gas benefits as the AB 1493 regulations for the 2012–2016 model years. Manufacturers agreed to ultimately drop current and forego similar future legal challenges, including challenging a waiver grant, which occurred on June 30, 2009. The State of California

committed to (1) revise its standards to allow manufacturers to demonstrate compliance with the fleet-average GHG emission standard by "pooling" California and specified State vehicle sales; (2) revise its standards for 2012–2016 model year vehicles so that compliance with USEPA-adopted GHG standards would also comply with California's standards; and (3) revise its standards, as necessary, to allow manufacturers to use emissions data from the federal CAFE program to demonstrate compliance with the AB 1493 regulations (CARB 2009, http://www.arb.ca.gov/regact/2009/ghgpv09/ghgpvisor.pdf) both of these programs are aimed at light-duty auto and light-duty trucks.

Executive Order S-3-05:

Executive Order S-3-05, which was signed by Governor Schwarzenegger in 2005, proclaims that California is vulnerable to the impacts of climate change (19). It declares that increased temperatures could reduce the Sierra's snowpack, further exacerbate California's air quality problems, and potentially cause a rise in sea levels. To combat those concerns, the Executive Order established total greenhouse gas emission targets. Specifically, emissions are to be reduced to the 1990 level by 2020, and to 80% below the 1990 level by 2050. The Executive Order directed the Secretary of the California Environmental Protection Agency (CalEPA) to coordinate a multi-agency effort to reduce greenhouse gas emissions to the target levels. The Secretary also is required to submit biannual reports to the Governor and state Legislature describing: (1) progress made toward reaching the emission targets; (2) impacts of global warming on California's resources; and (3) mitigation and adaptation plans to combat these impacts. To comply with the Executive Order, the Secretary of the CalEPA created a Climate Action Team (CAT) made up of members from various state agencies and commission. CAT released its first report in March 2006. The report proposed to achieve the targets by building on voluntary actions of California businesses, local government and community actions, as well as through state incentive and regulatory programs.

California Assembly Bill 32 (AB 32):

In September 2006, Governor Arnold Schwarzenegger signed AB 32, the California Climate Solutions Act of 2006. AB 32 requires that statewide GHG emissions be reduced to 1990 levels by the year 2020 (20). This reduction will be accomplished through an enforceable statewide cap on GHG emissions that will be phased in starting in 2012. To effectively implement the cap, AB 32 directs CARB to develop and implement regulations to reduce statewide GHG emissions from stationary sources. AB 32 specifies that regulations adopted in response to AB 1493 should be used to address GHG emissions from vehicles. However, AB 32 also includes language stating that if the AB 1493 regulations cannot be implemented, then CARB should develop new regulations to control vehicle GHG emissions under the authorization of AB 32.

AB 32 requires that CARB adopt a quantified cap on GHG emissions representing 1990 emissions levels and disclose how it arrives at the cap; institute a schedule to meet the emissions cap; and develop tracking, reporting, and enforcement mechanisms to ensure that the state achieves reductions in GHG emissions necessary to meet the cap. AB 32 also includes guidance to institute emissions reductions in an economically efficient manner and conditions to ensure that businesses and consumers are not unfairly affected by the reductions.

In November 2007, CARB completed its estimates of 1990 GHG levels. Net emission 1990 levels were estimated at 427 MMTs (emission sources by sector were: transportation – 35 percent; electricity generation – 26 percent; industrial – 24 percent; residential – 7 percent; agriculture – 5 percent; and commercial – 3 percent). Accordingly, 427 MMTs of CO2 equivalent was established as the emissions limit for 2020. For comparison, CARB's estimate for baseline GHG emissions was 473 MMT for 2000 and 532 MMT for 2010. "Business as usual" conditions (without the 28.4 percent reduction to be implemented by CARB regulations) for 2020 were projected to be 596 MMTs.

In December 2007, CARB approved a regulation for mandatory reporting and verification of GHG emissions for major sources. This regulation covered major stationary sources such as cement plants, oil refineries, electric generating facilities/providers, and co-generation facilities, which comprise 94 percent of the point source CO2 emissions in the State.

On December 11, 2008, CARB adopted a scoping plan to reduce GHG emissions to 1990 levels. The Scoping Plan's recommendations for reducing GHG emissions to 1990 levels by 2020 include emission reduction measures, including a cap-and-trade program linked to Western Climate Initiative partner jurisdictions, green building strategies, recycling and waste-related measures, as well as Voluntary Early Actions and Reductions. Implementation of individual measures must begin no later than January 1, 2012, so that the emissions reduction target can be fully achieved by 2020.

Table 2-3, shows the proposed reductions from regulations and programs outlined in the Scoping Plan. While local government operations were not accounted for in achieving the 2020 emissions reduction, local land use changes are estimated to result in a reduction of 5 MMTons of CO2e, which is approximately 3 percent of the 2020 GHG emissions reduction goal. In recognition of the critical role local governments will play in successful implementation of AB 32, CARB is recommending GHG reduction goals of 15 percent of 2006 levels by 2020 to ensure that municipal and community-wide emissions match the state's reduction target. According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 MMTons tons of CO2e (or approximately 1.2 percent of the GHG reduction target).

Overall, CARB determined that achieving the 1990 emission level in 2020 would require a reduction in GHG emissions of approximately 28.5 percent in the absence of new laws and regulations (referred to as "Business-As-Usual" [BAU]). The Scoping Plan evaluates opportunities for sector-specific reductions, integrates all CARB and California Climate Action

TABLE 2-3: SCOPING PLAN GHG REDUCTION MEASURES TOWARDS 2020 TARGET

Recommended Reduction Measures	*Reductions Counted toward 2020 Target of 169 MMT CO2e*	*Percentage of Statewide 2020 Target*
Cap and Trade Program and Associated Measures		
California Light-Duty Vehicle GHG Standards	31.7	19%
Energy Efficiency	26.3	16%
Renewable Portfolio Standard (33 percent by 2020)	21.3	13%
Low Carbon Fuel Standard	15	9%
Regional Transportation-Related GHG Targets[1]	5	3%
Vehicle Efficiency Measures	4.5	3%
Goods Movement	3.7	2%
Million Solar Roofs	2.1	1%
Medium/Heavy Duty Vehicles	1.4	1%
High Speed Rail	1.0	1%
Industrial Measures	0.3	0%
Additional Reduction Necessary to Achieve Cap	34.4	20%
Total Cap and Trade Program Reductions	146.7	87%
Uncapped Sources/Sectors Measures		
High Global Warming Potential Gas Measures	20.2	12%
Sustainable Forests	5	3%
Industrial Measures (for sources not covered under cap and trade program)	1.1	1%
Recycling and Waste (landfill methane capture)	1	1%
Total Uncapped Sources/Sectors Reductions	27.3	16%
Total Reductions Counted toward 2020 Target	174	100%
Other Recommended Measures – Not Counted toward 2020 Target		
State Government Operations	1.0 to 2.0	1%
Local Government Operations	To Be Determined[2]	NA
Green Buildings	26	15%
Recycling and Waste	9	5%
Water Sector Measures	4.8	3%
Methane Capture at Large Dairies	1	1%
Total Other Recommended Measures – Not Counted toward 2020 Target	42.8	NA

Source: CARB. 2008, MMTons CO2e: million metric tons of CO2e

[1]Reductions represent an estimate of what may be achieved from local land use changes. It is not the SB 375 regional target.

[2]According to the Measure Documentation Supplement to the Scoping Plan, local government actions and targets are anticipated to reduce vehicle miles by approximately 2 percent through land use planning, resulting in a potential GHG reduction of 2 million metric tons of CO2e (or approximately 1.2 percent of the GHG reduction target). However, these reductions were not included in the Scoping Plan reductions to achieve the 2020 Target

Team early actions and additional GHG reduction measures, identifies additional measures to be pursued as regulations, and outlines the role of the cap-and-trade program.

In connection with its preparation of the August 2011 Final Supplement to the Scoping Plan's Functional Equivalent Document, CARB released revised estimates of the 2020 emissions level projection in light of the economic recession and the availability of updated information from development of measure-specific regulations. Based on the new economic data, CARB determined the 2020 emissions level projection in the BAU condition would be reduced from 596 metric tons of CO2 equivalent (MTCO2e) to 545 MTCO2e. (21) Under this scenario, achieving the 1990 emissions level in 2020 would require a reduction of GHG emissions of 118 MTCO2e, or 21.7 percent (down from 28.5 percent), from the BAU condition.

When the 2020 emissions level projection also was updated to account for implemented regulatory measures, including Pavley (vehicle model-years 2009 - 2016) and the renewable portfolio standard (12% - 20%), the 2020 projection in the BAU condition was reduced further to 507 MTCO2e. As a result, based on the updated economic and regulatory data, CARB determined that achieving the 1990 emissions level in 2020 would now only require a reduction of GHG emissions of 80 MTCO2e, or approximately 16 percent (down from 28.5 percent), from the BAU condition. (21) (22)

On February 10, 2014, CARB released a Draft Proposed First Update of the Scoping Plan. The draft recalculates 1990 GHG emissions using new global warming potentials identified in the IPCC Fourth Assessment Report released in 2007. Using those GWPs, the 427 MTCO2e 1990 emissions level and 2020 GHG emissions limit identified in the 2008 Scoping Plan would be slightly higher, at 431 MTCO2e. (23) Based on the revised 2020 emissions level projection identified in the 2011 Final Supplement and the updated 1990 emissions levels identified in the discussion draft of the First Update, achieving the 1990 emissions level in 2020 would require a reduction of 78 MTCO2e (down from 509 MTCO2e), or approximately 15.3 percent (down from 28.5 percent), from the BAU condition. (21) (22) (23)

Although CARB has released an update to the Scoping Plan and reduction targets from BAU, it is still appropriate to utilize the previous 28.5% reduction from BAU since the modeling tools available are not able to easily segregate the inclusion of the renewable portfolio standards, and Pavley requirements that are now included in the revised BAU scenario.

<u>California Senate Bill No. 1368 (SB 1368):</u>

In 2006, the State Legislature adopted Senate Bill 1368 ("SB 1368"), which was subsequently signed into law by the Governor (24). SB 1368 directs the California Public Utilities Commission ("CPUC") to adopt a greenhouse gas emission performance standard ("EPS") for the future power purchases of California utilities. SB 1368 seeks to limit carbon emissions associated with electrical energy consumed in California by forbidding procurement arrangements for energy longer than five years from resources that exceed the emissions of a relatively clean, combined cycle natural gas power plant. Due to the carbon content of its fuel source, a coal-fired plant cannot meet this standard because such plants emit roughly twice as much carbon as natural gas, combined cycle plants.

Accordingly, the new law will effectively prevent California's utilities from investing in, otherwise financially supporting, or purchasing power from new coal plants located in or out of the State. Thus, SB 1368 will lead to dramatically lower greenhouse gas emissions associated with California energy demand, as SB 1368 will effectively prohibit California utilities from purchasing power from out of state producers that cannot satisfy the EPS standard required by SB 1368.

Senate Bill 97 (SB 97):

Pursuant to the direction of SB 97, OPR released preliminary draft CEQA Guideline amendments for greenhouse gas emissions on January 8, 2009, and submitted its final proposed guidelines to the Secretary for Natural Resources on April 13, 2009 (25). The Natural Resources Agency adopted the Guideline amendments and they became effective on March 18, 2010.

Of note, the new guidelines state that a lead agency shall have discretion to determine whether to use a quantitative model or methodology, or in the alternative, rely on a qualitative analysis or performance based standards. CEQA Guideline § 15064.4(a)"A lead agency shall have discretion to determine, in the context of a particular project, whether to: (1) Use a model or methodology to quantify greenhouse gas emissions resulting from a project, and which model or methodology to use . . .; or (2) Rely on a qualitative analysis or performance based standards."

Also amended were CEQA Guidelines Sections 15126.4 and 15130, which address mitigation measures and cumulative impacts respectively. Greenhouse gas mitigation measures are referenced in general terms, but no specific measures are championed. The revision to the cumulative impact discussion requirement (Section 15130) simply directs agencies to analyze greenhouse gas emissions in an EIR when a Project's incremental contribution of emissions may be cumulatively considerable, however it does not answer the question of when emission are cumulatively considerable.

Section 15183.5 permits programmatic greenhouse gas analysis and later project-specific tiering, as well as the preparation of Greenhouse Gas Reduction Plans. Compliance with such plans can support determination that a Project's cumulative effect is not cumulatively considerable, according to proposed Section 15183.5(b).

CEQA emphasizes that the effects of greenhouse gas emissions are cumulative, and should be analyzed in the context of CEQA's requirements for cumulative impacts analysis. (See CEQA Guidelines Section 15130(f)).

Section 15064.4(b) of the CEQA Guidelines provides direction for lead agencies for assessing the significance of impacts of greenhouse gas emissions:

1. The extent to which the project may increase or reduce greenhouse gas emissions as compared to the existing environmental setting;
2. Whether the project emissions exceed a threshold of significance that the lead agency determines applies to the project; or

3. The extent to which the project complies with regulations or requirements adopted to implement a statewide, regional, or local plan for the reduction or mitigation of greenhouse gas emissions. Such regulations or requirements must be adopted by the relevant public agency through a public review process and must include specific requirements that reduce or mitigate the project's incremental contribution of greenhouse gas emissions. If there is substantial evidence that the possible effects of a particular project are still cumulatively considerable notwithstanding compliance with the adopted regulations or requirements, an EIR must be prepared for the project.

The CEQA Guideline amendments do not identify a threshold of significance for greenhouse gas emissions, nor do they prescribe assessment methodologies or specific mitigation measures. Instead, they call for a "good-faith effort, based on available information, to describe, calculate or estimate the amount of greenhouse gas emissions resulting from a project." The amendments encourage lead agencies to consider many factors in performing a CEQA analysis and preserve lead agencies' discretion to make their own determinations based upon substantial evidence. The amendments also encourage public agencies to make use of programmatic mitigation plans and programs from which to tier when they perform individual project analyses. Specific GHG language incorporated in the Guidelines' suggested Environmental Checklist (Guidelines Appendix G) is as follows:

VII. GREENHOUSE GAS EMISSIONS

Would the project:

a) Generate greenhouse gas emissions, either directly or indirectly, that may have a significant impact on the environment?

b) Conflict with an applicable plan, policy or regulation adopted for the purpose of reducing the emissions of greenhouse gases?

<u>Executive Order S-01-07:</u>

On January 18, 2007 California Governor Arnold Schwarzenegger, through Executive Order S-01-07, mandated a statewide goal to reduce the carbon intensity of California's transportation fuel by at least ten percent by 2020 (26). The order also requires that a California specific Low Carbon Fuel Standard be established for transportation fuels.

<u>Senate Bills 1078 and 107 and Executive Order S-14-08:</u>

SB 1078 (Chapter 516, Statutes of 2002) requires retail sellers of electricity, including investor-owned utilities and community choice aggregators, to provide at least 20% of their supply from renewable sources by 2017 (27). SB 107 (Chapter 464, Statutes of 2006) changed the target date to 2010 (26). In November 2008 Governor Schwarzenegger signed Executive Order S-14-08, which expands the state's Renewable Energy Standard to 33% renewable power by 2020 (28).

Executive Order B-30-15:

In January 2015, Governor Brown, in his inaugural address and annual report to the Legislature, established supplementary goals which would further reduce GHG emissions over the next 15 years. These goals include an increase in California's renewable energy portfolio from 33% to 50%, a reduction in vehicle petroleum use for cars and trucks by up to 50% measures to double the efficiency of existing buildings, and decreasing emissions associated with heating fuels.

On April 29, 2015 California Governor Jerry Brown, through Executive Order B-30-15 ("BEO") states a new statewide policy goal to reduce GHG emissions 40 percent below their 1990 levels by 2030.

The BEO sets an ambitious new Statewide GHG emissions reduction target of 40% below 1990 levels by 2030 as a "mid-term" benchmark needed to achieve the 80% below 1990 levels by 2050. It should be noted however that this target has not been formally enacted by the Legislature or even CARB. As such, the BEO does not appear to constitute a new regulation or requirement adopted to implement a statewide, regional or local plan for the reduction of GHG emissions within the context of CEQA.

The Project reduces its GHG emissions to the maximum extent feasible as discussed in this document. At this time, no further analysis is necessary or required by CEQA as it pertains to Executive Order B-30-15.

Additionally, as described previously, the project applicant would not actively interfere with any future City-mandated, state-mandated, or federally-mandated retrofit obligations enacted or promulgated to legally require development City-wide, state-wide, or nation-wide to assist in meeting state-adopted greenhouse gas emissions reduction targets, including that established under Executive Order S-3-05 or Executive Order B-30-15.

Based on the foregoing, the Project does not interfere with the state's implementation of (i) Executive Order B-30-15's target of reducing statewide GHG emissions to 40% below 1990 levels by 2030 or (ii) Executive Order S-3-05's target of reducing statewide GHG emissions to 80% below 1990 levels by 2050 because it does not interfere with the state's implementation of GHG reduction plans described in the CARB's Updated Scoping Plan, including the state providing for 12,000 MW of renewable distributed generation by 2020, the California Building Commission mandating net zero energy homes in the building code after 2020, or existing building retrofits under AB 758. Therefore, the project's impacts on greenhouse gas emissions in the 2030 and 2050 horizon years are less than significant.

Senate Bill 375:

SB 375, signed in September 2008 (Chapter 728, Statutes of 2008), aligns regional transportation planning efforts, regional GHG reduction targets, and land use and housing allocation (29). SB 375 requires metropolitan planning organizations (MPOs) to adopt a sustainable communities strategy (SCS) or alternative planning strategy (APS) that will prescribe land use allocation in that MPO's regional transportation plan. ARB, in consultation with MPOs,

will provide each affected region with reduction targets for GHGs emitted by passenger cars and light trucks in the region for the years 2020 and 2035.

These reduction targets will be updated every 8 years but can be updated every 4 years if advancements in emissions technologies affect the reduction strategies to achieve the targets. ARB is also charged with reviewing each MPO's SCS or APS for consistency with its assigned targets. If MPOs do not meet the GHG reduction targets, transportation projects will not be eligible for funding programmed after January 1, 2012.

This law also extends the minimum time period for the regional housing needs allocation cycle from 5 years to 8 years for local governments located within an MPO that meets certain requirements. City or county land use policies (including general plans) are not required to be consistent with the regional transportation plan (and associated SCS or APS). However, new provisions of CEQA would incentivize (through streamlining and other provisions) qualified projects that are consistent with an approved SCS or APS, categorized as "transit priority projects."

The Southern California Association of Governments (SCAG) is required by law to update the Southern California Regional Transportation Plan (RTP) every four years. The 2012 draft plan has been released, this draft plan differs from past plans because it includes development of a SCS. The RTP/SCS incorporates land use and housing policies to meet the greenhouse gas emissions targets established by the California Air Resource Board (CARB) for 2020 (8% reduction) and 2035 (13% reduction). On April 4, 2012, the Regional Council of the Southern California Association of Governments (SCAG) adopted the 2012-2035 Regional Transportation Plan/Sustainable Communities Strategy (RTP/SCS): Towards a Sustainable Future.

<u>CARB's Preliminary Draft Staff Proposal for Interim Significance Thresholds:</u>

Separate from its Scoping Plan approved in December of 2008 (30), CARB issued a Staff Proposal in October 2008, as its first step toward developing recommended statewide interim thresholds of significance for GHGs that may be adopted by local agencies for their own use. CARB staff's objective in this proposal is to develop a threshold of significance that will result in the vast majority (approximately 90 percent statewide) of GHG emissions from new industrial projects being subject to CEQA's requirement to impose feasible mitigation. The proposal does not attempt to address every type of project that may be subject to CEQA, but instead focuses on common project types that, collectively, are responsible for substantial GHG emissions – specifically, industrial, residential, and commercial projects. CARB is developing these thresholds in these sectors to advance climate objectives, streamline project review, and encourage consistency and uniformity in the CEQA analysis of GHG emissions throughout the state. These draft thresholds are under revision in response to comments. There is currently no timetable for finalized thresholds at this time.

As currently proposed by CARB, a quantitative threshold of 7,000 metric tons (MT) of CO2e per year for operational emissions (excluding transportation), and performance standards yet to be defined for construction and transportation emissions are under consideration. However, CARB's proposal is not yet final, and thus cannot be applied to the Project.

South Coast Air Quality Management District Recommendations for Significance Thresholds:

In April 2008, the South Coast Air Quality Management District (SCAQMD), in order to provide guidance to local lead agencies on determining the significance of GHG emissions identified in CEQA documents, convened a "GHG CEQA Significance Threshold Working Group." The goal of the working group is to develop and reach consensus on an acceptable CEQA significance threshold for GHG emissions that would be utilized on an interim basis until CARB (or some other state agency) develops statewide guidance on assessing the significance of GHG emissions under CEQA.

Initially, SCAQMD staff presented the working group with a significance threshold that could be applied to various types of projects—residential; non-residential; industrial; etc (31). However, the threshold is still under development. In December 2008, staff presented the SCAQMD Governing Board with a significance threshold for stationary source projects where it is the lead agency. This threshold uses a tiered approach to determine a project's significance, with 10,000 metric tons of carbon dioxide equivalent (MTCO2e) as a screening numerical threshold for stationary sources. More importantly it should be noted that when setting the 10,000 MTCO2e threshold, the SCAQMD did not consider mobile sources (vehicular travel), rather the threshold is based mainly on stationary source generators such as boilers, refineries, power plants, etc. Therefore it would be misleading to apply a threshold that was developed without consideration for mobile sources to a Project where the majority of emissions are related to mobile sources. Thus there is no SCAQMD threshold that can be applied to this Project.

In September 2010 (32), the Working Group released additional revisions that consist of the following recommended tiered approach:

- Tier 1 consists of evaluating whether or not the Project qualifies for applicable CEQA exemptions.
- Tier 2 consists of determining whether or not a Project is consistent with a greenhouse gas reduction plan. If a Project is consistent with a greenhouse gas reduction plan, it would not have a significant impact.
- Tier 3 consists of screening values at the discretion of the lead agency; however they should be consistent for all projects within its jurisdiction. Project-related construction emissions should be amortized over 30 years and should be added back the Project's operational emissions. The following thresholds are proposed for consideration:
    - 3,000 MTCO2e per year for all land use types

      or
    - 3,500 MTCO2e per year for residential; 1,400 MTCO2e per year for commercial; or 3,000 MTCO2e per year for mixed-use projects
- Tier 4 has the following options:
    - Option 1: Reduce emissions from business as usual by a certain percentage (currently undefined)
    - Option 2: Early implementation of applicable AB 32 Scoping Plan measures
    - Option 3: A project-level efficiency target of 4.8 MTCO2e per service population as a 2020 target and 3.0 MTCO2e per service population as a 2035 target. The recommended

plan-level target for 2020 is 6.6 MTCO2e and the plan level target for 2035 is 4.1 MTCO2e

- Tier 5 involves mitigation offsets to achieve target significance thresholds

The SCAQMD has also adopted Rules 2700, 2701, and 2702 that address GHG reductions. However, these rules address boilers and process heater, forestry, and manure management projects, none of which are required by the Project

2.8 SAN BERNARDINO COUNTY REGIONAL GREENHOUSE GAS REDUCTION PLAN

In March 2014, the San Bernardino Associated Governments and Participating San Bernardino County Cities Partnership (Partnership) created a final draft of the San Bernardino County Regional Greenhouse Gas Reduction Plan (Reduction Plan). This Reduction Plan was created in accordance to AB 32, which established a greenhouse gas limit for the state of California. The Reduction Plan seeks to create an inventory of GHG gases and develop jurisdiction-specific GHG reduction measures and baseline information that could be used by the 21 Partnership Cities of San Bernardino County, which include the City of San Bernardino, the city of the Project site, to create community climate action plans (CAP) (41). Projects that demonstrate consistency with the strategies, actions, and emission reduction targets contained in the Reduction Plan would have a less than significant impact on climate change.

In the Reduction Plan, the City of San Bernardino selected a goal to reduce community GHG emissions to a level that is 15% below its 2008 GHG emissions levels by 2020.

The Project will be compliant with the goal and objectives set forth in the Partnership's Reduction Plan (as shown on Table 4-2, presented later in the report). Therefore, Project consistency with the Reduction Plan would result in a less than significant impact with respect to GHG emissions.

2.9 DISCUSSION ON EMISSIONS REDUCTION TARGET

The City of San Bernardino does not have an established emissions reduction target for GHG emissions. However, it is under the jurisdiction of the Reduction Plan. As such, the City uses the Reduction Plan's sub-region emissions reduction target of 15% below 2008 levels by 2020. Based on guidance from CARB and the Governor's Office of Planning and Research, this reduction target level is consistent with AB-32 and serves as a basis for Projects to be consistent with meeting statewide reduction targets.

As such, if a Project meets the emissions reduction target of 15% below 2008 emissions levels by 2020, it will have a less than significant impacts related to greenhouse gas emissions and global climate change. Conversely, Projects that do not meet the remissions reduction target will require additional analysis and potentially have significant impacts related to greenhouse gas emissions and global climate change.

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3 PROJECT GREENHOUSE GAS IMPACT

3.1 INTRODUCTION

The Project has been evaluated to determine if it will result in a significant greenhouse gas impact. The significance of these potential impacts is described in the following section.

3.2 PROJECT RELATED GREENHOUSE GAS EMISSIONS

CEQA Guidelines 15064.4 (b) (1) states that a lead agency may use a model or methodology to quantify greenhouse gas emissions associated with a project (35).

On October 2, 2013, the SCAQMD in conjunction with the California Air Pollution Control Officers Association (CAPCOA) released the latest version of the California Emissions Estimator Model™ (CalEEMod™) v2013.2.2. The purpose of this model is to more accurately calculate construction-source and operational-source criteria pollutant (NO_x, VOC, PM_{10}, $PM_{2.5}$, SO_x, and CO) and greenhouse gas (GHG) emissions from direct and indirect sources; and quantify applicable air quality and GHG reductions achieved from mitigation measures (36). Accordingly, the latest version of CalEEMod™ has been used for this Project to determine construction and operational air quality impacts. Output from the model runs for both construction and operational activity are provided in Appendix 3.1

3.3 CONSTRUCTION AND OPERATIONAL LIFE-CYCLE ANALYSIS

A full life-cycle analysis (LCA) for construction and operational activity is not included in this analysis due to the lack of consensus guidance on LCA methodology at this time. Life-cycle analysis (i.e., assessing economy-wide GHG emissions from the processes in manufacturing and transporting all raw materials used in the project development, infrastructure and on-going operations) depends on emission factors or econometric factors that are not well established for all processes. At this time a LCA would be extremely speculative and thus has not been prepared.

3.4 CONSTRUCTION EMISSIONS

Construction activities associated with the proposed Project will result in emissions of CO2 and CH4 from construction activities.

The report Rancho Palma Air Quality Impact Analysis Report, Urban Crossroads, Inc. (2015) contains detailed information regarding construction activity (36).

For construction phase Project emissions, GHGs are quantified and amortized over the life of the Project. To amortize the emissions over the life of the Project, the SCAQMD recommends calculating the total greenhouse gas emissions for the construction activities, dividing it by the a 30 year project life then adding that number to the annual operational phase GHG emissions (37). As such, construction emissions were amortized over a 30 year period and added to the annual operational phase GHG emissions.

3.5 OPERATIONAL EMISSIONS

Operational activities associated with the proposed Project will result in emissions of CO2, CH4, and N2O from the following primary sources:

- Area Source Emissions
- Energy Source Emissions
- Mobile Source Emissions
- Solid Waste
- Water Supply, Treatment and Distribution

3.5.1 AREA SOURCE EMISSIONS

Landscape Maintenance Equipment

Landscape maintenance equipment would generate emissions from fuel combustion and evaporation of unburned fuel. Equipment in this category would include lawnmowers, shedders/grinders, blowers, trimmers, chain saws, and hedge trimmers used to maintain the landscaping of the Project. The emissions associated with landscape maintenance equipment were calculated based on assumptions provided in the CalEEMod model.

3.5.2 ENERGY SOURCE EMISSIONS

Combustion Emissions Associated with Natural Gas and Electricity

GHGs are emitted from buildings as a result of activities for which electricity and natural gas are typically used as energy sources. Combustion of any type of fuel emits CO2 and other GHGs directly into the atmosphere; these emissions are considered direct emissions associated with a building. GHGs are also emitted during the generation of electricity from fossil fuels; these emissions are considered to be indirect emissions. Unless otherwise noted, CalEEMod™ default parameters were used.

3.5.3 MOBILE SOURCE EMISSIONS

Vehicles

GHG emissions will also result from mobile sources associated with the Project. These mobile source emissions will result from the typical daily operation of motor vehicles by visitors, employees, and residents. Project mobile source emissions are dependent on both overall daily vehicle trip generation. Trip characteristics available from the report, Rancho Palma Traffic Impact Analysis Urban Crossroads (2015) were utilized in this analysis (38).

3.5.4 SOLID WASTE

Residential and Commercial Retail land uses will result in the generation and disposal of solid waste. A large percentage of this waste will be diverted from landfills by a variety of means, such as reducing the amount of waste generated, recycling, and/or composting. The remainder of the waste not diverted will be disposed of at a landfill. GHG emissions from landfills are

associated with the anaerobic breakdown of material. GHG emissions associated with the disposal of solid waste associated with the proposed Project were calculated by the CalEEMod™ model using default parameters.

3.5.5 WATER SUPPLY, TREATMENT AND DISTRIBUTION

Indirect GHG emissions result from the production of electricity used to convey, treat and distribute water and wastewater. The amount of electricity required to convey, treat and distribute water depends on the volume of water as well as the sources of the water. Unless otherwise noted, CalEEMod™ default parameters were used.

3.6 EMISSIONS SUMMARY

The total project GHG emissions by phase for years 2008 and 2020 are shown on Table 3-1 and Table 3-2, respectively. In year 2008, total CO_2E emissions produced would be 8,356.66 MMTCO2e. In year 2020, total CO_2E emissions produced would be 5,653.77 MMTCO2e. The Project's 2020 GHG emissions levels results in a 32.34% reduction from the Project's 2008 GHG emissions levels.

TABLE 3-1: 2008 TOTAL PROJECT GREENHOUSE GAS EMISSIONS (ANNUAL)

Emission Source	Emissions (metric tons per year)			
	CO2	CH4	N2O	Total CO2E
Annual construction-related emissions amortized over 30 years	57.57	1.00E-02	--	57.78
Area	30.85	3.07E-03	5.30E-04	31.08
Energy	981.62	0.04	0.01	985.96
Mobile Sources	7,056.53	0.45	--	7,066.02
Waste	49.43	2.92	--	110.79
Water Usage	90.78	0.5	0.01	105.03
Total CO_2E (All Sources)	**8,356.66**			

Source: CalEEMod™ model output, See Appendix 3.1 for detailed model outputs.
Note: Totals obtained from CalEEMod™ and may not total 100% due to rounding.
Table results include scientific notation. *e* is used to represent *times ten raised to the power of* (which would be written as x 10^{b}") and is followed by the value of the exponent

TABLE 3-2: 2020 TOTAL PROJECT GREENHOUSE GAS EMISSIONS (ANNUAL)

Emission Source	Emissions (metric tons per year)			
	CO2	CH4	N2O	Total CO2E
Annual construction-related emissions amortized over 30 years	57.56	1.00E-02	--	57.78
Area	30.85	2.56E-03	--	31.07
Energy	738.08	0.04	1.00E-02	742.16
Mobile Sources	4,625.88	0.16	--	4,629.29
Waste	49.43	2.92	--	110.79
Water Usage	68.43	0.50	0.01	82.68
Total CO_2E (All Sources)	**5,653.77**			

4 FINDINGS & CONCLUSIONS

The City of San Bernardino does not have an established emissions reduction target for GHG emissions. However, the City of San Bernardino is a participant in the San Bernardino County Associated Governments and Participating San Bernardino County Cities Partnership (Partnership). The Partnership has prepared a Regional Greenhouse Gas Reduction Plan (Reduction Plan) that identifies emissions reduction targets for the City of San Bernardino and the other 20 participating cities within the sub-region. In the Reduction Plan, the City of San Bernardino selected a goal to reduce community GHG emissions to a level that is 15% below its 2008 greenhouse gas (GHG) emissions levels by 2020.

The Project's 2020 GHG emissions levels will amount to a 32.34% reduction from the Project's 2008 GHG emissions levels, as shown on Table 4-1 which is greater than the minimum reduction target identified in the Partnership's Reduction Plan. Thus, project-related emissions would not have a significant direct or indirect impact on GHG and climate change.

TABLE 4-1: 2008 VS 2020 TOTAL PROJECT GREENHOUSE GAS EMISSIONS REDUCTION LEVELS (ANNUAL)

Emission Source	CO2e Emissions Levels (Metric Tons Per Year)	
	BAU	**Project**
Annual Construction-related emissions amortized over 30 years	57.78	57.78
Area	31.08	31.07
Energy Use	985.96	742.16
Mobile Sources	7,066.02	4,629.29
Waste	110.79	110.79
Water Usage	105.03	82.68
Total	8,356.66	5,653.77
Total Project Reduction over 2008 levels	**32.34%**	
Project Minimum Improvement	**15%**	
Meets Requirement?	**YES**	

Consistency with AB 32

AB 32 requires California to reduce its GHG to 1990 levels by 2020. CARB identified reduction measures to achieve this goal as set forth in the CARB Scoping Plan (39). Thus, projects that are consistent with the CARB Scoping Plan are also consistent with the reduction targets required by AB 32.

The proposed Project would generate GHG emissions from a variety of sources which would all emit CO_2, CH_4 and N_2O. GHGs could also be indirectly generated by incremental electricity consumption and waste generation from the proposed Project.

As stated previously, the Scoping Plan recommends strategies for implementation at the statewide level to meet the goals of AB 32. The Scoping Plan recommendations serve as

statewide strategies to reduce the state's existing GHG emissions and proposed Project's contributions. Table 4-2: Project Consistency with Scoping Plan Greenhouse Gas Emissions Reduction Strategies, highlights measures that have or will be developed under the Scoping Plan and that would be applicable to the Project. Therefore, the Project will not conflict with or obstruct implementation of AB 32.

TABLE 4-2: PROJECT CONSISTENCY WITH SCOPING PLAN GREENHOUSE GAS EMISSION REDUCTION STRATEGIES

Scoping Plan Measure	Measure Number	Project Consistency
Pavley Motor Vehicle Standards (AB 1493)	T-1	The project's employees and residences would purchase vehicles in compliance with CARB vehicle standards that are in effect at the time of vehicle purchase.
Limit High GWP Use in Consumer Products	H-4	The project's employees and residences would use consumer products that would comply with the regulations that are in effect at the time of manufacture.
Motor Vehicle Air Conditioning Systems – Reduction from Non-Professional Servicing	H-1	The project's employees and residences would be prohibited from performing air conditioning repairs and required to use professional servicing.
Tire Pressure Program	T-4	Motor vehicles driven by the project's employees and residences would maintain proper tire pressure when their vehicles are serviced.
Low Carbon Fuel Standard	T-2	Motor vehicles driven by project's employees and residences would use compliant fuels in the future.
Water Use Efficiency	W-1	The project includes measures to minimize water use and maximize efficiency.
Green Buildings	GB-1	The project will be required to be constructed in compliance with state or local green building standards in effect at the time of building construction.
Air Conditioning Refrigerant Leak Test During Vehicle Smog Check	H-5	Motor vehicles driven by the project's employees and residences would comply with the leak test requirements during smog checks.
Renewable Portfolios Standard (33% by 2020)	E-3	The electricity used by employees and residences in the proposed project will benefit from reduced GHG emissions resulting from increased use of renewable energy sources.
Energy Efficiency Measures (Electricity)	E-1	The project will comply with energy efficiency standards for electrical appliances and other devices at the time of building construction.
Energy Efficiency (Natural Gas)	CR-1	The project will comply with energy efficiency standards for natural gas appliances and other devices at the time of building construction.
Greening New Residential and Commercial Construction	GB-1	The project's buildings would meet green building standards that are in effect at the time of design and construction.
Greening Existing Homes and Commercial Buildings	GB-1	The proposed project's buildings would meet retrofit standards when they become effective.

4.1 REGULATORY REQUIREMENTS

The Project would be required to comply with all mandates imposed by the State of California and the South Coast Air Quality Management District aimed at the reduction of air quality emissions. Those that are applicable to the Project and that would assist in the reduction of greenhouse gas emissions are:

- Global Warming Solutions Act of 2006 (AB32) (40). AB 32 is applicable to the Project because, as a development Project, the Rancho Palma will need to meet 2020 GHG reduction goals set forth

in AB 32. AB 32 requires the California Air Resources Board (CARB or ARB) to develop regulations and market mechanisms to reduce California's greenhouse gas emissions to 1990 levels by the year of 2020. Many of the GHG reduction measures outlined in AB 32 (e.g., Low Carbon Fuel Standard, Advanced Clean Car standards, and Cap-and-Trade) have been adopted over the last five years and implementation activities are ongoing.

- Pavley Fuel Efficiency Standards (AB1493). Establishes fuel efficiency ratings for new vehicles (41). AB 1493 (Pavley) establishes fuel efficiency rating for model year 2009-2016 passenger cars and light trucks. AB 1493 is applicable to the Project because model year 2009-2016 passenger cars and light duty truck vehicles traveling to and from the Project site are required by the State of California to implement GHG emission reduction standards related to fuel efficiency. The CARB anticipates that implementation of the Pavley regulations will reduce GHG emissions from California passenger vehicles by about 30 percent in 2016 compared to emissions that occurred prior to 2009 when AB 1492 was enacted.
- Title 24 California Code of Regulations (California Building Code). Establishes energy efficiency requirements for new construction (42). The Title 24 energy standards address the energy efficiency of new (and altered) homes and commercial buildings. Because energy efficiency reduces energy costs, increases reliability and availability of electricity, improves building occupant comfort, and reduces impacts to the environment, standards are important and necessary for California's energy future. Therefore, a new development such as the Rancho Palma is required to comply with Title 24 Code of Regulations and would therefore increase the Project's energy efficiency and reduce its environmental impact.
- Title 17 California Code of Regulations (Low Carbon Fuel Standard). Requires carbon content of fuel sold in California to be 10% less by 2020 (43). Because the LCFS applies to any transportation fuel that is sold, supplied, or offered for sale in California, and to any person who, as a regulated party, is responsible for a transportation fuel in a calendar year, all vehicles accessing the site will be required to comply with LCFS. Implementation of such a standard will reduce greenhouse gas emissions by reducing the full fuel-cycle, carbon intensity of the transportation fuel pool used in California.
- California Water Conservation in Landscaping Act of 2006 (AB1881). Requires local agencies to adopt the Department of Water Resources updated Water Efficient Landscape Ordinance or equivalent by January 1, 2010 to ensure efficient landscapes in new development and reduced water waste in existing landscapes (44). As new development project within the State of California, the Rancho Palma is required to comply with the City of San Bernardino's adopted water efficient landscape requirements and would therefore be consistent with the requirements of AB1881 in order to help conserve California's water resources and to promote efficient water use.

4.2 CONSTRUCTION AND OPERATIONAL-SOURCE MITIGATION MEASURES

No significant impacts occur, thus no mitigation is required.

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6 CERTIFICATION

The contents of this greenhouse gas study report represent an accurate depiction of the greenhouse gas impacts associated with the proposed Rancho Palma. The information contained in this greenhouse gas report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 217.

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AEP – Association of Environmental Planners
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ASTM – American Society for Testing and Materials

PROFESSIONAL CERTIFICATIONS

Planned Communities and Urban Infill – Urban Land Institute • June, 2011
Indoor Air Quality and Industrial Hygiene – EMSL Analytical • April, 2008
Principles of Ambient Air Monitoring – California Air Resources Board • August, 2007
AB2588 Regulatory Standards – Trinity Consultants • November, 2006
Air Dispersion Modeling – Lakes Environmental • June, 2006

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APPENDIX 3.1:

CALEEMOD EMISSIONS MODEL OUTPUTS

Rancho Palma

San Bernardino-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	500.00	Space	4.50	200,000.00	0
Single Family Housing	120.00	Dwelling Unit	28.40	313,200.00	343
Regional Shopping Center	98.00	1000sqft	4.70	98,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2010
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	630.89	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44. Year 2010 used in absense of year 2008.

Land Use - Total Lot Acreage: 37.6; Average home size is 2,610 SF based on 50% maximum coverage

Construction Phase - Operation run only

Off-road Equipment - Operation run only

Vehicle Trips - Trip Rate based on Traffic Study; Weekend Trip Rates based on ITE Trip Generation Handbook, 9th Edition. Credit for Internal Capture and Pass-By Trips have been taken.

Vechicle Emission Factors -

Vechicle Emission Factors -

Vechicle Emission Factors -

Woodstoves - Gas Stoves Only

Energy Use -

Mobile Land Use Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	50.00	1.00
tblFireplaces	NumberGas	102.00	120.00
tblFireplaces	NumberNoFireplace	12.00	0.00
tblFireplaces	NumberWood	6.00	0.00
tblLandUse	LandUseSquareFeet	216,000.00	313,200.00
tblLandUse	LotAcreage	38.96	28.40
tblLandUse	LotAcreage	2.25	4.70
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	OperationalYear	2014	2010
tblVehicleTrips	DV_TP	35.00	0.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	PR_TP	54.00	66.00
tblVehicleTrips	ST_TR	49.97	46.20
tblVehicleTrips	ST_TR	10.08	5.53
tblVehicleTrips	SU_TR	25.24	23.34
tblVehicleTrips	SU_TR	8.77	4.81
tblVehicleTrips	WD_TR	42.94	63.23
tblVehicleTrips	WD_TR	9.57	5.31
tblWoodstoves	NumberCatalytic	6.00	0.00
tblWoodstoves	NumberNoncatalytic	6.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	**NOx**	**CO**	**SO2**	**Fugitive PM10**	**Exhaust PM10**	**PM10 Total**	**Fugitive PM2.5**	**Exhaust PM2.5**	**PM2.5 Total**	**Bio- CO2**	**NBio-CO2**	**Total CO2**	**CH4**	**N20**	**CO2e**
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.5027	0.0159	1.3256	7.0000e-005		8.5600e-003	8.5600e-003		8.5300e-003	8.5300e-003	0.0000	30.8528	30.8528	3.0700e-003	5.3000e-004	31.0810
Energy	0.0231	0.1979	0.0888	1.2600e-003		0.0159	0.0159		0.0159	0.0159	0.0000	981.6236	981.6236	0.0390	0.0114	985.9613
Mobile	6.6842	17.7326	70.7687	0.0785	5.4787	0.3808	5.8595	1.4647	0.3493	1.8140	0.0000	7,056.5288	7,056.5288	0.4520	0.0000	7,066.0197
Waste						0.0000	0.0000		0.0000	0.0000	49.4344	0.0000	49.4344	2.9215	0.0000	110.7857
Water						0.0000	0.0000		0.0000	0.0000	4.7834	85.9980	90.7814	0.4953	0.0124	105.0315
Total	**9.2100**	**17.9463**	**72.1832**	**0.0798**	**5.4787**	**0.4053**	**5.8840**	**1.4647**	**0.3738**	**1.8385**	**54.2178**	**8,155.0032**	**8,209.2210**	**3.9108**	**0.0243**	**8,298.8791**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.5027	0.0159	1.3256	7.0000e-005		8.5600e-003	8.5600e-003		8.5300e-003	8.5300e-003	0.0000	30.8528	30.8528	3.0700e-003	5.3000e-004	31.0810
Energy	0.0231	0.1979	0.0888	1.2600e-003		0.0159	0.0159		0.0159	0.0159	0.0000	981.6236	981.6236	0.0390	0.0114	985.9613
Mobile	6.6842	17.7326	70.7687	0.0785	5.4787	0.3808	5.8595	1.4647	0.3493	1.8140	0.0000	7,056.5288	7,056.5288	0.4520	0.0000	7,066.0197
Waste						0.0000	0.0000		0.0000	0.0000	49.4344	0.0000	49.4344	2.9215	0.0000	110.7857
Water						0.0000	0.0000		0.0000	0.0000	4.7834	85.9980	90.7814	0.4952	0.0124	105.0239
Total	**9.2100**	**17.9463**	**72.1832**	**0.0798**	**5.4787**	**0.4053**	**5.8840**	**1.4647**	**0.3738**	**1.8385**	**54.2178**	**8,155.0032**	**8,209.2210**	**3.9107**	**0.0243**	**8,298.8715**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.08**	**0.00**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	162	0.38
Demolition	Rubber Tired Dozers	0	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	6.6842	17.7326	70.7687	0.0785	5.4787	0.3808	5.8595	1.4647	0.3493	1.8140	0.0000	7,056.5288	7,056.5288	0.4520	0.0000	7,066.0197
Unmitigated	6.6842	17.7326	70.7687	0.0785	5.4787	0.3808	5.8595	1.4647	0.3493	1.8140	0.0000	7,056.5288	7,056.5288	0.4520	0.0000	7,066.0197

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	6,196.54	4,527.60	2287.32	12,327,577	12,327,577
Single Family Housing	637.20	663.60	577.20	2,161,007	2,161,007
Total	6,833.74	5,191.20	2,864.52	14,488,584	14,488,584

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	66	0	34
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.486544	0.064021	0.169147	0.160108	0.054635	0.009206	0.014429	0.031168	0.001207	0.001399	0.004490	0.000757	0.002888

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	753.2590	753.2590	0.0346	7.1600e-003	756.2069
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	753.2590	753.2590	0.0346	7.1600e-003	756.2069
NaturalGas Mitigated	0.0231	0.1979	0.0888	1.2600e-003		0.0159	0.0159		0.0159	0.0159	0.0000	228.3646	228.3646	4.3800e-003	4.1900e-003	229.7544
NaturalGas Unmitigated	0.0231	0.1979	0.0888	1.2600e-003		0.0159	0.0159		0.0159	0.0159	0.0000	228.3646	228.3646	4.3800e-003	4.1900e-003	229.7544

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	4.05203e+006	0.0219	0.1867	0.0795	1.1900e-003		0.0151	0.0151		0.0151	0.0151	0.0000	216.2318	216.2318	4.1400e-003	3.9600e-003	217.5477
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	227360	1.2300e-003	0.0112	9.3600e-003	7.0000e-005		8.5000e-004	8.5000e-004		8.5000e-004	8.5000e-004	0.0000	12.1328	12.1328	2.3000e-004	2.2000e-004	12.2066
Total		**0.0231**	**0.1979**	**0.0888**	**1.2600e-003**		**0.0160**	**0.0160**		**0.0160**	**0.0160**	**0.0000**	**228.3646**	**228.3646**	**4.3700e-003**	**4.1800e-003**	**229.7544**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	4.05203e+006	0.0219	0.1867	0.0795	1.1900e-003		0.0151	0.0151		0.0151	0.0151	0.0000	216.2318	216.2318	4.1400e-003	3.9600e-003	217.5477
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	227360	1.2300e-003	0.0112	9.3600e-003	7.0000e-005		8.5000e-004	8.5000e-004		8.5000e-004	8.5000e-004	0.0000	12.1328	12.1328	2.3000e-004	2.2000e-004	12.2066
Total		**0.0231**	**0.1979**	**0.0888**	**1.2600e-003**		**0.0160**	**0.0160**		**0.0160**	**0.0160**	**0.0000**	**228.3646**	**228.3646**	**4.3700e-003**	**4.1800e-003**	**229.7544**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Parking Lot	176000	50.3654	2.3200e-003	4.8000e-004	50.5625
Regional Shopping Center	1.53468e+006	439.1746	0.0202	4.1800e-003	440.8933
Single Family Housing	921557	263.7190	0.0121	2.5100e-003	264.7511
Total		**753.2590**	**0.0346**	**7.1700e-003**	**756.2069**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Parking Lot	176000	50.3654	2.3200e-003	4.8000e-004	50.5625
Regional Shopping Center	1.53468e+006	439.1746	0.0202	4.1800e-003	440.8933
Single Family Housing	921557	263.7190	0.0121	2.5100e-003	264.7511
Total		**753.2590**	**0.0346**	**7.1700e-003**	**756.2069**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.5027	0.0159	1.3256	7.0000e-005		8.5600e-003	8.5600e-003		8.5300e-003	8.5300e-003	0.0000	30.8528	30.8528	3.0700e-003	5.3000e-004	31.0810
Unmitigated	2.5027	0.0159	1.3256	7.0000e-005		8.5600e-003	8.5600e-003		8.5300e-003	8.5300e-003	0.0000	30.8528	30.8528	3.0700e-003	5.3000e-004	31.0810

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2430					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.2086					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	2.9100e-003	0.0000	1.6000e-004	0.0000		2.0100e-003	2.0100e-003		1.9900e-003	1.9900e-003	0.0000	28.8165	28.8165	5.5000e-004	5.3000e-004	28.9918
Landscaping	0.0482	0.0159	1.3255	7.0000e-005		6.5400e-003	6.5400e-003		6.5400e-003	6.5400e-003	0.0000	2.0363	2.0363	2.5200e-003	0.0000	2.0891
Total	**2.5027**	**0.0159**	**1.3256**	**7.0000e-005**		**8.5500e-003**	**8.5500e-003**		**8.5300e-003**	**8.5300e-003**	**0.0000**	**30.8528**	**30.8528**	**3.0700e-003**	**5.3000e-004**	**31.0810**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2430					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.2086					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	2.9100e-003	0.0000	1.6000e-004	0.0000		2.0100e-003	2.0100e-003		1.9900e-003	1.9900e-003	0.0000	28.8165	28.8165	5.5000e-004	5.3000e-004	28.9918
Landscaping	0.0482	0.0159	1.3255	7.0000e-005		6.5400e-003	6.5400e-003		6.5400e-003	6.5400e-003	0.0000	2.0363	2.0363	2.5200e-003	0.0000	2.0891
Total	**2.5027**	**0.0159**	**1.3256**	**7.0000e-005**		**8.5500e-003**	**8.5500e-003**		**8.5300e-003**	**8.5300e-003**	**0.0000**	**30.8528**	**30.8528**	**3.0700e-003**	**5.3000e-004**	**31.0810**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	90.7814	0.4952	0.0124	105.0239
Unmitigated	90.7814	0.4953	0.0124	105.0315

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	7.25911 / 4.44913	43.4969	0.2384	5.9800e-003	50.3568
Single Family Housing	7.81848 / 4.92904	47.2845	0.2568	6.4400e-003	54.6747
Total		**90.7814**	**0.4953**	**0.0124**	**105.0315**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	7.25911 / 4.44913	43.4969	0.2384	5.9700e-003	50.3531
Single Family Housing	7.81848 / 4.92904	47.2845	0.2568	6.4300e-003	54.6708
Total		**90.7814**	**0.4952**	**0.0124**	**105.0239**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Unmitigated	49.4344	2.9215	0.0000	110.7857
Mitigated	49.4344	2.9215	0.0000	110.7857

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	102.9	20.8878	1.2344	0.0000	46.8108
Single Family Housing	140.63	28.5466	1.6871	0.0000	63.9748
Total		**49.4344**	**2.9215**	**0.0000**	**110.7857**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	102.9	20.8878	1.2344	0.0000	46.8108
Single Family Housing	140.63	28.5466	1.6871	0.0000	63.9748
Total		**49.4344**	**2.9215**	**0.0000**	**110.7857**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Rancho Palma 2020

San Bernardino-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	500.00	Space	4.50	200,000.00	0
Single Family Housing	120.00	Dwelling Unit	28.40	313,200.00	343
Regional Shopping Center	98.00	1000sqft	4.70	98,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2020
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	466.9067	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - CPUC GHG Calculator version 3c, worksheet tab "CO2 Allocations," cells AH/AQ 35-44.

Land Use - Total Lot Acreage: 37.6; Average home size is 2,610 SF based on 50% maximum coverage

Construction Phase - Operation run only

Off-road Equipment - Operation run only

Vehicle Trips - Trip Rate based on Traffic Study; Weekend Trip Rates based on ITE Trip Generation Handbook, 9th Edition. Credit for Internal Capture and Pass-By Trips have been taken.

Woodstoves - Gas Stoves Only

Energy Use - Title-24 Energy Intensity for Electricity & Natural Gas were adjusted by 21.8% & 16.8% respectively, for Non-Residential, and by 36.4% & 6.5%, respectively, for Residential. Impact Analysis California's 2013 Building Energy Efficiency Standards (CEC).

Mobile Land Use Mitigation -

Vechicle Emission Factors -

Vechicle Emission Factors -

Vechicle Emission Factors -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	50.00	1.00
tblEnergyUse	T24E	5.60	4.38
tblEnergyUse	T24E	980.99	623.91
tblEnergyUse	T24NG	2.02	1.68
tblEnergyUse	T24NG	27,816.78	26,008.69
tblFireplaces	NumberGas	102.00	120.00
tblFireplaces	NumberNoFireplace	12.00	0.00
tblFireplaces	NumberWood	6.00	0.00
tblLandUse	LandUseSquareFeet	216,000.00	313,200.00
tblLandUse	LotAcreage	38.96	28.40
tblLandUse	LotAcreage	2.25	4.70
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	1.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	3.00	0.00
tblOffRoadEquipment	OffRoadEquipmentUnitAmount	2.00	0.00
tblProjectCharacteristics	CO2IntensityFactor	630.89	466.9067
tblProjectCharacteristics	OperationalYear	2014	2020
tblVehicleTrips	DV_TP	35.00	0.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	PR_TP	54.00	66.00
tblVehicleTrips	ST_TR	49.97	46.20
tblVehicleTrips	ST_TR	10.08	5.53
tblVehicleTrips	SU_TR	25.24	23.34
tblVehicleTrips	SU_TR	8.77	4.81
tblVehicleTrips	WD_TR	42.94	63.23
tblVehicleTrips	WD_TR	9.57	5.31
tblWoodstoves	NumberCatalytic	6.00	0.00
tblWoodstoves	NumberNoncatalytic	6.00	0.00

2.0 Emissions Summary

2.1 Overall Construction

Unmitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Year	tons/yr										MT/yr					
2016	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**

2.2 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.4930	0.0144	1.2495	7.0000e-005		8.8700e-003	8.8700e-003		8.8500e-003	8.8500e-003	0.0000	30.8528	30.8528	2.5600e-003	5.3000e-004	31.0704
Energy	0.0217	0.1862	0.0832	1.1900e-003		0.0150	0.0150		0.0150	0.0150	0.0000	738.0812	738.0812	0.0366	0.0107	742.1558
Mobile	2.8846	8.1511	30.8718	0.0813	5.4888	0.1211	5.6099	1.4682	0.1117	1.5798	0.0000	5,736.1177	5,736.1177	0.1975	0.0000	5,740.2643
Waste						0.0000	0.0000		0.0000	0.0000	49.4344	0.0000	49.4344	2.9215	0.0000	110.7857
Water						0.0000	0.0000		0.0000	0.0000	4.7834	63.6451	68.4285	0.4953	0.0124	82.6786
Total	**5.3993**	**8.3518**	**32.2045**	**0.0826**	**5.4888**	**0.1450**	**5.6338**	**1.4682**	**0.1355**	**1.6037**	**54.2178**	**6,568.6967**	**6,622.9145**	**3.6534**	**0.0236**	**6,706.9547**

2.2 Overall Operational

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area	2.4930	0.0144	1.2495	7.0000e-005		8.8700e-003	8.8700e-003		8.8500e-003	8.8500e-003	0.0000	30.8528	30.8528	2.5600e-003	5.3000e-004	31.0704
Energy	0.0217	0.1862	0.0832	1.1900e-003		0.0150	0.0150		0.0150	0.0150	0.0000	738.0812	738.0812	0.0366	0.0107	742.1558
Mobile	2.7310	6.8352	27.0576	0.0656	4.3855	0.0987	4.4842	1.1731	0.0910	1.2640	0.0000	4,625.8791	4,625.8791	0.1622	0.0000	4,629.2859
Waste						0.0000	0.0000		0.0000	0.0000	49.4344	0.0000	49.4344	2.9215	0.0000	110.7857
Water						0.0000	0.0000		0.0000	0.0000	4.7834	63.6451	68.4285	0.4952	0.0124	82.6710
Total	**5.2457**	**7.0359**	**28.3903**	**0.0669**	**4.3855**	**0.1225**	**4.5081**	**1.1731**	**0.1148**	**1.2879**	**54.2178**	**5,458.4581**	**5,512.6760**	**3.6181**	**0.0236**	**5,595.9687**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**2.84**	**15.76**	**11.84**	**19.05**	**20.10**	**15.49**	**19.98**	**20.10**	**15.27**	**19.69**	**0.00**	**16.90**	**16.76**	**0.97**	**0.08**	**16.56**

3.0 Construction Detail

Construction Phase

Phase Number	Phase Name	Phase Type	Start Date	End Date	Num Days Week	Num Days	Phase Description
1	Demolition	Demolition	1/1/2016	1/1/2016	5	1	

Acres of Grading (Site Preparation Phase): 0

Acres of Grading (Grading Phase): 0

Acres of Paving: 0

Residential Indoor: 0; Residential Outdoor: 0; Non-Residential Indoor: 0; Non-Residential Outdoor: 0 (Architectural Coating – sqft)

OffRoad Equipment

Phase Name	Offroad Equipment Type	Amount	Usage Hours	Horse Power	Load Factor
Demolition	Concrete/Industrial Saws	0	8.00	81	0.73
Demolition	Excavators	0	8.00	162	0.38
Demolition	Rubber Tired Dozers	0	8.00	255	0.40

Trips and VMT

Phase Name	Offroad Equipment Count	Worker Trip Number	Vendor Trip Number	Hauling Trip Number	Worker Trip Length	Vendor Trip Length	Hauling Trip Length	Worker Vehicle Class	Vendor Vehicle Class	Hauling Vehicle Class
Demolition	0	0.00	0.00	0.00	14.70	6.90	20.00	LD_Mix	HDT_Mix	HHDT

3.1 Mitigation Measures Construction

3.2 Demolition - 2016

Unmitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Unmitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

3.2 Demolition - 2016

Mitigated Construction On-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Off-Road	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**		**0.0000**	**0.0000**		**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

Mitigated Construction Off-Site

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Hauling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Vendor	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Worker	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**	**0.0000**

4.0 Operational Detail - Mobile

4.1 Mitigation Measures Mobile

Increase Diversity

Improve Pedestrian Network

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.7310	6.8352	27.0576	0.0656	4.3855	0.0987	4.4842	1.1731	0.0910	1.2640	0.0000	4,625.8791	4,625.8791	0.1622	0.0000	4,629.2859
Unmitigated	2.8846	8.1511	30.8718	0.0813	5.4888	0.1211	5.6099	1.4682	0.1117	1.5798	0.0000	5,736.1177	5,736.1177	0.1975	0.0000	5,740.2643

4.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	6,196.54	4,527.60	2287.32	12,327,577	9,849,740
Single Family Housing	637.20	663.60	577.20	2,161,007	1,726,646
Total	6,833.74	5,191.20	2,864.52	14,488,584	11,576,385

4.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	66	0	34
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.468914	0.065172	0.173428	0.156844	0.056897	0.009079	0.016419	0.042157	0.001108	0.001337	0.005012	0.000672	0.002962

5.0 Energy Detail

4.4 Fleet Mix

Historical Energy Use: N

5.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated						0.0000	0.0000		0.0000	0.0000	0.0000	523.0731	523.0731	0.0325	6.7200e-003	525.8391
Electricity Unmitigated						0.0000	0.0000		0.0000	0.0000	0.0000	523.0731	523.0731	0.0325	6.7200e-003	525.8391
NaturalGas Mitigated	0.0217	0.1862	0.0832	1.1900e-003		0.0150	0.0150		0.0150	0.0150	0.0000	215.0081	215.0081	4.1200e-003	3.9400e-003	216.3166
NaturalGas Unmitigated	0.0217	0.1862	0.0832	1.1900e-003		0.0150	0.0150		0.0150	0.0150	0.0000	215.0081	215.0081	4.1200e-003	3.9400e-003	216.3166

5.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	3.83506e+006	0.0207	0.1767	0.0752	1.1300e-003		0.0143	0.0143		0.0143	0.0143	0.0000	204.6534	204.6534	3.9200e-003	3.7500e-003	205.8989
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	194040	1.0500e-003	9.5100e-003	7.9900e-003	6.0000e-005		7.2000e-004	7.2000e-004		7.2000e-004	7.2000e-004	0.0000	10.3547	10.3547	2.0000e-004	1.9000e-004	10.4177
Total		**0.0217**	**0.1862**	**0.0832**	**1.1900e-003**		**0.0150**	**0.0150**		**0.0150**	**0.0150**	**0.0000**	**215.0081**	**215.0081**	**4.1200e-003**	**3.9400e-003**	**216.3166**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Single Family Housing	3.83506e+006	0.0207	0.1767	0.0752	1.1300e-003		0.0143	0.0143		0.0143	0.0143	0.0000	204.6534	204.6534	3.9200e-003	3.7500e-003	205.8989
Parking Lot	0	0.0000	0.0000	0.0000	0.0000		0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	194040	1.0500e-003	9.5100e-003	7.9900e-003	6.0000e-005		7.2000e-004	7.2000e-004		7.2000e-004	7.2000e-004	0.0000	10.3547	10.3547	2.0000e-004	1.9000e-004	10.4177
Total		**0.0217**	**0.1862**	**0.0832**	**1.1900e-003**		**0.0150**	**0.0150**		**0.0150**	**0.0150**	**0.0000**	**215.0081**	**215.0081**	**4.1200e-003**	**3.9400e-003**	**216.3166**

5.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Parking Lot	176000	37.2742	2.3200e-003	4.8000e-004	37.4713
Regional Shopping Center	1.41512e+006	299.7016	0.0186	3.8500e-003	301.2865
Single Family Housing	878707	186.0973	0.0116	2.3900e-003	187.0814
Total		**523.0731**	**0.0325**	**6.7200e-003**	**525.8391**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Parking Lot	176000	37.2742	2.3200e-003	4.8000e-004	37.4713
Regional Shopping Center	1.41512e+006	299.7016	0.0186	3.8500e-003	301.2865
Single Family Housing	878707	186.0973	0.0116	2.3900e-003	187.0814
Total		**523.0731**	**0.0325**	**6.7200e-003**	**525.8391**

6.0 Area Detail

6.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated	2.4930	0.0144	1.2495	7.0000e-005		8.8700e-003	8.8700e-003		8.8500e-003	8.8500e-003	0.0000	30.8528	30.8528	2.5600e-003	5.3000e-004	31.0704
Unmitigated	2.4930	0.0144	1.2495	7.0000e-005		8.8700e-003	8.8700e-003		8.8500e-003	8.8500e-003	0.0000	30.8528	30.8528	2.5600e-003	5.3000e-004	31.0704

6.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2430					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.2086					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	2.9100e-003	0.0000	1.6000e-004	0.0000		2.0100e-003	2.0100e-003		1.9900e-003	1.9900e-003	0.0000	28.8165	28.8165	5.5000e-004	5.3000e-004	28.9918
Landscaping	0.0385	0.0144	1.2493	7.0000e-005		6.8500e-003	6.8500e-003		6.8500e-003	6.8500e-003	0.0000	2.0363	2.0363	2.0100e-003	0.0000	2.0785
Total	**2.4930**	**0.0144**	**1.2495**	**7.0000e-005**		**8.8600e-003**	**8.8600e-003**		**8.8400e-003**	**8.8400e-003**	**0.0000**	**30.8528**	**30.8528**	**2.5600e-003**	**5.3000e-004**	**31.0704**

6.2 Area by SubCategory

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating	0.2430					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products	2.2086					0.0000	0.0000		0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hearth	2.9100e-003	0.0000	1.6000e-004	0.0000		2.0100e-003	2.0100e-003		1.9900e-003	1.9900e-003	0.0000	28.8165	28.8165	5.5000e-004	5.3000e-004	28.9918
Landscaping	0.0385	0.0144	1.2493	7.0000e-005		6.8500e-003	6.8500e-003		6.8500e-003	6.8500e-003	0.0000	2.0363	2.0363	2.0100e-003	0.0000	2.0785
Total	**2.4930**	**0.0144**	**1.2495**	**7.0000e-005**		**8.8600e-003**	**8.8600e-003**		**8.8400e-003**	**8.8400e-003**	**0.0000**	**30.8528**	**30.8528**	**2.5600e-003**	**5.3000e-004**	**31.0704**

7.0 Water Detail

7.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	68.4285	0.4952	0.0124	82.6710
Unmitigated	68.4285	0.4953	0.0124	82.6786

7.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	7.25911 / 4.44913	32.7896	0.2384	5.9800e-003	39.6495
Single Family Housing	7.81848 / 4.92904	35.6389	0.2568	6.4400e-003	43.0291
Total		**68.4285**	**0.4953**	**0.0124**	**82.6786**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	7.25911 / 4.44913	32.7896	0.2384	5.9700e-003	39.6459
Single Family Housing	7.81848 / 4.92904	35.6389	0.2568	6.4300e-003	43.0251
Total		**68.4285**	**0.4952**	**0.0124**	**82.6710**

8.0 Waste Detail

8.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Unmitigated	49.4344	2.9215	0.0000	110.7857
Mitigated	49.4344	2.9215	0.0000	110.7857

8.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	102.9	20.8878	1.2344	0.0000	46.8108
Single Family Housing	140.63	28.5466	1.6871	0.0000	63.9748
Total		**49.4344**	**2.9215**	**0.0000**	**110.7857**

8.2 Waste by Land Use

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	102.9	20.8878	1.2344	0.0000	46.8108
Single Family Housing	140.63	28.5466	1.6871	0.0000	63.9748
Total		**49.4344**	**2.9215**	**0.0000**	**110.7857**

9.0 Operational Offroad

Equipment Type	Number	Hours/Day	Days/Year	Horse Power	Load Factor	Fuel Type

10.0 Vegetation

Rancho Palma 2035

San Bernardino-South Coast County, Annual

1.0 Project Characteristics

1.1 Land Usage

Land Uses	Size	Metric	Lot Acreage	Floor Surface Area	Population
Parking Lot	500.00	Space	4.50	200,000.00	0
Single Family Housing	120.00	Dwelling Unit	28.40	313,200.00	343
Regional Shopping Center	98.00	1000sqft	4.70	98,000.00	0

1.2 Other Project Characteristics

Urbanization	Urban	**Wind Speed (m/s)**	2.2	**Precipitation Freq (Days)**	32
Climate Zone	10			**Operational Year**	2035
Utility Company	Southern California Edison				
CO2 Intensity (lb/MWhr)	375.52	**CH4 Intensity (lb/MWhr)**	0.029	**N2O Intensity (lb/MWhr)**	0.006

1.3 User Entered Comments & Non-Default Data

Project Characteristics - SCE's CO2 Intensity Factor based on its mandated 2030 renewable energy mix

Land Use - Total Lot Acreage: 37.6; Average home size is 2,610 SF based on 50% maximum coverage

Construction Phase - Operation run only

Vehicle Trips - Trip Rate based on Traffic Study; Weekend Trip Rates based on ITE Trip Generation handbook, 9th Edition. Credit for Internal Capture and Pass-By Trips have been taken.

Woodstoves - Gas hearths only

Energy Use - Title 24 Energy Intensity for Electricity & Natural Gas were adjusted by 21.8% & 16.8% respectively, for Nonresidential; and by 36.4% & 6.5% for residential, respectively.

Mobile Land Use Mitigation -

Table Name	Column Name	Default Value	New Value
tblConstructionPhase	NumDays	50.00	10.00
tblEnergyUse	T24E	5.60	4.38
tblEnergyUse	T24E	980.99	623.91
tblEnergyUse	T24NG	2.02	1.68
tblEnergyUse	T24NG	27,816.78	26,008.69
tblFireplaces	FireplaceWoodMass	1,019.20	0.00
tblFireplaces	NumberGas	102.00	120.00
tblFireplaces	NumberNoFireplace	12.00	0.00
tblFireplaces	NumberWood	6.00	0.00
tblLandUse	LandUseSquareFeet	216,000.00	313,200.00
tblLandUse	LotAcreage	38.96	28.40
tblLandUse	LotAcreage	2.25	4.70
tblProjectCharacteristics	CO2IntensityFactor	630.89	375.52
tblProjectCharacteristics	OperationalYear	2014	2035
tblVehicleTrips	DV_TP	35.00	0.00
tblVehicleTrips	PB_TP	11.00	34.00
tblVehicleTrips	PR_TP	54.00	66.00
tblVehicleTrips	ST_TR	49.97	46.20
tblVehicleTrips	ST_TR	10.08	5.53
tblVehicleTrips	SU_TR	25.24	23.34
tblVehicleTrips	SU_TR	8.77	4.81
tblVehicleTrips	WD_TR	42.94	63.23
tblVehicleTrips	WD_TR	9.57	5.31
tblWoodstoves	NumberCatalytic	6.00	0.00
tblWoodstoves	NumberNoncatalytic	6.00	0.00
tblWoodstoves	WoodstoveWoodMass	999.60	0.00

2.0 Emissions Summary

2.1 Overall Operational

Unmitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area												30.8528	30.8528	2.5100e-003	5.3000e-004	31.0694
Energy												635.7012	635.7012	0.0366	0.0107	639.7757
Mobile												5,599.9468	5,599.9468	0.1426	0.0000	5,602.9407
Waste												0.0000	49.4344	2.9215	0.0000	110.7857
Water												51.1879	55.9714	0.4953	0.0124	70.2215
Total												**6,317.6887**	**6,371.9065**	**3.5984**	**0.0236**	**6,454.7929**

Mitigated Operational

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Area												30.8528	30.8528	2.5100e-003	5.3000e-004	31.0694
Energy												635.7012	635.7012	0.0366	0.0107	639.7757
Mobile												4,515.8243	4,515.8243	0.1164	0.0000	4,518.2687
Waste												0.0000	49.4344	2.9215	0.0000	110.7857
Water												51.1879	55.9714	0.4952	0.0124	70.2139
Total												**5,233.5662**	**5,287.7840**	**3.5722**	**0.0236**	**5,370.1132**

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio-CO2	Total CO2	CH4	N20	CO2e
Percent Reduction	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**0.00**	**17.16**	**17.01**	**0.73**	**0.08**	**16.80**

3.0 Operational Detail - Mobile

3.1 Mitigation Measures Mobile

Increase Diversity

Improve Pedestrian Network

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated												4,515.8243	4,515.8243	0.1164	0.0000	4,518.2687
Unmitigated												5,599.9468	5,599.9468	0.1426	0.0000	5,602.9407

3.2 Trip Summary Information

	Average Daily Trip Rate			Unmitigated	Mitigated
Land Use	Weekday	Saturday	Sunday	Annual VMT	Annual VMT
Parking Lot	0.00	0.00	0.00		
Regional Shopping Center	6,196.54	4,527.60	2287.32	12,327,577	9,849,740
Single Family Housing	637.20	663.60	577.20	2,161,007	1,726,646
Total	6,833.74	5,191.20	2,864.52	14,488,584	11,576,385

3.3 Trip Type Information

	Miles			Trip %			Trip Purpose %		
Land Use	H-W or C-W	H-S or C-C	H-O or C-NW	H-W or C-W	H-S or C-C	H-O or C-NW	Primary	Diverted	Pass-by
Parking Lot	16.60	8.40	6.90	0.00	0.00	0.00	0	0	0
Regional Shopping Center	16.60	8.40	6.90	16.30	64.70	19.00	66	0	34
Single Family Housing	14.70	5.90	8.70	40.20	19.20	40.60	86	11	3

LDA	LDT1	LDT2	MDV	LHD1	LHD2	MHD	HHD	OBUS	UBUS	MCY	SBUS	MH
0.445160	0.068315	0.180257	0.161061	0.057208	0.009197	0.016142	0.050774	0.001074	0.001468	0.004084	0.000577	0.004683

4.0 Energy Detail

Historical Energy Use: N

4.1 Mitigation Measures Energy

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Electricity Mitigated												420.6931	420.6931	0.0325	6.7200e-003	423.4591
Electricity Unmitigated												420.6931	420.6931	0.0325	6.7200e-003	423.4591
NaturalGas Mitigated												215.0081	215.0081	4.1200e-003	3.9400e-003	216.3166
NaturalGas Unmitigated												215.0081	215.0081	4.1200e-003	3.9400e-003	216.3166

4.2 Energy by Land Use - NaturalGas

Unmitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Parking Lot	0												0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	194040												10.3547	10.3547	2.0000e-004	1.9000e-004	10.4177
Single Family Housing	3.83506e+006												204.6534	204.6534	3.9200e-003	3.7500e-003	205.8989
Total													**215.0081**	**215.0081**	**4.1200e-003**	**3.9400e-003**	**216.3166**

Mitigated

	NaturalGas Use	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Land Use	kBTU/yr	tons/yr										MT/yr					
Parking Lot	0												0.0000	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	194040												10.3547	10.3547	2.0000e-004	1.9000e-004	10.4177
Single Family Housing	3.83506e+006												204.6534	204.6534	3.9200e-003	3.7500e-003	205.8989
Total													**215.0081**	**215.0081**	**4.1200e-003**	**3.9400e-003**	**216.3166**

4.3 Energy by Land Use - Electricity

Unmitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Parking Lot	176000	29.9786	2.3200e-003	4.8000e-004	30.1757
Regional Shopping Center	1.41512e+006	241.0416	0.0186	3.8500e-003	242.6265
Single Family Housing	878707	149.6728	0.0116	2.3900e-003	150.6569
Total		**420.6931**	**0.0325**	**6.7200e-003**	**423.4591**

Mitigated

	Electricity Use	Total CO2	CH4	N2O	CO2e
Land Use	kWh/yr	MT/yr			
Parking Lot	176000	29.9786	2.3200e-003	4.8000e-004	30.1757
Regional Shopping Center	1.41512e+006	241.0416	0.0186	3.8500e-003	242.6265
Single Family Housing	878707	149.6728	0.0116	2.3900e-003	150.6569
Total		**420.6931**	**0.0325**	**6.7200e-003**	**423.4591**

5.0 Area Detail

5.1 Mitigation Measures Area

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
Category	tons/yr										MT/yr					
Mitigated												30.8528	30.8528	2.5100e-003	5.3000e-004	31.0694
Unmitigated												30.8528	30.8528	2.5100e-003	5.3000e-004	31.0694

5.2 Area by SubCategory

Unmitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating												0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products												0.0000	0.0000	0.0000	0.0000	0.0000
Hearth												28.8165	28.8165	5.5000e-004	5.3000e-004	28.9918
Landscaping												2.0363	2.0363	1.9600e-003	0.0000	2.0775
Total												**30.8528**	**30.8528**	**2.5100e-003**	**5.3000e-004**	**31.0694**

Mitigated

	ROG	NOx	CO	SO2	Fugitive PM10	Exhaust PM10	PM10 Total	Fugitive PM2.5	Exhaust PM2.5	PM2.5 Total	Bio- CO2	NBio- CO2	Total CO2	CH4	N2O	CO2e
SubCategory	tons/yr										MT/yr					
Architectural Coating												0.0000	0.0000	0.0000	0.0000	0.0000
Consumer Products												0.0000	0.0000	0.0000	0.0000	0.0000
Hearth												28.8165	28.8165	5.5000e-004	5.3000e-004	28.9918
Landscaping												2.0363	2.0363	1.9600e-003	0.0000	2.0775
Total												**30.8528**	**30.8528**	**2.5100e-003**	**5.3000e-004**	**31.0694**

6.0 Water Detail

6.1 Mitigation Measures Water

	Total CO2	CH4	N2O	CO2e
Category	MT/yr			
Mitigated	55.9714	0.4952	0.0124	70.2139
Unmitigated	55.9714	0.4953	0.0124	70.2215

6.2 Water by Land Use

Unmitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	7.25911 / 4.44913	26.8225	0.2384	5.9800e-003	33.6825
Single Family Housing	7.81848 / 4.92904	29.1488	0.2568	6.4400e-003	36.5391
Total		**55.9714**	**0.4953**	**0.0124**	**70.2215**

Mitigated

	Indoor/Outdoor Use	Total CO2	CH4	N2O	CO2e
Land Use	Mgal	MT/yr			
Parking Lot	0 / 0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	7.25911 / 4.44913	26.8225	0.2384	5.9700e-003	33.6788
Single Family Housing	7.81848 / 4.92904	29.1488	0.2568	6.4300e-003	36.5351
Total		**55.9714**	**0.4952**	**0.0124**	**70.2139**

7.0 Waste Detail

7.1 Mitigation Measures Waste

Category/Year

	Total CO2	CH4	N2O	CO2e
	MT/yr			
Unmitigated	49.4344	2.9215	0.0000	110.7857
Mitigated	49.4344	2.9215	0.0000	110.7857

7.2 Waste by Land Use

Unmitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	102.9	20.8878	1.2344	0.0000	46.8108
Single Family Housing	140.63	28.5466	1.6871	0.0000	63.9748
Total		**49.4344**	**2.9215**	**0.0000**	**110.7857**

Mitigated

	Waste Disposed	Total CO2	CH4	N2O	CO2e
Land Use	tons	MT/yr			
Parking Lot	0	0.0000	0.0000	0.0000	0.0000
Regional Shopping Center	102.9	20.8878	1.2344	0.0000	46.8108
Single Family Housing	140.63	28.5466	1.6871	0.0000	63.9748
Total		**49.4344**	**2.9215**	**0.0000**	**110.7857**

3.8-1 WATER QUALITY MANAGEMENT PLAN

Water Quality Management Plan

For:

Rancho Palma

TTM No. 20006

Prepared for:

STRATA PALMA, LLC.

4370 LA JOLLA VILLAGE DRIVE, SUITE 960

SAN DIEGO, CA 92122

(858) 546-0900

Prepared by:

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Fontana, CA 92335

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Approval Date:_____

Design Review No.

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for STRATA PALMA, LLC. by Allard Engineering. The WQMP is intended to comply with the requirements of the County of San Bernardino and the NPDES Area wide Storm water Program requiring the preparation of a WQMP. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

Project Data			
Permit/Application Number(s):	Design Review No.	Grading Permit Number(s):	
Tract/Parcel Map Number(s):	TTM 20006	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			

Owner's Signature			
Owner Name: Eric Flodine			
Title	Director of Community Development		
Company	STRATA PALMA, LLC		
Address	4370 LA JOLLA VILLAGE DRIVE, SUITE 960, SAN DIEGO, CA 92122		
Email	ericf@strataequity.com		
Telephone #	(858) 546-0900		
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):	Design Review No.	Grading Permit Number(s):	
Tract/Parcel Map Number(s):	TTM No. 20006	Building Permit Number(s):	
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			

"The selection, sizing and design of storm water treatment and other storm water quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of Regional Water Quality Control Board Order No. R8-2010-0036."

Engineer: RAYMOND ALLARD		PE Stamp Below
Title	PRINCIPAL	
Company	Allard Engineering	
Address	16866 Seville Avenue	
Email	rallard@allardeng.com	
Telephone #	909-356-1815	
Signature		
Date		

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Section 1 Discretionary Permit(s)

Form 1-1 Project Information					
Project Name	Rancho Palma				
Project Owner Contact Name:	Strata Palma, LLC. , Eric Flodine				
Mailing Address:	4370 La Jolla Village Drive, Suite 960 San Diego, Ca. 92122	E-mail Address:		Telephone:	(858) 546-0900
Permit/Application Number(s):	Design Review	Tract/Parcel Map Number(s):	TTM 20006		
Additional Information/ Comments:	N/A				
Description of Project:	This project is a proposed mix residential and commercial development located north of Freeway 215 The site lays north of Little League Drive, south of Cable Creek Channel, East of Magnolia Avenue and east of Palm avenue in the City of San Bernardino, California. The development will create 120 single family dwellings, landscape areas and RV parking area with a total of 28.3 Ac on the west side of the site (DA1) and a commercial site including Retail space, parking spaces, circulation areas and landscape areas. The commercial site will be located at the east side of the site with a total of 9.3 Ac (DA2) DA1 residential areas. 100% of the runoff will be conveyed to the south east corner of the project into the proposed infiltration basin IB#1. DA2 commercial areas. 100% of the runoff will be conveyed to the southern portion of the site infiltration basin IB#2. Currently commercial and residential developments are established south of the site. A soils report is attached to the present report. No pre-existing onsite contamination has been identified.				

Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.	**Receiving waters** **DA1, and DA2, will be discharched into a proposed pipe system underneath Little Legue Drive the flows will be conveyed east to the intersection of Palm Avenue and Little League Drive where the flows will be discharged into Cable Creek.**

Section 2 Project Description

2.1 Project Information

This section of the WQMP should provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein. The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

Form 2.1-1 Description of Proposed Project

1 Development Category (Select all that apply):

☐ Significant re-development involving the addition or replacement of 5,000 ft^2 or more of impervious surface on an already developed site	☒ New development involving the creation of 10,000 ft^2 or more of impervious surface collectively over entire site	☐ Automotive repair shops with standard industrial classification (SIC) codes 5013, 5014, 5541, 7532- 7534, 7536-7539	☐ Restaurants (with SIC code 5812) where the land area of development is 5,000 ft^2 or more
☐ Hills Ranchide developments of 5,000 ft^2 or more which are located on areas with known erosive soil conditions or where the natural slope is 25 percent or more	☐ Developments of 2,500 ft^2 of impervious surface or more adjacent to (within 200 ft) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters.	☐ Parking lots of 5,000 ft^2 or more exposed to storm water	☐ Retail gasoline outlets that are either 5,000 ft^2 or more, or have a projected average daily traffic of 100 or more vehicles per day

☐ Non-Priority / Non-Category Project *May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements.*

2 Project Area (ft2):	1,637,856 sf	3 Number of Dwelling Units:	120	4 SIC Code:	5912, 5941, 5411 and 5812

5 Is Project going to be phased? Yes ☒ No ☐ *If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion. Residential and Commercial are 2 phases.*

6 Does Project include roads? Yes ☒ No ☐ *If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)*

2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

Form 2.2-1 Property Ownership/Management
Describe property ownership/management responsible for long-term of WQMP stormwater facilities:
STRATA PALMA, LLC. will be responsible to build the site and the initial maintenance of the post-developed BMP. **Contact Person:** **Eric Flodine** **4370 LA JOLLA VILLAGE DRIVE, SUITE 960** **SAN DIEGO, CA 92122** **(858) 546-0900** **ericf@strataequity.com**

2.3 Potential Stormwater Pollutants

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-3 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern			
Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
Pathogens (Bacterial / Virus)	E ☒	N ☐	
Phosphorous	E ☒	N ☐	
Nitrogen	E ☒	N ☐	
Sediment	E ☒	N ☐	
Metals	E ☒	N ☐	
Oil and Grease	E ☒	N ☐	
Trash/Debris	E ☒	N ☐	
Pesticides / Herbicides	E ☒	N ☐	
Organic Compounds	E ☒	N ☐	
Other: Nutrients	E ☒	N ☐	
Other: Oxygen Demanding Compounds	E ☒	N ☐	
Other:	E ☐	N ☐	

2.4 Water Quality Credits

A water quality credit program is applicable for certain types of development projects if it is not feasible to meet the requirements for on-site LID. Proponents for eligible projects, as described below, can apply for water quality credits that would reduce project obligations for selecting and sizing other treatment BMP or participating in other alternative compliance programs. Refer to Section 6.2 in the TGD for WQMP to determine if water quality credits are applicable for the project.

Form 2.4-1 Water Quality Credits			
[1] Project Types that Qualify for Water Quality Credits: *Select all that apply*			
☐ Redevelopment projects that reduce the overall impervious footprint of the project site. [Credit = % impervious reduced]	Higher density development projects ☐ Vertical density [20%] ☐ 7 units/ acre [5%]	☒ Mixed use development, (combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that demonstrate environmental benefits not realized through single use projects) [20%]	☐ Brownfield redevelopment (redevelop real property complicated by presence or potential of hazardous contaminants) [25%]
☐ Redevelopment projects in established historic district, historic preservation area, or similar significant core city center areas [10%]	☐ Transit-oriented developments (mixed use residential or commercial area designed to maximize access to public transportation) [20%]	☐ In-fill projects (conversion of empty lots & other underused spaces < 5 acres, substantially surrounded by urban land uses, into more beneficially used spaces, such as residential or commercial areas) [10%]	☐ Live-Work developments (variety of developments designed to support residential and vocational needs) [20%]
[2] Total Credit 20% *(Total all credit percentages up to a maximum allowable credit of 50 percent)*			
Description of Water Quality Credit Eligibility (if applicable)	20%. Mixed use development designed for easy residential access to neighborhood commercial opportunities.		

Section 3 Site and Watershed Description

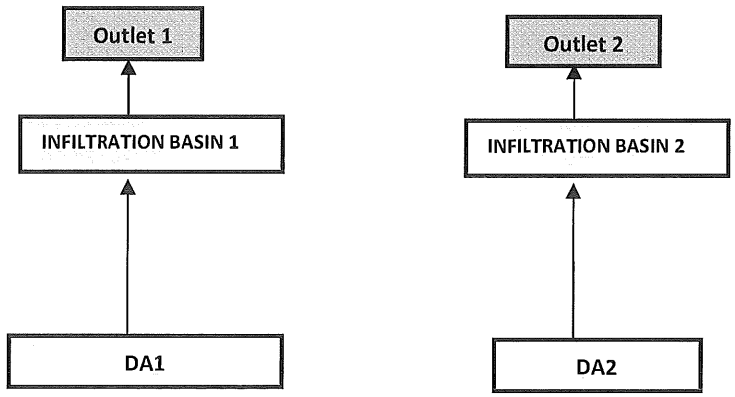
Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed DMAs) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example. Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet.***

Form 3-1 Site Location and Hydrologic Features

Site coordinates *take GPS measurement at approximate center of site*	Latitude 34° 11' 13.96" N	Longitude 117° 21' 30.80"W	Thomas Bros Map page PAGE 545 GRID H2 & H3

1 San Bernardino County climatic region: ☒ Valley ☐ Mountain

2 Does the site have more than one drainage area (DA): Yes☒ No☐ *If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached*



DA1 to outlet 1	28.3 Ac. including the entire DA1 will drain into proposed on site infiltration basin 1 located on the south east corner of the DA1 and then it will flow through proposed pipe system into Cable Creek
DA2 to outlet 2	9.3 Ac. including the entire DA2 will drain into proposed on site infiltration basin 1 located on the south east corner of the DA2 and then it will flow through proposed pipe system into Cable Creek

Form 3-2 Existing Hydrologic Characteristics for Drainage Area 1-1, 1-2 & 1-3				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DA1	DA2		
1 DMA drainage area (ft^2)	1,232,748	405,108		
2 Existing site impervious area (ft^2)	0	0		
3 Antecedent moisture condition *For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*	II	II		
4 Hydrologic soil group *Refer to Watershed Mapping Tool – http://sbcounty.permitrack.com/WAP*	A	A		
5 Longest flowpath length (ft)	1870	850		
6 Longest flowpath slope (ft/ft)	0.018	0.018		
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	0% Imp.	0% Imp.		
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating*	Undeveloped poor cover	Undeveloped poor cover		

Form 3-3 Watershed Description for Drainage Area (DA1, DA2 & DA3)

Receiving waters ***Refer to Watershed Mapping Tool - http://sbcounty.permitrack.com/WAP*** ***See 'Drainage Facilities" link at this website***	Flows from the site will east on Little league Drive., up to the intersection with Palm Avenue until the flows will reach an existing catch basin. The flows will enter the Cable Creek flowing south to confluence into Santa Ana River Reach 5
Applicable TMDLs ***Refer to Local Implementation Plan***	Cable Creek Channel : NONE Devil Creek Diversion Channel : NONE Cajon Creek Wash : NONE Little-Cajon Channel: Pathogens Warm Creek: NONE Santa Ana River Reach 4: Pathogens Santa Ana River Reach 3: Pathogens "Bacterial Indicator TMLDs for Middle Santa Ana River Watershed Waterbodies Nitrate : Santa Ana River Reach 3 Heavy metals, Nitrate TMDL Prado Flood Control basin Pathogens "Bacterial Indicator TMLDs for Middle Santa Ana River Watershed Waterbodies Santa Ana River Reach 2 NONE Santa Ana River Reach 1 NONE Tidal Prism, Santa Ana River NONE
303(d) listed impairments ***Refer to Local Implementation Plan and Watershed Mapping Tool – http://sbcounty.permitrack.com/WAP and State Water Resources Control Board website – http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml***	Expected pollutants of concern include pathogens, metals, Nutrients, organic compounds, pesticides, trash and debris, oxygen demanding compounds and oil and grease. There is no evidence to suggest that any other pollutants will be produced from the project site other than these. 303(d) listed impairment Cable Creek Channel : NONE Devil Creek Diversion Channel : NONE Cajon Creek Wash : NONE Little-Cajon Channel: Pathogens Warm Creek: NONE Santa Ana River Reach 4: Pathogens Santa Ana River Reach 3: Pathogens, Metals(copper & lead) Prado Flood Control Basin: Pathogens and Nutrients Santa Ana River Reach 2: Pathogens Santa Ana River Reach 1 and Tidal prism Santa Ana River : NONE
Environmentally Sensitive Areas (ESA) ***Refer to Watershed Mapping Tool – http://sbcounty.permitrack.com/WAP***	**NONE**

Unlined Downstream Water Bodies ***Refer to Watershed Mapping Tool – http://sbcounty.permitrack.com/WAP***	**Santa Ana River**
Hydrologic Conditions of Concern	☐ **Yes** ***Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal*** ☒ **No**
Watershed–based BMP included in a RWQCB approved WAP	☐ **Yes** ***Attach verification of regional BMP evaluation criteria in WAP*** • ***More Effective than On-site LID*** • ***Remaining Capacity for Project DCV*** • ***Upstream of any Water of the US*** • ***Operational at Project Completion*** • ***Long-Term Maintenance Plan*** ☒ **No**

Section 4 Best Management Practices (BMP)

4.1 Source Control BMP

4.1.1 Pollution Prevention

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	☒	☐	Practical education materials will be provided to property owners covering various water quality issues that will need to be addressed on their specific site. These materials will include general good house keeping practices that contribute to the protection of storm water quality and BMP's that eliminate or reduce pollution during property improvements. The developer will request these materials in writing at least 30 days prior to intended distribution and will then be responsible for publication and distribution.
N2	Activity Restrictions	☒	☐	Restrictions may be developed by property owners association, or other mechanisms. Pesticide applications will be performed by an applicator certified by the California Department of Pesticide Regulation. Vehicle washing will be prohibited.
N3	Landscape Management BMPs	☒	☐	According to the California Stormwater Quality Associations Stormwater Best Management Practice Handbook, landscape planning is implemented to reduce groundwater and storm water contamination. This will be accomplished through an infiltration basin, and landscape areas.
N4	BMP Maintenance	☒	☐	See section 5, Table 5.1 for details on BMP maintenance
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No hazardous materials will be found on site.
N6	Local Water Quality Ordinances	☐	☒	N/A
N7	Spill Contingency Plan	☒	☐	The spill contingency plan shall be provided in accordance with Section 6.95 of the California Health and Safety Code.
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tank compliance

Form 4.1-1 Non-Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N9	Hazardous Materials Disclosure Compliance	☐	☒	No hazardous materials in the site.
N10	Uniform Fire Code Implementation	☐	☒	No Uniform Code Implementation
N11	Litter/Debris Control Program	☒	☐	Homeowners/worker awareness.
N12	Employee Training	☒	☐	HOA and Within City maintained areas.
N13	Housekeeping of Loading Docks	☐	☒	No loading docks in the project
N14	Catch Basin Inspection Program	☒	☐	Catch basins will be inspected a minimum of once every three months during the dry season and a minimum of once every two months during the rainy season.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	Parking lot and onsite streets sweeping and vacuuming will be done by facility staff or by a specialized street sweeping company contracted by owner on a regular frequency based on usage and field observation of waste accumulation, using a vacuum assisted sweeper. As minimum all paved areas shall be swept before the rainy season starts.
N16	Other Non-structural Measures for Public Agency Projects	☐	☐	Not applicable
N17	Comply with all other applicable NPDES permits	☐	☐	Not applicable

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	☒	☐	Signs will be placed above storm drain inlets to warn the public of prohibitions against waste disposal
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☒	☐	No material storages areas in the project
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	Trash and waste storage will be built within the commercial areas.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	☒	☐	Rain sensors will be incorporated into the onsite sprinkler system so that no unnecessary watering of landscaped areas occurs after storm events.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	New landscaped areas will be constructed at a minimum of 1 inch below existing paved areas
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☒	☐	All slopes and channels will be protected in place, a perimeter wall will be
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☒	☐	If needed.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	No bays
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	No carwash areas
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	No outdoor processing

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	No wash areas
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	No fueling areas
S13	Hills side landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	No Hillside.
S14	Wash water control for food preparation areas	☐	☒	No food preparation
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	No carwash

4.1.2 Preventative LID Site Design Practices

Site design practices associated with new LID requirements in the MS4 Permit should be considered in the earliest phases of a project. Preventative site design practices can result in smaller DCV for LID BMP and hydromodification control BMP by reducing runoff generation. Describe site design and drainage plan including:

- A narrative of site design practices utilized or rationale for not using practices
- A narrative of how site plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

Form 4.1-3 Preventative LID Site Design Practices Checklist
Site Design Practices *If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets*
Minimize impervious areas: Yes ☒ No ☐ Impervious area will be to the cities development standards
Maximize natural infiltration capacity: Yes ☒ No ☐ Explanation: Runoff from impervious surfaces will be conveyed through landscaped areas so that infiltration is maximized. Runoff will also be intercepted by infiltration basins. Therefore alternative materials are unnecessary
Preserve existing drainage patterns and time of concentration: Yes ☒ No ☐ Explanation: Drainage pattern will be the same on existing and developed conditions.
Disconnect impervious areas: Yes ☒ No ☐ Explanation: Impervious areas will drain into landscaped areas.
Protect existing vegetation and sensitive areas: Yes ☒ No ☐ Explanation: There are no environmentally sensitive portions onsite but existing vegetation will be kept as much as possible.
Re-vegetate disturbed areas: Yes ☒ No ☐ Explanation: All disturbed areas will be re-vegetated, see landscape plan.
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: No compaction will be performed within the area where infiltration basins are proposed
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes ☐ No ☒ Explanation Runoff will also be intercepted by infiltration basins
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☒ No ☐ Explanation: No compaction will be performed within the area where landscape areas are proposed.

4.2 Project Performance Criteria

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in the MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection of any downstream waterbody segments with a HCOC. *If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.*

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), the San Bernardino County Stormwater Program requires use of the P_6 method (MS4 Permit Section XI.D.6a.ii) – Form 4.2-1
- For HCOC pre- and post-development hydrologic calculation, the San Bernardino County Stormwater Program requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi^2), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for HCOC performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)		
1 Project area DA 1 (ft^2): 1,232,748	2 Imperviousness after applying preventative site design practices (Imp%): 25%	3 Runoff Coefficient (Rc): 0.198 *$R_c = 0.858(Imp\%)^{\wedge 3} - 0.78(Imp\%)^{\wedge 2} + 0.774(Imp\%) + 0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.791 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
5 Compute P_6, Mean 6-hr Precipitation (inches): 1.1715 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)*		
6 Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*		24-hrs ☐ 48-hrs ☒
7 Compute design capture volume, DCV (ft^3): 46,812 ft^3 *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2*		

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 2)

1 Project area DA 2 (ft^2): 405,108	2 Imperviousness after applying preventative site design practices (Imp%): 90%	3 Runoff Coefficient (Rc): 0.73 *$R_c = 0.858(Imp\%)^{\wedge 3} - 0.78(Imp\%)^{\wedge 2} + 0.774(Imp\%) + 0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.791 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
5 Compute P_6, Mean 6-hr Precipitation (inches): 1.1715 *P_6 = Item 4 *C_1, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)*		
6 Drawdown Rate *Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.*		24-hrs ☐ 48-hrs ☒
7 Compute design capture volume, DCV (ft^3): 58,693 ft^3 *DCV = 1/12 * [Item 1* Item 3 *Item 5 * C_2], where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963)* *Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2*		

Form 4.2-2 Summary of HCOC Assessment (DA 1)

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☐ No ☒

Go to: *http://sbcounty.permitrack.com/WAP*

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below *(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)*

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft^3)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	1 *Form 4.2-3 Item 12*	2 *Form 4.2-4 Item 13*	3 *Form 4.2-5 Item 10*
Post-developed	4 *Form 4.2-3 Item 13*	5 *Form 4.2-4 Item 14*	6 *Form 4.2-5 Item 14*
Difference	7 *Item 4 – Item 1*	8 *Item 5 – Item 2*	9 *Item 6 – Item 3*
Difference (as % of pre-developed)	10 % *Item 7 / Item 1*	11 % *Item 8 / Item 2*	12 % *Item 9 / Item 3*

Form 4.2-3 HCOC Assessment for Runoff Volume

Weighted Curve Number Determination for: Pre-developed DA								
1a Land Cover type								
2a Hydrologic Soil Group (HSG)								
3a DMA Area, ft^2 *sum of areas of DMA should equal area of DA*								
4a Curve Number (CN) *use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*								
Weighted Curve Number Determination for: Post-developed DA			**DMA C**	**DMA D**	**DMA E**	**DMA F**	**DMA G**	**DMA H**
1b Land Cover type								
2b Hydrologic Soil Group (HSG)								
3b DMA Area, ft^2 *sum of areas of DMA should equal area of DA*								
4b Curve Number (CN) *use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*								

5 Pre-Developed area-weighted CN:	**7 Pre-developed soil storage capacity, S (in** *S = (1000 / Item 5) - 10*	**9 Initial abstraction, I_a (in):** *I_a = 0.2 * Item 7*
6 Post-Developed area-weighted CN:	**8 Post-developed soil storage capacity, S (in)** *S = (1000 / Item 6) - 10*	**10 Initial abstraction, I_a (in):** *I_a = 0.2 * Item 8*

11 Precipitation for 2 yr, 24 hr storm (in):
Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

12 Pre-developed Volume (ft^3):
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 9)^2 / ((Item 11 – Item 9 + Item 7)*

13 Post-developed Volume (ft^3):
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 10)^2 / ((Item 11 – Item 10 + Item 8)*

14 Volume Reduction needed to meet HCOC Requirement, (ft^3):
*V_{HCOC} = (Item 13 * 0.95) – Item 12*

Form 4.2-4 HCOC Assessment for Time of Concentration (DA 1)

Compute time of concentration for pre and post developed conditions for each DA *(For projects using the Hydrology Manual complete the form below)*

Variables	Pre-developed DA1 *Use additional forms if there are more than 4 DMA*				Post-developed DA1 *Use additional forms if there are more than 4 DMA*			
	DA 1	DMA B	DMA C	DMA D	DA 1	DMA B	DMA C	DMA D
1 Length of flowpath (ft) *Use Form 3-2 Item 5 for pre-developed condition*								
2 Change in elevation (ft)								
3 Slope (ft/ft), *S_o = Item 2 / Item 1*								
4 Land cover								
5 Initial DMA Time of Concentration (min) *Appendix C-1 of the TGD for WQMP*								
6 Length of conveyance from DMA outlet to project site outlet (ft) *May be zero if DMA outlet is at project site outlet*								
7 Cross-sectional area of channel (ft^2)								
8 Wetted perimeter of channel (ft)								
9 Manning's roughness of channel (n)								
10 Channel flow velocity (ft/sec) *V_{fps} = (1.49 / Item 9) * (Item 7/Item 8)$^{\wedge 0.67}$ * (Item 3)$^{\wedge 0.5}$*								
11 Travel time to outlet (min) *T_t = Item 6 / (Item 10 * 60)*								
12 Total time of concentration (min) *T_c = Item 5 + Item 11*								
13 Pre-developed time of concentration (min):								
14 Post-developed time of concentration (min):								
15 Additional time of concentration needed to meet HCOC requirement (min):								

Form 4.2-5 HCOC Assessment for Peak Runoff (DA 1)

Compute peak runoff for pre- and post-developed conditions

Variables	Pre-developed DA to Project Outlet (*Use additional forms if more than 3 DMA)*			Post-developed DA to Project Outlet (*Use additional forms if more than 3 DMA)*		
	DMA A	DMA B	DMA C	DMA A	DMA B	DMA C
1 Rainfall Intensity for storm duration equal to time of concentration *I_{peak} = 10^(LOG Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 /60)*						
2 Drainage Area of each DMA (ft^2) *For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*						
3 Ratio of pervious area to total area *For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)*						
4 Pervious area infiltration rate (in/hr) *Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP*						
5 Maximum loss rate (in/hr) *F_m = Item 3 * Item 4* *Use area-weighted F_m from DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA*						
6 Peak Flow from DMA (cfs) *Q_p =Item 2 * 0.9 * (Item 1 - Item 5)*						
7 Time of concentration adjustment factor for other DMA to site discharge point *Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)* — DMA A	*n/a*			*n/a*		
DMA B		*n/a*			*n/a*	
DMA C			*n/a*			*n/a*

8 Pre-developed Q_p at T_c for DMA A: *Q_p = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAA/2}$] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAA/3}$]*	9 Pre-developed Q_p at T_c for DMA B: *Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAB/1}$] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAB/3}$]*	10 Pre-developed Q_p at T_c for DMA C: *Q_p = Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAC/1}$] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAC/2}$]*

10 Peak runoff from pre-developed condition confluence analysis (cfs): *Maximum of Item 8, 9, and 10 (including additional forms as needed)*

11 Post-developed Q_p at T_c for DMA A: *Same as Item 8 for post-developed values*	12 Post-developed Q_p at T_c for DMA B: *Same as Item 9 for post-developed values*	13 Post-developed Q_p at T_c for DMA C: *Same as Item 10 for post-developed values*

14 Peak runoff from post-developed condition confluence analysis (cfs): *Maximum of Item 11, 12, and 13 (including add. forms as needed)*

15 Peak runoff reduction needed to meet HCOC Requirement (cfs): *$Q_{p\text{-}HCOC}$ = (Item 14 * 0.95) – Item 10*

4.3 Project Conformance Analysis

Complete the following forms for each project site DA to document that the proposed LID BMPs conform to the project DCV developed to meet performance criteria specified in the MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the MS4 Permit (see Section 5.3.1 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design and Hydrologic Source Controls (Form 4.3-2)
- Retention and Infiltration (Form 4.3-3)
- Harvested and Use (Form 4.3-4) or
- Biotreatment (Form 4.3-5).

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2.1 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is "Yes," provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Forms 4.3-2 and 4.3-4 to determine the feasibility of applicable HSC and harvest and use BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable HSC BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of LID HSC, retention and infiltration, and harvest and use BMPs are unable to mitigate the entire DCV, then biotreatment BMPs may be implemented by the project proponent. If biotreatment BMPs are used, then they must be sized to provide sufficient capacity for effective treatment of the remainder of the volume-based performance criteria that cannot be achieved with LID BMPs (TGD for WQMP Section 5.4.4.2). Under no circumstances shall any portion of the DCV be released from the site without effective mitigation and/or treatment.

Form 4.3-1 Infiltration BMP Feasibility (DA 1)

Feasibility Criterion – Complete evaluation for each DA on the Project Site

1 Would infiltration BMP pose significant risk for groundwater related concerns? Yes ☐ No ☒

Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

2 Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes ☐ No ☒

(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than eight feet from building foundations or an alternative setback.
- A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

3 Would infiltration of runoff on a Project site violate downstream water rights? Yes ☐ No ☒

If Yes, Provide basis: (attach)

4 Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? Yes ☐ No ☒

If Yes, Provide basis: (attach)

5 Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? Yes ☐ No ☒

If Yes, Provide basis: (attach)

6 Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? Yes ☐ No ☒

See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis: (attach)

7 Any answer from Item 1 through Item 3 is "Yes": Yes ☐ No ☒

If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 9 below.

8 Any answer from Item 4 through Item 6 is "Yes": Yes ☐ No ☒

If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP.
If no, then proceed to Item 9, below.

9 All answers to Item 1 through Item 6 are "No":

Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP.
Proceed to Form 4.3-2, Hydrologic Source Control BMP.

4.3.1 Site Design Hydrologic Source Control BMP

Section XI.E. of the Permit emphasizes the use of LID preventative measures; and the use of LID HSC BMPs reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable HSC shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of HSC, if a project cannot feasibly meet BMP sizing requirements or cannot fully address HCOCs, feasibility of all applicable HSC must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design HSC BMP. Refer to Section 5.4.1 in the TGD for more detailed guidance.

Form 4.3-2 Site Design Hydrologic Source Control BMPs (DA 1)

1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)			
3 Ratio of pervious area receiving runoff to impervious			
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*			
5 Sum of retention volume achieved from impervious area dispersion (ft^3):	$V_{retention}$ *=Sum of Item 4 for all BMPs*		
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)			
8 Ponding depth (ft)			
9 Surface area of amended soil/gravel (ft^2)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft^3) $V_{retention}$ *= (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*			
13 Runoff volume retention from on-lot infiltration (ft^3):	$V_{retention}$ *=Sum of Item 12 for all BMPs*		

Form 4.3-2 cont. Site Design Hydrologic Source Control BMPs (DA 1)

14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes ☐ No ☒ *If yes, complete Items 15-20. If no, proceed to Item 21*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Rooftop area planned for ET BMP (ft^2)			
16 Average wet season ET demand (in/day) *Use local values, typical ~ 0.1*			
17 Daily ET demand (ft^3/day) *Item 15 * (Item 16 / 12)*			
18 Drawdown time (hrs) *Copy Item 6 in Form 4.2-1*			
19 Retention Volume (ft^3) *$V_{retention}$ = Item 17 * (Item 18 / 24)*			
20 Runoff volume retention from evapotranspiration BMPs (ft^3): *$V_{retention}$ =Sum of Item 19 for all BMPs*			
21 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 20-2. If no, proceed to Item 24*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
22 Number of Street Trees			
23 Average canopy cover over impervious area (ft^2)			
24 Runoff volume retention from street trees (ft^3) *$V_{retention}$ = Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches*			
25 Runoff volume retention from street tree BMPs (ft^3): *$V_{retention}$ = Sum of Item 24 for all BMPs*			
26 Implementation of residential rain barrels/cisterns: Yes☐ No ☒ *If yes, complete Items 27-28; If no, proceed to Item 29*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
27 Number of rain barrels/cisterns			
28 Runoff volume retention from rain barrels/cisterns (ft^3) *$V_{retention}$ = Item 27 * 3*			
29 Runoff volume retention from residential rain barrels/Cisterns (ft3): *$V_{retention}$ =Sum of Item 28 for all BMPs*			
30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: 0 *Sum of Items 5, 13, 20, 25 and 29*			

4.3.2 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix D of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5.1 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

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Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1 & 2)

1 Remaining LID DCV not met by site design HSC BMP (ft^3):	46,812 ft^3	56,693 ft^3	
BMP Type *Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs*	DA 1 BMP Type Infiltration Basin	DA 2-1 BMP Type Infiltration Basin	
2 Infiltration rate of underlying soils (in/hr) *See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods*	*3.0*	*3.0*	
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	*1*	*1*	
4 Design percolation rate (in/hr) P_{design} = *Item 2 / Item 3*	*3.0*	*3.0*	
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	*48*	*48*	
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	*12'*	*12'*	
7 Ponding Depth (ft) d_{BMP} = *Minimum of (1/12*Item 4*Item 5) or Item 6*	2'	2'	
8 Infiltrating surface area, SA_{BMP} (ft^2) *the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP*	12,000	12,000	
9 Amended soil depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details*	1	1	
10 Amended soil porosity	0.35	0.35	
11 Gravel depth, d_{media} (ft) *Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details*	3	5	
12 Gravel porosity	0.35	0.35	
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	3	3	
14 Above Ground Retention Volume (ft^3) $V_{retention}$ = *Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	49,800	58,200	
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	0	0	
16 Total Retention Volume from LID Infiltration BMPs:	49,800 ft^3	58,200 ft^3	
17 Fraction of DCV achieved with infiltration BMP:	100 %	100 %	

18 Is full LID DCV retained on-site with combination of hydrologic source control and LID retention and infiltration BMPs? Yes ☒ No ☐

If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.

4.3.3 Harvest and Use BMP

Harvest and use BMP may be considered if the full LID DCV cannot be met by maximizing infiltration BMPs. Use Form 4.3-4 to compute on-site retention of runoff from proposed harvest and use BMPs.

Volume retention estimates for harvest and use BMPs are sensitive to the on-site demand for captured stormwater. Since irrigation water demand is low in the wet season, when most rainfall events occur in San Bernardino County, the volume of water that can be used within a specified drawdown period is relatively low. The bottom portion of Form 4.3-4 facilitates the necessary computations to show infeasibility if a minimum incremental benefit of 40 percent of the LID DCV would not be achievable with MEP implementation of on-site harvest and use of stormwater (Section 5.5.4 of the TGD for WQMP).

Form 4.3-4 Harvest and Use BMPs (DA 1)			
1 Remaining LID DCV not met by site design HSC or infiltration BMP (ft^3): 0 ft^3 *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16*			
BMP Type(s) *Compute runoff volume retention from proposed harvest and use BMP (Select BMPs from Table 5-4 of the TGD for WQMP) - Use additional forms for more BMPs*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Describe cistern or runoff detention facility			
3 Storage volume for proposed detention type (ft^3) *Volume of cistern*			
4 Landscaped area planned for use of harvested stormwater (ft^2)			
5 Average wet season daily irrigation demand (in/day) Use local values, typical ~ 0.1 in/day			
6 Daily water demand (ft^3/day) *Item 4 * (Item 5 / 12)*			
7 Drawdown time (hrs) *Copy Item 6 from Form 4.2-1*			
8 Retention Volume (ft^3) *$V_{retention}$ = Minimum of (Item 3) or (Item 6 * (Item 7 / 24))*			
9 Total Retention Volume (ft^3) from Harvest and Use BMP 0 ft^3 *Sum of Item 8 for all harvest and use BMP included in plan*			
10 Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest and use BMPs? Yes ☒ No ☐ *If yes, demonstrate conformance using Form 4.3-10. If no, then re-evaluate combinations of all LID BMP and optimize their implementation such that the maximum portion of the DCV is retained on-site (using a single BMP type or combination of BMP types). If the full DCV cannot be mitigated after this optimization process, proceed to Section 4.3.4.*			

4.3.4 Biotreatment BMP

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration, and harvest and use BMPs. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Use Form 4.3-5 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV w. Biotreatment computations are included as follows:

- **Use Form 4.3-6 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);**
- **Use Form 4.3-7 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);**
- **Use Form 4.3-8 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)**

Form 4.3-5 Selection and Evaluation of Biotreatment BMP (DA 1)

1 **Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft^3): 0 ft^3** *Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16- Form 4.3-4 Item 9*	**List pollutants of concern** *Copy from Form 2.3-1.* Pathogens, Phosphorous, Nitrogen, Metals, Sediment, Oil and Grease, Trash/Debris, Pestices/Herbicides, Organic compounds, Nutrients, and Oxygen Demanding compounds

2 **Biotreatment BMP Selected** *(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)*	**Volume-based biotreatment** *Use Forms 4.3-6 and 4.3-7 to compute treated volume*	**Flow-based biotreatment** *Use Form 4.3-8 to compute treated volume*
	☐ Bioretention with underdrain ☐ Planter box with underdrain ☐ Constructed wetlands ☐ Wet extended detention ☐ Dry extended detention	☐ Vegetated swale ☐ Vegetated filter strip ☐ Proprietary biotreatment

3 **Volume biotreated in volume based biotreatment BMP (ft^3): 0 ft^3** *Form 4.3-6 Item 15 + Form 4.3-7 Item 13*	4 **Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft^3): 0 ft^3** *Item 1 – Item 3*	5 **Remaining fraction of LID DCV for sizing flow based biotreatment BMP: 0 %** *Item 4 / Item 1*

6 **Flow-based biotreatment BMP capacity provided (cfs): 0** *Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)*

7 **Metrics for MEP determination:**

- **Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development:** ☐ *If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP.*

Form 4.3-6 Volume Based Biotreatment (DA 1) – Bioretention and Planter Boxes with Underdrains

Biotreatment BMP Type *(Bioretention w/underdrain, planter box w/underdrain, other comparable BMP)*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP*			
2 Amended soil infiltration rate *Typical ~ 5.0*			
3 Amended soil infiltration safety factor *Typical ~ 2.0*			
4 Amended soil design percolation rate (in/hr) P_{design} *= Item 2 / Item 3*			
5 Ponded water drawdown time (hr) *Copy Item 6 from Form 4.2-1*			
6 Maximum ponding depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
7 Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 4 * Item 5) or Item 6*			
8 Amended soil surface area (ft^2)			
9 Amended soil depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
10 Amended soil porosity, *n*			
11 Gravel depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
12 Gravel porosity, *n*			
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*			
14 Biotreated Volume (ft^3) $V_{biotreated}$ *= Item 8 * [(Item 7/2) + (Item 9 * Item 10) +(Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*			
15 Total biotreated volume from bioretention and/or planter box with underdrains BMP: *Sum of Item 14 for all volume-based BMPs included in this form*			

Form 4.3-7 Volume Based Biotreatment (DA 1) – Constructed Wetlands and Extended Detention

Biotreatment BMP Type *Constructed wetlands, extended wet detention, extended dry detention, or other comparable proprietary BMP. If BMP includes multiple modules (e.g. forebay and main basin), provide separate estimates for storage and pollutants treated in each module.*	DA DMA BMP Type		DA DMA BMP Type *(Use additional forms for more BMPs)*	
	Forebay	Basin	Forebay	Basin
1 Pollutants addressed with BMP forebay and basin *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP*				
2 Bottom width (ft)				
3 Bottom length (ft)				
4 Bottom area (ft^2) A_{bottom} = *Item 2 * Item 3*				
5 Side slope (ft/ft)				
6 Depth of storage (ft)				
7 Water surface area (ft^2) $A_{surface}$ =*(Item 2 + (2 * Item 5 * Item 6)) * (Item 3 + (2 * Item 5 * Item 6))*				
8 Storage volume (ft^3) *For BMP with a forebay, ensure fraction of total storage is within ranges specified in BMP specific fact sheets, see Table 5-6 of the TGD for WQMP for reference to BMP design details* V =*Item 6 / 3 * [Item 4 + Item 7 + (Item 4 * Item 7)^0.5]*				
9 Drawdown Time (hrs) *Copy Item 6 from Form 2.1*				
10 Outflow rate (cfs) Q_{BMP} = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) / (Item 9 * 3600)*				
11 Duration of design storm event (hrs)				
12 Biotreated Volume (ft^3) $V_{biotreated}$ = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) +(Item 10 * Item 11 * 3600)*				
13 Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : *(Sum of Item 12 for all BMP included in plan)*				

Form 4.3-8 Flow Based Biotreatment (DA 1)

Biotreatment BMP Type *Vegetated swale, vegetated filter strip, or other comparable proprietary BMP*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5*			
2 Flow depth for water quality treatment (ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
3 Bed slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
4 Manning's roughness coefficient			
5 Bottom width (ft) b_w = (Form 4.3-5 Item 6 * Item 4) / (1.49 * Item 2^1.67 * Item 3^0.5)			
6 Side Slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
7 Cross sectional area (ft^2) A = (Item 5 * Item 2) + (Item 6 * Item 2^2)			
8 Water quality flow velocity (ft/sec) V = Form 4.3-5 Item 6 / Item 7			
9 Hydraulic residence time (min) *Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*			
10 Length of flow based BMP (ft) L = Item 8 * Item 9 * 60			
11 Water surface area at water quality flow depth (ft^2) SA_{top} = (Item 5 + (2 * Item 2 * Item 6)) * Item 10			

4.3.5 Conformance Summary

Complete Form 4.3-9 to demonstrate how on-site LID DCV is met with proposed site design hydrologic source control, infiltration, harvest and use, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)

1 Total LID DCV for the Project DA-1 (ft^3): 46,812 ft^3 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 0 ft^3 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 49,800 ft^3 *Copy Item 16 in Form 4.3-3*

4 On-site retention with LID harvest and use BMP (ft^3): 0 ft^3 *Copy Item 9 in Form 4.3-4*

5 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 ft^3 *Copy Item 3 in Form 4.3-5*

6 Flow capacity provided by flow based biotreatment BMP (cfs): 0 cfs *Copy Item 6 in Form 4.3-5*

7 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☐ No ☒
  If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized
- On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☐ No ☒
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

8 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:

- Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐
  *Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} = (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*
- An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐
  Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed

Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 2)

1 Total LID DCV for the Project DA-1 (ft^3): 56,693 ft^3 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 0 ft^3 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 58,200 ft^3 *Copy Item 16 in Form 4.3-3*

4 On-site retention with LID harvest and use BMP (ft^3): 0 ft^3 *Copy Item 9 in Form 4.3-4*

5 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 ft^3 *Copy Item 3 in Form 4.3-5*

6 Flow capacity provided by flow based biotreatment BMP (cfs): 0 cfs *Copy Item 6 in Form 4.3-5*

7 LID BMP performance criteria are achieved if answer to any of the following is "Yes":

- Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐
  If yes, sum of Items 2, 3, and 4 is greater than Item 1
- Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☐ No ☒
  If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3--5 Item 6 and Items 2, 3 and 4 are maximized
- On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☐ No ☒
  If yes, Form 4.3-1 Items 7 and 8 were both checked yes

8 If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance:

- Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐
  Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, V_{alt} *= (Item 1 – Item 2 – Item 3 – Item 4 – Item 5) * (100 - Form 2.4-1 Item 2)%*
- An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐
  Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed

4.3.6 Hydromodification Control BMP

Use Form 4.3-10 to compute the remaining runoff volume retention, after LID BMP are implemented, needed to address HCOC, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential HCOC. Describe hydromodification control BMP that address HCOC, which may include off-site BMP and/or in-stream controls. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

Form 4.3-10 Hydromodification Control BMPs (DA 1)	
1 Volume reduction needed for HCOC performance criteria (ft^3): *(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1*	2 On-site retention with site design hydrologic source control, infiltration, and harvest and use LID BMP (ft^3): *Sum of Form 4.3-9 Items 2, 3, and 4* *Evaluate option to increase implementation of on-site retention in Forms 4.3-2, 4.3-3, and 4.3-4 in excess of LID DCV toward achieving HCOC volume reduction*
3 Remaining volume for HCOC volume capture (ft^3): *Item 1 – Item 2*	4 Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft^3): *Existing downstream BMP may be used to demonstrate additional volume capture (if so, attach to this WQMP a hydrologic analysis showing how the additional volume would be retained during a 2-yr storm event for the regional watershed)*
5 If Item 4 is less than Item 3, incorporate in-stream controls on downstream waterbody segment to prevent impacts due to hydromodification ☐ *Attach in-stream control BMP selection and evaluation to this WQMP*	
6 Is Form 4.2-2 Item 11 less than or equal to 5%: Yes ☐ No ☐ *If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:* • Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site or off-site retention BMP ☐ *BMP upstream of a waterbody segment with a potential HCOC may be used to demonstrate increased time of concentration through hydrograph attenuation (if so, show that the hydraulic residence time provided in BMP for a 2-year storm event is equal or greater than the addition time of concentration requirement in Form 4.2-4 Item 15)* • Increase time of concentration by preserving pre-developed flow path and/or increase travel time by reducing slope and increasing cross-sectional area and roughness for proposed on-site conveyance facilities ☐ • Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California ☐	
7 Form 4.2-2 Item 12 less than or equal to 5%: Yes ☐ No ☐ *If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:* • Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site or off-site retention BMPs ☐ *BMPs upstream of a waterbody segment with a potential HCOC may be used to demonstrate additional peak runoff reduction through hydrograph attenuation (if so, attach to this WQMP, a hydrograph analysis showing how the peak runoff would be reduced during a 2-yr storm event)* • Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California ☐	

4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, harvest and use, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance. Alternative compliance plans may include one or more of the following elements:

- On-site structural treatment control BMP - All treatment control BMP should be located as close to possible to the pollutant sources and should not be located within receiving waters;
- Off-site structural treatment control BMP - Pollutant removal should occur prior to discharge of runoff to receiving waters;
- Urban runoff fund or In-lieu program, if available

Depending upon the proposed alternative compliance plan, approval by the executive officer may or may not be required (see Section 6 of the TGD for WQMP).

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMP included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and may require a Maintenance Agreement (consult the jurisdiction's LIP). If a Maintenance Agreement is required, it must also be attached to the WQMP.

Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)			
BMP	**Reponsible Party(s)**	**Inspection/ Maintenance Activities Required**	**Minimum Frequency of Activities**
Infiltration basin	STRATA PALMA, LLC during construction and City of San Bernardino and HOA after construction is finished	Remove accumulated trash and debris in the basin at the start and end of the wet season. Inspect for standing water at the end of the wet season. Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons. Remove accumulated sediment and regrade when the accumulated sediment volume exceeds 10% of the basin. If erosion is occurring within the basin, re-vegetate immediately and stabilize with an erosion control mulch or mat until vegetation cover is established	2 times a year at the beginning and end of the rainy season (October to March)
Education of Property Owners, Tenants and Occupants on Stormwater BMPs	STRATA PALMA, LLC during construction then City of San Bernardino and HOA	Practical education materials will be provided to property owners covering various water quality issues that will need to be addressed on their specific site. These materials will include general good house keeping practices that contribute to the protection of storm water quality and BMP's that eliminate or reduce pollution during property improvements.	At Home sale

Activity Restrictions	City of San Bernardino and HOA	Restrictions may be developed by City of San Bernardino	Ongoing by Code Enforcement
Landscape maintenance	STRATA PALMA, LLC during construction then City of San Bernardino and HOA for landscape areas and for the Infiltration Basin	Landscape planning is implemented to reduce groundwater and storm water contamination. This will be accomplished through an infiltration basin, and landscape areas.	Monthly
BMP maintenance	STRATA PALMA, LLC during construction then City of San Bernardino and HOA	See details hereon	
Spill contingency plan	STRATA PALMA, LLC during construction then City of San Bernardino and HOA	The spill contingency plan shall be provided in accordance with Section 6.95 of the California Health and Safety Code.	Ongoing with every visit
Litter debris control program	STRATA PALMA, LLC during construction then City of San Bernardino and HOA	Litter debris control program may be developed by City of San Bernardino	Ongoing with every visit
Employee training	STRATA PALMA, LLC during construction then City of San Bernardino and HOA	Employee training may be developed by City of San Bernardino	Ongoing with every visit
Catch basin inspection program	STRATA PALMA, LLC during construction then City of San Bernardino and HOA	Catch basins will be inspected a minimum of once every three months during the dry season and a minimum of once every two months during the rainy season.	As stated

Provide storm drain system stencilling and signage	STRATA PALMA, LLC during construction then City of San Bernardino and HOA	Signs will be placed above storm drain inlets to warn the public of prohibitions against waste disposal	Inspect once a year
Use efficient irrigation systems & landscape design, water conservatio n, smart controllers, and source control	STRATA PALMA, LLC during construction then City of San Bernardino and HOA	Rain sensors will be incorporated into the onsite sprinkler system so that no unnecessary watering of landscaped areas occurs after storm events.	Once a year or according to Manufacturer Manuals
Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	STRATA PALMA, LLC during construction then City of San Bernardino and HOA	New landscaped areas will be constructed at a minimum of 1 inch below existing paved areas	Once a year

Section 6 WQMP Attachments

6.1. Site Plan and Drainage Plan

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural Source Control BMP locations
- Site Design Hydrologic Source Control BMP locations
- LID BMP details
- Drainage delineations and flow information
- Drainage connections

6.2 Electronic Data Submittal

Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their local Local Implementation Plan), this section will describe the contents (e.g., layering, nomenclature, geo-referencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

6.3 Post Construction

Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

6.4 Other Supporting Documentation

- BMP Educational Materials
- Activity Restriction – C, C&R's & Lease Agreements

Section 6

WQMP Certification

6.1 Certification

"This Water Quality Management Plan has been prepared for STRATA PALMA, LLC by Allard Engineering. It is intended to comply with the requirements of the County of San Bernardino for Rancho Palma Project requiring the preparation of a Water Quality Management Plan (WQMP). The undersigned is aware that Best Management Practices (BMPs) are enforceable pursuant to the City's Water Quality Ordinance. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Stormwater Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity. "

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

STRATA PALMA, LLC

By: STRATA PALMA, LLC

By: _____ Date: _____

Name: NN

<u>Applicant Telephone Number</u>:

Certifications

I certify under penalty of law that this document and all the attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the

information, the information submitted is to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations

Developer's Project Engineer Signature

_____ _____

Signature **Date**

I/we certify that I/we am/are the legal owner of the project and hereby accept the responsibility for the implementation of the provisions of the SWQMP as long as I/we retain ownership of this property and that upon the sale of this land, I/we will deliver this plan to the future owner and inform him of the requirement to implement the plan.

Owner(s) Signature

STRATA PALMA, LLC

By: _____ Date: _____

Name: NN

For the use by County of San Bernardino

Environmental Section Approval of SWQMP

I, and /or personnel acting under my direction and supervision, have reviewed this SWQMP and find that it meets the requirements set forth in the County of San Bernardino's Storm Water Ordinance.

Acceptance or approval of this Storm Water Quality Management Plan in no way precludes the authority of this agency to require modification to the plan as conditions warrant nor does this agency take responsibility for performance of BMP's provided for in the plan.

_____ _____

Signature **Date of SWQMP approval**

Target Capture Volume

DA1

1) Calculate the "Watershed Imperviousness Ratio", I which is equal to the percent of impervious area in the BMP Drainage Area divided by 100

Imperviousness(i)= **0.25**

Total Acreage(A) = **28.30**

2) Calculate the composite Runoff Coefficient C_{bmp} for the drainage area

$C_{bmp} = 0.858i^3-0.78i^2+0.774i+0.04$

C_{bmp} = 0.198

3) Determine which Regression Coefficient to use by region the project is located in

Valley	1.481
Mountain	1.909
Desert	1.237

Regression coefficient for this project is: 1.481

4) Determine the area averaged "6 hour Mean Storm Rainfall" , P_6

2 yr 1 Hr Rainfall Depth per NOAA Atlas 14= **0.791** inches

P_6 = 2 yr 1 hr Rainfall x Regression coefficient

P_6 = 1.1715 inches

5) Determine Regression Constant (a) for 48 hour drawdown

a for 24 hour = 1.582
a for 48 hour = 1.963

a = 1.963

6) Calculate the Maximized Detention Volume, P_0

P_0 = C x a x P6

Po(inches) = 0.4557

7) Calculate the Target Capture Volume, V_0, in acre feet

$V_0 = (P_0 * A)/12$

V_0 = 1.07 acre-feet

V_0 = 46,812 CF

Target Capture Volume

DA2

1) Calculate the "Watershed Imperviousness Ratio", I which is equal to the percent of impervious area in the BMP Drainage Area divided by 100

Imperviousness(i)= **0.90**

Total Acreage(A) = **9.30**

2) Calculate the composite Runoff Coefficient C_{bmp} for the drainage area

$C_{bmp} = 0.858i^3-0.78i^2+0.774i+0.04$

C_{bmp} = 0.730

3) Determine which Regression Coefficient to use by region the project is located in

Valley	1.481
Mountain	1.909
Desert	1.237

Regression coefficient for this project is: 1.481

4) Determine the area averaged "6 hour Mean Storm Rainfall" , P_6

2 yr 1 Hr Rainfall Depth per NOAA Atlas 14= **0.791** inches

P_6 = 2 yr 1 hr Rainfall x Regression coefficient

P_6 = 1.1715 inches

5) Determine Regression Constant (a) for 48 hour drawdown

a for 24 hour = 1.582
a for 48 hour = 1.963

a = 1.963

6) Calculate the Maximized Detention Volume, P_0

P_0 = C x a x P6

Po(inches) = 1.6794

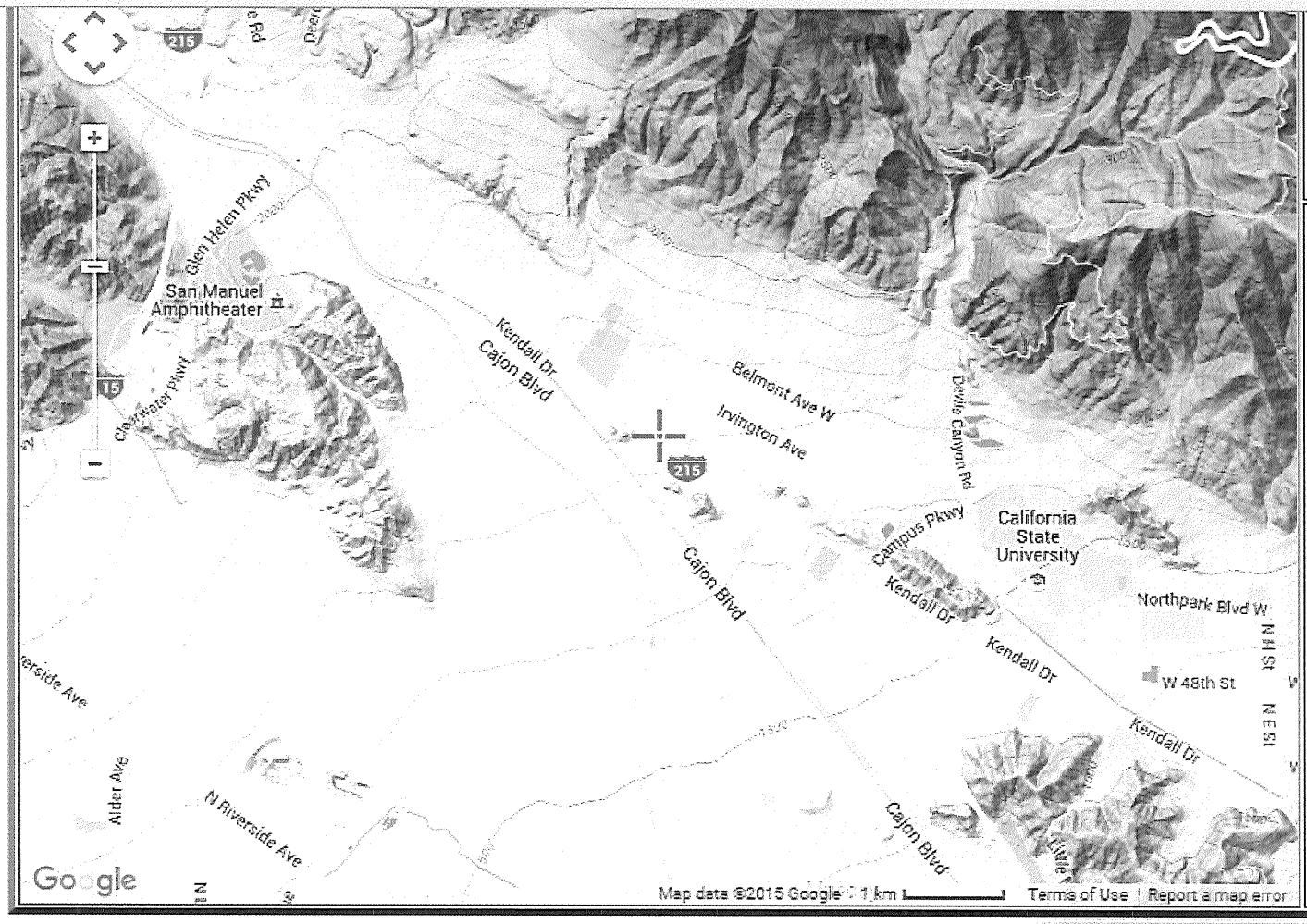
7) Calculate the Target Capture Volume, V_0, in acre feet

$V_0 = (P_0 * A)/12$

V_0 = 1.30 acre-feet

V_0 = 56,693 CF

Rivo TVX | Google Maps | PFDS: Contiguous US | Edmund
hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca
Show - Open ... | Rojadirecta.me - fen... | AronRa | Eyelet Fabric - Disco... | How to Determine R... | Wood beam calcula... | Alberto cortez, Retr... | digitalcommons.fiu....



a) Select location
(move crosshair or double click)

b) Click on station icon
(show stations on map)

LOCATION INFORMATION:

Name: San Bernardino, California, US*

Latitude: 34.1927°

Longitude: -117.3628°

Elevation: 1716 ft*

* source: Google Maps

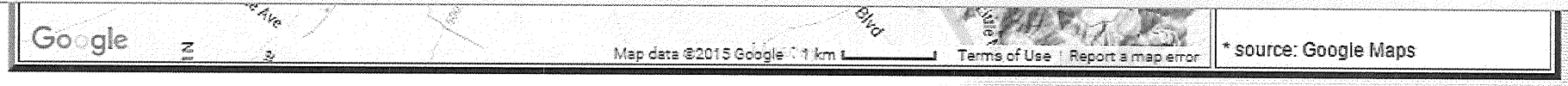
POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION

NOAA Atlas 14, Volume 6, Version 2

Desktop

Rivo TVX | Google Maps | PFDS: Contiguous US | Edmund
hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca
Show - Open ... | Rojadirecta.me - fen... | AronRa | Eyelet Fabric - Disco... | How to Determine R... | Wood beam calcula... | Alberto cortez, Retr... | digitalcommons.fiu...



* source: Google Maps

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION

NOAA Atlas 14, Volume 6, Version 2

PF tabular | PF graphical | Supplementary information

Print Page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.150 (0.125-0.182)	0.204 (0.169-0.248)	0.275 (0.227-0.335)	0.333 (0.273-0.410)	0.414 (0.328-0.527)	0.477 (0.370-0.621)	0.543 (0.411-0.724)	0.612 (0.451-0.840)	0.709 (0.500-1.02)	0.787 (0.536-1.17)
10-min	0.215 (0.179-0.262)	0.292 (0.242-0.355)	0.394 (0.326-0.480)	0.477 (0.392-0.587)	0.593 (0.470-0.755)	0.684 (0.531-0.890)	0.778 (0.589-1.04)	0.878 (0.646-1.20)	1.02 (0.717-1.46)	1.13 (0.768-1.67)
15-min	0.260 (0.216-0.316)	0.353 (0.293-0.430)	0.476 (0.394-0.581)	0.577 (0.474-0.710)	0.717 (0.569-0.913)	0.827 (0.642-1.08)	0.941 (0.713-1.25)	1.06 (0.781-1.46)	1.23 (0.867-1.76)	1.36 (0.929-2.02)
30-min	0.386 (0.321-0.469)	0.524 (0.435-0.638)	0.706 (0.584-0.861)	0.856 (0.703-1.05)	1.06 (0.844-1.35)	1.23 (0.952-1.60)	1.40 (1.06-1.86)	1.57 (1.16-2.16)	1.82 (1.29-2.61)	2.02 (1.38-3.00)
60-min	0.583 (0.485-0.709)	0.791 (0.657-0.963)	1.07 (0.882-1.30)	1.29 (1.06-1.59)	1.61 (1.27-2.04)	1.85 (1.44-2.41)	2.11 (1.60-2.81)	2.38 (1.75-3.26)	2.75 (1.94-3.94)	3.06 (2.08-4.53)
2-hr	0.875 (0.728-1.06)	1.15 (0.951-1.40)	1.50 (1.25-1.83)	1.80 (1.48-2.21)	2.20 (1.75-2.80)	2.52 (1.96-3.28)	2.85 (2.15-3.80)	3.19 (2.35-4.38)	3.67 (2.58-5.25)	4.04 (2.75-6.00)
3-hr	1.10 (0.918-1.34)	1.43 (1.18-1.74)	1.85 (1.53-2.26)	2.20 (1.81-2.71)	2.68 (2.12-3.41)	3.05 (2.37-3.97)	3.43 (2.60-4.58)	3.83 (2.82-5.26)	4.39 (3.10-6.28)	4.83 (3.29-7.16)
6-hr	1.62 (1.35-1.97)	2.07 (1.72-2.52)	2.67 (2.21-3.25)	3.15 (2.58-3.87)	3.80 (3.02-4.84)	4.31 (3.35-5.60)	4.82 (3.65-6.43)	5.36 (3.94-7.35)	6.09 (4.29-8.72)	6.66 (4.53-9.88)
12-hr	2.17 (1.81-2.64)	2.80 (2.32-3.40)	3.60 (2.98-4.40)	4.25 (3.49-5.24)	5.13 (4.07-6.53)	5.79 (4.50-7.54)	6.46 (4.90-8.62)	7.15 (5.26-9.81)	8.07 (5.69-11.6)	8.78 (5.98-13.0)
24-hr	2.94 [illegible]	3.84 [illegible]	5.01 [illegible]	5.95 (5.21-6.93)	7.19 (6.09-8.67)	8.14 (6.75-10.0)	9.08 (7.36-11.4)	10.0 (7.91-13.0)	11.3 (8.56-15.3)	12.3 (8.99-17.2)

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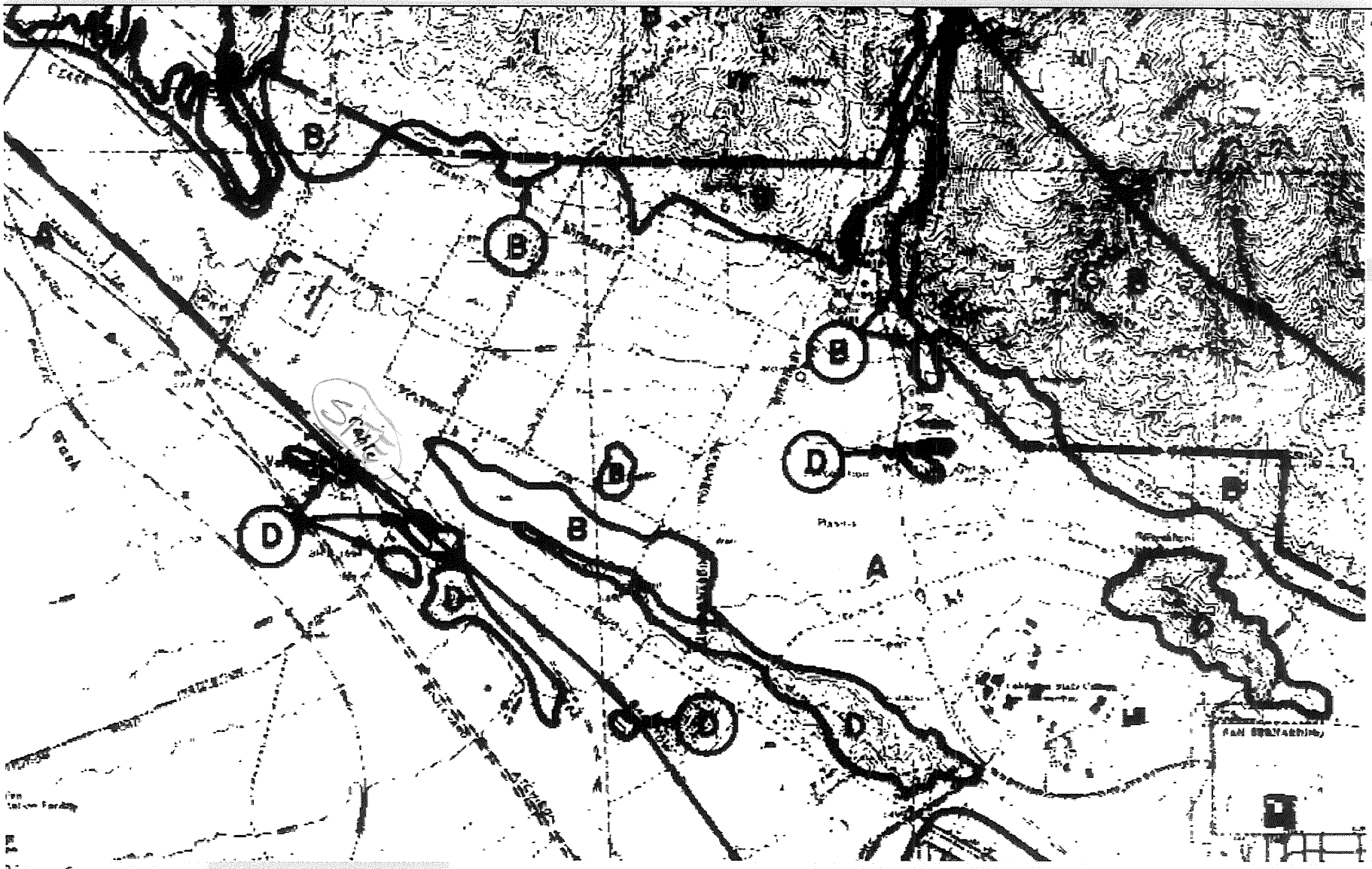

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Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1.0	0.25
		Predominant soil texture	0.25	2.0	0.50
		Site soil variability	0.25	2.0	0.50
		Depth to groundwater / impervious layer	0.25	1.0	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.5
B	Design	Tributary area size	0.25	3.0	0.75
		Level of pretreatment/ expected sediment loads	0.25	3.0	0.75
		Redundancy	0.25	2.0	0.5
		Compaction during construction	0.25	1.0	0.25
		Design Safety Factor, $S_B = \Sigma p$			2.25
Combined Safety Factor, $S_{Total} = S_A \times S_B$ = 1.5 x 2.25					3.375
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					77
Design Infiltration Rate, in/hr, $K_{DESIGN} = K_{Observed} / S_{Total}$					23.2 in/hr.

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

INFILTRATION RATE FOR COMMERCIAL BASIN. 77 in/hr / 3.315 = 23.2 in/hr.
A LAYER OF 1 FOOT OF AMENDED SOIL AT THE BOTTOM OF THE BASIN WILL PROVIDE AN INFILTRATION RATE OF 3 in/hr APPROX.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

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Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1.0	0.25
		Predominant soil texture	0.25	2.0	0.50
		Site soil variability	0.25	2.0	0.50
		Depth to groundwater / impervious layer	0.25	1.0	0.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.5
B	Design	Tributary area size	0.25	3.0	0.75
		Level of pretreatment/ expected sediment loads	0.25	3.0	0.75
		Redundancy	0.25	2.0	0.5
		Compaction during construction	0.25	1.0	0.25
		Design Safety Factor, $S_B = \Sigma p$			2.25
Combined Safety Factor, $S_{Total} = S_A \times S_B$ = 1.5 x 2.25					3.375
Observed Infiltration Rate, inch/hr, $K_{observed}$ (corrected for test-specific bias)					126
Design Infiltration Rate, in/hr, $K_{DESIGN} = K_{Observed} / S_{Total}$					37.3

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

INFILTRATION RATE FOR RESIDENTIAL BASIN 126 in/hr / 3.315 = 37.3 in/hr.

A LAYER OF 1 FOOT OF AMENDED SOIL AT BOTTOM OF THE BASIN WILL PROVIDE A INFILTRATION RATE OF 3 in/hr APPROX.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

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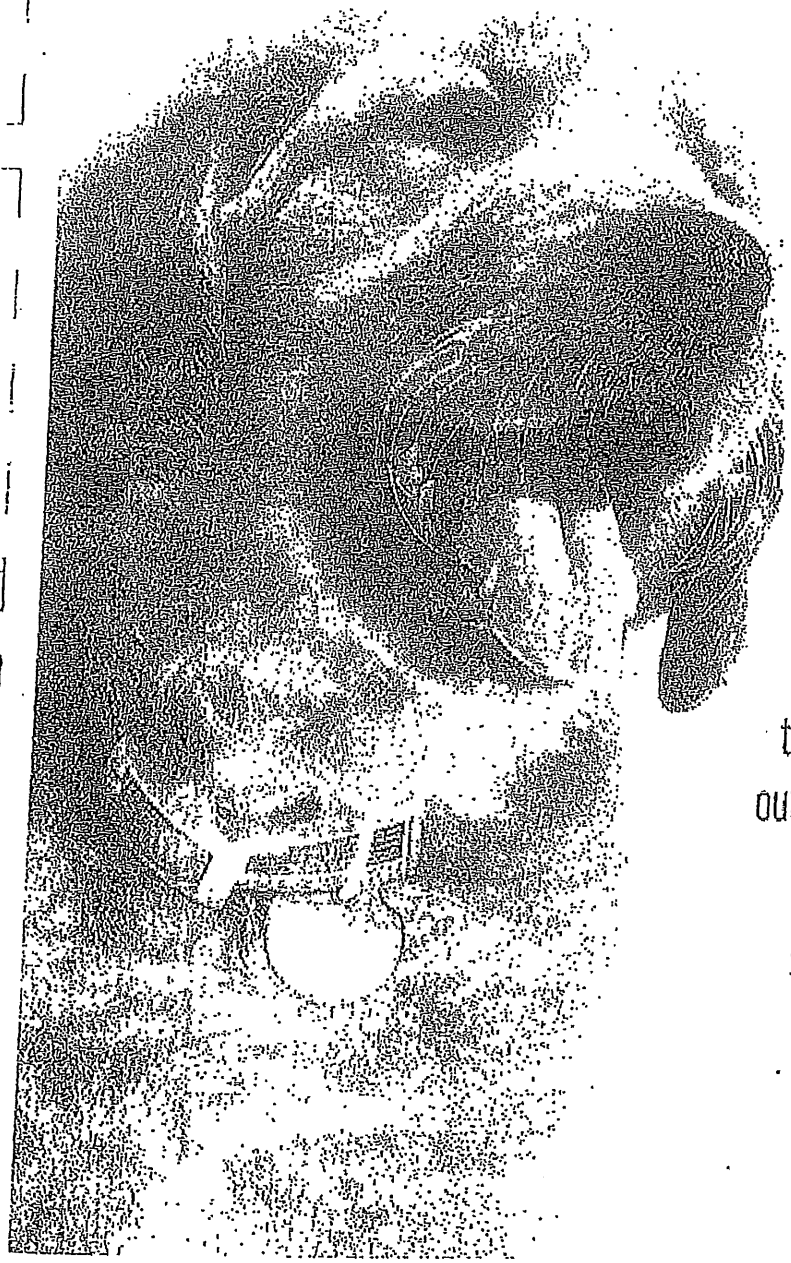
INFILTRATION BASIN CALCULATION				
			DA1	DA2
2	Infiltration rate	in/hr	126	77
3	Safety factor		3.315	2.625
4	Design infiltration rate	in/hr	3.00	3.00
5	Drawn time	hrs	48	48
6	Maximum depth	feet	12.00	12.00
7	Ponding depth	feet	2	2
8	Surface Area	sqft	12000	12000
9	Amended depth	feet	1	1
10	Porosity of amended soil	%	0.35	0.35
11	Gravel depth	feet	3	5
12	Gravel porosity	%	0.35	0.35
13	Duration of storm	hrs	3	3
14	Volume of total retention	cf	49,800	58,200
16	Target volume	cf	46,812	56,693

Pick up after your pooch to curb pollution.



Maybe you weren't aware, but dog waste left on the ground gets into storm drains, polluting rivers, lakes and beaches.

The bacteria and risk of disease threatens the health of our kids and communities. Wherever you live in San Bernardino County, this pollution is a problem. The answer? Pick up after your dog, to help prevent pollution and protect our health. It's in your hands.

CITY OF FONTANA

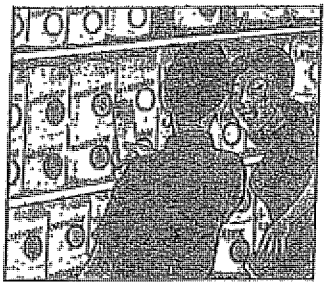
San Bernardino County STORMWATER PROGRAM

Printed on recycled paper

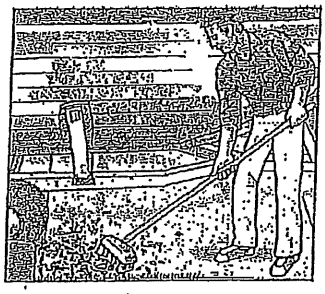
Stormwater Pollution Prevention

PAINTING

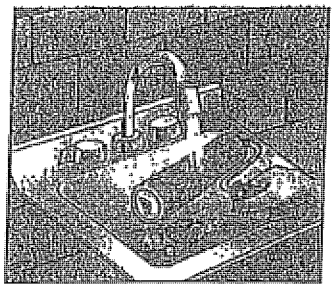
Paints, solvents, adhesives and other toxic chemicals used in painting often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these simple tips to prevent pollution and protect our health.



Water-Based Paints
Use water-based paints whenever possible. They are less toxic than oil-based paints and easier to clean up. Look for products labeled "latex" or "cleans with water."

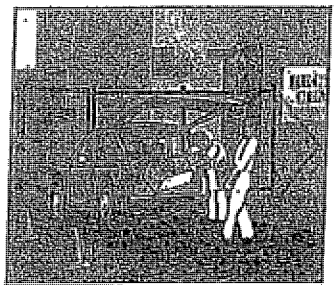


Paint Removal
Sweep up paint stripping residue, chips and dust instead of hosing into the street and dispose of them safely at a household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.



Painting Cleanup
Never clean brushes or rinse paint containers in the street, gutter or near a storm drain. Clean water-based paints in the sink. Clean oil-based paints with thinner, which can be reused by putting it in a jar to settle out the paint particles and then pouring off the clear liquid for future use. Wrap dried paint residue in newspaper and dispose of it in the trash.

Exterior Paint Removal
When stripping or cleaning building exteriors with high-pressure water, block nearby storm drains and divert washwater onto a designated dirt area. Ask your local wastewater treatment authority if you can collect building cleaning water and discharge it to the sewer.



Recycling Paint
Recycle leftover paint at a household hazardous waste collection facility, save it for touch ups or give it to someone who can use it, like a theatre group, school, city or community organization.

To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

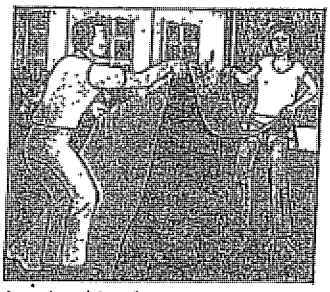
www.1800cleanup.org

CITY OF FONTANA

Pollution Prevention STORMWATER

HOME REPAIR & REMODELING

Paints, solvents, adhesives and other toxic substances used in home repair and remodeling often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these simple tips to prevent pollution and protect your health.

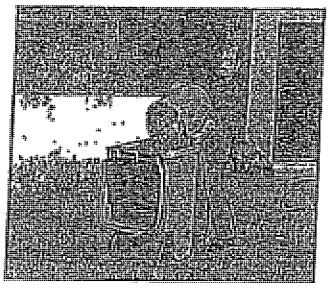


Construction Projects

Keep construction debris away from the street, gutter and storm drains. Schedule grading and excavation projects for dry weather. Cover excavated material and stockpiles of soil, sand or gravel, protected from rain, wind and runoff. Prevent erosion by planting fast-growing annual and perennial grass, which can shield and bind soil.

Recycle Household Hazardous Waste

Household cleaners, paint and other home improvement products like wallpaper and tile adhesives are too toxic to trash. Recycle them instead, at a convenient household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.

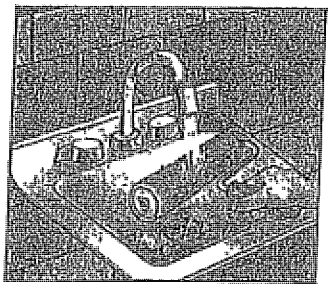


Landscaping & Gardening

Avoid applying fertilizers or pesticide near curbs and driveways, and store covered, protected from rain, wind and runoff. Try using organic or non-toxic alternatives. Reduce runoff and lower your water bill by using drip irrigation, soaker hoses or micro-spray systems. Recycle leaves instead of blowing, sweeping or raking them into the street, gutter or storm drain.

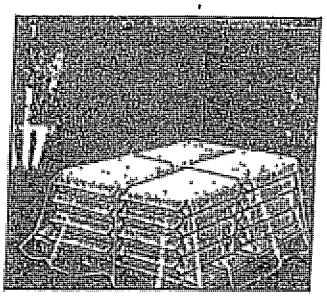
Paint Removal

Paint stripping residue, chips and dust from marine paints and paints containing lead or tributyl tin are hazardous wastes. Sweep them up instead of hosing into the street and dispose of them safely at a household hazardous waste collection facility.



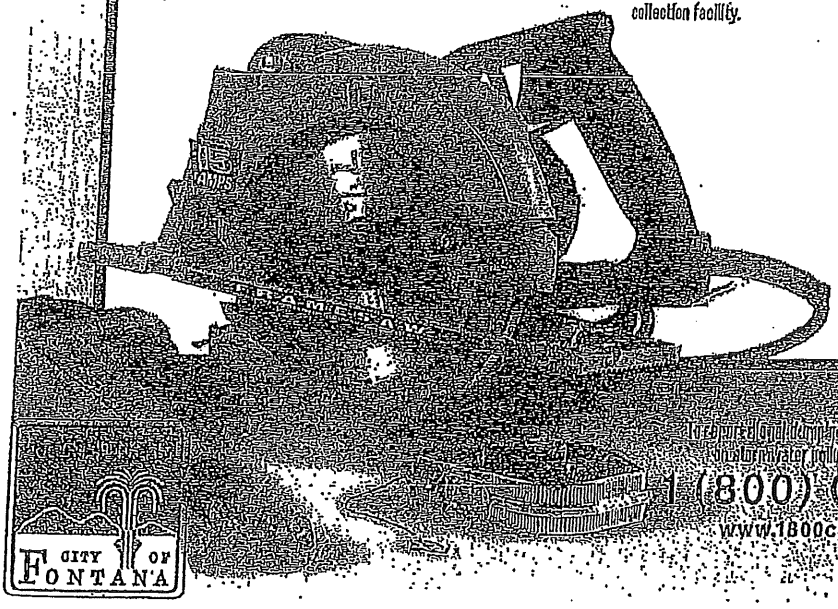
Painting Cleanup

Avoid cleaning brushes or rinsing paint containers in the street, gutter or near a storm drain. Clean water-based paints in the sink. Clean oil-based paints with thinner, which you can filter and reuse. Recycle leftover paint at a household hazardous waste collection facility, save it for touch ups or give it to someone who can use it, like a theatre group, school, city or community organization.



Concrete and Masonry

Store bags of cement and plaster away from gutters and storm drains, and cover them to protect against rain, wind and runoff. Sweep or scoop up cement washout or concrete dust instead of hosing into driveways, streets, gutters or storm drains.



To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

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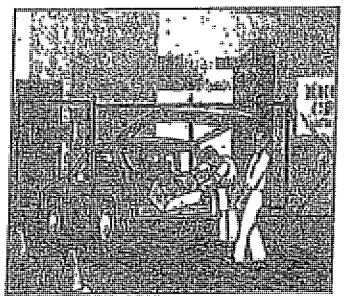
CITY OF FONTANA

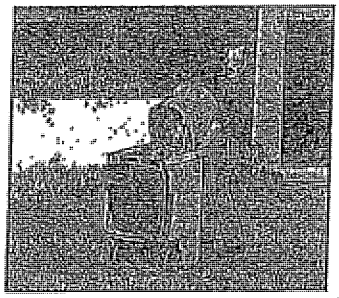
Pollution Prevention STORMWATER

HOME & GARDEN

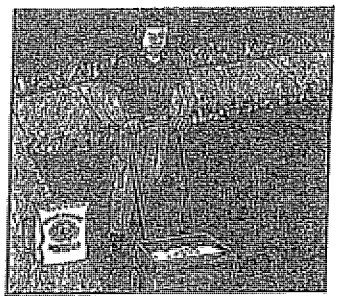
Yard waste and household toxics like paints and pesticides often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these simple tips to prevent pollution and protect your health.



Recycle Household Hazardous Waste
Household products like paint, pesticides, solvents and cleaners are too dangerous to dump and too toxic to trash. Take them to be recycled at a convenient household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.

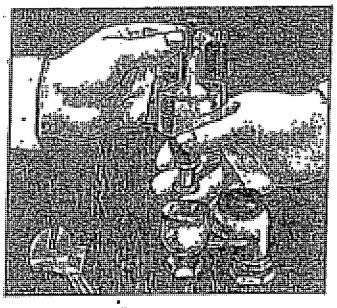


Disposing of Yard Waste
Recycle leaves, grass clippings and other yard waste, instead of blowing, sweeping or hosing into the street. Try grasscycling, leaving grass clippings on your lawn instead of using a grass catcher. The clippings act as a natural fertilizer, and because grass is mostly water, it also irrigates your lawn, conserving water.



Use Fertilizers & Pesticides Safely
Fertilizers and pesticides are often carried into the storm drain system by sprinkler runoff. Try using organic or non-toxic alternatives. If you use chemical fertilizers or pesticides, avoid applying near curbs and driveways and never apply before a rain.

Planting in the Yard
Produce less yard waste and save water by planting low maintenance, drought-tolerant trees and shrubs. Using drip irrigation, soaker hoses or micro-spray systems for flower beds and vegetation can also help reduce your water bill and prevent runoff.



Use Water Wisely
Cut your water costs and prevent runoff by controlling the amount of water and direction of sprinklers. The average lawn needs about an inch of water a week, including rainfall, or 10 to 20 minutes of watering. A half-inch per week is enough for fall and spring. Sprinklers should be on long enough to allow water to soak into the ground but not so long as to cause runoff.

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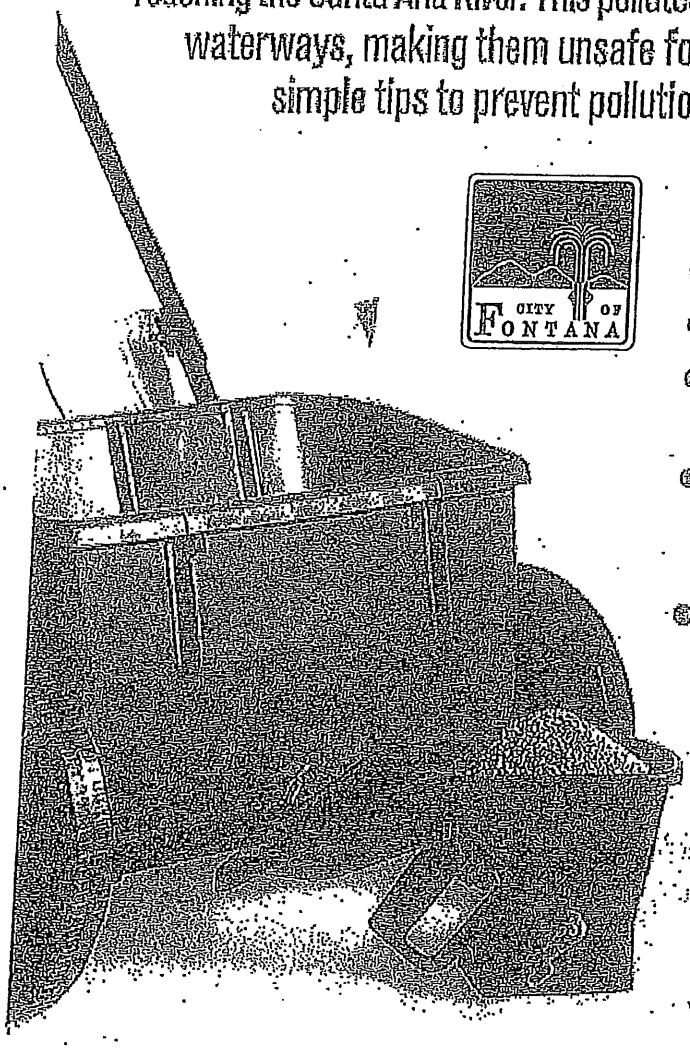
To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

www.1800cleanup.org

Fertilizer Tips to Prevent Pollution

Water that runs off your lawn and garden can carry excess fertilizer into the San Bernardino County storm drain system, and it does not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these simple tips to prevent pollution and protect your health:



CITY OF FONTANA

- Read the product label and follow the directions carefully, using only as directed.
- Avoid applying near driveways or gutters.
- Never apply fertilizer before a rain.
- Store fertilizers and chemicals in a covered area and in sealed, waterproof containers.
- Take unwanted lawn or garden chemicals to a household hazardous waste collection facility. Call (800) 253-2687.
- Use non-toxic products for your garden and lawn whenever possible.

To report illegal dumping or for more information on Stormwater pollution prevention, call:

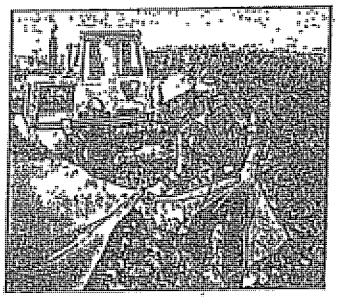
1 (800) CLEANUP

www.1800cleanup.org

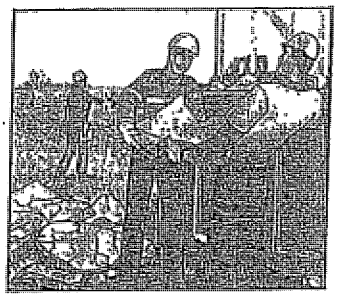
Pollution Prevention STORMWATER

FRESH CONCRETE & MORTAR APPLICATION

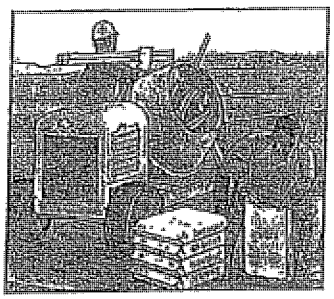
Cement wash, sediment, vehicle fluids, dust and hazardous debris from construction sites often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



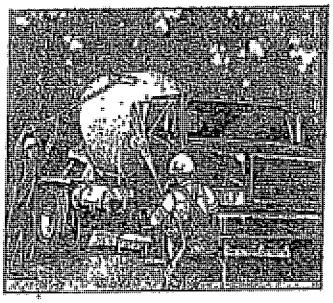
Storing Materials
Keep construction materials and debris away from the street, gutter and storm drains. Secure open bags of cement and cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.



Ordering Materials & Recycling Waste
Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. When breaking up paving, recycle the pieces at a crushing company. You can also recycle broken asphalt, concrete, wood, and cleared vegetation. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. Call (909) 386-8401 for recycling and disposal information.



During Construction
Schedule excavation and grading during dry weather. Prevent mortar and cement from entering the street and storm drains by placing erosion controls. Setup small mixers on tarps or drop cloths, for easy cleanup of debris. Never bury waste material. Recycle or dispose of it as hazardous waste.



Cleaning Up
Wash concrete dust onto designated dirt areas, not down driveways or into the street or storm drains. Wash out concrete mixers and equipment in specified washout areas, where water can flow into a containment pond. Cement washwater can be recycled by pumping it back into cement mixers for reuse. Never dispose of cement washout into driveways, streets, gutters, storm drains or drainage ditches.

CITY OF FONTANA

To report illegal dumping or for more information on storm water pollution prevention call

1 (800) CLEANUP

www.1800cleanup.org

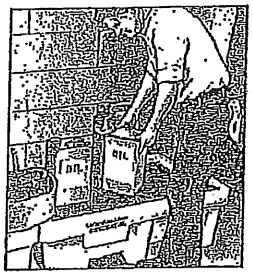
Pollution Prevention

STORMWATER

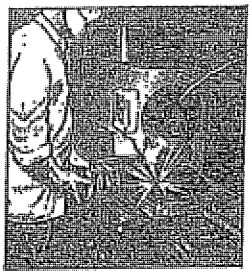
AUTO MAINTENANCE

Oil, grease, anti-freeze and other toxic automotive fluids often make their way into the San Bernardino County storm drain system, and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.

Cleaning Auto Parts
Scrape parts with a wire brush or use a bake oven rather than liquid cleaners. Arrange drip pans, drying racks and drain boards so that fluids are directed back into the parts washer or the fluid holding tank. Do not wash parts or equipment in a shop sink, parking lot, driveway or street.



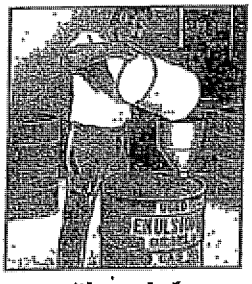
Storing Hazardous Waste
Keep your liquid waste segregated. Many fluids can be recycled via hazardous waste disposal companies if they are not mixed. Store all materials under cover with spill containment or inside to prevent contamination of rainwater runoff.



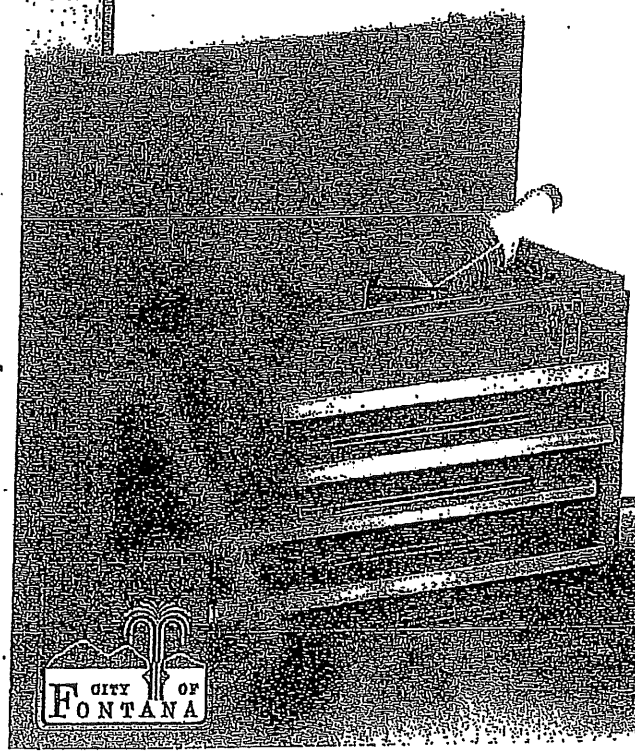
Metal Grinding and Polishing
Keep a bin under your lathe or grinder to capture metal filings. Send uncontaminated filings to a scrap metal recycler for reclamation. Store metal filings in a covered container or indoors.

Preventing Leaks and Spills
Place drip pans underneath to capture fluids. Use absorbent cleaning agents instead of water to clean work areas.

Cleaning Spills
Use dry methods for spill cleanup (sweeping, absorbent materials). Follow your hazardous materials response plan, as filed with your local fire department or other hazardous materials authority. Be sure that all employees are aware of the plan and are capable of implementing each phase. To report serious toxic spills, call 911.



Proper Disposal of Hazardous Waste
Recycle used motor oil and oil filters, anti-freeze and other hazardous automotive fluids, batteries, tires and metal filings collected from grinding or polishing auto parts. Contact a licensed hazardous waste hauler. For more recycling information, call (909) 388-9401.



To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

www.1800cleanup.org

CITY OF FONTANA

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1) INTRODUCTION

This section include copies of the educational materials that will be used in implementing the project specific Water Quality Management Plan.

2. NON-STORM WATER DISCHARGES

2.1 Description

Non-storm water discharges are those flows that do not consist entirely of storm water. Some non-storm water discharges do not include pollutants and may be discharged to the storm drain. These include u neon laminated groundwater and natural springs. There are also some non-storm water discharges that typically do not contain pollutants and may be discharged to the storm drain with conditions. These include car washing, air conditioner condensate, etc. However there are certain non-storm water discharges that pose environmental concern. These discharges may originate from illegal dumping or from internal floor drains, appliances, industrial processes, sinks, and toilets that are connected to the nearby storm drainage system. These discharges can carry substances such as paint, oil, fuel and other automotive fluids, chemicals and other pollutants into storm drains. They can generally be detected through a combination of detection and elimination. The ultimate goal is to effectively eliminate non-storm water discharges to the storm water drainage system through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants on streets and into the storm drain system and creeks.

2.2 Approach

Initially the industry must make an assessment of non-storm water discharges to determine which types must be eliminated or addressed through BMPs. The focus of the following approach is in the elimination of non-storm water discharges.
Ensure that used oil, used antifreeze, and hazardous chemical recycling programs are being implemented.
Encourage litter control.
Develop clear protocols and lines of communication for effectively prohibiting non storm water discharges, especially those that are not classified as hazardous. These axe often not responded to as effectively as they need to be stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as Dump No Waste Drains to Stream stenciled or demarcate next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
Isolate problem areas and plug illicit discharges points.
Inventory and inspect each discharges point during dry weather.
During dry weather the storm water collection system is filled with smoke and then traced to sources. The appearance of smoke at the base of a toilet indicates that there may be a connection between the sanitary and the storm water system.

2.3 Inspection & Reporting

Regularly inspect and clean up hot spots and other storm drainage areas where illegal dumping and disposal occurs.
Never hose down or bury dry material spills. Sweep up the material and dispose of Properly.
For larger spills, a private spill cleanup company or Hazmat team may be necessary. Lighting or barriers may also be-needed to discourage future dumping.
Conduct field investigations of the industrial storm drain system for potential sources of non-storm water discharges.
Report prohibited non-storm water discharges observed during the course of normal daily activities so they can be investigated, contained, and cleaned up or eliminated.
Maintain documentation of illicit connection and illegal dumping incidents, including significant conditionally exempt discharges that are not properly managed.

2.4 Training

Training of technical staff in identifying and documenting illegal dumping incidents is required.Train employees to identify non-storm water discharges and report discharges to the appropriate departments.
Educate employees about spill prevention and cleanup. Well trained employees can reduce human errors that lead to accidental releases or spills.
The employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur. Employees should be familiar with the Spill Prevention Control and Counter measure Plan.
Determine and implement appropriate outreach efforts to reduce non-permissible non-storm water discharges.
When a responsible party is identified, educate the party on the impacts of his or her actions.

Non-storm water discharges to the storm water collection system may include any water used directly in the manufacturing process, air conditioning condensate and coolant, non-contact cooling water, cooling equipment condensate, outdoor secondary containment water, vehicle and equipment wash water, sink and drinking fountain wastewater, sanitary wastes, or other wastewaters. One of the keys to success of reducing or eliminating illegal dumping is increasing the number of people at the facility who are aware of the. problem and who have the tools to at least identify the incident, if not correct it Therefore, train field staff to recognize and report the incidents.

3. SPILL PREVENTION, CONTROL & CLEANUP

3.1 Description

Many activities (that occur at an industrial or commercial site) have the potential to cause accidental *or* illegal spills. Preparation for accidental or illegal spills, with proper training and reporting systems implemented, can minimize the discharge of pollutants to the environment.

Spills and leaks are one of the largest contributors of storm water pollutants. Spill prevention and control plans are applicable to any site at which hazardous materials are stored or used. An effective plan should have spill prevention and response procedures that identify potential spill areas, specify material handling procedures, describe spill response procedures, and provide spill clean-up equipment. The plan should take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur in an effort to prevent pollutants from entering the storm water drainage system, and train personnel to prevent and control future spills.

3.2 Approach

Develop procedures to prevent/mitigate spills to storm drain systems. Develop and standardize reporting procedures, containment, storage, and disposal activities, documentation, and follow-up procedures.

Recycle, reclaim or reuse materials whenever possible. This will reduce the amount of process materials that are brought into the facility.

Store and contain liquid materials in such a manner that if the tank is ruptured, the contents will not discharge, flow, or be washed into the storm drainage system, surface waters, or groundwater.

Place drip pans or absorbent materials beneath al mounted taps, and at all potential drip and spill locations during filling and unloading of tanks. Any collected liquids or soiled absorbent materials must be reused/recycled or properly disposed.

Checks tanks daily for leaks and spills. Replace tanks that are leaking, corroded, or otherwise deteriorating with tanks in good condition. Collect all spilled liquids and properly dispose of them.

Label all containers according to their contents.

3.3 Spill Control and Cleanup Activities

Follow the Spill Prevention Control Countermeasure Plan.
Clean up leaks and spills immediately.
Place a stockpile of spill cleanup materials where it will be readily accessible.
Never hose down or bury dry material spills. Sweep up the material and dispose of Properly.
Chemical cleanups of material can be achieved with the use of adsorbents, gels, and forms.
Use adsorbent materials on small spills rather than hosing down the spill.
Remove the adsorbent materials promptly and dispose of properly.
For larger spills, a private spill cleanup company or Hazmat team may be necessary.

3.4 Reporting

Reporting spills that pose an immediate threat to human health or the environment to the Regional Water Quality Control Board.
Federal regulations require that any oil spill into a water body or onto an adjoining shoreline be reported to the National Response Center(NRC) at 800-424-8802 (24 hours)
Report spills to local agencies, such as the fire department; they can assist in cleanup.
Designated areas should be impervious and paved with Portland cement concrete, free of cracks and gaps, in order to contain leaks and spills.
Maintenance is critical to preventing leaks and spills. Conduct routing inspections.
Perform all vehicle fluid removal or changing inside or under cover to prevent the run-on of storm water and the runoff of spills.

3.5 Training

Educate employees about spill prevention and cleanup.
The employee should have the tools and knowledge to immediately begin cleaning up as pill should one occurs. Employees should be familiar with the spill Prevention Control and Countermeasure Plan.
Employees should be educated about aboveground storage tank requirements. Employees responsible for aboveground storage tanks and liquid transfers should be thoroughly familiar with the Spill Prevention Control Countermeasure Plan and the plan should be readily available.
Train employees to recognize and report illegal dumping incidents.
For the purposes of developing a spill prevention and response program to meet the storm water regulations, facility managers should use information provided in this fact sheet and the spill prevention/response portions of the fact sheet in this handbook, for specific activities.

4. OUTDOOR EQUIPMENT OPERATIONS

4.1 Description

Outside process equipment operations and maintenance can contaminate storm water runoff. Activities, such as grinding, painting, coating, sanding, degreasing or parts cleaning, landfills and waste piles, solid waste treatment and disposal, are examples of process operation that can lead to contamination of storm water runoff. Source controls for outdoor process equipment operations and maintenance include reducing the amount of waste created, enclosing or covering all or some of the equipment, installing secondary containment, and training employees.

4.2 Approach

Perform the activity during dry periods.
Use non-toxic chemicals for maintenance and minimize or eliminate the use of solvents.
Consider enclosing the activity in a building and connecting the floor drains to the sanitary sewer.
Minimize contact of storm water with outside process equipment operations through berming and drainage routing. If possible, connect process equipment area to public sewer or facility wastewater treatment system. Some municipalities require that secondary containment areas be connected to the sanitary sewer, prohibiting any hard connections to the storm drain.
Keep your Spill Prevention Control and Countermeasure Plan up-to-date. Place a stockpile of spill cleanup materials where it will be readily accessible.
Prevent operator errors by using engineering safe guards and thus reducing accidental releases of pollutant.
Inspect storage areas regularly for leaks or spills. Also check for structural failure, spills and overfills due to operator error, and/or failure of piping system.

4.3 Training

Train employees to perform the activity during dry periods only or substituting benign materials for more toxic ones.
Train employee and contractors in proper techniques for spill containment and cleanup. Employees should have the tools and knowledge to immediately begin cleaning up a spill should one occur.

4.4 Prevention

Keep Spill Prevention Control and Counter measure Plan up-to-date.
Have employees trained in emergency spill cleanup procedures present when dangerous waste, liquid chemicals, or other wastes are delivered.
Place a stockpile of spill cleanup materials where it will be readily accessible.

5. OUTDOOR LOADING / UNLOADING

5.1 Description

The loading/unloading of materials usually lakes place outside on docks or terminals; therefore materials spilled, leaked, or lost during loading/unloading may collect in the soil or on other surfaces and have the potential to be carried away by storm water runoff or when the area is cleaned. Additionally, rainfall may wash pollutant from machinery used to unload or move materials. Implementation of the following protocols will prevent or reduce the discharge of pollutants to storm water from outdoor loading/unloading of materials.

5.2 Approach

Reduce potential for pollution discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Keep accurate maintenance logs to evaluate materials removed and improvements made.
Parks tank trucks or delivery vehicles in designated areas so that spills or leaks can be contained.
Limit exposure of material to rainfall whenever possible.
Prevent storm water run-on.
Check equipment regularly for leaks
Develop an operations plan that describes procedures for loading and/or unloading.
Conduct loading and unloading in dry weather if possible.
Cover designated loading/unloading areas to reduce exposure of materials to rain
Have employees load and unload all materials and equipment in covered areas such as building overhangs at loading docks if feasible.
Load/unload only at designated loading areas.
Pave loading areas with concrete instead of asphalt.
Avoid placing storm drains in the area.
Keep your Spill Prevention Control and Countermeasure Plan up-to-date
Store and maintain appropriate spill cleanup materials in a location. that is readily accessible and known to all and ensure that employees are familiar with the site spill control plan and proper spill cleanup procedures.
Have an emergency spill cleanup plan readily available
Use drip pans or comparable devices when transferring oils, solvents, and paints.

5.3 Inspection

Check loading and unloading equipment regularly for leaks, including valves, pumps, flanges and connections.
Look for dust or fumes during loading or unloading operations.

5.4 Training

Train employees and contractors on proper spill containment and cleanup.
Have employees trained in spill containment and cleanup present during loading/unloading.
Train employees in proper handling techniques during liquid transfers to avoid spills
Make sure forklift operators are properly trained on loading and unloading procedures.

5.5 Prevention

Keep Spill Prevention Control Countermeasure Plan up-to-date.
Contain leaks during transfer.
Store and maintain appropriate spill cleanup materials in a location that is readily accessible and known to all and ensure that employees are familiar with the site spill control plan and proper spill cleanup procedures.
Have an emergency spill cleanup plan readily available.
Use drip pans or comparable devices when transferring oil, solvents, and paints.

6. WASTE HANDLING & DISPOSAL

6.1 Description

Improper storage and handling of solid wastes can allow toxic compounds, oils and greases, heavy metals, nutrients, suspended solids, and other pollutants to enter storm water runoff. The discharge of pollutants to storm water from waste handling and disposal can be prevented and reduced by tracking waste generation, storage, and disposal reducing waste generation and disposal through source reduction, reuse, and recycling; and preventing run-on and runoff. Approach

Accomplish reduction in the amount of waste generated using the following source controls:

Production planning and sequencing Process or equipment modification -
Raw material substitution or elimination Loss prevention and housekeeping Waste segregation and separation Close loop recycling

Establish a material tracking system to increase awareness about material usage.
This may reduce spills and minimize contamination, thus reducing the amount of waste produced.
Recycle materials whenever possible, Sweep and clean the storage area regularly. If it is paved, do not hose down the area to a storm drain.
Dispose of rinse and wash water from cleaning waste containers into a sanitary sewer if allowed by the local sewer authority. Do not discharge wash water to the street or storm drain.
Transfer waste from damaged containers into safe containers.
Take special care when loading or unloading wastes to minimize losses. Loading systems can be used to minimize spills and fugitive emission losses such as dust or mist.
Vacuum transfer systems can minimize waste loss.

Controlling Litter and Waste Collection
Post No Littering signs and enforce antilitter laws.
Provide a sufficient number of litter receptacles for the facility.
Clean out and cover Utter receptacles frequently to prevent spillage.
Inspect solid waste containers for structural damage regularly. Repair or replace damaged containers as necessary.
Do not mix wastes; this can cause chemical reactions, make recycling impossible, and complicate disposal.
Ensure that only appropriate solid wastes are added to the solid waste container.
Certain wastes such as hazardous wastes, appliances, fluorescent lamps, pesticides, etc., may not be disposed of in solid waste containers.

6.2 Inspection

Inspect and replace faulty pumps or hoses regularly to minimize the potential of releases and spills.
Check waste management areas for leaking containers or spills.
Repair leasing equipment including valves, lines, seals, or pumps promptly.

6.3 Training

Train staff in pollution prevention measures and proper disposal methods.
Train employees and contractors in proper spill containment and cleanup.
The employee should have the tools and knowledge to immediately begin cleaning up a spill should one occur.
Train employees and subcontractors in proper hazardous waste management

6.4 Prevention

Keep Spill Prevention Control and Countermeasure Plan up-to-date.
Have an emergency plan, equipment and trained personnel ready at all times to deal immediately with major spills.
Collect all spilled liquids and properly dispose of them.
Store and maintain appropriate spill cleanup materials in a location known to all near the designated wash area.

7. OUTDOOR STORAGE OF RAW MATERIALS

7.1 Description

Raw materials, by-products, finished products, containers, and material storage areas exposed to rain and/or runoff can pollute storm water. Storm water can become contaminated when materials wash off or dissolve into water or are added to runoff by spills and leaks. Improper storage of these materials can result in accidental spills and the release of materials. To prevent or reduce the discharge of pollutants to storm water from material delivery and storage, pollution prevention and source control measures must be implemented, such as minimizing the storage of hazardous materials on-site$_3$ enclosing or covering materials, storing materials in a designated area, installing secondary containment, conducting regular inspections, preventing storm water run-on and runoff, and training employees and subcontractors.

7.2 Approach

Emphasize employee education for successful BMP implementation.
Keep an accurate, up-to-date inventory of the materials delivered and stored on-site.
Keep chemicals in their original containers and keep them well labeled.
Keep outdoor storage containers in good condition.
Minimize storm water run-on by enclosing the area or building a berm around it.
Secure drums stored in an area where unauthorized persons may gain access to prevent accidental spillage, pilferage, or any unauthorized use. Curbing should be placed along the perimeter of the area to prevent the run-on of uncontaminated storm water from adjacent areas as well as runoff of storm water from the stockpile areas.

7.3 Inspection

Conduct regular inspections of storage areas so that leaks and spills are detected as soon as possible.
Check berms, curbing, containment for repair and patching.

7.2 Training

Train employees well in proper material storage.
Train employees and contractors in proper techniques for spill containment and cleanup.

7.3 Prevention

Keep Spill Prevention Control and Countermeasure Plan up-to-date. Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers near the storage area where it will be ready accessible.
Have employees trained in spill containment and cleanup present during the loading/unloading of dangerous wastes, liquid chemicals, or other materials.

8. BUILDING & GROUNDS MAINTENANCE

8.1 Description

Storm water runoff from building and grounds maintenance activities can be contaminated with toxic hydrocarbons in solvents, fertilizers and pesticides, suspended solids, heavy metals, abnormal pH, and oils and greases. Utilizing the protocols in this fact sheet will prevent or reduce the discharge of pollutants to storm water from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the storm water collection system.

8.2 Approach

Reduce potential for pollutant discharge through source control pollution prevention and BMP implementation. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Switch to non-toxic chemicals for maintenance when possible.

Choose cleaning agents that can be recycled.
Encourage proper lawn management and landscaping, including use of native vegetation.
Encourage use of Integrated Pest Management techniques for pest control.
Encourage proper onsite recycling of yard trimmings.
Recycle residual paints, solvents, lumber, and other material as much as possible.
If soaps or detergents are not used, and the surrounding area is paved, wash runoff does not have to be collected but must be screened. Pressure washers must use filer fabric or some other type of screen on the ground and/or in the catch basin to trap the particles in wash water runoff.
If pressured washing on a grassed area (with or without soap), runoff must be dispersed as sheet flow as much as possible, rather than as a concentrated stream. The wash runoff must remain on the grass and not drain to pavement

8.3 Landscaping Activities

Dispose of grass clippings, leaves, sticks, or other collected vegetation as garbage, or by composting. Do not dispose of collected vegetation into waterways or storm drainage system. Use mulch or other erosion control measures on exposed soils.

8.4 Building Repair, Remodeling and Construction

Do not dump any toxic substance or liquid waste on *the* paveme.nl, the ground, or toward a storm drain.
Use ground or drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of collected material daily.
Use a storm drain cover, filter fabric, or similarly effective runoff control mechanism if dust, grits wash water, or other pollutants may escape the work area and enter a catch basin. This is particularly necessary on rainy days.
Store toxic material under cover during precipitation events and when not in use. A Cover would include tarps or other temporary cover material.

8.5 Inspection

Inspect irrigation system periodically to ensure that the right amount of water is being applied and that excessive runoff is not occurring. Minimize excess watering and repair leaks in the irrigation system as soon as they are observed.

8.6 Training

Educate and train employees on pesticide use and in pesticide application techniques to
prevent pollution.
Train employees and contractors in proper techniques for spill containment and cleanup Be sure the frequency of training takes into account the complexity of the operations and
the nature of the staff.

8.7 Prevention

Keep Spill Prevention Control and Countermeasure Plan up-to-date.
Place a stockpile of spill cleanup materials, such as brooms, dustpans, and vacuum sweepers near the storage area where it wall be readily accessible.
Have employees trained in spill containment and cleanup present during the, loading/unloading of dangerous wastes, liquid chemicals, or other materials. Clean up spills immediately.

9. PARKING / STORAGE AREA MAINTENANCE

9.1 Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through storm water runoff or non-storm water discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMP s and training employees.

9.2 Approach

The goal of this program is to ensure storm water pollution prevention practices are considered when conducting activities on or around parking areas and storage areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Encourage alternative designs and maintenance strategies for impervious parking lots.

Keep accurate maintenance logs to evaluate BMP implementation.

Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.

Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

9.3 Controlling Litter, Surf ace Cleaning, and Repair

Post No Littering signs and enforce anti-litter laws.

Provide an adequate number of litter receptacles.

Routinely sweep, shovel, and dispose of litter in the trash.

Use dry cleaning methods to prevent the discharge of pollutants into the storm water conveyance system if possible.

Sweep all parking lots at least once before the onset of the wet season.

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting storm water runoff.

Use only as much water as necessary for dust control, to avoid runoff.

Catch drips from paving equipment that is not in use with pans or absorbent material place under the machines. Dispose of collected material and absorbents property.

9.4 Inspection

Have designated personnel conduct inspections of parking facilities and storm water conveyance systems associated with parking facilities on a regular basis.

9.5 Training

Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.

Train employees and contractors in proper techniques for spill containment and cleanup.

9.6 Prevention

Keep Spill Prevention Control Countermeasure Plan up-to-date.

Place stockpile of spill cleanup materials where it will be readily accessible or at a central location.

Clean up fluid spills immediately with absorbent rags or material. *JBS* Dispose or spilled material and absorbents properly.

10. METHOD TO PREVENT STORM WATER POLLUTION

Who is responsible for Storm Water Pollution Prevention?

10.1 In one sentence

Each individual working in the company is a responsible party. Of course there is one employee in charge of the program, but without your co-operation his/her job will be very difficult. We should keep our eyes open watching for any possible source of pollutants and either eliminate it or at least if you can't report the situation immediately to the management.

What is our company's propose to prevent storm water pollution?

(a) Facility Design
The site storm water run off is mainly directed to under ground filtration chambers. This means mat the storm water run off is going to the under ground reservoirs. To Reduce the under ground water pollution the storm water run off is going first to a "Filtration System" with high efficiency to capture the majority of sediments, oil and grease, suspended solid and will treat some of the dissolved solids and nutrients. Any equipment in the world has a limit in capacity. If we over load the filtration system with pollutants, the result are some of the pollutants will escape the system and go to the Filtration Chambers. We have to do what we agreed on; otherwise the "Filtration System" will be overwhelmed. It is not only some pollutants will escape the Filter but also it will be clogged with debris.

In the Original design of the facility there are two major Best Management Measures used:

(1) Filtration System (Show the slide of the filter drawing/picture)
(2) Filtration Chambers. (Show the drawing/picture of the filtration chamber)
Offer brief explanation of how these two BMP's function.

In the Water Quality Management Plan you can find the maintenance procedures and schedule for these two measures.

(b) Operation and Maintenance
Through the implementation of the Water Quality Management the company is taking all possible precautions to prevent the storm water run off pollution. Actually the training we have today is part of this plan.

Periodical inspection and maintenance of at the BMP's are required.
Copy of the "WQMP" is available for you to review.

[At this time the trainer will pick up a copy of the plan and show it to the trainees. Also the trainer shall highlight the main sections of the plan]

Once the trainer completes that he/she will guide the trainees through the facility to show them where are the "Filtration System" inlet and the location of the "Filtration Chambers". Then the trainer shall guide the group to show the landscape areas around the parameter of the site and how the sprinkler system is designed and controlled.

Then back to the class room to complete the training.

GOVERNMENT ORGANIZATIONS INVOLVED IN THE WQMP AND REGULATIONS:

Storm water pollution prevention started with Federal Regulations "Clean Water Act". States and Counties established detailed regulations in implementing the federal program. The program in the State of California is managed by The State Water Quality Control Board. Riverside County and City of Perris are responsible for enforcing the program and monitoring the compliance of all Commercial and Industrial Facilities in their jurisdiction.

The regulations allow the local authorities to impose penalties on violators. These penalties range from warning to fines and imprisonment depending on the kind of violation. Repeated violations or ignoring the required corrective actions can escalate the level of penalty even if it is a minor violation.

It is for every employee benefit to avoid any kind of violation. Penalties can threaten the continuation of the business operation. The bottom line is, when prevent storm water pollution we are:

(1) Protect our health and our children health
(2) Protect our job in Western Way Recycling

Let's make Pollution Prevention Part of our Daily Life

Class Room Training

The class room training shall cover the following:

1. What is the definition of storm water?
2. Where the storm water goes?
3. Why we are concerned about preventing the storm water pollution?
4. What are the substances that may pollute the storm water in general and what are the specific site potential pollutants?
5. How we can prevent those pollutants from reaching the storm water?
6. Who is responsible for storm water pollution prevention?
7. What our company (Western Way Recycling, Inc.) did and doing to prevent the storm water pollution?
8. The government organization responsible for the storm water pollution prevention program.

The Trainer: A qualified company employee or outside qualified consultant

Class room environment and tools:
Shall be comfortable setting using overhead projector. Preferred to have pictures of the existing on site BMPs (The retention area, filtration system and Infiltration Chambers Maximum number of trainees per class is 10 employees.

Method of approach:
Dynamic interaction based on addressing questions to the trainees. It is very important t& tie the training to the trainee's real life daily practice. At the end of the class the trainer should give sufficient time for the trainees to ask questions and generate suggestions from the trainees. Any suggestion regardless if it may look not valid shall be considered for discussion and positive criticism by the group.
The final list of employee's suggestions shall be presented to the company management for consideration. This is the best way to get the employees to participate in the implementation of the program.

Class room training shall be on annual base. The training material shall be revised to include:

- Employees suggestions from the previous training
- Update in permit conditions
- Any new regulations
- Any change in the operations

1. What is the Storm Water?

It is in common term the Rain Water. The natural cycle of water on earth start from the evaporated water mainly off the world large water bodies (Oceans, Seas, and Lakes). The water vapor forms the clouds which under certain weather conditions fall on the ground water drops or snow.

2. Where the Storm Water Goes?

The Storm Water (Rain) is the life blood for all human beings, animals and plants. Looking at the world map there are large areas just plain desert Good example is the desert areas in California. If God forbid- we suffer drought for extended period of time-say 7 to 8 years- our whole state will turn gradually to be desert. Considerable amount of rain water penetrate the surface soil and ends up in the under ground naturally created reservoirs which we call aquifers. These aquifers are the source of water feeding the water wells. The Inland empire and San Gabriel Valley area depending on the under ground water for the majority of these areas residential, commercial and industrial water supply needs. The rest of the rainwater which fall on the paved street, buildings, parking lots or any other impervious surfaces are collected by a huge piping net work and flood control channels and directed to the ocean. In addition there is always runoff quantity of rain water the soil can not absorb -especially in times of heavy rain- also goes to the storm water piping and flood control channels. If you look carefully under the streets curbs you can see large openings which are the inlet to the flood control system.

3. Why we are concerned about preventing the Storm Water Pollution?

Considering what we discussed before, the rain water will end up either in the ocean or in the under ground water reservoirs. The ocean is the world of magnificent marine life supplied us with all kinds of seafood Also it is where we go with our children to enjoy swimming and playing. Any pollutants may end up in the bodies of the seafood we eat. In case of high pollution the ocean beaches will be dangerous for the adults and children. The under ground water is what we are using in our homes for drinking, cooking, cleaning and other purposes.
In very short answer, WE PREVENT THE RAIN WATER POLLUTION BECAUSE WE ARE PROTECTING OUR SELF.

4. Pollutants

Pollutants are any substance which can represent threat to human life, marine life and plants. They range from mild pollutants to extremely dangerous and toxic pollutants. No doubt that the modern civilization created hundreds of chemicals that were not in nature before or were not exposed to use. Examples are: Oil and Grease, mercury compounds, solvents, pesticides, chemical fertilizers, specific metals and metal compounds etc. In the attached publication by Federal EPA # 833-B-03-002 you can see how different pollutants can affect the marine life. These pollutants include: Debris, Sediments, Excess Nutrients, Bacteria and Household Hazardous In our operation here we receive tons of empty cans, glass bottles and printed paper. The rain water can wash down the recyclable materials which potentially carry several pollutants. These pollutants can end up either to storm water drainage system then to the ocean or in the underground water.

5. How can we prevent the pollutants from mixing with the storm water?

a) Housekeeping; we can not stress enough the importance of housekeeping. Clean yard and well organized storage of material is the first pollution prevention measure.
b) Containment of any spilled liquids. In case some of the containers may have left over fluids, the operator should not allow the spill to spread all over the place. Use absorbents to contain the spill. DO NOT WASH ANY SPILL BY HOSING IT DOWN THE STORM WATER DRAIN.
c) No car wash or truck wash on site
d) No oil change or any car repair shall be performed on site.
e) Customers and employees shall use the available trash cans and not to litter the trash any where.
f) It is forbidden to intentionally dispose of any fluids to the storm water drain specially waste oil, cleaners, soap, alcohol beverage, pesticides, weed Wing chemicals, acids and alkaline .
g) Watch for any excess plant and lawn watering. The excessive watering and cause run-off to the storm water drain. Most probably the run off will carry with it sediments, soil fertilizers and pesticide (If it was in the soil)
h) Now the trainer can ask the attendees to suggest more measures

6. Who is Responsible for Storm Water Pollution Prevention?

In one sentence: Each individual working in the company is a responsible party.
Of course there is one employee in charge of the program, but without your co-operation his / her job will be very difficult. We should keep our eyes open watching for any possible source of pollutants and either eliminate it or at least if you can 7 report the situation immediately to the management.

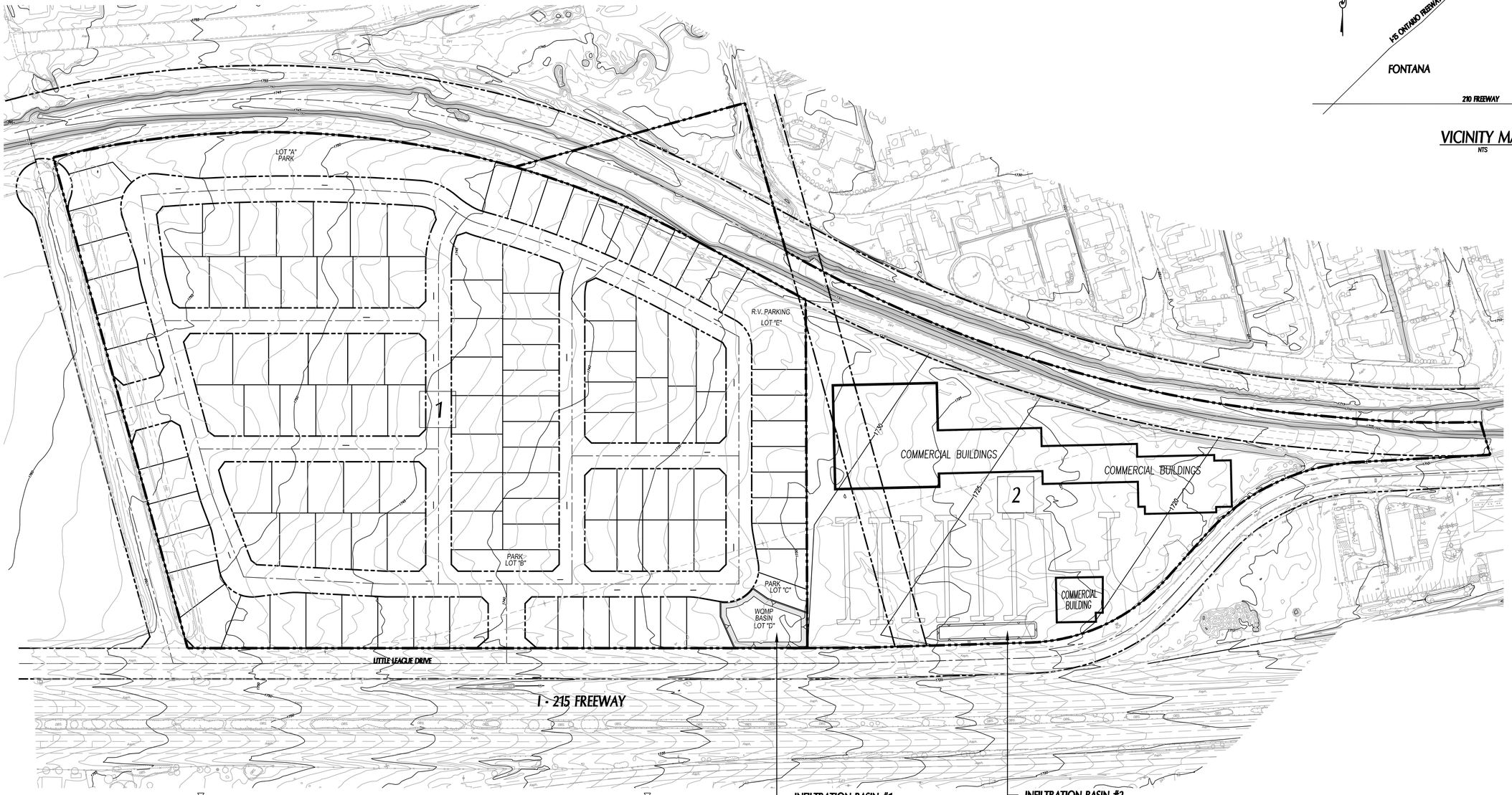
7. What is our company is doing to prevent storm water pollution?

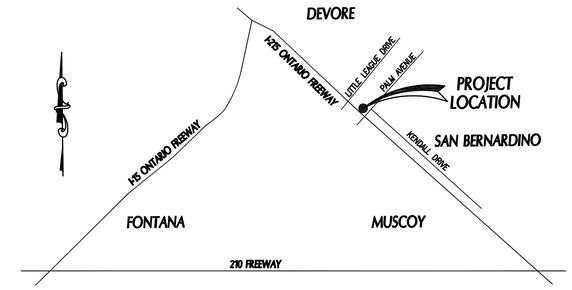
(a) Facility Design
The site storm water run off is mainly directed to under ground filtration chambers. This means that the storm water run off is going to the under ground water reservoirs. To reduce the under ground water pollution the storm water run off is going first to a violation. Repeated violations or ignoring the required corrective actions can escalate the level of penalty even if it is a minor violation.
It is for every employee benefit to avoid any kind of violation. Penalties can threaten the continuation of the business operation. The bottom line is, when prevent storm water pollution we are:

1) Protect our health and our children health
2) Protect our job in "Rancho Palma Project

3) Protect our health and our children health
4) Protect our job in Rancho Palma Project

RANCHO PALMA





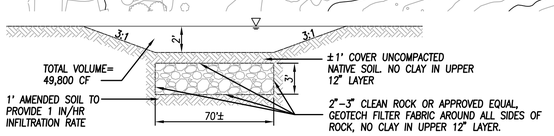
VICINITY MAP
NTS

NOTE:
VOLUME MAY BE IN LANDSCAPE AREAS OR SUBSURFACE PER THE PREFERENCE OF THE DEVELOPER.

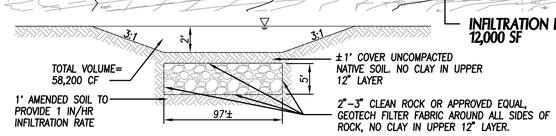
LEGEND:

- 1 — DRAINAGE AREA NUMBER
- DRAINAGE AREA BOUNDARY
- FLOW DIRECTION
- SD — ONSITE STORM DRAIN

GRAPHIC SCALE
80 0 40 80 160 320
(IN FEET)
1 inch = 80 ft.



CROSS SECTION
INFILTRATION BASIN #1
NTS



CROSS SECTION
INFILTRATION BASIN #2
NTS

BMP STATISTICS:

WATERSHED	AREA (AC)	BMP	REQUIRED VOLUME (CF)	PROVIDED VOLUME (CF)
DA 1	28.3	INFILTRATION BASIN #1	46,812	49,800
DA 2	9.3	INFILTRATION BASIN #2	56,693	58,200

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CITY OF SAN BERNARDINO
CALIFORNIA

WQMP EXHIBIT
SITE MAP

PLOT DATE: December 28, 2015 drafter48
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3.8-2 HYDROLOGY AND HYDRAULICS REPORT

ALLARD ENGINEERING

civil engineering land surveying land planning

Rancho Palma Hydrology & Hydraulics Report

December 15, 2015

Prepared For:
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Developed Hydrology Exhibit Residential and Commercial areas

Discussion

Introduction

Rancho Palma Project comprises an area of approximately 37.6 acres in the City of San Bernardino, San Bernardino County. This project is a proposed mix of residential and commercial development located north of Freeway 215.The site lays north of Little League Drive, south of Cable Creek Channel, West of Magnolia Avenue and east of Palm Avenue in the City of San Bernardino, California. The development will create 120 single family dwellings, landscape areas and RV parking area for a total of 28.3 Ac on the west side of the site and a commercial site including retail uses, parking spaces, circulation areas and landscape areas. The commercial site will be located at the east side of the site with a total of 9.3 Ac

The residential area will direct the storm water runoff through the proposed streets and into an infiltration basin (IB#1) and from there into a proposed pipe system outside the site on Little League Drive that will carry the flows into the Cable Creek. Two pairs of flow-by catch basins and one sump catch basin are proposed inside the residential area, to convey the flows into the infiltration basin. (IB#1)

The commercial area will direct the storm water runoff through the parking and circulation areas, to the southern portion of the site into infiltration basin (IB#2), after the basin the flows from the commercial site will join the pipe system coming from the residential area in Little League Drive.

Purpose

The purpose of this Drainage Report is to determine storm water runoff for the site and the associated tributary areas and show that the runoff is conveyed in a safe manner. Detailed hydraulic calculations for streets, storm drain systems and catch basins will be included in the final report.

Criteria

The criteria utilized for hydrologic analysis is the San Bernardino County Hydrology Manual. Civil Cad and Civild computer software were utilized to perform computations. In accordance with San Bernardino County policy, the detention basins analysis utilizes the following antecedent moisture content (AMC) of the soil and rainfall intensities:

Soil type and Intensity Table

Soil Type "A"
Intensity:
100 year storm 1 hour duration = 2.11"
10 year storm 1 hour duration = 1.29"

Findings

All the storm water runoff will be conveyed to a storm drainage system that consists of five proposed catch basins which will pick up all the flows of the residential project to convey them into a proposed infiltration basin located south east corner of the residential area. On the commercial site the storm water runoff will sheet flow through the parking, circulation and landscape areas reaching the infiltration basin at the southern portion of the site. After both areas, commercial and residential have reached their respective basin, flows will be conveyed through a pipe system to the intersection of Palm Ave. and Little league Ave. to be safely delivered into Cable Creek. The proposed storm drain system will provide protection to homes, commercial premises, streets, parking areas and they will designed according the City and County of San Bernardino Flood Control Department guidelines.

Peak flow rate for the residential area

Q = 92.7 cfs for 100 year storm

Q = 50.6 cfs for 10 year storm

Peak flow rate for the commercial area

Q = 50.6 cfs for 100 year storm

Hydrology Reference Material

Rivo TVX | Google Maps | PFDS: Contiguous US | Edmund
hdsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca
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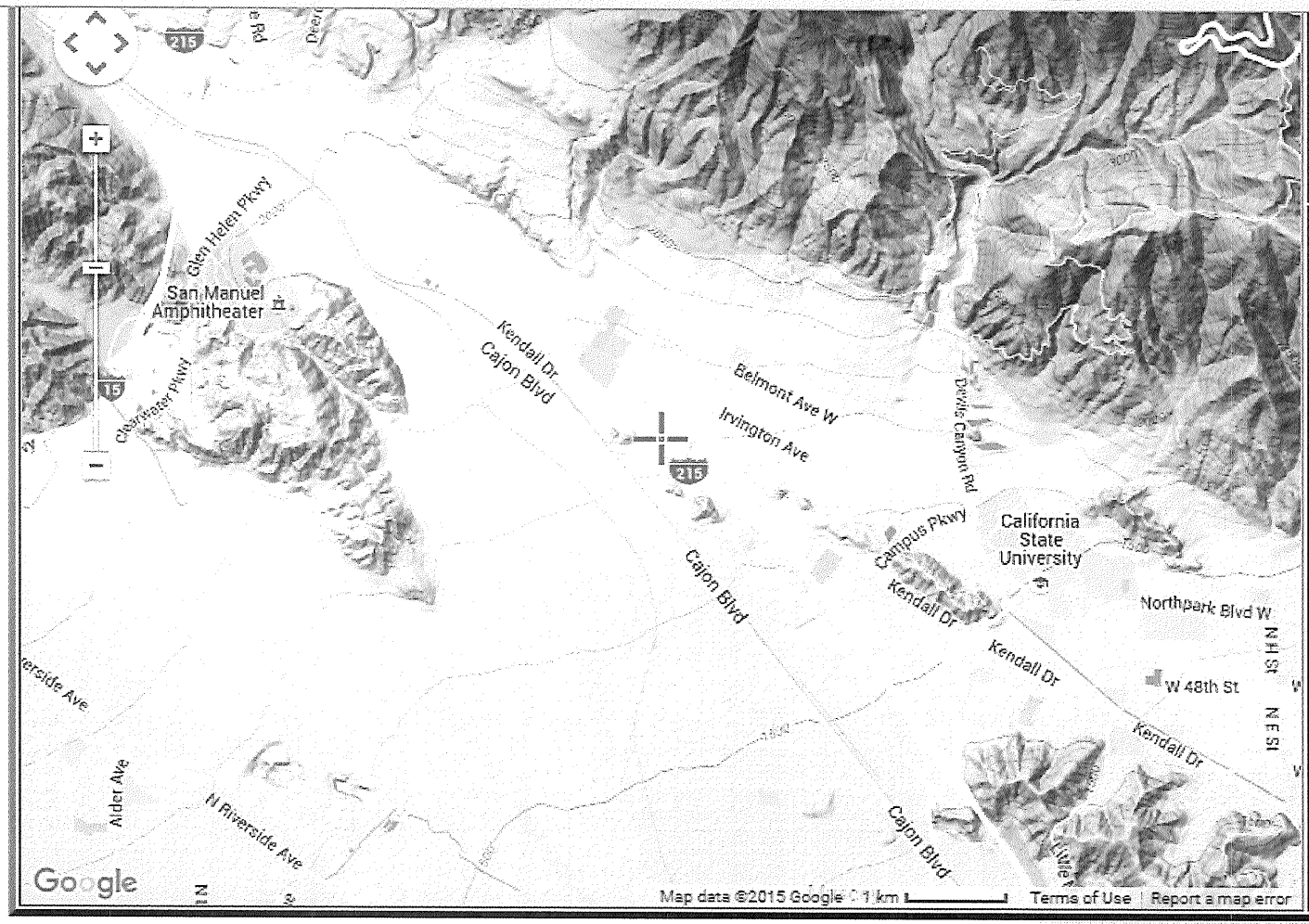

a) Select location
(move crosshair or double click)

b) Click on station icon
(☐ show stations on map)

LOCATION INFORMATION:

Name: San Bernardino, California, US*

Latitude: 34.1927°

Longitude: -117.3628°

Elevation: 1716 ft*

* source: Google Maps

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION

NOAA Atlas 14, Volume 6, Version 2

Rivo TVX | Google Maps | PFDS: Contiguous US | Edmund
ndsc.nws.noaa.gov/hdsc/pfds/pfds_map_cont.html?bkmrk=ca
Show - Open ... | Rojadirecta.me - fen... | AronRa | Eyelet Fabric - Disco... | How to Determine R... | Wood beam calcula... | Alberto cortez, Retr... | digitalcommons.fiu...

POINT PRECIPITATION FREQUENCY (PF) ESTIMATES

WITH 90% CONFIDENCE INTERVALS AND SUPPLEMENTARY INFORMATION
NOAA Atlas 14, Volume 6, Version 2

PF tabular | PF graphical | Supplementary information | Print Page

PDS-based precipitation frequency estimates with 90% confidence intervals (in inches)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.150 (0.125-0.182)	0.204 (0.169-0.248)	0.275 (0.227-0.335)	0.333 (0.273-0.410)	0.414 (0.328-0.527)	0.477 (0.370-0.621)	0.543 (0.411-0.724)	0.612 (0.451-0.840)	0.709 (0.500-1.02)	0.787 (0.536-1.17)
10-min	0.215 (0.179-0.262)	0.292 (0.242-0.355)	0.394 (0.326-0.480)	0.477 (0.392-0.587)	0.593 (0.470-0.755)	0.684 (0.531-0.890)	0.778 (0.589-1.04)	0.878 (0.646-1.20)	1.02 (0.717-1.46)	1.13 (0.768-1.67)
15-min	0.260 (0.216-0.316)	0.353 (0.293-0.430)	0.476 (0.394-0.581)	0.577 (0.474-0.710)	0.717 (0.569-0.913)	0.827 (0.642-1.08)	0.941 (0.713-1.25)	1.06 (0.781-1.46)	1.23 (0.867-1.76)	1.36 (0.929-2.02)
30-min	0.386 (0.321-0.469)	0.524 (0.435-0.638)	0.706 (0.584-0.861)	0.856 (0.703-1.05)	1.06 (0.844-1.35)	1.23 (0.952-1.60)	1.40 (1.06-1.86)	1.57 (1.16-2.16)	1.82 (1.29-2.61)	2.02 (1.38-3.00)
60-min	0.583 (0.485-0.709)	0.791 (0.657-0.963)	1.07 (0.882-1.30)	1.29 (1.06-1.59)	1.61 (1.27-2.04)	1.85 (1.44-2.41)	2.11 (1.60-2.81)	2.38 (1.75-3.26)	2.75 (1.94-3.94)	3.06 (2.08-4.53)
2-hr	0.875 (0.728-1.06)	1.15 (0.951-1.40)	1.50 (1.25-1.83)	1.80 (1.48-2.21)	2.20 (1.75-2.80)	2.52 (1.96-3.28)	2.85 (2.15-3.80)	3.19 (2.35-4.38)	3.67 (2.58-5.25)	4.04 (2.75-6.00)
3-hr	1.10 (0.918-1.34)	1.43 (1.18-1.74)	1.85 (1.53-2.26)	2.20 (1.81-2.71)	2.68 (2.12-3.41)	3.05 (2.37-3.97)	3.43 (2.60-4.58)	3.83 (2.82-5.26)	4.39 (3.10-6.28)	4.83 (3.29-7.16)
6-hr	1.62 (1.35-1.97)	2.07 (1.72-2.52)	2.67 (2.21-3.25)	3.15 (2.58-3.87)	3.80 (3.02-4.84)	4.31 (3.35-5.60)	4.82 (3.65-6.43)	5.36 (3.94-7.35)	6.09 (4.29-8.72)	6.66 (4.53-9.88)
12-hr	2.17 (1.81-2.64)	2.80 (2.32-3.40)	3.60 (2.98-4.40)	4.25 (3.49-5.24)	5.13 (4.07-6.53)	5.79 (4.50-7.54)	6.46 (4.90-8.62)	7.15 (5.26-9.81)	8.07 (5.69-11.6)	8.78 (5.98-13.0)
24-hr	2.94 (2.60-3.38)	3.84 (3.40-4.42)	5.01 (4.42-5.80)	5.95 (5.21-6.93)	7.19 (6.09-8.67)	8.14 (6.75-10.0)	9.08 (7.36-11.4)	10.0 (7.91-13.0)	11.3 (8.56-15.3)	12.3 (8.99-17.2)

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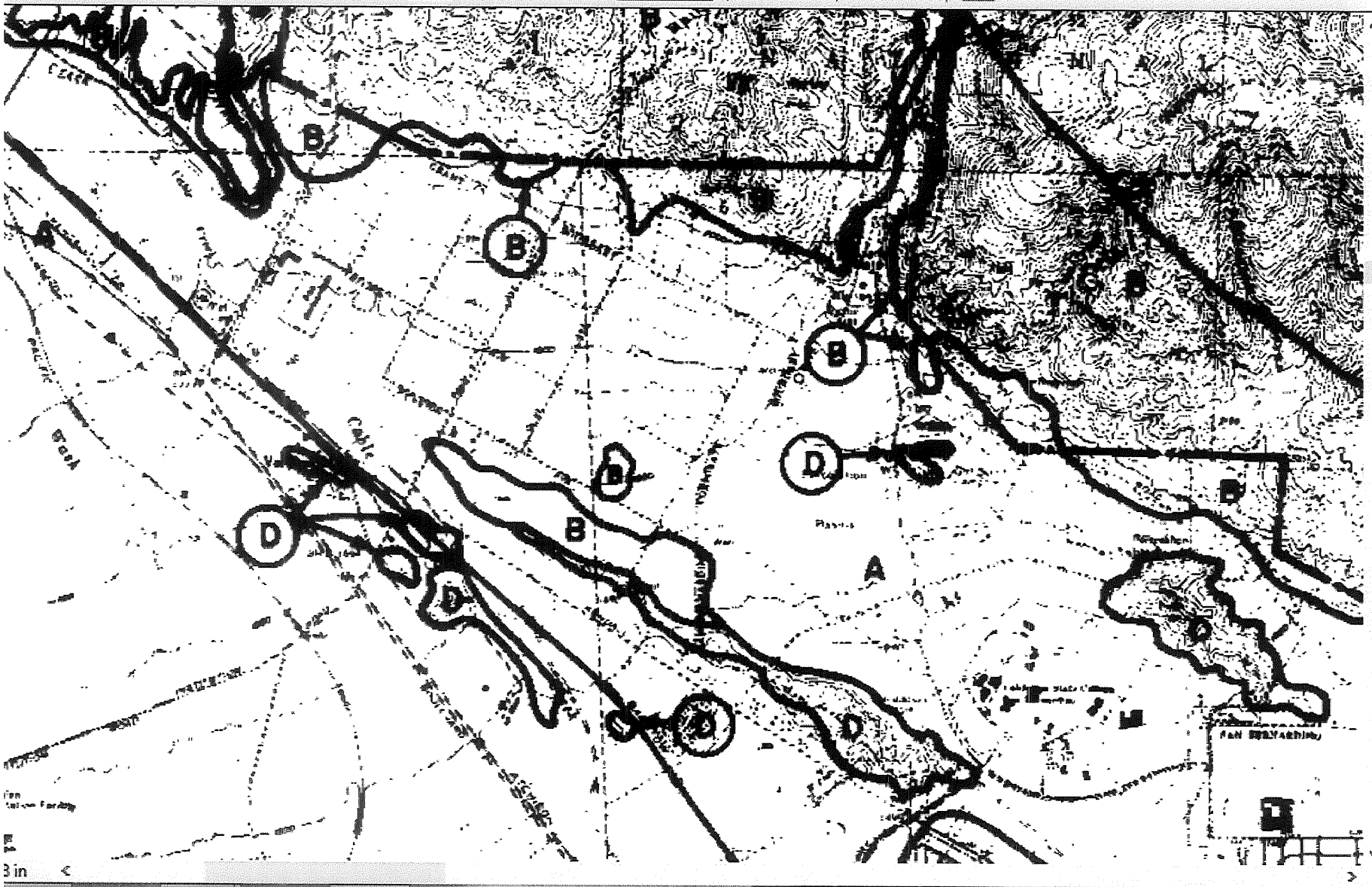

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Rational Methods

Developed Condition- 100, and 10 Year Storm Events Residential Area

Developed Condition- 100 Year Storm Events Commercial Area

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/19/15

RANCHO PALMA
DEVELOPED CONDITION
100 YEAR STORM
AMC II

Program License Serial Number 6019

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 2.110 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 16.000 to Point/Station 18.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 520.000(Ft.)
Top (of initial area) elevation = 55.000(Ft.)
Bottom (of initial area) elevation = 44.300(Ft.)
Difference in elevation = 10.700(Ft.)
Slope = 0.02058 s(%)= 2.06
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.320 min.
Rainfall intensity = 6.067(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.827
Subarea runoff = 13.555(CFS)
Total initial stream area = 2.700(Ac.)
Pervious area fraction = 0.500

```
Initial area Fm value =    0.489(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       18.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.700(Ac.)
Runoff from this stream =     13.555(CFS)
Time of concentration =   10.32 min.
Rainfall intensity =     6.067(In/Hr)
Area averaged loss rate (Fm) =    0.4889(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       15.000 to Point/Station       18.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Initial subarea data:
Initial area flow distance =   230.000(Ft.)
Top (of initial area) elevation =    48.000(Ft.)
Bottom (of initial area) elevation =    44.300(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.01609  s(%)=       1.61
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.285 min.
Rainfall intensity =      6.921(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.824
Subarea runoff =      3.421(CFS)
Total initial stream area =        0.600(Ac.)
Pervious area fraction = 0.600
Initial area Fm value =    0.587(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       18.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.600(Ac.)
Runoff from this stream =      3.421(CFS)
Time of concentration =    8.29 min.
Rainfall intensity =     6.921(In/Hr)
```

```
Area averaged loss rate (Fm) =    0.5867(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     13.55     2.700     10.32    0.489      6.067
2      3.42     0.600      8.29    0.587      6.921
Qmax(1) =
        1.000 *    1.000 *    13.555) +
        0.865 *    1.000 *     3.421) + =      16.514
Qmax(2) =
        1.153 *    0.803 *    13.555) +
        1.000 *    1.000 *     3.421) + =      15.970

Total of 2 streams to confluence:
Flow rates before confluence point:
      13.555       3.421
Maximum flow rates at confluence using above data:
       16.514       15.970
Area of streams before confluence:
        2.700        0.600
Effective area values after confluence:
        3.300        2.768
Results of confluence:
Total flow rate =     16.514(CFS)
Time of concentration =    10.320 min.
Effective stream area after confluence =      3.300(Ac.)
Study area average Pervious fraction(Ap) =  0.518
Study area average soil loss rate(Fm) =    0.507(In/Hr)
Study area total (this main stream) =       3.30(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       18.000 to Point/Station       28.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    44.300(Ft.)
End of street segment elevation =    43.100(Ft.)
Length of street segment  =   250.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
```

```
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     17.533(CFS)
Depth of flow =   0.508(Ft.), Average velocity =   2.335(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.40(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   2.34(Ft/s)
Travel time =    1.78 min.     TC =   12.10  min.
 Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Rainfall intensity =      5.513(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.815
Subarea runoff =      1.903(CFS) for    0.800(Ac.)
Total runoff =     18.417(CFS)
Effective area this stream =        4.10(Ac.)
Total Study Area (Main Stream No. 1) =        4.10(Ac.)
Area averaged Fm value =    0.522(In/Hr)
Street flow at end of street =     18.417(CFS)
Half street flow at end of street =      9.208(CFS)
Depth of flow =   0.516(Ft.), Average velocity =   2.362(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.79(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station       28.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.100(Ac.)
Runoff from this stream =     18.417(CFS)
Time of concentration =   12.10 min.
Rainfall intensity =     5.513(In/Hr)
Area averaged loss rate (Fm) =    0.5223(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5341


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       26.000 to Point/Station       28.000
```

```
**** INITIAL AREA EVALUATION ****
____________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Initial subarea data:
Initial area flow distance =   455.000(Ft.)
Top (of initial area) elevation =    53.700(Ft.)
Bottom (of initial area) elevation =    43.100(Ft.)
Difference in elevation =    10.600(Ft.)
Slope =    0.02330  s(%)=       2.33
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.107 min.
Rainfall intensity =      6.143(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.814
Subarea runoff =     11.502(CFS)
Total initial stream area =        2.300(Ac.)
Pervious area fraction = 0.600
Initial area Fm value =    0.587(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       28.000 to Point/Station       28.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.300(Ac.)
Runoff from this stream =     11.502(CFS)
Time of concentration =   10.11 min.
Rainfall intensity =     6.143(In/Hr)
Area averaged loss rate (Fm) =    0.5867(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min)  (In/Hr)     (In/Hr)


1     18.42     4.100     12.10    0.522      5.513
2     11.50     2.300     10.11    0.587      6.143
Qmax(1) =
       1.000 *    1.000 *    18.417) +
       0.887 *    1.000 *    11.502) + =      28.615
Qmax(2) =
       1.126 *    0.835 *    18.417) +
       1.000 *    1.000 *    11.502) + =      28.821

Total of 2 streams to confluence:
```

```
Flow rates before confluence point:
      18.417      11.502
Maximum flow rates at confluence using above data:
       28.615       28.821
Area of streams before confluence:
        4.100        2.300
Effective area values after confluence:
        6.400        5.724
Results of confluence:
Total flow rate =     28.821(CFS)
Time of concentration =    10.107 min.
Effective stream area after confluence =      5.724(Ac.)
Study area average Pervious fraction(Ap) =  0.558
Study area average soil loss rate(Fm) =    0.545(In/Hr)
Study area total (this main stream) =       6.40(Ac.)


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Process from Point/Station       28.000 to Point/Station       30.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    43.100(Ft.)
End of street segment elevation =    40.500(Ft.)
Length of street segment  =   295.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     29.537(CFS)
Depth of flow =   0.543(Ft.), Average velocity =   3.332(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.16(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   3.33(Ft/s)
Travel time =    1.48 min.     TC =   11.58  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
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```
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      5.661(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.814
Subarea runoff =      1.253(CFS) for    0.800(Ac.)
Total runoff =     30.074(CFS)
Effective area this stream =        6.52(Ac.)
Total Study Area (Main Stream No. 1) =        7.20(Ac.)
Area averaged Fm value =    0.539(In/Hr)
Street flow at end of street =     30.074(CFS)
Half street flow at end of street =     15.037(CFS)
Depth of flow =   0.546(Ft.), Average velocity =   3.346(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.32(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.524(Ac.)
Runoff from this stream =     30.074(CFS)
Time of concentration =   11.58 min.
Rainfall intensity =     5.661(In/Hr)
Area averaged loss rate (Fm) =    0.5385(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5507


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Process from Point/Station       10.000 to Point/Station       20.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Initial subarea data:
Initial area flow distance =   925.000(Ft.)
Top (of initial area) elevation =    62.000(Ft.)
Bottom (of initial area) elevation =    50.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.01297  s(%)=       1.30
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.092 min.
Rainfall intensity =      4.830(In/Hr) for a   100.0 year storm
```

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Effective runoff coefficient used for area (Q=KCIA) is C = 0.791
Subarea runoff =     11.456(CFS)
Total initial stream area =        3.000(Ac.)
Pervious area fraction = 0.600
Initial area Fm value =    0.587(In/Hr)


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Process from Point/Station       20.000 to Point/Station       30.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    50.000(Ft.)
End of street segment elevation =    40.500(Ft.)
Length of street segment  =   370.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     15.020(CFS)
Depth of flow =   0.385(Ft.), Average velocity =   4.177(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.928(Ft.)
Flow velocity =   4.18(Ft/s)
Travel time =    1.48 min.     TC =   16.57  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      4.567(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.792
Subarea runoff =      6.997(CFS) for    2.100(Ac.)
Total runoff =     18.453(CFS)
Effective area this stream =        5.10(Ac.)
Total Study Area (Main Stream No. 1) =       12.30(Ac.)
Area averaged Fm value =    0.546(In/Hr)
Street flow at end of street =     18.453(CFS)
Half street flow at end of street =      9.227(CFS)
Depth of flow =   0.408(Ft.), Average velocity =   4.387(Ft/s)
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Flow width (from curb towards crown)=  14.059(Ft.)

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Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      5.100(Ac.)
Runoff from this stream =     18.453(CFS)
Time of concentration =   16.57 min.
Rainfall intensity =     4.567(In/Hr)
Area averaged loss rate (Fm) =    0.5464(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5588
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)      (In/Hr)


1     30.07     6.524     11.58    0.539      5.661
2     18.45     5.100     16.57    0.546      4.567
Qmax(1) =
        1.000 *    1.000 *    30.074) +
        1.272 *    0.699 *    18.453) + =      46.486
Qmax(2) =
        0.786 *    1.000 *    30.074) +
        1.000 *    1.000 *    18.453) + =      42.104

Total of 2 streams to confluence:
Flow rates before confluence point:
      30.074      18.453
Maximum flow rates at confluence using above data:
       46.486       42.104
Area of streams before confluence:
        6.524        5.100
Effective area values after confluence:
       10.089       11.624
Results of confluence:
Total flow rate =     46.486(CFS)
Time of concentration =    11.583 min.
Effective stream area after confluence =     10.089(Ac.)
Study area average Pervious fraction(Ap) =  0.554
Study area average soil loss rate(Fm) =    0.542(In/Hr)
Study area total (this main stream) =      11.62(Ac.)


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Process from Point/Station       30.000 to Point/Station       40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    40.500(Ft.)
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End of street segment elevation =    35.500(Ft.)
Length of street segment  =   250.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     47.883(CFS)
Depth of flow =   0.556(Ft.), Average velocity =   5.107(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    2.79(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   5.11(Ft/s)
Travel time =    0.82 min.     TC =   12.40  min.
 Adding area flow to street
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.684(In/Hr)
Rainfall intensity =      5.434(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.808
Subarea runoff =      2.639(CFS) for    1.100(Ac.)
Total runoff =     49.125(CFS)
Effective area this stream =       11.19(Ac.)
Total Study Area (Main Stream No. 1) =       13.40(Ac.)
Area averaged Fm value =    0.556(In/Hr)
Street flow at end of street =     49.125(CFS)
Half street flow at end of street =     24.563(CFS)
Depth of flow =   0.560(Ft.), Average velocity =   5.139(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    3.01(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station       40.000 to Point/Station       40.000
**** CONFLUENCE OF MINOR STREAMS ****
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Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.189(Ac.)
Runoff from this stream =     49.125(CFS)
Time of concentration =   12.40 min.
Rainfall intensity =     5.434(In/Hr)
Area averaged loss rate (Fm) =    0.5560(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5686


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Process from Point/Station       25.000 to Point/Station       27.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Initial subarea data:
Initial area flow distance =   395.000(Ft.)
Top (of initial area) elevation =    41.500(Ft.)
Bottom (of initial area) elevation =    36.500(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.01266  s(%)=       1.27
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.189 min.
Rainfall intensity =      6.114(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.828
Subarea runoff =     10.125(CFS)
Total initial stream area =        2.000(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.489(In/Hr)


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Process from Point/Station       27.000 to Point/Station       40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    36.500(Ft.)
End of street segment elevation =    35.500(Ft.)
Length of street segment  =   250.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
```

```
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.136(CFS)
Depth of flow =   0.460(Ft.), Average velocity =   1.918(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.661(Ft.)
Flow velocity =   1.92(Ft/s)
Travel time =    2.17 min.     TC =   12.36  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      5.444(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.819
Subarea runoff =      1.917(CFS) for    0.700(Ac.)
Total runoff =     12.042(CFS)
Effective area this stream =        2.70(Ac.)
Total Study Area (Main Stream No. 1) =       16.10(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =     12.042(CFS)
Half street flow at end of street =      6.021(CFS)
Depth of flow =   0.470(Ft.), Average velocity =   1.955(Ft/s)
Flow width (from curb towards crown)=  17.183(Ft.)


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Process from Point/Station       40.000 to Point/Station       40.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =     12.042(CFS)
Time of concentration =   12.36 min.
Rainfall intensity =     5.444(In/Hr)
Area averaged loss rate (Fm) =    0.4889(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area     TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)      (In/Hr)


1     49.13    11.189     12.40    0.556      5.434
2     12.04     2.700     12.36    0.489      5.444
```

```
Qmax(1) =
        1.000 *    1.000 *    49.125) +
        0.998 *    1.000 *    12.042) + =      61.143
Qmax(2) =
        1.002 *    0.997 *    49.125) +
        1.000 *    1.000 *    12.042) + =      61.117

Total of 2 streams to confluence:
Flow rates before confluence point:
      49.125      12.042
Maximum flow rates at confluence using above data:
       61.143       61.117
Area of streams before confluence:
       11.189        2.700
Effective area values after confluence:
       13.889       13.854
Results of confluence:
Total flow rate =     61.143(CFS)
Time of concentration =    12.399 min.
Effective stream area after confluence =     13.889(Ac.)
Study area average Pervious fraction(Ap) =  0.555
Study area average soil loss rate(Fm) =    0.543(In/Hr)
Study area total (this main stream) =      13.89(Ac.)


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Process from Point/Station       40.000 to Point/Station       55.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    35.500(Ft.)
End of street segment elevation =    29.000(Ft.)
Length of street segment  =   345.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     63.125(CFS)
Depth of flow =   0.611(Ft.), Average velocity =   5.336(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    5.56(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
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Flow velocity =   5.34(Ft/s)
Travel time =    1.08 min.     TC =   13.48  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      5.169(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.806
Subarea runoff =      3.847(CFS) for    1.700(Ac.)
Total runoff =     64.990(CFS)
Effective area this stream =       15.59(Ac.)
Total Study Area (Main Stream No. 1) =       17.80(Ac.)
Area averaged Fm value =    0.537(In/Hr)
Street flow at end of street =     64.990(CFS)
Half street flow at end of street =     32.495(CFS)
Depth of flow =   0.617(Ft.), Average velocity =   5.373(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    5.83(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station       55.000 to Point/Station       55.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     15.589(Ac.)
Runoff from this stream =     64.990(CFS)
Time of concentration =   13.48 min.
Rainfall intensity =     5.169(In/Hr)
Area averaged loss rate (Fm) =    0.5371(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5492
Program is now starting with Main Stream No. 2


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Process from Point/Station       10.000 to Point/Station       15.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
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Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.684(In/Hr)
Initial subarea data:
Initial area flow distance =   800.000(Ft.)
Top (of initial area) elevation =    62.000(Ft.)
Bottom (of initial area) elevation =    48.000(Ft.)
Difference in elevation =    14.000(Ft.)
Slope =    0.01750  s(%)=       1.75
TC = k(0.438)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.259 min.
Rainfall intensity =      4.997(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.777
Subarea runoff =     12.808(CFS)
Total initial stream area =        3.300(Ac.)
Pervious area fraction = 0.700
Initial area Fm value =    0.684(In/Hr)


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Process from Point/Station       15.000 to Point/Station       25.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    48.000(Ft.)
End of street segment elevation =    41.500(Ft.)
Length of street segment  =   255.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     14.324(CFS)
Depth of flow =   0.381(Ft.), Average velocity =   4.119(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.698(Ft.)
Flow velocity =   4.12(Ft/s)
Travel time =    1.03 min.     TC =   15.29  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      4.792(In/Hr) for a   100.0 year storm
```

```
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.779
Subarea runoff =      2.876(CFS) for    0.900(Ac.)
Total runoff =     15.684(CFS)
Effective area this stream =        4.20(Ac.)
Total Study Area (Main Stream No. 2) =       22.00(Ac.)
Area averaged Fm value =    0.643(In/Hr)
Street flow at end of street =     15.684(CFS)
Half street flow at end of street =      7.842(CFS)
Depth of flow =   0.390(Ft.), Average velocity =   4.208(Ft/s)
Flow width (from curb towards crown)=  13.179(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       25.000 to Point/Station       35.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    41.500(Ft.)
End of street segment elevation =    36.000(Ft.)
Length of street segment  =   380.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     18.000(CFS)
Depth of flow =   0.439(Ft.), Average velocity =   3.508(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.617(Ft.)
Flow velocity =   3.51(Ft/s)
Travel time =    1.81 min.     TC =   17.10  min.
 Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Rainfall intensity =      4.482(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.774
Subarea runoff =      4.435(CFS) for    1.600(Ac.)
Total runoff =     20.120(CFS)
```

```
Effective area this stream =        5.80(Ac.)
Total Study Area (Main Stream No. 2) =       23.60(Ac.)
Area averaged Fm value =    0.627(In/Hr)
Street flow at end of street =     20.120(CFS)
Half street flow at end of street =     10.060(CFS)
Depth of flow =   0.453(Ft.), Average velocity =   3.604(Ft/s)
Flow width (from curb towards crown)=  16.324(Ft.)


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Process from Point/Station       35.000 to Point/Station       45.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    36.000(Ft.)
End of street segment elevation =    30.200(Ft.)
Length of street segment  =   370.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     21.630(CFS)
Depth of flow =   0.457(Ft.), Average velocity =   3.780(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.535(Ft.)
Flow velocity =   3.78(Ft/s)
Travel time =    1.63 min.     TC =   18.73  min.
 Adding area flow to street
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.684(In/Hr)
Rainfall intensity =      4.243(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.765
Subarea runoff =      2.919(CFS) for    1.300(Ac.)
Total runoff =     23.039(CFS)
Effective area this stream =        7.10(Ac.)
Total Study Area (Main Stream No. 2) =       24.90(Ac.)
Area averaged Fm value =    0.638(In/Hr)
Street flow at end of street =     23.039(CFS)
```

```
Half street flow at end of street =     11.519(CFS)
Depth of flow =   0.466(Ft.), Average velocity =   3.839(Ft/s)
Flow width (from curb towards crown)=  16.953(Ft.)


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Process from Point/Station       45.000 to Point/Station       45.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      7.100(Ac.)
Runoff from this stream =     23.039(CFS)
Time of concentration =   18.73 min.
Rainfall intensity =     4.243(In/Hr)
Area averaged loss rate (Fm) =    0.6376(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6521


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       45.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Initial subarea data:
Initial area flow distance =   325.000(Ft.)
Top (of initial area) elevation =    36.500(Ft.)
Bottom (of initial area) elevation =    30.200(Ft.)
Difference in elevation =     6.300(Ft.)
Slope =    0.01938  s(%)=       1.94
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.654 min.
Rainfall intensity =      6.743(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.835
Subarea runoff =      7.880(CFS)
Total initial stream area =        1.400(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.489(In/Hr)


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Process from Point/Station       45.000 to Point/Station       45.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.400(Ac.)
Runoff from this stream =      7.880(CFS)
```

```
Time of concentration =    8.65 min.
Rainfall intensity =     6.743(In/Hr)
Area averaged loss rate (Fm) =    0.4889(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     23.04     7.100     18.73    0.638      4.243
2      7.88     1.400      8.65    0.489      6.743
Qmax(1) =
        1.000 *    1.000 *    23.039) +
        0.600 *    1.000 *     7.880) + =      27.769
Qmax(2) =
        1.693 *    0.462 *    23.039) +
        1.000 *    1.000 *     7.880) + =      25.907

Total of 2 streams to confluence:
Flow rates before confluence point:
      23.039       7.880
Maximum flow rates at confluence using above data:
       27.769       25.907
Area of streams before confluence:
        7.100        1.400
Effective area values after confluence:
        8.500        4.681
Results of confluence:
Total flow rate =     27.769(CFS)
Time of concentration =    18.728 min.
Effective stream area after confluence =      8.500(Ac.)
Study area average Pervious fraction(Ap) =  0.627
Study area average soil loss rate(Fm) =    0.613(In/Hr)
Study area total (this main stream) =       8.50(Ac.)


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Process from Point/Station       45.000 to Point/Station       55.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
----------------------------------------------------------------------
Top of street segment elevation =    30.200(Ft.)
End of street segment elevation =    29.000(Ft.)
Length of street segment  =   285.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
```

```
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     28.656(CFS)
Depth of flow =   0.603(Ft.), Average velocity =   2.498(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    5.17(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   2.50(Ft/s)
Travel time =    1.90 min.     TC =   20.63  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      4.004(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.765
Subarea runoff =      1.650(CFS) for    1.100(Ac.)
Total runoff =     29.419(CFS)
Effective area this stream =        9.60(Ac.)
Total Study Area (Main Stream No. 2) =       27.40(Ac.)
Area averaged Fm value =    0.599(In/Hr)
Street flow at end of street =     29.419(CFS)
Half street flow at end of street =     14.709(CFS)
Depth of flow =   0.608(Ft.), Average velocity =   2.514(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    5.42(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)


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Process from Point/Station       55.000 to Point/Station       55.000
**** CONFLUENCE OF MAIN STREAMS ****
____________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.600(Ac.)
Runoff from this stream =     29.419(CFS)
Time of concentration =   20.63 min.
Rainfall intensity =     4.004(In/Hr)
Area averaged loss rate (Fm) =    0.5989(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6125
Summary of stream data:
```

```
Stream Flow rate    Area     TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min)  (In/Hr)     (In/Hr)


1      64.99    15.589     13.48    0.537      5.169
2      29.42     9.600     20.63    0.599      4.004
Qmax(1) =
        1.000 *    1.000 *    64.990) +
        1.342 *    0.653 *    29.419) + =      90.786
Qmax(2) =
        0.748 *    1.000 *    64.990) +
        1.000 *    1.000 *    29.419) + =      78.059

Total of 2 main streams to confluence:
Flow rates before confluence point:
      65.990      30.419
Maximum flow rates at confluence using above data:
       90.786       78.059
Area of streams before confluence:
       15.589        9.600
Effective area values after confluence:
       21.861       25.189


Results of confluence:
Total flow rate =     90.786(CFS)
Time of concentration =    13.477 min.
Effective stream area after confluence  =     21.861(Ac.)
Study area average Pervious fraction(Ap) =  0.573
Study area average soil loss rate(Fm) =    0.561(In/Hr)
Study area total =      25.19(Ac.)


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Process from Point/Station       55.000 to Point/Station       55.000
**** SUBAREA FLOW ADDITION ****
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UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Time of concentration =    13.48 min.
Rainfall intensity =      5.169(In/Hr) for a   100.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.802
Subarea runoff =      1.951(CFS) for    0.500(Ac.)
Total runoff =     92.737(CFS)
Effective area this stream =       22.36(Ac.)
```

Total Study Area (Main Stream No. 1) = 27.90(Ac.)
Area averaged Fm value = 0.561(In/Hr)
End of computations, Total Study Area = 27.90 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.580
Area averaged SCS curve number = 32.6

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/19/15

RANCHO PALMA
DEVELOPED CONDITION
10 YEAR STORM
AMC II

Program License Serial Number 6019

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 10.0
Computed rainfall intensity:
Storm year = 10.00 1 hour rainfall = 1.290 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 16.000 to Point/Station 18.000
**** INITIAL AREA EVALUATION ****

RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.5000 Max loss rate(Fm)= 0.489(In/Hr)
Initial subarea data:
Initial area flow distance = 520.000(Ft.)
Top (of initial area) elevation = 55.000(Ft.)
Bottom (of initial area) elevation = 44.300(Ft.)
Difference in elevation = 10.700(Ft.)
Slope = 0.02058 s(%)= 2.06
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.320 min.
Rainfall intensity = 3.709(In/Hr) for a 10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.781
Subarea runoff = 7.825(CFS)
Total initial stream area = 2.700(Ac.)
Pervious area fraction = 0.500
Initial area Fm value = 0.489(In/Hr)

++
Process from Point/Station 18.000 to Point/Station 18.000

```
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      2.700(Ac.)
Runoff from this stream =      7.825(CFS)
Time of concentration =   10.32 min.
Rainfall intensity =     3.709(In/Hr)
Area averaged loss rate (Fm) =    0.4889(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000


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Process from Point/Station       15.000 to Point/Station       18.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Initial subarea data:
Initial area flow distance =   230.000(Ft.)
Top (of initial area) elevation =    48.000(Ft.)
Bottom (of initial area) elevation =    44.300(Ft.)
Difference in elevation =     3.700(Ft.)
Slope =    0.01609  s(%)=       1.61
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.285 min.
Rainfall intensity =      4.232(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.775
Subarea runoff =      1.968(CFS)
Total initial stream area =        0.600(Ac.)
Pervious area fraction = 0.600
Initial area Fm value =    0.587(In/Hr)


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Process from Point/Station       18.000 to Point/Station       18.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      0.600(Ac.)
Runoff from this stream =      1.968(CFS)
Time of concentration =    8.29 min.
Rainfall intensity =     4.232(In/Hr)
Area averaged loss rate (Fm) =    0.5867(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1      7.83     2.700     10.32    0.489      3.709
2      1.97     0.600      8.29    0.587      4.232
```

```
Qmax(1) =
         1.000 *     1.000 *      7.825) +
         0.857 *     1.000 *      1.968) + =        9.511
Qmax(2) =
         1.162 *     0.803 *      7.825) +
         1.000 *     1.000 *      1.968) + =        9.270

Total of 2 streams to confluence:
Flow rates before confluence point:
       7.825        1.968
Maximum flow rates at confluence using above data:
        9.511        9.270
Area of streams before confluence:
        2.700        0.600
Effective area values after confluence:
        3.300        2.768
Results of confluence:
Total flow rate =       9.511(CFS)
Time of concentration =    10.320 min.
Effective stream area after confluence =       3.300(Ac.)
Study area average Pervious fraction(Ap) =  0.518
Study area average soil loss rate(Fm) =    0.507(In/Hr)
Study area total (this main stream) =       3.30(Ac.)


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Process from Point/Station       18.000 to Point/Station       28.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    44.300(Ft.)
End of street segment elevation =    43.100(Ft.)
Length of street segment  =   250.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     10.017(CFS)
Depth of flow =   0.435(Ft.), Average velocity =   2.004(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  15.405(Ft.)
Flow velocity =   2.00(Ft/s)
Travel time =    2.08 min.     TC =   12.40  min.
 Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
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```
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Rainfall intensity =      3.322(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.759
Subarea runoff =      0.821(CFS) for    0.800(Ac.)
Total runoff =     10.332(CFS)
Effective area this stream =        4.10(Ac.)
Total Study Area (Main Stream No. 1) =        4.10(Ac.)
Area averaged Fm value =    0.522(In/Hr)
Street flow at end of street =     10.332(CFS)
Half street flow at end of street =      5.166(CFS)
Depth of flow =   0.439(Ft.), Average velocity =   2.019(Ft/s)
Flow width (from curb towards crown)=  15.596(Ft.)


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Process from Point/Station       28.000 to Point/Station       28.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      4.100(Ac.)
Runoff from this stream =     10.332(CFS)
Time of concentration =   12.40 min.
Rainfall intensity =     3.322(In/Hr)
Area averaged loss rate (Fm) =    0.5223(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5341


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Process from Point/Station       26.000 to Point/Station       28.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Initial subarea data:
Initial area flow distance =   455.000(Ft.)
Top (of initial area) elevation =    53.700(Ft.)
Bottom (of initial area) elevation =    43.100(Ft.)
Difference in elevation =    10.600(Ft.)
Slope =    0.02330  s(%)=       2.33
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.107 min.
Rainfall intensity =      3.756(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.759
Subarea runoff =      6.560(CFS)
Total initial stream area =        2.300(Ac.)
Pervious area fraction = 0.600
Initial area Fm value =    0.587(In/Hr)


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Process from Point/Station       28.000 to Point/Station       28.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.300(Ac.)
Runoff from this stream =      6.560(CFS)
Time of concentration =   10.11 min.
Rainfall intensity =     3.756(In/Hr)
Area averaged loss rate (Fm) =    0.5867(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min)  (In/Hr)     (In/Hr)


1     10.33     4.100     12.40    0.522      3.322
2      6.56     2.300     10.11    0.587      3.756
Qmax(1) =
         1.000 *    1.000 *    10.332) +
         0.863 *    1.000 *     6.560) + =      15.995
Qmax(2) =
         1.155 *    0.815 *    10.332) +
         1.000 *    1.000 *     6.560) + =      16.286

Total of 2 streams to confluence:
Flow rates before confluence point:
      10.332       6.560
Maximum flow rates at confluence using above data:
       15.995       16.286
Area of streams before confluence:
        4.100        2.300
Effective area values after confluence:
        6.400        5.642
Results of confluence:
Total flow rate =     16.286(CFS)
Time of concentration =    10.107 min.
Effective stream area after confluence =      5.642(Ac.)
Study area average Pervious fraction(Ap) =  0.558
Study area average soil loss rate(Fm) =    0.545(In/Hr)
Study area total (this main stream) =       6.40(Ac.)


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Process from Point/Station       28.000 to Point/Station       30.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________
Top of street segment elevation =    43.100(Ft.)
End of street segment elevation =    40.500(Ft.)
Length of street segment  =   295.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
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Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     16.549(CFS)
Depth of flow =   0.460(Ft.), Average velocity =   2.848(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  16.668(Ft.)
Flow velocity =   2.85(Ft/s)
Travel time =    1.73 min.     TC =   11.83  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      3.417(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.758
Subarea runoff =      0.402(CFS) for    0.800(Ac.)
Total runoff =     16.688(CFS)
Effective area this stream =        6.44(Ac.)
Total Study Area (Main Stream No. 1) =        7.20(Ac.)
Area averaged Fm value =    0.538(In/Hr)
Street flow at end of street =     16.688(CFS)
Half street flow at end of street =      8.344(CFS)
Depth of flow =   0.461(Ft.), Average velocity =   2.854(Ft/s)
Flow width (from curb towards crown)=  16.723(Ft.)


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Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =      6.442(Ac.)
Runoff from this stream =     16.688(CFS)
Time of concentration =   11.83 min.
Rainfall intensity =     3.417(In/Hr)
Area averaged loss rate (Fm) =    0.5384(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5506


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Process from Point/Station       10.000 to Point/Station       20.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
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Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Initial subarea data:
Initial area flow distance =   925.000(Ft.)
Top (of initial area) elevation =    62.000(Ft.)
Bottom (of initial area) elevation =    50.000(Ft.)
Difference in elevation =    12.000(Ft.)
Slope =    0.01297  s(%)=       1.30
TC = k(0.412)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   15.092 min.
Rainfall intensity =      2.953(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.721
Subarea runoff =      6.388(CFS)
Total initial stream area =        3.000(Ac.)
Pervious area fraction = 0.600
Initial area Fm value =    0.587(In/Hr)


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Process from Point/Station       20.000 to Point/Station       30.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    50.000(Ft.)
End of street segment elevation =    40.500(Ft.)
Length of street segment  =   370.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      8.381(CFS)
Depth of flow =   0.329(Ft.), Average velocity =   3.644(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  10.115(Ft.)
Flow velocity =   3.64(Ft/s)
Travel time =    1.69 min.     TC =   16.78  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      2.770(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.722
Subarea runoff =      3.820(CFS) for    2.100(Ac.)
Total runoff =     10.208(CFS)
Effective area this stream =        5.10(Ac.)
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Total Study Area (Main Stream No. 1) =       12.30(Ac.)
Area averaged Fm value =    0.546(In/Hr)
Street flow at end of street =     10.208(CFS)
Half street flow at end of street =      5.104(CFS)
Depth of flow =   0.347(Ft.), Average velocity =   3.814(Ft/s)
Flow width (from curb towards crown)=  11.007(Ft.)


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Process from Point/Station       30.000 to Point/Station       30.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      5.100(Ac.)
Runoff from this stream =     10.208(CFS)
Time of concentration =   16.78 min.
Rainfall intensity =     2.770(In/Hr)
Area averaged loss rate (Fm) =    0.5464(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5588
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     16.69     6.442     11.83    0.538      3.417
2     10.21     5.100     16.78    0.546      2.770
Qmax(1) =
         1.000 *    1.000 *    16.688) +
         1.291 *    0.705 *    10.208) + =      25.977
Qmax(2) =
         0.775 *    1.000 *    16.688) +
         1.000 *    1.000 *    10.208) + =      23.149

Total of 2 streams to confluence:
Flow rates before confluence point:
      16.688      10.208
Maximum flow rates at confluence using above data:
       25.977       23.149
Area of streams before confluence:
        6.442        5.100
Effective area values after confluence:
       10.038       11.542
Results of confluence:
Total flow rate =     25.977(CFS)
Time of concentration =    11.834 min.
Effective stream area after confluence =     10.038(Ac.)
Study area average Pervious fraction(Ap) =  0.554
Study area average soil loss rate(Fm) =    0.542(In/Hr)
Study area total (this main stream) =      11.54(Ac.)


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Process from Point/Station       30.000 to Point/Station       40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    40.500(Ft.)
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End of street segment elevation =    35.500(Ft.)
Length of street segment  =   250.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     26.601(CFS)
Depth of flow =   0.469(Ft.), Average velocity =   4.359(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  17.101(Ft.)
Flow velocity =   4.36(Ft/s)
Travel time =    0.96 min.     TC =   12.79  min.
 Adding area flow to street
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.684(In/Hr)
Rainfall intensity =      3.261(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.747
Subarea runoff =      1.139(CFS) for    1.100(Ac.)
Total runoff =     27.116(CFS)
Effective area this stream =       11.14(Ac.)
Total Study Area (Main Stream No. 1) =       13.40(Ac.)
Area averaged Fm value =    0.556(In/Hr)
Street flow at end of street =     27.116(CFS)
Half street flow at end of street =     13.558(CFS)
Depth of flow =   0.471(Ft.), Average velocity =   4.380(Ft/s)
Flow width (from curb towards crown)=  17.231(Ft.)


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Process from Point/Station       40.000 to Point/Station       40.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 1
Stream flow area =     11.138(Ac.)
Runoff from this stream =     27.116(CFS)
Time of concentration =   12.79 min.
Rainfall intensity =     3.261(In/Hr)
Area averaged loss rate (Fm) =    0.5560(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5686


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Process from Point/Station       25.000 to Point/Station       27.000
**** INITIAL AREA EVALUATION ****
____________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Initial subarea data:
Initial area flow distance =   395.000(Ft.)
Top (of initial area) elevation =    41.500(Ft.)
Bottom (of initial area) elevation =    36.500(Ft.)
Difference in elevation =     5.000(Ft.)
Slope =    0.01266  s(%)=       1.27
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   10.189 min.
Rainfall intensity =      3.738(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.782
Subarea runoff =      5.848(CFS)
Total initial stream area =        2.000(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.489(In/Hr)


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Process from Point/Station       27.000 to Point/Station       40.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________
Top of street segment elevation =    36.500(Ft.)
End of street segment elevation =    35.500(Ft.)
Length of street segment  =   250.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      6.386(CFS)
Depth of flow =   0.393(Ft.), Average velocity =   1.678(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  13.328(Ft.)
Flow velocity =   1.68(Ft/s)
Travel time =    2.48 min.     TC =   12.67  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
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Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      3.279(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.766
Subarea runoff =      0.933(CFS) for    0.700(Ac.)
Total runoff =      6.781(CFS)
Effective area this stream =        2.70(Ac.)
Total Study Area (Main Stream No. 1) =       16.10(Ac.)
Area averaged Fm value =    0.489(In/Hr)
Street flow at end of street =      6.781(CFS)
Half street flow at end of street =      3.390(CFS)
Depth of flow =   0.400(Ft.), Average velocity =   1.702(Ft/s)
Flow width (from curb towards crown)=  13.657(Ft.)


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Process from Point/Station       40.000 to Point/Station       40.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 1 in normal stream number 2
Stream flow area =      2.700(Ac.)
Runoff from this stream =      6.781(CFS)
Time of concentration =   12.67 min.
Rainfall intensity =     3.279(In/Hr)
Area averaged loss rate (Fm) =    0.4889(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area     TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)      (In/Hr)


1     27.12    11.138     12.79    0.556      3.261
2      6.78     2.700     12.67    0.489      3.279
Qmax(1) =
         1.000 *    1.000 *    27.116) +
         0.993 *    1.000 *     6.781) + =      33.853
Qmax(2) =
         1.007 *    0.991 *    27.116) +
         1.000 *    1.000 *     6.781) + =      33.828

Total of 2 streams to confluence:
Flow rates before confluence point:
      27.116       6.781
Maximum flow rates at confluence using above data:
       33.853       33.828
Area of streams before confluence:
       11.138        2.700
Effective area values after confluence:
       13.838       13.735
Results of confluence:
Total flow rate =     33.853(CFS)
Time of concentration =    12.789 min.
Effective stream area after confluence =     13.838(Ac.)
Study area average Pervious fraction(Ap) =  0.555
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Study area average soil loss rate(Fm) =     0.543(In/Hr)
Study area total (this main stream) =       13.84(Ac.)


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Process from Point/Station       40.000 to Point/Station       55.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    35.500(Ft.)
End of street segment elevation =    29.000(Ft.)
Length of street segment  =   345.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     34.816(CFS)
Depth of flow =   0.508(Ft.), Average velocity =   4.629(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.42(Ft.)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   4.63(Ft/s)
Travel time =    1.24 min.     TC =   14.03  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      3.085(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.743
Subarea runoff =      1.775(CFS) for    1.700(Ac.)
Total runoff =     35.627(CFS)
Effective area this stream =       15.54(Ac.)
Total Study Area (Main Stream No. 1) =       17.80(Ac.)
Area averaged Fm value =    0.537(In/Hr)
Street flow at end of street =     35.627(CFS)
Half street flow at end of street =     17.814(CFS)
Depth of flow =   0.512(Ft.), Average velocity =   4.654(Ft/s)
Warning: depth of flow exceeds top of curb
Note:  depth of flow exceeds top of street crown.
Distance that curb overflow reaches into property =    0.60(Ft.)
Flow width (from curb towards crown)=  18.000(Ft.)
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Process from Point/Station       55.000 to Point/Station       55.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 1
Stream flow area =     15.538(Ac.)
Runoff from this stream =     35.627(CFS)
Time of concentration =   14.03 min.
Rainfall intensity =     3.085(In/Hr)
Area averaged loss rate (Fm) =    0.5370(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5492
Program is now starting with Main Stream No. 2


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Process from Point/Station       10.000 to Point/Station       15.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.684(In/Hr)
Initial subarea data:
Initial area flow distance =   800.000(Ft.)
Top (of initial area) elevation =    62.000(Ft.)
Bottom (of initial area) elevation =    48.000(Ft.)
Difference in elevation =    14.000(Ft.)
Slope =    0.01750  s(%)=       1.75
TC = k(0.438)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =   14.259 min.
Rainfall intensity =      3.055(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.698
Subarea runoff =      7.041(CFS)
Total initial stream area =        3.300(Ac.)
Pervious area fraction = 0.700
Initial area Fm value =    0.684(In/Hr)


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Process from Point/Station       15.000 to Point/Station       25.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    48.000(Ft.)
End of street segment elevation =    41.500(Ft.)
Length of street segment  =   255.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
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Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      7.906(CFS)
Depth of flow =   0.324(Ft.), Average velocity =   3.586(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =   9.877(Ft.)
Flow velocity =   3.59(Ft/s)
Travel time =    1.19 min.     TC =   15.44  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      2.912(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.701
Subarea runoff =      1.538(CFS) for    0.900(Ac.)
Total runoff =      8.579(CFS)
Effective area this stream =        4.20(Ac.)
Total Study Area (Main Stream No. 2) =       22.00(Ac.)
Area averaged Fm value =    0.643(In/Hr)
Street flow at end of street =      8.579(CFS)
Half street flow at end of street =      4.290(CFS)
Depth of flow =   0.331(Ft.), Average velocity =   3.654(Ft/s)
Flow width (from curb towards crown)=  10.234(Ft.)


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Process from Point/Station       25.000 to Point/Station       35.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    41.500(Ft.)
End of street segment elevation =    36.000(Ft.)
Length of street segment  =   380.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =      9.762(CFS)
Depth of flow =   0.370(Ft.), Average velocity =   3.031(Ft/s)
Streetflow hydraulics at midpoint of street travel:
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```
Halfstreet flow width =  12.182(Ft.)
Flow velocity =   3.03(Ft/s)
Travel time =    2.09 min.     TC =   17.53  min.
 Adding area flow to street
RESIDENTIAL(3 - 4 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.6000     Max loss rate(Fm)=     0.587(In/Hr)
Rainfall intensity =      2.699(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.691
Subarea runoff =      2.234(CFS) for    1.600(Ac.)
Total runoff =     10.813(CFS)
Effective area this stream =        5.80(Ac.)
Total Study Area (Main Stream No. 2) =       23.60(Ac.)
Area averaged Fm value =    0.627(In/Hr)
Street flow at end of street =     10.813(CFS)
Half street flow at end of street =      5.407(CFS)
Depth of flow =   0.381(Ft.), Average velocity =   3.105(Ft/s)
Flow width (from curb towards crown)=  12.707(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       35.000 to Point/Station       45.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
______________________________________________________________________
Top of street segment elevation =    36.000(Ft.)
End of street segment elevation =    30.200(Ft.)
Length of street segment  =   370.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     11.546(CFS)
Depth of flow =   0.384(Ft.), Average velocity =   3.251(Ft/s)
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  12.842(Ft.)
Flow velocity =   3.25(Ft/s)
Travel time =    1.90 min.     TC =   19.43  min.
 Adding area flow to street
RESIDENTIAL(2 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
```

```
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.7000     Max loss rate(Fm)=     0.684(In/Hr)
Rainfall intensity =      2.537(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.674
Subarea runoff =      1.326(CFS) for    1.300(Ac.)
Total runoff =     12.139(CFS)
Effective area this stream =        7.10(Ac.)
Total Study Area (Main Stream No. 2) =       24.90(Ac.)
Area averaged Fm value =    0.638(In/Hr)
Street flow at end of street =     12.139(CFS)
Half street flow at end of street =      6.070(CFS)
Depth of flow =   0.389(Ft.), Average velocity =   3.290(Ft/s)
Flow width (from curb towards crown)=  13.108(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station       45.000
**** CONFLUENCE OF MINOR STREAMS ****
______________________________________________________________________
Along Main Stream number: 2 in normal stream number 1
Stream flow area =      7.100(Ac.)
Runoff from this stream =     12.139(CFS)
Time of concentration =   19.43 min.
Rainfall intensity =     2.537(In/Hr)
Area averaged loss rate (Fm) =    0.6376(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6521


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       27.000 to Point/Station       45.000
**** INITIAL AREA EVALUATION ****
______________________________________________________________________
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Initial subarea data:
Initial area flow distance =   325.000(Ft.)
Top (of initial area) elevation =    36.500(Ft.)
Bottom (of initial area) elevation =    30.200(Ft.)
Difference in elevation =     6.300(Ft.)
Slope =    0.01938  s(%)=       1.94
TC = k(0.389)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration =    8.654 min.
Rainfall intensity =      4.122(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.793
Subarea runoff =      4.578(CFS)
Total initial stream area =        1.400(Ac.)
Pervious area fraction = 0.500
Initial area Fm value =    0.489(In/Hr)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
```

```
Process from Point/Station       45.000 to Point/Station       45.000
**** CONFLUENCE OF MINOR STREAMS ****
____________________________________________________________________
Along Main Stream number: 2 in normal stream number 2
Stream flow area =      1.400(Ac.)
Runoff from this stream =      4.578(CFS)
Time of concentration =    8.65 min.
Rainfall intensity =     4.122(In/Hr)
Area averaged loss rate (Fm) =    0.4889(In/Hr)
Area averaged Pervious ratio (Ap) = 0.5000
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     12.14     7.100     19.43    0.638      2.537
2      4.58     1.400      8.65    0.489      4.122
Qmax(1) =
         1.000 *    1.000 *    12.139) +
         0.564 *    1.000 *     4.578) + =      14.720
Qmax(2) =
         1.834 *    0.445 *    12.139) +
         1.000 *    1.000 *     4.578) + =      14.495

Total of 2 streams to confluence:
Flow rates before confluence point:
      12.139       4.578
Maximum flow rates at confluence using above data:
       14.720       14.495
Area of streams before confluence:
        7.100        1.400
Effective area values after confluence:
        8.500        4.562
Results of confluence:
Total flow rate =     14.720(CFS)
Time of concentration =    19.431 min.
Effective stream area after confluence =      8.500(Ac.)
Study area average Pervious fraction(Ap) =  0.627
Study area average soil loss rate(Fm) =    0.613(In/Hr)
Study area total (this main stream) =       8.50(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       45.000 to Point/Station       55.000
**** STREET FLOW TRAVEL TIME + SUBAREA FLOW ADDITION ****
____________________________________________________________________
Top of street segment elevation =    30.200(Ft.)
End of street segment elevation =    29.000(Ft.)
Length of street segment  =   285.000(Ft.)
Height of curb above gutter flowline  =    6.0(In.)
Width of half street (curb to crown)  =  18.000(Ft.)
Distance from crown to crossfall grade break  =   9.000(Ft.)
Slope from gutter to grade break (v/hz) =   0.020
Slope from grade break to crown (v/hz)  =   0.020
Street flow is on [2] side(s) of the street
Distance from curb to property line  =   7.000(Ft.)
```

```
Slope from curb to property line (v/hz) =   0.020
Gutter width =   2.000(Ft.)
Gutter hike from flowline =  2.000(In.)
 Manning's N in gutter =  0.0150
 Manning's N from gutter to grade break =  0.0150
 Manning's N from grade break to crown =  0.0150
Estimated mean flow rate at midpoint of street =     15.125(CFS)
Depth of flow =   0.496(Ft.), Average velocity =   2.135(Ft/s)
Note:  depth of flow exceeds top of street crown.
Streetflow hydraulics at midpoint of street travel:
Halfstreet flow width =  18.000(Ft.)
Flow velocity =   2.13(Ft/s)
Travel time =    2.22 min.     TC =   21.66  min.
 Adding area flow to street
RESIDENTIAL(5 - 7 dwl/acre)
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 32.00
Pervious ratio(Ap) = 0.5000     Max loss rate(Fm)=     0.489(In/Hr)
Rainfall intensity =      2.378(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.673
Subarea runoff =      0.647(CFS) for    1.100(Ac.)
Total runoff =     15.368(CFS)
Effective area this stream =        9.60(Ac.)
Total Study Area (Main Stream No. 2) =       27.40(Ac.)
Area averaged Fm value =    0.599(In/Hr)
Street flow at end of street =     15.368(CFS)
Half street flow at end of street =      7.684(CFS)
Depth of flow =   0.498(Ft.), Average velocity =   2.149(Ft/s)
Note:  depth of flow exceeds top of street crown.
Flow width (from curb towards crown)=  18.000(Ft.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.000 to Point/Station       55.000
**** CONFLUENCE OF MAIN STREAMS ****
______________________________________________________________________
The following data inside Main Stream is listed:
In Main Stream number: 2
Stream flow area =      9.600(Ac.)
Runoff from this stream =     15.368(CFS)
Time of concentration =   21.66 min.
Rainfall intensity =     2.378(In/Hr)
Area averaged loss rate (Fm) =    0.5989(In/Hr)
Area averaged Pervious ratio (Ap) = 0.6125
Summary of stream data:

Stream Flow rate    Area    TC     Fm       Rainfall Intensity
 No.    (CFS)    (Ac.)       (min) (In/Hr)     (In/Hr)


1     35.63    15.538     14.03    0.537      3.085
2     15.37     9.600     21.66    0.599      2.378
Qmax(1) =
```

```
        1.000 *    1.000 *    35.627) +
        1.398 *    0.648 *    15.368) + =      49.543
Qmax(2) =
        0.722 *    1.000 *    35.627) +
        1.000 *    1.000 *    15.368) + =      41.106

Total of 2 main streams to confluence:
Flow rates before confluence point:
      36.627      16.368
Maximum flow rates at confluence using above data:
       49.543       41.106
Area of streams before confluence:
       15.538        9.600
Effective area values after confluence:
       21.758       25.138


Results of confluence:
Total flow rate =     49.543(CFS)
Time of concentration =    14.031 min.
Effective stream area after confluence  =     21.758(Ac.)
Study area average Pervious fraction(Ap) =  0.573
Study area average soil loss rate(Fm) =    0.561(In/Hr)
Study area total =      25.14(Ac.)


++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
Process from Point/Station       55.000 to Point/Station       55.000
**** SUBAREA FLOW ADDITION ****
______________________________________________________________________
UNDEVELOPED (poor cover) subarea
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2)  = 67.00
Pervious ratio(Ap) = 1.0000     Max loss rate(Fm)=     0.578(In/Hr)
Time of concentration =    14.03 min.
Rainfall intensity =      3.085(In/Hr) for a    10.0 year storm
Effective runoff coefficient used for area,(total area with modified
rational method)(Q=KCIA) is C = 0.736
Subarea runoff =      1.012(CFS) for    0.500(Ac.)
Total runoff =     50.555(CFS)
Effective area this stream =       22.26(Ac.)
Total Study Area (Main Stream No. 1) =       27.90(Ac.)
Area averaged Fm value =    0.561(In/Hr)
End of computations, Total Study Area =           27.90 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area
effects caused by confluences in the rational equation.

Area averaged pervious area fraction(Ap) = 0.580
Area averaged SCS curve number =  32.6
```

San Bernardino County Rational Hydrology Program

(Hydrology Manual Date - August 1986)

CIVILCADD/CIVILDESIGN Engineering Software, (c) 1989-2005 Version 7.1
Rational Hydrology Study Date: 10/23/15

RANCHO PALMA
DEVELOPED CONDITION
AMC II
COMMERCIAL AREA

Program License Serial Number 6019

********* Hydrology Study Control Information **********

Rational hydrology study storm event year is 100.0
Computed rainfall intensity:
Storm year = 100.00 1 hour rainfall = 2.110 (In.)
Slope used for rainfall intensity curve b = 0.6000
Soil antecedent moisture condition (AMC) = 2

++
Process from Point/Station 10.000 to Point/Station 20.000
**** INITIAL AREA EVALUATION ****

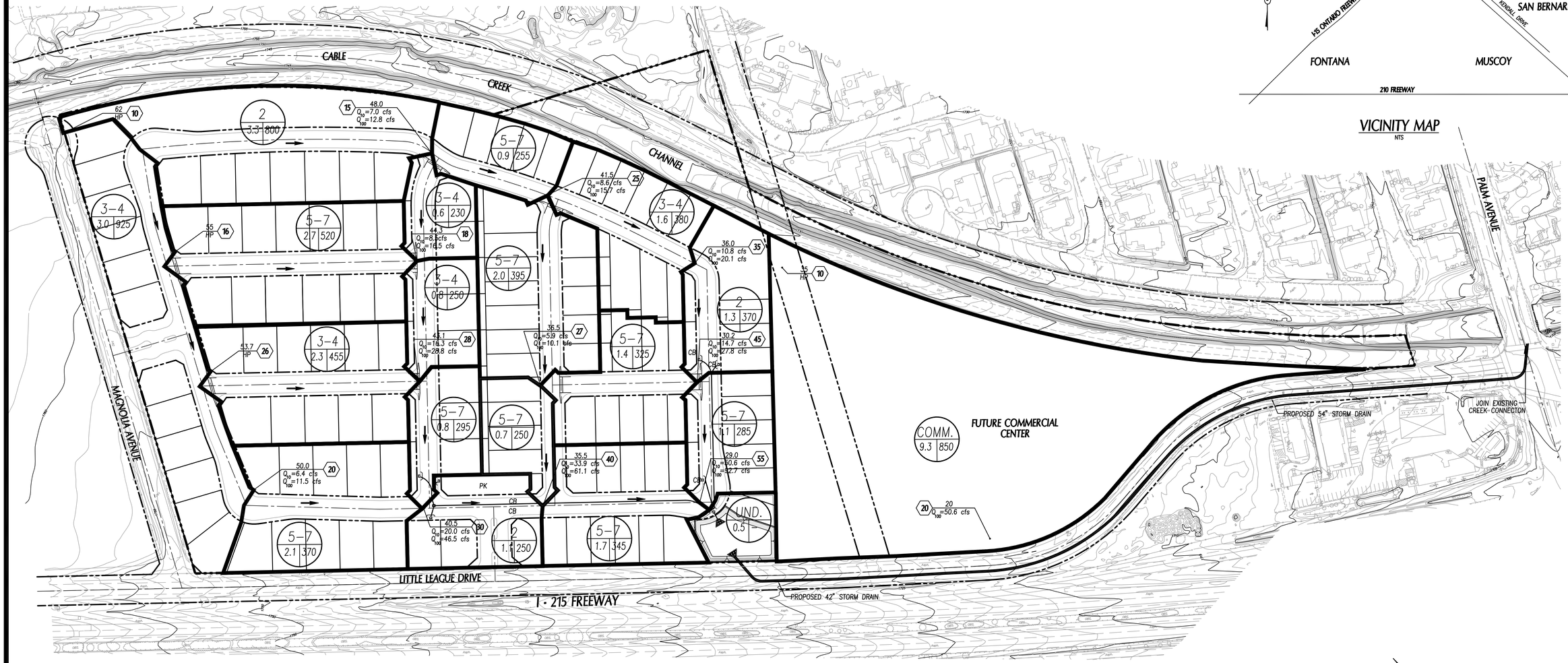
COMMERCIAL subarea type
Decimal fraction soil group A = 1.000
Decimal fraction soil group B = 0.000
Decimal fraction soil group C = 0.000
Decimal fraction soil group D = 0.000
SCS curve number for soil(AMC 2) = 32.00
Pervious ratio(Ap) = 0.1000 Max loss rate(Fm)= 0.098(In/Hr)
Initial subarea data:
Initial area flow distance = 850.000(Ft.)
Top (of initial area) elevation = 35.000(Ft.)
Bottom (of initial area) elevation = 20.000(Ft.)
Difference in elevation = 15.000(Ft.)
Slope = 0.01765 s(%)= 1.76
TC = k(0.304)*[(length^3)/(elevation change)]^0.2
Initial area time of concentration = 10.123 min.
Rainfall intensity = 6.137(In/Hr) for a 100.0 year storm
Effective runoff coefficient used for area (Q=KCIA) is C = 0.886
Subarea runoff = 50.552(CFS)
Total initial stream area = 9.300(Ac.)
Pervious area fraction = 0.100
Initial area Fm value = 0.098(In/Hr)
End of computations, Total Study Area = 9.30 (Ac.)
The following figures may
be used for a unit hydrograph study of the same area.
Note: These figures do not consider reduced effective area

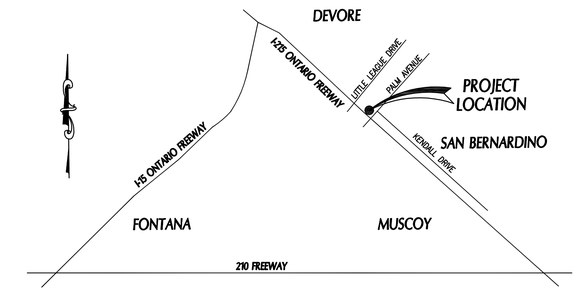
Hydrology Exhibits

Developed Hydrology Exhibit Residential and Commercial areas

RANCHO PALMA

HYDROLOGY DEVELOPED CONDITION EXHIBIT





VICINITY MAP

NTS

LEGEND

30 — 40.5 — ELEVATION

(AC) NODE

5-7 / 1.1 / 250

ACREAGE — TRAVEL LENGTH (FT)

INDICATES SUB-AREA BONDARY

FLOW DIRECTON

COM	COMMERCIAL LAND COVERAGE
5-7	5-7 DWELLING UNITS PER ACRE
PK	PARK
CB	CATCH BASIN

GRAPHIC SCALE

100 0 50 100 200 400

(IN FEET)
1 inch = 100 ft.

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CITY OF SAN BERNARDINO
CALIFORNIA

DRAINAGE EXHIBIT
SITE MAP

PLOT DATE: December 28, 2015 drafter48

Filename: I:\Strata Equities-226\Verdemont\DWG's\ENTITLEMENT\EXHIBITS\DRAINAGE EXHIBIT.dwg

3.10-1 Noise Impact Analysis

Rancho Palma

NOISE IMPACT ANALYSIS

CITY OF SAN BERNARDINO

PREPARED BY:

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DECEMBER 3, 2015

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
ANSI	American National Standards Institute
Calveno	California Vehicle Noise
CEQA	California Environmental Quality Act
CNEL	Community Noise Equivalent Level
dBA	A-weighted decibels
EPA	Environmental Protection Agency
FHWA	Federal Highway Administration
FTA	Federal Transit Administration
I-215	Interstate 215
INCE	Institute of Noise Control Engineering
Leq	Equivalent continuous (average) sound level
Lmax	Maximum level measured over the time interval
Lmin	Minimum level measured over the time interval
mph	Miles per hour
PPV	Peak Particle Velocity
Project	Rancho Palma
REMEL	Reference Energy Mean Emission Level
RMS	Root-mean-square
VdB	Vibration Decibels

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EXECUTIVE SUMMARY

Urban Crossroads, Inc. has prepared this noise study to determine the noise exposure and the necessary noise mitigation measures for the proposed Rancho Palma development ("Project"). The Project site is located northeast of West Little League Drive and northwest of Palm Avenue in the City of San Bernardino. The Project is proposed to consist of the development of up to 120 single-family detached residential dwelling units and 98,000 square feet of commercial retail use. This study has been prepared to satisfy the City of San Bernardino noise standards and to ensure that adequate noise abatement measures are incorporated into the Project's development.

OFF-SITE TRAFFIC NOISE ANALYSIS

Traffic generated by the proposed Project will influence the traffic noise levels in surrounding off-site areas. To quantify the off-site traffic noise increases on the surrounding off-site areas, the changes in traffic noise levels on 32 roadway segments surrounding the Project site were estimated based on the change in the average daily traffic (ADT) volumes. The traffic noise levels provided in this analysis are based on the traffic forecasts found in the *Rancho Palma Traffic Impact Analysis* prepared by Urban Crossroads, Inc. (1) To assess the off-site noise level impacts associated with the proposed Project, noise contour boundaries were developed for Existing, Existing plus Ambient (2018), Existing plus Ambient (2019), Opening Year Cumulative (2018), Opening Year Cumulative (2019), and Year 2035 traffic conditions. The off-site traffic noise analysis indicates that the Project's contributions to roadway noise levels at adjacent sensitive land uses will be *less than significant* for Existing, Existing plus Ambient (2018), Existing plus Ambient (2019), Opening Year Cumulative (2018), Opening Year Cumulative (2019), and Year 2035 conditions.

ON-SITE TRAFFIC NOISE ANALYSIS

The results of this analysis indicate that future vehicle noise from the I-215 Freeway, West Little League Drive, and Magnolia Avenue is the principal source of community noise that will impact the Project site. The Project will also experience some background traffic noise impacts from the Project's internal roads, however due to the distance, topography and low traffic volume/speeds, traffic noise from these roads will not make a significant contribution to the noise environment. The on-site noise mitigation measures recommended in this noise analysis have been designed to reduce the exterior and interior noise levels to satisfy the City of San Bernardino transportation related CNEL noise criteria for residential development. With the recommended noise mitigation measures shown on Exhibit ES-A, the on-site noise impacts will be *less than significant*.

EXTERIOR NOISE MITIGATION

To satisfy the City of San Bernardino 65 dBA CNEL exterior noise level standards for residential land use, the construction of a minimum effective 9-foot high noise barrier is required for the outdoor living areas (backyards) of lots 47 to 55 and 75 to 81 facing the I-215 Freeway and West Little League Drive. The planned noise barrier is expected to consist of a combination 1 foot high berm with an 8 foot high block wall. In addition, the construction of a minimum effective 7-foot

high noise barrier is required for lot 82 facing West Little League Drive. Further, 6-foot high noise barriers are recommended for all other lots adjacent to Magnolia Avenue and the commercial retail land use of the Project site. With the recommended noise barriers shown on Exhibit ES-A, the mitigated future exterior noise levels will range from 48.8 to 65.0 dBA CNEL. This noise analysis shows that the recommended noise barriers will satisfy the City of San Bernardino 65 dBA CNEL exterior noise level standards. The effective noise barrier height recommendations represent the minimum wall and/or berm combination height required to satisfy the City of San Bernardino exterior noise level standards.

The recommended noise control barriers shall be constructed so that the top of each wall and /or berm combination extends to the recommended height above the pad elevation of the lot it is shielding. When the road is elevated above the pad elevation, the barrier shall extend to the recommended height above the highest point between the residential home and the road. The barrier shall provide a weight of at least 4 pounds per square foot of face area with no decorative cutouts or line-of-sight openings between shielded areas and the roadways. The noise barrier shall be constructed using the following materials:

- Masonry block
- Stucco veneer over wood framing (or foam core), or 1 inch thick tongue and groove wood of sufficient weight per square foot
- Glass (1/4 inch thick), or other transparent material with sufficient weight per square foot
- Earthen berm
- Any combination of these construction materials

The barrier shall consist of a solid face from top to bottom. Unnecessary openings or decorative cutouts shall not be made. All gaps (except for weep holes) should be filled with grout or caulking.

INTERIOR NOISE MITIGATION

To satisfy the City of San Bernardino 45 dBA CNEL interior noise level criteria, lots facing the I-215 Freeway, West Little League Drive, and Magnolia Avenue will require a Noise Reduction (NR) of up to 29.3 dBA and a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning). In order to meet the City of San Bernardino 45 dBA CNEL interior noise standards the Project shall provide the following or equivalent noise mitigation measures:

- Exterior walls: If wood construction is used, exterior walls shall be furnished on the outside with siding-on-sheathing, stucco, or brick veneer. The interior surface shall be at least one-half inch gypsum board. Insulation having a minimum of R-11 shall be placed between the studs. Masonry walls, if used, shall have at least one surface of the wall plastered, painted, or covered with gypsum wallboard or approved materials. At least R-11 insulation shall be placed between the studs. There shall be no direct openings such as mail slots or ventilation units.
- Windows:
    - Lots 47 to 55 and 75 to 82 facing the I-215 Freeway require upgraded second floor windows with a minimum sound transmission class (STC) rating of 34.
    - All other windows and sliding glass doors shall be well fitted, well weather-stripped assemblies and shall have a minimum STC rating of 27.

- Doors: All exterior hinged and sliding glass doors to habitable rooms that are directly exposed to transportation noise and are facing the source of the noise shall be a door and edge seal assembly with a minimum STC rating of 27.
- Roof: Roof sheathing of wood construction shall be well fitted or caulked plywood of at least one-half inch thick. Ceilings shall be well fitted, well-sealed gypsum board of at least one-half inch thick. Insulation with at least a rating of R-19 shall be used in the attic space. Skylights shall have a minimum STC of 34.
- Attic: Attic ventilation shall be oriented away from the I-215 Freeway. If such an orientation cannot be avoided, then an acoustical baffle shall be placed in the attic space behind the vents.
- Ventilation: A ventilation system shall be provided that will provide at least the minimum air circulation and fresh air supply requirements of the Building Code in each habitable room without opening any window, door or other opening to the exterior. All concealed ductwork shall be insulated flexible glass fiber ducting that is at least ten feet long between any two points of connection. Kitchen cooktop vent hoods shall be the non-ducted recirculating type with no ducted connection to the exterior.
- Wall and ceiling openings: Openings in the shell of the residence which degrade its ability to achieve an interior CNEL rating of 45 dBA or less when all doors and windows are closed are prohibited unless access panels, pet doors, mail delivery drops, air- conditioning, or other openings are designed to maintain the 45 dBA CNEL (or less) standard in the room to which they provide access.

With the interior noise mitigation measures provided in this study, the proposed Rancho Palma is expected to meet the City of San Bernardino 45 dBA CNEL interior noise level standards for residential development.

OPERATIONAL NOISE ANALYSIS

Using reference noise levels to represent the noise sources within the Rancho Palma site, this analysis estimates the Project-related 24-hour operational stationary-source noise levels at the noise-sensitive receiver locations. The Project-related noise sources are expected to include: roof-top air conditioning units, shopping cart corrals, parking lot vehicle movements, and loading dock activities.

The analysis shows that the Project-related operational noise levels will satisfy the City of San Bernardino Development Code noise level standards at the sensitive receivers nearest the Project site. Further, this analysis demonstrates that the Project will not contribute an operational noise level impact to the existing ambient noise environment at any of the sensitive receiver locations. Therefore, the operational noise level impacts associated with the proposed Project activities, such as the roof-top air conditioning units, shopping cart corrals, parking lot vehicle movements, and loading dock activities will be *less than significant*.

CONSTRUCTION NOISE ANALYSIS

Construction noise represents a short-term impact on the ambient noise levels. Based on the five phases of Project construction, the temporary construction-related noise impacts are expected to create temporary and intermittent high-level noise at receivers surrounding the Project site when certain activities occur near the property line. While the City of San Bernardino establishes limits to the hours during which construction activity may take place, it does not identify specific noise level limits for construction noise levels. Section 8.54.060(I) *Exemptions* indicates that Project construction noise levels are considered exempt from the provisions of the ordinance. Therefore, if Project construction only occurs during the permitted hours of the Noise Control Ordinance, then the construction noise levels shall be exempt from the Noise Control Ordinance.

CONSTRUCTION NOISE & VIBRATION ABATEMENT MEASURES

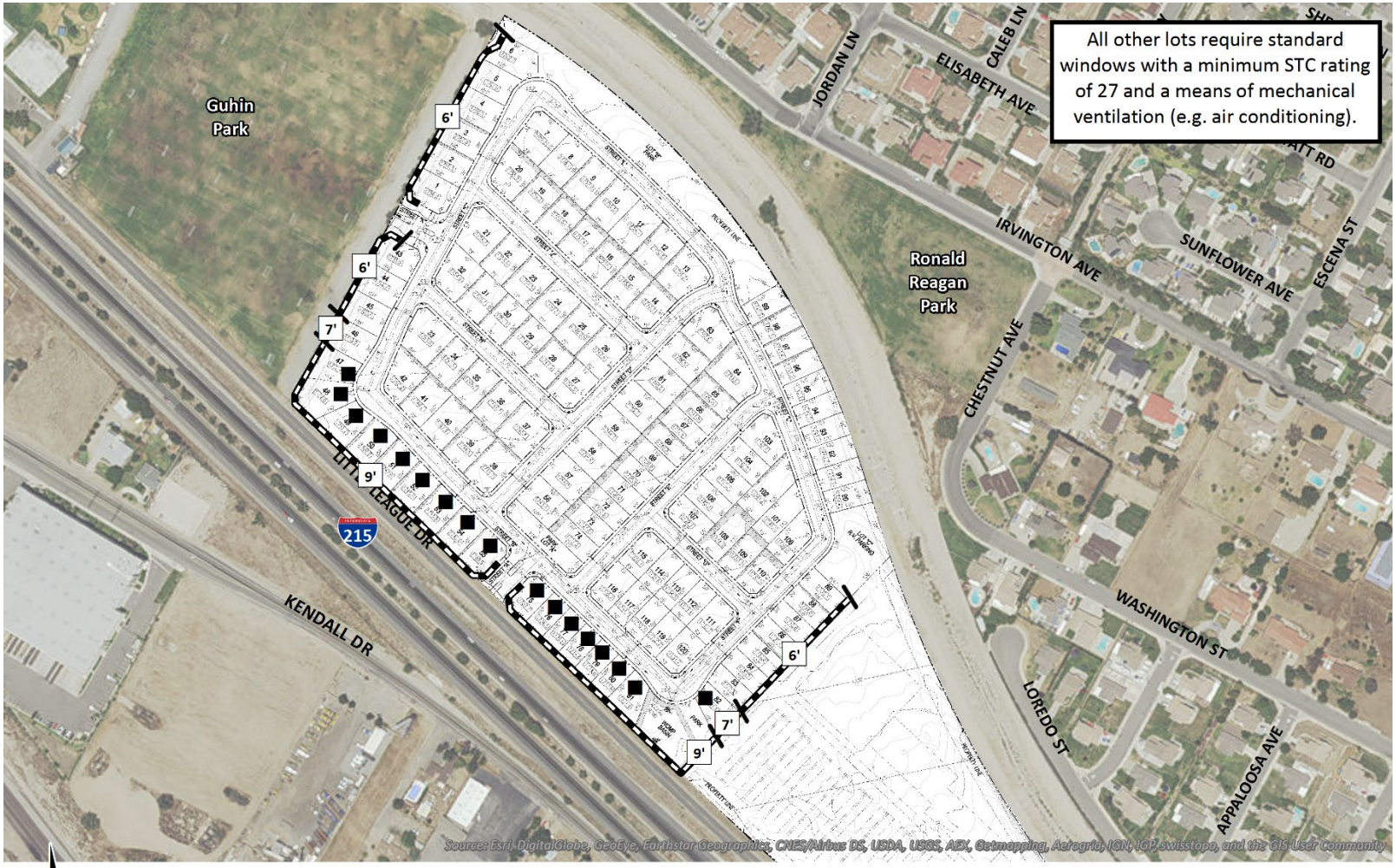
Though construction noise is temporary, intermittent and of short duration, and will not present any long-term impacts, the following practices would reduce any noise level increases produced by the construction equipment to the nearby noise sensitive residential land uses.

- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 a.m. and 8:00 p.m. on any day. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.
- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., at the southern center) during all Project construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. and 8:00 p.m. on any day). The Project Applicant shall prepare a haul route exhibit to design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

CONSTRUCTION VIBRATION ANALYSIS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. This analysis shows the construction vibration levels are expected to approach 63.6 VdB at the eight receiver locations. Based on the FTA vibration standards of 80 VdB, the proposed Project construction activities will not include or require equipment, facilities, or activities that would result in a *barely perceptible* human response (annoyance), and therefore, impacts due to vibration are considered *less than significant.*

EXHIBIT ES-A: SUMMARY OF RECOMMENDATIONS



N

LEGEND:

- 9' — Recommended Minimum Effective Noise Barrier Height (in feet)
- Recommended Noise Barrier
- ■ Lots facing the I-215 Freeway requiring upgraded second floor windows with a minimum STC rating of 34.

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1 INTRODUCTION

This noise analysis has been completed to determine the noise impacts associated with the development of the proposed Rancho Palma ("Project"). This noise study describes the proposed Project, provides information regarding noise fundamentals, outlines the local regulatory setting, provides the study methods and procedures for traffic noise analysis, and evaluates the future exterior noise environment. In addition, this study includes an analysis of the potential Project-related long-term operational and short-term construction noise and vibration impacts.

1.1 SITE LOCATION

The proposed Rancho Palma Project is located northeast of West Little League Drive and northwest of Palm Avenue in the City of San Bernardino, as shown on Exhibit 1-A. The Interstate 215 (I-215) Freeway is located approximately 75 feet south of the Project site. Existing residential land uses in the Project study area are located north of the Project site on Irvington Avenue, Chestnut Avenue, and Loredo Street. The Guhin and Verdemont Parks are located west and north of the Project site, respectively. North of the Project site are the Cesar E. Chavez Middle School on Magnolia Avenue, and the Little League Baseball Western Region Headquarters on North Little League Drive. The existing commercial retail Palm Travel Center is located south of the Project site on West Little League Drive.

1.2 PROJECT DESCRIPTION

The Project is proposed to include the development of up to 120 single-family detached residential dwelling units and 98,000 square feet of commercial retail use, as shown on Exhibit 1-B. For the purposes of this analysis, potential impacts have been assessed for two development phases. The two phases and their anticipated opening years are as follows:

- Phase 1 (2018) – 120 single family detached residential dwelling units (Western Half);
- Phase 2 (2019) – 98,000 square feet of commercial retail use (Eastern Half).

EXHIBIT 1-A: LOCATION MAP

EXHIBIT 1-B: SITE PLAN

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2 FUNDAMENTALS

Noise has been simply defined as "unwanted sound." Sound becomes unwanted when it interferes with normal activities, when it causes actual physical harm or when it has adverse effects on health. Noise is measured on a logarithmic scale of sound pressure level known as a decibel (dB). A-weighted decibels (dBA) approximate the subjective response of the human ear to broad frequency noise source by discriminating against very low and very high frequencies of the audible spectrum. They are adjusted to reflect only those frequencies which are audible to the human ear. Exhibit 2-A presents a summary of the typical noise levels and their subjective loudness and effects that are described in more detail below.

EXHIBIT 2-A: TYPICAL NOISE LEVELS

COMMON OUTDOOR ACTIVITIES	COMMON INDOOR ACTIVITIES	A - WEIGHTED SOUND LEVEL dBA	SUBJECTIVE LOUDNESS	EFFECTS OF NOISE
THRESHOLD OF PAIN		140	INTOLERABLE OR DEAFENING	HEARING LOSS
NEAR JET ENGINE		130		
		120		
JET FLY-OVER AT 300m (1000 ft)	ROCK BAND	110		
LOUD AUTO HORN		100	VERY NOISY	
GAS LAWN MOWER AT 1m (3 ft)		90		
DIESEL TRUCK AT 15m (50 ft), at 80 km/hr (50 mph)	FOOD BLENDER AT 1m (3 ft)	80		SPEECH INTERFERENCE
NOISY URBAN AREA, DAYTIME	VACUUM CLEANER AT 3m (10 ft)	70	LOUD	
HEAVY TRAFFIC AT 90m (300 ft)	NORMAL SPEECH AT 1m (3 ft)	60		
QUIET URBAN DAYTIME	LARGE BUSINESS OFFICE	50	MODERATE	
QUIET URBAN NIGHTTIME	THEATER, LARGE CONFERENCE ROOM (BACKGROUND)	40		SLEEP DISTURBANCE
QUIET SUBURBAN NIGHTTIME	LIBRARY	30	FAINT	NO EFFECT
QUIET RURAL NIGHTTIME	BEDROOM AT NIGHT, CONCERT HALL (BACKGROUND)	20		
	BROADCAST/RECORDING STUDIO	10	VERY FAINT	
LOWEST THRESHOLD OF HUMAN HEARING	LOWEST THRESHOLD OF HUMAN HEARING	0		

Source: Environmental Protection Agency Office of Noise Abatement and Control, Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety (EPA/ONAC 550/9-74-004) March 1974.

2.1 RANGE OF NOISE

Since the range of intensities that the human ear can detect is so large, the scale frequently used to measure intensity is a scale based on multiples of 10, the logarithmic scale. The scale for measuring intensity is the decibel scale. Each interval of 10 decibels indicates a sound energy ten times greater than before, which is perceived by the human ear as being roughly twice as loud. (2) The most common sounds vary between 40 dBA (very quiet) to 100 dBA (very loud). Normal conversation at three feet is roughly at 60 dBA, while loud jet engine noises equate to 110 dBA

at approximately 100 feet, which can cause serious discomfort. (3) Another important aspect of noise is the duration of the sound and the way it is described and distributed in time.

2.2 NOISE DESCRIPTORS

Environmental noise descriptors are generally based on averages, rather than instantaneous, noise levels. The most commonly used figure is the equivalent level (Leq). Equivalent sound levels are not measured directly but are calculated from sound pressure levels typically measured in A-weighted decibels (dBA). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period and is commonly used to describe the "average" noise levels within the environment.

Peak hour or average noise levels, while useful, do not completely describe a given noise environment. Noise levels lower than peak hour may be disturbing if they occur during times when quiet is most desirable, namely evening and nighttime (sleeping) hours. To account for this, the Day-Night Average Noise Level (LDN) and the Community Noise Equivalent Level (CNEL), representing a composite twenty-four hour noise level is utilized. The LDN and CNEL are weighted averages of the intensity of a sound, with corrections for time of day, and averaged over 24 hours. The LDN time of day corrections include the addition of 10 decibels to dBA Leq sound levels at night between 10:00 p.m. and 7:00 a.m. The CNEL time of day corrections require the addition of 5 decibels to dBA Leq sound levels in the evening from 7:00 p.m. to 10:00 p.m., in addition to the corrections for the LDN. These additions are made to account for the noise sensitive time periods during the evening and night hours when sound appears louder. LDN and CNEL do not represent the actual sound level heard at any particular time, but rather represent the total sound exposure. The City of San Bernardino relies on the 24-hour LDN level to assess land use compatibility with transportation related noise sources, however, this analysis uses the CNEL noise level to apply the more conservative evening hour corrections to the 24-hour noise levels.

2.3 SOUND PROPAGATION

When sound propagates over a distance, it changes in level and frequency content. The manner in which noise reduces with distance depends on the following factors.

2.3.1 GEOMETRIC SPREADING

Sound from a localized source (i.e., a stationary point source) propagates uniformly outward in a spherical pattern. The sound level attenuates (or decreases) at a rate of 6 dB for each doubling of distance from a point source. Highways consist of several localized noise sources on a defined path and hence can be treated as a line source, which approximates the effect of several point sources. Noise from a line source propagates outward in a cylindrical pattern, often referred to as cylindrical spreading. Sound levels attenuate at a rate of 3 dB for each doubling of distance from a line source.

2.3.2 GROUND ABSORPTION

The propagation path of noise from a highway to a receptor is usually very close to the ground. Noise attenuation from ground absorption and reflective wave canceling adds to the attenuation associated with geometric spreading. Traditionally, the excess attenuation has also been expressed in terms of attenuation per doubling of distance. This approximation is usually sufficiently accurate for distances of less than 200 ft. For acoustically hard sites (i.e., sites with a reflective surface between the source and the receptor, such as a parking lot or body of water), no excess ground attenuation is assumed. For acoustically absorptive or soft sites (i.e., those sites with an absorptive ground surface between the source and the receptor such as soft dirt, grass, or scattered bushes and trees), an excess ground attenuation value of 1.5 dB per doubling of distance is normally assumed. When added to the cylindrical spreading, the excess ground attenuation results in an overall drop-off rate of 4.5 dB per doubling of distance from a line source.

2.3.3 ATMOSPHERIC EFFECTS

Receptors located downwind from a source can be exposed to increased noise levels relative to calm conditions, whereas locations upwind can have lowered noise levels. Sound levels can be increased at large distances (e.g., more than 500 feet) due to atmospheric temperature inversion (i.e., increasing temperature with elevation). Other factors such as air temperature, humidity, and turbulence can also have significant effects.

2.3.4 SHIELDING

A large object or barrier in the path between a noise source and a receptor can substantially attenuate noise levels at the receptor. The amount of attenuation provided by shielding depends on the size of the object and the frequency content of the noise source. Shielding by trees and other such vegetation typically only has an “out of sight, out of mind” effect. That is, the perception of noise impact tends to decrease when vegetation blocks the line-of-sight to nearby resident. However, for vegetation to provide a substantial, or even noticeable, noise reduction, the vegetation area must be at least 15 feet in height, 100 feet wide and dense enough to completely obstruct the line-of sight between the source and the receiver. This size of vegetation may provide up to 5 dBA of noise reduction. The FHWA does not consider the planting of vegetation to be a noise abatement measure.

2.4 NOISE CONTROL

Noise control is the process of obtaining an acceptable noise environment for a particular observation point or receptor by controlling the noise source, transmission path, receptor, or all three. This concept is known as the source-path-receptor concept. In general, noise control measures can be applied to any and all of these three elements.

2.5 NOISE BARRIER ATTENUATION

Effective noise barriers can reduce noise levels by 10 to 15 dBA, cutting the loudness of traffic noise in half. A noise barrier is most effective when placed close to the noise source or receptor.

Noise barriers, however, do have limitations. For a noise barrier to work, it must be high enough and long enough to block the path of the noise source. (4)

2.6 LAND USE COMPATIBILITY WITH NOISE

Some land uses are more tolerant of noise than others. For example, schools, hospitals, churches and residences are more sensitive to noise intrusion than are commercial or industrial developments and related activities. As ambient noise levels affect the perceived amenity or livability of a development, so too can the mismanagement of noise impacts impair the economic health and growth potential of a community by reducing the area's desirability as a place to live, shop and work. For this reason, land use compatibility with the noise environment is an important consideration in the planning and design process. The FHWA encourages State and Local government to regulate land development in such a way that noise-sensitive land uses are either prohibited from being located adjacent to a highway, or that the developments are planned, designed, and constructed in such a way that noise impacts are minimized. (5)

2.7 COMMUNITY RESPONSE TO NOISE

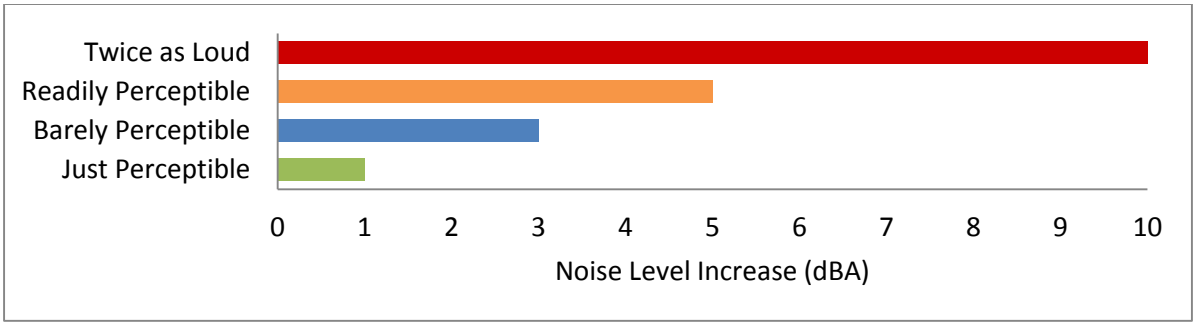
Community responses to noise may range from registering a complaint by telephone or letter, to initiating court action, depending upon each individual's susceptibility to noise and personal attitudes about noise. Several factors are related to the level of community annoyance including:

- Fear associated with noise producing activities;
- Socio-economic status and educational level;
- Perception that those affected are being unfairly treated;
- Attitudes regarding the usefulness of the noise-producing activity;
- Belief that the noise source can be controlled.

Approximately ten percent of the population has a very low tolerance for noise and will object to any noise not of their making. Consequently, even in the quietest environment, some complaints will occur. Another twenty-five percent of the population will not complain even in very severe noise environments. Thus, a variety of reactions can be expected from people exposed to any given noise environment. (6) Surveys have shown that about ten percent of the people exposed to traffic noise of 60 dBA will report being highly annoyed with the noise, and each increase of one dBA is associated with approximately two percent more people being highly annoyed. When traffic noise exceeds 60 dBA or aircraft noise exceeds 55 dBA, people may begin to complain. (6)

Despite this variability in behavior on an individual level, the population as a whole can be expected to exhibit the following responses to changes in noise levels as shown on Exhibit 2-B. An increase or decrease of 1 dBA cannot be perceived except in carefully controlled laboratory experiments, a change of 3 dBA are considered *barely perceptible*, and changes of 5 dBA are considered *readily perceptible*. (4)

EXHIBIT 2-B: NOISE LEVEL INCREASE PERCEPTION



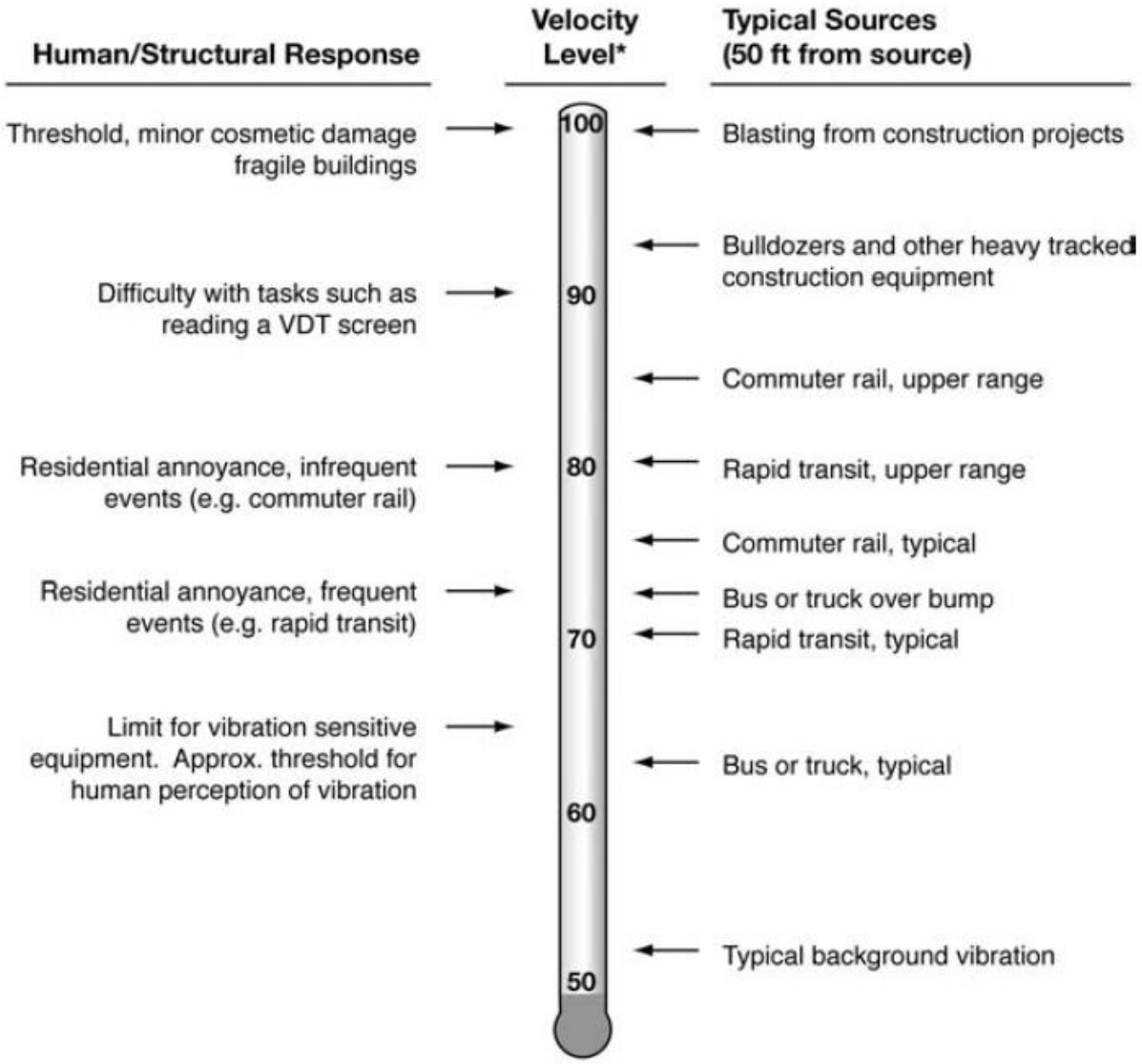
2.8 VIBRATION

According to the Federal Transit Administration (FTA) *Transit Noise Impact and Vibration Assessment* (7), vibration is the periodic oscillation of a medium or object. The rumbling sound caused by the vibration of room surfaces is called structure-borne noise. Sources of ground-borne vibrations include natural phenomena (e.g., earthquakes, volcanic eruptions, sea waves, landslides) or human-made causes (e.g., explosions, machinery, traffic, trains, construction equipment). Vibration sources may be continuous, such as factory machinery, or transient, such as explosions. As is the case with airborne sound, ground-borne vibrations may be described by amplitude and frequency.

There are several different methods that are used to quantify vibration. The peak particle velocity (PPV) is defined as the maximum instantaneous peak of the vibration signal. The PPV is most frequently used to describe vibration impacts to buildings, but is not always suitable for evaluating human response (annoyance) because it takes some time for the human body to respond to vibration signals. Instead, the human body responds to average vibration amplitude often described as the root mean square (RMS). The RMS amplitude is defined as the average of the squared amplitude of the signal, and is most frequently used to describe the effect of vibration on the human body. Decibel notation (VdB) is commonly used to measure RMS. Decibel notation (VdB) serves to reduce the range of numbers used to describe human response to vibration. Typically, ground-borne vibration generated by man-made activities attenuates rapidly with distance from the source of the vibration. Sensitive receivers for vibration include structures (especially older masonry structures), people (especially residents, the elderly, and sick), and vibration-sensitive equipment.

The background vibration-velocity level in residential areas is generally 50 VdB. Ground-borne vibration is normally perceptible to humans at approximately 65 VdB. For most people, a vibration-velocity level of 75 VdB is the approximate dividing line between barely perceptible and distinctly perceptible levels. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads. If a roadway is smooth, the ground-borne vibration is rarely perceptible. The range of interest is from approximately 50 VdB, which is the typical background vibration-velocity level, to 100 VdB, which is the general threshold where minor damage can occur in fragile buildings. Exhibit 2-C illustrates common vibration sources and the human and structural response to ground-borne vibration.

EXHIBIT 2-C: TYPICAL LEVELS OF GROUND-BORNE VIBRATION



** RMS Vibration Velocity Level in VdB relative to 10^{-6} inches/second*

Source: Federal Transit Administration (FTA) Transit Noise Impact and Vibration Assessment.

3 REGULATORY SETTING

To limit population exposure to physically and/or psychologically damaging as well as intrusive noise levels, the federal government, the State of California, various county governments, and most municipalities in the state have established standards and ordinances to control noise. In most areas, automobile and truck traffic is the major source of environmental noise. Traffic activity generally produces an average sound level that remains fairly constant with time. Air and rail traffic, and commercial and industrial activities are also major sources of noise in some areas. Federal, state, and local agencies regulate different aspects of environmental noise. Federal and state agencies generally set noise standards for mobile sources such as aircraft and motor vehicles, while regulation of stationary sources is left to local agencies.

3.1 STATE OF CALIFORNIA NOISE REQUIREMENTS

The State of California regulates freeway noise, sets standards for sound transmission, provides occupational noise control criteria, identifies noise standards and provides guidance for local land use compatibility. State law requires that each county and city adopt a General Plan that includes a Noise Element which is to be prepared according to guidelines adopted by the Governor's Office of Planning and Research. (8) The purpose of the Noise Element is to *limit the exposure of the community to excessive noise levels*. In addition, the California Environmental Quality Act (CEQA) requires that all known environmental effects of a project be analyzed, including the potential environmental noise impacts.

3.2 STATE OF CALIFORNIA BUILDING CODE

The State of California's noise insulation standards are codified in the California Code of Regulations, Title 24, Building Standards Administrative Code, Part 2, and the California Building Code. These noise standards are applied to new construction in California for the purpose of controlling interior noise levels resulting from exterior noise sources. The regulations specify that acoustical studies must be prepared when noise-sensitive structures, such as residential buildings, schools, or hospitals, are developed near major transportation noise sources, and where such noise sources create an exterior noise level of 60 dBA CNEL or higher. Acoustical studies that accompany building plans for noise-sensitive land uses must demonstrate that the structure has been designed to limit interior noise in habitable rooms to acceptable noise levels. For new residential buildings, schools, and hospitals, the acceptable interior noise limit for new construction is 45 dBA CNEL.

3.3 CITY OF SAN BERNARDINO GENERAL PLAN NOISE ELEMENT

The City of San Bernardino General Plan Noise Element identifies several policies to minimize the impacts of excessive noise levels throughout the community. (9) The Noise Element provides policy guidance which addresses the generation, mitigation, avoidance, and the control of excessive noise. To protect City of San Bernardino residents from excessive noise levels, the Noise Element contains the following three goals:

14.1 Ensure that residents are protected from excessive noise through careful land planning.

14.2 Encourage the reduction of noise from transportation-related noise sources such as motor vehicles, aircraft operations, and railroad movements.

14.3 Protect residents from the negative effects of "spill over" or nuisance noise.

The noise policies specified in the City of San Bernardino Noise Element provide the guidelines necessary to satisfy these goals. To ensure that residents are not exposed to excessive noise levels (Goal 14.1), Policies 14.1.1 to 14.1.4 indicate that sensitive land uses such as housing, health care facilities, schools, libraries, and religious facilities should not experience exterior noise levels greater than 65 dBA LDN for exterior areas and 45 dBA LDN for interior areas. As discussed in Section 2.2 the more conservative CNEL descriptor is used in this analysis, and therefore, the exterior noise level criteria of 65 dBA CNEL and interior noise level criteria of 45 dBA CNEL shall apply to sensitive land uses. Policies 14.2.1 to 14.2.19 outline the transportation-related guidelines and mitigation strategies the City uses to satisfy Goal 14.2. To protect residents from sources of operational and construction noise (Goal 14.3), the Noise Element includes Policies 14.3.1 to 14.3.8 to adopt a Noise Ordinance and ensure noise issues between land uses are reduced. (9)

3.3.1 LAND USE COMPATIBILITY

The noise criteria identified in the City of San Bernardino Noise Element (Figure N-1) are guidelines to evaluate the land use compatibility of transportation-related noise. The compatibility criteria, shown on Exhibit 3-A, provides the City with a planning tool to gauge the compatibility of land uses relative to existing and future exterior noise levels.

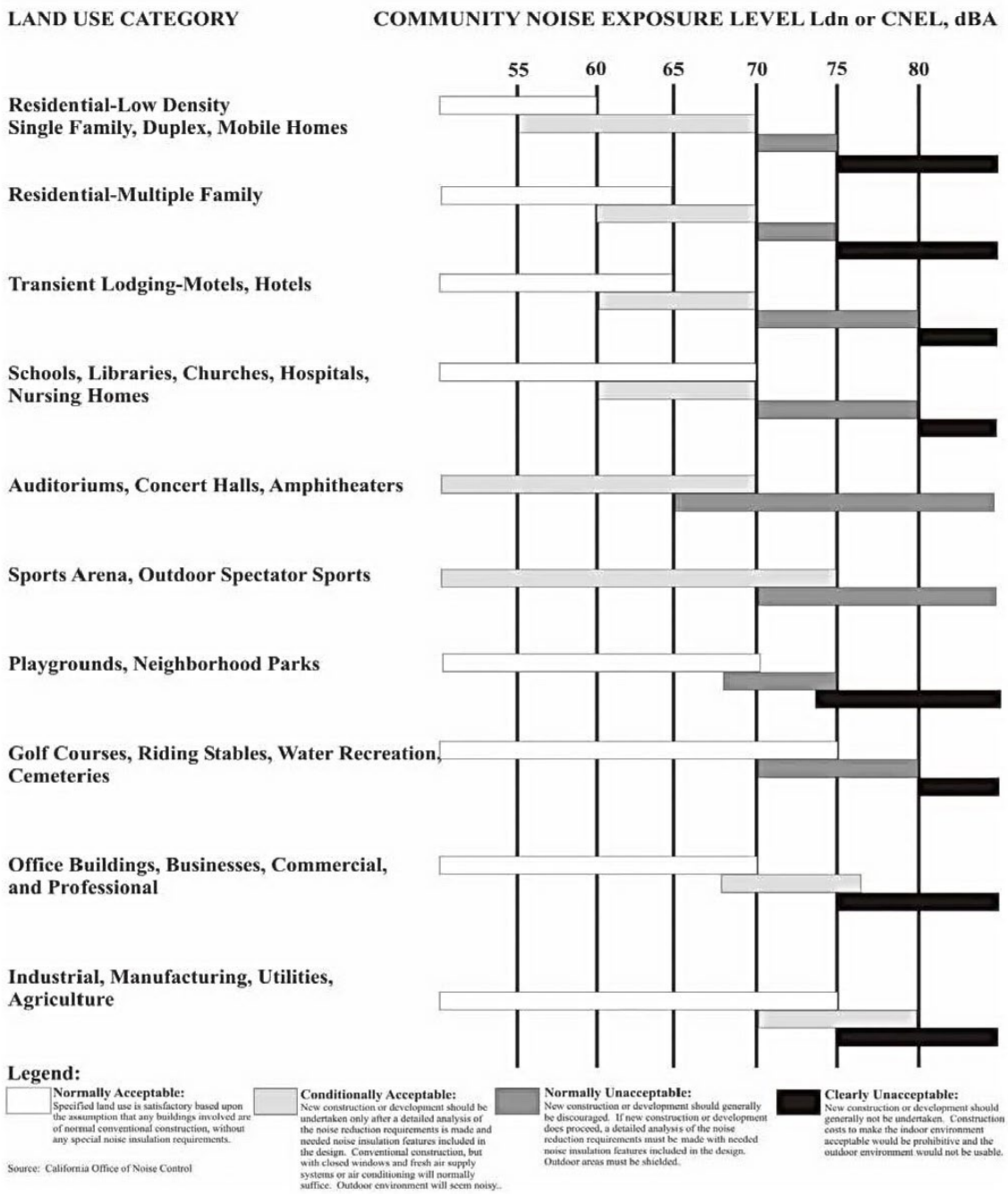
The *Land Use Compatibility for Community Noise Exposure* guidelines indicate that noise-sensitive land uses such as single-family residences are considered *normally acceptable* with exterior noise levels below 60 dBA CNEL and *conditionally acceptable* with noise levels below 70 dBA CNEL. For office and commercial land uses, exterior noise levels below 70 dBA CNEL are considered *normally acceptable* and noise levels of less than 75 are considered *conditionally acceptable*. Industrial, and manufacturing land uses are considered *normally acceptable* with noise levels below 75 dBA CNEL and conditionally acceptable with noise levels of less than 80 dBA CNEL.

3.3.2 TRANSPORTATION NOISE STANDARDS

To encourage the reduction of noise from transportation-related noise sources such as motor vehicles, aircraft operations and railroad movements (Goal 14.2), Table N-3 of the City of San

Bernardino General Plan Noise Element, shown on Exhibit 3-B, identifies a maximum allowable exterior noise level of 65 dBA CNEL and an interior noise level limit of 45 dBA CNEL for new residential developments. While the City specifically identifies an exterior noise level limit for noise-sensitive residential land uses such as hotels, hospitals, schools and parks, the City of San Bernardino does not maintain exterior noise standards for non-noise sensitive land uses such as office, retail, manufacturing, utilities, agriculture, and industrial.

EXHIBIT 3-A: LAND USE COMPATIBILITY FOR COMMUNITY NOISE EXPOSURE



Source: City of San Bernardino General Plan Noise Element, Figure N-1.

EXHIBIT 3-B: STATE OF CALIFORNIA INTERIOR AND EXTERIOR NOISE STANDARDS

Land Use		*CNEL (dBA)*	
Categories	***Uses***	***Interior [1]***	***Exterior [2]***
Residential	Single and multi-family, duplex	45[3]	65
	Mobile homes	----	65[4]
Commercial	Hotel, motel, transient housing	45	---
	Commercial retail, bank, restaurant	55	---
	Office building, research and development, professional offices	50	---
	Amphitheater, concert hall, auditorium, movie theater	45	---
	Gymnasium (Multipurpose)	50	---
	Sports Club	55	---
	Manufacturing, warehousing, wholesale, utilities	65	---
	Movie Theaters	45	---
Institutional/ Public	Hospital, school classrooms/playgrounds	45	65
	Church, library	45	---
Open Space	Parks	---	65

[1] Indoor environment excluding: bathrooms, kitchens, toilets, closets, and corridors

[2] Outdoor environment limited to:

- Private yard of single-family dwellings
- Multi-family private patios or balconies accessed from within the dwelling (Balconies 6 feet deep or less are exempt)
- Mobile home parks
- Park picnic areas
- School playgrounds
- Hospital patios

[3] Noise level requirement with closed windows, mechanical ventilation or other means of natural ventilation shall be provided as per Chapter 12, Section 1205 of the Uniform Building Code.

[4] Exterior noise levels should be such that interior noise levels will not exceed 45 dBA CNEL.

Source: City of San Bernardino General Plan Noise Element, Table N-3.

3.4 OPERATIONAL NOISE STANDARDS

To analyze noise impacts originating from a designated fixed location or private property such as the Rancho Palma Project, operational source noise is typically evaluated against standards established under a City's Municipal Code. While the City of San Bernardino maintains several policies in the Municipal Code Noise Control Ordinance to control the negative effects of nuisance noise, it does not identify specific exterior noise level limits. However, the policies in the Municipal Code Development Code, Chapter 19.20, *Property Development Standards* contain the exterior and interior noise level standards for residential land uses. Therefore, the stationary noise sources such as roof-top air conditioning units, shopping cart corrals, parking lot vehicle movements, and loading dock activities originating from a designated fixed location or private property such as the commercial retail use within the Rancho Palma site, are evaluated against the policies adopted in the City's Development Code. (10)

The Project operational noise impacts are governed by the City of San Bernardino Municipal Code, Section 8.54, included in Appendix 3.2. Section 8.54.060 states when: *such noises are an accompaniment and effect of a lawful business, commercial or industrial enterprise carried on in an area zoned for that purpose*…these activities shall be exempt (Section 8.54.060(B)). (11) However, due to the Project's close proximity to residential land uses, located north of the Project site boundary, Development Code, Section 19.20.030.15(A), limits the operational stationary-source noise from the Rancho Palma Project to an exterior noise level of 65 dBA for residential land use. (10) The City of San Bernardino Development Code noise standards are shown on Table 3-1 and included in Appendix 3.1.

TABLE 3-1: OPERATIONAL NOISE STANDARDS

Jurisdiction	Land Use	Exterior Noise Level Standard (dBA Leq)[1]
City of San Bernardino[1]	Residential	65

[1] Source: City of San Bernardino Development Code, Section 19.20.030.15(A) (Appendix 3.1).

3.5 CONSTRUCTION NOISE STANDARDS

To analyze noise impacts originating from the construction of the Rancho Palma site, noise from construction activities are typically evaluated against standards established under a City's Municipal Code. The Municipal Code noise standards for construction are described below for the City of San Bernardino to determine the potential noise impacts at nearby receiver locations. The construction-related noise standards are summarized on Table 3-2.

The City of San Bernardino has set restrictions to control noise impacts associated with the construction of the proposed Project. Section 8.54.070 of the City's Noise Control Ordinance states: *No person shall be engaged or employed, or cause any other person to be engaged or employed, in any work of construction, erection, alteration, repair, addition, movement, demolition, or improvement to any building or structure except within the hours of 7:00 a.m. and*

8:00 p.m. (11) While the City establishes limits to the hours during which construction activity may take place, it does not identify specific noise level limits for construction noise levels. Section 8.54.060(I) *Exemptions* indicates that Project construction noise levels are considered exempt from the provisions of the ordinance. Therefore, if Project construction only occurs during the permitted hours of the Noise Control Ordinance, then the construction noise levels shall be exempt from the Noise Control Ordinance.

TABLE 3-2: CONSTRUCTION NOISE STANDARDS

Jurisdiction	Permitted Hours of Construction Activity
City of San Bernardino[1]	7:00 a.m. to 8:00 p.m. on any day.

[1] Source: City of San Bernardino Municipal Code, Section 8.54.070 (Appendix 3.2).

3.6 VIBRATION STANDARDS

The City of San Bernardino Development Code, Section 19.20.030.28 indicates: *No vibration associated with any use shall be permitted which is discernible beyond the boundary line of the property*; however, no specific vibration standards are identified. To assess vibration impacts from the Project site, this analysis uses the United States Department of Transportation Federal Transit Administration (FTA) provided guidelines for maximum-acceptable vibration criteria for different types of land uses. (12) These guidelines allow 80 VdB for residential uses and buildings where people normally sleep.

Construction activity can result in varying degrees of ground-borne vibration, depending on the equipment and methods used, distance to the affected structures and soil type. Construction vibration is generally associated with pile driving and rock blasting. Other construction equipment such as air compressors, light trucks, hydraulic loaders, etc., generates little or no ground vibration. Occasionally large bulldozers and loaded trucks can cause perceptible vibration levels at close proximity. The FTA guidelines of 80 VdB for sensitive land uses provide the basis for determining the relative significance of potential Project related vibration impacts.

TABLE 3-3: CONSTRUCTION VIBRATION STANDARDS

Jurisdiction	Vibration Standard[1]	Acceptable Threshold For Analysis[2]
City of San Bernardino	No vibration associated with any use shall be permitted which is discernible beyond the boundary line of the property.	80 VdB

[1] Source: City of San Bernardino Development Code, Section 19.20.030.28 (Appendix 3.1).
[2] Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006.

4 SIGNIFICANCE CRITERIA

The following significance criteria are based on guidance provided by Appendix G of the California Environmental Quality Act (CEQA) Guidelines. For the purposes of this report, impacts would be potentially significant if the Project results in or causes:

A. Exposure of persons to or generation of noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

B. Exposure of persons to or generation of excessive ground-borne vibration or ground-borne noise levels.

C. A substantial permanent increase in ambient noise levels in the Project vicinity above existing levels without the proposed Project; or

D. A substantial temporary or periodic increase in ambient noise levels in the Project vicinity above noise levels existing without the proposed Project.

E. For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, expose people residing or working in the Project area to excessive noise levels.

F. For a project within the vicinity of a private airstrip, expose people residing or working in the Project area to excessive noise levels.

While the CEQA Guidelines and the City of San Bernardino General Plan Guidelines provide direction on noise compatibility and establish noise standards by land use type that are sufficient to assess the significance of noise impacts under CEQA Guideline A, they do not define the levels at which increases are considered substantial for use under Guidelines B, C, and D. CEQA Guidelines E and F do not apply to the Project since it is not located within the vicinity of a private airstrip or within two miles of a public airport.

Under CEQA Guidelines C and D, consideration must be given to the magnitude of the increase, the existing ambient noise levels, and the location of noise-sensitive receivers in order to determine if a noise increase represents a significant adverse environmental impact. This approach recognizes *that there is no single noise increase that renders the noise impact significant.* (13) Unfortunately, there is no completely satisfactory way to measure the subjective effects of noise or of the corresponding human reactions of annoyance and dissatisfaction. This is primarily because of the wide variation in individual thresholds of annoyance and differing individual experiences with noise. Thus, an important way of determining a person's subjective reaction to a new noise is the comparison of it to the existing environment to which one has adapted—the so-called *ambient* environment.

In general, the more a new noise exceeds the previously existing ambient noise level, the less acceptable the new noise will typically be judged. With this in mind, the Federal Interagency Committee on Noise (FICON) developed guidance to be used for the assessment of project-generated increases in noise levels that take into account the ambient noise level. (14) The FICON recommendations are based on studies that relate aircraft noise levels to the percentage of persons highly annoyed by aircraft noise. Although the FICON recommendations were

specifically developed to assess aircraft noise impacts, these recommendations are often used in environmental noise impact assessments involving the use of cumulative noise exposure metrics, such as the average-daily noise level (i.e., CNEL).

For example, if the ambient noise environment is quiet (<60 dBA) and the new noise source greatly increases the noise levels, an impact may occur even though the noise criteria might not be exceeded. Therefore, for the purpose of this analysis, FICON identifies a *readily perceptible* 5 dBA or greater project related noise level increase is considered a significant impact when nearby noise-sensitive receivers are affected. According to the FICON, in areas where the without project noise levels range from 60 to 65 dBA, a 3 dBA *barely perceptible* noise level increase appears to be appropriate for most people. When the without project noise levels already exceed 65 dBA, any increase in community noise louder than 1.5 dBA or greater is considered a significant impact if noise-sensitive receivers are affected, since it likely contributes to an existing noise exposure exceedance. Table 4-1 below provides a summary of the potential noise impact significance criteria, based on guidance from FICON.

TABLE 4-1: SIGNIFICANCE OF NOISE IMPACTS

Without Project Noise Level	Potential Significant Impact
< 60 dBA	5 dBA or more
60 - 65 dBA	3 dBA or more
> 65 dBA	1.5 dBA or more

Source: Federal Interagency Committee on Noise (FICON), 1992.

Based on the significance of noise impacts outlined below on Table 4-2, noise impacts shall be considered significant if any of the following occur as a direct result of the proposed development:

OFF-SITE TRAFFIC NOISE

- If the off-site traffic noise levels at nearby noise-sensitive land uses adjacent to roadways conveying Project traffic:
    - are less than 60 dBA CNEL and the Project creates a *readily perceptible* 5 dBA CNEL or greater Project-related noise level increase; or
    - range from 60 to 65 dBA CNEL and the Project creates a *barely perceptible* 3 dBA CNEL or greater Project-related noise level increase; or
    - already exceed 65 dBA CNEL, and the Project creates a community noise level impact of greater than 1.5 dBA CNEL (FICON, 1992.).

ON-SITE TRAFFIC NOISE

- If the on-site exterior noise levels exceed 65 dBA CNEL and the interior noise levels exceed 45 dBA CNEL at the residential uses located within the Project site (City of San Bernardino General Plan Noise Element, Table N-3).

OPERATIONAL NOISE

- If Project-related operational (stationary source) noise levels exceed the exterior 65 dBA Leq noise level standards at nearby sensitive residential land uses (City of San Bernardino Development Code, Section 19.20.030.15(A)); or
- If the existing ambient noise levels at the nearby noise-sensitive receivers near the Project site:
  - are less than 60 dBA and the Project creates a *readily perceptible* 5 dBA or greater Project-related noise level increase; or
  - range from 60 to 65 dBA and the Project creates a *barely perceptible* 3 dBA or greater Project-related noise level increase; or
  - already exceed 65 dBA, and the Project creates a community noise level impact of greater than 1.5 dBA (FICON, 1992).

CONSTRUCTION NOISE AND VIBRATION

- If Project-related construction activities occur anytime other than between the permitted hours of 7:00 a.m. and 8:00 p.m. on any day (City of San Bernardino Municipal Code, Section 8.54.070).
- If short-term Project generated construction source vibration levels could exceed the FTA maximum acceptable vibration standard of 80 vibration decibels (VdB) at sensitive receiver locations (FTA, Transit Noise and Vibration Impact Assessment, May 2006).

TABLE 4-2: SIGNIFICANCE CRITERIA SUMMARY

Analysis	Land Use	Condition(s)	Significance Criteria	
			Daytime	Nighttime
Off-Site[1]	Noise-Sensitive	if ambient is < 60 dBA CNEL	≥ 5 dBA CNEL Project increase	
		if ambient is 60 - 65 dBA CNEL	≥ 3 dBA CNEL Project increase	
		if ambient is > 65 dBA CNEL	≥ 1.5 dBA CNEL Project increase	
On-Site[2]	Residential	Exterior Noise Level	65 dBA CNEL	
		Interior Noise Level	45 dBA CNEL	
Operational[3]	Noise-Sensitive	Exterior Residential Land Use	65 dBA Leq	
Construction[4]	Permitted hours between 7:00 a.m. to 8:00 p.m. on any day.			
	Sensitive	Vibration Level Threshold[5]	80 VdB	n/a

[1] Source: FICON, 1992.
[2] Source: City of San Bernardino General Plan Noise Element, Table N-3.
[3] Source: City of San Bernardino Development Code, Section 19.20.030.15(A) (Appendix 3.1).
[4] Source: City of San Bernardino Municipal Code, Section 8.54.070 (Appendix 3.2).
[5] Source: Federal Transit Administration, Transit Noise and Vibration Impact Assessment, May 2006.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

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5 EXISTING NOISE LEVEL MEASUREMENTS

To assess the existing noise level environment, four 24-hour noise level measurements were taken at sensitive receiver locations in the Project study area. The receiver locations were selected to describe and document the existing noise environment within the Project study area. Exhibit 5-A provides the boundaries of the Project study area and the noise level measurement locations. To fully describe the existing noise conditions, noise level measurements were collected by Urban Crossroads, Inc. on Tuesday, August 18th, 2015. Appendix 5.1 includes study area photos.

5.1 MEASUREMENT PROCEDURE AND CRITERIA

To describe the existing noise environment, the hourly noise levels were measured during typical weekday conditions over a 24-hour period. By collecting individual hourly noise level measurements, it is possible to describe the daytime and nighttime hourly noise levels and calculate the 24-hour CNEL. The long-term noise readings were recorded using Piccolo Type 2 integrating sound level meter and dataloggers. The Piccolo sound level meters were calibrated using a Larson-Davis calibrator, Model CAL 150. All noise meters were programmed in "slow" mode to record noise levels in "A" weighted form. The sound level meters and microphones were equipped with a windscreen during all measurements. All noise level measurement equipment satisfies the American National Standards Institute (ANSI) standard specifications for sound level meters ANSI S1.4-2014/IEC 61672-1:2013. (15)

5.2 NOISE MEASUREMENT LOCATIONS

The long-term noise level measurements were positioned as close to the nearest sensitive receiver locations as possible to assess the existing ambient hourly noise levels surrounding the Project site. To describe the existing noise environment, it is not necessary to collect measurements at each individual building or residence, because each receiver measurement represents a group of buildings that share acoustical equivalence. In other words, the area represented by the receiver shares similar shielding, terrain, and geometric relationship to the reference noise source. Receivers represent a location of noise sensitive areas and are used to estimate the future noise level impacts. Collecting reference ambient noise level measurements at the nearby sensitive receiver locations allows for a comparison of the before and after Project noise levels and is necessary to assess potential cumulative noise impacts.

EXHIBIT 5-A: NOISE MEASUREMENT LOCATIONS

N

LEGEND:

▲ Noise Measurement Locations

5.3 NOISE MEASUREMENT RESULTS

The noise measurements presented below focus on the average or equivalent sound levels (Leq). The equivalent sound level (Leq) represents a steady state sound level containing the same total energy as a time varying signal over a given sample period. Table 5-1 identifies the hourly daytime (7:00 a.m. to 10:00 p.m.) and nighttime (10:00 p.m. to 7:00 a.m.) noise levels at each noise level measurement location. Appendix 5.2 provides a summary of the existing hourly ambient noise levels described below:

- Location L1 represents the noise levels north of the Project site adjacent to an existing barrier for residential homes and across Magnolia Avenue from Cesar E. Chavez Middle School. The noise level measurements collected show an overall 24-hour exterior noise level of 67.7 dBA CNEL. The hourly noise levels measured at location L1 ranged from 53.4 to 62.2 dBA Leq during the daytime hours and from 52.6 to 68.5 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 58.8 dBA Leq with an average nighttime noise level of 61.5 dBA Leq.
- Location L2 represents the noise levels north of the Project site on Chestnut Avenue near existing residential homes and the Ronald Reagan Park. The noise level measurements collected show an overall 24-hour exterior noise level of 60.9 dBA CNEL. The hourly noise levels measured at location L2 ranged from 48.9 to 55.9 dBA Leq during the daytime hours and from 49.2 to 59.8 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 53.0 dBA Leq with an average nighttime noise level of 54.6 dBA Leq.
- Location L3 represents the noise levels south of Guhin Park at the Project site boundary on Little League Drive north of the I-215 Freeway. The 24-hour CNEL indicates that the overall exterior noise level is 75.7 dBA CNEL. At location L3 the background ambient noise levels ranged from 67.7 to 71.8 dBA Leq during the daytime hours to levels of 64.8 to 71.6 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 69.8 dBA Leq with an average nighttime noise level of 68.9 dBA Leq.
- Located at the Project site boundary, location L4 represents the noise levels on Little League Drive north of the I-215 Freeway. The noise level measurements collected show an overall 24-hour exterior noise level of 76.3 dBA CNEL. The hourly noise levels measured at location L4 ranged from 69.3 to 71.5 dBA Leq during the daytime hours and from 65.7 to 72.0 dBA Leq during the nighttime hours. The energy (logarithmic) average daytime noise level was calculated at 70.5 dBA Leq with an average nighttime noise level of 69.4 dBA Leq.

Table 5-1 provides the (energy average) noise levels used to describe the daytime and nighttime ambient conditions. These daytime and nighttime energy average noise levels represent the average of all hourly noise levels observed during these time periods expressed as a single number. Appendix 5.2 provides summary worksheets of the noise levels for each hour as well as the minimum, maximum, L_1, L_2, L_5, L_8, L_{25}, L_{50}, L_{90}, L_{95}, and L_{99} percentile noise levels observed during the daytime and nighttime periods.

The background ambient noise levels in the Project study area are dominated by the transportation-related noise associated with the arterial roadway network. This includes the auto and heavy truck activities on the I-215 Freeway near the noise level measurement locations. The 24-hour existing noise level measurements shown on Table 5-1 present the worst-case existing unmitigated ambient noise conditions.

TABLE 5-1: 24-HOUR AMBIENT NOISE LEVEL MEASUREMENTS

Location[1]	Distance To Project Boundary	Description	Energy Average Hourly Noise Level (dBA Leq)[2]		CNEL
			Daytime	Nighttime	
L1	386'	Located north of the Project site adjacent to an existing barrier for residential homes and across Magnolia Avenue from Cesar E. Chavez Middle School.	58.8	61.5	67.7
L2	254'	Located north of the Project site on Chestnut Avenue near existing residential homes and the Ronald Reagan Park.	53.0	54.6	60.9
L3	0'	Located south of Guhin Park at the Project site boundary on Little League Drive north of the Interstate 215 Freeway.	69.8	68.9	75.7
L4	0'	Located at the Project site boundary on Little League Drive north of the Interstate 215 Freeway.	70.5	69.4	76.3

[1] See Exhibit 5-A for the noise level measurement locations.
[2] Energy (logarithmic) average hourly levels. The long-term 24-hour measurement worksheets are included in Appendix 5.2.
"Daytime" = 7:00 a.m. to 10:00 p.m.; "Nighttime" = 10:00 p.m. to 7:00 a.m.

6 METHODS AND PROCEDURES

The following section outlines the methods and procedures used to model and analyze the future traffic noise environment.

6.1 FHWA TRAFFIC NOISE PREDICTION MODEL

The estimated roadway noise impacts from vehicular traffic were calculated using a computer program that replicates the Federal Highway Administration (FHWA) Traffic Noise Prediction Model- FHWA-RD-77-108. (16) The FHWA Model arrives at a predicted noise level through a series of adjustments to the Reference Energy Mean Emission Level (REMEL). In California the national REMELs are substituted with the California Vehicle Noise (Calveno) Emission Levels. (17) Adjustments are then made to the REMEL to account for: the roadway classification (e.g., collector, secondary, major or arterial), the roadway active width (i.e., the distance between the center of the outermost travel lanes on each side of the roadway), the total average daily traffic (ADT), the travel speed, the percentages of automobiles, medium trucks, and heavy trucks in the traffic volume, the roadway grade, the angle of view (e.g., whether the roadway view is blocked), the site conditions ("hard" or "soft" relates to the absorption of the ground, pavement, or landscaping), and the percentage of total ADT which flows each hour throughout a 24-hour period.

6.2 OFF-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

Table 6-1 presents the roadway parameters used to assess the Project's off-site transportation noise impacts. Table 6-1 identifies the 32 study area roadway segments, the distance from the centerline to adjacent land use based on the functional roadway classifications according to the City of San Bernardino General Plan Circulation Element, and the posted vehicle speeds. For the purpose of this analysis, soft site conditions were used to analyze the traffic noise impacts within the Project study area. Soft site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation.

The Existing, Existing plus Ambient (2018), Existing plus Ambient (2019), Opening Year Cumulative (2018), Opening Year Cumulative (2019), and Year 2035 average daily traffic volumes used for this study are presented on Tables 6-2 and 6-3 and were provided by the *Rancho Palma Traffic Impact Analysis* prepared by Urban Crossroads, Inc. (1) Table 6-4 provides the time of day (daytime, evening and nighttime) vehicle splits.

TABLE 6-1: OFF-SITE ROADWAY PARAMETERS

ID	Roadway	Segment	Adjacent Land Use[1]	Distance From Centerline To Nearest Adjacent Land Use (Feet)[2]	Vehicle Speed (mph)[3]
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	44'	35
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	44'	35
3	Palm Av.	n/o Belmont Av.	Residential	44'	25
4	Palm Av.	s/o Belmont Av.	Residential	44'	45
5	Palm Av.	s/o Irvington Av.	Residential	44'	45
6	Palm Av.	n/o Kendall Dr.	Residential	44'	45
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	44'	45
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	44'	45
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	44'	45
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	44'	45
11	Pine Av.	n/o Belmont Av.	Residential	44'	45
12	Pine Av.	s/o Belmont Av.	Residential	44'	45
13	Pine Av.	n/o Kendall Dr.	Residential	44'	45
14	Campus Pkwy.	n/o Kendall Dr.	Residential	44'	45
15	University Pkwy.	n/o Kendall Dr.	Residential	50'	45
16	University Pkwy.	s/o Kendall Dr.	Residential	50'	45
17	Belmont Av.	w/o Palm Av.	Residential	30'	25
18	Belmont Av.	e/o Palm Av.	Residential	30'	25
19	Belmont Av.	w/o Pine Av.	Residential	30'	25
20	Irvington Av.	w/o Palm Av.	Residential	30'	25
21	Irvington Av.	e/o Palm Av.	Residential	30'	25
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	30'	25
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	44'	45
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	44'	45
25	W. Little League Dr.	w/o Palm Av.	Commercial	30'	45
26	Kendall Dr.	e/o Palm Av.	Commercial	50'	45
27	Kendall Dr.	w/o Pine Av.	Residential	50'	45
28	Kendall Dr.	w/o Campus Pkwy.	Residential	50'	45
29	Kendall Dr.	w/o University Pkwy.	Residential	50'	45
30	Kendall Dr.	e/o University Pkwy.	Residential	50'	45
31	I-215 Fwy.	w/o Palm Av.	Commercial	62'	70
32	I-215 Fwy.	e/o Palm Av.	Industrial	62'	70

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] Distance to adjacent land use is based upon the right-of-way distances for each functional roadway classification provided in the City of San Bernardino General Plan Circulation Element.
[3] Posted speed limits.

TABLE 6-2: AVERAGE DAILY TRAFFIC VOLUMES (1 OF 2)

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]						
			Existing (2015)			Existing + Ambient (2018)		Existing + Ambient (2019)	
			Without Project	With Phase 1	With Buildout	Without Project	With Phase 1	Without Project	With Buildout
1	N. Little League Dr.	n/o W. Little League Dr.	1.9	1.9	2.1	2.0	2.1	2.1	2.3
2	N. Little League Dr.	s/o W. Little League Dr.	2.3	2.5	3.0	2.5	2.7	2.5	3.2
3	Palm Av.	n/o Belmont Av.	3.8	3.8	4.0	4.0	4.1	4.1	4.3
4	Palm Av.	s/o Belmont Av.	6.8	6.9	7.5	7.2	7.3	7.4	8.0
5	Palm Av.	s/o Irvington Av.	12.8	12.9	13.7	13.6	13.7	13.9	14.7
6	Palm Av.	n/o Kendall Dr.	15.4	15.4	16.3	16.3	16.4	16.6	17.6
7	Palm Av.	n/o I-215 Fwy. NB Ramps	23.2	23.9	24.8	24.7	25.3	25.1	26.8
8	Palm Av.	s/o I-215 Fwy. NB Ramps	18.0	18.3	19.0	19.1	19.4	19.5	20.5
9	Palm Av.	n/o Hallmark Pkwy.	8.9	8.9	9.3	9.4	9.5	9.6	10.1
10	Palm Av.	s/o Hallmark Pkwy.	4.9	5.0	5.2	5.3	5.3	5.4	5.6
11	Pine Av.	n/o Belmont Av.	2.7	2.7	2.9	2.9	2.9	3.0	3.2
12	Pine Av.	s/o Belmont Av.	4.1	4.1	4.7	4.3	4.3	4.4	5.0
13	Pine Av.	n/o Kendall Dr.	8.2	8.2	8.8	8.7	8.7	8.9	9.5
14	Campus Pkwy.	n/o Kendall Dr.	5.0	5.1	5.1	5.3	5.4	5.4	5.5
15	University Pkwy.	n/o Kendall Dr.	29.5	29.5	29.6	31.3	31.3	31.9	32.1
16	University Pkwy.	s/o Kendall Dr.	37.1	37.2	37.4	39.4	39.5	40.2	40.4
17	Belmont Av.	w/o Palm Av.	2.5	2.5	2.7	2.6	2.6	2.7	2.9
18	Belmont Av.	e/o Palm Av.	2.4	2.4	2.6	2.5	2.5	2.6	2.9
19	Belmont Av.	w/o Pine Av.	1.3	1.3	1.7	1.4	1.4	1.4	1.8
20	Irvington Av.	w/o Palm Av.	3.7	3.7	3.8	4.0	4.0	4.0	4.2
21	Irvington Av.	e/o Palm Av.	3.4	3.4	3.5	3.6	3.6	3.7	3.7
22	W. Little League Dr.	w/o Magnolia Av.	2.2	2.4	3.1	2.3	2.6	2.4	3.2
23	Kendall Dr.	w/o N. Little League Dr.	8.7	8.7	9.0	9.2	9.3	9.4	9.8
24	Kendall Dr.	e/o N. Little League Dr.	7.2	7.3	7.5	7.6	7.8	7.8	8.0
25	W. Little League Dr.	w/o Palm Av.	2.1	3.0	6.0	2.2	3.1	2.3	6.2
26	Kendall Dr.	e/o Palm Av.	15.6	15.8	17.0	16.6	16.8	16.9	18.2
27	Kendall Dr.	w/o Pine Av.	14.1	14.3	15.5	15.0	15.2	15.3	16.6
28	Kendall Dr.	w/o Campus Pkwy.	19.6	19.8	20.4	20.8	21.0	21.3	22.0
29	Kendall Dr.	w/o University Pkwy.	19.2	19.3	19.8	20.4	20.5	20.8	21.4
30	Kendall Dr.	e/o University Pkwy.	17.9	17.9	18.1	19.0	19.0	19.4	19.6
31	I-215 Fwy.	w/o Palm Av.	36.7	37.0	37.2	39.0	39.3	39.7	40.3
32	I-215 Fwy.	e/o Palm Av.	43.8	44.1	44.3	46.4	46.8	47.3	47.9

[1] Source: Rancho Palma Traffic Impact Analysis, September 2015.

TABLE 6-3: AVERAGE DAILY TRAFFIC VOLUMES (2 OF 2)

ID	Roadway	Segment	Average Daily Traffic (1,000's)[1]					
			Opening Year Cumulative (2018)		Opening Year Cumulative (2019)		Horizon Year (2035)	
			Without Project	With Phase 1	Without Project	With Buildout	Without Project	With Project
1	N. Little League Dr.	n/o W. Little League Dr.	2.1	2.1	2.1	2.4	2.4	2.6
2	N. Little League Dr.	s/o W. Little League Dr.	2.5	2.7	2.6	3.2	3.1	3.7
3	Palm Av.	n/o Belmont Av.	4.2	4.2	4.2	4.5	6.6	6.7
4	Palm Av.	s/o Belmont Av.	7.5	7.6	7.6	8.3	9.2	9.8
5	Palm Av.	s/o Irvington Av.	14.1	14.1	14.3	15.2	17.2	18.1
6	Palm Av.	n/o Kendall Dr.	16.8	16.9	17.1	18.1	20.6	21.7
7	Palm Av.	n/o I-215 Fwy. NB Ramps	25.9	26.6	26.4	28.0	31.5	33.2
8	Palm Av.	s/o I-215 Fwy. NB Ramps	20.7	21.1	21.1	22.1	25.1	26.1
9	Palm Av.	n/o Hallmark Pkwy.	11.4	11.5	11.6	12.1	13.6	14.0
10	Palm Av.	s/o Hallmark Pkwy.	6.0	6.1	6.1	6.4	7.1	7.4
11	Pine Av.	n/o Belmont Av.	3.1	3.1	3.2	3.4	5.3	5.4
12	Pine Av.	s/o Belmont Av.	4.8	4.8	4.9	5.5	5.4	5.9
13	Pine Av.	n/o Kendall Dr.	9.3	9.3	9.4	10.1	10.4	10.8
14	Campus Pkwy.	n/o Kendall Dr.	5.7	5.8	5.8	5.9	7.4	7.6
15	University Pkwy.	n/o Kendall Dr.	32.3	32.3	32.9	33.1	39.5	39.6
16	University Pkwy.	s/o Kendall Dr.	41.0	41.1	41.8	42.1	50.1	50.3
17	Belmont Av.	w/o Palm Av.	2.7	2.7	2.7	2.9	3.0	3.3
18	Belmont Av.	e/o Palm Av.	2.6	2.6	2.6	2.8	3.0	3.1
19	Belmont Av.	w/o Pine Av.	1.4	1.4	1.5	1.9	1.6	2.0
20	Irvington Av.	w/o Palm Av.	4.0	4.0	4.1	4.2	4.5	4.8
21	Irvington Av.	e/o Palm Av.	3.7	3.7	3.7	3.8	4.1	4.2
22	W. Little League Dr.	w/o Magnolia Av.	2.4	2.7	2.5	3.4	2.7	3.7
23	Kendall Dr.	w/o N. Little League Dr.	9.3	9.3	9.5	9.8	11.4	11.8
24	Kendall Dr.	e/o N. Little League Dr.	7.6	7.8	7.8	8.1	9.4	9.6
25	W. Little League Dr.	w/o Palm Av.	2.3	3.2	2.4	6.4	7.6	11.5
26	Kendall Dr.	e/o Palm Av.	17.8	18.0	18.1	19.5	19.9	21.1
27	Kendall Dr.	w/o Pine Av.	16.0	16.1	16.3	17.6	18.4	19.6
28	Kendall Dr.	w/o Campus Pkwy.	21.9	22.1	22.3	23.0	26.7	27.4
29	Kendall Dr.	w/o University Pkwy.	21.5	21.6	21.9	22.5	26.2	26.7
30	Kendall Dr.	e/o University Pkwy.	19.5	20.0	19.9	20.1	23.9	24.1
31	I-215 Fwy.	w/o Palm Av.	39.8	40.1	40.6	41.1	80.7	81.2
32	I-215 Fwy.	e/o Palm Av.	46.9	47.2	47.8	48.3	91.2	91.8

[1] Source: Rancho Palma Traffic Impact Analysis, September 2015.

TABLE 6-4: TIME OF DAY VEHICLE SPLITS

Time Period	Vehicle Type		
	Autos	Medium Trucks	Heavy Trucks
Daytime (7:00 a.m. - 7:00 p.m.)	77.5%	84.8%	86.5%
Evening (7:00 p.m. - 10:00 p.m.)	12.9%	4.9%	2.7%
Nighttime (10:00 p.m. - 7:00 a.m.)	9.6%	10.3%	10.8%
Total:	100.0%	100.0%	100.0%

TABLE 6-5: DISTRIBUTION OF TRAFFIC FLOW BY VEHICLE TYPE (VEHICLE MIX)

Roadway	Total % Traffic Flow			Total
	Autos	Medium Trucks	Heavy Trucks	
All Segments	97.42%	1.84%	0.74%	100.00%
I-215 Fwy.[1]	90.87%	3.73%	5.40%	100.00%

[1] Source: Caltrans Data Branch Annual Average Daily Truck Traffic on the California Highways System, 2014.

6.3 ON-SITE TRAFFIC NOISE PREDICTION MODEL INPUTS

The on-site roadway parameters including the average daily traffic (ADT) volumes used for this study are presented on Table 6-6. Based on the City of San Bernardino General Plan Circulation Element, Figure C-2, West Little League Drive and Magnolia Avenue are classified as 2-lane Collectors. To predict the future on-site noise environment at the Project site, the Year 2035 with Magnolia Avenue bridge average daily traffic volumes were obtained for the I-215 Freeway, West Little League Drive, and Magnolia Avenue from the *Rancho Palma Traffic Impact Analysis*, prepared by Urban Crossroads, Inc. (1) The traffic volumes shown on Table 6-6 reflect future long-range traffic conditions needed to assess the future on-site traffic noise environment and to identify the appropriate noise mitigation measures that address the worst-case future noise conditions. For the purposes of this analysis, soft site conditions were used to analyze the on-site traffic noise impacts for the Project study area. Soft site conditions account for the sound propagation loss over natural surfaces such as normal earth and ground vegetation.

Table 6-4 presents the time of day vehicle splits by vehicle type, and Table 6-5 presents the total traffic flow distributions (vehicle mixes) used for this analysis. The vehicle mix provides the hourly distribution percentages of automobile, medium trucks and heavy trucks for input into the FHWA Model based on roadway types.

To predict the future noise environment at each lot within the Project site, coordinate information was collected to identify the noise transmission path between the noise source and receiver. The coordinate information is based on the Project site plan showing the plotting of each lot in relationship to the I-215 Freeway, West Little League Drive, and Magnolia Avenue, as shown in Appendix 6.1.

TABLE 6-6: ON-SITE ROADWAY PARAMETERS

Roadway Segment	Lanes	Classification[1]	Year 2035 With Magnolia Avenue Bridge Average Daily Traffic Volume[2]	Speed Limit (mph)[3]	Site Conditions
I-215 Freeway	4	Freeway	81,160	70	Soft
W. Little League Dr. e/o Magnolia Av.	2	Collector	5,600	35	Soft
W. Little League Dr. e/o Driveway 2	2	Collector	6,400	35	Soft
Magnolia Av. n/o W. Little League Dr.	2	Collector	2,500	25	Soft
Magnolia Av. n/o Driveway 1	2	Collector	2,300	25	Soft

[1] Road classifications based upon the City of San Bernardino Circulation Element, Figure C-2, and the Rancho Palma Traffic Impact Analysis prepared by Urban Crossroads, Inc.
[2] Source: Rancho Palma Traffic Impact Analysis, September 2015.
[3] Posted speed limit on the I-215 Freeway. West Little League Drive and Magnolia Avenue speed limits estimated based on similar roadways in the Project study area.

The site plan is used to identify the relationship between the roadway centerline elevation, the pad elevation and the centerline distance to the noise barrier, and the building façade. The exterior noise level impacts at the backyard receivers were placed five feet above the pad elevation and ten feet from the proposed barrier location or at the proposed building façade, whichever is greater. All second floor receivers were located fourteen feet above the proposed finished floor elevation.

6.4 VIBRATION ASSESSMENT

This analysis focuses on the potential ground-borne vibration associated with vehicular traffic and construction activities. Ground-borne vibration levels from automobile traffic are generally overshadowed by vibration generated by heavy trucks that roll over the same uneven roadway surfaces. However, due to the rapid drop-off rate of ground-borne vibration and the short duration of the associated events, vehicular traffic-induced ground-borne vibration is rarely perceptible beyond the roadway right-of-way, and rarely results in vibration levels that cause damage to buildings in the vicinity.

However, while vehicular traffic is rarely perceptible, construction has the potential to result in varying degrees of temporary ground vibration, depending on the specific construction activities and equipment used. Ground vibration levels associated with various types of construction equipment are summarized on Table 6-7. Based on the representative vibration levels presented for various construction equipment types, it is possible to estimate the human response (annoyance) using the following vibration assessment methods defined by the FTA. To describe the human response (annoyance) associated with vibration impacts the FTA provides the following equation: $L_{VdB}(D) = L_{VdB}(25\text{ ft}) - 30\log(D/25)$

TABLE 6-7: VIBRATION SOURCE LEVELS FOR CONSTRUCTION EQUIPMENT

Equipment	Vibration Decibels (VdB) at 25 feet
Small bulldozer	58
Jackhammer	79
Loaded Trucks	86
Large bulldozer	87

Source: FTA, Transit Noise and Vibration Impact Assessment, May 2006.

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7 OFF-SITE TRANSPORTATION NOISE IMPACTS

To assess the off-site transportation CNEL noise level impacts associated with development of the proposed Project, noise contours were developed based on the *Rancho Palma Traffic Impact Analysis*. (1) Noise contour boundaries represent the equal levels of noise exposure and are measured in CNEL from the center of the roadway. Noise contours were developed for the following traffic scenarios:

- Existing Conditions:
  - Without Project: This scenario refers to the existing present-day noise conditions without the proposed Project.
  - With Phase 1 of the Project: This scenario refers to the existing present-day noise conditions with Phase 1 of the proposed Project.
  - With Project Buildout: This scenario refers to the existing present-day noise conditions with Buildout of the proposed Project.
- Existing plus Ambient (EA) Without / With Phase 1 of the Project (2018): This scenario refers to the existing present-day noise conditions, plus ambient growth, without and with Phase 1 of the proposed Project.
- Existing plus Ambient (EA) Without / With Project Buildout (2019): This scenario refers to the existing present-day noise conditions, plus ambient growth, without and with Buildout of the proposed Project.
- Opening Year Cumulative Without / With Phase 1 of the Project (2018): This scenario refers to the background noise conditions at future Year 2018 without and with Phase 1 of the proposed Project. This scenario corresponds to 2018 conditions, and includes all cumulative projects identified in the Traffic Impact Analysis.
- Opening Year Cumulative Without / With Project Buildout (2019): This scenario refers to the background noise conditions at future Year 2019 without and with Buildout of the proposed Project. This scenario corresponds to 2019 conditions, and includes all cumulative projects identified in the Traffic Impact Analysis.
- Year 2035 Without / With Project: This scenario refers to the background noise conditions at future Year 2035 without and with the proposed Project. This scenario corresponds to 2035 conditions, and includes all cumulative projects identified in the Traffic Impact Analysis.

7.1 TRAFFIC NOISE CONTOURS

To quantify the Project's traffic noise impacts on the surrounding areas, the changes in traffic noise levels on 32 roadway segments surrounding the Project were calculated based on the changes in the average daily traffic volumes. The noise contours were used to assess the Project's incremental traffic-related noise impacts at land uses adjacent to roadways conveying Project traffic. Based on the noise impact significance criteria described in Section 4, a significant off-site traffic noise level impact occurs if the without Project noise levels at nearby noise-sensitive receivers:

- are less than 60 dBA and the Project creates a *readily perceptible* 5 dBA or greater Project-related noise level increase, or:
- range from 60 to 65 dBA and the Project creates a *barely perceptible* 3 dBA or greater Project-related noise level increase, or;
- already exceed 65 dBA, and the Project creates a community noise level impact of greater than 1.5 dBA.

Noise contours represent the distance to noise levels of a constant value and are measured from the center of the roadway for the 70, 65, and 60 dBA noise levels. The noise contours do not take into account the effect of any existing noise barriers or topography that may affect ambient noise levels. In addition, since the noise contours reflect modeling of vehicular noise on area roadways, they appropriately do not reflect noise contribution from any surrounding stationary noise sources within the Project study area. Tables 7-1 to 7-13 present a summary of the unmitigated exterior traffic noise levels for the 32 study area roadway segments analyzed from the without Project to the with Project conditions in each of the six timeframes: Existing, Existing plus Ambient (2018), Existing plus Ambient (2019), Opening Year Cumulative (2018), Opening Year Cumulative (2019), and Year 2035 conditions. Appendix 7.1 includes a summary of the traffic noise level contours for each of the 13 traffic scenarios.

TABLE 7-1: EXISTING WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.0	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	58.8	RW	RW	RW
3	Palm Av.	n/o Belmont Av.	Residential	57.5	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.2	RW	53	114
5	Palm Av.	s/o Irvington Av.	Residential	68.9	RW	80	173
6	Palm Av.	n/o Kendall Dr.	Residential	69.7	RW	91	196
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.5	56	120	258
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.4	47	101	218
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.4	RW	63	136
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	64.8	RW	RW	91
11	Pine Av.	n/o Belmont Av.	Residential	62.2	RW	RW	61
12	Pine Av.	s/o Belmont Av.	Residential	64.0	RW	RW	81
13	Pine Av.	n/o Kendall Dr.	Residential	67.0	RW	60	129
14	Campus Pkwy.	n/o Kendall Dr.	Residential	64.8	RW	RW	93
15	University Pkwy.	n/o Kendall Dr.	Residential	72.6	74	160	345
16	University Pkwy.	s/o Kendall Dr.	Residential	73.6	87	187	402
17	Belmont Av.	w/o Palm Av.	Residential	57.9	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	57.8	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	55.1	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	59.6	RW	RW	RW
21	Irvington Av.	e/o Palm Av.	Residential	59.3	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.4	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.3	RW	62	134
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.4	RW	55	118
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.3	RW	RW	50
26	Kendall Dr.	e/o Palm Av.	Commercial	69.8	RW	105	226
27	Kendall Dr.	w/o Pine Av.	Residential	69.4	RW	98	211
28	Kendall Dr.	w/o Campus Pkwy.	Residential	70.8	57	122	263
29	Kendall Dr.	w/o University Pkwy.	Residential	70.7	56	120	259
30	Kendall Dr.	e/o University Pkwy.	Residential	70.4	53	115	247
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.0	286	616	1328
32	I-215 Fwy.	e/o Palm Av.	Industrial	80.7	322	693	1494

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-2: EXISTING WITH PHASE 1 PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.0	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.1	RW	RW	RW
3	Palm Av.	n/o Belmont Av.	Residential	57.5	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.2	RW	53	115
5	Palm Av.	s/o Irvington Av.	Residential	69.0	RW	81	174
6	Palm Av.	n/o Kendall Dr.	Residential	69.7	RW	91	196
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.6	57	122	263
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.5	47	102	220
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.4	RW	63	136
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	64.8	RW	RW	93
11	Pine Av.	n/o Belmont Av.	Residential	62.2	RW	RW	61
12	Pine Av.	s/o Belmont Av.	Residential	64.0	RW	RW	81
13	Pine Av.	n/o Kendall Dr.	Residential	67.0	RW	60	129
14	Campus Pkwy.	n/o Kendall Dr.	Residential	64.9	RW	44	94
15	University Pkwy.	n/o Kendall Dr.	Residential	72.6	74	160	345
16	University Pkwy.	s/o Kendall Dr.	Residential	73.6	87	187	403
17	Belmont Av.	w/o Palm Av.	Residential	57.9	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	57.8	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	55.1	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	59.6	RW	RW	RW
21	Irvington Av.	e/o Palm Av.	Residential	59.3	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.8	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.3	RW	62	134
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.5	RW	55	119
25	W. Little League Dr.	w/o Palm Av.	Commercial	64.9	RW	RW	63
26	Kendall Dr.	e/o Palm Av.	Commercial	69.9	RW	106	228
27	Kendall Dr.	w/o Pine Av.	Residential	69.4	RW	99	213
28	Kendall Dr.	w/o Campus Pkwy.	Residential	70.9	57	123	264
29	Kendall Dr.	w/o University Pkwy.	Residential	70.7	56	121	260
30	Kendall Dr.	e/o University Pkwy.	Residential	70.4	53	115	247
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.0	288	620	1335
32	I-215 Fwy.	e/o Palm Av.	Industrial	80.8	323	697	1501

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-3: EXISTING WITH PROJECT BUILDOUT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.4	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.9	RW	RW	44
3	Palm Av.	n/o Belmont Av.	Residential	57.7	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.6	RW	56	121
5	Palm Av.	s/o Irvington Av.	Residential	69.2	RW	84	181
6	Palm Av.	n/o Kendall Dr.	Residential	70.0	44	95	204
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.8	58	125	269
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.6	49	105	226
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.5	RW	65	140
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.0	RW	44	95
11	Pine Av.	n/o Belmont Av.	Residential	62.5	RW	RW	64
12	Pine Av.	s/o Belmont Av.	Residential	64.6	RW	RW	89
13	Pine Av.	n/o Kendall Dr.	Residential	67.3	RW	63	135
14	Campus Pkwy.	n/o Kendall Dr.	Residential	64.9	RW	44	94
15	University Pkwy.	n/o Kendall Dr.	Residential	72.6	74	160	346
16	University Pkwy.	s/o Kendall Dr.	Residential	73.6	87	188	404
17	Belmont Av.	w/o Palm Av.	Residential	58.3	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	58.1	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	56.3	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	59.8	RW	RW	RW
21	Irvington Av.	e/o Palm Av.	Residential	59.4	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	58.9	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.4	RW	64	137
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.6	RW	56	121
25	W. Little League Dr.	w/o Palm Av.	Commercial	67.9	RW	47	101
26	Kendall Dr.	e/o Palm Av.	Commercial	70.2	51	111	239
27	Kendall Dr.	w/o Pine Av.	Residential	69.8	RW	104	225
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.0	58	125	270
29	Kendall Dr.	w/o University Pkwy.	Residential	70.9	57	123	264
30	Kendall Dr.	e/o University Pkwy.	Residential	70.5	54	116	249
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.0	289	622	1340
32	I-215 Fwy.	e/o Palm Av.	Industrial	80.8	324	699	1505

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-4: EA 2018 WITHOUT PHASE 1 PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.2	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.1	RW	RW	RW
3	Palm Av.	n/o Belmont Av.	Residential	57.7	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.4	RW	55	118
5	Palm Av.	s/o Irvington Av.	Residential	69.2	RW	84	181
6	Palm Av.	n/o Kendall Dr.	Residential	70.0	44	95	204
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.8	58	125	269
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.7	49	105	226
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.6	RW	65	141
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.1	RW	45	96
11	Pine Av.	n/o Belmont Av.	Residential	62.5	RW	RW	64
12	Pine Av.	s/o Belmont Av.	Residential	64.2	RW	RW	84
13	Pine Av.	n/o Kendall Dr.	Residential	67.3	RW	62	134
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.1	RW	45	96
15	University Pkwy.	n/o Kendall Dr.	Residential	72.8	77	167	359
16	University Pkwy.	s/o Kendall Dr.	Residential	73.8	90	194	418
17	Belmont Av.	w/o Palm Av.	Residential	58.1	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	57.9	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	55.4	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.0	RW	RW	30
21	Irvington Av.	e/o Palm Av.	Residential	59.5	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.6	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.5	RW	65	139
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.7	RW	57	122
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.5	RW	RW	52
26	Kendall Dr.	e/o Palm Av.	Commercial	70.1	51	109	235
27	Kendall Dr.	w/o Pine Av.	Residential	69.6	RW	102	220
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.1	59	127	273
29	Kendall Dr.	w/o University Pkwy.	Residential	71.0	58	125	270
30	Kendall Dr.	e/o University Pkwy.	Residential	70.7	55	119	257
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.2	298	642	1383
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.0	334	721	1552

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-5: EA 2018 WITH PHASE 1 PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.4	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.5	RW	RW	RW
3	Palm Av.	n/o Belmont Av.	Residential	57.8	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.5	RW	55	119
5	Palm Av.	s/o Irvington Av.	Residential	69.2	RW	84	181
6	Palm Av.	n/o Kendall Dr.	Residential	70.0	44	95	204
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.9	59	127	273
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.7	49	106	229
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.6	RW	66	142
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.1	RW	45	96
11	Pine Av.	n/o Belmont Av.	Residential	62.5	RW	RW	64
12	Pine Av.	s/o Belmont Av.	Residential	64.2	RW	RW	84
13	Pine Av.	n/o Kendall Dr.	Residential	67.3	RW	62	134
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.2	RW	45	98
15	University Pkwy.	n/o Kendall Dr.	Residential	72.8	77	167	359
16	University Pkwy.	s/o Kendall Dr.	Residential	73.9	90	195	419
17	Belmont Av.	w/o Palm Av.	Residential	58.1	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	57.9	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	55.4	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.0	RW	RW	30
21	Irvington Av.	e/o Palm Av.	Residential	59.5	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	58.1	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.5	RW	65	140
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.8	RW	58	125
25	W. Little League Dr.	w/o Palm Av.	Commercial	65.0	RW	30	65
26	Kendall Dr.	e/o Palm Av.	Commercial	70.1	51	110	237
27	Kendall Dr.	w/o Pine Av.	Residential	69.7	RW	103	222
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.1	59	128	275
29	Kendall Dr.	w/o University Pkwy.	Residential	71.0	58	126	271
30	Kendall Dr.	e/o University Pkwy.	Residential	70.7	55	119	257
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.3	299	645	1390
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.0	336	725	1561

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-6: EA 2019 WITHOUT PROJECT BUILDOUT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.4	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.1	RW	RW	RW
3	Palm Av.	n/o Belmont Av.	Residential	57.8	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.6	RW	56	120
5	Palm Av.	s/o Irvington Av.	Residential	69.3	RW	85	183
6	Palm Av.	n/o Kendall Dr.	Residential	70.1	44	96	206
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.9	59	126	272
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.8	49	107	230
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.7	RW	66	143
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.2	RW	45	98
11	Pine Av.	n/o Belmont Av.	Residential	62.6	RW	RW	66
12	Pine Av.	s/o Belmont Av.	Residential	64.3	RW	RW	85
13	Pine Av.	n/o Kendall Dr.	Residential	67.4	RW	63	136
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.2	RW	45	98
15	University Pkwy.	n/o Kendall Dr.	Residential	72.9	78	169	363
16	University Pkwy.	s/o Kendall Dr.	Residential	73.9	91	197	424
17	Belmont Av.	w/o Palm Av.	Residential	58.3	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	58.1	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	55.4	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.0	RW	RW	30
21	Irvington Av.	e/o Palm Av.	Residential	59.6	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.8	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.6	RW	65	141
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.8	RW	58	125
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.7	RW	RW	53
26	Kendall Dr.	e/o Palm Av.	Commercial	70.2	51	110	238
27	Kendall Dr.	w/o Pine Av.	Residential	69.7	RW	103	223
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.2	60	129	278
29	Kendall Dr.	w/o University Pkwy.	Residential	71.1	59	127	273
30	Kendall Dr.	e/o University Pkwy.	Residential	70.8	56	121	261
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.3	301	649	1399
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.1	339	730	1572

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-7: EA 2019 WITH PROJECT BUILDOUT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.8	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	60.2	RW	RW	46
3	Palm Av.	n/o Belmont Av.	Residential	58.0	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.9	RW	59	127
5	Palm Av.	s/o Irvington Av.	Residential	69.5	RW	88	190
6	Palm Av.	n/o Kendall Dr.	Residential	70.3	46	99	214
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	72.1	61	132	284
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	71.0	51	110	237
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.9	RW	69	148
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.3	RW	46	100
11	Pine Av.	n/o Belmont Av.	Residential	62.9	RW	RW	69
12	Pine Av.	s/o Belmont Av.	Residential	64.8	RW	RW	93
13	Pine Av.	n/o Kendall Dr.	Residential	67.6	RW	66	142
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.3	RW	46	99
15	University Pkwy.	n/o Kendall Dr.	Residential	72.9	79	169	365
16	University Pkwy.	s/o Kendall Dr.	Residential	73.9	92	197	425
17	Belmont Av.	w/o Palm Av.	Residential	58.6	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	58.6	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	56.5	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.2	RW	RW	31
21	Irvington Av.	e/o Palm Av.	Residential	59.6	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	59.0	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.8	RW	67	145
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.9	RW	59	127
25	W. Little League Dr.	w/o Palm Av.	Commercial	68.0	RW	48	103
26	Kendall Dr.	e/o Palm Av.	Commercial	70.5	54	116	250
27	Kendall Dr.	w/o Pine Av.	Residential	70.1	51	109	235
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.3	61	132	284
29	Kendall Dr.	w/o University Pkwy.	Residential	71.2	60	129	279
30	Kendall Dr.	e/o University Pkwy.	Residential	70.8	57	122	263
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.4	304	656	1413
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.1	342	736	1586

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-8: OPENING YEAR 2018 WITHOUT PHASE 1 PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.4	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.1	RW	RW	RW
3	Palm Av.	n/o Belmont Av.	Residential	57.9	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.6	RW	56	121
5	Palm Av.	s/o Irvington Av.	Residential	69.4	RW	86	185
6	Palm Av.	n/o Kendall Dr.	Residential	70.1	45	96	208
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	72.0	60	129	277
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	71.0	51	111	239
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	68.4	RW	74	160
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.6	RW	49	105
11	Pine Av.	n/o Belmont Av.	Residential	62.8	RW	RW	67
12	Pine Av.	s/o Belmont Av.	Residential	64.7	RW	RW	90
13	Pine Av.	n/o Kendall Dr.	Residential	67.5	RW	65	140
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.4	RW	47	101
15	University Pkwy.	n/o Kendall Dr.	Residential	73.0	79	170	366
16	University Pkwy.	s/o Kendall Dr.	Residential	74.0	93	199	430
17	Belmont Av.	w/o Palm Av.	Residential	58.3	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	58.1	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	55.4	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.0	RW	RW	30
21	Irvington Av.	e/o Palm Av.	Residential	59.6	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.8	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.5	RW	65	140
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.7	RW	57	122
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.7	RW	RW	53
26	Kendall Dr.	e/o Palm Av.	Commercial	70.4	53	114	246
27	Kendall Dr.	w/o Pine Av.	Residential	69.9	RW	106	229
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.3	61	131	283
29	Kendall Dr.	w/o University Pkwy.	Residential	71.2	60	130	279
30	Kendall Dr.	e/o University Pkwy.	Residential	70.8	56	122	262
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.3	302	650	1401
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.0	337	726	1564

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-9: OPENING YEAR 2018 WITH PHASE 1 PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.4	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.5	RW	RW	RW
3	Palm Av.	n/o Belmont Av.	Residential	57.9	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.7	RW	57	122
5	Palm Av.	s/o Irvington Av.	Residential	69.4	RW	86	185
6	Palm Av.	n/o Kendall Dr.	Residential	70.1	45	97	209
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	72.1	61	131	282
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	71.1	52	112	242
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	68.5	RW	75	161
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.7	RW	49	106
11	Pine Av.	n/o Belmont Av.	Residential	62.8	RW	RW	67
12	Pine Av.	s/o Belmont Av.	Residential	64.7	RW	RW	90
13	Pine Av.	n/o Kendall Dr.	Residential	67.5	RW	65	140
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.5	RW	47	102
15	University Pkwy.	n/o Kendall Dr.	Residential	73.0	79	170	366
16	University Pkwy.	s/o Kendall Dr.	Residential	74.0	93	200	430
17	Belmont Av.	w/o Palm Av.	Residential	58.3	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	58.1	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	55.4	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.0	RW	RW	30
21	Irvington Av.	e/o Palm Av.	Residential	59.6	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	58.3	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.5	RW	65	140
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.8	RW	58	125
25	W. Little League Dr.	w/o Palm Av.	Commercial	65.2	RW	31	66
26	Kendall Dr.	e/o Palm Av.	Commercial	70.4	53	115	248
27	Kendall Dr.	w/o Pine Av.	Residential	70.0	50	107	230
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.3	61	132	285
29	Kendall Dr.	w/o University Pkwy.	Residential	71.2	60	130	280
30	Kendall Dr.	e/o University Pkwy.	Residential	70.9	57	124	266
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.3	303	654	1408
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.1	338	729	1570

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-10: OPENING YEAR 2019 WITHOUT PROJECT BUILDOUT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.4	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.3	RW	RW	RW
3	Palm Av.	n/o Belmont Av.	Residential	57.9	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	66.7	RW	57	122
5	Palm Av.	s/o Irvington Av.	Residential	69.4	RW	87	187
6	Palm Av.	n/o Kendall Dr.	Residential	70.2	45	98	210
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	72.1	61	130	281
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	71.1	52	112	242
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	68.5	RW	75	162
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.7	RW	49	106
11	Pine Av.	n/o Belmont Av.	Residential	62.9	RW	RW	69
12	Pine Av.	s/o Belmont Av.	Residential	64.8	RW	RW	91
13	Pine Av.	n/o Kendall Dr.	Residential	67.6	RW	65	141
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.5	RW	47	102
15	University Pkwy.	n/o Kendall Dr.	Residential	73.1	80	172	371
16	University Pkwy.	s/o Kendall Dr.	Residential	74.1	94	202	435
17	Belmont Av.	w/o Palm Av.	Residential	58.3	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	58.1	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	55.7	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.1	RW	RW	30
21	Irvington Av.	e/o Palm Av.	Residential	59.6	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.9	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.6	RW	66	142
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.8	RW	58	125
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.9	RW	RW	55
26	Kendall Dr.	e/o Palm Av.	Commercial	70.5	54	116	249
27	Kendall Dr.	w/o Pine Av.	Residential	70.0	50	108	232
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.4	62	133	286
29	Kendall Dr.	w/o University Pkwy.	Residential	71.3	61	131	283
30	Kendall Dr.	e/o University Pkwy.	Residential	70.9	57	123	265
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.4	306	659	1420
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.1	341	735	1583

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-11: OPENING YEAR 2019 WITH PROJECT BUILDOUT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	59.0	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	60.2	RW	RW	46
3	Palm Av.	n/o Belmont Av.	Residential	58.2	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	67.1	RW	60	130
5	Palm Av.	s/o Irvington Av.	Residential	69.7	RW	90	194
6	Palm Av.	n/o Kendall Dr.	Residential	70.4	47	101	218
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	72.3	63	136	292
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	71.3	54	116	249
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	68.7	RW	78	167
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.9	RW	51	109
11	Pine Av.	n/o Belmont Av.	Residential	63.2	RW	RW	72
12	Pine Av.	s/o Belmont Av.	Residential	65.3	RW	46	99
13	Pine Av.	n/o Kendall Dr.	Residential	67.9	RW	69	148
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.6	RW	48	103
15	University Pkwy.	n/o Kendall Dr.	Residential	73.1	80	173	372
16	University Pkwy.	s/o Kendall Dr.	Residential	74.1	94	203	437
17	Belmont Av.	w/o Palm Av.	Residential	58.6	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	58.4	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	56.7	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.2	RW	RW	31
21	Irvington Av.	e/o Palm Av.	Residential	59.8	RW	RW	RW
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	59.3	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.8	RW	67	145
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.9	RW	59	128
25	W. Little League Dr.	w/o Palm Av.	Commercial	68.2	RW	49	105
26	Kendall Dr.	e/o Palm Av.	Commercial	70.8	56	122	262
27	Kendall Dr.	w/o Pine Av.	Residential	70.3	53	113	244
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.5	63	136	292
29	Kendall Dr.	w/o University Pkwy.	Residential	71.4	62	134	288
30	Kendall Dr.	e/o University Pkwy.	Residential	70.9	58	124	267
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.5	308	665	1432
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.2	344	740	1594

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-12: YEAR 2035 WITHOUT PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	59.0	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	60.1	RW	RW	45
3	Palm Av.	n/o Belmont Av.	Residential	59.9	RW	RW	RW
4	Palm Av.	s/o Belmont Av.	Residential	67.5	RW	65	139
5	Palm Av.	s/o Irvington Av.	Residential	70.2	45	98	211
6	Palm Av.	n/o Kendall Dr.	Residential	71.0	51	111	238
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	72.8	68	147	316
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	71.9	59	126	272
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	69.2	RW	84	181
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	66.4	RW	54	117
11	Pine Av.	n/o Belmont Av.	Residential	65.1	RW	45	96
12	Pine Av.	s/o Belmont Av.	Residential	65.2	RW	45	98
13	Pine Av.	n/o Kendall Dr.	Residential	68.0	RW	70	151
14	Campus Pkwy.	n/o Kendall Dr.	Residential	66.6	RW	56	120
15	University Pkwy.	n/o Kendall Dr.	Residential	73.9	90	195	419
16	University Pkwy.	s/o Kendall Dr.	Residential	74.9	106	228	491
17	Belmont Av.	w/o Palm Av.	Residential	58.7	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	58.7	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	56.0	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.5	RW	RW	32
21	Irvington Av.	e/o Palm Av.	Residential	60.1	RW	RW	30
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	58.3	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	68.4	RW	74	160
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	67.6	RW	65	141
25	W. Little League Dr.	w/o Palm Av.	Commercial	68.9	RW	55	118
26	Kendall Dr.	e/o Palm Av.	Commercial	70.9	57	123	265
27	Kendall Dr.	w/o Pine Av.	Residential	70.5	54	117	252
28	Kendall Dr.	w/o Campus Pkwy.	Residential	72.1	70	150	323
29	Kendall Dr.	w/o University Pkwy.	Residential	72.1	69	148	319
30	Kendall Dr.	e/o University Pkwy.	Residential	71.7	65	139	300
31	I-215 Fwy.	w/o Palm Av.	Commercial	83.4	484	1042	2245
32	I-215 Fwy.	e/o Palm Av.	Industrial	83.9	525	1131	2436

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

TABLE 7-13: YEAR 2035 WITH PROJECT CONDITIONS NOISE CONTOURS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Nearest Adjacent Land Use (dBA)	Distance to Contour from Centerline (Feet)[2]		
					70 dBA CNEL	65 dBA CNEL	60 dBA CNEL
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	59.3	RW	RW	RW
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	60.9	RW	RW	50
3	Palm Av.	n/o Belmont Av.	Residential	60.0	RW	RW	44
4	Palm Av.	s/o Belmont Av.	Residential	67.8	RW	67	145
5	Palm Av.	s/o Irvington Av.	Residential	70.4	47	101	218
6	Palm Av.	n/o Kendall Dr.	Residential	71.2	53	114	246
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	73.1	71	152	327
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	72.0	60	129	279
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	69.3	RW	85	184
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	66.6	RW	56	120
11	Pine Av.	n/o Belmont Av.	Residential	65.2	RW	45	98
12	Pine Av.	s/o Belmont Av.	Residential	65.6	RW	48	103
13	Pine Av.	n/o Kendall Dr.	Residential	68.2	RW	72	155
14	Campus Pkwy.	n/o Kendall Dr.	Residential	66.7	RW	57	122
15	University Pkwy.	n/o Kendall Dr.	Residential	73.9	90	195	420
16	University Pkwy.	s/o Kendall Dr.	Residential	74.9	106	229	492
17	Belmont Av.	w/o Palm Av.	Residential	59.1	RW	RW	RW
18	Belmont Av.	e/o Palm Av.	Residential	58.9	RW	RW	RW
19	Belmont Av.	w/o Pine Av.	Residential	57.0	RW	RW	RW
20	Irvington Av.	w/o Palm Av.	Residential	60.8	RW	RW	34
21	Irvington Av.	e/o Palm Av.	Residential	60.2	RW	RW	31
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	59.6	RW	RW	RW
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	68.6	RW	76	164
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	67.7	RW	66	143
25	W. Little League Dr.	w/o Palm Av.	Commercial	70.7	33	72	155
26	Kendall Dr.	e/o Palm Av.	Commercial	71.1	59	128	276
27	Kendall Dr.	w/o Pine Av.	Residential	70.8	57	122	263
28	Kendall Dr.	w/o Campus Pkwy.	Residential	72.3	71	152	328
29	Kendall Dr.	w/o University Pkwy.	Residential	72.1	70	150	323
30	Kendall Dr.	e/o University Pkwy.	Residential	71.7	65	140	301
31	I-215 Fwy.	w/o Palm Av.	Commercial	83.4	486	1046	2254
32	I-215 Fwy.	e/o Palm Av.	Industrial	83.9	527	1136	2447

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] "RW" = Location of the respective noise contour falls within the right-of-way of the road.

7.2 EXISTING CONDITION PROJECT TRAFFIC NOISE LEVELS

Tables 7-14 and 7-15 show the Existing without and with Phase 1 and Project Buildout conditions, respectively.

7.2.1 WITH PHASE 1 PROJECT CONDITIONS

Table 7-14 presents a comparison of the Existing without and with Phase 1 Project conditions CNEL noise levels. Table 7-1 shows that the unmitigated exterior noise levels are expected to range from 55.1 to 80.7 dBA CNEL for Existing without Project conditions. Table 7-2 presents the Existing with Phase 1 Project conditions noise level contours that are expected to range from 55.1 to 80.8 dBA CNEL. As shown on Table 7-14 the Project is expected to generate an exterior noise level increase of up to 1.6 dBA CNEL, which is below the significance thresholds identified in Section 4 when the existing ambient conditions range from 60 to 65 dBA CNEL. Therefore, the Phase 1 Project-related off-site traffic noise level increases are considered *less than significant* for Existing conditions.

7.2.2 WITH PROJECT BUILDOUT CONDITIONS

Table 7-15 presents a comparison of the Existing without and with Project Buildout conditions CNEL noise levels. Table 7-3 presents the Existing with Project Buildout conditions noise level contours that are expected to range from 56.3 to 80.8 dBA CNEL. As shown on Table 7-15 the Project is expected to generate an exterior noise level increase of up to 4.6 dBA CNEL, which will exceed the significance thresholds identified in Section 4 when the existing ambient conditions range from 60 to 65 dBA CNEL on roadway segment 22: West Little League Drive west of Palm Avenue. However, since the land use adjacent to this roadway segment is commercial and not noise-sensitive, the Project Buildout-related noise level increase is considered *less than significant* for Existing conditions.

7.3 EXISTING PLUS AMBIENT 2018 PHASE 1 PROJECT TRAFFIC NOISE LEVELS

Table 7-16 presents a comparison of the Existing plus Ambient 2018 without and with Phase 1 Project conditions CNEL noise levels. Table 7-4 shows that the unmitigated exterior noise levels are expected to range from 55.4 to 81.0 dBA CNEL for Existing plus Ambient 2018 without Project conditions. Table 7-5 presents the Existing plus Ambient 2018 with Phase 1 Project conditions noise level contours that are expected to range from 55.4 to 81.0 dBA CNEL. As shown on Table 7-16 the Project is expected to generate an exterior noise level increase of up to 1.5 dBA CNEL, which is below the significance thresholds identified in Section 4 when the existing ambient conditions range from 60 to 65 dBA CNEL. Therefore, the Phase 1 Project-related off-site traffic noise level increases are considered *less than significant* for Existing plus Ambient 2018 conditions.

7.4 EXISTING PLUS AMBIENT 2019 PROJECT BUILDOUT TRAFFIC NOISE LEVELS

Table 7-17 presents a comparison of the Existing plus Ambient 2019 without and with Project Buildout conditions CNEL noise levels. Table 7-6 shows that the unmitigated exterior noise levels are expected to range from 55.4 to 81.1 dBA CNEL for Existing plus Ambient 2019 without Project conditions. Table 7-7 presents the Existing plus Ambient 2019 with Project Buildout conditions noise level contours that are expected to range from 56.5 to 81.1 dBA CNEL. As shown on Table 7-17 the Project is expected to generate an exterior noise level increase of up to 4.3 dBA CNEL, which will exceed the significance thresholds identified in Section 4 when the existing ambient conditions range from 60 to 65 dBA CNEL on roadway segment 22: West Little League Drive west of Palm Avenue. However, since the land use adjacent to this roadway segment is commercial and not noise-sensitive, the Project Buildout-related noise level increase is considered *less than significant* for Existing plus Ambient 2019 conditions.

7.5 OPENING YEAR CUMULATIVE 2018 PHASE 1 PROJECT TRAFFIC NOISE LEVELS

Table 7-18 presents a comparison of the Opening Year Cumulative 2018 without and with Phase 1 Project conditions CNEL noise levels. Table 7-8 shows that the unmitigated exterior noise levels are expected to range from 55.4 to 81.0 dBA CNEL for Opening Year Cumulative 2018 without Project conditions. Table 7-9 presents the Opening Year Cumulative 2018 with Phase 1 Project conditions noise level contours that are expected to range from 55.4 to 81.1 dBA CNEL. As shown on Table 7-18 the Project is expected to generate an exterior noise level increase of up to 1.5 dBA CNEL, which is below the significance thresholds identified in Section 4 when the existing ambient conditions range from 60 to 65 dBA CNEL. Therefore, the Phase 1 Project-related off-site traffic noise level increases are considered *less than significant* for Opening Year Cumulative 2018 conditions.

7.6 OPENING YEAR CUMULATIVE 2019 PROJECT BUILDOUT TRAFFIC NOISE LEVELS

Table 7-19 presents a comparison of the Opening Year Cumulative 2019 without and with Project Buildout conditions CNEL noise levels. Table 7-10 shows that the unmitigated exterior noise levels are expected to range from 55.7 to 81.1 dBA CNEL for Opening Year Cumulative 2019 without Project conditions. Table 7-11 presents the Opening Year Cumulative 2019 with Project Buildout conditions noise level contours that are expected to range from 56.7 to 81.2 dBA CNEL. As shown on Table 7-19 the Project is expected to generate an exterior noise level increase of up to 4.3 dBA CNEL, which will exceed the significance thresholds identified in Section 4 when the existing ambient conditions range from 60 to 65 dBA CNEL on roadway segment 22: West Little League Drive west of Palm Avenue. However, since the land use adjacent to this roadway segment is commercial and not noise-sensitive, the Project Buildout-related noise level increase is considered *less than significant* for Opening Year Cumulative 2019 conditions.

7.7 YEAR 2035 PROJECT TRAFFIC NOISE LEVEL CONTRIBUTIONS

Table 7-20 presents a comparison of the Year 2035 without and with Project conditions CNEL noise levels. Table 7-12 shows that the unmitigated exterior noise levels are expected to range from 56.0 to 83.9 dBA CNEL for Year 2035 without Project conditions. Table 7-13 presents the Year 2035 with Project conditions noise level contours that are expected to range from 57.0 to 83.9 dBA CNEL. As shown on Table 7-20 the Project is expected to generate an exterior noise level increase of up to 1.8 dBA CNEL, which will exceed the significance thresholds identified in Section 4 when the existing ambient conditions range from 60 to 65 dBA CNEL on roadway segment 22: West Little League Drive west of Palm Avenue. However, since the land use adjacent to this roadway segment is commercial and not noise-sensitive, the Project Buildout-related noise level increase is considered *less than significant* for Year 2035 conditions.

7.8 PROJECT TRAFFIC NOISE CONTRIBUTIONS

The off-site traffic noise analysis shows that the Project noise level contributions will be *less than significant* under with Project conditions in each of the six timeframes: Existing, Existing plus Ambient (2018), Existing plus Ambient (2019), Opening Year Cumulative (2018), Opening Year Cumulative (2019), and Year 2035 conditions. Further, the Project's incremental traffic-related noise level increases at land uses adjacent to roadways conveying Project traffic will diminish over time. This occurs as the background traffic on the study area roadway segments increases and the Project represents a smaller percentage of the overall traffic volume.

TABLE 7-14: EXISTING OFF-SITE PHASE 1 PROJECT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Threshold Exceeded?[2]
				Without Project	With Project	Project Addition	
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.0	58.0	0.0	No
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	58.8	59.1	0.3	No
3	Palm Av.	n/o Belmont Av.	Residential	57.5	57.5	0.0	No
4	Palm Av.	s/o Belmont Av.	Residential	66.2	66.2	0.0	No
5	Palm Av.	s/o Irvington Av.	Residential	68.9	69.0	0.1	No
6	Palm Av.	n/o Kendall Dr.	Residential	69.7	69.7	0.0	No
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.5	71.6	0.1	No
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.4	70.5	0.1	No
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.4	67.4	0.0	No
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	64.8	64.8	0.0	No
11	Pine Av.	n/o Belmont Av.	Residential	62.2	62.2	0.0	No
12	Pine Av.	s/o Belmont Av.	Residential	64.0	64.0	0.0	No
13	Pine Av.	n/o Kendall Dr.	Residential	67.0	67.0	0.0	No
14	Campus Pkwy.	n/o Kendall Dr.	Residential	64.8	64.9	0.1	No
15	University Pkwy.	n/o Kendall Dr.	Residential	72.6	72.6	0.0	No
16	University Pkwy.	s/o Kendall Dr.	Residential	73.6	73.6	0.0	No
17	Belmont Av.	w/o Palm Av.	Residential	57.9	57.9	0.0	No
18	Belmont Av.	e/o Palm Av.	Residential	57.8	57.8	0.0	No
19	Belmont Av.	w/o Pine Av.	Residential	55.1	55.1	0.0	No
20	Irvington Av.	w/o Palm Av.	Residential	59.6	59.6	0.0	No
21	Irvington Av.	e/o Palm Av.	Residential	59.3	59.3	0.0	No
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.4	57.8	0.4	No
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.3	67.3	0.0	No
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.4	66.5	0.1	No
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.3	64.9	1.6	No
26	Kendall Dr.	e/o Palm Av.	Commercial	69.8	69.9	0.1	No
27	Kendall Dr.	w/o Pine Av.	Residential	69.4	69.4	0.0	No
28	Kendall Dr.	w/o Campus Pkwy.	Residential	70.8	70.9	0.1	No
29	Kendall Dr.	w/o University Pkwy.	Residential	70.7	70.7	0.0	No
30	Kendall Dr.	e/o University Pkwy.	Residential	70.4	70.4	0.0	No
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.0	80.0	0.0	No
32	I-215 Fwy.	e/o Palm Av.	Industrial	80.7	80.8	0.1	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] Significance Criteria (Section 4).

TABLE 7-15: EXISTING OFF-SITE PROJECT BUILDOUT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Threshold Exceeded?[2]
				Without Project	With Project	Project Addition	
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.0	58.4	0.4	No
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	58.8	59.9	1.1	No
3	Palm Av.	n/o Belmont Av.	Residential	57.5	57.7	0.2	No
4	Palm Av.	s/o Belmont Av.	Residential	66.2	66.6	0.4	No
5	Palm Av.	s/o Irvington Av.	Residential	68.9	69.2	0.3	No
6	Palm Av.	n/o Kendall Dr.	Residential	69.7	70.0	0.3	No
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.5	71.8	0.3	No
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.4	70.6	0.2	No
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.4	67.5	0.1	No
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	64.8	65.0	0.2	No
11	Pine Av.	n/o Belmont Av.	Residential	62.2	62.5	0.3	No
12	Pine Av.	s/o Belmont Av.	Residential	64.0	64.6	0.6	No
13	Pine Av.	n/o Kendall Dr.	Residential	67.0	67.3	0.3	No
14	Campus Pkwy.	n/o Kendall Dr.	Residential	64.8	64.9	0.1	No
15	University Pkwy.	n/o Kendall Dr.	Residential	72.6	72.6	0.0	No
16	University Pkwy.	s/o Kendall Dr.	Residential	73.6	73.6	0.0	No
17	Belmont Av.	w/o Palm Av.	Residential	57.9	58.3	0.4	No
18	Belmont Av.	e/o Palm Av.	Residential	57.8	58.1	0.3	No
19	Belmont Av.	w/o Pine Av.	Residential	55.1	56.3	1.2	No
20	Irvington Av.	w/o Palm Av.	Residential	59.6	59.8	0.2	No
21	Irvington Av.	e/o Palm Av.	Residential	59.3	59.4	0.1	No
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.4	58.9	1.5	No
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.3	67.4	0.1	No
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.4	66.6	0.2	No
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.3	67.9	4.6	Yes
26	Kendall Dr.	e/o Palm Av.	Commercial	69.8	70.2	0.4	No
27	Kendall Dr.	w/o Pine Av.	Residential	69.4	69.8	0.4	No
28	Kendall Dr.	w/o Campus Pkwy.	Residential	70.8	71.0	0.2	No
29	Kendall Dr.	w/o University Pkwy.	Residential	70.7	70.9	0.2	No
30	Kendall Dr.	e/o University Pkwy.	Residential	70.4	70.5	0.1	No
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.0	80.0	0.0	No
32	I-215 Fwy.	e/o Palm Av.	Industrial	80.7	80.8	0.1	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] Significance Criteria (Section 4).

TABLE 7-16: EA 2018 PHASE 1 PROJECT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Threshold Exceeded?[2]
				Without Project	With Project	Project Addition	
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.2	58.4	0.2	No
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.1	59.5	0.4	No
3	Palm Av.	n/o Belmont Av.	Residential	57.7	57.8	0.1	No
4	Palm Av.	s/o Belmont Av.	Residential	66.4	66.5	0.1	No
5	Palm Av.	s/o Irvington Av.	Residential	69.2	69.2	0.0	No
6	Palm Av.	n/o Kendall Dr.	Residential	70.0	70.0	0.0	No
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.8	71.9	0.1	No
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.7	70.7	0.0	No
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.6	67.6	0.0	No
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.1	65.1	0.0	No
11	Pine Av.	n/o Belmont Av.	Residential	62.5	62.5	0.0	No
12	Pine Av.	s/o Belmont Av.	Residential	64.2	64.2	0.0	No
13	Pine Av.	n/o Kendall Dr.	Residential	67.3	67.3	0.0	No
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.1	65.2	0.1	No
15	University Pkwy.	n/o Kendall Dr.	Residential	72.8	72.8	0.0	No
16	University Pkwy.	s/o Kendall Dr.	Residential	73.8	73.9	0.1	No
17	Belmont Av.	w/o Palm Av.	Residential	58.1	58.1	0.0	No
18	Belmont Av.	e/o Palm Av.	Residential	57.9	57.9	0.0	No
19	Belmont Av.	w/o Pine Av.	Residential	55.4	55.4	0.0	No
20	Irvington Av.	w/o Palm Av.	Residential	60.0	60.0	0.0	No
21	Irvington Av.	e/o Palm Av.	Residential	59.5	59.5	0.0	No
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.6	58.1	0.5	No
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.5	67.5	0.0	No
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.7	66.8	0.1	No
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.5	65.0	1.5	No
26	Kendall Dr.	e/o Palm Av.	Commercial	70.1	70.1	0.0	No
27	Kendall Dr.	w/o Pine Av.	Residential	69.6	69.7	0.1	No
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.1	71.1	0.0	No
29	Kendall Dr.	w/o University Pkwy.	Residential	71.0	71.0	0.0	No
30	Kendall Dr.	e/o University Pkwy.	Residential	70.7	70.7	0.0	No
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.2	80.3	0.1	No
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.0	81.0	0.0	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] Significance Criteria (Section 4).

TABLE 7-17: EA 2019 PROJECT BUILDOUT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Threshold Exceeded?[2]
				Without Project	With Project	Project Addition	
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.4	58.8	0.4	No
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.1	60.2	1.1	No
3	Palm Av.	n/o Belmont Av.	Residential	57.8	58.0	0.2	No
4	Palm Av.	s/o Belmont Av.	Residential	66.6	66.9	0.3	No
5	Palm Av.	s/o Irvington Av.	Residential	69.3	69.5	0.2	No
6	Palm Av.	n/o Kendall Dr.	Residential	70.1	70.3	0.2	No
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	71.9	72.1	0.2	No
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	70.8	71.0	0.2	No
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	67.7	67.9	0.2	No
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.2	65.3	0.1	No
11	Pine Av.	n/o Belmont Av.	Residential	62.6	62.9	0.3	No
12	Pine Av.	s/o Belmont Av.	Residential	64.3	64.8	0.5	No
13	Pine Av.	n/o Kendall Dr.	Residential	67.4	67.6	0.2	No
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.2	65.3	0.1	No
15	University Pkwy.	n/o Kendall Dr.	Residential	72.9	72.9	0.0	No
16	University Pkwy.	s/o Kendall Dr.	Residential	73.9	73.9	0.0	No
17	Belmont Av.	w/o Palm Av.	Residential	58.3	58.6	0.3	No
18	Belmont Av.	e/o Palm Av.	Residential	58.1	58.6	0.5	No
19	Belmont Av.	w/o Pine Av.	Residential	55.4	56.5	1.1	No
20	Irvington Av.	w/o Palm Av.	Residential	60.0	60.2	0.2	No
21	Irvington Av.	e/o Palm Av.	Residential	59.6	59.6	0.0	No
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.8	59.0	1.2	No
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.6	67.8	0.2	No
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.8	66.9	0.1	No
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.7	68.0	4.3	Yes
26	Kendall Dr.	e/o Palm Av.	Commercial	70.2	70.5	0.3	No
27	Kendall Dr.	w/o Pine Av.	Residential	69.7	70.1	0.4	No
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.2	71.3	0.1	No
29	Kendall Dr.	w/o University Pkwy.	Residential	71.1	71.2	0.1	No
30	Kendall Dr.	e/o University Pkwy.	Residential	70.8	70.8	0.0	No
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.3	80.4	0.1	No
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.1	81.1	0.0	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] Significance Criteria (Section 4).

TABLE 7-18: OPENING YEAR 2018 PHASE 1 PROJECT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Threshold Exceeded?[2]
				Without Project	With Project	Project Addition	
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.4	58.4	0.0	No
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.1	59.5	0.4	No
3	Palm Av.	n/o Belmont Av.	Residential	57.9	57.9	0.0	No
4	Palm Av.	s/o Belmont Av.	Residential	66.6	66.7	0.1	No
5	Palm Av.	s/o Irvington Av.	Residential	69.4	69.4	0.0	No
6	Palm Av.	n/o Kendall Dr.	Residential	70.1	70.1	0.0	No
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	72.0	72.1	0.1	No
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	71.0	71.1	0.1	No
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	68.4	68.5	0.1	No
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.6	65.7	0.1	No
11	Pine Av.	n/o Belmont Av.	Residential	62.8	62.8	0.0	No
12	Pine Av.	s/o Belmont Av.	Residential	64.7	64.7	0.0	No
13	Pine Av.	n/o Kendall Dr.	Residential	67.5	67.5	0.0	No
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.4	65.5	0.1	No
15	University Pkwy.	n/o Kendall Dr.	Residential	73.0	73.0	0.0	No
16	University Pkwy.	s/o Kendall Dr.	Residential	74.0	74.0	0.0	No
17	Belmont Av.	w/o Palm Av.	Residential	58.3	58.3	0.0	No
18	Belmont Av.	e/o Palm Av.	Residential	58.1	58.1	0.0	No
19	Belmont Av.	w/o Pine Av.	Residential	55.4	55.4	0.0	No
20	Irvington Av.	w/o Palm Av.	Residential	60.0	60.0	0.0	No
21	Irvington Av.	e/o Palm Av.	Residential	59.6	59.6	0.0	No
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.8	58.3	0.5	No
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.5	67.5	0.0	No
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.7	66.8	0.1	No
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.7	65.2	1.5	No
26	Kendall Dr.	e/o Palm Av.	Commercial	70.4	70.4	0.0	No
27	Kendall Dr.	w/o Pine Av.	Residential	69.9	70.0	0.1	No
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.3	71.3	0.0	No
29	Kendall Dr.	w/o University Pkwy.	Residential	71.2	71.2	0.0	No
30	Kendall Dr.	e/o University Pkwy.	Residential	70.8	70.9	0.1	No
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.3	80.3	0.0	No
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.0	81.1	0.1	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] Significance Criteria (Section 4).

TABLE 7-19: OPENING YEAR 2019 PROJECT BUILDOUT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Threshold Exceeded?[2]
				Without Project	With Project	Project Addition	
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	58.4	59.0	0.6	No
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	59.3	60.2	0.9	No
3	Palm Av.	n/o Belmont Av.	Residential	57.9	58.2	0.3	No
4	Palm Av.	s/o Belmont Av.	Residential	66.7	67.1	0.4	No
5	Palm Av.	s/o Irvington Av.	Residential	69.4	69.7	0.3	No
6	Palm Av.	n/o Kendall Dr.	Residential	70.2	70.4	0.2	No
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	72.1	72.3	0.2	No
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	71.1	71.3	0.2	No
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	68.5	68.7	0.2	No
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	65.7	65.9	0.2	No
11	Pine Av.	n/o Belmont Av.	Residential	62.9	63.2	0.3	No
12	Pine Av.	s/o Belmont Av.	Residential	64.8	65.3	0.5	No
13	Pine Av.	n/o Kendall Dr.	Residential	67.6	67.9	0.3	No
14	Campus Pkwy.	n/o Kendall Dr.	Residential	65.5	65.6	0.1	No
15	University Pkwy.	n/o Kendall Dr.	Residential	73.1	73.1	0.0	No
16	University Pkwy.	s/o Kendall Dr.	Residential	74.1	74.1	0.0	No
17	Belmont Av.	w/o Palm Av.	Residential	58.3	58.6	0.3	No
18	Belmont Av.	e/o Palm Av.	Residential	58.1	58.4	0.3	No
19	Belmont Av.	w/o Pine Av.	Residential	55.7	56.7	1.0	No
20	Irvington Av.	w/o Palm Av.	Residential	60.1	60.2	0.1	No
21	Irvington Av.	e/o Palm Av.	Residential	59.6	59.8	0.2	No
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	57.9	59.3	1.4	No
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	67.6	67.8	0.2	No
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	66.8	66.9	0.1	No
25	W. Little League Dr.	w/o Palm Av.	Commercial	63.9	68.2	4.3	Yes
26	Kendall Dr.	e/o Palm Av.	Commercial	70.5	70.8	0.3	No
27	Kendall Dr.	w/o Pine Av.	Residential	70.0	70.3	0.3	No
28	Kendall Dr.	w/o Campus Pkwy.	Residential	71.4	71.5	0.1	No
29	Kendall Dr.	w/o University Pkwy.	Residential	71.3	71.4	0.1	No
30	Kendall Dr.	e/o University Pkwy.	Residential	70.9	70.9	0.0	No
31	I-215 Fwy.	w/o Palm Av.	Commercial	80.4	80.5	0.1	No
32	I-215 Fwy.	e/o Palm Av.	Industrial	81.1	81.2	0.1	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] Significance Criteria (Section 4).

TABLE 7-20: YEAR 2035 PROJECT RELATED TRAFFIC NOISE IMPACTS

ID	Road	Segment	Adjacent Land Use[1]	CNEL at Adjacent Land Use (dBA)			Threshold Exceeded?[2]
				Without Project	With Project	Project Addition	
1	N. Little League Dr.	n/o W. Little League Dr.	Public/Comm. Rec.	59.0	59.3	0.3	No
2	N. Little League Dr.	s/o W. Little League Dr.	Public Parks	60.1	60.9	0.8	No
3	Palm Av.	n/o Belmont Av.	Residential	59.9	60.0	0.1	No
4	Palm Av.	s/o Belmont Av.	Residential	67.5	67.8	0.3	No
5	Palm Av.	s/o Irvington Av.	Residential	70.2	70.4	0.2	No
6	Palm Av.	n/o Kendall Dr.	Residential	71.0	71.2	0.2	No
7	Palm Av.	n/o I-215 Fwy. NB Ramps	Commercial	72.8	73.1	0.3	No
8	Palm Av.	s/o I-215 Fwy. NB Ramps	Commercial	71.9	72.0	0.1	No
9	Palm Av.	n/o Hallmark Pkwy.	Commercial	69.2	69.3	0.1	No
10	Palm Av.	s/o Hallmark Pkwy.	Industrial	66.4	66.6	0.2	No
11	Pine Av.	n/o Belmont Av.	Residential	65.1	65.2	0.1	No
12	Pine Av.	s/o Belmont Av.	Residential	65.2	65.6	0.4	No
13	Pine Av.	n/o Kendall Dr.	Residential	68.0	68.2	0.2	No
14	Campus Pkwy.	n/o Kendall Dr.	Residential	66.6	66.7	0.1	No
15	University Pkwy.	n/o Kendall Dr.	Residential	73.9	73.9	0.0	No
16	University Pkwy.	s/o Kendall Dr.	Residential	74.9	74.9	0.0	No
17	Belmont Av.	w/o Palm Av.	Residential	58.7	59.1	0.4	No
18	Belmont Av.	e/o Palm Av.	Residential	58.7	58.9	0.2	No
19	Belmont Av.	w/o Pine Av.	Residential	56.0	57.0	1.0	No
20	Irvington Av.	w/o Palm Av.	Residential	60.5	60.8	0.3	No
21	Irvington Av.	e/o Palm Av.	Residential	60.1	60.2	0.1	No
22	W. Little League Dr.	w/o Magnolia Av.	Public Parks	58.3	59.6	1.3	No
23	Kendall Dr.	w/o N. Little League Dr.	Industrial	68.4	68.6	0.2	No
24	Kendall Dr.	e/o N. Little League Dr.	Industrial	67.6	67.7	0.1	No
25	W. Little League Dr.	w/o Palm Av.	Commercial	68.9	70.7	1.8	Yes
26	Kendall Dr.	e/o Palm Av.	Commercial	70.9	71.1	0.2	No
27	Kendall Dr.	w/o Pine Av.	Residential	70.5	70.8	0.3	No
28	Kendall Dr.	w/o Campus Pkwy.	Residential	72.1	72.3	0.2	No
29	Kendall Dr.	w/o University Pkwy.	Residential	72.1	72.1	0.0	No
30	Kendall Dr.	e/o University Pkwy.	Residential	71.7	71.7	0.0	No
31	I-215 Fwy.	w/o Palm Av.	Commercial	83.4	83.4	0.0	No
32	I-215 Fwy.	e/o Palm Av.	Industrial	83.9	83.9	0.0	No

[1] Source: City of San Bernardino General Plan Land Use Element, Figure LU-2.
[2] Significance Criteria (Section 4).

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8 ON-SITE TRANSPORTATION NOISE IMPACTS

An on-site exterior noise impact analysis has been completed to determine the traffic noise exposure and to identify potential necessary noise abatement measures for the proposed Rancho Palma Project. It is expected that the primary source of noise impacts to the Project site will be traffic noise from the I-215 Freeway, West Little League Drive, and Magnolia Avenue. The Project will also experience some background traffic noise impacts from the Project's internal streets, however, due to the distance, topography and low traffic volume/speed, traffic noise from these roads will not make a significant contribution to the noise environment.

8.1 ON-SITE EXTERIOR NOISE ANALYSIS

Using the FHWA traffic noise prediction model and the parameters outlined in Tables 6-4 to 6-6, the expected future exterior noise levels for the single-family residential lots were calculated. Table 8-1 presents a summary of future exterior noise level impacts in the outdoor living areas (backyards) of lots facing the I-215 Freeway, West Little League Drive, and Magnolia Avenue. The on-site traffic noise level impacts indicate that the lots facing the I-215 Freeway, West Little League Drive, and Magnolia Avenue will experience unmitigated exterior noise levels ranging from 54.6 to 74.6 dBA CNEL. The on-site traffic noise analysis calculations are provided in Appendix 8.1.

To satisfy the City of San Bernardino 65 dBA CNEL exterior noise level standards for residential land use, the construction of a minimum effective 9-foot high noise barrier is required for the outdoor living areas (backyards) of lots 47 to 55 and 75 to 81 facing the I-215 Freeway and West Little League Drive. The planned noise barrier is expected to consist of a combination 1 foot high berm with an 8 foot high block wall. In addition, the construction of a minimum effective 7-foot high noise barrier is required for lot 82 facing West Little League Drive. Further, 6-foot high noise barriers are recommended for all other lots adjacent to Magnolia Avenue and the commercial retail land use of the Project site. With the recommended noise barriers shown on Exhibit ES-A, the mitigated future exterior noise levels will range from 48.8 to 65.0 dBA CNEL. This noise analysis shows that the recommended noise barriers will satisfy the City of San Bernardino 65 dBA CNEL exterior noise level standards. The effective noise barrier height recommendations represent the minimum wall and/or berm combination height required to satisfy the City of San Bernardino exterior noise level standards.

TABLE 8-1: EXTERIOR NOISE LEVELS (CNEL)

Lot Number	Roadway	Unmitigated Noise Level (dBA CNEL)	Mitigated Noise Level (dBA CNEL)	Combined Mitigated Noise Level (dBA CNEL)	Barrier Height (Feet)	Top Of Barrier Elevation (Feet)
50	I-215 Freeway	74.6	64.7	64.9	9.0'	1,758.0'
	W. Little League Dr. e/o Magnolia Av.	62.8	51.5		9.0'	1,758.0'
55	I-215 Freeway	74.6	64.9	65.0	9.0'	1,749.5'
	W. Little League Dr. e/o Magnolia Av.	62.9	52.0		9.0'	1,749.5'
79	I-215 Freeway	74.6	65.0	65.0	9.0'	1,742.6'
	W. Little League Dr. e/o Driveway 2	63.3	51.8		9.0'	1,743.6'
82	I-215 Freeway	70.9	64.0	64.1	7.0'	1,738.6'
	W. Little League Dr. e/o Driveway 2	54.6	47.3		7.0'	1,738.6'
3	Magnolia Av. n/o Driveway 1	55.0	49.0	49.0	6.0'	1,763.8'
44	Magnolia Av. n/o W. Little League Dr.	55.2	48.8	48.8	6.0'	1,760.7'

8.2 ON-SITE INTERIOR NOISE ANALYSIS

To ensure that the interior noise levels comply with the City of San Bernardino 45 dBA CNEL interior noise standards, future noise levels were calculated at the first and second floor building facades.

8.2.1 NOISE REDUCTION METHODOLOGY

The interior noise level is the difference between the predicted exterior noise level at the building facade and the noise reduction of the structure. Typical building construction will provide a Noise Reduction (NR) of approximately 12 dBA with "windows open" and a minimum 25 dBA noise reduction with "windows closed." However, sound leaks, cracks and openings within the window assembly can greatly diminish its effectiveness in reducing noise. Several methods are used to improve interior noise reduction, including: (1) weather-stripped solid core exterior doors; (2) upgraded dual glazed windows; (3) mechanical ventilation/air conditioning; and (4) exterior wall/roof assembles free of cut outs or openings.

8.2.2 INTERIOR NOISE LEVEL ASSESSMENT

To provide the necessary interior noise level reduction, Tables 8-2 and 8-3 indicate that residential homes facing the I-215 Freeway, West Little League Drive, and Magnolia Avenue will require a windows closed condition and a means of mechanical ventilation (e.g. air conditioning). Table 8-2 shows that the future unmitigated noise levels at the first floor building façade are expected to range from 47.5 to 66.3 dBA CNEL. The first floor interior noise level analysis shows that the City of San Bernardino 45 dBA CNEL interior noise level standards can be satisfied using standard windows with a minimum STC rating of 27. Table 8-3 shows that the future noise levels at the second floor building façade are expected to range from 53.6 to 74.3 dBA CNEL, and upgraded windows with a minimum STC rating of 34 are required to satisfy the City of San Bernardino's 45 dBA CNEL interior noise level standards. The interior noise analysis shows that with the recommended interior noise mitigation measures described in the Executive Summary the Project will satisfy the City of San Bernardino 45 dBA CNEL interior noise level standards for residential development.

TABLE 8-2: FIRST FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot Number	Noise Level at Façade[1]	Required Interior Noise Reduction[2]	Estimated Interior Noise Reduction[3]	Upgraded Windows[4]	Interior Noise Level[5]
50	65.8	20.8	25.0	No	40.8
55	66.1	21.1	25.0	No	41.1
79	66.3	21.3	25.0	No	41.3
82	64.5	19.5	25.0	No	39.5
3	47.7	2.7	27.0	No	20.7
44	47.5	2.5	28.0	No	19.5

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] A minimum of 25 dBA noise reduction is assumed with standard building construction.
[4] Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.

TABLE 8-3: SECOND FLOOR INTERIOR NOISE IMPACTS (CNEL)

Lot Number	Noise Level at Façade[1]	Required Interior Noise Reduction[2]	Estimated Interior Noise Reduction[3]	Upgraded Windows[4]	Interior Noise Level[5]
50	74.3	29.3	32.0	Yes	42.3
55	74.2	29.2	32.0	Yes	42.2
79	74.3	29.3	32.0	Yes	42.3
82	70.8	25.8	32.0	Yes	38.8
3	53.6	8.6	27.0	No	26.6
44	53.8	8.8	28.0	No	25.8

[1] Exterior noise level at the facade with a windows closed condition requiring a means of mechanical ventilation (e.g. air conditioning).
[2] Noise reduction required to satisfy the 45 dBA CNEL interior noise standards.
[3] Estimated interior noise reduction with the recommended windows.
[4] Does the required interior noise reduction trigger upgraded with a minimum STC rating of greater than 27?
[5] Estimated interior noise level with minimum STC rating for all windows.

9 RECEIVER LOCATIONS

To assess the potential for long-term operational and short-term construction noise impacts, the following eight receiver locations as shown on Exhibit 9-A were identified as representative locations for analysis. Sensitive receivers are generally defined as locations where people reside or where the presence of unwanted sound could otherwise adversely affect the use of the land. Noise-sensitive land uses are generally considered to include: schools, hospitals, single-family dwellings, mobile home parks, churches, libraries, and recreation areas. Moderately noise-sensitive land uses typically include: multi-family dwellings, hotels, motels, dormitories, out-patient clinics, cemeteries, golf courses, country clubs, athletic/tennis clubs, and equestrian clubs. Land uses that are considered relatively insensitive to noise include business, commercial, and professional developments. Land uses that are typically not affected by noise include: industrial, manufacturing, utilities, agriculture, natural open space, undeveloped land, parking lots, warehousing, liquid and solid waste facilities, salvage yards, and transit terminals.

Sensitive receivers in the vicinity of the Project site include the single-family residential dwellings located at receiver locations R2 to R8. Receiver location R1 represents the existing Cesar E. Chavez Middle School. The closest sensitive receiver is represented by location R5 at a distance of approximately 151 feet east of the Project site.

R1: Located approximately 878 feet north of the Project site, R1 represents the Cesar E. Chavez Middle School on Magnolia Avenue.

R2: Location R2 represents existing single-family residential homes located approximately 280 feet north of the Project site on Irvington Avenue. A 24-hour noise level measurement was taken near this location, L1, to describe the existing ambient noise environment.

R3: Location R3 represents the existing single-family residential homes located roughly 355 feet northeast of the Project Site on Irvington Avenue.

R4: Location R4 represents the existing single-family residential homes located approximately 250 feet east of the Project site on Washington Street. A 24-hour noise level measurement was taken at this location, L2, to describe the existing ambient noise environment.

R5: Location R5 represents an existing single-family residential home which is situated approximately 151 feet east of the Project site boundary at the cul-de-sac of Red Sky Avenue.

R6: At a distance of approximately 208 feet east of the Project site, location R6 represents noise-sensitive residential homes on Red Sky Avenue.

R7: At a distance of 240 feet from the Project site boundary, R7 represents single-family residential homes located on Red Sky Avenue.

R8: Location R8 represents the residential home located approximately 346 feet west of the Project site across the I-215 Freeway on Kendall Drive.

EXHIBIT 9-A: RECEIVER LOCATIONS

LEGEND:

- Receiver Locations
- Distance from receiver to Project site boundary (in feet)
- 6' Existing Barrier Height (in feet)
- Existing Barrier

10 OPERATIONAL IMPACTS

This section analyzes the potential stationary-source operational noise impacts due to the Project's stationary noise sources on the sensitive receiver locations. Exhibit 10-A identifies the receiver locations and noise source locations used to assess the operational noise levels due to the operation of the Project.

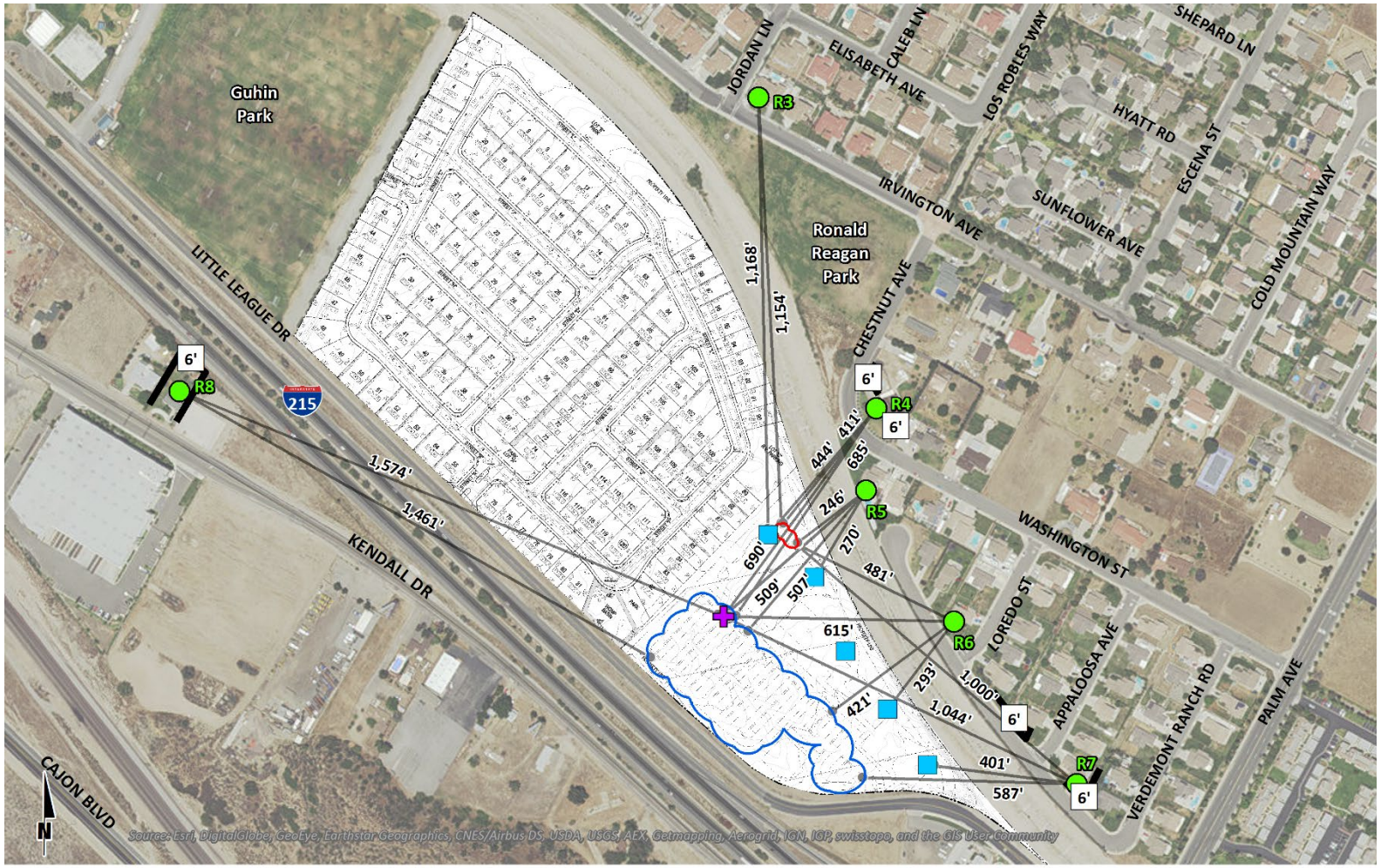
10.1 OPERATIONAL NOISE STANDARDS

The Project operational noise impacts are governed by the City of San Bernardino Municipal Code, Section 8.54, included in Appendix 3.2. Section 8.54.060 states when: *such noises are an accompaniment and effect of a lawful business, commercial or industrial enterprise carried on in an area zoned for that purpose*…these activities shall be exempt (Section 8.54.060(B)). (11) However, due to the Project's close proximity to residential land uses, located north of the Project site boundary, Development Code, Section 19.20.030.15(A), limits the operational stationary-source noise from the Rancho Palma Project to an exterior noise level of 65 dBA for residential land use. (10)

10.2 OPERATIONAL NOISE SOURCES

The potential Project-related stationary noise sources include: roof-top air conditioning units, shopping cart corrals, parking lot vehicle movements, and loading dock activities. Exhibit 10-A shows the noise source and the distance to each of the sensitive receiver locations used in this analysis.

EXHIBIT 10-A: OPERATIONAL NOISE SOURCE AND RECEIVER LOCATIONS



LEGEND:

- Receiver Locations
- Distance from receiver to center of noise source (in feet).
- 6' Existing Barrier Height (in feet)
- Existing Barrier
- Roof-Top Air Conditioning Unit
- Shopping Cart Corral
- Parking Lot Vehicle Movements
- Loading Dock Activity

10.3 REFERENCE NOISE LEVELS

To estimate the Project operational noise impacts, reference noise level measurements were collected from similar types of activities to represent the noise levels expected with the development of the proposed Project. This section provides a detailed description of the reference noise level measurements shown on Table 10-1 used to estimate the Project operational noise impacts. It is important to note that the following projected noise levels assume the worst-case noise environment with the roof-top air conditioning units, shopping cart corrals, parking lot vehicle movements, and loading dock activities all operating simultaneously. In reality, these noise level impacts will vary throughout the day.

TABLE 10-1: REFERENCE NOISE LEVEL MEASUREMENTS

Noise Source	Duration (hh:mm:ss)	Distance From Source (Feet)	Noise Source Height (Feet)	Hourly Activity (Minutes)[4]	Noise Level (dBA Leq)
Roof-Top Air Conditioning Unit[1]	96:00:00	5'	25'	39	77.2
Shopping Car Corrals[2]	0:16:00	5'	3'	20	72.9
Parking Lot Vehicle Movements[2]	0:15:00	5'	5'	60	60.1
Loading Dock Activities[3]	0:01:00	20'	8'	18	77.3

[1] As measured by Urban Crossroads, Inc. on 7/27/2015 at the Santee Walmart located at 170 Town Center Parkway.
[2] As measured by Urban Crossroads, Inc. on 5/30/2012 at the Laguna Niguel Walmart located at 27470 Alicia Parkway.
[3] As measured at the Huntington Beach Walmart by Urban Crossroads, Inc. on 4/14/2011.
[4] Anticipated duration (minutes within the hour) of noise activity during peak hourly conditions expected at the Project site.

10.3.1 ROOF-TOP AIR CONDITIONING UNITS

In order to assess the impacts created by the roof-top air conditioning units at the Project site, reference noise levels measurements were taken at an existing Walmart on July 27th, 2015. Located at 170 Town Center Parkway in the City of Santee, the noise level measurements describe a single mechanical roof-top air conditioning unit on the roof of an existing Walmart store. The reference noise level represents a Lennox SCA120 series 10-ton model packaged air conditioning unit. At a distance of 5 feet from the roof-top air conditioning unit, the exterior noise levels were measured at 77.2 dBA Leq. Based on the typical operating conditions observed over a four-day measurement period, the roof-top air conditioning units are estimated to operate for 39 minutes during the daytime hours. These operating conditions reflect peak summer cooling requirements with measured temperatures approaching 96 degrees Fahrenheit (°F) with average daytime temperatures of 82°F. For the purpose of this noise analysis, the air conditioning units are expected to be located on the roof at a noise elevation of 25 feet.

10.3.2 Shopping Cart Corrals

To evaluate the noise level impacts from shopping carts placed by customers into assigned shopping cart areas, Urban Crossroads collected noise level measurements at the Laguna Niguel Walmart located at 27470 Alicia Parkway on May 30th, 2012. At a distance of 5 feet from the noise source, the noise associated with the placement of the shopping carts into the corral was measured at 72.9 dBA Leq. The noise impacts are mainly due to the metal shopping carts crashing into other carts already placed in the corral as well as striking the side rails. This noise impact analysis includes the noise level impacts associated with the adjacent shopping cart corrals with noise impacts expected for approximately 20 minutes an hour for the typical daytime and nighttime conditions.

10.3.3 Parking Lot Vehicle Movements

To determine the noise level impacts associated with parking lot vehicle movements, Urban Crossroads collected reference noise level measurements at the at the Laguna Niguel Walmart located at 27470 Alicia Parkway on May 30th, 2012. The fifteen minute noise level measurement indicates that the parking lot vehicle movements generates a noise level of 60.1 dBA Leq at a distance of 5 feet. The parking lot noise levels are mainly due to cars pulling in and out of spaces, car alarms sounding, and customers moving shopping carts. Noise associated with parking lot vehicle movements is expected during the typical daytime and nighttime conditions for the entire hour (60 minutes).

10.3.4 Loading Dock Activity

As part of its operations, the proposed Rancho Palma Project may include truck doors and loading facilities at the northern façade of the grocery building. Loading docks will accommodate truck and vendor deliveries. Truck deliveries would consist of both semi-trucks (larger deliveries would be accomplished by way of 3+ axle tractor-trailer combinations with trailers up to 53 feet in length), and small to medium size (two-axle) trucks.

It is expected that the loading docks would be constructed to allow trailers to seal to the docks, thereby directing the unloading noise into the store, rather than onto neighboring uses. In order to evaluate the noise impacts associated with the delivery truck tractor trailer unloading/loading activities, reference noise level measurements were taken at the Huntington Beach Walmart located at the southwest corner of Goldenwest Street and Edinger Avenue by Urban Crossroads Inc. on April 14th, 2011.

The primary noise generated by tractor trailer unloading is the noise of the truck arriving, backing into the dock area, detaching the cab, attaching the cab to the empty trailer, and exiting the loading dock. Because the trailer seals to the loading dock, employees unload the tractor trailer from the inside of the store. The receiving crew places a 20' long rolling conveyor assembly inside the trailer to roll merchandise (on pallets or in boxes) into the store. The unmitigated exterior noise level was measured at 77.3 dBA Leq at a distance of 20 feet from the tractor trailer.

Delivery truck delivery activities will typically last an average of 3 to 6 minutes per truck, depending on whether or not the loading bay is empty at the time of arrival. In the event idling

does occur, idling time would be limited to no more than 5 minutes under California State law (Cal Code Regs. 2485). Delivery trucks are generally equipped with an engine shutdown system that automatically turns off the engine after 5 minutes of idling. In order to analyze a worst-case condition for noise impacts related to delivery, it is assumed that there would be a maximum of three delivery trucks coming to the loading docks and completing delivery activities within a one-hour period for both daytime and nighttime hours. For the purpose of this noise analysis, a maximum average delivery time of six minutes per delivery is used for a total of 18 minutes of activity during the peak noise hour.

10.4 OPERATIONAL NOISE LEVELS

Based upon the reference noise levels, it is possible to estimate the Project operational stationary-source noise levels at each of the sensitive receiver locations. The operational noise level calculations shown on Table 10-2 account for the distance attenuation provided due to geometric spreading, when sound from a localized stationary source (i.e., a point source) propagates uniformly outward in a spherical pattern. With geometric spreading, sound levels attenuate (or decrease) at a rate of 6 dB for each doubling of distance from a point source (roof-top air conditioning units, shopping cart corrals, loading dock activities) and 4.5 dB for each doubling of distance from a line source (parking lot vehicle movements).

Table 10-2 indicates that the hourly noise levels associated with the roof-top air conditioning units, shopping cart corrals, parking lot vehicle movements, and loading dock activities at the commercial retail used within the Project site are expected to range from 18.6 to 50.8 dBA Leq at the sensitive receiver locations. The operational noise level calculation worksheets are included in Appendix 10.1.

TABLE 10-2: PROJECT OPERATIONAL NOISE LEVELS (DBA LEQ)

Receiver Location[1]	Noise Sources[2]	Operational Noise Levels (dBA Leq)[3]
R3	Roof-Top Air Conditioning Unit	27.9
	Shopping Cart Corral	-[4]
	Parking Lot Vehicle Movements	-[4]
	Loading Dock Activity	36.9
	Combined Noise Level:	37.4
R4	Roof-Top Air Conditioning Unit	36.3
	Shopping Cart Corral	12.8
	Parking Lot Vehicle Movements	15.6
	Loading Dock Activity	45.8
	Combined Noise Level:	46.3
R5	Roof-Top Air Conditioning Unit	40.7
	Shopping Cart Corral	15.4
	Parking Lot Vehicle Movements	16.2
	Loading Dock Activity	50.3
	Combined Noise Level:	50.8
R6	Roof-Top Air Conditioning Unit	39.9
	Shopping Cart Corral	16.6
	Parking Lot Vehicle Movements	19.3
	Loading Dock Activity	44.5
	Combined Noise Level:	45.8
R7	Roof-Top Air Conditioning Unit	32.0
	Shopping Cart Corral	13.6
	Parking Lot Vehicle Movements	18.4
	Loading Dock Activity	32.7
	Combined Noise Level:	35.5
R8	Roof-Top Air Conditioning Unit	-[4]
	Shopping Cart Corral	12.4
	Parking Lot Vehicle Movements	17.4
	Loading Dock Activity	-[4]
	Combined Noise Level:	18.6

[1] See Exhibit 9-A for the receiver and noise source locations. Receiver locations R1 and R2 do not have line of sight to the noise sources and are therefore excluded from the operational noise analysis.
[2] Reference noise sources as shown on Table 10-1.
[3] Stationary source noise level calculations are provided in Appendix 10.1.
[4] Noise source is not within the line-of-sight of the receiver location.

10.5 OPERATIONAL NOISE LEVEL COMPLIANCE

To demonstrate compliance with local noise standards, the Project-only operational noise levels are evaluated against the City of San Bernardino 65 dBA Leq exterior noise level standards, previously shown on Table 3-1. Table 10-3 shows the operational noise levels associated with the Rancho Palma commercial retail land use will not exceed the noise level standard at the sensitive residential receivers in the City of San Bernardino. Therefore, since the Project will satisfy the noise level standards of the City of San Bernardino at the nearby sensitive receiver locations, the Project-related operational noise levels will be *less than significant*.

TABLE 10-3: OPERATIONAL NOISE LEVEL COMPLIANCE

Receiver Location[1]	Noise Level At Receiver Locations (dBA Leq)[2]	Noise Level Standard (dBA Leq)[3]	Threshold Exceeded?[4]
R1	n/a	65	No
R2	n/a	65	No
R3	37.4	65	No
R4	46.3	65	No
R5	50.8	65	No
R6	45.8	65	No
R7	35.5	65	No
R8	18.6	65	No

[1] See Exhibit 10-A for the noise receiver and noise source locations.
[2] Estimated Project stationary source noise levels as shown on Table 10-2.
[3] Noise standards as shown on Table 3-1.
[4] Do the estimated Project stationary source noise levels exceed the noise standards on the affected land uses?
"n/a" = Receiver locations R1 and R2 do not have line of sight to the noise sources and are therefore excluded from the operational noise analysis.

10.6 PROJECT OPERATIONAL NOISE CONTRIBUTION

To describe the Project operational noise level contributions, the Project operational noise levels were combined with the existing ambient noise levels measurements for the eight receiver locations potentially impacted by Project operational noise sources. The difference between the combined Project and ambient noise levels describe the Project noise level contributions. Noise levels that would be experienced at receiver locations when Project-source noise is added to the ambient daytime and nighttime conditions are presented on Tables 10-4 and 10-5, respectively.

As indicated in Table 10-4, the Project will contribute operational noise level increases approaching 2.0 dBA Leq during the daytime hours. Table 10-5 shows the Project noise level increases during the nighttime hours will approach 1.5 dBA Leq. Since the Project-related operational noise level contributions will not exceed the significance criteria discussed in Section 4, the increases at the sensitive receiver locations will be *less than significant*. On this basis, Project operational stationary-source noise would not result in a substantial temporary/periodic,

or permanent increase in ambient noise levels in the Project vicinity above levels existing without the Project, and impacts in these regards will be *less than significant*.

TABLE 10-4: DAYTIME OPERATIONAL NOISE LEVEL CONTRIBUTIONS (DBA LEQ)

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Contribution[6]	Threshold Exceeded?[7]
R1	n/a	L1	58.8	58.8	0.0	No
R2	n/a	L1	58.8	58.8	0.0	No
R3	37.4	L2	53.0	53.1	0.1	No
R4	46.3	L2	53.0	53.8	0.8	No
R5	50.8	L2	53.0	55.0	2.0	No
R6	45.8	L2	53.0	53.8	0.8	No
R7	35.5	L2	53.0	53.1	0.1	No
R8	18.6	L3	69.8	69.8	0.0	No

[1] See Exhibit 10-A for the sensitive receiver locations.
[2] Total Project operational noise levels as shown on Table 10-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed daytime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance Criteria as defined in Section 4.

TABLE 10-5: NIGHTTIME OPERATIONAL NOISE LEVEL CONTRIBUTIONS (DBA LEQ)

Receiver Location[1]	Total Project Operational Noise Level[2]	Measurement Location[3]	Reference Ambient Noise Levels[4]	Combined Project and Ambient[5]	Project Contribution[6]	Threshold Exceeded?[7]
R1	n/a	L1	61.5	61.5	0.0	No
R2	n/a	L1	61.5	61.5	0.0	No
R3	37.4	L2	54.6	54.7	0.1	No
R4	46.3	L2	54.6	55.2	0.6	No
R5	50.8	L2	54.6	56.1	1.5	No
R6	45.8	L2	54.6	55.1	0.5	No
R7	35.5	L2	54.6	54.7	0.1	No
R8	18.6	L3	68.9	68.9	0.0	No

[1] See Exhibit 10-A for the sensitive receiver locations.
[2] Total Project operational noise levels as shown on Table 10-3.
[3] Reference noise level measurement locations as shown on Exhibit 5-A.
[4] Observed nighttime ambient noise levels as shown on Table 5-1.
[5] Represents the combined ambient conditions plus the Project activities.
[6] The noise level increase expected with the addition of the proposed Project activities.
[7] Significance Criteria as defined in Section 4.

11 CONSTRUCTION IMPACTS

This section analyzes potential impacts resulting from the short-term construction activities associated with the development of the Project.

11.1 CONSTRUCTION NOISE STANDARDS

The City of San Bernardino has set restrictions to control noise impacts associated with the construction of the proposed Project. Section 8.54.070 of the City's Noise Control Ordinance states: *No person shall be engaged or employed, or cause any other person to be engaged or employed, in any work of construction, erection, alteration, repair, addition, movement, demolition, or improvement to any building or structure except within the hours of 7:00 a.m. and 8:00 p.m.* (11) While the City establishes limits to the hours during which construction activity may take place, it does not identify specific noise level limits for construction noise levels. Section 8.54.060(I) *Exemptions* indicates that Project construction noise levels are considered exempt from the provisions of the ordinance. Therefore, if Project construction only occurs during the permitted hours of the Noise Control Ordinance, then the construction noise levels shall be exempt from the Noise Control Ordinance.

11.2 CONSTRUCTION NOISE LEVELS

Noise generated by the Project construction equipment will include a combination of trucks, power tools, concrete mixers and portable generators that when combined can reach high levels. The number and mix of construction equipment is expected to occur in the following five stages:

- Site Preparation
- Grading
- Building Construction
- Architectural Coating
- Paving

This construction noise analysis was prepared using reference noise level measurements taken by Urban Crossroads, Inc. to describe the typical construction activity noise levels for each stage of Project construction. The construction reference noise level measurements, provided in Appendix 11.1, represent a list of typical construction activity noise levels. Noise levels generated by heavy construction equipment can range from approximately 62 dBA to in excess of 80 dBA when measured at 50 feet. However, these noise levels diminish with distance from the construction site at a rate of 6 dBA per doubling of distance. For example, a noise level of 80 dBA measured at 50 feet from the noise source to the receiver would be reduced to 74 dBA at 100 feet from the source to the receiver, and would be further reduced to 68 dBA at 200 feet from the source to the receiver. The construction phases used in this analysis are consistent with the data used to support the construction emissions in the *Rancho Palma Air Quality Impact Analysis* prepared by Urban Crossroads Inc. (18)

11.3 CONSTRUCTION REFERENCE NOISE LEVELS

To describe the Project construction noise levels, measurements were collected for similar activities at several construction sites. Table 11-1 provides a summary of the sixteen construction reference noise level measurements. Since the reference noise levels were collected at varying distances, all construction noise level measurements presented on Table 11-1 have been adjusted to describe a common reference distance of 50 feet. Appendix 11.1 includes a detailed construction reference noise level memo and reference noise source photos for each type of construction activity.

TABLE 11-1: CONSTRUCTION REFERERNCE NOISE LEVELS

ID	Noise Source	Reference Distance From Source (Feet)	Reference Noise Levels @ Reference Distance		Reference Noise Levels @ 50 Feet[6]	
			dBA Leq	dBA Lmax	dBA Leq	dBA Lmax
1	Truck Pass-Bys & Dozer Activity[1]	30'	63.6	68.1	59.2	63.7
2	Dozer Activity[1]	30'	68.6	76.4	64.2	72.0
3	Construction Vehicle Maintenance Activities[2]	30'	71.9	74.8	67.5	70.4
4	Foundation Trenching[2]	30'	72.6	74.9	68.2	70.5
5	Rough Grading Activities[2]	30'	77.9	84.8	73.5	80.4
6	Residential Framing[3]	30'	66.7	76.7	62.3	72.3
7	Water Truck Pass-By & Backup Alarm[4]	30'	76.3	82.3	71.9	77.9
8	Dozer Pass-By[4]	30'	84.0	89.9	79.6	85.5
9	Two Scrapers & Water Truck Pass-By[4]	30'	83.4	89.0	79.0	84.6
10	Two Scrapers Pass-By[4]	30'	83.7	86.9	79.3	82.5
11	Scraper, Water Truck, & Dozer Activity[4]	30'	79.7	87.7	75.3	83.3
12	Concrete Mixer Truck Movements[5]	50'	71.2	73.1	71.2	73.1
13	Concrete Paver Activities[5]	30'	70.0	75.7	65.6	71.3
14	Concrete Mixer Pour & Paving Activities[5]	30'	70.3	76.3	65.9	71.9
15	Concrete Mixer Backup Alarms & Air Brakes[5]	50'	71.6	78.8	71.6	78.8
16	Concrete Mixer Pour Activities[5]	50'	67.7	79.2	67.7	79.2

[1] As measured by Urban Crossroads, Inc. on 10/14/15 at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine.
[2] As measured by Urban Crossroads, Inc. on 10/20/15 at a construction site located in Rancho Mission Viejo.
[3] As measured by Urban Crossroads, Inc. on 10/20/15 at a residential construction site located in Rancho Mission Viejo.
[4] As measured by Urban Crossroads, Inc. on 10/30/15 during grading operations within an industrial construction site located in the City of Ontario.
[5] Reference noise level measurements were collected from a nighttime concrete pour at an industrial construction site, located at 27334 San Bernardino Avenue in the City of Redlands, between 1:00 a.m. to 2:00 a.m. on 7/1/15.
[6] Reference noise levels are calculated at 50 feet using a drop off rate of 6 dBA per doubling of distance (point source).

11.4 CONSTRUCTION NOISE ANALYSIS

Tables 11-2 to 11-6 show the Project construction stages and the reference construction noise levels used for each stage. Table 11-7 provides a summary of the noise levels from each stage of construction at each of the sensitive receiver locations. Based on the reference construction noise levels, the Project-related construction noise levels when the peak reference noise level is operating at a single point nearest the sensitive receiver location will range from 54.7 to 70.0 dBA Leq.

TABLE 11-2: SITE PREPARATION EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)
Dozer Activity	64.2
Dozer Pass-By	79.6
Peak Reference Noise Level at 50 Feet (dBA Leq) :	79.6

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA Leq)[3]	Estimated Noise Barrier Attenuation (dBA Leq)[4]	Construction Noise Level (dBA Leq)
R1	878'	-24.9	0.0	54.7
R2	280'	-15.0	0.0	64.6
R3	335'	-16.5	0.0	63.0
R4	250'	-14.0	0.0	65.6
R5	151'	-9.6	0.0	70.0
R6	208'	-12.4	0.0	67.2
R7	240'	-13.6	-5.0	60.9
R8	346'	-16.8	-5.0	57.8

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 11.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 11-3: GRADING EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)
Dozer Activity	64.2
Rough Grading Activities	73.5
Dozer Pass-By	79.6
Two Scrapers Pass-By	79.3
Peak Reference Noise Level at 50 Feet (dBA Leq) :	79.6

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA Leq)[3]	Estimated Noise Barrier Attenuation (dBA Leq)[4]	Construction Noise Level (dBA Leq)
R1	878'	-24.9	0.0	54.7
R2	280'	-15.0	0.0	64.6
R3	335'	-16.5	0.0	63.0
R4	250'	-14.0	0.0	65.6
R5	151'	-9.6	0.0	70.0
R6	208'	-12.4	0.0	67.2
R7	240'	-13.6	-5.0	60.9
R8	346'	-16.8	-5.0	57.8

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 11.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 11-4: BUILDING CONSTRUCTION EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)
Foundation Trenching	68.2
Residential Framing	62.3
Peak Reference Noise Level at 50 Feet (dBA Leq) :	68.2

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA Leq)[3]	Estimated Noise Barrier Attenuation (dBA Leq)[4]	Construction Noise Level (dBA Leq)
R1	878'	-24.9	0.0	43.3
R2	280'	-15.0	0.0	53.2
R3	335'	-16.5	0.0	51.6
R4	250'	-14.0	0.0	54.2
R5	151'	-9.6	0.0	58.6
R6	208'	-12.4	0.0	55.8
R7	240'	-13.6	-5.0	49.5
R8	346'	-16.8	-5.0	46.4

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 11.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 11-5: ARCHITECTURAL COATING EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)
Residential Framing	62.3
Peak Reference Noise Level at 50 Feet (dBA Leq) :	62.3

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA Leq)[3]	Estimated Noise Barrier Attenuation (dBA Leq)[4]	Construction Noise Level (dBA Leq)
R1	878'	-24.9	0.0	37.4
R2	280'	-15.0	0.0	47.3
R3	335'	-16.5	0.0	45.7
R4	250'	-14.0	0.0	48.3
R5	151'	-9.6	0.0	52.7
R6	208'	-12.4	0.0	49.9
R7	240'	-13.6	-5.0	43.6
R8	346'	-16.8	-5.0	40.5

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 11.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 11-6: PAVING EQUIPMENT NOISE LEVELS

Reference Construction Activity[1]	Reference Noise Level @ 50 Feet (dBA Leq)
Concrete Mixer Truck Movements	71.2
Concrete Paver Activities	65.6
Concrete Mixer Backup Alarms & Air Brakes	71.6
Peak Reference Noise Level at 50 Feet (dBA Leq) :	71.6

Receiver Location	Distance To Construction Activity (Feet)[2]	Distance Attenuation (dBA Leq)[3]	Estimated Noise Barrier Attenuation (dBA Leq)[4]	Construction Noise Level (dBA Leq)
R1	878'	-24.9	0.0	46.7
R2	280'	-15.0	0.0	56.6
R3	335'	-16.5	0.0	55.1
R4	250'	-14.0	0.0	57.6
R5	151'	-9.6	0.0	62.0
R6	208'	-12.4	0.0	59.2
R7	240'	-13.6	-5.0	53.0
R8	346'	-16.8	-5.0	49.8

[1] Reference construction noise level measurements taken by Urban Crossroads, Inc. (Appendix 11.1).
[2] Distance from the nearest point of construction activity to the nearest receiver.
[3] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.
[4] Estimated barrier attenuation from existing barriers in the Project study area.

TABLE 11-7: CONSTRUCTION EQUIPMENT NOISE LEVEL SUMMARY

Receiver Location[1]	Construction Phase Hourly Noise Level (dBA Leq)					
	Site Preparation	Grading	Building Construction	Architectural Coating	Paving	Peak Activity[2]
R1	54.7	54.7	43.3	37.4	46.7	54.7
R2	64.6	64.6	53.2	47.3	56.6	64.6
R3	63.0	63.0	51.6	45.7	55.1	63.0
R4	65.6	65.6	54.2	48.3	57.6	65.6
R5	70.0	70.0	58.6	52.7	62.0	70.0
R6	67.2	67.2	55.8	49.9	59.2	67.2
R7	60.9	60.9	49.5	43.6	53.0	60.9
R8	57.8	57.8	46.4	40.5	49.8	57.8

[1] Noise receiver locations are shown on Exhibit 9-A.
[2] Estimated construction noise levels during peak operating conditions.

11.5 CONSTRUCTION NOISE ABATEMENT MEASURES

Though construction noise is temporary, intermittent and of short duration, and will not present any long-term impacts, the following practices would reduce any noise level increases produced by the construction equipment to the nearby noise-sensitive residential land uses:

- Prior to approval of grading plans and/or issuance of building permits, plans shall include a note indicating that noise-generating Project construction activities shall only occur between the hours of 7:00 a.m. and 8:00 p.m. on any day. The Project construction supervisor shall ensure compliance with the note and the City shall conduct periodic inspection at its discretion.
- During all Project site construction, the construction contractors shall equip all construction equipment, fixed or mobile, with properly operating and maintained mufflers, consistent with manufacturers' standards. The construction contractor shall place all stationary construction equipment so that emitted noise is directed away from the noise sensitive receptors nearest the Project site.
- The construction contractor shall locate equipment staging in areas that will create the greatest distance between construction-related noise sources and noise-sensitive receivers nearest the Project site (i.e., at the southern center) during all Project construction.
- The construction contractor shall limit haul truck deliveries to the same hours specified for construction equipment (between the hours of 7:00 a.m. and 8:00 p.m. on any day). The Project Applicant shall prepare a haul route exhibit to design delivery routes to minimize the exposure of sensitive land uses or residential dwellings to delivery truck-related noise.

11.6 CONSTRUCTION VIBRATION IMPACTS

Construction activity can result in varying degrees of ground vibration, depending on the equipment and methods used, distance to the affected structures and soil type. It is expected that ground-borne vibration from Project construction activities would cause only intermittent, localized intrusion. The proposed Project's construction activities most likely to cause vibration impacts are:

- Heavy Construction Equipment: Although all heavy mobile construction equipment has the potential of causing at least some perceptible vibration while operating close to building, the vibration is usually short-term and is not of sufficient magnitude to cause building damage. It is not expected that heavy equipment such as large bulldozers would operate close enough to any residences to cause a vibration impact.
- Trucks: Trucks hauling building materials to construction sites can be sources of vibration intrusion if the haul routes pass through residential neighborhoods on streets with bumps or potholes. Repairing the bumps and potholes generally eliminates the problem.

Ground-borne vibration levels resulting from construction activities occurring within the Project site were estimated by data published by the Federal Transit Administration. Construction activities that would have the potential to generate low levels of ground-borne vibration within the Project site include grading. Using the vibration source level of construction equipment provided on Table 6-7 and the construction vibration assessment methodology published by the

FTA, it is possible to estimate the Project vibration impacts. Table 11-8 presents the expected Project related vibration levels at each of the sensitive receiver locations.

Based on the reference vibration levels provided by the FTA, a large bulldozer represents the peak source of vibration with a reference level of 87 VdB at a distance of 25 feet. At distances ranging from 151 to 878 feet from the Project site, construction vibration levels are expected to range from 40.6 to 63.6 VdB. Using the construction vibration assessment methods provided by the FTA the proposed Project site will not include or require equipment, facilities, or activities that would result in a perceptible human response (annoyance).

The construction of the Project is not expected to generate vibration levels exceeding the FTA maximum acceptable vibration standard of 80 (VdB). Further, impacts at the site of the closest sensitive receiver are unlikely to be sustained during the entire construction period, but will occur rather only during the times that heavy construction equipment is operating adjacent to the Project site perimeter. Therefore, the potential for the Project to result in exposure of persons to, or generation of, excessive ground-borne vibration is *less than significant*.

TABLE 11-8: CONSTRUCTION EQUIPMENT VIBRATION LEVELS

Receiver[1]	Distance To Construction Activity (Feet)	Receiver Vibration Levels (VdB)[2]					Threshold Exceeded?[3]
		Small Bulldozer	Jackhammer	Loaded Trucks	Large Bulldozer	Peak Vibration	
R1	878'	11.6	32.6	39.6	40.6	40.6	No
R2	280'	26.5	47.5	54.5	55.5	55.5	No
R3	335'	24.2	45.2	52.2	53.2	53.2	No
R4	250'	28.0	49.0	56.0	57.0	57.0	No
R5	151'	34.6	55.6	62.6	63.6	63.6	No
R6	208'	30.4	51.4	58.4	59.4	59.4	No
R7	240'	28.5	49.5	56.5	57.5	57.5	No
R8	346'	23.8	44.8	51.8	52.8	52.8	No

[1] Receiver locations are shown on Exhibit 9-A.
[2] Based on the Vibration Source Levels of Construction Equipment included on Table 6-7.
[3] Does the peak vibration exceed the FTA maximum acceptable vibration standard of 80 (VdB)?

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12 REFERENCES

1. **Urban Crossroads, Inc.** *Rancho Palma Traffic Impact Analysis.* September 2015.
2. **California Department of Transportation Environmental Program.** *Technical Noise Supplement - A Technical Supplement to the Traffic Noise Analysis Protocol.* Sacramento, CA : s.n., September 2013.
3. **Environmental Protection Agency Office of Noise Abatement and Control.** *Information on Levels of Environmental Noise Requisite to Protect Public Health and Welfare with an Adequate Margin of Safety.* March 1974. EPA/ONAC 550/9/74-004.
4. **U.S. Department of Transportation, Federal Highway Administration, Office of Environment and Planning, Noise and Air Quality Branch.** *Highway Traffic Noise Analysis and Abatement Policy and Guidance.* June, 1995.
5. **U.S. Department of Transportation, Federal Highway Administration.** *Highway Traffic Noise in the United States, Problem and Response.* April 2000. p. 3.
6. **U.S. Environmental Protection Agency Office of Noise Abatement and Control.** *Noise Effects Handbook-A Desk Reference to Health and Welfare Effects of Noise.* October 1979 (revised July 1981). EPA 550/9/82/106.
7. **U.S. Department of Transportation, Federal Transit Administration.** *Transit Noise and Vibration Impact Assessment.* May 2006. FTA-VA-90-1003-06.
8. **Office of Planning and Research.** *State of California General Plan Guidlines 2003.* October 2003.
9. **City of San Bernardino.** *General Plan, Noise Element.* November 2005.
10. —. *Municipal Code, Title 19, Article III, Chapter 19.20 - Property Development Standards.*
11. —. *Municipal Code, Title 8, Section 8.54 - Noise Control.*
12. **U.S. Department of Transportation, Federal Transit Administration.** *Transit noise and Vibration Impact Assessment.* May 2006. FTA-VA-90-1003-06.
13. **California Court of Appeal.** *Gray v. County of Madera, F053661.* 167 Cal.App.4th 1099; - Cal.Rptr.3d, October 2008.
14. **Federal Interagency Committee on Noise.** *Federal Agency Review of Selected Airport Noise Analysis Issues.* August 1992.
15. **American National Standards Institute (ANSI).** *Specification for Sound Level Meters ANSI S1.4-2014/IEC 61672-1:2013.*
16. **U.S. Department of Transportation, Federal Highway Administration.** *FHWA Highway Traffic Noise Prediction Model.* December 1978. FHWA-RD-77-108.
17. **California Department of Transportation Environmental Program, Office of Environmental Engineering.** *Use of California Vehicle Noise Reference Energy Mean Emission Levels (Calveno REMELs) in FHWA Highway Traffic Noise Prediction.* September 1995. TAN 95-03.
18. **Urban Crossroads, Inc.** *Rancho Palma Air Quality Impact Analysis.* November 2015.

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13 CERTIFICATION

The contents of this noise study report represent an accurate depiction of the noise environment and impacts associated with the proposed Rancho Palma Project. The information contained in this noise study report is based on the best available data at the time of preparation. If you have any questions, please contact me directly at (949) 660-1994 ext. 203.

Bill Lawson, P.E., INCE
Principal
URBAN CROSSROADS, INC.
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Irvine, CA 92606
(949) 660-1994 x203
blawson@urbanxroads.com

EDUCATION

Master of Science in Civil and Environmental Engineering
California Polytechnic State University, San Luis Obispo • December, 1993

Bachelor of Science in City and Regional Planning
California Polytechnic State University, San Luis Obispo • June, 1992

PROFESSIONAL REGISTRATIONS

PE – Registered Professional Traffic Engineer – TR 2537 • January, 2009
AICP – American Institute of Certified Planners – 013011 • June, 1997–January 1, 2012
PTP – Professional Transportation Planner • May, 2007 – May, 2013
INCE – Institute of Noise Control Engineering • March, 2004

PROFESSIONAL AFFILIATIONS

ASA – Acoustical Society of America
ITE – Institute of Transportation Engineers

PROFESSIONAL CERTIFICATIONS

Certified Acoustical Consultant – County of Orange • February, 2011
FHWA-NHI-142051 Highway Traffic Noise Certificate of Training • February, 2013

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APPENDIX 3.1:

CITY OF SAN BERNARDINO DEVELOPMENT CODE

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ARTICLE III - GENERAL

CHAPTER 19.20
PROPERTY DEVELOPMENT STANDARDS

Section | Page

19.20.010 Purpose III-19.20-1
19.20.020 Applicability III-19.20-1
19.20.030 General Standards III-19.20-1

Tables

20.01 Fences, Walls, Hedges Height and Type Limits III-19.20-8

19.20.010 PURPOSE

These standards shall ensure that new or modified uses and development will produce an urban environment of stable, desirable character which is harmonious with the existing and future development, consistent with the General Plan.

19.20.020 APPLICABILITY

Any permit which authorizes new construction or modifications to an existing structure in excess of 25% of the structure floor area shall be subject to the standards set forth in this Chapter.

19.20.030 GENERAL STANDARDS

No permit shall be approved unless it conforms to all of the following standards set forth in this Chapter:

1. Access
2. Additional Height Restrictions
3. Antennae, Satellite Dish and Telecommunications Facilities
4. Design Considerations
5. Dust and Dirt
6. Environmental Resources/Constraints
7. Exterior Building Walls
8. Fences and Walls
9. Fire Protection
10. Fumes, Vapor and Gases
11. Glare
12. Hazardous Materials
13. Height Determination (Buildings and Structures)
14. Lighting
15. Noise
16. Odor
17. Projections into Setbacks
18. Public Street Improvements
19. Radioactivity
20. Refuse Storage/Disposal
21. Screening
22. Signs, Off-Street Parking, Off-Street Loading, and Landscaping
23. Solar Energy
24. Storage
25. Toxic Substances
26. Transportation Control Measures (TCM)
27. Underground Utilities
28. Vibration

MC 890 1/20/94, MC 1056 10/8/99

15. NOISE

No loudspeaker, bells, gongs, buzzers, mechanical equipment or other sounds, attention-attracting, or communication device associated with any use shall be discernible beyond any boundary line of the parcel, except fire protection devices, burglar alarms and church bells. The following provisions shall apply:

A. In residential areas, no exterior noise level shall exceed 65dBA and no interior noise level shall exceed 45dBA.

B. All residential developments shall incorporate the following standards to mitigate noise levels:

1. Increase the distance between the noise source and receiver.

2. Locate land uses not sensitive to noise (i.e., parking lots, garages, maintenance facilities, utility areas, etc.) between the noise source and the receiver.

3. Bedrooms should be located on the side of the structure away from major rights-of-way.

4. Quiet outdoor spaces may be provided next to a noisy right-of-way by creating a U-shaped development which faces away from the right-of-way.

C. The minimum acceptable surface weight for a noise barrier is four pounds per square foot (equivalent to ¾-inch plywood). The barrier shall be of a continuous material which is resistant to sound including:

1. Masonry block
2. Precast concrete
3. Earth berm or a combination of earth berm with block concrete.

D. Noise barriers shall interrupt the line-of-sight between noise source and receiver.

16. ODOR

No use shall emit any obnoxious odor or fumes.

17. PROJECTIONS/CONSTRUCTION AND EQUIPMENT PERMITTED INTO SETBACKS

The following list represents the only projections, construction, or equipment that shall be permitted within the required setbacks:

A. Front Setback: Roof overhangs, fireplace chimney, awnings & canopies

APPENDIX 3.2:

CITY OF SAN BERNARDINO MUNICIPAL CODE

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any stationary engine driven by means of internal combustion of gases therein, within the City of San Bernardino without placing upon the exhaust thereof a muffler or other device so as to silence the noise or report caused by the escaping of such gases from and through such exhaust. (Ord. 465 §1, 9-5-11.)

8.51.020 Violation - Penalty.

Any person, firm or corporation violating any provision of this chapter is guilty of an infraction, which upon conviction thereof is punishable in accordance with the provisions of §1.12.010 of this Code. (Ord. MC-460, 5-13-85; Ord. 465 §2, 9-5-11.)

Chapter 8.54
NOISE CONTROL

Sections:

8.54.010 Purpose and Intent.
8.54.020 Prohibited Acts.
8.54.030 Issuance of Written Notice and Impoundment.
8.54.040 Cost Recovery for Second Response.
8.54.050 Controlled Hours of Operation.
8.54.060 Exemptions.
8.54.070 Disturbances From Construction Activity.
8.54.080 Violation - Penalty
8.54.090 Severability.

8.54.010 Purpose and Intent.

A. It is the purpose and intent of these regulations to establish community-wide noise standards. It is further the purpose of these regulations to recognize that the existence of excessive noise within the City is a condition which is detrimental to the health, safety, welfare, and quality of life of the citizens and shall be regulated in the public interest.

B. In furtherance of the foregoing purpose, it is found and declared as follows:

1. The making, creation, or maintenance of such loud, unnecessary, unnatural, or unusual noises that are prolonged, unusual, annoying, disturbing and unnatural in their time, place, and use are a detriment to public health, comfort, convenience, safety, general welfare, and the peace and quiet of the City and its inhabitants; and

2. The public interest and necessity of the provisions and prohibitions hereinafter contained and enacted is declared as a matter of legislative determination and public policy, and it is further declared that the provisions and prohibitions hereinafter contained and enacted are in pursuance of, and for the purpose of, securing and promoting the public health, comfort, convenience, safety, general welfare and property, and the peace and quiet of the City and its inhabitants.

(Ord. MC-1246, 5-21-07; Ord. 1925 §1, 11-5-51.)

8.54.020 Prohibited Acts.

It shall be unlawful for any person to engage in the following activities:

A. Sounding any horn or signal device on any automobile, motorcycle, bus, or other motor vehicle in any other manner or circumstances or for any other purpose than required or permitted by the California Vehicle Code, or other laws, for an unnecessary or unreasonable period of time;

B. Racing the engine of any motor vehicle while the vehicle is not in motion, except when necessary to do so in the course of repairing, adjusting, or testing the same.

C. Operating or permitting the use of any motor vehicle on any public right-of-way or public place or on private property within a residential zone for which the exhaust muffler, intake muffler, or any other noise abatement device has been modified or changed in a manner such that the noise emitted by the motor vehicle is increased above that emitted by the vehicle as originally manufactured.

D. Using, operating, or permitting to be played, used or operated any radio receiving set, musical instrument, phonograph, or other sound amplification or production equipment for producing or reproducing sound in such a manner as to disturb the peace, quiet, or comfort of neighboring persons, or at any time with louder volume than is necessary for the convenient hearing of the person or persons who are in the room, vehicle, or other enclosure in which such machine or device is operated, and who are voluntary listeners thereto and that is:

1. Plainly audible across property boundaries;

2. Plainly audible through partitions common to two residences within a building;

3. Plainly audible at a distance of 50 feet in any direction from the source of the music or sound between the hours of 8:00 a.m. and 10:00 p.m.; or

4. Plainly audible at a distance of 25 feet in any direction from the source of the music or sound between the hours of 10:00 p.m. and 8:00 a.m.

E. The intentional sounding or permitting the sounding outdoors of any fire, burglar, or civil defense alarm, siren, whistle, or any motor vehicle burglar alarm, except for emergency purposes or for testing, unless such alarm is terminated within fifteen minutes of activation.

F. Yelling, shouting, whistling, or singing in a loud and boisterous manner on the public streets so as to disturb the quiet, comfort, or repose of persons in any office, dwelling, hotel, or other type of residence, or neighborhood.

G. The keeping of any animal, fowl, or bird which by causing frequent or long continued noise disturbs the comfort, quiet, or repose of any person or neighborhood.

H. The unnecessary or excessive blowing of whistles, sounding of horns, ringing of bells, or use of signaling devices by operators of trains, motor trucks, and other transportation equipment.

I. The creation of loud and excessive noise in connection with the loading or unloading of motor trucks and other vehicles.

J. The shouting and crying of peddlers, hawkers, and vendors which disturbs the peace and quiet of any considerable number of persons or neighborhood.

K. The doing of automobile, automotive body or fender repair work, or other work on metal objects and metal parts in a residential district so as to cause loud and excessive noise which disturbs the peace, quiet, and repose of any person occupying adjoining or closely situated property or neighborhood.

L. The operation or use between the hours of 10:00 p.m. and 8:00 a.m. of any pile driver, steam shovel, pneumatic hammers, derrick, steam or electric hoist, power driven saw, or any other tool or apparatus, the use of which is attended by loud and excessive noise, except with the approval of the City.

M. Creating excessive noise adjacent to any school, church, court, or library while the same is in use, or adjacent to any hospital or care facility, which unreasonably interferes with the workings of such institution, or which disturbs or unduly annoys patients in the hospital, provided conspicuous signs are displayed in such streets indicating the presence of a school, institution of learning, church, court, or hospital.

N. Making or knowingly and unreasonably permitting to be made any unreasonably loud, unnecessary, or unusual noise that disturbs the comfort, repose, health, peace and quiet, or which causes discomfort or annoyance to any reasonable person of normal sensitivity. The characteristics and conditions that may be considered in determining whether this section has been violated include, but are not limited to, the following:

1. The level of noise;

2. The level of background noise;

3. The proximity of the noise to sleeping facilities;

4. The nature and zoning of the areas within which the noise emanates;

5. The density of the inhabitation of the area within which the noise emanates;

6. The time of day or night the noise occurs;

7. The duration of the noise;

8. Whether the noise is recurrent, intermittent, or constant; and

9. Whether the noise is produced by a commercial or noncommercial activity.

(Ord. MC-1246, 5-21-07; Ord. 2102, 1956; Ord. 1925 §2, 1951.)

8.54.030 Issuance of Written Notice and Impoundment.

A. Any officer who encounters a violation of this section may issue a written notice to the Responsible Person demanding immediate abatement of the violation. The written notice shall inform the recipient that a second violation of the same provision within a seventy two (72) hour period may result in the issuance of a criminal citation, the imposition of criminal and civil penalties, and confiscation and impoundment, as evidence, of the components that are amplifying or transmitting the prohibited noise.

1. Responsible Person means (a) any person who owns, leases, or is lawfully in charge of the property or motor vehicle where the noise violation takes place, or (b) any person who owns or controls the source of the noise or violation. If the Responsible Person is a minor, then the parent or guardian who has custody of the child at the time of the violation shall be the Responsible Person who is liable under this chapter.

B. Any officer who encounters a second violation of this chapter within a seventy two (72) hour period following the issuance of a written notice is empowered to confiscate and impound, as evidence, any or all of the components amplifying or transmitting the sound. The immediate confiscation of a motor vehicle to which a component is attached may be made if the same may not be removed without causing harm to the vehicle or component.

C. Any person claiming legal ownership of the items confiscated and impounded under this chapter may request the return of the item by filing a written request with the police department within seven (7) calendar days of the confiscation. Such requests shall be processed in accordance with the procedures adopted by the department.

(Ord. MC-1246, 5-21-07; Ord. MC-649, 1-3-89; Ord. 1925 §3, 1951.)

8.54.040 Cost Recovery for Second Response.

A. Whenever any officer issues a written notice to a responsible person to discontinue a noise violation, the Responsible Person shall be liable for the actual cost of each subsequent response required to abate the violation within seventy two (72) hours of the issuance of the written warning.

B. The bill for the response charge shall be served upon the Responsible Person within thirty (30) days after the violation. If the Responsible Person has no last known business or residence address, the location of the violation shall be deemed to be the proper address for service. The bill shall include a notice of the right of the person being charged to request a hearing to dispute the imposition of the response charge or the amount of the charge.

C. The response charge shall be deemed to be a civil debt to the City.
(Ord. MC-1246, 5-21-07; Ord. MC-460, 5-13-85; Ord. 1925 §5, 1951.)

8.54.050 Controlled Hours of Operation.

It shall be unlawful for any person to engage in the following activities other than between the hours of 8:00 a.m. and 8:00 p.m. in residential zones and other than between the hours of 7:00 a.m. and 8:00 p.m. in all other zones:

A. Operate or permit the use of powered model vehicles and planes.

B. Load or unload any vehicle, or operate or permit the use of dollies, carts, forklifts, or other wheeled equipment that causes any impulsive sound, raucous, or unnecessary noise within one thousand (1,000) feet of a residence.

C. Operate or permit the use of domestic power tools, or machinery or any other equipment or tool in any garage, workshop, house, or any other structure.

D. Operate or permit the use of gasoline or electric powered leaf blowers, such as commonly used by gardeners and other persons for cleaning lawns, yards, driveways, gutters, and other property.

E. Operate or permit the use of privately operated street/parking lot sweepers or vacuums, except that emergency work and/or work necessitated by unusual conditions may be performed with the written consent of the City Manager.

F. Operate or permit the use of electrically operated compressor, fan, and other similar devices.

G. Operate or permit the use of any motor vehicle with a gross vehicle weight rating in excess of ten thousand (10,000) pounds, or of any auxiliary equipment attached to such a vehicle, including, but not limited to, refrigerated truck compressors for a period longer than fifteen (15) minutes in any hour while the vehicle is stationary and on a public right-of-way or public space except when movement of said vehicle is restricted by other traffic.

H. Repair, rebuild, reconstruct, or dismantle any motor vehicle or other mechanical equipment or devices in a manner so as to be plainly audible across property lines.
(Ord. MC-1246, 5-21-07)

8.54.060 Exemptions.

The following activities and noise sources shall be exempt from the provisions of this chapter:

A. The use of horns, sirens, or other signaling or warning devices by persons vested with legal authority to use the same, and in pursuit of their lawful duties, such as on ambulances, fire, police, or other governmental or official equipment.

B. Such noises as are an accompaniment and effect of a lawful business, commercial or industrial enterprise carried on in an area zoned for that purpose, except where there is evidence that such noise is a nuisance and that such a nuisance is a result of the employment of unnecessary and injurious methods of operation.

C. Activities conducted on the grounds of any public or private school during regular hours of operation.

D. Outdoor gatherings, public dances, shows, and sporting and entertainment events provided said events are authorized by the City.

E. Activities conducted at public spaces during regular hours of operation.

F. Any mechanical devices, apparatus, or equipment used, related to, or connected with emergency machinery, vehicle, or work.

G. Construction, repair, or excavation necessary for the immediate preservation of life or property.

H. Construction, operation, maintenance, and repairs of equipment, apparatus, or facilities of park and recreation departments, public work projects, or essential public services and facilities, including, but not limited to, trash collection and those of public utilities subject to the regulatory jurisdiction of the California Public Utilities Commission.

I. Construction, repair, or excavation work performed pursuant to a valid written agreement with the City, or any of its political subdivisions, which provides for noise mitigation measures.

J. Any activity to the extent that regulation thereof has been preempted by State or Federal law.

K. Sounds generated in connection with speech or communication protected by the United States Constitution or the California Constitution, except to the extent such sounds are subject to permissible time, place, and manner restrictions.

(Ord. MC-1246, 5-21-07)

8.54.070 Disturbances from Construction Activity.

No person shall be engaged or employed, or cause any other person to be engaged or employed, in any work of construction, erection, alteration, repair, addition, movement, demolition, or improvement to any building or structure except within the hours of 7:00 a.m. and 8:00 p.m. (Ord. MC-1246, 5-21-07)

8.54.080 Violation - Penalty.

Any person violating any of the provisions of this Chapter is guilty of an infraction or a misdemeanor, which upon conviction thereof is punishable in accordance with the provisions of Section 1.12.010 of this code. (Ord. MC-1246, 5-21-07)

APPENDIX 5.1:

STUDY AREA PHOTOS

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L1
34, 12' 0.304800", 117, 21' 57.837500"

L1_SW
34, 12' 0.304800", 117, 21' 57.837500"

L1_W
34, 12' 0.304800", 117, 21' 57.837500"

L2
,

L2_E
34, 11' 48.013900", 117, 21' 47.592700"

L2_NE
34, 11' 48.013900", 117, 21' 47.592700"

L2_NE2
34, 11' 50.980200", 117, 21' 45.450400"

L2_SW
34, 11' 48.013900", 117, 21' 47.592700"

L2_SW2
34, 11' 48.013900", 117, 21' 47.592700"

L2_W
34, 11' 48.013900", 117, 21' 47.592700"

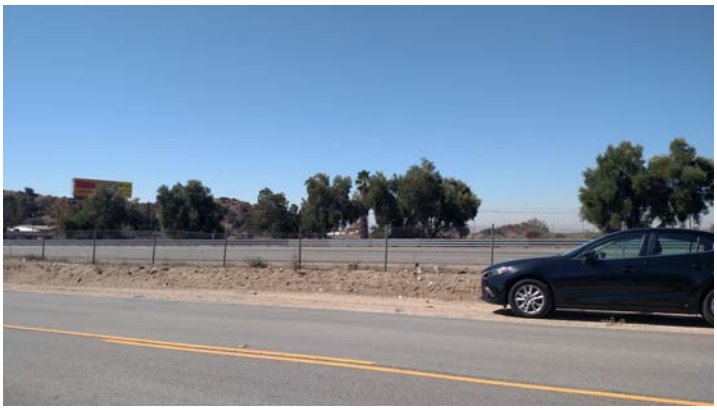
L3
34, 11' 45.995100", 117, 22' 3.248200"

L3_E
34, 11' 45.995100", 117, 22' 3.248200"

L3_N
34, 11' 45.995100", 117, 22' 3.248200"

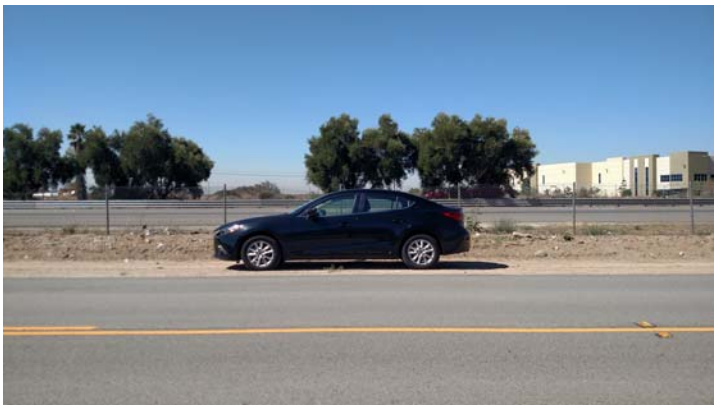
L3_NE
34, 11' 45.995100", 117, 22' 3.248200"

L3_NW
34, 11' 45.995100", 117, 22' 3.248200"



L3_S
34, 11' 45.995100", 117, 22' 3.248200"

L3_SE
34, 11' 45.995100", 117, 22' 3.248200"



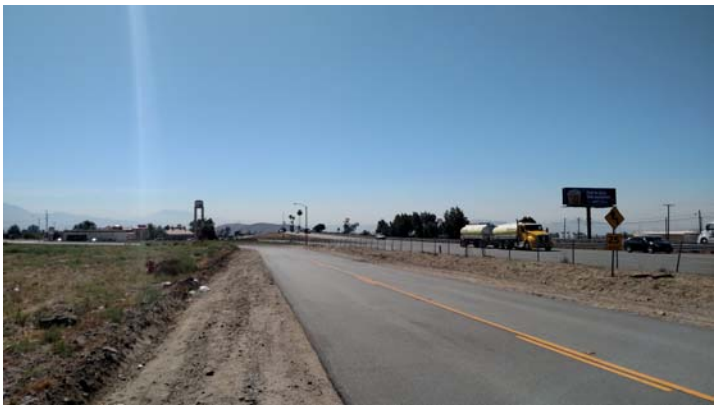
L3_SW
34, 11' 45.995100", 117, 22' 3.248200"

L3_W
34, 11' 45.995100", 117, 22' 3.248200"

L4
34, 11' 38.071200", 117, 21' 53.250700"

L4_N
34, 11' 38.071200", 117, 21' 53.250700"

L4_NE
34, 11' 38.071200", 117, 21' 53.250700"



L4_SE
34, 11' 38.071200", 117, 21' 53.250700"

L4_W2
34, 11' 38.071200", 117, 21' 53.250700"

APPENDIX 5.2:

NOISE LEVEL MEASUREMENT WORKSHEETS

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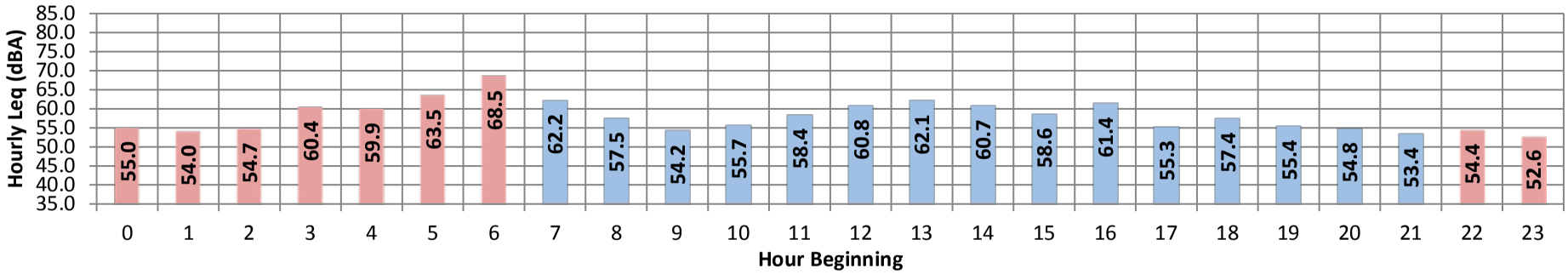
24-Hour Noise Level Measurement Summary

Project Name:	Rancho Palma	*JN:*	9785	*Energy Average Leq*		*24-Hour*
Location:	L1 - Located north of the Project site adjacent to an existing barrier for residential homes and across Magnolia Avenue from Cesar E. Chavez Middle School.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	8/18/2015	58.8	61.5	67.7

Hourly Leq dBA Readings (unadjusted)



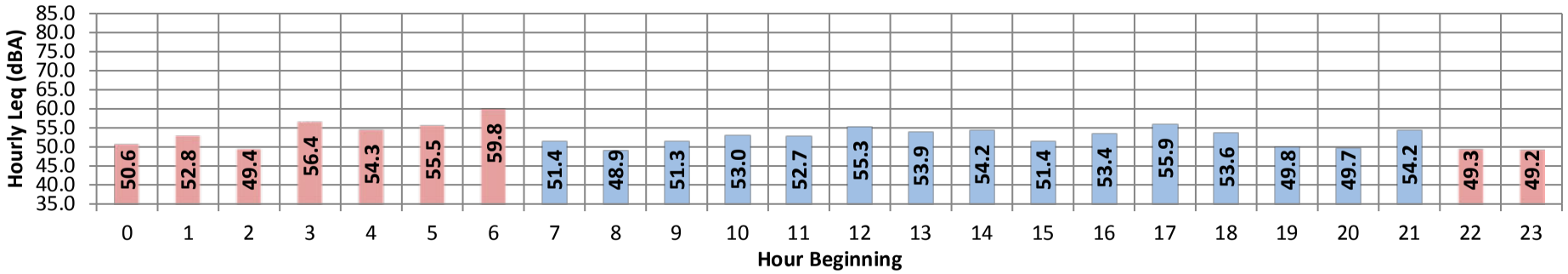
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	53.4	70.6	41.9	61.0	59.0	57.0	55.0	52.0	49.0	45.0	44.0	43.0
	Max	62.2	89.0	50.3	73.0	71.0	68.0	65.0	61.0	58.0	54.0	53.0	52.0
Energy Average:		58.8	Average:		66.8	64.5	61.5	58.8	55.5	52.7	49.3	48.3	46.9
Night	Min	52.6	61.3	42.1	59.0	58.0	56.0	55.0	52.0	48.0	45.0	45.0	43.0
	Max	68.5	93.3	52.8	77.0	74.0	72.0	70.0	67.0	64.0	57.0	56.0	54.0
Energy Average:		61.5	Average:		65.7	64.3	62.0	60.0	57.2	54.6	50.0	48.9	47.2
Hourly Summary													
Night	0	55.0	79.2	43.4	65.0	63.0	60.0	56.0	52.0	48.0	45.0	45.0	44.0
	1	54.0	74.4	42.5	63.0	61.0	59.0	56.0	53.0	50.0	46.0	45.0	43.0
	2	54.7	66.0	44.6	62.0	61.0	59.0	57.0	55.0	53.0	47.0	46.0	45.0
	3	60.4	71.4	50.6	67.0	67.0	65.0	63.0	60.0	58.0	55.0	54.0	53.0
	4	59.9	69.3	48.2	64.0	64.0	63.0	62.0	61.0	58.0	55.0	54.0	51.0
	5	63.5	87.7	52.8	71.0	69.0	65.0	63.0	61.0	60.0	57.0	56.0	54.0
	6	68.5	93.3	47.0	77.0	74.0	72.0	70.0	67.0	64.0	53.0	50.0	48.0
Day	7	62.2	81.9	45.0	73.0	71.0	68.0	65.0	59.0	52.0	48.0	47.0	46.0
	8	57.5	84.1	43.1	67.0	65.0	62.0	58.0	53.0	50.0	46.0	45.0	44.0
	9	54.2	76.8	43.4	65.0	63.0	58.0	55.0	52.0	49.0	46.0	45.0	44.0
	10	55.7	72.6	42.6	66.0	65.0	62.0	59.0	54.0	49.0	45.0	44.0	43.0
	11	58.4	83.6	41.9	68.0	66.0	63.0	60.0	55.0	52.0	46.0	45.0	43.0
	12	60.8	87.9	48.6	70.0	67.0	63.0	61.0	57.0	54.0	51.0	50.0	49.0
	13	62.1	84.0	50.3	71.0	69.0	66.0	64.0	61.0	58.0	54.0	53.0	51.0
	14	60.7	83.3	49.8	70.0	67.0	64.0	61.0	58.0	56.0	54.0	53.0	52.0
	15	58.6	81.3	48.7	67.0	65.0	63.0	60.0	57.0	55.0	52.0	51.0	49.0
	16	61.4	89.0	45.9	69.0	66.0	62.0	58.0	55.0	54.0	50.0	49.0	47.0
	17	55.3	79.7	46.7	63.0	60.0	57.0	55.0	54.0	52.0	50.0	49.0	48.0
	18	57.4	70.6	50.2	65.0	63.0	61.0	59.0	57.0	55.0	53.0	52.0	51.0
	19	55.4	76.9	44.2	65.0	61.0	58.0	56.0	54.0	52.0	50.0	49.0	47.0
	20	54.8	75.9	45.2	62.0	60.0	58.0	56.0	54.0	53.0	49.0	48.0	47.0
	21	53.4	71.2	42.5	61.0	59.0	57.0	55.0	53.0	50.0	46.0	45.0	43.0
Night	22	54.4	73.8	42.1	63.0	62.0	59.0	58.0	53.0	49.0	46.0	45.0	43.0
	23	52.6	61.3	43.3	59.0	58.0	56.0	55.0	53.0	51.0	46.0	45.0	44.0

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Rancho Palma	*JN:*	9785	*Energy Average Leq*		*24-Hour*
Location:	L2 - Located north of the Project site on Chestnut Avenue near existing residential homes and the Ronald Reagan Park.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	8/18/2015	53.0	54.6	60.9

Hourly Leq dBA Readings (unadjusted)



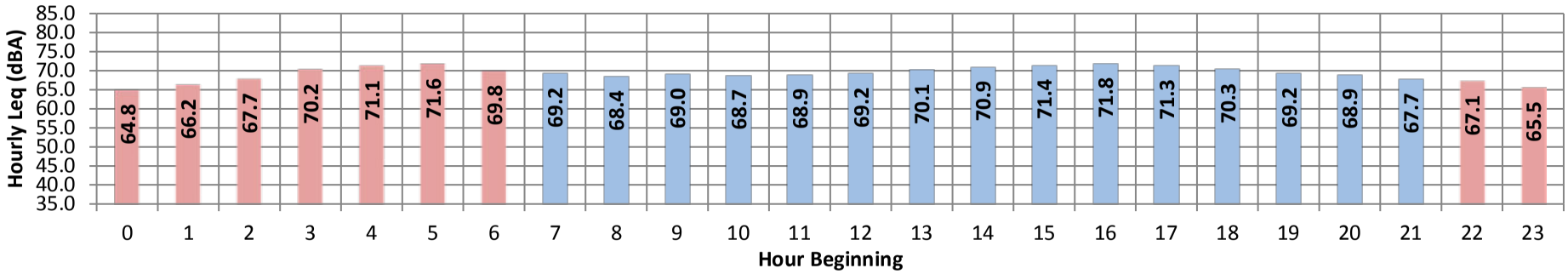
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	48.9	65.6	40.6	57.0	54.0	51.0	50.0	47.0	45.0	43.0	42.0	41.0
	Max	55.9	86.6	46.5	64.0	61.0	58.0	56.0	53.0	52.0	49.0	48.0	47.0
Energy Average:		53.0	Average:		60.7	57.9	54.3	52.2	49.9	48.1	45.3	44.6	43.5
Night	Min	49.2	65.6	40.6	55.0	54.0	53.0	51.0	48.0	46.0	42.0	41.0	40.0
	Max	59.8	88.0	48.5	68.0	66.0	63.0	59.0	57.0	54.0	52.0	51.0	50.0
Energy Average:		54.6	Average:		61.0	59.2	56.9	54.7	51.9	49.8	46.0	45.4	44.3
Hourly Summary													
Night	0	50.6	67.7	40.6	60.0	59.0	56.0	53.0	49.0	46.0	42.0	41.0	40.0
	1	52.8	70.0	41.4	64.0	61.0	57.0	54.0	51.0	48.0	43.0	43.0	42.0
	2	49.4	67.3	41.6	55.0	54.0	53.0	52.0	49.0	48.0	44.0	43.0	42.0
	3	56.4	65.6	47.2	63.0	62.0	61.0	59.0	57.0	54.0	50.0	50.0	49.0
	4	54.3	66.7	47.6	60.0	59.0	58.0	56.0	54.0	53.0	50.0	50.0	48.0
	5	55.5	70.2	48.5	62.0	61.0	58.0	57.0	55.0	54.0	52.0	51.0	50.0
	6	59.8	88.0	44.5	68.0	66.0	63.0	59.0	55.0	53.0	47.0	46.0	45.0
Day	7	51.4	72.9	42.4	63.0	59.0	54.0	50.0	48.0	47.0	45.0	44.0	43.0
	8	48.9	69.2	41.9	57.0	55.0	52.0	50.0	48.0	46.0	44.0	43.0	42.0
	9	51.3	72.5	41.6	64.0	58.0	52.0	50.0	47.0	46.0	43.0	43.0	42.0
	10	53.0	83.5	40.7	58.0	56.0	53.0	50.0	48.0	45.0	43.0	43.0	41.0
	11	52.7	76.7	41.6	61.0	59.0	55.0	53.0	50.0	48.0	44.0	43.0	42.0
	12	55.3	83.4	43.6	62.0	59.0	56.0	54.0	51.0	49.0	46.0	45.0	44.0
	13	53.9	72.2	44.2	63.0	61.0	58.0	55.0	53.0	51.0	47.0	47.0	45.0
	14	54.2	71.8	46.5	64.0	61.0	57.0	55.0	53.0	51.0	49.0	48.0	47.0
	15	51.4	65.6	43.6	59.0	57.0	55.0	53.0	51.0	49.0	46.0	45.0	44.0
	16	53.4	76.7	43.6	63.0	61.0	56.0	53.0	51.0	49.0	46.0	45.0	44.0
	17	55.9	86.6	43.6	62.0	59.0	55.0	53.0	51.0	49.0	46.0	46.0	44.0
	18	53.6	69.8	45.4	61.0	60.0	57.0	56.0	53.0	52.0	48.0	48.0	47.0
	19	49.8	71.6	42.5	57.0	55.0	52.0	50.0	49.0	47.0	45.0	44.0	44.0
	20	49.7	71.9	41.6	59.0	55.0	52.0	51.0	48.0	46.0	44.0	43.0	43.0
	21	54.2	83.5	40.6	57.0	54.0	51.0	50.0	48.0	46.0	43.0	42.0	41.0
Night	22	49.3	66.9	40.6	60.0	55.0	53.0	51.0	48.0	46.0	43.0	42.0	41.0
	23	49.2	68.4	40.7	57.0	56.0	53.0	51.0	49.0	46.0	43.0	43.0	42.0

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Rancho Palma	*JN:*	9785	*Energy Average Leq*		*24-Hour*
Location:	L3 - Located south of Guhin Park at the Project site boundary on Little League Drive north of the Interstate 215 Freeway.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	8/18/2015	69.8	68.9	75.7

Hourly Leq dBA Readings (unadjusted)



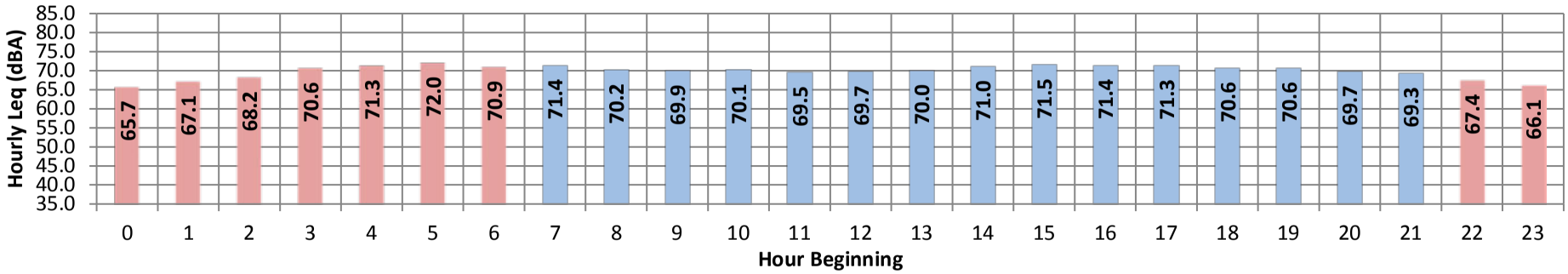
Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	67.7	82.5	46.3	76.0	75.0	73.0	71.0	67.0	64.0	57.0	54.0	49.0
	Max	71.8	93.7	60.4	79.0	77.0	75.0	74.0	72.0	70.0	66.0	65.0	63.0
Energy Average:		69.8	Average:		77.3	76.1	74.3	72.6	69.4	66.6	60.9	59.3	56.1
Night	Min	64.8	79.8	43.3	74.0	73.0	71.0	68.0	64.0	60.0	52.0	51.0	46.0
	Max	71.6	87.8	61.9	78.0	77.0	76.0	74.0	72.0	69.0	66.0	64.0	63.0
Energy Average:		68.9	Average:		76.7	75.6	73.3	71.0	67.8	64.4	58.3	56.6	53.8
Hourly Summary													
Night	0	64.8	81.3	45.6	74.0	73.0	71.0	68.0	64.0	60.0	52.0	51.0	47.0
	1	66.2	79.8	49.0	76.0	75.0	72.0	69.0	65.0	61.0	55.0	53.0	51.0
	2	67.7	87.8	50.3	78.0	76.0	73.0	70.0	66.0	63.0	56.0	54.0	52.0
	3	70.2	83.4	54.8	78.0	77.0	75.0	73.0	70.0	67.0	62.0	60.0	58.0
	4	71.1	86.0	57.2	78.0	77.0	75.0	74.0	71.0	69.0	65.0	64.0	61.0
	5	71.6	86.1	61.9	78.0	77.0	76.0	74.0	72.0	69.0	66.0	64.0	63.0
	6	69.8	84.4	52.9	77.0	76.0	74.0	73.0	70.0	67.0	63.0	61.0	58.0
Day	7	69.2	84.1	52.4	77.0	76.0	74.0	72.0	69.0	66.0	60.0	59.0	56.0
	8	68.4	82.8	52.0	76.0	75.0	74.0	72.0	68.0	65.0	59.0	58.0	55.0
	9	69.0	84.9	50.8	77.0	76.0	74.0	72.0	69.0	65.0	59.0	57.0	53.0
	10	68.7	82.7	48.2	77.0	76.0	74.0	72.0	68.0	65.0	59.0	57.0	53.0
	11	68.9	84.4	50.4	77.0	76.0	74.0	72.0	69.0	65.0	59.0	58.0	55.0
	12	69.2	85.9	47.9	77.0	76.0	74.0	72.0	69.0	66.0	60.0	58.0	55.0
	13	70.1	93.7	51.2	77.0	76.0	74.0	73.0	70.0	67.0	61.0	59.0	55.0
	14	70.9	87.5	55.2	78.0	77.0	75.0	74.0	71.0	68.0	64.0	62.0	59.0
	15	71.4	89.7	55.0	79.0	77.0	75.0	74.0	71.0	69.0	65.0	63.0	61.0
	16	71.8	84.9	60.4	78.0	77.0	75.0	74.0	72.0	70.0	66.0	65.0	63.0
	17	71.3	89.0	55.5	78.0	77.0	75.0	74.0	71.0	69.0	64.0	63.0	60.0
	18	70.3	82.7	54.5	78.0	76.0	75.0	73.0	70.0	68.0	63.0	61.0	59.0
	19	69.2	82.5	53.1	77.0	76.0	74.0	72.0	69.0	67.0	60.0	59.0	56.0
	20	68.9	84.5	48.2	78.0	76.0	74.0	72.0	68.0	65.0	58.0	57.0	53.0
	21	67.7	87.1	46.3	76.0	75.0	73.0	71.0	67.0	64.0	57.0	54.0	49.0
Night	22	67.1	84.8	44.5	76.0	75.0	73.0	70.0	67.0	63.0	53.0	51.0	48.0
	23	65.5	81.8	43.3	75.0	74.0	71.0	68.0	65.0	61.0	53.0	51.0	46.0

URBAN CROSSROADS

24-Hour Noise Level Measurement Summary

Project Name:	Rancho Palma	*JN:*	9785	*Energy Average Leq*		*24-Hour*
Location:	L4 - Located at the Project site boundary on Little League Drive north of the Interstate 215 Freeway.	*Analyst:*	A. Wolfe	*Day*	*Night*	*CNEL*
		Date:	8/18/2015	70.5	69.4	76.3

Hourly Leq dBA Readings (unadjusted)



Time Period	*Hour*	*Leq*	*Lmax*	*Lmin*	*L1%*	*L2%*	*L5%*	*L8%*	*L25%*	*L50%*	*L90%*	*L95%*	*L99%*
Day	Min	69.3	83.0	49.9	77.0	75.0	74.0	71.0	69.0	66.0	60.0	58.0	55.0
	Max	71.5	93.5	57.6	80.0	78.0	76.0	74.0	71.0	69.0	66.0	65.0	62.0
Energy Average:		70.5	Average:		78.1	76.6	74.7	72.9	70.1	67.3	62.4	60.9	57.7
Night	Min	65.7	79.3	44.6	75.0	74.0	71.0	68.0	65.0	61.0	55.0	53.0	49.0
	Max	72.0	88.9	62.0	80.0	78.0	76.0	74.0	72.0	69.0	66.0	65.0	64.0
Energy Average:		69.4	Average:		77.2	75.9	73.8	71.8	68.2	65.1	60.2	58.9	56.4
Hourly Summary													
Night	0	65.7	82.2	44.6	75.0	74.0	71.0	69.0	65.0	61.0	55.0	53.0	49.0
	1	67.1	80.3	48.3	76.0	75.0	73.0	71.0	66.0	63.0	57.0	55.0	51.0
	2	68.2	88.9	49.8	78.0	76.0	74.0	71.0	67.0	63.0	56.0	54.0	52.0
	3	70.6	86.1	58.4	78.0	77.0	75.0	74.0	70.0	67.0	63.0	62.0	60.0
	4	71.3	83.7	60.2	79.0	77.0	76.0	74.0	71.0	69.0	65.0	64.0	62.0
	5	72.0	88.0	62.0	80.0	78.0	76.0	74.0	72.0	69.0	66.0	65.0	64.0
	6	70.9	84.5	55.7	78.0	77.0	75.0	74.0	71.0	68.0	64.0	63.0	60.0
Day	7	71.4	93.5	51.2	80.0	78.0	76.0	74.0	71.0	67.0	62.0	61.0	57.0
	8	70.2	91.0	52.4	78.0	77.0	75.0	73.0	70.0	67.0	61.0	59.0	56.0
	9	69.9	84.8	51.4	78.0	77.0	75.0	73.0	70.0	66.0	60.0	59.0	55.0
	10	70.1	92.9	49.9	77.0	76.0	75.0	73.0	69.0	66.0	60.0	58.0	55.0
	11	69.5	86.0	52.6	78.0	76.0	74.0	72.0	69.0	66.0	60.0	59.0	56.0
	12	69.7	91.3	53.6	78.0	76.0	74.0	72.0	69.0	66.0	60.9	59.0	57.0
	13	70.0	86.1	53.4	78.0	76.0	74.0	73.0	70.0	67.0	62.0	60.0	57.0
	14	71.0	88.7	57.4	79.0	77.0	75.0	73.0	71.0	68.0	63.0	62.0	60.0
	15	71.5	92.2	56.6	79.0	77.0	75.0	73.0	71.0	69.0	65.0	63.0	60.0
	16	71.4	86.5	57.6	78.0	77.0	75.0	74.0	71.0	69.0	66.0	65.0	62.0
	17	71.3	92.0	54.7	78.0	77.0	75.0	73.0	71.0	69.0	65.0	63.0	60.0
	18	70.6	91.7	51.7	78.0	77.0	75.0	73.0	70.0	68.0	63.0	61.0	57.0
	19	70.6	83.0	54.7	77.0	76.0	74.0	73.0	71.0	69.0	64.0	63.0	58.0
	20	69.7	84.9	56.4	78.0	77.0	75.0	73.0	69.0	66.0	61.0	60.0	58.0
	21	69.3	87.8	55.6	77.0	75.0	74.0	71.0	69.0	67.0	63.0	61.0	58.0
Night	22	67.4	79.3	52.9	76.0	75.0	73.0	71.0	67.0	64.0	59.0	58.0	55.0
	23	66.1	83.3	50.9	75.0	74.0	71.0	68.0	65.0	62.0	57.0	56.0	55.0

URBAN CROSSROADS

APPENDIX 6.1:

SITE PLAN

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CABLE CREEK
CHANNEL
PROPERTY LINE
LOT "D" PARK
LOT "C" R.V. PARKING
LOT "B" PARK
PARK
PARK LOT "A"
STREET "L"
STREET "K"
STREET "J"
STREET "H"
STREET "G"
STREET "F"
STREET "E"
STREET "D"
STREET "C"
STREET "B"
STREET "A"
MAGNOLIA AVENUE
LITTLE LEAGUE DRIVE
I-215 FREEWAY
ATHLETIC FIELD
WQMP BASIN
ACCESS ROAD
PROPOSED STORM DRAIN
15" SEWER (EX)
EX. 24" D.I.P. WATER
12" D.I.P. WATER
LOS = 305'

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APPENDIX 7.1:

OFF-SITE TRAFFIC NOISE CONTOURS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	190 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-8.07	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-25.31	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-29.27	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.3	54.4	52.6	46.6	55.2	55.8
Medium Trucks:	50.6	49.0	42.7	41.1	49.6	49.8
Heavy Trucks:	52.4	51.0	42.0	43.2	51.6	51.7
Vehicle Noise:	58.5	56.8	53.4	49.0	57.5	58.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	14	30	65
CNEL:	7	15	32	69

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	230 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.24	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.48	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.44	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.1	55.2	53.5	47.4	56.0	56.6
Medium Trucks:	51.4	49.9	43.5	42.0	50.4	50.7
Heavy Trucks:	53.2	51.8	42.8	44.0	52.4	52.5
Vehicle Noise:	59.4	57.7	54.2	49.8	58.4	58.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	16	34	74
CNEL:	8	17	37	79

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	380 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.60	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.84	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.79	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.2	53.3	51.5	45.5	54.1	54.7
Medium Trucks:	50.1	48.6	42.2	40.7	49.1	49.3
Heavy Trucks:	53.3	51.9	42.8	44.1	52.4	52.6
Vehicle Noise:	58.1	56.4	52.5	48.6	57.1	57.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	28	61
CNEL:	6	14	30	65

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	680 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.63	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.86	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.82	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.9	63.0	61.2	55.2	63.8	64.4
Medium Trucks:	58.7	57.2	50.8	49.3	57.7	58.0
Heavy Trucks:	59.5	58.1	49.1	50.3	58.7	58.8
Vehicle Noise:	66.8	65.0	61.9	57.2	65.7	66.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	23	49	106	228
CNEL:	24	53	114	245

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,280 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.88	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.12	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.07	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.7	65.8	64.0	57.9	66.6	67.2
Medium Trucks:	61.4	59.9	53.6	52.0	60.5	60.7
Heavy Trucks:	62.3	60.9	51.8	53.1	61.4	61.6
Vehicle Noise:	69.5	67.8	64.6	59.9	68.5	68.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	35	75	162	348
CNEL:	37	80	173	373

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,540 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.08	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.31	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.27	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.8	58.7	67.4	68.0
Medium Trucks:	62.2	60.7	54.4	52.8	61.3	61.5
Heavy Trucks:	63.1	61.7	52.6	53.9	62.2	62.4
Vehicle Noise:	70.3	68.6	65.4	60.7	69.3	69.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	39	85	183	394
CNEL:	42	91	196	422

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,320 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.70	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.53	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.49	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.2	68.3	66.6	60.5	69.1	69.7
Medium Trucks:	64.0	62.5	56.2	54.6	63.1	63.3
Heavy Trucks:	64.9	63.4	54.4	55.7	64.0	64.1
Vehicle Noise:	72.1	70.3	67.2	62.5	71.1	71.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	52	112	240	518
CNEL:	56	120	258	555

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,800 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.60	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.64	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.59	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.1	67.2	65.5	59.4	68.0	68.6
Medium Trucks:	62.9	61.4	55.1	53.5	62.0	62.2
Heavy Trucks:	63.8	62.3	53.3	54.6	62.9	63.0
Vehicle Noise:	71.0	69.2	66.1	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	44	94	203	437
CNEL:	47	101	218	469

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	890 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.46	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.70	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.65	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	59.9	58.4	52.0	50.5	58.9	59.1
Heavy Trucks:	60.7	59.3	50.3	51.5	59.9	60.0
Vehicle Noise:	67.9	66.2	63.0	58.4	66.9	67.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	59	127	273
CNEL:	29	63	136	293

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	490 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.05	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.29	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.24	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.5	61.6	59.8	53.8	62.4	63.0
Medium Trucks:	57.3	55.8	49.4	47.9	56.3	56.6
Heavy Trucks:	58.1	56.7	47.7	48.9	57.3	57.4
Vehicle Noise:	65.3	63.6	60.4	55.8	64.3	64.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	18	40	85	184
CNEL:	20	42	91	197

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Pine Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.64	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.88	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.83	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.9	59.0	57.2	51.2	59.8	60.4
Medium Trucks:	54.7	53.2	46.8	45.3	53.7	54.0
Heavy Trucks:	55.5	54.1	45.1	46.3	54.7	54.8
Vehicle Noise:	62.7	61.0	57.8	53.2	61.7	62.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	12	27	57	123
CNEL:	13	29	61	132

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Pine Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	410 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.82	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-23.06	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-27.02	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.7	60.8	59.0	53.0	61.6	62.2
Medium Trucks:	56.5	55.0	48.6	47.1	55.5	55.8
Heavy Trucks:	57.3	55.9	46.9	48.1	56.5	56.6
Vehicle Noise:	64.6	62.8	59.7	55.0	63.5	64.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	16	35	76	163
CNEL:	17	38	81	175

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	820 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.81	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.05	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.01	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.8	62.1	56.0	64.6	65.2
Medium Trucks:	59.5	58.0	51.6	50.1	58.6	58.8
Heavy Trucks:	60.4	58.9	49.9	51.1	59.5	59.6
Vehicle Noise:	67.6	65.8	62.7	58.0	66.5	67.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	56	120	259
CNEL:	28	60	129	278

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	500 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.96	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.20	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.16	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.6	61.7	59.9	53.9	62.5	63.1
Medium Trucks:	57.4	55.9	49.5	47.9	56.4	56.6
Heavy Trucks:	58.2	56.8	47.7	49.0	57.4	57.5
Vehicle Noise:	65.4	63.7	60.5	55.9	64.4	64.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	40	86	186
CNEL:	20	43	93	200

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.75	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.49	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.45	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.3	69.4	67.6	61.6	70.2	70.8
Medium Trucks:	65.1	63.6	57.2	55.7	64.1	64.4
Heavy Trucks:	65.9	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	73.2	71.4	68.3	63.6	72.1	72.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	69	149	322	693
CNEL:	74	160	345	743

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,710 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.74	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.50	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.45	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.6	62.6	71.2	71.8
Medium Trucks:	66.1	64.6	58.2	56.7	65.1	65.4
Heavy Trucks:	66.9	65.5	56.5	57.7	66.1	66.2
Vehicle Noise:	74.1	72.4	69.3	64.6	73.1	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	81	174	375	807
CNEL:	87	187	402	866

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Belmont Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.42	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.66	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.61	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.6	53.7	52.0	45.9	54.5	55.1
Medium Trucks:	50.5	49.0	42.6	41.1	49.6	49.8
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	58.5	56.9	52.9	49.0	57.5	57.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	10	21	44
CNEL:	5	10	22	47

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Belmont Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	240 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.60	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.83	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.79	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.4	53.5	51.8	45.7	54.3	55.0
Medium Trucks:	50.3	48.8	42.5	40.9	49.4	49.6
Heavy Trucks:	53.6	52.1	43.1	44.3	52.7	52.8
Vehicle Noise:	58.4	56.7	52.8	48.9	57.4	57.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	9	20	43
CNEL:	5	10	21	46

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Belmont Av.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	130 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-8.26	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-25.50	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-29.45	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	52.8	50.9	49.1	43.1	51.7	52.3
Medium Trucks:	47.7	46.2	39.8	38.3	46.7	47.0
Heavy Trucks:	50.9	49.5	40.4	41.7	50.0	50.2
Vehicle Noise:	55.7	54.0	50.1	46.2	54.7	55.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	6	13	29
CNEL:	3	7	14	30

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Irvington Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.72	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.95	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.91	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	52.2	50.7	44.4	42.8	51.3	51.5
Heavy Trucks:	55.4	54.0	45.0	46.2	54.6	54.7
Vehicle Noise:	60.2	58.6	54.6	50.7	59.2	59.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	27	58
CNEL:	6	13	28	61

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	340 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.08	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.32	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.28	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.0	55.1	53.3	47.2	55.9	56.5
Medium Trucks:	51.9	50.3	44.0	42.4	50.9	51.1
Heavy Trucks:	55.1	53.6	44.6	45.9	54.2	54.3
Vehicle Noise:	59.9	58.2	54.3	50.4	58.9	59.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	12	25	54
CNEL:	6	12	27	58

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	220 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.97	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-23.21	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-27.17	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.1	53.2	51.4	45.3	54.0	54.6
Medium Trucks:	50.0	48.5	42.1	40.5	49.0	49.2
Heavy Trucks:	53.2	51.8	42.7	44.0	52.3	52.4
Vehicle Noise:	58.0	56.3	52.4	48.5	57.0	57.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	9	19	41
CNEL:	4	9	20	43

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	870 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.56	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.79	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.75	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.0	64.1	62.3	56.3	64.9	65.5
Medium Trucks:	59.8	58.3	51.9	50.4	58.8	59.0
Heavy Trucks:	60.6	59.2	50.2	51.4	59.8	59.9
Vehicle Noise:	67.8	66.1	62.9	58.3	66.8	67.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	58	125	269
CNEL:	29	62	134	289

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	720 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.38	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.62	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.57	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.2	63.3	61.5	55.4	64.1	64.7
Medium Trucks:	58.9	57.4	51.1	49.5	58.0	58.2
Heavy Trucks:	59.8	58.4	49.3	50.6	58.9	59.1
Vehicle Noise:	67.0	65.3	62.1	57.4	66.0	66.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	51	110	237
CNEL:	25	55	118	254

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	210 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-8.73	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-25.97	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-29.92	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.0	60.1	58.4	52.3	60.9	61.5
Medium Trucks:	55.9	54.4	48.0	46.4	54.9	55.1
Heavy Trucks:	56.7	55.3	46.2	47.5	55.8	56.0
Vehicle Noise:	63.9	62.2	59.0	54.3	62.9	63.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	10	22	47	100
CNEL:	11	23	50	108

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,560 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.02	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.26	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.21	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.9	58.8	67.4	68.0
Medium Trucks:	62.3	60.8	54.5	52.9	61.4	61.6
Heavy Trucks:	63.2	61.7	52.7	54.0	62.3	62.4
Vehicle Noise:	70.4	68.6	65.5	60.8	69.4	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	45	98	210	453
CNEL:	49	105	226	486

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,410 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.46	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.70	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.65	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.1	66.2	64.4	58.4	67.0	67.6
Medium Trucks:	61.9	60.4	54.0	52.5	60.9	61.2
Heavy Trucks:	62.7	61.3	52.3	53.5	61.9	62.0
Vehicle Noise:	69.9	68.2	65.0	60.4	68.9	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	42	91	197	424
CNEL:	45	98	211	454

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,960 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.97	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.27	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.22	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.9	59.8	68.4	69.0
Medium Trucks:	63.3	61.8	55.4	53.9	62.4	62.6
Heavy Trucks:	64.2	62.7	53.7	55.0	63.3	63.4
Vehicle Noise:	71.4	69.6	66.5	61.8	70.4	70.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	114	245	528
CNEL:	57	122	263	566

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,920 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.88	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.36	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.31	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.8	59.7	68.3	69.0
Medium Trucks:	63.2	61.7	55.4	53.8	62.3	62.5
Heavy Trucks:	64.1	62.7	53.6	54.9	63.2	63.3
Vehicle Noise:	71.3	69.5	66.4	61.7	70.3	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	52	112	242	520
CNEL:	56	120	259	558

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,790 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.58	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.66	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.62	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.1	67.2	65.5	59.4	68.0	68.6
Medium Trucks:	62.9	61.4	55.1	53.5	62.0	62.2
Heavy Trucks:	63.8	62.3	53.3	54.6	62.9	63.0
Vehicle Noise:	71.0	69.2	66.1	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	107	231	497
CNEL:	53	115	247	533

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	36,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,670 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.47	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-12.39	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.79	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.3	74.4	72.7	66.6	75.2	75.8
Medium Trucks:	72.7	71.2	64.8	63.2	71.7	71.9
Heavy Trucks:	77.3	75.9	66.8	68.1	76.4	76.6
Vehicle Noise:	80.6	79.0	74.2	71.2	79.6	80.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	272	586	1,264	2,722
CNEL:	286	616	1,328	2,860

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: Existing Without Project
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	43,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,380 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.24	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.62	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.02	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.1	75.2	73.4	67.4	76.0	76.6
Medium Trucks:	73.4	71.9	65.6	64.0	72.5	72.7
Heavy Trucks:	78.0	76.6	67.6	68.8	77.2	77.3
Vehicle Noise:	81.4	79.8	75.0	71.9	80.4	80.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	306	660	1,422	3,063
CNEL:	322	693	1,494	3,218

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	190 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-8.07	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-25.31	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-29.27	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.3	54.4	52.6	46.6	55.2	55.8
Medium Trucks:	50.6	49.0	42.7	41.1	49.6	49.8
Heavy Trucks:	52.4	51.0	42.0	43.2	51.6	51.7
Vehicle Noise:	58.5	56.8	53.4	49.0	57.5	58.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	14	30	65
CNEL:	7	15	32	69

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-6.88	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.12	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.07	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.5	55.6	53.8	47.8	56.4	57.0
Medium Trucks:	51.7	50.2	43.9	42.3	50.8	51.0
Heavy Trucks:	53.6	52.2	43.1	44.4	52.7	52.9
Vehicle Noise:	59.7	58.0	54.6	50.2	58.7	59.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	17	36	78
CNEL:	8	18	39	83

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	380 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.60	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.84	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.79	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.2	53.3	51.5	45.5	54.1	54.7
Medium Trucks:	50.1	48.6	42.2	40.7	49.1	49.3
Heavy Trucks:	53.3	51.9	42.8	44.1	52.4	52.6
Vehicle Noise:	58.1	56.4	52.5	48.6	57.1	57.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	28	61
CNEL:	6	14	30	65

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	690 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.56	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.80	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.76	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.0	63.1	61.3	55.3	63.9	64.5
Medium Trucks:	58.8	57.3	50.9	49.3	57.8	58.0
Heavy Trucks:	59.6	58.2	49.1	50.4	58.8	58.9
Vehicle Noise:	66.8	65.1	61.9	57.2	65.8	66.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	23	50	107	231
CNEL:	25	53	115	247

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,290 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.85	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.08	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.04	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.7	65.8	64.0	58.0	66.6	67.2
Medium Trucks:	61.5	60.0	53.6	52.1	60.5	60.8
Heavy Trucks:	62.3	60.9	51.9	53.1	61.5	61.6
Vehicle Noise:	69.5	67.8	64.6	60.0	68.5	69.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	35	75	162	350
CNEL:	38	81	174	375

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,540 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.08	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.31	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.27	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.8	58.7	67.4	68.0
Medium Trucks:	62.2	60.7	54.4	52.8	61.3	61.5
Heavy Trucks:	63.1	61.7	52.6	53.9	62.2	62.4
Vehicle Noise:	70.3	68.6	65.4	60.7	69.3	69.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	39	85	183	394
CNEL:	42	91	196	422

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,390 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.83	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.41	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.36	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.7	60.6	69.3	69.9
Medium Trucks:	64.2	62.6	56.3	54.7	63.2	63.4
Heavy Trucks:	65.0	63.6	54.5	55.8	64.1	64.3
Vehicle Noise:	72.2	70.5	67.3	62.6	71.2	71.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	114	245	528
CNEL:	57	122	263	566

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,830 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.67	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.56	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.52	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.2	67.3	65.5	59.5	68.1	68.7
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	71.1	69.3	66.2	61.5	70.0	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	44	95	205	442
CNEL:	47	102	220	474

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	890 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.46	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.70	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.65	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	59.9	58.4	52.0	50.5	58.9	59.1
Heavy Trucks:	60.7	59.3	50.3	51.5	59.9	60.0
Vehicle Noise:	67.9	66.2	63.0	58.4	66.9	67.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	59	127	273
CNEL:	29	63	136	293

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	500 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.96	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.20	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.16	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.6	61.7	59.9	53.9	62.5	63.1
Medium Trucks:	57.4	55.9	49.5	47.9	56.4	56.6
Heavy Trucks:	58.2	56.8	47.7	49.0	57.4	57.5
Vehicle Noise:	65.4	63.7	60.5	55.9	64.4	64.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	40	86	186
CNEL:	20	43	93	200

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Pine Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.64	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.88	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.83	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	60.9	59.0	57.2	51.2	59.8	60.4
Medium Trucks:	54.7	53.2	46.8	45.3	53.7	54.0
Heavy Trucks:	55.5	54.1	45.1	46.3	54.7	54.8
Vehicle Noise:	62.7	61.0	57.8	53.2	61.7	62.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	12	27	57	123
CNEL:	13	29	61	132

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Pine Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	410 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.82	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-23.06	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-27.02	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.7	60.8	59.0	53.0	61.6	62.2
Medium Trucks:	56.5	55.0	48.6	47.1	55.5	55.8
Heavy Trucks:	57.3	55.9	46.9	48.1	56.5	56.6
Vehicle Noise:	64.6	62.8	59.7	55.0	63.5	64.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	16	35	76	163
CNEL:	17	38	81	175

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	820 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006
Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.81	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.05	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.01	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.8	62.1	56.0	64.6	65.2
Medium Trucks:	59.5	58.0	51.6	50.1	58.6	58.8
Heavy Trucks:	60.4	58.9	49.9	51.1	59.5	59.6
Vehicle Noise:	67.6	65.8	62.7	58.0	66.5	67.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	56	120	259
CNEL:	28	60	129	278

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	510 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006
Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.88	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.11	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.07	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.7	61.8	60.0	53.9	62.6	63.2
Medium Trucks:	57.4	55.9	49.6	48.0	56.5	56.7
Heavy Trucks:	58.3	56.9	47.8	49.1	57.4	57.6
Vehicle Noise:	65.5	63.8	60.6	55.9	64.5	64.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	41	88	189
CNEL:	20	44	94	202

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006
Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.75	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.49	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.45	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.3	69.4	67.6	61.6	70.2	70.8
Medium Trucks:	65.1	63.6	57.2	55.7	64.1	64.4
Heavy Trucks:	65.9	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	73.2	71.4	68.3	63.6	72.1	72.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	69	149	322	693
CNEL:	74	160	345	743

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,720 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000
Medium Trucks:	2.297
Heavy Trucks:	8.006
Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.75	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.48	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.44	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.6	62.6	71.2	71.8
Medium Trucks:	66.1	64.6	58.2	56.7	65.1	65.4
Heavy Trucks:	66.9	65.5	56.5	57.7	66.1	66.2
Vehicle Noise:	74.2	72.4	69.3	64.6	73.1	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	81	174	375	809
CNEL:	87	187	403	867

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Belmont Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.42	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.66	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.61	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.6	53.7	52.0	45.9	54.5	55.1
Medium Trucks:	50.5	49.0	42.6	41.1	49.6	49.8
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	58.5	56.9	52.9	49.0	57.5	57.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	10	21	44
CNEL:	5	10	22	47

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Belmont Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	240 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.60	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.83	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.79	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.4	53.5	51.8	45.7	54.3	55.0
Medium Trucks:	50.3	48.8	42.5	40.9	49.4	49.6
Heavy Trucks:	53.6	52.1	43.1	44.3	52.7	52.8
Vehicle Noise:	58.4	56.7	52.8	48.9	57.4	57.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	9	20	43
CNEL:	5	10	21	46

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Belmont Av.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	130 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-8.26	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-25.50	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-29.45	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	52.8	50.9	49.1	43.1	51.7	52.3
Medium Trucks:	47.7	46.2	39.8	38.3	46.7	47.0
Heavy Trucks:	50.9	49.5	40.4	41.7	50.0	50.2
Vehicle Noise:	55.7	54.0	50.1	46.2	54.7	55.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	6	13	29
CNEL:	3	7	14	30

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Irvington Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.72	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.95	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.91	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	52.2	50.7	44.4	42.8	51.3	51.5
Heavy Trucks:	55.4	54.0	45.0	46.2	54.6	54.7
Vehicle Noise:	60.2	58.6	54.6	50.7	59.2	59.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	27	58
CNEL:	6	13	28	61

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Irvington Av.
Road Segment: e/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	340 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.08	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.32	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.28	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.0	55.1	53.3	47.2	55.9	56.5
Medium Trucks:	51.9	50.3	44.0	42.4	50.9	51.1
Heavy Trucks:	55.1	53.6	44.6	45.9	54.2	54.3
Vehicle Noise:	59.9	58.2	54.3	50.4	58.9	59.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	12	25	54
CNEL:	6	12	27	58

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	240 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.60	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.83	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.79	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.4	53.5	51.8	45.7	54.3	55.0
Medium Trucks:	50.3	48.8	42.5	40.9	49.4	49.6
Heavy Trucks:	53.6	52.1	43.1	44.3	52.7	52.8
Vehicle Noise:	58.4	56.7	52.8	48.9	57.4	57.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	9	20	43
CNEL:	5	10	21	46

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	870 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.56	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.79	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.75	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.0	64.1	62.3	56.3	64.9	65.5
Medium Trucks:	59.8	58.3	51.9	50.4	58.8	59.0
Heavy Trucks:	60.6	59.2	50.2	51.4	59.8	59.9
Vehicle Noise:	67.8	66.1	62.9	58.3	66.8	67.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	58	125	269
CNEL:	29	62	134	289

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	730 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.32	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.56	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.51	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.2	63.3	61.6	55.5	64.1	64.7
Medium Trucks:	59.0	57.5	51.1	49.6	58.1	58.3
Heavy Trucks:	59.8	58.4	49.4	50.6	59.0	59.1
Vehicle Noise:	67.1	65.3	62.2	57.5	66.0	66.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	52	111	239
CNEL:	26	55	119	257

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	300 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.18	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-24.42	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-28.37	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.6	61.7	59.9	53.9	62.5	63.1
Medium Trucks:	57.4	55.9	49.5	48.0	56.5	56.7
Heavy Trucks:	58.3	56.8	47.8	49.0	57.4	57.5
Vehicle Noise:	65.4	63.7	60.5	55.9	64.4	64.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	13	27	59	127
CNEL:	14	29	63	137

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.04	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.20	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.16	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.6	66.7	64.9	58.9	67.5	68.1
Medium Trucks:	62.4	60.9	54.5	53.0	61.4	61.7
Heavy Trucks:	63.2	61.8	52.8	54.0	62.4	62.5
Vehicle Noise:	70.4	68.7	65.5	60.9	69.4	69.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	46	98	212	457
CNEL:	49	106	228	490

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,430 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.40	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.64	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.59	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.2	66.3	64.5	58.4	67.1	67.7
Medium Trucks:	61.9	60.4	54.1	52.5	61.0	61.2
Heavy Trucks:	62.8	61.4	52.3	53.6	61.9	62.1
Vehicle Noise:	70.0	68.3	65.1	60.4	69.0	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	43	92	198	428
CNEL:	46	99	213	459

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,980 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.02	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.22	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.18	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.6	67.7	65.9	59.9	68.5	69.1
Medium Trucks:	63.4	61.9	55.5	53.9	62.4	62.6
Heavy Trucks:	64.2	62.8	53.7	55.0	63.4	63.5
Vehicle Noise:	71.4	69.7	66.5	61.9	70.4	70.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	114	247	531
CNEL:	57	123	264	570

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,930 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.90	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.33	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.29	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.8	59.7	68.4	69.0
Medium Trucks:	63.3	61.7	55.4	53.8	62.3	62.5
Heavy Trucks:	64.1	62.7	53.6	54.9	63.2	63.4
Vehicle Noise:	71.3	69.6	66.4	61.7	70.3	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	52	113	242	522
CNEL:	56	121	260	560

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,790 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.58	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.66	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.62	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.1	67.2	65.5	59.4	68.0	68.6
Medium Trucks:	62.9	61.4	55.1	53.5	62.0	62.2
Heavy Trucks:	63.8	62.3	53.3	54.6	62.9	63.0
Vehicle Noise:	71.0	69.2	66.1	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	107	231	497
CNEL:	53	115	247	533

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,700 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.51	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-12.36	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.75	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.4	74.5	72.7	66.6	75.3	75.9
Medium Trucks:	72.7	71.2	64.8	63.3	71.7	72.0
Heavy Trucks:	77.3	75.9	66.9	68.1	76.5	76.6
Vehicle Noise:	80.6	79.0	74.2	71.2	79.7	80.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	274	590	1,270	2,737
CNEL:	288	620	1,335	2,876

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Phase 1)
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,410 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.27	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.59	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.99	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.1	75.2	73.4	67.4	76.0	76.6
Medium Trucks:	73.5	71.9	65.6	64.0	72.5	72.7
Heavy Trucks:	78.1	76.7	67.6	68.9	77.2	77.4
Vehicle Noise:	81.4	79.8	75.0	72.0	80.4	80.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	308	663	1,428	3,077
CNEL:	323	697	1,501	3,233

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	210 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.64	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.88	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.83	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.7	54.8	53.1	47.0	55.6	56.2
Medium Trucks:	51.0	49.5	43.1	41.6	50.0	50.3
Heavy Trucks:	52.8	51.4	42.4	43.6	52.0	52.1
Vehicle Noise:	59.0	57.3	53.8	49.4	58.0	58.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	15	32	69
CNEL:	7	16	34	74

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	300 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-6.09	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-23.33	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-27.28	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.3	56.4	54.6	48.6	57.2	57.8
Medium Trucks:	52.5	51.0	44.7	43.1	51.6	51.8
Heavy Trucks:	54.4	53.0	43.9	45.2	53.5	53.7
Vehicle Noise:	60.5	58.8	55.4	51.0	59.5	59.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	19	41	88
CNEL:	9	20	44	94

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.62	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.57	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.4	53.5	51.8	45.7	54.3	54.9
Medium Trucks:	50.3	48.8	42.4	40.9	49.3	49.6
Heavy Trucks:	53.5	52.1	43.1	44.3	52.7	52.8
Vehicle Noise:	58.3	56.7	52.7	48.8	57.3	57.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	14	29	63
CNEL:	7	14	31	67

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	750 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.20	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.44	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.39	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.7	55.6	64.2	64.8
Medium Trucks:	59.1	57.6	51.3	49.7	58.2	58.4
Heavy Trucks:	60.0	58.5	49.5	50.8	59.1	59.2
Vehicle Noise:	67.2	65.4	62.3	57.6	66.2	66.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	53	113	244
CNEL:	26	56	121	262

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,370 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.58	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.82	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.78	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.0	66.1	64.3	58.2	66.9	67.5
Medium Trucks:	61.7	60.2	53.9	52.3	60.8	61.0
Heavy Trucks:	62.6	61.2	52.1	53.4	61.7	61.9
Vehicle Noise:	69.8	68.1	64.9	60.2	68.8	69.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	36	78	169	364
CNEL:	39	84	181	391

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,630 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.07	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.02	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.7	66.8	65.0	59.0	67.6	68.2
Medium Trucks:	62.5	61.0	54.6	53.1	61.5	61.8
Heavy Trucks:	63.3	61.9	52.9	54.1	62.5	62.6
Vehicle Noise:	70.6	68.8	65.7	61.0	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	88	190	409
CNEL:	44	95	204	439

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,480 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.99	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.24	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.20	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.6	66.9	60.8	69.4	70.0
Medium Trucks:	64.3	62.8	56.4	54.9	63.4	63.6
Heavy Trucks:	65.2	63.7	54.7	56.0	64.3	64.4
Vehicle Noise:	72.4	70.6	67.5	62.8	71.3	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	117	251	541
CNEL:	58	125	269	580

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,900 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.84	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.40	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.36	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.7	59.7	68.3	68.9
Medium Trucks:	63.2	61.7	55.3	53.7	62.2	62.4
Heavy Trucks:	64.0	62.6	53.5	54.8	63.1	63.3
Vehicle Noise:	71.2	69.5	66.3	61.6	70.2	70.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	45	98	210	453
CNEL:	49	105	226	486

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	930 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.27	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.50	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.46	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.6	56.6	65.2	65.8
Medium Trucks:	60.1	58.5	52.2	50.6	59.1	59.3
Heavy Trucks:	60.9	59.5	50.4	51.7	60.0	60.2
Vehicle Noise:	68.1	66.4	63.2	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	131	281
CNEL:	30	65	140	302

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	520 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.79	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.03	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.99	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.7	61.8	60.1	54.0	62.6	63.3
Medium Trucks:	57.5	56.0	49.7	48.1	56.6	56.8
Heavy Trucks:	58.4	57.0	47.9	49.2	57.5	57.6
Vehicle Noise:	65.6	63.8	60.7	56.0	64.6	65.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	41	89	191
CNEL:	20	44	95	205

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Pine Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	290 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.33	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.57	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.52	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.2	59.3	57.5	51.5	60.1	60.7
Medium Trucks:	55.0	53.5	47.1	45.6	54.0	54.3
Heavy Trucks:	55.8	54.4	45.4	46.6	55.0	55.1
Vehicle Noise:	63.1	61.3	58.2	53.5	62.0	62.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	13	28	60	129
CNEL:	14	30	64	139

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Pine Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	470 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.23	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.47	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.42	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.3	61.4	59.6	53.6	62.2	62.8
Medium Trucks:	57.1	55.6	49.2	47.7	56.1	56.4
Heavy Trucks:	57.9	56.5	47.5	48.7	57.1	57.2
Vehicle Noise:	65.2	63.4	60.3	55.6	64.1	64.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	18	38	83	179
CNEL:	19	41	89	192

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	880 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.51	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.74	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.70	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.0	64.1	62.4	56.3	64.9	65.5
Medium Trucks:	59.8	58.3	51.9	50.4	58.9	59.1
Heavy Trucks:	60.7	59.2	50.2	51.5	59.8	59.9
Vehicle Noise:	67.9	66.1	63.0	58.3	66.8	67.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	58	126	271
CNEL:	29	63	135	291

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	510 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.88	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.11	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.07	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.7	61.8	60.0	53.9	62.6	63.2
Medium Trucks:	57.4	55.9	49.6	48.0	56.5	56.7
Heavy Trucks:	58.3	56.9	47.8	49.1	57.4	57.6
Vehicle Noise:	65.5	63.8	60.6	55.9	64.5	64.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	41	88	189
CNEL:	20	44	94	202

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	29,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,960 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.76	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.48	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.43	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.3	69.4	67.7	61.6	70.2	70.8
Medium Trucks:	65.1	63.6	57.2	55.7	64.2	64.4
Heavy Trucks:	66.0	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	73.2	71.4	68.3	63.6	72.1	72.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	69	150	322	694
CNEL:	74	160	346	745

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,740 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.78	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.46	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.42	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.3	70.4	68.7	62.6	71.2	71.8
Medium Trucks:	66.1	64.6	58.3	56.7	65.2	65.4
Heavy Trucks:	67.0	65.5	56.5	57.8	66.1	66.2
Vehicle Noise:	74.2	72.4	69.3	64.6	73.2	73.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	81	175	377	812
CNEL:	87	188	404	871

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Belmont Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.08	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.32	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.28	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.0	54.1	52.3	46.2	54.9	55.5
Medium Trucks:	50.9	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	54.1	52.6	43.6	44.9	53.2	53.3
Vehicle Noise:	58.9	57.2	53.3	49.4	57.9	58.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	22	47
CNEL:	5	11	23	50

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Belmont Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.25	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.49	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.44	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.8	53.9	52.1	46.1	54.7	55.3
Medium Trucks:	50.7	49.2	42.8	41.3	49.7	50.0
Heavy Trucks:	53.9	52.5	43.4	44.7	53.0	53.2
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	21	46
CNEL:	5	10	22	48

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Belmont Av.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	170 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-7.09	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-24.33	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-28.29	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.9	52.0	50.3	44.2	52.9	53.5
Medium Trucks:	48.8	47.3	41.0	39.4	47.9	48.1
Heavy Trucks:	52.1	50.6	41.6	42.8	51.2	51.3
Vehicle Noise:	56.9	55.2	51.3	47.4	55.9	56.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	7	16	34
CNEL:	4	8	17	36

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Irvington Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	380 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.60	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.84	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.79	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.4	55.5	53.8	47.7	56.3	57.0
Medium Trucks:	52.3	50.8	44.5	42.9	51.4	51.6
Heavy Trucks:	55.5	54.1	45.1	46.3	54.7	54.8
Vehicle Noise:	60.4	58.7	54.8	50.9	59.4	59.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	27	59
CNEL:	6	13	29	62

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	350 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.96	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.20	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.15	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.1	55.2	53.4	47.4	56.0	56.6
Medium Trucks:	52.0	50.5	44.1	42.6	51.0	51.3
Heavy Trucks:	55.2	53.8	44.7	46.0	54.3	54.5
Vehicle Noise:	60.0	58.3	54.4	50.5	59.0	59.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	26	55
CNEL:	6	13	27	59

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	310 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.48	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.72	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.68	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.6	54.7	52.9	46.8	55.5	56.1
Medium Trucks:	51.5	49.9	43.6	42.0	50.5	50.7
Heavy Trucks:	54.7	53.2	44.2	45.5	53.8	53.9
Vehicle Noise:	59.5	57.8	53.9	50.0	58.5	58.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	11	24	51
CNEL:	5	12	25	54

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	900 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.41	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.65	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.60	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.5	56.4	65.0	65.6
Medium Trucks:	59.9	58.4	52.0	50.5	59.0	59.2
Heavy Trucks:	60.8	59.3	50.3	51.5	59.9	60.0
Vehicle Noise:	68.0	66.2	63.1	58.4	66.9	67.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	59	128	275
CNEL:	30	64	137	295

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	750 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.20	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.44	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.39	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.7	55.6	64.2	64.8
Medium Trucks:	59.1	57.6	51.3	49.7	58.2	58.4
Heavy Trucks:	60.0	58.5	49.5	50.8	59.1	59.2
Vehicle Noise:	67.2	65.4	62.3	57.6	66.2	66.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	53	113	244
CNEL:	26	56	121	262

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.17	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-21.41	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-25.36	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.6	64.7	62.9	56.9	65.5	66.1
Medium Trucks:	60.4	58.9	52.6	51.0	59.5	59.7
Heavy Trucks:	61.3	59.8	50.8	52.1	60.4	60.5
Vehicle Noise:	68.5	66.7	63.6	58.9	67.4	67.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	44	94	202
CNEL:	22	47	101	217

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,700 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.35	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.88	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.84	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.9	67.0	65.2	59.2	67.8	68.4
Medium Trucks:	62.7	61.2	54.8	53.3	61.7	62.0
Heavy Trucks:	63.5	62.1	53.1	54.3	62.7	62.8
Vehicle Noise:	70.8	69.0	65.9	61.2	69.7	70.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	48	103	223	480
CNEL:	51	111	239	515

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,550 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.05	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.29	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.24	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.8	58.8	67.4	68.0
Medium Trucks:	62.3	60.8	54.4	52.9	61.3	61.6
Heavy Trucks:	63.1	61.7	52.7	53.9	62.3	62.4
Vehicle Noise:	70.4	68.6	65.5	60.8	69.3	69.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	45	97	209	451
CNEL:	48	104	225	484

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout)
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,040 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.15	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.09	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.05	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.7	67.8	66.0	60.0	68.6	69.2
Medium Trucks:	63.5	62.0	55.6	54.1	62.5	62.8
Heavy Trucks:	64.3	62.9	53.9	55.1	63.5	63.6
Vehicle Noise:	71.6	69.8	66.7	62.0	70.5	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	117	252	542
CNEL:	58	125	270	581

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout) *Project Name:* Rancho Palma
Road Name: Kendall Dr. *Job Number:* 9785
Road Segment: w/o University Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,980 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.02	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.22	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.18	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.6	67.7	65.9	59.9	68.5	69.1
Medium Trucks:	63.4	61.9	55.5	53.9	62.4	62.6
Heavy Trucks:	64.2	62.8	53.7	55.0	63.4	63.5
Vehicle Noise:	71.4	69.7	66.5	61.9	70.4	70.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	114	247	531
CNEL:	57	123	264	570

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout) *Project Name:* Rancho Palma
Road Name: Kendall Dr. *Job Number:* 9785
Road Segment: e/o University Pkwy.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,810 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.63	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.61	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.57	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.2	67.3	65.5	59.5	68.1	68.7
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	71.0	69.3	66.1	61.5	70.0	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	108	232	500
CNEL:	54	116	249	537

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout) *Project Name:* Rancho Palma
Road Name: I-215 Fwy. *Job Number:* 9785
Road Segment: w/o Palm Av.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	37,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,720 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.53	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-12.33	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.73	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.4	74.5	72.7	66.7	75.3	75.9
Medium Trucks:	72.7	71.2	64.8	63.3	71.8	72.0
Heavy Trucks:	77.3	75.9	66.9	68.1	76.5	76.6
Vehicle Noise:	80.7	79.0	74.2	71.2	79.7	80.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	275	592	1,275	2,747
CNEL:	289	622	1,340	2,886

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: E+P (Buildout) *Project Name:* Rancho Palma
Road Name: I-215 Fwy. *Job Number:* 9785
Road Segment: e/o Palm Av.

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	44,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,430 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.29	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.58	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.97	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.1	75.2	73.5	67.4	76.0	76.6
Medium Trucks:	73.5	72.0	65.6	64.1	72.5	72.8
Heavy Trucks:	78.1	76.7	67.6	68.9	77.2	77.4
Vehicle Noise:	81.4	79.8	75.0	72.0	80.5	80.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	309	665	1,432	3,086
CNEL:	324	699	1,505	3,243

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	200 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.85	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-25.09	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-29.04	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.5	54.6	52.9	46.8	55.4	56.0
Medium Trucks:	50.8	49.3	42.9	41.4	49.8	50.1
Heavy Trucks:	52.6	51.2	42.2	43.4	51.8	51.9
Vehicle Noise:	58.8	57.0	53.6	49.2	57.8	58.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	14	31	67
CNEL:	7	15	33	72

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-6.88	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.12	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.07	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.5	55.6	53.8	47.8	56.4	57.0
Medium Trucks:	51.7	50.2	43.9	42.3	50.8	51.0
Heavy Trucks:	53.6	52.2	43.1	44.4	52.7	52.9
Vehicle Noise:	59.7	58.0	54.6	50.2	58.7	59.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	17	36	78
CNEL:	8	18	39	83

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.62	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.57	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.4	53.5	51.8	45.7	54.3	54.9
Medium Trucks:	50.3	48.8	42.4	40.9	49.3	49.6
Heavy Trucks:	53.5	52.1	43.1	44.3	52.7	52.8
Vehicle Noise:	58.3	56.7	52.7	48.8	57.3	57.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	14	29	63
CNEL:	7	14	31	67

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	720 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.38	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.62	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.57	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.2	63.3	61.5	55.4	64.1	64.7
Medium Trucks:	58.9	57.4	51.1	49.5	58.0	58.2
Heavy Trucks:	59.8	58.4	49.3	50.6	58.9	59.1
Vehicle Noise:	67.0	65.3	62.1	57.4	66.0	66.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	51	110	237
CNEL:	25	55	118	254

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,360 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.62	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.85	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.81	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.9	66.0	64.3	58.2	66.8	67.4
Medium Trucks:	61.7	60.2	53.8	52.3	60.8	61.0
Heavy Trucks:	62.6	61.1	52.1	53.3	61.7	61.8
Vehicle Noise:	69.8	68.0	64.9	60.2	68.7	69.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	36	78	168	363
CNEL:	39	84	181	389

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,630 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.07	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.02	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.7	66.8	65.0	59.0	67.6	68.2
Medium Trucks:	62.5	61.0	54.6	53.1	61.5	61.8
Heavy Trucks:	63.3	61.9	52.9	54.1	62.5	62.6
Vehicle Noise:	70.6	68.8	65.7	61.0	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	88	190	409
CNEL:	44	95	204	439

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,470 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.98	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.26	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.22	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.5	68.6	66.8	60.8	69.4	70.0
Medium Trucks:	64.3	62.8	56.4	54.9	63.3	63.6
Heavy Trucks:	65.1	63.7	54.7	55.9	64.3	64.4
Vehicle Noise:	72.4	70.6	67.5	62.8	71.3	71.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	116	251	540
CNEL:	58	125	269	579

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,910 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.86	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.38	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.33	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.7	59.7	68.3	68.9
Medium Trucks:	63.2	61.7	55.3	53.8	62.2	62.5
Heavy Trucks:	64.0	62.6	53.6	54.8	63.2	63.3
Vehicle Noise:	71.2	69.5	66.3	61.7	70.2	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	45	98	211	455
CNEL:	49	105	226	488

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	940 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.22	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.46	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.41	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.7	56.6	65.2	65.8
Medium Trucks:	60.1	58.6	52.2	50.7	59.1	59.4
Heavy Trucks:	60.9	59.5	50.5	51.7	60.1	60.2
Vehicle Noise:	68.2	66.4	63.3	58.6	67.1	67.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	132	283
CNEL:	30	65	141	304

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	530 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.71	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.95	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.90	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	57.6	56.1	49.7	48.2	56.7	56.9
Heavy Trucks:	58.5	57.0	48.0	49.2	57.6	57.7
Vehicle Noise:	65.7	63.9	60.8	56.1	64.6	65.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	42	90	193
CNEL:	21	45	96	207

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Pine Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	290 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.33	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.57	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.52	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.2	59.3	57.5	51.5	60.1	60.7
Medium Trucks:	55.0	53.5	47.1	45.6	54.0	54.3
Heavy Trucks:	55.8	54.4	45.4	46.6	55.0	55.1
Vehicle Noise:	63.1	61.3	58.2	53.5	62.0	62.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	13	28	60	129
CNEL:	14	30	64	139

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Pine Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	430 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.62	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.85	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.81	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.9	61.0	59.3	53.2	61.8	62.4
Medium Trucks:	56.7	55.2	48.8	47.3	55.8	56.0
Heavy Trucks:	57.5	56.1	47.1	48.3	56.7	56.8
Vehicle Noise:	64.8	63.0	59.9	55.2	63.7	64.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	17	36	78	168
CNEL:	18	39	84	180

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	870 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.56	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.79	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.75	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.0	64.1	62.3	56.3	64.9	65.5
Medium Trucks:	59.8	58.3	51.9	50.4	58.8	59.0
Heavy Trucks:	60.6	59.2	50.2	51.4	59.8	59.9
Vehicle Noise:	67.8	66.1	62.9	58.3	66.8	67.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	58	125	269
CNEL:	29	62	134	289

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	530 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.71	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.95	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.90	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	57.6	56.1	49.7	48.2	56.7	56.9
Heavy Trucks:	58.5	57.0	48.0	49.2	57.6	57.7
Vehicle Noise:	65.7	63.9	60.8	56.1	64.6	65.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	42	90	193
CNEL:	21	45	96	207

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,130 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.00	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.23	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.19	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.6	69.7	67.9	61.8	70.5	71.1
Medium Trucks:	65.4	63.8	57.5	55.9	64.4	64.6
Heavy Trucks:	66.2	64.8	55.7	57.0	65.3	65.5
Vehicle Noise:	73.4	71.7	68.5	63.8	72.4	72.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	72	155	335	721
CNEL:	77	167	359	773

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,940 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.00	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.23	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.19	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	68.9	62.8	71.5	72.1
Medium Trucks:	66.4	64.8	58.5	56.9	65.4	65.6
Heavy Trucks:	67.2	65.8	56.7	58.0	66.3	66.5
Vehicle Noise:	74.4	72.7	69.5	64.8	73.4	73.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	181	390	840
CNEL:	90	194	418	901

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Belmont Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.25	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.49	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.44	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.8	53.9	52.1	46.1	54.7	55.3
Medium Trucks:	50.7	49.2	42.8	41.3	49.7	50.0
Heavy Trucks:	53.9	52.5	43.4	44.7	53.0	53.2
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	21	46
CNEL:	5	10	22	48

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Belmont Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.42	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.66	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.61	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.6	53.7	52.0	45.9	54.5	55.1
Medium Trucks:	50.5	49.0	42.6	41.1	49.6	49.8
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	58.5	56.9	52.9	49.0	57.5	57.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	10	21	44
CNEL:	5	10	22	47

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Belmont Av.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	140 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-7.94	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-25.18	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-29.13	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.1	51.2	49.4	43.4	52.0	52.6
Medium Trucks:	48.0	46.5	40.1	38.6	47.0	47.3
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	56.0	54.3	50.4	46.5	55.0	55.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	6	14	30
CNEL:	3	7	15	32

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Irvington Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.62	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.57	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.8	54.0	47.9	56.6	57.2
Medium Trucks:	52.6	51.1	44.7	43.1	51.6	51.8
Heavy Trucks:	55.8	54.4	45.3	46.6	54.9	55.0
Vehicle Noise:	60.6	58.9	55.0	51.1	59.6	60.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	28	61
CNEL:	6	14	30	64

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	360 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.84	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.07	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.03	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.2	55.3	53.5	47.5	56.1	56.7
Medium Trucks:	52.1	50.6	44.2	42.7	51.1	51.4
Heavy Trucks:	55.3	53.9	44.9	46.1	54.5	54.6
Vehicle Noise:	60.1	58.4	54.5	50.6	59.1	59.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	26	57
CNEL:	6	13	28	60

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	230 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.78	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-23.02	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.98	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.3	53.4	51.6	45.5	54.2	54.8
Medium Trucks:	50.2	48.6	42.3	40.7	49.2	49.4
Heavy Trucks:	53.4	51.9	42.9	44.2	52.5	52.6
Vehicle Noise:	58.2	56.5	52.6	48.7	57.2	57.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	9	19	42
CNEL:	4	10	21	45

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	920 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.31	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.55	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.51	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.2	64.3	62.6	56.5	65.1	65.7
Medium Trucks:	60.0	58.5	52.1	50.6	59.1	59.3
Heavy Trucks:	60.9	59.4	50.4	51.6	60.0	60.1
Vehicle Noise:	68.1	66.3	63.2	58.5	67.0	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	60	130	279
CNEL:	30	65	139	300

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	760 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.14	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.38	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.34	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.4	63.5	61.7	55.7	64.3	64.9
Medium Trucks:	59.2	57.7	51.3	49.8	58.2	58.5
Heavy Trucks:	60.0	58.6	49.6	50.8	59.2	59.3
Vehicle Noise:	67.2	65.5	62.3	57.7	66.2	66.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	53	114	246
CNEL:	26	57	122	264

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	220 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-8.53	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-25.77	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-29.72	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.2	60.3	58.6	52.5	61.1	61.7
Medium Trucks:	56.1	54.6	48.2	46.6	55.1	55.3
Heavy Trucks:	56.9	55.5	46.4	47.7	56.0	56.2
Vehicle Noise:	64.1	62.4	59.2	54.5	63.1	63.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	10	22	48	104
CNEL:	11	24	52	111

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,660 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.25	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.99	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.94	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.8	66.9	65.1	59.1	67.7	68.3
Medium Trucks:	62.6	61.1	54.7	53.2	61.6	61.9
Heavy Trucks:	63.4	62.0	53.0	54.2	62.6	62.7
Vehicle Noise:	70.7	68.9	65.8	61.1	69.6	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	47	102	219	472
CNEL:	51	109	235	507

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,500 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.19	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.43	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.38	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.4	66.5	64.7	58.7	67.3	67.9
Medium Trucks:	62.2	60.6	54.3	52.7	61.2	61.4
Heavy Trucks:	63.0	61.6	52.5	53.8	62.1	62.3
Vehicle Noise:	70.2	68.5	65.3	60.6	69.2	69.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	44	95	205	441
CNEL:	47	102	220	473

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,080 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.23	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.01	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.96	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.1	60.1	68.7	69.3
Medium Trucks:	63.6	62.1	55.7	54.2	62.6	62.9
Heavy Trucks:	64.4	63.0	54.0	55.2	63.6	63.7
Vehicle Noise:	71.6	69.9	66.7	62.1	70.6	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	55	118	255	549
CNEL:	59	127	273	589

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,040 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.15	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.09	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.05	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.7	67.8	66.0	60.0	68.6	69.2
Medium Trucks:	63.5	62.0	55.6	54.1	62.5	62.8
Heavy Trucks:	64.3	62.9	53.9	55.1	63.5	63.6
Vehicle Noise:	71.6	69.8	66.7	62.0	70.5	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	117	252	542
CNEL:	58	125	270	581

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,900 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.84	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.40	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.36	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.7	59.7	68.3	68.9
Medium Trucks:	63.2	61.7	55.3	53.8	62.2	62.5
Heavy Trucks:	64.0	62.6	53.6	54.8	63.2	63.3
Vehicle Noise:	71.2	69.5	66.3	61.7	70.2	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	52	111	240	517
CNEL:	55	119	257	554

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,900 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.74	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-12.13	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.52	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.6	74.7	72.9	66.9	75.5	76.1
Medium Trucks:	72.9	71.4	65.1	63.5	72.0	72.2
Heavy Trucks:	77.5	76.1	67.1	68.3	76.7	76.8
Vehicle Noise:	80.9	79.3	74.5	71.4	79.9	80.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	283	611	1,316	2,835
CNEL:	298	642	1,383	2,979

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2018
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	46,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,640 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.49	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.37	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.77	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.3	75.4	73.7	67.6	76.2	76.8
Medium Trucks:	73.7	72.2	65.8	64.3	72.7	73.0
Heavy Trucks:	78.3	76.9	67.8	69.1	77.4	77.6
Vehicle Noise:	81.6	80.0	75.2	72.2	80.7	81.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	318	686	1,477	3,183
CNEL:	334	721	1,552	3,344

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	210 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.64	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.88	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.83	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.7	54.8	53.1	47.0	55.6	56.2
Medium Trucks:	51.0	49.5	43.1	41.6	50.0	50.3
Heavy Trucks:	52.8	51.4	42.4	43.6	52.0	52.1
Vehicle Noise:	59.0	57.3	53.8	49.4	58.0	58.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	15	32	69
CNEL:	7	16	34	74

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-6.55	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-23.78	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-27.74	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.8	55.9	54.2	48.1	56.7	57.3
Medium Trucks:	52.1	50.6	44.2	42.7	51.1	51.4
Heavy Trucks:	53.9	52.5	43.5	44.7	53.1	53.2
Vehicle Noise:	60.1	58.4	54.9	50.5	59.1	59.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	18	38	82
CNEL:	9	19	41	88

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	410 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.27	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.51	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.46	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.5	53.6	51.9	45.8	54.4	55.0
Medium Trucks:	50.4	48.9	42.5	41.0	49.4	49.7
Heavy Trucks:	53.6	52.2	43.2	44.4	52.8	52.9
Vehicle Noise:	58.4	56.8	52.8	48.9	57.4	57.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	14	30	64
CNEL:	7	15	32	68

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	730 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.32	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.56	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.51	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.2	63.3	61.6	55.5	64.1	64.7
Medium Trucks:	59.0	57.5	51.1	49.6	58.1	58.3
Heavy Trucks:	59.8	58.4	49.4	50.6	59.0	59.1
Vehicle Noise:	67.1	65.3	62.2	57.5	66.0	66.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	52	111	239
CNEL:	26	55	119	257

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,370 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.58	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.82	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.78	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.0	66.1	64.3	58.2	66.9	67.5
Medium Trucks:	61.7	60.2	53.9	52.3	60.8	61.0
Heavy Trucks:	62.6	61.2	52.1	53.4	61.7	61.9
Vehicle Noise:	69.8	68.1	64.9	60.2	68.8	69.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	36	78	169	364
CNEL:	39	84	181	391

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,640 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.20	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.04	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.00	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.7	66.8	65.1	59.0	67.6	68.2
Medium Trucks:	62.5	61.0	54.7	53.1	61.6	61.8
Heavy Trucks:	63.4	61.9	52.9	54.2	62.5	62.6
Vehicle Noise:	70.6	68.8	65.7	61.0	69.6	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	88	191	411
CNEL:	44	95	204	441

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,530 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.08	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.16	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.11	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.6	68.7	67.0	60.9	69.5	70.1
Medium Trucks:	64.4	62.9	56.5	55.0	63.4	63.7
Heavy Trucks:	65.2	63.8	54.8	56.0	64.4	64.5
Vehicle Noise:	72.5	70.7	67.6	62.9	71.4	71.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	55	118	255	548
CNEL:	59	127	273	588

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,940 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.93	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.31	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.27	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.8	59.7	68.4	69.0
Medium Trucks:	63.2	61.7	55.4	53.8	62.3	62.5
Heavy Trucks:	64.1	62.7	53.6	54.9	63.2	63.4
Vehicle Noise:	71.3	69.6	66.4	61.7	70.3	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	46	99	213	459
CNEL:	49	106	229	493

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.41	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.37	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.6	65.3	65.9
Medium Trucks:	60.1	58.6	52.3	50.7	59.2	59.4
Heavy Trucks:	61.0	59.6	50.5	51.8	60.1	60.3
Vehicle Noise:	68.2	66.5	63.3	58.6	67.2	67.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	61	132	285
CNEL:	31	66	142	306

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	530 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.71	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.95	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.90	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	57.6	56.1	49.7	48.2	56.7	56.9
Heavy Trucks:	58.5	57.0	48.0	49.2	57.6	57.7
Vehicle Noise:	65.7	63.9	60.8	56.1	64.6	65.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	42	90	193
CNEL:	21	45	96	207

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Pine Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	290 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.33	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.57	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.52	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.2	59.3	57.5	51.5	60.1	60.7
Medium Trucks:	55.0	53.5	47.1	45.6	54.0	54.3
Heavy Trucks:	55.8	54.4	45.4	46.6	55.0	55.1
Vehicle Noise:	63.1	61.3	58.2	53.5	62.0	62.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	13	28	60	129
CNEL:	14	30	64	139

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Pine Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	430 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.62	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.85	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.81	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.9	61.0	59.3	53.2	61.8	62.4
Medium Trucks:	56.7	55.2	48.8	47.3	55.8	56.0
Heavy Trucks:	57.5	56.1	47.1	48.3	56.7	56.8
Vehicle Noise:	64.8	63.0	59.9	55.2	63.7	64.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	17	36	78	168
CNEL:	18	39	84	180

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	870 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.56	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.79	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.75	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.0	64.1	62.3	56.3	64.9	65.5
Medium Trucks:	59.8	58.3	51.9	50.4	58.8	59.0
Heavy Trucks:	60.6	59.2	50.2	51.4	59.8	59.9
Vehicle Noise:	67.8	66.1	62.9	58.3	66.8	67.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	58	125	269
CNEL:	29	62	134	289

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.63	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.87	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.82	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	57.7	56.2	49.8	48.3	56.7	57.0
Heavy Trucks:	58.5	57.1	48.1	49.3	57.7	57.8
Vehicle Noise:	65.8	64.0	60.9	56.2	64.7	65.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	42	91	196
CNEL:	21	45	98	210

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,130 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.00	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.23	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.19	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.6	69.7	67.9	61.8	70.5	71.1
Medium Trucks:	65.4	63.8	57.5	55.9	64.4	64.6
Heavy Trucks:	66.2	64.8	55.7	57.0	65.3	65.5
Vehicle Noise:	73.4	71.7	68.5	63.8	72.4	72.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	72	155	335	721
CNEL:	77	167	359	773

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.01	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.22	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.18	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	66.4	64.9	58.5	56.9	65.4	65.6
Heavy Trucks:	67.2	65.8	56.7	58.0	66.4	66.5
Vehicle Noise:	74.4	72.7	69.5	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	181	391	842
CNEL:	90	195	419	903

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Belmont Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.25	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.49	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.44	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.8	53.9	52.1	46.1	54.7	55.3
Medium Trucks:	50.7	49.2	42.8	41.3	49.7	50.0
Heavy Trucks:	53.9	52.5	43.4	44.7	53.0	53.2
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	21	46
CNEL:	5	10	22	48

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Belmont Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.42	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.66	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.61	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.6	53.7	52.0	45.9	54.5	55.1
Medium Trucks:	50.5	49.0	42.6	41.1	49.6	49.8
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	58.5	56.9	52.9	49.0	57.5	57.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	10	21	44
CNEL:	5	10	22	47

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Belmont Av.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	140 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-7.94	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-25.18	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-29.13	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.1	51.2	49.4	43.4	52.0	52.6
Medium Trucks:	48.0	46.5	40.1	38.6	47.0	47.3
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	56.0	54.3	50.4	46.5	55.0	55.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	6	14	30
CNEL:	3	7	15	32

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Irvington Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.62	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.57	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.8	54.0	47.9	56.6	57.2
Medium Trucks:	52.6	51.1	44.7	43.1	51.6	51.8
Heavy Trucks:	55.8	54.4	45.3	46.6	54.9	55.0
Vehicle Noise:	60.6	58.9	55.0	51.1	59.6	60.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	28	61
CNEL:	6	14	30	64

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	360 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.84	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.07	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.03	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.2	55.3	53.5	47.5	56.1	56.7
Medium Trucks:	52.1	50.6	44.2	42.7	51.1	51.4
Heavy Trucks:	55.3	53.9	44.9	46.1	54.5	54.6
Vehicle Noise:	60.1	58.4	54.5	50.6	59.1	59.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	26	57
CNEL:	6	13	28	60

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.25	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.49	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.44	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.8	53.9	52.1	46.1	54.7	55.3
Medium Trucks:	50.7	49.2	42.8	41.3	49.7	50.0
Heavy Trucks:	53.9	52.5	43.4	44.7	53.0	53.2
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	21	46
CNEL:	5	10	22	48

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	930 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.27	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.50	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.46	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.6	56.6	65.2	65.8
Medium Trucks:	60.1	58.5	52.2	50.6	59.1	59.3
Heavy Trucks:	60.9	59.5	50.4	51.7	60.0	60.2
Vehicle Noise:	68.1	66.4	63.2	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	131	281
CNEL:	30	65	140	302

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	780 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.03	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.27	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.22	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	59.3	57.8	51.4	49.9	58.3	58.6
Heavy Trucks:	60.1	58.7	49.7	50.9	59.3	59.4
Vehicle Noise:	67.4	65.6	62.5	57.8	66.3	66.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	54	116	250
CNEL:	27	58	125	268

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	310 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.04	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-24.28	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-28.23	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.7	61.8	60.1	54.0	62.6	63.2
Medium Trucks:	57.6	56.0	49.7	48.1	56.6	56.8
Heavy Trucks:	58.4	57.0	47.9	49.2	57.5	57.7
Vehicle Noise:	65.6	63.8	60.7	56.0	64.6	65.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	13	28	60	130
CNEL:	14	30	65	140

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,680 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.30	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.94	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.89	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.9	67.0	65.2	59.1	67.8	68.4
Medium Trucks:	62.6	61.1	54.8	53.2	61.7	61.9
Heavy Trucks:	63.5	62.1	53.0	54.3	62.6	62.8
Vehicle Noise:	70.7	69.0	65.8	61.1	69.7	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	48	103	221	476
CNEL:	51	110	237	511

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,520 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.13	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.37	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.33	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.4	66.5	64.8	58.7	67.3	67.9
Medium Trucks:	62.2	60.7	54.3	52.8	61.3	61.5
Heavy Trucks:	63.1	61.6	52.6	53.8	62.2	62.3
Vehicle Noise:	70.3	68.5	65.4	60.7	69.2	69.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	45	96	207	445
CNEL:	48	103	222	478

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,100 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.27	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.97	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.92	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.2	60.1	68.7	69.3
Medium Trucks:	63.6	62.1	55.7	54.2	62.7	62.9
Heavy Trucks:	64.5	63.0	54.0	55.3	63.6	63.7
Vehicle Noise:	71.7	69.9	66.8	62.1	70.6	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	55	119	256	552
CNEL:	59	128	275	593

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,050 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.17	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.07	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.03	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.7	67.8	66.1	60.0	68.6	69.2
Medium Trucks:	63.5	62.0	55.6	54.1	62.6	62.8
Heavy Trucks:	64.4	62.9	53.9	55.1	63.5	63.6
Vehicle Noise:	71.6	69.8	66.7	62.0	70.5	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	117	252	544
CNEL:	58	126	271	583

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,900 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.84	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.40	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.36	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.7	59.7	68.3	68.9
Medium Trucks:	63.2	61.7	55.3	53.8	62.2	62.5
Heavy Trucks:	64.0	62.6	53.6	54.8	63.2	63.3
Vehicle Noise:	71.2	69.5	66.3	61.7	70.2	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	52	111	240	517
CNEL:	55	119	257	554

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,930 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.77	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-12.10	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.49	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.6	74.7	72.9	66.9	75.5	76.1
Medium Trucks:	73.0	71.4	65.1	63.5	72.0	72.2
Heavy Trucks:	77.6	76.2	67.1	68.4	76.7	76.9
Vehicle Noise:	80.9	79.3	74.5	71.5	79.9	80.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	285	614	1,323	2,849
CNEL:	299	645	1,390	2,994

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2018
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	46,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,680 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.53	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.34	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.73	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.4	75.5	73.7	67.7	76.3	76.9
Medium Trucks:	73.7	72.2	65.8	64.3	72.8	73.0
Heavy Trucks:	78.3	76.9	67.9	69.1	77.5	77.6
Vehicle Noise:	81.7	80.0	75.2	72.2	80.7	81.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	320	690	1,486	3,201
CNEL:	336	725	1,561	3,364

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	210 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.64	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.88	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.83	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.7	54.8	53.1	47.0	55.6	56.2
Medium Trucks:	51.0	49.5	43.1	41.6	50.0	50.3
Heavy Trucks:	52.8	51.4	42.4	43.6	52.0	52.1
Vehicle Noise:	59.0	57.3	53.8	49.4	58.0	58.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	15	32	69
CNEL:	7	16	34	74

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-6.88	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.12	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.07	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.5	55.6	53.8	47.8	56.4	57.0
Medium Trucks:	51.7	50.2	43.9	42.3	50.8	51.0
Heavy Trucks:	53.6	52.2	43.1	44.4	52.7	52.9
Vehicle Noise:	59.7	58.0	54.6	50.2	58.7	59.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	17	36	78
CNEL:	8	18	39	83

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	410 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.27	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.51	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.46	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.5	53.6	51.9	45.8	54.4	55.0
Medium Trucks:	50.4	48.9	42.5	41.0	49.4	49.7
Heavy Trucks:	53.6	52.2	43.2	44.4	52.8	52.9
Vehicle Noise:	58.4	56.8	52.8	48.9	57.4	57.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	14	30	64
CNEL:	7	15	32	68

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	740 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.26	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.50	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.45	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.6	55.6	64.2	64.8
Medium Trucks:	59.1	57.6	51.2	49.6	58.1	58.3
Heavy Trucks:	59.9	58.5	49.4	50.7	59.1	59.2
Vehicle Noise:	67.1	65.4	62.2	57.6	66.1	66.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	52	112	242
CNEL:	26	56	120	259

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,390 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.52	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.76	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.72	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.0	66.1	64.4	58.3	66.9	67.5
Medium Trucks:	61.8	60.3	53.9	52.4	60.8	61.1
Heavy Trucks:	62.6	61.2	52.2	53.4	61.8	61.9
Vehicle Noise:	69.9	68.1	65.0	60.3	68.8	69.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	79	171	368
CNEL:	39	85	183	395

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,660 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.25	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.99	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.94	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.8	66.9	65.1	59.1	67.7	68.3
Medium Trucks:	62.6	61.1	54.7	53.2	61.6	61.9
Heavy Trucks:	63.4	62.0	53.0	54.2	62.6	62.7
Vehicle Noise:	70.6	68.9	65.7	61.1	69.6	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	41	89	192	414
CNEL:	44	96	206	444

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,510 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.05	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.19	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.15	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.6	68.7	66.9	60.9	69.5	70.1
Medium Trucks:	64.4	62.9	56.5	55.0	63.4	63.6
Heavy Trucks:	65.2	63.8	54.8	56.0	64.4	64.5
Vehicle Noise:	72.4	70.7	67.5	62.9	71.4	71.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	55	118	253	545
CNEL:	59	126	272	585

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.95	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.29	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.24	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.8	59.8	68.4	69.0
Medium Trucks:	63.3	61.8	55.4	53.9	62.3	62.6
Heavy Trucks:	64.1	62.7	53.7	54.9	63.3	63.4
Vehicle Noise:	71.3	69.6	66.4	61.8	70.3	70.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	46	99	214	461
CNEL:	49	107	230	494

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	960 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.13	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.37	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.32	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.7	65.3	65.9
Medium Trucks:	60.2	58.7	52.3	50.8	59.2	59.5
Heavy Trucks:	61.0	59.6	50.6	51.8	60.2	60.3
Vehicle Noise:	68.3	66.5	63.4	58.7	67.2	67.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	62	133	287
CNEL:	31	66	143	308

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.63	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.87	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.82	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	57.7	56.2	49.8	48.3	56.7	57.0
Heavy Trucks:	58.5	57.1	48.1	49.3	57.7	57.8
Vehicle Noise:	65.8	64.0	60.9	56.2	64.7	65.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	42	91	196
CNEL:	21	45	98	210

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Pine Av.
Road Segment: n/o Belmont Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	300 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.18	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.42	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.37	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.4	59.5	57.7	51.6	60.3	60.9
Medium Trucks:	55.1	53.6	47.3	45.7	54.2	54.4
Heavy Trucks:	56.0	54.6	45.5	46.8	55.1	55.3
Vehicle Noise:	63.2	61.5	58.3	53.6	62.2	62.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	13	29	61	132
CNEL:	14	31	66	142

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Pine Av.
Road Segment: s/o Belmont Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	440 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.52	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.75	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.71	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.0	61.1	59.4	53.3	61.9	62.5
Medium Trucks:	56.8	55.3	48.9	47.4	55.9	56.1
Heavy Trucks:	57.6	56.2	47.2	48.4	56.8	56.9
Vehicle Noise:	64.9	63.1	60.0	55.3	63.8	64.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	17	37	79	171
CNEL:	18	39	85	183

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	890 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.46	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.70	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.65	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.1	64.2	62.4	56.4	65.0	65.6
Medium Trucks:	59.9	58.4	52.0	50.5	58.9	59.1
Heavy Trucks:	60.7	59.3	50.3	51.5	59.9	60.0
Vehicle Noise:	67.9	66.2	63.0	58.4	66.9	67.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	27	59	127	273
CNEL:	29	63	136	293

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.63	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.87	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.82	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	57.7	56.2	49.8	48.3	56.7	57.0
Heavy Trucks:	58.5	57.1	48.1	49.3	57.7	57.8
Vehicle Noise:	65.8	64.0	60.9	56.2	64.7	65.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	42	91	196
CNEL:	21	45	98	210

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,190 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.09	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.15	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.11	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.6	69.7	68.0	61.9	70.5	71.2
Medium Trucks:	65.4	63.9	57.6	56.0	64.5	64.7
Heavy Trucks:	66.3	64.9	55.8	57.1	65.4	65.6
Vehicle Noise:	73.5	71.8	68.6	63.9	72.5	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	73	157	339	730
CNEL:	78	169	363	783

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,020 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.09	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.15	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.10	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.0	62.9	71.6	72.2
Medium Trucks:	66.4	64.9	58.6	57.0	65.5	65.7
Heavy Trucks:	67.3	65.9	56.8	58.1	66.4	66.6
Vehicle Noise:	74.5	72.8	69.6	64.9	73.5	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	85	183	395	852
CNEL:	91	197	424	914

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Belmont Av.
Road Segment: w/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.08	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.32	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.28	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.0	54.1	52.3	46.2	54.9	55.5
Medium Trucks:	50.9	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	54.1	52.6	43.6	44.9	53.2	53.3
Vehicle Noise:	58.9	57.2	53.3	49.4	57.9	58.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	22	47
CNEL:	5	11	23	50

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Belmont Av.
Road Segment: e/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.25	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.49	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.44	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.8	53.9	52.1	46.1	54.7	55.3
Medium Trucks:	50.7	49.2	42.8	41.3	49.7	50.0
Heavy Trucks:	53.9	52.5	43.4	44.7	53.0	53.2
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	21	46
CNEL:	5	10	22	48

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Belmont Av.
Road Segment: w/o Pine Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	140 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-7.94	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-25.18	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-29.13	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.1	51.2	49.4	43.4	52.0	52.6
Medium Trucks:	48.0	46.5	40.1	38.6	47.0	47.3
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	56.0	54.3	50.4	46.5	55.0	55.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	6	14	30
CNEL:	3	7	15	32

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Irvington Av.
Road Segment: w/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.62	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.57	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.8	54.0	47.9	56.6	57.2
Medium Trucks:	52.6	51.1	44.7	43.1	51.6	51.8
Heavy Trucks:	55.8	54.4	45.3	46.6	54.9	55.0
Vehicle Noise:	60.6	58.9	55.0	51.1	59.6	60.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	28	61
CNEL:	6	14	30	64

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Irvington Av.
Road Segment: e/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.72	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.95	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.91	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	52.2	50.7	44.4	42.8	51.3	51.5
Heavy Trucks:	55.4	54.0	45.0	46.2	54.6	54.7
Vehicle Noise:	60.2	58.6	54.6	50.7	59.2	59.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	27	58
CNEL:	6	13	28	61

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	240 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.60	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.83	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.79	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.4	53.5	51.8	45.7	54.3	55.0
Medium Trucks:	50.3	48.8	42.5	40.9	49.4	49.6
Heavy Trucks:	53.6	52.1	43.1	44.3	52.7	52.8
Vehicle Noise:	58.4	56.7	52.8	48.9	57.4	57.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	9	20	43
CNEL:	5	10	21	46

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	940 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.22	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.46	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.41	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.7	56.6	65.2	65.8
Medium Trucks:	60.1	58.6	52.2	50.7	59.1	59.4
Heavy Trucks:	60.9	59.5	50.5	51.7	60.1	60.2
Vehicle Noise:	68.2	66.4	63.3	58.6	67.1	67.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	132	283
CNEL:	30	65	141	304

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	780 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.03	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.27	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.22	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	59.3	57.8	51.4	49.9	58.3	58.6
Heavy Trucks:	60.1	58.7	49.7	50.9	59.3	59.4
Vehicle Noise:	67.4	65.6	62.5	57.8	66.3	66.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	54	116	250
CNEL:	27	58	125	268

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	230 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-8.33	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-25.57	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-29.53	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.4	60.5	58.8	52.7	61.3	61.9
Medium Trucks:	56.3	54.7	48.4	46.8	55.3	55.5
Heavy Trucks:	57.1	55.7	46.6	47.9	56.2	56.4
Vehicle Noise:	64.3	62.6	59.4	54.7	63.3	63.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	11	23	50	107
CNEL:	11	25	53	114

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,690 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.33	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.91	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.87	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.9	67.0	65.2	59.2	67.8	68.4
Medium Trucks:	62.7	61.2	54.8	53.3	61.7	62.0
Heavy Trucks:	63.5	62.1	53.1	54.3	62.7	62.8
Vehicle Noise:	70.7	69.0	65.8	61.2	69.7	70.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	48	103	222	478
CNEL:	51	110	238	513

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,530 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.10	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.34	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.30	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.5	66.6	64.8	58.7	67.4	68.0
Medium Trucks:	62.2	60.7	54.4	52.8	61.3	61.5
Heavy Trucks:	63.1	61.7	52.6	53.9	62.2	62.4
Vehicle Noise:	70.3	68.6	65.4	60.7	69.3	69.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	45	96	208	447
CNEL:	48	103	223	480

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,130 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.33	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.91	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.86	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.0	66.2	60.2	68.8	69.4
Medium Trucks:	63.7	62.2	55.8	54.3	62.7	63.0
Heavy Trucks:	64.5	63.1	54.1	55.3	63.7	63.8
Vehicle Noise:	71.7	70.0	66.8	62.2	70.7	71.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	120	259	558
CNEL:	60	129	278	598

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,080 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.23	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.01	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.96	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.1	60.1	68.7	69.3
Medium Trucks:	63.6	62.1	55.7	54.2	62.6	62.9
Heavy Trucks:	64.4	63.0	54.0	55.2	63.6	63.7
Vehicle Noise:	71.6	69.9	66.7	62.1	70.6	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	55	118	255	549
CNEL:	59	127	273	589

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,940 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.93	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.31	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.27	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.8	59.8	68.4	69.0
Medium Trucks:	63.3	61.8	55.4	53.9	62.3	62.6
Heavy Trucks:	64.1	62.7	53.7	54.9	63.3	63.4
Vehicle Noise:	71.3	69.6	66.4	61.8	70.3	70.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	52	113	243	524
CNEL:	56	121	261	562

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,970 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.82	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-12.05	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.44	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.7	74.8	73.0	66.9	75.6	76.2
Medium Trucks:	73.0	71.5	65.1	63.6	72.0	72.3
Heavy Trucks:	77.6	76.2	67.2	68.4	76.8	76.9
Vehicle Noise:	80.9	79.3	74.5	71.5	80.0	80.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	287	618	1,332	2,869
CNEL:	301	649	1,399	3,014

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EA 2019
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	47,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,730 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.58	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.29	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.68	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.4	75.5	73.8	67.7	76.3	76.9
Medium Trucks:	73.8	72.3	65.9	64.3	72.8	73.0
Heavy Trucks:	78.4	77.0	67.9	69.2	77.5	77.7
Vehicle Noise:	81.7	80.1	75.3	72.3	80.7	81.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	322	695	1,496	3,224
CNEL:	339	730	1,572	3,388

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	230 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.24	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.48	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.44	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.1	55.2	53.5	47.4	56.0	56.6
Medium Trucks:	51.4	49.9	43.5	42.0	50.4	50.7
Heavy Trucks:	53.2	51.8	42.8	44.0	52.4	52.5
Vehicle Noise:	59.4	57.7	54.2	49.8	58.4	58.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	16	34	74
CNEL:	8	17	37	79

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	320 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-5.81	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-23.05	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-27.00	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	56.7	54.9	48.9	57.5	58.1
Medium Trucks:	52.8	51.3	44.9	43.4	51.9	52.1
Heavy Trucks:	54.7	53.3	44.2	45.5	53.8	53.9
Vehicle Noise:	60.8	59.1	55.6	51.3	59.8	60.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	20	43	92
CNEL:	10	21	46	98

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	430 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.06	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.30	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.26	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.7	53.8	52.1	46.0	54.6	55.3
Medium Trucks:	50.6	49.1	42.7	41.2	49.7	49.9
Heavy Trucks:	53.8	52.4	43.4	44.6	53.0	53.1
Vehicle Noise:	58.6	57.0	53.1	49.1	57.7	58.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	14	31	66
CNEL:	7	15	33	70

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	800 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.92	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.16	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.11	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	62.0	55.9	64.5	65.1
Medium Trucks:	59.4	57.9	51.5	50.0	58.4	58.7
Heavy Trucks:	60.2	58.8	49.8	51.0	59.4	59.5
Vehicle Noise:	67.5	65.7	62.6	57.9	66.4	66.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	55	118	255
CNEL:	27	59	127	273

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,470 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.28	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.52	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.47	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.3	66.4	64.6	58.5	67.2	67.8
Medium Trucks:	62.0	60.5	54.2	52.6	61.1	61.3
Heavy Trucks:	62.9	61.5	52.4	53.7	62.0	62.2
Vehicle Noise:	70.1	68.4	65.2	60.5	69.1	69.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	38	82	177	382
CNEL:	41	88	190	410

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,760 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.50	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.73	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.69	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.0	67.1	65.4	59.3	67.9	68.5
Medium Trucks:	62.8	61.3	55.0	53.4	61.9	62.1
Heavy Trucks:	63.7	62.2	53.2	54.5	62.8	62.9
Vehicle Noise:	70.9	69.1	66.0	61.3	69.9	70.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	43	93	200	431
CNEL:	46	99	214	462

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,680 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.33	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-14.91	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.86	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.9	69.0	67.2	61.1	69.8	70.4
Medium Trucks:	64.7	63.1	56.8	55.2	63.7	63.9
Heavy Trucks:	65.5	64.1	55.0	56.3	64.6	64.8
Vehicle Noise:	72.7	71.0	67.8	63.1	71.7	72.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	57	123	265	570
CNEL:	61	132	284	611

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,050 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.07	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.03	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.7	67.8	66.0	60.0	68.6	69.2
Medium Trucks:	63.5	62.0	55.6	54.1	62.5	62.8
Heavy Trucks:	64.3	62.9	53.9	55.1	63.5	63.6
Vehicle Noise:	71.5	69.8	66.7	62.0	70.5	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	48	103	221	477
CNEL:	51	110	237	511

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,010 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.91	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.15	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.10	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.6	64.7	63.0	56.9	65.5	66.1
Medium Trucks:	60.4	58.9	52.5	51.0	59.5	59.7
Heavy Trucks:	61.3	59.8	50.8	52.1	60.4	60.5
Vehicle Noise:	68.5	66.7	63.6	58.9	67.4	67.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	64	138	297
CNEL:	32	69	148	319

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	560 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.47	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.71	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.66	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.1	62.2	60.4	54.3	63.0	63.6
Medium Trucks:	57.9	56.3	50.0	48.4	56.9	57.1
Heavy Trucks:	58.7	57.3	48.2	49.5	57.8	58.0
Vehicle Noise:	65.9	64.2	61.0	56.3	64.9	65.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	43	93	201
CNEL:	22	46	100	215

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Pine Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	320 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-6.90	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.14	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.09	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.6	59.7	58.0	51.9	60.5	61.1
Medium Trucks:	55.4	53.9	47.6	46.0	54.5	54.7
Heavy Trucks:	56.3	54.8	45.8	47.1	55.4	55.5
Vehicle Noise:	63.5	61.7	58.6	53.9	62.5	62.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	14	30	64	138
CNEL:	15	32	69	148

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Pine Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	500 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.96	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.20	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.16	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.6	61.7	59.9	53.9	62.5	63.1
Medium Trucks:	57.4	55.9	49.5	47.9	56.4	56.6
Heavy Trucks:	58.2	56.8	47.7	49.0	57.4	57.5
Vehicle Noise:	65.4	63.7	60.5	55.9	64.4	64.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	40	86	186
CNEL:	20	43	93	200

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.41	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.37	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.6	65.3	65.9
Medium Trucks:	60.1	58.6	52.3	50.7	59.2	59.4
Heavy Trucks:	61.0	59.6	50.5	51.8	60.1	60.3
Vehicle Noise:	68.2	66.5	63.3	58.6	67.2	67.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	61	132	285
CNEL:	31	66	142	306

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	550 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.55	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.79	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.74	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.0	62.1	60.3	54.3	62.9	63.5
Medium Trucks:	57.8	56.3	49.9	48.4	56.8	57.1
Heavy Trucks:	58.6	57.2	48.2	49.4	57.8	57.9
Vehicle Noise:	65.8	64.1	60.9	56.3	64.8	65.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	43	92	198
CNEL:	21	46	99	213

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	32,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,210 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.11	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.12	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.08	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.7	69.8	68.0	62.0	70.6	71.2
Medium Trucks:	65.5	64.0	57.6	56.0	64.5	64.7
Heavy Trucks:	66.3	64.9	55.8	57.1	65.5	65.6
Vehicle Noise:	73.5	71.8	68.6	64.0	72.5	72.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	73	158	340	733
CNEL:	79	169	365	786

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,040 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.11	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.13	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.08	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	66.5	65.0	58.6	57.0	65.5	65.7
Heavy Trucks:	67.3	65.9	56.8	58.1	66.5	66.6
Vehicle Noise:	74.5	72.8	69.6	64.9	73.5	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	85	184	397	855
CNEL:	92	197	425	917

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Belmont Av.
Road Segment: w/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	290 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-4.77	3.51	-1.20	*-4.49*	0.000	0.000
Medium Trucks:	70.80	-22.01	3.58	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	77.97	-25.97	3.57	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.3	54.4	52.6	46.5	55.2	55.8
Medium Trucks:	51.2	49.7	43.3	41.7	50.2	50.4
Heavy Trucks:	54.4	53.0	43.9	45.2	53.5	53.6
Vehicle Noise:	59.2	57.5	53.6	49.7	58.2	58.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	5	11	23	49
CNEL:	5	11	24	52

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Belmont Av.
Road Segment: e/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	290 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-4.77	3.51	-1.20	*-4.49*	0.000	0.000
Medium Trucks:	70.80	-22.01	3.58	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	77.97	-25.97	3.57	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.3	54.4	52.6	46.5	55.2	55.8
Medium Trucks:	51.2	49.7	43.3	41.7	50.2	50.4
Heavy Trucks:	54.4	53.0	43.9	45.2	53.5	53.6
Vehicle Noise:	59.2	57.5	53.6	49.7	58.2	58.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	5	11	23	49
CNEL:	5	11	24	52

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Belmont Av.
Road Segment: w/o Pine Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	180 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-6.85	3.51	-1.20	*-4.49*	0.000	0.000
Medium Trucks:	70.80	-24.08	3.58	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	77.97	-28.04	3.57	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	54.2	52.3	50.5	44.5	53.1	53.7
Medium Trucks:	49.1	47.6	41.2	39.7	48.1	48.4
Heavy Trucks:	52.3	50.9	41.8	43.1	51.5	51.6
Vehicle Noise:	57.1	55.4	51.5	47.6	56.1	56.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	4	8	17	36
CNEL:	4	8	18	38

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Irvington Av.
Road Segment: w/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	420 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-3.17	3.51	-1.20	*-4.49*	0.000	0.000
Medium Trucks:	70.80	-20.40	3.58	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	77.97	-24.36	3.57	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.9	56.0	54.2	48.2	56.8	57.4
Medium Trucks:	52.8	51.3	44.9	43.4	51.8	52.0
Heavy Trucks:	56.0	54.6	45.5	46.8	55.1	55.3
Vehicle Noise:	60.8	59.1	55.2	51.3	59.8	60.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	6	13	29	63
CNEL:	7	14	31	66

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.72	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.95	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.91	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	52.2	50.7	44.4	42.8	51.3	51.5
Heavy Trucks:	55.4	54.0	45.0	46.2	54.6	54.7
Vehicle Noise:	60.2	58.6	54.6	50.7	59.2	59.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	27	58
CNEL:	6	13	28	61

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	320 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.35	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.59	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.54	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.7	54.8	53.0	47.0	55.6	56.2
Medium Trucks:	51.6	50.1	43.7	42.2	50.6	50.9
Heavy Trucks:	54.8	53.4	44.3	45.6	54.0	54.1
Vehicle Noise:	59.6	57.9	54.0	50.1	58.6	59.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	11	24	52
CNEL:	6	12	26	55

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	980 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.04	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.28	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.23	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.8	56.8	65.4	66.0
Medium Trucks:	60.3	58.8	52.4	50.9	59.3	59.6
Heavy Trucks:	61.1	59.7	50.7	51.9	60.3	60.4
Vehicle Noise:	68.3	66.6	63.4	58.8	67.3	67.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	63	135	291
CNEL:	31	67	145	313

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	800 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.92	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.16	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.11	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.6	63.7	62.0	55.9	64.5	65.1
Medium Trucks:	59.4	57.9	51.5	50.0	58.4	58.7
Heavy Trucks:	60.2	58.8	49.8	51.0	59.4	59.5
Vehicle Noise:	67.5	65.7	62.6	57.9	66.4	66.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	55	118	255
CNEL:	27	59	127	273

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	620 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.03	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-21.27	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-25.22	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.7	64.8	63.1	57.0	65.6	66.2
Medium Trucks:	60.6	59.1	52.7	51.1	59.6	59.8
Heavy Trucks:	61.4	60.0	50.9	52.2	60.5	60.7
Vehicle Noise:	68.6	66.9	63.7	59.0	67.6	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	45	96	207
CNEL:	22	48	103	222

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,820 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.65	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.59	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.54	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.2	67.3	65.5	59.5	68.1	68.7
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	71.1	69.3	66.2	61.5	70.0	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	108	233	502
CNEL:	54	116	250	539

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,660 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.25	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.99	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.94	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.8	66.9	65.1	59.1	67.7	68.3
Medium Trucks:	62.6	61.1	54.7	53.2	61.6	61.9
Heavy Trucks:	63.4	62.0	53.0	54.2	62.6	62.7
Vehicle Noise:	70.7	68.9	65.8	61.1	69.6	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	47	102	219	472
CNEL:	51	109	235	507

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,200 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.47	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.77	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.72	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.4	60.3	68.9	69.5
Medium Trucks:	63.8	62.3	56.0	54.4	62.9	63.1
Heavy Trucks:	64.7	63.2	54.2	55.5	63.8	63.9
Vehicle Noise:	71.9	70.1	67.0	62.3	70.9	71.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	57	123	264	570
CNEL:	61	132	284	611

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,140 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.35	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.89	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.84	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.0	66.2	60.2	68.8	69.4
Medium Trucks:	63.7	62.2	55.8	54.3	62.7	63.0
Heavy Trucks:	64.5	63.1	54.1	55.3	63.7	63.8
Vehicle Noise:	71.8	70.0	66.9	62.2	70.7	71.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	121	260	559
CNEL:	60	129	279	600

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,960 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.97	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.27	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.22	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.9	59.8	68.4	69.0
Medium Trucks:	63.3	61.8	55.4	53.9	62.4	62.6
Heavy Trucks:	64.2	62.7	53.7	55.0	63.3	63.4
Vehicle Noise:	71.4	69.6	66.5	61.8	70.4	70.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	114	245	528
CNEL:	57	122	263	566

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,030 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.88	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.99	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.38	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.7	74.8	73.1	67.0	75.6	76.2
Medium Trucks:	73.1	71.6	65.2	63.7	72.1	72.3
Heavy Trucks:	77.7	76.3	67.2	68.5	76.8	77.0
Vehicle Noise:	81.0	79.4	74.6	71.6	80.0	80.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	290	624	1,345	2,897
CNEL:	304	656	1,413	3,045

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	47,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,790 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.63	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.24	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.63	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.5	75.6	73.8	67.8	76.4	77.0
Medium Trucks:	73.8	72.3	65.9	64.4	72.9	73.1
Heavy Trucks:	78.4	77.0	68.0	69.2	77.6	77.7
Vehicle Noise:	81.8	80.1	75.3	72.3	80.8	81.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	325	700	1,509	3,251
CNEL:	342	736	1,586	3,416

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	210 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.64	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.88	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.83	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.7	54.8	53.1	47.0	55.6	56.2
Medium Trucks:	51.0	49.5	43.1	41.6	50.0	50.3
Heavy Trucks:	52.8	51.4	42.4	43.6	52.0	52.1
Vehicle Noise:	59.0	57.3	53.8	49.4	58.0	58.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	15	32	69
CNEL:	7	16	34	74

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-6.88	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.12	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.07	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.5	55.6	53.8	47.8	56.4	57.0
Medium Trucks:	51.7	50.2	43.9	42.3	50.8	51.0
Heavy Trucks:	53.6	52.2	43.1	44.4	52.7	52.9
Vehicle Noise:	59.7	58.0	54.6	50.2	58.7	59.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	17	36	78
CNEL:	8	18	39	83

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	420 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.40	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.36	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.6	53.7	52.0	45.9	54.5	55.2
Medium Trucks:	50.5	49.0	42.6	41.1	49.5	49.8
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	58.5	56.9	53.0	49.0	57.5	57.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	14	30	65
CNEL:	7	15	32	69

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	750 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.20	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.44	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.39	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.7	55.6	64.2	64.8
Medium Trucks:	59.1	57.6	51.3	49.7	58.2	58.4
Heavy Trucks:	60.0	58.5	49.5	50.8	59.1	59.2
Vehicle Noise:	67.2	65.4	62.3	57.6	66.2	66.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	53	113	244
CNEL:	26	56	121	262

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,410 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.46	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.70	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.65	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.1	66.2	64.4	58.4	67.0	67.6
Medium Trucks:	61.9	60.4	54.0	52.4	60.9	61.1
Heavy Trucks:	62.7	61.3	52.2	53.5	61.9	62.0
Vehicle Noise:	69.9	68.2	65.0	60.4	68.9	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	80	172	371
CNEL:	40	86	185	398

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,680 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.30	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.94	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.89	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.8	66.9	65.2	59.1	67.7	68.3
Medium Trucks:	62.6	61.1	54.8	53.2	61.7	61.9
Heavy Trucks:	63.5	62.0	53.0	54.3	62.6	62.7
Vehicle Noise:	70.7	68.9	65.8	61.1	69.7	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	42	90	194	417
CNEL:	45	96	208	448

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,590 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.18	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.06	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.01	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.7	68.8	67.1	61.0	69.6	70.2
Medium Trucks:	64.5	63.0	56.6	55.1	63.6	63.8
Heavy Trucks:	65.3	63.9	54.9	56.1	64.5	64.6
Vehicle Noise:	72.6	70.8	67.7	63.0	71.5	72.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	120	259	557
CNEL:	60	129	277	597

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,070 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.21	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.03	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.99	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.7	67.8	66.1	60.0	68.6	69.3
Medium Trucks:	63.5	62.0	55.7	54.1	62.6	62.8
Heavy Trucks:	64.4	63.0	53.9	55.2	63.5	63.6
Vehicle Noise:	71.6	69.8	66.7	62.0	70.6	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	48	103	223	480
CNEL:	51	111	239	515

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,140 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.38	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.62	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.58	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.2	65.3	63.5	57.4	66.1	66.7
Medium Trucks:	60.9	59.4	53.1	51.5	60.0	60.2
Heavy Trucks:	61.8	60.4	51.3	52.6	60.9	61.1
Vehicle Noise:	69.0	67.3	64.1	59.4	68.0	68.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	32	69	150	322
CNEL:	35	74	160	346

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.41	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.36	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.4	62.5	60.7	54.6	63.3	63.9
Medium Trucks:	58.2	56.6	50.3	48.7	57.2	57.4
Heavy Trucks:	59.0	57.6	48.5	49.8	58.1	58.3
Vehicle Noise:	66.2	64.5	61.3	56.6	65.2	65.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	45	98	210
CNEL:	23	49	105	225

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Pine Av.
Road Segment: n/o Belmont Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	310 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.04	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.28	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.23	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.5	59.6	57.8	51.8	60.4	61.0
Medium Trucks:	55.3	53.8	47.4	45.9	54.3	54.6
Heavy Trucks:	56.1	54.7	45.7	46.9	55.3	55.4
Vehicle Noise:	63.3	61.6	58.4	53.8	62.3	62.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	14	29	63	135
CNEL:	15	31	67	145

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Pine Av.
Road Segment: s/o Belmont Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	480 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.14	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.38	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.33	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.4	61.5	59.7	53.7	62.3	62.9
Medium Trucks:	57.2	55.7	49.3	47.8	56.2	56.5
Heavy Trucks:	58.0	56.6	47.6	48.8	57.2	57.3
Vehicle Noise:	65.2	63.5	60.3	55.7	64.2	64.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	18	39	84	181
CNEL:	19	42	90	194

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	930 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.27	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.50	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.46	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.6	56.6	65.2	65.8
Medium Trucks:	60.1	58.5	52.2	50.6	59.1	59.3
Heavy Trucks:	60.9	59.5	50.4	51.7	60.0	60.2
Vehicle Noise:	68.1	66.4	63.2	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	131	281
CNEL:	30	65	140	302

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	570 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.39	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.63	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.59	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.1	62.2	60.5	54.4	63.0	63.7
Medium Trucks:	57.9	56.4	50.1	48.5	57.0	57.2
Heavy Trucks:	58.8	57.4	48.3	49.6	57.9	58.0
Vehicle Noise:	66.0	64.2	61.1	56.4	65.0	65.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	44	94	203
CNEL:	22	47	101	218

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	32,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,230 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.14	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.10	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.05	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.7	69.8	68.0	62.0	70.6	71.2
Medium Trucks:	65.5	64.0	57.6	56.1	64.5	64.8
Heavy Trucks:	66.3	64.9	55.9	57.1	65.5	65.6
Vehicle Noise:	73.5	71.8	68.6	64.0	72.5	73.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	74	159	342	736
CNEL:	79	170	366	790

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	41,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,100 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.18	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.06	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.02	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.1	63.0	71.6	72.2
Medium Trucks:	66.5	65.0	58.7	57.1	65.6	65.8
Heavy Trucks:	67.4	65.9	56.9	58.2	66.5	66.6
Vehicle Noise:	74.6	72.8	69.7	65.0	73.6	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	86	186	401	863
CNEL:	93	199	430	926

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Belmont Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.08	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.32	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.28	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.0	54.1	52.3	46.2	54.9	55.5
Medium Trucks:	50.9	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	54.1	52.6	43.6	44.9	53.2	53.3
Vehicle Noise:	58.9	57.2	53.3	49.4	57.9	58.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	22	47
CNEL:	5	11	23	50

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Belmont Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.25	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.49	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.44	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.8	53.9	52.1	46.1	54.7	55.3
Medium Trucks:	50.7	49.2	42.8	41.3	49.7	50.0
Heavy Trucks:	53.9	52.5	43.4	44.7	53.0	53.2
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	21	46
CNEL:	5	10	22	48

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Belmont Av.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	140 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-7.94	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-25.18	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-29.13	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.1	51.2	49.4	43.4	52.0	52.6
Medium Trucks:	48.0	46.5	40.1	38.6	47.0	47.3
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	56.0	54.3	50.4	46.5	55.0	55.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	6	14	30
CNEL:	3	7	15	32

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Irvington Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.62	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.57	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.8	54.0	47.9	56.6	57.2
Medium Trucks:	52.6	51.1	44.7	43.1	51.6	51.8
Heavy Trucks:	55.8	54.4	45.3	46.6	54.9	55.0
Vehicle Noise:	60.6	58.9	55.0	51.1	59.6	60.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	28	61
CNEL:	6	14	30	64

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.72	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.95	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.91	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	52.2	50.7	44.4	42.8	51.3	51.5
Heavy Trucks:	55.4	54.0	45.0	46.2	54.6	54.7
Vehicle Noise:	60.2	58.6	54.6	50.7	59.2	59.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	27	58
CNEL:	6	13	28	61

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	240 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.60	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.83	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.79	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.4	53.5	51.8	45.7	54.3	55.0
Medium Trucks:	50.3	48.8	42.5	40.9	49.4	49.6
Heavy Trucks:	53.6	52.1	43.1	44.3	52.7	52.8
Vehicle Noise:	58.4	56.7	52.8	48.9	57.4	57.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	9	20	43
CNEL:	5	10	21	46

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	930 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.27	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.50	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.46	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.6	56.6	65.2	65.8
Medium Trucks:	60.1	58.5	52.2	50.6	59.1	59.3
Heavy Trucks:	60.9	59.5	50.4	51.7	60.0	60.2
Vehicle Noise:	68.1	66.4	63.2	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	131	281
CNEL:	30	65	140	302

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	760 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.14	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.38	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.34	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.4	63.5	61.7	55.7	64.3	64.9
Medium Trucks:	59.2	57.7	51.3	49.8	58.2	58.5
Heavy Trucks:	60.0	58.6	49.6	50.8	59.2	59.3
Vehicle Noise:	67.2	65.5	62.3	57.7	66.2	66.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	53	114	246
CNEL:	26	57	122	264

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	230 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-8.33	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-25.57	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-29.53	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.4	60.5	58.8	52.7	61.3	61.9
Medium Trucks:	56.3	54.7	48.4	46.8	55.3	55.5
Heavy Trucks:	57.1	55.7	46.6	47.9	56.2	56.4
Vehicle Noise:	64.3	62.6	59.4	54.7	63.3	63.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	11	23	50	107
CNEL:	11	25	53	114

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,780 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.55	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.69	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.64	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.1	67.2	65.4	59.4	68.0	68.6
Medium Trucks:	62.9	61.4	55.0	53.5	61.9	62.2
Heavy Trucks:	63.7	62.3	53.3	54.5	62.9	63.0
Vehicle Noise:	71.0	69.2	66.1	61.4	69.9	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	107	230	495
CNEL:	53	114	246	531

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,600 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.09	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.15	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.10	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.7	66.8	65.0	58.9	67.6	68.2
Medium Trucks:	62.4	60.9	54.6	53.0	61.5	61.7
Heavy Trucks:	63.3	61.9	52.8	54.1	62.4	62.6
Vehicle Noise:	70.5	68.8	65.6	60.9	69.5	69.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	46	99	214	461
CNEL:	49	106	229	494

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,190 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.45	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.78	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.74	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.3	60.3	68.9	69.5
Medium Trucks:	63.8	62.3	55.9	54.4	62.8	63.1
Heavy Trucks:	64.6	63.2	54.2	55.4	63.8	63.9
Vehicle Noise:	71.9	70.1	67.0	62.3	70.8	71.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	57	122	264	568
CNEL:	61	131	283	609

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,150 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.37	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.86	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.82	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.0	66.3	60.2	68.8	69.4
Medium Trucks:	63.7	62.2	55.9	54.3	62.8	63.0
Heavy Trucks:	64.6	63.1	54.1	55.4	63.7	63.8
Vehicle Noise:	71.8	70.0	66.9	62.2	70.8	71.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	121	260	561
CNEL:	60	130	279	602

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.95	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.29	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.24	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.8	59.8	68.4	69.0
Medium Trucks:	63.3	61.8	55.4	53.9	62.3	62.6
Heavy Trucks:	64.1	62.7	53.7	54.9	63.3	63.4
Vehicle Noise:	71.4	69.6	66.5	61.8	70.3	70.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	113	244	526
CNEL:	56	122	262	564

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,980 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.83	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-12.04	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.43	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.7	74.8	73.0	66.9	75.6	76.2
Medium Trucks:	73.0	71.5	65.1	63.6	72.1	72.3
Heavy Trucks:	77.6	76.2	67.2	68.4	76.8	76.9
Vehicle Noise:	80.9	79.3	74.5	71.5	80.0	80.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	287	619	1,334	2,873
CNEL:	302	650	1,401	3,019

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	46,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,690 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.54	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.33	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.72	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.4	75.5	73.7	67.7	76.3	76.9
Medium Trucks:	73.7	72.2	65.9	64.3	72.8	73.0
Heavy Trucks:	78.3	76.9	67.9	69.1	77.5	77.6
Vehicle Noise:	81.7	80.1	75.3	72.2	80.7	81.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	321	691	1,488	3,206
CNEL:	337	726	1,564	3,368

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	210 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.64	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.88	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.83	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.7	54.8	53.1	47.0	55.6	56.2
Medium Trucks:	51.0	49.5	43.1	41.6	50.0	50.3
Heavy Trucks:	52.8	51.4	42.4	43.6	52.0	52.1
Vehicle Noise:	59.0	57.3	53.8	49.4	58.0	58.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	15	32	69
CNEL:	7	16	34	74

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-6.55	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-23.78	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-27.74	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.8	55.9	54.2	48.1	56.7	57.3
Medium Trucks:	52.1	50.6	44.2	42.7	51.1	51.4
Heavy Trucks:	53.9	52.5	43.5	44.7	53.1	53.2
Vehicle Noise:	60.1	58.4	54.9	50.5	59.1	59.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	18	38	82
CNEL:	9	19	41	88

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	420 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.40	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.36	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.6	53.7	52.0	45.9	54.5	55.2
Medium Trucks:	50.5	49.0	42.6	41.1	49.5	49.8
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	58.5	56.9	53.0	49.0	57.5	57.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	14	30	65
CNEL:	7	15	32	69

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	760 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.14	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.38	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.34	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.4	63.5	61.7	55.7	64.3	64.9
Medium Trucks:	59.2	57.7	51.3	49.8	58.2	58.5
Heavy Trucks:	60.0	58.6	49.6	50.8	59.2	59.3
Vehicle Noise:	67.2	65.5	62.3	57.7	66.2	66.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	53	114	246
CNEL:	26	57	122	264

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,410 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.46	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.70	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.65	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.1	66.2	64.4	58.4	67.0	67.6
Medium Trucks:	61.9	60.4	54.0	52.4	60.9	61.1
Heavy Trucks:	62.7	61.3	52.2	53.5	61.9	62.0
Vehicle Noise:	69.9	68.2	65.0	60.4	68.9	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	80	172	371
CNEL:	40	86	185	398

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,690 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.33	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.91	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.87	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.9	67.0	65.2	59.1	67.8	68.4
Medium Trucks:	62.7	61.1	54.8	53.2	61.7	61.9
Heavy Trucks:	63.5	62.1	53.0	54.3	62.6	62.8
Vehicle Noise:	70.7	69.0	65.8	61.1	69.7	70.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	42	90	195	419
CNEL:	45	97	209	449

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,660 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.30	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-14.94	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.90	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.8	68.9	67.2	61.1	69.7	70.3
Medium Trucks:	64.6	63.1	56.8	55.2	63.7	63.9
Heavy Trucks:	65.5	64.0	55.0	56.3	64.6	64.7
Vehicle Noise:	72.7	70.9	67.8	63.1	71.7	72.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	57	122	263	567
CNEL:	61	131	282	608

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,110 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.29	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.95	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.90	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.2	60.1	68.7	69.3
Medium Trucks:	63.6	62.1	55.7	54.2	62.7	62.9
Heavy Trucks:	64.5	63.0	54.0	55.2	63.6	63.7
Vehicle Noise:	71.7	69.9	66.8	62.1	70.6	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	105	226	486
CNEL:	52	112	242	521

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,150 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.34	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.58	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.54	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.2	65.3	63.5	57.5	66.1	66.7
Medium Trucks:	61.0	59.5	53.1	51.6	60.0	60.3
Heavy Trucks:	61.8	60.4	51.4	52.6	61.0	61.1
Vehicle Noise:	69.0	67.3	64.1	59.5	68.0	68.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	32	70	150	324
CNEL:	35	75	161	348

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	610 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.10	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.34	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.29	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.4	62.5	60.8	54.7	63.3	63.9
Medium Trucks:	58.2	56.7	50.4	48.8	57.3	57.5
Heavy Trucks:	59.1	57.6	48.6	49.9	58.2	58.3
Vehicle Noise:	66.3	64.5	61.4	56.7	65.3	65.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	46	99	212
CNEL:	23	49	106	228

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Pine Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	310 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-7.04	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.28	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.23	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.5	59.6	57.8	51.8	60.4	61.0
Medium Trucks:	55.3	53.8	47.4	45.9	54.3	54.6
Heavy Trucks:	56.1	54.7	45.7	46.9	55.3	55.4
Vehicle Noise:	63.3	61.6	58.4	53.8	62.3	62.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	14	29	63	135
CNEL:	15	31	67	145

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Pine Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	480 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.14	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.38	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.33	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.4	61.5	59.7	53.7	62.3	62.9
Medium Trucks:	57.2	55.7	49.3	47.8	56.2	56.5
Heavy Trucks:	58.0	56.6	47.6	48.8	57.2	57.3
Vehicle Noise:	65.2	63.5	60.3	55.7	64.2	64.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	18	39	84	181
CNEL:	19	42	90	194

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	930 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.27	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.50	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.46	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.6	56.6	65.2	65.8
Medium Trucks:	60.1	58.5	52.2	50.6	59.1	59.3
Heavy Trucks:	60.9	59.5	50.4	51.7	60.0	60.2
Vehicle Noise:	68.1	66.4	63.2	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	131	281
CNEL:	30	65	140	302

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.32	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.56	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.51	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.6	54.5	63.1	63.7
Medium Trucks:	58.0	56.5	50.1	48.6	57.1	57.3
Heavy Trucks:	58.8	57.4	48.4	49.6	58.0	58.1
Vehicle Noise:	66.1	64.3	61.2	56.5	65.0	65.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	44	95	205
CNEL:	22	47	102	220

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	32,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,230 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.14	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.10	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.05	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.7	69.8	68.0	62.0	70.6	71.2
Medium Trucks:	65.5	64.0	57.6	56.1	64.5	64.8
Heavy Trucks:	66.3	64.9	55.9	57.1	65.5	65.6
Vehicle Noise:	73.5	71.8	68.6	64.0	72.5	73.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	74	159	342	736
CNEL:	79	170	366	790

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	41,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,110 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.19	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.05	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.01	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.7	70.8	69.1	63.0	71.7	72.3
Medium Trucks:	66.5	65.0	58.7	57.1	65.6	65.8
Heavy Trucks:	67.4	66.0	56.9	58.2	66.5	66.7
Vehicle Noise:	74.6	72.9	69.7	65.0	73.6	74.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	86	186	401	864
CNEL:	93	200	430	927

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Belmont Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.08	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.32	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.28	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.0	54.1	52.3	46.2	54.9	55.5
Medium Trucks:	50.9	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	54.1	52.6	43.6	44.9	53.2	53.3
Vehicle Noise:	58.9	57.2	53.3	49.4	57.9	58.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	22	47
CNEL:	5	11	23	50

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Belmont Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.25	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.49	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.44	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.8	53.9	52.1	46.1	54.7	55.3
Medium Trucks:	50.7	49.2	42.8	41.3	49.7	50.0
Heavy Trucks:	53.9	52.5	43.4	44.7	53.0	53.2
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	21	46
CNEL:	5	10	22	48

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Belmont Av.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	140 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-7.94	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-25.18	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-29.13	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.1	51.2	49.4	43.4	52.0	52.6
Medium Trucks:	48.0	46.5	40.1	38.6	47.0	47.3
Heavy Trucks:	51.2	49.8	40.8	42.0	50.4	50.5
Vehicle Noise:	56.0	54.3	50.4	46.5	55.0	55.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	6	14	30
CNEL:	3	7	15	32

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Irvington Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	400 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.38	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.62	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.57	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.8	54.0	47.9	56.6	57.2
Medium Trucks:	52.6	51.1	44.7	43.1	51.6	51.8
Heavy Trucks:	55.8	54.4	45.3	46.6	54.9	55.0
Vehicle Noise:	60.6	58.9	55.0	51.1	59.6	60.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	28	61
CNEL:	6	14	30	64

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.72	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.95	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.91	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	52.2	50.7	44.4	42.8	51.3	51.5
Heavy Trucks:	55.4	54.0	45.0	46.2	54.6	54.7
Vehicle Noise:	60.2	58.6	54.6	50.7	59.2	59.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	27	58
CNEL:	6	13	28	61

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.08	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.32	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.28	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.0	54.1	52.3	46.2	54.9	55.5
Medium Trucks:	50.9	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	54.1	52.6	43.6	44.9	53.2	53.3
Vehicle Noise:	58.9	57.2	53.3	49.4	57.9	58.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	22	47
CNEL:	5	11	23	50

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	930 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.27	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.50	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.46	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.6	56.6	65.2	65.8
Medium Trucks:	60.1	58.5	52.2	50.6	59.1	59.3
Heavy Trucks:	60.9	59.5	50.4	51.7	60.0	60.2
Vehicle Noise:	68.1	66.4	63.2	58.5	67.1	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	131	281
CNEL:	30	65	140	302

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	780 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.03	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.27	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.22	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	59.3	57.8	51.4	49.9	58.3	58.6
Heavy Trucks:	60.1	58.7	49.7	50.9	59.3	59.4
Vehicle Noise:	67.4	65.6	62.5	57.8	66.3	66.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	54	116	250
CNEL:	27	58	125	268

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	320 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-6.90	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-24.14	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-28.09	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.1	62.8	63.4
Medium Trucks:	57.7	56.2	49.8	48.3	56.7	57.0
Heavy Trucks:	58.5	57.1	48.1	49.3	57.7	57.8
Vehicle Noise:	65.7	64.0	60.8	56.2	64.7	65.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	13	29	62	133
CNEL:	14	31	66	143

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,800 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.60	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.64	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.59	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.2	67.3	65.5	59.4	68.1	68.7
Medium Trucks:	62.9	61.4	55.1	53.5	62.0	62.2
Heavy Trucks:	63.8	62.4	53.3	54.6	62.9	63.1
Vehicle Noise:	71.0	69.3	66.1	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	107	231	498
CNEL:	53	115	248	535

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,610 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.12	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.12	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.08	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.7	66.8	65.0	59.0	67.6	68.2
Medium Trucks:	62.5	61.0	54.6	53.0	61.5	61.7
Heavy Trucks:	63.3	61.9	52.8	54.1	62.5	62.6
Vehicle Noise:	70.5	68.8	65.6	61.0	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	46	100	215	463
CNEL:	50	107	230	496

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,210 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.49	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.75	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.70	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.1	68.2	66.4	60.3	69.0	69.6
Medium Trucks:	63.8	62.3	56.0	54.4	62.9	63.1
Heavy Trucks:	64.7	63.3	54.2	55.5	63.8	64.0
Vehicle Noise:	71.9	70.2	67.0	62.3	70.9	71.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	57	123	265	572
CNEL:	61	132	285	613

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,160 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.39	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.84	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.80	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.3	60.2	68.9	69.5
Medium Trucks:	63.7	62.2	55.9	54.3	62.8	63.0
Heavy Trucks:	64.6	63.2	54.1	55.4	63.7	63.9
Vehicle Noise:	71.8	70.1	66.9	62.2	70.8	71.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	121	261	563
CNEL:	60	130	280	604

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,000 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.06	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.18	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.13	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.6	67.7	66.0	59.9	68.5	69.1
Medium Trucks:	63.4	61.9	55.5	54.0	62.5	62.7
Heavy Trucks:	64.2	62.8	53.8	55.0	63.4	63.5
Vehicle Noise:	71.5	69.7	66.6	61.9	70.4	70.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	115	248	535
CNEL:	57	124	266	574

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,010 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.86	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-12.01	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.40	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.7	74.8	73.0	67.0	75.6	76.2
Medium Trucks:	73.0	71.5	65.2	63.6	72.1	72.3
Heavy Trucks:	77.7	76.2	67.2	68.5	76.8	76.9
Vehicle Noise:	81.0	79.4	74.6	71.6	80.0	80.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	289	622	1,340	2,888
CNEL:	303	654	1,408	3,034

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2018 With Project
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	47,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,720 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.57	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.30	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.69	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.4	75.5	73.7	67.7	76.3	76.9
Medium Trucks:	73.8	72.2	65.9	64.3	72.8	73.0
Heavy Trucks:	78.4	77.0	67.9	69.2	77.5	77.6
Vehicle Noise:	81.7	80.1	75.3	72.3	80.7	81.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	322	694	1,494	3,219
CNEL:	338	729	1,570	3,383

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	210 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.64	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.88	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.83	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.7	54.8	53.1	47.0	55.6	56.2
Medium Trucks:	51.0	49.5	43.1	41.6	50.0	50.3
Heavy Trucks:	52.8	51.4	42.4	43.6	52.0	52.1
Vehicle Noise:	59.0	57.3	53.8	49.4	58.0	58.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	15	32	69
CNEL:	7	16	34	74

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-6.71	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-23.95	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-27.90	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.8	54.0	47.9	56.6	57.2
Medium Trucks:	51.9	50.4	44.0	42.5	51.0	51.2
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	59.9	58.2	54.7	50.4	58.9	59.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	17	37	80
CNEL:	9	18	40	85

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	420 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.40	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.36	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.6	53.7	52.0	45.9	54.5	55.2
Medium Trucks:	50.5	49.0	42.6	41.1	49.5	49.8
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	58.5	56.9	53.0	49.0	57.5	57.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	14	30	65
CNEL:	7	15	32	69

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	760 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.14	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.38	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.34	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.4	63.5	61.7	55.7	64.3	64.9
Medium Trucks:	59.2	57.7	51.3	49.8	58.2	58.5
Heavy Trucks:	60.0	58.6	49.6	50.8	59.2	59.3
Vehicle Noise:	67.2	65.5	62.3	57.7	66.2	66.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	53	114	246
CNEL:	26	57	122	264

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,430 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.40	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.64	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.59	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.1	66.2	64.5	58.4	67.0	67.6
Medium Trucks:	61.9	60.4	54.1	52.5	61.0	61.2
Heavy Trucks:	62.8	61.3	52.3	53.6	61.9	62.0
Vehicle Noise:	70.0	68.2	65.1	60.4	69.0	69.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	81	174	375
CNEL:	40	87	187	402

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,710 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.38	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.86	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.82	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.9	67.0	65.3	59.2	67.8	68.4
Medium Trucks:	62.7	61.2	54.8	53.3	61.7	62.0
Heavy Trucks:	63.5	62.1	53.1	54.3	62.7	62.8
Vehicle Noise:	70.8	69.0	65.9	61.2	69.7	70.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	42	91	196	422
CNEL:	45	98	210	453

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,640 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.27	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-14.97	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.93	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.8	68.9	67.1	61.1	69.7	70.3
Medium Trucks:	64.6	63.1	56.7	55.2	63.6	63.9
Heavy Trucks:	65.4	64.0	55.0	56.2	64.6	64.7
Vehicle Noise:	72.6	70.9	67.7	63.1	71.6	72.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	122	262	564
CNEL:	61	130	281	605

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,110 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.29	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.95	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.90	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.8	67.9	66.2	60.1	68.7	69.3
Medium Trucks:	63.6	62.1	55.7	54.2	62.7	62.9
Heavy Trucks:	64.5	63.0	54.0	55.2	63.6	63.7
Vehicle Noise:	71.7	69.9	66.8	62.1	70.6	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	105	226	486
CNEL:	52	112	242	521

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,160 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.31	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.54	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.50	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.2	65.3	63.6	57.5	66.1	66.7
Medium Trucks:	61.0	59.5	53.1	51.6	60.1	60.3
Heavy Trucks:	61.9	60.4	51.4	52.7	61.0	61.1
Vehicle Noise:	69.1	67.3	64.2	59.5	68.0	68.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	33	70	151	326
CNEL:	35	75	162	350

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	610 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.10	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.34	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.29	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.4	62.5	60.8	54.7	63.3	63.9
Medium Trucks:	58.2	56.7	50.4	48.8	57.3	57.5
Heavy Trucks:	59.1	57.6	48.6	49.9	58.2	58.3
Vehicle Noise:	66.3	64.5	61.4	56.7	65.3	65.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	46	99	212
CNEL:	23	49	106	228

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Pine Av.
Road Segment: n/o Belmont Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	320 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-6.90	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-24.14	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-28.09	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.6	59.7	58.0	51.9	60.5	61.1
Medium Trucks:	55.4	53.9	47.6	46.0	54.5	54.7
Heavy Trucks:	56.3	54.8	45.8	47.1	55.4	55.5
Vehicle Noise:	63.5	61.7	58.6	53.9	62.5	62.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	14	30	64	138
CNEL:	15	32	69	148

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Pine Av.
Road Segment: s/o Belmont Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	490 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-5.05	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-22.29	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-26.24	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.5	61.6	59.8	53.8	62.4	63.0
Medium Trucks:	57.3	55.8	49.4	47.9	56.3	56.6
Heavy Trucks:	58.1	56.7	47.7	48.9	57.3	57.4
Vehicle Noise:	65.3	63.6	60.4	55.8	64.3	64.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	18	40	85	184
CNEL:	20	42	91	197

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	940 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.22	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.46	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.41	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.7	56.6	65.2	65.8
Medium Trucks:	60.1	58.6	52.2	50.7	59.1	59.4
Heavy Trucks:	60.9	59.5	50.5	51.7	60.1	60.2
Vehicle Noise:	68.2	66.4	63.3	58.6	67.1	67.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	132	283
CNEL:	30	65	141	304

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	580 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.32	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.56	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.51	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.2	62.3	60.6	54.5	63.1	63.7
Medium Trucks:	58.0	56.5	50.1	48.6	57.1	57.3
Heavy Trucks:	58.8	57.4	48.4	49.6	58.0	58.1
Vehicle Noise:	66.1	64.3	61.2	56.5	65.0	65.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	44	95	205
CNEL:	22	47	102	220

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	32,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,290 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.22	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.02	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.97	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.8	69.9	68.1	62.1	70.7	71.3
Medium Trucks:	65.6	64.1	57.7	56.2	64.6	64.8
Heavy Trucks:	66.4	65.0	56.0	57.2	65.6	65.7
Vehicle Noise:	73.6	71.9	68.7	64.1	72.6	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	75	161	346	745
CNEL:	80	172	371	799

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	41,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,180 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.26	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-12.98	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-16.93	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.8	70.9	69.2	63.1	71.7	72.3
Medium Trucks:	66.6	65.1	58.7	57.2	65.7	65.9
Heavy Trucks:	67.5	66.0	57.0	58.2	66.6	66.7
Vehicle Noise:	74.7	72.9	69.8	65.1	73.6	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	87	188	406	874
CNEL:	94	202	435	938

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Belmont Av.
Road Segment: w/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-5.08	3.51	-1.20	*-4.49*	0.000	0.000
Medium Trucks:	70.80	-22.32	3.58	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	77.97	-26.28	3.57	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	56.0	54.1	52.3	46.2	54.9	55.5
Medium Trucks:	50.9	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	54.1	52.6	43.6	44.9	53.2	53.3
Vehicle Noise:	58.9	57.2	53.3	49.4	57.9	58.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	5	10	22	47
CNEL:	5	11	23	50

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Belmont Av.
Road Segment: e/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-5.25	3.51	-1.20	*-4.49*	0.000	0.000
Medium Trucks:	70.80	-22.49	3.58	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	77.97	-26.44	3.57	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.8	53.9	52.1	46.1	54.7	55.3
Medium Trucks:	50.7	49.2	42.8	41.3	49.7	50.0
Heavy Trucks:	53.9	52.5	43.4	44.7	53.0	53.2
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	5	10	21	46
CNEL:	5	10	22	48

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Belmont Av.
Road Segment: w/o Pine Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	150 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-7.64	3.51	-1.20	*-4.49*	0.000	0.000
Medium Trucks:	70.80	-24.88	3.58	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	77.97	-28.83	3.57	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.4	51.5	49.7	43.7	52.3	52.9
Medium Trucks:	48.3	46.8	40.4	38.9	47.3	47.6
Heavy Trucks:	51.5	50.1	41.1	42.3	50.7	50.8
Vehicle Noise:	56.3	54.6	50.7	46.8	55.3	55.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	3	7	15	32
CNEL:	3	7	16	33

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Irvington Av.
Road Segment: w/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	410 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	58.73	-3.27	3.51	-1.20	*-4.49*	0.000	0.000
Medium Trucks:	70.80	-20.51	3.58	-1.20	*-4.86*	0.000	0.000
Heavy Trucks:	77.97	-24.46	3.57	-1.20	*-5.77*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	57.8	55.9	54.1	48.1	56.7	57.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	51.9
Heavy Trucks:	55.9	54.5	45.4	46.7	55.0	55.2
Vehicle Noise:	60.7	59.0	55.1	51.2	59.7	60.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	*65 dBA*	*60 dBA*	*55 dBA*
Ldn:	6	13	29	62
CNEL:	7	14	30	65

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.72	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.95	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.91	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	52.2	50.7	44.4	42.8	51.3	51.5
Heavy Trucks:	55.4	54.0	45.0	46.2	54.6	54.7
Vehicle Noise:	60.2	58.6	54.6	50.7	59.2	59.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	27	58
CNEL:	6	13	28	61

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.42	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.66	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.61	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.6	53.7	52.0	45.9	54.5	55.1
Medium Trucks:	50.5	49.0	42.6	41.1	49.6	49.8
Heavy Trucks:	53.7	52.3	43.3	44.5	52.9	53.0
Vehicle Noise:	58.5	56.9	52.9	49.0	57.5	57.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	10	21	44
CNEL:	5	10	22	47

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.17	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.41	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.37	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.6	65.3	65.9
Medium Trucks:	60.1	58.6	52.3	50.7	59.2	59.4
Heavy Trucks:	61.0	59.6	50.5	51.8	60.1	60.3
Vehicle Noise:	68.2	66.5	63.3	58.6	67.2	67.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	61	132	285
CNEL:	31	66	142	306

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	780 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000	
Medium Trucks:	2.297	
Heavy Trucks:	8.006	Grade Adjustment: 0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.03	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.27	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.22	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.5	63.6	61.8	55.8	64.4	65.0
Medium Trucks:	59.3	57.8	51.4	49.9	58.3	58.6
Heavy Trucks:	60.1	58.7	49.7	50.9	59.3	59.4
Vehicle Noise:	67.4	65.6	62.5	57.8	66.3	66.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	54	116	250
CNEL:	27	58	125	268

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	240 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-8.15	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-25.39	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-29.34	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	62.6	60.7	59.0	52.9	61.5	62.1
Medium Trucks:	56.4	54.9	48.6	47.0	55.5	55.7
Heavy Trucks:	57.3	55.9	46.8	48.1	56.4	56.6
Vehicle Noise:	64.5	62.7	59.6	54.9	63.4	63.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	11	24	51	110
CNEL:	12	25	55	118

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,810 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.63	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.61	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.57	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.2	67.3	65.5	59.5	68.1	68.7
Medium Trucks:	63.0	61.5	55.1	53.6	62.0	62.3
Heavy Trucks:	63.8	62.4	53.4	54.6	63.0	63.1
Vehicle Noise:	71.0	69.3	66.1	61.5	70.0	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	108	232	500
CNEL:	54	116	249	537

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	16,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,630 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.17	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-17.07	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.02	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.7	66.8	65.1	59.0	67.6	68.2
Medium Trucks:	62.5	61.0	54.6	53.1	61.6	61.8
Heavy Trucks:	63.4	61.9	52.9	54.2	62.5	62.6
Vehicle Noise:	70.6	68.8	65.7	61.0	69.5	70.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	47	101	217	467
CNEL:	50	108	232	500

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,230 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.53	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.71	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.66	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.1	68.2	66.4	60.4	69.0	69.6
Medium Trucks:	63.9	62.4	56.0	54.5	62.9	63.2
Heavy Trucks:	64.7	63.3	54.3	55.5	63.9	64.0
Vehicle Noise:	71.9	70.2	67.0	62.4	70.9	71.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	58	124	267	575
CNEL:	62	133	286	617

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,190 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.45	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.78	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.74	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.3	60.3	68.9	69.5
Medium Trucks:	63.8	62.3	55.9	54.4	62.8	63.1
Heavy Trucks:	64.6	63.2	54.2	55.4	63.8	63.9
Vehicle Noise:	71.9	70.1	67.0	62.3	70.8	71.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	57	122	264	568
CNEL:	61	131	283	609

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,990 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.04	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.20	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.16	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.6	67.7	65.9	59.9	68.5	69.1
Medium Trucks:	63.4	61.9	55.5	54.0	62.4	62.7
Heavy Trucks:	64.2	62.8	53.8	55.0	63.4	63.5
Vehicle Noise:	71.4	69.7	66.5	61.9	70.4	70.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	115	247	533
CNEL:	57	123	265	572

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	40,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,060 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.91	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.95	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.35	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.8	74.9	73.1	67.0	75.7	76.3
Medium Trucks:	73.1	71.6	65.2	63.7	72.1	72.4
Heavy Trucks:	77.7	76.3	67.3	68.5	76.9	77.0
Vehicle Noise:	81.0	79.4	74.6	71.6	80.1	80.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	291	627	1,352	2,912
CNEL:	306	659	1,420	3,060

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	47,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,780 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.62	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.24	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.64	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.5	75.6	73.8	67.7	76.4	77.0
Medium Trucks:	73.8	72.3	65.9	64.4	72.9	73.1
Heavy Trucks:	78.4	77.0	68.0	69.2	77.6	77.7
Vehicle Noise:	81.7	80.1	75.3	72.3	80.8	81.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	325	699	1,507	3,247
CNEL:	341	735	1,583	3,411

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	240 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.06	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.30	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.25	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	51.6	50.1	43.7	42.2	50.6	50.8
Heavy Trucks:	53.4	52.0	43.0	44.2	52.6	52.7
Vehicle Noise:	59.6	57.8	54.4	50.0	58.5	59.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	16	35	76
CNEL:	8	17	38	81

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	320 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-5.81	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-23.05	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-27.00	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.6	56.7	54.9	48.9	57.5	58.1
Medium Trucks:	52.8	51.3	44.9	43.4	51.9	52.1
Heavy Trucks:	54.7	53.3	44.2	45.5	53.8	53.9
Vehicle Noise:	60.8	59.1	55.6	51.3	59.8	60.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	20	43	92
CNEL:	10	21	46	98

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	450 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.87	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-20.10	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-24.06	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	55.9	54.0	52.3	46.2	54.8	55.5
Medium Trucks:	50.8	49.3	42.9	41.4	49.8	50.1
Heavy Trucks:	54.0	52.6	43.6	44.8	53.2	53.3
Vehicle Noise:	58.8	57.2	53.3	49.3	57.8	58.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	15	32	68
CNEL:	7	16	34	72

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	830 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.76	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.00	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.95	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.8	63.9	62.1	56.1	64.7	65.3
Medium Trucks:	59.6	58.1	51.7	50.1	58.6	58.8
Heavy Trucks:	60.4	59.0	49.9	51.2	59.6	59.7
Vehicle Noise:	67.6	65.9	62.7	58.1	66.6	67.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	56	121	261
CNEL:	28	60	130	280

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	15,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,520 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.13	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.37	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.33	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.4	66.5	64.7	58.7	67.3	67.9
Medium Trucks:	62.2	60.7	54.3	52.8	61.2	61.5
Heavy Trucks:	63.0	61.6	52.6	53.8	62.2	62.3
Vehicle Noise:	70.2	68.5	65.4	60.7	69.2	69.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	39	84	181	390
CNEL:	42	90	194	419

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,810 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.63	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.61	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.57	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.2	67.3	65.5	59.4	68.1	68.7
Medium Trucks:	62.9	61.4	55.1	53.5	62.0	62.2
Heavy Trucks:	63.8	62.4	53.3	54.6	62.9	63.1
Vehicle Noise:	71.0	69.3	66.1	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	44	95	204	439
CNEL:	47	101	218	471

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	28,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,800 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.52	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-14.72	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.67	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.1	69.2	67.4	61.3	70.0	70.6
Medium Trucks:	64.8	63.3	57.0	55.4	63.9	64.1
Heavy Trucks:	65.7	64.3	55.2	56.5	64.8	65.0
Vehicle Noise:	72.9	71.2	68.0	63.3	71.9	72.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	59	126	272	587
CNEL:	63	136	292	629

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,210 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.49	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.75	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.70	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.4	60.3	68.9	69.5
Medium Trucks:	63.8	62.3	55.9	54.4	62.9	63.1
Heavy Trucks:	64.7	63.2	54.2	55.5	63.8	63.9
Vehicle Noise:	71.9	70.1	67.0	62.3	70.8	71.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	108	233	501
CNEL:	54	116	249	538

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	12,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,210 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.12	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.36	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.32	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.4	65.5	63.7	57.7	66.3	66.9
Medium Trucks:	61.2	59.7	53.3	51.8	60.2	60.5
Heavy Trucks:	62.0	60.6	51.6	52.8	61.2	61.3
Vehicle Noise:	69.3	67.5	64.4	59.7	68.2	68.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	34	72	156	335
CNEL:	36	78	167	360

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	640 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.89	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.13	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.08	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.6	62.7	61.0	54.9	63.5	64.2
Medium Trucks:	58.4	56.9	50.6	49.0	57.5	57.7
Heavy Trucks:	59.3	57.9	48.8	50.1	58.4	58.6
Vehicle Noise:	66.5	64.8	61.6	56.9	65.5	65.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	22	47	102	219
CNEL:	24	51	109	235

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Pine Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	340 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-6.64	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-23.87	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-27.83	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	61.9	60.0	58.2	52.2	60.8	61.4
Medium Trucks:	55.7	54.2	47.8	46.3	54.7	55.0
Heavy Trucks:	56.5	55.1	46.1	47.3	55.7	55.8
Vehicle Noise:	63.7	62.0	58.8	54.2	62.7	63.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	14	31	67	144
CNEL:	15	33	72	154

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Pine Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	550 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.55	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.79	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.74	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.0	62.1	60.3	54.3	62.9	63.5
Medium Trucks:	57.8	56.3	49.9	48.4	56.8	57.1
Heavy Trucks:	58.6	57.2	48.2	49.4	57.8	57.9
Vehicle Noise:	65.8	64.1	60.9	56.3	64.8	65.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	43	92	198
CNEL:	21	46	99	213

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,010 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.91	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.15	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.10	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.6	64.7	63.0	56.9	65.5	66.1
Medium Trucks:	60.4	58.9	52.5	51.0	59.5	59.7
Heavy Trucks:	61.3	59.8	50.8	52.1	60.4	60.5
Vehicle Noise:	68.5	66.7	63.6	58.9	67.4	67.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	64	138	297
CNEL:	32	69	148	319

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	590 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.24	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.48	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.44	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.3	62.4	60.6	54.6	63.2	63.8
Medium Trucks:	58.1	56.6	50.2	48.7	57.1	57.4
Heavy Trucks:	58.9	57.5	48.5	49.7	58.1	58.2
Vehicle Noise:	66.1	64.4	61.2	56.6	65.1	65.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	45	96	208
CNEL:	22	48	103	223

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,310 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.25	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.99	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.95	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.8	69.9	68.1	62.1	70.7	71.3
Medium Trucks:	65.6	64.1	57.7	56.2	64.6	64.9
Heavy Trucks:	66.4	65.0	56.0	57.2	65.6	65.7
Vehicle Noise:	73.7	71.9	68.8	64.1	72.6	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	75	161	347	748
CNEL:	80	173	372	803

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	42,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,210 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.29	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-12.95	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-16.90	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.9	71.0	69.2	63.1	71.8	72.4
Medium Trucks:	66.6	65.1	58.8	57.2	65.7	65.9
Heavy Trucks:	67.5	66.1	57.0	58.3	66.6	66.8
Vehicle Noise:	74.7	73.0	69.8	65.1	73.7	74.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	88	189	408	878
CNEL:	94	203	437	942

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Belmont Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	290 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.77	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.01	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.97	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.3	54.4	52.6	46.5	55.2	55.8
Medium Trucks:	51.2	49.7	43.3	41.7	50.2	50.4
Heavy Trucks:	54.4	53.0	43.9	45.2	53.5	53.6
Vehicle Noise:	59.2	57.5	53.6	49.7	58.2	58.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	11	23	49
CNEL:	5	11	24	52

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Belmont Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	280 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.93	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.17	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.12	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.1	54.2	52.5	46.4	55.0	55.6
Medium Trucks:	51.0	49.5	43.1	41.6	50.1	50.3
Heavy Trucks:	54.2	52.8	43.8	45.0	53.4	53.5
Vehicle Noise:	59.0	57.4	53.4	49.5	58.0	58.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	22	48
CNEL:	5	11	24	51

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Belmont Av.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	190 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-6.61	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-23.85	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-27.80	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	54.4	52.5	50.8	44.7	53.3	53.9
Medium Trucks:	49.3	47.8	41.5	39.9	48.4	48.6
Heavy Trucks:	52.5	51.1	42.1	43.3	51.7	51.8
Vehicle Noise:	57.3	55.7	51.7	47.8	56.4	56.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	8	17	37
CNEL:	4	8	18	39

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Irvington Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	420 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.17	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.40	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.36	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.9	56.0	54.2	48.2	56.8	57.4
Medium Trucks:	52.8	51.3	44.9	43.4	51.8	52.0
Heavy Trucks:	56.0	54.6	45.5	46.8	55.1	55.3
Vehicle Noise:	60.8	59.1	55.2	51.3	59.8	60.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	29	63
CNEL:	7	14	31	66

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	380 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.60	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.84	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.79	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.4	55.5	53.8	47.7	56.3	57.0
Medium Trucks:	52.3	50.8	44.5	42.9	51.4	51.6
Heavy Trucks:	55.5	54.1	45.1	46.3	54.7	54.8
Vehicle Noise:	60.4	58.7	54.8	50.9	59.4	59.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	27	59
CNEL:	6	13	29	62

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	340 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.08	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.32	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.28	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.0	55.1	53.3	47.2	55.9	56.5
Medium Trucks:	51.9	50.3	44.0	42.4	50.9	51.1
Heavy Trucks:	55.1	53.6	44.6	45.9	54.2	54.3
Vehicle Noise:	59.9	58.2	54.3	50.4	58.9	59.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	12	25	54
CNEL:	6	12	27	58

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	980 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.04	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.28	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.23	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.8	56.8	65.4	66.0
Medium Trucks:	60.3	58.8	52.4	50.9	59.3	59.6
Heavy Trucks:	61.1	59.7	50.7	51.9	60.3	60.4
Vehicle Noise:	68.3	66.6	63.4	58.8	67.3	67.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	63	135	291
CNEL:	31	67	145	313

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	8,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	810 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.87	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.10	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.06	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.7	63.8	62.0	56.0	64.6	65.2
Medium Trucks:	59.5	57.9	51.6	50.0	58.5	58.7
Heavy Trucks:	60.3	58.9	49.8	51.1	59.4	59.6
Vehicle Noise:	67.5	65.8	62.6	57.9	66.5	66.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	26	55	119	257
CNEL:	28	59	128	275

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	640 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.89	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-21.13	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-25.08	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.9	65.0	63.2	57.2	65.8	66.4
Medium Trucks:	60.7	59.2	52.8	51.3	59.7	60.0
Heavy Trucks:	61.5	60.1	51.1	52.3	60.7	60.8
Vehicle Noise:	68.7	67.0	63.8	59.2	67.7	68.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	45	98	211
CNEL:	23	49	105	226

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.95	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.29	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.24	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.8	59.8	68.4	69.0
Medium Trucks:	63.3	61.8	55.4	53.9	62.3	62.6
Heavy Trucks:	64.1	62.7	53.7	54.9	63.3	63.4
Vehicle Noise:	71.4	69.6	66.5	61.8	70.3	70.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	113	244	526
CNEL:	56	122	262	564

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,760 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.50	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.73	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.69	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.1	67.2	65.4	59.3	68.0	68.6
Medium Trucks:	62.9	61.3	55.0	53.4	61.9	62.1
Heavy Trucks:	63.7	62.3	53.2	54.5	62.8	63.0
Vehicle Noise:	70.9	69.2	66.0	61.3	69.9	70.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	49	106	228	491
CNEL:	53	113	244	527

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,300 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.67	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.57	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.53	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.2	68.3	66.6	60.5	69.1	69.7
Medium Trucks:	64.0	62.5	56.1	54.6	63.1	63.3
Heavy Trucks:	64.9	63.4	54.4	55.6	64.0	64.1
Vehicle Noise:	72.1	70.3	67.2	62.5	71.0	71.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	59	126	272	587
CNEL:	63	136	292	630

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	22,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,250 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.57	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.67	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.62	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.1	68.2	66.5	60.4	69.0	69.6
Medium Trucks:	63.9	62.4	56.0	54.5	63.0	63.2
Heavy Trucks:	64.8	63.3	54.3	55.6	63.9	64.0
Vehicle Noise:	72.0	70.2	67.1	62.4	70.9	71.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	58	125	268	578
CNEL:	62	134	288	620

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,010 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.08	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.16	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.11	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.6	67.7	66.0	59.9	68.5	69.1
Medium Trucks:	63.4	61.9	55.6	54.0	62.5	62.7
Heavy Trucks:	64.3	62.8	53.8	55.1	63.4	63.5
Vehicle Noise:	71.5	69.7	66.6	61.9	70.5	70.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	54	116	249	537
CNEL:	58	124	267	575

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	41,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,110 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	1.97	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.90	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-10.29	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	76.8	74.9	73.1	67.1	75.7	76.3
Medium Trucks:	73.2	71.6	65.3	63.7	72.2	72.4
Heavy Trucks:	77.8	76.4	67.3	68.6	76.9	77.0
Vehicle Noise:	81.1	79.5	74.7	71.7	80.1	80.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	294	632	1,363	2,936
CNEL:	308	665	1,432	3,085

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: OY 2019 With Project
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	48,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	4,830 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	2.67	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-11.20	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-9.59	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	77.5	75.6	73.8	67.8	76.4	77.0
Medium Trucks:	73.9	72.3	66.0	64.4	72.9	73.1
Heavy Trucks:	78.5	77.1	68.0	69.3	77.6	77.7
Vehicle Noise:	81.8	80.2	75.4	72.4	80.8	81.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	327	704	1,517	3,269
CNEL:	344	740	1,594	3,435

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	240 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-7.06	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-24.30	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-28.25	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	51.6	50.1	43.7	42.2	50.6	50.8
Heavy Trucks:	53.4	52.0	43.0	44.2	52.6	52.7
Vehicle Noise:	59.6	57.8	54.4	50.0	58.5	59.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	16	35	76
CNEL:	8	17	38	81

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	310 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-5.95	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-23.18	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-27.14	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.4	56.5	54.8	48.7	57.3	57.9
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	52.0
Heavy Trucks:	54.5	53.1	44.1	45.3	53.7	53.8
Vehicle Noise:	60.7	59.0	55.5	51.1	59.7	60.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	19	42	90
CNEL:	10	21	45	96

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	660 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-1.20	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-18.44	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-22.40	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.6	55.7	53.9	47.9	56.5	57.1
Medium Trucks:	52.5	51.0	44.6	43.1	51.5	51.7
Heavy Trucks:	55.7	54.3	45.2	46.5	54.8	55.0
Vehicle Noise:	60.5	58.8	54.9	51.0	59.5	59.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	19	41	88
CNEL:	9	20	43	93

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	920 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.31	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.55	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.51	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.2	64.3	62.6	56.5	65.1	65.7
Medium Trucks:	60.0	58.5	52.1	50.6	59.1	59.3
Heavy Trucks:	60.9	59.4	50.4	51.6	60.0	60.1
Vehicle Noise:	68.1	66.3	63.2	58.5	67.0	67.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	60	130	279
CNEL:	30	65	139	300

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	17,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,720 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.40	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.83	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.79	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.9	67.0	65.3	59.2	67.8	68.4
Medium Trucks:	62.7	61.2	54.9	53.3	61.8	62.0
Heavy Trucks:	63.6	62.1	53.1	54.4	62.7	62.8
Vehicle Noise:	70.8	69.0	65.9	61.2	69.8	70.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	42	91	197	424
CNEL:	45	98	211	455

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	20,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,060 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.19	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.05	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.01	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.7	67.8	66.1	60.0	68.6	69.2
Medium Trucks:	63.5	62.0	55.6	54.1	62.6	62.8
Heavy Trucks:	64.4	62.9	53.9	55.1	63.5	63.6
Vehicle Noise:	71.6	69.8	66.7	62.0	70.5	71.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	48	103	222	478
CNEL:	51	111	238	513

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	31,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,150 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.03	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-14.21	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.16	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.6	69.7	67.9	61.8	70.5	71.1
Medium Trucks:	65.4	63.8	57.5	55.9	64.4	64.6
Heavy Trucks:	66.2	64.8	55.7	57.0	65.3	65.5
Vehicle Noise:	73.4	71.7	68.5	63.8	72.4	72.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	63	137	295	635
CNEL:	68	147	316	681

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	25,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,510 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.05	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.19	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.15	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.6	68.7	66.9	60.9	69.5	70.1
Medium Trucks:	64.4	62.9	56.5	55.0	63.4	63.6
Heavy Trucks:	65.2	63.8	54.8	56.0	64.4	64.5
Vehicle Noise:	72.4	70.7	67.5	62.9	71.4	71.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	55	118	253	545
CNEL:	59	126	272	585

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	13,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,360 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.62	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.85	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.81	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.9	66.0	64.3	58.2	66.8	67.4
Medium Trucks:	61.7	60.2	53.8	52.3	60.8	61.0
Heavy Trucks:	62.6	61.1	52.1	53.3	61.7	61.8
Vehicle Noise:	69.8	68.0	64.9	60.2	68.7	69.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	36	78	168	363
CNEL:	39	84	181	389

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	710 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.44	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.68	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.63	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.1	63.2	61.4	55.4	64.0	64.6
Medium Trucks:	58.9	57.4	51.0	49.5	57.9	58.2
Heavy Trucks:	59.7	58.3	49.3	50.5	58.9	59.0
Vehicle Noise:	66.9	65.2	62.0	57.4	65.9	66.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	51	109	235
CNEL:	25	54	117	252

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Pine Av.
Road Segment: n/o Belmont Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	530 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.71	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.95	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.90	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.8	61.9	60.2	54.1	62.7	63.3
Medium Trucks:	57.6	56.1	49.7	48.2	56.7	56.9
Heavy Trucks:	58.5	57.0	48.0	49.2	57.6	57.7
Vehicle Noise:	65.7	63.9	60.8	56.1	64.6	65.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	19	42	90	193
CNEL:	21	45	96	207

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Pine Av.
Road Segment: s/o Belmont Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.63	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.87	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.82	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	57.7	56.2	49.8	48.3	56.7	57.0
Heavy Trucks:	58.5	57.1	48.1	49.3	57.7	57.8
Vehicle Noise:	65.8	64.0	60.9	56.2	64.7	65.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	42	91	196
CNEL:	21	45	98	210

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,040 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.78	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.02	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.97	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.8	64.9	63.1	57.0	65.7	66.3
Medium Trucks:	60.5	59.0	52.7	51.1	59.6	59.8
Heavy Trucks:	61.4	60.0	50.9	52.2	60.5	60.7
Vehicle Noise:	68.6	66.9	63.7	59.0	67.6	68.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	30	65	141	303
CNEL:	33	70	151	325

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	740 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.26	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.50	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.45	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.6	55.6	64.2	64.8
Medium Trucks:	59.1	57.6	51.2	49.6	58.1	58.3
Heavy Trucks:	59.9	58.5	49.4	50.7	59.1	59.2
Vehicle Noise:	67.1	65.4	62.2	57.6	66.1	66.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	52	112	242
CNEL:	26	56	120	259

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,950 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.01	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.22	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.18	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	66.4	64.9	58.5	56.9	65.4	65.6
Heavy Trucks:	67.2	65.8	56.7	58.0	66.4	66.5
Vehicle Noise:	74.4	72.7	69.5	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	181	391	842
CNEL:	90	195	419	903

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	50,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,010 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	5.05	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-12.19	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-16.15	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.6	71.7	69.9	63.9	72.5	73.1
Medium Trucks:	67.4	65.9	59.5	58.0	66.4	66.7
Heavy Trucks:	68.2	66.8	57.8	59.0	67.4	67.5
Vehicle Noise:	75.5	73.7	70.6	65.9	74.4	74.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	99	212	458	986
CNEL:	106	228	491	1,058

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Belmont Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	300 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.63	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.87	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.82	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.4	54.5	52.8	46.7	55.3	55.9
Medium Trucks:	51.3	49.8	43.4	41.9	50.4	50.6
Heavy Trucks:	54.5	53.1	44.1	45.3	53.7	53.8
Vehicle Noise:	59.3	57.7	53.7	49.8	58.3	58.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	11	23	50
CNEL:	5	11	25	53

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Belmont Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	300 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.63	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.87	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.82	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.4	54.5	52.8	46.7	55.3	55.9
Medium Trucks:	51.3	49.8	43.4	41.9	50.4	50.6
Heavy Trucks:	54.5	53.1	44.1	45.3	53.7	53.8
Vehicle Noise:	59.3	57.7	53.7	49.8	58.3	58.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	11	23	50
CNEL:	5	11	25	53

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Belmont Av.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	1,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	160 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-7.36	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-24.60	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-28.55	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	53.7	51.8	50.0	44.0	52.6	53.2
Medium Trucks:	48.6	47.1	40.7	39.2	47.6	47.9
Heavy Trucks:	51.8	50.4	41.3	42.6	50.9	51.1
Vehicle Noise:	56.6	54.9	51.0	47.1	55.6	56.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	3	7	15	33
CNEL:	3	8	16	35

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Irvington Av.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	450 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.87	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.10	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.06	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.2	56.3	54.5	48.5	57.1	57.7
Medium Trucks:	53.1	51.6	45.2	43.7	52.1	52.3
Heavy Trucks:	56.3	54.9	45.8	47.1	55.4	55.6
Vehicle Noise:	61.1	59.4	55.5	51.6	60.1	60.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	14	30	66
CNEL:	7	15	32	70

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Irvington Av.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	410 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.27	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.51	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.46	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.8	55.9	54.1	48.1	56.7	57.3
Medium Trucks:	52.7	51.2	44.8	43.3	51.7	51.9
Heavy Trucks:	55.9	54.5	45.4	46.7	55.0	55.2
Vehicle Noise:	60.7	59.0	55.1	51.2	59.7	60.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	29	62
CNEL:	7	14	30	65

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	270 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-5.08	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-22.32	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-26.28	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.0	54.1	52.3	46.2	54.9	55.5
Medium Trucks:	50.9	49.3	43.0	41.4	49.9	50.1
Heavy Trucks:	54.1	52.6	43.6	44.9	53.2	53.3
Vehicle Noise:	58.9	57.2	53.3	49.4	57.9	58.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	10	22	47
CNEL:	5	11	23	50

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,140 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.38	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.62	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.58	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.2	65.3	63.5	57.4	66.1	66.7
Medium Trucks:	60.9	59.4	53.1	51.5	60.0	60.2
Heavy Trucks:	61.8	60.4	51.3	52.6	60.9	61.1
Vehicle Noise:	69.0	67.3	64.1	59.4	68.0	68.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	32	69	150	322
CNEL:	35	74	160	346

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	940 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.22	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.46	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.41	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.3	64.4	62.7	56.6	65.2	65.8
Medium Trucks:	60.1	58.6	52.2	50.7	59.1	59.4
Heavy Trucks:	60.9	59.5	50.5	51.7	60.1	60.2
Vehicle Noise:	68.2	66.4	63.3	58.6	67.1	67.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	28	61	132	283
CNEL:	30	65	141	304

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	760 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.14	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-20.38	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-24.34	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.6	65.7	64.0	57.9	66.5	67.1
Medium Trucks:	61.4	59.9	53.6	52.0	60.5	60.7
Heavy Trucks:	62.3	60.9	51.8	53.1	61.4	61.6
Vehicle Noise:	69.5	67.7	64.6	59.9	68.5	68.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	51	110	237
CNEL:	25	55	118	254

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,990 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.04	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.20	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.16	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.6	67.7	65.9	59.9	68.5	69.1
Medium Trucks:	63.4	61.9	55.5	54.0	62.4	62.7
Heavy Trucks:	64.2	62.8	53.8	55.0	63.4	63.5
Vehicle Noise:	71.4	69.7	66.5	61.9	70.4	70.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	115	247	533
CNEL:	57	123	265	572

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,840 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.70	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.54	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.50	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.3	67.4	65.6	59.5	68.2	68.8
Medium Trucks:	63.0	61.5	55.2	53.6	62.1	62.3
Heavy Trucks:	63.9	62.5	53.4	54.7	63.0	63.2
Vehicle Noise:	71.1	69.4	66.2	61.5	70.1	70.5

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	51	109	235	506
CNEL:	54	117	252	543

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,670 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.31	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.92	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.88	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.9	69.0	67.2	61.2	69.8	70.4
Medium Trucks:	64.7	63.2	56.8	55.2	63.7	63.9
Heavy Trucks:	65.5	64.1	55.0	56.3	64.7	64.8
Vehicle Noise:	72.7	71.0	67.8	63.2	71.7	72.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	65	140	301	648
CNEL:	70	150	323	695

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,620 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.23	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.01	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.96	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.8	68.9	67.1	61.1	69.7	70.3
Medium Trucks:	64.6	63.1	56.7	55.2	63.6	63.9
Heavy Trucks:	65.4	64.0	55.0	56.2	64.6	64.7
Vehicle Noise:	72.6	70.9	67.7	63.1	71.6	72.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	64	138	297	640
CNEL:	69	148	319	687

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	23,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,390 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.83	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.41	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.36	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.7	60.7	69.3	69.9
Medium Trucks:	64.2	62.7	56.3	54.8	63.2	63.5
Heavy Trucks:	65.0	63.6	54.6	55.8	64.2	64.3
Vehicle Noise:	72.2	70.5	67.3	62.7	71.2	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	60	130	280	602
CNEL:	65	139	300	646

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	80,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,070 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	4.90	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-8.97	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-7.36	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	79.7	77.8	76.1	70.0	78.6	79.2
Medium Trucks:	76.1	74.6	68.2	66.7	75.1	75.4
Heavy Trucks:	80.7	79.3	70.2	71.5	79.9	80.0
Vehicle Noise:	84.0	82.4	77.6	74.6	83.1	83.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	460	992	2,137	4,603
CNEL:	484	1,042	2,245	4,837

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: 2035 Without Project
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	91,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	9,120 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	5.43	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-8.44	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-6.83	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	80.3	78.4	76.6	70.6	79.2	79.8
Medium Trucks:	76.6	75.1	68.7	67.2	75.7	75.9
Heavy Trucks:	81.2	79.8	70.8	72.0	80.4	80.5
Vehicle Noise:	84.6	82.9	78.1	75.1	83.6	83.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	499	1,076	2,318	4,994
CNEL:	525	1,131	2,436	5,248

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: N. Little League Dr.
Road Segment: n/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	260 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-6.71	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-23.95	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-27.90	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.8	54.0	47.9	56.6	57.2
Medium Trucks:	51.9	50.4	44.0	42.5	51.0	51.2
Heavy Trucks:	53.8	52.3	43.3	44.6	52.9	53.0
Vehicle Noise:	59.9	58.2	54.7	50.4	58.9	59.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	8	17	37	80
CNEL:	9	18	40	85

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: N. Little League Dr.
Road Segment: s/o W. Little League Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	64.30	-5.18	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	75.75	-22.42	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	81.57	-26.37	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	59.2	57.3	55.5	49.5	58.1	58.7
Medium Trucks:	53.4	51.9	45.6	44.0	52.5	52.7
Heavy Trucks:	55.3	53.9	44.8	46.1	54.5	54.6
Vehicle Noise:	61.4	59.7	56.3	51.9	60.4	60.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	10	22	47	101
CNEL:	11	23	50	108

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	670 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-1.14	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	70.80	-18.38	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	77.97	-22.33	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.7	55.8	54.0	48.0	56.6	57.2
Medium Trucks:	52.5	51.0	44.7	43.1	51.6	51.8
Heavy Trucks:	55.7	54.3	45.3	46.5	54.9	55.0
Vehicle Noise:	60.6	58.9	55.0	51.1	59.6	60.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	9	19	41	89
CNEL:	9	20	44	94

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	980 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.04	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.28	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.23	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.5	64.6	62.8	56.8	65.4	66.0
Medium Trucks:	60.3	58.8	52.4	50.9	59.3	59.6
Heavy Trucks:	61.1	59.7	50.7	51.9	60.3	60.4
Vehicle Noise:	68.3	66.6	63.4	58.8	67.3	67.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	63	135	291
CNEL:	31	67	145	313

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: s/o Irvington Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	18,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,810 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.63	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-16.61	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.57	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.2	67.3	65.5	59.4	68.1	68.7
Medium Trucks:	62.9	61.4	55.1	53.5	62.0	62.2
Heavy Trucks:	63.8	62.4	53.3	54.6	62.9	63.1
Vehicle Noise:	71.0	69.3	66.1	61.4	70.0	70.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	44	95	204	439
CNEL:	47	101	218	471

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,170 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.41	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.82	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.78	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.0	68.1	66.3	60.2	68.9	69.5
Medium Trucks:	63.7	62.2	55.9	54.3	62.8	63.0
Heavy Trucks:	64.6	63.2	54.1	55.4	63.7	63.9
Vehicle Noise:	71.8	70.1	66.9	62.2	70.8	71.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	50	107	230	495
CNEL:	53	114	246	531

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: n/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	33,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,320 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	3.26	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-13.98	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.93	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.8	69.9	68.1	62.1	70.7	71.3
Medium Trucks:	65.6	64.1	57.7	56.2	64.6	64.9
Heavy Trucks:	66.4	65.0	56.0	57.2	65.6	65.7
Vehicle Noise:	73.6	71.9	68.7	64.1	72.6	73.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	66	142	305	657
CNEL:	71	152	327	705

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: s/o I-215 Fwy. NB Ramps
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,610 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.22	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-15.02	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.98	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.8	68.9	67.1	61.0	69.7	70.3
Medium Trucks:	64.5	63.0	56.7	55.1	63.6	63.8
Heavy Trucks:	65.4	64.0	54.9	56.2	64.5	64.7
Vehicle Noise:	72.6	70.9	67.7	63.0	71.6	72.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	56	121	260	560
CNEL:	60	129	279	601

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: n/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	14,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,400 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-0.49	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-17.73	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-21.68	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	68.0	66.1	64.4	58.3	66.9	67.6
Medium Trucks:	61.8	60.3	54.0	52.4	60.9	61.1
Heavy Trucks:	62.7	61.3	52.2	53.5	61.8	62.0
Vehicle Noise:	69.9	68.2	65.0	60.3	68.9	69.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	37	80	172	370
CNEL:	40	85	184	396

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Palm Av.
Road Segment: s/o Hallmark Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	740 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.26	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.50	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.45	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.3	63.4	61.6	55.6	64.2	64.8
Medium Trucks:	59.1	57.6	51.2	49.6	58.1	58.3
Heavy Trucks:	59.9	58.5	49.4	50.7	59.1	59.2
Vehicle Noise:	67.1	65.4	62.2	57.6	66.1	66.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	24	52	112	242
CNEL:	26	56	120	259

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Pine Av.
Road Segment: n/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	540 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.63	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.87	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.82	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	63.9	62.0	60.2	54.2	62.8	63.4
Medium Trucks:	57.7	56.2	49.8	48.3	56.7	57.0
Heavy Trucks:	58.5	57.1	48.1	49.3	57.7	57.8
Vehicle Noise:	65.8	64.0	60.9	56.2	64.7	65.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	20	42	91	196
CNEL:	21	45	98	210

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Pine Av.
Road Segment: s/o Belmont Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,900 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	590 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-4.24	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-21.48	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-25.44	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	64.3	62.4	60.6	54.6	63.2	63.8
Medium Trucks:	58.1	56.6	50.2	48.7	57.1	57.4
Heavy Trucks:	58.9	57.5	48.5	49.7	58.1	58.2
Vehicle Noise:	66.1	64.4	61.2	56.6	65.1	65.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	21	45	96	208
CNEL:	22	48	103	223

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Pine Av.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	10,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,080 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.62	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.86	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.81	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.9	65.0	63.3	57.2	65.8	66.4
Medium Trucks:	60.7	59.2	52.8	51.3	59.8	60.0
Heavy Trucks:	61.5	60.1	51.1	52.3	60.7	60.8
Vehicle Noise:	68.8	67.0	63.9	59.2	67.7	68.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	31	67	144	311
CNEL:	33	72	155	333

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Campus Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	7,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	760 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-3.14	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-20.38	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-24.34	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	65.4	63.5	61.7	55.7	64.3	64.9
Medium Trucks:	59.2	57.7	51.3	49.8	58.2	58.5
Heavy Trucks:	60.0	58.6	49.6	50.8	59.2	59.3
Vehicle Noise:	67.2	65.5	62.3	57.7	66.2	66.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	25	53	114	246
CNEL:	26	57	122	264

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: University Pkwy.
Road Segment: n/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	39,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	3,960 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	4.03	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-13.21	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-17.17	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	66.4	64.9	58.5	57.0	65.4	65.7
Heavy Trucks:	67.2	65.8	56.8	58.0	66.4	66.5
Vehicle Noise:	74.4	72.7	69.5	64.9	73.4	73.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	84	182	391	843
CNEL:	90	195	420	904

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: University Pkwy.
Road Segment: s/o Kendall Dr.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	50,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	5,030 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	5.06	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-12.17	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-16.13	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	73.6	71.7	70.0	63.9	72.5	73.1
Medium Trucks:	67.4	65.9	59.5	58.0	66.5	66.7
Heavy Trucks:	68.3	66.8	57.8	59.0	67.4	67.5
Vehicle Noise:	75.5	73.7	70.6	65.9	74.4	74.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	99	213	459	989
CNEL:	106	229	492	1,061

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Belmont Av.
Road Segment: w/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	330 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.21	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.45	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.41	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.8	54.9	53.2	47.1	55.7	56.3
Medium Trucks:	51.7	50.2	43.9	42.3	50.8	51.0
Heavy Trucks:	54.9	53.5	44.5	45.7	54.1	54.2
Vehicle Noise:	59.7	58.1	54.1	50.2	58.7	59.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	11	25	53
CNEL:	6	12	26	57

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Belmont Av.
Road Segment: e/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	310 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-4.48	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-21.72	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-25.68	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	56.6	54.7	52.9	46.8	55.5	56.1
Medium Trucks:	51.5	49.9	43.6	42.0	50.5	50.7
Heavy Trucks:	54.7	53.2	44.2	45.5	53.8	53.9
Vehicle Noise:	59.5	57.8	53.9	50.0	58.5	58.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	5	11	24	51
CNEL:	5	12	25	54

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Belmont Av.
Road Segment: w/o Pine Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,000 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	200 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-6.39	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-23.63	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-27.58	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	54.7	52.8	51.0	44.9	53.6	54.2
Medium Trucks:	49.5	48.0	41.7	40.1	48.6	48.8
Heavy Trucks:	52.8	51.3	42.3	43.6	51.9	52.0
Vehicle Noise:	57.6	55.9	52.0	48.1	56.6	57.0

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	4	8	18	38
CNEL:	4	9	19	41

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Irvington Av.
Road Segment: w/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	480 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-2.59	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-19.82	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-23.78	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	58.5	56.6	54.8	48.7	57.4	58.0
Medium Trucks:	53.3	51.8	45.5	43.9	52.4	52.6
Heavy Trucks:	56.6	55.1	46.1	47.4	55.7	55.8
Vehicle Noise:	61.4	59.7	55.8	51.9	60.4	60.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	7	15	32	68
CNEL:	7	16	34	73

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Irvington Av.
Road Segment: e/o Palm Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	4,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	420 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.17	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.40	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.36	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.9	56.0	54.2	48.2	56.8	57.4
Medium Trucks:	52.8	51.3	44.9	43.4	51.8	52.0
Heavy Trucks:	56.0	54.6	45.5	46.8	55.1	55.3
Vehicle Noise:	60.8	59.1	55.2	51.3	59.8	60.2

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	13	29	63
CNEL:	7	14	31	66

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: W. Little League Dr.
Road Segment: w/o Magnolia Av.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	3,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	370 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	58.73	-3.72	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	70.80	-20.95	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	77.97	-24.91	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	57.3	55.4	53.7	47.6	56.2	56.8
Medium Trucks:	52.2	50.7	44.4	42.8	51.3	51.5
Heavy Trucks:	55.4	54.0	45.0	46.2	54.6	54.7
Vehicle Noise:	60.2	58.6	54.6	50.7	59.2	59.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	6	12	27	58
CNEL:	6	13	28	61

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: w/o N. Little League Dr.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,180 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.23	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-18.47	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-22.43	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	67.3	65.4	63.6	57.6	66.2	66.8
Medium Trucks:	61.1	59.6	53.2	51.7	60.1	60.4
Heavy Trucks:	61.9	60.5	51.5	52.7	61.1	61.2
Vehicle Noise:	69.1	67.4	64.3	59.6	68.1	68.6

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	33	71	153	330
CNEL:	35	76	164	354

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: e/o N. Little League Dr.

Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	9,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	960 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	36 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	44.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.460
Medium Trucks:	40.241
Heavy Trucks:	40.262

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-2.13	1.28	-1.20	-4.61	0.000	0.000
Medium Trucks:	79.45	-19.37	1.31	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-23.32	1.31	-1.20	-5.50	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	66.4	64.5	62.7	56.7	65.3	65.9
Medium Trucks:	60.2	58.7	52.3	50.8	59.2	59.5
Heavy Trucks:	61.0	59.6	50.6	51.8	60.2	60.3
Vehicle Noise:	68.3	66.5	63.4	58.7	67.2	67.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	29	62	133	287
CNEL:	31	66	143	308

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: W. Little League Dr.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	11,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,150 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	20 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	30.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	28.723
Medium Trucks:	28.413
Heavy Trucks:	28.444

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	-1.34	3.51	-1.20	-4.49	0.000	0.000
Medium Trucks:	79.45	-18.58	3.58	-1.20	-4.86	0.000	0.000
Heavy Trucks:	84.25	-22.54	3.57	-1.20	-5.77	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.4	67.5	65.8	59.7	68.3	68.9
Medium Trucks:	63.2	61.7	55.4	53.8	62.3	62.5
Heavy Trucks:	64.1	62.7	53.6	54.9	63.2	63.4
Vehicle Noise:	71.3	69.5	66.4	61.7	70.3	70.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	31	67	145	312
CNEL:	33	72	155	335

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	21,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,110 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.29	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.95	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.90	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.9	68.0	66.2	60.1	68.8	69.4
Medium Trucks:	63.6	62.1	55.8	54.2	62.7	62.9
Heavy Trucks:	64.5	63.1	54.0	55.3	63.6	63.8
Vehicle Noise:	71.7	70.0	66.8	62.1	70.7	71.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	55	119	257	554
CNEL:	59	128	276	594

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: w/o Pine Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	19,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	1,960 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	0.97	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-16.27	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-20.22	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	69.5	67.6	65.9	59.8	68.4	69.0
Medium Trucks:	63.3	61.8	55.4	53.9	62.4	62.6
Heavy Trucks:	64.2	62.7	53.7	55.0	63.3	63.4
Vehicle Noise:	71.4	69.6	66.5	61.8	70.4	70.8

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	53	114	245	528
CNEL:	57	122	263	566

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: w/o Campus Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	27,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,740 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.43	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.81	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.77	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	71.0	69.1	67.3	61.3	69.9	70.5
Medium Trucks:	64.8	63.3	56.9	55.4	63.8	64.1
Heavy Trucks:	65.6	64.2	55.2	56.4	64.8	64.9
Vehicle Noise:	72.8	71.1	67.9	63.3	71.8	72.3

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	66	142	306	660
CNEL:	71	152	328	708

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: w/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	26,700 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,670 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	2.31	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-14.92	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-18.88	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.9	69.0	67.2	61.2	69.8	70.4
Medium Trucks:	64.7	63.2	56.8	55.2	63.7	63.9
Heavy Trucks:	65.5	64.1	55.0	56.3	64.7	64.8
Vehicle Noise:	72.7	71.0	67.8	63.2	71.7	72.1

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	65	140	301	648
CNEL:	70	150	323	695

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: Kendall Dr.
Road Segment: e/o University Pkwy.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	24,100 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	2,410 vehicles
Vehicle Speed:	45 mph
Near/Far Lane Distance:	60 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	50.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	40.311
Medium Trucks:	40.091
Heavy Trucks:	40.113

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	68.46	1.87	1.30	-1.20	-4.65	0.000	0.000
Medium Trucks:	79.45	-15.37	1.34	-1.20	-4.87	0.000	0.000
Heavy Trucks:	84.25	-19.33	1.33	-1.20	-5.43	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	70.4	68.5	66.8	60.7	69.3	69.9
Medium Trucks:	64.2	62.7	56.3	54.8	63.3	63.5
Heavy Trucks:	65.1	63.6	54.6	55.9	64.2	64.3
Vehicle Noise:	72.3	70.5	67.4	62.7	71.2	71.7

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	61	130	281	606
CNEL:	65	140	301	650

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: I-215 Fwy.
Road Segment: w/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,200 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,120 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	4.92	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-8.94	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-7.34	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	79.8	77.9	76.1	70.0	78.7	79.3
Medium Trucks:	76.1	74.6	68.2	66.7	75.2	75.4
Heavy Trucks:	80.7	79.3	70.3	71.5	79.9	80.0
Vehicle Noise:	84.0	82.4	77.6	74.6	83.1	83.4

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	462	996	2,145	4,622
CNEL:	486	1,046	2,254	4,857

Tuesday, November 24, 2015

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL

Scenario: EAP 2019
Road Name: I-215 Fwy.
Road Segment: e/o Palm Av.
Project Name: Rancho Palma
Job Number: 9785

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	91,800 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	9,180 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**0.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	62.0 feet
Centerline Dist. to Observer:	62.0 feet
Barrier Distance to Observer:	0.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	0.0 feet
Road Elevation:	0.0 feet
Road Grade:	0.0%
Left View:	-90.0 degrees
Right View:	90.0 degrees

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	Day	Evening	Night	Daily
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	0.000		
Medium Trucks:	2.297		
Heavy Trucks:	8.006	Grade Adjustment:	0.0

Lane Equivalent Distance (in feet)

Autos:	47.210
Medium Trucks:	47.022
Heavy Trucks:	47.040

FHWA Noise Model Calculations

VehicleType	REMEL	Traffic Flow	Distance	Finite Road	Fresnel	Barrier Atten	Berm Atten
Autos:	75.77	5.46	0.27	-1.20	-4.70	0.000	0.000
Medium Trucks:	85.95	-8.41	0.30	-1.20	-4.88	0.000	0.000
Heavy Trucks:	88.97	-6.80	0.29	-1.20	-5.32	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	Leq Peak Hour	Leq Day	Leq Evening	Leq Night	Ldn	CNEL
Autos:	80.3	78.4	76.6	70.6	79.2	79.8
Medium Trucks:	76.6	75.1	68.8	67.2	75.7	75.9
Heavy Trucks:	81.3	79.8	70.8	72.1	80.4	80.5
Vehicle Noise:	84.6	83.0	78.2	75.2	83.6	83.9

Centerline Distance to Noise Contour (in feet)

	70 dBA	65 dBA	60 dBA	55 dBA
Ldn:	502	1,081	2,328	5,016
CNEL:	527	1,136	2,447	5,271

Tuesday, November 24, 2015

APPENDIX 8.1:

ON-SITE TRAFFIC NOISE CALCULATIONS

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FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	50	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	8,116	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	81	feet

Site Data

Barrier Height:	**9.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	150.0	feet
Centerline Dist. to Observer:	160.0	feet
Barrier Distance to Observer:	10.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	1,749.0	feet
Road Elevation:	1,749.0	feet
Barrier Elevation:	1,749.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,749.000		
Medium Trucks:	1,751.297		
Heavy Trucks:	1,757.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	155.480
Medium Trucks:	155.355
Heavy Trucks:	155.203

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-7.49	-1.20	*0.94*	-10.120	-13.120
Medium Trucks:	82.53	-8.95	-7.49	-1.20	*0.88*	-9.940	-12.940
Heavy Trucks:	85.83	-7.34	-7.48	-1.20	*0.73*	-9.420	-12.420

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.4	63.3	71.9	72.5
Medium Trucks:	64.9	63.4	57.0	55.5	63.9	64.2
Heavy Trucks:	69.8	68.4	59.3	60.6	69.0	69.1
Vehicle Noise:	75.1	73.4	70.0	65.6	74.1	74.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.9	61.0	59.2	53.2	61.8	62.4
Medium Trucks:	55.0	53.5	47.1	45.5	54.0	54.2
Heavy Trucks:	60.4	59.0	49.9	51.2	59.5	59.7
Vehicle Noise:	65.3	63.6	59.9	55.7	64.3	64.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Magnolia Av.	*Job Number:*	9785
Lot No:	50	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	560 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,749.0 feet
Road Elevation:	1,749.0 feet
Barrier Elevation:	1,749.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,749.000		
Medium Trucks:	1,751.297		
Heavy Trucks:	1,757.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	41.690
Medium Trucks:	41.101
Heavy Trucks:	40.367

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-3.38	1.08	-1.20	*1.74*	-11.780	-14.780
Medium Trucks:	74.83	-20.62	1.17	-1.20	*1.39*	-11.080	-14.080
Heavy Trucks:	80.05	-24.57	1.29	-1.20	*0.66*	-9.180	-12.180

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.6	59.7	57.9	51.9	60.5	61.1
Medium Trucks:	54.2	52.7	46.3	44.8	53.2	53.5
Heavy Trucks:	55.6	54.1	45.1	46.4	54.7	54.8
Vehicle Noise:	63.2	61.4	58.4	53.6	62.1	62.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	49.8	47.9	46.2	40.1	48.7	49.3
Medium Trucks:	43.1	41.6	35.2	33.7	42.2	42.4
Heavy Trucks:	46.4	45.0	35.9	37.2	45.5	45.7
Vehicle Noise:	52.0	50.3	46.9	42.5	51.0	51.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	55	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,116 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	150.0 feet
Centerline Dist. to Observer:	160.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,740.5 feet
Road Elevation:	1,743.0 feet
Barrier Elevation:	1,740.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,743.000		
Medium Trucks:	1,745.297		
Heavy Trucks:	1,751.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	155.346
Medium Trucks:	155.261
Heavy Trucks:	155.207

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-7.49	-1.20	*0.87*	-9.910	-12.910
Medium Trucks:	82.53	-8.95	-7.48	-1.20	*0.81*	-9.730	-12.730
Heavy Trucks:	85.83	-7.34	-7.48	-1.20	*0.67*	-9.210	-12.210

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.0	71.1	69.4	63.3	71.9	72.5
Medium Trucks:	64.9	63.4	57.0	55.5	64.0	64.2
Heavy Trucks:	69.8	68.4	59.3	60.6	69.0	69.1
Vehicle Noise:	75.1	73.4	70.0	65.6	74.1	74.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.1	61.2	59.4	53.4	62.0	62.6
Medium Trucks:	55.2	53.7	47.3	45.8	54.2	54.5
Heavy Trucks:	60.6	59.2	50.1	51.4	59.7	59.9
Vehicle Noise:	65.5	63.8	60.2	56.0	64.5	64.9

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Magnolia Av.	*Job Number:*	9785
Lot No:	55	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	560 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	40.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,740.5 feet
Road Elevation:	1,743.0 feet
Barrier Elevation:	1,740.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,743.000		
Medium Trucks:	1,745.297		
Heavy Trucks:	1,751.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	41.056
Medium Trucks:	40.648
Heavy Trucks:	40.389

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-3.38	1.18	-1.20	*1.36*	-11.020	-14.020
Medium Trucks:	74.83	-20.62	1.25	-1.20	*1.04*	-10.380	-13.380
Heavy Trucks:	80.05	-24.57	1.29	-1.20	*0.42*	-8.100	-11.100

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	61.7	59.8	58.0	52.0	60.6	61.2
Medium Trucks:	54.3	52.7	46.4	44.8	53.3	53.5
Heavy Trucks:	55.6	54.1	45.1	46.4	54.7	54.8
Vehicle Noise:	63.2	61.5	58.5	53.7	62.2	62.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	50.7	48.8	47.0	41.0	49.6	50.2
Medium Trucks:	43.9	42.4	36.0	34.5	42.9	43.2
Heavy Trucks:	47.5	46.0	37.0	38.3	46.6	46.7
Vehicle Noise:	53.0	51.2	47.7	43.4	51.9	52.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	79	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	8,116	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	81	feet

Site Data

Barrier Height:	**9.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	149.0	feet
Centerline Dist. to Observer:	159.0	feet
Barrier Distance to Observer:	10.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	1,733.6	feet
Road Elevation:	1,737.0	feet
Barrier Elevation:	1,733.6	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,737.000		
Medium Trucks:	1,739.297		
Heavy Trucks:	1,745.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	154.270
Medium Trucks:	154.199
Heavy Trucks:	154.181

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-7.44	-1.20	*0.85*	-9.850	-12.850
Medium Trucks:	82.53	-8.95	-7.44	-1.20	*0.79*	-9.660	-12.660
Heavy Trucks:	85.83	-7.34	-7.44	-1.20	*0.65*	-9.150	-12.150

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	73.1	71.2	69.4	63.3	72.0	72.6
Medium Trucks:	64.9	63.4	57.1	55.5	64.0	64.2
Heavy Trucks:	69.8	68.4	59.4	60.6	69.0	69.1
Vehicle Noise:	75.2	73.5	70.0	65.7	74.2	74.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.2	61.3	59.6	53.5	62.1	62.7
Medium Trucks:	55.3	53.8	47.4	45.9	54.3	54.6
Heavy Trucks:	60.7	59.3	50.2	51.5	59.8	60.0
Vehicle Noise:	65.6	63.9	60.3	56.1	64.6	65.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Driveway 2	*Job Number:*	9785
Lot No:	79	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	640 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	31.0 feet
Centerline Dist. to Observer:	41.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,733.6 feet
Road Elevation:	1,737.0 feet
Barrier Elevation:	1,734.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,737.000		
Medium Trucks:	1,739.297		
Heavy Trucks:	1,745.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	42.478
Medium Trucks:	42.076
Heavy Trucks:	41.807

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-2.80	0.96	-1.20	*1.80*	-11.900	-14.900
Medium Trucks:	74.83	-20.04	1.02	-1.20	*1.44*	-11.180	-14.180
Heavy Trucks:	80.05	-23.99	1.06	-1.20	*0.70*	-9.300	-12.300

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.1	60.2	58.4	52.4	61.0	61.6
Medium Trucks:	54.6	53.1	46.7	45.2	53.7	53.9
Heavy Trucks:	55.9	54.5	45.5	46.7	55.1	55.2
Vehicle Noise:	63.6	61.8	58.9	54.0	62.6	63.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	50.2	48.3	46.5	40.5	49.1	49.7
Medium Trucks:	43.4	41.9	35.6	34.0	42.5	42.7
Heavy Trucks:	46.6	45.2	36.2	37.4	45.8	45.9
Vehicle Noise:	52.4	50.6	47.2	42.8	51.3	51.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	82	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,116 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**7.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	265.0 feet
Centerline Dist. to Observer:	275.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,731.6 feet
Road Elevation:	1,731.0 feet
Barrier Elevation:	1,731.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,731.000		
Medium Trucks:	1,733.297		
Heavy Trucks:	1,739.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	272.195
Medium Trucks:	272.139
Heavy Trucks:	272.085

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-11.14	-1.20	*0.24*	-7.080	-10.080
Medium Trucks:	82.53	-8.95	-11.14	-1.20	*0.23*	-7.010	-10.010
Heavy Trucks:	85.83	-7.34	-11.14	-1.20	*0.18*	-6.640	-9.640

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.4	67.5	65.7	59.6	68.3	68.9
Medium Trucks:	61.2	59.7	53.4	51.8	60.3	60.5
Heavy Trucks:	66.1	64.7	55.7	56.9	65.3	65.4
Vehicle Noise:	71.5	69.8	66.3	62.0	70.5	70.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.3	60.4	58.6	52.6	61.2	61.8
Medium Trucks:	54.2	52.7	46.4	44.8	53.3	53.5
Heavy Trucks:	59.5	58.1	49.0	50.3	58.7	58.8
Vehicle Noise:	64.6	62.8	59.3	55.0	63.5	64.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Driveway 2	*Job Number:*	9785
Lot No:	82	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	640 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**7.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	145.0 feet
Centerline Dist. to Observer:	155.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,731.6 feet
Road Elevation:	1,731.0 feet
Barrier Elevation:	1,731.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,731.000		
Medium Trucks:	1,733.297		
Heavy Trucks:	1,739.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	155.311
Medium Trucks:	155.209
Heavy Trucks:	155.112

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-2.80	-7.49	-1.20	*0.29*	-7.430	-10.430
Medium Trucks:	74.83	-20.04	-7.48	-1.20	*0.25*	-7.150	-10.150
Heavy Trucks:	80.05	-23.99	-7.48	-1.20	*0.18*	-6.640	-9.640

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.6	51.7	50.0	43.9	52.5	53.1
Medium Trucks:	46.1	44.6	38.2	36.7	45.2	45.4
Heavy Trucks:	47.4	46.0	36.9	38.2	46.5	46.6
Vehicle Noise:	55.1	53.4	50.4	45.5	54.1	54.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	46.2	44.3	42.5	36.5	45.1	45.7
Medium Trucks:	39.0	37.5	31.1	29.5	38.0	38.2
Heavy Trucks:	40.7	39.3	30.3	31.5	39.9	40.0
Vehicle Noise:	47.9	46.1	43.1	38.3	46.8	47.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	Magnolia Av. n/o Driveway 1	*Job Number:*	9785
Lot No:	3	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	230 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	34.0 feet
Centerline Dist. to Observer:	44.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,757.8 feet
Road Elevation:	1,760.0 feet
Barrier Elevation:	1,757.8 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,760.000		
Medium Trucks:	1,762.297		
Heavy Trucks:	1,768.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	43.894
Medium Trucks:	43.714
Heavy Trucks:	43.942

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-5.78	0.75	-1.20	*0.17*	-6.560	-9.560
Medium Trucks:	71.09	-23.02	0.77	-1.20	*0.08*	-5.800	-8.800
Heavy Trucks:	77.24	-26.98	0.74	-1.20	*0.00*	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.2	51.3	49.5	43.5	52.1	52.7
Medium Trucks:	47.6	46.1	39.8	38.2	46.7	46.9
Heavy Trucks:	49.8	48.4	39.3	40.6	49.0	49.1
Vehicle Noise:	55.6	53.9	50.3	46.1	54.6	55.0

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	46.6	44.7	43.0	36.9	45.5	46.2
Medium Trucks:	41.8	40.3	34.0	32.4	40.9	41.1
Heavy Trucks:	44.9	43.5	34.4	35.7	44.1	44.2
Vehicle Noise:	49.7	48.0	44.0	40.2	48.7	49.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Backyard With Wall	*Project Name:*	Rancho Palma
Road Name:	Magnolia Av. n/o W. Little League Dr.	*Job Number:*	9785
Lot No:	44	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	35.0 feet
Centerline Dist. to Observer:	45.0 feet
Barrier Distance to Observer:	10.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,754.7 feet
Road Elevation:	1,755.0 feet
Barrier Elevation:	1,754.7 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,755.000		
Medium Trucks:	1,757.297		
Heavy Trucks:	1,763.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	45.157
Medium Trucks:	44.858
Heavy Trucks:	44.768

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-5.42	0.56	-1.20	*0.26*	-7.220	-10.220
Medium Trucks:	71.09	-22.66	0.60	-1.20	*0.15*	-6.400	-9.400
Heavy Trucks:	77.24	-26.61	0.62	-1.20	*0.00*	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.4	51.5	49.7	43.7	52.3	52.9
Medium Trucks:	47.8	46.3	40.0	38.4	46.9	47.1
Heavy Trucks:	50.0	48.6	39.6	40.8	49.2	49.3
Vehicle Noise:	55.8	54.1	50.5	46.3	54.8	55.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	46.2	44.3	42.5	36.4	45.1	45.7
Medium Trucks:	41.4	39.9	33.6	32.0	40.5	40.7
Heavy Trucks:	45.1	43.7	34.7	35.9	44.3	44.4
Vehicle Noise:	49.4	47.8	43.6	40.0	48.5	48.8

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	50	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	8,116	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	81	feet

Site Data

Barrier Height:	**9.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	150.0	feet
Centerline Dist. to Observer:	170.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	1,749.0	feet
Road Elevation:	1,749.0	feet
Barrier Elevation:	1,749.0	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,749.000		
Medium Trucks:	1,751.297		
Heavy Trucks:	1,757.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	165.105
Medium Trucks:	164.981
Heavy Trucks:	164.829

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-7.89	-1.20	*0.58*	-8.900	-11.900
Medium Trucks:	82.53	-8.95	-7.88	-1.20	*0.51*	-8.550	-11.550
Heavy Trucks:	85.83	-7.34	-7.87	-1.20	*0.36*	-7.800	-10.800

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.6	70.7	69.0	62.9	71.5	72.1
Medium Trucks:	64.5	63.0	56.6	55.1	63.6	63.8
Heavy Trucks:	69.4	68.0	59.0	60.2	68.6	68.7
Vehicle Noise:	74.8	73.0	69.6	65.2	73.7	74.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	63.7	61.8	60.1	54.0	62.6	63.2
Medium Trucks:	56.0	54.5	48.1	46.5	55.0	55.2
Heavy Trucks:	61.6	60.2	51.2	52.4	60.8	60.9
Vehicle Noise:	66.2	64.5	60.8	56.7	65.2	65.6

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Magnolia Av.	*Job Number:*	9785
Lot No:	50	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	560 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,749.0 feet
Road Elevation:	1,749.0 feet
Barrier Elevation:	1,749.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,749.000		
Medium Trucks:	1,751.297		
Heavy Trucks:	1,757.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	51.315
Medium Trucks:	50.726
Heavy Trucks:	49.993

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-3.38	-0.27	-1.20	*1.44*	-11.180	-14.180
Medium Trucks:	74.83	-20.62	-0.20	-1.20	*1.04*	-10.380	-13.380
Heavy Trucks:	80.05	-24.57	-0.10	-1.20	*0.32*	-7.600	-10.600

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.3	58.4	56.6	50.5	59.2	59.8
Medium Trucks:	52.8	51.3	44.9	43.4	51.9	52.1
Heavy Trucks:	54.2	52.8	43.7	45.0	53.3	53.4
Vehicle Noise:	61.8	60.0	57.1	52.2	60.8	61.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	49.1	47.2	45.4	39.4	48.0	48.6
Medium Trucks:	42.4	40.9	34.6	33.0	41.5	41.7
Heavy Trucks:	46.6	45.2	36.1	37.4	45.7	45.8
Vehicle Noise:	51.6	49.9	46.2	42.1	50.6	51.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	55	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,116 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	150.0 feet
Centerline Dist. to Observer:	170.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,740.5 feet
Road Elevation:	1,743.0 feet
Barrier Elevation:	1,740.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,743.000		
Medium Trucks:	1,745.297		
Heavy Trucks:	1,751.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	164.971
Medium Trucks:	164.886
Heavy Trucks:	164.833

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-7.88	-1.20	*0.51*	-8.550	-11.550
Medium Trucks:	82.53	-8.95	-7.88	-1.20	*0.45*	-8.250	-11.250
Heavy Trucks:	85.83	-7.34	-7.87	-1.20	*0.31*	-7.550	-10.550

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.6	70.7	69.0	62.9	71.5	72.1
Medium Trucks:	64.5	63.0	56.6	55.1	63.6	63.8
Heavy Trucks:	69.4	68.0	59.0	60.2	68.6	68.7
Vehicle Noise:	74.8	73.0	69.6	65.2	73.7	74.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.1	62.2	60.4	54.4	63.0	63.6
Medium Trucks:	56.3	54.8	48.4	46.8	55.3	55.5
Heavy Trucks:	61.9	60.4	51.4	52.7	61.0	61.1
Vehicle Noise:	66.5	64.9	61.2	57.0	65.5	66.0

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Magnolia Av.	*Job Number:*	9785
Lot No:	55	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	560 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,740.5 feet
Road Elevation:	1,743.0 feet
Barrier Elevation:	1,740.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,743.000		
Medium Trucks:	1,745.297		
Heavy Trucks:	1,751.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	50.682
Medium Trucks:	50.274
Heavy Trucks:	50.015

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-3.38	-0.19	-1.20	*1.01*	-10.320	-13.320
Medium Trucks:	74.83	-20.62	-0.14	-1.20	*0.67*	-9.210	-12.210
Heavy Trucks:	80.05	-24.57	-0.11	-1.20	*0.13*	-6.240	-9.240

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.3	58.4	56.7	50.6	59.2	59.8
Medium Trucks:	52.9	51.4	45.0	43.5	51.9	52.2
Heavy Trucks:	54.2	52.7	43.7	45.0	53.3	53.4
Vehicle Noise:	61.9	60.1	57.2	52.3	60.8	61.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	50.0	48.1	46.4	40.3	48.9	49.5
Medium Trucks:	43.7	42.2	35.8	34.2	42.7	42.9
Heavy Trucks:	47.9	46.5	37.5	38.7	47.1	47.2
Vehicle Noise:	52.7	51.0	47.2	43.2	51.7	52.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	79	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	8,116	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	81	feet

Site Data

Barrier Height:	**9.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	149.0	feet
Centerline Dist. to Observer:	169.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	1,733.6	feet
Road Elevation:	1,737.0	feet
Barrier Elevation:	1,733.6	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,737.000		
Medium Trucks:	1,739.297		
Heavy Trucks:	1,745.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	163.896
Medium Trucks:	163.824
Heavy Trucks:	163.806

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-7.84	-1.20	*0.48*	-8.400	-11.400
Medium Trucks:	82.53	-8.95	-7.83	-1.20	*0.42*	-8.100	-11.100
Heavy Trucks:	85.83	-7.34	-7.83	-1.20	*0.29*	-7.430	-10.430

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	63.0	71.6	72.2
Medium Trucks:	64.6	63.0	56.7	55.1	63.6	63.8
Heavy Trucks:	69.5	68.0	59.0	60.2	68.6	68.7
Vehicle Noise:	74.8	73.1	69.6	65.3	73.8	74.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	64.3	62.4	60.6	54.6	63.2	63.8
Medium Trucks:	56.5	54.9	48.6	47.0	55.5	55.7
Heavy Trucks:	62.0	60.6	51.6	52.8	61.2	61.3
Vehicle Noise:	66.7	65.0	61.4	57.2	65.7	66.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Driveway 2	*Job Number:*	9785
Lot No:	79	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	640 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	31.0 feet
Centerline Dist. to Observer:	51.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,733.6 feet
Road Elevation:	1,737.0 feet
Barrier Elevation:	1,734.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,737.000		
Medium Trucks:	1,739.297		
Heavy Trucks:	1,745.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	51.913
Medium Trucks:	51.511
Heavy Trucks:	51.242

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-2.80	-0.35	-1.20	*1.26*	-10.820	-13.820
Medium Trucks:	74.83	-20.04	-0.30	-1.20	*0.89*	-9.970	-12.970
Heavy Trucks:	80.05	-23.99	-0.26	-1.20	*0.24*	-7.080	-10.080

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.8	58.9	57.1	51.0	59.7	60.3
Medium Trucks:	53.3	51.8	45.4	43.9	52.3	52.6
Heavy Trucks:	54.6	53.2	44.1	45.4	53.7	53.9
Vehicle Noise:	62.3	60.5	57.6	52.7	61.3	61.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	49.9	48.0	46.3	40.2	48.8	49.5
Medium Trucks:	43.3	41.8	35.5	33.9	42.4	42.6
Heavy Trucks:	47.5	46.1	37.1	38.3	46.7	46.8
Vehicle Noise:	52.5	50.8	47.1	43.0	51.5	51.9

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	82	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	8,116	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	81	feet

Site Data

Barrier Height:	**7.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	265.0	feet
Centerline Dist. to Observer:	285.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	5.0	feet
Pad Elevation:	1,731.6	feet
Road Elevation:	1,731.0	feet
Barrier Elevation:	1,731.6	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,731.000		
Medium Trucks:	1,733.297		
Heavy Trucks:	1,739.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	282.097
Medium Trucks:	282.040
Heavy Trucks:	281.987

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-11.37	-1.20	*0.15*	-6.400	-9.400
Medium Trucks:	82.53	-8.95	-11.37	-1.20	*0.13*	-6.240	-9.240
Heavy Trucks:	85.83	-7.34	-11.37	-1.20	*0.09*	-5.900	-8.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.1	67.2	65.5	59.4	68.0	68.6
Medium Trucks:	61.0	59.5	53.1	51.6	60.1	60.3
Heavy Trucks:	65.9	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	71.3	69.5	66.1	61.7	70.2	70.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	62.7	60.8	59.1	53.0	61.6	62.2
Medium Trucks:	54.8	53.3	46.9	45.4	53.8	54.1
Heavy Trucks:	60.0	58.6	49.6	50.8	59.2	59.3
Vehicle Noise:	65.0	63.3	59.8	55.5	64.0	64.4

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Driveway 2	*Job Number:*	9785
Lot No:	82	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	640 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**7.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	145.0 feet
Centerline Dist. to Observer:	165.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,731.6 feet
Road Elevation:	1,731.0 feet
Barrier Elevation:	1,731.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,731.000		
Medium Trucks:	1,733.297		
Heavy Trucks:	1,739.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	165.213
Medium Trucks:	165.111
Heavy Trucks:	165.014

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-2.80	-7.89	-1.20	*0.20*	-6.800	-9.800
Medium Trucks:	74.83	-20.04	-7.89	-1.20	*0.16*	-6.480	-9.480
Heavy Trucks:	80.05	-23.99	-7.88	-1.20	*0.08*	-5.800	-8.800

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.2	51.3	49.6	43.5	52.1	52.7
Medium Trucks:	45.7	44.2	37.8	36.3	44.8	45.0
Heavy Trucks:	47.0	45.6	36.5	37.8	46.1	46.2
Vehicle Noise:	54.7	53.0	50.0	45.1	53.7	54.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	46.4	44.5	42.8	36.7	45.3	45.9
Medium Trucks:	39.2	37.7	31.4	29.8	38.3	38.5
Heavy Trucks:	41.2	39.8	30.7	32.0	40.3	40.4
Vehicle Noise:	48.2	46.4	43.3	38.6	47.1	47.6

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	Magnolia Av. n/o Driveway 1	*Job Number:*	9785
Lot No:	3	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	230 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	34.0 feet
Centerline Dist. to Observer:	54.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,757.8 feet
Road Elevation:	1,760.0 feet
Barrier Elevation:	1,757.8 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,760.000		
Medium Trucks:	1,762.297		
Heavy Trucks:	1,768.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	53.869
Medium Trucks:	53.689
Heavy Trucks:	53.917

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-5.78	-0.59	-1.20	*0.16*	-6.480	-9.480
Medium Trucks:	71.09	-23.02	-0.57	-1.20	*0.05*	-5.500	-8.500
Heavy Trucks:	77.24	-26.98	-0.59	-1.20	*0.03*	-5.300	-8.300

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	51.9	50.0	48.2	42.2	50.8	51.4
Medium Trucks:	46.3	44.8	38.4	36.9	45.3	45.6
Heavy Trucks:	48.5	47.0	38.0	39.3	47.6	47.7
Vehicle Noise:	54.3	52.6	49.0	44.7	53.3	53.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	45.4	43.5	41.7	35.7	44.3	44.9
Medium Trucks:	40.8	39.3	32.9	31.4	39.8	40.1
Heavy Trucks:	43.2	41.7	32.7	34.0	42.3	42.4
Vehicle Noise:	48.3	46.6	42.7	38.8	47.3	47.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	First Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	Magnolia Av. n/o W. Little League Dr.	*Job Number:*	9785
Lot No:	44	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	35.0 feet
Centerline Dist. to Observer:	55.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	5.0 feet
Pad Elevation:	1,754.7 feet
Road Elevation:	1,755.0 feet
Barrier Elevation:	1,754.7 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,755.000		
Medium Trucks:	1,757.297		
Heavy Trucks:	1,763.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	55.132
Medium Trucks:	54.833
Heavy Trucks:	54.743

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-5.42	-0.74	-1.20	*0.28*	-7.360	-10.360
Medium Trucks:	71.09	-22.66	-0.70	-1.20	*0.13*	-6.240	-9.240
Heavy Trucks:	77.24	-26.61	-0.69	-1.20	*0.00*	-4.900	-7.900

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	52.1	50.2	48.4	42.4	51.0	51.6
Medium Trucks:	46.5	45.0	38.7	37.1	45.6	45.8
Heavy Trucks:	48.7	47.3	38.3	39.5	47.9	48.0
Vehicle Noise:	54.5	52.8	49.2	45.0	53.5	53.9

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	44.7	42.8	41.1	35.0	43.6	44.2
Medium Trucks:	40.3	38.8	32.4	30.9	39.3	39.6
Heavy Trucks:	43.8	42.4	33.4	34.6	43.0	43.1
Vehicle Noise:	48.1	46.4	42.2	38.6	47.1	47.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	50	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,116 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	150.0 feet
Centerline Dist. to Observer:	170.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,749.0 feet
Road Elevation:	1,749.0 feet
Barrier Elevation:	1,749.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,749.000		
Medium Trucks:	1,751.297		
Heavy Trucks:	1,757.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	165.698
Medium Trucks:	165.520
Heavy Trucks:	165.214

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-7.91	-1.20	*-0.30*	0.000	0.000
Medium Trucks:	82.53	-8.95	-7.90	-1.20	*-0.36*	0.000	0.000
Heavy Trucks:	85.83	-7.34	-7.89	-1.20	*-0.50*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	64.5	63.0	56.6	55.1	63.5	63.8
Heavy Trucks:	69.4	68.0	58.9	60.2	68.5	68.7
Vehicle Noise:	74.7	73.0	69.6	65.2	73.7	74.1

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	64.5	63.0	56.6	55.1	63.5	63.8
Heavy Trucks:	69.4	68.0	58.9	60.2	68.5	68.7
Vehicle Noise:	74.7	73.0	69.6	65.2	73.7	74.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Magnolia Av.	*Job Number:*	9785
Lot No:	50	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	560 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,749.0 feet
Road Elevation:	1,749.0 feet
Barrier Elevation:	1,749.0 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,749.000		
Medium Trucks:	1,751.297		
Heavy Trucks:	1,757.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	51.535
Medium Trucks:	51.107
Heavy Trucks:	50.109

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-3.38	-0.30	-1.20	*0.01*	-5.100	-8.100
Medium Trucks:	74.83	-20.62	-0.25	-1.20	*0.00*	0.000	0.000
Heavy Trucks:	80.05	-24.57	-0.12	-1.20	*-0.27*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.2	58.3	56.6	50.5	59.1	59.7
Medium Trucks:	52.8	51.3	44.9	43.4	51.8	52.0
Heavy Trucks:	54.2	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	61.8	60.0	57.1	52.2	60.7	61.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.1	53.2	51.5	45.4	54.0	54.6
Medium Trucks:	52.8	51.3	44.9	43.4	51.8	52.0
Heavy Trucks:	54.2	52.7	43.7	44.9	53.3	53.4
Vehicle Noise:	58.9	57.3	52.9	49.4	57.9	58.3

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	55	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,116 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	150.0 feet
Centerline Dist. to Observer:	170.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,740.5 feet
Road Elevation:	1,743.0 feet
Barrier Elevation:	1,740.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,743.000		
Medium Trucks:	1,745.297		
Heavy Trucks:	1,751.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	165.505
Medium Trucks:	165.362
Heavy Trucks:	165.142

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-7.90	-1.20	*-0.36*	0.000	0.000
Medium Trucks:	82.53	-8.95	-7.90	-1.20	*-0.42*	0.000	0.000
Heavy Trucks:	85.83	-7.34	-7.89	-1.20	*-0.57*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	64.5	63.0	56.6	55.1	63.5	63.8
Heavy Trucks:	69.4	68.0	58.9	60.2	68.5	68.7
Vehicle Noise:	74.7	73.0	69.6	65.2	73.7	74.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.6	70.7	68.9	62.9	71.5	72.1
Medium Trucks:	64.5	63.0	56.6	55.1	63.5	63.8
Heavy Trucks:	69.4	68.0	58.9	60.2	68.5	68.7
Vehicle Noise:	74.7	73.0	69.6	65.2	73.7	74.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Magnolia Av.	*Job Number:*	9785
Lot No:	55	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	5,600 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	560 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	30.0 feet
Centerline Dist. to Observer:	50.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,740.5 feet
Road Elevation:	1,743.0 feet
Barrier Elevation:	1,740.5 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,743.000		
Medium Trucks:	1,745.297		
Heavy Trucks:	1,751.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	50.902
Medium Trucks:	50.493
Heavy Trucks:	49.872

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-3.38	-0.22	-1.20	*0.01*	-5.100	-8.100
Medium Trucks:	74.83	-20.62	-0.17	-1.20	*0.07*	-5.700	-8.700
Heavy Trucks:	80.05	-24.57	-0.09	-1.20	*-0.52*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.3	58.4	56.6	50.6	59.2	59.8
Medium Trucks:	52.8	51.3	45.0	43.4	51.9	52.1
Heavy Trucks:	54.2	52.8	43.7	45.0	53.3	53.5
Vehicle Noise:	61.8	60.1	57.1	52.3	60.8	61.3

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.2	53.3	51.5	45.5	54.1	54.7
Medium Trucks:	47.1	45.6	39.3	37.7	46.2	46.4
Heavy Trucks:	54.2	52.8	43.7	45.0	53.3	53.5
Vehicle Noise:	58.1	56.4	52.4	48.6	57.1	57.5

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	79	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	8,116	vehicles
Vehicle Speed:	70	mph
Near/Far Lane Distance:	81	feet

Site Data

Barrier Height:	**9.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	149.0	feet
Centerline Dist. to Observer:	169.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	1,733.6	feet
Road Elevation:	1,737.0	feet
Barrier Elevation:	1,733.6	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,737.000		
Medium Trucks:	1,739.297		
Heavy Trucks:	1,745.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	164.417
Medium Trucks:	164.285
Heavy Trucks:	164.096

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-7.86	-1.20	*-0.38*	0.000	0.000
Medium Trucks:	82.53	-8.95	-7.85	-1.20	*-0.44*	0.000	0.000
Heavy Trucks:	85.83	-7.34	-7.85	-1.20	*-0.60*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	62.9	71.6	72.2
Medium Trucks:	64.5	63.0	56.7	55.1	63.6	63.8
Heavy Trucks:	69.4	68.0	59.0	60.2	68.6	68.7
Vehicle Noise:	74.8	73.1	69.6	65.2	73.8	74.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	72.7	70.8	69.0	62.9	71.6	72.2
Medium Trucks:	64.5	63.0	56.7	55.1	63.6	63.8
Heavy Trucks:	69.4	68.0	59.0	60.2	68.6	68.7
Vehicle Noise:	74.8	73.1	69.6	65.2	73.8	74.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Driveway 2	*Job Number:*	9785
Lot No:	79	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	640 vehicles
Vehicle Speed:	35 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**9.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	31.0 feet
Centerline Dist. to Observer:	51.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,733.6 feet
Road Elevation:	1,737.0 feet
Barrier Elevation:	1,734.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,737.000		
Medium Trucks:	1,739.297		
Heavy Trucks:	1,745.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	51.694
Medium Trucks:	51.291
Heavy Trucks:	50.821

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-2.80	-0.32	-1.20	*0.00*	-4.900	-7.900
Medium Trucks:	74.83	-20.04	-0.27	-1.20	*0.02*	-5.200	-8.200
Heavy Trucks:	80.05	-23.99	-0.21	-1.20	*-0.35*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	60.8	58.9	57.1	51.1	59.7	60.3
Medium Trucks:	53.3	51.8	45.5	43.9	52.4	52.6
Heavy Trucks:	54.6	53.2	44.2	45.4	53.8	53.9
Vehicle Noise:	62.3	60.6	57.6	52.7	61.3	61.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	55.9	54.0	52.2	46.2	54.8	55.4
Medium Trucks:	48.1	46.6	40.3	38.7	47.2	47.4
Heavy Trucks:	54.6	53.2	44.2	45.4	53.8	53.9
Vehicle Noise:	58.7	57.0	53.1	49.2	57.7	58.1

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	I-215 Freeway	*Job Number:*	9785
Lot No:	82	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	81,160 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	8,116 vehicles
Vehicle Speed:	70 mph
Near/Far Lane Distance:	81 feet

Site Data

Barrier Height:	**7.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	265.0 feet
Centerline Dist. to Observer:	285.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,731.6 feet
Road Elevation:	1,731.0 feet
Barrier Elevation:	1,731.6 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	90.87%
Medium Trucks:	84.8%	4.9%	10.3%	3.73%
Heavy Trucks:	86.5%	2.7%	10.8%	5.40%

Noise Source Elevations (in feet)

Autos:	1,731.000		
Medium Trucks:	1,733.297		
Heavy Trucks:	1,739.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	282.485
Medium Trucks:	282.376
Heavy Trucks:	282.185

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	76.79	4.92	-11.38	-1.20	*-0.90*	0.000	0.000
Medium Trucks:	82.53	-8.95	-11.38	-1.20	*-0.96*	0.000	0.000
Heavy Trucks:	85.83	-7.34	-11.38	-1.20	*-1.09*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.1	67.2	65.5	59.4	68.0	68.6
Medium Trucks:	61.0	59.5	53.1	51.6	60.1	60.3
Heavy Trucks:	65.9	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	71.3	69.5	66.1	61.7	70.2	70.7

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	69.1	67.2	65.5	59.4	68.0	68.6
Medium Trucks:	61.0	59.5	53.1	51.6	60.1	60.3
Heavy Trucks:	65.9	64.5	55.5	56.7	65.1	65.2
Vehicle Noise:	71.3	69.5	66.1	61.7	70.2	70.7

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	W. Little League Dr. e/o Driveway 2	*Job Number:*	9785
Lot No:	82	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	6,400	vehicles
Peak Hour Percentage:	10%	
Peak Hour Volume:	640	vehicles
Vehicle Speed:	35	mph
Near/Far Lane Distance:	10	feet

Site Data

Barrier Height:	**7.0**	**feet**
Barrier Type (0-Wall, 1-Berm):	0.0	
Centerline Dist. to Barrier:	145.0	feet
Centerline Dist. to Observer:	165.0	feet
Barrier Distance to Observer:	20.0	feet
Observer Height (Above Pad):	14.0	feet
Pad Elevation:	1,731.6	feet
Road Elevation:	1,731.0	feet
Barrier Elevation:	1,731.6	feet
Road Grade:	0.0%	

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,731.000		
Medium Trucks:	1,733.297		
Heavy Trucks:	1,739.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	165.569
Medium Trucks:	165.382
Heavy Trucks:	165.056

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	65.11	-2.80	-7.90	-1.20	*-0.73*	0.000	0.000
Medium Trucks:	74.83	-20.04	-7.90	-1.20	*-0.81*	0.000	0.000
Heavy Trucks:	80.05	-23.99	-7.88	-1.20	*-1.04*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.2	51.3	49.5	43.5	52.1	52.7
Medium Trucks:	45.7	44.2	37.8	36.3	44.7	45.0
Heavy Trucks:	47.0	45.5	36.5	37.8	46.1	46.2
Vehicle Noise:	54.7	53.0	50.0	45.1	53.7	54.2

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	53.2	51.3	49.5	43.5	52.1	52.7
Medium Trucks:	45.7	44.2	37.8	36.3	44.7	45.0
Heavy Trucks:	47.0	45.5	36.5	37.8	46.1	46.2
Vehicle Noise:	54.7	53.0	50.0	45.1	53.7	54.2

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	Magnolia Av. n/o Driveway 1	*Job Number:*	9785
Lot No:	3	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,300 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	230 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	34.0 feet
Centerline Dist. to Observer:	54.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,757.8 feet
Road Elevation:	1,760.0 feet
Barrier Elevation:	1,757.8 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,760.000		
Medium Trucks:	1,762.297		
Heavy Trucks:	1,768.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	55.048
Medium Trucks:	54.601
Heavy Trucks:	53.902

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-5.78	-0.73	-1.20	*-0.47*	0.000	0.000
Medium Trucks:	71.09	-23.02	-0.68	-1.20	*-0.73*	0.000	0.000
Heavy Trucks:	77.24	-26.98	-0.59	-1.20	*-1.63*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	51.7	49.8	48.1	42.0	50.6	51.2
Medium Trucks:	46.2	44.7	38.3	36.8	45.2	45.5
Heavy Trucks:	48.5	47.1	38.0	39.3	47.6	47.7
Vehicle Noise:	54.2	52.5	48.9	44.6	53.2	53.6

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	51.7	49.8	48.1	42.0	50.6	51.2
Medium Trucks:	46.2	44.7	38.3	36.8	45.2	45.5
Heavy Trucks:	48.5	47.1	38.0	39.3	47.6	47.7
Vehicle Noise:	54.2	52.5	48.9	44.6	53.2	53.6

FHWA-RD-77-108 HIGHWAY NOISE PREDICTION MODEL (CALVENO) - 10/1/2012

Scenario:	Second Floor With Wall	*Project Name:*	Rancho Palma
Road Name:	Magnolia Av. n/o W. Little League Dr.	*Job Number:*	9785
Lot No:	44	*Analyst:*	A. Wolfe

SITE SPECIFIC INPUT DATA

Highway Data

Average Daily Traffic (Adt):	2,500 vehicles
Peak Hour Percentage:	10%
Peak Hour Volume:	250 vehicles
Vehicle Speed:	25 mph
Near/Far Lane Distance:	10 feet

Site Data

Barrier Height:	**6.0 feet**
Barrier Type (0-Wall, 1-Berm):	0.0
Centerline Dist. to Barrier:	35.0 feet
Centerline Dist. to Observer:	55.0 feet
Barrier Distance to Observer:	20.0 feet
Observer Height (Above Pad):	14.0 feet
Pad Elevation:	1,754.7 feet
Road Elevation:	1,755.0 feet
Barrier Elevation:	1,754.7 feet
Road Grade:	0.0%

NOISE MODEL INPUTS

Site Conditions (Hard = 10, Soft = 15)

Autos:	15
Medium Trucks (2 Axles):	15
Heavy Trucks (3+ Axles):	15

Vehicle Mix

VehicleType	*Day*	*Evening*	*Night*	*Daily*
Autos:	77.5%	12.9%	9.6%	97.42%
Medium Trucks:	84.8%	4.9%	10.3%	1.84%
Heavy Trucks:	86.5%	2.7%	10.8%	0.74%

Noise Source Elevations (in feet)

Autos:	1,755.000		
Medium Trucks:	1,757.297		
Heavy Trucks:	1,763.006	*Grade Adjustment:*	0.0

Lane Equivalent Distance (in feet)

Autos:	56.460
Medium Trucks:	55.947
Heavy Trucks:	55.067

FHWA Noise Model Calculations

VehicleType	*REMEL*	*Traffic Flow*	*Distance*	*Finite Road*	*Fresnel*	*Barrier Atten*	*Berm Atten*
Autos:	59.44	-5.42	-0.89	-1.20	*-0.31*	0.000	0.000
Medium Trucks:	71.09	-22.66	-0.84	-1.20	*-0.52*	0.000	0.000
Heavy Trucks:	77.24	-26.61	-0.73	-1.20	*-1.29*	0.000	0.000

Unmitigated Noise Levels (without Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	51.9	50.0	48.3	42.2	50.8	51.4
Medium Trucks:	46.4	44.9	38.5	37.0	45.4	45.7
Heavy Trucks:	48.7	47.3	38.2	39.5	47.8	48.0
Vehicle Noise:	54.4	52.7	49.1	44.8	53.4	53.8

Mitigated Noise Levels (with Topo and barrier attenuation)

VehicleType	*Leq Peak Hour*	*Leq Day*	*Leq Evening*	*Leq Night*	*Ldn*	*CNEL*
Autos:	51.9	50.0	48.3	42.2	50.8	51.4
Medium Trucks:	46.4	44.9	38.5	37.0	45.4	45.7
Heavy Trucks:	48.7	47.3	38.2	39.5	47.8	48.0
Vehicle Noise:	54.4	52.7	49.1	44.8	53.4	53.8

APPENDIX 10.1:

OPERATIONAL NOISE CALCULATIONS

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STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location:	**R3**	*Project Name:*	Rancho Palma
Source:	Roof-Top Air Conditioning Units	*Job Number:*	9785
Condition:	Operational	*Analyst:*	A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,168.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	1,168.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,758.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,750.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,758.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	53.7	51.5	50.1	78.2
Distance Attenuation	1,168.0	-47.4	-47.4	-47.4	-47.4	-47.4	-47.4
Shielding (Barrier Attenuation)	1,168.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		29.8	27.0	6.3	4.1	2.7	30.8
39 Minute Hourly Adjustment		**27.9**	**25.1**	**4.4**	**2.2**	**0.8**	**28.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location:	**R3**	*Project Name:*	Rancho Palma
Source:	Loading Dock Activity	*Job Number:*	9785
Condition:	Operational	*Analyst:*	A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,154.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	1,154.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,758.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,725.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,758.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	20.0	77.3	77.2	77.6	77.9	78.2	80.6
Distance Attenuation	1,154.0	-35.2	-35.2	-35.2	-35.2	-35.2	-35.2
Shielding (Barrier Attenuation)	1,154.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		42.1	42.0	42.4	42.7	43.0	45.4
18 Minute Hourly Adjustment		**36.9**	**36.8**	**37.2**	**37.5**	**37.8**	**40.2**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R4**
Source: Roof-Top Air Conditioning Units
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	444.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	444.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,740.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,750.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,740.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	53.7	51.5	50.1	78.2
Distance Attenuation	444.0	-39.0	-39.0	-39.0	-39.0	-39.0	-39.0
Shielding (Barrier Attenuation)	444.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		38.2	35.4	14.7	12.5	11.1	39.2
39 Minute Hourly Adjustment		**36.3**	**33.5**	**12.8**	**10.6**	**9.2**	**37.3**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R4**
Source: Shopping Cart Corral
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	690.0	feet	***Barrier Height:***	**20.0**	**feet**
Noise Distance to Barrier:	61.0	feet	*Noise Source Height:*	3.0	feet
Barrier Distance to Observer:	629.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,740.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,730.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,730.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	72.9	61.9	70.3	79.5	82.7	83.4
Distance Attenuation	690.0	-42.8	-42.8	-42.8	-42.8	-42.8	-42.8
Shielding (Barrier Attenuation)	61.0	-12.5	-12.5	-12.5	-12.5	-12.5	-12.5
Raw (Distance + Barrier)		17.6	6.6	15.0	24.2	27.4	28.1
20 Minute Hourly Adjustment		**12.8**	**1.8**	**10.2**	**19.4**	**22.6**	**23.3**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location:	**R4**	*Project Name:*	Rancho Palma
Source:	Parking Lot Vehicle Movements	*Job Number:*	9785
Condition:	Operational	*Analyst:*	A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	685.0	feet	***Barrier Height:***	**20.0**	**feet**
Noise Distance to Barrier:	51.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	634.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,740.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,730.0	feet	*Drop Off Coefficient:*	15.0	
Barrier Elevation:	1,730.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	60.1	56.7	60.7	63.7	67.1	79.5
Distance Attenuation	685.0	-32.1	-32.1	-32.1	-32.1	-32.1	-32.1
Shielding (Barrier Attenuation)	51.0	-12.4	-12.4	-12.4	-12.4	-12.4	-12.4
Raw (Distance + Barrier)		15.6	12.2	16.2	19.2	22.6	35.0
60 Minute Hourly Adjustment		**15.6**	**12.2**	**16.2**	**19.2**	**22.6**	**35.0**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location:	**R4**	*Project Name:*	Rancho Palma
Source:	Loading Dock Activity	*Job Number:*	9785
Condition:	Operational	*Analyst:*	A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	411.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	411.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,740.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,725.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,740.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	20.0	77.3	77.2	77.6	77.9	78.2	80.6
Distance Attenuation	411.0	-26.3	-26.3	-26.3	-26.3	-26.3	-26.3
Shielding (Barrier Attenuation)	411.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		51.0	50.9	51.3	51.6	51.9	54.3
18 Minute Hourly Adjustment		**45.8**	**45.7**	**46.1**	**46.4**	**46.7**	**49.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R5**
Source: Roof-Top Air Conditioning Units
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	270.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	270.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,739.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,750.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,739.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	53.7	51.5	50.1	78.2
Distance Attenuation	270.0	-34.6	-34.6	-34.6	-34.6	-34.6	-34.6
Shielding (Barrier Attenuation)	270.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		42.6	39.8	19.1	16.9	15.5	43.6
39 Minute Hourly Adjustment		**40.7**	**37.9**	**17.2**	**15.0**	**13.6**	**41.7**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R5**
Source: Shopping Cart Corral
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	509.0	feet	***Barrier Height:***	**20.0**	**feet**
Noise Distance to Barrier:	63.0	feet	*Noise Source Height:*	3.0	feet
Barrier Distance to Observer:	446.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,739.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,730.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,730.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	72.9	61.9	70.3	79.5	82.7	83.4
Distance Attenuation	509.0	-40.2	-40.2	-40.2	-40.2	-40.2	-40.2
Shielding (Barrier Attenuation)	63.0	-12.5	-12.5	-12.5	-12.5	-12.5	-12.5
Raw (Distance + Barrier)		20.2	9.2	17.6	26.8	30.0	30.7
20 Minute Hourly Adjustment		**15.4**	**4.4**	**12.8**	**22.0**	**25.2**	**25.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R5**
Source: Parking Lot Vehicle Movements
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	507.0	feet	***Barrier Height:***	**20.0**	**feet**
Noise Distance to Barrier:	56.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	451.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,739.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,725.0	feet	*Drop Off Coefficient:*	15.0	
Barrier Elevation:	1,730.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	60.1	56.7	60.7	63.7	67.1	79.5
Distance Attenuation	507.0	-30.1	-30.1	-30.1	-30.1	-30.1	-30.1
Shielding (Barrier Attenuation)	56.0	-13.8	-13.8	-13.8	-13.8	-13.8	-13.8
Raw (Distance + Barrier)		16.2	12.8	16.8	19.8	23.2	35.6
60 Minute Hourly Adjustment		**16.2**	**12.8**	**16.8**	**19.8**	**23.2**	**35.6**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R5**
Source: Loading Dock Activity
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	246.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	246.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,739.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,725.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,739.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	20.0	77.3	77.2	77.6	77.9	78.2	80.6
Distance Attenuation	246.0	-21.8	-21.8	-21.8	-21.8	-21.8	-21.8
Shielding (Barrier Attenuation)	246.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		55.5	55.4	55.8	56.1	56.4	58.8
18 Minute Hourly Adjustment		**50.3**	**50.2**	**50.6**	**50.9**	**51.2**	**53.6**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R6**
Source: Roof-Top Air Conditioning Units
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	293.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	293.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,732.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,740.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,732.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	53.7	51.5	50.1	78.2
Distance Attenuation	293.0	-35.4	-35.4	-35.4	-35.4	-35.4	-35.4
Shielding (Barrier Attenuation)	293.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		41.8	39.0	18.3	16.1	14.7	42.8
39 Minute Hourly Adjustment		**39.9**	**37.1**	**16.4**	**14.2**	**12.8**	**40.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R6**
Source: Shopping Cart Corral
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	615.0	feet	***Barrier Height:***	**20.0**	**feet**
Noise Distance to Barrier:	93.0	feet	*Noise Source Height:*	3.0	feet
Barrier Distance to Observer:	522.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,732.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,730.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,725.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	72.9	61.9	70.3	79.5	82.7	83.4
Distance Attenuation	615.0	-41.8	-41.8	-41.8	-41.8	-41.8	-41.8
Shielding (Barrier Attenuation)	93.0	-9.7	-9.7	-9.7	-9.7	-9.7	-9.7
Raw (Distance + Barrier)		21.4	10.4	18.8	28.0	31.2	31.9
20 Minute Hourly Adjustment		**16.6**	**5.6**	**14.0**	**23.2**	**26.4**	**27.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R6**
Source: Parking Lot Vehicle Movements
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	421.0	feet	***Barrier Height:***	**20.0**	**feet**
Noise Distance to Barrier:	62.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	359.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,732.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,725.0	feet	*Drop Off Coefficient:*	15.0	
Barrier Elevation:	1,725.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	60.1	56.7	60.7	63.7	67.1	79.5
Distance Attenuation	421.0	-28.9	-28.9	-28.9	-28.9	-28.9	-28.9
Shielding (Barrier Attenuation)	62.0	-11.9	-11.9	-11.9	-11.9	-11.9	-11.9
Raw (Distance + Barrier)		19.3	15.9	19.9	22.9	26.3	38.7
60 Minute Hourly Adjustment		**19.3**	**15.9**	**19.9**	**22.9**	**26.3**	**38.7**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R6**
Source: Loading Dock Activity
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	481.0	feet	***Barrier Height:***	**0.0**	**feet**
Noise Distance to Barrier:	481.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	0.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,732.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,725.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,732.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	20.0	77.3	77.2	77.6	77.9	78.2	80.6
Distance Attenuation	481.0	-27.6	-27.6	-27.6	-27.6	-27.6	-27.6
Shielding (Barrier Attenuation)	481.0	0.0	0.0	0.0	0.0	0.0	0.0
Raw (Distance + Barrier)		49.7	49.6	50.0	50.3	50.6	53.0
18 Minute Hourly Adjustment		**44.5**	**44.4**	**44.8**	**45.1**	**45.4**	**47.8**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location:	**R7**	*Project Name:*	Rancho Palma
Source:	Roof-Top Air Conditioning Units	*Job Number:*	9785
Condition:	Operational	*Analyst:*	A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	401.0 feet	***Barrier Height:***	**6.0**	**feet**
Noise Distance to Barrier:	391.0 feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	10.0 feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,723.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,740.0 feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,723.0 feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	77.2	74.4	53.7	51.5	50.1	78.2
Distance Attenuation	401.0	-38.1	-38.1	-38.1	-38.1	-38.1	-38.1
Shielding (Barrier Attenuation)	391.0	-5.2	-5.2	-5.2	-5.2	-5.2	-5.2
Raw (Distance + Barrier)		33.9	31.1	10.4	8.2	6.8	34.9
39 Minute Hourly Adjustment		**32.0**	**29.2**	**8.5**	**6.3**	**4.9**	**33.0**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location:	**R7**	*Project Name:*	Rancho Palma
Source:	Shopping Cart Corral	*Job Number:*	9785
Condition:	Operational	*Analyst:*	A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,044.0 feet	***Barrier Height:***	**20.0**	**feet**
Noise Distance to Barrier:	281.0 feet	*Noise Source Height:*	3.0	feet
Barrier Distance to Observer:	763.0 feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,723.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,730.0 feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,725.0 feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	72.9	61.9	70.3	79.5	82.7	83.4
Distance Attenuation	1,044.0	-46.4	-46.4	-46.4	-46.4	-46.4	-46.4
Shielding (Barrier Attenuation)	281.0	-8.1	-8.1	-8.1	-8.1	-8.1	-8.1
Raw (Distance + Barrier)		18.4	7.4	15.8	25.0	28.2	28.9
20 Minute Hourly Adjustment		**13.6**	**2.6**	**11.0**	**20.2**	**23.4**	**24.1**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R7**
Source: Parking Lot Vehicle Movements
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	587.0	feet	***Barrier Height:***	**20.0**	**feet**
Noise Distance to Barrier:	103.0	feet	*Noise Source Height:*	5.0	feet
Barrier Distance to Observer:	484.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,723.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,720.0	feet	*Drop Off Coefficient:*	15.0	
Barrier Elevation:	1,720.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	60.1	56.7	60.7	63.7	67.1	79.5
Distance Attenuation	587.0	-31.0	-31.0	-31.0	-31.0	-31.0	-31.0
Shielding (Barrier Attenuation)	103.0	-10.7	-10.7	-10.7	-10.7	-10.7	-10.7
Raw (Distance + Barrier)		18.4	15.0	19.0	22.0	25.4	37.8
60 Minute Hourly Adjustment		**18.4**	**15.0**	**19.0**	**22.0**	**25.4**	**37.8**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R7**
Source: Loading Dock Activity
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,000.0	feet	***Barrier Height:***	**6.0**	**feet**
Noise Distance to Barrier:	990.0	feet	*Noise Source Height:*	8.0	feet
Barrier Distance to Observer:	10.0	feet	*Observer Height:*	5.0	feet
Observer Elevation:	1,723.0	feet	*Barrier Type (0-Wall, 1-Berm):*	0	
Noise Source Elevation:	1,725.0	feet	*Drop Off Coefficient:*	20.0	
Barrier Elevation:	1,723.0	feet			

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	20.0	77.3	77.2	77.6	77.9	78.2	80.6
Distance Attenuation	1,000.0	-34.0	-34.0	-34.0	-34.0	-34.0	-34.0
Shielding (Barrier Attenuation)	990.0	-5.4	-5.4	-5.4	-5.4	-5.4	-5.4
Raw (Distance + Barrier)		37.9	37.8	38.2	38.5	38.8	41.2
18 Minute Hourly Adjustment		**32.7**	**32.6**	**33.0**	**33.3**	**33.6**	**36.0**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R8**
Source: Shopping Cart Corral
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,574.0 feet	***Barrier Height:***	**6.0 feet**
Noise Distance to Barrier:	1,564.0 feet	*Noise Source Height:*	3.0 feet
Barrier Distance to Observer:	10.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	1,759.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	1,730.0 feet	*Drop Off Coefficient:*	20.0
Barrier Elevation:	1,759.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	72.9	61.9	70.3	79.5	82.7	83.4
Distance Attenuation	1,574.0	-50.0	-50.0	-50.0	-50.0	-50.0	-50.0
Shielding (Barrier Attenuation)	1,564.0	-5.7	-5.7	-5.7	-5.7	-5.7	-5.7
Raw (Distance + Barrier)		17.2	6.2	14.6	23.8	27.0	27.7
20 Minute Hourly Adjustment		**12.4**	**1.4**	**9.8**	**19.0**	**22.2**	**22.9**

STATIONARY SOURCE NOISE PREDICTION MODEL

11/17/2015

Observer Location: **R8**
Source: Parking Lot Vehicle Movements
Condition: Operational

Project Name: Rancho Palma
Job Number: 9785
Analyst: A. Wolfe

NOISE MODEL INPUTS

Noise Distance to Observer	1,461.0 feet	***Barrier Height:***	**6.0 feet**
Noise Distance to Barrier:	1,451.0 feet	*Noise Source Height:*	5.0 feet
Barrier Distance to Observer:	10.0 feet	*Observer Height:*	5.0 feet
Observer Elevation:	1,759.0 feet	*Barrier Type (0-Wall, 1-Berm):*	0
Noise Source Elevation:	1,730.0 feet	*Drop Off Coefficient:*	15.0
Barrier Elevation:	1,759.0 feet		

20 = 6 dBA per doubling of distance
15 = 4.5 dBA per doubling of distance

NOISE MODEL PROJECTIONS

Noise Level	*Distance (feet)*	*Leq*	*L50*	*L25*	*L8*	*L2*	*Lmax*
Reference (Sample)	5.0	60.1	56.7	60.7	63.7	67.1	79.5
Distance Attenuation	1,461.0	-37.0	-37.0	-37.0	-37.0	-37.0	-37.0
Shielding (Barrier Attenuation)	1,451.0	-5.7	-5.7	-5.7	-5.7	-5.7	-5.7
Raw (Distance + Barrier)		17.4	14.0	18.0	21.0	24.4	36.8
60 Minute Hourly Adjustment		**17.4**	**14.0**	**18.0**	**21.0**	**24.4**	**36.8**

APPENDIX 11.1:

CONSTRUCTION REFERENCE NOISE LEVEL MEASUREMENTS MEMO

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URBAN CROSSROADS
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SUBJECT: CONSTRUCTION REFERENCE NOISE LEVEL MEASUREMENTS MEMO

This Construction Reference Noise Level Measurements Memo has been prepared to summarize the sample reference noise level measurements collected by Urban Crossroads, Inc. To describe peak construction noise activities, we have historically relied on reference noise level measurements provided in the Federal Highway Administration (FHWA) Roadway Construction Noise Model (RCNM). However, our experience demonstrates that the RCNM significantly overstates the predicted construction noise levels. This is largely due the fact that RCNM is based on construction equipment data collected from the Central Artery/Tunnel project in Boston, Massachusetts in the early 1990's. Due to substantial changes in the air quality emission requirements in the State of California Air Resources Board (ARB), the RCNM reference noise level measurements do not adequately describe modern construction equipment noise levels. In addition, the RCNM methodology places all construction equipment at a single point near the property line. This scenario simply does not occur in the real world as typical construction activity represents a variety of equipment operating at different locations throughout the project site.

REFERENCE NOISE LEVEL MEASUREMENTS

To estimate a project's construction-related noise levels, sample reference noise level measurements of similar construction activities were collected by Urban Crossroads, Inc. to describe the different stages of construction. The reference noise levels are intended to represent typical construction noise levels when multiple pieces of equipment are operating simultaneously at a construction site. The following reference noise level measurements were collected from existing construction operations with similar equipment as those expected with future construction of comparable land uses. Appendix A includes the data collected from each of the reference noise level measurements adjusted to present noise levels at a uniform reference distance of 50 feet. Appendix B includes the reference noise source photos by identification number ("ID"). Table 1 summarizes the reference noise level measurements. The reference noise level measurements are identified by land use type and location below.

BUSINESS PARK CONSTRUCTION SITE, CITY OF IRVINE

On Wednesday, October 14th, 2015, Urban Crossroads, Inc. collected short-term construction noise level measurements at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine. The reference noise level measurements include the following noise source activities: a truck pass-by and background dozer activity (ID 1) and dozer activity (ID 2). Both measurements were taken at a distance of approximately 30 feet from the source and represent typical construction activities during the grading stage of construction.

RESIDENTIAL CONSTRUCTION SITE, CITY OF RANCHO MISSION VIEJO

On Tuesday, October 20th, 2015, Urban Crossroads, Inc. collected short-term construction noise level measurements at a residential construction site located in the unincorporated area within the County of Orange known as Rancho Mission Viejo. The reference noise level measurements include the following noise source activities: construction vehicle maintenance (ID 3), foundation trenching (ID 4), rough grading activities (ID 5), and residential building framing (ID 6). All reference measurements were taken at this location at a distance of approximately 30 feet from the noise source.

INDUSTRIAL SITE, CITY OF ONTARIO

Additional short-term reference noise level measurements were collected on Friday, October 30th, 2015, by Urban Crossroads, Inc. at an active industrial construction site in the City of Ontario. The reference noise level measurements represent the grading activities associated with industrial/warehousing construction. Five reference noise level measurements were taken at this location to describe: a water truck pass-by and backup alarm (ID 7), a dozer pass-by (ID 8), two scrapers and a water truck pass-by (ID 9), two scrapers pass-by (ID 10), and scraper, water truck and dozer activities over a 30-minute period (ID 11). All reference measurements taken at this location were at a distance of approximately 30 feet from the source.

INDUSTRIAL SITE, CITY OF REDLANDS

On July 1st, 2015, Urban Crossroads, Inc. collected short-term construction noise level measurements of a nighttime concrete pour at an industrial construction site located at 27334 San Bernardino Avenue in the City of Redlands. The reference noise level measurements include the following nighttime building construction and paving-related noise source activities: concrete mixer truck movements (ID 12), concrete paver activities (ID 13), concrete mixer pour & paving activities (ID 14), concrete mixer backup alarms and air brakes (ID 15), and a one-hour measurement over the duration of all reference measurements at this location of concrete mixer pour activities (ID 16).

TABLE 1: CONSTRUCTION REFERENCE NOISE LEVEL MEASUREMENTS SUMMARY

ID	Noise Source	Reference Distance From Source (Feet)	Reference Noise Levels @ Reference Distance		Reference Noise Levels @ 50 Feet[6]	
			dBA Leq	dBA Lmax	dBA Leq	dBA Lmax
1	Truck Pass-Bys & Dozer Activity[1]	30'	63.6	68.1	59.2	63.7
2	Dozer Activity[1]	30'	68.6	76.4	64.2	72.0
3	Construction Vehicle Maintenance Activities[2]	30'	71.9	74.8	67.5	70.4
4	Foundation Trenching[2]	30'	72.6	74.9	68.2	70.5
5	Rough Grading Activities[2]	30'	77.9	84.8	73.5	80.4
6	Residential Framing[3]	30'	66.7	76.7	62.3	72.3
7	Water Truck Pass-By & Backup Alarm[4]	30'	76.3	82.3	71.9	77.9
8	Dozer Pass-By[4]	30'	84.0	89.9	79.6	85.5
9	Two Scrapers & Water Truck Pass-By[4]	30'	83.4	89.0	79.0	84.6
10	Two Scrapers Pass-By[4]	30'	83.7	86.9	79.3	82.5
11	Scraper, Water Truck, & Dozer Activity[4]	30'	79.7	87.7	75.3	83.3
12	Concrete Mixer Truck Movements[5]	50'	71.2	73.1	71.2	73.1
13	Concrete Paver Activities[5]	30'	70.0	75.7	65.6	71.3
14	Concrete Mixer Pour & Paving Activities[5]	30'	70.3	76.3	65.9	71.9
15	Concrete Mixer Backup Alarms & Air Brakes[5]	50'	71.6	78.8	71.6	78.8
16	Concrete Mixer Pour Activities[5]	50'	67.7	79.2	67.7	79.2

[1] As measured by Urban Crossroads, Inc. on 10/14/15 at a business park construction site located at the northwest corner of Barranca Parkway and Alton Parkway in the City of Irvine.
[2] As measured by Urban Crossroads, Inc. on 10/20/15 at a construction site located in Rancho Mission Viejo.
[3] As measured by Urban Crossroads, Inc. on 10/20/15 at a residential construction site located in Rancho Mission Viejo.
[4] As measured by Urban Crossroads, Inc. on 10/30/15 during grading operations within an industrial construction site located in the City of Ontario.
[5] Reference noise level measurements were collected from a nighttime concrete pour at an industrial construction site, located at 27334 San Bernardino Avenue in the City of Redlands, between 1:00 a.m. to 2:00 a.m. on 7/1/15.
[6] Reference noise levels are calculated at 50 feet using a drop off rate of 6 dBA per doubling of distance (point source).

MODELED AND MEASURED CONSTRUCTION NOISE LEVELS

A RCNM construction noise analysis was prepared by Urban Crossroads, Inc. on October 17th, 2014 for an industrial project site in the City of Ontario. The noise levels due to construction in the industrial portion of the project site (Planning Area 1) were estimated at up to thirteen receiver locations to determine the potential noise impacts at adjacent sensitive land uses. Returning to the same industrial project site over a year later, in October 2015, Urban Crossroads, Inc. collected noise level measurements at the same receiver locations to validate the modeled RCNM construction noise levels with actual construction noise level measurements collected in the field. The grading stage of construction was chosen for this comparison since grading activities typically represent the worst-case construction activities due to the number and size of the mobile equipment used in the grading process.

MODELED CONSTRUCTION NOISE LEVELS

As shown on Table 2, the modeled RCNM noise levels during the grading stage of construction were estimated to produce a noise level approaching 92.6 dBA Leq at a distance of 50 feet from the project site boundary. The RCNM noise levels reflect the combined construction noise level impacts of excavators, graders, tractors, loaders, backhoes, rubber tired dozers, and scrapers producing a noise level of 92.6 dBA Leq. At nearby receiver locations, this results in a short-term construction noise level approaching 88.2 dBA Leq.

TABLE 2: RCNM MODELED CONSTRUCTION NOISE LEVELS

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Leq)	Combined Level @ 50 Feet (dBA Leq)
Excavator	2	40%	3.2	81.0	80.0
Grader	8	40%	3.2	85.0	90.1
Tractor/Loader/Backhoe	5	40%	3.2	78.0	81.0
Rubber Tired Dozer	2	40%	3.2	79.0	78.0
Scraper	5	40%	3.2	84.0	87.0
Combined Hourly Noise Levels 50 Feet (Leq dBA)					92.6

Receiver Location	Distance To Property Line (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Noise Barrier Attenuation (dBA Leq)	Construction Noise Level (dBA Leq)
R2	83'	-4.4	0.0	88.2
R3	78'	-3.9	-5.6	83.1

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.

MEASURED CONSTRUCTION NOISE LEVELS

To describe the actual construction noise levels based on typical conditions, short-term construction noise level measurements were collected in the field during grading activities at receiver locations R2 and R3. Appendix C includes study area photos of the measurement locations and the construction activities observed from each location at the project site. To validate the construction noise levels, measurements were collected during continuous on-site grading activities on Friday, October 30th, and again on Friday, November 6th, 2015.

Grading activities observed on the site during the short-term noise level measurements include water trucks queuing and refilling at a stationary tank, trencher activity, up to three scrapers operating simultaneously, and dozer activity. The water truck queuing activity was the closest equipment observed near the project site boundaries due to the stationary location of the water refill tank, at a distance of approximately 100 feet from the receiver locations. The trencher was observed at a distance of roughly 600 feet from the receiver locations, and the scrapers and dozer activities were at approximately 900 feet from the receiver locations. Additional stationary scrapers were located at a distance of approximately 700 feet from the receiver locations. Additional background construction noise sources include forklifts, cranes, and man lifts used in the building construction stage of a portion of the site located roughly 900 feet southeast of the receiver locations. The construction activities observed during the short-term measurements represent typical grading activities within an industrial construction site, with multiple pieces of equipment operating at varying distances from the project site boundaries.

Table 3 shows the modeled RCNM noise levels using the actual distances from each receiver location to the nearest equipment activity observed during the short-term noise level measurements. Based on the RCNM model, the peak grading construction noise levels would range from 80.9 to 86.5 dBA Leq when equipment is located at 100 feet from each receiver location. By calculating the modeled RCNM noise level at each location, a comparison can be made between the modeled and measured grading construction noise levels to calibrate the construction noise model.

TABLE 3: MODELED CONSTRUCTION NOISE LEVELS BASED ON ACTUAL EQUIPMENT DISTANCES

Equipment Type[1]	Quantity	Usage Factor[2]	Hours Of Operation[3]	Reference Noise Level @ 50 Feet (dBA Leq)	Combined Level @ 50 Feet (dBA Leq)
Excavator	2	40%	3.2	81.0	80.0
Grader	8	40%	3.2	85.0	90.1
Tractor/Loader/Backhoe	5	40%	3.2	78.0	81.0
Rubber Tired Dozer	2	40%	3.2	79.0	78.0
Scraper	5	40%	3.2	84.0	87.0
Combined Hourly Noise Levels 50 Feet (Leq dBA)					92.6

Receiver Location	Distance To Closest Equipment Activity (Feet)[4]	Distance Attenuation (dBA Leq)[5]	Estimated Noise Barrier Attenuation (dBA Leq)	Construction Noise Level (dBA Leq)
R2	100'	-6.0	0.0	86.5
R3	100'	-6.0	-5.6	80.9

[1] Source: FHWA's Roadway Construction Noise Model, January 2006.
[2] Estimates the fraction of time each piece of equipment is operating at full power during a construction operation.
[3] Represents the actual hours of peak construction equipment activity out of a typical 8 hour workday.
[4] Distance from the nearest point of construction activity to the nearest receiver.
[5] Point (stationary) source drop off rate of 6.0 dBA per doubling of distance.

To determine the project-only construction noise levels at each receiver location during the grading activities observed at the project site, the ambient without project noise level measurements are compared to the short-term with project noise level measurements. The ambient noise level measurements from the original noise study are shown on Table 4 in addition to the new short-term noise level measurements collected during typical grading activity at the receiver locations on Day 1, Friday, October 30th 2015. By subtracting the previous ambient noise level from the new combined (project construction plus ambient) noise level measurements at each receiver, the project-only construction noise levels can be logarithmically calculated. Table 4 shows the project-only construction noise levels ranged from 61.4 to 63.4 dBA Leq, and are significantly lower than those modeled with the RCNM at the same receiver locations.

Based on the Day 1 analysis, the differences between the peak RCNM model and typical measured construction noise levels range from 19.6 to 23.2 dBA Leq. This analysis demonstrates how the RCNM overstates the potential construction noise level impacts by placing all equipment at a single point at the project site boundary. In reality, the grading equipment within the project site was observed to operate in different locations throughout the project site. . In addition, the typical construction noise levels

measured at the receiver locations reflect modern construction equipment noise level emissions that are largely overstated using the older RCNM reference noise levels.

TABLE 4: DAY 1 CONSTRUCTION NOISE LEVEL COMPARISON

Original Noise Study			Calibration			
Receiver Location[1]	Measured Daytime Ambient Noise Levels (dBA Leq)[2]	Peak Modeled RCNM Grading Construction Noise Levels (dBA Leq)[3]	Calculated RCNM Noise Levels to Closest Observed Equipment (dBA Leq)[4]	Measured Typical Grading Construction Noise Levels at Receivers (dBA Leq)[5]	Calculated Project-Only Construction Noise Levels (dBA Leq)[6]	Difference Between Modeled & Measured Noise Levels (dBA Leq)[7]
R2	70.3	88.2	86.5	71.1	63.4	23.2
R3	68.3	83.1	80.9	69.1	61.4	19.6

[1] Receiver locations from the construction noise analysis which are closest to the Planning Area 1 construction activities.
[2] Ambient noise level measurements taken on 3/13/14 at the receiver locations during the Ontario industrial project noise study.
[3] Estimated construction noise levels based on the RCNM peak construction noise analysis methodology. These conditions are not likely to occur as the RCNM assumes all equipment is operating simultaneously at a single point at the project site boundary.
[4] Modeled RCNM construction noise levels at each receiver location based on the observed distance to the nearest construction equipment activity during the noise level measurements, shown on Table 3.
[5] Measured noise levels at the receiver locations during one hour of typical grading activities in the center of the construction site.
[6] Project only construction noise levels calculated based on the logarithmic noise level difference between the measured noise levels during grading activity and the ambient without project noise levels measured at each receiver location.
[7] Difference between the peak RCNM modeled noise levels and the typical noise levels measured at the receiver locations during typical grading activities.

Similarly, the Day 2 short-term construction noise level measurements are shown on Table 5 in relation to the RCNM modeled noise levels. Table 5 shows the project-only construction noise levels ranged from 64.1 to 65.3 dBA Leq, and are significantly lower than those modeled with the RCNM at the same receiver locations. Based on the Day 2 analysis, the differences between the peak RCNM model and typical measured construction noise levels range from 16.8 to 21.2 dBA Leq. This Day 2 analysis is consistent with the Day 1 typical grading construction noise level measurements taken a week later at the same receiver locations.

TABLE 5: DAY 2 CONSTRUCTION NOISE LEVEL COMPARISON

Original Noise Study			Calibration			
Receiver Location[1]	Measured Daytime Ambient Noise Levels (dBA Leq)[2]	Peak Modeled RCNM Grading Construction Noise Levels (dBA Leq)[3]	Calculated RCNM Noise Levels to Closest Observed Equipment (dBA Leq)[4]	Measured Typical Grading Construction Noise Levels at Receivers (dBA Leq)[5]	Calculated Project-Only Construction Noise Levels (dBA Leq)[6]	Difference Between Modeled & Measured Noise Levels (dBA Leq)[7]
R2	70.3	88.2	86.5	71.5	65.3	21.2
R3	68.3	83.1	80.9	69.7	64.1	16.8

[1] Receiver locations from the construction noise analysis which are closest to the Planning Area 1 construction activities.
[2] Ambient noise level measurements taken on 3/13/14 at the receiver locations during the Ontario industrial project noise study.
[3] Estimated construction noise levels based on the RCNM peak construction noise analysis methodology. These conditions are not likely to occur as the RCNM assumes all equipment is operating simultaneously at a single point at the project site boundary.
[4] Modeled RCNM construction noise levels at each receiver location based on the observed distance to the nearest construction equipment activity during the noise level measurements, shown on Table 3.
[5] Measured noise levels at the receiver locations during one hour of typical grading activities in the center of the construction site.
[6] Project only construction noise levels calculated based on the logarithmic noise level difference between the measured noise levels during grading activity and the ambient without project noise levels measured at each receiver location.
[7] Difference between the peak RCNM modeled noise levels and the typical noise levels measured at the receiver locations during typical grading activities.

CONCLUSIONS

The sample reference noise level measurements were taken by Urban Crossroads, Inc. in order to better describe the noise levels from various typical construction activities at different land use types. To quantify the difference between the modeled RCNM and measured construction noise levels in the field, Urban Crossroads, Inc. compared the modeled results of a RCNM construction noise level analysis with the actual measured noise levels observed in the field during typical grading activities at the same project site. While the RCNM equipment database and methodology provides conservative, worst-case, construction noise levels for specific pieces of equipment, our field measurements show how the RCNM methodology overstates the noise levels experienced at the nearby receiver locations during actual construction activities.

This analysis demonstrates how the RCNM overstates the potential construction noise level impacts by placing all equipment at a single point at the project site boundary. In reality based on our observations in the field, the grading equipment within the project site was observed to operate at different locations throughout the project site. In addition, the typical construction noise levels measured at the receiver locations reflect modern construction equipment noise level emissions that are largely overstated using the older RCNM reference noise levels. The reference noise level measurements presented in this memo are, therefore, representative of typical construction noise levels to accurately describe potential construction noise impacts at nearby receiver locations for a given project. This memo presents typical construction activity reference noise levels. Detailed site specific analysis is needed to assess potential

construction noise level impacts at nearby sensitive receiver locations on a project by project basis and to identify the appropriate mitigation measures as needed at future construction sites.

Prepared by:

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APPENDIX A

REFERENCE NOISE LEVEL MEASUREMENTS SUMMARY TABLE

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Appendix A

Construction Equipment Reference Noise Levels

ID	Reference Source	Type of Project (Land Use)	Typical Construction Stage(s)	Reference Measurement Duration (h:mm:ss)	Reference Distance From Source (Feet)	Reference Noise Levels		Reference Noise Levels @ 50 Feet	
						dBA Leq	dBA Lmax	dBA Leq	dBA Lmax
1	Truck Pass-Bys & Dozer Activity	Business Park	Grading	0:01:15	30'	63.6	68.1	59.2	63.7
2	Dozer Activity	Business Park	Grading	0:01:00	30'	68.6	76.4	64.2	72.0
3	Construction Vehicle Maintenance Activities	Residential	Grading	0:01:00	30'	71.9	74.8	67.5	70.4
4	Foundation Trenching	Residential	Trenching, Building Const.	0:01:01	30'	72.6	74.9	68.2	70.5
5	Rough Grading Activities	Residential	Grading	0:05:00	30'	77.9	84.8	73.5	80.4
6	Residential Framing	Residential	Building Const.	0:02:00	30'	66.7	76.7	62.3	72.3
7	Water Truck Pass-By & Backup Alarm	Industrial	Grading	0:00:45	30'	76.3	82.3	71.9	77.9
8	Dozer Pass-By	Industrial	Grading	0:00:32	30'	84.0	89.9	79.6	85.5
9	Two Scrapers & Water Truck Pass-By	Industrial	Grading	0:00:32	30'	83.4	89.0	79.0	84.6
10	Two Scrapers Pass-By	Industrial	Grading	0:00:30	30'	83.7	86.9	79.3	82.5
11	Scraper, Water Truck, & Dozer Activity	Industrial	Grading	0:30:00	30'	79.7	87.7	75.3	83.3
12	Concrete Mixer Truck Movements	Industrial	Building Const., Paving	0:01:00	50'	71.2	*73.1*	71.2	73.1
13	Concrete Paver Activities	Industrial	Building Const., Paving	0:01:00	30'	70.0	*75.7*	65.6	71.3
14	Concrete Mixer Pour & Paving Activities	Industrial	Building Const., Paving	0:01:00	30'	70.3	*76.3*	65.9	71.9
15	Concrete Mixer Backup Alarms & Air Brakes	Industrial	Building Const., Paving	0:00:20	50'	71.6	*78.8*	71.6	78.8
16	Concrete Mixer Pour Activities	Industrial	Building Const., Paving	1:00:00	50'	67.7	79.2	67.7	79.2

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APPENDIX B

REFERENCE NOISE SOURCE PHOTOS

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Construction Reference Noise Source Photos

1.1_TruckPass-By&DozerActivity
33, 39' 0.101600", 117, 43' 56.773600"

2.1_DozerActivity
33, 39' 0.101600", 117, 43' 56.773600"

3.1_ConstructionVehicleMaintenance
33, 31' 16.600000", 117, 36' 58.060000"

4.1_FoundationTrenching
33, 32' 8.530000", 117, 35' 55.490000"

4.2_FoundationTrenching
33, 32' 8.540000", 117, 35' 55.710000"

5.1_RoughGradingActivities
33, 31' 16.710000", 117, 37' 0.530000"

Construction Reference Noise Source Photos

5.2_RoughGradingActivities
33, 31' 16.600000", 117, 37' 0.450000"

5.3_RoughGradingActivities
33, 31' 16.570000", 117, 37' 0.450000"

5.4_RoughGradingActivities
33, 31' 16.660000", 117, 37' 0.310000"

6.1_ResidentialFraming
33, 32' 15.610000", 117, 36' 2.740000"

7.1_WaterTruckPassBy&BackupAlarm
34, 4' 19.318500", 117, 36' 25.015800"

8.1_DozerPass-By
34, 4' 19.373400", 117, 36' 24.988400"

Construction Reference Noise Source Photos

9.1_TwoScrapers&WaterTruckPass-By
34, 4' 19.332200", 117, 36' 24.988400"

10.1_TwoScrapersPass-By
34, 4' 19.373400", 117, 36' 25.070800"

10.2_TwoScrapersPass-By
34, 4' 19.373400", 117, 36' 25.070800"

11.1_Scraper,WaterTruck,&DozerActivity
34, 4' 19.373400", 117, 36' 25.070800"

11.2_Scraper,WaterTruck,&DozerActivity
34, 4' 19.318500", 117, 36' 25.125700"

11.3_Scraper,WaterTruck,&DozerActivity
34, 4' 19.346000", 117, 36' 25.043300"

Construction Reference Noise Source Photos

11.4_Scraper,WaterTruck,&DozerActivity
34, 4' 19.291000", 117, 36' 25.070800"

12.1_ConcreteMixerTruckMovements
34, 4' 43.200000", 117, 12' 25.779400"

13.1_ConcretePaverActivities
34, 4' 43.625700", 117, 12' 25.312500"

14.1_ConcreteMixerPour&PavingActivities
34, 4' 42.746800", 117, 12' 24.955400"

15.1_ConcreteMixerBackupAlarms&AirBrakes
34, 4' 43.666900", 117, 12' 24.763100"

16.1_ConcreteMixerPourActivities
34, 4' 43.158800", 117, 12' 25.944200"

APPENDIX C

SHORT-TERM MEASUREMENTS & CONSTRUCTION ACTIVITY PHOTOS

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ConstructionSite_1
34, 4' 39.808000", 117, 36' 22.955900"

ConstructionSite_2
34, 4' 39.808000", 117, 36' 22.955900"

ConstructionSite_3
34, 4' 39.533300", 117, 36' 23.312900"

ConstructionSite_4
34, 4' 39.533300", 117, 36' 23.312900"

ConstructionSite_5
34, 4' 39.341100", 117, 36' 28.064500"

ConstructionSite_6
34, 4' 39.684400", 117, 36' 23.477700"

ConstructionSite_7
34, 4' 39.684400", 117, 36' 23.477700"

R2
34, 4' 39.341100", 117, 36' 28.064500"

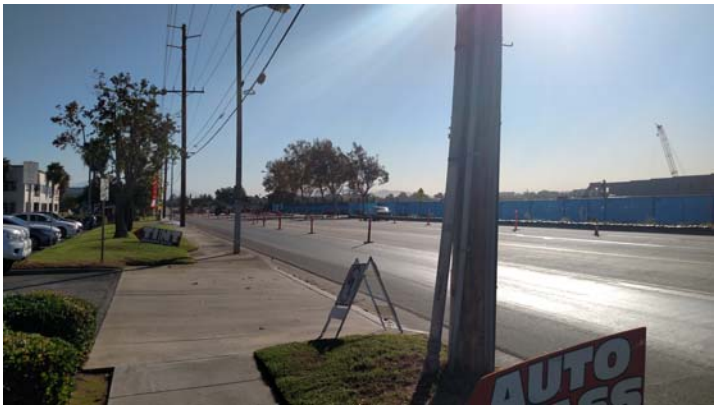
R2_South
34, 4' 39.217500", 117, 36' 29.108200"

R2_Southwest
34, 4' 39.217500", 117, 36' 29.108200"

R2_Southwest2
34, 4' 39.505900", 117, 36' 28.970900"

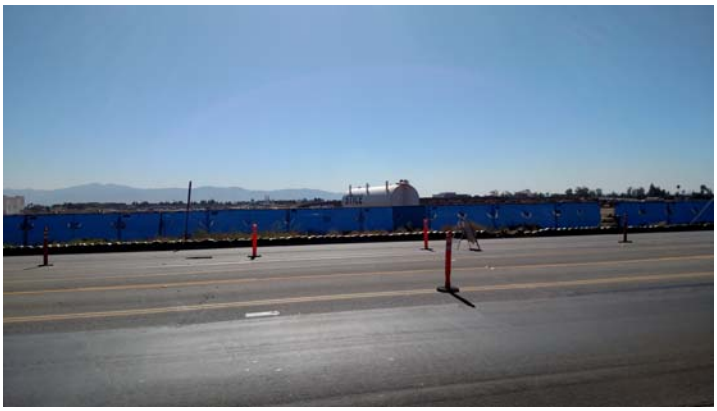
R2_West
34, 4' 39.217500", 117, 36' 29.108200"

R3
34, 4' 39.972800", 117, 36' 16.803500"

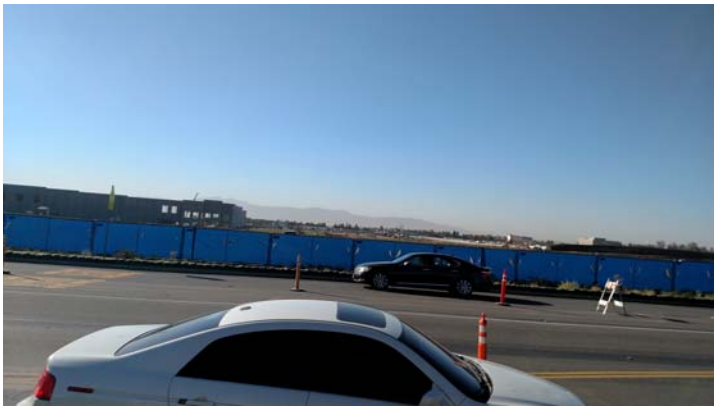


R3_E
34, 4' 39.972800", 117, 36' 16.803500"

R3_South
34, 4' 39.972800", 117, 36' 16.803500"



R3_South2
34, 4' 39.519600", 117, 36' 17.050700"



R3_South3
34, 4' 39.698100", 117, 36' 14.221800"

R3_Southeast
34, 4' 39.698100", 117, 36' 14.221800"

R3_Southwest
34, 4' 39.972800", 117, 36' 16.803500"

3.12-1 TRAFFIC IMPACT ANALYSIS

Rancho Palma

TRAFFIC IMPACT ANALYSIS

CITY OF SAN BERNARDINO

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SEPTEMBER 1, 2015

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LIST OF ABBREVIATED TERMS

(1)	Reference
ADT	Average Daily Traffic
Av.	Avenue
BT&H	California Business, Transportation & Housing Agency
Caltrans	California Department of Transportation
CEQA	California Environmental Quality Act
CMP	Congestion Management Program
CTC	California Transportation Commission
DIF	Development Impact Fee
Dr	Drive
DU	Dwelling Unit
E+P	Existing Plus Project
EA	Existing Plus Ambient Growth
EAP	Existing Plus Ambient Growth Plus Project
FHWA	Federal Highway Administration
HCM	Highway Capacity Manual
ITE	Institute of Transportation Engineers
ITIP	Interregional Transportation Improvement Program
LOS	Level of Service
MPO	Metropolitan Planning Organization
MUTCD	Manual on Uniform Traffic Control Devices
NCHRP	National Cooperative Highway Research Program
PHF	Peak Hour Factor
Pkwy	Parkway
Project	Rancho Palma
RTIP	Regional Transportation Improvement Program
RTP	Regional Transportation Plan
RTPA	Regional Transportation Planning Agency
SANBAG	San Bernardino Associated Governments
SBTAM	San Bernardino Transportation Analysis Model
SCAG	Southern California Association of Governments
Sf	Square Feet
SHOPP	State Highway Operation and Protection Program
SHS	State Highway System
STIP	State Transportation Improvement Program
TIA	Traffic Impact Analysis
v/c	Volume-to-Capacity Ratio

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1 INTRODUCTION

This report presents the results of the traffic impact analysis (TIA) for the proposed Rancho Palma ("Project") located in the City of San Bernardino northeast of W. Little League Drive and northwest of Palm Avenue, as shown on Exhibit 1-1.

The purpose of this traffic impact analysis is to evaluate the potential impacts to traffic and circulation associated with the development of the proposed Project, and to recommend improvements to mitigate impacts considered significant in comparison to established regulatory thresholds. The scope of this study has been developed through consultation with the City of San Bernardino, and follows the City of San Bernardino Traffic Impact Study Guidelines (September 2004), and also where appropriate addresses requirements as identified by the County of San Bernardino Congestion Management Program (CMP) and Caltrans traffic study guidelines. (1) (2) (3) The approved Project Traffic Study Scoping agreement with the City of San Bernardino is provided in Appendix 1.1 of this TIA.

1.1 PROJECT OVERVIEW

The Project is proposed to include the development of 120 single family detached residential dwelling units and 98,000 square feet of commercial retail use. For the purposes of this analysis, potential impacts have been assessed for two development phases. The two phases and their anticipated opening years are as follows:

- Phase 1 (2018) – 120 single family detached residential dwelling units (Western Half)
- Phase 2 (2019) – 98,000 square feet of commercial retail use (Eastern Half)

Trips generated by the Project's proposed land uses have been estimated based on trip generation rates collected by the Institute of Transportation Engineers (ITE) *Trip Generation Manual*, 9th Edition, 2012. (4) The Project is estimated to generate a net total of 4,728 trip-ends per day on a typical weekday with approximately 242 AM peak hour trips and 425 PM peak hour trips. The assumptions and methods used to estimate the Project's trip generation characteristics are discussed in greater detail in Section 4.1 *Project Trip Generation* of this report.

1.2 ANALYSIS SCENARIOS

For the purposes of this traffic study, potential impacts to traffic and circulation have been assessed for each of the following conditions:

- Existing (2015) (1 scenario)
- Existing plus Project (E+P) (Phase 1 and Project Buildout) (2 scenarios)
- Existing Plus Ambient Growth (EA) (2018) and (2019) (2 scenarios) – ambient growth
- Existing Plus Ambient Growth Plus Project (EAP) (2019) and (2020) (2 scenarios) – ambient growth and Project traffic

EXHIBIT 1-1: PRELIMINARY SITE PLAN

- Opening Year Cumulative (2018) Without and With Project (2 scenarios) – ambient growth, Project (Phase 1), and cumulative development projects
- Opening Year Cumulative (2019) Without and With Project (2 scenarios) – ambient growth, Project (Buildout), and cumulative development projects
- Horizon Year (2035) Without and With Project (2 scenarios) – County of San Bernardino Association of Governments (SANBAG) San Bernardino Transportation Analysis Model (SBTAM) forecasts, Project (Buildout) traffic

1.2.1 EXISTING CONDITIONS

Existing (2015) physical conditions have been disclosed to represent the baseline traffic conditions as they existed at the time this report was prepared.

1.2.2 EXISTING PLUS PROJECT (E+P) CONDITIONS

The E+P analysis determines circulation system deficiencies that would occur on the existing roadway system in the scenario of the Project being placed upon Existing conditions. The analysis has been prepared for each phase of development (i.e., E+P (Phase 1) and E+P (Project Buildout)).

1.2.3 EXISTING PLUS AMBIENT GROWTH (EA) AND EXISTING PLUS AMBIENT GROWTH PLUS PROJECT (EAP) CONDITIONS

The EA (2018), EAP (2018), EA (2019), and EAP (2019) traffic conditions analyses determine potential traffic impacts based on a comparison of the EAP traffic conditions to EA conditions. To account for background traffic growth, an ambient growth factor from Existing conditions of 6.12% (2 percent per year over 3 years, compounded annually) for 2018 conditions and 8.24% (2 percent per year over 4 years, compounded annually) for 2019 conditions are included for EA and EAP traffic conditions.

1.2.4 OPENING YEAR CUMULATIVE WITHOUT AND WITH PROJECT CONDITIONS

The Opening Year Cumulative (2018) and (2019) Without and With Project traffic conditions analysis determines the potential near-term cumulative circulation system deficiencies. To account for background traffic growth, traffic associated with other known cumulative development projects in conjunction with an ambient growth factor from Existing conditions of 6.12% (for 2018 conditions) and 8.24% (for 2019 conditions) are included for Opening Year Cumulative traffic conditions. This comprehensive list was compiled from information provided by the City of San Bernardino and County of San Bernardino.

The currently adopted Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan (RTP) (April 2012) growth forecasts for the City of San Bernardino identifies projected growth in population of 209,900 in 2008 to 261,400 in 2035, or a 24.54 percent increase over the 27 year period. (5) The change in population equates to roughly a 0.82 percent annual growth rate, compounded annually. Similarly, growth over the same 27 year period in households is projected to increase by 29.51 percent, or 0.96 percent annual growth rate. Finally, growth in employment over the same 27 year period is projected to increase by 43.44 percent, or a 1.34 percent annual growth rate.

Based on a comparison of Existing traffic volumes to the Horizon Year (2035) forecasts, the average growth rate is estimated at approximately 2.20 percent compounded annually between Existing and Horizon Year (2035) traffic conditions. The annual growth rate at each individual intersection is not lower than 1.27 percent to as high as 4.67 percent compounded annually over the same time period. Therefore, the annual growth rate utilized for the purposes of this analysis would appear to conservatively approximate the anticipated regional growth in traffic volumes in the City of San Bernardino for both Opening Year Cumulative and Horizon Year (2035) traffic conditions, especially when considered along with the addition of cumulative development project traffic and project-related traffic. As such, the growth in traffic volumes assumed in this traffic impact analysis would tend to overstate, as opposed to understate, the potential impacts to traffic and circulation.

1.2.5 Horizon Year (2035) Conditions

The Horizon Year (2035) conditions analysis will be utilized to determine if improvements funded through local and regional transportation mitigation fee programs, such as the City of San Bernardino Development Impact Fee (DIF) program, or other approved funding mechanism can accommodate the cumulative traffic at the target Level of Service (LOS) identified by the City of San Bernardino. If the planned and funded improvements can provide the necessary improvements in delay, then the Project's payment into these established fee programs will be considered as long-range cumulative mitigation. Other improvements needed beyond the "funded" improvements (such as localized improvements to non-funded facilities) are identified as such and would be subject to fair share or as identified by City staff. Traffic projections for Horizon Year (2035) With Project conditions were derived from the SBTAM using accepted procedures for model forecast refinement and smoothing.

Horizon Year traffic conditions have been evaluated for without and with the Magnolia Avenue crossing over the Cajon Creek Wash. The currently SBTAM model does not account for the extension of Magnolia Avenue over the Cajon Creek Wash. However, the City of San Bernardino's General Plan Circulation Element shows the extension of Magnolia Avenue as a future roadway connection. As such, the Magnolia Avenue extension has been evaluated as an alternative analysis scenario for Horizon Year traffic conditions.

1.3 Study Area

To ensure that this TIA satisfies the City of San Bernardino's traffic study requirements, Urban Crossroads, Inc. prepared a Project traffic study scoping package for review by City of San Bernardino staff prior to the preparation of this report. The Agreement provides an outline of the Project study area, trip generation, trip distribution, and analysis methodology. The Agreement approved by the City of San Bernardino is included in Appendix 1.1.

1.3.1 INTERSECTIONS

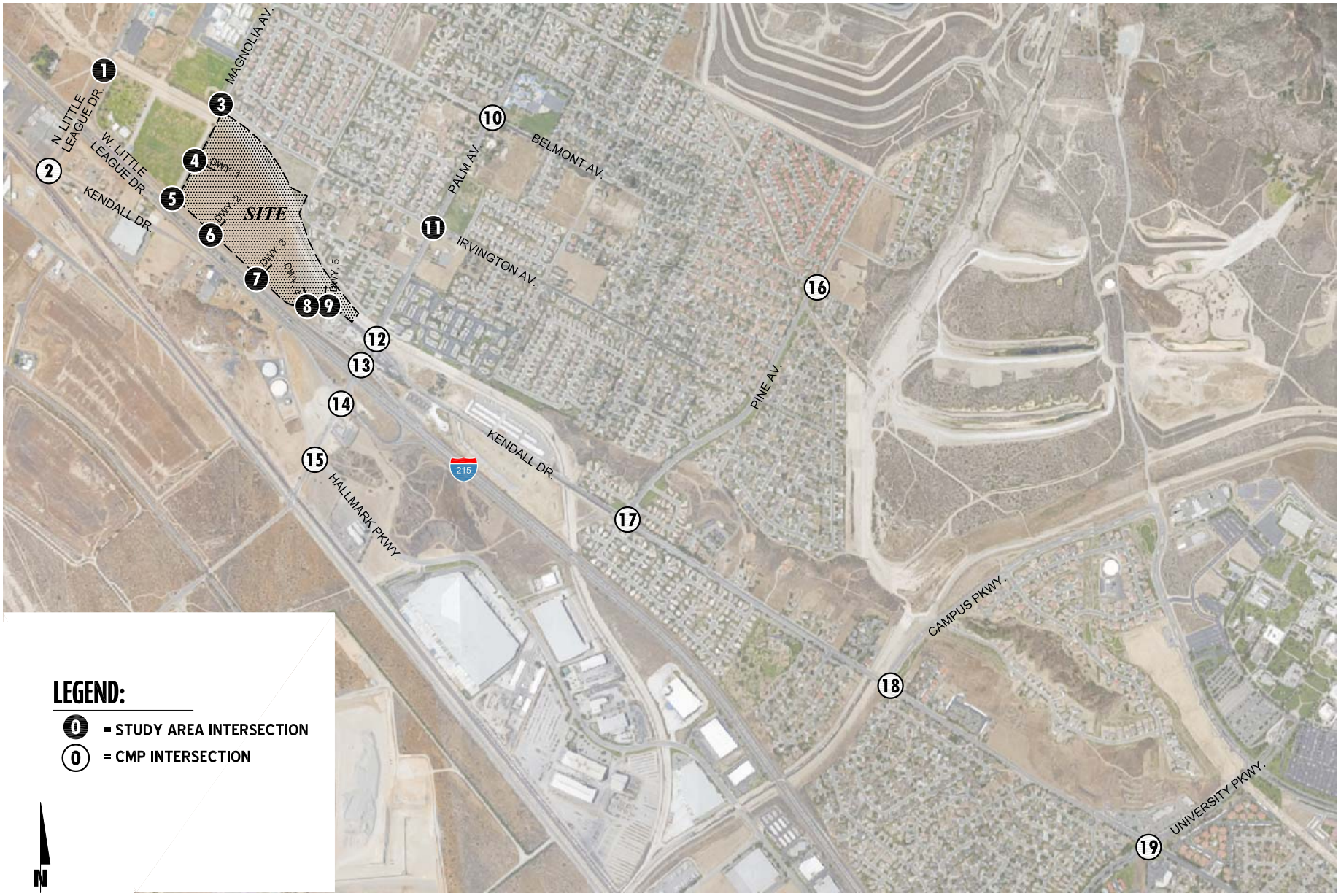
The following study area intersections were selected for this TIA based on the City of San Bernardino's traffic study guidelines that require analysis of intersection locations in which the proposed Project is anticipated to contribute 50 or more peak-hour trips, or were added based on discussions with City staff. Furthermore, the rationale for evaluating intersections where a project would contribute 50 or more peak-hour trips is standard industry practice and supported by substantial evidence. The intersection locations are listed in Table 1-1 and are also shown on Exhibit 1-2.

TABLE 1-1: INTERSECTION ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction	CMP
1	N. Little League Drive / W. Little League Drive	City of San Bernardino	No
2	N. Little League Drive / Kendall Drive	City of San Bernardino	Yes
3	Magnolia Avenue / Irvington Avenue	City of San Bernardino	No
4	Magnolia Avenue / Driveway 1 – Future Intersection	City of San Bernardino	No
5	Magnolia Avenue / W. Little League Drive – Future Intersection	City of San Bernardino	No
6	Driveway 2 / W. Little League Drive – Future Intersection	City of San Bernardino	No
7	Driveway 3 / W. Little League Drive – Future Intersection	City of San Bernardino	No
8	Driveway 4 / W. Little League Drive – Future Intersection	City of San Bernardino	No
9	Driveway 5 / W. Little League Drive – Future Intersection	City of San Bernardino	No
10	Palm Avenue / Belmont Avenue	City of San Bernardino	Yes
11	Palm Avenue / Irvington Avenue	City of San Bernardino	No
12	Palm Avenue / Kendall Avenue	City of San Bernardino	Yes
13	Palm Avenue / I-215 Northbound Ramps	San Bernardino, Caltrans	Yes
14	Palm Avenue / I-215 Southbound Ramps	San Bernardino, Caltrans	Yes
15	Palm Avenue / Hallmark Parkway	City of San Bernardino	Yes
16	Pine Avenue / Belmont Avenue	City of San Bernardino	Yes
17	Pine Avenue / Kendall Drive	City of San Bernardino	Yes
18	Campus Parkway / Kendall Drive	City of San Bernardino	Yes
19	University Parkway / Kendall Drive	City of San Bernardino	Yes

Study area intersections are anticipated to be affected by the potential future extension of Magnolia Avenue over the Cajon Creek Wash and have been evaluated for Horizon Year (2035) (Alternative) traffic conditions (shown on Table 1-2).

EXHIBIT 1-2: LOCATION MAP



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URBAN CROSSROADS

TABLE 1-2: INTERSECTION ANALYSIS LOCATIONS FOR HORIZON YEAR (2035) (ALTERNATIVE) TRAFFIC CONDITIONS

ID	Intersection Location	Jurisdiction	CMP
3	Magnolia Avenue / Irvington Avenue	City of San Bernardino	No
4	Magnolia Avenue / Driveway 1 – Future Intersection	City of San Bernardino	No
5	Magnolia Avenue / W. Little League Drive – Future Intersection	City of San Bernardino	No
6	Driveway 2 / W. Little League Drive – Future Intersection	City of San Bernardino	No
7	Driveway 3 / W. Little League Drive – Future Intersection	City of San Bernardino	No
8	Driveway 4 / W. Little League Drive – Future Intersection	City of San Bernardino	No
9	Driveway 5 / W. Little League Drive – Future Intersection	City of San Bernardino	No
11	Palm Avenue / Irvington Avenue	City of San Bernardino	No
12	Palm Avenue / Kendall Avenue	City of San Bernardino	Yes

It should also be noted that the 50 peak hour trip threshold is used by numerous other agencies throughout Southern California including Caltrans, County of San Bernardino, County of Riverside, and the County of Orange. The 50 peak hour trip threshold is based on the desire to analyze potential impacts when a project contributes 3 percent or more of the capacity of a typical signalized intersection. The 50 peak hour threshold represents less than 3 percent of capacity of a signalized intersection for critical movements, estimated based on the Highway Capacity Manual (HCM) at approximately 1700 vehicles per hour. In effect, acting as the lead agency, these jurisdictions have established 50 project trips as the threshold for when to analyze signalized intersections. Therefore, a project trip contribution of less than 50 peak hour trips is considered less than significant and is typically not evaluated. The Project is anticipated to contribute less than 50 peak hour trips at the locations indicated, but have been evaluated in an effort to conduct a conservative analysis.

The intent of a Congestion Management Program (CMP) is to more directly link land use, transportation, and air quality, thereby prompting reasonable growth management programs that will effectively utilize new transportation funds, alleviate traffic congestion and related impacts, and improve air quality. Counties within California have developed CMPs with varying methods and strategies to meet the intent of the CMP legislation. The County of San Bernardino CMP became effective with the passage of Proposition 111 in 1992 and updated most recently updated in 2011. The San Bernardino Associated Governments (SANBAG) adopted the 2011 CMP for the County of San Bernardino in November 2011. (2) There are 10 study area intersections that are identified as CMP facilities.

1.3.2 FREEWAY MAINLINE SEGMENTS

Study area freeway mainline analysis locations were selected based on Caltrans traffic study guidelines, which may require the analysis of State highway facilities. (3) Although the Project is anticipated to contribute less than 50 peak hour directional trips to the following freeway

segments adjacent to the point of entry to the State Highway System (SHS), they have been evaluated for the purposes of this traffic study in an effort to conduct a conservative analysis (see Table 1-3):

TABLE 1-3: FREEWAY MAINLINE SEGMENT ANALYSIS LOCATIONS

ID	Freeway Mainline Segments
1	I-215 Freeway – Southbound, North of Palm Avenue
2	I-215 Freeway – Southbound, South of Palm Avenue
3	I-215 Freeway – Northbound, North of Palm Avenue
4	I-215 Freeway – Northbound, South of Palm Avenue

1.3.3 FREEWAY MERGE/DIVERGE RAMP JUNCTIONS

The study area freeway merge/diverge ramp junction analysis locations include the following freeway ramp junctions for each direction of flow (Table 1-4), although the Project is anticipated to contribute less than 50 peak hour directional trips:

TABLE 1-4: FREEWAY MERGE/DIVERGE RAMP JUNCTION ANALYSIS LOCATIONS

ID	Freeway Merge/Diverge Ramp Junctions
1	I-215 Freeway – Southbound, Palm Avenue Off-Ramp (Diverge)
2	I-215 Freeway – Southbound, Palm Avenue On-Ramp (Merge)
3	I-215 Freeway – Northbound, Palm Avenue On-Ramp (Merge)
4	I-215 Freeway – Northbound, Palm Avenue Off-Ramp (Diverge)

1.4 POTENTIAL PROJECT IMPACTS

This section provides a summary of recommended mitigation measures necessary to address Project impacts for E+P and EA/EAP traffic conditions. Section 2 *Methodologies* provides information on the methodologies used in the analysis and Section 5 *E+P Traffic Analysis*, Section 6 *EA (2018) and EAP (2018) Traffic Analysis*, and Section 7 *EA (2019) and EAP (2019) Traffic Analysis* includes the detailed analysis. A summary of the peak hour intersection LOS are provided on Table 1-5 for each of the analysis scenarios.

1.4.1 PHASE 1 (2018)

Based on an assessment of E+P (Phase 1), EA (2018), and EAP (2018) traffic conditions, the Project's potential impact to the surrounding study area intersections was found to be less-than-significant. Section 5 *E+P Traffic Analysis* and Section 6 *EA (2018) and EAP (2018) Traffic Analysis* includes the detailed analysis results.

Table 1-5

Summary of Intersection Level of Service by Analysis Scenario

#	Intersection	Traffic Control[2]	Existing LOS[2]		E+P (Phase 1) LOS[2]		E+P (Project Buildout) LOS[2]		EA (2018) LOS[2]		EAP (2018) LOS[2]		EA (2019) LOS[2]		EAP (2019) LOS[2]		2018 NP[3] LOS[2]		2018 WP[3] LOS[2]		2019 NP[3] LOS[2]		2019 WP[3] LOS[2]		2035 NP[3] LOS[2]		2035 WP[3] LOS[2]	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N. Little League Dr. / W. Little League Dr.	CSS	B	A	B	A	B	B	B	A	B	B	B	A	B	B	B	A	B	B	B	B	B	B	B	B	B	B
2	N. Little League Dr. / Kendall Dr.	CSS	B	B	B	B	B	B	B	B	B	B	B	B	B	C	B	B	B	B	B	B	B	C	B	C	B	C
3	Magnolia Av. / Irvington Av.	CSS	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A
4	Magnolia Av. / Driveway 1	**CSS**	NA[4]		A	A	A	A	NA[4]		A	A	NA[4]		A	A	NA[4]		A	A	NA[4]		A	A	NA[4]		A	A
5	Magnolia Av. / W. Little League Dr.	**CSS**	NA[4]		A	A	A	A	NA[4]		A	A	NA[4]		A	A	NA[4]		A	A	NA[4]		A	B	NA[4]		A	B
6	Driveway 2 / W. Little League Dr.	**CSS**	NA[4]		A	B	B	B	NA[4]		A	B	NA[4]		B	B	NA[4]		A	B	NA[4]		B	B	NA[4]		B	B
7	Driveway 3 / W. Little League Dr.	**CSS**	NA[4]		NA[4]		B	B	NA[4]		NA[4]		NA[4]		B	B	NA[4]		NA[4]		NA[4]		B	B	NA[4]		B	B
8	Driveway 4 / W. Little League Dr.	**CSS**	NA[4]		NA[4]		B	B	NA[4]		NA[4]		NA[4]		B	B	NA[4]		NA[4]		NA[4]		B	B	NA[4]		B	B
9	Driveway 5 / W. Little League Dr.	**CSS**	NA[4]		NA[4]		B	B	NA[4]		NA[4]		NA[4]		B	B	NA[4]		NA[4]		NA[4]		B	B	NA[4]		B	B
10	Palm Av. / Belmont Av.	AWS	C	A	C	A	C	B	C	A	C	A	C	B	C	B	C	B	C	B	C	B	C	B	**E**	B	**E**	B
11	Palm Av. / Irvington Av.	TS	C	B	C	B	C	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	D	B	**E**	B	**E**	B
12	Palm Av. / Kendall Dr.	TS	D	C	D	C	D	D	D	C	D	D	D	C	D	D	D	D	D	D	D	D	D	D	D	D	D	D
13	Palm Av. / I-215 NB Ramps	TS	A	A	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	B	B	D	C
14	Palm Av. / I-215 SB Ramps	TS	C	B	D	B	D	B	D	B	D	B	D	B	D	B	D	C	D	C	D	C	D	C	D	**E**	D	**E**
15	Palm Av. / Hallmark Pkwy.	AWS	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	**E**	C	**E**
16	Pine Av. / Belmont Av.	CSS	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	B	C	C	C	C
17	Pine Av. / Kendall Dr.	TS	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	C	C	C	C	C
18	Campus Pkwy. / Kendall Dr.	TS	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C
19	University Pkwy. / Kendall Dr.	TS	D	D	D	D	D	D	D	D	D	D	D	**E**	D	**E**	D	**E**	D	**E**	D	**E**	D	**E**	D	**F**	D	**F**

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

[2] LOS = Level of Service

[3] NP = Without Project; WP = With Project

[4] NA = Not Applicable; Intersection not evaluated for analysis scenario.

1.4.2 PHASE 2 (PROJECT BUILDOUT – 2019)

Based on a comparison of Existing and E+P (Project Buildout) traffic conditions, the Project's potential impact to the surrounding study area intersections was found to be less-than-significant. The intersection of University Parkway at Kendall Drive is anticipated to operate at an unacceptable LOS (LOS E) during the PM peak hour under EA (2019) traffic conditions, and is anticipated to continue to operate at unacceptable levels during the PM peak hour only with the addition of Project Buildout traffic. The addition of Project traffic is anticipated to increase the volume-to-capacity (v/c) ratio by more than the City's minimum threshold of 0.01 for intersections operating at LOS E or F under pre-project traffic conditions. As such, the Project's contribution to this impact is cumulatively considerable (see Section 1.7 *Project Mitigation Measures*).

1.5 CUMULATIVE IMPACTS

A summary of the operationally deficient study area intersections and recommended improvements required to achieve acceptable circulation system operational conditions are described in detail within Section 8 *Opening Year Cumulative (2018) Traffic Analysis,* Section 9 *Opening Year Cumulative (2019) Traffic Analysis,* and Section 10 *Horizon Year (2035) Traffic Analysis* of this report. The peak hour intersection LOS are summarized on Table 1-5 for each of the analysis scenarios.

Cumulative traffic impacts are deficiencies that are not directly caused by the Project, but occur as a result of regional growth combined with that or other nearby cumulative development projects. The Project's contribution to a particular cumulative transportation deficiency is deemed significant cumulative impacts if the Project adds significant traffic to the forecasted deficiency (as measured by the 50 or more peak hour trip threshold).

1.5.1 CUMULATIVE IMPACTS FOR OPENING YEAR CUMULATIVE (2018) TRAFFIC CONDITIONS

The following study area intersection is anticipated to operate at unacceptable LOS during the peak hours under Opening Year Cumulative (2018) Without Project traffic conditions:

ID	Intersection Location
19	University Parkway / Kendall Drive – LOS E PM peak hour only

The addition of Project traffic is not anticipated to result in any additional deficiencies. However, the addition of Project traffic is anticipated to increase the v/c by more than the City's minimum threshold of 0.01 for intersections operating at LOS E or F under pre-project traffic conditions. There are no queuing issues anticipated at the Palm Avenue and I-215 Freeway off-ramps during the peak hours for Opening Year Cumulative (2018) traffic conditions. Similar to Existing, E+P, EA, and EAP traffic conditions, the I-215 Freeway mainline segments and merge/diverge ramp junctions are anticipated to operate at acceptable LOS under Opening Year Cumulative (2018) traffic conditions (see Table 1-6 and Table 1-7).

Table 1-6

Summary of Basic Freeway Segment Level of Service by Analysis Scenario

Freeway	Direction	Mainline Segment	Lanes[1]	Existing LOS[2]		E+P (Phase 1) LOS[2]		E+P (Project Buildout) LOS[2]		EA (2018) LOS[2]		EAP (2018) LOS[2]		EA (2019) LOS[2]		EAP (2019) LOS[2]		2018 NP[3] LOS[2]		2018 WP[3] LOS[2]		2019 NP[3] LOS[2]		2019 WP[3] LOS[2]		2035 NP[3] LOS[2]		2035 WP[3] LOS[2]	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	North of Palm Avenue	2	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	**F**	**F**	**F**	**F**
		South of Palm Avenue	2	C	B	C	B	C	B	C	B	C	B	C	B	D	B	C	B	C	B	D	B	D	B	**F**	**F**	**F**	**F**
	NB	North of Palm Avenue	2	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	A	B	C	D	C	D
		South of Palm Avenue	2	A	C	A	C	A	C	A	C	A	C	B	C	B	C	B	C	B	C	B	C	B	C	D	D	D	D

* **BOLD** = Unacceptable Level of Service

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

Table 1-7

Summary of Freeway Ramp Junction Merge/Diverge Level of Service by Analysis Scenario

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	Existing LOS[2]		E+P (Phase 1) LOS[2]		E+P (Project Buildout) LOS[2]		EA (2018) LOS[2]		EAP (2018) LOS[2]		EA (2019) LOS[2]		EAP (2019) LOS[2]		2018 NP[3] LOS[2]		2018 WP[3] LOS[2]		2019 NP[3] LOS[2]		2019 WP[3] LOS[2]		2035 NP[3] LOS[2]		2035 WP[3] LOS[2]	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	Off-Ramp at Palm Avenue	2	C	B	C	C	C	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	**F**	**F**	**F**	**F**
		On-Ramp at Palm Avenue	2	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	D	C	**F**	**F**	**F**	**F**
	NB	On-Ramp at Palm Avenue	2	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	B	C	D	D	D	D
		Off-Ramp at Palm Avenue	2	B	C	B	C	B	C	B	C	B	D	B	D	B	D	B	D	B	D	B	D	B	D	D	**E**	D	**E**

* **BOLD** = Unacceptable Level of Service

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

1.5.2 CUMULATIVE IMPACTS FOR OPENING YEAR CUMULATIVE (2019) TRAFFIC CONDITIONS

There are no additional study area intersections anticipated to operate at an unacceptable LOS in addition to the location previously identified under Opening Year Cumulative (2018) Without Project traffic conditions. The addition of Project traffic is not anticipated to result in any additional deficiencies.

There are no queuing issues anticipated at the Palm Avenue and I-215 Freeway off-ramps during the peak hours for Opening Year Cumulative (2019) traffic conditions. Similar to Existing, E+P, EA, EAP, and Opening Year Cumulative (2018) traffic conditions, the I-215 Freeway mainline segments and merge/diverge ramp junctions are anticipated to operate at acceptable LOS under Opening Year Cumulative (2019) traffic conditions (see Table 1-6 and Table 1-7).

1.5.3 CUMULATIVE IMPACTS FOR HORIZON YEAR (2035) TRAFFIC CONDITIONS

The following study area intersections are anticipated to operate at unacceptable LOS during the peak hours under Horizon Year (2035) Without Project traffic conditions:

ID	Intersection Location
10	Palm Avenue / Belmont Avenue – LOS E AM peak hour only
11	Palm Avenue / Irvington Avenue – LOS E AM peak hour only
14	Palm Avenue / I-215 Southbound Ramps – LOS E PM peak hour only
15	Palm Avenue / Hallmark Parkway – LOS E PM peak hour only
19	University Parkway / Kendall Drive – LOS F PM peak hour only

The addition of Project traffic is not anticipated to result in any additional deficiencies. There are no queuing issues anticipated at the Palm Avenue and I-215 Freeway off-ramps during the peak hours for Opening Year Cumulative (2018) traffic conditions. The following I-215 Freeway mainline segments and merge/diverge ramp junctions are anticipated to operate at an unacceptable LOS under Horizon Year (2035) Without and With Project traffic conditions (see Table 1-6 and Table 1-7):

ID	Freeway Mainline Segments
1	I-215 Freeway – Southbound, North of Palm Avenue – LOS F AM and PM peak hour
2	I-215 Freeway – Southbound, South of Palm Avenue – LOS F AM and PM peak hours

ID	Freeway Merge/Diverge Ramp Junctions
1	I-215 Freeway – Southbound, Palm Avenue Off-Ramp – LOS F AM and PM peak hours
2	I-215 Freeway – Southbound, Palm Avenue On-Ramp – LOS F AM and PM peak hours
4	I-215 Freeway – Northbound, Palm Avenue Off-Ramp – LOS E PM peak hour only

1.5.4 CUMULATIVE IMPACTS FOR HORIZON YEAR (2035) (WITH MAGNOLIA AVENUE BRIDGE ALTERNATIVE) TRAFFIC CONDITIONS

The following study area intersection is anticipated to operate at unacceptable LOS during the peak hours under Horizon Year (2035) Without and With Project traffic conditions with the Magnolia Avenue extension over the Cajon Creek Wash:

ID	Intersection Location
12	Palm Avenue / Kendall Avenue – LOS F AM peak hour only

Freeway off-ramp queues, freeway mainline segments, and freeway merge/diverge ramp junctions were not evaluated for the With Magnolia Avenue Bridge alternative as the extension is not anticipated to effect the traffic forecasts south of Kendall Drive.

1.6 LOCAL AND REGIONAL FUNDING MECHANISMS

Transportation improvements throughout the City of San Bernardino are funded through a combination of project mitigation, fair share contributions or development impact fee programs, such as the City of San Bernardino's Development Impact Fee (DIF) program. Identification and timing of needed improvements is generally determined through local jurisdictions based upon a variety of factors.

1.6.1 MEASURE "I" FUNDS

In 2004, the voters of San Bernardino County approved the 30-year extension of Measure "I", a one-half of one percent sales tax on retail transactions, through the year 2040, for transportation projects including, but not limited to, infrastructure improvements, commuter rail, public transit, and other identified improvements. The Measure "I" extension requires that a regional traffic impact fee be created to ensure development is paying its fair share. A regional Nexus study was prepared by SANBAG and concluded that each jurisdiction should include a regional fee component in their local programs in order to meet the Measure "I" requirement. The regional component assigns specific facilities and cost sharing formulas to each jurisdiction and was most recently updated in November 2013. Revenues collected through these programs are used in tandem with Measure "I" funds to deliver projects identified in the Nexus Study.

While Measure "I" is a self-executing sales tax administered by SANBAG, it bears discussion here because the funds raised through Measure "I" have funded in the past and will continue to fund new transportation facilities in San Bernardino County, including within the City of San Bernardino. The following is a summary of the Measure "I" facilities located within the City of San Bernardino and identified in Appendix K (Development Mitigation Nexus Study) of the CMP: (2)

- Campus Parkway widening from Kendall Drive to I-215 Freeway
- Kendall Drive widening from Cambridge Avenue to Pine Avenue
- Little League Drive widening from Palm Avenue to I-215 Frontage Road
- Little League Drive widening from Belmont Avenue to I-215 Frontage Road
- Palm Avenue widening from Cajon Boulevard to I-215 Freeway
- Pine Avenue widening from Kendall Drive to Belmont Avenue
- Kendall Drive widening from Palm Avenue to Cajon Boulevard
- I-215 Freeway/Palm Avenue interchange
- I-215 Freeway Mainline

1.6.2 CITY OF SAN BERNARDINO DEVELOPMENT IMPACT FEE (DIF) PROGRAM

The City of San Bernardino has created its own local Development Impact Fee (DIF) program to impose and collect fees from new residential, commercial and industrial development for the purpose of funding roadways and intersections necessary to accommodate City growth as identified in the City's General Plan Circulation Element. The City's DIF includes a Regional Circulation System Fee to comply with Measure "I" and a Local Circulation System Fee to address transportation improvements which are locally significant. The fee schedule was recently updated in June 2014 and is adjusted annually based upon changes in the construction cost index (CCI). Under the City's DIF program, the City may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program. The City may grant to developers a credit against specific components of fees when those developers construct certain facilities and landscaped medians identified in the list of improvements funded by the DIF program.

The timing to use the DIF fees is established through periodic capital improvement programs which are overseen by the City's Public Works Department. Periodic traffic counts, review of traffic accidents, and a review of traffic trends throughout the City are also periodically performed by City staff and consultants. The City uses this data to determine the timing of implementing the improvements listed in its facilities list. The City also uses this data to ensure that the improvements listed on the facilities list are constructed before the LOS falls below the LOS performance standards adopted by the City. In this way, the improvements are constructed before the LOS falls below the City's LOS performance thresholds.

The Project applicant will be subject to the City's DIF fee program, and will pay the requisite City DIF fees at the rates then in effect. The Project Applicant's payment of the requisite DIF fees at the rates then in effect pursuant to the DIF Program will mitigate its impacts to DIF-funded facilities. After the City's DIF fees are collected, they are placed in a separate interest bearing account pursuant to the requirements of Government Code § 66000 *et seq*. The timing to use the DIF fees is established through periodic capital improvement programs which are overseen by the City's Public Works Department.

1.6.3 FAIR SHARE CONTRIBUTION

Project mitigation may include a combination of fee payments to established programs (e.g., DIF), construction of specific improvements, payment of a fair share contribution toward future improvements or a combination of these approaches. Improvements constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate (to be determined at the City of San Bernardino's discretion).

When off-site improvements are identified with a minor share of responsibility assigned to proposed development, the approving jurisdiction may elect to collect a fair share contribution or require the development to construct improvements. Detailed fair share calculations, for each peak hour, has been provided on Table 1-8 for the applicable deficient intersections shown on Table 1-9 and Table 1-10.

Table 1-8

Project Fair Share Calculations for Intersections

#	Intersection		Existing	Project	2035 WP[1]	Total New Traffic	Project % of New Traffic
10	Palm Av. / Belmont Av.						
		AM:	780	30	1,028	248	**12.1%**
		PM:	561	59	814	253	23.3%
11	Palm Av. / Irvington Av.						
		AM:	1,336	42	1,720	384	**10.9%**
		PM:	977	87	1,344	367	23.7%
19	University Pkwy. / Kendall Dr.						
		AM:	2,947	28	4,038	1,091	2.6%
		PM:	3,775	64	5,217	1,442	**4.4%**

* Highest deficient peak hour represented in **BOLD** and shown on Table 1-8.

[1] Project fair share based on net new trips between Existing and Horizon Year (2035) traffic conditions.

Table 1-9

Summary of Project Impacts and Recommended Improvements

#	Intersection Location	Jurisdiction	Existing	E+P (Phase 1)	E+P (Project Buildout)	EA (2018)	EAP (2018)	EA (2019)	EAP (2019)	Improvements in DIF Fee Program?[1]	Fair Share %[2]
10	Palm Av. / Belmont Av.	City of San Bernardino	None	None	None	None	None	None	None	NA[3]	NA[3]
11	Palm Av. / Irvington Av.	City of San Bernardino	None	None	None	None	None	None	None	NA[3]	NA[3]
12	Palm Av. / Kendall Dr.	City of San Bernardino	None	None	None	None	None	None	None	NA[3]	NA[3]
14	Palm Av. / I-215 SB Ramps	City of San Bernardino,	None	None	None	None	None	None	None	NA[3]	NA[3]
15	Palm Av. / Hallmark Pkwy.	City of San Bernardino	None	None	None	None	None	None	None	NA[3]	NA[3]
19	University Pkwy. / Kendall Dr.	City of San Bernardino	None	None	None	None	None	2nd SB left turn lane	Same	No	4.4%

[1] Improvements included in City of San Bernardino DIF program for local and regional components.

[2] Program improvements constructed by project may be eligible for fee credit, at discretion of City. See Table 1-7 for Fair Share Calculations.

[3] Not applicable; no improvements recommended.

Table 1-10

Summary of Cumulative Impacts and Recommended Improvements

#	Intersection Location	Jurisdiction	2018 Without Project	2018 With Project	2019 Without Project	2019 With Project	2035 Without Project	2035 With Project	Improvements in DIF Fee Program?[1]	Total Cost[2]	Fair Share %[3]	Fair Share Cost[4]
10	Palm Av. / Belmont Av.	City of San Bernardino	None	None	None	None	Restripe NB w/ 1 left turn lane and 1 shared through-right turn lane	Same	No	$37,100	12.1%	$4,488
							1 SB left turn lane	Same	No	$74,200		$8,976
							1 EB left turn lane	Same	No	$74,200		$8,976
							1 WB left turn lane	Same	No	$74,200		$8,976
									Total	**$259,700**		**$31,415**
11	Palm Av. / Irvington Av.	City of San Bernardino	None	None	None	None	EB right turn lane w/ overlap phasing	Same	No	$111,300	10.9%	$12,173
									Total	**$111,300**		**$12,173**
14	Palm Av. / I-215 SB Ramps	City of San Bernardino, Caltrans	None	None	None	None	2nd SB left turn lane	Same	Yes	--	NA[6]	--
									Total	**$0**		**$0**
15	Palm Av. / Hallmark Pkwy.	City of San Bernardino	None	None	None	None	2nd NB through lane	Same	Yes	--	NA[6]	--
							2nd SB through lane	Same	Yes	--		--
									Total	**$0**		**$0**
19	University Pkwy. / Kendall Dr.	City of San Bernardino	None	None	2nd SB left turn lane	Same	Same	Same	No	$74,200	4.4%	$3,293
							1 NB right turn lane	Same	No	$74,200		$3,293
							2nd SB left turn lane	Same	No	$74,200		$3,293
							3rd EB through lane	Same	No	$267,120		$11,856
							1 EB right turn lane	Same	No	$74,200		$3,293
							3rd WB through lane	Same	No	$267,120		$11,856
							Modify traffic signal with overlap phasing on the NB and EB right turn lanes	Same	No	$111,300		$4,940
									Total	**$942,340**		**$41,824**
									Total Costs for Horizon Year (2035) Improvements[5]	**$1,313,340**		**$85,412**

[1] Improvements included in City of San Bernardino DIF program for local and regional components.

[2] Costs have been estimated using the data provided in Appendix "G" of the CMP (2003 Update) for preliminary construction costs. Appendix "G" costs escalated by a factor of 1.484, except Traffic Signals, to reflect 2015 costs.

[3] Program improvements constructed by project may be eligible for fee credit, at discretion of City. See Table 1-7 for Fair Share Calculations.

[4] Rough order of magnitude cost estimate.

[5] Total project fair share contribution consists of the improvements which are not already included in a fee program for those intersections wholly or partially within the City of San Bernardino.

[6] "N/A or Not Applicable" because improvements are included in a pre-existing fee program.

1.7 PROJECT MITIGATION MEASURES

1.7.1 MITIGATION MEASURES TO ADDRESS CUMULATIVE IMPACTS AT INTERSECTIONS

Table 1-9 and Table 1-10 list the recommended improvements necessary to reduce the identified intersection LOS deficiencies. Street and intersection improvements that may be funded though the City's DIF program are noted. If a particular facility tentatively listed in Table 1-9 and Table 1-10 are ultimately excluded from the DIF program, the Project would be responsible for, and would be required to pay, fair share fees for improvement of affected facilities. These fees are collected as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected vehicle trip increases. Alternatively, minor fair share responsibilities may be waived when collection is infeasible or where other mitigation assignments substantially exceed the Project's demonstrated impacts.

Improvements included in a defined program and constructed by development may be eligible for a fee credit or reimbursement through the program where appropriate. A rough order of magnitude cost has been prepared to determine the appropriate contribution value based upon the project's fair share of traffic as part of the project approval process. Table 1-9 and Table 1-10 also summarize the applicable cost associated with each of the recommended improvements based on the preliminary construction cost estimates found in Appendix "G" of the San Bernardino County CMP in conjunction with a cost escalation factor of 1.484% to reflect current (2015) costs. These estimates are a rough order of magnitude only as they are intended only for discussion purposes and do not imply any legal responsibility or formula for contributions or mitigation.

Phase 1 (2018)

Based on an assessment of E+P (Phase 1), EA (2018), and EAP (2018) traffic conditions, the Project's potential impact to the surrounding study area intersections was found to be less-than-significant. As such, no mitigation measures have been identified.

Phase 2 (Project Buildout – 2019)

Mitigation Measure 1.1 – University Parkway / Kendall Drive (#19) – The following improvement is necessary to reduce the Project's proportionate increase in delay to pre-project levels or better, thus reducing the Project's cumulative impact to less-than-significant:

- Payment of the Project's fair share towards a 2nd southbound left turn lane.

Mitigation Measure 2.1 – Prior to the issuance of building permits, the Project applicant shall participate in the City's DIF fee program by paying the requisite fees at the time of building permit, and in addition pay the Project's fair share amount of $85,412 for the improvements identified in Table 1-10 that are consistent with the improvements shown on Table 10-5 and Table 10-6, or as agreed to by the City and applicant. This fair share payment should only be collected if the City creates a fee program that includes the improvements in which this fair share contribution is intended to construct. The City shall ensure that the improvements will be constructed pursuant to the fee program at that point in time necessary to avoid identified significant impacts.

1.7.2 Cumulative Mitigation Measures to Address Deficiencies on Freeway Facilities

Changes and/or expansions to the I-215 Freeway mainline are not within the jurisdiction of the City of San Bernardino. Rather, those improvements are planned, funded, and constructed by the State through a complicated legislative and political process involving the State Legislature, the California Transportation Commission (CTC), the California Business, Transportation and Housing Agency (BT&H), and Caltrans.

In California, most of SHS improvements are programs through two documents, the State Transportation Improvement Program (STIP) or the State Highway Operation and Protection Program (SHOPP). State and federal fuel taxes generate most of the funds used to pay for these improvements. Funds are expected to be available for transportation improvements are identified through a Fund Estimate prepared by Caltrans and adopted by the CTC. These funds, along with other fund sources, are deposited in the State Highway Account to be programmed and allocated to specific project improvements in both the STIP and SHOPP by the CTC.

The STIP is built from Regional Transportation Improvement Programs (RTIPs) proposed by Regional Transportation Planning Agencies/Metropolitan Planning Organizations (RTPA/MPOs) throughout California and the Interregional Transportation Improvement Program (ITIP) proposed by Caltrans. Of the funds made available by the CTC for the STIP, 25 percent is made available for Caltrans to propose expansion and capacity-enhancements on the statutorily designated interregional road system. Seventy-five percent of the funds are made available to the RTPA/MPOs to propose all types of improvements on all other State highway system roads, other non-State highway roads eligible to use federal funds, and on the Interregional Road System. Transportation funds generally come from a variety of sources including the National Highway System fund, State fuel taxes, federal fuel taxes, sales taxes on fuel, truck weight fees, roadway and bridge tolls, user fares, local sales tax measures, development fees, where applicable, bond revenues, and State and local general and matching funds.

Improvements to SHS are deemed to be matters of federal, State, regional, and local concern. On the federal level, the City, through its congressional delegation along with other Cities in the Western Riverside region, has aggressively sought federal monies for regional roadway improvements. On the local level, the City through its Circulation Element contained within its General Plan, maintains policies whereby the City commits to work closely with regional infrastructure planning entities and to continue to identify new circulation and roadway improvements.

The traffic study prepared for this Project concludes that segments of the I-215 Freeway would operate at LOS E or F without the Project for Horizon Year (2035) conditions. The Project's contributions to cumulative impacts under Horizon Year (2035) conditions are relatively di minimis, involving only a small percentage of the forecast traffic occurring on the identified segments at Horizon Year (2035) conditions (e.g., less than 1 percent of the total traffic). Caltrans recognizes that many of its facilities will operate at LOS E and F even at the ultimate build out of the identified facility as is the case here in the context of the identified I-215 Freeway under Horizon Year (2035) conditions. Because the City of San Bernardino has no control over State facilities, and because the State facilities funded and planned to be

developed under Horizon Year (2035) conditions are already anticipated to operate at LOS E or F even without the proposed Project, there are no further mitigation measures that can be imposed upon the Project to mitigate its small cumulative contribution to impacts on segments of I-215 Freeway under Horizon Year (2035) conditions. Caltrans has exclusive control over State highway improvements and State highway improvements are by and large a matter of State-wide control.

In addition, State highway funding is an extraordinarily complex State-wide and regional problem the cities have grappled with for decades. By definition, State highways are impacted by interstate, State-wide and regional traffic. To this end, in 2007, State Senator Alan Lowenthal (D, Long Beach) chair of the Senate Transportation Committee, held hearings on alternative funding mechanisms for State highway improvements, including legislation that would allow private companies to build and operate State highways. The State Legislature, Caltrans, the Executive Branch and public-private partnerships are all engaged in multi-jurisdictional and creative solutions to feasibly alleviate congestion on the State's highways. Thus, for the aforementioned reasons there are no available and feasible mitigation measures available to mitigate the projects di minimis cumulative contribution to traffic on the I-215 Freeway under Horizon Year (2035) conditions.

1.8 SITE ADJACENT ROADWAY AND SITE ACCESS IMPROVEMENTS

This section summarizes Project site access and on-site circulation recommendations. Vehicular access will be provided via the following driveways (see Exhibit 1-1) and all driveways are assumed to allow for full access (i.e., no turning movement restrictions):

- Magnolia Avenue / Driveway 1 – Access to Phase 1 (Residential)
- Driveway 2 / W. Little League Drive – Access to Phase 1 (Residential)
- Driveway 3 / W. Little League Drive – Access to Phase 2 (Commercial Retail)
- Driveway 4 / W. Little League Drive – Access to Phase 2 (Commercial Retail)
- Driveway 5 / W. Little League Drive – Access to Phase 2 (Commercial Retail)

Regional access to the project site is provided via the I-215 Freeway at the Palm Avenue interchange. Roadway improvements necessary to provide site access and on-site circulation are assumed to be constructed in conjunction with site development and are described below. These improvements are required to be in place prior to occupancy. Construction of on-site and site adjacent improvements are recommended to occur in conjunction with adjacent Project development activity or as needed for Project access purposes.

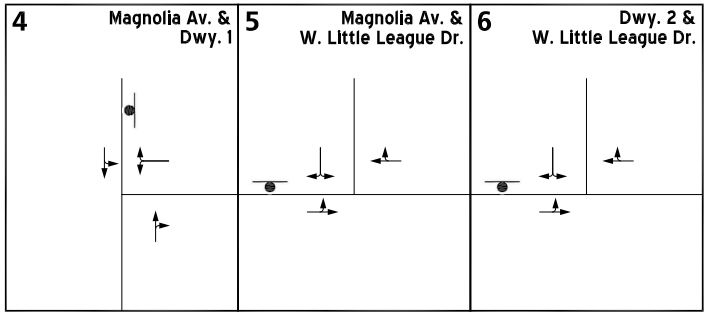
1.8.1 ON-SITE ROADWAY IMPROVEMENTS

Exhibit 1-3 illustrates the site-adjacent roadway improvement recommendations and site access improvements for Phase 1 (2018) conditions.

Phase 1 (2018)

Magnolia Avenue – Magnolia Avenue is a north-south oriented roadway along the western Project boundary. Construct Magnolia Avenue from the northern Project boundary to W. Little

EXHIBIT 1-3: PHASE 1 (2018) SITE ACCESS AND SITE ADJACENT ROADWAY RECOMMENDATIONS



LEGEND:

= COLLECTOR

League Drive at its ultimate half-section width as a Collector (60-foot right-of-way), in compliance with applicable City of San Bernardino standards.

W. Little League Drive – W. Little League Drive is an east-west oriented roadway along the southern Project boundary. Construct W. Little League Drive from Magnolia Avenue to the eastern Project boundary of Phase 1 at its ultimate half-section width as a Collector (60-foot right-of-way), in compliance with applicable City of San Bernardino standards.

Phase 2 (Project Buildout – 2019)

Exhibit 1-4 illustrates the site-adjacent roadway improvement recommendations and site access improvements for Phase 2 (2019 – Project Buildout) conditions.

W. Little League Drive – W. Little League Drive is an east-west oriented roadway along the southern Project boundary. Construct W. Little League Drive from the western boundary of Phase 2 to the eastern Project boundary at its ultimate half-section width as a Collector (60-foot right-of-way), in compliance with applicable City of San Bernardino standards.

Wherever necessary, roadways adjacent to the Project, site access points and site-adjacent intersections will be constructed to be consistent with or within the recommended roadway classifications and respective cross-sections in the City of San Bernardino General Plan Circulation Element.

1.8.2 SITE ACCESS IMPROVEMENTS

The recommended site access driveway improvements for the Project are described below. Exhibit 1-3 (Phase 1) and Exhibit 1-4 (Project Buildout) illustrate the on-site and site adjacent recommended roadway lane improvements. Construction of on-site and site adjacent improvements shall occur in conjunction with adjacent Project development activity or as needed for Project access purposes.

Phase 1 (2018)

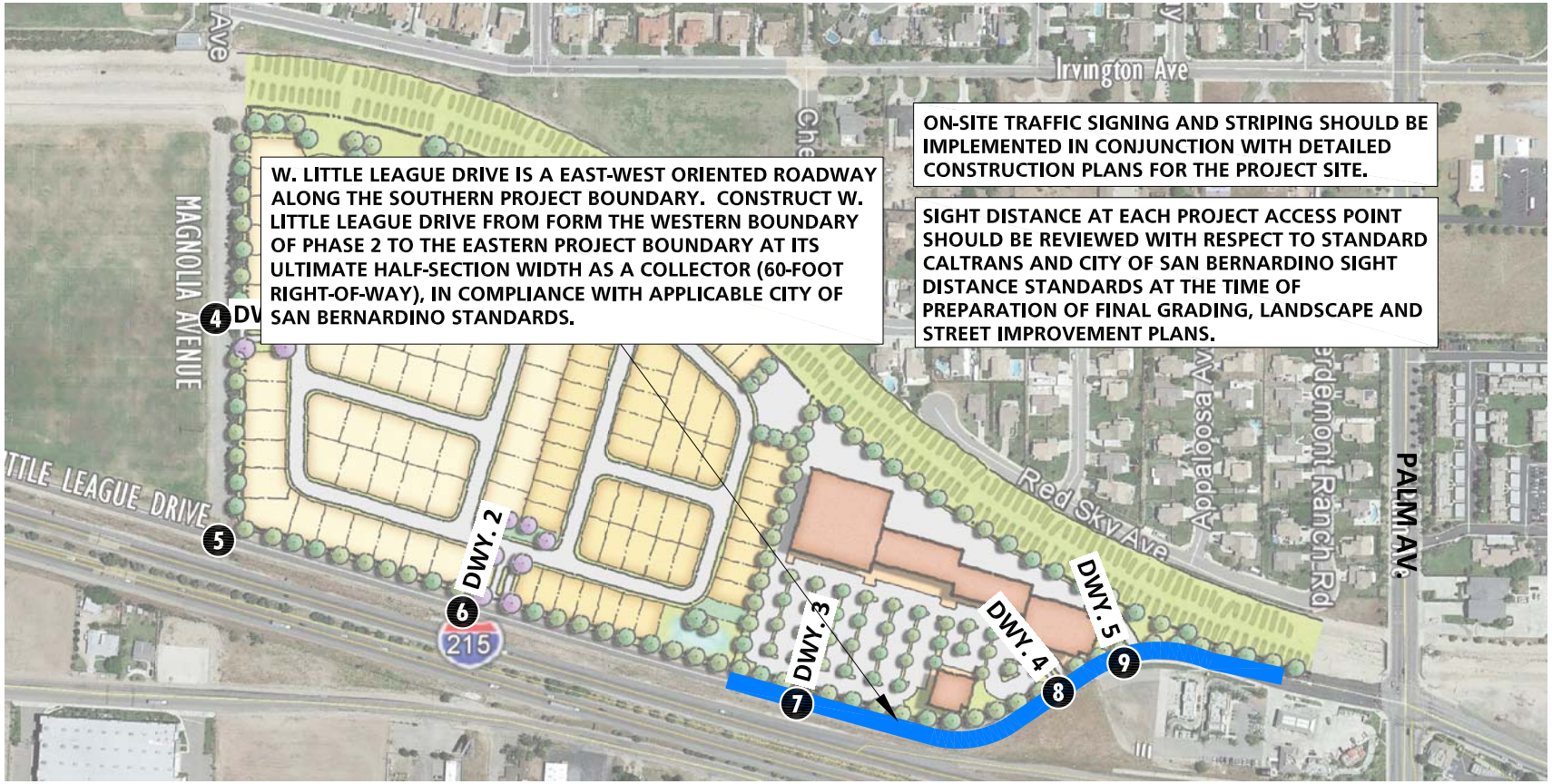
Magnolia Avenue / Driveway 1 – Install a stop control on the westbound approach and construct the intersection with the following geometrics:

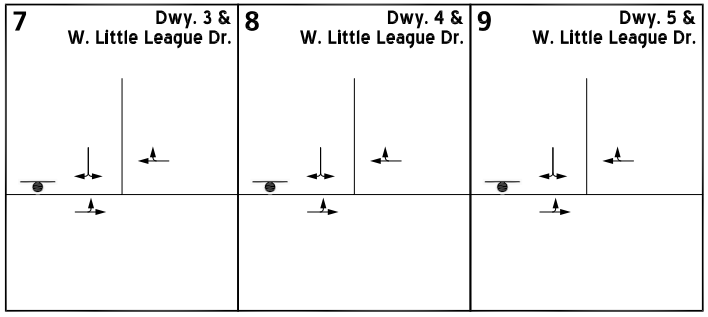
- Northbound Approach: One shared through-right turn lane.
- Southbound Approach: One shared left-through lane.
- Eastbound Approach: Not applicable.
- Westbound Approach: One shared left-right turn lane.

Magnolia Avenue / W. Little League Drive – Install a stop control on the southbound approach and construct the intersection with the following geometrics:

- Northbound Approach: Not applicable.
- Southbound Approach: One shared left-right turn lane.
- Eastbound Approach: One shared left-through lane.
- Westbound Approach: One shared through-right turn lane.

EXHIBIT 1-4: PHASE 2 (2019) SITE ACCESS AND SITE ADJACENT ROADWAY RECOMMENDATIONS





LEGEND:

- COLLECTOR

Driveway 2 / W. Little League Drive – Install a stop control on the southbound approach and construct the intersection with the following geometrics:

- Northbound Approach: Not applicable.
- Southbound Approach: One shared left-right turn lane.
- Eastbound Approach: One shared left-through lane.
- Westbound Approach: One shared through-right turn lane.

Phase 2 (Project Buildout – 2019)

Driveway 3 / W. Little League Drive – Install a stop control on the southbound approach and construct the intersection with the following geometrics:

- Northbound Approach: Not applicable.
- Southbound Approach: One shared left-right turn lane.
- Eastbound Approach: One shared left-through lane.
- Westbound Approach: One shared through-right turn lane.

Driveway 4 / W. Little League Drive – Install a stop control on the southbound approach and construct the intersection with the following geometrics:

- Northbound Approach: Not applicable.
- Southbound Approach: One shared left-right turn lane.
- Eastbound Approach: One shared left-through lane.
- Westbound Approach: One shared through-right turn lane.

Driveway 5 / W. Little League Drive – Install a stop control on the southbound approach and construct the intersection with the following geometrics:

- Northbound Approach: Not applicable.
- Southbound Approach: One shared left-right turn lane.
- Eastbound Approach: One shared left-through lane.
- Westbound Approach: One shared through-right turn lane.

On-site traffic signing and striping should be implemented in conjunction with detailed construction plans for the Project site.

Sight distance at each project access point should be reviewed with respect to standard Caltrans and City of San Bernardino sight distance standards at the time of preparation of final grading, landscape and street improvement plans.

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2 METHODOLOGIES

This section of the report presents the methodologies used to perform the traffic analyses summarized in this report. The methodologies described are generally consistent with City of San Bernardino traffic study guidelines. (1)

2.1 LEVEL OF SERVICE

Traffic operations of roadway facilities are described using the term "Level of Service" (LOS). LOS is a qualitative description of traffic flow based on several factors such as speed, travel time, delay, and freedom to maneuver. Six levels are typically defined ranging from LOS A, representing completely free-flow conditions, to LOS F, representing breakdown in flow resulting in stop-and-go conditions. LOS E represents operations at or near capacity, an unstable level where vehicles are operating with the minimum spacing for maintaining uniform flow. (6)

2.2 INTERSECTION CAPACITY ANALYSIS

The definitions of LOS for interrupted traffic flow (flow restrained by the existence of traffic signals and other traffic control devices) differ slightly depending on the type of traffic control. The LOS is typically dependent on the quality of traffic flow at the intersections along a roadway. The *Highway Capacity Manual* (HCM) methodology expresses the LOS at an intersection in terms of delay time for the various intersection approaches. (6) The HCM uses different procedures depending on the type of intersection control.

2.2.1 SIGNALIZED INTERSECTIONS

The City of San Bernardino requires signalized intersection operations analysis based on the methodology described in the (HCM). Intersection LOS operations are based on an intersection's average control delay. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. For signalized intersections LOS is directly related to the average control delay per vehicle and is correlated to a LOS designation as described in Table 2-1. Study area intersections have been evaluated using the Synchro (Version 8 Build 806) analysis software package.

TABLE 2-1: SIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Operations with very low delay occurring with favorable progression and/or short cycle length.	0 to 10.00	A	F
Operations with low delay occurring with good progression and/or short cycle lengths.	10.01 to 20.00	B	F
Operations with average delays resulting from fair progression and/or longer cycle lengths. Individual cycle failures begin to appear.	20.01 to 35.00	C	F

Description	Average Control Delay (Seconds), V/C ≤ 1.0	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Operations with longer delays due to a combination of unfavorable progression, long cycle lengths, or high V/C ratios. Many vehicles stop and individual cycle failures are noticeable.	35.01 to 55.00	D	F
Operations with high delay values indicating poor progression, long cycle lengths, and high V/C ratios. Individual cycle failures are frequent occurrences. This is considered to be the limit of acceptable delay.	55.01 to 80.00	E	F
Operation with delays unacceptable to most drivers occurring due to over saturation, poor progression, or very long cycle lengths	80.01 and up	F	F

Source: HCM

Synchro is a macroscopic traffic software program that is based on the signalized intersection capacity analysis as specified in the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections. Equations are used to determine measures of effectiveness such as delay and queue length. The level of service and capacity analysis performed by Synchro takes into consideration optimization and coordination of signalized intersections within a network.

The peak hour traffic volumes have been adjusted using a peak hour factor (PHF) to reflect peak 15 minute volumes. Common practice for LOS analysis is to use a peak 15-minute rate of flow. However, flow rates are typically expressed in vehicles per hour. The PHF is the relationship between the peak 15-minute flow rate and the full hourly volume (e.g. PHF = [Hourly Volume] / [4 x Peak 15-minute Flow Rate]). The use of a 15-minute PHF produces a more detailed analysis as compared to analyzing vehicles per hour. Existing PHFs have been used for all analysis scenarios. Per the HCM, PHF values over 0.95 often are indicative of high traffic volumes with capacity constraints on peak hour flows while lower PHF values are indicative of greater variability of flow during the peak hour. (6)

Consistent with Appendix C, Page C-13 of the San Bernardino County CMP, 2005 Update, the following saturation flow rates, in vehicles per hour green per lane (vphgpl), will be utilized in the traffic analysis for signalized intersections: (2)

Existing, E+P, EA, EAP, and Opening Year Cumulative Traffic Conditions:

- Exclusive through: 1800 vphgpl
- Exclusive left: 1700 vphgpl
- Exclusive right: 1800 vphgpl
- Exclusive dual left: 1600 vphgpl
- Exclusive triple left: 1500 vphgpl

Horizon Year (2035) Traffic Conditions:

- Exclusive through: 1900 vphgpl
- Exclusive left: 1800 vphgpl
- Exclusive dual left: 1700 vphgpl
- Exclusive right: 1900 vphgpl
- Exclusive dual right: 1800 vphgpl
- Exclusive triple left: 1600 vphgpl or less

California Department of Transportation (Caltrans)

Per the Caltrans *Guide for the Preparation of Traffic Impact Studies*, the traffic modeling and signal timing optimization software package Synchro (Version 8 Build 806) has also been utilized to analyze signalized intersections under Caltrans' jurisdiction, which include interchange to arterial ramps (i.e. I-215 Freeway ramps at Palm Avenue). (3) Signal timing for the freeway arterial-to-ramp intersections have been obtained from Caltrans District 8 and were utilized for the purposes of this analysis.

2.2.2 UNSIGNALIZED INTERSECTIONS

The City of San Bernardino requires the operations of unsignalized intersections be evaluated using the methodology described in the HCM. (6) The LOS rating is based on the weighted average control delay expressed in seconds per vehicle (see Table 2-2).

TABLE 2-2: UNSIGNALIZED INTERSECTION LOS THRESHOLDS

Description	Average Control Delay Per Vehicle (Seconds)	Level of Service, V/C ≤ 1.0	Level of Service, V/C > 1.0
Little or no delays.	0 to 10.00	A	F
Short traffic delays.	10.01 to 15.00	B	F
Average traffic delays.	15.01 to 25.00	C	F
Long traffic delays.	25.01 to 35.00	D	F
Very long traffic delays.	35.01 to 50.00	E	F
Extreme traffic delays with intersection capacity exceeded.	> 50.00	F	F

Source: HCM

At two-way or side-street stop-controlled intersections, LOS is calculated for each controlled movement and for the left turn movement from the major street, as well as for the intersection as a whole. For approaches composed of a single lane, the delay is computed as the average of all movements in that lane. For all-way stop controlled intersections, LOS is computed for the intersection as a whole.

2.3 FREEWAY OFF-RAMP QUEUING ANALYSIS

The study area for this TIA includes the freeway-to-arterial interchange of the I-215 Freeway at Palm Avenue off-ramps. Consistent with Caltrans requirements, the 95th percentile queuing of vehicles has been assessed at the off-ramps to determine potential queuing impacts at the

freeway ramp intersections on Palm Avenue. Specifically, the queuing analysis is utilized to identify any potential queuing and "spill back" onto the I-215 Freeway mainline from the off-ramps.

The traffic progression analysis tool and HCM intersection analysis program, Synchro, has been used to assess the potential impacts/needs of the intersections with traffic added from the proposed Project. Storage (turn-pocket) length recommendations at the ramps have been based upon the 95th percentile queue resulting from the Synchro progression analysis. The queue length reported is for the lane with the highest queue in the lane group.

The traffic modeling and signal timing optimization software package Synchro/SimTraffic (Version 8 Build 806) has been utilized to assess queues at the I-215 Freeway interchange at Palm Avenue. Synchro is a macroscopic traffic software program that is based on the signalized and unsignalized intersection capacity analyses as specified in the HCM. Macroscopic level models represent traffic in terms of aggregate measures for each movement at the study intersections.

SimTraffic is designed to model networks of signalized and unsignalized intersections, with the primary purpose of checking and fine tuning signal operations. SimTraffic uses the input parameters from Synchro to generate random simulations. The 95th percentile queue is not necessarily ever observed, it is simply based on statistical calculations (or Average Queue plus 1.65 standard deviations). However, the average queue is the average of all the two-minute maximum queues observed by SimTraffic. The maximum back of queue observed for every two-minute period is recorded by SimTraffic.

A vehicle is considered queued whenever it is traveling at less than 10 feet/second. A vehicle will only become queued when it is either at the stop bar or behind another queued vehicle. Although only the 95th percentile queue has been reported in the tables, the 50th percentile queue can be found in the appendix alongside the 95th percentile queue for each ramp location. The 50th percentile maximum queue is the maximum back of queue on a typical cycle during the peak hour, while the 95th percentile queue is the maximum back of queue with 95th percentile traffic volumes during the peak hour. In other words, if traffic were observed for 100 cycles, the 95th percentile queue would be the queue experienced with the 95th busiest cycle (or 5% of the time). The 50th percentile or average queue represents the typical queue length for peak hour traffic conditions, while the 95th percentile queue is derived from the average queue plus 1.65 standard deviations. The 95th percentile queue is not necessarily ever observed, it is simply based on statistical calculations.

2.4 TRAFFIC SIGNAL WARRANT ANALYSIS METHODOLOGY

The term "signal warrants" refers to the list of established criteria used by Caltrans and other public agencies to quantitatively justify or ascertain the potential need for installation of a traffic signal at an otherwise unsignalized intersection. This TIA uses the signal warrant criteria presented in the latest edition of the Federal Highway Administration's (FHWA) *Manual on Uniform Traffic Control Devices (MUTCD)*, as amended by *the MUTCD 2014 California Supplement*, for all study area intersections. (7)

The signal warrant criteria for Existing study area intersections are based upon several factors, including volume of vehicular and pedestrian traffic, frequency of accidents, and location of school areas. Both the FHWA's *MUTCD* and the *MUTCD 2014 California Supplement* indicate that the installation of a traffic signal should be considered if one or more of the signal warrants are met. (7) Specifically, this TIA utilizes the Peak Hour Volume-based Warrant 3 as the appropriate representative traffic signal warrant analysis for existing traffic conditions. Warrant 3 criteria are basically identical for both the FHWA's *MUTCD* and the *MUTCD 2014 California Supplement*. Warrant 3 is appropriate to use for this TIA because it provides specialized warrant criteria for intersections with rural characteristics (e.g. located in communities with populations of less than 10,000 persons or with adjacent major streets operating above 40 miles per hour). For the purposes of this study, the speed limit was the basis for determining whether Urban or Rural warrants were used for a given intersection.

Future unsignalized intersections, that currently do not exist, have been assessed regarding the potential need for new traffic signals based on future average daily traffic (ADT) volumes, using the Caltrans planning level ADT-based signal warrant analysis worksheets.

As shown on Table 2-3, traffic signal warrant analyses were performed for the following unsignalized study area intersections during the peak weekday conditions wherein the Project is anticipated to contribute the highest trips:

TABLE 2-3: TRAFFIC SIGNAL WARRANT ANALYSIS LOCATIONS

ID	Intersection Location	Jurisdiction	CMP
1	N. Little League Drive / W. Little League Drive	City of San Bernardino	No
2	N. Little League Drive / Kendall Drive	City of San Bernardino	Yes
3	Magnolia Avenue / Irvington Avenue	City of San Bernardino	No
4	Magnolia Avenue / Driveway 1 – Future Intersection	City of San Bernardino	No
5	Magnolia Avenue / W. Little League Drive – Future Intersection	City of San Bernardino	No
6	Driveway 2 / W. Little League Drive – Future Intersection	City of San Bernardino	No
7	Driveway 3 / W. Little League Drive – Future Intersection	City of San Bernardino	No
8	Driveway 4 / W. Little League Drive – Future Intersection	City of San Bernardino	No
9	Driveway 5 / W. Little League Drive – Future Intersection	City of San Bernardino	No
10	Palm Avenue / Belmont Avenue	City of San Bernardino	Yes
15	Palm Avenue / Hallmark Parkway	City of San Bernardino	Yes
16	Pine Avenue / Belmont Avenue	City of San Bernardino	Yes

The Existing conditions traffic signal warrant analysis is presented in the subsequent section, Section 3 *Area Conditions* of this report. The traffic signal warrant analyses for future conditions are presented in Section 5.0 *E+P Traffic Analysis,* Section 6.0 *EA (2018) and EAP (2018) Traffic Analysis*, Section 7.0 *EA (2019) and EAP (2019) Traffic Analysis*, Section 8.0 *Opening Year Cumulative (2018) Traffic Analysis*, Section 9.0 *Opening Year Cumulative (2019) Traffic Analysis,* and Section 10.0 *Horizon Year (2035) Traffic Analysis* of this report.

It is important to note that a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant.

2.5 FREEWAY MAINLINE SEGMENT ANALYSIS METHODOLOGY

Consistent with recent Caltrans guidance and because impacts to freeway segments dissipate with distance from the point of State Highway System (SHS) entry, quantitative study of freeway segments beyond those immediately adjacent to the point of entry is not required. As such, the traffic study has evaluated the freeway segments along the I-215 Freeway where the Project is anticipated to contribute traffic. Because impacts to freeway segments dissipate with distance from the point of SHS entry, quantitative evaluation of freeway segments with less than 50 peak hour trips is not necessary. Although the Project is anticipated to contribute less than 50 peak hour directional trips to the I-215 Freeway adjacent to the point of entry to the SHS, they have been evaluated for the purposes of this traffic study in an effort to conduct a conservative analysis.

The freeway system in the study area has been broken into segments defined by the freeway-to-arterial interchange locations. The freeway segments have been evaluated in this TIA based upon peak hour directional volumes. The freeway segment analysis is based on the methodology described in the HCM and performed using HCS2010 software. The performance measure preferred by Caltrans to calculate LOS is density. Density is expressed in terms of passenger cars per mile per lane. Table 2-4 illustrates the freeway segment LOS descriptions for each density range utilized for this analysis.

TABLE 2-4: DESCRIPTION OF FREEWAY MAINLINE LOS

Level of Service	Description	Density Range (pc/mi/ln)[1]
A	Free-flow operations in which vehicles are relatively unimpeded in their ability to maneuver within the traffic stream. Effects of incidents are easily absorbed.	0.0 – 11.0
B	Relative free-flow operations in which vehicle maneuvers within the traffic stream are slightly restricted. Effects of minor incidents are easily absorbed.	11.1 – 18.0
C	Travel is still at relative free-flow speeds, but freedom to maneuver within the traffic stream is noticeably restricted. Minor incidents may be absorbed, but local deterioration in service will be substantial. Queues begin to form behind significant blockages.	18.1 – 26.0
D	Speeds begin to decline slightly and flows and densities begin to increase more quickly. Freedom to maneuver is noticeably limited. Minor incidents can be expected to create queuing as the traffic stream has little space to absorb disruptions.	26.1 – 35.0
E	Operation at capacity. Vehicles are closely spaced with little room to maneuver. Any disruption in the traffic stream can establish a disruption wave that propagates throughout the upstream traffic flow. Any incident can be expected to produce a serious disruption in traffic flow and extensive queuing.	35.1 – 45.0
F	Breakdown in vehicle flow.	>45.0

[1] pc/mi/ln = passenger cars per mile per lane. Source: HCM

The number of lanes for existing baseline conditions has been obtained from field observations conducted by Urban Crossroads in May 2015. These existing freeway geometrics have been utilized for Existing, E+P, EA, EAP, Opening Year Cumulative, and Horizon Year Without and With Project conditions.

The I-215 Freeway mainline volume data were obtained from the Caltrans Performance Measurement System (PeMS) website for the segments of the I-215 Freeway interchange, south of Palm Avenue. The data was obtained from May 2015. In an effort to conduct a conservative analysis, the maximum value observed within the three day period was utilized for the weekday morning (AM) and weekday evening (PM) peak hours. In addition, truck traffic, represented as a percentage of total traffic, has been utilized for the purposes of this analysis in an effort to not overstate traffic volumes and peak hour deficiencies. As such, actual vehicles (as opposed to PCE volumes) have been utilized for the purposes of the basic freeway segment analysis. (8)

2.6 FREEWAY MERGE/DIVERGE RAMP JUNCTION ANALYSIS

The freeway system in the study area has been broken into segments defined by freeway-to-arterial interchange locations resulting in 6 existing on and off ramp locations where the Project is anticipated to contribute traffic. Although the HCM indicates the influence area for a merge/diverge junction is 1,500 feet, the analysis presented in this traffic study has been performed at all ramp locations with respect to the nearest on or off ramp at each interchange in an effort to be consistent with Caltrans guidance/comments on other projects Urban Crossroads has worked on in the region. Per HCM guidelines, analysis of the adjacent freeway

mainline segments to each of these ramp junctions is sufficient to evaluate the peak hour operations.

The merge/diverge analysis is based on the HCM Ramps and Ramp Junctions analysis method and performed using HCS2010 software. The measure of effectiveness (reported in passenger car/mile/lane) are calculated based on the existing number of travel lanes, number of lanes at the on and off ramps both at the analysis junction and at upstream and downstream locations (if applicable) and acceleration/deceleration lengths at each merge/diverge point. Table 2-5 presents the merge/diverge area level of service descriptions for each density range utilized for this analysis.

TABLE 2-5: DESCRIPTION OF FREEWAY MERGE AND DIVERGE LOS

Level of Service	Density Range (pc/mi/ln)[1]
A	≤10.0
B	10.0 – 20.0
C	20.0 – 28.0
D	28.0 – 35.0
E	>35.0
F	Demand Exceeds Capacity

[1] pc/mi/ln = passenger cars per mile per lane. Source: HCM

Similar to the basic freeway segment analysis, the I-215 Freeway mainline volume data were obtained from the Caltrans maintained PeMS website for the segments of the I-215 Freeway interchange south of Palm Avenue. The ramp data (per the count data presented in Appendix 3.1) were then utilized to flow conserve the mainline volumes to determine the remaining I-215 Freeway mainline segment volumes. Flow conservation checks ensure that traffic flows from west to east (and vice versa) of the interchange area with no unexplained loss of vehicles. The data was obtained from May 2015. In an effort to conduct a conservative analysis, the maximum value observed within the three day period was utilized for the weekday morning (AM) and weekday evening (PM) peak hours. In addition, truck traffic, represented as a percentage of total traffic, has been utilized for the purposes of this analysis in an effort to not overstate traffic volumes and peak hour deficiencies. (8) As such, actual vehicles (as opposed to PCE volumes) have been utilized for the purposes of the freeway ramp junction (merge/diverge) analysis.

2.7 LOS CRITERIA

2.7.1 CITY OF SAN BERNARDINO

The definition of an intersection deficiency in the City of San Bernardino is based on the City of San Bernardino General Plan Circulation Element. The City of San Bernardino General Plan states that target LOS D be maintained at City intersections wherever possible.

2.7.2 CALTRANS

Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on SHS facilities, however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the appropriate target LOS. If an existing State highway facility is operating at less than this target LOS, the existing LOS should be maintained. Caltrans acknowledges that the region-wide goal for an acceptable LOS on all freeways, roadway segments, and intersections is LOS D. Consistent with the City of San Bernardino LOS threshold of LOS D and in excess of the CMP stated LOS threshold of LOS E, LOS D will be used as the target LOS for freeway ramps, freeway segments, and freeway merge/diverge ramp junctions.

2.8 THRESHOLDS OF SIGNIFICANCE

2.8.1 INTERSECTIONS

Based on the City of San Bernardino TIA Guidelines, a "significant" project-related traffic impact occurs when the addition of project traffic as defined by the EAP scenario causes an intersection that operates at an acceptable LOS under EA traffic conditions (i.e., LOS D or better) to fall to an unacceptable LOS (i.e., LOS E or worse). Therefore, EAP traffic conditions are compared to EA traffic conditions in order to identify significant project-related traffic impacts according to the following criteria:

- If an intersection is projected to operate at an acceptable level of service (i.e., LOS D or better) without the project and the addition of Project traffic, as measured by 50 or more peak hour trips, is expected to cause the intersection to operate at an unacceptable level of service (i.e., LOS E or worse), the impact is considered a significant impact.
- If an intersection is projected to operate at an unacceptable level of service (i.e., LOS E or F) without the project, and the project contributes 50 or more peak hour trips and increases the v/c by more than 0.01, the impact is considered a significant impact.

A significant cumulative impact is identified when a facility is projected to operate below the level of service standards due to cumulative future traffic AND a project-related increase to the v/c of 0.01 or more for intersections operating at LOS E Or LOS F under pre-project traffic conditions. Cumulative traffic impacts are created as a result of a combination of the proposed Project together with other future developments contributing to the overall traffic impacts requiring additional improvements to maintain acceptable level of service operations with or without the Project.

A Project's contribution to a cumulatively significant impact can be reduced to less-than-significant if the Project is required to implement or fund its fair share of improvements designed to alleviate the potential cumulative impact. If full funding of future cumulative improvements is not reasonably assured, a temporary unmitigated cumulative impact may occur until the needed improvement is fully funded and constructed.

2.8.2 CALTRANS FACILITIES

To determine whether the addition of project traffic to the SHS freeway segments would result in a deficiency, the following will be utilized:

- The traffic study finds that the LOS of a segment will degrade from D or better to E or F.
- The traffic study finds that the project will exacerbate an already deficient condition by contributing 50 or more peak hour trips. A segment that is operating at or near capacity is deemed to be deficient.

2.9 PROJECT FAIR SHARE CALCULATION METHODOLOGY

Improvements found to be included in the City of San Bernardino's DIF will be identified as such. For improvements that do not appear to be in a pre-existing fee program, a fair share financial contribution based on the Project's fair share impact may be imposed in order to mitigate the Project's share of impacts in lieu of construction.

The Project's fair share cost of improvements would be determined based on the following equation, which is the ratio of Project traffic to new traffic, where new traffic is total future traffic less existing baseline traffic:

Project Fair Share % = Project Traffic / (Horizon Year Total Traffic – Existing Traffic)

3 EXISTING CONDITIONS

This section provides a summary of the existing circulation network, the City of San Bernardino General Plan Circulation Network, and a review of existing peak hour intersection operations, traffic signal warrant, and freeway mainline operations analyses.

3.1 EXISTING CIRCULATION NETWORK

Pursuant to the Traffic Study Scoping Agreement (Appendix 1.1) and discussion with City of San Bernardino staff, the study area includes a total of 19 existing and future intersections as shown previously on Exhibit 1-2. Exhibit 3-1 illustrates the study area intersections located near the proposed Project and identifies the number of through traffic lanes for existing roadways and intersection traffic controls.

3.2 CITY OF SAN BERNARDINO GENERAL PLAN CIRCULATION ELEMENT

As previously noted, the Project site is located within the City of San Bernardino. Exhibit 3-2 shows the City of San Bernardino General Plan Circulation Element, and Exhibit 3-3 illustrates the City of San Bernardino General Plan roadway cross-sections.

The roadway classifications and planned (ultimate) roadway cross-sections of the major roadways within the City of San Bernardino in the vicinity of the proposed Project as identified on the City's General Plan Circulation Element are described subsequently.

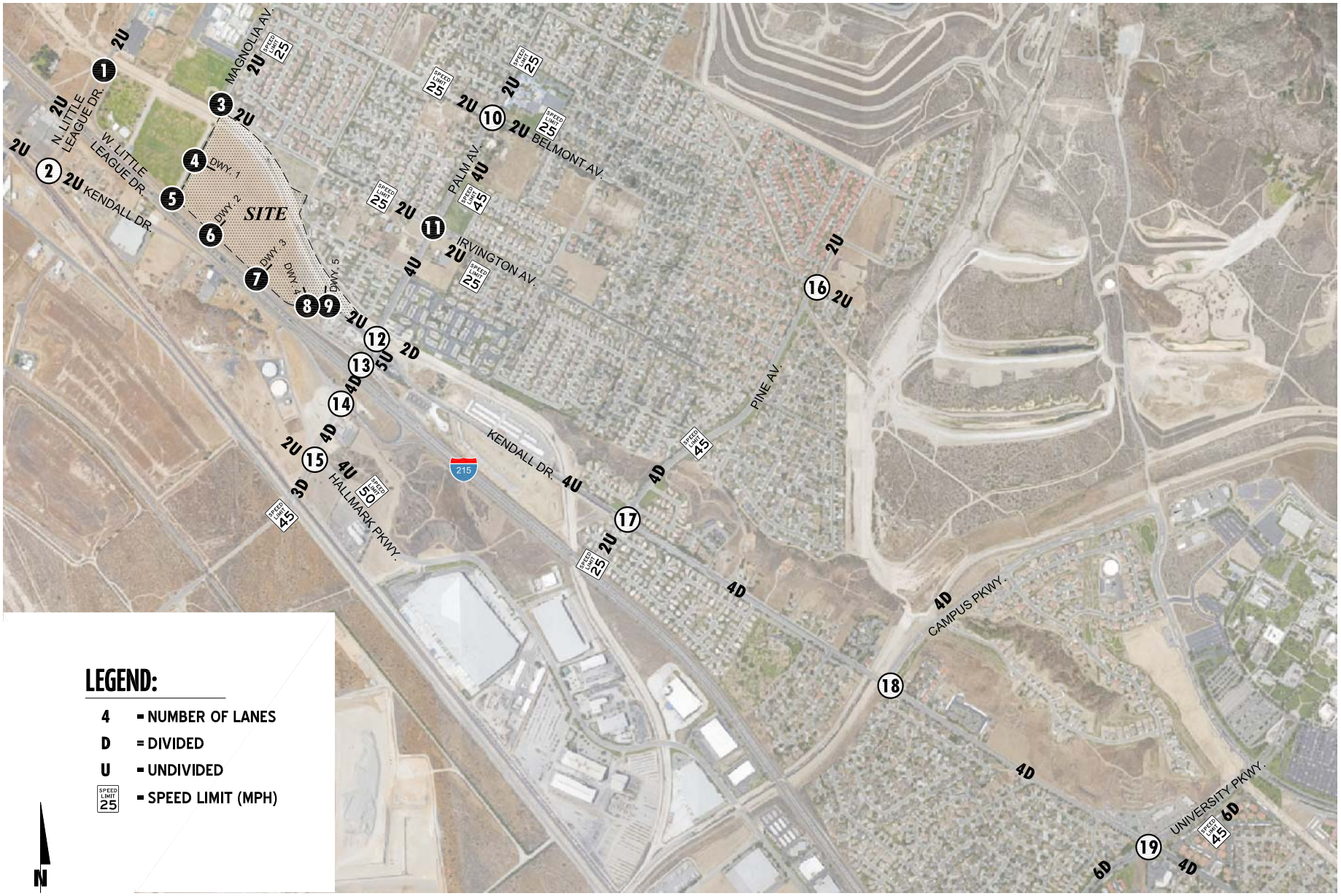
Major Arterials can accommodate six or eight travel lanes and may have raised medians. These facilities typically carry a high volume of traffic and are the primary thoroughfares linking San Bernardino with adjacent cities and the regional highway system. Driveway access to these roadways are typically limited in order to provide efficient high volume traffic flow. Examples of Major Arterials within the study area include:

- Kendall Drive, east of Palm Avenue
- Campus Parkway, south of Kendall Drive (Future Extension)
- University Parkway, south of Kendall Drive

Secondary Arterials are typically four-lane streets, providing two lanes in each direction. These highways carry traffic along the perimeters of major developments, provide support to the major arterials, and are also through streets enabling traffic to travel uninterrupted for longer distances throughout the City. Examples of Secondary Arterials within the study area include:

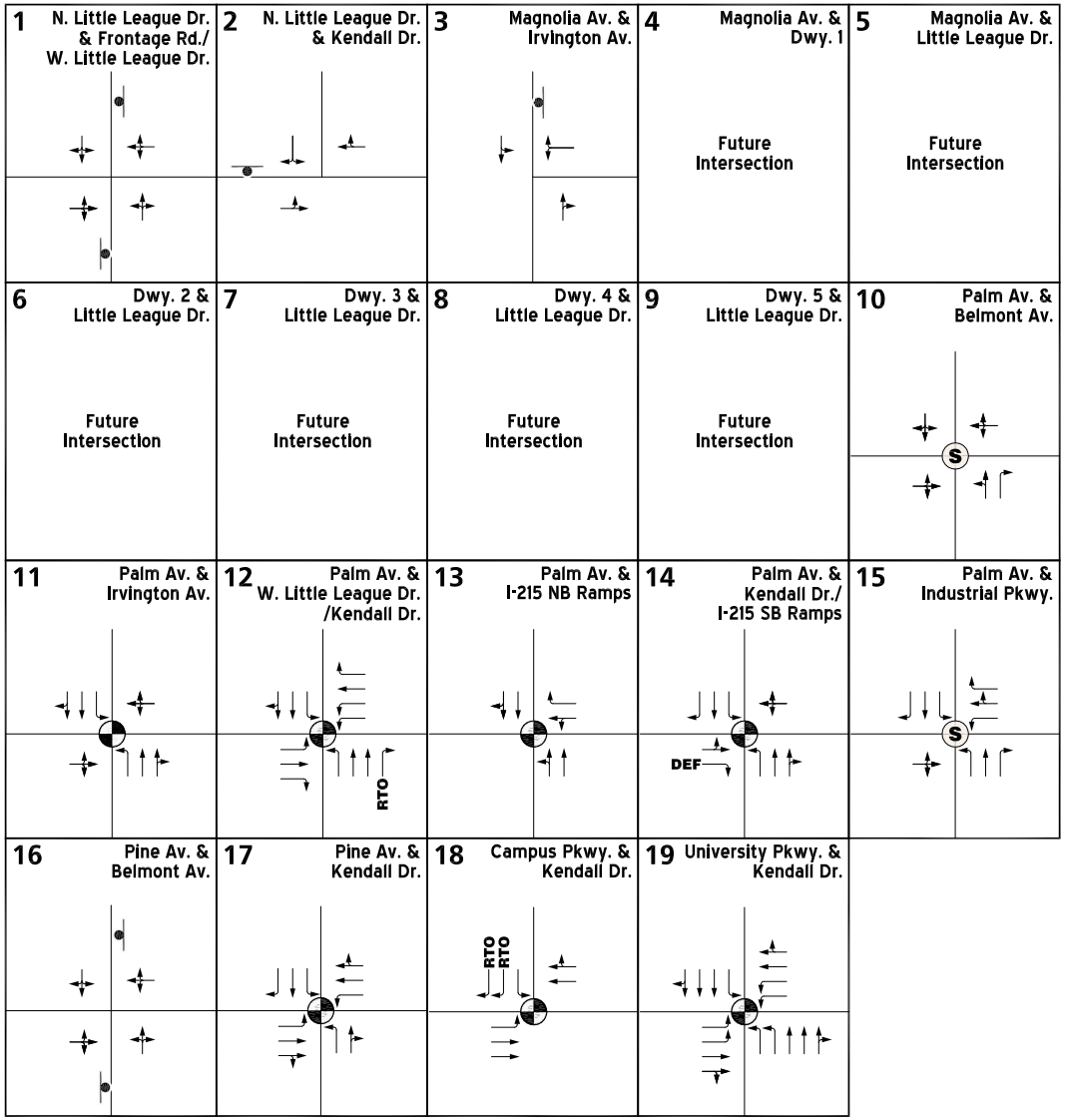
- N. Little League Drive
- Kendall Drive, west of Palm Avenue
- Industrial Parkway, east of Palm Avenue
- Palm Avenue, south of Ohio Avenue
- Pine Avenue, south of Ohio Avenue
- Campus Parkway, north of Kendall Drive

EXHIBIT 3-1 (1OF2): EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



URBAN CROSSROADS

EXHIBIT 3-1 (2OF2): EXISTING NUMBER OF THROUGH LANES AND INTERSECTION CONTROLS



LEGEND:

- = TRAFFIC SIGNAL
- S = ALL WAY STOP
- = STOP SIGN
- 4 = NUMBER OF LANES
- D = DIVIDED
- U = UNDIVIDED
- RTO = RIGHT TURN OVERLAP
- DEF = DEFACTO RIGHT TURN

N

URBAN CROSSROADS

EXHIBIT 3-2: CITY OF SAN BERNADINO GENERAL PLAN CIRCULATION ELEMENT

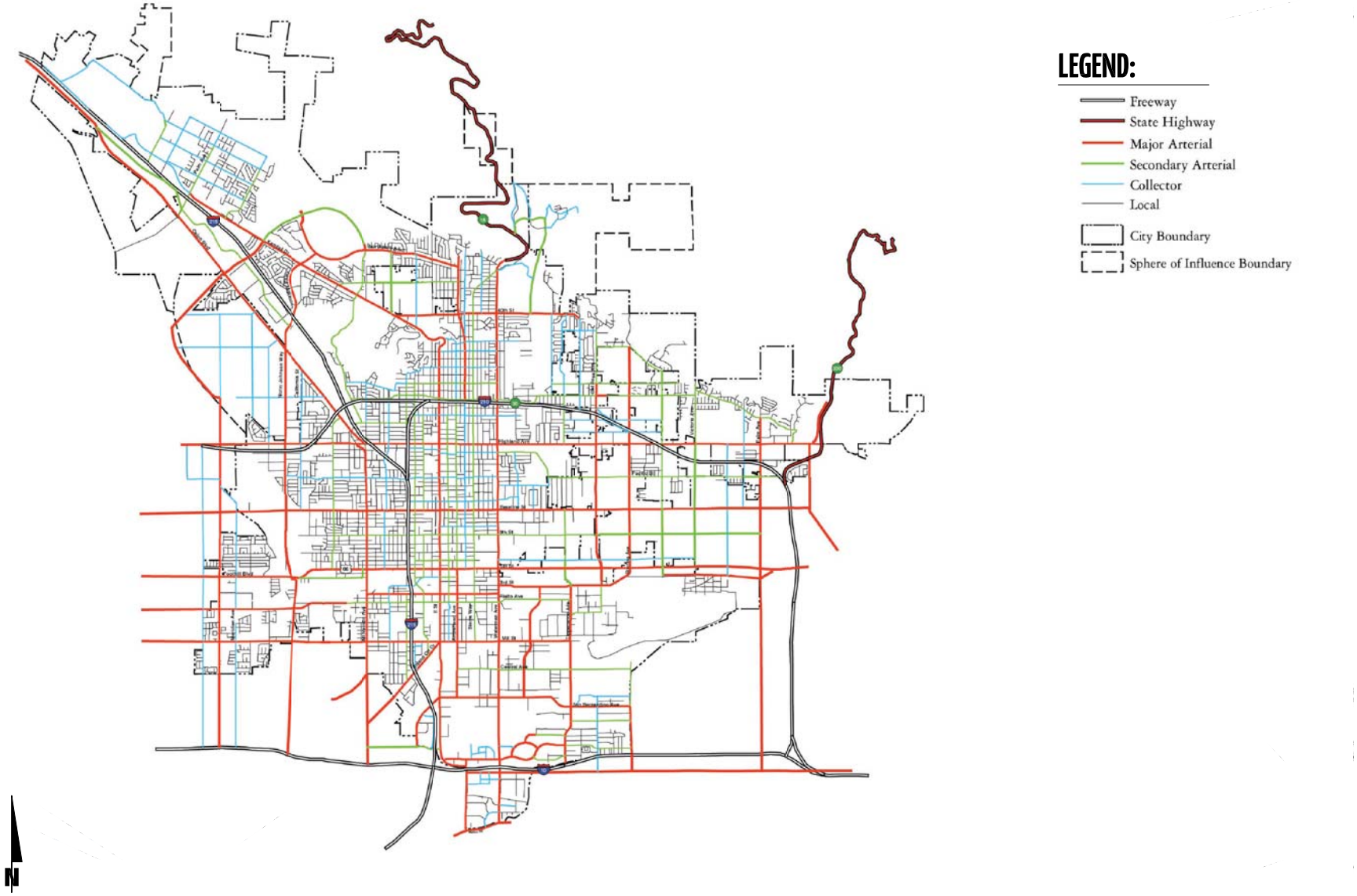
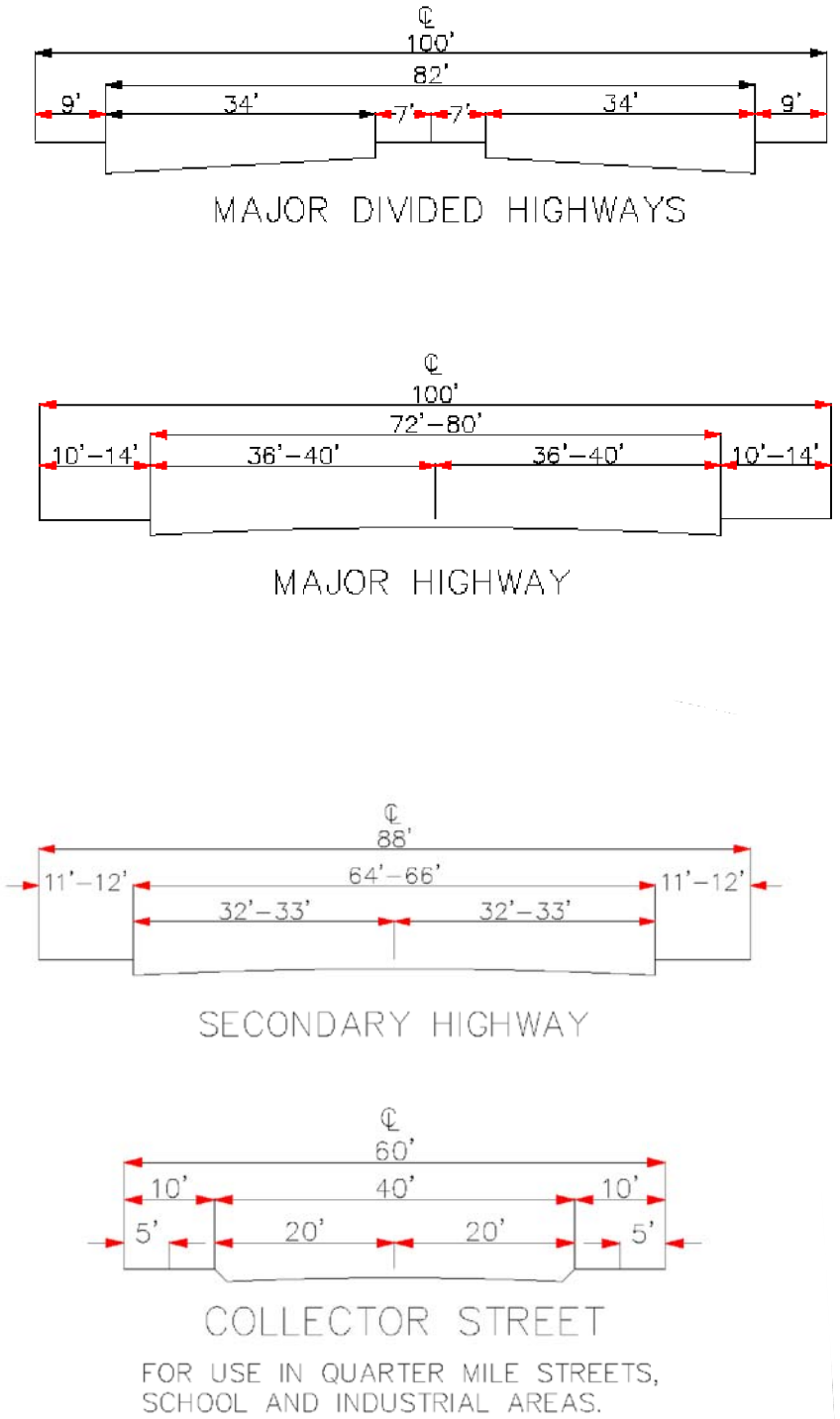


EXHIBIT 3-3: CITY OF SAN BERNADINO GENERAL PLAN ROADWAY CROSS-SECTIONS



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Collector Streets are typically two-lane streets that connect the local streets with secondary arterials allowing local traffic to access the regional transportation facilities. Examples of Collector Streets within the study area include:

- Frontage Road/W. Little League Drive
- Magnolia Avenue
- Belmont Avenue
- Irvington Avenue

3.3 TRANSIT SERVICE

The study area is currently served by Omnitrans, a public transit agency serving the County of San Bernardino and the City of San Bernardino, with bus service in the vicinity of the Project site along Kendall Drive and University Parkway. SbX is a rapid transit service offering quick, convenient, comfortable, and affordable transportation to major destinations within the City of San Bernardino and City of Loma Linda. There is an existing sbX transit station/transfer point on Kendall Drive, just east of Palm Avenue. Omnitrans Route 2, Route 7, Route 11, and sbX route are illustrated on Exhibit 3-4. Transit service is reviewed and updated by Omnitrans periodically to address ridership, budget and community demand needs. Changes in land use can affect these periodic adjustments which may lead to either enhanced or reduced service where appropriate.

3.4 BICYCLE & PEDESTRIAN FACILITIES

The existing pedestrian facilities within the study area are shown on Exhibit 3-5. Existing bus stop locations, crosswalks, bike lanes, trails, and sidewalks are shown. Pedestrian facilities are limited within the western portion of the study area.

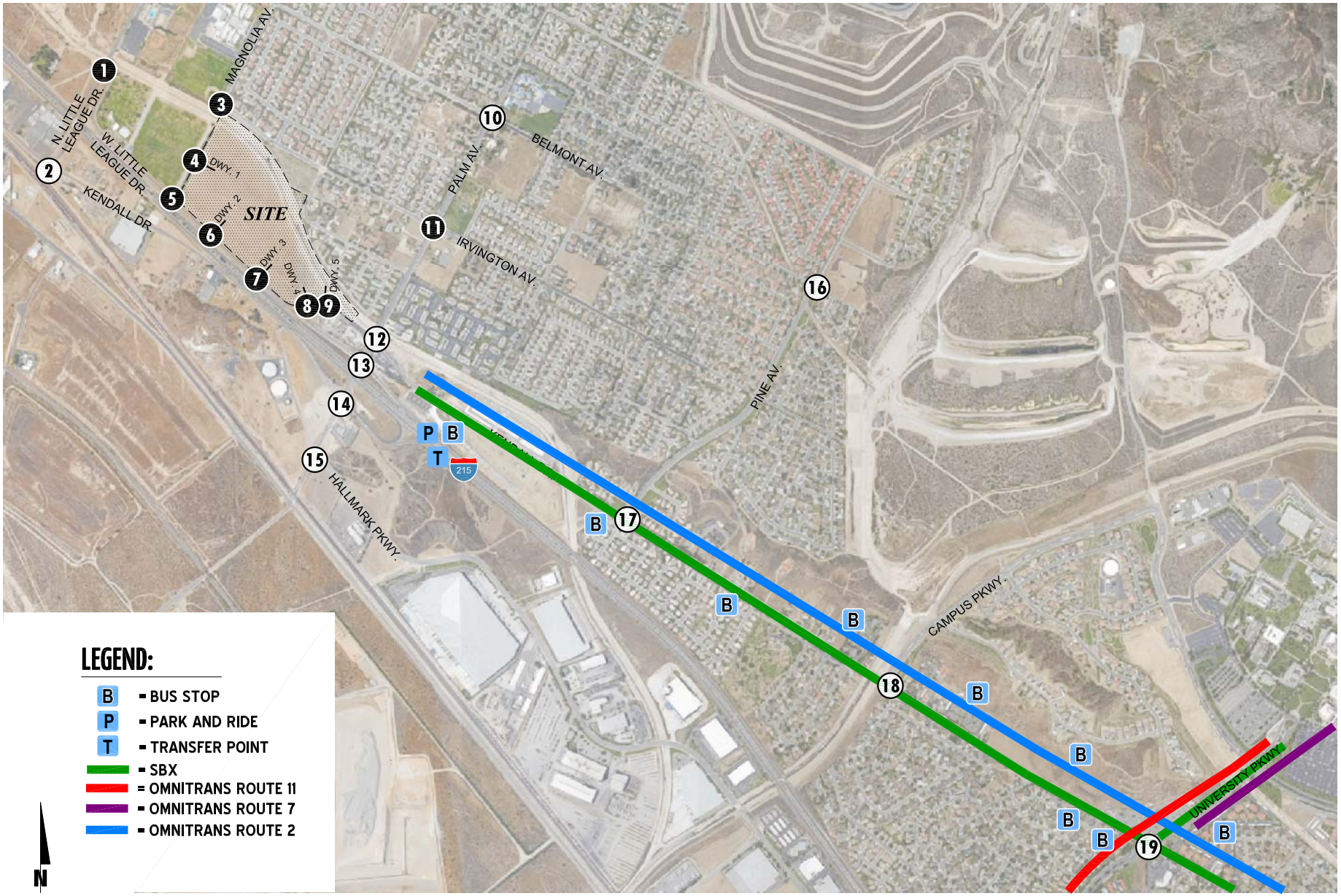
The City of San Bernardino Conceptual Trail System is illustrated on Exhibit 3-6. As shown on the Conceptual Trail System, there are proposed regional multi-purpose trail west of Palm Avenue and along Pine Avenue, north of Kendall Drive. Additionally, there are proposed bicycle routes along Cajon Boulevard, west of Palm Avenue.

3.5 EXISTING (2015) TRAFFIC COUNTS

The intersection LOS analysis is based on the traffic volumes observed during the peak hour conditions using traffic count data collected in May 2015, while local schools were in session and operating on normal bell schedules. The following peak hours were selected for analysis:

- Weekday AM Peak Hour (peak hour between 7:00 AM and 9:00 AM)
- Weekday PM Peak Hour (peak hour between 4:00 PM and 6:00 PM)

EXHIBIT 3-4: CITY OF SAN BERNADINO TRANSIT SERVICES



URBAN CROSSROADS

EXHIBIT 3-5: EXISTING PEDESTRIAN FACILITIES

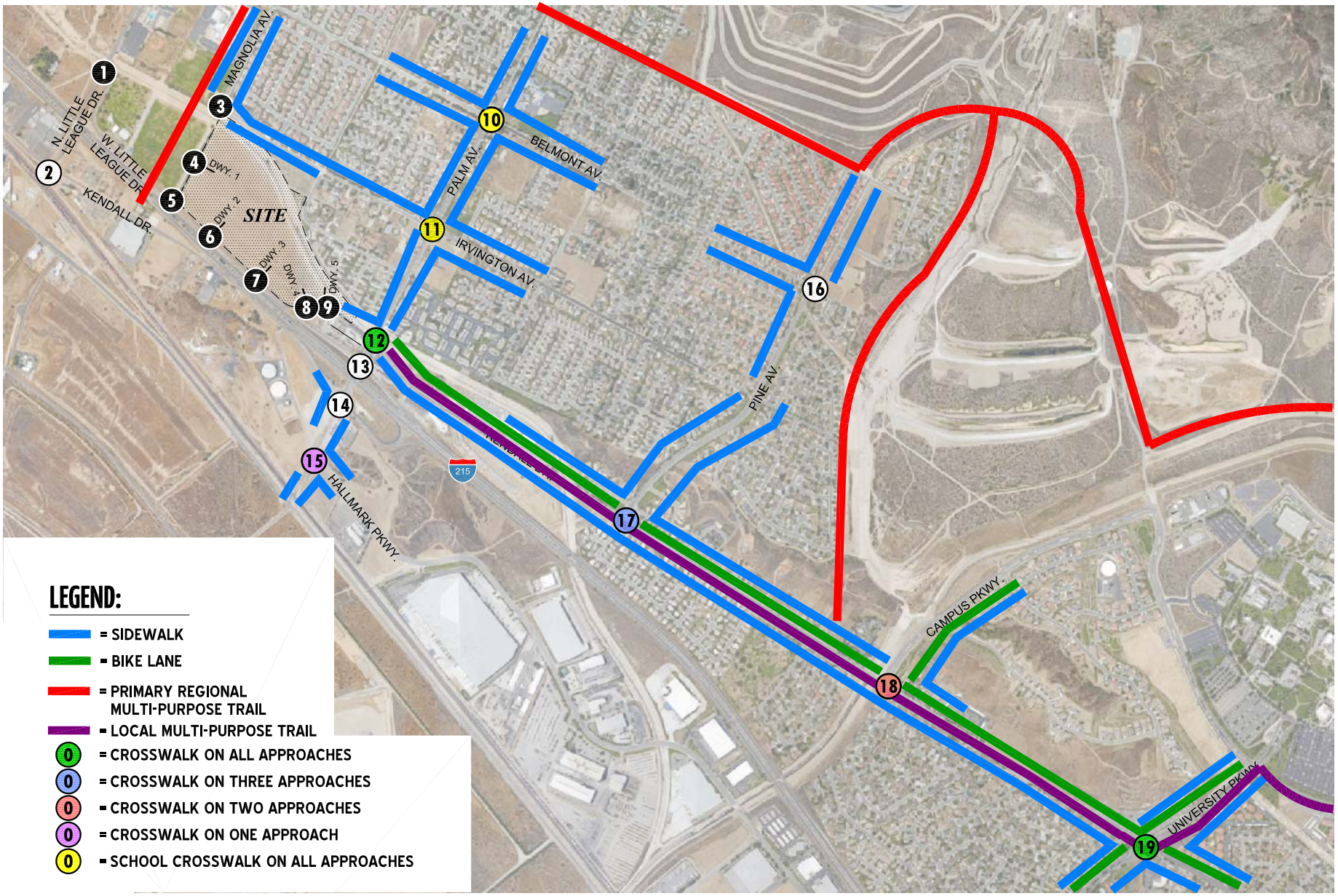


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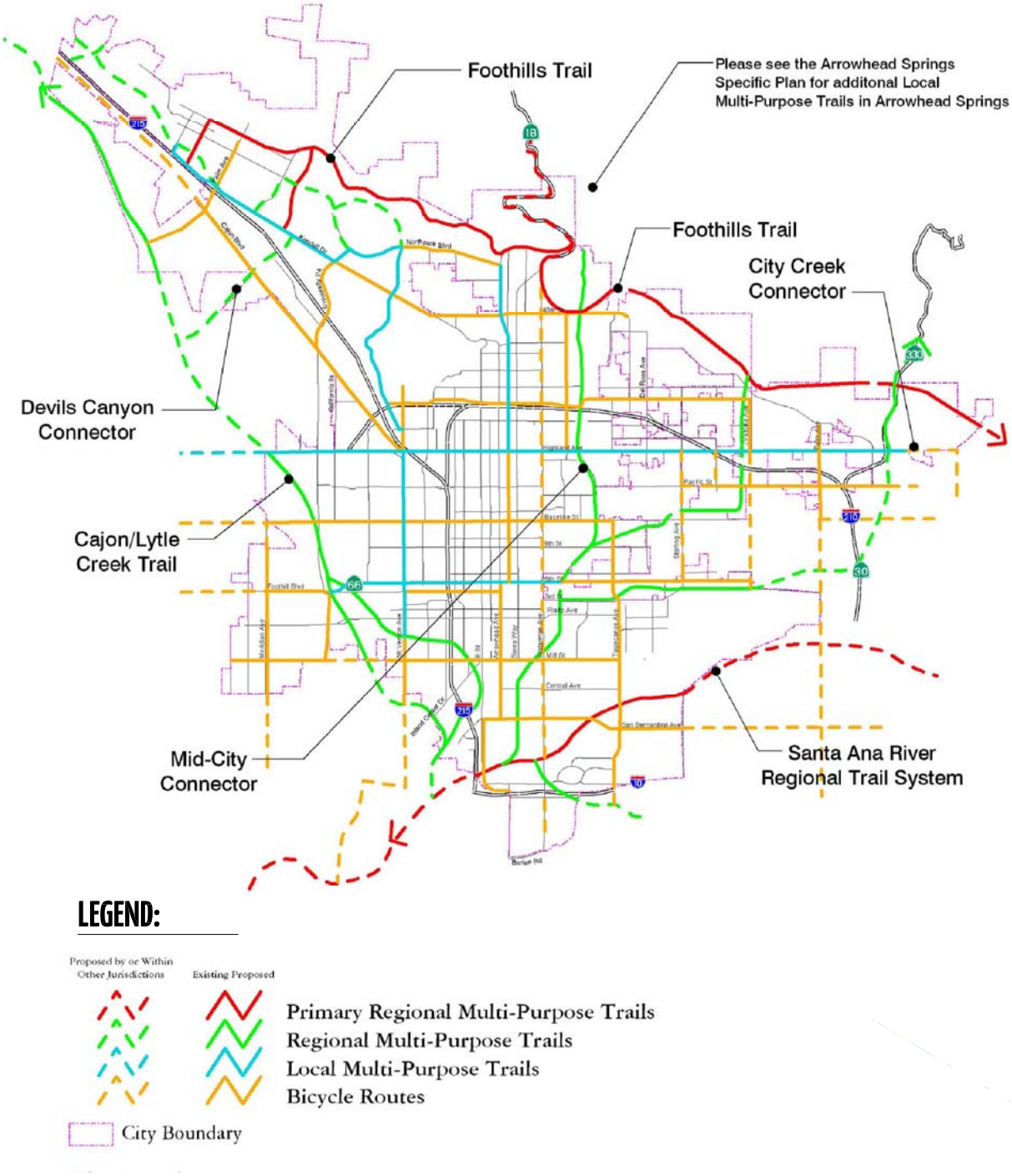
EXHIBIT 3-6: CITY OF SAN BERNADINO CONCEPTUAL TRAIL SYSTEM



The weekday AM and PM peak hour count data is representative of typical peak hour traffic conditions in the study area. There were no observations made in the field that would indicate atypical traffic conditions on the count dates, such as construction activity that would prevent or limit roadway access and detour routes. In consultation with nearby school schedules, this count date is considered representative of traffic in this effort as nearby schools were in session. The raw manual peak hour turning movement traffic count data sheets are included in Appendix 3.1. These raw turning volumes have been flow conserved between intersections with limited access, no access and where there are currently no uses generating traffic.

Existing weekday average daily traffic (ADT) volumes on arterial highways throughout the study area are shown on Exhibit 3-7. Existing ADT volumes are based upon factored intersection peak hour counts collected by Urban Crossroads, Inc. using the following formula for each intersection leg:

Weekday PM Peak Hour (Approach Volume + Exit Volume) x 13.7339 = Leg Volume

For those roadway segments which have 24-hour tube count data available in close proximity to the study area, a comparison between the PM peak hour and daily traffic volumes indicated that the peak-to-daily relationship of approximately 7.28 percent would sufficiently estimate average daily traffic (ADT) volumes for planning-level analyses. As such, the above equation utilizing a factor of 13.7339 estimates the ADT volumes on the study area roadway segments assuming a peak-to-daily relationship of approximately 7.28 percent (i.e., 1/0.0728 = 13.7339). Existing weekday AM and PM peak hour intersection volumes are also shown on Exhibit 3-7.

3.6 INTERSECTION OPERATIONS ANALYSIS

Existing (2015) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2.2 *Intersection Capacity Analysis* of this report. The intersection operations analysis results are summarized in Table 3-1 which indicates that the existing study area intersections are currently operating at acceptable LOS during the peak hours.

Consistent with Table 3-1, a summary of the peak hour intersection LOS for Existing conditions is shown on Exhibit 3-8. The intersection operations analysis worksheets are included in Appendix 3.2 of this TIA.

3.7 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially “spill back” onto the I-215 Freeway mainline. Queuing analysis findings are presented in Table 3-2. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline. As shown on Table 3-2, there are no movements that are currently experiencing queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows. Worksheets for Existing traffic conditions off-ramp queuing analysis are provided in Appendix 3.3.

EXHIBIT 3-7 (1OF2) : EXISTING (2015) TRAFFIC VOLUMES

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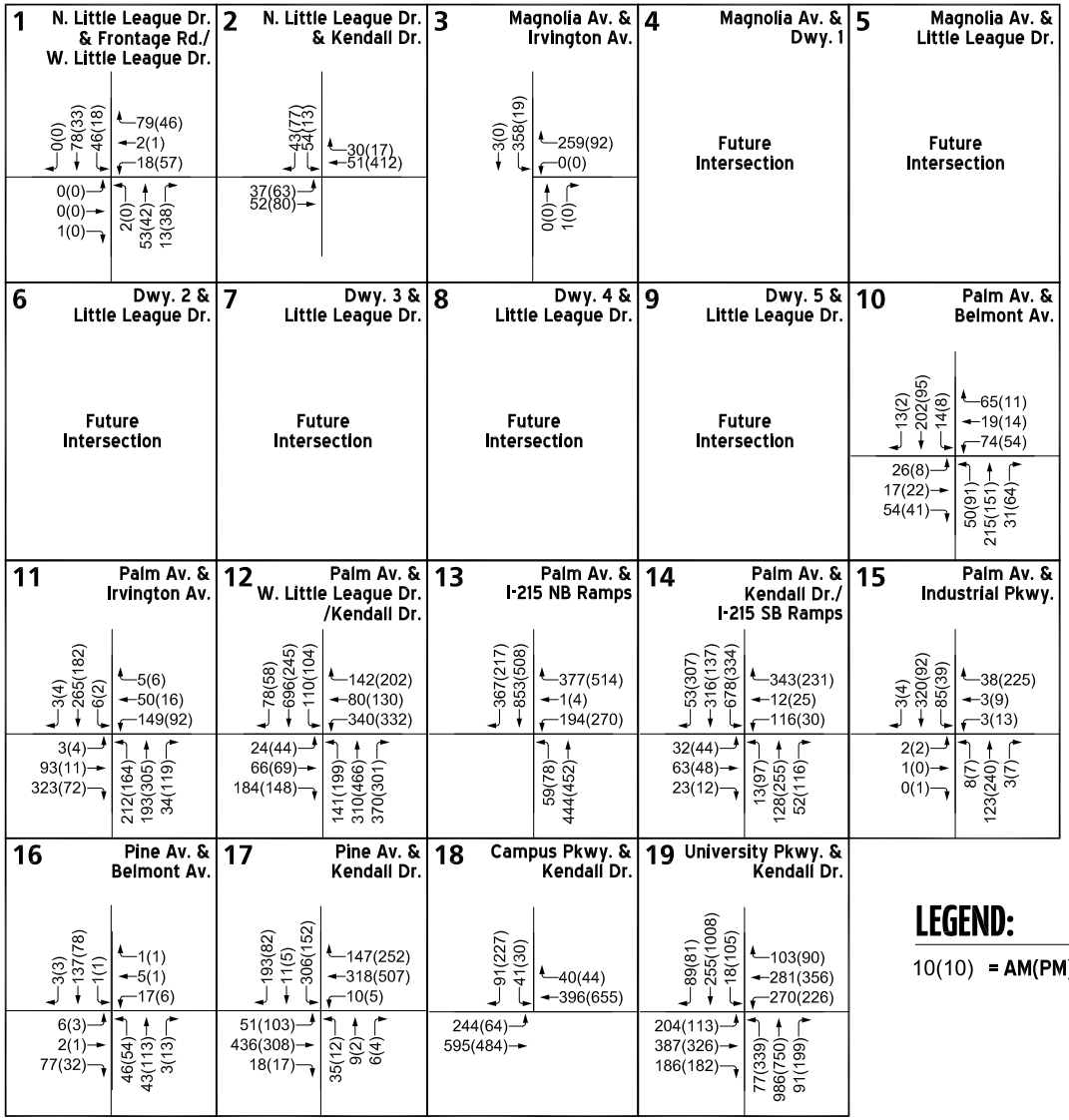
EXHIBIT 3-7 (2OF2): EXISTING (2015) TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

N

EXHIBIT 3-8: SUMMARY OF LOS FOR EXISTING (2015) CONDITIONS

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Table 3-1

Intersection Analysis for Existing (2015) Conditions

#	Intersection	Traffic Control[4]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
1	N. Little League Dr. / W. Little League Dr.	CSS	0	1	0	0	1	0	0	1	0	0	1	0	10.1	9.8	B	A
2	N. Little League Dr. / Kendall Dr.	CSS	0	0	0	0	1	0	0	1	0	0	1	0	10.3	13.3	B	B
3	Magnolia Av. / Irvington Av.	CSS	0	1	0	0	1	0	0	0	0	0	1	0	10.4	0.0	B	A
4	Magnolia Av. / Driveway 1		Future Intersection															
5	Magnolia Av. / W. Little League Dr.		Future Intersection															
6	Driveway 2 / W. Little League Dr.		Future Intersection															
7	Driveway 3 / W. Little League Dr.		Future Intersection															
8	Driveway 4 / W. Little League Dr.		Future Intersection															
9	Driveway 5 / W. Little League Dr.		Future Intersection															
10	Palm Av. / Belmont Av.	AWS	0	1	1	0	1	0	0	1	0	0	1	0	15.7	9.7	C	A
11	Palm Av. / Irvington Av.	TS	1	2	0	1	2	0	0	1	0	0	1	0	31.0	15.2	C	B
12	Palm Av. / Kendall Dr.	TS	1	2	1>	1	2	0	1	1	1	2	1	1	35.1	33.9	D	C
13	Palm Av. / I-215 NB Ramps	TS	0	2	0	0	2	0	0	0	0	0	1	1	8.0	9.8	A	A
14	Palm Av. / I-215 SB Ramps	TS	1	2	0	1	1	1	0	1	d	0	1	0	32.3	15.3	C	B
15	Palm Av. / Hallmark Pkwy.	AWS	1	1	1	1	1	1	0	1	0	1	1	1	11.5	10.9	B	B
16	Pine Av. / Belmont Av.	CSS	0	1	0	0	1	0	0	1	0	0	1	0	12.6	11.5	B	B
17	Pine Av. / Kendall Dr.	TS	1	1	0	1	1	1	1	2	0	1	2	0	20.0	18.0	C	B
18	Campus Pkwy. / Kendall Dr.	TS	0	0	0	1	0	2>	1	2	0	0	2	0	37.5	26.7	D	C
19	University Pkwy. / Kendall Dr.	TS	2	3	0	1	3	0	2	2	0	2	2	0	37.1	49.6	D	D

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane; > = Right Turn Overlap Phasing

[2] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal

Table 3-2

Peak Hour Freeway Off-Ramp Queuing Summary for Existing (2015) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak	PM Peak	AM	PM
I-215 NB Off-Ramp / Palm Av.	NBL/T	910	105	133	Yes	Yes
	NBR	415	104	165	Yes	Yes
I-215 SB Off-Ramp / Palm Av.	NBL/T/R	1,470	429 [2]	74	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 fee of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] 95th percentile volume exceeds capacity, queue may be longer. Queue shown is maximum after two cycles.

3.8 TRAFFIC SIGNAL WARRANTS ANALYSIS

Traffic signal warrants for Existing traffic conditions are based on existing peak hour intersection turning volumes. There are no study area intersections that currently warrant a traffic signal based on peak hour intersection turning volumes. Existing conditions traffic signal warrant analysis worksheets are provided in Appendix 3.4.

3.9 BASIC FREEWAY SEGMENT ANALYSIS

Existing mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 3-9. As shown on Table 3-3, the basic freeway segments evaluated for the purposes of this TIA were found to operate at an acceptable LOS (i.e., LOS C or better) during the peak hours. Existing basic freeway segment analysis worksheets are provided in Appendix 3.5.

3.10 FREEWAY MERGE/DIVERGE ANALYSIS

Ramp merge and diverge operations were also evaluated for Existing conditions and the results of this analysis are presented in Table 3-4. As shown in Table 3-4, the freeway ramp merge and diverge areas currently operate at acceptable LOS (i.e., LOS D or better). Existing freeway ramp junction operations analysis worksheets are provided in Appendix 3.6.

EXHIBIT 3-9: EXISTING (2015) FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

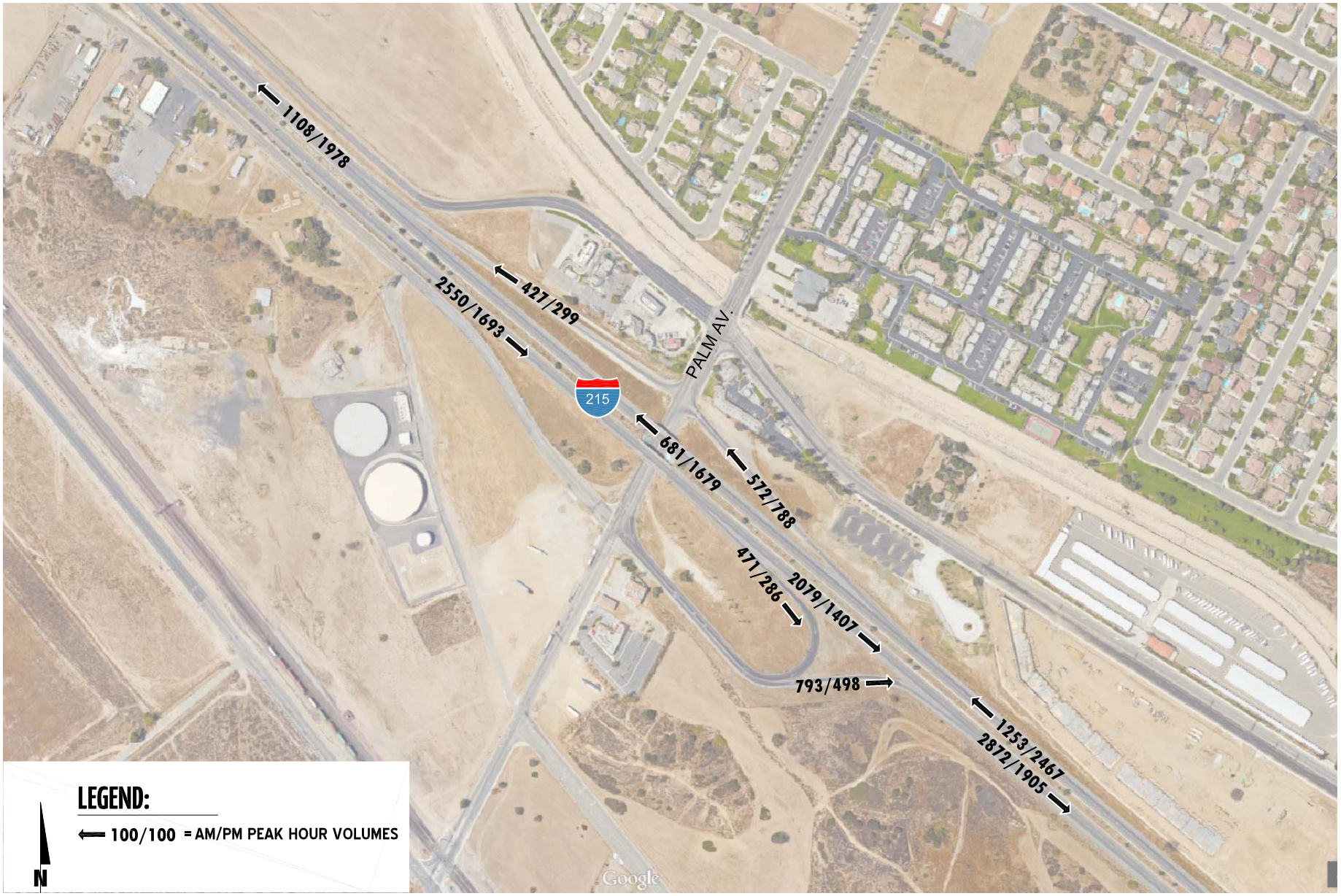

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Table 3-3

Basic Freeway Segment Analysis for Existing (2015) Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	Volume		Truck %	Truck %	Density[2]		LOS	
				AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	North of Palm Avenue	2	2,550	1,693	5%	9%	20.5	13.7	C	B
		South of Palm Avenue	2	2,872	1,905	5%	8%	23.5	15.4	C	B
	NB	North of Palm Avenue	2	1,108	1,978	9%	5%	9.0	15.7	A	B
		South of Palm Avenue	2	1,253	2,467	10%	5%	10.2	19.7	A	C

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

Table 3-4

Freeway Ramp Junction Merge/Diverge Analysis for Existing (2015) Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	AM Peak Hour		PM Peak Hour	
				Density[2]	LOS	Density[2]	LOS
I-215 Freeway	SB	Off-Ramp at Palm Avenue	2	27.8	C	19.9	B
		On-Ramp at Palm Avenue	2	28.8	D	20.7	C
	NB	On-Ramp at Palm Avenue	2	13.3	B	20.7	C
		Off-Ramp at Palm Avenue	2	15.2	B	26.5	C

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

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4 PROJECTED FUTURE TRAFFIC

This section presents the traffic volumes estimated to be generated by the Project, as well as the Project's trip assignment onto the study area roadway network. The Project is proposed to consist of 120 single-family residential units and 98,000 square feet of commercial retail use. The Project is anticipated to be developed in two phases as listed below:

- Phase 1 (2018) – 120 single family detached residential dwelling units (Western Half)
- Phase 2 (2019) – 98,000 square feet of commercial retail use (Eastern Half)

Vehicular access will be provided via the following driveways and all driveways are assumed to allow for full access (i.e., no turning movement restrictions):

- Magnolia Avenue / Driveway 1 – Access to Phase 1 (Residential)
- Driveway 2 / W. Little League Drive – Access to Phase 1 (Residential)
- Driveway 3 / W. Little League Drive – Access to Phase 2 (Commercial Retail)
- Driveway 4 / W. Little League Drive – Access to Phase 2 (Commercial Retail)
- Driveway 5 / W. Little League Drive – Access to Phase 2 (Commercial Retail)

4.1 PROJECT TRIP GENERATION

4.1.1 PROPOSED PROJECT

Trip generation represents the amount of traffic which is both attracted to and produced by a development. Determining traffic generation for a specific project is therefore based upon forecasting the amount of traffic that is expected to be both attracted to and produced by the specific land uses being proposed for a given development. Trip generation rates used to estimate Project traffic are shown in Table 4-1. The trip generation rates are based upon data collected by the Institute of Transportation Engineers (ITE) Trip Generation manual, 9th Edition, 2012. (4)

Pass-by trips are defined as intermediate stops on the way from an origin to a primary trip destination without a route diversion. Pass-by trips are attracted from traffic passing the site on an adjacent street or roadway that offers direct access to the generator. These types of trips are many times associated with retail uses such as fast-food restaurants and coffee/donut shops with drive-through windows. Pass-by percentages have been obtained from Table 5.6 from the ITE Trip Generation Handbook, 2nd Edition, 2004. (9)

Internal capture is a percentage reduction that can be applied to the trip generation estimates for individual land uses to account for trips internal to the site. In other words, trips may be made between individual retail uses on-site and can be made either by walking or using internal roadways without using external streets. An internal capture reduction was applied to recognize the interactions that would occur between the various complimentary land uses. For example, residents may visit the elementary school or commercial site without leaving the site and are therefore considered as vehicle trips that are internal to the site. The NCHRP 684 Internal Trip Capture Estimation Tool was used to compute internal capture reduction for residential-to-retail.

Table 4-1

Proposed Project Trip Generation Summary

Land Use	Units[2]	ITE LU Code	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Project Trip Generation Rates[1]									
Single Family Residential	DU	210	0.19	0.56	0.75	0.63	0.37	1.00	9.52
Commercial Retail[3]	TSF	820	0.97	0.60	1.57	2.90	3.14	6.04	68.39

Land Use	Quantity	Units[2]	AM Peak Hour In	AM Peak Hour Out	AM Peak Hour Total	PM Peak Hour In	PM Peak Hour Out	PM Peak Hour Total	Daily
Project Trip Generation Summary									
Phase 1:									
Single Family Residential	120	DU	23	67	90	76	44	120	1,142
Phase 2:									
Single Family Residential	120	DU	23	67	90	76	44	120	1,142
Internal Capture - Residential to Commercial[2]			0	-1	-1	-35	-18	-53	-505
Residential Subtotal			*23*	*66*	*89*	*41*	*26*	*67*	*638*
Commercial Retail	98.000	TSF	95	59	154	284	308	592	6,702
Internal Capture - Commercial to Residential[4]			-1	0	-1	-18	-35	-53	-505
Pass-by Reduction (34% - PM Peak Hour and Daily)[5]			--	--	--	*-91*	*-91*	*-181*	*-2,107*
Commercial Retail Subtotal			*94*	*59*	*153*	*176*	*182*	*358*	*4,090*
Project Buildout Total			**117**	**125**	**242**	**217**	**208**	**425**	**4,728**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation manual, Ninth Edition (2012).

[2] DU = Dwelling Units; TSF = Thousand Square Feet

[3] Trip generation rates based on the regression equation for ITE Land Use 820.

[4] Internal capture is based on the NCHRP 684 Internal Capture Estimation Tool.

[5] Pass-by reduction percentage is based on the ITE methodology per Table 5.6 of ITE Trip Generation Handbook (2nd Edition, 2004).

A summary of the Project's trip generation for Phase 1 (2018) and Project Buildout (2019) are also shown on Table 4-1. As shown on Table 4-1, the Phase 1 (2018) of the Project is estimated to generate a net total of 1,142 trip-ends per day on a typical weekday with approximately 90 AM peak hour trips and 120 PM peak hour trips. The Project is estimated to generate a net total of 4,728 trip-ends per day on a typical weekday with 242 AM peak hour trips and 425 PM peak hour trips at Project Buildout (2019).

4.1.2 CURRENTLY APPROVED LAND USE

Table 4-2 summarizes the resulting trip generation estimates based on the currently approved land use (Commercial Retail). The Project site's current General Plan designation is all commercial retail. Assuming a conservative floor-to-area ratio of 0.24 for the 37.6 acre site, the General Plan would allow for the development of up to 393,085 square feet of commercial retail use. The currently approved land use is anticipated to generate a net total of approximately 10,912 trip-ends per day with 362 AM peak hour trips and 1,008 PM peak hour trips.

4.1.3 TRIP GENERATION COMPARISON

As shown in Table 4-3, the development of the proposed Project is anticipated to generate 6,184 fewer trip-ends per day with 120 fewer AM peak hour trip and 583 fewer PM peak hour trips as compared to the land uses and intensities currently allowed as adopted under the General Plan.

4.2 PROJECT TRIP DISTRIBUTION

Trip distribution is the process of identifying the probable destinations, directions or traffic routes that will be utilized by Project traffic. The potential interaction between the planned land uses and surrounding regional access routes are considered, to identify the route where the Project traffic would distribute. The Project trip distribution was developed based on anticipated travel patterns to and from the Project site. The Project trip distribution patterns were developed based on an understanding of existing travel patterns in the area, the geographical location of the site, and the site's proximity to the regional arterial and state highway system in conjunction with City of San Bernardino staff.

Trip distribution patterns have been provided for both residential and commercial retail uses. In addition, an alternative long range roadway network that would include the potential extension of Magnolia Avenue over the Cajon Creek Wash has also been evaluated for the purposes of this TIA. As such, trip distribution patterns are anticipated to change for long range traffic conditions for both the residential and commercial retail uses for the With Magnolia Avenue Bridge alternative. Exhibit 4-1 illustrates the proposed Residential trip distribution patterns that will be utilized for both 2018 and 2019 traffic conditions and Exhibit 4-2 illustrates the proposed Commercial Retail trip distribution patterns which will be utilized for 2019 traffic conditions. Exhibit 4-3 illustrates the proposed Horizon Year (2035) Residential trip distribution patterns and Exhibit 4-4 illustrates the proposed Horizon Year (2035) Commercial Retail trip distribution patterns. The With Magnolia Avenue Bridge alternative trip distributions for Horizon Year (2035) traffic conditions are shown on an inset on Exhibit 4-3 and Exhibit 4-4.

Table 4-2

Currently Approved General Plan Land Use Trip Generation Summary

Land Use	Units[2]	ITE LU Code	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Rates[1]									
Commercial Retail[3]	TSF	820	0.57	0.35	0.92	1.83	1.98	3.81	42.06

Land Use	Quantity	Units[2]	AM Peak Hour			PM Peak Hour			Daily
			In	Out	Total	In	Out	Total	
Trip Generation Summary									
Commercial Retail	393.085	TSF	224	138	362	719	778	1,498	16,533
Pass-by Reduction (34% - PM Peak Hour and Daily)[4]			--	--	--	*-245*	*-245*	*-490*	*-5,621*
Total			**224**	**138**	**362**	**474**	**533**	**1,008**	**10,912**

[1] Trip Generation Source: Institute of Transportation Engineers (ITE), Trip Generation manual, Ninth Edition (2012).

[2] TSF = Thousand Square Feet

[3] Trip generation rates based on the regression equation for ITE Land Use 820.

[4] Pass-by reduction percentage is based on the ITE methodology per Table 5.6 of ITE Trip Generation Handbook (2nd Edition, 2004).

Table 4-3

Trip Generation Comparison

Land Use	AM Peak Hour			PM Peak Hour			Daily
	In	Out	Total	In	Out	Total	
Trip Generation Summary							
Proposed Project	117	125	242	217	208	425	4,728
Currently Approved Land Use	224	138	362	474	533	1,008	10,912
Variance[1]	**-107**	**-13**	**-120**	**-257**	**-325**	**-583**	**-6,184**

[1] Variance = Proposed Project - Currently Approved Land Use

EXHIBIT 4-1: PROJECT (RESIDENTIAL 2018 & 2019) TRIP DISTRIBUTION

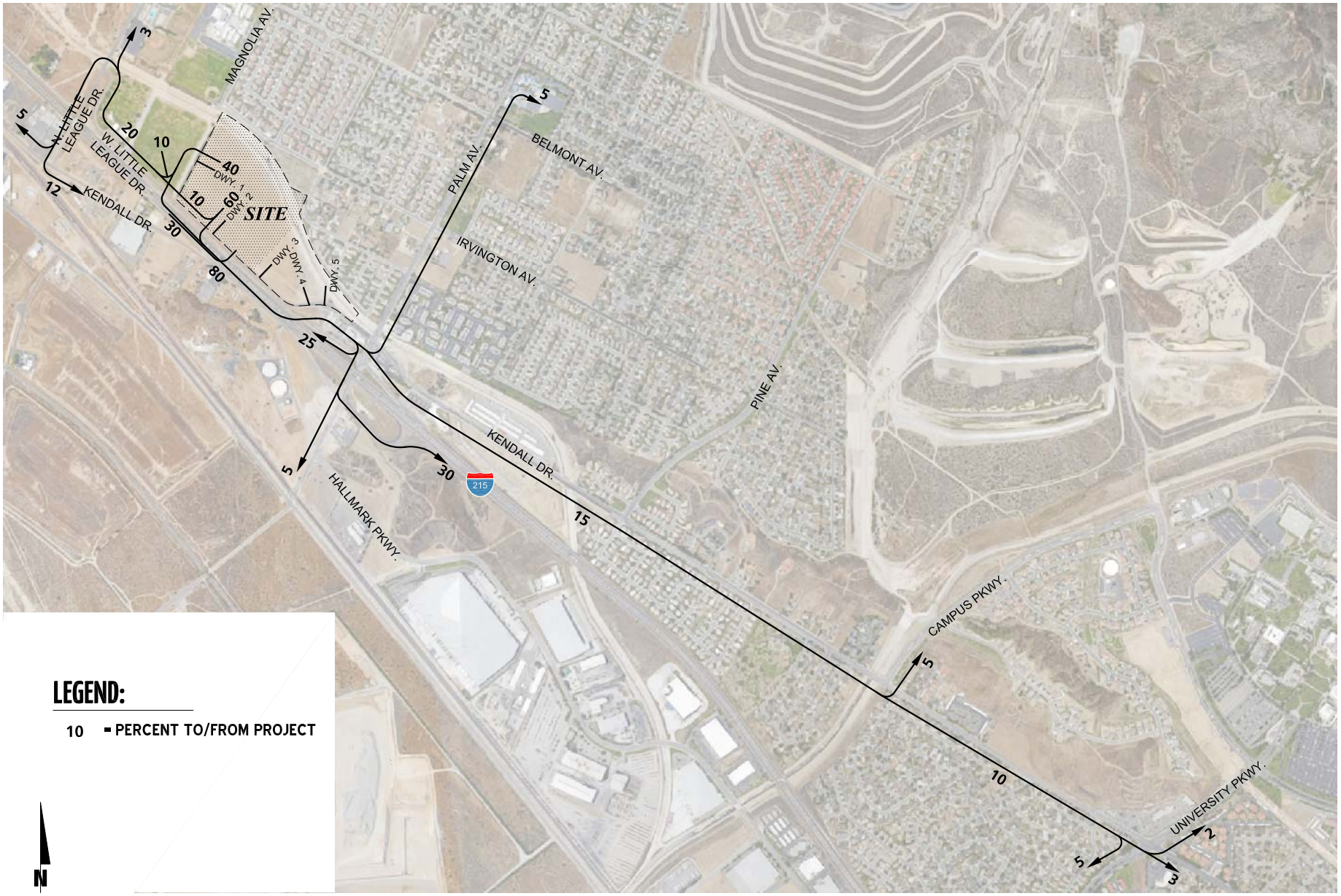

EXHIBIT 4-2: PROJECT (COMMERCIAL RETAIL 2019) TRIP DISTRIBUTION

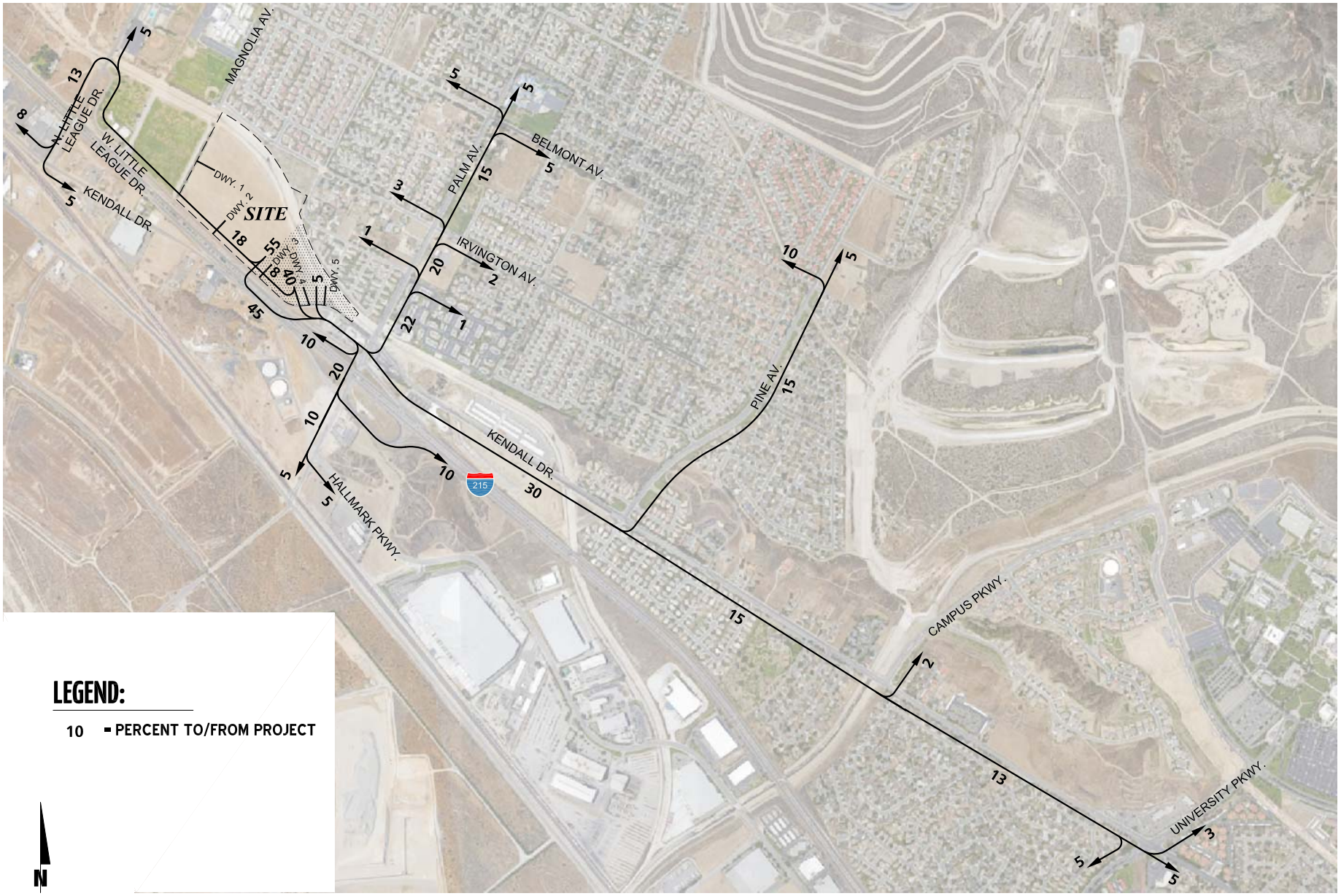

EXHIBIT 4-3: HORIZON YEAR (2035) PROJECT (RESIDENTIAL) TRIP DISTRIBUTION

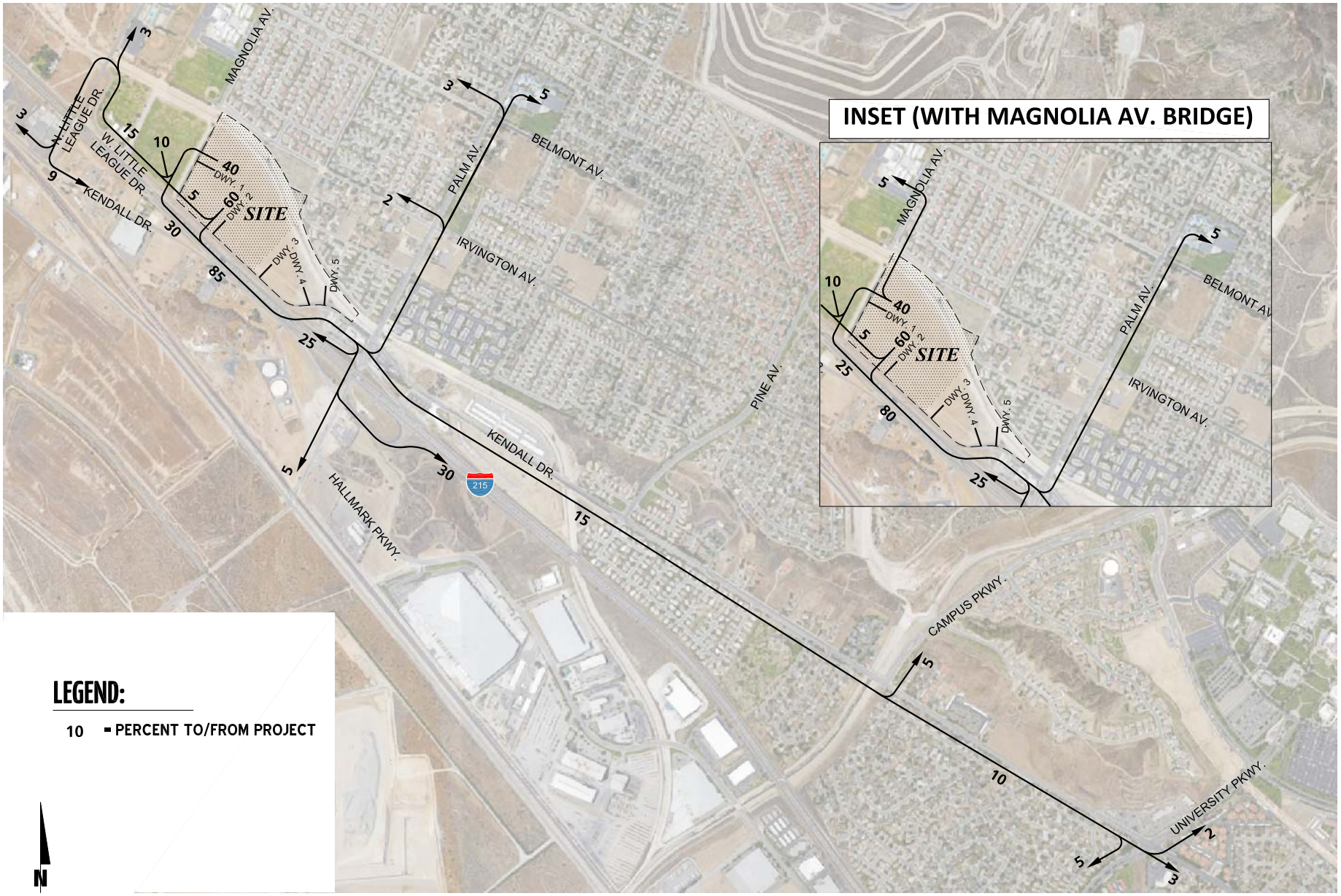

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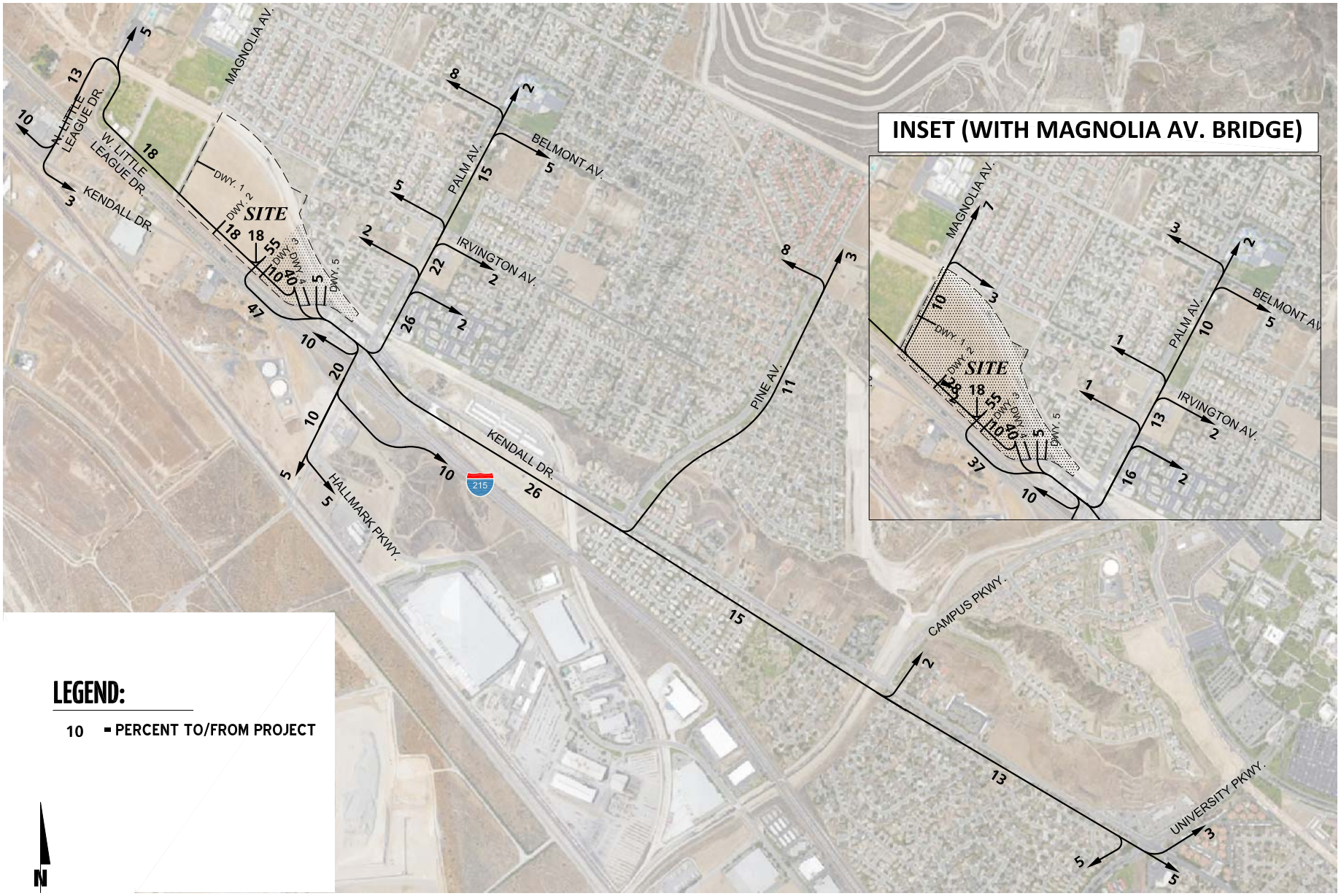
EXHIBIT 4-4: HORIZON YEAR (2035) PROJECT (COMMERCIAL RETAIL) TRIP DISTRIBUTION



4.3 MODAL SPLIT

Although the use of public transit, walking, and/or bicycling have the potential to reduce Project-related traffic, such reductions have not been taken into consideration in this traffic study in order to provide a conservative analysis of the Project's potential to contribute to circulation system deficiencies. Specifically, no reductions have been taken to account for the use of the existing Verdemont Transit Center located south of Kendall Drive, just east of Palm Avenue.

4.4 PROJECT TRIP ASSIGNMENT

The assignment of traffic from the Project area to the adjoining roadway system is based upon the Project trip generation, trip distribution, and the arterial highway and local street system improvements that would be in place by the time of initial occupancy of the Project. Based on the identified Project traffic generation and trip distribution patterns, Project ADT, AM and PM peak hour volumes are shown on Exhibit 4-5 for Phase 1 (2018) conditions, Exhibit 4-6 for Project Buildout (2019) conditions, and Exhibit 4-7 for Horizon Year (2035) conditions.

4.5 CONSTRUCTION TRAFFIC

Project construction activities may potentially result in temporary and transient traffic deficiencies related to:

- Construction employee commutes;
- Import of construction materials and soils; and
- Transport and use of heavy construction equipment.

The Applicant would be required to develop and implement a City-approved Construction Traffic Management Plan addressing potential construction-related traffic detours and disruptions. In general, the Construction Traffic Management Plan would ensure that to the extent practical, construction traffic would access the Project site during off-peak hours; and that construction traffic would be routed to avoid travel through, or proximate to, sensitive land uses.

4.6 BACKGROUND TRAFFIC

Future year traffic forecasts have been based upon a background (ambient) growth factor of 2% per year. The ambient growth factor is intended to approximate traffic growth. The total ambient growth is 6.12% for 2018 traffic conditions (compounded growth of two percent per year over 3 years) and 8.24% for 2019 traffic conditions (compounded growth of two percent per year over 4 years). This ambient growth rate is added to existing traffic volumes to account for area-wide growth not reflected by cumulative development projects. Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the development of future projects that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies.

EXHIBIT 4-5 (1OF2) : PROJECT (2018) TRAFFIC VOLUMES

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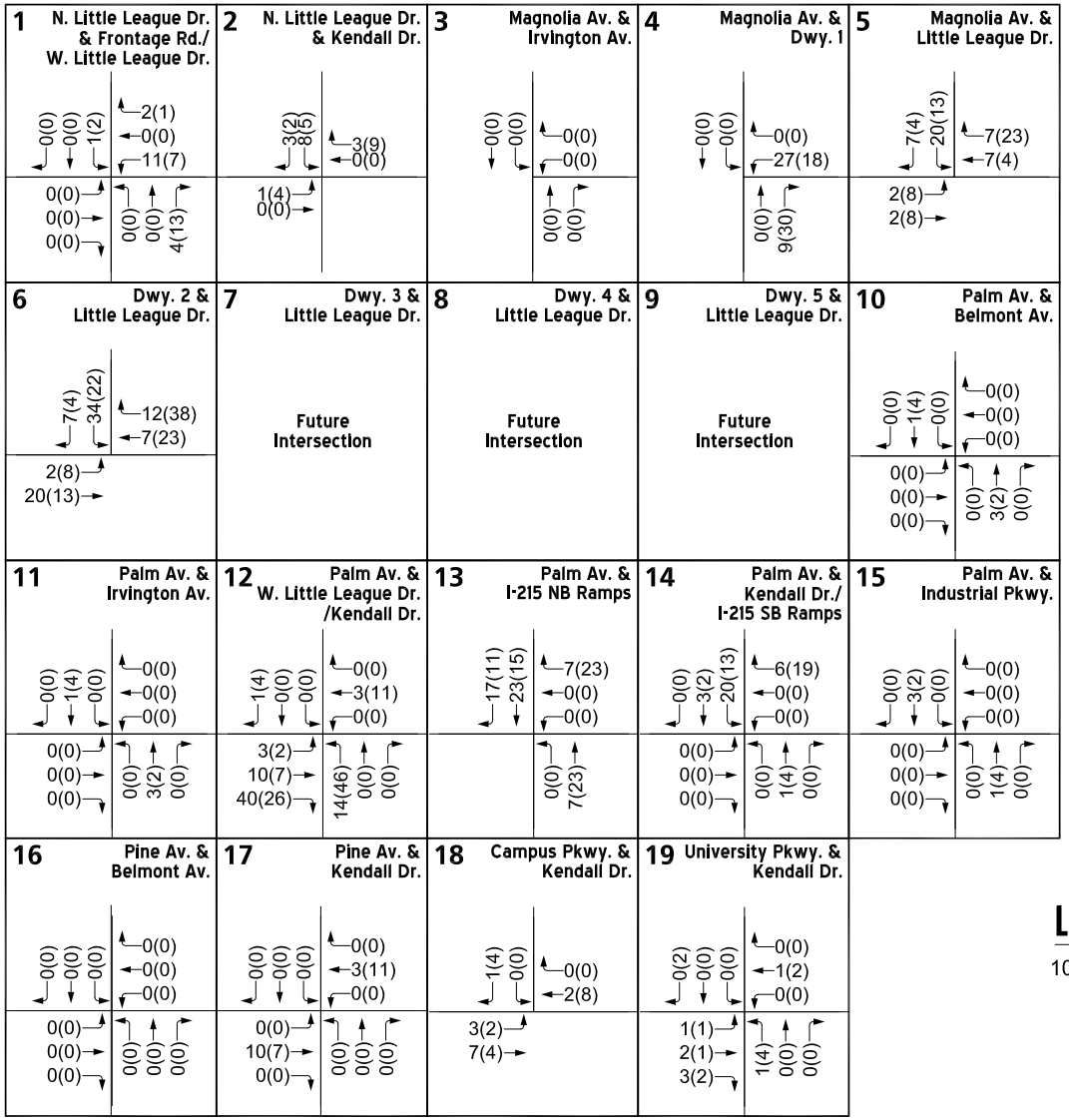
EXHIBIT 4-5 (2OF2) : PROJECT (2018) TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

EXHIBIT 4-6 (1OF2) : PROJECT (2019) TRAFFIC VOLUMES

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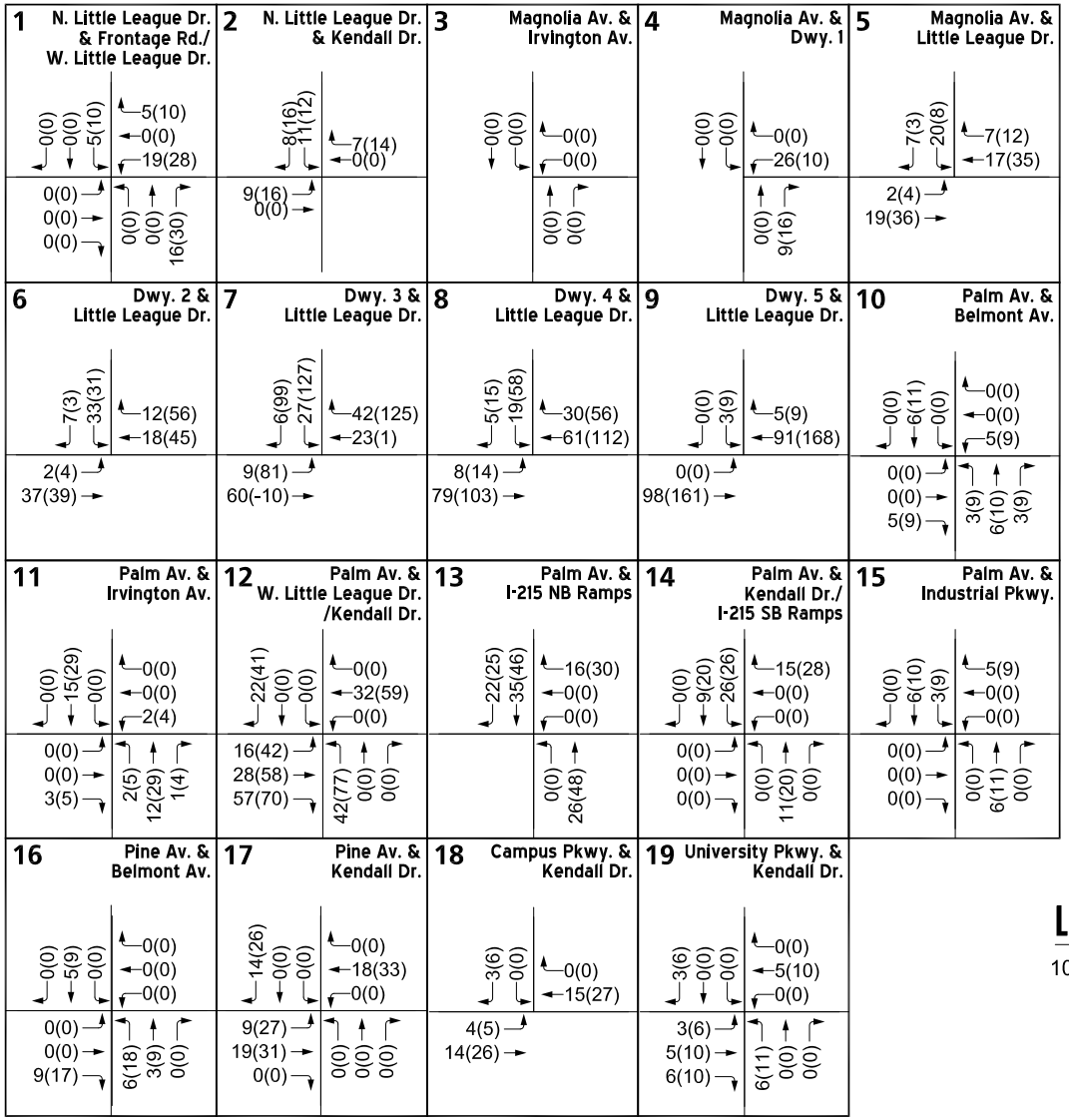
EXHIBIT 4-6 (2OF2) : PROJECT (2019) TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

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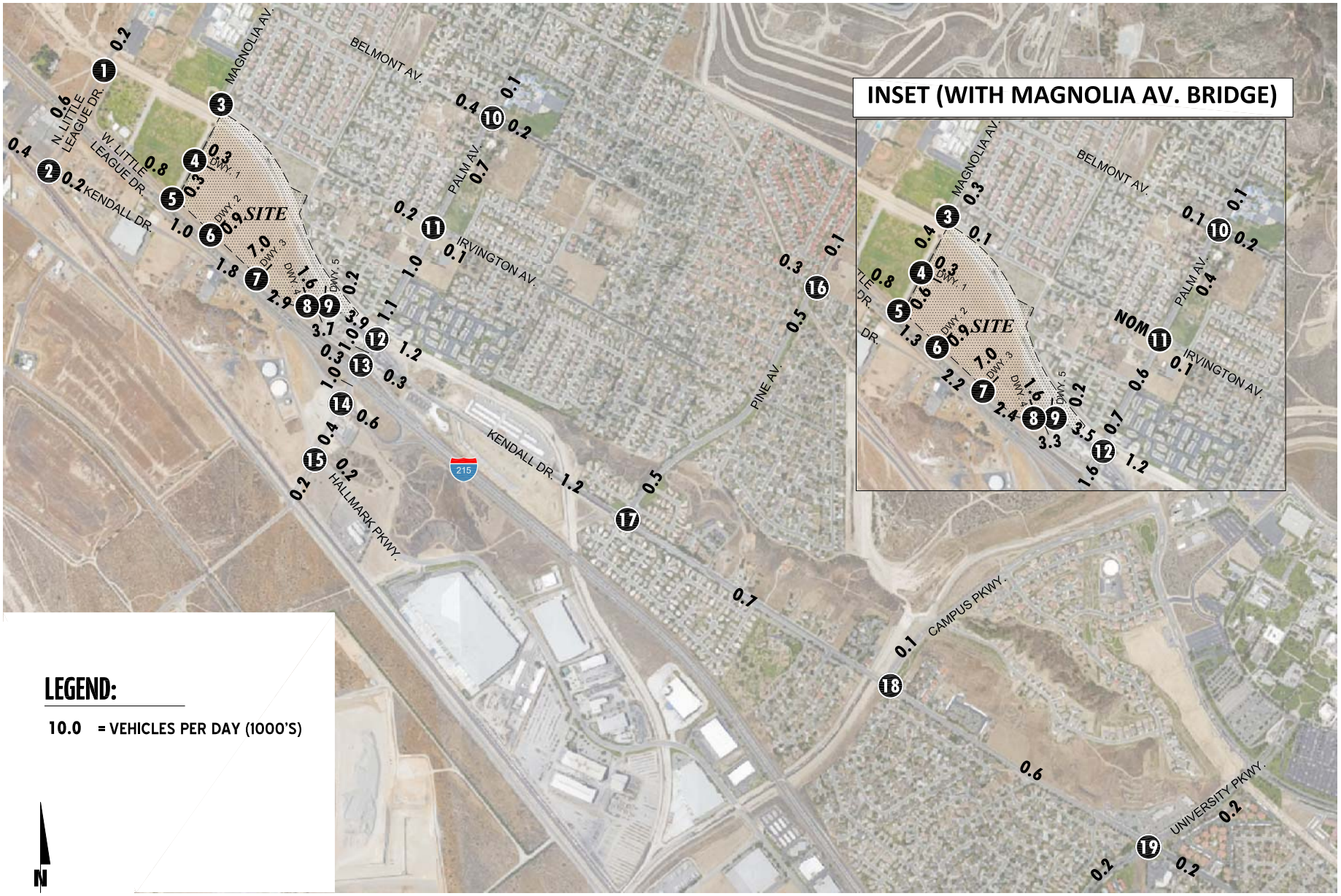
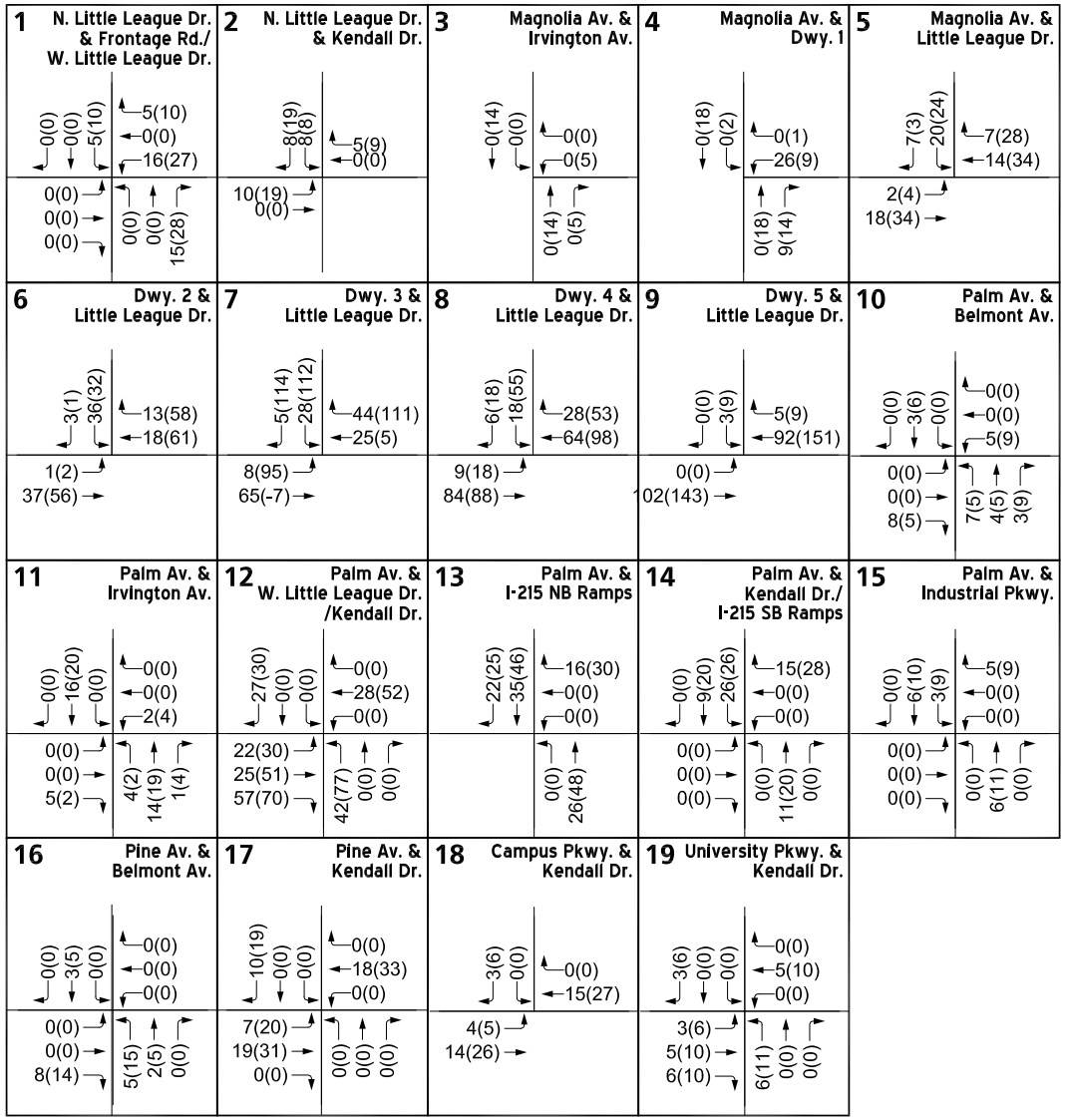
EXHIBIT 4-7 (1OF2) : PROJECT (2035) TRAFFIC VOLUMES

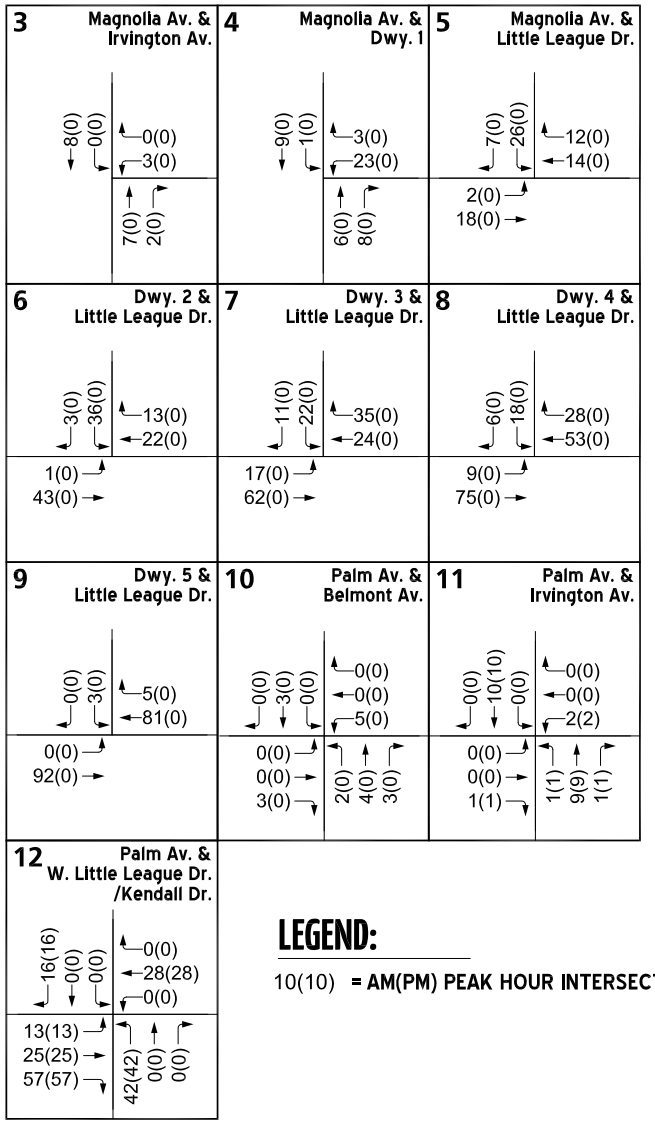


URBAN CROSSROADS

EXHIBIT 4-7 (2OF2) : PROJECT (2035) TRAFFIC VOLUMES



2035 ALTERNATIVE



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

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Ambient growth has been added to daily and peak hour traffic volumes on surrounding roadways, in addition to traffic generated by the development of future projects that have been approved but not yet built and/or for which development applications have been filed and are under consideration by governing agencies.

The currently adopted Southern California Association of Governments (SCAG) 2012 Regional Transportation Plan (RTP) (April 2012) growth forecasts for the City of San Bernardino identifies projected growth in population of 209,900 in 2008 to 261,400 in 2035, or a 24.54 percent increase over the 27 year period. (5) The change in population equates to roughly a 0.82 percent annual growth rate, compounded annually. Similarly, growth over the same 27 year period in households is projected to increase by 29.51 percent, or 0.96 percent annual growth rate. Finally, growth in employment over the same 27 year period is projected to increase by 43.44 percent, or a 1.34 percent annual growth rate.

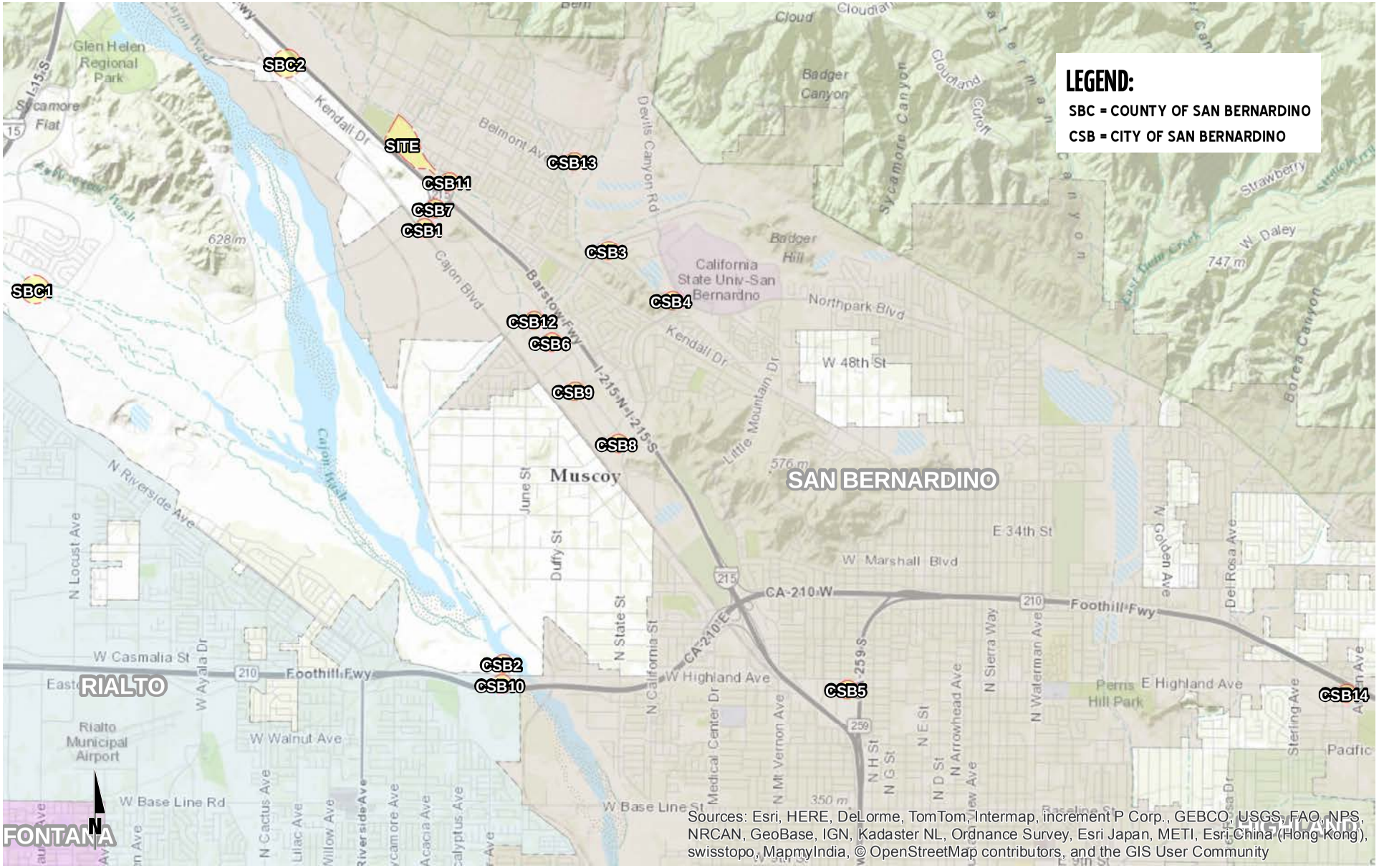
Based on a comparison of Existing traffic volumes to the Horizon Year (2035) forecasts, the average growth rate is estimated at approximately 2.20 percent compounded annually between Existing and Horizon Year (2035) traffic conditions. The annual growth rate at each individual intersection is not lower than 1.27 percent to as high as 4.67 percent compounded annually over the same time period. Therefore, the annual growth rate utilized for the purposes of this analysis would appear to conservatively approximate the anticipated regional growth in traffic volumes in the City of San Bernardino for both Opening Year Cumulative and Horizon Year (2035) traffic conditions, especially when considered along with the addition of cumulative development project traffic and project-related traffic. As such, the growth in traffic volumes assumed in this traffic impact analysis would tend to overstate, as opposed to understate, the potential impacts to traffic and circulation.

4.7 CUMULATIVE DEVELOPMENT TRAFFIC

California Environmental Quality Act (CEQA) guidelines require that other reasonably foreseeable development projects which are either approved or being processed concurrently in the study area also be included as part of a cumulative analysis scenario. A cumulative project list was developed for the purposes of this analysis through consultation with planning and engineering staff from the City of San Bernardino and the County of San Bernardino (see Appendix 4.1). Exhibit 4-8 illustrates the cumulative development location map. A summary of cumulative development projects and their proposed land uses are shown on Table 4-4. If applicable, the traffic generated by individual cumulative projects was manually added to both the Opening Year Cumulative and Horizon Year forecasts to ensure that traffic generated by the listed cumulative development projects in Table 4-4 are reflected as part of the background traffic.

Based on the identified cumulative development project traffic generation and trip distribution patterns, cumulative development project ADT, AM and PM peak hour volumes are shown on Exhibit 4-9.

EXHIBIT 4-8: CUMULATIVE DEVELOPMENT PROJECTS LOCATION MAP

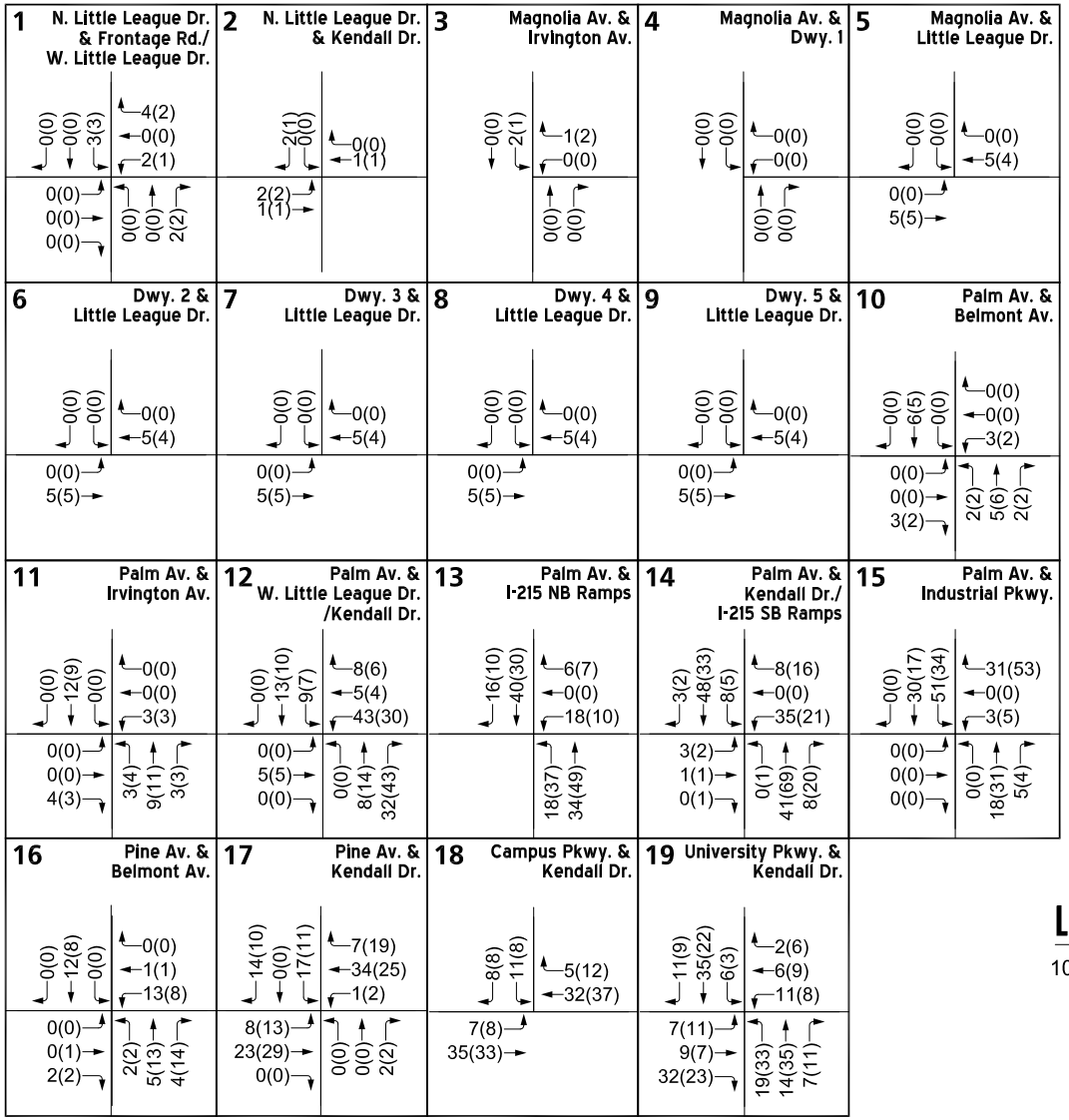


URBAN CROSSROADS

EXHIBIT 4-9 (1OF2) : CUMULATIVE DEVELOPMENT PROJECTS TRAFFIC VOLUMES

URBAN CROSSROADS

EXHIBIT 4-9 (2OF2) : CUMULATIVE DEVELOPMENT PROJECTS TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

URBAN CROSSROADS

Table 4-4

Cumulative Development Land Use Summary

#	Project/Location	Land Use[1]	Quantity	Units[2]
City of San Bernardino				
CSB1	DP206-28	Distribution Center	678.275	TSF
CSB2	ADP15-05	Market	18.000	TSF
CSB3	The Colonies at University Park	SFDR	22	DU
CSB4	The Promenade at University Park	Student Housing	104	DU
CSB5	CUP12-06	Fast Food Restaurant with Drive-Thru	2.300	TSF
CSB6	CUP14-04	Water Treatment Plant	63.000	TSF
CSB7	CUP14-08	Gas Station / Commercial	5.000	TSF
CSB8	CUP14-19	Car Wash	3.650	TSF
CSB9	CUP14-21	Church	121.000	TSF
CSB10	Harbor Flight Tools (DP-D14-18)	Retail	17.541	TSF
CSB11	CUP15-03	Restaurants with Drive-Thru	5.422	TSF
CSB12	DP-D15-02	Warehouse	155.000	TSF
CSB13	DP-P13-07	SFDR	39	DU
CSB14	CUP11-08	Home Improvement	136.090	TSF
		Retail / Restaurant	68.630	TSF
County of San Bernardino				
SBC1	P201400536	Recreational Facility Expansion		
SBC2	P201200390	Truck Terminal	4.298	TSF
SBC3	Silverleaf at Rosena Ranch (P201400397)	SFDR		
SBC4	P201400346	Vehicle Service Shop Expansion	1.462	TSF

[1] SFDR = Single Family Detached Residential

[2] TSF = Ten Thousand Square Feet; DU = Dwelling Unit

4.8 NEAR-TERM CONDITIONS

The "buildup" approach combines existing traffic counts with a background ambient growth factor to forecast the EA (2018), EAP (2018), EA (2019), EAP (2018), Opening Year Cumulative (2018), and Opening Year Cumulative (2019) traffic conditions. An ambient growth factor of 6.12% accounts for background (area-wide) traffic increases that occur over time up to the year 2018 from the year 2015 (compounded two percent per year growth over a 3 year period) and 8.24% for year 2019 from the year 2015 (compounded two percent per year over a 4 year period). Phase 1 and Phase 2 Project traffic is added to assess EAP (2018) and EAP (2019) traffic conditions, respectively. Traffic volumes generated by cumulative development projects are then added to assess the Opening Year Cumulative traffic conditions. The 2018 and 2019 roadway networks are similar to the existing conditions roadway network with the exception of future roadways and intersections proposed to be developed by the Project.

The near-term traffic analysis includes the following traffic conditions, with the various traffic components:

- EA (2018)
    - Existing 2015 counts
    - Ambient growth traffic (6.12%)
- EAP (2018)
    - Existing 2015 counts
    - Ambient growth traffic (6.12%)
    - Project (Phase 1) Traffic
- EA (2019)
    - Existing 2015 counts
    - Ambient growth traffic (8.24%)
- EAP (2019)
    - Existing 2015 counts
    - Ambient growth traffic (8.24%)
    - Project Buildout Traffic
- Opening Year Cumulative (2018) Without Project
    - Existing 2015 counts
    - Ambient growth traffic (6.12%)
    - Cumulative Development traffic
- Opening Year Cumulative (2018) With Project
    - Existing 2015 counts
    - Ambient growth traffic (6.12%)
    - Cumulative Development traffic
    - Project (Phase 1) Traffic

- Opening Year Cumulative (2019) Without Project
  - Existing 2015 counts
  - Ambient growth traffic (8.24%)
  - Cumulative Development traffic
- Opening Year Cumulative (2019) With Project
  - Existing 2015 counts
  - Ambient growth traffic (8.24%)
  - Cumulative Development traffic
  - Project Buildout Traffic

4.9 HORIZON YEAR (2035) VOLUME DEVELOPMENT

Traffic projections for Horizon Year (2035) Without Project conditions were derived from the SBTAM using accepted procedures for model forecast refinement and smoothing. The traffic forecasts reflect the area-wide growth anticipated between Existing conditions and Horizon Year (2035) traffic conditions. In most instances the traffic model zone structure is not designed to provide accurate turning movements along arterial roadways unless refinement and reasonableness checking is performed. Therefore, the Horizon Year (2035) peak hour forecasts were refined using the model derived long-range forecasts, base (validation) year model forecasts, along with existing peak hour traffic count data. The SBTAM has a base (validation) year of 2008 and a horizon (future forecast) year of 2035. The difference in model volumes (2035-2008) defines the growth in traffic over the 27-year period.

The refined future peak hour approach and departure volumes obtained from the model output data are then entered into a spreadsheet program consistent with the National Cooperative Highway Research Program (NCHRP Report 255), along with initial estimates of turning movement proportions. A linear programming algorithm is used to calculate individual turning movements which match the known directional roadway segment forecast volumes computed in the previous step. This program computes a likely set of intersection turning movements from intersection approach counts and the initial turning proportions from each approach leg.

The future Horizon Year (2035) Without Project peak hour turning movements were then reviewed by Urban Crossroads for reasonableness, and in some cases, were adjusted to achieve reasonable growth. Horizon Year (2035) turning volumes were compared to Opening Year Cumulative (2019) volumes in order to ensure a minimum growth as a part of the refinement process. The minimum growth includes any additional growth between Opening Year Cumulative (2019) and Horizon Year (2035) traffic conditions that is not accounted for by the traffic generated by cumulative development projects and ambient growth rates assumed between Existing and Opening Year Cumulative (2019) conditions. Future estimated peak hour traffic data was used for new intersections to further refine the Horizon Year (2035) peak hour forecasts.

The Project only traffic forecasts have been generated by applying the trip generation, distribution and traffic assignment calculations. Project traffic volumes were then added to the refined future year SBTAM traffic model volumes to determine Horizon Year (2035) With

Project traffic conditions. Flow conservation checks and forecast adjustments were performed as necessary to ensure that all future Opening Year Cumulative (2019) and Horizon Year (2035) traffic volume forecasts are reasonable and to ensure the flow of traffic volumes between closely spaced intersections is maintained. In order words, traffic flow between two closely spaced intersections, such as two freeway ramp locations, is verified in order to make certain that vehicles leaving one intersection are entering the adjacent intersection and that there are no unexplained loss of vehicles. The result of this traffic forecasting procedure is a series of traffic volumes which are suitable for traffic operations analysis.

Post-processing worksheets for Horizon Year (2035) with Project traffic conditions are provided in Appendix 4.2.

5 EXISTING PLUS PROJECT TRAFFIC ANALYSIS

This section discusses the traffic forecasts for Existing plus Project (E+P) conditions and the resulting intersection operations, traffic signal warrant, and freeway mainline operations analyses.

5.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for E+P conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the Project driveways and those facilities assumed to be in place prior to or constructed by the Project to provide site access are also assumed to be in place for E+P conditions.

5.2 EXISTING PLUS PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus Phase 1 Project traffic. Exhibit 5-1 shows the weekday ADT and peak hour volumes which can be expected for E+P (Phase 1) traffic conditions.

5.3 EXISTING PLUS PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus Project Buildout traffic. Exhibit 5-2 shows the weekday ADT and peak hour volumes which can be expected for E+P (Project Buildout) traffic conditions.

5.4 INTERSECTION OPERATIONS ANALYSIS

E+P peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 5-1 for both E+P (Phase 1) and E+P (Project Buildout) conditions.

5.4.1 E+P (PHASE 1) CONDITIONS

All study area intersections are anticipated to continue to operate at acceptable levels of service with the addition of Phase 1 Project traffic, consistent with Existing traffic conditions. Consistent with Table 5-1, a summary of the peak hour intersection LOS for E+P (Phase 1) conditions are shown on Exhibit 5-3. The intersection operations analysis worksheets for E+P (Phase 1) traffic conditions are included in Appendix 5.1 of this TIA.

5.4.2 E+P (PROJECT BUILDOUT) CONDITIONS

All study area intersections are anticipated to continue to operate at acceptable levels of service with the addition of Project Buildout traffic, consistent with Existing traffic conditions. Consistent with Table 5-1, a summary of the peak hour intersection LOS for E+P (Project Buildout) conditions are shown on Exhibit 5-4. The intersection operations analysis worksheets for E+P (Project Buildout) traffic conditions are included in Appendix 5.2 of this TIA.

EXHIBIT 5-1 (1OF2) : E+P (PHASE 1) TRAFFIC VOLUMES

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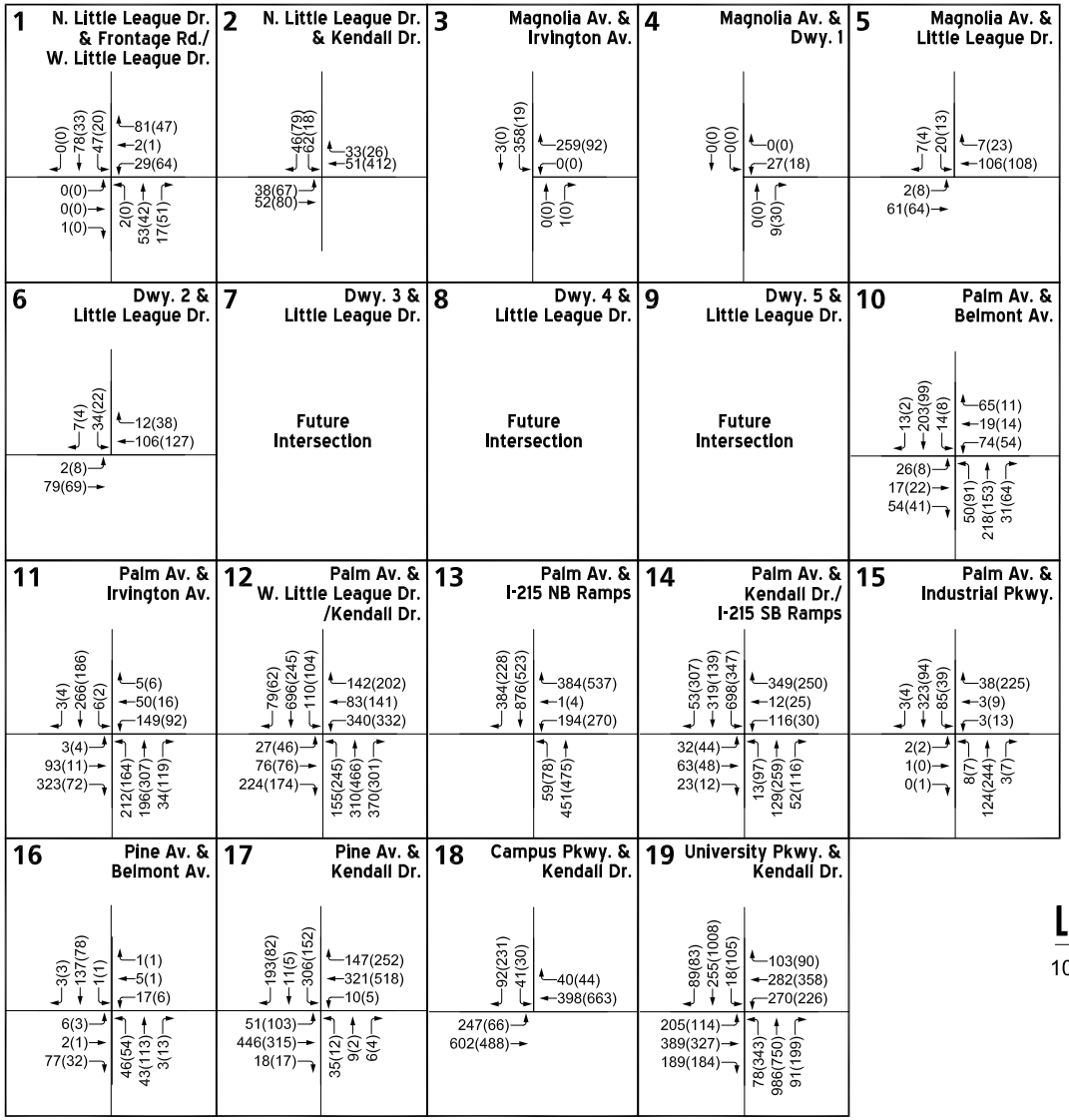
EXHIBIT 5-1 (2OF2) : E+P (PHASE 1) TRAFFIC VOLUMES



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

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EXHIBIT 5-2 (1OF2) : E+P (PROJECT BUILDOUT) TRAFFIC VOLUMES

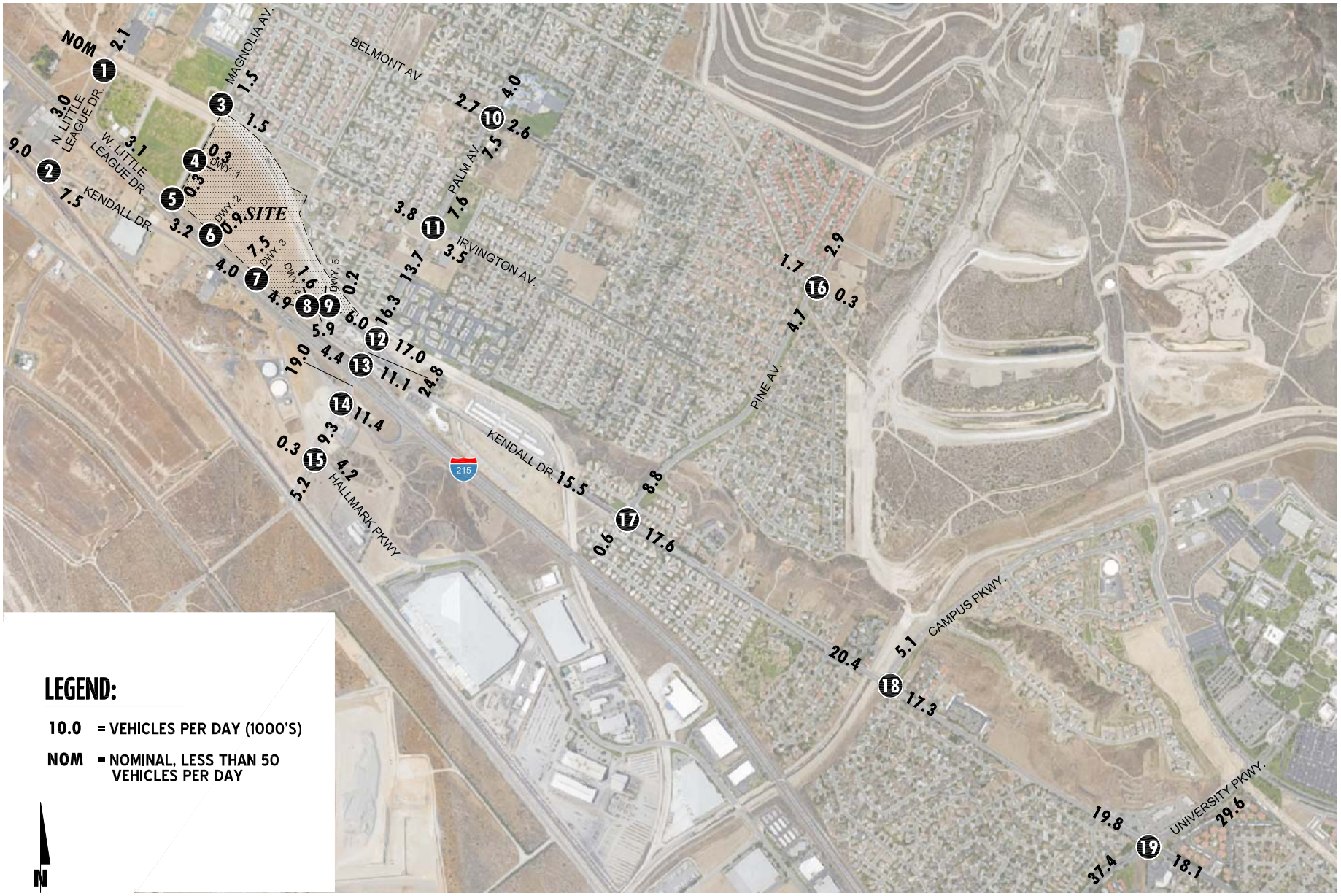

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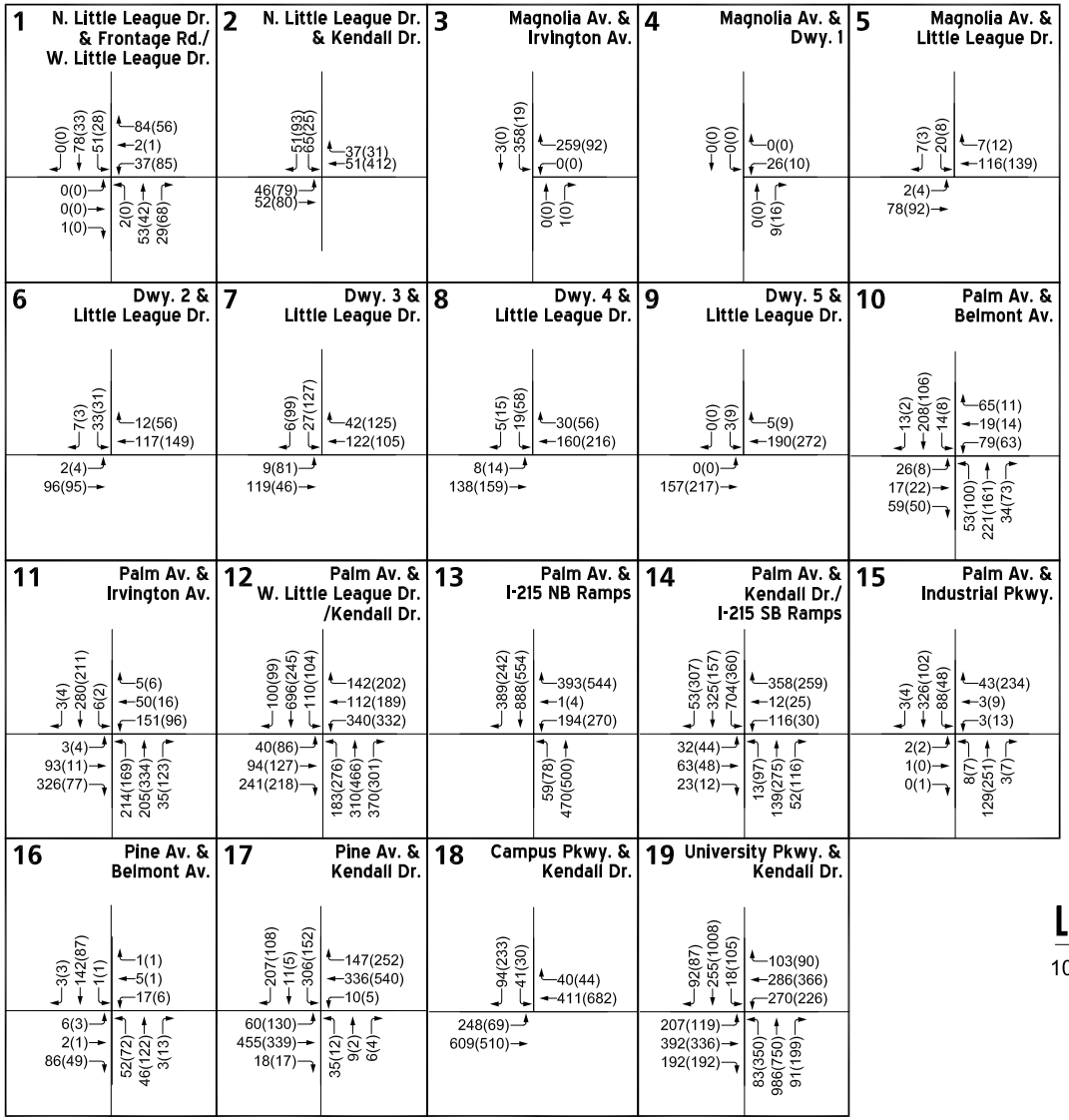
EXHIBIT 5-2 (2OF2) : E+P (PROJECT BUILDOUT) TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

URBAN CROSSROADS

EXHIBIT 5-3: SUMMARY OF LOS FOR E+P (PHASE 1) CONDITIONS

EXHIBIT 5-4: SUMMARY OF LOS FOR E+P (PROJECT BUILDOUT) CONDITIONS

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URBAN CROSSROADS

Table 5-1

Intersection Analysis for E+P Conditions

#	Intersection	Traffic Control[2]	Existing (2015)				E+P (Phase 1)				E+P (Project Buildout)			
			Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N. Little League Dr. / W. Little League Dr.	CSS	10.1	9.8	B	A	10.6	9.9	B	A	11.1	10.4	B	B
2	N. Little League Dr. / Kendall Dr.	CSS	10.3	13.3	B	B	10.5	13.8	B	B	10.7	14.8	B	B
3	Magnolia Av. / Irvington Av.	CSS	10.4	0.0	B	A	10.4	0.0	B	A	10.4	0.0	B	A
4	Magnolia Av. / Driveway 1	**CSS**	Future Intersection				8.6	8.7	A	A	8.6	8.6	A	A
5	Magnolia Av. / W. Little League Dr.	**CSS**	Future Intersection				9.5	9.6	A	A	9.7	9.8	A	A
6	Driveway 2 / W. Little League Dr.	**CSS**	Future Intersection				9.8	10.0	A	B	10.0	10.4	B	B
7	Driveway 3 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				10.3	13.7	B	B
8	Driveway 4 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				10.6	12.2	B	B
9	Driveway 5 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				10.8	12.3	B	B
10	Palm Av. / Belmont Av.	AWS	15.7	9.7	C	A	16.0	9.7	C	A	16.8	10.1	C	B
11	Palm Av. / Irvington Av.	TS	31.0	15.2	C	B	31.0	15.2	C	B	31.6	15.4	C	B
12	Palm Av. / Kendall Dr.	TS	35.1	33.9	D	C	36.8	33.9	D	C	40.5	36.0	D	D
13	Palm Av. / I-215 NB Ramps	TS	8.0	9.8	A	A	8.1	10.2	A	B	8.2	10.3	A	B
14	Palm Av. / I-215 SB Ramps	TS	32.3	15.3	C	B	35.5	15.6	D	B	38.0	16.1	D	B
15	Palm Av. / Hallmark Pkwy.	AWS	11.5	10.9	B	B	11.6	11.1	B	B	11.6	11.4	B	B
16	Pine Av. / Belmont Av.	CSS	12.6	11.5	B	B	12.6	11.5	B	B	13.1	12.4	B	B
17	Pine Av. / Kendall Dr.	TS	20.0	18.0	C	B	20.1	18.0	C	B	21.0	18.3	C	B
18	Campus Pkwy. / Kendall Dr.	TS	37.5	26.7	D	C	37.5	26.7	D	C	37.7	28.1	D	C
19	University Pkwy. / Kendall Dr.	TS	37.1	49.6	D	D	37.2	50.2	D	D	37.4	51.3	D	D

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

5.5 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway mainline. Queuing analysis findings are presented in Table 5-2 for E+P (Phase 1) and E+P (Project Buildout) traffic conditions. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline.

5.5.1 E+P (PHASE 1) CONDITIONS

As shown on Table 5-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for E+P (Phase 1) traffic conditions. Worksheets for E+P (Phase 1) traffic conditions off-ramp queuing analysis are provided in Appendix 5.3.

5.5.2 E+P (PROJECT BUILDOUT) CONDITIONS

As shown on Table 5-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for E+P (Project Buildout) traffic conditions. Worksheets for E+P (Project Buildout) traffic conditions off-ramp queuing analysis are provided in Appendix 5.4.

5.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no traffic signals anticipated to meet peak hour volume based or planning level (Caltrans) ADT traffic signal warrants with the addition of either Phase 1 Project traffic or at Project Buildout (see Appendix 5.5 and Appendix 5.6).

5.7 BASIC FREEWAY SEGMENT ANALYSIS

5.7.1 E+P (PHASE 1) CONDITIONS

E+P (Phase 1) mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 5-5. As shown on Table 5-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS C or better) during the peak hours, with the addition of Phase 1 Project traffic. E+P (Phase 1) basic freeway segment analysis worksheets are provided in Appendix 5.7.

5.7.2 E+P (PROJECT BUILDOUT) CONDITIONS

E+P (Project Buildout) mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 5-6. As shown on Table 5-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS C or better) during the peak hours, with the addition of Project Buildout traffic. E+P (Project Buildout) basic freeway segment analysis worksheets are provided in Appendix 5.8.

Table 5-2

Peak Hour Freeway Off-Ramp Queuing Summary for E+P Conditions

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2015)				E+P (Phase 1)				E+P (Project Buildout)			
			95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 NB Off-Ramp / Palm Av.	NBL/T	910	105	133	Yes	Yes	104	133	Yes	Yes	102	133	Yes	Yes
	NBR	415	104	165	Yes	Yes	109	188	Yes	Yes	118	202	Yes	Yes
I-215 SB Off-Ramp / Palm Av.	NBL/T/R	1,470	429 [2]	74	Yes	Yes	436 [2]	76	Yes	Yes	445 [2]	77	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Maximum queue length for the approach reported.

Table 5-3

Basic Freeway Segment Analysis for E+P Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	Existing (2015)				E+P (Phase 1)				E+P (Project Buildout)			
				Density[2]		LOS		Density[2]		LOS		Density[2]		LOS	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	North of Palm Avenue	2	20.5	13.7	C	B	20.5	13.9	C	B	20.6	13.9	C	B
		South of Palm Avenue	2	23.5	15.4	C	B	23.7	15.5	C	B	23.7	15.6	C	B
	NB	North of Palm Avenue	2	9.0	15.7	A	B	9.1	15.8	A	B	9.2	15.9	A	B
		South of Palm Avenue	2	10.2	19.7	A	C	10.3	19.9	A	C	10.3	20.0	A	C

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

EXHIBIT 5-5: E+P (PHASE 1) FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

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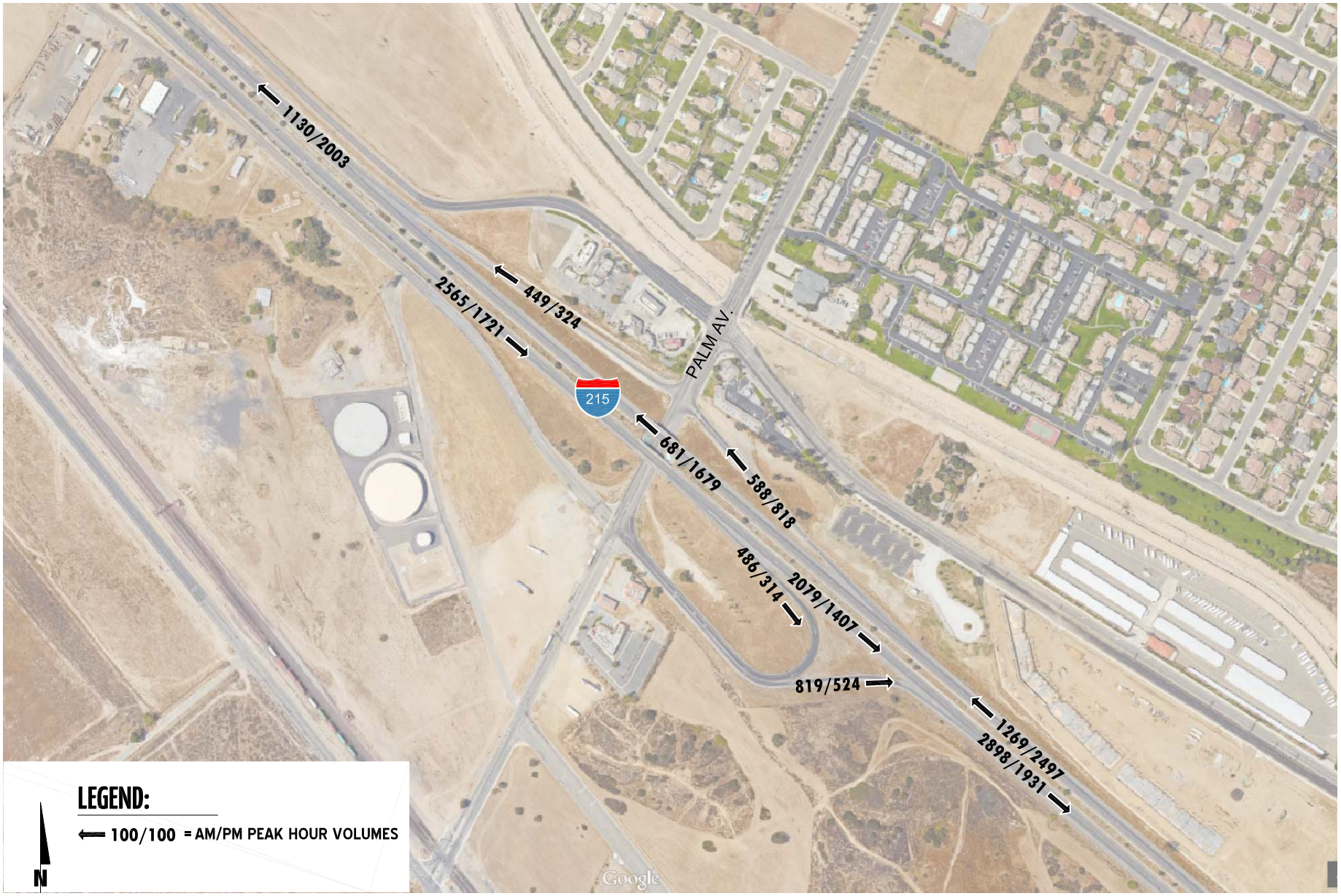
EXHIBIT 5-6: E+P (PROJECT BUILDOUT) FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)



5.8 FREEWAY MERGE/DIVERGE ANALYSIS

5.8.1 E+P (PHASE 1) CONDITIONS

Ramp merge and diverge operations were evaluated for E+P (Phase 1) traffic conditions and the results of this analysis are presented in Table 5-4. As shown in Table 5-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). E+P (Phase 1) freeway ramp junction operations analysis worksheets are provided in Appendix 5.9.

5.8.2 E+P (PROJECT BUILDOUT) CONDITIONS

Ramp merge and diverge operations were evaluated for E+P (Project Buildout) traffic conditions and the results of this analysis are presented in Table 5-4. As shown in Table 5-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). E+P (Project Buildout) freeway ramp junction operations analysis worksheets are provided in Appendix 5.10.

Table 5-4

Freeway Ramp Junction Merge/Diverge Analysis for E+P Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	Existing (2015)				E+P (Phase 1)				E+P (Project Buildout)			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS
I-215 Freeway	SB	Off-Ramp at Palm Avenue	2	27.8	C	19.9	B	27.9	C	20.1	C	27.9	C	20.1	C
		On-Ramp at Palm Avenue	2	28.8	D	20.7	C	29.0	D	20.8	C	29.0	D	20.9	C
	NB	On-Ramp at Palm Avenue	2	13.3	B	20.7	C	13.4	B	20.8	C	13.5	B	20.9	C
		Off-Ramp at Palm Avenue	2	15.2	B	26.5	C	15.3	B	26.8	C	15.3	B	26.8	C

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

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6 EA (2018) AND EAP (2018) TRAFFIC ANALYSIS

This section discusses the traffic forecasts for EA (2018) and EAP (2018) conditions and the resulting intersection operations, traffic signal warrant, and freeway mainline operations analyses.

6.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for EA (2018) and EAP (2018) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the Project driveways and those facilities assumed to be in place prior to or constructed by the Project to provide site access are also assumed to be in place for EAP (2018) conditions.

6.2 EA (2018) TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 6.12%. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for EA (2018) traffic conditions are shown on Exhibit 6-1.

6.3 EAP (2018) TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 6.12% and the addition of Phase 1 Project traffic. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for EAP (2018) traffic conditions are shown on Exhibit 6-2.

6.4 INTERSECTION OPERATIONS ANALYSIS

EA and EAP (2018) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 6-1 for both EA and EAP (2018) conditions.

6.4.1 EA (2018) CONDITIONS

All study area intersections are anticipated to continue to operate at acceptable levels of service with the application of a 6.12% ambient growth factor on existing traffic forecasts. Consistent with Table 6-1, a summary of the peak hour intersection LOS for EA (2018) conditions are shown on Exhibit 6-3. The intersection operations analysis worksheets for EA (2018) traffic conditions are included in Appendix 6.1 of this TIA.

6.4.2 EAP (2018) CONDITIONS

All study area intersections are anticipated to continue to operate at acceptable levels of service with the addition of Project Buildout traffic, consistent with Existing traffic conditions. Consistent with Table 6-1, a summary of the peak hour intersection LOS for EAP (2018) conditions are shown on Exhibit 6-4. The intersection operations analysis worksheets for EAP (2018) traffic conditions are included in Appendix 6.2 of this TIA.

EXHIBIT 6-1 (1OF2) : EA (2018) TRAFFIC VOLUMES

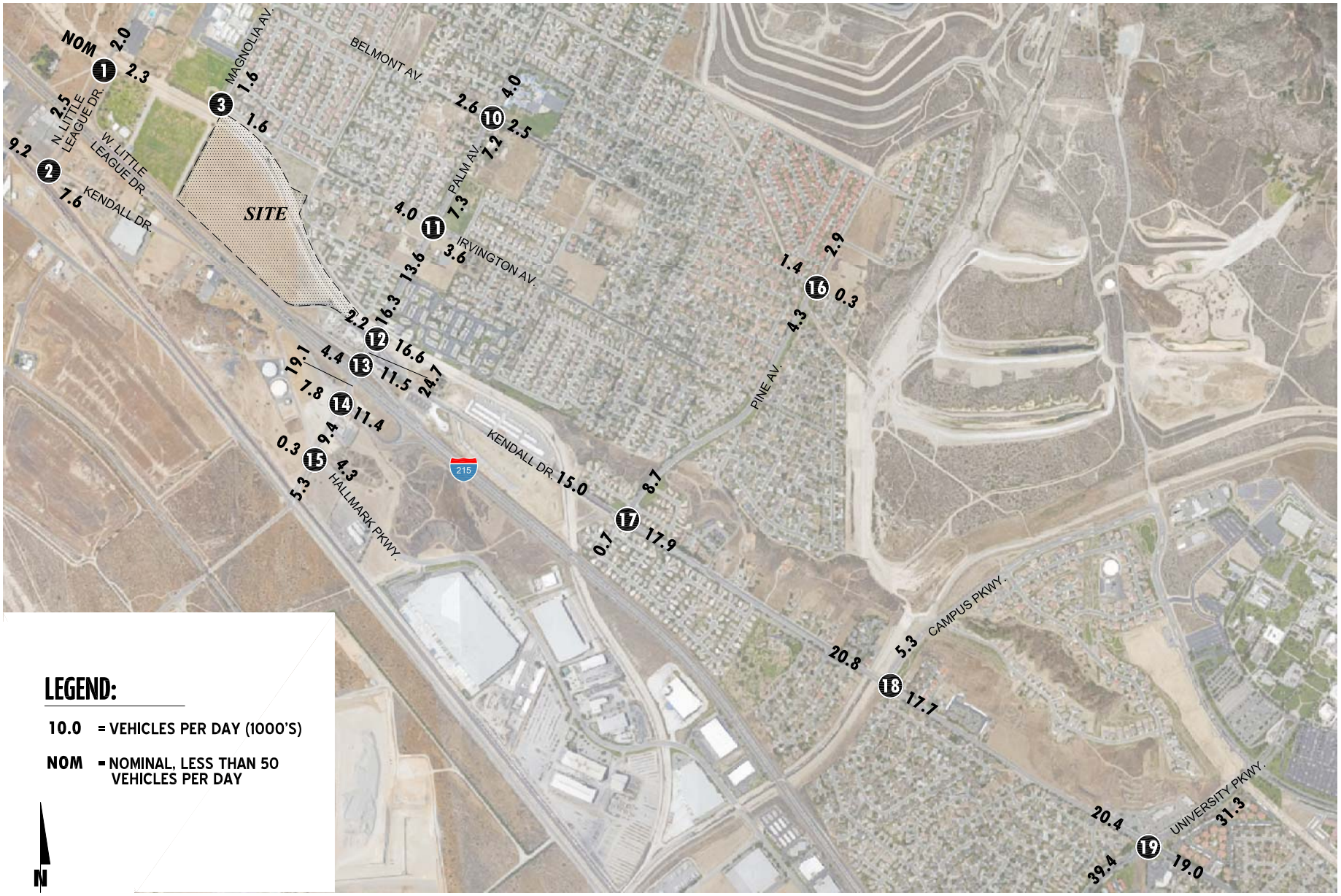
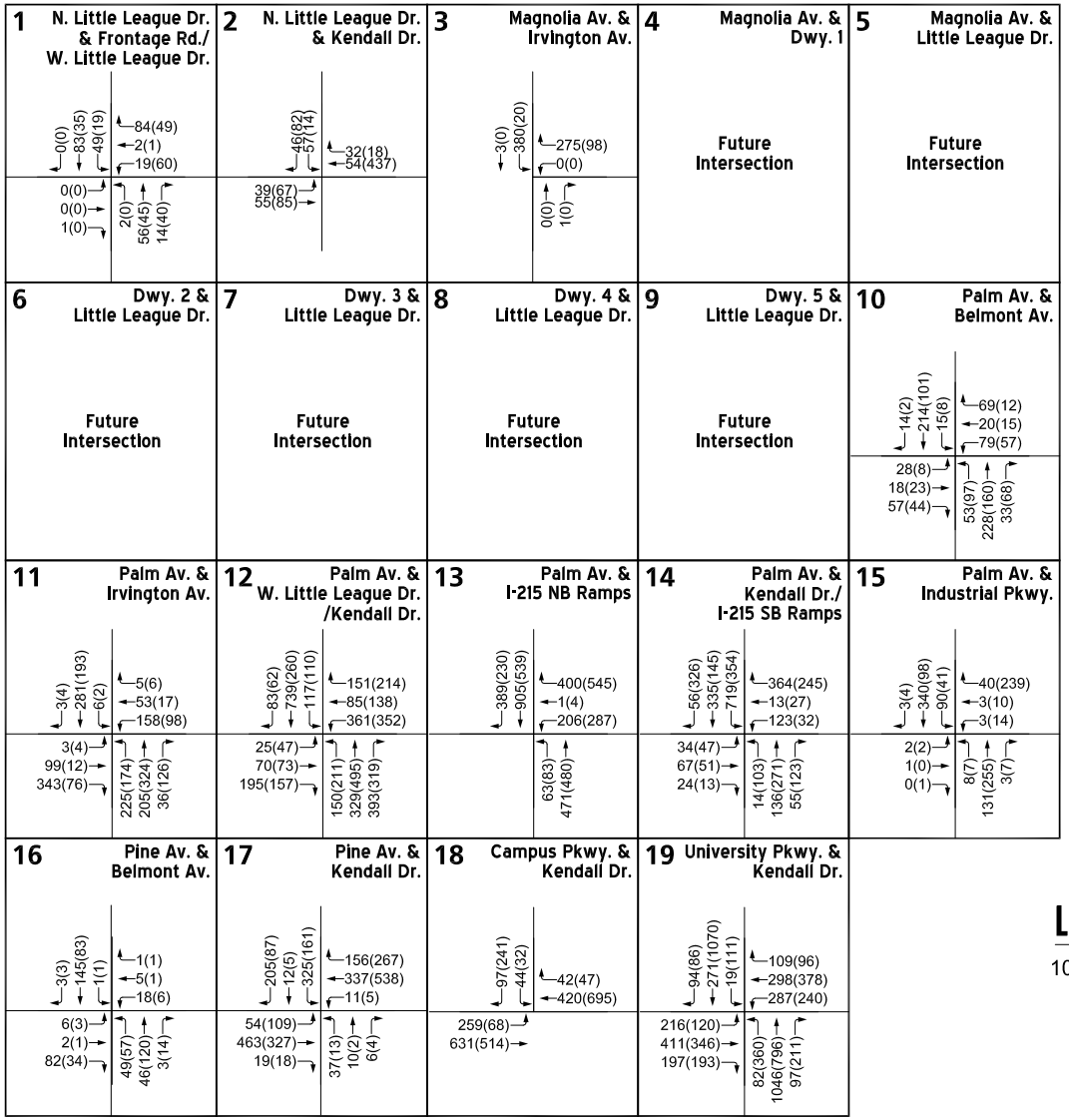


EXHIBIT 6-1 (2OF2) : EA (2018) TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

EXHIBIT 6-2 (1OF2) : EAP (2018) TRAFFIC VOLUMES

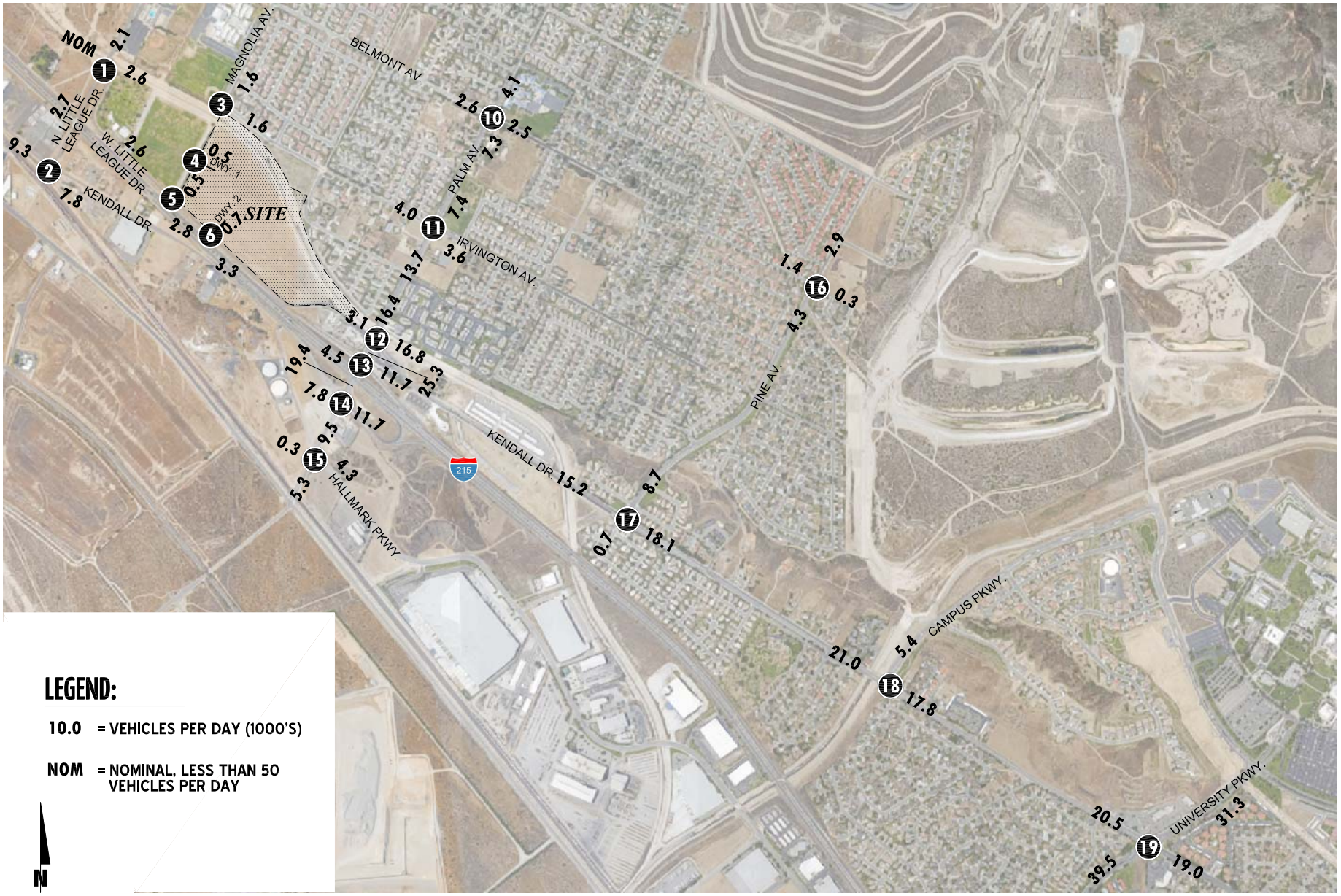


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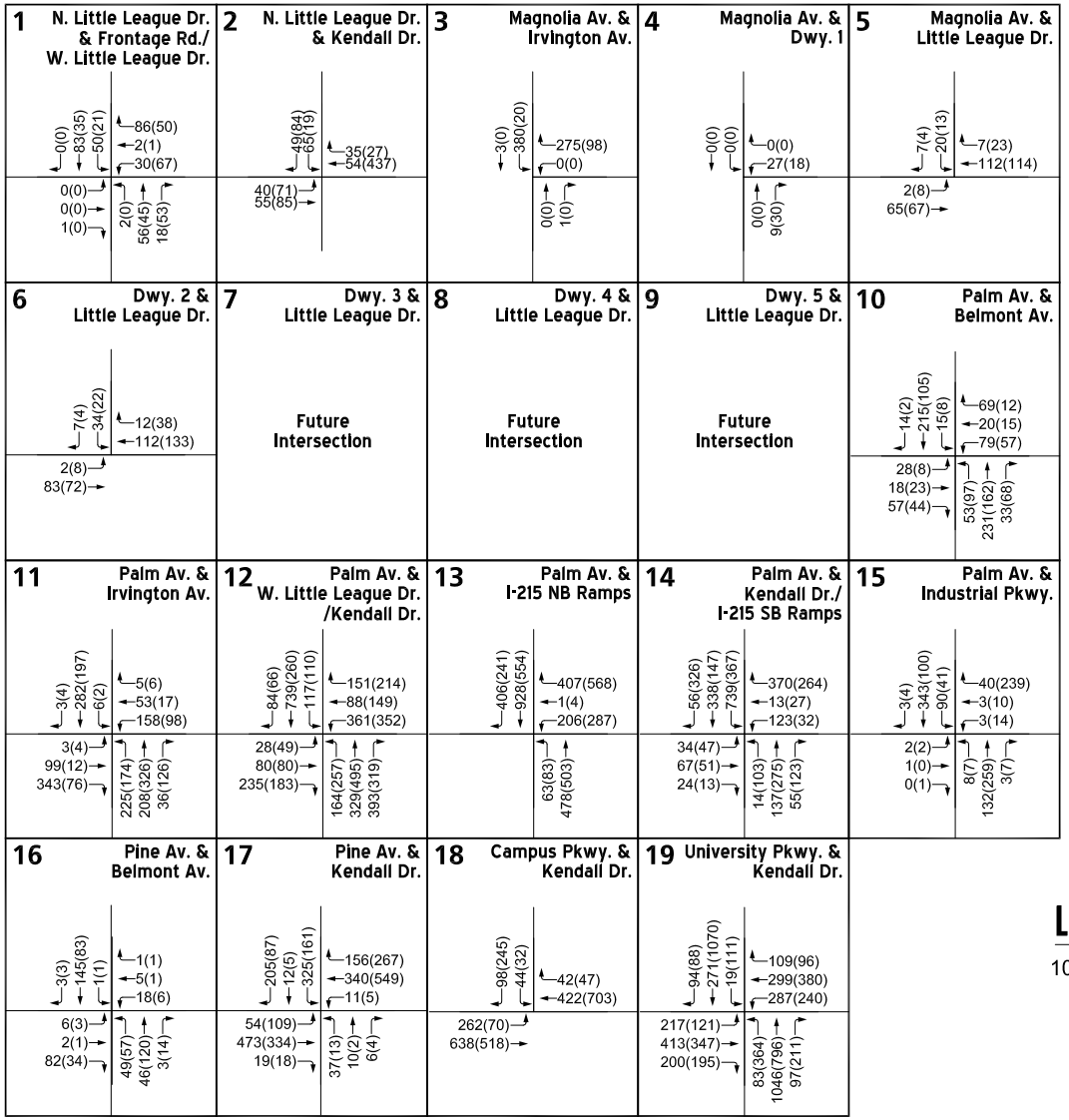
EXHIBIT 6-2 (2OF2) : EAP (2018) TRAFFIC VOLUMES



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

EXHIBIT 6-3: SUMMARY OF LOS FOR EA (2018) CONDITIONS

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EXHIBIT 6-4: SUMMARY OF LOS FOR EAP (2018) CONDITIONS

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Table 6-1

Intersection Analysis for EA and EAP (2018) Conditions

#	Intersection	Traffic Control[2]	Existing (2015)				EA (2018)				EAP (Phase 1 - 2018)			
			Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N. Little League Dr. / W. Little League Dr.	CSS	10.1	9.8	B	A	10.3	9.9	B	A	10.8	10.0	B	B
2	N. Little League Dr. / Kendall Dr.	CSS	10.3	13.3	B	B	10.4	13.9	B	B	10.6	14.5	B	B
3	Magnolia Av. / Irvington Av.	CSS	10.4	0.0	B	A	10.6	0.0	B	A	10.6	0.0	B	A
4	Magnolia Av. / Driveway 1	**CSS**	Future Intersection				Future Intersection				8.6	8.7	A	A
5	Magnolia Av. / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				9.6	9.7	A	A
6	Driveway 2 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				9.8	10.0	A	B
7	Driveway 3 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				Future Intersection			
8	Driveway 4 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				Future Intersection			
9	Driveway 5 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				Future Intersection			
10	Palm Av. / Belmont Av.	AWS	15.7	9.7	C	A	18.1	9.9	C	A	18.4	10.0	C	A
11	Palm Av. / Irvington Av.	TS	31.0	15.2	C	B	38.1	15.5	D	B	38.1	15.5	D	B
12	Palm Av. / Kendall Dr.	TS	35.1	33.9	D	C	36.5	34.6	D	C	38.3	35.1	D	D
13	Palm Av. / I-215 NB Ramps	TS	8.0	9.8	A	A	8.5	10.5	A	B	8.7	11.2	A	B
14	Palm Av. / I-215 SB Ramps	TS	32.3	15.3	C	B	44.8	16.2	D	B	50.3	16.6	D	B
15	Palm Av. / Hallmark Pkwy.	AWS	11.5	10.9	B	B	12.0	11.4	B	B	12.0	11.6	B	B
16	Pine Av. / Belmont Av.	CSS	12.6	11.5	B	B	13.0	11.7	B	B	12.6	11.7	B	B
17	Pine Av. / Kendall Dr.	TS	20.0	18.0	C	B	21.2	18.1	C	B	21.3	18.5	C	B
18	Campus Pkwy. / Kendall Dr.	TS	37.5	26.7	D	C	37.8	27.7	D	C	37.8	27.9	D	C
19	University Pkwy. / Kendall Dr.	TS	37.1	49.6	D	D	38.3	54.3	D	D	38.3	54.8	D	D

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[2] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

6.5 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway mainline. Queuing analysis findings are presented in Table 6-2 for EA and EAP (2018) traffic conditions. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline.

6.5.1 EA (2018) CONDITIONS

As shown on Table 6-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for EA (2018) traffic conditions. Worksheets for EA (2018) traffic conditions off-ramp queuing analysis are provided in Appendix 6.3.

6.5.2 EAP (2018) CONDITIONS

As shown on Table 6-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for EAP (2018) traffic conditions. Worksheets for EAP (2018) traffic conditions off-ramp queuing analysis are provided in Appendix 6.4.

6.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no traffic signals anticipated to meet peak hour volume based or planning level (Caltrans) ADT traffic signal warrants under EA or EAP (2018) traffic conditions (see Appendix 6.5 and Appendix 6.6).

6.7 BASIC FREEWAY SEGMENT ANALYSIS

6.7.1 EA (2018) CONDITIONS

EA (2018) mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 6-5. As shown on Table 6-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS C or better) during the peak hours. EA (2018) basic freeway segment analysis worksheets are provided in Appendix 6.7.

6.7.2 EAP (2018) CONDITIONS

EAP (2018) mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 6-6. As shown on Table 6-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS C or better) during the peak hours, with the addition of Phase 1 Project traffic. EAP (2018) basic freeway segment analysis worksheets are provided in Appendix 6.8.

Table 6-2

Peak Hour Freeway Off-Ramp Queuing Summary for EA and EAP (2018) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2015)				EA (2018)				EAP (Phase 1 - 2018)			
			95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 NB Off-Ramp / Palm Av.	NBL/T	910	105	133	Yes	Yes	108	143	Yes	Yes	108	143	Yes	Yes
	NBR	415	104	165	Yes	Yes	123	196	Yes	Yes	130	219	Yes	Yes
I-215 SB Off-Ramp / Palm Av.	NBL/T/R	1,470	429 [2]	74	Yes	Yes	473 [2]	79	Yes	Yes	478 [2]	80	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Maximum queue length for the approach reported.

Table 6-3

Basic Freeway Segment Analysis for EA and EAP (2018) Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	Existing (2015)				EA (2018)				EAP (Phase 1 - 2018)			
				Density[2]		LOS		Density[2]		LOS		Density[2]		LOS	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	North of Palm Avenue	2	20.5	13.7	C	B	21.9	14.6	C	B	21.9	14.7	C	B
		South of Palm Avenue	2	23.5	15.4	C	B	25.3	16.3	C	B	25.5	16.4	C	B
	NB	North of Palm Avenue	2	9.0	15.7	A	B	9.5	16.7	A	B	9.7	16.8	A	B
		South of Palm Avenue	2	10.2	19.7	A	C	10.8	21.1	A	C	10.9	21.3	A	C

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

EXHIBIT 6-5: EA (2018) FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

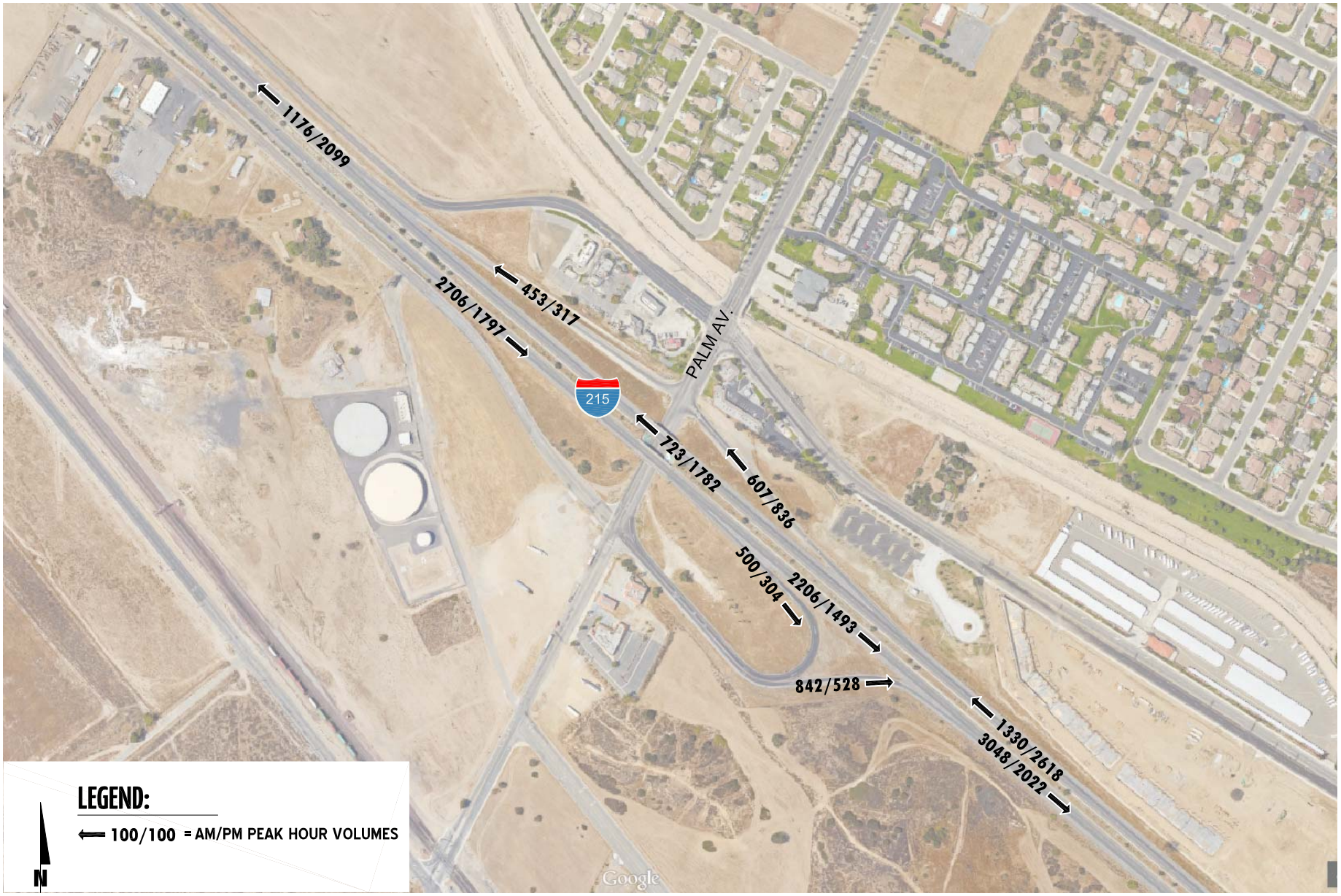

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EXHIBIT 6-6: EAP (2018) FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

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6.8 FREEWAY MERGE/DIVERGE ANALYSIS

6.8.1 EA (2018) CONDITIONS

Ramp merge and diverge operations were evaluated for EA (2018) traffic conditions and the results of this analysis are presented in Table 6-4. As shown in Table 6-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). EA (2018) freeway ramp junction operations analysis worksheets are provided in Appendix 6.9.

6.8.2 EAP (2018) CONDITIONS

Ramp merge and diverge operations were evaluated for EAP (2018) traffic conditions and the results of this analysis are presented in Table 6-4. As shown in Table 6-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). EAP (2018) freeway ramp junction operations analysis worksheets are provided in Appendix 6.10.

Table 6-4

Freeway Ramp Junction Merge/Diverge Analysis for EA and EAP (2018) Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	Existing (2015)				EA (2018)				EAP (Phase 1 - 2018)			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS
I-215 Freeway	SB	Off-Ramp at Palm Avenue	2	27.8	C	19.9	B	29.3	D	20.9	C	29.3	D	21.1	C
		On-Ramp at Palm Avenue	2	28.8	D	20.7	C	30.3	D	21.7	C	30.5	D	21.9	C
	NB	On-Ramp at Palm Avenue	2	13.3	B	20.7	C	13.9	B	21.8	C	14.0	B	21.9	C
		Off-Ramp at Palm Avenue	2	15.2	B	26.5	C	16.0	B	28.0	C	16.0	B	28.2	D

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

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7 EA (2019) AND EAP (2019) TRAFFIC ANALYSIS

This section discusses the traffic forecasts for EA (2019) and EAP (2019) conditions and the resulting intersection operations, traffic signal warrant, and freeway mainline operations analyses.

7.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for EA (2019) and EAP (2019) conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the Project driveways and those facilities assumed to be in place prior to or constructed by the Project to provide site access are also assumed to be in place for EAP (2019) conditions.

7.2 EA (2019) TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 8.24%. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for EA (2019) traffic conditions are shown on Exhibit 7-1.

7.3 EAP (2019) TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 8.24% and the addition of Project Buildout traffic. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for EAP (2019) traffic conditions are shown on Exhibit 7-2.

7.4 INTERSECTION OPERATIONS ANALYSIS

EA and EAP (2019) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 7-1 for both EA and EAP (2019) conditions.

7.4.1 EA (2019) CONDITIONS

All study area intersections are anticipated to continue to operate at acceptable levels of service with the application of an 8.24% ambient growth factor on existing traffic forecasts, with the exception of the following:

ID	Intersection Location
19	University Parkway / Kendall Drive – LOS E PM peak hour only

Consistent with Table 7-1, a summary of the peak hour intersection LOS for EA (2019) conditions are shown on Exhibit 7-3. The intersection operations analysis worksheets for EA (2019) traffic conditions are included in Appendix 7.1 of this TIA.

EXHIBIT 7-1 (1OF2) : EA (2019) TRAFFIC VOLUMES

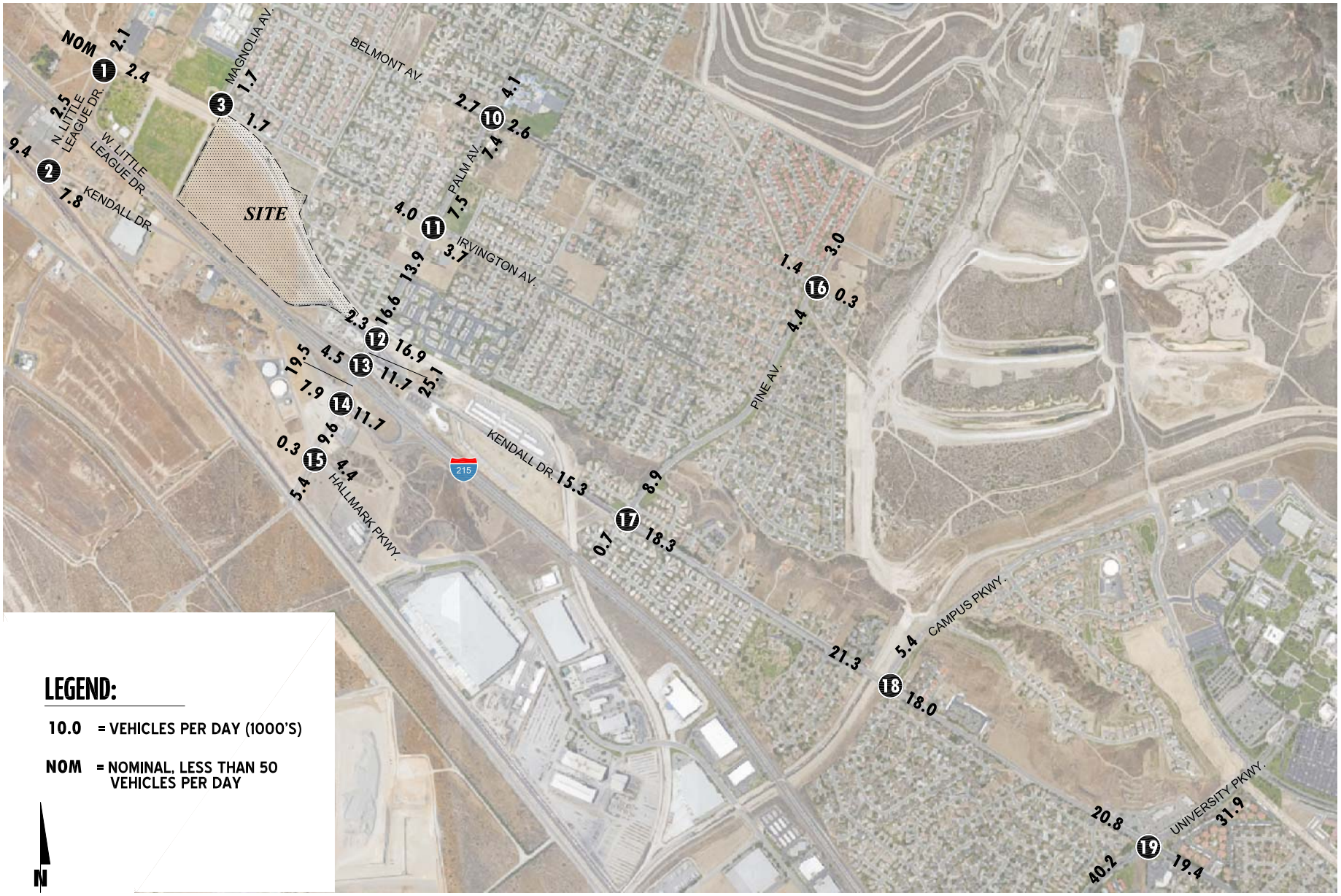

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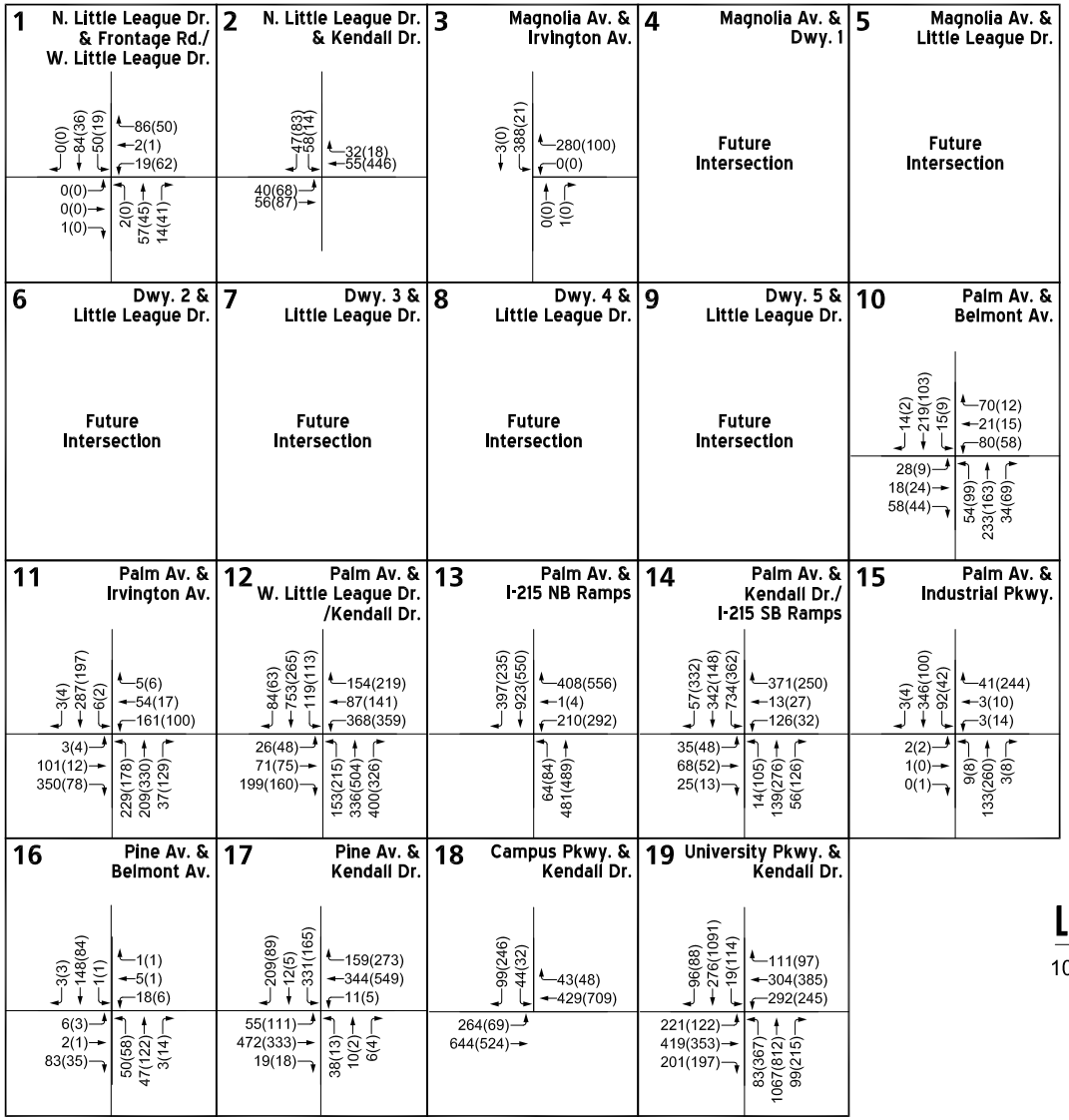
EXHIBIT 7-1 (2OF2) : EA (2019) TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

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EXHIBIT 7-2 (1OF2) : EAP (2019) TRAFFIC VOLUMES

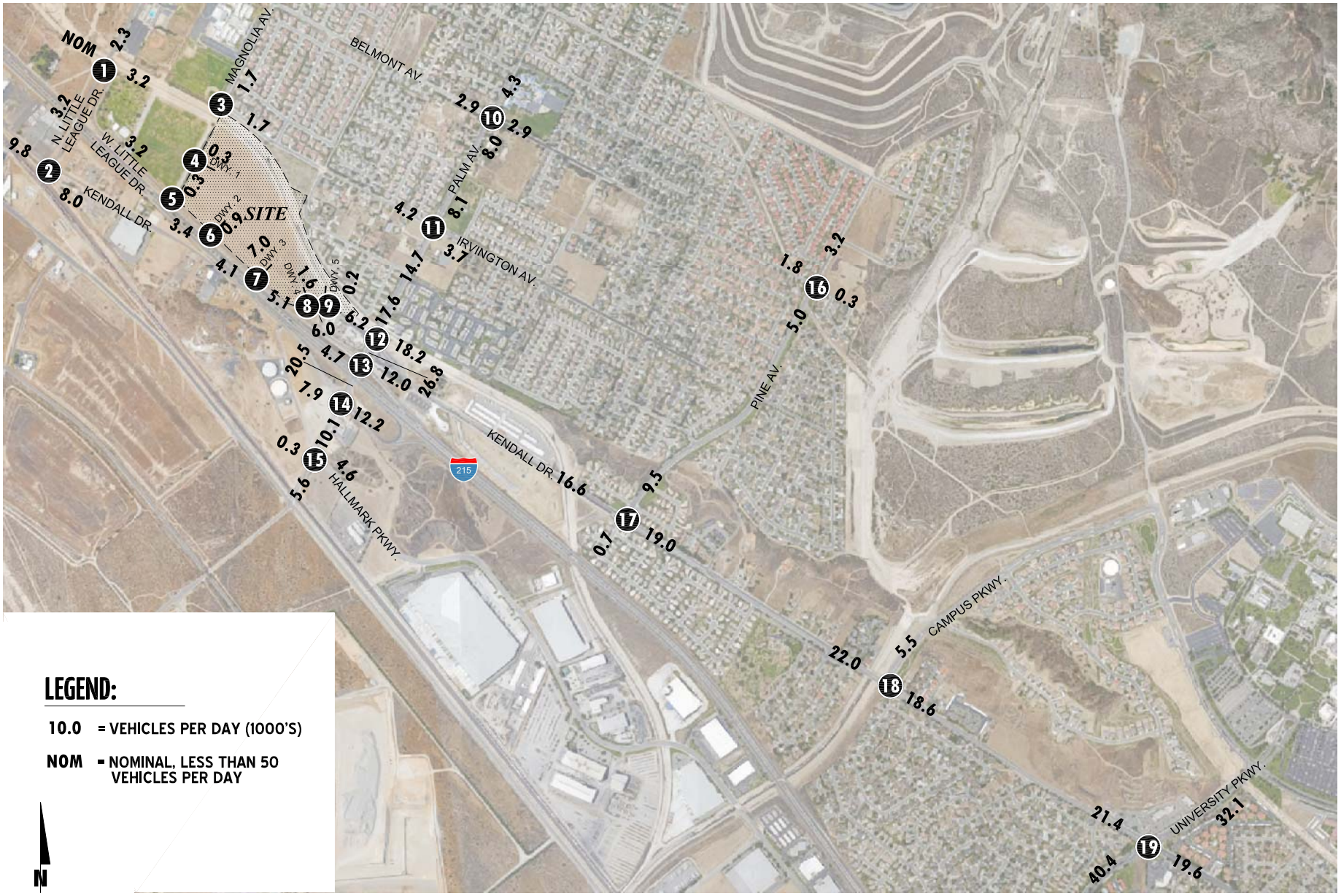

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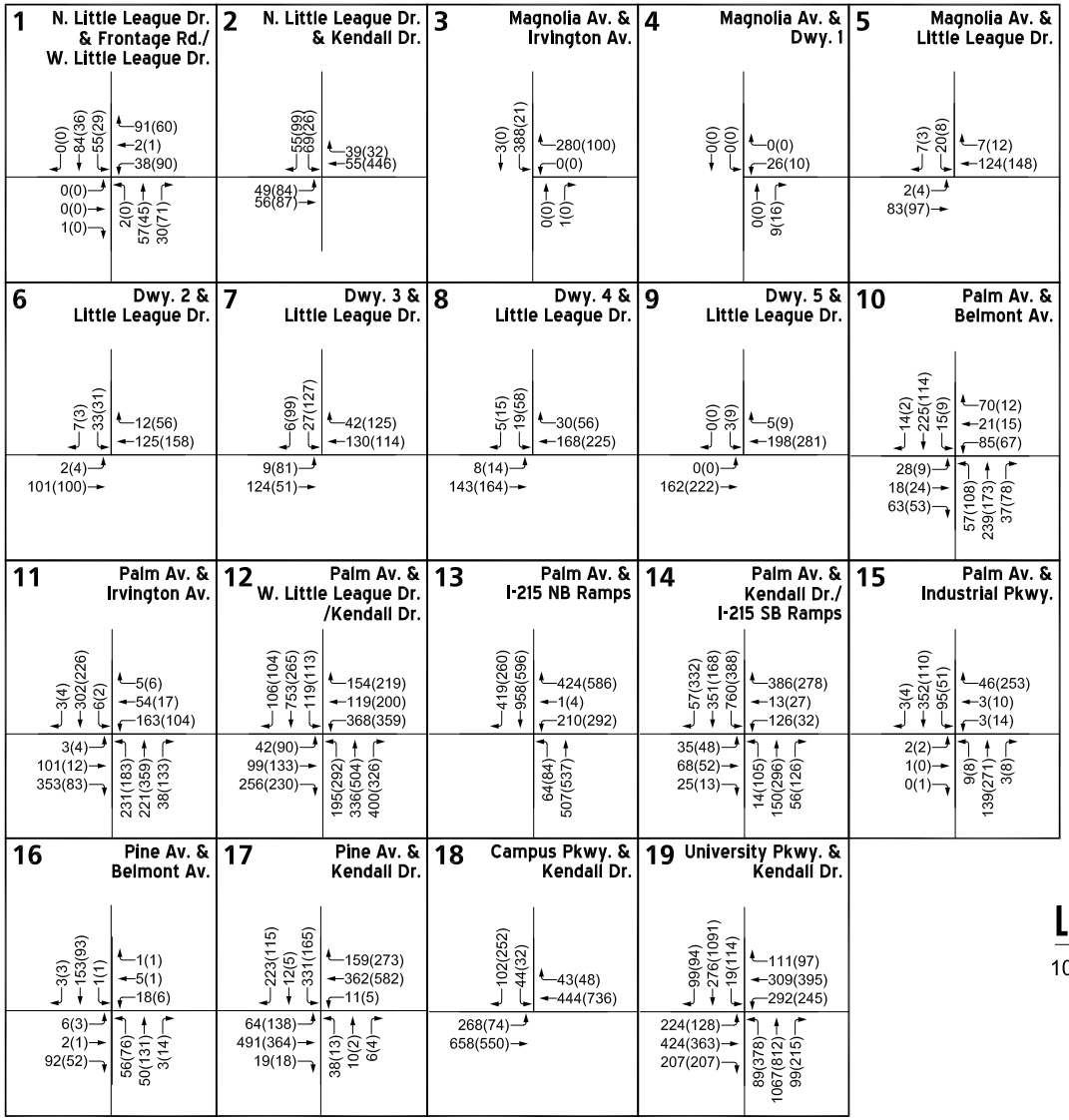
EXHIBIT 7-2 (2OF2) : EAP (2019) TRAFFIC VOLUMES



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

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EXHIBIT 7-3: SUMMARY OF LOS FOR EA (2019) CONDITIONS

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Table 7-1

Intersection Analysis for EA and EAP (2019) Conditions

#	Intersection	Traffic Control[2]	Existing (2015)				EA (2019)				EAP (2019)			
			Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N. Little League Dr. / W. Little League Dr.	CSS	10.1	9.8	B	A	10.3	9.9	B	A	11.3	10.6	B	B
2	N. Little League Dr. / Kendall Dr.	CSS	10.3	13.3	B	B	10.5	14.1	B	B	11.0	15.9	B	C
3	Magnolia Av. / Irvington Av.	CSS	10.4	0.0	B	A	10.7	0.0	B	A	10.7	0.0	B	A
4	Magnolia Av. / Driveway 1	**CSS**	Future Intersection				Future Intersection				8.6	8.6	A	A
5	Magnolia Av. / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				9.7	9.9	A	A
6	Driveway 2 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				10.0	10.6	B	B
7	Driveway 3 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				10.4	13.9	B	B
8	Driveway 4 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				10.7	12.3	B	B
9	Driveway 5 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection				10.9	12.4	B	B
10	Palm Av. / Belmont Av.	AWS	15.7	9.7	C	A	19.0	10.1	C	B	20.7	10.5	C	B
11	Palm Av. / Irvington Av.	TS	31.0	15.2	C	B	41.5	15.5	D	B	43.0	15.8	D	B
12	Palm Av. / Kendall Dr.	TS	35.1	33.9	D	C	37.0	35.0	D	C	43.8	37.1	D	D
13	Palm Av. / I-215 NB Ramps	TS	8.0	9.8	A	A	8.7	10.9	A	B	9.0	11.7	A	B
14	Palm Av. / I-215 SB Ramps	TS	32.3	15.3	C	B	46.2	16.5	D	B	49.9	17.5	D	B
15	Palm Av. / Hallmark Pkwy.	AWS	11.5	10.9	B	B	12.1	11.7	B	B	12.3	12.2	B	B
16	Pine Av. / Belmont Av.	CSS	12.6	11.5	B	B	13.1	11.8	B	B	13.7	12.7	B	B
17	Pine Av. / Kendall Dr.	TS	20.0	18.0	C	B	21.1	18.0	C	B	22.1	18.7	C	B
18	Campus Pkwy. / Kendall Dr.	TS	37.5	26.7	D	C	37.6	27.7	D	C	37.9	27.8	D	C
19	University Pkwy. / Kendall Dr.	TS	37.1	49.6	D	D	38.7	**56.1**	D	**E**	39.1	**58.0**	D	**E**

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

1 Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

2 CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

7.4.2 EAP (2019) CONDITIONS

There are no additional study area intersections anticipated to operate at unacceptable LOS with the addition of Project Buildout traffic, in addition to the location previously identified for EA (2019) traffic conditions. However, the addition of Project traffic is anticipated to exceed the City's minimum v/c threshold of 0.01 for intersections operating at LOS E or LOS F under pre-project traffic conditions:

ID	Intersection Location	v/c for EA (2019) – PM Peak Hour	v/c for EAP (2019) – PM Peak Hour	Variance
19	University Parkway / Kendall Drive	0.734	0.749	0.015

NOTE: v/c not reported by Synchro 8 for HCM 2010 methodology; as such, v/c has been reported using Vistro Version 3.00-04.

As such, the Project's impact to the deficient intersection is considered to be cumulatively considerable. Consistent with Table 7-1, a summary of the peak hour intersection LOS for EAP (2019) conditions are shown on Exhibit 7-4. The intersection operations analysis worksheets for EAP (2019) traffic conditions are included in Appendix 7.2 of this TIA.

7.5 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway mainline. Queuing analysis findings are presented in Table 7-2 for EA and EAP (2019) traffic conditions. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline.

7.5.1 EA (2019) CONDITIONS

As shown on Table 7-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for EA (2019) traffic conditions. Worksheets for EA (2019) traffic conditions off-ramp queuing analysis are provided in Appendix 7.3.

7.5.2 EAP (2019) CONDITIONS

As shown on Table 7-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for EAP (2019) traffic conditions. Worksheets for EAP (2019) traffic conditions off-ramp queuing analysis are provided in Appendix 7.4.

7.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

There are no traffic signals anticipated to meet peak hour volume based or planning level (Caltrans) ADT traffic signal warrants under EA or EAP (2019) traffic conditions (see Appendix 7.5 and Appendix 7.6).

Table 7-2

Peak Hour Freeway Off-Ramp Queuing Summary for EA and EAP (2019) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	Existing (2015)				EA (2019)				EAP (2019)			
			95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 NB Off-Ramp / Palm Av.	NBL/T	910	105	133	Yes	Yes	110	146	Yes	Yes	110	146	Yes	Yes
	NBR	415	104	165	Yes	Yes	131	207	Yes	Yes	149	259 [2]	Yes	Yes
I-215 SB Off-Ramp / Palm Av.	NBL/T/R	1,470	429 [2]	74	Yes	Yes	488 [2]	79	Yes	Yes	504 [2]	82	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Maximum queue length for the approach reported.

EXHIBIT 7-4: SUMMARY OF LOS FOR EAP (2019) CONDITIONS

7.7 BASIC FREEWAY SEGMENT ANALYSIS

7.7.1 EA (2019) CONDITIONS

EA (2019) mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 7-5. As shown on Table 7-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS C or better) during the peak hours. EA (2019) basic freeway segment analysis worksheets are provided in Appendix 7.7.

7.7.2 EAP (2019) CONDITIONS

EAP (2019) mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 7-6. As shown on Table 7-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours, with the addition of Project Buildout traffic. EAP (2019) basic freeway segment analysis worksheets are provided in Appendix 7.8.

7.8 FREEWAY MERGE/DIVERGE ANALYSIS

7.8.1 EA (2019) CONDITIONS

Ramp merge and diverge operations were evaluated for EA (2019) traffic conditions and the results of this analysis are presented in Table 7-4. As shown in Table 7-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). EA (2019) freeway ramp junction operations analysis worksheets are provided in Appendix 7.9.

7.8.2 EAP (2019) CONDITIONS

Ramp merge and diverge operations were evaluated for EAP (2019) traffic conditions and the results of this analysis are presented in Table 7-4. As shown in Table 7-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). EAP (2019) freeway ramp junction operations analysis worksheets are provided in Appendix 7.10.

7.9 PROJECT IMPACTS AND RECOMMENDED IMPROVEMENTS

This section provides a summary of Project impacts and recommended improvements.

7.9.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

Improvement strategies have been recommended at intersections that have been identified as deficient in an effort to reduce each location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the recommended improvement strategies discussed below to address EA and EAP (2019) traffic deficiencies is presented in Table 7-5.

EXHIBIT 7-5: EA (2019) FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

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EXHIBIT 7-6: EAP (2019) FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

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Table 7-3

Basic Freeway Segment Analysis for EA and EAP (2019) Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	Existing (2015)				EA (2019)				EAP (2019)			
				Density[2]		LOS		Density[2]		LOS		Density[2]		LOS	
				AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	North of Palm Avenue	2	20.5	13.7	C	B	22.4	14.9	C	B	22.5	15.0	C	B
		South of Palm Avenue	2	23.5	15.4	C	B	26.0	16.6	C	B	26.2	16.9	D	B
	NB	North of Palm Avenue	2	9.0	15.7	A	B	9.7	17.0	A	B	9.9	17.2	A	B
		South of Palm Avenue	2	10.2	19.7	A	C	11.1	21.5	B	C	11.1	21.8	B	C

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

Table 7-4

Freeway Ramp Junction Merge/Diverge Analysis for EA and EAP (2019) Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	Existing (2015)				EA (2019)				EAP (2019)			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS
I-215 Freeway	SB	Off-Ramp at Palm Avenue	2	27.8	C	19.9	B	29.8	D	21.3	C	29.9	D	21.4	C
		On-Ramp at Palm Avenue	2	28.8	D	20.7	C	30.8	D	22.1	C	31.1	D	22.3	C
	NB	On-Ramp at Palm Avenue	2	13.3	B	20.7	C	14.1	B	22.1	C	14.3	B	22.3	C
		Off-Ramp at Palm Avenue	2	15.2	B	26.5	C	16.2	B	28.5	D	16.3	B	28.8	D

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

Table 7-5

Intersection Analysis for EA and EAP (2019) Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
19	University Pkwy. / Kendall Dr.																	
	- EA (2019)																	
	- Without Improvements	TS	2	3	0	1	3	0	2	2	0	2	2	0	38.7	**56.1**	D	**E**
	- With Improvements	TS	2	3	0	**2**	3	0	2	2	0	2	2	0	38.5	49.5	D	D
	- EAP (2019)																	
	- Without Improvements	TS	2	3	0	1	3	0	2	2	0	2	2	0	39.1	**58.0**	D	**E**
	- With Improvements	TS	2	3	0	**2**	3	0	2	2	0	2	2	0	38.7	50.3	D	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane; > = Right-Turn Overlap Phasing; >> = Free-Right Turn Lane; **1** = Improvement

[2] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] TS = Traffic Signal

The intersection of University Parkway at Kendall Drive is anticipated to operate at an unacceptable LOS (LOS E) during the PM peak hour under EA (2019) traffic conditions, and is anticipated to continue to operate at unacceptable levels during the PM peak hour only with the addition of Project Buildout traffic. As such, the Project's contribution to this impact is cumulatively considerable. It is recommended that the Project pay their fair share towards a 2nd southbound left turn lane at the intersection of University Parkway and Kendall Drive to reduce the Project's proportionate increase in delay to pre-project levels or better, thus reducing the Project's cumulative impact to less-than-significant.

Worksheets for EA (2019) and EAP (2019) traffic conditions, with improvements, HCM calculation worksheets are provided in Appendix 7.11 and 7.12, respectively.

7.9.2 Recommended Improvements to Address Off-Ramp Queues

As shown previously on Table 7-2, there are no peak hour queuing issues at the I-215 Freeway at Palm Avenue interchange for both EA and EAP (2019) traffic conditions. As such, no improvements have been recommended.

7.9.3 Recommended Improvements to Address Deficiencies on Freeway Facilities

As shown previously on Table 7-3 and Table 7-4, there are no deficient freeway mainline segments or merge/diverge ramp junctions anticipated for EA and EAP (2019) traffic conditions. As such, no improvements have been recommended.

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8 OPENING YEAR CUMULATIVE (2018) TRAFFIC ANALYSIS

This section discusses the methods used to develop Opening Year Cumulative (2018) traffic forecasts, and the resulting intersection operations, traffic signal warrant, and freeway mainline operations analyses.

8.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the Project driveways and those facilities assumed to be in place prior to or constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative (2018) conditions only.

8.2 OPENING YEAR CUMULATIVE (2018) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 6.12% plus traffic from pending and approved but not yet constructed but known development projects (as previously shown on Table 4-2) in the area. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for Opening Year Cumulative (2018) Without Project traffic conditions are shown on Exhibit 8-1.

8.3 OPENING YEAR CUMULATIVE (2018) WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 6.12%, traffic from pending and approved but not yet constructed but known development projects in the area and the addition of Phase 1 Project traffic. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for Opening Year Cumulative (2018) With Project traffic conditions are shown on Exhibit 8-2.

8.4 INTERSECTION OPERATIONS ANALYSIS

Opening Year Cumulative (2018) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 8-1 for Opening Year Cumulative (2018) conditions.

EXHIBIT 8-1 (1OF2) : OPENING YEAR CUMULATIVE (2018) WITHOUT PROJECT TRAFFIC VOLUMES

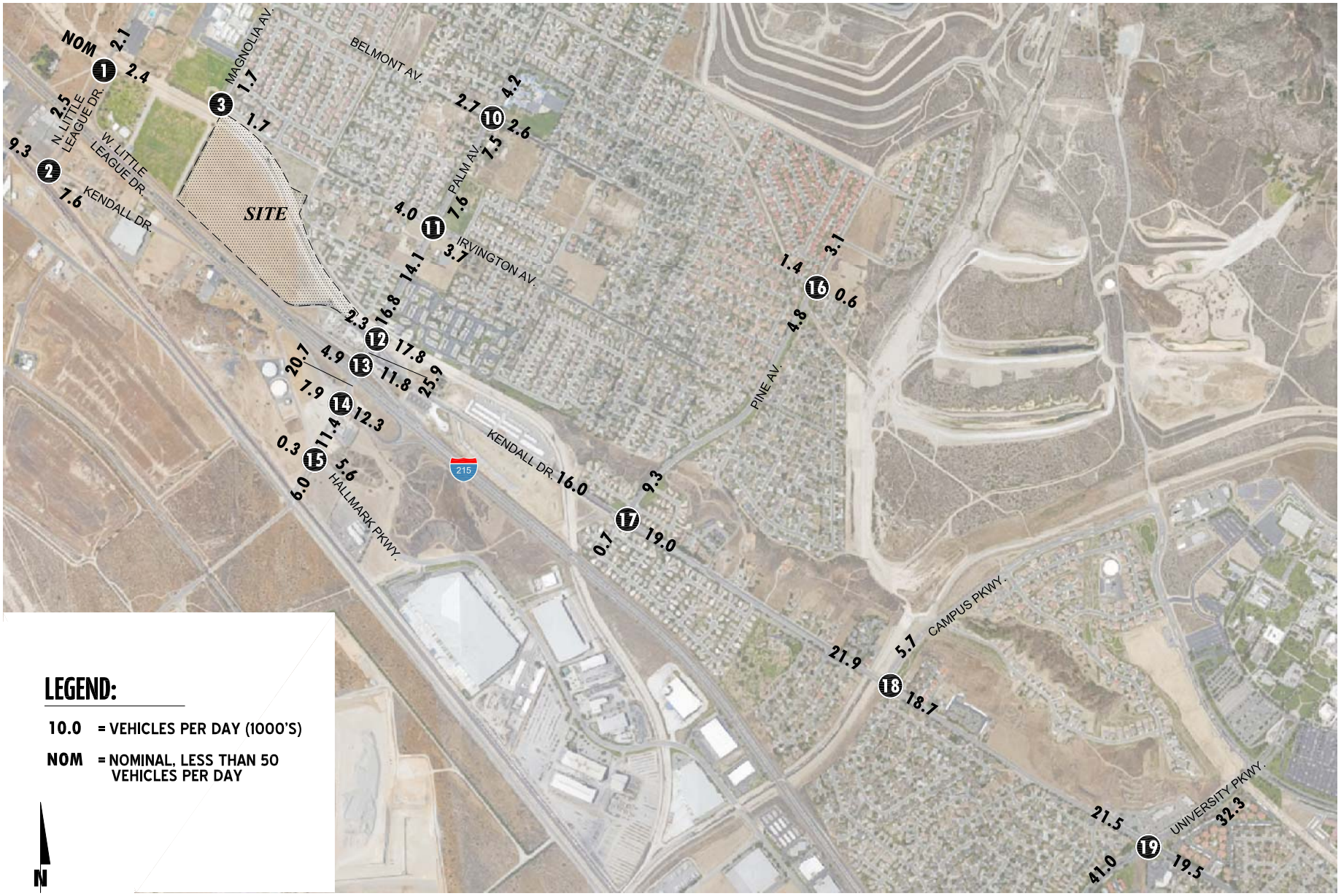

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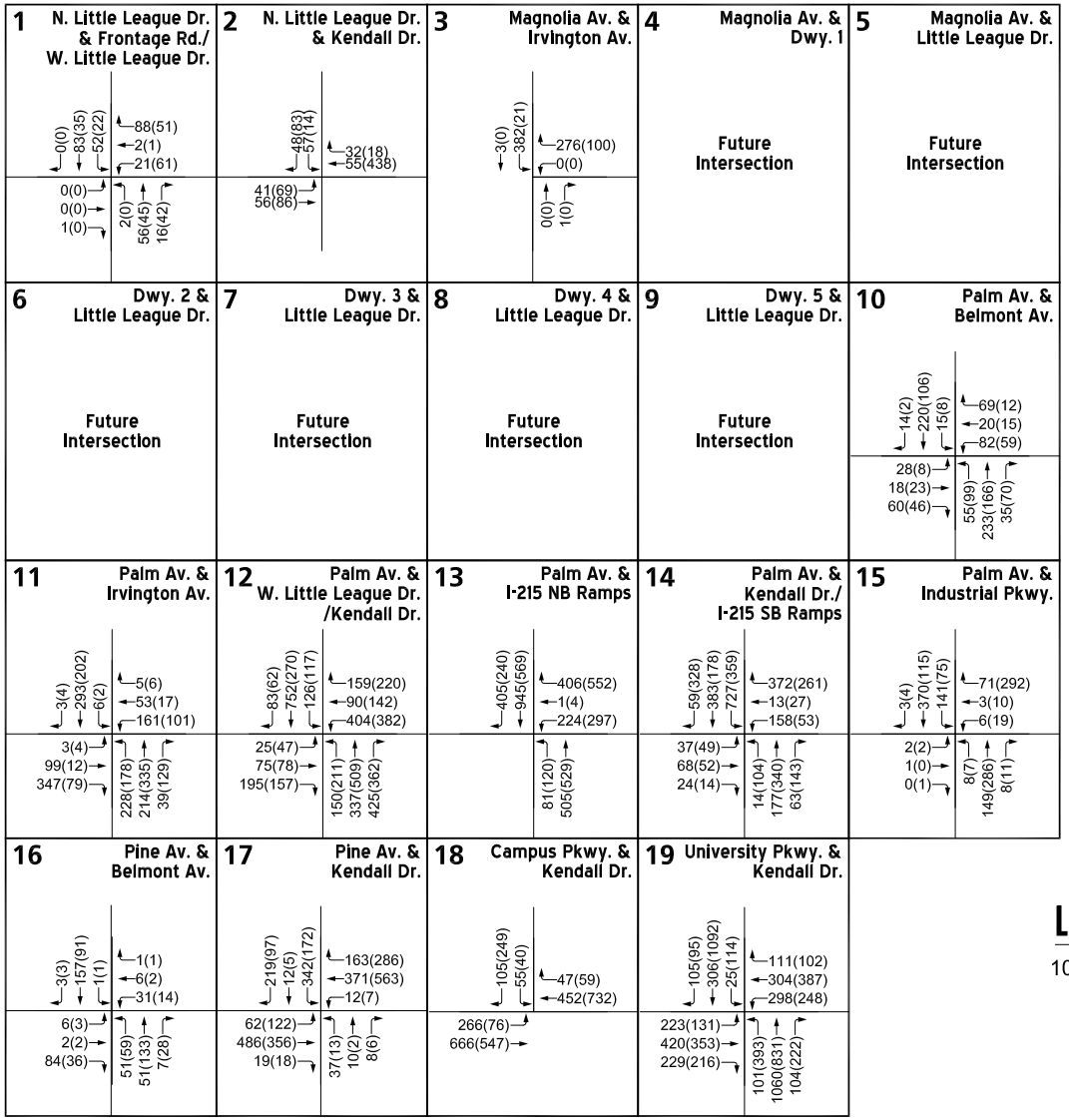
EXHIBIT 8-1 (2OF2) : OPENING YEAR CUMULATIVE (2018) WITHOUT PROJECT TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

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EXHIBIT 8-2 (1OF2) : OPENING YEAR CUMULATIVE (2018) WITH PROJECT TRAFFIC VOLUMES

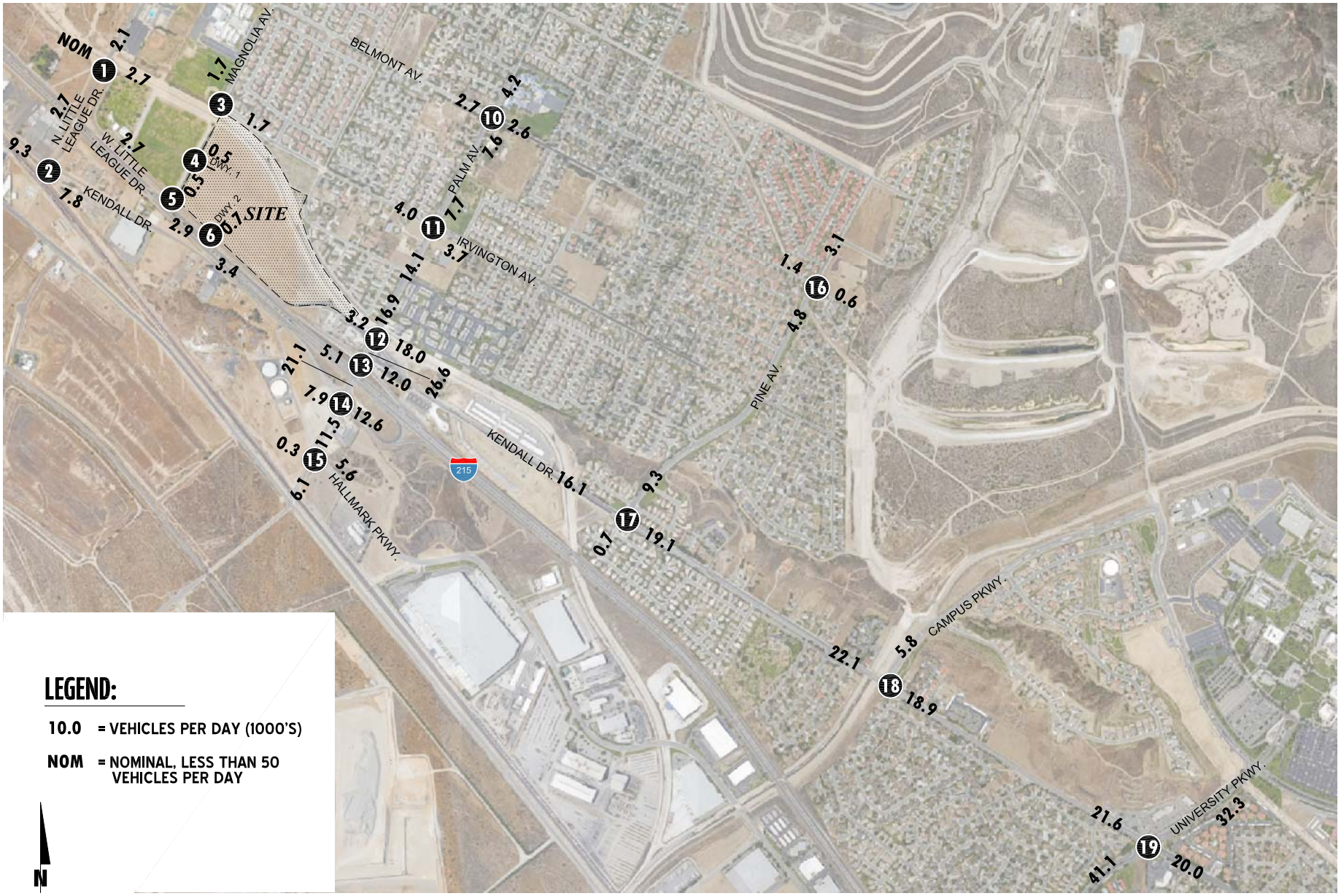

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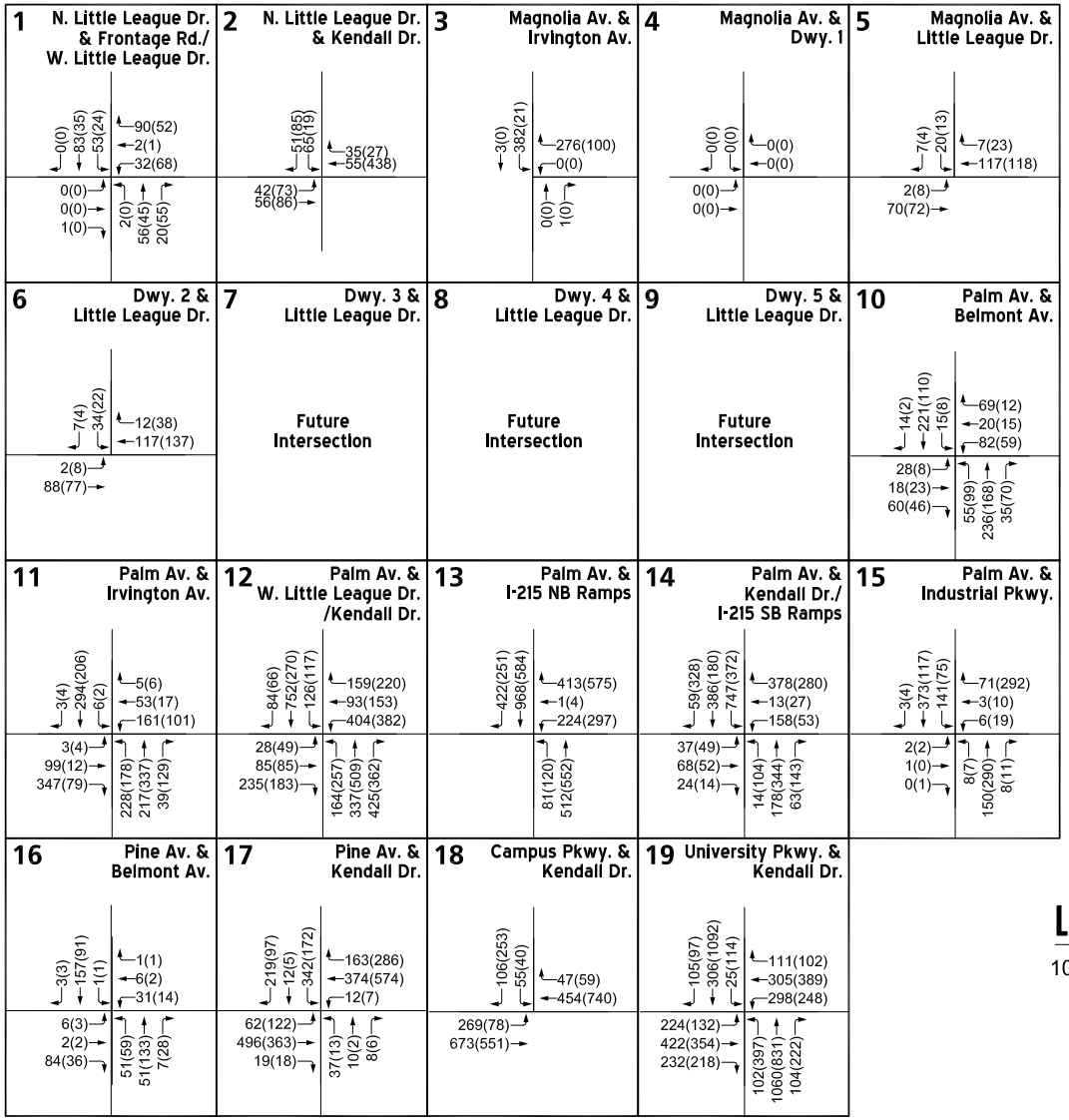
EXHIBIT 8-2 (2OF2) : OPENING YEAR CUMULATIVE (2018) WITH PROJECT TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

N

Table 8-1

Intersection Analysis for Opening Year Cumulative (2018) Conditions

#	Intersection	Traffic Control[2]	2018 Without Project Delay[1] (secs.) AM	2018 Without Project Delay[1] (secs.) PM	2018 Without Project LOS AM	2018 Without Project LOS PM	2018 With Project Delay[1] (secs.) AM	2018 With Project Delay[1] (secs.) PM	2018 With Project LOS AM	2018 With Project LOS PM
1	N. Little League Dr. / W. Little League Dr.	CSS	10.4	9.9	B	A	10.9	10.1	B	B
2	N. Little League Dr. / Kendall Dr.	CSS	10.5	14.0	B	B	10.7	14.6	B	B
3	Magnolia Av. / Irvington Av.	CSS	10.7	0.0	B	A	10.7	0.0	B	A
4	Magnolia Av. / Driveway 1	**CSS**	Future Intersection				8.6	8.7	A	A
5	Magnolia Av. / W. Little League Dr.	**CSS**	Future Intersection				9.6	9.7	A	A
6	Driveway 2 / W. Little League Dr.	**CSS**	Future Intersection				9.9	10.1	A	B
7	Driveway 3 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection			
8	Driveway 4 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection			
9	Driveway 5 / W. Little League Dr.	**CSS**	Future Intersection				Future Intersection			
10	Palm Av. / Belmont Av.	AWS	19.3	10.1	C	B	19.6	10.1	C	B
11	Palm Av. / Irvington Av.	TS	40.0	15.6	D	B	39.9	15.6	D	B
12	Palm Av. / Kendall Dr.	TS	40.1	36.0	D	D	41.7	37.0	D	D
13	Palm Av. / I-215 NB Ramps	TS	8.8	10.5	A	B	9.0	11.3	A	B
14	Palm Av. / I-215 SB Ramps	TS	47.3	20.5	D	C	48.2	21.1	D	C
15	Palm Av. / Hallmark Pkwy.	AWS	13.2	13.2	B	B	13.3	13.5	B	B
16	Pine Av. / Belmont Av.	CSS	14.0	12.5	B	B	14.0	12.5	B	B
17	Pine Av. / Kendall Dr.	TS	21.0	18.0	C	B	21.1	18.2	C	B
18	Campus Pkwy. / Kendall Dr.	TS	36.9	27.9	D	C	37.2	28.0	D	C
19	University Pkwy. / Kendall Dr.	TS	39.9	**60.6**	D	**E**	40.0	**61.4**	D	**E**

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or

[2] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

8.4.1 Opening Year Cumulative (2018) Without Project Conditions

All study area intersections are anticipated to operate at acceptable levels of service, with the exception of the following:

ID	Intersection Location
19	University Parkway / Kendall Drive – LOS E PM peak hour only

Consistent with Table 8-1, a summary of the peak hour intersection LOS for Opening Year Cumulative (2018) Without Project conditions are shown on Exhibit 8-3. The intersection operations analysis worksheets for Opening Year Cumulative (2018) Without Project traffic conditions are included in Appendix 8.1 of this TIA.

8.4.2 Opening Year Cumulative (2018) With Project Conditions

There are no additional study area intersections anticipated to operate at unacceptable LOS with the addition of Phase 1 Project traffic, in addition to the location previously identified for Opening Year Cumulative (2018) Without Project traffic conditions. However, the addition of Project traffic is anticipated to exceed the City's minimum v/c threshold of 0.01 for intersections operating at LOS E or LOS F under pre-project traffic conditions:

ID	Intersection Location	v/c for 2018 NP – PM Peak Hour	v/c for 2018 WP – PM Peak Hour	Variance
19	University Parkway / Kendall Drive	0.725	0.728	0.003

NOTE: v/c not reported by Synchro 8 for HCM 2010 methodology; as such, v/c has been reported using Vistro Version 3.00-04.

As such, the Project's impact to the deficient intersection is less than significant. Consistent with Table 8-1, a summary of the peak hour intersection LOS for Opening Year Cumulative (2018) With Project conditions are shown on Exhibit 8-4. The intersection operations analysis worksheets for Opening Year Cumulative (2018) With Project traffic conditions are included in Appendix 8.2 of this TIA.

8.5 Off-Ramp Queuing Analysis

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway mainline. Queuing analysis findings are presented in Table 8-2 for Opening Year Cumulative (2018) traffic conditions. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline.

8.5.1 Opening Year Cumulative (2018) Without Project Conditions

As shown on Table 8-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for Opening Year Cumulative (2018) Without Project traffic conditions. Worksheets for Opening Year Cumulative (2018) Without Project traffic conditions off-ramp queuing analysis are provided in Appendix 8.3.

EXHIBIT 8-3: SUMMARY OF LOS FOR OPENING YEAR CUMULATIVE (2018) WITHOUT PROJECT CONDITIONS

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EXHIBIT 8-4: SUMMARY OF LOS FOR OPENING YEAR CUMULATIVE (2018) WITH PROJECT CONDITIONS

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Table 8-2

Peak Hour Freeway Off-Ramp Queuing Summary for Opening Year Cumulative (2018) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	2018 Without Project				2018 With Project			
			95th Percentile Queue (Feet)[2]		Acceptable? [1]		95th Percentile Queue (Feet)[2]		Acceptable? [1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 NB Off-Ramp / Palm Av.	NBL/T	910	118	148	Yes	Yes	118	148	Yes	Yes
	NBR	415	137	216	Yes	Yes	143	248 [2]	Yes	Yes
I-215 SB Off-Ramp / Palm Av.	NBL/T/R	1,470	572 [2]	108	Yes	Yes	578 [2]	112	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Maximum queue length for the approach reported.

8.5.2 Opening Year Cumulative (2018) With Project Conditions

As shown on Table 8-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for Opening Year Cumulative (2018) With Project traffic conditions. Worksheets for Opening Year Cumulative (2018) With Project traffic conditions off-ramp queuing analysis are provided in Appendix 8.4.

8.6 Traffic Signal Warrants Analysis

The following intersection is anticipated to meet a peak hour traffic signal warrant under Opening Year Cumulative (2018) Without Project traffic conditions (see Appendix 8.5):

ID	Intersection Location	Jurisdiction	CMP
15	Palm Avenue / Hallmark Parkway	City of San Bernardino	Yes

There are no additional traffic signals anticipated to meet peak hour volume based or planning level (Caltrans) ADT traffic signal warrants under Opening Year Cumulative (2018) With Project traffic conditions, in addition to the intersection previously warranted under Opening Year Cumulative (2018) Without Project traffic conditions (see Appendix 8.6).

However, a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant. As such, the installation of a traffic signal at the intersection of Palm Avenue and Hallmark Parkway has not been recommended for the purposes of this TIA as the intersection is anticipated to operate at acceptable LOS under Opening Year Cumulative (2018) traffic conditions.

8.7 Basic Freeway Segment Analysis

8.7.1 Opening Year Cumulative (2018) Without Project Conditions

Opening Year Cumulative (2018) Without Project mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 8-5. As shown on Table 8-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS C or better) during the peak hours. Opening Year Cumulative (2018) Without Project basic freeway segment analysis worksheets are provided in Appendix 8.7.

Table 8-3

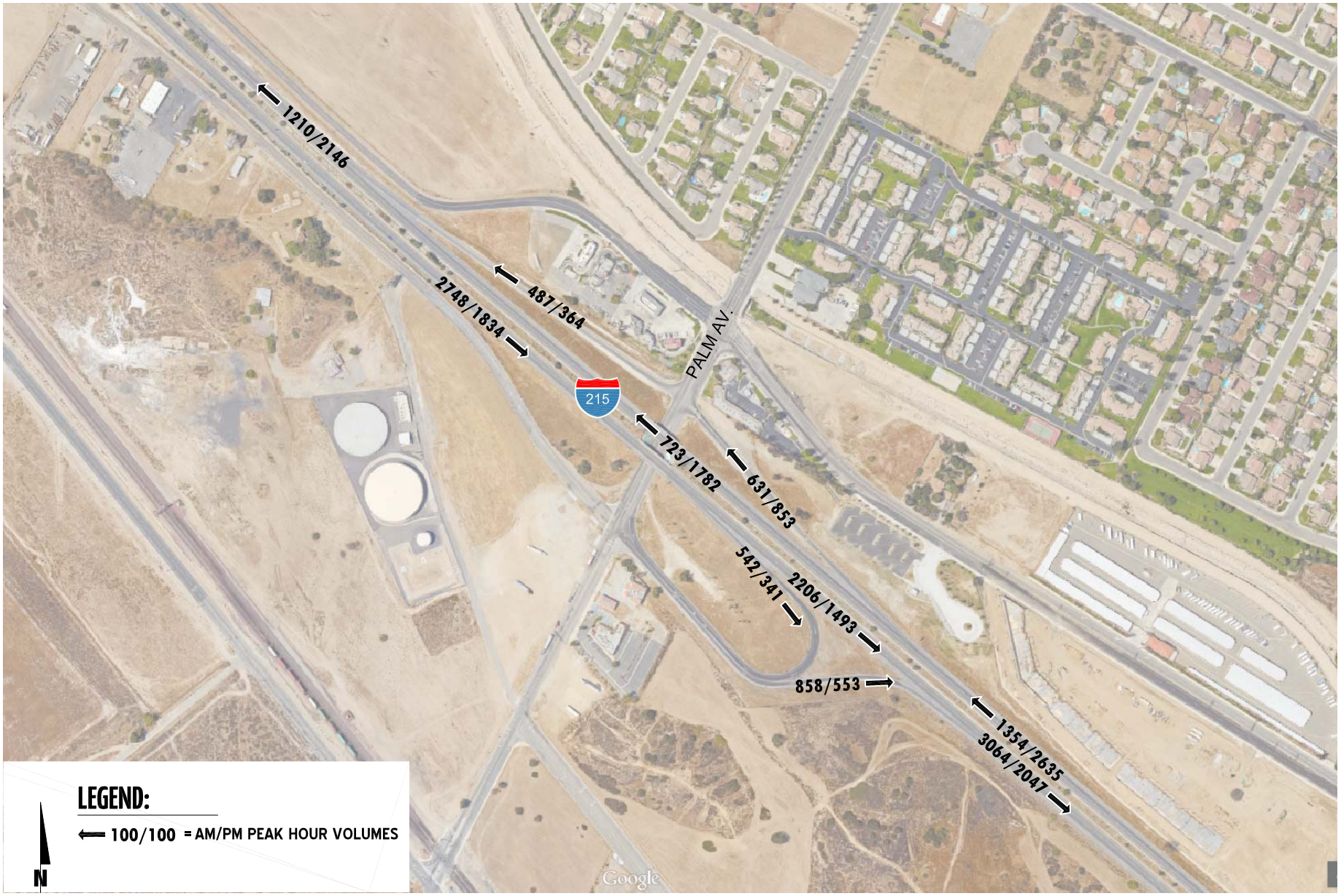
Basic Freeway Segment Analysis for Opening Year Cumulative (2018) Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	2018 Without Project				2018 With Project			
				Density[2]		LOS		Density[2]		LOS	
				AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	North of Palm Avenue	2	22.4	14.9	C	B	22.5	15.0	C	B
		South of Palm Avenue	2	25.5	16.5	C	B	25.7	16.6	C	B
	NB	North of Palm Avenue	2	9.8	17.1	A	B	10.0	17.2	A	B
		South of Palm Avenue	2	11.0	21.2	B	C	11.1	21.4	B	C

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

EXHIBIT 8-5: OPENING YEAR CUMULATIVE (2018) WITHOUT PROJECT FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)



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8.7.2 Opening Year Cumulative (2018) With Project Conditions

Opening Year Cumulative (2018) With Project mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 8-6. As shown on Table 8-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS C or better) during the peak hours, with the addition of Phase 1 Project traffic. Opening Year Cumulative (2018) With Project basic freeway segment analysis worksheets are provided in Appendix 8.8.

8.8 Freeway Merge/Diverge Analysis

8.8.1 Opening Year Cumulative (2018) Without Project Conditions

Ramp merge and diverge operations were evaluated for Opening Year Cumulative (2018) Without Project traffic conditions and the results of this analysis are presented in Table 8-4. As shown in Table 8-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). Opening Year Cumulative (2018) Without Project freeway ramp junction operations analysis worksheets are provided in Appendix 8.9.

8.8.2 Opening Year Cumulative (2018) With Project Conditions

Ramp merge and diverge operations were evaluated for Opening Year Cumulative (2018) With Project traffic conditions and the results of this analysis are presented in Table 8-4. As shown in Table 8-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). Opening Year Cumulative (2018) With Project freeway ramp junction operations analysis worksheets are provided in Appendix 8.10.

8.9 Cumulative Impacts and Recommended Improvements

This section provides a summary of cumulative impacts and recommended improvements.

8.9.1 Recommended Improvements to Address Deficiencies at Intersections

Improvement strategies have not been recommended as the Project's contribution to the deficient study area intersection (University Parkway and Kendall Drive) is anticipated to be less-than-significant (i.e., the addition of Project traffic is anticipated to increase the v/c by less than 0.01 from the pre-project traffic condition).

8.9.2 Recommended Improvements to Address Off-Ramp Queues

As shown previously on Table 8-2, there are no peak hour queuing issues at the I-215 Freeway at Palm Avenue interchange for both Opening Year Cumulative (2018) Without and With Project traffic conditions. As such, no improvements have been recommended.

8.9.3 Recommended Improvements to Address Deficiencies on Freeway Facilities

As shown previously on Table 8-3 and Table 8-4, there are no deficient freeway mainline segments or merge/diverge ramp junctions anticipated for Opening Year Cumulative (2018) traffic conditions. As such, no improvements have been recommended.

EXHIBIT 8-6: OPENING YEAR CUMULATIVE (2018) WITH PROJECT FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

Table 8-4

Freeway Ramp Junction Merge/Diverge Analysis for Opening Year Cumulative (2018) Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	2018 Without Project				2018 With Project			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS
I-215 Freeway	SB	Off-Ramp at Palm Avenue	2	29.8	D	21.3	C	29.9	D	21.5	C
		On-Ramp at Palm Avenue	2	30.5	D	22.0	C	30.6	D	22.1	C
	NB	On-Ramp at Palm Avenue	2	14.2	B	22.2	C	14.3	B	22.3	C
		Off-Ramp at Palm Avenue	2	16.2	B	28.2	D	16.3	B	28.4	D

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

9 OPENING YEAR CUMULATIVE (2019) TRAFFIC ANALYSIS

This section discusses the methods used to develop Opening Year Cumulative (2019) traffic forecasts, and the resulting intersection operations, traffic signal warrant, and freeway mainline operations analyses.

9.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Opening Year Cumulative conditions are consistent with those shown previously on Exhibit 3-1, with the exception of the Project driveways and those facilities assumed to be in place prior to or constructed by the Project to provide site access are also assumed to be in place for Opening Year Cumulative (2019) conditions only.

9.2 OPENING YEAR CUMULATIVE (2019) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 8.24% plus traffic from pending and approved but not yet constructed but known development projects (as previously shown on Table 4-2) in the area. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for Opening Year Cumulative (2019) Without Project traffic conditions are shown on Exhibit 9-1.

9.3 OPENING YEAR CUMULATIVE (2019) WITH PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes Existing traffic volumes plus an ambient growth factor of 8.24%, traffic from pending and approved but not yet constructed but known development projects in the area and the addition of Project Buildout traffic. The weekday ADT, weekday AM, and PM peak hour volumes which can be expected for Opening Year Cumulative (2019) With Project traffic conditions are shown on Exhibit 9-2.

9.4 INTERSECTION OPERATIONS ANALYSIS

Opening Year Cumulative (2019) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 9-1 for Opening Year Cumulative (2019) conditions.

EXHIBIT 9-1 (1OF2) : OPENING YEAR CUMULATIVE (2019) WITHOUT PROJECT TRAFFIC VOLUMES

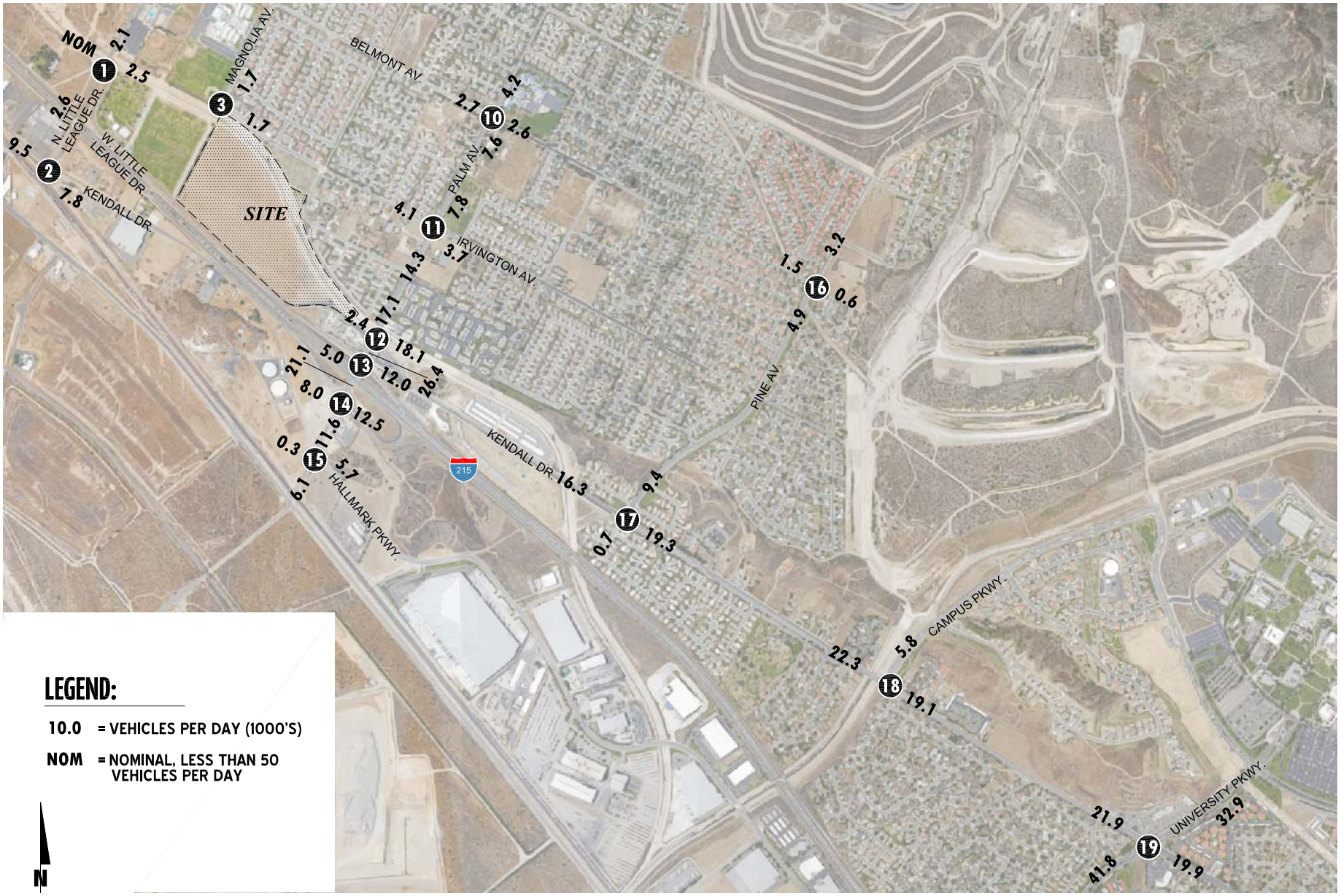

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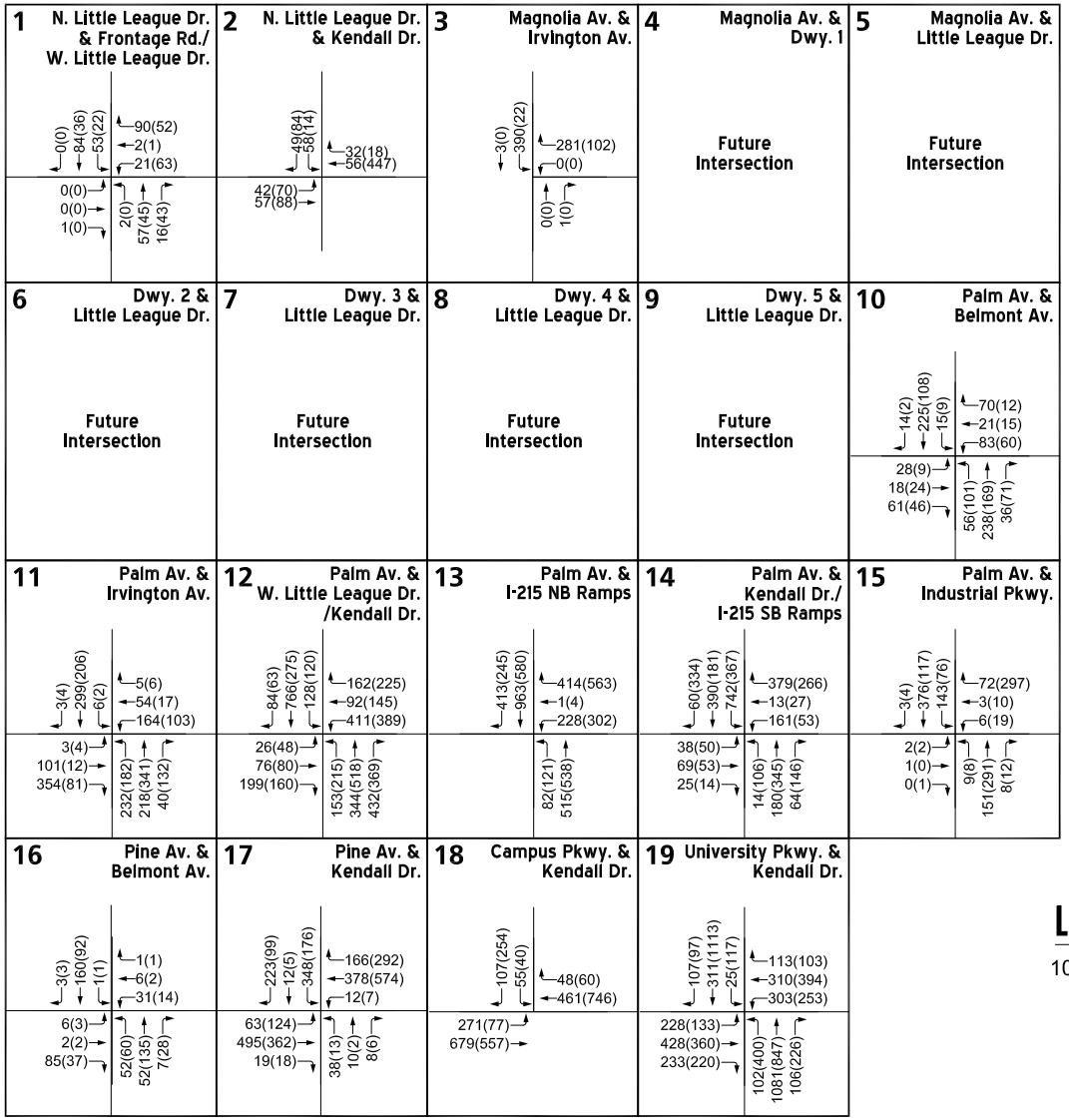
EXHIBIT 9-1 (2OF2) : OPENING YEAR CUMULATIVE (2019) WITHOUT PROJECT TRAFFIC VOLUMES



LEGEND:

10(10) = **AM(PM) PEAK HOUR INTERSECTION VOLUMES**

N

EXHIBIT 9-2 (1OF2) : OPENING YEAR CUMULATIVE (2019) WITH PROJECT TRAFFIC VOLUMES

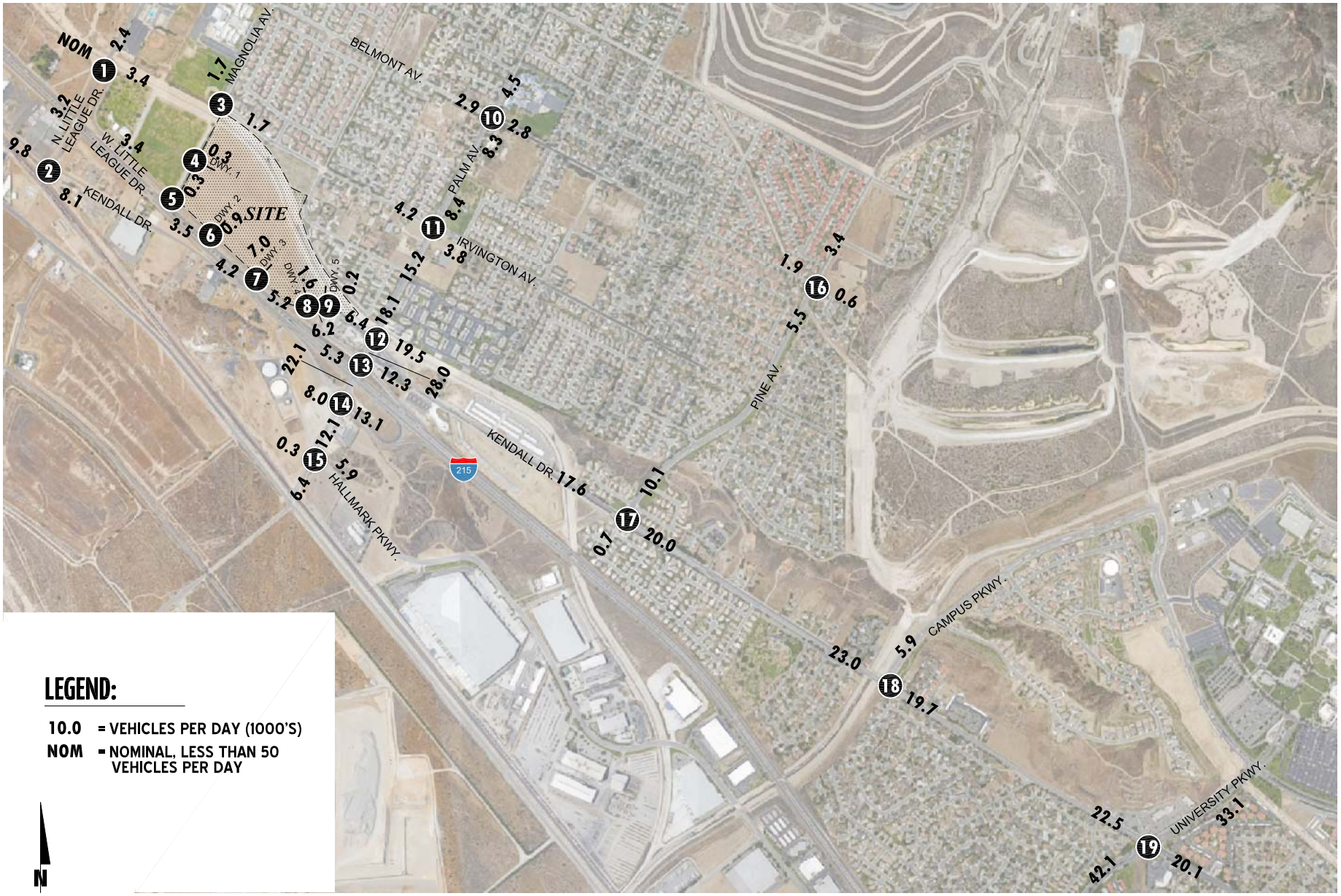


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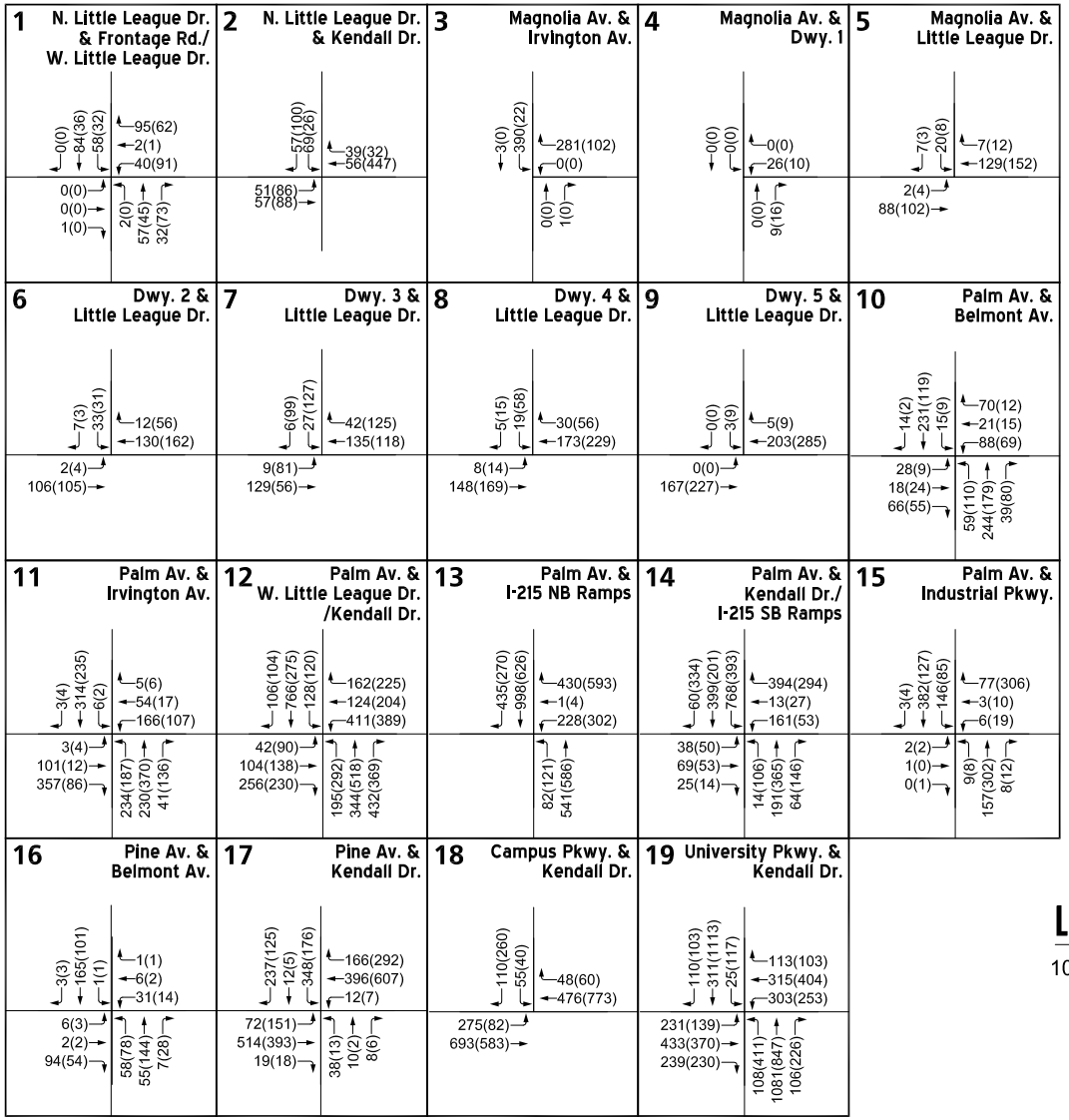
EXHIBIT 9-2 (2OF2) : OPENING YEAR CUMULATIVE (2019) WITH PROJECT TRAFFIC VOLUMES



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

N

Table 9-1

Intersection Analysis for Opening Year Cumulative (2019) Conditions

#	Intersection	Traffic Control[2]	2019 Without Project Delay[1] (secs.) AM	PM	LOS AM	PM	2019 With Project Delay[1] (secs.) AM	PM	LOS AM	PM
1	N. Little League Dr. / W. Little League Dr.	CSS	10.4	10.0	B	B	11.5	10.7	B	B
2	N. Little League Dr. / Kendall Dr.	CSS	10.5	14.2	B	B	11.0	16.0	B	C
3	Magnolia Av. / Irvington Av.	CSS	10.7	0.0	B	A	10.7	0.0	B	A
4	Magnolia Av. / Driveway 1	**CSS**	Future Intersection				8.6	8.6	A	A
5	Magnolia Av. / W. Little League Dr.	**CSS**	Future Intersection				9.8	10.0	A	B
6	Driveway 2 / W. Little League Dr.	**CSS**	Future Intersection				10.1	10.6	B	B
7	Driveway 3 / W. Little League Dr.	**CSS**	Future Intersection				10.5	14.1	B	B
8	Driveway 4 / W. Little League Dr.	**CSS**	Future Intersection				10.8	12.4	B	B
9	Driveway 5 / W. Little League Dr.	**CSS**	Future Intersection				11.0	12.5	B	B
10	Palm Av. / Belmont Av.	AWS	20.3	10.2	C	B	22.3	10.7	C	B
11	Palm Av. / Irvington Av.	TS	43.6	15.7	D	B	44.3	15.9	D	B
12	Palm Av. / Kendall Dr.	TS	41.1	36.9	D	D	47.3	38.6	D	D
13	Palm Av. / I-215 NB Ramps	TS	9.1	10.9	A	B	9.3	11.9	A	B
14	Palm Av. / I-215 SB Ramps	TS	51.6	21.1	D	C	54.7	23.0	D	C
15	Palm Av. / Hallmark Pkwy.	AWS	13.5	13.6	B	B	13.8	14.2	B	B
16	Pine Av. / Belmont Av.	CSS	14.1	12.6	B	B	14.8	13.8	B	B
17	Pine Av. / Kendall Dr.	TS	21.0	18.3	C	B	22.2	20.4	C	C
18	Campus Pkwy. / Kendall Dr.	TS	36.7	27.9	D	C	36.8	28.0	D	C
19	University Pkwy. / Kendall Dr.	TS	40.3	**62.7**	D	**E**	40.8	**65.0**	D	**E**

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or

[2] CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

9.4.1 Opening Year Cumulative (2019) Without Project Conditions

All study area intersections are anticipated to operate at acceptable levels of service, with the exception of the following:

ID	Intersection Location
19	University Parkway / Kendall Drive – LOS E PM peak hour only

Consistent with Table 9-1, a summary of the peak hour intersection LOS for Opening Year Cumulative (2019) Without Project conditions are shown on Exhibit 9-3. The intersection operations analysis worksheets for Opening Year Cumulative (2019) Without Project traffic conditions are included in Appendix 9.1 of this TIA.

9.4.2 Opening Year Cumulative (2019) With Project Conditions

There are no additional study area intersections anticipated to operate at unacceptable LOS with the addition of Project Buildout traffic, in addition to the location previously identified for Opening Year Cumulative (2019) Without Project traffic conditions. However, the addition of Project traffic is anticipated to exceed the City's minimum v/c threshold of 0.01 for intersections operating at LOS E or LOS F under pre-project traffic conditions:

ID	Intersection Location	v/c for 2019 NP – PM Peak Hour	v/c for 2019 WP – PM Peak Hour	Variance
19	University Parkway / Kendall Drive	0.739	0.752	0.013

NOTE: v/c not reported by Synchro 8 for HCM 2010 methodology; as such, v/c has been reported using Vistro Version 3.00-04.

As such, the Project's impact to the deficient intersection is considered to be cumulatively considerable. Consistent with Table 9-1, a summary of the peak hour intersection LOS for Opening Year Cumulative (2019) With Project conditions are shown on Exhibit 9-4. The intersection operations analysis worksheets for Opening Year Cumulative (2019) With Project traffic conditions are included in Appendix 9.2 of this TIA.

9.5 Off-Ramp Queuing Analysis

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway mainline. Queuing analysis findings are presented in Table 9-2 for Opening Year Cumulative (2019) traffic conditions. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline.

9.5.1 Opening Year Cumulative (2019) Without Project Conditions

As shown on Table 9-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for Opening Year Cumulative (2019) Without Project traffic conditions. Worksheets for Opening Year Cumulative (2019) Without Project traffic conditions off-ramp queuing analysis are provided in Appendix 9.3.

EXHIBIT 9-3: SUMMARY OF LOS FOR OPENING YEAR CUMULATIVE (2019) WITHOUT PROJECT CONDITIONS

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EXHIBIT 9-4: SUMMARY OF LOS FOR OPENING YEAR CUMULATIVE (2019) WITH PROJECT CONDITIONS

Table 9-2

Peak Hour Freeway Off-Ramp Queuing Summary for Opening Year Cumulative (2019) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	2019 Without Project				2019 With Project			
			95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 NB Off-Ramp / Palm Av.	NBL/T	910	120	151	Yes	Yes	120	151	Yes	Yes
	NBR	415	145	228	Yes	Yes	163	310 [2]	Yes	Yes
I-215 SB Off-Ramp / Palm Av.	NBL/T/R	1,470	585 [2]	109	Yes	Yes	601 [2]	115	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Maximum queue length for the approach reported.

9.5.2 Opening Year Cumulative (2019) With Project Conditions

As shown on Table 9-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for Opening Year Cumulative (2019) With Project traffic conditions. Worksheets for Opening Year Cumulative (2019) With Project traffic conditions off-ramp queuing analysis are provided in Appendix 9.4.

9.6 Traffic Signal Warrants Analysis

There are no additional traffic signals anticipated to meet peak hour volume based or planning level (Caltrans) ADT traffic signal warrants under Opening Year Cumulative (2019) traffic conditions in addition to the intersection previously warranted under Opening Year Cumulative (2018) traffic conditions (see Appendix 9.5 and Appendix 9.6).

9.7 Basic Freeway Segment Analysis

9.7.1 Opening Year Cumulative (2019) Without Project Conditions

Opening Year Cumulative (2019) Without Project mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 9-5. As shown on Table 9-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours. Opening Year Cumulative (2019) Without Project basic freeway segment analysis worksheets are provided in Appendix 9.7.

9.7.2 Opening Year Cumulative (2019) With Project Conditions

Opening Year Cumulative (2019) With Project mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 9-6. As shown on Table 9-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours, with the addition of Project Buildout traffic. Opening Year Cumulative (2019) With Project basic freeway segment analysis worksheets are provided in Appendix 9.8.

9.8 Freeway Merge/Diverge Analysis

9.8.1 Opening Year Cumulative (2019) Without Project Conditions

Ramp merge and diverge operations were evaluated for Opening Year Cumulative (2019) Without Project traffic conditions and the results of this analysis are presented in Table 9-4. As shown in Table 9-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). Opening Year Cumulative (2019) Without Project freeway ramp junction operations analysis worksheets are provided in Appendix 9.9.

Table 9-3

Basic Freeway Segment Analysis for Opening Year Cumulative (2019) Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	2019 Without Project				2019 With Project			
				Density[2]		LOS		Density[2]		LOS	
				AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	North of Palm Avenue	2	22.9	15.2	C	B	23.1	15.4	C	B
		South of Palm Avenue	2	26.1	16.9	D	B	26.4	17.1	D	B
	NB	North of Palm Avenue	2	10.0	17.4	A	B	10.2	17.6	A	B
		South of Palm Avenue	2	11.2	21.7	B	C	11.4	22.0	B	C

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

Table 9-4

Freeway Ramp Junction Merge/Diverge Analysis for Opening Year Cumulative (2019) Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	2019 Without Project				2019 With Project			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS
I-215 Freeway	SB	Off-Ramp at Palm Avenue	2	30.3	D	21.6	C	30.5	D	21.9	C
		On-Ramp at Palm Avenue	2	31.0	D	22.3	C	31.2	D	22.5	C
	NB	On-Ramp at Palm Avenue	2	14.4	B	22.6	C	14.5	B	22.8	C
		Off-Ramp at Palm Avenue	2	16.4	B	28.7	D	16.6	B	28.9	D

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

EXHIBIT 9-5: OPENING YEAR CUMULATIVE (2019) WITHOUT PROJECT FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

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EXHIBIT 9-6: OPENING YEAR CUMULATIVE (2019) WITH PROJECT FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

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9.8.2 Opening Year Cumulative (2019) With Project Conditions

Ramp merge and diverge operations were evaluated for Opening Year Cumulative (2019) With Project traffic conditions and the results of this analysis are presented in Table 9-4. As shown in Table 9-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better). Opening Year Cumulative (2019) With Project freeway ramp junction operations analysis worksheets are provided in Appendix 9.10.

9.9 Cumulative Impacts and Recommended Improvements

This section provides a summary of cumulative impacts and recommended improvements.

9.9.1 Recommended Improvements to Address Deficiencies at Intersections

Improvement strategies have been recommended at intersections that have been identified as deficient in an effort to reduce each location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the recommended improvement strategies discussed below to address Opening Year Cumulative (2019) traffic deficiencies is presented in Table 9-5.

Worksheets for Opening Year Cumulative (2019) Without and With Project traffic conditions, with improvements, HCM calculation worksheets are provided in Appendix 9.11 and 9.12, respectively.

9.9.2 Recommended Improvements to Address Off-Ramp Queues

As shown previously on Table 9-2, there are no peak hour queuing issues at the I-215 Freeway at Palm Avenue interchange for both Opening Year Cumulative (2019) Without and With Project traffic conditions. As such, no improvements have been recommended.

9.9.3 Recommended Improvements to Address Deficiencies on Freeway Facilities

As shown previously on Table 9-3 and Table 9-4, there are no deficient freeway mainline segments or merge/diverge ramp junctions anticipated for Opening Year Cumulative (2019) traffic conditions. As such, no improvements have been recommended.

Table 9-5

Intersection Analysis for Opening Year Cumulative (2019) Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
19	University Pkwy. / Kendall Dr.																	
	- 2019 Without Project																	
	- Without Improvements	TS	2	3	0	1	3	0	2	2	0	2	2	0	38.7	**56.1**	D	**E**
	- With Improvements	TS	2	3	0	**2**	3	0	2	2	0	2	2	0	39.9	52.6	D	D
	- 2019 With Project																	
	- Without Improvements	TS	2	3	0	1	3	0	2	2	0	2	2	0	39.1	**58.0**	D	**E**
	- With Improvements	TS	2	3	0	**2**	3	0	2	2	0	2	2	0	40.2	53.2	D	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

[1] When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane; > = Right-Turn Overlap Phasing; >> = Free-Right Turn Lane; **1** = Improvement

[2] Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

[3] TS = Traffic Signal

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10 HORIZON YEAR (2035) TRAFFIC ANALYSIS

This section discusses the methods used to develop Horizon Year (2035) traffic forecasts, and the resulting intersection operations, traffic signal warrant, and freeway mainline operations analyses.

10.1 ROADWAY IMPROVEMENTS

The lane configurations and traffic controls assumed to be in place for Horizon Year conditions are consistent with those shown previously on Exhibit 3-1, with the exception of Project driveways and those facilities assumed to be constructed by the Project to provide site access.

10.2 HORIZON YEAR (2035) WITHOUT PROJECT TRAFFIC VOLUME FORECASTS

This scenario includes the refined post-processed volumes based on SBTAM (see Section 4.9 *Horizon Year (2035) Volume Forecasts* of this TIA for a detailed discussion on the post-processing methodology). Exhibit 10-1 shows the weekday ADT and peak hour volumes which can be expected for Horizon Year (2035) Without Project traffic conditions.

Peak hour intersection operations have also been evaluated at study area intersections that were determined to potentially be impacted by the future Magnolia Avenue Bridge over the Cajon Creek Wash. Traffic forecasts for Horizon Year (2035) Without Project conditions with the Magnolia Avenue Bridge are also shown on Exhibit 10-1.

10.3 HORIZON YEAR (2035) WITH PROJECT TRAFFIC VOLUME FORECASTS

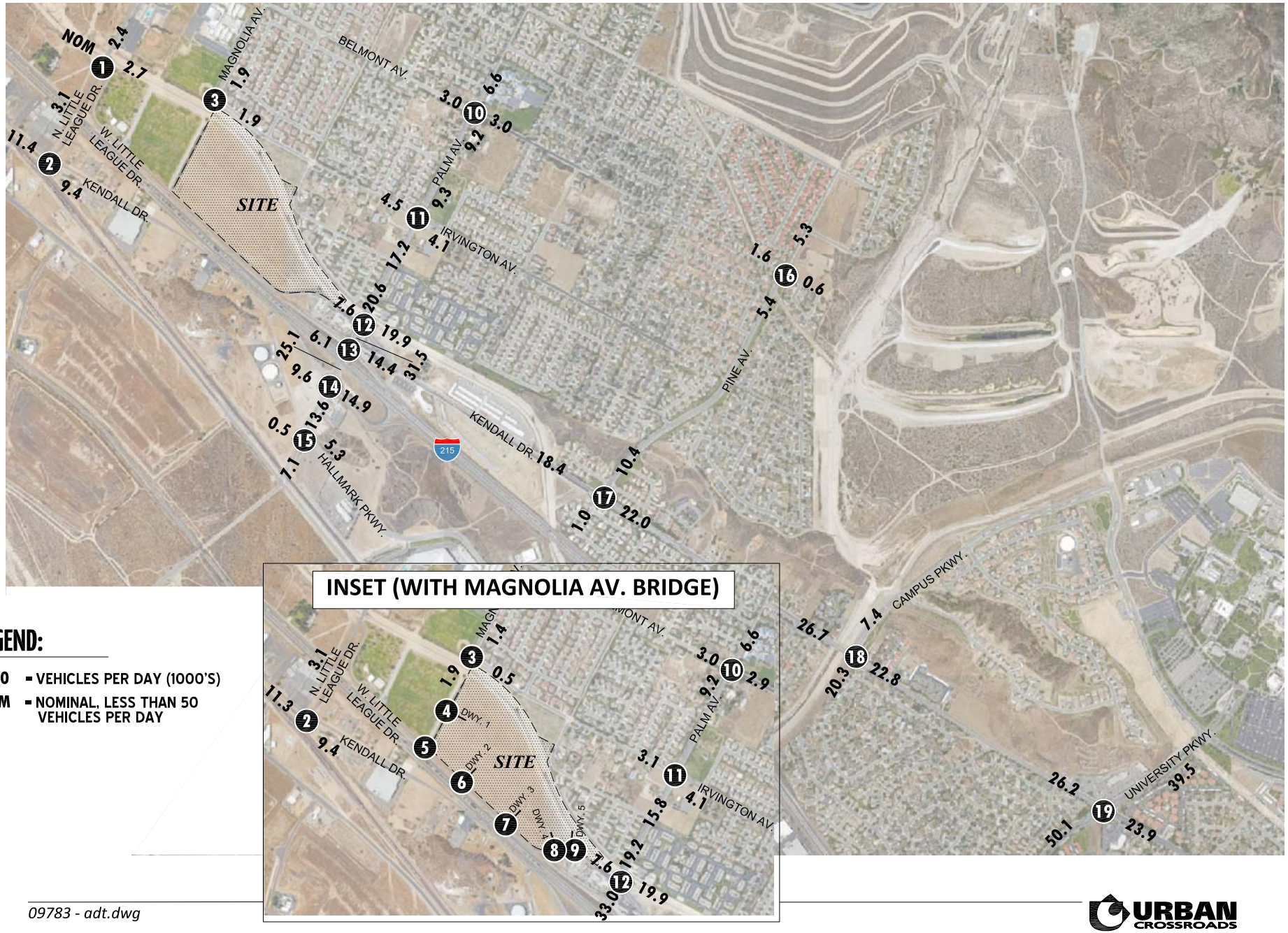
This scenario includes the refined post-processed volumes based on SBTAM, plus the addition of Project Buildout traffic. Exhibit 10-2 shows the weekday ADT and peak hour volumes which can be expected for Horizon Year (2035) With Project traffic conditions.

Peak hour intersection operations have also been evaluated at study area intersections that were determined to potentially be impacted by the future Magnolia Avenue Bridge over the Cajon Creek Wash. Traffic forecasts for Horizon Year (2035) With Project conditions with the Magnolia Avenue Bridge are also shown on Exhibit 10-2.

10.4 INTERSECTION OPERATIONS ANALYSIS

Horizon Year (2035) peak hour traffic operations have been evaluated for the study area intersections based on the analysis methodologies presented in Section 2 *Methodologies* of this TIA. The intersection analysis results are summarized in Table 10-1 for Horizon Year (2035) traffic conditions.

EXHIBIT 10-1 (1OF2) : HORIZON YEAR CUMULATIVE (2035) WITHOUT PROJECT TRAFFIC VOLUMES



LEGEND:

10.0 - VEHICLES PER DAY (1000'S)

NOM - NOMINAL, LESS THAN 50 VEHICLES PER DAY

N

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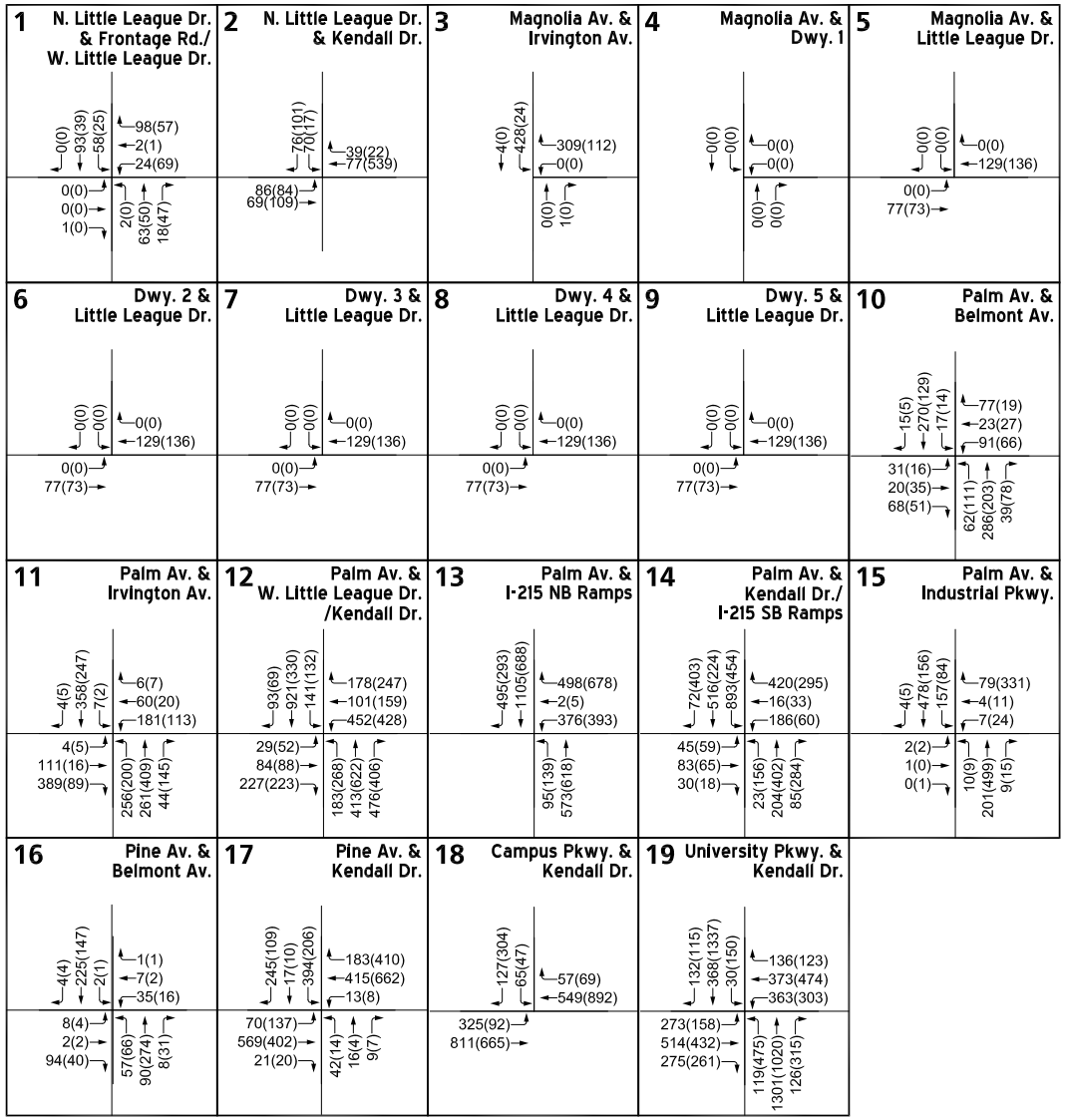
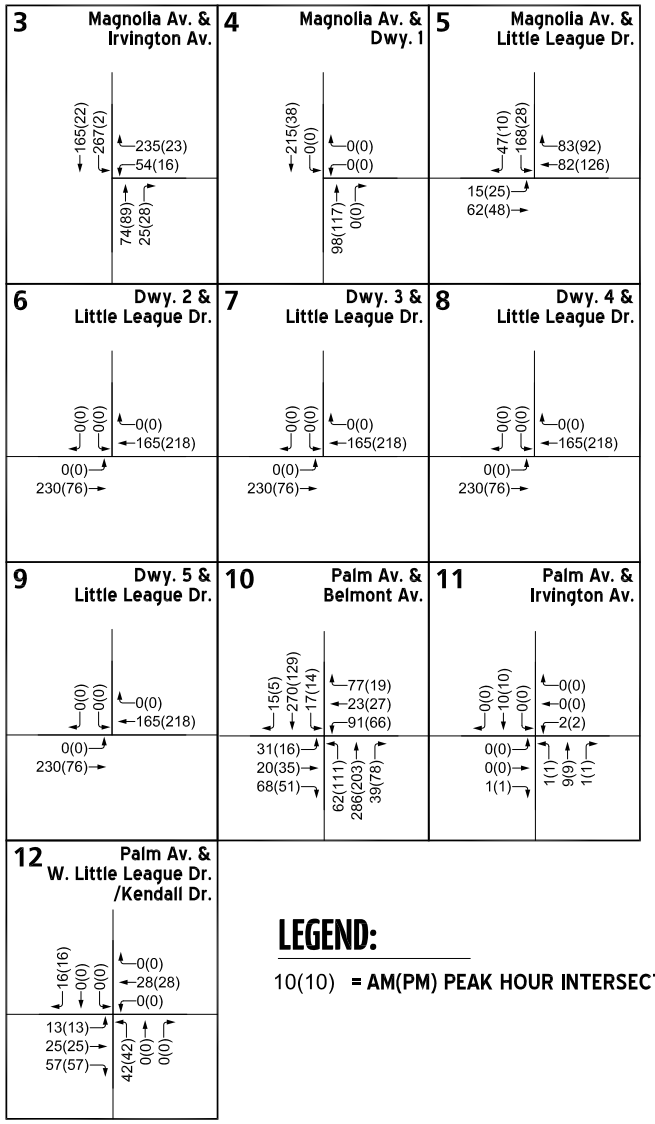
EXHIBIT 10-1 (2OF2) : HORIZON YEAR CUMULATIVE (2035) WITHOUT PROJECT TRAFFIC VOLUMES



2035 ALTERNATIVE



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

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EXHIBIT 10-2 (1OF2) : HORIZON YEAR CUMULATIVE (2035) WITH PROJECT TRAFFIC VOLUMES

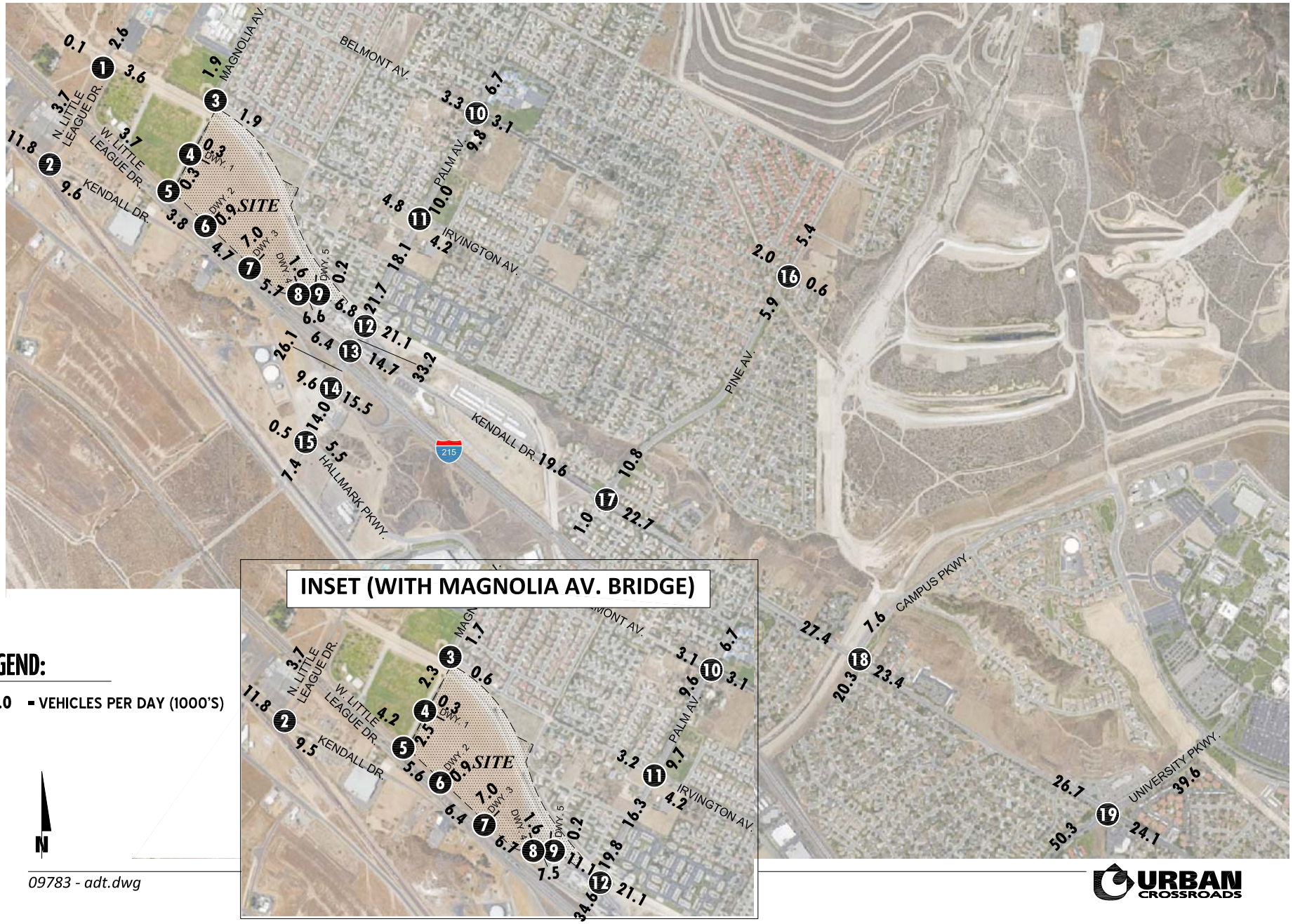

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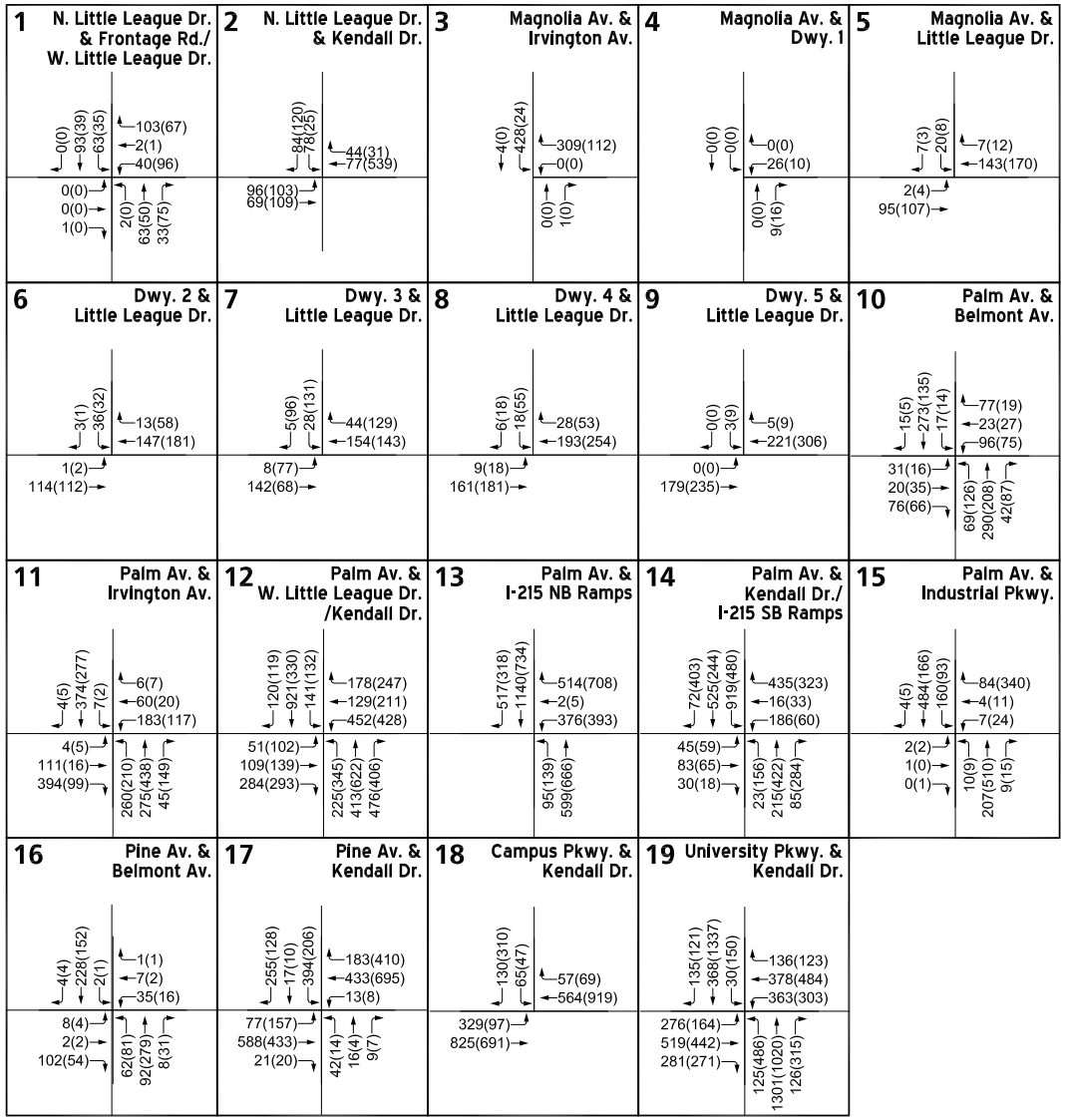
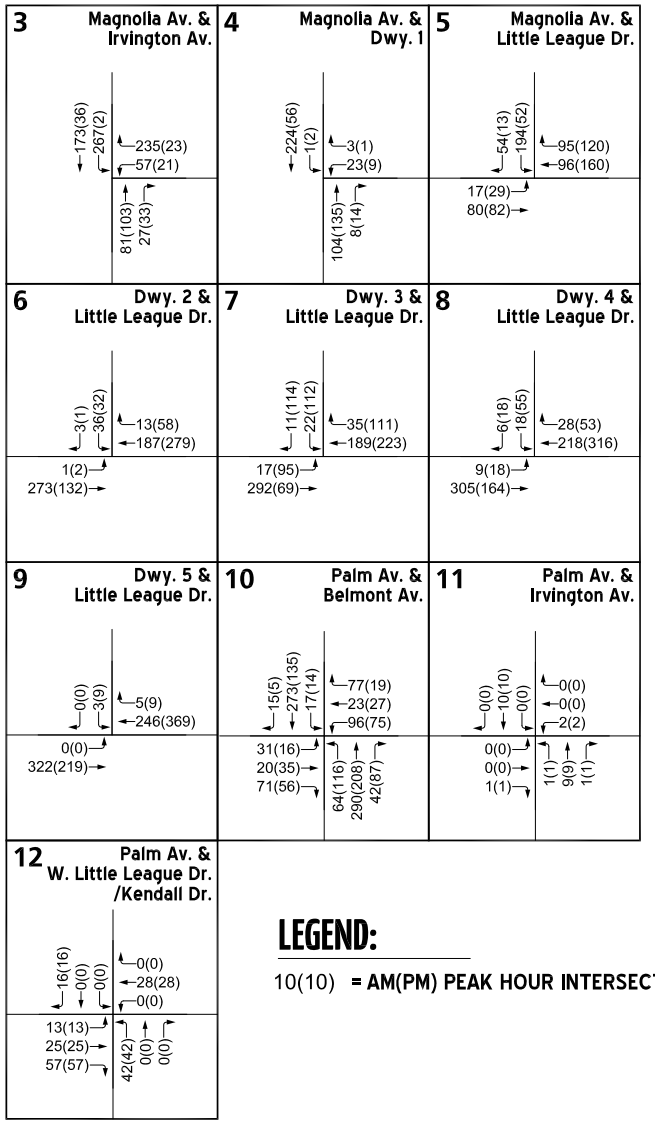
EXHIBIT 10-2 (2OF2) : HORIZON YEAR CUMULATIVE (2035) WITH PROJECT TRAFFIC VOLUMES



2035 ALTERNATIVE



LEGEND:

10(10) = AM(PM) PEAK HOUR INTERSECTION VOLUMES

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Table 10-1

Intersection Analysis for Horizon Year (2035) Conditions

#	Intersection	Traffic Control[2]	2035 Without Project				2035 With Project				2035 Without Project (w/ Magnolia Av Bridge)				2035 With Project (w/ Magnolia Av Bridge)			
			Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS		Delay[1] (secs.)		LOS	
			AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM	AM	PM
1	N. Little League Dr. / W. Little League Dr.	CSS	10.8	10.2	B	B	11.9	11.0	B	B	Not Applicable[3]				Not Applicable[3]			
2	N. Little League Dr. / Kendall Dr.	CSS	12.4	17.3	B	C	13.2	20.0	B	C	Not Applicable[3]				Not Applicable[3]			
3	Magnolia Av. / Irvington Av.	CSS	11.2	0.0	B	A	11.2	0.0	B	A	21.6	10.5	C	B	23.8	11.1	C	B
4	Magnolia Av. / Driveway 1	**CSS**	Future Intersection				8.6	8.6	A	A	Future Intersection				10.7	9.7	B	A
5	Magnolia Av. / W. Little League Dr.	**CSS**	Future Intersection				9.9	10.1	A	B	11.6	10.3	B	B	12.7	11.5	B	B
6	Driveway 2 / W. Little League Dr.	**CSS**	Future Intersection				10.4	10.9	B	B	Future Intersection				12.3	12.1	B	B
7	Driveway 3 / W. Little League Dr.	**CSS**	Future Intersection				10.8	14.9	B	B	Future Intersection				12.0	17.0	B	C
8	Driveway 4 / W. Little League Dr.	**CSS**	Future Intersection				11.0	12.9	B	B	Future Intersection				12.4	13.5	B	B
9	Driveway 5 / W. Little League Dr.	**CSS**	Future Intersection				11.3	12.9	B	B	Future Intersection				13.0	13.4	B	B
10	Palm Av. / Belmont Av.	AWS	**41.1**	11.5	**E**	B	**41.3**	12.5	**E**	B	Not Applicable[3]				Not Applicable[3]			
11	Palm Av. / Irvington Av.	TS	**58.1**	16.2	**E**	B	**60.6**	16.5	**E**	B	28.6	15.4	C	B	28.8	15.6	C	B
12	Palm Av. / Kendall Dr.	TS	49.0	41.6	D	D	54.1	46.4	D	D	**62.1**	42.3	**E**	D	**83.0**	51.3	**F**	D
13	Palm Av. / I-215 NB Ramps	TS	18.0	18.2	B	B	44.1	27.6	D	C	Not Applicable[3]				Not Applicable[3]			
14	Palm Av. / I-215 SB Ramps	TS	48.9	**57.5**	D	**E**	53.7	**57.9**	D	**E**	Not Applicable[3]				Not Applicable[3]			
15	Palm Av. / Hallmark Pkwy.	AWS	20.8	**36.0**	C	**E**	21.9	**36.2**	C	**E**	Not Applicable[3]				Not Applicable[3]			
16	Pine Av. / Belmont Av.	CSS	17.7	16.6	C	C	18.5	18.1	C	C	Not Applicable[3]				Not Applicable[3]			
17	Pine Av. / Kendall Dr.	TS	21.5	25.9	C	C	21.5	32.4	C	C	Not Applicable[3]				Not Applicable[3]			
18	Campus Pkwy. / Kendall Dr.	TS	36.9	27.7	D	C	36.9	28.2	D	C	Not Applicable[3]				Not Applicable[3]			
19	University Pkwy. / Kendall Dr.	TS	48.9	**89.3**	D	**F**	49.6	**92.9**	D	**F**	Not Applicable[3]				Not Applicable[3]			

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

1 Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

2 CSS = Cross-street Stop; AWS = All Way Stop; TS = Traffic Signal; **CSS** = Improvement

10.4.1 Horizon Year (2035) Without Project Conditions

All study area intersections are anticipated to operate at acceptable levels of service, with the exception of the following:

ID	Intersection Location
10	Palm Avenue / Belmont Avenue – LOS E AM peak hour only
11	Palm Avenue / Irvington Avenue – LOS E AM peak hour only
14	Palm Avenue / I-215 Southbound Ramps – LOS E PM peak hour only
15	Palm Avenue / Hallmark Parkway – LOS E PM peak hour only
19	University Parkway / Kendall Drive – LOS F PM peak hour only

Consistent with Table 10-1, a summary of the peak hour intersection LOS for Horizon Year (2035) Without Project conditions are shown on Exhibit 10-3. The intersection operations analysis worksheets for Horizon Year (2035) Without Project traffic conditions are included in Appendix 10.1 of this TIA.

The following study area intersection is anticipated to operate at unacceptable LOS during the peak hours under Horizon Year (2035) Without Project traffic conditions with the Magnolia Avenue extension over the Cajon Creek Wash:

ID	Intersection Location
12	Palm Avenue / Kendall Avenue – LOS F AM peak hour only

The intersection operations analysis worksheets for Horizon Year (2035) Without Project (With Magnolia Avenue Bridge) traffic conditions are included in Appendix 10.2 of this TIA.

10.4.2 Horizon Year (2035) With Project Conditions

There are no additional study area intersections anticipated to operate at unacceptable LOS with the addition of Project Buildout traffic, in addition to the locations previously identified for Horizon Year (2035) Without Project traffic conditions. However, the addition of Project traffic is anticipated to exceed the City's minimum v/c threshold of 0.01 for intersections operating at LOS E or LOS F under pre-project traffic conditions:

ID	Intersection Location	v/c for 2035 NP – Deficient Peak Hour	v/c for 2035 WP – Deficient Peak Hour	Variance
10	Palm Av. / Belmont Av.	0.990	1.033	0.043
11	Palm Av. / Irvington Av.	1.140	1.190	0.050
14	Palm Av. / I-215 SB Ramps	0.952	1.077	0.125
15	Palm Av. / Industrial Pkwy.	1.099	1.149	0.050
19	University Pkwy. / Kendall Dr.	0.888	0.902	0.014

NOTE: v/c not reported by Synchro 8 for HCM 2010 methodology at signalized intersections; as such, v/c has been reported using Vistro Version 3.00-04.

EXHIBIT 10-3: SUMMARY OF LOS FOR HORIZON YEAR CUMULATIVE (2035) WITHOUT PROJECT CONDITIONS

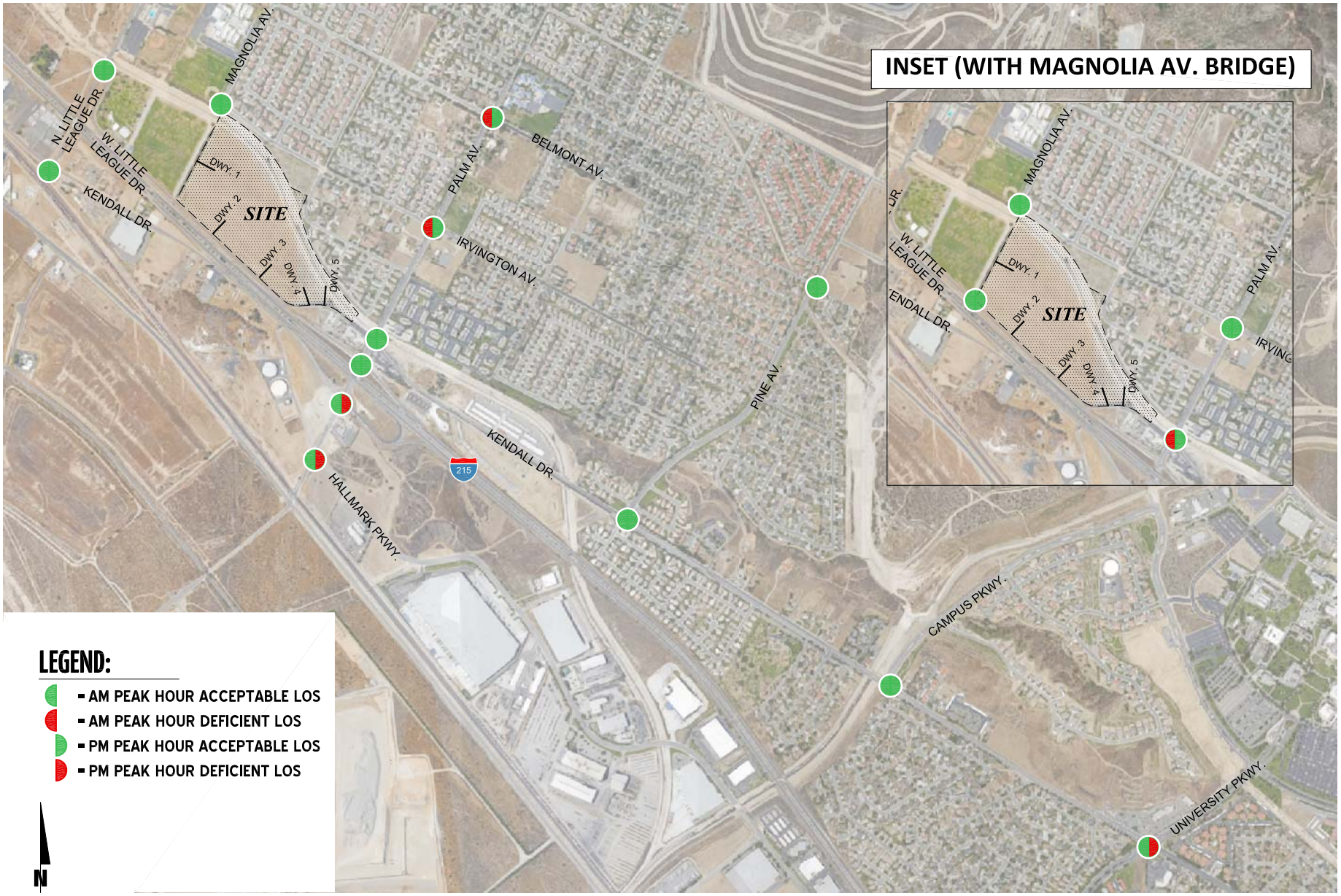

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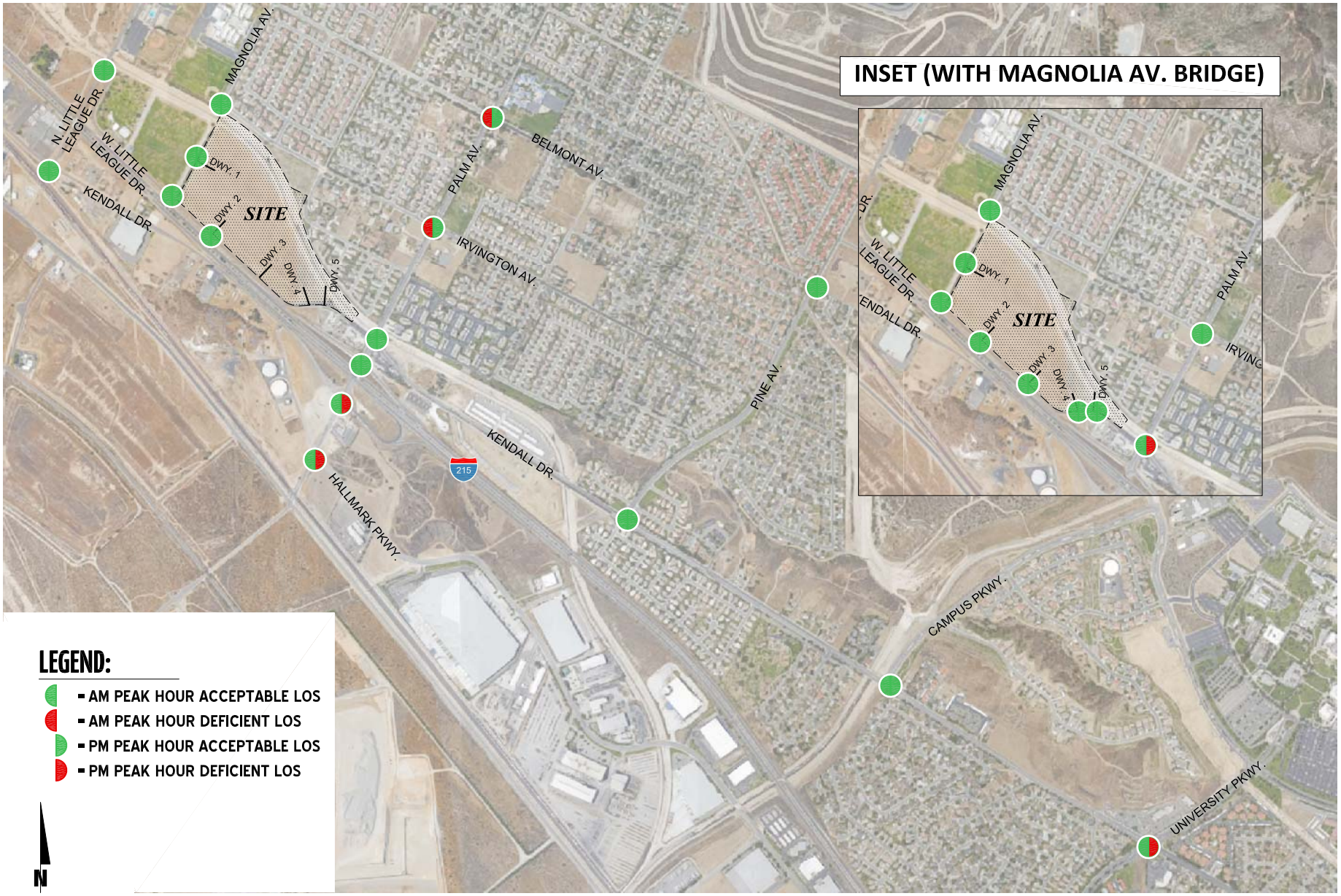
EXHIBIT 10-4: HORIZON YEAR CUMULATIVE (2035) WITH PROJECT CONDITIONS FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)



As such, the Project's impact to the deficient intersection is considered to be cumulatively considerable. Consistent with Table 10-1, a summary of the peak hour intersection LOS for Horizon Year (2035) With Project conditions are shown on Exhibit 10-4. The intersection operations analysis worksheets for Horizon Year (2035) With Project traffic conditions are included in Appendix 10.3 of this TIA.

There are no additional study area intersections anticipated to operate at an unacceptable LOS during the peak hours under Horizon Year (2035) With Project traffic conditions with the Magnolia Avenue extension over the Cajon Creek Wash in addition to the intersection previously identified under Horizon Year (2035) Without Project conditions. However, the addition of Project traffic is anticipated to exceed the City's minimum v/c threshold of 0.01 for intersections operating at LOS E or LOS F under pre-project traffic conditions:

ID	Intersection Location	v/c for 2035 NP – AM Peak Hour	v/c for 2035 WP – AM Peak Hour	Variance
12	Palm Av. / Kendall Dr.	0.217	0.217	0.000

NOTE: v/c not reported by Synchro 8 for HCM 2010 methodology at signalized intersections; as such, v/c has been reported using Vistro Version 3.00-04.

As such, the Project's impact to the deficient intersection is less-than-significant. The intersection operations analysis worksheets for Horizon Year (2035) With Project (With Magnolia Avenue Bridge) traffic conditions are included in Appendix 10.4 of this TIA.

10.5 OFF-RAMP QUEUING ANALYSIS

A queuing analysis was performed for the off-ramps at the I-215 Freeway and Palm Avenue interchange to assess vehicle queues for the off ramps that may potentially result in deficient peak hour operations at the ramp-to-arterial intersections and may potentially "spill back" onto the I-215 Freeway mainline. Queuing analysis findings are presented in Table 10-2 for Horizon Year (2035) traffic conditions. It is important to note that off-ramp lengths are consistent with the measured distance between the intersection and the freeway mainline.

10.5.1 HORIZON YEAR (2035) WITHOUT PROJECT CONDITIONS

As shown on Table 10-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for Horizon Year (2035) Without Project traffic conditions. Worksheets for Horizon Year (2035) Without Project traffic conditions off-ramp queuing analysis are provided in Appendix 10.5.

10.5.2 HORIZON YEAR (2035) WITH PROJECT CONDITIONS

As shown on Table 10-2, consistent with Existing traffic conditions, there are no movements that are anticipated to experience queuing issues during the weekday AM or weekday PM peak 95th percentile traffic flows for Horizon Year (2035) With Project traffic conditions. Worksheets for Horizon Year (2035) With Project traffic conditions off-ramp queuing analysis are provided in Appendix 10.6.

Table 10-2

Peak Hour Freeway Off-Ramp Queuing Summary for Horizon Year (2035) Conditions

Intersection	Movement	Available Stacking Distance (Feet)	2035 Without Project				2035 With Project			
			95th Percentile Queue (Feet)[2]		Acceptable?[1]		95th Percentile Queue (Feet)[2]		Acceptable?[1]	
			AM Peak Hour	PM Peak Hour	AM	PM	AM Peak Hour	PM Peak Hour	AM	PM
I-215 NB Off-Ramp / Palm Av.	NBL/T	910	218 [2]	208	Yes	Yes	218 [2]	208	Yes	Yes
	NBR	415	226 [2]	400 [2]	Yes	Yes	281 [2]	441 [2]	Yes	Yes[3]
I-215 SB Off-Ramp / Palm Av.	NBL/T/R	1,470	700 [2]	179 [2]	Yes	Yes	718 [2]	191 [2]	Yes	Yes

[1] Stacking Distance is acceptable if the required stacking distance is less than or equal to the stacking distance provided. An additional 15 feet of stacking which is assumed to be provided in the transition for turn pockets is reflected in the stacking distance shown on this table, where applicable.

[2] Maximum queue length for the approach reported.

[3] Although 95th percentile queue is anticipated to exceed the available storage for the turn lane, the adjacent through lane has sufficient storage to accommodate any spillover without spilling back and affecting the I-215 Freeway mainline.

Freeway off-ramp queues were not evaluated for the With Magnolia Avenue Bridge alternative as the extension is not anticipated to effect the traffic forecasts south of Kendall Drive.

10.6 TRAFFIC SIGNAL WARRANTS ANALYSIS

The following intersection is anticipated to meet a peak hour traffic signal warrant under Horizon Year (2035) Without Project traffic conditions (see Appendix 10.7):

ID	Intersection Location	Jurisdiction	CMP
10	Palm Avenue / Belmont Avenue	City of San Bernardino	Yes

There are no additional traffic signals anticipated to meet peak hour volume based or planning level (Caltrans) ADT traffic signal warrants under Horizon Year (2035) With Project traffic conditions, in addition to the intersection previously warranted under Horizon Year (2035) Without Project traffic conditions (see Appendix 10.8). However, a signal warrant defines the minimum condition under which the installation of a traffic signal might be warranted. Meeting this threshold condition does not require that a traffic control signal be installed at a particular location, but rather, that other traffic factors and conditions be evaluated in order to determine whether the signal is truly justified. It should also be noted that signal warrants do not necessarily correlate with LOS. An intersection may satisfy a signal warrant condition and operate at or above acceptable LOS or operate below acceptable LOS and not meet a signal warrant. As such, the installation of a traffic signal at the intersections of Palm Avenue at Belmont Avenue and Palm Avenue at Hallmark Parkway have not been recommended for the purposes of this TIA as the intersection is anticipated to operate at acceptable LOS under Horizon Year (2035) traffic conditions, without the installation of a traffic signal.

10.7 BASIC FREEWAY SEGMENT ANALYSIS

10.7.1 HORIZON YEAR (2035) WITHOUT PROJECT CONDITIONS

Horizon Year (2035) Without Project mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 10-5. As shown on Table 10-3, the basic freeway segments analyzed for this study are anticipated to operate at an acceptable LOS (i.e., LOS D or better) during the peak hours, with the exception of the following:

ID	Freeway Mainline Segments
1	I-215 Freeway – Southbound, North of Palm Avenue – LOS F AM and PM peak hour
2	I-215 Freeway – Southbound, South of Palm Avenue – LOS F AM and PM peak hours

Horizon Year (2035) Without Project basic freeway segment analysis worksheets are provided in Appendix 10.9.

Table 10-3

Basic Freeway Segment Analysis for Horizon Year (2035) Conditions

Freeway	Direction	Mainline Segment	Lanes[1]	2035 Without Project				2035 With Project			
				Density[2]		LOS		Density[2]		LOS	
				AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	North of Palm Avenue	2	**60.2**	**63.8**	**F**	**F**	**60.7**	**65.0**	**F**	**F**
		South of Palm Avenue	2	**82.3**	**87.0**	**F**	**F**	**84.2**	**89.1**	**F**	**F**
	NB	North of Palm Avenue	2	23.5	26.1	C	D	23.7	26.4	C	D
		South of Palm Avenue	2	26.5	34.5	D	D	26.7	34.9	D	D

* **BOLD** = Unacceptable Level of Service

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

EXHIBIT 10-5: HORIZON YEAR CUMULATIVE (2035) WITHOUT PROJECT FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

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10.7.2 Horizon Year (2035) With Project Conditions

Horizon Year (2035) With Project mainline directional volumes for the weekday AM and PM peak hours are provided on Exhibit 10-6. As shown on Table 10-3, there are no additional basic freeway segments anticipated to operate at an unacceptable LOS during the peak hours for Horizon Year (2035) With Project traffic conditions, in addition to those previously identified for Horizon Year (2035) Without Project traffic conditions. Horizon Year (2035) With Project basic freeway segment analysis worksheets are provided in Appendix 10.10.

Freeway mainline segments were not evaluated for the With Magnolia Avenue Bridge alternative as the extension is not anticipated to effect the traffic forecasts south of Kendall Drive.

10.8 Freeway Merge/Diverge Analysis

10.8.1 Horizon Year (2035) Without Project Conditions

Ramp merge and diverge operations were evaluated for Horizon Year (2035) Without Project traffic conditions and the results of this analysis are presented in Table 10-4. As shown in Table 10-4, the freeway ramp merge and diverge areas are anticipated to operate at acceptable LOS (i.e., LOS D or better), with the exception of the following:

ID	Freeway Merge/Diverge Ramp Junctions
1	I-215 Freeway – Southbound, Palm Avenue Off-Ramp – LOS F AM and PM peak hours
2	I-215 Freeway – Southbound, Palm Avenue On-Ramp – LOS F AM and PM peak hours
4	I-215 Freeway – Northbound, Palm Avenue Off-Ramp – LOS E PM peak hour only

Horizon Year (2035) Without Project freeway ramp junction operations analysis worksheets are provided in Appendix 10.11.

10.8.2 Horizon Year (2035) With Project Conditions

Ramp merge and diverge operations were evaluated for Horizon Year (2035) With Project traffic conditions and the results of this analysis are presented in Table 10-4. As shown in Table 10-4, there are no additional freeway ramp merge and diverge areas are anticipated to operate at an unacceptable LOS for Horizon Year (2035) With Project traffic conditions, in addition to those previously identified for Horizon Year (2035) Without Project traffic conditions. Horizon Year (2035) With Project freeway ramp junction operations analysis worksheets are provided in Appendix 10.12.

Freeway merge/diverge ramp junctions were not evaluated for the With Magnolia Avenue Bridge alternative as the extension is not anticipated to effect the traffic forecasts south of Kendall Drive.

EXHIBIT 10-6: HORIZON YEAR CUMULATIVE (2035) WITH PROJECT FREEWAY MAINLINE VOLUMES (ACTUAL VEHICLES)

Table 10-4

Freeway Ramp Junction Merge/Diverge Analysis for Horizon Year (2035) Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	2035 Without Project				2035 With Project			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS
I-215 Freeway	SB	Off-Ramp at Palm Avenue	2	**49.5**	**F**	**50.3**	**F**	**49.6**	**F**	**50.6**	**F**
		On-Ramp at Palm Avenue	2	**49.3**	**F**	**50.0**	**F**	**49.5**	**F**	**50.2**	**F**
	NB	On-Ramp at Palm Avenue	2	28.3	D	30.6	D	28.5	D	30.8	D
		Off-Ramp at Palm Avenue	2	33.2	D	**38.9**	**E**	33.3	D	**39.2**	**E**

* **BOLD** = Unacceptable Level of Service

[1] Number of lanes are in the specified direction and is based on existing conditions.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

10.9 CUMULATIVE IMPACTS AND RECOMMENDED IMPROVEMENTS

This section provides a summary of cumulative impacts and recommended improvements.

10.9.1 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES AT INTERSECTIONS

Improvement strategies have been recommended at intersections that have been identified as deficient in an effort to reduce each location's peak hour delay and improve the associated LOS grade to an acceptable LOS (LOS D or better). The effectiveness of the recommended improvement strategies discussed below to address Horizon Year (2035) traffic deficiencies is presented in Table 10-5 for the Without Magnolia Avenue Bridge alternative. Improvement strategies have not been recommended for the With Magnolia Avenue Bridge alternative, as the Project's contribution to the deficient study area intersection (Palm Avenue and Kendall Drive) is anticipated to be less-than-significant (i.e., the addition of Project traffic is anticipated to increase the v/c by less than 0.01 from the pre-project traffic condition).

The applicant shall participate in the funding of off-site improvements, including traffic signals that are needed to serve cumulative traffic conditions through the payment of City of San Bernardino DIF (if the improvements are included in the DIF program), or on a fair share basis (if the improvements are not included in the DIF fee program). These fees shall be collected by the City of San Bernardino, with the proceeds solely used as part of a funding mechanism aimed at ensuring that regional highways and arterial expansions keep pace with the projected population increases. Each of the improvements discussed above have been identified as being included as part of City DIF fee program or fair share contribution in Section 1.6 *Local and Regional Funding Mechanisms* of this TIA.

Worksheets for Horizon Year (2035) Without Project traffic conditions, with improvements, HCM calculation worksheets are provided in Appendix 10.13 (Without Magnolia Avenue Bridge). Worksheets for Horizon Year (2035) With Project traffic conditions, with improvements, HCM calculation worksheets are provided in Appendix 10.14 (Without Magnolia Avenue Bridge).

10.9.2 RECOMMENDED IMPROVEMENTS TO ADDRESS OFF-RAMP QUEUES

As shown previously on Table 10-2, there are no peak hour queuing issues at the I-215 Freeway at Palm Avenue interchange for both Horizon Year (2035) Without and With Project traffic conditions. As such, no improvements have been recommended.

10.9.3 RECOMMENDED IMPROVEMENTS TO ADDRESS DEFICIENCIES ON FREEWAY FACILITIES

The SCAG 2012 RTP identifies the construction of an additional high-occupancy vehicle (HOV) lane in each direction of the I-215 Freeway and the construction of a mixed flow lane in each direction of travel along the I-215 Freeway within the study area. (5) Caltrans typically assumes a reduction of fourteen percent to the freeway mainline through volumes in this region to account for vehicles utilizing the carpool (high-occupancy vehicle) lanes. The reduction to the I-215 Freeway mainline volumes has been applied to account for the proposed HOV lanes in conjunction with the additional mixed flow lane in each direction of travel.

Table 10-5

Intersection Analysis for Horizon Year (2035) Conditions With Improvements

#	Intersection	Traffic Control[3]	Intersection Approach Lanes[1]												Delay[2] (secs.)		Level of Service	
			Northbound			Southbound			Eastbound			Westbound						
			L	T	R	L	T	R	L	T	R	L	T	R	AM	PM	AM	PM
10	Palm Av. / Belmont Av.																	
	- 2035 Without Project																	
	- Without Improvements	AWS	0	1	1	0	1	0	0	1	0	0	1	0	**41.1**	11.5	**E**	B
	- With Improvements	AWS	**1**	1	**0**	**1**	1	0	**1**	1	0	**1**	1	0	28.4	10.8	C	B
	- 2035 With Project																	
	- Without Improvements	AWS	0	1	1	0	1	0	0	1	0	0	1	0	**41.3**	12.5	**E**	B
	- With Improvements	AWS	**1**	1	**0**	**1**	1	0	**1**	1	0	**1**	1	0	31.5	11.4	D	B
11	Palm Av. / Irvington Av.																	
	- 2035 Without Project																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	0	0	1	0	**58.1**	16.2	**E**	B
	- With Improvements	TS	1	2	0	1	2	0	0	1	**1>**	0	1	0	40.3	16.0	D	B
	- 2035 With Project																	
	- Without Improvements	TS	1	2	0	1	2	0	0	1	0	0	1	0	**60.6**	16.5	**E**	B
	- With Improvements	TS	1	2	0	1	2	0	0	1	**1>**	0	1	0	41.5	16.3	D	B
14	Palm Av. / I-215 SB Ramps																	
	- 2035 Without Project																	
	- Without Improvements	TS	1	2	0	1	1	1	0	1	d	0	1	0	48.9	**57.5**	D	**E**
	- With Improvements	TS	1	2	0	**2**	1	1	0	1	d	0	1	0	26.5	20.1	C	C
	- 2035 With Project																	
	- Without Improvements	TS	1	2	0	1	1	1	0	1	d	0	1	0	53.7	**57.9**	D	**E**
	- With Improvements	TS	1	2	0	**2**	1	1	0	1	d	0	1	0	29.8	24.1	C	C
19	University Pkwy. / Kendall Dr.																	
	- 2035 Without Project																	
	- Without Improvements	TS	2	3	0	1	3	0	2	2	0	2	2	0	48.9	**89.3**	D	**F**
	- With Improvements	TS	2	3	**1>**	**2**	3	0	2	**3**	**1>**	2	**3**	0	40.9	52.4	D	D
	- 2035 With Project																	
	- Without Improvements	TS	2	3	0	1	3	0	2	2	0	2	2	0	49.6	**92.9**	D	**F**
	- With Improvements	TS	2	3	**1>**	**2**	3	0	2	**3**	**1>**	2	**3**	0	41.1	54.8	D	D

BOLD = LOS does not meet the applicable jurisdictional requirements (i.e., unacceptable LOS).

1 When a right turn is designated, the lane can either be striped or unstriped. To function as a right turn lane there must be sufficient width for right turning vehicles to travel outside the through lanes

L = Left; T = Through; R = Right; d = Defacto Right Turn Lane; > = Right-Turn Overlap Phasing; >> = Free-Right Turn Lane; **1** = Improvement

2 Per the 2010 Highway Capacity Manual, overall average intersection delay and level of service are shown for intersections with a traffic signal or all-way stop control. For intersections with cross street stop control, the delay and level of service for the worst individual movement (or movements sharing a single lane) are shown.

3 AWS = All Way Stop; TS = Traffic Signal

As shown on Table 10-6, the I-215 freeway mainline segments are anticipated to operate at an acceptable LOS with the improvements discussed above (i.e., LOS C or better). Worksheets for Horizon Year (2035) Without and With Project conditions freeway mainline level of service analysis, with improvements, are provided in Appendix 10.15 and Appendix 10.16.

Similarly, Table 10-7 shows that the I-215 freeway ramp junctions are anticipated to operate at an acceptable LOS with the improvements discussed above (i.e., LOS D or better). Horizon Year (2035) Without and With Project freeway ramp junction level of service analysis worksheets, with improvements, are provided in Appendix 10.17 and Appendix 10.18.

Table 10-6

Basic Freeway Segment Analysis for Horizon Year (2035) Conditions With Improvements

Freeway	Direction	Mainline Segment	Lanes[1]	2035 Without Project				2035 With Project			
				Density[2]		LOS		Density[2]		LOS	
				AM	PM	AM	PM	AM	PM	AM	PM
I-215 Freeway	SB	North of Palm Avenue	**3**	22.4	23.0	C	C	22.5	23.2	C	C
		South of Palm Avenue	**3**	25.3	25.7	C	C	25.5	25.9	C	C
	NB	North of Palm Avenue	**3**	13.1	14.3	B	B	13.2	14.4	B	B
		South of Palm Avenue	**3**	14.7	17.7	B	B	14.8	17.9	B	B

[1] Per the SCAG RTP, planned improvements along this segment of the I-215 Freeway include an additional mixed flow lane and an HOV lane in each direction of travel.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

Table 10-7

Freeway Ramp Junction Merge/Diverge Analysis for Horizon Year (2035) Conditions

Freeway	Direction	Ramp or Segment	Lanes on Freeway[1]	2035 Without Project				2035 With Project			
				AM Peak Hour		PM Peak Hour		AM Peak Hour		PM Peak Hour	
				Density[2]	LOS	Density[2]	LOS	Density[2]	LOS	Density[2]	LOS
I-215 Freeway	SB	Off-Ramp at Palm Avenue	**3**	30.0	D	30.0	D	30.1	D	30.1	D
		On-Ramp at Palm Avenue	**3**	30.3	D	29.8	D	30.5	D	30.0	D
	NB	On-Ramp at Palm Avenue	**3**	18.1	B	18.8	B	18.3	B	19.0	B
		Off-Ramp at Palm Avenue	**3**	22.9	C	26.5	C	23.0	C	26.7	C

* **BOLD** = Unacceptable Level of Service

[1] Per the SCAG RTP, planned improvements along this segment of the I-215 Freeway include an additional mixed flow lane and an HOV lane in each direction of travel.

[2] Density is measured by passenger cars per mile per lane (pc/mi/ln).

11 REFERENCES

1. **City of San Bernardino Development Services Department .** *The City of San Bernardino Traffic Impact Study Guidelines.* San Bernardino : City of San Bernardino Development Services Department , 2004.
2. **San Bernardino Associated Governments.** *Congestion Management Program for County of San Bernardino.* County of San Bernardino : s.n., Updated December 2007.
3. **California Department of Transportation.** *Guide for the Preparation of Traffic Impact Studies.* December 2002.
4. **Institute of Transportation Engineers.** *Trip Generation.* 9th Edition. 2012.
5. **Southern California Association of Governments.** *2012 Regional Transportation Plan.* April 2012.
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7. **Federal Highway Administration.** Manual on Uniform Traffic Control Devices (MUTCD). [book auth.] California Department of Transportation. *California Manual on Uniform Traffic Control Devices (CAMUTCD).* 2014.
8. **California Department of Transportation.** *Freeway Performance Measurement (PeMS).* [Online] [Cited: January 7, 2014.] http://pems.dot.ca.gov/.
9. **Institute of Transportation Engineers.** *Trip Generation Handbook.* 2004.

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3.12-2 LITTLE LEAGUE DRIVE DESIGN PARAMETER REVIEW

URBAN CROSSROADS

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www.urbanXroads.com

September 4, 2015

Mr. Eric Flodine
Strata Equity Group, Inc.
4370 La Jolla Village Drive, Suite 960
San Diego, CA 92122

SUBJECT: RANCHO PALMA LITTLE LEAGUE DRIVE DESIGN PARAMETER REVIEW

Dear Mr. Eric Flodine:

Urban Crossroads, Inc. is pleased to submit this letter report documenting our review of the appropriate design parameters for Little League Drive in the vicinity of the Rancho Palma development ("Project") located in the City of San Bernardino. The location of interest in this analysis is shown on Exhibit A.

EXISTING CONDITIONS

Although Little League Drive in the immediate vicinity of the Rancho Palma project site will be redesigned as part of the project, the remainder of Little League Drive north of the project site will retain its current configuration. Therefore, the design of Little League Drive in the vicinity of the project should consider multiple factors, including the General Plan Circulation Element designation, along with current sight distances and existing curve radii that will remain to the northwest of the project subsequent to project completion.

Little League Drive north of the Rancho Palma project site provides access to Guhin Park, the Blast Soccer Complex, and a local church. All of these uses take access to Little League Drive via a single access point located just northwest of the Rancho Palma project site. This access road serves traffic with the high intensity, short term "bursts" of traffic associated with these types of uses.

Exhibit B presents the key existing design characteristics of Little League Drive to the northeast of the Rancho Palma project site. Key existing design characteristics include the existing sight distance for the access road to the Blast Soccer Park, Guhin Park and church, as well as the existing curve radii between West Little League Drive and North Little League Drive.

The existing curve radii adjacent to the project site (just northwest of Palm Avenue) are approximately 230' (227' and 235'). These curves will be redesigned and reconstructed in conjunction with the proposed project.

The existing sight distance from the access road serving the existing park, church, and soccer field complex to the first curve to the northwest is approximately 400 feet. The two curves between this access roadway and North Little League Drive are constructed with radii of approximately 240 feet and 90 feet for the curve nearest the project and the curve nearest North Little League Drive, respectively.

DESIGN STANDARD REVIEW

The primary design standard used in the State of California is the California Department of Transportation (CALTRANS) Highway Design Manual HDM). The City of San Bernardino has an adopted Traffic Engineering Design Policies and Procedures document. These policies explicitly reference the CALTRANS HDM. Excerpts from the CALTRANS HDM are provided as Attachment "A" to this letter. Attachment "A" also contains sight distance from the American Association of State Highway and Transportation Officials (AASHTO) publication Geometric Design of Highways and Streets. Excerpts from the City of San Bernardino Traffic Engineering Design Policies and Procedures document are provided as Attachment "B" to this letter.

As stated previously, the sight distance from the access road serving existing park, church, and soccer field complex is approximately 400 feet. This distance is consistent with the corner sight distance for a roadway with a 30 mile per hour (MPH) design speed, per the guidance of the (AASHTO) publication Geometric Design of Highways and Streets. The CALTRANS Highway Design Manual specifies a design speed of 35 MPH for a sight distance of 385 feet. The CALTRANS HDM design standard is more restrictive than the City of San Bernardino design standard, which cites a design speed of 40 MPH for a sight distance of 400'. The recommended curve radius per the CALTRANS HDM for a design speed of 30 MPH is 300 feet, while the recommended curve radius for a design speed of 40 MPH is 550 feet. The CALTRANS HDM (Topic 203.3 Alignment Consistency) also indicates that the design speed for successive curves should not vary by more than 10 MPH. The existing curve located northwest of the project has a radius of approximately 240 feet, which falls between the curve radii standards for a design speed of 20 MPH (130' radius) and 30 MPH (300' radius). This suggests an existing design speed of approximately 25 MPH.

The design standards for the County of San Bernardino have also been consulted as a part of this review. The standards for a Collector roadway located in the Valley area of San Bernardino County range from 470 feet horizontal curve radius (rolling terrain) to 820 feet (flat terrain).

Based on the CALTRANS HDM guidance regarding alignment consistency and the existing curve to the northwest of the project site with a radius of 240 feet (corresponding to a design speed of approximately 25 MPH), it is recommended that a design speed of no more than 35 MPH be used to design the curves adjacent to the Rancho Palma project site. Based on interpolating from the CALTRANS HDM design radii for 30 MPH and 40 MPH, this corresponds to a curve radius of 400 feet.

SUMMARY AND CLOSING

Based on the existing design characteristics in the vicinity of the proposed Rancho Palma project, it is recommended that a curve radius of 400 feet be used for the design of the reconstruction of Little League Drive adjacent to the project site. This will provide alignment consistency with the existing curve located to the northwest of the project site. The recommended design concept is shown on Exhibit C. If you have any questions, please feel free to contact me directly at (949) 336-5981.

Respectfully submitted,

Carleton Waters, P.E.
Principal

Attachments

EXHIBIT A: LOCATION MAP

EXHIBIT B: EXISTING DESIGN CHARACTERISTICS

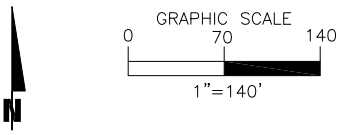
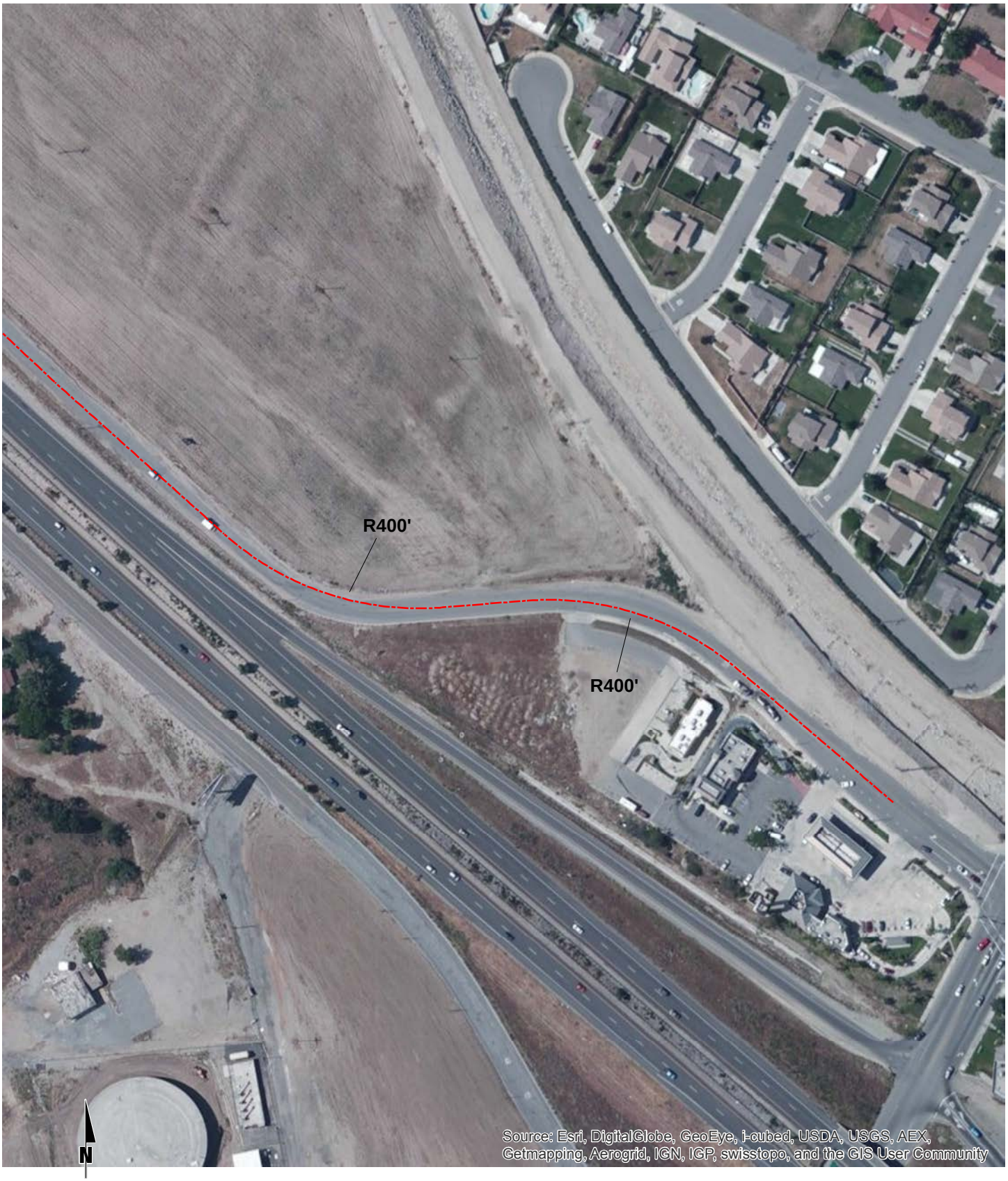


EXHIBIT C: LITTLE LEAGUE DRIVE PROPOSED ALIGNMENT CONCEPT (400' RADII)



ATTACHMENT A

AASHTO AND CALTRANS DESIGN GUIDANCE EXCERPTS

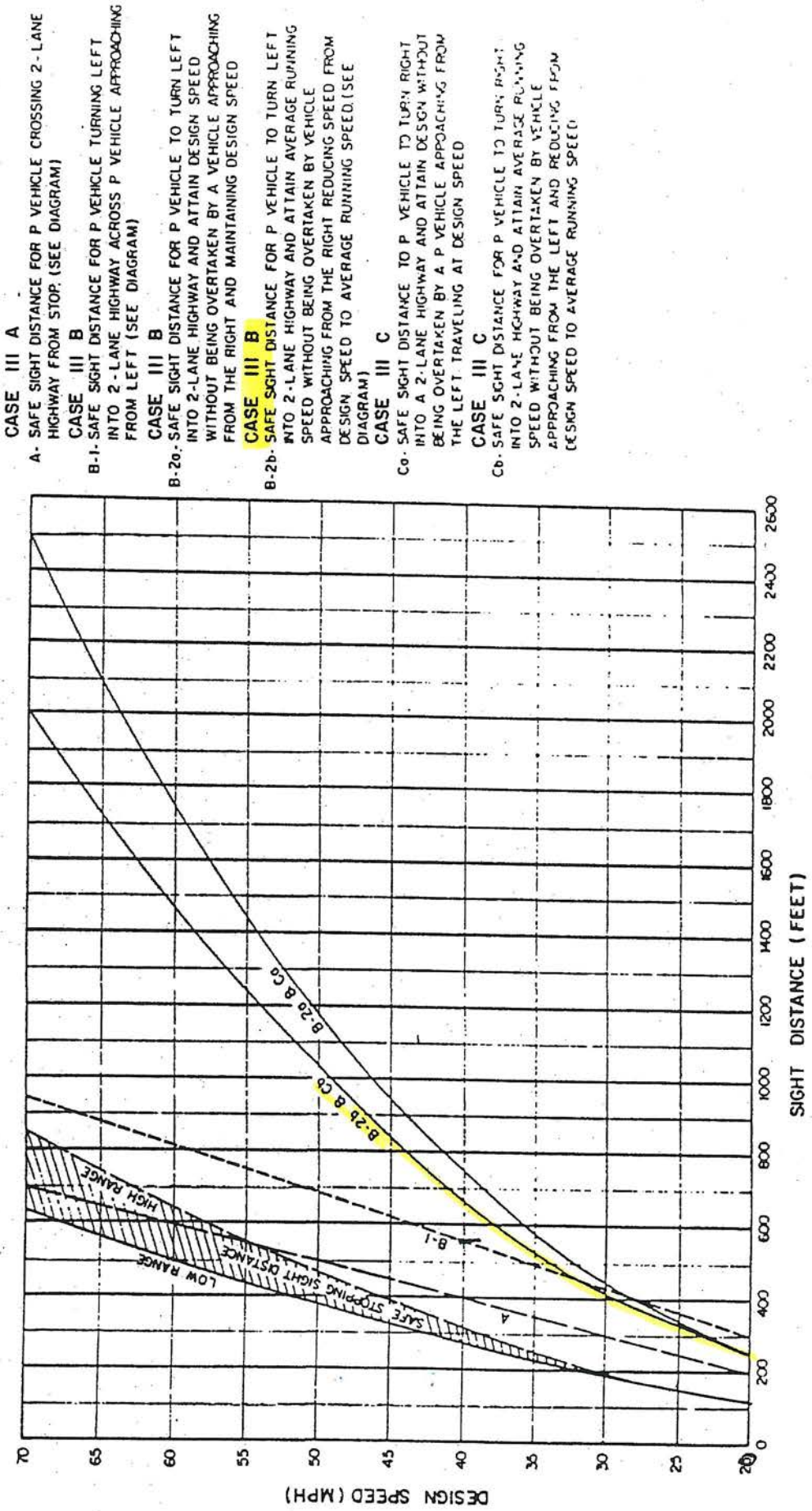


Figure 8-3 Intersection sight distance at at-grade intersection (case IIIB and case IIIC).

CHAPTER 100
BASIC DESIGN POLICIES

Topic 101 - Design Speed

Index 101.1 - Selection of Highway Design Speed

Design speed is defined as: "a speed selected to establish specific minimum geometric design elements for a particular section of highway". These design elements include vertical and horizontal alignment, and sight distance. Other features such as widths of pavement and shoulders, horizontal clearances, etc., are generally not directly related to design speed.

In California the majority of projects only modify existing facilities. On those projects observed motor vehicle speed (operating speed) is the primary factor requiring consideration by the designer. Generally the posted speed is a reliable indicator of operating speed although operating speeds frequently exceed posted speeds. Speed limits and speed zones are discussed in Chapter 2 of the California MUTCD, which include references to the California Vehicle Code.

On projects where posted speeds or observational data is not available, the choice of design speed is influenced principally by the character of terrain, economic considerations, environmental factors, type and anticipated volume of vehicular traffic, presence of non-motorized traffic, functional classification of the highway, existing and future adjacent land use, and whether the area is rural or urban. A highway in level or rolling terrain justifies a higher design speed than one in mountainous terrain. As discussed under Topic 109, scenic values are also a consideration in the selection of a design speed.

In addition, the selected design speed should be consistent with the operating speeds that are likely to be expected on a given highway facility. Drivers and bicyclists adjust their speed based on their perception of the physical limitations of the highway and its vehicular and bicycle traffic. In addition, bicycling and walking can be encouraged when bicyclists and pedestrians perceive an increase in safety due to lower design speeds.

Where a reason for limiting speed is obvious to approaching drivers or bicyclists, they are more apt to accept a lower operating speed than where there is no apparent reason for it.

A highway carrying a higher volume of traffic may justify a higher design speed than a lower classification facility in similar topography, particularly where the savings in user operation and other costs are sufficient to offset the increased cost of right of way and construction. A lower design speed; however, should not be assumed for a secondary road where the topography is such that drivers are likely to travel at higher speeds.

Subject to the above discussion, on high-speed facilities as high a design speed as feasible should be used. Highway context in terms of area place type, land use, types of users, etc. need to also be considered when determining the appropriate design speed for lower speed facilities.

It is preferable that the design speed for any section of highway be a constant value. However, during the detailed design phase of a project, special situations may arise in which engineering, economic, environmental, or other considerations make it impractical to provide the minimum elements established by the design speed. See Index 82 for documenting localized exception to features preventing the standard design speed.

The cost to correct such restrictions may not be justified. Technically, this will result in a reduction in the effective design speed at the location in question. **Such technical reductions in design speed shall be discussed with and documented as required by the Design Coordinator.**

Local streets or roads within the State right of way, including facilities which will be relinquished after construction (such as frontage roads), shall have minimum design speeds conforming to AASHTO standards, as per the functional classification of the facility in question. <u>If the local agency having jurisdiction over the facility in question maintains design standards that exceed AASHTO standards, then the local agency standards should apply.</u>

203.2 Standards for Curvature

Table 203.2 shall be the minimum radius of curve for specific design speeds on highways. This table is based upon speed alone; it does not address the sight distance factor. **If the minimum radii indicated in Table 203.2 does not provide the desired lateral clearance to an obstruction, Figure 201.6 shall govern**.

Every effort should be made to exceed minimum values, and such minimum radii should be used only when the cost or other adverse effects of realizing a higher standard are inconsistent with the benefits. As an aid to designers, Figure 202.2 displays the maximum comfortable speed for various curve radii and superelevation rates. Use of Figure 202.2, in lieu of the above standards must be documented as discussed in Index 82.2.

The recommended minimum radii for freeways are 5,000 feet in rural areas and 3,000 feet in urban areas.

If a glare screen or a median barrier is contemplated, either initially or ultimately, adjustments may be necessary to maintain the required sight distance on curves on divided highways. In such cases, a larger curve radius or a wider median may be required throughout the length of the curve. For design purposes, a planting screen is presumed to be 8 feet wide. See Chapter 7 of the Traffic Manual for glare screen criteria.

Table 203.2
Standards for Curve Radius

Design Speed mph	Minimum Radius of Curve (ft)
20	130
30	300
40	550
50	850
60	1,150
70	2,100
80	3,900

203.3 Alignment Consistency

Sudden reductions in alignment standards should be avoided. Where physical restrictions on curve radius cannot be overcome and it becomes necessary to introduce curvature of lower standard than the design speed for the project, the design speed between successive curves should change not more than 10 miles per hour. Introduction of curves with lower design speeds should be avoided at the end of long tangents, steep downgrades, or at other locations where high approach speeds may be anticipated.

The horizontal and vertical alignments should be coordinated such that horizontal curves are not hidden behind crest vertical curves. Sharp horizontal curves should not follow long tangents because some drivers tend to develop higher speeds on the tangent and could over drive the curve.

See "Combination of Horizontal and Vertical Alignment" in Chapter III of AASHTO, A Policy on Geometric Design of Highways and Streets, for further guidance on alignment consistency.

203.4 Curve Length and Central Angle

The minimum curve length for central angles less than 10 degrees should be 800 feet to avoid the appearance of a kink. For central angles smaller than 30 minutes, no curve is required. Above a 20,000 -foot radius, a parabolic curve may be used. In no event should sight distance or other safety considerations be sacrificed to meet the above requirements.

On 2-lane roads a curve should not exceed a length of one-half mile and should be no shorter than 500 feet.

203.5 Compound Curves

Compound curves should be avoided because drivers who have adjusted to the first curve could over drive the second curve if the second curve has a smaller radius than the first. Exceptions can occur in mountainous terrain or other situations where use of a simple curve would result in excessive cost. Where compound curves are necessary, the shorter radius should be at least two-thirds the longer radius when the shorter radius is 1,000 feet or less. On

required to adjust for flat spots or unsightly sags and humps, or when conforming to existing roadway.

(3) *Restrictive Situations.* In restrictive situations, such as on two lane highways in mountainous terrain, interchange ramps, collector roads, frontage roads, etc., where curve radius and length and tangents between curves are short, standard superelevation rates and/or transitions may not be attainable. In such situations the highest possible superelevation rate(s) and transition length should be used, but the rate of change of cross slope should not exceed 6 percent per 100 feet.

(4) *Superelevation Transitions on Bridges*. Superelevation transitions on bridges should be avoided whenever possible (See Index 203.9).

(5) *Shoulder Transitions.* The shoulder plane rotates about the adjacent edge of traveled way as well as the rotational axis of the traveled way. Shoulder superelevation transitions should be smooth and compatible with the transition of the adjacent pavements.

202.6 Superelevation of Compound Curves

Superelevation of compound curves should follow the procedure as shown in Figure 202.6. Where feasible, the criteria in Index 202.5 should apply.

202.7 Superelevation on City Streets and County Roads

Superelevation rates of local streets and roads which are within the State right of way (with or without connection to State facilities) shall conform to AASHTO standards, for the functional classification of the facility in question. If the local agency having jurisdiction over the local facility in question maintains standards that exceed AASHTO standards, then the local agency standards should prevail.

See Index 202.2 and Table 202.2 for Frontage Roads within the State right of way. Frontage roads that will be relinquished after construction should follow AASHTO or local standards as stated above.

Topic 203 - Horizontal Alignment

203.1 General Controls

Horizontal alignment should provide for safe and continuous operation at a uniform design speed for substantial lengths of highway. The standards which follow apply to curvature on both 2-lane and multilane highways except when otherwise noted. These standards also apply to portions of local streets and roads within the State right of way which connect directly to a freeway or expressway, or are expected to do so in the foreseeable future. **For local facilities which are within the State right of way and where there is no connection or the connection is to a non-controlled access facility (conventional highway), AASHTO standards shall prevail**. If the local agency having jurisdiction over the local facility in question maintains standards that exceed AASHTO standards, then the local agency standards should prevail.

The major considerations in horizontal alignment design are safety, profile, type of facility, design speed, geotechnical features, topography, right of way cost and construction cost. In design, safety is always considered, either directly or indirectly. On freeways in metropolitan areas, alternative studies often indicate that right of way considerations influence alignment more than any other single factor. Topography controls both curve radius and design speed to a large extent. The design speed, in turn, controls sight distance, but sight distance must be considered concurrently with topography because it often demands a larger radius than the design speed. All these factors must be balanced to produce an alignment which optimizes the achievement of various objectives such as safety, cost, harmony with the natural contour of the land, and at the same time adequate for the design classification of the highway.

Horizontal alignment shall provide at least the minimum stopping sight distance for the chosen design speed at all points on the highway, as given in Table 201.1 and explained in Index 201.3. See Index 101.1 for technical reductions in design speed.

may be excessive. High costs may be attributable to right of way acquisition, building removal, extensive excavation, or immitigable environmental impacts. In such cases a lesser value of corner sight distance, as described under the following headings, may be used.

(b) Public Road Intersections (Refer to Topic 205)--At unsignalized public road intersections (see Index 405.7) corner sight distance values given in Table 405.1A should be provided.

At signalized intersections the values for corner sight distances given in Table 405.1A should also be applied whenever possible. Even though traffic flows are designed to move at separate times, unanticipated conflicts can occur due to violation of signal, right turns on red, malfunction of the signal, or use of flashing red/yellow mode.

Table 405.1A
Corner Sight Distance
(7-1/2 Second Criteria)

Design Speed (mph)	Corner Sight Distance (ft)
25	275
30	330
35	385
40	440
45	495
50	550
55	605
60	660
65	715
70	770

Where restrictive conditions exist, similar to those listed in Index 405.1(2)(a), the minimum value for corner sight distance at both signalized and unsignalized intersections shall be equal to the stopping sight distance as given in Table 201.1, measured as previously described.

(c) Private Road Intersections (Refer to Index 205.2) and Rural Driveways (Refer to Index 205.4)--**The minimum corner sight distance shall be equal to the stopping sight distance as given in Table 201.1, measured as previously described.**

(d) Urban Driveways (Refer to Index 205.3)--Corner sight distance requirements as described above are not applied to urban driveways.

(3) *Decision Sight Distance.* At intersections where the State route turns or crosses another State route, the decision sight distance values given in Table 201.7 should be used. In computing and measuring decision sight distance, the 3.5-foot eye height and the 0.5-foot object height should be used, the object being located on the side of the intersection nearest the approaching driver.

The application of the various sight distance requirements for the different types of intersections is summarized in Table 405.1B.

(4) *Acceleration Lanes for Turning Moves onto State Highways.* At rural intersections, with "STOP" control on the local cross road, acceleration lanes for left and right turns onto the State facility should be considered. At a minimum, the following features should be evaluated for both the major highway and the cross road:

- divided versus undivided
- number of lanes
- design speed
- gradient
- lane, shoulder and median width
- traffic volume and composition of highway users, including trucks and transit vehicles
- turning volumes
- horizontal curve radii
- sight distance
- proximity of adjacent intersections
- types of adjacent intersections

ATTACHMENT B

CITY OF SAN BERNARDINO DESIGN GUIDANCE EXCERPTS

DIVISION I — AUTHORITY

This policy paper is prepared to serve as a guide for the preparation of traffic reports, traffic related improvement plans and to assist the developer in preparing information and plans that meet the criteria of the City of San Bernardino.

It does not replace the Standard Drawings and is not intended to be all inclusive. It provides the minimum level expected on a project, but all projects must be based on sound engineering judgement and be acceptable to the Director of Public Works/City Engineer.

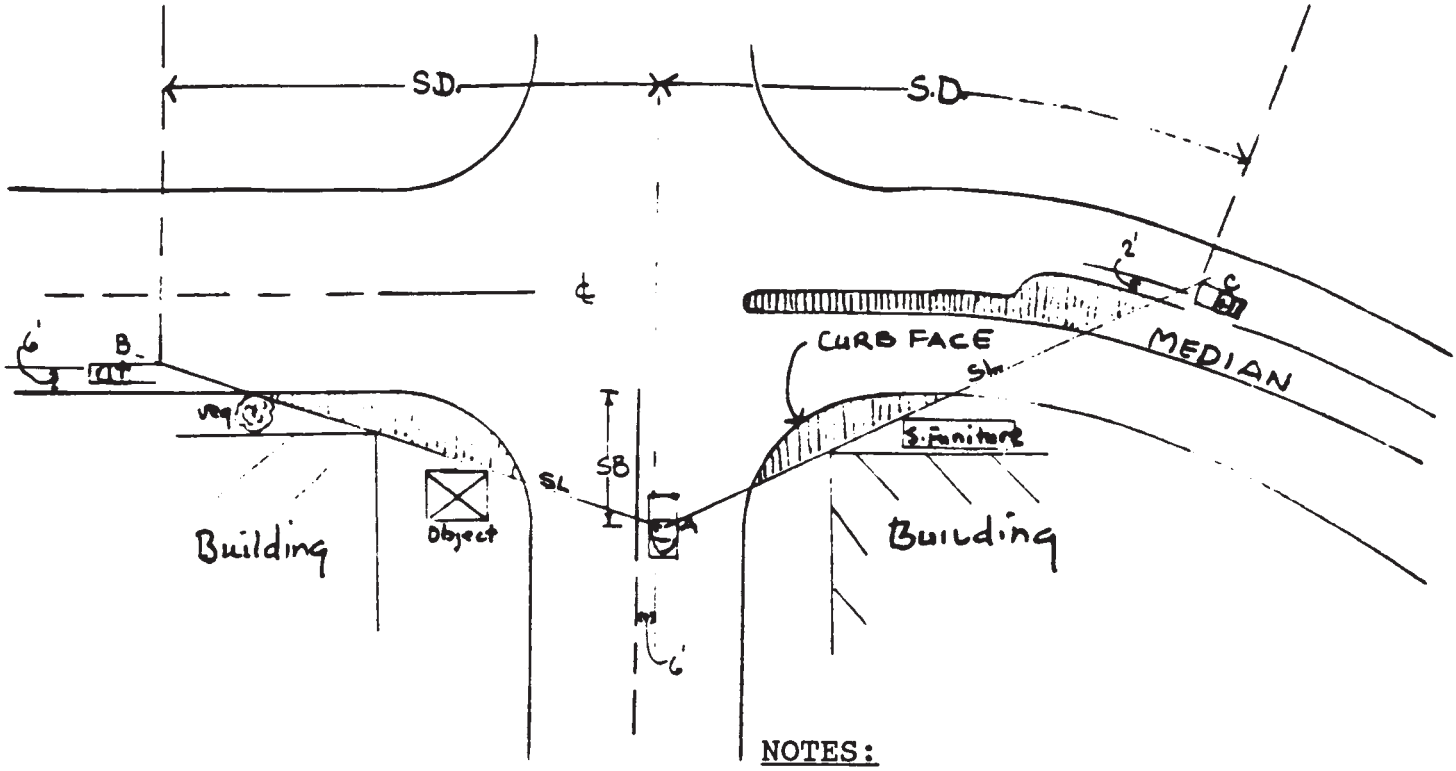
Authority for the traffic policy is contained in the City of San Bernardino municipal Code in the following sections:

Section 2.14
Section 3.26
Title 10
Title 12
Development Code

In addition to the above, the City of San Bernardino has adopted a General Plan with the Circulation Element, area plans, overlay zoning, the "Standard Specifications for Public Works Construction" (Green Book), Caltrans Standard Specifications and its own Standard Drawings for Public Works Improvements. Also, the City uses as a standard reference the Manual of Uniform Traffic Control Devices, the ITE Trip Generation Report, the ITE Parking Report, Caltrans Traffic Design Manual, 1985 Highway Capacity Manual, AASHTO manuals, WATCH manual, CAPSSI and PASSERprograms and its own transportation planning program, based on TRANPIAN.

The referenced code sections also refer to many varied resolutions and ordinances adopted by the Mayor and common Council in which fees are established, including a traffic systems fee, for services or-impacts.

This authority is established as the minimum requirement of the City of San Bernardino with all material subject to the review and approval of the Director of Public Works/City Engineer for conformance to acceptable design practices and sound engineering judgement. All plans and reports must receive approval of the Director of Public Works/City Engineer prior to approval of the project and for the recordation of any maps.



NOTES:

1) SB = 18′ at intersections
SB = 10′ at driveways
(Under special conditions lesser SB. Values may be approved by Traffic Engineer)

2) V = Speed (MPH) = 85th Percentile i.e., prevailing speed or as determined by Traffic Engineer

3) S.D. = Minimum Sight Distance

4)

Speed = V (MPH)	Minimum Sight Distance (feet)
30	300
35	350
40	400
45	450
50	500
55	550

5) SL = Line of Sight

6) ///// = Area of Limited Use

**Refer to the City of San Bernardino Traffic Engineering Policy Paper for further detail.

(a) There shall be no obstruction within the limited use area. Area of limited use shall be determined geophyically using appropriate distances given in the Minimum Sight Distance Table (4).

(b) Obstructions shall include, but not be limited to, any signs or objects higher than 2.5′ measured from pavement within the area of limited use. Example, block walls, utility vents, and cabinets, sign street furnitures, mature landscaping, etc.

(c) Developer's Engineer shall evaluate and show sight lines at proposed intersections/ driveways, grading plans, tentative tract maps and landscaping plans where sight distance is questionable.

(d) Where existing sign, vegetation or objects constitute a sight distance hazard, property owner or occupant shall be notified/-required to meet minimum sight distance requirements within 15 days and maintain same thereafter.

SIGHT DISTANCE REQUIREMENTS AT CONTROLLED INTERSECTIONS AND DRIVEWAYS

ATTACHMENT C

COUNTY OF SAN BERNARDINO DESIGN GUIDANCE EXCERPTS

STREET DESIGNATIONS

		LOCAL STREET (>500 ADT)	LOCAL STREET	COLLECTOR	SECONDARY HIGHWAY *	MAJOR HIGHWAY *	MAJOR DIVIDED *	MAJOR ARTERIAL *
RIGHT OF WAY		50	60	66	88	104	120	120
SURFACED WIDTH CURB TO CURB		36	40	44	64	80	94	104
RADII (HORIZ.)	FLAT: 0.5% - 4%	300	470	820	1400	2200	-	-
	ROLLING: 4% - 9%	180	300	470	1100	1800	-	-
MAX. GRADE	FLAT	4	4	4	4	4	-	-
	ROLLING	9	9	8	7	6	-	-
DESIGN SPEED (MIN.)	FLAT	30	35	40	50	60	-	-
	ROLLING	25	30	35	45	55	-	-
INTERSECTION INTERVALS (a) (MIN.)		200	250	660	1320	2640	-	-

NOTES:

1. Minimum street grade 0.5%.
2. Roadway design less than shown requires Transportation Department approval.
3. Part-width streets shall have a minimum of 40' R/W and 26' paving for residential and 50' R/W and 36' paving for industrial.
4. Radii based on "Geometric Design of Highways and Streets" for speeds 35 MPH or less (-2% super elevation). Radii based on Caltrans "Comfortable Speed" for speeds 40 MPH or more (-2% elevation).

* Direct vehicular access restricted.

(a) Additional distance may be required when left turns are necessary or when directed by Director of Transportation.

SAN BERNARDINO COUNTY TRANS. DEPT.	VALLEY DESIGN GUIDELINES	TABLE 7-1
KEN A. MILLER Director of Transportation		

5-1 Construction Fuel Usage

Rancho Palma
Total Construction
Fuel Usage

Project Action	CO2e (Metric tons)	Total Gallons of Fuel Consumed
Construction		
Rancho Palma	**1727**	170,148

Notes:
Fuel used by vehicle hauling trips and processing equipment assumed to be diesel.

Sources:
Carbon Dioxide Equivalent Emissions: See Section 3.4; Conversion Ratios: Climate Registry 2015

5-2 Rancho Palma Annual Fuel Consumption

Sub-Area	Year	Season	Veh_Tech	EMFAC2007 Category	VMT	Trips	Fuel_GAS
San Bernardino (SC)	2015	Annual	All Vehicles	All Vehicles	13,019,626.5	2,138,998.5	658.6
San Bernardino (SC)	2015	Annual	LDA - DSL	LDA - DSL	45,252.2	6,103.0	
San Bernardino (SC)	2015	Annual	LDA - GAS	LDA - GAS	7,559,788.6	1,223,482.8	318.7
San Bernardino (SC)	2015	Annual	LDT1 - DSL	LDT1 - DSL	822.8	161.2	
San Bernardino (SC)	2015	Annual	LDT1 - GAS	LDT1 - GAS	653,717.2	119,381.5	32.2
San Bernardino (SC)	2015	Annual	LDT2 - DSL	LDT2 - DSL	2,738.2	342.4	
San Bernardino (SC)	2015	Annual	LDT2 - GAS	LDT2 - GAS	2,546,963.0	411,906.8	146.7
San Bernardino (SC)	2015	Annual	MDV - DSL	MDV - DSL	16,897.7	2,066.3	
San Bernardino (SC)	2015	Annual	MDV - GAS	MDV - GAS	2,193,446.8	375,554.4	160.9

Fuel_DSL
2.63
1.50
0.0325
0.1224
0.9751

5-3 San Bernardino County Daily Fuel Consumption

Year	Season	Area	Vehicle Class	Pollutant	Gallons
2007	Annual	San Bernardino (SC)	LDA	Fuel	726.4504
2007	Annual	San Bernardino (SC)	LDT1	Fuel	110.1684
2007	Annual	San Bernardino (SC)	LDT2	Fuel	344.3519
2007	Annual	San Bernardino (SC)	LHD1	Fuel	110.2098
2007	Annual	San Bernardino (SC)	LHD2	Fuel	20.40398
2007	Annual	San Bernardino (SC)	MCY	Fuel	4.471391
2007	Annual	San Bernardino (SC)	MDV	Fuel	502.4313
2007	Annual	San Bernardino (SC)	MH	Fuel	9.868062
2007	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.064312
2007	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.130303
2007	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.39803
2007	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	2.431283
2007	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	5.33291
2007	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	19.35683
2007	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	51.17881
2007	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.074659
2007	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.228056
2007	Annual	San Bernardino (SC)	T6 Public	Fuel	1.222736
2007	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.33095
2007	Annual	San Bernardino (SC)	T6TS	Fuel	12.80713
2007	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.094934
2007	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	39.10114
2007	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	2.799871
2007	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	48.92825
2007	Annual	San Bernardino (SC)	T7 NOOS	Fuel	15.7107
2007	Annual	San Bernardino (SC)	T7 POLA	Fuel	46.94035
2007	Annual	San Bernardino (SC)	T7 Public	Fuel	3.491298
2007	Annual	San Bernardino (SC)	T7 Single	Fuel	26.89371
2007	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	6.883967
2007	Annual	San Bernardino (SC)	T7 SWCV	Fuel	16.57368
2007	Annual	San Bernardino (SC)	T7 Tractor	Fuel	52.54504
2007	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	5.136559
2007	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.38728

2007	Annual	San Bernardino (SC)	T7IS	Fuel	3.594018
2007	Annual	San Bernardino (SC)	PTO	Fuel	6.951186
2007	Annual	San Bernardino (SC)	SBUS	Fuel	4.258148
2007	Annual	San Bernardino (SC)	UBUS	Fuel	10.96616
2007	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.250045
2007	Annual	San Bernardino (SC)	OBUS	Fuel	3.20111
2007	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.240149
			Year 2007 Total		**2218.859**
2008	Annual	San Bernardino (SC)	LDA	Fuel	691.3391
2008	Annual	San Bernardino (SC)	LDT1	Fuel	103.7437
2008	Annual	San Bernardino (SC)	LDT2	Fuel	324.1939
2008	Annual	San Bernardino (SC)	LHD1	Fuel	101.3061
2008	Annual	San Bernardino (SC)	LHD2	Fuel	21.68848
2008	Annual	San Bernardino (SC)	MCY	Fuel	4.650851
2008	Annual	San Bernardino (SC)	MDV	Fuel	472.0537
2008	Annual	San Bernardino (SC)	MH	Fuel	9.096437
2008	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.064327
2008	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.119554
2008	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.365776
2008	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	2.091396
2008	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	4.599344
2008	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	17.84034
2008	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	47.18187
2008	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.0685
2008	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.209576
2008	Annual	San Bernardino (SC)	T6 Public	Fuel	1.147204
2008	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.338009
2008	Annual	San Bernardino (SC)	T6TS	Fuel	12.30441
2008	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.092586
2008	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	34.54049
2008	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	2.304614
2008	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	43.18204
2008	Annual	San Bernardino (SC)	T7 NOOS	Fuel	13.73189
2008	Annual	San Bernardino (SC)	T7 POLA	Fuel	42.61088

2008	Annual	San Bernardino (SC)	T7 Public	Fuel	3.606059
2008	Annual	San Bernardino (SC)	T7 Single	Fuel	24.42305
2008	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	5.906664
2008	Annual	San Bernardino (SC)	T7 SWCV	Fuel	16.23464
2008	Annual	San Bernardino (SC)	T7 Tractor	Fuel	48.19471
2008	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	4.408257
2008	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.408854
2008	Annual	San Bernardino (SC)	T7IS	Fuel	4.890914
2008	Annual	San Bernardino (SC)	PTO	Fuel	6.332166
2008	Annual	San Bernardino (SC)	SBUS	Fuel	3.951631
2008	Annual	San Bernardino (SC)	UBUS	Fuel	10.90992
2008	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.146384
2008	Annual	San Bernardino (SC)	OBUS	Fuel	3.601576
2008	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.147903
			Year 2008 Total		**2086.028**
2009	Annual	San Bernardino (SC)	LDA	Fuel	689.3529
2009	Annual	San Bernardino (SC)	LDT1	Fuel	98.58349
2009	Annual	San Bernardino (SC)	LDT2	Fuel	320.9203
2009	Annual	San Bernardino (SC)	LHD1	Fuel	94.29793
2009	Annual	San Bernardino (SC)	LHD2	Fuel	19.77277
2009	Annual	San Bernardino (SC)	MCY	Fuel	4.464257
2009	Annual	San Bernardino (SC)	MDV	Fuel	450.5718
2009	Annual	San Bernardino (SC)	MH	Fuel	8.761432
2009	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.063569
2009	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.108589
2009	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.33266
2009	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	1.500822
2009	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	3.306812
2009	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	15.57751
2009	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	40.86709
2009	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.062217
2009	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.190601
2009	Annual	San Bernardino (SC)	T6 Public	Fuel	1.235444
2009	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.339889

2009	Annual	San Bernardino (SC)	T6TS	Fuel	10.79798
2009	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.091772
2009	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	31.51768
2009	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	1.658573
2009	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	39.54297
2009	Annual	San Bernardino (SC)	T7 NOOS	Fuel	12.53682
2009	Annual	San Bernardino (SC)	T7 POLA	Fuel	35.07282
2009	Annual	San Bernardino (SC)	T7 Public	Fuel	3.679619
2009	Annual	San Bernardino (SC)	T7 Single	Fuel	21.76917
2009	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	4.245301
2009	Annual	San Bernardino (SC)	T7 SWCV	Fuel	16.20893
2009	Annual	San Bernardino (SC)	T7 Tractor	Fuel	44.01841
2009	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	3.166993
2009	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.402004
2009	Annual	San Bernardino (SC)	T7IS	Fuel	4.39596
2009	Annual	San Bernardino (SC)	PTO	Fuel	5.668933
2009	Annual	San Bernardino (SC)	SBUS	Fuel	3.65874
2009	Annual	San Bernardino (SC)	UBUS	Fuel	11.00959
2009	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.044328
2009	Annual	San Bernardino (SC)	OBUS	Fuel	3.697473
2009	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.052256
			Year 2009 Total		**2005.546**
2010	Annual	San Bernardino (SC)	LDA	Fuel	697.5844
2010	Annual	San Bernardino (SC)	LDT1	Fuel	96.97776
2010	Annual	San Bernardino (SC)	LDT2	Fuel	323.9606
2010	Annual	San Bernardino (SC)	LHD1	Fuel	89.44533
2010	Annual	San Bernardino (SC)	LHD2	Fuel	19.36775
2010	Annual	San Bernardino (SC)	MCY	Fuel	4.246988
2010	Annual	San Bernardino (SC)	MDV	Fuel	444.4532
2010	Annual	San Bernardino (SC)	MH	Fuel	8.439727
2010	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.063149
2010	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.1095
2010	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.335731
2010	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	1.795747

2010	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	3.965474
2010	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	15.62971
2010	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	41.53167
2010	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.06274
2010	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.192361
2010	Annual	San Bernardino (SC)	T6 Public	Fuel	1.184773
2010	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.342681
2010	Annual	San Bernardino (SC)	T6TS	Fuel	10.26202
2010	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.091119
2010	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	31.88648
2010	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	1.989398
2010	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	40.08688
2010	Annual	San Bernardino (SC)	T7 NOOS	Fuel	12.69978
2010	Annual	San Bernardino (SC)	T7 POLA	Fuel	42.48628
2010	Annual	San Bernardino (SC)	T7 Public	Fuel	3.806383
2010	Annual	San Bernardino (SC)	T7 Single	Fuel	22.02536
2010	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	5.078002
2010	Annual	San Bernardino (SC)	T7 SWCV	Fuel	16.28746
2010	Annual	San Bernardino (SC)	T7 Tractor	Fuel	44.10993
2010	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	3.785863
2010	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.387428
2010	Annual	San Bernardino (SC)	T7IS	Fuel	3.4463
2010	Annual	San Bernardino (SC)	PTO	Fuel	5.734884
2010	Annual	San Bernardino (SC)	SBUS	Fuel	3.675176
2010	Annual	San Bernardino (SC)	UBUS	Fuel	11.20364
2010	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.053786
2010	Annual	San Bernardino (SC)	OBUS	Fuel	3.770525
2010	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.103891
			Year 2010 Total		**2014.66**
2011	Annual	San Bernardino (SC)	LDA	Fuel	696.7402
2011	Annual	San Bernardino (SC)	LDT1	Fuel	88.84558
2011	Annual	San Bernardino (SC)	LDT2	Fuel	326.4095
2011	Annual	San Bernardino (SC)	LHD1	Fuel	82.21095
2011	Annual	San Bernardino (SC)	LHD2	Fuel	18.68439

2011	Annual	San Bernardino (SC)	MCY	Fuel	4.073483
2011	Annual	San Bernardino (SC)	MDV	Fuel	426.0928
2011	Annual	San Bernardino (SC)	MH	Fuel	7.856279
2011	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.062954
2011	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.111565
2011	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.343846
2011	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	2.448407
2011	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	5.42332
2011	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	15.54741
2011	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	41.87458
2011	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.063923
2011	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.197011
2011	Annual	San Bernardino (SC)	T6 Public	Fuel	1.231044
2011	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.352172
2011	Annual	San Bernardino (SC)	T6TS	Fuel	10.52633
2011	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.090694
2011	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	32.46353
2011	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	2.715004
2011	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	40.67236
2011	Annual	San Bernardino (SC)	T7 NOOS	Fuel	12.93842
2011	Annual	San Bernardino (SC)	T7 POLA	Fuel	42.03392
2011	Annual	San Bernardino (SC)	T7 Public	Fuel	3.901684
2011	Annual	San Bernardino (SC)	T7 Single	Fuel	21.42135
2011	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	6.897613
2011	Annual	San Bernardino (SC)	T7 SWCV	Fuel	16.35297
2011	Annual	San Bernardino (SC)	T7 Tractor	Fuel	44.72361
2011	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	5.142809
2011	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.396298
2011	Annual	San Bernardino (SC)	T7IS	Fuel	2.975081
2011	Annual	San Bernardino (SC)	PTO	Fuel	5.559754
2011	Annual	San Bernardino (SC)	SBUS	Fuel	3.75022
2011	Annual	San Bernardino (SC)	UBUS	Fuel	10.90816
2011	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.070362
2011	Annual	San Bernardino (SC)	OBUS	Fuel	3.59152

2011	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.087653
			Year 2011 Total		**1987.789**
2012	Annual	San Bernardino (SC)	LDA	Fuel	704.5742
2012	Annual	San Bernardino (SC)	LDT1	Fuel	83.29702
2012	Annual	San Bernardino (SC)	LDT2	Fuel	321.0838
2012	Annual	San Bernardino (SC)	LHD1	Fuel	75.2456
2012	Annual	San Bernardino (SC)	LHD2	Fuel	18.18661
2012	Annual	San Bernardino (SC)	MCY	Fuel	4.006429
2012	Annual	San Bernardino (SC)	MDV	Fuel	406.4075
2012	Annual	San Bernardino (SC)	MH	Fuel	7.367822
2012	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.062356
2012	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.111523
2012	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.343151
2012	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	2.700471
2012	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	6.000333
2012	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	14.58014
2012	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	37.86229
2012	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.064098
2012	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.196613
2012	Annual	San Bernardino (SC)	T6 Public	Fuel	1.248643
2012	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.357855
2012	Annual	San Bernardino (SC)	T6TS	Fuel	9.571982
2012	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.08984
2012	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	32.61849
2012	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	3.001892
2012	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	40.59581
2012	Annual	San Bernardino (SC)	T7 NOOS	Fuel	13.08563
2012	Annual	San Bernardino (SC)	T7 POLA	Fuel	42.3237
2012	Annual	San Bernardino (SC)	T7 Public	Fuel	3.904782
2012	Annual	San Bernardino (SC)	T7 Single	Fuel	20.96214
2012	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	7.589471
2012	Annual	San Bernardino (SC)	T7 SWCV	Fuel	16.71384
2012	Annual	San Bernardino (SC)	T7 Tractor	Fuel	44.61749
2012	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	5.658526

2012	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.39671
2012	Annual	San Bernardino (SC)	T7IS	Fuel	2.820451
2012	Annual	San Bernardino (SC)	PTO	Fuel	5.42933
2012	Annual	San Bernardino (SC)	SBUS	Fuel	3.742526
2012	Annual	San Bernardino (SC)	UBUS	Fuel	11.13088
2012	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.070474
2012	Annual	San Bernardino (SC)	OBUS	Fuel	3.135219
2012	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.134893
			Year 2012 Total		**1953.29**
2013	Annual	San Bernardino (SC)	LDA	Fuel	700.1186
2013	Annual	San Bernardino (SC)	LDT1	Fuel	78.78316
2013	Annual	San Bernardino (SC)	LDT2	Fuel	319.2222
2013	Annual	San Bernardino (SC)	LHD1	Fuel	69.70292
2013	Annual	San Bernardino (SC)	LHD2	Fuel	17.32628
2013	Annual	San Bernardino (SC)	MCY	Fuel	3.876817
2013	Annual	San Bernardino (SC)	MDV	Fuel	388.6928
2013	Annual	San Bernardino (SC)	MH	Fuel	6.917899
2013	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.062539
2013	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.115372
2013	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.361367
2013	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	2.840397
2013	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	6.317612
2013	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	15.22678
2013	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	40.28202
2013	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.066433
2013	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.20705
2013	Annual	San Bernardino (SC)	T6 Public	Fuel	1.221291
2013	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.36446
2013	Annual	San Bernardino (SC)	T6TS	Fuel	9.067041
2013	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.090044
2013	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	33.35991
2013	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	3.150411
2013	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	41.37659
2013	Annual	San Bernardino (SC)	T7 NOOS	Fuel	13.38533

2013	Annual	San Bernardino (SC)	T7 POLA	Fuel	43.84345
2013	Annual	San Bernardino (SC)	T7 Public	Fuel	3.944637
2013	Annual	San Bernardino (SC)	T7 Single	Fuel	22.24435
2013	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	7.931489
2013	Annual	San Bernardino (SC)	T7 SWCV	Fuel	16.4907
2013	Annual	San Bernardino (SC)	T7 Tractor	Fuel	45.47352
2013	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	5.913517
2013	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.396696
2013	Annual	San Bernardino (SC)	T7IS	Fuel	2.68804
2013	Annual	San Bernardino (SC)	PTO	Fuel	5.736266
2013	Annual	San Bernardino (SC)	SBUS	Fuel	3.743707
2013	Annual	San Bernardino (SC)	UBUS	Fuel	10.68533
2013	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.116979
2013	Annual	San Bernardino (SC)	OBUS	Fuel	3.13622
2013	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.215226
			Year 2013 Total		**1926.695**
2014	Annual	San Bernardino (SC)	LDA	Fuel	715.9315
2014	Annual	San Bernardino (SC)	LDT1	Fuel	76.53572
2014	Annual	San Bernardino (SC)	LDT2	Fuel	325.9877
2014	Annual	San Bernardino (SC)	LHD1	Fuel	66.49574
2014	Annual	San Bernardino (SC)	LHD2	Fuel	16.95583
2014	Annual	San Bernardino (SC)	MCY	Fuel	3.880019
2014	Annual	San Bernardino (SC)	MDV	Fuel	382.4446
2014	Annual	San Bernardino (SC)	MH	Fuel	6.650687
2014	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.062536
2014	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.119865
2014	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.372628
2014	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	2.973672
2014	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	6.589948
2014	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	16.11957
2014	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	42.22578
2014	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.068976
2014	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.213502
2014	Annual	San Bernardino (SC)	T6 Public	Fuel	1.173353

2014	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.373799
2014	Annual	San Bernardino (SC)	T6TS	Fuel	8.93136
2014	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.090033
2014	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	34.36795
2014	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	3.311522
2014	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	42.0232
2014	Annual	San Bernardino (SC)	T7 NOOS	Fuel	13.81453
2014	Annual	San Bernardino (SC)	T7 POLA	Fuel	44.86493
2014	Annual	San Bernardino (SC)	T7 Public	Fuel	3.907763
2014	Annual	San Bernardino (SC)	T7 Single	Fuel	23.31083
2014	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	8.22478
2014	Annual	San Bernardino (SC)	T7 SWCV	Fuel	16.13495
2014	Annual	San Bernardino (SC)	T7 Tractor	Fuel	46.6316
2014	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	6.153235
2014	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.395882
2014	Annual	San Bernardino (SC)	T7IS	Fuel	2.608734
2014	Annual	San Bernardino (SC)	PTO	Fuel	6.005271
2014	Annual	San Bernardino (SC)	SBUS	Fuel	3.860976
2014	Annual	San Bernardino (SC)	UBUS	Fuel	10.52775
2014	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.148585
2014	Annual	San Bernardino (SC)	OBUS	Fuel	3.217208
2014	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.266318
			Year 2014 Total		**1945.973**
2015	Annual	San Bernardino (SC)	LDA	Fuel	731.8319
2015	Annual	San Bernardino (SC)	LDT1	Fuel	74.52559
2015	Annual	San Bernardino (SC)	LDT2	Fuel	331.9903
2015	Annual	San Bernardino (SC)	LHD1	Fuel	63.46698
2015	Annual	San Bernardino (SC)	LHD2	Fuel	16.64037
2015	Annual	San Bernardino (SC)	MCY	Fuel	3.914135
2015	Annual	San Bernardino (SC)	MDV	Fuel	376.2215
2015	Annual	San Bernardino (SC)	MH	Fuel	6.482803
2015	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.06306
2015	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.12829
2015	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.398429

2015	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	3.117521
2015	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	6.929103
2015	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	17.53474
2015	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	46.22634
2015	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.073805
2015	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.228285
2015	Annual	San Bernardino (SC)	T6 Public	Fuel	1.138527
2015	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.380274
2015	Annual	San Bernardino (SC)	T6TS	Fuel	8.972739
2015	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.090645
2015	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	36.4243
2015	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	3.431065
2015	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	43.90661
2015	Annual	San Bernardino (SC)	T7 NOOS	Fuel	14.66256
2015	Annual	San Bernardino (SC)	T7 POLA	Fuel	46.41119
2015	Annual	San Bernardino (SC)	T7 Public	Fuel	3.900655
2015	Annual	San Bernardino (SC)	T7 Single	Fuel	25.11715
2015	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	8.508634
2015	Annual	San Bernardino (SC)	T7 SWCV	Fuel	15.88943
2015	Annual	San Bernardino (SC)	T7 Tractor	Fuel	49.21807
2015	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	6.375118
2015	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.398919
2015	Annual	San Bernardino (SC)	T7IS	Fuel	2.546992
2015	Annual	San Bernardino (SC)	PTO	Fuel	6.393957
2015	Annual	San Bernardino (SC)	SBUS	Fuel	4.063026
2015	Annual	San Bernardino (SC)	UBUS	Fuel	10.41523
2015	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.214304
2015	Annual	San Bernardino (SC)	OBUS	Fuel	3.362008
2015	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.379013
			Year 2015 Total		**1973.974**
2016	Annual	San Bernardino (SC)	LDA	Fuel	744.0015
2016	Annual	San Bernardino (SC)	LDT1	Fuel	72.35963
2016	Annual	San Bernardino (SC)	LDT2	Fuel	335.4404
2016	Annual	San Bernardino (SC)	LHD1	Fuel	60.45353

2016	Annual	San Bernardino (SC)	LHD2	Fuel	16.28671
2016	Annual	San Bernardino (SC)	MCY	Fuel	3.965121
2016	Annual	San Bernardino (SC)	MDV	Fuel	367.9235
2016	Annual	San Bernardino (SC)	MH	Fuel	6.204974
2016	Annual	San Bernardino (SC)	T6 Ag	Fuel	0.063057
2016	Annual	San Bernardino (SC)	T6 CAIRP Heavy	Fuel	0.134477
2016	Annual	San Bernardino (SC)	T6 CAIRP Small	Fuel	0.416944
2016	Annual	San Bernardino (SC)	T6 Instate Construction Heavy	Fuel	3.247926
2016	Annual	San Bernardino (SC)	T6 Instate Construction Small	Fuel	7.195074
2016	Annual	San Bernardino (SC)	T6 Instate Heavy	Fuel	18.71903
2016	Annual	San Bernardino (SC)	T6 Instate Small	Fuel	49.4048
2016	Annual	San Bernardino (SC)	T6 OOS Heavy	Fuel	0.077351
2016	Annual	San Bernardino (SC)	T6 OOS Small	Fuel	0.238893
2016	Annual	San Bernardino (SC)	T6 Public	Fuel	1.095322
2016	Annual	San Bernardino (SC)	T6 Utility	Fuel	0.382944
2016	Annual	San Bernardino (SC)	T6TS	Fuel	8.930987
2016	Annual	San Bernardino (SC)	T7 Ag	Fuel	0.090636
2016	Annual	San Bernardino (SC)	T7 CAIRP	Fuel	37.95746
2016	Annual	San Bernardino (SC)	T7 CAIRP Construction	Fuel	3.529663
2016	Annual	San Bernardino (SC)	T7 NNOOS	Fuel	45.16582
2016	Annual	San Bernardino (SC)	T7 NOOS	Fuel	15.30191
2016	Annual	San Bernardino (SC)	T7 POLA	Fuel	48.73644
2016	Annual	San Bernardino (SC)	T7 Public	Fuel	3.879738
2016	Annual	San Bernardino (SC)	T7 Single	Fuel	26.77879
2016	Annual	San Bernardino (SC)	T7 Single Construction	Fuel	8.780466
2016	Annual	San Bernardino (SC)	T7 SWCV	Fuel	15.7356
2016	Annual	San Bernardino (SC)	T7 Tractor	Fuel	51.20419
2016	Annual	San Bernardino (SC)	T7 Tractor Construction	Fuel	6.59117
2016	Annual	San Bernardino (SC)	T7 Utility	Fuel	0.399424
2016	Annual	San Bernardino (SC)	T7IS	Fuel	2.476389
2016	Annual	San Bernardino (SC)	PTO	Fuel	6.798516
2016	Annual	San Bernardino (SC)	SBUS	Fuel	4.241439
2016	Annual	San Bernardino (SC)	UBUS	Fuel	10.28937
2016	Annual	San Bernardino (SC)	Motor Coach	Fuel	1.26662

2016	Annual	San Bernardino (SC)	OBUS	Fuel	3.464251
2016	Annual	San Bernardino (SC)	All Other Buses	Fuel	1.461561
			Year 2016 Total		**1990.692**