PRELIMINARY LOW IMPACT DEVELOPMENT PLAN (LID)

Prepared for:
Mission Villas, LLC
Attention: Mitch Gardner
11766 Wilshire Boulevard, Suite 820
Los Angeles, CA 90025

Property:

8601 Mission Drive
Rosemead, California
APN: 5389-009-029, 5389-009-030, 5389-009-031

Prepared by:
C&V Consulting, Inc.
9830 Irvine Center Drive
Irvine, California 92618
(949) 916-3800
Contact: Mr. Ryan Bittner, P.E.

Preparation Date:
February 2022

Receipt of WDID

REPLACE THIS SHEET

To be provided prior to final approval

Notice of Intent

REPLACE THIS SHEET

To be provided prior to final approval

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Project Owner's Certification of the Preliminary Low Impact Development (LID) Plan

Project Name: ***Mission Villas Rosemead***

Project Number: **Vesting Tentative Tract Map No. 83705**
APN: 5389-009-029, 5389-009-030, 5389-009-031

Project Address: **8601 Mission Drive**
Rosemead, CA 91770

This Preliminary Low Impact Development (LID) Plan for the Mission Villas Rosemead (***VTTM No. 83705)*** project has been prepared for Mission Villas, LLC by C&V Consulting, Inc. It is intended to comply with the requirements of the City of Rosemead's Conditions of Approval.

The undersigned is authorized to approve implementation of provisions of this plan as appropriate and will strive to have the plan carried out by successors consistent with the County of Los Angeles LID Manual and the intent of the NPDES storm water requirements.

"I certify under penalty of law that this document and all attachments were prepared under my jurisdiction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathered the information, to the best of my knowledge and belief, the information submitted is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Owner's Name:	Erik Pfahler		
Owner's Title:	Senior Vice President		
Company:	Mission Villas, LLC		
Address:	11766 Wilshire Blvd., Suite 820, Los Angeles, CA 90025		
Email:	erik@borsteinenterprises.com		
Telephone No.:	(310) 582-1991 x203		
Signature:		Date:	

Engineer Certification

Engineer's Name:	Ryan J. Bittner		
Engineer's Title:	Principal		
Company:	C&V Consulting, Inc.		
Address:	9830 Irvine Center Drive, Irvine, CA 92618		
Email:	rbittner@cvc-inc.net		
Telephone No.	(949) 916-3800		
I hereby certify that this Low Impact Development Plan is in compliance with, and meets the requirements set forth in, Order No. R4-2012-0175, of the Los Angeles Regional Water Quality Control Board.			
Engineer's Signature		Date	
Place Stamp Here			

Section 2

A. Contact Information/List of Responsible Parties

The homeowner's association (HOA) contact information is:

Contact: TBD
Phone: TBD
The Homeowner's Association

The HOA shall have primary responsibility and significant authority for the implementation, maintenance, and inspection of the property Best Management Practices (BMPs). Duties include, but are not limited to:

- Implementing all elements of the Low Impact Development Plan, including but not limited to:
  - Implementation of prompt and effective erosion and sediment control measures
  - Implementing all non-storm water management, and materials and waste management activities, such as: monitoring, discharges, general site clean-up; vehicle and equipment cleaning, spill control; ensuring that nothing other than storm water enters the storm drain system, etc.
- Pre-storm inspections
- Storm event inspections
- Post-storm inspections
- Routine inspections as described in the Low Impact Development Plan
- Ensuring elimination of all unauthorized discharges
- The HOA shall be assigned authority to mobilize crews to make immediate repairs to the control measures.
- Coordinate all the necessary corrections/repairs are made immediately, and that the project always complies with the Low Impact Development Plan.
- Managing and report any Illicit Connections or Illegal Discharges.

Section 3

A. References

The following documents are made a part of this Low Impact Development Plan by reference:

- Project plans and specifications for Vesting Tentative Tract No. 83705, prepared by C&V Consulting, Inc.
- State Water Resources Control Board (SWRCB) Order No. 2013-0001-DWQ, February 5, 2013.
- National Pollutant Discharge Elimination System (NPDES) General Permit No. CAS000002, Waste Discharge Requirements (WDRs) for Discharges of Storm Water Runoff Associated with Construction Activity.
- California Stormwater BMP Handbook – Construction, November 2009.
- California Stormwater BMP Handbook – New Development and Redevelopment, January 2003.
- County of Los Angeles Department of Public Works L.I.D. Standards Manual, February 2014

Section 4 – Body of LID Plan

A. Objectives

This Low Impact Development (LID) Plan has four main objectives:

1) Identify all pollutant sources, including sources of sediment that may affect the quality of storm water discharges associated with daily use / activity (storm water discharges) from the property site.
2) Identify non-storm water discharges.
3) Identify, construct, implement and maintain Best Management Practices (BMPs) to reduce or eliminate pollutants in storm water discharges and authorized non-storm water discharges from the property site.
4) Develop a maintenance schedule for BMPs designed to reduce or eliminate pollutants.

B. Project Background and Description

The proposed project is in Rosemead, California is approximately 3.38 net acres. The proposed development intends to construct 4 buildings of 8 attached 2-story duplex units as well as 29 2-story single family homes. These homes have private garages, private drive aisles, private yards, sidewalks, and common landscaped areas. The residential project site will be accessible with one (1) entrance/ exit along Mission Road. In the existing condition there is no cross-lot drainage as the existing residential lots have various perimeter controls surrounding them. In the proposed condition a new CMU wall will be built and therefore off-site run-on is not of concern.

The pre-development conditions of the project site consist of a vacant lot covered by vegetation. Impervious cover of the pre-developed condition was determined to be 1.5% and pervious cover to be 98.5% by utilizing Topographic information. For this preliminary study, post-development impervious cover was estimated to be 86% per LACDPW Hydrology Manual land use type "Low-Rise Apartments, Condominiums, and Townhouses". Imperviousness is to be verified with final site plan to confirm the consistency of the water quality treatment design during final engineering.

C. Vicinity Map

The proposed development encompasses three (3) parcels consisting of approximately 3.44 gross acres and 3.38 net acres. The site is bounded by existing residential lots to the north and east, Mission Drive to the south, and power lines owned by Southern California Edison to the west.

Refer to Figure 1 for the Vicinity Map

D. Pre-Development Drainage Condition

All three parcels are currently a vacant lot. Besides two small service roads in southern and eastern portions of the site the site is all pervious coverage. The site is surrounded by alternating masonry block wall, wooden fence, and chain link fence around the entire property. There is existing public sidewalk and driveway entrances along Mission Drive. There are no existing

storm drain facilities located on the site and no storm drain facilities located in the adjacent portion of Mission Drive along the project frontage.

The existing drainage pattern of the site is accounted for as one drainage area. The entire site sheet flows over the vacant land in a southerly direction. Stormwater appears to simply sheet flow over existing driveway entrances and enters Mission Road. Once stormwater enters Mission Rd. it flows in a southeasterly direction and enters a Los Angeles County Flood Control District (LACFCD) owned catch basin approximately 500' downstream of our site. This catch basin is connected to a LACFCD 30" RCP which flows into the Eaton Wash channel then into the Rio Hondo Channel. The Rio Hondo Channel then connects to the Los Angeles River then ultimately the Pacific Ocean. Water bodies downstream of the project site are listed on the most current 303 (d) List as follows:

- Rio Hondo Channel Reach 3
  - Indicator Bacteria
  - Iron
  - Oxygen, Dissolved
- Rio Hondo Channel Reach 2
  - Cyanide
- Rio Hondo Channel Reach 1
  - Copper
  - Indicator Bacteria
  - Lead
  - Toxicity
  - Trash
  - Zinc
  - pH
- Los Angeles River Reach 2
  - Ammonia
  - Copper
  - Indicator Bacteria
  - Lead
  - Nutrients (Algae)
  - Oil
  - Trash
- Los Angeles River Reach 1
  - Ammonia
  - Cadmium
  - Cyanide
  - Indicator Bacteria
  - Lead
  - Nutrients (Algae)
  - Trash
  - pH
- Los Angeles River Estuary
  - Chlordane

  - Toxicity
  - Trash
- San Pedro Bay Near/ Offshore Zones
  - Chlordane
  - DDT (tissue & sediment)
  - PCBs (Polychlorinated biphenyls)
  - Sediment Toxicity

E. Post-Development Drainage Condition

The proposed project consists of 8 duplex units and 29 single family homes over approximately 3.38 acres. The proposed development includes drive aisles, parking, landscaping, walkways, patios, and common open space areas. The site will be graded to collect runoff at one low point to control the amount of imported fill during grading and maintaining the existing site drainage pattern. The proposed development will utilize onsite catch basins, infiltration systems, and a detention pipe system to capture and treat stormwater. Stormwater up to the design capture volume will be infiltrated by a proposed onsite drywell system.

Stormwater runoff will be conveyed via proposed onsite gutter and directed to one sump area equipped with a curb inlet catch basin. There will be two additional catch basins located along the site's main spine in flow by conditions to convey stormwater into the underground storm drain system. The sump catch basin will be located at the end of the drive aisle at the southern property line. All on-site catch basins will be connected by storm drain pipe to the drywell infiltration system for water quality treatment. During larger storm events, stormwater runoff will back up the drywell system which is connected to the underground detention system. Larger storm events will bypass the infiltration system and overflow into a proposed grate inlet catch basin which is attached to a parkway culvert. Once stormwater enters the parkway culvert it will drain into Mission Road and follow the existing drainage pattern. For emergency overflow, runoff will spill out of the proposed curb inlet catch basin, topple over the proposed driveway entrance, and sheet flow into Mission Road. Refer to separately prepared Preliminary Grading and Utility Plans for site design information.

Per Preliminary Geotechnical Investigation, prepared by Albus & Associates, Inc. dated October 27, 2021, infiltration BMPs were determined to be feasible. "Based on the results of percolation testing and analyses, the well configuration as depicted on Plate 2 may utilize a "measured" peak flow rate of 0.16 ft^3/sec. This flow rate corresponds to an average peak infiltration rate of 17.0 in./hr."

Refer to Figure 2, BMP Exhibit for additional information.

F. LID Project Types, Characteristics, & Activities

Per the Los Angeles Department of Public Works (LACDPW), *Low Impact Development Standards Manual*, dated February 2014, the proposed project is classified as a "Designated Project." A "Designated Project" is defined by the LACDPW as follows:

"Redevelopment projects, which are developments that result in creation or addition or replacement of either: (1) 5,000 square feet or more of impervious surface on a site that was previously developed as described in the above bullets; or (2) 10,000 square feet or more of impervious surface area on a site that was previous developed as a single-family home."

G. Pollutant Source Identification and BMP Selection

The following is a list of materials to be used in the daily construction activities at the project site, which will potentially contribute to pollutants, other than sediment, to storm water runoff. Control Practices for each activity are identified below:

- Vehicle fluids, including oil, grease, petroleum, and coolants from personal vehicles.
- Landscaping materials and wastes (topsoil, plant materials, herbicides, fertilizers, mulch, pesticides)
- General trash debris and litter
- Pet waste (bacteria/ fecal coliforms)

The Best Management Practices (BMPs) that have been selected for implementation on this project are detailed in the following sections.

H. Source Control BMPs

The County of Los Angeles LID Standards Manual lists preference for selection of BMPs which includes retention-based stormwater quality control measures, biofiltration, vegetation-based storm quality control measures, and/or treatment-based stormwater quality control measures. This project has selected a retention-based stormwater quality control measure by using a drywell infiltration system.

In the soils report prepared by Albus & Associates, Inc. infiltration systems were determined to be feasible as a stormwater BMP. Additionally, roof gutters will discharge to landscape areas using splash blocks when possible, creating a passive bio treatment in small planter areas prior to interception by an area drain system, catch basin, and storm drain system. All runoff from the site is tributary to the proposed onsite drywell infiltration system. As retention-based stormwater quality control measures are of the highest priority per the LA County LID Manual, the other the other stormwater quality control measures were not considered. Drywells were selected for their reduced footprint compared to other retention-based infiltration systems.

Structural BMPs shall be installed by Mission Villas, LLC, the developer, through the construction and development of the project; planting and irrigation systems shall be designed by licensed landscape architects and installed by qualified contractors to specifications and standards of the City of Rosemead. The structural BMPs used for this project are summarized below.

Project proponents shall implement site design concepts that achieve each of the following:

- Minimize Storm Water Pollutants of Concern

- Peak Storm Water Runoff Discharge Rate

The following tables identify the source control and treatment BMPs and how each is implemented to achieve each site design concept.

Table-1: Site Design BMPs

BMP	TECHNIQUE	INCLUDED? YES	INCLUDED? NO	BRIEF DESCRIPTION OF METHOD
SD-10	Site Design & Landscape Planning	X		
SD-11	Roof Runoff Controls	X		
SD-12	Efficient Irrigation	X		
SD-13	Storm Drain Signage	X		
SD-20	Pervious Pavements		X	Site design does not allow for this BMP.
SD-21	Alternative Building Materials		X	Not Applicable
SD-30	Fueling Areas		X	Not Applicable
SD-31	Maintenance Bays & Docks		X	Not Applicable
SD-32	Trash Storage Areas		X	No Trash Storage Areas Proposed
SD-33	Vehicle Washing Areas		X	Not Applicable
SD-34	Outdoor Material Storage Areas		X	Not Applicable
SD-35	Outdoor Work Areas		X	Not Applicable
SD-36	Outdoor Processing Areas		X	Not Applicable

Roof Runoff Controls
All roof runoff will be collected and directed to splash blocks then onto grass or vegetated swales before discharging to the street or storm drain system. Area drains within the onsite landscaping between buildings will flow to onsite infiltration system where flows will be treated.

Efficient Irrigation
As part of the design of all common area landscape irrigation shall employ water conservation principals, including, but not limited to, such provisions as water sensors, programmable irrigation times (for short cycles), etc., will be used. Such common areas will be maintained by the HOA.

Storm Drain Signage
Storm Drain Signage will be provided on all proposed on-site catch basins to prevent residence from discarding pollutants to the storm drain system and potentially obstructing the proposed

BMP treatment facility. The placard or stencil will indicate the ultimate destination of the runoff entering the device. This stencil shall be always weatherproof and visible. The HOA will be responsible for maintaining the signage after the construction is completed. See Appendix D for an example.

Table-2: Source Control BMPs

BMP	TECHNIQUE	INCLUDED?		BRIEF DESCRIPTION OF METHOD
		YES	NO	
S-1	Storm Drain Message and Signage	X		
S-2	Outdoor Material Storage Area		X	Not Applicable
S-3	Outdoor Trash Storage and Waste Handling Area		X	Not Applicable
S-4	Outdoor Loading/Unloading Dock Area		X	No Loading Dock Areas
S-5	Outdoor Repair/Maintenance Area		X	No Maintenance Bays
S-6	Outdoor Vehicle/Equipment's/Accessory Washing Area		X	No Wash Areas
S-7	Fueling Area		X	No Fueling Areas
S-8	Landscape Irrigation Practices	X		
S-9	Building Materials Selection	X		
S-10	Animal Care and Handling Facilities		X	No Animal Care Facility
S-11	Outdoor Horticulture Areas		X	Not Applicable

Storm Drain Message and Signage
Storm Drain Signage will be provided on all proposed on-site catch basins to prevent residence from discarding pollutants to the storm drain system and potentially obstructing the proposed BMP treatment facility. The placard or stencil will indicate the ultimate destination of the runoff entering the device. This stencil shall be always weatherproof and visible. The HOA will be responsible for maintaining the signage after the construction is completed. See Appendix B for an example.

Landscape Irrigation Processes
Management programs will be designed and established by the HOA, who will maintain the common areas within the project site. These programs will include how to mitigate the potential dangers of fertilizer and pesticide usage (refer to the Maintenance and Frequency Table). Ongoing maintenance will be consistent with the State of California Model- Water Efficient Landscape Ordinance. Fertilizer and pesticide usage shall be consistent with County Management Guidelines for use of Fertilizers and Pesticides.

Building Materials Selection
Material selection will minimize the use of copper, galvanized metals and other materials that could add significant amounts of harmful pollutants to stormwater runoff.

Table-3: Stormwater Quality Control BMPs

BMP	NAME	INCLUDED? YES	INCLUDED? NO	IF NOT APPLICABLE, STATE BRIEF REASON
RET-1	Bioretention		X	Used alternative method – Drywell System
RET-2	Infiltration Basin		X	Used alternative method – Drywell System
RET-3	Infiltration Trench		X	Used alternative method – Drywell System
RET-4	Drywell	X		A Maxwell Plus Drywell System will be used on this site.
RET-5	Permeable Pavement without an Underdrain		X	Used alternative method – Drywell System
RET-6	Rain Barrel/Cistern		X	Used alternative method – Drywell System
BIO-1	Biofiltration		X	Used alternative method – Drywell System
VEG-1	Green Roof		X	Space not available for BMP
VEG-2	Stormwater Planter		X	Used alternative method – Drywell System
VEG-3	Tree-Well Filter		X	Used alternative method – Drywell System
VEG-4	Vegetated Swales		X	Space not available for BMP
VEG-5	Vegetated Filter Strip		X	Space not available for BMP
T-1	Sand Filter		X	Space not available for BMP
T-2	Constructed Wetland		X	This is not a wetland area/ development
T-3	Extended Detention Basin		X	Space not available for BMP
T-4	Wet Pond		X	This is not a wetland area/ development
T-5	Permeable Pavement with an Underdrain		X	Used alternative method – Drywell System

RET-4 Drywell
Storm water will enter the drywell unit via curb openings throughout the site and flow via pipe directly onto specially designed pretreatment chamber. The pretreatment chamber is designed intercept the majority of the first flows during a rain event and reduce the impact of sediment and debris on the system. After the pretreatment chamber fills up stormwater will flow into the main drywell system where it will be infiltrated. A detention system located upstream of the drywell will have a high-flow bypass inlet for flows greater than the 85th percentile storm event. See Appendix C for drywell sizing calculations.

I. Non-Structural BMPs

Non-structural BMPs are generally managerial, educational, inspection and/ or maintenance oriented. These items consist of educating employees and occupants, developing, and implementing HOA guidelines, implementing BMPs and enforcing Code requirements. Non-structural BMPs used for this project are summarized below:

Education for Employees and Occupants

Practical informational materials will be provided to occupants, the HOA and employees on general good housekeeping practices that contribute to protection of storm water quality. Among other things, these materials will describe the use of chemicals (including household type) that should be limited to the property, with no discharge of specified wastes via hosing or other direct discharge to gutters, catch basins and storm drains.

This program must be maintained, enforced, and updated periodically by the HOA. Educational materials including, but not limited to, the materials included in the Appendix F of this plan will be made available to the employees and contractors of the HOA.

Activity Restrictions

Activities on this site will be limited to activities related to residential living. The Conditions, Covenants, and Restrictions (CC&Rs) will outline the activities that are restricted on the property. Such activities related to the LID include car washing, car maintenance and disposal of used motor fluids, pet waste cleanup, and trash container areas.

Common Area Landscape Management

Management programs will be designed and established by the HOA, who will maintain the common areas within the project site. These programs will include how to mitigate the potential dangers of fertilizer and pesticide usage, require that fertilizer and pesticide usage shall be consistent with City and County guidelines, discuss utilization of water-efficient landscaping practices, require that maintenance be consistent with any Los Angeles County water conservation resolutions or City of Rosemead equivalent, and detail the proper disposal of landscape wastes. Ongoing maintenance will be consistent with the State of California Model Water-Efficient Landscape Ordinance. Fertilizer and pesticide usage shall be consistent with County Management Guidelines for use of Fertilizers and Pesticides.

Common Area Litter Control

The HOA will be required to implement trash management and litter control procedures in the common areas aimed at reducing pollution of drainage water. The HOA may also contract with their landscape maintenance firm to provide this service during regularly scheduled maintenance, which should consist of litter patrol, emptying of trash receptacles in common areas, and noting trash disposal violations and reporting the violations to the HOA for remediation.

Street Sweeping in Private Streets and Parking Lots

The HOA shall have all streets and parking lots swept on a weekly basis. This procedure will be intensified around October 15th of each year prior to and throughout rainstorm period.

Drainage Facility Inspection & Maintenance
The HOA will be responsible for implementing each of the BMPs detailed in this plan. The HOA will also be responsible for cleaning and maintaining the BMPs on a regular basis. Refer to Appendix G for the Operation and Maintenance Plan. Refer to Appendix B for site specific drainage BMP information.

Title 22 CC&R Compliance
The HOA will comply with this Regulation as part of the development's CC&Rs. CC&Rs will be prepared as a separate document and reviewed by the City's Attorney.

Uniform Fire Code Implementation
The HOA will comply with this Code as part of the development's CC&Rs. CC&Rs will be prepared as a separate document and reviewed by the City's Attorney

Employee Training/Education Program
A training program will be established as it would apply to future employees, contractors, and homeowners of the HOA to inform and train in maintenance activities regarding the impact of dumping oil, paints, solvents, or other potentially harmful chemicals into storm drains; the proper use of fertilizers and pesticides in landscaping maintenance practices; and the impacts of littering and improper water disposal.

The HOA (or a hired firm) will conduct the training program which will include targeted training sessions with specific construction disciplines (landscaping, concrete finishers, painters, etc.). See Appendix F for examples of educational materials that will be provided to the Employees.

The project's O&M will include provisions for future employee training programs conducted on a yearly based prior to the rainy season.

J. BMP Maintenance, Inspection, and Repair

Inspections will be conducted as follows:

- Annually prior to the start of the rainy season (Oct. 1st- May 31st)
- Every (1) month during rainy season
- At any other time(s) or intervals of time specified in the contract documents

An inspection form shall be completed at least once per year prior to the start of the rainy season. This inspection check sheet (see Appendix G) shall be included in this report and always kept onsite. The check sheet should be filled out completely and clearly indicate any BMPs that need repair or maintenance. These repairs and/ or maintenance procedures shall be carried out at the soonest possible time.

A legible log shall be kept on site to record the inspection of the storm water pollution abatement control measures. The record must contain the following information: (i) type of maintenance activities or source-control practices; (ii) date the activities are completed; and (iii) the name of the operator performing the activities. During transfer of ownership/operation of the facility, the

current owner must notify the new owner/operator of the BMPs and the associated maintenance activities that also transfer to the new owner/operator of the property. See Appendix G.

K. Inspection, Maintenance, and Responsibility for BMPs

The following tables list the post-construction BMPs (routine non-structural and structural), the required ongoing maintenance, the inspection and maintenance frequency, the inspection criteria, and the entity or party responsible for implementation, maintenance, and/or inspection.

Table-4: Non-Structural BMP Maintenance Responsibility/Frequency Matrix

BMP	RESPONSIBILITY	FREQUENCY
Homeowner/ Business owner Education, Activity Restrictions	HOA will provide educational materials. Those materials and responsibilities must be passed onto subsequent property owners.	Continuous. CC&Rs to be provided to homeowners at the time they purchase the property and updates provided by the HOA as they occur.
Common Area Landscape Management	HOA will appoint a landscape maintenance contractor	Monthly during regular maintenance and use with management guidelines for use of fertilizers and pesticides.
Parking Areas and Drives Management	HOA will appoint a landscape maintenance contractor	The Drives Aisles are to be swept on a routine scheduled basis to facilitate the pickup of trash and debris (plant or otherwise) and to remove excessive oil, grease, and build-up. During sweeping, debris is to be removed from the parking areas and drives and then scrubbed and rinsed. This sweeping schedule will be at a minimum occurrence of once a week and as necessary to rid / reduce active pollutants from the pavement areas. This maintenance requirement will be listed in the Convent, Conditions and Restrictions (CC&Rs) of this project. These CC&Rs will be recorded to the property at the County Recorder's Office and be included on the final Title report of these properties.
Litter Control by Sweeping	HOA will appoint a landscape maintenance contractor.	Weekly inspection of trash receptacles to ensure that lids are closed and pick up any excess trash on the ground, noting trash disposal violations to the HOA for remediation.
Employee Training	HOA will appoint a landscape contractor after construction.	Monthly for maintenance personnel and employees to include the educational materials contained in the approved LID.

BMP	RESPONSIBILITY	FREQUENCY
Common Area Catch Basin Inspection & Cleaning	HOA will appoint a landscape maintenance contractor for common areas and storm drain facilities.	Inspect basins once a month. Clean debris and silt in bottom of catch basins as needed. Intensified on or about October 15th each year or prior to the first 24-hour storm event, whichever occurs first. Refer to Appendix E.

Table-5: Structural BMP Maintenance Responsibility/Frequency Matrix

BMP	RESPONSIBILITY	FREQUENCY
Common Area Efficient Irrigation	HOA will appoint a landscape contractor after construction	Once a week, in conjunction with maintenance activities. Verify that runoff minimizing landscape design continues to function by checking that water sensors are functioning properly, that irrigation heads are adjusted properly to eliminate overspray to hardscape areas, and to verify that irrigation timing and cycle lengths are adjusted in accordance with water demands, given time of year, weather and day or nighttime temperatures.
Common Area Runoff Efficient Landscape Design	HOA will appoint a landscaping contractor	Once a week in conjunction with maintenance activities and prior to finalizing any replanting schemes. Verify that plants continue to be grouped according to similar water requirements to reduce excess irrigation runoff.
Catch Basin Stenciling	HOA	A warning stencil will be painted on top and in view with the words: "No-Dumping – Drains to Ocean" At all catch basin, drain inlets draining to the street or storm drain system. See Appendix "B" (example). Once every 6 months, inspect for re-stenciling needs. Re-stencil as needed immediately.
Maxwell Plus Drywell System	HOA	Maxwell Plus Drywell System maintenance will conform to manufacturer's specifications. Please see additional information in Appendix C
Stormwater Detention System	HOA	Stormwater detention system maintenance will conform to manufacturer's specifications.
Oldcastle FloGard Catch Basin Insert Filters	HOA	Oldcastle FloGard catch basin insert filter maintenance will conform to manufacturer's specifications. See additional information in Appendix C

L. Operation/Maintenance Funding after Project Completion

The post-construction BMPs as described above will be funded and maintained by:

The Homeowner's Association

Maintenance and requirements of the maintenance for the properties will be listed in the Convent, Conditions and Restrictions (CC&Rs) of this project and will be the responsibility of the property owner at all times. These CC&Rs will be recorded to the property at the County Recorder's Office and be included on the Title report of these properties.

Figure -1:
Project Vicinity Map

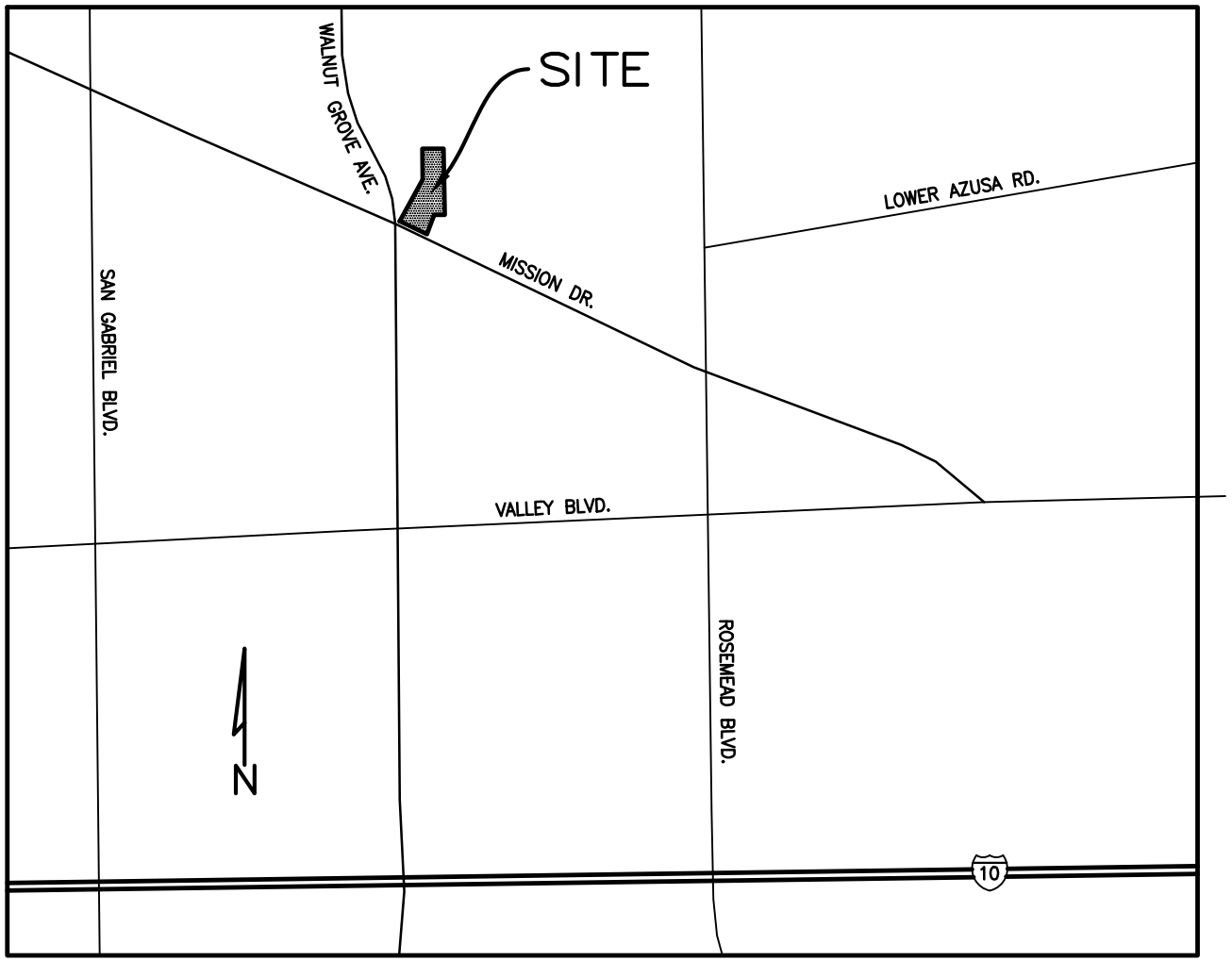
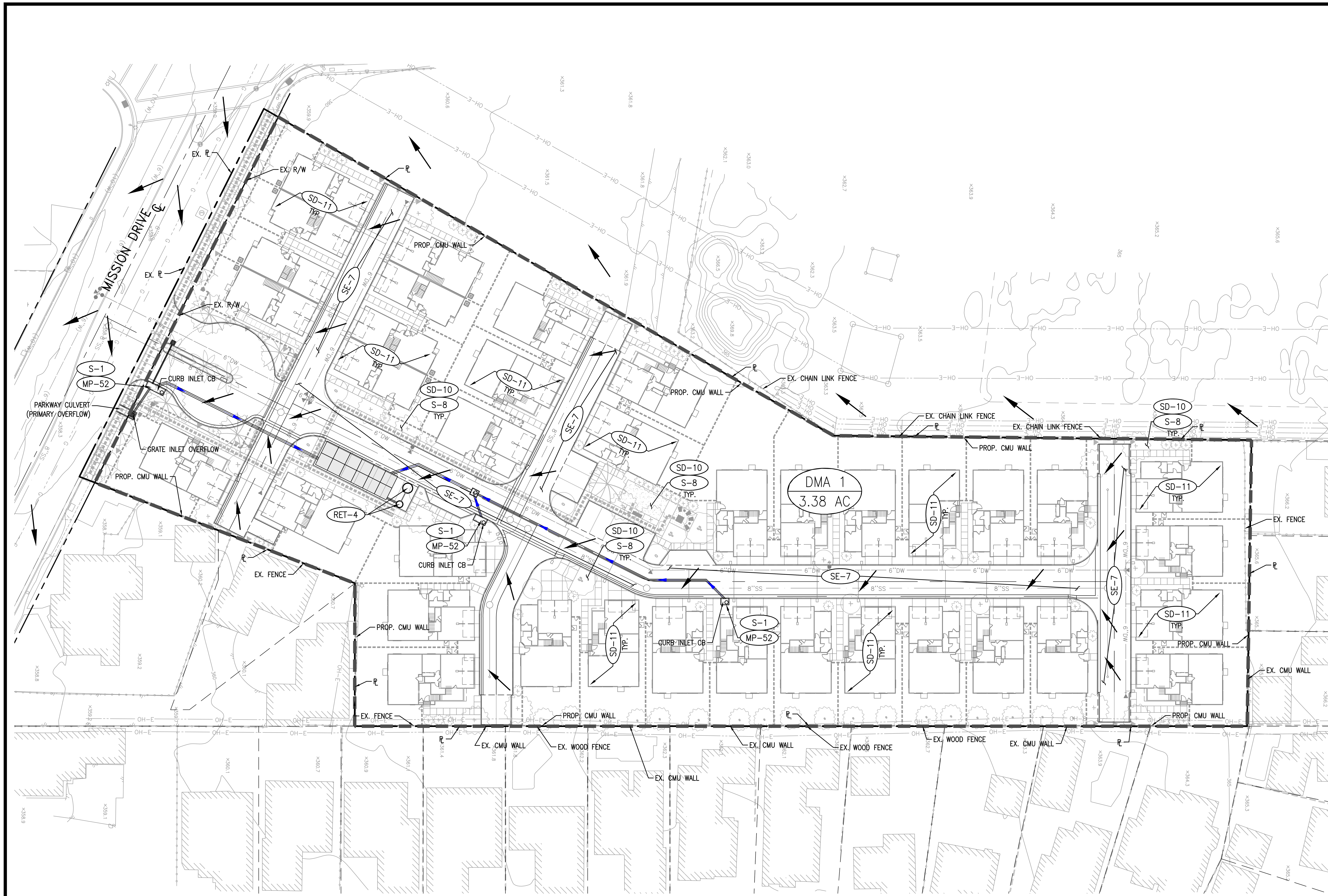
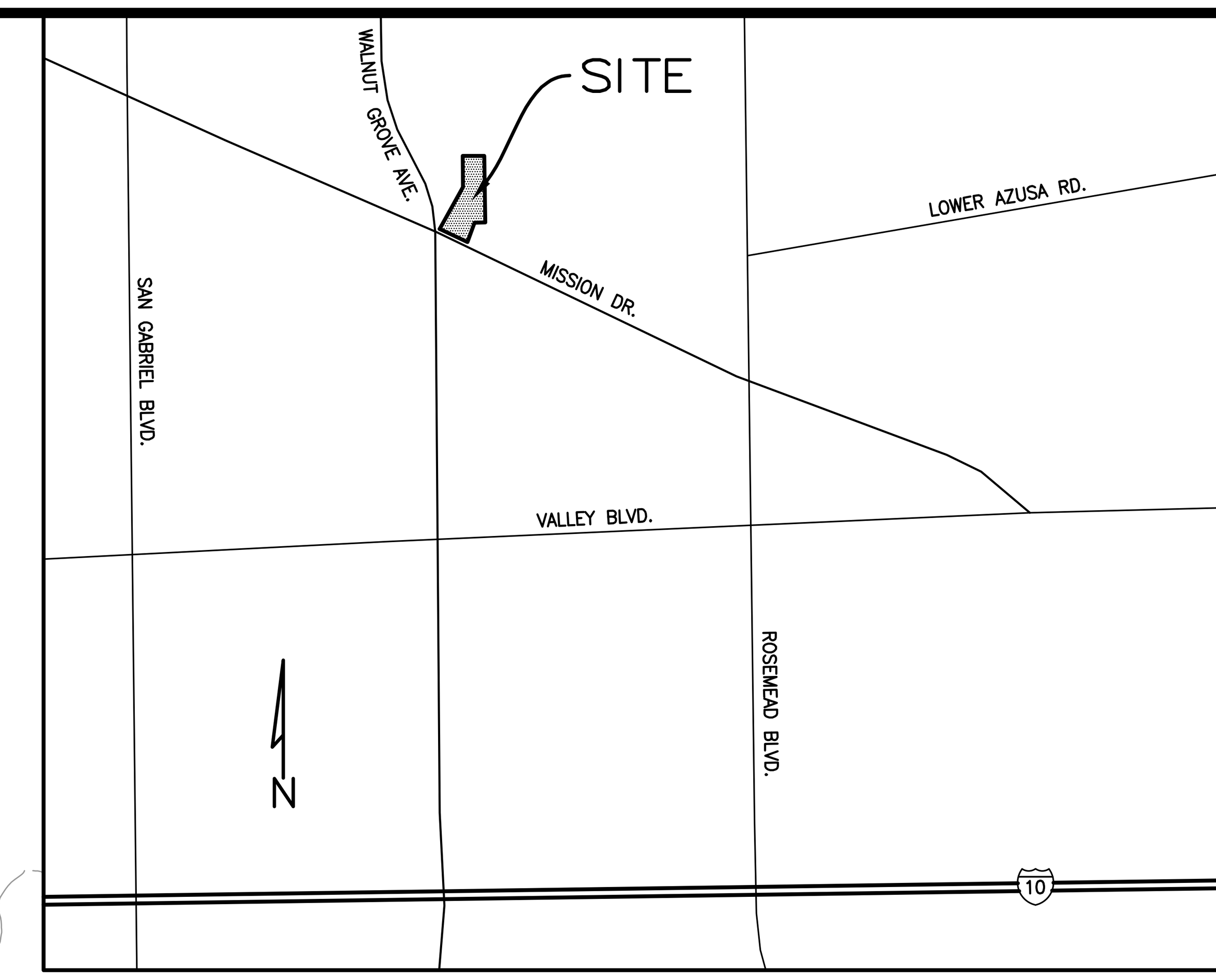

SITE
WALNUT GROVE AVE.
LOWER AZUSA RD.
MISSION DR.
SAN GABRIEL BLVD.
VALLEY BLVD.
ROSEMEAD BLVD.
N
10

Figure -2:
BMP Exhibit





VICINITY MAP
SCALE: NTS

LEGEND:

- DRAINAGE MANAGEMENT AREA (DMA) BOUNDARY
- PROPOSED LOT LINE
- SURFACE FLOW DIRECTION
- PIPE FLOW DIRECTION
- FLOW LINE

BEST MANAGEMENT PRACTICES:

- SE-7 — PRIVATE STREET/ PARKING LOT SWEEPING & VACUUMING
- SD-10 — SITE DESIGN & LANDSCAPE PLANNING
- SD-11 — ROOF RUNOFF CONTROLS
- S-8 — EFFICIENT IRRIGATION
- S-1 — STORM DRAIN SYSTEM SIGNAGE
- RET-3 — INFILTRATION TRENCH (ADS STORMTECH MC-4500 CHAMBERS) (SEE LID REPORT FOR ADDITIONAL INFORMATION)
- MP-52 — DRAIN INSERTS (OLDCASTLE FLOGARD CATCH BASIN INSERT FILTER)

SCALE: 1" = 30'

0 15 60 60

PREPARED FOR:

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CITY OF ROSEMEAD

VESTING TENTATIVE TRACT MAP NO. 83705
8601 MISSION DRIVE
BMP EXHIBIT

SHEET 1 OF 1

Figure -3:
Impaired Waters

COUNTY OF LOS ANGELES

LOS ANGELES RIVER WATERSHED

Los Angeles River Watershed

PACIFIC OCEAN

PROJECT SITE

MILES
0 1 2 4

LEGEND

- LOS ANGELES RIVER WATERSHED
- UNINCORPORATED AREA
- DAM / LAKE / RESERVOIR
- MAJOR RIVER
- MAJOR CHANNEL

Data contained in this map is produced in whole or part from the Los Angeles County Department of Public Works' digital database.

Appendix A:
Volume and Flow Rate Calculations and Hydrologic Report

The proposed development was analyzed for the 0.75-in storm event and the 85th Percentile storm event using the LACDPW HydroCalc software. The governing stormwater runoff volume between the two storm events was utilized for design. Below is a summary of the HydroCalc outputs:

DMA	85th Percentile Storm ✓		0.75-in Storm		Governing Volume (cf)
	Volume (cf)	Flowrate (cfs)	Volume (cf)	Flowrate (cfs)	
1	8,629.68	0.5731	7,191.44	0.4485	8,629.69

Refer to LACDPW HydroCalc Output Data within this Appendix for Volume and Flowrate Calculations.

Peak Flow Hydrologic Analysis

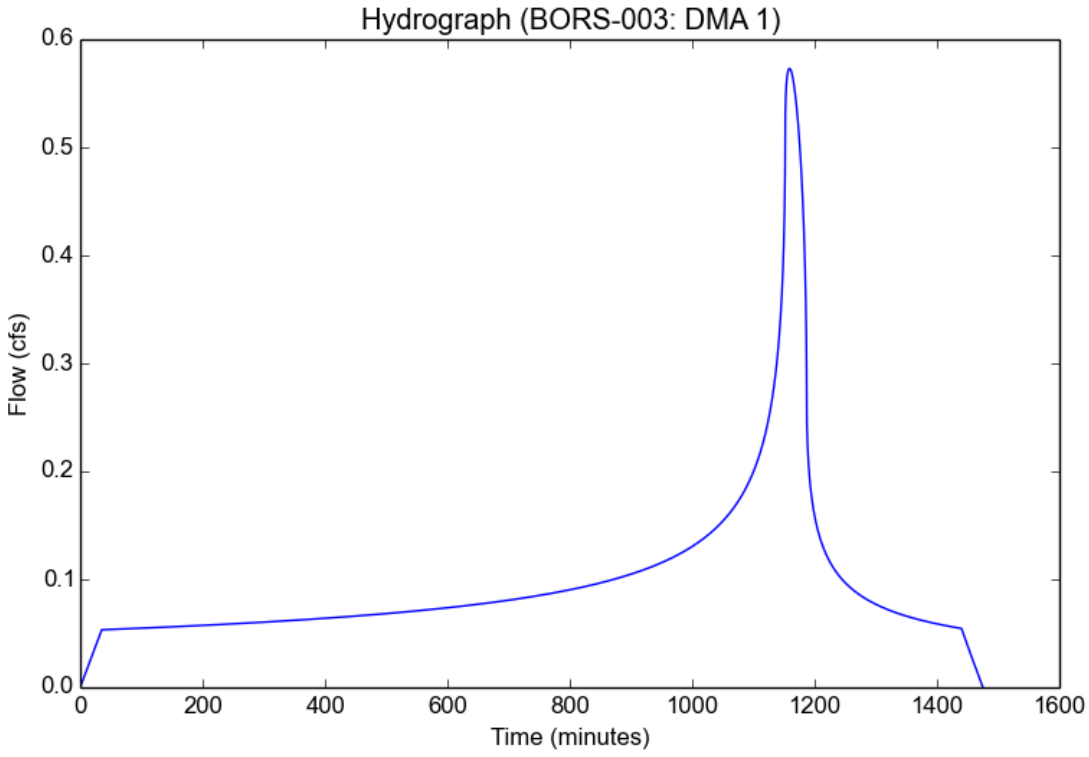
File location: P:/B/BORS-003/Admin/Reports/LID/Preliminary/Appendix A - Calcs/BORS-003 - DMA 1 - 85%.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	BORS-003
Subarea ID	DMA 1
Area (ac)	3.38
Flow Path Length (ft)	714.0
Flow Path Slope (vft/hft)	0.009
85th Percentile Rainfall Depth (in)	0.9
Percent Impervious	0.86
Soil Type	6
Design Storm Frequency	85th percentile storm
Fire Factor	0
LID	True

Output Results

Modeled (85th percentile storm) Rainfall Depth (in)	0.9
Peak Intensity (in/hr)	0.2152
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.788
Time of Concentration (min)	35.0
Clear Peak Flow Rate (cfs)	0.5731
Burned Peak Flow Rate (cfs)	0.5731
24-Hr Clear Runoff Volume (ac-ft)	0.1981
24-Hr Clear Runoff Volume (cu-ft)	8629.6809



Peak Flow Hydrologic Analysis

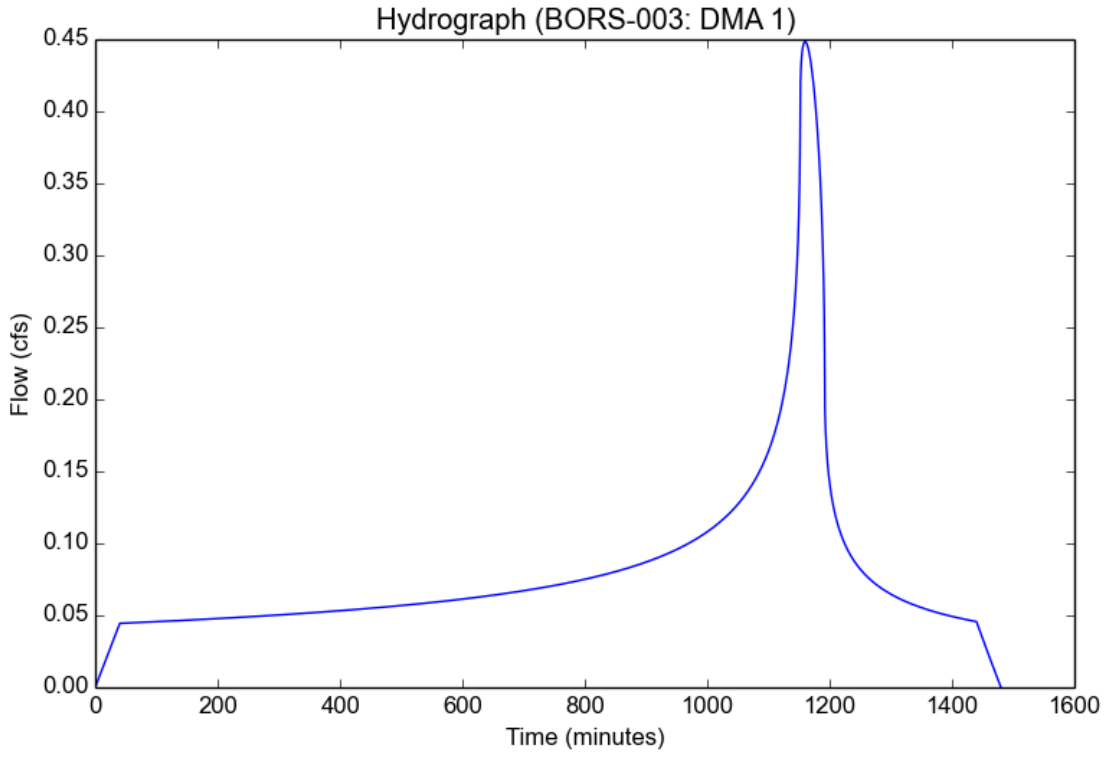
File location: P:/B/BORS-003/Admin/Reports/LID/Preliminary/Appendix A - Calcs/BORS-003 - DMA 1 - .75in.pdf
Version: HydroCalc 1.0.3

Input Parameters

Project Name	BORS-003
Subarea ID	DMA 1
Area (ac)	3.38
Flow Path Length (ft)	714.0
Flow Path Slope (vft/hft)	0.009
0.75-inch Rainfall Depth (in)	0.75
Percent Impervious	0.86
Soil Type	6
Design Storm Frequency	0.75 inch storm
Fire Factor	0
LID	True

Output Results

Modeled (0.75 inch storm) Rainfall Depth (in)	0.75
Peak Intensity (in/hr)	0.1684
Undeveloped Runoff Coefficient (Cu)	0.1
Developed Runoff Coefficient (Cd)	0.788
Time of Concentration (min)	40.0
Clear Peak Flow Rate (cfs)	0.4485
Burned Peak Flow Rate (cfs)	0.4485
24-Hr Clear Runoff Volume (ac-ft)	0.1651
24-Hr Clear Runoff Volume (cu-ft)	7191.4357



Appendix B:
Site BMPs

Site Design & Landscape Planning SD-10

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- ☑ Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Each project site possesses unique topographic, hydrologic, and vegetative features, some of which are more suitable for development than others. Integrating and incorporating appropriate landscape planning methodologies into the project design is the most effective action that can be done to minimize surface and groundwater contamination from stormwater.

Approach

Landscape planning should couple consideration of land suitability for urban uses with consideration of community goals and projected growth. Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Design requirements for site design and landscapes planning should conform to applicable standards and specifications of agencies with jurisdiction and be consistent with applicable General Plan and Local Area Plan policies.

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Designing New Installations

Begin the development of a plan for the landscape unit with attention to the following general principles:

- Formulate the plan on the basis of clearly articulated community goals. Carefully identify conflicts and choices between retaining and protecting desired resources and community growth.
- Map and assess land suitability for urban uses. Include the following landscape features in the assessment: wooded land, open unwooded land, steep slopes, erosion-prone soils, foundation suitability, soil suitability for waste disposal, aquifers, aquifer recharge areas, wetlands, floodplains, surface waters, agricultural lands, and various categories of urban land use. When appropriate, the assessment can highlight outstanding local or regional resources that the community determines should be protected (e.g., a scenic area, recreational area, threatened species habitat, farmland, fish run). Mapping and assessment should recognize not only these resources but also additional areas needed for their sustenance.

Project plan designs should conserve natural areas to the extent possible, maximize natural water storage and infiltration opportunities, and protect slopes and channels.

Conserve Natural Areas during Landscape Planning

If applicable, the following items are required and must be implemented in the site layout during the subdivision design and approval process, consistent with applicable General Plan and Local Area Plan policies:

- Cluster development on least-sensitive portions of a site while leaving the remaining land in a natural undisturbed condition.
- Limit clearing and grading of native vegetation at a site to the minimum amount needed to build lots, allow access, and provide fire protection.
- Maximize trees and other vegetation at each site by planting additional vegetation, clustering tree areas, and promoting the use of native and/or drought tolerant plants.
- Promote natural vegetation by using parking lot islands and other landscaped areas.
- Preserve riparian areas and wetlands.

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

- Promote the conservation of forest cover. Building on land that is already deforested affects basin hydrology to a lesser extent than converting forested land. Loss of forest cover reduces interception storage, detention in the organic forest floor layer, and water losses by evapotranspiration, resulting in large peak runoff increases and either their negative effects or the expense of countering them with structural solutions.
- Maintain natural storage reservoirs and drainage corridors, including depressions, areas of permeable soils, swales, and intermittent streams. Develop and implement policies and

regulations to discourage the clearing, filling, and channelization of these features. Utilize them in drainage networks in preference to pipes, culverts, and engineered ditches.

- Evaluating infiltration opportunities by referring to the stormwater management manual for the jurisdiction and pay particular attention to the selection criteria for avoiding groundwater contamination, poor soils, and hydrogeological conditions that cause these facilities to fail. If necessary, locate developments with large amounts of impervious surfaces or a potential to produce relatively contaminated runoff away from groundwater recharge areas.

Protection of Slopes and Channels during Landscape Design

- Convey runoff safely from the tops of slopes.
- Avoid disturbing steep or unstable slopes.
- Avoid disturbing natural channels.
- Stabilize disturbed slopes as quickly as possible.
- Vegetate slopes with native or drought tolerant vegetation.
- Control and treat flows in landscaping and/or other controls prior to reaching existing natural drainage systems.
- Stabilize temporary and permanent channel crossings as quickly as possible, and ensure that increases in run-off velocity and frequency caused by the project do not erode the channel.
- Install energy dissipaters, such as riprap, at the outlets of new storm drains, culverts, conduits, or channels that enter unlined channels in accordance with applicable specifications to minimize erosion. Energy dissipaters shall be installed in such a way as to minimize impacts to receiving waters.
- Line on-site conveyance channels where appropriate, to reduce erosion caused by increased flow velocity due to increases in tributary impervious area. The first choice for linings should be grass or some other vegetative surface, since these materials not only reduce runoff velocities, but also provide water quality benefits from filtration and infiltration. If velocities in the channel are high enough to erode grass or other vegetative linings, riprap, concrete, soil cement, or geo-grid stabilization are other alternatives.
- Consider other design principles that are comparable and equally effective.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Redevelopment may present significant opportunity to add features which had not previously been implemented. Examples include incorporation of depressions, areas of permeable soils, and swales in newly redeveloped areas. While some site constraints may exist due to the status of already existing infrastructure, opportunities should not be missed to maximize infiltration, slow runoff, reduce impervious areas, disconnect directly connected impervious areas.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Stormwater Management Manual for Western Washington, Washington State Department of Ecology, August 2001.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- ☑ Contain Pollutants
- Collect and Convey

Description

Various roof runoff controls are available to address stormwater that drains off rooftops. The objective is to reduce the total volume and rate of runoff from individual lots, and retain the pollutants on site that may be picked up from roofing materials and atmospheric deposition. Roof runoff controls consist of directing the roof runoff away from paved areas and mitigating flow to the storm drain system through one of several general approaches: cisterns or rain barrels; dry wells or infiltration trenches; pop-up emitters, and foundation planting. The first three approaches require the roof runoff to be contained in a gutter and downspout system. Foundation planting provides a vegetated strip under the drip line of the roof.

Approach

Design of individual lots for single-family homes as well as lots for higher density residential and commercial structures should consider site design provisions for containing and infiltrating roof runoff or directing roof runoff to vegetative swales or buffer areas. Retained water can be reused for watering gardens, lawns, and trees. Benefits to the environment include reduced demand for potable water used for irrigation, improved stormwater quality, increased groundwater recharge, decreased runoff volume and peak flows, and decreased flooding potential.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment.

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

One method of addressing roof runoff is to direct roof downspouts to cisterns or rain barrels. A cistern is an above ground storage vessel with either a manually operated valve or a permanently open outlet. Roof runoff is temporarily stored and then released for irrigation or infiltration between storms. The number of rain

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barrels needed is a function of the rooftop area. Some low impact developers recommend that every house have at least 2 rain barrels, with a minimum storage capacity of 1000 liters. Roof barrels serve several purposes including mitigating the first flush from the roof which has a high volume, amount of contaminants, and thermal load. Several types of rain barrels are commercially available. Consideration must be given to selecting rain barrels that are vector proof and childproof. In addition, some barrels are designed with a bypass valve that filters out grit and other contaminants and routes overflow to a soak-away pit or rain garden.

If the cistern has an operable valve, the valve can be closed to store stormwater for irrigation or infiltration between storms. This system requires continual monitoring by the resident or grounds crews, but provides greater flexibility in water storage and metering. If a cistern is provided with an operable valve and water is stored inside for long periods, the cistern must be covered to prevent mosquitoes from breeding.

A cistern system with a permanently open outlet can also provide for metering stormwater runoff. If the cistern outlet is significantly smaller than the size of the downspout inlet (say ¼ to ½ inch diameter), runoff will build up inside the cistern during storms, and will empty out slowly after peak intensities subside. This is a feasible way to mitigate the peak flow increases caused by rooftop impervious land coverage, especially for the frequent, small storms.

Dry wells and Infiltration Trenches

Roof downspouts can be directed to dry wells or infiltration trenches. A dry well is constructed by excavating a hole in the ground and filling it with an open graded aggregate, and allowing the water to fill the dry well and infiltrate after the storm event. An underground connection from the downspout conveys water into the dry well, allowing it to be stored in the voids. To minimize sedimentation from lateral soil movement, the sides and top of the stone storage matrix can be wrapped in a permeable filter fabric, though the bottom may remain open. A perforated observation pipe can be inserted vertically into the dry well to allow for inspection and maintenance.

In practice, dry wells receiving runoff from single roof downspouts have been successful over long periods because they contain very little sediment. They must be sized according to the amount of rooftop runoff received, but are typically 4 to 5 feet square, and 2 to 3 feet deep, with a minimum of 1-foot soil cover over the top (maximum depth of 10 feet).

To protect the foundation, dry wells must be set away from the building at least 10 feet. They must be installed in solids that accommodate infiltration. In poorly drained soils, dry wells have very limited feasibility.

Infiltration trenches function in a similar manner and would be particularly effective for larger roof areas. An infiltration trench is a long, narrow, rock-filled trench with no outlet that receives stormwater runoff. These are described under Treatment Controls.

Pop-up Drainage Emitter

Roof downspouts can be directed to an underground pipe that daylights some distance from the building foundation, releasing the roof runoff through a pop-up emitter. Similar to a pop-up irrigation head, the emitter only opens when there is flow from the roof. The emitter remains flush to the ground during dry periods, for ease of lawn or landscape maintenance.

Foundation Planting

Landscape planting can be provided around the base to allow increased opportunities for stormwater infiltration and protect the soil from erosion caused by concentrated sheet flow coming off the roof. Foundation plantings can reduce the physical impact of water on the soil and provide a subsurface matrix of roots that encourage infiltration. These plantings must be sturdy enough to tolerate the heavy runoff sheet flows, and periodic soil saturation.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Supplemental Information

Examples

- City of Ottawa's Water Links Surface –Water Quality Protection Program
- City of Toronto Downspout Disconnection Program
- City of Boston, MA, Rain Barrel Demonstration Program

Other Resources

Hager, Marty Catherine, Stormwater, "Low-Impact Development", January/February 2003. www.stormh2o.com

Low Impact Urban Design Tools, Low Impact Development Design Center, Beltsville, MD. www.lid-stormwater.net

Start at the Source, Bay Area Stormwater Management Agencies Association, 1999 Edition

Efficient Irrigation SD-12

Design Objectives

- ☑ Maximize Infiltration
- ☑ Provide Retention
- ☑ Slow Runoff
- Minimize Impervious Land Coverage
- Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Irrigation water provided to landscaped areas may result in excess irrigation water being conveyed into stormwater drainage systems.

Approach

Project plan designs for development and redevelopment should include application methods of irrigation water that minimize runoff of excess irrigation water into the stormwater conveyance system.

Suitable Applications

Appropriate applications include residential, commercial and industrial areas planned for development or redevelopment. (Detached residential single-family homes are typically excluded from this requirement.)

Design Considerations

Designing New Installations

The following methods to reduce excessive irrigation runoff should be considered, and incorporated and implemented where determined applicable and feasible by the Permittee:

- Employ rain-triggered shutoff devices to prevent irrigation after precipitation.
- Design irrigation systems to each landscape area's specific water requirements.
- Include design featuring flow reducers or shutoff valves triggered by a pressure drop to control water loss in the event of broken sprinkler heads or lines.
- Implement landscape plans consistent with County or City water conservation resolutions, which may include provision of water sensors, programmable irrigation times (for short cycles), etc.

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- Design timing and application methods of irrigation water to minimize the runoff of excess irrigation water into the storm water drainage system.
- Group plants with similar water requirements in order to reduce excess irrigation runoff and promote surface filtration. Choose plants with low irrigation requirements (for example, native or drought tolerant species). Consider design features such as:
  - Using mulches (such as wood chips or bar) in planter areas without ground cover to minimize sediment in runoff
  - Installing appropriate plant materials for the location, in accordance with amount of sunlight and climate, and use native plant materials where possible and/or as recommended by the landscape architect
  - Leaving a vegetative barrier along the property boundary and interior watercourses, to act as a pollutant filter, where appropriate and feasible
  - Choosing plants that minimize or eliminate the use of fertilizer or pesticides to sustain growth
- Employ other comparable, equally effective methods to reduce irrigation water runoff.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. The definition of " redevelopment" must be consulted to determine whether or not the requirements for new development apply to areas intended for redevelopment. If the definition applies, the steps outlined under "designing new installations" above should be followed.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

Storm Drain Signage SD-13

Design Objectives

- Maximize Infiltration
- Provide Retention
- Slow Runoff
- Minimize Impervious Land Coverage
- ☑ Prohibit Dumping of Improper Materials
- Contain Pollutants
- Collect and Convey

Description

Waste materials dumped into storm drain inlets can have severe impacts on receiving and ground waters. Posting notices regarding discharge prohibitions at storm drain inlets can prevent waste dumping. Storm drain signs and stencils are highly visible source controls that are typically placed directly adjacent to storm drain inlets.

Approach

The stencil or affixed sign contains a brief statement that prohibits dumping of improper materials into the urban runoff conveyance system. Storm drain messages have become a popular method of alerting the public about the effects of and the prohibitions against waste disposal.

Suitable Applications

Stencils and signs alert the public to the destination of pollutants discharged to the storm drain. Signs are appropriate in residential, commercial, and industrial areas, as well as any other area where contributions or dumping to storm drains is likely.

Design Considerations

Storm drain message markers or placards are recommended at all storm drain inlets within the boundary of a development project. The marker should be placed in clear sight facing toward anyone approaching the inlet from either side. All storm drain inlet locations should be identified on the development site map.

Designing New Installations

The following methods should be considered for inclusion in the project design and show on project plans:

- Provide stenciling or labeling of all storm drain inlets and catch basins, constructed or modified, within the project area with prohibitive language. Examples include "NO DUMPING

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– DRAINS TO OCEAN" and/or other graphical icons to discourage illegal dumping.

- Post signs with prohibitive language and/or graphical icons, which prohibit illegal dumping at public access points along channels and creeks within the project area.

Note - Some local agencies have approved specific signage and/or storm drain message placards for use. Consult local agency stormwater staff to determine specific requirements for placard types and methods of application.

Redeveloping Existing Installations

Various jurisdictional stormwater management and mitigation plans (SUSMP, WQMP, etc.) define "redevelopment" in terms of amounts of additional impervious area, increases in gross floor area and/or exterior construction, and land disturbing activities with structural or impervious surfaces. If the project meets the definition of "redevelopment", then the requirements stated under " designing new installations" above should be included in all project design plans.

Additional Information

Maintenance Considerations

- Legibility of markers and signs should be maintained. If required by the agency with jurisdiction over the project, the owner/operator or homeowner's association should enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards or signs.

Placement

- Signage on top of curbs tends to weather and fade.
- Signage on face of curbs tends to be worn by contact with vehicle tires and sweeper brooms.

Supplemental Information

Examples

- Most MS4 programs have storm drain signage programs. Some MS4 programs will provide stencils, or arrange for volunteers to stencil storm drains as part of their outreach program.

Other Resources

A Manual for the Standard Urban Stormwater Mitigation Plan (SUSMP), Los Angeles County Department of Public Works, May 2002.

Model Standard Urban Storm Water Mitigation Plan (SUSMP) for San Diego County, Port of San Diego, and Cities in San Diego County, February 14, 2002.

Model Water Quality Management Plan (WQMP) for County of Orange, Orange County Flood Control District, and the Incorporated Cities of Orange County, Draft February 2003.

Ventura Countywide Technical Guidance Manual for Stormwater Quality Control Measures, July 2002.

S-1: Storm Drain Message and Signage

Purpose

Waste material dumped into storm drain inlets can adversely impact surface and ground waters. In fact, any material discharged into the storm drain system has the potential to significantly impact downstream receiving waters. Storm drain messages have become a popular method of alerting and reminding the public about the effects of and the prohibitions against waste disposal into the storm drain system. The signs are typically stenciled or affixed near the storm drain inlet or catch basin. The message simply informs the public that dumping of wastes into storm drain inlets is prohibited and/or that the drain ultimately discharges into receiving waters.

General Guidance

- The signs must be placed so they are easily visible to the public.
- Be aware that signs placed on sidewalk will be worn by foot traffic.

Design Specifications

- Signs with language and/or graphical icons that prohibit illegal dumping, must be posted at designated public access points along channels and streams within the project area. Consult with Los Angeles County Department of Public Works (LACDPW) staff to determine specific signage requirements for channels and streams.
- Storm drain message markers, placards, concrete stamps, or stenciled language/icons (e.g., “No Dumping – Drains to the Ocean”) are required at all storm drain inlets and catch basins within the project area to discourage illegal or inadvertent dumping. Signs should be placed in clear sight facing anyone approaching the storm drain inlet or catch basin from either side (see Figure D-1 and Figure D-2). LACDPW staff should be contacted to determine specific requirements for types of signs and methods of application. A stencil can be purchased for a nominal fee from LACDPW Building and Safety Office by calling (626) 458-3171. All storm drain inlet and catch basin locations must be identified on the project site map.

Maintenance Requirements

Legibility and visibility of markers and signs should be maintained (e.g., signs should be repainted or replaced as necessary). If required by LACDPW, the owner/operator or homeowner’s association shall enter into a maintenance agreement with the agency or record a deed restriction upon the property title to maintain the legibility of placards and signs.

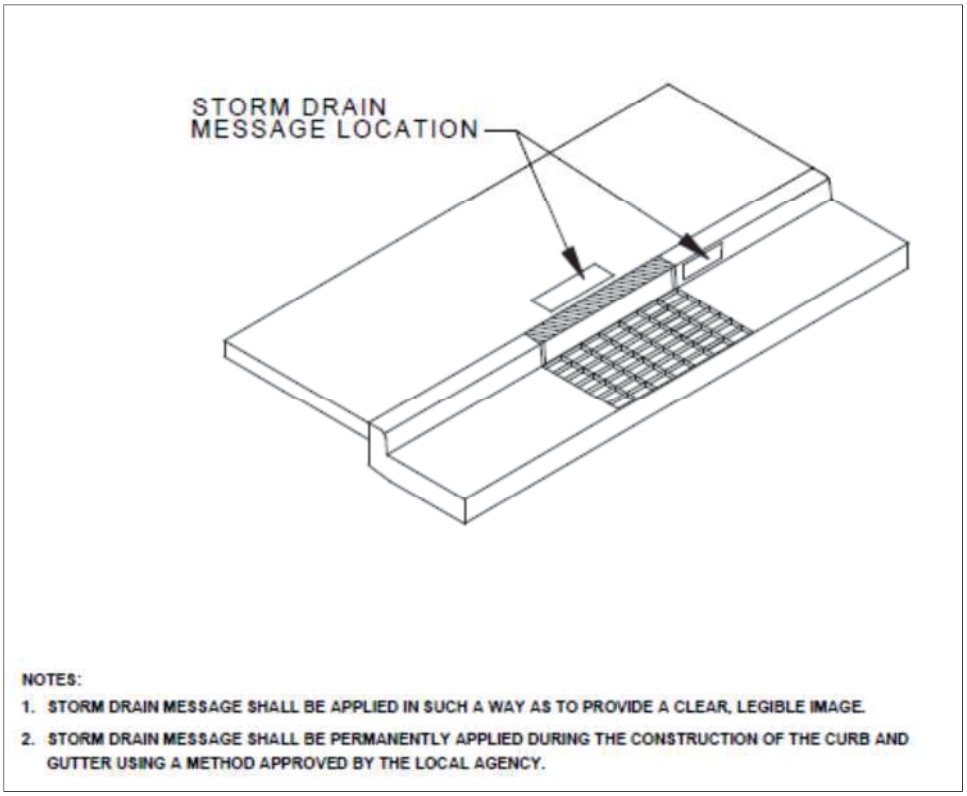


Figure D-1. Storm Drain Message Location – Curb Type Inlet

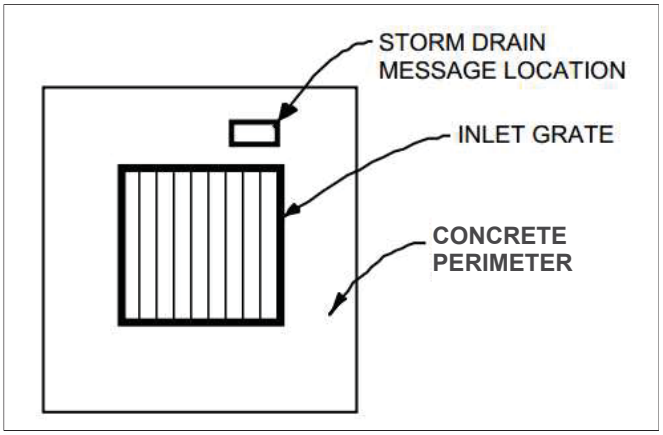


Figure D-2. Storm Drain Message Location – Catch Basin/Area Type Inlet

S-8: Landscape Irrigation Practices

Purpose

Irrigation runoff provides a pathway for pollutants (i.e., nutrients, bacteria, organics, sediment) to enter the storm drain system. By effectively irrigating, less runoff is produced resulting in less potential for pollutants to enter the storm drain system.

General Guidance

- Do not allow irrigation runoff from the landscaped area to drain directly to storm drain system.
- Minimize use of fertilizer, pesticides, and herbicides on landscaped areas.
- Plan sites with sufficient landscaped area and dispersal capacity (e.g., ability to receive irrigation water without generating runoff).
- Consult a landscape professional regarding appropriate plants, fertilizer, mulching applications, and irrigation requirements (if any) to ensure healthy vegetation growth.

Design Specifications

- Choose plants that minimize the need for fertilizer and pesticides.
- Group plants with similar water requirements and water accordingly.
- Use mulch to minimize evaporation and erosion.
- Include a vegetative boundary around project site to act as a filter.
- Design the irrigation system to only water areas that need it.
- Install an approved subsurface drip, pop-up, or other irrigation system.[1] The irrigation system should employ effective energy dissipation and uniform flow spreading methods to prevent erosion and facilitate efficient dispersion.
- Install rain sensors to shut off the irrigation system during and after storm events.
- Include pressure sensors to shut off flow-through system in case of sudden pressure drop. A sudden pressure drop may indicate a broken irrigation head or water line.
- If the hydraulic conductivity in the soil is not sufficient for the necessary water application rate, implement soil amendments to avoid potential geotechnical hazards (i.e., liquefaction, landslide, collapsible soils, and expansive soils).

[1] If alternative distribution systems (e.g., spray irrigation) are approved, the County will establish guidelines to implement these new systems.

- For sites located on or within 50 feet of a steep slope (15% or greater), do not irrigate landscape within three days of a storm event to avoid potential geotechnical instability.[2]
- Implement Integrated Pest Management practices.

For additional guidelines and requirements, refer to the Los Angeles County Department of Health Services.

Maintenance Requirements

Maintain irrigation areas to remove trash and debris and loose vegetation. Rehabilitate areas of bare soil. If a rain or pressure sensor is installed, it should be checked periodically to ensure proper function. Inspect and maintain irrigation equipment and components to ensure proper functionality. Clean equipment as necessary to prevent algae growth and vector breeding. Maintenance agreements between LACDPW and the owner/operator may be required. Failure to properly maintain building and property may subject the property owner to citation.

[2] As determined by the City of Los Angeles, Building and Safety Division

S-9: Building Materials Selection

Purpose

Building materials can potentially contribute pollutants of concern to stormwater runoff through leaching. For example, metal buildings, roofing, and fencing materials may be significant sources of metals in stormwater runoff, especially due to acidic precipitation. The use of alternative building materials can reduce pollutant sources in stormwater runoff by eliminating compounds that can leach into stormwater runoff. Alternative building materials may also reduce the need to perform maintenance activities (i.e., painting) that involve pollutants of concern, and may reduce the volume of stormwater runoff. Alternative materials are available to replace lumber and paving.

Design Specifications

Lumber

Decks and other house components constructed using pressure-treated wood that is typically treated using arsenate, copper, and chromium compounds are hazardous to the environment. Pressure-treated wood may be replaced with cement-fiber or vinyl.

Roofs, Fencing, and Metals

Minimizing the use of copper and galvanized (zinc-coated) metals on buildings and fencing can reduce leaching of these pollutants into stormwater runoff. The following building materials are conventionally made of galvanized metals:

- Metal roofs;
- Chain-link fencing and siding; and
- Metal downspouts, vents, flashing, and trim on roofs.

Architectural use of copper for roofs and gutters should be avoided. As an alternative to copper and galvanized materials, coated metal products are available for both roofing and gutter application. Vinyl-coated fencing is an alternative to traditional galvanized chain-link fences. These products eliminate contact of bare metal with precipitation or stormwater runoff, and reduce the potential for stormwater runoff contamination. Roofing materials are also made of recycled rubber and plastic.

Green roofs may be an option. Green roofs use vegetation such as grasses and other plants as an exterior surface. The plants reduce the velocity of stormwater runoff and absorb water to reduce the volume of stormwater runoff. One potential problem with using green roofs in the Los Angeles County area is the long, hot and dry summers, which may kill the plants if they are not watered. See the Green Roof Fact Sheet (RET-7) in Appendix E.

Pesticides

The use of pesticides around foundations can be reduced through the use of alternative barriers. Sand barriers can be applied around foundations to deter termites, as they cannot tunnel through sand. Metal shields also block termites from tunneling. Additionally, diatomaceous earth can be used to repel or kill a wide variety of other pests.

Maintenance Requirements

The integrity of structural elements that are subject to damage (e.g., signs) must be maintained by the owner/operator as required by local codes and ordinances. Maintenance agreements between LACDPW and the owner/operator may be required. Failure to properly maintain building and property may subject the property owner to citation.

RET-4: Dry Well

Description

A dry well is a bored, drilled, or driven shaft or hole whose depth is greater than its width. A dry well may either be a small excavated pit filled with aggregate or a prefabricated storage chamber or pipe segment. Dry well design and function are similar to infiltration trenches in that they are designed to temporarily store and subsequently infiltrate stormwater runoff. In particular, dry wells can be used to reduce the volume of stormwater runoff from building roofs. While generally not a significant source of stormwater runoff pollution, roofs are one of the most important sources of new or increased stormwater runoff volume from land development sites. Dry wells can be used to indirectly enhance water quality by reducing the volume of stormwater runoff to be treated by other downstream stormwater quality control measures.

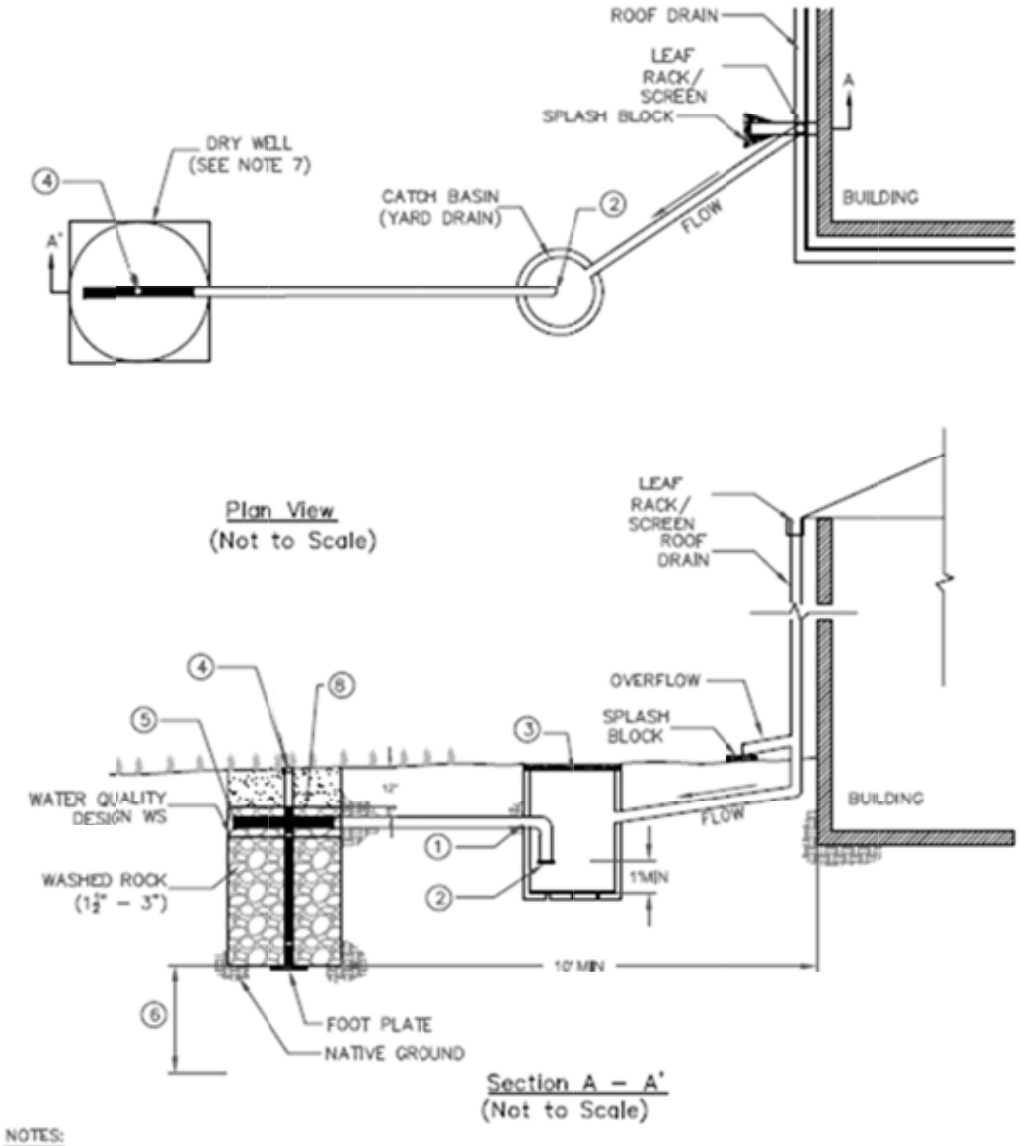
A schematic of a typical dry well is presented in Figure E-4.

LID Ordinance Requirements

Dry wells can be used to meet the on-site retention requirements of the LID Ordinance. Dry wells will prevent pollutants in the SWQDv from being discharged off-site.

Advantages

- Requires minimal space to install
- Low installation costs
- Provide groundwater recharge
- Reduces peak stormwater runoff flows during small storm events



NOTES:

① MINIMUM 4" – 6" DIAMETER PVC PIPE. INSTALL AT FLAT SLOPE.

② INSTALL FINE MESH SCREEN AT INLET TO DRY WELL. SET INLET ELEVATION AT 1' MINIMUM ABOVE CATCH BASIN BOTTOM.

③ CATCH BASIN (YARD DRAIN) INSTALLED WITH A SOLID LID FLUSH WITH GROUND SURFACE.

④ 4–6" VERTICAL PERFORATED PVC INSPECTION WELL WITH SCREW LID (NUT DOWN) FLUSH WITH GROUND SURFACE.

⑤ CAP END OF 4–6" HORZONTAL PERFORATED PVC DISPERSION PIPE.

⑥ MINIMUM 10' ABOVE SEASONAL HIGH GROUNDWATER TABLE AND 3' ABOVE BEDROCK.

⑦ DRY WELL CONFIGURATION MAY VARY (E.G. PRE-FAB MAY BE CIRCULAR).

⑧ CHOKING STONE LAYER SHALL BE PLACED ON TOP OF THE DRY WELL TO SEPARATE IT FROM THE TOPSOIL AND PREVENT CLOGGING.

Figure E-4. Dry Well Schematic

Disadvantages

- Is not appropriate for areas with low permeability soils or high groundwater levels
- May not be appropriate for industrial sites or locations with contaminated soils or where spills may occur because of the potential threat to groundwater contamination
- Cannot receive untreated stormwater runoff except from rooftops
- Requires complete reconstruction for failed dry wells
- Is not suitable for fill sites or on steep slopes

General Constraints and Implementation Considerations

- Dry wells can be integrated into open space buffers and other landscape areas.
- The potential for groundwater contamination must be carefully considered,. Dry wells are not suitable for sites that:
    - Use or store chemicals or hazardous materials, unless they are prevented from entering the well; or
    - Un-remediated “brownfield sites” where there is known groundwater or soil contamination
- Dry wells should be sited away from tree drip lines and kept free of vegetation.
- If the corrected in-situ infiltration rate exceed 2.4 in/hr, then stormwater runoff may need to be fully-treated with an upstream stormwater quality control measure prior to infiltration to protect groundwater quality.
- Dry wells cannot be located on sites with a slope greater than 20 percent (5:1).
- Pretreatment to remove sediment is required to protect dry wells from high sediment loads.
- If a yard drain is proposed as part of the design, it must be designed so that any standing water in the catch basin will infiltrate within 96 hours.
- If possible, the entire tributary area of the dry well should be stabilized before construction begins. If this is not possible, all flows should be diverted around the dry well to protect it from sediment loads during construction or the top two inches of soil from the dry well bottom should be removed after the site has been stabilized. Excavated material should be stored such that it cannot be washed back into the dry well if a storm occurs during construction.
- The equipment used to construct the dry well should have extra wide low-pressure tires. Construction traffic should not enter the dry well because it can compact soil, which reduces infiltration capacity. If heavy equipment is used on the base of the dry well, the infiltrative capacity may be restored by tilling or aerating prior to placing the infiltrative bed.

- Clean, washed gravel should be placed in the excavated dry well in lifts and lightly compacted with a plate compactor. Use of unwashed gravel can result in clogging.
- A geomembrane liner should be installed generously with overlapping seams on sides, bottom, and one foot below the surface of the dry well.
- Once construction is complete, stabilize the entire tributary area to the dry well before allowing stormwater runoff to enter it.
- An observation well must be installed to check water levels, retention time, and evidence of clogging.
- Accessibility for maintenance during dry and wet weather conditions must be provided.

Design Specifications

The following sections provide design specifications for dry wells.

Geotechnical

Due to the potential to contaminate groundwater, cause slope instability, impact surrounding structures, and potential for insufficient infiltration capacity, an extensive geotechnical site investigation must be conducted during the site planning process to verify site suitability for a dry well. All geotechnical investigations must be performed according to the most recent GMED Policy GS 200.1. Soil infiltration rates and the groundwater table depth must be evaluated to ensure that conditions are satisfactory for proper operation of a dry well. The project applicant must demonstrate through infiltration testing, soil logs, and the written opinion of a licensed civil engineer that sufficiently permeable soils exist on-site to allow the construction of a properly functioning dry well.

Dry wells are appropriate for soils with a minimum corrected in-situ infiltration rate of 0.3 in/hr. The geotechnical report must determine if the proposed project site is suitable for a dry well and must recommend a design infiltration rate (see “Design Infiltration Rate” under the “Sizing” section). The geotechnical investigation should be such that a good understanding is gained as to how the stormwater runoff will move through the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water.

Pretreatment

Pretreatment is important for all structural stormwater quality control measures, but it is particularly important for retention facilities. Pretreatment refers to design features that provide settling of large particles before stormwater runoff enters a stormwater quality control measure in order to reduce the long-term maintenance burden. Pretreatment should be provided to reduce the sediment load entering a dry well in order to maintain the infiltration rate of the dry well. To ensure that dry wells are effective, the project applicant must incorporate pretreatment devices that provide sediment reduction (e.g.,

vegetated swales, vegetated filter strips, sedimentation manholes, and proprietary devices).

Setbacks

Dry wells must be sited following the setbacks from the most recent GMED Policy GS 200.1.

Geometry

- Dry well configurations vary, but generally have length and width top dimensions close to a square. Prefabricated dry wells are often circular.
- The filter bed media layers must have the following composition and thickness, unless they are prefabricated dry wells:
    - Top layer: 2 inches of pea gravel
    - Middle layer: 3 to 5 feet of washed 2- to 6-inch gravel; void spaces should be approximately 30 to 40 percent
    - Bottom layer: 6 inches of sand or geomembrane liner equivalent.
- Gravel media and prefabricated dry wells have porosities of 30 to 40 percent and 80 to 95 percent, respectively.
- If a dry well receives stormwater runoff from an underground pipe (i.e., stormwater runoff does not enter the top of the dry well from the ground surface), a fine mesh screen should be installed at the inlet. The inlet elevation should be 18 inches below the ground surface (i.e., below 12 inches of surface soil and 6 inches of dry well media).

Sizing

Dry wells are sized using a simple sizing method where the SWQDv must be completely infiltrated within 96 hours. Dry wells provide stormwater runoff storage in the voids of the rock fill.

Step 1: Determine the SWQDv

Dry wells must be designed to capture and retain the SWQDv (see Section 6 for SWQDv calculation procedures).

Step 2: Determine the design infiltration rate

Determine the corrected in-situ infiltration rate (f_{design}) of the native soil using the procedures described in the most recent GMED Policy GS 200.1.

Step 3: Calculate the surface area

Determine the required size of the infiltration surface by assuming the SWQDv will fill the available void spaces of the gravel storage layer. The maximum depth of stormwater runoff that can be infiltrated within the maximum retention time (96 hrs) is calculated using the following equation:

$$d_{max} = \frac{f_{design}}{12} \times t$$

Where:

d_{max} = Maximum depth of water that can be infiltrated within the required drawdown time [ft];
f_{design} = Design infiltration rate [in/hr]; and
t = Maximum retention time (max 96 hrs) [hr].

Select the dry well depth (d_t) such that:

$$d_t \leq \frac{d_{max}}{n_t}$$

Where:

d_t = Depth of dry well fill [ft];
d_{max} = Maximum depth of water that can be infiltrated within the maximum retention time [ft]; and
n_t = Dry well fill porosity.

Calculate the infiltrating surface area (bottom of the dry well) required:

$$A = \frac{SWQDv}{d_t \times n_t}$$

Where:

A = Surface area of the bottom of the dry well [ft^2];
SWQDv = Stormwater quality design volume [ft^3]; and
d_t = Depth of dry well fill [ft]; and
n_t = Dry well fill porosity.

Flow Entrance and Energy Dissipation

Energy dissipation controls, constructed of sound materials such as stones, concrete, or proprietary devices that are rated to withstand the energy of the influent flow, must be installed at the inlet to the dry well. Consult with LACDPW for the type and design of energy dissipation structure.

Drainage

The specifications for designing drainage systems for dry wells are presented below:

- The bottom of dry well must be native soil that is over-excavated at least one foot in depth with the soil replaced uniformly without compaction. Amending the excavated soil with two to four inches (~15 to 30 percent) of coarse sand is recommended.
- The use of vertical piping, either for distribution or infiltration enhancement, is prohibited. This application may be classified as a Class V Injection Well per 40 CFR Part 146.5(e)(4).
- The infiltration capacity of the subsurface layers should be sufficient to ensure a maximum retention time of 96 hours. An observation well must be installed to allow observation of retention time.

Hydraulic Restriction Layer

The entire infiltrative area, including the side walls must lined with a geomembrane liner to prevent soil from migrating into the top layer and reducing storage capacity. The specifications of the geomembrane liner are presented in Table E-7. The entire well area, including the sides, must be lined with a geomembrane liner prior to placing the media bed. Provide generous overlap at the seams.

Table E-7. Geomembrane Liner Specifications for Dry Wells

Parameter	Test Method	Specifications
Material		Nonwoven geomembrane liner
Unit weight		8 oz/yd^3 (minimum)
Filtration rate		0.08 in/sec (minimum)
Puncture strength	ASTM D-751 (Modified)	125 lbs (minimum)
Mullen burst strength	ASTM D-751	400 lb/in^2 (minimum)
Tensile strength	AST D-1682	300 lbs (minimum)
Equiv. opening size	US Standard Sieve	No. 80 (minimum)

Observation Well

The observation well is a vertical section of perforated PVC pipe, four- to six-inch diameter, installed flush with the top of the dry well on a footplate and with a locking, removable cap. The observation well is needed to monitor the infiltration rate in dry well and is useful for marking the location of the dry well.

Vegetation

- Dry wells must be kept free of vegetation.

- Trees and other large vegetation should be planted away from dry well such that drip lines do not overhang the infiltration area.

Restricted Construction Materials

Use of pressure-treated wood or galvanized metal at or around a dry well is prohibited.

Maintenance Access

The dry well must be safely accessible during wet and dry weather conditions if it is publicly-maintained. If the dry well becomes plugged and fails, access is needed to excavate the dry well and replace the filter bed media. To prevent damage and compaction, access must able to accommodate a backhoe working at "arm's length" from the dry well.

Maintenance Requirements

Maintenance and regular inspections are important for proper function of dry wells. The following are general maintenance requirements:

- Conduct regular inspection and routine maintenance for pretreatment devices.
- Inspect dry well and its observation well frequently to ensure that water infiltrates into the subsurface completely within maximum retention time of 96 hours. If water is present in the observation well more than 96 hours after a major storm, the dry well may be clogged. Maintenance activities triggered by a potentially clogged facility include:
    - Check for debris/sediment accumulation and remove sediment (if any) and evaluate potential sources of sediment and vegetative or other debris (e.g., embankment erosion, channel scour, overhanging trees, etc). If suspected upstream sources are outside of the County's jurisdiction, additional pretreatment operations (e.g., trash racks, vegetated swales, etc.) may be necessary.
    - Assess the condition of the top aggregate layer for sediment buildup and crusting. Remove the top layer of pea gravel and replace. If slow draining conditions persist, the entire dry well may need to be excavated and replaced.
- Eliminate standing water to prevent vector breeding.
- Remove and dispose of trash and debris as needed, but at least prior to the beginning of the wet season.

A summary of potential problems that may need to be addressed by maintenance activities is presented in Table E-8.

The County requires execution of a maintenance agreement to be recorded by the property owner for the on-going maintenance of any privately-maintained stormwater

quality control measures. The property owner is responsible for compliance with the maintenance agreement. A sample maintenance agreement is presented in Appendix H.

Table E-8. Dry Well Troubleshooting Summary

Problem	Conditions When Maintenance Is Needed	Maintenance Required
Trash and Debris	Trash and debris > 5 ft^3/1,000 ft^2	Remove and dispose of trash and debris.
Contaminants and Pollution	Any evidence of oil, gasoline, contaminants, or other pollutants	Remove any evidence of visual contamination.
Erosion/Sediment Accumulation	Undercut or eroded areas at inlet structures	Repair eroded areas and re-grade if necessary.
	Accumulation of sediment, debris, and oil/grease in pretreatment devices	Remove sediment, debris, and/or oil/grease.
	Accumulation of sediment, debris, and oil/grease on surface or inlet	Remove sediment, debris, and/or oil/grease.
Water Drainage Rate	Standing water, or by inspection of observation wells	Remove the top layer of the dry well bottom and replace if necessary.

Appendix C:
Drywell System Information and Sizing

VTTM No. 83705
8601 Mission Drive, Rosemead, CA

Drywell Calculations

- Infiltration Rate was determined by project's geotechnical engineer. The Site is located within Soil Type 6 per LA County Hydrology Maps. The average measured Infiltration Rate of site soils was calculated as 17.0-inches per hour per the Geotechnical Investigation Results prepared by Albus & Associates, Inc. A factor of safety of 2 was applied to the assumed measured rate for a design infiltration rate (K_{DESIGN}) = 8.5 in/hr
- All Drywell Systems have been located at least 10' from building foundations.
- The volume statically held within the drywell system includes the volume held by the gravel drywell (void ratio = 0.35) and the volume held by the 10' sumps below the inlet pipes to the Primary Chamber and the Settling Chamber. Upstream Detention Pipe storage will be provided for the required amount of volume not statically held within each drywell system. Refer to the drywell details on the following pages for more information.
- Historic high depth of groundwater is 60' below existing ground surface. However, per nearby groundwater wells indicate that groundwater is at a depth of 231' below ground surface. Groundwater was not encountered at a depth of 51.5' below ground surface during the Geotechnical Investigation conducted by Albus & Associates, Inc.
- 48-hour Drawdown timeframe utilized

DMA A1

A = 3.38 ac
DCV = 8,630 cf
Maxwell Plus Drywell System with the following properties:

- 25' depth* Primary Chamber at 4' diameter (10' static storage depth)
- 25' depth* Settling Chamber at 4' diameter (10' static storage depth)
- 20' Drywell at 6' diameter
- Inlet pipe at invert 15' below FS
- $d_{drywell\ infiltration}$= (dsettling-$d_{slurry}$) + $d_{drywell}$
  = (25' – 13') + (20') = 32'
- Total Depth (overall depth) = $d_{settling}$ + $d_{drywell}$
  = 25' + 20' = 45'

Storage Calculations

$V_{SETTLING}$ *= $\pi r^2(d_{static\ settling}) = \pi(2\ ft)^2(10\ ft) = 126$ cf
$V_{PRIMARY}$ *= $\pi r^2(d_{static\ primary}) = \pi(2\ ft))^2(10\ ft) = 126$ cf
$V_{DRYWELL} = \pi r^2(d_{drywell\ infiltration})(n) = \pi(3\ ft)^2(25\ ft)(0.35) = 198$ cf
where, r = radius (ft), d = depth (ft), n = Void Space (0.35) per manufacturer's specifications
∑Volume = 126 cf + 126 cf + 198 cf = 449 cf

*Only the portion below the inlet pipe for the Primary Chamber and the Settling Chamber was included for static storage calculation of drywell system.

Required Detention Vault Storage = DCV - ∑V = 8,630 cf – 449 cf = 8,180 cf
Provided → 8'x8'x10' BioClean Urbanpond Detention System
Storage Per Module = 596 cf / module
Modules provided = 14 modules

V = (596 cf / module)*(14 modules) = **8,344 cf > 8,180 cf** ✓

Infiltration Calculations

$V_{48\text{-}HR}$ = (1 ft/ 12 in)(K_{DESIGN}, in/hr)(SA, sf)(48 hr), where SA = Infiltrating Surface Area of Drywell

$SA = \pi r^2 + 2\pi(r)(d_{drywell\ infiltration}) = \pi(3\ ft)^2 + 2(\pi)(3\ ft)(32\ ft) = 631.5\ sf$

where, r = radius (ft), $d_{drywell\ infiltration}$ = depth of drywell infiltration zone (ft)

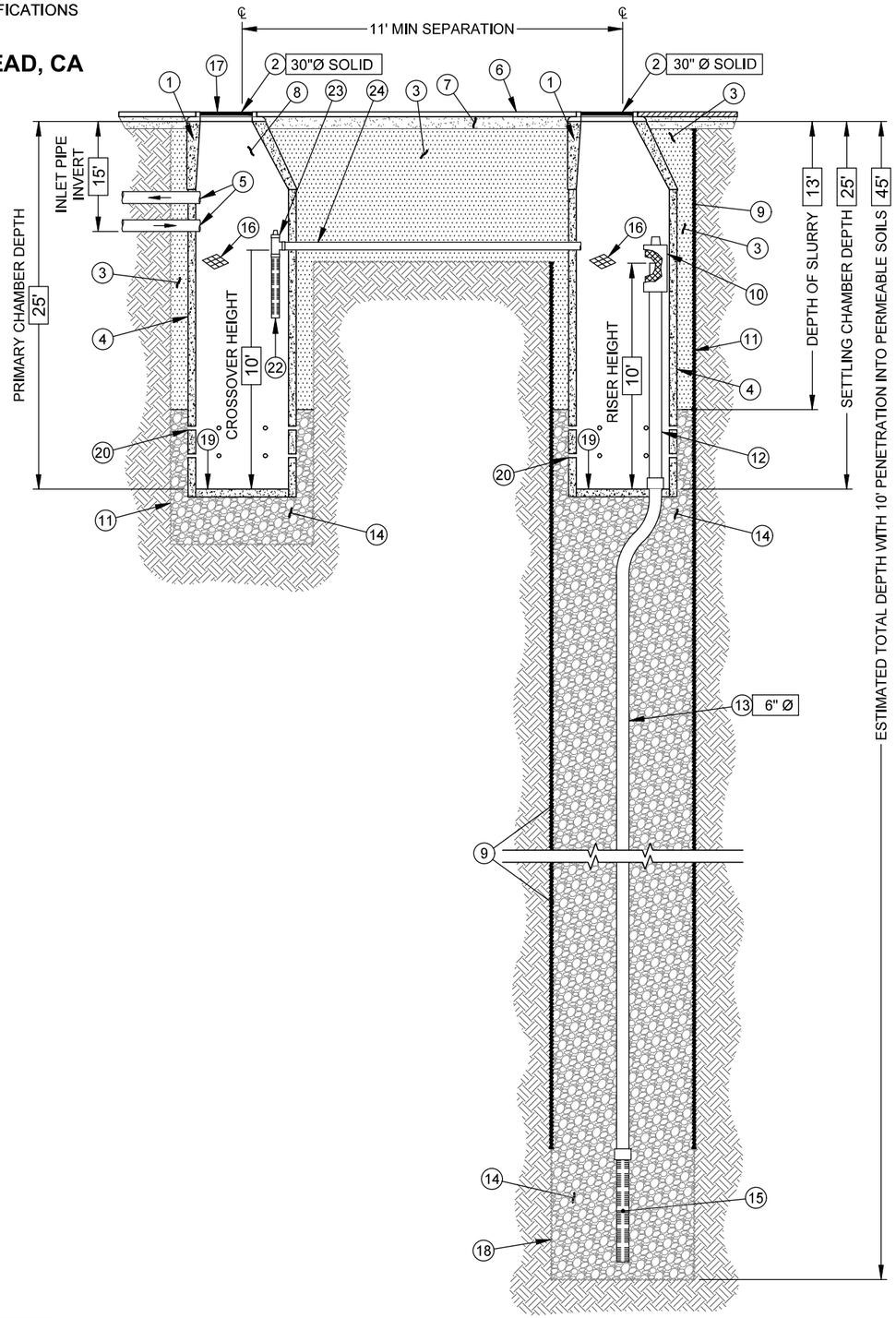
$V_{48\text{-}HR}$ = (1 ft/12 in)(8.5 in/hr)(631.5 sf)(48 hr) = **21,469 cf > DCV = 8,630 cf** ✓

The MaxWell® Plus

DRAINAGE SYSTEM DETAILS AND SPECIFICATIONS

VTTM NO. 83705

8601 MISSION DR., ROSEMEAD, CA



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CA Lic. 886759, C-42, C-57, HAZ.
Also licensed in the following states: MT, NM, NV, OR, TX, UT, and WA.

U.S. Patent No. 4,923,330 - ™ Trademark 1974, 1990, 2004

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 (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. WITH TRI-B COUPLER. 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. **6 PERFORATIONS MINIMUM PER FOOT, 2 ROWS MINIMUM.**
21. NOT USED.
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-CEND CAP.
23. **VENTED ANTI-SIPHON INTAKE WITH FLOW REGULATOR.**
24. **CONNECTOR PIPE** - 4" Ø SCH. 40 PVC.

DETAIL : PL-6-SS-CA	REVISED BY: EMP		
DRAWN ON: 05-23-19	REVISED DATE: 1/21/2022	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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- 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

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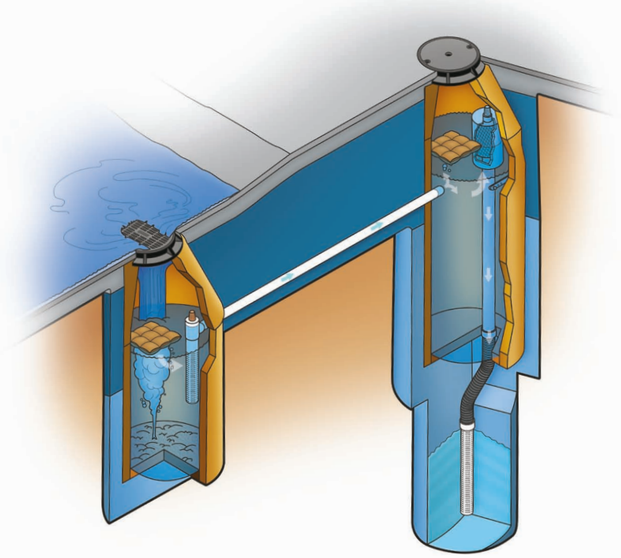
1/12

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.

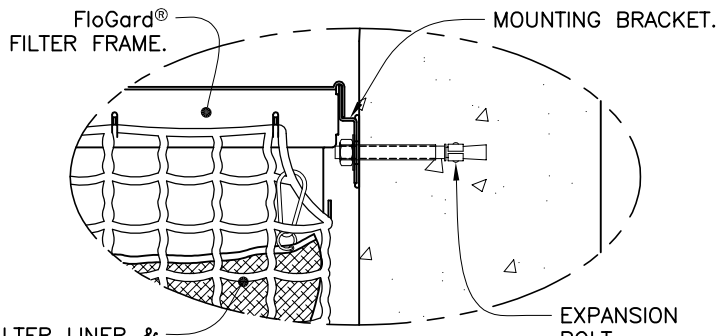
SECURITY FEATURES

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.

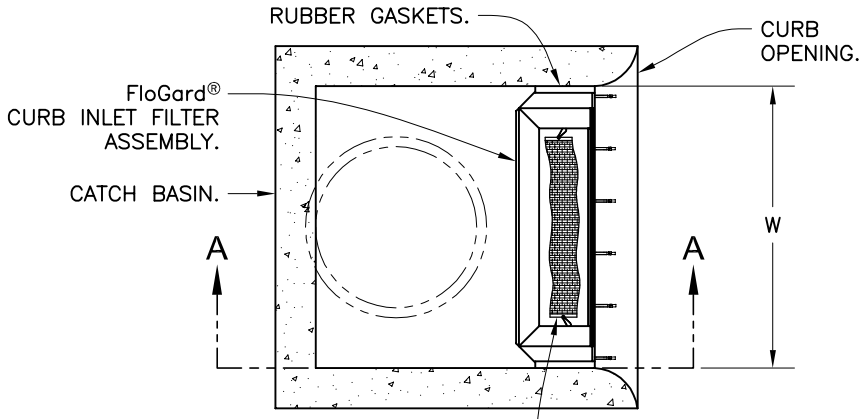
THE MAXWELL FIVE-YEAR WARRANTY

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.

FGP-0002

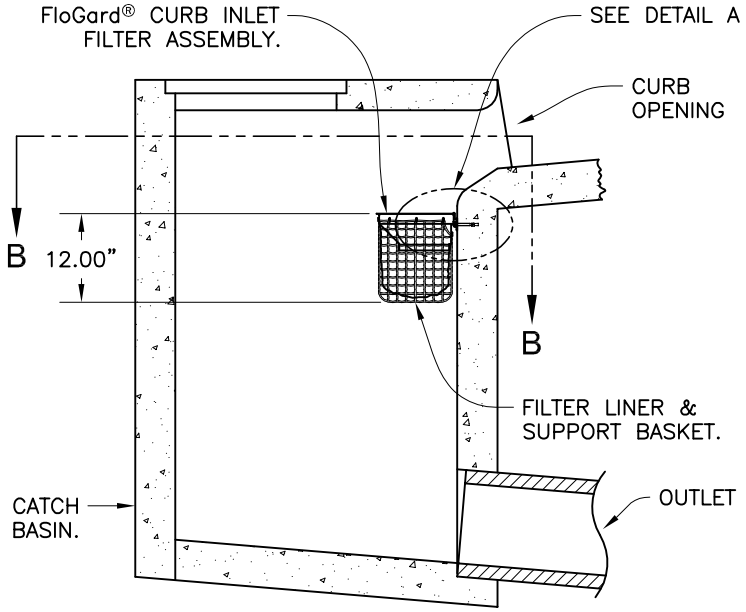


DETAIL A
MOUNTING BRACKET & EXPANSION BOLTS
SEE NOTE 2
SCALE: 6X



SECTION B-B
TOP VIEW
SCALE: 1X

SPECIFIER CHART				
MODEL NO.	Curb Opening Width - W -	Storage Capacity - Cu. Ft. -	Filtered Flow Rate - GPM/CFS -	Bypass Flow Rate - GPM/CFS -
FGP-24CI	2.0' (24")	.95	338 / .75	2,513 / 5.6
FGP-30CI	2.5' (30")	1.20	450 / 1.00	3,008 / 6.7
FGP-36CI	3.0' (36")	1.50	563 / 1.25	3,547 / 7.9
FGP-42CI	3.5' (42")	1.80	675 / 1.50	3,951 / 8.8
FGP-48CI	4.0' (48")	2.10	768 / 1.76	4,445 / 9.9
FGP-5.0CI	5.0' (60")	2.40	900 / 2.00	5,208 / 11.6
FGP-6.0CI	6.0' (72")	3.05	1,126 / 2.51	6,196 / 13.8
FGP-7.0CI	7.0' (84")	3.65	1,350 / 3.01	7,139 / 15.9
FGP-8.0CI	8.0' (96")	4.25	1,576 / 3.51	8,082 / 18.0
FGP-10.0CI	10.0' (120")	4.85	1,800 / 4.01	9,833 / 21.9
FGP-12.0CI	12.0' (144")	6.10	2,252 / 5.02	11,764 / 26.2
FGP-14.0CI	14.0' (168")	7.30	2,700 / 6.02	13,515 / 30.1
FGP-16.0CI	16.0' (192")	8.55	3.152 / 7.02	15,446 / 34.4
FGP-18.0CI	18.0' (216")	9.45	3,490 / 7.78	17,152 / 38.2
FGP-21.0CI	21.0' (252")	10.95	4,050 / 9.02	19,891 / 44.3
FGP-28.0CI	28.0 (336")	14.60	5,400 / 12.03	26,311 / 58.6



SECTION A-A
SIDE VIEW
SCALE: 1X

NOTES:

1. Filter insert shall have a high flow bypass feature.
2. Filter support frame shall be constructed from stainless steel Type 304.
3. Filter medium shall be *Fossil Rock* ™, installed and maintained in accordance with manufacturer specifications.
4. Storage capacity reflects 80% of maximum solids collection prior to impeding filtering bypass.

Inlet
Filtration

FloGard®

Catch Basin Insert Filter

Curb Inlet Style

Oldcastle®
Stormwater Solutions

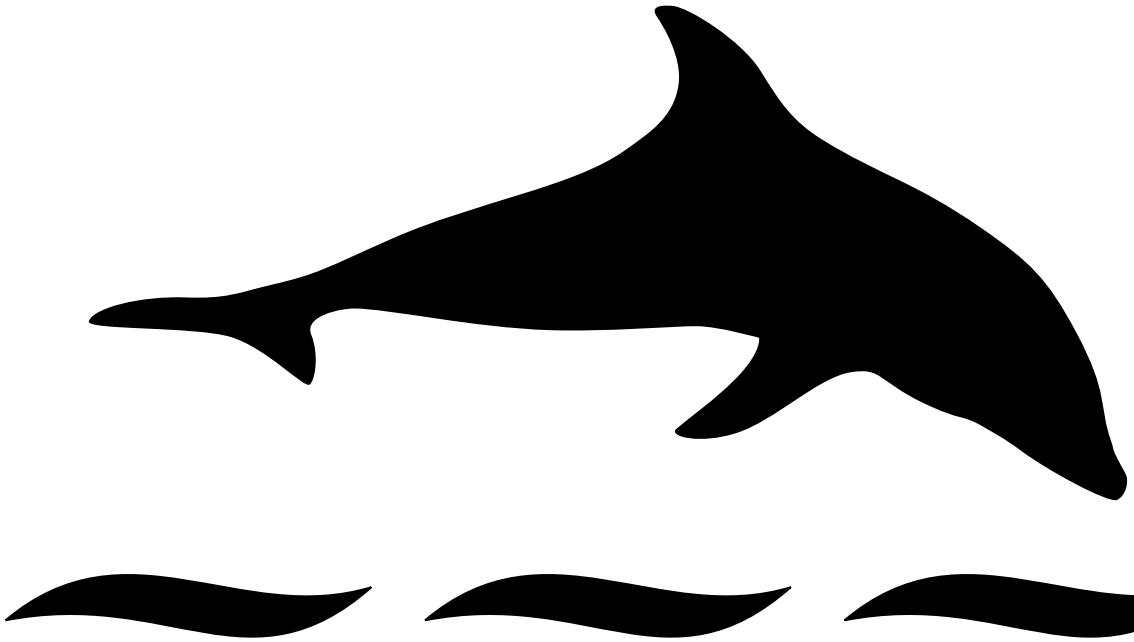
7921 Southpark Plaza, Suite 200 | Littleton, CO | 80120 | Ph: 800.579.8819 | oldcastlestormwater.com

DRAWING NO.	REV	ECO	DATE	
FGP-0002	E	ECO-0127 JPR 5/18/15	JPR 1/3/06	SHEET 1 OF 1

Appendix D:
"NO DUMPING – DRAINS TO OCEAN" Stencil Examples

Sample Stencil 1

NO DUMPING



DRAINS TO OCEAN

Sample Stencil 2

Appendix E:
Catch Basin Cleaning

OPERATION & MAINTENANCE PLAN
FOR FILTER INSERT

The maintenance program will include the following key components:

1. **REGULAR SWEEPING AND REMOVAL OF DEBRIS:**
   Vehicle parking lot will be swept on a regular basis. Sediment and debris (litter, leaves, papers and cans, etc.) within the area, especially around the drainage inlet, will be collected and removed. The frequency of sweeping will be based on the amount of sediment and debris generated.

2. **REGULAR INSPECTIONS:**
   The catch basin, downspout, or trench drain filter insert will be inspected on a regular basis. The frequency of inspection will be based on pollutant loading, amount of debris, leaves, etc., and amount of runoff. At a minimum, there will be three inspections per year.

3. **CONDUCT OF THE VISUAL INSPECTION:**
   a. Broom sweep around the inlet and remove the inlet grate.
   b. Inspect the filter liner for serviceability. If called for, the filter body will be replaced.
   c. Check the condition of the adsorbent pouches and visually check the condition of the enclosed adsorbent. If the surface of the granules is more than 50% coated with a dark gray or black substance, the pouches will be replaced with new ones.
   d. Check for loose or missing nuts (on some models) and gaps between the filter and the inlet wall, which would allow bypass of the filter during low flows.
   e. The filter components will be replaced in the inlet and the grate replaced.

4. **CLEANING OUT THE FILTER INSERT:**
   Regardless of the model of filter insert, the devices must be cleaned out on a recurring basis. The manufacturer recommends at least three cleanings per year – more in high exposure areas. For the Flo-Gard+Plus filters, the filter must be cleaned when the solids level reaches close to the fullel tip.
   a. The Standard Filter, in most cases, can be cleaned out by removing the device from the inlet and dumping the contents into a DOT approved drum for later disposal. If the oil-absorbant pouches need to be changed, the time to change them is immediately after dumping and before the filter is replaced in the inlet.
   b. Because of weight, method of installation and so forth, some filter inserts will be cleaned with the aid of a vactor truck. If necessary, the oil-absorbant pouches will be changed after the pollutants have been removed and as the filter is being returned to service.

5. **MAINTENANCE LOG:**
   Keep a log of all inspections and maintenance performed on the catch basins, trench drains, and filter inserts. Keep this log on-site.

CATCH BASIN MAINTENANCE RECORD

SITE INFORMATION	
Contact:	Phone: ( )
Project Name:	
Address:	
Filter No. & Model:	

SERVICE INFORMATION		
Date of Service:	By:	
☐ Inspection	☐ Clean Debris	☐ Clean Silt/Sediment
☐ Replace Pouch	☐ Replace Rock	☐ Repair/Replace Parts
Comments:		
Approval Signature:		

SITE INFORMATION	
Contact:	Phone: ( )
Project Name:	
Address:	
Filter No. & Model:	

SERVICE INFORMATION		
Date of Service:	By:	
☐ Inspection	☐ Clean Debris	☐ Clean Silt/Sediment
☐ Replace Pouch	☐ Replace Rock	☐ Repair/Replace Parts
Comments:		
Approval Signature:		

CATCH BASIN MAINTENANCE RECORD

SITE INFORMATION		
Contact:	Phone: ( )	
Project Name:		
Address:		
Filter No. & Model:		

SERVICE INFORMATION		
Date of Service:	By:	
☐ Inspection	☐ Clean Debris	☐ Clean Silt/Sediment
☐ Replace Pouch	☐ Replace Rock	☐ Repair/Replace Parts
Comments:		
Approval Signature:		

SITE INFORMATION		
Contact:	Phone: ( )	
Project Name:		
Address:		
Filter No. & Model:		

SERVICE INFORMATION		
Date of Service:	By:	
☐ Inspection	☐ Clean Debris	☐ Clean Silt/Sediment
☐ Replace Pouch	☐ Replace Rock	☐ Repair/Replace Parts
Comments:		
Approval Signature:		

GENERAL SPECIFICATIONS FOR MAINTENANCE OF
FLO-GARD™+PLUS CATCH BASIN INSERT FILTERS

SCOPE:

Federal, State and Local Clean Water Act regulations and those of insurance carriers require that stormwater filtration systems be maintained and serviced on a recurring basis. The intent of the regulations is to ensure that the systems, on a continuing basis, efficiently remove pollutants from stormwater runoff thereby preventing pollution of the nation's water resources. These Specifications apply to the Flo-Gard™ +Plus Catch Basin Insert Filter.

RECOMMENDED FREQUENCY OF SERVICE:

Drainage Protection Systems (DPS) recommends that installed Flo-Gard™ +Plus Catch Basin Insert Filters be serviced on a recurring basis. Ultimately, the frequency depends on the amount of runoff, pollutant loading and interference from debris (leaves, vegetation, cans, paper, etc.); however, it is recommended that each installation be serviced a minimum of three times per year, with a change of filter medium once per year. DPS technicians are available to do an on-site evaluation, upon request.

RECOMMENDED TIMING OF SERVICE:

DPS guidelines for the timing of service are as follows:

1. For areas with a definite rainy season: Prior to, during and following the rainy season.
2. For areas subject to year-round rainfall: On a recurring basis (at least three times per year).
3. For areas with winter snow and summer rain: Prior to and just after the snow season and during the summer rain season.
4. For installed devices not subject to the elements (washracks, parking garages, etc.): On a recurring basis (no less than three times per year).

SERVICE PROCEDURES:

1. The service shall commence with collection and removal of sediment and debris (litter, leaves, papers, cans, etc.) and broom sweeping around the drainage inlet. Accumulated materials shall be placed in a DOT approved container for later disposal.
2. The catch basin shall be visually inspected for defects and possible illegal dumping. If illegal dumping has occurred, the proper authorities and property owner representative shall be notified as soon as practicable.
3. The catch basin grate shall be removed and set to one side. Using an industrial vacuum, the collected materials shall be removed from the liner. (Note: DPS uses a truck-mounted vacuum for servicing Flo-Gard ™ +Plus catch basin inserts.)
4. When all of the collected materials have been removed, the filter medium pouches shall be removed by unsnapping the tether from the D-ring and set to one side. The filter liner, gaskets, stainless steel frame and mounting brackets, etc. shall be inspected for continued serviceability. Minor damage or defects found shall be corrected on-the-spot and a notation made on the Maintenance Record. More extensive deficiencies that affect the efficiency of the filter (torn liner, etc.), if approved by the customer representative, will be corrected and an invoice submitted to the representative along with the Maintenance Record.
5. The filter medium pouches shall be inspected for defects and continued serviceability and replaced as necessary and the pouch tethers re-attached to the liner's D-ring. See below.
6. The grate shall be replaced.

EXCHANGE AND DISPOSAL OF EXPOSED FILTER MEDIUM AND COLLECTED DEBRIS

The frequency of filter medium pouch exchange will be in accordance with the existing DPS-Customer Maintenance Contract. DPS recommends that the medium be changed at least once per year. During the appropriate service, or if so determined by the service technician during a non-scheduled service, the filter medium pouches will be replaced with new pouches and the exposed pouches placed in the DOT approved container, along with the exposed debris. Once the exposed pouches and debris have been placed in the container, DPS has possession and must dispose of it in accordance with local, state and federal agency requirements.

Note: As the generator, the landowner is ultimately responsible for the proper disposal of the exposed filter medium and debris. Because the materials likely contain petroleum hydrocarbons, heavy metals and other harmful pollutants, the materials must be treated as an EPA Class 2 Hazardous Waste and properly disposed of. DPS relieves the landowner of the actual disposal task, and provides certification of its completion in accordance with appropriate regulations.

DPS also has the capability of servicing all manner of catch basin inserts and catch basins without inserts, underground oil/water separators, stormwater interceptors and other such devices. All DPS personnel are highly qualified technicians and are confined space trained and certified. Call us at (888) 950-8826 for further information and assistance.

Appendix F:
General Education Materials

Storm Drains are for Rain...

More than 50% of the automotive oil sold to do-it-yourself oil changers is not recycled. There are more than 600 State-certified used oil collection centers within Los Angeles County.

Never dispose of automotive fluids in the street or gutter. Take them to your local auto parts store, gas station or repair shop, or a household hazardous waste Roundup for recycling.

1(888)CLEAN LA
www.888CleanLA.com

...not automotive fluids.

Car Care Tips:

You can keep your car running smoothly and efficiently, and at the same time help prevent stormwater pollution by taking these easy steps...

- When changing vehicle fluids — motor oil, transmission, brake and radiator fluids — drain them into separate drip pans to avoid spills. Do not combine these fluids. Do not dispose of these fluids in the street, gutter or garbage. It is illegal.
- If a spill occurs, use kitty litter, sawdust or cornmeal for cleanup. Do not hose or rinse with water.
- Recycle all used vehicle fluids. Call 1(888)CLEAN LA or visitwww.888CleanLA.com for the location of an auto parts store or gas station that recycles these fluids, or for the location of a local household hazardous waste Roundup.
- Regularly check and maintain your car to keep it running safely and efficiently. Water runoff from streets, parking lots and driveways picks up oil and grease drippings, asbestos from brake linings, zinc from tires and organic compounds and metals from spilled fuels and carries them to the ocean.

PROJECT Pollution PREVENTION

Printed on recycled paper

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- If a spill occurs, use kitty litter, sawdust or cornmeal for cleanup. Do not hose or rinse with water.
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PROJECT Pollution PREVENTION

Printed on recycled paper

Good Cleaning Practices

Managing FATS, OIL and GREASE

POST IN CLEANUP/WORK AREA

THE RIGHT WAY

1 Wipe pots, pans, and work areas prior to washing.

2 Dispose of food waste directly into the trash.

3 Collect waste oil and store for recycling.

4 Clean mats inside over a utility sink. Use dry clean up for spills.

THE WRONG WAY

1 Do not pour cooking residue directly into the drain.

2 Avoid using the garbage disposal. Place greasy food in the trash.

3 Do not pour waste oil directly into the drain, parking lot or street.

4 Do not wash floor mats outside where water will run off directly into the storm drain.
Do not rinse spills into the street.

For more information call **(888) CLEAN LA** or visit **www.888CleanLA.com**

PUBLIC WORKS

County of Los Angeles Department of Public Works

environmental health

SANITATION DISTRICTS OF LOS ANGELES COUNTY

www.lacsd.org

Are You a Litter Bug and Don't Know It?

Take our quiz!

Have you ever...

- Dropped a cigarette butt or trash on the ground?
- Failed to pick up after your dog while out on a walk?
- Overwatered your lawn after applying fertilizers/pesticides?
- Disposed of used motor oil in the street, gutter or garbage?

If you answered **yes** to any of these actions, then **YOU ARE A LITTER BUG**!

Each of these behaviors contribute to stormwater pollution, which contaminates our ocean and waterways, kills marine life and causes beach closures.

You can become part of the solution!
To find out how, flip this card over.

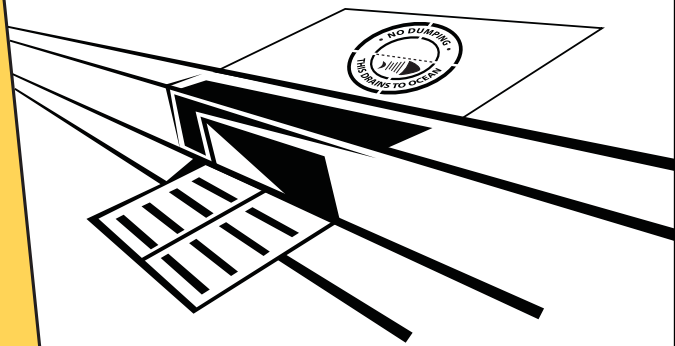
For more information, call or visit:

1 (888) CLEAN LA
www.888CleanLA.com

PROJECT Pollution PREVENTION

Follow these simple steps to prevent stormwater pollution:

- Put your garbage where it belongs — in the trash can.
- Pick up after your dog when out on a walk.
- Reduce pesticide and fertilizer use; don't overwater after application or apply if rain is forecast.
- Dispose of used motor oil at an oil recycling center or at a free Household Hazardous Waste/E-Waste collection event.



A message from the County of Los Angeles Department of Public Works.
Printed on recycled paper.

Don't Paint the Town Red!

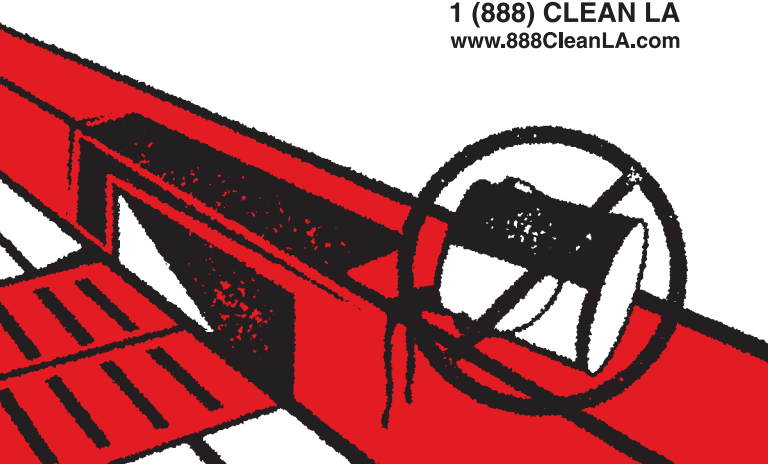
Storm drains are for rain…
they're not for paint disposal.

More than **197,000** times each month, L.A. County residents wash their dirty paint brushes under an outdoor faucet.

This dirty rinse water flows into the street, down the storm drain and straight to the ocean — **untreated**.

Remember to clean water-based paint brushes in the sink, rinse oil-based paint brushes with paint thinner, and take old paint and paint-related products to a Household Hazardous Waste/E-Waste collection event.

1 (888) CLEAN LA
www.888CleanLA.com



Tips for Paint Clean-Up:

L.A. County residents can help solve the stormwater pollution problem by taking these easy steps when working with paint and paint-related products…

- Never dispose of paint or paint-related products in the gutters or storm drains. This is called illegal dumping. Take them to a Household Hazardous Waste/E-Waste collection event. Call 1 (888) CLEAN LA or visit www.888CleanLA.com to locate an event near you.
- Buy only what you need. Reuse leftover paint for touch-ups or donate it to a local graffiti abatement program. Recycle or use excess paint.
- Clean water-based paint brushes in the sink.
- Oil-based paints should be cleaned with paint thinner. Filter and reuse paint thinner. Set the used thinner aside in a closed jar to settle-out paint particles.
- Store paints and paint-related products in rigid, durable and watertight containers with tight-fitting covers.

PROJECT Pollution PREVENTION

A message from the County of Los Angeles Department of Public Works.
Printed on recycled paper.

Storm Drains are for Rain...

More than 200,000 times each month, lawns and gardens throughout LA County are sprayed with pesticides. Overwatering or rain causes pesticides on leaves and grass to flow into the storm drain and to the ocean — untreated.

Please use pesticides wisely, not before a rain, and water carefully.

...not pesticides.

1(888)CLEAN LA
www.888CleanLA.com

Pesticide Tips:

You can keep your lawn and garden green and at the same time solve the pollution problem by taking these easy steps...

- Never dispose of lawn or garden chemicals in storm drains. This is called illegal dumping. Take them to a household hazardous waste roundup. Call 1(888)CLEAN LA or visit www.888CleanLA.com to locate a roundup or collection facility near you.
- More is not better. Use pesticides sparingly. "Spot" apply, rather than "blanket" apply.
- Read labels! Use only as directed.
- Use non-toxic products for your garden and lawn whenever possible.
- If you must store pesticides, make sure they are in a sealed, water-proof container that cannot leak.
- When watering your lawn, use the least amount of water possible so it doesn't run into the street and carry pesticide chemicals with it. Don't use pesticides before a rain storm. You will not only lose the pesticide, but also will be harming the environment.

PROJECT Pollution PREVENTION

Printed on recycled paper

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More than 200,000 times each month, lawns and gardens throughout LA County are sprayed with pesticides. Overwatering or rain causes pesticides on leaves and grass to flow into the storm drain and to the ocean — untreated.

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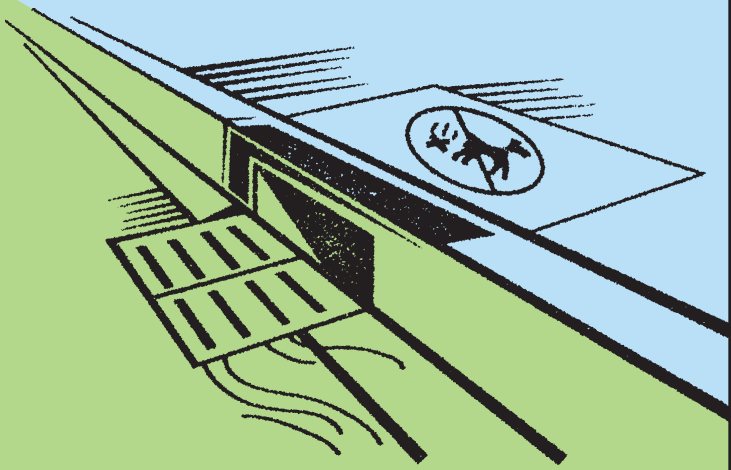
- Read labels! Use only as directed.
- Use non-toxic products for your garden and lawn whenever possible.
- If you must store pesticides, make sure they are in a sealed, water-proof container that cannot leak.
- When watering your lawn, use the least amount of water possible so it doesn't run into the street and carry pesticide chemicals with it. Don't use pesticides before a rain storm. You will not only lose the pesticide, but also will be harming the environment.

PROJECT Pollution PREVENTION

Printed on recycled paper

Pick Up After Your Pooch!



Storm drains are for rain…
they're not pooper scoopers.

L.A. County residents walk a dog without picking up the droppings more than **62,000** times per month.

Disease-causing dog waste washes from the ground and streets into storm drains and flows straight to the ocean — untreated.

Remember to bring a bag and clean up after your dog.

1 (888) CLEAN LA
www.888CleanLA.com

Tips for Dog Owners:

Dog owners can help solve the stormwater pollution problem by taking these easy steps…

- Clean up after your dog every single time.
- Take advantage of the complimentary waste bags offered in dispensers at local parks.
- Ensure you always have extra bags in your car so you are prepared when you travel with your dog.
- Carry extra bags when walking your dog and make them available to other pet owners who are without.
- Teach children how to properly clean up after a pet. Encourage them to throw the used bags in the nearest trash receptacle if they are away from home.
- Put a friendly message on the bulletin board at the local dog park to remind pet owners to clean up after their dogs.
- Tell friends and neighbors about the ill effects of animal waste on the environment. Encourage them to clean up after their pets as well.

PROJECT Pollution PREVENTION

Storm Drains are for Rain...

Stormdrains take runoff directly to creeks and the ocean without treatment. Pool chemicals can harm our natural creeks and waterways. Anything going into our stormdrains that isn't rainwater contributes to stormwater pollution, which contaminates our creeks and ocean, kills marine life and causes beach closures.

...not pool chemicals

LOS ANGELES COUNTY PUBLIC WORKS Public Service That Works

Swimming Pool Tips

Follow these simple steps to prevent stormwater pollution...

- Make sure all chemicals are dissipated before draining a pool or spa
- Do not drain pools within 5 days of adding chemicals
- Never backwash a filter into the street or stormdrain
- Cleanup chemical spills with absorbent, don't wash it down the drain
- Dispose of leftover chemicals and paints through a licensed hazardous waste disposal provider

PROJECT Pollution PREVENTION

Storm Drains are for Rain...

More than 50% of the automotive oil sold to do-it-yourself oil changers is not recycled. There are more than 600 State-certified used oil collection centers within Los Angeles County.

Never dispose of automotive fluids, recyclable products, or household hazardous wastes into the street or gutter. Take them to your local auto repair station, recycling center or a household hazardous waste roundup.

...they're not recycling centers.

1(888)CLEAN LA
www.888CleanLA.com

Recycling Tips:

You can help keep your community clean, protect our area waterways and make the beaches safe for ocean swimmers by putting recyclable materials where they belong — at a recycling center or household hazardous waste roundup. Never throw or pour anything into the streets or gutters...

- When changing vehicle fluids – transmission, hydraulic and motor oil, brake and radiator fluid – drain them into a drip pan to avoid spills. Do not combine these fluids. Do not dispose of them in the street, gutter or in the garbage. It is illegal.
- Recycle all used vehicle fluids. Call 1(888)CLEAN LA or visit www.888CleanLA.com for the location of a center that recycles these fluids, or for the location of a local household hazardous waste Roundup.
- Other materials that should be taken to a household hazardous waste Roundup are: paint and paint-related materials, household cleaners, batteries, pesticides and fertilizers, pool chemicals, and aerosol products.
- Aluminum, glass, plastic and newspapers should be placed in your curbside recycling bin or taken to a local recycling center.

Printed on recycled paper

PROJECT Pollution PREVENTION

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- Aluminum, glass, plastic and newspapers should be placed in your curbside recycling bin or taken to a local recycling center.

Printed on recycled paper

PROJECT Pollution PREVENTION

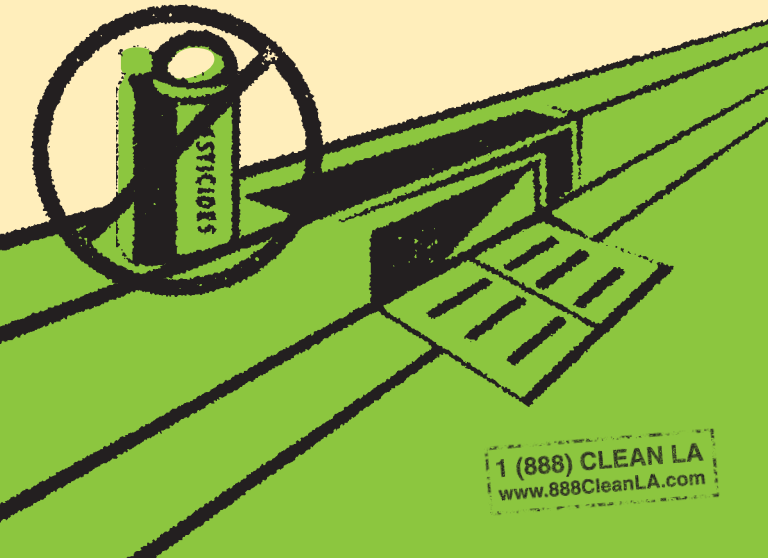
A Yard is a Terrible Thing to Waste!

Storm drains are for rain…**not yard waste.**

Residential yard waste represents about **13 percent** of the total waste generated in L.A. County.

Pesticides, fertilizer and yard waste such as leaves and mowed grass wash from the ground and streets into storm drains and flow straight to the ocean — **untreated**.

Remember to use pesticides and fertilizer wisely and pick-up yard waste.



Tips For Yard Care:

L.A. County residents can help solve the stormwater pollution problem by taking these easy steps…

- Do not over-fertilize and do not use fertilizer or pesticides near ditches, gutters or storm drains.
- Do not use fertilizer or pesticides before a rain.
- Follow the directions on the label carefully.
- Use pesticides sparingly — more is not better. "Spot" apply, rather than "blanket" apply.
- When watering your lawn, use the least amount of water possible so it doesn't run into the street carrying pesticides and other chemicals with it.
- Use non-toxic products for your garden and lawn whenever possible.
- If you must store pesticides or fertilizer, make sure they are in a sealed, water-proof container in a covered area to prevent runoff.
- Do not blow, sweep, hose or rake leaves or other yard trimmings into the street, gutter or storm drain.

PROJECT Pollution PREVENTION

A message from the County of Los Angeles Department of Public Works.
Printed on recycled paper.

Appendix G:
Operation and Maintenance Plan

To be provided during Final Engineering

Appendix H:
Geotechnical Report

October, 27, 2021
J.N.: 3016.00

Mr. Erik Pfahler
Borstein Enterprises
11766 Wilshire Boulevard, Suite 820
Los Angeles, CA 90025

Subject: **Preliminary Geotechnical Investigation for Proposed Water Quality Improvements, Proposed Residential Development, 8601 Mission Drive, Rosemead, California**

Dear Mr. Pfahler,

Albus & Associates, Inc. has completed a geotechnical investigation of the site for evaluation of the percolation characteristics of the site soils. The scope of this investigation consisted of the following:

- Exploratory drilling, soil sampling and test well installation
- Field percolation testing
- Laboratory testing of selected soil samples
- Engineering analysis of the data
- Preparation of this report

SITE DESCRIPTION AND PROPOSED DEVELOPMENT

Site Location and Description

The site is located at 8601 Mission Drive within the city of Rosemead, California. The APN parcel numbers for the current development are 5389-009-029, -030, and -031. The property is bordered by Mission Drive to the south, Walnut Grove Avenue, an existing easement for power lines, and a nursery to the west, and single-family residences to the north and east. The location of the site and its relationship to the surrounding areas are shown in Figure 1, Site Location Map.

The site consists of an irregularly-shaped property containing approximately 3.35 acres of land. The site is relatively flat with elevations ranging from 357 to 363 feet above mean sea level (based on Google Earth) and slopes gently down to the south. The site is currently vacant land with some improvements onsite. The perimeters of the site are bounded by chain-link fencing, masonry block walls, and plastic fencing. A short concrete driveway is located to the south and west. Along the southwest boundary of the property is existing overhead powerlines. Vegetation within the site consists of minor ground cover and some large palm trees within the southwest portion of the site.

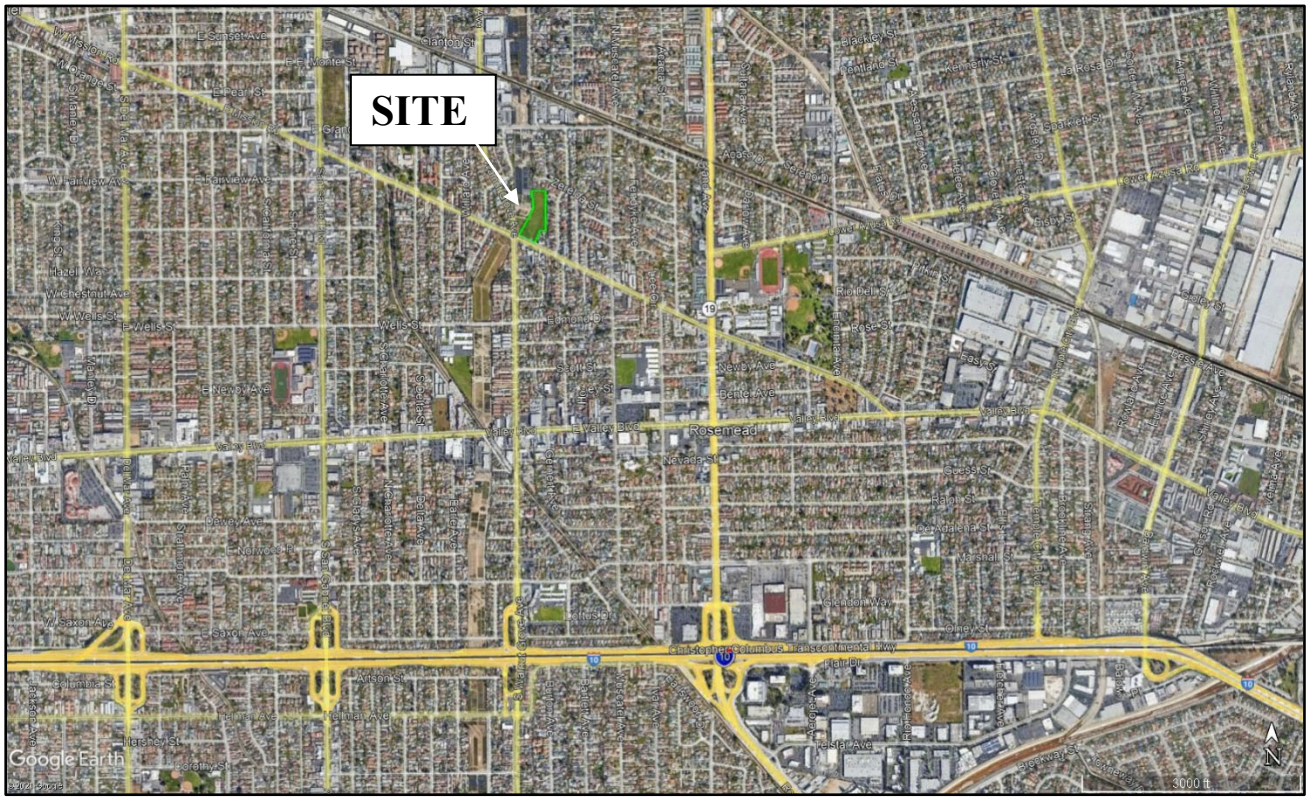


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FIGURE 1-SITE LOCATION MAP

Proposed Residential Development
8601 Mission Drive,
Rosemead, California

NOT TO SCALE

Proposed Development

Based on our understanding, site development is anticipated to consist of multi-story (2 to 3), wood-framed buildings at grade. Associated interior driveways, decorative hardscape, parking areas and underground utilities are also anticipated.

No grading or structural plans were available in preparing this proposal. However, we anticipate some minor cut and filling of the site will be required to achieve future surface configuration and we expect future foundation loads will be moderate.

SUMMARY OF FIELD AND LABORATORY WORK

Subsurface Investigation

Subsurface exploration for this investigation was conducted on September 7, 2021, and consisted of drilling six (6) soil borings to depths ranging from approximately 11.5 to 51.5 feet below the existing ground surface (bgs). The borings were drilled using a truck-mounted, continuous flight, hollow-stem-auger drill rig. A representative of Albus & Associates, Inc. logged the exploratory borings. Visual and tactile identifications were made of the materials encountered, and their descriptions are presented in the Exploration Logs in Appendix A. The approximate locations of the exploratory excavations completed by this firm are shown on the enclosed Geotechnical Map, Plate 1.

Bulk, relatively undisturbed and Standard Penetration Test (SPT) samples were obtained at selected depths within the exploratory borings for subsequent laboratory testing. Relatively undisturbed samples were obtained using a 3-inch O.D., 2.5-inch I.D., California split-spoon soil sampler lined with brass rings. SPT samples were obtained from the boring using a standard, unlined SPT soil sampler. During each sampling interval, the sampler was driven 18 inches with successive drops of a 140-pound automatic hammer falling 30 inches. The number of blows required to advance the sampler was recorded for each six inches of advancement. The total blow count for the lower 12 inches of advancement per soil sample is recorded on the exploration log. Samples were placed in sealed containers or plastic bags and transported to our laboratory for analyses. The borings were backfilled with auger cuttings upon completion of sampling.

Two additional borings (P-1 and P-2) were drilled adjacent to boring B-1 for percolation testing. Upon completion of drilling, well materials were installed within P-1 and P-2 for subsequent percolation testing. Construction details for P-1 and P-2 consisted of 15 and 30 feet of well materials. The bottom 5 feet for both wells utilized perforated 3-inch-diameter pipe with the remaining well utilizing solid 3-inch-diameter pipe to ground surface. The joints between pipes were reinforced with duct tape and the sections of perforated pipe were covered with filter sock. After installation of pipe, ¾" gravel was used to fill the annular space around the perforated sections. Upon completion of testing, all well materials were removed from the borings and then backfilled with soil cuttings.

Percolation Testing

Percolation testing was performed on September 7, 2021, in general conformance with the constant-head test procedures outlined in the referenced Well Permeameter Method (USBR 7300-89). A water hose attached to a water source on site was connected to an inline flowmeter to measure the water flow. The flowmeter is capable of measuring flow rates up to 10 gallons per minute and as low as 0.06 gallons per minute. A valve was connected in line with the flowmeter to control the flow rate. A filling hose was used to connect the flowmeter and the test wells. Water was introduced by the filling hose near the bottom of the test wells. A water level meter with 1/100-foot divisions was used to measure the depths to water surface from the top of well casings.

Flow to the wells was terminated upon either completion of testing of all the pre-determined water levels or the flow rate exceeded the maximum capacity of the flowmeter. Measurements obtained during the percolation testing are provided in Appendix C on Plates C-1 and C-2.

Laboratory Testing

Selected soil samples of representative earth materials were tested to assist in the formulation of conclusions and recommendations presented in this report. Tests consisted of in-situ moisture contents and dry densities, 200 washes and sieve analyses. Results of laboratory testing relevant to percolation characteristics are presented in Appendix B and on the Exploration Logs in Appendix A.

ANALYSIS OF DATA

Subsurface Conditions

Review of the Diblee Map for the El Monte and Baldwin Park Quadrangles shows the site is designated as Quaternary Alluvium and falls within a flood plain and would have been subjected to seasonally-deposited materials associated with heavy rains from nearby mountain ranges to the north. Our exploration encountered artificial fills overlaying alluvial soils. Descriptions of the earth materials encountered during our investigation are summarized below and are presented in detail on the Exploration Logs presented in Appendix A.

Fills up to about 2 feet thick appear to be present on site due to previous site improvements and grading. Fill materials typically consisted of fine to medium-grained silty sands.

Alluvium was encountered underlying the artificial fill and generally consisted of interlayered silty sands, sands with silt, gravelly sands, and clayey sands. These materials were typically medium dense to very dense and damp. Alluvial soils were encountered to the maximum depth explored (51.5 feet).

Within borings B-2 and B-3, cobbles were encountered at depths of approximately 10 feet. Due to the size of the cobbles, the hollow stem could not extract all the cobbles. As such, the cobbles generally remained within the borings and floated within the cuttings and around the stem. Sizes were either measured or visually observed within the boring shaft and are estimated to be 4 to 6 inches in diameter.

Groundwater

Groundwater was not encountered during this firm's subsurface exploration to a depth of 51.5 feet. The CDMG Special Report 024 suggests that historic high groundwater for the subject site is approximately 60 feet. However, review of the Los Angeles County groundwater level data for the nearby well 2920G indicates that groundwater for the area is 231 feet below ground surface as of 2018. Well readings have been recorded from 5/1/1949 to 4/26/2018, and during this period, groundwater has fluctuated, but has continued to increase in depth from 126 feet (bgs) to 231 feet (bgs) during this time period. The last recorded reading at the time of this report was April 26, 2018 and indicated a depth of 231 feet.

Percolation Data

Analyses were performed to evaluate permeability using the flow rate obtained at the end of the constant-head stage of field percolation testing. These analyses were performed in accordance with the procedures provided in the referenced USBR 7300-89. The procedure essentially uses a closed-form solution to the percolation out of a small-diameter well.

Using the USBR method, we calculated a composite permeability value for the head conditions maintained in the wells. The results are summarized in Table 1 below and the supporting analyses are included in Appendix C, Plates C-3 and C-4. Comparing the results of grain-size testing confirms the field test results are appropriate for the soils tested.

TABLE 1
Summary of Back-Calculated Permeability Coefficient

Test Well	Total Depth of Well (ft)	Depth to Water in Well (ft)	Height of Water in Well (ft)	Static Flow Rate (gal./min.)	Estimated Permeability, k_s (in/hr.)
P-1	14.7	12	2.7	4.7	18.34
P-2	30	27	3	0.68	2.26

Design of Dry Well

The ***infiltration rate*** in a dry well is dependent upon several factors including the soil permeabilities of the various soil layers throughout the soil mass, hydraulic gradient of water pressure head in the soil mass, and depth to groundwater. The infiltration rate is related to the permeability by Darcy's equation:

$V = ki$

Where:

V= water velocity (infiltration rate)
k= permeability
i=hydraulic gradient

The presence of differing soil layers with differing permeabilities, the variable head condition in the well shaft, and presence of ground water are factors that make determining the effective infiltration rate of a dry well somewhat complicated. We have performed the Well Permeameter tests in accordance with the test method. This test provides a means to estimate the ***Permeability Rate*** of the soils influencing the dry well, not the infiltration rate. Therefore, the effective infiltration rate must be determined using the relationship between permeability and infiltration rate as expressed by Darcy's equation. Solution of the Darcy equation essentially requires solving a differential mass balance equation. Due to these complications, the infiltration characteristics of the proposed dry well were modeled using a computer program.

Infiltration in a dry well was modeled using the software Seep/W, version 2007, by Geo-Slope International. The program allows for modeling of both partially-saturated and saturated porous medium using a finite element approach to solve Darcy's Law. The program can evaluate both steady-state and transient flow in planar and axisymmetric cases. Boundaries of the model can be identified with various conditions including fix total head, fix pressure head, fix flow rate, and head as a function

of flow. Soil permeability properties can be modeled with either Fredlund et al (1994), Green and Corey (1971), Van Genuchten (1980), or Saxton et al. (1986). Only saturated permeabilities were used in our analyses.

A Seep/W model was setup with the bottom of the dry well at a depth of 40 feet below ground surface. The dry well was assumed to consist of a shaft that is 6 feet in diameter and contains a settling chamber having an inside diameter of 4 feet, outside diameter of 4.5 feet, and length of 18 feet. The annular space around the chamber between the depths of 0 and 13 feet was assumed to consist of a cement slurry. A more detailed model of the dry well design can be found on Plate 2.

The model consisted of three zones of material to represent the general soil profile. The saturated permeability of material 1 was modeled to be impermeable and represent the future artificial fills. The saturated permeability of the primary infiltration zones, materials 2 and 3, were selected based on the coefficient of permeability estimated from percolation tests as well as laboratory gradation test results. The saturated permeability of material 4 was modeled to represent the clayey sand materials encountered at depth. The permeability values are summarized in Table 2.

TABLE 2
Summary of Permeability Values

Depth (ft)	Material No.	Material Type	Sat. Perm., Ks (in/hr)
0-5	1	Fill	0.001
5-15	2	SW	15
15-45	3	SP/SM	2
>45	4	SC	0.01

Water in the well was assumed to be at a depth of 7 feet below the ground surface so a fix-head boundary was set with a total head elevation of 93 feet around the edge of the well (ground surface was set to an elevation of 100 feet).

A steady state analysis was performed to estimate the maximum inflow that the well can accommodate. Using a well as described above, we obtain a static total flow of 0.16 ft^3/sec. A plot depicting the resulting pressure head contours and flow vectors for the model is provided on Plate C-5. The average infiltration rate can be determined by taking the flow rate divided by the wetted surface area. The surface area is equal to 395.8 square feet which includes the side and bottom area. Based on the above flow rate and surface area, the average "measured" infiltration rate across the wetted surface area is 17.0 in/hr.

To evaluate the time required to empty the well once no more water is introduced, the model was reanalyzed with a variable head condition that was dependent upon the volume of water leaving the well. As water infiltrates into the surrounding soil, the volume of water remaining in the well is reduced as well as the resulting water head. A graph of the well head versus exit volume is provided

in Figure 2. The function assumes a void ratio of 0.4 within the zones occupied by gravel. If some other well configuration is used, then the analyses will require updating.

The analysis was performed as a transient case over a total time of 2.5 hours. The conditions in the model were evaluated in 10 increments of time over the total duration. From our analyses, the water is evacuated from the chamber in approximately 0.55 hours. Plots depicting the resulting pressure head contours and flow vectors at selected times are provided in Appendix C on Plates C-6 through C-9. A plot of time versus water height in the well is shown on Figure 3.

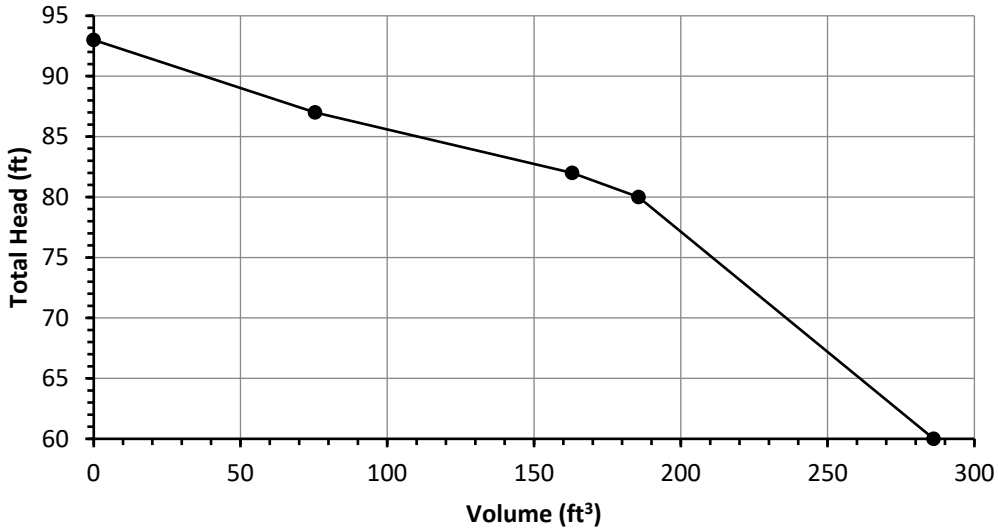


FIGURE 2- Well Head versus Exit Volume

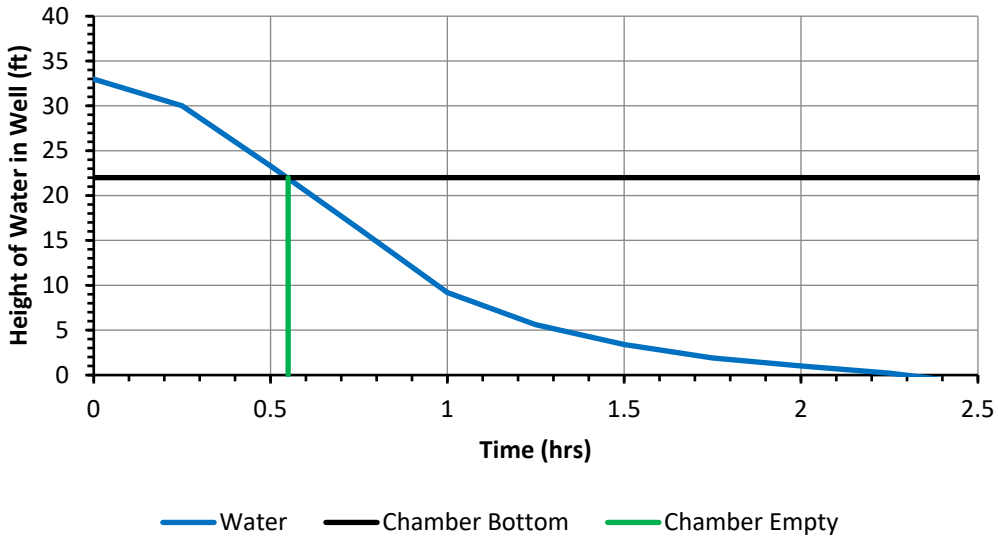


FIGURE 3- Water Head Versus Time

CONCLUSIONS AND RECOMMENDATIONS

Dry Well

Results of our work indicate a storm water disposal system consisting of a dry well is feasible at the site. The use of a dry well is not anticipated to result in worsening any adverse conditions or hazards that may be present for the proposed site development or adjacent properties including subsidence, landsliding, or liquefaction. As discussed above, the historic groundwater level in this area is approximately 60 feet. However, based on the aforementioned well data, we estimate that groundwater is currently at least 230 feet below ground surface and we anticipate will remain at least 200 feet below ground surface for the life of the project. Therefore, a dry well having a total depth of 40 feet will maintain a clearance above groundwater greater than the minimum required clearance of 10 feet.

Based on the results of percolation testing and analyses, the well configuration as depicted on Plate 2 may utilize a "measured" peak flow rate of 0.16 ft^3/sec. This flow rate corresponds to an average peak infiltration rate of 17.0 in./hr. This flow rate and infiltration rate only apply to the well configuration evaluated and will differ for other configurations. These values are "measured" values and as such, an appropriate factor of safety should be applied to determine the "design" rates.

The design infiltration rate requires the application of a Reduction Factor in accordance with the County of Los Angeles GS200.2 guidelines. Based on the county requirements, the reduction factor (safety factor) is determined by multiplying the partial reduction factors as indicated in Table 3 below.

The RFt value is prescribed by the test method used. The RFv value is based on the fact that soil conditions are uniform within the infiltration zone, that a test was performed in close proximity to the proposed dry well location, and correlations with laboratory testing of site materials confirm the selected permeability rate obtained by the field test. The RFs value is based on the dry well providing a chamber that traps sediments and removes oils via an absorptive pillow or some other system providing for the removal of most sediment and oils before entering the dry well.

TABLE 3
Reduction Factor

Factor	Value
RFt	2.0
RFv	1.0
RFs	1.0
Total Reduction Factor (RF)	**2.0**
Note: Total Reduction Factor, RF= RFt x RFv x RFs	

Based on the above reduction factor, design of the system should be based on a **peak "design" flow** of 0.16 cfs/2.0 = **0.08 cfs.** Once water flow to the well has ceased, we estimate the time to empty the chamber will be approximately 0.55 hours.

The maximum volume that can be infiltrated by the dry well is defined by the following equation:

$$V_T = (T_D - T_W) \cdot Q_W + V_W$$

Where:

V_T= Total volume infiltrated
T_D= Allowable drawdown time of system
T_W= Time to empty well chamber
Q_W= Design flow rate of well
V_W= Storage volume of dry well

Assuming an allowable total drawdown time of 96 hours, the maximum total design capture volume (DCV) one dry well can dispose would be approximately (96-0.55) hrs x 0.08 cfs x 3600 s/hr = 27,490 cubic feet. The effective storage capacity of the dry will is 285 cubic feet.

The well should be located at least 10 feet horizontally from any habitable structure.

The actual flow capacity of the dry well could be less or more than the estimated value. As such, provisions should be made to accommodate excess flow quantities in the event the dry well does not infiltrate the anticipated amount. The design also assumes that sediments will be removed from the inflowing water through an upper chamber or other device. Sediments that are allowed to enter the dry well will tend to degrade the flow capacity by plugging up the infiltration surfaces.

In general, the dry well shaft is anticipated to be adequately stable under temporary construction conditions for uncased drilling. However, friable materials are present and will likely slough during drilling. The contractor should be prepared to install the gravel and chamber immediately following the drilling of the shaft. Workers should not enter the shaft unless the excavation is laid back or shored in accordance with OSHA requirements. The placement and compaction of backfill materials, including the gravel and slurry, should be observed by the project geotechnical consultant.

Chamber

A buried chamber system may be used in lieu of a dry well. Infiltration of storm water using a buried chamber is not anticipated to result in adverse geotechnical conditions at the site or surrounding sites including subsidence, landsliding, or liquefaction.

Using a system that is founded at a depth of at least 5 feet below current grade, we recommend a "measured" infiltration rate of 2.0 in./hr. Applying the required reduction factor of 2 as previously discussed, we obtained a **Design Infiltration Rate of 1.0 in./hr.**

The chambers should be located at least 10 feet horizontally from any habitable structure or property boundaries but otherwise can generally be located anywhere else on the property.

The excavations for the chamber system should be observed by the project geotechnical consultant to confirm they expose native alluvial soils at the bottom and are consistent with the conditions anticipated herein.

LIMITATIONS

This report is based on the geotechnical data as described herein. The materials encountered in our boring excavations and utilized in our laboratory testing for this investigation are believed representative of the project area, and the conclusions and recommendations contained in this report are presented on that basis. However, soil and bedrock materials can vary in characteristics between points of exploration, both laterally and vertically, and those variations could affect the conclusions and recommendations contained herein. As such, observations by a geotechnical consultant during the construction phase of the storm water infiltration systems are essential to confirming the basis of this report.

This report has been prepared consistent with that level of care being provided by other professionals providing similar services at the same locale and time period. The contents of this report are professional opinions and as such, are not to be considered a guaranty or warranty.

This report should be reviewed and updated after a period of one year or if the site ownership or project concept changes from that described herein.

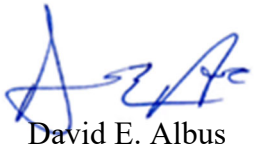
This report has been prepared for the exclusive use of **Borstein Enterprises** to assist the project consultants in the design of the proposed development. This report has not been prepared for use by parties or projects other than those named or described herein. This report may not contain sufficient information for other parties or other purposes.

This report is subject to review by the controlling governmental agency.

We appreciate this opportunity to be of service to you. If you should have any questions regarding the contents of this report, please do not hesitate to call.

Sincerely,

ALBUS & ASSOCIATES, INC.



David E. Albus
Principal Engineer
GE 2455

Enclosures: Plate 1- Geotechnical Map
Plate 2- Dry Well Diagram
Appendix A - Exploratory Logs
Appendix B – Laboratory Testing
Appendix C - Percolation Testing and Analyses

REFERENCES

Publications and Reports

California Department of Conservation, Division of Mines and Geology, Seismic Hazard Report 024, "Seismic Hazard Zone Report for the El Monte 7.5-Minute Quadrangle, Los Angeles County, California", 1998.

Los Angeles County Department of Public Works Well Data (accessed 2020): https://dpw.lacounty.gov/general/wells/

Procedure for Performing Field Permeability Testing by the Well Permeameter Method, by United States Department of The Interior, Bureau of Reclamation (USBR 7300-89).

Guidelines for Geotechnical Investigation and Reporting Low Impact Development Stormwater Infiltration, by County of Los Angeles, Department of Public Works, Geotechnical and Materials Engineering Division (GS200.2).

0 50 100 200

APPROX SCALE : 1" = 100'

EXPLANATION

(Locations Approximate)

- Exploratory Boring
- Percolation Test Boring

ALBUS ASSOCIATES

GEOTECHNICAL MAP

Job No.: 3016.00	Date: 10/27/2021	Plate: 1

APPENDIX A

EXPLORATORY LOGS

Field Identification Sheet

Light gray

Gray

Dark gray

Gray Brown

Light brown

Brown

Dark Brown

Olive brown

Olive

Yellow

Yellowish brown

Yellowish red

Red

Reddish Brown

Tan

Description Order:

Description, Color, Moisture, Density, Grain Size, Additional Description

Description	%	Example
	0-5	Sand
trace	5-15	Sand trace Silt
with	15-30	Sand with Silt
	30+	Silty Sand

More Examples

Sand with Silt trace Clay

Sand trace Silt and Clay

Sand with Silt and Clay

Gravelly Sand with Silt trace Clay

Silty Clay with Sand trace Gravel

Moisture

Dry	absence of water
Damp	below optimum
Moist	near optimum
Very Moist	above optimum
Wet	free water visible

Density (Navfac)

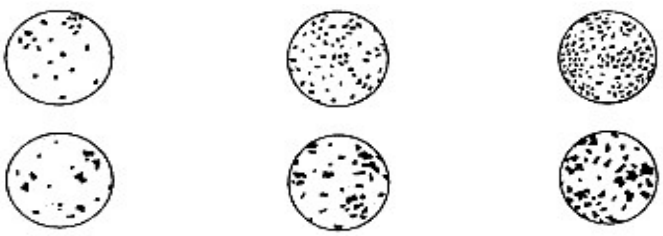
Coarse grained soils	SPT	CA
Very Loose	0-3	0-5
Loose	3-8	5-13
Medium Dense	8-14	13-22
Dense	14-25	22-40
Very Dense	25>	40>
Fine grained soils		
Very Soft	2<	0-3
Soft	2-4	3-6
Medium Stiff	4-8	6-13
Stiff	8-15	13-24
Very Stiff	15-30	24-48
Hard	30>	48>

Grain Size

Description		Sieve Size	Approx. Size
Boulders		>12"	Larger than basketball
Cobbles		3-12"	Fist to basketball
Gravel	coarse	3/4-3"	Thumb to Fist
	fine	#4-3/4"	Pea to Thumb
Sand	coarse	#10-4	Rock Salt to Pea
	medium	#40-10	Sugar to Rock Salt
	fine	#200-40	Flour to Sugar
Fines		Pass #200	Smaller than Flour

Additional Description (ie. roots, pinhole pores, debris, etc.)

Trace 5% Moderate 15% Abundant 30%



EXPLORATION LOG

Project:		Location:
Address:		Elevation:
Job Number:	Client:	Date:
Drill Method:	Driving Weight:	Logged By:

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		EXPLANATION							
		Solid lines separate geologic units and/or material types.							
		Dashed lines indicate unknown depth of geologic unit change or material type change.							
5		**Solid black rectangle** in Core column represents California Split Spoon sampler (2.5in ID, 3in OD).							
		Double triangle in core column represents SPT sampler.							
10		**Vertical Lines** in core column represents Shelby sampler.							
		Solid black rectangle in Bulk column respresents large bag sample.							
		Other Laboratory Tests:							
15		Max = Maximum Dry Density/Optimum Moisture Content							
		EI = Expansion Index							
		SO4 = Soluble Sulfate Content							
		DSR = Direct Shear, Remolded							
		DS = Direct Shear, Undisturbed							
		SA = Sieve Analysis (1" through #200 sieve)							
		Hydro = Particle Size Analysis (SA with Hydrometer)							
20		200 = Percent Passing #200 Sieve							
		Consol = Consolidation							
		SE = Sand Equivalent							
		Rval = R-Value							
		ATT = Atterberg Limits							

EXPLORATION LOG

Project:		Location: B-1
Address: 8601 Mission Dr, Rosemead, CA		Elevation: 358
Job Number: 3016.00	Client: Borstein Enterprises	Date: 9/7/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand (SM): Light brown, dry, fine to medium grained sand							Max EI SO4 DS pH Resist Ch
		ALLUVIUM (Qal) Sand with Gravel trace Silt (SP): Brown to yellowish brown, damp, medium dense, fine to coarse grained sand		17	■	■	2.9	112.4	
5				20	■	■	3.2	103.9	
		Sand with Gravel (SP): Yellowish brown, damp to moist, medium dense, fine to coarse grained sand		28	■		2.6	112.8	
		Gravelly Sand (SW): Yellowish brown, damp to moist, medium dense, fine to coarse grained sand							
10		@ 10 ft, more coarse grained sand		34	■		3.6	117.4	
15		@ 15 ft, dry to damp, very dense		37	⧗				SA Hydro
		Silty Sand (SM): Brown to yellowish brown, moist, very dense, fine grained sand							
20		@ 20 ft, medium dense		10	⧗				200
25		Sand with Gravel trace Silt (SP): Brown, moist, dense, more fine grained sand		21	⧗				

Albus & Associates, Inc.

Plate A-2

EXPLORATION LOG

Project:		Location: B-1
Address: 8601 Mission Dr, Rosemead, CA		Elevation: 358
Job Number: 3016.00	Client: Borstein Enterprises	Date: 9/7/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		Yellowish brown, very dense, more fine to coarse grained sand		52					SA Hydro
35		Gravelly Sand (SP): Light reddish brown, dry to damp, very dense, fine to coarse grained sand		49					200
40		Sand with Silt (SP): Light reddish brown, damp to moist, very dense, fine grained sand		36					
45		Silty Sand (SM): Light reddish brown, damp to moist, very dense, fine grained sand, moderate fines		61					200
		Clayey Sand (SC): Brown to reddish brown, moist, hard, fine grained sand							
50				30					ATT
		Total Depth 51.5 feet No Groundwater Boring backfilled with soil cuttings							

Albus & Associates, Inc.

Plate A-3

EXPLORATION LOG

Project:		Location: B-2
Address: 8601 Mission Dr, Rosemead, CA		Elevation: 357.9
Job Number: 3016.00	Client: Borstein Enterprises	Date: 9/7/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand (SM): Brown, dry, fine grained sand							
		ALLUVIUM (Qal) Silty Sand with Gravel (SM): Brown, damp, medium dense, fine to coarse grained sand		28	■		2.7		
		Gravelly Sand (SP): Yellowish brown, moist, medium dense, fine to coarse grained sand		25	■		3.3	112.4	
5		@ 6 ft, dense, gravel up to 1 inch dia		30	⧗				
10		@ 10 ft, medium dense, cobbles observed in cuttings up to 6 inch dia		15	⧗				200
		Total Depth 11.5 feet No Groundwater Boring backfilled with soil cuttings							

Albus & Associates, Inc.

Plate A-4

EXPLORATION LOG

Project:		Location: B-3
Address: 8601 Mission Dr, Rosemead, CA		Elevation: 357.9
Job Number: 3016.00	Client: Borstein Enterprises	Date: 9/7/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand (SM): Brown, dry, fine grained sand							
		ALLUVIUM (Qal) Gravelly Sand trace Silt (SP): Yellowish brown, dry to damp, medium dense, fine to coarse grained sand		19	■		2.3		
		@ 4 ft, damp, loose, no silt, gravel up to 1 inch dia		12	■		3.1	104.9	
5		@ 6 ft, moist, medium dense		27	■		3.4	109.8	Consol
10		@ 10 ft, 4 inch dia cobble observed in cuttings				■			
		Total Depth 11.5 feet No Groundwater Boring backfilled with soil cuttings							

EXPLORATION LOG

Project:		Location: B-4
Address: 8601 Mission Dr, Rosemead, CA		Elevation: 358
Job Number: 3016.00	Client: Borstein Enterprises	Date: 9/7/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand (SM): Brown, dry, fine grained sand							
		ALLUVIUM (Qal) Silty Sand with Gravel (SM): Brown, moist, loose, fine to coarse grained sand		15	■		3.8	107.2	
		Sand with Gravel (SP): Yellowish brown, moist, loose, fine to coarse grained sand		13	■		2.8		
5		@ 6 ft, medium dense		17	■		4.5	105.9	Consol
10		@ 10 ft, more coarse grained sand		31	■		3.7	112.9	
		Total Depth 11.5 feet No Groundwater Boring backfilled with soil cuttings							

EXPLORATION LOG

Project:		Location: B-5
Address: 8601 Mission Dr, Rosemead, CA		Elevation: 361
Job Number: 3016.00	Client: Borstein Enterprises	Date: 9/7/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand (SM): Brown, dry, fine grained sand							
		ALLUVIUM (Qal) Silty Sand with Gravel (SM): Brown, damp, medium dense, fine to medium grained sand		17	■		3.4	108.7	
		@ 4 ft, Yellowish brown		20	■		4.6	-31.3	
5									
		Sand with Gravel (SP): Yellowish brown, moist, medium dense, fine to coarse grained sand		34	■		3.1	111.1	
10						■			200
		Total Depth 11.5 feet No Groundwater Boring backfilled with soil cuttings							

EXPLORATION LOG

Project:		Location: B-6
Address: 8601 Mission Dr, Rosemead, CA		Elevation: 361.2
Job Number: 3016.00	Client: Borstein Enterprises	Date: 9/7/2021
Drill Method: Hollow-Stem Auger	Driving Weight: 140 lbs / 30 in	Logged By: ddalbus

Depth (feet)	Lith-ology	Material Description	Water	Samples: Blows Per Foot	Samples: Core	Samples: Bulk	Laboratory Tests: Moisture Content (%)	Laboratory Tests: Dry Density (pcf)	Laboratory Tests: Other Lab Tests
		ARTIFICIAL FILL (Af) Silty Sand (SM): Brown, dry, fine grained sand							
		ALLUVIUM (Qal) Silty Sand with Gravel (SM): Brown, damp, medium dense, fine to coarse grained sand		16	■		2.1	108.5	
		Gravelly Sand (SP): Yellowish brown, damp, loose, fine to coarse grained sand		15	■		2.4		200
5		@ 6 ft, medium dense, more coarse grained sand		24	■		2.4	109.8	
10		@ 10 ft, dense, more gravel		46	■		3.4	103.2	
		Total Depth 11.5 feet No Groundwater Boring backfilled with soil cuttings							

APPENDIX B

LABORATORY TEST PROGRAM

LABORATORY TESTING PROGRAM

Soil Classification

Soils encountered within the exploratory borings were initially classified in the field in general accordance with the visual-manual procedures of the Unified Soil Classification System (ASTM D 2488). The samples were re-examined in the laboratory and classifications reviewed and then revised where appropriate. The assigned group symbols are presented on the Exploration Logs provided in Appendix A.

In-Situ Moisture Content and Dry Density

Moisture content and dry density of in-place soil materials were determined in representative strata. Test data are summarized on the Exploration Logs, Appendix A.

Atterberg Limits

Atterberg Limits (Liquid Limit, Plastic Limit, and Plasticity Index) were performed in accordance with Test Method ASTM D 4318. Pertinent test values are presented within Table B-1.

Particle Size Analyses

Particle size analyses were performed on representative samples of site materials in accordance with ASTM D 422. The results are presented graphically on the attached Plates B-1 and B-2.

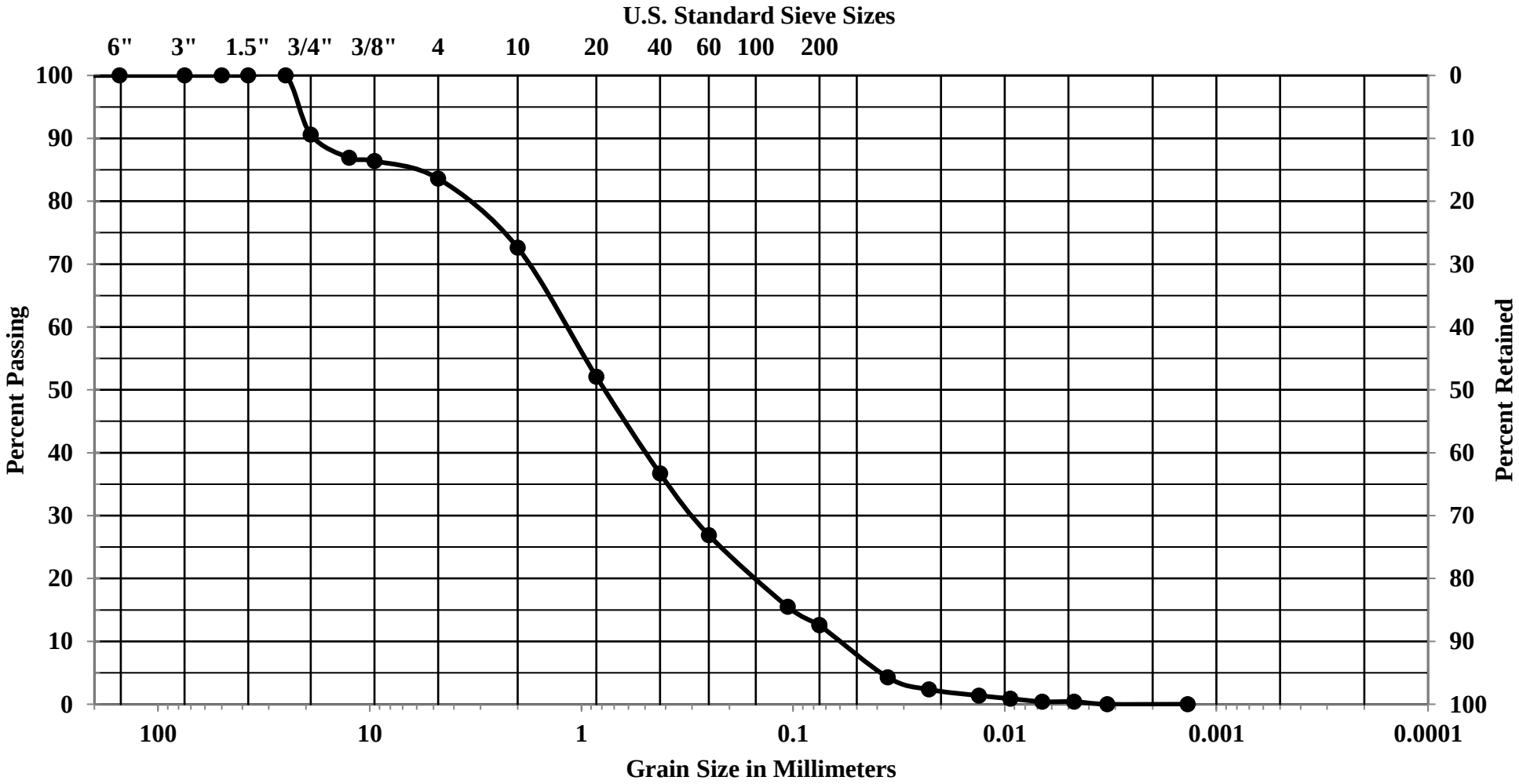
TABLE B-1
SUMMARY OF LABORATORY TEST RESULTS

Boring No.	Sample Depth (ft)	Soil Description	Test Results	
B-1	20	Silty Sand	Passing No. 200 Sieve:	43.4
B-1	35	Gravelly Sand trace Silt	Passing No. 200 Sieve:	11.1
B-1	45	Sand with Silt	Passing No. 200 Sieve:	17.7
B-1	50	Sandy Clay with Silt	Liquid Limit (%): Plasticity Index (%):	25 7.2
B-2	10	Gravelly Sand trace Silt	Passing No. 200 Sieve:	10.7
B-5	10	Gravelly Sand with Silt	Passing No. 200 Sieve:	20.3
B-6	4	Sand trace Silt	Passing No. 200 Sieve:	6.2

Note: Additional laboratory test results are provided on the boring logs provided in Appendix A.

GRAIN SIZE DISTRIBUTION

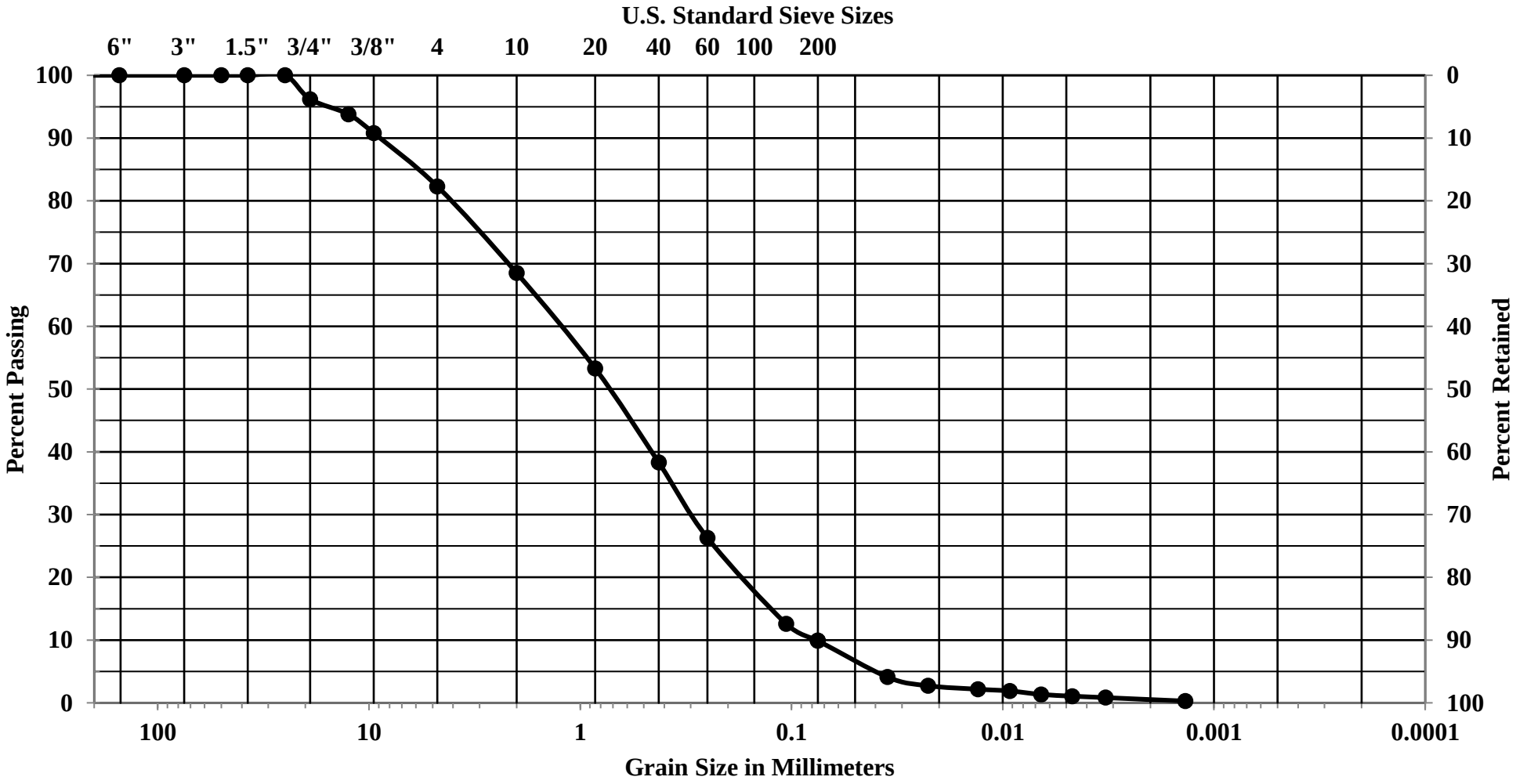
COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Job Number	Location	Depth	Description
3016.00	B-1	15	Sand with Gravel trace Silt

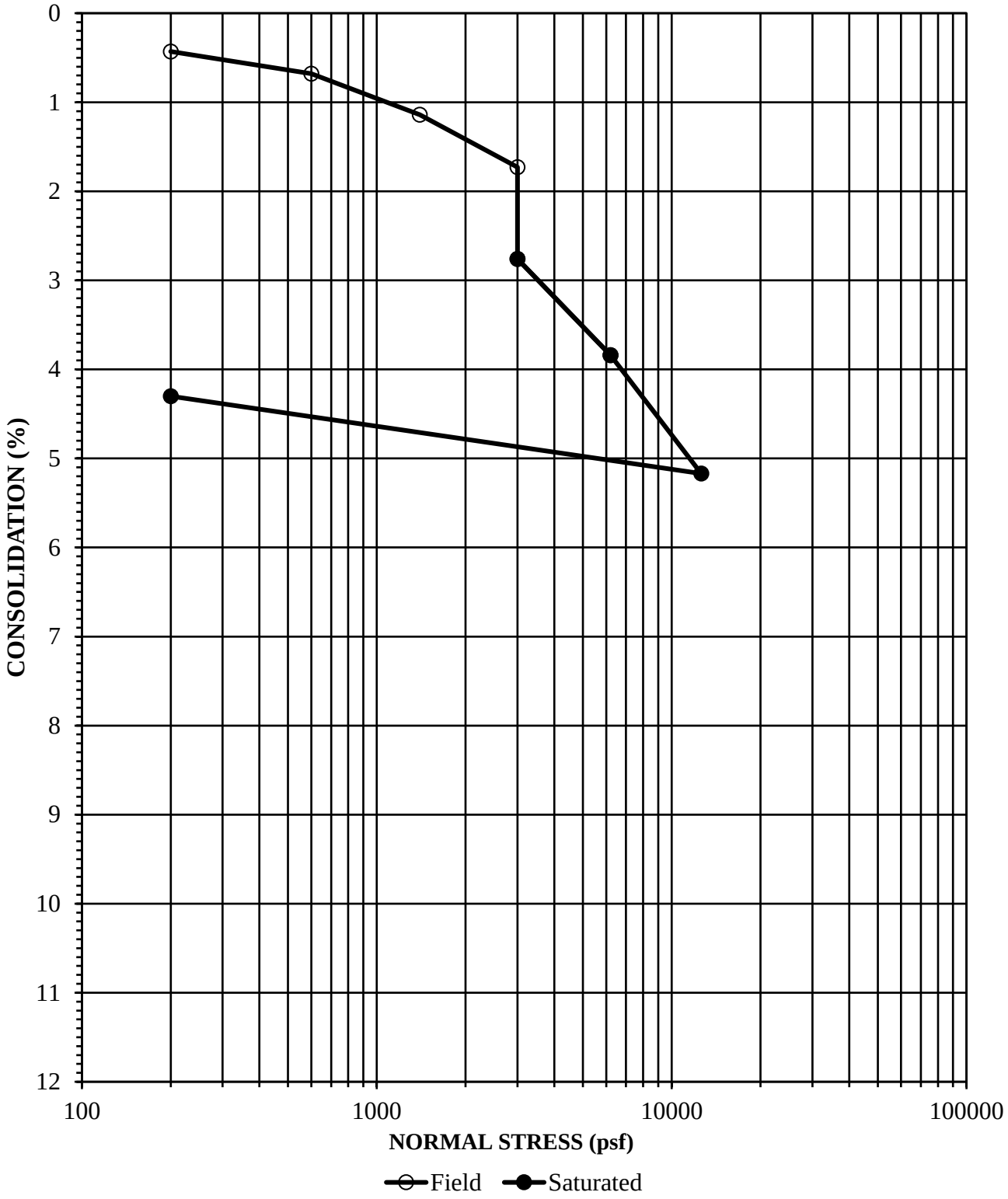
GRAIN SIZE DISTRIBUTION

COBBLES	GRAVEL		SAND			SILT AND CLAY
	COARSE	FINE	COARSE	MEDIUM	FINE	



Job Number	Location	Depth	Description
3016.00	B-1	30	Sand with Gravel trace Silt

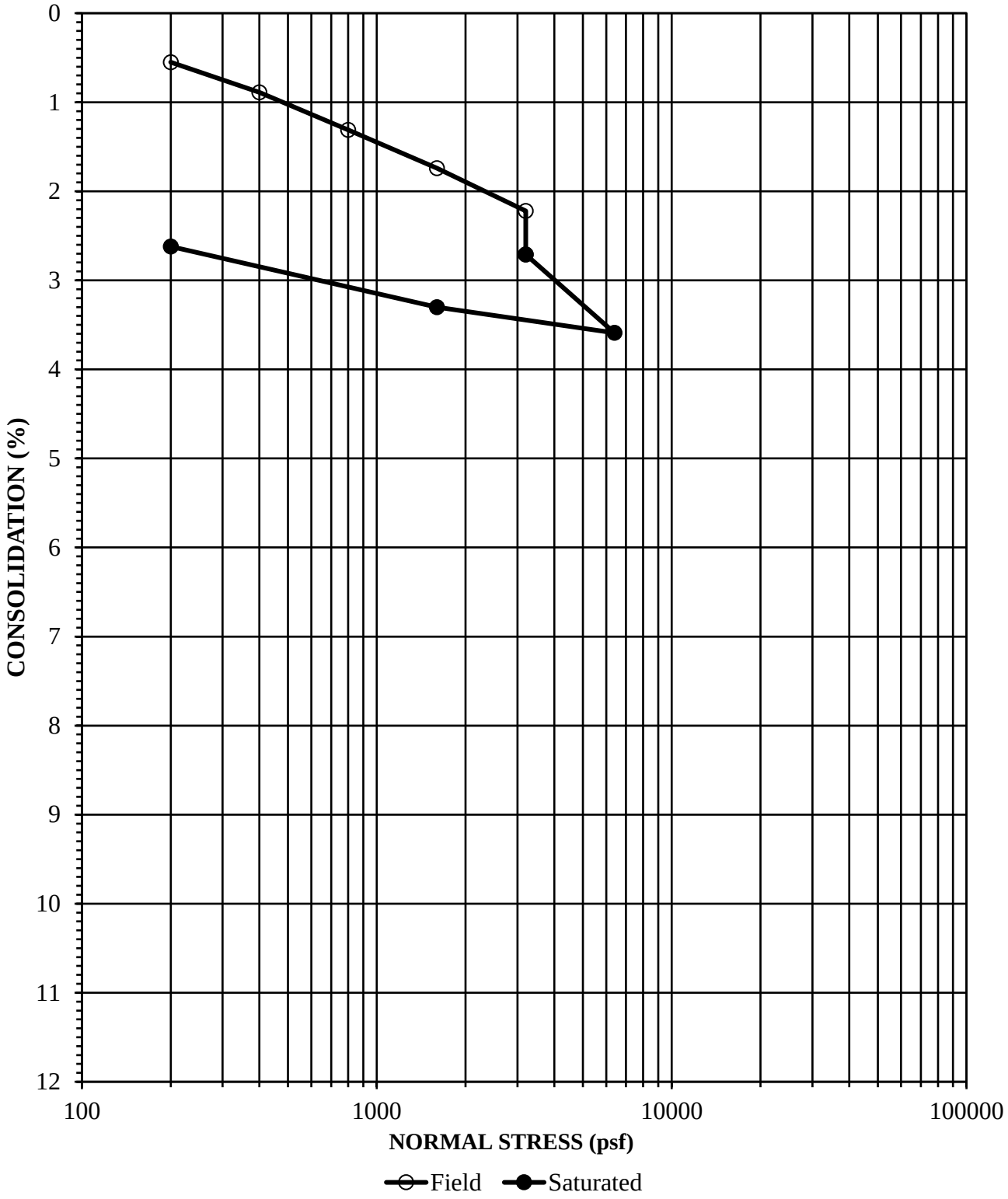
CONSOLIDATION



Job Number	Location	Depth	Description
3016.00	B-3	6	Sand

Initial Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Concent (%)
102.5	4	18.2

CONSOLIDATION



Job Number	Location	Depth	Description
3016.00	B-4	6	Sand

Initial Dry Density (pcf)	Initial Moisture Content (%)	Final Moisture Concent (%)
106.5	4.9	18.7

APPENDIX C

PERCOLATION TESTING AND ANALYSES

Field Percolation Testing - Constant Head

Client: Borstein Enterprises

Job. No.: 3016.00

Date Tested: 9/7/2021

Test by: ddalbus

Location: P-1

Top of Casing to Bottom of Well (ft): 15

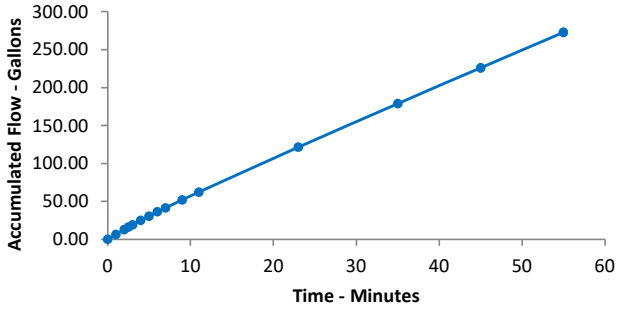
Elev. of Ground Surface (ft):

Diam. of Test Hole (in): 8

Diam. of Casing (in): 3

Ht. to Top of Casing (ft): 0.3

Water Tempurature (C°): 21



Constant Head

Elapsed Time (minutes)	Time	Depth to H2O (ft)	Flow Rate (gal./min.)	Total H_2O used (gal)
0	9:35	12.5	6.60	0.00
1	9:36	12.5	6.40	6.50
2	9:37	12.5	6.10	13.00
2	9:37	12.5	5.92	16.12
3	9:38	12.5	5.80	19.13
4	9:39	12.5	5.56	24.99
5	9:40	12.50	5.46	30.67
6	9:41	12.50	5.36	36.18
7	9:42	12.50	5.20	41.59
9	9:44	12.50	5.00	52.15
11	9:46	12.50	4.86	62.35
23	9:58	12.30	4.70	121.51
35	10:10	12.3	4.70	178.87
45	10:20	12.30	4.70	225.87
55	10:30	21.30	4.70	272.87

Field Percolation Testing - Constant Head

Client: Borstein Enterprises

Job. No.: 3016.00

Date Tested: 9/7/2021

Test by: ddalbus

Location: P-2

Top of Casing to Bottom of Well (ft): 30

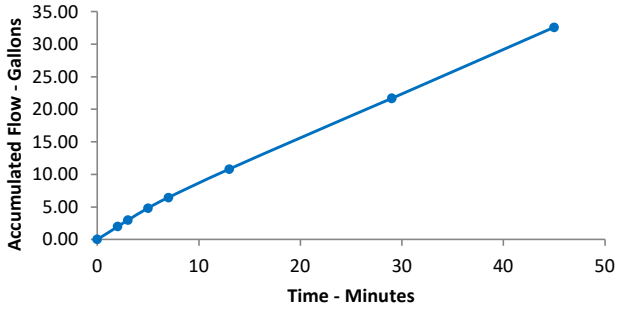
Elev. of Ground Surface (ft):

Diam. of Test Hole (in): 8

Diam. of Casing (in): 3

Ht. to Top of Casing (ft): 0

Water Tempurature (C°): 21



Constant Head

Elapsed Time (minutes)	Time	Depth to H2O (ft)	Flow Rate (gal./min.)	Total H_2O used (gal)
0	12:15	26.95	1.00	0.00
2	12:17	26.95	0.98	1.98
3	12:18	26.85	0.86	2.97
5	12:20	26.8	0.78	4.81
7	12:22	26.8	0.68	6.45
13	12:28	26.8	0.68	10.83
29	12:44	26.80	0.68	21.71
45	13:00	26.80	0.68	32.59

INFILTRATION WELL DESIGN

Constant Head
USBR 7300-89 Method
J.N.: 3016.00
Client: Borstein Enterprises
Well No.: P-1

Low Water Table	Condition 1	
High Water Table & Water Below Bottom of Well	Condition 2	
High water Table with Water Above the Well Bottom	Condition 3	
		Units:
Enter Condition (1, 2 or 3):	1	
Ground Surface to Bottom of Well (**h_1**):	14.7	feet
Depth to Water (**h_2**):	12	feet
Height of Water in the Well (h_1-h_2=**h**):	2.7	feet
Radius of Well (**r**):	4.0	Inches
Minimum Volume Required:	361.1	Gal.
Discharge Rate of Water Into Well for Steady-State Condition (**q**):	4.7	Gal/min.
Temperature (**T**):	21	Celsius
(Viscosity of Water @ Temp. T) / (Viscosity of water @ 20° C) (**V**):	0.9647	ft^3/min.
Unsaturated Distance Between the Water Surface in the Well and the Water table (**T_u**):		Ignore T_u
Factor of Safety:	1	
Coefficient of Permeability @ 20° C (**k_{20}**):	2.55E-02	ft/min.
Design k_{20}:	18.34	in./hr.

The presence or absence of a water table or impervious soil layer within a distance of less than three times that of the water depth in the well (measured from the water surface) will enable the water table to be classified as **Condition I**, **Condition II**, **Condtion III**.

Low Water Table-When the distance from the water surface in the test well to the ground water table, or to an impervious soil layer which is considered for test puposes to be equivalent to a water table, is greater than three times the depth of water in the well, classify as **Condition I**.

High Water Table-When the distance from the water surface in the test well to the ground water table or to an impervious layer is less than three times the depth of water in the well, a high water table condition exists. Use **Condition II** when the water table or impervious layer is below the well bottom. Use **Condition III** when the water table or impervious layer is above the well bottom.

INFILTRATION WELL DESIGN

Constant Head
USBR 7300-89 Method
J.N.: 3016.00
Client: Borstein Enterprises
Well No.: P-2

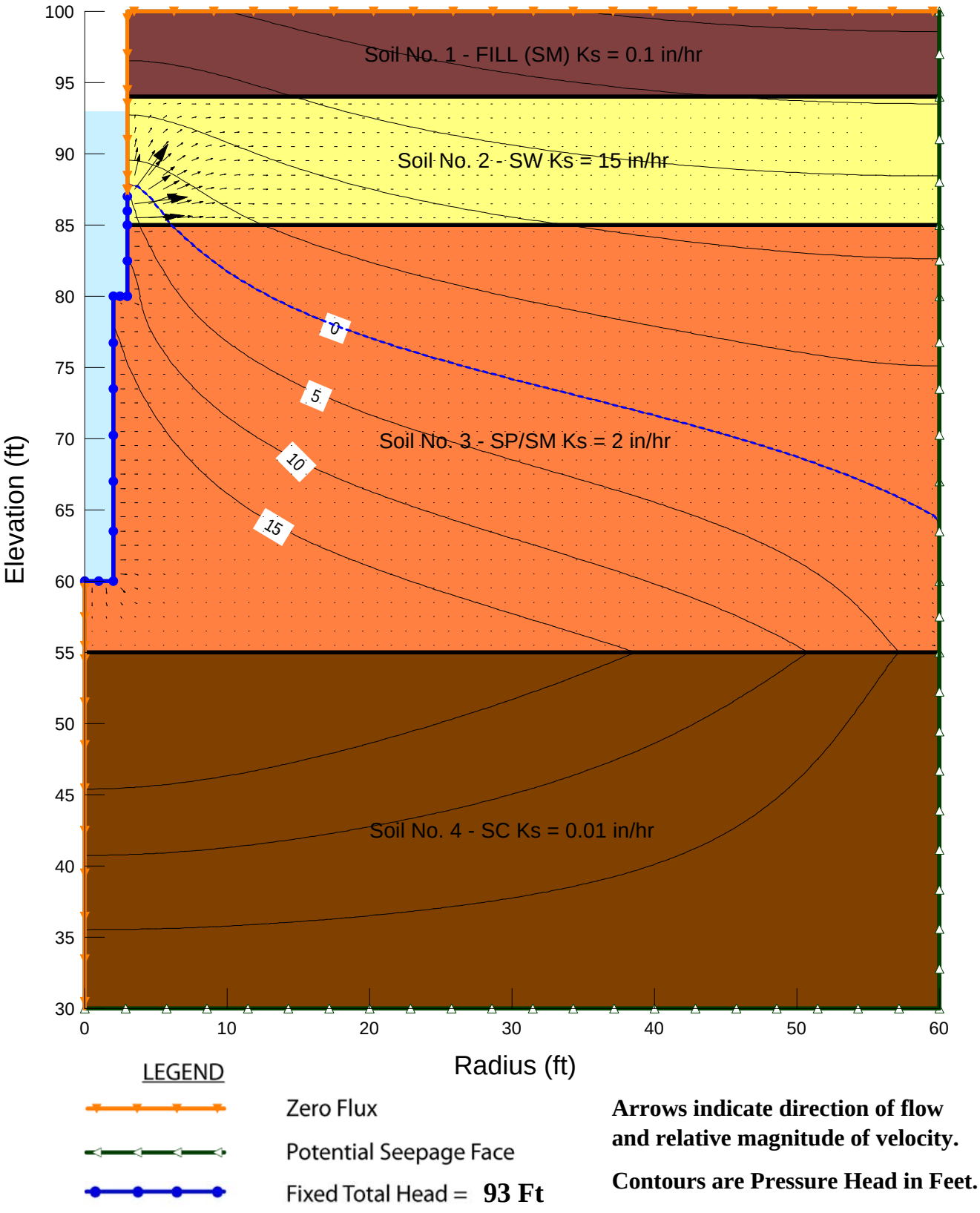
Low Water Table	Condition 1	
High Water Table & Water Below Bottom of Well	Condition 2	
High water Table with Water Above the Well Bottom	Condition 3	
		Units:
Enter Condition (1, 2 or 3):	1	
Ground Surface to Bottom of Well (**h_1**):	30	feet
Depth to Water (**h_2**):	27	feet
Height of Water in the Well (h_1-h_2=**h**):	3	feet
Radius of Well (**r**):	4.0	Inches
Minimum Volume Required:	454.8	Gal.
Discharge Rate of Water Into Well for Steady-State Condition (**q**):	0.68	Gal/min.
Temperature (**T**):	21	Celsius
(Viscosity of Water @ Temp. T) / (Viscosity of water @ 20° C) (**V**):	0.9647	ft^3/min.
Unsaturated Distance Between the Water Surface in the Well and the Water table (**T_u**):		Ignore T_u
Factor of Safety:	1	
Coefficient of Permeability @ 20° C (**k_{20}**):	3.13E-03	ft/min.
Design k_{20}:	2.26	in./hr.

The presence or absence of a water table or impervious soil layer within a distance of less than three times that of the water depth in the well (measured from the water surface) will enable the water table to be classified as **Condition I**, **Condition II**, **Condtion III**.

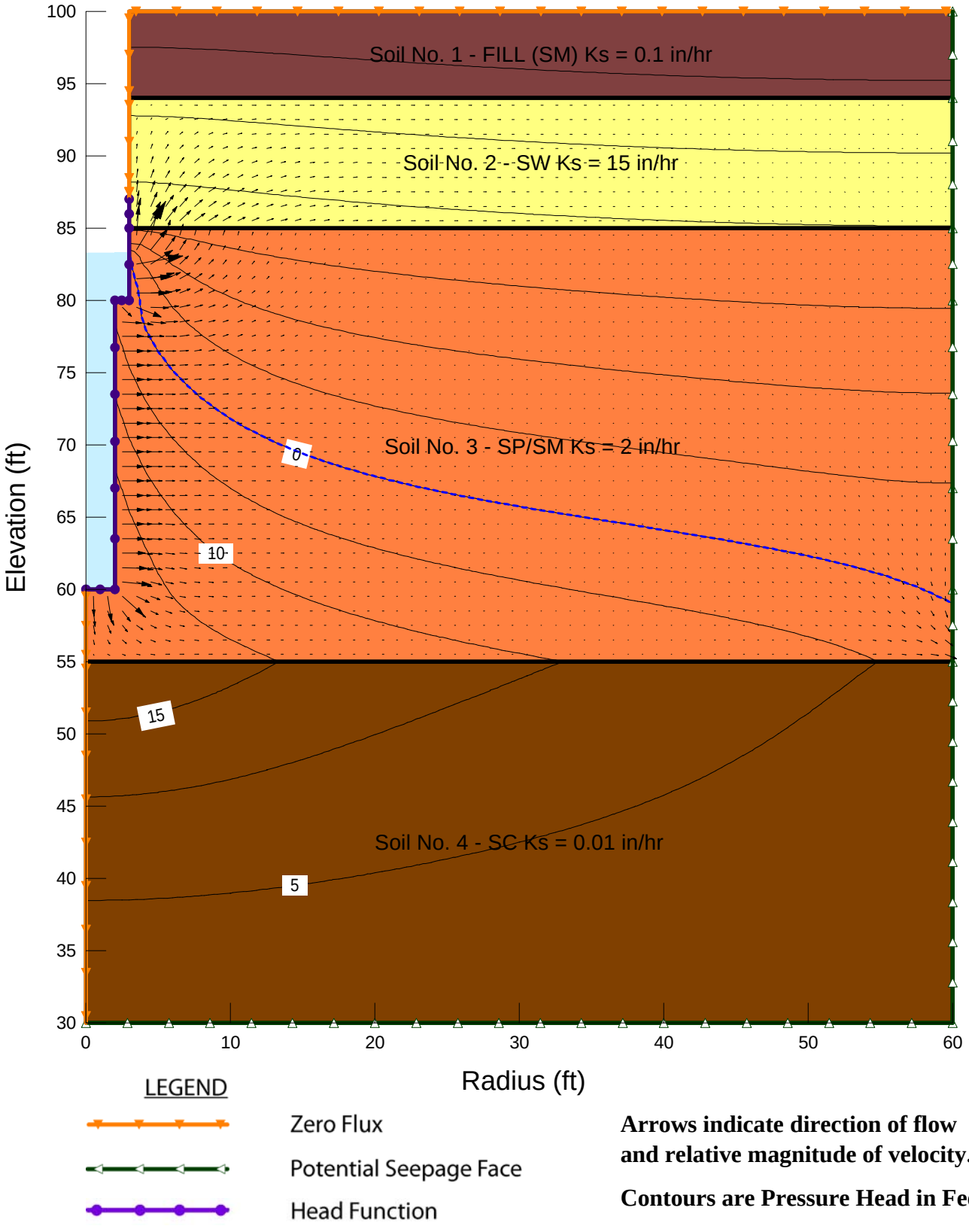
Low Water Table-When the distance from the water surface in the test well to the ground water table, or to an impervious soil layer which is considered for test puposes to be equivalent to a water table, is greater than three times the depth of water in the well, classify as **Condition I**.

High Water Table-When the distance from the water surface in the test well to the ground water table or to an impervious layer is less than three times the depth of water in the well, a high water table condition exists. Use **Condition II** when the water table or impervious layer is below the well bottom. Use **Condition III** when the water table or impervious layer is above the well bottom.

STEADY STATE



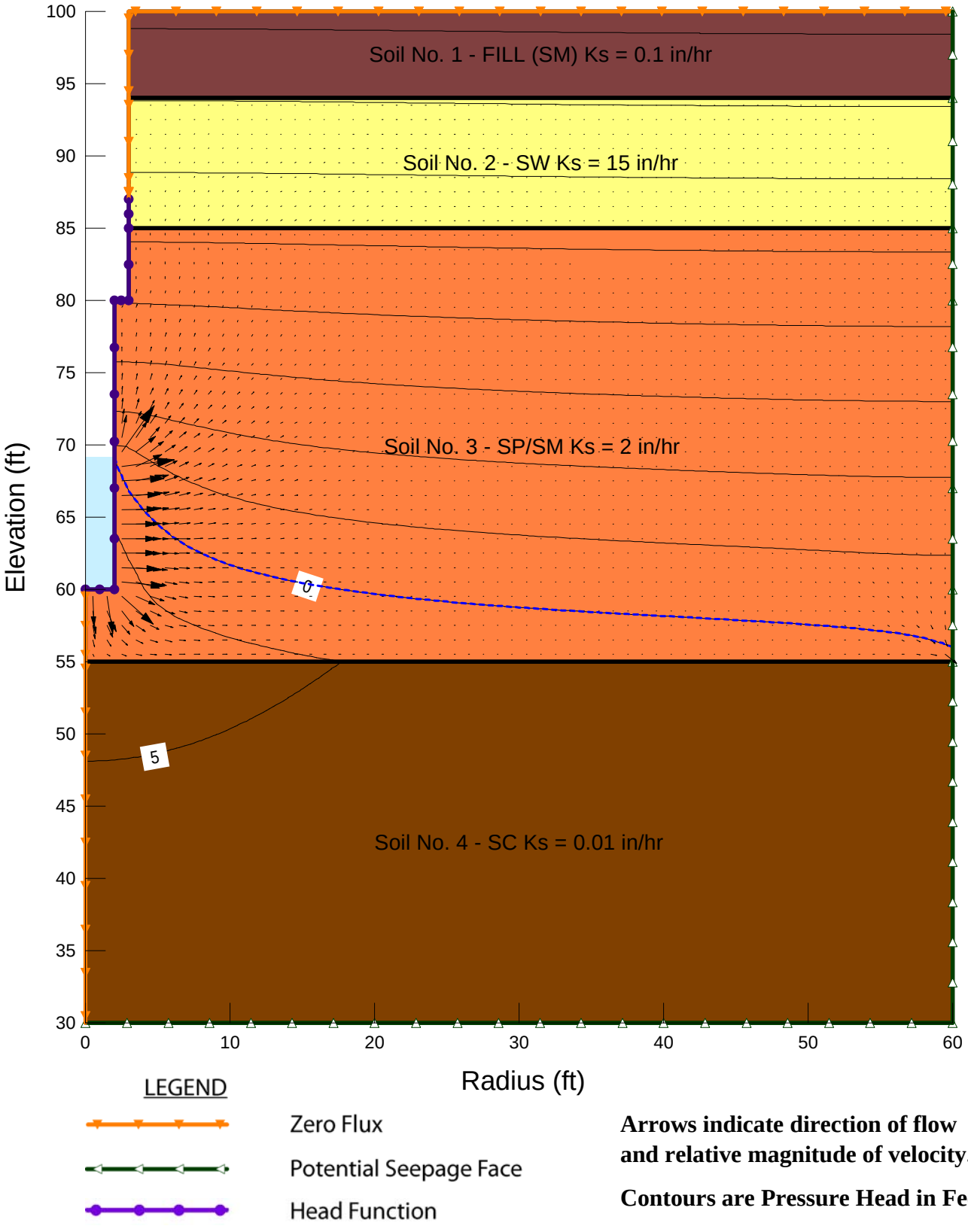
TRANSIENT @ 0.5 hrs



Arrows indicate direction of flow and relative magnitude of velocity.

Contours are Pressure Head in Feet.

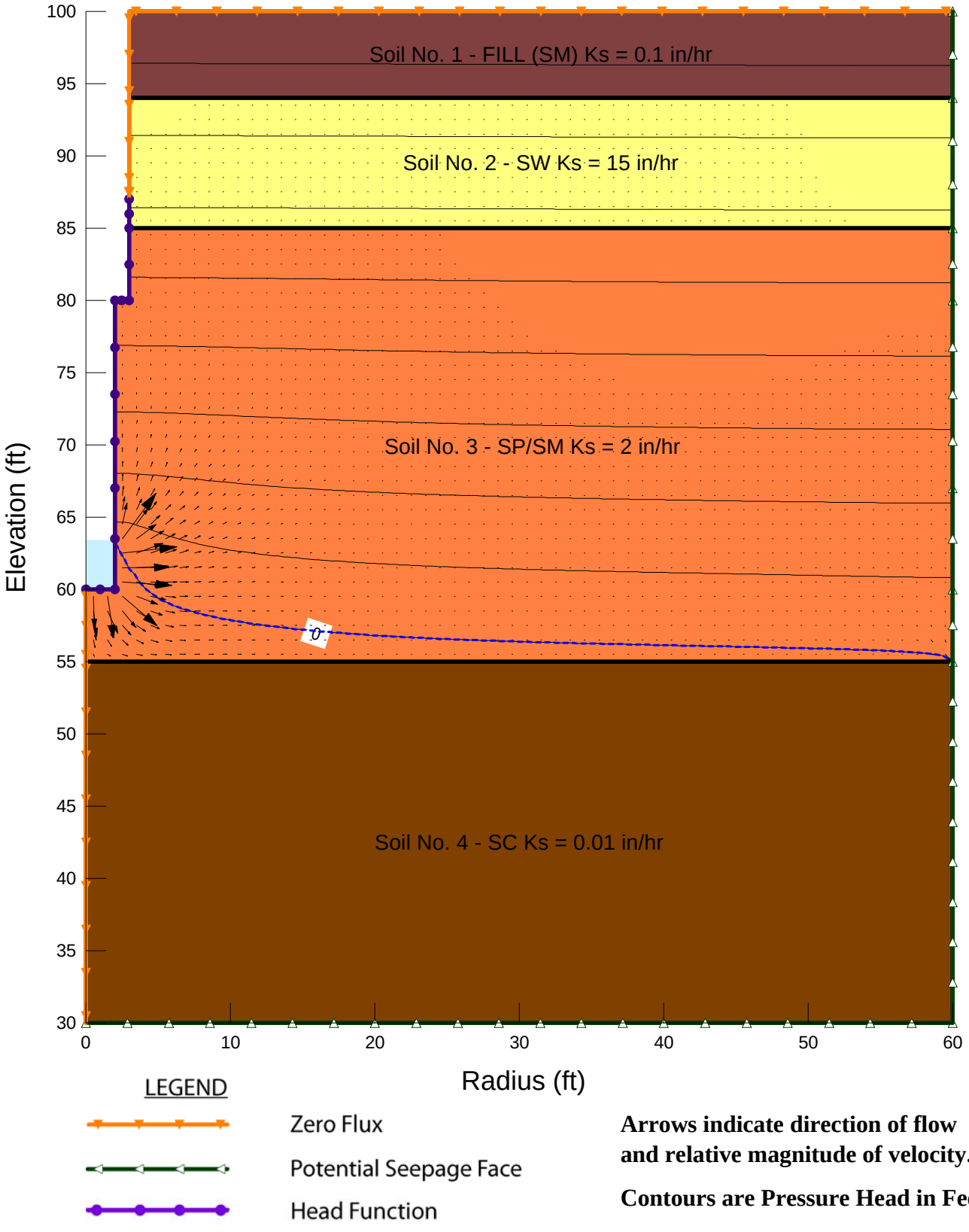
TRANSIENT @ 1 hr



Arrows indicate direction of flow and relative magnitude of velocity.

Contours are Pressure Head in Feet.

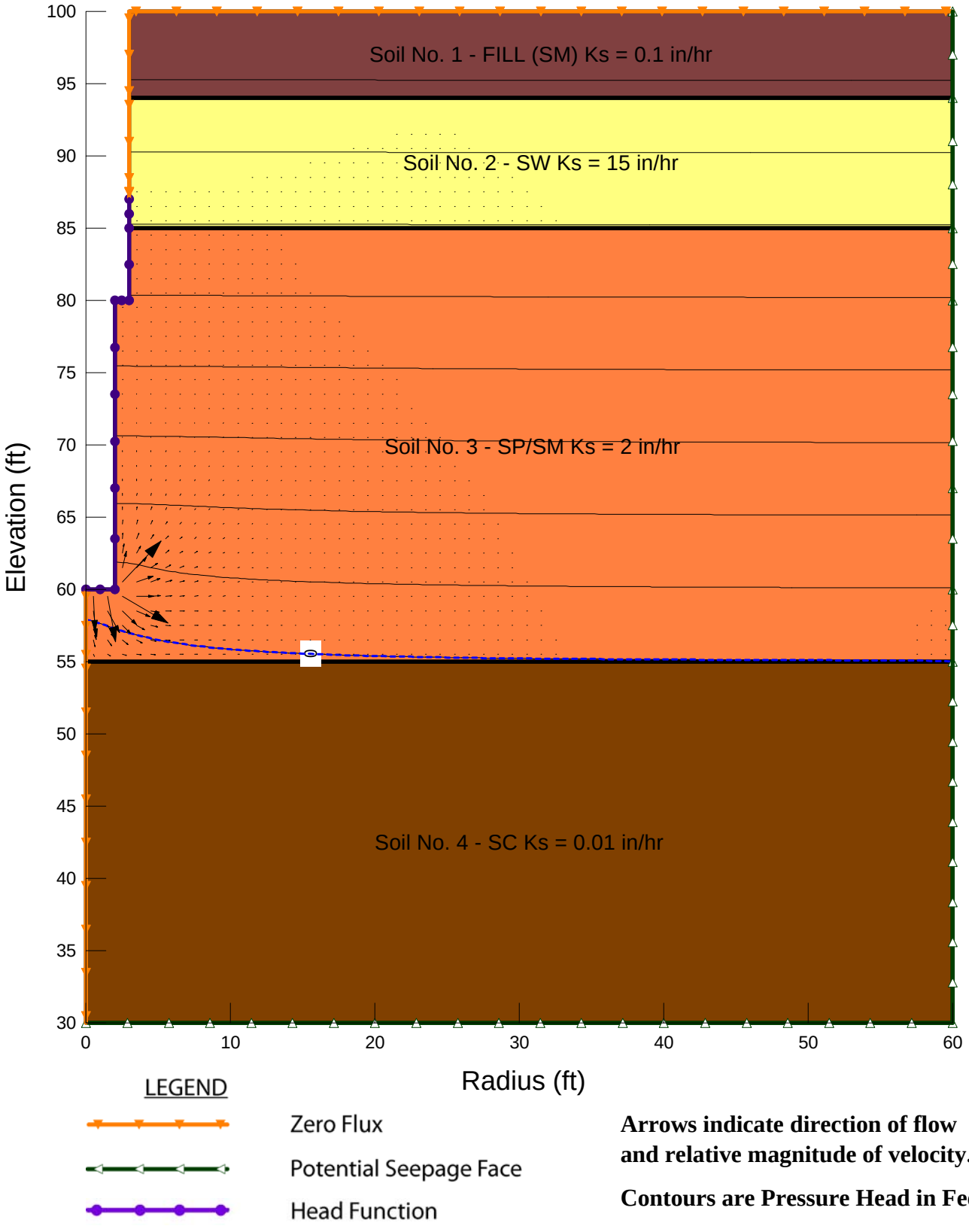
TRANSIENT @ 1.5 hrs



Arrows indicate direction of flow and relative magnitude of velocity.

Contours are Pressure Head in Feet.

TRANSIENT @ 2.5 hrs



Arrows indicate direction of flow and relative magnitude of velocity.

Contours are Pressure Head in Feet.