TECHNICAL APPENDICES

DRAFT ENVIRONMENTAL IMPACT REPORT

CALMAT CAJON CREEK SPECIFIC PLAN AND CONDITIONAL USE PERMIT/RECLAMATION PLAN

SCH No.: 90020908

Prepared for:

CITY OF SAN BERNARDINO
Department of Planning and Building
300 North D Street
San Bernardino, CA 92418-0001
(714) 384-5057

Prepared by:

WOODWARD-CLYDE CONSULTANTS
1550 Hotel Circle North, Suite 200
San Diego, California 92108
(619) 294-9400

December 1991

D/9053139N-3000

TECHNICAL APPENDICES

DRAFT ENVIRONMENTAL IMPACT REPORT CALMAT CAJON CREEK SPECIFIC PLAN AND CONDITIONAL USE PERMIT/RECLAMATION PLAN

SCH No: 90020908
General Plan Amendment: 91-18
Specific Plan: 90-01
Tentative Parcel Map Nos: 14106, 14107, 14108
CUP No: 9131

Prepared for:

CITY OF SAN BERNARDINO
Planning and Building Services Department
300 North D Street
San Bernardino, CA 92418-0001
(714) 384-5057

Contact Person:
Deborah Woldruff, Associate Planner

Prepared by:

WOODWARD-CLYDE CONSULTANTS
1550 Hotel Circle North, Suite 200
San Diego, California 92108
(619) 294-9400

Contact Person:
Gary D. Clossin, Senior Project Engineer

Project Proponent:

CALMAT COMPANY
3200 San Fernando Road
Los Angeles, CA 90065
(213) 258-2777

Contact Person:
Wesley A. Murray, Manager of Land Use Planning

December 1991

C/9053139N-3000

TABLE OF CONTENTS

APPENDIX A

CITY OF SAN BERNARDINO PLANNING AND BUILDING SERVICES DEPARTMENT

NOTICE OF PREPARATION

TO: Office of Planning and Research
(Agency)
1400 10th Street
(Address)
Sacramento, CA 95814

Subject: **Notice of Preparation of a Draft Environmental Impact Report**

Lead Agency:

City of San Bernardino
Planning and Building Services Department
385 North "D" Street
San Bernardino, CA 92418

Contact Edalia Olivo-Gomez

Consulting Firm (If applicable):

Firm Name Woodward-Clyde Consultants

Street Address 1550 Hotel Circle North

City/State/Zip San Diego, CA 92108

Contact Gary D. Clossin, P.E.

The City of San Bernardino will be the Lead Agency and will prepare an environmental impact report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials. A copy of the Initial Study (☐ is ☐ is not) attached.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but ***not later than 30 days*** after receipt of this notice.

Please send your response to Edalia Olivo-Gomez at the address shown above. We will need the name for a contact person in your agency.

Project Title: Specific Plan No. 90-1

Project Location: San Bernardino, San Bernardino County
City (nearest) County

Project Description: (brief)

A mineral extraction (sand and gravel) industrial, and open space development.

Date 9/7/90

Signature [signature]

Title Associate Planner

Telephone (714) 384-5057

Reference: California Administrative Code, Title 14, (CEQA Guidelines) Sections 15082(a), 15103, 15375.

PROJECT DESCRIPTION

SPECIFIC PLAN NO. 90-01

Specific Plan No. 90-01, the CalMat Cajon Creek project, encompasses approximately 1199 acres under Calmat ownership and 100 acres owned by the County of San Bernardino in the Cajon Creek Wash area. The DEIR will address the utilization of the site for industrial uses, sand and gravel extraction and processing, open space, and related uses. In addition to addressing land uses, the DEIR will also assess the annexation of approximately 1,091 acres of land from the County of San Bernardino (in the City's Sphere of Influence) to the City of San Bernardino.

Also discussed in the DEIR will be the requirements for parcel maps and related planning review for industrial development and a conditional use permit for mining permits and a reclamation plan. Findings for the redesignation of significant mineral resource zones to permit uses that would preclude extractive uses will be included. A general plan amendment will also be required because the locations of the proposed uses differ from the General Plan Land Use Plan.

The Cajon Creek Wash and alluvial tan, upon which the proposed project is situated, is located partially within and adjacent to the northwesterly portion of the City of San Bernardino, just west of Cajon Boulevard and approximately three-quarters of a mile south of the I-15/I-215 junction (See attached map).


BUFFER DEVELOPMENT - R&D/LIGHT INDUSTRIAL
A
INDUSTRIAL - WITH RAIL ACCESS
B
C
PRIVATE OWNERSHIP
SOUTHERN PACIFIC RAILROAD
CAJON CREEK
INDUSTRIAL WITH RAIL ACCESS
D
INTERIM PORTABLE ROCK PLANT SITE
E
BUFFER DEVELOPMENT - R&D/LIGHT INDUSTRIAL
POTENTIAL FUTURE
MINING
F
COUNTY OWNERSHIP PRIOR LANDFILL OPERATION
CAJON CREEK
MINING
P
COUNTY OWNERSHIP
BUFFER DEVELOPMENT R&D/LIGHT INDUSTRIAL
G
H
K
BUFFER DEVELOPMENT - R&D/LIGHT INDUSTRIAL
CAJON BLVD.
SANTA FE/UNION PACIFIC RAILROAD
BUFFER DEVELOPMENT CMUP/MEDIUM INDUSTRIAL
J
MINING - AREA
L
MINING - AREA
INTERIM CONSTRUCTION MATERIALS
M
PRIVATE OWNERSHIPS
N
PLANT SITE
ROCK PLANT
R.M.C. PLANT
CAJON CREEK
COUNTY OWNERSHIP
NO.
DATE
REVISION
BY
CalMat Co
LOS ANGELES, CA
CAJON CREEK
CONCEPT PLAN
0'
500'
1000'
2500'
SCALE
1"=400'
PROJ. NO.
DWG. NO.
REV.

STATE OF CALIFORNIA—OFFICE OF THE GOVERNOR

GEORGE DEUKMEJIAN, Governor

OFFICE OF PLANNING AND RESEARCH
1400 TENTH STREET
SACRAMENTO, CA 95814

DATE: Sep 12, 1990

TO: Reviewing Agency

RE: CITY OF SAN BERNARDINO PLANNING AND BUILDING SERVI's NOP for SPECIFIC PLAN NO. 90-1
SCH # 90020908

Attached for your comment is the CITY OF SAN BERNARDINO PLANNING AND BUILD Notice of Preparation of a draft Environmental Impact Report (EIR) for th SPECIFIC PLAN NO. 90-1.

Responsible agencies must transmit their concerns and comments on the scop and content of the EIR, focusing on specific information related to thei own statutory responsibility, within 30 days of receipt of this notice. W encourage commenting agencies to respond to this notice and express thei concerns early in the environmental review process.

Please direct your comments to:

EDALIA OLIVO-GOMEZ
CITY OF SAN BERNARDINO PLANNING AND BUILDING SERVI
300 NORTH "D" STREET
SAN BERNARDINO, CA 92418

with a copy to the Office of Planning and Research. Please refer to th SCH number noted above in all correspondence concerning this project.

If you have any questions about the review process, call John Vanderbilt at (916) 445-0613.

Sincerely,

David C. Nunenkamp
Deputy Director, Permit Assistance

Attachments

cc: Lead Agency

RECEIVED
SEP 14 1990
CITY OF SAN BERNARDINO
DEPARTMENT OF PLANNING &
BUILDING SERVICES

X = sent by SCH

Resources Agency

- [ ] Karen Cagle, Dept. of Boating & Waterways, 1629 S Street, Sacramento, CA 95814, 916/445-6281
- [ ] Gary L. Holloway, California Coastal Commission, 631 Howard Street, 4th Floor, San Francisco, CA 94105, 415/543-8555
- [ ] Reed Holderman, State Coastal Conservancy, 1330 Broadway, Suite 1100, Oakland, CA 94612, 415/464-1015
- [S] Dennis O'Bryant, Dept. of Conservation, 1416 Ninth Street, Room 1326-2, Sacramento, CA 95814, 916/322-5873
  - (X) Div. of Mines and Geology
  - ( ) Div. of Oil and Gas
  - ( ) Land Resources Protect. Unit
- [S] Douglas Wickizer, Dept. of Forestry, 1416 Ninth Street, Room 1516-2, Sacramento, CA 95814, 916/322-0128
- [X] Hans Kreutzberg, Office of Historic Preservation, P.O. Box 942896, Sacramento, CA 94296-0001, 916/322-9621
- [X] Mike Doyle, Dept. of Parks and Recreation, P.O. Box 942896, Sacramento, CA 94296-0001, 916/324-6421
- [X] Anna Leena Bronson, Reclamation Board, 1416 Ninth Street Room 706, Sacramento, CA 95814, 916/322-3740
- [ ] Nancy Wakeman, S.F. Bay Conservation & Dev't. Comm., 30 Van Ness Avenue, Room 2011, San Francisco, CA 94102, 415/557-3686
- [S] Nadell Gayou, Dept. of Water Resources, 1416 Ninth Street, Room 215-4, Sacramento, CA 95814, 916/445-7416

Fish and Game Regional Offices

- [ ] Gary Stacey, Regional Manager, Department of Fish and Game, 601 Locust, Redding, CA 96001, 916/225-2300 (8-442)
- [ ] Jim Messersmith, Regional Manager, Department of Fish & Game, 1701 Nimbus Road, Suite A, Rancho Cordova, CA 95670, 916/355-0922 (8-438)
- [ ] B. Hunter, Regional Manager, Department of Fish and Game, P.O. Box 47, Yountville, CA 94599, 707/944-5510
- [ ] G. Nokes, Regional Manager, Department of Fish and Game, 1234 East Shaw Avenue, Fresno, CA 93710, 209/222-3761 (8-421)
- [S] Fred A. Worthley, Jr., Reg. Manager, Department of Fish and Game, 330 Golden Shore, Suite 50, Long Beach, CA 90802, 213/590-5113 (8-635)

Independent Commissions

- [ ] John R. Nuffer, California Energy Commission, 1516 Ninth Street, MS-15, Sacramento, CA 95814, 916/323-9180
- [X] William A. Johnson, Native American Heritage Comm., 915 Capitol Mall, Room 288, Sacramento, CA 95814, 916/322-7791
- [ ] George Hersh, Public Utilities Commission, 505 Van Ness Avenue, San Francisco, CA 94102, 415/557-1375 (8-597)
- [X] Ted Fukushima, State Lands Commission, 1807 - 13th Street, Sacramento, CA 95814, 916/322-7813

Business, Transportation, & Housing

- [ ] Sandy Hesnard, Caltrans - Division of Aeronautics, P.O. Box 942874, Sacramento, CA 94274-0001, 916/324-1833
- [ ] Sgt. Jim Weddell, California Highway Patrol, Long Range Planning Section, Planning and Analysis Division, 2555 First Avenue, Sacramento, CA 95818, 916/445-1981
- [ ] George Smith, Caltrans - Planning, [illegible] 94274

District Contacts

- [ ] Jo Sanford, Caltrans, *District 1*, 1656 Union Street, Eureka, CA 95501, 707/445-6671 (8-538)
- [ ] Michelle Gallagher, Caltrans, *District 2*, 1657 Riverside Drive, Redding, CA 96001, 916/225-3259 (8-442)
- [ ] Brian J. Smith, Caltrans, *District 3*, 703 B Street, Marysville, CA 95901, 916/741-4277 (8-457)
- [ ] Wade Green, Caltrans, *District 4*, P.O. Box 7310, San Francisco, CA 94120, 415/557-9162 (8-[illegible])
- [ ] Jerry Laumer, Caltrans, *District 5*, P.O. Box 8114, San Luis Obispo, CA 93403-8114, 805/549-3161 (8-629)
- [ ] Loren Fairchild, Caltrans, *District 6*, P.O. Box 12616, Fresno, CA 93778, 209/276-5989 (8-422)
- [ ] Gary McSweeney, Caltrans, *District 7*, 120 South Spring Street, Los Angeles, CA 90012, 213/620-2376 (8-640)
- [S] Harvey Sawyer, Caltrans, *District 8*, 247 West Third Street, San Bernardino, CA 92403, 714/383-4808 (8-670)
- [ ] Andy Zellman, Caltrans, *District 9*, 500 South Main Street, Bishop, CA 93514, 619/872-0693 (8-627)
- [ ] Al Johnson, Caltrans, *District 10*, P.O. Box 2048, Stockton, CA 95201, 209/948-7838 (8-423)
- [ ] Jim Cheshire, Caltrans, *District 11*, P.O. Box 85406, 2829 Juan Street, San Diego, CA 92138-5406, 619/237-6755 (8-631)
- [ ] Chuck Elmon, Caltrans, *District 12*, 2501 Pullman St., Santa Ana, CA 92705, 714/724-2061 (8-655)

- [ ] Yoshek Cersinko, Dept. of Food and Agriculture, 1220 N Street, Room 104, Sacramento, CA 95814, 916/322-5227

Health & Welfare

- [X] Quy Tu, Dept. of Health, 714 P Street, Room 1253, Sacramento, CA 95814, 916/323-6111
- [X] DHS/TSCD: TOXICS

State and Consumer Services

- [ ] Robert Sleppy, Dept. of General Services, 400 P Street, Suite 3460, Sacramento, CA 95814, 916/324-0214

Environmental Affairs

- [X] Bob Fletcher, Air Resources Board, 1102 Q Street, Sacramento, CA 95814, 916/322-8267
- [X] Jeannie Blakeslee, Calif. Waste Management Board, 1020 Ninth Street, Room 300, Sacramento, CA 95814, 916/327-0454

State Water Resources Control Board

- [ ] Allan Patton, State Water Resources Control Board, Division of Loans & Grants, P.O. Box 944212, Sacramento, CA 94244-2120, 916/739-4414
- [ ] Dave Beringer, State Water Resources Control Board, Delta Unit, P.O. Box 2000, Sacramento, CA 95810, 916/322-9870
- [S] Ed Anton, State Water Resources Control Board, Division of Water Quality, P.O. Box 100, Sacramento, CA 95801, 916/445-9552
- [ ] Mike Falkenstein, State Water Resources Control Board, Division of Water Rights, 901 P Street, Sacramento, CA 95814, 916/324-5636
- [X] APCD/AQMD: South Coast

- [ ] NORTH COAST REGION (1), 1440 Guerneville Rd., Santa Rosa, CA 95401, 707/576-2220 (8-590)
- [ ] SAN FRANCISCO BAY REGION (2), 1111 Jackson Street, Room 6000, Oakland, CA 94607, 415/464-1255 (8-561)
- [ ] CENTRAL COAST REGION (3), 1102-A Laurel Lane, San Luis Obispo, CA 93401, 805/549-3147 (8-629)
- [ ] LOS ANGELES REGION (4), 101 Centre Plaza Drive, Monterey Park, CA 91754, 213/620-4460 (8-640)
- [ ] CENTRAL VALLEY REGION (5), 3443 Routier Road, Suite A, Sacramento, CA 95827-3098, 916/361-5600
  - ( ) Fresno Branch Office, 3614 East Ashlan Avenue, Fresno, CA 93726, 209/445-5116 (8-421)
  - ( ) Redding Branch Office, 100 East Cypress Avenue, Redding, CA 96002, 916/224-4845 (ATS 441)
- [ ] LAHONTAN REGION (6), 2092 Lake Tahoe Boulevard, P.O. Box 9428, South Lake Tahoe, CA 95731, 916/544-3481
  - ( ) Victorville Branch Office, 15428 Civic Drive, Suite 100, Victorville, CA 92392-2359, 619/241-6583
- [ ] COLORADO RIVER BASIN REGION (7), 73-271 Highway 111, Suite 21, Palm Desert, CA 92260, 619/346-7491
- [S] SANTA ANA REGION (8), 6809 Indiana Avenue, Suite 200, Riverside, CA 92506, 714/782-4130 (8-632)
- [ ] SAN DIEGO REGION (9), 9771 Clairemont Mesa Blvd., Suite B, San Diego, CA 92124-1331, 619/265-5114 (8-636)
- [S] OTHER: Resource agency
- [X] OTHER: OLA (Schools)

San Bernardino City Unified School District

E. Neal Roberts, Ed.D., Superintendent
Harold L. Boring, Ed.D., Assistant Superintendent, Administrative Services

Your Public Schools . . .
There's No Better Place To Learn

September 13, 1990

Ms. Edalia Olivo-Gomez, Associate Planner
City of San Bernardino
Planning Department
300 North "D" Street
San Bernardino, CA 92418

Subject: Initial Study for Specific Plan No. 90-01

Dear Ms. Olivo-Gomez:

The San Bernardino City Unified School District has reviewed the referenced document. The following items concerning schools were not addressed:

#2a Only the impacts on the future high school are discussed. The impact of substantial air emissions on nearby elementary schools must be addressed.

#9 Transportation and circulation adjacent to the proposed high school site must be addressed. Significant safety problems may exist for students, staff, and parents depending on the volume of traffic generated by the proposed development.

#10 Public Services - The creation of a significant number of jobs in the project may result in the future employees and their families residing in the San Bernardino City Unified School District. The District requests a detailed study regarding available student capacity and the impact of this project on the District's ability to provide services.

Sincerely,

R. Scott Shira
Facilities Planning and
Development Director

RECEIVED
SEP 17 1990
CITY OF SAN BERNARDINO
DEPARTMENT OF PLANNING &
BUILDING SERVICES

RSS:ej
#olivo.csb

cc: Cal Mat Co., ATT: Douglas Sprague

City of San Bernardino
INTEROFFICE MEMORANDUM
9009-1102

TO: Edalia Olivo-Gomez, Associate Planner

FROM: Council Office, Ward Five

SUBJECT: Specific Plan No. 90-1

DATE: September 17, 1990

COPIES:

In reference to this specific plan, I will be very brief. The planned project, a sand and gravel extraction industry, at this location is unreasonable, unsafe and does not meet current zone requirements.

The mitigation, I believe, to have the project environmentally sound would create a prohibitive cost for successful operation.

I am opposed to any zone change that would make the project compatible with the General Plan.

The presence of hazardous wastes, pollution of water, fouling the air and extreme noise would be unacceptable to my constituents and I agree with this feeling.

Tom Minor

TOM MINOR
Councilman, Sixth Ward

TM:jv

RECEIVED
SEP 18 1990
CITY OF SAN BERNARDINO
DEPARTMENT OF PLANNING &
BUILDING SERVICES

STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF TRANSPORTATION
DISTRICT 8, P.O. BOX 231
SAN BERNARDINO, CALIFORNIA 92402
TDD (714) 383-4609

September 20, 1990 08-SBd-215-14.1/17.3

RECEIVED
SEP 24 1990
CITY OF SAN BERNARDINO
DEPARTMENT OF PLANNING &
BUILDING SERVICES

Ms. Edilia Olivio-Gomez
Planning Department
City of San Bernardino
300 North "D" Street
San Bernardino, CA 92418

Dear Ms. Olivio-Gomez:

We have reviewed a Notice of Preparation of a Draft Environmental Impact Report for Specific Plan 90-1 in the City of San Bernardino and request consideration of the following:

Please insure the traffic study includes any interchanges on State Route 215 that are used to access this project. The study should include impacts of the truck traffic on the load bearing capacity of freeway ramps along with the need for increased maintenance of the ramps.

The traffic study should also include the following from a worst case scenario viewpoint: existing and future average daily traffic (ADT) volumes, traffic generation (including peak hour), traffic distribution, analysis of peak hour demand and capacity using delay methodology for intersections along with current and projected capacities of local roads, state highways and freeways that might be impacted.

Discussion of the impacts should also include traffic safety, drainage, and any impact associated with the construction, maintenance, and operation of any anticipated highway improvements. In addition, the Report should list the funding source of any potential improvements to the state highway.

Given the intense population growth coupled with increasing traffic congestion, demand mitigation programs are a necessary solution to congestion. The City of San Bernardino should develop a plan that facilitates the use of carpooling, vanpooling, public transit, and accommodations for both pedestrians and bicycles as mitigations for the effect of cumulative traffic. In addition, the City should implement a program where each project proponent contributes towards a city-wide Park and Ride Program which will reduce the number of homebased work trips.

All industrial or commercial development should form a Transportation Management Association (TMA), which includes: flex-time work scheduling, compressed work week, and use of on-site rideshare coordinators. The Specific Plan should indicate preferential parking areas for those who rideshare, location and standards for both bus bays and Park and Ride facilities.

In order to review this project within the specified time period, please send the Draft Environmental Impact Report directly to the Department of Transportation in addition to anything sent to the State Clearinghouse. When available, please send the document to:

Richard Malacoff
CEQA/IGR Coordinator
California Department of Transportation
Transportation Planning B
P.O. Box 231
San Bernardino, CA 92402

If you have any questions, please contact Tom Meyers at (714) 383-6908 or FAX (714) 383-4936.

Very truly yours,

Harvey J Sawyer

HARVEY J. SAWYER
Chief, Transportation Planning
Branch B

LOCAL AGENCY FORMATION COMMISSION

175 West Fifth Street, Second Floor
San Bernardino, CA 92415-0490 • (714) 387-5866 • FAX (714) 387-5871

Established by the State of California to serve the Citizens, Cities, Special Districts and the County of San Bernardino

September 24, 1990

Edalia Olivo-Gomez
City of San Bernardino
Planning and Building Services Department
Post Office Box 1318
San Bernardino, CA 92402

Dear Ms. Olivo-Gomez:

Thank you for the opportunity to respond to the Notice of Preparation for the Draft Environmental Impact Report for Specific Plan #90-01 and annexation of 1,091 acres to the City of San Bernardino. It is our understanding that LAFCO is a Responsible Agency in this review and will be noticed as such, and that the entire area proposed for annexation will be included within the subject DEIR. Please ensure that the analysis includes alternatives to annexation of the area to the City of San Bernardino.

Please call if I may be of assistance.

Sincerely,

Deborah A. Cubberley

DEBORAH A. CUBBERLEY
LAFCO Analyst

DAC:clh

STATE OF CALIFORNIA—THE RESOURCES AGENCY

GEORGE DEUKMEJIAN, Governor

DEPARTMENT OF FISH AND GAME
330 Golden Shore, Suite 50
Long Beach, CA 90802
(213) 590-5113

September 25, 1990

Ms. Edalia Olivo-Gomez
City of San Bernardino Planning and Building Services
300 North "D" Street
San Bernardino, CA 92418

Dear Ms. Olivo-Gomez:

We have reviewed the Notice of Preparation of a Draft EIR for the Specific Plan No. 90-1 project SCH 90020908. To enable our staff to adequately review and comment on this project, we recommend the following information be included in the Draft EIR:

1. A complete assessment of flora and fauna within and adjacent to the project area, with particular emphasis upon identifying endangered, threatened, and locally unique species and sensitive and critical habitats.

2. A discussion of direct, indirect, and cumulative impacts expected to adversely affect biological resources, with specific measures to offset such impacts.

3. A discussion of potential adverse impacts from any increased runoff, sedimentation, soil erosion, and/or urban pollutants on streams and watercourses on or near the project site, with mitigation measures proposed to alleviate such impacts. Stream buffer areas and their maintenance in a natural condition through non-structural flood control methods should also be considered in order to continue their high value as wildlife corridors.

More generally, there should be discussion of alternatives to not only minimize adverse impacts to wildlife but also to include direct benefit to wildlife and wildlife habitat. Those discussions should recognize the Department of Fish and Game's policy that there should be no net loss of wetland acreage or habitat values. We oppose projects which do not provide adequate mitigation for such losses.

RECEIVED
OCT 2 1990

CITY OF SAN BERNARDINO
DEPARTMENT OF PLANNING &
BUILDING SERVICES

Diversion, obstruction of the natural flow, or changes in the bed, channel, or bank of any river, stream, or lake will require notification to the Department of Fish and Game as called for in the Fish and Game Code. Notification should be made after the project is approved by the lead agency.

Thank you for the opportunity to review and comment on this project. If you have any questions, please contact Mr. Bruce Eliason of our Environmental Services staff at (213) 590-5137.

Sincerely,

R. E. Mall for

Fred Worthley
Regional Manager
Region 5

cc: Office of Planning & Research

STATE OF CALIFORNIA

GEORGE DEUKMEJIAN, Governor

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
SANTA ANA REGION
6809 INDIANA AVENUE, SUITE 200
RIVERSIDE, CALIFORNIA 92506
PHONE: (714) 782-4130

RECEIVED
SEP 28 1990
CITY OF SAN BERNARDINO
DEPARTMENT OF PLANNING &
BUILDING SERVICES

September 26, 1990

Edalia Olivo-Gomez
City of San Bernardino
Planning and Building Services Dept.
300 North "D" Street
San Bernardino, CA 92418

NOTICE OF PREPARATION (NOP) OF DRAFT ENVIRONMENTAL IMPACT REPORT (EIR) FOR SPECIFIC PLAN NO. 90-1, SCH # 90020908

Dear Mr. Olivo-Gomez:

We have reviewed the NOP for this project. In response to the statutory concerns of this office, the Draft EIR should address the following:

I. Water Quality

A. Potential impacts of the proposed project on surface and groundwater quality:

- Construction activities (including grading) that could result in water quality impacts.
- Soil characteristics related to water quality (potential for erosion and subsequent siltation, increase or decrease in percolation).
- Impacts of waste generation, treatment and disposal.
- Impacts of toxic substances handling and/or disposal (if appropriate).

B. Mitigation of Adverse Impacts.

II. Water, Wastewater and Solid Waste Service

A. Water

- Availability of water for the proposed project.
- Existing infrastructure: location of water supply lines, tie-ins.
- Applications or permits required for water acquisition.
- Impact or calculated project demand on water supply.

B. Waste Disposal/Treatment

- Types and amounts of waste materials generated by project.

- Proposed waste treatment and disposal methods. Existing infrastructure:

  * treatment facilities: location, current capacity, treatment standards; master treatment facilities expansion plan (if appropriate)

  * treatment plant collector system; location of major trunk lines and tie-ins, current capacity

  * disposal facilities: location, capacity

- Applications or permits required to implement waste disposal.

- Impact of calculated project waste volume on capacity of existing and proposed treatment and disposal facilities.

In addition, either a National Pollutant Discharge Elimination System (NPDES) permit for any discharge of wastes to surface waters or a Waste Discharge Requirements (WDR) permit for any discharge of wastes to land will be required from this Regional Board. These discharges of wastes can be those associated with, but not limited to, dewatering during construction, dredging activities, or stormwater runoff from industrial areas and/or facilities which use hazardous materials. Any proposed use of reclaimed water will also require a Report of Waste Discharge be filed with this office.

We look forward to reviewing the Draft EIR when it becomes available.

If you have any questions, please contact me.

Sincerely,

Augustine Anijielo, Water Resources Control Engineer
Regulations Section

cc: John Vanderbilt, State Clearinghouse

AEA/3449ctsn.nop

September 27, 1990

City of San Bernardino
Planning and Building Services Department
300 N. "D" Street
San Bernardino, Ca. 92418

Attn: Ms. Edalia Oliva-Gomez Re: Specific Plan 90-01

Dear Ms. Gomez:

Before making any comments about this proposed project, I would like to express my appreciation in being notified of the public scoping meeting and subsequent Initial Study for Environmental Impacts report.

I agree with the reports environmental evaluation except to the following:

AIR (c) While a line drawn on paper may try to delineate where a high wind area should be designated for development purposes, as a practical basis it's inadequate. Disturbing the sand in the wash will probably create severe sand storms during Santa Anas.

LAND USE (a) This project will result in a substantial conversion of open space to other uses. The area is environmentally sensitive for several rare and endangered species. To survive, their habitats must be preserved.

(c) The county has a "Foothills Greenbelt Zone." It should not be ignored.

Finally, the use is incompatible with the Glen Helen Regional Park facility. And an economics "needs" analysis should be considered for all the industrial designation.

I appreciate the opportunity to comment on the initial study and to review the EIR after completion.

Sincerely,

Helen Kopczynski

Helen Kopczynski
8150 Cable Canyon Road
San Bernardino, Ca. 92407
714-887-1833

RECEIVED
OCT 2 1990
CITY OF SAN BERNARDINO
DEPARTMENT OF PLANNING &
BUILDING SERVICES

3939 East Coronado Street, Second Floor
Anaheim, California 92807

PACIFIC BELL®
A Pacific Telesis Company

October 2, 1990

City of San Bernardino
Planning Department
300 N. "D" Street
San Bernardino, Ca. 92418

Attention: Edalia Olivo Gomez - Associate Planner

RE: EIR Initial Study - for Specific Plan No. 90-01
West of Cajon Boulevard between Devore and South of Institution Roads

Dear Edalia Olivo-Gomez:

Pacific Bell has no facilities within the area of this project. Telephone service is provided by General Telephone.

Thank you for helping us protect our plant. Any additional questions that you have concerning this matter may be directed to me in Anaheim on (714) 666-5657.

Sincerely,

Jack E. Stewart Jr.
Right of Way/Liaison

Zoll12

RECEIVED

OCT [illegible]

CITY OF SAN BERNARDINO DEPARTMENT OF PLANNING & BUILDING SERVICES

SOUTHERN CALIFORNIA gas COMPANY

1981 LUGONIA AVENUE • REDLANDS, CALIFORNIA

MAILING ADDRESS: BOX 3003, REDLANDS, CALIFORNIA 92373-9982

October 3,1990

City of San Bernardino
300 North D St.
San Bernardino CA 92418

ATTENTION: Planning Dept.

RE: Specific Plan # 90-01

Thank you for inquiring about the availability of natural gas service for your project. We are pleased to inform you that Southern California Gas Company has facilities in the area where the above named project is proposed. Gas service to the project could be provided from 4" main in Institution south of Santa Fe R/R (Devore) without any significant impact on the environment. The service would be in accordance with the Company's policies and extension rules on file with the California Public Utilities Commission at the time contractural arrangements are made.

You should be aware that this letter is not to be interpreted as a contractural commitment to serve the proposed project, but only as an informational service. The availability of natural gas service, as set forth in this letter, is based upon present conditions of gas supply and regulatory policies. As a public utility, the Southern California Gas Company is under the jurisdiction of the California Public Utilities Commission. We can also be affected by actions of federal regulatory agencies. Should these agencies take any action which affects gas supply or the conditions under which service is available, gas service will be provided in accordance with revised conditions.

Typical demand use for:

a. Residential (System Area Average/Use Per Meter) Yearly

Single Family	799 therms/year dwelling unit
Multi-Family 4 or less units	482 therms/year dwelling unit
Multi-Family 5 or more units	483 therms/year dwelling unit

These averages are based on total gas consumption in residential units served by Southern California Gas Company, and it should not be implied that any particular home, apartment or tract of homes will use these amounts of energy.

b. Commercial

Due to the fact that construction varies so widely (a glass building vs. a heavily insulated building) and there is such a wide variation in types of materials and equipment used, a typical demand figure is not available for this type of construction. Calculations would need to be made after the building has been designed.

SOUTHERN CALIFORNIA GAS COMPANY

To insure the existing facilities are adequate to accommodate the new development, an engineering study will be required. Detailed information including tract maps and plot plans must be submitted to the Gas Company Market Services Representative, 1-800-624-2497, six months prior to the actual construction of the natural gas pipeline.

We have developed several programs which are available, upon request, to provide assistance in selecting the most effective applications of energy conservation techniques for a particular project. If you desire further information on any of our energy conservation programs, please contact our Building Services Department, P.O. Box 3003, Redlands, CA 92373-0306, phone 1-800-624-2497.

Sincerely,

Kevin B. Flum
Technical Supervisor

KBF:blh

cc: Environ Affairs - ML209B

Southern California Edison Company

P. O. BOX 410
LONG BEACH, CALIFORNIA 90801
100 LONG BEACH BOULEVARD
LONG BEACH, CALIFORNIA 90802

WESTERN REGION
LAND SERVICES DIVISION
REAL PROPERTIES AND ADMINISTRATIVE SERVICES

TELEPHONE
(213) 491-2946
FAX (213) 491-267:

City of San Bernardino
300 North "D" Street
San Bernardino, CA 92418

October 15, 1990

Attention: Director of Public Works Engineering

SUBJECT: Cajon Creek Concept Plan

Our review of the subject subdivision map reveals that the proposed development will interfere with our rights within the subdivision boundaries.

Until such time as arrangements have been made with the developer to eliminate this interference, the development of the subdivision will unreasonably interfere with the complete and free exercise of Edison's rights.

If additional information is required in connection with the above mentioned subject, please call Dennis C. Bazant at (213) 491-2644.

Sincerely,

S. R. SHERMOEN
Regional Manager

By Dennis C. Bazant
DENNIS C. BAZANT
Real Properties Agent

DCB/jc

cc: Cal Mat Company
R. C. Warren/A. J. Lee
H. G. Ross
W. L. McClanahan
Area Manager
C. W. Luker

1157-7

STETSON ENGINEERS INC.

CIVIL AND CONSULTING ENGINEERS

3104 East Garvey Avenue
West Covina, California 91791
(818) 967-6202
Fax (818) 331-7065

224 Avenida Del Mar
Suite D
San Clemente, California 92672
(714) 492-2777
Fax (714) 492-1658

2171-K E. Francisco Blvd.
San Rafael, California 94901
(415) 457-0701
Fax (415) 457-1638

October 19, 1990

REPLY TO:

West Covina

Mr. Edalia Olivo-Gomez, Associate Planner
City of San Bernardino
Planning and Building Services Department
385 North "D" Street
San Bernardino, CA 92418

RE: Notice of Preparation of a Draft Environmental Impact Report
Specific Plan No. 90-1-Cal Mat Cajon Creek Project

Dear Mr. Olivo-Gomez:

Thank you for furnishing the San Gabriel Valley Municipal Water District (District) with copies of the Notice of Preparation, the Environmental Impact Checklist (EIC), and the Environmental Document Transmittal Form for the Cal Mat Cajon Creek Project. These documents have been reviewed and our comments are set forth below.

Item B.1.e of the EIC indicates that the project will result in soil erosion on or off the project site. However, potential impacts related to this issue are not required to be addressed in the Draft Environmental Impact Report (DEIR). These potential impacts are of concern because scouring of the Cajon Creek channel downstream Institution Road could cause damage to the District's Devil Canyon-Azusa pipeline, which is located about 500 feet south of Institution Road. An assessment of the potential impacts and mitigation measures related to soil erosion, particularly downstream of the project site, should be addressed in the DEIR.

Item B.3.d of the EIC indicates that the project may result in changes in the quantity and quality of ground water; however, this issue has not been fully discussed in Item C.3.d of the EIC. The construction of the drop structure within the constricted area of the Cajon Creek channel would raise the upstream water table and may cause raising water in the channel. The excavation below the water table would cause ground water to be discharged into the Cajon Creek and lower the water table downstream of the drop structure. These areas of concern should be addressed in the DEIR.

Item B.3.e of the EIC indicates that the project may result in exposure of people or property to flood hazards; however, the DEIR is not required to address this issue except for property within the project site located in the 100-year floodplain. The construction of the drop structure and training dikes, which creates a constriction within the Cajon Creek channel could cause backwater and expose people and property upstream of the project site to flood hazards. This area of concern and possible mitigation measures should be addressed in the DEIR.

The District is very concerned with potential damages to the Devil Canyon-Azusa Pipeline due to additional loading by trucks and trains at the proposed easements across the District's pipeline and property rights. An assessment of these potential damages and possible mitigation measures should be addressed in the DEIR.

We appreciate the opportunity of submitting these comments. If you have any questions on these comments, please contact Mr. Bob Stallings at (818) 969-7911.

Sincerely,

Stephen B. Johnson
Stetson Engineers Inc.

cc: Mr. Bob Stallings
San Gabriel Valley Municipal Water District
P.O. Box 1299
Azusa, CA 91702

Cal Mat Co.
Douglas Sprague
3200 San Fernando Road
Los Angeles, CA 90065

Mr. W. J. Conway, Jr.
Tradelands, Inc..
800 Wilshire Blvd.
13th Floor
Los Angeles, CA 90017

Mr. C. J. DiPietro
Flood Control Engineer
San Bernardino County Flood Control District
825 East Third Street
San Bernardino, CA 92415

Department of the Army
Los Angeles District
Corps of Engineers
P.O. Box 2711
Los Angeles, CA 90053
Attention: Mr. Norman Arno
Chief Engineering Division

County of San Bernardino
Planning Department
1111 East Mill Street
San Bernardino, CA 92410

TRANSPORTATION/FLOOD CONTROL DEPARTMENT

825 East Third Street • San Bernardino, CA 92415-0835 • (714) 387-2800

COUNTY OF SAN BERNAR[DINO]
ENVIRONMENTAL
PUBLIC WORKS AGENC[Y]

KEN A. MILLER
Director

October 22, 1990

City of San Bernardino
Planning & Building Services Department
385 North D Street
San Bernardino, CA 92418

File: 2-201/1.00
218.0110

REFERENCE: ZONE 2 - NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT - SPECIFIC PLAN 90-01

Dear Sir:

Reference is made to your Notice of Preparation dated September 7, 1990, with accompanying initial study for Specific Plan #90-01, requesting the Flood Control District's review and comments. The proposed combined mining operation, light industrial and open space use site is located west of Cajon Boulevard between Devore Road and Devil Creek Diversion Channel in the Verdemont area of San Bernardino County.

A portion of the site lies within the active watercourse of Cajon Creek and is therefore, in our opinion, subject to serious infrequent flood hazards by reason of overflow, erosion, and debris deposition until adequate channel and debris retention facilities are provided for Cajon Creek Wash. The site, in general, is also subject to infrequent sheet flow and accumulated drainage flows from the adjacent hill sides as a result of valley thunderstorms.

Our recommendation/comments are as follows:

1. The Draft Environmental Impact Report shall address mitigation of major flood hazard problems from Cajon Creek, and the local drainage problems, as outlined in Section C, discussion of Environmental Evaluation and Mitigation Measures of the Notice of Preparation. This shall be coordinated with Flood Control District personnel.

2. A lease agreement will be required for any mining operation on, or access over, Flood Control District property. This shall be coordinated through the County's Real Estate Services Department.

3. Approximately one half of the site lies within Zone A as determined by Federal Insurance Agency (F.I.A.) mapping. Any development within designated floodways shall not raise base flood elevations.

RECEIVED
OCT 24 1990
CITY OF SAN BERNARDINO
DEPARTMENT OF PLANNING & BUILDING SERVICES

Page 2
October 22, 1990
REFERENCE: ZONE 2 - NOTICE OF PREPARATION OF A DRAFT ENVIRONMENTAL IMPACT REPORT - SPECIFIC PLAN 90-01

4. Any grading associated with the proposed mining operation shall not adversely affect the natural flow of Cajon Creek.

5. Adequate building setbacks shall be established from the Devore Levees and the Muscoy Groins. Additionally, maximum slopes for the wet and dry sides of these levees will have to be established when more detailed plans are submitted.

6. Setbacks of 200-feet shall be applied to both the wet and dry sides of the levees. Any excavation outside of the setback shall not have a slope line steeper than 5 horizontal to 1 vertical.

Should you have any further questions or need additional information please feel free to contact Jay Johnson of this office, or me at (714) 387-2515.

Very truly yours,

KENNETH D. GUIDRY, Chief
Water Resources Division

KDG:MLM:jm

Document name: 4984

MWD

METROPOLITAN WATER DISTRICT OF SOUTHERN CALIFORNIA

Office of the General Manager

December 5, 1990

Mr. Gary D. Clossin, P.E.
Woodward-Clyde Consultants
Suite 200
1550 Hotel Circle North
San Diego, California 92108

Dear Mr. Clossin:

Notice of Preparation of a Draft Environmental Impact Report for the Specific Plan No. 90-10

We have received your Notice of Preparation (NOP) of a Draft Environmental Impact Report (EIR) for the Specific Plan No. 90-10. The project involves mineral extraction of sand and gravel, and industrial and open space development on 1,299 acres in San Bernardino County. The comments herein represent Metropolitan's response as a potentially affected public agency.

Our review of the NOP indicates that Metropolitan has an existing pipeline within your project area. Metropolitan's Foothill Feeder Rialto Pipeline traverses the project site in a northeast direction. The attached map shows this pipeline in relation to your project. Your Draft EIR should address project-related impacts to this conveyance.

Your project is also located within Metropolitan's study area for the Inland Feeder Pipeline. Metropolitan is currently evaluating several alternative alignments for the new pipeline. This pipeline would convey State Water Project water from the Lake Silverwood area to the head of the San Diego Canal for distribution throughout Metropolitan's service area. One alignment route for the Inland Feeder abuts the eastern side of your project site. It may be appropriate to consider the location of Metropolitan's proposed project in your project planning.

In order to avoid potential conflicts, we request that prints of plans for construction or other activity in the area of Metropolitan's facilities and rights-of-way be submitted for our review and written approval. You may obtain detailed prints of drawings of Metropolitan's facilities and rights-of-way by contacting Mr. James E. Hale, Senior Engineering Technician, at (213) 250-6564. Questions regarding the Inland Feeder Project should be directed to Dr. Marty Meisler at (213) 250-6364.

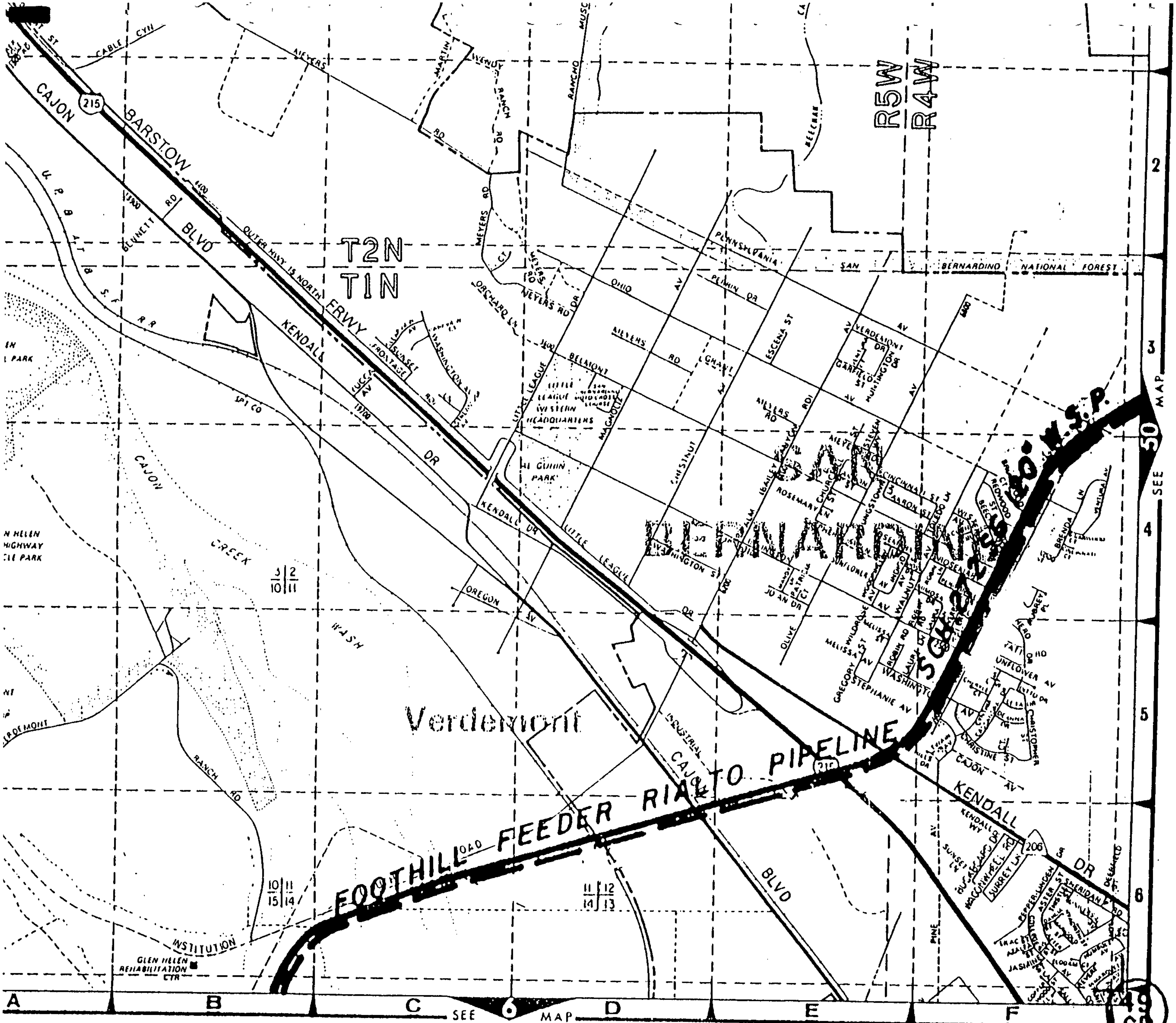
We appreciate the opportunity to provide input to your planning process. If we can be of further assistance, please contact me at (213) 250-6437.

Very truly yours,

Roberta L. Soltz, Ph.D.
Manager, Environmental Affairs

AER:led/C204

Attachment



FOOTHILL FEEDER RIALTO PIPELINE
SAN BERNARDINO
Verdemont
CAJON BARSTOW FRWY
OUTER HWY 15 NORTH
CAJON BLVD
KENDALL DR
LITTLE LEAGUE DR
T2N
T1N
R5W
R4W
SAN BERNARDINO NATIONAL FOREST
CAJON CREEK WASH
U. P. & A.T. & S.F. R.R.
SP CO
GLEN HELEN REHABILITATION CTR
INSTITUTION RD
PENNSYLVANIA AV
OHIO AV
MEYERS RD
BELMONT AV
MAGNOLIA AV
CHESTNUT AV
OREGON AV
PALM AV
OLIVE AV
WASHINGTON ST
STEPHANIE AV
GREGORY ST
MELISSA ST
VERDEMONT DR
HUNTINGTON DR
GARFIELD ST
CINCINNATI ST
AARON ST
ROSEMARY
CHURCH
TOLEDO LN
WALNUT AV
SUNFLOWER AV
BRENDA LN
UNIFLOWER AV
CHRISTOPHER
CHRISTINE ST
CAJON AV
PINE AV
SUNSET LN
SURREY LN
SHERIDAN RD
COLLEGE
JASMINE
ASTER ST
INDUSTRIAL
LITTLE LEAGUE WESTERN HEADQUARTERS
AL GUHIN PARK
MARTIN RD
WENDY RANCH RD
RANCHO
BEECHAR
BENNETT RD
ORCHARD LN
SUNSET
FRONTAGE RD
ESCENA ST
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SCH 27 SCH 26 W.S.P.
A
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SEE 6 MAP
SEE 50 MAP
49 SB
215
206

SPRING MOUNTAIN HOMES, LTD.
ESTATE SERIES I & II
A CALIFORNIA LIMITED PARTNERSHIP
2100 S. Sawtelle Blvd
Suite 302
Los Angeles, CA 90025

Telephone
(213) 479-4933

Fax
(213) 312-0830

February 11, 1991

Planning and Building Services Department
City of San Bernardino
300 North D Street
San Bernardino, CA 92418

Re: Specific Plan No. 90-01-- CalMat Cajon Creek Project

Attention: Edalia Olivio-Gomez

We the undersigned land owner in the area wish to record our opposition to the proposal of utilizing the site referred to in Specific Plan No. 90-01 for industrial uses, sand and gravel extraction and processing, open space, and related uses. The grounds for our opposition are as follows:

1. Siting of the plant in the vicinity of our homes will be a health threat. People in the area will be directly exposed to heavy air, water, noise and other pollution generated by the plant. The high wind conditions which prevail in this area will make the plant exceptionally vulnerable to erosion and will often result in a very high level of air pollution.

2. The development of such an industry in the near proximity to land either developed or being developed for residential uses will have a serious negative impact on such residential property values. It is not possible for such an industry to coexist with the attractive, residential neighborhoods that the city is seeking to have developed in the area.

3. Other owners of undeveloped residential land who are likely to be affected adversely by the CalMat

Cajon Creek Project are also being currently contacted.

We appreciate your attention to our request that our opposition to the CalMat Cajon Creek Project be recorded. Please be informed that the contact person for our company is Patricia Necochea. She may be reached at 213-479-4933. If you have any questions or comments regarding our request, please do not hesitate to call.

Sincerely,

Richard Nau
Michael John Enterprises, Inc.
General Partner
Spring Mountain Homes Limited
Estate Series I & II

cc:

Gary D. Clossin, P. E.
Woodward-Clyde Consultants
1550 Hotel Circle North
San Diego, CA 92108

CITY OF SAN BERNARDINO
PLANNING DEPARTMENT
INITIAL STUDY

No. comment site is located out of Highland's Sphere of Influence and not in close proximity to ~~the~~ City.
Steve Walker
City Planner
9/13/90

Initial Study for Environmental Impacts
For Specific Plan No. 90-01
Project Number

Project description/Location A mineral extraction (sand and gravel), industrial, and open space development on approximately 1299 acres located at the northwest portion of San Bernardino, West of Cajon Blvd., and between Devore Road and South of Institution Road.

Date August 30, 1990

Prepared for:

Applicant(s) CalMat Co.
Douglas Sprague
Address 3200 San Fernando Road
City, State Zip Los Angeles, CA 90065

Prepared by:
Edalia Olivo-Gomez
Name
Associate Planner
Title

RECEIVED
SEP 18 1990
CITY OF SAN BERNARDINO
DEPARTMENT OF PLANNING & BUILDING SERVICES

City of San Bernardino
Planning Department
300 N. "D" Street
San Bernardino, CA 92418

MISC:
ISPREPARATION
ke/9-1-89

APPENDIX B

CalMat Cajon Creek Concept Plan

Biological Assessment

Prepared For:

CalMat Properties Division
3200 San Fernando Road
Los Angeles, CA 90065

Prepared By:

Tierra Madre Consultants, Inc.
1271 Columbia Ave, Suite F-10
Riverside, CA 92507

September 20, 1990

I certify that this report is a complete and accurate account of the findings and conclusions of the biological assessment for the CalMat Cajon Creek Concept Plan.

TIERRA MADRE CONSULTANTS, INC.

Scott White

Scott White
Consulting Biologist

CalMat Cajon Creek Concept Plan
Draft Revised
Biological Assessment

Scott White
Tierra Madre Consultants, Inc.

September 20, 1990

Introduction

This report was contracted by CalMat Company as part of the baseline data necessary for consideration of the proposed project by San Bernardino County, the City of San Bernardino and other concerned regulating agencies. The property described in this report totals about 1,300 acres. It is located in Cajon Wash, adjacent to Cajon Blvd. The northern end of the project area is near Devore Road, in Devore. The southern end is about one mile south of the intersection of Cajon Blvd. with Institution Road (Map 1). The Cajon Creek Concept Plan encompasses two separate parcels of land owned by CalMat and a parcel owned by the County of San Bernardino.

As proposed by the Cajon Creek Concept Plan, 586 acres are planned for aggregate mining and a processing site, 268 acres are planned for industrial development, and 440 acres are planned as open space. In this report, the biological resources of the site are described and potential impacts to those resources resulting from the proposed mining and development are discussed.

Methods

A literature review was conducted to identify any sensitive biological elements which are known to occur in the vicinity of the property. The literature review included consultation with the California Natural Diversity Data Base (CNDDB) and reviews of California Native Plant Society's Inventory of Rare and Endangered Vascular Plants of California, the U.S. Department of Agriculture Soil Conservation Service's Soil Survey of San Bernardino County, Southwestern Part, California, and unpublished biological reports on nearby sites.

Following the literature review, field surveys were performed by Scott White, Megan Phillips, Gjon Hazard, Richard Montijo, Steve Gardner and Kelly Campbell in May, June and July, 1990. Field surveys were designed primarily to locate suitable slender-horned spineflower habitat and the plant itself if it occurs. In addition, they were intended to provide a thorough characterization of biological resources on the property. Most of the site was systematically walked along linear transects in order to locate suitable habitat for slender-horned spineflower. Where apparently suitable habitat was located, it was carefully examined for the plant. Part of the property was not surveyed until after the spineflower's flowering season (Map 2); this area was briefly examined to locate suitable habitat but detailed searches were not made.

Thirty person-hours were devoted specifically to bird surveys, forty person-hours were devoted to reptile surveys, and forty hours were devoted to locating and measuring woolly-stars to determine whether populations on the property are the endangered Santa Ana River woolly-star. A total of about 225 person-hours were spent on the property. Throughout all fieldwork, all vascular plants and vertebrate animal species seen or identified by sign were recorded in field notes. Plant species of uncertain identity were collected and subsequently identified by Andrew C. Sanders, herbarium curator at the University of California, Riverside campus. All species are referred to in the text by common names. Complete species lists, using both Latin and common names, are included at the end of this report.

Results

Soils

The soil survey of southwestern San Bernardino County (USDA Soil Conservation Service, 1980) indicates four soil types on the subject property, listed below.

Ps -- Psamments and fluvents, frequently flooded.
SoC -- Soboba gravelly loamy sand, 0 to 9 percent slopes.
SpC -- Soboba stony loamy sand, 2 to 9 percent slopes.
TuC -- Tujunga gravelly, loamy sand, 0 to 9 percent slopes.

These soil types are widespread in the San Bernardino area, and are typical of flood plains throughout interior southern California valleys. The soils are substrate for two endangered plants restricted to sandy flood plains (discussed later in the report) but do not provide habitat for sensitive plant species associated only with clay soils. The soil series found on the site are discussed more fully below:

Psamments and Fluvents, frequently flooded - Sandy and gravelly material in intermittent streambeds. Alluvium is deposited and reworked during each flood. Vegetation is generally annual grasses, forbs and shrubs with a few willows or cottonwood trees.

Soboba - Found on talus slopes and alluvial fans. Are excessively drained soils on alluvium from gravelly, cobbly, or stony granitic materials. Annual grasses, forbs, and chamise are common.

Tujunga - Excessively drained soils on alluvial fans and flood plains. Developed on alluvium from predominantly granite materials. Annual grasses, forbs, chamise, willows, and a few cottonwoods are typical.

Vegetation and Flora

The proposed project site is in the alluvial fan of Cajon Creek, south of Cajon Pass, the divide between two major mountain ranges, the San Bernardinos and the San Gabriels. The project site includes land no longer subject to natural flooding and land within the 100-year flood plain as defined by the San Bernardino County Flood Control Department. The land not subject to flooding is located to the east of levees and raised railroad lines and is protected by these developments (Map 3). The remainder of the property, west of the railroad tracks and levees, is within the 100 year flood plain and remains subject to natural flood processes.

Most vegetation on the property is characteristic Riversidian alluvial fan sage scrub (Holland, 1986). Riversidian alluvial fan sage scrub is considered a sensitive plant community ("communities with highest inventory priority," Holland, 1986). Lands still subject to natural flooding are more representative of this sensitive community, while lands above the flood plain are expected to develop into a plant community resembling upland chaparral as succession continues.

Riversidian alluvial fan sage scrub in the Cajon Wash area is particularly noteworthy because of desert plants occurring there. Desert agave and antelope bush, two plants not normally found on the coastal side of the mountains, were both located on the property. Joshua trees are known from a site adjacent to the CalMat property, though they were not seen on the project site. This may be the species' furthest intrusion into into the San Bernardino Valley.

<u>Flood plain vegetation</u>

To the west of the railroad tracks and flood control structures, most of the Riversidian alluvial fan sage scrub remains in a natural state. An area not planned for mining or development, north of Institution Road and east of the County land planned for mining, has been graded, causing a degradation of habitat quality (Map 1). There are occasional off-road vehicle trails throughout the western project site.

The area is a patchwork of open washes and alluvial benches dating to past flood events, representing various successional stages of the plant community. Open washes are dominated by California buckwheat and scalebroom with sparse cover of herbs including chia, Thurber's buckwheat and phacelia. Alluvial benches support these plants, along with chaparral yucca, prickly-pear cactus, mountain mahogany, deerweed and basketbush. Older alluvial benches support older and larger woody plants such as redberry, walnut, sycamore and juniper, along with the shrubs and herbs listed above.

<u>Vegetation above flood plain</u>

To the east of the railroad tracks and levees, vegetation has been degraded by human activity (grading, trash dumping, off-road vehicle use, etc.) and it has been altered by protection from natural flooding. Riversidian alluvial fan sage scrub vegetation experiences periodic natural flood events which remove vegetation and rework soils, leading to a new cycle of plant succession. Areas protected by levees and raised railroad tracks have not been flooded since these structures were built and will not be flooded in the foreseeable future.

The native vegetation has aged and is following a successional pattern which seems to be developing away from Riversidian alluvial fan sage scrub and instead into upland chaparral, dominated by chamise, hoary-leaf ceanothus, sugar bush, basketbush and other shrubs. There is a large component of herbaceous weedy plants among the native shrubs. These annual weeds tend to reduce habitat quality for native plants, including the endangered slender-horned spineflower and Santa Ana River woolly-star. Further, weeds alter natural fire behavior by igniting easily and carrying fire through open areas between shrubs which might otherwise have stopped or slowed fires.

Although the eastern area is somewhat degraded, it continues to provide suitable habitat for sensitive plants and animals and should not be considered biologically unimportant.

Wildlife Habitat and Fauna

Most of the project site provides suitable habitat for a wide variety of common animal species found in the area. Riversidian alluvial fan sage scrub is a diverse assemblage of plant species, providing abundant seeds and green plant material for herbivorous animals. Degraded habitat to the east of the railroad tracks and levees supports a similar assemblage of birds and mammals to the more natural areas to the west. Vegetation provides cover and nest sites for bird species including California thrasher, California quail, Bewick's wren, loggerhead shrike, rufous-sided towhee, and many others. The habitat is very productive for rodents and rabbits, and provides excellent foraging habitat for birds of prey such as red-tailed hawks, kestrels, great horned owls, golden eagles and prairie falcons.

Audubon's cottontail, Beechy ground squirrels and a bobcat were seen during the field survey. Sign of Botta pocket gopher, kangaroo rats, wood rats, coyote and gray fox were also noted.

The open sandy and rocky areas with sparse shrub cover are excellent reptile habitat. Shaded cover and productive foraging areas support a diverse assemblage of snakes and lizards. Reptiles observed on the site include red racer, San Diego horned lizard, zebra-tailed lizard and others.

Fauna on the site displays a desert influence comparable to the flora's. Zebra-tailed lizard and cactus wren are examples of animals on the Cajon Wash property normally restricted to southern California's deserts.

Sensitive Elements

Plant and animal taxa may be considered sensitive due to declining populations, vulnerability to habitat change or restricted distribution. Certain sensitive species have been listed as threatened or endangered by the U.S. Fish and Wildlife Service or by the California Fish and Game Commission and are protected by federal or state law. Some habitat types, including Riversidian alluvial fan sage scrub, are also considered sensitive biological resources by the California Natural Diversity Data Base.

The literature review showed that sixteen sensitive elements (seven plants, two reptiles, two birds, one mammal and four community types) are known to occur within a five mile radius of the subject property. Five of the plants and three of the plant communities, described below, are not on the property and are excluded from more detailed discussion.

Thread-leaved brodiaea, Orcutt's brodiaea, many-stemmed dudleya, San Bernardino Mountain owl's clover and San Bernardino Mountain bluegrass all occur in the mountains to the northeast of the CalMat property (CNDDB 1989, San Bernardino North quad) and are found in plant communities much different from those on the site. No suitable habitat for these species is located on the property. Cottonwood-willow riparian forest, sycamore alluvial riparian scrub and California walnut woodland are sensitive plant communities in the area. None occurs on the CalMat property, though elements of each community type are found in the Riversidian alluvial fan sage scrub vegetation.

The remaining eight sensitive elements (two plants, two reptiles, two birds and one mammal) are summarized in Table 1 and are discussed in the following paragraphs. Three other sensitive elements were seen during field visits to the area. These are prairie falcon, northern harrier and Plummer's mariposa lily. These three species are included in Table 1 and in the following discussion.

Table 1. Sensitive species considered for CalMat Cajon Wash property.

Sensitive element and associated habitat	Status Designation*	Occurrence Probability*	Number of Sightings
Calochortus plummerae **Plummer's mariposa lily** Mountains, foothills and washes	Fed: ND Calif: ND CNPS: ND Noteworthy	occurs	about 30
Centrostegia leptoceras **Slender-horned spineflower** Alluvial benches	Fed: E Calif: CE CNPS: List 1B R-E-D 3-3-3	high	0
Eriastrum densifolium ssp. _sanctorum_ **Santa Ana River woolly-star** Flood plain of Santa Ana River and tributaries	Fed: E Calif: CE CNPS: List 1B R-E-D 3-3-3	absent	0
Cnemidophorus hyperythrus **Orange-throated whiptail** Brush with rock outcrops	Fed: C2 Calif: CSC	high	0

*status designations and occurrence probability defined at end of table.

Table 1, continued.

Sensitive element and associated habitat	Status Designation*	Occurrence Probability*	Number of Sightings
Phrynosoma coronatum blainvillei **San Diego horned lizard** Sandy areas in grassland or brush	Fed: C2 Calif: CSC	occurs	4
Circus cyaneus **Northern harrier** Various open areas	Fed: ND Calif: CSC	nesting:absent foraging:high	0
Aquilia chrysaetos **Golden eagle** Grassland, brushland, hills and mountains	Fed: ND Calif: CP, CSC	nesting:absent foraging: occurs	2
Accipiter striatus **Sharp-shinned hawk** Hilly areas, brush, woodlands	Fed: ND Calif: CSC, W	nesting:absent foraging: moderate	0
Falco mexicanus **Prairie falcon** Grassland, brushland, hills and mountains	Fed: ND Calif: CSC	nesting:absent foraging: occurs	2
Polioptila californica **California gnatcatcher** Coastal sage scrub	Fed: C2 Calif: CSC	moderate	0
Perognathus longimembris brevinasus **Los Angeles pocket mouse** Coastal sage scrub and grassland	Fed: C2 Calif: CSC	high	0
Riversidian alluvial fan sage scrub	Fed: ND Calif: CHIP	occurs	n/a

Status designations:

Federal designations:

E = Federally listed, endangered.

C2 = Category 2 candidate species. Threat and/or distribution data are not sufficient to support federal listing at this time.

ND = Not designated.

Table 1, continued

Status designations, continued:

State designations:
- CE = State listed, endangered.
- CP = Fully protected under California Fish and Game Code, Sections 3511, 4700, 5050, 5515.
- CSC = California Department of Fish and Game Species of Special Concern.
- ND = Not designated.
- W = Watch list
- CHIP = Communities with highest inventory priorities.

California Native Plant Society (CNPS):
- List 1B = Plants rare and endangered in California and elsewhere.

R-E-D CODE (CNPS):
- R (Rarity)
  - 1 - Rare, but found in sufficient numbers and distributed widely enough that the potential for extinction or extirpation is low at this time.
  - 2 - Occurrence confined to several populations or one extended population.
  - 3 - Occurrence limited to one or a few highly restricted populations, or present in such small numbers that it is seldom reported.
- E (Endangerment)
  - 1 - Not endangered.
  - 2 - Endangered in a portion of its range.
  - 3 - Endangered throughout its range.
- D (Distribution)
  - 1 - More or less widespread outside California.
  - 2 - Rare outside California.
  - 3 - Endemic to California (i.e., does not occur outside California).

Species listed as "noteworthy" are considered by Tierra Madre Consultants to be unusual occurrences, species of limited distribution or ecologically significant.

Definitions of occurrence probability:

Occurs: Observed on the site by field personnel of Tierra Madre Consultants, or recorded on-site observations by other qualified biologists.

High: Observed on similar habitat in surrounding region by field personnel of Tierra Madre Consultants, or habitat on the site is a type often utilized by the species and the site is within the known range of the species.

Table 1, continued

Definitions of occurrence probability, continued:

Moderate: Reported sightings in surrounding region, habitat on the site is a type occasionally utilized by the species; or site is within the known range of the species and habitat on the site is a type occasionally utilized by the species.

Low: Site is within or near the known range of the species but habitat on the site is rarely used by the species.

Absent: A focused study for this species failed to reveal its presence, or, no suitable habitat is present.

Sources: CNDDB, 1989; CNPS, 1988.

Discussion of sensitive elements listed in Table 1:

Plummer's mariposa lily (*Calochortus plummerae*) is a violet-flowered herbaceous plant in the lily family. The plant was collected on CalMat property and identified by Andrew Sanders of the UC Riverside Herbarium. According to Sanders, the plant is quite uncommon and may warrant special consideration, but it is not included in the *Inventory of Rare and Endangered Vascular Plants of California* (CNPS 1988). Based on Sanders' suggestion, the herbarium collection at Rancho Santa Ana Botanic Garden was examined for *Calochortus plummerae* specimens.

Herbarium collections indicate that it is widely distributed in cismontane southern California, from the Santa Monica Mountains to the San Jacintos and San Bernardinos. It occurs on sandy and rocky soils, usually of granitic or alluvial material, in plant communities including coastal sage scrub, chaparral (including burned-over chaparral), open yellow pine forest, and grasslands. Its elevational distribution ranges from below 1,000 feet to about 5,000 feet.

Many of the collection sites have been extirpated, and there is no doubt that much of the species' habitat has been lost to development. Examples of presumably extirpated sites include Los Angeles (1892), Rialto (1938), Claremont (1912), and Monrovia (1960). Even so, many of the sites have not been developed. These include locations on National Forest land in the San Gabriel, San Bernardino and San Jacinto Mountains. It does not appear that the proposed project would significantly impact this species, although the ongoing cumulative loss of habitat may eventually become a significant impact.

Slender-horned spineflower (*Centrostegia leptoceras*) is a small, prostrate, spring-blooming annual of the buckwheat family. Its habitat is dry sandy benches of washes within coastal sage scrub vegetation. Populations of the slender-horned spineflower range from the San Fernando Valley to the San Bernardino Valley and the Elsinore area, but most historic locations have been eliminated by urbanization and flood control channel modification (CNPS, 1988). Even where the plant's habitat has not been destroyed by development, it has been altered by flood control activities so that flooding no longer occurs on many historic sites. The plant seems to be dependent on periodic flooding, and this extensive loss or alteration of habitat has resulted in the listing of slender-horned spineflower as endangered by both the State of California and the US Fish & Wildlife Service.

Slender-horned spineflower blooms between April and June. It cannot be detected outside this period. The plant may not germinate every year, possibly due to fluctuations in rainfall or other environmental factors. In order to determine its presence or absence, an area should be surveyed in each of several consecutive springs. Surveys should consist of closely spaced transects through suitable habitat. Because it is so small, slender-horned spineflower can easily be overlooked.

Much of the CalMat property in Cajon Wash may be suitable habitat for Centrostegia leptoceras. Alluvial benches on the western portion of the property seem to provide the best habitat because they are still subject to natural flooding, there is little human disturbance and little competition from non-native weedy grasses and herbs. By comparison, the area to the east of the railroad tracks is not subject to flooding, it is somewhat disturbed by human activity, and there is a heavy cover of weedy plants.

Tierra Madre Consultants has surveyed the entire area east of the Southern Pacific railroad tracks, and much of the area west of the tracks between May 10 and June 15 (Map 2). Slender-horned spineflower was not located during the survey, but seed may be present that did not germinate this year due to the drought.

Tierra Madre Consultants briefly examined the unsurveyed areas west of the railroad tracks for suitable slender-horned spineflower habitat, but did not examine the area more closely because the species' flowering season had ended. Suitable habitat for slender-horned spineflower is shown on Map 4.

Santa Ana River woolly-star (Eriastrum densifolium ssp. sanctorum) is a small gray-green shrub with bright blue flowers. It occurs in alluvial fan sage scrub communities in the flood plain terraces of the Santa Ana River and its tributaries. The historic range of the species spanned about sixty river miles from the former Rancho Santa Ana in Orange County (at 500' elevation) to the vicinity of Highland in San Bernardino County (at about 1500'). It is now restricted to a few populations on Lytle Creek and the flood plain of the Santa Ana River between Redlands and the mouth of the Santa Ana Canyon, near Mentone (reviewed by Zembel and Kramer, 1984). Zembel and Kramer estimated in 1984 that more than 90% of the Santa Ana River woolly-star's habitat had been eliminated by urbanization, flood control activity, grazing, aggregate mining, and farming. It is now listed as endangered by the State of California and by the US Fish and Wildlife Service.

The Santa Ana River woolly-star is closely related to a more common subspecies, the chaparral woolly-star (Eriastrum densifolium ssp. elongatum). The chaparral woolly-star is common on Riversidian alluvial fan sage scrub in the Cajon Wash area, including the CalMat property. In a biological report for an adjacent parcel, Tierra Madre Consultants (1988) identified plants that appeared to be intermediate between the endangered Santa Ana River woolly-star and the common chaparral woolly-star. This seemingly intermediate population is contiguous with woolly-stars on CalMat property. Whether these plants are protected under the State or Federal Endangered Species Acts was not clear, and required further investigation.

Tierra Madre Consultants has carried out a study of woolly-stars on CalMat's property, including measurement of all populations on the property and determination of samples by Dr. Robert Patterson of San Francisco State University. Dr. Patterson is currently reviewing the taxonomic descriptions of the genus Eriastrum for the upcoming revision of Jepson's Manual of the Flowering Plants of California.

The woolly-star study consisted of a literature review of current and previous research conducted on the species Eriastrum densifolium. Following the literature review, a field survey was performed by Megan Phillips. Over forty hours were spent revisiting the woolly-star populations, mapped during the spineflower surveys, and collecting samples.

The distinguishing characteristics for the respective woolly-star subspecies, as defined by Craig (1934), are stature, pubescence and corolla length. Eriastrum densifolium ssp. elongatum is 20-90 cm in height, woolly when young, but becomes glabrous (without hair) in maturity, and has corolla lengths of 14-19 mm. Eriastrum densifolium ssp. sanctorum is 25-75 cm tall, woolly throughout its lifespan, and has corolla lengths of 25-32 mm. Woolly-stars of uncertain subspecies in the Cajon Wash area have characteristics resembling both subspecies, but corolla lengths range from 20 to 23 mm, as documented by Craig (1934) and Maureen Pendleton (Tierra Madre Consultants, 1988).

The woolly-star populations on CalMat's property, totaling more than 2,000 plants, were separated into six study areas (Fig. 5), each of which supported approximately 300 woolly-stars. Each study area was visited and thirty plants were randomly chosen for sampling. Three corollas per chosen plant were collected. The three corollas were then measured with a vernier caliper. Mean corolla length was calculated for each study area, and compared to a sample collected from an area in Highland known to support the endangered Santa Ana River woolly-star.

The other distinguishing characteristics, stature and pubescence, were also noted. Little difference in stature was detected, but pubescence was notably different between Cajon wash and known Santa Ana River woolly-star populations near Highland. The Cajon wash woolly-stars were sub-glabrous to glabrous (little to no wool) while both young and mature plants in the known Eriastrum densifolium ssp. sanctorum were lanate (woolly).

Samples of eight plants collected from CalMat property and adjacent property were sent to Dr. Patterson for subspecies verification. Dr. Patterson's reply states that the plants "fall best within the circumscription" of the chaparral woolly-star, which is not listed as an endangered species. Dr. Patterson cautions that overlap between the two subspecies is to be expected, and that "it would be difficult to discount completely" an argument that these plants are at the extreme end of subspecies _sanctorum_'s variability. Copies of Tierra Madre Consultants' letter to Dr. Patterson and his reply are included as appendices.

The results for the corolla length analysis are summarized in the following table. We note that many of the measurements are smaller than the described length of even the common chaparral woolly-star. It is unclear why these plants seem to be outside the range of even the short-flowered subspecies. A table of raw corolla-length data is included as an appendix.

Table 2. _Eriastrum densifolium_ Corolla-length Sampling Results.

Study Area	COROLLA LENGTHS Range	Mean
1	9.65 - 11.33mm	10.24mm
2	8.45 - 15.65mm	12.04mm
3	13.80 - 18.43mm	16.73mm
4	14.00 - 18.43mm	16.59mm
5	12.43 - 17.50mm	14.53mm
6	13.80 - 18.20mm	16.88mm
7*	21.50 - 29.03mm	26.61mm

* denotes comparative population of known _Eriastrum densifolium_ ssp. _sanctorum_.

According to the results of this survey and the verification by Robert Patterson, Tierra Madre Consultants concludes that the endangered Santa Ana River woolly-star, _Eriastrum densifolium_ ssp. _sanctorum_, does not occur on CalMat's proposed Cajon Wash project site. The woolly-stars found on the site are the more common _Eriastrum densifolium_ ssp. _elongatum_. CalMat's proposed mining and development will not impact the Santa Ana River woolly-star.

The **orange-throated whiptail** (_Cnemidophorus hyperythrus_) occupies washes and other sandy areas where there are rocks and patches of brush nearby (Behler and King, 1979). Populations of this species are declining as habitat is lost to land conversion for agriculture and development. It is a category 2 candidate for federal listing and is a California species of special concern.

Orange-throated whiptails are known from the immediate west (Tierra Madre Consultants, 1988), but were not located on the CalMat property during this survey. The property is at the northern edge of the species' range and most of it seems to be marginal habitat at best. Orange-throated whiptails on the adjacent property were seen at the base of Lytle Creek ridge, near the Glen Helen Rehabilitation Facility in more typical habitat. There is a high probability that they occasionally are found near the western property boundary where the wash habitat meets Lytle Creek Ridge.

The **San Diego horned lizard** (Phrynosoma coronatum blainvillei) is found in a variety of habitat types including coastal sage scrub, broad-leaved woodlands, and grasslands where there is loose sandy soil with low-growing brush nearby (Behler and King, 1979). Its numbers are declining due to habitat loss and extensive collecting on wildlands near urban development.

Four San Diego horned lizards and several of their distinctive scats were seen during the field survey of the property. Horned lizards and/or their sign were seen on both sides of the railroad tracks indicating that the entire proposed project area is occupied San Diego horned lizard habitat.

The **northern harrier** (Circus cyaneus, formerly called marsh hawk) is a common winter visitor and increasingly rare breeding species in most of southern California (Garrett and Dunn, 1981). It inhabits marshes, meadows, and open lands. It nests on the ground in marshes or grassy meadows. The northern harrier feeds on ground-dwelling mammals and other animals. Its breeding population has declined in California over the past fifty years, mainly due to loss of marsh habitat. Conversion of land to agricultural and residential uses have reduced available nesting and foraging habitat of local populations. A northern harrier was seen about three miles west of CalMat's property, foraging over similar habitat, in the winter of 1989-90. Northern harriers were not seen over the subject property during this survey, but there is a high probability that they occasionally use the property for foraging.

The **golden eagle** (Aquilia chrysaetos) nests in rugged mountainous areas near open grassland or scrubland where prey occurs. It feeds mainly on ground squirrels, rabbits, and other small to medium-sized mammals. Its home range averages 36 square miles (USDA, 1980). Threats to the species include habitat loss, shooting, electrocution from high-voltage power lines, and human disturbance to nests (Remsen, 1978).

Two golden eagles were seen foraging over the property during the field survey. No suitable nesting sites are present on the property, but the alluvial fan sage scrub is productive mammal habitat well suited to the golden eagle's foraging technique. Development on the property would contribute to the ongoing loss of golden eagle foraging area in the region.

The **sharp-shinned hawk** (Accipiter striatus) is a fairly common winter visitor to southwestern Riverside County. It does not nest in the valleys of southern California (Garrett and Dunn, 1981). This raptor feeds on small birds it captures beneath forest and woodland canopy or over annual grassland (USDA, 1980). A sharp-shinned hawk was reported less than a mile east of the property in October, 1989 (Tierra Madre Consultants, 1989). Presumably, the reported bird was a migrant or a winter visitor.

No woodlands occur on the property, but wintering sharp-shinned hawks may occasionally hunt over the open scrub vegetation. The property does not provide ideal habitat, but there is a high probability that these raptors occasionally use the area.

The **prairie falcon** (Falco mexicanus) extends over much of the western United States. It is an uncommon resident in arid parts of southern California (Garrett and Dunn, 1981). Birds which breed at higher elevations may winter in valleys. Known home ranges have varied from about two to ten square miles (USDA, 1980). The prairie falcon nests on high cliff faces and feeds on birds and small mammals over open, arid land. Prairie falcons are known to nest in the Mormon Rocks area near Cajon Pass.

Prairie falcons were seen foraging over the CalMat property on two field visits during May. As discussed above for other raptors, loss of foraging area would contribute to the ongoing loss of habitat throughout the region.

The **California gnatcatcher** (Polioptila californica) has recently been recognized as a distinct species by the American Ornithologists' Union. It was previously considered a race of the black-tailed gnatcatcher (Polioptila melanura). This "split" was based largely on a detailed study of the genus by Atwood (1988).

Atwood (1980) states "...it appears that numbers of [Polioptila] californica are seriously low, with further declines to be expected due to continuing habitat destruction." In southern California, California gnatcatchers are normally associated with coastal sage scrub vegetation, which has been subject to extensive alteration and fragmentation. O'Leary (1989) estimates that as little as ten to twenty-five percent of former coastal sage scrub habitat remains in California.

The California gnatcatcher is a Category 2 candidate species for listing as threatened or endangered by the U.S. Fish and Wildlife Service (FWS) and it is a California Department of Fish and Game "Species of Special Concern." Its status is presently under review by the FWS. In view of its recent taxonomic elevation to full species and ongoing habitat loss, it is likely that its designation will be changed to Category 1 candidate and, eventually, listing as threatened or endangered.

California gnatcatchers were not observed on the subject property during the extensive field surveys, and have not been reported from the vicinity by the CNDDB (1989, San Bernardino North, Devore, Cajon, San Bernardino South, Silverwood Lake quads). There has been one California gnatcatcher sighting near the confluence of Cajon Wash and Lytle Creek, about one mile south of the subject property, reported by Doug Willick (personal communication).

The property is near the boundary of the species' known range, and the vegetation differs from the gnatcatcher's favored coastal sage scrub habitat. Riversidian sage scrub is more open than other forms of coastal sage scrub and it is dominated by different plant species. There is a moderate probability that California gnatcatchers occasionally occur on the site.

Very little is known about the **Los Angeles pocket mouse** (Perognathus longimembris brevinasus). It apparently digs underground burrows and is nocturnal, and is therefore not often detected except in trapping surveys. The geographic range is restricted to lower elevations in open areas from Burbank to San Bernardino and eastward to Aguanga and Beaumont. Urbanization and cultivation have eliminated much of the habitat of this uncommon mammal (reviewed by Williams, 1986).

Tierra Madre Consultants has identified the Los Angeles pocket mouse on San Bernardino County Flood Control property between the northern and southern CalMat parcels (report in preparation). In addition, it has been reported from several sites in the vicinity of the CalMat property: nine specimens from "Cajon Wash," three specimens from "4.75 miles north of San Bernardino, 1600'," thirty-two specimens "five miles northwest of San Bernardino," one from "Slover Mountain, near Colton," and several from Reche Canyon (locations listed by Williams, 1986). These are undated historical records; other than the 1990 Tierra Madre record, the nearest dated record is 4.5 miles southeast of the CalMat property, from 1931. None of these records include descriptions of habitats where the animals were found.

The Tierra Madre record is from disturbed Riversidian sage scrub habitat. While the other locations are general, three of them seem to be very near the CalMat property. Los Angeles pocket mice from the reported Cajon Wash site were almost certainly in habitat similar to that found on the CalMat property, since Riversidian alluvial fan sage scrub is the predominant vegetation throughout Cajon Wash. The site north of San Bernardino at 1600' elevation could be on CalMat property (the 1600' contour line crosses the project site). The site five miles northwest of San Bernardino is certainly in the Cajon Wash area and may be on CalMat property.

Without performing a trapping survey on CalMat land, Tierra Madre Consultants considers the site as having a very high probability of supporting Los Angeles pocket mouse.

Riversidian alluvial fan sage scrub is a variety of coastal sage scrub occurring on alluvial fan soils (Smith, 1980) in interior southern California (Holland, 1986). It is distinct from other forms of coastal sage scrub in its species composition and in the physical forces that influence it (particularly flooding). Alluvial fan sage scrub is being lost throughout its range by development, flood control, and other activity, and is therefore considered a "community with highest inventory priority" by the California Department of Fish and Game Natural Heritage Division.

Discussion

Project Impacts

The proposed project would grade or otherwise alter about two-thirds of the subject property while retaining about 440 acres as open space. Project impacts would include the loss of essentially all vegetation and wildlife in the eastern portion of the project site (above the 100-year flood plain) and about 260 acres of high quality Riversidian alluvial fan sage scrub within the flood plain. The proposed project would also preserve about 440 acres of high quality habitat within the flood plain. Impacts to each of the sensitive elements listed earlier are discussed below.

Impacts to sensitive plants: Slender-horned spineflower may occur on the proposed project site. Further studies will be necessary to determine the presence or absence of this species. If it is absent, then there would be no direct "take," but the project would indirectly impact the plant by destroying habitat, reducing the potential for its future recovery. Suitable habitat for the slender-horned spineflower is common to the west of the railroad tracks (Map 4), and the species could conceivably recolonize this area at some time in the future if the site is not developed.

Development or mining on property to the east of the railroad tracks would not impact slender-horned spineflower populations over the long term. The area will not provide suitable spineflower habitat long into the future because of the absence of natural flooding. Nevertheless, any impact to slender-horned spineflowers would be a significant environmental impact under the California Environmental Quality Act. If they occur there, loss of individual plants could affect the possibility for eventual recovery of the species by eliminating a potential seed source for eventual establishment of a population on protected habitat.

Aggregate mining to the west of the railroad tracks would destroy suitable spineflower habitat. This impact could potentially be mitigated through reclamation of the land after completion of mining activity and preservation of undisturbed habitat. Proposed open space preservation in the project area could benefit the slender-horned spineflower by providing land for eventual recolonization by the species.

Impacts to sensitive reptiles: The site provides suitable habitat for two sensitive reptiles, the orange-throated whiptail and the San Diego horned lizard. San Diego horned lizards occur throughout the site; orange-throated whiptails may occasionally use the western margin of the property, near the base of Lytle Creek Ridge. Both animals are candidates for federal listing (category 2) and are California species of special concern.

Development and mining would destroy habitat and would result in the loss of San Diego horned lizards; proposed open space preservation areas would continue to provide San Diego horned lizard habitat. Little is known of the population biology of San Diego horned lizards or orange-throated whiptails and it is uncertain whether the loss of animals or habitat on this site would significantly impact regional populations. Both species range over a large area, and the property under consideration for this project is only a small portion of their ranges.

Impacts to sensitive raptors: The project would impact foraging habitat of four sensitive raptor species (Table 1).

Sharp-shinned hawks feed primarily on birds they capture in flight. Development and mining on the site would eliminate or reduce its value as foraging habitat for this bird by altering or eliminating prey habitat and by increasing noise and other disturbances which would tend to keep sharp-shinned hawks from using the site.

Golden eagles, prairie falcons and northern harriers feed on mammals and other ground-dwelling animals. The property provides productive prey habitat. All of these raptors forage in the area. Golden eagles and prairie falcons were seen over the property and the habitat is better suited to them than to northern harriers. The loss of foraging habitat would have a greater impact on the eagles and falcons than on northern harriers but it is difficult to evaluate the impact's significance for any of these birds. Open space preserved by the project will continue to provide suitable foraging habitat. The area is presently impacted by the noise and disturbance of nearby railroad tracks and an off-road vehicle park; mining and developoment will increase noise and other disturbances, but their impacts on suitability of raptor foraging habitat are uncertain. Quality of preserved habitat may be reduced by increased disturbances.

Development in the region continues to cumulatively impact raptors. The ongoing loss of raptor habitat is a regionally significant impact on biological resources and the present project will contribute to this cumulative loss. Without specific data on population densities, home ranges, seasonal use, historic nesting sites and availability of alternate wintering habitat, it is not possible to predict the extent of these impacts.

Impacts to California gnatcatchers: California gnatcatchers do not appear to occupy the site, though they have been reported from nearby. The site is near the species' range boundary and none were detected during the extensive field survey. There is a moderate probability that the project could impact marginal California gnatcatcher habitat.

Impacts to Los Angeles pocket mouse: The proposed mining and development would destroy apparently suitable habitat and probably would result in loss of Los Angeles pocket mice. The species' habitat requirements, population sizes, and other biological aspects are little-known, and it is uncertain whether the proposed project's impacts would be significant.

Impacts to Riversidian alluvial fan sage scrub: About half of the proposed project site is high quality Riversidian alluvial fan sage scrub, still subject to natural flooding. About 257 acres of this vegetation would be destroyed by proposed aggregate mining and about 440 acres would be retained as open space.

Riversidian alluvial fan sage scrub has never been completely restored through replanting. Some of the plants characteristic of this habitat are readily propagated (e.g., California buckwheat), but others (e.g., California juniper) have not been successfully grown under cultivation. Because of the difficulty of cultivating these plants and because of the complex nature of any ecological community, it probably will not be possible to completely mitigate the loss of this vegetation through restoration efforts.

The most effective mitigation for this impact would be a combination of habitat preservation and restoration of natural conditions (to allow eventual natural regeneration of Riversidian alluvial fan sage scrub) on the site following the completion of the mining project.

Recommended Mitigation Measures

The most important biological impacts of the CalMat Cajon Creek Concept Plan would be the loss of Riversidian alluvial fan sage scrub habitat, and the plants and animals (including sensitive species) found there. Land east of the railroad tracks no longer functions as Riversidian alluvial fan sage scrub because of the absence of natural flooding. Nevertheless, this area provides valuable habitat for sensitive species including golden eagle and San Diego horned lizard. The development of this upland habitat would impact these sensitive species and contribute to the ongoing loss of natural open space throughout the region. CalMat property outside the 100-year flood plain scheduled for development, or for mining followed by reclamation to development, would be permanently lost as habitat.

Mining areas to the west of the railroad tracks (within the flood plain) would not be available as habitat during mining but could potentially be reclaimed to restore some or all biological values after mining is complete. They probably cannot be reclaimed to completely replace the high-quality Riversidian alluvial fan sage scrub now present, but conditions approximating nature can be restored, allowing natural regeneration to eventually replace existing habitat values. The project proposes to restore a natural hydrologic regime to the quarry and the site is expected to regenerate naturally after mining and reclamation.

The impacts to biological resources of development and mining at the CalMat Cajon Creek site can be partially mitigated by preserving open space for the retention of biological resources. The 440 acres on the property proposed as open space provide suitable habitat for mitigation of losses that would result from the proposed project. In order to mitigate habitat loss, like habitat must be preserved, preferably in perpetuity, but at least until impacted mining areas have been fully reclaimed to their original biological values.

The following recommendations are intended to minimize impacts to biological resources and to mitigate remaining impacts as fully as possible.

A. **Avoid impacts to slender-horned spineflower.**

1. Do not conduct mining operations or other soil-disturbing activity on any suitable habitat within the delineated 100-year flood plain until surveys for slender-horned spineflower have been conducted during a total of at least three flowering seasons.

2. Do not conduct soil-disturbing activity on lands outside the 100-year flood plain until surveys for slender-horned spineflower have been conducted during at least one flowering season in addition to the survey already conducted for this report.

3. Do not conduct soil-disturbing activity on suitable habitat, either within or outside the 100-year flood plain, without the habitat preservation measures outlined below.

4. If slender-horned spineflower is located during surveys, the California Department of Fish and Game and the US Fish and Wildlife Service should be notified of the species presence on the site. These agencies may wish to salvage plant populations that would be impacted by proposed mining or development.

B. **Preservation of open space:** These two measures are intended to preserve high quality Riversidian alluvial fan sage scrub, which would also provide suitable habitat for slender-horned spineflower and other sensitive species. Preservation would not reduce the impacts of mining and development on sensitive elements and habitat, but would assure long-term availability of suitable habitat and would preserve a significant acreage of Riversidian alluvial fan sage scrub.

1. Preserve the property south of Institution Road and west of the 100-year flood plain boundary (not planned for mining or development) as open space to retain biological resources either <u>in perpetuity</u> or until all adverse biological impacts of mining in the flood plain have been fully eliminated through reclamation of the mine site.

2. Seek an agreement with the San Bernardino County Flood Control District to preserve land between CalMat's Cajon Creek property and CalMat's San Bernardino Plant as open space.

C. **Provide for the long-term management of natural open space for biological resources.** Management should be according to a plan which would identify a managing entity, identify requisite funding, and include the following management elements.

1. Exclusion of off-road vehicles, shooting and trespassing.

2. Restoration plans for degraded Riversidian alluvial fan sage scrub within the preserved open space areas.

3. Fire management to prevent human-caused fires while allowing for natural fires and preventing damage to habitat which may result from firefighting efforts.

4. Retention of natural hydrologic conditions.

D. Reclaim the western mining area to restore biological values: The proposed mining area within the 100-year flood plain should be reclaimed to restore Riversidian alluvial fan sage scrub vegetation as fully as possible. Restoration of this plant community will also serve to restore sensitive plant and animal habitat.

1. A reclamation plan for the western mining area should be designed to restore natural conditions as fully as possible and allow natural processes to continue. The reclamation plan should include provisions for the following:

a. Final contours should allow for sheet flow of floodwaters across Institution Road and onto open space to the south.

b. Final configurations of the western mining area should allow for continuation of natural hydrologic processes, maximizing the probability of natural restoration of the mine site.

c. The western mining area should be reseeded with native plants now growing on the property to restore elements of habitat conditions now present. No non-native species should be included in restoration efforts.

d. Restoration should include reestablishment of trees and large shrubs at suitable sites to provide nesting, roosting and perching sites for birds and to provide shaded cover for mammals.

E. Design a mitigation monitoring plan to assure implementation of any mitigation measures finally adopted, and its success. California law requires that any mitigation measures imposed under the California Environmental Quality Act (CEQA) be monitored to ensure compliance with CEQA. The following recommendations address this requirement.

1. The mitigation monitoring plan should be implemented by an agency or other entity independent from CalMat.

2. Mitigation monitoring should ensure compliance with required mitigation measures (preservation and management of open space and implementation of a reclamation program).

3. The mitigation monitoring plan should include measures to periodically monitor habitat quality within open space and, eventually, on reclaimed mining areas. This information should be used in management of the open space and in evaluating the effectiveness of the reclamation efforts.

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SPECIES LISTS

Animals

REPTILIA	REPTILES
Iguanidae	**Iguanids**
Callisaurus draconoides	Zebra-tailed lizard
Sceloporus orcutti	Granite spiny lizard
Sceloporus occidentalis	Western fence lizard
Uta stansburiana	Side-blotched lizard
Phrynosoma coronatum blainvillei	San Diego horned lizard
Teiidae	**Whiptails**
Cnemidophorus tigris	Western whiptail
Anguidae	**Alligator lizards**
Gerrhonotus multicarinatus	Southern alligator lizard
Colubridae	**Colubrids**
Coluber constrictor	Racer
Masticophis flagellum	Coachwhip
Pituophis melanoleucus	Gopher snake
Viperidae	**Vipers**
Crotalus viridis	Western rattlesnake

AVES	BIRDS
Anatidae	**Ducks, geese and swans**
Anas platyrhynchos	Mallard
Cathartidae	**Vultures**
Cathartes aura	Turkey vulture
Accipitridae	**Hawks, eagles, harriers**
Buteo jamaicensis	Red-tailed hawk
Aquila chrysaetos	Golden eagle
Falconidae	**Falcons**
Falco sparverius	American kestrel
Falco mexicanus	Prairie falcon
Phasianidae	**Grouse and quail**
Callipepla californica	California quail
Charadriidae	**Plovers**
Charadrius vociferus	Killdeer
Scoloracidae	**Sandpipers**
Tringa melanoleuca	Greater yellowlegs

Family / Species	Common name
Columbidae	**Pigeons and doves**
Columba livia	Rock dove
Zenaida macroura	Mourning dove
Columbina passerina	Common ground-dove
Cuculidae	**Cuckoos**
Geococcyx californianus	Greater roadrunner
Strigidae	**Typical owls**
Bubo virginianus	Great horned owl
Camprimulgidae	**Nightjars**
Chordeiles acutipennis	Lesser nighthawk
Apodidae	**Swifts**
Aeronautes saxatalis	White-throated swift
Chaetura vauxi	Vaux's swift
Trochilidae	**Hummingbirds**
Archilochus alexandri	Black-chinned hummingbird
Calypte anna	Anna's hummingbird
Calypte costae	Costa's hummingbird
Picidae	**Woodpeckers**
Colaptes auratus	Northern flicker
Picoides nuttallii	Nuttall's woodpecker
Tyrannidae	**Tyrant flycatchers**
Contopus borealis	Olive-sided flycatcher
Empidonax difficilis	Pacific-slope flycatcher
Sayornis nigricans	Black phoebe
Myiarchus cinerascens	Ash-throated flycatcher
Tyrannus verticalis	Western kingbird
Alaudidae	**Larks**
Eremophila alpestris	Horned lark
Hirundinidae	**Swallows**
Tachycineta thalassina	Violet-green swallow
Stelgidopteryx serripennis	Northern rough-winged swallow
Hirundo pyrrhonota	Cliff swallow
Hirundo rustica	Barn swallow
Corvidae	**Crows and jays**
Aphelocoma coerulescens	Scrub jay
Corvus brachyrhynchos	American crow
Corvus corax	Common raven
Paridae	**Chickadees and titmice**
Parus inornatus	Plain titmouse
Aegithalidae	**Bushtits**
Psaltriparus minimus	Bushtit

Troglodytidae	Wrens
Campylorhynchus brunneicapillus	Cactus wren
Thryomanes bewickii	Bewick's wren
Salpinctes obsoletus	Rock wren
Muscicapidae	Thrushes and allies
Chamaea fasciata	Wrentit
Polioptila caerula	Blue-gray gnatcatcher
Mimidae	Mockingbirds and thrashers
Mimus polyglottos	Northern mockingbird
Toxostoma redivivum	California thrasher
Ptilogonatidae	Silky flycatchers
Phainopepla nitens	Phainopepla
Laniidae	Shrikes
Lanius ludovicianus	Loggerhead shrike
Sturnidae	Starlings
Sturnus vulgaris	European starling
Vireonidae	Vireos
Vireo gilvus	Warbling vireo
Emberizidae	Sparrows, warblers, tanagers
Vermivora celata	Orange-crowned warbler
Vermivora ruficapilla	Nashville warbler
Dendroica petechia	Yellow warbler
Dendroica nigrescens	Black-throated gray warbler
Oporornis tolmiei	MacGillivary's warbler
Wilsonia pusilla	Wilson's warbler
Pheucticus melanocephalus	Black-headed grosbeak
Passerina amoena	Lazuli bunting
Pipilo erythrophthalmus	Rufous-sided towhee
Pipilo crissalis	California towhee
Aimophila ruficeps	Rufous-crowned sparrow
Chondestes grammacus	Lark sparrow
Amphispiza belli	Sage sparrow
Zonothrichia leucophrys	White-crowned sparrow
Junco hyemalis	Dark-eyed junco
Sturnella neglecta	Western meadowlark
Euphagus cyanocephalus	Brewer's blackbird
Molothrus ater	Brown-headed cowbird
Icterus cucullatus	Hooded oriole
Icterus galbula	Northern oriole
Fringillidae	Finches
Carpodacus mexicanus	House finch
Carduelis psaltria	Lesser goldfinch
Carduelis lawrencei	Lawrence's goldfinch
Passeridae	Weavers
Passer domesticus	House sparrow

MAMMALIA	MAMMALS
Leporidae	**Hares and rabbits**
<u>Lepus</u> <u>californicus</u>	Black-tailed hare
<u>Sylvilagus</u> <u>audubonii</u>	Audubon cottontail
<u>Sylvilagus</u> <u>bachmani</u>	Brush rabbit
Sciuridae	**Squirrels**
<u>Otospermophilus</u> <u>beecheyi</u>	Beechey ground squirrel
Geomyidae	**Pocket gophers**
<u>Thomomys</u> <u>bottae</u>	Botta pocket gopher
Heteromyidae	**Pocket mice**
<u>Perognathus</u> sp.	Pocket mouse
<u>Dipodomys</u> sp.	Kangaroo rat
Cricetidae	**Rats and mice**
<u>Neotoma</u> <u>lepida</u>	Desert wood rat
<u>Peromyscus</u> sp.	Deer mouse
Canidae	**Foxes, wolves and coyotes**
<u>Canis</u> <u>latrans</u>	Coyote
<u>Urocyon</u> <u>cinereoargenteus</u>	Gray fox
Mustelidae	**Weasels and skunks**
<u>Mephitis</u> <u>mephitis</u>	Striped skunk
Felidae	**Cats**
<u>Lynx</u> <u>rufus</u>	Bobcat
Cervidae	**Elks, moose, caribou, deer**
<u>Odocoileus</u> <u>hemionus</u>	Mule deer

<u>Plants</u>

CONIFERAE	CONE-BEARING PLANTS
Cupressaceae	**Cypress family**
<u>Juniperus</u> <u>californica</u>	California juniper
ANGIOSPERMAE: DICOTYLEDONES	DICOT FLOWERING PLANTS
Anacardiaceae	**Sumac family**
<u>Rhus</u> <u>ovata</u>	Sugarbush
<u>Rhus</u> <u>trilobata</u>	Basket bush
<u>Toxicodendron</u> <u>diversilobum</u>	Poison oak
Asteraceae	**Sunflower family**
<u>Ambrosia</u> <u>acanthicarpa</u>	Annual bur-weed
<u>Artemisia</u> <u>californica</u>	California sagebrush
<u>Artemisia</u> <u>dracunculus</u>	Tarragon
<u>Artemesia</u> <u>douglassiana</u>	Mugwort
<u>Baccharis</u> <u>glutinosa</u>	Mulefat

Asteraceae (continued)	Sunflower family
*_Centaurea melitensis_	Star thistle
Chaenactis glabriuscula	Golden curls
Chrysopsis villosa	Golden-aster
Cirsium sp.	Thistle
Corethrogyne filaginifolia	Corethrogyne
*_Cnicus benedictus_	Blessed thistle
Erigeron foliosus	Leafy daisy
Eriophyllum confertiflorum	Golden yarrow
Gnaphalium californicum	California ever-lasting
Gutierrezia bracteata	Matchweed
Haplopappus linearifolius	Goldenbush
Haplopappus pinifolius	Pine bush
Helianthus annuus	Western sunflower
Heterotheca grandiflora	Telegraph weed
Lepidospartum squamatum	Scalebroom
Lessingia cf. _glandulifera_	Lessingia
Senecio douglasii	Groundsel
Tetradymia comosa	Cotton-thorn
Boraginaceae	Borage family
Cryptantha intermedia	Forget-me-not
Cryptantha muricata	Forget-me-not
Brassicaceae	Mustard family
*_Brassica geniculata_	Short-pod mustard
*_Lobularia maritima_	Sweet alyssum
*_Sisymbrium orientale_	Hare's-ear cabbage
*_Sisymbrium altissimum_	Tumble-mustard
Cactaceae	Cactus family
Opuntia littoralis	Prickly-pear cactus
Opuntia parryi	Valley cholla
Caprifoliaceae	Honeysuckle family
Sambucus mexicana	Mexican elderberry
Convolvulaceae	Morning-glory family
Cuscuta sp.	Dodder
Cucurbitaceae	Gourd family
Marah macrocarpus	Wild cucumber
Ericaceae	Heath family
Arctostaphylos glauca	Bigberry manzanita
Euphorbiaceae	Spurge family
Croton californicus	Croton
Ricinus communis	Castor-bean
Stillingia linearifolia	Stillingia

Fabaceae	**Pea family**
Astragalus pomonensis	Pomona locoweed
Lotus scoparius	Deerweed
Fagaceae	**Beech family**
Quercus chrysolepis	Canyon live oak
Quercus dumosa	Scrub oak
Fumariaceae	**Bleeding-hearts Family**
Dicentra chrysantha	Golden tear-drops
Garryaceae	**Silk-tassle family**
Garrya veatchii	Vetch silk-tassle
Geraneaceae	**Geranium family**
*Erodium cicutarium	Red-stemmed filaree
*Erodium botrys	Long-beak filaree
Hydrophyllaceae	**Water-leaf family**
Emmenanthe penduliflora	Whispering bells
Eriodictyon trichocalyx	Yerba santa
Eucrypta chrysanthemifolia	Eucrypta
Phacelia ramosissima	Many-stemmed phacelia
Juglandaceae	**Walnut family**
Juglans californica	California walnut
Lamiaceae	**Mint family**
*Marrubium vulgare	Horehound
Salvia apiana	White sage
Salvia columbariae	Chia
Salvia mellifera	Black sage
Loasaceae	**Stick-leaf family**
Mentzelia laevicaulis	Giant blazing-star
Malvaceae	**Mallow family**
Malacothamnus fasciculatus	Bushmallow
Oleaceae	**Olive family**
Fraxinus velutina	Arizona ash
Onagraceae	**Evening-primrose family**
Camissonia bistorta	Southern sun cup
Camissonia californica	Camissonia
Camissonia hirtella	Field suncup
Oenothera californica	Oenothera
Paeoniaceae	**Peony family**
Paeonia californica	Calif. peony

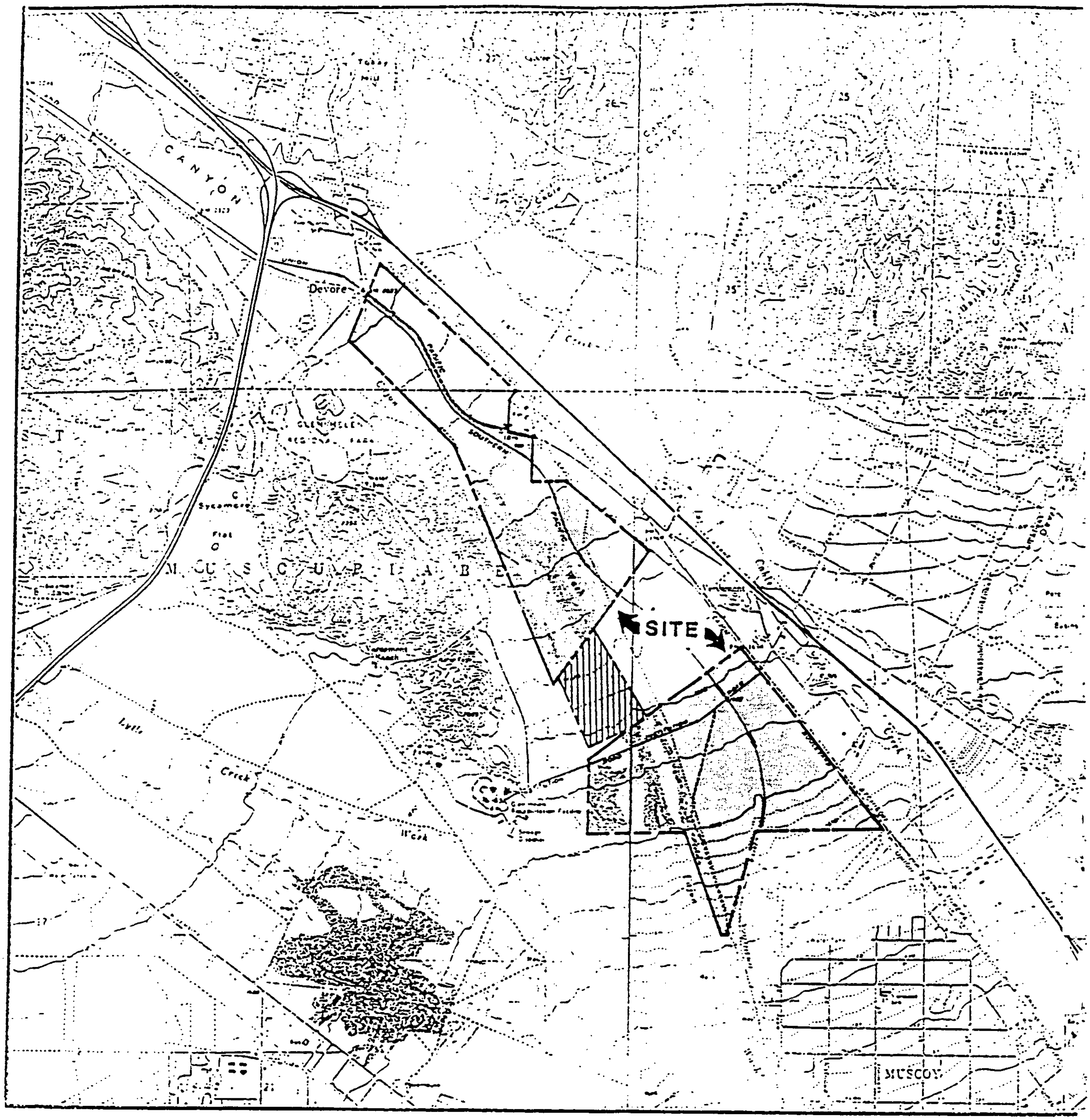
Papaveraceae	**Poppy family**
Argemone munita	Prickly-poppy
Dendromecon rigida	Bush poppy
Eschscholzia californica	California poppy
Platanaceae	**Sycamore family**
Platanus racemosa	California sycamore
Polemoniaceae	**Phlox family**
Eriastrum densifolium	Woolly star
Eriastrum sapphirinum	Mojave woolly star
Polygonaceae	**Buckwheat family**
Chorizanthe coriacea	Lastarriaea
Chorizanthe parryi	San Fernando spine-flower
Eriogonum fasciculatum	California buckwheat
Eriogonum gracile	Slender buckwheat
Eriogonum thurberi	Thurber's buckwheat
Ranunculaceae	**Crowsfoot family**
Delphinium cardinale	Scarlet larkspur
Rhamnaceae	**Buckthorn family**
Ceanothus crassifolius	Hoary ceanothus
Ceanothus leucodermis	Chaparral whitethorn
Rhamnus crocea	Redberry
Rhamnus ilicifolia	Hollyleaf redberry
Rosaceae	**Rose family**
Adenostoma fasciculatum	Chamise
Cercocarpus betuloides	Mountain mahogany
Heteromyles arbutifolia	Toyon
Prunus ilicifolia	Holly-leaved cherry
Purshia glandulosa	Mohave antelope bush
Rubiaceae	**Madder family**
Galium angustifolium	Narrow-leaf bedstraw
Galium aparine	Common bedstraw
Salicaceae	**Willow family**
Populus fremontii	Fremont cottonwood
Salix lasiolepis	Arroyo willow
Salix laevigata	Red willow
Saxifragaceae	**Saxifrage family**
Ribes malvaceum	Chaparral currant
Scrophulariaceae	**Figwort family**
Castilleja sp.	Paintbrush
Penstemon spectabilis	Showy penstemon
Antirrhinum coulterianum	Coulter's snapdragon

Solanaceae	Nightshade family
Datura meteloides	Jimsonweed
*Nicotiana glauca	Tree tobacco
Solanum xanti	Nightshade
Urticaceae	Nettle family
*Urtica urens	Dwarf nettle
Visaceae	Mistletoe family
Phoradendron sp.	Mistletoe
ANGIOSPERMAE: MONOCOTYLEDONES	MONOCOT FLOWERING PLANTS
Agavaceae	Agave family
Agave deserti	Desert agave
Yucca whipplei	Chaparral yucca
Amaryllidaceae	Amaryllis family
Dichelostemma pulchella	Blue dicks
Iridaceae	Iris family
Iris germanica	Ornamental iris
Sisyrinchium bellum	Blue-eyed grass
Liliaceae	Lily family
Calochortus plummerae	Plummer's mariposa-lily
Poaceae	Grass family
*Arundo donax	Giant reed
*Avena barbata	Slender wild oat
*Bromus diandrus	Common ripgut-grass
*Bromus mollis	Soft chess
*Bromus rubens	Red brome
*Bromus tectorum	Cheat grass
Elymus condensatus	Ryegrass
Festuca megalura	Fescue
Muhlenbergia rigens	Deergrass
*Schismus barbatus	Abu-mashi

* - indicates a non-native (introduced) species.
c.f. - compares favorably to.

This list reports only those species actually observed on the site by this study. Other species may have been overlooked or undetectable due to the seasonal nature of their occurrence.

Nomenclature follows Munz (1974), Behler and King (1979), A.O.U. (1983 and supplements through 1989), and Ingles (1965).



MAP 1. VICINITY MAP FOR CAJON CREEK CONCEPT PLAN.

☐ CALMAT PROPERTY

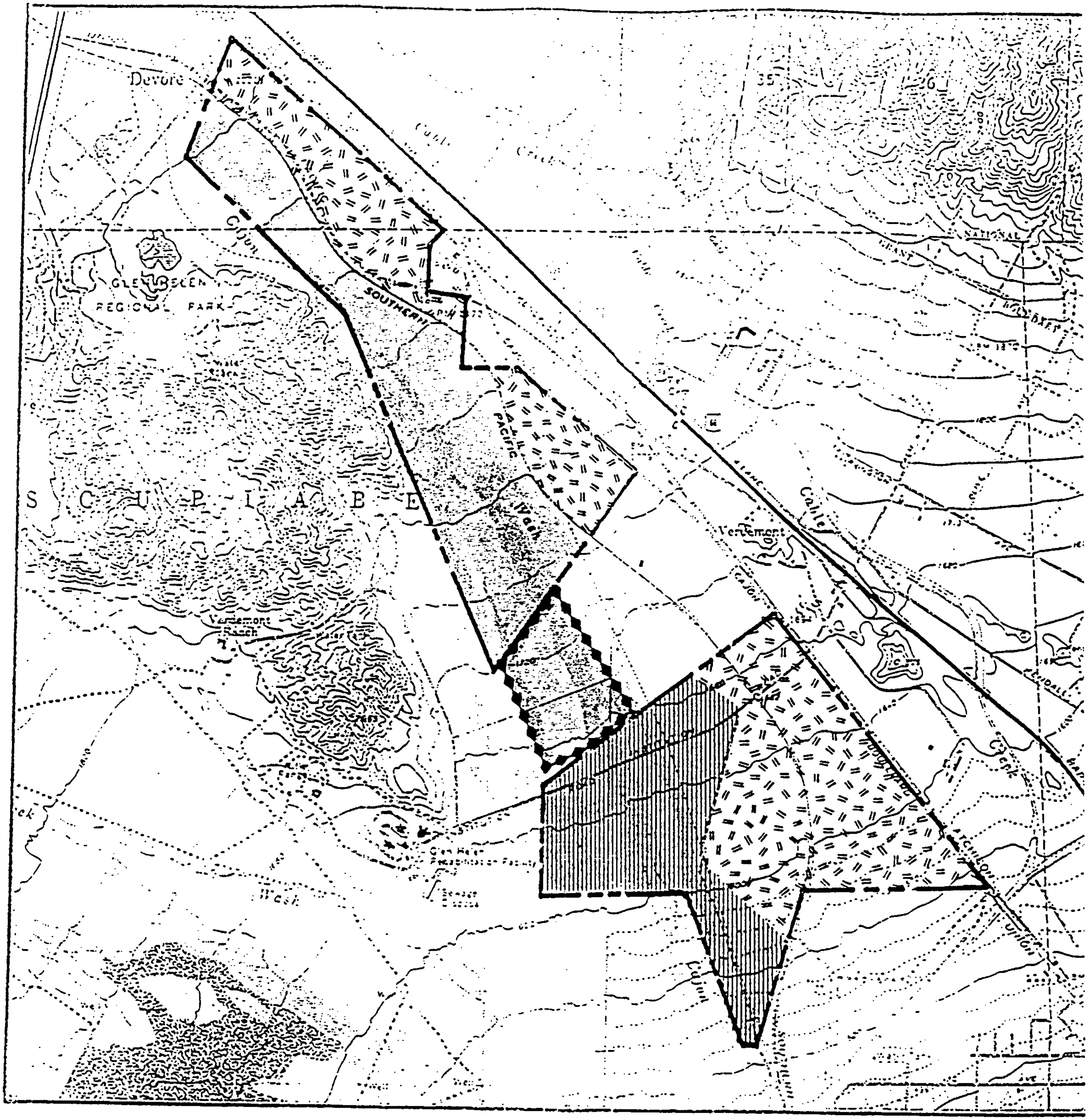
▥ SAN BERNARDINO COUNTY PROPERTY

SCALE: 1":: 4000

6/28/90: MP

Tierra Madre Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.



MAP 2. SLENDER-HORNED SPINEFLOWER SURVEY

UPLAND HABITAT SURVEYED FOR SLENDER-HORNED SPINEFLOWER (ONE YEAR ADDITIONAL SURVEY RECOMMENDED)

FLOODPLAIN HABITAT SURVEYED FOR SLENDER-HORNED SPINEFLOWER (TWO YEARS ADDITIONAL SURVEY RECOMMENDED)

AREA NOT SURVEYED (THREE YEARS SURVEY RECOMMENDED)

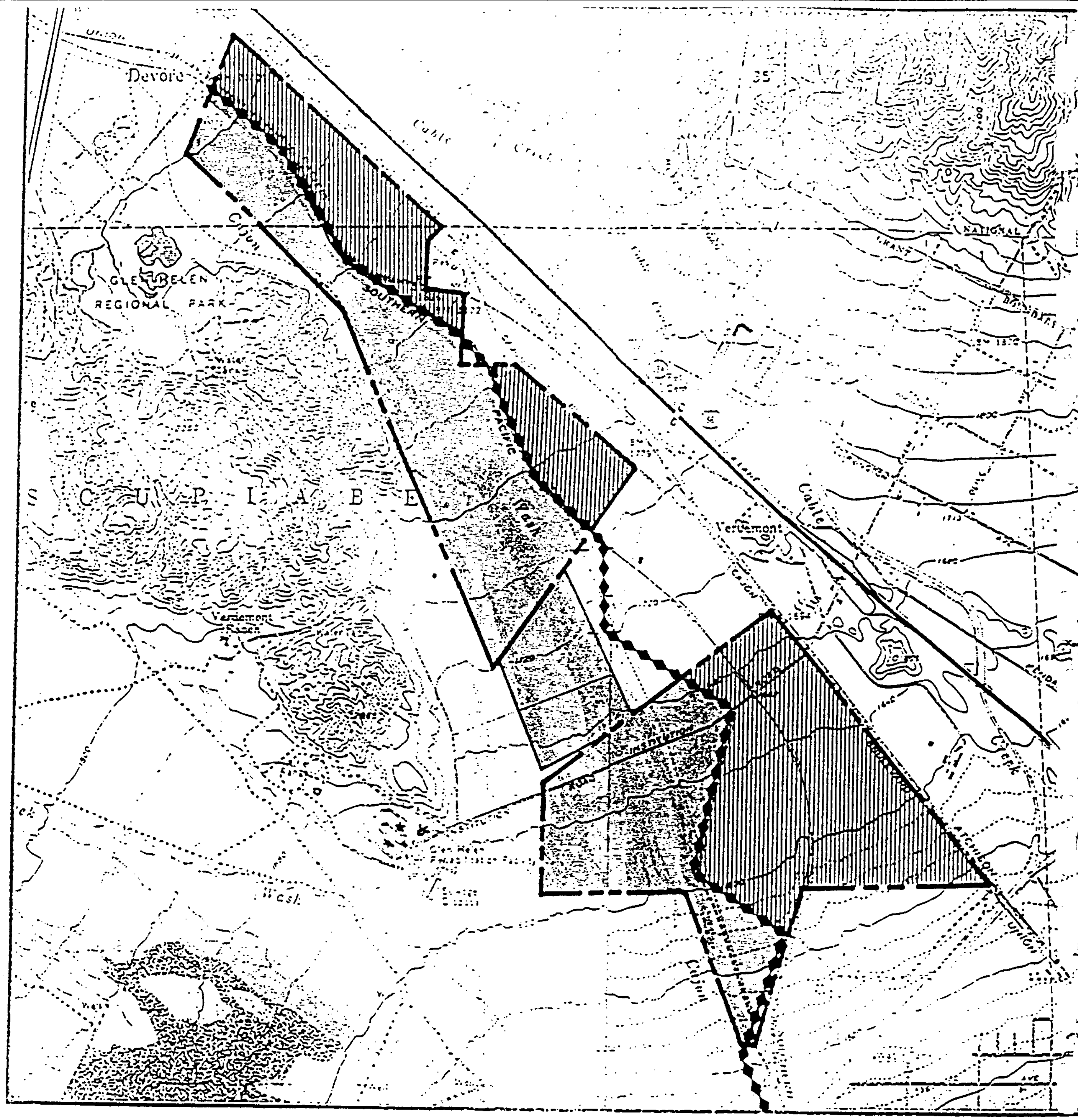
SAN BERNARDINO COUNTY PROPERTY PROPOSED FOR AGGREGATE MINING

SCALE: 1":: 1500'

7/6/90:mp

Tierra Madre Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.



MAP 3. 100 YEAR FLOODPLAIN

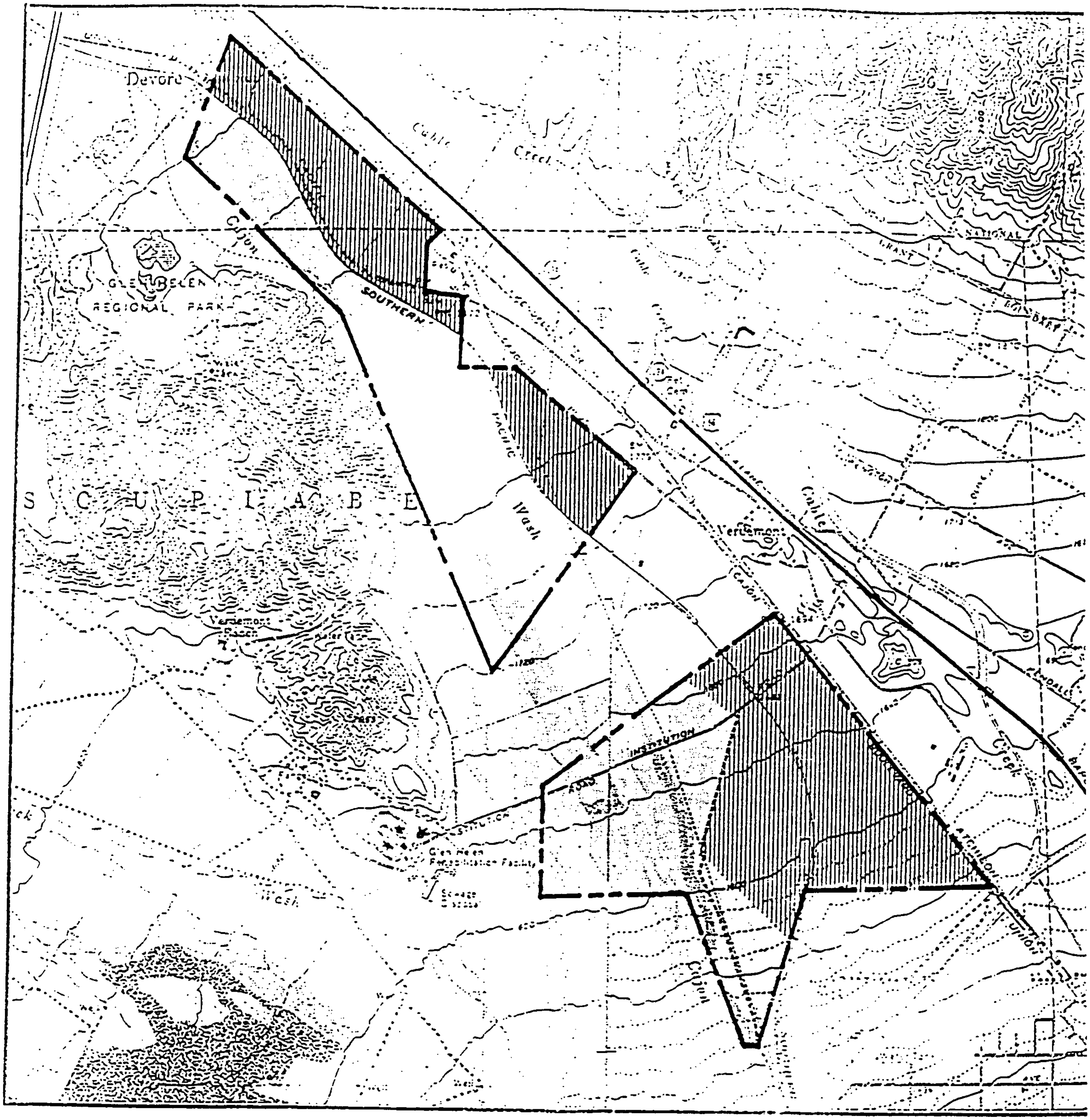
- HABITAT PROTECTED FROM NATURAL FLOODING
- HABITAT STILL SUBJECT TO PERIODIC NATURAL FLOODING
- BOUNDARY OF 100-YEAR FLOODPLAIN

SCALE: 1":: 150

7/6/90:mp

Tierra Madre Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.



MAP 4. SUITABLE HABITAT FOR SLENDER–HORNED SPINEFLOWER

☐ SUITABLE HABITAT IN FLOODPLAIN

▥ POTENTIAL REMNANT POPULATIONS IN LANDS PROTECTED BY FLOOD CONTROL STRUCTURES

SCALE: 1":: 1500'
7/6/90:mp

Tierra Madre
Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.

APPENDIX 1.
SAMPLING DATA FOR WOOLLY-STAR SURVEY

STUDY AREA #1

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	9.83	9.70	9.96	16	10.33	10.33	10.15
2	9.98	10.02	9.97	17	9.63	9.55	9.57
3	11.13	11.10	11.01	18	9.88	9.90	9.57
4	9.88	9.70	9.81	19	10.28	10.07	10.01
5	10.68	10.50	10.35	20	9.83	9.95	9.62
6	10.55	10.51	10.44	21	11.12	11.00	10.94
7	10.35	10.36	10.30	22	10.24	10.20	10.04
8	9.85	9.89	9.72	23	9.80	9.70	9.66
9	9.65	9.70	9.62	24	9.90	9.98	9.86
10	9.75	9.81	9.52	25	9.70	9.52	9.46
11	11.15	11.20	10.93	26	10.88	10.80	10.79
12	10.50	10.32	10.37	27	11.00	11.11	11.07
13	10.45	10.35	10.42	28	10.90	10.69	10.67
14	9.70	9.68	9.53	29	10.01	9.98	10.04
15	11.33	11.22	11.10	30	11.12	11.10	10.81
MEAN	-----	-----	-----	----	-----	-----	10.24

STUDY AREA #2**

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	12.35	12.43	10.97	21	14.18	12.78	13.10
2	8.58	8.45	10.05	22	11.77	12.78	13.10
3	10.35	9.30	9.601	23	11.10	11.65	11.90
4	13.23	13.00	12.95	24	11.13	12.98	13.45
5	13.08	12.03	11.90	25	12.55	14.00	13.65
6	9.83	9.98	11.13	26	14.00	14.37	13.35
7	10.85	12.40	13.10	27	10.90	12.95	12.55
8	11.95	11.85	11.60	28	10.05	10.90	9.67
9	10.55	11.28	10.28	29	11.48	13.45	13.07
10	13.15	12.73	12.98	30	13.83	12.77	11.58
11	10.90	10.55	10.70	31	12.25	11.25	12.02
12	13.98	11.95	13.25	32	9.63	12.68	12.15
13	11.28	10.90	11.58	33	9.80	10.57	9.12
14	14.00	12.90	12.63	34	14.07	12.27	13.28
15	12.60	13.53	12.55	35	13.38	12.10	12.10
16	11.45	10.70	11.20	36	10.90	11.63	13.41
17	11.17	12.00	9.50	37	12.67	15.22	12.55
18	10.45	12.12	9.50	38	14.40	15.31	12.77
19	11.65	11.87	11.82	39	14.45	15.65	13.97
20	10.05	11.12	9.95	40	13.46	12.34	12.26
MEAN	-----	-----	-----	----	-----	-----	12.04

STUDY AREA #3

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	13.80	14.33	14.00	16	14.33	13.99	13.80
2	16.03	15.75	16.08	17	18.43	18.18	18.38
3	16.08	16.03	15.40	18	16.85	16.55	16.60
4	16.70	16.85	16.90	19	16.83	16.90	16.82
5	17.15	17.25	16.83	20	15.75	16.08	15.72
6	17.25	17.15	16.55	21	17.45	17.38	17.25
7	17.78	17.40	17.49	22	14.00	13.80	13.96
8	17.88	17.93	17.78	23	16.55	16.70	16.90
9	17.93	17.88	17.91	24	16.90	17.15	16.83
10	18.18	17.78	17.70	25	16.50	16.67	16.70
11	15.40	15.40	16.03	26	17.50	17.78	17.39
12	17.40	17.45	17.38	27	18.41	18.18	18.44
13	17.78	17.93	17.88	28	16.87	16.80	16.90
14	17.70	17.52	17.40	29	13.98	14.33	14.10
15	17.38	17.52	17.42	30	17.42	17.78	17.70
MEAN	-----	-----	-----	----	-----	-----	16.73

STUDY AREA #4

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	17.78	17.75	17.80	16	16.04	15.99	16.01
2	17.70	17.73	17.75	17	16.93	16.85	16.90
3	17.38	17.35	17.40	18	16.56	16.51	16.54
4	14.33	14.30	14.35	19	17.46	17.41	17.44
5	18.43	18.40	18.45	20	15.36	15.36	15.31
6	16.85	16.85	16.83	21	13.96	13.96	14.01
7	16.83	16.80	16.80	22	17.51	17.46	17.47
8	15.75	15.78	15.73	23	15.74	15.76	15.71
9	17.45	17.48	17.50	24	16.81	16.78	16.90
10	14.00	13.98	13.95	25	16.84	16.83	16.87
11	15.40	15.38	15.35	26	18.45	18.38	18.35
12	17.40	17.43	17.45	27	14.35	14.28	14.29
13	16.55	16.53	16.55	28	17.41	17.33	17.39
14	16.90	16.87	16.92	29	17.76	17.71	17.74
15	16.03	16.01	16.03	30	17.81	17.73	17.77
MEAN	-----	-----	-----	----	-----	-----	16.59

STUDY AREA #5**

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	12.43	13.13	12.87	11	14.27	14.25	14.11
2	14.15	14.03	14.17	12	15.22	15.32	15.17
3	14.40	14.35	14.21	13	16.30	16.17	16.24
4	14.00	13.65	13.99	14	12.98	13.12	12.89
5	14.70	15.01	14.67	15	12.87	12.73	12.85
6	17.50	17.27	17.15	16	13.11	13.16	13.07
7	13.50	13.37	13.45	17	14.52	14.47	14.38
8	16.71	16.92	16.83	18	14.77	14.89	14.83
9	14.22	14.17	14.33	19	14.31	14.19	14.23
10	14.35	14.43	14.47	20	16.21	16.37	16.18
MEAN	-----	-----	-----	----	-----	-----	14.53

STUDY AREA #6

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	16.03	15.99	16.07	16	17.14	17.00	17.01
2	17.78	17.84	17.81	17	16.07	16.05	16.12
3	16.70	16.61	16.72	18	18.16	18.12	18.20
4	17.93	17.91	17.99	19	17.24	17.21	17.21
5	13.80	13.82	13.89	20	17.87	17.89	17.81
6	17.15	17.13	17.19	21	16.04	16.21	16.14
7	16.08	15.99	16.07	22	17.79	17.50	17.61
8	18.18	18.09	18.23	23	16.71	16.83	16.81
9	17.25	17.20	17.27	24	17.94	17.92	17.90
10	17.88	17.81	17.86	25	13.82	13.86	13.85
11	16.02	16.05	16.11	26	17.15	17.12	17.21
12	17.77	17.69	17.71	27	16.09	16.11	16.12
13	16.69	16.73	16.77	28	18.19	18.11	18.18
14	17.92	17.95	17.81	29	17.26	17.33	17.31
15	13.91	13.85	13.87	30	17.89	17.77	17.89
MEAN	-----	-----	-----	----	-----	-----	16.88

STUDY AREA #7

PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)	PLANT #	COROLLA LENGTH (mm)	(mm)	(mm)
1	21.50	23.86	24.01	16	23.41	22.83	22.72
2	23.40	24.69	25.33	17	25.62	24.71	24.83
3	25.25	25.63	25.43	18	24.66	24.78	24.83
4	25.60	25.74	25.66	19	25.54	24.62	24.63
5	26.85	26.81	27.01	20	28.22	28.41	28.37
6	27.20	27.29	27.25	21	28.41	28.73	28.66
7	27.50	27.69	27.67	22	26.44	25.51	25.45
8	27.58	27.74	27.65	23	27.10	27.21	27.17
9	27.88	27.89	28.02	24	28.55	28.72	28.62
10	28.65	28.74	28.67	25	28.10	28.15	28.21
11	28.90	28.92	29.01	26	28.72	28.98	28.89
12	29.03	28.98	29.01	27	26.51	25.59	25.62
13	25.44	25.59	25.64	28	25.60	25.69	25.67
14	25.51	24.47	24.67	29	26.61	26.77	26.64
15	25.60	25.70	25.67	30	27.72	27.82	27.87
MEAN	-----	-----	-----	----	-----	-----	26.61

** Sample size for Study Area #5 was reduced due to the low density of woolly-star. The sample size for Study Area #2 was correspondingly increased.

Tierra Madre Consultants

Environmental Analysis and Resource Planning
Endangered Species Surveys • Mitigation Design • Ecological Services

1271 Columbia Ave., Suite F-10
Riverside, CA 92507
(714) 684-7081 (FAX) 784-5647

June 25, 1990

Dr. Robert Patterson
Dept. of Biological Sciences
San Francisco State University
1600 Holloway Ave.
San Francisco, CA 94132

Re. Eriastrum densifolium identifications

Dear Dr. Patterson:

I am enclosing eight Eriastrum densifolium samples from Cajon Wash. They have been oven-dried overnight, and should be sterile. I am also sending field notes and maps indicating their locations, and a discussion of this woolly-star population from a report prepared by Maureen Pendleton.

As we discussed on the telephone last week, I will appreciate it if you can identify these plants to subspecies. As you know, it is particularly important to know whether the plants may be the endangered subspecies, E. d. sanctorum. I understand that they may not clearly fall into a described subspecies.

You may keep all of these samples. I am providing specimens from the same individual plants to the UC Riverside Herbarium. I also have sent along a sample of Eriastrum sapphirinum from the same area. I thought it might be useful in your taxonomic work.

Sincerely,

TIERRA MADRE CONSULTANTS, INC.

Scott White
Natural Resource Specialist

JUL. 23 1990

San Francisco State University
1600 Holloway Avenue
San Francisco, California 94132

Department of Biology
415/338-1548

18 July 1990

Scott White
Tierra Madre Consultants
1271 Columbia Avenue, Suite F-10
Riverside, CA

Dear Mr. White:

I received your specimens of perennial Eriastrum and have examined them. My opinion is that they all fall best within the circumscription of E. densifolium subsp. elongatum. The corolla tubes do not appear to be as long as "typical" subsp. sanctorum; neither does the indumentum appear to be as dense as that of subsp. sanctorum.

The problem here is that the differences between subsp. elongatum and subsp. sanctorum are not discontinuous, and that there is great difficulty assessing where one subspecies' circumscription ends and that of the other begins. This is, of course, the nature of plant subspecies, where morphological discontinuity does not necessarily define infraspecific taxa.

The bottom line is that what you sent me is probably what botanists would call subsp. elongatum, but it would be difficult to discount completely a strong argument for these specimens to be recognized within the morphological range (although at an extreme) of subsp. sanctorum. Such is the nature of taxonomy.

The question of possible hybrids between these two subspecies is probably moot. First, subspecies are commonly interfertile, so "hybrids" wouldn't be unexpected. Second, care must be taken not to substitute the word "hybrid" for "intermediate". While hybrids are often intermediate morphologically, the demonstration of hybridization is a complex matter that may be impossible to undertake.

I hope this helps you out. From a personal perspective, I would suggest close monitoring be continued of these populations with the intent of further comparison with known populations of "good" subsp. sanctorum. Although sanctorum is appropriately listed, we still have much to learn about it and its relatives. Many thanks for the specimens, and feel free to call me if you need further clarification.

Yours truly,

Bob Patterson
Professor of Biology
San Francisco State University
(415) 338-1237

Tierra Madre Consultants

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Endangered Species Surveys • Mitigation Design • Ecological Services

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November 2, 1990

Douglas W. Sprague
CalMat Company
3200 San Fernando Road
Los Angeles, CA 90065

Re: Addendum to Cajon Creek Biological Assessment

Dear Mr. Sprague:

As per our telephone conversation, I am enclosing a "Biological Resources Map" for our biological assessment of the Cajon Creek Concept Plan (September 20, 1990). By necessity, the map is quite general and should not be considered a complete summary of biological resources on the project site. For example, I have not noted on the map that the entire site is suitable habitat for foraging golden eagles, or that the western margin of the site near Lytle Creek Ridge may occasionally be used by orange-throated whiptails. The map includes only the locations of San Diego horned lizard sightings, suitable habitat for slender-horned spineflower, and differentiation between high-quality and reduced quality Riversidian alluvial fan sage scrub. I would prefer that this map be used only along with the earlier report.

In my judgment, no habitat on the project site would be considered "wetlands" by the Army Corps of Engineers or other agencies. The site does not have hydric soils or wetlands hydrology. Several of the plant species are commonly associated with riparian habitat (e.g., California sycamore, Fremont cottonwood, mugwort, mulefat, arroyo willow and red willow), but these are not dominant components of the vegetation. Please note, however, that this is not a formal "wetlands delineation" as defined by the Federal Interagency Committee for Wetland Delineation. Please contact me if you require a more rigorous wetlands delineation.

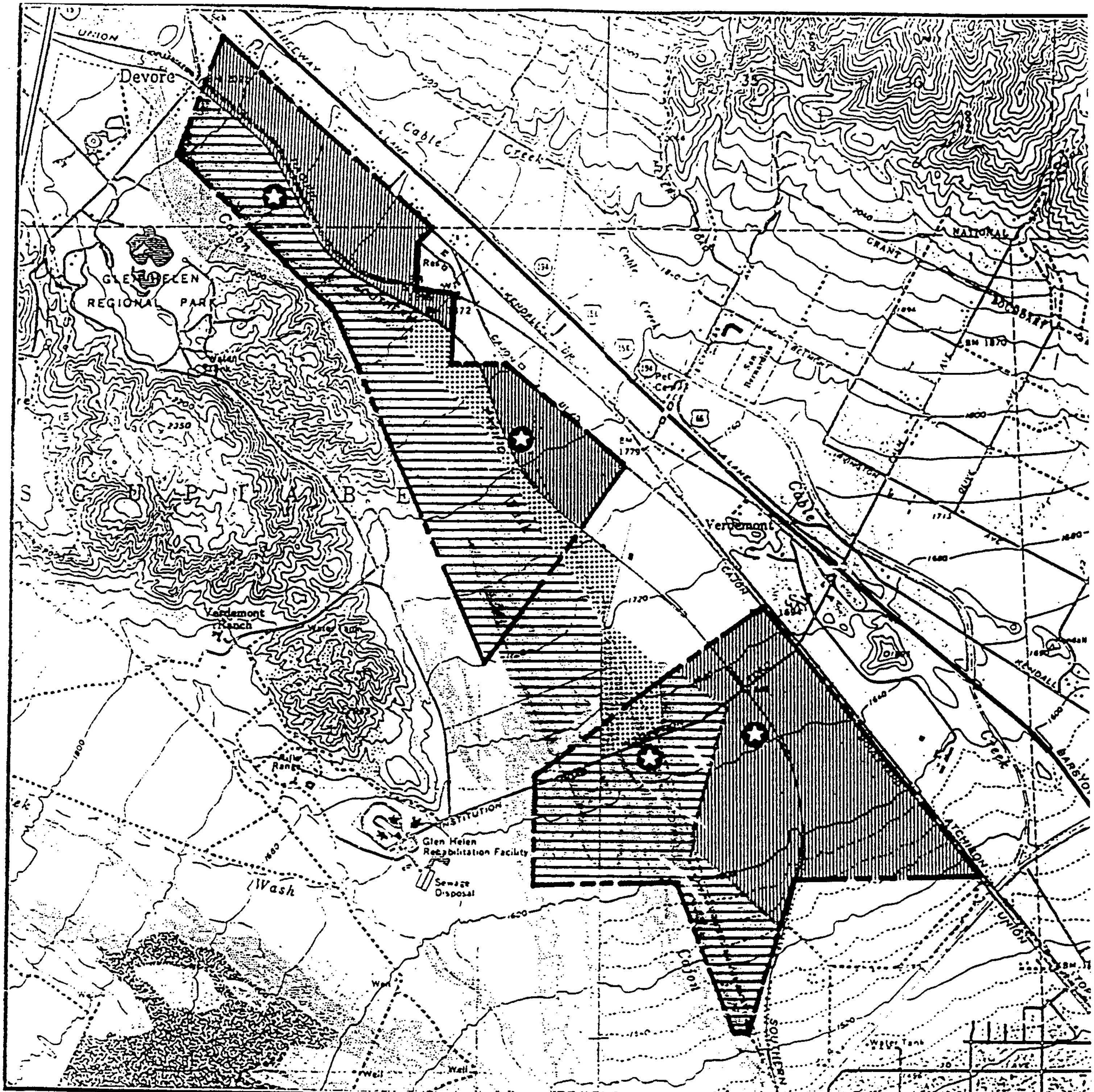
Sincerely,

TIERRA MADRE CONSULTANTS, INC.

Scott White

Scott White
Natural Resource Specialist

encl.



ADDENDUM MAP 1: BIOLOGICAL RESOURCES.

- FLOOD PLAIN VEGETATION (RIVERSIDIAN ALLUVIAL FAN SAGE SCRUB)
- SUITABLE SLENDER-HORNED SPINEFLOWER HABITAT WITHIN FLOOD PLAIN
- VEGETATION ABOVE FLOOD PLAIN (FORMER RIVERSIDIAN ALLUVIAL FAN SAGE SCRUB. MAY SUPPORT SLENDER-HORNED SPINEFLOWER POPULATIONS.)
- DISTURBED AREAS WITHIN FLOOD PLAIN
- APPROXIMATE LOCATIONS OF SAN DIEGO HORNED LIZARD SIGHTINGS

SCALE: 1"::1500'
11/26/90:mp

Tierra Madre Consultants

MAP SOURCE: USGS 7.5' DEVORE & SAN BERNARDINO NORTH QUADS.

APPENDIX C

AIR QUALITY IMPACT ANALYSIS

CAJON CREEK AGGREGATE PROJECT

CITY OF SAN BERNARDINO, CALIFORNIA

Prepared For:

New Horizons Planning Consultants, Inc.
Attn: Ed Dilginis
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San Diego, CA 92101

Date:

July 31, 1991

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rine, California 92714

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METEOROLOGY/CLIMATE

The climate of the San Bernardino area, as with all of Southern California, is governed largely by the strength and location of the semi-permanent high pressure center over the Pacific Ocean and the moderating effects of the nearby vast oceanic heat reservoir. Local climatic conditions are characterized by very warm summers, mild winters, infrequent rainfall, moderate daytime on-shore breezes, and comfortable humidities. Unfortunately, the same climatic conditions that create such a desirable living climate combine to severely restrict the ability of the local atmosphere to disperse the large volumes of air pollution generated by the population and industry attracted in part by the climate. San Bernardino is situated in an area where the pollutants generated in coastal portions of the Los Angeles basin undergo photochemical reactions and then move inland across the project site during the daily sea breeze cycle. The resulting smog at times gives San Bernardino some of the worst air quality in all of California. Fortunately, significant air quality improvement in the last decade suggests that healthful air quality may someday be attained despite the limited regional meteorological dispersion potential.

Winds across the project area are an important meteorological parameter because they control both the initial rate of dilution of locally generated air pollutant emissions as well as controlling their regional trajectory. Winds across the project site display a very unidirectional onshore flow from the southwest-northwest that is strongest in summer with a weaker offshore return flow from the northeast that is strongest on winter nights when the land is colder than the ocean. The onshore winds during the day average 8-12 mph while the offshore flow is often calm or drifts slowly westward at 1-3 mph. During the daytime, any locally generated air emissions are thus rapidly transported eastward toward Cajon Pass without generating any localized air quality impacts. The nocturnal drainage winds which move slowly across the area have some potential for localized stagnation, but fortunately, these winds have their origin in the adjacent mountains where background pollution levels are low such that any localized contributions do not create any unhealthful impacts.

In conjunction with the two characteristic wind regimes that affect the rate and orientation of horizontal pollutant transport, there are two similarly distinct types of temperature inversions that control the vertical depth through which pollutants are mixed. The summer on-shore flow is capped by a massive dome of warm, sinking air which caps a shallow layer of cooler ocean air. These marine/subsidence inversions act like a giant lid over the basin. They allow for local mixing of emissions, but they confine the entire polluted air mass within the basin until it escapes into the desert or along the thermal chimneys formed along heated mountain slopes. In winter, when the air near the ground cools while the air aloft remains warm, radiation inversions are formed that trap low-level emissions such as automobile exhaust near their source. As background levels of primary vehicular exhaust rise during the seaward return flow, the combination of rising non-local baseline levels plus emissions trapped locally by these radiation inversions creates microscale air pollution "hot spots" near freeways, shopping centers and other traffic concentrations in coastal areas of the Los Angeles Basin. The combination of winds and inversions are thus critical determinants in leading to the highly degraded air quality in summer, and the generally good air quality in winter in the San Bernardino area.

AIR QUALITY SETTING

Ambient Air Quality Standards (AAQS): In order to gauge the significance of the air quality impacts of the proposed Cajon Creek project, those impacts, together with existing background air quality levels, must be compared to the applicable ambient air quality standards. These standards are the levels of air quality considered safe, with an adequate margin of safety, to protect the public health and welfare. They are designed to protect those people most susceptible to further respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and persons engaged in strenuous work or exercise, called "sensitive receptors." Healthy adults can tolerate occasional exposure to air pollutant concentrations considerably above these minimum standards before adverse effects are observed. Recent research has shown, however, that chronic exposure to ozone even at the federal clean air standard level can create unhealthful reactions through pulmonary distress.

National AAQS were established in 1971 for six pollution species with states retaining the option to add other pollutants, require more stringent compliance, or to include different exposure periods. The initial attainment deadline of 1977 was extended to 1987 for national AAQS, and with the passage of the 1987 deadline, attainment is still nowhere near being met in air quality problem areas like Southern California. Because California had established AAQS several years before the federal action and because of unique air quality problems introduced by the restrictive dispersion meteorology, there is considerable difference between state and national clean air standards. Those standards currently in effect in California are shown in Table 1.

Baseline Air Quality: Existing levels of ambient air quality and historical trends and projections in the San Bernardino area are best documented from measurements made near the project site. The South Coast Air Quality Management District (SCAQMD) operates a monitoring station in San Bernardino that measures the complete spectrum of gaseous and particulate pollutants for which there are clean air standards. From these data resources, one can well infer that baseline air quality levels near the Cajon Creek project site are occasionally very unhealthful, but there are some encouraging signs that the air is slowly, but surely, getting better. Attainment may still be many years away, but the frequency of smog alerts, especially those considered unhealthy for all people, has dropped considerably in the last decade. Table 2 summarizes the last six years of published monitoring data from the San Bernardino station. Ozone, the primary ingredient in photochemical smog, is obviously the biggest pollution problem in the area. About one-third of all days of the year experience a violation of the national hourly ozone standard with 25-30 first stage alerts called each year. The encouraging sign is the complete lack of any second stage smog alerts

TABLE 1

Ambient Air Quality Standards

Pollutant	Averaging Time	California Standards		National Standards		
		Concentration	Method	Primary	Secondary	Method
Ozone	1 Hour	0.09 ppm (180 ug/m3)	Ultraviolet Photometry	0.12 ppm (235 ug/m3)	Same as Primary Std.	Ethylene Chemiluminescence
Carbon Monoxide	8 Hour	9.0 ppm (10 mg/m3)	Non-dispersive Infrared Spectroscopy (NDIR)	9.0 ppm (10 mg/m3)	Same as Primary Stds.	Non-dispersive Infrared Spectroscopy (NDIR)
	1 Hour	20 ppm (23 mg/m3)		35 ppm (40 mg/m3)		
Nitrogen Dioxide	Annual Average	-	Gas Phase Chemiluminescence	0.053 ppm (100 ug/m3)	Same as Primary Std.	Gas Phase Chemiluminescence
	1 Hour	0.25 ppm (470 ug/m3)		-		
Sulfur Dioxide	Annual Average	-	Ultraviolet Fluorescence	80 ug/m3 (0.03 ppm)	-	Pararosoaniline
	24 Hour	0.05 ppm (131 ug/m3)		365 ug/m3 (0.14 ppm)	-	
	3 Hour	-		-	1300 ug/m3 (0.5 ppm)	
	1 Hour	0.25 ppm (655 ug/m3)		-	-	
Suspended Particulate Matter (PM_{10})	Annual Geometric Mean	30 ug/m3	Size Selective Inlet High Volume Sampler and Gravimetric Analysis	-	-	-
	24 Hour	50 ug/m3		150 ug/m3	Same as Primary Stds.	Inertial Seperation and Gravimetric Analysis
	Annual Arithmetic Mean	-	-	50 ug/m3		
Sulfates	24 Hour	25 ug/m3	Turbidimetric Barium Sulfate	-	-	-
Lead	30 Day Average	1.5 ug/m3	Atomic Absorption	-	-	Atomic Absorption
	Calendar Quarter	-		1.5 ug/m3	Same as Primary Std.	
Hydrogen Sulfide	1 Hour	0.03 ppm (42 ug/m3)	Cadmium Hydroxide STRactan	-	-	-
Vinyl Chloride (chloroethene)	24 Hour	0.010 ppm (26 ug/m3)	Tedlar Bag Collection, Gas Chromatography	-	-	-
Visibility Reducing Particles	1 Observation	In sufficient amount to reduce the prevailing visibility to less than 10 miles when the relative humidity is less than 70%		-	-	-
Applicable Only in the Lake Tahoe Air Basin						
Carbon Monoxide	8 Hour	6 ppm (7 mg/m3)	NDIR	-	-	-
Visibility Reducing Particles	1 Observation	In sufficient amount to reduce the prevailing visibility to less than 30 miles when the relative humidity is less than 70%.		-	-	-

TABLE 2

AIR QUALITY MONITORING SUMMARY
CAJON CREEK AGGREGATE PROJECT
(Days Exceeding Standards and Observed Maximum Levels)

Pollutant/Standard	1984	1985	1986	1987	1988	1989
Ozone:						
1-Hour > 0.09 ppm	173	155	149	166	173	159
1-Hour > 0.12 ppm	125	111	108	117	121	115
1-Hour ≥ 0.20 ppm	36	30	41	27	31	22
1-Hour ≥ 0.35 ppm	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.30	0.27	0.30	0.25	0.28	0.30
Carbon Monoxide:						
1-Hour > 20. ppm	0	0	0	0	0	0
8-Hour > 9. ppm	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	9	9	9	11	9	11
Max. 8-Hour Conc. (ppm)	5.1	5.3	6.7	6.7	7.6	8.1
Nitrogen Dioxide:						
1-Hour > 0.25 ppm	0	0	0	0	0	0
Max. 1-Hour Conc. (ppm)	0.20	0.15	0.18	0.19	0.19	0.18
Suspended Particulates:						
24-Hour ≥ 100 ug/m^3	37/57	33/60	25/35	35/60	42/59	43/60
24-Hour > 260 ug/m^3	0/57	1/60	1/35	2/60	3/59	2/60
Max. 24-Hour Conc. (ug/m^3)	219.	277.	385.	271.	486.	327.
Particulate Lead:						
1-Month ≥ 1.5 ug/m^3	0/57	0/60	0/25	0/60	0/59	0/60
Max. 1-Month Conc. (ug/m^3)	0.47	0.31	0.23	0.15	0.12	0.09
Particulate Sulfate:						
24-Hour ≥ 25. ug/m^3	—	—	0/29	0/61	0/56	0/59
Max. 24-Hour Conc. (ug/m^3)	—	—	18.4	18.3	17.8	18.5
Inhalable Particulates (PM_{10}):						
24-Hour > 50 ug/m^3	—	—	20/29	36/61	38/47	44/59
24-Hour > 150 ug/m^3	—	—	2/29	2/61	3/47	3/59
Max. 24-Hour Conc. (ug/m^3)	—	—	285.	211.	289.	271.

Source: South Coast AQMD Annual Summaries, 1984-89, San Bernardino Monitoring Stations.

— = No data available

in San Bernardino since 1982, and the general reduction in average ozone concentrations throughout the 1980s. These trends are taken as an indication that stationary source controls, the retirement of older, polluting cars and the mandatory vehicle inspection program are all contributing to a positive improvement in inland valley air quality. While the secondary pollution levels of ozone and to a certain extent particulates are high from transport of pollution into the area, the primary vehicular pollution levels of species such as carbon monoxide (CO) and nitrogen oxides (NOx) are quite low. Standards for these species are not violated in San Bernardino. In contrast to the high pollution levels during the summer, winter air quality around the project site is thus quite good. The air quality impact implications of existing baseline air quality levels in the San Bernardino area are that such development will be exposed to occasional levels of regional pollutants such as ozone and particulates far in excess of healthful standards. The low levels of primary vehicular pollutants such as CO and NOx, however, also mean that the atmosphere has considerable excess carrying capacity that will allow such development to occur with only a negligible impact on localized levels of these pollutants.

In addition to gaseous air pollution concerns, western San Bernardino County experiences frequent violations of standards for 10-micron diameter respirable particulate matter (PM-10) as well as for larger diameter total suspended particulates (TSP). High dust levels occur during Santa Ana wind conditions, as well as from the trapped accumulation of soot, roadway dust and byproducts of atmospheric chemical reactions during warm season days with poor visibility. The existence of elevated baseline PM-10 levels is a vital concern to planned aggregate operations in Cajon Creek that may incrementally add particulate matter to the current violations of standards. Fortunately, the prevailing winds blow up Cajon Creek during the day when plant dust emissions may occur such that there will be a very limited receptor population potentially exposed to any possible project-related exacerbation of existing PM-10 violations.

<u>Air Quality Management Planning</u>: The Clean Air Act Amendments of 1977 required that each state develop an implementation plan that outlined the pollution control measures by which attainment was to occur in all non-attainment areas of the state by 1987. Such a document was prepared by the SCAQMD and the Southern California Association of Governments (SCAG) in 1978 called the South Coast Air Basin Air Quality Management Plan (AQMP). The basic premise of the AQMP was that Southern California could have a reasonable rate of growth and still achieve clean air goals if a number of assumptions were realized. It soon became apparent that the assumptions in the AQMP were completely unrealistic. In the update to the plan issued in 1982, the SCAQMD and SCAG acknowledged that air quality was still so far from attainment and that control measures needed to obtain attainment were so drastic and unacceptable, that a realistic expectation

for attainment was well into the 21st century.

With the passage of the 1987 attainment deadline and with the expiration of the Clean Air Act in 1988, the EPA developed a set of administrative guidelines for development of a post-'87 attainment plan. The need for such a plan was further confirmed by the 9th Circuit Court of Appeals which instructed the EPA to revoke its previous conditional approval of the South Coast Air Basin portion of the California State Implementation Plan and ordered that a new AQMP be prepared. If a satisfactory plan could not be developed at the local level, the EPA was instructed to impose an air quality plan on the region. Development of a new basin AQMP was already in progress which culminated in the adoption of a new basinwide AQMP by AQMD and SCAG in March 1989, and ARB approval for submittal to EPA in July 1989.

The new AQMP is a three-tiered approach based on enhanced existing technology (Tier I), development of emerging technologies (Tier II), and anticipation of new technologies still on the horizon (Tier III). The plan incorporates additional strong controls on industry, but also focuses more and more on transportation, land use and life style as major contributors to air quality problems that must be significantly reduced if attainment is to occur. Some of the tactics in the new plan (which individually must be enacted into law to be enforced) that may affect people of the region include proposed limits on the number of cars a household may register, banning gas-powered mowers, aerosol deodorants, liquid charcoal lighter or bias ply tires, requiring afterburners on restaurant grills, etc. By far, the greatest pollution reduction is expected from conversion of the travel fleet to methanol or other clean fuels, a major shift to transit, electrification of the railway system and the conversion of solvent-based paints, coatings and manufacturing processes to water-based systems. The Bush Administration and the U.S. Congress have both recently proposed separate plans for a new Clean Air Act such that the current AQMP may require additional modification to be consistent with any new federal clean air program if and when such a program is adopted.

Proposed development of the Cajon Creek project relates to the AQMP through the land use assumptions used by SCAG to forecast land use and transportation patterns in the air basin. To the extent that the project meets a demand for industrial space and sand and gravel product uses as close as possible to the source of the demand, a project minimizes travel requirements and reduces vehicular emissions. If there is such an existing demand, and if applicable AQMP measures are adopted and implemented by project proponents and responsible regulatory agencies, the project will not have an adverse regional air quality impact. Among the AQMP measures, the most important concern for continuing land use intensification is to examine to what extent the proposed development contributes positively or negatively to the existing and growing basinwide jobs/housing imbalance. If regional employment growth in San Bernardino County does not keep pace with residential growth, the incremental air quality impact of any development, while small on a basinwide scale, may nevertheless be perceived as creating an adverse air quality impact. Because the industrial component of the project is jobs intensive, the Cajon Creek project likely will have a positive regional air quality impact.

AIR QUALITY IMPACT

Significance Criteria

Federal, state and local air quality rules forbid the creation of an impact that causes ambient air quality standards to be exceeded. This prohibition theoretically represents a well defined impact significance criterion. In reality, there are several difficulties with this simple definition of significance. Because of the complex atmospheric chemistry, many of the end products of pollution emissions are not formed until many hours later and many miles away from their release. An individual project thus contributes only a very small pollution increment to the overall burden without any violation of standards being uniquely ascribable to the project.

Furthermore, in many cases the air quality for the pre-project condition already exceeds standards. Impacts will, therefore, be superimposed upon already unhealthful conditions. Impact significance in such cases becomes a matter of not measurably worsening an existing violation rather than creating a new violation of standards. As previously noted, some reasoning suggests that even one molecule of additional pollution in a non-attainment area is incrementally significant. The South Coast AQMD, which formerly had a statutory threshold of insignificance of around 100 pounds per day of new pollution per permitted source, uses a "zero tolerance threshold" in that any new permitted source emitting more than 1 pound per day of any pollutant must cause a reduction of an even greater amount of pollution upwind of the new source. This offset requirement mitigates the regional incremental air quality impact of a project, but there may still be local effects important to receptors with very small source to receptor distances. In such cases, the "measurable worsening" threshold is taken to mean an ambient pollution level that can be measured accurately and is a reportable amount. The primary (unreacted) pollutants near a source that may have a direct impact on a nearby receiver are carbon monoxide (CO), sulfur dioxide (SO2) and particulates (PM-10). Very little SO2 is emitted in Southern California. For CO, the reportable hourly concentration is to the nearest whole ppm (5% of the standard) such that 1 ppm would be a significant change if the San Bernardino area were a CO non-attainment sub-area (which it is not) of the South Coast Air Basin CO non-attainment area. For PM-10, the accuracy and reproducibility of samples is somewhat less than for gaseous pollutants. A change of 5% of the most stringent California 24-hour PM-10 standard (a 2.5 ug/m^3 increase) is the threshold used in the project impact analysis, but a 2.5 ug/m^3 change in dust levels is difficult to detect with conventional instrumentation. A 10% change is probably a more realistic significance threshold based on "measurable worsening."

Impact Sources

Heavy industry, whether processing aggregate resources on extraction and plant-site parcels of the planning area or from non-aggregate industry in designated industrial parks, create visions of serious air quality degradation associated with "smokestack" industries. The non-aggregate industry that would locate on any heavy industry parcel, however, has to cope with such restrictive AQMD rules that it simply would locate outside AQMD jurisdiction. To keep such industry from just moving "across the hill" to the Victor or Apple Valleys, the San Bernardino County APCD has adopted very similar rules to the AQMD such that most of California is closed to heavy polluters. Thus, although the mix of expected tenants on any industrial development areas of the Specific Plan is not known, their potential to possibly impact air quality is severely restricted by regulatory constraints. Any air quality impacts from such uses will derive primarily from transportation sources (trucks, employee commuting and possibly train delivery of goods). Minor emissions may result from light industrial activities (surface coating, parts cleaning, sandblasting, etc.). The exact nature of any such emissions is unknown. Air quality rules, however, strictly limit even small emitters and the AQMD also has general rules prohibiting emissions of fumes, odors, dusts, mists, etc. that may cause annoyance or nuisance to any significant number of people even if the emissions are not regulated by specific prohibitions. Thus, although air quality impacts from such potential uses cannot be completely predicted at this time, the presumption must be that the AQMD would not allow siting such uses if indeed they had the potential to create an adverse air quality impact.

The most readily identifiable sources of possible impact are the proposed aggregate extraction, processing, sale and building product manufacturing operations. These activities are also controlled by AQMD permit conditions and by specified control measures in the District's Best Available Control Technology (BACT) guidelines. A new source of emissions cannot receive a permit to even begin construction unless BACT is used where it is economically feasible. BACT in aggregate operations once meant water sprays on transfer points but now requires highly efficient dust collectors on major source points within the aggregate process stream. Similarly, any concrete production (asphalt, ready-mix, etc.) requires the utilization of stringent controls on all steps of such operations. Aggregate facilities are still significant emitters of air pollution, but those emissions derive more from scattered sources not amenable to fully effective control (called fugitive sources) rather than from specific pieces of processing equipment. Control of such sources results from good operational practices, proper housekeeping and use of supplemental dust suppression measures. Although impacts can generally be maintained within acceptable levels by such measures, there will be instances where aggregate resource development may incrementally degrade air quality (especially for particulates) beyond the project boundary. Historical measurements of dust levels at rock plants have found a dust "signature" of the plant that may extend as much as one mile beyond the plant boundary. These measurements, sponsored by the Southern California Rock Products Association in the late 1970s, do not reflect the current level of BACT requirements and would not necessarily be fully applicable to any of the proposed Cajon Creek plant sites. However, the processing technology is still similar even if control procedures have been stiffened in the last decade. Many of the fugitive sources that existed in the SCRPA study are still the same today as then. Cajon Creek is also in a high wind hazard zone from Santa Ana Winds blowing north to south into West San Bernardino (the hazard zone extends northward from Highland Avenue all the way to Cajon Pass) such that loose dust is readily blown southward into populated areas. Impacts from aggregate operations, including extensive truck traffic on area streets, represents the major air quality impact concern of project implementation.

Dust Emissions and Impacts

On-site dust emissions from aggregate operations were calculated using factors supplied by the AQMD (see Appendix A). These factors assume the use of standard control procedures and equipment required by air quality regulatory agencies, including best available control technology on in-plant processing dust sources. Total TSP emissions of 6 pounds/day for aggregate processing are predicted by this method based on the assumed split of material through the processing cycle for a 1,000 ton/hour rock plant. The process breakdown and associated dust emissions is shown in Table 3. As a worst-case assumption, a permanent plant on Parcel N and one of the temporary plants was assumed operating simultaneously with a maximum throughput of 12,000 tons/day at each site. A daily dust emission level of 78 pounds is predicted from all rock production and distribution within the planning area. If processing operations occur over a 12-hour period, hourly dust emission level will be around 7.8 pounds per hour.

Because the soil disturbance from materials processing and hauling is a "fresh" disturbance where the heavier airborne particles have not had time to settle out, a large percentage of the above TSP emissions are larger than 10 microns outside the PM-10 range. The PM-10 fraction of TSP from such sources has been variously estimated somewhere from 10 to 50 percent. The range of project-related PM-10 emissions is, therefore, from 5.6 to 2.8 pounds per day, or 0.8 to 3.9 pounds per hour.

An estimate of the ambient air quality impacts of the respirable fraction of project-related dust emissions was made by assuming that PM-10 emissions were 33% of TSP. It was also assumed that these emissions were approximately homogeneously mixed into a parcel of air 100 meters deep and 1,000 meters wide during normal daytime upcanyon winds of 3 m/sec

TABLE 3
DUST EMISSIONS CALCULATIONS FOR CAJON CREEK ROCK PLANT
(12 Hours/Day)

Point	Description	Process Rate TPH	Emission Factor (lb/ton)	Control Means	Control Efficiency (%)	Total (lb/hr)	Emissions (lb/day)
1	Transfer	1000	0.001	Wet Suppression	90.00%	0.1000	1.20
2	Jaw Crusher	109	0.005	Baghouse	99.90%	0.0005	0.01
3	Transfer	529	0.001	Wet Suppression	90.00%	0.0529	0.63
4	Transfer	500	0.001	Wet Suppression	90.00%	0.0500	0.60
5	Cone Crusher(s)	92	0.01	Baghouse	99.90%	0.0009	0.01
6	Transfer	109	0.001	Wet Suppression	90.00%	0.0109	0.13
7	Transfer	891	0.001	Wet Suppression	90.00%	0.0891	1.07
8	Transfer	179	0.001	Wet Suppression	90.00%	0.0179	0.21
9	Transfer	60	0.001	Wet Suppression	90.00%	0.0060	0.07
10	Transfer	166	0.001	Wet Suppression	90.00%	0.0166	0.20
11	Cone Crusher	127	0.01	Baghouse	99.99%	0.0001	0.00
12	Transfer	500	0.001	Wet Suppression	90.00%	0.0500	0.60
13	Transfer	798	0.001	Wet Suppression	90.00%	0.0798	0.96
14	Transfer	102	0.001	Wet Suppression	90.00%	0.0102	0.12
15	Transfer	104	0.001	Wet Suppression	90.00%	0.0104	0.12
16	Transfer	38	0.001	Wet Suppression	90.00%	0.0038	0.05
17	Transfer	19	0.001	Wet Suppression	90.00%	0.0019	0.02
18	Transfer	7	0.001	Wet Suppression	90.00%	0.0007	0.01
TOTALS						0.5018	6.0215
Quarry Extraction - 9 transfer points x 0.0001 lb/ton x 12,000 ton/day =							10.8
Storage Piles - 2 acres x 10.95 lb/acre/day x 0.1 (90% control) =							2.19
Fugitive Dust (In-Plant Trucks) 1 lb/mi/truck x 0.5 mi (in plant) x 400 truck/day x 0.1 (90% control) =							20.0
TOTAL ROCK PLANT =							39.0

(about 6 mph). The hourly PM-10 level downwind of the proposed processing and hauling operations was calculated as follows:

$$\text{Hourly PM-10} = \frac{2.6 \text{ lb/hour} \times 453.6 \text{ g/lb} \times 10^6 \text{ ug/g}}{100 \text{ m} \times 1000 \text{ m} \times 3 \text{ m/sec} \times 3600 \text{ sec/hour}}$$

$$= 1.1 \text{ ug/m}^3$$

$$\text{Daily PM-10} = 0.4 \times \text{Hourly PM-10}$$

$$= 0.5 \text{ ug/m}^3$$

$$\text{Annual PM-10} = 0.1 \times \text{Hourly PM-10}$$

$$= 0.1 \text{ ug/m}^3$$

The 24-hour PM-10 impact of 0.5 ug/m^3 compares to a state standard of 50 ug/m^3 and a federal standard of 150 ug/m^3. By itself, the project will not "make measurably worse" the existing violations of state and federal PM-10 standards. With the level of controls on aggregate operations now imposed by the AQMD, the fixed plant and one temporary site will not have a significant air quality impact presuming that material transfer from the quarry to the processing plant occurs via a conveyor system. Substantial off-road hauling with associated increased dust emissions could bring the impact estimate somewhat closer to the assumed significance threshold.

These calculations are based on normal daytime airflow. However, during Santa Ana winds toward San Bernardino, these activities will create a disturbed surface that increases the rate of particulate lofting. It would be difficult to isolate any project-specific dust contribution during such wind events because the air already contains high levels of dust from both man-made and natural sources throughout Cajon Creek Canyon. However, some incremental addition to that incoming burden will certainly result from these proposed Cajon Creek aggregate resource operations. Under atypical conditions, aggregate operations may thus have a significant particulate impact particularly on residences south of the Parcel N main processing plant. Additional mitigation beyond the mandatory measures required by AQMD permits must, therefore, be incorporated to reduce the probability of creating a localized dust nuisance.

Cumulative particulate effects from on-site sources may occur in conjunction with vehicular dust generation as traffic levels increase, as well as from other dust generating resource development and site construction effects. A Specific Plan for Lytle Creek similar to the Cajon Creek operation has been under consideration in the past where two major aggregate resource operations might co-exist within reasonable proximity. While the individual particulate impact from either one or the other large-scale aggregate resource operation may be maintained within an acceptable level, their combined impacts when air meets after flowing down both creek drainage could be cumulatively significant for PM-10 levels. Because of intervening topography, however, airflow within Lytle Creek and Cajon Creek Canyons does not significantly interact. As previously noted, the maximum "dust signature" from an aggregate plant extends about one mile. This general conclusion on impact radius is also why operations in Cajon or Lytle Creeks will not have a cumulatively significant impact. Such a relatively finite impact zone for particulate matter is also why there will not be any cumulative interaction between the existing Calmat Highland Avenue plant and the new facilities, or between on-site emissions from essentially a stationary source and off-site emissions from project-related vehicular sources hauling rock, concrete or asphalt and from vehicles associated with Specific Plan area industrial development sites.

Concrete Batch Plant Dust Impacts

Batch plant emissions are shown in the AQMD memo to be relatively substantial if not controlled. Baghouse control on charging the cement silo and on conveying cement to the mixing drum are standard design features in modern plants (besides being required by AQMD rules). Most new plants also use a pre-mix drum that blends aggregate, cement and water and then discharges to the mixer truck in a wet slurry instead of a dry powder. AQMD emission factors for concrete batching using standard controls are about 0.01 pound of dust per yard of concrete batched. Although the size of any ready-mix plant has not yet been determined, a 1,000 yard per day facility is a reasonable estimate. Such batching operations generate about 10 pounds of dust per day. Compared to the larger fugitive dust burden of about 40 pounds for the aggregate mining and processing, any batch plant dust emissions represent only a small particulate increment without changing any conclusions regarding overall project dust impact significance.

Asphaltic Concrete Dust Impacts

For purposes of analysis, a daily production of 2,400 tons of asphaltic concrete was assumed. Emission factors of 0.005 pound of total dust per ton of asphalt was assumed from the rotary drier using a baghouse for dust control. Another 0.005 pounds per ton will result from aggregate handling. Total daily dust emissions (TSP) will total about 24 pounds, of which only a fraction is PM-10. As with the concrete batch plant, the level of dust generated is much less than the production and sale of rock product. Any cumulative impacts of dust from production of asphaltic concrete is small when considered within the context of overall dust generation.

Combustion Emissions and Impacts

Considerable quantities of pollutant emissions from fuel combustion processes will be released into the atmosphere in connection with both any aggregate resource activities as well as from the gradual conversion of the Specific Plan area into an industrial park. Most of these emissions will not be released from the project site itself but will be spread over a larger region. The predominant type of such emissions will be vehicular exhausts, with a small portion of the emissions due to fuel combustion in an asphaltic concrete plant and in on-site thermal energy devices for certain types of industrial uses. Some fuel combustion will result from on-site heavy equipment used to extract rock material, feed the conveying system, and product loading after the aggregate has been processed.

Aggregate Product Hauling Impacts

Daily trip generation from the main Cajon Creek plant is estimated at 950 trip ends per day with 650 trips from the secondary north plant. Of these 1,600 trips, 1,500 are assumed due to trucks and 100 due to employee commuting. A one-way trip length of 20 miles has been assumed (many trips shorter, a few trips longer) such that around 30,000 truck vehicle miles traveled will be generated by aggregate resource activities. Assuming all commuting trips are "cold-start" trips and all trucks are diesel-powered, the following aggregate activities emissions (pounds/day) will be generated from rock product-related travel:

	Commuting	Trucks	Total
Reactive Organic Gases	4.2	184.4	188.6
Carbon Monoxide	56.8	521.8	578.6
Nitrogen Oxides	4.4	943.8	948.2

Source: EMFAC7pc Emission Model, Year = 1990, T = 60° F

These emission levels are substantial by any standard of significance. However, the "no build" alternative would not leave several hundred trucks per day idle. People will still move to San Bernardino County, roads and buildings will need to be built and other "hardscape" constructed. If the demand for building materials is not met at Cajon Creek, it may be met elsewhere in the area (or even out of the local area) with the same or even greater vehicular emissions. The Inland Empire is forecast to be the major growth area of the air basin in the next two decades. A demand for building materials will accompany that demand. By meeting that demand as close to the source as possible to minimize truck travel, truck and employee commuting emissions, while substantial, are not judged as individually significant.

Cumulatively, vehicular exhaust from all vehicles accessing the Cajon Creek site will mix with that from millions of other vehicles in the basin. Exhaust emissions from this project will thus incrementally impede the ultimate attainment of clean air standards. That fact places a special responsibility on Calmat and its customers to develop as much mitigation as possible to reduce the number of trips, their length of travel, or to ship product at times that interfere less with existing (and future) congested roadways. With good rail access to the project site, distribution of aggregate by train instead of truck, even within the basin to other batch facilities with rail access, should be investigated. That same concept should be considered with respect to raw materials. If screened rock were train-hauled to other major rock plants such as Irwindale, both the processing dust emissions and the truck haul exhaust could be more widely dispersed within the region instead of being concentrated within the Cajon Creek area.

Industrial Park Vehicular Emissions

After the completion of the first phase of industrial park development, the Cajon Creek area will generate around 5,844 daily trips. By the year 2010, trip generation will total about 16,942 per day. While these vehicles are generally "cleaner" than the aggregate resource big rigs, they nevertheless will create a substantial volume of exhaust emissions. Vehicular source emissions were calculated using the ARB's URBEMIS3 (Urban Emissions) computer program for four analysis years (1995 - near term, 2000 + 2005 - intermediate term, and 2010 - long term) identified in the project traffic study. Table 4 summarizes the mobile source emissions which hold generally steady at around 110 pounds per day of ROG, 200 pounds per day of NOx and 1,300 pounds per day of CO until after 2005. Long-term conversion of depleted extraction areas to industrial uses after 2005 dramatically increases mobile source emissions. (See Appendix B for computer model output.)

As with the aggregate trucking activity, the mobile sources are substantial and should be considered significant in a cumulative sense. Individually, the need for employment

TABLE 4

CAJON CREEK SPECIFIC PLAN AREA
MOBILE SOURCE EMISSIONS

(Pounds/Day)

Year	ROG*	CO	NOx	PM-10	SO2
1995	89.1	973.3	137.5	440.7	16.7
2000	116.7	1332.9	201.4	459.5	24.2
2005	108.6	1250.2	196.2	448.0	23.0
2010	211.6	2439.1	386.1	760.0	44.7

* = Assumes 92% of total organic gases (TOG) are reactive organic gases (ROG).

Source: URBEMIS3 Computer Model

opportunities will exist regardless of project implementation. In fact, the San Bernardino area has a forecast growth of 246,200 jobs in 25 years from the mid-1980s to 2010. In 1984, western San Bernardino County had 0.99 jobs for every house compared to a regional average of 1.22. In 2010, even with SCAG growth policies that mandate better jobs/housing balance, this part of the County will still have only 1.16 jobs per dwelling unit compared to a regional jobs/housing ratio projection of 1.27. Clearly, any job-intensive development in western San Bernardino County is air pollution positive by reducing the commuting distance of County residents. This positive contribution to jobs/housing goals in no way reduces the responsibility of site developers, tenants or approving agencies to develop additional mobile source mitigation measures that might further reduce travel and associated air emissions. While South Coast AQMD Reg. XV will require major employers to develop a trip/VMT reduction plan, many of the small employers in the future Cajon Creek Industrial Park may be too small to have an employee base sufficiently large to effectively implement those measures most successful in generating substantial trip diversion/reduction. If, however, all small employers participated in a transportation demand management (TDM) program being developed by the City of San Bernardino, then the effectiveness of Reg. XV-type measures could be extended to encompass not just major employers, but the entire Specific Plan area work force. Provision for inclusion of all site tenants into the City's program should, therefore, be included as a condition for any discretionary approvals of the Specific Plan.

Warehousing and Outdoor Storage Emissions Impacts

Outdoor warehousing of construction materials represents interim uses on certain parcels that are ultimately planned for mineral resource extraction. They will generate limited amounts of traffic, but are more planned as storage and distribution facilities rather than any high turn-over operations. Their trip generation is estimated at around 1,400 per day, and the termination of such uses will only occur in the late stages of resource completion. Daily emissions (in pounds per day) associated with such uses are predicted to be as follows:

Year	ROG	CO	NOx	PM-10	SO2
1995	25.1	279.5	38.0	69.8	4.6
2010	18.8	218.0	34.1	58.1	3.9

Because the number of trips generated have been assumed constant for such uses from 1995 to 2010, the small emissions decrease with time shown above reflects the expected continued small improvement in mobile source emission characteristics within the analysis timeframe. Compared to the truck-dominated aggregate resource vehicular emissions, and to the much larger light industrial mobile source emissions component, the construction materials users park contribution to the total development mobile source pollution burden is small. As with other traffic generators associated with this development, the air quality impact of each individual component is insignificant, but becomes significant on a cumulative basis in conjunction with the continued predicted non-attainment status of the air basin into the early part of the 21st century.

Stationary Source Emissions Impacts

Fuel combustion in basin power plants, in light industrial uses for heating, drying, hot water, etc. and for heat to dry the asphaltic concrete all will result in air pollution byproducts. Electrical and natural gas consumption cannot be estimated very accurately based solely on gross Cajon Creek acreage until the future tenant mix becomes better defined. However, AQMD rules strongly discourage the use of liquid fuels in power plants, and similarly require the use of electricity or natural gas for any local on-site thermal needs.

The one source where more highly polluting liquid fuels have traditionally been used is in the asphalt plant rotary dryer. When diesel fuel is used to supply the heat needed to coat the rock with liquified asphalt oil, emissions of all pollution species are relatively high because diesel fuel combustion is usually not complete. With the current AQMD "clean fuels policy," natural gas or propane will almost certainly be required. Natural gas combustion creates substantially less ROG per unit of heat output than does fuel oil. The estimated asphaltic concrete plant stationary source emissions are as follows:

Pollutant	Emission Factor (lb/ton)	Emissions (lb/day)
Sulfur Dioxide (SO_2)	0.0002	0.5
Nitrogen Oxides (NOx)	0.034	81.6
Reactive Organic Gases (ROG)	0.0004	1.0
Carbon Monoxide (CO)	0.0008	19.2
Particulates	negl. (baghouse control)	

The NOx emissions are seen to be the most substantial air pollutant from any on-site asphalt production. In order to meet AQMD Regulation XIII requirements, emissions off-sets will need to be provided by retiring an even greater amount of emissions upwind of Cajon Creek than the 81.6 pounds of NOx to be generated. The 19.2 pound of CO will need to be off-set while the other pollutants fall below the 1 pound per day off-set trigger level. With respect to asphaltic concrete, AQMD rules already govern the volatility of the asphalt itself. With such limits, and with the use of BACT on the plant, the plant can be built while maintaining a minimum air quality impact. Confirmation of this preliminary conclusion will be required as part of the AQMD permit process. In order to obtain an authority to construct and then a permit to operate, plant operators must go through the following steps:

1. Document that BACT is employed in all phases of plant operations (baghouse for dust control, low pollution fuel in the dryer, water spray on aggregate transfer and storage, etc.)

2. Reduce emissions at some other facility upwind of San Bernardino at a greater level than the new emissions from the Cajon Creek plant.

3. Verify that air emissions from the new plant will not cause clean air standards to be violated outside the plant boundary.

Asphaltic Plant Odor Impacts

Asphalt plants heat a petroleum product as a binder medium, and then dry the aggregate mixture in a rotary dryer. Poorly controlled plants may have excessive emissions of odorous organic material which condenses in the atmosphere to form a gray haze ("blue smoke"). Odor impacts from such plants derive both from uncontrolled processing operations as well as from poor housekeeping procedures where warm material is spilled during batching and loading operations. Any observable air quality impacts (mainly odor) derive from inadequate emissions controls and poor operational procedures. The AQMD recognizes the special need for emissions controls from asphalt plants. Conditions on the air permits needed from the AQMD will, therefore, be strongly conditioned to control asphalt odor emissions as well as from pollutants with ambient standards. With such stringent controls on asphalt production, there are numerous asphalt plants located near odor-sensitive land uses in Southern California that do so with little or no observable odor or other air emissions impacts. The technology to run as asphalt plant with minimal air quality impacts certainly exists. Thus, despite the fact that early morning light drainage winds associated with limited mixing blow from the plant site toward the scattered homes to the south, the pollution control features to be required by the AQMD will minimize any odor nuisance potential as well.

Construction Activity Impacts

In most projects, the temporary nature of construction is generally used to justify finding that project buildout will not have an adverse air quality impact. At Cajon Creek, however, construction may last for 20 years or more such that this is hardly a temporary source of emissions. It should be noted, that the AQMD has placed a very strong emphasis on control of construction dust because of its contribution to the non-attainment status of the basin for PM-10. In the current AQMP, the air district is proposing a rule to address minimum dust control measures scheduled for adoption before 1995. Similarly, the ARB has proposed emissions controls on off-road heavy duty construction equipment such as catalytic converters on bulldozer exhausts. If these rules are passed, then the discretionary action of requiring soil watering or using well-tuned equipment generally included in major construction projects will be replaced by mandatory measures. Some discretionary latitude will continue to exist such as encouraging ridesharing by construction workers and insuring that construction of any project does not have "spill-over" effects into public travel lanes from lane blockage, detours, or spilled dirt. Thus, even with AQMD rules about construction impact reduction, there will continue to be a responsibility on developers/contractors to control emissions as effectively as possible and on local approving agencies to enforce such controls.

To some extent, construction emissions impact reduction will occur naturally both because of the nature of the surface as well as the procedures to be followed in preparing individual parcels for development. Several sieve analyses of the aggregate resource in Cajon Creek have shown that water flow over long periods has washed most of the fines out of the ore body down to a depth of several hundred feet. Only four percent of the soil material will pass through a 200-mesh (75 micron) screen. Such a low percentage of fines translates into a corresponding limited potential for dust to loft during construction. Aggregate removal will also prepare the parcel for subsequent development as pit slopes are stabilized and the bottom leveled for future construction. The unusually low soil silt and the fact that future needs for grading, clearing and other disturbance are substantially reduced both make the AQMD's average construction dust emission factor not applicable for Cajon Creek development. Although one cannot readily quantify the construction dust and equipment exhaust impact, it will certainly be much less than if the same type of light and heavy industrial development were built on ground that has more silt and has not been "prepped" by previous site activity. If one acknowledges a need in the San Bernardino area for employment intensive development, then construction at Cajon Creek is certainly more air quality positive than at other potential development sites.

Toxic Air Contaminants Impacts

Toxic air contaminants (TACs) are generally not associated with quarries, rock plants and other proposed Cajon Creek land uses. Some TACs may be used in industrial uses as solvents, cleaning compounds, degreasers, etc. AQMD authority into fugitive releases of even small amounts of TACs has been expanding under programs such as AB-2588, but very small users are not easily identified. Within the timeframe of much of the development of Cajon Creek, TAC regulations will probably be further strengthened. It would be useful, however, to establish requirements for any tenant that uses compounds listed under programs such as AB-1807 or Prop. 65 to document that such use poses no excessive threat to any adjacent land use.

Within rock processing operations, there may be minerals released that are lung irritants. The mechanism for such action results when the immune system tries to rid the body of such inhaled substances. If the mineral crystal is unusually shaped, the human body may inadvertently damage its own lung tissue because the immune system attacks the foreign substance too aggressively. Long crystalline needles or sharp-cornered cubic crystals are the primary potential problems. Needles are found in rock formations such as serpentine which contain asbestiform minerals. There is little serpentine in the San Gabriel or San Bernardino Mountains such that asbestos needle crystals are not a major concern in Southern California aggregate operations. Crystalline silica is found around rock plants, but not in concentrations that would trigger silicosis responses in either on-site employees or the off-site general public. A detailed review of the silicosis issue around rock plants was undertaken for the proposed Webster Quarry project in the Santa Ana River between Redlands and Highlands (P & D Technologies, 1988). The County Health Department and the Department of Environmental Medicine at the University of California, Irvine, concluded that the only identified risk is for occupational exposure, not to the public. Occupational exposure is controlled by MSHA (the federal Mine Safety and Health Administration). MSHA's position on crystalline silica is that as long as occupational standards are met within plant boundaries, the additional dispersion during transport from the plant to the surrounding community will correspondingly protect public health. The results of the crystalline silica/silicosis issue are summarized in Appendix C.

MITIGATION

The proposed Cajon Creek project is really two somewhat distinct developments with different types of impacts and different mitigation potential. The aggregate operations are a semi-stationary source of emissions with well-defined control rules except perhaps for various fugitive dust sources. The industrial component has few stationary sources with the primary impact deriving from vehicular emissions. Although the AQMD's authority to reduce vehicular emissions has been expanding in the last few years through programs such as Regulation XV, an individual's choice of travel mode still is not strongly regulated. While stationary source control is through a stick, travel mode choice is still mainly a carrot approach through various incentives to encourage drivers to abandon the single occupant vehicle. The level of discretionary action recommended for inclusion in any Specific Plan approval for industrial development is, therefore, different than for the aggregate resource component.

Aggregate Resource Development Impact Mitigation

Impacts from aggregate materials hauling, processing and distribution of finished product create potentially significant air quality concerns, especially from the creation of dust during the hauling and processing activities. Mitigation of vehicular emissions from product distribution on a regional scale depends on locating the processing activity as closely as possible to the demand for such product until an alternative to the diesel fueled truck is developed for movement of materials. Mitigation through discretionary action by project proponents and local regulatory agencies, therefore, must concentrate on on-site impact minimization, especially from any dust generation. Such measures include:

1. Air quality permits mandated by the AQMD (Authority to Construct and Permit to Operate) will be obtained and renewed as required. The AQMD will require the best available control technology (BACT) on those processing components amenable to dust control. BACT typically entails the use of water spray on transfer points and a bag-house on crushers or other sources amenable to such controls.

2. Fugitive dust impacts from materials handling and in-plant travel will be controlled through a program of paving the off-site access road and major in-plant travel paths, through the use of water or other dust palliatives on storage piles and load out systems, and through an aggressive program of roadway sweeping and watering to remove spillage from public and private roadways. Minimum implementation action of this mitigation measure will be to meet the requirements of AQMD Rule 401 prohibiting a visible dust plume at the project boundary.

3. Dust transport away from the facility can be reduced through a landscaping program that utilizes fast-growing species with minimum water demands to reduce wind erosion and off-site transport. Because the strongest winds are from the north during Santa Ana wind conditions, a windbreak north of the processing plant to reduce winds through the plant plus a line of landscaping near the southern site boundary to trap dust already picked up will be the most effective areas of landscaping to reduce dust impacts. A berm system in conjunction with landscaping will have air quality benefits by allowing the strongest winds to pass over the top of the plant complex while exposing storage piles and loose surface material to much reduced wind velocities.

4. Aggregate facilities access/egress shall be designed to minimize use of local arterial roadways or areas of existing or potential future air quality sensitivity.

The combination of favorable meteorology, few receptors along the primary daytime airflow pathway and the implementation of the above measures will reduce the individual project air quality impact of this project to a level of insignificance.

Industrial Park Transportation Impact Mitigation

Large industrial tenants will be required to submit trip reduction plans as required by AQMD Reg. XV. The current threshold for plan submittal is 100 employees, but the threshold is expected to drop in the future to encompass smaller companies as well. Effective trip reduction strategies require a sufficient participant pool to make carpools, vanpools or transit alternatives work. For small employers, those measures are not viable unless many small companies coordinate their efforts. Even for larger companies, effectiveness can be enhanced if their program could be coordinated with other nearby companies. This consolidation of trip/VMT reduction is best performed through a coordinated effort within the context of the City of San Bernardino's TDM program. As the future industrial tenant base increases, the program can be more localized within the Specific Plan area through the formation of a Cajon Creek transportation management agency (TMA). Calmat already has a company-wide transportation demand management program in place such that the Cajon Creek TMA can probably initially operate within the company structure. As other participants are added, the TMA will need to become an independent agency. Given the importance being placed on transportation control to improve air quality, any commitment as part of the Specific Plan approval process must, therefore, reflect the seriousness with which that responsibility is being taken as an integral part of the Cajon Creek project.

APPENDIX A

SOUTH COAST AQMD EMISSIONS DATA

FOR AGGREGATE AND CONCRETE BATCH PLANTS

South Coast
AIR QUALITY MANAGEMENT DISTRICT
9150 FLAIR DRIVE, EL MONTE, CA 91731 (818) 572-6200

March 6, 1990

Hans Giroux
17744 Sky Park, No. 210
Irvine, CA 92714

Dear Hans,

The following are emission factors used in the Mechanical Operations Unit to estimate particulate emissions from aggregate plants and concrete batch plants:

Aggregate Plants

Material transfer points	0.001 lbs/ton of throughput
Cone crusher	0.01 lbs/ton of throughput
Jaw crusher	0.005 lbs/ton of throughput

The emission factors are based on the aggregate's surface being saturated with moisture in order to prevent excessive visible emissions and not vented to control equipment.

Concrete Batch Plants

Uncontrolled Particulate Emission Factors

Cement Silo	0.001 lbs/lbs of cement
Cement Conveying	0.05 lbs/yard^3 of concrete
Aggregate Conveying	0.005 lbs/yard^3 of concrete

Controlled Particulate Emission Factors

Cement Silo	0.00001 lbs/lbs of cement
Cement Conveying	0.005 lbs/yard^3 of concrete
Aggregate Conveying	0.005 lbs/yard^3 of concrete

The cement silo emissions are the particulate emissions that occur due to the loading of the cement silo. The controlled emission factor is based on a well designed baghouse or filter vent servicing the cement silo.

The cement conveying emissions are the particulate emissions that occur due to the cement handling processes after the cement leaves its storage silo. The controlled emission factor is based on a well designed baghouse system venting the batching operations.

The aggregate conveying emissions are the particulate emissions that occur due to the handling of the aggregate throughout the plant. Both the uncontrolled and controlled emission factors are based on the aggregate being moist enough to prevent excessive visible emissions. The controlled emission factor is the same as the uncontrolled emission factor since the aggregate conveying and handling systems are usually not vented to control equipment in a concrete batch plant.

These emission factors are from two memos dated March 2, 1978 and November 21, 1978 and do not reference any sources. In the near future we plan to revisit these memos and possibly revise the emission factors. If you have any questions, please call me at (818)572-6213.

Very truly yours,

William J. Dennison
Director of Engineering

Gary T. Turner

Gary Turner
Acting Supervising AQ Engineer

GLT

APPENDIX B

URBEMIS3 COMPUTER MODEL OUTPUT

CAJON CREEK SPA 90-1 MOBILE SOURCES

Project Name : NEAR TERM   Date : 05-02-1991

Analysis Year = 1995   Temperature = 75
EMFAC7 VERSION : EMFAC7D ...11/88

Unit Type	Trip Rate	Size	Tot Trips	Days Op.
eral Light Industry	60.0/Acre	97	5844	1
ieral Heavy Industry	650.0/Plant	2	1300	1
rehouse	10.0/Acre	31	314	1
rage Yard	5.0/Acre	228	1140	1

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
ip Length	8.8	3.2	5.2	8.1	5.5
Started Cold	88.2	40.1	58.0	77.2	27.0
p Speed	35	35	35	30	30
cent Trip	27.3	21.2	51.5		

Vehicle Fleetmix

hicle Type	Percent Type	Leaded	Unleaded	Diesel
ight Duty Autos	72.8	1.7	95.6	2.7
ight Duty Trucks	14.3	2.2	95.0	2.8
dium Duty Trucks	4.3	5.3	94.7	0.0
avy Duty Trucks	3.9	29.8	70.3	N/A
Heavy Duty Trucks	3.9	N/A	N/A	100.0
torcycles	0.9	100.0	N/A	N/A

Project Emissions Report in Lb/Day

Unit Type	TOG	CO	NOx
General Light Industry	96.8	973.3	137.5
ieneral Heavy Industry	25.4	261.0	35.1
larehouse	5.9	60.4	8.2
Storage Yard	21.4	219.1	29.8

Project Emissions Report in Lb/Day

Unit Type	FUEL USE	PM10	SOx
General Light Industry	1779.2	440.7	16.7
General Heavy Industry	457.9	35.1	4.3
Jarehouse	106.8	15.1	1.0
Storage Yard	387.9	54.7	3.6

Project Name : INTERMEDIATE TERM Date : 05-02-1991

Analysis Year = 2000 Temperature = 75
EMFAC7 VERSION : EMFAC7D ...11/88

Unit Type	Trip Rate	Size	Tot Trips	Days Op.
eral Light Industry	60.0/Acre	97	5844	1
eral Heavy Industry	60.0/Acre	49	2928	1
eral Heavy Industry	950.0/Plant	1	950	1
eral Heavy Industry	650.0/Plant	1	650	1

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
p Length	8.8	3.2	5.2	8.1	5.5
tarted Cold	88.3	40.2	58.3	77.4	27.2
Speed	35	35	35	30	30
ent Trip	27.3	21.2	51.5		

Vehicle Fleetmix

icle Type	Percent Type	Leaded	Unleaded	Diesel
ght Duty Autos	72.8	0.2	97.3	2.5
ght Duty Trucks	14.3	0.6	96.8	2.6
ium Duty Trucks	4.3	2.0	98.0	0.0
vy Duty Trucks	3.9	18.0	82.0	N/A
eavy Duty Trucks	3.9	N/A	N/A	100.0
orcycles	0.9	100.0	N/A	N/A

Project Emissions Report in Lb/Day

Unit Type	TOG	CO	NOx
General Light Industry	79.9	831.9	127.9
neral Heavy Industry	47.0	501.0	73.5
neral Heavy Industry	15.2	162.5	23.8
eneral Heavy Industry	10.4	111.2	16.3

Project Emissions Report in Lb/Day

Unit Type	FUEL USE	PM10	SOx
neral Light Industry	1633.9	389.6	15.3
eneral Heavy Industry	947.1	69.9	8.9
neral Heavy Industry	307.3	22.7	2.9
neral Heavy Industry	210.2	15.5	2.0

Project Name : INTERMEDIATE TERM   Date : 05-02-1991

Analysis Year = 2005   Temperature = 75
EMFAC7 VERSION : EMFAC7D ...11/88

Unit Type	Trip Rate	Size	Tot Trips	Days Op.
ral Light Industry	60.0/Acre	97	5844	1
eral Heavy Industry	60.0/Acre	49	2928	1
eral Heavy Industry	950.0/Plant	1	950	1
ral Heavy Industry	650.0/Plant	1	650	1

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
p Length	8.8	3.2	5.2	8.1	5.5
tarted Cold	88.4	40.3	58.6	77.6	27.4
Speed	35	35	35	30	30
ent Trip	27.3	21.2	51.5		

Vehicle Fleetmix

icle Type	Percent Type	Leaded	Unleaded	Diesel
ght Duty Autos	72.8	0.0	97.5	2.5
ght Duty Trucks	14.3	0.0	97.4	2.6
ium Duty Trucks	4.3	0.0	100.0	0.0
vy Duty Trucks	3.9	13.6	86.4	N/A
avy Duty Trucks	3.9	N/A	N/A	100.0
orcycles	0.9	100.0	N/A	N/A

Project Emissions Report in Lb/Day

Unit Type	TOG	CO	NOx
eneral Light Industry	74.4	780.8	124.6
neral Heavy Industry	43.6	469.4	71.6
neral Heavy Industry	14.1	152.3	23.2
eneral Heavy Industry	9.7	104.2	15.9

Project Emissions Report in Lb/Day

Unit Type	FUEL USE	PM10	SOx
neral Light Industry	1546.9	379.9	14.6
eneral Heavy Industry	896.7	68.1	8.4
neral Heavy Industry	290.9	22.1	2.7
neral Heavy Industry	199.1	15.1	1.9

Project Name : LONG TERM Date : 05-02-1991

Analysis Year = 2010 Temperature = 75
EMFAC7 VERSION : EMFAC7D ...11/88

Unit Type	Trip Rate	Size	Tot Trips	Days Op.
al Light Industry	60.0/Acre	154	9234	1
al Heavy Industry	60.0/Acre	130	7788	1
eral Heavy Industry	950.0/Plant	1	950	1
ouse	10.0/Acre	30	304	1
ge Yard	5.0/Acre	228	1140	1

	Residential			Commercial	
	Home-Work	Home-Shop	Home-Other	Work	Non-Work
Length	8.8	3.2	5.2	8.1	5.5
rted Cold	88.6	40.4	58.8	77.8	27.6
Speed	35	35	35	30	30
cent Trip	27.3	21.2	51.5		

Vehicle Fleetmix

cle Type	Percent Type	Leaded	Unleaded	Diesel
ght Duty Autos	72.8	0.0	97.5	2.5
t Duty Trucks	14.3	0.0	97.4	2.6
um Duty Trucks	4.3	0.0	100.0	0.0
avy Duty Trucks	3.9	11.4	88.6	N/A
y Duty Trucks	3.9	N/A	N/A	100.0
rcycles	0.9	100.0	N/A	N/A

Project Emissions Report in Lb/Day

Unit Type	TOG	CO	NOx
eral Light Industry	115.8	1212.4	196.2
eral Heavy Industry	114.2	1226.7	189.9
eneral Heavy Industry	13.9	149.6	23.2
rehouse	4.3	45.9	7.2
rage Yard	16.1	172.1	26.9

Project Emissions Report in Lb/Day

Unit Type	FUEL USE	PM10	SOx
eral Light Industry	2390.4	583.8	22.6
eral Heavy Industry	2332.5	176.2	22.1
neral Heavy Industry	284.5	21.5	2.7
rehouse	88.0	12.2	0.8
rage Yard	329.8	45.9	3.1

APPENDIX C

SUMMARY OF FINDINGS RELATIVE TO SILICOSIS

AND LUNG CANCER RISK NEAR AGGREGATE FACILITIES

P&D Technologies
972 Town & Country Road
Orange, CA 92668
P.O. Box 5367
Orange, CA 92613-5367
714•835•4447

An Ashland Technology Company

Planning
Engineering
Transportation
Environmental
Economics
Landscape Architecture

January 23, 1989

Mr. Joe Bellandi
Land Management Department
County of San Bernardino
385 North Arrowhead Avenue, 3rd Floor
San Bernardino, CA 92415-0182

Subject: Old Webster Quarry - Silica Issue

Dear Joe:

This is to convey our findings relative to potential health hazards posed by airborne crystalline silica originating from the proposed sand and gravel project at the Old Webster Quarry site. These concerns were first raised in December 1988 after completion of the Final EIR in October 1988 and the conduct of two County Planning Commission hearings in November 1988.

The investigation of this issue included consultation with the Proposition 65 Division of the State Health and Welfare Agency, the South Coast Air Quality Management District (SCAQMD), the National Stone Association, the Mine Safety and Health Administration (MSHA), the San Bernardino County Health Department, the Department of Community and Environmental Medicine at the University of California, Irvine, and the Air Pollutant Health Effects Department at the U.S. Environmental Protection Agency (EPA).

Summary

None of the organizations we consulted indicated any concern with potential adverse health effects resulting form general environmental exposure to crystalline silica. Cases of silicosis have been associated with individuals who have had steady occupational exposure to crystalline silica over an extended period of time (i.e., decades). As stated by John Howard, M.D., Assistant Clinical Professor of Environmental Medicine at the University of California, Irvine, there are "...no (known) cases of silicosis which arose in individuals who have not had some direct, occupational exposure to crystalline silica." (see attached correspondence dated January 19, 1989.) In a telephone interview on January 18, 1989, Dr. Howard indicated that silicosis is currently a fairly rare occupationally-related illness and requires a substantial degree of exposure (eg., sandblasters). Dr. Howard also indicated that he would not expect long-term operation of a sand and gravel quarry to pose a hazard for area residents because the concentration of airborne crystalline silica would be reduced as the particulates settle out from airborne dust.

Background

The Proposition 65 Division of the State Health and Welfare Agency added crystalline silica to the State's list of toxic materials in October 1988. This action was taken because of the association between silicosis and the inhalation of free crystalline silica. On the other hand, the Silicosis and Silicate Disease Committee of the National Institute of Occupational Safety and Health (NIOSH) concluded in a 1988 report that "the epidemiological evidence at present is insufficient to permit conclusions regarding the role of silica in the pathogenesis of bronchogenic carcinoma in man." Based on this and other supporting evidence, the National Stone Association has petitioned the Occupational Safety and Health Administration (OSHA) to remove crystalline silica from its list of toxic substances.

Consultation with MSHA revealed that levels of health-threatening airborne crystalline silica are rarely found at sand and gravel operations except perhaps in the immediate vicinity of crusher equipment. If safe levels for workers are maintained within the processing plant site, MSHA feels that similarly safe levels for the general public would typically occur at the plant boundary and beyond.

Since silicosis is not a reportable disease, the San Bernardino County Health Department does not have any morbidity or mortality data related to silicosis. The County's Chief of Preventive Medical Services offered the opinion that airborne crystalline silica from a sand and gravel quarry is not a major health hazard for area residents and represents more of an occupational hazard. This is supported by the correspondence from the University of California, Irvine noted previously. (We also contacted the Pulmonary Medicine Department at Loma Linda in an effort to interview one of their experts. We were told that no one there is familiar with silica-related issues and were referred to the Scripps Hospital in La Jolla. The Scripps expert is unavailable through January 30th.)

Consultation with the EPA was less conclusive since EPA does not regulate airborne crystalline silica levels. However, the EPA staff focused on the issue as an occupational consideration and indicated that any available and relevant information would be forwarded.

Similarly, the SCAQMD sets forth general dust emission standards (Rule 403) and does not have any standards related specifically to crystalline silica. Measures to control dust emissions set forth in the EIR and in the Conditions of Approval are consistent with SCAQMD's Rule 403.

Conclusion

Our investigation has yet to reveal any credible evidence that airborne crystalline silica poses a significant health hazard to residents in the vicinity of the proposed Old Webster Quarry Project. Further, we expect that the dust control measures set forth in the EIR and as Conditions of Approval will mitigate potential dust emissions to a level of non-significance. Potential concerns relative to occupational exposure to crystalline silica would be handled under the jurisdiction of MSHA.

Sincerely,

&D TECHNOLOGIES

Tim Lattimer
Senior Project Manager

TL:la

APPENDIX D

PRELIMINARY GEOLOGIC RECONNAISSANCE FOR THE PROPOSED CAJON CREEK PROJECT

DECEMBER 4, 1990

Prepared for:

CalMat Company
3200 San Fernando Road
Los Angeles, California

1550 Hotel Circle North
San Diego, CA 92108
(619) 294-9400
FAX: (619) 293-7920

Woodward-Clyde Consultants

December 4, 1990
Project No. 9053139N-2000

CalMat Company
3200 San Fernando Road
Los Angeles, California

Attention: Mr. Douglas Sprague

PRELIMINARY GEOLOGIC RECONNAISSANCE
FOR THE PROPOSED CAJON CREEK PROJECT
SAN BERNARDINO, CALIFORNIA

Gentlemen:

Woodward-Clyde Consultants (WCC) is pleased to provide the accompanying report, which presents the results of our preliminary geologic reconnaissance for the project. This study was performed in accordance with our proposal dated May 1, 1990 under terms and conditions of our contract between CalMat Company and WCC dated May 1, 1990.

This report presents our conclusions and recommendations pertaining to the proposed sand and gravel extraction and the industrial development.

Our geologist assigned to this project is Mr. Michael E. Hatch, if you have any questions or if we can be of further service, please give us a call.

Very truly yours,

WOODWARD-CLYDE CONSULTANTS

Michael E. Hatch
Project Manager

David L. Schug
C.E.G. 1212

MEH/DLS/eg (b/meh1)

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Figures

PRELIMINARY GEOLOGIC RECONNAISSANCE FOR THE PROPOSED CAJON CREEK PROJECT

1.0 INTRODUCTION

1.1 Purpose and Scope of Investigation

This report presents the results of our preliminary geologic reconnaissance and geotechnical feasibility studies at the site of the proposed Cajon Creek Project. The site is located in San Bernardino County in the northern portion of the San Bernardino Valley, in and adjacent to Cajon Creek Wash. The general site area is between the communities of Devore and Muscoy in the Verdemont area.

This report has been prepared exclusively for CalMat Company (CalMat) and their consultants for use in evaluating the property and to provide technical information to be incorporated into a Draft Environmental Impact Report for the proposed project. This report presents our conclusions and/or recommendations regarding:

- The geologic setting of the site;
- Potential geologic hazards;
- General subsurface soil conditions based on available information;
- General extent of existing fill soils;
- Groundwater conditions based on published and available information;
- Preliminary evaluation of stability of proposed cut slopes; and
- General foundation considerations.

1.2 Description of the Project

For our study we have discussed the project with Messrs. Wesley A. Murray and Douglas W. Sprague of CalMat, and Mr. Ed Dilginis of New Horizons. We have also been provided with plans from CalMat titled "Cajon Creek Project Concept Plan", dated May 5, 1989 and topographic base maps of the project area dated May 27, 1987.

We understand that the proposed project will include sand and gravel extraction and processing, and the development of light industrial and rail-access industrial land use. The location and layout of the proposed mining sites and the industrial development are shown on the Site Plan (Figure 1).

1.3 Site Investigation

Our site investigation included visual geologic reconnaissances of the existing surface conditions on July 13, 1990 and August 15, 1990. No subsurface investigations were conducted as part of this study. Subsurface conditions discussed in the following section are based on published and available information, including test boring logs and results of gradation analyses (provided by CalMat) and logs from monitoring wells and water wells.

In addition, we have conducted photogeologic interpretation of stereographic aerial photographs taken in 1938, 1969, 1978 and 1986; a review of pertinent geologic reports and maps; and a review of our files for nearby projects. Local agencies were contacted and searches were conducted to gather information on existing wells in the site vicinity.

2.0 SITE CONDITIONS

2.1 Geologic Setting

The study area is located in and immediately east of Cajon Creek Wash, upstream of the confluence of Cajon and Lytle Creeks in the northwesterly portion of the San Bernardino Valley. The valley is bounded by the San Bernardino Mountains to the northeast and by a portion of the Transverse Ranges, the San Gabriel Mountains, to the northwest.

The San Bernardino Valley is a fault-controlled structural block defined by the San Andreas fault zone to the northeast and by the San Jacinto fault zone to the southwest. The southwestern margin of the block is complicated by a series of stepping and branching faults within the San Jacinto fault zone, including the Glen Helen fault which projects into the site area along three different mapped traces.

Roughly 3 miles to the west of the site area lies the terminus of the Cucamonga-Sierra Madre fault zone. The Cucamonga-Sierra Madre fault zone is a series of east-west trending thrust faults that define the southern mountain front of the Transverse Ranges in the eastern portion of the Los Angeles Basin. The Cucamonga fault is the easternmost fault in this fault zone.

The San Andreas fault zone is located about 1 to 2 miles northeast of the site and trends roughly parallel to the northeastern site boundary. Individual fault splays within the San Andreas fault zone are mapped to within 1/2 mile of the northernmost portion of the site.

Locations of above-mentioned fault zones are shown on Figure 5.

2.2 Surface Conditions

The study site is in an area of low topographic relief in and adjacent to the flood plain of Cajon Creek. Cajon Creek is an alluvial channel, which is dry except during periods of significant rainfall or heavy spring runoff. The active channel areas typically have sparse vegetation and are characterized by sand and gravel exposed at the ground surface. The channel margin areas are slightly higher topographically and are underlain by similar deposits of recent sand and gravel with a very thin, weakly developed mantle of soil that supports a modest growth of chaparral.

The site area is undeveloped in terms of habitable structures but a number of transportation corridors, utility easements, and flood control structures are present on and adjacent to the site. Three adjacent rail lines, the Southern Pacific, the Santa Fe and Union Pacific, are present in the northern portion of the site (Figure 1). The Southern Pacific railroad passes through the central portion of the site in a generally north to south direction, while the Santa Fe and Union Pacific lines split off from the mutual rail corridor and pass along the eastern boundary of the site area.

In the vicinity of the project site the railway is built on a raised fill berm. An underpass structure allows Institution Road to pass below the Southern Pacific rail line. Four roads are present that cross or bound some portion of the site. Devore Road bounds the northern end of the site area, Kendall Road and Cajon Boulevard bound portions of the eastern site margin and Institution Road traverses the south central site area in a northeast direction. Numerous dirt roads and trails are present on site. Generally unrestricted access to the site area along these dirt roads and trails has resulted in the abandonment of vehicles and the placement of numerous piles of debris, household trash and other fill materials.

Utilities in the site vicinity include: water aqueducts, overhead power transmission lines, petroleum and gas pipelines, telephone lines and municipal water and sewer lines.

2.3 Subsurface Conditions

The following discussion on subsurface conditions is based on limited information from published reports and available documents and on our understanding of the geologic setting of the site.

Channel alluvium and alluvial fan deposits dominate the near-surface geology of the Cajon Creek area. The geologic setting of the area is such that the alluvial deposits of the active Cajon Creek coalesce or interfinger with the alluvial fan deposits emanating from the adjacent bedrock highlands at the mouths of various canyons including Hopper, Ames, Cable and Meyers Canyons.

High energy alluvial processes have deposited materials that are generally very coarse-grained with boulder-sized clasts common. Finer grained, predominantly sandy deposits may also occur at depth as a result of distal alluvial fan deposition from the adjacent mountain fronts. In the site vicinity, the coarser, high energy alluvial deposits are likely predominant in the subsurface. Figure 2 shows the site geology based on existing mapping, aerial photo review, and our limited visual geologic reconnaissance.

Based largely on previous geophysical studies, the thickness of alluvial deposits in the San Bernardino area has been contoured and the depth to bedrock in the site area is estimated to vary from 100 to 200 feet in the northern part of the site, to an estimated 400 to 600 feet in the southern part of the site (Fife and others, 1976).

Exploratory borings advanced by CalMat in the proposed areas of extraction revealed dry conditions and predominantly gravel and sand deposits to depths of greater than 75 to 100 feet below ground surface (Boring 89-1, 89-2, and 79-7 on Figure 2). In the central area of the site, six monitoring wells were placed around the perimeter of a closed Cajon landfill, operated by the County of San Bernardino. These wells were advanced to depths ranging from 280 to 353 feet and encountered alluvial deposits to depths ranging from roughly 265 to greater than 353 feet. Materials encountered included primarily coarse-grained sand and gravel deposits with lesser amount of predominantly sandy material. Few silty intervals and no significant clay layers were recorded on the subsurface logs from these previous investigations.

2.4 Groundwater

2.4.1 Hydrogeologic Setting

The study area lies within the Bunker Hill groundwater basin, an area of about 92 square miles that is bounded by smaller groundwater basins including the Lytle Creek and Rialto-Colton Basins (Dutcher and Garrett, 1963). Natural barriers, including faults and bedrock highs influence the movement of groundwater between the various groundwater basins. Minor barriers to groundwater movement, of varying effectiveness, also exist within the groundwater basins, creating water level variations and localized anamolies. Some of the more prominent minor barriers are the basis for dividing the basins into subbasins, while other barriers are present that further separate the subbasins into compartments. In general, the hydrologic setting of the area is complex given the restricted basin, local stratigraphic variations, faulting, numerous groundwater barriers, and the seasonal variations in the inflow of water into the system.

The complexity of the hydrogeologic setting results in temporal and spatial variations in the depth to water. The variations are sometimes dramatic, as shown by the changes in water depth in a municipal well located in the north central part of the site. This well (Cajon Well No. 1; IN/5W-3H01), has historic water level data covering periods from 1927 to 1957 and from 1973 to the present. This data is considered generally representative of the relative range and duration of water table fluctuations in the site region. Figure 3 shows the depth to water recorded over a period of almost 50 years and Figure 4 shows the depth to water for the same well recorded over the last 17 years.

Water level fluctuations of greater than a hundred feet are noted at Cajon Well No. 1 during wet years. The current drought is also clearly shown as the depth to water has dropped to greater than 200 feet below the ground surface. Historic minimum depths to water are relatively shallow as shown by Figures 3 and 4 and reflect extended periods of high rainfall. Depth to groundwater for the general site vicinity is normally greater than 120 feet and greater than 300 feet during dry periods. Increased water usage in the San Bernardino area is likely, and may lower groundwater levels in the future. Artificial recharge programs help maintain water levels in some areas of San Bernardino but to our knowledge such recharge efforts are not being conducted in or upgradient of the site vicinity.

2.4.2 Groundwater Levels On-Site

The most representative groundwater data for estimation of the depth to water in the proposed extraction area (E, L, and M) are available from the monitoring wells located in the vicinity of the County of San Bernardino landfill site. The landfill site is in the central part of our study area and is shown on Figures 1 and 2. Six wells were placed in 1988 after the closure of the landfill and are monitored and sampled periodically by the County of San Bernardino. Groundwater levels for two of the wells have been included on the short term hydrograph, Figure 4.

Depth to water in the landfill area measured in March of 1990 varied from 238 feet to greater than 348 feet below the ground surface for well CJ-6 to CJ-1A (some wells have gone dry). An anomaly is present in the landfill area in that adjacent monitoring wells show a marked difference in depths to groundwater and in the depth to bedrock. On the basis of those observations, a suspected fault which acts as a groundwater barrier in the deeper portions of the alluvium has been postulated (I.T., 1989). This postulated fault is shown on Figure 2.

The limited groundwater data from the County landfill area in the vicinity of the planned mining areas suggest excavations to depths of about 120 to possibly 170 feet will likely be above the regional water table. It is important to note that the landfill groundwater data is fairly limited and that the local groundwater setting is considered complex.

3.0 SEISMICITY

3.1 Tectonic Setting

The site is located in a complex structural zone near the convergence of the San Jacinto and San Andreas Faults. The San Andreas Fault Zone is the dominant structural element in California. However, roughly one-third of the overall slip found on the San Andreas Fault zone in northern and central California is transferred to the San Jacinto Fault in southern California. Slip is transferred across this zone of convergence from the San Andreas Fault to the San Jacinto Fault along a series of en echelon, or stepping, faults.

The Glen Helen Fault is one of the northernmost faults in this en echelon zone within the San Jacinto Fault system. Movement along the Glen Helen Fault, like the San Andreas and the San Jacinto Faults, is characterized as right-slip.

The location of the Glen Helen Fault is well-constrained northwest of the site where the fault's geomorphic expression is clearly visible in bedrock and older alluvial terrain. In the young alluvial deposits of Cajon Creek however, the fault is not well located and our preliminary interpretations of the approximate, buried locations (Figure 1 and 2) are based on the projections of the faults exposed in the bedrock to the northwest of the site and on subtle geomorphology and vegetative lineaments visible on aerial photographs.

Other suspected faults have been mapped by previous workers in the general site vicinity and have been categorized as "questionable faults" on the City of San Bernardino's General Plan. Three of these features have been mapped to the east of the site and are shown of Figure 2. One of these questionable faults has been mapped on-site in the vicinity of the proposed processing plant. Also shown of Figure 2 is the suspected fault postulated as buried beneath the alluvial deposits on the County of San Bernardino's Cajon Boulevard Landfill (I.T. 1989).

3.2 Historical Seismicity

The San Bernardino Valley is a very active seismic area because of the proximity of the San Andreas and San Jacinto Fault Zones. Other nearby active faults include the Sierra Madre-Cucamonga Fault Zone and the Elsinore-Whittier Fault Zone. Figure 5 shows historic earthquake epicenter locations and magnitudes and their relationship to the major faults in southern California.

Based on the historical seismicity, the San Jacinto Fault Zone can be considered the most active fault zone in southern California (Allen and others, 1965). Eight moderate to large earthquakes have occurred historically on the San Jacinto Fault Zone between Cajon Pass and the Mexican border.

The southern segment of the San Andreas Fault has been less active than the San Jacinto historically, but the San Andreas is capable of generating larger, more damaging earthquakes than the San Jacinto Fault. Detailed studies of the earthquake geology of the southern San Andreas Fault have revealed that a number of seismic events have occurred in the last several thousand years (Weldon and Sieh, 1985). Recurrence of these earthquakes may be on the order of 150 to 200 years. Based on paleoseismic studies, the last large magnitude event on the southern segment of the San Andreas was probably in 1812 (Jacoby and others, 1987).

4.0 DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

The discussions, conclusions, and recommendations presented in this report are based on the information provided to us, results of our field studies, analyses, and professional judgment.

4.1 Potential Geologic Hazards

4.1.1 Faulting and Ground Rupture

The site is located in a seismically active area near the juncture of two major strike-slip faults zones, the San Andreas and the San Jacinto Fault Zones. Potentially active faults related to the San Jacinto Fault Zone have been mapped on the subject site. The potentially active faults mapped on site are traces of the Glen Helen Fault that have been included in an Alquist-Priolo Special Study Zone (APSSZ), as defined by the State of California and delineated by the State Geologist. Figure 1 shows the Alquist-Priolo Special Studies Zone and the three alternate interpretations of traces of the Glen Helen Fault that have been mapped as buried beneath the young alluvium of Cajon Creek. Ground rupture along these potentially active fault traces is a potential hazard if a moderate to large earthquake were to occur on the Glen Helen Fault. Current site development plans do not include the construction of any habitable structures within the APSSZ and thus, based on the available information, the potential for damage resulting from ground rupture on the mapped traces of the Glen Helen Fault on the subject site is considered low. It should be noted that other unmapped faults may be present given the complex tectonic setting of San Bernardino Valley.

4.1.2 Ground Shaking

The site lies in an area where nearby major active faults including the San Andreas, San Jacinto and Cucamonga-Sierra Madre Fault Zones are capable of generating moderate to large earthquakes. Strong ground motions are likely to occur at the subject site and the surrounding area in the event of a moderate to large earthquake on one of the nearby faults. For planning purposes, the City of San Bernardino in their General Plan (1989) has adopted maximum credible earthquake (MCE) magnitudes and resultant peak ground accelerations derived from regional studies (Fife and others, 1976). This information is tabulated below, along with our estimates of the maximum probable earthquake (MPE) magnitudes which are considered more likely seismic events based on our current understanding of these faults. These estimated accelerations are intended to provide a general assessment of the site seismic hazard, and are not intended to be used as design values.

MAXIMUM CREDIBLE AND PROBABLE EARTHQUAKE

Fault	Approximate Distance from Site	MCE(1)	Peak Ground(1) Accelerations	MPE(2)	Peak(3) Ground Acceleration
San Andreas	1.6 km	8.5	.80g	7.5	.68 (g)
San Jacinto	0.3 km	7.5	.70g	7.0	.54 (g)
Cucamonga	5.5 km	6.5	.58g	6.0	.26 (g)

Notes: (1) Based on Fife and others (1976). Units are expressed relative to gravity (g).

(2) Modified from U.S. Geological Survey Open-File Report 88-398, (1988).

(3) Based on Joyner and Boore (1988). Units are expressed relative to gravity (g).

It should be noted that the Maximum Credible Earthquake and the resultant accelerations are considered rare events when compared to the probability of occurrence of the Maximum Probable Earthquake. Maximum Credible Earthquake estimates are generally used when critical facilities (like hospitals and schools) are being evaluated. The Maximum Probable Earthquake is generally considered a more likely seismic event. The San Andreas Fault presents what we consider to be the most significant seismic shaking hazard to the subject site because of the larger seismic events expected and its proximity to the site. Statistical analyses suggest that the southern San Andreas has a relatively high probability for a major earthquake in the near future (Sykes and Nishenko, 1984; Wesnousky, 1986).

4.1.3 Liquefaction

The project site lies in an area of high liquefaction susceptibility as delineated by the City of San Bernardino General Plan (1989). The General Plan based its zonation on regional studies conducted by the U.S. Geological Survey (Matti and Carson, 1986). The key issue in these studies is that the minimum depth to water is on the order of 30 to 50 feet for most of the site and as shallow as 10 feet in the northern end of the site. These studies were regional in scope, and apparently did not review subsurface data in the area of CalMat Cajon Creek project. Liquefaction is less likely to occur in areas where the depth to regional water table exceeds 50 feet or so. For the general subsurface conditions in the Cajon Creek study area, the liquefaction susceptibility is, in our opinion, low because of the very coarse-grained deposits that predominate in the upper 50 feet and given that groundwater levels are typically deeper than 50 feet below ground surface.

4.1.4 Subsidence

Subsidence has been identified as a potential geologic hazard in the central portions of San Bernardino Valley but is not considered a significant geologic hazard in the northern portions of the valley where the Cajon Creek Project is located. Historical subsidence has not been reported for the general project area.

4.1.5 Flooding

Flooding in the site vicinity is considered likely only in the area of the active drainage of Cajon Creek. No development is planned within the 100-year flood plain area, (shown on Figure 2) and thus flooding associated with the 100-year event is not considered a significant impact to the development.

4.1.6 Groundwater

Groundwater conditions are not likely to impact the industrial development portions of the proposed project even during periods of shallow groundwater occurrence. The mining operations, however, will be effected if shallow groundwater occurs. Based on information from Cajon Well No. 1 (1N/5W-3H01) shallow groundwater conditions have occurred in the north central portions of the site. In the past, these periods of shallow groundwater occurrence have varied from a few months to three years in duration.

During shallow groundwater periods, mining operations could be limited to the upper areas of the pit and thus continue to mine dry sand and gravel resources without being significantly impacted. Groundwater conditions should not be significantly impacted by temporary ponding in a small portion of the mine area if the extraction operations remain in the unsaturated areas.

Anticipated mining depths are 75 feet for area "F" and 120 feet for areas "L" and "M." Actual depth to water in areas "F", "L" and "M" are likely to be significantly deeper than the depths indicated in the Cajon Well (IN/5W-3H1). The depth to water in the prior landfill area is roughly 60 to 170 feet deeper than the levels shown in the Cajon Well for similar periods. Given their proximity to the proposed extraction areas, water levels from the landfill area wells are likely to be more representative of the conditions in the proposed mining areas than the Cajon Well. The data from the landfill wells suggest that it is unlikely that the depth to groundwater will be less than 120 feet, except for short-term responses to heavy rainfall of flood events.

4.2 Geotechnical Considerations

4.2.1 Slope Stability

The extraction areas "F", "L", and "M" all have granular soils consisting of various proportions of sand, gravel and cobbles. A typical sample is expected to have 25 to 35 percent gravel, 2 to 5 percent fines and the remainder sand-sized material. No clay layers were encountered in any of the borings made. For analysis of slope stability an angle of internal friction of 40 degrees was used. A water table level at the base of the pit was assumed.

The static stability of slopes made at an inclination of 2 horizontal to 1 vertical is greater than 1.5 when analyzed using the computer program "PC Slope" and assuming a potential circular failure surface. To analyze the stability of slopes during ground motions associated with a maximum credible event on the San Andreas fault we used a deformation analysis and a horizontal ground acceleration of 0.8 g. The method used is similar to that presented in the paper, "A Simplified Procedure For Estimating Earthquake-Induced Deformation in Dams and Embankments" by Makdisi and Seed. The results of these analyses (considering a 120 foot high slope and 0.8 g. horizontal ground acceleration) indicate that:

- The overall stability of the 2 horizontal:1 vertical slope is likely to be adequate. Instability involving massive, deep seated failure of the slope appears unlikely.

- Shallow ravelling of the slope may however, occur. Slumping of the crest of the slope can also occur. Ravelling and slumping of materials may represent a hazard to structures, equipment, or people working at the toe of the slope.

- The potential for deformations (in this case considered to be settlements) of up to 1/2 foot is moderate within 50 feet of the crest of the slope.

- Deformations at locations beyond 80 feet from the slope crest are likely to be smaller than 1 inch.

- If the groundwater table is above the foot of the excavation, deformations of over 1 foot may occur within 80 feet of the crest; deformations beyond 80 feet are likely to be small.

During times of flooding in the active channel of the stream there may be some lateral movement of infiltrating water that could surface on mine slopes. We would expect some slope ravelling and sloughing during the relatively short duration of such seepage but no major slope instability.

4.2.2 Foundation Design

The design of building foundations for the proposed Light Industrial development, which is proposed for some of the areas adjacent to the mines, will require consideration by the structural engineer of probable differential settlements of footing and floor slab due to settlement of the alluvial foundation soils during an earthquake. However, as our analyses indicate, the settlements should be manageable, provided structures are distanced from the tops of slopes as indicated above.

Designs to resist lateral loads should utilize normal increases of allowable soil bearing pressure for seismic loading. The granular soils are typically good foundation materials. Some near-surface recompaction of loose zones may be required prior to construction.

4.3 Mitigation of Possible Geologic and Geotechnical Impacts

4.3.1 Faulting and Ground Rupture

Active or potentially active faults are present in the site area, and portions of the site are within an Alquist-Priolo Special Studies Zone (APSSZ). Human-occupancy structures should not be placed within the APSSZ or near suspected fault traces without an investigation into the location and level of activity of the suspected fault. The Cajon Creek project does not propose to locate any human-occupancy structures within the APSSZ; and thus, detailed fault studies do not appear to be warranted.

The City of San Bernardino has identified "questionable faults", one of which is present in the southern portion of the site near the proposed plant facility. To mitigate any potential hazard represented by this suspected fault, a fault study is recommended if structures for human occupancy are planned for this area. Such a study should be designed to locate the fault if present on the site, assess its activity and establish setbacks if warranted.

4.3.2 Ground Shaking

Ground shaking resulting from a moderate to large earthquake in the San Bernardino area is likely to occur within the anticipated life of the project. To mitigate possible high levels of ground motion, human occupancy structures should be designed according to appropriate local building codes. Even so, earthquake damage is possible.

4.3.3 Liquefaction

In our opinion, the liquefaction potential is considered low for most of the site area. Site specific geotechnical studies should include subsurface investigations that would further evaluate liquefaction potential. If liquefaction-susceptible areas are identified, mitigation for proposed buildings would be site specific and might involve enhanced foundation design, remedial grading, or perhaps relocation of the structure.

4.3.4 Subsidence

Subsidence resulting from fluid withdrawal or hydrocompaction has not been reported in the project area and does not appear likely in our opinion. Dramatic changes in the groundwater level appear to be a common occurrence in the site area and apparently have not resulted in detectable area-wide subsidence. Based on existing information, subsidence is not considered a significant geologic hazard on the subject site, and no mitigation measures are suggested.

4.3.5 Flooding

The flood potential for the developed portions of the site is largely mitigated by existing flood control levees. Proposed plant sites and industrial development areas are located outside the 100-year flood plain. Flood susceptibility for the site should be evaluated for final design.

4.3.6 Groundwater

Although open mining pits are not likely to encounter groundwater during extended wet periods, in the unlikely event of such occurrence, the impact would be the loss of water due to evaporation. This is not expected to to have a significant effect on groundwater resources. No mitigation is warranted because the amount of water lost would be very small when compared to the abundance of water that the region will have during such a period of high groundwater levels.

4.3.7 Slope Stability

Slope instability is considered a potential hazard only for periods of strong ground motions accompanying large earthquakes. To mitigate the potential effects of seismic-induced slope instability we recommend:

- For commercial, residential, and industrial buildings, a minimum setback from the top of the slope of 80 feet.

- For preliminary planning purposes, and depending on the level of acceptable risk, a minimum setback of 50 feet may be used for roads, pipelines, railroads, transmission line towers, and flood control structures. The ability of these structures to withstand a few inches of displacement should be evaluated.

4.3.8 Foundation Design

To mitigate the effects of ground shaking, possible liquefaction, and loose surficial soils we recommend:

- Normal geotechnical and structural engineering practices, and providing continuous perimeter footings and floor slabs with reinforcing, should mitigate the effects of seismically-induced differential settlements.

- Recompaction of near-surface, loose or disturbed zones of soil should provide good foundation conditions for the proposed light structures in the Light Industrial development proposed. Site-specific geotechnical studies should be made for grading and construction on the sites.

5.0 UNCERTAINTY AND LIMITATIONS

The recommendations made herein are based on the assumption that soil condition do not deviate appreciably from those found during our preliminary literature review and limited geologic reconnaissance.

This report is intended for planning purposes only and is not sufficient to design the project. Site-specific, design-level studies are recommended for the various elements of the proposed project.

California, including San Bernardino is an area of high seismic risk. It is generally considered economically unfeasible to build a totally earthquake-resistant project; it is, therefore, possible that a large or nearby earthquake could cause damage at the site.

Geotechnical engineering and the geologic sciences are characterized by uncertainty. Professional judgements presented herein are based partly on our understanding of the proposed construction, and partly on our general experience. Our engineering work and judgements rendered meet current professional standards.

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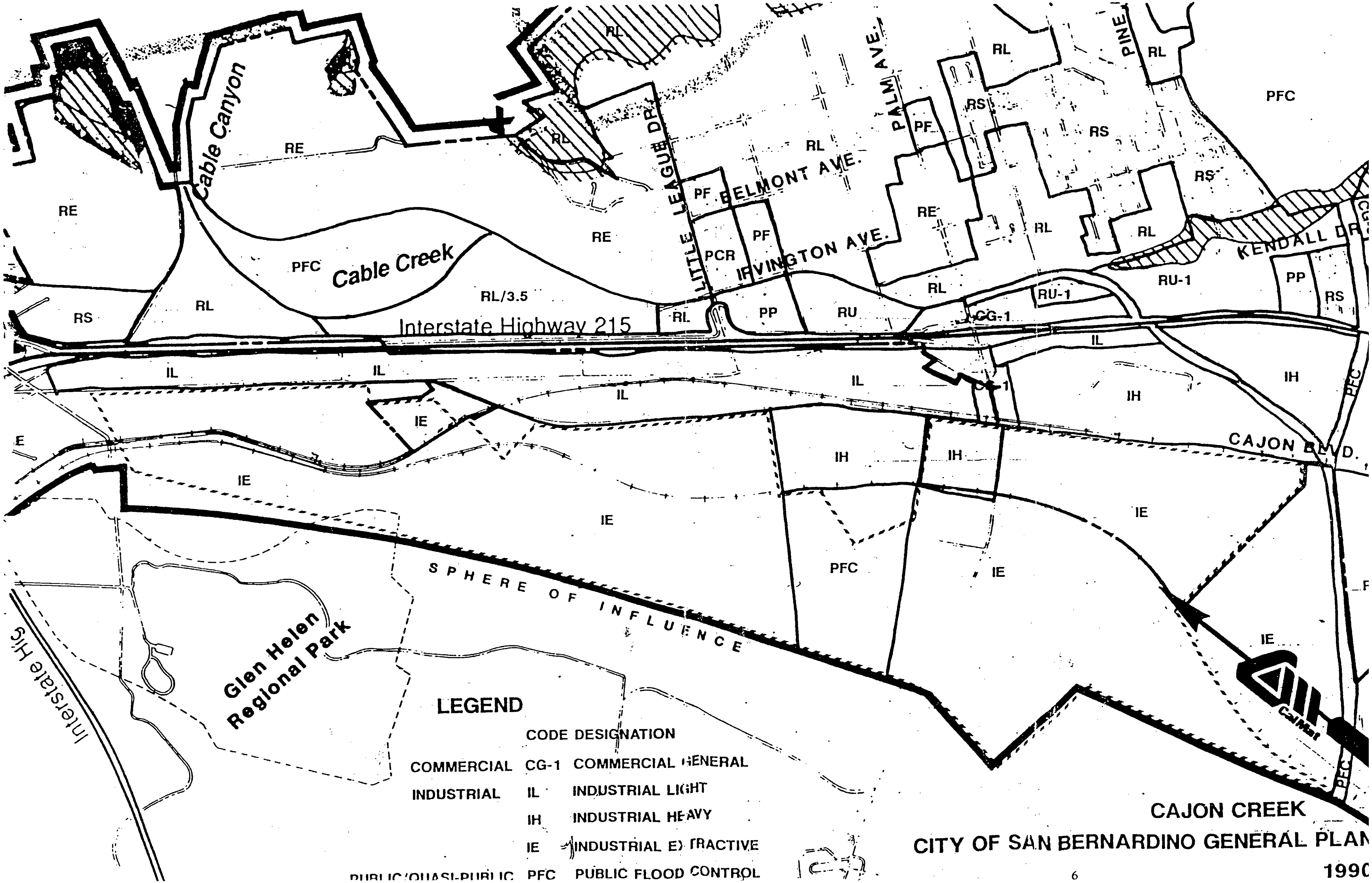
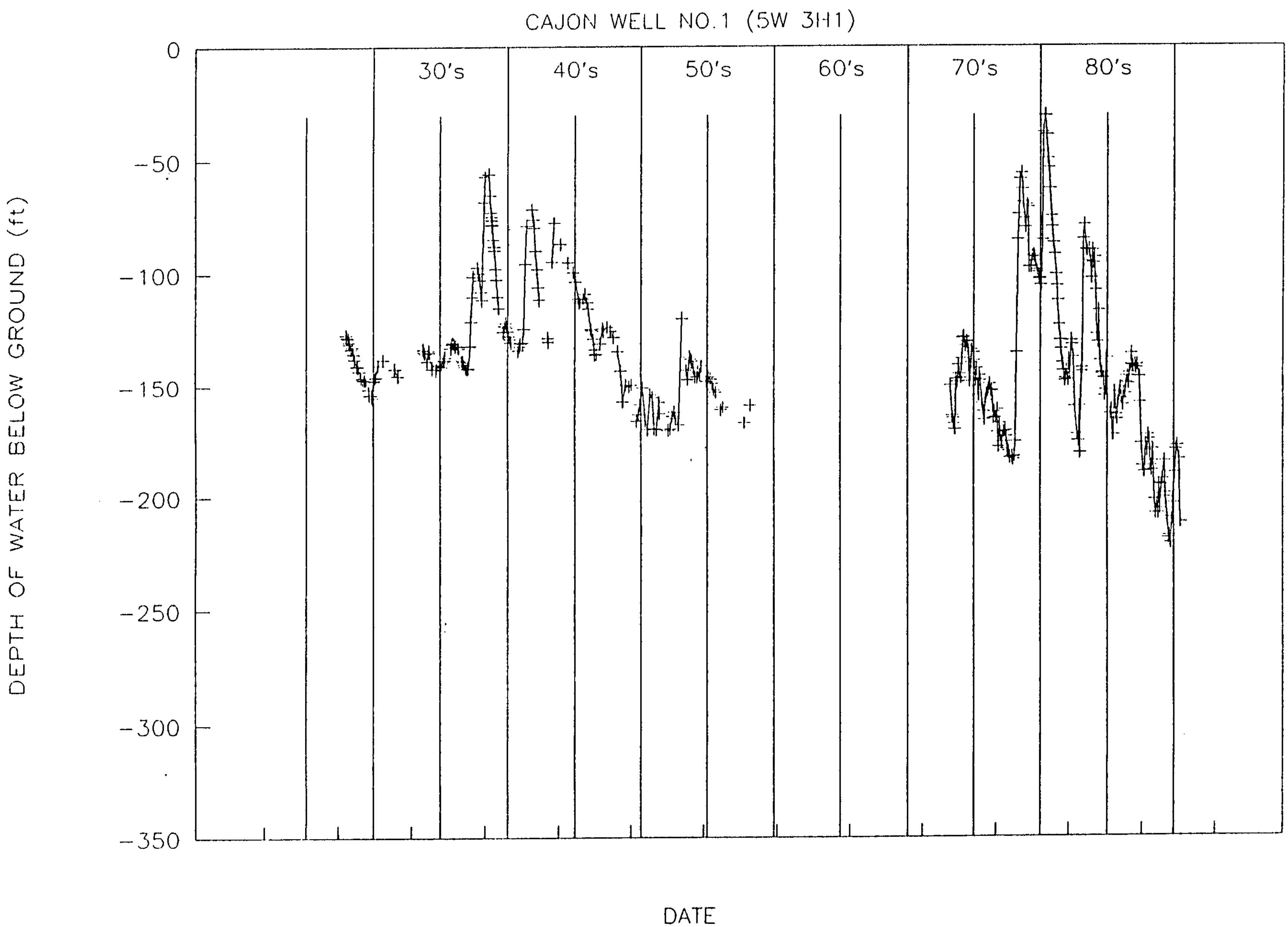


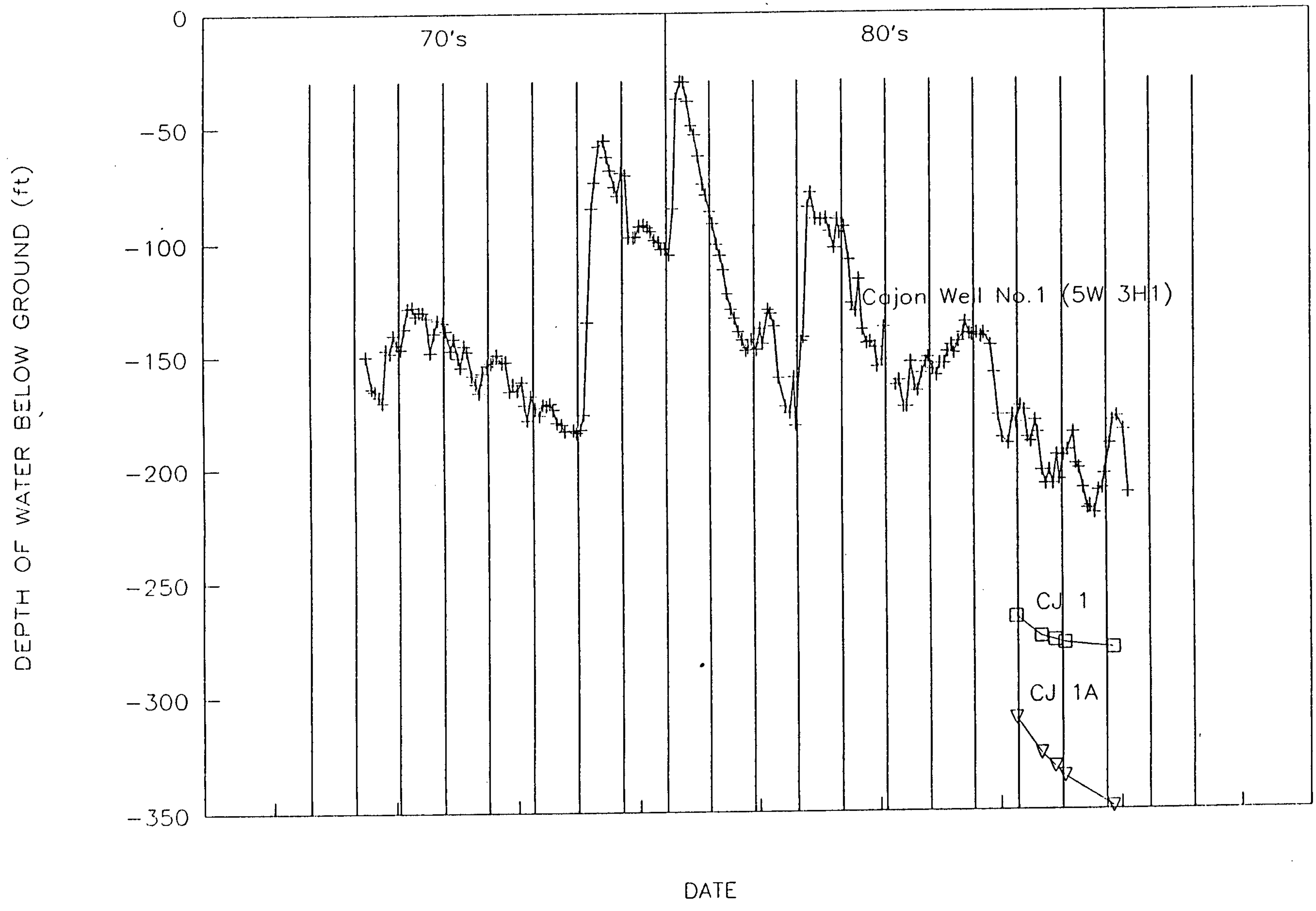
Cable Canyon
Cable Creek
Interstate Highway 215
LITTLE LEAGUE DR.
BELMONT AVE.
IRVINGTON AVE.
PALM AVE.
PINE
KENDALL DR.
CAJON BLVD.
SPHERE OF INFLUENCE
Glen Helen Regional Park
Interstate Hig
RE
RS
RL
PFC
RL/3.5
PF
PCR
PP
RU
RU-1
CG-1
IL
IH
IE
CalMat
LEGEND
CODE DESIGNATION
COMMERCIAL CG-1 COMMERCIAL GENERAL
INDUSTRIAL IL INDUSTRIAL LIGHT
IH INDUSTRIAL HEAVY
IE INDUSTRIAL EXTRACTIVE
PUBLIC/QUASI-PUBLIC PFC PUBLIC FLOOD CONTROL
CAJON CREEK
CITY OF SAN BERNARDINO GENERAL PLAN
1990



SEE FIGURE 2 FOR WELL LOCATION

LONG TERM HYDROGRAPH - CAJON WELL NO. 1
1927 - 1957; 1973 - 1990
CALMAT CAJON CREEK PROJECT

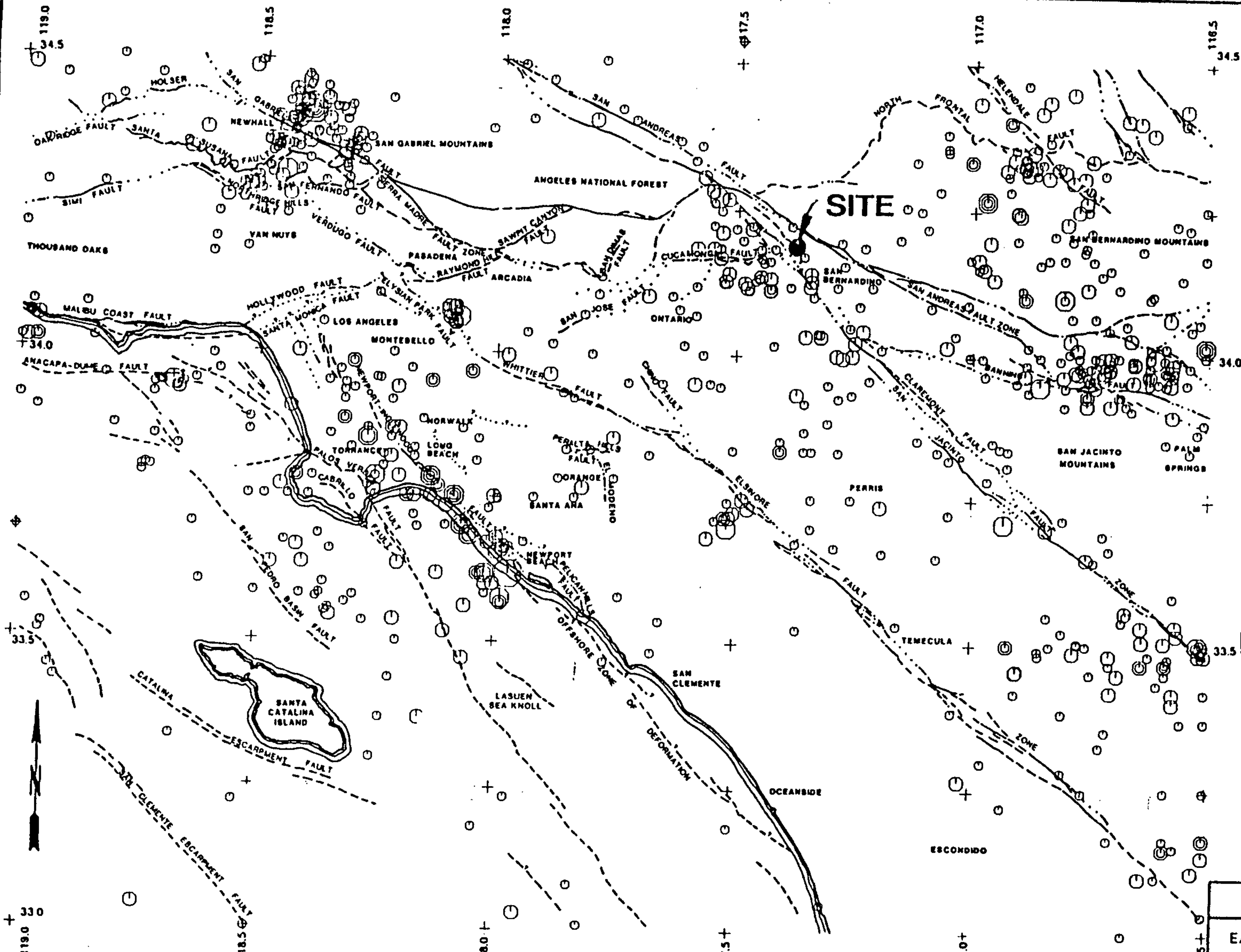
DRAWN BY: cb	CHECKED BY: mch	PROJECT NO: 9053139N-2000	DATE: 9-20-90	FIGURE NO: 3



SEE FIGURE 2 FOR WELL LOCATION

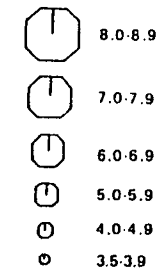
SHORT TERM HYDROGRAPH - CAJON WELL NO. 1
AND MONITORING WELLS CJ-1 AND CJ-1A
CALMAT CAJON CREEK PROJECT

DRAWN BY: cb	CHECKED BY: MCA	PROJECT NO: 9053139N-2000	DATE: 9-20-90	FIGURE NO: 4



LEGEND

REPORTED EARTHQUAKE MAGNITUDES



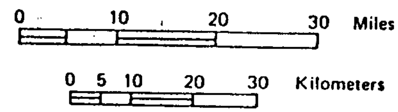
Symbols Sizes Represent Designated Range of Richter Magnitude Symbols.

Epicenter and magnitude data from the Caltech Earthquake Catalog for the period 1932 through 1987, only epicenters with magnitudes greater than 3.5 are shown.

Faults dashed where approximately located, dotted where concealed and queried where conjectural.

Fault locations modified from Geologic Map Series of California, 1977-1986, 1:250,000 Scale, CDMG.

Offshore faults modified from Geologic Map Series, California Continental Margin, 1986-1987, 1:250,000 Scale, USGS and CDMG.



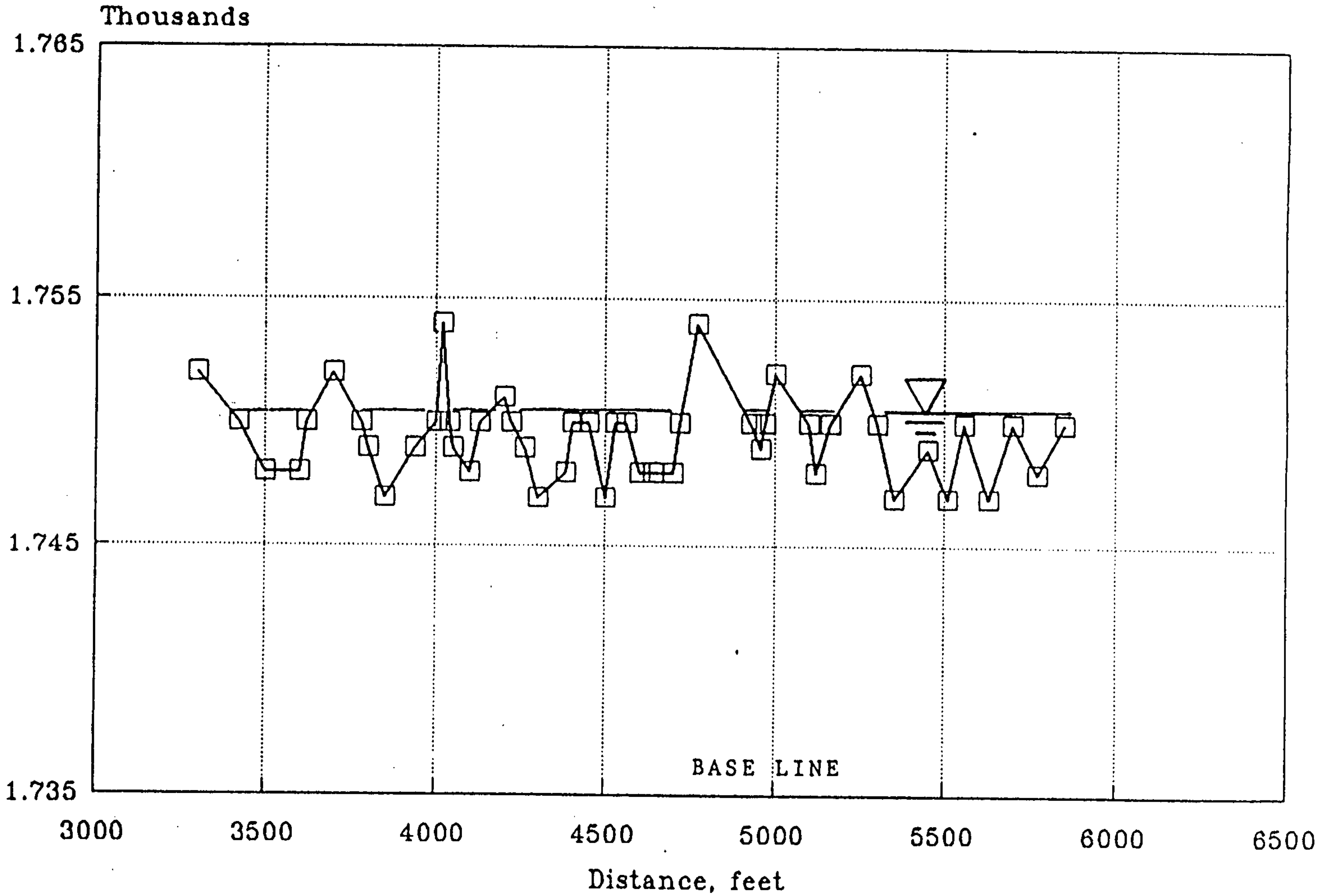
Woodward-Clyde Consultants

EARTHQUAKE EPICENTER AND FAULT MAP OF SOUTHERN CALIFORNIA

Project No.: CALMAT CAJON CREEK PROJECT	Date: 9-20-90
Project: 9053239N-2000	Figure: 5

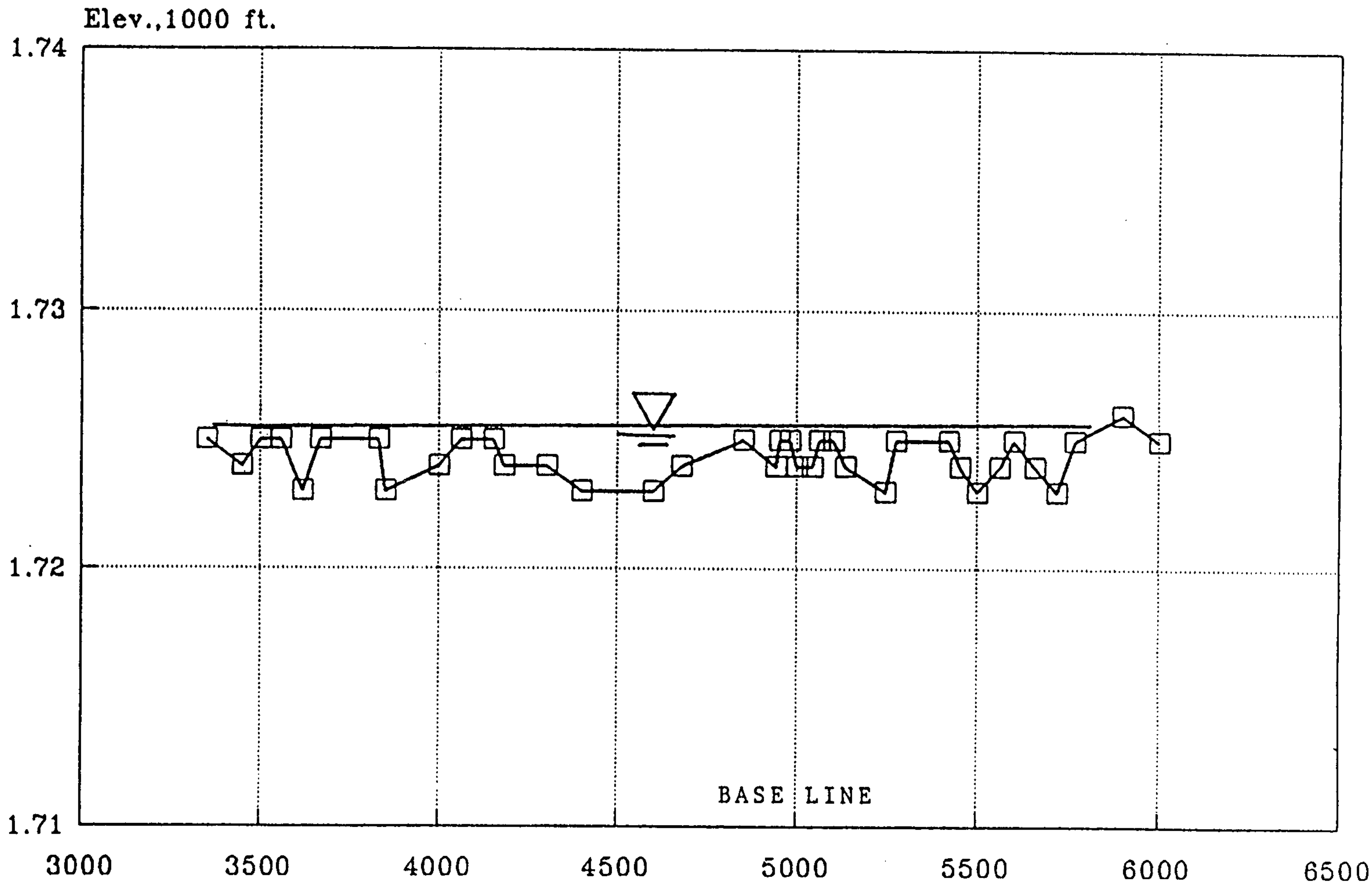
APPENDIX E

Cajon Creek
Cross-sectional Profile



Section 154+20, looking downstream

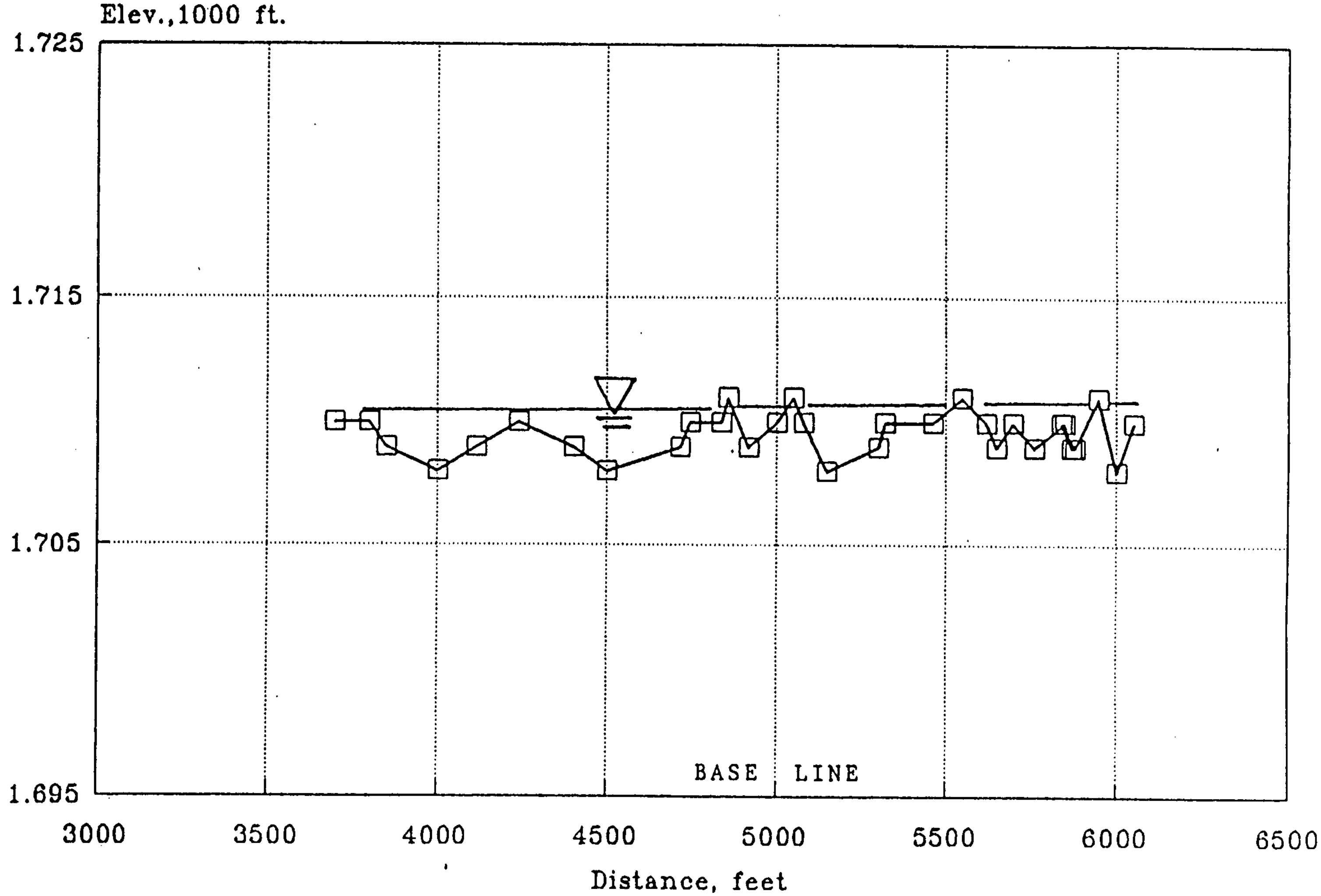
Cajon Creek
Cross-sectional Profile



Distance, feet

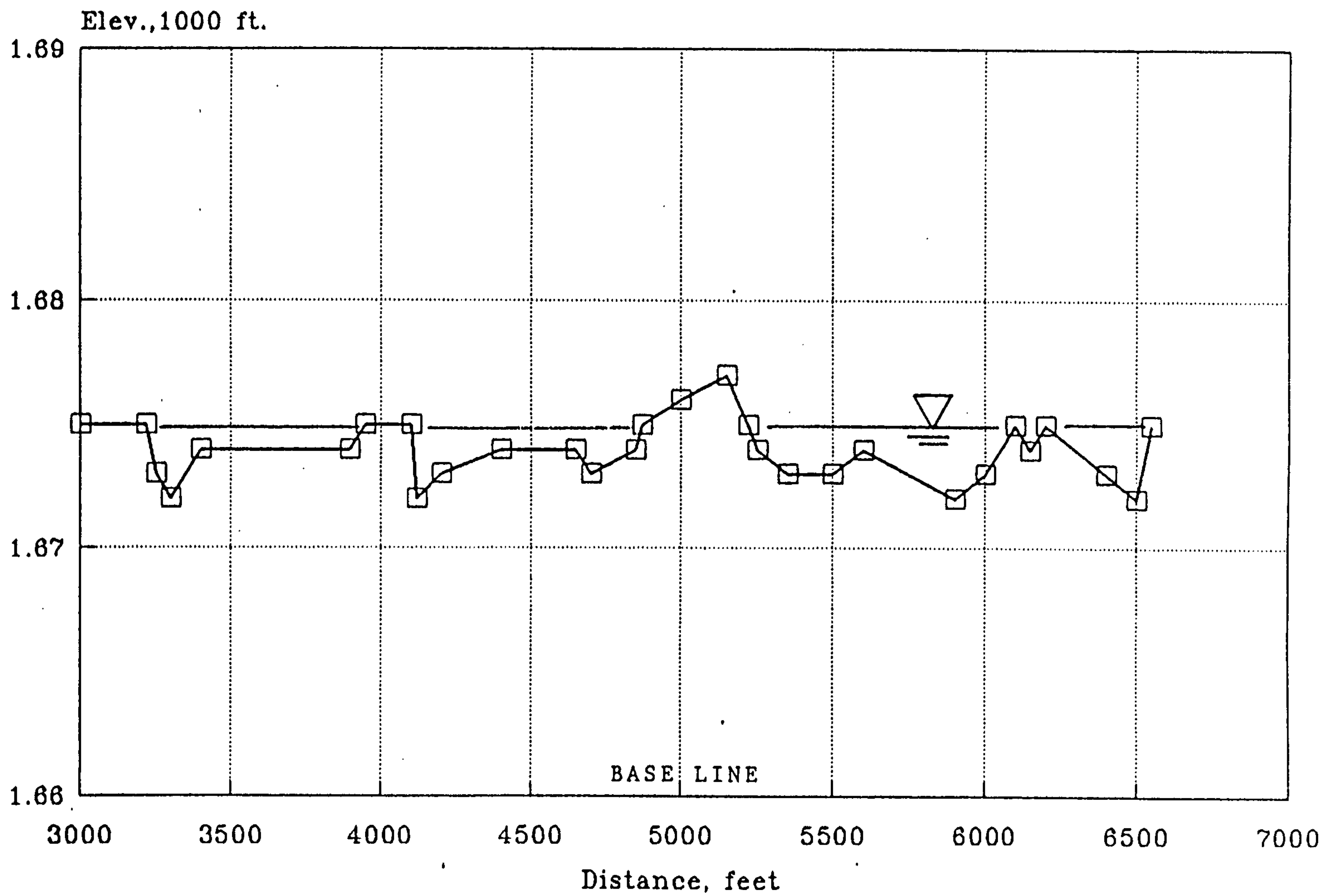
Section 143+20, looking downstream

Cajon Creek
Cross-sectional Profile

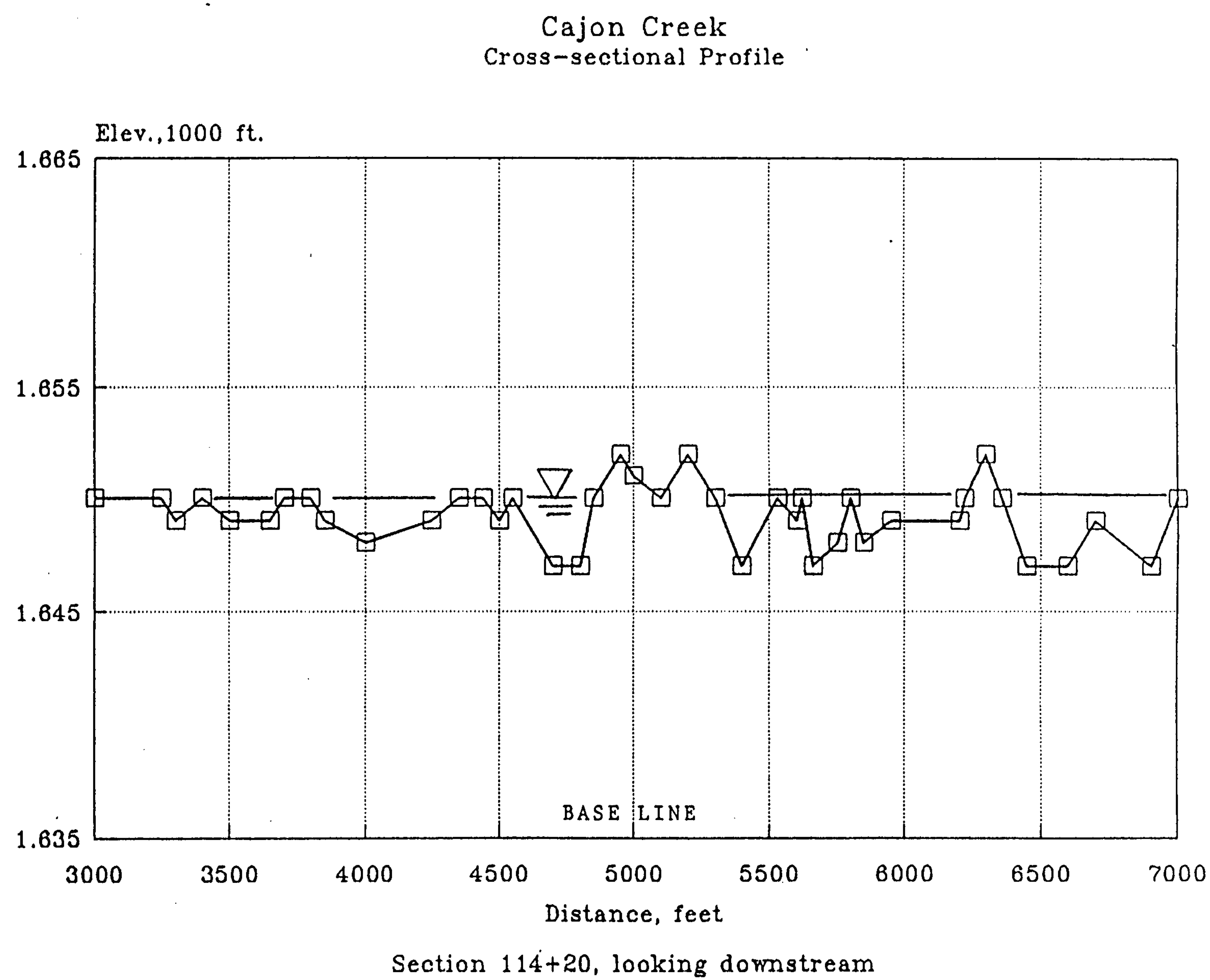


Section 137+50, looking downstream

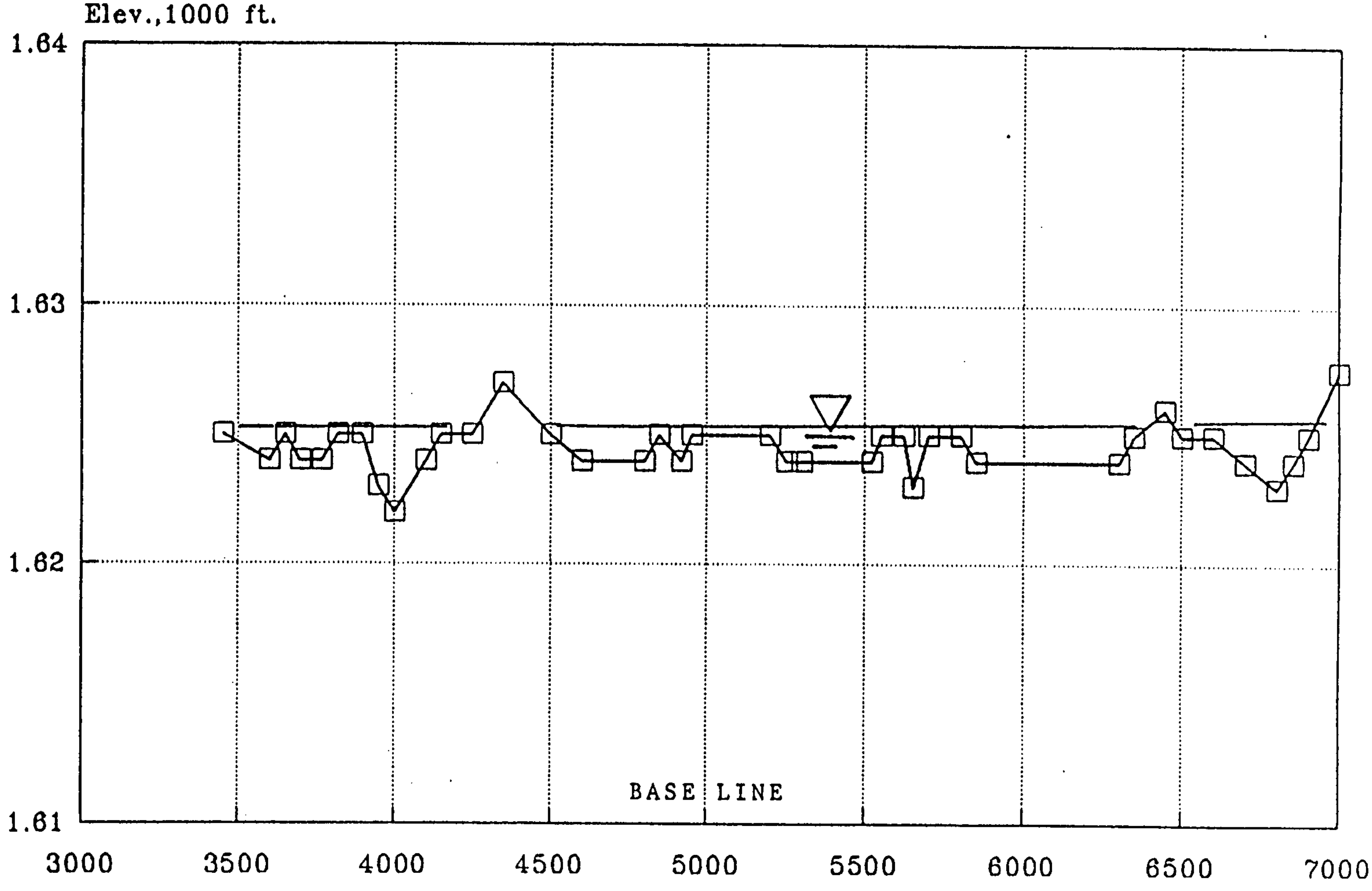
Cajon Creek
Cross-sectional Profile



Section 123+70, looking downstream

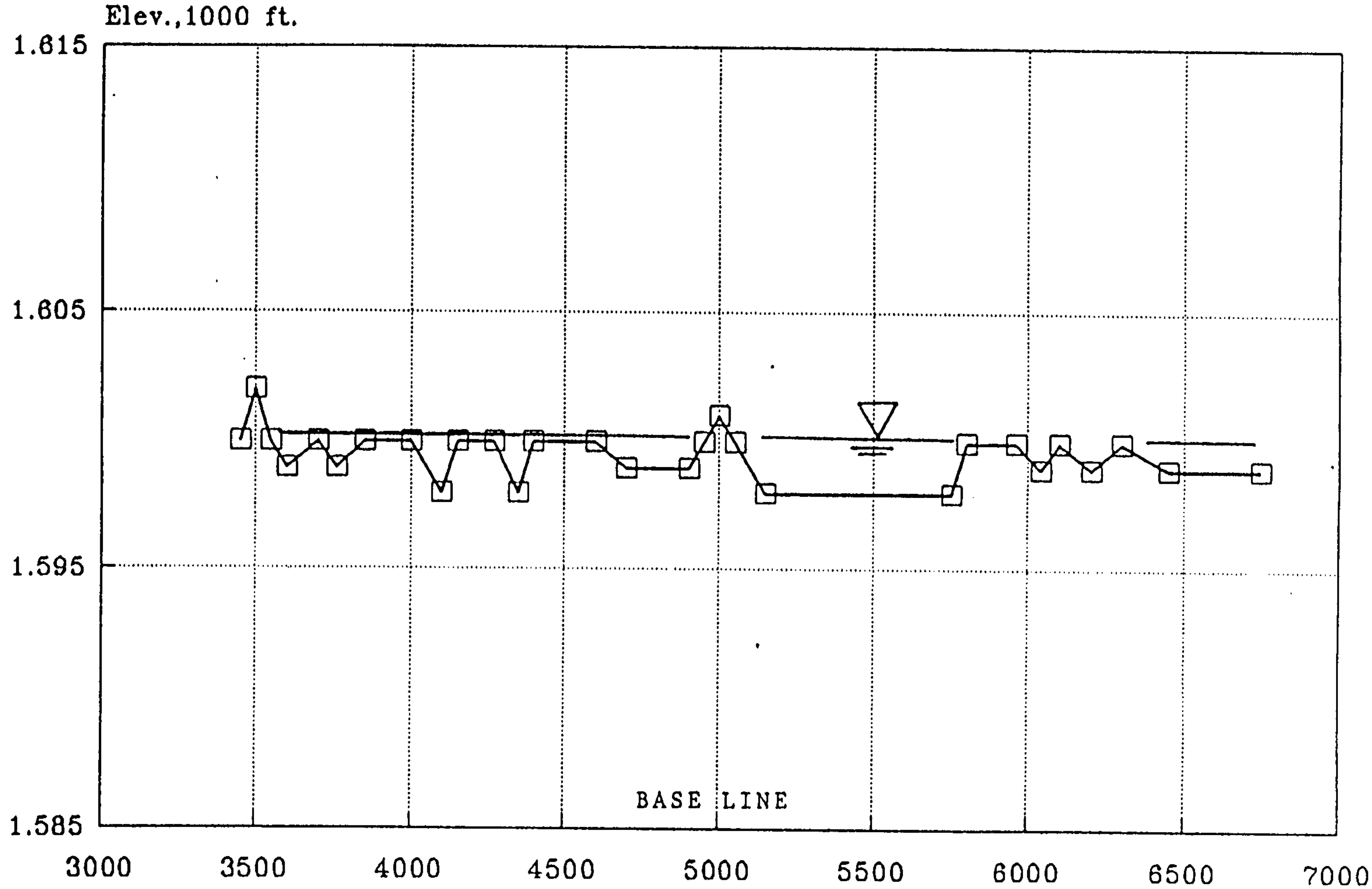

Cajon Creek
Cross-sectional Profile
Elev.,1000 ft.
1.665
1.655
1.645
1.635
BASE LINE
3000
3500
4000
4500
5000
5500
6000
6500
7000
Distance, feet
Section 114+20, looking downstream

Cajon Creek
Cross-sectional Profile



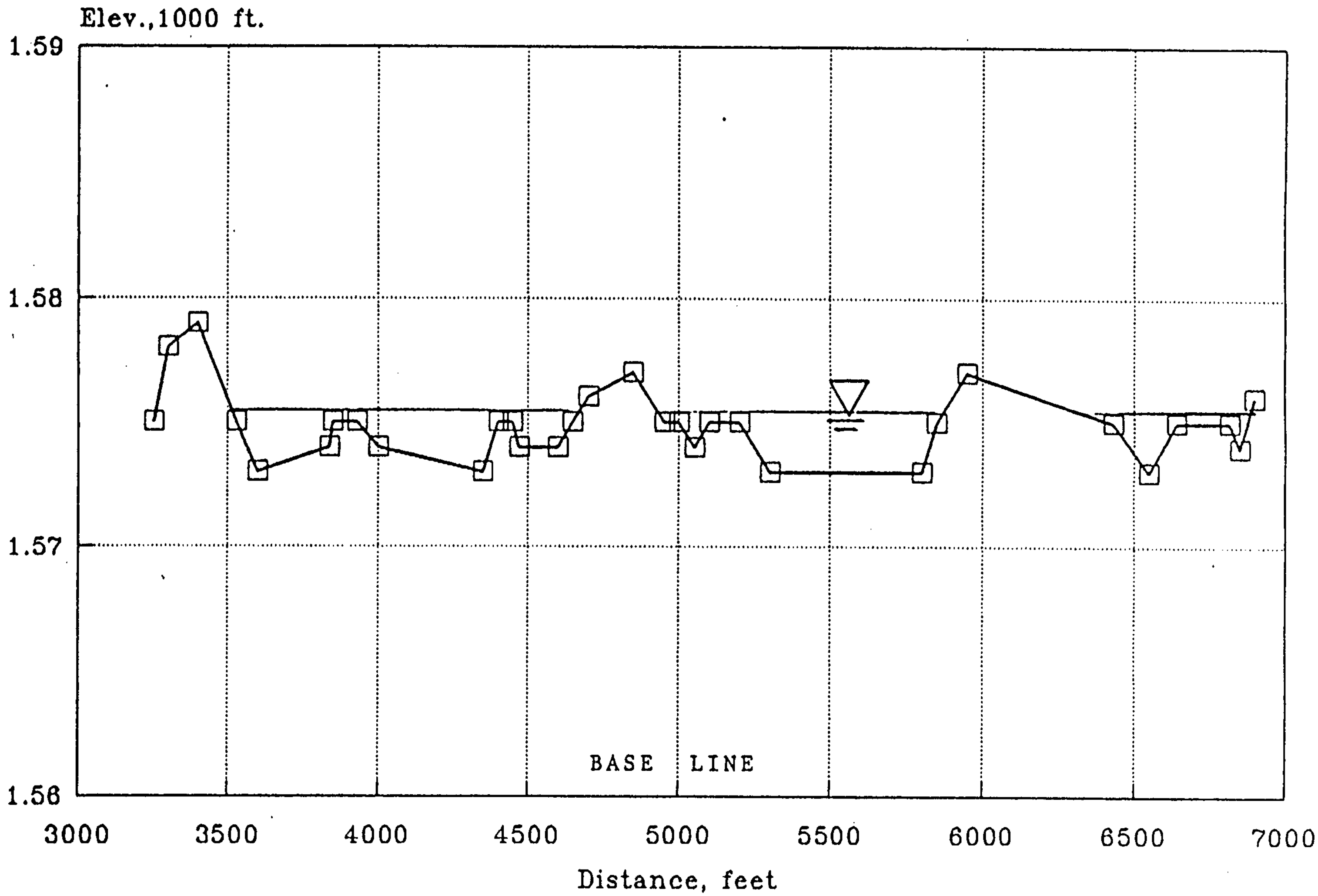
Section 102+90, looking downstream

Cajon Creek
Cross-sectional Profile



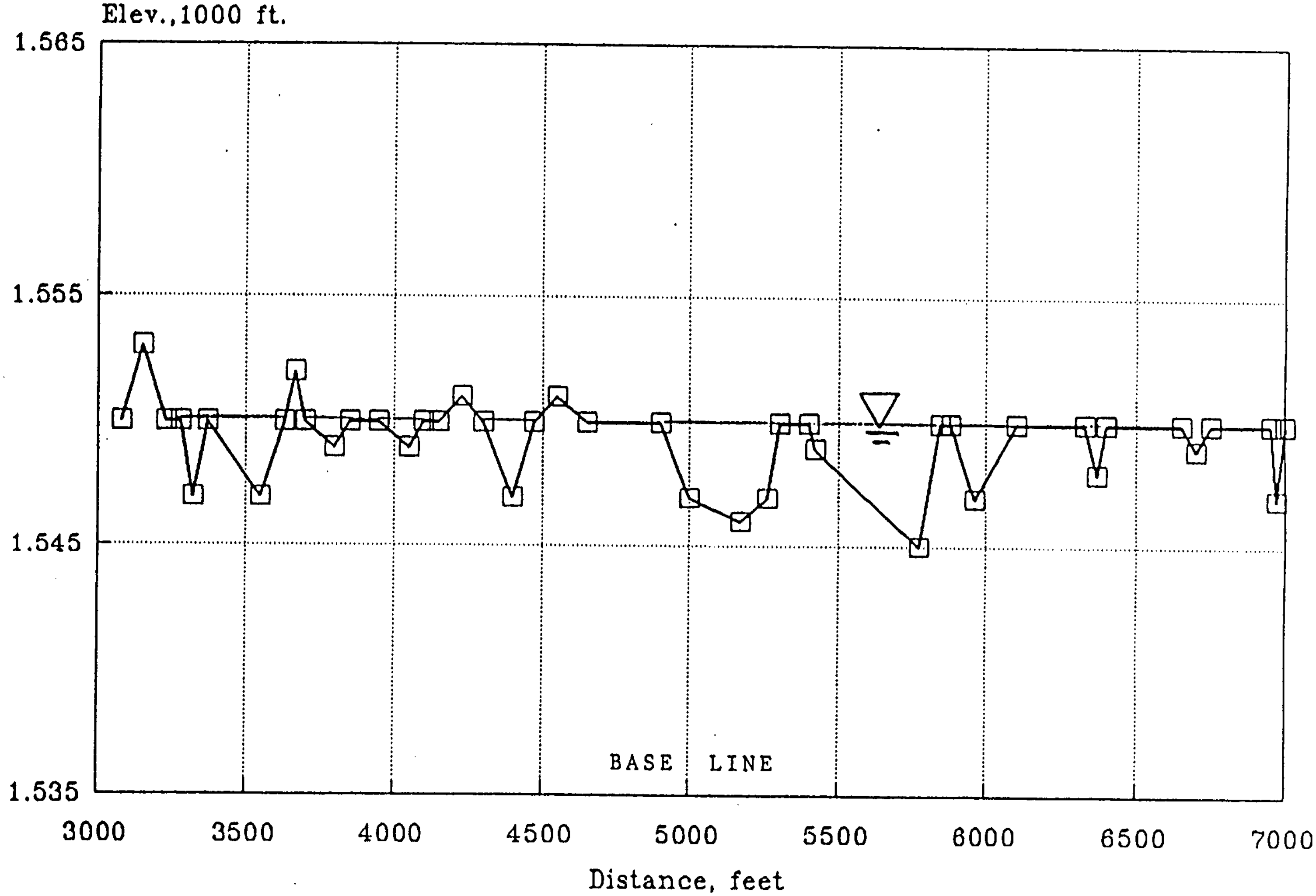
Section 91+30, looking downstream

Cajon Creek
Cross-sectional Profile



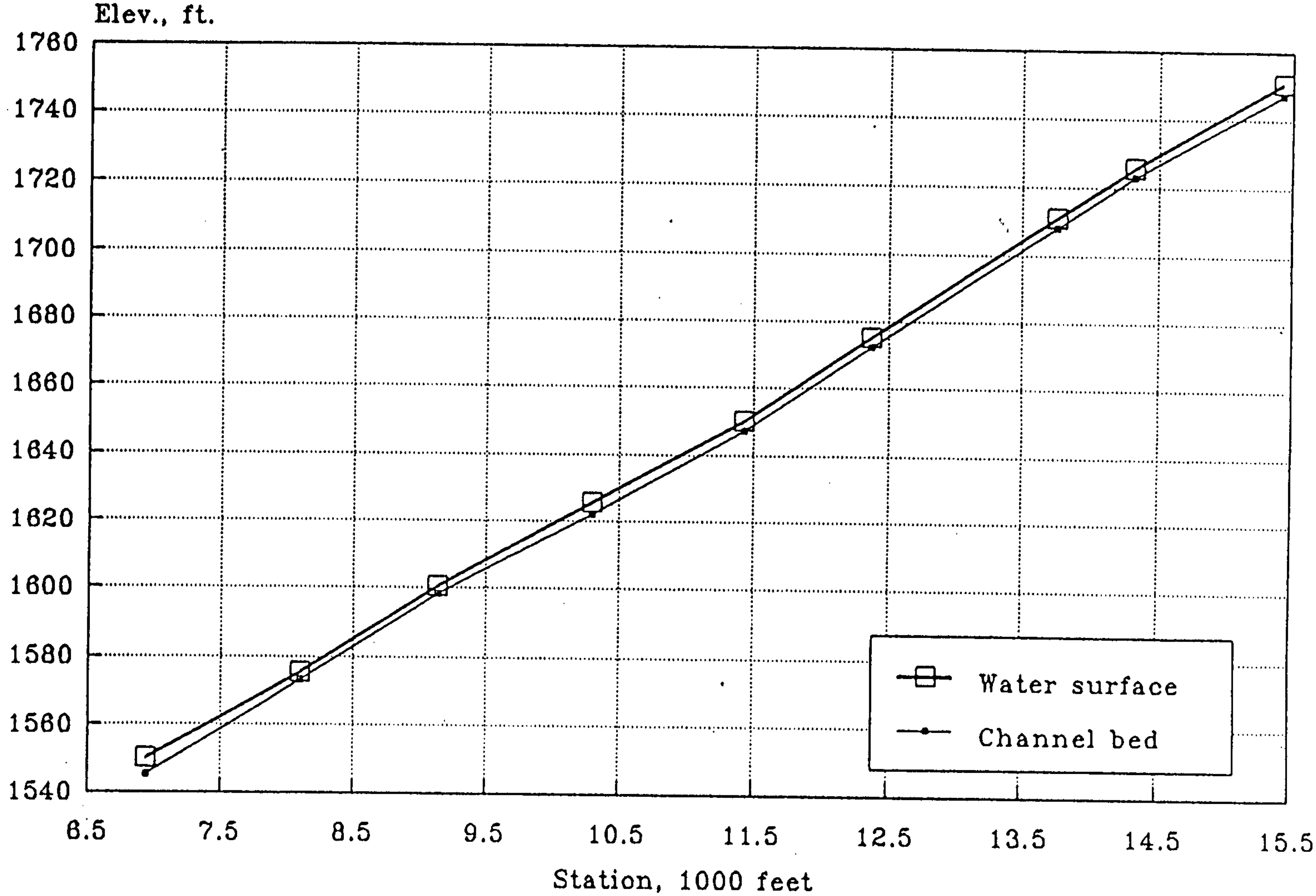
Section 81+00, looking downstream

Cajon Creek
Cross-sectional Profile



Section 69+40, looking downstream

Cajon Creek
Water-Surface and Channel-Bed Profiles



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*	12370.000	24700.00	1674.83	.00	24.96	.00	2762.31	950.00
*	13750.000	24700.00	1710.87	.00	36.04	.00	2303.96	1380.00
*	14320.000	24700.00	1725.63	.00	14.76	.00	2564.48	570.00
*	15420.000	24700.00	1750.53	.00	24.90	.00	1887.27	1100.00

SUMMARY OF ERRORS AND SPECIAL NOTES

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CAUTION SECNO=    6940.000  PROFILE=  1  CRITICAL DEPTH ASSUMED

CAUTION SECNO=    8100.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    8100.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=    9130.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=    9130.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=   10290.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   10290.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=   12370.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   12370.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=   13750.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   13750.000  PROFILE=  1  PROBABLE MINIMUM SPECIFIC ENERGY
CAUTION SECNO=   13750.000  PROFILE=  1  20 TRIALS ATTEMPTED TO BALANCE WSEL

CAUTION SECNO=   14320.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   14320.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

CAUTION SECNO=   15420.000  PROFILE=  1  CRITICAL DEPTH ASSUMED
CAUTION SECNO=   15420.000  PROFILE=  1  MINIMUM SPECIFIC ENERGY

Normal program termination
```

.31	.00	6.85	.00	.000	.040	.000	.000	1723.00	3350.00
.021609	570.	570.	570.	8	11	0	.00	2564.48	6000.00

*SECNO 15420.000

3265 DIVIDED FLOW

3280 CROSS SECTION 15420.00 EXTENDED .53 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

15420.000	3.53	1750.53	1750.53	.00	1751.41	.88	22.65	.05	1752.00
24700.0	.0	24700.0	.0	.0	3282.9	.0	721.5	539.2	1750.00
.35	.00	7.52	.00	.000	.040	.000	.000	1747.00	3388.10
.019637	1100.	1100.	1100.	4	11	0	.00	1887.27	5850.00

****
HEC2 RELEASE DATED SEP 88 UPDATED JUN 1990

ERROR CORR - 01,02,03,04
MODIFICATION -
****

NOTE- ASTERISK (*) AT LEFT OF CROSS-SECTION NUMBER INDICATES MESSAGE IN SUMMARY OF ERRORS LIST

EAS EAST OF SCE EASEMENT

SUMMARY PRINTOUT TABLE 150

	SECNO	XLCH	ELTRD	ELLC	ELMIN	Q	CWSEL	CRIWS	EG	10*KS	VCH	AREA	.01K
*	6940.000	.00	.00	.00	1545.00	24700.00	1550.08	1550.08	1550.72	219.20	6.46	3825.85	1668.29
*	8100.000	1160.00	.00	.00	1573.00	24700.00	1575.39	1575.39	1576.10	215.27	6.76	3652.59	1683.47
*	9130.000	1030.00	.00	.00	1598.00	24700.00	1600.41	1600.41	1601.04	220.99	6.35	3888.92	1661.53
*	10290.000	1160.00	.00	.00	1622.00	24700.00	1625.57	1625.57	1626.19	222.05	6.30	3920.95	1657.56
	11420.000	1130.00	.00	.00	1647.00	24700.00	1649.87	1649.80	1650.51	208.63	6.46	3842.39	1710.06
*	12370.000	950.00	.00	.00	1672.00	24700.00	1674.83	1674.83	1675.55	234.72	6.82	3622.58	1612.22
*	13750.000	1380.00	.00	.00	1708.00	24700.00	1710.87	1710.87	1711.63	203.82	7.02	3516.40	1730.13
*	14320.000	570.00	.00	.00	1723.00	24700.00	1725.63	1725.63	1726.36	216.09	6.85	3605.56	1680.29
*	15420.000	1100.00	.00	.00	1747.00	24700.00	1750.53	1750.53	1751.41	196.37	7.52	3282.89	1762.61

EAS EAST OF SCE EASEMENT

SUMMARY PRINTOUT TABLE 150

	SECNO	Q	CWSEL	DIFWSP	DIFWSX	DIFKWS	TOPWID	XLCH
*	6940.000	24700.00	1550.08	.00	.00	.08	3007.53	.00
*	8100.000	24700.00	1575.39	.00	25.32	.00	2647.50	1160.00
*	9130.000	24700.00	1600.41	.00	25.02	.00	3151.54	1030.00
*	10290.000	24700.00	1625.57	.00	25.16	.00	3229.19	1160.00

*SECNO 10290.000

3265 DIVIDED FLOW

3280 CROSS SECTION 10290.00 EXTENDED .57 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3720 CRITICAL DEPTH ASSUMED

10290.000	3.57	1625.57	1625.57	.00	1626.19	.62	25.70	.00	1625.00
24700.0	.0	24700.0	.0	.0	3921.0	.0	292.7	228.8	1630.00
.14	.00	6.30	.00	.000	.040	.000	.000	1622.00	3450.00
.022205	1160.	1160.	1160.	20	14	0	.00	3229.19	6922.75

*SECNO 11420.000

3265 DIVIDED FLOW

3280 CROSS SECTION 11420.00 EXTENDED 1.86 FEET

11420.000	2.87	1649.87	1649.80	.00	1650.51	.64	24.32	.01	1650.00
24700.0	439.0	24261.0	.0	86.9	3755.5	.0	393.4	308.8	1650.00
.19	5.05	6.46	.00	.040	.040	.000	.000	1647.00	2900.00
.020863	1130.	1130.	1130.	9	12	0	.00	2935.61	6995.48

*SECNO 12370.000

3265 DIVIDED FLOW

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

12370.000	2.83	1674.83	1674.83	.00	1675.55	.72	21.00	.02	1675.00
24700.0	.0	24700.0	.0	.0	3622.6	.0	474.8	370.9	1675.00
.23	.00	6.82	.00	.000	.040	.000	.000	1672.00	3222.61
.023472	950.	950.	950.	10	5	0	.00	2762.31	6547.09

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*SECNO 13750.000

3265 DIVIDED FLOW

3280 CROSS SECTION 13750.00 EXTENDED .87 FEET

3685 20 TRIALS ATTEMPTED WSEL,CWSEL
3693 PROBABLE MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

13750.000	2.87	1710.87	1710.87	.00	1711.63	.77	30.15	.01	1710.00
24700.0	.0	24700.0	.0	.0	3516.4	.0	587.9	451.2	1710.00
.29	.00	7.02	.00	.000	.040	.000	.000	1708.00	3700.00
.020382	1380.	1380.	1380.	20	5	0	.00	2303.96	6050.00

*SECNO 14320.000

3265 DIVIDED FLOW

3280 CROSS SECTION 14320.00 EXTENDED .63 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

14320.000	2.63	1725.63	1725.63	.00	1726.36	.73	11.96	.00	1725.00
24700.0	.0	24700.0	.0	.0	3605.6	.0	634.5	483.0	1725.00

GR	1750	4560	1748	4600	1748	4640	1748	4700	1750	4720
GR	1754	4770	1750	4930	1749	4960	1750	4970	1752	5000
GR	1750	5100	1748	5120	1750	5160	1752	5250	1750	5300
GR	1747	5350	1749	5450	1747	5510	1750	5560	1747	5630
GR	1750	5700	1748	5770	1750	5850				

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

*PROF 1

CCHV= .100 CEHV= .300
*SECNO 6940.000

3265 DIVIDED FLOW

3280 CROSS SECTION 6940.00 EXTENDED .08 FEET

3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 3370.0 6750.0 TYPE= 1 TARGET= 3380.000

6940.000	5.08	1550.08	1550.08	1550.00	1550.72	.65	.00	.00	1550.00
24700.0	.0	24700.0	.0	.0	3825.8	.0	.0	.0	100000.00
.00	.00	6.46	.00	.000	.040	.000	.000	1545.00	3370.00
.021920	0.	0.	0.	0	4	0	.00	3007.53	6750.00

*SECNO 8100.000

3265 DIVIDED FLOW

3280 CROSS SECTION 8100.00 EXTENDED .39 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

8100.000	2.39	1575.39	1575.39	.00	1576.10	.71	25.20	.02	1579.00
24700.0	2.3	24697.7	.0	1.3	3651.3	.0	99.6	75.3	1576.00
.05	1.77	6.76	.00	.040	.040	.000	.000	1573.00	3250.00
.021527	1160.	1160.	1160.	6	14	0	.00	2647.50	6884.83

*SECNO 9130.000

3265 DIVIDED FLOW

3280 CROSS SECTION 9130.00 EXTENDED 1.41 FEET

7185 MINIMUM SPECIFIC ENERGY
3720 CRITICAL DEPTH ASSUMED

3470 ENCROACHMENT STATIONS= 3500.0 6750.0 TYPE= 1 TARGET= -3500.000

SECNO	DEPTH	CWSEL	CRIWS	WSELK	EG	HV	HL	OLOSS	L-BANK ELEV
Q	QLOB	QCH	QROB	ALOB	ACH	AROB	VOL	TWA	R-BANK ELEV
TIME	VLOB	VCH	VROB	XNL	XNCH	XNR	WTN	ELMIN	SSTA
SLOPE	XLOBL	XLCH	XLOBR	ITRIAL	IDC	ICONT	CORAR	TOPWID	ENDST

9130.000	2.41	1600.41	1600.41	.00	1601.04	.63	22.46	.01	1602.00
24700.0	.0	24700.0	.0	.0	3888.9	.0	188.7	143.9	100000.00
.09	.00	6.35	.00	.000	.040	.000	.000	1598.00	3539.69
.022099	1030.	1030.	1030.	5	5	0	.00	3151.54	6750.00

X1	8100	32	3400	6900	1160	1160	1160			
GR	1575	3250	1578	3300	1579	3400	1575	3530	1573	3600
GR	1574	3840	1575	3850	1575	3930	1574	4000	1573	4350
GR	1575	4400	1575	4450	1574	4470	1574	4600	1575	4650
GR	1576	4700	1577	4850	1575	4950	1575	5000	1574	5050
GR	1575	5100	1575	5200	1573	5300	1573	5800	1575	5850
GR	1577	5950	1575	6430	1573	6550	1575	6640	1575	6820
GR	1574	6850	1576	6900						
X1	9130	29	3500	6750	1030	1030	1030			
X3				3500						
GR	1600	3450	1602	3500	1600	3550	1599	3600	1600	3700
GR	1599	3760	1600	3850	1600	4000	1598	4100	1600	4150
GR	1600	4270	1598	4350	1600	4400	1600	4600	1599	4700
GR	1599	4900	1600	4950	1601	5000	1600	5050	1598	5150
GR	1598	5750	1600	5800	1600	5960	1599	6040	1600	6100
GR	1599	6200	1600	6300	1599	6450	1599	6750		
X1	10290	39	3450	7100	1160	1160	1160			
GR	1625	3450	1624	3600	1625	3650	1624	3700	1624	3770
GR	1625	3820	1625	3900	1623	3950	1622	4000	1624	4100
GR	1625	4150	1625	4250	1627	4350	1625	4500	1624	4600
GR	1624	4800	1625	4850	1624	4920	1625	4950	1625	5200
GR	1624	5250	1624	5300	1624	5520	1625	5550	1625	5620
GR	1623	5650	1625	5700	1625	5800	1624	5850	1624	6300
GR	1625	6350	1626	6450	1625	6500	1625	6600	1624	6700
GR	1623	6800	1624	6850	1625	6900	1630	7100		
X1	11420	42	3000	7000	1130	1130	1130			
GR	1648	2900	1650	3000	1650	3250	1649	3300	1650	3400
GR	1649	3500	1649	3650	1650	3700	1650	3800	1649	3850
GR	1648	4000	1649	4250	1650	4350	1650	4440	1649	4500
GR	1650	4550	1647	4700	1647	4800	1650	4850	1652	4950
GR	1651	5000	1650	5100	1652	5200	1650	5300	1647	5400
GR	1650	5530	1649	5600	1650	5620	1647	5660	1648	5750
GR	1650	5800	1648	5850	1649	5950	1649	6200	1650	6220
GR	1652	6300	1650	6360	1647	6450	1647	6600	1649	6700
GR	1647	6900	1650	7000						
X1	12370	30	3000	6785	950	950	950			
GR	1675	3000	1675	3220	1673	3250	1672	3300	1674	3400
GR	1674	3900	1675	3950	1675	4100	1672	4120	1673	4200
GR	1674	4400	1674	4650	1673	4700	1674	4850	1675	4870
GR	1676	5000	1677	5150	1675	5220	1674	5250	1673	5350
GR	1673	5500	1674	5600	1672	5900	1673	6000	1675	6100
GR	1674	6150	1675	6200	1673	6400	1672	6500	1675	6550
X1	13750	32	3700	6050	1380	1380	1380			
GR	1710	3700	1710	3800	1709	3850	1708	4000	1709	4115
GR	1710	4240	1709	4400	1708	4500	1709	4720	1710	4750
GR	1710	4840	1711	4860	1709	4920	1710	5000	1711	5050
66	1710	5080	1708	5150	1709	5300	1710	5320	1710	5460
GR	1711	5550	1710	5620	1709	5650	1710	5700	1709	5760
GR	1710	5850	1709	5870	1710	5870	1709	5880	1711	5950
GR	1708	6000	1710	6050						
X1	14320	37	3350	6000	570	570	570			
GR	1725	3350	1724	3450	1725	3500	1725	3560	1723	3620
GR	1725	3670	1725	3830	1723	3850	1724	4000	1725	4060
GR	1725	4150	1724	4180	1724	4300	1723	4400	1723	4600
GR	1724	4680	1725	4850	1724	4940	1725	4950	1725	4980
GR	1724	5000	1724	5040	1725	5060	1725	5100	1724	5130
GR	1723	5240	1725	5270	1725	5420	1724	5450	1723	5500
GR	1724	5560	1725	5600	1724	5660	1723	5720	1725	5770
GR	1726	5900	1725	6000						
X1	15420	48	3300	5850	1100	1100	1100			
GR	1752	3300	1750	3420	1748	3500	1748	3600	1750	3620
GR	1752	3700	1750	3780	1749	3800	1747	3850	1749	3940
GR	1750	4000	1754	4020	1750	4040	1749	4050	1748	4100
GR	1750	4130	1751	4200	1750	4220	1749	4260	1747	4300
GR	1748	4380	1750	4400	1750	4450	1747	4500	1750	4530

```
*****************************************************          ****************************************
* WATER SURFACE PROFILES                            *          * U.S. ARMY CORPS OF ENGINEERS
* VERSION OF SEPTEMBER 1988                         *          * THE HYDROLOGIC ENGINEERING CEN
* ERROR: 01,02,03,04                                *          * 609 SECOND STREET, SUITE D
* UPDATED:  JUNE 1990                               *          * DAVIS, CALIFORNIA 95616-4687
* RUN DATE   12/ 4/90      TIME   16:24:26          *          *
*****************************************************          ****************************************
```

```
X     X  XXXXXXX   XXXXX              XXXXX
X     X  X        X     X            X     X
X     X  X        X                        X
XXXXXXX  XXXX     X          XXXXX    XXXXX
X     X  X        X                  X
X     X  X        X     X            X
X     X  XXXXXXX   XXXXX             XXXXXXX
```

```
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
:::                                      :::
:::  FULL MICRO-COMPUTER IMPLEMENTATION  :::
:::                                      :::
::::::::::::::::::::::::::::::::::::::::::::
::::::::::::::::::::::::::::::::::::::::::::
```

END OF BANNER

THIS RUN EXECUTED 12/ 4/90 16:2

```
**************************************************
HEC2 RELEASE DATED SEP 88 UPDATED JUN  1990

ERROR CORR -  01,02,03,04
MODIFICATION -
**************************************************
```

T1   CAJON CREEK IN SAN BERNARDINO COUNTY
T2   SEPTEMBER 1990 BY HOWARD H. CHANG
T3   AREAS EAST OF SCE EASEMENT ARE CONSIDERED TO BE INEFFECTIVE FLOW AREAS

J1	ICHECK	INQ	NINV	IDIR	STRT	METRIC	HVINS	Q	WSEL	FQ
		2			-1				1550	

J2	NPROF	IPLOT	PRFVS	XSECV	XSECH	FN	ALLDC	IBW	CHNIM	ITRACE
	-1		-1							

QT	2	24700	24700							
NC	0.04	0.04	0.04	0.1	0.3					
X1	6940	43	3370	6750						
X3				3370		6750				
GR	1550	3080	1553	3150	1550	3230	1550	3280	1547	
GR	1550	3370	1547	3550	1550	3630	1552	3670	1550	
GR	1549	3800	1550	3850	1550	3950	1549	4050	1550	
GR	1550	4150	1551	4230	1550	4300	1547	4400	1550	
GR	1551	4550	1550	4650	1550	4900	1547	5000	1546	
GR	1547	5260	1550	5300	1550	5400	1549	5420	1545	
GR	1550	5840	1550	5880	1547	5960	1550	6100	1550	
GR	1548	6370	1550	6400	1550	6650	1549	6700	1550	
GR	1550	6950	1547	6970	1550	7000				

Bement
Dainwood
Sturgeon

CIVIL ENGINEERS, A Corporation 6859 FEDERAL BOULEVARD • LEMON GROVE, CALIF. 91945-1315 • (619) 582-4992

JAMES D. BEMENT, President
KENT L. STURGEON, Vice President
THOMAS A. JONES, Vice President
GORDON K. AXELSON, Associate

July 2, 1991

Mr. Douglas Sprague
CalMat Co
P.O. Box 2950, Terminal Annex
Los Angeles, California 90051

Reference: Cajon Creek
BDS No. 90-01

Dear Mr. Sprague:

Please find attached the HEC-2 hydrology study performed by Dr. Howard Chang, at our request, in December 1990. The cross-sectional input data was prepared by our firm, based on topographic information furnished by CalMat.

Cajon Creek has a large flood plain width and a relative steep slope for a large drainage way. As the HEC-2 study shows this results in shallow depth of flooding, typically 3 feet or less. The areas easterly of the S.C.E. easement are considered to be ineffective flow areas.

It is Dr. Chang's opinion that this area easterly of the S.C.E. easement can be encroached upon within the guidelines of the Federal Emergency Management Agency (FEMA). Typically, this would mean that fill could be placed in the fringe/ineffective flow area as long as the 100 year water surface elevation is not raised over one foot. It is anticipated a request would be made to FEMA to change the 100 year flood plain limits in this area.

Please let me know if you need any additional information.

Very truly yours,

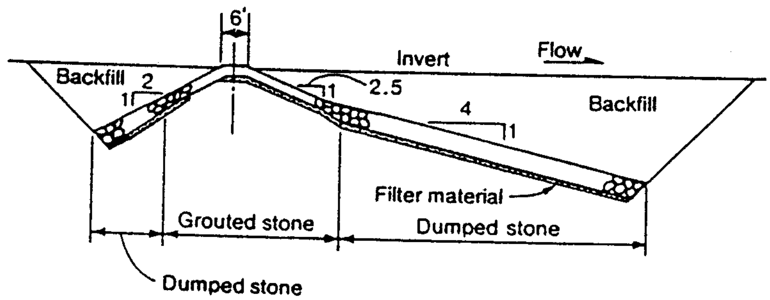
BEMENT-DAINWOOD-STURGEON
Civil Engineers

Kent L. Sturgeon

KLS:ls

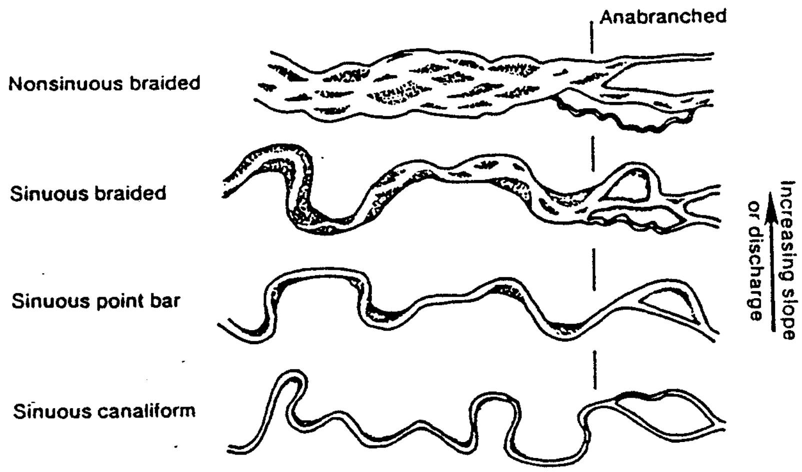
Attachment

FIG. 5 STREAMBED STABILIZER
BY U.S. ARMY CORPS OF ENGINEERS



Chang-Fluvial

FIG. 4 RIVER CHANNEL TYPES
BY BRICE (1983)



Chang-Fluvial

Fig. 2. Longitudinal bed profile
of Cajon Creek

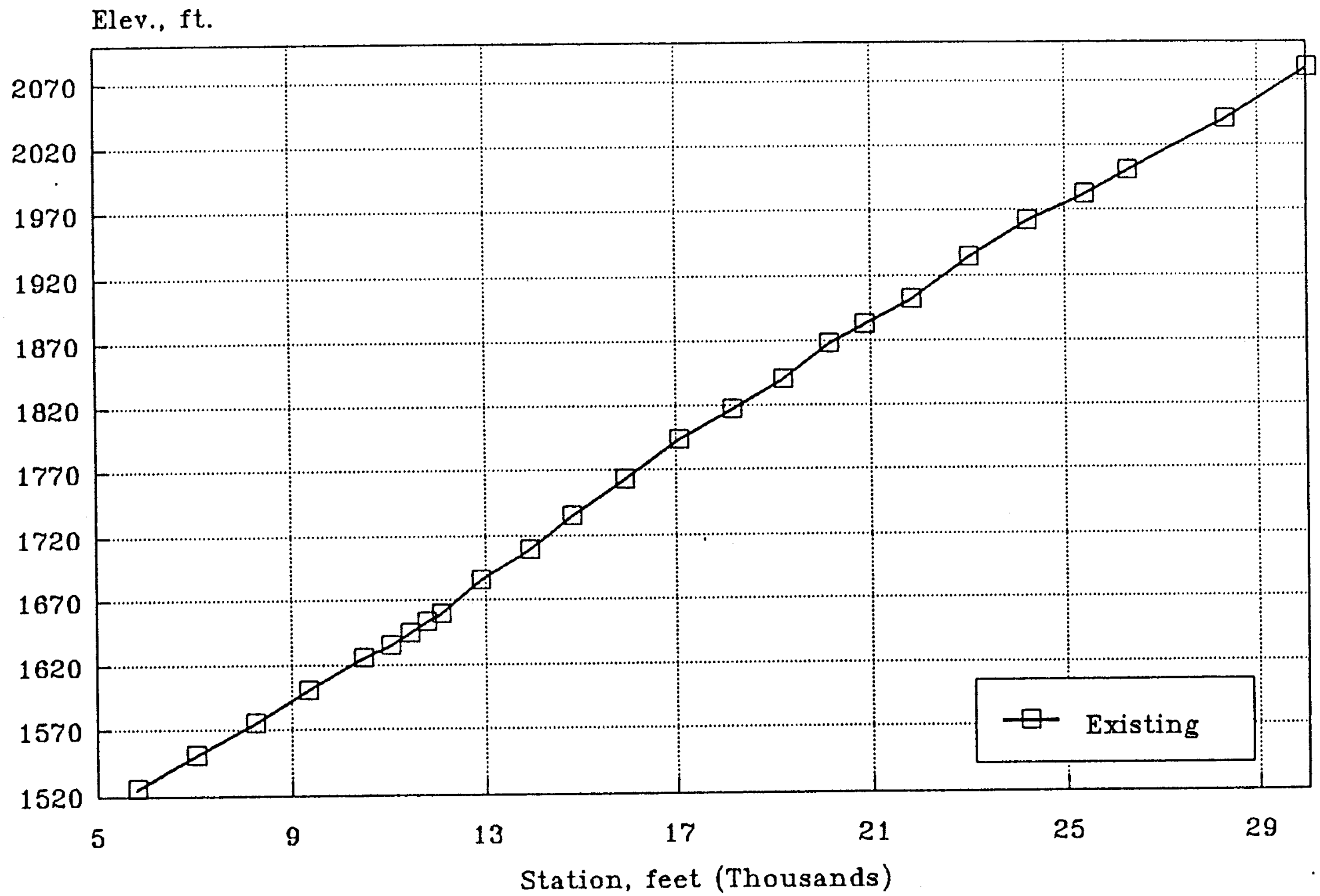
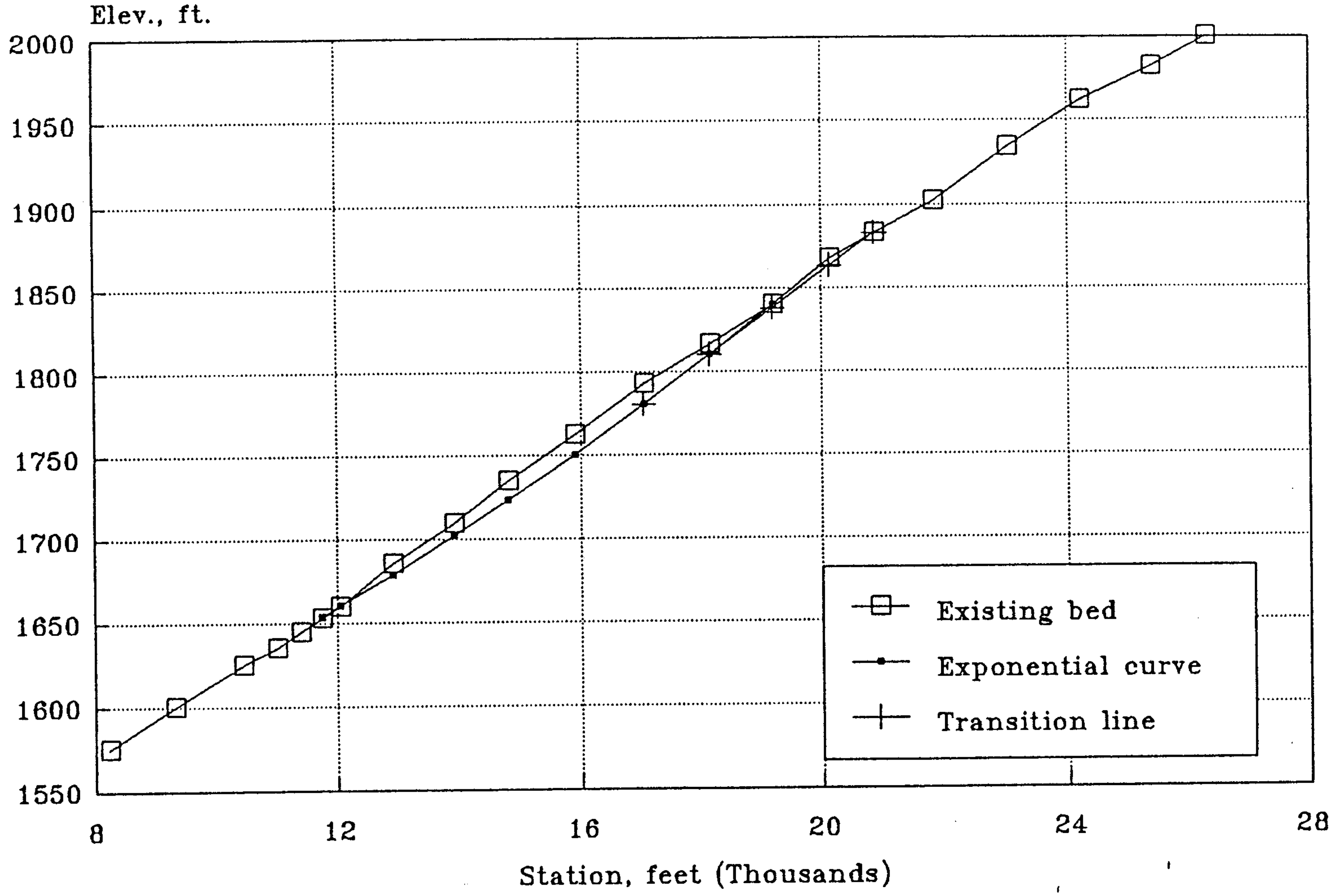


Fig. 3. Longitudinal bed profile
and redline of Cajon Creek



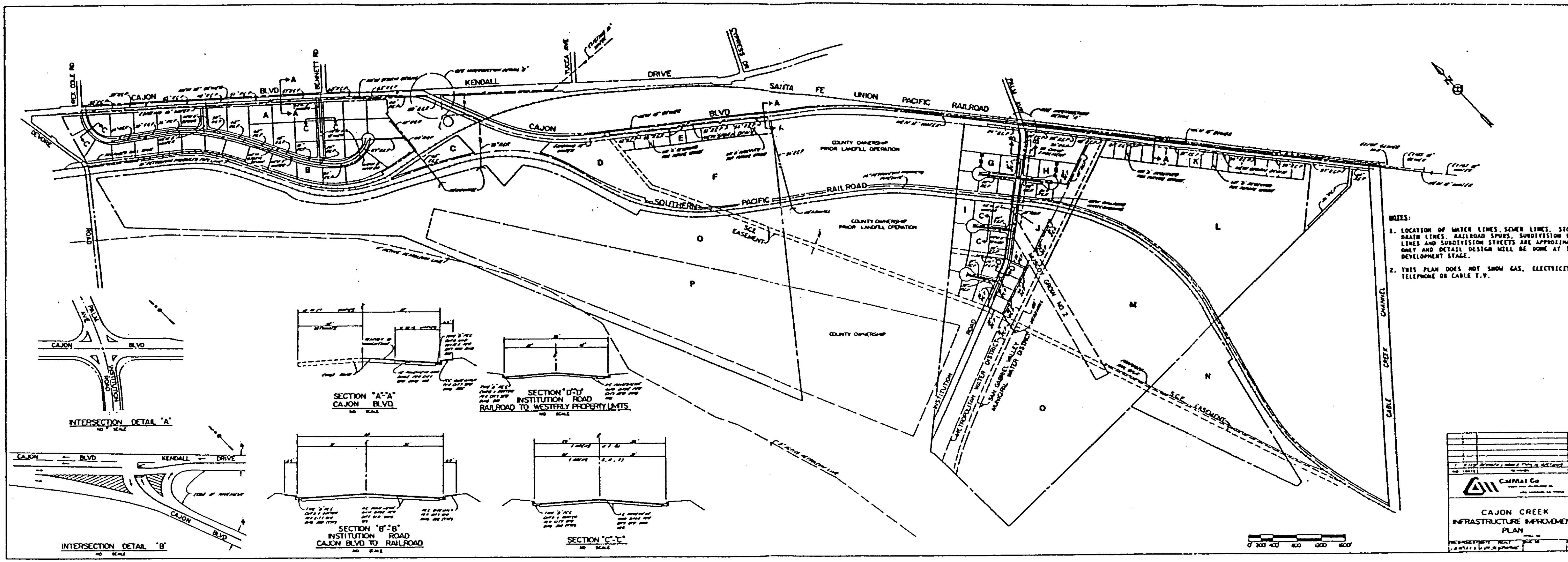

NOTES:
1. LOCATION OF WATER LINES, SEWER LINES, STORM DRAIN LINES, RAILROAD SPURS, SUBDIVISION LOT LINES AND SUBDIVISION STREETS ARE APPROXIMATE ONLY AND DETAIL DESIGN WILL BE DONE AT THE DEVELOPMENT STAGE.
2. THIS PLAN DOES NOT SHOW GAS, ELECTRICITY, TELEPHONE OR CABLE T.V.
CalMat Co
CAJON CREEK
INFRASTRUCTURE IMPROVEMENT
PLAN
SANTA FE UNION PACIFIC RAILROAD
SOUTHERN PACIFIC RAILROAD
CAJON BLVD
KENDALL DRIVE
CYPRESS DR
YUCCA AVE
BENNETT RD
RICK COLE RD
DEVORE ROAD
PALM AVE
INSTITUTION ROAD
CABLE CREEK CHANNEL
METROPOLITAN WATER DISTRICT
SAN GABRIEL VALLEY MUNICIPAL WATER DISTRICT
LOT GROW NO 2
S.C.E. EASEMENT
COUNTY OWNERSHIP PRIOR LANDFILL OPERATION
COUNTY OWNERSHIP
INTERSECTION DETAIL 'A'
NO SCALE
INTERSECTION DETAIL 'B'
NO SCALE
SECTION "A"-"A" CAJON BLVD.
NO SCALE
SECTION "B"-"B" INSTITUTION ROAD CAJON BLVD TO RAILROAD
NO SCALE
SECTION "C"-"C"
NO SCALE
SECTION "D"-"D" INSTITUTION ROAD RAILROAD TO WESTERLY PROPERTY LIMITS
NO SCALE
0 200 400 800 1200 1600'

FIGURE 4

5

DEVELOPMENT OF MINING PLAN IN CAJON CREEK CALMAT COMPANY SAN BERNARDINO, CALIFORNIA

CalMat

PREPARED BY: TOM T. FUJIWARA

INPUT BY: DR. HOWARD H. CHANG

NASLAND ENGINEERING

CIVIL ENGINEERING SURVEYING LAND PLANNING
3359 CHICAGO AVENUE, RIVERSIDE, CALIFORNIA, 92507
(714) 784-3300

NASLAND ENGINEERING

CIVIL ENGINEERING SURVEYING LAND PLANNING

3359 CHICAGO AVENUE, RIVERSIDE, CA 92507

(714) 784-3300

CONTENTS

DEVELOPMENT OF MINING PLAN
FOR CALMAT'S UPPER CAJON CREEK PROPERTIES
SAN BERNARDINO, CALIFORNIA
EXECUTIVE SUMMARY

The purpose of this study is to delineate a limit (i.e. redline) for skimming mining by CalMat within the 100 year flood plain on Cajon Creek , between Devore Road and Institution Road, in San Bernardino County. The redline concept of mining is employed to minimize impacts of mining on adjacent properties and on the stream itself. A redline for Cajon Creek has been developed which limits the excavation depth using the existing longitudinal bed profile as the basis. The redline follows the equilibrium profile of a natural stream defined by the exponential curve proposed by Shulits (1941); it represents the approximate direction toward which the stream channel adjusts. The erosion potential will be minimized since the redline for excavation follows a smooth longitudinal profile that closely approximates the equilibrium profile.

A typical longitudinal profile of a stream is a concave curve, with channel slope decreasing in the downstream direction. The existing streambed profile of Cajon Creek is a convex curve near the proposed mining area, opposite to ordinary streams. The convex curve is caused by sediment deposition in the stream where the creek hugs an adjacent hillside. Sediment inflow from the adjacent steep hillside tends to settle in the streambed in the form of alluvial fans. Materials in the small alluvial fans are then redistributed by the stream flow. The convex curve is an indication of excess sediment in the stream reach. This situation is advantageous for mining, since excavation in the area of excess sediment tends to restore the stream equilibrium.

The natural streambed of Cajon Creek is very broad and generally flat, characteristic of steep braided streams classified in river morphology. Because of this natural feature, sand and gravel excavation should be allowed to extend to wide areas within the property boundary, subject to smooth transitions between the redline and property boundaries.

The bridge and road crossings exist in the upstream area of the project site. At the downstream area are the Institution Road crossing and pipeline crossings (see fig. 1). Because of the redline, the proposed project should have minimum impacts on these structures and crossings. It should also be understood that natural stream channel changes in this steep stream are expected to occur during major floods in the absence of the proposed mining. Erosion usually develops at bridge crossings during high flow since the channel width at a bridge crossing is considerably narrower than the adjacent flood plain.

The conceptual schemes for the protection of adjacent properties, road and pipeline crossing protection using hydraulic structures are described in this report. The 8-inch petroleum line in the floodplain of Upper Cajon Creek will be relocated to allow mining of the area. The remaining items in the mining area that may need to be protected include the railroad located along the northeast side of the proposed mining area, the Institution Road crossing, and the M.W.D. and S.G.M.W.D. aqueduct crossings located at the southeasterly of the mining area. Protection of the railroad is accomplished by an established setback from the limit of excavation and the use of a 4:1 gradient side slope for the mining excavation.

Protection of Institution Road and aqueduct crossings will be accomplished by a streambed stabilizer. The conceptual design of the streambed stabilizer is taken directly from the Corps manual <u>Hydraulic Design of Flood Control Structures</u>. It is normally a riprap structure placed over the pipeline crossing, thereby separating the pipeline from the eroding water flow.

Using the established redline as a basis, the quantity of material reserve is approximately 5,400,000 cubic yards.

DEVELOPMENT OF MINING PLAN
FOR CALMAT'S UPPER CAJON CREEK PROPERTIES
SAN BERNARDINO, CALIFORNIA

I. INTRODUCTION

This study has been made to develop an initial excavation plan for sand/gravel mining on the upper Cajon Creek properties in San Bernardino County. The primary objective is to delineate a limit for skimming mining so that it will result in minimum impacts on adjacent properties and on the stream itself. The property under consideration as shown in the attached map (Fig.1) is immediately upstream of Institution Road. The upstream limit of the property is near Devore Road.

The excavation plan is developed in this study employing basic engineering and geomorphic principles. Because of the erosion potential, the excavation for sand/gravel will be limited by a redline, based on stream morphology, which specifies a limit of excavation.

The redline is determined in this study using engineering and geomorphic principles. Under the redline scheme, sand/gravel mining will cover the extent of the property to be used by CalMat, subject to a smooth transitions from the redline within the limits of the proposed mining area.

To accomplish this study, the following tasks have been undertaken:

a. Collection of basic data including topographic maps, hydrological information, extent of current mining, longitudinal profile of river channel, etc.

b. Site visits.

c. Engineering and geomorphic analyses to estimate the approximate equilibrium longitudinal profile of stream under its existing conditions. This longitudinal profile is the basis of the red line.

II. EXISTING LONGITUDINAL STREAMBED PROFILE

The existing longitudinal streambed profiles of Upper Cajon Creek have been obtained as shown in Figs. 2 and 3. Points of interest along the stream reach are given below:

Stream station feet	Description
114+00	Upstream boundary of waterline easement
117+50	Institution Road
148+00	Downstream CalMat property line
263+15	Upstream CalMat property line

A typical longitudinal streambed profile is slightly curved. The longitudinal curve is typically concave upward, as the channel slope decreases in the downstream direction. The longitudinal streambed profiles for Cajon Creek as shown in Figs. 2 and 3 do not follow the profile of a typical stream in the proposed mining area. Instead, it is characterized by a convex curve, opposite to ordinary streams. The convex curve is evidence of sediment deposition in the area. As shown in the topographic map, Cajon Creek hugs an adjacent hillside in the proposed mining area. Sediment inflow from the steep hillside tends to settle in the streambed in the form of alluvial fans. Materials in the small alluvial fans are then redistributed by the stream flow. The convex curve is an indication of excess sediment in the stream reach. This situation is advantageous for mining, since excavation in the area of excess sediment tends to restore the stream equilibrium.

III. ANALYSIS BASED ON STREAM MORPHOLOGY

Stream morphology involves the study of the shape of alluvial channels and its responses to outside factors. Stream morphology has been a subject of great challenge to scientists and engineers who recognize that any effort with regard to river engineering must be based on a proper understanding of (1) the morphological features involved and (2) the responses to the imposed changes. An overview of river morphology related to the present project is presented herein. Included in the scope are the regime concept, river channel classifications, and longitudinal stream profiles.

Regime Concept

The regime concept is generally considered synonymous with that of equilibrium. This concept originated from the study of stable alluvial canals, which, with a mobile bed and earth banks, are non scouring and non silting over an operating cycle. An alluvial canal used for irrigation is usually operated under a fairly constant discharge. Because of natural discharge variation, the true regime or dynamic equilibrium of a natural river may never be attained, although each river is constantly adjusting itself toward that direction. Mackin (1948) defined grade as a condition of equilibrium in streams acting as agents of transportation; he defined graded stream as one in which, over a period of years, slope is delicately adjusted to provide, with available discharge and the prevailing channel geometry, just the velocity required to transport the load supplied from the drainage basin. A graded stream (i.e., a regime river) is a system in dynamic equilibrium, or, to be more precise, a system in quasi-equilibrium. The regime concept has been reaffirmed by Ackers and Charlton (1970) on the basis that the channel geometry does not adjust with short-term variation in discharge.

River Channel Classifications

Since any control and regulation of river flow must be based on understanding, it therefore is important to review the physical nature of Cajon Creek near the project location. Following is an overview of river morphology from the geomorphic viewpoint. The emphases are on river classification and on the stability associated with each type of river. These river engineering and morphological principles are then applied to Cajon Creek.

The three major channel patterns classified by Leopold and Wolman (1957) are straight (or sinuous), meandering, and braided. Cajon Creek should be classified as a braided river.

Lane (1957) concluded that the primary causes that may be responsible for the braided condition are: (1) overloading, that is, the stream may be supplied with more sediment than it can carry, resulting in aggradation, and (2) steep slopes. The braided condition of Cajon Creek is associated with the steep slope.

The classification of river types by Brice (1983) is based on four major planform properties that are most readily observed on aerial photographs: sinuosity, point bars, braiding, and anabranching. Four major river types, each of which consists of commonly occurring association of planform properties are illustrated in Fig. 4 in the direction of increasing slope.

Sinuous canaliform rivers have a flat slope, characterized by narrow crescent-shaped point bars, a notably uniform width, a lack of braiding, and a moderate to high sinuosity. The channel is relatively narrow and deep, with greatest lateral stability and high silt-clay content for the banks.

Sinuous point-bar rivers are steeper and have more rapid rates of lateral migration at bends, although straight reaches may remain stable for long period of time. Such rivers tend to have greater width at bend apexes, they also tend to have prominent point bars that are typically scrolled and visible at normal stage.

Sinuous braided rivers are steeper and wider than sinuous point-bar rivers with the same discharge, featured by rapid rates of lateral migration and rapid shifts in the position of the thalweg. Such rivers have fairly heavy bed-material load but less silt-clay content. Point bars are more irregular as the braiding increases.

Nonsinuous braided rivers without point bars, such as Cajon Creek, exist on steep slopes with heavy bed-material load and low silt-clay content. Such rivers are highly braided and have moderate rates of lateral migration at random places where one of the multiple branches impinges against a bank. The branch channels shift at random within the banklines.

It is clear that Cajon Creek is propely classified as a nonsinuous braided river. The braided river bed is generally broad and flat.

Longitudinal Stream Profiles

The slope of a stream is determined by conditions imposed from upstream, but the elevation and location of each point of the profile are also determined by the downstream base level, which in this case is the existing bed downstream of the limit of operation. Major variables controlling the slope are the discharge, sediment load, and caliber.

The longitudinal slope profile was fitted by Shulits (1941) as an exponential decay function:

$$S = S_o e^{-\alpha x} \tag{1}$$

where S is the slope at a distance x downstream of a reference section where the slope is S_o; α is a coefficient of slope reduction. Replacing S by dz/dx in Eq. 1 and integrating gives the equation for stream profile:

$$z = \frac{S_o}{\alpha}(e^{-\alpha x} - 1) \tag{2}$$

where x and z are the respective longitudinal and vertical coordinates of the stream profile.

The downstream decrease in slope is attributed, in part, to the decrease in the grain size of the bed material due to abrasion and sorting. Abrasion means wearing, grinding, or rubbing away by friction. Sorting refers to differential transport of particles of various sizes, since fine grains are more likely to be moved than are the coarse ones.

IV. REDLINE BASED ON EQUILIBRIUM LONGITUDINAL PROFILE

For a river reach in equilibrium or in regime, its transport capacities for water and sediment are in balance with the rates supplied. Adjustments of equilibrium can be induced by climatic, hydrologic, and tectonic events; they may also be results of such human interferences as damming, diversion, mining, cutoffs, and so on. As equilibrium is disturbed by any of such factors, changes will occur in order to restore equilibrium. The equilibrium profile finally reestablished should be a smooth profile since any deviation from the smooth curve would be eliminated through the erosion and deposition processes.

Since the equilibrium longitudinal profile is the direction toward which each stream channel adjusts, the erosion potential will be minimized if the excavation plan for sand/gravel mining follows a smooth longitudinal profile that closely approximates the equilibrium profile. For this reason, the longitudinal profile given by Eq. 1 is proposed as the basis for the redline of the excavation plan. The constants in the equation must be specified to define the precise shape of the profile. These constants are determined by fitting the existing stream bed profile to Eq. 1. The redline established following this approach minimizes potential changes of the present stream bed while accommodating sand/gravel mining.

The redline is established based on the three following conditions:

(1) It maintains the existing channel bed elevations at the upstream property boundary and Institution Road. The redline

approaches the existing channel bed elevation of 1644.2 at station 114+00 and elevation of 1152.6 at station 117+50 near Institution Road; and existing elevations are maintained at and upstream of station 208+60.

(2) It maintains the existing channel bed slope at Institution Road. This slope is measured from the topographic map to be 0.0215.

(3) It is connected to other property boundaries by straight lines, serving as transitions between the redline and existing elevations along all property boundaries.

Figure 3 shows the curve fitting of existing stream bed profile by a smooth exponential curve of Eq. 1. In the fitting, the curve is located so that present and future excavations will reduce potential stream channel changes. The redline, so determined, is represented by an exponential curve and a transition line connecting the exponential curve to the existing bed profile at the upstream end. The exponential curve is given by the following equation:

$$z = 1132.6 + 320.4 \exp(0.0000413\ x) \qquad (3)$$

in which, z is the redline elevation; x is the stream station measured in the upstream direction. The exponential function in Eq. 3 has a positive argument in contrast to a negative value in Eq. 1. This is because the x coordinate in Eq. 3 is toward upstream, opposite that in Eq. 1. The transition is a straight line which is from station 170+50 to station 208+50. This line is represented by the following equation:

$$z = 1321.8 + 0.0269\ x, \qquad \text{for } x > 17050 \qquad (4)$$

Based on these two equations (Eqs. 3 and 4), the redline has the following elevations along the stream channel:

Stream station, x feet	Elevation, z feet	
117+50	1653.0	Matching existing bed elevation
120+50	1659.6	Matching existing bed elevation
129+00	1678.4	
139+00	1701.5	
148+00	1723.0	
159+00	1750.5	
170+50	1780.5	Start of transition line
181+50	1810.1	
191+80	1837.8	
201+30	1863.4	
208+60	1883.0	Matching existing bed elevation

The natural stream bed of Cajon Creek is very broad and generally flat, characteristic of steep braided streams described in the review of river morphology. Because of this natural feature, sand and gravel excavation should be allowed to extend to wide areas within the property boundary.

V. POTENTIAL BED SCOUR AT BRIDGE AND PIPELINE CROSSINGS

There exist two bridges in the upstream vicinity of the project site, one is the Union Pacific Railroad Bridge located 1.4 miles northwesterly of the proposed mining area, and the other is the I-15 bridge located 1.6 miles northwesterly of the site. The Devore Road crossing is located one mile upstream of the mining area. At the downstream side are the Institution Road crossing and M.W.D. and S.G.W.D. aqueduct crossings located 300 feet and 700 feet southeasterly, respectively.

Because of the redline, the proposed project should have minimum impacts on these structures and crossings. It should also be understood that natural stream channel changes in this steep stream are expected to occur during major floods in the absence of the proposed mining. Erosion usually develops at bridge crossings during the high flow since the channel width at the bridge crossing is considerably narrower than the adjacent flood plain.

The impacts from mining are mitigated by the redline. In addition, the mining area has received greater sediment inflow from the adjacent hillside than from adjacent stream reaches. Removal of material from this area has the effects of restoring stream channel equilibrium.

VI. CHANNEL STABILIZATION

Channel stabilization refers to the stabilization of the channel banks, bridges, road and M.W.D. and S.G.W.D. aqueduct crossings. The channel bed itself will remain unprotected but its changes are mitigated by the redline mining scheme and the use of 4:1 gradient side slopes in the mining area.

The 8-inch petroleum line in the floodplain of Upper Cajon Creek will be relocated. The remaining items in the mining area that may need to be protected include the railroad, the Institution Road crossing, and the pipeline crossings. Protection of the railroad will be accomplished by an established setback from the limit of excavation, and the use of 4:1 gradient side slopes.

Protection of the road and aqueduct crossings may be accomplished by a streambed stabilizer, as illustrated in Fig. 5. The conceptual design of the streambed stabilizer is taken directly from the Corps manual <u>Hydraulic Design of Flood Control Structures</u>. It is normally a riprap structure placed over the pipeline (aqueduct) crossing, thereby separating the pipeline from the eroding water flow.

VII. LIMITATIONS

This report was prepared using the available topographic map (1"=200') and "as-built" drawings of existing facilities from the San Bernardino County Flood Control District. No warranty, expressed or implied, is made to the accuracy of the topographic map or reference "as-built" drawings.

The redline was established with some margin using engineering and geomorphic principles as best can be determined with the limited calculations. The design of the channel stabilizer is conceptual and further detailed engineeering is recommended prior to its (their) construction.

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LIST OF FIGURES

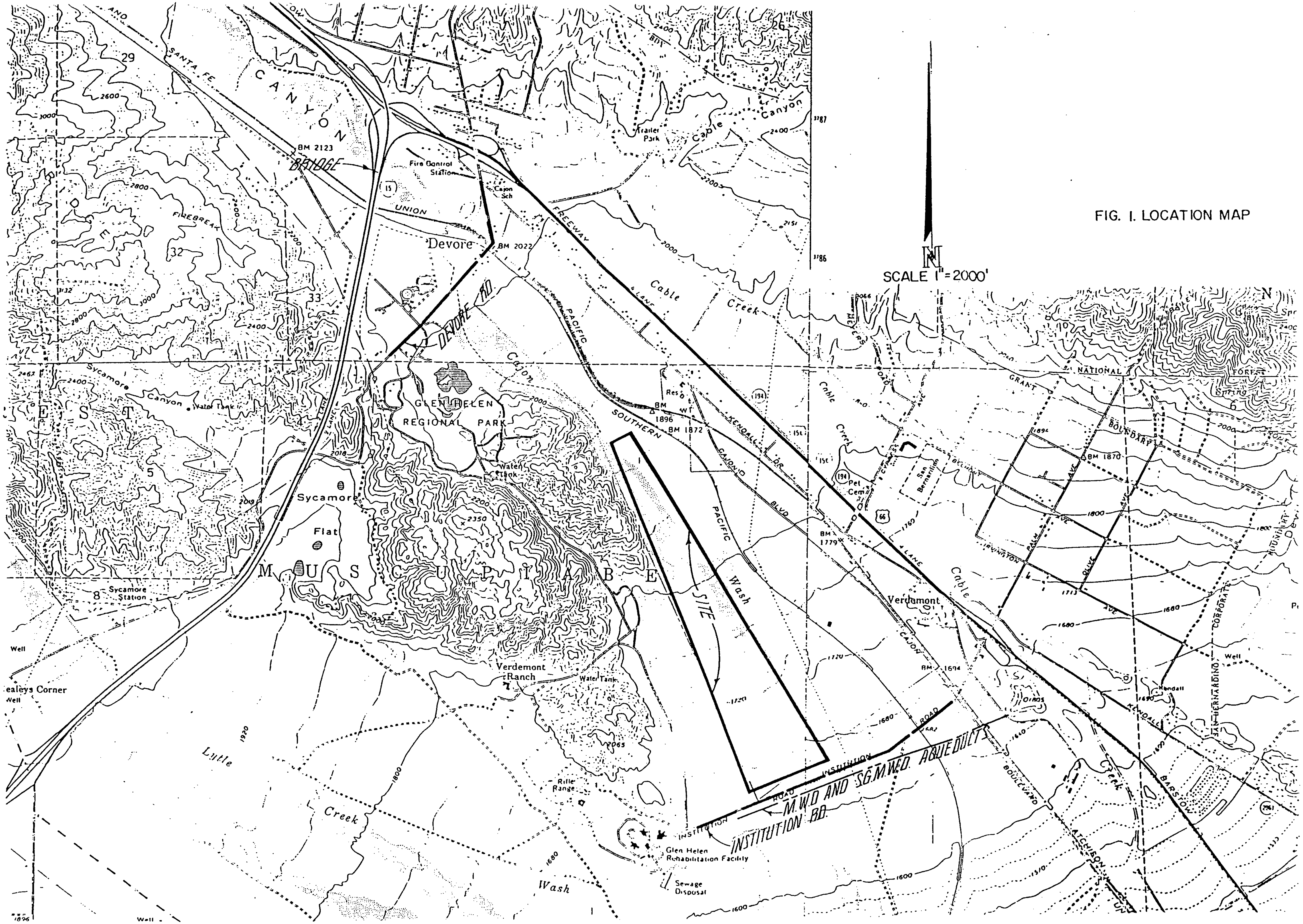

FIG. I. LOCATION MAP

APPENDIX F

NOISE IMPACT STUDY

CAJON CREEK

CITY OF SAN BERNARDINO, CALIFORNIA

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NOISE SETTING

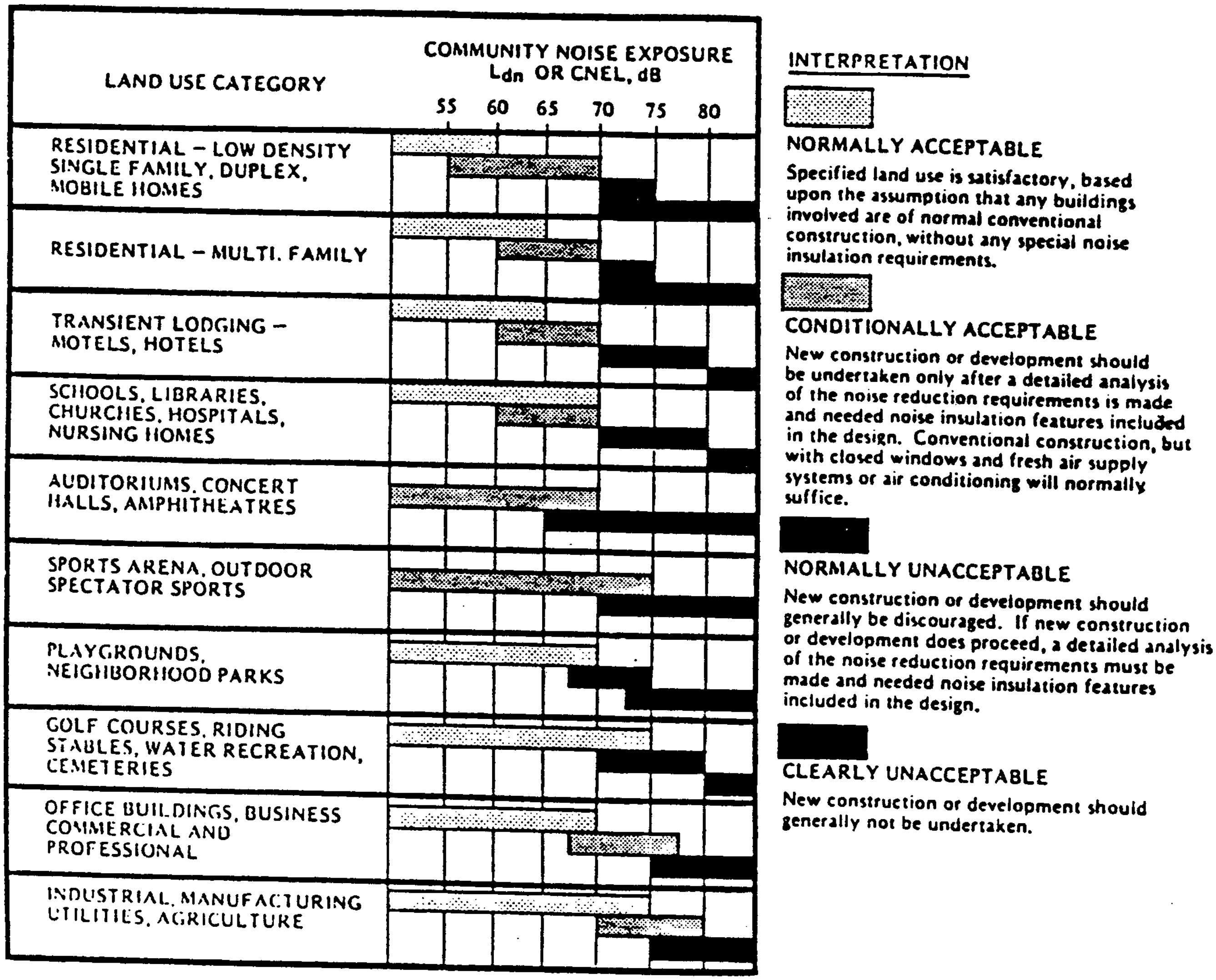
Sound is mechanical energy transmitted by pressure waves in a compressible medium such as air. Noise is generally defined as unwanted sound. Sound is characterized by various parameters that describe the rate of oscillation of sound waves, the distance between successive troughs or crests, the speed of propagation, and the pressure level or energy content of a given sound wave. In particular, the sound pressure level has become the most common descriptor used to characterize the loudness of an ambient sound level. The unit of sound pressure ratioed to an assumed zero sound level is called a decibel (dB). Because sound or noise can vary in intensity by over one million times within the range of human hearing, a logarithmic loudness scale similar to the Richter Scale for earthquake intensity is used to keep sound intensity numbers at a convenient and manageable level. Since the human ear is not equally sensitive to all sound frequencies within the entire spectrum, noise levels at maximum human sensitivity (middle A and its higher harmonics) are factored more heavily into sound descriptions in a process called "A-weighting" written as dB(A).

Time variations in noise exposure are normally expressed in terms of a steady-state energy level equal to the energy content of the time varying period (called Leq), or, alternately, as a statistical description of the sound level that is exceeded over some fraction of a given observation period. Finally, because community receptors are more sensitive to unwanted noise intrusion during the evening and at night, state law requires that, for planning purposes, an artificial dB increment be added to quiet time noise levels in a 24-hour noise descriptor called the Community Noise Equivalent Level (CNEL). An interior CNEL of 45 dB(A) is mandated by the State of California Noise Insulation Standards (CAC, Title 24, Part 6, Section T25-28) for multiple family dwellings and is considered a desirable noise exposure for single family dwelling units as well. Since typical noise attenuation within residential structures with closed windows is about 20 dB, an exterior noise exposure of 65 dB CNEL is generally the noise land use compatibility guideline for new residential dwellings in California. Because commercial or industrial uses are not occupied on a 24-hour basis, the exterior noise exposure standard for less sensitive land uses generally is somewhat less stringent.

In many communities where a quiet environment is considered an important asset that enhances the natural scenic values, a somewhat more stringent land use compatibility guideline has often been adopted. In the Noise Element in the City of San Bernardino General Plan, the State of California Office of Noise Control, guidelines are used to specify a range of community noise exposure acceptable for various receiver site land uses, as seen in Figure 1. An exterior noise exposure standard of 60 dB CNEL is identified as most desirable for residential, school, visitor accommodation and other noise-sensitive receptors.

FIGURE 1

CITY OF SAN BERNARDINO NOISE/LAND USE COMPATIBILITY GUIDELINES



Source: Office of Noise Control, California Department of Health--as shown in San Bernardino General Plan Noise Element, Figure 56

Noise exposures of up to 70 dB CNEL are considered conditionally acceptable if noise barriers such as perimeter walls have been used to mitigate levels as much as possible, while an exterior noise exposure in excess of 70 dB CNEL is considered patently unacceptable. Within the normally acceptable range of 60-70 dB for residential uses, the City of San Bernardino generally uses the mid-point value of 65 dB CNEL as an acceptable residential exterior exposure. Industrial areas are less noise sensitive and, therefore, require less stringent guidelines for noise/land use compatibility. Noise exposures below 70 dB CNEL are normally acceptable for industrial land uses, with exposures between 70-80 CNEL conditionally acceptable.

Existing noise levels within Cajon Creek derive mainly from vehicular sources on the highways and secondary roads in the area. Railroad traffic, occasional aircraft activity and some manufacturing processes constitute additional noise intrusions with their integrated contribution to the 24-hour community noise level, a significant additional burden to the overall noise environment. It is recognized that the proposed mineral product extraction and processing activities and the proposed light industrial uses will be located in an area that already experiences a partially degraded noise environment.

In order to document existing baseline noise levels, a brief on-site noise monitoring program was conducted at many receiver locations around the Cajon Creek site on September 16, 1990. Locations ranged from southern residential areas near Mesa and Duffy Streets to residential and commercial areas in the north off of Cajon Boulevard and Kendall Drive. Other monitoring locations included The Blake Street Park, additional residential/railroad areas near Ogden and Gray Streets, areas near the Verdemont Boys Camp and along Verdemont Road, the Glen Helen Off-Road Vehicle Park, the Sheriff's Academy and San Bernardino jail.

In addition, to answer concerns raised about the plans for a proposed school site on land adjacent to the Cajon Creek Project, a second noise monitoring survey was conducted on the possible future school site on October 26, 1990. Three locations (near Cajon Boulevard, on the southern edge of the site and along the northwestern edge of the site closest to the proposed main aggregate processing plant) were chosen. The results of the monitoring are summarized in Table A.

Several pertinent conclusions can be drawn from this data. Except in very close proximity to the freeway or railroad tracks, noise exposure in the testing area is generally low and well below the exterior 60 dB goal for noise sensitive land uses. The acceptable exposure limit was only exceeded at three of the monitoring locations. Two locations are Cajon Boulevard at Bennet with 63.0 dB Leq and Cajon Boulevard on the school site with 62.4 dB Leq.

TABLE A

CAJON CREEK PROJECT
ON-SITE NOISE MONITORING SUMMARY

Location	Auto/Med/Hvy	Speed	Leq	Lmax	Lmin	L01	L10	L25	L50
Southern Residential									
A. Duffy St. near Mesa o	50/10/0	35	52.6	71.0	38.5	65.5	55.5	48.5	45.0
B. Duffy St. 150' oo	——	–	49.1	64.5	36.0	62.5	50.0	44.0	41.0
Blake St Park									
C. Blake St. 50' oo	——	–	44.1	56.0	37.0	51.0	47.0	44.5	42.0
D. Blake St. 200' oo	——	–	45.1	64.5	35.5	54.5	47.5	45.5	42.0
Ogden St. near Gray St.									
E. End of Ogden	——	–	40.6	55.0	35.0	50.5	43.0	39.5	37.5
F. Other side of tracks 200' East of E.	——	–	38.9	51.0	34.0	47.5	41.0	39.0	37.0
Verdemont Road									
G. Near Boys Camp o	50/0/0	50	50.1	68.5	37.5	65.0	52.5	45.0	41.0
H. Verdemont Road o	50/0/0	50	53.3	73.5	35.0	68.0	52.5	46.5	41.5
I. Off-Road Vehicle Park (no activity)	——	–	50.1	67.0	35.5	62.0	53.0	48.5	43.5
Institute Road									
J. Near Jail o	60/0/0	45	53.7	66.5	39.0	62.5	57.5	54.5	50.0
K. R/R Crossing Overpass	60/0/0	65	50.2	63.5	34.0	60.5	54.0	49.5	44.5
Northern Residential									
L. Cajon Blvd. at Bennet 50' oo	220/0/10	75	63.0	78.5	42.5	75.0	67.5	61.0	52.5
M. Kendall Dr. near Yucca 50' oo	160/10/0	65	72.6	93.5	41.0	88.5	66.5	62.5	53.5
School Site									
N. Cajon Blvd. o	80/20/10	60	62.4	80.0	44.5	75.5	66.0	56.5	49.5
O. S. Edge	——	–	43.9	53.5	38.0	52.0	48.0	43.5	41.0
P. NW. Edge	——	–	43.9	59.5	36.5	57.0	44.5	41.5	39.0

—— = no data
o = 50 feet from center of roadway
oo = 50 feet from edge of roadway

Source: On-Site Noise Monitoring 09/16/90 (11:20-15:20) and 10/26/90 (10:15-11:30)

These noise levels could be attributed to vehicular traffic at high speeds and truck traffic along Cajon Boulevard. The noise exposure recorded at Kendall Drive near Yucca Avenue was 72.6 dB Leq. The proximity to traffic on Kendall Drive plus proximity to both freight and passenger trains passing in the 25 minute monitoring period created a noise exposure level well above the desired 60 dB CNEL. Clearly, no single simple descriptor can characterize areawide noise quality because of the inhomogeneity of existing source distributions. Any project noise impact analysis will need to take this marked spatial variation into account.

Noise review procedure for all development applications in the City of San Bernardino are specified in the City Noise Element. This review process is designed to preclude the development of incompatible uses in noise impacted areas but also to prevent siting major noise producers adjacent to areas of enhanced noise sensitivity. The review procedures, therefore, mandate a careful site survey to analyze for potential compatibility problems. Land use incompatibility is presumed to exist if a noise-producing activity creates a noise hazard even if the impacted property is currently vacant. If any noise producing land use such as a mineral extraction/processing activity creates noise levels in excess of 60 dB CNEL at a sensitive land use, acoustical studies shall be prepared. If the impact cannot be mitigated at least to the 65 dB CNEL level, a sensitive land use incompatibility exists that would be unacceptable under most circumstances. If the noise-producing impact on a sensitive land use cannot be mitigated below 70 dB CNEL, such an impact would be considered unacceptable under almost any circumstance. Project noise impacts on any adjacent industrial uses would be considered acceptable below 70 dB CNEL, conditionally acceptable with mitigation at 75 dB CNEL and unacceptable at noise levels above 80 dB CNEL. These criteria thus form the basis for evaluating the noise impact from the proposed Cajon Creek sand and gravel resource extraction and on-site processing project plus traffic noise impacts from both mineral resource activities as well as from proposed industrial development of the planning area.

NOISE IMPACTS

Significance Criteria

There are no absolute standards of noise impact significance because public impacts are rarely at hearing loss thresholds, but rather more at levels that cause psychological damage. Noisy environments create a perception that external intrusion has degraded the quality of one's life. There are some health impacts such as sleep disturbance that can occur in even relatively quiet areas, but excessive noise is more of a nuisance rather than a trigger for adverse health effects. Although noise standards have been established to distinguish between sensitivity as a function of land use, and artificial penalties have been added to noise events that occur during periods of greater sensitivity, neither the standard nor the noise metric tied to the standard are ideal mechanisms to evaluate nuisance potential. A drippy faucet, a brief dog bark or one noisy motorcycle may all waken a sleeping person without violating a standard or even measurably changing the CNEL. Similarly, people living near a freeway with noise levels 20-30 dB higher than a rural home learn to "tune out" the steady rumble and sleep without interruption. Although one typically uses an incremental increase in CNEL or the existence of noise levels above certain thresholds as criteria for determining impact significance, these measures are not perfect yardsticks. Any impact thus must be evaluated within the context in which it happens in order to determine impact significance.

An increase in noise exposure is generally determined to be significant if:

1. It represents a perceptible increase in noise exposure over the pre-project condition, or,

2. It creates a substantial unsuitability for uses exposed to such noise.

Perceptible for most humans is around a 3 dB change. For an industrial project such as a rock plant, that change can occur almost instantaneously between the plant quiet versus the plant operating. For automotive traffic noise sources, the change is very gradual such that there usually is not a sudden perception that it has gotten noisier. Complaints associated with transportation noise tend to be more focused on single event intrusions such as an aircraft overflight or a train passage rather than for a semi-continuous rumble of vehicles. Nevertheless, a 3 dB change is generally taken as a significance criterion for project impacts even if the impact occurs gradually over an extended period of time.

Changes in noise/land use compatibility levels require a determination of the extent that a given receiver location has been made unsuitable for a current or planned land use. Clearly, a change in noise quality from a level designated "normally acceptable" to one that is "normally unacceptable" is significant. A small incremental degradation that makes the noise exposure only slightly less acceptable is more difficult to evaluate. Accuracy of noise models, especially for traffic sources, is typically only ± 1 dB. Differentiation of the exact contour distances from a source of various classes of acceptability, therefore, has some uncertainty. A noise impact is, therefore, considered significant if it creates a worsening of site suitability for residential use while accompanied by a measurable (+ 1 dB) increase in noise exposure.

Two significance criteria will, therefore, be employed for this analysis, namely,

1. An increase of 3 dB in noise exposure, or,

2. A change in the site suitability for a given land use accompanied by a measurable increase (+ 1 dB) in noise levels.

As previously noted, these arbitrary criteria need to be considered within the context of the existing noise setting. Some locations within the project vicinity are relatively quiet and will be sensitive to changes in the noise loading. Other locations near freeways, train tracks or existing industrial sources are chronically exposed to loud noise and will thus be considerably less sensitive to any changes created by adoption of SP 90-1.

On-Site Noise Impacts

The Cajon Creek project is unique in terms of noise impacts. It is a complex project with industrial growth occurring simultaneously with mineral extraction and processing. The project is, therefore, transitional with progressively more intensive land uses gradually replacing the more passive mineral resource extraction. Noise impacts from site activities will shift concurrently with such transitional development. Initially, on-site rock plant activities and specified plant access routes will create well defined point and line sources at the two simultaneously operating rock plant sites and their primary truck access routes. With increased industrial development, automobiles and trucks dispersed throughout the local transportation grid will become increasingly dominant. Although there will be a cumulative noise effect of all development activities, the on-site processing and off-site transportation noise sources are sufficiently distinct as to be treated/analyzed separately.

Mineral Resource Processing Impacts

Mineral resource extraction, hauling, crushing, screening, loading and other site activities will create noise from a variety of on-site sources. The noise emissions are most heavily concentrated within the processing area because extraction noise is generally shielded by the walls of the quarry itself. The observed noise impact at the nearest residential receptors south and east of the two proposed rock plant sites from all activities will thus be a combination of distinct point radiators and a diffuse collection of mobile combustion equipment noise sources.

Noise emissions from similar operations have been measured on many occasions, and their spherical radiation pattern lends itself well to predicting off-site noise exposure from such sources. However, the noise level around one plant is often different from a comparable plant with similar equipment. In areas of complex terrain, noise levels may vary over short distances such that site-specific effects are difficult to incorporate in a noise impact assessment based on generalized measurements from a prototype plant.

Noise impacts from rock processing activities derive from a wide variety of sources that differ in intensity, frequency and duration. The nature of the rock resource itself tends to contribute to noise generation as the size of the material will determine crushing/screening requirements, as will the ease with which the rock shatters during crushing determine crusher resistance. One characteristic of rock processing and related uses such as concrete production, is that the noise is relatively steady-state such that the noise is more psychologically adaptable to a human observer. One other characteristic is that aggregate resource processing produces considerable low frequency tones that carry for long distances with only partial atmospheric attenuation. Such activities thus unfortunately may be more intrusive at considerable distances from the activity, especially at night. One factor mitigating low frequency noise impacts is that the primary crusher, as one of the main noise generators, will be located within the extraction pit. Both the physical walls of the pit and the greater source to receiver distance will reduce low frequency noise impact potential.

Noise emission rates from individual components within aggregate resource operations have been measured on many occasions such that one can determine a source strength to an arbitrary combination of such sources. Practically, there is a wide array of structural components that limit the effective propagation direction such that crushers may be most audible in one direction, screen discharges in another, and rocks bouncing on a screen in a third. Despite this diversity, one can typically ascribe an effective source strength that is accurate within a rather narrow range of uncertainty. Effective source strength of a rock plant as measured at the C. L. Pharris Church Street Plant in Redlands/Highland is around

72-75 dB at 400 feet from plant center if there is a clear line of sight to the plant and there are no nearby activities such as mobile equipment, stacker discharges, etc. The inclusion of a ready mix plant or an asphaltic concrete plant generally does not substantially change the overall far-field noise level because the rock plant is the more dominant noise generator. The indicated 3 dB range of exposure, in addition to any nearby contamination or obstructions to line-of-sight propagation, depends mainly on whether the primary crusher is operating at the plant or within the quarry removed from the final processing. Differences in percentage of dry versus wet processing also affect noise exposure with wet processing considerably quieter.

Under the assumption of a spherically radiating surface with a clear transmission path, the hourly noise exposure at the nearest off-site residential structure at 1,000 feet from the Parcel N main processing plant will be 64-67 dBA. In terms of an integrated daily (CNEL) exposure from such hourly loading consistent with City Noise Element guidelines, it will depend on the number of hours of operation of the facility and on any measures taken to reduce the overall noise loading. The noise exposure to the possible high school site at 2,000 feet from the proposed main Parcel N plant is 57-60 dB. Because the school site would be occupied primarily during the daytime, plant noise impacts would never exceed the City's 65 dB standard for noise-sensitive land uses. However, if the plant is operated for many hours per day, including from 7-10 p.m. when sound pressure levels are artificially tripled in the CNEL metric, and from 10 p.m. to 7 a.m. when levels are presumed ten times as high as in reality, the acceptability standard form maximally sensitive land uses could be substantially exceeded. The noise exposure at the nearest residence and the school site, as a function of various possible hours of plant operation, is as follows:

	Noise Exposure (dB CNEL)	
Hours of Operation	Nearest Home	High School
07 a.m. - 07 p.m.	61 - 64	54 - 57
07 a.m. - 10 p.m.	64 - 67	57 - 60
06 a.m. - 07 p.m.	64 - 67	57 - 60
06 a.m. - 10 p.m.	65 - 68	58 - 61
06 a.m. - 12 p.m.	67 - 70	60 - 63
24 hours/day	71 - 74	64 - 67

Clearly, City standards of 65 dB as most desirable for maximally sensitive land uses may be exceeded for any operations during periods of enhanced noise sensitivity. Exposure becomes increasingly less acceptable with plant operations during more hours of greater noise sensitivity. Given that there is property even closer than the current nearest home that could be developed into residential uses, a potentially significant impact exists.

Candidate noise reduction measures, in addition to possible limits on hours of operation to avoid the 10 p.m. to 7 a.m. period as much as possible, include design features in the process stream to deaden noise, physical obstructions to line of sight propagation, and building a low profile plant that keeps screens and discharge chutes lower to the ground to where they can be more readily shielded by perimeter berms, or using product stockpiles and/or perimeter berms to help break the line of sight. Noise reduction effectiveness of about 5 dB has been observed at Calmat rock plants in San Diego that use rubberized screen fabric and rubberized discharge chutes/aprons. Rubberizing creates greater maintenance requirements, it can contaminate aggregate quality if it abrades substantially, and it requires much larger screens for the same rock throughput because large portions of the screen mesh are the rubber fabric. Nevertheless, such sound deadening, especially from the upper levels of a rock plant that are hardest to shield from line of sight impacts, is the state of the art in noise impact control.

Shielding of crushers will occur either by quarry walls for the primary crusher, or by product stockpiles for the cone crushers in the processing plant. Crusher and screen noise at residences south of the plant can also be reduced by facing the screens and crushers northward. The shielding of low-level plant sources, including mobile loaders with their annoying back-up alarms, haul trucks, ready mix loading, etc. can be enhanced by perimeter berming which will create substantial additional noise reduction benefit. Some berming benefit already exists from the railroad embankment such that a similar berm on other sides of the plant, coupled with maintaining a 30-foot maximum height on the top of any screen, will substantially further reduce plant noise impacts. With partial screening of ground-based sources, the additional noise benefit will be a 5-10 dB reduction. With full shielding of line of sight of all processing components except the tops of conveyors and silos, the noise reduction will be 10-15 dB.

There is, therefore, a detailed menu of control options that may be employed for noise control. Because each option entails a set of economic trade-offs, it might be most preferable to establish a performance standard at the nearest sensitive receiver site and let the applicant pick from those control options that generate the greatest noise reduction benefit for the least additional cost. An hourly noise exposure of 65 dB from 7 a.m. to 7 p.m., 60 dB from 7 p.m. to 10 p.m., and 55 dB from 10 p.m. to 7 a.m., would insure maintaining the City standard while leaving the applicant maximum flexibility. The unabated hourly noise level was calculated to be 64-67 dB at the closest receiver. Noise reduction of around 5 dB by day and 10 dB during maximum sensitivity are needed to meet the suggested performance standard. As noted above, such reduction is well within the range of possible control, and is easily verified with a mitigation effectiveness monitoring program after plant start-up. Because the change in exterior noise levels from current exposures in the 40-50 dB range to levels above 60 dB CNEL will occur at the nearest residences to the project site, the change substantially exceeds the 3 dB threshold of significance. Noise abatement should, therefore, strive to not just barely meet the City standard, but to reduce exposure with as much additional margin safety as possible.

Portable plant sites aside from the main Area N permanent plant will be surround by less sensitive land uses, and any noise constraints on their operation will be diminished by the lack of any adjacent sensitive receiver population. The same level of noise control will not be necessary. A performance standard of 70 dB at any adjacent occupied light industrial use would be a reasonable limit. Such a level is typically met within 500 feet of the plant center, especially when product stockpile create intermittent transmission barriers. As long as the main plant is carefully controlled, and as long as site traffic is funneled toward Institution/Palm Avenue for freeway access and Cajon Blvd. traffic is minimized, aggregate resource development will not have an adverse noise impact on the surrounding community.

Mobile Source Impacts

Construction Impacts

Temporary equipment noise will result from construction of facilities either from parcels not to be mined or from reuse when mining is completed. The surrounding land use to such activities either has a reduced sensitivity, or the nearest sensitive receivers are so far away as to create an insignificant impact potential. Temporary equipment noise levels of 90 dB may result during construction similar to a rock plant, but these noises occur mainly by day under time constraints imposed on grading/construction permits, and are not a chronic source. Development of the main processing plant will entail considerable effort, but much of the mobile equipment activity will be at ground level shielded from the nearest homes by the railroad embankment. Given the combination of time limits, distance, low surrounding sensitivity and an existing propagation barrier at the nearest homes or school site at the south end of the project, any construction noise impacts will be insignificant. Similarly, the separation distance and freeway background masking effect at the homes near the north end of the project site will sustain any construction activity noise impacts at an insignificant level.

Traffic Noise Impacts

The traffic noise impact analysis was based on a combination of existing traffic dominated by moderate travel speeds and high truck volumes which were expected to continue to well into the future given the industrial nature of proposed development in the Specific Plan area. Noise exposure was calculated using the Federal Highway Traffic Noise Prediction Model (FHWA-Rd-77-108) modified with California-specific vehicle noise characteristics (CALVENO-85). Model calibration was performed by comparing vehicle noise observations from the proposed high school site along Cajon Blvd. with those predicted by the Caltrans microcomputer version of the FHWA Noise Model. With a model-observation difference of less than 1.0 dB, the computer model was judged to be a very suitable tool to evaluate project-related acoustic impacts.

Noise exposure calculations from roadway sources were made for existing traffic and for three horizon years (1997, 2007 and 2017). Calculations were made to determine the CNEL at a fixed reference distance, and the contour distance to various levels of receptor sensitivity were determined from the reference distance calculation. A daytime truck percentage of nine percent heavy trucks was maintained throughout the analysis period to properly simulate the noise effects of truck-intensive uses such as rock products distribution, construction equipment storage and staging, goods warehousing, and industrial development. Roadway noise calculations are summarized in Table B for the 100 foot reference distance CNEL exposure and in Tables C, D and E for the distance to the 60, 65 and 70 dB CNEL contour. The 60 dB CNEL contour distance is the set-back needed for any noise-sensitive not requiring any noise attenuation, 65 dB is the exposure that is not to be exceeded even with mitigation for such sensitive uses, and 70 dB CNEL is the exposure at which noise attenuation must be considered for less noise-sensitive uses such as commercial or light industrial development.

Despite the limited development intensity of the project area, noise levels in close proximity to local roadways exceed the 60 dB CNEL standard out to a moderate distance from area roadways because of heavy truck traffic and rapid travel speeds. Table E shows, however, that the 70 dB contour distance is currently within the roadway right of way along all roads analyzed and thus presents no development constraint for any proposed project light or heavy industrial uses governed by the 70 dB CNEL exposure guideline. Although the 3 dB threshold of significance is marginally exceeded for the "with project" versus "no project" condition, there are only limited noise-sensitive land uses where such a change in noise exposure might be important.

Residential uses along Cajon Blvd. at the north end of the Specific Plan area, Muscoy

TABLE B

CNEL @ 100' TO ROADWAY CENTERLINE (dBA)

Roadway Segment	Exist (1989)	1997 NP	1997 WP	2007 NP	2007 WP	2017 NP	2017 WP
Institution/Palm Ave							
W of RR Tracks	62.4	63.3	64.6	64.6	67.0	66.1	68.2
RR Tracks--Cajon	62.4	63.3	66.6	64.6	68.2	66.1	69.2
Cajon--Kendall	65.3	66.4	68.9	67.1	69.8	68.4	71.0
Cajon Blvd.							
N of Palm	60.0	61.7	63.4	63.8	64.5	66.0	67.3
S of Palm	61.3	63.3	65.3	65.1	66.5	67.2	68.7
Kendall Drive							
Cajon--Palm	59.6	61.2	61.2	63.4	63.4	65.5	68.2

Source: FHWA-RD-77-108 (CALVENO-85 mod.)

NP = No Project

WP = With Project

TABLE C

DISTANCE FROM CENTERLINE TO 60 dB CNEL CONTOUR FROM CENTERLINE

Roadway Segment	Exist (1989)	1997 NP	1997 WP	2007 NP	2007 WP	2017 NP	2017 WP
Institution/Palm Ave							
W of RR Tracks	144'	165'	202'	202'	294'	257'	351'
RR Tracks--Cajon	144'	165'	273'	202'	353'	257'	414'
Cajon--Kendall	227'	268'	391'	297'	448'	364'	541'
Cajon Blvd.							
N of Palm	100'	130'	169'	180'	200'	250'	307'
S of Palm	123'	165'	224'	220'	273'	304'	380'
Kendall Drive							
Cajon--Palm	94'	121'	121'	168'	168'	233'	352'

Source: FHWA-RD-77-108 (CALVENO-85 mod.)

NP = No Project

WP = With Project

TABLE D

DISTANCE FROM CENTERLINE TO 65 dB CNEL CONTOUR FROM CENTERLINE

Roadway Segment	Exist (1989)	1997 NP	1997 WP	2007 NP	2007 WP	2017 NP	2017 WP
Institution/Palm Ave							
W of RR Tracks	67'	77'	94'	94'	137'	119'	163'
RR Tracks--Cajon	67'	77'	127'	94'	164'	119'	192'
Cajon--Kendall	105'	125'	182'	138'	208'	169'	251'
Cajon Blvd.							
N of Palm	<50'	60'	78'	83'	93'	116'	143'
S of Palm	57'	77'	104'	102'	127'	141'	176'
Kendall Drive							
Cajon--Palm	<50'	56'	56'	78'	78'	108'	164'

Source: FHWA-RD-77-108 (CALVENO-85 mod.)

NP = No Project

WP = With Project

TABLE E

DISTANCE FROM CENTERLINE TO 70 dB CNEL CONTOUR

Roadway Segment	Exist (1989)	1997 NP	1997 WP	2007 NP	2007 WP	2017 NP	2017 WP
Institution/Palm Ave							
W of RR Tracks	<50'	<50'	<50'	<50'	64'	55'	76'
RR Tracks--Cajon	<50'	<50'	59'	<50'	76'	55'	89'
Cajon--Kendall	<50'	58'	84'	64'	97'	78'	117'
Cajon Blvd.							
N of Palm	<50'	<50'	<50'	<50'	<50'	54'	66'
S of Palm	<50'	<50'	<50'	<50'	59'	66'	82'
Kendall Drive							
Cajon--Palm	<50'	<50'	<50'	<50'	<50'	50'	76'

Source: FHWA-RD-77-108 (CALVENO-85 mod.)

NP = No Project

WP = With Project

residents at the south end, and the proposed school site are the three main sensitive receiver sites affected by traffic noise changes. The northern residences back up to I-215, and, therefore, have a high baseline noise exposure that will mask any arterial noise impacts. Most Cajon Creek traffic will head southward such that noise impacts near Devore will be limited in any event by the prevailing traffic pattern. Muscoy community homes generally do not back upon or directly face Cajon Blvd. They have adequate set-back to retain an acceptable noise exposure. The amount of frontage for the school site along Cajon Blvd. is very small. Any school buildings would have to be built farther down Fifth Avenue since the possible school property almost comes to a point near Cajon Blvd. At each possible sensitive receiver site (current residences or the future possible high school) background masking or set-back will preclude formation of any adverse noise impacts. A noise conflict could occur if future residences southeast of the project site are built in closer proximity to Cajon Blvd. City noise standards are specific in requiring acceptable exposures not only for existing land uses, but for future uses allowed under current zoning or general plan designation. However, any such homes would need to incorporate sufficient acoustic protection to shield the homes from a noise level of 72 dB CNEL at 200 feet from the AT&SF railroad track (City General Plan, Section 14, p. 14-7). That shielding will similarly protect those same homes from roadway noise exposure. Traffic noise impacts from implementation of Specific Plan SP 90-1 are thus not judged to constitute a significant deterioration of the local noise environment.

MITIGATION

The permanent aggregate processing plant (Planning Area N) noise impact on scattered existing semi-rural residences (and possible future construction) is the only impact identified as requiring mitigation. A variety of mechanisms to achieve an acceptable noise exposure have been identified. It is recommended that the project applicant select those design features that achieve a recommended performance standard and that compliance with that standard is confirmed by subsequent mitigation monitoring imposed as a CUP condition. Mitigation in the way of a performance standard is as follows:

1. Plant operations, including aggregate extraction, processing, handling and formulation of any construction materials, shall not cause hourly noise levels to exceed 65 dB LEQ from 7 a.m. to 7 p.m., 60 dB LEQ from 7 p.m. to 10 p.m., and not to exceed 55 dB LEQ from 10 p.m. to 7 a.m. at the nearest occupied residence to the plant site.

Additionally,

2. Truck traffic, except for local deliveries, shall access I-215 via Palm/Institution to minimize project-related traffic on Cajon Blvd.

3. Construction activities at any permanent facilities within the Specific Plan area shall occur only from 7 a.m. to 7 p.m. on Monday through Saturday, excluding any nationally recognized holidays.

APPENDIX G

TRAFFIC REPORT

CALMAT - CAJON CREEK PROJECT

August 30, 1991

Prepared for:

CalMat Co.
3200 San Fernando Road
Los Angeles, CA 90065

Prepared by

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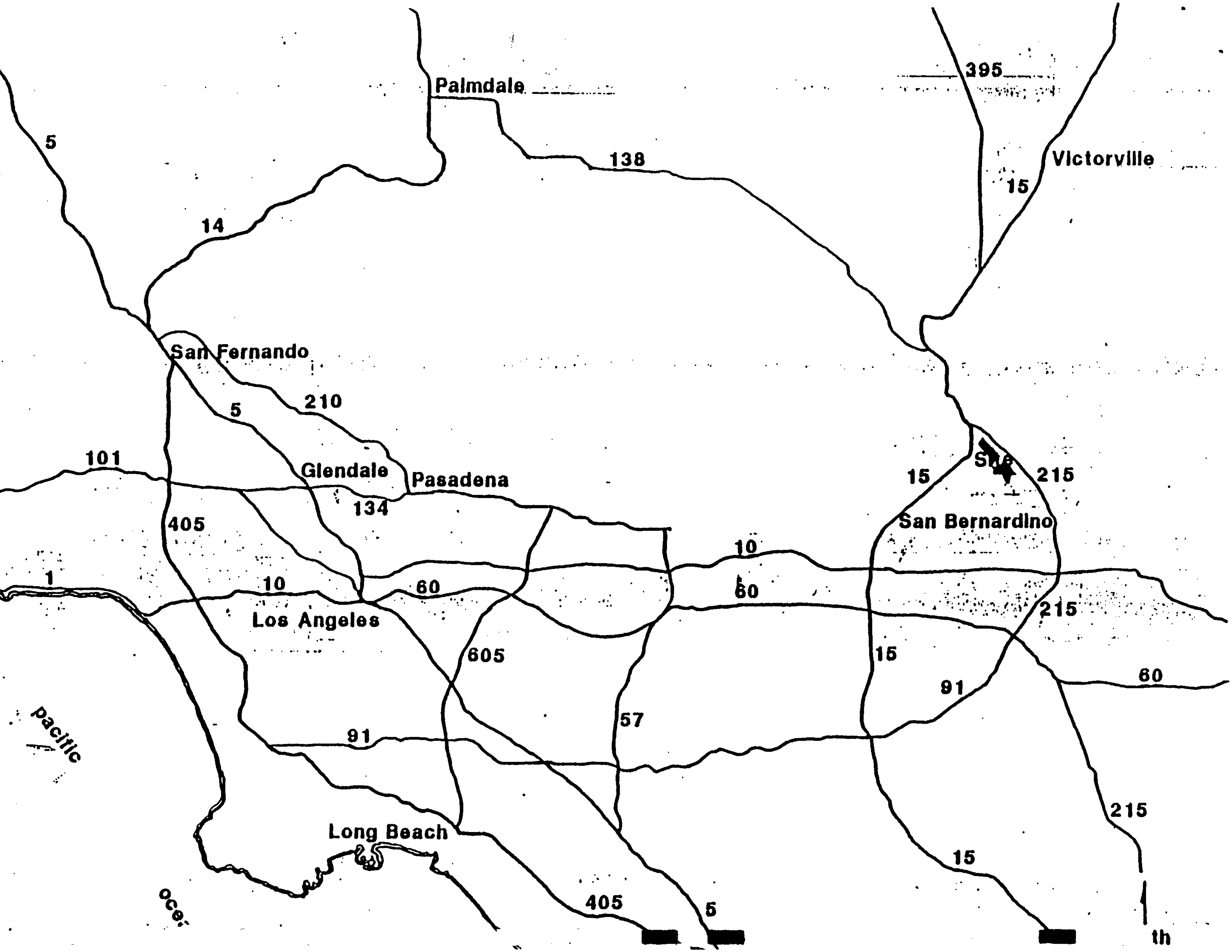
INTRODUCTION

The 1392-acre CalMat Cajon Creek Specific Plan area is located within and adjacent to the extreme northwestern portion of the City of San Bernardino, approximately 5 1/2 miles northwest of the downtown (Figures 1 and 2). Approximately 215 acres of the southeastern portion of the CalMat property are currently within the City of San Bernardino. The remaining 1177 acres of the overall project site are located within the City's Sphere of Influence and are presently undergoing annexation proceedings. Approximately 180 acres of the Specific Plan area, located within Cajon Creek, is owned by the County of San Bernardino Department of Transportation and Flood Control.

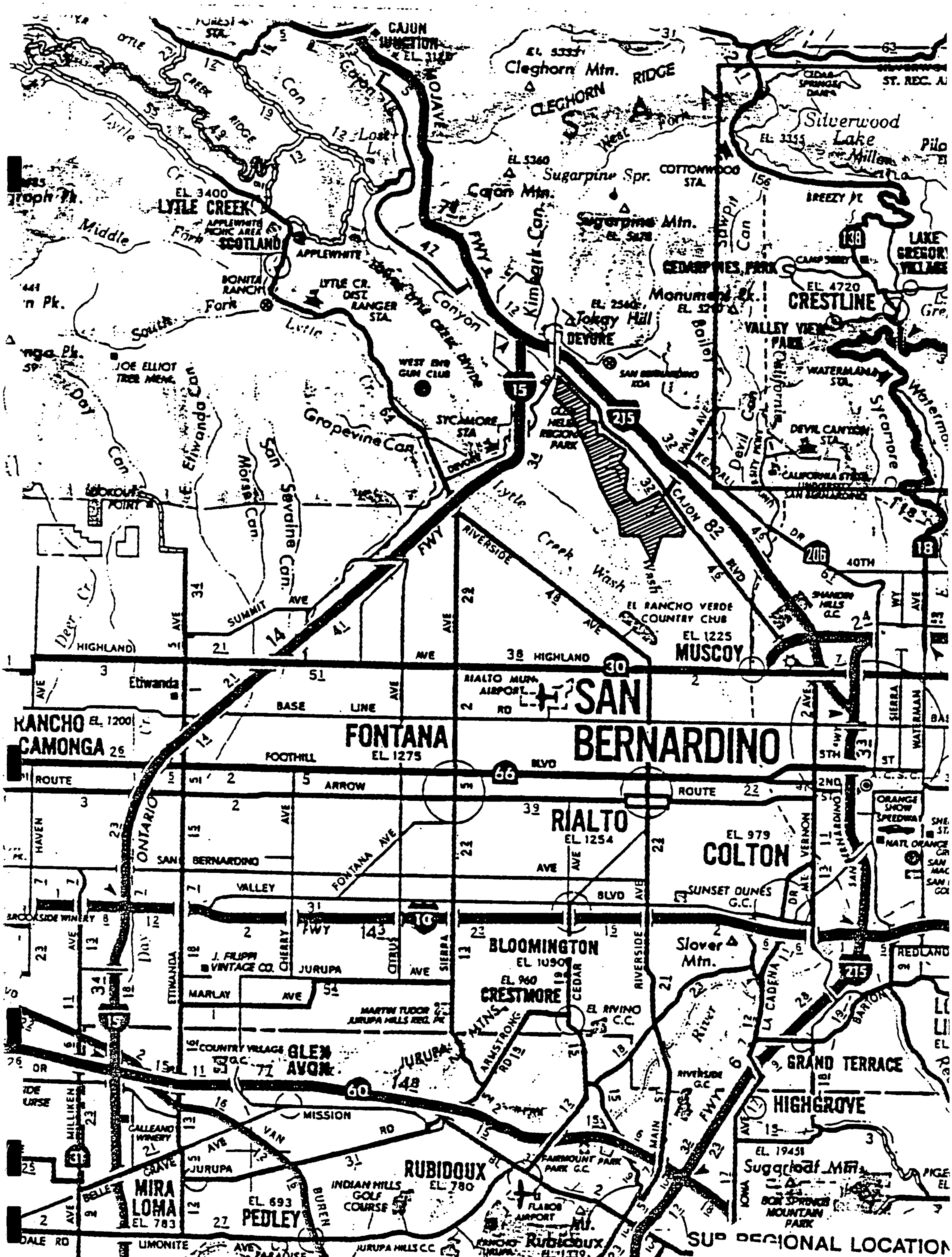
The proposed CalMat Cajon Creek Specific Plan land uses can be seen in Figure 3.

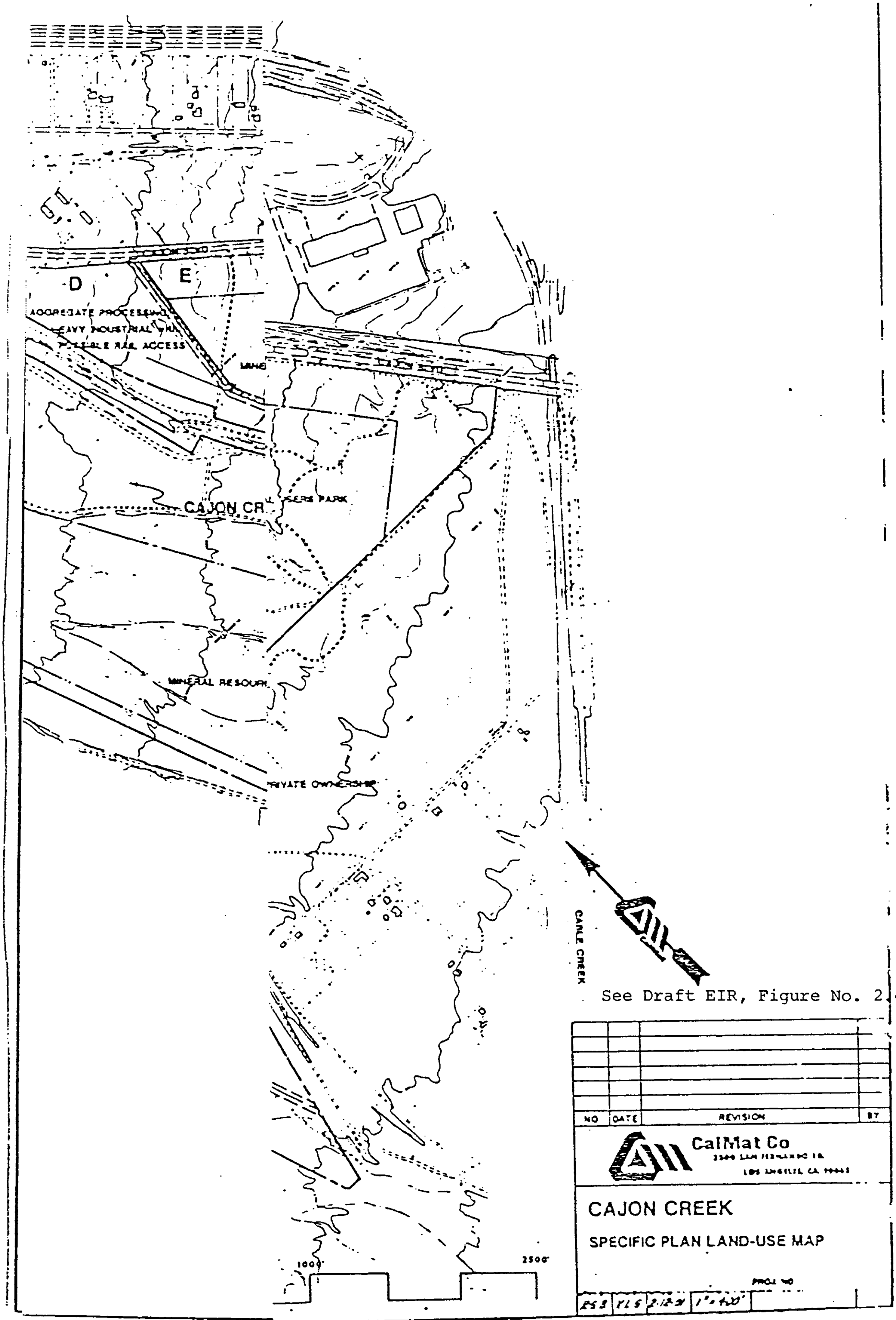
Figure 4 shows the Cajon Creek Infrastructure Improvement Plan which locates the project's overall development by area "A" through "P," and identifies the basic circulation system.

Figure 5 shows the City of San Bernardino General Plan.



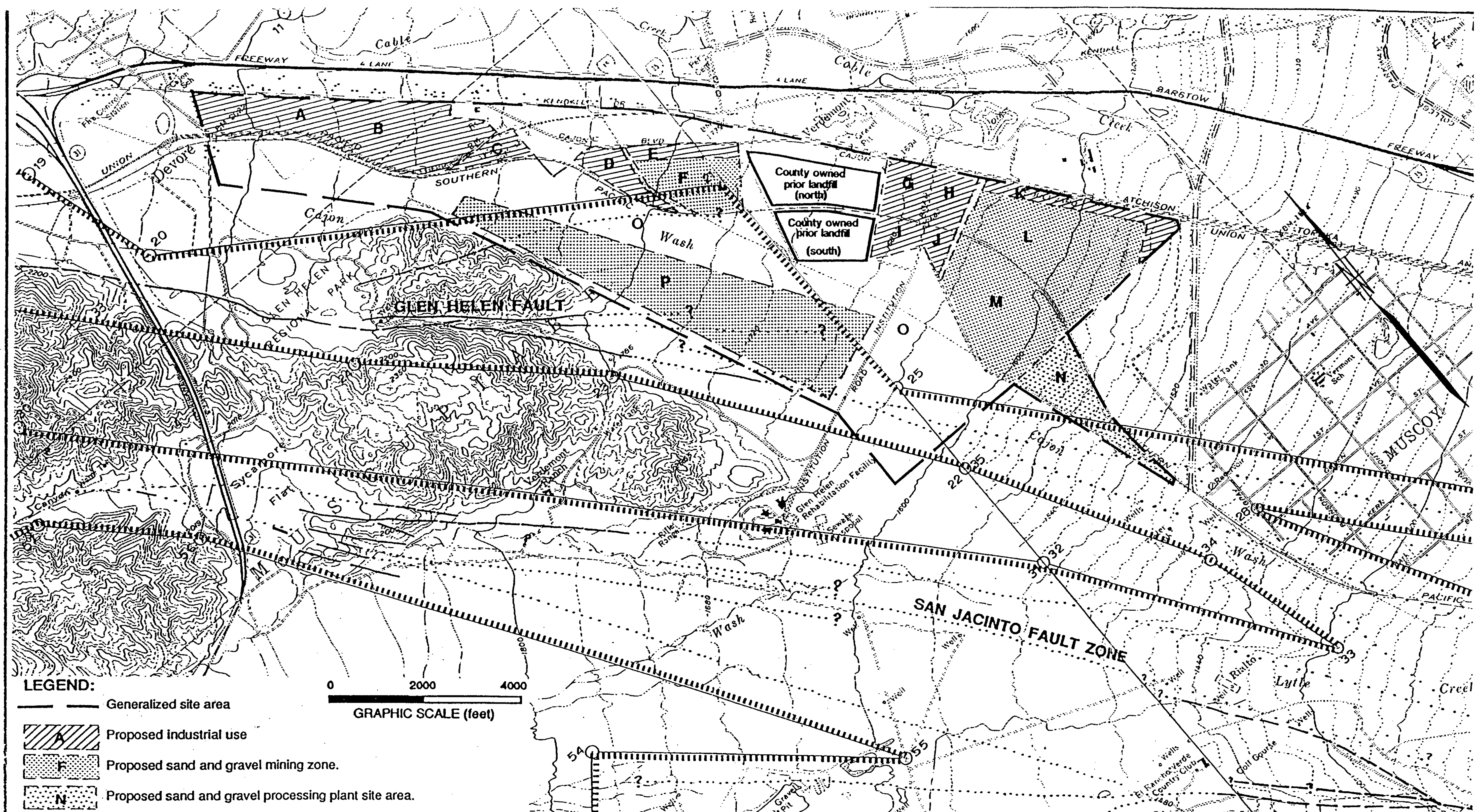
REGIONAL LOCATIC


CAJON JUNCTION
Cleghorn Mtn.
CLEGHORN RIDGE
Silverwood Lake
Sugarpine Spr.
COTTONWOOD STA.
Cajon Mtn.
LYTLE CREEK
EL. 3400
Middle Fork
SCOTLAND
APPLEWHITE
BONITA RANCH
South Fork
LYTLE CR. DIST. RANGER STA.
Conyon
Kimbark Can.
Monument Pk.
CRESTLINE
EL. 4720
VALLEY VIEW PARK
LAKE GREGORY VILLAGE
DEVORE
JOE ELLIOT TREE MEM.
WEST END GUN CLUB
Gropevine Can.
SYCAMORE STA.
Etiwanda Can.
San Sevaine Can.
LOOKOUT POINT
Lytle Creek Wash
CAJON BLVD
RIVERSIDE AVE
EL RANCHO VERDE COUNTRY CLUB
SHANDIN HILLS G.C.
40TH
DEVIL CANYON STA.
CALIFORNIA STATE UNIVERSITY SAN BERNARDINO
SUMMIT AVE
HIGHLAND AVE
Etiwanda
MUSCOY
EL. 1225
RIALTO MUN. AIRPORT
SAN BERNARDINO
BASE LINE RD
RANCHO CAMONGA
EL. 1200
FONTANA
EL. 1275
FOOTHILL BLVD
ARROW ROUTE
RIALTO
EL. 1254
COLTON
EL. 979
ORANGE SHOW SPEEDWAY
SAN BERNARDINO AVE
VALLEY BLVD
SUNSET DUNES G.C.
FONTANA AVE
BLOOMINGTON
EL. 1090
Slover Mtn.
J. FILIPPI VINTAGE CO.
JURUPA AVE
MARLAY AVE
CRESTMORE
EL. 960
MARTIN TUDOR JURUPA HILLS REG. PK
EL RIVINO C.C.
COUNTRY VILLAGE G.C.
GLEN AVON
JURUPA MTNS
GRAND TERRACE
HIGHGROVE
RIVERSIDE G.C.
MISSION
VAN BUREN
CALLEANO WINERY
RUBIDOUX
EL. 780
FAIRMOUNT PARK G.C.
INDIAN HILLS GOLF COURSE
FLABOB AIRPORT
MIRA LOMA
EL. 783
PEDLEY
EL. 693
LIMONITE AVE
Sugarloaf Mtn.
EL. 1945
BOX SPRINGS MOUNTAIN PARK
LA CADENA
BARTON
MILLIKEN
HAVEN AVE
ETIWANDA
CHERRY
CITRUS
SIERRA
CEDAR
WATERMAN
SUB REGIONAL LOCATION



See Draft EIR, Figure No. 2.4-1

FIGURF 3



SITE PLAN AND ALQUIST-PRIOLO SPECIAL STUDY ZONES
PRELIMINARY GEOLOGIC RECONNAISSANCE
CALMAT CAJON CREEK PROJECT

DRAWN BY: CDJ	CHECKED BY:	FIGURE NO: 1
DATE: 8-7-90	PROJECT NO: 9053139N-2000	

WOODWARD-CLYDE CONSULTANTS

PROJECT DESCRIPTION

CalMat proposes to develop Planning Areas "A," "B," "C," "D,""E," "G," "H," "I," "K," and "J" as light- or heavy-industrial sites. Area "D" and a portion of Area "I" will have an interim use as aggregate processing plant sites, but ultimate use will be heavy industrial. Area "N" will be the permanent aggregate processing plant site for the long-term mining of Areas "L" & "M."

Area "F" will be mined and, following reclamation, developed as heavy industrial.

Areas "L" and "M" will be used as an interim Construction Material User Park during near term, mined during intermediate term, and when reclaimed in 30+ years, and redeveloped as light industrial/Construction Material Users Park (CMUP).

PHASING PLAN

CalMat proposes to phase the project as shown in Table 1.

San Bernardino City Department of Public Works has approved the use of a 5% per year growth factor for existing traffic in this report. For purposes of this study, it has been necessary to establish an estimated final year for each phase. In each mining area, this estimate is based on the amount of aggregate resource material available and an assumed extraction rate, based on the annual capacity of the proposed procesing plants. The projection development in the industrial areas also assumed an absorption rate for such land use in the community. These year-by-year estimates are intended for use in projecting traffic volumes for this report. They are not meant to direct project implementation.

Near term	1992-1997
Intermediate term	1997-2007
Long term	2007-2017

Table 1

CalMat Cajon Creek Specific Plan Development Phasing

Timing	Development Cluster	Planning Area	Planned Use
Near Term	1a	O	Open Space
	1b	D	Aggregate Processing
		F	Mineral Resource Extraction
		E	Buffer Development - Light Industrial
	1c	G	Light Industrial
		H	Light Industrial
		I (part)	Construction Material Users Park
		J	Construction Material Users Park
	1d	P	Mineral Resource Extraction
		I (part)	Aggregate Processing
	1e	L or M	Construction Material Users Park
		K	Buffer Development - Light Industrial

Table 1 (continued)

CalMat Cajon Creek Specific Plan Development Phasing

Timing	Development Cluster	Planning Area	Planned Use
Intermediate Term	2a	L	Mineral Resource Extraction
		M	Mineral Resource Extraction
		N	Aggregate Processing
	2b	I	Heavy Industrial - Redevelopment
		J	Heavy Industrial - Redevelopment
Long Term	3a	D	Heavy Industrial - Redevelopment
		F	Heavy Industrial - Redevelopment
	3b	A	Buffer Development - Light Industrial
		B	Heavy Industrial with Rail Access
		C	Heavy Industrial with Possible Rail Access
	3c	L	Light Industrial/ Construction Material Users Park - Redevelopment
		M	Light Industrial/ Construction Material Users Park - Redevelopment

TRAFFIC GENERATION

Three aggregate processing plant sites are planned. Site #1 will be in Area "D" and used for the mining of Area "F." This will be a portable plant only without an ancillary concrete and asphalt batching plant. It is assumed that this plant will generate 650 trips/day, which includes 600 truck trips. It is assumed that the processing operation will be completed by the year 2007.

Site #2 will be on a portion of Area "I." This plant site, portable without concrete and asphaltic batch plant, will be used during the mining of Area "P" in the Cajon Creek Floodplain area. It is again assumed that this plant will generate 650 trips/day, including 600 truck trips. It is assumed for this study that mining will be completed by year 2007, and Area "I" would subsequently be redeveloped.

Site #3 will be located on Area "N" and utilized during the long-term mining of Areas "L" and "M." This plant will be of similar size and makeup as CalMat plants in Mission Valley and Carroll Canyon in the City of San Diego. Recent studies of these plants made by Federhart & Associates showed a total of 950 vehicles per day at each site, of which 800 trips were trucks. This site will have asphalt and concrete batch plants.

After consultation with the City of San Bernardino Traffic Engineer, it was agreed that, for purposes of this study, a generation rate of 60 trips per acre would be used for all light and heavy industrial sites.

In the phasing plan (see Table 1) CalMat proposes to utilize Areas "L" and "M" of the project as Construction Material Users Park (CMUP) This use will, in fact, be a low intensity land use which will include activities such as concrete pipe manufacture. It is not viewed as a major traffic generator, and a generation rate of 5 trips per acre for Areas "L" and "M" has been assigned for such uses in this report. In the smaller, similar interim use areas, within Planning Areas "I" and "J," a rate of 10 trips per acre was used. These rates were approved by the City Traffic Engineer.

Table 2

Traffic Generation by Area and Phasing Time

Near Term

Planning Areas	AC	Land Use	Generation Rate	ADT
A & B	113.0 (net)	Lt & Heavy Ind	- 0 -	0
C	6.0	Heavy Ind	- 0 -	0
D	18.5	Aggregate Plant	650/Plant	0
E	14.0	Lt Ind	60/AC	840
F	51.0	Mineral Extraction	- 0 -	0
G	25.1 (net)	Lt Ind	60/AC	1506
H	22.3 (net)	Lt Ind	60/AC	1338
I	17.4	Aggregate Plant	650/Plant	650
	17.4	Const. Matl. User Park	10/AC	174
J	14.0	Const. Matl. User Park	10/AC	140
K	36.0	Lt Ind	60/AC	2160
L	130.5	Const. Matl. User Park	5/AC	653
M	97.5	Const. Matl. User Park	5/AC	488
N	70.0	Future Plant Site	- 0 -	0
O	488.0	Open Space	- 0-	0
P	257.0	Mineral Extraction	- 0 -	0

NEAR TERM TOTAL (1992-1997) = 8599

Table 2

Traffic Generation by Area and Phasing Time

Intermediate Term

Planning Areas	AC	Land Use	Generation Rate	ADT
A & B	113.0 (net)	Lt & Heavy Ind	60/AC	0
C	6.0	Heavy Ind	60/AC	0
D	18.5	Reclamation	- 0 -	0
E	14.0	Lt Ind	60/AC	840
F	51.0	Reclamation	- 0 -	0
G	25.1 (net)	Lt Ind	60/AC	1506
H	22.3 (net)	Lt Ind	60/AC	1338
I	34.8	Heavy Ind	60/AC	2088
J	14.0	Heavy Ind	60/AC	840
K	36.0	Lt Ind	60/AC	2160
L	130.5	Mineral Extraction	- 0 -	0
M	97.5	Mineral Extraction	- 0 -	0
N	70.0	Plant Site	950/Plant	950
O	488.0	Open Space	- 0-	0
P	257.0	Open Space	- 0 -	0

INTERMEDIATE TERM TOTAL (1997-2007) 9722 ADT

Table 2

Traffic Generation by Area and Phasing Time

<u>Long Term</u>

Planning Areas	AC	Land Use	Generation Rate	ADT
A & B	113.0 (net)	Lt & Heavy Ind	60/AC	6780
C	6.0	Heavy Ind	60/AC	360
D	18.5	Heavy Ind	60/AC	1110
E	14.0	Lt Ind	60/AC	840
F	30.4 (net)	Const. Matl. User Park	10/AC	304
G	25.1 (net)	Lt Ind	60/AC	1506
H	22.3 (net)	Lt Ind	60/AC	1338
I	34.8 (net)	Heavy Ind	60/AC	2088
J	14.0	Heavy Ind	60/AC	840
K	36.0	Lt Ind	60/AC	2160
L	130.5	Const. Matl. User Park (small part may be Lt Ind)	5/AC	653
M	97.5	Const. Matl. User Park (some extraction may continue)	5/AC	488
N	70.0	Plant Site	950/Plant	950
O	488.0	Open Space	- 0-	0
P	257.0	Open Space	- 0 -	0

LONG TERM TOTAL (2007-2017) 19,417 ADT

TRAFFIC DISTRIBUTION

After review with the San Bernardino Traffic Engineer, the following traffic distribution will be used when assigning project traffic to the street system.

Table 3

Traffic Distribution

General - Regional
To the south 85%
To the north 15% (part of traffic is to I-15 south)

Areas A, B, & C south traffic (85% of total)

90% will use Kendall to reach Palm and I-215
10% will use Cajon Blvd. to south of project

North traffic:

All will use Cajon Blvd. (15% of total)

Areas D, E, & F

South traffic: (85% of total)

90% will use Cajon Blvd. to Palm to I-215
10% will use Cajon Blvd. to south of project

North traffic:

All will use Cajon Blvd. (15% of total)

Areas G, H, I, & J

90% of all traffic will use Palm Ave.--I-215 N & S
10% of all traffic will use Cajon to south

Area K

60% of all traffic will use Palm Ave.--I-215 N & S
40% of all traffic will use Cajon Blvd. to south

Areas L, M, & N

70% north to Palm
30% south on Cajon

EXISTING CONDITION

Cajon Boulevard varies in width along the length of the project. It was built by CalTrans during the first half of this century and formerly designated Route 66. It is basically a 40' roadway in a 60' right-of-way between the south end of the project and north of Planning Area "G." Along areas "D" &" E," some improvements have been made to the easterly side of the roadway. The underpass of the railroad north of Area "D" and south of Kendall Drive is 30' wide. North of Kendall Drive and along Areas "A" and "B" Cajon Boulevard is 50' to 58' wide and striped for four lanes.

The City of San Bernardino proposes that Cajon Boulevard be constructed as a 64' roadway along the project area within a 90' right-of-way.

Palm Avenue, which will serve the project as access to I-215, is 72' in width near the Interstate 215 freeway. In the area between I-215 and Cajon Boulevard, adjacent development will complete Palm Avenue to its planned 72' width.

Institution Road is currently 30'wide through the project area. The City proposes the widening of this road to 64'.

Traffic counts have been made in the area of Cajon Boulevard, Palm Avenue, Institution Road, and Kendall Drive by the County of San Bernardino in 1989. They are shown in Figure 6.

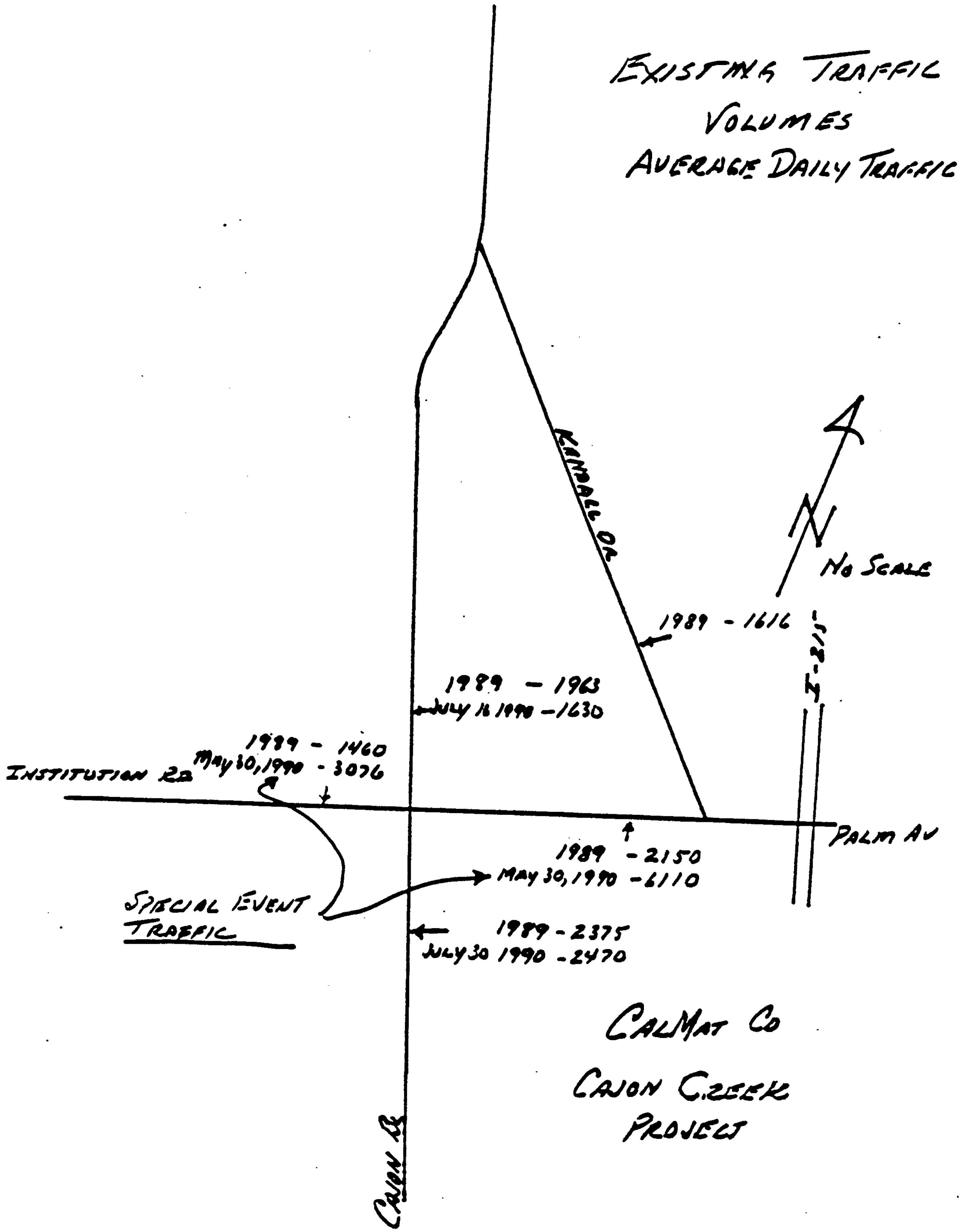

EXISTING TRAFFIC
VOLUMES
AVERAGE DAILY TRAFFIC
KENDALL DR
N
NO SCALE
1989 - 1616
I-215
1989 - 1963
JULY 16 1990 - 1630
1989 - 1460
MAY 30, 1990 - 3076
INSTITUTION RD
PALM AV
1989 - 2150
MAY 30, 1990 - 6110
SPECIAL EVENT
TRAFFIC
1989 - 2375
JULY 30 1990 - 2470
CALMAT CO
CAJON CREEK
PROJECT
CAJON BL

FIGURE 6

In addition, traffic counts were made on May 30, 1990, on Palm Avenue/Institution Road that reflect a special event at the Don Brown Racing Facility. This facility holds Wednesday night events during their racing season. This nighttime traffic would not conflict with the project's mining or industrial traffic. These counts were 6110 on Palm Avenue and 3076 on Institution Road. For a worst case analysis, these special count increases over the normal counts were added to the normal counts each year, but were not compounded at 5%.

Traffic counts were also made on Cajon Boulevard on July 16, 1990, north and south of Palm. These counts are shown on Figure 6 and serve to confirm the 1989 counts. These 1990 counts were averaged with the 1989 counts and used as 1989 counts for purposes of this report.

Charles P. Strong and Associates made manual turning movement count at the intersections of Cajon Boulevard and Palm/Institution during the A.M. peak hours on March 20, 1990, and P.M. peak hours on February 23, 1990. The A.M. peak was found to be 7:15 to 8:15 A.M. The P.M. peak was found to be 4:00 to 5:00 P.M. This intersection was found to be operating at Level of Service "A" during both the A.M. and P.M. peak hours. These traffic counts are shown in the Appendix.

The City of San Bernardino requested that a Traffic Engineering Study traffic count be made at the intersection of Cajon Boulevard and State College Way, which is 1 1/2 miles south of the project. A P.M. manual count was made between 4:00 P.M.

and 6:00 P.M. The peak hour was 4:30-5:30 P.M.. Level of Service was found to be "A." However, because of the offset nature of this intersection and lack of traffic signals, the intersection functioned poorly.

The consultant contacted the County of San Bernardino and found that a traffic signal study was made on 12/5/88 (copy attached). The County staff stated that the intersection met traffic signal warrants at that time. It ranked #18 on their signal priority list. They estimated that it would be signalized in 3 to 4 years (1992-93).

Property owners in the area report that negotiations are underway to obtain additional right-of-way for the reconfiguration of the intersection.

EXISTING TRAFFIC GROWTH RATE

As previously discussed, the City Department of Public Works staff approved a growth rate of 5% per year compounded to be used on existing traffic flow for purposes of estimating future traffic volume over which project traffic will be superimposed. Table 4 shows this background traffic by selected year based on the County of San Bernardino's 1989 traffic counts.

Table 4

Existing Traffic Growth Rate
(5%/year)
(approved 9/18/90)

Year	Kendall No. of Palm	Cajon No. of Palm	Cajon So. of Palm	Institution West of Cajon	Palm East of Cajon
1989	1616	1796	2422	3076	6110
1990	1697	1886	2543	3149	6218
1997	2388	2653	3578	3774	7138
2007	3888	4322	5828	5131	9138
2017	6330	7040	9491	7344	12396

TRAFFIC ASSIGNMENT

Using the traffic generation rates, the Specific Phasing Plan, and traffic distribution as previously described, a manual average daily traffic assignment was made. These traffic volumes were combined with the existing traffic volumes expanded to the years 1997, 2007, and 2017. These volumes are shown in Figures 7, 8, and 9.

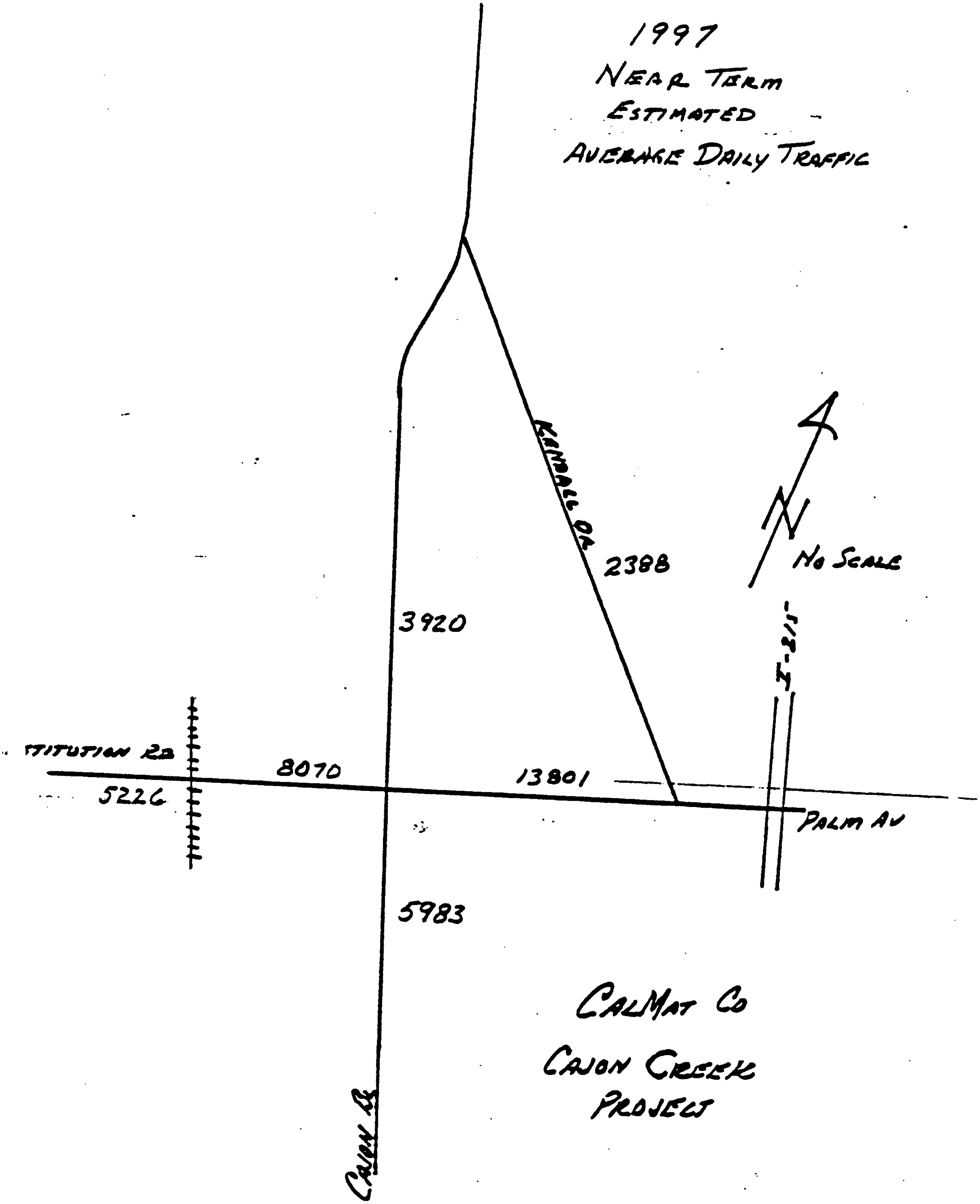
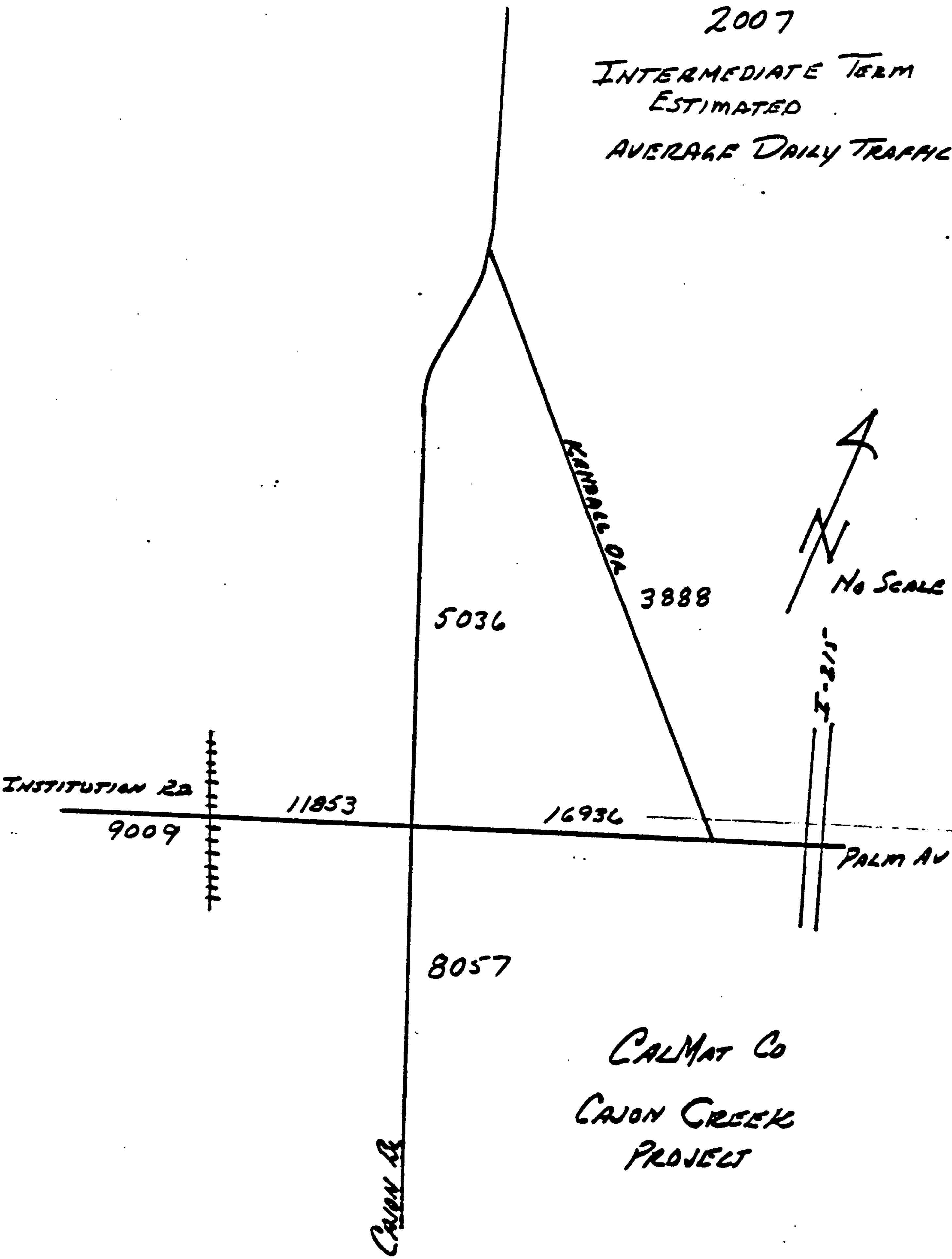

1997
Near Term
Estimated
Average Daily Traffic
Kendall Dr
2388
No Scale
3920
I-215
8070
13801
5226
Palm Av
5983
CalMat Co
Cajon Creek
Project
Cajon Bl

Figure 7



2007
INTERMEDIATE TERM
ESTIMATED
AVERAGE DAILY TRAFFIC
KENDALL DR
3888
5036
NO SCALE
N
I-215
INSTITUTION RD
9009
11853
16936
PALM AV
8057
CALMAT CO
CAJON CREEK
PROJECT
CAJON BL

Figure 8

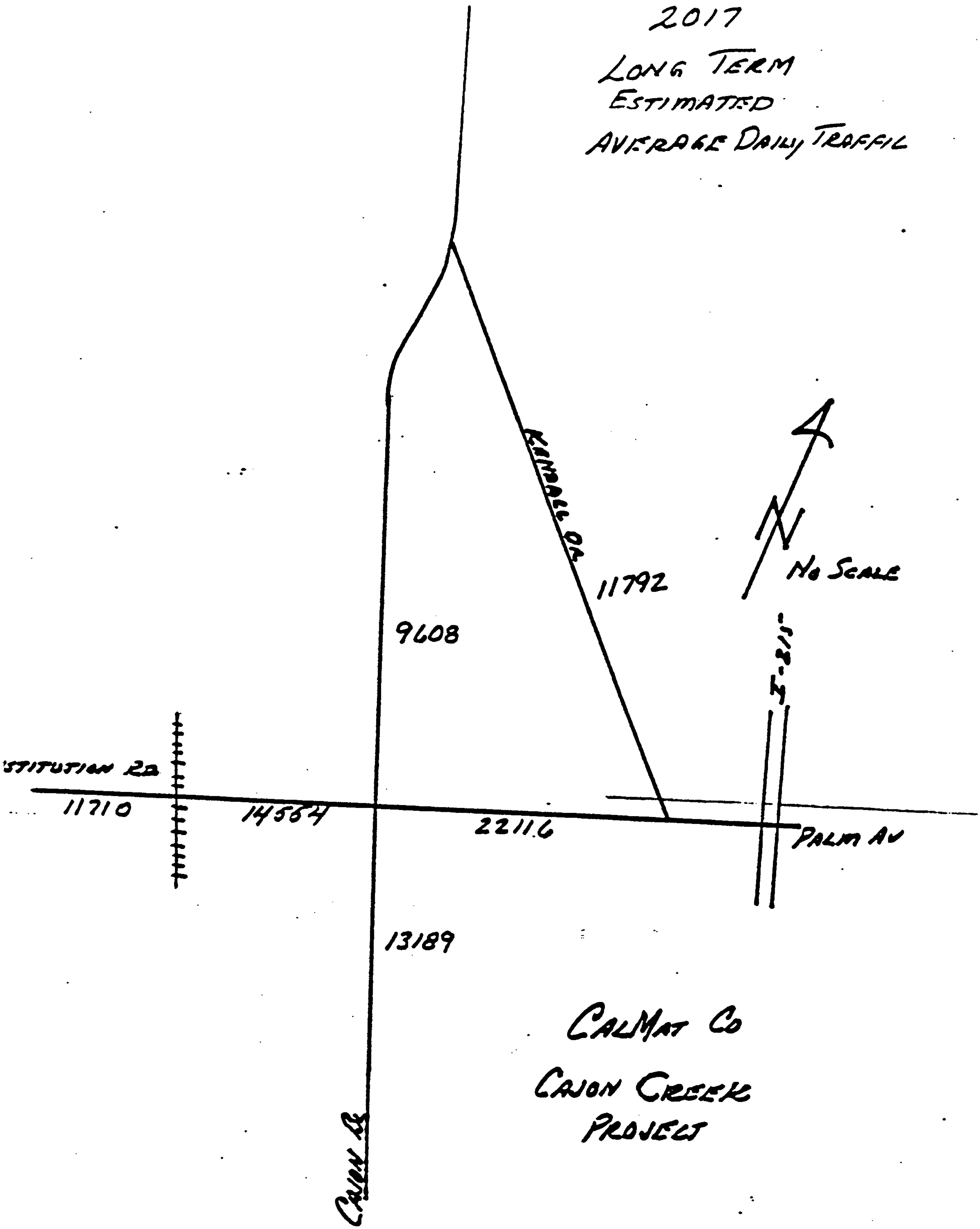

2017
LONG TERM
ESTIMATED
AVERAGE DAILY TRAFFIC
KENDALL DR
11792
9608
NO SCALE
N
I-215
STITUTION RD
11710
14564
22116
PALM AV
13189
CALMAT CO
CAJON CREEK
PROJECT
CAJON BL

Figure 9

CAJON BOULEVARD RAILROAD UNDERPASS

The City of San Bernardino requested an analysis of the future traffic volumes at the Cajon Boulevard underpass of the AT&SF Railroad tracks south of the intersection of Cajon Boulevard and Kendall Drive.

The closest available traffic count is on Cajon Boulevard, just north of Palm Avenue. In 1989 the traffic volume at this location was 1796 vehicles per day.

After an evaluation of the existing development, freeway interchanges, and street patterns, it was estimated that the traffic volumes at the underpass would be at a maximum of 2/3 of the Cajon Boulevard traffic volumes just north of Palm Avenue. Using the approved 5% annual growth factor for the nonproject traffic volumes, the traffic volumes shown on Figure 10 were obtained.

The CalMat-Cajon Creek Project traffic has been assigned as previously described. Few near-term traffic volumes were assigned north on Cajon Boulevard to reach I-215 and the north (15%). The majority of all traffic was assigned to and from the south.

During the long-term development (year 2017), most of which is north of the Cajon Boulevard and Kendall Drive intersection, 10% of Areas "A," "B," and "C" project traffic will be assigned to this section of roadway. This volume of 1359 vehicles per day is also shown in Figure 10.

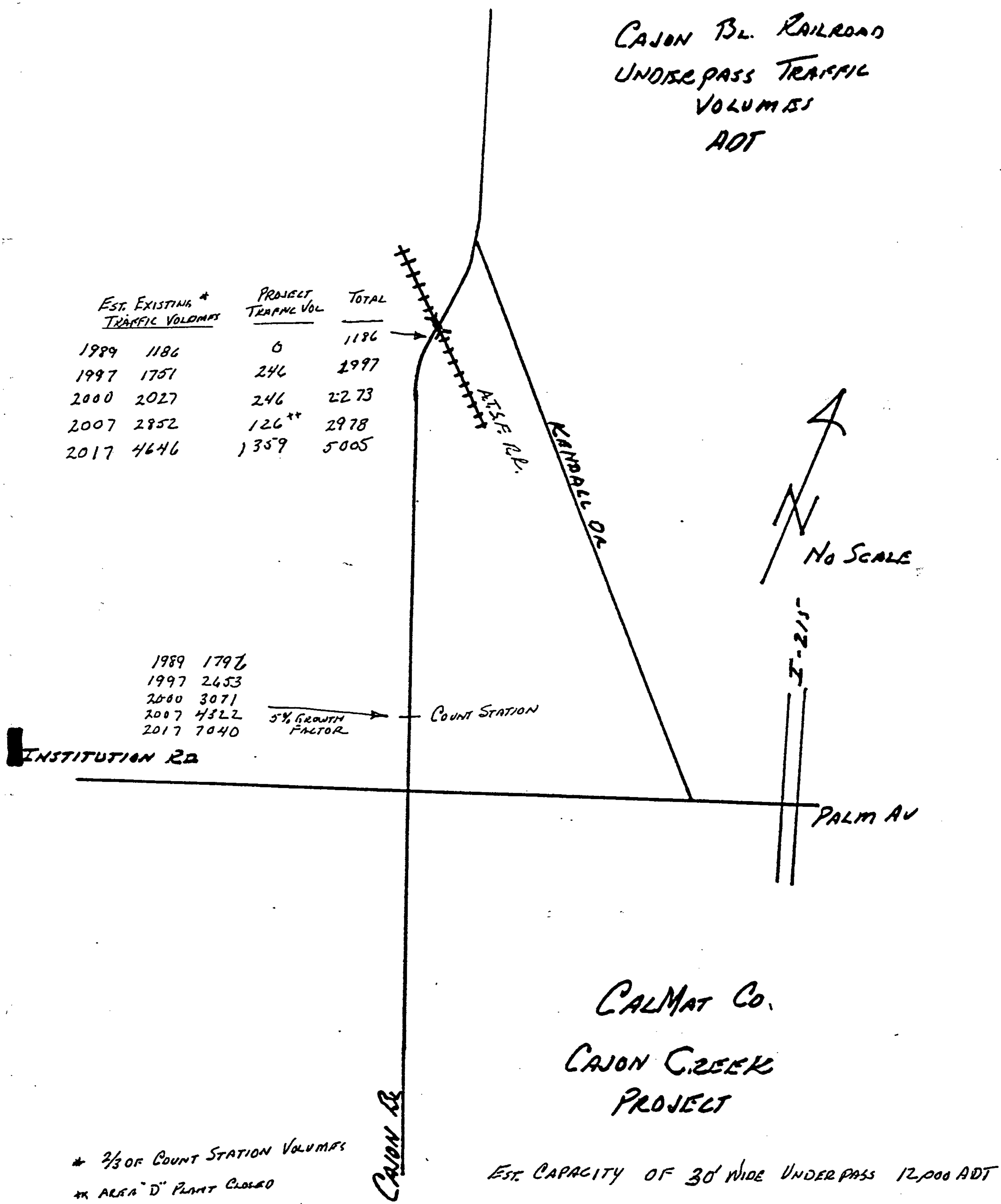

CAJON BL. RAILROAD
UNDERPASS TRAFFIC
VOLUMES
ADT
EST. EXISTING * TRAFFIC VOLUMES
PROJECT TRAFFIC VOL
TOTAL
1989 1186 0 1186
1997 1751 246 1997
2000 2027 246 2273
2007 2852 126** 2978
2017 4646 1359 5005
A.T.S.F. R.R.
RANDALL DR
N
NO SCALE
I-215
1989 1792
1997 2453
2000 3071
2007 4322
2017 7040
5% GROWTH FACTOR
COUNT STATION
INSTITUTION RD
PALM AV
CALMAT CO.
CAJON CREEK
PROJECT
CAJON BL
* 2/3 OF COUNT STATION VOLUMES
** AREA "D" PLANT CLOSED
EST. CAPACITY OF 30' WIDE UNDERPASS 12,000 ADT

Figure 10

It is estimated that the traffic volume at the underpass will reach 5,000 vehicles per day in 2017. The capacity of this roadway is estimated at 12,000 vehicles per day. We foresee no need to widen the underpass during the life of this project, if ever. In this section of the City of San Bernardino, Kendall Drive will carry a higher traffic volume than Cajon Boulevard.

PEAK HOUR TRAFFIC ANALYSIS

A detailed traffic analysis of the A.M. and P.M. peak traffic was made for the through intersection of Palm Avenue and Cajon Boulevard, Palm Avenue and Kendall/SB I-215 ramps, and Palm Avenue and NB I-215 ramps for the existing year (1990 or 1991), and the years 1997, 2007, and 2017. Because of the voluminous nature of the hand calculations and computer printouts necessary for this analysis (250+ pages), a copy of this data, presented as a "Technical Appendix," will be given to the Public Works Department for their analysis and file. The following is a summary of the analysis.

PEAK-HOUR PROJECT VOLUMES ON CMP
NETWORK SHEETS FOR THE YEAR 2000

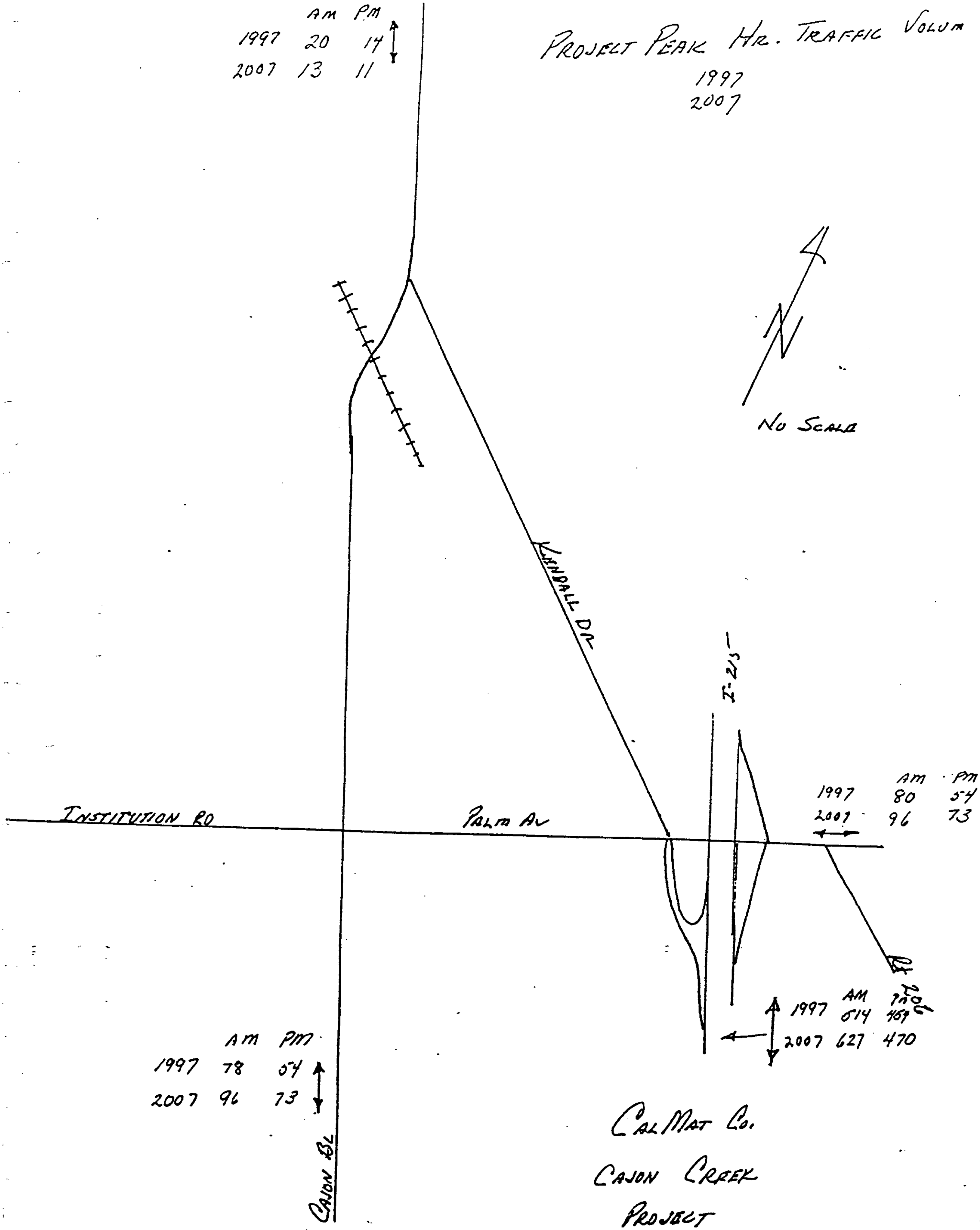
The proposed Congestion Management Program (CMP) for San Bernardino County proposes a detailed analysis of project traffic volumes on their street network that exceeds 50 vehicles per hour and 100 vehicles per hour on freeways in the year 2000. Since a regional computer assignment of the region is not available at this time, the manual traffic assignment performed by the consultant, with the assistance of the City Traffic Engineer, was made.

All project data is based on the years 1997 and 2007. We will give the peak-hour estimate for 1997 and 2007. These volumes are shown on Figure 11.

Cajon Boulevard north of the project is estimated to have peak-hour volumes less than 50 vehicles per hour until the year 2017. No additional analysis was made.

Cajon Boulevard south of the project will have traffic volumes 54 and 96 during the peak hours. It is estimated that the volumes will be less than 50 vehicles per hour on the intersection of Cajon Boulevard and State College Way. This intersection will be improved by the County of San Bernardino. A discussion of their planned improvements are discussed on page 20 of this report.

Peak-hour traffic volume on Palm Avenue east of I-215 Freeway will vary from 54 to 96 vehicles per hour. These volumes will not exceed 50 vehicles per hour past the intersection of Route 206 (Kendall Drive) and Palm Avenue.



Project Peak Hr. Traffic Volum
1997
2007
AM PM
1997 20 14
2007 13 11
No Scale
Kendall Dr
I-215
Institution Rd
Palm Av
AM PM
1997 80 54
2007 96 73
Rt 206
AM PM
1997 614 469
2007 627 470
AM PM
1997 78 54
2007 96 73
Cajon Bl
CalMat Co.
Cajon Creek
Project

Figure 11

The peak-hour traffic volume on I-215 Freeway will not exceed 100 vehicles per hour north of Palm Avenue during the year 2000 time frame. South of Palm Avenue the peak-hour traffic will be well in excess of 100 vehicles per hour. Without a regional traffic assignment, we are unable to determine the freeway distribution beyond this point.

PEAK HOUR INTERSECTION ANALYSIS

Table 5 shows a summary of the detailed analysis. All calculations are in accord with the 1985 Highway Capacity Manual. The computer programs do not provide for a four-way stop analysis. Therefore, hand calculations were made. Enclosed in the Technical Appendix is a description of the method used.

A major inherent error is involved with the years 2007 and 2017 estimated traffic volumes that requires caution in looking at the data presented. Expansion factors used on the existing traffic to expand these volumes from 1991-2007 and 1991-2017 resulted in multiplying existing data by factors of 219% and 355%. This resulted in some traffic moves that are not realistic. However, with the widening of the freeway off-and-on ramps to accept two or three lanes, all the traffic signals at the I-215 interchange can be made to work without major redesign of the interchange. It is our recommendation the interchange ramps be signalized between the years 1997 and 2000. However, the design should be based on then existing counts and not compound expansion of 1990 and 1991 counts.

Table 5 provides the A.M. and P.M. level of service at the through intersections for the years 1997, 2007, and 2017.

Table 5

Intersection Level of Service

Intersection: Palm Avenue and Cajon

Year	A.M. LOS	P.M. LOS	COMMENTS
Existing	A	A	Existing 4-way stop
1997	C	A	Existing 4-way stop
2007	B	B	Ultimate signalized intersection 60 sec. cycle 13.5 & 13.6 sec. delay
2017	B	B	60 sec. cycle 11.5 & 14.3 sec. delay

Intersection: Palm Avenue and I-215 SB Ramps/Kendall

Year	A.M. LOS	P.M. LOS	COMMENTS
Existing	A	A	Existing 4-way stop
1997	B	B	4-way stop
1997	B	C	Signalized 60 sec. cycle 13.8 & 16.6 sec. delay
2007	B	B	Signalized 60 sec. cycle 13.9 & 14.9 sec. delay P.M. required a 3-lane ramp from freeway
2017	E	C	Signalized 60 sec. cycle 49.5 & 19.7 sec. delay Added capacity needed in ramp storage

Table 5 (continued)

Intersection Level of Service

Intersection: Palm Avenue and I-215 NB Ramps

Year	A.M. LOS	P.M. LOS	COMMENTS
Existing	A-D	A-D	Nonsignal no-ramp stop The EB to NB move has delay
1997	B	B	Signalized 60 sec. cycle 9.7 - 9.6 delay Dual left
2007	B	B	Signalized 60 sec. cycle 9.6 - 11.7 sec. delay Dual left
2017	C	--	Signalized 60 sec. cycle 22.6 sec. A.M. delay V/C 1.243 P.M. - must add dual right NB to work

TRAFFIC IMPACTS AND MITIGATION

It should be the goal of this project to have in place infrastructure improvements sufficient to handle the existing and project traffic **before** such traffic develops.

Existing traffic volumes on the local roadways are low. Much of the development proposed for the Near Term is also of relatively low traffic intensity. As a result few, if any, major improvements, other than those normally required as part of the Subdivision approval process, would be necessary for most of the Near Term development.

Near Term development will include mining and CMUP uses which will require only minor improvements, as well as light industrial development associated with tentative maps being processed concurrently, which will require traffic improvement.

As can be seen in Table 6, aggregate resource extraction and processing in Planning Areas "D," "F," "I," and "P" would not significantly impact the existing roadway and thus would not require any significant roadway improvements, other than very localized access improvements such as lane striping or minor pavement widening. Such improvements would be specified by the Department of Public Works as part of the Conditional Use Permit approval process. A tentative Subdivision Map for Planning Area "E" is being concurrently processed along with a Conditional Use Permit which includes Planning Areas "D" and "F." Thus, normal Cajon Boulevard frontage improvements, designed to City Standards associated with this map would be required along Planning Area "D," as well as Planning Area "E."

Table 6

Traffic Improvement Requirements

Near Term Development

lng. Area		Use	Total ADT	Traffic Improvements Required
D	Aggreg. Proc.		650	Cajon Blvd. Frontage Impr.
	Extr.		-	None
E	Lt. Ind.		840	Cajon Blvd. Frontage Impr.
	Lt. Ind.		1506	Cajon Blvd./Inst. Rd. Intersection Impr. Required. Institution Rd./Cajon Blvd. Frontage Improvements
H	Lt. Ind.		1338	Cajon Blvd./Inst. Rd. Intersection Impr. Required. Institution Rd./Cajon Blvd. Frontage Improvements
	CMUP		174	None/Minor
	CMUP		140	None/Minor
K	Lt. Ind.		2160	Frontage Improvements on Cajon Blvd.
L	CMUP		653	None/Minor
	CMUP		488	None/Minor
P	Extr.		-	None/Minor
	Aggreg. Proc.		650	None/Minor

Table 6 (continued)

Traffic Improvement Requirements

Intermediate Term Development*

Plng. Area		Use ADT	Traffic Improvements Required
L	Extr.	-	None
M	Extr.	-	None
N	Aggreg. Proc.	950	Access Rd./Institution Rd. Intersection Improvements
I	Hvy. Ind.	2088	Institution Road Frontage Improvements
J	Hvy. Ind.	840	Institution Road Frontage Improvements

Long-Term Development*

Plng. Area		Use ADT	Traffic Improvements Required
D	Hvy. Ind.	1110	None
F	Hvy. Ind./CMUP	304	None
A B	Lt. Ind. } Hvy. Ind. }	6780	Cajon Blvd. Frontage Impr. Minor Impr. at Cajon Blvd./ Kendall Dr.
C	Hvy. Ind.	360	Possible Cajon Blvd. Access Improvements
L	CMUP	653	None
M	CMUP	488	None

* Assumes Cajon Blvd./Palm Ave./Institution Road Intersection has been improved.

Interim Construction Material Users Park (CMUP) uses are anticipated for Planning Areas "L" and "M," in advance of subsequent mineral resource extraction, as well as in Planning Area "J" and portions of Planning Area "I." These low-intensity, low-traffic uses are adequately accommodated by the existing roadway system. Light Industrial development within Planning Area "K" would necessitate Cajon Boulevard frontage improvements as a requirement of Subdivision map approval.

Near Term

Near Term development of Planning Areas "G" and "H," located both north and south of Institution Road at the Cajon Boulevard intersection, would require Cajon Boulevard and Institution Road frontage improvements, as well as intersection improvement as part of the Subdivision approval process. This intersection improvement may either be of an interim nature, involving realignment of the Institution Road leg of this intersection and possible signalization in order to accommodate the traffic generated by these two light industrial subdivisions, or full ultimate improvement of this intersection, as shown in Detail A in Figure 4, could be made. A proposed detailed intersection drawing is shown in the Appendix. This ultimate intersection improvement should easily accommodate all future traffic, both project-related and non-project future traffic through the life of the entire project.

Intermediate Term

Intermediate Term development will include mineral resource extraction activity in Planning Areas "L" and "M," with construction of a permanent aggregate processing plant in Planing Area "N." This will necessitate access road intersection improvements at Institution Road, including provision of a westbound left-turn lane. It is expected that Planning Areas "I" and "J" would be redeveloped into more intensive, Heavy Industrial land use. Institution Road frontage improvements would be required as part of the Subdivision approval process for both Planning Areas "I" and "J."

Projected ultimate (year 2017) traffic volumes along Institution Road west of the Southern Pacific Railroad undercrossing would be approximately 11,730 ADT. This could be adequately accommodated by transitioning the four-lane portion of Institution Road between Cajon Boulevard and the railroad, which would have been made as part of development of Planning Areas "G" and "H," down to two lanes through the existing under-crossing.

Long Term

Long Term development will consist of continuing resource extraction within Planning Area "M" and processing in Planning Area "N," the traffic improvements for which will already have been provided. Upon completion of extraction within Planning Area "L" and possibly portions of Planning Area "M," CMUP uses would be expected to resume. No further improvements would be expected to be required in this regard.

Upon completion of extractive and processing activities in Planning Areas "D" and "F," and following reclamation these areas would be redeveloped with Heavy Industrial and possibly CMUP uses. Necessary Cajon Boulevard frontage improvements will already have been made. Development of Planning Area "A" with Light Industrial and Planning Area "B" with Heavy Industrial uses will require that Cajon Boulevard frontage improvements be made as part of Subdivision approval process. The intersection of Cajon Boulevard and Kendall Drive may require minor redesign at that time. A proposed design is shown as Detail B on Figure 4. Sufficient right-of-way exists to make these revisions with little, if any, new construction needed.

Off-site widening of Cajon Boulevard, both north and south of the Palm Avenue/Institution Road intersection, in the vicinity of the former County landfill, and the MWD/SGUWD aqueducts to the south of this intersection are not part of the proposed project. However, provision will at some point have to be made in order to provide continuity between the improved Planning Area "E" and Planning Area "G" frontage improvements, as well as between Planning Areas "H" and "K." It is expected that half-width Cajon Boulevard frontage improvements along the project frontage can be designed to accommodate the estimated traffic volumes, except at the intersection of Cajon Boulevard and Palm Avenue, where full-width improvement will be required.

CONCLUSION

This project, for planning purposes, including this traffic study, phased over an approximate 25-year time frame, is a major undertaking. The estimating of future traffic volumes for this period is a broad estimate, at best. However, with the early construction of the major intersection improvement of Cajon Boulevard and Palm Avenue, I foresee few, if any, transportation or congestion problems in the area as a result of full development of this project or the growth of existing traffic, except in later years at the I-215 interchange where expansion of existing traffic presents a problem.

It is our understanding that the existing off-site traffic problems at the Cajon Boulevard and State Street intersection are in the process of being corrected by the County of San Bernardino and should be completed before significant project-related traffic develops.

The traffic generation rates and phasing assumes full use of all mining and aggregate plant land at all times for use as either CMUP uses or mining. This is not realistic and thus results in a worst-case traffic assignment.

No future peak-hour traffic assignments were attempted because of the difficulty in estimating such volume in such a diverse area and the overdesign of the only major conflict point.

This project will fully mitigate its traffic impacts.

REGISTERED PROFESSIONAL ENGINEER
CHARLES PORTER STRONG
NO. 87
EXP. 3/31/92
TRAFFIC
STATE OF CALIFORNIA

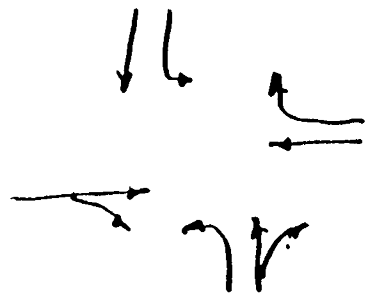
Charles P. Strong & Associates

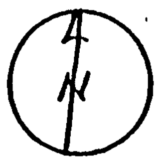
APPENDICES

TRAFFIC TURNING MOVEMENTS COUNTS

INTERSECTION Cajon Bl & Palm

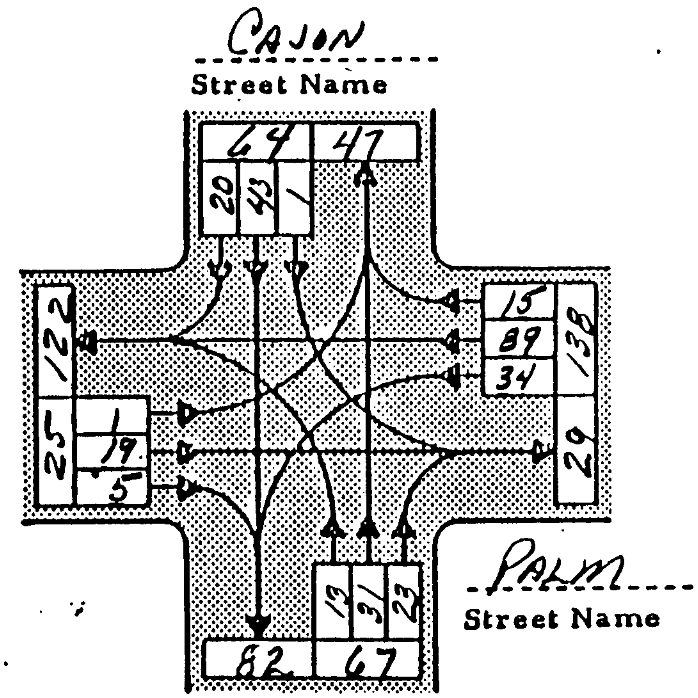
PROJECT Calmat Cajon Creek





			min
NBL	$\frac{13}{1600}$ =	0.008	0.10
SBT	$\frac{43}{1600}$ =	0.027	0.10
WBT	$\frac{89}{1600}$ =	0.056	0.10
EBL	$\frac{1}{1600}$ =	0.001	0.10
		0.092	0.40

LOS A



A M. PEAK HOUR VOLUME

Peak Hour: 7:15 – 8:15

Date: 3/20/90

Figure

Charles P. Strong & Associates
5241 Del Cerro Blvd.
San Diego, CA 92120
(619) 583-3469

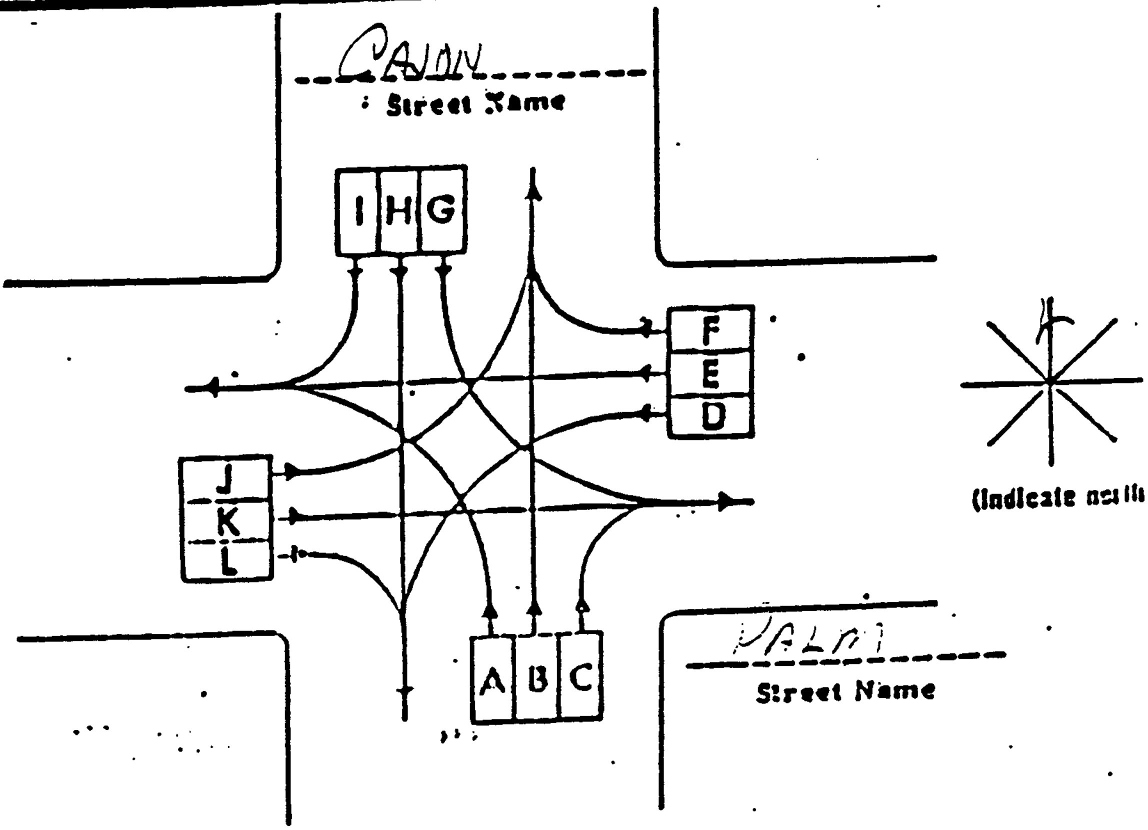
TRAFFIC TURNING MOVEMENTS COUNT

CALMAT - CAJON CREEK
(City or Project)

Intersection of CAJON BL and PALM

Date 3/20/ Day of Week TUE Weather CLEAR Recorder STRONG

Time	CAJON (Street) from the S			PALM (Street) from the E			CAJON (Street) from the N			INSTITUTE (Street) from the			
	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt	
Period STARTIN	A	B	C	D	E	F	G	H	I	J	K	L	T
:00-7:15	0	10	12	8	11	1	1	10	2	0	5	0	60
:15	1	9	8	11	11	2	0	7	9	0	8	2	68
:30	4	5	2	7	34	3	1	16	4	0	4	0	80
:45	4	7	4	9	28	9	0	5	4	0	3	1	74
:00	4	10	9	7	16	1	0	15	3	1	4	2	72
:15	0 13	11	2	7	16	2	2	16	2	2	5	2	67
:30	3	11	2	5	1	1	2	11	1	0	4	5	46
:45-9:00	4	5	5	10	7	0	2	11	1	1	6	0	52
	20	68	44	64	124	19	8	91	26	4	39	12	519
			-18 TRUCK	-21 TRUCK									



harles P. Strong & Associates
Del Cerro Blvd.
Diego, CA 92120
19) 583-3469

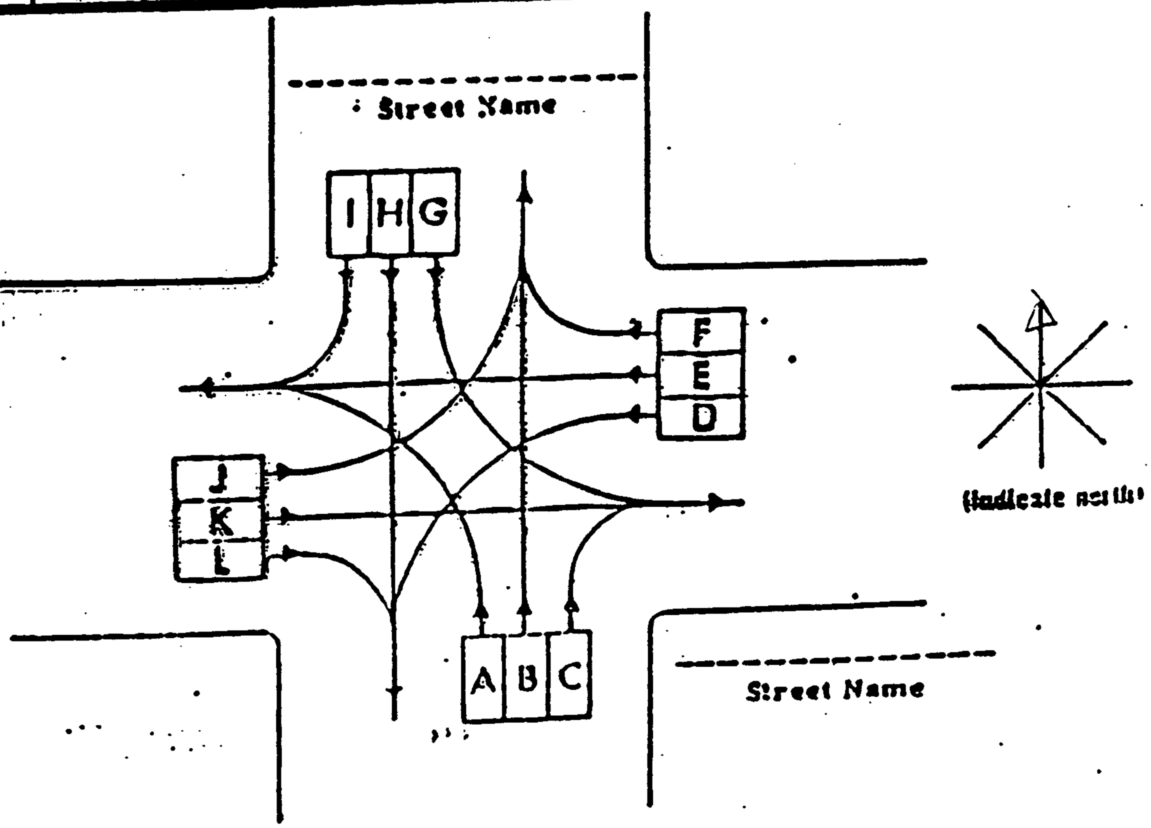
TRAFFIC TURNING MOVEMENTS COUNT

(City or Project)

ection of Cajon Bl and Palm

3/21 Day of Week Tue Weather [illegible] Recorder [illegible]

Time Period	Cajon (Street) from the S — Lt. A	St. B	Rt. C	Palm (Street) from the E — Lt. D	St. E	Rt. F	Cajon (Street) from the N — Lt. G	St. H	Rt. I	(Street) from the — Lt. J	St. K	Rt. L
0-715	0	10	12	9	11	1	1	10	2			
	1	19	20	19	22	3	1	17	11			
	5	24	22	26	56	6	2	33	15			
45	9	31	26	35	74	15	2	38	19			
	13	41	35	42	100	16	2	53	22			
	13	52	37	49	116	18	4	69	24			
30	16	63	39	54	117	19	2	80	25			
-900	20	68	44	64	124	19	8	91	25			



INSQUITITE / PALM –

	LT	ST	RT
7:00 – 7:15	0	HHH 5	0
7:15	0	HHH II 8	II 2
7:30	0	IIII 4	0
7:45	0	III 3	I 1
8:00	I 1	IIII 4	II 2
8:15	II 2	HHH 5	II 2
8:30	0	IIII 4	HHH 5
8:45 – 9:00	I 1	HHH I 6	0

ASPHALT TRUCK TO / FROM Property on Palm & Pine

7–	5
7:15	II
7:30	HHH
7:45	0
8:00	IIII
8:15	II
8:30	I
8:45	II

21 Truck

7-7:15	5
~~7:15~~	IIII
7:30	I
~~7:45~~	II
8:00	III
~~8:15~~	0
8:30	II
8:45	I

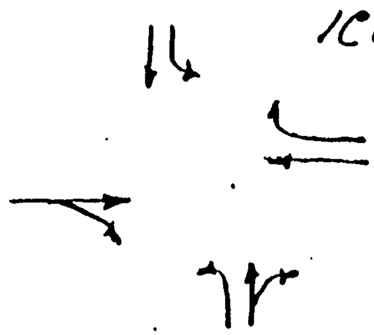
18 Truck

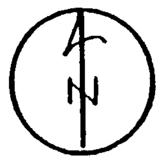
Pike To Pike S/B Palm 70

TRAFFIC TURNING MOVEMENTS COUNTS

INTERSECTION Cajon Bl. & Palm Av / Institute **PROJECT** Palmar - Cajon Creek

ICU

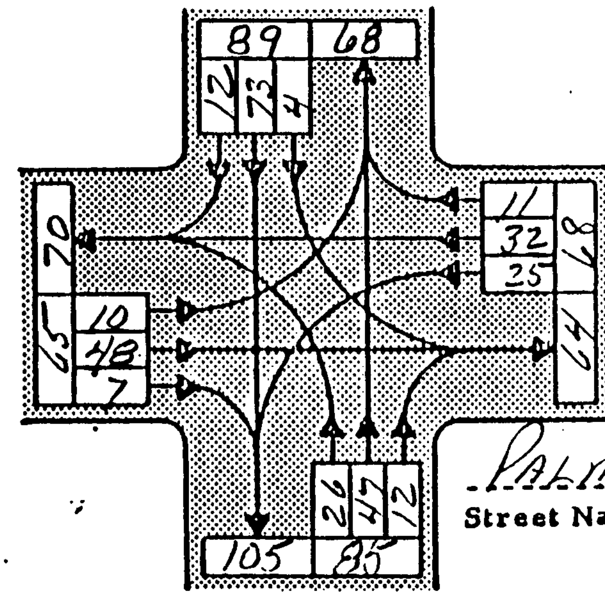




		ICU	ICU Min
NBL	$\frac{26}{1600}$	= 0.016	0.10
SBT	$\frac{73}{1600}$	= 0.046	0.10
WBL	$\frac{25}{1600}$	= 0.016	0.10
EBT	$\frac{48}{1600}$	= 0.030	0.10
		0.108	0.40

LOS A

Cajon Bl.
Street Name



Palm Av.
Street Name

P.M. PEAK HOUR VOLUME

Peak Hour: 4:00 To 5:00

Date: 2/23/90

Figure

Charles P. Strong & Associates
3241 Del Cerro Blvd.
San Diego, CA 92120
(619) 583-3469

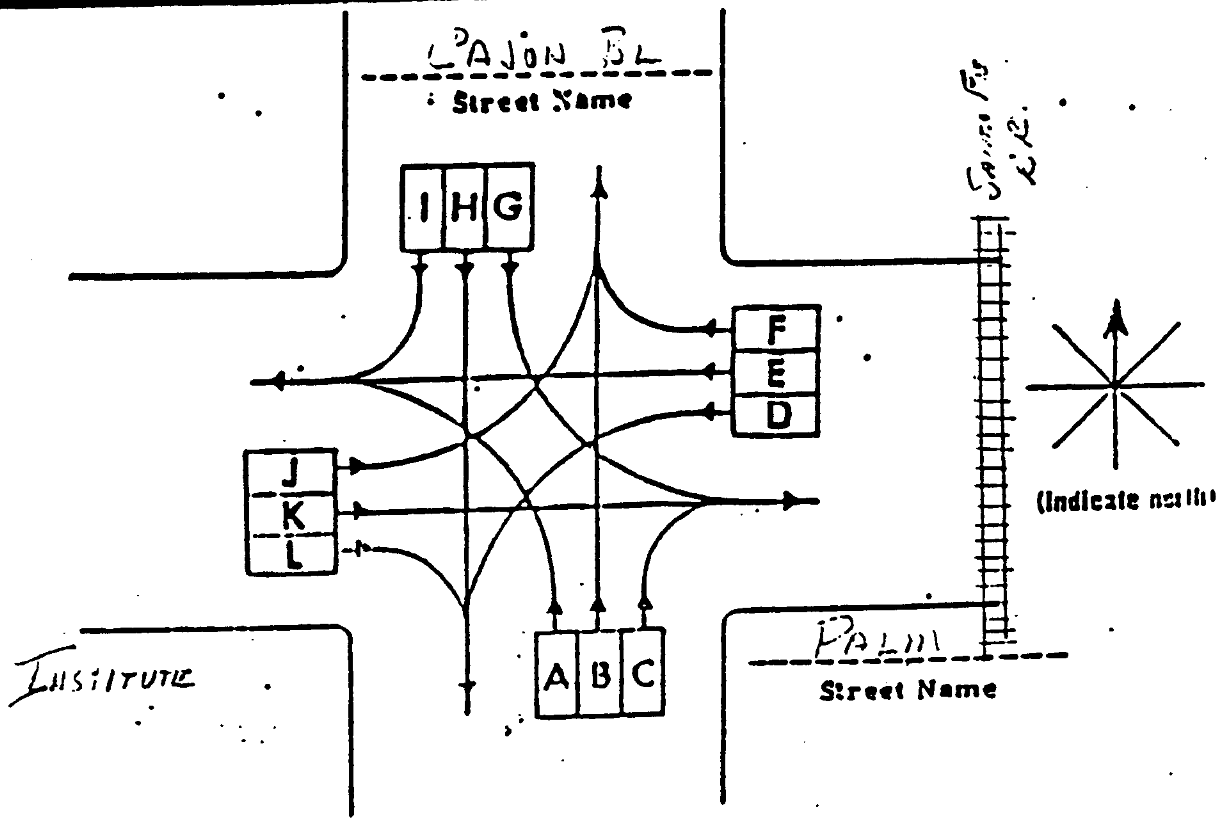
TRAFFIC TURNING MOVEMENTS COUNT

(City or Project)

Intersection of CAJON BL and PALM AV / INSTITUTE

Date 2/23/90 Day of Week FRI Weather CLEAR Recorder STRONG

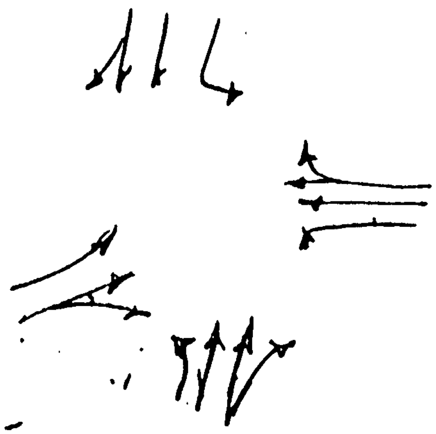
Time	CAJON BL (Street) from the SO			INSTITUTE (Street) from the W			CAJON BL (Street) from the N			PALM (Street) from the E			
	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt	
Period START	A	B	C	D	E	F	G	H	I	J	K	L	
4:00	0	7	6	2	20	6	4	17	1	6	6	3	78
:15	2	14	4	4	17	1	4	16	1	5	11	2	81
:30	5	7	11	0	4	1	4	14	0	7	8	5	66
:45	5/24	19/47	5/13	1/10	7/48	2/7	0/14	26/72	2/12	7/11	7/32	1/21	82
5:00	5	6	5	0	2	8	7	15	1	6	14	3	70
:15	5	9	5	1	12	5	3	9	3	8	16	1	77
	22	62	36	8	62	23	22	95	8	39	62	15	454

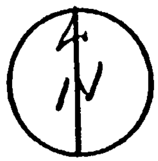


TRAFFIC TURNING MOVEMENTS COUNTS

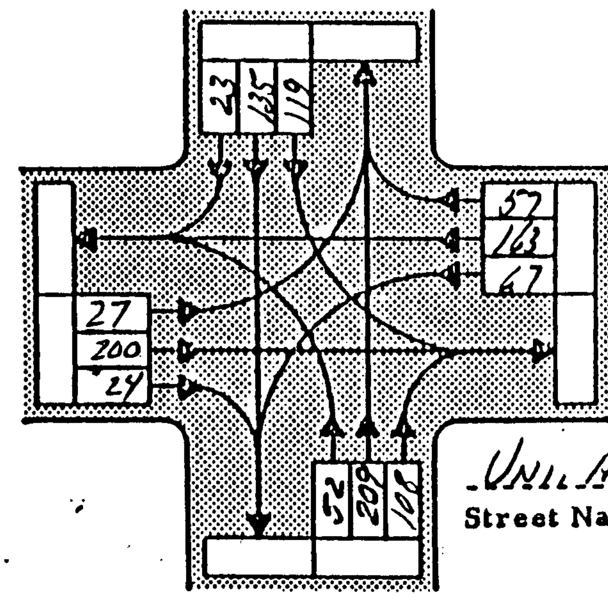
INTERSECTION Cajon Bl / State / Uni. Av

PROJECT Col Mash - Cajon Creek





Cajon Bl
Street Name



Uni. Av
Street Name

				Min
SBL	$\frac{119}{1600}$	=	0.074	0.10
NBT	$\frac{317}{3600}$	=	0.088	0.10
EBT	$\frac{200}{1600}$	=	0.125	
WBL	$\frac{67}{1600}$	=	0.042	0.10
				0.425

LOS A

P.M. PEAK HOUR VOLUME

Peak Hour: 4:30 - 5:30 PM

Date: 3/19/90

Figure

Charles P. Strong & Associates
1241 Del Cerro Blvd.
San Diego, CA 92120
(619) 583-3469

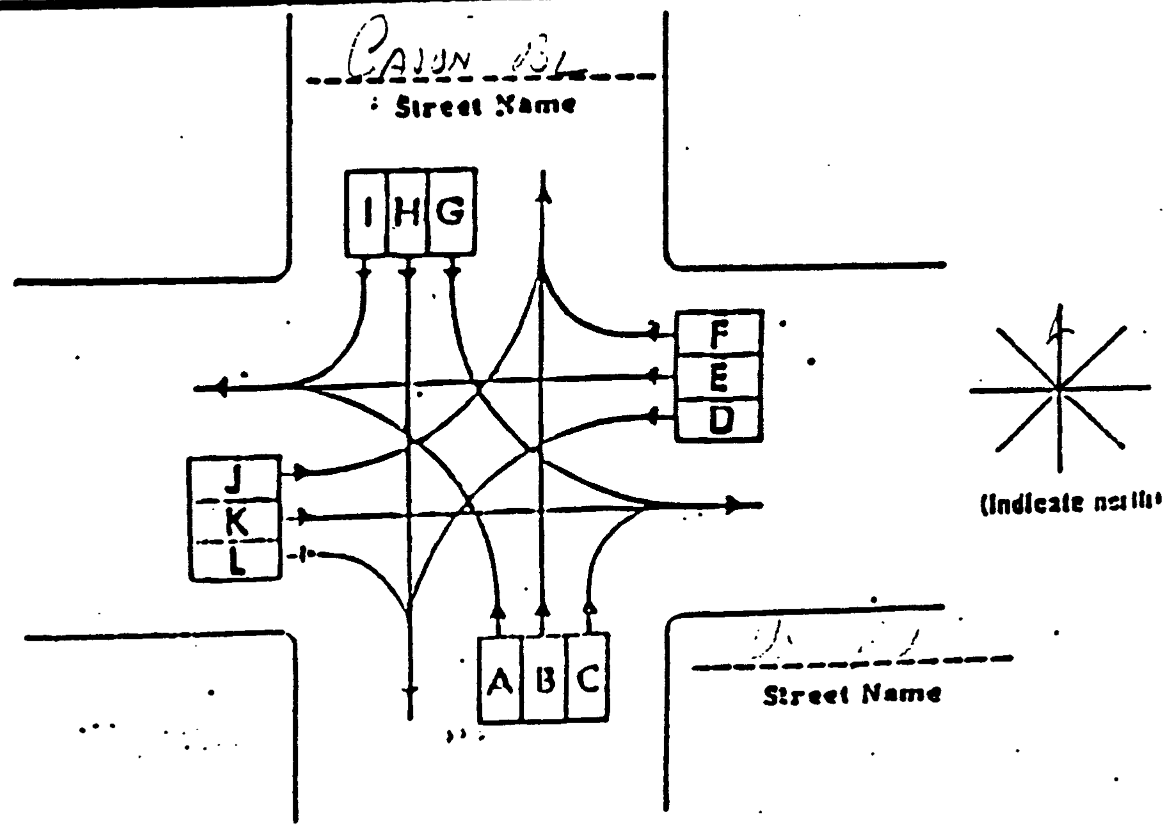
TRAFFIC TURNING MOVEMENTS COUNT

CALMAT. - SB
(City or Project)

Intersection of UNIVERSITY AV / STATE ST and CAJON BL

Date 3/19/90 Day of Week MON Weather CLEAR Recorder STRONG

Time PM Period START	CAJON BL (Street) from the S			UNI. AV (Street) from the E			CAJON BL (Street) from the N			STATE ST (Street) from the W			
	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt	
	A	B	C	D	E	F	G	H	I	J	K	L	
4:00-4:15	8	46	25	15	46	16	34	31	8	4	38	7	276
15	10	47	18	14	48	11	29	32	14	7	37	3	270
:30	13	51	25	17	52	27	32	43	6	4	47	8	325
4:45	9	50	24	17	45	8	30	38	4	10	45	6	286
:00	13	54	36	14	26	13	24	31	4	7	50	5	271
:15	17	54	23	19	33	9	33	23	9	6	58	5	294
:30	7	44	18	10	37	7	31	30	12	3	54	6	262
:45-6:00	10	43	15	12	46	10	28	30	10	7	41	5	271
	77	389	114	116	338	103	241	253	68	48	390	45	226[redacted]
Peak Hr	52	209	108	67	161	57	119	135	23	27	201	24	



[redacted]arles P. Strong & Associates
[redacted]1 Del Cerro Blvd.
San Diego, CA 92120
(619) 583-3469

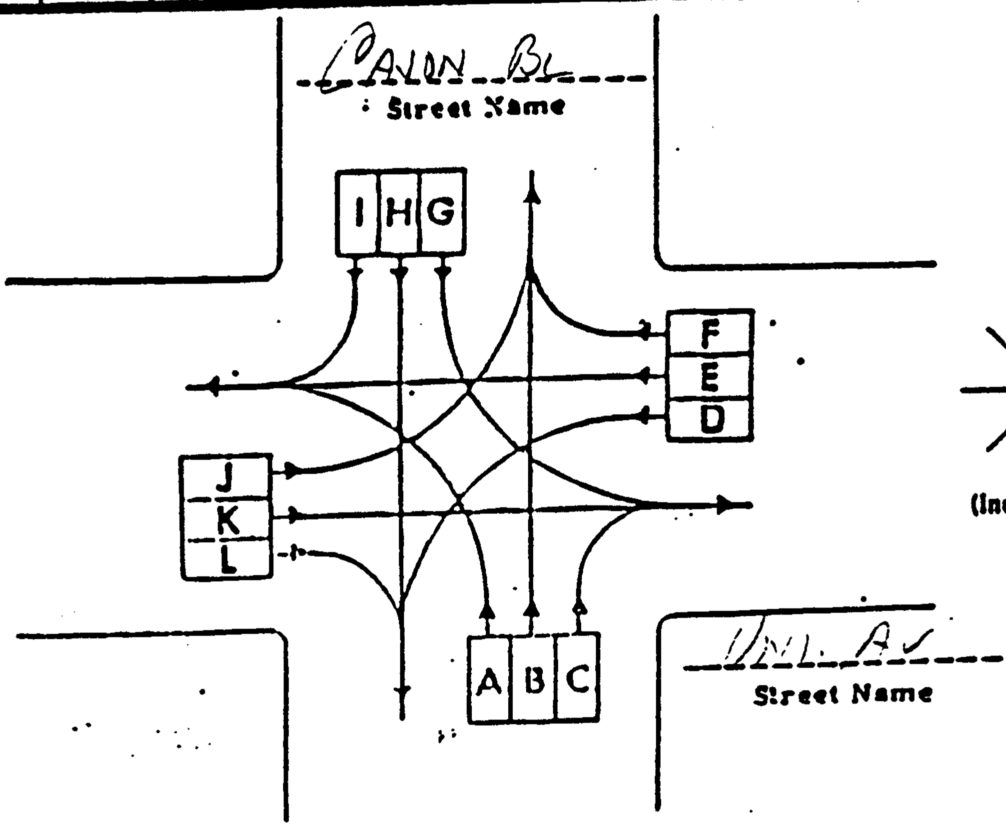
TRAFFIC TURNING MOVEMENTS COUNT

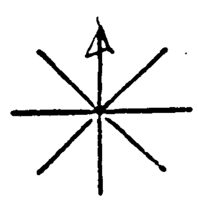
CALMAT - SB
(City or Project)

Intersection of UNIVERSITY AV / STATE ST and CAJON BL

3/19/ Day of Week MON Weather Clear Recorder STR

Time Period	CAJON BL (Street) from the S			UNI AV (Street) from the E			CAJON (Street) from the N			STATE (Street) from the W		
	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt.	Lt.	St.	Rt
	A	B	C	D	E	F	G	H	I	J	K	L
4:00 - 4:15	8	46	25	13	46	16	34	51	8			
	18	93	43	27	94	27	63	63	22			
:30	31	144	68	44	146	53	95	106	28			
:45	40	194	92	61	191	62	125	144	32			
	53	243	128	75	217	75	149	175	36			
	70	302	151	94	255	84	182	198	45			
	77	346	169	104	292	93	213	228	58			
- 6:00	87	389	184	116	338	103	241	258	62			





(Indicate north)

CARSON BL. & UNI. / STATE

STATE ST

	LT	ST	RT
4:00 - 4:15	4	38	7
4:15	7	37	3
4:30	4	47	8
4:45	10	45	6
5:00	7	50	5
5:15	6	58	5
5:30	3	54	6
5:45 - 6:00	7	61	5

DIRECTIONAL TRAFFIC COUNT
SUMMARY
12- 5-93

ADT EXPANSION FACTOR 1.01 [illegible] OF COUNT 12- 1-93
[illegible] 77.[illegible] MAJOR RD NAME CAJON BLVD RD NBR 199950 MINOR

12 Hr ~~Of~~ To 24 Hr
18 ~~Th~~ on Signal Seid
3-4 years review

* * * NORTH LEG * * *

	TOTAL	8	2	3	4	5	6
[illegible]	[illegible]7			1			
[illegible]	2[illegible]91	41	17	6	1	4	
[illegible]	[illegible]59	3	4	1			
ENTERING TOTAL	2[illegible]47	44	21	10	1	4	
DEPARTING TOTAL	4[illegible]29	9[illegible]	39	24	8	8	10
24 TOTAL LEG VOLUME	717[illegible]	134	6[illegible]	34	9	12	10

TRUCK PERCENT = 3.[illegible]

* * * WEST LEG * * *

	TOTAL	[illegible]	[illegible]	3	4	5	6
EB-N	1[illegible]	[illegible]	5	12			3
EB-E	1[illegible]	1[illegible]	17	[illegible]	3		4
EB-S	[illegible]53						
ENTERING TOTAL	[illegible]	[illegible]	[illegible]	21	[illegible]		7
DEPARTING TOTAL	[illegible]	55	4[illegible]	10	7	1	[illegible]
TOTAL LEG VOLUME	[illegible]	[illegible]	[illegible]	31	1[illegible]	1	13

TRUCK PERCENT = [illegible]

* * * EAST LEG * * *

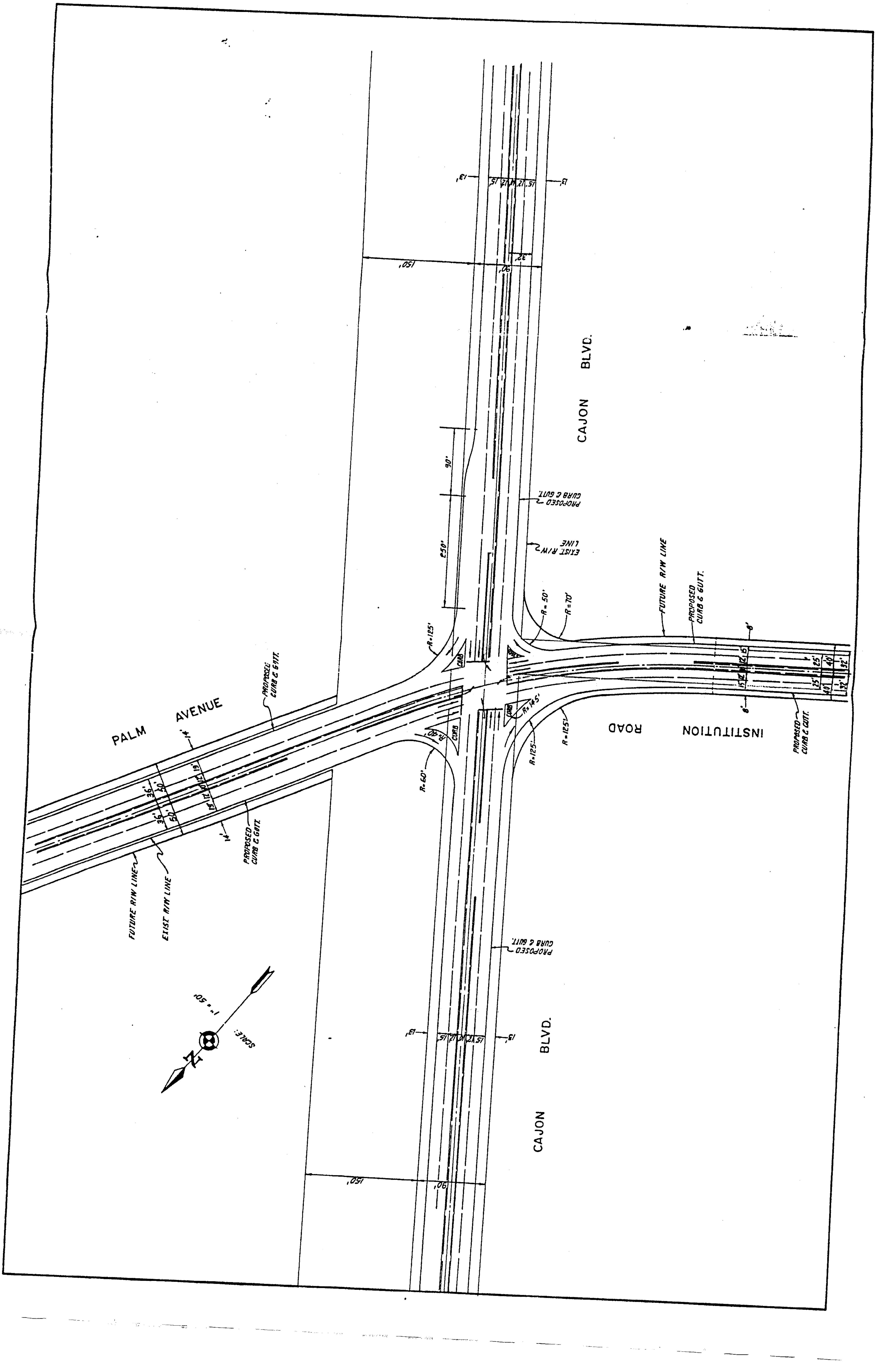
	TOTAL	8	2	3	4	5	6
WB-N	1394	14	20	1	3	1	4
WB-W	1729	13	20	5	4		5
WB-S	421	4	4	1			
ENTERING TOTAL	3544	36	44	7	7	1	9
DEPARTING TOTAL	2072	21	22	10	3	1	4
TOTAL LEG VOLUME	5616	57	66	17	10	2	13

TRUCK PERCENT = 2.9

* * * SOUTH LEG * * *

	TOTAL	8	2	3	4	5	6
NB-W	9[illegible]0	37	22	4	3	1	3
NB-N	23[illegible]	51	14	11	5	7	3
NB-E	217	5	1			1	
ENTERING TOTAL	[illegible]49[illegible]	93	37	15	8	9	6
DEPARTING TOTAL	3071	45	24	9	1	4	
TOTAL LEG VOLUME	6570	139	61	24	9	13	6

TRUCK PERCENT = 3.2


CAJON BLVD.
PALM AVENUE
INSTITUTION ROAD
PROPOSED CURB & GUTT.
EXIST. R/W LINE
FUTURE R/W LINE
CURB
R=125'
R=60'
R=50'
R=70'
R=145'
90'
250'
150'
32'
SCALE: 1" = 50'
N

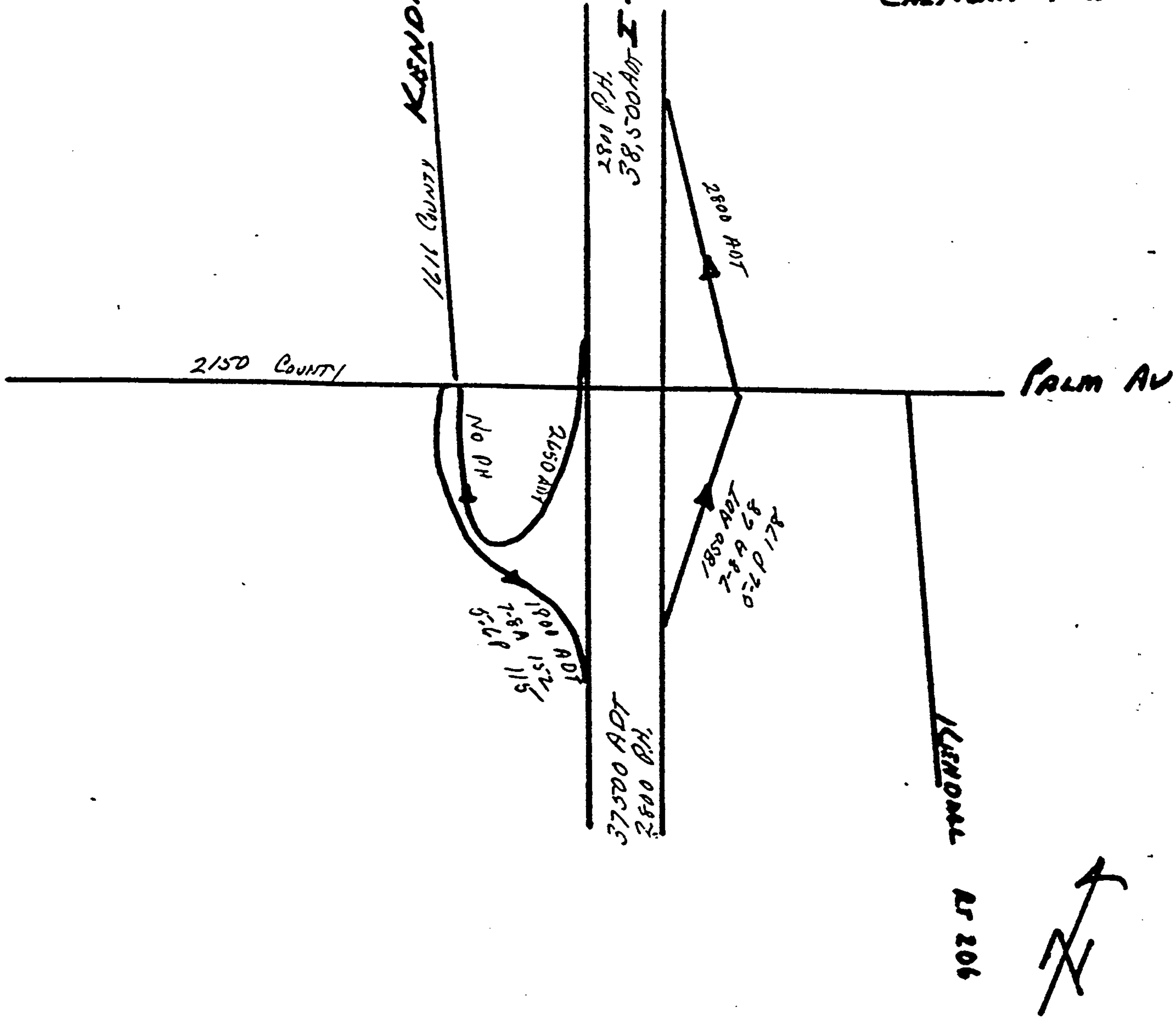
08-SBD-215

P POST P MILE	P S	DESCRIPTION	1989 ADT	1988 ADT	1987 ADT	1986 ADT	1985 ADT	1984 ADT	1983 ADT	1982 ADT	1981 ADT	1980 ADT	H G	SEQ NUMBER
008.949		NB OFF TO MUSCUPIABE DR	2250				1775			1100			D	0046761
009.127		NB ON FM MASSACHUSETTS	380				260	260			190		D	0046821
009.311		NB OFF TO WB RTE 30	3050				2775	2850			2300		D	0046861
009.419		SB ON FR MT VERN-27TH	6700				5400	5200			4500		D	0046931
009.497		NBOFF TO MT VERNON-27TH	3350				2450	2350			1950		D	0046961
009.812		NB ON FR MT VERNON-27TH	4000				2775	2600			2150		D	0047031
009.941		SBOFF TO MT VERNON-27TH	3600				2300	2150			1800		D	0047061
011.418		NBOFF TO UNIVERSITY PKY	7400				4225			3950			D	0047141
011.448		SB ON FR UNIVERSITY PKY	7900				4150			2800			D	0047161
011.816		NB ON FR UNIVERSITY PKY	1300				575			320			D	0047431
011.857		SBOFF TO UNIVERSITY PKY	1500				600			330			D	0047461
013.877		SB ON FR PALM/206	1800	A 7-8 152 P 5-6 115	From District 8 Count Files		1075	780				500	D	0047861
013.974		NB OFF TO PALM/206	1850	A 3-8 68 P 5-6 178			925	650				460	D	0047891
013.999		SB OFF TO PALM/206 2R Count	2650	no PH.			1400	820	940				D	0047931
014.310		NB ON FR PALM/206 2R Count	2800	no PH.			1125			190		740	D	0048211
017.075		SEG SB ON FR CAJON BL	3600				1450			1100			D	0048511
017.146		NB OFF TO DEVORE RD	850				750			750			D	0048661
017.253		NB ON FM DEVORE RD	950				950			840			D	0048701
017.489		NB OFF TO SB RTE 15	3350				1400	620					D	0048861
017.654		SEG SB OFF TO CAJON BL	4000				500	420					D	0049012

Milepost	Description	Peak Hour	ADT Pk. Mo.	ADT Annual
22.76	Ethanac Road			
23.20	Begin Freeway	3,500	36,000	35,500
23.54	Jct. Rte. 74 Southeast, Case Road Interchange			
26.31	Jct. Rte. 74 West, Fourth Street Interchange	3,500	45,500	45,000
27.23	Perris, D Street Interchange	3,600	40,000	39,500
27.56	End Freeway	3,700	45,500	45,000
27.89	Nuevo Road, Perris, North			
		3,750	49,000	48,500
		3,900	55,000	54,000
31.08	Ramona Expressway			
		4,050	59,000	58,000
		4,200	60,000	59,000
34.22	Van Buren Boulevard			
35.93	Cactus Avenue Interchange (Road to March Air Force Base)	4,300	50,000	49,000
		4,400	49,500	48,500
36.38	Allesandro Boulevard			
		4,450	56,000	55,000
R38.11	Begin Freeway			
R38.34	Box Springs, Jct. Rte. 60 East	4,500	56,000	55,000
R38.92	Riverside, Fisher Road Interchange	10,900	141,000	139,000
R38.93 =38.62	Milepost Equation			
		10,300	145,000	143,000
39.48	Riverside, Central Avenue Interchange			
40.29	Riverside, University Knolls Interchange	9,600	140,000	137,000
40.98	Riverside, Pennsylvania Avenue Interchange	9,000	135,000	132,000
41.04	Riverside, University Avenue Interchange	8,300	138,000	135,000
42.16	Riverside, Blaine Street Interchange	7,600	137,000	133,000
42.84	Riverside, Spruce Street Interchange	6,900	142,000	138,000
43.27	Riverside, Jct. Rtes. 60 and 91 West, Riverside-Escondido Freeway	6,200	158,000	154,000
43.90	Riverside, Columbia Avenue Interchange	10,600	139,000	134,000
		10,600	133,000	128,000
45.01	Center Street Interchange			

Milepost	Description	Peak Hour	ADT Pk. Mo.	ADT Annual
45.01	Center Street Interchange			
45.33 =0.00	Riverside County San Bernardino County	10,700	128,000	123,000
0.40	Iowa Avenue Interchange			
		10,600	129,000	124,000
1.31	Barton Road Interchange			
2.69	Colton, Mount Vernon Avenue/Washington Street Interchange	10,700	129,000	124,000
4.05	Colton, Jct. Rte. 10, San Bernardino-Riverside Freeway Interchange	10,800	130,000	129,000
5.03	San Bernardino, Orange Show Road Interchange	10,800	160,000	159,000
5.58	San Bernardino, Inland Center Drive	10,800	150,000	149,000
6.06	San Bernardino, Mill Street Interchange	10,800	141,000	140,000
6.79	San Bernardino, Second Street Interchange	10,800	143,000	142,000
7.18	San Bernardino, Jct. Rte. 66 West, Fifth Street Interchange	10,800	127,000	126,000
8.08	San Bernardino, Baseline Street Interchange	10,700	136,000	131,000
8.60	San Bernardino, Jct. Rte. 259 North, I Street Interchange	10,700	124,000	119,000
9.03	San Bernardino, Massachusetts Avenue Interchange	10,800	58,000	53,000
9.36	San Bernardino, Jct. Rte. 30, Highland Avenue Interchange	10,700	59,000	54,000
9.72	San Bernardino, 27th Street Interchange	10,700	56,000	51,000
11.63	San Bernardino, University Parkway Interchange	10,700	54,000	49,000
14.10	San Bernardino, Jct. Rte. 206, Kendall Drive-Palm Avenue Interchange	2,800	38,500	37,500
		2,800	39,500	38,500
17.32	Devore Road Interchange			
		2,800	29,000	28,000
17.75	Jct. Rte. 15 Freeway			

1989 TRAFFIC VOLUMES
CALTRAN DIST. 8



COUNTS UNLIMITED

Site Code : DILGINIS
N-S STREET: I-215 NORTHBOUND RAMPS
E-W STREET: PALM AVENUE
WEATHER : SUNNY

PAGE: 1
FILE: 8B215NPP

Movements by: Primary

DATE: 8/20/91

Time	.... From North				.... From East				.... From South				.... From West				Vehicle	PEDS
Begin	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	Total	Total
4:00 PM	0	0	0	0	1	43	35	0	0	42	1	14	1	0	82	6	223	2
4:15	0	0	0	0	1	35	35	0	0	43	0	7	0	0	122	6	248	1
4:30	0	0	0	0	1	41	41	0	0	58	0	9	0	0	91	6	246	1
4:45	0	0	0	0	0	39	41	0	0	59	0	9	0	0	97	0	245	0
HR TOTAL	0	0	0	0	3	158	152	0	0	202	1	39	1	0	392	18	962	4
5:00 PM	0	0	0	0	0	47	34	0	0	62	1	15	2	0	105	5	269	2
5:15	0	0	0	0	2	36	38	0	0	49	1	11	1	0	123	10	268	3
5:30	0	0	0	0	0	40	39	0	0	68	1	24	1	0	133	8	313	1
5:45	0	0	0	0	0	37	49	0	0	38	0	22	0	0	114	7	267	0
HR TOTAL	0	0	0	0	2	160	160	0	0	217	3	72	4	0	475	30	1117	6
DAY TOTAL	0	0	0	0	5	318	312	0	0	419	4	111	5	0	867	48	2079	10

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION	START	PEAK HR	.... VOLUMES					...... PERCENTS			
FROM	PEAK HOUR	FACTOR	PEDS	Right	Thru	Left	Total	PEDS	Right	Thru	Left
North	12:00 AM	0.00	0	0	0	0	0	-	0	0	0
East	5:00 PM	0.93	2	160	160	0	320	-	50	50	0
South	4:45 PM	0.81	0	238	3	59	300	-	79	1	20
West	5:00 PM	0.90	4	0	475	30	505	-	0	94	6

Entire Intersection

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	PEDS	Right	Thru	Left	Total	PEDS	Right	Thru	Left
North	5:00 PM	0.00	0	0	0	0	0	-	0	0	0
East		0.93	2	160	160	0	320	-	50	50	0
South		0.78	0	217	3	72	292	-	74	1	25
West		0.90	4	0	475	30	505	-	0	94	6

COUNTS UNLIMITED

Site Code : DILOINIS
N-S STREET: I-215 NORTHBOUND RAMPS
E-W STREET: PALM AVENUE
WEATHER : SUNNY

Movements by: Primary

PAGE: 1
FILE: SB215NPP
DATE: 8/20/91

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	VOLUMES Right	VOLUMES Thru	VOLUMES Left	VOLUMES Total	PERCENTS PEDS	PERCENTS Right	PERCENTS Thru	PERCENTS Left
North	5:00 PM	0.00	0	0	0	0	0	-	0	0	0
East	5:00 PM	0.93	2	160	160	0	320	-	50	50	0
South	4:45 PM	0.81	0	238	3	59	300	-	79	1	20
West	5:00 PM	0.90	4	0	476	30	506	-	0	94	6
Entire Intersection											
North	5:00 PM	0.00	0	0	0	0	0	-	0	0	0
East		0.93	2	160	160	0	320	-	50	50	0
South		0.78	0	217	3	72	292	-	74	1	25
West		0.90	4	0	475	30	505	-	0	94	6

```
                      I-215 NORTHBOUND RAMPS                  N
                                                            W-+-E
                                                              S
                                            193
     [PEDS ]    0      0      0      0                  2 [PEDS ]

              232              0                   160

  PALM AVENUE                                 320  160

           30                                        0

          475  505                                PALM AVENUE

                                                   692
            0               292

     [PEDS ]    4        72     3    217          0 [PEDS ]
                    0

                      I-215 NORTHBOUND RAMPS
```

COUNTS UNLIMITED

Site Code : DILGINI3
N-S STREET: I-215 SB RAMPS/KENDALL
E-W STREET: PALM AVENUE
WEATHER : SUNNY

PAGE: 1
FILE: SB215SPP
DATE: 8/20/91

Movements by: Primary

Time Begin	.... From North .... PEDS	RT	THRU	LT	.... From East .... PEDS	RT	THRU	LT	.... From South .... PEDS	RT	THRU	LT	.... From West .... PEDS	RT	THRU	LT	Vehicle Total	PEDS Total
4:00 PM	0	2	8	11	0	11	11	24	0	64	0	1	1	13	22	1	168	1
4:15	0	0	5	21	0	12	9	20	0	78	0	3	1	6	16	1	171	1
4:30	0	0	9	13	0	8	14	25	0	73	1	5	1	6	11	2	167	1
4:45	0	1	6	11	0	15	9	27	0	79	0	4	0	6	10	0	168	0
HR TOTAL	0	3	28	56	0	46	43	96	0	294	1	13	3	31	59	4	674	3
5:00 PM	2	0	3	9	0	13	18	16	0	88	2	8	2	6	18	2	183	4
5:15	0	0	3	6	2	8	14	21	0	101	0	15	1	11	25	1	205	3
5:30	0	1	5	14	0	6	29	27	0	101	0	17	1	13	20	1	234	1
5:45	0	3	5	13	0	12	31	25	0	87	0	15	0	9	18	0	218	0
HR TOTAL	2	4	16	42	2	39	92	89	0	377	2	55	4	39	81	4	840	8
DAY TOTAL	2	7	44	98	2	85	135	185	0	671	3	68	7	70	140	8	1514	11

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	.... VOLUMES .... PEDS	Right	Thru	Left	Total	...... PERCENTS .... PEDS	Right	Thru	Left
North	4:00 PM	0.84	0	3	28	56	87	-	3	32	64
East	5:00 PM	0.81	2	39	92	89	220	-	18	42	40
South	5:00 PM	0.92	0	377	2	55	434	-	87	0	13
West	5:00 PM	0.84	4	39	81	4	124	-	31	65	3

Entire Intersection

North	5:00 PM	0.74	2	4	16	42	62	-	6	26	68
East		0.81	2	39	92	89	220	-	18	42	40
South		0.92	0	377	2	55	434	-	87	0	13
West		0.84	4	39	81	4	124	-	31	65	3

COUNTS UNLIMITED

Code : DILGINIS
STREET: I-215 SB RAMPS/KENDALL
-W STREET: PALM AVENUE
F'THER : SUNNY

Movements by: Primary

PAGE: 1
FILE: SB2158PP
DATE: 8/20/91

PEAK PERIOD ANALYSIS FOR THE PERIOD: 4:00 PM - 6:00 PM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	Right	Thru	Left	Total	PERCENTS PEDS	Right	Thru	Left
North	4:00 PM	0.84	0	3	28	56	87	-	3	32	64
East	5:00 PM	0.81	2	39	92	89	220	-	18	42	40
South	5:00 PM	0.92	0	377	2	55	434	-	87	0	13
West	5:00 PM	0.84	4	39	81	4	124	-	31	65	3

Entire Intersection

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	Right	Thru	Left	Total	PERCENTS PEDS	Right	Thru	Left
North	5:00 PM	0.74	2	4	16	42	62	-	6	26	68
East		0.81	2	39	92	89	220	-	18	42	40
South		0.92	0	377	2	55	434	-	87	0	13
West		0.84	4	39	81	4	124	-	31	65	3

```
                                   KENDALL                N
                                                        W-+-E
                                                          S
                                            45
 [PEDS ]   2     4   16   42                     2 [PEDS ]

                     62                    39
         151

 PALM AVENUE                          220  92

          4                                89

         81  124                       PALM AVENUE

                                        500
         39                434

 [PEDS ]   4          55    2   377      0 [PEDS ]
              144

                 I-215 SB RAMPS
```

COUNTS UNLIMITED

Site Code : DILGINIS
N-S STREET: I-215 SB RAMPS/KENDALL AV
E-W STREET: PALM AVENUE
WEATHER :

PAGE: 1
FILE: SB215SPA

Movements by: Primary

DATE: 8/20/91

Time	.... From North				.... From East				.... From South				.... From West				Vehicle	PEDS
Begin	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	PEDS	RT	THRU	LT	Total	Total
6:30	3	3	8	4	0	4	50	39	0	35	0	16	3	1	4	0	164	6
6:45	1	4	3	3	0	4	47	36	0	32	0	10	1	3	9	0	151	2
~~HR TOTAL~~	~~4~~	~~7~~	~~11~~	~~7~~	~~0~~	~~8~~	~~97~~	~~75~~	~~0~~	~~67~~	~~0~~	~~26~~	~~4~~	~~4~~	~~13~~	~~0~~	~~315~~	~~8~~
7:00 AM	0	0	4	3	0	2	24	46	0	21	0	7	1	2	12	0	120	1
7:15	0	2	7	5	0	2	16	59	0	29	0	4	0	6	6	2	136	0
7:30	0 4	1 9	7 22	6 14	0	5 12	21 136	59 180	0	26 117	0	3 37	0 4	1 11	6 31	0 2	135	0
7:45	C	3	4	4	1	6	18	60	0	18	0	7	2	3	5	1	129	3
HR TOTAL	0	6	22	17	1	15	78	224	0	94	0	21	3	11	29	3	520	4
8:00 AM	0	1	10	6	0	4	14	40	0	33	1	6	0	6	6	1	128	0
8:15	0	1	8	8	0	5	12	26	0	22	1	3	0	7	13	3	108	0
DAY TOTAL	4	15	51	38	1	32	201	364	0	216	2	56	7	28	61	7	1071	12

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	...... VOLUMES ...... PEDS	Right	Thru	Left	Total	...... PERCENTS ...... PEDS	Right	Thru	Left
North	7:30 AM	0.87	0	6	29	24	59	-	10	49	41
East	6:30 AM	0.88	0	12	136	180	328	-	4	41	55
South	6:30 AM	0.75	0	117	0	37	154	-	76	0	24
West	7:30 AM	0.57	2	17	30	5	52	-	33	58	10

Entire Intersection

North	6:30 AM	0.75	4	9	22	14	45	-	20	49	31
East		0.88	0	12	136	180	328	-	4	41	55
South		0.75	0	117	0	37	154	-	76	0	24
West		0.79	5	11	31	2	44	-	25	70	5

COUNTS UNLIMITED

S e Code : DILGINIS
N-S STREET: I-215 SB RAMPS/KENDALL AV
E " STREET: PALM AVENUE
W THER :

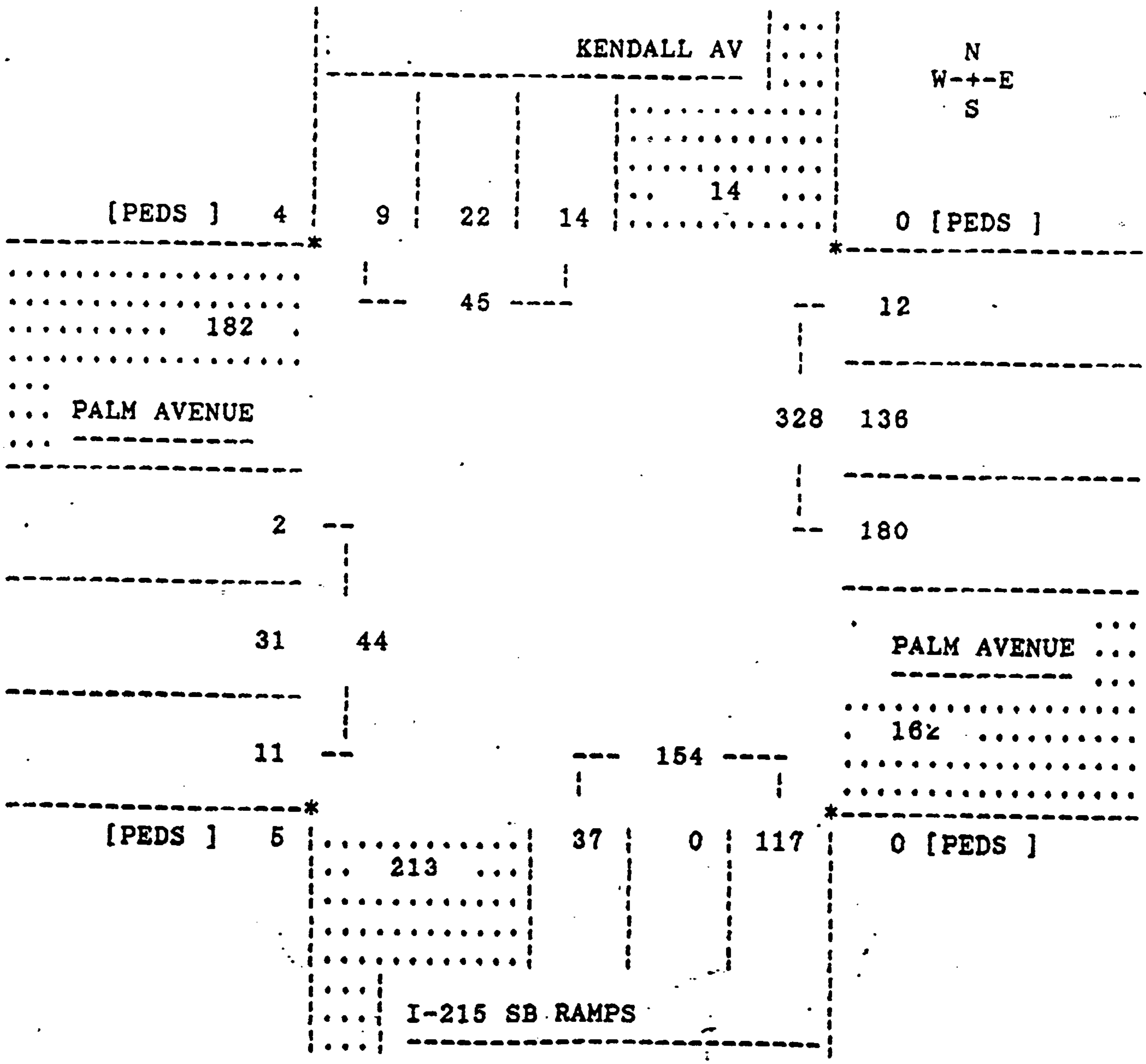
PAGE: 1
FILE: SB215SPA

Movements by: Primary

TUE DATE: 8/20/91

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	VOLUMES Right	VOLUMES Thru	VOLUMES Left	VOLUMES Total	PERCENTS PEDS	PERCENTS Right	PERCENTS Thru	PERCENTS Left
North	7:30 AM	0.87	0	6	29	24	59	-	10	49	41
East	6:30 AM	0.88	0	12	136	180	328	-	4	41	55
South	6:30 AM	0.75	0	117	0	37	154	-	76	0	24
West	7:30 AM	0.57	2	17	30	5	52	-	33	58	10
Entire Intersection											
North	6:30 AM	0.75	4	9	22	14	45	-	20	49	31
East		0.88	0	12	136	180	328	-	4	41	55
South		0.75	0	117	0	37	154	-	76	0	24
West		0.79	5	11	31	2	44	-	25	70	5



COUNTS UNLIMITED

Site Code : DILGINIS
N-S STREET: I-215 NORTHBOUND RAMPS
E-W STREET: PALM AVENUE
WEATHER : SUNNY

PAGE: 1
FILE: SB215NPA

Movements by: Primary

JUE DATE: 8/20/91

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	VOLUMES PEDS	VOLUMES Right	VOLUMES Thru	VOLUMES Left	VOLUMES Total	PERCENTS PEDS	PERCENTS Right	PERCENTS Thru	PERCENTS Left
North	6:30 AM	0.00	0	0	0	0	0	-	0	0	0
East	6:30 AM	0.91	1	391	247	0	638	-	61	39	0
South	6:30 AM	0.75	0	60	2	90	152	-	39	1	59
West	6:30 AM	0.86	6	0	149	12	161	-	0	93	7

Entire Intersection

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	PEDS	Right	Thru	Left	Total	PEDS	Right	Thru	Left
North	6:30 AM	0.00	0	0	0	0	0	-	0	0	0
East		0.91	1	391	247	0	638	-	61	39	0
South		0.75	0	60	2	90	152	-	39	1	59
West		0.86	6	0	149	12	161	-	0	93	7

```
                 |  I-215 NORTHBOUND RAMPS |...|          N
                 |  --------------------    |...|       W-+-E
                 |      |       |       |...........|       S
                 |      |       |       |...........|
                 |      |       |       |...........|
                 |      |       |       |..  405  ..|
       [PEDS ]  0|   0  |   0   |   0   |...........|  1 [PEDS ]
-----------------*                                   *-----------------
.................      |        |
................. ---     0 ----                   --  391
..........  337  .                                  |
.................                                   |  ---------------
...
... PALM AVENUE                                    638  247
... -----------
-----------------                                   |  ---------------
                                                    |
            12  --                                 --   0
                 |
-----------------|                                     ---------------
                                                                    ...
           149  161                                   PALM AVENUE ...
                                                      ----------- ...
-----------------|                                 ..................
                 |                                 .  209  ..........
             0  --            ---  152  ----       ..................
                                |          |       ..................
-----------------*                                   *-----------------
       [PEDS ]  6|............|  90 |  2  |  60  |  0 [PEDS ]
                 |..    0  ...|     |     |      |
                 |............|     |     |      |
                 |............|     |     |      |
                 |............|     |     |      |
                 |...|                           |
                 |...|  I-215 NORTHBOUND RAMPS   |
                 |...|  ----------------------   |
```

COUNTS UNLIMITED

ite Code : DILGINIS
N-S STREET: I-215 NORTHBOUND RAMPS
W STREET: PALM AVENUE
ATHER : SUNNY

PAGE: 1
FILE: SB215NPA

Movements by: Primary

DATE: 8/20/91

me gin	.... From North .... PEDS	RT	THRU	LT	.... From East .... PEDS	RT	THRU	LT	.... From South .... PEDS	RT	THRU	LT	.... From West .... PEDS	RT	THRU	LT	Vehicle Total	PEDS Total
:30	0	0	0	0	0	112	64	0	0	14	1	36	4	0	40	2	269	4
:45	0	0	0	0	1	75	62	0	0	19	0	27	1	0	43	4	230	2
HR TOTAL	~~0~~	~~0~~	~~0~~	~~0~~	~~1~~	~~187~~	~~126~~	~~0~~	~~0~~	~~33~~	~~1~~	~~63~~	5	0	83	6	~~499~~	6
:00 AM	0	0	0	0	0	101	57	0	0	13	0	16	0	0	29	3	218	0
.:15	0	0	0	0	0	103	64	0	0	14	1	12	1	0	37	3	234	1
7:30	0	0	0	0	0	95 391	69 247	0	0	15 60	2 2	18 90	0 6	0 0	40 149	1 12	240	0
:45	0	0	0	0	2	69	73	0	0	18	3	13	1	0	28	1	205	3
TOTAL	0	0	0	0	2	368	263	0	0	60	6	58	2	0	134	8	897	4
:00 AM	0	0	0	0	0	48	49	0	0	23	0	9	0	0	39	4	172	0
:15	1	0	0	0	3	45	39	0	1	8	1	4	3	0	33	8	138	8
DAY TOTAL	1	0	0	0	5	648	477	0	1	124	8	134	10	0	289	26	1706	18

PEAK PERIOD ANALYSIS FOR THE PERIOD: 6:30 AM - 8:30 AM

DIRECTION FROM	START PEAK HOUR	PEAK HR FACTOR	.... VOLUMES .... PEDS	Right	Thru	Left	Total	...... PERCENTS .... PEDS	Right	Thru	Left
North	12:00 AM	0.00	0	0	0	0	0	-	0	0	0
East	6:30 AM	0.91	1	391	247	0	638	-	61	39	0
South	6:30 AM	0.75	0	60	2	90	152	-	39	1	59
West	6:30 AM	0.86	6	0	149	12	161	-	0	93	7

Entire Intersection

North	6:30 AM	0.00	0	0	0	0	0	-	0	0	0
East		0.91	1	391	247	0	638	-	61	39	0
South		0.75	0	60	2	90	152	-	39	1	59
West		0.86	6	0	149	12	161	-	0	93	7

APPENDIX H

CULTURAL RESOURCE SURVEY
of the
CAJON CREEK SPECIFIC PLAN PROJECT
San Bernardino County, California

Prepared For:

CalMat Properties Co.
3200 San Fernando Road
Los Angeles, California 90065

Prepared By:

ASM Affiliates, Inc.
P.O. Box 2476
Leucadia, California 92024

John R. Cook

October 1, 1990

Table of Contents

I. Executive Summary

A cultural resource survey of the proposed Cajon Wash Project was conducted by ASM Affiliates, Inc. in order to identify extant prehistoric, ethnohistoric, and historic archaeological resources within the property and assess potential impacts in compliance with local, state, and federal regulations and guidelines. Comprised of approximately 1,293 acres, the project area is located south of Devore and northwest of the City of San Bernardino, between Interstate Highway 215 and the Glen Helen Rehabilitation Facility. The study consisted of a search of site records and pertinent literature at the Archaeological Information Center for San Bernardino County, a review of historic archival documents, and an intensive survey of the entire property. As a result of this study it was determined that no significant cultural resources occur within the project property, and therefore no adverse impacts will result from the proposed development and mitigation will not be necessary.

Based on previous archaeological investigations, it is known that the San Bernardino Valley has been occupied since at least 4,500 years ago when prehistoric peoples associated with the Milling Stone Horizon settled the region. Available evidence suggests that these people subsisted primarily on plant foods made from various ground seeds collected throughout a wide ranging area by small extended family groups. Sites attributed to the Milling Stone Horizon contain a relatively large number of manos and metates, and crude percussion flaked stone tools including choppers and scraper planes. A Late Prehistoric Period population that is thought to be ancestral to the ethnograhpic inhabitants of the region appears to have replaced the earlier people by about 2,000 years B.P. (before present). Archaeologically, this period is characterized by the presence of brownware pottery and small projectile points indicative of bow and arrow technology. Large village sites were settled and an extensive trade network developed involving exchange between groups as far ranging as the coast and Colorado River. At the time of Spanish contact, the study area was contained with the ethnographically documented territory of the Serrano, their closest village being in Rialto some four miles to the south.

According to the record search information, 18 area-specific surveys and 2 general-area overviews have been conducted within a mile radius of the proposed project. Most of these studies date from the mid-1970s and were performed as part of state and federal environmental reviews to assess potential development related impacts. Interestingly, as a result of these cultural resource investigations only three extant sites were identified nearby: two historic archaeological sites at Lytle Creek and California Historic Landmark CHL-573 at Sycamore Grove. Other prehistoric and historic sites are suspected to have once occurred within the studied properties, but historic land uses have presumably destroyed them. The sensitivity of the project property was evaluated as low for prehistoric resources and moderate to high for historic archaeological and architectural sites (see

Appendix A in the Technical Report). A previous survey of the Cajon Wash project in 1982 by Michael Learch was completely negative, however, in that no phycial evidence of either prehistoric or historic use was found.

An intensive cultural resource survey of the entire project area was conducted between August 27th and September 7th, 1990, under the direction of John R. Cook, S.O.P.A., and Cole Parker. Systematic coverage was ensured using a combination of parallel and zig-zag transects at 15 to 25 meter interval spacing between the archaeologists. Surface visibility was generally adequate for the detection of any significant cultural resources, though in some limited areas of dense vegetation cover it is possible that isolated occurrences such as flakes or pottery may have gone unobserved. In general though, due to the deleterious effects of past flooding and extensive nature of the modern land uses and disturbances, conditions on the property were not conducive to the preservation of cultural resources, whether prehistoric or historic. This is attested to that only one small historic isolate consisting of four pieces of purple glass was identified during the current survey, and the previous 1982 survey was negative. This isolate is not considered significant in that the documentation provided herein exhausts its research potential and does not have any inherent heritage value.

In the absence of any signficant cultural resources, it is concluded that development of the proposed Cajon Wash Project will not result in any adverse impacts to archaeological resources and no mitigation is recommended. If during grading, however, archaeological or architectural remains are unearthed, then a qualified archaeologist should be consulted to assess the significance of the find and, if necessary, devise appropriate mitigation measures.

II. Project and Environmental Setting

The proposed Cajon Creek Specific Plan project is a 1,293-acre property located in southwestern San Bernardino County between the community of Devore and the City of San Bernardino. Cajon Boulevard, which parallels Interstate Highway 215, delineates the eastern boundary of the project from the area of Devore south to the Cable Creek Flood Control Channel, and the Glen Helen Regional Park and Glen Helen Rehabilitation Facility approximate the western boundary on the north and south respectively. Tracks of the Southern Pacific Railroad bisect the property along its long, north-south axis, and Institution Road crosses in the southern third of the study area providing the only east-west access.

The Specific Plan as proposed by CalMat consists of 16 separate planning areas that will be developed for a variety of mining and industrial uses. A total of 273 acres is proposed for light industrial development, of which approximately 90.5 acres will be oriented toward rail-served manufacturing and distribution uses. Mineral resource extraction will occur wtihin four separate areas totaling 535 acres. Approximately 103 acres of the extraction area will be used as a Construction Material Users Park on an interim basis, while the aggregate processing plants and related facilities will cover another 72 acres. The remaining acres will be designated as open space where no uses are proposed.

The project property is situated within the Rancho Muscipiable Land Grant, an unsectioned area of the county. As projected from the U.S.G.S. 7.5' Devore and San Bernardino North topographic quadrangles, portions of the property are located within sections 33 and 34 of Township 2 North and Range 5 West, and sections 2, 3, 10, 11, 12, 13, and 14 of Township 1 North and Range 5 West, SBBM (Figure 1).

Cajon Wash, a large north-south trending drainage, is the dominant topographic feature of the project property. Emanating from the Cajon Pass area some 15 miles to the northwest, it occupies much of the western half of the project, the remainder consisting of the slightly higher, adjoining terrace slopes of the floodplain. From west to east the elevations perpendicular to the wash rise less than 10-20 feet, while the fall in the drainage over the length of the property is some 500 feet from a high point of approximately 2020 feet above mean sea level near Devore. Extensive and frequent flooding is evident throughout the entire project area, and numerous historically active channels were observed during the study.

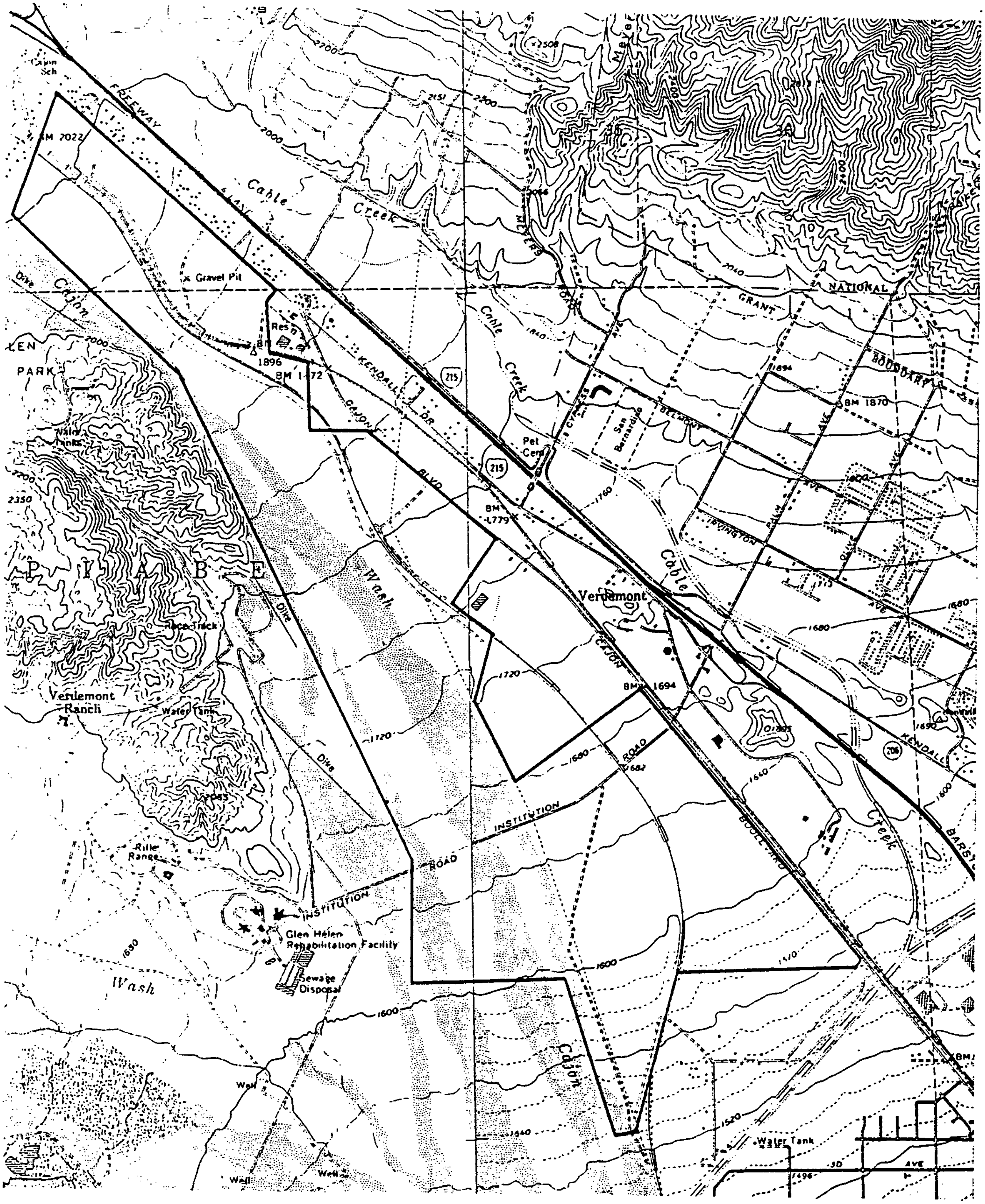


FIGURE 1 Project location as shown on the Devore and San Bernardino North U.S.G.S. 7.5' Quadrangles. Scale is approximately 1:30,000.

Geologic mapping indicates the occurrence of Quaternary Wash Deposits (alluvial deposits of modern washes) in the area west of the railroad tracks and Quaternary Older Wash Deposits (alluvial deposits of abandoned washes) to the east. The active washes contain relatively clean, course sands with abundant boulder and cobble sized rock, and are generally free of vegetation except for sparse grasses. A silty soil has developed over most of the older alluvial deposits and although generally weak, these support varying densities of vegetation. On the more stable, older deposits loamy soils have accumulated allowing the growth of dense stands of brush and trees.

The vegetation within the project area is composed of plant species from the Coastal Sage Scrub and Chaparral associations, and is transitional in nature. Coastal Sage Scrub is an open type community largely made up of half-shrubs and sub-shrubs, and generally occurs below 1500 feet in elevation, whereas the Chaparral association is characteristic of inland slopes and ridges commonly found within an elevation range of 1000 to 4500 feet. Principal dominants of the Coastal Sage Scrub include California Sagebrush, white and black sage, California buckwheat, lemonade berry, and laurel sumac. Typical forbs are mustards, filarees, and monkey flower; grasses are mostly annuals such as red brome, soft chess, ripgut brome, and foxtail fescue. Within the Chaparral association the dominants belong to four genera: chamise and red shank, manzanita, wild lilac and buckbrush, and various forms of scrub oak. Species observed within the property that were of economic importance to the prehistoric inhabitants include yucca, chia, Yerba Santa, prickly-pear cactus, holly-leaf cherry, and buckwheat.

Evidence of historic and on-going land use is extensive throughout the project, and few areas are undisturbed. Large tracts have been graded level or otherwise brushed, and the vegetation in these areas has only begun to recover. Scattered trash is ubiquitous, with concentrated dumpings adjacent to roadsides and other access routes. It is also apparent that periodic clean-ups have occurred in the past, resulting in additional disturbance. Given the extent and magnitude of historic and recent disruption in conjunction with the effects of flooding, conditions were not conducive to preservation of archaeological material.

III. Background Information

This section provides an overview of prehistory and history of the study area, and summarizes previous archaeological research conducted within the immediate vicinity of the project property. The prehistory is regional in scope and applies an area including the San Bernardino Mountains, Cajon Canyon and its tributary drainages, and San Bernardino Valley, while the history focuses more directly on the Cajon Pass and Creek region.

Prehistory

Despite its presence in nearby desert and coastal environs, no clear evidence for a San Dieguito occupancy has been documented for the study area. The local cultural sequence seems to start with evidence of the Milling Stone pattern, which in adjacent areas has been dated as early as 8000 B.P. (Kaldenberg 1982; Greenwood 1972). Several sites with Milling Stone characteristics are known for the general San Bernardino region; however, radiometric date from these deposits place settlement no earlier than about 2000 or 3000 B.P. (Salls 1983). Major sites in the region that have assemblages representative of Milling Stone affiliation include Liberty Grove, Wilson, Sassone, Mesarica, and Chaffey Hillside. All share several diagnostic elements: large numbers of manos and metates (with a paucity or absence of mortar and pestle); high frequencies of scraper planes and other core-cobble tools; variable but generally small numbers of formal bifaces and projectile points; and occasionally discoidals and cogged stones. The artifact assemblage indicates a fairly stable gathering economy that may have been semi-sedentary, and the relatively large number of milling tools is generally assumed to reflect the importance of seed processing and plant food consumption (Warren 1964).

Following the Milling Stone Horizon and possibly overlapping its terminal phase there is scattered evidence in the region for artifacts that can be attributed to Warren's (1968) "Campbell Intrusion". Evidence of this intrusion is sporatic, consisting mostly of occasional artifacts found as part of in association with other cultural desposits, and pure components indicative of the intrusion are as yet unknown. Diagnostic artifacts are usually projectile points that fit Pinto, Elko, and/or Amargosa stylistic types.

The introduction of bow and arrow technology as evidenced by small projectile points and pottery mark the beginning of the Late Prehistoric period. This period began roughly 2000 B.P., and represents the culture of the people ancestral to the ethnographic inhabitants of the study area. Artifacts that characterize the Late Prehistoric include bedrock mortars, metates, manos, pestles, arrowshaft straighteners, small triangular projectile points, and the use of both precussion and pressure flaking methods. Pottery vessels of various forms, basketry, Olivella shell beadns, rock art, and cremations are also indicators.

The Cajon Canyon area was occupied historically by Shoshonean speaking people generally referred to as the Serrano. As defined by Kroeber (1925), the Serrano territory included the San Bernardino and San Gabriel Mountains, and probably a strip of foothill and valley land marginal to the San Bernardino Valley itself. Based on ethnographic and archaeological information, the Serrano had a generalized hunter-gatherer economy involving a seasonal round of subsistence that took them through various ecological zones ranging from the valley grasslands and coastal sage scrub near their permanent villages, up into the mountains at progressively higher elevations to the oak groves and pinyon woodlands as those resources became available in late summer and early fall (Lerch 1982). With the onset of winter, the bands would return to the warmer, lower elevations where they would depend on stored food resources and small game hunting until spring.

Various ethnographies for the area report between 14 and 19 Serrano clans or local kin groups. According to Benedict (1924), the Serrano houses were rectangular and built on forked post supports with a sloped roof hung on a single cross beam; tules formed the roof and wall covering. Her informants stated that pottery vessels in the form of cooking pots and storage ollas were made of residual red clay paste, using uncontrolled firing, paddle and anvil construction, and the occasional use of overcoloring with fine red clay that burned darker when fired. No painted black decoration was known to the informants.

Basketry similar to that constructed by the Cahuilla was made. Storage containers were made of slender branches and twigs, and a similar tub-like container was made to hold sand for leaching acorns. Acorns and other foodstuffs were processed in bedrock mortars, in wooden portable mortars set into the ground, and in movable stone mortars made from boulders. Clothing made of buckskin, rabbit furs, bark cloth, and other fibers, some decorated with feathers, were reported by Benedict. Netting was used as a base for many kinds of woven goods, most notably for rabbit skin robes and blankets which were manufactured by the men. Sandals were made of agave or yucca fiber, and mats of rolled cactus fiber were used for sleeping and other domestic purposes. The bow was made of scrub oak and some arrows of sharpened wood. Other arrows were composite, with cane shafts and stone arrow points attached with a fiber wrapping. Cane shafts were straightened with a heated stone shaft straightener. All personal belongings were reportedly destroyed at the death of the owner.

History

Travel Transportation

Cajon Wash and Pass are portions of one of the oldest overland routes in the United States. Known as the Mojave River Trail and later as U. S. Highway 66, the route was a major overland thoroughfare from prehistoric times through the late 1950s. The trail was originally established by Native American tribes as a trade route between the Mojave Desert and the Pacific Coast (Cleland 1950:69). Indian guides in turn showed the trail to European and American explorers during the 18th and 19th centuries.

The earliest historic record of the Cajon Wash area occurred in 1772 when Pedro Fages, a Spanish officer from the San Diego Presidio, followed deserters through the pass into the Mojave Desert (Bolton 1931). The next record occurred in 1776 when Father Francisco Garces crossed from the desert to the coast in 1776 (Chapman 1925:316; Hoover et al. 1966). Other early explorers in the Cajon Pass area were Father Zalvadia in 1806 and Father Nuez in 1819. In 1826 Indian guides led Jedediah Smith and an expedition of American fur trappers from the Mojave River to San Gabriel Mission along this route (Cleland 1950:69). During the 1830s, the route became a portion of the Santa Fe Trail and was used by trappers and horse traders from New Mexico (Hoover et al.1966).

Following the discovery of gold in Northern California in 1848, thousands of American immigrants entered California over the Mojave Trail. The Mormons entered San Bernardino Valley via El Cajon Pass in 1851, and established a settlement at Sycamore Grove (Flat), just west of the project area (Quinn 1980:30). Railroad lines were laid through the pass in the 1880s resulting in the establishment of Irvington Station (Marida) and Devore (Haenszel 1976). Irvington was in existence by 1894 and Devore by 1936 (U.S.G.S. 1901, 1941).

The development of the automobile during the early 20th century brought establishment of state and national highway systems to serve cross country travelers. The old Mojave Trail became part of U. S. Highway 66. Thousands of immigrants followed this road into California during the 1930s and 40s. Today Interstate 15 has replaced Old Route 66 as the last in a series of cross-country transportation routes crossing Cajon Pass.

Settlement and Water Exploitation

Spanish explorers began crossing the San Bernardino Valley by the end of the 18th century. By the early 19th century, Spanish missionaries had set up an asestencia of San

Gabriel Mission just east of Guachama, the largest Indian settlement in the San Bernardino Valley (Brown and Boyde 1922).

The winning of Mexico's independence from Spain in 1821 was followed by the secularization of the missions in the mid-1830s. The mission ranches were neglected and the asistencia was abandoned. In the early 1840s the family of Antonio Maria Lugo was granted the old asistencia lands. Vicente Lugo established his house near what became San Bernardino, while Jose del Carmen Lugo set up his ranch at the old asistencia. Indians from the desert began coming through Cajon Pass to raid for cattle and horses.

The area of Lytle Creek and Cajon Pass was first settled by Michael White, an Englishman, when he was granted Rancho Muscupiabe in 1843 for the purpose of defending the area against Indian raiders from the desert. The desert marauders, however, soon succeeded in driving White from the area (Brown and Boyde 1922:31).

As noted, a group of Mormons entered San Bernardino Valley via Cajon Pass in 1851, and established a settlement at Sycamore Grove (Flat), just west of the project site (Quinn 1980:30). Captain Andrew Lytle explored the mouth of Lytle Creek Canyon in June 1851. Some Mormons established homes in the canyon (Thrall 1950:228). In the early 1860s placer gold deposits were discovered resulting in the establishment of hydraulic mining operations at Texas Point in 1867 (Thrall 1950:229-30).

The majority of historic activity within the Cajon Wash and Lytle Creek areas relates to the establishment of water supply, flood control, and hydro-electric development. Early attempts to tap the water supply of these drainages by nearby settlers resulted in the establishment of numerous canals and ditches. The earliest of these was the Rancheria Ditch first excavated to exploit the waters of Lytle Creek in 1843. Shortly after the Lugo family had settled on Rancho San Bernardino they offered a parcel of land to a group of New Mexican immigrants in return for an agreement to assist the Lugos in repelling the desert Indian raiders. The Rancheria Ditch was abandoned in the 1850s, but was reopened and expanded in the 1870s. Other early canals tapping Lytle Creek included the Old Town Ditch, established by the Mormons in the 1850s, and the Lloyd Ditch, excavated by George Lloyd. Other numerous unnamed ditches were also excavated and used between 1855 and 1871 (Scott 1977:124-129; Hall 1888).

During the 1870s a major conflict occurred over Lytle Creek water rights. When the Muscupiabe Rancho was originally granted to Michael White in 1843 it was for one square league (4,439 acres). The grant was surveyed in 1871 by the United States Land Commission when it suddenly increased to 30,145 acres. When a patent for the rancho reflecting the resurvey was issued to its owners the following year many settlers in the Lytle

Creek area who had established homes and irrigation facilities on what was believed to be government land found their water source within the rancho boundaries (Scott 1977; Brown and Boyd 1922:32).

In 1877 the owners of Muscupaibe Rancho brought suit against appropriators of Lytle Creek water. The case was decided in favor of the defendants in December 1878 by the Superior Court. The California Supreme Court overturned the decision a year later. Private appropriators continued to use Lytle Creek waters despite the court decision and formed the Lytle Creek Water Company in 1881. The rancho owners filed an injunction against the appropriators who ignored it. Gradually, however, the grant owners acquired stock in the Lytle Creek Company until they gained control (Scott 1977:130-131).

In the late 1880s Southern California experienced a short lived real estate boom (Dumke 1944). A group of investors purchased large holdings of land and water rights, including the Lytle Creek Water Company, in 1866 and organized the Semi Tropic Land and Water Company the following year. The company laid out the town of Rialto and constructed the Rialto Canal from the mouth of Lytle Canyon. The real estate boom collapsed in 1888, however, resulting in bankruptcy of the company in 1896. Former lands and water rights of the Semi Tropic Company came under control of the Chicla Water Company and the Anglo-American Canaigre Company who constructed another canal known as the Canaigre Ditch. These holdings were purchased in 1907 by the Fontana Development Company. Between 1900 and 1961 numerous other companies controlled Lytle Creek water rights including the Rialto Irrigation District and the Citizens Land and Water Company. They eventually came under the control of the West San Bernardino County Water District which was established in 1952.

Hydroelectric power has also been an important use of Lytle Creek water. A power house at the mouth of Lytle Canyon was completed by the Edison Electric Company in September 1904, and the Fontana Power House, which is located southwest of the project area, was built by the Fontana Power Company in 1917 (Scott 1977).

The first recorded water diversion from Cajon Creek was made by the Towne Family who owned Glen Helen Ranch in 1883. Known as the Glen Helen Ditch, the conduit's intake was on the west side of Cajon Creek a short distance downstream from the Vincent Cienaga. The water was conveyed to Glen Helen Ranch by means of ditches, tunnels, and flumes. In 1888 it provided enough water to irrigate 200 acres of alfalfa, deciduous fruits, and grains (Hall 1888).

Between 1888 and 89 a diversion dam was built in Cajon Canyon downstream from the junction of Cajon and Lone Pine Creeks. Water was conveyed by pipes and tunnels to the Glen Helen Ditch. This addition was known as the Muscoy Water Company pipeline. By 1930 this system irrigated approximately 3,000 acres (Scott 1976).

During the 1930s water conservation and flood control concerns resulted in construction of large spreading grounds within the Lytle Creek flood plain as well as later channel improvements and diversion dikes. As early as 1913 water conservation efforts had been attempted by spreading flood waters over grounds at the mouth of Lytle Creek (Adams 1913). Between 1929 and 1932 the Fontana Union Water Company constructed a large spreading grounds that encompassed most of the Lytle Creek flood plain north of the Fontana Power Plant. The work was completed in September 1932 at a cost of $32,600 of which half was paid through the Santa Ana River flood control fund established by the State Office of California (Fontana Herald 2-19-1932; 2-26-1932; 3-18-1932; 9-2-1932). An additional spreading ground was constructed southeast of the Fontana Power Plant by the Lytle Creek Land Improvement Company (Wilson 1989). Following disastrous flooding in Lytle Creek in 1939 that destroyed many of the spreading ground facilities, the Army Corps of Engineers constructed numerous channel improvements and dikes for the purpose of flood control (Chief of Engineers 1949).

Previous Archaeological Research

The El Cajon Canyon area has been the focus of potential development of one kind or another for numerous years. As such, environmental assessments have been carried out over the past few decades in order to address the impacts that may occur to significant cultural and natural resources. According to recorded information at the Archaeological Information Center at the San Bernardino County Museum, at least 18 area-specific surveys have been conducted within a one-mile radius of the proposed project area, 1 of which was performed for the same project area in 1982. Additionally, 2 general overviews have also been prepared. All of these studies date from 1976 and continue through 1990. As noted, an intensitve survey of the subject property was also carried out in 1982 by archaeologists of the San Bernardino County Museum in anticipation for project approval by the San Bernardino County Planning Department in keeping with the goals, objectives, and policies of the San Bernardino City's General Plan Historical and Archaeological Resources requirements (Section 3.0:1-34; 1989). These area-specific studies range from small acre, private development projects, to large scale projects such as the current survey conducted as part of federal, state, and local environmental review. General overviews encompassed studies of public works projects and an overall assessment of settlement within the larger Upper Santa Ana River Drainage.

The record search indicated that as a result of the above mentioned studies, various cultural resources were located within and in close proximity to the project area. A possible segment of the Mohave Trail was thought to be located in the far northern portion of the project area; and recorded nearby are 2 prehistoric sites, 2 historic sites, and 1 California Historic Landmark (CHL-573) at Sycamore Grove just to the west. Also recorded nearby were 1 pending prehistoric site and 6 pending historic archaeological sites. The pending prehistoric site is thought to be the possible location of a village site in the area of Glen Helen Regional Park but presumably destroyed. The pending historical sites include early roads, military sites, residential building foundations, and an irrigation ditch. These are also presumed destroyed.

Given the results of the records search and known history of the region it was determined that the proposed project area was located within an archaeological sensitive area for cultural resources. The 2 prehistoric sites recorded nearby consisted of bedrock milling features on boulders adjacent to a small ravine. It was noted that vegetation in the area was thick and that more milling features could be present. These sites are located within one-half mile of the project in the far northern portion of the study area. Historic sites recorded nearby consist of features of water spreading grounds most likely built in the early 1930s by the Fontana Union Water Company. The spreading grounds are relatively large area sites consisting of rows of shallow ditches throughout the site with diversion boxes and outlet gates. Some penstock water pipe is associated with one of the sites. These two sites are located to the west and southwest of the southern portion of the project area about 1 mile away. One California Registered Historical Landmark (CHL-573), Sycamore Grove, is situated within one-half mile just southwest of the northern extremity of the project area. This area is a campsite location located on either side of what is thought to be the Mojave Trail, most likely first seen by Europeans in the 1770s. The area is also thought to be very near the "lost rancheria" in Cajon Pass known as Beatisima or Santisima Trinidad (Johnson 1962). It was recorded by Spanish and American travelers in 1806, 1849, and 1850. In 1851 a mormon colony camped on both sides of the pass. The area was dedicated in 1927 and again in 1972.

Based upon the above information, sensitivity assessments by the Information Center staff indicated a low sensitivity for prehistoric archaeological resources, a moderate sensitivity for historic archaeological resources (older than 50 years in age), and a high sensitivity for the potential for Historic Structures. An intensive, on-foot survey to locate, identify, and assess the significance of any cultural resources located within the project area was undertaken in compliance with local, state, and federal regulations and guidelines. The survey methods and results are discussed below, followed by recommendations.

IV. Study Methods

In order to determine the potential for cultural resources to be located within the approximately 1,293-acre project area a background records search, historic and archival data review, and an intensive on-foot field survey was performed. The study was conducted in compliance with local, state, and federal regulations and within the framework of the goals and policies of the San Bernardino General Plan.

A records search was requested from the Archaeological Information Center, San Bernardino County Museum, prior to the commencement of field work in order to determine the number, types, and locations of previously recorded archaeological sites and to assess the potential sensitivity of the area for cultural resources. As previously noted, the record search indicated that the area had low sensitivity for prehistoric resources and moderate to high sensitivity for historic archaeological and architectural sites. Of particular concern were sites associated with the historical development and use of the immediate area. Because of the amount of historic land use in the area special attention was given to identifying features associated with historic water exploitation. Literature reviews of earlier archaeological studies were also conducted. In particular, a survey of the same property was performed and reported upon in 1982 (Lerch). This study reported that no cultural resources were located within the project area. Large scale topographic maps were received from the project proponent and the Information Center that provided excellent locational data of earlier survey project boundaries and previously recorded sites nearby.

Historic and archival reviews were also conducted given the high historic sensitivity of the area by historian Stephen Van Wormer. A summary of the area's historic background is presented in Section III focusing upon travel, transportation, settlement, and water exploitation given the types of historic resources likely to be located within the project area. The historic research confirms that the area is located very close by the Mojave Trail, a major overland route used from prehistoric times through the 1950s, and that water exploitation was a primary historic land use.

Between August 27th and September 7th, 1990, an archaeological survey was then conducted under the direction of Mr. John R. Cook, S.O.P.A., and Mr. Cole Parker. Survey methods consisted of a crew of between 3 and 4 individuals visually inspecting the entire project area. The field team walked within a series of zig-zagging parallel transects with intervals measuring between 15 and 25 meters between individuals. Cultural features such as roads and railroad tracks and natural features such as washes and the Cajon Creek were used as markers for survey boundaries to ensure complete coverage. Spatial control was maintained by using compass bearings and an aerial photograph of the project area. Precise locations were determined using aerial photographs and all artifacts were flagged, measured, and plotted on the U.S.G.S. topographic map for future reference. Thirteen development areas were plotted on the preliminary site design provided to the survey crew. The field work was divided into survey units within these development areas, and all material observed within these sections were recorded and plotted. Photographic documentation of the project area concluded the in-field survey.

The overall visibility ranged from areas of open wash to heavy chamise-chaparral, although surface visibility was generally adequate to identify if significant cultural resources were present. In areas of heavy vegetation ground cover was removed in random locations to inspect better the ground surface. Some isolated artifacts, however, could have gone undetected in those areas exhibiting dense vegetation. The general nature of the project area was heavily impacted, indicated by extensive flooding and modern day land use disturbances. These activities, of course, do not contribute to the preservation of cultural resources.

V. Results

The survey resulted in the identification and recording of four shards of purple glass in the southeastern portion of the project area, at the boundary between Sections J and M. No other cultural resources were found. The following provides an in-depth discussion of the survey results for each of the proposed development sections, labled A through P (see Plan Map).

Sections A, B, and C

No prehistoric artifacts or sites were found in these sections. Aside from the modern debris and trash no historic sites or artifacts were found. One modern day fire rock was seen but not plotted.

Sections D, E, and F

The survey failed to find any prehistoric or historic artifacts or sites in these areas. Modern scatters of tin cans, glass, paper products, and other debris were seen, along with abandon vehicles and temporary shelters. Two modern rock rings were also seen but not plotted.

Section G

No prehistoric or historic sites or artifacts were found in this section; however, there is a relatively modern flood control dike. The dike is a berm approximately 7-10 feet in height that runs almost the length of the section. A large block of cement is located at one end and on top of the berm there are intermittent scatters of ceramic pipe.

Sections H, K, and L

No prehistoric or historic sites were found in these sections. These areas are highly disturbed with evidence of off-road vehicle use, abandon cars, and modern trash dumps.

Sections I, J, and M

The survey team found no prehistoric or historic sites or artifacts in sections I and J. Four historic purple glass fragments were found between sections J and M. The glass is located about 1500 feet south of Palm Road between the MWD line, the secondary access road, and 125 meters east of the S.C.E. easement line; it was plotted as Isolate (I) 1 (see Appendix B; U.S.G.S. topographic map). Historic purple glass is important in that is recognized as an historic time marker by archaeologists for artifacts and sites dating around the turn of the 20th century. The purple coloring of the glass is the result of using manganese within the glass. The manganese was imported from Germany, and as such the practice was discontinued in 1917 with the outbreak of hostilities during World War I.

All of the four pieces are part of large serving bowl or platter. Along with this glassware there are piles of boards and bricks and scatters of other glassware that cover an area approximately 5 X 15 meters. These other items appear to be more modern and therefore the area is probably not an historic site.

Sections N and P

No prehistoric or historic sites or artifacts were found in these sections.

VI. Recommendations

The cultural resource study conducted for the proposed project did not discover any significant cultural resources and therefore it is concluded that the development of the proposed Cajon Wash Project will not result in any adverse impacts to archaeological resources, with the stipulations discussed below. Besides the four historic glass fragments no prehistoric or historic sites or artifacts were found within the proposed project area. Therefore, development of the area should not impact any significant cultural resource.

Because much of the area surveyed was heavily vegetated, the surface visibility was reduced and therefore artifacts or features may have been missed. Also, much of the area surveyed was heavily disturbed by off-road vehicle use, trash dumping, and modern construction. For example, a 5 X 7 X 3 meter borrow pit was found in section L and a large 30 X 50 meter rectangular minning pit was found in Section P. These types of disturbances may have destroyed archaeological resources or could possibly obscure them.

If during grading any prehistoric archaeological or historic archaeological or architectural remains over 50 years old are unearthed, construction activities should cease until a qualified archaeologist is brought in to assess and evaluate the significance of the resources. Recommendations as to alternative mitigation measures would then be made within the quidelines of the California Environmental Quality Act and/or the National Environmental Policy Act.

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Appendix A

Record Search

CALIFORNIA
ARCHAEOLOGICAL
INVENTORY

San Bernardino County

ARCHAEOLOGICAL INFORMATION CENTER
San Bernardino County Museum
2024 Orange Tree Lane
Redlands, California 92374
(714) 792-1497

August 30, 1990

John Cook
ASM Affiliates, Inc.
P.O. Box 2476
Leucadia, CA 92024-0960

Dear John:

CULTURAL RESOURCES RECORDS SEARCH FOR: Cajon Wash Project.

In response to your request for information dated August 21, 1990, a record search has been conducted for the above project, located on the USGS San Bernardino North and Devore 7.5-minute quadrangles (see enclosed map).

CULTURAL RESOURCES:

Cultural resources exist within and adjacent to the project area:

Prehistoric Archaeological Resources:
- 2 prehistoric sites
  - CA-SBR-1397 -- food processing site (destroyed?)
  - CA-SBR-5429 -- food processing site (destroyed?)
- 1 pending prehistoric sites
  - P1072-25 -- village? (destroyed?)
- 0 prehistoric isolates

Historical Archaeological Resources (older than 50 years in age):
- 2 historic archaeological sites
  - CA-SBR-6706H -- spreading ground
  - CA-SBR-6708H -- spreading ground
- 6 pending historical archaeological sites
  - PSBR-2-H -- road (destroyed?)
  - PSBR-4-H -- road (destroyed?)
  - PSBR-5-H -- road (destroyed?)
  - P1071-1-H -- military sites (destroyed?)
  - P1071-25-H -- residential building foundations (destroyed?)
  - P1072-37-H -- irrigation ditch (destroyed?)
- 0 historic isolates
- 0 possible historical archaeological site locations determined from historic maps (maps searched: USGS San Bernardino, surveyed 1893-1894)

Historic Structures (older than 50 years in age):

- 0 historic structures
- 0 pending historic structures

some possible historic structure locations determined from historic maps (maps searched: USGS Devore, surveyed 1936; US Army San Bernardino, surveyed 1940-1941)

- including existing railroad and Route 66 road

Heritage Properties (designated by State and Federal commissions):

- 0 National Register Listed Properties
- 0 National Register Eligible Properties
- 1 California Historic Landmarks
  CHL-573 -- Sycamore Grove
- 0 California Points of Historical Interest

PREVIOUS CULTURAL RESOURCE INVESTIGATIONS:

Cultural resource reports for the project area include (see enclosed bibliographies):

18 Area-specific survey reports
2 General area overviews

In addition to the Center's cultural resource site files, the following publications, manuscripts or correspondence also were consulted:

American Association for State and Local History
1989 National Register of Historic Places, 1966-1988. Nashville, TN.

California Department of Parks and Recreation
1982 California Historical Landmarks.

California Office of Historic Preservation
1985 National Register of Historic Places -- Eligible Properties, through 3/31/88. Correspondence (photocopy of listing from the National Register).

1986 Points of Historical Interest, SBr-001 through SBr-109, as of June 1986. Correspondence.

1986 National Register of Historic Places -- Listed Properties, as of August 1986. Correspondence.

1986 Survey of Surveys: A Summary of California's Historical and Architectural Resource Surveys.

1987 Inventory of Historic Structures -- Records entered into the OHP computer file of historic resources as of February 1987.

1988 Five Views: An Ethnic Sites Survey for California.

National Park Service
1986 National Register of Historic Places; Annual Supplemental Listing of Historic Properties -- Listed and Eligible Properties. Federal Register:
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February 2, 1982; Vol. 47(22):4933, 4956, 4957, 4959;
March 1, 1983; Vol. 48(41):8629, 8673;
February 7, 1984; Vol. 49(26):4612, 4676;
March 5, 1985; Vol. 50(43):8853, 8903;
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SENSITIVITY OF PROJECT AREA FOR CULTURAL RESOURCES:

Based upon the above information, available historic records and comparisons with similar environmental localities, the sensitivity assessment for this project area is:

Prehistoric Archaeological Resources:

_X_ Low ___ Moderate ___ High ___ Unknown

Historic Archaeological Resources (older than 50 years in age):

___ Low _X_ Moderate ___ High ___ Unknown

Historic Structures (older than 50 years in age):

___ Low ___ Moderate _X_ High ___ Unknown

RECOMMENDATIONS:

Reviewing available information, the following recommendations are made:

1. Conduct a field survey for historic archaeological resources and historic structures within portions of the project area not surveyed previously for such resources.

2. Inventory all resources older than 45 years using appropriate State record forms, following guidelines in the California Office of Historic Preservation manuals for archaeological resources and historic structures. Submit two copies of the completed forms to the San Bernardino County Archaeological Information Center for assignment of State trinomials.

3. Evaluate the significance and integrity of all prehistoric and historic archaeological resources and historic structures within the project area, using criteria established for the National Register of Historic Places.

4. Propose mitigation measures, and recommend conditions of approval (if a local government action), to eliminate adverse project effects to significant or unique cultural resources, following appropriate CEQA or National Historic Preservation Act - Section 106 guidelines.

5. Prepare a technical cultural resource management report, documenting the inventory, evaluation and proposed mitigation of resources within the project area (follow instructions in the California Office of Historic Preservation guidelines for archaeological resource management reports). Submit one copy of the completed report (preferably with original illustrations) to the San Bernardino County Archaeological Information Center for permanent archiving.

Appendix B

Isolate Record

SITE LOCATIONS AND SITE RECORDS
NOT FOR PUBLIC DISCLOSURE

SAN BERNARDINO COUNTY CULTURAL RESOURCE MANUSCRIPT INVENTORY
GENERAL REFERENCES FOR SAN BERNARDINO COUNTY

09-0.1 NADB 1062011
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A CEQA Initial Study determination of "MAYBE" for potential adverse environmental impact to prehistoric and historic resources is warranted, unless it can be documented by a qualified professional that no prehistoric or historic archaeological sites and historic structures (older than 50 years; including buildings, roads, agricultural features, mining features, utilities, etc.) exist on the property. Implementation of the above recommendations will ensure that existing cultural resources will be inventoried and evaluated, and that appropriate mitigation measures will be recommended to avoid adverse impacts.

If appropriate mitigation measures are not proposed for significant cultural resources within the project area, then subsequent destruction of these resources may violate provisions of the California Environmental Quality Act, National Environmental Policy Act, or National Historic Preservation Act.

If prehistoric or historic artifacts over 50 years in age are encountered during land modification, then activities in the immediate area of the finds should be halted. If a qualified archaeologist is not on-call, contact the San Bernardino County Archaeological Information Center, (714) 792-1497, for the names of qualified professionals. Arrangements should then be made for an archaeologist to assess the find, determine its significance, and make recommendations for appropriate mitigation measures within the guidelines of the California Environmental Quality Act (CEQA) and/or the Federal National Environmental Policy Act (NEPA).

If human remains are encountered on any property within San Bernardino County, then the San Bernardino County Coroner's office must be contacted, and all work within the immediate vicinity of the find halted until a clearance is given by that office and any other involved agencies. Contact the county coroner at 825 East Third Street, San Bernardino, CA 92415-0876; (714) 387-2978.

The County of San Bernardino requests that cultural resource data and artifacts collected within this project area be permanently curated at a repository within the county. The repository selected should possess archival and collection standards equivalent to those discussed in 36 CFR 79, Curation of Federally-Owned and Administered Archeological Collections; Proposed Rule, published in the Federal Register, August 28, 1987. For names and addresses of repositories within the county, please contact me at the address and telephone number above.

Sincerely,

Lester A. Ross
Center Coordinator

SAN BERNARDINO COUNTY CULTURAL RESOURCE MANUSCRIPT INVENTORY
Cajon Wash Project

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