Appendix I

Preliminary Water Quality Management Plan

MOJAVE RIVER WATERSHED
Water Quality Management Plan

For:

Raising Cane's 1051 Victorville, CA (Roy Rogers & Civic)

APN: PORTIONS OF 3106-201-27, 3106-201-24, AND 3106-201-25

PORTIONS OF PARCEL 5, 6, AND 8 OF PARCEL MAP NO. 19000, AS PER MAP IN BOOK 230 OF PARCEL MAPS, PAGE 76 TO 82 INCLUSIVE

WQMP TBD

Prepared for:

Kristen Roberts

Raising Cane's Restaurants, L.L.C.

6800 Bishop Road

Plano, TX 75024

Prepared by:

John Pollock, PE

Kimley-Horn and Associates

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(951)543-9868

Submittal Date: 10/23/2023

Revision Date:

Approval Date:

Project Owner's Certification

This Water Quality Management Plan (WQMP) has been prepared for **Raising Cane's Restaurants, L.L.C. by Kimley-Horn and Associates**. The WQMP is intended to comply with the requirements of the **City of Victorville** 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 TBD	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	APN: Portions of 3106-201-27, 3106-201-24 and 3106-201-25. Portions of parcels 5, 6, and 8 , of Parcel Map NO. 19000.	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			

Owner's Signature			
Owner Name: Kristen Roberts			
Title	Authorized Representative		
Company	Raising Cane's Restaurants, L.L.C.		
Address	6800 Bishop Road, Plano, TX 75024		
Email	kroberts@raisingcanes.com		
Telephone #	(972) 769-3395		
Signature		Date	

Preparer's Certification

Project Data			
Permit/Application Number(s):	WQMP TBD	Grading Permit Number(s):	TBD
Tract/Parcel Map Number(s):	APN: Portions of 3106-201-27, 3106-201-24 and 3106-201-25. Portions of parcels 5, 6, and 8 , of Parcel Map NO. 19000.	Building Permit Number(s):	TBD
CUP, SUP, and/or APN (Specify Lot Numbers if Portions of Tract):			

"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: John Pollock		PE Stamp Below
Title	Project Manager	
Company	Kimley-Horn and Associates	
Address	3801 University Ave, Suite 600, Riverside, CA 92501	
Email	John.Pollock@Kimley-Horn.com	
Telephone #	(951) 543-9868	
Signature		
Date		

Table of Contents

Forms

Section 1 Discretionary Permit(s)

Form 1-1 Project Information					
Project Name	Raising Cane's 1051 Victorville				
Project Owner Contact Name:	Kristen Roberts				
Mailing Address:	6800 Bishop Road, Plano, TX 75024	E-mail Address:	kroberts@raisingcanes.com	Telephone:	(972) 769-3395
Permit/Application Number(s):	TBD	Tract/Parcel Map Number(s):	APN: Portions of 3106-201-27, 3106-201-24 and 3106-201-25. Portions of parcels 5, 6, and 8 , of Parcel Map NO. 19000.		
Additional Information/ Comments:					
Description of Project:	The existing lot will be developed into the proposed Raising Cane's Restaurant. In the proposed condition, the project will not be phased. The proposed development will include a proposed 2,899 square foot building with dual drive-thru service and paved parking for sit-down dining. There will be food preparation, service, and storage on-site for customers ordering, paying, and receiving food. Site improvements will include landscaping, concrete hardscape, and asphalt paving. The associated improvements include, but are not limited to onsite grading, domestic water service, sanitary sewer service, storm drain infrastructure, infiltration basins, concrete and asphalt pavement, landscaping, and irrigation. The project site is approximately 1.50 acres and is located along Roy Rogers Drive, adjacent to an existing Chevron and Rockets Convenience Plus store on the Northwesterly corner of Roy Rogers Drive and Civic Drive in Victorville, CA, San Bernardino County. The APN for the project site includes portions of 3106-201-27, 3106-201-24 and 3106-201-25. Appendix A contains an aerial photograph that depicts the project location. The existing condition of the project site is predominantly vacant, with minimal existing earthwork. Under the existing conditions, the site has no predominant drainage pattern. The majority of the site drains to the public right-of-way, into the existing curb and gutter along Roy Rogers. The remainder of the site drains northerly onto the adjacent property. Runoff from the South does not reach the project site as drainage form the sidewalk and the road flows easterly along the curb and gutter to an existing curb inlet along Roy Rogers Drive. There is minimal off-site flows from the northeasterly property. This runoff will be collected by a temporary earthen swale which will discharge easterly of the property onto the existing shared access aisle, which drains to the public right-of-way, following existing drainage patterns. Expected waste for the proposed condition will include trash and debris. All proposed landscaping will consist of trees, shrubs and drought tolerant native ground cover. See Attachment A for a Site Plan. For water quality purposes the proposed site drainage will intercepted by proposed inlets with full trash capture filter inserts and will be routed to one (1) CDS Pre-Treatment unit and then to (1) one underground infiltration system (BMP 1) located on the northeast side of the				

	site. See Attachment A for Site Plan showing BMP location. The proposed underground infiltration system will be a Prinsco HydroStor HS180 Underground Infiltration System and will be sized to treat the design capture volume (DCV). BMP-1 will provide stormwater treatment and storm water mitigation. When the Prinsco HydroStor HS180 Underground Infiltration System meets its full capacity for the 100-yr storm event, the flows will overflow back into the storm drain, overflowing from the inlet adjacent to Roy Rogers drive. These flows will be discharged into the existing curb and gutter through a proposed curb cut/concrete channel.
Provide summary of Conceptual WQMP conditions (if previously submitted and approved). Attach complete copy.	N/A

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 ft² or more of impervious surface on an already developed site	☒ New development involving the creation of 10,000 ft² 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 ft² or more
☐ Hillside developments of 5,000 ft² 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 ft² 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 ft² or more exposed to storm water	☐ Retail gasoline outlets that are either 5,000 ft² or more, or have a projected average daily traffic of 100 or more vehicles per day

☐ Non-Priority / Non-Category Project *May require source control LID BMPs and other LIP requirements. Please consult with local jurisdiction on specific requirements*.

2 Project Area (ft2):	65,200	**3** Number of Dwelling Units:	N/A	**4** SIC Code:	5812

5 Is Project going to be phased? Yes ☐ No ☒ *If yes, ensure that the WQMP evaluates each phase as a distinct DA, requiring LID BMPs to address runoff at time of completion.*

6 Does Project include roads? Yes ☐ No ☒ *If yes, ensure that applicable requirements for transportation projects are addressed (see Appendix A of TGD for WQMP)*

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 property owner, Raising Cane's Restaurants, L.L.C., as previously outlined in this report, will be formed and responsible for the long-term maintenance of project storm water facilities.
This WQMP will be reviewed with the facility operator, facility supervisors, employees, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity.

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 ☐	Resulting from wild bird, pet waste, and garbage. Pollutant of concern for Santa Ana River Reach 3 and 4.
Nutrients - Phosphorous	E ☒	N ☐	Resulting from fertilizers, food waste, and garbage.
Nutrients - Nitrogen	E ☒	N ☐	Resulting from fertilizer and waste.
Noxious Aquatic Plants	E ☒	N ☐	Resulting from the infiltration basin. Water will be temporarily stagnant until it infiltrates into the soil, resulting in the promotion of the growth of aquatic plants.
Sediment	E ☒	N ☐	Resulting from cars, trucks, and parking areas.
Metals	E ☒	N ☐	Resulting from leaking vehicles and parking areas.
Oil and Grease	E ☒	N ☐	Resulting from leaking vehicles and parking areas.
Trash/Debris	E ☒	N ☐	Resulting from proposed landscaping areas and proposed use.
Pesticides / Herbicides	E ☒	N ☐	Resulting from proposed landscaping areas.
Organic Compounds	E ☒	N ☐	Resulting from proposed landscaping areas.
Other: Petroleum/Hydrocarbons	E ☐	N ☐	Resulting from cars, trucks, and parking areas.
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: *Select all that apply*

☐ Redevelopment projects that reduce the overall impervious footprint of the project site. [Credit = % impervious reduced]	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 % 0 *(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 **34.5217**	Longitude **-117.3245**	Thomas Bros Map page **4386**

1 San Bernardino County climatic region: ☒ Valley ☐ Mountain

2 Does the site have more than one drainage area (DA): Yes☐ No☒ *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*

Conveyance	Briefly describe on-site drainage features to convey runoff that is not retained within a DMA
DMA-1	*DMA-1 encompasses the onsite of the project. This DMA drains to its respective inlets and is tributary to BMP-1.*

Form 3-2 Existing Hydrologic Characteristics for Drainage Areas

For Drainage Area 1's sub-watershed DMA, provide the following characteristics	DMA 1	DMA 2	DMA C	DMA D
1 DMA drainage area (ft^2)	65,200			
2 Existing site impervious area (ft^2)	0			
3 Antecedent moisture condition *For desert areas, use http://www.sbcounty.gov/dpw/floodcontrol/pdf/20100412_map.pdf*	II			
4 Hydrologic soil group *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	B			
5 Longest flowpath length (ft)	256.65			
6 Longest flowpath slope (ft/ft)	3.23			
7 Current land cover type(s) *Select from Fig C-3 of Hydrology Manual*	Barren			
8 Pre-developed pervious area condition: *Based on the extent of wet season vegetated cover good >75%; Fair 50-75%; Poor <50% Attach photos of site to support rating*	Poor			

Form 3-3 Watershed Description for Drainage Areas

Receiving waters *Refer to Watershed Mapping Tool - http://permitrack.sbcounty.gov/wap/ See 'Drainage Facilities" link at this website*	Mojave River (receiving water is below the narrows)
Applicable TMDLs *Refer to Local Implementation Plan*	No applicable TMDLS
303(d) listed impairments *Refer to Local Implementation Plan and Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/ and State Water Resources Control Board website – http://www.waterboards.ca.gov/santaana/water_issues/programs/tmdl/index.shtml*	Chloride, Sodium, Sulfates
Environmentally Sensitive Areas (ESA) *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	N/A
Unlined Downstream Water Bodies *Refer to Watershed Mapping Tool – http://permitrack.sbcounty.gov/wap/*	Mojave 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	☒	☐	Education Material included in Attachment F of this document will be provided to Property Owners, Tenants and Occupants when taking possession of property.
N2	Activity Restrictions	☒	☐	Pursuant to the Education Material included in Attachment F of this document, the User of the facility will be notified upon possession of the property of all activities that are restricted and or limited and the education material shall be referenced in all lease documents.
N3	Landscape Management BMPs	☒	☐	Landscape crews contracted shall inspect irrigation system and health of landscaping and shall report all repairs or problems to owner. Routine landscaping maintenance shall be done according to CASQA SC-73 fact sheet.
N4	BMP Maintenance	☒	☐	See Section 5 for complete information.
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No Hazardous Wastes as defined by Title 22 CCR produced at this site.
N6	Local Water Quality Ordinances	☐	☒	No known local water quality ordinances.
N7	Spill Contingency Plan	☒	☐	Owner will prepare spill contingency plan and educate all employees on said plan.
N8	Underground Storage Tank Compliance	☐	☒	No underground storage tank applicable to project site.
N9	Hazardous Materials Disclosure Compliance	☐	☒	On-site investigations did not reveal hazardous materials.

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	☐	☒	No hazardous waste applicable to project site.
N11	Litter/Debris Control Program	☒	☐	A program shall be implemented to pick up litter, sweep and clean the trash enclosure on a weekly basis. Owner shall ensure tenants contract with a refuse company to have dumpsters emptied on a weekly basis, at a minimum.
N12	Employee Training	☒	☐	Owner shall establish an educational program for site employees and contractors to inform and train personnel engaged in maintenance activities.
N13	Housekeeping of Loading Docks	☐	☒	No loading docks are proposed.
N14	Catch Basin Inspection Program	☒	☐	A program shall be implemented to inspect catch basins. Inspection should occur at a minimum two times per year and prior to the storm season.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	Parking lots shall be swept weekly by a contractor provided by the owner.
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	Not a public agency project.
N17	Comply with all other applicable NPDES permits	☒	☐	All required application NPDES permits will be obtained by the contractor including filing an NOI, SWPPP and obtaining a WDID # prior to the start of construction.

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)	☒	☐	Storm drain stenciling to be provided near proposed infiltration basins with underground storage systems.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	No proposed outdoor material storage.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	All dumpsters shall have working lids which shall be kept closed at all times. Trash enclosure shall comply with CASQA SD-32 and shall be enclosed and have a roof.
S4	Use efficient irrigation systems & landscape design, water conservation, smart controllers, and source control (State-wide Model Landscape Ordinance; CASQA New Development BMP Handbook SD-12)	☒	☐	Efficient irrigation, drought tolerant landscape and water conservation methods have been included in landscape design.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	Finish grade of landscaped areas at a minimum of 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 proposed slopes or channels.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	Not included in site development.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	Not included in site development.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	Not included in site development.
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	Not included in site development.

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)	☒	☐	Proposed site follows equipment washing requirements described in CASQA New Development BMP SD-33. See Attachment F. Spill contingency plan prepared by owner for employees.
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☒	No Fueling Areas.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	No hillside.
S14	Wash water control for food preparation areas	☒	☐	No food preparation.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	No community car wash racks.

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 *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*
Minimize impervious areas: Yes ☒ No ☐ Explanation: Landscape area incorporated into site design to the maximum extent possible by minimizing driveway and parking area widths and incorporating landscape planters along the property perimeter.
Maximize natural infiltration capacity: Yes ☒ No ☐ Explanation: Installation of infiltration facility with 100 percent infiltration and landscape areas where applicable. See attached soils information for infiltration feasibility.
Preserve existing drainage patterns and time of concentration: Yes ☒ No ☐ Explanation: Site drainage patterns mimic existing patterns.
Disconnect impervious areas: Yes ☐ No ☒ Explanation: Runoff will be collected in catch basins and directed to an underground infiltration basin.
Protect existing vegetation and sensitive areas: Yes ☐ No ☒ Explanation: Minimal existing vegetation on-site. Not located in an environmentally sensitive area. Pre-development conditions are barren.
Re-vegetate disturbed areas: Yes ☒ No ☐ Explanation: Site plan includes incorporation of vegetated area in different areas of the site as feasible.
Minimize unnecessary compaction in stormwater retention/infiltration basin/trench areas: Yes ☒ No ☐ Explanation: No compaction allowed at the bottom of the infiltration basin. This will be identified on the Construction Documents.
Utilize vegetated drainage swales in place of underground piping or imperviously lined swales: Yes ☐ No ☒ Explanation: Proposed flow paths will traverse the parking lot and driveways and therefore cannot use vegetated swales for conveyance.
Stake off areas that will be used for landscaping to minimize compaction during construction : Yes ☒ No ☐ Explanation: landscape areas will be staked off in order to minimize 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 P_6 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 mi^2), 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): 65,200	**2** Imperviousness after applying preventative site design practices (Imp%): 69.3%	**3** Runoff Coefficient (Rc): 0.487 *$R_c = 0.858(Imp\%)^{\wedge 3} - 0.78(Imp\%)^{\wedge 2} + 0.774(Imp\%) + 0.04$*
4 Determine 1-hour rainfall depth for a 2-year return period $P_{2yr\text{-}1hr}$ (in): 0.376 *http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html*		
5 Compute P_6, Mean 6-hr Precipitation (inches): 0.465 *P_6 = 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 *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.*		24-hrs ☐ 48-hrs ☒
7 Compute design capture volume, DCV (ft^3): 2,416 *DCV = 1/12 * [Item 1* Item 3 *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 (DA 1)

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

Go to: *http://permitrack.sbcounty.gov/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** 2,178.00 *Form 4.2-3 Item 12*	**2** 9.59 *Form 4.2-4 Item 13*	**3** 1.04 *Form 4.2-5 Item 10*
Post-developed	**4** 5,662.80 *Form 4.2-3 Item 13*	**5** 5.67 *Form 4.2-4 Item 14*	**6** 2.43 *Form 4.2-5 Item 14*
Difference	**7** 3484.80 *Item 4 – Item 1*	**8** 3.92 *Item 2 – Item 5*	**9** *1.39* *Item 6 – Item 3*
Difference (as % of pre-developed)	**10** 1.6% *Item 7 / Item 1*	**11** *0.408%* *Item 8 / Item 2*	**12** *1.33%* *Item 9 / Item 3*

The unmitigated post development drainage complies with hydromodification requirements due to meeting the matching requirement of the 2-year 24-hour post-development peak flow and volume to the pre-development peak flow and volume. See software generated unit hydrographs in attachment C for the pre-development and post-development peak flow and volumes.

Form 4.2-3 HCOC Assessment for Runoff Volume (DA 1)

Weighted Curve Number Determination for: Pre-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1a Land Cover type	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2a Hydrologic Soil Group (HSG)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3a DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4a Curve Number (CN) *use Items 1 and 2 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
Weighted Curve Number Determination for: Post-developed DA	DMA A	DMA B	DMA C	DMA D	DMA E	DMA F	DMA G	DMA H
1b Land Cover type	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
2b Hydrologic Soil Group (HSG)	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
3b DMA Area, ft^2 *sum of areas of DMA should equal area of DA*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A
4b Curve Number (CN) *use Items 5 and 6 to select the appropriate CN from Appendix C-2 of the TGD for WQMP*	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

5 Pre-Developed area-weighted CN: N/A	**7** Pre-developed soil storage capacity, S (in): N/A *S = (1000 / Item 5) - 10*	**9** Initial abstraction, I_a (in): N/A *I_a = 0.2 * Item 7*
6 Post-Developed area-weighted CN: N/A	**8** Post-developed soil storage capacity, S (in): N/A *S = (1000 / Item 6) - 10*	**10** Initial abstraction, I_a (in): N/A *I_a = 0.2 * Item 8*

11 Precipitation for 2 yr, 24 hr storm (in): N/A
Go to: http://hdsc.nws.noaa.gov/hdsc/pfds/sa/sca_pfds.html

12 Pre-developed Volume (ft^3): N/A
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 9)^2 / ((Item 11 – Item 9 + Item 7)*

13 Post-developed Volume (ft^3): N/A
*V_{pre} =(1 / 12) * (Item sum of Item 3) * [(Item 11 – Item 10)^2 / ((Item 11 – Item 10 + Item 8)*

14 Volume Reduction needed to meet HCOC Requirement, (ft^3): N/A
*V_{HCOC} = (Item 13 * 0.95) – Item 12*

Form 4.2-4 HCOC Assessment for Time of Concentration (DA 1)

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

13 Pre-developed time of concentration (min): *Minimum of Item 12 pre-developed DMA*

14 Post-developed time of concentration (min): *Minimum of Item 12 post-developed DMA*

15 Additional time of concentration needed to meet HCOC requirement (min): *$T_{C\text{-}HCOC}$ = (Item 13 * 0.95) – Item 14*

Form 4.2-5 AHCOC Assessment for Peak Runoff (DA 1)

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 Form 4.2-1 Item 4 - 0.6 LOG Form 4.2-4 Item 5 /60)*		N/A	N/A	N/A	N/A	N/A	N/A
2 Drainage Area of each DMA (Acres) *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)*		N/A	N/A	N/A	N/A	N/A	N/A
3 Ratio of pervious area to total area *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)*		N/A	N/A	N/A	N/A	N/A	N/A
4 Pervious area infiltration rate (in/hr) *Use pervious area CN and antecedent moisture condition with Appendix C-3 of the TGD for WQMP*		N/A	N/A	N/A	N/A	N/A	N/A
5 Maximum loss rate (in/hr) *F_m = Item 3 * Item 4* *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)*		N/A	N/A	N/A	N/A	N/A	N/A
6 Peak Flow from DMA (cfs) *Q_p =Item 2 * 0.9 * (Item 1 - Item 5)*		N/A	N/A	N/A	N/A	N/A	N/A
7 Time of concentration adjustment factor for other DMA to site discharge point *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)*	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 = Item 6_{DMAA} + [Item 6_{DMAB} * (Item 1_{DMAA} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAA/2}$] + [Item 6_{DMAC} * (Item 1_{DMAA} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAA/3}$]*	**9** Pre-developed Q_p at T_c for DMA B: *Q_p = Item 6_{DMAB} + [Item 6_{DMAA} * (Item 1_{DMAB} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAB/1}$] + [Item 6_{DMAC} * (Item 1_{DMAB} - Item 5_{DMAC})/(Item 1_{DMAC} - Item 5_{DMAC})* Item $7_{DMAB/3}$]*	**10** Pre-developed Q_p at T_c for DMA C: *Q_p = Item 6_{DMAC} + [Item 6_{DMAA} * (Item 1_{DMAC} - Item 5_{DMAA})/(Item 1_{DMAA} - Item 5_{DMAA})* Item $7_{DMAC/1}$] + [Item 6_{DMAB} * (Item 1_{DMAC} - Item 5_{DMAB})/(Item 1_{DMAB} - Item 5_{DMAB})* Item $7_{DMAC/2}$]*
10 Peak runoff from pre-developed condition confluence analysis (cfs):		*Maximum of Item 8, 9, and 10 (including additional forms as needed)*
11 Post-developed Q_p at T_c for DMA A: *Same as Item 8 for post-developed values*	**12** Post-developed Q_p at T_c for DMA B: *Same as Item 9 for post-developed values*	**13** Post-developed Q_p at T_c for DMA C: *Same as Item 10 for post-developed values*
14 Peak runoff from post-developed condition confluence analysis (cfs):		*Maximum of Item 11, 12, and 13 (including additional forms as needed)*
15 Peak runoff reduction needed to meet HCOC Requirement (cfs):		*$Q_{p\text{-}HCOC}$ = (Item 14 * 0.95) – 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 (DA 1)

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: (attach)

[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 8 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":
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 (DA 1)

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 ☒ *If yes, complete Items 2-5; If no, proceed to Item 6*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Total impervious area draining to pervious area (ft^2)	N/A		
3 Ratio of pervious area receiving runoff to impervious area	N/A		
4 Retention volume achieved from impervious area dispersion (ft^3) *V = Item2 * Item 3 * (0.5/12), assuming retention of 0.5 inches of runoff*	N/A		
5 Sum of retention volume achieved from impervious area dispersion (ft^3):		$V_{retention}$ *=Sum of Item 4 for all BMPs*	
6 Implementation of Localized On-lot Infiltration BMPs (e.g. on-lot rain gardens): Yes ☐ No ☒ *If yes, complete Items 7-13 for aggregate of all on-lot infiltration BMP in each DA; If no, proceed to Item 14*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
7 Ponding surface area (ft^2)	N/A		
8 Ponding depth (ft)	N/A		
9 Surface area of amended soil/gravel (ft^2)	N/A		
10 Average depth of amended soil/gravel (ft)	N/A		
11 Average porosity of amended soil/gravel	N/A		
12 Retention volume achieved from on-lot infiltration (ft^3) $V_{retention}$ *= (Item 7 *Item 8) + (Item 9 * Item 10 * Item 11)*	N/A		
13 Runoff volume retention from on-lot infiltration (ft^3): N/A		$V_{retention}$ *=Sum of Item 12 for all BMPs*	

Form 4.3-2 Site Design Hydrologic Source Control BMPs (DA 1)

Form 4.3-2 cont. Site Design Hydrologic Source Control BMPs (DA 1)

14 Implementation of evapotranspiration BMP (green, brown, or blue roofs): Yes ☐ No ☒ *If yes, complete Items 15-20. If no, proceed to Item 21*	DA DMA BMP Type N/A	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
15 Rooftop area planned for ET BMP (ft^2)	N/A		
16 Average wet season ET demand (in/day) *Use local values, typical ~ 0.1*	N/A		
17 Daily ET demand (ft^3/day) *Item 15 * (Item 16 / 12)*	N/A		
18 Drawdown time (hrs) *Copy Item 6 in Form 4.2-1*	N/A		
19 Retention Volume (ft^3) *$V_{retention}$ = Item 17 * (Item 18 / 24)*	N/A		
20 Runoff volume retention from evapotranspiration BMPs (ft^3): N/A *$V_{retention}$ =Sum of Item 19 for all BMPs*			
21 Implementation of Street Trees: Yes ☐ No ☒ *If yes, complete Items 22-25. If no, proceed to Item 26*	DA DMA BMP Type N/A	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
22 Number of Street Trees	N/A		
23 Average canopy cover over impervious area (ft^2)	N/A		
24 Runoff volume retention from street trees (ft^3) *$V_{retention}$ = Item 22 * Item 23 * (0.05/12) assume runoff retention of 0.05 inches*	N/A		
25 Runoff volume retention from street tree BMPs (ft^3): N/A *$V_{retention}$ = Sum of Item 24 for all BMPs*			
26 Implementation of residential rain barrel/cisterns: Yes ☐ No ☒ *If yes, complete Items 27-29; If no, proceed to Item 30*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
27 Number of rain barrels/cisterns	N/A		
28 Runoff volume retention from rain barrels/cisterns (ft^3) *$V_{retention}$ = Item 27 * 3*	N/A		
29 Runoff volume retention from residential rain barrels/Cisterns (ft3): N/A *$V_{retention}$ =Sum of Item 28 for all BMPs*			
30 Total Retention Volume from Site Design Hydrologic Source Control BMPs: N/A *Sum of Items 5, 13, 20, 25 and 29*			

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).

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Form 4.3-3 Infiltration LID BMP - including underground BMPs (DA 1)

1 Remaining LID DCV not met by site design HSC BMP (ft^3): 3510 *V_{unmet} = Form 4.2-1 Item 7 - 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 1 Underground Infiltration	DA 2 Temporary Infiltration Basin	DA DMA BMP Type *(Use additional forms for more BMPs)*
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*	4.4		
3 Infiltration safety factor *See TGD Section 5.4.2 and Appendix D*	3		
4 Design percolation rate (in/hr) *P_{design} = Item 2 / Item 3*	1.47		
5 Ponded water drawdown time (hr) *Copy Item 6 in Form 4.2-1*	31.628		
6 Maximum ponding depth (ft) *BMP specific, see Table 5-4 of the TGD for WQMP for BMP design details*	1.92		
7 Ponding Depth (ft) *d_{BMP} = Minimum of (1/12*Item 4*Item 5) or Item 6*	1.92		
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*	627		
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*	N/A		
10 Amended soil porosity	N/A		
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*	N/A		
12 Gravel porosity	N/A		
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	24		
14 Above Ground Retention Volume (ft^3) *$V_{retention}$ = Item 8 * [Item7 + (Item 9 * Item 10) + (Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	0		
15 Underground Retention Volume (ft^3) *Volume determined using manufacturer's specifications and calculations*	7,311		

16 Total Retention Volume from LID Infiltration BMPs: 7,308.86 *(Sum of Items 14 and 15 for all infiltration BMP included in plan)*

17 Fraction of DCV achieved with infiltration BMP: 302.48% *Retention% = Item 16 / Form 4.2-1 Item 7*

18 Is full LID DCV retained onsite with combination of hydrologic source control and LID retention/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.

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)

1 Remaining LID DCV not met by site design HSC or infiltration BMP (ft^3): N/A *V_{unmet} = Form 4.2-1 Item 7 - Form 4.3-2 Item 30 – Form 4.3-3 Item 16*			
BMP Type(s) *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*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
2 Describe cistern or runoff detention facility	N/A		
3 Storage volume for proposed detention type (ft^3) *Volume of cistern*	N/A		
4 Landscaped area planned for use of harvested stormwater (ft^2)	N/A		
5 Average wet season daily irrigation demand (in/day) Use local values, typical ~ 0.1 in/day	N/A		
6 Daily water demand (ft^3/day) *Item 4 * (Item 5 / 12)*	N/A		
7 Drawdown time (hrs) *Copy Item 6 from Form 4.2-1*	N/A		
8 Retention Volume (ft^3) *$V_{retention}$ = Minimum of (Item 3) or (Item 6 * (Item 7 / 24))*	N/A		
9 Total Retention Volume (ft^3) from Harvest and Use BMP N/A *Sum of Item 8 for all harvest and use BMP included in plan*			
10 Is the full DCV retained with a combination of LID HSC, retention and infiltration, and harvest & use BMPs? Yes ☐ No ☐ *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.*			

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

Form 4.3-5 Selection and Evaluation of Biotreatment BMP (DA 1)

1 Remaining LID DCV not met by site design HSC, infiltration, or harvest and use BMP for potential biotreatment (ft^3): N/A *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 *Copy from Form 2.3-1.* N/A

2 Biotreatment BMP Selected *(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)*

Volume-based biotreatment *Use Forms 4.3-6 and 4.3-7 to compute treated volume*	Flow-based biotreatment *Use Form 4.3-8 to compute treated volume*
☐ Bioretention with underdrain	☐ Vegetated swale
☐ Planter box with underdrain	☐ Vegetated filter strip
☐ Constructed wetlands	☐ Proprietary biotreatment
☐ Wet extended detention	
☐ Dry extended detention	

3 Volume biotreated in volume based biotreatment BMP (ft^3): *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): *Item 1 – Item 3*

5 Remaining fraction of LID DCV for sizing flow based biotreatment BMP: % *Item 4 / Item 1*

6 Flow-based biotreatment BMP capacity provided (cfs): *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.*

Form 4.3-6 Volume Based Biotreatment (DA 1) – Bioretention and Planter Boxes with Underdrains

Biotreatment BMP Type *(Bioretention w/underdrain, planter box w/underdrain, other comparable BMP)*	DA DMA BMP Type	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *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*	N/A		
2 Amended soil infiltration rate *Typical ~ 5.0*	N/A		
3 Amended soil infiltration safety factor *Typical ~ 2.0*	N/A		
4 Amended soil design percolation rate (in/hr) P_{design} *= Item 2 / Item 3*	N/A		
5 Ponded water drawdown time (hr) *Copy Item 6 from Form 4.2-1*	N/A		
6 Maximum ponding depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*	N/A		
7 Ponding Depth (ft) d_{BMP} *= Minimum of (1/12 * Item 4 * Item 5) or Item 6*	N/A		
8 Amended soil surface area (ft^2)	N/A		
9 Amended soil depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*	N/A		
10 Amended soil porosity, *n*	N/A		
11 Gravel depth (ft) *see Table 5-6 of the TGD for WQMP for reference to BMP design details*	N/A		
12 Gravel porosity, *n*	N/A		
13 Duration of storm as basin is filling (hrs) *Typical ~ 3hrs*	N/A		
14 Biotreated Volume (ft^3) $V_{biotreated}$ *= Item 8 * [(Item 7/2) + (Item 9 * Item 10) +(Item 11 * Item 12) + (Item 13 * (Item 4 / 12))]*	N/A		
15 Total biotreated volume from bioretention and/or planter box with underdrains BMP: N/A *Sum of Item 14 for all volume-based BMPs included in this form*			

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

Biotreatment BMP Type *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.*	DA DMA BMP Type N/A		DA DMA BMP Type *(Use additional forms for more BMPs)*	
	Forebay	Basin	Forebay	Basin
1 Pollutants addressed with BMP forebay and basin *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*	N/A			
2 Bottom width (ft)	N/A			
3 Bottom length (ft)	N/A			
4 Bottom area (ft^2) A_{bottom} = *Item 2 * Item 3*	N/A			
5 Side slope (ft/ft)	N/A			
6 Depth of storage (ft)	N/A			
7 Water surface area (ft^2) $A_{surface}$ =*(Item 2 + (2 * Item 5 * Item 6)) * (Item 3 + (2 * Item 5 * Item 6))*	N/A			
8 Storage volume (ft^3) *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* V =*Item 6 / 3 * [Item 4 + Item 7 + (Item 4 * Item 7)^0.5]*	N/A			
9 Drawdown Time (hrs) *Copy Item 6 from Form 2.1*	N/A			
10 Outflow rate (cfs) Q_{BMP} = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) / (Item 9 * 3600)*	N/A			
11 Duration of design storm event (hrs)	N/A			
12 Biotreated Volume (ft^3) $V_{biotreated}$ = *(Item* $8_{forebay}$ *+ Item* 8_{basin}*) +(Item 10 * Item 11 * 3600)*	N/A			
13 Total biotreated volume from constructed wetlands, extended dry detention, or extended wet detention : N/A *(Sum of Item 12 for all BMP included in plan)*				

Form 4.3-8 Flow Based Biotreatment (DA 1)

Biotreatment BMP Type *Vegetated swale, vegetated filter strip, or other comparable proprietary BMP*	DA DMA BMP Type N/A	DA DMA BMP Type	DA DMA BMP Type *(Use additional forms for more BMPs)*
1 Pollutants addressed with BMP *List all pollutant of concern that will be effectively reduced through specific Unit Operations and Processes described in TGD Table 5-5*	N/A		
2 Flow depth for water quality treatment (ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*	N/A		
3 Bed slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*	N/A		
4 Manning's roughness coefficient	N/A		
5 Bottom width (ft) b_w = *(Form 4.3-5 Item 6 * Item 4) / (1.49 * Item 2^1.67 * Item 3^0.5)*	N/A		
6 Side Slope (ft/ft) *BMP specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*	N/A		
7 Cross sectional area (ft^2) *A = (Item 5 * Item 2) + (Item 6 * Item 2^2)*	N/A		
8 Water quality flow velocity (ft/sec) *V = Form 4.3-5 Item 6 / Item 7*	N/A		
9 Hydraulic residence time (min) *Pollutant specific, see Table 5-6 of the TGD for WQMP for reference to BMP design details*	N/A		
10 Length of flow based BMP (ft) *L = Item 8 * Item 9 * 60*	N/A		
11 Water surface area at water quality flow depth (ft^2) SA_{top} = *(Item 5 + (2 * Item 2 * Item 6)) * Item 10*	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): 2,416 *Copy Item 7 in Form 4.2-1*

2 On-site retention with site design hydrologic source control LID BMP (ft^3): 0 *Copy Item 30 in Form 4.3-2*

3 On-site retention with LID infiltration BMP (ft^3): 7,311 *Copy Item 16 in Form 4.3-3*

4 On-site retention with LID harvest and use BMP (ft^3): 0 *Copy Item 9 in Form 4.3-4*

5 On-site biotreatment with volume based biotreatment BMP (ft^3): 0 *Copy Item 3 in Form 4.3-5*

6 Flow capacity provided by flow based biotreatment BMP (cfs): 0 *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

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 (DA 1)

1 Volume reduction needed for HCOC performance criteria (ft^3): *3,201.66* *(Form 4.2-2 Item 4 * 0.95) – Form 4.2-2 Item 1*	**2** On-site retention with site design hydrologic source control, infiltration, and harvest and use LID BMP (ft^3): 7,311 *Sum of Form 4.3-9 Items 2, 3, and 4 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*
3 Remaining volume for HCOC volume capture (ft^3): 0 *Item 1 – Item 2*	**4** Volume capture provided by incorporating additional on-site or off-site retention BMPs (ft^3): n/a *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)*
5 If Item 4 is less than Item 3, incorporate in-stream controls on downstream waterbody segment to prevent impacts due to hydromodification ☐ *Attach in-stream control BMP selection and evaluation to this WQMP*	
6 Is Form 4.2-2 Item 11 less than or equal to 5%: Yes ☒ No ☐ *If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:* • Demonstrate increase in time of concentration achieved by proposed LID site design, LID BMP, and additional on-site or off-site retention BMP ☐ *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)* • 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 ☐ *If yes, HCOC performance criteria is achieved. If no, select one or more mitigation options below:* • Demonstrate reduction in peak runoff achieved by proposed LID site design, LID BMPs, and additional on-site or off-site retention BMPs ☐ *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)* • 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 ☐	

Runoff from the site will be conveyed to an underground infiltration system. This infiltration system will also provide hydromodification control by reducing the proposed peak flow rates. Design of the infiltration system to meet hydromodification requirements will be completed during final design.

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).

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 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	☒	☐	Education Material included in Attachment E of this document will be provided to Property Owners, Tenants and Occupants when taking possession of property.
N2	Activity Restrictions	☒	☐	Pursuant to the Education Material included in Attachment E of this document, the User of the facility will be notified upon possession of the property of all activities that are restricted and or limited and the education material shall be referenced in all lease documents.
N3	Landscape Management BMPs	☒	☐	Leasing documents will require user of property to adhere to Landscape management BMPs listed in the Education Material in Attachment E of this document.
N4	BMP Maintenance	☒	☐	Owner will be responsible for maintain all BMPs per the appropriate O&M and as outlined in the Educational Material included win Attachment E of this document.
N5	Title 22 CCR Compliance (How development will comply)	☐	☒	No Hazardous Wastes as defined by Title 22 CCR produced at this site.
N6	Local Water Quality Ordinances	☐	☒	No known local water quality ordinances.
N7	Spill Contingency Plan	☒	☐	Owner will prepare spill contingency plan and educate all employees on said plan.
N8	Underground Storage Tank Compliance	☒	☐	Underground compliance for the ChamberMaxx system will be included.
N9	Hazardous Materials Disclosure Compliance	☐	☒	No Hazardous Materials.

Form 5-1 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	☐	☒	Proposed site compliant with Article 80 of the Uniform Fire Code, does not require fire sprinkler system.
N11	Litter/Debris Control Program	☒	☐	See Section 5 for BMP inspection, maintenance and frequency of litter and debris control. See Attachment E for material on litter and debris control.
N12	Employee Training	☒	☐	See Attachment E for BMP specific employee training and Section 5 for post construction BMP training.
N13	Housekeeping of Loading Docks	☐	☒	Loading docks not proposed.
N14	Catch Basin Inspection Program	☒	☐	See Appendix E for BMP inspection, maintenance and frequency of litter and debris control.
N15	Vacuum Sweeping of Private Streets and Parking Lots	☒	☐	See Road and Maintenance (SC-70) and Parking/Storage Maintenance (SC-43) in Attachment F for sweeping requirements.
N16	Other Non-structural Measures for Public Agency Projects	☐	☒	No non-structural measures for public agency projects.
N17	Comply with all other applicable NPDES permits	☒	☐	Proposed site will comply with all NPDES permits.

Form 5-2 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)	☒	☐	Stencilling and signage will be provided.
S2	Design and construct outdoor material storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-34)	☐	☒	No Outdoor Storage.
S3	Design and construct trash and waste storage areas to reduce pollution introduction (CASQA New Development BMP Handbook SD-32)	☒	☐	Covered Trash Enclosure Proposed. Inspection and maintenance outlined in Form 5-1.
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)	☒	☐	Proposed site follows irrigation requirements described in CASQA New Development BMP SD-12. See Attachment E.
S5	Finish grade of landscaped areas at a minimum of 1-2 inches below top of curb, sidewalk, or pavement	☒	☐	Proposed site has finished grade of landscape area at a minimum of 1-2 inches below top of curb, sidewalk, and pavement.
S6	Protect slopes and channels and provide energy dissipation (CASQA New Development BMP Handbook SD-10)	☐	☒	Slopes/channels not expected.
S7	Covered dock areas (CASQA New Development BMP Handbook SD-31)	☐	☒	No docks.
S8	Covered maintenance bays with spill containment plans (CASQA New Development BMP Handbook SD-31)	☐	☒	No maintenance bays.
S9	Vehicle wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☒	☐	No vehicle washing.

Form 5-2 Structural Source Control BMPs

Identifier	Name	Check One		Describe BMP Implementation OR, If not applicable, state reason
		Included	Not Applicable	
S10	Covered outdoor processing areas (CASQA New Development BMP Handbook SD-36)	☐	☒	No outdoor processing.
S11	Equipment wash areas with spill containment plans (CASQA New Development BMP Handbook SD-33)	☐	☒	No equipment washing areas
S12	Fueling areas (CASQA New Development BMP Handbook SD-30)	☐	☐	No Fueling Areas.
S13	Hillside landscaping (CASQA New Development BMP Handbook SD-10)	☐	☒	No hillside.
S14	Wash water control for food preparation areas	☒	☐	Food preparation will be available on the property. Food preparation informational guides follow requirements.
S15	Community car wash racks (CASQA New Development BMP Handbook SD-33)	☐	☒	No community car wash racks.

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

Vicinity Map
Raising Cane's Victorville 1051 (Roy Rogers & Civic)

LEGEND

1695	PROPOSED CONTOUR
(1695)	EXISTING CONTOUR MINOR
	PROPERTY LINE/RIGHT-OF-WAY
	CENTERLINE
	EASEMENT
	DMA BOUNDARY
SD	STORM DRAIN PIPE
	FLOW ARROW
X / XX	DA AREA (IN ACRES)
	STANDARD DUTY CONCRETE PAVEMENT
	HEAVY DUTY CONCRETE PAVEMENT
	LANDSCAPE/PLANTER AREA
	HEAVY DUTY ASPHALT PAVEMENT
	DETECTABLE WARNING SYSTEM
	COLORED CONCRETE/ENHANCED PAVING

STRUCTURAL BMP NOTES

1. PROPOSED CATCH BASIN WITH FLEXSTORM INSERTS.
2. ~~PROPOSED CDS PRE-TREATMENT UNIT.~~
3. PROPOSED PRINSCO HYDROSTOR 180 UNDERGROUND INFILTRATION SYSTEM. (BMP-1) — UPDATE
4. PROPOSED PARKWAY DRAIN.

STRUCTURAL SOURCE CONTROL BMP NOTES

S1 STORM DRAIN INLET – MARK ALL INLETS WITH WORDS "ONLY RAIN DOWN THE STORM DRAIN" OR SIMILAR.

S3 BUILDING DESIGN FEATURES TO DISCOURAGE ENTRY OF PESTS. APPLICABLE TO ALL PROPOSED BUILDINGS.

S4 LANDSCAPE DESIGN TO MINIMIZE THE USE OF FERTILIZERS AND PESTICIDES: LANDSCAPE PALATE TO CONSIST OF PLANTS APPROPRIATE FOR SITE SOILS, SLOPES, CLIMATE, SUN, WING, RAIN, AND LAND USE.

S5 FINISH GRADE OF LANDSCAPED AREAS AT A MINIMUM OF 1-2 INCHES BELOW TOP OF CURB, SIDEWALK, OR PAVEMENT.

NON-STRUCTURAL SOURCE CONTROL BMP NOTES

N3 LANDSCAPE MANAGEMENT BMPS

N14 BMP MAINTENANCE

N14 CATCH BASIN INSPECTION PROGRAM

N15 VACUUM SWEEPING OF PRIVATE STREETS AND PARKING LOTS

N1 LITTER/DEBRIS CONTROL PROGRAM

THE FOLLOWING BMPS MAY BE APPLICABLE THROUGHOUT THE SITE AS NEEDED PER FORM 4.1-1 IN PROJECT WQMP FOR DETAILS.

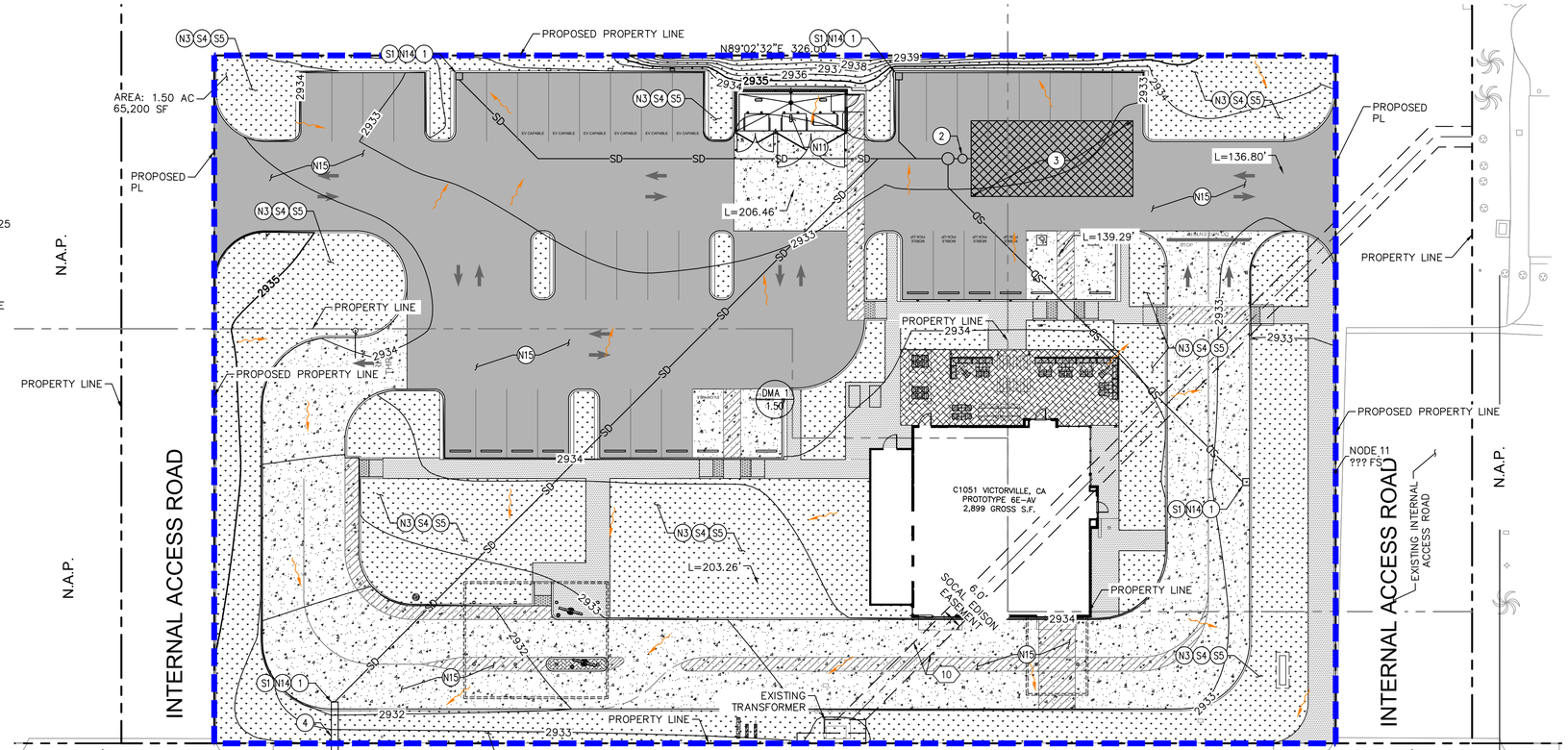
- N1 – EDUCATION OF PROPERTY OWNERS, TENANTS, AND OCCUPANTS ON STORMWATER BMPS
- N2 – ACTIVITY RESTRICTIONS
- N6 – LOCAL WATER QUALITY ORDINANCES
- N7 – SPILL CONTINGENCY PLAN
- N12 – EMPLOYEE TRAINING
- N17 – COMPLY WITH ALL OTHER APPLICABLE NPDES PERMITS

EASEMENT NOTES

10 EASEMENT(S) TO SOUTHERN CALIFORNIA EDISON COMPANY FOR ELECTRICAL AND COMMUNICATION FACILITIES RECORDED OCTOBER 1, 2008 BY INSTRUMENT NO. 2008-440379 OF OFFICIAL RECORDS.

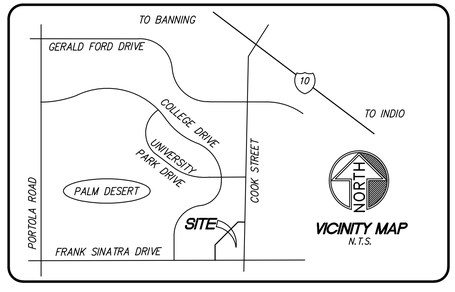
SITE DATA

PARCEL SIZE: LIMITS OF DISTURBANCE:	65,150± S.F. (1.50± AC) 65,150± S.F. (1.50± AC)
PROPOSED IMPERVIOUS AREA:	45,153± S.F. (INCLUDING BLDG)
PROPOSED PERVIOUS AREA:	19,997± S.F.
PROPOSED BLDG AREA:	2,691± S.F.
APN:	PORTIONS OF 3106-201-27, 3106-201-24, AND 3106-201-25
ZONING:	COMMERCIAL
ADDRESS:	TBD
RECEIVING WATERS:	MOJAVE RIVER WATERSHED (RECEIVING WATER IS BELOW THE NARROWS)



PERMANENT BMP ID #	BMP PROVIDED	SURFACE AREA	DCV	HYDROSTOR TREATMENT CAPACITY
BMP 1	PRINSCO HYDROSTOR 180 CHAMBER SYSTEM WITH OPEN BOTTOM FOR INFILTRATION	2,850 S.F.	3,510 FT³ (SEE WQMP REPORT FORM 4.2-1)	10,034.60 FT³

PRINSCO VOLUME



NORTH

GRAPHIC SCALE IN FEET
0 10 20 40
1" = 20'
WHEN PRINTED AT FULL SIZE (24" BY 36")

~~CUP NO. XX-XX~~

K:\ORA_LDEV\RAISING CANE'S\094797162 - VICTORVILLE (ROY ROGERS & CIVIC) 1051\REPORTS\WQMP\EXHIBITS\CANE'S VICTORVILLE 1051 - PWQMP EXHIBIT.DWG 10/17/2023 10:55:18 PM

Kimley»Horn

PRELIMINARY WQMP EXHIBIT
RAISING CANE'S VICTORVILLE 1051 (ROY ROGERS AND CIVIC)
10/17/2023

LEGAL DESCRIPTION

THE TITLE DESCRIPTION AND SCHEDULE B ITEMS HEREON ARE FROM FIDELITY NATIONAL TITLE COMPANY, COMMITMENT FOR TITLE INSURANCE ORDER NO.:01007046-010-PA-SLO, DATED JANUARY 9, 2023.

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE UNINCORPORATED AREA OF VICTORVILLE, IN THE COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

PARCELS 5, 6, AND 8, OF PARCEL MAP NO. 19000, IN THE CITY OF VICTORVILLE, COUNTY OF SAN BERNARDINO, STATE OF CALIFORNIA, AS PER MAP IN BOOK 230 OF PARCEL MAPS, PAGE 76 TO 82 INCLUSIVE, RECORDS OF SAID COUNTY.

EXCEPTING FROM THAT PORTION OF THE AFOREDESCRIBED PROPERTY WHICH UNDERLIES A PLANE PARALLEL TO AND 250 FEET BELOW THE SURFACE THEREOF, WHICH PORTION IS HEREINAFTER REFERRED TO AS "SAID LAND": ½ OF ALL OIL, GAS, PETROLEUM AND OTHER HYDROCARBON SUBSTANCES, MINERALS AND WATER IN, UNDER OR RECOVERABLE FROM SAID LAND; TOGETHER WITH THE RIGHT TO INJECT OR INTRODUCE FROM TIME TO TIME, STORE THEREIN AND SUBSEQUENTLY REMOVE FROM SAID LAND, ANY OIL, GAS, PETROLEUM AND OTHER HYDROCARBON SUBSTANCES, MINERALS AND WATER; TOGETHER WITH RIGHTS OF WAY, EASEMENTS AND SERVITUDES IN AND THROUGH SAID LAND FOR THE PURPOSES OF EXERCISING THE RIGHTS HEREIN RESERVED, INCLUDING, BUT NOT LIMITED TO THE RIGHT, FROM TIME TO TIME, TO DRILL WELL HOLES, TO CASE THE SAME AND OTHERWISE TO COMPLETE AND MAINTAIN WELLS INTO AND THROUGH SAID LAND FROM SURFACE LOCATIONS OUTSIDE THE PROPERTY HEREIN CONVEYED; PROVIDED, HOWEVER, THAT THE RIGHTS HEREIN RESERVED DO NOT INCLUDE THE RIGHT TO ENTER UPON THE SURFACE OVERLYING SAID LAND, AS RESERVED IN THE DEED FROM ELIZABETH C. BREHM, RECORDED ON 30 DECEMBER 1964, IN BOOK 6302, PAGE 345, OFFICIAL RECORDS.

PARCEL NUMBERS: 3106-201-24, 25 & 27

SIGN INFORMATION

(K) CMUTCD SIGN R5-1 – "DO NOT ENTER"

TITLE REPORT EXCEPTIONS

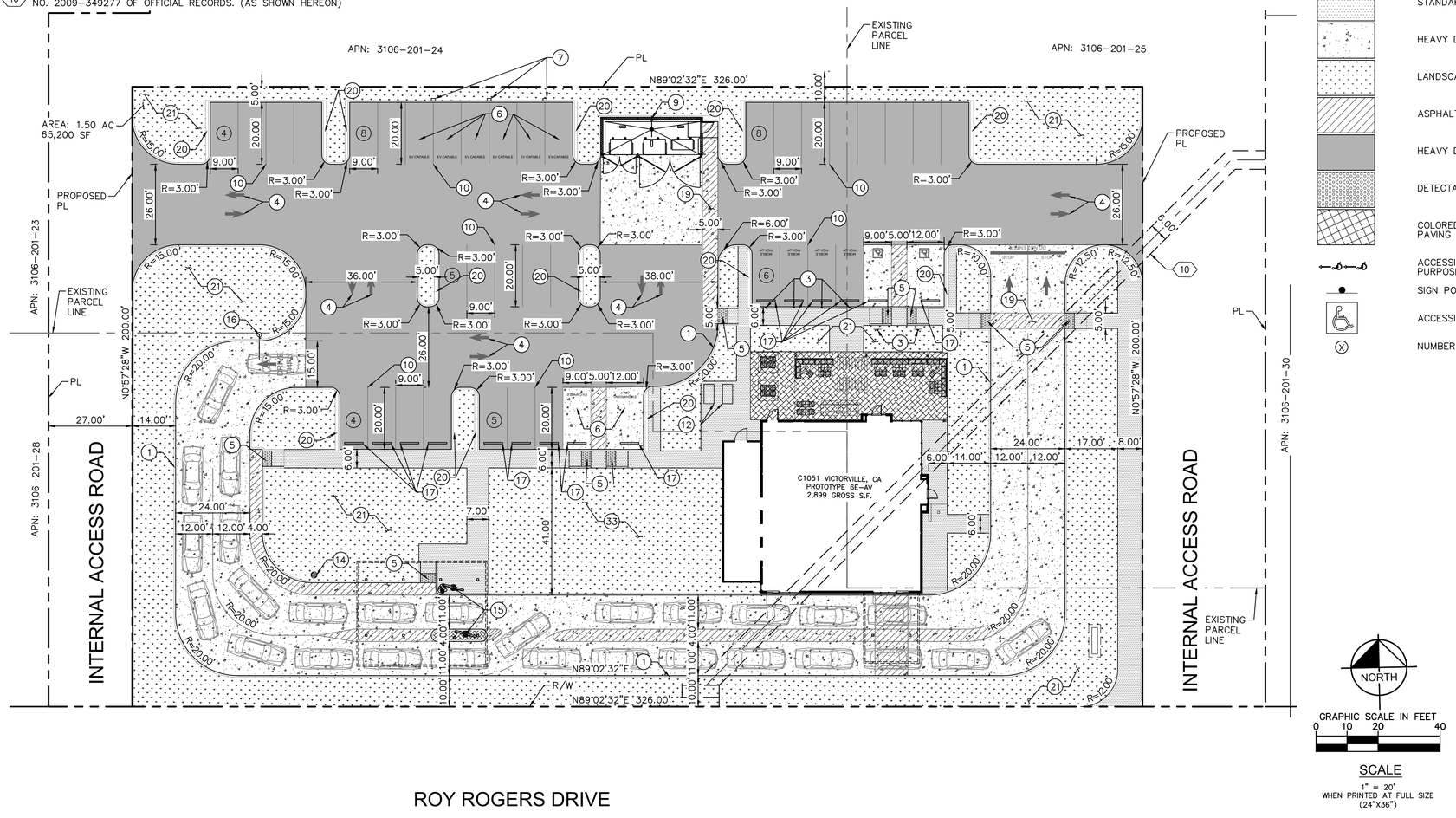
(3) ITEM 3 REFERS TO EASEMENT(S) GRANTED TO THE CITY OF VICTORVILLE FOR STREET PURPOSES RECORDED MAY 7, 1974 IN BOOK 8425, PAGE 712 OF OFFICIAL RECORD. (AS SHOWN HEREON)

(10) ITEM 10 REFERS TO EASEMENT(S) TO SOUTHERN CALIFORNIA EDISON COMPANY FOR ELECTRICAL AND COMMUNICATION FACILITIES RECORDED OCTOBER 1, 2008 BY INSTRUMENT NO. 2008-440379 OF OFFICIAL RECORDS. (AS SHOWN HEREON)

(16) ITEM 16 REFERS TO EASEMENT FOR WATER FACILITIES RECORDED AUGUST 7, 2009 BY INSTRUMENT NO. 2009-349277 OF OFFICIAL RECORDS. (AS SHOWN HEREON)

SITE KEY NOTES:

1. CONCRETE CURB
2. CONCRETE CURB AND GUTTER
3. ACCESSIBLE PARKING STALL SIGN
4. DIRECTIONAL MARKING PER PLAN
5. ACCESSIBLE RAMP WITH DETECTABLE WARNING (TRUNCATED DOMES)
6. "CLEAN AIR/VAN POOL/EV" IN 12" HIGH WHITE LETTERS AT THE END OF PARKING STALL
7. FUTURE E/V CHARGING STATION. CONDUIT TO BE RAN TO STALL FOR FUTURE CONNECTION
8. ADA PATH OF TRAVEL SIGN
9. COVERED TRASH ENCLOSURE AND RECYCLING BIN STORAGE
10. STANDARD 90° PARKING STALL STRIPING.
11. SHORT TERM BIKE RACK
12. LONG TERM BIKE RACK
13. OUTDOOR COVERED PATIO TO BE STAINED STANDARD DUTY CONCRETE PAVEMENT
14. PREVIEW BOARD
15. ORDER BOARD
16. HEIGHT DETECTOR POLE
17. INSTALL WHEELSTOPS FOR PARKING SPACES ADJACENT TO WALKWAYS
18. SITE LIGHTING
19. ACCESSIBLE PATH OF TRAVEL STRIPING. ACCESSIBLE PATHS SHALL BE ENHANCED PAVING.
20. 18" WALK-OFF CURB
21. LANDSCAPE



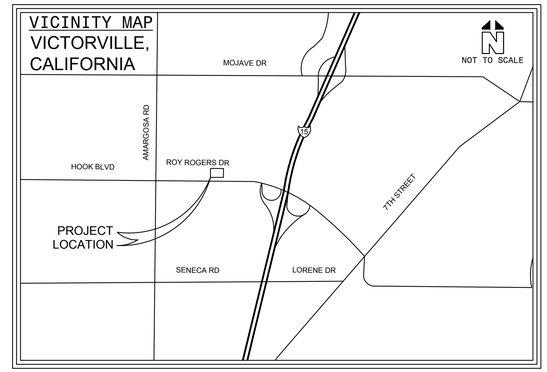
LEGEND:

- CENTER LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE / LEASE LINE
- EASEMENT LINE / SETBACK LINE
- APPROXIMATE LIMIT OF WORK LINE
- STANDARD DUTY CONCRETE PAVEMENT
- HEAVY DUTY CONCRETE PAVEMENT
- LANDSCAPE/PLANTER AREA
- ASPHALT PAVEMENT MILL AND OVERLAY
- HEAVY DUTY ASPHALT PAVEMENT
- DETECTABLE WARNING SYSTEM
- COLORED CONCRETE/ENHANCED PAVING
- ACCESSIBLE ROUTE (LOCATION PURPOSES ONLY, DO NOT PAINT)
- SIGN POST
- ACCESSIBLE PARKING SPACE
- (X) NUMBER OF PARKING SPACES

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

SCALE
1" = 20'
WHEN PRINTED AT FULL SIZE (24"X36")



SITE DATA:

PROJECT DESCRIPTION:	NEW CONSTRUCTION OF A RAISING CANE'S DRIVE THRU RESTAURANT AND PARKING LOT.		
ADDRESS:			
APN:	3106-201-24, 25 & 27		
ZONING DISTRICT:	C2T – GENERAL COMMERCIAL – TRANSITIONAL		
ADJACENT ZONING DISTRICTS:	N: R3T – MULTI-FAMILY – TRANSITIONAL S: SP – SPECIFIC PLAN E: C4T – GENERAL COMMERCIAL – TRANSITIONAL W: R1 – SINGLE FAMILY		
LAND USE:	COMMERCIAL		
ADJACENT LAND USE:	N: HIGH DENSITY RESIDENTIAL S: SPECIFIC PLAN E: COMMERCIAL W: LOW DENSITY RESIDENTIAL		
GENERAL PLAN DISTRICT:	GC – GENERAL COMMERCIAL		
SPECIFIC PLAN:	CIVIC COMMERCIAL		
FLOOD ZONE:	ZONE X – AREAS DETERMINED TO BE OUTSIDE THE 0.02% ANNUAL CHANCE FLOODPLAIN.		
TOTAL DISTURBED AREA:	65,200 S.F.	(1.50 AC)	
TOTAL PAD AREA:	2,899 S.F.	(0.07 AC)	
TOTAL LOT AREA:	65,200 S.F.	(1.50 AC)	
LOT COVERAGE			
TOTAL SITE AREA:	65,150 S.F.	(1.50 AC)	100%
BUILDING AREA:	2,899 S.F.	(0.07 AC)	4.4%
IMPERVIOUS AREA:	42,254 S.F.	(0.97 AC)	64.9%
LANDSCAPE AREA:	19,997 S.F.	(0.46 AC)	30.7%
PARKING/LANDSCAPE BUFFER			
FRONT:	0'		
REAR:	0'		
SIDE (E):	0'		
SIDE (W):	0'		
PARKING SUMMARY:	RAISING CANE'S: 2,899 S.F. (1 STALL/100 S.F.) – 2 SPACE CREDIT FOR DRIVE-THRU STAKING OVER 40' IN LENGTH = 27 STALLS REQUIRED PER CITY CODE • ADA PARKING FOR 26-50 PARKING STALLS = 2 ADA PARKING STALLS REQUIRED, PER 2019 CBC. • FUTURE EV FOR 26-50 PARKING STALLS = 2 FUTURE EV STALLS REQUIRED PER 2019 CALGREEN 1 FUTURE EV STALL MUST BE VAN ACCESSIBLE. • NUMBER OF REQUIRED DESIGNATED STALLS FOR LOW-EMITTING, FUEL-EFFICIENT, CARPOOL/VANPOOL, AND ELECTRIC VEHICLES (PER 2019 CALIFORNIA GREEN BUILDING STANDARDS) = 3. TOTAL NUMBER OF PARKING SPACES PROVIDED = 40		

PARKING TABLE:	RAISING CANE'S REQUIRED	PROVIDED	
STANDARD	20	30	
COMPACT (C)	–	–	
MOTORCYCLE	–	–	
DESIGNATED	5	8	(2 STALLS TO BE EV CAPABLE PER CALIFORNIA GREEN BUILDING CODE TABLE 5.106.5.2)
			*6 CAR STACK BEHIND THE ORDER BOARD HAS BEEN PROVIDED PER THE CITY'S CODE REQUIREMENTS.
ACCESSIBLE	2	2	
TOTAL:	27	40	

Know what's below. Call before you dig.

ISSUE	DATE	DESCRIPTION

SU — DRAWN BY
JP — CHECKED BY
JP — RECOMMENDED

Kimley»Horn
3801 UNIVERSITY AVENUE, SUITE 300
RIVERSIDE, CA 92501
(951)543-9868
BUSINESS TAX ID: 12309613
EXPIRATION DATE: 05/31/2024

PREPARED UNDER THE DIRECT SUPERVISION OF:
JOHN POLLOCK, R.C.E. NO. 86160 — DATE: EXP. 12.31.2024

CITY OF VICTORVILLE
PLANNING DEPARTMENT
APPROVED BY:
CITY PLANNER — DATE

Raising Cane's Chicken Fingers
VICTORVILLE, CA 92394

CITY OF VICTORVILLE
GP-
PRELIMINARY SITE PLAN

C1.0 OF C1.0

Drawing name: K:\ORA_LDEV\Raising Cane's\092497162 – Victorville (Roy Rogers & Civic) 1051\CADD\Exhibits\Entitlement Package\C1.0 – Preliminary Site Plan.dwg C1.0 – Preliminary Site Plan Oct 17, 2023 1:17pm by: Jacqueline.Yanez
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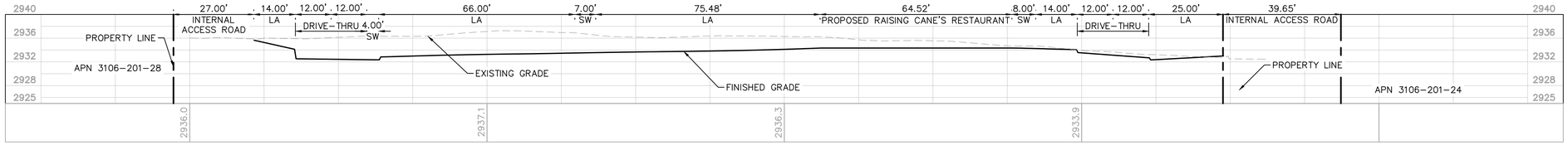
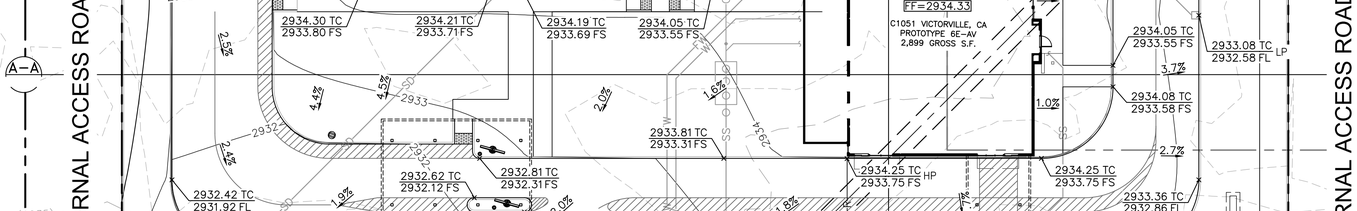


SECTION A-A

HORIZONTAL SCALE: 1" = 20' WHEN PRINTED AT FULL SIZE (24" X 36")
VERTICAL SCALE: 1" = 5' WHEN PRINTED AT FULL SIZE (24" X 36")



SECTION B-B

HORIZONTAL SCALE: 1" = 20' WHEN PRINTED AT FULL SIZE (24" X 36")
VERTICAL SCALE: 1" = 5' WHEN PRINTED AT FULL SIZE (24" X 36")

LEGEND

- CENTER LINE
- PROPERTY LINE
- RIGHT-OF-WAY LINE / LEASE LINE
- EASEMENT LINE / SETBACK LINE
- APPROXIMATE LIMITS OF DISTURBANCE
- R — PROPOSED RIDGE LINE
- GB — PROPOSED GRADE BREAK LINE
- 899.00 TC / 898.50 FS — PROPOSED SPOT ELEVATION
- (898.75 TC) / (898.25 FS) — EXISTING SPOT ELEVATION
- PROPOSED FLOW LINE
- SD — EXISTING STORM DRAIN LINE
- SD — PROPOSED STORM DRAIN LINE
- EXISTING FLOW DIRECTION

GRADING AND DRAINAGE NOTES

1. PROPOSED 30" DEEP DRYWELL
2. 6" SDR-35 PVC STORM DRAIN PIPE SLOPED AT 0.5% MIN.
3. CONCRETE CURB AND GUTTER.
4. CONCRETE VALLEY GUTTER.
5. TRASH ENCLOSURE DRAIN WITH ACCESSIBLE GRATE. DRAIN TO SEWER.
6. ROOF DOWNSPOUTS. CONNECT TO 4" SDR-35 PVC STORM DRAIN PIPE AND DRAIN THRU CURB FACE.
7. EXISTING VALLEY GUTTER TO REMAIN TO PREVENT OFF-SITE RUNON.
8. PROPOSED CMU BLOCK WALL TO MATCH EXISTING.
9. 24" X 24" JENSEN PRECAST DROP INLET WITH CATCH BASIN FILTER INSERT FOR TRASH CAPTURE.

NORTH

GRAPHIC SCALE IN FEET
0 10 20 40

SCALE
1" = 20'
WHEN PRINTED AT FULL SIZE
(24"X36")

Know what's below. Call before you dig. 811

ISSUE	DATE	DESCRIPTION

DRAWN BY: SU
CHECKED BY: JP
RECOMMENDED: JP

Kimley»Horn
3801 UNIVERSITY AVENUE, SUITE 300
RIVERSIDE, CA 92501
(951)543-9868
BUSINESS TAX ID: 12309613
EXPIRATION DATE: 05/31/2024

PREPARED UNDER THE DIRECT SUPERVISION OF:
JOHN POLLOCK, R.C.E. NO. 86160 DATE: EXP. 12.31.2024

CITY OF VICTORVILLE
PLANNING DEPARTMENT
APPROVED BY:
CITY PLANNER DATE

Raising Cane's Chicken Fingers
VICTORVILLE, CA 92394

CITY OF VICTORVILLE
GP-
PRELIMINARY GRADING PLAN

1 OF 1

Drawing name: K:\ORA_LDEV\Raising Cane's\094797162 - Victorville (Roy Rogers & Civic) 1051\CADD\Exhibits\Entitlement Package\C2.0 - Preliminary Grading Plan.dwg C2.0 - Preliminary Grading Plan Oct 17, 2023 1:17pm by: Jacqueline Yanez
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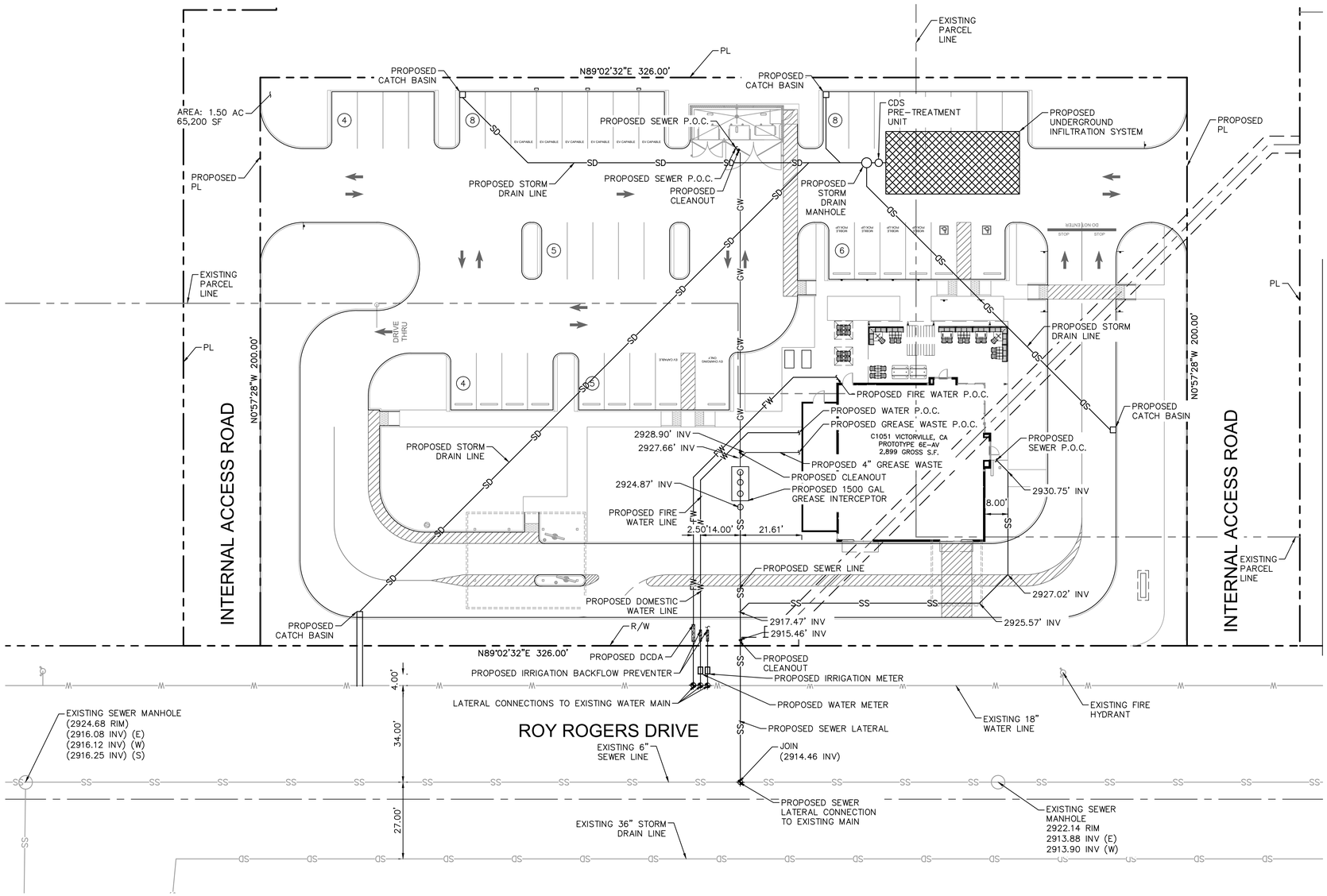

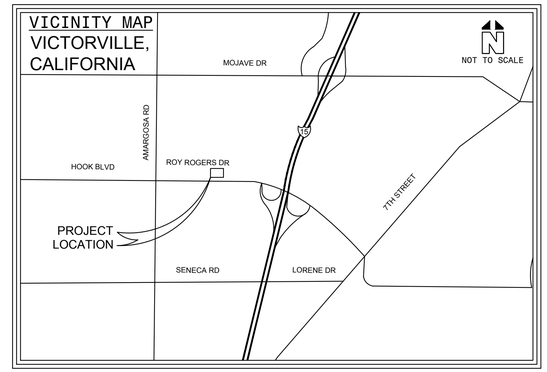

LEGEND:

- CENTER LINE
- PROPERTY LINE
- RIGHT OF WAY
- EASEMENT LINE
- APPROXIMATE LIMIT OF WORK LINE
- W — EXISTING WATER LINE
- SS — EXISTING SANITARY SEWER LINE
- G — EXISTING GAS LINE
- E — E — EXISTING UNDERGROUND ELECTRICAL LINE
- T — EXISTING UNDERGROUND TELECOMMUNICATIONS LINE
- SD — EXISTING STORM DRAIN LINE
- W — PROPOSED WATER LINE
- FW — PROPOSED FIRE WATER LINE
- SS — PROPOSED SANITARY SEWER LINE
- E — E — PROPOSED ELECTRICAL CONDUIT
- PROPOSED SITE ELECTRICAL CONDUIT
- IRR — PROPOSED IRRIGATION ELECTRICAL CONDUIT
- T — PROPOSED TELECOMMUNICATIONS CONDUIT
- G — PROPOSED GAS LINE
- GW — PROPOSED GREASE WASTE LINE
- SD — PROPOSED STORM DRAIN LINE

NORTH

GRAPHIC SCALE IN FEET
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SCALE
1" = 20'
WHEN PRINTED AT FULL SIZE (24"X36")

811 Know what's below. Call before you dig.

ISSUE	DATE	DESCRIPTION

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JP — RECOMMENDED

Kimley»Horn
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JOHN POLLOCK, R.C.E. NO. 86160 — DATE: EXP. 12.31.2024

CITY OF VICTORVILLE
PLANNING DEPARTMENT
APPROVED BY:
CITY PLANNER — DATE

Raising Cane's Chicken Fingers
VICTORVILLE, CA 92394

CITY OF VICTORVILLE
GP-
C3.0 - PRELIMINARY UTILITY PLAN

C3.0 OF C3.0

Drawing name: K:\ORA_LDEV\Raising Cane's\094797162 – Victorville (Roy Rogers & Civic) 1051\CADD\Exhibits\Entitlement Package\C3.0 – Preliminary Utility Plan.dwg C3.0 – Preliminary Utility Plan Oct 17, 2023 1:17pm by: Jacqueline Yanez
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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 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.

RECORDING REQUESTED BY:
County of San Bernardino
Department of Public Works

AND WHEN RECORDED MAIL TO:
County of San Bernardino
Department of Public Works
825 E. Third Street, Room 117
San Bernardino, CA 92415-0835

SPACE ABOVE THIS LINE FOR RECORDER'S USE

COVENANT AND AGREEMENT REGARDING WATER QUALITY MANAGEMENT PLAN AND STORMWATER BEST MANAGEMENT PRACTICES TRANSFER, ACCESS AND MAINTENANCE

THIS PAGE ADDED TO PROVIDE ADEQUATE SPACE FOR RECORDING INFORMATION

Covenant and Agreement Regarding Water Quality Management Plan and Stormwater Best Management Practices
Transfer, Access and Maintenance

OWNER NAME: _____

PROPERTY ADDRESS: _____

_____

APN: _____

THIS AGREEMENT is made and entered into in

_____ ,California, this _____ day of

_____ , by and between

_____ , hereinafter

referred to as Owner, and the COUNTY OF SAN BERNARDINO, a political subdivision of the State of California, hereinafter referred to as "the County";

WHEREAS, the Owner owns real property ("Property") in the County of San Bernardino, State of California, more specifically described in Exhibit "A" and depicted in Exhibit "B", each of which exhibits is attached hereto and incorporated herein by this reference; and

WHEREAS, at the time of initial approval of development project known as

_____ within the Property described herein, the County required the project to employ Best Management Practices, hereinafter referred to as "BMPs," to minimize pollutants in urban runoff; and

WHEREAS, the Owner has chosen to install and/or implement BMPs as described in the Water Quality Management Plan, dated _____, on file with the County and incorporated herein by this reference, hereinafter referred to as "WQMP", to minimize pollutants in urban runoff and to minimize other adverse impacts of urban runoff; and

WHEREAS, said WQMP has been certified by the Owner and reviewed and approved by the County; and

WHEREAS, the Owner is aware that periodic and continuous maintenance, including, but not necessarily limited to, filter material replacement and sediment removal, is required to assure peak performance of all BMPs in the WQMP and that, furthermore, such maintenance activity will require compliance with all Local, State, or Federal laws and regulations, including those pertaining to confined space and waste disposal methods, in effect at the time such maintenance occurs.

NOW THEREFORE, it is mutually stipulated and agreed as follows:

1. Owner shall comply with the WQMP.

2. All maintenance or replacement of BMPs proposed as part of the WQMP are the sole responsibility of the Owner in accordance with the terms of this Agreement.

3. Owner hereby provides the County's designee complete access, of any duration, to the BMPs and their immediate vicinity at any time, upon reasonable notice, or in the event of emergency, as determined by the County Director of Public Works, no advance notice, for the purpose of inspection, sampling, testing of the BMPs, and in case of emergency, to undertake all necessary repairs or other preventative measures at owner's expense as provided in paragraph 5 below. The County shall make every effort at all times to minimize or avoid interference with Owner's use of the Property. Denial of access to any premises or facility that contains WQMP features is a breach of this Agreement and may also be a violation of the County's Pollutant Discharge Elimination System regulations, which on the effective date of this Agreement are found in County Code Sections 35.0101 et seq. If there is reasonable cause to believe that an illicit discharge or breach of this Agreement is occurring on the premises then the authorized enforcement agency may seek issuance of a search warrant from any court of competent jurisdiction in addition to other enforcement actions. Owner recognizes that the County may perform routine and regular inspections, as well as emergency inspections, of the BMPs. Owner or Owner's successors or assigns shall pay County for all costs incurred by County in the inspection, sampling, testing of the BMPs within thirty (30) calendar days of County invoice.

4. Owner shall use its best efforts diligently to maintain all BMPs in a manner assuring peak performance at all times. All reasonable precautions shall be exercised by Owner and Owner's representative or contractor in the removal and extraction of any material(s) from the BMPs and the ultimate disposal of the material(s) in a manner consistent with all relevant laws and regulations in effect at the time. As may be requested from time to time by the County, the Owner shall provide the County with documentation identifying the material(s) removed, the quantity, and disposal destination), testing construction or reconstruction.

5. In the event Owner, or its successors or assigns, fails to accomplish the necessary maintenance contemplated by this Agreement, within five (5) business days of being given written notice by the County , the County is hereby authorized to cause any maintenance necessary to be done and charge the entire cost and expense against the Property and/or to the Owner or Owner's successors or assigns, including administrative costs, attorneys fees and interest thereon at the maximum rate authorized by the County Code from the date of the notice of expense until paid in full. Owner or Owner's successors or assigns shall pay County within thirty (30) calendar days of County invoice.

6. The County may require the owner to post security in form and for a time period satisfactory to the County to guarantee the performance of the obligations stated herein. Should the Owner fail to perform the obligations under the Agreement, the County may, in the case of a cash bond, act for the Owner using the proceeds from it, or in the case of a surety bond, require the surety(ies) to perform the obligations of this Agreement.

7. The County agrees, from time to time, within ten (10) business days after request of Owner, to execute and deliver to Owner, or Owner's designee, an estoppel certificate requested by Owner, stating that this Agreement is in full force and effect, and that Owner is not in default hereunder with regard to any maintenance or payment obligations (or specifying in detail the nature of Owner's default). Owner shall pay all costs and expenses incurred by the County in its investigation of whether to issue an estoppel certificate within thirty (30) calendar days after receipt of a County invoice and prior to the County's issuance of such certificate. Where the County cannot issue an estoppel certificate, Owner shall pay the County within thirty (30) calendar days of receipt of a County invoice.

8. Owner shall not change any BMPs identified in the WQMP without an amendment to this Agreement approved by authorized representatives of both the County and the Owner.

9. County and Owner shall comply with all applicable laws, ordinances, rules, regulations, court orders and government agency orders now or hereinafter in effect in carrying out the terms of this Agreement. If a provision of this Agreement is terminated or held to be invalid, illegal or unenforceable, the validity, legality and enforceability of the remaining provisions shall remain in full effect.

10. In addition to any remedy available to County under this Agreement, if Owner violates any term of this Agreement and does not cure the violation within the time already provided in this Agreement, or, if not provided, within thirty (30) calendar days, or within such time authorized by the County if said cure reasonably requires more than the subject time, the County may bring an action at law or in equity in a court of competent jurisdiction to enforce compliance by the Owner with the terms of this Agreement. In such action, the County may recover any damages to which the County may be entitled for the violation, enjoin the violation by temporary or permanent injunction without the necessity of proving actual damages or the inadequacy of otherwise available legal remedies, or obtain other equitable relief, including, but not limited to, the restoration of the Property and/or the BMPs identified in the WQMP to the condition in which it/they existed prior to any such violation or injury.

11. This Agreement shall be recorded in the Office of the Recorder of San Bernardino County, California, at the expense of the Owner and shall constitute notice to all successors and assigns of the title to said Property of the obligation herein set forth, and also a lien in such amount as will fully reimburse the County, including interest as herein above set forth, subject to foreclosure in event of default in payment.

12. In event of legal action occasioned by any default or action of the Owner, or its successors or assigns, then the Owner and its successors or assigns agree(s) to hold the County harmless and pay all costs incurred by the County in enforcing the terms of this Agreement, including reasonable attorney's fees and costs, and that the same shall become a part of the lien against said Property.

13. It is the intent of the parties hereto that burdens and benefits herein undertaken shall constitute covenants that run with said Property and constitute a lien there against.

14. The obligations herein undertaken shall be binding upon the heirs, successors, executors, administrators and assigns of the parties hereto. The term "Owner" shall include not only the present Owner, but also its heirs, successors, executors, administrators, and assigns. Owner shall notify any successor to title of all or part of the Property about the existence of this Agreement. Owner shall provide such notice prior to such successor obtaining an

interest in all or part of the Property. Owner shall provide a copy of such notice to the County at the same time such notice is provided to the successor.

15. Time is of the essence in the performance of this Agreement.

16. Any notice to a party required or called for in this Agreement shall be served in person, or by deposit in the U.S. Mail, first class postage prepaid, to the address set forth below. Notice(s) shall be deemed effective upon receipt, or seventy-two (72) hours after deposit in the U.S. Mail, whichever is earlier. A party may change a notice address only by providing written notice thereof to the other party.

17. Owner agrees to indemnify, defend (with counsel reasonably approved by the County) and hold harmless the County and its authorized officers, employees, agents and volunteers from any and all claims, actions, losses, damages, and/or liability arising out of this Agreement from any cause whatsoever, including the acts, errors or omissions of any person and for any costs or expenses incurred by the County on account of any claim except where such indemnification is prohibited by law. This indemnification provision shall apply regardless of the existence or degree of fault of indemnitees. The Owner's indemnification obligation applies to the County's "active" as well as "passive" negligence but does not apply to the County's "sole negligence" or "willful misconduct" within the meaning of Civil Code Section 2782, or to any claims, actions, losses, damages, and/or liabilities, to the extent caused by the acts or omissions of any third party contractors undertaking any work (other than field inspections) or other maintenance on the Property on behalf of the County under this Agreement..

[REMAINDER OF THIS PAGE INTENTIONALLY LEFT BLANK]

IF TO COUNTY :

Director of Public Works

825 E. Third Street, Room 117

San Bernardino, CA 92415-0835

IF TO OWNER:

_____

_____

_____

IN WITNESS THEREOF, the parties hereto have affixed their signatures as of the date first written above.

OWNER:

Company/Trust:_____

Signature: _____

Name: _____

Title: _____

Date: _____

OWNER:

Company/Trust:_____

Signature: _____

Name: _____

Title: _____

Date: _____

FOR: Maintenance Agreement, dated

_____, for the

project known as

_____

_____

(APN)_____,

As described in the WQMP dated

_____.

NOTARIES ON FOLLOWING PAGE

A notary acknowledgement is required for recordation.

ACCEPTED BY:

_____

BRENDON BIGGS, M.S., P.E., Director of Public Works

Date: _____

Attachment: Notary Acknowledgement

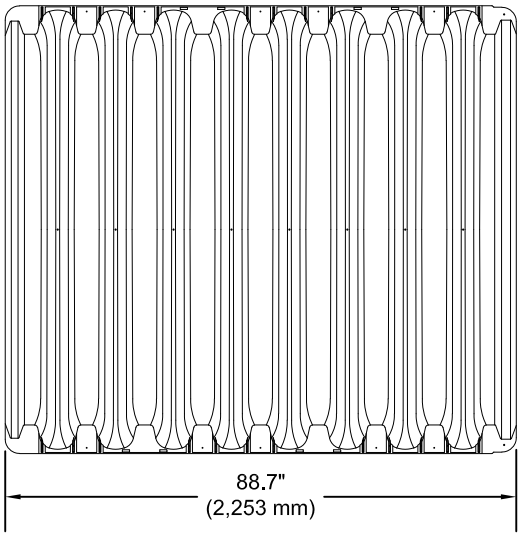
ATTACHMENT 1
Notary Acknowledgement)

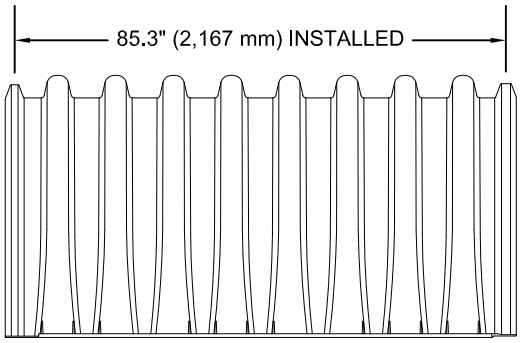
EXHIBIT A
(Legal Description)

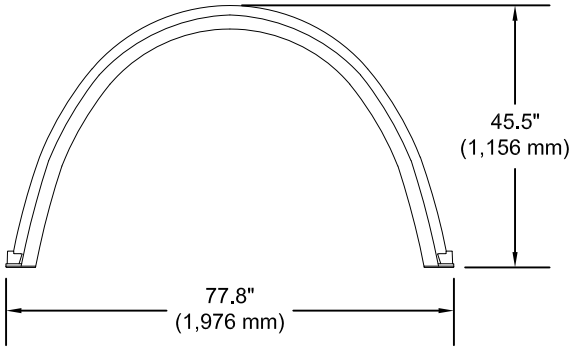
EXHIBIT B
(Map/illustration)

HydroStor™ HS180

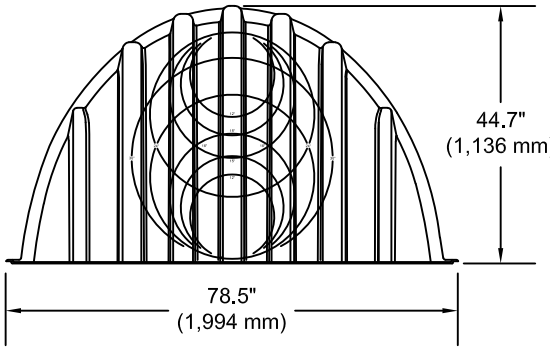
Chamber Specifications	
Chamber Size (L x W x H)	88.7" x 77.8" x 45.5" (2,253 x 1,976 x 1,156 mm)
Installed Length	85.3" (2,167 mm)
Chamber Storage	113.6 ft^3 (3.2 m^3)
Min. Installed Storage*	176.0 ft^3 (5.0 m^3)
Weight	122 lbs (55.3 kg)
Chambers / Pallet	19
Approx. Weight / Pallet	2,500 lbs (1,135 kg)

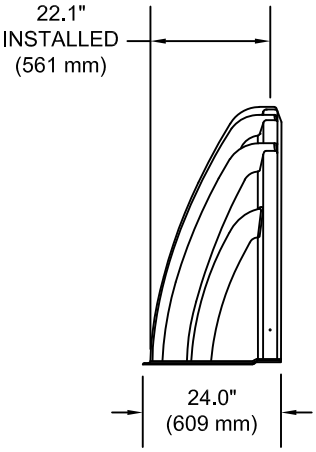






End Cap Specifications	
End Cap Size (L x W x H)	24.0" x 78.5" x 44.7" (609 x 1,994 x 1,136 mm)
Installed Length	22.1" (561 mm)
End Cap Storage	15.3 ft^3 (0.4 m^3)
Min. Installed Storage*	44.8 ft^3 (1.3 m^3)
Weight	52 lbs (23.6 kg)





*ASSUMES 12" (300 mm) STONE ABOVE CHAMBERS/END CAPS, 9" (230 mm) OF STONE FOR FOUNDATION STONE, 5" (130 mm) OF STONE BETWEEN CHAMBERS/END CAPS, 6" (150 mm) OF STONE PERIMETER IN FRONT OF END CAPS AND 40% STONE POROSITY.

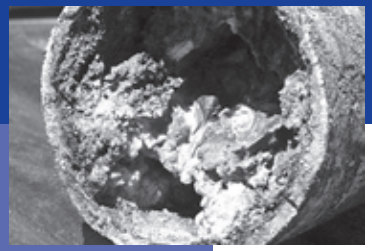
THIS DETAIL DEPICTS RECOMMENDED INSTALLATION PRACTICES AND IS NOT INTENDED TO SUPERSEDE ANY NATIONAL, STATE OR LOCAL SPECIFICATIONS. PRINSCO BEARS NO RESPONSIBILITY FOR ANY ALTERATIONS, REVISION AND/OR DEVIATION FROM THIS STANDARD DETAIL. PRINSCO HAS NOT PERFORMED ANY ENGINEERING OR DESIGN SERVICE FOR THIS PROJECT. THE DESIGN ENGINEER SHALL REVIEW THESE DETAILS PRIOR TO CONSTRUCTION TO VERIFY SUITABILITY. © PRINSCO, INC.

PRINSCO WATER MANAGEMENT SOLUTIONS
1717 16TH ST. NE
WILLMAR, MN 56201
www.prinsco.com

TITLE:	HYDROSTOR HS180 - SPECIFICATION			
DRAWN BY:	AED	DATE:	09-Aug-22	DRAWING NUMBER: D-7-201
SCALE:	NTS	SHEET:	1 OF 1	

6.4 BMP Educational Material

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



Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. Fats, oils and grease from restaurants and food service facilities can cause sewer line blockages that may result in sewage overflow into your facility and into storm drains. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways and should never contain washwater, trash, grease or other materials.

You would never dump oil and trash into the ocean, so don't let it enter the storm drains. Follow these tips to help prevent water pollution.

For more information,
please call the
Orange County Stormwater Program
at **1-877-89-SPILL** (1-877-897-7455)
or visit
www.ocwatersheds.com

Report sewage spills and
discharges that are not
contained to your site to the
Orange County 24-Hour
Water Pollution Problem
Reporting Hotline
at **1-877-89-SPILL** (1-877-897-7455)

For emergencies, dial 911.

CALIFORNIA Restaurant ASSOCIATION SINCE 1906

Printed on Recycled Paper

Help Prevent Ocean Pollution:

Tips for the Food Service Industry

The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Best Kitchen Practices

Food Waste Disposal

- Scrape food waste off of plates, utensils, pots, food preparation and cooking areas and dispose of it in the trash.
- Never put food waste down the drain. Food scraps often contain grease, which can clog sewer pipes and result in sewage backups and overflows.

Grease & Oil Disposal

- Never put oil or grease down the drain. Contain grease and oil by using covered grease storage containers or installing a grease interceptor.
- Never overfill your grease storage container or transport it without a cover.
- Grease control devices must be emptied and cleaned by permitted companies.
- Keep maintenance records on site.

- For a list of oil/grease recycling companies, contact the CIWMB at **www.ciwmb.ca.gov/foodwaste/render.htm** or contact your local sanitation district.

Minor Spill Cleanup

- Always use dry cleanup methods, such as a rag, damp mop or broom.
- Never hose a spill into the street, gutter or storm drain.

Major Spill Cleanup

- Have spill containment and clean-up kits readily available, and train all employees on how to use them.
- Immediately contain and clean the spill using dry methods.
- If the spill leaves your site, call **(714) 567-6363**.

Dumpster Cleanup

- Pick up all debris around the dumpster.
- Always keep the lid on the dumpster closed.

- Never pour liquids into the dumpster or hose it out.

Floor Mat Cleaning

- Sweep the floor mats regularly, discarding the debris into the trash.
- Hose off the mats in a mop sink, at a floor drain, or in an outdoor area that can contain the water.

- Never hose the mats in an area where the wastewater can flow to the street, gutter or storm drain.

Washwater Disposal

- Dispose of washwater in a mop sink or an area with a floor drain.
- Never dispose of washwater in the street, gutter or storm drain.

PROJECT Pollution PREVENTION

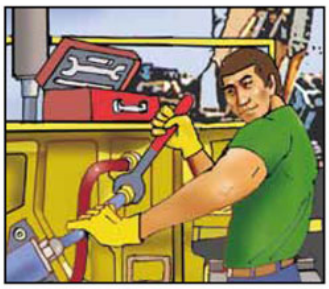
STORMWATER Pollution Prevention

ROADWORK AND PAVING

Asphalt, saw-cut slurry and excavated materials from road paving, surfacing and pavement removal 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.

Preventing Erosion
Schedule excavation and grading work during dry weather. Develop and implement erosion and sediment control plans for excavated embankments. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.

During Construction
Cover catch basins and maintenance holes when applying seal coat, slurry seal or fog seal. Use check dams, ditches or berms around excavations, and avoid over applying water for dust control. Never wash excess materials from exposed aggregate or concrete into the street, gutter or a storm drain.



Maintaining Vehicles & Equipment
Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids.

Asphalt & Concrete Removal
Barricade storm drain openings during saw-cutting, and recycle broken up pavement at a crushing company. For recycling information, call (909) 386-8401.

Cleaning & Preventing Spills
Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. Sweep up dry spills, instead of hosing. Prevent spills from paver machines by using drip pans, or by placing absorbent materials like cloths or rags under the machines when not in use. To report serious spills, call 911.

To report illegal dumping call

(877) WASTE18

sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

STORMWATER Pollution Prevention

FRESH CONCRETE & MORTAR APPLICATION

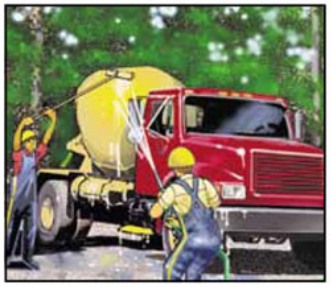
Cement wash, sediment, vehicle fluids, dust and hazardous debris from construction sites often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.

Storing Materials
Keep construction materials and debris away from the street, gutter and storm drains. Secure open bags of cement and cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.

Ordering Materials & Recycling Waste
Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. When breaking up paving, recycle the pieces at a crushing company. You can also recycle broken asphalt, concrete, wood, and cleared vegetation. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. Call (909) 386-8401 for recycling and disposal information.

During Construction
Schedule excavation and grading during dry weather. Prevent mortar and cement from entering the street and storm drains by placing erosion controls. Setup small mixers on tarps or drop cloths, for easy cleanup of debris. Never bury waste material. Recycle or dispose of it as hazardous waste.

Cleaning Up
Wash concrete dust onto designated dirt areas, not down driveways or into the street or storm drains. Wash out concrete mixers and equipment in specified washout areas, where water can flow into a containment pond. Cement washwater can be recycled by pumping it back into cement mixers for reuse. Never dispose of cement washout into driveways, streets, gutters, storm drains or drainage ditches.



To report illegal dumping call
(877) WASTE18
sbcountystormwater.org

STORMWATER Pollution Prevention

CONSTRUCTION

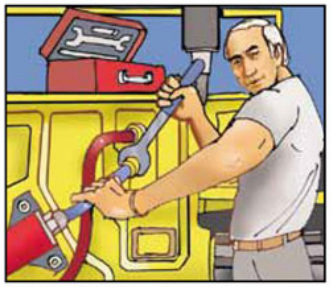
Cement wash, sediment, vehicle fluids, dust and hazardous debris from construction sites often make their way into the San Bernardino County storm drain system and do not get treated before reaching the Santa Ana River. This pollutes our drinking water and contaminates waterways, making them unsafe for people and wildlife. Follow these best management practices to prevent pollution and protect public health.

Store Materials Safely
Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.

Ordering Materials & Recycling Waste
Reduce waste by ordering only the amounts of materials needed for the job. Use recycled or recyclable materials whenever possible. You can recycle broken asphalt, concrete, wood, and cleared vegetation. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.

Cleaning & Preventing Spills
Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. To report serious spills, call 911.

Preventing Erosion
Avoid excavation or grading during wet weather. Plant temporary vegetation or add hydromulch on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff to a detention basin and around the construction site. Channels can be lined with grass or roughened pavement to reduce runoff velocity.



Maintaining Vehicles & Equipment
Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutter and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks, and prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids.

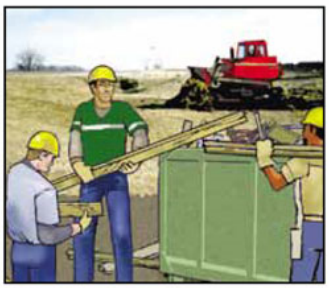
To report illegal dumping call
(877) WASTE18
sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

STORMWATER Pollution Prevention

EXCAVATION AND GRADING

Sediment, cement wash, asphalt and vehicle fluids from soil excavation and grading 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.



Recycling Waste

Recycle broken asphalt, concrete, wood, and cleared vegetation whenever possible. Non-recyclable materials should be taken to a landfill or disposed of as hazardous waste. For recycling and disposal information, call (909) 386-8401.

Maintaining Vehicles & Equipment

Maintain and refuel vehicles and equipment at a single location on-site, away from the street, gutters and storm drains. Perform major equipment repairs and washings off-site. Inspect vehicles and equipment frequently for leaks. Use gravel approaches where truck traffic is heavy to reduce soil compaction and limit the tracking of sediment into the street.

Cleaning & Preventing Spills

Use a drip pan and funnel when draining or pouring fluids. Sweep up dry spills, instead of hosing. Be ready for spills by preparing and using spill containment and cleanup kits that include safety equipment and dry cleanup materials such as kitty litter or sawdust. Prevent leaks from stored vehicles by draining gas, hydraulic oil, transmission, brake and radiator fluids. To report serious spills, call 911.

Storing Materials

Keep construction materials and debris away from the street, gutter and storm drains. Cover exposed stockpiles of soil, sand or gravel and excavated material with plastic sheeting, protected from rain, wind and runoff.

Preventing Erosion

Avoid excavation or grading during wet weather. Plant temporary vegetation on slopes where construction is not immediately planned, and permanent vegetation once excavation and grading are complete. Construct diversion dikes to channel runoff. Channels can be lined with grass or roughened pavement to reduce runoff velocity.

To report illegal dumping call

(877) WASTE18

sbcountystormwater.org

San Bernardino County STORMWATER PROGRAM

IC22. EATING AND DRINKING ESTABLISHMENTS

Best Management Practices (BMPs)

A BMP is a technique, measure or structural control that is used for a given set of conditions to improve the quality of the stormwater runoff in a cost effective manner[1]. The minimum required BMPs for this activity are outlined in the box to the right. Implementation of pollution prevention/good housekeeping measures may reduce or eliminate the need to implement other more costly or complicated procedures. Proper employee training is key to the success of BMP implementation.

MINIMUM BEST MANAGEMENT PRACTICES

Pollution Prevention/Good Housekeeping

- Use dry cleaning methods instead of water
- Clean equipment (floor mats, grease filters, grills, garbage cans, etc.) indoors or in a covered outdoor wash area that is plumbed to the sanitary sewer or in an area that will contain the wash water (Refer to fact sheet *IC24 Wastewater Disposal* for guidance on appropriate methods for disposal of wash water to the sanitary sewer).
- Recycle and/or properly dispose of grease and oil.
- Block the storm drain when hosing or steam/pressure washing outside dumpster areas, sidewalks, and common areas.

Stencil storm drains

Training

- Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.

The BMPs outlined in this fact sheet target the following pollutants:

Targeted Constituents	
Sediment	
Nutrients	x
Floatable Materials	x
Metals	
Bacteria	x
Oil & Grease	x
Organics & Toxicants	x
Pesticides	x
Oxygen Demanding	x

Provided below are specific procedures associated with each of the minimum BMPs along with procedures for additional BMPs that should be considered if this activity takes place at a facility located near a sensitive waterbody. In order to meet the requirements for medium and high priority facilities, the owners/operators must select, install and maintain appropriate BMPs on site. Since the selection of the appropriate BMPs is a site-specific process, the types and numbers of additional BMPs will vary for each facility.

1. Practice good housekeeping.
    - Conduct regular sweeping or vacuuming of outdoor areas: Dry sweep pavement areas including "drive-thru" areas, parking lots, sidewalks, outdoor eating areas and dumpster storage areas frequently.
    - Keep outside areas free of trash & debris.
    - Do not hose out dumpsters or fill them with liquid waste.
    - Regularly inspect, repair, and/or replace dumpsters.
2. Clean equipment (floor mats, grease filters, grills, garbage cans, etc.) indoors or in a covered outdoor wash area that is plumbed to the sanitary sewer.
    - Clean equipment in a mop sink if possible (never in a food preparation sink). If there is no mop sink, dedicate an indoor cleaning area where a drain is plumbed to the sanitary sewer.
    - Dispose mop water from cleaning floors in a mop sink, toilet or other drain that is plumbed to the sanitary sewer. Refer to fact sheet *IC24 Wastewater Disposal* for guidance on appropriate methods for disposal of wash water to the sanitary sewer.
    - Do not pour wash water outside or into a street, gutter, or storm drain.

[1] EPA " *Preliminary Data Summary of Urban Stormwater Best Management Practices"*

- Dispose of all wastewater containing oil and grease in a grease trap or interceptor.

3. Recycle and/or properly dispose of grease and oil. Collect and dispose of concentrated waste oil and grease and disposed of by a certified waste grease hauler. NEVER pour grease or oil into a sink, floor drain, storm drain or dumpster.
4. Block storm drain(s) when cleaning (hosing or steam/pressure washing) outside dumpster areas, sidewalks, and common areas with hot water, soap, or other cleaning agent. Collect water/waste and discharge to the sanitary sewer (with approval of the local sanitation district).

Training

1. Train employees on these BMPs, storm water discharge prohibitions, and wastewater discharge requirements.
2. Train employees on proper spill containment and cleanup.
    - Establish training that provides employees with the proper tools and knowledge to immediately begin cleaning up a spill.
    - Ensure that employees are familiar with the site's spill control plan and/or proper spill cleanup procedures.
    - Fact sheet IC17 discusses Spill Prevention and Control in detail.
3. Establish a regular training schedule, train all new employees, and conduct annual refresher training.
4. Use a training log or similar method to document training.

Stencil storm drains

Storm drain system signs act as highly visible source controls that are typically stenciled directly adjacent to storm drain inlets. Stencils should read "No Dumping Drains to Ocean".

References

California Storm Water Best Management Practice Handbook. Industrial and Commercial. 2003. www.cabmphandbooks.com

Carlsbad Jurisdictional Urban Runoff Management Plan. Best Management Practices for Restaurants. City of Carlsbad. February 2002. On-line: http://www.ci.carlsbad.ca.us/cserv/jurmp.html

Orange County Stormwater Program. 2001. Water Quality Guidelines for Exterior Restaurant Cleaning Operations. Brochure. June.

Orange County Stormwater Program. Good Cleaning Practices Food & Restaurant Industry. Poster. Courtesy of the City and County of LA.

For additional information contact:

County of Orange/ OC Watersheds
Main: (714) 955-0600
24 hr Water Pollution Hotline: 1-877-89-SPILL
or visit our website at www.ocwatersheds.com

LANDSCAPE MAINTENANCE

DISCHARGE TO THE STORM DRAIN, ACCIDENTAL OR NOT, COULD LEAD TO ENFORCEMENT ACTIONS, WHICH COULD INCLUDE FINES.

Follow the best practices below to **prevent water pollution from landscaping activities.**

RECYCLE YARD WASTE

- Recycle leaves, grass clippings and other yard waste.
- Do not blow, sweep, rake or hose yard waste into the street or catch basin.
- **Try grasscycling:** the natural recycling of grass by leaving clippings on the lawn when mowing.

  For more information, please visit: **www.calrecycle.ca.gov/organics/grasscycling**

USE FERTILIZERS, HERBICIDES AND PESTICIDES SAFELY

- Fertilizers, herbicides and pesticides are often carried into the storm drain system by sprinkler runoff. Use natural and non-toxic alternatives as often as possible.
- If you must use chemical fertilizers, herbicides or pesticides:
  - Spot apply, rather than blanketing entire areas.
  - Avoid applying near curbs and driveways, and **never** before a rain.
  - Apply fertilizers as needed: when plants could best use it and when the potential runoff would be low.
  - Follow the manufacturer's instructions carefully—this will not only give the best results, but will save money.

USE WATER WISELY

- Control the amount of water and direction of sprinklers. Sprinklers should only be on long enough to allow water to soak into the ground, but not so long as to cause runoff.
- Periodically inspect, fix leaks and realign sprinkler heads.
- Plant native vegetation to reduce the need of water, fertilizers, herbicides and pesticides.

HOMEOWNERS

KEEP THESE TIPS IN MIND WHEN HIRING PROFESSIONAL LANDSCAPERS AND REMIND AS NECESSARY.

Leftover pesticides, fertilizers, and herbicides contaminate landfills and should be disposed of through a Hazardous Waste Facility.

For more information on proper disposal call,

(909) 382-5401 or 1-800-OILY CAT.

*FREE for San Bernardino County residents only. Businesses can call for cost inquiries and to schedule an appointment.

To report illegal dumping, call (877) WASTE18 or visit sbcountystormwater.org
To report toxic spills, call 1(800) 33 TOXIC
To dispose of hazardous waste, call 1(800) OILY CAT

sbcountystormwater.org

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Redlands • Rialto • San Bernardino • San Bernardino County • San Bernardino County Flood Control District • Upland • Yucaipa

Preventing water pollution at your commercial/industrial site

Clean beaches and healthy creeks, rivers, bays and ocean are important to Orange County. However, many landscape and building maintenance activities can lead to water pollution if you're not careful. Paint, chemicals, plant clippings and other materials can be blown or washed into storm drains that flow to the ocean. Unlike water in sanitary sewers (from sinks and toilets), water in storm drains is not treated before entering our waterways.

You would never pour soap or fertilizers into the ocean, so why would you let them enter the storm drains? Follow these easy tips to help prevent water pollution.

Some types of industrial facilities are required to obtain coverage under the State General Industrial Permit. For more information visit: **www.swrcb.ca.gov/stormwater/industrial.html**

For more information, please call the **Orange County Stormwater Program** at **1-877-89-SPILL** (1-877-897-7455) or visit **www.ocwatersheds.com**

To report a spill, call the **Orange County 24-Hour Water Pollution Problem Reporting Hotline** at **1-877-89-SPILL** (1-877-897-7455).

For emergencies, dial 911.

RECYCLE USED OIL

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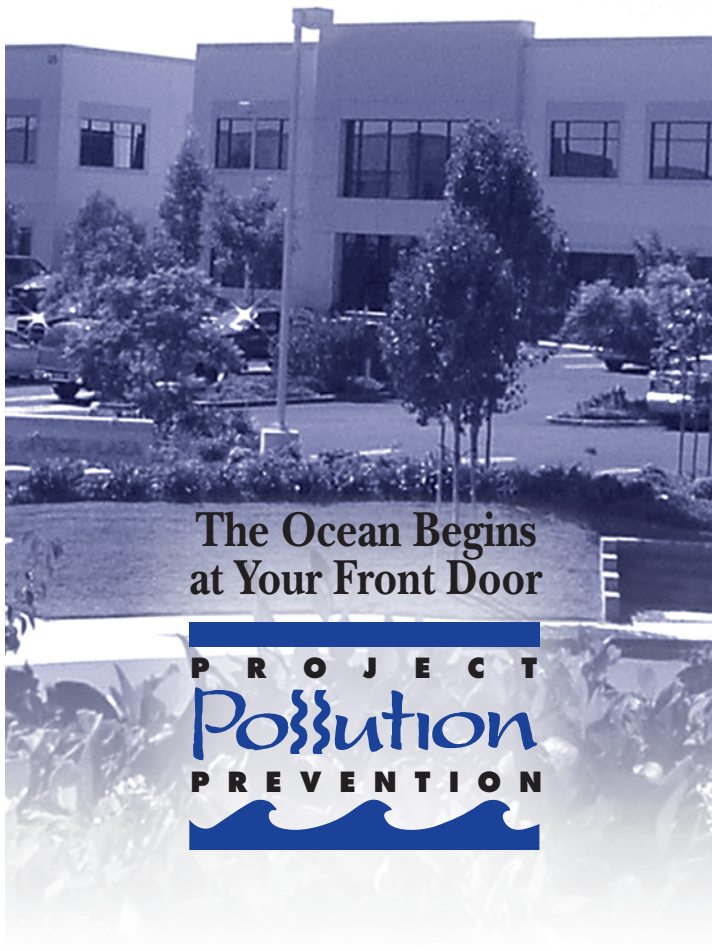
Help Prevent Ocean Pollution:

Proper Maintenance Practices for Your Business



The Ocean Begins at Your Front Door

PROJECT Pollution PREVENTION

Proper Maintenance Practices for your Business

Landscape Maintenance

- Compost grass clippings, leaves, sticks and other vegetation, or dispose of it at a permitted landfill or in green waste containers. Do not dispose of these materials in the street, gutter or storm drain.
- Irrigate slowly and inspect the system for leaks, overspraying and runoff. Adjust automatic timers to avoid overwatering.
- Follow label directions for the use and disposal of fertilizers and pesticides.
- Do not apply pesticides or fertilizers if rain is expected within 48 hours or if wind speeds are above 5 mph.
- Do not spray pesticides within 100 feet of waterways.
- Fertilizers should be worked into the soil rather than dumped onto the surface.
- If fertilizer is spilled on the pavement or sidewalk, sweep it up immediately and place it back in the container.

Building Maintenance

- Never allow washwater, sweepings or sediment to enter the storm drain.
- Sweep up dry spills and use cat litter, towels or similar materials to absorb wet spills. Dispose of it in the trash.
- If you wash your building, sidewalk or parking lot, you **must** contain the water. Use a shop vac to collect the water and contact your city or sanitation agency for proper disposal information. Do not let water enter the street, gutter or storm drain.
- Use drop cloths underneath outdoor painting, scraping, and sandblasting work, and properly dispose of materials in the trash.
- Use a ground cloth or oversized tub for mixing paint and cleaning tools.
- Use a damp mop or broom to clean floors.
- Cover dumpsters to keep insects, animals, rainwater and sand from entering. Keep the area around the dumpster clear of trash and debris. Do not overfill the dumpster.
- Call your trash hauler to replace leaking dumpsters.
- Do not dump any toxic substance or liquid waste on the pavement, the ground, or near a storm drain. Even materials that seem harmless such as latex paint or biodegradable cleaners can damage the environment.

Never Dispose of Anything in the Storm Drain.

- Recycle paints, solvents and other materials. For more information about recycling and collection centers, visit **www.oclandfills.com**.
- Store materials indoors or under cover and away from storm drains.
- Use a construction and demolition recycling company to recycle lumber, paper, cardboard, metals, masonry, carpet, plastic, pipes, drywall, rocks, dirt, and green waste. For a listing of construction and demolition recycling locations in your area, visit **www.ciwmb.ca.gov/recycle.**
- Properly label materials. Familiarize employees with Material Safety Data Sheets.

PROJECT Pollution PREVENTION

COMMERCIAL TRASH ENCLOSURES

FOLLOW THESE **REQUIREMENTS** TO **KEEP OUR WATERWAYS CLEAN**

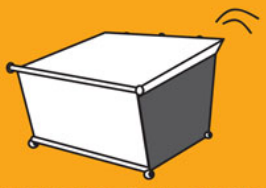
Trash enclosures, such as those found in commercial and apartment complexes, typically contain materials that are intended to find their way to a landfill or a recycling facility. **These materials are NOT meant to go into our local lakes and rivers.**

PROTECT WATER QUALITY BY FOLLOWING THESE SIMPLE STEPS

PUT TRASH INSIDE

Place trash inside the bin (preferably in sealed bags)

CLOSE THE LID



Prevent rain from entering the bin in order to avoid leakage of polluted water runoff

KEEP TOXICS OUT

- Paint
- Grease, fats and used oils
- Batteries, electronics and fluorescent lights

SOME ADDITIONAL GUIDELINES, INCLUDE

✓ SWEEP FREQUENTLY
Sweep trash enclosure areas frequently, instead of hosing them down, to prevent polluted water from flowing into the streets and storm drains.

✓ FIX LEAKS
Address trash bin leaks immediately by using dry clean up methods and report to your waste hauler to receive a replacement.

✓ CONSTRUCT ROOF
Construct a solid cover roof over the existing trash enclosure structure to prevent rainwater from coming into contact with trash and garbage. Check with your local City/County for Building Codes.

In San Bernardino County, stormwater pollution is caused by food waste, landscape waste, chemicals and other debris that are washed into storm drains and end up in our waterways - untreated! You can be part of the solution by maintaining a water-friendly trash enclosure.

THANK YOU FOR HELPING TO KEEP SAN BERNARDINO COUNTY CLEAN AND HEALTHY!

To report illegal dumping **(877-WASTE18)** or
to find a household hazardous waste facility (800-OILY CAT): **sbcountystormwater.org**
To dispose of hazardous waste call the San Bernardino County Fire Dept. - CUPA Program **(909) 386-8401**

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Redlands • Rialto • San Bernardino • San Bernardino County • San Bernardino County Flood Control District • Upland • Yucaipa

6.5 Activity Restriction – C, C&R's & Lease Agreements

N/A - THIS SECTION WAS INTENTIONALLY LEFT BLANK

6.6 BMP Fact Sheets

Site Design & Landscape Planning SD-10

Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

CASQA
CALIFORNIA STORMWATER QUALITY ASSOCIATION

Designing New Installations

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

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

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

Conserve Natural Areas during Landscape Planning

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

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

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

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

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

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

Protection of Slopes and Channels during Landscape Design

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

Redeveloping Existing Installations

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

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

Other Resources

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

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

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

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

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

Roof Runoff Controls SD-11

Rain Garden

Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

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

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

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

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

Dry wells and Infiltration Trenches

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

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

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

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

Pop-up Drainage Emitter

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

Foundation Planting

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

Redeveloping Existing Installations

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

Supplemental Information

Examples

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

Other Resources

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

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

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

Efficient Irrigation SD-12

Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

Designing New Installations

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

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

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

Redeveloping Existing Installations

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

Other Resources

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

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

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

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

Trash Storage Areas SD-32

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.

Design Objectives

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

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.

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- 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.

Infiltration Basin TC-11

Design Considerations

- Soil for Infiltration
- Slope
- Aesthetics

Targeted Constituents

☑	Sediment	■
☑	Nutrients	■
☑	Trash	■
☑	Metals	■
☑	Bacteria	■
☑	Oil and Grease	■
☑	Organics	■

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

Description

An infiltration basin is a shallow impoundment that is designed to infiltrate stormwater. Infiltration basins use the natural filtering ability of the soil to remove pollutants in stormwater runoff. Infiltration facilities store runoff until it gradually exfiltrates through the soil and eventually into the water table. This practice has high pollutant removal efficiency and can also help recharge groundwater, thus helping to maintain low flows in stream systems. Infiltration basins can be challenging to apply on many sites, however, because of soils requirements. In addition, some studies have shown relatively high failure rates compared with other management practices.

California Experience

Infiltration basins have a long history of use in California, especially in the Central Valley. Basins located in Fresno were among those initially evaluated in the National Urban Runoff Program and were found to be effective at reducing the volume of runoff, while posing little long-term threat to groundwater quality (EPA, 1983; Schroeder, 1995). Proper siting of these devices is crucial as underscored by the experience of Caltrans in siting two basins in Southern California. The basin with marginal separation from groundwater and soil permeability failed immediately and could never be rehabilitated.

Advantages

- Provides 100% reduction in the load discharged to surface waters.
- The principal benefit of infiltration basins is the approximation of pre-development hydrology during which a

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significant portion of the average annual rainfall runoff is infiltrated and evaporated rather than flushed directly to creeks.

- If the water quality volume is adequately sized, infiltration basins can be useful for providing control of channel forming (erosion) and high frequency (generally less than the 2-year) flood events.

Limitations

- May not be appropriate for industrial sites or locations where spills may occur.
- Infiltration basins require a minimum soil infiltration rate of 0.5 inches/hour, not appropriate at sites with Hydrologic Soil Types C and D.
- If infiltration rates exceed 2.4 inches/hour, then the runoff should be fully treated prior to infiltration to protect groundwater quality.
- Not suitable on fill sites or steep slopes.
- Risk of groundwater contamination in very coarse soils.
- Upstream drainage area must be completely stabilized before construction.
- Difficult to restore functioning of infiltration basins once clogged.

Design and Sizing Guidelines

- Water quality volume determined by local requirements or sized so that 85% of the annual runoff volume is captured.
- Basin sized so that the entire water quality volume is infiltrated within 48 hours.
- Vegetation establishment on the basin floor may help reduce the clogging rate.

Construction/Inspection Considerations

- Before construction begins, stabilize the entire area draining to the facility. If impossible, place a diversion berm around the perimeter of the infiltration site to prevent sediment entrance during construction or remove the top 2 inches of soil after the site is stabililized. Stabilize the entire contributing drainage area, including the side slopes, before allowing any runoff to enter once construction is complete.
- Place excavated material such that it can not be washed back into the basin if a storm occurs during construction of the facility.
- Build the basin without driving heavy equipment over the infiltration surface. Any equipment driven on the surface should have extra-wide (“low pressure”) tires. Prior to any construction, rope off the infiltration area to stop entrance by unwanted equipment.
- After final grading, till the infiltration surface deeply.
- Use appropriate erosion control seed mix for the specific project and location.

Performance

As water migrates through porous soil and rock, pollutant attenuation mechanisms include precipitation, sorption, physical filtration, and bacterial degradation. If functioning properly, this approach is presumed to have high removal efficiencies for particulate pollutants and moderate removal of soluble pollutants. Actual pollutant removal in the subsurface would be expected to vary depending upon site-specific soil types. This technology eliminates discharge to surface waters except for the very largest storms; consequently, complete removal of all stormwater constituents can be assumed.

There remain some concerns about the potential for groundwater contamination despite the findings of the NURP and Nightingale (1975; 1987a,b,c; 1989). For instance, a report by Pitt et al. (1994) highlighted the potential for groundwater contamination from intentional and unintentional stormwater infiltration. That report recommends that infiltration facilities not be sited in areas where high concentrations are present or where there is a potential for spills of toxic material. Conversely, Schroeder (1995) reported that there was no evidence of groundwater impacts from an infiltration basin serving a large industrial catchment in Fresno, CA.

Siting Criteria

The key element in siting infiltration basins is identifying sites with appropriate soil and hydrogeologic properties, which is critical for long term performance. In one study conducted in Prince George's County, Maryland (Galli, 1992), all of the infiltration basins investigated clogged within 2 years. It is believed that these failures were for the most part due to allowing infiltration at sites with rates of less than 0.5 in/hr, basing siting on soil type rather than field infiltration tests, and poor construction practices that resulted in soil compaction of the basin invert.

A study of 23 infiltration basins in the Pacific Northwest showed better long-term performance in an area with highly permeable soils (Hilding, 1996). In this study, few of the infiltration basins had failed after 10 years. Consequently, the following guidelines for identifying appropriate soil and subsurface conditions should be rigorously adhered to.

- Determine soil type (consider RCS soil type ‘A, B or C’ only) from mapping and consult USDA soil survey tables to review other parameters such as the amount of silt and clay, presence of a restrictive layer or seasonal high water table, and estimated permeability. The soil should not have more than 30% clay or more than 40% of clay and silt combined. Eliminate sites that are clearly unsuitable for infiltration.

- Groundwater separation should be at least 3 m from the basin invert to the measured ground water elevation. There is concern at the state and regional levels of the impact on groundwater quality from infiltrated runoff, especially when the separation between groundwater and the surface is small.

- Location away from buildings, slopes and highway pavement (greater than 6 m) and wells and bridge structures (greater than 30 m). Sites constructed of fill, having a base flow or with a slope greater than 15% should not be considered.

- Ensure that adequate head is available to operate flow splitter structures (to allow the basin to be offline) without ponding in the splitter structure or creating backwater upstream of the splitter.

- Base flow should not be present in the tributary watershed.

Secondary Screening Based on Site Geotechnical Investigation

- At least three in-hole conductivity tests shall be performed using USBR 7300-89 or Bouwer-Rice procedures (the latter if groundwater is encountered within the boring), two tests at different locations within the proposed basin and the third down gradient by no more than approximately 10 m. The tests shall measure permeability in the side slopes and the bed within a depth of 3 m of the invert.

- The minimum acceptable hydraulic conductivity as measured in any of the three required test holes is 13 mm/hr. If any test hole shows less than the minimum value, the site should be disqualified from further consideration.

- Exclude from consideration sites constructed in fill or partially in fill unless no silts or clays are present in the soil boring. Fill tends to be compacted, with clays in a dispersed rather than flocculated state, greatly reducing permeability.

- The geotechnical investigation should be such that a good understanding is gained as to how the stormwater runoff will move in the soil (horizontally or vertically) and if there are any geological conditions that could inhibit the movement of water.

Additional Design Guidelines

(1) Basin Sizing - The required water quality volume is determined by local regulations or sufficient to capture 85% of the annual runoff.

(2) Provide pretreatment if sediment loading is a maintenance concern for the basin.

(3) Include energy dissipation in the inlet design for the basins. Avoid designs that include a permanent pool to reduce opportunity for standing water and associated vector problems.

(4) Basin invert area should be determined by the equation:

$$A = \frac{WQV}{kt}$$

where A = Basin invert area (m^2)

WQV = water quality volume (m^3)

k = 0.5 times the lowest field-measured hydraulic conductivity (m/hr)

t = drawdown time (48 hr)

(5) The use of vertical piping, either for distribution or infiltration enhancement shall not be allowed to avoid device classification as a Class V injection well per 40 CFR146.5(e)(4).

Maintenance

Regular maintenance is critical to the successful operation of infiltration basins. Recommended operation and maintenance guidelines include:

- Inspections and maintenance to ensure that water infiltrates into the subsurface completely (recommended infiltration rate of 72 hours or less) and that vegetation is carefully managed to prevent creating mosquito and other vector habitats.
- Observe drain time for the design storm after completion or modification of the facility to confirm that the desired drain time has been obtained.
- Schedule semiannual inspections for beginning and end of the wet season to identify potential problems such as erosion of the basin side slopes and invert, standing water, trash and debris, and sediment accumulation.
- Remove accumulated trash and debris in the basin at the start and end of the wet season.
- Inspect for standing water at the end of the wet season.
- Trim vegetation at the beginning and end of the wet season to prevent establishment of woody vegetation and for aesthetic and vector reasons.
- Remove accumulated sediment and regrade when the accumulated sediment volume exceeds 10% of the basin.
- If erosion is occurring within the basin, revegetate immediately and stabilize with an erosion control mulch or mat until vegetation cover is established.
- To avoid reversing soil development, scarification or other disturbance should only be performed when there are actual signs of clogging, rather than on a routine basis. Always remove deposited sediments before scarification, and use a hand-guided rotary tiller, if possible, or a disc harrow pulled by a very light tractor.

Cost

Infiltration basins are relatively cost-effective practices because little infrastructure is needed when constructing them. One study estimated the total construction cost at about $2 per ft (adjusted for inflation) of storage for a 0.25-acre basin (SWRPC, 1991). As with other BMPs, these published cost estimates may deviate greatly from what might be incurred at a specific site. For instance, Caltrans spent about $18/ft^3 for the two infiltration basins constructed in southern California, each of which had a water quality volume of about 0.34 ac.-ft. Much of the higher cost can be attributed to changes in the storm drain system necessary to route the runoff to the basin locations.

Infiltration basins typically consume about 2 to 3% of the site draining to them, which is relatively small. Additional space may be required for buffer, landscaping, access road, and fencing. Maintenance costs are estimated at 5 to 10% of construction costs.

One cost concern associated with infiltration practices is the maintenance burden and longevity. If improperly maintained, infiltration basins have a high failure rate. Thus, it may be necessary to replace the basin with a different technology after a relatively short period of time.

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Information Resources

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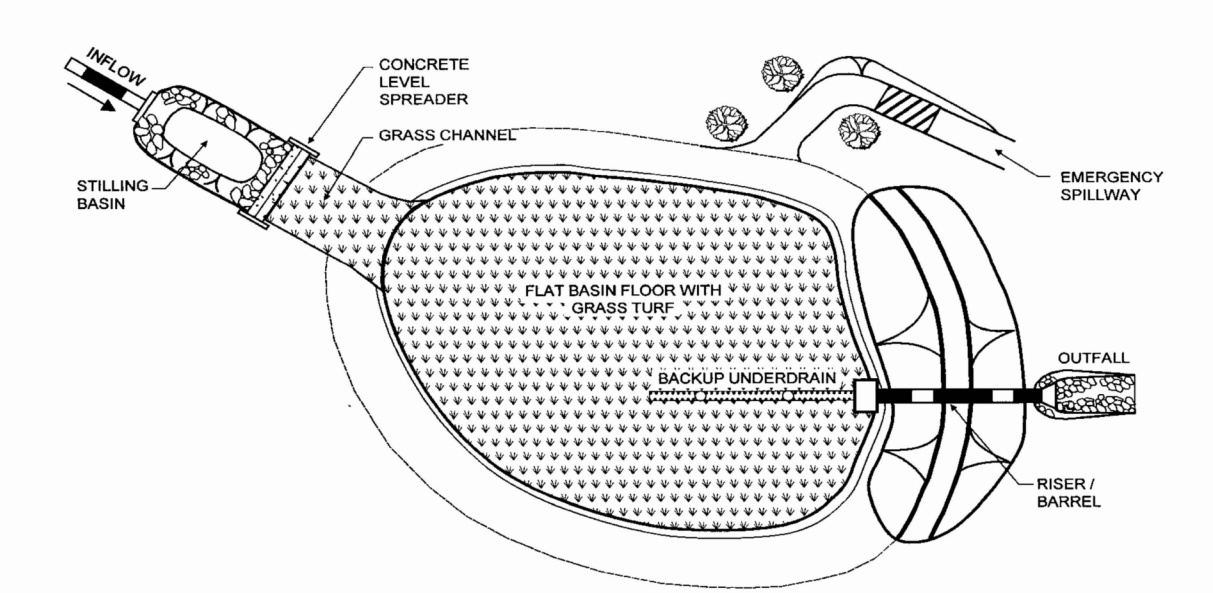
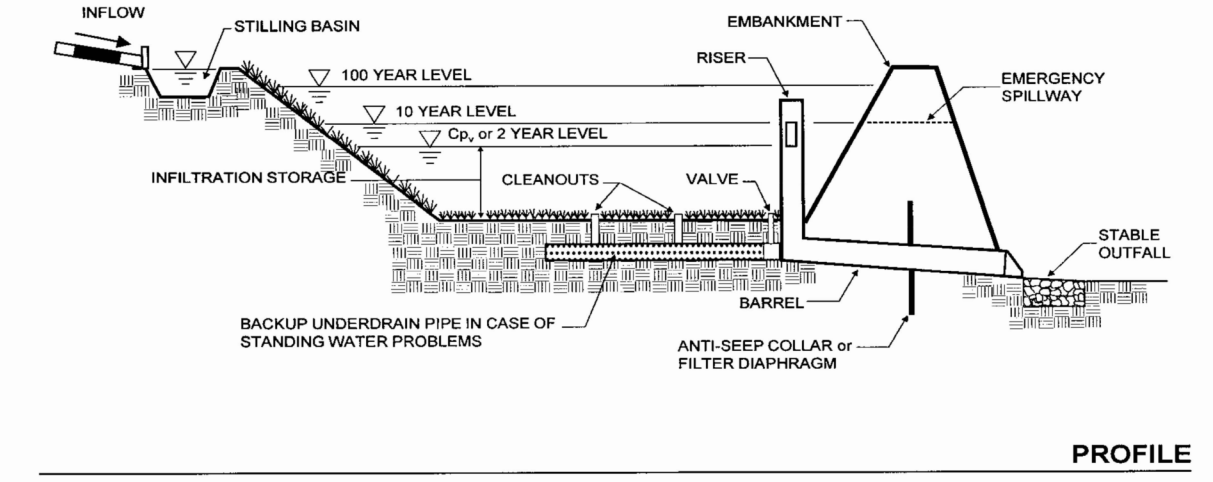


PLAN VIEW



PROFILE

State Water Resources Control Board

Certified Trash Full Capture Systems Available to the Public
(Updated October 13, 2022)

Trash Provisions

To qualify as a trash full capture system (System) as described below and satisfy the requirements of the Trash Provisions,[1] a System installed after December 2, 2015, must be certified, prior to installation, by the State Water Resources Control Board (State Water Board) Executive Director, or designee, that meets the full capture system definition. The Trash Provisions define a full capture system as a treatment control, or series of treatment controls, including but not limited to, a multi-benefit project or a low impact development control that traps all particles that are 5-millimeter or greater, and has a design treatment capacity that is either:

1. Of not less than the peak flow rate resulting from a one-year, one-hour storm event (design storm) in the subdrainage area, or

2. Appropriately sized and designed to carry at least the same flows as the corresponding storm drain.

Consistent with these requirements, the Systems shall not bypass trash below the design storm under maximum operational loading conditions and shall not have a diversion structure present upstream such that a portion of the peak flow is not treated to trap all particles 5-millimeter or greater.

Vector Control Accessibility

According to the California Health and Safety Code,[2] California landowners are legally responsible to abate (eliminate the source of) a public nuisance arising from their property, including mosquitoes. Mosquito vector control districts have substantial authority to access public and private property, inspect known or suspected sources of

[1] Amendment to the Water Quality Control Plan for Ocean Waters of California to Control Trash and Part 1 Trash Provisions of the Water Quality Control Plan for Inland Surface Waters, Enclosed Bays, and Estuaries of California adopted by the State Water Board.

[2] Health & Safety Code sections 2001-2002, 2060-2067, 100170, and 131075.

mosquitoes, abate mosquito sources, and charge the landowner for work performed and/or charge fees if a landowner is unwilling or unable to address a mosquito source arising from their property.

If not designed properly, a System may impede the mosquito vector control district's ability to (1) visually inspect the System and/or storm vault for mosquito breeding, and (2) apply the appropriate chemical treatment. Moreover, some Systems may create a habitat for mosquitoes.

All the Systems in the tables below have been reviewed and approved by the Mosquito Vector Control Association of California for vector control accessibility. However, prior to installation of any Systems, the local mosquito vector control district should be contacted to ensure the installation conforms to the local district's visual inspection, treatment, and vector breeding minimizing guidelines. The Mosquito Vector Control Association of California may also be contacted via email at Trashtreatment@mvcac.org.

Certified Trash Full Capture System Tables

The Systems included in the tables below are: 1) new Systems certified by the State Water Board Executive Director after adoption of the Trash Provisions, and 2) legacy Systems that were certified pursuant to the Trash Provisions include those full capture systems that were listed in Appendix I of the Bay Area-wide Trash Capture Demonstration Project, Final Project Report (May 8, 2014). All Systems remain certified unless and until they are decertified by the State Water Board's Executive Director or designee. Legacy Systems' descriptions are included in "fact sheets" that have been updated to address the application requirements for new Systems.

The tables do not include the Department of Transportation's Systems as its Systems are not available to the public. Multi-benefit trash treatment systems are listed separately on the State Water Board's Trash Implementation webpage at: https://www.waterboards.ca.gov/water_issues/programs/stormwater/trash_implementation.html.

Systems are either identified by their application number or, for legacy Systems, by a fact sheet alpha numeric designation.

Please note: Only Systems originally manufactured or distributed by the listed applicants are certified full capture systems.

The alphabetical tables of System applicants are divided into two categories:

- *Catch Basin Inserts and Other Insert Systems.* These Systems typically are inserted into existing stormwater infrastructure; and

- *High Flow Capacity Trash Full Capture Systems*. These Systems are generally self-contained units that typically are not inserted into existing stormwater infrastructure and that are designed to treat trash from large drainage areas.

How to Access Certified System Applications and Legacy System Fact Sheets

Other than those applications pertaining to the Department of Transportation's certified Systems, all certified System applications and legacy System fact sheets may be obtained from the California Stormwater Quality Association's trash webpage at: https://www.casqa.org/resources/trash/certified-full-capture-system-trash-treatment-control-devices. To obtain the Department of Transportation's certified applications, please contact Leo Cosentini (contact information below).

All questions concerning the Trash Provisions and the tables below should be directed to Leo Cosentini by email at Leo.Cosentini@waterboards.ca.gov or by phone at (916) 341-5524.

Certified Trash Full Capture Systems Available to the Public

TABLE 1. Catch Basin Inserts and Other Insert Systems

Applicant/Owner	Full Capture System Name	Date of Application Certification and Update (if applicable), or Fact Sheet Update	Date of Vector Control Accessibility Approval
AbTech Industries, Inc.	Ultra Urban Filter Curb Opening and Drop-In	Application 25 06/30/20	04/8/20
Advanced Drainage Systems, Inc.	FLEXSTORM PURE Full Trash Capture Inserts	Application 3 03/15/18 Updated 04/21/21	03/30/21
Advanced Drainage Systems, Inc.	FLEXSTORM Connector Pipe Screen	Fact Sheet ADS-1 Updated 06/08/21	03/30/21
Bio Clean® Environmental Services, Inc.	Curb Inlet and Grate Inlet Filters	Application 4 03/15/18 Updated 10/21/21	10/20/21
Bio Clean® Environmental Services, Inc.	Modular Connector Pipe Trash Screen	Fact Sheet BC-3 Updated 04/30/20	03/10/20
BrightWater™	Connector Pipe Screen	Application 29 03/15/18 Updated 12/29/20	11/19/20
BrightWater™	Curb Inlet Filter	Application 26 06/30/20	04/17/20

Certified Trash Full Capture Systems Available to the Public

Applicant/Owner	Full Capture System Name	Date of Application Certification and Update (if applicable), or Fact Sheet Update	Date of Vector Control Accessibility Approval
Ecology Control Industries	Debris Dam - Catch Basin Insert for Curb Inlet Design	Fact Sheet ECI-1 12/02/15 Updated 06/17/20	04/29/20
Enviropod® International: A Stormwater 360 Group Company	Enviropod® LittaTrap™ Full Capture	Application 27 10/14/20	07/20/20
Fabco Industries, Inc.	Fabco Connector Pipe Screen	Application 36 07/06/22	06/16/22
Fabco Industries, Inc.	Fabco ScreenBox	Application 37 10/13/22	10/05/22
Fabco Industries, Inc.	Fabco StormBasin	Application 38 10/13/22	10/05/22
Fabco Industries, Inc.	Fabco StormSack	Application 39 10/13/22	10/05/22
Filtrexx® Sustainable Technologies	StormExx® Clean	Application 16 08/10/18 Updated 11/25/19	12/06/19

Certified Trash Full Capture Systems Available to the Public

Applicant/Owner	Full Capture System Name	Date of Application Certification and Update (if applicable), or Fact Sheet Update	Date of Vector Control Accessibility Approval
Frog Creek Partners, LLC	Gutter Bin® Channel Filtration System and Mundus Bag® Water Filter	Application 22 06/26/19	04/19/19
Frog Creek Partners, LLC	Gutter Bin® Eco Curb Inlet Filter and Mundus Bag® Water Filter	Application 23 02/18/19	10/14/19
Frog Creek Partners, LLC	Gutter Bin® Eco Drop Inlet Filter and Mundus Bag® Water Filter	Application 24 02/18/20	12/06/19
G2 Construction, Inc.	G2 CPS-Mod™ and Removable CPS-Mod™ Screen	Application 18 06/26/19	03/15/19
G2 Construction, Inc.	G2 Grated Inlet Trash Screen	Application 19 06/26/19	04/10/19
Inventive Resources, Inc.	Water Decontaminator	Application 2 03/15/18 Updated 02/05/21	04/20/20
Oldcastle Infrastructure	FloGard® + Plus® Catchbasin Trash Screen Insert, Combination Inlet Style Drop in Basket	Fact Sheet OI-1 12/02/15 Updated 06/09/21	06/09/21
Oldcastle Infrastructure	FloGard® Catchbasin Trash Screen Insert, Flat Grated Inlet Style Drop in Basket	Fact Sheet OI-2 12/02/15 Updated 06/09/21	06/09/21

Certified Trash Full Capture Systems Available to the Public

Applicant/Owner	Full Capture System Name	Date of Application Certification and Update (if applicable), or Fact Sheet Update	Date of Vector Control Accessibility Approval
Oldcastle Infrastructure	FloGard® Catchbasin Outlet Trash Screen Insert Connector Pipe Screen	Fact Sheet OI-3 Updated 01/29/19	12/06/19
Revel Environmental Manufacturing, Inc.	Triton™ Bioflex Inlet Trash Guard Catchbasin Polyester Fiber Mesh Trash Filter Insert	Fact Sheet REM-1 12/02/15 Updated 09/10/21	09/07/21
Revel Environmental Manufacturing, Inc.	Triton™ Crescent Pipe Screen	Application 12 07/10/18	03/15/19
Revel Environmental Manufacturing, Inc.	Triton™ Perf-Full Trash Capture Insert	Application 13 07/10/18 Updated 12/21/21	12/20/21
Safe Drain Stormwater Holdings, Inc.	Storm Vector Guard	Application 30 02/11/21	12/17/20
Stormtek	Stormtek ST3 & STEG Catchbasin Connector Pipe	Fact Sheet AS-1, A1S-2 12/02/15 Updated 08/12/21	08/04/21
United Stormwater, Inc.	Connector Pipe Trash Screen	Fact Sheet USW-1 12/02/15 Updated 01/29/22	01/26/22

TABLE 2. High Flow Capacity Trash Full Capture Systems

Applicant/Owner	Full Capture System Name	Date of Application Certification and Update (if applicable), or Fact Sheet Update	Date of Vector Control Accessibility Approval
Advanced Drainage Systems, Inc.	Barracuda Hydrodynamic Separator	Application 21 06/26/19 Updated 05/21/21	03/15/19
AquaShield, Inc.	Aqua-Swirl® Stormwater Treatment System	Application 1 08/04/17 Updated 11/06/20	12/03/20
Bio Clean® Environmental Services, Inc.	Debris Separating Baffle Box	Application 6 03/15/18	07/28/20
Bio Clean® Environmental Services, Inc.	Bio Clean® Deflective Screening Device	Application 20 06/26/19	07/28/20
Bio Clean® Environmental Services, Inc.	Modular Wetland System®	Application 15 07/10/18	03/15/19
Coanda Inc.	Coanda Trash Screen and Debris Fence	Fact Sheet COA-1 12/02/15 Updated 09/10/21	09/07/21

Certified Trash Full Capture Systems Available to the Public

Applicant/Owner	Full Capture System Name	Date of Application Certification and Update (if applicable), or Fact Sheet Update	Date of Vector Control Accessibility Approval
Contech Engineered Solutions	Continuous Deflective Separator Hydrodynamic Separator	Fact Sheet CCP-1HF 12/02/15 Updated 05/27/21	04/29/21
Jensen® Stormwater Systems	Jensen® Deflective Separators	Application 5 03/15/18	12/06/19
Hydro International®	Downstream Defender® (In-Line and Off-Line Configurations)	Application 14 07/10/18	03/16/20
Hydro International®	First Defense® High-Capacity Full Trash Capture Device	Application 28 10/30/20	08/20/20
Hydro International®	Hydro Up-Flo Filter®	Application 11 07/18/18	03/16/20
Hydro International®	Hydro DryScreen®	Application 10 07/10/18 Updated 05/05/21	04/29/21

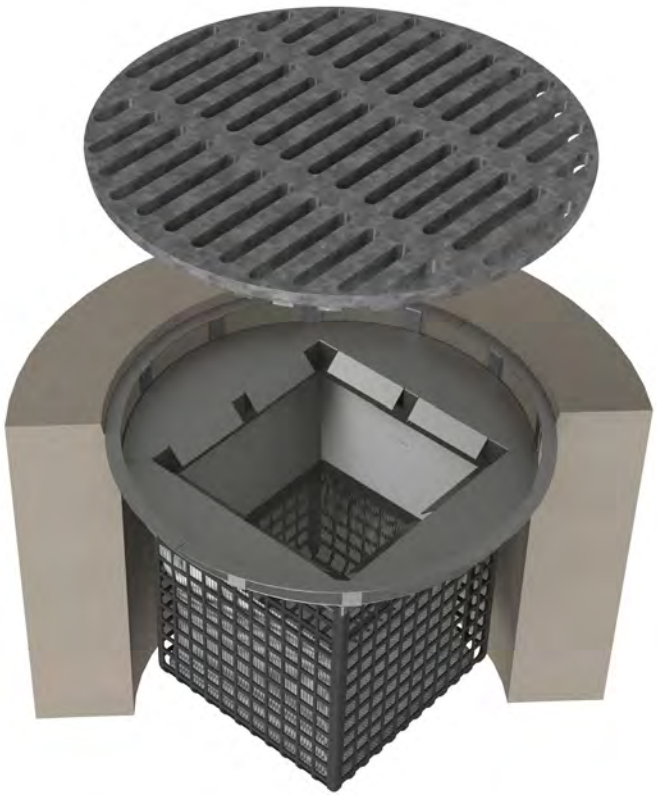
Certified Trash Full Capture Systems Available to the Public

Applicant/Owner	Full Capture System Name	Date of Application Certification and Update (if applicable), or Fact Sheet Update	Date of Vector Control Accessibility Approval
Oldcastle Infrastructure	FloGard® NetTech	Fact Sheet OI-11HF 12/02/15 Updated 02/08/20	12/03/20
Oldcastle Infrastructure	Nutrient Separating Baffle Box®	Application 17 10/12/18 Updated 07/21/20	07/20/20
Roscoe Moss Company	Storm Flo® Trash Screen – Linear Radial Gross Solids Removal Device	Fact Sheet RMC-1HF 12/02/15 Updated 03/30/21	03/11/21
StormTrap®, LLC	SiteSaver®	Application 9 03/15/18 Updated 02/23/21	03/18/21
StormTrap®, LLC	TrashTrap® Net and Fixed Basket In-Line Stormwater Treatment System	Application 34 06/21/22	05/03/22
StormTrap®, LLC	TrashTrap® Net and Fixed Basket End-of-Pipe Stormwater Treatment System	Application 35 07/06/22	06/01/22

Oldcastle Infrastructure™
A CRH COMPANY

FLOGARD® CATCH BASIN INSERT FILTER

Submittal Package



Water

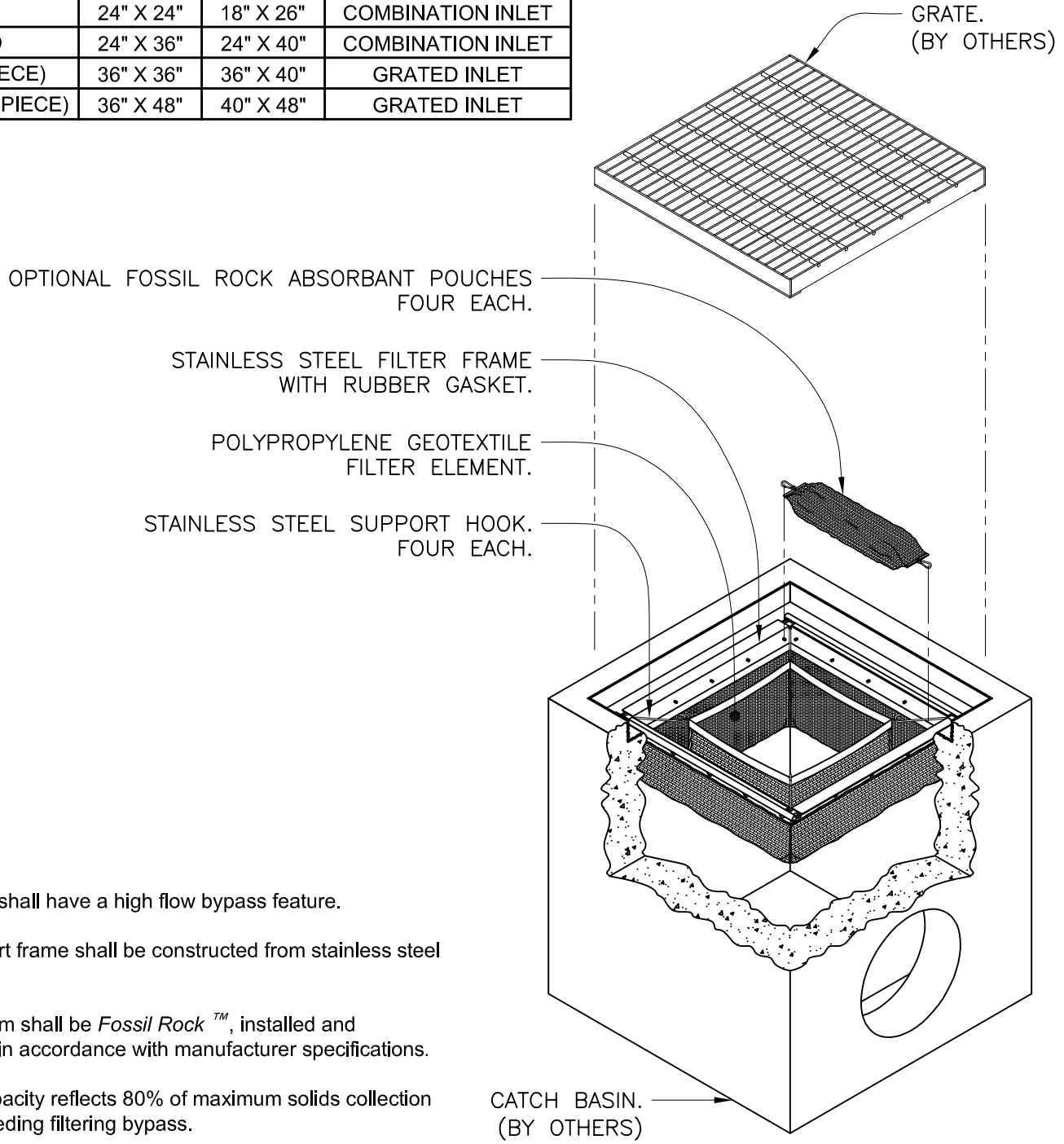
TABLE OF CONTENTS

SECTION 1

Submittal Drawing

FG-0001

SPECIFIER CHART			
MODEL	INLET ID	GRATE OD	COMMENTS
FF-12D	12" X 12"	15" X 15"	GRATED INLET
FF-16D	16" X 16"	18" X 18"	GRATED INLET
FF-18D	18" X 18"	20" X 20"	GRATED INLET
FF-1836SD	18" X 36"	18" X 40"	GRATED INLET
FF-1836DGO	18" X 36"	18" X 40"	COMBINATION INLET
FF-24D	24" X 24"	26" X 26"	GRATED INLET
FF-2436SD	24" X 36"	24" X 40"	GRATED INLET
FF-24DGO	24" X 24"	18" X 26"	COMBINATION INLET
FF-2436DGO	24" X 36"	24" X 40"	COMBINATION INLET
FF-36D (2 PIECE)	36" X 36"	36" X 40"	GRATED INLET
FF-3648D (2 PIECE)	36" X 48"	40" X 48"	GRATED INLET



NOTES:

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

Inlet Filtration

FloGard®

Catch Basin Insert Filter

Grated Inlet Style

Oldcastle®
Stormwater Solutions

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

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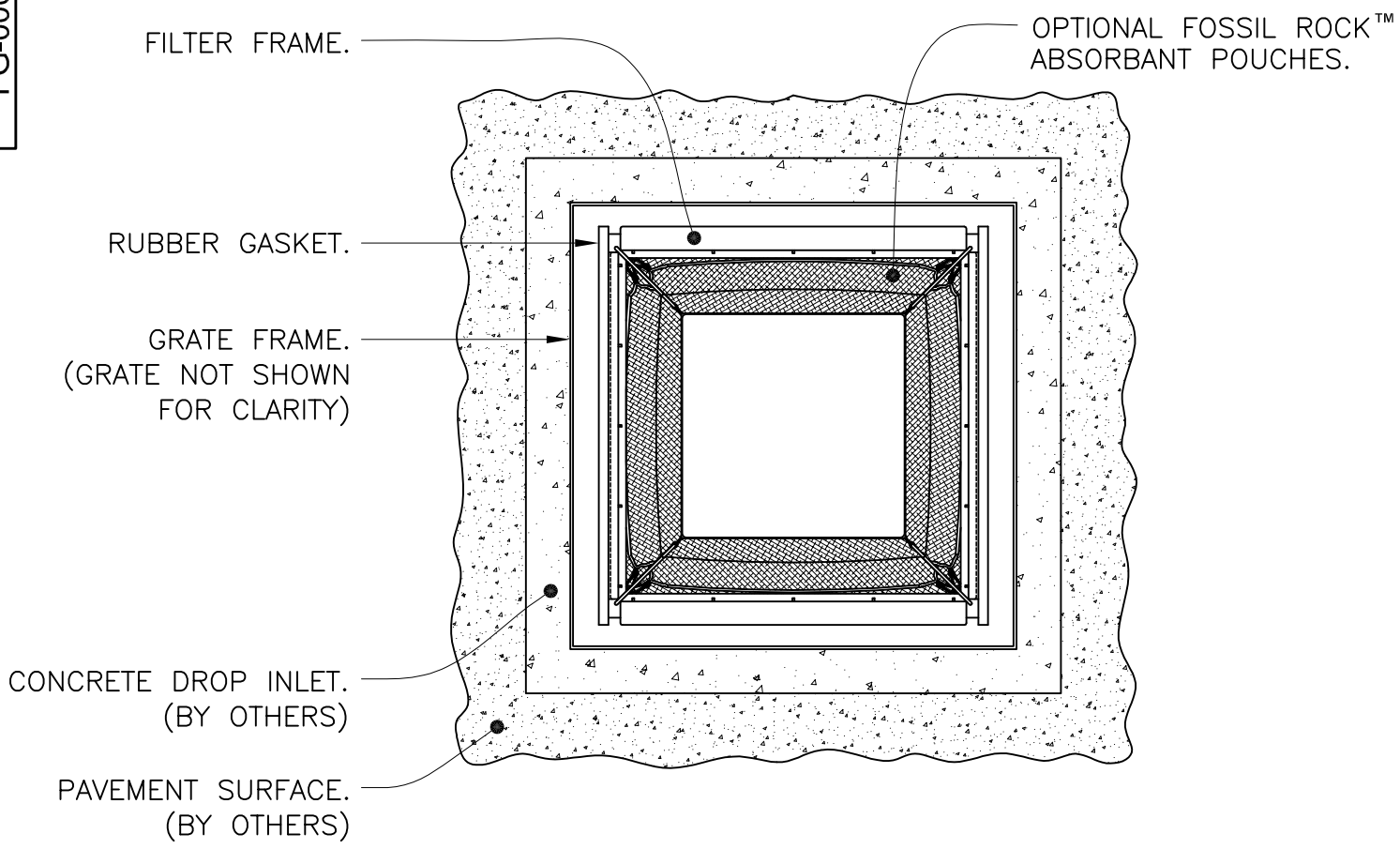
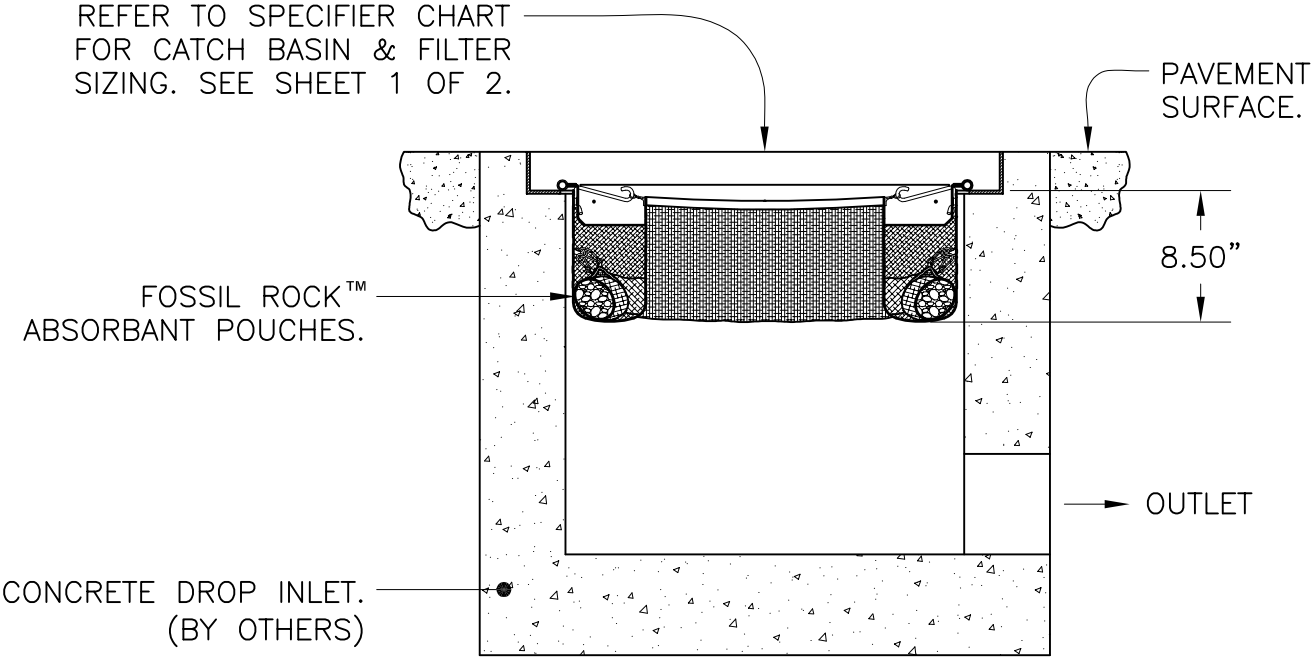
DRAWING NO.	REV	ECO	DATE	
FG-0001	E	ECO–0142 JPR 7/13/16	JPR 12/18/06	SHEET 1 OF 2

FG-0001





SECTION VIEW

Inlet Filtration

FloGard®

Catch Basin Insert Filter

Grated Inlet Style

Oldcastle® Stormwater Solutions

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DRAWING NO.	REV	ECO	DATE	
FG-0001	E	ECO-0142 JPR 7/13/16	JPR 12/18/06	SHEET 2 OF 2

SECTION 2

Features & Benefits

Oldcastle Infrastructure™
A CRH COMPANY

PUT A STOP to TSS

Removes Pollutants from Runoff Prior to Entering Waterways

Efficient System
Catches pollutants where they are easiest to catch, at the inlet.

Variable Design
Able to be retrofitted or used in new projects.

Treatment Train
Can be incorporated as part of a "Treatment Train".

No Standing Water
Helps to minimize bacteria and odor problems.

Focused Treatment
Removes petroleum hydrocarbons, trash and Total Suspended Solids (TSS).

Maximum Flexibility
Available in a variety of standard sizes to fit round and square inlets.

Economical
Earn a higher return on system investment.

Two-part stainless-steel insert to filter solids and oils/grease.

Easy to install, inspect and maintain, even on small and confined sites.

By the Numbers*:
Filter will remove up to 80% of Total Suspended Solids (TSS), at least 70% of oils and grease, and up to 40% of Total Phosphorus (TP) associated with organic debris as well as Polycyclic Aromatic Hydrocarbons (PAH) from oil leaks and spills.

*Approximate for urban street application.

CATCH BASIN FILTER TEST RESULTS SUMMARY			
Testing Agency	% TSS Removal	% Oil & Grease Removal	% PAH Removal
UCLA	80	70 to 80	
U of Auckland Tonking & Taylor, Ltd (for City of Auckland)	78 to 95		
U of Hawaii (for City of Honolulu)	80		20 to 40

Oldcastle Infrastructure™
A CRH COMPANY

PUT A STOP
to TSS

Multi-Purpose Catch Basin Insert Retains Sediment, Debris, Trash and Oils/Grease

FloGard® catch basin insert filters are recommended for areas subject to silt and debris as well as low-to-moderate levels of petroleum hydrocarbons (oils and grease). Examples of such areas include vehicle parking lots, aircraft ramps, truck and bus storage yards, business parks, residential and public streets.

CATCH BASIN FILTER COMPETITIVE FEATURE COMPARISON		
Evaluation of Catch Basin Filters (Based on flow-comparable units) (Scale 1-10)	Oldcastle	Other Insert Filter Types**
Flow Rate	10	7
Removal Efficiency*	80%	45%
Capacity - Sludge & Oil	7	7
Service Life	10	3
Installation - Ease of Handling / Installation	8	6
Ease of Inspections & Maintenance	7	7
Value	10	2

*Approximate, based on field sediment removal testing in urban street application **Average

Long-Term Value Comparison (Based on flow-comparable units) (Scale 1-10)	Oldcastle	Other Insert Filter Types**
Unit Value - Initial ($/cfs treated)	10	4
Installation Value ($/cfs treated)	10	7
Absorbent Replacement (annual avg ($/cfs treated)	10	2
Materials Replacement Value (annual avg ($/cfs treated)	10	10
Maintenance Value (annual avg ($/cfs treated)	10	7
Total First Year ROI ($/cfs treated)	10	5
Total Annual Avg Value ($/cfs treated, avg over 20 yrs)*	10	5

Captured debris from FloGard catch basin insert filter in Dana Point, California.

Combination Inlet

Flat-Grated Inlet

Circular Frame Inlet

(800) 579-8819
oldcastleinfrastructure.com

Oldcastle Infrastructure™
A CRH COMPANY

FLOGARD®
Catch Basin Insert Filter

Catch basin insert designed to capture sediment, gross solids, trash and petroleum hydrocarbons from low ("first flush") flows, even during the most extreme weather conditions

Example Types, Sizes and Capacities: Additional sizes, including regional and custom options are available.

FloGard Combination Inlet
SPECIFIER CHART

MODEL NO. STANDARD DEPTH	STANDARD & SHALLOW DEPTH (Data in these columns is the same for both STANDARD & SHALLOW versions)			STANDARD DEPTH -20 Inches-		MODEL NO. SHALLOW DEPTH	SHALLOW DEPTH -12 Inches-	
	INLET ID Inside Dimension (inch x inch)	GRADE OD Outside Dimension (inch x inch)	TOTAL BYPASS CAPACITY (cu. ft. / sec.)	SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)		SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)
FGP-1633FGO	16 X 33	18 X 36	7.0	2.5	1.7	FGP-1633FGO8	1.4	1.1
FGP-1836FGO	18 X 36	18 X 40	6.9	2.3	1.6	FGP-1836FGO8	1.3	.9
FGP-2234FGO	22 X 34	24 X 36	8.1	3.6	2.1	FGP-2234FGO8	2.1	1.4
FGP-2436FGO	24 X 36	24 X 40	8.0	3.4	2.0	FGP-2436FGO8	1.95	1.15

FloGard Flat Grated Inlet
SPECIFIER CHART

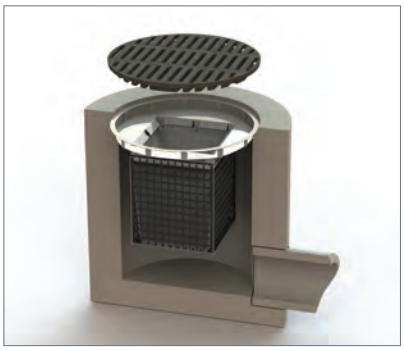
MODEL NO. STANDARD DEPTH	STANDARD & SHALLOW DEPTH (Data in these columns is the same for both STANDARD & SHALLOW versions)			STANDARD DEPTH -20 Inches-		MODEL NO. SHALLOW DEPTH	SHALLOW DEPTH -12 Inches-	
	INLET ID Inside Dimension (inch x inch)	GRADE OD Outside Dimension (inch x inch)	TOTAL BYPASS CAPACITY (cu. ft. / sec.)	SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)		SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)
FGP-12F	12 X 12	12 X 14	2.8	0.3	0.4	FGP-12F8	.15	.25
FGP-16F	16 X 16	16 X 19	4.7	0.8	0.7	FGP-16F8	.45	.4
FGP-18F	18 X 18	18 X 20	4.7	0.8	0.7	FGP-18F8	.45	.4
FGP-1836F	18 X 36	18 X 40	6.9	2.3	1.6	FGP-1836F8	1.3	.9
FGP-21F	22 X 22	22 X 24	6.1	2.2	1.5	FGP-21F8	1.25	.85
FGP-24F	24 X 24	24 X 27	6.1	2.2	1.5	FGP-24F8	1.25	.85
FGP-2436F	24 X 36	24 X 40	8.0	3.4	2.0	FGP-2436F8	1.95	1.15
FGP-2448F	24 X 48	24 X 48	9.3	4.4	2.4	FGP-2448F8	2.5	1.35
FGP-32F-TN	28 X 28	32 X 32	6.3	2.2	1.5	FGP-32F8-TN	1.25	.85
FGP-30F	30 X 30	30 X 34	8.1	3.6	2.0	FGP-30F8	2.05	1.15
FGP-36F	36 X 36	36 X 40	9.1	4.6	2.4	FGP-36F8	2.65	1.35
FGP-3648F	36 X 48	40 X 48	11.5	6.8	3.2	FGP-3648F8	3.9	1.85
FGP-48F	48 X 48	48 X 54	13.2	9.5	3.9	FGP-48F8	5.45	2.25
FGP-1633F	16 X 34	18 X 36	6.9	2.3	1.6	FGP-1633F8	1.3	.9
FGP-2234F	22 X 34	24 X 36	8.0	3.4	2.0	FGP-2234F8	1.95	1.15

FloGard Circular Grated Inlet
SPECIFIER CHART

MODEL NUMBER	INLET ID (inches)	GRADE OD (inches)	SOLIDS STORAGE CAPACITY (CU FT)	FILTERED FLOW (CSF)	TOTAL BYPASS CAPACITY (CFS)
FGP-RF15F	15	18	0.3	0.4	2.8
FGP-RF18F	18	20	0.8	0.7	4.7
FGP-RF20F	20	23	0.8	0.7	4.7
FGP-RF21F	21	23.5	0.8	0.7	4.7
FGP-RF22F	22	24	0.8	0.7	4.7
FGP-RF24F	24	26	0.8	0.7	4.7
FGP-RF30F	30	32	2.2	1.5	6.1
FGP-RF36F	36	39	3.6	2.0	8.1

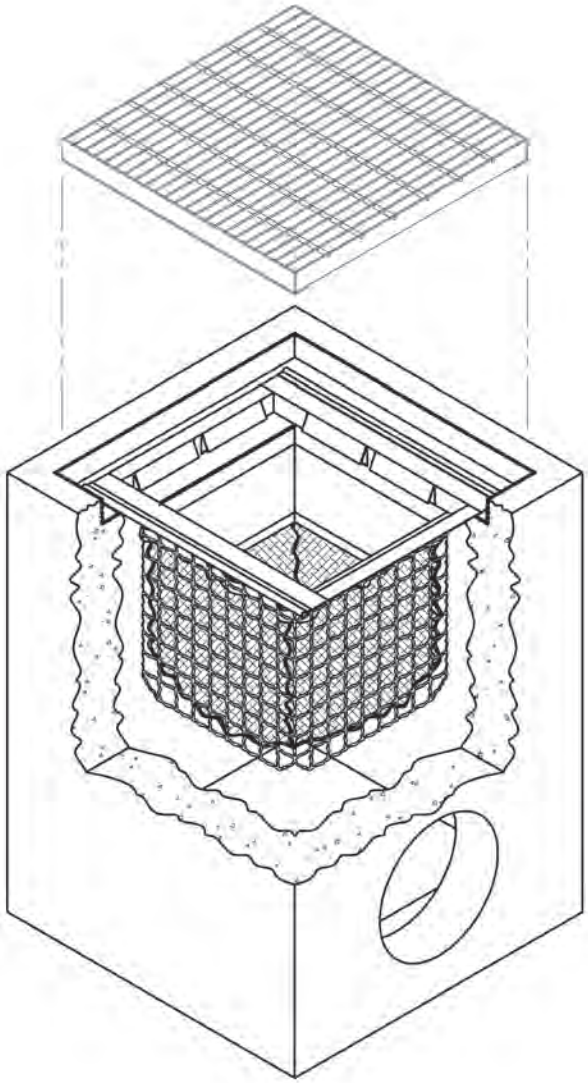

Combination Inlet


Flat-Grated Inlet

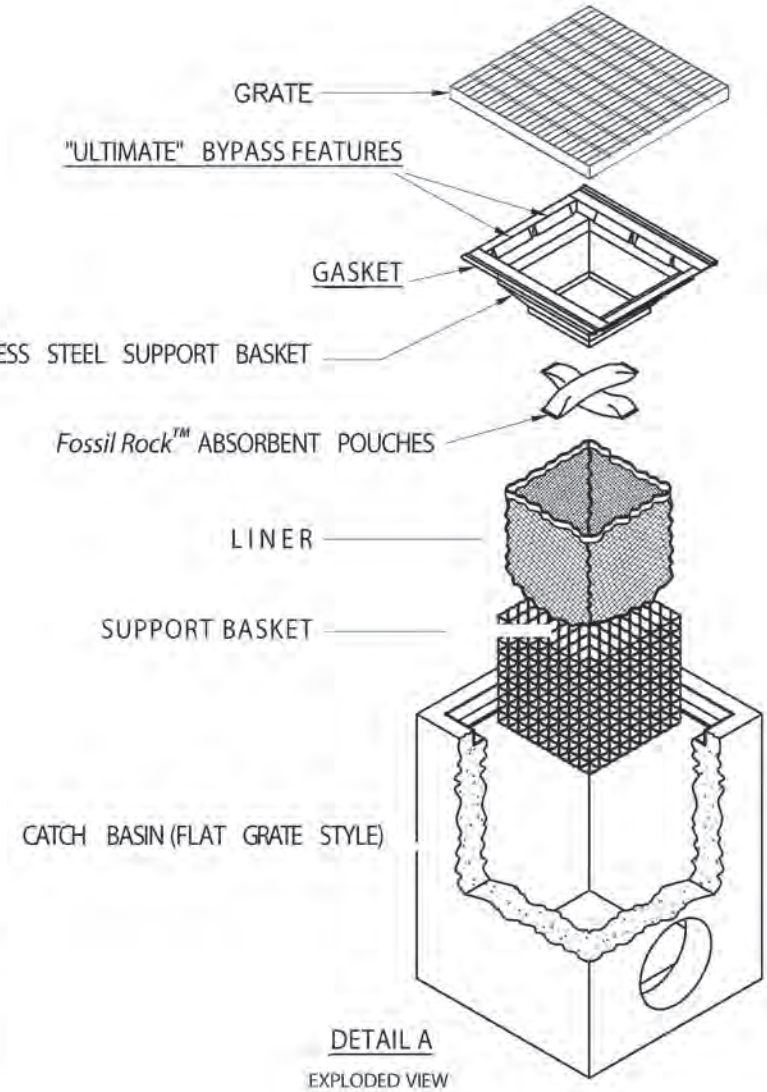

Circular Frame Inlet

SECTION 3

Accessories



FloGard® FILTER
-INSTALLED INTO CATCH BASIN-



DETAIL A
EXPLODED VIEW

NOTES:

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

U.S. PATENT #6,551,023 & 6,872,029

Oldcastle Infrastructure™
A CRH COMPANY

How Rubberizer® (Fossil Rock) Products Work*

Rubberizer® transforms spilled hydrocarbons into a rubber-like solid on contact, and does not re-release when it is retrieved. The solidification process is non-chemical in nature allowing the US EPA to classify Rubberizer as a sorbent.

This product, which comes in booms, pillows or granular form, can be used to clean oil from bilges, deck spills, around hydraulic storage tanks, under hydraulic machinery, in all engineering spaces and most importantly, in any hydrocarbon fuel spill where leaking oil comes in contact with water.

Rubberizer has been used in clean-up operations around the world and is patented in 22 countries.

The key advantages of the Rubberizer product line when compared to many of the characteristics of the more conventional products include:

- Works on land or water borne spills
- Remains buoyant
- Solidifies and is landfill approved
- Resistant to leaching
- Does not release solidified oils under pressure
- Incinerates with less that .1% residual ash
- Reduces overall clean-up time
- Reduces overall costs

Rubberizer products sorb and transform into a rubber-like material similar to many petroleum based products like:

- Gasoline
- Jet Fuel
- Diesel Fuels
- Transformer Oils
- Hydraulic Oils
- Lube Oils
- Aromatic Solvents
- Chlorinated Solvents
- Light Crudes

Rubberizer particulate is a mixture of hydrocarbon polymers plus additives resulting in a grainy material used primarily for cleanup operations where sweeping and shoveling are involved. It can also be used for clarification of various emulsions, or solidification and removal of various petroleum based slicks from the surface of water which is in a controlled state.

This product, (and the booms and pillows) in which it is the filler, exhibit characteristics that include:

- Lightweight enabling rapid deployment and retrieval (apparent specific gravity approximately = 0.4)
- Rapid sorption and solidification (measured in minutes), hydrophobic (no affinity for water)
- Permanently buoyant (both before and after sorption)
- Will not release solidified liquids under pressure
- Resistant to leaching upon aqueous contact
- High sorbed liquid to sorbent ratios (nominally 5 parts liquid to 1 part sorbent)
- Minimal incineration residue (less than .1%)
- Little volume increase of sorbed liquids (15% in laboratory tests, nominally 25% in field applications)

One pound of this product will solidify into a rubber-like material up to 2/3 gallon of jet fuel, diesel, gasoline, transformer oil, hydraulic oils, light crude and many other liquids.

*Rubberizer® = Fossil Rock

SECTION 4

Inspection & Maintenance

Oldcastle Infrastructure™
A CRH COMPANY

FLOGARD+PLUS®
CATCH BASIN INSERT FILTER

Inspection and Maintenance Guide

DRAINAGE PROTECTION SYSTEMS
DPS
A division of
Oldcastle Infrastructure

Water

SCOPE:

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

RECOMMENDED FREQUENCY OF SERVICE:

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

RECOMMENDED TIMING OF SERVICE:

DPS guidelines for the timing of service are as follows:

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

SERVICE PROCEDURES:

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

REPLACEMENT AND DISPOSAL OF EXPOSED FILTER MEDIUM AND COLLECTED DEBRIS

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

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

SECTION 5

Product Specifications

PART 1 — GENERAL

1.1 Section Includes

FloGard® Catch Basin Insert Filter – catch basin filtration device for stormwater treatment.

1.2 References

American Society for Testing and Materials (ASTM)

1. ASTM A240
2. ASTM D3786
3. ASTM D4355
4. ASTM D4491
5. ASTM D4533
6. ASTM D4632
7. ASTM D4751
8. ASTM D4833
9. ASTM D4991
10. ASTM D5261

PART 2 — PRODUCTS

2.1 Description

This specification describes a Catch Basin Filtration Device that removes sediment, debris, trash and petroleum hydrocarbons (oil and grease) from water flowing into the drainage inlets during low flows (first flush) without impeding the inlet's maximum design flow. Hydraulic calculations shall be supplied upon request.

The filtration device shall incorporate a sorbent capable of collecting and containing non-soluble pollutants including, but not limited to, petroleum hydrocarbons (oil and grease). Sorbent shall be contained in separate removable containers that can easily be replaced without removing the filter liner. Filtration device shall not rely on collected sediment, debris, trash or filter liner as the medium for hydrocarbon collection.

High capacity filtration devices shall incorporate a debris trap, designed to retain floatable pollutants during high flow periods and both an initial filtering bypass for moderate flows and an ultimate bypass for peak design flows. The installed device shall not impede drainage inlet's peak design flow prior to or after the device has reached its pollutant storage capacity.

2.2 Materials

Filtration device support frame and hardware shall be manufactured from Type 304 stainless steel. It shall be designed to support maximum anticipated loads from the collected pollutants and water.

Field modifications, welding or painting of the device shall not be allowed.

Device shall incorporate a removable filter liner made from a woven polypropylene monofilament geotextile with an apparent opening size less than 35 US Mesh and a clean flow rate of not less than 145 gallons per minute (gpm) per square foot, or stainless steel screen with opening size between 4 and 200 US Mesh. The use of a

non-woven geotextile filter liner shall not be allowed.

Sorbent shall be a hydrophobic material treated to attract and retain petroleum hydrocarbons and other non-soluble pollutants. It shall be non-biodegradable and non-leaching and contain no hazardous ingredients as defined by the U.S. Environmental Protection Agency (EPA).

2.3 Manufacturer

Each catch basin filter device shall be a FloGard as manufactured by Oldcastle Infrastructure, 7100 Longe St, Stockton, California 95206. Phone: (800) 579-8819.

PART 3 — EXECUTION

3.1 Installation

Installation of filtration device shall not require extensive modification of the catch basin and shall be performed by a manufacturer-approved installation contractor. Installation contractor shall be licensed and insured in accordance with agency requirements.

Filtration devices installed into grated, or combination grate with curb opening inlets shall be either supported by resting the support brackets on the grate bearing ledge (installed without the use of bolts or other anchoring devices) or mounted to the catch basin wall with easily removable separate wall mount brackets to allow for quick access to the piping system in the event of an emergency.

Devices for curb opening style inlets (no grate) shall be installed across the entire width of the curb opening and shall be secured to inlet wall, across and beneath the curb opening, using corrosion-resistant anchors (Type 304 stainless steel). The use of chains or cable to secure the device shall not be allowed.

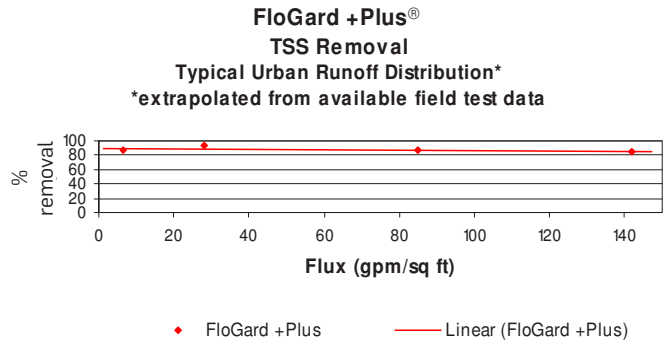
Filtration devices shall be installed in such a manner as to direct all flows into the device. Distance (gaps) between the inlet wall and the device shall not exceed one half inch. Gaps of less than one half inch shall be sealed with a flexible weatherproof sealant, as approved by agency.

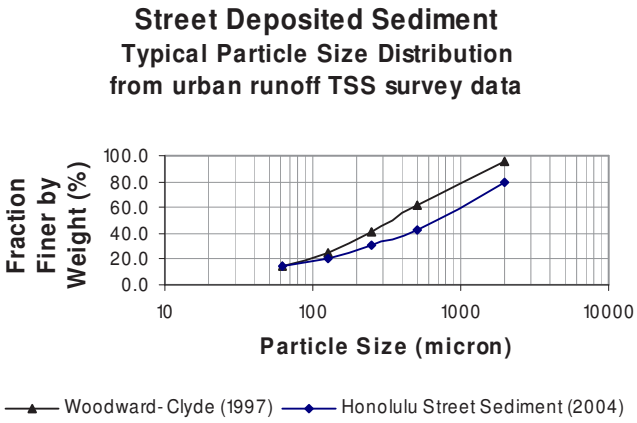
Installation contractor shall supply agency (engineer) with an installation record, denoting the date of installation, drainage inlet location, type of drainage inlet and type and/or size of filtration device.

Oldcastle Infrastructure™
A CRH COMPANY

FLOGARD +PLUS®

Independent field tests conducted in Hawaii and New Zealand on FloGard +PLUS® Catch Basin Insert Filters to determine removal efficiency of Total Suspended Solids (TSS). Results were extrapolated to a typical street deposited sediment particle size. Removal efficiencies were plotted and reflect effective TSS removal over a typical range of operating flow rates. Results are shown below as a function of unit internal surface area.





FloGard +PLUS® Catch Basin Insert Filter is an efficient inlet prefilter designed to remove suspended sediment and floatable trash and hydrocarbons from stormwater runoff in new or retrofit applications. It is ideally suited for removal of primary pollutants from paved surfaces in commercial and residential areas, or may form part of a treatment train. The device features a unique dual-bypass design, durable components, flexible installation options and easy maintenance access.

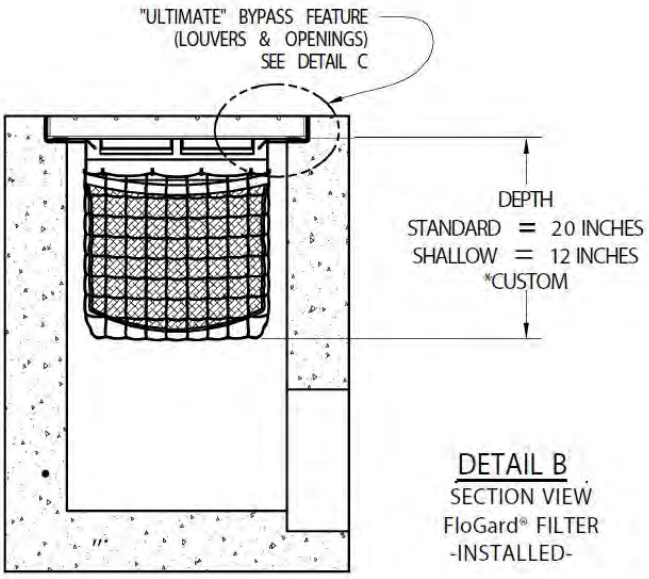
Units are sized to fit most common styles of drainage inlet grate frames or inlet widths. Rated filtered flow capacities for each model typically exceed the required "first flush" treatment flow rate, and account for reduction in capacity as the unit accumulates suspended pollutants. Rated bypass capacity for each model also typically exceeds the inlet capacity of the catch basin.

FloGard +PLUS® Test Results Summary

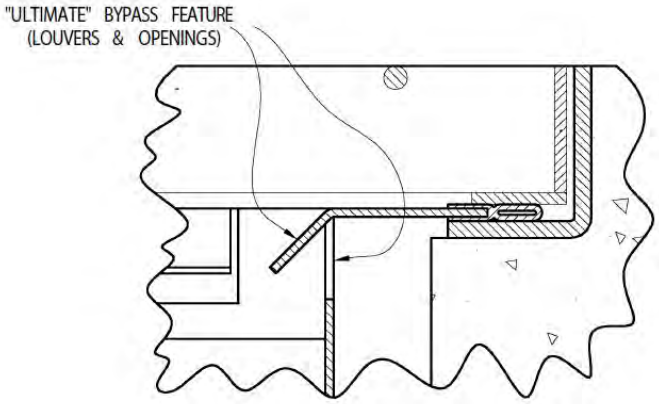
Testing Agency	%TSS Removal	% Oil & Grease Removal
UCLA	80*	70-80
U of Auckland Tonkin & Taylor LTD (City of Auckland)	95** 78-86***	
U of Hawaii (City of Honolulu)	80***	

*Sand larger than ~ 575 µm
**Sand distribution ~ 100-1000 µm
***Local street sweep material (distribution consistent with NURP)

See product specifications for standard model details.



DETAIL B
SECTION VIEW
FloGard® FILTER
-INSTALLED-



DETAIL C
"ULTIMATE" BYPASS
FEATURE

*** MANY** OTHER STANDARD & CUSTOM SIZES AND DEPTHS AVAILABLE UPON REQUEST.

FloGard Flat Grated Inlet									
SPECIFIER CHART									
MODEL NO. STANDARD DEPTH	STANDARD & SHALLOW DEPTH (Data in these columns is the same for both STANDARD & SHALLOW versions)			STANDARD DEPTH -20 Inches-		MODEL NO. SHALLOW DEPTH	SHALLOW DEPTH -12 Inches-		
	INLET ID Inside Dimension (inch x inch)	GRADE OD Outside Dimension (inch x inch)	TOTAL BYPASS CAPACITY (cu. ft. / sec.)	SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)		SOLIDS STORAGE CAPACITY (cu. ft.)	FILTERED FLOW (cu. ft. / sec.)	
FGP-12F	12 X 12	12 X 14	2.8	0.3	0.4	FGP-12F8	.15	.25	
FGP-16F	16 X 16	16 X 19	4.7	0.8	0.7	FGP-16F8	.45	.4	
FGP-18F	18 X 18	18 X 20	4.7	0.8	0.7	FGP-18F8	.45	.4	
FGP-1836F	18 X 36	18 X 40	6.9	2.3	1.6	FGP-1836F8	1.3	.9	
FGP-21F	22 X 22	22 X 24	6.1	2.2	1.5	FGP-21F8	1.25	.85	
FGP-24F	24 X 24	24 X 27	6.1	2.2	1.5	FGP-24F8	1.25	.85	
FGP-2436F	24 X 36	24 X 40	8.0	3.4	2.0	FGP-2436F8	1.95	1.15	
FGP-2448F	24 X 48	24 X 48	9.3	4.4	2.4	FGP-2448F8	2.5	1.35	
FGP-32F-TN	28 X 28	32 X 32	6.3	2.2	1.5	FGP-32F8-TN	1.25	.85	
FGP-30F	30 X 30	30 X 34	8.1	3.6	2.0	FGP-30F8	2.05	1.15	
FGP-36F	36 X 36	36 X 40	9.1	4.6	2.4	FGP-36F8	2.65	1.35	
FGP-3648F	36 X 48	40 X 48	11.5	6.8	3.2	FGP-3648F8	3.9	1.85	
FGP-48F	48 X 48	48 X 54	13.2	9.5	3.9	FGP-48F8	5.45	2.25	
FGP-1633F	16 X 34	18 X 36	6.9	2.3	1.6	FGP-1633F8	1.3	.9	
FGP-2234F	22 X 34	24 X 36	8.0	3.4	2.0	FGP-2234F8	1.95	1.15	

FLOGARD® CATCH BASIN INSERT FILTER

OUR MARKETS

BUILDING STRUCTURES

COMMUNICATIONS

WATER

ENERGY

TRANSPORTATION

6.7 Precipitation Information

NOAA Atlas 14, Volume 6, Version 2
Location name: Victorville, California, USA*
Latitude: 34.5217°, Longitude: -117.3245°
Elevation: 2932 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	0.103 (0.085-0.126)	0.140 (0.116-0.172)	0.193 (0.158-0.237)	0.238 (0.194-0.295)	0.304 (0.240-0.390)	0.359 (0.278-0.469)	0.418 (0.315-0.560)	0.483 (0.354-0.664)	0.577 (0.406-0.827)	0.655 (0.445-0.972)
10-min	0.147 (0.122-0.180)	0.201 (0.166-0.246)	0.276 (0.227-0.339)	0.341 (0.278-0.423)	0.436 (0.344-0.559)	0.515 (0.398-0.673)	0.599 (0.452-0.802)	0.692 (0.508-0.952)	0.826 (0.582-1.18)	0.938 (0.639-1.39)
15-min	0.178 (0.147-0.218)	0.243 (0.200-0.298)	0.334 (0.275-0.410)	0.413 (0.337-0.511)	0.528 (0.417-0.675)	0.623 (0.481-0.814)	0.725 (0.547-0.970)	0.837 (0.614-1.15)	0.999 (0.704-1.43)	1.14 (0.772-1.68)
30-min	0.238 (0.196-0.291)	0.324 (0.267-0.397)	0.445 (0.366-0.547)	0.551 (0.449-0.682)	0.704 (0.556-0.901)	0.830 (0.642-1.08)	0.967 (0.729-1.29)	1.12 (0.819-1.54)	1.33 (0.939-1.91)	1.51 (1.03-2.25)
60-min	0.276 (0.228-0.338)	0.376 (0.310-0.461)	0.517 (0.425-0.635)	0.639 (0.522-0.792)	0.817 (0.645-1.05)	0.964 (0.745-1.26)	1.12 (0.847-1.50)	1.30 (0.951-1.78)	1.55 (1.09-2.22)	1.76 (1.20-2.61)
2-hr	0.384 (0.317-0.470)	0.513 (0.423-0.629)	0.692 (0.569-0.850)	0.846 (0.690-1.05)	1.07 (0.842-1.37)	1.25 (0.964-1.63)	1.44 (1.08-1.93)	1.65 (1.21-2.26)	1.94 (1.37-2.79)	2.19 (1.49-3.24)
3-hr	0.456 (0.376-0.557)	0.606 (0.499-0.742)	0.812 (0.668-0.998)	0.988 (0.806-1.22)	1.24 (0.978-1.58)	1.44 (1.11-1.88)	1.66 (1.25-2.22)	1.88 (1.38-2.59)	2.21 (1.56-3.17)	2.48 (1.68-3.67)
6-hr	0.613 (0.506-0.750)	0.814 (0.671-0.997)	1.09 (0.893-1.33)	1.32 (1.07-1.63)	1.64 (1.29-2.09)	1.89 (1.46-2.47)	2.16 (1.63-2.89)	2.44 (1.79-3.36)	2.84 (2.00-4.07)	3.16 (2.15-4.69)
12-hr	0.781 (0.645-0.955)	1.05 (0.864-1.28)	1.40 (1.16-1.72)	1.70 (1.39-2.10)	2.10 (1.66-2.69)	2.42 (1.87-3.16)	2.75 (2.07-3.68)	3.09 (2.27-4.26)	3.56 (2.51-5.11)	3.93 (2.68-5.84)
24-hr	1.01 (0.892-1.16)	1.37 (1.22-1.58)	1.85 (1.64-2.14)	2.25 (1.97-2.62)	2.78 (2.36-3.35)	3.20 (2.65-3.93)	3.62 (2.93-4.56)	4.05 (3.19-5.25)	4.65 (3.51-6.28)	5.11 (3.74-7.14)
2-day	1.14 (1.01-1.31)	1.57 (1.39-1.81)	2.15 (1.90-2.48)	2.62 (2.30-3.06)	3.28 (2.78-3.94)	3.78 (3.14-4.65)	4.30 (3.48-5.42)	4.84 (3.81-6.27)	5.58 (4.22-7.54)	6.16 (4.50-8.61)
3-day	1.24 (1.10-1.42)	1.72 (1.52-1.98)	2.36 (2.09-2.73)	2.90 (2.54-3.38)	3.63 (3.08-4.37)	4.20 (3.49-5.17)	4.79 (3.88-6.04)	5.41 (4.26-7.01)	6.26 (4.73-8.45)	6.93 (5.06-9.68)
4-day	1.32 (1.17-1.52)	1.84 (1.63-2.12)	2.52 (2.23-2.92)	3.09 (2.71-3.60)	3.87 (3.28-4.66)	4.48 (3.72-5.50)	5.10 (4.13-6.42)	5.75 (4.53-7.45)	6.64 (5.02-8.97)	7.35 (5.37-10.3)
7-day	1.42 (1.26-1.64)	1.96 (1.74-2.26)	2.67 (2.36-3.09)	3.25 (2.85-3.79)	4.04 (3.42-4.86)	4.65 (3.86-5.71)	5.27 (4.27-6.63)	5.90 (4.65-7.65)	6.78 (5.12-9.15)	7.46 (5.44-10.4)
10-day	1.51 (1.34-1.74)	2.07 (1.83-2.38)	2.80 (2.47-3.23)	3.39 (2.97-3.95)	4.19 (3.55-5.05)	4.81 (3.99-5.91)	5.43 (4.40-6.84)	6.07 (4.78-7.86)	6.94 (5.24-9.37)	7.61 (5.56-10.6)
20-day	1.74 (1.54-2.00)	2.40 (2.12-2.76)	3.27 (2.88-3.77)	3.97 (3.48-4.63)	4.93 (4.18-5.94)	5.67 (4.71-6.97)	6.42 (5.20-8.09)	7.20 (5.67-9.32)	8.25 (6.23-11.1)	9.06 (6.62-12.7)
30-day	1.96 (1.74-2.26)	2.74 (2.43-3.16)	3.77 (3.33-4.36)	4.63 (4.05-5.39)	5.81 (4.92-6.99)	6.73 (5.59-8.28)	7.68 (6.23-9.68)	8.68 (6.84-11.2)	10.0 (7.60-13.6)	11.1 (8.13-15.5)
45-day	2.26 (2.01-2.61)	3.19 (2.83-3.68)	4.46 (3.94-5.16)	5.55 (4.86-6.46)	7.08 (6.00-8.53)	8.32 (6.90-10.2)	9.62 (7.79-12.1)	11.0 (8.67-14.3)	13.0 (9.80-17.5)	14.5 (10.6-20.3)
60-day	2.47 (2.19-2.84)	3.49 (3.09-4.02)	4.94 (4.36-5.71)	6.20 (5.43-7.22)	8.03 (6.80-9.67)	9.54 (7.92-11.7)	11.2 (9.05-14.1)	12.9 (10.2-16.8)	15.5 (11.7-20.9)	17.6 (12.9-24.7)

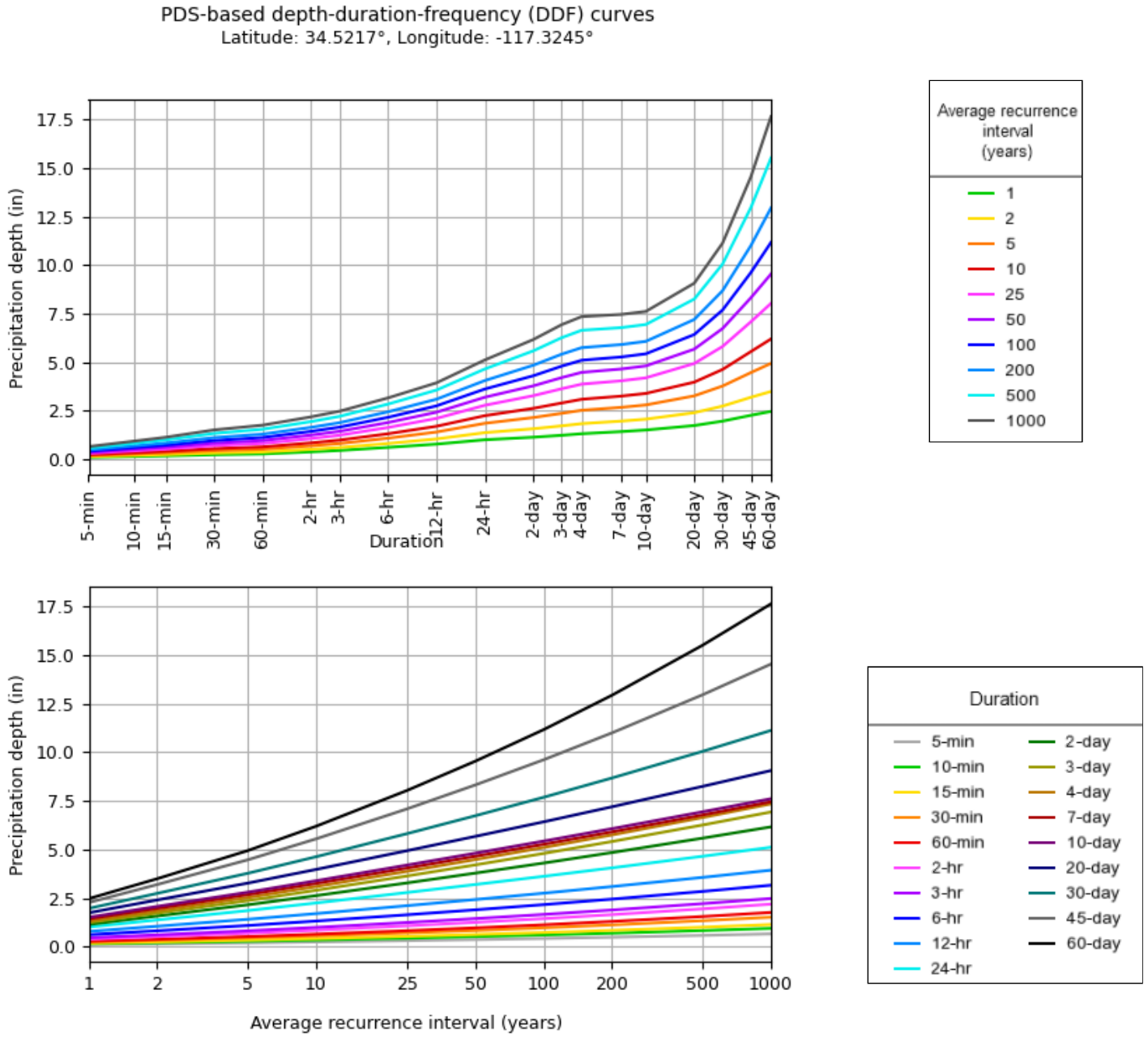
[1] Precipitation frequency (PF) estimates in this table are based on frequency analysis of partial duration series (PDS).

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



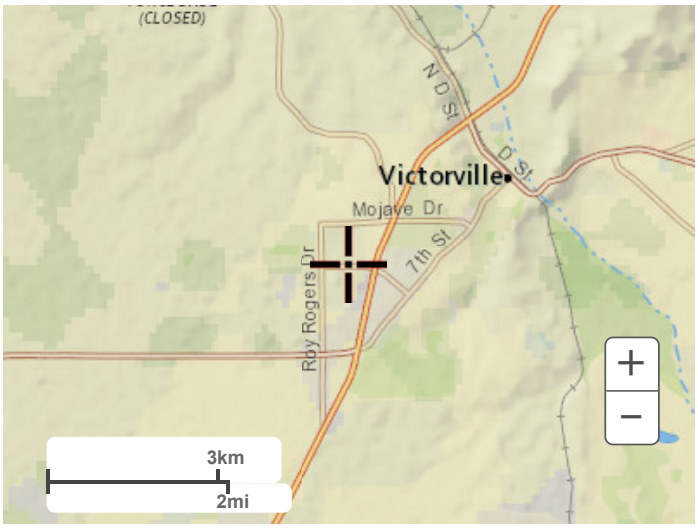
NOAA Atlas 14, Volume 6, Version 2

Created (GMT): Mon Oct 9 16:32:39 2023

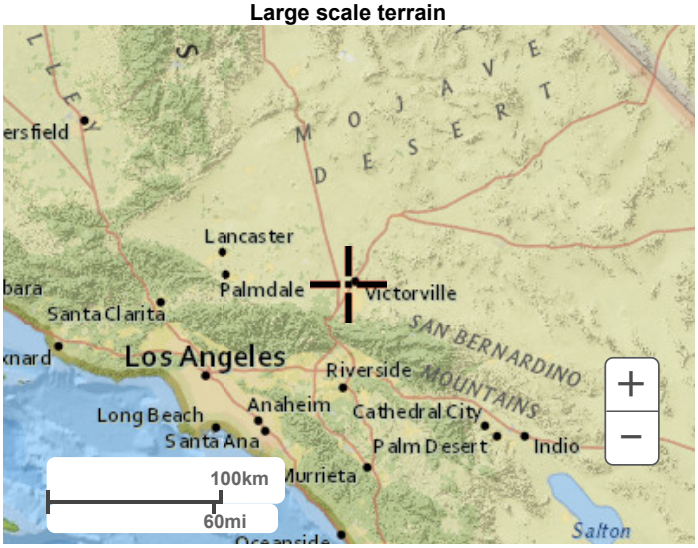
Back to Top

Maps & aerials

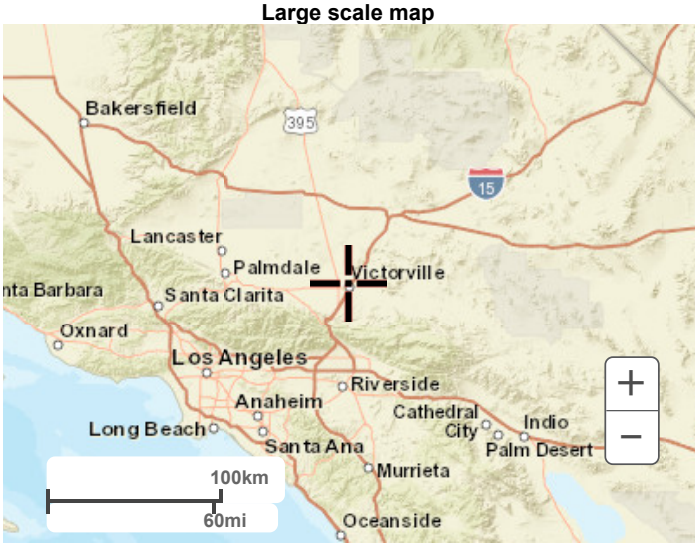
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

NOAA Atlas 14, Volume 6, Version 2
Location name: Victorville, California, USA*
Latitude: 34.5217°, Longitude: -117.3245°
Elevation: 2932 ft**
* source: ESRI Maps
** source: USGS

POINT PRECIPITATION FREQUENCY ESTIMATES

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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/hour)[1]

Duration	Average recurrence interval (years)									
	1	2	5	10	25	50	100	200	500	1000
5-min	**1.24** (1.02-1.51)	**1.68** (1.39-2.06)	**2.32** (1.90-2.84)	**2.86** (2.33-3.54)	**3.65** (2.88-4.68)	**4.31** (3.34-5.63)	**5.02** (3.78-6.72)	**5.80** (4.25-7.97)	**6.92** (4.87-9.92)	**7.86** (5.34-11.7)
10-min	**0.882** (0.732-1.08)	**1.21** (0.996-1.48)	**1.66** (1.36-2.03)	**2.05** (1.67-2.54)	**2.62** (2.06-3.35)	**3.09** (2.39-4.04)	**3.59** (2.71-4.81)	**4.15** (3.05-5.71)	**4.96** (3.49-7.11)	**5.63** (3.83-8.36)
15-min	**0.712** (0.588-0.872)	**0.972** (0.800-1.19)	**1.34** (1.10-1.64)	**1.65** (1.35-2.04)	**2.11** (1.67-2.70)	**2.49** (1.92-3.26)	**2.90** (2.19-3.88)	**3.35** (2.46-4.61)	**4.00** (2.82-5.74)	**4.54** (3.09-6.74)
30-min	**0.476** (0.392-0.582)	**0.648** (0.534-0.794)	**0.890** (0.732-1.09)	**1.10** (0.898-1.36)	**1.41** (1.11-1.80)	**1.66** (1.28-2.17)	**1.93** (1.46-2.59)	**2.23** (1.64-3.07)	**2.67** (1.88-3.82)	**3.03** (2.06-4.49)
60-min	**0.276** (0.228-0.338)	**0.376** (0.310-0.461)	**0.517** (0.425-0.635)	**0.639** (0.522-0.792)	**0.817** (0.645-1.05)	**0.964** (0.745-1.26)	**1.12** (0.847-1.50)	**1.30** (0.951-1.78)	**1.55** (1.09-2.22)	**1.76** (1.20-2.61)
2-hr	**0.192** (0.158-0.235)	**0.256** (0.211-0.314)	**0.346** (0.284-0.425)	**0.423** (0.345-0.524)	**0.533** (0.421-0.683)	**0.623** (0.482-0.815)	**0.719** (0.542-0.963)	**0.823** (0.604-1.13)	**0.971** (0.684-1.39)	**1.09** (0.743-1.62)
3-hr	**0.151** (0.125-0.185)	**0.201** (0.166-0.247)	**0.270** (0.222-0.332)	**0.329** (0.268-0.407)	**0.412** (0.325-0.527)	**0.479** (0.370-0.627)	**0.551** (0.415-0.737)	**0.627** (0.460-0.863)	**0.735** (0.518-1.06)	**0.824** (0.560-1.22)
6-hr	**0.102** (0.084-0.125)	**0.135** (0.112-0.166)	**0.181** (0.149-0.222)	**0.219** (0.179-0.271)	**0.273** (0.215-0.349)	**0.315** (0.244-0.412)	**0.360** (0.272-0.482)	**0.407** (0.299-0.561)	**0.474** (0.334-0.680)	**0.527** (0.359-0.783)
12-hr	**0.064** (0.053-0.079)	**0.086** (0.071-0.106)	**0.116** (0.095-0.143)	**0.141** (0.115-0.174)	**0.174** (0.137-0.223)	**0.201** (0.155-0.262)	**0.228** (0.172-0.305)	**0.256** (0.188-0.353)	**0.295** (0.208-0.424)	**0.326** (0.222-0.484)
24-hr	**0.041** (0.037-0.048)	**0.057** (0.050-0.065)	**0.077** (0.068-0.089)	**0.093** (0.082-0.109)	**0.115** (0.098-0.139)	**0.133** (0.110-0.163)	**0.150** (0.122-0.189)	**0.168** (0.133-0.218)	**0.193** (0.146-0.261)	**0.213** (0.155-0.297)
2-day	**0.023** (0.020-0.027)	**0.032** (0.029-0.037)	**0.044** (0.039-0.051)	**0.054** (0.047-0.063)	**0.068** (0.057-0.082)	**0.078** (0.065-0.096)	**0.089** (0.072-0.112)	**0.100** (0.079-0.130)	**0.116** (0.087-0.156)	**0.128** (0.093-0.179)
3-day	**0.017** (0.015-0.019)	**0.023** (0.021-0.027)	**0.032** (0.029-0.037)	**0.040** (0.035-0.046)	**0.050** (0.042-0.060)	**0.058** (0.048-0.071)	**0.066** (0.053-0.083)	**0.075** (0.059-0.097)	**0.086** (0.065-0.117)	**0.096** (0.070-0.134)
4-day	**0.013** (0.012-0.015)	**0.019** (0.016-0.022)	**0.026** (0.023-0.030)	**0.032** (0.028-0.037)	**0.040** (0.034-0.048)	**0.046** (0.038-0.057)	**0.053** (0.043-0.066)	**0.059** (0.047-0.077)	**0.069** (0.052-0.093)	**0.076** (0.055-0.106)
7-day	**0.008** (0.007-0.009)	**0.011** (0.010-0.013)	**0.015** (0.014-0.018)	**0.019** (0.016-0.022)	**0.024** (0.020-0.028)	**0.027** (0.022-0.034)	**0.031** (0.025-0.039)	**0.035** (0.027-0.045)	**0.040** (0.030-0.054)	**0.044** (0.032-0.062)
10-day	**0.006** (0.005-0.007)	**0.008** (0.007-0.009)	**0.011** (0.010-0.013)	**0.014** (0.012-0.016)	**0.017** (0.014-0.021)	**0.020** (0.016-0.024)	**0.022** (0.018-0.028)	**0.025** (0.019-0.032)	**0.028** (0.021-0.039)	**0.031** (0.023-0.044)
20-day	**0.003** (0.003-0.004)	**0.004** (0.004-0.005)	**0.006** (0.006-0.007)	**0.008** (0.007-0.009)	**0.010** (0.008-0.012)	**0.011** (0.009-0.014)	**0.013** (0.010-0.016)	**0.014** (0.011-0.019)	**0.017** (0.012-0.023)	**0.018** (0.013-0.026)
30-day	**0.002** (0.002-0.003)	**0.003** (0.003-0.004)	**0.005** (0.004-0.006)	**0.006** (0.005-0.007)	**0.008** (0.006-0.009)	**0.009** (0.007-0.011)	**0.010** (0.008-0.013)	**0.012** (0.009-0.015)	**0.013** (0.010-0.018)	**0.015** (0.011-0.021)
45-day	**0.002** (0.001-0.002)	**0.002** (0.002-0.003)	**0.004** (0.003-0.004)	**0.005** (0.004-0.005)	**0.006** (0.005-0.007)	**0.007** (0.006-0.009)	**0.008** (0.007-0.011)	**0.010** (0.008-0.013)	**0.012** (0.009-0.016)	**0.013** (0.009-0.018)
60-day	**0.001** (0.001-0.001)	**0.002** (0.002-0.002)	**0.003** (0.003-0.003)	**0.004** (0.003-0.005)	**0.005** (0.004-0.006)	**0.006** (0.005-0.008)	**0.007** (0.006-0.009)	**0.008** (0.007-0.011)	**0.010** (0.008-0.014)	**0.012** (0.008-0.017)

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

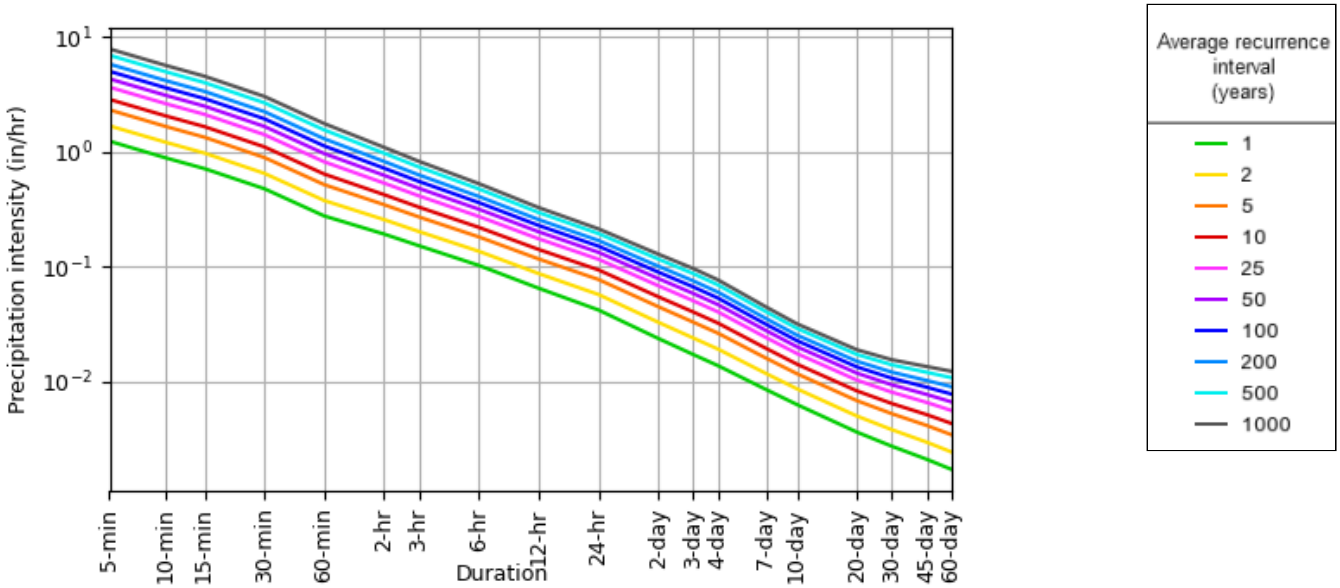
Numbers in parenthesis are PF estimates at lower and upper bounds of the 90% confidence interval. The probability that precipitation frequency estimates (for a given duration and average recurrence interval) will be greater than the upper bound (or less than the lower bound) is 5%. Estimates at upper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

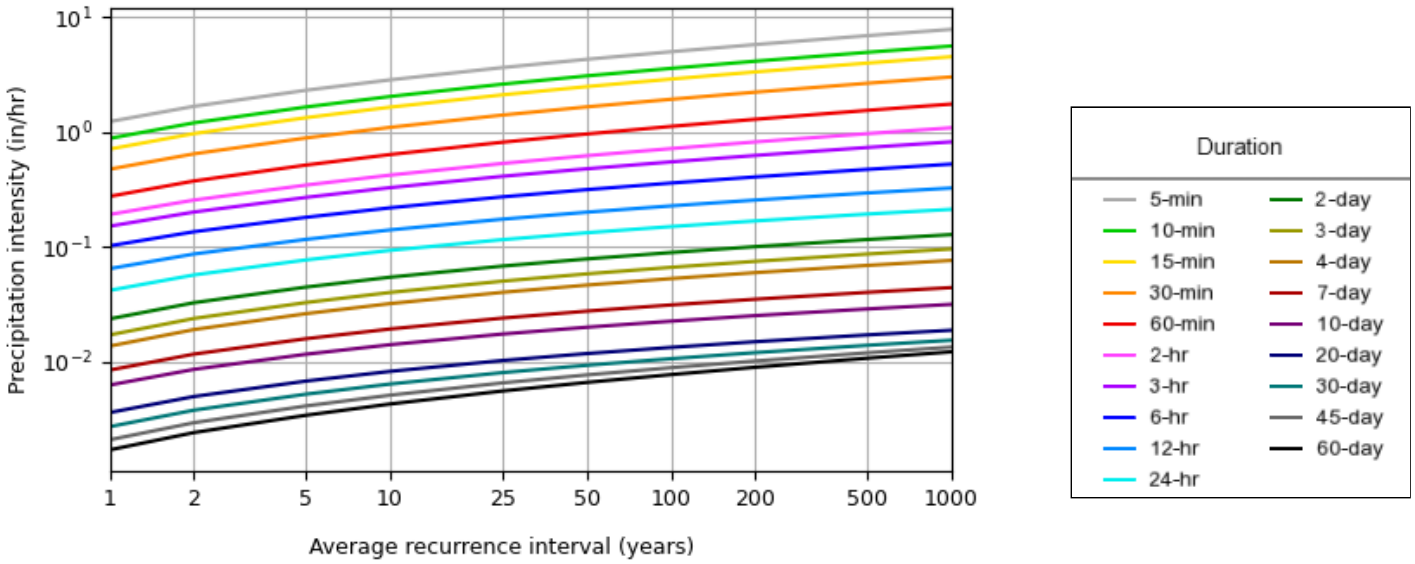
Please refer to NOAA Atlas 14 document for more information.

Back to Top

PF graphical

PDS-based intensity-duration-frequency (IDF) curves
Latitude: 34.5217°, Longitude: -117.3245°





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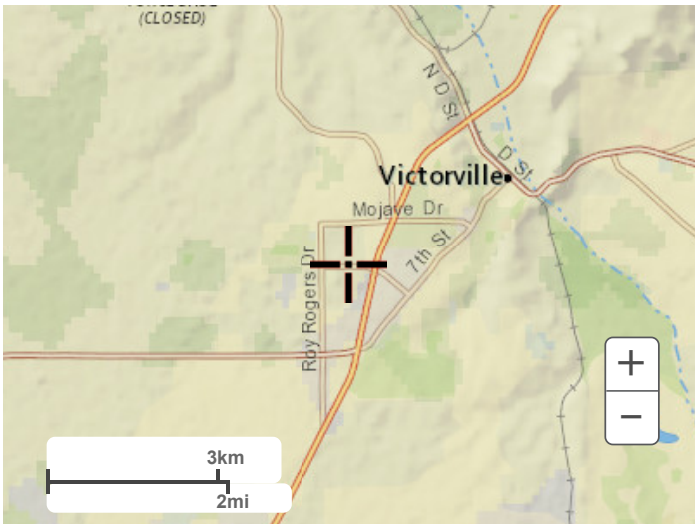
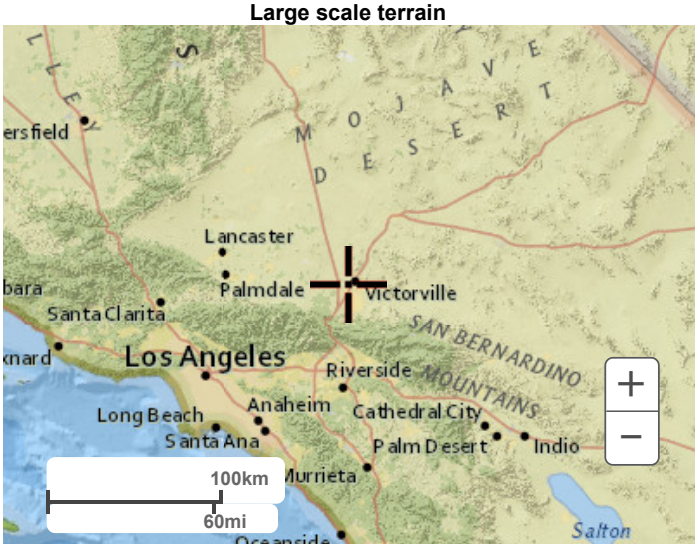
Back to Top

Maps & aerials

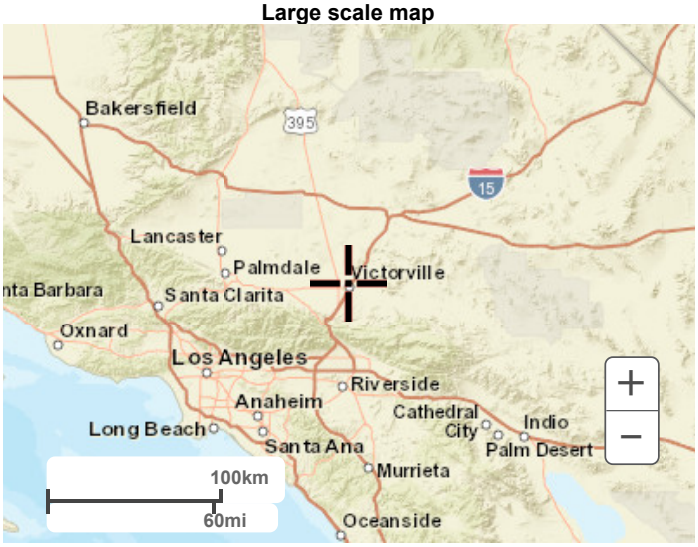
Small scale terrain



Large scale terrain



Large scale map



Large scale aerial

Back to Top

US Department of Commerce
National Oceanic and Atmospheric Administration
National Weather Service
National Water Center
1325 East West Highway
Silver Spring, MD 20910
Questions?: HDSC.Questions@noaa.gov

Disclaimer

6.8 Infiltration System Calculations

Worksheet H: Factor of Safety and Design Infiltration Rate and Worksheet

Factor Category		Factor Description	Assigned Weight (w)	Factor Value (v)	Product (p) p = w x v
A	Suitability Assessment	Soil assessment methods	0.25	1	.25
		Predominant soil texture	0.25	3	.75
		Site soil variability	0.25	1	.25
		Depth to groundwater / impervious layer	0.25	1	.25
		Suitability Assessment Safety Factor, $S_A = \Sigma p$			1.50
B	Design	Tributary area size	0.25	1	.25
		Level of pretreatment/ expected sediment loads	0.25	2	.50
		Redundancy	0.25	1	.25
		Compaction during construction	0.25	2	.50
		Design Safety Factor, $S_B = \Sigma p$			1.5
Combined Safety Factor, $S_{TOT} = S_A \times S_B$				3	
Measured Infiltration Rate, inch/hr, K_M (corrected for test-specific bias)				4.4	
Design Infiltration Rate, in/hr, $K_{DESIGN} = S_{TOT} \times K_M$				13.2	

Supporting Data

Briefly describe infiltration test and provide reference to test forms:

Infiltration testing is available in the geotechnical report. See attached geotech report for infiltration testing.

Note: The minimum combined adjustment factor shall not be less than 2.0 and the maximum combined adjustment factor shall not exceed 9.0.

Detention Basin Infiltration Calculation

Project Name: Raising Canes Victorville
Completed by: AG
Reviewed by: LAC
Date: 31-Mar-23
Updated: 22-Oct-23
County: San Bernardino

BMP	Measured Infiltration Rate	Design Factor of Safety	Design Infiltration Rate	Detention Basin Infiltration Area	In/Hr to Ft/Sec Conversion Value	Constant Infiltration Rate
	(in/hr)		(in/hr)	(sf)		(cf/sec)
BMP 1	4.4	3.00	1.47	625	43200	0.021

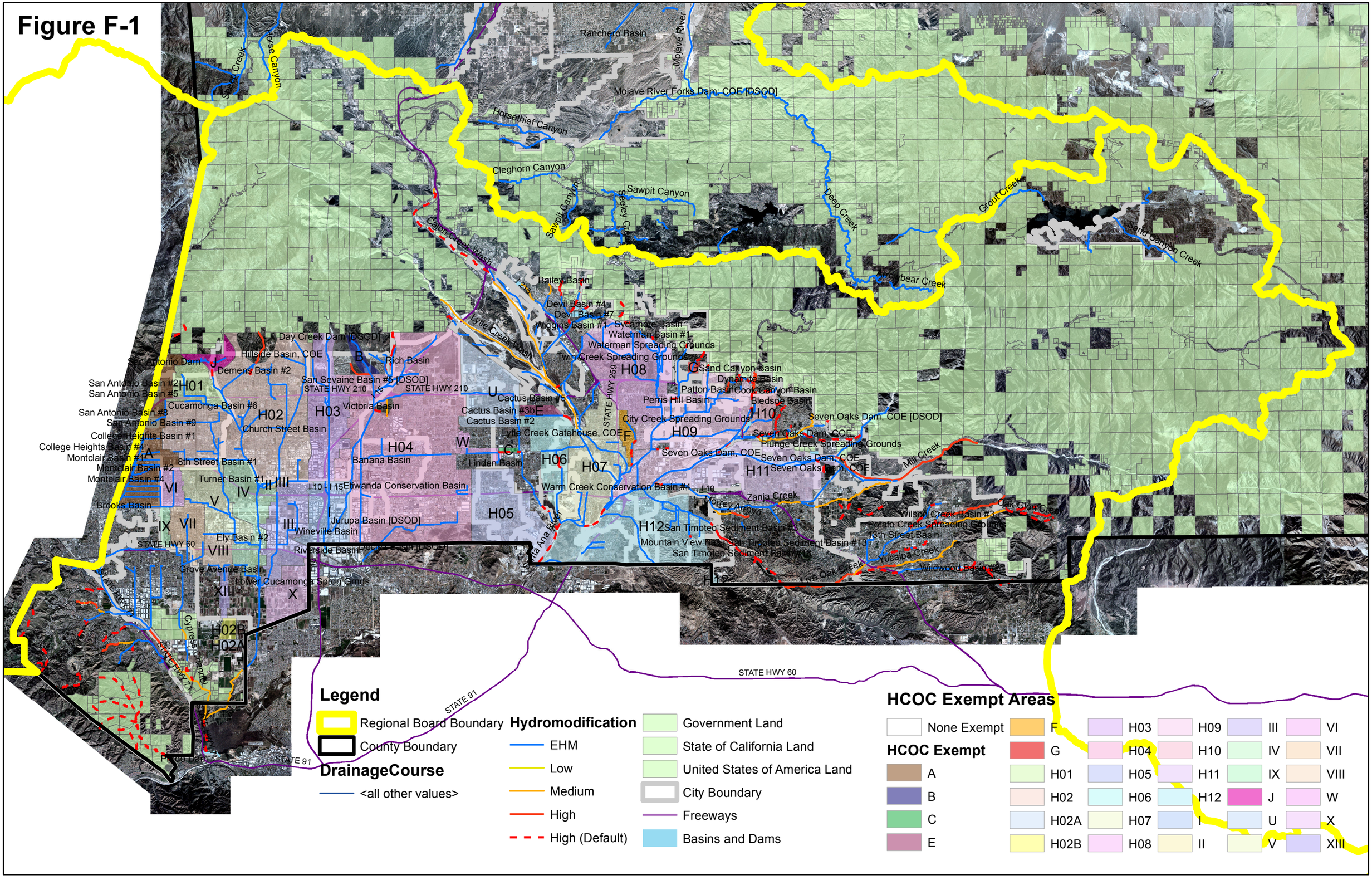
Drawdown Calculations

Project Name: Raising Cane's Victorville
Completed by: AG
Reviewed by: LAC
Date: 31-Mar-23
Updated: 22-Oct-23
County: San Bernardino

BMP	Design Infiltration Rate	Design Infiltration Rate Converted	Detention Basin Infiltration Area	Volume to Infiltrate	Drawdown Time
	(in/hr)	(ft/hr)	(sf)	(cf)	(hrs)
BMP 1	1.467	0.122	625	2416	31.628

6.9 HCOC

Figure F-1



Legend

- Regional Board Boundary
- County Boundary

DrainageCourse

- <all other values>

Hydromodification

- EHM
- Low
- Medium
- High
- High (Default)

- Government Land
- State of California Land
- United States of America Land
- City Boundary
- Freeways
- Basins and Dams

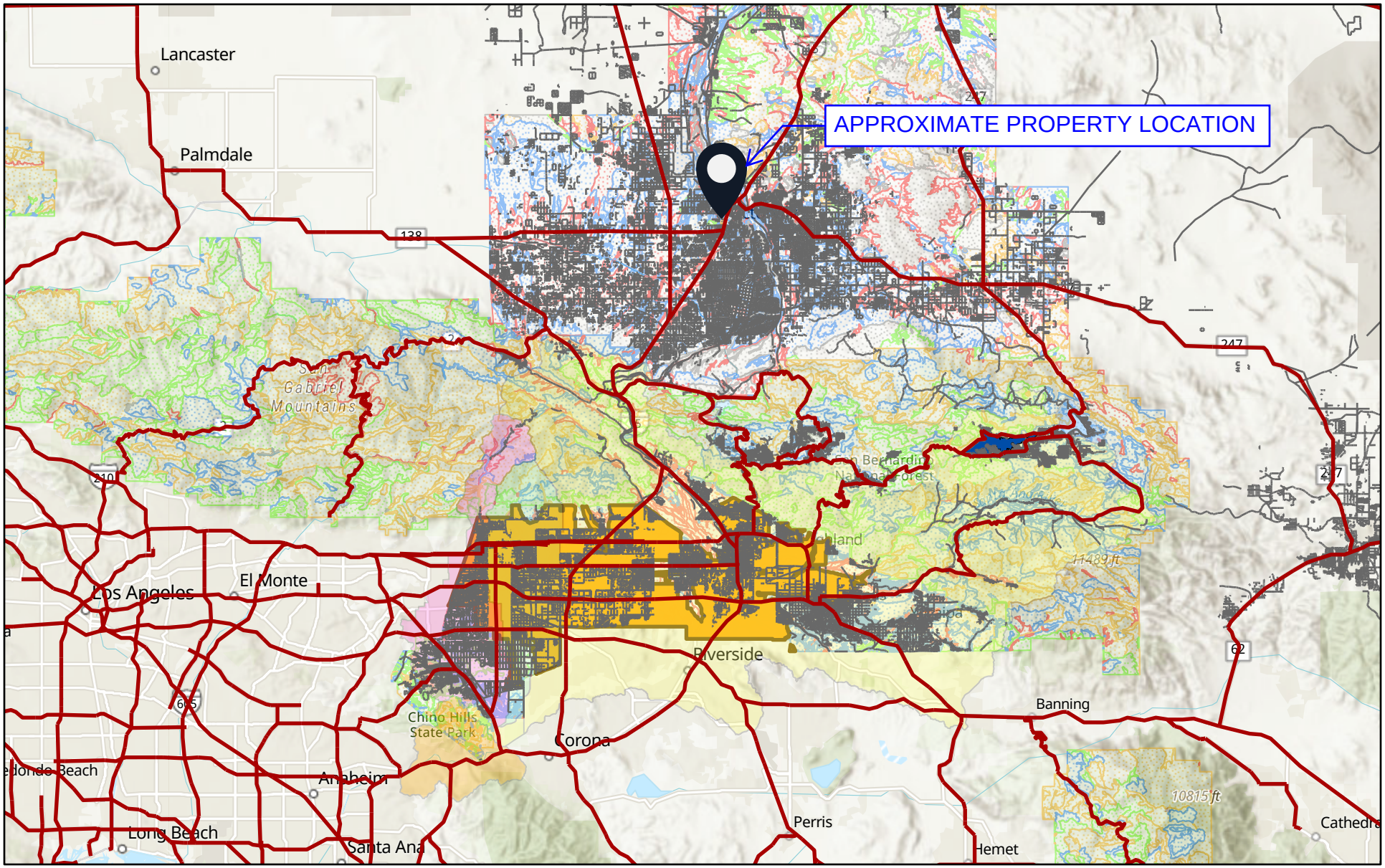
HCOC Exempt Areas

- None Exempt

HCOC Exempt

- A
- B
- C
- E
- F
- G
- H01
- H02
- H02A
- H02B
- H03
- H04
- H05
- H06
- H07
- H08
- H09
- H10
- H11
- H12
- I
- II
- III
- IV
- V
- VI
- VII
- VIII
- IX
- J
- U
- W
- X
- XIII

HCOC Exempt Areas



10/9/2023

1:873,428

0 5 10 20 mi

0 10 20 40 km

California State Parks, Esri, HERE, Garmin, SafeGraph, FAO, METI/NASA, USGS, Bureau of Land Management, EPA, NPS, Esri, CGIAR, USGS

Hydromodification

A.1 Hydrologic Conditions of Concern (HCOC) Analysis

HCOC Exemption:

1. **Sump Condition:** All downstream conveyance channel to an adequate sump (for example, Prado Dam, Santa Ana River, or other Lake, Reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

2. **Pre = Post**: The runoff flow rate, volume and velocity for the post-development condition of the Priority Development Project do not exceed the pre-development (i.e, naturally occurring condition for the 2-year, 24-hour rainfall event utilizing latest San Bernardino County Hydrology Manual.

    a. Submit a substantiated hydrologic analysis to justify your request.

3. **Diversion to Storage Area**: The drainage areas that divert to water storage areas which are considered as control/release point and utilized for water conservation.

    a. See Appendix F for the HCOC Exemption Map and the on-line Watershed Geodatabase (http://sbcounty.permitrack.com/wap) for reference.

4. **Less than One Acre**: The Priority Development Project disturbs less than one acre. The Co-permittee has the discretion to require a Project Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The project disturbs less than one acre and is not part of a common plan of development.

5. **Built Out Area**: The contributing watershed area to which the project discharges has a developed area percentage greater than 90 percent.

    a. See Appendix F for the HCOC Exemption Map and the on-line Watershed Geodatabase (http://sbcounty.permitrack.com/wap) for reference.

Summary of HCOC Exempted Area

	HCOC Exemption reasoning				
	1	2	3	4	5
Area					
A			X		X
B			X		
C					X
E			X		
F					X
G			X		X
H01	X		X		
H02	X		X		
H02A	X		X		
H02B			X		
H03			X		
H04	X		X		
H05	X				
H06			X		
H07	X				
H08	X		X		
H09	X				
H10	X		X		
H11	X		X		
H12	X				
J			X		
U			X		
W			X		
I			X		
II			X		
III					X
IV			X		X
V			X*		
VI					X
VII					X
VIII			X		
IX					X
X			X		
XIII			X		

*Detention/Conservation Basin

```
**************************************************************************
            RATIONAL METHOD HYDROLOGY COMPUTER PROGRAM PACKAGE
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        (c) Copyright 1983-2016 Advanced Engineering Software (aes)
            Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* RAISING CANE'S VICTORVILLE                                            *
* 2 YR EXISTING                                                         *
* 10.19.2023 JY                                                         *
 ************************************************************************

  FILE NAME: RCV2E.DAT
  TIME/DATE OF STUDY: 16:13 10/19/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3760

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
```

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   256.65
  ELEVATION DATA: UPSTREAM(FEET) =   2940.70  DOWNSTREAM(FEET) =   2932.40

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    9.593
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.357
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
        LAND USE           GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  NATURAL POOR COVER
  "BARREN"                   B        1.07      0.27     1.000    86    9.59
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.27
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  1.000
  SUBAREA RUNOFF(CFS) =      1.04
  TOTAL AREA(ACRES) =      1.07   PEAK FLOW RATE(CFS) =      1.04
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.1  TC(MIN.) =      9.59
  EFFECTIVE AREA(ACRES) =      1.07  AREA-AVERAGED Fm(INCH/HR)=  0.27
  AREA-AVERAGED Fp(INCH/HR) =  0.27  AREA-AVERAGED Ap = 1.000
  PEAK FLOW RATE(CFS)   =       1.04
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
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            Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:
```

```
 ************************* DESCRIPTION OF STUDY *************************
* RAISING CANE'S VICTORVILLE                                            *
* 2 YR PROPOSED                                                         *
* 10.19.2023 JY                                                         *
 ************************************************************************

  FILE NAME: RCV2P.DAT
  TIME/DATE OF STUDY: 16:08 10/19/2023
==========================================================================
  USER SPECIFIED HYDROLOGY AND HYDRAULIC MODEL INFORMATION:
==========================================================================
                    --*TIME-OF-CONCENTRATION MODEL*--

  USER SPECIFIED STORM EVENT(YEAR) =    2.00
  SPECIFIED MINIMUM PIPE SIZE(INCH) =   6.00
  SPECIFIED PERCENT OF GRADIENTS(DECIMAL) TO USE FOR FRICTION SLOPE = 0.95
  *USER-DEFINED LOGARITHMIC INTERPOLATION USED FOR RAINFALL*

  SLOPE OF INTENSITY DURATION CURVE(LOG(I;IN/HR) vs. LOG(Tc;MIN)) = 0.7000
  USER SPECIFIED 1-HOUR INTENSITY(INCH/HOUR) = 0.3760

  *ANTECEDENT MOISTURE CONDITION (AMC) II ASSUMED FOR RATIONAL METHOD*

  *USER-DEFINED STREET-SECTIONS FOR COUPLED PIPEFLOW AND STREETFLOW MODEL*
     HALF-  CROWN TO   STREET-CROSSFALL:   CURB  GUTTER-GEOMETRIES:  MANNING
     WIDTH  CROSSFALL  IN-  / OUT-/PARK-  HEIGHT  WIDTH  LIP   HIKE  FACTOR
NO.   (FT)     (FT)    SIDE / SIDE/ WAY    (FT)    (FT)  (FT)  (FT)    (n)
===  =====  =========  =================  ======  ===== ====== ===== =======
  1   30.0     20.0    0.018/0.018/0.020   0.67    2.00 0.0313 0.167 0.0150

  GLOBAL STREET FLOW-DEPTH CONSTRAINTS:
    1. Relative Flow-Depth =  0.00 FEET
       as (Maximum Allowable Street Flow Depth) - (Top-of-Curb)
    2. (Depth)*(Velocity) Constraint =  6.0 (FT*FT/S)
  *SIZE PIPE WITH A FLOW CAPACITY GREATER THAN
   OR EQUAL TO THE UPSTREAM TRIBUTARY PIPE.*
```

```
  *USER-SPECIFIED MINIMUM TOPOGRAPHIC SLOPE ADJUSTMENT NOT SELECTED

****************************************************************************
  FLOW PROCESS FROM NODE     10.00 TO NODE     11.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   206.46
  ELEVATION DATA: UPSTREAM(FEET) =   2934.33  DOWNSTREAM(FEET) =   2932.13

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    6.357
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.810
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.45      0.75     0.100    56    6.36
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.70
  TOTAL AREA(ACRES) =      0.45   PEAK FLOW RATE(CFS) =      0.70

****************************************************************************
  FLOW PROCESS FROM NODE     11.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2929.13  DOWNSTREAM(FEET) =  2927.07
  FLOW LENGTH(FEET) =   131.29   MANNING'S N =  0.012
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.7 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   4.29
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.70
  PIPE TRAVEL TIME(MIN.) =   0.51    Tc(MIN.) =    6.87
  LONGEST FLOWPATH FROM NODE     10.00 TO NODE     12.00 =     337.75 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.87
  RAINFALL INTENSITY(INCH/HR) =   1.71
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.10
```

```
  EFFECTIVE STREAM AREA(ACRES) =       0.45
  TOTAL STREAM AREA(ACRES) =       0.45
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.70

****************************************************************************
  FLOW PROCESS FROM NODE     20.00 TO NODE     21.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   203.26
  ELEVATION DATA: UPSTREAM(FEET) =   2934.33  DOWNSTREAM(FEET) =   2931.19

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.866
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  1.915
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap      SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.46      0.75     0.100    56    5.87
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.76
  TOTAL AREA(ACRES) =      0.46   PEAK FLOW RATE(CFS) =      0.76

****************************************************************************
  FLOW PROCESS FROM NODE     21.00 TO NODE     12.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2928.19  DOWNSTREAM(FEET) =  2927.07
  FLOW LENGTH(FEET) =   223.37   MANNING'S N =  0.012
  DEPTH OF FLOW IN   9.0 INCH PIPE IS   5.1 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   2.94
  ESTIMATED PIPE DIAMETER(INCH) =   9.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.76
  PIPE TRAVEL TIME(MIN.) =   1.27    Tc(MIN.) =    7.13
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     12.00 =     426.63 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     12.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    7.13
  RAINFALL INTENSITY(INCH/HR) =   1.67
```

```
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.46
  TOTAL STREAM AREA(ACRES) =       0.46
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.76

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        0.70    6.87    1.715  0.75( 0.07) 0.10       0.4      10.00
      2        0.76    7.13    1.670  0.75( 0.07) 0.10       0.5      20.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.46    6.87    1.715  0.75( 0.07) 0.10       0.9      10.00
      2        1.45    7.13    1.670  0.75( 0.07) 0.10       0.9      20.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.46    Tc(MIN.) =     6.87
  EFFECTIVE AREA(ACRES) =       0.89   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        0.9
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     12.00 =     426.63 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     12.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2927.07  DOWNSTREAM(FEET) =  2927.02
  FLOW LENGTH(FEET) =    11.05   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.34
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.46
  PIPE TRAVEL TIME(MIN.) =   0.06    Tc(MIN.) =    6.92
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     13.00 =     437.68 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
```

```
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
  TIME OF CONCENTRATION(MIN.) =    6.92
  RAINFALL INTENSITY(INCH/HR) =   1.70
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.89
  TOTAL STREAM AREA(ACRES) =       0.91
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.46

****************************************************************************
  FLOW PROCESS FROM NODE     30.00 TO NODE     31.00 IS CODE =  21
----------------------------------------------------------------------------
  >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
  >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
  INITIAL SUBAREA FLOW-LENGTH(FEET) =   139.29
  ELEVATION DATA: UPSTREAM(FEET) =   2934.33  DOWNSTREAM(FEET) =   2932.45

  Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
  SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.181
  *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.088
  SUBAREA Tc AND LOSS RATE DATA(AMC  II):
   DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
       LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
  COMMERCIAL                 B        0.17      0.75     0.100    56    5.18
  SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
  SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
  SUBAREA RUNOFF(CFS) =      0.31
  TOTAL AREA(ACRES) =      0.17   PEAK FLOW RATE(CFS) =      0.31

****************************************************************************
  FLOW PROCESS FROM NODE     31.00 TO NODE     13.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2927.45  DOWNSTREAM(FEET) =  2927.02
  FLOW LENGTH(FEET) =    25.02   MANNING'S N =  0.012
  DEPTH OF FLOW IN   6.0 INCH PIPE IS   2.6 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.70
  ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       0.31
  PIPE TRAVEL TIME(MIN.) =   0.11    Tc(MIN.) =    5.29
  LONGEST FLOWPATH FROM NODE     30.00 TO NODE     13.00 =     164.31 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     13.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
```

```
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
================================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.29
  RAINFALL INTENSITY(INCH/HR) =   2.06
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.17
  TOTAL STREAM AREA(ACRES) =       0.17
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.31

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.46    6.92    1.705  0.75( 0.07) 0.10       0.9      10.00
      1        1.45    7.19    1.661  0.75( 0.07) 0.10       0.9      20.00
      2        0.31    5.29    2.057  0.75( 0.07) 0.10       0.2      30.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.66    5.29    2.057  0.75( 0.07) 0.10       0.9      30.00
      2        1.71    6.92    1.705  0.75( 0.07) 0.10       1.1      10.00
      3        1.69    7.19    1.661  0.75( 0.07) 0.10       1.1      20.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       1.71    Tc(MIN.) =     6.92
  EFFECTIVE AREA(ACRES) =       1.06   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.1
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     13.00 =     437.68 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     13.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2927.02  DOWNSTREAM(FEET) =  2926.97
  FLOW LENGTH(FEET) =     9.28   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   6.8 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.70
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       1.71
  PIPE TRAVEL TIME(MIN.) =   0.04    Tc(MIN.) =    6.96
```

```
 LONGEST FLOWPATH FROM NODE     20.00 TO NODE     14.00 =     446.96 FEET.

****************************************************************************
 FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
 >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
============================================================================
 TOTAL NUMBER OF STREAMS =  2
 CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  1 ARE:
 TIME OF CONCENTRATION(MIN.) =    6.96
 RAINFALL INTENSITY(INCH/HR) =   1.70
 AREA-AVERAGED Fm(INCH/HR) =  0.07
 AREA-AVERAGED Fp(INCH/HR) =  0.75
 AREA-AVERAGED Ap =  0.10
 EFFECTIVE STREAM AREA(ACRES) =       1.06
 TOTAL STREAM AREA(ACRES) =       1.08
 PEAK FLOW RATE(CFS) AT CONFLUENCE =       1.71

****************************************************************************
 FLOW PROCESS FROM NODE     40.00 TO NODE     41.00 IS CODE =  21
----------------------------------------------------------------------------
 >>>>>RATIONAL METHOD INITIAL SUBAREA ANALYSIS<<<<<
 >>USE TIME-OF-CONCENTRATION NOMOGRAPH FOR INITIAL SUBAREA<<
============================================================================
 INITIAL SUBAREA FLOW-LENGTH(FEET) =   136.80
 ELEVATION DATA: UPSTREAM(FEET) =   2934.34  DOWNSTREAM(FEET) =   2932.58

 Tc = K*[(LENGTH** 3.00)/(ELEVATION CHANGE)]**0.20
 SUBAREA ANALYSIS USED MINIMUM Tc(MIN.) =    5.193
 *   2 YEAR RAINFALL INTENSITY(INCH/HR) =  2.085
 SUBAREA Tc AND LOSS RATE DATA(AMC  II):
  DEVELOPMENT TYPE/      SCS SOIL   AREA      Fp         Ap     SCS   Tc
      LAND USE            GROUP   (ACRES)  (INCH/HR)  (DECIMAL)  CN  (MIN.)
 COMMERCIAL                 B        0.42      0.75     0.100    56    5.19
 SUBAREA AVERAGE PERVIOUS LOSS RATE, Fp(INCH/HR) =  0.75
 SUBAREA AVERAGE PERVIOUS AREA FRACTION, Ap =  0.100
 SUBAREA RUNOFF(CFS) =      0.76
 TOTAL AREA(ACRES) =      0.42   PEAK FLOW RATE(CFS) =      0.76

****************************************************************************
 FLOW PROCESS FROM NODE     41.00 TO NODE     14.00 IS CODE =  31
----------------------------------------------------------------------------
 >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
 >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
 ELEVATION DATA: UPSTREAM(FEET) =  2929.58  DOWNSTREAM(FEET) =  2926.97
 FLOW LENGTH(FEET) =   129.50   MANNING'S N =  0.012
 DEPTH OF FLOW IN   6.0 INCH PIPE IS   4.5 INCHES
 PIPE-FLOW VELOCITY(FEET/SEC.) =   4.83
 ESTIMATED PIPE DIAMETER(INCH) =   6.00    NUMBER OF PIPES =   1
```

```
  PIPE-FLOW(CFS) =       0.76
  PIPE TRAVEL TIME(MIN.) =   0.45    Tc(MIN.) =    5.64
  LONGEST FLOWPATH FROM NODE     40.00 TO NODE     14.00 =     266.30 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     14.00 IS CODE =   1
----------------------------------------------------------------------------
  >>>>>DESIGNATE INDEPENDENT STREAM FOR CONFLUENCE<<<<<
  >>>>>AND COMPUTE VARIOUS CONFLUENCED STREAM VALUES<<<<<
============================================================================
  TOTAL NUMBER OF STREAMS =  2
  CONFLUENCE VALUES USED FOR INDEPENDENT STREAM  2 ARE:
  TIME OF CONCENTRATION(MIN.) =    5.64
  RAINFALL INTENSITY(INCH/HR) =   1.97
  AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.75
  AREA-AVERAGED Ap =  0.10
  EFFECTIVE STREAM AREA(ACRES) =       0.42
  TOTAL STREAM AREA(ACRES) =       0.42
  PEAK FLOW RATE(CFS) AT CONFLUENCE =       0.76

  ** CONFLUENCE DATA **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        1.66    5.34    2.046  0.75( 0.07) 0.10       0.9      30.00
      1        1.71    6.96    1.698  0.75( 0.07) 0.10       1.1      10.00
      1        1.69    7.23    1.654  0.75( 0.07) 0.10       1.1      20.00
      2        0.76    5.64    1.968  0.75( 0.07) 0.10       0.4      40.00

  RAINFALL INTENSITY AND TIME OF CONCENTRATION RATIO
  CONFLUENCE FORMULA USED FOR  2 STREAMS.

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.41    5.34    2.046  0.75( 0.07) 0.10       1.3      30.00
      2        2.43    5.64    1.968  0.75( 0.07) 0.10       1.3      40.00
      3        2.36    6.96    1.698  0.75( 0.07) 0.10       1.5      10.00
      4        2.33    7.23    1.654  0.75( 0.07) 0.10       1.5      20.00

  COMPUTED CONFLUENCE ESTIMATES ARE AS FOLLOWS:
  PEAK FLOW RATE(CFS) =       2.43    Tc(MIN.) =     5.64
  EFFECTIVE AREA(ACRES) =       1.31   AREA-AVERAGED Fm(INCH/HR) =  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap =  0.10
  TOTAL AREA(ACRES) =        1.5
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     14.00 =     446.96 FEET.

****************************************************************************
  FLOW PROCESS FROM NODE     14.00 TO NODE     15.00 IS CODE =  31
----------------------------------------------------------------------------
```

```
  >>>>>COMPUTE PIPE-FLOW TRAVEL TIME THRU SUBAREA<<<<<
  >>>>>USING COMPUTER-ESTIMATED PIPESIZE (NON-PRESSURE FLOW)<<<<<
============================================================================
  ELEVATION DATA: UPSTREAM(FEET) =  2926.97  DOWNSTREAM(FEET) =  2926.94
  FLOW LENGTH(FEET) =     6.76   MANNING'S N =  0.012
  DEPTH OF FLOW IN  12.0 INCH PIPE IS   9.5 INCHES
  PIPE-FLOW VELOCITY(FEET/SEC.) =   3.64
  ESTIMATED PIPE DIAMETER(INCH) =  12.00    NUMBER OF PIPES =   1
  PIPE-FLOW(CFS) =       2.43
  PIPE TRAVEL TIME(MIN.) =   0.03    Tc(MIN.) =    5.67
  LONGEST FLOWPATH FROM NODE     20.00 TO NODE     15.00 =     453.72 FEET.
============================================================================
  END OF STUDY SUMMARY:
  TOTAL AREA(ACRES)     =        1.5  TC(MIN.) =      5.67
  EFFECTIVE AREA(ACRES) =      1.31  AREA-AVERAGED Fm(INCH/HR)=  0.07
  AREA-AVERAGED Fp(INCH/HR) =  0.75  AREA-AVERAGED Ap = 0.100
  PEAK FLOW RATE(CFS)   =       2.43

  ** PEAK FLOW RATE TABLE **
   STREAM       Q      Tc   Intensity   Fp(Fm)     Ap     Ae     HEADWATER
   NUMBER     (CFS)  (MIN.) (INCH/HR) (INCH/HR)         (ACRES)    NODE
      1        2.41    5.37    2.038  0.75( 0.07) 0.10       1.3      30.00
      2        2.43    5.67    1.960  0.75( 0.07) 0.10       1.3      40.00
      3        2.36    7.00    1.692  0.75( 0.07) 0.10       1.5      10.00
      4        2.33    7.26    1.649  0.75( 0.07) 0.10       1.5      20.00
============================================================================
============================================================================
  END OF RATIONAL METHOD ANALYSIS
```

```
**************************************************************************
                    SMALL AREA UNIT HYDROGRAPH MODEL
==========================================================================
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             Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                          Analysis prepared by:




**************************************************************************
--------------------------------------------------------------------------

 Problem Descriptions:
  RAISING CANE'S VICTORVILLE
  2 YR EXISTING UNIT HYDROGRAPH
  10.19.2023 JY
--------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 1.11
    TOTAL CATCHMENT AREA(ACRES) =    1.02
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.272
    LOW LOSS FRACTION = 0.702
    TIME OF CONCENTRATION(MIN.) =  9.59
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.14
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.32
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.38
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.61
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  0.81
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  1.37

--------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.05
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.07

**************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
--------------------------------------------------------------------------
  0.02      0.0000      0.00  Q         .         .         .         .
  0.18      0.0000      0.01  Q         .         .         .         .
```

0.34	0.0001	0.01	Q	.	.	.	.
0.50	0.0002	0.01	Q	.	.	.	.
0.66	0.0003	0.01	Q	.	.	.	.
0.82	0.0004	0.01	Q	.	.	.	.
0.98	0.0005	0.01	Q	.	.	.	.
1.14	0.0006	0.01	Q	.	.	.	.
1.30	0.0007	0.01	Q	.	.	.	.
1.46	0.0008	0.01	Q	.	.	.	.
1.61	0.0009	0.01	Q	.	.	.	.
1.77	0.0010	0.01	Q	.	.	.	.
1.93	0.0011	0.01	Q	.	.	.	.
2.09	0.0012	0.01	Q	.	.	.	.
2.25	0.0013	0.01	Q	.	.	.	.
2.41	0.0015	0.01	Q	.	.	.	.
2.57	0.0016	0.01	Q	.	.	.	.
2.73	0.0017	0.01	Q	.	.	.	.
2.89	0.0018	0.01	Q	.	.	.	.
3.05	0.0019	0.01	Q	.	.	.	.
3.21	0.0020	0.01	Q	.	.	.	.
3.37	0.0021	0.01	Q	.	.	.	.
3.53	0.0022	0.01	Q	.	.	.	.
3.69	0.0023	0.01	Q	.	.	.	.
3.85	0.0024	0.01	Q	.	.	.	.
4.01	0.0025	0.01	Q	.	.	.	.
4.17	0.0027	0.01	Q	.	.	.	.
4.33	0.0028	0.01	Q	.	.	.	.
4.49	0.0029	0.01	Q	.	.	.	.
4.65	0.0030	0.01	Q	.	.	.	.
4.81	0.0031	0.01	Q	.	.	.	.
4.97	0.0032	0.01	Q	.	.	.	.
5.13	0.0034	0.01	Q	.	.	.	.
5.29	0.0035	0.01	Q	.	.	.	.
5.45	0.0036	0.01	Q	.	.	.	.
5.61	0.0037	0.01	Q	.	.	.	.
5.77	0.0039	0.01	Q	.	.	.	.
5.93	0.0040	0.01	Q	.	.	.	.
6.09	0.0041	0.01	Q	.	.	.	.
6.25	0.0042	0.01	Q	.	.	.	.
6.41	0.0044	0.01	Q	.	.	.	.
6.57	0.0045	0.01	Q	.	.	.	.
6.73	0.0046	0.01	Q	.	.	.	.
6.89	0.0048	0.01	Q	.	.	.	.
7.05	0.0049	0.01	Q	.	.	.	.
7.21	0.0050	0.01	Q	.	.	.	.
7.37	0.0052	0.01	Q	.	.	.	.
7.53	0.0053	0.01	Q	.	.	.	.
7.69	0.0055	0.01	Q	.	.	.	.
7.85	0.0056	0.01	Q	.	.	.	.
8.01	0.0057	0.01	Q	.	.	.	.
8.17	0.0059	0.01	Q	.	.	.	.

8.33	0.0060	0.01	Q	.	.	.	.
8.49	0.0062	0.01	Q	.	.	.	.
8.65	0.0063	0.01	Q	.	.	.	.
8.81	0.0065	0.01	Q	.	.	.	.
8.97	0.0067	0.01	Q	.	.	.	.
9.13	0.0068	0.01	Q	.	.	.	.
9.29	0.0070	0.01	Q	.	.	.	.
9.45	0.0071	0.01	Q	.	.	.	.
9.61	0.0073	0.01	Q	.	.	.	.
9.77	0.0075	0.01	Q	.	.	.	.
9.93	0.0076	0.01	Q	.	.	.	.
10.09	0.0078	0.01	Q	.	.	.	.
10.25	0.0080	0.01	Q	.	.	.	.
10.41	0.0082	0.01	Q	.	.	.	.
10.57	0.0084	0.01	Q	.	.	.	.
10.73	0.0085	0.01	Q	.	.	.	.
10.89	0.0087	0.01	Q	.	.	.	.
11.05	0.0089	0.01	Q	.	.	.	.
11.20	0.0091	0.02	Q	.	.	.	.
11.36	0.0093	0.02	Q	.	.	.	.
11.52	0.0095	0.02	Q	.	.	.	.
11.68	0.0097	0.02	Q	.	.	.	.
11.84	0.0100	0.02	Q	.	.	.	.
12.00	0.0102	0.02	Q	.	.	.	.
12.16	0.0104	0.02	Q	.	.	.	.
12.32	0.0107	0.02	Q	.	.	.	.
12.48	0.0109	0.02	Q	.	.	.	.
12.64	0.0112	0.02	Q	.	.	.	.
12.80	0.0115	0.02	Q	.	.	.	.
12.96	0.0118	0.02	Q	.	.	.	.
13.12	0.0121	0.02	Q	.	.	.	.
13.28	0.0124	0.02	Q	.	.	.	.
13.44	0.0127	0.02	Q	.	.	.	.
13.60	0.0130	0.03	Q	.	.	.	.
13.76	0.0134	0.03	Q	.	.	.	.
13.92	0.0137	0.03	Q	.	.	.	.
14.08	0.0141	0.03	Q	.	.	.	.
14.24	0.0145	0.03	Q	.	.	.	.
14.40	0.0149	0.03	Q	.	.	.	.
14.56	0.0153	0.03	Q	.	.	.	.
14.72	0.0158	0.04	Q	.	.	.	.
14.88	0.0163	0.04	Q	.	.	.	.
15.04	0.0168	0.04	Q	.	.	.	.
15.20	0.0174	0.05	Q	.	.	.	.
15.36	0.0180	0.05	Q	.	.	.	.
15.52	0.0186	0.03	Q	.	.	.	.
15.68	0.0190	0.04	Q	.	.	.	.
15.84	0.0200	0.12	Q	.	.	.	.
16.00	0.0221	0.21	Q	.	.	.	.
16.16	0.0304	1.04	.	Q	.	.	.	.

16.32	0.0376	0.05	Q	.	.	.	.
16.48	0.0382	0.05	Q	.	.	.	.
16.64	0.0388	0.04	Q	.	.	.	.
16.80	0.0393	0.04	Q	.	.	.	.
16.96	0.0398	0.03	Q	.	.	.	.
17.12	0.0402	0.03	Q	.	.	.	.
17.28	0.0406	0.03	Q	.	.	.	.
17.44	0.0409	0.02	Q	.	.	.	.
17.60	0.0412	0.02	Q	.	.	.	.
17.76	0.0415	0.02	Q	.	.	.	.
17.92	0.0418	0.02	Q	.	.	.	.
18.08	0.0421	0.02	Q	.	.	.	.
18.24	0.0423	0.02	Q	.	.	.	.
18.40	0.0425	0.02	Q	.	.	.	.
18.56	0.0427	0.02	Q	.	.	.	.
18.72	0.0429	0.01	Q	.	.	.	.
18.88	0.0431	0.01	Q	.	.	.	.
19.04	0.0433	0.01	Q	.	.	.	.
19.20	0.0435	0.01	Q	.	.	.	.
19.36	0.0437	0.01	Q	.	.	.	.
19.52	0.0438	0.01	Q	.	.	.	.
19.68	0.0440	0.01	Q	.	.	.	.
19.84	0.0441	0.01	Q	.	.	.	.
20.00	0.0443	0.01	Q	.	.	.	.
20.16	0.0444	0.01	Q	.	.	.	.
20.32	0.0446	0.01	Q	.	.	.	.
20.48	0.0447	0.01	Q	.	.	.	.
20.64	0.0449	0.01	Q	.	.	.	.
20.80	0.0450	0.01	Q	.	.	.	.
20.95	0.0451	0.01	Q	.	.	.	.
21.11	0.0453	0.01	Q	.	.	.	.
21.27	0.0454	0.01	Q	.	.	.	.
21.43	0.0455	0.01	Q	.	.	.	.
21.59	0.0456	0.01	Q	.	.	.	.
21.75	0.0458	0.01	Q	.	.	.	.
21.91	0.0459	0.01	Q	.	.	.	.
22.07	0.0460	0.01	Q	.	.	.	.
22.23	0.0461	0.01	Q	.	.	.	.
22.39	0.0462	0.01	Q	.	.	.	.
22.55	0.0463	0.01	Q	.	.	.	.
22.71	0.0464	0.01	Q	.	.	.	.
22.87	0.0466	0.01	Q	.	.	.	.
23.03	0.0467	0.01	Q	.	.	.	.
23.19	0.0468	0.01	Q	.	.	.	.
23.35	0.0469	0.01	Q	.	.	.	.
23.51	0.0470	0.01	Q	.	.	.	.
23.67	0.0471	0.01	Q	.	.	.	.
23.83	0.0472	0.01	Q	.	.	.	.
23.99	0.0473	0.01	Q	.	.	.	.
24.15	0.0474	0.01	Q	.	.	.	.

```
  24.31      0.0474      0.00  Q         .         .         .         .
 ------------------------------------------------------------------------------
-------------------------------------------------------------------------------
    TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
    (Note: 100% of Peak Flow Rate estimate assumed to have
    an instantaneous time duration)

    Percentile of Estimated                Duration
        Peak Flow Rate                     (minutes)
    ======================                 =========
               0%                           1448.1
              10%                             28.8
              20%                             19.2
              30%                              9.6
              40%                              9.6
              50%                              9.6
              60%                              9.6
              70%                              9.6
              80%                              9.6
              90%                              9.6
```

```
_______________________________________________________________________________
*******************************************************************************
                      SMALL AREA UNIT HYDROGRAPH MODEL
===============================================================================
         (C) Copyright 1989-2016 Advanced Engineering Software (aes)
             Ver. 23.0  Release Date: 07/01/2016  License ID 1499

                            Analysis prepared by:




*******************************************************************************
-------------------------------------------------------------------------------

 Problem Descriptions:
  RAISING CANE'S VICTORVILLE
  2 YR PROPOSED UNIT HYDROGRAPH
  10.19.2023 JY
-------------------------------------------------------------------------------


    RATIONAL METHOD CALIBRATION COEFFICIENT = 1.21
    TOTAL CATCHMENT AREA(ACRES) =    1.50
    SOIL-LOSS RATE, Fm,(INCH/HR) =  0.230
    LOW LOSS FRACTION = 0.417
    TIME OF CONCENTRATION(MIN.) =  5.67
    SMALL AREA PEAK Q COMPUTED USING PEAK FLOW RATE FORMULA
    USER SPECIFIED RAINFALL VALUES ARE USED
    RETURN FREQUENCY(YEARS) =   2
       5-MINUTE POINT RAINFALL VALUE(INCHES) =  0.14
      30-MINUTE POINT RAINFALL VALUE(INCHES) =  0.32
       1-HOUR   POINT RAINFALL VALUE(INCHES) =  0.38
       3-HOUR   POINT RAINFALL VALUE(INCHES) =  0.61
       6-HOUR   POINT RAINFALL VALUE(INCHES) =  0.81
      24-HOUR   POINT RAINFALL VALUE(INCHES) =  1.37

-------------------------------------------------------------------------------

    TOTAL CATCHMENT   RUNOFF  VOLUME(ACRE-FEET) =     0.13
    TOTAL CATCHMENT SOIL-LOSS VOLUME(ACRE-FEET) =     0.05

*******************************************************************************
  TIME     VOLUME       Q    0.        2.5       5.0       7.5      10.0
 (HOURS)    (AF)      (CFS)
-------------------------------------------------------------------------------
  0.03      0.0000      0.00  Q         .         .         .         .
  0.12      0.0001      0.02  Q         .         .         .         .
```

0.22	0.0003	0.02	Q	.	.	.	.
0.31	0.0004	0.02	Q	.	.	.	.
0.41	0.0006	0.02	Q	.	.	.	.
0.50	0.0008	0.02	Q	.	.	.	.
0.60	0.0010	0.02	Q	.	.	.	.
0.69	0.0012	0.02	Q	.	.	.	.
0.79	0.0013	0.02	Q	.	.	.	.
0.88	0.0015	0.02	Q	.	.	.	.
0.97	0.0017	0.02	Q	.	.	.	.
1.07	0.0019	0.02	Q	.	.	.	.
1.16	0.0021	0.02	Q	.	.	.	.
1.26	0.0023	0.02	Q	.	.	.	.
1.35	0.0025	0.02	Q	.	.	.	.
1.45	0.0026	0.02	Q	.	.	.	.
1.54	0.0028	0.02	Q	.	.	.	.
1.64	0.0030	0.02	Q	.	.	.	.
1.73	0.0032	0.02	Q	.	.	.	.
1.82	0.0034	0.02	Q	.	.	.	.
1.92	0.0036	0.02	Q	.	.	.	.
2.01	0.0038	0.02	Q	.	.	.	.
2.11	0.0040	0.02	Q	.	.	.	.
2.20	0.0042	0.02	Q	.	.	.	.
2.30	0.0044	0.02	Q	.	.	.	.
2.39	0.0046	0.02	Q	.	.	.	.
2.49	0.0047	0.03	Q	.	.	.	.
2.58	0.0049	0.03	Q	.	.	.	.
2.68	0.0051	0.03	Q	.	.	.	.
2.77	0.0053	0.03	Q	.	.	.	.
2.86	0.0055	0.03	Q	.	.	.	.
2.96	0.0057	0.03	Q	.	.	.	.
3.05	0.0059	0.03	Q	.	.	.	.
3.15	0.0061	0.03	Q	.	.	.	.
3.24	0.0063	0.03	Q	.	.	.	.
3.34	0.0065	0.03	Q	.	.	.	.
3.43	0.0068	0.03	Q	.	.	.	.
3.53	0.0070	0.03	Q	.	.	.	.
3.62	0.0072	0.03	Q	.	.	.	.
3.71	0.0074	0.03	Q	.	.	.	.
3.81	0.0076	0.03	Q	.	.	.	.
3.90	0.0078	0.03	Q	.	.	.	.
4.00	0.0080	0.03	Q	.	.	.	.
4.09	0.0082	0.03	Q	.	.	.	.
4.19	0.0084	0.03	Q	.	.	.	.
4.28	0.0086	0.03	Q	.	.	.	.
4.38	0.0089	0.03	Q	.	.	.	.
4.47	0.0091	0.03	Q	.	.	.	.
4.57	0.0093	0.03	Q	.	.	.	.
4.66	0.0095	0.03	Q	.	.	.	.
4.75	0.0097	0.03	Q	.	.	.	.
4.85	0.0099	0.03	Q	.	.	.	.

4.94	0.0102	0.03	Q	.	.	.	.
5.04	0.0104	0.03	Q	.	.	.	.
5.13	0.0106	0.03	Q	.	.	.	.
5.23	0.0108	0.03	Q	.	.	.	.
5.32	0.0111	0.03	Q	.	.	.	.
5.42	0.0113	0.03	Q	.	.	.	.
5.51	0.0115	0.03	Q	.	.	.	.
5.61	0.0118	0.03	Q	.	.	.	.
5.70	0.0120	0.03	Q	.	.	.	.
5.79	0.0122	0.03	Q	.	.	.	.
5.89	0.0125	0.03	Q	.	.	.	.
5.98	0.0127	0.03	Q	.	.	.	.
6.08	0.0129	0.03	Q	.	.	.	.
6.17	0.0132	0.03	Q	.	.	.	.
6.27	0.0134	0.03	Q	.	.	.	.
6.36	0.0136	0.03	Q	.	.	.	.
6.46	0.0139	0.03	Q	.	.	.	.
6.55	0.0141	0.03	Q	.	.	.	.
6.64	0.0144	0.03	Q	.	.	.	.
6.74	0.0146	0.03	Q	.	.	.	.
6.83	0.0149	0.03	Q	.	.	.	.
6.93	0.0151	0.03	Q	.	.	.	.
7.02	0.0154	0.03	Q	.	.	.	.
7.12	0.0156	0.03	Q	.	.	.	.
7.21	0.0159	0.03	Q	.	.	.	.
7.31	0.0161	0.03	Q	.	.	.	.
7.40	0.0164	0.03	Q	.	.	.	.
7.49	0.0167	0.03	Q	.	.	.	.
7.59	0.0169	0.03	Q	.	.	.	.
7.68	0.0172	0.03	Q	.	.	.	.
7.78	0.0175	0.03	Q	.	.	.	.
7.87	0.0177	0.03	Q	.	.	.	.
7.97	0.0180	0.03	Q	.	.	.	.
8.06	0.0183	0.03	Q	.	.	.	.
8.16	0.0185	0.04	Q	.	.	.	.
8.25	0.0188	0.04	Q	.	.	.	.
8.35	0.0191	0.04	Q	.	.	.	.
8.44	0.0194	0.04	Q	.	.	.	.
8.53	0.0197	0.04	Q	.	.	.	.
8.63	0.0199	0.04	Q	.	.	.	.
8.72	0.0202	0.04	Q	.	.	.	.
8.82	0.0205	0.04	Q	.	.	.	.
8.91	0.0208	0.04	Q	.	.	.	.
9.01	0.0211	0.04	Q	.	.	.	.
9.10	0.0214	0.04	Q	.	.	.	.
9.20	0.0217	0.04	Q	.	.	.	.
9.29	0.0220	0.04	Q	.	.	.	.
9.38	0.0223	0.04	Q	.	.	.	.
9.48	0.0226	0.04	Q	.	.	.	.
9.57	0.0229	0.04	Q	.	.	.	.

9.67	0.0232	0.04	Q	.	.	.	.
9.76	0.0235	0.04	Q	.	.	.	.
9.86	0.0239	0.04	Q	.	.	.	.
9.95	0.0242	0.04	Q	.	.	.	.
10.05	0.0245	0.04	Q	.	.	.	.
10.14	0.0248	0.04	Q	.	.	.	.
10.24	0.0252	0.04	Q	.	.	.	.
10.33	0.0255	0.04	Q	.	.	.	.
10.42	0.0258	0.04	Q	.	.	.	.
10.52	0.0262	0.04	Q	.	.	.	.
10.61	0.0265	0.04	Q	.	.	.	.
10.71	0.0269	0.04	Q	.	.	.	.
10.80	0.0272	0.05	Q	.	.	.	.
10.90	0.0276	0.05	Q	.	.	.	.
10.99	0.0279	0.05	Q	.	.	.	.
11.09	0.0283	0.05	Q	.	.	.	.
11.18	0.0287	0.05	Q	.	.	.	.
11.27	0.0290	0.05	Q	.	.	.	.
11.37	0.0294	0.05	Q	.	.	.	.
11.46	0.0298	0.05	Q	.	.	.	.
11.56	0.0302	0.05	Q	.	.	.	.
11.65	0.0306	0.05	Q	.	.	.	.
11.75	0.0310	0.05	Q	.	.	.	.
11.84	0.0314	0.05	Q	.	.	.	.
11.94	0.0318	0.05	Q	.	.	.	.
12.03	0.0322	0.05	Q	.	.	.	.
12.13	0.0327	0.06	Q	.	.	.	.
12.22	0.0331	0.06	Q	.	.	.	.
12.31	0.0336	0.06	Q	.	.	.	.
12.41	0.0341	0.06	Q	.	.	.	.
12.50	0.0346	0.07	Q	.	.	.	.
12.60	0.0351	0.07	Q	.	.	.	.
12.69	0.0357	0.07	Q	.	.	.	.
12.79	0.0362	0.07	Q	.	.	.	.
12.88	0.0367	0.07	Q	.	.	.	.
12.98	0.0373	0.07	Q	.	.	.	.
13.07	0.0378	0.07	Q	.	.	.	.
13.16	0.0384	0.07	Q	.	.	.	.
13.26	0.0390	0.07	Q	.	.	.	.
13.35	0.0396	0.08	Q	.	.	.	.
13.45	0.0402	0.08	Q	.	.	.	.
13.54	0.0408	0.08	Q	.	.	.	.
13.64	0.0414	0.08	Q	.	.	.	.
13.73	0.0421	0.08	Q	.	.	.	.
13.83	0.0427	0.09	Q	.	.	.	.
13.92	0.0434	0.09	Q	.	.	.	.
14.02	0.0441	0.09	Q	.	.	.	.
14.11	0.0448	0.09	Q	.	.	.	.
14.20	0.0455	0.10	Q	.	.	.	.
14.30	0.0463	0.10	Q	.	.	.	.

14.39	0.0471	0.10	Q	.	.	.	.
14.49	0.0479	0.11	Q	.	.	.	.
14.58	0.0487	0.11	Q	.	.	.	.
14.68	0.0496	0.11	Q	.	.	.	.
14.77	0.0505	0.12	Q	.	.	.	.
14.87	0.0515	0.12	Q	.	.	.	.
14.96	0.0524	0.13	Q	.	.	.	.
15.05	0.0535	0.13	Q	.	.	.	.
15.15	0.0546	0.14	Q	.	.	.	.
15.24	0.0557	0.15	Q	.	.	.	.
15.34	0.0569	0.16	Q	.	.	.	.
15.43	0.0581	0.12	Q	.	.	.	.
15.53	0.0589	0.10	Q	.	.	.	.
15.62	0.0598	0.11	Q	.	.	.	.
15.72	0.0610	0.19	Q	.	.	.	.
15.81	0.0631	0.35	.Q	.	.	.	.
15.91	0.0663	0.48	.Q	.	.	.	.
16.00	0.0709	0.68	. Q	.	.	.	.
16.09	0.0830	2.43	.	Q.	.	.	.
16.19	0.0941	0.40	.Q	.	.	.	.
16.28	0.0961	0.13	Q	.	.	.	.
16.38	0.0970	0.09	Q	.	.	.	.
16.47	0.0980	0.16	Q	.	.	.	.
16.57	0.0991	0.14	Q	.	.	.	.
16.66	0.1002	0.13	Q	.	.	.	.
16.76	0.1011	0.12	Q	.	.	.	.
16.85	0.1020	0.11	Q	.	.	.	.
16.94	0.1028	0.10	Q	.	.	.	.
17.04	0.1036	0.09	Q	.	.	.	.
17.13	0.1043	0.09	Q	.	.	.	.
17.23	0.1049	0.08	Q	.	.	.	.
17.32	0.1056	0.08	Q	.	.	.	.
17.42	0.1062	0.08	Q	.	.	.	.
17.51	0.1068	0.07	Q	.	.	.	.
17.61	0.1074	0.07	Q	.	.	.	.
17.70	0.1079	0.07	Q	.	.	.	.
17.80	0.1084	0.07	Q	.	.	.	.
17.89	0.1090	0.06	Q	.	.	.	.
17.98	0.1094	0.06	Q	.	.	.	.
18.08	0.1099	0.06	Q	.	.	.	.
18.17	0.1103	0.05	Q	.	.	.	.
18.27	0.1108	0.05	Q	.	.	.	.
18.36	0.1111	0.05	Q	.	.	.	.
18.46	0.1115	0.05	Q	.	.	.	.
18.55	0.1119	0.05	Q	.	.	.	.
18.65	0.1123	0.05	Q	.	.	.	.
18.74	0.1126	0.05	Q	.	.	.	.
18.83	0.1130	0.04	Q	.	.	.	.
18.93	0.1133	0.04	Q	.	.	.	.
19.02	0.1136	0.04	Q	.	.	.	.

19.12	0.1140	0.04	Q	.	.	.	.
19.21	0.1143	0.04	Q	.	.	.	.
19.31	0.1146	0.04	Q	.	.	.	.
19.40	0.1149	0.04	Q	.	.	.	.
19.50	0.1152	0.04	Q	.	.	.	.
19.59	0.1155	0.04	Q	.	.	.	.
19.69	0.1158	0.04	Q	.	.	.	.
19.78	0.1161	0.04	Q	.	.	.	.
19.87	0.1164	0.04	Q	.	.	.	.
19.97	0.1167	0.04	Q	.	.	.	.
20.06	0.1169	0.04	Q	.	.	.	.
20.16	0.1172	0.03	Q	.	.	.	.
20.25	0.1175	0.03	Q	.	.	.	.
20.35	0.1177	0.03	Q	.	.	.	.
20.44	0.1180	0.03	Q	.	.	.	.
20.54	0.1183	0.03	Q	.	.	.	.
20.63	0.1185	0.03	Q	.	.	.	.
20.73	0.1188	0.03	Q	.	.	.	.
20.82	0.1190	0.03	Q	.	.	.	.
20.91	0.1193	0.03	Q	.	.	.	.
21.01	0.1195	0.03	Q	.	.	.	.
21.10	0.1197	0.03	Q	.	.	.	.
21.20	0.1200	0.03	Q	.	.	.	.
21.29	0.1202	0.03	Q	.	.	.	.
21.39	0.1204	0.03	Q	.	.	.	.
21.48	0.1207	0.03	Q	.	.	.	.
21.58	0.1209	0.03	Q	.	.	.	.
21.67	0.1211	0.03	Q	.	.	.	.
21.76	0.1213	0.03	Q	.	.	.	.
21.86	0.1216	0.03	Q	.	.	.	.
21.95	0.1218	0.03	Q	.	.	.	.
22.05	0.1220	0.03	Q	.	.	.	.
22.14	0.1222	0.03	Q	.	.	.	.
22.24	0.1224	0.03	Q	.	.	.	.
22.33	0.1226	0.03	Q	.	.	.	.
22.43	0.1228	0.03	Q	.	.	.	.
22.52	0.1230	0.03	Q	.	.	.	.
22.61	0.1232	0.03	Q	.	.	.	.
22.71	0.1234	0.03	Q	.	.	.	.
22.80	0.1236	0.03	Q	.	.	.	.
22.90	0.1238	0.03	Q	.	.	.	.
22.99	0.1240	0.02	Q	.	.	.	.
23.09	0.1242	0.02	Q	.	.	.	.
23.18	0.1244	0.02	Q	.	.	.	.
23.28	0.1246	0.02	Q	.	.	.	.
23.37	0.1248	0.02	Q	.	.	.	.
23.47	0.1250	0.02	Q	.	.	.	.
23.56	0.1251	0.02	Q	.	.	.	.
23.65	0.1253	0.02	Q	.	.	.	.
23.75	0.1255	0.02	Q	.	.	.	.

23.84	0.1257	0.02	Q	.	.	.	.
23.94	0.1259	0.02	Q	.	.	.	.
24.03	0.1261	0.02	Q	.	.	.	.
24.13	0.1261	0.00	Q	.	.	.	.

TIME DURATION(minutes) OF PERCENTILES OF ESTIMATED PEAK FLOW RATE:
(Note: 100% of Peak Flow Rate estimate assumed to have
an instantaneous time duration)

Percentile of Estimated Peak Flow Rate	Duration (minutes)
0%	1440.2
10%	28.4
20%	11.3
30%	5.7
40%	5.7
50%	5.7
60%	5.7
70%	5.7
80%	5.7
90%	5.7

Project Summary	
Title	Raising Cane's Victorville 2-yr 24 -hr Analysis
Engineer	
Company	Kimley-Horn and Associates, Inc.
Date	10/17/2023

Notes	1. Inflow hydrographs calculated using the AES Software.

Table of Contents

Subsection: User Notifications

User Notifications?	No user notifications generated.

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
Onsite	Base	0	5,458.000	16.103	2.43000

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
O-2	Base	0	0.000	0.000	0.00000

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
PRINSCO (IN)	Base	0	5,465.000	16.100	2.38354	(N/A)	(N/A)
PRINSCO (OUT)	Base	0	0.000	0.000	0.00000	2,928.070	3,998.000

Peak Discharge	2.43000 ft³/s
Time to Peak	16.103 hours
Hydrograph Volume	5,457.900 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.094 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00000	0.00000	0.02000	0.02000	0.02000
0.471	0.02000	0.02000	0.02000	0.02000	0.02000
0.942	0.02000	0.02000	0.02000	0.02000	0.02000
1.413	0.02000	0.02000	0.02000	0.02000	0.02000
1.883	0.02000	0.02000	0.02000	0.02000	0.02000
2.354	0.02000	0.02000	0.03000	0.03000	0.03000
2.825	0.03000	0.03000	0.03000	0.03000	0.03000
3.296	0.03000	0.03000	0.03000	0.03000	0.03000
3.767	0.03000	0.03000	0.03000	0.03000	0.03000
4.238	0.03000	0.03000	0.03000	0.03000	0.03000
4.708	0.03000	0.03000	0.03000	0.03000	0.03000
5.179	0.03000	0.03000	0.03000	0.03000	0.03000
5.650	0.03000	0.03000	0.03000	0.03000	0.03000
6.121	0.03000	0.03000	0.03000	0.03000	0.03000
6.592	0.03000	0.03000	0.03000	0.03000	0.03000
7.063	0.03000	0.03000	0.03000	0.03000	0.03000
7.533	0.03000	0.03000	0.03000	0.03000	0.03000
8.004	0.03000	0.03000	0.04000	0.04000	0.04000
8.475	0.04000	0.04000	0.04000	0.04000	0.04000
8.946	0.04000	0.04000	0.04000	0.04000	0.04000
9.417	0.04000	0.04000	0.04000	0.04000	0.04000
9.888	0.04000	0.04000	0.04000	0.04000	0.04000
10.358	0.04000	0.04000	0.04000	0.04000	0.04000
10.829	0.05000	0.05000	0.05000	0.05000	0.05000
11.300	0.05000	0.05000	0.05000	0.05000	0.05000
11.771	0.05000	0.05000	0.05000	0.05000	0.06000
12.242	0.06000	0.06000	0.06000	0.07000	0.07000
12.713	0.07000	0.07000	0.07000	0.07000	0.07000
13.183	0.07000	0.07000	0.08000	0.08000	0.08000
13.654	0.08000	0.08000	0.09000	0.09000	0.09000
14.125	0.09000	0.10000	0.10000	0.10000	0.11000
14.596	0.11000	0.11000	0.12000	0.12000	0.13000
15.067	0.13000	0.14000	0.15000	0.16000	0.12000
15.538	0.10000	0.11000	0.19000	0.35000	0.48000
16.008	0.68000	2.43000	0.40000	0.13000	0.09000
16.479	0.16000	0.14000	0.13000	0.12000	0.11000
16.950	0.10000	0.09000	0.09000	0.08000	0.08000
17.421	0.08000	0.07000	0.07000	0.07000	0.07000
17.892	0.06000	0.06000	0.06000	0.05000	0.05000

Subsection: Read Hydrograph
Scenario: Base
Label: Onsite

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.094 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
18.363	0.05000	0.05000	0.05000	0.05000	0.05000
18.833	0.04000	0.04000	0.04000	0.04000	0.04000
19.304	0.04000	0.04000	0.04000	0.04000	0.04000
19.775	0.04000	0.04000	0.04000	0.04000	0.03000
20.246	0.03000	0.03000	0.03000	0.03000	0.03000
20.717	0.03000	0.03000	0.03000	0.03000	0.03000
21.188	0.03000	0.03000	0.03000	0.03000	0.03000
21.658	0.03000	0.03000	0.03000	0.03000	0.03000
22.129	0.03000	0.03000	0.03000	0.03000	0.03000
22.600	0.03000	0.03000	0.03000	0.03000	0.02000
23.071	0.02000	0.02000	0.02000	0.02000	0.02000
23.542	0.02000	0.02000	0.02000	0.02000	0.02000
24.013	0.02000	0.00000	(N/A)	(N/A)	(N/A)

Subsection: Time vs. Elevation
Label: PRINSCO (IN)

Scenario: Base

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	2,925.020	2,925.020	2,925.020	2,925.021	2,925.024
0.250	2,925.027	2,925.030	2,925.033	2,925.036	2,925.039
0.500	2,925.042	2,925.045	2,925.048	2,925.051	2,925.054
0.750	2,925.057	2,925.060	2,925.063	2,925.065	2,925.068
1.000	2,925.071	2,925.074	2,925.076	2,925.079	2,925.082
1.250	2,925.085	2,925.087	2,925.090	2,925.093	2,925.095
1.500	2,925.098	2,925.101	2,925.103	2,925.106	2,925.108
1.750	2,925.111	2,925.114	2,925.116	2,925.119	2,925.121
2.000	2,925.124	2,925.126	2,925.128	2,925.131	2,925.133
2.250	2,925.135	2,925.138	2,925.140	2,925.143	2,925.145
2.500	2,925.148	2,925.151	2,925.155	2,925.159	2,925.163
2.750	2,925.167	2,925.170	2,925.174	2,925.177	2,925.181
3.000	2,925.185	2,925.188	2,925.192	2,925.196	2,925.199
3.250	2,925.203	2,925.206	2,925.210	2,925.213	2,925.217
3.500	2,925.220	2,925.223	2,925.227	2,925.230	2,925.233
3.750	2,925.237	2,925.240	2,925.243	2,925.246	2,925.250
4.000	2,925.253	2,925.256	2,925.259	2,925.262	2,925.265
4.250	2,925.268	2,925.271	2,925.274	2,925.278	2,925.281
4.500	2,925.283	2,925.286	2,925.289	2,925.292	2,925.295
4.750	2,925.298	2,925.301	2,925.304	2,925.307	2,925.310
5.000	2,925.312	2,925.315	2,925.318	2,925.321	2,925.323
5.250	2,925.326	2,925.329	2,925.331	2,925.334	2,925.337
5.500	2,925.339	2,925.342	2,925.344	2,925.347	2,925.349
5.750	2,925.352	2,925.354	2,925.357	2,925.360	2,925.362
6.000	2,925.365	2,925.367	2,925.369	2,925.372	2,925.374
6.250	2,925.376	2,925.379	2,925.381	2,925.384	2,925.386
6.500	2,925.388	2,925.390	2,925.393	2,925.395	2,925.397
6.750	2,925.399	2,925.401	2,925.404	2,925.406	2,925.408
7.000	2,925.410	2,925.412	2,925.414	2,925.417	2,925.418
7.250	2,925.421	2,925.423	2,925.425	2,925.427	2,925.429
7.500	2,925.431	2,925.433	2,925.435	2,925.437	2,925.439
7.750	2,925.441	2,925.443	2,925.445	2,925.447	2,925.448
8.000	2,925.450	2,925.452	2,925.454	2,925.456	2,925.459
8.250	2,925.463	2,925.466	2,925.469	2,925.473	2,925.476
8.500	2,925.479	2,925.482	2,925.486	2,925.489	2,925.492
8.750	2,925.495	2,925.498	2,925.501	2,925.504	2,925.508
9.000	2,925.511	2,925.514	2,925.517	2,925.520	2,925.523
9.250	2,925.526	2,925.529	2,925.532	2,925.535	2,925.538
9.500	2,925.541	2,925.543	2,925.547	2,925.550	2,925.552
9.750	2,925.555	2,925.559	2,925.562	2,925.564	2,925.567
10.000	2,925.570	2,925.573	2,925.576	2,925.579	2,925.582
10.250	2,925.585	2,925.588	2,925.591	2,925.594	2,925.597
10.500	2,925.600	2,925.603	2,925.606	2,925.609	2,925.612

Subsection: Time vs. Elevation
Label: PRINSCO (IN)

Scenario: Base

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.750	2,925.615	2,925.619	2,925.623	2,925.628	2,925.632
11.000	2,925.637	2,925.641	2,925.646	2,925.651	2,925.655
11.250	2,925.660	2,925.664	2,925.669	2,925.673	2,925.678
11.500	2,925.682	2,925.687	2,925.692	2,925.696	2,925.701
11.750	2,925.705	2,925.710	2,925.714	2,925.719	2,925.723
12.000	2,925.728	2,925.733	2,925.738	2,925.743	2,925.749
12.250	2,925.755	2,925.762	2,925.768	2,925.774	2,925.780
12.500	2,925.787	2,925.794	2,925.802	2,925.810	2,925.818
12.750	2,925.825	2,925.833	2,925.841	2,925.848	2,925.856
13.000	2,925.864	2,925.872	2,925.879	2,925.887	2,925.895
13.250	2,925.902	2,925.910	2,925.919	2,925.928	2,925.937
13.500	2,925.946	2,925.956	2,925.965	2,925.974	2,925.983
13.750	2,925.993	2,926.002	2,926.013	2,926.023	2,926.032
14.000	2,926.041	2,926.049	2,926.058	2,926.067	2,926.076
14.250	2,926.086	2,926.096	2,926.106	2,926.117	2,926.127
14.500	2,926.138	2,926.149	2,926.161	2,926.172	2,926.183
14.750	2,926.195	2,926.208	2,926.220	2,926.233	2,926.246
15.000	2,926.260	2,926.274	2,926.288	2,926.302	2,926.318
15.250	2,926.334	2,926.351	2,926.368	2,926.384	2,926.398
15.500	2,926.410	2,926.420	2,926.431	2,926.443	2,926.459
15.750	2,926.482	2,926.514	2,926.557	2,926.609	2,926.672
16.000	2,926.747	2,926.881	2,927.126	2,927.369	2,927.483
16.250	2,927.522	2,927.544	2,927.557	2,927.567	2,927.580
16.500	2,927.597	2,927.614	2,927.630	2,927.645	2,927.659
16.750	2,927.673	2,927.686	2,927.698	2,927.709	2,927.720
17.000	2,927.730	2,927.739	2,927.749	2,927.758	2,927.766
17.250	2,927.774	2,927.782	2,927.790	2,927.797	2,927.805
17.500	2,927.812	2,927.819	2,927.825	2,927.832	2,927.838
17.750	2,927.844	2,927.851	2,927.857	2,927.862	2,927.867
18.000	2,927.873	2,927.878	2,927.883	2,927.887	2,927.891
18.250	2,927.895	2,927.899	2,927.903	2,927.906	2,927.910
18.500	2,927.914	2,927.918	2,927.922	2,927.926	2,927.929
18.750	2,927.933	2,927.937	2,927.939	2,927.942	2,927.944
19.000	2,927.947	2,927.949	2,927.952	2,927.954	2,927.957
19.250	2,927.959	2,927.962	2,927.964	2,927.967	2,927.969
19.500	2,927.972	2,927.974	2,927.977	2,927.979	2,927.982
19.750	2,927.984	2,927.987	2,927.989	2,927.992	2,927.994
20.000	2,927.997	2,928.000	2,928.002	2,928.003	2,928.004
20.250	2,928.006	2,928.007	2,928.008	2,928.009	2,928.010
20.500	2,928.011	2,928.013	2,928.014	2,928.015	2,928.016
20.750	2,928.017	2,928.019	2,928.020	2,928.021	2,928.022
21.000	2,928.023	2,928.025	2,928.026	2,928.027	2,928.028
21.250	2,928.030	2,928.031	2,928.032	2,928.033	2,928.034

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
21.500	2,928.035	2,928.037	2,928.038	2,928.039	2,928.040
21.750	2,928.042	2,928.043	2,928.044	2,928.045	2,928.046
22.000	2,928.048	2,928.049	2,928.050	2,928.051	2,928.052
22.250	2,928.054	2,928.055	2,928.056	2,928.057	2,928.059
22.500	2,928.060	2,928.061	2,928.062	2,928.063	2,928.064
22.750	2,928.066	2,928.067	2,928.068	2,928.069	2,928.070
23.000	2,928.070	2,928.070	2,928.070	2,928.070	2,928.069
23.250	2,928.069	2,928.069	2,928.069	2,928.069	2,928.069
23.500	2,928.069	2,928.068	2,928.068	2,928.068	2,928.068
23.750	2,928.068	2,928.068	2,928.068	2,928.067	2,928.067
24.000	2,928.067	(N/A)	(N/A)	(N/A)	(N/A)

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
0.000	0.000	0.000	0.000	1.000	4.000
0.250	8.000	12.000	15.000	19.000	23.000
0.500	26.000	30.000	33.000	37.000	40.000
0.750	44.000	47.000	51.000	54.000	57.000
1.000	61.000	64.000	67.000	71.000	74.000
1.250	77.000	81.000	84.000	87.000	90.000
1.500	93.000	96.000	99.000	102.000	104.000
1.750	107.000	110.000	113.000	115.000	118.000
2.000	120.000	123.000	126.000	128.000	131.000
2.250	133.000	136.000	138.000	141.000	143.000
2.500	146.000	150.000	154.000	158.000	162.000
2.750	166.000	170.000	174.000	178.000	182.000
3.000	186.000	189.000	193.000	198.000	202.000
3.250	206.000	210.000	214.000	219.000	223.000
3.500	227.000	231.000	235.000	239.000	243.000
3.750	247.000	251.000	254.000	258.000	262.000
4.000	266.000	270.000	273.000	277.000	281.000
4.250	285.000	288.000	292.000	296.000	299.000
4.500	303.000	306.000	310.000	313.000	317.000
4.750	320.000	324.000	327.000	330.000	334.000
5.000	337.000	340.000	344.000	347.000	350.000
5.250	353.000	357.000	360.000	363.000	366.000
5.500	369.000	372.000	375.000	378.000	381.000
5.750	384.000	387.000	390.000	392.000	395.000
6.000	397.000	400.000	403.000	405.000	408.000
6.250	410.000	413.000	415.000	418.000	420.000
6.500	422.000	425.000	427.000	430.000	432.000
6.750	434.000	437.000	439.000	441.000	444.000
7.000	446.000	448.000	450.000	453.000	455.000
7.250	457.000	459.000	461.000	464.000	466.000
7.500	468.000	470.000	472.000	474.000	476.000
7.750	478.000	481.000	483.000	485.000	487.000
8.000	490.000	492.000	494.000	497.000	501.000
8.250	505.000	509.000	513.000	517.000	520.000
8.500	524.000	528.000	532.000	536.000	540.000
8.750	543.000	547.000	551.000	555.000	558.000
9.000	562.000	566.000	569.000	573.000	576.000
9.250	580.000	583.000	587.000	591.000	594.000
9.500	598.000	601.000	605.000	608.000	612.000
9.750	615.000	619.000	623.000	626.000	630.000
10.000	633.000	637.000	640.000	644.000	648.000
10.250	651.000	655.000	658.000	662.000	665.000
10.500	669.000	672.000	675.000	678.000	682.000

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
10.750	685.000	689.000	693.000	698.000	703.000
11.000	708.000	713.000	717.000	722.000	727.000
11.250	732.000	737.000	742.000	746.000	751.000
11.500	756.000	761.000	766.000	771.000	777.000
11.750	782.000	788.000	793.000	799.000	804.000
12.000	810.000	815.000	821.000	828.000	835.000
12.250	842.000	850.000	857.000	864.000	872.000
12.500	880.000	889.000	898.000	907.000	916.000
12.750	926.000	935.000	944.000	953.000	962.000
13.000	970.000	978.000	986.000	994.000	1,002.000
13.250	1,011.000	1,019.000	1,028.000	1,038.000	1,047.000
13.500	1,058.000	1,069.000	1,080.000	1,091.000	1,102.000
13.750	1,113.000	1,125.000	1,138.000	1,151.000	1,163.000
14.000	1,176.000	1,189.000	1,202.000	1,216.000	1,230.000
14.250	1,244.000	1,259.000	1,273.000	1,286.000	1,300.000
14.500	1,314.000	1,329.000	1,344.000	1,359.000	1,374.000
14.750	1,390.000	1,408.000	1,427.000	1,446.000	1,465.000
15.000	1,485.000	1,506.000	1,527.000	1,548.000	1,571.000
15.250	1,594.000	1,619.000	1,641.000	1,663.000	1,681.000
15.500	1,696.000	1,710.000	1,724.000	1,740.000	1,763.000
15.750	1,797.000	1,844.000	1,907.000	1,981.000	2,063.000
16.000	2,170.000	2,360.000	2,702.000	3,040.000	3,192.000
16.250	3,248.000	3,279.000	3,297.000	3,312.000	3,331.000
16.500	3,355.000	3,377.000	3,397.000	3,416.000	3,434.000
16.750	3,451.000	3,468.000	3,484.000	3,501.000	3,516.000
17.000	3,530.000	3,544.000	3,557.000	3,570.000	3,582.000
17.250	3,593.000	3,604.000	3,615.000	3,626.000	3,637.000
17.500	3,647.000	3,656.000	3,666.000	3,675.000	3,684.000
17.750	3,693.000	3,702.000	3,710.000	3,717.000	3,723.000
18.000	3,730.000	3,736.000	3,742.000	3,748.000	3,753.000
18.250	3,758.000	3,763.000	3,767.000	3,772.000	3,777.000
18.500	3,782.000	3,787.000	3,792.000	3,796.000	3,801.000
18.750	3,806.000	3,810.000	3,814.000	3,817.000	3,821.000
19.000	3,824.000	3,828.000	3,831.000	3,835.000	3,838.000
19.250	3,842.000	3,845.000	3,849.000	3,852.000	3,856.000
19.500	3,859.000	3,863.000	3,866.000	3,870.000	3,874.000
19.750	3,877.000	3,881.000	3,884.000	3,888.000	3,891.000
20.000	3,895.000	3,898.000	3,901.000	3,904.000	3,905.000
20.250	3,907.000	3,909.000	3,910.000	3,912.000	3,914.000
20.500	3,915.000	3,917.000	3,919.000	3,920.000	3,922.000
20.750	3,924.000	3,925.000	3,927.000	3,929.000	3,931.000
21.000	3,932.000	3,934.000	3,936.000	3,937.000	3,939.000
21.250	3,941.000	3,942.000	3,944.000	3,946.000	3,948.000

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
21.500	3,949.000	3,951.000	3,953.000	3,954.000	3,956.000
21.750	3,958.000	3,959.000	3,961.000	3,963.000	3,965.000
22.000	3,966.000	3,968.000	3,970.000	3,971.000	3,973.000
22.250	3,975.000	3,976.000	3,978.000	3,980.000	3,982.000
22.500	3,983.000	3,985.000	3,987.000	3,988.000	3,990.000
22.750	3,992.000	3,994.000	3,995.000	3,997.000	3,998.000
23.000	3,998.000	3,997.000	3,997.000	3,997.000	3,997.000
23.250	3,997.000	3,997.000	3,996.000	3,996.000	3,996.000
23.500	3,996.000	3,996.000	3,995.000	3,995.000	3,995.000
23.750	3,995.000	3,995.000	3,994.000	3,994.000	3,994.000
24.000	3,994.000	(N/A)	(N/A)	(N/A)	(N/A)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	2,925.020 ft
Increment (Headwater)	0.500 ft
Maximum (Headwater)	2,931.690 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward	TW	2,931.190	2,931.690
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	2,931.190 ft
Weir Length	3.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Elevation-Volume-Flow Table (Pond) Scenario: Base
Label: PRINSCO

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.02100 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	2,925.020 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00000 ft³/s
Flow (Initial Infiltration)	0.00000 ft³/s
Flow (Initial, Total)	0.00000 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
2,925.020	0.00000	0.000	0	0.00000	0.00000	0.00000
2,925.520	0.00000	573.100	0	0.02100	0.02100	6.38878
2,926.020	0.00000	1,146.200	0	0.02100	0.02100	12.75656
2,926.520	0.00000	1,852.710	0	0.02100	0.02100	20.60667
2,927.020	0.00000	2,552.510	0	0.02100	0.02100	28.38222
2,927.520	0.00000	3,244.680	0	0.02100	0.02100	36.07300
2,928.020	0.00000	3,927.430	0	0.02100	0.02100	43.65911
2,928.520	0.00000	4,597.190	0	0.02100	0.02100	51.10089
2,929.020	0.00000	5,249.350	0	0.02100	0.02100	58.34711
2,929.520	0.00000	5,870.380	0	0.02100	0.02100	65.24744
2,930.020	0.00000	6,449.210	0	0.02100	0.02100	71.67889
2,930.520	0.00000	7,022.310	0	0.02100	0.02100	78.04667
2,931.020	0.00000	7,309.515	0	0.02100	0.02100	81.23783
2,931.190	0.00000	7,309.960	0	0.02100	0.02100	81.24278
2,931.520	1.70614	7,310.620	0	0.02100	1.72714	82.95625
2,931.690	3.18198	7,310.960	0	0.02100	3.20298	84.43587

Subsection: Level Pool Pond Routing Summary
Label: PRINSCO (IN)

Scenario: Base

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.02100 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	2,925.020 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00000 ft³/s
Flow (Initial Infiltration)	0.00000 ft³/s
Flow (Initial, Total)	0.00000 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	2.38354 ft³/s	Time to Peak (Flow, In)	16.100 hours
Infiltration (Peak)	0.02100 ft³/s	Time to Peak (Infiltration)	9.200 hours
Flow (Peak Outlet)	0.00000 ft³/s	Time to Peak (Flow, Outlet)	0.000 hours

Elevation (Water Surface, Peak)	2,928.070 ft
Volume (Peak)	3,997.682 ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	5,465.000 ft³
Volume (Total Infiltration)	1,478.000 ft³
Volume (Total Outlet Outflow)	0.000 ft³
Volume (Retained)	3,990.000 ft³
Volume (Unrouted)	3.000 ft³
Error (Mass Balance)	0.1 %

Summary for Hydrograph Addition at 'PRINSCO'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Onsite

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Onsite	5,457.900	16.103	2.43000
Flow (In)	PRINSCO	5,464.784	16.100	2.38354

Index

Project Summary	
Title	Raising Cane's Victorville 100-yr 24 -hr Analysis
Engineer	
Company	Kimley-Horn and Associates, Inc.
Date	10/17/2023

Notes	1. Inflow hydrographs calculated using the AES Software.

Table of Contents

Subsection: User Notifications

User Notifications

Message Id	56
Scenario	Base
Element Type	Pond
Element Id	91
Label	PRINSCO
Time	(N/A)
Message	Volume/Outflow data exceeded. Inflow= 5.09514 ft^3/s, Outflow > 3.18198 ft^3/s.
Source	Warning
Message Id	59
Scenario	Base
Element Type	Pond
Element Id	91
Label	PRINSCO
Time	(N/A)
Message	Volume/Outflow data exceeded during routing.
Source	Warning
Message Id	44
Scenario	Base
Element Type	Pond
Element Id	91
Label	PRINSCO
Time	(N/A)
Message	Elevation-flow-volume table data overtopped...routing results invalid.
Source	Warning

Subsection: Master Network Summary

Catchments Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
Onsite	Base	0	15,811.000	16.095	7.44000

Node Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)
O-2	Base	0	7,487.000	16.000	3.18198

Pond Summary

Label	Scenario	Return Event (years)	Hydrograph Volume (ft³)	Time to Peak (hours)	Peak Flow (ft³/s)	Maximum Water Surface Elevation (ft)	Maximum Pond Storage (ft³)
PRINSCO (IN)	Base	0	15,817.000	16.100	7.11946	(N/A)	(N/A)
PRINSCO (OUT)	Base	0	7,487.000	16.000	3.18198	2,931.690	7,311.000

Peak Discharge	7.44000 ft³/s
Time to Peak	16.095 hours
Hydrograph Volume	15,810.840 ft³

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.093 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
0.000	0.00000	0.06000	0.06000	0.06000	0.06000
0.463	0.06000	0.06000	0.06000	0.07000	0.07000
0.925	0.07000	0.07000	0.07000	0.07000	0.07000
1.388	0.07000	0.07000	0.07000	0.07000	0.07000
1.850	0.07000	0.07000	0.07000	0.07000	0.07000
2.313	0.07000	0.07000	0.07000	0.07000	0.07000
2.775	0.07000	0.07000	0.07000	0.07000	0.07000
3.238	0.07000	0.07000	0.07000	0.07000	0.07000
3.700	0.07000	0.07000	0.08000	0.08000	0.08000
4.163	0.08000	0.08000	0.08000	0.08000	0.08000
4.625	0.08000	0.08000	0.08000	0.08000	0.08000
5.088	0.08000	0.08000	0.08000	0.08000	0.08000
5.550	0.08000	0.08000	0.08000	0.08000	0.08000
6.013	0.08000	0.09000	0.09000	0.09000	0.09000
6.475	0.09000	0.09000	0.09000	0.09000	0.09000
6.938	0.09000	0.09000	0.09000	0.09000	0.09000
7.400	0.09000	0.09000	0.09000	0.09000	0.10000
7.863	0.10000	0.10000	0.10000	0.10000	0.10000
8.325	0.10000	0.10000	0.10000	0.10000	0.10000
8.788	0.10000	0.10000	0.11000	0.11000	0.11000
9.250	0.11000	0.11000	0.11000	0.11000	0.11000
9.713	0.11000	0.11000	0.11000	0.12000	0.12000
10.175	0.12000	0.12000	0.12000	0.12000	0.12000
10.638	0.12000	0.13000	0.13000	0.13000	0.13000
11.100	0.13000	0.13000	0.14000	0.14000	0.14000
11.563	0.14000	0.14000	0.14000	0.15000	0.15000
12.025	0.15000	0.15000	0.16000	0.16000	0.16000
12.488	0.16000	0.17000	0.17000	0.17000	0.18000
12.950	0.18000	0.18000	0.19000	0.19000	0.19000
13.413	0.20000	0.20000	0.21000	0.21000	0.22000
13.875	0.22000	0.23000	0.23000	0.23000	0.24000
14.338	0.24000	0.25000	0.26000	0.27000	0.28000
14.800	0.30000	0.31000	0.33000	0.34000	0.37000
15.263	0.39000	0.43000	0.31000	0.32000	0.36000
15.725	0.69000	1.27000	1.88000	2.62000	7.44000
16.188	1.51000	0.40000	0.30000	0.41000	0.36000
16.650	0.32000	0.29000	0.27000	0.25000	0.23000
17.113	0.23000	0.22000	0.21000	0.20000	0.19000
17.575	0.18000	0.18000	0.17000	0.17000	0.16000

Subsection: Read Hydrograph
Scenario: Base
Label: Onsite

HYDROGRAPH ORDINATES (ft³/s)
Output Time Increment = 0.093 hours
Time on left represents time for first value in each row.

Time (hours)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)	Flow (ft³/s)
18.038	0.16000	0.15000	0.14000	0.14000	0.14000
18.500	0.13000	0.13000	0.13000	0.13000	0.12000
18.963	0.12000	0.12000	0.12000	0.11000	0.11000
19.425	0.11000	0.11000	0.11000	0.10000	0.10000
19.888	0.10000	0.10000	0.10000	0.10000	0.10000
20.350	0.09000	0.09000	0.09000	0.09000	0.09000
20.813	0.09000	0.09000	0.09000	0.08000	0.08000
21.275	0.08000	0.08000	0.08000	0.08000	0.08000
21.738	0.08000	0.08000	0.08000	0.08000	0.08000
22.200	0.07000	0.07000	0.07000	0.07000	0.07000
22.663	0.07000	0.07000	0.07000	0.07000	0.07000
23.125	0.07000	0.07000	0.07000	0.07000	0.07000
23.588	0.07000	0.07000	0.06000	0.06000	0.06000
24.050	0.06000	0.00000	(N/A)	(N/A)	(N/A)

Subsection: Time vs. Elevation
Label: PRINSCO (IN)

Scenario: Base

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
0.000	2,925.020	2,925.022	2,925.030	2,925.039	2,925.048
0.250	2,925.058	2,925.067	2,925.076	2,925.085	2,925.094
0.500	2,925.103	2,925.112	2,925.120	2,925.129	2,925.138
0.750	2,925.148	2,925.158	2,925.168	2,925.178	2,925.188
1.000	2,925.198	2,925.208	2,925.218	2,925.227	2,925.237
1.250	2,925.246	2,925.256	2,925.265	2,925.274	2,925.284
1.500	2,925.293	2,925.302	2,925.311	2,925.320	2,925.329
1.750	2,925.338	2,925.347	2,925.356	2,925.365	2,925.373
2.000	2,925.382	2,925.391	2,925.399	2,925.407	2,925.416
2.250	2,925.424	2,925.433	2,925.441	2,925.449	2,925.457
2.500	2,925.465	2,925.473	2,925.481	2,925.489	2,925.497
2.750	2,925.505	2,925.513	2,925.520	2,925.528	2,925.536
3.000	2,925.543	2,925.551	2,925.559	2,925.566	2,925.574
3.250	2,925.582	2,925.590	2,925.597	2,925.605	2,925.613
3.500	2,925.620	2,925.628	2,925.636	2,925.644	2,925.651
3.750	2,925.659	2,925.667	2,925.675	2,925.684	2,925.693
4.000	2,925.702	2,925.712	2,925.721	2,925.730	2,925.740
4.250	2,925.749	2,925.758	2,925.767	2,925.776	2,925.786
4.500	2,925.795	2,925.804	2,925.813	2,925.823	2,925.832
4.750	2,925.841	2,925.851	2,925.860	2,925.869	2,925.878
5.000	2,925.888	2,925.897	2,925.906	2,925.916	2,925.925
5.250	2,925.934	2,925.943	2,925.953	2,925.962	2,925.971
5.500	2,925.980	2,925.990	2,925.999	2,926.008	2,926.017
5.750	2,926.025	2,926.033	2,926.041	2,926.048	2,926.055
6.000	2,926.063	2,926.071	2,926.079	2,926.088	2,926.097
6.250	2,926.105	2,926.114	2,926.123	2,926.132	2,926.141
6.500	2,926.149	2,926.158	2,926.167	2,926.176	2,926.185
6.750	2,926.193	2,926.202	2,926.211	2,926.220	2,926.229
7.000	2,926.237	2,926.246	2,926.255	2,926.264	2,926.272
7.250	2,926.281	2,926.290	2,926.299	2,926.308	2,926.316
7.500	2,926.325	2,926.334	2,926.343	2,926.352	2,926.361
7.750	2,926.370	2,926.380	2,926.390	2,926.400	2,926.410
8.000	2,926.420	2,926.430	2,926.440	2,926.450	2,926.460
8.250	2,926.470	2,926.480	2,926.490	2,926.501	2,926.511
8.500	2,926.521	2,926.531	2,926.541	2,926.551	2,926.562
8.750	2,926.572	2,926.582	2,926.592	2,926.602	2,926.613
9.000	2,926.624	2,926.636	2,926.647	2,926.659	2,926.670
9.250	2,926.681	2,926.693	2,926.704	2,926.716	2,926.727
9.500	2,926.739	2,926.750	2,926.762	2,926.773	2,926.784
9.750	2,926.796	2,926.807	2,926.819	2,926.830	2,926.842
10.000	2,926.854	2,926.867	2,926.880	2,926.893	2,926.906
10.250	2,926.918	2,926.931	2,926.944	2,926.957	2,926.969
10.500	2,926.982	2,926.995	2,927.007	2,927.020	2,927.034

Subsection: Time vs. Elevation
Label: PRINSCO (IN)

Scenario: Base

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
10.750	2,927.048	2,927.062	2,927.076	2,927.090	2,927.104
11.000	2,927.118	2,927.133	2,927.147	2,927.161	2,927.175
11.250	2,927.190	2,927.205	2,927.220	2,927.236	2,927.251
11.500	2,927.267	2,927.282	2,927.298	2,927.313	2,927.329
11.750	2,927.344	2,927.360	2,927.377	2,927.394	2,927.410
12.000	2,927.427	2,927.444	2,927.460	2,927.478	2,927.495
12.250	2,927.513	2,927.531	2,927.550	2,927.568	2,927.586
12.500	2,927.605	2,927.624	2,927.643	2,927.663	2,927.682
12.750	2,927.702	2,927.722	2,927.742	2,927.763	2,927.784
13.000	2,927.805	2,927.826	2,927.848	2,927.870	2,927.892
13.250	2,927.914	2,927.937	2,927.959	2,927.982	2,928.006
13.500	2,928.029	2,928.054	2,928.079	2,928.104	2,928.130
13.750	2,928.156	2,928.182	2,928.209	2,928.236	2,928.263
14.000	2,928.291	2,928.319	2,928.347	2,928.375	2,928.404
14.250	2,928.433	2,928.462	2,928.492	2,928.522	2,928.553
14.500	2,928.586	2,928.619	2,928.652	2,928.687	2,928.722
14.750	2,928.759	2,928.796	2,928.835	2,928.875	2,928.916
15.000	2,928.958	2,929.001	2,929.047	2,929.095	2,929.146
15.250	2,929.198	2,929.252	2,929.310	2,929.365	2,929.411
15.500	2,929.453	2,929.497	2,929.544	2,929.600	2,929.677
15.750	2,929.786	2,929.939	2,930.142	2,930.398	2,930.899
16.000	2,931.690	2,931.690	2,931.690	2,931.690	2,931.690
16.250	2,931.690	2,931.690	2,931.690	2,931.425	2,930.938
16.500	2,931.231	2,931.287	2,931.222	2,931.278	2,931.215
16.750	2,931.271	2,931.211	2,931.266	2,931.207	2,931.261
17.000	2,931.203	2,931.258	2,931.203	2,931.257	2,931.202
17.250	2,931.254	2,931.200	2,931.252	2,931.198	2,931.249
17.500	2,931.197	2,931.247	2,931.196	2,931.246	2,931.195
17.750	2,931.244	2,931.194	2,931.243	2,931.194	2,931.241
18.000	2,931.193	2,931.240	2,931.192	2,931.238	2,931.191
18.250	2,931.236	2,931.191	2,931.235	2,931.191	2,931.234
18.500	2,931.095	2,931.231	2,931.191	2,931.231	2,931.191
18.750	2,931.231	2,931.191	2,931.229	2,931.184	2,931.228
19.000	2,931.190	2,931.228	2,931.191	2,931.227	2,931.173
19.250	2,931.225	2,931.112	2,931.224	2,931.191	2,931.224
19.500	2,931.191	2,931.223	2,931.191	2,931.222	2,931.132
19.750	2,931.220	2,931.190	2,931.220	2,931.191	2,931.220
20.000	2,931.191	2,931.219	2,931.191	2,931.219	2,931.191
20.250	2,931.219	2,931.191	2,931.217	2,931.190	2,931.217
20.500	2,931.190	2,931.216	2,931.190	2,931.216	2,931.191
20.750	2,931.216	2,931.191	2,931.216	2,931.191	2,931.215
21.000	2,931.191	2,931.214	2,931.122	2,931.212	2,931.191
21.250	2,931.212	2,931.191	2,931.212	2,931.191	2,931.212

Time vs. Elevation (ft)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)	Elevation (ft)
21.500	2,931.191	2,931.212	2,931.191	2,931.211	2,931.191
21.750	2,931.211	2,931.192	2,931.211	2,931.192	2,931.211
22.000	2,931.192	2,931.211	2,931.192	2,931.210	2,931.190
22.250	2,931.208	2,931.190	2,931.208	2,931.191	2,931.208
22.500	2,931.191	2,931.208	2,931.191	2,931.208	2,931.191
22.750	2,931.208	2,931.191	2,931.208	2,931.191	2,931.208
23.000	2,931.191	2,931.207	2,931.192	2,931.207	2,931.192
23.250	2,931.207	2,931.192	2,931.207	2,931.192	2,931.207
23.500	2,931.192	2,931.207	2,931.192	2,931.207	2,931.192
23.750	2,931.205	2,931.191	2,931.204	2,931.191	2,931.204
24.000	2,931.191	(N/A)	(N/A)	(N/A)	(N/A)

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
0.000	0.000	3.000	12.000	23.000	34.000
0.250	45.000	56.000	67.000	77.000	88.000
0.500	98.000	108.000	117.000	126.000	136.000
0.750	147.000	157.000	168.000	179.000	189.000
1.000	201.000	212.000	224.000	235.000	247.000
1.250	258.000	270.000	281.000	292.000	303.000
1.500	314.000	325.000	336.000	347.000	357.000
1.750	368.000	379.000	388.000	398.000	407.000
2.000	416.000	425.000	434.000	443.000	452.000
2.250	461.000	470.000	479.000	488.000	498.000
2.500	508.000	517.000	527.000	536.000	546.000
2.750	555.000	564.000	574.000	583.000	592.000
3.000	601.000	610.000	619.000	629.000	638.000
3.250	647.000	656.000	665.000	674.000	682.000
3.500	690.000	698.000	707.000	715.000	723.000
3.750	731.000	739.000	748.000	758.000	768.000
4.000	779.000	790.000	801.000	812.000	823.000
4.250	834.000	845.000	856.000	867.000	878.000
4.500	890.000	901.000	912.000	923.000	934.000
4.750	945.000	956.000	966.000	975.000	985.000
5.000	995.000	1,005.000	1,015.000	1,025.000	1,034.000
5.250	1,044.000	1,055.000	1,066.000	1,077.000	1,088.000
5.500	1,099.000	1,110.000	1,121.000	1,132.000	1,143.000
5.750	1,154.000	1,165.000	1,176.000	1,187.000	1,199.000
6.000	1,210.000	1,221.000	1,234.000	1,246.000	1,259.000
6.250	1,272.000	1,283.000	1,295.000	1,306.000	1,318.000
6.500	1,329.000	1,341.000	1,352.000	1,364.000	1,375.000
6.750	1,387.000	1,400.000	1,413.000	1,426.000	1,439.000
7.000	1,452.000	1,465.000	1,478.000	1,491.000	1,504.000
7.250	1,517.000	1,530.000	1,543.000	1,556.000	1,569.000
7.500	1,581.000	1,594.000	1,607.000	1,620.000	1,632.000
7.750	1,644.000	1,657.000	1,670.000	1,683.000	1,696.000
8.000	1,709.000	1,723.000	1,736.000	1,751.000	1,765.000
8.250	1,780.000	1,795.000	1,810.000	1,824.000	1,839.000
8.500	1,854.000	1,869.000	1,884.000	1,898.000	1,913.000
8.750	1,928.000	1,943.000	1,958.000	1,973.000	1,987.000
9.000	2,001.000	2,016.000	2,031.000	2,046.000	2,061.000
9.250	2,076.000	2,091.000	2,108.000	2,124.000	2,141.000
9.500	2,158.000	2,175.000	2,191.000	2,208.000	2,225.000
9.750	2,241.000	2,258.000	2,275.000	2,291.000	2,309.000
10.000	2,326.000	2,342.000	2,359.000	2,375.000	2,392.000
10.250	2,408.000	2,425.000	2,442.000	2,460.000	2,479.000
10.500	2,497.000	2,516.000	2,534.000	2,553.000	2,572.000

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
10.750	2,592.000	2,613.000	2,634.000	2,654.000	2,674.000
11.000	2,692.000	2,710.000	2,729.000	2,747.000	2,765.000
11.250	2,784.000	2,806.000	2,828.000	2,851.000	2,873.000
11.500	2,895.000	2,917.000	2,940.000	2,962.000	2,984.000
11.750	3,007.000	3,028.000	3,049.000	3,070.000	3,092.000
12.000	3,113.000	3,135.000	3,159.000	3,184.000	3,209.000
12.250	3,235.000	3,261.000	3,287.000	3,313.000	3,340.000
12.500	3,365.000	3,389.000	3,414.000	3,439.000	3,464.000
12.750	3,490.000	3,519.000	3,548.000	3,578.000	3,608.000
13.000	3,637.000	3,667.000	3,698.000	3,726.000	3,754.000
13.250	3,782.000	3,810.000	3,841.000	3,874.000	3,907.000
13.500	3,940.000	3,975.000	4,010.000	4,045.000	4,077.000
13.750	4,109.000	4,142.000	4,179.000	4,216.000	4,255.000
14.000	4,294.000	4,333.000	4,372.000	4,407.000	4,442.000
14.250	4,478.000	4,517.000	4,558.000	4,600.000	4,643.000
14.500	4,687.000	4,730.000	4,771.000	4,813.000	4,861.000
14.750	4,910.000	4,961.000	5,014.000	5,064.000	5,113.000
15.000	5,166.000	5,224.000	5,285.000	5,349.000	5,409.000
15.250	5,472.000	5,543.000	5,617.000	5,686.000	5,738.000
15.500	5,788.000	5,842.000	5,900.000	5,969.000	6,052.000
15.750	6,182.000	6,352.000	6,590.000	6,882.000	7,309.000
16.000	7,311.000	7,311.000	7,311.000	7,311.000	7,311.000
16.250	7,311.000	7,311.000	7,311.000	7,310.000	7,309.000
16.500	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
16.750	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
17.000	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
17.250	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
17.500	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
17.750	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
18.000	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
18.250	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
18.500	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
18.750	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
19.000	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
19.250	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
19.500	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
19.750	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
20.000	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
20.250	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
20.500	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
20.750	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
21.000	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
21.250	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000

Time vs. Volume (ft³)

Output Time increment = 0.050 hours
Time on left represents time for first value in each row.

Time (hours)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)	Volume (ft³)
21.500	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
21.750	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
22.000	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
22.250	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
22.500	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
22.750	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
23.000	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
23.250	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
23.500	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
23.750	7,310.000	7,310.000	7,310.000	7,310.000	7,310.000
24.000	7,310.000	(N/A)	(N/A)	(N/A)	(N/A)

Requested Pond Water Surface Elevations	
Minimum (Headwater)	2,925.020 ft
Increment (Headwater)	0.500 ft
Maximum (Headwater)	2,931.690 ft

Outlet Connectivity

Structure Type	Outlet ID	Direction	Outfall	E1 (ft)	E2 (ft)
Rectangular Weir	Weir - 1	Forward	TW	2,931.190	2,931.690
Tailwater Settings	Tailwater			(N/A)	(N/A)

Structure ID: Weir - 1 Structure Type: Rectangular Weir	
Number of Openings	1
Elevation	2,931.190 ft
Weir Length	3.00 ft
Weir Coefficient	3.00 (ft^0.5)/s

Structure ID: TW Structure Type: TW Setup, DS Channel	
Tailwater Type	Free Outfall

Convergence Tolerances	
Maximum Iterations	30
Tailwater Tolerance (Minimum)	0.010 ft
Tailwater Tolerance (Maximum)	0.500 ft
Headwater Tolerance (Minimum)	0.010 ft
Headwater Tolerance (Maximum)	0.500 ft
Flow Tolerance (Minimum)	0.001 ft³/s
Flow Tolerance (Maximum)	10.000 ft³/s

Subsection: Elevation-Volume-Flow Table (Pond) Scenario: Base
Label: PRINSCO

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.02100 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	2,925.020 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00000 ft³/s
Flow (Initial Infiltration)	0.00000 ft³/s
Flow (Initial, Total)	0.00000 ft³/s
Time Increment	0.050 hours

Elevation (ft)	Outflow (ft³/s)	Storage (ft³)	Area (ft²)	Infiltration (ft³/s)	Flow (Total) (ft³/s)	2S/t + O (ft³/s)
2,925.020	0.00000	0.000	0	0.00000	0.00000	0.00000
2,925.520	0.00000	573.100	0	0.02100	0.02100	6.38878
2,926.020	0.00000	1,146.200	0	0.02100	0.02100	12.75656
2,926.520	0.00000	1,852.710	0	0.02100	0.02100	20.60667
2,927.020	0.00000	2,552.510	0	0.02100	0.02100	28.38222
2,927.520	0.00000	3,244.680	0	0.02100	0.02100	36.07300
2,928.020	0.00000	3,927.430	0	0.02100	0.02100	43.65911
2,928.520	0.00000	4,597.190	0	0.02100	0.02100	51.10089
2,929.020	0.00000	5,249.350	0	0.02100	0.02100	58.34711
2,929.520	0.00000	5,870.380	0	0.02100	0.02100	65.24744
2,930.020	0.00000	6,449.210	0	0.02100	0.02100	71.67889
2,930.520	0.00000	7,022.310	0	0.02100	0.02100	78.04667
2,931.020	0.00000	7,309.515	0	0.02100	0.02100	81.23783
2,931.190	0.00000	7,309.960	0	0.02100	0.02100	81.24278
2,931.520	1.70614	7,310.620	0	0.02100	1.72714	82.95625
2,931.690	3.18198	7,310.960	0	0.02100	3.20298	84.43587

Subsection: Level Pool Pond Routing Summary
Label: PRINSCO (IN)

Scenario: Base

Infiltration	
Infiltration Method (Computed)	Constant
Infiltration Rate (Constant)	0.02100 ft³/s

Initial Conditions	
Elevation (Water Surface, Initial)	2,925.020 ft
Volume (Initial)	0.000 ft³
Flow (Initial Outlet)	0.00000 ft³/s
Flow (Initial Infiltration)	0.00000 ft³/s
Flow (Initial, Total)	0.00000 ft³/s
Time Increment	0.050 hours

Inflow/Outflow Hydrograph Summary			
Flow (Peak In)	(N/A) ft³/s	Time to Peak (Flow, In)	(N/A) hours
Infiltration (Peak)	(N/A) ft³/s	Time to Peak (Infiltration)	(N/A) hours
Flow (Peak Outlet)	(N/A) ft³/s	Time to Peak (Flow, Outlet)	(N/A) hours

Elevation (Water Surface, Peak)	(N/A) ft
Volume (Peak)	(N/A) ft³

Mass Balance (ft³)	
Volume (Initial)	0.000 ft³
Volume (Total Inflow)	(N/A) ft³
Volume (Total Infiltration)	(N/A) ft³
Volume (Total Outlet Outflow)	(N/A) ft³
Volume (Retained)	(N/A) ft³
Volume (Unrouted)	(N/A) ft³
Error (Mass Balance)	(N/A) %

Summary for Hydrograph Addition at 'PRINSCO'

Upstream Link	Upstream Node
<Catchment to Outflow Node>	Onsite

Node Inflows

Inflow Type	Element	Volume (ft^3)	Time to Peak (hours)	Flow (Peak) (ft^3/s)
Flow (From)	Onsite	15,810.840	16.095	7.44000
Flow (In)	PRINSCO	15,816.600	16.100	7.11946

Index

Chamber Model	HS180		
Number of Chambers	10		
Number of Endcaps	4		
Stone Voids (porosity)	40%		
Base of Stone Elevation	2925.02	ft	
Recommended Stone Below Chambers*	12	in.	**Include perimeter stone?** Yes
Recommended Stone Above Chambers*	12	in.	**Standard or metric?** Standard

Area of System** **2850** sq.ft

***Area must be greater than:* **626.51 sq.ft**

**The minimum stone below and above the chambers to be determinded by the design engineer.*

System Height (Inches)	Incremental Single Chamber Storage (cu.ft)	Incremental Single End Cap Storage (cu.ft)	Incremental Total Chamber Storage (cu.ft)	Incremental Total End Cap Storage (cu.ft)	Incremental Stone Storage (cu.ft)	Incremental Chamber, End Cap, & Stone (cu.ft)	Cumulative System Storage (cu.ft)	Elevation (ft)
69	0.000	0.000	0.000	0.000	95.52	95.52	7308.86	2930.77
68	0.000	0.000	0.000	0.000	95.52	95.52	7213.34	2930.69
67	0.000	0.000	0.000	0.000	95.52	95.52	7117.83	2930.60
66	0.000	0.000	0.000	0.000	95.52	95.52	7022.31	2930.52
65	0.000	0.000	0.000	0.000	95.52	95.52	6926.79	2930.44
64	0.000	0.000	0.000	0.000	95.52	95.52	6831.28	2930.35
63	0.000	0.000	0.000	0.000	95.52	95.52	6735.76	2930.27
62	0.000	0.000	0.000	0.000	95.52	95.52	6640.24	2930.19
61	0.000	0.000	0.000	0.000	95.52	95.52	6544.73	2930.10
60	0.000	0.000	0.000	0.000	95.52	95.52	6449.21	2930.02
59	0.000	0.000	0.000	0.000	95.52	95.52	6353.69	2929.94
58	0.000	0.000	0.000	0.000	95.52	95.52	6258.18	2929.85
57	0.183	0.000	1.827	0.000	94.79	96.61	6162.66	2929.77
56	0.314	0.010	3.138	0.040	94.25	97.42	6066.05	2929.69
55	0.442	0.030	4.424	0.120	93.70	98.24	5968.63	2929.60
54	0.626	0.050	6.263	0.200	92.93	99.39	5870.38	2929.52
53	1.024	0.070	10.240	0.280	91.31	101.83	5770.99	2929.44
52	1.272	0.080	12.720	0.320	90.30	103.34	5669.16	2929.35
51	1.461	0.100	14.615	0.400	89.51	104.53	5565.82	2929.27
50	1.620	0.120	16.197	0.480	88.85	105.52	5461.29	2929.19
49	1.757	0.150	17.567	0.600	88.25	106.42	5355.77	2929.10
48	1.878	0.160	18.779	0.640	87.75	107.17	5249.35	2929.02
47	1.986	0.170	19.862	0.680	87.30	107.84	5142.19	2928.94
46	2.084	0.190	20.840	0.760	86.88	108.48	5034.34	2928.85
45	2.173	0.200	21.730	0.800	86.50	109.03	4925.87	2928.77
44	2.255	0.220	22.553	0.880	86.14	109.58	4816.83	2928.69
43	2.333	0.230	23.326	0.920	85.82	110.06	4707.26	2928.60
42	2.406	0.250	24.059	1.000	85.49	110.55	4597.19	2928.52
41	2.476	0.270	24.755	1.080	85.18	111.02	4486.64	2928.44
40	2.542	0.280	25.416	1.120	84.90	111.44	4375.62	2928.35
39	2.604	0.300	26.042	1.200	84.62	111.86	4264.19	2928.27
38	2.664	0.320	26.636	1.280	84.35	112.27	4152.33	2928.19
37	2.720	0.330	27.199	1.320	84.11	112.63	4040.06	2928.10

36	2.773	0.350	27.733	1.400	83.86	113.00	3927.43	2928.02
35	2.824	0.370	28.237	1.480	83.63	113.35	3814.44	2927.94
34	2.871	0.370	28.714	1.480	83.44	113.63	3701.09	2927.85
33	2.916	0.400	29.163	1.600	83.21	113.97	3587.46	2927.77
32	2.964	0.410	29.644	1.640	83.00	114.29	3473.48	2927.69
31	2.998	0.420	29.984	1.680	82.85	114.51	3359.20	2927.60
30	3.036	0.440	30.355	1.760	82.67	114.79	3244.68	2927.52
29	3.071	0.450	30.707	1.800	82.51	115.02	3129.89	2927.44
28	3.105	0.460	31.052	1.840	82.36	115.25	3014.87	2927.35
27	3.138	0.470	31.384	1.880	82.21	115.47	2899.62	2927.27
26	3.171	0.490	31.705	1.960	82.05	115.72	2784.15	2927.19
25	3.202	0.500	32.017	2.000	81.91	115.93	2668.43	2927.10
24	3.232	0.510	32.321	2.040	81.77	116.13	2552.51	2927.02
23	3.261	0.520	32.613	2.080	81.64	116.33	2436.37	2926.94
22	3.292	0.530	32.916	2.120	81.50	116.54	2320.04	2926.85
21	3.321	0.540	33.206	2.160	81.37	116.74	2203.50	2926.77
20	3.349	0.550	33.492	2.200	81.24	116.93	2086.77	2926.69
19	3.377	0.560	33.767	2.240	81.11	117.12	1969.83	2926.60
18	3.405	0.560	34.047	2.240	81.00	117.29	1852.71	2926.52
17	3.433	0.570	34.329	2.280	80.87	117.48	1735.42	2926.44
16	3.462	0.580	34.620	2.320	80.74	117.68	1617.94	2926.35
15	3.490	0.580	34.900	2.320	80.63	117.85	1500.26	2926.27
14	3.518	0.580	35.176	2.320	80.52	118.01	1382.41	2926.19
13	3.545	0.590	35.452	2.360	80.39	118.20	1264.40	2926.10
12	0.000	0.000	0.000	0.000	95.52	95.52	1146.20	2926.02
11	0.000	0.000	0.000	0.000	95.52	95.52	1050.68	2925.94
10	0.000	0.000	0.000	0.000	95.52	95.52	955.16	2925.85
9	0.000	0.000	0.000	0.000	95.52	95.52	859.65	2925.77
8	0.000	0.000	0.000	0.000	95.52	95.52	764.13	2925.69
7	0.000	0.000	0.000	0.000	95.52	95.52	668.61	2925.60
6	0.000	0.000	0.000	0.000	95.52	95.52	573.10	2925.52
5	0.000	0.000	0.000	0.000	95.52	95.52	477.58	2925.44
4	0.000	0.000	0.000	0.000	95.52	95.52	382.07	2925.35
3	0.000	0.000	0.000	0.000	95.52	95.52	286.55	2925.27
2	0.000	0.000	0.000	0.000	95.52	95.52	191.03	2925.19
1	0.000	0.000	0.000	0.000	95.52	95.52	95.52	2925.10
0	0.000	0.000	0.000	0.000	0.00	0.00	0.00	2925.02

6.10 WEB Soil Survey

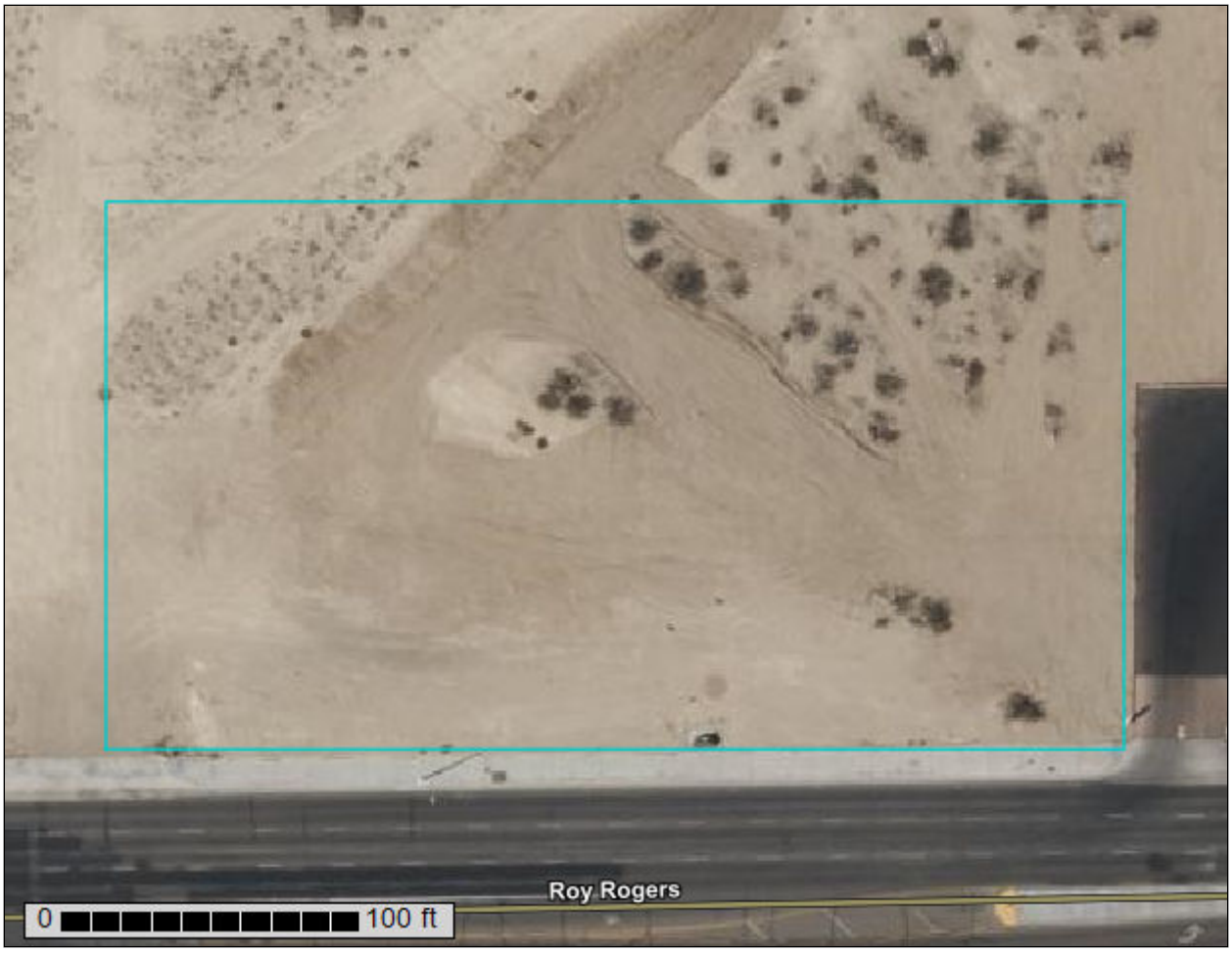
United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for San Bernardino County, California, Mojave River Area



October 6, 2023

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil

scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and

identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Custom Soil Resource Report
Soil Map

Map Scale: 1:572 if printed on A landscape (11" x 8.5") sheet.

N

Meters
0 5 10 20 30

Feet
0 25 50 100 150

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: San Bernardino County, California, Mojave River Area
Survey Area Data: Version 15, Aug 30, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 17, 2022—Jun 12, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
132	HELENDALE LOAMY SAND, 2 TO 5 PERCENT SLOPES	0.3	17.7%
140	LAVIC LOAMY FINE SAND	1.2	82.3%
Totals for Area of Interest		**1.4**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however,

onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

San Bernardino County, California, Mojave River Area

132—HELENDALE LOAMY SAND, 2 TO 5 PERCENT SLOPES

Map Unit Setting

National map unit symbol: hks5
Elevation: 2,500 to 3,800 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Helendale and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Helendale

Setting

Landform: Fan remnants
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile

H1 - 0 to 4 inches: loamy sand
H2 - 4 to 30 inches: sandy loam
H3 - 30 to 66 inches: sandy loam
H4 - 66 to 99 inches: loamy sand

Properties and qualities

Slope: 2 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.9 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: A
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Lavic
Percent of map unit: 5 percent
Hydric soil rating: No

Cave
Percent of map unit: 5 percent
Hydric soil rating: No

Cajon
Percent of map unit: 5 percent
Hydric soil rating: No

140—LAVIC LOAMY FINE SAND

Map Unit Setting
National map unit symbol: hksf
Elevation: 2,800 to 3,100 feet
Mean annual precipitation: 3 to 6 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 180 to 280 days
Farmland classification: Farmland of statewide importance

Map Unit Composition
Lavic and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Lavic

Setting
Landform: Fan skirts, fan aprons
Landform position (two-dimensional): Toeslope, footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite sources

Typical profile
H1 - 0 to 10 inches: loamy fine sand
H2 - 10 to 20 inches: loamy sand
H3 - 20 to 49 inches: loam
H4 - 49 to 60 inches: stratified sand to loamy sand

Properties and qualities
Slope: 0 to 5 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high (0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 26 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Available water supply, 0 to 60 inches: Low (about 5.5 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R030XF012CA - Sandy
Hydric soil rating: No

Minor Components

Unnamed soils

Percent of map unit: 14 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent
Landform: Playas
Hydric soil rating: Yes

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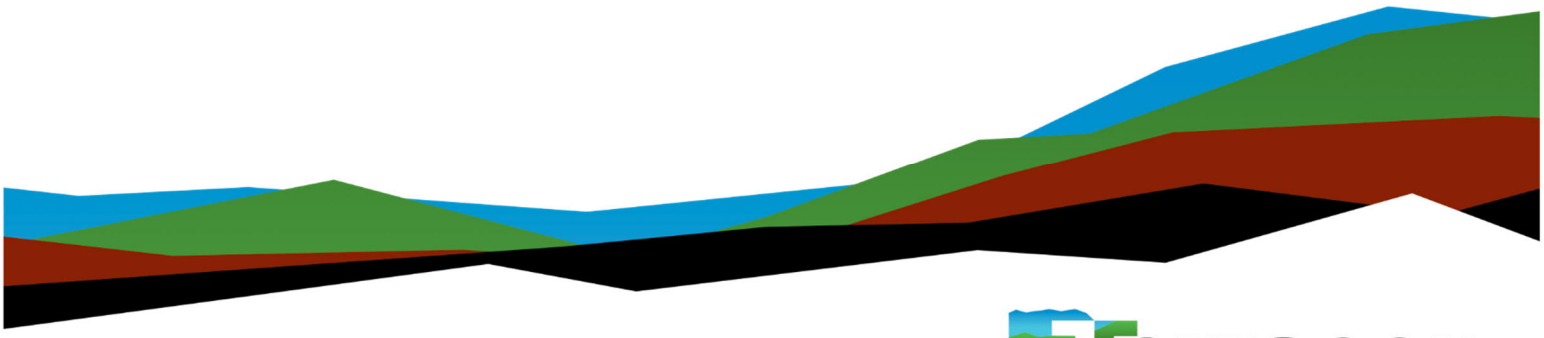
6.11 Geotechnical/Infiltration Tesing Report

Raising Cane's Restaurant (RC-1051) – Victorville

Geotechnical Engineering Report

Prepared for:

Raising Cane's Restaurant, LLC
6800 Bishop Road
Plano, Texas 75024



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July 28, 2023

Raising Cane's Restaurant, LLC
6800 Bishop Road
Plano, Texas 75024

Attn: Ms. Kristen Roberts
P: (972) 769-3348
E: kroberts@raisingcanes.com

Re: Geotechnical Engineering Report
Raising Cane's Restaurant (RC-1051) – Victorville
North of Roy Rogers Drive and West of Civic Drive
Victorville, San Bernardino County, California
Terracon Project No. CB235076

Dear Ms. Roberts:

We have completed the scope of Geotechnical Engineering services for the above referenced project. This study was performed in general accordance with Terracon Proposal No. PCB235076 dated May 9, 2023. This report presents the findings of the subsurface exploration and provides geotechnical recommendations concerning earthwork and the design and construction of foundations and floor slabs for the proposed project.

We appreciate the opportunity to be of service to you on this project. If you have any questions concerning this report or if we may be of further service, please contact us.

Sincerely,

Terracon

REGISTERED PROFESSIONAL ENGINEER
SEYEDALI TABATABAEI
No. 3159
GEOTECHNICAL
STATE OF CALIFORNIA

Ali Tabatabaei, Ph.D., G.E.
Geotechnical Project Engineer

Scott Lawson, P.E., G.E.
Senior Engineer

Table of Contents

Attachments

Exploration and Testing Procedures
Site Location and Exploration Plans
Exploration and Laboratory Results
Supporting Information

Refer to each individual Attachment for a listing of contents.

Introduction

This report presents the results of our subsurface exploration and Geotechnical Engineering services performed for the proposed Raising Cane's restaurant to be located North of Roy Rogers Drive and West of Civic Drive in Victorville, San Bernardino County, California. The purpose of these services was to provide information and geotechnical engineering recommendations relative to:

- Subsurface soil conditions
- Groundwater conditions and historic high groundwater
- 2022 California Building Code (CBC) seismic design parameters
- Subgrade preparation/earthwork recommendations
- Foundation design and construction
- Floor slab design and construction
- Preliminary pavement section design
- Infiltration and drainage

The geotechnical engineering Scope of Services for this project included the advancement of nine test borings to depths ranging from approximately 5 to 26½ feet below existing site grades (bgs), laboratory testing, engineering analysis, and preparation of this report.

Drawings showing the site and boring locations are shown on the Site Location and Exploration Plan, respectively. The results of the laboratory testing performed on soil samples obtained from the site during our field exploration are included on the boring logs and/or as separate graphs in the Exploration Results section.

Project Description

Our initial understanding of the project was provided in our proposal and was discussed during project planning. A period of collaboration has transpired since the project was initiated, and our final understanding of the project conditions is as follows:

Item	Description
Information Provided	Project information was furnished to us via email dated May 3, 2023, with attachments including maps and site plans.
Project Description	Based on our review of the site plans provided to us, a new Raising Cane's building and appurtenant infrastructure will be constructed, including paved roadway/parking, and stormwater infiltration/retention facilities.

Item	Description
Proposed Structure	Structure consists of a single-story restaurant building (approximately 3,181 sf) with appurtenant improvements.
Building Construction	The proposed building will consist of a single-story wood- frame structure supported on a shallow foundation system with slabs on grade.
Finished Floor Elevation	Anticipated to be within 2 feet of existing grade
Maximum Loads (assumed)	■ Columns: 40 to 80 kips ■ Walls: 1 to 3 kips per linear foot (klf) ■ Slabs: 150 pounds per square foot (psf)
Grading/Slopes	Design grades are anticipated to be similar to the existing grades; however, remedial grading is anticipated.
Below-Grade Structures	None
Free-Standing Retaining Walls	None
Pavements	Paved driveway and parking will be constructed on site. We assume flexible (asphalt concrete) and rigid (Portland cement concrete) pavement sections should be considered. Anticipated traffic indices (TIs) are as follows for pavement: ■ Auto Parking Areas: TI=4.5 ■ Auto Driveways: TI=5.5 ■ Pavement design period: 20 years
Infiltration Systems	An on-site stormwater retention/infiltration system is planned. However, the location, type and depth of system were not available at the time of preparation of this report.
Building Code	California Building Code 2022

Terracon should be notified if any of the above information is inconsistent with the planned construction, especially the grading limits, as modifications to our recommendations may be necessary.

Site Conditions

The following description of site conditions is derived from our site visit in association with the field exploration and our review of publicly available geologic and topographic maps.

Item	Description
Parcel Information	The project site is located North of Roy Rogers Drive and West of Civic Drive in Victorville, San Bernardino County, California. Approximate coordinates of the center of the site: Latitude: 34.5218, Longitude: -117.3252 See Site Location
Existing Improvements	Currently consists of an undeveloped tract of land.
Current Ground Cover	Exposed soils with a light growth of grass and vegetation.
Existing Topography	Site is relatively flat.

Geotechnical Characterization

We have developed a general characterization of the subsurface soil and groundwater conditions based upon our review of the data and our understanding of the geologic setting and planned construction. The following table provides our geotechnical characterization. Conditions observed at each exploration point are indicated on the individual logs. The individual logs can be found in the Exploration Results. The table below summarizes our geotechnical characterization.

Stratum	Approximate Depth to Bottom of Stratum (feet)	Material Description	Consistency / Density
Stratum I	26 ½	Interbedded layers of silty sand, poorly graded sand with silt, lean clay with sand and silt with sand	Granular soils: medium dense to very dense Fine grained soils: hard

Groundwater

The borings were advanced using a hollow-stem-auger drilling technique that allows short term groundwater observations to be made while drilling. Groundwater seepage was not encountered within the maximum drilled depth of 26.5 feet below ground surface (bgs) at the time of our field exploration. Our review of historical information regarding groundwater levels indicates that historical high groundwater levels are deeper than 50 feet bgs. Groundwater level fluctuations occur due to seasonal variations in

the amount of rainfall, runoff and other factors not evident at the time the borings were performed.

Seismic Site Class

The 2022 California Building Code (CBC) Seismic Design Parameters have been generated using the SEAOC/OSHPD Seismic Design Maps Tool. This web-based software application calculates seismic design parameters in accordance with ASCE 7-16, and 2022 CBC. The 2022 CBC requires that a site-specific ground motion study be performed in accordance with Section 11.4.8 of ASCE 7-16 for Site Class D sites with a mapped S_s value greater than or equal 0.2.

However, Section 11.4.8 of ASCE 7-16 includes an exception from such analysis for specific structures on Site Class D sites. The commentary for Section 11 of ASCE 7-16 (Page 534 of Section C11 of ASCE 7-16) states that "In general, this exception effectively limits the requirements for site-specific hazard analysis to very tall and or flexible structures at Site Class D sites." Based on our understanding of the proposed structures, it is our assumption that the exception in Section 11.4.8 applies to the proposed structure. However, the structural engineer should verify the applicability of this exception.

Based on this exception, the spectral response accelerations presented below were determined using the site coefficients (Fa and Fv) from Tables 1613.2.3(1) and 1613.2.3(2) presented in Section 16.4.4 of the 2022 CBC.

Description	Value
2019 California Building Code Site Classification (CBC)[1]	D[2]
Site Latitude (°N)	34.5218
Site Longitude (°W)	117.3252
S_s Spectral Acceleration for a 0.2-Second Period	1.155
S_1 Spectral Acceleration for a 1-Second Period	0.447
F_a Site Coefficient for a 0.2-Second Period	1.038
F_v Site Coefficient for a 1-Second Period	1.85
Site Modified Peak Ground Acceleration (PGA_M)	0.548g
De-aggregated Modal Magnitude [3]	7.91

Description	Value

1. Seismic site classification in general accordance with the *2022 California Building Code*.
2. The 2022 California Building Code (CBC) requires a site soil profile determination extending to a depth of 100 feet for seismic site classification. The current scope does not include the 100-foot soil profile determination. Borings were extended to a maximum depth of 26½ feet, and this seismic site class definition considers that similar or denser soils continue below the maximum depth of the subsurface exploration. Additional exploration to deeper depths would be required to confirm the conditions below the current depth of exploration.
3. These values were obtained using on-line Unified Hazard Tool by the USGS (https://earthquake.usgs.gov/hazards/interactive/) for return period of 2% in 50 years accessed

In some cases, a site-specific ground motion study may generate less conservative coefficients and acceleration values which may reduce construction costs. We recommend consulting with a structural engineer to evaluate the need for such study and its potential impact on construction costs. Terracon should be contacted if a site-specific ground motion study is desired.

Faulting and Estimated Ground Motions

The site is located in southern California, which is a seismically active area. The type and magnitude of seismic hazards affecting the site are dependent on the distance to causative faults, the intensity, and the magnitude of the seismic event. As calculated using the USGS Unified Hazard Tool, the San Andreas (San Bernardino N segment), which is considered to have the most significant effect at the site from a design standpoint, has a maximum magnitude of 7.98 and is located approximately 30 kilometers from the site. Furthermore, the site is not located within an Alquist-Priolo Earthquake Fault Zone based on our review of the State Fault Hazard Maps.

Liquefaction

Liquefaction is a mode of ground failure that results from the generation of high pore-water pressures during earthquake ground shaking, causing loss of shear strength, and is typically a hazard where loose sandy soils exist below groundwater. San Bernardino County has designated certain areas as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table.

According to the County of San Bernardino Geologic Hazard Maps, the site is located within an area having low liquefaction potential. Moreover, historic groundwater levels are deeper than 50 feet. Based on the County mapping and encountered subsurface

conditions, it is our opinion that liquefaction potential/seismic settlement is low for this site.

Geotechnical Overview

The site appears suitable for the proposed construction based upon geotechnical conditions encountered in the test borings, provided that the recommendations provided in this report are implemented in the design and construction phases of this project.

On-site soils generally consisted of interbedded layers of silty sand, poorly graded sand with silt, lean clay with sand and silt with sand, extending to the maximum boring termination depth of about 26½ feet below ground surface (bgs).

Based on the conditions encountered, the proposed buildings can be supported on shallow foundations, such as spread footings, provided the recommendations outlined herein are followed.

Groundwater was not encountered within the maximum depths of exploration during or at the completion of drilling. Groundwater is not expected to affect shallow foundation construction on this site.

The recommendations contained in this report are based upon the results of field and laboratory testing (presented in the Exploration Results), engineering analyses, and our current understanding of the proposed project. The General Comments section provides an understanding of the report limitations.

Earthwork

Earthwork is anticipated to include clearing and grubbing, excavations, and engineered fill placement. The following sections provide recommendations for use in the preparation of specifications for the work. Recommendations include critical quality criteria, as necessary, to render the site in the state considered in our geotechnical engineering evaluation for foundations, floor slabs, and pavements.

Site Preparation

Strip and remove existing vegetation, debris, pavements, and other deleterious materials from proposed building and pavement areas. Exposed surfaces should be free of mounds and depressions which could prevent uniform compaction. The site should be initially graded to create a relatively level surface to receive fill and provide for a relatively uniform thickness of fill beneath proposed building structures.

Although no evidence of underground facilities such as septic tanks, cesspools, or basements were observed during the site reconnaissance, such features could be encountered during construction. If unexpected fills, utilities, or underground facilities are encountered, such features should be removed, and the excavation thoroughly cleaned prior to backfill placement and/or construction.

Subgrade Preparation

We recommend that the proposed structures be supported on engineered fill extending to a minimum depth of 2 feet below the bottom of foundations, or 4 feet below existing grades, whichever is greater. Engineered fill placed beneath the entire footprint of the structures should extend horizontally a minimum distance of 3 feet beyond the outside edge of perimeter footings.

Subgrade soils beneath exterior slabs and pavements should be removed and replaced with engineered compacted fill to a depth of 1 foot below existing grade, or proposed pavement sections, whichever is greater.

Exposed areas which will receive fill, once properly cleared and benched where necessary, should be scarified to a minimum depth of 10 inches, moisture conditioned, and compacted per the compaction requirements in this report. Compacted fill soils should then be placed to the design elevations per the recommendations of this report. The moisture content and compaction of subgrade soils should be maintained until foundation, slab, or pavement construction.

Based upon the subsurface conditions observed from the geotechnical exploration, subgrade soils exposed during construction are anticipated to be relatively workable. However, the workability of the subgrade may be affected by precipitation, repetitive construction traffic or other factors. If unworkable conditions develop, workability may be improved by scarifying and drying.

Excavation

Due to very dense soil encountered near the surface in some areas, excavation may require the use of specialized heavy-duty equipment. Consideration should be given to obtaining a unit price for difficult excavation in the contract documents for the project.

Individual contractors are responsible for designing and constructing stable, temporary excavations. Excavations should be sloped or shored in the interest of safety following local, and federal regulations, including current OSHA excavation and trench safety standards.

Fill Material Types

All fill materials should be inorganic soils free of vegetation, debris, and fragments larger than 3 inches in size. Pea gravel or other similar non-cementitious, poorly-graded materials should not be used as fill or backfill without the prior approval of the geotechnical engineer.

Clean on-site soils or approved imported materials may be used as fill material for the following:

- general site grading
- foundation areas
- interior floor slab areas
- foundation backfill
- pavement areas
- exterior slab areas

Imported Fill Materials: Imported fill materials should meet the following material property requirements. Regardless of its source, compacted fill should consist of approved materials that are free of organic matter and debris.

Gradation	Percent Finer by Weight (ASTM C 136)
3"	100
No. 4 Sieve	50-100
No. 200 Sieve	10-40
Liquid Limit	30 (max)
Plasticity Index	15 (max)
Maximum expansion index*	20 (max)

*ASTM D 4829

The contractor shall notify the Geotechnical Engineer of import sources sufficiently ahead of their use so that the sources can be observed and approved as to the physical characteristic of the import material. For all import material, the contractor shall also submit current verified reports from a recognized analytical laboratory indicating that the import has a "not applicable" (Class S0) potential for sulfate attack based upon current ACI criteria and is "mildly corrosive" to ferrous metal and copper. The reports shall be accompanied by a written statement from the contractor that the laboratory test results are representative of all import material that will be brought to the job.

Engineered fill should be placed and compacted in horizontal lifts, using equipment and procedures that will produce recommended moisture contents and densities throughout the lift. Fill lifts should not exceed 10 inches loose thickness.

Fill Placement and Compaction Requirements

Engineered fill should meet the following compaction requirements.

Material Type and Location	Per the Modified Proctor Test (ASTM D 1557)		
	Minimum Compaction Requirement (%)	Range of Moisture Contents for Compaction Above Optimum	
		Minimum	Maximum
On-site soils and/or low volume change imported fill:			
Beneath foundations:	90	0%	+3%
Beneath interior slabs:	90	0%	+3%
Fill greater than 5 feet in depth:	95	0%	+3%
Miscellaneous backfill:	90	0%	+3%
Beneath pavements:	95	0%	+3%
Utility trenches: [1]	90	0%	+3%
Bottom of excavation receiving fill:	90	0%	+3%
Aggregate base (beneath pavements)	95	0%	+3%

1. Upper 12 inches should be compacted to 95% within pavement and structural areas.

Utility Trench Backfill

Any soft or unsuitable materials encountered at the bottom of utility trench excavations should be removed and replaced with structural fill or bedding material in accordance with public works specifications for the utility be supported. This recommendation is particularly applicable to utility work requiring grade control and/or in areas where subsequent grade raising could cause settlement in the subgrade supporting the utility. Trench excavation should not be conducted below a downward 1:1 projection from existing foundations or existing utilities without engineering review of shoring requirements and geotechnical observation during construction.

A non-expansive granular material with a sand equivalent greater than 30 should be used for bedding and shading of utilities, unless allowed or specified otherwise by the utility manufacturer. On-site materials are considered suitable for backfill of utility and pipe trenches from 1 foot above the top of the pipe to the final ground surface, provided the material is free of organic matter and deleterious substances.

Trench backfill should be mechanically placed and compacted as discussed earlier in this report. Compaction of initial lifts should be accomplished with hand-operated tampers or other lightweight compactors. Where trenches are placed beneath slabs or footings, the backfill should satisfy the gradation and expansion index requirements of engineered fill discussed in this report. Flooding or jetting for placement and compaction of backfill is not recommended.

Exterior Slab Design and Construction

Compacted subgrade composed of on-site clayey or silty soils may expand with increasing moisture content; therefore, exterior concrete slabs may heave, resulting in cracking or vertical offsets. The potential for damage would be greatest where exterior slabs are constructed adjacent to the building or other structural elements. To reduce the potential for damage caused by movement, we recommend:

- exterior slabs should be supported directly on subgrade fill (not ABC) with no, or very low expansion potential;
- strict moisture-density control during placement of subgrade fills;
- maintain proper subgrade moisture until placement of slabs;
- placement of effective control joints on relatively close centers and isolation joints between slabs and other structural elements;
- provision for adequate drainage in areas adjoining the slabs;
- use of designs which allow vertical movement between the exterior slabs and adjoining structural elements.

Grading and Drainage

All grades must provide effective drainage away from the building during and after construction and should be maintained throughout the life of the structure. Water retained next to the building can result in soil movements greater than those discussed in this report. Greater movements can result in unacceptable differential floor slab and/or foundation movements, cracked slabs and walls, and roof leaks. The roof should have gutters/drains with downspouts that discharge onto splash blocks at a distance of at least 10 feet from the building.

Exposed ground should be sloped and maintained at a minimum 5% away from the building for at least 10 feet beyond the perimeter of the building. Locally, flatter grades may be necessary to transition ADA access requirements for flatwork. After building construction and landscaping have been completed, final grades should be verified to document effective drainage has been achieved. Grades around the structure should also be periodically inspected and adjusted, as necessary, as part of the structure's maintenance program. Where paving or flatwork abuts the structure, a maintenance

program should be established to effectively seal and maintain joints and prevent surface water infiltration.

Earthwork Construction Considerations

Upon completion of filling and grading, care should be taken to maintain the subgrade water content prior to construction of grade-supported improvements such as floor slabs and pavements. Construction traffic over the completed subgrades should be avoided. The site should also be graded to prevent ponding of surface water on the prepared subgrades or in excavations. Water collecting over or adjacent to construction areas should be removed. If the subgrade desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

Water collecting over or adjacent to construction areas should be removed. If the subgrade freezes, desiccates, saturates, or is disturbed, the affected material should be removed, or the materials should be scarified, moisture conditioned, and recompacted prior to floor slab construction.

As a minimum, excavations should be performed in accordance with OSHA 29 CFR, Part 1926, Subpart P, "Excavations" and its appendices, and in accordance with any applicable local and/or state regulations.

Excavations or other activities resulting in ground disturbance have the potential to affect adjoining properties and structures. Our scope of services does not include review of available final grading information or consider potential temporary grading performed by the contractor for potential effects such as ground movement beyond the project limits. A preconstruction/ precondition survey should be conducted to document nearby property/infrastructure prior to any site development activity. Excavation or ground disturbance activities adjacent or near property lines should be monitored or instrumented for potential ground movements that could negatively affect adjoining property and/or structures.

We recommend that the earthwork portion of this project be completed during extended periods of dry weather if possible. If earthwork is completed during the wet season (typically November through April) it may be necessary to take extra precautionary measures to protect subgrade soils. Wet season earthwork operations may require additional mitigative measures beyond that which would be expected during the drier summer and fall months. This could include diversion of surface runoff around exposed soils and draining of ponded water on the site. Once subgrades are established, it may be necessary to protect the exposed subgrade soils from construction traffic.

Construction site safety is the sole responsibility of the contractor who controls the means, methods, and sequencing of construction operations. Under no circumstances

shall the information provided herein be interpreted to mean Terracon is assuming responsibility for construction site safety or the contractor's activities; such responsibility shall neither be implied nor inferred.

Construction Observation and Testing

The earthwork efforts should be observed by the Geotechnical Engineer (or others under their direction). Observation should include documentation of adequate removal of surficial materials (vegetation, topsoil, and pavements), evaluation and remediation of existing fill materials, as well as proofrolling and mitigation of unsuitable areas delineated by the proofroll.

Each lift of compacted fill should be tested, evaluated, and reworked, as necessary, as recommended by the Geotechnical Engineer prior to placement of additional lifts. Each lift of fill should be tested for density and water content at a frequency of at least one test for every 2,500 square feet of compacted fill in the building areas and 5,000 square feet in pavement areas. Where not specified by local ordinance, one density and water content test should be performed for every 50 linear feet of compacted utility trench backfill and a minimum of one test performed for every 12 vertical inches of compacted backfill. This testing frequency criteria may be adjusted during construction as specified by the geotechnical engineer of record.

In areas of foundation excavations, the bearing subgrade should be evaluated by the Geotechnical Engineer. If unanticipated conditions are observed, the Geotechnical Engineer should prescribe mitigation options.

In addition to the documentation of the essential parameters necessary for construction, the continuation of the Geotechnical Engineer into the construction phase of the project provides the continuity to maintain the Geotechnical Engineer's evaluation of subsurface conditions, including assessing variations and associated design changes.

Shallow Foundations

If the site has been prepared in accordance with the requirements noted in Earthwork, the following design parameters are applicable for mat foundation.

Design Parameters

Item	Description
Foundation Type	Shallow Spread Footings
Net Allowable Bearing Pressure [1, 2]	3,000 psf

Foundation Support [3]	Engineered fill extending 2 feet below the bottom of foundations, or 4 feet below existing grades, whichever is greater.
Minimum Foundation Dimensions	Continuous: 18 inches wide Columns: 24 inches wide
Minimum Embedment below Finished Grade [4]	18 inches
Ultimate Passive Resistance[5] (Equivalent fluid pressures)	375 pcf
Ultimate Coefficient of Sliding Friction [6]	0.36
Estimated Static Settlement from Structural Loads [2]	About 1 inch
Estimated Differential Settlement [2, 7]	About ½ of total settlement

1. The maximum net allowable bearing pressure is the pressure in excess of the minimum surrounding overburden pressure at the footing base elevation.
2. Values provided are for maximum loads noted in Project Description. Additional geotechnical consultation will be necessary if higher loads are anticipated. Does not include seismically induced settlement.
3. Unsuitable or soft soils should be over excavated and replaced per the recommendations presented in Earthwork.
4. Embedment necessary to minimize the effects of frost and/or seasonal water content variations. For sloping ground, maintain depth below the lowest adjacent exterior grade within 5 horizontal feet of the structure.
5. Use of passive earth pressures require the sides of the excavation for the spread footing foundation to be nearly vertical and the concrete placed neat against these vertical faces or that the footing forms be removed, and compacted structural fill be placed against the vertical footing face. Assumes no hydrostatic pressure.
6. Can be used to compute sliding resistance where foundations are placed on suitable soil/materials. Frictional resistance for granular materials is dependent on the bearing pressure which may vary due to load combinations.
7. Differential settlements are noted for equivalent-loaded foundations and bearing elevation as measured over a span of 50 feet.

Shallow Foundations Designed for Uplift Conditions

Reinforced concrete footings or dead-man foundations, cast against undisturbed subsoils, are recommended for resistance to uplift. Footings may be designed using the cone method. The equation for determining the ultimate uplift capacity as a function of footing dimension, foundation depth, and soil weight is:

$$T_u = 0.8 \cdot \gamma \cdot D^2 \cdot (B + L) + W$$

Where:

Variable	Description	Unit
T_u	Ultimate uplift capacity	pounds
γ	Unit weight of soil[1]	pcf
D	Depth to base of footing/dead-man foundation below final grade	feet
B	Width of footing/dead-man foundation	feet
L	Length of footing/dead-man foundation	feet
W	Weight of footing/dead-man + weight of soil directly over the top of the footing/block	pounds

Notes: [1]A unit weight (γ) of 120 pounds per cubic foot (pcf) is recommended for soil (either undisturbed or compacted backfill) at this site.

The design uplift resistance should be calculated by dividing the ultimate resistance obtained from the equation above by an appropriate factor of safety. A factor of safety of at least 2 is recommended for live uplift loads in the analysis.

Foundations should be reinforced as necessary to reduce the potential for distress caused by differential foundation movement. The use of joints at openings or other discontinuities in masonry walls is recommended.

Foundation excavations should be observed by the geotechnical engineer. If the soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

Foundation Construction Considerations

As noted in Earthwork, the footing excavations should be evaluated under the observation of the Geotechnical Engineer. The base of all foundation excavations should be free of water and loose soil, prior to placing concrete. Concrete should be placed soon after excavating to reduce bearing soil disturbance. Care should be taken to prevent wetting or drying of the bearing materials during construction. Excessively wet or dry material or any loose/disturbed material in the bottom of the footing excavations should be removed/reconditioned before foundation concrete is placed.

Over excavation for engineered fill placement below footings should be conducted as shown below. The over excavation should be backfilled up to the footing base elevation, with low volume change engineered fill placed, as recommended in the Earthwork section.

Drilled Pier Design Parameters

Drilled pier recommendations are provided for the proposed exterior canopies. We recommend drilled piers be designed and constructed as presented below.

Drilled Pier Foundation – Design Parameters

Axial Loading: Axial compressive loads may be supported on straight-sided drilled piers. Compressive axial loads on pier foundations are resisted by both side friction along the pier and by end bearing at the base of the pier if above groundwater, while uplift loads are resisted solely by side friction along the pier and by the weight of the pier.

Allowable compressive side friction and allowable total compressive axial capacity for the canopy piers are provided for pile diameters of 2, 2.5, and 3 feet in the attachments of this report. The allowable uplift capacities should only be based on two-thirds of the allowable side friction of the shaft; however, the weight of the foundation should be added to these values to obtain the actual allowable uplift capacities for drilled shafts. The allowable end bearing capacity and skin friction values are based on factors of safety of 3 and 2, respectively. Skin friction within the upper 2 feet of piers should be ignored for foundation areas not protected by pavements. The minimum center to center spacing of the piers should be 3 times the diameter of the shaft to develop full axial resistance. If closer center-to-center spacing are needed, geotechnical engineer should be consulted to evaluate the reduction in capacity.

Post-construction settlements of drilled piers designed and constructed as described in this report are estimated to range from about ¾ to 1 inch. Differential settlement between individual piers is expected to be ½ to ⅔ of the total settlement.

Lateral Loading: Since the proposed drilled shafts are short piles, we recommend that the pile embedment length to resist lateral loads may be calculated based on the Section 1807.3 of 2022 California Building Code. An allowable equivalent fluid with a density of 225 pounds per cubic foot may be assumed for estimating the lateral resistance of the soils against the projected width of the shaft. The maximum lateral resistance should be capped at 2,250 pounds per square foot at depths greater than 10 feet below the ground surface. The contribution of lateral resistance to a depth equal to two pier diameters or three feet from finished grade, whichever is less, should be neglected. For temporary loading conditions, lateral capacity could be increased by 33%.

The above parameters assumed the groundwater level is below the maximum depth of the drilled shaft. The load capacities provided are based only on the stresses induced in the supporting soils; the structural capacity of the shafts should be checked to assure that they can safely accommodate the combined stresses induced by axial and lateral forces. The response of the drilled shaft foundations to lateral loads is dependent upon the soils/structure interaction as well as the shaft's actual diameter, length, stiffness, and "fixity" (fixed or free-

head condition). Tensile reinforcement should extend to the bottom of piers subjected to uplift loading, while maintaining appropriate concrete coverage.

Drilled Pier Construction Recommendations

The Geotechnical Engineer should observe the installation of drilled piers to verify the soil conditions and the diameter and depth of piers. Drilled piers should be constructed true and plumb.

Because of the granular nature of the soils encountered, and the anticipated diameter of the drilled holes, it is anticipated that caving could occur during the drilling and construction of piers within the on-site soils. Appropriate precautions should therefore be taken during the construction of piers to reduce caving and raveling.

Temporary steel casing may be required to properly drill and clean drilled piers prior to concrete placement. Foundation concrete should be placed immediately after completion of drilling and cleaning. If foundation concrete cannot be placed in dry conditions, a tremie should be used for concrete placement. Due to potential sloughing and raveling, foundation concrete quantities may exceed calculated geometric volumes.

If casing is used for foundation construction, it should be withdrawn in a slow continuous manner, maintaining a sufficient head of concrete to prevent caving or the creation of voids in pier concrete. Foundation concrete should have a relatively high fluidity when placed in cased pier holes or through a tremie. Foundation concrete with slump in the range of 6 to 8 inches is recommended when temporary casing is utilized.

Free-fall concrete placement in drilled piers will only be acceptable if provisions are taken to avoid striking the concrete on the sides of the hole or reinforcing steel. The use of a bottom-dump hopper, or an "elephant's trunk" discharging near the bottom of the hole where concrete segregation will be minimized, is recommended.

Drilled pier end bearing surfaces must be thoroughly cleaned prior to concrete placement. A representative of the Geotechnical Engineer should inspect the bearing surface and foundation pier configuration. If the subsurface soil conditions encountered differ significantly from those presented in this report, supplemental recommendations will be required.

The contractor should check for gas and/or oxygen deficiency before any workers enter the excavation for observation and manual cleanup. All necessary monitoring and safety precautions as required by OSHA, State or local codes should be strictly enforced.

The drilling speed should be reduced as necessary to minimize vibration and caving of the silty sand materials. Based on the data developed during our investigation, drilling for the piers may need casing as caving soils may be encountered; the contractor should be prepared to use casing or other approved means to prevent caving. The contractor should review the

boring logs to make sure he is familiar with the anticipated subsurface conditions prior to beginning construction of the deep foundations.

Closely spaced piers should be drilled and filled alternately, allowing the concrete to set at least eight hours before drilling the adjacent pier. All excavations should be filled with concrete as soon after drilling as possible. In no event should pier holes be left open overnight. To prevent concrete from striking the walls of the pier and causing caving, the concrete should be placed with appropriate equipment so that the concrete is not allowed to fall freely more than 5 feet. All loose materials should be thoroughly cleaned from the bottom of the pier excavation. This is especially important because end bearing has been considered in determining the provided pier capacities. If casing is necessary and is utilized, then the casing should be withdrawn concurrently with the concrete placement.

Floor Slabs

Design parameters for floor slabs assume the requirements for Earthwork have been followed. Specific attention should be given to positive drainage away from the structure and positive drainage of the aggregate base beneath the floor slab.

Floor Slab Design Parameters

Item	Description
Floor Slab Support[1]	Engineered fill extending 2 feet below the bottom of foundations, or 4 feet below existing grades, whichever is greater.
Subbase	Minimum 4 inches of Aggregate Base
Estimated Modulus of Subgrade Reaction [2]	200 pounds per square inch per inch (psi/in) for point loads. (The modulus was obtained based on estimates obtained from NAVFAC 7.1 design charts). This value is for a small loaded area (1 Sq. ft or less) such as for forklift wheel loads or point loads and should be adjusted for larger loaded areas.

The use of a vapor retarder should be considered beneath concrete slabs on grade covered with wood, tile, carpet, or other moisture sensitive or impervious coverings, when the project includes humidity-controlled areas, or when the slab will support equipment sensitive to moisture. When conditions warrant the use of a vapor retarder, the slab designer should refer to ACI 302 and/or ACI 360 for procedures and cautions regarding the use and placement of a vapor retarder.

Saw-cut contraction joints should be placed in the slab to help control the location and extent of cracking. For additional recommendations, refer to the ACI Design Manual. Joints or cracks should be sealed with a waterproof, non-extruding compressible

compound specifically recommended for heavy duty concrete pavement and wet environments.

Where floor slabs are tied to perimeter walls or turn-down slabs to meet structural or other construction objectives, our experience indicates differential movement between the walls and slabs will likely be observed in adjacent slab expansion joints or floor slab cracks beyond the length of the structural dowels. The Structural Engineer should account for potential differential settlement through use of sufficient control joints, appropriate reinforcing or other means.

Floor Slab Construction Considerations

Finished subgrade, within and for at least 10 feet beyond the floor slab, should be protected from traffic, rutting, or other disturbance and maintained in a relatively moist condition until floor slabs are constructed. If the subgrade should become damaged or desiccated prior to construction of floor slabs, the affected material should be removed, and structural fill should be added to replace the resulting excavation. Final conditioning of the finished subgrade should be performed immediately prior to placement of the floor slab support course.

The Geotechnical Engineer should observe the condition of the floor slab subgrades immediately prior to placement of the floor slab support course, reinforcing steel, and concrete. Attention should be paid to high traffic areas that were rutted and disturbed earlier, and to areas where backfilled trenches are located.

LATERAL EARTH PRESSURES

Design Parameters

For engineered fill comprised of on-site soils above any free water surface, recommended equivalent fluid pressures for unrestrained foundation elements are:

ITEM	VALUE[a, b]
Active Case	40 psf/ft
Passive Case	375 psf/ft
At-Rest Case	60 psf/ft
Coefficient of Friction	0.36

[a]Note: The values are based on on-site soils used as backfill.
[b]Note: Uniform, horizontal backfill, compacted to at least 90% of the ASTM D 1557 maximum dry density, rendering a maximum unit weight of 125 pcf.

The lateral earth pressures herein do not include any factor of safety and are not applicable for submerged soils/hydrostatic loading. Additional recommendations may be necessary if such conditions are to be included in the design.

Fill against foundation and retaining walls should be compacted to densities specified in the Earthwork section of this report. Compaction of each lift adjacent to walls should be accomplished with hand-operated tampers or other lightweight compactors.

Pavements

General Pavement Comments

Pavement designs are provided for the traffic conditions and pavement life conditions as noted in Project Description and in the following sections of this report. A critical aspect of pavement performance is site preparation. Pavement designs noted in this section must be applied to the site which has been prepared as recommended in the Earthwork section.

Pavement Design Parameters

Design of asphalt concrete (AC) pavements is based on the procedures outlined in the Caltrans "Highway Design Manual" (Caltrans, 2018). Design of Portland cement concrete (PCC) pavements are based upon American Concrete Institute (ACI) 330R-08; "Guide for Design and Construction of Concrete Parking Lots."

An estimated correlated R-value of 25 was used to calculate the AC pavement thickness sections. A modulus of subgrade reaction of 120 pci and a modulus of rupture of 600 psi were used for the PCC pavement designs. R-value testing should be completed prior to pavement construction to verify the design R-value.

The structural sections are predicated upon proper compaction of the utility trench backfills and the subgrade soils as prescribed by in Earthwork, with the upper 12 inches of subgrade soils and all aggregate base material brought to a minimum relative compaction of 95 percent in accordance with ASTM D 1557 prior to paving. The aggregate base should meet Caltrans requirements for Class 2 base.

The pavement designs were based upon the results of preliminary sampling and testing and should be verified by additional sampling and testing during construction when the actual subgrade soils are exposed.

Pavement Section Thicknesses

The following tables provides our opinion of minimum thickness for AC and PCC sections:

Asphalt Concrete Design		
Usage	Assumed Traffic Index	Recommended Structural Section
Auto Parking Areas	4.5	3" HMA[1]/5" Class 2 AB[2]
Drive lanes	5.5	3" HMA[1]/8" Class 2 AB[2]
Truck Delivery Areas	6.0	3.5" HMA[1]/9" Class 2 AB[2]

1. HMA = hot mix asphalt
2. AB = aggregate base

Portland Cement Concrete Design			
Layer	Thickness (inches)		
	Light Duty[1]	Medium Duty[2]	Dumpster Pad[3]
PCC	5.0	6.0	7.5
Aggregate Base	4.0	4.0	4.0

1. Car Parking and Access Lanes, Average Daily Truck Traffic (ADTT) = 1 (Category A).
2. Truck Parking Areas, Multiple Units, ADTT = 25 (Category B)
3. **In areas of anticipated heavy traffic, fire trucks, delivery trucks, or concentrated loads (e.g., dumpster pads), and areas with repeated turning or maneuvering of heavy vehicles,** ADTT = 700 (Category C)**.**

Areas for parking of heavy vehicles, concentrated turn areas, and start/stop maneuvers could require thicker pavement sections. Edge restraints (i.e. concrete curbs or aggregate shoulders) should be planned along curves and areas of maneuvering vehicles.

Although not required for structural support, a minimum 4-inch thick base course layer is recommended to help reduce potential for slab curl, shrinkage cracking, and subgrade pumping through joints. Proper joint spacing will also be required to prevent excessive slab curling and shrinkage cracking. Joints should be sealed to prevent entry of foreign material and doweled where necessary for load transfer. PCC pavement details for joint spacing, joint reinforcement, and joint sealing should be prepared in accordance with ACI 330 and ACI 325.

Where practical, we recommend early-entry cutting of crack-control joints in PCC pavements. Cutting of the concrete in its "green" state typically reduces the potential for

micro-cracking of the pavements prior to the crack control joints being formed, compared to cutting the joints after the concrete has fully set. Micro-cracking of pavements may lead to crack formation in locations other than the sawed joints, and/or reduction of fatigue life of the pavement.

Openings in pavements, such as decorative landscaped areas, are sources for water infiltration into surrounding pavement systems. Water can collect in the islands and migrate into the surrounding subgrade soils thereby degrading support of the pavement. Islands with raised concrete curbs, irrigated foliage, and low permeability near-surface soils are particular areas of concern. The civil design for the pavements with these conditions should include features to restrict or collect and discharge excess water from the islands. Examples of features are edge drains connected to the stormwater collection system, longitudinal subdrains, or other suitable outlets and impermeable barriers preventing lateral migration of water such as a cutoff wall installed to a depth below the pavement structure.

Pavement Drainage

Pavements should be sloped to provide rapid drainage of surface water. Water allowed to pond on or adjacent to the pavements could saturate the subgrade and contribute to premature pavement deterioration. In addition, the pavement subgrade should be graded to provide positive drainage within the granular base section. Appropriate sub-drainage or connection to a suitable daylight outlet should be provided to remove water from the granular subbase.

Pavement Maintenance

The pavement sections represent minimum recommended thicknesses and, as such, periodic upkeep should be anticipated. Preventive maintenance should be planned and provided for through an on-going pavement management program. Maintenance activities are intended to slow the rate of pavement deterioration and to preserve the pavement investment. Pavement care consists of both localized (e.g., crack and joint sealing and patching) and global maintenance (e.g., surface sealing). Additional engineering consultation is recommended to determine the type and extent of a cost-effective program. Even with periodic maintenance, some movements and related cracking may still occur, and repairs may be required.

Pavement performance is affected by its surroundings. In addition to providing preventive maintenance, the civil engineer should consider the following recommendations in the design and layout of pavements:

- Final grade adjacent to paved areas should slope down from the edges at a minimum 2%.

- Subgrade and pavement surfaces should have a minimum 2% slope to promote proper surface drainage.
- Install pavement drainage systems surrounding areas anticipated for frequent wetting.
- Install joint sealant and seal cracks immediately.
- Seal all landscaped areas in or adjacent to pavements to reduce moisture migration to subgrade soils.
- Place compacted, low permeability backfill against the exterior side of curb and gutter.
- Place curb, gutter and/or sidewalk directly on clay subgrade soils rather than on unbound granular base course materials.

STORM WATER MANAGEMENT

Three in-situ percolation tests (falling head borehole permeability) were performed at approximate depths of 5 and 10 feet bgs within boreholes drilled with an 8-inch diameter auger. The objective of the testing is to provide infiltration rates for designing the proposed infiltration system. A 2-inch thick, 3/4-inch gravel layer was placed in the bottom of each boring after the borings were drilled to investigate the soil profile. Three-inch diameter perforated pipes were installed on top of the gravel layer and gravel was used to backfill between the perforated pipes and the boring sidewall. The borings were then filled with water for a pre-soak period.

At the beginning of each test, the pipes were refilled with water and readings were taken at periodic time intervals as the water level dropped. The soil at the percolation test locations was classified in the field using a visual/manual procedure. The infiltration velocity is presented as the infiltration rate and is summarized in the following table. The infiltration rates provided do not include safety factors.

Test Location	Boring Depth (ft.) [1]	Test Depth Range (ft.) [1]	Soil Type	Water Head (ft)	Percolation Rate Average (in./hr.)	Infiltration Rate Average (in./hr.) [2]
P-1	5	0 to 5	SM	5	24	0.8
P-2	10	5 to 10	SM	5	116	4.4
P-3	5	0 to 5	SC	5	30	1.0

1. Below existing ground surface.
2. If proposed infiltration system will mainly rely on vertical downward seepage, the correlated infiltration rates should be used. The correlation rate is based on the Porchet Method.

The above infiltration rates determined by the percolation test method are based on field test results utilizing clear water. Infiltration rates can be affected by silt buildup, debris, degree of soil saturation, site variability and other factors. The rate obtained at specific location and depth is representative of the location and depth tested and may not be representative of the entire site. Application of an appropriate safety factor is prudent to account for subsoil inconsistencies, possible compaction related to site grading, and potential silting of the percolating soils, depending on the application.

The design engineer should also check with the local agency for the limitation of the infiltration rate allowed in the design. If the maximum allowable design infiltration rate is lower than the above recommended rate, the maximum allowable design infiltration rate should be used. The designer of the basins should also consider other possible site variability in the design.

The percolation tests were performed with clear water, whereas the storm water will likely not be clear, but may contain organics, fines, and grease/oil. The presence of these deleterious materials will tend to decrease the rate that water percolates from the infiltration systems. Design of the storm water infiltration systems should account for the presence of these materials and should incorporate structures/devices to remove these deleterious materials.

Based on the soils encountered in our borings, we expect the percolation rates of the soils could be different than measured in the field due to variations in fines and gravel content. The design elevation and size of the proposed infiltration system should account for this expected variability in infiltration rates.

Infiltration testing should be performed after construction of the infiltration system to verify the design infiltration rates. It should be noted that siltation and vegetation growth along with other factors may affect the infiltration rates of the infiltration areas. The actual infiltration rate may vary from the values reported here. Infiltration systems should be located at least 10 feet from any existing or proposed foundation system.

Corrosivity

The results of laboratory sulfides, soluble sulfate, chlorides, electrical resistivity, redox potential, total salts, and pH testing are presented in our appendix within the Exploration Results section. The values may be used to estimate potential corrosive characteristics of the on-site soils with respect to contact with the various underground materials which will be used for project construction.

Results of soluble sulfate testing indicate samples of the on-site soils tested possess negligible sulfate concentrations when classified in accordance with Table 19.3.1.1 of the

ACI Design Manual. Concrete should be designed in accordance with the exposure class S0 provisions of the ACI Design Manual, Section 318, Chapter 19.

General Comments

Our analysis and opinions are based upon our understanding of the project, the geotechnical conditions in the area, and the data obtained from our site exploration. Variations will occur between exploration point locations or due to the modifying effects of construction or weather. The nature and extent of such variations may not become evident until during or after construction. Terracon should be retained as the Geotechnical Engineer, where noted in this report, to provide observation and testing services during pertinent construction phases. If variations appear, we can provide further evaluation and supplemental recommendations. If variations are noted in the absence of our observation and testing services on-site, we should be immediately notified so that we can provide evaluation and supplemental recommendations.

Our Scope of Services does not include either specifically or by implication any environmental or biological (e.g., mold, fungi, bacteria) assessment of the site or identification or prevention of pollutants, hazardous materials, or conditions. If the owner is concerned about the potential for such contamination or pollution, other studies should be undertaken.

Our services and any correspondence are intended for the sole benefit and exclusive use of our client for specific application to the project discussed and are accomplished in accordance with generally accepted geotechnical engineering practices with no third-party beneficiaries intended. The findings and recommendations presented in this report were prepared in a manner consistent with the standards of care and skill ordinarily exercised by members of its profession completing similar studies and practicing under similar conditions in the geographic vicinity and at the time these services have been performed. Any third-party access to services or correspondence is solely for information purposes to support the services provided by Terracon to our client. Reliance upon the services and any work product is limited to our client and is not intended for third parties. Any use or reliance of the provided information by third parties is done solely at their own risk. No warranties, either express or implied, are intended or made.

Site characteristics as provided are for design purposes and not to estimate excavation cost. Any use of our report in that regard is done at the sole risk of the excavating cost estimator as there may be variations on the site that are not apparent in the data that could significantly affect excavation cost. Any parties charged with estimating excavation costs should seek their own site characterization for specific purposes to obtain the specific level of detail necessary for costing. Site safety and cost estimating including excavation support and dewatering requirements/design are the responsibility of others. Construction and site development have the potential to affect adjacent properties. Such

impacts can include damages due to vibration, modification of groundwater/surface water flow during construction, foundation movement due to undermining or subsidence from excavation, as well as noise or air quality concerns. Evaluation of these items on nearby properties are commonly associated with contractor means and methods and are not addressed in this report. The owner and contractor should consider a preconstruction/precondition survey of surrounding development. If changes in the nature, design, or location of the project are planned, our conclusions and recommendations shall not be considered valid unless we review the changes and either verify or modify our conclusions in writing.

Figures

Attachments

Exploration and Testing Procedures

Field Exploration

Boring Number and Designation	Approximate Boring Depth or Refusal (feet)	Location
3 (B-1 to B-3)	26 ½	Planned building area and drive through canopy
3 (B-4 to B-6)	6	Planned parking/driveway area
3 (Perc-1 to Perc-3)	5 and 10	Parking and Infiltration areas

Boring Layout and Elevations: Terracon personnel provided the boring layout using handheld GPS equipment (estimated horizontal accuracy of about ±10 feet) and referencing existing site features. If elevations and a more precise boring layout are desired, we recommend borings be surveyed.

Subsurface Exploration Procedures: We advanced the borings with a truck-mounted drill rig using continuous flight hollow stem augers. Four samples were generally obtained in the upper 10 feet of each boring and at intervals of 5 feet thereafter. In the split-barrel sampling procedure, a standard 2-inch outer diameter split-barrel sampling spoon was driven into the ground by a 140-pound automatic hammer falling a distance of 30 inches. The number of blows required to advance the sampling spoon the last 12 inches of a normal 18-inch penetration is recorded as the Standard Penetration Test (SPT) resistance value. The SPT resistance values, also referred to as N-values, are indicated on the boring logs at the test depths. A 3-inch O.D. split-barrel sampling spoon with 2.5-inch I.D. ring lined sampler was also used for sampling soils at the project site. Ring-lined, split-barrel sampling procedures are similar to standard split spoon sampling procedure. We observed and recorded groundwater levels during drilling and sampling. For safety purposes, all borings were backfilled with auger cuttings after their completion.

The sampling depths, penetration distances, and other sampling information was recorded on the field boring logs. The samples were placed in appropriate containers and taken to our soil laboratory for testing and classification by a Geotechnical Engineer. Our exploration team prepared field boring logs as part of the drilling operations. These field logs included visual classifications of the materials encountered during drilling and our interpretation of the subsurface conditions between samples. Final boring logs were prepared from the field logs. The final boring logs represent the Geotechnical Engineer's interpretation of the field logs and include modifications based on observations and tests of the samples in our laboratory.

Laboratory Testing

The project engineer reviewed the field data and assigned laboratory tests. The laboratory testing program included the following types of tests:

- Moisture Content
- Dry Unit Weight
- Particle-size Distribution (Gradation) of Soils Using Sieve Analysis
- Maximum Dry Density/Optimum Moisture Content
- Expansion Index
- Corrosion Suite
- Horticulture testing results

The laboratory testing program often included examination of soil samples by an engineer. Based on the results of our field and laboratory programs, we described and classified the soil samples in accordance with the Unified Soil Classification System.

Site Location and Exploration Plans

Contents:

Site Location Plan
Exploration Plan

Note: All attachments are one page unless noted above.

Site Location

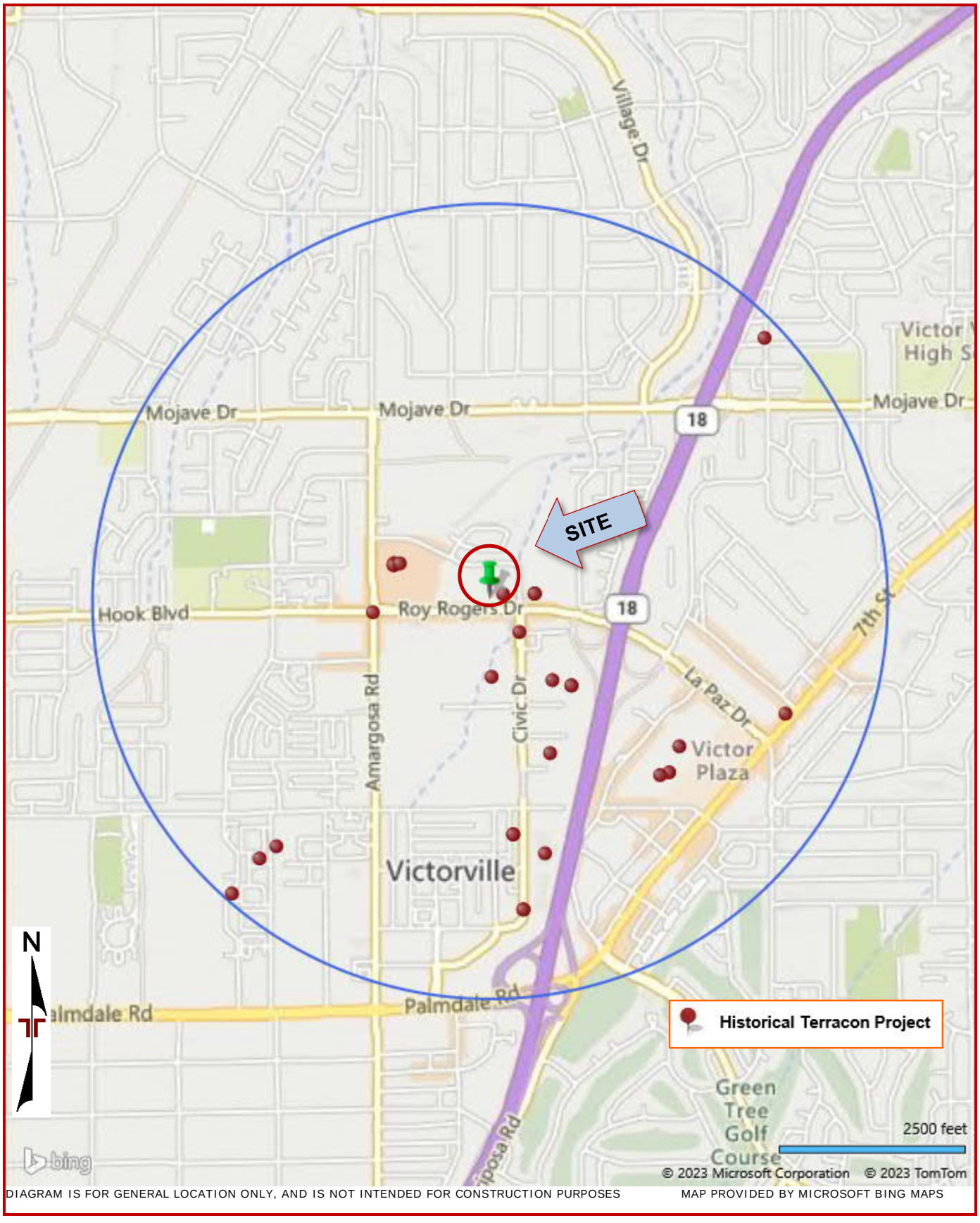

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration Plan

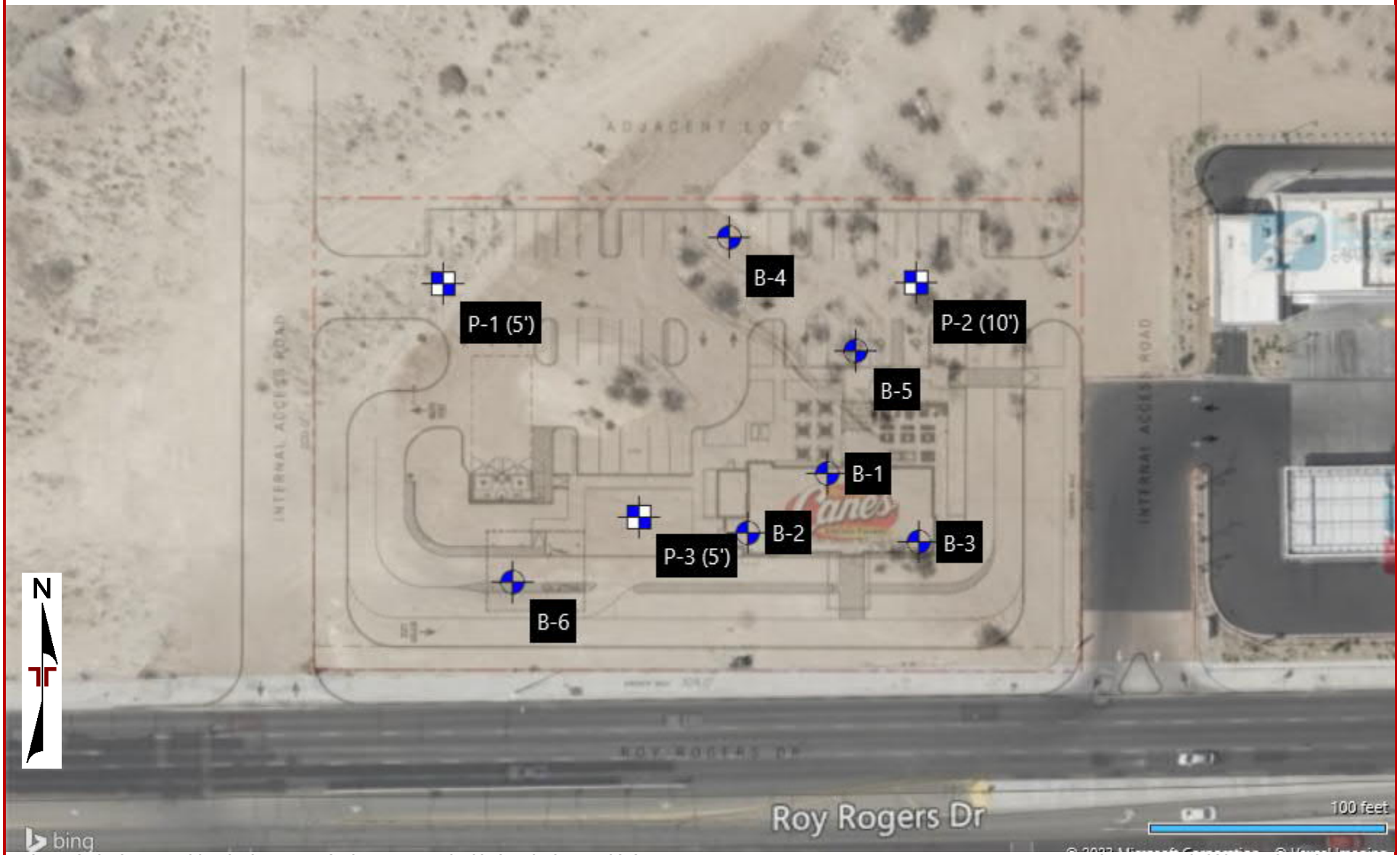

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

MAP PROVIDED BY MICROSOFT BING MAPS

Exploration and Laboratory Results

Contents:

Note: All attachments are one page unless noted above.

Raising Cane's Restaurant (RC-1051)-Victorville
North of Roy Rogers Dr. and west of Civic Dr. | Victorville, CA
Terracon Project No. CB235076

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Log No. B-1

Graphic Log	Location: See Exploration Plan Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	Water Content (%)	Dry Unit Weight (pcf)	Percent Fines
	SILTY SAND (SM), light brown, very dense								
					23-50/3"		5.1		48
	dense	5			20-37-43		6.5	113	24
	7.5								
	POORLY GRADED SAND WITH SILT (SP-SM), brown, dense				19-31-50		4.9		5
	very dense	10			24-50/4"				
		15			14-17-18 N=35				5
	20.0								
	LEAN CLAY WITH SAND (CL), brown, hard	20			11-16-19 N=35				76
	25.0								
	POORLY GRADED SAND WITH SILT (SP-SM), light brown, dense	25			14-20-27 N=47				
	26.5								
	Boring Terminated at 26.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
None observed while drilling

Drill Rig

Hammer Type
Automatic

Driller
2R Drilling

Logged by
AS

Boring Started
06-06-2023

Boring Completed
06-06-2023

Notes

Advancement Method
HSA

Abandonment Method

Raising Cane's Restaurant (RC-1051)-Victorville
North of Roy Rogers Dr. and west of Civic Dr. | Victorville, CA
Terracon Project No. CB235076

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Log No. B-2

Graphic Log	Location: See Exploration Plan Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	Water Content (%)	Dry Unit Weight (pcf)	Percent Fines
	SILTY SAND (SM), light brown, very dense				50/4"		4.7		48
		5			21-50/6"		1.7	107	
	7.5								
	SANDY LEAN CLAY (CL), brown, hard				16-23-41		9.4	109	68
	9.0								
	SILTY SAND (SM), brown to light brown, very dense	10			50/6"				
	medium dense	15			12-13-15 N=28				21
	20.0								
	LEAN CLAY WITH SAND (CL), brown, hard	20			11-16-24 N=40				83
	25.0								
	POORLY GRADED SAND WITH SILT (SP-SM), brown, very dense	25			14-23-28 N=51				
	26.5								
	Boring Terminated at 26.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
None observed while drilling

Drill Rig

Hammer Type
Automatic

Driller
2R Drilling

Logged by
AS

Boring Started
06-06-2023

Boring Completed
06-06-2023

Notes

Advancement Method
HSA

Abandonment Method

Raising Cane's Restaurant (RC-1051)-Victorville
North of Roy Rogers Dr. and west of Civic Dr. | Victorville, CA
Terracon Project No. CB235076

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Log No. B-3

Graphic Log	Location: See Exploration Plan Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	Water Content (%)	Dry Unit Weight (pcf)	Percent Fines
	SILTY SAND (SM), light tan, medium dense					1			
					15-17-17		1.0	117	
	dense	5			9-25-45		3.1	111	
	very dense				50/6"				
	very dense	10			50/5"				
	15.0								
	SILTY SAND WITH CLAY (SM), brown, very dense	15			12-20-37 N=57				
	dense	20			17-21-21 N=42				
	25.0								
	POORLY GRADED SAND WITH SILT (SP-SM), light brown, very dense	25			14-20-31 N=51				
	26.5								
	Boring Terminated at 26.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
None observed while drilling

Drill Rig

Hammer Type
Automatic

Driller
2R Drilling

Logged by
AS

Boring Started
06-06-2023

Boring Completed
06-06-2023

Notes

Advancement Method
HSA

Abandonment Method

Raising Cane's Restaurant (RC-1051)-Victorville
North of Roy Rogers Dr. and west of Civic Dr. | Victorville, CA
Terracon Project No. CB235076

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Log No. B-4

Graphic Log	Location: See Exploration Plan Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	Water Content (%)	Dry Unit Weight (pcf)	Percent Fines
	SILT WITH SAND (ML), tan, hard								
					19-50/6"				80
		5							
	6.0								
	Boring Terminated at 6 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
None observed while drilling

Drill Rig

Hammer Type
Automatic

Driller
2R Drilling

Logged by
AS

Boring Started
06-06-2023

Boring Completed
06-06-2023

Notes

Advancement Method
HSA

Abandonment Method

Raising Cane's Restaurant (RC-1051)-Victorville
North of Roy Rogers Dr. and west of Civic Dr. | Victorville, CA
Terracon Project No. CB235076

Terracon
1355 E Cooley Dr, Ste C
Colton, CA

Boring Log No. B-5

Graphic Log	Location: See Exploration Plan Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	Water Content (%)	Dry Unit Weight (pcf)	Percent Fines
	SANDY SILT (ML), trace gravel, tan, dry, hard								
					14-27-40				
		5							
	6.0								
	Boring Terminated at 6 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
None observed while drilling

Drill Rig

Hammer Type
Automatic

Driller
2R Drilling

Logged by
AS

Boring Started
06-06-2023

Boring Completed
06-06-2023

Notes

Advancement Method
HSA

Abandonment Method

Raising Cane's Restaurant (RC-1051)-Victorville
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Terracon
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Colton, CA

Boring Log No. B-6

Graphic Log	Location: See Exploration Plan Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	Water Content (%)	Dry Unit Weight (pcf)	Percent Fines
	SILT WITH SAND (ML), trace gravel, tan, hard	5			25-39-50/5"				69
	6.0 ***Boring Terminated at 6 Feet***								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
None observed while drilling

Drill Rig

Hammer Type
Automatic

Driller
2R Drilling

Logged by
AS

Boring Started
06-06-2023

Boring Completed
06-06-2023

Notes

Advancement Method
HSA

Abandonment Method

Raising Cane's Restaurant (RC-1051)-Victorville
North of Roy Rogers Dr. and west of Civic Dr. | Victorville, CA
Terracon Project No. CB235076

Terracon
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Colton, CA

Boring Log No. P-1

Graphic Log	Location: See Exploration Plan Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	Water Content (%)	Dry Unit Weight (pcf)	Percent Fines
	SILTY SAND (SM), brown								48
	5.0	5							
	Boring Terminated at 5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
None observed while drilling

Drill Rig

Hammer Type
Automatic

Driller
2R Drilling

Logged by
AS

Boring Started
06-06-2023

Boring Completed
06-06-2023

Notes

Advancement Method
HSA

Abandonment Method

Raising Cane's Restaurant (RC-1051)-Victorville
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Boring Log No. P-2

Graphic Log	Location: See Exploration Plan Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	Water Content (%)	Dry Unit Weight (pcf)	Percent Fines
	SILTY SAND (SM), trace gravel, light brown to brown	5							22
	10.0 ***Boring Terminated at 10 Feet***	10							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
None observed while drilling

Drill Rig

Hammer Type
Automatic

Driller
2R Drilling

Logged by
AS

Boring Started
06-06-2023

Boring Completed
06-06-2023

Notes

Advancement Method
HSA

Abandonment Method

Raising Cane's Restaurant (RC-1051)-Victorville
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Terracon
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Colton, CA

Boring Log No. P-3

Graphic Log	Location: See Exploration Plan Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Expansion Index	Water Content (%)	Dry Unit Weight (pcf)	Percent Fines
	CLAYEY SAND (SC), trace gravel, tan								45
	5.0	5							
	Boring Terminated at 5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).

See Supporting Information for explanation of symbols and abbreviations.

Water Level Observations
None observed while drilling

Drill Rig

Hammer Type
Automatic

Driller
2R Drilling

Logged by
AS

Boring Started
06-06-2023

Boring Completed
06-06-2023

Notes

Advancement Method
HSA

Abandonment Method

Raising Cane's Restaurant (RC-1051)-Victorville
North of Roy Rogers Dr. and west of Civic Dr. | Victorville, CA
Terracon Project No. CB235076

Terracon
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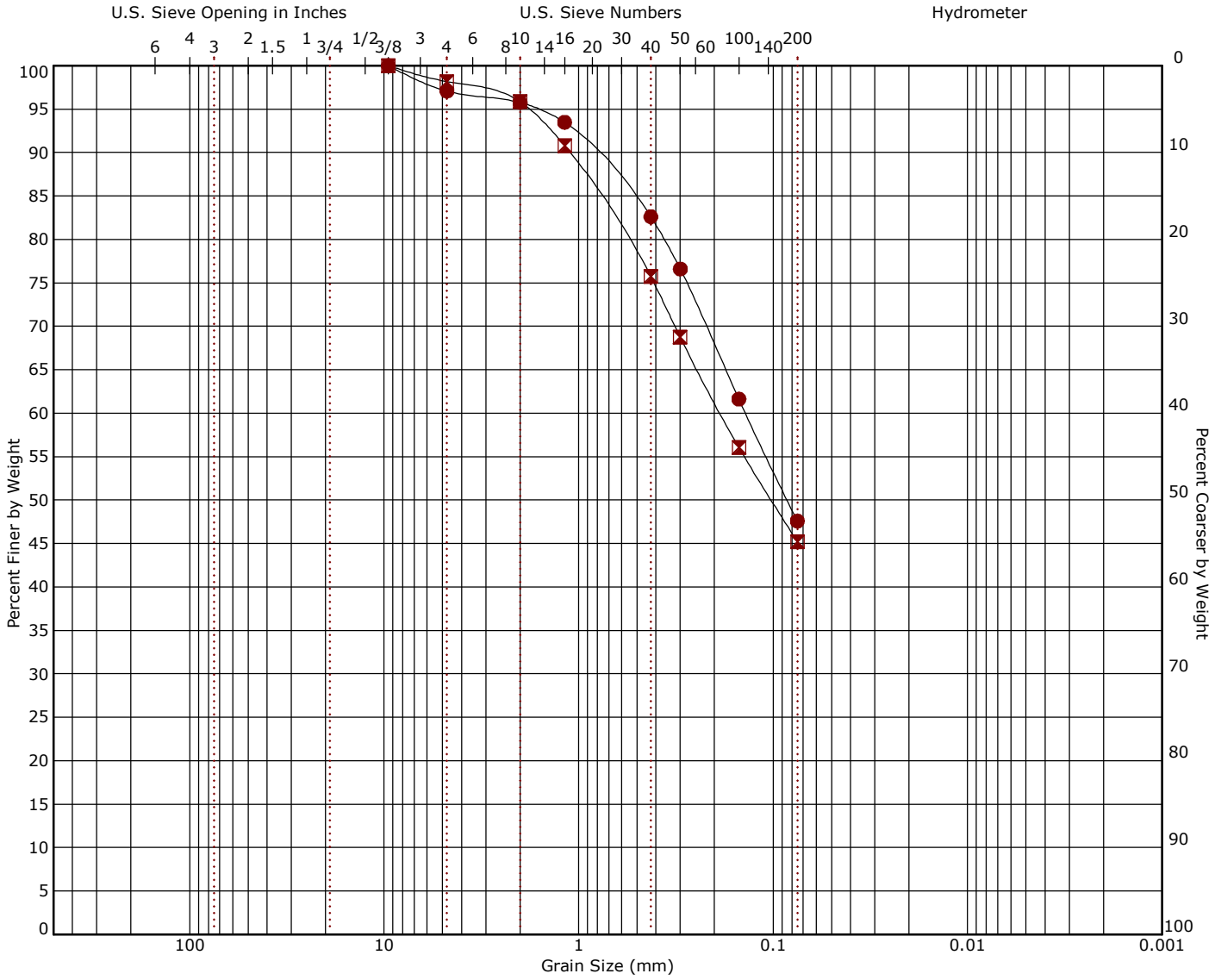
Colton, CA

Grain Size Distribution

ASTM D422 / ASTM C136



Cobbles	Gravel		Sand			Silt or Clay
	coarse	fine	coarse	medium	fine	

Boring ID	Depth (Ft)	USCS Classification	USCS	AASHTO	LL	PL	PI	Cc	Cu
P-1	0 - 5								
P-3	0 - 5								

Boring ID	Depth (Ft)	D_{100}	D_{60}	D_{30}	D_{10}	%Cobbles	%Gravel	%Sand	%Fines	%Silt	%Clay
P-1	0 - 5	9.5	0.138			0.0	2.9	49.5	47.6		
P-3	0 - 5	9.5	0.186			0.0	1.8	52.9	45.2		

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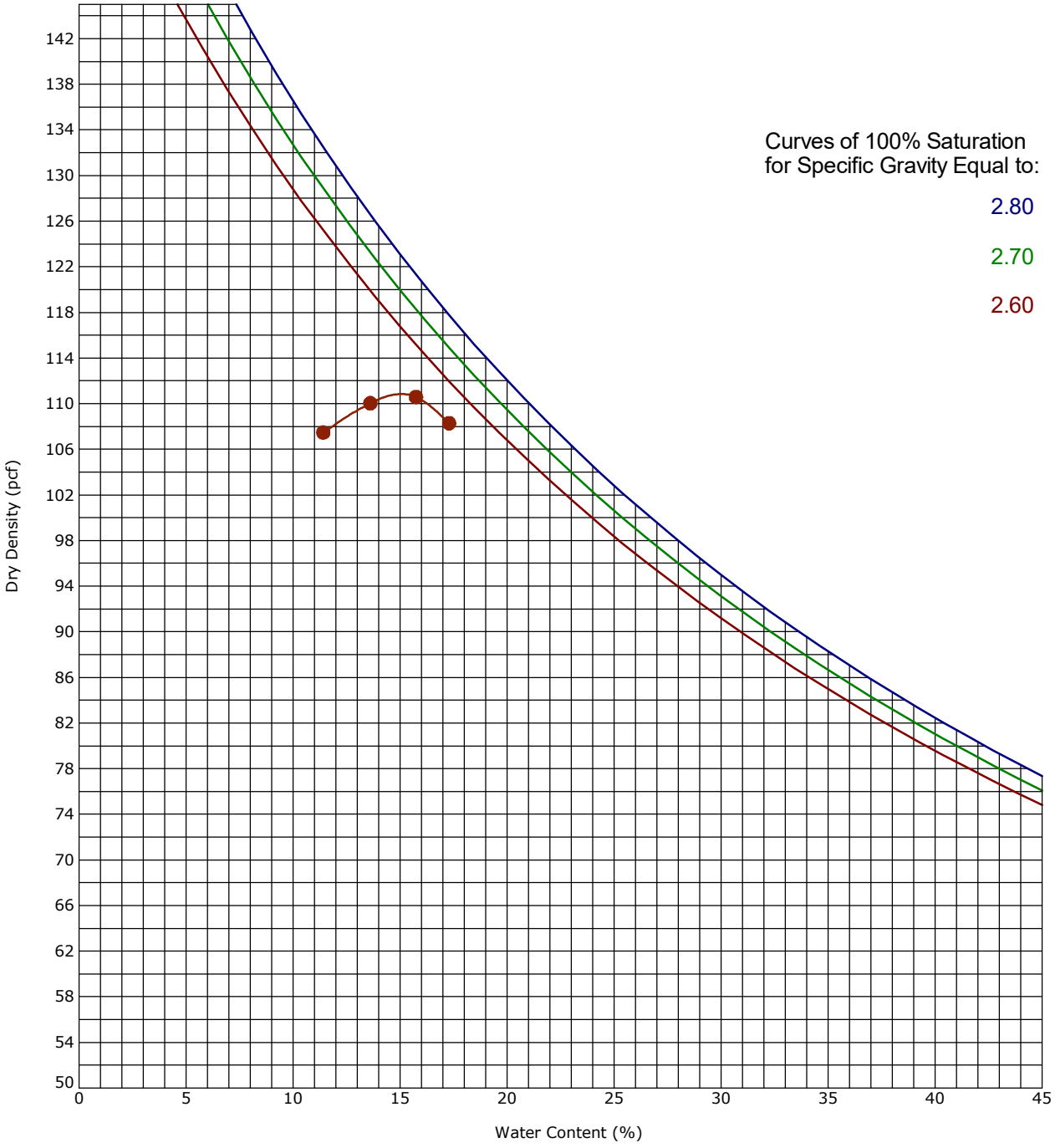
Moisture-Density Relationship

ASTM D1557-Method B



Boring ID	Depth (Ft)	Description of Materials
B-2	0 - 2.5	

Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
	0.0				ASTM D1557-Method B	110.8	15.1

750 Pilot Road, Suite F
Las Vegas, Nevada 89119
(702) 597-9393

Client
Raising Cane's Restaurants, LLC

Project
Raising Cane's Restaurant (RC-1051)
Victorville

Sample Submitted By: Terracon (CB) **Date Received:** 6/16/2023 **Lab No.: 23-0346**

Results of Corrosion Analysis

Sample Number	Bulk
Sample Location	B-3
Sample Depth (ft.)	0.0-2.5
pH Analysis, ASTM G51	8.46
Water Soluble Sulfate (SO4), ASTM C 1580 (mg/kg)	31
Sulfides, AWWA 4500-S D, (mg/Kg)	Nil
Chlorides, ASTM D512, (mg/kg)	45
Red-Ox, ASTM G200, (mV)	+733
Total Salts, AWWA 2540, (mg/Kg)	268
As-Received Resitivity, ASTM G-57, (ohm-cm)	97000
Saturated Minimum Resistivity, ASTM G-57, (ohm-cm)	3007

Analyzed By N. Campo

Nathan Campo
Engineering Technician III

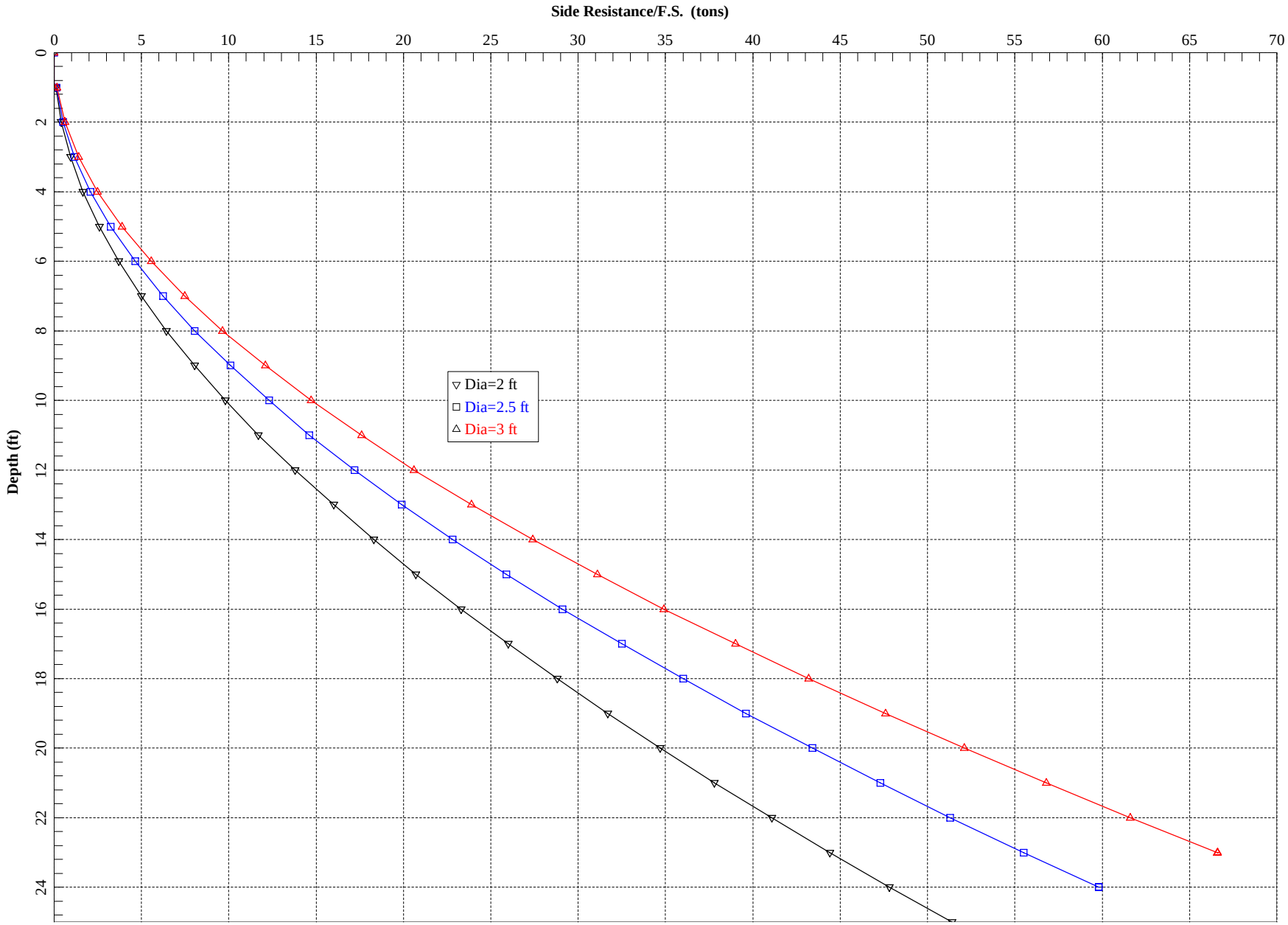
The tests were performed in general accordance with applicable ASTM and AWWA test methods. This report is exclusively for the use of the client indicated above and shall not be reproduced except in full without the written consent of our company. Test results transmitted herein are only applicable to the actual samples tested at the location(s) referenced and are not necessarily indicative of the properties of other apparently similar or identical materials.

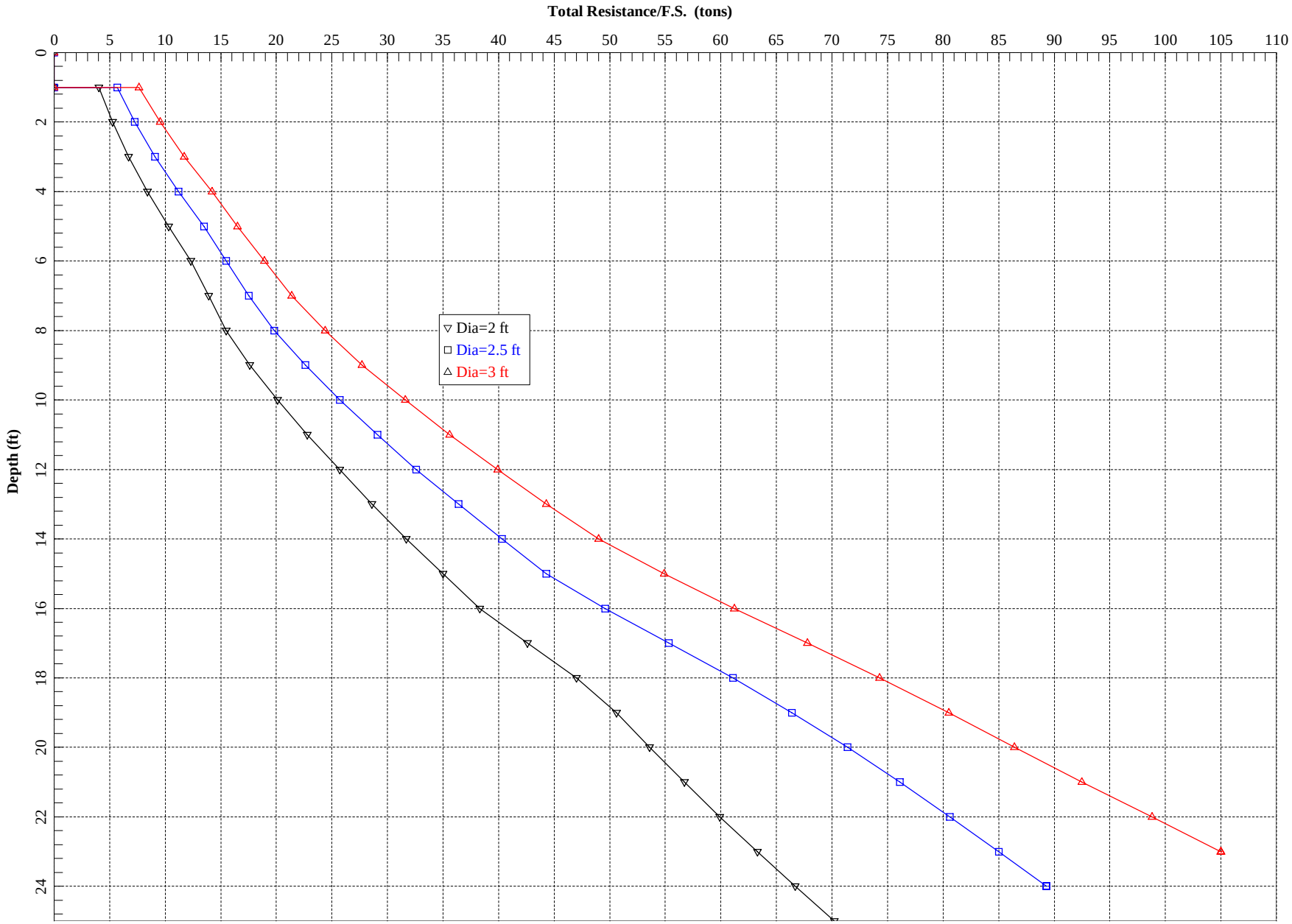
Supporting Information

Contents:

Drilled Pier Skin Friction & Total Capacity Analysis
General Notes
Unified Soil Classification System

Note: All attachments are one page unless noted above.


Side Resistance/F.S. (tons)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Dia=2 ft
Dia=2.5 ft
Dia=3 ft


Total Resistance/F.S. (tons)
0
5
10
15
20
25
30
35
40
45
50
55
60
65
70
75
80
85
90
95
100
105
110
Depth (ft)
0
2
4
6
8
10
12
14
16
18
20
22
24
Dia=2 ft
Dia=2.5 ft
Dia=3 ft

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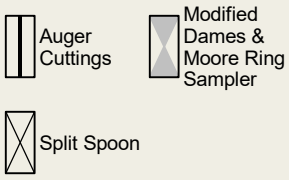
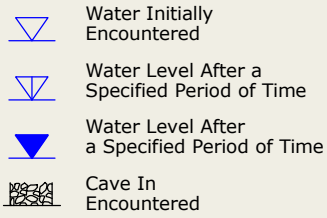
Colton, CA

General Notes

Sampling



Water Level



Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.

Field Tests

N	Standard Penetration Test Resistance (Blows/Ft.)
(HP)	Hand Penetrometer
(T)	Torvane
(DCP)	Dynamic Cone Penetrometer
UC	Unconfined Compressive Strength
(PID)	Photo-Ionization Detector
(OVA)	Organic Vapor Analyzer

Descriptive Soil Classification

Soil classification as noted on the soil boring logs is based Unified Soil Classification System. Where sufficient laboratory data exist to classify the soils consistent with ASTM D2487 "Classification of Soils for Engineering Purposes" this procedure is used. ASTM D2488 "Description and Identification of Soils (Visual-Manual Procedure)" is also used to classify the soils, particularly where insufficient laboratory data exist to classify the soils in accordance with ASTM D2487. In addition to USCS classification, coarse grained soils are classified on the basis of their in-place relative density, and fine-grained soils are classified on the basis of their consistency. See "Strength Terms" table below for details. The ASTM standards noted above are for reference to methodology in general. In some cases, variations to methods are applied as a result of local practice or professional judgment.

Location And Elevation Notes

Exploration point locations as shown on the Exploration Plan and as noted on the soil boring logs in the form of Latitude and Longitude are approximate. See Exploration and Testing Procedures in the report for the methods used to locate the exploration points for this project. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

Strength Terms

Relative Density of Coarse-Grained Soils
(More than 50% retained on No. 200 sieve.)
Density determined by Standard Penetration Resistance

Relative Density	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)
Very Loose	0 - 3	0 - 5
Loose	4 - 9	6 - 14
Medium Dense	10 - 29	15 - 46
Dense	30 - 50	47 - 79
Very Dense	> 50	> 80

Consistency of Fine-Grained Soils
(50% or more passing the No. 200 sieve.)
Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance

Consistency	Unconfined Compressive Strength Qu (tsf)	Standard Penetration or N-Value (Blows/Ft.)	Ring Sampler (Blows/Ft.)
Very Soft	less than 0.25	0 - 1	< 3
Soft	0.25 to 0.50	2 - 4	3 - 5
Medium Stiff	0.50 to 1.00	4 - 8	6 - 10
Stiff	1.00 to 2.00	8 - 15	11 - 18
Very Stiff	2.00 to 4.00	15 - 30	19 - 36
Hard	> 4.00	> 30	> 36

Relevance of Exploration and Laboratory Test Results

Exploration/field results and/or laboratory test data contained within this document are intended for application to the project as described in this document. Use of such exploration/field results and/or laboratory test data should not be used independently of this document.

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests [A]				Soil Classification	
				Group Symbol	Group Name [B]
Coarse-Grained Soils: More than 50% retained on No. 4 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines [C]	Cu≥4 and 1≤Cc≤3 [E]	GW	Well-graded gravel [F]
			Cu<4 and/or [Cc<1 or Cc>3.0] [E]	GP	Poorly graded gravel [F]
		Gravels with Fines: More than 12% fines [C]	Fines classify as ML or MH	GM	Silty gravel [F, G, H]
			Fines classify as CL or CH	GC	Clayey gravel [F, G, H]
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines [D]	Cu≥6 and 1≤Cc≤3 [E]	SW	Well-graded sand [I]
			Cu<6 and/or [Cc<1 or Cc>3.0] [E]	SP	Poorly graded sand [I]
		Sands with Fines: More than 12% fines [D]	Fines classify as ML or MH	SM	Silty sand [G, H, I]
			Fines classify as CL or CH	SC	Clayey sand [G, H, I]
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	PI > 7 and plots above "A" line [J]	CL	Lean clay [K, L, M]
			PI < 4 or plots below "A" line [J]	ML	Silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried}$ < 0.75	OL	Organic clay [K, L, M, N]
					Organic silt [K, L, M, O]
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay [K, L, M]
			PI plots below "A" line	MH	Elastic silt [K, L, M]
		Organic:	$\frac{LL\ oven\ dried}{LL\ not\ dried}$ < 0.75	OH	Organic clay [K, L, M, P]
					Organic silt [K, L, M, Q]
Highly organic soils:	Primarily organic matter, dark in color, and organic odor			PT	Peat

[A] Based on the material passing the 3-inch (75-mm) sieve.
[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.
[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.
[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.
[E] $Cu = D_{60}/D_{10}$ $Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$
[F] If soil contains ≥ 15% sand, add "with sand" to group name.
[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.
[H] If fines are organic, add "with organic fines" to group name.
[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.
[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.
[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.
[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.
[N] PI ≥ 4 and plots on or above "A" line.
[O] PI < 4 or plots below "A" line.
[P] PI plots on or above "A" line.
[Q] PI plots below "A" line.