Appendix H

Conceptual Hydrology and Low Impact Development (LID) Report

CONCEPTUAL HYDROLOGY AND LOW IMPACT DEVELOPMENT REPORT FOR RESIDENTIAL APPARTMENT PROJECT

ALEXAN ARCADIA
150 N. SANTA ANITA AVENUE
ARCADIA, CA

PSOMAS PROJECT: 1ARC040100

Prepared For:
Trammel Crow Residential
5780 Fleet Street, Suite 130
Carlsbad, CA 92008

Prepared By:
PSOMAS
27220 Turnberry Lane, Suite 190
Valencia, CA 91355
TEL: (661) 219-6000
FAX: (661) 775-4410
dmartin@psomas.com

LID Prepared: May 2021

5/18/2021

David Martin ..... RCE 74143

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TABLES

APPENDICIES

1. INTRODUCTION

Project Background

The project is located at 150 N Santa Anita Avenue Arcadia, California. The site is bound by E. Santa Clara St. to the north, Wheeler Avenue to the south, a public alley the east and North Santa Anita Avenue to the west. The project site is currently occupied by commercial building and surface parking.

The proposed development is a residential appartment with 5 stories above a two story parking structure and 1 level of subterranean parking. (Refer site plan included in Appendix 1)

The project extends over five parcels per pages 34 to 64 of PM 34-64 in book at the county recorder's office, consisting of lots 2, 7, 8, 27 and 28. Lot two needs to be subdivided to establish a separate lot for the existing buildings along the Santa Anita Avenue and the remaining lots are to be consolidated. The alley between lots 7 and 8 and 27 and 28 is to be vacated.

The site is within a Zone X as defined by Federal Emergency Management Agency (FEMA, 2021; LACDPW, 2021b). Sites within the Zone X have a minimal potential for flooding (FEMA, 2021).

Purpose and Scope

This project falls under the jurisdiction of the City of Arcadia. The purpose of this report is to document that the proposed project site can be designed to provide adequate flood protection for onsite improvements without adversely impacting existing drainage facilities or adjacent properties. This report is to also document that the County of Los Angeles Low Impact Development (LID) Best Management Practices will be met.

A finalized storm drain design plan has not been completed. Detailed storm drain sizing will occur when the location of roof drains has been determined, and a final storm drain design plan is complete.

2. HYDROLOGIC CONDITIONS

Hydrology analysis for this report is limited to the onsite development area affected by the proposed development. The affected area is comprised of an existing asphalt paved parking lot and existing buildings.

2.1 Existing Conditions

The existing site has a existing buildings surrounded by a paved parking lot and slopes gently to the south with a elevation change of approximately 7 feet and an approximate grade of 1.6%. The percentage impervious of the existing condition is high and estimated to be 95% impervious.

2.2 Proposed Conditions

The proposed condition replaces most of the paved parking with an apartment building above subterranean parking. Surface flows from the roof level will be collected via roof drains and discharged into BMP drywells located in the south side of the basement parking. The dry wells are below the basement level and to be able to overflow at street level into Wheeler Street via street curb drain. Discharge from the project site ultimately drains to an existing street catch basin located at the northeast intersection of Santa Anita and Wheeler Avenue.
See Appendix 4 for LID plan and drywell detail system connection.

While the percentage imperviousness of the site remains high at roughly 95% impervious due to the podium structure the flow path of travel is prolonged due to the interception into the proposed settlement chamber and dry wells which need to fill prior to overflow off the site.

3. HYDROLOGIC CALCULATIONS

3.1 Existing Conditions Results

Mount Wilson Isohyet Map1-H1.28, Soil Type 006, Isohyet 7.7", 50-year 24-hour storm event.
Existing condition hydrology results for the 50-year storm events are summarized in Table 3-1.

Table 3-1 EXISTING CONDITION HYDROLOGY SUMMARY

SUBAREA	AREA (ac)	Tc-Calculated (min.)	Q_{50} (cfs)
E1	2.13	5	8.81

3.2 Proposed Conditions Results

The proposed condition hydrology results for the 50-year storm events are summarized in Table 3-2 below.

Table 3-2 PROPOSED CONDITION HYDROLOGY SUMMARY

SUBAREA	AREA (ac)	Tc-Calculated (min.)	Q_{50} (cfs)
P1	2.13	6	8.08

The results no increase in the runoff between the existing and proposed conditions. The proposed detention/infiltration will significantly decrease runoff in the proposed condition by retaining runoff onsite and increasing the time of concentration. See Appendix 1 for calculations.

The peak flow detention storage volume is additionally required above the LID storage volume that accommodates the 85th percentile storm event. The required storage volume for the project site is summarized in Table 3-3 below:

Table 3-3 REQUIRED STORAGE VOLUMES

Storm Event	Storage Volume Type	Volume (cf)
85th percentile	BMP Detention	7591

Through infiltration and storage provided in the proposed settlement chamber and drywells the project site will accommodate the peak storm water runoff discharge rate below the pre-developed condition for the 50-year storm. These site design features result in an outlet discharge from the site less than the existing condition 50-year flowrate of 8.81 cfs. See Appendix 1 for hydrology and required storage calculations.

4. LOW IMPACT DEVELOPMENT (LID)

Structural or Treatment Control Best Management Practices (BMPs) are required for this project under the County of Los Angeles LID program. The LID requirements, approved by the Regional Water Quality Control Board, call for the treatment of peak mitigation flow rate or volume of runoff produced by the 85th percentile, 24-hour rainfall event. The 85th percentile rainfall depth in this area is 1.1 in.

BMP selection was analyzed per section 4 of the Countyof Los Angeles Low Impact Development Best Management Practices Handbook (LID Manual).

Infiltration

Infiltration systems were analyzed for the site. Per Table 4.1 (Appendix 3) of the LID Manual, it was determined that the site was in a Category 1 Screening. The historical high groundwater is 100 to 150 feet below the existing ground surface. Groundwater was not encountered in geotechnical drilled borings up to 40.5 feet dep. The site-specific geotechnical report (See Appendix 2 for excerpt from Geotechnical Report) indicated that a percolation test was performed and the measured infiltration rate was 13.83 in/hour and the design infiltration rate after appropriate reduction factors is 6.92 in/hour. The report specified the infiltration will not increase the potential for liquefaction the soil zones encountered on site are suitable for infiltration of stormwater.

Methodology

The Hydrocalc software program was utilized to calculate the required treatment flow and volume for the total development area. The calculations were based on a runoff coefficient curve for Soil Type 6 and an Isohyet of 1.1 inches. See Appendix 3 for LID Calculations. The results are summarized in Table 4-1 below:

Table 4-1 LID CALCULATION RESULTS

Subarea	Area (Ac)	Tc (min)	Ix (in/hr)	Soil Type	%imp	Qpm (cfs)	Vm (cf)
P1	2.13	17	0.37	6	100	0.71	7,591

The building roof will be treated by the drywell infiltration system, through which stormwater will infiltrate to the pervious subgrade approximately 42 feet below surface. The infiltration rate and a 96-hour draw down time were used to size the drywell to meet the required LID storage volume required (Vm) for the site. Infiltration drywell sizing calculations can be seen in Appendix 3. The project pr0posed LID Plan is in Appendix 4.

We are proposing the Torrent Maxwell-plus infiltration system with one primary settling chamber and dual drywells to eliminate the need for detention structure. The volume infiltrated in 96 hrs is about 6 times the required mitigated volume and the volume infiltrated as it enters the drywells are nearly equal to the mitigated volume. The calculation shows there will be no additional detention required as shown on Appendix 3.

The infiltration drywell sizing results provided by Torrent are summarized in Table 4-2 below:

Table 4-2 INFILTRATION DRYWELL SIZING RESULTS

Type of System	Mitigated Volume (CF)	Volume Infiltrated in 96 hours (CF)	Detention Required (CF)	Volume Infiltrated as it Enters Drywell (CF)	Volume in Drywells (CF)	Total Number of Primary Settling Chamber	Total Number of Drywells	Drywell Diameter (FT)	Total Depth (FT)
Dual MaxWell Plus	7,592	49,010	0	6,577	1,062	1	2	6	42

In the event of a large storm event that exceeds the 85th percentile event event, overflow runoff would be discharged to the street gutter via a curb outlet and to the existing storm drain catch basin located at the northeast corner of the intersection of Santa Anita Ave. and Wheeler Avenue. See Appendix 4.

4.1 Pollutants of Concern

The pollutants of concern for this project are sediment from roof runoff, heavy metals, and polycyclic aromatic hydrocarbons.

4.2 LID Requirements

The project complies with the general LID provisions as follows:

1. Peak storm water discharge rates - The post-development peak storm water runoff rate has been reduced by the introduction of a drywell and will be less than the pre-development conditions.

2. Conservation of natural areas - The project site has no natural areas and minimal landscaping. The development will introduce landscaping to meet code requirement for the new building development and as such will improve conditions on site.

3. Minimize storm water pollutants of concern – The project minimizes pollutants of concern using drywell infiltration with pretreatment for the removal of settling solids and hydrocarbons. Refer to the LID Plan in Appendix 4 for the location of the drywell.

4. Protect slopes & channels – The project is relatively flat. No slopes or channels exist on site.

5. Provide storm drain stenciling and signage – Storm drain stenciling, and signage will be provided at all storm water catch basin inlets. See the LID plan in Appendix 4.

6. Properly design outdoor material storage areas – The project does not include any outdoor storage areas as these will all occur within the building footprint.

7. Properly design trash storage areas – Trash storage areas and recycling areas will be enclosed to prevent off-site transport of trash and are placed within the building footprint.

8. Ongoing BMP maintenance – The developer, their successors or assigns would be obligated to provide ongoing maintenance of the drywell system.

4.3 Source Control BMPs

Source control BMPs help to prevent stormwater pollution by reducing the potential for contamination at the source of the pollution. The following source control BMPs shall be implemented for this project in order to reduce the potential for pollutants of concern to enter the storm drain system.

Employee Training- Employees will be educated about spill prevention and cleanup and trained to identify non-stormwater discharges.

Non-Stormwater Discharges- Non-stormwater discharges will be eliminated through implementation of measures to detect, correct, and enforce against illicit connections and illegal discharges of pollutants into the storm drain system.

Spill Prevention, Control & Cleanup- Take steps to identify and characterize potential spills, eliminate and reduce spill potential, respond to spills when they occur, and train personnel to prevent and control future spills.

Outdoor Loading/Unloading of Material- Implement protocols to prevent or reduce the discharge of pollutants to stormwater from outdoor loading/unloading of materials.

Waste Handling & Disposal- Prevent and reduce the discharge of pollutants to stormwater from waste handling and disposal by reducing waste generation and properly disposing of waste.

Safer Alternative Products- Promote the use of less harmful products and products that contain little or no TMDL pollutants.

Building and Grounds Maintenance- Reduce the discharge of pollutants to stormwater from building and grounds maintenance activities by washing and cleaning up with as little water as possible, following good landscape management practices, preventing and cleaning up spills immediately, keeping debris from entering the storm drains, and maintaining the stormwater collection system.

Building Repair and Remodeling- Reduce the discharge of pollutants to stormwater from building repair, remodeling, and construction by using soil erosion controls, enclosing or covering building material storage areas, and using good housekeeping practices.

Efficient Irrigation- Minimize runoff of excess irrigation water into the stormwater conveyance system.

Storm Drain System Signage- The following City of Arcadia approved stencil will be placed directly adjacent to storm drain inlets.

Trash Storage Areas- Enclosures, containment structures, and impervious pavements should be utilized to mitigate spills and prevent the transport of trash and other pollutants into the storm drain system.

4.4 Treatment Control BMPs

Treatment goals can be achieved through a variety of BMPs. The BMPs chosen for this site are listed below:

- Drywell Infiltration System – Runoff from the roof and surrounding project area of the proposed development will be infiltrated through a Dual Maxwell Plus drywell infiltration system that includes the removal of settling solids and hydrocarbins prior to infiltration. See Appendix 4.

5. CONCLUSION

Comparing the existing and proposed conditions at the project outlet point demonstrates that the proposed condition flowrate does not exceed the respective existing condition discharge for the 50-year, 24 hour storm event. For the project design storm, the analysis demonstrates that there is no negative downstream effect.

LID BMP's have been designed to treat the peak mitigation flow rate produced by a 1.1 inch 24-hour rainfall event. Infiltration BMPs were selected as the appropriate treatment system. The drywell infiltration system has been sized to treat the required mitigation volume.

6. LIMITATIONS

This report was prepared to comply with the guidelines established by the City of Arcadia. Evaluation of the appropriateness of these guidelines and the accuracy of the City and County data were beyond the scope of this work.

Usage of this report is limited to address the purpose and scope previously defined. Psomas shall not be responsible for any unauthorized application of this report and the contents therein.

The opinions represented in this report have been derived in accordance with current standards of civil engineering practice. No other warranty is expressed or implied.

7. REFERENCES

Los Angeles County Department of Public Works, *LACDPW Hydrology / Sedimentation Manual and Appendices* (LACDPW 1991, 1992, 1993, 2002, 2006).

Los Angeles County Department of Public Works, The LACDPW TC v1.0 Manual (TC_calc_depth.xls, December 1991, June 2002)

Los Angeles Regional Water Quality Control Board, *Standard Urban Storm Water Mitigation Plan for Los Angeles County and Cities in Los Angeles County,* (March 2000)

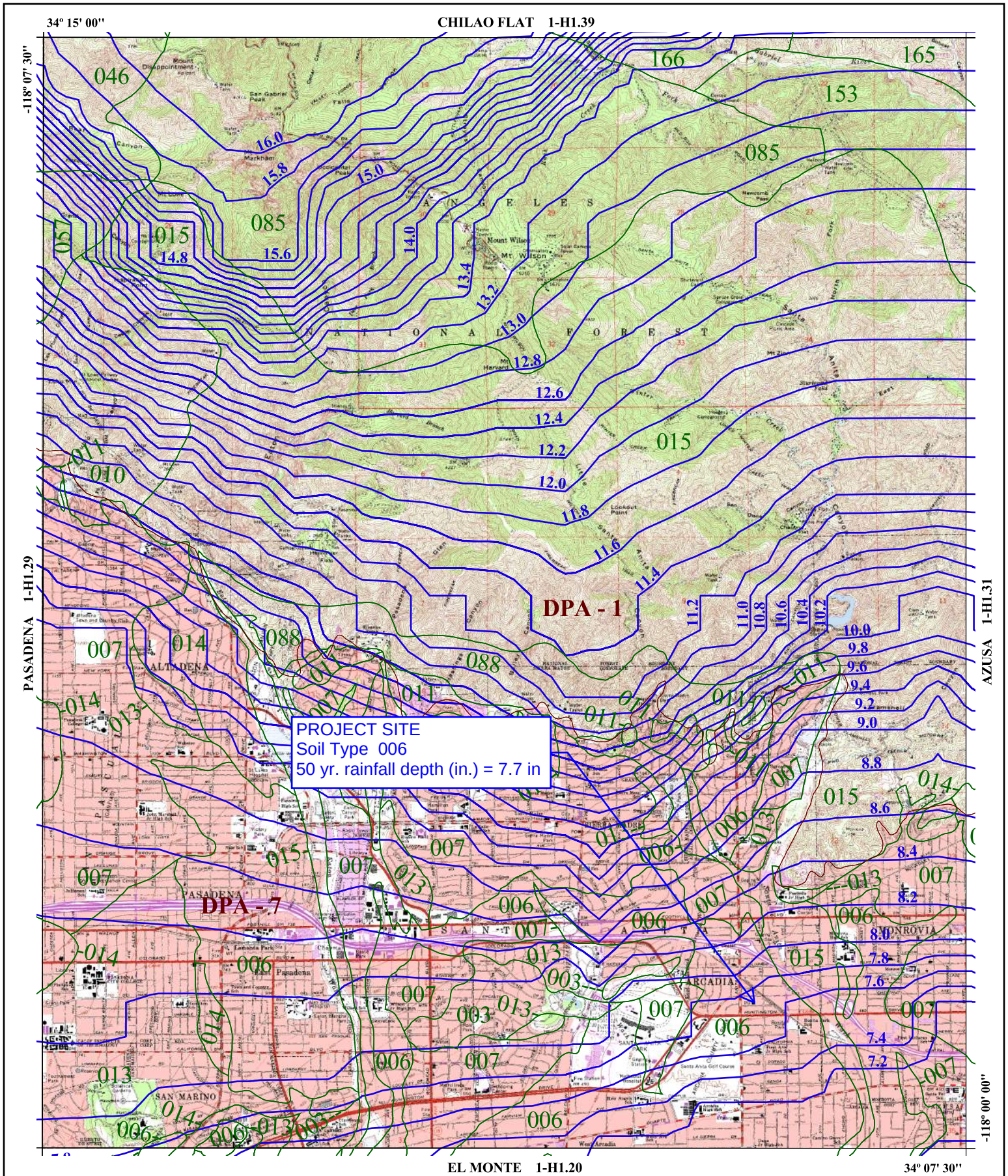
Los Angeles County Department of Public Works, *Development Planning for Storm Water Management, A Manual for the Standard Urban Stormwater Mitigation Plan, Appendix A, Volume and Flow Rate Calculations,* issued on May 2000 (LACDPW, 2000).

California Stormwater Quality Association, Stormwater Best Management Practice Handbook New Development and Redevelopment (January 2003).

Appendix 1

HYDROLOGY CALCULATIONS & MAPS

- **Isohyetal Map**
- **Existing Condition Hydrology Exhibit**
- **Proposed Condition Hydrology Exhibit**
- **Hydrocalc- Existing (50-yr)**
- **Hydrocalc- Proposed (50- yr)**



N
W E
S

016 SOIL CLASSIFICATION AREA

7.2 INCHES OF RAINFALL

DPA - 6 DEBRIS POTENTIAL AREA

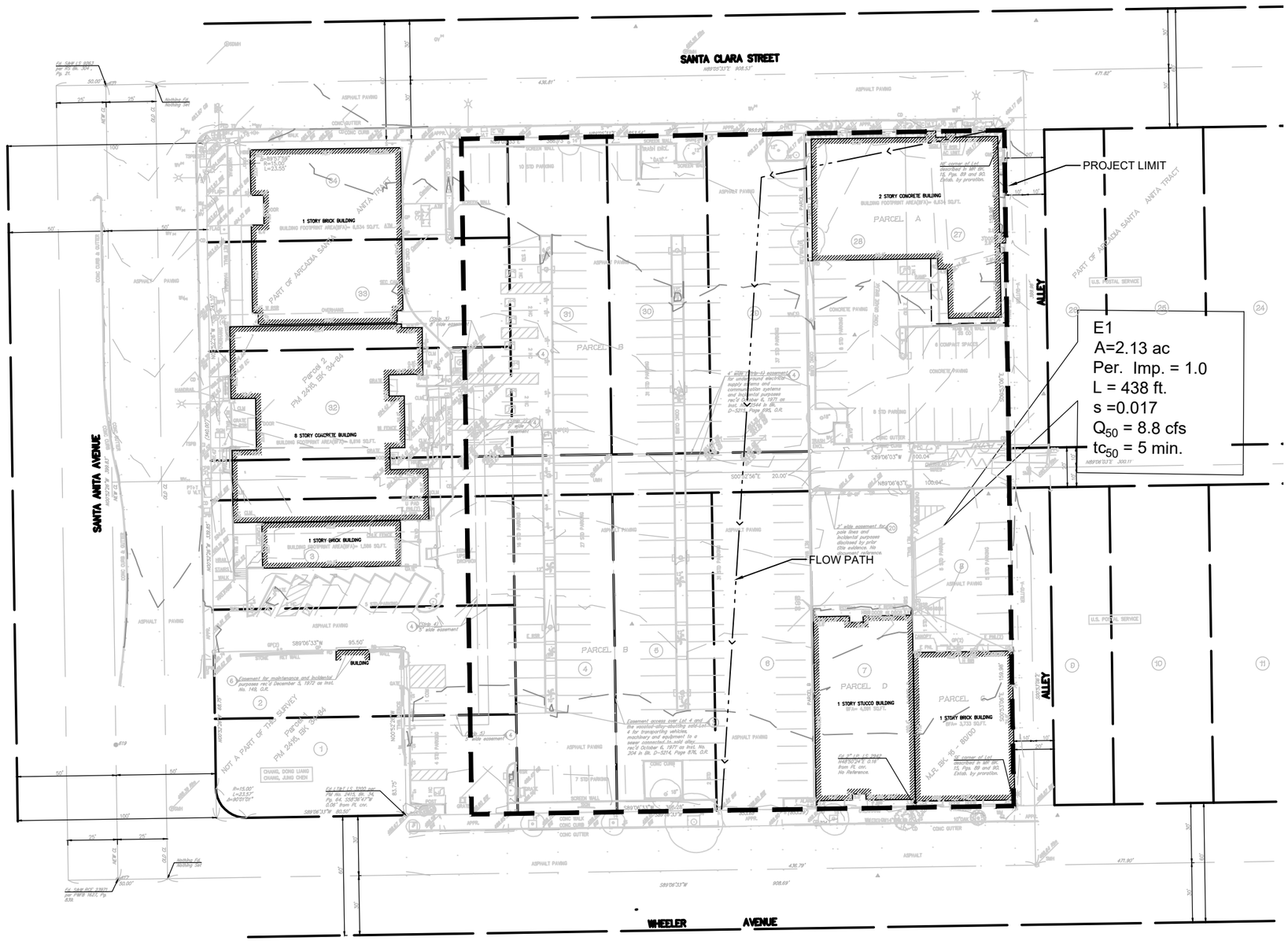
1 0 1 2 Miles

25-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.878
10-YEAR 24-HOUR ISOHYET REDUCTION FACTOR: 0.714

MOUNT WILSON
50-YEAR 24-HOUR ISOHYET

1-H1.30

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works



HYDROLOGY DATA
50 YR. RAINFALL DEPTH = 7.7 in
85TH PERCENTILE = 1.1 in
SOIL TYPE = 006

Alexan Arcadia
Existing Condition
Hydrology Exhibit

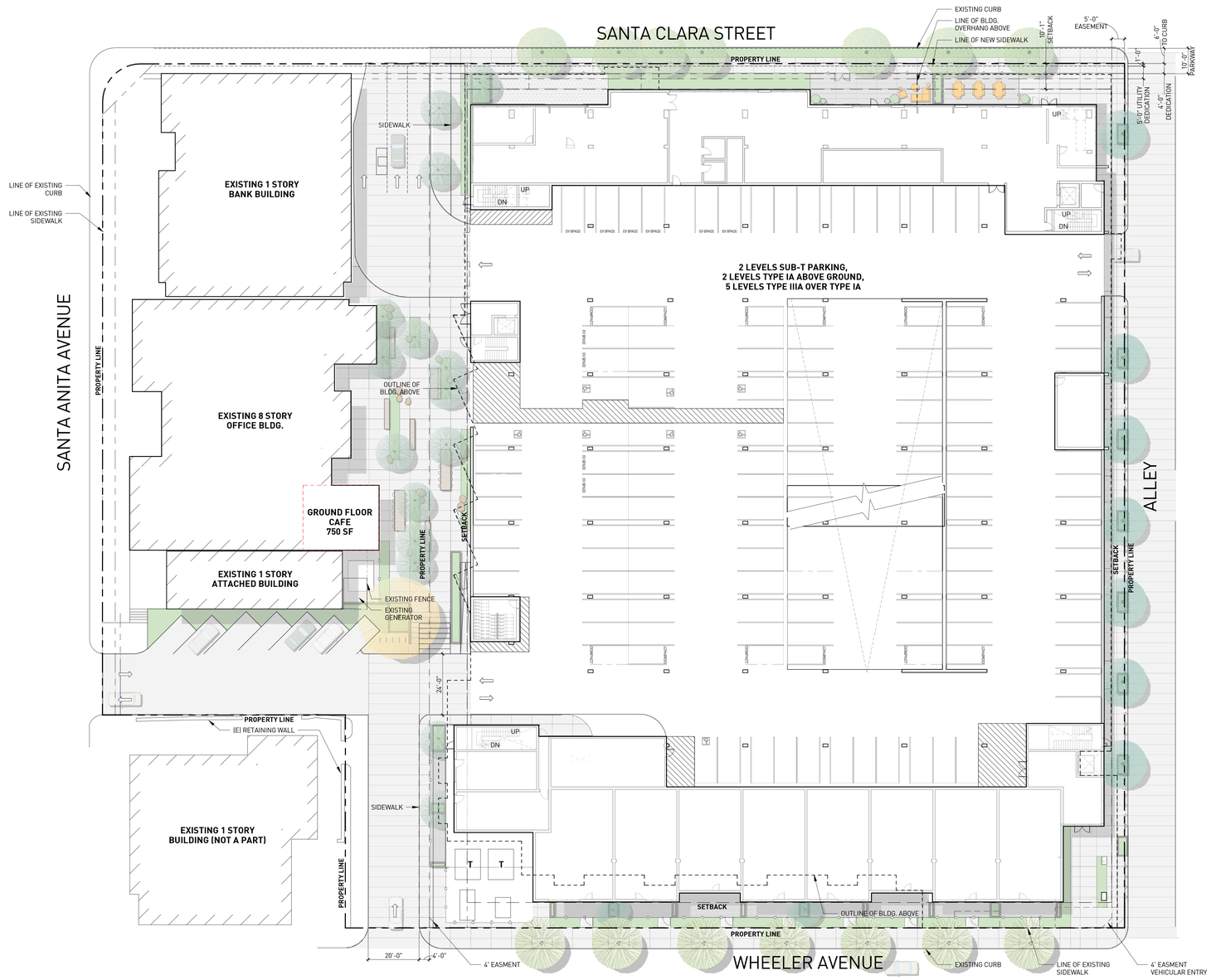
60' 30' 0' 60'
GRAPHIC SCALE
Note: For reduced sized prints, original scale is in inches

PSOMAS

DATE: 04-09-21 REVISED ON:
JOB No:1ARC040100

SHEET 1 OF 2
EXH 01

ARC



SITE PLAN 1
1" = 20'-0"

GRAPHICS LEGEND

- AREA OF NEW BUILDING OUTLINE ABOVE GRADE
- EXISTING BUILDING
- PROPERTY LINE
- NEW PROPERTY LINE
- SET BACK LINE
- NEW DEDICATION LINE
- OUTLINE OF BLDG. ABOVE
- T TRANSFORMER

ENTITLEMENT SUBMITTAL: 05/23/21

studioneleven
245 East Third Street
Long Beach, Ca 90802
t 562.901.1500
studio-111.com

TCR
TRAMMELL CROW RESIDENTIAL

POSITIVE INVESTMENTS, INC.

ALEXAN ARCADIA
MIXED-USE/MULTI-FAMILY HOUSING PROJECT
150 N. SANTA ANITA AVE.
ARCADIA CA 91006

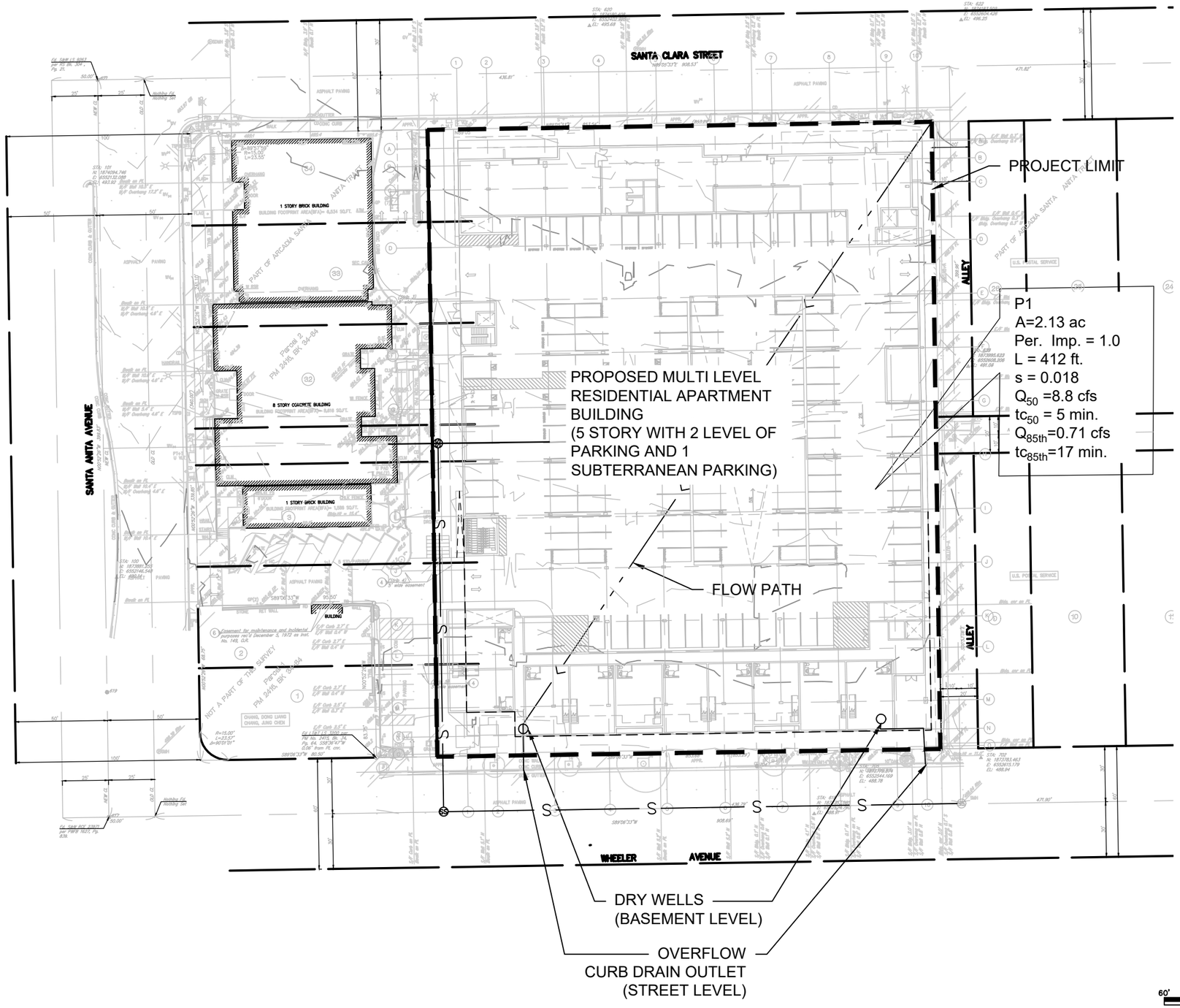
REVISIONS

ISSUE	DATE

PROJECT NUMBER: 20-301

SITE PLAN

A0.53.



HYDROLOGY DATA
50 YR. RAINFALL DEPTH = 7.7 in
85TH PERCENTILE = 1.1 in
SOIL TYPE = 006

Alexan Arcadia
Proposed Condition
Hydrology Exhibit

60' 30' 0' 60'
GRAPHIC SCALE
Note: For reduced sized prints, original scale is in inches

PSOMAS

DATE: 04-09-21 REVISED ON:
JOB No:1ARC040100

SHEET 2 OF 2
EXH 01

ARC

Peak Flow Hydrologic Analysis

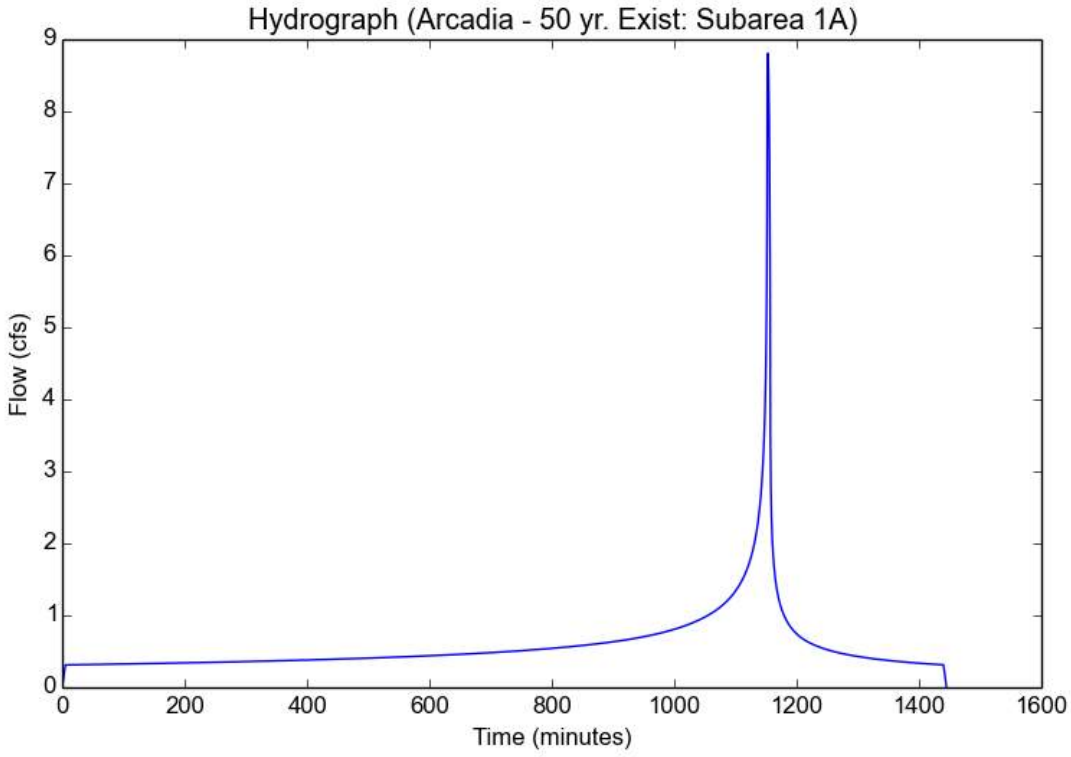
File location: V:/1ARC040100/ENGR/DESIGN/HYDR/LID Report/Hydrocalc/Revised/Arcadia - 50 yr. Exist - Subarea 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Arcadia - 50 yr. Exist
Subarea ID	Subarea 1A
Area (ac)	2.13
Flow Path Length (ft)	438.0
Flow Path Slope (vft/hft)	0.017
50-yr Rainfall Depth (in)	7.7
Percent Impervious	0.95
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.7
Peak Intensity (in/hr)	4.594
Undeveloped Runoff Coefficient (Cu)	0.8992
Developed Runoff Coefficient (Cd)	0.9
Time of Concentration (min)	5.0
Clear Peak Flow Rate (cfs)	8.8064
Burned Peak Flow Rate (cfs)	8.8064
24-Hr Clear Runoff Volume (ac-ft)	1.1762
24-Hr Clear Runoff Volume (cu-ft)	51235.3865



Peak Flow Hydrologic Analysis

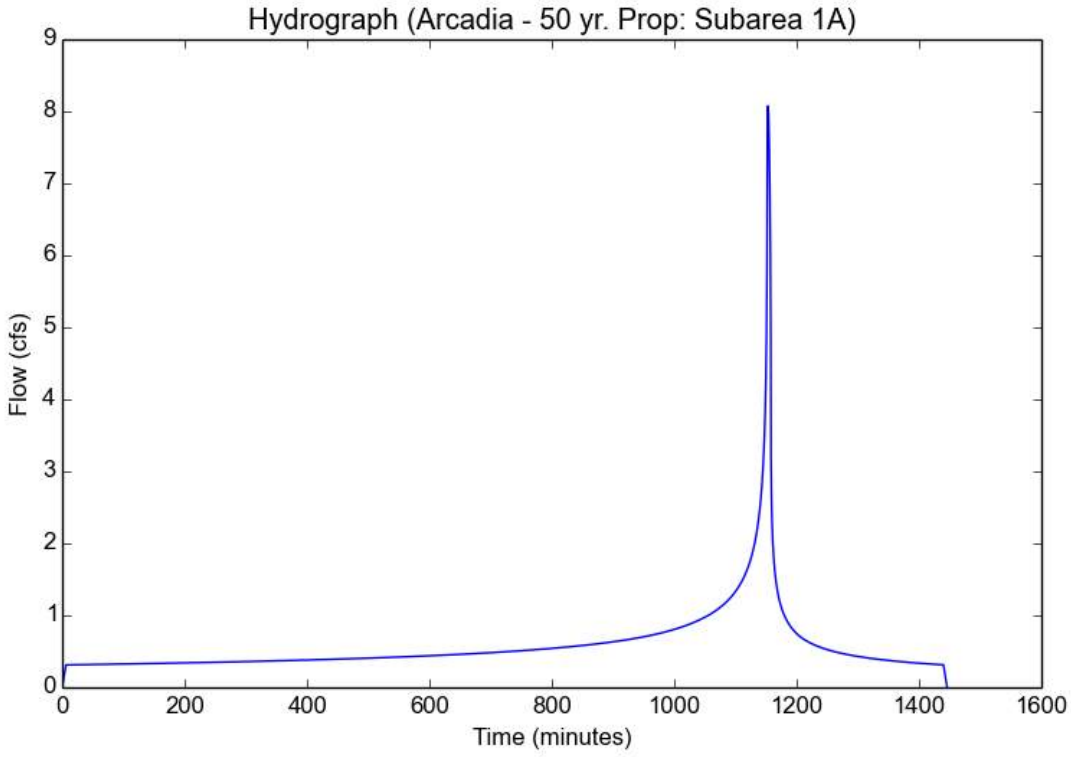
File location: V:/1ARC040100/ENGR/DESIGN/HYDR/LID Report/Hydrocalc/Revised/Arcadia - 50 yr. Prop - Subarea 1A.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	Arcadia - 50 yr. Prop
Subarea ID	Subarea 1A
Area (ac)	2.13
Flow Path Length (ft)	600.0
Flow Path Slope (vft/hft)	0.01
50-yr Rainfall Depth (in)	7.7
Percent Impervious	0.95
Soil Type	6
Design Storm Frequency	50-yr
Fire Factor	0
LID	False

Output Results

Modeled (50-yr) Rainfall Depth (in)	7.7
Peak Intensity (in/hr)	4.2168
Undeveloped Runoff Coefficient (Cu)	0.8848
Developed Runoff Coefficient (Cd)	0.8992
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	8.0767
Burned Peak Flow Rate (cfs)	8.0767
24-Hr Clear Runoff Volume (ac-ft)	1.1762
24-Hr Clear Runoff Volume (cu-ft)	51234.849



Appendix 2

EXCERPT FROM GEOTECHNICAL REPORT

GEOTECHNICAL INVESTIGATION

ALEXAN ARCADIA
PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
150 NORTH SANTA ANITA AVENUE
ARCADIA, CALIFORNIA

GEOCON
WEST, INC.
GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

PREPARED FOR

ARCADIA APARTMENTS, LLC
CARLSBAD, CALIFORNIA

PROJECT NO. W1304-06-01

MARCH 18, 2021

Project No. W1304-06-01
March 18, 2021

Ms. Ashley Swarts
Trammell Crow Residential
5790 Fleet Street, Suite 140
Carlsbad, California 92008

Subject: GEOTECHNICAL INVESTIGATION
ALEXAN ARCADIA
PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
150 NORTH SANTA ANITA AVENUE, ARCADIA, CALIFORNIA

Dear Ms. Swarts:

In accordance with your authorization of our proposal dated January 19, 2021, we have performed a geotechnical investigation for the proposed multi-family residential development located at 150 North Santa Anita Avenue in the City of Arcadia, California. The accompanying report presents the findings of our study, and our conclusions and recommendations pertaining to the geotechnical aspects of proposed design and construction. Based on the results of our investigation, it is our opinion that the site can be developed as proposed, provided the recommendations of this report are followed and implemented during design and construction.

If you have any questions regarding this report, or if we may be of further service, please contact the undersigned.

Very truly yours,

GEOCON WEST, INC.

REGISTERED PROFESSIONAL ENGINEER
PETRINA ZEN
C87489
CIVIL
STATE OF CALIFORNIA

Petrina Zen
PE 87489

REGISTERED PROFESSIONAL ENGINEER
JELISA THOMAS ADAMS
GE3092
GEOTECHNICAL
STATE OF CALIFORNIA

Jelisa Thomas Adams
GE 3092

PROFESSIONAL GEOLOGIST
SUSAN FRANZEN KIRKGARD
No. 1754
CERTIFIED ENGINEERING GEOLOGIST
STATE OF CALIFORNIA

Susan F. Kirkgard
CEG 1754

(Email) Addressee

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GEOTECHNICAL INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a geotechnical investigation for the proposed multi-family residential development located at 150 North Santa Anita Avenue in the City of Arcadia, California (see Vicinity Map, Figure 1). The purpose of the investigation was to evaluate subsurface soil and geologic conditions underlying the site and, based on conditions encountered, to provide conclusions and recommendations pertaining to the geotechnical aspects of design and construction.

The scope of this investigation included a site reconnaissance, field exploration, laboratory testing, engineering analysis, and the preparation of this report. The site was explored on February 8, 2021 by excavating four 8-inch diameter borings to depths ranging from approximately 30½ to 40½ feet below the existing ground surface using a truck-mounted, hollow-stem auger drilling machine. The approximate locations of the exploratory borings are depicted on the Site Plan (see Figure 2A). A detailed discussion of the field investigation, including boring logs, is presented in Appendix A.

Laboratory tests were performed on selected soil samples obtained during the investigation to determine pertinent physical and chemical soil properties. Appendix B presents a summary of the laboratory test results.

The recommendations presented herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section.

If project details vary significantly from those described herein, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE AND PROJECT DESCRIPTION

The subject site is located at 150 North Santa Anita Avenue in the City of Arcadia, California. The site is currently occupied by a multi-story office tower, several single-story structures, a two-story office building and associated asphalt paved parking lots. The site is bounded by East Santa Clara Street to the north, by Wheeler Avenue to the south, by commercial structures and asphalt paved parking to the east, and by North Santa Anita Avenue to the west. The topography at the site and in the general site vicinity slopes gently downward towards the south. Surface water drainage at the site appears to be by sheet flow along the existing ground contours to the city streets. Vegetation consists of some isolated trees and shrubs in isolated planter areas.

Based on the information provided by the Client, it is our understanding that the office tower and the single-story commercial structure located on the west side of the property will remain in place; the existing improvements on the east side of the property will be demolished. The new construction will consist of a seven-story multi-family residential structure to be constructed over up to two levels of subterranean parking (see Figures 2A and 2B). Based on the plans provided to us and due to the sloping nature of the site, the structure will be underlain by one subterranean level on the south side and by two subterranean levels on the north side extending to depths of approximately 15 and 26 feet, respectively, including foundation depths.

Due to preliminary nature of the design at this time, wall and column loads were not available. It is anticipated that column loads for the proposed structure will be up to 900 kips, and wall loads will be up to 10 kips per linear foot.

Once the design phase and foundation loading configuration proceeds to a more finalized plan, the recommendations within this report should be reviewed and revised, if necessary. Any changes in the design, location or elevation of any structure, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

3. GEOLOGIC SETTING

The site is located in the north-central San Gabriel Valley, approximately 1.0 mile south of the southern flank of the San Gabriel Mountains. The San Gabriel Valley is an alluvium-filled valley bounded by the Sierra Madre Fault Zone and San Gabriel Mountains on the north, by the Puente Hills on the south, by the Covina and Indian Hills on the east, and by the Raymond Basin on the west. The alluvial deposits are derived from erosion of the San Gabriel Mountains to the north and subsequent deposition by the San Gabriel River, Santa Anita Wash, and other local drainages. The alluvium is estimated to be approximately 200 feet thick at the base of the mountains, extending to hundreds of feet thick in the central portion of the valley.

Regionally, the site is located within the northern portion of the Peninsular Ranges geomorphic province. This geomorphic province is characterized by northwest-trending physiographic and geologic features such as the active Whittier Fault located approximately 9.4 miles to the south. The active Raymond Fault, located approximately 0.6 mile to the northwest of the site, forms the local boundary between the Peninsular Ranges geomorphic province and the Transverse Ranges geomorphic province to the north.

4. SOIL AND GEOLOGIC CONDITIONS

Based on our field investigation and published geologic maps of the area, the site is underlain by artificial fill and Holocene age alluvium comprised of alluvial channel and outwash deposits consisting of varying amounts of silt, sand, and gravel (California Geological Survey [CGS], 2010). Detailed stratigraphic profiles are provided on the boring logs in Appendix A.

4.1 Artificial Fill

Artificial fill was encountered in the exploratory borings to a maximum depth of 4 feet below existing ground surface. The artificial fill generally consists of dark brown silty sand. The fill is characterized as slightly moist to moist and medium dense. The fill is likely the result of past grading or construction activities at the site. Deeper fill may exist between excavations and in other portions of the site that were not directly explored.

4.2 Alluvium

Holocene age alluvium was encountered beneath the artificial fill and consists primarily of light brown to brown and reddish brown interbedded silty sand, poorly graded sand, and well-graded sand with varying amounts of fine to coarse gravel. The alluvium is characterized as dry to moist and medium dense to very dense.

5. GROUNDWATER

Review of the Seismic Hazard Evaluation of the Mount Wilson 7.5-minute Quadrangle (California Division of Mines and Geology [CDMG], 1998) indicates that the historically highest groundwater level in the immediate area is approximately 100 to 150 feet beneath the ground surface. Groundwater information presented in this document is generated from data collected in the early 1900's to the late 1990s. Based on current groundwater basin management practices, it is unlikely that groundwater levels will ever exceed the historic high levels.

Groundwater was not encountered in our borings drilled to a maximum depth of 40½ feet beneath the existing ground surface. Considering the reported historic high groundwater level (CDMG, 1998), the lack of groundwater encountered in our borings, and the depth of the proposed construction, it is unlikely that groundwater will be encountered during construction or adversely impact the proposed development. However, it is not uncommon for groundwater levels to vary seasonally or for groundwater seepage conditions to develop where none previously existed, especially in impermeable fine-grained soils which are heavily irrigated or after seasonal rainfall. In addition, recent requirements for stormwater infiltration could result in shallower seepage conditions in the immediate site vicinity. Proper surface drainage of irrigation and precipitation will be critical for future performance of the project. Recommendations for drainage are provided in the S*urface Drainage* section of this report (see Section 7.23).

7.22 Stormwater Infiltration

7.22.1 During the February 8, 2021 site exploration, boring B4 was utilized to perform percolation testing. The boring was advanced to the depth listed in the table below. Slotted casing was placed in the boring, and the annular space between the casing and excavation was filled with filter pack. The boring was then filled with water to pre-saturate the soils. On February 9, 2021, after pre-saturating the soils, the casing was refilled with water and percolation test readings were performed after repeated flooding of the cased excavation. Based on the test results, the measured percolation rate and design infiltration rate, for the earth materials encountered, are provided in the following table. These values have been calculated in accordance with the Boring Percolation Test Procedure in the County of Los Angeles Department of Public Works GMED *Guidelines for Geotechnical Investigation and Reporting, Low Impact Development Stormwater Infiltration* (June 2017). Percolation test field data and calculation of the measured percolation rate and design infiltration rate are provided on Figures 7.

Boring	Soil Type	Infiltration Depth (ft)	Measured Percolation Rate (in / hour)	Design Infiltration Rate (in / hour)
B4	SW	20-30½	8.78	4.39

7.22.2 Based on the test method utilized (Boring Percolation Test), the reduction factor RF_t may be taken as 2.0 in the infiltration system design. Based on the number of tests performed and consistency of the soils throughout the site, it is suggested that the reduction factor RF_v be taken as 1.0. In addition, provided proper maintenance is performed to minimize long-term siltation and plugging, the reduction factor RF_s may be taken as 1.0.

7.22.3 The results of the percolation testing in the table above indicate that the infiltration rate for soils encountered at the depth and location indicated in the table above are considered conductive to infiltration, and it is our opinion that the site is suitable for infiltration of stormwater.

7.22.4 It is our further opinion that infiltration of stormwater and will not induce excessive hydro-consolidation, will not create a perched groundwater condition, will not affect soil structure interaction of existing or proposed foundations due to expansive soils, will not saturate soils supported by existing retaining walls, and will not increase the potential for liquefaction. Resulting settlements are anticipated to be less than ¼ inch, if any. If infiltration is planned for any location other than where the above testing was performed, additional field and laboratory testing may be required.

Note the above measured percolation and design infiltration rates are adjusted. Geotechnical engineer issued a letter dated 3/18/21 also added in this report

7.22.5 The infiltration system must be located such that the closest distance between an adjacent foundation is at least 15 feet in all directions from the zone of saturation. The zone of saturation may be assumed to project downward from the discharge of the infiltration facility at a gradient of 1:1. Additional property line or foundation setbacks may be required by the governing jurisdiction and should be incorporated into the stormwater infiltration system design as necessary.

7.22.6 Where a 15-foot horizontal setback cannot be maintained between the infiltration system and an adjacent footing, and the infiltration system penetrates below the foundation influence line, the proposed stormwater infiltration system must be designed to resist the surcharge from the adjacent foundation. The foundation surcharge line may be assumed to project down away from the bottom of the foundation at a 1:1 gradient

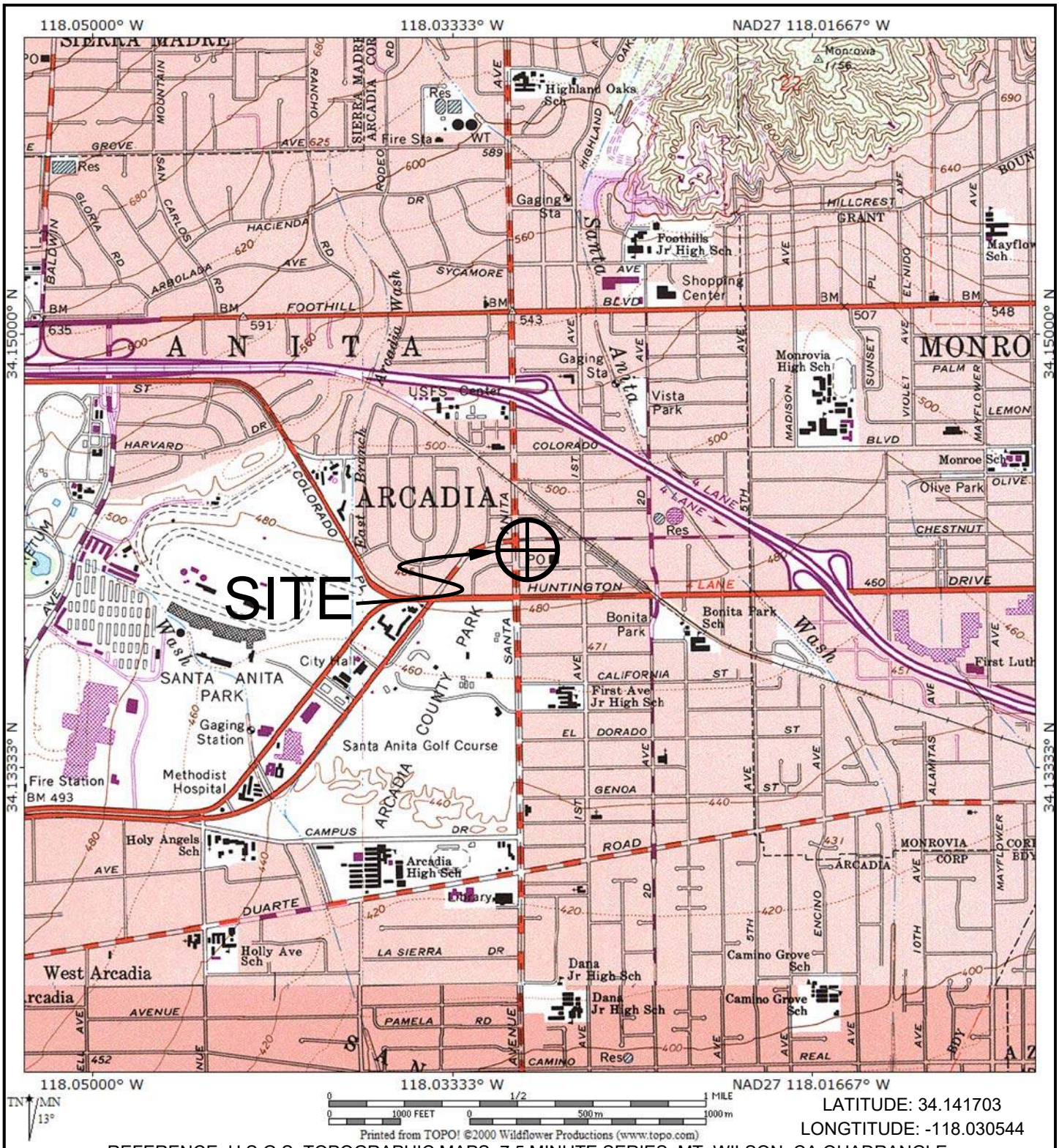
7.22.7 Subsequent to the placement of the infiltration system, it is acceptable to backfill the resulting void space between the excavation sidewalls and the infiltration system with minimum 2-sack slurry provided the slurry is not placed in the infiltration zone. It is recommended that pea gravel be utilized adjacent to the infiltration zone so communication of water to the soil is not hindered.

7.22.8 The design drawings should be reviewed and approved by the Geotechnical Engineer. The installation of the stormwater infiltration system should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon).

7.23 Surface Drainage

7.23.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the soils can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change in the original designed engineering properties. Proper drainage should be maintained at all times.

7.23.2 All site drainage should be collected and controlled in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2019 CBC 1804.4 or other applicable standards. In addition, drainage should not be allowed to flow uncontrolled over any descending slope. Discharge from downspouts, roof drains and scuppers are not recommended onto unprotected soils within 5 feet of the building perimeter. Planters which are located adjacent to foundations should be sealed to prevent moisture intrusion into the soils providing foundation support. Landscape irrigation is not recommended within 5 feet of the building perimeter footings except when enclosed in protected planters.



LATITUDE: 34.141703
LONGTITUDE: -118.030544

REFERENCE: U.S.G.S. TOPOGRAPHIC MAPS, 7.5 MINUTE SERIES, MT. WILSON, CA QUADRANGLE

GEOCON
WEST, INC.

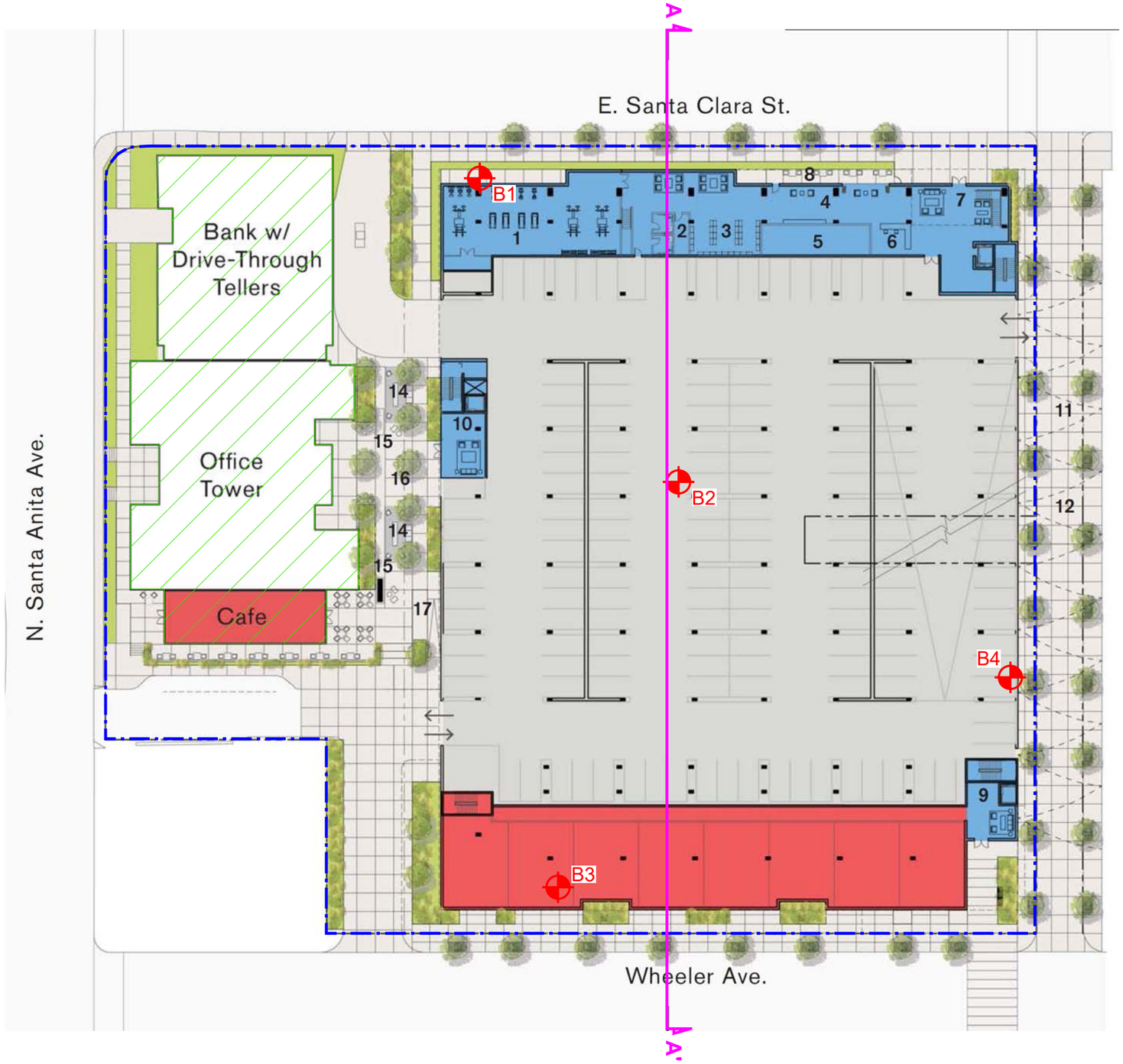
ENVIRONMENTAL GEOTECHNICAL MATERIALS
3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

VICINITY MAP

150 N. SANTA ANITA AVENUE
ARCADIA, CALIFORNIA

DRAFTED BY: RA	CHECKED BY: SFK

MARCH 2021	PROJECT NO. W1304-06-01	FIG. 1



LEGEND

- B4 — Approximate Location of Boring
- Approximate Location of Property Line
- Location of Existing Structures

0 50' 100'

GEOCON WEST, INC.
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3303 N. SAN FERNANDO BLVD. - SUITE 100 - BURBANK, CA 91504
PHONE (818) 841-8388 - FAX (818) 841-1704

DRAFTED BY: PZ	CHECKED BY: JTA

SITE PLAN

150 N. SANTA ANITA AVENUE
ARCADIA, CALIFORNIA

MARCH 2021	PROJECT NO. W1304-06-01	FIG. 2A

Project No. W1304-06-01
March 18, 2021

Mr. Todd Phillips
Trammell Crow Residential
5790 Fleet Street, Suite 140
Carlsbad, California 92008

Subject: UPDATED STORMWATER INFILTRATION RECOMMENDATIONS
ALEXAN ARCADIA
PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
150 NORTH SANTA ANITA AVENUE, ARCADIA, CALIFORNIA

Reference: *Geotechnical Investigation, Alexan Arcadia, Proposed Multi-Family Residential Development, 150 North Santa Anita Avenue, Arcadia, California,* by Geocon West, Inc., dated March 18, 2021.

Dear Mr. Phillips:

The purpose of this letter is to provide updated recommendations for onsite stormwater infiltration for the subject project. Where differing, the recommendations presented herein supersede the previous recommendations and may be utilized for design and construction.

Based on information provided by the project team, it is our understanding that the proposed onsite infiltration system will consist of a drywell system. The following table presents the recommended infiltration rate based on the average surface area during the testing intervals. Percolation test field data and calculation of the measured percolation rate and design infiltration rate are provided on Figure 1.

Boring	Soil Type	Infiltration Depth (ft)	Measured Percolation Rate (in / hour)	Design Infiltration Rate (in / hour)
B4	SW	20-30½	13.83	6.92

All other recommendations for the design and construction of an onsite infiltration system provided in the above referenced Geotechnical Investigation report remain applicable to the project.

Should you have any questions regarding this letter, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON WEST, INC.

Jelisa Thomas Adams
GE 3092

(Email) Addressee

Enclosures: Figure 1, Boring Percolation Test Field Log

BORING PERCOLATION TEST FIELD LOG

Date:	Tuesday, February 9, 2021		**Boring/Test Number:**	B4	
Project Number:	W1304-06-01		**Diameter of Boring:**	8	inches
Project Location:	150 N. Santa Anita		**Diameter of Casing:**	2	inches
Earth Description:	SW		**Depth of Boring:**	30.5	feet
Tested By:	RA		**Depth to Invert of BMP:**	20	feet
Liquid Description:	Water		**Depth to Water Table:**	N/A	feet
Measurement Method:	Sounder		**Depth to Initial Water Depth (d_1):**	240	inches
Start Time for Pre-Soak:	12:30 PM		**Water Remaining in Boring (Y/N):**	No	
Start Time for Standard:	8:05 AM		**Standard Time Interval Between Readings:**	10	

Reading Number	Time Start (hh:mm)	Time End (hh:mm)	Elapsed Time Δtime (min)	Water Drop During Standard Time Interval, Δd (in)	Soil Description Notes Comments
1	9:40 AM	9:50 AM	10	94.8	
2	10:13 AM	10:23 AM	10	93.6	
3	10:48 AM	10:58 AM	10	93.6	
4	11:21 AM	11:31 AM	10	93.6	
5	11:56 AM	12:06 PM	10	93.6	Stabilized Readings Achieved

MEASURED PERCOLATION RATE & DESIGN INFILTRATION RATE CALCULATIONS*

* Calculations Below Based on Stabilized Readings Only

Boring Radius, r:	4	inches	
Test Section Height, h:	79.2	inches	$Test\ Section\ Surface\ Area, A = 2\pi rh + \pi r^2$
Test Section Height, h:	79.2	inches	A = **2041** in^2
Test Section Height, h:	79.2	inches	A = **2041** in^2
			A = **2041** in^2

$Discharged\ Water\ Volume, V = \pi r^2 \Delta d$

$Percolation\ Rate = \left(\frac{V/A}{\Delta T}\right)$

Reading 6	V =	**4705**	in^3	Percolation Rate =	**13.83**	inches/hour
Reading 7	V =	**4705**	in^3	Percolation Rate =	**13.83**	inches/hour
Reading 8	V =	**4705**	in^3	Percolation Rate =	**13.83**	inches/hour

Measured Percolation Rate = **13.83** inches/hour

Reduction Factors

Boring Percolation Test, RF_t =	2
Site Variability, RF_v =	1
Long Term Siltation, RF_s =	1

$Total\ Reduction\ Factor, RF = RF_t \times RF_v \times RF_s$

Total Reduction Factor = 2

Design Infiltration Rate

$Design\ Infiltration\ Rate = Measured\ Percolation\ Rate\ /RF$

Design Infiltration Rate = **6.92** inches/hour

FIGURE 1

Project No. W1304-06-01
March 18, 2021

Mr. Todd Phillips
Trammell Crow Residential
5790 Fleet Street, Suite 140
Carlsbad, California 92008

Subject: UPDATED STORMWATER INFILTRATION RECOMMENDATIONS
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PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
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Reading 8	V =	**4705**	in^3	Percolation Rate =	**13.83**	inches/hour

Measured Percolation Rate = **13.83** inches/hour

Reduction Factors

Boring Percolation Test, RF_t =	2
Site Variability, RF_v =	1
Long Term Siltation, RF_s =	1

$Total\ Reduction\ Factor, RF = RF_t \times RF_v \times RF_s$

Total Reduction Factor = 2

Design Infiltration Rate

$Design\ Infiltration\ Rate = Measured\ Percolation\ Rate\ /RF$

Design Infiltration Rate = **6.92** inches/hour

FIGURE 1

Appendix 3

- **Hydrocalc LID Calculations**
- **LID Infiltration/ Storage Calculations**
- **85TH Percentile Map**

Peak Flow Hydrologic Analysis

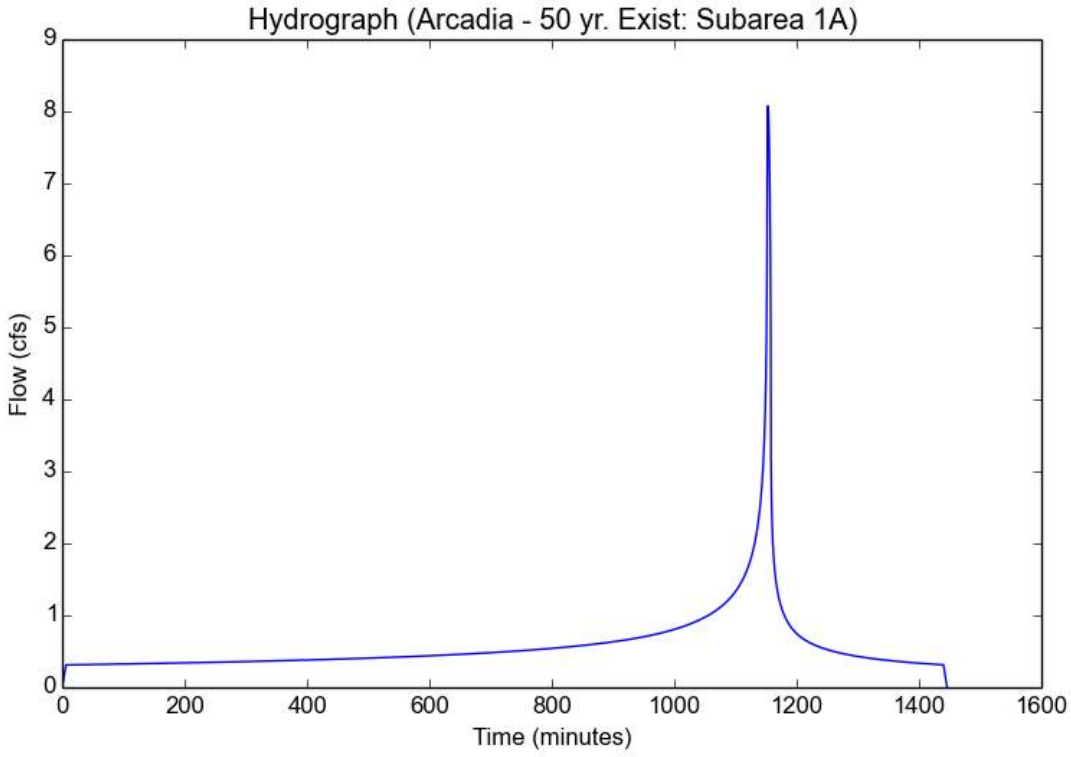
File location: V:/1ARC040100/ENGR/DESIGN/HYDR/LID Report/Hydrocalc/Revised/Arcadia - 85th percentile - Subarea 1A.pdf
Version: HydroCalc 1.0.3

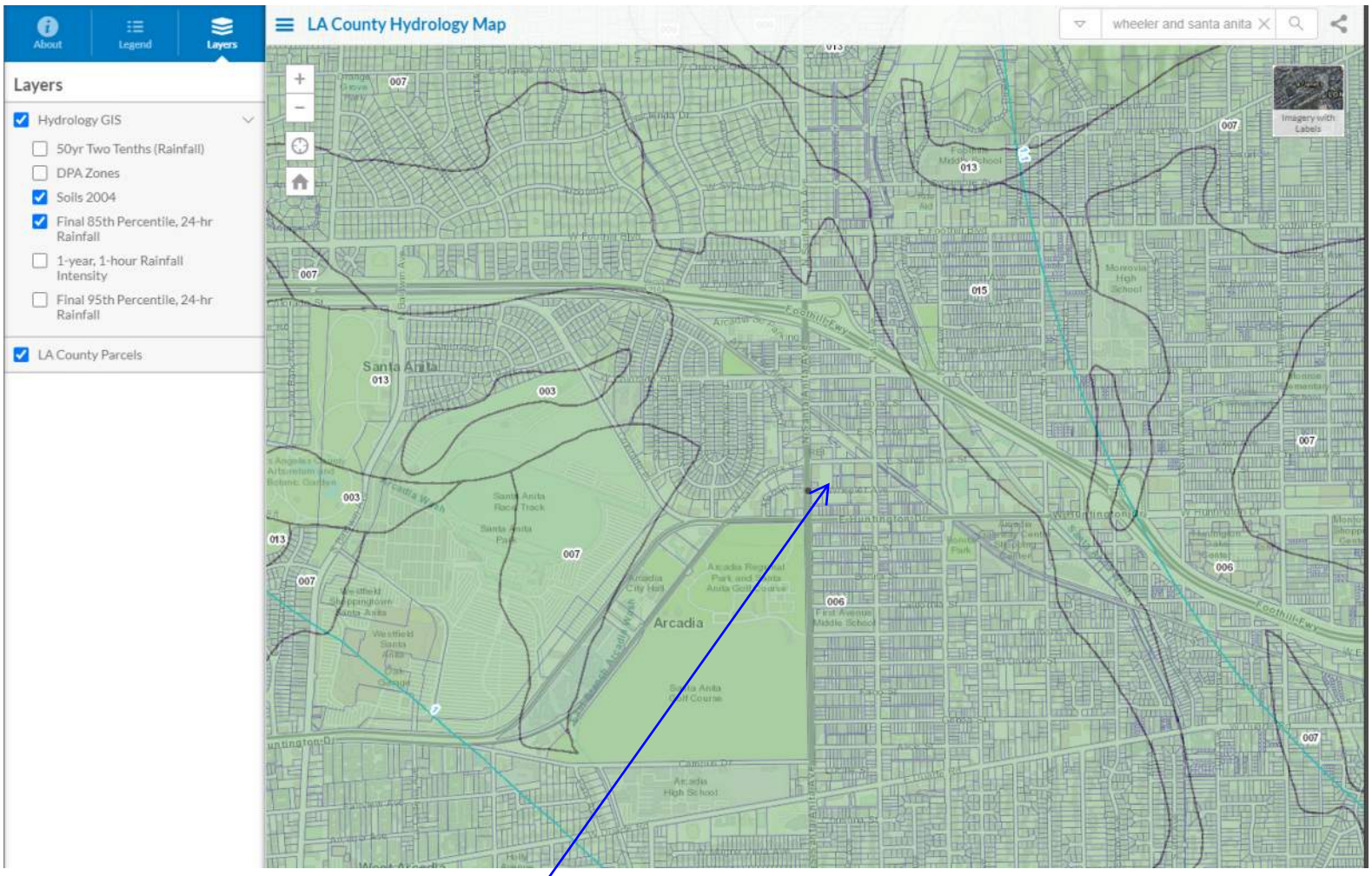
Input Parameters

Project Name	Arcadia - 50 yr. Exist
Subarea ID	Subarea 1A
Area (ac)	2.13
Flow Path Length (ft)	600.0
Flow Path Slope (vft/hft)	0.01
85th Percentile Rainfall Depth (in)	7.7
Percent Impervious	0.95
Soil Type	6
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	7.7
Peak Intensity (in/hr)	4.2168
Undeveloped Runoff Coefficient (Cu)	0.8848
Developed Runoff Coefficient (Cd)	0.8992
Time of Concentration (min)	6.0
Clear Peak Flow Rate (cfs)	8.0767
Burned Peak Flow Rate (cfs)	8.0767
24-Hr Clear Runoff Volume (ac-ft)	1.1762
24-Hr Clear Runoff Volume (cu-ft)	51234.849





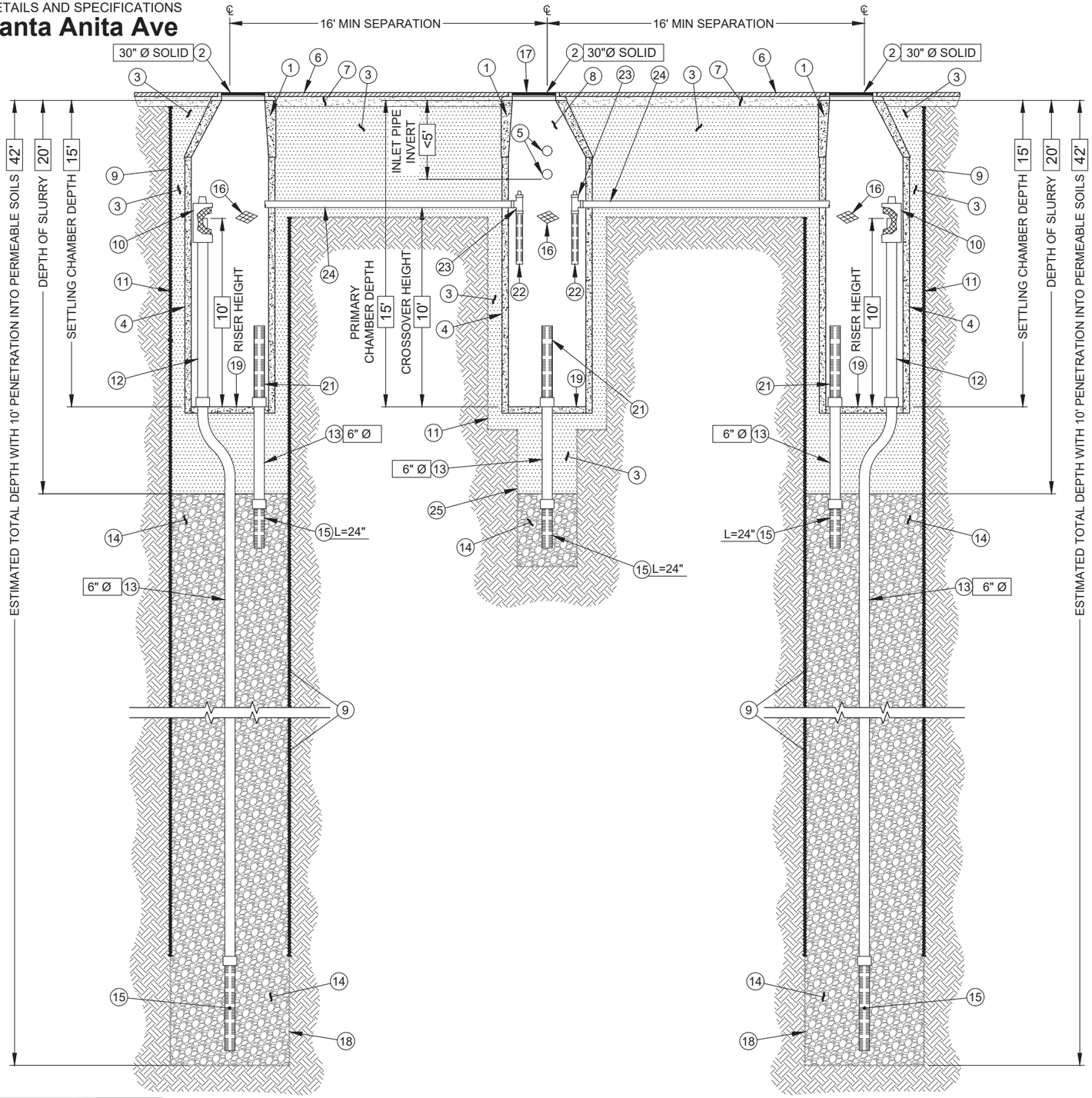
Project Site
85th Percentile - 24hr Rainfal
1.1 in.

The MaxWell® Plus

DRAINAGE SYSTEM DETAILS AND SPECIFICATIONS

150 North Santa Anita Ave

Arcadia, CA



ITEM NUMBERS

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **BOLTED RING & GRATE/COVER** - DIAMETER & TYPE AS SHOWN. CLEAN CAST IRON WITH WORDING **"STORM WATER ONLY"** IN RAISED LETTERS. **BOLTED IN 2 LOCATIONS** AND SECURED TO CONE WITH MORTAR. RIM ELEVATION ±0.02' OF PLANS.
3. **STABILIZED BACKFILL** - TWO-SACK SLURRY MIX.
4. **PRE-CAST LINER -** 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE** AND ALIGN SECTIONS **TO MAXIMIZE BEARING SURFACE.**
5. **INLET PIPE/OUTLET PIPE (BY OTHERS). SEE SEPARATE PLAN FOR INVERT ELEVATIONS.**
6. **GRADED BASIN OR PAVING** (BY OTHERS).
7. **COMPACTED BASE MATERIAL**, IF REQUIRED (BY OTHERS).
8. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE PRIMARY AND SECONDARY CHAMBER DEPTHS AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE RISER PIPE.
9. **NON-WOVEN GEOTEXTILE SLEEVE** - MIRAFI 140 NL. MIN. 6 FT Ø. HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
10. **PUREFLO® DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL 0.265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED**.
11. **MIN. 6' Ø DRILLED SHAFT.**
12. **RISER PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
13. **DRAINAGE PIPE** - ADS HIGHWAY GRADE OR SCH. 40 PVC WITH TRI-A COUPLER. SUSPEND PIPE DURING BACKFILL OPERATIONS. DIAMETER AS NOTED.
14. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2".
15. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. OVERALL LENGTH VARIES, UP TO 120" WITH TRI-B COUPLER.
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, 2 PER CHAMBER.
17. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION. GRATED ONLY.
18. **MIN. 6' Ø DRILLED SHAFT.**
19. **BASE SEAL** - CONCRETE SLURRY.
20. NOT USED.
21. **DRAIN DOWN INTAKE SCREEN** - 6" Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. WRAPPED WITH NON-WOVEN GEOTEXTILE FABRIC. 48" OVERALL LENGTH WITH TRI-B COUPLER.
22. **INTAKE SCREEN** - 4" Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/ FT. 48" OVERALL LENGTH WITH TRI-C END CAP.
23. **VENTED ANTI-SIPHON INTAKE WITH FLOW REGULATOR.**
24. **CONNECTOR PIPE** - 4" Ø SCH. 40 PVC.
25. **MIN. 18" Ø DRILLED SHAFT.**

DETAIL : DPD-6-DS-CA	REVISED BY: RJA	
DRAWN ON: 05-17-19	REVISED DATE: 05-13-21	SCALE: N.T.S

Manufactured and Installed by
TORRENT RESOURCES®
An evolution of McGuckin Drilling
www.torrentresources.com
CALIFORNIA 909-829-0740
ARIZONA 602-268-0785

Maxwell® Plus Drainage System Calculations Prepared on May 13, 2021
Project: **150 North Santa Anita Ave - Arcadia, CA**
Contact: Nelson Rivera at PSOMAS - Valencia, CA

Given:

Measured Infiltration Rate	13.83	in/hr	
Safety Factor	2.00		
Design Infiltration Rate	6.92	in/hr	
Mitigated Volume	7,592	ft^3	
Required Drawdown Time	96	hours	
Min. Depth to Infiltration	20	ft	(Assumed a total 5FT depth for foundations)
Groundwater Depth for Design	+100	ft	(Required 15FT setback in all directions from zone of saturation)

Proposed:

Drywell Rock Shaft Diameter	6	ft
Primary Chamber Depth	15	ft
Drywell Chamber Depth	15	ft
Rock Porosity	40	%
Depth to Infiltration	20	ft
Drywell Bottom Depth	42	ft

Apply Safety Factor to get Design Rate.

$13.83 \frac{in}{hr} \div 2 = 6.92 \frac{in}{hr}$

Convert Design Rate from in/hr to ft/sec.

$6.92 \frac{in}{hr} \times \frac{1\ ft}{12\ in} \times \frac{1\ hr}{3600\ sec} = 0.000160 \frac{ft}{sec}$

A 6 foot diameter drywell provides 18.85 SF of infiltration area per foot of depth, plus 28.27 SF at the bottom.

For a 42 foot deep drywell, infiltration occurs between 20 feet and 42 feet below grade. This provides 22 feet of infiltration depth in addition to the bottom area. Infiltration area per drywell is calculated below.

$22\ ft \times 18.85 \frac{ft^2}{ft} + 28.27\ ft^2 = 443\ ft^2$

Combine design rate with infiltration area to get flow (disposal) rate for each drywell.

$0.000160 \frac{ft}{sec} \times 443\ ft^2 = 0.07091 \frac{ft^3}{sec}$

Volume of disposal for each drywell based on various time frames are included below.

96 hrs: 0.0709 CFS x 96 hours x $\frac{3600\ sec}{1\ hr}$ = 24,505 cubic feet of retained water disposed of.

Chamber diameter = 4 feet. Drywell rock shaft diameter = 6 feet.
Volume provided in each primary settling chamber with depth = 15 feet.
$15\ ft \times 12.57\ ft^2 = 188\ ft^3$
Volume provided in each drywell with chamber depth of 15 feet.
$15\ ft \times 12.57\ ft^2 + 22\ ft \times 28.27\ ft^2 \times 40\ \% = 437\ ft^3$

The MaxWell System is composed of 2 drywell(s) and 1 primary chamber(s).
Total volume provided = $1062\ ft^3$
Total 96 hour infiltration volume $49{,}010\ ft^3$
Total infiltration flowrate = $0.14181 \frac{ft^3}{sec}$

Based on the total mitigated volume of 7592 CF, after subtracting the volume infiltrated as quickly as it enters the drywell of 6577 CF, the remaining volume is 1015 CF. The storage provided in the drywell system is 1062 CF.

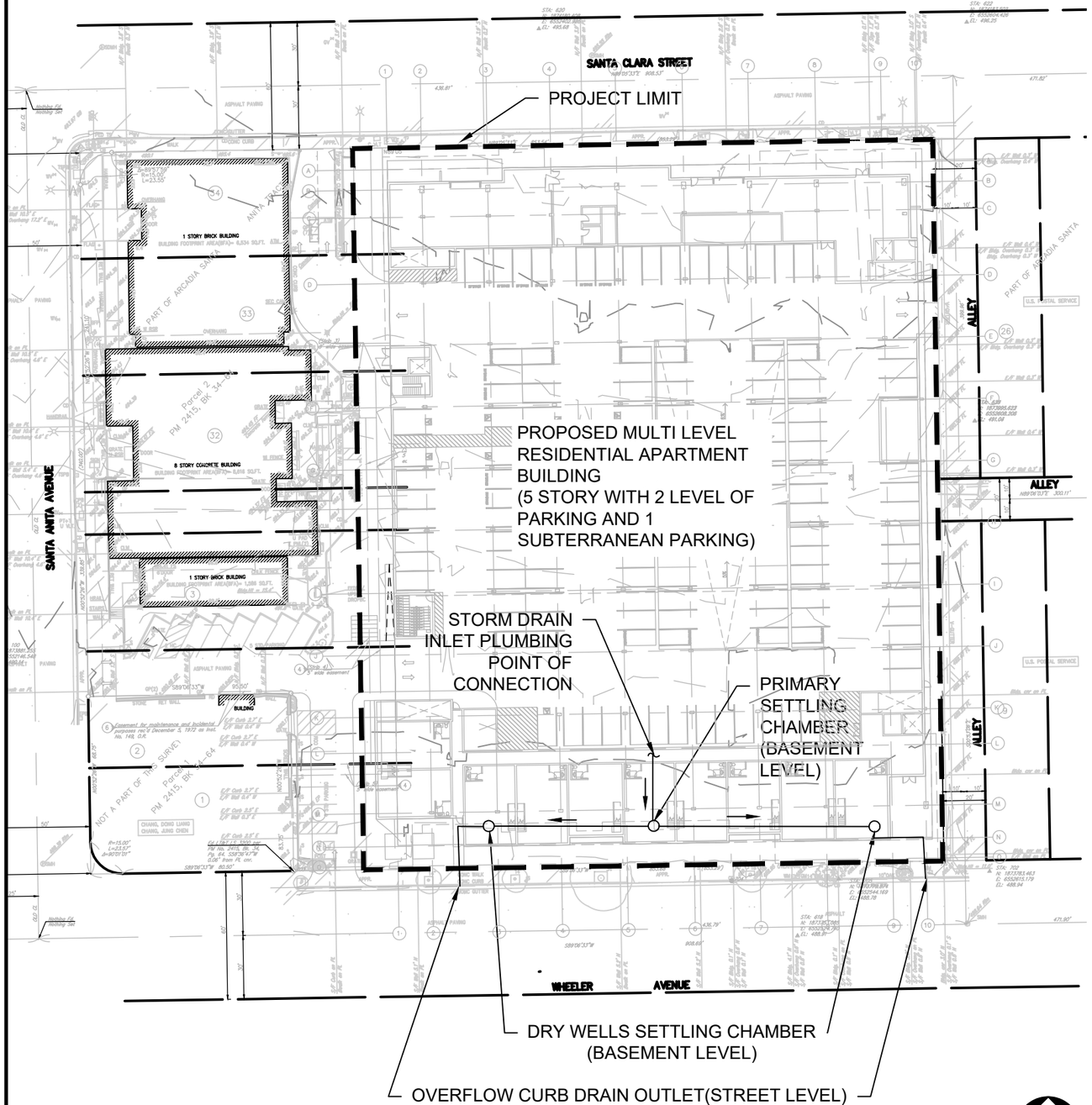
For any questions, please contact Bill De Jong at 909-915-9490 or via email at BDejong@TorrentResources.com

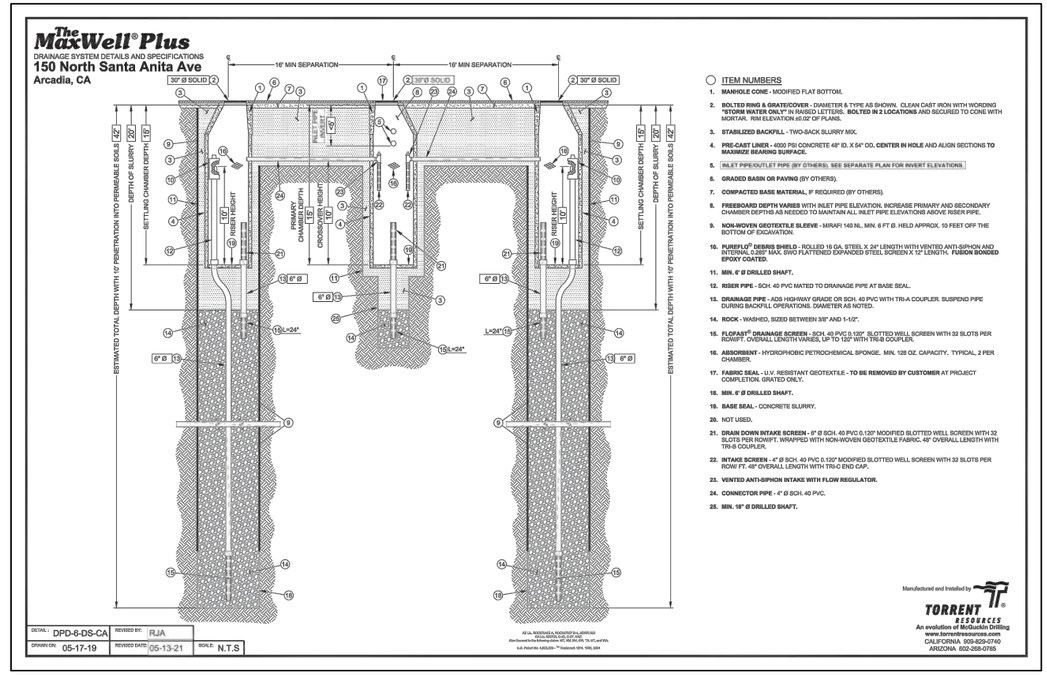
Torrent Resources (CA) Incorporated
9950 Alder Avenue
Bloomington, CA 92316
Phone 909-829-0740

Appendix 4

LID PLAN & DOCUMENTS

- **LID PLAN**
- **STORMWATER INFILTRATION SYSTEM BROCHURE**





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8. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE PRIMARY AND SECONDARY CHAMBER DEPTHS AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE RISER PIPE.
9. **NON-WOVEN GEOTEXTILE SLEEVE -** MIRAFI 140 NL. MIN. 6 FT Ø. HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
10. **PUREFLO® DEBRIS SHIELD -** ROLLED 18 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL 0.269" MAX. BWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED.**
11. **MIN. 6' Ø DRILLED SHAFT.**
12. **RISER PIPE -** SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
13. **DRAINAGE PIPE -** ADS HIGHWAY GRADE OR SCH. 40 PVC WITH TRI-A COUPLER. SUSPEND PIPE DURING BACKFILL OPERATIONS. DIAMETER AS NOTED.
14. **ROCK -** WASHED, SIZED BETWEEN 3/8" AND 1-1/2".
15. **FLOFAST® DRAINAGE SCREEN -** SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. OVERALL LENGTH VARIES, UP TO 120" WITH TRI-B COUPLER.
16. **ABSORBENT -** HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, 2 PER CHAMBER.
17. **FABRIC SEAL -** U.V. RESISTANT GEOTEXTILE **- TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION. GRATED ONLY.
18. **MIN. 6' Ø DRILLED SHAFT.**
19. **BASE SEAL -** CONCRETE SLURRY.
20. NOT USED.
21. **DRAIN DOWN INTAKE SCREEN -** 8" Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. WRAPPED WITH NON-WOVEN GEOTEXTILE FABRIC. 48" OVERALL LENGTH WITH TRI-B COUPLER.
22. **INTAKE SCREEN -** 4" Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/ FT. 48" OVERALL LENGTH WITH TRI-C END CAP.
23. **VENTED ANTI-SIPHON INTAKE WITH FLOW REGULATOR.**
24. **CONNECTOR PIPE -** 4" Ø SCH. 40 PVC.
25. **MIN. 18" Ø DRILLED SHAFT.**

1 DRY WELL

NOT TO SCALE

60' 30' 0' 60'

GRAPHIC SCALE

Note: For reduced sized prints, original scale is in inches

TRA

Alexan Arcadia LID Exhibit

PSOMAS

DATE: 05-12-21 REVISED ON:
JOB No:1ARC040100

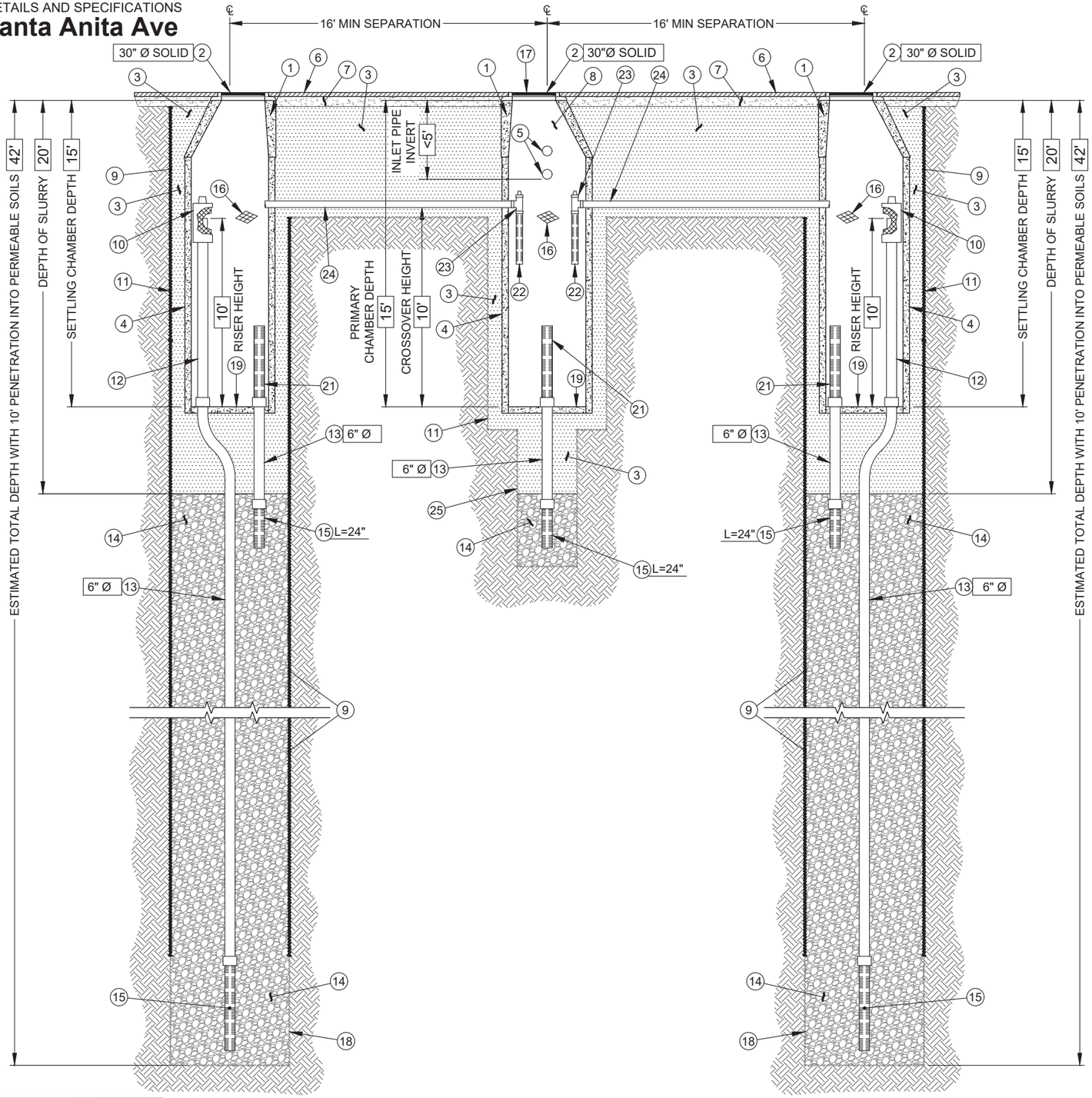
SHEET 1 OF 1
EXH 02

The MaxWell® Plus

DRAINAGE SYSTEM DETAILS AND SPECIFICATIONS

150 North Santa Anita Ave

Arcadia, CA



ITEM NUMBERS

1. **MANHOLE CONE** - MODIFIED FLAT BOTTOM.
2. **BOLTED RING & GRATE/COVER** - DIAMETER & TYPE AS SHOWN. CLEAN CAST IRON WITH WORDING **"STORM WATER ONLY"** IN RAISED LETTERS. **BOLTED IN 2 LOCATIONS** AND SECURED TO CONE WITH MORTAR. RIM ELEVATION ±0.02' OF PLANS.
3. **STABILIZED BACKFILL** - TWO-SACK SLURRY MIX.
4. **PRE-CAST LINER -** 4000 PSI CONCRETE 48" ID. X 54" OD. **CENTER IN HOLE** AND ALIGN SECTIONS **TO MAXIMIZE BEARING SURFACE.**
5. **INLET PIPE/OUTLET PIPE (BY OTHERS). SEE SEPARATE PLAN FOR INVERT ELEVATIONS.**
6. **GRADED BASIN OR PAVING** (BY OTHERS).
7. **COMPACTED BASE MATERIAL**, IF REQUIRED (BY OTHERS).
8. **FREEBOARD DEPTH VARIES** WITH INLET PIPE ELEVATION. INCREASE PRIMARY AND SECONDARY CHAMBER DEPTHS AS NEEDED TO MAINTAIN ALL INLET PIPE ELEVATIONS ABOVE RISER PIPE.
9. **NON-WOVEN GEOTEXTILE SLEEVE** - MIRAFI 140 NL. MIN. 6 FT Ø. HELD APPROX. 10 FEET OFF THE BOTTOM OF EXCAVATION.
10. **PUREFLO® DEBRIS SHIELD** - ROLLED 16 GA. STEEL X 24" LENGTH WITH VENTED ANTI-SIPHON AND INTERNAL 0.265" MAX. SWO FLATTENED EXPANDED STEEL SCREEN X 12" LENGTH. **FUSION BONDED EPOXY COATED**.
11. **MIN. 6' Ø DRILLED SHAFT.**
12. **RISER PIPE** - SCH. 40 PVC MATED TO DRAINAGE PIPE AT BASE SEAL.
13. **DRAINAGE PIPE** - ADS HIGHWAY GRADE OR SCH. 40 PVC WITH TRI-A COUPLER. SUSPEND PIPE DURING BACKFILL OPERATIONS. DIAMETER AS NOTED.
14. **ROCK** - WASHED, SIZED BETWEEN 3/8" AND 1-1/2".
15. **FLOFAST® DRAINAGE SCREEN** - SCH. 40 PVC 0.120" SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. OVERALL LENGTH VARIES, UP TO 120" WITH TRI-B COUPLER.
16. **ABSORBENT** - HYDROPHOBIC PETROCHEMICAL SPONGE. MIN. 128 OZ. CAPACITY. TYPICAL, 2 PER CHAMBER.
17. **FABRIC SEAL** - U.V. RESISTANT GEOTEXTILE - **TO BE REMOVED BY CUSTOMER** AT PROJECT COMPLETION. GRATED ONLY.
18. **MIN. 6' Ø DRILLED SHAFT.**
19. **BASE SEAL** - CONCRETE SLURRY.
20. NOT USED.
21. **DRAIN DOWN INTAKE SCREEN** - 6" Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/FT. WRAPPED WITH NON-WOVEN GEOTEXTILE FABRIC. 48" OVERALL LENGTH WITH TRI-B COUPLER.
22. **INTAKE SCREEN** - 4" Ø SCH. 40 PVC 0.120" MODIFIED SLOTTED WELL SCREEN WITH 32 SLOTS PER ROW/ FT. 48" OVERALL LENGTH WITH TRI-C END CAP.
23. **VENTED ANTI-SIPHON INTAKE WITH FLOW REGULATOR.**
24. **CONNECTOR PIPE** - 4" Ø SCH. 40 PVC.
25. **MIN. 18" Ø DRILLED SHAFT.**

DETAIL : DPD-6-DS-CA	REVISED BY: RJA	
DRAWN ON: 05-17-19	REVISED DATE: 05-13-21	SCALE: N.T.S

Manufactured and Installed by
TORRENT RESOURCES®
An evolution of McGuckin Drilling
www.torrentresources.com
CALIFORNIA 909-829-0740
ARIZONA 602-268-0785

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- Stormwater Drywells
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Technical Analysis
- Design Review
- Percolation Testing
- Geologic Database
- ADEQ Drywell Registration

Recharge Systems
- Municipal/Private Recharge Wells
- Injection Wells & Galleries

Environmental Applications
- Pattern Drilling/Soil Remediation
- Drainage Rehabilitation
- Drywell Abandonments
- OSHA HAZMAT-Certified

Drainage Renovation
- Problem Assessment
- Site Redesign/Modification
- System Retrofit

Drainage Maintenance
- Preventive Maintenance
- Service Contracts
- Drywell Cleaning

TORRENT RESOURCES INCORPORATED

1509 East Elwood Street
Phoenix Arizona 85040~1391

phone 602~268~0785
fax 602~268~0820

Nevada
702~366~1234

AZ Lic. ROC070465 A,
ROC047067 B-4; ADWR 363

CA Lic. 528080 A, C-42, HAZ

NV Lic. 0035350 A

NM Lic. 90504 GF04

TORRENT RESOURCES (CA) INCORPORATED

phone 661~947~9836

CA Lic. 886759 A, C-42

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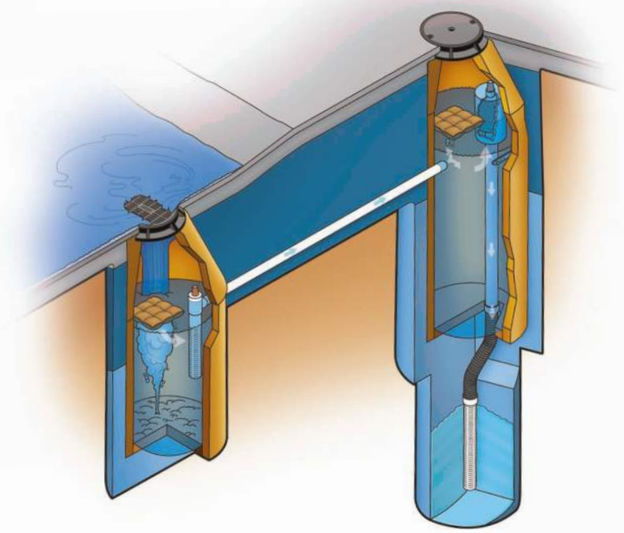
1/12

MaxWell® Plus DRAINAGE SYSTEM

Product Information and Design Features

TORRENT RESOURCES

The ***MaxWell® Plus,*** as manufactured and installed exclusively by Torrent Resources Incorporated, is the industry standard for draining large paved surfaces, nuisance water and other demanding applications. This patented system incorporates state-of-the-art pre-treatment technology.



THE ULTIMATE IN DESIGN

Since 1974, nearly 65,000 MaxWell® Systems have proven their value as a cost-effective solution in a wide variety of drainage applications. They are accepted by state and municipal agencies and are a standard detail in numerous drainage manuals. Many municipalities have recognized the inherent benefits of the MaxWell Plus and now require it for drainage of all paved surfaces.

SUPERIOR PRE-TREATMENT

Industry research, together with Torrent Resources' own experience, have shown that initial storm drainage flows have the greatest impact on system performance. This "first flush" occurs during the first few minutes of runoff, and carries the majority of sediment and debris. Larger paved surfaces or connecting pipes from catch basins, underground storage, etc. can also generate high peak flows which may strain system function. In addition, nuisance water flows require controlled processing separate from normal storm runoff demands.

Manufactured and Installed Exclusively by Torrent Resources Incorporated
Please see reverse side for additional information
U.S. Patent No. 4,923,330

In the ***MaxWell® Plus,*** preliminary treatment is provided through collection and separation in deep large-volume settling chambers. The standard MaxWell Plus System has over 2,500 gallons of capacity to contain sediment and debris carried by incoming water. Floating trash, paper, pavement oil, etc. are effectively stopped by the **PureFlo®** Debris Shields in each chamber. These shielding devices are equipped with an effective screen to filter suspended material and are vented to prevent siphoning of floating surface debris as the system drains.

EFFECTIVE PROCESSING

Incoming water from the surface grated inlets or connecting pipes is received in the Primary Settling Chamber where silt and other heavy particles settle to the bottom. A PureFlo Debris Shield ensures containment by trapping floating debris and pavement oil. The pre-treated flow is then regulated to a design rate of up to 0.25cfs and directed to a Secondary Settling Chamber. The settling and containment process is repeated, thereby effectively achieving controlled, uniform treatment. The system is drained as water rises under the PureFlo Debris Shield and spills into the top of the overflow pipe. The drainage assembly returns the cleaned water into the surrounding soil through the **FloFast®** Drainage Screen.

ABSORBENT TECHNOLOGY

Both MaxWell Plus settling chambers are equipped with absorbent sponges to provide prompt removal of pavement oils. These floating pillow-like devices are 100% water repellent and literally wick petrochemical compounds from the water. Each sponge has a capacity of up to 128 ounces to accommodate effective, long-term treatment. The absorbent is completely inert and will safely remove runoff constituents down to rainbow sheens that are typically no more than one molecule thick.

SECURITY FEATURES

MaxWell Plus Systems include bolted, theft-deterrent, cast iron gratings and covers as standard security features. Special inset castings which are resistant to loosening from accidental impact are available for use in landscaped applications. Machined mating surfaces and "Storm Water Only" wording are standard.

THE MAXWELL FIVE-YEAR WARRANTY

Innovative engineering, quality materials and exacting construction are standard with every MaxWell System designed, manufactured and installed by Torrent Resources Incorporated. The MaxWell Drainage Systems Warranty is the best in the industry and guarantees against failures due to workmanship or materials for a period of five years from date of completion.

MAXWELL® PLUS DRAINAGE SYSTEM DETAIL AND SPECIFICATIONS

CALCULATING MAXWELL PLUS REQUIREMENTS:

The type of property, soil permeability, rainfall intensity and local drainage ordinances determine the number and design of MaxWell Systems. For general applications draining retained stormwater, use one standard ***MaxWell® Plus*** per the instructions below for up to 5 acres of landscaped contributory area, and up to 2 acres of paved surface. To drain nuisance water flows in storm runoff systems, add a remote inlet to the system. For smaller drainage needs, refer to our ***MaxWell® IV.*** For industrial drainage, our ***Envibro® System*** may be recommended. For additional considerations, please refer to **"Design Suggestions For Retention And Drainage Systems"** or consult our Design Staff.

COMPLETING THE MAXWELL PLUS DRAWING

To apply the MaxWell Plus drawing to your specific project, simply fill in the blue boxes per the following instructions. For assistance, please consult our Design Staff.

' PRIMARY SETTLING CHAMBER DEPTH

The overall depth of the Primary Settling Chamber is determined by the amount of surface area being drained. Use a standard depth of **15 feet** for the initial acre of contributory drainage area, **plus 2 feet** for each additional acre, up to the design limits of the property type noted in "Calculating MaxWell Plus Requirements" noted above. Other conditions that would require increased chamber depths are property usage, maintenance scheduling, and severe or unusual service conditions. Connecting pipe depth may dictate deeper chambers so as to maintain the effectiveness of the settling process. Maximum chamber depth is 25 feet.
A pump and lift station is recommended for systems with deeper requirements.

' ESTIMATED TOTAL DEPTH

The Estimated Total Depth is the approximate total system depth required to achieve 10 continuous feet of penetration into permeable soils, based upon known soil information. Torrent utilizes specialized **"crowd"** equipped rigs to get through the difficult cemented soil and to reach clean drainage soils at depths up to **180 feet.** An extensive drilling log database is available to use as a reference.

' SETTLING CHAMBER DEPTH

On MaxWell Plus Systems of over 30 feet overall depth and up to 0.25cfs design rate, the standard Settling Chamber Depth is **18 feet.** Maximum chamber depth is 25 feet.

' OVERFLOW HEIGHT

The Overflow Height and Secondary Settling Chamber Depth determine the effectiveness of the settling process. The higher the overflow pipe, the deeper the chamber, the greater the settling capacity. An overflow height of **13 feet** is used with the standard settling chamber depth of **18 feet.**

"Ø DRAINAGE PIPE

This dimension also applies to the **PureFlo®** Debris Shields, the **FloFast®** Drainage Screen, and fittings. The size is based upon system design rates, multiple primary settling chambers, soil conditions, and need for adequate venting. Choices are 6", 8", or 12" diameter. Refer to our company's **"Design Suggestions for Retention and Drainage Systems"** for recommendations on which size best matches your application.

"Ø BOLTED RING & GRATE/COVER

Standard models are quality cast iron and available to fit 24" Ø or 30" Ø manhole openings. All units are bolted in two locations with wording "Storm Water Only" in raised letters. For other surface treatments, please refer to "Design Suggestions for Retention and Drainage Systems."

' INLET PIPE INVERT

Pipes up to 12" in diameter from catch basins, underground storage, etc. may be connected into the primary settling chamber. Larger pipe diameters dictate the use of manhole material for the primary setting chamber with 48" grates on the cone.Inverts deeper than 5 feet will require additional depth in both system settling chambers to maintain respective effective settling capacities.

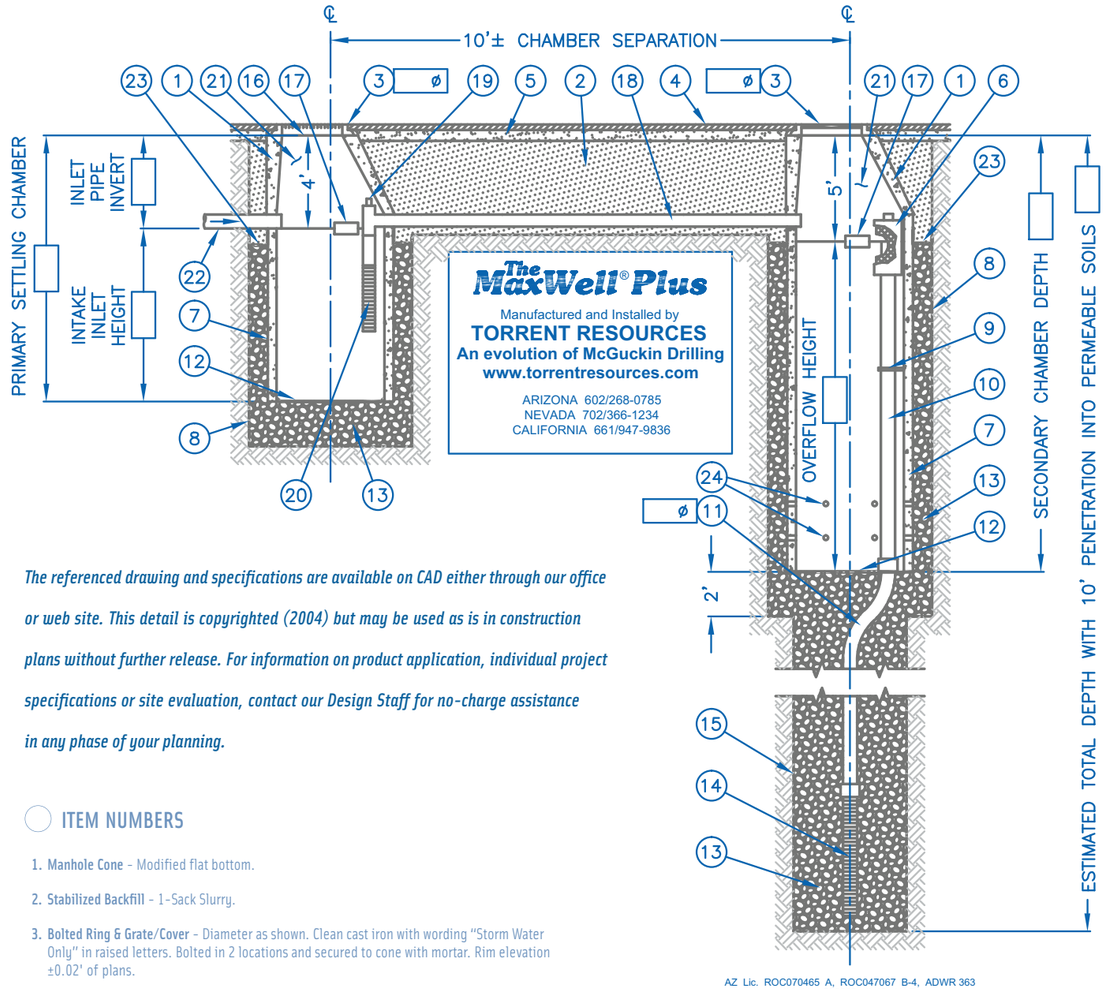
' INTAKE INLET HEIGHT

The Intake Inlet Height determines the effectiveness of the settling process in the Primary Settling Chamber. A minimum inlet height of **11 feet** is used with the standard primary settling chamber depth of 15 feet. Greater inlet heights would be required with increased system demands as noted in Primary Settling Chamber Depth. Freeboard Depth Varies with inlet pipe elevation. Increase primary/secondary settling chamber depths as needed to maintain all inlet pipe elevations above connector pipe overflow.

' CHAMBER SEPARATION

The standard separation between chambers is **10 feet** from center to center.
Soil conditions and deeper inverts may dictate required variations in chamber separation.

The MaxWell® Plus Drainage System Detail And Specifications



The referenced drawing and specifications are available on CAD either through our office or web site. This detail is copyrighted (2004) but may be used as is in construction plans without further release. For information on product application, individual project specifications or site evaluation, contact our Design Staff for no-charge assistance in any phase of your planning.

AZ Lic. ROC070465 A, ROC047067 B-4, ADWR 363
CA Lic. 528080, C-42, HAZ.
NV Lic. 0035350 A - NM Lic. 90504 GF04

ITEM NUMBERS

1. **Manhole Cone** - Modified flat bottom.
2. **Stabilized Backfill** - 1-Sack Slurry.
3. **Bolted Ring & Grate/Cover** - Diameter as shown. Clean cast iron with wording "Storm Water Only" in raised letters. Bolted in 2 locations and secured to cone with mortar. Rim elevation ±0.02' of plans.
4. **Graded Basin or Paving** (by Others).
5. **Compacted Base Material** (by Others).
6. **PureFlo® Debris Shield** - Rolled 16 Ga. steel X 24" length with vented anti-siphon and internal .265" Max. SWO flattened expanded steel screen X 12" length. **Fusion bonded epoxy coated.**
7. **Pre-cast Liner** - 4000 PSI concrete 48" ID. X 54" OD. **Center in hole** and align sections to **maximize bearing surface.**
8. **Min. 6' Ø Drilled Shaft.**
9. **Support Bracket** - Formed 12 Ga. steel. **Fusion bonded epoxy coated.**
10. **Overflow Pipe** - Sch. 40 PVC mated to drainage pipe at base seal.
11. **Drainage Pipe** - ADS highway grade with TRI-A coupler. **Suspend pipe** during backfill operations to prevent buckling or breakage. Diameter as noted.
12. **Base Seal** - Geotextile or concrete slurry.
13. **Rock** - Washed, sized between 3/8" and 1-1/2" to **best complement soil conditions.**
14. **FloFast® Drainage Screen** - Sch. 40 PVC 0.120" slotted well screen with 32 slots per row/ft. Diameter varies 120" overall length with TRI-B coupler.
15. **Min. 4' Ø Shaft** - Drilled to **maintain permeability** of drainage soils.
16. **Fabric Seal** - U.V. Resistant Geotextile - **To be removed by customer** at project completion.
17. **Absorbent** – Hydrophobic Petrochemical Sponge. Min 128 oz. capacity.
18. **Connector Pipe** – 4" Ø Sch. 40 PVC.
19. **Anti-Siphon Vent** with flow regulator.
20. **Intake Screen** – Sch. 40 PVC 0.120" modified slotted well screen with 32 slots per row/ft. 48" overall length with TRI-C end cap.
21. **Freeboard Depth Varies** with inlet pipe elevation. Increase primary/secondary settling chamber depths as needed to maintain all inlet pipe elevations above connector pipe overflow.
22. **Optional Inlet Pipe** (by Others).
23. **Moisture Membrane** – 6 mil. Plastic. Place securely against eccentric cone and hole sidewall. Used in lieu of slurry in landscaped areas.
24. **Eight** – (8) **perforations per foot,** 2 row minimum.

Appendix 5

MASTER COVENANT AND AGREEMENT AND OPERATION/MAINTENANCE PLAN

ATTACHMENT 1
Operation and Maintenance Plan at 150 N. Santa Anita Avenue, Arcadia

RESPONSIBLE PERSON

The person responsible for the operation and maintenance of the stormwater treatment BMPs is:

Name
Title, Company
Street Address
City, CA Zip Code
(XXX) XXX-XXXX

The owner is aware of the maintenance responsibilities of the proposed BMPs. A funding mechanism is in place to maintain the BMPs at the frequency stated in the SUSMP.

OPERATION AND MAINTENANCE PLAN

The maintenance program will include the following key components:

1.) Inspection Guidelines:

New installations
Newly installed systems should receive a thorough visual examination following the first several significant rainfall events. This assessment will assure that there is no standing water, and that runoff or nuisance water flows are being eliminated within the allowable 48 hour draw-down timeframe.

Ongoing Operations
At a minimum, the drainage structures should be inspected annually, and within 48 hours following a significant storm event to ensure that there is no standing water in the chambers.

2.) Maintenance Format:

After the first 12-months of entering service, it is recommended that an initial cleaning be undertaken. This will help to establish the amount of accumulated particulate matter and debris to be expected on a yearly basis. Thereafter, the systems should receive inspection at least annually, and cleaning should be undertaken when the evaluation reveals that 15% or more of the original chamber volume is occupied by silt and sediment.

During the maintenance operation, all screens and filters should be serviced and the floating absorbent blankets replaced. Should repair be needed, descriptions of deficiencies and estimated costs for suggested corrections should be provided. The above information shall be submitted in writing to the Owner at the conclusion of the maintenance service. Replacement is recommended for drywells that no longer dispose of ponded water within 48 hours after cleaning.

3.) Maintenance Records:

A written log shall be kept on-site of all inspections and maintenance performed on the drainage systems.