

Preliminary Water Quality Management Plan

For:

Tract 20727

ID: PROJ-2024-_____

APN 0230-031-67, -68

WQMP-2024-_____

Prepared for:

All-Era Properties, LLC

PO Box 11503

Carson, CA 90749

310-768-3338

Byron Walker

Prepared by:

Encompass Associates, Inc.

5699 Cousins Place

Rancho Cucamonga, CA 91737

909-684-0093

Aaron Skeers, P.E.

Date: August 7, 2024

Approval Date:_____

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for All-Era Properties, LLC by Encompass Associates, Inc. The WQMP is intended to comply with the requirements of the County of San Bernardino and the NPDES Areawide Stormwater Program requiring the preparation of a WQMP. The undersigned, while it owns the subject property, is responsible for the implementation of the provisions of this plan and will ensure that this plan is amended as appropriate to reflect up-to-date conditions on the site consistent with San Bernardino County's Municipal Storm Water Management Program and the intent of the NPDES Permit for San Bernardino County and the incorporated cities of San Bernardino County within the Santa Ana Region. Once the undersigned transfers its interest in the property, its successors in interest and the city/county shall be notified of the transfer. The new owner will be informed of its responsibility under this WQMP. A copy of the approved WQMP shall be available on the subject site in perpetuity.

"I certify under a penalty of law that the provisions (implementation, operation, maintenance, and funding) of the WQMP have been accepted and that the plan will be transferred to future successors."

Project Data			
Permit/Application Number(s):	WQMP-2024-_____ PROJ-2024-_____	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	Tract 20727	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			APN 0230-031-67, -68
Owner's Signature			
Owner Name: Byron Walker			
Title	Owner		
Company	All-Era Properties, LLC		
Address	PO Box 11503, Carson, CA 90749		
Email	bwalker@alleraproperties.com		
Telephone #	310-768-3338		
Signature			Date

Preparer's Certification

Project Data			
Permit/Application Number(s):	WQMP-2024-_____ PROJ-2024-_____	Grading Permit Number(s):	TBD
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CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			0230-031-67, -68

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan were prepared under my oversight and meet the requirements of Regional Water Quality Control Board Order No. R8-2010-0036."

Engineer:	Aaron T. Skeers, P.E.	PE Stamp Below
Title	President	
Company	Encompass Associates, Inc.	
Address	5699 Cousins Place, Rancho Cucamonga, CA, 91737	
Email	askeers@encompasscivil.com	
Telephone #	909-684-0093	
Signature		
Date		

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Appendix E: Factor of Safety Calculation

Appendix F: Agreement

WQMP Plan (In Back Pocket)

Section 1 Discretionary Permit(s)

Form 1-1 Project Information					
Project Name		Tract 20727			
Project Owner Contact Name:		Byron Walker			
Mailing Address:	PO Box 11503 Carson, CA 90749	E-mail Address:	bwalker@alleraproperties.com	Telephone:	310-768-3338
Permit/Application Number(s):		WQMP-2024-_____ PROJ-2024-_____	Tract/Parcel Map Number(s):		0230-031-67, -68
Additional Information/ Comments:		Notice to homeowners: removal or revision of BMPs described in this document and as constructed is prohibited. Maintenance is required and shall be conducted as described in this document.			
Description of Project:		Subdivision of 68 attached condominium units on two existing parcels, one of which currently developed as a single-family residence. Single-family residences exist to the north, west, east, and south. In addition to the residential buildings, the condo site will be comprised of drives and parking. The proposed LID BMPs for this project include 2 underground infiltration systems. Inlets will have filters for pre-treatment. The underground systems are upsized to serve as 100-year mitigation detention systems as well (see separate drainage study for more information). DA 1 comprises the west portion of the site and is 89,739 sf with 26,024 sf pervious and 63,715 sf impervious (buildings, pavement, sidewalks, and driveways). DA 1 ultimately discharges to Buena Vista Drive as surface flow via a parkway drain once the underground infiltration system volume is exceeded. DA 2 is situated on the east portion of the site and is 115,094 sf with 33,377 sf pervious and 81,717 sf impervious (buildings, pavement, sidewalks, and driveways). DA 2 ultimately discharges to Banana Avenue as surface flow via a parkway drain once the underground infiltration system volume is exceeded.			
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.					

Section 2 Project Description

2.1 Project Information

This section of the WQMP should provide the information listed below. The information provided for Conceptual/ Preliminary WQMP should give sufficient detail to identify the major proposed site design and LID BMPs and other anticipated water quality features that impact site planning. Final Project WQMP must specifically identify all BMP incorporated into the final site design and provide other detailed information as described herein.

The purpose of this information is to help determine the applicable development category, pollutants of concern, watershed description, and long term maintenance responsibilities for the project, and any applicable water quality credits. This information will be used in conjunction with the information in Section 3, Site Description, to establish the performance criteria and to select the LID BMP or other BMP for the project or other alternative programs that the project will participate in, which are described in Section 4.

Form 2.1-1 Description of Proposed Project					
1 Development Category (Select all that apply):					
☐ Significant re-development involving the addition or replacement of 5,000 ft ² or more of impervious surface on an already developed site	☒ New development involving the creation of 10,000 ft ² or more of impervious surface collectively over entire site	☐ Automotive repair shops with standard industrial classification (SIC) codes 5013, 5014, 5541, 7532-7534, 7536-7539	☐ Restaurants (with SIC code 5812) where the land area of development is 5,000 ft ² or more		
☐ Hillside developments of 5,000 ft ² or more which are located on areas with known erosive soil conditions or where the natural slope is 25 percent or more	☐ Developments of 2,500 ft ² of impervious surface or more adjacent to (within 200 ft) or discharging directly into environmentally sensitive areas or waterbodies listed on the CWA Section 303(d) list of impaired waters.	☒ Parking lots of 5,000 ft ² or more exposed to storm water	☐ Retail gasoline outlets that are either 5,000 ft ² or more, or have a projected average daily traffic of 100 or more vehicles per day		
☐ Non-Priority / Non-Category Project <i>May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements.</i>					
2 Project Area (ft ²):	204,833	3 Number of Dwelling Units:	68	4 SIC Code:	6513, 6514
5 Is Project going to be phased? Yes ☐ No ☒ <i>If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.</i>					
6 Does Project include roads? Yes ☐ No ☒ <i>If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)</i>					

2.2 Property Ownership/Management

Describe the ownership/management of all portions of the project and site. State whether any infrastructure will transfer to public agencies (City, County, Caltrans, etc.) after project completion. State if a homeowners or property owners association will be formed and be responsible for the long-term maintenance of project stormwater facilities. Describe any lot-level stormwater features that will be the responsibility of individual property owners.

Form 2.2-1 Property Ownership/Management

Describe property ownership/management responsible for long-term maintenance of WQMP stormwater facilities:

The site will be maintained by the Homeowner's Association.

Until the HOA is established, the following will be the contact information:

All-Era Properties, LLC

PO Box 11503

Carson, CA 90749

310-768-3338

Byron Walker

2.3 Potential Stormwater Pollutants

Determine and describe expected stormwater pollutants of concern based on land uses and site activities (refer to Table 3-3 in the TGD for WQMP).

Form 2.3-1 Pollutants of Concern			
Pollutant	Please check: E=Expected, N=Not Expected		Additional Information and Comments
Pathogens (Bacterial / Virus)	E ☒	N ☐	Bacterial indicators are routinely detected in pavement runoff. Can be caused by the transport of human or fecal wastes in runoff. Santa Ana River Reaches 2-4
Phosphorous	E ☒	N ☐	Primary sources are from fertilizers and eroded soils. Eroded soils can be deposited by air to the site.
Nitrogen	E ☒	N ☐	Expected pollutant due to on-site landscaping
Sediment	E ☒	N ☐	Expected pollutant due to on-site landscaping
Metals	E ☒	N ☐	The primary source is emissions from brake pad and tire tread wear associated with driving. Santa Ana River Reach 3
Oil and Grease	E ☒	N ☐	Expected pollutant due to uncovered parking areas. Petroleum hydrocarbon products for motor vehicles and equipment are the primary source.
Trash/Debris	E ☒	N ☐	Even with good housekeeping practices, random trash and debris can still exist on site after being blown in from adjacent properties, roadways, etc.
Pesticides / Herbicides	E ☒	N ☐	These products can be washed off urban landscapes and hardscapes during storm events.
Organic Compounds	E ☒	N ☐	Expected due to on-site landscaping. Includes solvents.
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	
Other:	E ☐	N ☐	

2.4 Water Quality Credits

A water quality credit program is applicable for certain types of development projects if it is not feasible to meet the requirements for on-site LID. Proponents for eligible projects, as described below, can apply for water quality credits that would reduce project obligations for selecting and sizing other treatment BMP or participating in other alternative compliance programs. Refer to Section 6.2 in the TGD for WQMP to determine if water quality credits are applicable for the project.

Form 2.4-1 Water Quality Credits			
1 Project Types that Qualify for Water Quality Credits: <i>Select all that apply</i>			
☐ Redevelopment projects that reduce the overall impervious footprint of the project site. [Credit = % impervious reduced] 50%	Higher density development projects ☐ Vertical density [20%] ☐ 7 units/ acre [5%]	☐ Mixed use development, (combination of residential, commercial, industrial, office, institutional, or other land uses which incorporate design principles that demonstrate environmental benefits not realized through single use projects) [20%]	☐ Brownfield redevelopment (redevelop real property complicated by presence or potential of hazardous contaminants) [25%]
☐ Redevelopment projects in established historic district, historic preservation area, or similar significant core city center areas [10%]	☐ Transit-oriented developments (mixed use residential or commercial area designed to maximize access to public transportation) [20%]	☐ In-fill projects (conversion of empty lots & other underused spaces < 5 acres, substantially surrounded by urban land uses, into more beneficially used spaces, such as residential or commercial areas) [10%]	☐ Live-Work developments (variety of developments designed to support residential and vocational needs) [20%]
2 Total Credit % <u>0%</u> (Total all credit percentages up to a maximum allowable credit of 50 percent)			
Description of Water Quality Credit Eligibility (if applicable)	N/A		

Section 3 Site and Watershed Description

Describe the project site conditions that will facilitate the selection of BMP through an analysis of the physical conditions and limitations of the site and its receiving waters. Identify distinct drainage areas (DA) that collect flow from a portion of the site and describe how runoff from each DA (and sub-watershed DMAs) is conveyed to the site outlet(s). Refer to Section 3.2 in the TGD for WQMP. The form below is provided as an example.

Then complete Forms 3.2 and 3.3 for each DA on the project site. ***If the project has more than one drainage area for stormwater management, then complete additional versions of these forms for each DA / outlet.***

Form 3-1 Site Location and Hydrologic Features			
Site coordinates take GPS measurement at approximate center of site	Latitude <u>34.1006°N</u>	Longitude <u>117.4987°W</u>	Thomas Bros Map page <u>601</u>
1 San Bernardino County climatic region: ☒ Valley ☐ Mountain			
2 Does the site have more than one drainage area (DA): Yes ☒ No ☐ <i>If no, proceed to Form 3-2. If yes, then use this form to show a conceptual schematic describing DMAs and hydrologic feature connecting DMAs to the site outlet(s). An example is provided below that can be modified for proposed project or a drawing clearly showing DMA and flow routing may be attached</i>			
<pre> graph TD DA1[DA1] --> O1[Outlet 1 Buena Vista Dr] DA2[DA2] --> O2[Outlet 2 Banana Ave] </pre>			
Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA		
DA 1 to Outlet 1	Drainage is collected via inlets and directed to BMP1 (underground infiltration). Flows in excess of the LID BMP will pond up in the detention basin at the southwest corner and ultimately out via a parkway drain to Buena Vista Drive		
DA 2 to Outlet 2	Drainage is collected via inlets and directed to BMP2 (underground infiltration). Flows in excess of the LID BMP will pond up in the detention basin at the southeast corner and ultimately out via a parkway drain to Banana Avenue		

Form 3-2 Existing Hydrologic Characteristics for Drainage Areas				
For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DA 1 / DMA A	DA 2 / DMA A		
1 DMA drainage area (ft ²)	89,739	115,094		
2 Existing site impervious area (ft ²)	0	11,248		
3 Antecedent moisture condition <i>For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf</i>	2	2		
4 Hydrologic soil group <i>Refer to Watershed Mapping Tool – http://sbcounty.permitrack.com/WAP</i>	A	A		
5 Longest flowpath length (ft)	400	400		
6 Longest flowpath slope (ft/ft)	0.02	0.02		
7 Current land cover type(s) <i>Select from Fig C-3 of Hydrology Manual</i>	Grass	Grass, SFR		
8 Pre-developed pervious area condition: <i>Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating</i>	Poor (50%)	Poor (50%)		

Form 3-3 Watershed Description for Drainage Areas

Receiving waters <i>Refer to Watershed Mapping Tool -</i> http://sbcounty.permitrack.com/WAP <i>See "Drainage Facilities" link at this website</i>	West Fontana Channel San Sevaine Channel Santa Ana River Reach 4 Santa Ana River Reach 3 Prado Flood Control Basin Santa Ana River Reach 2 Santa Ana River Reach 1 Pacific Ocean
Applicable TMDLs <i>Refer to Local Implementation Plan</i>	Santa Ana River, Reach 3: Pathogens
303(d) listed impairments <i>Refer to Local Implementation Plan and Watershed Mapping Tool -</i> http://sbcounty.permitrack.com/WAP and State Water Resources Control Board website - http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml	Santa Ana River, Reach 4: Indicator Bacteria Santa Ana River, Reach 3: Copper, Lead, Indicator Bacteria Prado Flood Control Basin - pH
Environmentally Sensitive Areas (ESA) <i>Refer to Watershed Mapping Tool -</i> http://sbcounty.permitrack.com/WAP	No
Unlined Downstream Water Bodies <i>Refer to Watershed Mapping Tool -</i> http://sbcounty.permitrack.com/WAP	Santa Ana River
Hydrologic Conditions of Concern	☐ Yes Complete Hydrologic Conditions of Concern (HCOC) Assessment. Include Forms 4.2-2 through Form 4.2-5 and Hydromodification BMP Form 4.3-10 in submittal ☒ No
Watershed-based BMP included in a RWQCB approved WAP	☐ Yes Attach verification of regional BMP evaluation criteria in WAP • More Effective than On-site LID • Remaining Capacity for Project DCV • Upstream of any Water of the US • Operational at Project Completion • Long-Term Maintenance Plan ☒ No

Section 4 Best Management Practices (BMP)

4.1 Source Control BMP

4.1.1 Pollution Prevention

Non-structural and structural source control BMP are required to be incorporated into all new development and significant redevelopment projects. Form 4.1-1 and 4.1-2 are used to describe specific source control BMPs used in the WQMP or to explain why a certain BMP is not applicable. Table 7-3 of the TGD for WQMP provides a list of applicable source control BMP for projects with specific types of potential pollutant sources or activities. The source control BMP in this table must be implemented for projects with these specific types of potential pollutant sources or activities.

The preparers of this WQMP have reviewed the source control BMP requirements for new development and significant redevelopment projects. The preparers have also reviewed the specific BMP required for project as specified in Forms 4.1-1 and 4.1-2. All applicable non-structural and structural source control BMP shall be implemented in the project.

Form 4.1-1 Non-Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N1	Education of Property Owners, Tenants and Occupants on Stormwater BMPs	☒	☐	Property owner shall be provided educational material including but not limited to: litter/trash collection program, water conservation, and guidelines on stormwater quality consistent with and County guidelines. Training will be required within 6 months of hire dates for new employees, and then annually thereafter
N2	Activity Restrictions	☒	☐	Use restrictions shall include the following: no rubbish, trash, garbage, or other waste material shall be kept or permitted on or adjacent to the site, the common area, or on any public street abutting or visible from the property, except in proper refuse enclosures or DOT 55 gallon drum sanitary containers. No odor shall be permitted to arise therefrom so as to render the property, or any portion thereof, unsanitary, or detrimental to any other property in the vicinity thereof or its occupants. Pesticide application shall be by permitted operators only in accordance with manufacturer's specifications.
N3	Landscape Management BMPs	☒	☐	Plants with similar water requirements shall be grouped in order to reduce excess irrigation runoff, promote surface filtration, and adhere to County landscape design standards. Landscaping shall be maintained monthly or as required by maintenance personnel, and waste disposed and/or recycled in appropriate bins per County requirements. Fertilizers and amendments shall be applied only per manufacturers specifications.
N4	BMP Maintenance	☒	☐	The owner is responsible to ensure BMPs are properly maintained. Maintenance for BMPs are shown in Appendix A
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No medical waste to be stored onsite.
N6	Local Water Quality Ordinances	☒	☐	The project shall comply with any local water quality ordinances as determined by the County of San Bernardino.
N7	Spill Contingency Plan	☒	☐	The owner or agent will prepare and maintain spill contingency plans as required by local, state, and federal requirements. A spill plan for chlorine for the pool is provided in Appendix A. Spill absorbent materials shall be kept on-site. All employees will be trained in spill contingency planning, spill prevention, notification, and cleanup.
N8	Underground Storage Tank Compliance	☐	☒	No proposed USTs
N9	Hazardous Materials Disclosure Compliance	☒	☐	Pool chemicals (chlorine) require careful handling by qualified, trained personnel only. Limit storage to 5 separate 1 gallon sealed containers. Storage and usage shall be limited to the immediate pool area.

Form 4.1-1 Non-Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, if not applicable, state reason
		Included	Not Applicable	
N10	Uniform Fire Code Implementation	☒	☐	Pool chemicals (chlorine) require careful handling by qualified, trained personnel only. Limit storage to 5 separate 1 gallon sealed containers. Storage and usage shall be limited to the immediate pool area.
N11	Litter/Debris Control Program	☒	☐	The owner shall implement trash management and litter control procedures to prevent off-site migration of trash. Specifically, the owner/operator will inspect the site on a daily basis and will ensure that all litter is removed for proper disposal on a regular basis.
N12	Employee Training	☒	☐	Owner/operator shall provide a training program for all employees, within 3 months of initial hiring, and annually thereafter. Include a litter/trash collection program, water conservation, and guidelines on stormwater quality consistent with County guidelines.
N13	Housekeeping of Loading Docks	☐	☒	No loading docks on this project
N14	Catch Basin Inspection Program	☒	☐	Catch basins to be maintained as part of routine landscape maintenance, including inspection, removal of debris and trash (with proper disposal). Owner will have at least 80% of drainage facilities inspected, cleaned and maintained on an annual basis and 100% of the facilities included in a two-year period.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	Parking lots shall be vacuum swept at least twice annually, prior to the storm season in the late summer or early fall, to reduce the amount of sediment, garden waste, and trash entering the storm drain systems
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	Project is not a public agency project.
N17	Comply with all other applicable NPDES permits	☒	☐	Project will comply with NPDES requirements during and after construction, including compliance with a site-specific SWPPP which meets State General Construction Permit requirements

Form 4.1-2 Structural Source Control BMPs				
Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S1	Provide storm drain system stencilling and signage (CASQA New Development BMP Handbook SD-13)	☒	☐	Management company to regularly inspect catch basin stencil (see exhibit, "NO DUMPING/DRAINS TO RIVER") to ensure it is legible and to have it inspected quarterly and reapplied as needed.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	No outdoor material storage proposed
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	Trash and waste storage areas shall be designed to reduce pollution introduction and will comply with local ordinances and requirements. The proposed trash enclosure will have a roof, paved underneath and the paved grades surrounding the enclosure will be such to prevent stormwater from entering the trash enclosure area.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (Statewide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	☒	☐	The irrigation system will be electronically controlled and set for optimum water timing. Irrigation duration times shall be short to minimize the potential for overwatering and runoff. Irrigation shall be tested monthly as part of landscape maintenance and repairs made as part of inspection. Malfunctions reported at other times shall be repaired within 24 hours.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	Landscaping will be designed to be 1-2 inches below top of curb, sidewalk or pavement.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☐	☒	No slopes with significant runoff are proposed.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	No docks are proposed for this project.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	No covered maintenance bays
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	Vehicle washing is not part of this project. Vehicle washing is prohibited.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	No outdoor processing is proposed.

Form 4.1-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	There is no equipment washing proposed for this project. Washing of equipment is prohibited on-site.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	There is no fueling proposed for this project.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	No hillsides on site.
S14	Wash water control for food preparation areas	☐	☒	There is no food preparation proposed for this project.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	There is no car washing proposed for this project.

4.1.2 Preventative LID Site Design Practices

Site design practices associated with new LID requirements in the MS4 Permit should be considered in the earliest phases of a project. Preventative site design practices can result in smaller DCV for LID BMP and hydromodification control BMP by reducing runoff generation. Describe site design and drainage plan including:

- A narrative of site design practices utilized or rationale for not using practices
- A narrative of how site plan incorporates preventive site design practices
- Include an attached Site Plan layout which shows how preventative site design practices are included in WQMP

Refer to Section 5.2 of the TGD for WQMP for more details.

Form 4.1-3 Preventative LID Site Design Practices Checklist	
Site Design Practices <i>If yes, explain how preventative site design practice is addressed in project site plan. If no, other LID BMPs must be selected to meet targets</i>	
Minimize impervious areas: Yes ☒ No ☐	Explanation: Street widths are at the minimum allowed.
Maximize natural infiltration capacity: Yes ☒ No ☐	Explanation: Building runoff will be discharged to adjacent landscaping.
Preserve existing drainage patterns and time of concentration: Yes ☒ No ☐	Explanation: Street flow length is longer than original, natural flow path, and is directed to WQ retention facilities, which helps increase time of concentration. Proposed drainage is to the south, consistent with existing drainage.
Disconnect impervious areas: Yes ☒ No ☐	Explanation: Lot runoff drains to infiltration BMP prior to discharge into the existing streets. Street runoff will be directed to on-site BMPs.
Protect existing vegetation and sensitive areas: Yes ☐ No ☒	Explanation: Optimized site layout and grading does not provide for protection of existing vegetation, however there is proposed landscaping throughout the site.
Re-vegetate disturbed areas: Yes ☒ No ☐	Explanation: Landscaping will be installed on lots and in parkways
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐	Explanation: Infiltration BMPs are outside of the building pad, therefore compaction will be less
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes ☐ No ☒	Explanation: Swales are not utilized. All runoff is directed to retention facilities.
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☒ No ☐	Explanation: Common area landscaping and infiltration BMP areas will be staked off to limit compaction during construction.

4.2 Project Performance Criteria

The purpose of this section of the Project WQMP is to establish targets for post-development hydrology based on performance criteria specified in the MS4 Permit. These targets include runoff volume for water quality control (referred to as LID design capture volume), and runoff volume, time of concentration, and peak runoff for protection of any downstream waterbody segments with a HCOC. ***If the project has more than one outlet for stormwater runoff, then complete additional versions of these forms for each DA / outlet.***

Methods applied in the following forms include:

- For LID BMP Design Capture Volume (DCV), the San Bernardino County Stormwater Program requires use of the P₆ method (MS4 Permit Section XI.D.6a.ii) – Form 4.2-1
- For HCOC pre- and post-development hydrologic calculation, the San Bernardino County Stormwater Program requires the use of the Rational Method (San Bernardino County Hydrology Manual Section D). Forms 4.2-2 through Form 4.2-5 calculate hydrologic variables including runoff volume, time of concentration, and peak runoff from the project site pre- and post-development using the Hydrology Manual Rational Method approach. For projects greater than 640 acres (1.0 mi²), the Rational Method and these forms should not be used. For such projects, the Unit Hydrograph Method (San Bernardino County Hydrology Manual Section E) shall be applied for hydrologic calculations for HCOC performance criteria.

Refer to Section 4 in the TGD for WQMP for detailed guidance and instructions.

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 1)

1 Project area DA 1 (ft ²): 89,739	2 Imperviousness after applying preventative site design practices (Imp%): <u>71%</u>	3 Runoff Coefficient (Rc): <u>0.5</u> $R_c = 0.858(\text{Imp}\%)^{1/3} - 0.78(\text{Imp}\%)^{1/2} + 0.774(\text{Imp}\%) + 0.04$
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2\text{yr-1hr}}$ (in): <u>0.542</u> http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html		
5 Compute P_6 , Mean 6-hr Precipitation (inches): <u>0.8</u> $P_6 = \text{Item 4} * C_1$, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)		
6 Drawdown Rate <i>Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.</i>		24-hrs ☐ 48-hrs ☒
7 Compute design capture volume, DCV (ft ³): <u>5872</u> $DCV = 1/12 * [\text{Item 1} * \text{Item 3} * \text{Item 5} * C_2]$, where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963) Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2		

Form 4.2-1 LID BMP Performance Criteria for Design Capture Volume (DA 2)

1 Project area DA 1 (ft ²): 115,094	2 Imperviousness after applying preventative site design practices (Imp%): <u>71%</u>	3 Runoff Coefficient (Rc): <u>0.5</u> $R_c = 0.858(\text{Imp}\%)^{1/3} - 0.78(\text{Imp}\%)^{1/2} + 0.774(\text{Imp}\%) + 0.04$
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2\text{yr-1hr}}$ (in): <u>0.542</u> http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html		
5 Compute P_6 , Mean 6-hr Precipitation (inches): <u>0.8</u> $P_6 = \text{Item 4} * C_1$, where C_1 is a function of site climatic region specified in Form 3-1 Item 1 (Valley = 1.4807; Mountain = 1.909; Desert = 1.2371)		
6 Drawdown Rate <i>Use 48 hours as the default condition. Selection and use of the 24 hour drawdown time condition is subject to approval by the local jurisdiction. The necessary BMP footprint is a function of drawdown time. While shorter drawdown times reduce the performance criteria for LID BMP design capture volume, the depth of water that can be stored is also reduced.</i>		24-hrs ☐ 48-hrs ☒
7 Compute design capture volume, DCV (ft ³): <u>7531</u> $DCV = 1/12 * [\text{Item 1} * \text{Item 3} * \text{Item 5} * C_2]$, where C_2 is a function of drawdown rate (24-hr = 1.582; 48-hr = 1.963) Compute separate DCV for each outlet from the project site per schematic drawn in Form 3-1 Item 2		

Form 4.2-2 Summary of HCOC Assessment

Does project have the potential to cause or contribute to an HCOC in a downstream channel: Yes ☐ No ☒

Go to: <http://sbcounty.permitrack.com/WAP>

If "Yes", then complete HCOC assessment of site hydrology for 2yr storm event using Forms 4.2-3 through 4.2-5 and insert results below
(Forms 4.2-3 through 4.2-5 may be replaced by computer software analysis based on the San Bernardino County Hydrology Manual)

If "No," then proceed to Section 4.3 Project Conformance Analysis

Condition	Runoff Volume (ft ³)	Time of Concentration (min)	Peak Runoff (cfs)
Pre-developed	1 <i>Form 4.2-3 Item 12</i>	2 <i>Form 4.2-4 Item 13</i>	3 <i>Form 4.2-5 Item 10</i>
Post-developed	4 <i>Form 4.2-3 Item 13</i>	5 <i>Form 4.2-4 Item 14</i>	6 <i>Form 4.2-5 Item 14</i>
Difference	7 <i>Item 4 – Item 1</i>	8 <i>Item 5 – Item 2</i>	9 <i>Item 6 – Item 3</i>
Difference (as % of pre-developed)	10 <i>Item 7 / Item 1</i>	11 <i>Item 8 / Item 2</i>	12 <i>Item 9 / Item 3</i>

Form 4.2-3 HCOC Assessment for Runoff Volume

Weighted Curve Number Determination for: <u>Pre-developed DA</u>	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1a Land Cover type								
2a Hydrologic Soil Group (HSG)								
3a DMA Area, ft ² sum of areas of DMA should equal area of DA								
4a Curve Number (CN) use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP								
Weighted Curve Number Determination for: <u>Post-developed DA</u>	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1b Land Cover type								
2b Hydrologic Soil Group (HSG)								
3b DMA Area, ft ² sum of areas of DMA should equal area of DA								
4b Curve Number (CN) use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP								
5 Pre-Developed area-weighted CN:	7 Pre-developed soil storage capacity, S (in): $S = (1000 / \text{Item 5}) - 10$				9 Initial abstraction, I _a (in): $I_a = 0.2 * \text{Item 7}$			
6 Post-Developed area-weighted CN:	8 Post-developed soil storage capacity, S (in): $S = (1000 / \text{Item 6}) - 10$				10 Initial abstraction, I _a (in): $I_a = 0.2 * \text{Item 8}$			
11 Precipitation for 2 yr, 24 hr storm (in): Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/qa/sca_pfds.html								
12 Pre-developed Volume (ft ³): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 9})^2 / ((\text{Item 11} - \text{Item 9} + \text{Item 7}))]$								
13 Post-developed Volume (ft ³): $V_{pre} = (1 / 12) * (\text{Item sum of Item 3}) * [(\text{Item 11} - \text{Item 10})^2 / ((\text{Item 11} - \text{Item 10} + \text{Item 8}))]$								
14 Volume Reduction needed to meet HCOC Requirement, (ft ³): $V_{HCOC} = (\text{Item 13} * 0.95) - \text{Item 12}$								

Form 4.2-4 HCOC Assessment for Time of Concentration

Compute time of concentration for pre and post developed conditions for each DA (For projects using the Hydrology Manual complete the form below)

Variables	Pre-developed DA1 <i>Use additional forms if there are more than 4 DMA</i>				Post-developed DA1 <i>Use additional forms if there are more than 4 DMA</i>			
	DMA A	DMA B	DMA C	DMA D	DMA A	DMA B	DMA C	DMA D
1 Length of flowpath (ft) <i>Use Form 3-2 Item 5 for pre-developed condition</i>								
2 Change in elevation (ft)								
3 Slope (ft/ft), $S_o = \text{Item 2} / \text{Item 1}$								
4 Land cover								
5 Initial DMA Time of Concentration (min) <i>Appendix C-1 of the TGD for WQMP</i>								
6 Length of conveyance from DMA outlet to project site outlet (ft) <i>May be zero if DMA outlet is at project site outlet</i>								
7 Cross-sectional area of channel (ft ²)								
8 Wetted perimeter of channel (ft)								
9 Manning's roughness of channel (n)								
10 Channel flow velocity (ft/sec) $V_{fps} = (1.49 / \text{Item 9}) * (\text{Item 7} / \text{Item 8})^{0.67} * (\text{Item 3})^{0.5}$								
11 Travel time to outlet (min) $T_t = \text{Item 6} / (\text{Item 10} * 60)$								
12 Total time of concentration (min) $T_c = \text{Item 5} + \text{Item 11}$								
13 Pre-developed time of concentration (min):	<i>Minimum of Item 12 pre-developed DMA</i>							
14 Post-developed time of concentration (min):	<i>Minimum of Item 12 post-developed DMA</i>							
15 Additional time of concentration needed to meet HCOC requirement (min):	$T_{C-HCOC} = (\text{Item 14} * 0.95) - \text{Item 13}$							

Form 4.2-5 HCOC Assessment for Peak Runoff

Compute peak runoff for pre- and post-developed conditions

Variables	Pre-developed DA to Project Outlet (Use additional forms if more than 3 DMA)			Post-developed DA to Project Outlet (Use additional forms if more than 3 DMA)										
	DMA A	DMA B	DMA C	DMA A	DMA B	DMA C								
1 Rainfall Intensity for storm duration equal to time of concentration $I_{peak} = 10^{(LOG \text{ Form 4.2-1 Item 4} - 0.6 LOG \text{ Form 4.2-4 Item 5} / 60)}$														
2 Drainage Area of each DMA (ft ²) <i>For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>														
3 Ratio of pervious area to total area <i>For DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>														
4 Pervious area infiltration rate (in/hr) <i>Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP</i>														
5 Maximum loss rate (in/hr) $F_m = \text{Item 3} * \text{Item 4}$ <i>Use area-weighted F_m from DMA with outlet at project site outlet, include upstream DMA (Using example schematic in Form 3-1, DMA A will include drainage from DMA C)</i>														
6 Peak Flow from DMA (cfs) $Q_p = \text{Item 2} * 0.9 * (\text{Item 1} - \text{Item 5})$														
7 Time of concentration adjustment factor for other DMA to site discharge point <i>Form 4.2-4 Item 12 DMA / Other DMA upstream of site discharge point (If ratio is greater than 1.0, then use maximum value of 1.0)</i>	DMA A	n/a		n/a										
	DMA B		n/a		n/a									
	DMA C		n/a			n/a								
8 Pre-developed Q_p at T_c for DMA A: $Q_p = \text{Item } 6_{DMAA} + [\text{Item } 6_{DMAB} * (\text{Item } 1_{DMAA} - \text{Item } 5_{DMAB}) / (\text{Item } 1_{DMAB} - \text{Item } 5_{DMAB}) * \text{Item } 7_{DMAA/2}] + [\text{Item } 6_{DMAC} * (\text{Item } 1_{DMAA} - \text{Item } 5_{DMAC}) / (\text{Item } 1_{DMAC} - \text{Item } 5_{DMAC}) * \text{Item } 7_{DMAA/3}]$	9 Pre-developed Q_p at T_c for DMA B: $Q_p = \text{Item } 6_{DMAB} + [\text{Item } 6_{DMAA} * (\text{Item } 1_{DMAB} - \text{Item } 5_{DMAA}) / (\text{Item } 1_{DMAA} - \text{Item } 5_{DMAA}) * \text{Item } 7_{DMAB/1}] + [\text{Item } 6_{DMAC} * (\text{Item } 1_{DMAB} - \text{Item } 5_{DMAC}) / (\text{Item } 1_{DMAC} - \text{Item } 5_{DMAC}) * \text{Item } 7_{DMAB/3}]$			10 Pre-developed Q_p at T_c for DMA C: $Q_p = \text{Item } 6_{DMAC} + [\text{Item } 6_{DMAA} * (\text{Item } 1_{DMAC} - \text{Item } 5_{DMAA}) / (\text{Item } 1_{DMAA} - \text{Item } 5_{DMAA}) * \text{Item } 7_{DMAC/1}] + [\text{Item } 6_{DMAB} * (\text{Item } 1_{DMAC} - \text{Item } 5_{DMAB}) / (\text{Item } 1_{DMAB} - \text{Item } 5_{DMAB}) * \text{Item } 7_{DMAC/2}]$										
10 Peak runoff from pre-developed condition confluence analysis (cfs): <i>Maximum of Item 8, 9, and 10 (including additional forms as needed)</i>														
11 Post-developed Q_p at T_c for DMA A: <i>Same as Item 8 for post-developed values</i>	12 Post-developed Q_p at T_c for DMA B: <i>Same as Item 9 for post-developed values</i>		13 Post-developed Q_p at T_c for DMA C: <i>Same as Item 10 for post-developed values</i>											
14 Peak runoff from post-developed condition confluence analysis (cfs): <i>Maximum of Item 11, 12, and 13 (including additional forms as needed)</i>														
15 Peak runoff reduction needed to meet HCOC Requirement (cfs): $Q_{p-HCOC} = (\text{Item 14} * 0.95) - \text{Item 10}$														

4.3 Project Conformance Analysis

Complete the following forms for each project site DA to document that the proposed LID BMPs conform to the project DCV developed to meet performance criteria specified in the MS4 Permit (WQMP Template Section 4.2). For the LID DCV, the forms are ordered according to hierarchy of BMP selection as required by the MS4 Permit (see Section 5.3.1 in the TGD for WQMP). The forms compute the following for on-site LID BMP:

- Site Design and Hydrologic Source Controls (Form 4.3-2)
- Retention and Infiltration (Form 4.3-3)
- Harvested and Use (Form 4.3-4) or
- Biotreatment (Form 4.3-5).

At the end of each form, additional fields facilitate the determination of the extent of mitigation provided by the specific BMP category, allowing for use of the next category of BMP in the hierarchy, if necessary.

The first step in the analysis, using Section 5.3.2.1 of the TGD for WQMP, is to complete Forms 4.3-1 and 4.3-3) to determine if retention and infiltration BMPs are infeasible for the project. For each feasibility criterion in Form 4.3-1, if the answer is “Yes,” provide all study findings that includes relevant calculations, maps, data sources, etc. used to make the determination of infeasibility.

Next, complete Forms 4.3-2 and 4.3-4 to determine the feasibility of applicable HSC and harvest and use BMPs, and, if their implementation is feasible, the extent of mitigation of the DCV.

If no site constraints exist that would limit the type of BMP to be implemented in a DA, evaluate the use of combinations of LID BMPs, including all applicable HSC BMPs to maximize on-site retention of the DCV. If no combination of BMP can mitigate the entire DCV, implement the single BMP type, or combination of BMP types, that maximizes on-site retention of the DCV within the minimum effective area.

If the combination of LID HSC, retention and infiltration, and harvest and use BMPs are unable to mitigate the entire DCV, then biotreatment BMPs may be implemented by the project proponent. If biotreatment BMPs are used, then they must be sized to provide sufficient capacity for effective treatment of the remainder of the volume-based performance criteria that cannot be achieved with LID BMPs (TGD for WQMP Section 5.4.4.2).

Under no circumstances shall any portion of the DCV be released from the site without effective mitigation and/or treatment.

Form 4.3-1 Infiltration BMP Feasibility

Feasibility Criterion – Complete evaluation for each DA on the Project Site

1 Would infiltration BMP pose significant risk for groundwater related concerns? Yes ☐ No ☒

Refer to Section 5.3.2.1 of the TGD for WQMP

If Yes, Provide basis: (attach)

2 Would installation of infiltration BMP significantly increase the risk of geotechnical hazards? Yes ☐ No ☒

(Yes, if the answer to any of the following questions is yes, as established by a geotechnical expert):

- The location is less than 50 feet away from slopes steeper than 15 percent
- The location is less than eight feet from building foundations or an alternative setback.
- A study certified by a geotechnical professional or an available watershed study determines that stormwater infiltration would result in significantly increased risks of geotechnical hazards.

If Yes, Provide basis: (attach)

3 Would infiltration of runoff on a Project site violate downstream water rights? Yes ☐ No ☒

If Yes, Provide basis: (attach)

4 Is proposed infiltration facility located on hydrologic soil group (HSG) D soils or does the site geotechnical investigation indicate presence of soil characteristics, which support categorization as D soils? Yes ☐ No ☒

If Yes, Provide basis: (attach)

5 Is the design infiltration rate, after accounting for safety factor of 2.0, below proposed facility less than 0.3 in/hr (accounting for soil amendments)? Yes ☐ No ☒

If Yes, Provide basis: (attach)

6 Would on-site infiltration or reduction of runoff over pre-developed conditions be partially or fully inconsistent with watershed management strategies as defined in the WAP, or impair beneficial uses? Yes ☐ No ☒

See Section 3.5 of the TGD for WQMP and WAP

If Yes, Provide basis:

7 Any answer from Item 1 through Item 3 is "Yes": Yes ☐ No ☒

If yes, infiltration of any volume is not feasible onsite. Proceed to Form 4.3-4, Harvest and Use BMP. If no, then proceed to Item 9 below.

8 Any answer from Item 4 through Item 6 is "Yes": Yes ☐ No ☒

If yes, infiltration is permissible but is not required to be considered. Proceed to Form 4.3-2, Hydrologic Source Control BMP.

If no, then proceed to Item 9, below.

9 All answers to Item 1 through Item 6 are "No": Yes ☒ No ☐

Infiltration of the full DCV is potentially feasible, LID infiltration BMP must be designed to infiltrate the full DCV to the MEP.

Proceed to Form 4.3-2, Hydrologic Source Control BMP.

4.3.1 Site Design Hydrologic Source Control BMP

Section XI.E. of the Permit emphasizes the use of LID preventative measures; and the use of LID HSC BMPs reduces the portion of the DCV that must be addressed in downstream BMPs. Therefore, all applicable HSC shall be provided except where they are mutually exclusive with each other, or with other BMPs. Mutual exclusivity may result from overlapping BMP footprints such that either would be potentially feasible by itself, but both could not be implemented. Please note that while there are no numeric standards regarding the use of HSC, if a project cannot feasibly meet BMP sizing requirements or cannot fully address HCOCs, feasibility of all applicable HSC must be part of demonstrating that the BMP system has been designed to retain the maximum feasible portion of the DCV. Complete Form 4.3-2 to identify and calculate estimated retention volume from implementing site design HSC BMP. Refer to Section 5.4.1 in the TGD for more detailed guidance.

Form 4.3-2 Site Design Hydrologic Source Control BMPs			
1 Implementation of Impervious Area Dispersion BMP (i.e. routing runoff from impervious to pervious areas), excluding impervious areas planned for routing to on-lot infiltration BMP: Yes ☐ No ☒ <i>If yes, complete Items 2-5; If no, proceed to Item 6</i>	DA <u>1</u> DMA <u>A</u> BMP Type	DA DMA BMP Type	DA DMA BMP Type
2 Total impervious area draining to pervious area (ft ²)	-	-	-
3 Ratio of pervious area receiving runoff to impervious area			
4 Retention volume achieved from impervious area dispersion (ft ³) $V = \text{Item 2} * \text{Item 3} * (0.5/12)$, assuming retention of 0.5 inches of runoff			
5 Sum of retention volume achieved from impervious area dispersion (ft ³): <u>0</u> $V_{\text{retention}} = \text{Sum of Item 4 for all BMPs}$			
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ <i>If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14</i>	DA <u>1</u> DMA <u>A</u> BMP Type	DA <u>1</u> DMA BMP Type	DA <u>1</u> DMA BMP Type
7 Ponding surface area (ft ²)			
8 Ponding depth (ft) (for paver voids: 10% of 4" depth)			
9 Surface area of amended soil/gravel (ft ²)			
10 Average depth of amended soil/gravel (ft)			
11 Average porosity of amended soil/gravel			
12 Retention volume achieved from on-lot infiltration (ft ³) $V_{\text{retention}} = (\text{Item 7} * \text{Item 8}) + (\text{Item 9} * \text{Item 10} * \text{Item 11})$			
13 Runoff volume retention from on-lot infiltration (ft ³): $V_{\text{retention}} = \text{Sum of Item 12 for all BMPs}$			

Form 4.3-2 cont. Site Design Hydrologic Source Control BMPs			
14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes ☐ No ☒ <i>If yes, complete Items 15-20. If no, proceed to Item 21</i>	DA <u>1</u> DMA <u>A</u> BMP Type	DA <u>1</u> DMA <u>B</u> BMP Type	DA <u>1</u> DMA <u>C</u> BMP Type
15 Rooftop area planned for ET BMP (ft ²)			
16 Average wet season ET demand (in/day) <i>Use local values, typical ~ 0.1</i>			
17 Daily ET demand (ft ³ /day) <i>Item 15 * (Item 16 / 12)</i>			
18 Drawdown time (hrs) <i>Copy Item 6 in Form 4.2-1</i>			
19 Retention Volume (ft ³) <i>V_{retention} = Item 17 * (Item 18 / 24)</i>			
20 Runoff volume retention from evapotranspiration BMPs (ft ³): 0 <i>V_{retention} = Sum of Item 19 for all BMPs</i>			
21 Implementation of Street Trees: Yes ☐ No ☒ <i>If yes, complete Items 20-2. If no, proceed to Item 24</i>	DA <u>1</u> DMA <u>A</u> BMP Type	DA <u>1</u> DMA <u>B</u> BMP Type	DA <u>1</u> DMA <u>C</u> BMP Type
22 Number of Street Trees			
23 Average canopy cover over impervious area (ft ²)			
24 Runoff volume retention from street trees (ft ³) <i>V_{retention} = Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches</i>			
25 Runoff volume retention from street tree BMPs (ft ³): 0 <i>V_{retention} = Sum of Item 24 for all BMPs</i>			
26 Implementation of residential rain barrels/cisterns: Yes ☐ No ☒ <i>If yes, complete Items 27-28; If no, proceed to Item 29</i>	DA <u>1</u> DMA <u>A</u> BMP Type	DA <u>1</u> DMA <u>B</u> BMP Type	DA <u>1</u> DMA <u>C</u> BMP Type
27 Number of rain barrels/cisterns			
28 Runoff volume retention from rain barrels/cisterns (ft ³) <i>V_{retention} = Item 27 * 3</i>			
29 Runoff volume retention from residential rain barrels/Cisterns (ft ³): 0 <i>V_{retention} = Sum of Item 28 for all BMPs</i>			
30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: 0 <i>Sum of Items 5, 13, 20, 25 and 29</i>			

4.3.2 Infiltration BMPs

Use Form 4.3-3 to compute on-site retention of runoff from proposed retention and infiltration BMPs. Volume retention estimates are sensitive to the percolation rate used, which determines the amount of runoff that can be infiltrated within the specified drawdown time. The infiltration safety factor reduces field measured percolation to account for potential inaccuracy associated with field measurements, declining BMP performance over time, and compaction during construction. Appendix D of the TGD for WQMP provides guidance on estimating an appropriate safety factor to use in Form 4.3-3.

If site constraints limit the use of BMPs to a single type and implementation of retention and infiltration BMPs mitigate no more than 40% of the DCV, then they are considered infeasible and the Project Proponent may evaluate the effectiveness of BMPs lower in the LID hierarchy of use (Section 5.5.1 of the TGD for WQMP)

If implementation of infiltrations BMPs is feasible as determined using Form 4.3-1, then LID infiltration BMPs shall be implemented to the MEP (section 4.1 of the TGD for WQMP).

Form 4.3-3 Infiltration LID BMP - including underground BMPs

1 Remaining LID DCV not met by site design HSC BMP (ft ³): DA1: <u>5872</u> DA2: <u>7531</u> $V_{unmet} = \text{Form 4.2-1 Item 7} - \text{Form 4.3-2 Item 30}$			
BMP Type Use columns to the right to compute runoff volume retention from proposed infiltration BMP (select BMP from Table 5-4 in TGD for WQMP) - Use additional forms for more BMPs	DA <u>1</u> BMP Type <u>Underground</u> <u>Infiltration</u>	DA <u>2</u> BMP Type <u>Underground</u> <u>Infiltration</u>	
2 Infiltration rate of underlying soils (in/hr) See Section 5.4.2 and Appendix D of the TGD for WQMP for minimum requirements for assessment methods	1.2	1.2	
3 Infiltration safety factor See TGD Section 5.4.2 and Appendix D	3	3	
4 Design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$	0.4	0.4	
5 Ponded water drawdown time (hr) Copy Item 6 in Form 4.2-1	48	48	
6 Maximum ponding depth (ft) BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details	1.6	1.6	
7 Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$			
8 Infiltrating surface area, SA_{BMP} (ft ²) the lesser of the area needed for infiltration of full DCV or minimum space requirements from Table 5.7 of the TGD for WQMP	3700	4800	
9 Amended soil depth, d_{media} (ft) Only included in certain BMP types, see Table 5-4 in the TGD for WQMP for reference to BMP design details			
10 Amended soil porosity			
11 Gravel depth, d_{media} (ft) Only included in certain BMP types, see Table 5-4 of the TGD for WQMP for BMP design details			
12 Gravel porosity			
13 Duration of storm as basin is filling (hrs) Typical ~ 3hrs	3	3	
14 Above Ground Retention Volume (ft ³) $V_{retention} = \text{Item 8} * [\text{Item 7} + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$	370	480	
15 Underground Retention Volume (ft ³) Volume determined using manufacturer's specifications and calculations	5744	7521	
16 Total Retention Volume from LID Infiltration BMPs: DA1: <u>6114</u> DA2: <u>8001</u> (Sum of Items 14 and 15 for all infiltration BMP included in plan)			
17 Fraction of DCV achieved with infiltration BMP: <u>100</u> % (over) $\text{Retention\%} = \text{Item 16} / \text{Form 4.2-1 Item 7}$			
18 Is full LID DCV retained on-site with combination of hydrologic source control and LID retention and infiltration BMPs? Yes ☒ No ☐ If yes, demonstrate conformance using Form 4.3-10; If no, then reduce Item 3, Factor of Safety to 2.0 and increase Item 8, Infiltrating Surface Area, such that the portion of the site area used for retention and infiltration BMPs equals or exceeds the minimum effective area thresholds (Table 5-7 of the TGD for WQMP) for the applicable category of development and repeat all above calculations.			

Project: WLY System - Tract 20727 Banana



Chamber Model - SC-740
Units - Imperial

Number of Chambers - 110
Voids in the stone (porosity) - 40 %
Base of Stone Elevation - 74.83 ft
Amount of Stone Above Chambers - 6 in
Amount of Stone Below Chambers - 6 in

Area of system - 3718 sf Min. Area - 3718 sf min. area

StormTech SC-740 Cumulative Storage Volumes

Height of System (inches)	Incremental Single Chamber (cubic feet)	Incremental Total Chamber (cubic feet)	Incremental Stone (cubic feet)	Incremental Ch & St (cubic feet)	Cumulative Chamber (cubic feet)	Elevation (feet)
42	0.00	0.00	123.93	123.93	8237.96	78.33
41	0.00	0.00	123.93	123.93	8114.02	78.25
40	0.00	0.00	123.93	123.93	7990.09	78.16
39	0.00	0.00	123.93	123.93	7866.16	78.08
38	0.00	0.00	123.93	123.93	7742.22	78.00
37	0.00	0.00	123.93	123.93	7618.29	77.91
36	0.05	6.05	121.51	127.56	7494.36	77.83
35	0.16	17.92	116.76	134.69	7366.79	77.75
34	0.28	31.01	111.53	142.54	7232.11	77.66
33	0.60	66.44	97.36	163.79	7089.57	77.58
32	0.80	88.19	88.66	176.85	6925.77	77.50
31	0.95	104.57	82.10	186.68	6748.92	77.41
30	1.07	118.20	76.65	194.85	6562.25	77.33
29	1.18	129.85	71.99	201.85	6367.39	77.25
28	1.27	139.22	68.24	207.47	6165.55	77.16
27	1.36	149.05	64.31	213.36	5958.08	77.08
26	1.45	159.95	59.95	219.90	5744.72	77.00
25	1.52	167.72	56.85	224.57	5524.81	76.91
24	1.58	174.06	54.31	228.37	5300.25	76.83
23	1.64	180.65	51.67	232.32	5071.88	76.75
22	1.70	186.95	49.15	236.10	4839.56	76.66
21	1.75	192.82	46.80	239.63	4603.46	76.58
20	1.80	198.31	44.61	242.92	4363.83	76.50
19	1.85	204.05	42.31	246.36	4120.91	76.41
18	1.89	208.24	40.64	248.88	3874.55	76.33
17	1.93	212.74	38.84	251.58	3625.67	76.25
16	1.97	217.25	37.03	254.28	3374.09	76.16
15	2.01	221.09	35.50	256.59	3119.81	76.08
14	2.04	224.95	33.95	258.90	2863.22	76.00
13	2.07	228.25	32.64	260.88	2604.32	75.91
12	2.10	231.54	31.32	262.86	2343.44	75.83
11	2.13	234.50	30.13	264.63	2080.58	75.75
10	2.15	236.92	29.16	266.09	1815.95	75.66
9	2.18	239.48	28.14	267.62	1549.86	75.58
8	2.20	241.82	27.21	269.02	1282.24	75.50
7	2.21	242.81	26.81	269.62	1013.22	75.41
6	0.00	0.00	123.93	123.93	743.60	75.33
5	0.00	0.00	123.93	123.93	619.67	75.25
4	0.00	0.00	123.93	123.93	495.73	75.16
3	0.00	0.00	123.93	123.93	371.80	75.08
2	0.00	0.00	123.93	123.93	247.87	75.00
1	0.00	0.00	123.93	123.93	123.93	74.91

Overflow elevation
(DCV contained below)

Project: ELY System - Tr20727 Banana



Chamber Model - SC-740
Units - Imperial

Number of Chambers - 144
Voids in the stone (porosity) - 40 %
Base of Stone Elevation - 75.80 ft
Amount of Stone Above Chambers - 6 in
Amount of Stone Below Chambers - 6 in

Area of system - 4868 sf Min. Area - 4868 sf min. area

StormTech SC-740 Cumulative Storage Volumes

Height of System (inches)	Incremental Single Chamber (cubic feet)	Incremental Total Chamber (cubic feet)	Incremental Stone (cubic feet)	Incremental Ch & St (cubic feet)	Cumulative Chamber (cubic feet)	Elevation (feet)
42	0.00	0.00	162.27	162.27	10785.35	79.30
41	0.00	0.00	162.27	162.27	10623.09	79.22
40	0.00	0.00	162.27	162.27	10460.82	79.13
39	0.00	0.00	162.27	162.27	10298.55	79.05
38	0.00	0.00	162.27	162.27	10136.29	78.97
37	0.00	0.00	162.27	162.27	9974.02	78.88
36	0.05	7.92	159.10	167.02	9811.75	78.80
35	0.16	23.46	152.88	176.34	9644.73	78.72
34	0.28	40.60	146.03	186.63	9468.39	78.63
33	0.60	86.97	127.48	214.45	9281.77	78.55
32	0.80	115.45	116.09	231.53	9067.32	78.47
31	0.95	136.90	107.51	244.40	8835.78	78.38
30	1.07	154.73	100.37	255.10	8591.38	78.30
29	1.18	169.99	94.27	264.26	8336.27	78.22
28	1.27	182.26	89.36	271.62	8072.01	78.13
27	1.36	195.12	84.22	279.34	7800.39	78.05
26	1.45	209.39	78.51	287.90	7521.05	77.97
25	1.52	219.56	74.44	294.00	7233.15	77.88
24	1.58	227.86	71.12	298.98	6939.15	77.80
23	1.64	236.49	67.67	304.16	6640.17	77.72
22	1.70	244.73	64.37	309.10	6336.01	77.63
21	1.75	252.42	61.30	313.72	6026.90	77.55
20	1.80	259.61	58.42	318.03	5713.18	77.47
19	1.85	267.12	55.42	322.54	5395.15	77.38
18	1.89	272.61	53.22	325.83	5072.62	77.30
17	1.93	278.50	50.87	329.36	4746.79	77.22
16	1.97	284.40	48.51	332.91	4417.42	77.13
15	2.01	289.43	46.50	335.92	4084.51	77.05
14	2.04	294.48	44.48	338.95	3748.59	76.97
13	2.07	298.79	42.75	341.54	3409.64	76.88
12	2.10	303.11	41.02	344.13	3068.09	76.80
11	2.13	306.98	39.48	346.45	2723.96	76.72
10	2.15	310.16	38.20	348.36	2377.51	76.63
9	2.18	313.50	36.87	350.36	2029.15	76.55
8	2.20	316.56	35.64	352.20	1678.78	76.47
7	2.21	317.86	35.12	352.98	1326.58	76.38
6	0.00	0.00	162.27	162.27	973.60	76.30
5	0.00	0.00	162.27	162.27	811.33	76.22
4	0.00	0.00	162.27	162.27	649.07	76.13
3	0.00	0.00	162.27	162.27	486.80	76.05
2	0.00	0.00	162.27	162.27	324.53	75.97
1	0.00	0.00	162.27	162.27	162.27	75.88

Overflow
Elevation (DCV
contained
below)



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Job Tr20727

155-238.014

Sheet No.	1	of	1
Calculated by:	ATS	Date	8/2/24
Checked by:		Date	
		Scale	

Drawdown Calculation

	DA	1	2
BMP Drainage Area	A (acres)	2.06	2.64
LID DCV (see separate calculations)	DCV (cf)	5872	7531
	Surface Area (sf)	3700	4800
	Infiltration Rate (with Factor of Safety) (in/hr)	0.40	0.40
	Drawdown (hr)*	<u>47.6</u>	<u>47.1</u>

Drawdown = Volume / Surface Area / Infiltration Rate / 12 in / ft

4.3.3 Harvest and Use BMP

Harvest and use BMP may be considered if the full LID DCV cannot be met by maximizing infiltration BMPs. Use Form 4.3-4 to compute on-site retention of runoff from proposed harvest and use BMPs.

Volume retention estimates for harvest and use BMPs are sensitive to the on-site demand for captured stormwater. Since irrigation water demand is low in the wet season, when most rainfall events occur in San Bernardino County, the volume of water that can be used within a specified drawdown period is relatively low. The bottom portion of Form 4.3-4 facilitates the necessary computations to show infeasibility if a minimum incremental benefit of 40 percent of the LID DCV would not be achievable with MEP implementation of on-site harvest and use of stormwater (Section 5.5.4 of the TGD for WQMP).

Form 4.3-4 Harvest and Use BMPs (DA 1&2)			
1 Remaining LID DCV not met by site design HSC or infiltration BMP (ft ³): <u>0 sf</u> <i>V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30 - Form 4.3-3 Item 16</i>			
BMP Type(s) <i>Compute runoff volume retention from proposed harvest and use BMP (Select BMPs from Table 5-4 of the TGD for WQMP) - Use additional forms for more BMPs</i>	DA <u>1</u> DMA <u>A</u> BMP Type	DA <u>1</u> DMA <u>B</u> BMP Type	DA <u>1</u> DMA <u>C</u> BMP Type
2 Describe cistern or runoff detention facility			
3 Storage volume for proposed detention type (ft ³) <i>Volume of cistern</i>			
4 Landscaped area planned for use of harvested stormwater (ft ²)			
5 Average wet season daily irrigation demand (in/day) Use local values, typical ~ 0.1 in/day			
6 Daily water demand (ft ³ /day) <i>Item 4 * (Item 5 / 12)</i>			
7 Drawdown time (hrs) <i>Copy Item 6 from Form 4.2-1</i>			
8 Retention Volume (ft ³) <i>V_{retention} = Minimum of (Item 3) or (Item 6 * (Item 7 / 24))</i>			
9 Total Retention Volume (ft ³) from Harvest and Use BMP <u>n/a</u> <i>Sum of Item 8 for all harvest and use BMP included in plan</i>			
10 Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest and use BMPs? Yes ☒ No ☐ <i>If yes, demonstrate conformance using Form 4.3-10. If no, then re-evaluate combinations of all LID BMP and optimize their implementation such that the maximum portion of the DCV is retained on-site (using a single BMP type or combination of BMP types). If the full DCV cannot be mitigated after this optimization process, proceed to Section 4.3.4.</i>			

4.3.4 Biotreatment BMP

Biotreatment BMPs may be considered if the full LID DCV cannot be met by maximizing retention and infiltration, and harvest and use BMPs. A key consideration when using biotreatment BMP is the effectiveness of the proposed BMP in addressing the pollutants of concern for the project (see Table 5-5 of the TGD for WQMP).

Use Form 4.3-5 to summarize the potential for volume based and/or flow based biotreatment options to biotreat the remaining unmet LID DCV w. Biotreatment computations are included as follows:

- Use Form 4.3-6 to compute biotreatment in small volume based biotreatment BMP (e.g. bioretention w/underdrains);
- Use Form 4.3-7 to compute biotreatment in large volume based biotreatment BMP (e.g. constructed wetlands);

Form 4.3-5 Selection and Evaluation of Biotreatment BMP (DA 1&2)		
1 Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft ³): <u>0</u> Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16- Form 4.3-4 Item 9		List pollutants of concern <i>Copy from Form 2.3-1.</i> Pathogens, Nitrogen, Sediment, Oil & Grease, Trash/Debris, Pesticides/Herbicides
2 Biotreatment BMP Selected <i>(Select biotreatment BMP(s) necessary to ensure all pollutants of concern are addressed through Unit Operations and Processes, described in Table 5-5 of the TGD for WQMP)</i>	Volume-based biotreatment <i>Use Forms 4.3-6 and 4.3-7 to compute treated volume</i> ☐ Bioretention with underdrain ☐ Planter box with underdrain ☐ Constructed wetlands ☐ Wet extended detention ☐ Dry extended detention	Flow-based biotreatment <i>Use Form 4.3-8 to compute treated volume</i> ☐ Vegetated swale ☐ Vegetated filter strip ☐ Proprietary biotreatment
3 Volume biotreated in volume based biotreatment BMP (ft ³): <u>0</u> Form 4.3-6 Item 15 + Form 4.3-7 Item 13	4 Compute remaining LID DCV with implementation of volume based biotreatment BMP (ft ³): <u>0</u> Item 1 – Item 3	5 Remaining fraction of LID DCV for sizing flow based biotreatment BMP: <u>0</u> % Item 4 / Item 1
6 Flow-based biotreatment BMP capacity provided (cfs): <u>n/a</u> Use Figure 5-2 of the TGD for WQMP to determine flow capacity required to provide biotreatment of remaining percentage of unmet LID DCV (Item 5), for the project's precipitation zone (Form 3-1 Item 1)		
7 Metrics for MEP determination: • Provided a WQMP with the portion of site area used for suite of LID BMP equal to minimum thresholds in Table 5-7 of the TGD for WQMP for the proposed category of development: ☐ If maximized on-site retention BMPs is feasible for partial capture, then LID BMP implementation must be optimized to retain and infiltrate the maximum portion of the DCV possible within the prescribed minimum effective area. The remaining portion of the DCV shall then be mitigated using biotreatment BMP.		

- Use Form 4.3-8 to compute sizing criteria for flow-based biotreatment BMP (e.g. bioswales)

Form 4.3-6 Volume Based Biotreatment (DA 1 & 2) – Bioretention and Planter Boxes with Underdrains			
Biotreatment BMP Type (Bioretention w/underdrain, planter box w/underdrain, other comparable BMP)	DA <u>1</u> DMA BMP Type	DA <u>1</u> DMA BMP Type	DA <u>2</u> DMA BMP Type
1 Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP</i>	Pathogens, nutrients	Pathogens, nutrients	Pathogens, nutrients
2 Amended soil infiltration rate <i>Typical ~ 5.0</i>			
3 Amended soil infiltration safety factor <i>Typical ~ 2.0</i>			
4 Amended soil design percolation rate (in/hr) $P_{design} = \text{Item 2} / \text{Item 3}$			
5 Pondered water drawdown time (hr) <i>Copy Item 6 from Form 4.2-1</i>			
6 Maximum ponding depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
7 Ponding Depth (ft) $d_{BMP} = \text{Minimum of } (1/12 * \text{Item 4} * \text{Item 5}) \text{ or Item 6}$			
8 Amended soil surface area (ft ²)			
9 Amended soil depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
10 Amended soil porosity, n			
11 Gravel depth (ft) <i>see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>			
12 Gravel porosity, n			
13 Duration of storm as basin is filling (hrs) <i>Typical ~ 3hrs</i>			
14 Biotreated Volume (ft ³) $V_{biotreated} = \text{Item 8} * [(\text{Item 7}/2) + (\text{Item 9} * \text{Item 10}) + (\text{Item 11} * \text{Item 12}) + (\text{Item 13} * (\text{Item 4} / 12))]$			
15 Total biotreated volume from bioretention and/or planter box with underdrains BMP: <i>Sum of Item 14 for all volume-based BMPs included in this form</i>			

Form 4.3-7 Volume Based Biotreatment (DA 1 & 2) – Constructed Wetlands and Extended Detention

Biotreatment BMP Type <i>Constructed wetlands, extended wet detention, extended dry detention, or other comparable proprietary BMP. If BMP includes multiple modules (e.g. forebay and main basin), provide separate estimates for storage and pollutants treated in each module.</i>	DA DMA BMP Type		DA DMA BMP Type <i>(Use additional forms for more BMPs)</i>	
	Forebay	Basin	Forebay	Basin
1 Pollutants addressed with BMP forebay and basin <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in Table 5-5 of the TGD for WQMP</i>				
2 Bottom width (ft)				
3 Bottom length (ft)				
4 Bottom area (ft ²) $A_{bottom} = \text{Item 2} * \text{Item 3}$				
5 Side slope (ft/ft)				
6 Depth of storage (ft)				
7 Water surface area (ft ²) $A_{surface} = (\text{Item 2} + (2 * \text{Item 5} * \text{Item 6})) * (\text{Item 3} + (2 * \text{Item 5} * \text{Item 6}))$				
8 Storage volume (ft ³) <i>For BMP with a forebay, ensure fraction of total storage is within ranges specified in BMP specific fact sheets, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i> $V = \text{Item 6} / 3 * [\text{Item 4} + \text{Item 7} + (\text{Item 4} * \text{Item 7})^{0.5}]$				
9 Drawdown Time (hrs) <i>Copy Item 6 from Form 2.1</i>				
10 Outflow rate (cfs) $Q_{BMP} = (\text{Item 8}_{forebay} + \text{Item 8}_{basin}) / (\text{Item 9} * 3600)$				
11 Duration of design storm event (hrs)				
12 Biotreated Volume (ft ³) $V_{biotreated} = (\text{Item 8}_{forebay} + \text{Item 8}_{basin}) + (\text{Item 10} * \text{Item 11} * 3600)$				
13 Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : <i>(Sum of Item 12 for all BMP included in plan)</i>				

Form 4.3-8 Flow Based Biotreatment (DA 1)			
Biotreatment BMP Type <i>Vegetated swale, vegetated filter strip, or other comparable proprietary BMP</i>	DA 1 DMA A BMP Type	DA 1 DMA B BMP Type	DA 1 DMA C BMP Type
1 Pollutants addressed with BMP <i>List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5</i>	n/a	n/a	n/a
2 Flow depth for water quality treatment (ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	n/a	n/a	n/a
3 Bed slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	n/a	n/a	n/a
4 Manning's roughness coefficient	n/a	n/a	n/a
5 Bottom width (ft) $b_w = (\text{Form 4.3-5 Item 6} * \text{Item 4}) / (1.49 * \text{Item 2}^{1.67} * \text{Item 3}^{0.5})$			
6 Side Slope (ft/ft) <i>BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	n/a	n/a	n/a
7 Cross sectional area (ft ²) $A = (\text{Item 5} * \text{Item 2}) + (\text{Item 6} * \text{Item 2}^2)$	n/a	n/a	n/a
8 Water quality flow velocity (ft/sec) $V = \text{Form 4.3-5 Item 6} / \text{Item 7}$	n/a	n/a	n/a
9 Hydraulic residence time (min) <i>Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details</i>	n/a	n/a	n/a
10 Length of flow based BMP (ft) $L = \text{Item 8} * \text{Item 9} * 60$	n/a	n/a	n/a
11 Water surface area at water quality flow depth (ft ²) $SA_{top} = (\text{Item 5} + (2 * \text{Item 2} * \text{Item 6})) * \text{Item 10}$	n/a	n/a	n/a

4.3.5 Conformance Summary

Complete Form 4.3-9 to demonstrate how on-site LID DCV is met with proposed site design hydrologic source control, infiltration, harvest and use, and/or biotreatment BMP. The bottom line of the form is used to describe the basis for infeasibility determination for on-site LID BMP to achieve full LID DCV, and provides methods for computing remaining volume to be addressed in an alternative compliance plan. If the project has more than one outlet, then complete additional versions of this form for each outlet.

Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 1)	
1	Total LID DCV for the Project DA-1 (ft ³): <u>5872</u> Copy Item 7 in Form 4.2-1
2	On-site retention with site design hydrologic source control LID BMP (ft ³): <u>0</u> Copy Item 30 in Form 4.3-2
3	On-site retention with LID infiltration BMP (ft ³): <u>6114</u> Copy Item 16 in Form 4.3-3
4	On-site retention with LID harvest and use BMP (ft ³): <u>0</u> Copy Item 9 in Form 4.3-4
5	On-site biotreatment with volume based biotreatment BMP (ft ³): <u>0</u> Copy Item 3 in Form 4.3-5
6	Flow capacity provided by flow based biotreatment BMP (cfs): <u>0.0</u> Copy Item 6 in Form 4.3-5
7	LID BMP performance criteria are achieved if answer to any of the following is "Yes": - Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐ If yes, sum of Items 2, 3, and 4 is greater than Item 1 - Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☐ No ☐ If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3-5 Item 6 and Items 2, 3 and 4 are maximized - On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☒ No ☐ If yes, Form 4.3-1 Items 7 and 8 were both checked yes
8	If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance: - Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐ Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, $V_{alt} = (Item\ 1 - Item\ 2 - Item\ 3 - Item\ 4 - Item\ 5) * (100 - Form\ 2.4-1\ Item\ 2)\%$ - An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐ Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed

Form 4.3-9 Conformance Summary and Alternative Compliance Volume Estimate (DA 2)

1	Total LID DCV for the Project DA-2 (ft ³): <u>7531</u> Copy Item 7 in Form 4.2-1
2	On-site retention with site design hydrologic source control LID BMP (ft ³): <u>0</u> Copy Item 30 in Form 4.3-2
3	On-site retention with LID infiltration BMP (ft ³): <u>8001</u> Copy Item 16 in Form 4.3-3
4	On-site retention with LID harvest and use BMP (ft ³): <u>0</u> Copy Item 9 in Form 4.3-4
5	On-site biotreatment with volume based biotreatment BMP (ft ³): <u>0</u> Copy Item 3 in Form 4.3-5
6	Flow capacity provided by flow based biotreatment BMP (cfs): <u>0.0</u> Copy Item 6 in Form 4.3-5
7	LID BMP performance criteria are achieved if answer to any of the following is "Yes": • Full retention of LID DCV with site design HSC, infiltration, or harvest and use BMP: Yes ☒ No ☐ <i>If yes, sum of Items 2, 3, and 4 is greater than Item 1</i> • Combination of on-site retention BMPs for a portion of the LID DCV and volume-based biotreatment BMP that address all pollutants of concern for the remaining LID DCV: Yes ☐ No ☐ <i>If yes, a) sum of Items 2, 3, 4, and 5 is greater than Item 1, and Items 2, 3 and 4 are maximized; or b) Item 6 is greater than Form 4.3-5 Item 6 and Items 2, 3 and 4 are maximized</i> ▪ On-site retention and infiltration is determined to be infeasible and biotreatment BMP provide biotreatment for all pollutants of concern for full LID DCV: Yes ☒ No ☐ <i>If yes, Form 4.3-1 Items 7 and 8 were both checked yes</i>
8	If the LID DCV is not achieved by any of these means, then the project may be allowed to develop an alternative compliance plan. Check box that describes the scenario which caused the need for alternative compliance: • Combination of HSC, retention and infiltration, harvest and use, and biotreatment BMPs provide less than full LID DCV capture: ☐ <i>Checked yes for Form 4.3-5 Item 7, Item 6 is zero, and sum of Items 2, 3, 4, and 5 is less than Item 1. If so, apply water quality credits and calculate volume for alternative compliance, $V_{alt} = (Item\ 1 - Item\ 2 - Item\ 3 - Item\ 4 - Item\ 5) * (100 - Form\ 2.4-1\ Item\ 2)\%$</i> • An approved Watershed Action Plan (WAP) demonstrates that water quality and hydrologic impacts of urbanization are more effective when managed in at an off-site facility: ☐ <i>Attach appropriate WAP section, including technical documentation, showing effectiveness comparisons for the project site and regional watershed</i>

4.3.6 Hydromodification Control BMP

Use Form 4.3-10 to compute the remaining runoff volume retention, after LID BMP are implemented, needed to address HCOC, and the increase in time of concentration and decrease in peak runoff necessary to meet targets for protection of waterbodies with a potential HCOC. Describe hydromodification control BMP that address HCOC, which may include off-site BMP and/or in-stream controls. Section 5.6 of the TGD for WQMP provides additional details on selection and evaluation of hydromodification control BMP.

Form 4.3-10 Hydromodification Control BMPs	
1 Volume reduction needed for HCOC performance criteria (ft ³): n/a <i>(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1</i>	2 On-site retention with site design hydrologic source control, infiltration, and harvest and use LID BMP (ft ³): n/a <i>Sum of Form 4.3-9 Items 2, 3, and 4</i> <i>Evaluate option to increase implementation of on-site retention in Forms 4.3-2, 4.3-3, and 4.3-4 in excess of LID DCV toward achieving HCOC volume reduction</i>
3 Remaining volume for HCOC volume capture (ft ³): - n/a <i>Item 1 – Item 2</i>	4 Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft ³): n/a <i>Existing downstream BMP may be used to demonstrate additional volume capture (if so, attach to this WQMP a hydrologic analysis showing how the additional volume would be retained during a 2-yr storm event for the regional watershed)</i>
5 If Item 4 is less than Item 3, incorporate in-stream controls on downstream waterbody segment to prevent impacts due to hydromodification <i>Attach in-stream control BMP selection and evaluation to this WQMP</i>	
6 Is Form 4.2-2 Item 11 less than or equal to 5%: Yes ☐ No ☐ n/a <i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i> - Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site or off-site retention BMP <i>BMP upstream of a waterbody segment with a potential HCOC may be used to demonstrate increased time of concentration through hydrograph attenuation (if so, show that the hydraulic residence time provided in BMP for a 2-year storm event is equal or greater than the addition time of concentration requirement in Form 4.2-4 Item 15)</i> - Increase time of concentration by preserving pre-developed flow path and/or increase travel time by reducing slope and increasing cross-sectional area and roughness for proposed on-site conveyance facilities - Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California	
7 Form 4.2-2 Item 12 less than or equal to 5%: Yes ☐ No ☐ n/a <i>If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:</i> - Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site or off-site retention BMPs <i>BMPs upstream of a waterbody segment with a potential HCOC may be used to demonstrate additional peak runoff reduction through hydrograph attenuation (if so, attach to this WQMP, a hydrograph analysis showing how the peak runoff would be reduced during a 2-yr storm event)</i> - Incorporate appropriate in-stream controls for downstream waterbody segment to prevent impacts due to hydromodification, in a plan approved and signed by a licensed engineer in the State of California	

4.4 Alternative Compliance Plan (if applicable)

Describe an alternative compliance plan (if applicable) for projects not fully able to infiltrate, harvest and use, or biotreat the DCV via on-site LID practices. A project proponent must develop an alternative compliance plan to address the remainder of the LID DCV. Depending on project type some projects may qualify for water quality credits that can be applied to reduce the DCV that must be treated prior to development of an alternative compliance plan (see Form 2.4-1, Water Quality Credits). Form 4.3-9 Item 8 includes instructions on how to apply water quality credits when computing the DCV that must be met through alternative compliance. Alternative compliance plans may include one or more of the following elements:

- On-site structural treatment control BMP - All treatment control BMP should be located as close to possible to the pollutant sources and should not be located within receiving waters;
- Off-site structural treatment control BMP - Pollutant removal should occur prior to discharge of runoff to receiving waters;
- Urban runoff fund or In-lieu program, if available

Depending upon the proposed alternative compliance plan, approval by the executive officer may or may not be required (see Section 6 of the TGD for WQMP).

Alternative Compliance Plan is not applicable to the Project.

Section 5 Inspection and Maintenance Responsibility for Post Construction BMP

All BMP included as part of the project WQMP are required to be maintained through regular scheduled inspection and maintenance (refer to Section 8, Post Construction BMP Requirements, in the TGD for WQMP). Fully complete Form 5-1 summarizing all BMP included in the WQMP. Attach additional forms as needed. The WQMP shall also include a detailed Operation and Maintenance Plan for all BMP and may require a Maintenance Agreement (consult the jurisdiction's LIP). If a Maintenance Agreement is required, it must also be attached to the WQMP.

Form 5-1 BMP Inspection and Maintenance (use additional forms as necessary)			
BMP	Responsible Party(s)	Inspection/ Maintenance Activities Required	Minimum Frequency of Activities
N11- Litter/Debris Control	Owner/Manager	Inspect site on a daily basis. Remove trash and debris and dispose into proper trash receptacles	Daily
N15- Vacuum Sweeping of Parking Lots	Owner/Manager	Vacuum sweep parking lots at least twice annually to reduce the amount of sediment, garden waste, and trash entering into BMPs.	In the month of September and in the month of January at minimum.
N3,S5- Landscape Maintenance	Owner/Manager	Remove trash and debris and rake soils to maintain 1 to 2 inch depression next to hardscape	Monthly
N3-Landscape Maintenance	Owner/Manager	Limit pesticide and herbicide use. If pesticides/herbicides are used they shall be used in conformance with manufacturers recommendations regarding application rate and applied by a certified applicator.	N/A
N3-Landscape Maintenance	Owner/Manager	Eradicate weeds and prune back excess plant growth. Remove invasive vegetation. Limit overspray of landscaping from draining into the storm drain inlets. Excess periodic drainage will result in a shorter useful life for the infiltration system. Fix broken sprinkler system components immediately. Ensure proper watering levels are maintained to ensure overspray and runoff is limited.	Monthly
Infiltration System	Owner/Manager	Inspection of hydraulic and structural facilities. Examine inlets for blockage, as well as damage to any structural element	Once per year between September 1 and September 30
Infiltration System	Owner/Manager	Check pipe depth for sediment build-up and reduced total capacity. Vacuum bottom as needed and remove sediment. Restore to original cross-section and infiltration rate.	Once per year between September 1 and September 30
Infiltration System	Owner/Manager	No water should be present 72 hours after an event. No long-term standing water should be present at all. No algae formation should be visible. Correct problem as required.	Within three days of storm end.

Water Quality Management Plan (WQMP)

Infiltration Basin	Owner/Manager	Remove debris and litter from the system to minimize clogging.	Monthly, and before and after rainfall events.
Infiltration System	Owner/Manager	Check for obvious problems and repair as needed. Address odor, insects, and overgrowth issues (weeds) associated with stagnant or standing water in the bottom. There should be no long-term ponding water.	Monthly, and before and after rainfall events.
S1—Storm Drain Stenciling and Signage	Property Owners	Maintain stenciling and/or signage so that the messages are highly visible. Stenciling and signage shall be repaired immediately if vandalized or removed.	Quarterly at minimum.
Spill Contingency Plan (N7)	Property Owners	Ensure the spill cleanup kit is adequately supplied and located near the pool chemical storage. Ensure only properly qualified and trained personnel are handling these chemicals and are trained in what to do if a spill should occur.	Monthly
N1-Education for Property Owners, Tenants, and Occupants	Owner	As part of employee orientation, all employees will be educated on the information shown. Information about hazardous materials and uniform fire code will be posted per OSHA and local ordinances.	With 6 months of hiring and annually thereafter

Section 6 WQMP Attachments

6.1. Site Plan and Drainage Plan

Include a site plan and drainage plan sheet set containing the following minimum information:

- Project location
- Site boundary
- Land uses and land covers, as applicable
- Suitability/feasibility constraints
- Structural Source Control BMP locations
- Site Design Hydrologic Source Control BMP locations
- LID BMP details
- Drainage delineations and flow information
- Drainage connections

6.2 Electronic Data Submittal

Minimum requirements include submittal of PDF exhibits in addition to hard copies. Format must not require specialized software to open. If the local jurisdiction requires specialized electronic document formats (as described in their local Local Implementation Plan), this section will describe the contents (e.g., layering, nomenclature, geo-referencing, etc.) of these documents so that they may be interpreted efficiently and accurately.

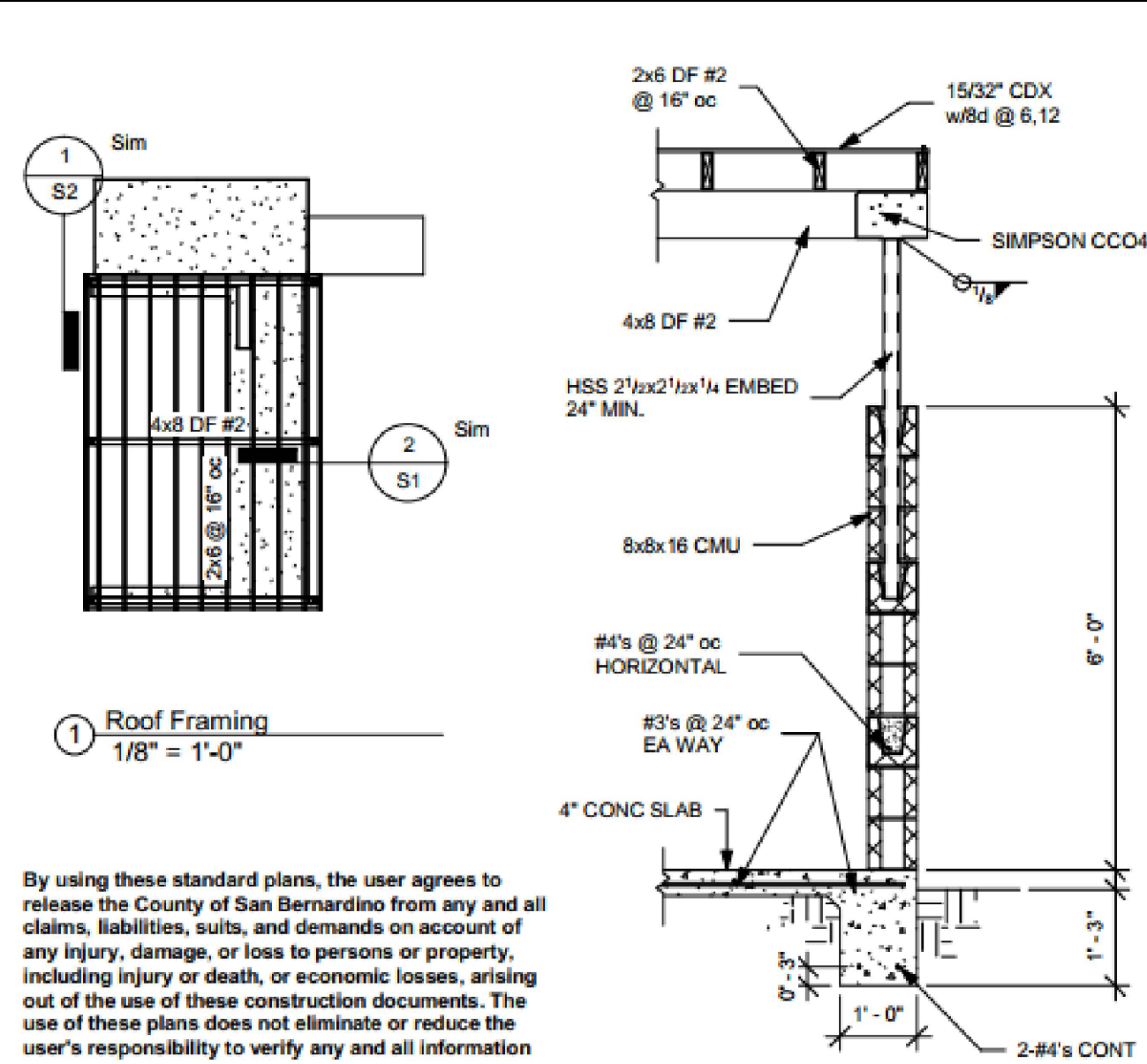
6.3 Post Construction

Attach all O&M Plans and Maintenance Agreements for BMP to the WQMP.

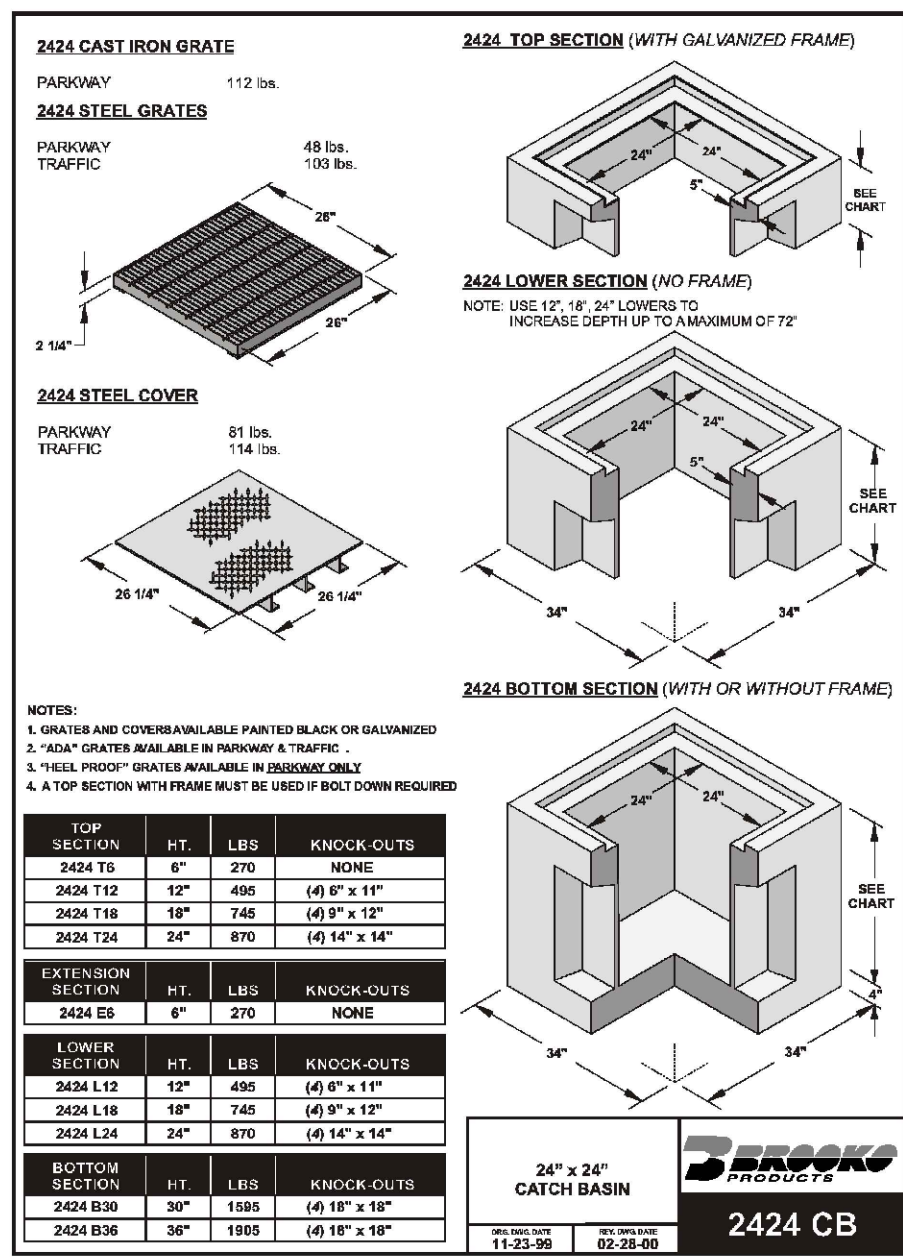
6.4 Other Supporting Documentation

Appendix A: Operation and Maintenance Plan
Appendix B: Supporting Documentation
Appendix C: BMP Educational Materials
Appendix D: Soils Report
Appendix E: Factor of Safety Calculation
Appendix F: Agreement

WQMP Plan (In Back Pocket)

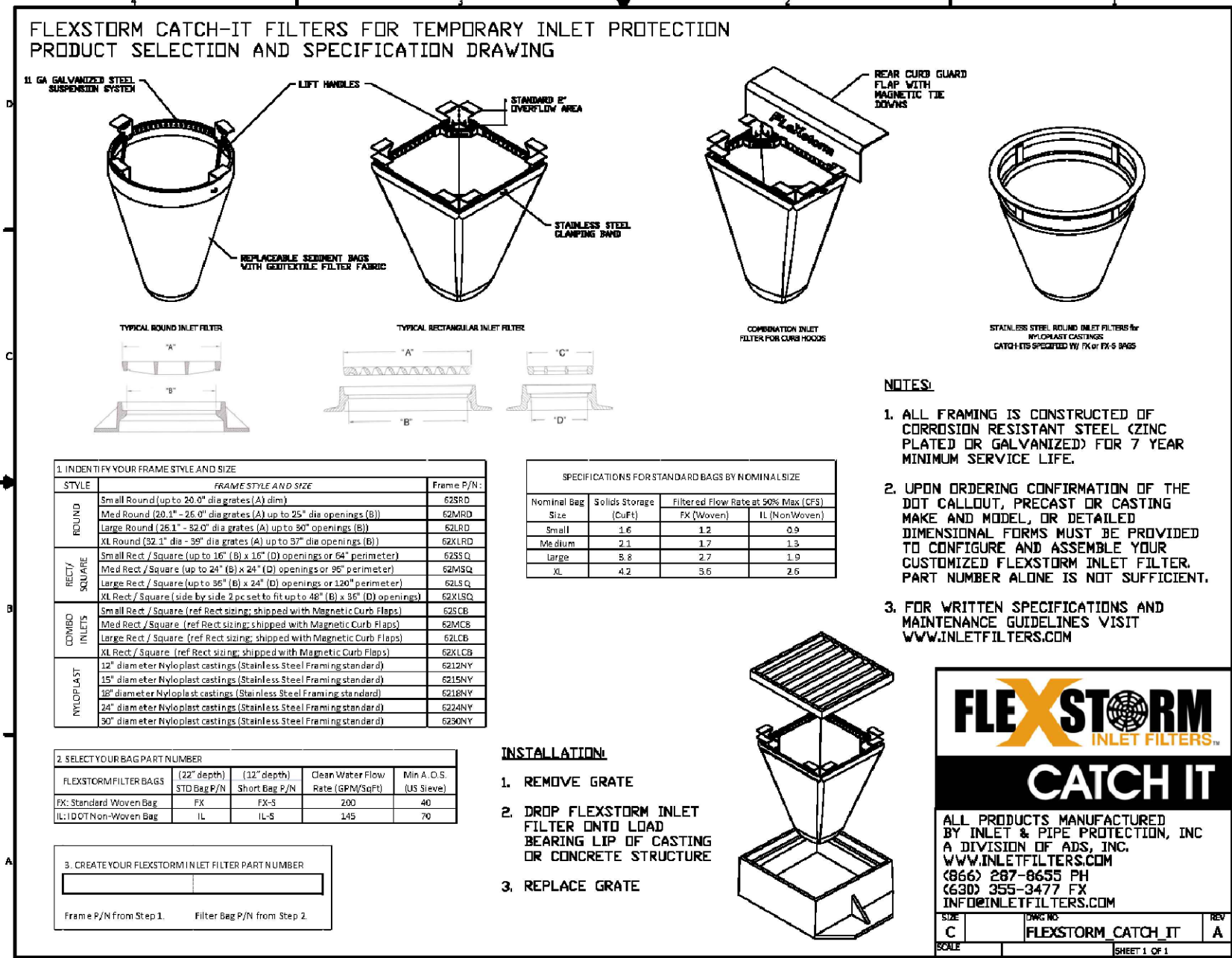


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WATER QUALITY MANAGEMENT PLAN

TRACT 20727



CONCRETE

1. ALL CONCRETE SHALL CONFORM TO THE LATEST EDITION OF THE CALIFORNIA BUILDING CODE AND ACI 318.
2. CONCRETE SHALL BE DESIGNED AND TESTED AS OUTLINED IN THE PROJECT SPECIFICATIONS.
3. NO WATER SHALL BE ADDED ON SITE.
4. ALL CEMENT SHALL CONFORM TO ASTM C150. APPROPRIATE CEMENT TYPE AND CONCRETE STRENGTH AND SHALL BE SELECTED BASED ON EXPOSURE TO SOILS AND OR MATERIALS CAUSING SULFATE ATTACK PER CBC TABLE 1904.3.
5. FINE AND COARSE AGGREGATE SHALL CONFORM TO ASTM C33 FOR STANDARD WEIGHT CONCRETE AND ASTM C330 FOR LIGHT WEIGHT CONCRETE.
6. ALL AGGREGATE SHALL WELL GRADED AND SHRINKAGE SHALL BE AS PER ASTM C157 W/ THE AVERAGE DRYING SHRINKAGE AT 28-DAYS NOT EXCEEDING 0.04%.
7. CHEMICAL ADMIXTURES SHALL CONFORM TO ASTM C494, HIGH RANGE WATER REDUCING (TYPE G) WHERE USED.
8. AIR ENTRAINING ADMIXTURES SHALL CONFORM TO ASTM C260 WHERE USED
9. DRYPACK SHALL BE COMPOSED OF ONE PART PORTLAND CEMENT TO NOT MORE THAT THREE PARTS SAND.
10. ANCHOR BOLTS, HOLDOWN BOLTS, DOWELS, INSERTS, ETC. SHALL BE SECURELY TIED IN PLACE PRIOR TO PLACING CONCRETE.
11. CONCRETE SHALL BE CURED BY KEEPING CONTINUOUSLY WET FOR 10-DAYS OR BY AN APPROVED CURING COMPOUND CONFORMING TO ASTM C1315, CLEAR TYPE I, CLASS A, WATERBORNE.
12. CONCRETE STRENGTHS:

STRUCTURAL CONCRETE $f_c = 3,000$ psi

SLABS-ON-GRADE $f_c = 2,500$ psi

CONTINUOUS FOOTINGS AND PADS $f_c = 2,500$ PSI

WATER / CEMENT RATIO = 0.45

TYPE I/II CEMENT UNO

ALL CONCRETE SHALL REACH MINIMUM COMPRESSIVE STRENGTH AT 28 DAYS. PROVIDE CONCRETE MIX TO MEET ACI REQUIREMENTS FOR SULFATE EXPOSURE PER SITE SOIL TYPE. FIELD VERIFY.
13. UNLESS NOTED OTHERWISE, FOOTINGS, FOUNDATIONS, AND SLABS ON GRADE DO NOT REQUIRE SPECIAL INSPECTION. HOWEVER ALL OTHER STRUCTURAL CONCRETE w/ SPECIFIED f_c GREATER THAN 2,500 psi SHALL HAVE SPECIAL INSPECTION PER SECTION 1704 OF THE CALIFORNIA BUILDING CODE UNLESS NOTED OTHERWISE.
14. CONCRETE FOR EXTERIOR SLABS ON GRADE SHALL HAVE A MAXIMUM OF 4" OF SLUMP PER ASTM C143. MAXIMUM WATER TO CEMENT RATIO =0.45. EXTERIOR SLABS TO BE DESIGNED FOR "SEVERE EXPOSURE" PER SECTION 4.2.1 OF ACI 318-11.



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General Notes

Project number	Project Number	A1
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Checked by	Checker	Scale

STRUCTURAL STEEL

1. ALL STRUCTURAL AND MISCELLANEOUS STEEL SHALL CONFORM TO THE FIFTEENTH EDITION OF THE AISC "SPECIFICATION FOR THE DESIGN, FABRICATION AND ERECTION OF STRUCTURAL STEEL FOR BUILDINGS" AND ALL ITS SUPPLEMENTS, AND TO THE AISC "CODE OF STANDARD PRACTICE FOR STEEL BUILDINGS AND BRIDGES."
2. ALL STRUCTURAL WIDE FLANG STEEL SHAPES SHALL HAVE A MIN. YIELD STRENGTH OF 50,000 psi , UNLESS NOTED OTHERWISE.
3. ALL STRUCTURAL AND MISCELLANEOUS STEEL SHALL CONFORM TO ASTM -36 HAVING A MINIMUM YIELD STRENGTH OF 36,000 psi. UNLESS NOTED OTHERWISE.
4. ALL CONNECTIONS, EXCEPT AS NOTED ON PLANS AND DETAILS, SHALL BE BOLTED OR WELDED CONNECTIONS AS SHOWN IN THE FIFTEENTH EDITION OF THE AISC MANUAL. ALL BEAM CONNECTIONS SHALL DEVELOP THE FULL UNIFORM LOAD CAPACITY THE MEMBER CAN CARRY WITH DUE CONSIDERATION TO CONCENTRATED LOADS AT THE ENDS OF THE MEMBER.
5. ALL BOLTED CONNECTIONS SHALL USE $\frac{3}{4}$ " Ø MINIMUM ASTM A325 HIGH STRENGTH BOLTS, U.N.O. NO CONNECTION SHALL BE MADE USING LESS THAN TWO BOLTS.
6. WELDING SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE "STRUCTURAL WELDING CODE", AWS D1.1 OF THE AMERICAN WELDING SOCIETY. ALL SHOP AND FIELD WELDING SHALL BE DONE BY CERTIFIED WELDERS QUALIFIED IN ACCORDANCE WITH AMERICAN WELDING SOCIETY STANDARDS. ALL WELDED CONNECTIONS SHALL BE PERFORMED USING E70XX ELECTRODES.
7. ALL ANCHOR BOLTS SHALL BE ASTM A-307. ANCHOR BOLT LENGTHS SHOWN ARE EMBEDDED LENGTHS.
8. STRUCTURAL STEEL TUBING SHALL BE ASTM A500.
9. SHOP PAINTING - ONE COAT RUSTOLEUM #678 OR EQUAL. PREPARATION FOR PAINTING SHALL CONFORM TO REQUIREMENTS OF SSPC-SP2.



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General Notes

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A1.1

Scale

MASONRY

1. ALL MASONRY CONSTRUCTION SHALL CONFORM TO THE CURRENT PROVISIONS OF THE BUILDING CODE REGULATIONS FOR MASONRY STRUCTURES - ACI 530 (ASCE 5), AND SPECIFICATIONS FOR MASONRY STRUCTURES - ACI 530.1 (ASCE 6).
2. ASSUMED COMPRESSIVE STRENGTH OF MASONRY, $f_m = 1350$ psi @ 28 DAYS.
3. ALL CONCRETE MASONRY UNITS SHALL CONFORM TO ASTM C 90, GRADE N-1, NORMAL WEIGHT.
4. MORTAR FOR ALL WORK SHALL BE TYPE S.
5. GROUT FOR FILLING SHALL HAVE A MINIMUM COMPRESSIVE STRENGTH (f_m) OF 2000 psi, AND SHALL CONFORM TO ASTM C476. PLACE GROUT FILL IN 4'-0" MAXIMUM LIFTS VERTICALLY.
6. ALL REINFORCING BARS FOR REINFORCED MASONRY CONSTRUCTION SHALL CONFORM TO ASTM A-615 GRADE 60. LAP LENGTH SHALL BE MINIMUM 40 BAR DIAMETERS.
7. PROVIDE 100% SOLID MASONRY BELOW ALL LINTEL BEARINGS 12" BEYOND THE OPENING FOR THE FULL WALL WIDTH AT ALL LINTELS FROM THE LINTEL BEARING TO THE FLOOR BELOW.
8. PROVIDE ONE 8" COURSE OF SOLID MASONRY AT JOIST AND BEAM BEARING LINES, UNLESS NOTED OTHERWISE.
9. BRACE AND SHORE ALL MASONRY WALLS AS REQUIRED THROUGHOUT THE COMPACTION AND CONSTRUCTION PROCESS UNTIL THE GROUND FLOOR SLAB AND SUPPORTING FLOORS OR ROOF HAVE BEEN COMPLETELY INSTALLED.

REINFORCING STEEL

1. ALL REINFORCING SHALL BE ASTM A615, GRADE 60.
2. WELDED WIRE FABRIC SHALL CONFORM TO ASTM A185 FLAT SHEETS NOT ROLLS. LAP 1'-1/2 SPACES, 9" MINIMUM FOR STRUCTURAL SLABS.
3. ALL BARS SHALL BE DEFORMED AS PER ASTM A305.
4. ALL BARS SHALL BE CLEAN OF LOOSE FLAKY RUST, GREASE OR OTHER MATERIALS LIKELY TO IMPAIR BOND.
5. ALL BENDS SHALL BE MADE COLD.
6. SPLICING OF BARS SHALL HAVE LAPS OF 30 BAR DIAMETERS OR 2'-0" MINIMUM FOR ALL CONTINUOUS REINFORCEMENT OF FOOTINGS AND CONCRETE WALLS, UNLESS OTHERWISE NOTED ON PLANS. MASONRY REINFORCEMENT SHALL HAVE LAPS OF 40 BAR DIAMETERS OR 2'-0", WHICHEVER IS GREATER.
7. ALL REINFORCING BARS SHALL BE ACCURATELY AND SECURELY PLACED BEFORE PLACING CONCRETE.
8. CONCRETE PROTECTION FOR REINFORCEMENT SHALL BE AT LEAST EQUAL TO THE DIAMETER OF THE BARS. MINIMUM COVER SHALL BE AS FOLLOWS:
 - A. POURED AGAINST EARTH 3"
 - B. SLABS ON GRADE (FROM TOP OF SLAB) 1"
 - C. WALLS: - EXPOSED TO WEATHER 2"
- NOT EXPOSED TO WEATHER #11 AND SMALLER 1"



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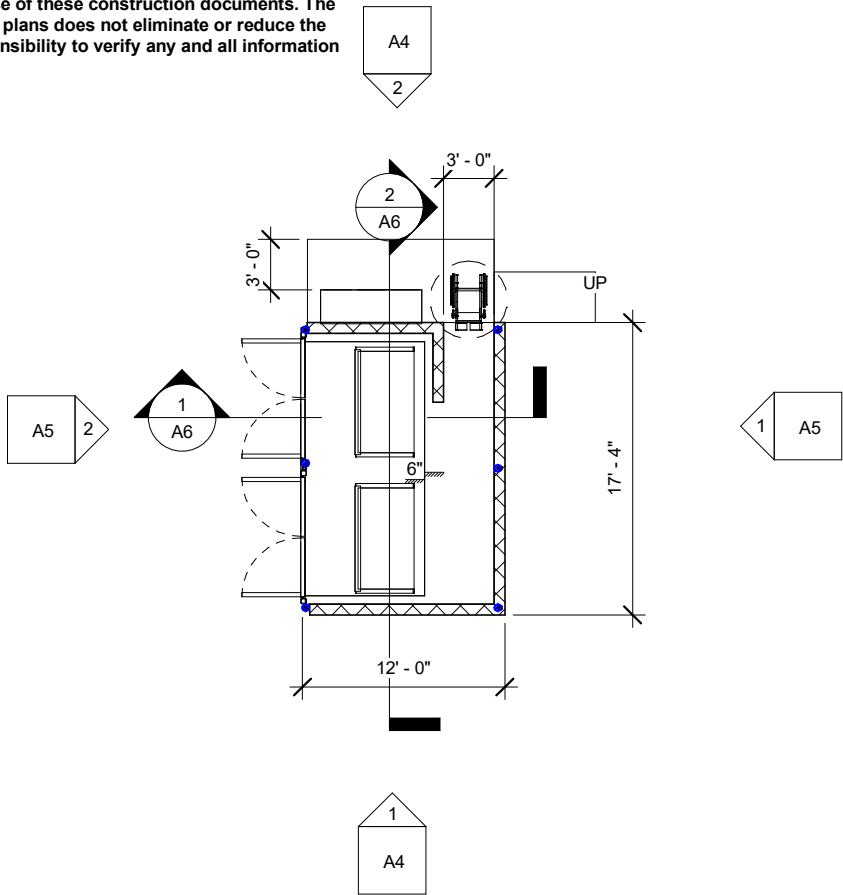
General Notes

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Checked by	Checker

A1.2

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① Level 1
1/8" = 1'-0"



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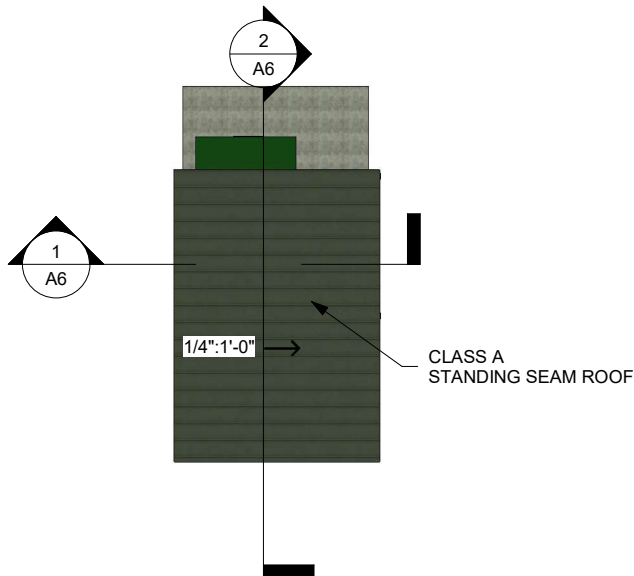
First Floor

Project number	Project Number
Date	Issue Date
Drawn by	Author
Checked by	Checker

A2

Scale 1/8" = 1'-0"

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1 Roof
1/8" = 1'-0"



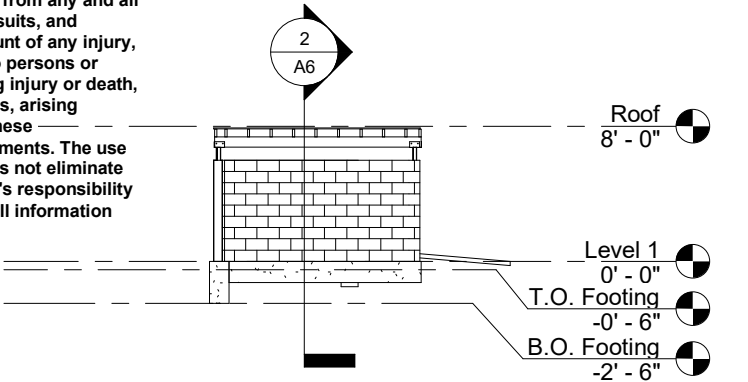
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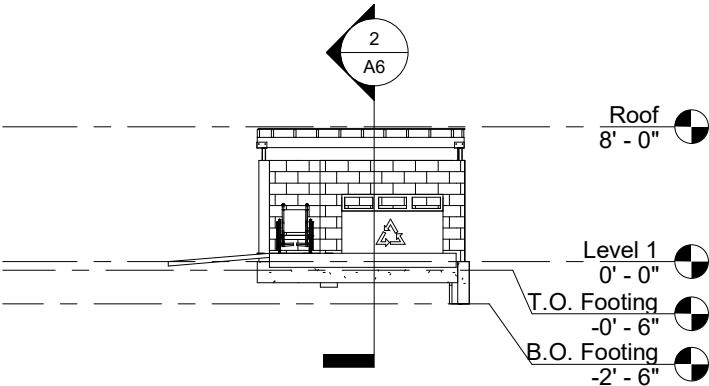
Roof Plan

Project number	Project Number	A3
Date	Issue Date	
Drawn by	Author	Scale 1/8" = 1'-0"
Checked by	Checker	

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1 South
1/8" = 1'-0"



2 North
1/8" = 1'-0"



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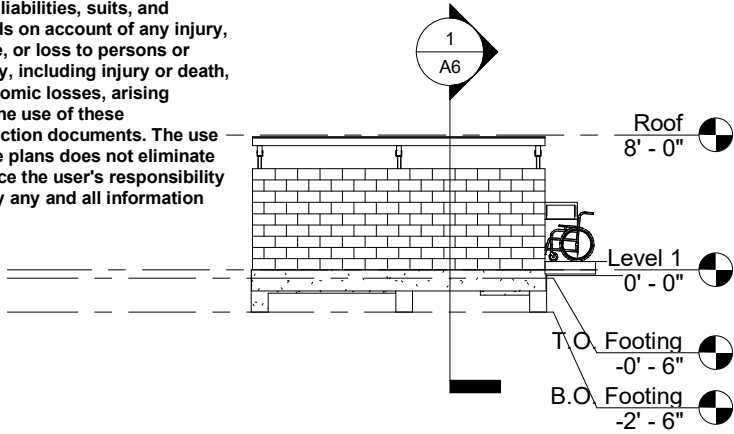
Elevations

Project number	Project Number
Date	Issue Date
Drawn by	Author
Checked by	Checker

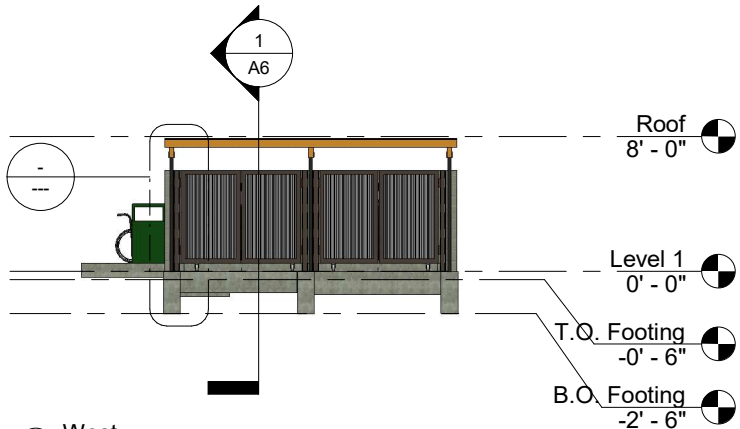
A4

Scale 1/8" = 1'-0"

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1 East
1/8" = 1'-0"



2 West
1/8" = 1'-0"



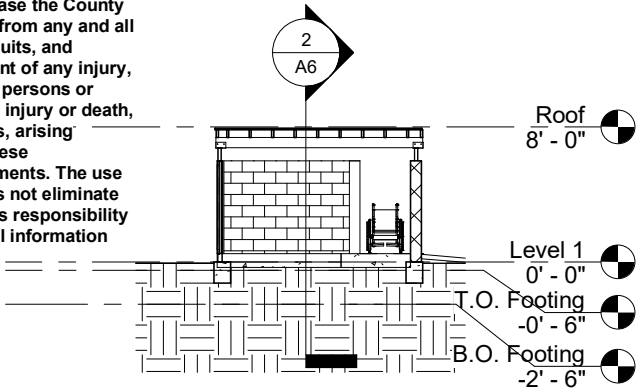
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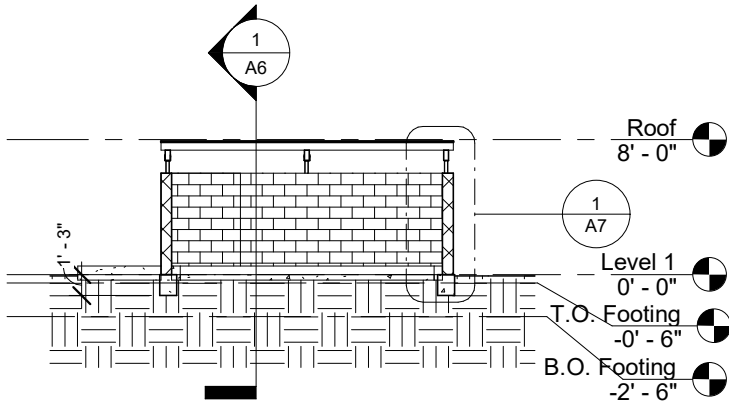
Elevations

Project number	Project Number	A5
Date	Issue Date	
Drawn by	Author	Scale 1/8" = 1'-0"
Checked by	Checker	

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① Section 1
1/8" = 1'-0"



② Section 2
1/8" = 1'-0"



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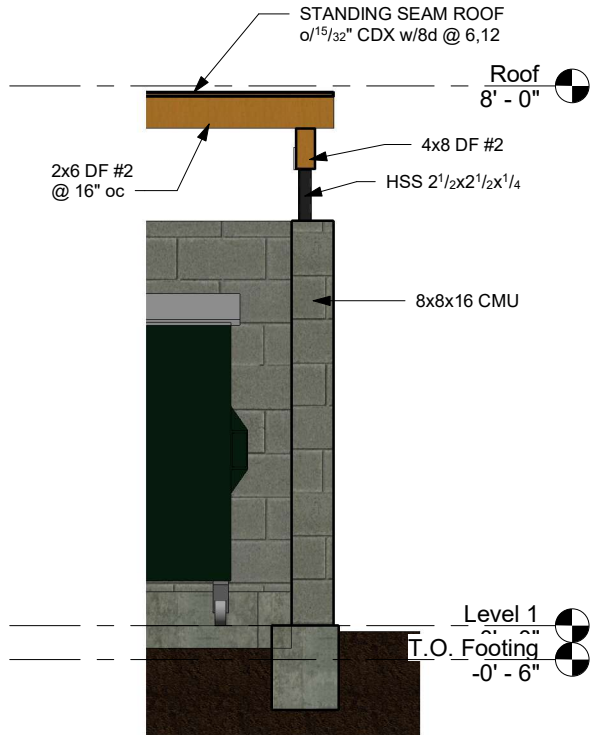
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Building Sections

Project number	Project Number
Date	Issue Date
Drawn by	Author
Checked by	Checker

A6

Scale 1/8" = 1'-0"



① Section 2 - Callout 1
1/2" = 1'-0"



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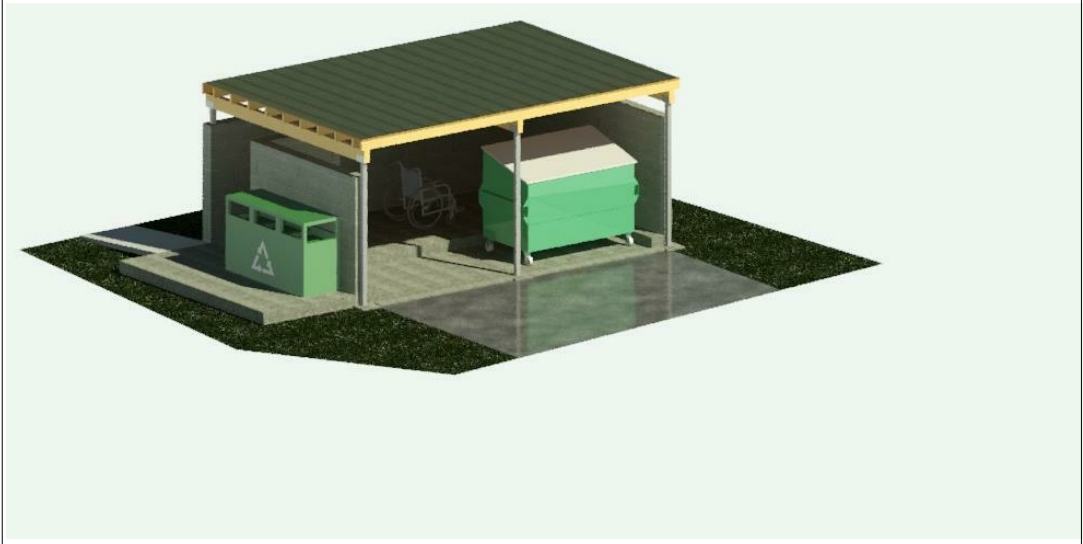
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Wall Sections

Project number	Project Number
Date	Issue Date
Drawn by	Author
Checked by	Checker

A7

Scale 1/2" = 1'-0"



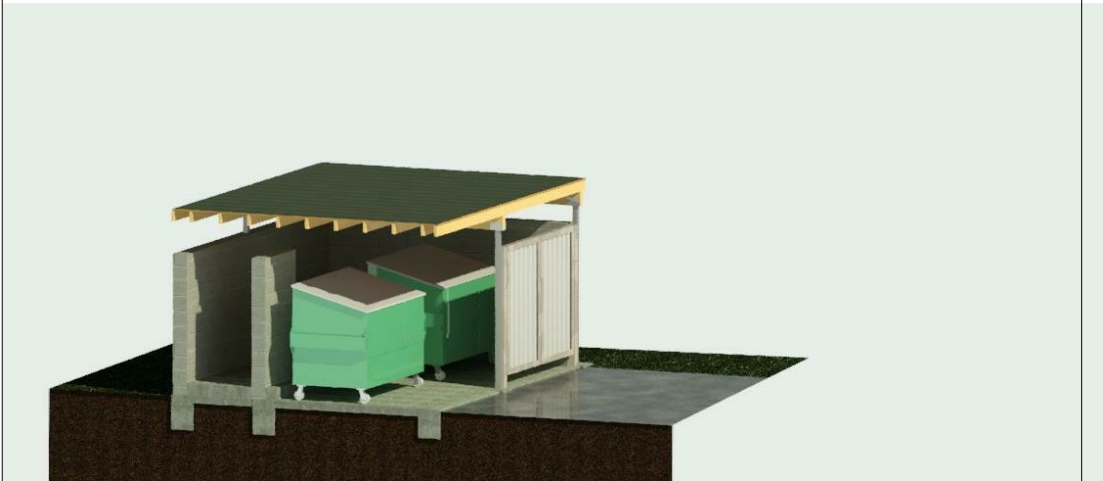
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Building Perspectives

Project number	Project Number
Date	Issue Date
Drawn by	Author
Checked by	Checker

A9
Scale

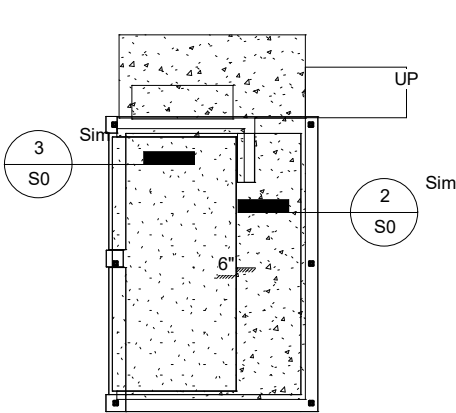


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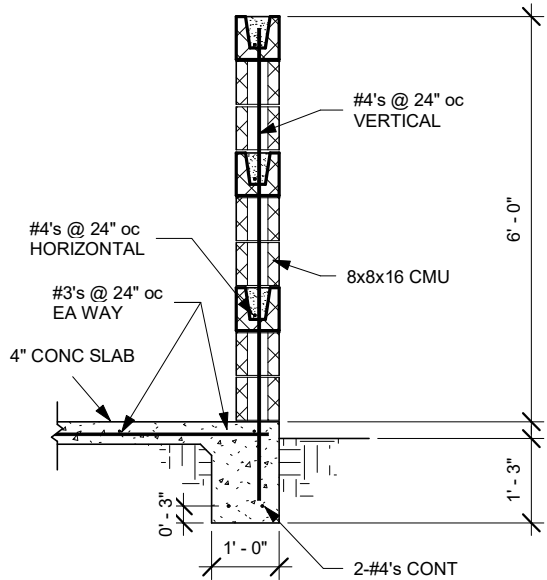
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Building Perspectives

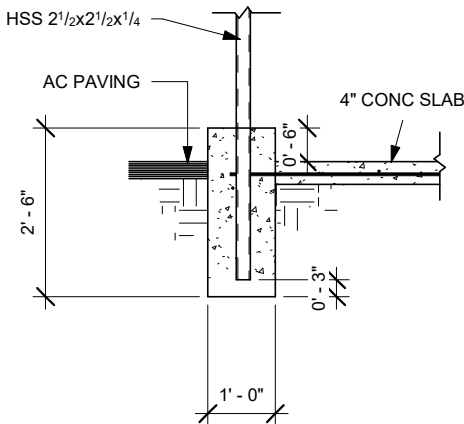
Project number	Project Number	A10
Date	Issue Date	
Drawn by	Author	Scale
Checked by	Checker	



① Foundation
1/8" = 1'-0"



② Foundation/Wall Detail
1/2" = 1'-0"



③ Cantilevered Column Foundation
1/2" = 1'-0"

By using these standard plans, the user agrees to release the County of San Bernardino from any and all claims, liabilities, suits, and demands on account of any injury, damage, or loss to persons or property, including injury or death, or economic losses, arising out of the use of these construction documents. The use of these plans does not eliminate or reduce the user's responsibility to verify any and all information



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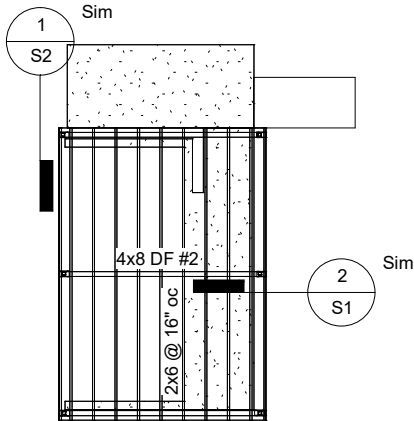
SB County
12'x17'-4"
Enclosure

Foundation

Project number	Project Number
Date	Issue Date
Drawn by	Author
Checked by	Checker

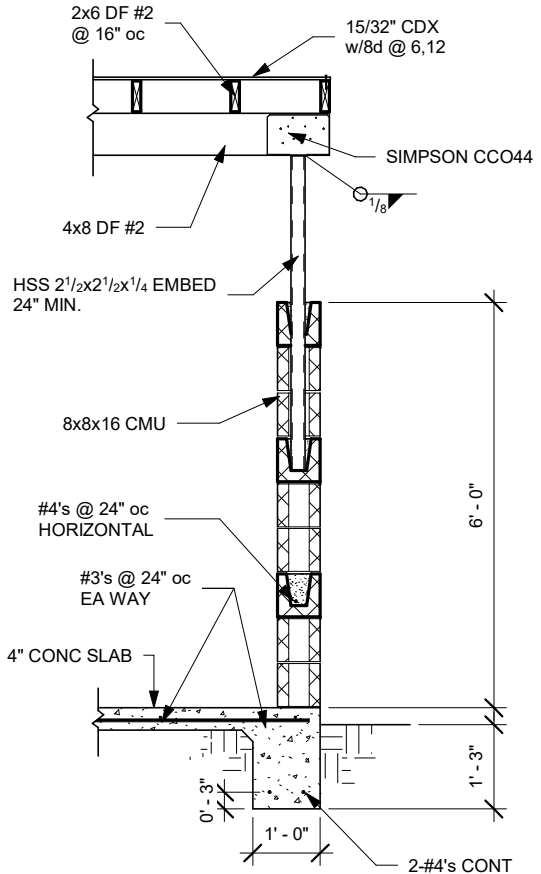
S0

Scale As indicated



1 Roof Framing
1/8" = 1'-0"

By using these standard plans, the user agrees to release the County of San Bernardino from any and all claims, liabilities, suits, and demands on account of any injury, damage, or loss to persons or property, including injury or death, or economic losses, arising out of the use of these construction documents. The use of these plans does not eliminate or reduce the user's responsibility to verify any and all information



2 Wall/Framing Detail
1/2" = 1'-0"



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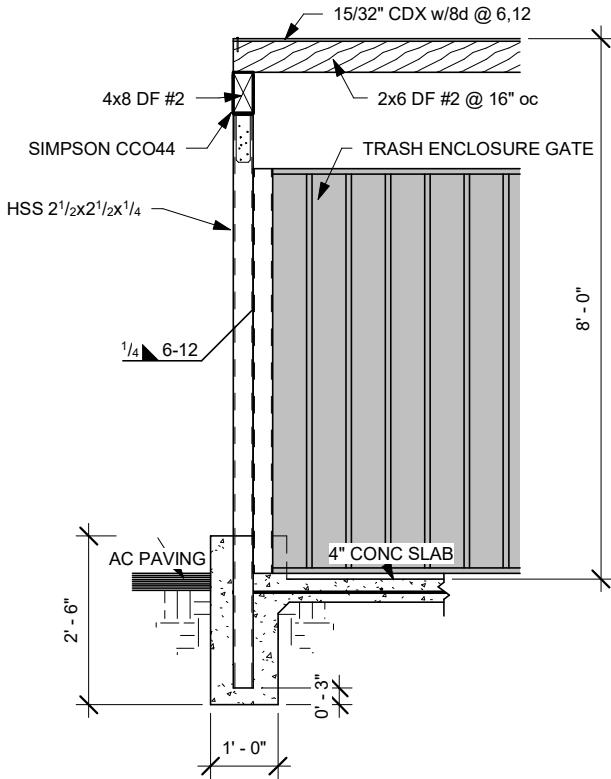
SB County
12'x17'-4"
Enclosure

Roof Framing

Project number	Project Number
Date	Issue Date
Drawn by	Author
Checked by	Checker

S1

Scale As indicated



① Trash Enclosure Gate
1/2" = 1'-0"

By using these standard plans, the user agrees to release the County of San Bernardino from any and all claims, liabilities, suits, and demands on account of any injury, damage, or loss to persons or property, including injury or death, or economic losses, arising out of the use of these construction documents. The use of these plans does not eliminate or reduce the user's responsibility to verify any and all information



www.sbcounty.gov

SB County
12'x17'-4"
Enclosure

Details

Project number	Project Number
Date	Issue Date
Drawn by	Author
Checked by	Checker

S2

Scale 1/2" = 1'-0"

FLEXSTORM CATCH-IT FILTERS FOR TEMPORARY INLET PROTECTION

PRODUCT SELECTION AND SPECIFICATION DRAWING

11 GA GALVANIZED STEEL SUSPENSION SYSTEM

LIFT HANDLES

STANDARD 2" OVERFLOW AREA

STAINLESS STEEL CLAMPING BAND

REPLACEABLE SEDIMENT BAGS WITH GEOTEXTILE FILTER FABRIC

TYPICAL ROUND INLET FILTER

TYPICAL RECTANGULAR INLET FILTER

COMBINATION INLET FILTER FOR CURB HOODS

STAINLESS STEEL ROUND INLET FILTERS for NYLOPLAST CASTINGS CATCH-ITS SPECIFIED W/ FX or FX-S BAGS

NOTES:

- ALL FRAMING IS CONSTRUCTED OF CORROSION RESISTANT STEEL (ZINC PLATED OR GALVANIZED) FOR 7 YEAR MINIMUM SERVICE LIFE.
- UPON ORDERING CONFIRMATION OF THE DOT CALLOUT, PRECAST OR CASTING MAKE AND MODEL, OR DETAILED DIMENSIONAL FORMS MUST BE PROVIDED TO CONFIGURE AND ASSEMBLE YOUR CUSTOMIZED FLEXSTORM INLET FILTER. PART NUMBER ALONE IS NOT SUFFICIENT.
- FOR WRITTEN SPECIFICATIONS AND MAINTENANCE GUIDELINES VISIT WWW.INLETFILTERS.COM

1. IDENTIFY YOUR FRAME STYLE AND SIZE

STYLE	FRAME STYLE AND SIZE	Frame P/N:
ROUND	Small Round (up to 20.0" dia grates (A) dim)	62SRD
	Med Round (20.1" - 26.0" dia grates (A) up to 25" dia openings (B))	62MRD
	Large Round (26.1" - 32.0" dia grates (A) up to 30" openings (B))	62LRD
	XL Round (32.1" dia - 39" dia grates (A) up to 37" dia openings (B))	62XLRD
RECT/ SQUARE	Small Rect / Square (up to 16" (B) x 16" (D) openings or 64" perimeter)	62SSQ
	Med Rect / Square (up to 24" (B) x 24" (D) openings or 96" perimeter)	62MSQ
	Large Rect / Square (up to 36" (B) x 24" (D) openings or 120" perimeter)	62LSQ
	XL Rect / Square (side by side 2 pc set to fit up to 48" (B) x 36" (D) openings)	62XLSQ
COMBO INLETS	Small Rect / Square (ref Rect sizing; shipped with Magnetic Curb Flaps)	62SCB
	Med Rect / Square (ref Rect sizing; shipped with Magnetic Curb Flaps)	62MCB
	Large Rect / Square (ref Rect sizing; shipped with Magnetic Curb Flaps)	62LCB
	XL Rect / Square (ref Rect sizing; shipped with Magnetic Curb Flaps)	62XLCB
NYLOPLAST	12" diameter Nyloplast castings (Stainless Steel Framing standard)	6212NY
	15" diameter Nyloplast castings (Stainless Steel Framing standard)	6215NY
	18" diameter Nyloplast castings (Stainless Steel Framing standard)	6218NY
	24" diameter Nyloplast castings (Stainless Steel Framing standard)	6224NY
	30" diameter Nyloplast castings (Stainless Steel Framing standard)	6230NY

SPECIFICATIONS FOR STANDARD BAGS BY NOMINAL SIZE

Nominal Bag Size	Solids Storage (CuFt)	Filtered Flow Rate at 50% Max (CFS)	
		FX (Woven)	IL (NonWoven)
Small	1.6	1.2	0.9
Medium	2.1	1.7	1.3
Large	3.8	2.7	1.9
XL	4.2	3.6	2.6

2. SELECT YOUR BAG PART NUMBER

FLEXSTORM FILTER BAGS	(22" depth) STD Bag P/N	(12" depth) Short Bag P/N	Clean Water Flow Rate (GPM/SqFt)	Min A.O.S. (US Sieve)
FX: Standard Woven Bag	FX	FX-S	200	40
IL: IDOT Non-Woven Bag	IL	IL-S	145	70

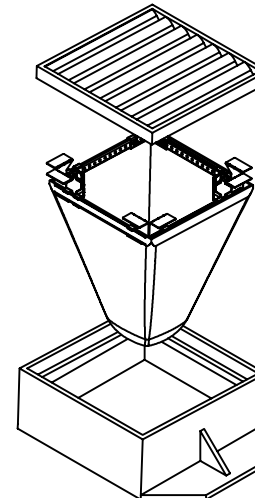
3. CREATE YOUR FLEXSTORM INLET FILTER PART NUMBER

Frame P/N from Step 1.

Filter Bag P/N from Step 2.

INSTALLATION:

- REMOVE GRATE
- DROP FLEXSTORM INLET FILTER ONTO LOAD BEARING LIP OF CASTING OR CONCRETE STRUCTURE
- REPLACE GRATE



FLEXSTORM

INLET FILTERS™

CATCH IT

ALL PRODUCTS MANUFACTURED BY INLET & PIPE PROTECTION, INC A DIVISION OF ADS, INC.
WWW.INLETFILTERS.COM
 (866) 287-8655 PH
 (630) 355-3477 FX
INFO@INLETFILTERS.COM

SIZE	DWG NO	REV
C	FLEXSTORM_CATCH_IT	A
SCALE	SHEET 1 OF 1	

Appendix A: Operation and Maintenance Plan

Appendix B: Supporting Documentation



WQMP Project Report

County of San Bernardino Stormwater Program

Santa Ana River Watershed Geodatabase

Friday, November 12, 2021

Note: The information provided in this report and on the Stormwater Geodatabase for the County of San Bernardino Stormwater Program is intended to provide basic guidance in the preparation of the applicant's Water Quality Management Plan (WQMP) and should not be relied upon without independent verification.

Project Site Parcel Number(s):	025702128, 025703135
Project Site Acreage:	11.288
HCOC Exempt Area:	Yes. Verify that the project is completely within the HCOC exemption area.
Closest Receiving Waters:	System Number -
(Applicant to verify based on local drainage facilities and topography.)	Facility Name - Mulberry Channel
	Owner - SBCFCD
Closest channel segment's susceptibility to Hydromodification:	EHM
Highest downstream hydromodification susceptibility:	EHM
Is this drainage segment subject to TMDLs?	No
Are there downstream drainage segments subject to TMDLs?	No
Is this drainage segment a 303d listed stream?	No
Are there 303d listed streams downstream?	No
Are there unlined downstream waterbodies?	No
Project Site Onsite Soil Group(s):	A
Environmentally Sensitive Areas within 200':	None
Groundwater Depth (FT):	-247
Parcels with potential septic tanks within 1000':	Yes
Known Groundwater Contamination Plumes within 1000':	No
Studies and Reports Related to Project Site:	Cactus Basin CSDP 3-3 Rialto Channel Drainage Area Volume I CSDP 3-3 Rialto Channel Drainage Area Volume II CSDP 3-3 Rialto Channel Drainage Area Volume III CSDP 3-3 Rialto Channel Drainage Area Volume I CSDP 3-3 Rialto Channel Drainage Area Volume IV CSDP 3-3 Rialto Channel Drainage Area Volume V CSDP 3-4 100yr Hydrology Update CSDP 3-4 Engineers Report Volume 1 CSDP 3-4 Hydrology Study West Portion Only CSDP 3-4 Hydrology Study East Portion CSDP 3 CALC SHEET FOR HYDRO CSDP 3-3 Rialto Channel Drain Area Draft Hydrology Study Project 3-4 East Portion Hydrology Study Project 3-4 West portion Only Project #3-4 100yr Hydrology Update Sept1997 SBCounty CSDP Project No.2 Volume 1 SBCounty CSDP Project No.2 Volume 2 Volume 2 Map SBCounty CSDP Project No.3 Volume I SBCounty CSDP Project No.3 Volume II SBVMWD High Groundwater / Pressure Zone Area



NOAA Atlas 14, Volume 6, Version 2
Location name: **Bloomington, California, USA***
Latitude: **34.0595°**, Longitude: **-117.3993°**
Elevation: **1054.32 ft****
* source: ESRI Maps
** source: USGS



POINT PRECIPITATION FREQUENCY ESTIMATES

Sanja Perica, Sarah Dietz, Sarah Heim, Lillian Hiner, Kazungu Maitaria, Deborah Martin, Sandra Pavlovic, Ishani Roy, Carl Trypaluk, Dale Unruh, Fenglin Yan, Michael Yekta, Tan Zhao, Geoffrey Bonnin, Daniel Brewer, Li-Chuan Chen, Tye Parzybok, John Yarchoan

NOAA, National Weather Service, Silver Spring, Maryland

[PF_tabular](#) | [PF_graphical](#) | [Maps_&_aerials](#)

PF tabular

PDS-based point precipitation frequency estimates with 90% confidence intervals (in inches) ¹										
Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	0.108 (0.090-0.131)	0.140 (0.117-0.170)	0.183 (0.152-0.223)	0.219 (0.180-0.269)	0.269 (0.214-0.342)	0.308 (0.240-0.400)	0.349 (0.265-0.465)	0.392 (0.289-0.538)	0.453 (0.320-0.649)	0.503 (0.343-0.746)
10-min	0.155 (0.129-0.188)	0.201 (0.167-0.244)	0.263 (0.218-0.320)	0.314 (0.258-0.385)	0.385 (0.306-0.490)	0.442 (0.344-0.573)	0.500 (0.379-0.666)	0.562 (0.414-0.771)	0.650 (0.459-0.930)	0.721 (0.491-1.07)
15-min	0.188 (0.156-0.228)	0.243 (0.203-0.295)	0.318 (0.264-0.387)	0.380 (0.313-0.466)	0.466 (0.370-0.592)	0.534 (0.415-0.693)	0.605 (0.459-0.806)	0.680 (0.501-0.933)	0.786 (0.555-1.13)	0.872 (0.594-1.29)
30-min	0.280 (0.233-0.340)	0.363 (0.302-0.441)	0.474 (0.393-0.577)	0.566 (0.466-0.695)	0.695 (0.553-0.883)	0.797 (0.620-1.03)	0.902 (0.684-1.20)	1.01 (0.748-1.39)	1.17 (0.828-1.68)	1.30 (0.886-1.93)
60-min	0.409 (0.341-0.496)	0.530 (0.441-0.643)	0.692 (0.574-0.842)	0.827 (0.680-1.01)	1.01 (0.806-1.29)	1.16 (0.904-1.51)	1.32 (0.999-1.75)	1.48 (1.09-2.03)	1.71 (1.21-2.45)	1.90 (1.29-2.81)
2-hr	0.599 (0.499-0.726)	0.769 (0.640-0.934)	0.994 (0.825-1.21)	1.18 (0.970-1.45)	1.43 (1.14-1.82)	1.63 (1.27-2.12)	1.84 (1.39-2.44)	2.05 (1.51-2.81)	2.34 (1.66-3.35)	2.58 (1.76-3.83)
3-hr	0.747 (0.623-0.906)	0.957 (0.797-1.16)	1.23 (1.02-1.50)	1.46 (1.20-1.79)	1.77 (1.40-2.24)	2.00 (1.56-2.60)	2.25 (1.70-2.99)	2.50 (1.84-3.43)	2.85 (2.01-4.08)	3.13 (2.13-4.64)
6-hr	1.06 (0.879-1.28)	1.35 (1.13-1.64)	1.74 (1.44-2.12)	2.05 (1.69-2.52)	2.48 (1.97-3.15)	2.80 (2.18-3.64)	3.13 (2.37-4.17)	3.47 (2.56-4.76)	3.93 (2.78-5.63)	4.30 (2.93-6.37)
12-hr	1.40 (1.17-1.70)	1.81 (1.51-2.19)	2.33 (1.94-2.84)	2.75 (2.27-3.38)	3.32 (2.64-4.21)	3.75 (2.91-4.86)	4.18 (3.17-5.56)	4.62 (3.41-6.34)	5.22 (3.69-7.47)	5.69 (3.87-8.43)
24-hr	1.88 (1.66-2.16)	2.44 (2.16-2.82)	3.17 (2.80-3.67)	3.76 (3.29-4.39)	4.55 (3.85-5.48)	5.14 (4.26-6.32)	5.74 (4.65-7.23)	6.35 (5.00-8.22)	7.17 (5.42-9.67)	7.80 (5.71-10.9)
2-day	2.28 (2.02-2.63)	3.02 (2.67-3.49)	3.99 (3.52-4.62)	4.77 (4.17-5.56)	5.83 (4.93-7.02)	6.63 (5.50-8.16)	7.45 (6.03-9.38)	8.29 (6.53-10.7)	9.43 (7.13-12.7)	10.3 (7.54-14.4)
3-day	2.44 (2.16-2.82)	3.29 (2.91-3.80)	4.40 (3.88-5.10)	5.31 (4.65-6.19)	6.55 (5.55-7.89)	7.51 (6.23-9.23)	8.48 (6.87-10.7)	9.50 (7.48-12.3)	10.9 (8.23-14.7)	12.0 (8.75-16.7)
4-day	2.63 (2.33-3.03)	3.58 (3.16-4.13)	4.82 (4.25-5.58)	5.84 (5.11-6.82)	7.25 (6.14-8.73)	8.34 (6.92-10.3)	9.46 (7.66-11.9)	10.6 (8.37-13.8)	12.2 (9.25-16.5)	13.5 (9.86-18.8)
7-day	3.00 (2.66-3.46)	4.14 (3.66-4.77)	5.63 (4.96-6.51)	6.86 (6.00-8.00)	8.55 (7.24-10.3)	9.88 (8.19-12.1)	11.2 (9.11-14.2)	12.7 (9.99-16.4)	14.6 (11.1-19.7)	16.2 (11.9-22.6)
10-day	3.26 (2.89-3.76)	4.52 (4.00-5.21)	6.18 (5.45-7.15)	7.56 (6.61-8.81)	9.46 (8.01-11.4)	10.9 (9.08-13.5)	12.5 (10.1-15.7)	14.1 (11.1-18.3)	16.4 (12.4-22.1)	18.2 (13.3-25.3)
20-day	3.95 (3.50-4.55)	5.51 (4.87-6.36)	7.60 (6.70-8.79)	9.34 (8.17-10.9)	11.8 (9.97-14.2)	13.7 (11.4-16.8)	15.7 (12.7-19.8)	17.8 (14.1-23.1)	20.8 (15.8-28.1)	23.3 (17.0-32.4)
30-day	4.67 (4.14-5.39)	6.53 (5.77-7.53)	9.01 (7.95-10.4)	11.1 (9.71-13.0)	14.0 (11.9-16.9)	16.4 (13.6-20.1)	18.8 (15.3-23.7)	21.5 (16.9-27.8)	25.2 (19.1-34.0)	28.2 (20.6-39.4)
45-day	5.58 (4.94-6.44)	7.73 (6.84-8.93)	10.6 (9.39-12.3)	13.1 (11.5-15.3)	16.6 (14.0-20.0)	19.4 (16.1-23.8)	22.3 (18.1-28.1)	25.5 (20.1-33.0)	30.1 (22.8-40.6)	33.8 (24.7-47.2)
60-day	6.53 (5.78-7.53)	8.95 (7.92-10.3)	12.2 (10.8-14.2)	15.0 (13.2-17.5)	19.0 (16.1-22.9)	22.2 (18.4-27.3)	25.6 (20.8-32.3)	29.3 (23.1-38.0)	34.6 (26.2-46.7)	39.1 (28.6-54.5)

¹ Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

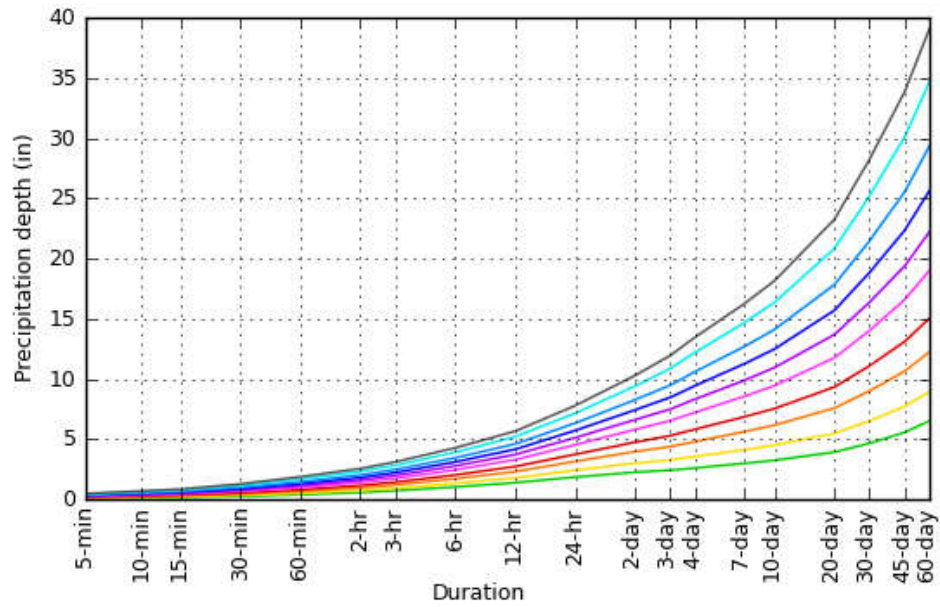
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper bounds are not checked against probable maximum precipitation (PMP) estimates and may be higher than currently valid PMP values.

Please refer to NOAA Atlas 14 document for more information.

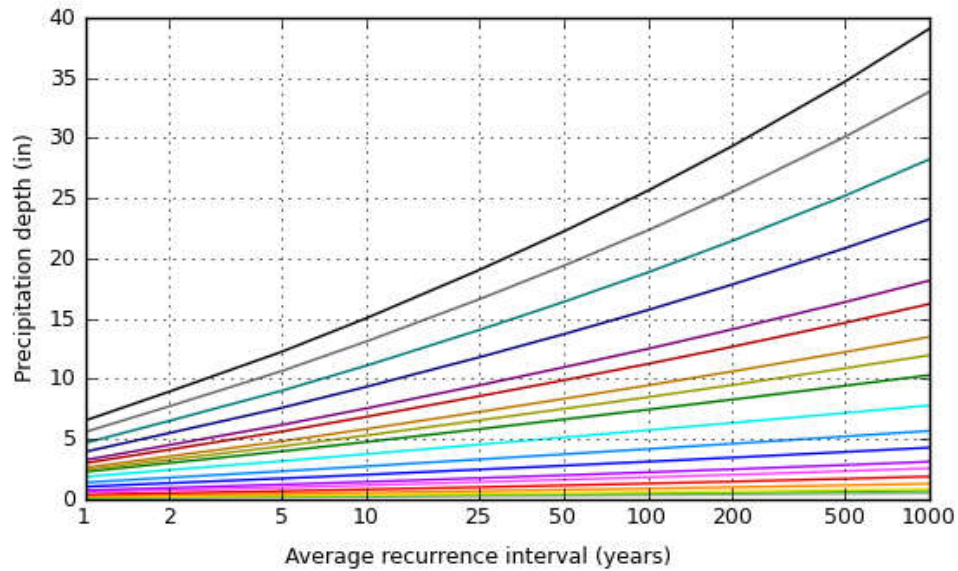
[Back to Top](#)

PF graphical

PDS-based depth-duration-frequency (DDF) curves
Latitude: 34.0595°, Longitude: -117.3993°



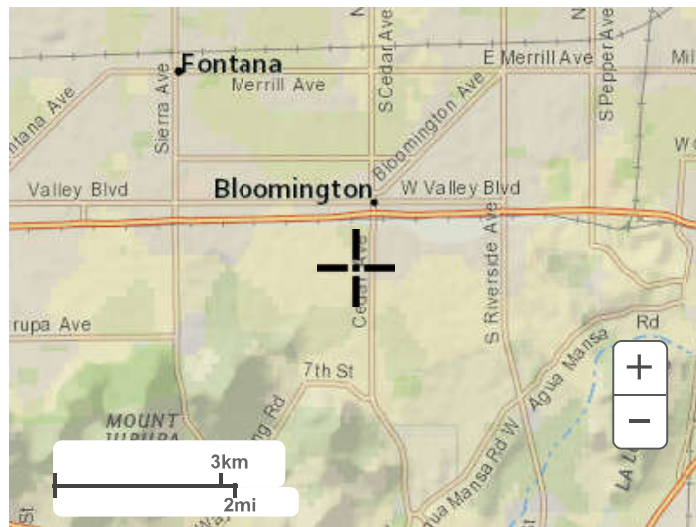
Average recurrence interval (years)
1
2
5
10
25
50
100
200
500
1000



Duration	
5-min	2-day
10-min	3-day
15-min	4-day
30-min	7-day
60-min	10-day
2-hr	20-day
3-hr	30-day
6-hr	45-day
12-hr	60-day
24-hr	

Maps & aerials

Small scale terrain



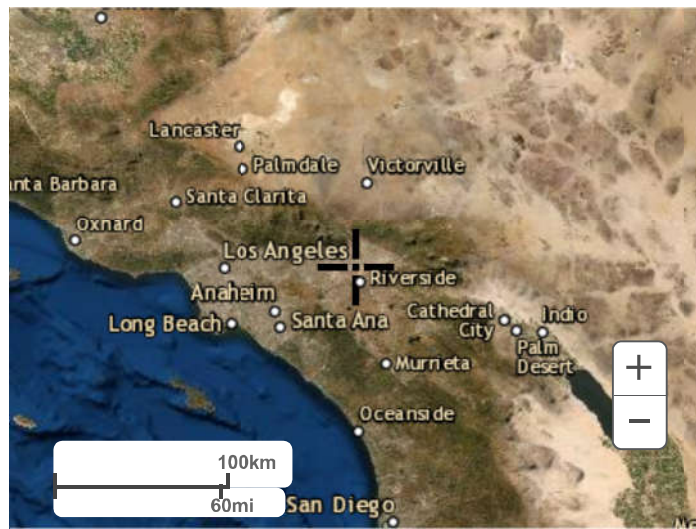
Large scale terrain



Large scale map



Large scale aerial



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1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

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Appendix C: BMP Educational Materials

POLLUTION ^{STORMWATER} Prevention

PAINTING

Paints, solvents, adhesives and other toxic chemicals used in painting often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these simple tips to prevent pollution and protect our health.



Water-Based Paints

Use water-based paints whenever possible. They are less toxic than oil-based paints and easier to clean up. Look for products labeled "latex" or "cleans with water."



Paint Removal

Sweep up paint stripping residue, chips and dust instead of hosing into the street and dispose of them safely at a household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.



Painting Cleanup

Never clean brushes or rinse paint containers in the street, gutter or near a storm drain. Clean water-based paints in the sink. Clean oil-based paints with thinner, which can be reused by putting it in a jar to settle out the paint particles and then pouring off the clear liquid for future use. Wrap dried paint residue in newspaper and dispose of it in the trash.

Exterior Paint Removal

When stripping or cleaning building exteriors with high-pressure water, block nearby storm drains and divert washwater onto a designated dirt area. Ask your local wastewater treatment authority if you can collect building cleaning water and discharge it to the sewer.



Recycling Paint

Recycle leftover paint at a household hazardous waste collection facility, save it for touch ups or give it to someone who can use it, like a theatre group, school, city or community organization.

To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

www.1800cleanup.org



POLLUTION ^{STORMWATER} Prevention

HOME REPAIR & REMODELING

Paints, solvents, adhesives and other toxic substances used in home repair and remodeling often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these simple tips to prevent pollution and protect your health.



Construction Projects

Keep construction debris away from the street, gutter and storm drains. Schedule grading and excavation projects for dry weather. Cover excavated material and stockpiles of soil, sand or gravel, protected from rain, wind and runoff. Prevent erosion by planting fast-growing annual and perennial grass, which can shield and bind soil.

Recycle Household Hazardous Waste

Household cleaners, paint and other home improvement products like wallpaper and tile adhesives are too toxic to trash. Recycle them instead, at a convenient household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.



Landscaping & Gardening

Avoid applying fertilizers or pesticide near curbs and driveways, and store covered, protected from rain, wind and runoff. Try using organic or non-toxic alternatives. Reduce runoff and lower your water bill by using drip irrigation, soaker hoses or micro-spray systems. Recycle leaves instead of blowing, sweeping or raking them into the street, gutter or storm drain.

Paint Removal

Paint stripping residue, chips and dust from marine paints and paints containing lead or tributyl tin are hazardous wastes. Sweep them up instead of hosing into the street and dispose of them safely at a household hazardous waste collection facility.



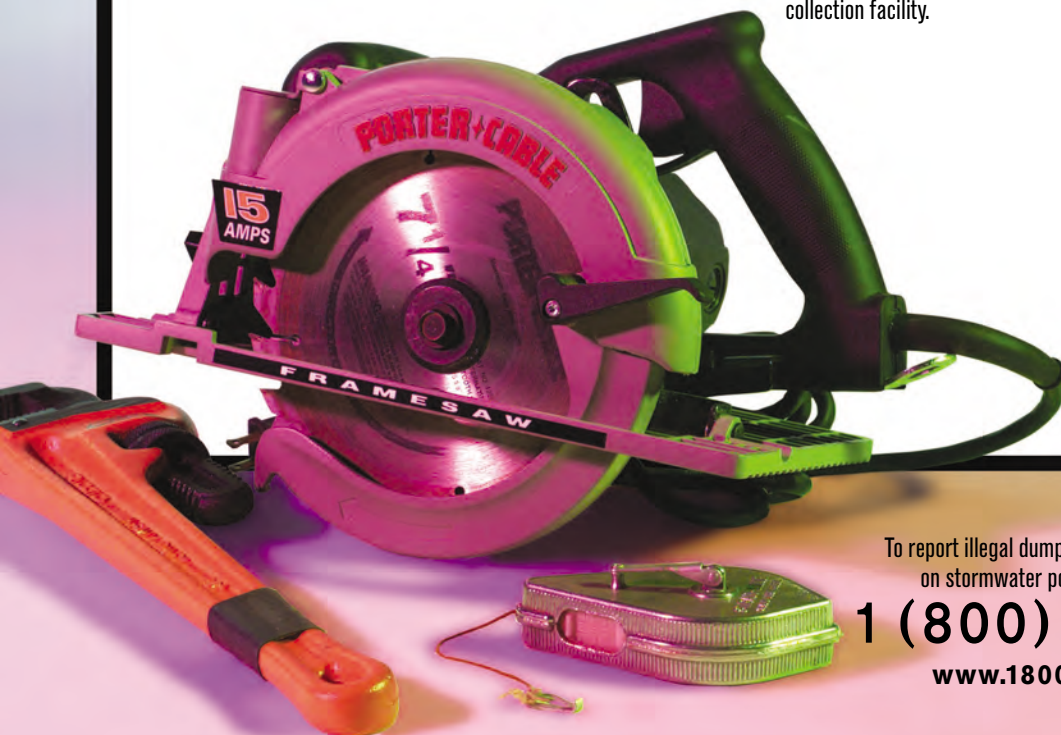
Painting Cleanup

Avoid cleaning brushes or rinsing paint containers in the street, gutter or near a storm drain. Clean water-based paints in the sink. Clean oil-based paints with thinner, which you can filter and reuse. Recycle leftover paint at a household hazardous waste collection facility, save it for touch ups or give it to someone who can use it, like a theatre group, school, city or community organization.



Concrete and Masonry

Store bags of cement and plaster away from gutters and storm drains, and cover them to protect against rain, wind and runoff. Sweep or scoop up cement washout or concrete dust instead of hosing into driveways, streets, gutters or storm drains.



To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

www.1800cleanup.org



POLLUTION ^{STORMWATER} Prevention

HOME & GARDEN

Yard waste and household toxics like paints and pesticides often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these simple tips to prevent pollution and protect your health.



Recycle Household Hazardous Waste

Household products like paint, pesticides, solvents and cleaners are too dangerous to dump and too toxic to trash. Take them to be recycled at a convenient household hazardous waste collection facility. Call (800) CLEANUP for the facility in your area.



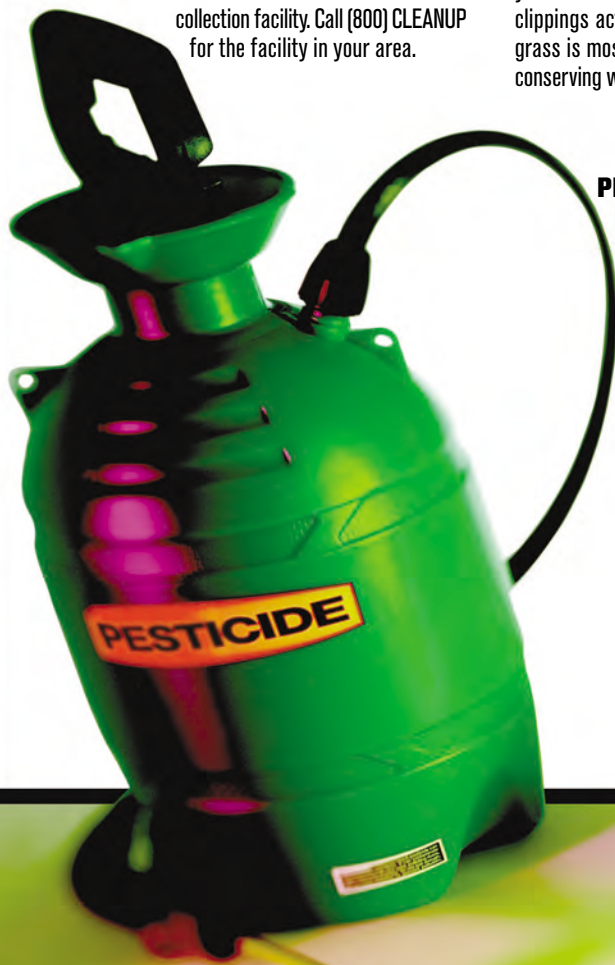
Disposing of Yard Waste

Recycle leaves, grass clippings and other yard waste, instead of blowing, sweeping or hosing into the street. Try grasscycling, leaving grass clippings on your lawn instead of using a grass catcher. The clippings act as a natural fertilizer, and because grass is mostly water, it also irrigates your lawn, conserving water.



Use Fertilizers & Pesticides Safely

Fertilizers and pesticides are often carried into the storm drain system by sprinkler runoff. Try using organic or non-toxic alternatives. If you use chemical fertilizers or pesticides, avoid applying near curbs and driveways and never apply before a rain.



Planting in the Yard

Produce less yard waste and save water by planting low maintenance, drought-tolerant trees and shrubs. Using drip irrigation, soaker hoses or micro-spray systems for flower beds and vegetation can also help reduce your water bill and prevent runoff.



Use Water Wisely

Cut your water costs and prevent runoff by controlling the amount of water and direction of sprinklers. The average lawn needs about an inch of water a week, including rainfall, or 10 to 20 minutes of watering. A half-inch per week is enough for fall and spring. Sprinklers should be on long enough to allow water to soak into the ground but not so long as to cause runoff.

To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

www.1800cleanup.org



Pollution Prevention

AUTO MAINTENANCE

Oil, grease, anti-freeze and other toxic automotive fluids often make their way into the San Bernardino County storm drain system, and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.



Cleaning Auto Parts

Scrape parts with a wire brush or use a bake oven rather than liquid cleaners. Arrange drip pans, drying racks and drain boards so that fluids are directed back into the parts washer or the fluid holding tank. Do not wash parts or equipment in a shop sink, parking lot, driveway or street.



Storing Hazardous Waste

Keep your liquid waste segregated. Many fluids can be recycled via hazardous waste disposal companies if they are not mixed. Store all materials under cover with spill containment or inside to prevent contamination of rainwater runoff.



Metal Grinding and Polishing

Keep a bin under your lathe or grinder to capture metal filings. Send uncontaminated filings to a scrap metal recycler for reclamation. Store metal filings in a covered container or indoors.



Preventing Leaks and Spills

Place drip pans underneath to capture fluids. Use absorbent cleaning agents instead of water to clean work areas.



Cleaning Spills

Use dry methods for spill cleanup (sweeping, absorbent materials). Follow your hazardous materials response plan, as filed with your local fire department or other hazardous materials authority. Be sure that all employees are aware of the plan and are capable of implementing each phase. To report serious toxic spills, call 911.



Proper Disposal of Hazardous Waste

Recycle used motor oil and oil filters, anti-freeze and other hazardous automotive fluids, batteries, tires and metal filings collected from grinding or polishing auto parts. Contact a licensed hazardous waste hauler. For more recycling information, call (909) 386-8401.



To report illegal dumping or for more information on stormwater pollution prevention, call:

1 (800) CLEANUP

www.1800cleanup.org





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.



- 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.

Description

Trash storage areas are areas where a trash receptacle (s) are located for use as a repository for solid wastes. Stormwater runoff from areas where trash is stored or disposed of can be polluted. In addition, loose trash and debris can be easily transported by water or wind into nearby storm drain inlets, channels, and/or creeks. Waste handling operations that may be sources of stormwater pollution include dumpsters, litter control, and waste piles.

Approach

This fact sheet contains details on the specific measures required to prevent or reduce pollutants in stormwater runoff associated with trash storage and handling. Preventative measures including enclosures, containment structures, and impervious pavements to mitigate spills, should be used to reduce the likelihood of contamination.

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

Design requirements for waste handling areas are governed by Building and Fire Codes, and by current local agency ordinances and zoning requirements. The design criteria described in this fact sheet are meant to enhance and be consistent with these code and ordinance requirements. Hazardous waste should be handled in accordance with legal requirements established in Title 22, California Code of Regulation.

Wastes from commercial and industrial sites are typically hauled by either public or commercial carriers that may have design or access requirements for waste storage areas. The design criteria in this fact sheet are recommendations and are not intended to be in conflict with requirements established by the waste hauler. The waste hauler should be contacted prior to the design of your site trash collection areas. Conflicts or issues should be discussed with the local agency.

Designing New Installations

Trash storage areas should be designed to consider the following structural or treatment control BMPs:

- Design trash container areas so that drainage from adjoining roofs and pavement is diverted around the area(s) to avoid run-on. This might include berming or grading the waste handling area to prevent run-on of stormwater.
- Make sure trash container areas are screened or walled to prevent off-site transport of trash.

Design Objectives

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



- Use lined bins or dumpsters to reduce leaking of liquid waste.
- Provide roofs, awnings, or attached lids on all trash containers to minimize direct precipitation and prevent rainfall from entering containers.
- Pave trash storage areas with an impervious surface to mitigate spills.
- Do not locate storm drains in immediate vicinity of the trash storage area.
- Post signs on all dumpsters informing users that hazardous materials are not to be disposed of therein.

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.

Additional Information***Maintenance Considerations***

The integrity of structural elements that are subject to damage (i.e., screens, covers, and signs) must be maintained by the owner/operator. Maintenance agreements between the local agency and the owner/operator may be required. Some agencies will require maintenance deed restrictions to be recorded of the property title. If required by the local agency, maintenance agreements or deed restrictions must be executed by the owner/operator before improvement plans are approved.

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.

STORMTECH SC-740 CHAMBER

Designed to meet the most stringent industry performance standards for superior structural integrity while providing designers with a cost-effective method to save valuable land and protect water resources. The StormTech system is designed primarily to be used under parking lots, thus maximizing land usage for private (commercial) and public applications. StormTech chambers can also be used in conjunction with Green Infrastructure, thus enhancing the performance and extending the service life of these practices.

STORMTECH SC-740 CHAMBER (not to scale)

Nominal Chamber Specifications

Size (L x W x H)

85.4" x 51" x 30"

2,170 mm x 1,295 mm x 762 mm

Chamber Storage

45.9 ft³ (1.30 m³)

Min. Installed Storage*

74.9 ft³ (2.12 m³)

Weight

74.0 lbs (33.6 kg)

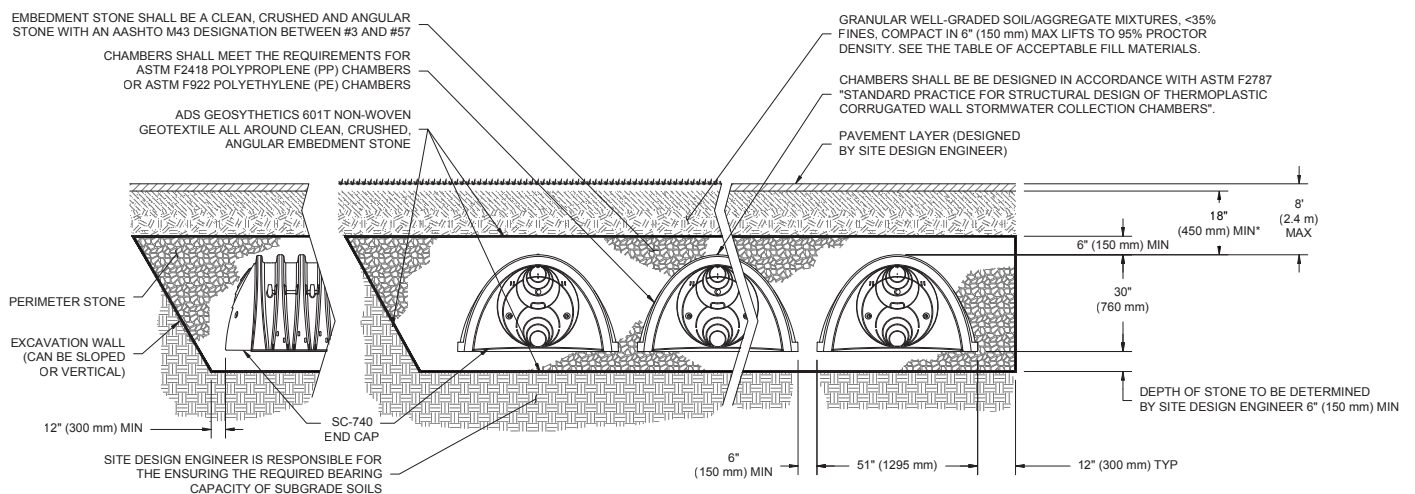
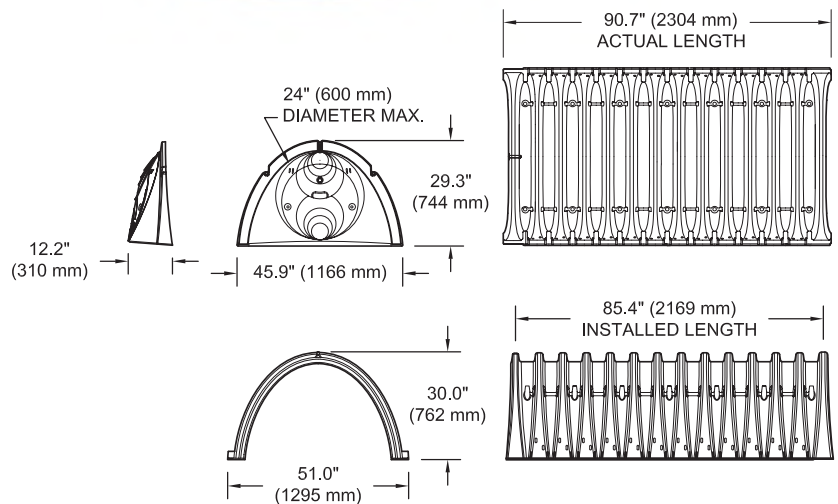
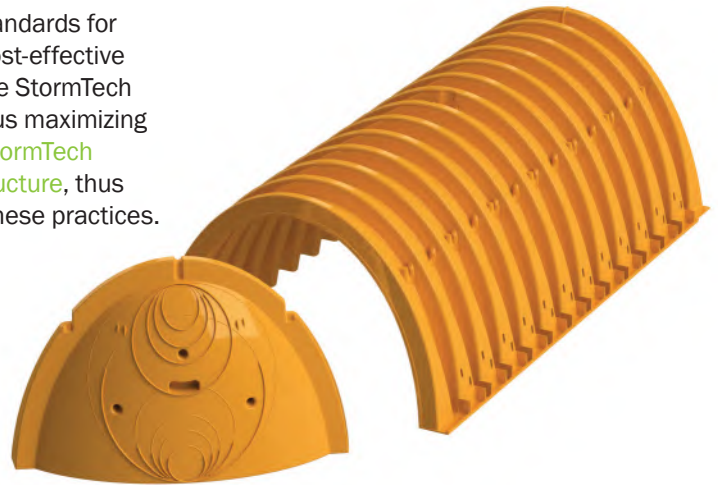
Shipping

30 chambers/pallet

60 end caps/pallet

12 pallets/truck

*Assumes 6" (150 mm) stone above, below and between chambers and 40% stone porosity.



*MINIMUM COVER TO BOTTOM OF FLEXIBLE PAVEMENT. FOR UNPAVED INSTALLATIONS WHERE RUTTING FROM VEHICLES MAY OCCUR, INCREASE COVER TO 24" (600 mm).

SC-740 CUMULATIVE STORAGE VOLUMES PER CHAMBER

Assumes 40% Stone Porosity. Calculations are Based Upon a 6" (150 mm) Stone Base Under Chambers.

Depth of Water in System Inches (mm)	Cumulative Chamber Storage ft ³ (m ³)	Total System Cumulative Storage ft ³ (m ³)
42 (1067)	45.90 (1.300)	74.90 (2.121)
41 (1041)	45.90 (1.300)	73.77 (2.089)
40 (1016)	45.90 (1.300)	72.64 (2.057)
39 (991)	45.90 (1.300)	71.52 (2.025)
38 (965)	45.90 (1.300)	70.39 (1.993)
37 (940)	45.90 (1.300)	69.26 (1.961)
36 (914)	45.90 (1.300)	68.14 (1.929)
35 (889)	45.85 (1.298)	66.98 (1.897)
34 (864)	45.69 (1.294)	65.75 (1.862)
33 (838)	45.41 (1.286)	64.46 (1.825)
32 (813)	44.81 (1.269)	62.97 (1.783)
31 (787)	44.01 (1.246)	61.36 (1.737)
30 (762)	43.06 (1.219)	59.66 (1.689)
29 (737)	41.98 (1.189)	57.89 (1.639)
28 (711)	40.80 (1.155)	56.05 (1.587)
27 (686)	39.54 (1.120)	54.17 (1.534)
26 (660)	38.18 (1.081)	52.23 (1.479)
25 (635)	36.74 (1.040)	50.23 (1.422)
24 (610)	35.22 (0.977)	48.19 (1.365)
23 (584)	33.64 (0.953)	46.11 (1.306)
22 (559)	31.99 (0.906)	44.00 (1.246)
21 (533)	30.29 (0.858)	41.85 (1.185)
20 (508)	28.54 (0.808)	39.67 (1.123)
19 (483)	26.74 (0.757)	37.47 (1.061)
18 (457)	24.89 (0.705)	35.23 (0.997)
17 (432)	23.00 (0.651)	32.96 (0.939)
16 (406)	21.06 (0.596)	30.68 (0.869)
15 (381)	19.09 (0.541)	28.36 (0.803)
14 (356)	17.08 (0.484)	26.03 (0.737)
13 (330)	15.04 (0.426)	23.68 (0.670)
12 (305)	12.97 (0.367)	21.31 (0.608)
11 (279)	10.87 (0.309)	18.92 (0.535)
10 (254)	8.74 (0.247)	16.51 (0.468)
9 (229)	6.58 (0.186)	14.09 (0.399)
8 (203)	4.41 (0.125)	11.66 (0.330)
7 (178)	2.21 (0.063)	9.21 (0.264)
6 (152)	0 (0)	6.76 (0.191)
5 (127)	0 (0)	5.63 (0.160)
4 (102)	0 (0)	4.51 (0.128)
3 (76)	0 (0)	3.38 (0.096)
2 (51)	0 (0)	2.25 (0.064)
1 (25)	0 (0)	1.13 (0.032)

Note: Add 1.13 ft³ (0.032 m³) of storage for each additional inch (25 mm) of stone foundation.

STORAGE VOLUME PER CHAMBER FT³ (M³)

	Bare Chamber Storage ft ³ (m ³)	Chamber and Stone Foundation Depth in. (mm)		
		6 (150)	12 (300)	18 (450)
SC-740 Chamber	45.9 (1.3)	74.9 (2.1)	81.7 (2.3)	88.4 (2.5)

Note: Assumes 6" (150 mm) stone above chambers, 6" (150 mm) row spacing and 40% stone porosity.

AMOUNT OF STONE PER CHAMBER

ENGLISH TONS (yds ³)	Stone Foundation Depth		
	6"	12"	16"
SC-740	3.8 (2.8)	4.6 (3.3)	5.5 (3.9)
METRIC KILOGRAMS (m ³)	150 mm	300 mm	450 mm
SC-740	3,450 (2.1)	4,170 (2.5)	4,490 (3.0)

Note: Assumes 6" (150 mm) of stone above and between chambers.

VOLUME EXCAVATION PER CHAMBER YD³ (M³)

	Stone Foundation Depth		
	6 (150)	12 (300)	18 (450)
SC-740	5.5 (4.2)	6.2 (4.7)	6.8 (5.2)

Note: Assumes 6" (150 mm) of row separation and 18" (450 mm) of cover. The volume of excavation will vary as depth of cover increases.



Working on a project?
Visit us at www.stormtech.com
and utilize the StormTech Design Tool

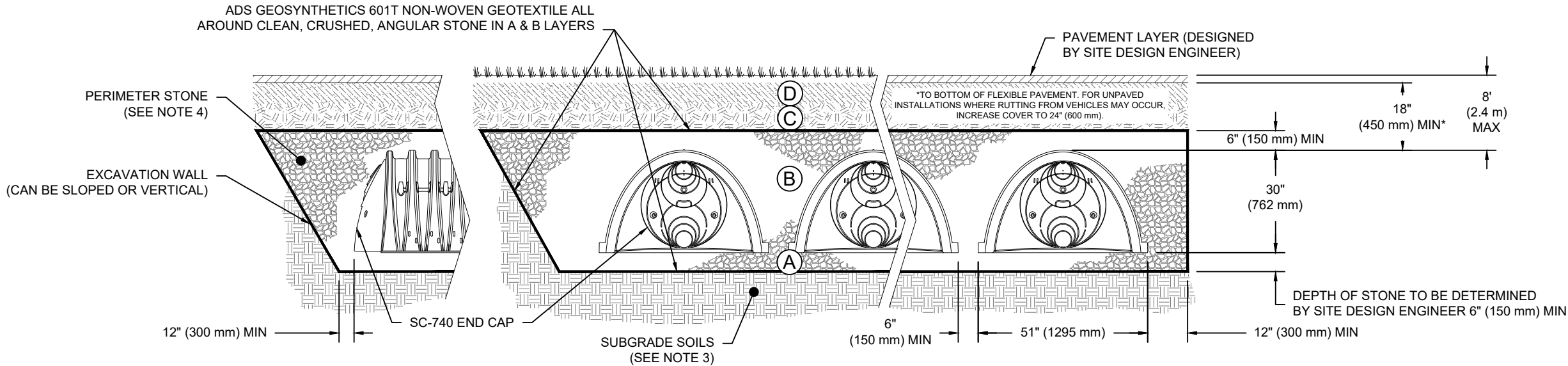
For more information on the StormTech SC-740 Chamber and other ADS products, please contact our Customer Service Representatives at 1-800-821-6710

THE MOST **ADVANCED** NAME IN WATER MANAGEMENT SOLUTIONS™

ACCEPTABLE FILL MATERIALS: STORMTECH SC-740 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER.	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 18" (450 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 ¹ A-1, A-2-4, A-3 OR AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 12" (300 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 6" (150 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS. ROLLER GROSS VEHICLE WEIGHT NOT TO EXCEED 12,000 lbs (53 kN). DYNAMIC FORCE NOT TO EXCEED 20,000 lbs (89 kN).
B	EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. ^{2,3}

- PLEASE NOTE:
- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
 - STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 6" (150 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
 - WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
 - ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.



NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418-16a, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- SC-740 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 2".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT AS DEFINED IN SECTION 6.2.8 OF ASTM F2418 SHALL BE GREATER THAN OR EQUAL TO 550 LBS/IN/IN. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

SC-740

STANDARD CROSS SECTION

DATE: 05-10-19

DRAWN: KR

CHECKED: KR

PROJECT #:

DESCRIPTION

DATE

DRWN

CHKD



StormTech
Detention • Retention • Water Quality

70 INWOOD ROAD, SUITE 3 | ROCKY HILL | CT | 06067
860-629-8188 | 888-892-2694 | WWW.STORMTECH.COM



ADS
ADVANCED DRAINAGE SYSTEMS, INC.

4640 TRUEMAN BLVD
HILLIARD, OH 43026

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SHEET

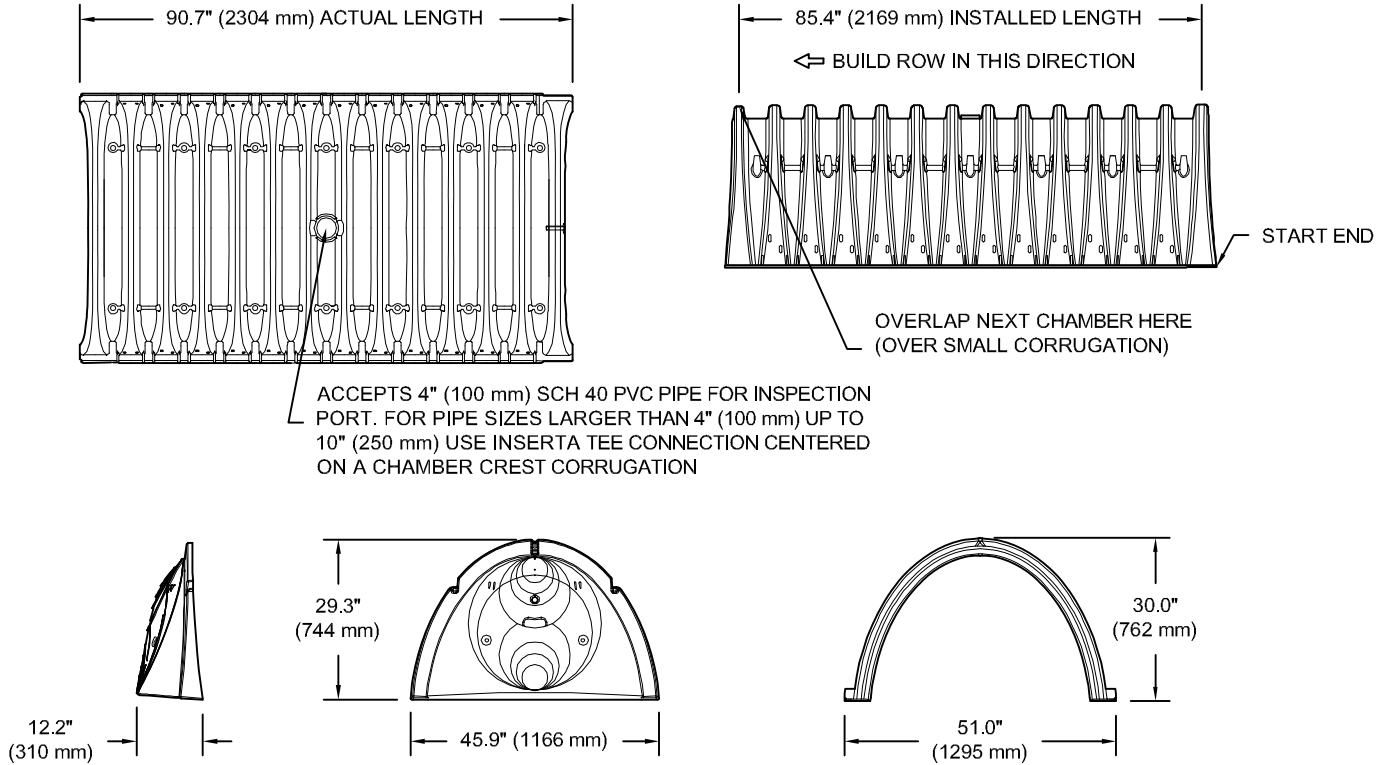
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OF

THIS DRAWING HAS BEEN PREPARED BASED ON INFORMATION PROVIDED TO ADS UNDER THE DIRECTION OF THE SITE DESIGN ENGINEER OR OTHER PROJECT REPRESENTATIVE. THE SITE DESIGN ENGINEER SHALL REVIEW THIS DRAWING PRIOR TO CONSTRUCTION. IT IS THE ULTIMATE RESPONSIBILITY OF THE SITE DESIGN ENGINEER TO ENSURE THAT THE PRODUCT(S) DEPICTED AND ALL ASSOCIATED DETAILS MEET ALL APPLICABLE LAWS, REGULATIONS, AND PROJECT REQUIREMENTS.

SC-740 TECHNICAL SPECIFICATION

NTS



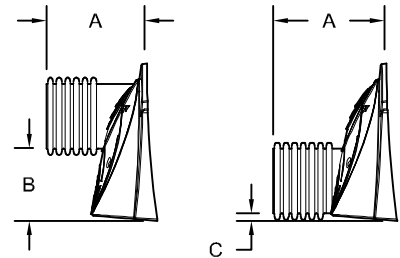
NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)
CHAMBER STORAGE
MINIMUM INSTALLED STORAGE*
WEIGHT

51.0" X 30.0" X 85.4"
45.9 CUBIC FEET
74.9 CUBIC FEET
75.0 lbs.

(1295 mm X 762 mm X 2169 mm)
(1.30 m³)
(2.12 m³)
(33.6 kg)

*ASSUMES 6" (152 mm) STONE ABOVE, BELOW, AND BETWEEN CHAMBERS



STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"

PART #	STUB	A	B	C
SC740EPE06T / SC740EPE06TPC	6" (150 mm)	10.9" (277 mm)	18.5" (470 mm)	—
SC740EPE06B / SC740EPE06BPC			—	0.5" (13 mm)
SC740EPE08T / SC740EPE08TPC	8" (200 mm)	12.2" (310 mm)	16.5" (419 mm)	—
SC740EPE08B / SC740EPE08BPC			—	0.6" (15 mm)
SC740EPE10T / SC740EPE10TPC	10" (250 mm)	13.4" (340 mm)	14.5" (368 mm)	—
SC740EPE10B / SC740EPE10BPC			—	0.7" (18 mm)
SC740EPE12T / SC740EPE12TPC	12" (300 mm)	14.7" (373 mm)	12.5" (318 mm)	—
SC740EPE12B / SC740EPE12BPC			—	1.2" (30 mm)
SC740EPE15T / SC740EPE15TPC	15" (375 mm)	18.4" (467 mm)	9.0" (229 mm)	—
SC740EPE15B / SC740EPE15BPC			—	1.3" (33 mm)
SC740EPE18T / SC740EPE18TPC	18" (450 mm)	19.7" (500 mm)	5.0" (127 mm)	—
SC740EPE18B / SC740EPE18BPC			—	1.6" (41 mm)
SC740EPE24B*	24" (600 mm)	18.5" (470 mm)	—	0.1" (3 mm)

ALL STUBS, EXCEPT FOR THE SC740EPE24B ARE PLACED AT BOTTOM OF END CAP SUCH THAT THE OUTSIDE DIAMETER OF THE STUB IS FLUSH WITH THE BOTTOM OF THE END CAP. FOR ADDITIONAL INFORMATION CONTACT STORMTECH AT 1-888-892-2694.

* FOR THE SC740EPE24B THE 24" (600 mm) STUB LIES BELOW THE BOTTOM OF THE END CAP APPROXIMATELY 1.75" (44 mm). BACKFILL MATERIAL SHOULD BE REMOVED FROM BELOW THE N-12 STUB SO THAT THE FITTING SITS LEVEL.

NOTE: ALL DIMENSIONS ARE NOMINAL

Appendix D: Soils Report



SOILS SOUTHWEST, INC.

SOILS, MATERIALS AND ENVIRONMENTAL ENGINEERING CONSULTANTS

897 VIA LATA, SUITE N • COLTON, CA 92324 • (909) 370-0474 • (909) 370-0481 • FAX (909) 370-3156

**Report of Geotechnical Evaluations and
Soil Infiltration Testing for WQMP-BMP Stormwater Disposal Design**

Proposed 62-Unit Multi-Family Apartment Complex
8428 Banana Avenue
Fontana, California
APN: 0230-031-67 & 68

Project No. 24008-F/BMP
April 16, 2024

Prepared for:

Mr. Fred Asad
c/o TLKM, LLC
449 W. Foothill Boulevard #104
Glendora, CA 91741



SOILS SOUTHWEST, INC.

SOILS, MATERIALS AND ENVIRONMENTAL ENGINEERING CONSULTANTS

897 VIA LATA, SUITE N • COLTON, CA 92324 • (909) 370-0474 • (909) 370-0481 • FAX (909) 370-3156

April 16, 2024

Project No. 24008-F/BMP

TLKM, LLC
449 W. Foothill Boulevard #104
Glendora, CA 91741

Attention: Mr. Mr. Fred Asad

Subject: Report of (i) Geotechnical Evaluations &
(ii) Soil Infiltration Testing for WQMP-BMP Stormwater Disposal Design
Proposed 62-Unit Multi-Family Apartment Complex
8428 Banana Avenue
Fontana, California
APN: 0230-031-67 & 68

Reference: Preliminary Project Layout Plan Prepared by Encompass Associates, Inc.

Gentlemen,

Presented herewith is the Report of (i) Geotechnical Evaluations and (ii) Soil Infiltration Testing for WQMP-BMP Stormwater Disposal Design for the site of the proposed 62-Unit Multi-Family Apartment Complex to be constructed on the parcels located at 8428 Banana Avenue, City of Fontana, California. In absence of detailed development plans review, the opinions and recommendations included should be considered as "preliminary". Revised and/or updated recommendations may be warranted following precise grading and development plans review.

No development details are available for review. However, based on the conceptual project development plan supplied, it is understood that the subject development will primarily include a 62-unit apartment complex comprised of fourteen (14) detached multi-story structures. Conventional construction of wood frame and stucco with concrete slabs-on-grade is expected. Supplemental installation of on-site WQMP-BMP underground stormwater disposal chamber installation is proposed. Conventional site preparations and grading are anticipated. Supplemental improvements are also expected to include on-site paving/parking driveways and off-site street improvements among others. For estimation purposes, structural loadings of 40 kips and 4 klf are assumed for isolated and continuous wall footing, respectively.

Based on the geotechnical explorations completed at this time, it is our opinion that, in general, the site soils encountered primarily consist of upper damp to moist, loose to low density, slightly compressible, poorly graded slightly silty fine to medium sands (SP) with low Standard Penetration Test blow counts (SPT<10) up to about 5 feet below grade, overlying variegating deposits of loose to very dense sands poorly graded fine to coarse sands with some silts and no silts along with gravely medium to coarse sands with and without silts, rock fragments, rocks, and cobbles to the maximum 31 feet depth explored. No free groundwater was encountered. Descriptions of the soils encountered are provided in the attached Log of Borings (B-1 to B-8).

No shallow-depth groundwater or bedrock was encountered. Historical and shallow-depth groundwater table is reported by the local agency is approximately 348 feet below grade as measured at the nearest water well, 01S06W11N001S. Based on such and as described in the Special Publication 117, published by the State of California Department of Conservation, Division of Mines and Geology, it is our opinion that the site should be considered non-susceptible to seismically induced soils liquefaction requiring no special geotechnical design recommendations other than those as recommended herein.

Following review of the online FEMA National Flood Hazard Layer Mapping, it is understood that the west side of the project site is classified as a Zone X, Area of Minimal Flood Hazard while the remaining portions of the project site are classified as being within an Area of Reduced Flood Risk due to Levee as shown in the Appendix C attachment.

The opinions, findings, and recommendations included should be considered "preliminary" and subject to revision following detailed development plan review.

It is our opinion that from a geotechnical viewpoint, the site should be considered suitable for the proposed development provided that the recommendations included are considered in design and construction.

It is suggested that when prepared the site topographic and plans should be available for review to verify applicability of certain assumptions used in the preparation of this report. Revised and/or updated recommendations may be warranted following detailed development plans review.

We offer no other warranty, express or implied.

Respectfully submitted,
Soils Southwest, Inc.

Moloy Gupta, RCE 31708



John Flippin, Project Coordinator

3.3 Subsurface Variations

Based on the results of subsurface explorations and local experience from similar projects completed as of this date, it is our opinion that variations in subsoils continuity and depths of subsoils deposit may be expected. Due to the nature and depositional characteristics of the soils underlying as described it is our opinion that care should be exercised in interpolating and/or extrapolating of the subsurface conditions existing in between and beyond the test explorations described. Although not encountered, presence of underlying old, buried utilities may be expected during grading and construction.

3.4 Groundwater

No shallow depth groundwater was encountered within the maximum 31 feet depth explored. The following table lists the historical groundwater table based on the information as supplied by the local reporting agency.

GROUNDWATER TABLE	
Reporting Agency	California Department of Water Resources Marcelo Montagna 2008 Maps http://wdl.water.ca.gov/waterdatalibrary/
Well Number	01S/06W-11N001S Chino-1002215
Well Monitoring Agency	Chino Basin Water Master
Well Location: Township/Range/Section	T01S-R06W-Section 11
Well Elevation:	1164.70
Current Depth to Water (Measured in feet)	467
Current Date Water was Measured	April 1, 2017
Depth to Water (Measured in feet) (Shallowest)	348
Date Water was Measured (Shallowest)	October 25, 1925

3.5 Soil Corrosivity Analyses

Reference Soil Sample B-7 @ 0-5 feet below grade

1. Chloride concentration equal to < 5.0 mg/Kg does not exceed 10,000 ppm is non-corrosive to ferrous metals,
2. pH equal to 8.16 units exceeding 4.0 units is non-corrosive to buried metals,
3. Sulfate concentration equal to 15 mg/Kg does not exceed 2000 ppm is non-corrosive to concrete, and
4. Resistivity equal to 40,500 ohms/cm is mildly corrosive to buried metals.

Soil chemical test results are included in Appendix B.

It is suggested that following mass grading completions, soils corrosivity potential evaluations should be made to determine, at a minimum, concentrations of pH, sulfate, chloride, and resistivity. Further corrective recommendations should be provided by Corrosion Engineer.

6.0 WQMP-BMP Infiltration Rates Using Porchet Method for Stormwater Disposal Design

In general, three (3) infiltration tests were performed at the depth and locations as suggested by the project design engineer. The tests were performed using the standardized "falling-head" test converted using the Porchet method. Test locations and test data are shown in the attached Appendix D.

Method of infiltration rate as per the guidelines in accordance with Table 1, Infiltration Basin Option 2 of Appendix A of the Riverside County-Low Impact Development (LID) BMP Design Handbook as well as per the Appendices Section VII.3.8.2, Appendix VII: Infiltration Rate Evaluation Protocol and Factor of Safety Recommendations of the San Bernardino County Technical Guidance Document for Water Quality Management Plans Handbook.

Approximate test locations are shown on the attached Plate 1. The test results should be considered tentative given the potential for changes to site finish grades or changes in soil conditions as exposed during site preparations and grading.

The soils encountered within the proposed WQMP-BMP infiltration design system consist, in general, of fine to medium coarse poorly graded sands with some silts overlying layers of gravely medium coarse to coarse sands, and gravels, to the maximum depth of 5 feet explored and proposed chamber bottom as described (test borings P-1 to P-3). Additional soil sample boring (B-1) advanced to the maximum depth of 31 feet did not expose the presence of shallow depth groundwater or layers considered impermeable to water. However, it is understood that the subject site was reported to have received rain storms days before site Soils Southwest site reconnaissance visit. Descriptions of the soils encountered are provided in the attached Log of Borings.

Based on the field infiltration testing completed, it is our opinion that for the infiltration system design proposed at about 5 feet below grade as suggested by the project civil engineer, the observed soils infiltration rates are 1.21 inches/hour, 9.73 inches/hour, and 0.16 inches/hour for test locations P-1 to P-3, respectively.

For design, it is suggested that use of an appropriate factor of safety as determined by the design engineer should be considered to the observed rate to account for long-term saturation, inconsistencies in subsoil conditions, potential for silting, and lack of maintenance. The observed soils' percolation rates are provided in Section 6.3 of this report.

6.1 METHODOLOGY AND TEST PROCEDURES

EQUIPMENT SET-UP (POST EXCAVATION) PROCEDURES:

Following test boring completion, each of the test holes were fitted with perforated PVC pipes backfilled with 2-inch-thick crushed rock at the bottom to minimize potentials for scouring and caving. For testing, each test hole was initially filled using water supplied by water jugs.

Prior to actual testing, to determine test intervals, as per the Section 2.3 for deep percolation testing of the referenced handbook guideline, two consecutive readings were performed to determine if 6 or more inches of water seeped in 25 minutes. For P-1 & P-2, Since 6 inches or more of water seeped away in less than 25 minutes, subsequent percolation testing was performed at 10-minute time intervals for at least minimum one hour or until the rates were uniform. For P-3, since 6 inches or more of water did not seep away in less than 25 minutes, subsequent percolation testing was performed at 30-minute time intervals for at least minimum six hours, or until the rates were uniform. Testing included water placement at about 3 feet below existing grade surface (inlet depth of 24 inches above infiltration system bottom).

The final 10-minute and 30-minute recorded percolation test rates were converted into an Infiltration Rate (I_i) for inches per hour using the "Porchet Method" equation as described in the Reference 2, Riverside County Low Impact Development BMP Design Handbook, as well as per the Appendices Section VII.3.8.2, Appendix

VII: Infiltration Rate Evaluation Protocol and Factor of Safety Recommendations on the San Bernardino County Technical Guidance Document for Water Quality Management Plans Handbook.

6.2 INFILTRATION TEST RESULTS

Based on the soils infiltration testing completed at the test locations and at the test depth as described, the observed soils' percolation rates are 1.21 inches/hour, 9.73 inches/hour, and 0.16 inches/hour for test locations P-1 to P-3, respectively.

Calculations to convert the percolation test rate to infiltration test rates in accordance with Section 2.3 of the County Handbook are presented in Table I and II below. For design, it is suggested that an appropriate Factor of Safety as selected by the design engineer should be considered to the observed field percolation rate described.

1. SUMMARY & CONVERSION CALCULATIONS

TABLE I

For WQMP-BMP design, based on the soils infiltration testing completed and, on the calculations as described, the following infiltration rates may be considered. Actual field test data are attached.

Observed Infiltration Rate for Design

Test Location (311-24)	Test Depth Below Grade, feet	Porchet Method Observed Rate, inch/hour
P-1	5	1.21
P-2	5	9.73
P-3	5	0.16

TABLE II

Conversion Table (Porchet Method)

Test No.	Depth Test Hole, inches	Time Interval, minutes	Initial Depth, inches	Final Depth, inches	Initial Water Height, inches	Final Water Height, inches	Change in Height/ Time	Average Head Height/Time
	D _t	Δ _T	D _o	D _f	H _o =D _t -D _o	H _f =D _t -D _f	ΔH= H _f -H _o	H _{avg} = (H _o +H _f)/2
P-1	60	10	36	38.5	24.0	21.50	2.5	22.75
P-2	60	10	36	51.0	24.0	9.00	15.0	16.50
P-3	60	30	36	37.0	24.0	23.00	1.00	23.50

Test No.	Infiltration Rate (It)= $\Delta H60r/\Delta t(r+2H_{avg})$		
	A	B	C
	$\Delta H60r$	$\Delta t(r+2H_{avg})$	A/B=in/hr
P-1	600	495	1.21
P-2	3600	370	9.73
P-3	240	1530.0	0.16

Use of a safety factor should be considered to account for long-term saturation, inconsistencies in subsoil conditions along with the potential for silting of percolating soils.

The infiltration rate described is based on the in-situ testing completed at the locations as suggested by the project civil engineer. In the event that the final chamber location and depth vary considerably from those described herein, supplemental soils infiltration testing may be warranted.

It should be noted that over prolonged use and lack of maintenance the detention/infiltration basins or deep chambers constructed based on the suggested design rate may experience much lower infiltration rate due to the accumulation of silts, fines, soils, and others. Regular maintenance of the chambers in the form of removal of debris, oil, and fines are strongly recommended. A maintenance record of such is suggested for future use.

Suggested Requirements for Standard Stormwater BMP installation (where applicable)

The invert of stormwater infiltration should be set at least 10 feet above the groundwater elevation and should not be placed on steep slopes to create conditions for slopes instability.

When adequately installed, it is our opinion that the Stormwater infiltration systems installed should not increase the potential for static or seismic settlement of structures.

Stormwater infiltration installed should not place an increased surcharge on structures or foundations on or its adjacent. The pore water pressure should not increase the soils retained by retaining structures.

The invert of stormwater infiltration should be set back at least 15 feet and outside a 1:1 plan drawn up from the bottom of adjacent foundations.

Stormwater infiltration should not be located near utility lines where the introduction of stormwater could cause damage to utilities or settlement of trench backfill.

Stormwater infiltration systems should not be allowed within 100 feet of any potable groundwater production well.

Once installed, regular maintenance of the detention systems is recommended.

7.0 Closure

The conclusions and recommendations presented are based upon the findings and observations as made during subsurface test excavations and subsequent laboratory testing and engineering evaluations as currently used in the Geotechnical industry. The recommendations supplied should be considered "preliminary" since they are based on soil samples only. If during construction, the subsoil conditions appear different from those as disclosed during field investigation this office should be notified to consider any possible need for modification by the geotechnical recommendations as provided in this report.

Recommendations provided are based on the assumptions that structural footings will be established exclusively into compacted fill. No footings and/or slabs should be allowed straddling over cut and fill transition interface.

Site grading observations and testing must be performed by a representative of this office. Further, it is recommended that excavated footings should be verified and approved by geotechnical engineer prior to steel and concrete placement to ensure that foundations are founded into satisfactory soils and excavations are free of loose and disturbed materials.

A pre-grading meeting between grading contractor and geotechnical engineer is recommended prior to construction preferably at the site, to discuss the grading procedures to be implemented and other requirements described in this report to be fulfilled.

This report has been prepared exclusively for the use of the addressee for the project referenced in the context. It shall not be transferred or be used by other parties without written consent by Soils Southwest, Inc.

Should the project be delayed beyond one year after the date of this report, the recommendations presented shall be reviewed to consider any possible change in site conditions.

The recommendations presented are on the assumption that the necessary geotechnical observations and testing during construction will be performed by a representative of this office. The field observations are considered a continuation of the geotechnical investigation performed.

If another firm is retained for geotechnical observations and testing, our professional liability and responsibility shall be limited to the extent that Soils Southwest, Inc. would not be the geotechnical engineer of record. Use of the geotechnical recommendations by others will relieve Soils Southwest, Inc. of any liability that may arise during the lifetime use of the structure constructed.

PLOT PLAN AND TEST LOCATIONS
8428 Banana Avenue
San Bernardino County (Fontana), CA
APN: 0230-031-67 & 68
Not to Scale



APPENDIX D

Field Infiltration Test Data Porchet Method Calculation Summary

Conversion Table (Porchet Method)
Fred Asad/TLK, LLC
8428 Banana Ave., Fontana
Project No. 24008-BMP

Test No.	Test Hole Depth (inches)	Time Interval Δt	Initial Depth (inches)	Final Depth (inches)	Initial Water Height (inches)	Final Water Height (inches)	Change Height/Time $\Delta H/\Delta D = H_0 - H_f$	Average Head Height/Time $H_{avg} = (H_0 + H_f)/2$
P-1	60	10	36	38.5	24	21.5	2.5	22.75
P-2	60	10	36	51	24	9	15	16.5
P-3	60	30	36	37	24	23	1	23.5

Observed Infiltration Rate (lt) = $\Delta H_{60r}/\Delta t (r+2H_{avg})$		
A	B	C
ΔH_{60r}	$\Delta t (r+2H_{avg})$	A/B= inch/hr
P-1	600	495
P-2	3600	370
P-3	240	1530

Legend

$\Delta H/\Delta D$ = Observed Field Rate

H_0 = inches of water filled from bottom

D_0 = initial height of water (inches) from bottom

D_f = final height of water (inches) from bottom

Columns A-B-C : Porchet Conversion Calculations

Column C: Observed Rate following Porchet Conversion

D_t = depth of test hole bottom (inches)

Percolation Test Data Sheet

Project: <u>ASAD / TLK, LLC 8428 BAWANA AVE FONTANA</u>				Project No. <u>24008-BMP</u>	
Test Hole No: <u>P-1</u>		Tested By: <u>JG</u>		Date: <u>3/11/24</u>	
Depth of Test Hole, D_T <u>60</u>		USCS Soil Classification			
Test Hole Dimensions (inches)				Length	Width
Diameter (if round)= <u>8.0 in.</u>		Sides (if rectangular)=			

Sandy Soil Criteria Test *

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Greater Than or Equal to 6.0 inches??? (Y/N)
1	10:02	10:27	25	36	44	8	Y
2	10:29	10:54	25	36	43	7	Y

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25."

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	$\Delta T / \Delta D$ Percolation Rate (min./in.)
1	10:56	11:06	10	36	39	3	3.33
2	11:07	11:17	10	36	39	3	3.33
3	11:18	11:28	10	36	39	3	3.33
4	11:30	11:40	10	36	39	3	3.33
5	11:42	11:52	10	36	38.5	2.5	4.0
6	11:52	12:02	10	36	38.5	2.5	4.0
7	12:03	12:13	10	36	38.5	2.5	4.0
8							
9							
10							
11							
12							
13							
14							
15							
16							
17							
18							

Comments

Percolation Test Data Sheet

Project: <u>ASAD / TLK, LLC 8428 BANANA AVE FORT WORTH</u>				Project No. <u>24008-BMP</u>	
Test Hole No: <u>P-2</u>		Tested By: <u>JG</u>		Date: <u>3/11/24</u>	
Depth of Test Hole, D_T <u>60</u>		USCS Soil Classification			
Test Hole Dimensions (inches)				Length	Width
Diameter (if round)= <u>8.0 in.</u>		Sides (if rectangular)=			
Sandy Soil Criteria Test *					

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Greater Than or Equal to 6.0 inches??? (Y/N)
1	10:39	10:49	25	36	60	24	Y
2	10:50	11:00	25	36	60	24	Y

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25."

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	$\Delta T / \Delta D$ Percolation Rate (min./in.)
1	11:01	11:11	10	36	60	24	0.42
2	11:14	11:24	10	36	58	22	0.45
3	11:25	11:35	10	36	57	21	0.48
4	11:36	11:46	10	36	57	21	0.48
5	11:48	11:58	10	36	56	20	0.50
6	11:59	12:09	10	36	56	20	0.50
7	12:11	12:21	10	36	55	19	0.53
8	12:24	12:34	10	36	55	19	0.53
9	12:35	12:45	10	36	53	17	0.59
10	12:47	12:57	10	36	53	17	0.59
11	12:58	1:08	10	36	51	15	0.67
12	1:09	1:19	10	36	51	15	0.67
13	1:21	1:31	10	36	51	15	0.67
14							
15							
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18							

Comments

Percolation Test Data Sheet

Project: <u>ASAD / TLK, LLC 8428 BANANA AVE FORTNA</u>		Project No. <u>24008-BMP</u>	
Test Hole No:	<u>P-3</u>	Tested By: <u>JG</u>	Date: <u>3/11/24</u>
Depth of Test Hole, D_T	<u>60</u>	USCS Soil Classification	
Test Hole Dimensions (inches)		Length	Width
Diameter (if round)=	<u>8.0 in.</u>	Sides (if rectangular)=	
Sandy Soil Criteria Test *			

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	Greater Than or Equal to 6.0 inches??? (Y/N)
1	12:40	13:05	25	36	37	1	N
2	13:06	13:31	25	36	37	1	N

* If two consecutive measurements show that six inches of water seeps away in less than 25 minutes, the test shall be run for an additional hour with measurements taken every 10 minutes. Otherwise, pre-soak (fill) overnight. Obtain at least twelve measurements per hole over at least six hours (approximately 30 minute intervals) with a precision of at least 0.25."

Trial No.	Start Time	Stop Time	Δt Time Interval (min)	D_o Initial Depth to Water (in.)	D_f Final Depth to Water (in.)	ΔD Change in Water Level (in.)	$\Delta T / \Delta D$ Percolation Rate (min./in.)
1	13:33	14:03	30	36	37.25	1.25	24.0
2	2:03	2:33	30	36	37.0	1.0	30.0
3	2:37	3:07	30	36	37.0	1.0	30.0
4	3:07	3:37	30	36	37.0	1.0	30.0
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Comments