

PRELIMINARY HYDROLOGY REPORT

Home Depot
Highland Avenue & Arden Avenue
San Bernardino, CA

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Prepared: August 09, 2011

Revised: October 18, 2011

TAIT JOB # HM2064

TABLE OF CONTENTS

Section I	Introduction.....	1
Section II	Methodology.....	2
Section III	Summary.....	3
Section IV	Calculations.....	4
Section V	<u>Appendices</u>	
	Appendix A: Vicinity Map	
	Appendix B: 100-Year Isohyetal Maps	
	Appendix C: Soil Group Map	
	Appendix D: Hydrology Maps	
	Appendix E: Soils Report Recommendations	

SECTION I INTRODUCTION

This report presents a preliminary hydrology analysis for a proposed 17.4-acre shopping center in the City of San Bernardino located at the southwestern corner of Highland Avenue and Arden Avenue. The main objective of this project is to analyze pre and post development peak flows for the project site and determine the volume that needs to be detained on-site to prevent an adverse effect of the properties downstream of the project.

The proposed improvements also include widening of Highland Avenue. This report also presents hydrologic calculations for Highland Avenue.

DESCRIPTION:

Existing conditions

The site previously contained residential homes on a total of 73 individual lots and six (6) dead-end residential streets; however, the homes have been demolished over the years and the site currently contains vacant land owned by the City of San Bernardino. An application is currently before the City to merge the lots and rights-of-way of the aforementioned six (6) streets to form one parcel totaling 16.7 acres. In addition, as part of this application currently before the City, a paved portion of the right-of-way of Highland Outer Highway South will also be merged with the proposed parcel to form a larger parcel totaling 17.4 acres. There are no existing storm drain improvements on the property, and all storm water drainage on the property is conveyed via overland flow to 20th Street right-of-way to the south. Storm water is then conveyed via sheet flow along the northern gutter line of 20th Street for approximately 200 feet to North Guthrie Street. From there, it continues along the eastern gutter of line of North Guthrie Street for approximately 1800 feet southward to Pacific Street. From there, it continues along the northern gutter line approximately 1200 feet westward to a drain inlet located at the northeastern corner of Pacific Street and North Sterling Avenue.

The pre-development condition analyzed for this report is the residential development with approximately 63% of impervious area.

The existing drainage for Highland Avenue consist of half street flows from Guthrie Street to Arden Avenue that are being discharged into a ditch located along Highland Avenue east of Guthrie Street. The ditch conveys storm water runoff to a 24" CMP pipe that crosses Guthrie to an underground public storm drain system. The current existing area draining to the ditch is approximately 1.43acres. See drainage area 1 of the hydrology report included in Appendix D.

Proposed conditions

The proposed project is a 17.4 acre shopping center consisting of a Home Depot, a major groceries store, and five outparcels that will be occupied by restaurants, shops and a gas station.

Improvements for construction of the abovementioned project will include: development of the parcels, including construction of the buildings and associated parking and landscaped areas;

widening of a portion of Highland Avenue along the site frontage for right turn lanes; and construction of an onsite subsurface storm water detention basin with drywells.

The proposed drainage consists of storm water runoff sheet flow to several catch basins located throughout the site. The drainage for this project is divided into two main areas. One that will be discharged to detention basins on-site and the other one that will be discharged into 20th Street via parkway drains. The area that will be detained on-site will be approximately 7.5 acres while the remaining 9.9 acres of the site will be discharged via parkway drains to 20th Street.

It is anticipated that three underground retention basins with dry well systems will be located in the main parking lot area. The basins will collect storm water runoff from the four parcels located north of the site and the main parking lot located north of the proposed Home Depot store. See drainage areas A, B, and C of the hydrology map located in Appendix D of this report.

The preliminary design of the dry wells was based upon the recommendations provided in the geotechnical report (Section 8.1.4). The report indicates that the soils are not suitable for shallow infiltration. The excerpt of the recommendations from the geotechnical report is located in Appendix E of this report.

The dry wells are classified as Class V Wells by the United States Environmental Protection Agency, and the required recommendation will be filed.

The drainage area that will be discharged to 20th Street includes runoff from the rooftops of the Home Depot Store, Major 1, and a multitenant building located southeast of the site as well as runoff from paved areas of the southern portion of the site. Runoff from the rooftops and paved areas will be treated with biofilters (tree –boxes) prior to being discharged into the street. The runoff from this 9.9 acre area will be divided in subareas that will be discharged periodically into 20th Street to mimic the pre-development condition.

The proposed improvements along Highland Avenue consist of approximately 12' widening which will result in an additional 0.24 acres being discharge to the existing 24" CMP. It is anticipated that the ditch will be re-graded or remove as need to accommodate the proposed improvements and the inlet to the 24" CMP will be reconstructed.

SECTION II METHODOLOGY

The program chosen for this hydrology study was the Small Unit Hydrograph Computer Program Package by Advanced Engineering Software (AES). The overall pre-development and post-development conditions were analyzed using the San Bernardino County Detention Basin Criteria (Addendum issued in 1987) and the San Bernardino hydrology manual.

The rational method by AES was also utilized to determine pre and post development peak flows to the existing 24" CMP located along Highland Avenue.

Design Criteria:

Design Storm: 100 year

Land Use: Commercial

Rainfall Intensity: Based on San Bernardino Hydrology Manual Maps

SECTION III SUMMARY

Hydrologic calculations for the overall site were performed for the 2year, 10year, 25 year and 100 year and are included in section IV of this report. The peak volume for the pre-development condition for the 100 year storm is **5.48ac-ft** while the post development is **8.51ac-ft**. Per the County of San Bernardino basin guidelines, the post-development peak flow rate from the site should be less than 90% of the pre-development peak flow rate for all storm events. Based on these criteria, a proposed basin with a volume of 3.33ac-ft is required for the proposed project.

The proposed improvements will consist in two main drainage areas. One that will be conveyed to the underground basin on-site and another one that will be conveyed via parkway drain to 20th Street. The total area that will be detained on-site consists of 7.5acres and the total underground basins will have an approximate volume of **3.64ac-ft**. It is anticipated that three separate basins with Max well dry well drainage systems will be utilized to mitigate the proposed improvements impact on properties downstream of the project. The second area that will be conveyed to 20th Street will imitate the pre-development pattern by having subareas that will be discharged to the street via parkway drains at different locations along 20th. This area will consist of 9.9acres and will have a volume of **4.87ac-ft** which is less than the 90% pre-development peak flow for the 100year storm event.

The proposed improvements will include widening of Highland Avenue by approximately 12'. The calculations shown in section IV show that the additional drainage area of 0.24ac that will result from the street widening does not have a significant impact on the existing 24" CMP pipe that crosses Guthrie Street. The pre-development and post-development peak flows are **4.42cfs** and **5.17cfs** respectively. The capacity of the existing 24" CMP was analyzed for the post-development peak flow and is 50% full. The proposed improvements will include the reconstruction of the inlet to the existing pipe in order to accommodate the proposed street improvements.

SECTION IV

HYDRAULIC/HYDROLOGIC CALCULATIONS

SECTION IV

SMALL UNIT HYDROGRAPH
PRE-DEVELOPMENT

100YEAR, 25YEAR, 10YEAR & 2 YEAR

SECTION IV

SMALL UNIT HYDROGRAPH
POST-DEVELOPMENT

100YEAR, 25YEAR, 10YEAR & 2 YEAR

SECTION IV

ON-SITE DETENTION
100 YEAR

SECTION IV

HIGHLAND AVENUE
PRE-DEVELOPMENT
100 YEAR

SECTION IV

HIGHLAND AVENUE
POST-DEVELOPMENT
100 YEAR

SECTION IV

HIGHLAND AVENUE
CAPACITY 24" CMP PIPE
100 YEAR

SECTION V

APPENDIX

APPENDIX A: VICINITY MAP

SECTION V

APPENDIX

APPENDIX B: 100-YEAR ISOHYETAL MAPS

SECTION V

APPENDIX

APPENDIX C: SOIL GROUP MAP

SECTION V

APPENDIX

APPENDIX D: HYDROLOGY MAPS

Preliminary Pre-Development Hydrology Map
Preliminary Post-Development Hydrology Map

SECTION V

APPENDIX

APPENDIX E: SOILS REPORT RECOMMENDATIONS

“Section 8.0: Recommendations”
Excerpt from Draft Geotechnical Engineering Investigation,
prepared by Moore Twining Associates, Inc.,
dated March 25, 2011
(Project No. D050M5.01-01)