Project Specific Water Quality Management Plan

*A Template for Projects located within the **Santa Ana Watershed** Region of Riverside County*

Project Title: Central Avenue Commercial Retails

Development No:

Design Review/Case No: CUP200006

Preliminary
Final

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Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
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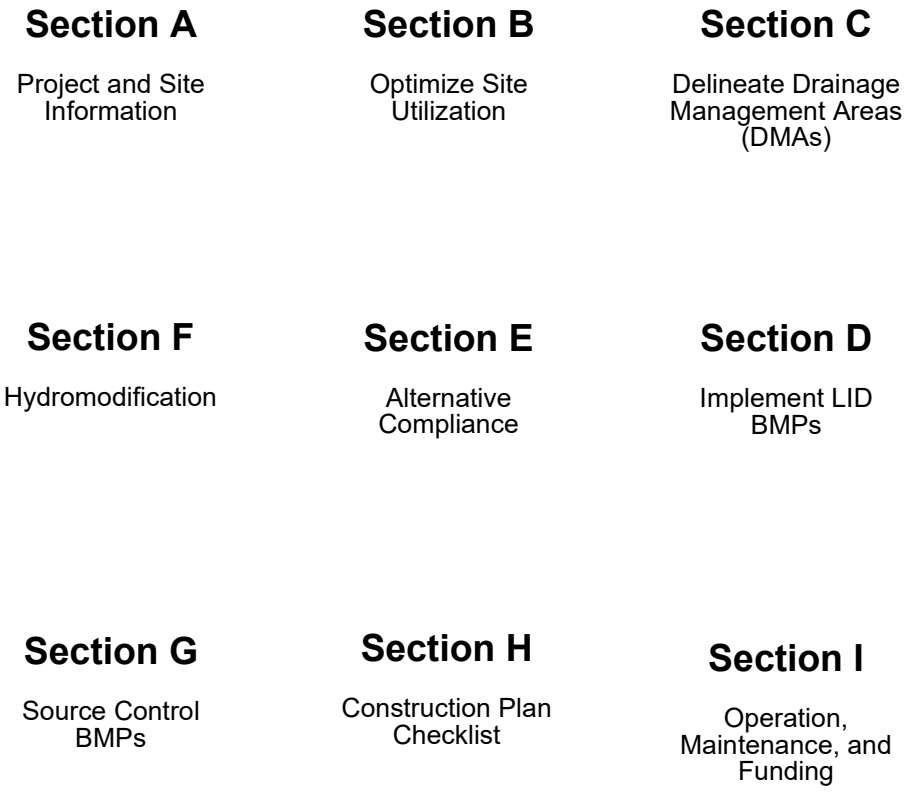
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A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Paljatinder Singh by Kamal B. Mchantaf for the Central Avenue Commercial Retails project.

This WQMP is intended to comply with the requirements of City of Lake Elsinore for Regional Board Order No. R8-2010-0033 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, 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. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under City of Lake Elsinore Water Quality Ordinance (Municipal Code Section).

"I, the undersigned, certify under penalty of law that the provisions of this WQMP have been reviewed and accepted and that the WQMP will be transferred to future successors in interest."

Owner's Signature | Date

Owner's Printed Name | Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature | Date

Kamal Mchantaf, P.E.
Preparer's Printed Name

Civil Engineer of Record / Project Engineer
Preparer's Title/Position

Preparer's Licensure: C051050 Exp. 09/30/25

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Section A: Project and Site Information

Project Information

Type of Project:	Commercial
Planning Area:	Commercial, mixed use
Community Name:	Lake Elsinore
Development Name:	Central Avenue Commercial Retails

Project Location

Latitude & Longitude (DMS): 33°41'59.6"N, 117°19'46.3"W
Project Watershed and Sub-Watershed: Santa Ana River Watershed / San Jacinto Sub-watershed
Gross Acres: 2.38 AC
APN(s): 377-372-038-8

Map Book and Page No.:

Project Characteristics

Proposed or Potential Land Use(s)	Retail / Commercial	
Proposed or Potential SIC Code(s)	5541	
Area of Impervious Project Footprint (SF)	44765.43	
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	44765.43	
Does the project consist of offsite road improvements?	Y	N
Does the project propose to construct unpaved roads?	Y	N
Is the project part of a larger common plan of development (phased project)?	Y	N

Existing Site Characteristics

Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0	
Is the project located within any MSHCP Criteria Cell?	Y	N
If so, identify the Cell number:	n/a	
Are there any natural hydrologic features on the project site?	Y	N
Is a Geotechnical Report attached?	Y	N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)		
What is the Water Quality Design Storm Depth for the project?	0.65	

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the local vicinity and existing site. In addition, include all grading, drainage, landscape/plant palette and other pertinent construction plans in Appendix 2. At a **minimum**, your WQMP Site Plan should include the following:

- Drainage Management Areas
- Proposed Structural BMPs
- Drainage Path
- Drainage Infrastructure, Inlets, Overflows
- Source Control BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Standard Labeling
- BMP Locations (Lat/Long)

Use your discretion on whether or not you may need to create multiple sheets or can appropriately accommodate these features on one or two sheets. Keep in mind that the Co-Permittee plan reviewer must be able to easily analyze your project utilizing this template and its associated site plans and maps.

A.2 Identify Receiving Waters

Using Table A.1 below, list in order of upstream to downstream, the receiving waters that the project site is tributary to. Continue to fill each row with the Receiving Water's 303(d) listed impairments (if any), designated beneficial uses, and proximity, if any, to a RARE beneficial use. Include a map of the receiving waters in Appendix 1.

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Temescal Creek Reach 6	None	GWR, REC1, REC2, WARM, WILD	None
Temescal Creek Reach 5	None	AGR, GWR, REC1, REC2, WARM, WILD, RARE	3 miles
Temescal Creek Reach 4	None	RARE, AGR, GWR, REC1, REC2, WARM, WILD	6.9 miles
Temescal Creek Reach 3	None	AGR, IND, GWR. REC1. REC2, WARM, WILD	None
Lake Lee	None	AGR, IND, GWR, REC1. REC2, WARM, WILD, COMM	None
Temescal Creek Reach 2	None	AGR, IND, GWR, REC1, REC2, WARM, WILD, RARE	8 Miles
Temescal Creek Reach 1	None	REC2, WARM, WILD	None
Prado Basin Management Zone	ph	REC1, REC2, WARM, WILD, RARE	24.2 miles
Santa Ana River Reach 3	Copper, lead, indicator bacteria	AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN	24.2 miles
Santa Ana River Reach 2	None	MUN, AGR, GWR, REC1, REC2, WARM, WILD, SPWN, RARE	24.5 miles
Santa Ana River Reach 1	None	MUN, REC1, REC2, WARM, WLD,	None
Pacific Ocean	None	None	None

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	Y	N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	Y	N
US Army Corps of Engineers, CWA Section 404 Permit	Y	N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	Y	N
Statewide Construction General Permit Coverage	Y	N
Statewide Industrial General Permit Coverage	Y	N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	Y	N

Other *(please list in the space below as required)* City of Lake Elsinore Grading Permit and Building Permit	Y	N

If yes is answered to any of the questions above, the Co-Permittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. Therefore, it is important that your narrative identify and justify if there are any constraints that would prevent the use of those categories of LID BMPs. Similarly, you should also note opportunities that exist which will be utilized during project design. Upon completion of identifying Constraints and Opportunities, include these on your WQMP Site plan in Appendix 1.

Consideration of "highest and best use" of the discharge should also be considered. For example, Lake Elsinore is evaporating faster than runoff from natural precipitation can recharge it. Requiring infiltration of 85% of runoff events for projects tributary to Lake Elsinore would only exacerbate current water quality problems associated with Pollutant concentration due to lake water evaporation. In cases where rainfall events have low potential to recharge Lake Elsinore (i.e. no hydraulic connection between groundwater to Lake Elsinore, or other factors), requiring infiltration of Urban Runoff from projects is counterproductive to the overall watershed goals. Project proponents, in these cases, would be allowed to discharge Urban Runoff, provided they used equally effective filtration-based BMPs.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

Yes, runoff will be directed towards a southerly to westerly direction, following the existing drainage patterns.

Did you identify and protect existing vegetation? If so, how? If not, why?

The existing site has no existing important vegetation to protect.

Did you identify and preserve natural infiltration capacity? If so, how? If not, why?

Areas where Infiltration BMPs and landscape areas are proposed will be cordoned off and protected from heavy equipment and vehicles from entering to avoid unnecessary compaction of the soil in the area.

Did you identify and minimize impervious area? If so, how? If not, why?

Landscape areas are constructed wherever possible, along parking islands adjacent areas surrounding the property and the western side of the site will primarily be landscape area.

Did you identify and disperse runoff to adjacent pervious areas? If so, how? If not, why?

No, site constraints prevent from draining to adjacent landscape areas.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1][2]	Area (Sq. Ft.)	DMA Type
A1	Landscaping	47925.42	Type B
B1	Asphalt Concrete	34166.44	Type D
B2	Roof	3024	Type D
B3	Roof	4050	Type D
B4	Roof	3525	Type D
B5	Landscaping	9570.94	Type D
B6	Landscaping	16	Type B
B7	Landscaping	163.63	Type B
B8	Landscaping	24	Type B
B9	Landscaping	276.84	Type B
B10	Landscaping	178.47	Type D
B11	Landscaping	144.63	Type B
B12	Landscaping	70.42	Type B
B13	Landscaping	163.16	Type B
B14	Landscaping	24	Type B
B15	Landscaping	428.13	Type B
B16	Landscaping	32	Type B
B17	Landscaping	117.14	Type B

[1]Reference Table 2-1 in the WQMP Guidance Document to populate this column
[2]If multi-surface provide back-up

Table C.2 Type 'A', Self-Treating Areas

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area				Type 'C' DMAs that are draining to the Self-Retaining Area	
DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
A1	Landscaping	47925.42	0.65	n/a		
B6	Landscaping	16	0.65	n/a		
B7	Landscaping	163.63	0.65	n/a		
B8	Landscaping	24	0.65	n/a		
B9	Landscaping	276.84	0.65	n/a		
B11	Landscaping	144.63	0.65	n/a		
B12	Landscaping	70.42	0.65	n/a		
B13	Landscaping	163.16	0.65	n/a		
B14	Landscaping	24	0.65	n/a		
B15	Landscaping	428.13	0.65	n/a		
B16	Landscaping	32	0.65	n/a		
B17	Landscaping	117.14	0.65	n/a		

$$[D] = [B] + \frac{[B] \cdot [C]}{[A]}$$

Table C.4 Type 'C', Areas that Drain to Self-Retaining Areas

DMA					Receiving Self-Retaining DMA		
DMA Name/ ID	Area (square feet)	Post-project surface type	Impervious fraction	Product	DMA name /ID	Area (square feet)	Ratio
	[A]		[B]	[C] = [A] x [B]		[D]	[C]/[D]

Table C.5 Type 'D', Areas Draining to BMPs

DMA Name or ID	BMP Name or ID
B1	Underground Chamber
B2	Underground Chamber
B3	Underground Chamber
B4	Underground Chamber
B5	Underground Chamber
B10	Underground Chamber

Note: More than one drainage management area can drain to a single LID BMP, however, one drainage management area may not drain to more than one BMP.

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? Y N

If yes has been checked, Infiltration BMPs shall not be used for the site; proceed to section D.3

If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Copermittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? Y N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?		X
If Yes, list affected DMAs: DMA B		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs should not be used for those DMAs and you should proceed to the assessment for Harvest and Use below.

D.2 Harvest and Use Assessment

Please check what applies*:*

☐ Reclaimed water will be used for the non-potable water demands for the project.

☐Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee).

☒The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If none of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for Irrigation Use BMPs on your site:

Step 1: Identify the total area of irrigated landscape on the site, and the type of landscaping used.

Total Area of Irrigated Landscape: N/A

Type of Landscaping (Conservation Design or Active Turf): N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: N/A

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	**Available Irrigated Landscape (Step 1)**
Full DCV Infiltrated Harvest and Reuse not required	

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: N/A

Project Type: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-2 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: N/A

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4) **Projected number of toilet users (Step 1)**

Full DCV Infiltrated Harvest and Reuse not required

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-4 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-4: N/A

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the projected average daily use (Step 1) to the minimum required non-potable use (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment per Section 3.4.2 of the WQMP Guidance Document.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☐ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Copermittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
B1					
B2					
B3					
B4					
B10					

For those DMAs where LID BMPs are not feasible, provide a brief narrative below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section E below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First**,** calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second**,** design the LID BMP to meet the required V_{BMP} using a method approved by the Copermittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Copermittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Cultec Recharger 902HD Chambers*		
	[A]		[B]	[C]	[A] x [C]			
B1	*34166.44*	*Conc./Asphalt*	*1.00*	*0.89*	*30476.50*			
B2	*3024*	*Roofs*	*1.00*	*0.89*	*2697.40*			
B3	*4050*	*Roofs*	*1.00*	*0.89*	*3612.60*			
B4	*3525*	*Roofs*	*1.00*	*0.89*	*3144.30*			
B5	*9570.94*	*Ornamental Landscaping*	*0.1*	*0.11*	*1057.20*			
B10	*178.47*	*Ornamental Landscaping*	*0.1*	*0.11*	*19.70*	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	A_T = Σ[A] 54514.85				Σ= [D] 41007.70	[E] 0.65	[F] = $\frac{[D]x[E]}{12}$ =2221.30	[G]2257.30

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

LID BMPs are expected to be feasible on virtually all projects. Where LID BMPs have been demonstrated to be infeasible as documented in Section D, other Treatment Control BMPs must be used (subject to LID waiver approval by the Copermittee). Check one of the following Boxes:

☐ LID Principles and LID BMPs have been incorporated into the site design to fully address all Drainage Management Areas. No alternative compliance measures are required for this project and thus this Section is not required to be completed.

- *Or* -

☐ The following Drainage Management Areas are unable to be addressed using LID BMPs. A site-specific analysis demonstrating technical infeasibility of LID BMPs has been approved by the Co-Permittee and included in Appendix 5. Additionally, no downstream regional and/or sub-regional LID BMPs exist or are available for use by the project. The following alternative compliance measures on the following pages are being implemented to ensure that any pollutant loads expected to be discharged by not incorporating LID BMPs, are fully mitigated.

List DMAs Here.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
Detached Residential Development	P	N	P	P	N	P	P	P
Attached Residential Development	P	N	P	P	N	P	P	P[(2)]
Commercial/Industrial Development	P[(3)]	P	P[(1)]	P[(1)]	P[(5)]	P[(1)]	P	P
Automotive Repair Shops	N	P	N	N	P[(4, 5)]	N	P	P
Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
Parking Lots (>5,000 ft^2)	P[(6)]	P	P[(1)]	P[(1)]	P[(4)]	P[(1)]	P	P
Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern								

P = Potential

N = Not Potential

[(1)] A potential Pollutant if non-native landscaping exists or is proposed onsite; otherwise not expected

[(2)] A potential Pollutant if the project includes uncovered parking areas; otherwise not expected

[(3)] A potential Pollutant is land use involving animal waste

[(4)] Specifically petroleum hydrocarbons

[(5)] Specifically solvents

[(6)] Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

Projects that cannot implement LID BMPs but nevertheless implement smart growth principles are potentially eligible for Stormwater Credits. Utilize Table 3-8 within the WQMP Guidance Document to identify your Project Category and its associated Water Quality Credit. If not applicable, write N/A.

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
n/a	

Total Credit Percentage[1]

[1]*Cannot Exceed 50%*
[2]*Obtain corresponding data from Table 3-8 in the WQMP Guidance Document*

E.3 Sizing Criteria

After you appropriately considered Stormwater Credits for your project, utilize Table E.3 below to appropriately size them to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.2 of the WQMP Guidance Document for further information.

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet) [A]	Post-Project Surface Type	Effective Impervious Fraction, I_f [B]	DMA Runoff Factor [C]	DMA Area x Runoff Factor [A] x [C]	*Enter BMP Name / Identifier Here*

			Design Storm Depth (in)	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume or Flow on Plans (cubic feet or cfs)*
A_T = Σ[A]		Σ= [D]	[E]	$[F] = \frac{[D]x[E]}{[G]}$	[F] X (1-[H])	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

Treatment Control BMPs typically provide proprietary treatment mechanisms to treat potential pollutants in runoff, but do not sustain significant biological processes. Treatment Control BMPs must have a removal efficiency of a medium or high effectiveness as quantified below:

- **High**: equal to or greater than 80% removal efficiency
- **Medium**: between 40% and 80% removal efficiency

Such removal efficiency documentation (e.g., studies, reports, etc.) as further discussed in Chapter 3.5.2 of the WQMP Guidance Document, must be included in Appendix 6. In addition, ensure that proposed Treatment Control BMPs are properly identified on the WQMP Site Plan in Appendix 1.

Table E.4 Treatment Control BMP Selection

Selected Treatment Control BMP Name or ID[1]	Priority Pollutant(s) of Concern to Mitigate[2]	Removal Efficiency Percentage[3]
n/a		

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.
[2] Cross Reference Table E.1 above to populate this column.
[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee 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 disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? Y N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? Y N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration	6 MIN.	6 MIN.	1.0 < 1.05
Volume (Cubic Feet)	2531.93 CF	6715.50 CF	2.65 > 1.05

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, 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 Susceptibility Maps.

Does the project qualify for this HCOC Exemption? Y N

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Be sure to include all pertinent documentation used in your analysis of the items a, b or c in Appendix 7.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
A. On-Site Slotted Curbs	Curb Stenciling with "ONLY RAIN DOWN THE STORM DRAIN" or similar	-Maintain and periodically repaint or replace inlet markings. -Provide stormwater pollution prevention information to new site owners, lessees, or operators. -See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater

		Quality Handbooks at www.cabmphandbooks.com -Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
D1. Need for future indoor & structural pest control	Note building design features that discourage entry of pests.	Provide Integrated Pest Management information to owners, lessees, and operators.
D2. Landscape/Outdoor Pesticide Use	State that final landscape plans will accomplish all of the following. -Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. -Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. -Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. -Consider using pest-resistant plants, especially adjacent to hardscape. -To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	-Maintain landscaping using minimum or no pesticides. -See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/ -Provide IPM information to new owners, lessees and operators.
F. Food service	Describe the location and features of the designated cleaning area.	**See the brochure, "**The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/

	Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	**Provide this brochure to new site owners, lessees, and operators.**
O. Miscellaneous Drain or Wash Water or Other Sources -Roofing, gutters, and trim.	Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff**.**	
P. Plazas, sidewalks, and parking lots.		Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. -Collect wash-water containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)	BMP Location (Lat/Long)
To be included in Final WQMP			

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Section I: Operation, Maintenance and Funding

The Copermittee will periodically verify that Stormwater BMPs on your site are maintained and continue to operate as designed. To make this possible, your Copermittee will require that you include in Appendix 9 of this Project-Specific WQMP:

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: Paljatinder Singh

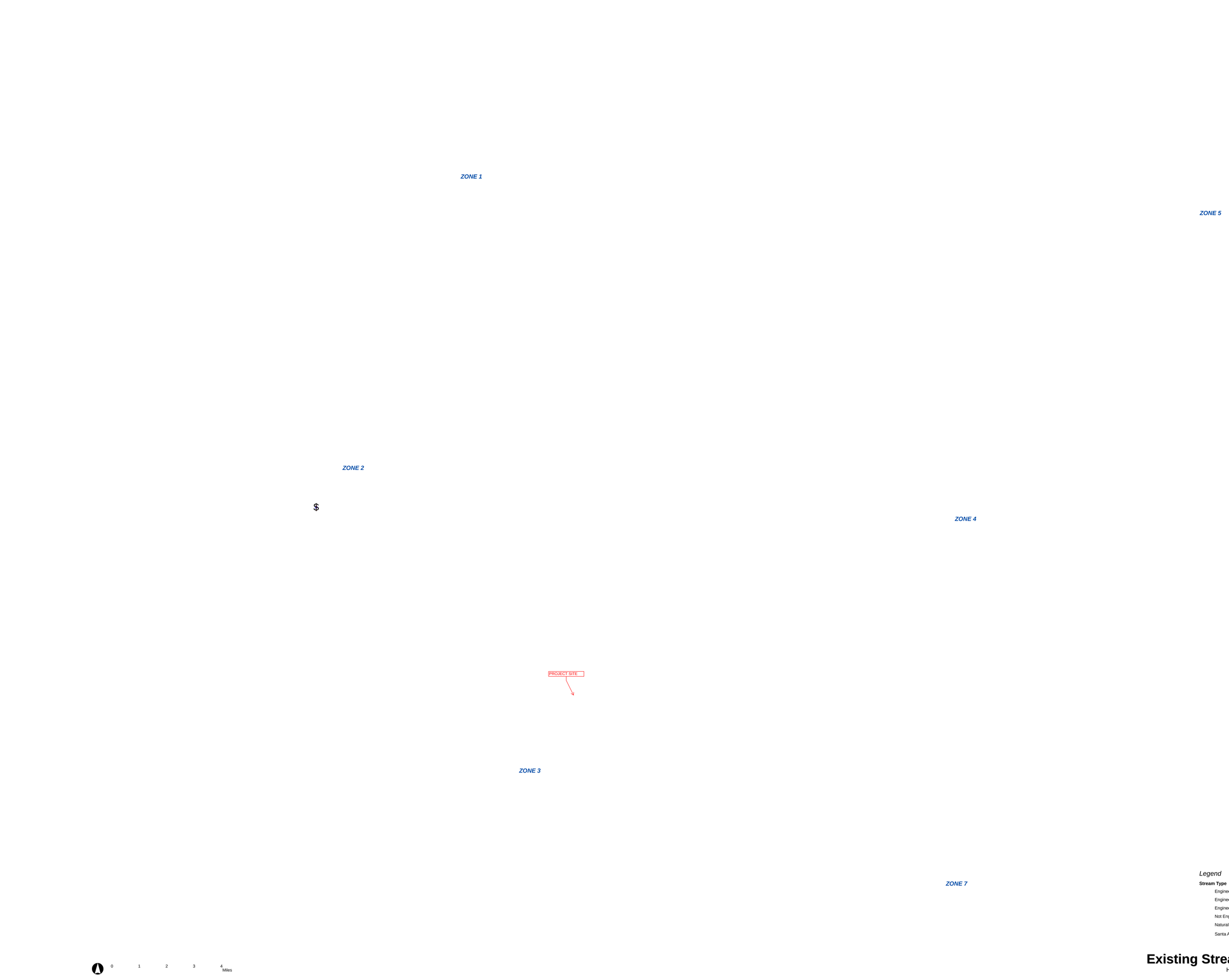
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

Y N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map



Map Document: (M:\Mitake\101082020\PCP\MCE_HCOC_Overall_Large_0000.mxd mxd - 8/5/2022

Legend

Stream Type

- Engineered, Fully Hardened, and Maintained (EFHM)
- Engineered, Partially Hardened, and Maintained (EPHM)
- Engineered, Earthen, and Maintained (EEM)
- Not Engineered and Earthen (NEE)
- Natural (NAT)
- Santa Ana River (SAR)

- Flood Control and Water Conservation District Boundary
- Study Area
- County Boundary

Existing Stream Channel Delineation Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

Map 1

JURUPA VALLEY

ZONE 1

EASTVALE

RIVERSIDE

NORCO

PRADO DAM

PRADO DAM

CORONA

LAKE
MATHEWS

ZONE 2

CALIMESA

ZONE 5

BEAUMONT

BANNING

MORENO
VALLEY

MYSTIC LAKE

LAKE
PERRIS

SAN JACINTO

ZONE 4

PERRIS

HEMET

MENIFEE

CANYON
LAKE

CANYON
LAKE

DIAMOND VALLEY
LAKE

LAKE ELSINORE
ELSINORE

ZONE 3

WILDOMAR

ZONE 7

MURRIETA

LAKE
SKINNER

Legend

Stream Type
- Not Susceptible Stream Channels
- Potentially Susceptible Stream Channels
- Large River (Not Susceptible)
- Santa Ana River
- Adequate Sump

Watershed Areas
- Not Applicable Area
- Applicable Area
- Applicable Area Watershed Boundaries

- Flood Control and Water Conservation District Boundary
- Study Area
- County Boundary

0 1 2 3 4
Miles

Map Document: (M:\Models\2013\BZD\RCFC\HCOC_HydromodModule_Large_5000.mxd mxd 8/5/2013 - 2/8/2013

HCOC Applicability Map

Hydromodification Susceptibility Documentation Report and Mapping
Riverside County Flood Control and Water Conservation District

Map 2



LEGEND

SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC&WCD

HYDROLOGY MANUAL

N

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR ELSINORE

PLATE C-1.41



Rain Gage Locations

RIVERSIDE COUNTY FLOOD
CONTROL AND WATER
CONSERVATION DISTRICT

July 2011

0 3000 6000 9000 12000

Survey Feet

NPDES MUNICIPAL PERMIT
Santa Ana River Watershed
EXHIBIT SA-2
(Lake Elsinore, Canyon Lake, Perris, Menifee, Wildomar Areas)

SAR Core Monitoring Stations

City Facilities

County Facilities

RCFC&WCD Facilities

Other Facilities

Major Outfall Sites

Landfill Sites

SewageTreatment Plants

Blue Line Streams

Thomas Bros Streets

Highways/Freeways

Incorporated Areas

SA Region Watershed Boundary

SM Region MS4 Permit Area Boundary

SAR 2011 AnnRpt - MS4 Maps.gws Nov. 2011

SEE FOOTNOTE

SEE FOOTNOTE

Footnote:
1) MS4 Permit Area removed from Region 8 based on jurisdictional area swap agreement between Region 8 and Region 9

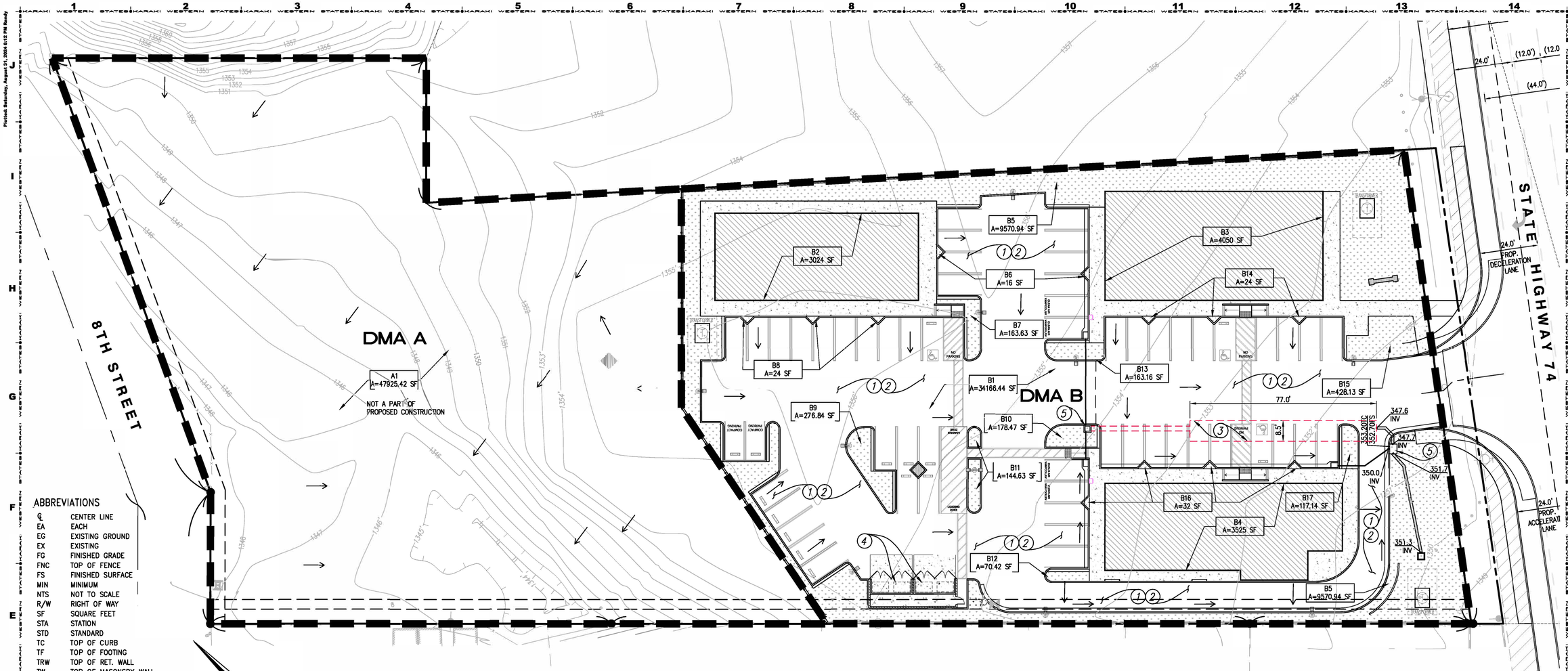
The graphical and tabular information shown on this document may be derived from a variety of public agency and/or private commercial sources such as Riverside County Transportation and Land Management Agency, Thomas Brothers Mapping, the Stephen P. Teale Data Center, GIS Technology Center, State of California, the United States Geologic Survey and the United States National Atlas. These sources may possess varying levels of accuracy and precision and this product is meant only as a guide to the relative position and scale of the depicted features. This GIS document is in no case to be interpreted as fundamental or decisive for purposes of land surveying, field engineering, plan drafting, code enforcement, land boundary determination and/or land acquisition.

WQMP LOCATION MAP

Appendix 2: Construction Plans

Grading and Drainage Plans

Plotted: Saturday, August 31, 2024 @ 12 PM Randy



ABBREVIATIONS

℄	CENTER LINE
EA	EACH
EG	EXISTING GROUND
EX	EXISTING
FG	FINISHED GRADE
FNC	TOP OF FENCE
FS	FINISHED SURFACE
MIN	MINIMUM
NTS	NOT TO SCALE
R/W	RIGHT OF WAY
SF	SQUARE FEET
STA	STATION
STD	STANDARD
TC	TOP OF CURB
TF	TOP OF FOOTING
TRW	TOP OF RET. WALL
TW	TOP OF MASONSRY WALL
TYP	TYPICAL
BOT	BOTTOM

LEGEND

- FLOWLINE
- CENTERLINE
- DAYLIGHT LINE
- TRACT BOUNDARY / RIGHT-OF-WAY LINE
- LOT LINE
- EX. FENCE
- PROP. RETAINING WALL
- PROP. BLOCK WALL
- EX. WALL
- SLOPE (2:1 UNLESS OTHERWISE INDICATED)
- MATCHLINE
- PROPOSED WOOD FENCE
- PROPOSED WROUGHT IRON FENCE
- CONTOUR
- LANDSCAPE AREA
- CONCRETE
- FLOW ARROW
- DMA BOUNDARY
- DMA NAME OR ID / AREA IN SQ. FT.

SCALE: 1"=20'

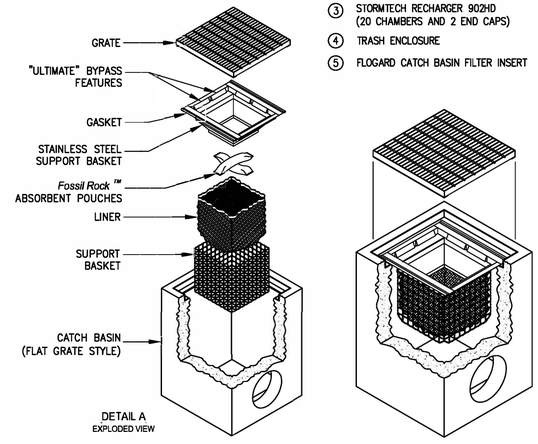
BMP'S

ROUTINE NON-STRUCTURAL BMP

1. STREET SWEEPING
2. COMMON AREA LITTER CONTROL

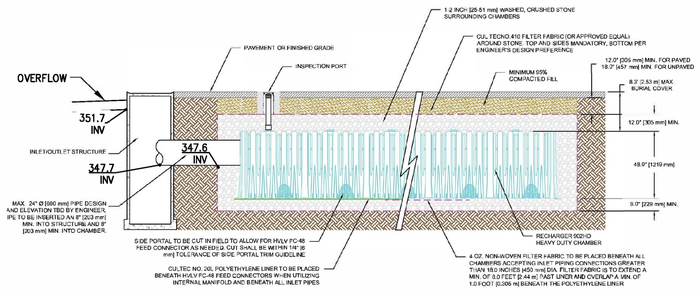
STRUCTURAL BMP

3. STORMTECH RECHARGER 902HD (20 CHAMBERS AND 2 END CAPS)
4. TRASH ENCLOSURE
5. FLOGARD CATCH BASIN FILTER INSERT

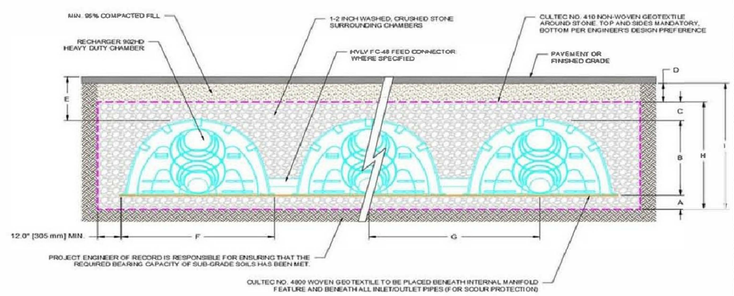


FLOGARD CATCH BASIN FILTER INSERT

N.T.S.



Cross Section Table Reference			
A	Depth of Stone Base	9.0	inches
B	Chamber Height	48.0	inches
C	Depth of Stone Above Units	12.0	inches
D	Depth of 95% Compacted Fill	12.0	inches
E	Max. Depth Allowed Above the Chamber	8.33	feet
F	Chamber Width	78.0	inches
G	Center to Center Spacing	7.25	feet
H	Effective Depth	5.75	feet
I	Bed Depth	6.75	feet



CULTEC RECHARGER 902HD CHAMBER

N.T.S.

SITE DATA:

TOTAL SITE AREA = 2.38 AC
PERVIOUS AREA = 1.36 AC
IMPERVIOUS AREA = 1.03 AC

	BMP	VOLUME REQUIRED	STORAGE VOLUME PROVIDED
DMA B	CULTEC RECHARGER 902HD 1 ROW, 20 CHAMBERS, 2 END CAPS – 8.5' x 77'	2221.30 CU. FT.	2257.30 CU. FT.

KARAKI WSE
WESTERN STATES ENGINEERING
A DESIGN-BUILD COMPANY
4887 E. LA PALMA STE. 707
ANAHEIM, CA 92807
TEL: (714)685-9300 FAX: (714)693-1002
www.westernsec.com

CONSULTANT/ SEALS

REGISTERED PROFESSIONAL ENGINEER — KAMAL B. MCHAYLEF — No. C051050 Exp. 6/30/25 — CIVIL — STATE OF CALIFORNIA

SUBMITTAL

NO.	DESCRIPTION	BY	DATE
1			
2			
3			
4			

REVISIONS

NO.	DESCRIPTION	BY	DATE
△			
△			
△			
△			
△			

OWNER NAME & ADDRESS

MR. PALJATINDER SINGH
MRS. BHUPINDER KAUR

45029 PROMISE RD
LAKE ELSINORE, CA 92532

PROJECT NAME & ADDRESS

CENTRAL AVENUE COMMERCIAL RETAILS

N.W.C. CENTRAL AVE. (74 HWY) & ALLAN ST.
LAKE ELSINORE, CA 92532

NOTE TO CONTRACTOR

CONTRACTOR TO VERIFY LOCATION AND DEPTH OF ALL UTILITIES ON-SITE AND OFF-SITE PRIOR TO START OF CONSTRUCTION.

CONFIDENTIALITY STATEMENT

THESE DRAWINGS, WITH ITS ACCOMPANYING CONTRACT DOCUMENTS, ACTING HERE FOR AS INSTRUMENTS OF SERVICE, ARE THE EXCLUSIVE PROPERTIES OF THIS DESIGNER WHETHER THE PROJECT FOR WICH THEY WERE PREPARED IS EXECUTED AND CONSTRUCTED OR NOT. THESE DOCUMENTS ARE NOT TO BE REPRODUCED, DISTRIBUTED, DISCLOSED, OR BE FURNISHED, IN PART OR IN WHOLE, FOR ANY INDIVIDUAL, CORPORATE ENTITY AND/ OR AGENCY, WITHOUT EXPRESSED, LEGAL AUTHORIZATION FROM ITS OWNER/ AUTHOR. THEY ARE NOT TO BE USED BY THE OWNER NOR ANY OTHER ENTITY ON ANY PROJECT OR FOR ANY EXTENSIONS OR ADDITIONS OR ALTERATIONS TO THE ORIGINAL PROJECT EXPECT BY WRITTEN AUTHORIZATION AND PERMISSION FROM AND AGREEMENT WITH THE DESIGNER/ THE LEGAL/ ILLEGAL USE OF THESE DOCUMENTS IS GOUNDED BY EXISTING PROPRIETARY RIGHTS ACT AND LAW OF THE STATE.

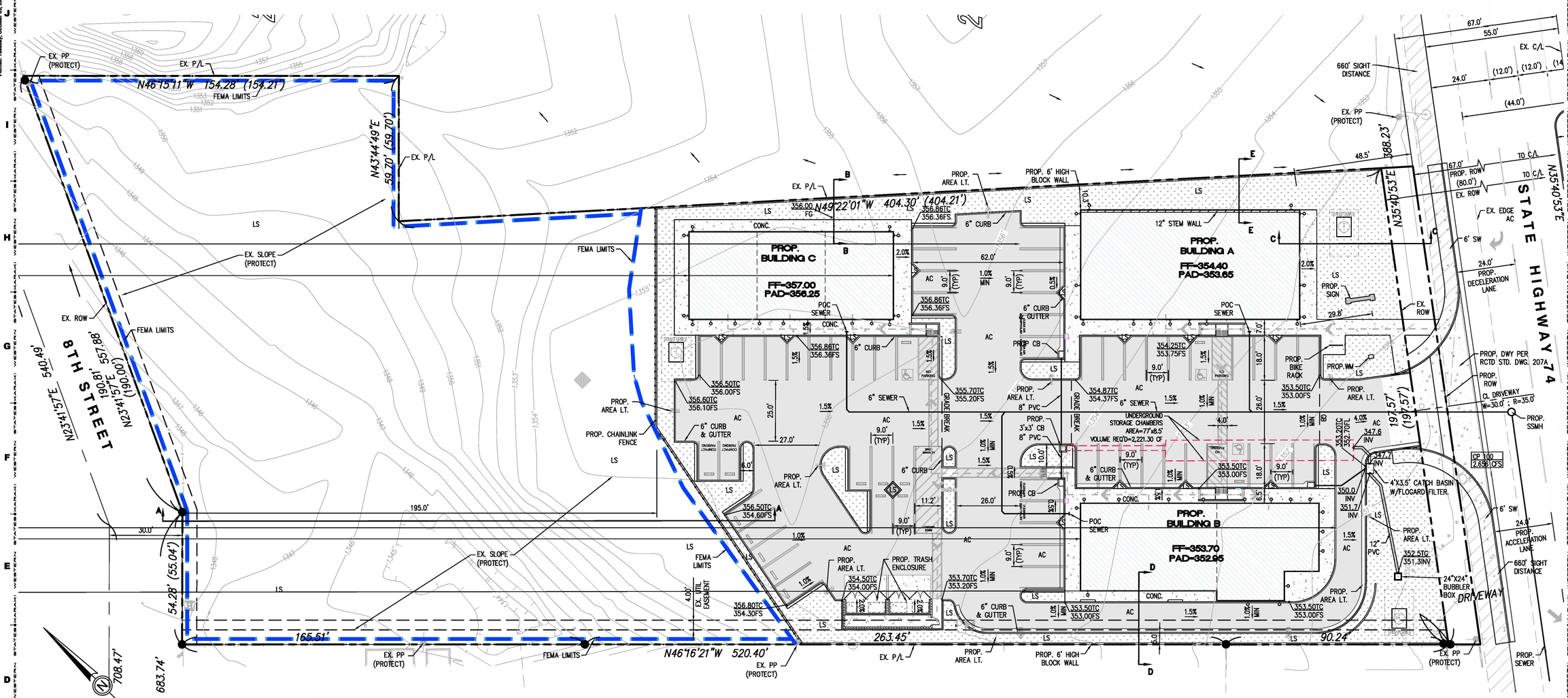
DESIGNED BY:	JR
DRAWN BY:	RR
CHECKED BY:	KM
PLOT DATE:	08.31.24
SCALE:	1 : 20
SHEET TITLE	

WQMP
BMP EXHIBIT

BUILDING	SHEET NUMBER

JOB No	CUP No
E99218A	PR-190002

Plotted: Tuesday, October 03, 2023 8:01 PM Pseudo



SCALE: 1"=20'

EARTHWORK QUANTITIES:

RAW CUT:	670 CY
RAW FILL:	570 CY
RAW EXPORT:	100 CY (C)

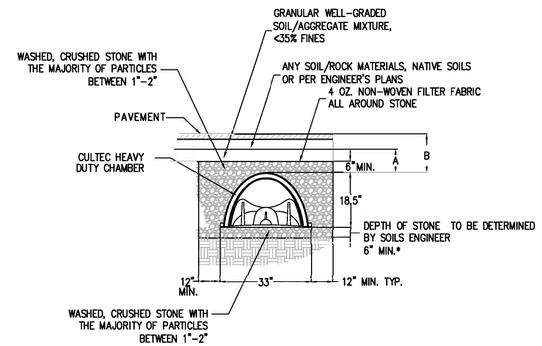
*EARTHWORK QUANTITIES SHOWN HEREON ARE FOR PERMIT PURPOSES ONLY. CONTRACTOR SHALL BE RESPONSIBLE FOR DETERMINING HIS OWN QUANTITIES FOR BIDDING PURPOSES.

ABBREVIATIONS

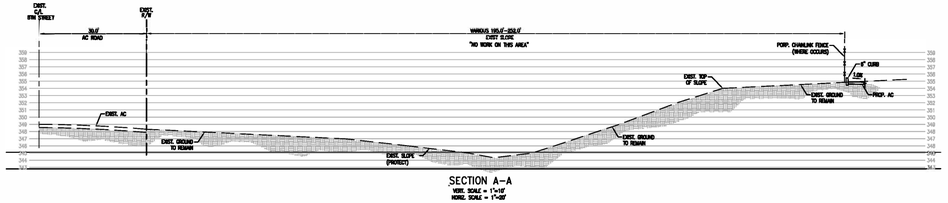
℄	CENTER LINE
EA	EACH
EG	EXISTING GROUND
EX	EXISTING
FG	FINISHED GRADE
FNC	TOP OF FENCE
FS	FINISHED SURFACE
MIN	MINIMUM
NTS	NOT TO SCALE
R/W	RIGHT OF WAY
SF	SQUARE FEET
STA	STATION
STD	STANDARD
TC	TOP OF CURB
TF	TOP OF FOOTING
TRW	TOP OF RET. WALL
TW	TOP OF MASONSRY WALL
TYP	TYPICAL
BOT	BOTTOM

LEGEND

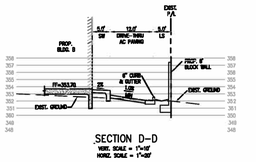
- FLOWLINE
- CENTERLINE
- DAYLIGHT LINE
- TRACT BOUNDARY / RIGHT-OF-WAY LINE
- LOT LINE
- EX. FENCE
- PROP. RETAINING WALL
- PROP. BLOCK WALL
- EX. WALL
- SLOPE (2:1 UNLESS OTHERWISE INDICATED)
- MATCHLINE
- PROPOSED WOOD FENCE
- PROPOSED WROUGHT IRON FENCE



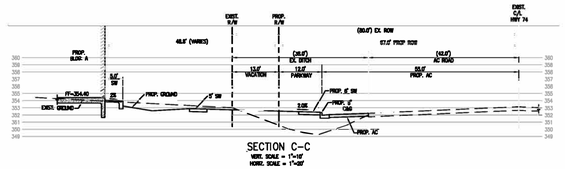
CULTEC HEAVY DUTY CHAMBER



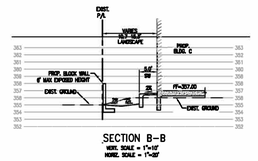
SECTION A–A
VERT. SCALE = 1"=10'
HORIZ. SCALE = 1"=20'



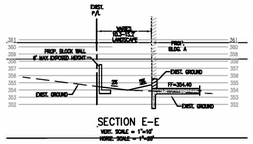
SECTION D–D
VERT. SCALE = 1"=10'
HORIZ. SCALE = 1"=20'



SECTION C–C
VERT. SCALE = 1"=10'
HORIZ. SCALE = 1"=20'



SECTION B–B
VERT. SCALE = 1"=10'
HORIZ. SCALE = 1"=20'



SECTION E–E
VERT. SCALE = 1"=10'
HORIZ. SCALE = 1"=20'

KARAKI WSE
WESTERN STATES ENGINEERING
A DESIGN-BUILD COMPANY
4887 E. LA PALMA STE. 707
ANAHEIM, CA 92807
TEL: (714)695-9300 FAX: (714)693-1002
www.westernsec.com

■ CONSULTANT/ SEALS

REGISTERED PROFESSIONAL ENGINEER FRANCIS B. MCNAMARA No. C057050 Exp. 9/30/24 CIVIL STATE OF CALIFORNIA

■ SUBMITTAL

NO.	DESCRIPTION	BY	DATE
1			
2			
3			
4			

■ REVISIONS

NO.	DESCRIPTION	BY	DATE
△			
△			
△			
△			
△			

■ OWNER NAME & ADDRESS

MR. PALJATINDER SINGH
MRS. BHUPINDER KAUR

45029 PROMISE RD
LAKE ELSINORE, CA 92532

■ PROJECT NAME & ADDRESS

CENTRAL AVENUE COMMERCIAL RETAILS

N.W.C. CENTRAL AVE. (74 HWY) & ALLAN ST.
LAKE ELSINORE, CA 92532

■ NOTE TO CONTRACTOR

CONTRACTOR TO VERIFY LOCATION AND DEPTH OF ALL UTILITIES ON–SITE AND OFF–SITE PRIOR TO START OF CONSTRUCTION.

■ CONFIDENTIALITY STATEMENT

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■ DESIGNED BY: JR
■ DRAWN BY: RR
■ CHECKED BY: KM
■ PLOT DATE: 08.31.24
■ SCALE: 1 : 20
■ SHEET TITLE

PRELIMINARY GRADING PLAN

■ BUILDING ■ SHEET NUMBER

C.001

■ JOB No E99218A
■ CUP No PR-190002

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

GEO ENVIRON ENGINEERING CONSULTANTS, INC.
CIVIL • GEOTECHNICAL • ENVIRONMENTAL
4071 E. La Palma Ave., Ste. B, Anaheim, Ca 92807 • (714) 632-3190 • (714) 606-2598

Job No. 20-1041P-2.2
August 20 , 2024

Mr. Joseph Karaki
Western State Eng. & Construction, Inc.
4887 E. La Palma Street, Ste # 707
Anaheim, Ca 92807

Subject: **Supplemental Report, Percolation Testing for the Proposed Infiltration System,** N.W.C Central Ave (74 Hwy) & Allan St, Lake Elsinore California

Gentlemen,

In accordance with your request, we have performed a supplemental soil investigation for percolation testing with regard to the proposed infiltration system. The intent of this report is to re-evaluate the feasibility of the proposed system to be constructed at the subject site.

The minimum percolation rate of the subsurface soils was found to be 1.78 inch per hour, and suitable for the intended use.

The bottom of the proposed infiltration system is estimated to be within 30.0 feet below the existing natural grade. The percolation testing and the relevant calculations were performed using the method per the Riverside County Manuel.

SITE GEOLOGY & GROUNDWATER

The site is underlain by **older alluvium consists of silt and sand to 40 feet, the maximum depth explored.** A more detailed description of the earth materials encountered is presented on the log borings in Appendix 'B'. **Groundwater was not encountered** during this investigation.

PERCOLATION INVESTIGATION

A preliminary set of percolation tests were performed in order to determine the suitability of the surface soils as an absorb medium for seepage beds. Two (2) soil borings of 8 inches diameters were drilled to satisfy this investigation. Two (2) soil borings were drilled to depths of 40.0 feet below existing surface within the subject site to conduct percolation tests. The test holes were presaturated over night . After the presaturation was completed, water level measurements were started. From a fixed reference point, the drop in water levels were measured over a 30 minute periods for six hours. The drop that occurred during the final reading was used calculate the percolation rate.

TEST RESULT

The minimum percolation rate of the subsurface soils was found to be 1.78 inch per hour.

CONCLUSION

1. **The minimum percolation rate of the subsurface soils was found to be 1.78 inch per hour, and suitable for the intended use.**
2. We drilled to a depth of 50 feet below grade, and groundwater was encountered at 37 feet below the existing surface. Therefore, the impact of the proposed infiltration system to ground water is nil
3. The site has no potential for liquefaction, and therefore the infiltration system will have minimal effect in the event of an earthquake.
4. There will be a minim 10 feet horizontal and 1:1 (H:V) set back from the proposed building foundation and the expected zone of saturation of the infiltration system. The depth to groundwater is greater than 40 feet from the bottom of the infiltration pit. Therefore, no perched water conditions are expected, or adversely affect the structures.
5. The system will not be located near a retaining wall or basement wall.
6. The site is underlain with non expansive (sandy silt) soils, and there will be no effect on infiltration behavior.
7. Since the proposed or existing structures will have adequate setbacks, therefore the susceptibility of hydro-consolidation from the proposed infiltration system will be very remote.
8. No ground settlements due to soil saturation from the proposed infiltration system are anticipated.

CLOSURE & LIMITATIONS

The findings, conclusions, and recommendations presented reflect our best estimate of subsurface conditions based on the data obtained from a limited subsurface exploration performed during the field study. The conclusions and recommendations are based on generally accepted geotechnical engineering principles and practices. No further warranties are implied nor made.

This opportunity to be of service is appreciated. If you have any further questions regarding this matter, please contact our office at your earliest convenience.

Respectfully submitted,

Geo Environ Eng. Consultants, Inc.

REGISTERED PROFESSIONAL ENGINEER
FAHAD MASUD
No.92662
Exp 9/30/25
CIVIL
STATE OF CALIFORNIA

Jabed Masud, MSCE
President

Fahad Masud, PE
Vice President

JM/FM/gm

Attachments:

1. Percolation Test Data
2. Boring Logs
3. Plot Map

Project Name	Proposed Retail Center
Project Location	N.W.C Central Ave (74 Hwy) & Allan St, Lake Elsinore California
Project Number	21-1162
Engineer	Fahad Masud

Test Hole Radius (inch)	4
Total Depth (ft)	30

Infiltration Test Hole	**B-1**
Start Time for Pre Soak	1:30
Start Time for Testing	2:30

Trial No.	Start Time	Stop Time	/\t Time Interval (min)	Hi Initial Depth to Water(inch)	Hf Final Depth to water (inch)	/\H Change in Water Level (inch)	Infiltration Rate (Q) (in/hr)	Reduction Factor	Design Infiltration Rate Q (in/hr)
1	2:30	2:40	10	12.00	41.00	29.00	12.21	3.0	4.07
2	2:40	2:50	10	12.25	23.00	10.75	6.57	3.0	2.19
3	2:50	3:00	10	12.00	23.00	11.00	6.77	3.0	2.26
4	3:00	3:10	10	12.00	22.25	10.25	6.43	3.0	2.14
5	3:10	3:20	10	12.50	21.50	9.00	5.68	3.0	1.89
6	3:20	3:30	10	12.00	20.00	8.00	5.33	3.0	**1.78**

Option 2- This test regime includes percolation type tests, test pit or boring logs and a final report. The minimum required number of tests is as described in Table 1. The minimum required factor of safety for this option is FS=3.

Trial No.	Start Time	Stop Time	/\t Time Interval (min)	Di Initial Depth to Water(inch)	Df Final Depth to water (inch)	/\D Change in Water Level (inch)	Greater than or Equal to 6'?*
1	9:00	9:25	25.00	12	57	45	Y
2	9:30	9:55	25.00	12	45	33	Y

Infiltration Test Hole	**B-2**
Start Time for Pre Soak	12:00
Start Time for Testing	1:00

Trial No.	Start Time	Stop Time	/\t Time Interval (min)	Hi Initial Depth to Water(inch)	Hf Final Depth to water (inch)	/\H Change in Water Level (inch)	Infiltration Rate (Q) (in/hr)	Reduction Factor	Design Infiltration Rate Q (in/hr)
1	1:00	1:10	10	12.20	45.20	33.00	12.90	3.0	4.30
2	1:10	1:20	10	12.50	24.50	12.00	7.02	3.0	2.34
3	1:20	1:30	10	12.00	23.00	11.00	6.77	3.0	2.26
4	1:30	1:40	10	12.25	22.50	10.25	6.35	3.0	2.12
5	1:40	1:50	10	12.00	22.00	10.00	6.32	3.0	2.11
6	1:50	2:00	10	12.25	21.50	9.25	5.88	3.0	**1.96**

Trial No.	Start Time	Stop Time	/\t Time Interval (min)	Di Initial Depth to Water(inch)	Df Final Depth to water (inch)	/\D Change in Water Level (inch)	Greater than or Equal to 6'?*
1	9:00	9:25	25.00	12	52	40	Y
2	9:30	9:55	25.00	12	36	24	Y

LOG NO. B1 Job No 20-1041-2

Client KARAKI, WS Site NWC CENTRAL AVE & ALLAN ST. LAKE ELSINORE

Hole Dia. 8" Elevation _____ Logged By J.P. Date 8/19/24

Sampling Method: Drive Weight 140 lb Drop 30"

Dry Density (pcf)	Moisture Content (%)	Blows per foot	Sample	Depth (feet)	Soil Class.	EARTH MATERIALS DESCRIPTION
				2		
	4.1	24		5		Lt. tan DG, mod-moist, mod-dense
	9.6	30		10		Lt-olive fine sandy silt, mod moist, med stiff
	15.5	25		15		Dark gray, fine sandy silt, mod. moist, med stiff
				20		SAME AS ABOVE
		31		25		
				30		Reddish, DG, mod moist, dense
		39		35		
		42		40		Dark gray, sandy silt, moist, stiff
				45		
				50		
				55		GROUND WATER ENCOUNTERED AT _____
				60		NO GROUND WATER ENCOUNTERED X
				65		END OF BORING @ 45'
				70		
				75		
				80		
				85		
				90		

⊕ Undisturbed Sample

⊠ Bulk Sample

AGE-113

LOG NO. B-4 Job No. 20-1041 M-2

Client KARAKI & WS Site NWC CENTRAL AVE & ALLANST, LAKE ELS.

Hole Dia. 8" Elevation _____ Logged By J.P. Date 8/19/24

Sampling Method: Drive Weight 140 Drop 30"

Dry Density (pcf)	Moisture Content (%)	Blows per foot	Sample	Depth (feet)	Soil Class.	EARTH MATERIALS DESCRIPTION
				0		
	3.4	39		5		lt-brown, sandy silt, mod. mois, mod. stiff
	3.7	39		10		med brown, silty sand, W/scatted gravel ½" to ¼"
	13.2	27		15		olive, sandy silt, med moist, med. stiff
	24.8	38		20		SAME AS ABOVE
	17.8	44		25		Reddish, DG, mod. moist, mod. dense
	22.2	41		30		Dark gray, fine sandy silt, moist, med stiff
				35		
				40		
				45		
				50		
				55		GROUND WATER ENCOUNTERED AT _____
				60		NO GROUND WATER ENCOUNTERED X
				65		END OF BORING @ 30'
				70		
				75		
				80		
				85		
				90		

Undisturbed Sample

Bulk Sample

AGE-113

Field Percolation Test Data

PROJECT NO. LAKE ELSINORE

DATE 08/19/24

TEST NO. 1

DEPTH OF TEST: 15 FT/in 10A

PREDOMINANT SOIL TYPE:

DESIGN RATE MIN/INCH:

No.	*Time Interval (Min.)	* Drop (Inches)	
1	5	32	
2	5	40	
3	10	24	R.F.
4	10	36	
5	10	42	
6	10	20	R.F.
7	10	20	
8	10	23	
9	10	26	
10	20	31	
11	20	36	
12	20	40	

* Time Interval: Time from the last previous set of readings taken.

MINIMUM AREA REQUIRED

FT²/100 GALLONS/DAY

TEST NO. 2

DEPTH OF TEST: 30 FT/10MT in. 25 FT/3

PREDOMINANT SOIL TYPE:

DESIGN RATE MIN/INCH:

No.	*Time Interval (Min.)	* Drop (Inches)	
1	5	40	
2	5	60	
3	10	45	R.F.
4	10	42	R.F.
5	10	33	R.F.
6	10	29	R.F.
7	10	37	
8	10	44	
9	10	55	
10	10	64	
11	10	74	
12			

* Time Interval: Time from the last previous set of readings taken.

MINIMUM AREA REQUIRED

FT²/100 GALLONS/DAY

TEST NO.

DEPTH OF TEST: in.

PREDOMINANT SOIL TYPE:

DESIGN RATE MIN/INCH:

No.	*Time Interval (Min.)	* Drop (Inches)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

* Time Interval: Time from the last previous set of readings taken.

MINIMUM AREA REQUIRED

FT²/100 GALLONS/DAY

TEST NO.

DEPTH OF TEST: in.

PREDOMINANT SOIL TYPE:

DESIGN RATE MIN/INCH:

No.	*Time Interval (Min.)	* Drop (Inches)
1		
2		
3		
4		
5		
6		
7		
8		
9		
10		
11		
12		

* Time Interval: Time from the last previous set of readings taken.

MINIMUM AREA REQUIRED

FT²/100 GALLONS/DAY

RECOMMENDED DESIGN RATE

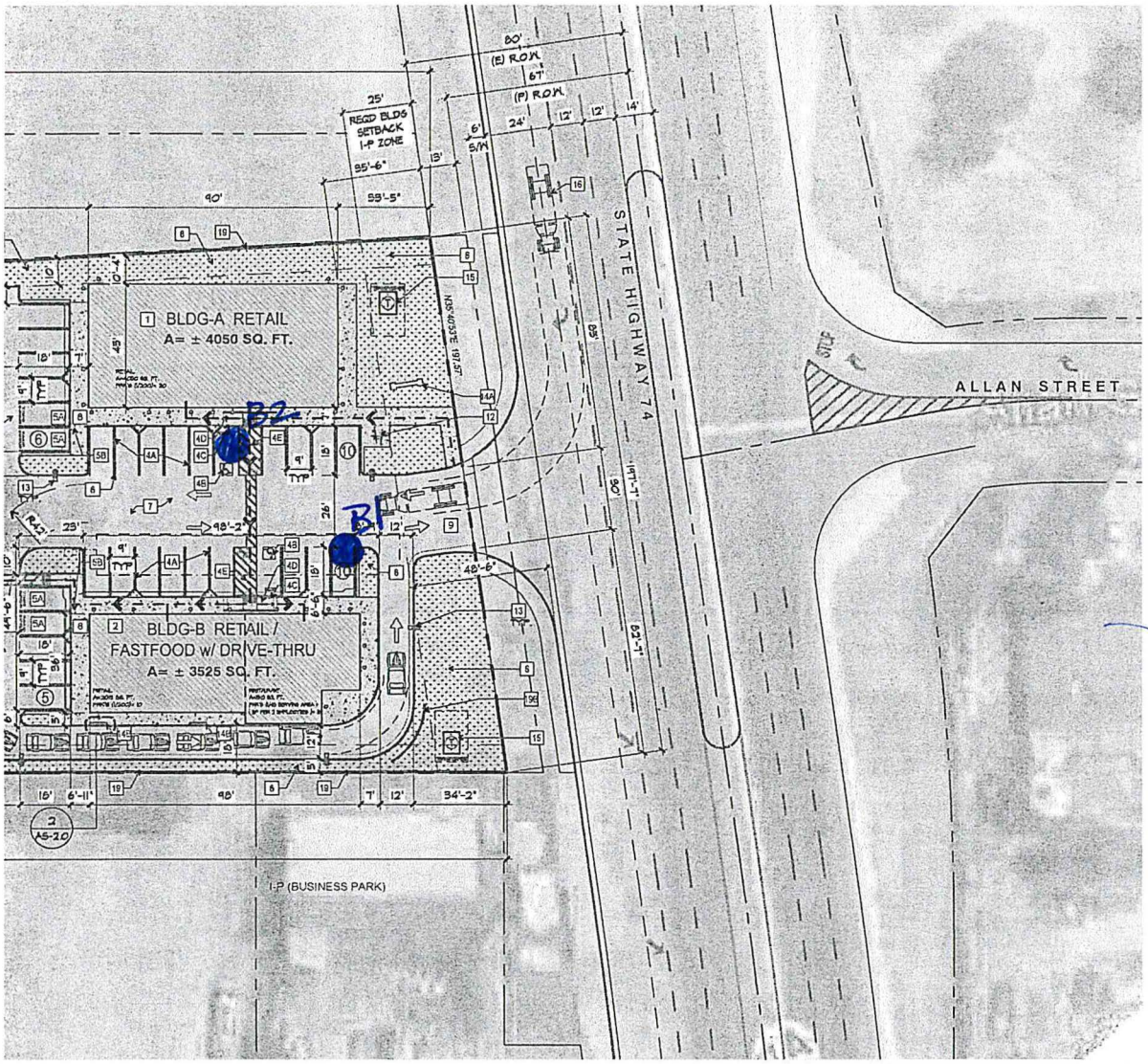
MIN/INCH

RECOMMENDED MINIMUM AREA REQUIRED

FT²/100 GALLONS/DAY

Project No:	Date:	Figure No:

B2 12

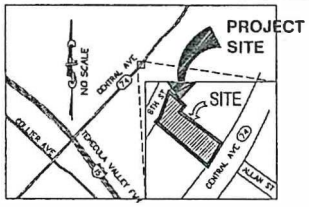


1 PROPOSED SITE PLAN
SCALE: 1" = 30'-0"

ASSESSOR'S PARCEL NUMBER

377-372-038-8

VICINITY MAP



LEGEND

- NO. OF PARKING SPACES
- ACCESSIBLE PARKING
- PROPERTY LINE
- FEMA FLOOD CONTROL BLUE LINE STREAM
- ADA PATH OF TRAVEL
- CONCRETE PAVING AREA
- DECORATIVE PAVING AREA
- LANDSCAPED AREA
- DIRECTIONAL ARROW
- AREA LIGHTS
- WALL MOUNTED DECORATIVE AREA LIGHTS
- (E) FIRE HYDRANT
- (E) SEWER MANHOLE
- (E) SEWER CLEANOUT
- (E) POWER POLE
- WM (E) WATER METER
- (E) WATER POINT
- (E) SIGN

B1
SOIL BORING

KARAKI WSe
WESTERN STATES ENGINEERING
A DESIGN-BUILD COMPANY

4667 E. LA PALMA STE. 707
ANAHEIM, CA 92807
TEL: (714)685-9200 FAX: (714)693-1002
www.westernseo.com

CONSULTANT/ SEALS

SUBMITTAL

NO.	DESCRIPTION	BY	DATE
1			
2			
3			
4			

REVISIONS

NO.	DESCRIPTION	BY	DATE
△			
△			
△			
△			
△			

OWNER NAME & ADDRESS

MR. PALJATINDER SINGH
MRS. BHUPINDER KAUR

45029 PROMISE RD
LAKE ELSINORE, CA92532

PROJECT NAME & ADDRESS

CENTRAL AVENUE
COMMERCIAL
RETAILS

N.W.C. CENTRAL AVE. (74 HWY) & ALLAN ST.
LAKE ELSINORE, CA 92532

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DESIGNED BY:	WS
DRAWN BY:	WS
CHECKED BY:	JK
PLOT DATE:	6.25.2024
SCALE:	AS SHOWN
SHEET TITLE	PROPOSED SITE PLAN
BUILDING	
SHEET NUMBER	AS-10
JOB No	E9921BA
CUP No	CUP 200006

GEO ENVIRON
GEOTECHNICAL & ENVIRONMENTAL ENG. CONSULTANTS,
4071 La Palma Ave., Ste E
Anaheim, CA 92807
8/19/24

GEO ENVIRON
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS, INC.
4071 E. La Palma Ave., Ste. B, Anaheim, Ca 92807 • (714) 632-3190 • Fax (714) 632-3191

Job No. 20-1041P-2
July 22, 2020

Mr. Joseph Karaki
Western State Eng. & Construction, Inc.
4887 E. La Palma Street, Ste # 707
Anaheim, Ca 92807

Subject: **Report of Percolation Testing for the Proposed Infiltration System,** N.W.C Central Ave (74 Hwy) & Allan St, Lake Elsinore California

Gentlemen,

In accordance with your request, we have performed a percolation testing with regard to the proposed infiltration system. The intent of this report is to evaluate the feasibility of the proposed system to be constructed at the subject site.

The percolation rates of the subsurface soils was found to be 1.52 inch per hour. The bottom of the proposed infiltration system is estimated to be within 5.0 feet below the existing natural grade. The percolation testing and the relevant calculations were performed using the method per the Riverside County Manuel.

SITE GEOLOGY & GROUNDWATER

The site is underlain by **older alluvium consists of silt and sand to 15 feet.** A more detailed description of the earth materials encountered is presented on the log borings in Appendix 'B'. **Groundwater was encountered approximately at 37 feet below the existing grade** during this investigation.

PERCOLATION INVESTIGATION

A preliminary set of percolation tests were performed in order to determine the suitability of the surface soils as an absorb medium for seepage beds. Two (2) soil borings of 8 inches diameters were drilled to satisfy this investigation. The borings were drilled to depths of 10.0 feet below existing surface within the subject site to conduct percolation tests. One additional boring was drilled to depth of 50.0 feet below existing surface to determine depth to groundwater or any impervious layer. The test holes were presaturated over night . After the presaturation was completed, water level measurements were started. From a fixed reference point, the drop in water levels were measured over a 30 minute periods for six hours. The drop that occurred during the final reading was used calculate the percolation rate.

TEST RESULTS

The percolation rate of the subsurface soils was found to be 1.52 inch per hour.

CONCLUSION

1. The percolation rate of the subsurface soils was found to be 1.52 inch per hour.
2. We drilled to a depth of 50 feet below grade, and groundwater was encountered at 37 feet below the existing surface. Therefore, the impact of the proposed infiltration system to ground water is nil
3. The site has no potential for liquefaction, and therefore the infiltration system will have minimal effect in the event of an earthquake.
4. There will be a minim 10 feet horizontal and 1:1 (H:V) set back from the proposed building foundation and the expected zone of saturation of the infiltration system. The depth to groundwater is greater than 15 feet from the bottom of the infiltration pit. Therefore, no perched water conditions are expected, or adversely affect the structures.
5. The system will not be located near a retaining wall or basement wall.
6. The site is underlain with non expansive (sandy silt) soils, and there will be no effect on infiltration behavior.
7. Since the proposed or existing structures will have adequate setbacks, therefore the susceptibility of hydro-consolidation from the proposed infiltration system will be very remote.
8. No ground settlements due to soil saturation from the proposed infiltration system are anticipated.

CLOSURE & LIMITATIONS

The findings, conclusions, and recommendations presented reflect our best estimate of subsurface conditions based on the data obtained from a limited subsurface exploration performed during the field study. The conclusions and recommendations are based on generally accepted geotechnical engineering principles and practices. No further warranties are implied nor made.

This opportunity to be of service is appreciated. If you have any further questions regarding this matter, please contact our office at your earliest convenience.

Respectfully submitted,

Geo Environ Eng. Consultants, Inc.



Jabed Masud, MSCE
Principal

Esmail Rastegari, P.E.
Principal

JM/ER/gm

Attachments:
Drawings
Boring Logs
Percolation Test Data

PERCOLATION TEST DATA SHEET

Date: *7/13/20*
Project No: *20-1041P*
Depth to Test Hole (Dt) : *15 ft.*
Project Name: *Commercial Retail*
Tested By: *F.M*
USCS Soil Classification: *SM-ML*

Test Hole ID: B-2
Test Hole Dimensions *(inches/ feet)*
Diameters: *8 inch.*

Rectangular:

TEST HOLE NO: B-2

Trial No.	Start Time	Stop Time	/\t Time Interval (min)	Di Initial Depth to Water(inch)	Df Final Depth to water (inch)	/\D Change in Water Level (inch)	Percolation Rate (min./in)
1	12:00	12:30	30	12	31.5	19.5	1.5
2	12:30	1:00	30	11.8	30.7	18.90	1.6
3	1:00	1:30	30	12.2	29.9	17.7	1.7
4	1:30	2:00	30	12	29.1	17.1	1.8
5	2:00	2:30	30	12	28.6	16.6	1.8
6	2:30	3:00	30	12.25	28.3	16.05	1.9
7	3:30	4:00	30	12	28	16	1.9
8	4:00	4:30	30	12.25	28.2	15.95	1.9

TEST HOLE NO: B-2	
Time Interval: t (min)	30
Initial Depth to Water (in), Di	12.25
Final Depth to Water (in), Df	28.2
Total Depth of Test Hole (in): Dt	60
Test Hole Radius, r (in)	4
Hi, initial ht of water @ selected time interval	
Hi = (Dt - Di)	47.8
Hf, final ht. Of water @ selected time interval	
Hf = (Dt- Df)	31.8
/\H (change in ht. over the time interval = (Hi- Hf)	15.95
H (avg) = (Hi + Hf)/ 2	39.8
It = Test Infiltration Rate	
^h*60*R	3828.0
^T(R+2*Havg)	2506.5
Rate	1.527

Gross Infiltration Rate= 1.52 in/hr

Project: **Commercial Retail**	Project Number: **20-1041P**	Client: Westerm States	Boring No. **B-1**
Address, City, State	**NWC Central & Allan St Lake Elsinore California**	Drilling Contractor: Geo Environ	Drill Rig Type: **HSA**
Logged By: **Fahad Masud**	Started: **12:00 PM**	Bit Type: **N/A**	Diameter: **2 feet**
Drill Crew: **N/A**	Completed: **4:00 PM**	Hammer Type: **Slide Hammer**	
USA Ticket Number: **N/A**	Backfilled:	Hammer Weight: **34 lb**	Hammer Drop: **24 inches**
	Groundwater Depth: **37 feet**	Elevation:	Total Depth of Boring: **50**

4/26/2020

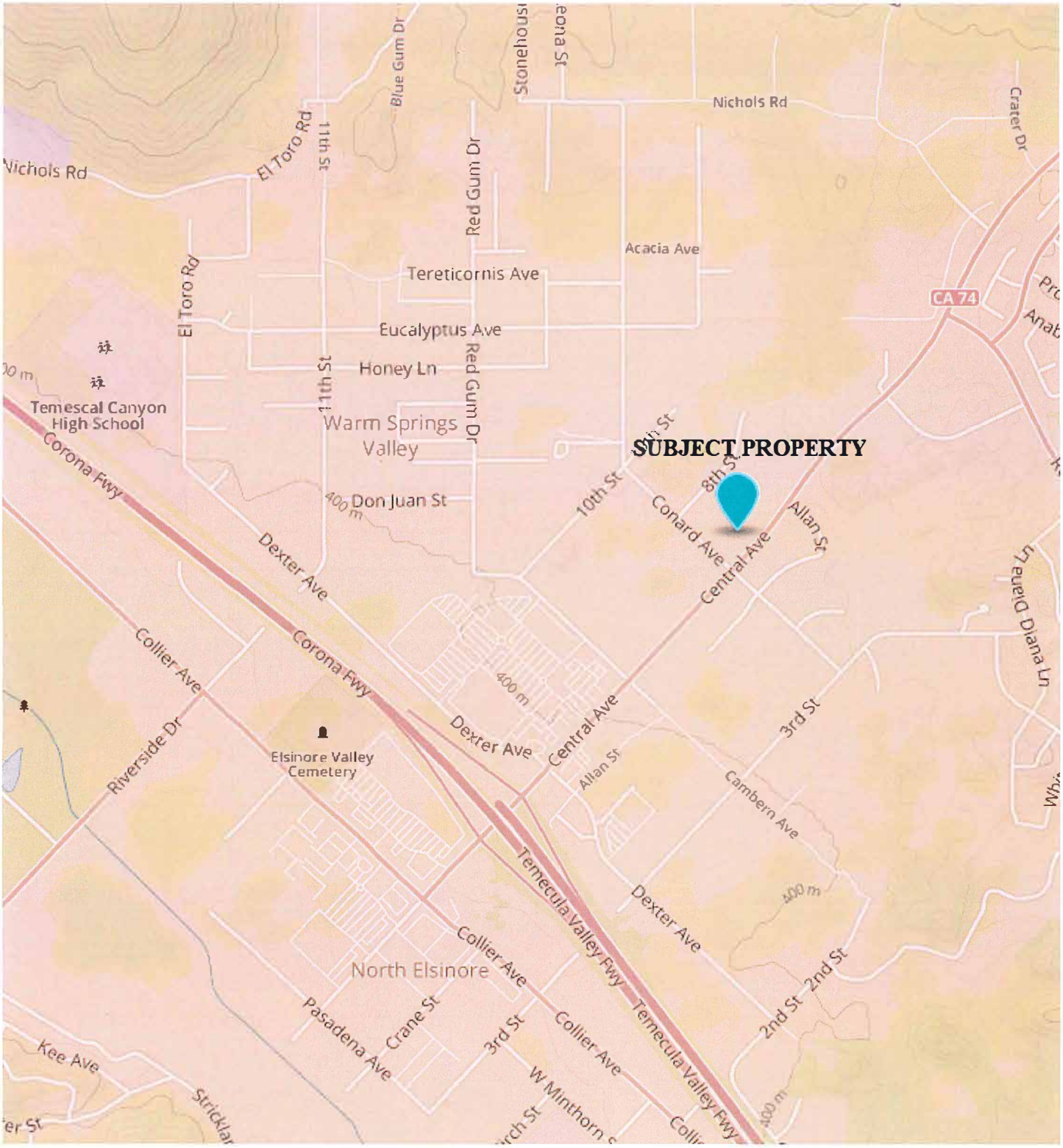
Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log		Dry Density (pcf)	Moisture Content (%)
2			21		Brownish orange, **sandy silt**, slightly moist, w/ fine-med sand, dense	90.1	5.8
5			30		Brownish orange, **sandy silt**, moist, w/ fine-coarse sand and gravel, dense	110.1	7.4
10			45		Brownish red, **sandy silt**, moist, w/ fine-coarse sand and gravel, medium dense	118.2	8.2
15			28			109.5	9.1
20			41			115.2	10.1
25			48			119.2	9.8
30			33		Greenish-brown, **sandy silt**, moist, w/ fine-and coarse gravel, medium dense	113.3	14.1
35			26		Greenish-brown, **sandy silt**, wet, w/ coarse sand and gravel, very dense	107.6	16.2
40			50/6"			120.1	21.2
45			50/6"			122.4	20.1
50			50/6"			121.3	20.8

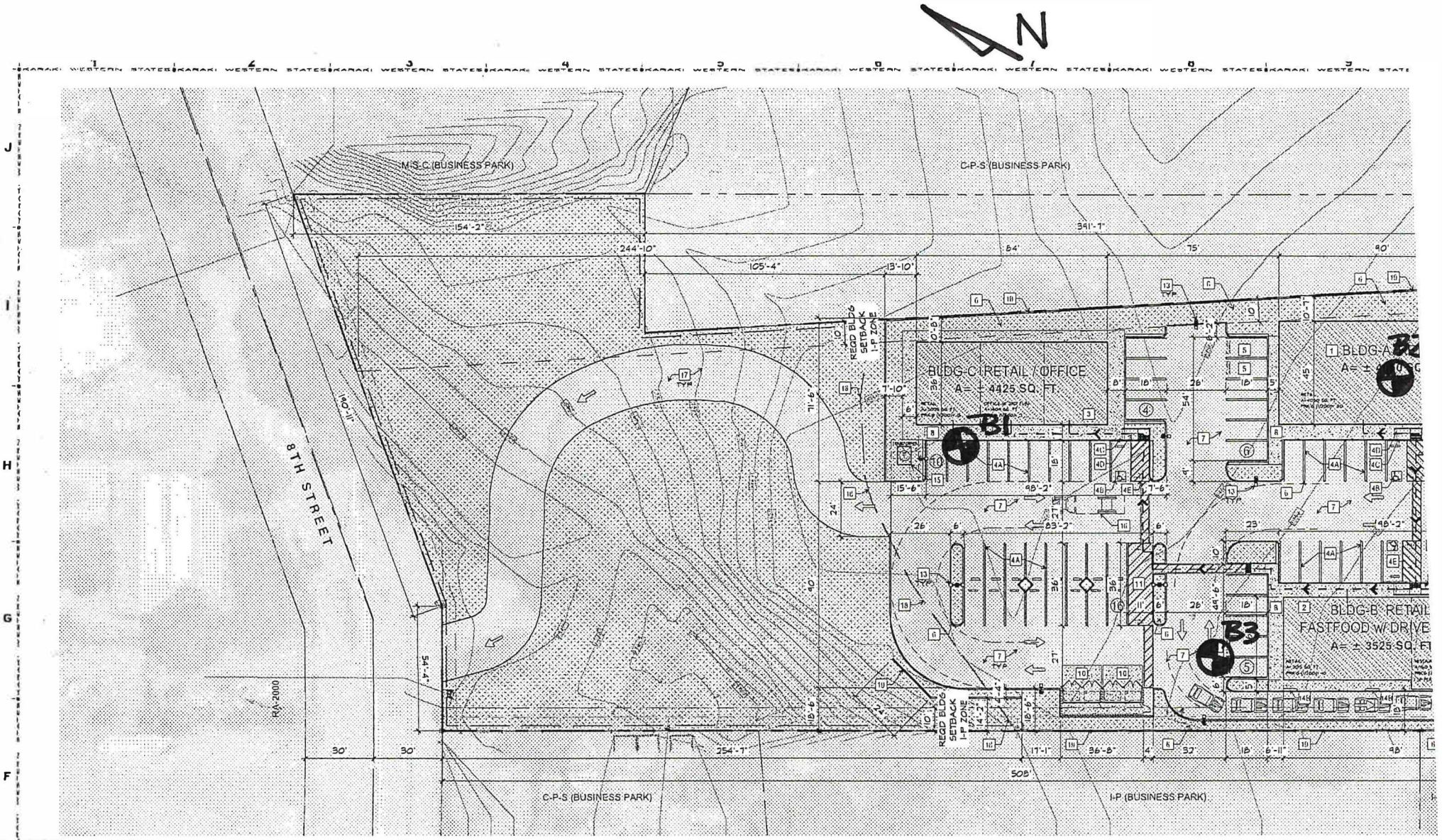
Standard Penetration Slit Spoon Sampler (SPT)
California Sampler
Shelby Tube
CPP Sampler
Bulk/ Bag Sample
Stabllized Ground water
Groundwater At time of Drilling

Project:	Project Number:	Client:	Boring No.
Commercial Retail	**20-1041P**	Westerm States	**B-2**
Address, City, State	**NWC Central & Allan St Lake Elsinore California**	Drilling Contractor: Geo Environ	Drill Rig Type: **HSA**
Logged By: **Fahad Masud**	Started: **12:00 PM**	Bit Type: **N/A**	Diameter: **2 feet**
Drill Crew: **N/A**	Completed: **4:00 PM**	Hammer Type: **Slide Hammer**	
USA Ticket Number: **N/A**	Backfilled: **4/26/2020**	Hammer Weight: **34 lb**	Hammer Drop: **24 inches**
	Groundwater Depth:	Elevation:	Total Depth of Boring: **15**

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log		Dry Density (pcf)	Moisture Content (%)
2	⊠		18		Brownish orange, **sandy silt**, slightly moist, w/ fine-med sand, dense	92.1	6.1
5	⊠		27		Reddish-brown, **sandy silt**, moist, w/ fine-coarse sand and gravel, dense	109.9	7.9
10	⊠		43		Reddish Brown, sandy silt, moist, w/ fine-coarse sand and gravel, medium dense	117.6	8.4
15	⊠		26			110.1	9.7
20							
25							
30							
35							
40							
45							
50							

Standard Penetration Slit Spoon Sampler (SPT)
California Sampler
Shelby Tube
CPP Sampler
Bulk/ Bag Sample
Stabllized Ground water
Groundwater At time of Drilling


SUBJECT PROPERTY
Nichols Rd
El Toro Rd
11th St
Blue Gum Dr
Red Gum Dr
Stonehouse
Nichols Rd
Crater Dr
Acacia Ave
Tereticornis Ave
Eucalyptus Ave
Honey Ln
CA 74
Temescal Canyon High School
Warm Springs Valley
Corona Fwy
Don Juan St
400 m
10th St
8th St
Conard Ave
Central Ave
Allan St
Dexter Ave
Collier Ave
Riverside Dr
Elsinore Valley Cemetery
Dexrer Ave
3rd St
Cambern Ave
Temecula Valley Fwy
North Elsinore
Pasadena Ave
Crane St
Kee Ave
W Minthorn St
2nd St
Diana Ln



B1 SOIL BORING

GEO ENVIRON
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Anaheim, CA 92807

GEO ENVIRON
GEOTECHNICAL AND ENVIRONMENTAL ENGINEERING CONSULTANTS, INC.
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Job No. 19-990P
July 20, 2020

Mr. Joseph Karaki
Western State Eng. & Construction, Inc.
4887 E. La Palma Street, Ste # 707
Anaheim, Ca 92807

Subject: **Preliminary Geotechnical Investigation Report for Foundation Design, Proposed Commercial Retail, N.W.C Central Ave (74 Hwy) & Allan St, Lake Elsinore California**

Reference:

1) WS Eng., Inc , 6/9/20, "Site Plan, Proposed Commercial Retail, N.W.C Central Ave (74 Hwy) & Allan St, Lake Elsinore California

Gentlemen:

In accordance with your request and authorization, we have performed a preliminary geotechnical engineering investigation for the subject project. The accompanying report presents the preliminary results of our field exploration work, laboratory tests, our geotechnical experience previously performed in the vicinity of the project site, as well as engineering analysis. The subsurface and foundation conditions are discussed and preliminary recommendations for the geotechnical engineering aspects of the project are presented.

This opportunity to be of service is appreciated. If you have any questions concerning our findings, please call at your convenience.

Respectfully submitted,

Geo Environ Eng. Consultants, Inc.



Jabed Masud, MSCE
Principal

Esmail Rastegari, P.E.
Principal

JM/ER/gm

Attachments: Appendix 'A' - Drawings, Boring Location
Appendix 'B' - Boring Logs
Appendix 'C' - Laboratory Test Results
Appendix 'D' -Liquefaction Analysis

SCOPE

The scope of this study was designed to determine and evaluate the surface and subsurface conditions of the subject site and to present preliminary recommendations for the foundation systems and grading requirements as they relate to the planned development

The scope included the following geotechnical functions:

- Review of available literature pertaining to the site and vicinity.
- Evaluation of natural and manmade surface features at the site and contiguous areas.
- Drilling and logging of exploratory borings.
- Securing of bulk and undisturbed samples of earth materials from the trenches for laboratory testing.
- Laboratory testing of selected samples.
- Geotechnical engineering analysis of data obtained during the study.
- Preparation of this report and the accompanying illustrations to present the findings, conclusions, and recommendations pertaining to the planned construction.

The scope of work did not include any environmental assessment of the property or opinions relating to possible soil or subsurface contamination by hazardous or toxic substances.

SITE DESCRIPTION

Location

The subject property upon which the soil exploration has been performed is located at N.W.C Central Ave (74 Hwy) & Allan St, Lake Elsinore, California. Surrounding the site is vacant land, commercial building, and multi-family buildings.

Site Conditions

The subject site is a vacant plot of land, 2.57 acres in size. The site is currently vacant and the north-west side of the property rests on a descending slope.

PROPOSED CONSTRUCTION & GRADING

Preliminary details of the proposed construction and the reference drawing were provided by the project Architect. As shown on the site plan, attached herein (Appendix 'B').

Three (3) commercial retail stores approximately 4425 sq. ft, 4050 sq. ft, and 3525 sft in size with associated parking pavement are planned within the subject site. Loads on the foundations are unknown but are expected to be between 2 and 4 kips per linear foot. Column loads are expected to be between 50 and 100 kips. Other structures will remain in place. No grading plans were to provided to this firm for our use during this study. However, cut and fill grading are anticipated within the proposed construction areas. Should details involved in final design vary from those outlined above, this firm should be notified for review and possible revision of our recommendations.

FIELD STUDY

A field study consisting of site observations and subsurface exploration was conducted on July 13, 2020. Three exploratory borings were drilled to a maximum depth of 50 feet below existing surface The soils encountered in the exploratory drilling were logged by our field personnel. The boring log are included in Appendix 'B'. The approximate location of the borings are shown on the plot plan in Appendix 'A'. Disturbed and undisturbed samples of the soils encountered were obtained at frequent intervals in the borings. Undisturbed samples were obtained by driving a thin walled steel sampler with successive drops of a 140-pound weight having a free fall of 30 inches. The blow count for each one foot of penetration is shown on the boring logs. Undisturbed soils were retained in brass rings with a 1-inch height and 2.413-inch inside diameter. The ring samples were retained in close fitting moisture proof containers and transported to our laboratory for testing.

LABORATORY TEST

The results of laboratory tests performed on disturbed, undisturbed, and remolded soil samples are presented in appendix 'C'. Following is a listing and brief explanation of the laboratory tests which were performed as part of this study. The remaining soil samples are stored in our laboratory for future reference. Unless notified to the contrary, all samples will be disposed of 30 days after the date of this report.

Classification

The field classification of the soils were verified in the laboratory in general accordance with the Unified Soil Classification System. The final classification is shown on the boring logs.

Field Moistures and Densities

The field moisture content was determined for each of the disturbed and undisturbed soil samples. The dry density was also determined for each of the undisturbed samples. The dry density was determined in pounds per cubic foot and the field moisture content was determined as a percentage of the dry weight of the soil. Both results are shown on boring logs.

Consolidation Tests

Settlement predictions of the soil's behavior under load were made on the basis of the consolidation tests which are performed in general accordance with ASTM D-2435 procedures. The Consolidation apparatus is designed to receive a one inch high ring.

Expansion Characteristics

Laboratory expansion tests were performed on a near surface soil sample in general accordance with ASTM D-4829 procedures.

Direct Shear Test

Direct Shear test was performed in the Direct Shear Test Machine which is of the strain control type in general with ASTM D-3080 procedure. Each sample was sheared under varying pressures normal to the face of the specimen to determine the shear strength (cohesion and angle of internal friction). Samples were tested in a submerged condition. The result is plotted on the "Direct Shear Test Graph."

GEOTECHNICAL CONDITIONS

Earth Materials

The site consists of top native soils (alluvium) classified as brown-orange, sandy silt with coarse sand & gravel, dense to very dense in consistency, moist to very moist all the way to a depth of 50 feet.

A more detailed description of the earth materials encountered is presented on the log borings in Appendix 'B'. The boring locations are presented on the log borings in Appendix 'A'. The soil strata as the boring logs represents the soil conditions in the actual boring locations other variations may occur between the borings. Lines of demarcation represent the approximate boundary between the soil types, but the transition may be gradual. Please note that we have performed a limited soil investigation. Based on the soil borings, it appeared that the site is underlain with native alluvial soils. During grading and construction, the soil engineer or his representatives will definitely verify unsuitable fill depths if any exist. Revised recommendations will be provided, if needed.

Groundwater

Groundwater was encountered at approximately 37 feet below the existing grade in the exploratory boring during our subsurface exploration. The historic groundwater may have been existed at 15 feet below the existing surface obtained from near by soil boring data.

Seismicity

The frequency of earthquake and intensity of seismic ground shaking to be expected at the site depends upon which fault produces the earthquake, the earthquake magnitude and the distance to the epicenter.

Nearby active fault lines are the Elsinore-Glen Ivy and Elsinore-Temecula, these have associated postulated, maximum probable earthquake magnitudes of 6.8. In turn, the probabilistic ground motion acceleration range upwards to ± 0.859g. The related California Building Code factors include the type B, Elsinore-Glen Ivy Fault the near source zone at 5.0 kilometers towards the south-west and a soil profile type of alluvium or Sd.

Based on the California Building Code acceptance of some structural damage without collapse, the subject development may be designed in accordance with the seismic formulas and requirements presented in the latest version of the California Building Code (CBC 2016). It is the responsibility of the project structural engineer to utilize the critical seismic factors to be used for building design and to implement the applicable sections of the code. Please refer to the referenced boring log B-1A. B-1A.There was not enough information regarding the liquefaction potential of the site. A liquefaction analysis will be performed to determine the liquefaction potential at the site .

Liquefaction

A liquefaction analysis was performed to verify the susceptibility to liquefaction at the subject location due to no current data in existence to verify liquefaction potential in the area. **Our analysis has determined that subject property is NOT susceptible to liquefaction.** Please reference the liquefaction analysis report attached in Appendix 'D' to this report.

CONCLUSIONS

- The plan construction and development of the site is considered feasible from a geotechnical engineering point of view provided the engineering recommendations of this report are followed.
- The surface and the subsurface soil on the site will be adequate for the support of the structure and any fill soils proposed for the site.
- The proposed structure, grading, and development of the site will not cause adverse safety hazards or instability to the adjacent properties or their structures.
- Conversely, the adjacent properties or their structures will not cause adverse safety hazards or instability to the planned development.
- Laboratory expansion test indicate that the soils on the site have low expansion potential.
- The site is not susceptible to liquefaction.

RECOMMENDATIONS

Rough Grading Recommendation

The following recommendations may need to be modified and/ or supplemented during rough grading as field conditions necessitate. All earthwork and grading shall be performed in accordance with the recommendations presented herein, and in accordance with all applicable requirements of the Grading Code of the City of Lake Elsinore, California.

The proposed building areas should be overexacavated to a depth of 3.0 feet below the existing soil grade, or 2.0 feet below the proposed footing bottoms, whichever is greater. Where possible, the limits of overexcavation for building areas shall extend at least 5.0 feet beyond the proposed building limits or to the property line whichever is less. The excavated soils free from debris or other organic may be replaced as a certified compacted fill. The depth of the excavations will be determined by the soil engineer during grading and construction, based on the previously placed un-certified fill.

The competency of the exposed overexcavation bottoms must be determined by the soil engineer or his representative at the time they are exposed and prior to scarification or placement of fill. All overexcavation bottoms and any areas to receive fill shall be scarified a minimum of 6 inches, watered or aerated as necessary to achieve optimum moisture content, and properly compacted to at least 90% of maximum dry density prior to filling.

For the purpose of estimating earthwork quantities, a shrinkage factor of 15% (0.15) may be assumed for the existing near surface on-site soil to be used as fill and compacted to 90% of maximum dry density. Subsidence due to grading is estimated to be .1 feet.

Any soil to be placed as fill, whether natural or import, shall be approved by the soil engineer or his representative prior to their placement. The fill material shall be free from vegetation, organic material or debris. Import soil shall be no more expansive than the existing near surface soils on the site.

Suitable fill soil shall be placed in horizontal lifts not exceeding 6 inches in thickness after compaction and uniformly watered or aerated to obtain optimum moisture content. Each layer shall be spread evenly and shall be thoroughly mixed during the spreading to ensure uniformity of the soil and optimum moisture in each layer. After each lift has been placed, it shall be thoroughly compacted to not less than 90% of maximum dry density.

The soil engineer or his representative shall observe the placement of fill and should take sufficient tests to verify the moisture content and the uniformity and degree of compaction obtained. In-place density testing should be performed in accordance with ASTM acceptable to the local building authority. The optimum moisture content and the maximum dry density for compacted soils shall be determined in accordance with ASTM D-1557 procedures.

Due to the possibility of imported fill soil in the building areas and / or variable soil strata that may be exposed in the building pad, typical soil samples should be obtained at completion of rough grading for laboratory testing to confirm the expansion characteristics of the graded site.

FOUNDATION DESIGN RECOMMENDATIONS

Conventional Footing Recommendations

- The footings for the proposed building should be founded into certified compacted fills and minimum 24 inches below lowest adjacent finished grade.

- Continuous footing should be reinforced with at least two (2) #4 rebars at the top and at the bottom of the footing in order to minimize the effects of any minor variations in the engineering characteristics in the supporting soils.
- All pad footings should be a minimum of 24 inches square by 24 inches in depth.

The project Architect / or Structural Engineer shall determine actual footing widths, depths and reinforcements necessary to resist design vertical, horizontal and uplift forces.

Allowable Soil Bearing Capacities

Based on the field and laboratory test data, an allowable soil bearing value of 2000 psf is recommended for the design of the continuous and spread footings for the proposed building. A 1/3 increase in the above bearing value may be used when considering short term loading from wind or seismic sources. A factor of safety of 3 was used in calculation of the soil allowable bearing capacity.

Settlement

Using the recommended bearing value and the maximum assumed wall and column loads, the total settlement is estimated to be 0.5 inches . The differential settlement is estimated to be on the order of 0.25 inches, between similarly loading footing of the same size, over a minimum horizontal distance of 30 feet.

Lateral Bearing Pressure

Additional soil design parameters that may be pertinent to the design and development based on undisturbed natural soil or properly compacted fill are as follows:

- Allowable lateral soil pressures using a factor of safety of 3 (Equivalent Fluid Pressure) Passive case: 300 psf/ft.
- Allowable Coefficient of Friction between concrete and soil: 0.30

Seismic Design

In accordance with the ASCE 7-16 the structural design should consider the following design parameters:

Site Latitude: 33.699782 degree

Site Longitude: 117.329646 degree

Site Class: Default

Short Period Site Coefficient- **Fa: 1.2**

Long Period Site Coefficient- **Fv: Null**

Mapped Spectral Response Acceleration-Short Period: (0.2 sec)-**Ss: 2.021**

Mapped Spectral Response Acceleration-Short Period: (1 sec)-**S1: 0.724**

Adjusted Spectral Response Acceleration-Short Period: (0.2 sec)-**Sms: 2.425**

Adjusted Spectral Response Acceleration-Short Period: (1 sec)-**Sm1**: **Null**

Design Spectral Response Acceleration-Short Period: (0.2 sec)-**Sds**: **1.617**

Design Spectral Response Acceleration-Short Period: (1 sec)-**Sd1**: **Null**

FLOOR SLAB RECOMMENDATIONS

Concrete slabs should be constructed in accordance with the following section.

Floor slabs should be a minimum of 4 inches thick. Floor slabs should be reinforced with # 3 rebars at 18- inches on centers.

Concrete slabs should be underlain with a minimum 6 mil polyvinyl chloride membrane vapor retarder with a minimum overlap of 12 inches in all directions. This membrane should be sandwiched between two, two-inch layers of sand.

The slab subgrade should be moisture conditioned to near optimum moisture content condition to a depth of 12 inches immediately prior to placement of the moisture barrier or pouring concrete.

CEMENT TYPE

A very low exposure to sulfate can be expected for concrete placed in contact with on site soil and native material. Therefore, based on the CBC no special cement will be required for concrete in contact with these materials.

Sample	PH	Soluble Sulfates per CA 417 (PPM)	Soluble Sulfates per CA 422 (PPM)	Minimum Resistivity per CA 643 (ohm-cm)
#1	6.0	20	45	2600

RETAINING WALL RECOMMENDATIONS

Retaining walls if planned should be designed to resist the active pressures summarized in the following table. The active pressure is no rmally calculated from the lowermost portion of the footing to the highest ground surface at the back of the wall, including necessary factors for sloping ground. The active and passive pressures indicated in the table are equivalent fluid densities. Walls that are not free to rotate or that are braced at the top should use active pressures that are 50% greater than those indicated in the table. Retaining wall design for passive resistance should neglect the top foot of earth in front of the wall.

Retaining Wall Design Parameters

Equivalent Fluid Pressures

Slope of adjacent ground	Active Pressure backfill with low expansive soil.
Level	30 pcf
2:1	45 pcf

The pressures shown on above table are for retaining walls backfilled with non-cohesive granular materials available on the site, and provided with drainage devices such as weep holes or subdrains to prevent the build-up of hydrostatic pressures beyond the design values. Also, it is strongly recommended that all backfill material be compacted to a minimum of 90 percent relative compaction, as this is the density from which the pressure are calculated. This recommendation cannot be overemphasized.

TEMPORARY CONSTRUCTION CUTS

Temporary construction cuts for retaining walls, foundations, utility trenches, etc., in excess of 5 feet in depth should cut back into an inclination not steeper than 1:1 (horizontal to vertical). Where more restrictive, the safety requirements for excavations contained in the State Construction Safety Orders enforced by the State Division of Industrial Safety (CAL-OSHA) and or the safety codes of the local agency having jurisdiction over the project shall apply. All excavations shall be initially observed by the geotechnical engineer or his representative to verify the recommendations presented or to make any additional recommendations necessary to maintain stability.

TRENCH BACKFILL

Trench excavations for utility lines which extend under building and paved areas are within the zone of influence of adjacent foundations shall be properly backfilled and compacted in accordance with the following recommendations.

The pipe should be bedded and backfilled with clean sand or approved granular soil (minimum Sand Equivalent Value of 30) to a depth of at least 1 foot over the pipe. This backfill should be uniformly watered and compacted to a firm condition.

The remainder of the backfill should be on-site soil or very low to low expansive import soil, which should be placed in loose lifts not exceeding 12 inches in thickness, watered or aerated to optimum moisture content, and mechanically compacted to at least 90% of maximum dry density as determined by ASTM D-1557 procedures. Water jetting of the backfill is not allowed.

PAVEMENT RECOMMENDATIONS

For preliminary design purposes, the typical soil anticipated in the subgrade will consist of fine silty sand. Based on this soil type (silty sand), a conservative R-Value of 50 can be estimated for preliminary design of the pavement section. The actual R-Value of the subgrade soil should be tested and verified at the time of construction. The following are our preliminary recommendations for the structural pavement section calculated in general accordance with Caltrans procedures and based on the estimated R-Value and the Traffic Indexes (TI).

Site Area	Traffic Index	R-value	Pavement Section
Parking	4.5	50	3" A.C. over 4.5" Class II Base
Vehicle Drive Area	5.5	50	4" A.C. over 6" Class II Base
Heavy Truck Area	6.5	50	4" A.C. over 6.0" Class II Base

As an alternative to asphaltic concrete pavement, Portland Cement Concrete (PCC) pavement may be utilized. Concrete driveway and parking slabs shall be at least 5 inches thick and provided with saw cuts or expansion joints every 10 feet or less. The reinforcing shall consist with No. 3 bars spaced 24 inches on centers, both ways. Concrete pavement should be underlain by a minimum 4 inches of base course. The concrete should have a 28-day concrete strength of at least 2500 psi.

To reduce the potential of unsightly cracking concrete pavement for sidewalk and hardscape should be at least 4 inches thick and provided with saw cuts or expansion joints every 6 feet or less.

Subgrade soils should e overexcavated, scarified and compacted to at least 90% + of laboratory maximum dry density as recommended in the previous section of rough grading. Base course should be compacted to at least 95% + of laboratory maximum dry.

PLAN REVIEW

Subsequent to formulation of final development plans and specifications but prior to construction, grading and foundation plans should be reviewed by Geo Environ to verify compatibility with site geotechnical conditions and conformance with recommendations contained herein.

CONSTRUCTION OBSERVATIONS

All rough grading of the property shall be performed under engineering observation of Geo Environ.

Geo Environ shall observe all rough grading, foundation excavations, utility trenches backfill subgrade, and base compaction. Observations should be made prior to installation of concrete forms and reinforcing steel in order to verify or modify, if necessary, conclusions and recommendations in this report.

CLOSURE& LIMITATIONS

The findings, conclusions, and recommendations presented reflect our best estimate of subsurface conditions based on the data obtained from a limited subsurface exploration performed during the field study. The conclusions and recommendations are based on generally accepted geotechnical engineering principles and practices. No further warranties are implied nor made.

Due to the possible variability of soil and subsurface conditions within the site, conditions may be encountered during grading and development that may differ from those presented herein. Should any variation or unusual condition become apparent during grading and development, this office should be contacted to evaluate these conditions prior to continuation of work and necessary_revisions to the recommendations.

This office should be notified if changes of ownership occur or if the final plans for the site development indicate structures areas, type of structures, or structural loading conditions differing from those presented in this report.

If the site is not developed or grading does not begin within 12 months following the date of this report, further studies may be required to ensure that the surface or subsurface conditions have not changed.

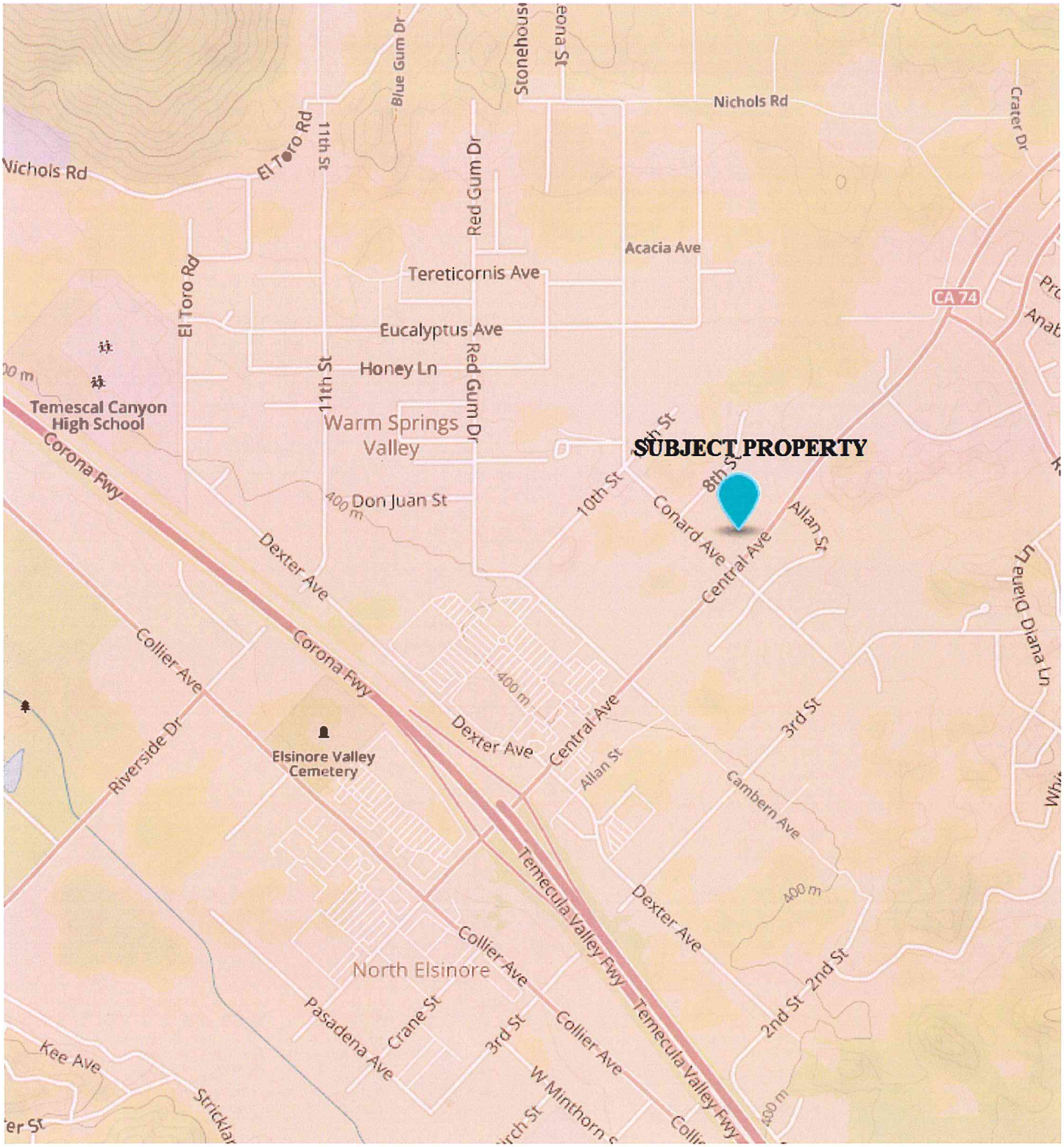
Any charges for necessary review or updates will be at the prevailing rate at the time the review work is performed.

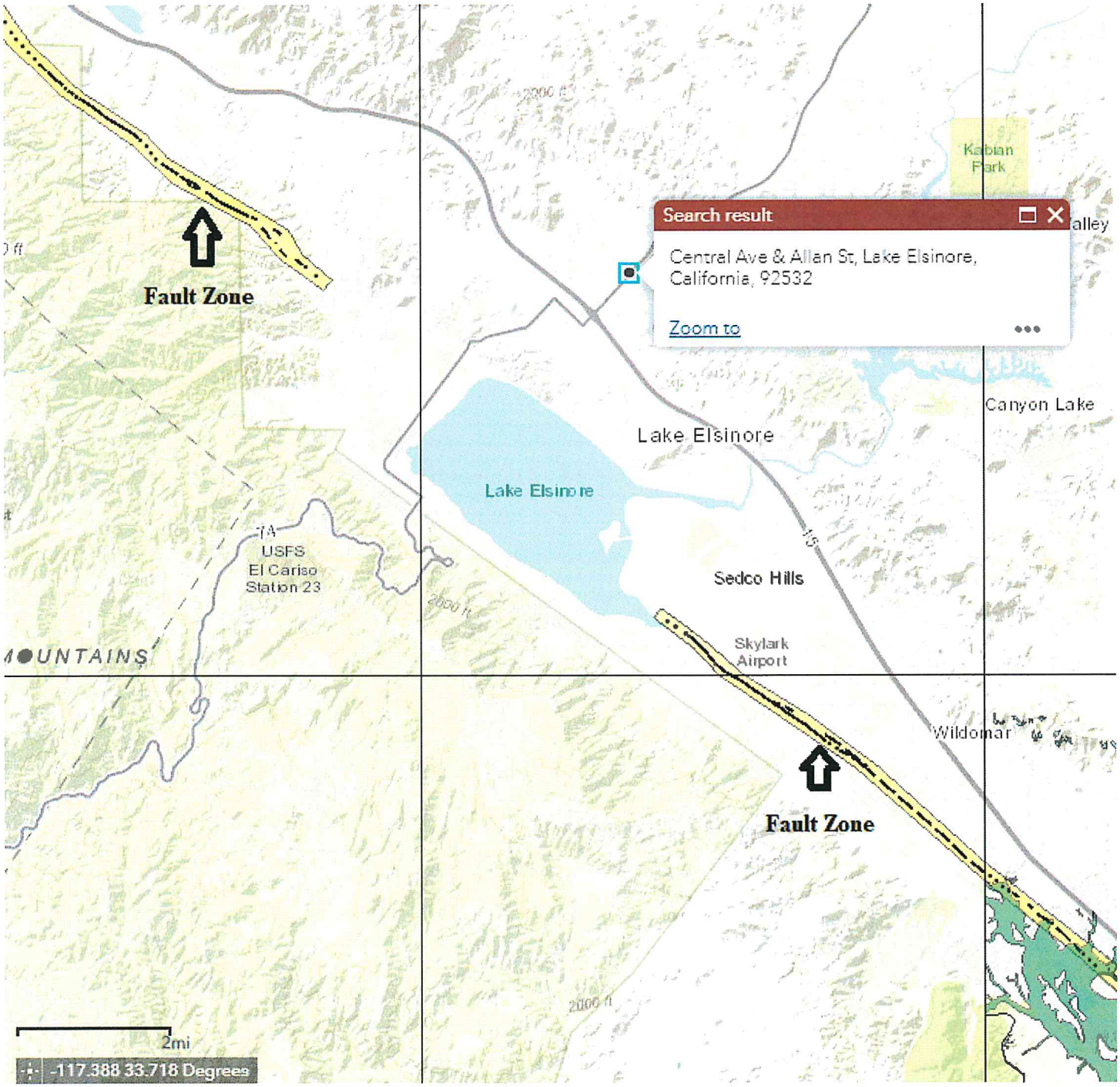
TECHNICAL REFERENCES

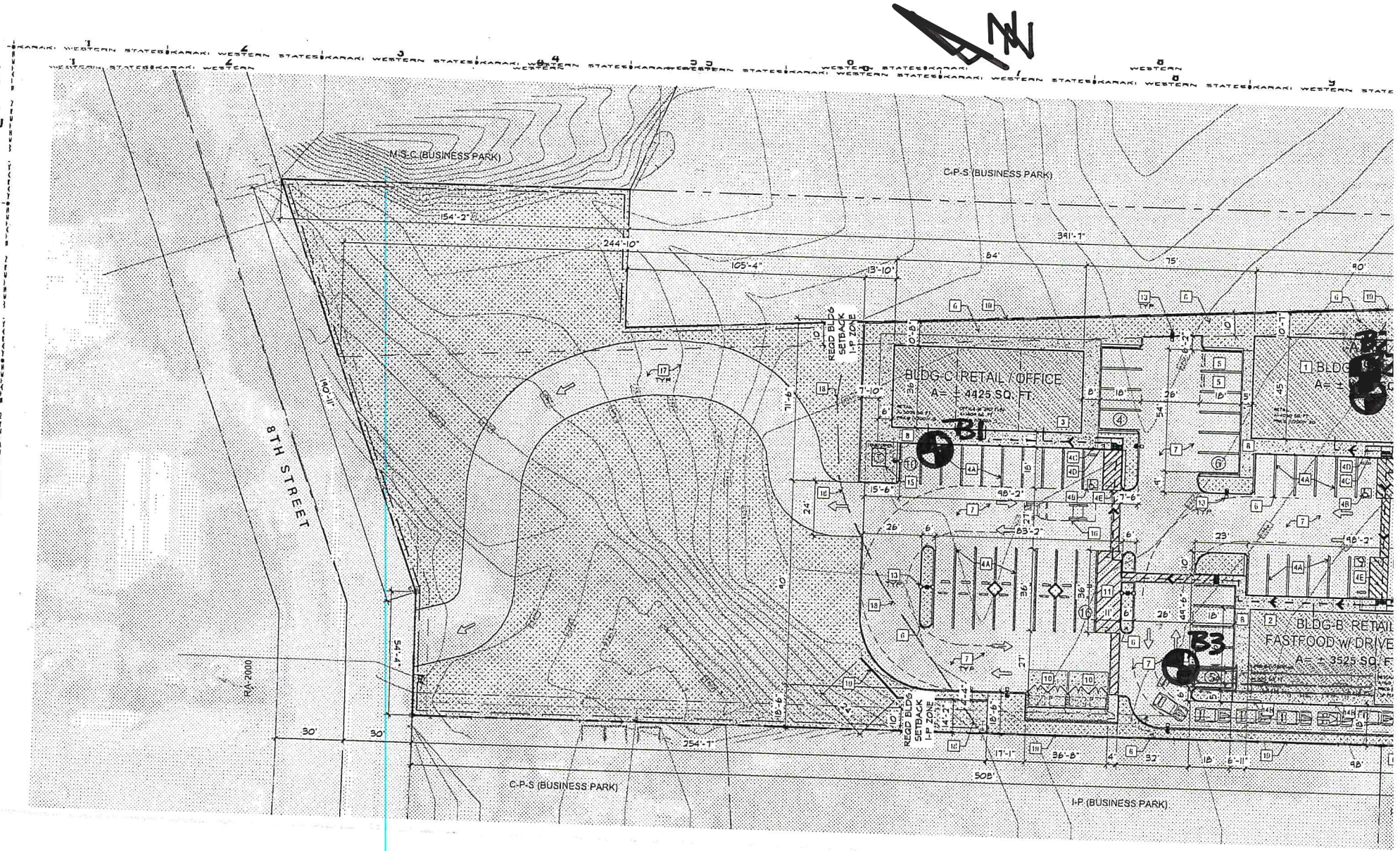
1. California Building Code 2019 foundation design parameters
2. County of Riverside Building and Grading Code
3. USGS, Ground Acceleration from Earthquakes
4. USGS, Seismic Design Values for Buildings
5. California Division of Mines and Geology (CDMG), Seismic Hazard & Liquefaction Evaluation
6. Geotracker- Historic Groundwater Data

APPENDIX A

DRAWINGS


SUBJECT PROPERTY
Nichols Rd
El Toro Rd
11th St
Blue Gum Dr
Red Gum Dr
Stonehouse
Crater Dr
Acacia Ave
Tereticornis Ave
Eucalyptus Ave
Honey Ln
CA 74
Temescal Canyon High School
Warm Springs Valley
Corona Fwy
Don Juan St
400 m
10th St
8th St
Conard Ave
Central Ave
Allan St
Dexter Ave
Collier Ave
Riverside Dr
Elsinore Valley Cemetery
3rd St
Cambern Ave
Temecula Valley Fwy
North Elsinore
Pasadena Ave
Crane St
2nd St
W Minthorn St
Kee Ave
Diana Ln


Fault Zone
Search result
Central Ave & Allan St, Lake Elsinore, California, 92532
Zoom to
Kabian Park
Canyon Lake
Lake Elsinore
Lake Elsinore
74
USFS
El Cariso
Station 23
Sedco Hills
Skylark Airport
Wildomar
Fault Zone
2000 ft
2mi
-117.388 33.718 Degrees



B1

Soil Borings

GEO-ENVIRON
GEOTECHNICAL & ENVIRONMENTAL ENG. CONSULTANTS, INC.
4071 E. La Palma Ave., Ste B
Anaheim, CA 92807

APPENDIX B

BORING LOGS

Project:	Project Number:	Client:	Boring No.
Commercial Retail	**20-1041P**	Westerm States	**B-1**
Address, City, State	**NWC Central & Allan St Lake Elsinore California**	Drilling Contractor: Geo Environ	Drill Rig Type: **HSA**
Logged By: **Fahad Masud**	Started: **12:00 PM** (4/26/2020)	Bit Type: **N/A**	Diameter: **2 feet**
Drill Crew: **N/A**	Completed: **4:00 PM**	Hammer Type: **Slide Hammer**	
USA Ticket Number: **N/A**	Backfilled:	Hammer Weight: **34 lb**	Hammer Drop: **24 inches**
	Groundwater Depth: **37 feet**	Elevation:	Total Depth of Boring: **50**

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log		Dry Density (pcf)	Moisture Content (%)
2			21		Brownish orange, **sandy silt**, slightly moist, w/ fine-med sand, dense	90.1	5.8
5			30		Brownish orange, **sandy silt**, moist, w/ fine-coarse sand and gravel, dense	110.1	7.4
10			45		Brownish red, **sandy silt**, moist, w/ fine-coarse sand and gravel, medium dense	118.2	8.2
15			28			109.5	9.1
20			41			115.2	10.1
25			48			119.2	9.8
30			33		Greenish-brown, **sandy silt**, moist, w/ fine-and coarse gravel, medium dense	113.3	14.1
35			26		Greenish-brown, **sandy silt**, wet, w/ coarse sand and gravel, very dense	107.6	16.2
40			50/6"			120.1	21.2
45			50/6"			122.4	20.1
50			50/6"			121.3	20.8

Geo Environ Engineering, Inc. Boring Log: Sheet 1 of 2

Standard Penetration Slit Spoon Sampler (SPT)
California Sampler
Shelby Tube
CPP Sampler
Bulk/ Bag Sample
Stabllized Ground water
Groundwater At time of Drilling

Project: **Commercial Retail**	Project Number: **20-1041P**	Client: Westerm States	Boring No. **B-2**
Address, City, State **NWC Central & Allan St Lake Elsinore California**		Drilling Contractor: Geo Environ	Drill Rig Type: **HSA**
Logged By: **Fahad Masud**	Started: **12:00 PM**	Bit Type: **N/A**	Diameter: **2 feet**
Drill Crew: **N/A**	Completed: **4:00 PM**	Hammer Type: **Slide Hammer**	
USA Ticket Number: **N/A**	Backfilled:	Hammer Weight: **34 lb**	Hammer Drop: **24 inches**
	Groundwater Depth:	Elevation:	Total Depth of Boring: **15**

4/26/2020

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log		Dry Density (pcf)	Moisture Content (%)
2	⊠		18		Brownish orange, **sandy silt**, slightly moist, w/ fine-med sand, dense	92.1	6.1
5	⊠		27		**Reddish-brown, sandy silt**, moist, **w/** fine-coarse sand and gravel, dense	109.9	7.9
10	⊠		43		**Reddish Brown**, sandy silt, moist, **w/** fine-coarse sand and gravel, medium dense	117.6	8.4
15	⊠		26			110.1	9.7
20							
25							
30							
35							
40							
45							
50							

Standard Penetration Slit Spoon Sampler (SPT)
California Sampler
Shelby Tube
CPP Sampler
⊠ Bulk/ Bag Sample
Stabllized Ground water
Groundwater At time of Drilling

Project: **Commercial Retail**	Project Number: **20-1041P**	Client: **Westerm States**	Boring No. **B-3**
Address, City, State: **NWC Central & Allan St Lake Elsinore California**		Drilling Contractor: **Geo Environ**	Drill Rig Type: **HSA**
Logged By: **Fahad Masud**	Started: **12:00 PM** (4/26/2020)	Bit Type: **N/A**	Diameter: **2 feet**
Drill Crew: **N/A**	Completed: **4:00 PM**	Hammer Type: **Slide Hammer**	
USA Ticket Number: **N/A**	Backfilled:	Hammer Weight: **34 lb**	Hammer Drop: **24 inches**
	Groundwater Depth:	Elevation:	Total Depth of Boring: **15**

Depth (feet)	Sample Type	Sample Number	Blow Counts (blows/foot)	Graphic Log		Dry Density (pcf)	Moisture Content (%)
2	☒		18		Brownish orange, **sandy silt**, slightly moist, w/ fine-med sand, dense	94.1	6.4
5	☒		27		Reddish-brown, **sandy silt**, moist, w/ fine-coarse sand and gravel, dense	111.9	7.3
10	☒		43		Reddish Brown, sandy silt, moist, w/ fine-coarse sand and gravel, medium dense	119.1	8.6
15	☒		26			111.4	8.9
20							
25							
30							
35							
40							
45							
50							

Standard Penetration Slit Spoon Sampler (SPT)
California Sampler
Shelby Tube
CPP Sampler
Bulk/ Bag Sample
Stabllized Ground water
Groundwater At time of Drilling

APPENDIX C

LABORATORY TEST RESULTS

EXPANSION CHARACTERISTICS
(ASTM D-2435)

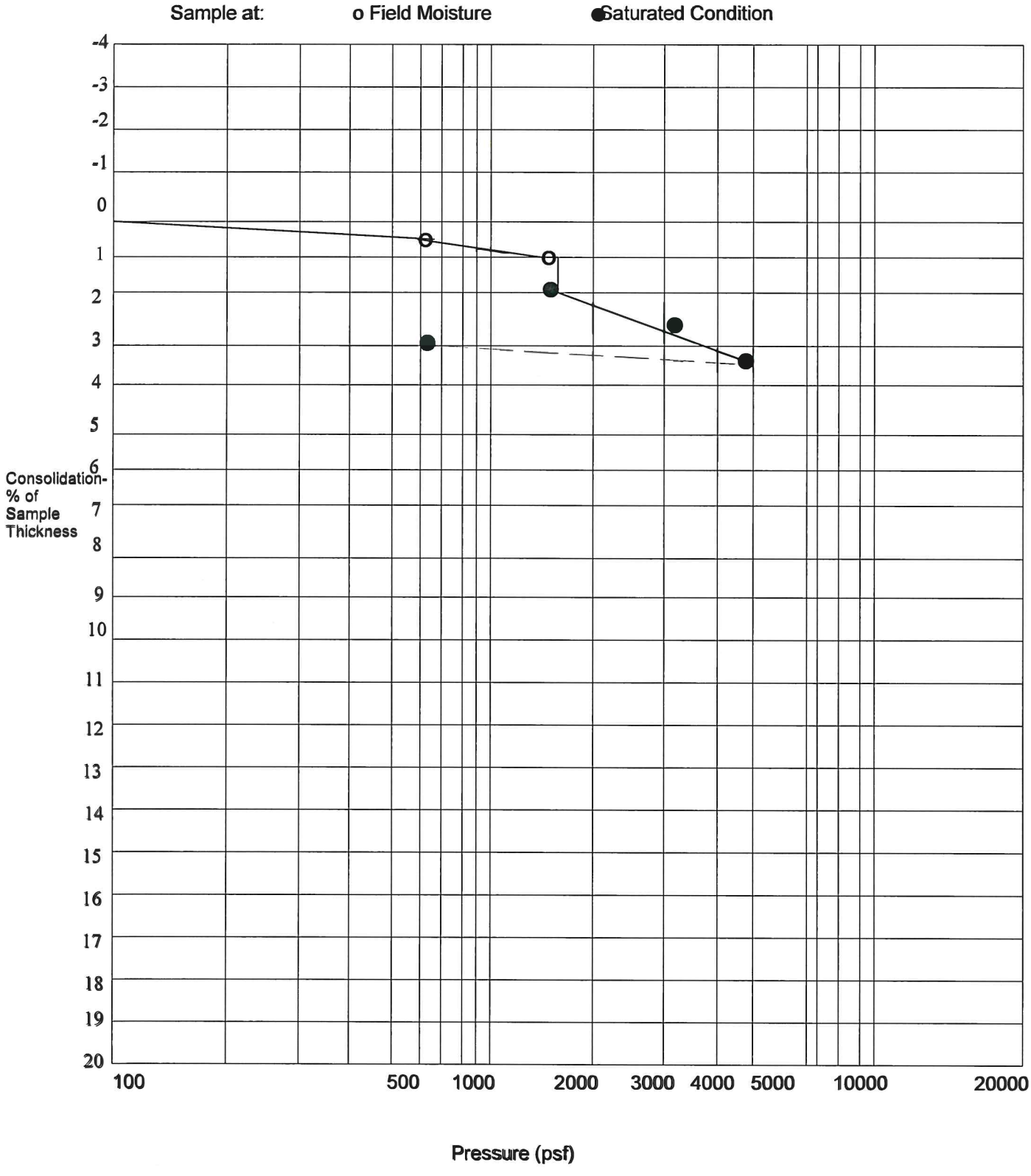
0-21	Very Low
21-50	Low
51-90	Medium
91-130	High
131+	Very High

Sample	Soil Type	Expansion Index	Expansion Classification
B1 @ 0-5'	Fine Sandy Silt	12	Low

MAXIMUM DRY DENSITY
(ASTM D1557)

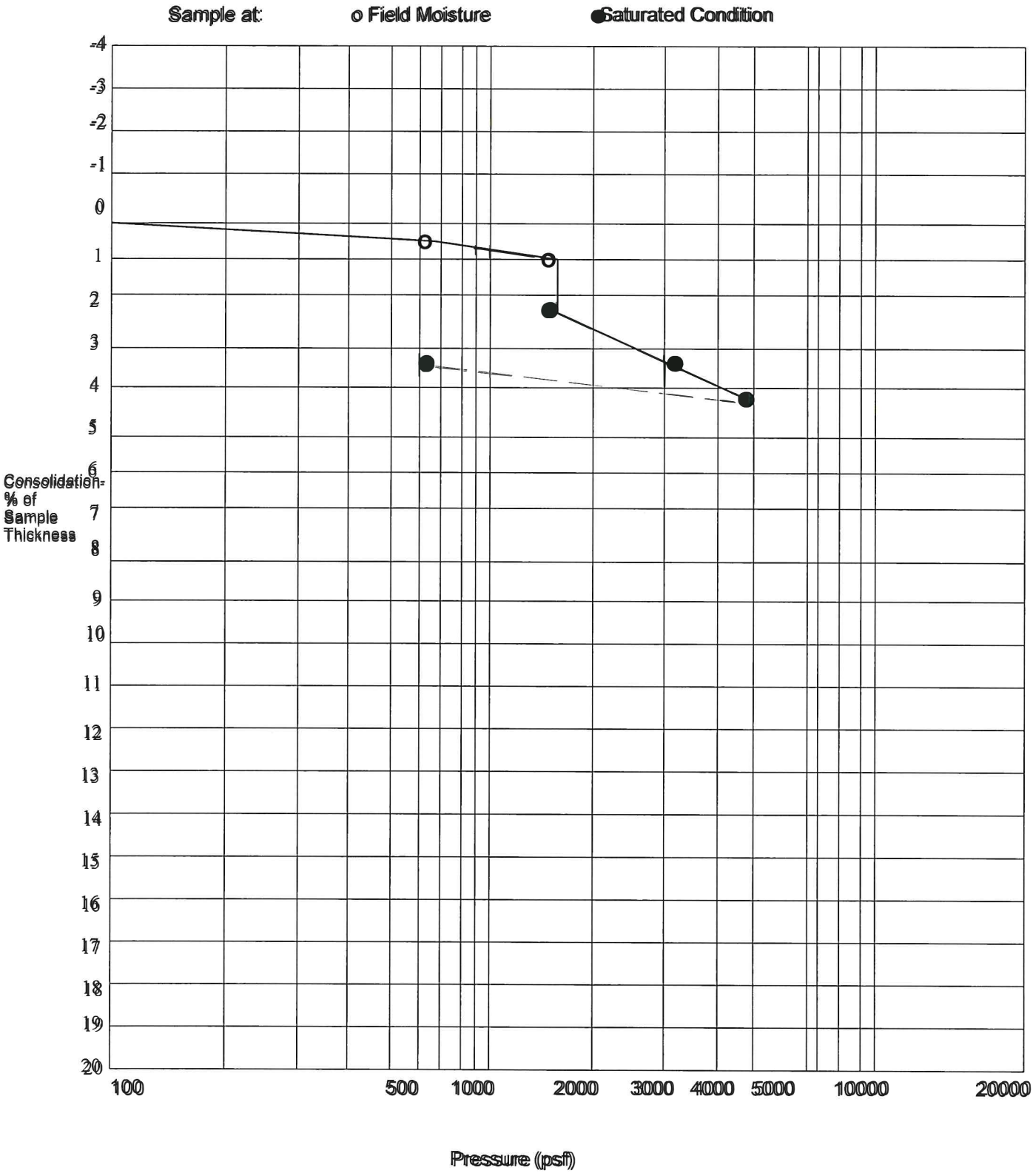
Sample		Max. Density (pcf)	Opt. Mois.(%)
B1 @ 0-5'	Fine Sandy Silt	126.0	12.5

CONSOLIDATION CURVE: ASTM D-2435
PROJECT NO: 20-1041P
CLIENT: WS Eng.
JOB ADDRESS: N.W.C Central Ave & Allan St, Lake Elsinore
SAMPLE ID: B-1 @ 5.0 ft.
SOIL CLASS: SM-ML
TECH: F.M.
DATE: 6/15/20



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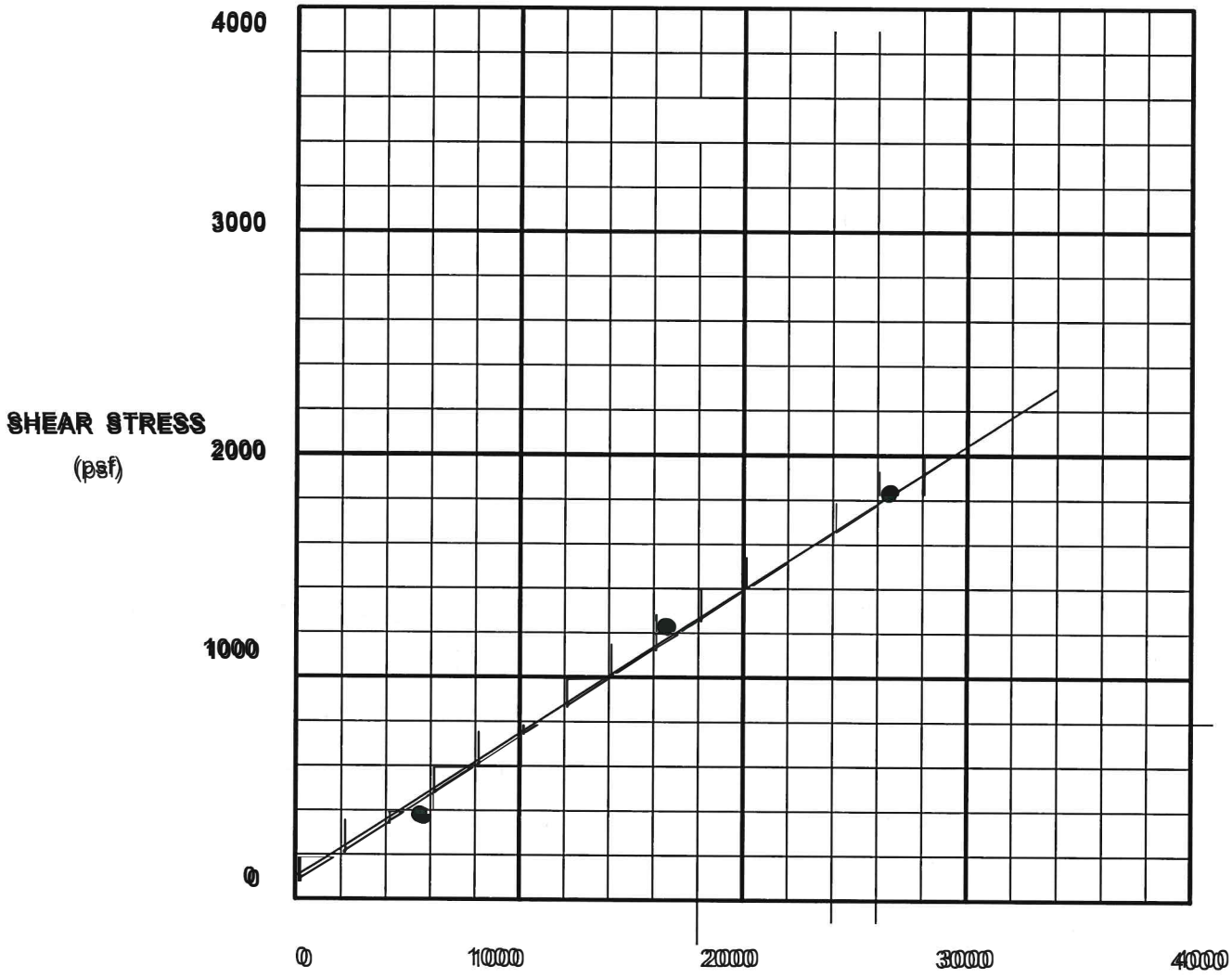
CONSOLIDATION CURVE: ASTM D-2435
PROJECT NO: 20-1041P
CLIENT: WS Eng.
JOB ADDRESS: N.W.C Central Ave & Allan St, Lake Elsinore
SAMPLE ID: B-3 @ 5.0 ft.
SOIL CLASS: SM-ML
TECH: F.M.
DATE: 6/16/20



GEO ENVIRON

DIRECT SHEAR TEST

DATE: 7/16/20
JOB NO: 20-1041P
CLIENT: WS Eng.
JOB ADDRESS: NWC Central Ave & Allan St, Lake Elsinore
SAMPLE ID: B-1 @ 5 '
SOIL CLASS: Fine Sandy Silt
MOIS. CONTENT: 10.5%
DRY DENSITY: 110.0
Sample Type: Un-disturbed
STRAIN RATE: 0.002 in/min
SHEAR STRENGTH: Ultimate
ANGLE OF FRICTION : 31 deg.
COHESION (psf): 100



GEO ENVIRON

APPENDIX D

LIQUEFACTION ANALYSIS

GEOLOGISMIKI
Geotechnical Software

SPT BASED LIQUEFACTION ANALYSIS REPORT

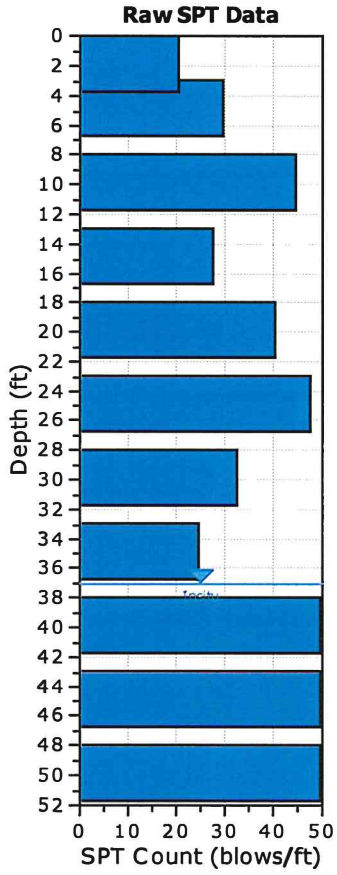
Project title : Edwin Bray (Job No. 20-1027)

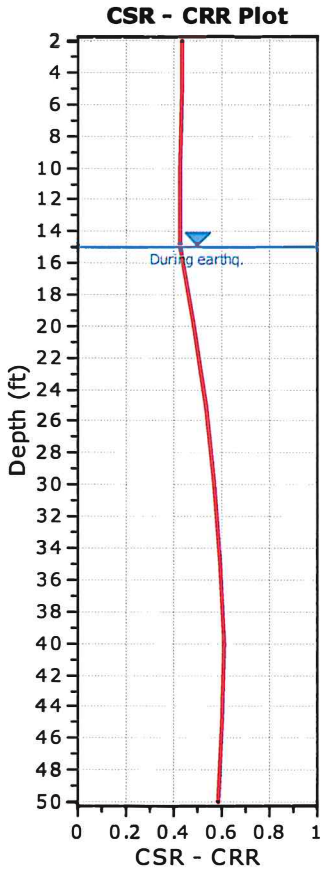
SPT Name: SPT #1

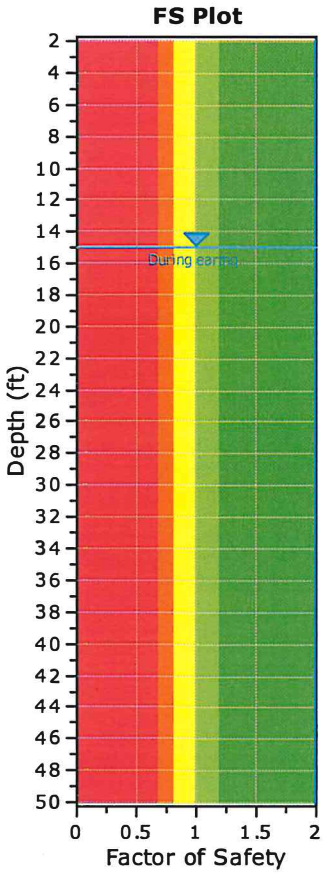
Location : 10626 Felson St, Bellflower

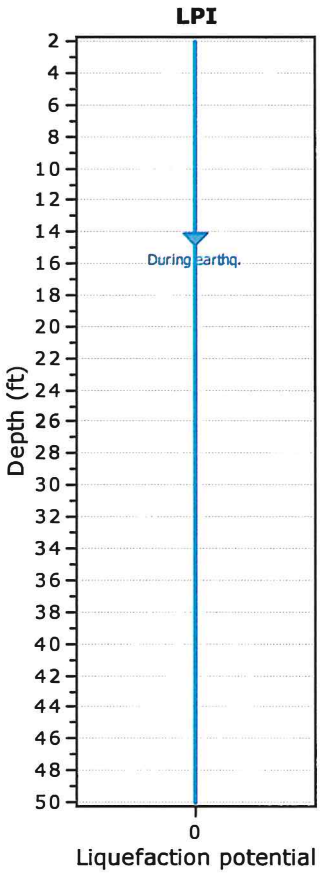
:: Input parameters and analysis properties ::

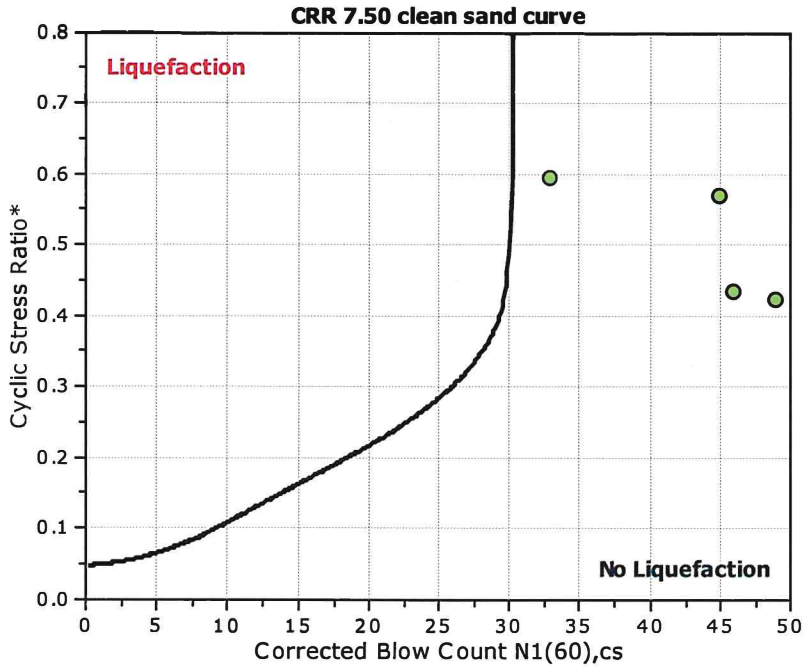
Analysis method:	NCEER 1998	G.W.T. (in-situ):	37.00 ft
Fines correction method:	NCEER 1998	G.W.T. (earthq.):	15.00 ft
Sampling method:	Standard Sampler	Earthquake magnitude M_w:	6.80
Borehole diameter:	150mm	Peak ground acceleration:	0.86 g
Rod length:	5.00 ft	Eq. external load:	0.00 tsf
Hammer energy ratio:	1.20		











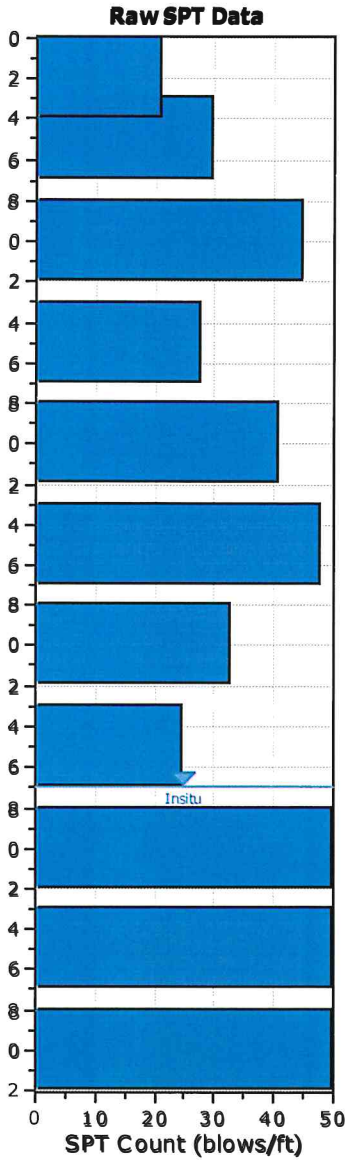
F.S. color scheme

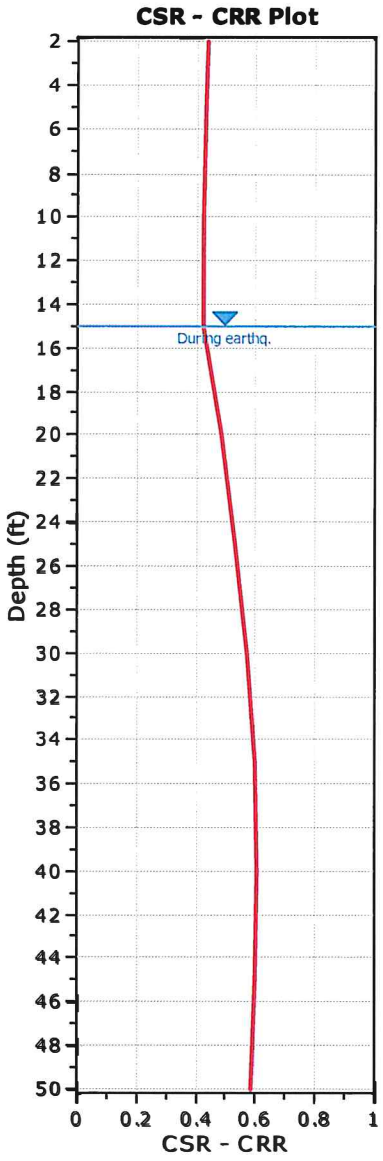
- Almost certain it will liquefy
- Very likely to liquefy
- Liquefaction and no liq. are equally likely
- Unlike to liquefy
- Almost certain it will not liquefy

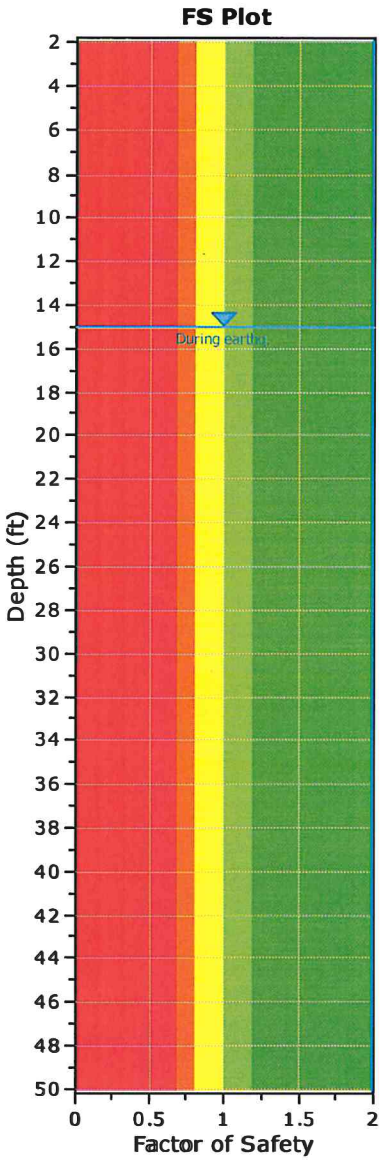
LPI color scheme

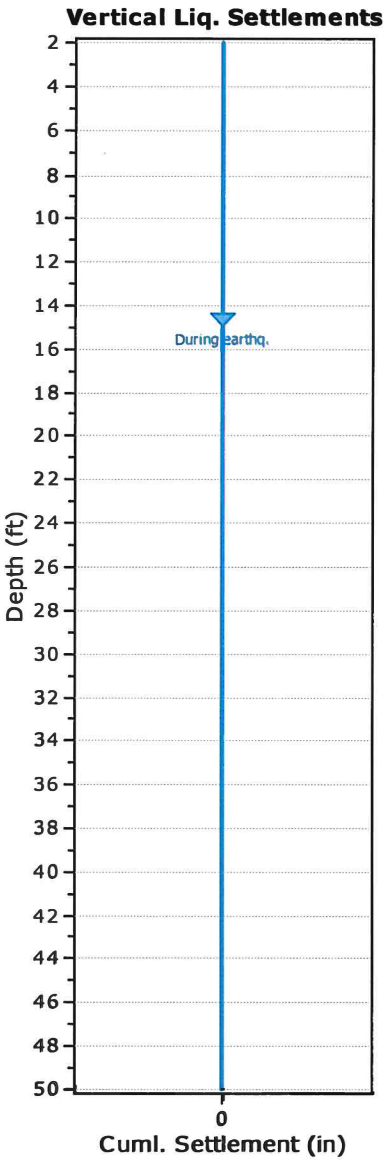
- Very high risk
- High risk
- Low risk

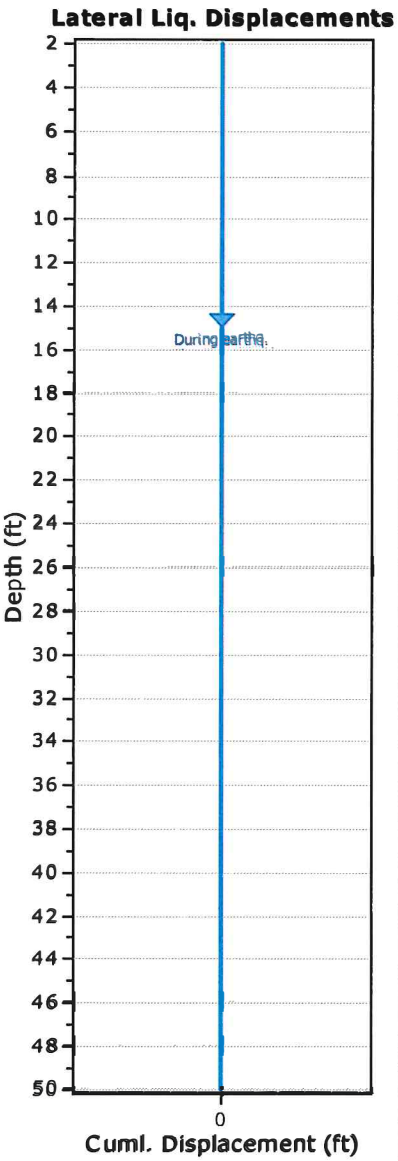
verall Liquefaction Assessment Analysis Plots ::











:: Field input data ::

Test Depth (ft)	SPT Field Value (blows)	Fines Content (%)	Unit Weight (pcf)	Infl. Thickness (ft)	Can Liquefy
2.00	21	52.00	90.10	5.00	Yes
5.00	30	52.00	110.10	5.00	Yes
10.00	45	52.00	118.20	5.00	Yes
15.00	28	52.00	109.50	5.00	Yes
20.00	41	52.00	115.20	5.00	Yes
25.00	48	52.00	119.20	5.00	Yes
30.00	33	52.00	113.30	5.00	Yes
35.00	25	51.00	107.50	5.00	Yes
40.00	50	55.00	120.10	5.00	Yes
45.00	50	55.00	122.40	5.00	Yes
50.00	50	55.00	121.30	5.00	Yes

Abbreviations

Depth: Depth at which test was performed (ft)
SPT Field Value: Number of blows per foot
Fines Content: Fines content at test depth (%)
Unit Weight: Unit weight at test depth (pcf)
Infl. Thickness: Thickness of the soil layer to be considered in settlements analysis (ft)
Can Liquefy: User defined switch for excluding/including test depth from the analysis procedure

:: Cyclic Resistance Ratio (CRR) calculation data ::

Depth (ft)	SPT Field Value	Unit Weight (pcf)	σ_v (tsf)	u_o (tsf)	σ'_{vo} (tsf)	C_N	C_E	C_B	C_R	C_S	$(N_1)_{60}$	Fines Content (%)	α	β	$(N_1)_{60cs}$	$CRR_{7.5}$
2.00	21	90.10	0.09	0.00	0.09	1.70	1.20	1.05	0.75	1.00	34	52.00	5.00	1.20	46	4.000
5.00	30	110.10	0.26	0.00	0.26	1.53	1.20	1.05	0.75	1.00	43	52.00	5.00	1.20	57	4.000
10.00	45	118.20	0.55	0.00	0.55	1.28	1.20	1.05	0.85	1.00	62	52.00	5.00	1.20	79	4.000
15.00	28	109.50	0.82	0.00	0.82	1.11	1.20	1.05	0.95	1.00	37	52.00	5.00	1.20	49	4.000
20.00	41	115.20	1.11	0.00	1.11	0.98	1.20	1.05	0.95	1.00	48	52.00	5.00	1.20	63	4.000
25.00	48	119.20	1.41	0.00	1.41	0.87	1.20	1.05	0.95	1.00	50	52.00	5.00	1.20	65	4.000
30.00	33	113.30	1.69	0.00	1.69	0.79	1.20	1.05	1.00	1.00	33	52.00	5.00	1.20	45	4.000
35.00	25	107.50	1.96	0.00	1.96	0.72	1.20	1.05	1.00	1.00	23	51.00	5.00	1.20	33	4.000
40.00	50	120.10	2.26	0.09	2.17	0.68	1.20	1.05	1.00	1.00	43	55.00	5.00	1.20	57	4.000
45.00	50	122.40	2.57	0.25	2.32	0.65	1.20	1.05	1.00	1.00	41	55.00	5.00	1.20	54	4.000
50.00	50	121.30	2.87	0.41	2.47	0.62	1.20	1.05	1.00	1.00	39	55.00	5.00	1.20	52	4.000

Abbreviations

σ_v: Total stress during SPT test (tsf)
u_o: Water pore pressure during SPT test (tsf)
σ'_{vo}: Effective overburden pressure during SPT test (tsf)
C_N: Overburden corretion factor
C_E: Energy correction factor
C_B: Borehole diameter correction factor
C_R: Rod length correction factor
C_S: Liner correction factor
$N_{1(60)}$: Corrected N_{SPT} to a 60% energy ratio
α, β: Clean sand equivalent clean sand formula coefficients
$N_{1(60)cs}$: Corected $N_{1(60)}$ value for fines content
$CRR_{7.5}$: Cyclic resistance ratio for M=7.5

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS

:: Cyclic Stress Ratio calculation (CSR fully adjusted and normalized) ::

Depth (ft)	Unit Weight (pcf)	$\sigma_{v,eq}$ (tsf)	$u_{o,eq}$ (tsf)	$\sigma'_{vo,eq}$ (tsf)	r_d	α	CSR	MSF	$CSR_{eq,M=7.5}$	K_{sigma}	CSR^*	FS	
2.00	90.10	0.09	0.00	0.09	1.00	1.00	0.558	1.28	0.434	1.00	0.434	2.000	●
5.00	110.10	0.26	0.00	0.26	0.99	1.00	0.554	1.28	0.431	1.00	0.431	2.000	●
10.00	118.20	0.55	0.00	0.55	0.98	1.00	0.547	1.28	0.426	1.00	0.426	2.000	●
15.00	109.50	0.82	0.00	0.82	0.97	1.00	0.541	1.28	0.421	1.00	0.421	2.000	●
20.00	115.20	1.11	0.16	0.96	0.96	1.00	0.622	1.28	0.484	1.00	0.484	2.000	●
25.00	119.20	1.41	0.31	1.10	0.94	1.00	0.676	1.28	0.526	0.99	0.530	2.000	●
30.00	113.30	1.69	0.47	1.23	0.92	1.00	0.711	1.28	0.554	0.97	0.570	2.000	●
35.00	107.50	1.96	0.62	1.34	0.89	1.00	0.730	1.28	0.568	0.95	0.596	2.000	●
40.00	120.10	2.26	0.78	1.48	0.85	1.00	0.726	1.28	0.565	0.93	0.605	2.000	●
45.00	122.40	2.57	0.94	1.63	0.80	1.00	0.707	1.28	0.550	0.92	0.600	2.000	●
50.00	121.30	2.87	1.09	1.78	0.75	1.00	0.679	1.28	0.529	0.90	0.587	2.000	●

Abbreviations

$\sigma_{v,eq}$: Total overburden pressure at test point, during earthquake (tsf)
$u_{o,eq}$: Water pressure at test point, during earthquake (tsf)
$\sigma'_{vo,eq}$: Effective overburden pressure, during earthquake (tsf)
r_d : Nonlinear shear mass factor
α: Improvement factor due to stone columns
CSR : Cyclic Stress Ratio (adjusted for improvement)
MSF : Magnitude Scaling Factor
$CSR_{eq,M=7.5}$: CSR adjusted for M=7.5
K_{sigma}: Effective overburden stress factor
CSR^*: CSR fully adjusted (user FS applied)***
FS: Calculated factor of safety against soil liquefaction

*** User FS: 1.00

:: Liquefaction potential according to Iwasaki ::

Depth (ft)	FS	F	wz	Thickness (ft)	I_L
2.00	2.000	0.00	9.70	3.00	0.00
5.00	2.000	0.00	9.24	3.00	0.00
10.00	2.000	0.00	8.48	5.00	0.00
15.00	2.000	0.00	7.71	5.00	0.00
20.00	2.000	0.00	6.95	5.00	0.00
25.00	2.000	0.00	6.19	5.00	0.00
30.00	2.000	0.00	5.43	5.00	0.00
35.00	2.000	0.00	4.67	5.00	0.00
40.00	2.000	0.00	3.90	5.00	0.00
45.00	2.000	0.00	3.14	5.00	0.00
50.00	2.000	0.00	2.38	5.00	0.00

Overall potential I_L : 0.00

I_L = 0.00 - No liquefaction
I_L between 0.00 and 5 - Liquefaction not probable
I_L between 5 and 15 - Liquefaction probable
I_L > 15 - Liquefaction certain

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	α	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)

:: Vertical settlements estimation for dry sands ::

Depth (ft)	$(N_1)_{60}$	τ_{av}	p	G_{max} (tsf)	a	b	γ	ε_{15}	N_c	ε_{Nc} (%)	Δh (ft)	ΔS (in)
5.00	43	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000
10.00	62	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	5.00	0.000

Cumulative settlemetns: 0.000

Abbreviations

τ_{av}: Average cyclic shear stress
p: Average stress
G_{max}: Maximum shear modulus (tsf)
a, b: Shear strain formula variables
γ: Average shear strain
ε_{15}: Volumetric strain after 15 cycles
N_c: Number of cycles
ε_{Nc}: Volumetric strain for number of cycles N_c (%)
Δh: Thickness of soil layer (in)
ΔS: Settlement of soil layer (in)

:: Vertical settlements estimation for saturated sands ::

Depth (ft)	D_{50} (in)	q_c/N	e_v (%)	Δh (ft)	s (in)
15.00	1.00	7.99	0.00	5.00	0.000
20.00	1.00	7.99	0.00	5.00	0.000
25.00	1.00	7.99	0.00	5.00	0.000
30.00	1.00	7.99	0.00	5.00	0.000
35.00	1.00	7.99	0.00	5.00	0.000
40.00	1.00	7.99	0.00	5.00	0.000
45.00	1.00	7.99	0.00	5.00	0.000
50.00	1.00	7.99	0.00	5.00	0.000

Cumulative settlements: 0.000

Abbreviations

D_{50}: Median grain size (in)
q_c/N: Ratio of cone resistance to SPT
e_v: Post liquefaction volumetric strain (%)
Δh: Thickness of soil layer to be considered (ft)
s: Estimated settlement (in)

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)
2.00	34	81.63	0.00	5.00	0.000	0.00
5.00	43	100.00	0.00	5.00	0.000	0.00
10.00	62	100.00	0.00	5.00	0.000	0.00
15.00	37	85.16	0.00	5.00	0.000	0.00
20.00	48	100.00	0.00	5.00	0.000	0.00
25.00	50	100.00	0.00	5.00	0.000	0.00
30.00	33	80.42	0.00	5.00	0.000	0.00
35.00	23	67.14	0.00	5.00	0.000	0.00
40.00	43	100.00	0.00	5.00	0.000	0.00
45.00	41	89.64	0.00	5.00	0.000	0.00
50.00	39	87.43	0.00	5.00	0.000	0.00

:: Lateral displacements estimation for saturated sands ::

Depth (ft)	$(N_1)_{60}$	D_r (%)	γ_{max} (%)	d_z (ft)	LDI	LD (ft)

Cumulative lateral displacements: 0.00

Abbreviations

D_r: Relative density (%)
γ_{max}: Maximum amplitude of cyclic shear strain (%)
d_z: Soil layer thickness (ft)
LDI: Lateral displacement index (ft)
LD: Actual estimated displacement (ft)

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Appendix 4: Historical Site Conditions

Phase I Environmental Site Assessment or Other Information on Past Site Use

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name	Western States Engineering	Date	3/7/2023
Designed by	RR	Case No	
Company Project Number/Name	Central Avenue Commercial Retails		

BMP Identification

BMP NAME / ID: Underground Chamber

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

85th Percentile, 24-hour Rainfall Depth, from the Isohyetal Map in Handbook Appendix E

D_{85}= 0.65 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
B1	*34166.44*	*Concrete or Asphalt*	*1*	*0.89*	*30476.5*			
B2	*3024*	*Roofs*	*1*	*0.89*	*2697.4*			
B3	*4050*	*Roofs*	*1*	*0.89*	*3612.6*			
B4	*3525*	*Roofs*	*1*	*0.89*	*3144.3*			
B5	*9570.94*	*Ornamental Landscaping*	*0.1*	*0.11*	*1057.2*			
B10	*178.47*	*Ornamental Landscaping*	*0.1*	*0.11*	*19.7*			
	54514.85	*Total*			*41007.7*	*0.65*	*2221.3*	*2257.3*

Notes:

CULTEC Stormwater Design Calculator

Date:	October 03, 2023

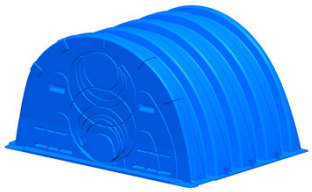
Project Information:

New Building
NWC Central Ave & Allan St.
Lake Elsinore
California
USA

Calculations Performed By:

RR

RECHARGER 902HD



Recharger 902HD Chamber Specifications		
Height	**48.0**	inches
Width	**78.0**	inches
Length	**4.10**	feet
Installed Length	**3.67**	feet
Bare Chamber Volume	**63.47**	cu. feet
Installed Chamber Volume	**99.22**	cu. feet

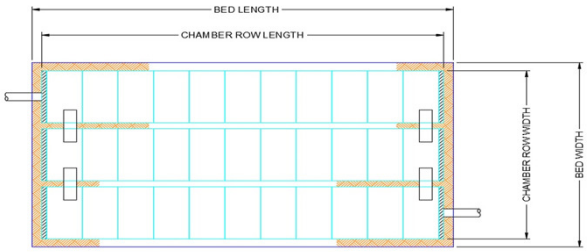
Breakdown of Storage Provided by Recharger 902HD Stormwater System		
Within Chambers	**1,274.92**	cu. feet
Within Feed Connectors	**-**	cu. feet
Within Stone	**982.39**	cu. feet
Total Storage Provided	**2,257.3**	**cu. feet**
Total Storage Required	2221.30	cu. feet

Materials List

Recharger 902HD		
Total Number of Chambers Required	**20**	**pieces**
Chamber Units	**20**	pieces
End Caps	**2**	pieces
HVLV FC-48 Feed Connectors	**0**	pieces
CULTEC No. 410 Non-Woven Geotextile	**316**	sq. yards
CULTEC No. 4800 Woven Geotextile	**17**	feet
Stone	**91**	cu. yards

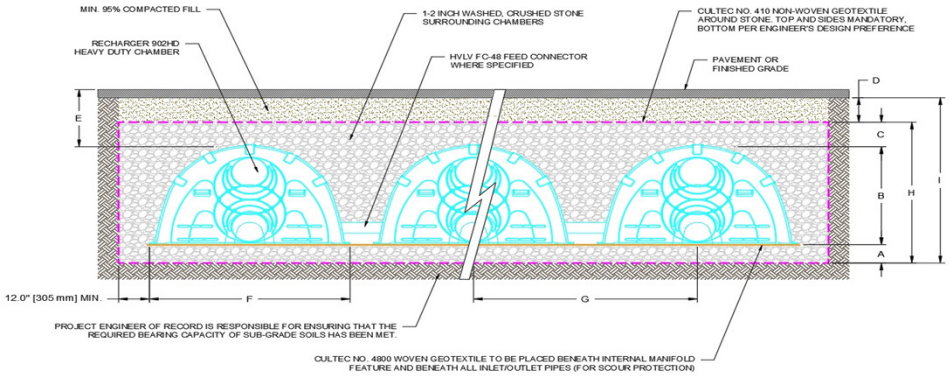
Based on 2 Internal Manifolds

Bed Detail



Bed Layout Information		
Number of Rows Wide	**1**	pieces
Number of Chambers Long	**20**	pieces
Chamber Row Width	**6.50**	feet
Chamber Row Length	**74.34**	feet
Bed Width	**8.50**	feet
Bed Length	**76.34**	feet
Bed Area Required	**648.85**	sq. feet
Length of Separator Row	**N/A**	feet

Bed detail for reference only. Not project specific. Not to scale.



Conceptual graphic only. Not job specific.

Cross Section Table Reference			
A	Depth of Stone Base	**9.0**	inches
B	Chamber Height	**48.0**	inches
C	Depth of Stone Above Units	**12.0**	inches
D	Depth of 95% Compacted Fill	**12.0**	inches
E	Max. Depth Allowed Above the Chamber	**8.33**	feet
F	Chamber Width	**78.0**	inches
G	Center to Center Spacing	**7.25**	feet
H	Effective Depth	**5.75**	feet
I	Bed Depth	**6.75**	feet

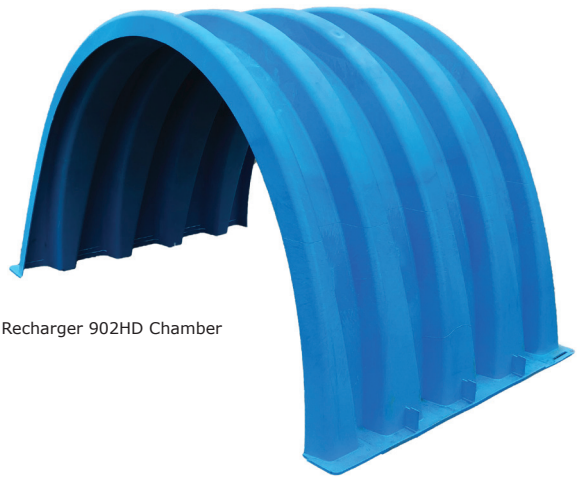
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P.O. Box 280
Brookfield, CT 06804 USA

Phone: 203-775-4416
www.cultec.com
tech@cultec.com

Created on : 10/3/2023

CULTEC RECHARGER® 902HD STORMWATER CHAMBER

The Recharger® 902HD is a 48" (1219 mm) tall, high capacity chamber. Typically when using this model, fewer chambers are required resulting in less labor and a smaller installation area. The Recharger® 902HD has the side portal internal manifold feature. HVLV® FC-48 Feed Connectors are inserted into the side portals to create the internal manifold.



Recharger 902HD Chamber



Recharger 902HD End Cap

Recharger 902HD Chamber	
Size (L x W x H)	4.25' x 78" x 48"
	1.30 m x 1981 mm x 1219 mm
Installed Length	3.67'
	1.12 m
Length Adjustment per Row - with two end caps installed	1.03'
	0.31 m
Length Adjustment per Row - when not using end caps	0.58'
	0.18 m
Chamber Storage	17.31 ft^3/ft
	1.61 m^3/m
	63.47 ft^3/unit
	1.80 m^3/unit
Min. Installed Storage	27.06 ft^3/ft
	2.53 m^3/m
	99.28 ft^3/unit
	2.81 m^3/unit
Min. Area Required	26.58 ft^2
	2.47 m^2
Chamber Weight	83.0 lbs
	37.65 kg
Shipping	15 chambers/skid
	1,370 lbs/skid
	14 skids/48' flatbed
Min. Center-to-Center Spacing	7.25'
	2.21 m
Max. Allowable Cover	8.3'
	2.53 m
Max. Allowable O.D. in Side Portal	10" HDPE, 12" PVC
	250 mm HDPE, 300 mm PVC
Compatible Feed Connector	HVLV FC-48 Feed Connector

Calculations are based on installed chamber length.
All above values are nominal.
Includes 12" (305 mm) stone above crown of chamber and typical stone surround at 7.25' (2.21 m) center-to-center spacing and stone foundation depth as listed in table.
Stone void calculated at 40%.

	Stone Foundation Depth		
	9"	12"	18"
	229 mm	305 mm	457 mm
Chamber and Stone Storage Per Chamber	99.28 ft^3	101.94 ft^3	107.26 ft^3
	2.81 m^3	2.89 m^3	3.04 m^3
Min. Effective Depth	5.75'	6.00'	6.5'
	1.75 m	1.83 m	1.98 m
Stone Required Per Chamber	3.32 yd^3	3.56 yd^3	4.05 yd^3
	2.54 m^3	2.72 m^3	3.06 m^3

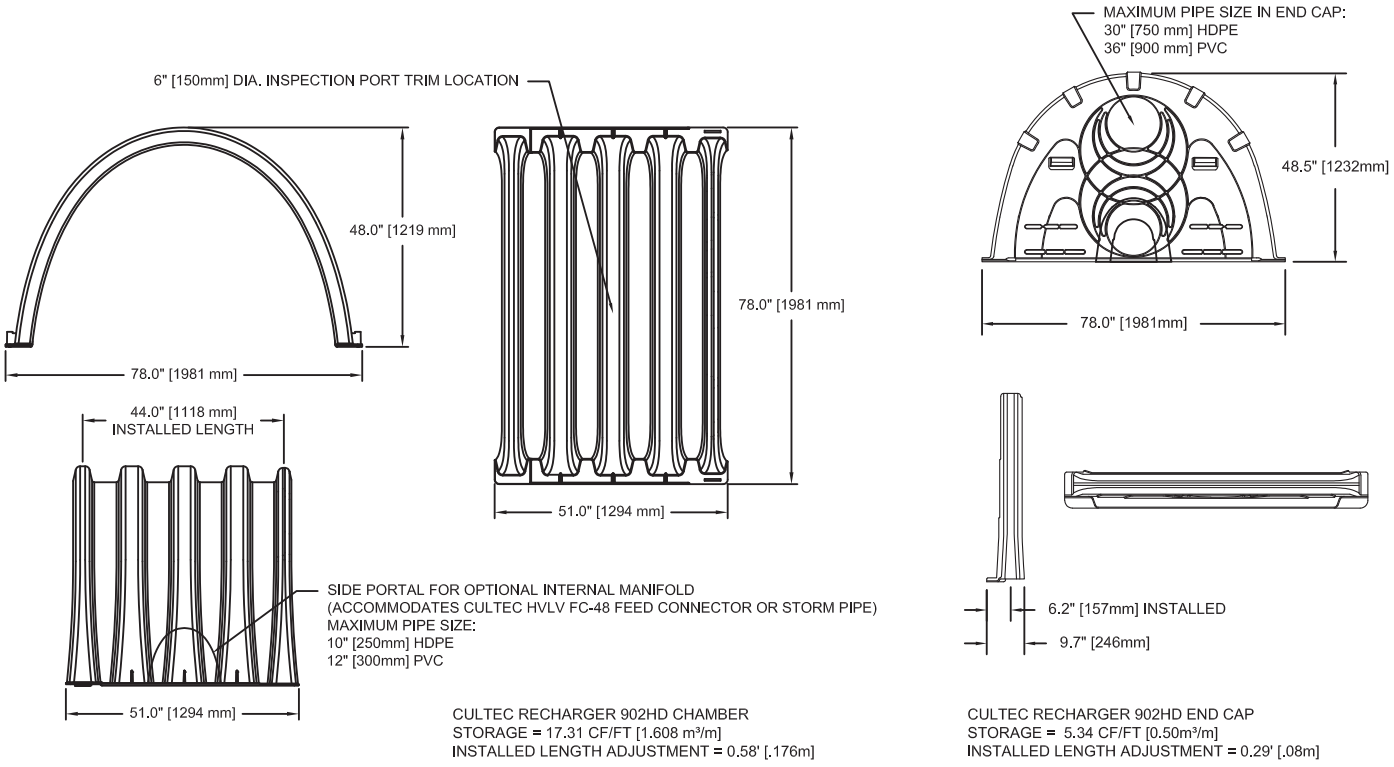
Recharger 902HD End Cap	
Size (L x W x H)	9.7" x 78" x 48.5"
	246 mm x 1982 mm x 1231 mm
Installed Length	6.2"
	157 mm
End Cap Storage	5.34 ft^3/ft
	0.50 m^3/m
	2.76 ft^3/unit
	0.08 m^3/unit
Min. Installed Storage	19.88 ft^3/ft
	1.85 m^3/m
	10.28 ft^3/unit
	0.29 m^3/unit
End Cap Weight	52.0 lbs
	23.59 kg
Shipping	7 end caps/skid
	638 lbs/skid
	14 skids/48' flatbed
Max. Inlet Opening in End Cap	30" HDPE, 36" PVC
	750 mm HDPE, 900 mm PVC

Calculations are based on installed chamber length.
All above values are nominal.
Min. installed storage includes 9" (229 mm) stone base, 12" (305 mm) stone above crown of chamber and typical stone surround at 7.25' (2.21 m) center-to-center spacing.

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

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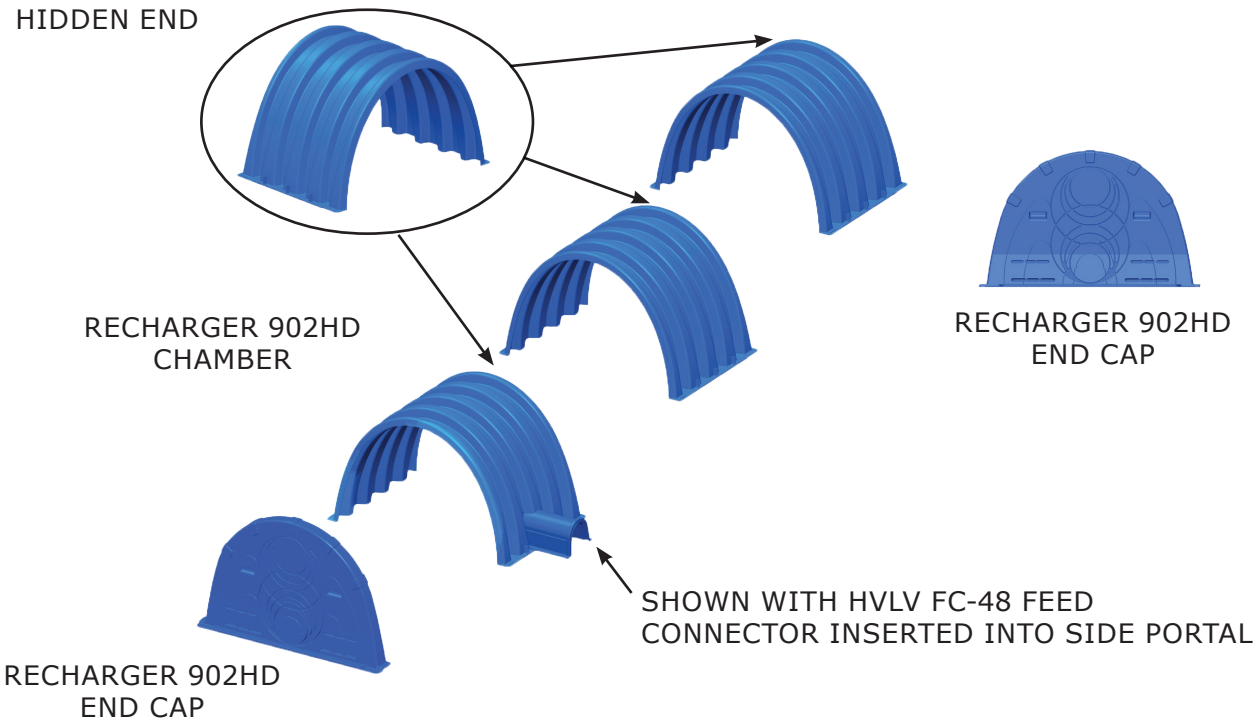
Three View Drawing



CULTEC RECHARGER 902HD CHAMBER
STORAGE = 17.31 CF/FT [1.608 m³/m]
INSTALLED LENGTH ADJUSTMENT = 0.58' [.176m]

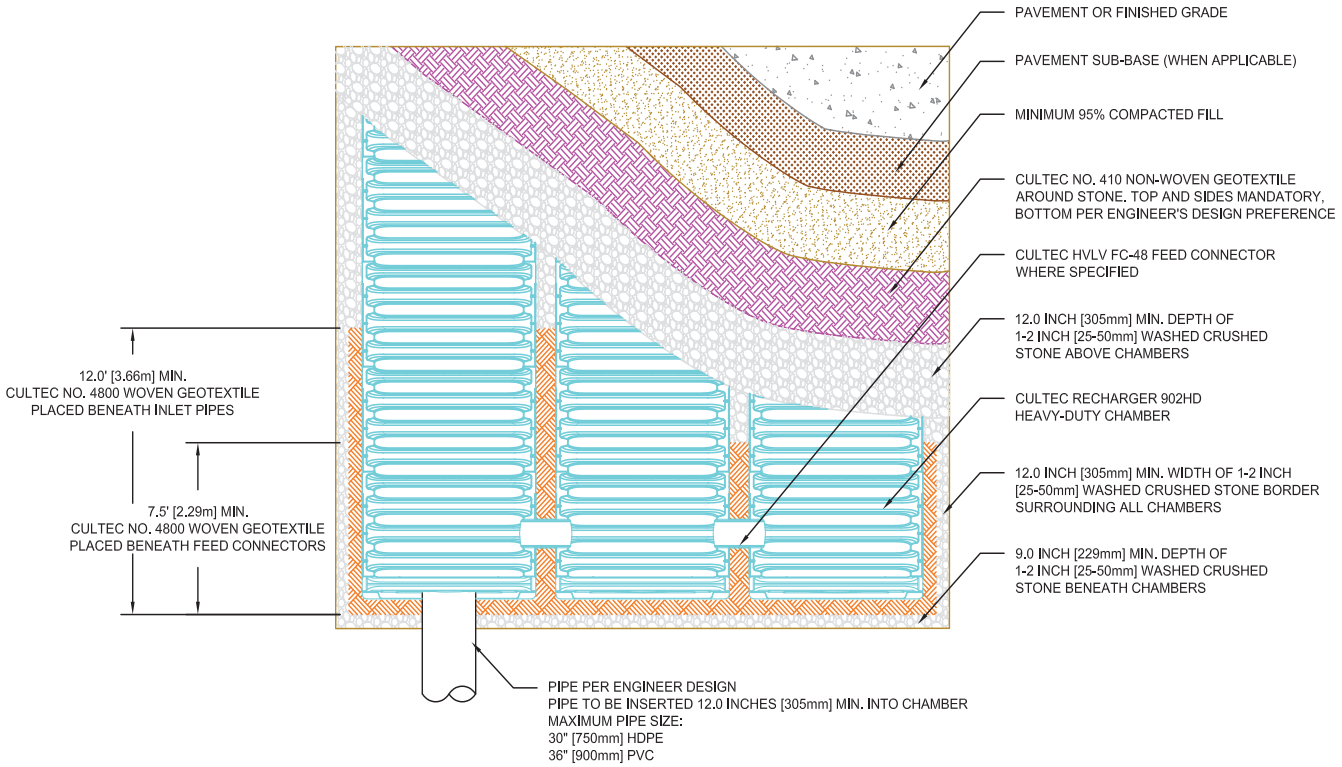
CULTEC RECHARGER 902HD END CAP
STORAGE = 5.34 CF/FT [0.50m³/m]
INSTALLED LENGTH ADJUSTMENT = 0.29' [.08m]

Typical Interlock Installation

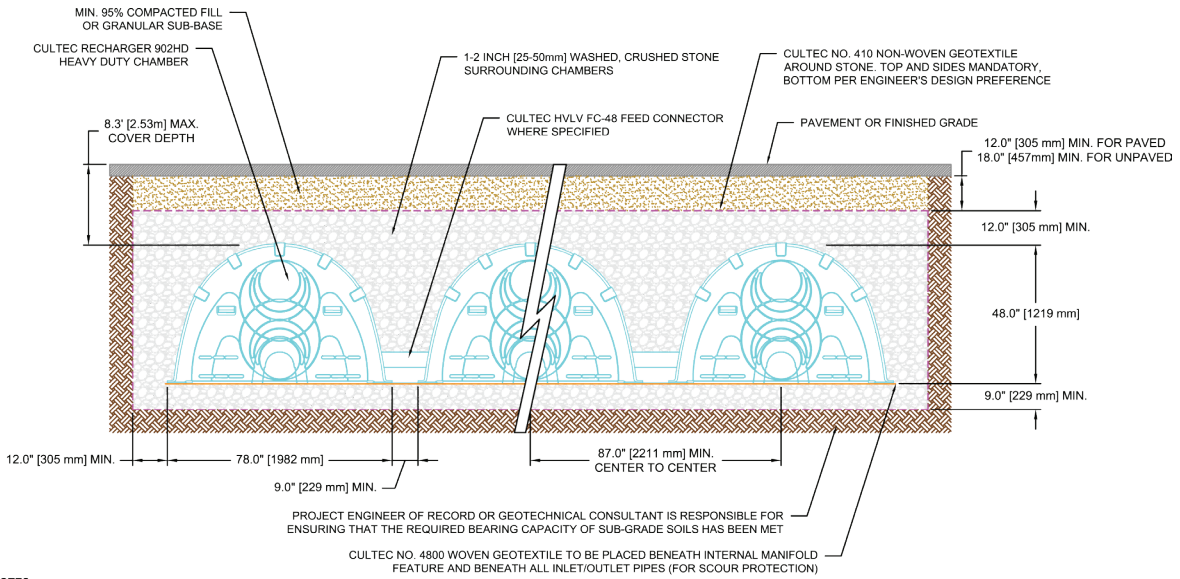


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Plan View Drawing



Typical Cross Section for Traffic Application



NOTES:

1. THE CHAMBERS SHALL BE DESIGNED AND TESTED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS." THE LOAD CONFIGURATION SHALL INCLUDE:
   - 1.a. INSTANTANEOUS AASHTO DESIGN TRUCK LIVE LOAD AT MINIMUM COVER
   - 1.b. MAXIMUM PERMANENT (50-YEAR) COVER LOAD
   - 1.c. 1-WEEK PARKED AASHTO DESIGN TRUCK LOAD
2. THE CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F3430-20 "STANDARD SPECIFICATION FOR CELLULAR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS"
3. THE INSTALLED CHAMBER SYSTEM SHALL PROVIDE RESISTANCE TO THE LOADS AND LOAD FACTORS AS DEFINED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS SECTION 12.12, WHEN INSTALLED ACCORDING TO CULTEC'S RECOMMENDED INSTALLATION INSTRUCTIONS. THE STRUCTURAL DESIGN OF THE CHAMBERS SHALL INCLUDE THE FOLLOWING:
   - 3.a. THE CREEP MODULUS SHALL BE 50-YEAR AS SPECIFIED IN ASTM F3430
   - 3.b. THE MINIMUM SAFETY FACTOR FOR LIVE LOADS SHALL BE 1.75
   - 3.c. THE MINIMUM SAFETY FACTOR FOR DEAD LOADS SHALL BE 1.95

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CULTEC RECHARGER® 902HD STORMWATER CHAMBER

Recharger® 902HD Bare Chamber Storage Volumes

Elevation		Incremental Storage Volume				Cumulative Storage	
in.	mm	ft³/ft	m³/m	ft³	m³	ft³	m³
48	1219	0.020	0.002	0.073	0.002	63.470	1.797
47	1194	0.050	0.005	0.183	0.005	63.397	1.795
46	1168	0.070	0.007	0.257	0.007	63.213	1.790
45	1143	0.120	0.011	0.440	0.012	62.957	1.783
44	1118	0.160	0.015	0.587	0.017	62.517	1.770
43	1092	0.200	0.019	0.733	0.021	61.930	1.754
42	1067	0.220	0.020	0.807	0.023	61.197	1.733
41	1041	0.240	0.022	0.880	0.025	60.390	1.710
40	1016	0.270	0.025	0.990	0.028	59.510	1.685
39	991	0.270	0.025	0.990	0.028	58.520	1.657
38	965	0.290	0.027	1.063	0.030	57.530	1.629
37	940	0.300	0.028	1.100	0.031	56.467	1.599
36	914	0.310	0.029	1.137	0.032	55.367	1.568
35	889	0.330	0.031	1.210	0.034	54.230	1.536
34	864	0.340	0.032	1.247	0.035	53.020	1.502
33	838	0.350	0.033	1.283	0.036	51.773	1.466
32	813	0.350	0.033	1.283	0.036	50.490	1.430
31	787	0.360	0.033	1.320	0.037	49.207	1.394
30	762	0.370	0.034	1.357	0.038	47.887	1.356
29	737	0.380	0.035	1.393	0.039	46.530	1.318
28	711	0.390	0.036	1.430	0.040	45.137	1.278
27	686	0.390	0.036	1.430	0.040	43.707	1.238
26	660	0.400	0.037	1.467	0.042	42.277	1.197
25	635	0.400	0.037	1.467	0.042	40.810	1.156
24	610	0.410	0.038	1.503	0.043	39.343	1.114
23	584	0.410	0.038	1.503	0.043	37.840	1.072
22	559	0.410	0.038	1.503	0.043	36.337	1.029
21	533	0.420	0.039	1.540	0.044	34.833	0.986
20	508	0.420	0.039	1.540	0.044	33.293	0.943
19	483	0.420	0.039	1.540	0.044	31.753	0.899
18	457	0.430	0.040	1.577	0.045	30.213	0.856
17	432	0.430	0.040	1.577	0.045	28.637	0.811
16	406	0.440	0.041	1.613	0.046	27.060	0.766
15	381	0.440	0.041	1.613	0.046	25.447	0.721
14	356	0.450	0.042	1.650	0.047	23.833	0.675
13	330	0.450	0.042	1.650	0.047	22.183	0.628
12	305	0.450	0.042	1.650	0.047	20.533	0.582
11	279	0.450	0.042	1.650	0.047	18.883	0.535
10	254	0.460	0.043	1.687	0.048	17.233	0.488
9	229	0.460	0.043	1.687	0.048	15.547	0.440
8	203	0.460	0.043	1.687	0.048	13.860	0.393
7	178	0.460	0.043	1.687	0.048	12.173	0.345
6	152	0.470	0.044	1.723	0.049	10.487	0.297
5	127	0.470	0.044	1.723	0.049	8.763	0.248
4	102	0.480	0.045	1.760	0.050	7.040	0.199
3	76	0.480	0.045	1.760	0.050	5.280	0.150
2	51	0.480	0.045	1.760	0.050	3.520	0.100
1	25	0.480	0.045	1.760	0.050	1.760	0.050
Total		**17.310**	**1.608**	**63.470**	**1.797**	**63.470**	**1.797**

Calculations are based on installed chamber length of 3.67' (1.12 m).

Recharger® 902HD Bare End Cap Storage Volumes

Elevation		Incremental Storage Volume				Cumulative Storage	
in.	mm	ft³/ft	m³/m	ft³	m³	ft³	m³
48	1219	0.039	0.004	0.020	0.0006	2.758	0.0781
47	1194	0.058	0.005	0.030	0.0008	2.738	0.0775
46	1168	0.058	0.005	0.030	0.0008	2.780	0.0767
45	1143	0.077	0.007	0.040	0.0011	2.678	0.0758
44	1118	0.097	0.009	0.050	0.0014	2.638	0.0747
43	1092	0.077	0.007	0.040	0.0011	2.588	0.0733
42	1067	0.097	0.009	0.050	0.0014	2.548	0.0722
41	1041	0.097	0.009	0.050	0.0014	2.498	0.0707
40	1016	0.097	0.009	0.050	0.0014	2.448	0.0693
39	991	0.097	0.009	0.050	0.0014	2.398	0.0679
38	965	0.097	0.009	0.050	0.0014	2.348	0.0665
37	940	0.116	0.011	0.060	0.0017	2.299	0.0651
36	914	0.097	0.009	0.050	0.0014	2.239	0.0634
35	889	0.097	0.009	0.050	0.0014	2.189	0.0620
34	864	0.116	0.011	0.060	0.0017	2.139	0.0606
33	838	0.097	0.009	0.050	0.0014	2.079	0.0589
32	813	0.097	0.009	0.050	0.0014	2.029	0.0574
31	787	0.116	0.011	0.060	0.0017	1.979	0.0560
30	762	0.097	0.009	0.050	0.0014	1.919	0.0543
29	737	0.135	0.013	0.070	0.0020	1.869	0.0529
28	711	0.097	0.009	0.050	0.0014	1.799	0.0509
27	686	0.116	0.011	0.060	0.0017	1.749	0.0495
26	660	0.116	0.011	0.060	0.0017	1.689	0.0478
25	635	0.097	0.009	0.050	0.0014	1.629	0.0461
24	609	0.116	0.011	0.060	0.0017	1.579	0.0447
23	584	0.116	0.011	0.060	0.0017	1.519	0.0430
22	559	0.135	0.013	0.070	0.0020	1.459	0.0413
21	533	0.116	0.011	0.060	0.0017	1.389	0.0393
20	508	0.116	0.011	0.060	0.0017	1.329	0.0376
19	483	0.116	0.011	0.060	0.0017	1.269	0.0359
18	457	0.116	0.011	0.060	0.0017	1.209	0.0342
17	432	0.116	0.011	0.060	0.0017	1.149	0.0325
16	406	0.135	0.013	0.070	0.0020	1.089	0.0308
15	381	0.116	0.011	0.060	0.0017	1.019	0.0289
14	356	0.116	0.011	0.060	0.0017	0.959	0.0272
13	330	0.116	0.011	0.060	0.0017	0.899	0.0255
12	305	0.135	0.013	0.070	0.0020	0.839	0.0238
11	279	0.116	0.011	0.060	0.0017	0.770	0.0218
10	254	0.135	0.013	0.070	0.0020	0.710	0.0201
9	229	0.135	0.013	0.070	0.0020	0.640	0.0181
8	203	0.135	0.013	0.070	0.0020	0.570	0.0161
7	178	0.135	0.013	0.070	0.0020	0.500	0.0141
6	152	0.116	0.011	0.060	0.0017	0.430	0.0122
5	127	0.135	0.013	0.070	0.0020	0.370	0.0105
4	102	0.135	0.013	0.070	0.0020	0.300	0.0085
3	76	0.155	0.014	0.080	0.0023	0.230	0.0065
2	51	0.135	0.013	0.070	0.0020	0.150	0.0042
1	25	0.155	0.014	0.080	0.0023	0.080	0.0023
Total		**5.338**	**0.496**	**2.758**	**0.0781**	**2.758**	**0.0781**

Calculations are based on installed chamber length of 6.2" (157 mm).

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

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CULTEC Recharger® 902HD Specifications

GENERAL

CULTEC Recharger® 902HD chambers are designed for underground stormwater management. The chambers may be used for retention, recharging, detention or controlling the flow of on-site stormwater runoff.

CHAMBER PARAMETERS

1. The chambers shall be manufactured in the U.S.A. or Canada by CULTEC, Inc. of Brookfield, CT (cultec.com, 203-775-4416).
2. The chambers shall be designed and tested in accordance with ASTM F2787 "Standard Practice for Structural Design of Thermoplastic Corrugated Wall Stormwater Collection Chambers". The load configuration shall include:
    a. Instantaneous AASHTO Design Truck live load at minimum cover
    b. Maximum permanent (50-year) cover load
    c. 1-week parked AASHTO design truck load
3. The chambers shall meet the requirements of ASTM F3430-20 "Standard Specification for Cellular Polypropylene (PP) Corrugated Wall Stormwater Collection Chambers".
4. The installed chamber system shall provide resistance to the loads and load factors as defined in the AASHTO LRFD Bridge Design Specifications Section 12.12, when installed according to CULTEC's recommended installation instructions. The structural design of the chambers shall include the following:
    a. The Creep Modulus shall be 50-year as specified in ASTM F3430
    b. The minimum safety factor for live loads shall be 1.75
    c. The minimum safety factor for dead loads shall be 1.95
5. The chamber shall be structural foam injection molded of blue virgin high molecular weight impact-modified polypropylene.
6. The chamber shall be arched in shape.
7. The chamber shall be open-bottomed.
8. The chamber shall be joined using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings.
9. The nominal chamber dimensions of the CULTEC Recharger® 902HD shall be 48 inches (1219 mm) tall, 78 inches (1981 mm) wide and 4.25 feet (1.30 m) long. The installed length of a joined Recharger 902HD shall be 3.67 feet (1.12 m).
10. Multiple chambers may be connected to form different length rows. Each row shall begin and end with a separately formed CULTEC Recharger® 902HD End Cap. Maximum inlet opening on the end cap is 30 inches (750 mm) HDPE or 36 inches (900 mm) PVC.
11. The chamber shall have two side portals to accept CULTEC HVLV™ FC-48 Feed Connectors to create an internal manifold. Maximum allowable pipe size in the side portal is 10 inches (250 mm) HDPE and 12 inches (300 mm) PVC.
12. The nominal chamber dimensions of the CULTEC HVLV™ FC-48 Feed Connector shall be 12 inches (305 mm) tall, 16 inches (406 mm) wide and 49 inches (1245 mm) long.
13. The nominal storage volume of the Recharger 902HD chamber shall be 17.31 ft^3 / ft (1.61 m^3 / m) - without stone. The nominal storage volume of a joined Recharger 902HD shall be 63.47 ft^3 / unit (1.80 m^3 / unit) - without stone.
14. The nominal storage volume of the HVLV™ FC-48 Feed Connector shall be 0.913 ft^3 / ft (0.085 m^3 / m) - without stone.
15. The Recharger 902HD chamber shall have 5 corrugations.
16. The chamber shall be capable of accepting a 6 inch (150 mm) inspection port opening at the top center of each chamber, centered on the corrugation crest.
17. The units may be trimmed to custom lengths by cutting back to any corrugation.
18. The chamber shall be manufactured in a facility employing CULTEC's Quality Control and Assurance Procedures.
19. Maximum allowable cover over the top of the chamber shall be 8.3 feet (2.53 m).

END CAP PARAMETERS

1. The CULTEC Recharger® 902HD End Cap (referred to as 'end cap') shall be manufactured in the U.S.A. by CULTEC, Inc. of Brookfield, CT (cultec.com, 203-775-4416).
2. The end cap shall be twin-sheet thermoformed of virgin high molecular weight polyethylene.
3. The end cap shall be joined at the beginning and end of each row of chambers using an interlocking overlapping rib method. Connections must be fully shouldered overlapping ribs, having no separate couplings.
4. The nominal dimensions of the end cap shall be 48.5 inches (1231 mm) tall, 78 inches (1982 mm) wide and 9.7 inches (246 mm) long. When joined with a Recharger 902HD Chamber, the installed length of the end cap shall be 6.2 inches (157 mm).
5. The nominal storage volume of the end cap shall be 5.34 ft^3 / ft (0.50 m^3 / m) - without stone. The nominal storage volume of an interlocked end cap shall be 2.76 ft^3 / unit (0.08 m^3 / unit) - without stone.
6. Maximum inlet opening on the end cap is 30 inches (750 mm) HDPE or 36 inches (900 mm) PVC.
7. The end cap shall provide resistance to the loads and load factors as defined in the AASHTO LRFD Bridge Design Specifications Section 12.12.

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Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

HCOC is mitigated through the Underground Chambers BMP by retention and infiltration of the runoff for the site significantly reducing discharge from the pre-development condition.

Total Storage Volume Required	Total Storage Volume provided
2221.30 cu. ft.	2257.30 cu. ft.

EXISTING CONDITION

WinTR-55 Current Data Description

--- Identification Data ---

User: RR
Project: Central AveCommercial Retail
SubTitle: Existing
State: California
County: Riverside
Filename: D:\Projects\20-2802 Central Lake Elsinore LATEST\TR-55\Existing.w55

Date: 10/3/2023
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Subarea B		Outlet	1.25	79	0.1

Total area: 1.25 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.43	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

Central AveCommercial Retail
Existing
Riverside County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.43	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

RR Central AveCommercial Retail
Existing
Riverside County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)
SUBAREAS	
Subarea B	0.64
REACHES	
OUTLET	0.64

RR Central AveCommercial Retail
Existing
Riverside County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs) (hr)
SUBAREAS	
Subarea B	0.64 9.94
REACHES	
OUTLET	0.64

RR Central AveCommercial Retail
Existing
Riverside County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Subarea B	1.25	0.100	79	Outlet	

Total Area: 1.25 (ac)

RR Central AveCommercial Retail
Existing
Riverside County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Subarea B							
SHEET	96	0.0209	0.050				0.074
SHALLOW	169	0.0237	0.050				0.019
					Time of Concentration		0.1

RR Central AveCommercial Retail
Existing
Riverside County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use		Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Subarea B	Open space; grass cover < 50%	(poor)	B	1.25	79
	Total Area / Weighted Curve Number			1.25	79

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
Central AveCommercial Retail
Existing

SUB-AREA:
  Subarea B Outlet .00195 79. .1

STREAM REACH:

STORM ANALYSIS:
  2-Yr 2.43 Type I 2

STRUCTURE RATING:

GLOBAL OUTPUT:
  2 0.05 YYYYN YYYYNN

WinTR-20 Printed Page File End of Input Data List

Central AveCommercial Retail
Existing

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Subarea B	0.002		0.558		9.94	0.64	327.03

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.551	0.05	0.05	0.06	0.06	0.06	0.06	0.06
9.595	0.07	0.07	0.07	0.07	0.07	0.08	0.08
9.639	0.08	0.09	0.09	0.10	0.10	0.11	0.11
9.684	0.11	0.12	0.12	0.13	0.13	0.13	0.14
9.728	0.14	0.15	0.16	0.17	0.18	0.19	0.20
9.772	0.21	0.22	0.23	0.24	0.25	0.25	0.26
9.816	0.27	0.28	0.30	0.32	0.34	0.36	0.39
9.861	0.41	0.44	0.47	0.49	0.52	0.54	0.56
9.905	0.58	0.60	0.61	0.63	0.63	0.64	0.64
9.949	0.63	0.63	0.62	0.61	0.61	0.60	0.59
9.993	0.59	0.59	0.58	0.58	0.58	0.57	0.55
10.037	0.54	0.51	0.49	0.46	0.43	0.40	0.38
10.082	0.35	0.33	0.31	0.29	0.28	0.27	0.26
10.126	0.25	0.24	0.24	0.23	0.22	0.22	0.22
10.170	0.21	0.21	0.21	0.20	0.20	0.20	0.20
10.214	0.20	0.19	0.19	0.19	0.19	0.19	0.19
10.258	0.19	0.18	0.18	0.18	0.18	0.18	0.18
10.303	0.18	0.18	0.18	0.17	0.17	0.17	0.17
10.347	0.17	0.17	0.17	0.16	0.16	0.16	0.16
10.391	0.16	0.16	0.16	0.16	0.16	0.16	0.15
10.435	0.15	0.15	0.15	0.15	0.15	0.14	0.14
10.479	0.14	0.14	0.14	0.14	0.14	0.14	0.14
10.524	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.568	0.13	0.13	0.13	0.12	0.12	0.12	0.12
10.612	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.656	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.701	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.745	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.789	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.833	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.877	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.922	0.11	0.11	0.11	0.11	0.11	0.10	0.10
10.966	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.010	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.054	0.10	0.10	0.10	0.10	0.10	0.10	0.10

11.098	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.143	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.187	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.231	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.275	0.10	0.10	0.10	0.10	0.10	0.10	0.10

Central AveCommercial Retail
Existing

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.319	0.10	0.10	0.10	0.10	0.09	0.09	0.09
11.364	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.408	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.452	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.496	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.541	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.585	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.629	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.673	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.717	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.762	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.806	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.850	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.894	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.938	0.09	0.08	0.08	0.08	0.08	0.08	0.08
11.983	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.027	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.071	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.115	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.159	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.204	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.248	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.292	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.336	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.381	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.425	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.469	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.513	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.557	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.602	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.646	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.690	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.734	0.08	0.07	0.07	0.07	0.07	0.07	0.07
12.778	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.823	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.867	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.911	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.955	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.999	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.044	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.088	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.132	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.176	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.221	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.265	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.309	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.353	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.397	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.442	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.486	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.530	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

Central AveCommercial Retail
Existing

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
13.574	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.618	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.663	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.707	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.751	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.795	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.839	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.884	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.928	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.972	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.016	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.061	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.105	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.149	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.193	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.237	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.282	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.326	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.370	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.414	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.458	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.503	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.547	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.591	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.635	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.679	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.724	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.768	0.06	0.06	0.06	0.06	0.06	0.06	0.05
14.812	0.05	0.05	0.05	0.05	0.05	0.05	0.05
14.856	0.05	0.05	0.05	0.05	0.05	0.05	0.05

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

14.901	0.05	0.05	0.05	0.05	0.05	0.05	0.05
14.945	0.05	0.05	0.05	0.05	0.05	0.05	0.05
14.989	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.033	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.077	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.122	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.166	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.210	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.254	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.298	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.343	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.387	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.431	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.475	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.519	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.564	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.608	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.652	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.696	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.741	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.785	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Central AveCommercial Retail
Existing

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
15.829	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.873	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.917	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.962	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.006	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.050	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.094	0.05	0.05	0.05	0.05	0.05	0.05	0.05

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

16.138	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.183	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.227	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.271	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.315	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.359	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.404	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.448	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.492	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.536	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.581	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.625	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.669	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.713	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.757	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.802	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.846	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.890	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.934	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.002		0.558		9.94	0.64	327.03

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.551	0.05	0.05	0.06	0.06	0.06	0.06	0.06
9.595	0.07	0.07	0.07	0.07	0.07	0.08	0.08
9.639	0.08	0.09	0.09	0.10	0.10	0.11	0.11
9.684	0.11	0.12	0.12	0.13	0.13	0.13	0.14
9.728	0.14	0.15	0.16	0.17	0.18	0.19	0.20
9.772	0.21	0.22	0.23	0.24	0.25	0.25	0.26
9.816	0.27	0.28	0.30	0.32	0.34	0.36	0.39
9.861	0.41	0.44	0.47	0.49	0.52	0.54	0.56

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

9.905	0.58	0.60	0.61	0.63	0.63	0.64	0.64
9.949	0.63	0.63	0.62	0.61	0.61	0.60	0.59
9.993	0.59	0.59	0.58	0.58	0.58	0.57	0.55
10.037	0.54	0.51	0.49	0.46	0.43	0.40	0.38
10.082	0.35	0.33	0.31	0.29	0.28	0.27	0.26
10.126	0.25	0.24	0.24	0.23	0.22	0.22	0.22

Central AveCommercial Retail
Existing

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
10.170	0.21	0.21	0.21	0.20	0.20	0.20	0.20
10.214	0.20	0.19	0.19	0.19	0.19	0.19	0.19
10.258	0.19	0.18	0.18	0.18	0.18	0.18	0.18
10.303	0.18	0.18	0.18	0.17	0.17	0.17	0.17
10.347	0.17	0.17	0.17	0.16	0.16	0.16	0.16
10.391	0.16	0.16	0.16	0.16	0.16	0.16	0.15
10.435	0.15	0.15	0.15	0.15	0.15	0.14	0.14
10.479	0.14	0.14	0.14	0.14	0.14	0.14	0.14
10.524	0.13	0.13	0.13	0.13	0.13	0.13	0.13
10.568	0.13	0.13	0.13	0.12	0.12	0.12	0.12
10.612	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.656	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.701	0.12	0.12	0.12	0.12	0.12	0.12	0.12
10.745	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.789	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.833	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.877	0.11	0.11	0.11	0.11	0.11	0.11	0.11
10.922	0.11	0.11	0.11	0.11	0.11	0.10	0.10
10.966	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.010	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.054	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.098	0.10	0.10	0.10	0.10	0.10	0.10	0.10

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

11.143	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.187	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.231	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.275	0.10	0.10	0.10	0.10	0.10	0.10	0.10
11.319	0.10	0.10	0.10	0.10	0.09	0.09	0.09
11.364	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.408	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.452	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.496	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.541	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.585	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.629	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.673	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.717	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.762	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.806	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.850	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.894	0.09	0.09	0.09	0.09	0.09	0.09	0.09
11.938	0.09	0.08	0.08	0.08	0.08	0.08	0.08
11.983	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.027	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.071	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.115	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.159	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.204	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.248	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.292	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.336	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.381	0.08	0.08	0.08	0.08	0.08	0.08	0.08

Central AveCommercial Retail
Existing

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

12.425	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.469	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.513	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.557	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.602	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.646	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.690	0.08	0.08	0.08	0.08	0.08	0.08	0.08
12.734	0.08	0.07	0.07	0.07	0.07	0.07	0.07
12.778	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.823	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.867	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.911	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.955	0.07	0.07	0.07	0.07	0.07	0.07	0.07
12.999	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.044	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.088	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.132	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.176	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.221	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.265	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.309	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.353	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.397	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.442	0.07	0.07	0.07	0.07	0.07	0.07	0.07
13.486	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.530	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.574	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.618	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.663	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.707	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.751	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.795	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.839	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.884	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.928	0.06	0.06	0.06	0.06	0.06	0.06	0.06
13.972	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.016	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

14.061	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.105	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.149	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.193	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.237	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.282	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.326	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.370	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.414	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.458	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.503	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.547	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.591	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.635	0.06	0.06	0.06	0.06	0.06	0.06	0.06

Central AveCommercial Retail
Existing

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
14.679	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.724	0.06	0.06	0.06	0.06	0.06	0.06	0.06
14.768	0.06	0.06	0.06	0.06	0.06	0.06	0.05
14.812	0.05	0.05	0.05	0.05	0.05	0.05	0.05
14.856	0.05	0.05	0.05	0.05	0.05	0.05	0.05
14.901	0.05	0.05	0.05	0.05	0.05	0.05	0.05
14.945	0.05	0.05	0.05	0.05	0.05	0.05	0.05
14.989	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.033	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.077	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.122	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.166	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.210	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.254	0.05	0.05	0.05	0.05	0.05	0.05	0.05

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

15.298	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.343	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.387	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.431	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.475	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.519	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.564	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.608	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.652	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.696	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.741	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.785	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.829	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.873	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.917	0.05	0.05	0.05	0.05	0.05	0.05	0.05
15.962	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.006	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.050	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.094	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.138	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.183	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.227	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.271	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.315	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.359	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.404	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.448	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.492	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.536	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.581	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.625	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.669	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.713	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.757	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.802	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.846	0.05	0.05	0.05	0.05	0.05	0.05	0.05
16.890	0.05	0.05	0.05	0.05	0.05	0.05	0.05

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

Central AveCommercial Retail
Existing

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
16.934	0.05	0.05	0.05	0.05	0.05	0.05	0.05

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

Central AveCommercial Retail
Existing

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Subarea B	0.002		0.64				
OUTLET	0.002		0.64				

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

WinTR-20 Printed Page File TR20.inp Beginning of Input Data List

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Existing

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 79. .1

STREAM REACH:

PROPOSED CONDITION

WinTR-55 Current Data Description

--- Identification Data ---

User: RR
Project: Central AveCommercial Retail
SubTitle: Proposed
State: California
County: Riverside
Filename: D:\Projects\20-2802 Central Lake Elsinore LATEST\TR-55\Proposed.w55

Date: 10/3/2023
Units: English
Areal Units: Acres

--- Sub-Area Data ---

Name	Description	Reach	Area(ac)	RCN	Tc
Subarea B		Outlet	1.25	92	0.1

Total area: 1.25 (ac)

--- Storm Data --

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.43	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

Central AveCommercial Retail
Proposed
Riverside County, California

Storm Data

Rainfall Depth by Rainfall Return Period

2-Yr (in)	5-Yr (in)	10-Yr (in)	25-Yr (in)	50-Yr (in)	100-Yr (in)	1-Yr (in)
2.43	.0	.0	.0	.0	.0	.0

Storm Data Source: User-provided custom storm data
Rainfall Distribution Type: Type I
Dimensionless Unit Hydrograph: <standard>

RR Central AveCommercial Retail
Proposed
Riverside County, California

Watershed Peak Table

Sub-Area or Reach Identifier	Peak Flow by Rainfall Return Period 2-Yr (cfs)
SUBAREAS	
Subarea B	1.60
REACHES	
OUTLET	1.60

RR Central AveCommercial Retail
Proposed
Riverside County, California

Hydrograph Peak/Peak Time Table

Sub-Area or Reach Identifier	Peak Flow and Peak Time (hr) by Rainfall Return Period 2-Yr (cfs) (hr)
SUBAREAS	
Subarea B	1.60 9.93
REACHES	
OUTLET	1.60

RR Central AveCommercial Retail
Proposed
Riverside County, California

Sub-Area Summary Table

Sub-Area Identifier	Drainage Area (ac)	Time of Concentration (hr)	Curve Number	Receiving Reach	Sub-Area Description
Subarea B	1.25	0.100	92	Outlet	

Total Area: 1.25 (ac)

RR Central AveCommercial Retail
Proposed
Riverside County, California

Sub-Area Time of Concentration Details

Sub-Area Identifier/	Flow Length (ft)	Slope (ft/ft)	Mannings's n	End Area (sq ft)	Wetted Perimeter (ft)	Velocity (ft/sec)	Travel Time (hr)
Subarea B							
SHEET	100	0.0150	0.011				0.026
SHALLOW	20	0.0150	0.025				0.002
SHALLOW	231	0.0150	0.025				0.026
						Time of Concentration	0.1

Central AveCommercial Retail
Proposed
Riverside County, California

Sub-Area Land Use and Curve Number Details

Sub-Area Identifier	Land Use	Hydrologic Soil Group	Sub-Area Area (ac)	Curve Number
Subarea B	Open space; grass cover > 75% (good)	B	.19	61
	Paved parking lots, roofs, driveways	B	1.06	98
	Total Area / Weighted Curve Number		1.25	92

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
Central AveCommercial Retail
Proposed

SUB-AREA:
  Subarea B Outlet .00195 92. .1

STREAM REACH:

STORM ANALYSIS:
  2-Yr 2.43 Type I 2

STRUCTURE RATING:

GLOBAL OUTPUT:
  2 0.05 YYYYN YYYYNN

WinTR-20 Printed Page File End of Input Data List

Central AveCommercial Retail
Proposed

Name of printed page file:
TR20.out

STORM 2-Yr

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
Subarea B	0.002		1.480		9.93	1.60	821.42

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
7.831	0.05	0.05	0.05	0.05	0.05	0.05	0.05
7.876	0.05	0.05	0.05	0.05	0.05	0.05	0.05
7.920	0.05	0.05	0.05	0.05	0.05	0.05	0.05
7.964	0.05	0.05	0.05	0.05	0.05	0.05	0.05
8.008	0.05	0.05	0.05	0.05	0.05	0.05	0.05
8.052	0.05	0.05	0.05	0.06	0.06	0.06	0.06
8.097	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.141	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.185	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.229	0.06	0.06	0.07	0.07	0.07	0.07	0.07
8.274	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.318	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.362	0.07	0.08	0.08	0.08	0.08	0.08	0.08
8.406	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.450	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.495	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.539	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.583	0.09	0.09	0.09	0.09	0.09	0.09	0.10
8.627	0.10	0.10	0.10	0.10	0.10	0.10	0.10
8.671	0.10	0.10	0.10	0.10	0.10	0.10	0.10
8.716	0.10	0.10	0.10	0.10	0.11	0.11	0.11
8.760	0.11	0.11	0.11	0.11	0.11	0.11	0.11
8.804	0.11	0.11	0.11	0.11	0.11	0.11	0.11
8.848	0.11	0.12	0.12	0.12	0.12	0.12	0.12
8.892	0.12	0.12	0.12	0.12	0.12	0.12	0.12
8.937	0.12	0.12	0.12	0.12	0.13	0.13	0.13
8.981	0.13	0.13	0.13	0.13	0.13	0.13	0.13
9.025	0.13	0.13	0.13	0.13	0.13	0.14	0.14
9.069	0.14	0.14	0.14	0.14	0.14	0.14	0.14
9.114	0.14	0.14	0.14	0.14	0.15	0.15	0.15
9.158	0.15	0.15	0.15	0.15	0.15	0.16	0.16
9.202	0.16	0.16	0.16	0.16	0.16	0.16	0.16
9.246	0.16	0.17	0.17	0.17	0.17	0.17	0.17
9.290	0.17	0.17	0.17	0.18	0.18	0.18	0.18
9.335	0.18	0.18	0.18	0.18	0.18	0.19	0.19

9.379	0.19	0.19	0.19	0.19	0.19	0.19	0.19
9.423	0.19	0.20	0.20	0.20	0.20	0.20	0.20
9.467	0.20	0.21	0.21	0.21	0.21	0.21	0.21
9.511	0.21	0.21	0.22	0.22	0.23	0.23	0.24
9.556	0.25	0.26	0.26	0.27	0.28	0.29	0.29

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Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
9.600	0.30	0.30	0.31	0.31	0.32	0.33	0.34
9.644	0.35	0.37	0.38	0.40	0.42	0.43	0.44
9.688	0.46	0.47	0.48	0.49	0.50	0.51	0.52
9.732	0.54	0.56	0.59	0.62	0.65	0.68	0.70
9.777	0.73	0.76	0.78	0.80	0.82	0.83	0.85
9.821	0.88	0.91	0.95	0.99	1.05	1.11	1.17
9.865	1.23	1.29	1.35	1.40	1.45	1.49	1.53
9.909	1.56	1.58	1.60	1.60	1.60	1.59	1.56
9.954	1.54	1.51	1.48	1.45	1.42	1.40	1.37
9.998	1.35	1.34	1.32	1.30	1.27	1.24	1.20
10.042	1.15	1.09	1.02	0.96	0.89	0.83	0.77
10.086	0.72	0.67	0.63	0.60	0.57	0.55	0.53
10.130	0.51	0.50	0.48	0.47	0.46	0.45	0.44
10.175	0.43	0.42	0.42	0.41	0.41	0.40	0.40
10.219	0.40	0.39	0.39	0.39	0.38	0.38	0.37
10.263	0.37	0.37	0.36	0.36	0.36	0.35	0.35
10.307	0.35	0.35	0.35	0.34	0.34	0.34	0.34
10.351	0.33	0.33	0.32	0.32	0.32	0.31	0.31
10.396	0.31	0.31	0.31	0.30	0.30	0.30	0.30
10.440	0.29	0.29	0.29	0.28	0.28	0.28	0.27
10.484	0.27	0.27	0.27	0.26	0.26	0.26	0.26
10.528	0.26	0.26	0.25	0.25	0.25	0.25	0.24
10.572	0.24	0.24	0.24	0.24	0.23	0.23	0.23
10.617	0.23	0.23	0.23	0.23	0.23	0.23	0.22
10.661	0.22	0.22	0.22	0.22	0.22	0.22	0.22
10.705	0.22	0.22	0.22	0.22	0.22	0.22	0.21
10.749	0.21	0.21	0.21	0.21	0.21	0.21	0.21
10.794	0.21	0.21	0.21	0.21	0.21	0.21	0.21
10.838	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.882	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.926	0.20	0.19	0.19	0.19	0.19	0.19	0.19
10.970	0.19	0.19	0.19	0.19	0.19	0.19	0.19
11.015	0.19	0.19	0.18	0.18	0.18	0.18	0.18
11.059	0.18	0.18	0.18	0.18	0.18	0.18	0.18
11.103	0.18	0.18	0.18	0.18	0.18	0.18	0.18
11.147	0.18	0.18	0.18	0.18	0.17	0.17	0.17
11.191	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.236	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.280	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.324	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.368	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.412	0.17	0.17	0.17	0.17	0.17	0.16	0.16
11.457	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.501	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.545	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.589	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.634	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.678	0.16	0.16	0.16	0.15	0.15	0.15	0.15
11.722	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.766	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.810	0.15	0.15	0.15	0.15	0.15	0.15	0.15

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STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

Central AveCommercial Retail
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Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
11.855	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.899	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.943	0.15	0.15	0.14	0.14	0.14	0.14	0.14
11.987	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.031	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.076	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.120	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.164	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.208	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.252	0.14	0.14	0.14	0.14	0.14	0.13	0.13
12.297	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.341	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.385	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.429	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.474	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.518	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.562	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.606	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.650	0.13	0.13	0.13	0.13	0.13	0.13	0.12
12.695	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.739	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.783	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.827	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.871	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.916	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.960	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.004	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.048	0.12	0.12	0.12	0.12	0.12	0.12	0.11
13.092	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.137	0.11	0.11	0.11	0.11	0.11	0.11	0.11

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al AveCommercial Retail (continued)
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STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

13.181	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.225	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.269	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.314	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.358	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.402	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.446	0.11	0.11	0.11	0.11	0.11	0.10	0.10
13.490	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.535	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.579	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.623	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.667	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.711	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.756	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.800	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.844	0.10	0.10	0.10	0.09	0.09	0.09	0.09
13.888	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.932	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.977	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.021	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.065	0.09	0.09	0.09	0.09	0.09	0.09	0.09

Central AveCommercial Retail
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Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
14.109	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.154	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.198	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.242	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.286	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.330	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.375	0.09	0.09	0.09	0.09	0.09	0.09	0.09

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Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

14.419	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.463	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.507	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.551	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.596	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.640	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.684	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.728	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.772	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.817	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.861	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.905	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.949	0.09	0.09	0.09	0.09	0.09	0.08	0.08
14.994	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.038	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.082	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.126	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.170	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.215	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.259	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.303	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.347	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.391	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.436	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.480	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.524	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.568	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.612	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.657	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.701	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.745	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.789	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.834	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.878	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.922	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.966	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.010	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.055	0.08	0.08	0.08	0.08	0.08	0.08	0.08

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STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

16.099	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.143	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.187	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.231	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.276	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.320	0.08	0.08	0.08	0.08	0.08	0.08	0.08

Central AveCommercial Retail
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Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
16.364	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.408	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.452	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.497	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.541	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.585	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.629	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.674	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.718	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.762	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.806	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.850	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.895	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.939	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.983	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.027	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.071	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.116	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.160	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.204	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.248	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.292	0.07	0.07	0.07	0.07	0.07	0.07	0.07

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

17.337	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.381	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.425	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.469	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.514	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.558	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.602	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.646	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.690	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.735	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.779	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.823	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.867	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.911	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.956	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.000	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.044	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.088	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.132	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.177	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.221	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.265	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.309	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.354	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.398	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.442	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.486	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.530	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.575	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Central AveCommercial Retail
Proposed

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

18.619	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.663	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.707	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.751	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.796	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.840	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.884	0.07	0.07	0.06	0.06	0.06	0.06	0.06
18.928	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.972	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.017	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.061	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.105	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.149	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.194	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.238	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.282	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.326	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.370	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.415	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.459	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.503	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.547	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.591	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.636	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.680	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.724	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.768	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.812	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.857	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.901	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.945	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.989	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.034	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.078	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.122	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.166	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.210	0.06	0.06	0.06	0.06	0.06	0.06	0.06

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

20.255	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.299	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.343	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.387	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.431	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.476	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.520	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.564	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.608	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.652	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.697	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.741	0.06	0.06	0.06	0.05	0.05	0.05	0.05
20.785	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.829	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Central AveCommercial Retail
Proposed

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
20.874	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.918	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.962	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.006	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.050	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.095	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.139	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.183	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.227	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.271	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.316	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.360	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.404	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.448	0.05	0.05	0.05	0.05	0.05	0.05	0.05

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

21.492	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.537	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.581	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.625	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Area or Reach Identifier	Drainage Area (sq mi)	Rain Gage ID or Location	Runoff Amount (in)	Peak Flow Elevation (ft)	Peak Flow Time (hr)	Peak Flow Rate (cfs)	Peak Flow Rate (csm)
OUTLET	0.002		1.480		9.93	1.60	821.42

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
7.831	0.05	0.05	0.05	0.05	0.05	0.05	0.05
7.876	0.05	0.05	0.05	0.05	0.05	0.05	0.05
7.920	0.05	0.05	0.05	0.05	0.05	0.05	0.05
7.964	0.05	0.05	0.05	0.05	0.05	0.05	0.05
8.008	0.05	0.05	0.05	0.05	0.05	0.05	0.05
8.052	0.05	0.05	0.05	0.06	0.06	0.06	0.06
8.097	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.141	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.185	0.06	0.06	0.06	0.06	0.06	0.06	0.06
8.229	0.06	0.06	0.07	0.07	0.07	0.07	0.07
8.274	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.318	0.07	0.07	0.07	0.07	0.07	0.07	0.07
8.362	0.07	0.08	0.08	0.08	0.08	0.08	0.08
8.406	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.450	0.08	0.08	0.08	0.08	0.08	0.08	0.08
8.495	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.539	0.09	0.09	0.09	0.09	0.09	0.09	0.09
8.583	0.09	0.09	0.09	0.09	0.09	0.09	0.10
8.627	0.10	0.10	0.10	0.10	0.10	0.10	0.10
8.671	0.10	0.10	0.10	0.10	0.10	0.10	0.10
8.716	0.10	0.10	0.10	0.10	0.11	0.11	0.11
8.760	0.11	0.11	0.11	0.11	0.11	0.11	0.11

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

Central AveCommercial Retail
Proposed

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
8.804	0.11	0.11	0.11	0.11	0.11	0.11	0.11
8.848	0.11	0.12	0.12	0.12	0.12	0.12	0.12
8.892	0.12	0.12	0.12	0.12	0.12	0.12	0.12
8.937	0.12	0.12	0.12	0.12	0.13	0.13	0.13
8.981	0.13	0.13	0.13	0.13	0.13	0.13	0.13
9.025	0.13	0.13	0.13	0.13	0.13	0.14	0.14
9.069	0.14	0.14	0.14	0.14	0.14	0.14	0.14
9.114	0.14	0.14	0.14	0.14	0.15	0.15	0.15
9.158	0.15	0.15	0.15	0.15	0.15	0.16	0.16
9.202	0.16	0.16	0.16	0.16	0.16	0.16	0.16
9.246	0.16	0.17	0.17	0.17	0.17	0.17	0.17
9.290	0.17	0.17	0.17	0.18	0.18	0.18	0.18
9.335	0.18	0.18	0.18	0.18	0.18	0.19	0.19
9.379	0.19	0.19	0.19	0.19	0.19	0.19	0.19
9.423	0.19	0.20	0.20	0.20	0.20	0.20	0.20
9.467	0.20	0.21	0.21	0.21	0.21	0.21	0.21
9.511	0.21	0.21	0.22	0.22	0.23	0.23	0.24
9.556	0.25	0.26	0.26	0.27	0.28	0.29	0.29
9.600	0.30	0.30	0.31	0.31	0.32	0.33	0.34
9.644	0.35	0.37	0.38	0.40	0.42	0.43	0.44
9.688	0.46	0.47	0.48	0.49	0.50	0.51	0.52
9.732	0.54	0.56	0.59	0.62	0.65	0.68	0.70
9.777	0.73	0.76	0.78	0.80	0.82	0.83	0.85
9.821	0.88	0.91	0.95	0.99	1.05	1.11	1.17
9.865	1.23	1.29	1.35	1.40	1.45	1.49	1.53
9.909	1.56	1.58	1.60	1.60	1.60	1.59	1.56
9.954	1.54	1.51	1.48	1.45	1.42	1.40	1.37
9.998	1.35	1.34	1.32	1.30	1.27	1.24	1.20
10.042	1.15	1.09	1.02	0.96	0.89	0.83	0.77

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

10.086	0.72	0.67	0.63	0.60	0.57	0.55	0.53
10.130	0.51	0.50	0.48	0.47	0.46	0.45	0.44
10.175	0.43	0.42	0.42	0.41	0.41	0.40	0.40
10.219	0.40	0.39	0.39	0.39	0.38	0.38	0.37
10.263	0.37	0.37	0.36	0.36	0.36	0.35	0.35
10.307	0.35	0.35	0.35	0.34	0.34	0.34	0.34
10.351	0.33	0.33	0.32	0.32	0.32	0.31	0.31
10.396	0.31	0.31	0.31	0.30	0.30	0.30	0.30
10.440	0.29	0.29	0.29	0.28	0.28	0.28	0.27
10.484	0.27	0.27	0.27	0.26	0.26	0.26	0.26
10.528	0.26	0.26	0.25	0.25	0.25	0.25	0.24
10.572	0.24	0.24	0.24	0.24	0.23	0.23	0.23
10.617	0.23	0.23	0.23	0.23	0.23	0.23	0.22
10.661	0.22	0.22	0.22	0.22	0.22	0.22	0.22
10.705	0.22	0.22	0.22	0.22	0.22	0.22	0.21
10.749	0.21	0.21	0.21	0.21	0.21	0.21	0.21
10.794	0.21	0.21	0.21	0.21	0.21	0.21	0.21
10.838	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.882	0.20	0.20	0.20	0.20	0.20	0.20	0.20
10.926	0.20	0.19	0.19	0.19	0.19	0.19	0.19
10.970	0.19	0.19	0.19	0.19	0.19	0.19	0.19
11.015	0.19	0.19	0.18	0.18	0.18	0.18	0.18

Central AveCommercial Retail
Proposed

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
11.059	0.18	0.18	0.18	0.18	0.18	0.18	0.18
11.103	0.18	0.18	0.18	0.18	0.18	0.18	0.18
11.147	0.18	0.18	0.18	0.18	0.17	0.17	0.17
11.191	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.236	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.280	0.17	0.17	0.17	0.17	0.17	0.17	0.17

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

11.324	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.368	0.17	0.17	0.17	0.17	0.17	0.17	0.17
11.412	0.17	0.17	0.17	0.17	0.17	0.16	0.16
11.457	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.501	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.545	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.589	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.634	0.16	0.16	0.16	0.16	0.16	0.16	0.16
11.678	0.16	0.16	0.16	0.15	0.15	0.15	0.15
11.722	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.766	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.810	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.855	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.899	0.15	0.15	0.15	0.15	0.15	0.15	0.15
11.943	0.15	0.15	0.14	0.14	0.14	0.14	0.14
11.987	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.031	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.076	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.120	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.164	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.208	0.14	0.14	0.14	0.14	0.14	0.14	0.14
12.252	0.14	0.14	0.14	0.14	0.14	0.13	0.13
12.297	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.341	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.385	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.429	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.474	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.518	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.562	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.606	0.13	0.13	0.13	0.13	0.13	0.13	0.13
12.650	0.13	0.13	0.13	0.13	0.13	0.13	0.12
12.695	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.739	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.783	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.827	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.871	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.916	0.12	0.12	0.12	0.12	0.12	0.12	0.12
12.960	0.12	0.12	0.12	0.12	0.12	0.12	0.12

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

13.004	0.12	0.12	0.12	0.12	0.12	0.12	0.12
13.048	0.12	0.12	0.12	0.12	0.12	0.12	0.11
13.092	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.137	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.181	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.225	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.269	0.11	0.11	0.11	0.11	0.11	0.11	0.11

Central AveCommercial Retail
Proposed

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
13.314	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.358	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.402	0.11	0.11	0.11	0.11	0.11	0.11	0.11
13.446	0.11	0.11	0.11	0.11	0.11	0.10	0.10
13.490	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.535	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.579	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.623	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.667	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.711	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.756	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.800	0.10	0.10	0.10	0.10	0.10	0.10	0.10
13.844	0.10	0.10	0.10	0.09	0.09	0.09	0.09
13.888	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.932	0.09	0.09	0.09	0.09	0.09	0.09	0.09
13.977	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.021	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.065	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.109	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.154	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.198	0.09	0.09	0.09	0.09	0.09	0.09	0.09

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

14.242	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.286	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.330	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.375	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.419	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.463	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.507	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.551	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.596	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.640	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.684	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.728	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.772	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.817	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.861	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.905	0.09	0.09	0.09	0.09	0.09	0.09	0.09
14.949	0.09	0.09	0.09	0.09	0.09	0.08	0.08
14.994	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.038	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.082	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.126	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.170	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.215	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.259	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.303	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.347	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.391	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.436	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.480	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.524	0.08	0.08	0.08	0.08	0.08	0.08	0.08

Central AveCommercial Retail
Proposed

Line
Start Time ---------- Flow Values @ time increment of 0.006 hr ----------

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al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

(hr)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
15.568	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.612	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.657	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.701	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.745	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.789	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.834	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.878	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.922	0.08	0.08	0.08	0.08	0.08	0.08	0.08
15.966	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.010	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.055	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.099	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.143	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.187	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.231	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.276	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.320	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.364	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.408	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.452	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.497	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.541	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.585	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.629	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.674	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.718	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.762	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.806	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.850	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.895	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.939	0.08	0.08	0.08	0.08	0.08	0.08	0.08
16.983	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.027	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.071	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.116	0.07	0.07	0.07	0.07	0.07	0.07	0.07

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al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

17.160	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.204	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.248	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.292	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.337	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.381	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.425	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.469	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.514	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.558	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.602	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.646	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.690	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.735	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.779	0.07	0.07	0.07	0.07	0.07	0.07	0.07

Central AveCommercial Retail
Proposed

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)	(cfs)
17.823	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.867	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.911	0.07	0.07	0.07	0.07	0.07	0.07	0.07
17.956	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.000	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.044	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.088	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.132	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.177	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.221	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.265	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.309	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.354	0.07	0.07	0.07	0.07	0.07	0.07	0.07

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al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

18.398	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.442	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.486	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.530	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.575	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.619	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.663	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.707	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.751	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.796	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.840	0.07	0.07	0.07	0.07	0.07	0.07	0.07
18.884	0.07	0.07	0.06	0.06	0.06	0.06	0.06
18.928	0.06	0.06	0.06	0.06	0.06	0.06	0.06
18.972	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.017	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.061	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.105	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.149	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.194	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.238	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.282	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.326	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.370	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.415	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.459	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.503	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.547	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.591	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.636	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.680	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.724	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.768	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.812	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.857	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.901	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.945	0.06	0.06	0.06	0.06	0.06	0.06	0.06
19.989	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.034	0.06	0.06	0.06	0.06	0.06	0.06	0.06

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al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

Central AveCommercial Retail
Proposed

Line Start Time (hr)	Flow Values @ time increment of 0.006 hr (cfs)						
20.078	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.122	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.166	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.210	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.255	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.299	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.343	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.387	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.431	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.476	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.520	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.564	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.608	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.652	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.697	0.06	0.06	0.06	0.06	0.06	0.06	0.06
20.741	0.06	0.06	0.06	0.05	0.05	0.05	0.05
20.785	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.829	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.874	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.918	0.05	0.05	0.05	0.05	0.05	0.05	0.05
20.962	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.006	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.050	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.095	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.139	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.183	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.227	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.271	0.05	0.05	0.05	0.05	0.05	0.05	0.05

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

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al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:

Subarea B Outlet			.00195	92.	.1		

STREAM REACH:

21.316	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.360	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.404	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.448	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.492	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.537	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.581	0.05	0.05	0.05	0.05	0.05	0.05	0.05
21.625	0.05	0.05	0.05	0.05	0.05	0.05	0.05

Central AveCommercial Retail
Proposed

Area or Reach Identifier	Drainage Area (sq mi)	Alternate	Peak Flow by Storm 2-Yr (cfs)	(cfs)	(cfs)	(cfs)	(cfs)
Subarea B	0.002		1.60				
OUTLET	0.002		1.60				

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al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:

Subarea B Outlet	.00195	92.	.1

STREAM REACH:

WinTR-20 Printed Page File Beginning of Input Data List
TR20.inp

WinTR-20: Version 1.10 0 0 0.05
al AveCommercial Retail (continued)
Proposed

STORM 2-Yr

SUB-AREA:
Subarea B Outlet .00195 92. .1

STREAM REACH:

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

PROJECT SOURCE CONTROL BMPS

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☒ **A.** On-site storm drain inlets	☒ Locations of inlets.	☒ Mark all inlets with the words "No Dumping! Flows to Bay" or similar	☒ Maintain and periodically repaint or replace inlet markings ☒ Provide stormwater pollution prevention information to new site owners, lessees, or operators ☒ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ Include the following in lease agreements: 'Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains.
☐ **B.** Interior floor drains and elevator shaft sump pumps		☐ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.
☐ **C.** Interior parking garages		☐ State that parking garage floor drains will be plumbed to the sanitary sewer.	☐ Inspect and maintain drains to prevent blockages and overflow.

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☒ **D1.** Need for future indoor & structural pest control		☒ Note building design features that discourage entry of pests.	☒ Provide Integrated Pest Management information to owners, lessees, and operators.
☒ **D2.** Landscape/Outdoor Pesticide Use Note: should be consistent with project landscape plan (if applicable).	☒ Show Locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ☒ Show self-retaining landscape areas, if any. ☒ Show stormwater treatment and hydrograph modification management BMPs. (See instructions in Chapter 3, Step 5 and guidance in Chapter 5.)	State that final landscape plans will accomplish all of the following: ☒ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☒ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☒ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☒ Consider using pest-resistant plants, especially adjacent to hardscape. ☒ To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	☒ Maintain landscaping using minimum or no pesticides ☒ See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ Provide Integrated Pest Management information to new owners, lessees and operators

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☐ **E.** Pools, spas, ponds, decorative fountains, and other water features	☐ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet.	☐ If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	☐ See applicable operational BMPs in Fact Sheet SC-72, "Fountain and Pool Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
☒ **F.** Food Services	☒ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ☐ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	☐ If the local municipality requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements. ☐ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	☒ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://rcflood.org/stormwater/ Provide this brochure to new site owners, lessees, and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☐ **G.** Refuse areas	☐ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ☐ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms. ☐ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	☐ State how site refuse will be handled and provide supporting detail to what is shown on plans. ☐ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	☐ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available onsite. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
☐ **H.** Industrial processes.	☐ Show process area.	☐ If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	☐ See Fact Sheet SC-10, "Non- Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☐ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	☐ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent contamination. ☐ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ☐ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	☐ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of local Hazardous Materials Programs for: • Hazardous Waste Generation • Hazardous Materials Release Response and Inventory • California Accidental Release (CalARP) • Aboveground Storage Tank • Uniform Fire Code Article 80 Section 103(b) & (c) 1991 • Underground Storage Tank	☐ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC- 33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☐ **J.** Vehicle and Equipment Cleaning	☐ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shutoff to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	☐ If a car wash area is not provided, describe measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ☐ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. ☐ Car dealerships and similar may rinse cars with water only. ☐ See Fact Sheet SC-21, "Vehicle and Equipment Cleaning," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☐ **K.** Vehicle/Equipment Repair and Maintenance	☐ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater.	☐ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area.	In the SUSMP report, note that all of the following restrictions apply to use the site:
	☐ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas.	☐ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	☐ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains.
	☐ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	☐ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	☐ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ☐ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment.

IF THESE SOURCES WILL BE ON THE PROJECT SITE…	…THEN YOUR STORMWATER CONTROL PLAN SHOULD INCLUDE THESE SOURCE CONTROL BMPS		
Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☐ **L.** Fuel Dispensing Areas	☐ Fueling areas1 shall have impermeable floors (i.e., Portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ☐ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area1.] The canopy [or cover] shall not drain onto the fueling area.		☐ The property owner shall dry sweep the fueling area routinely. ☐ See the Business Guide Sheet, "Automotive Service—Service Stations" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
☐ **M.** Loading Docks	☐ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas should be drained to the sanitary sewer where feasible. Direct connections to storm drains from depressed loading docks are prohibited. ☐ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ☐ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		☐ Move loaded and unloaded items indoors as soon as possible. ☐ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
☐ **N.** Fire Sprinkler Test Water		☐ Provide a means to drain fire Sprinkler test water to the sanitary sewer.	☐ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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Potential Sources of Runoff Pollutants	**Permanent Controls – Show on Source Control Exhibit, Appendix 1**	**Permanent Control – List in SUSMP Table and Narrative**	**Operational BMPs – Include in SUSMP Table and Narrative**
O. Miscellaneous Drain or Wash Water			
☐ Boiler Drain Lines		☐ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system.	
☐ Condensate Drain Lines		☐ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system.	
☐ Rooftop Equipment		☐ Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment.	
☐ Drainage Sumps		☐ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water.	
☒ Roofing, gutters, and trim		☒ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff.	
☒ **P.** Plazas, sidewalks, and parking lots			☒ Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain.

Appendix 9: O&M

Operation and Maintenance Plan and Documentation of Finance, Maintenance and Recording Mechanisms

Operations and Maintenance (O&M) Plan

Water Quality Management Plan
For

Central Avenue Commercial Retails

APN: 377-372-038-8

Paljatinder Singh & Bhupinder Kaur
45029 Promise Road,
Lake Elsinore, CA 92532

Property Management Company:
To be determined

Exhibit A, Operations and Maintenance Plan

BMP Applicable? Yes/ No	BMP Name and BMP Implementation, Maintenance, and Inspection Procedures	Implementation, Maintenance, and Inspection Frequency and Schedule	Person or Entity with Operation and Maintenance Responsibility
Non-Structural Source Control BMPs			
Yes	**Education for Property Owners, Tenants, and Occupants** This will be addressed through educational materials. All included materials provide ways of mitigating stormwater pollution in everyday activities associated with employees of the property management company and their sub-contractors. Practical informational materials are provided to increase the public's understanding of stormwater quality, sources of pollutants, and what they can do to reduce pollutants in stormwater.	PMC to provide education material, a copy of the approved WQMP and Operation & Maintenance Plan (O&M) to the owner & employees.	Property Management Company (PMC)
Yes	**Activity Restriction** Rules or guidelines for developments are established within the appropriate documents which prohibit activities that can result in discharges of pollutants.	PMC employees notified of activities that are prohibited by tenants, occupants & employees. Restrictions identified in Employee Manual and reviewed yearly by employees.	PMC
Yes	**Common Area Landscaped Management** Specific practices are followed and ongoing maintenance is conducted to minimize erosion and over-irrigation, conserve water, and reduce pesticide and fertilizer applications.	Professional landscape company to conduct maintenance of landscaping to meet current water efficiency and keep plants healthy and bio areas maintained with proper soil amendments. Regular maintenance once a week and monthly inspection to determine deficiencies	The PMC will maintain or hire professionals to manage the upkeep of the project's landscaped areas.
Yes	**BMP Maintenance** In order to ensure adequate and comprehensive BMP implementation, all responsible parties are identified for implementing all non-structural and structural BMPs, cleaning, inspection, and other maintenance activities are specified including responsible parties for conducting such activities.	A minimum 2 Inspections/ Cleanings per year per manufacturer's specifications starting on or near October 1st (before the rainy season)	PMC (During the first year, a contract between the PMC and manufacturer will be established for inspections. Afterwards, the BMP can be

			inspected by a PMC chosen maintenance crew)
No	**Title 22 CCR Compliance** Hazardous waste is managed properly through compliance with applicable Title 22 regulations. Hazardous materials or wastes will be generated, handled, transported, or disposed of in association with the project; measures are taken to comply with applicable local, state, and federal regulation to avoid harm to humans and the environment.		
No	**Spill Contingency Plan**		
No	**Underground Storage Tank Compliance**		
No	**Uniform Fire Code Implementation**		
Yes	**Common Area Litter Control** The proposed project will have various trash receptacles located near the common areas. Trash management and litter control procedures are specified within this report, including responsible parties, and implemented to reduce pollution of drainage water.	Once per week provide litter removal of site parking lot and landscape areas and to empty common area trash bins.	PMC
Yes	**Employee Training** Practical informational materials and/or training are provided to employees at the initial time of hiring by the PMC to increase their understanding of stormwater quality, sources of pollutants, and their responsibility for reducing pollutants in stormwater.	The distribution of these materials will be the responsibility of the PMC at the initial hiring of the employee.	PMC
No	**Housekeeping of Loading Docks**		
Yes	**Common Area Catch Basin Inspection** In order to ensure adequate and comprehensive BMP implementation, all responsible parties are identified for implementing all non-structural and structural BMPs, cleaning, inspection, and other maintenance activities are specified including responsible parties for conducting such activities.	Common inspection should occur weekly or prior to any significant storm events by method of clearing any trash/ debris from the catch basin.	PMC
Yes	**Street Sweeping Private Streets and Parking Lots** Regular sweeping is conducted to reduce pollution of drainage water.	City's Street Sweeping Services or approved Private Company on a weekly basis	PMC
No	**Retail Gasoline Outlets**		
Structural Source Control BMPs			
Yes	**Provide Storm Drain System Stenciling and Signage** Catch Basin Stenciling and Signage will be placed on all on-site catch basins to the satisfaction of the City Engineer.	Inspect and repair as needed all onsite storm drain stencilling & signage. Inspection should occur at	PMC

		minimum twice per year.	
No	**Design and Construct Outdoor Material Storage Areas to Reduce Pollutant Introduction**		
Yes	**Design and Construct Trash and Waste Storage Areas to Reduce Pollutant Introduction**	A trash enclosure will be constructed for the site. PMC will make sure no runoff will enter or leave the enclosure.	PMC
Yes	**Use Efficient Irrigation Systems and Landscape Design** Site efficient irrigation and landscaping has been implemented by the project's landscape architect to the satisfaction of the City Engineer and Planning Department.	Efficient irrigation and landscaping should be implemented prior to construction completion by the Contractor. The PMC will be responsible for the upkeep. Irrigation piping, timers, and landscaped areas should be inspected at least 4 times per year by the PMC or a professional landscaper.	The PMC will maintain or hire professionals to manage the upkeep of the project's landscaped
No	**Protect Slopes and Channels and Provide Energy Dissipation**		
No	**Loading Docks**		
No	**Maintenance Bays**		
No	**Vehicle Wash Areas**		
No	**Outdoor Processing Areas**		
No	**Equipment Wash Areas**		
No	**Fueling Areas**		
No	**Hillside Landscaping**		
No	**Wash Water Controls for Food Preparation Area**		

BMPs			
Yes	**Cultec Recharger 902HD**		PMC to hire professional maintenance company
	Check inlets and outlets for clogging and remove any debris, as required	Monthly in first Year, every sping and fall and every third year following.	
	Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.	Every 3 years	
	Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV of comparable technique.	2 years after commissioning	
	Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.	2 years after commissioning	
	Clean storm water management chambers and feed connectors of any debris.	9 years after commissioning and every 9 years following.	
	Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique.	9 years after commissioning and every 9 years following.	
	Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.	9 years after commissioning and every 9 years following.	
	Clean Stormwater management chambers and feed connectors of any debris	45 years after commissioning	
	Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required.	45 years after commissioning	
	Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique/	45 years after commissioning	

	Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection.	45 years after commissioning	
	Attain the appropriate approvals as required.	45 years after commissioning	
	Establish a new operation and maintenance schedule.	45 years after commissioning	
	Check for depressions in areas over and surrounding the stormwater management system.	Monthly in 1st year.	
	Check for depressions in areas over and surrounding the stormwater management system.	Spring and Fall	
	Confirm that no unauthorized modifications have been performed to the site.	Yearly	

Required Permits

This section must list any permits required for the implementation, operation, and maintenance of the BMPs. Possible examples are:

- No required permits are needed for the implementation, operation, and maintenance of the previously listed BMPs.

Forms to Record the BMP Implementation, Maintenance, and Inspection

The form that will be used to record the implementation, maintenance, and inspection of the BMPs is attached.

Recordkeeping

All records must be maintained for at least five (5) years and must be made available for review upon request.

Notice to Owner:

The property is currently owned by Paljatinder Singh & Bhupinder Kaur. The Owner will be responsible for the long term maintenance of the project's storm water facilities and conformance to this WQMP after construction is complete.

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

RECORD OF BMP IMPLEMENTATION, MAINTENANCE, AND INSPECTION

Today's Date: _____

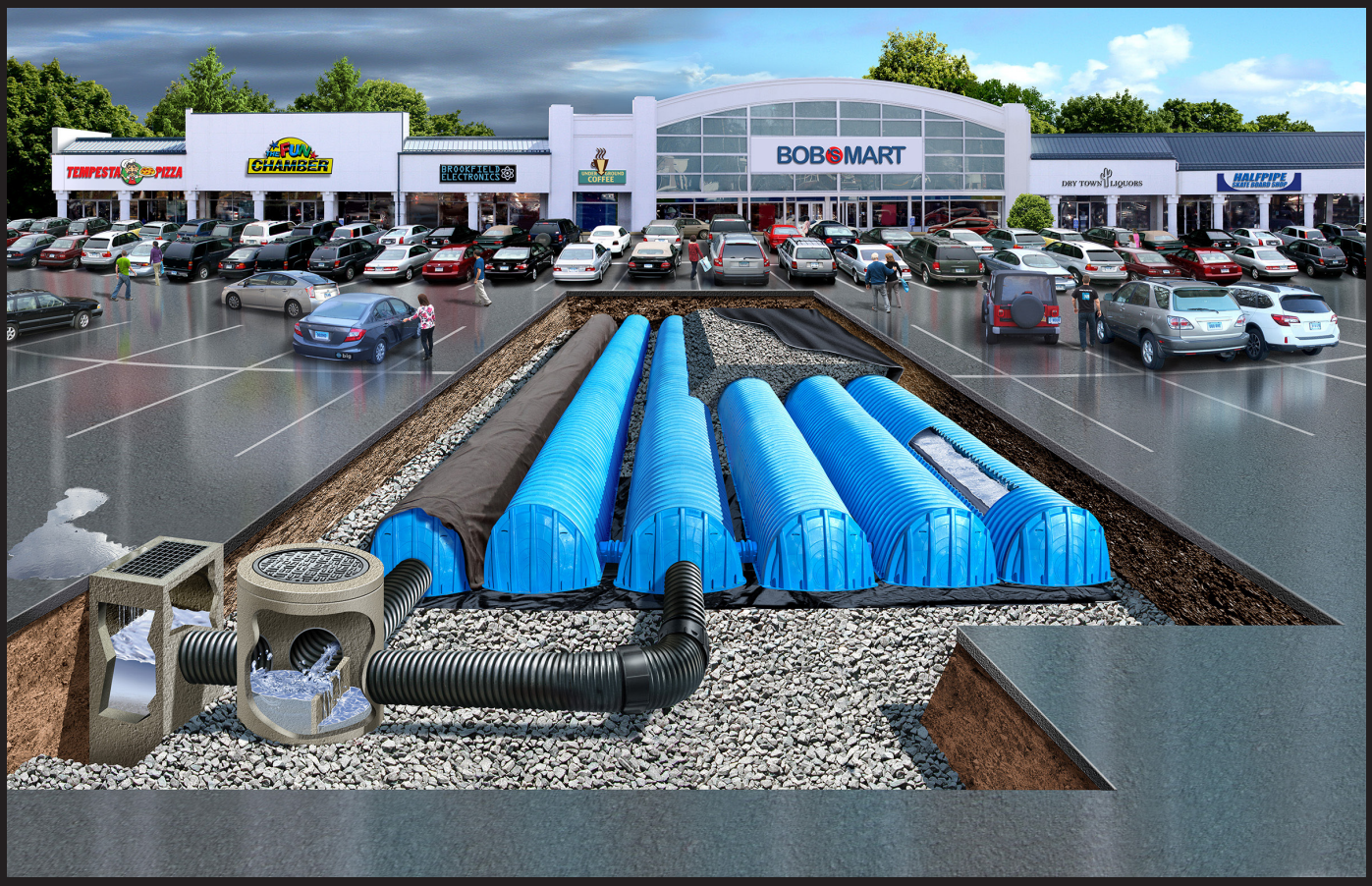
Name of Person Performing Activity: _____
(Printed)

Signature: _____

BMP Name (As Shown on O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

CONTACTOR® & RECHARGER®

STORMWATER MANAGEMENT SOLUTIONS



OPERATION & MAINTENANCE GUIDELINES

FOR CULTEC STORMWATER MANAGEMENT SYSTEMS

CULTEC®

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For technical support, please call (203)775-4416 ext. 203 or e-mail tech@cultec.com.

Visit www.cultec.com/downloads.html for Product Downloads and CAD details.

Doc ID: CLT057 01-20
January 2020

These instructions are for single-layer traffic applications only. For multi-layer applications, contact CULTEC.
All illustrations and photos shown herein are examples of typical situations. Be sure to follow the engineer's drawings.
Actual designs may vary.

This manual contains guidelines recommended by CULTEC, Inc. and may be used in conjunction with, but not to supersede, local regulations or regulatory authorities. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Introduction

The CULTEC Subsurface Stormwater Management System is a high-density polyethylene (HDPE) chamber system arranged in parallel rows surrounded by washed stone. The CULTEC chambers create arch-shaped voids within the washed stone to provide stormwater detention, retention, infiltration, and reclamation. Filter fabric is placed between the native soil and stone interface to prevent the intrusion of fines into the system. In order to minimize the amount of sediment which may enter the CULTEC system, a sediment collection device (stormwater pretreatment device) is recommended upstream from the CULTEC chamber system. Examples of pretreatment devices include, but are not limited to, an appropriately sized catch basin with sump, pretreatment catchment device, oil grit separator, or baffled distribution box. Manufactured pretreatment devices may also be used in accordance with CULTEC chambers. Installation, operation, and maintenance of these devices shall be in accordance with manufacturer's recommendations. Almost all of the sediment entering the stormwater management system will be collected within the pretreatment device.

Best Management Practices allow for the maintenance of the preliminary collection systems prior to feeding the CULTEC chambers. The pretreatment structures shall be inspected for any debris that will restrict inlet flow rates. Outfall structures, if any, such as outlet control must also be inspected for any obstructions that would restrict outlet flow rates. OSHA Guidelines must be followed when inspecting or cleaning any structure.

Operation and Maintenance Requirements

I. Operation

CULTEC stormwater management systems shall be operated to receive only stormwater run-off in accordance with applicable local regulations. CULTEC subsurface stormwater management chambers operate at peak performance when installed in series with pretreatment. Pretreatment of suspended solids is superior to treatment of solids once they have been introduced into the system. The use of pretreatment is adequate as long as the structure is maintained and the site remains stable with finished impervious surfaces such as parking lots, walkways, and pervious areas are properly maintained. If there is to be an unstable condition, such as improvements to buildings or parking areas, all proper silt control measures shall be implemented according to local regulations.

II. Inspection and Maintenance Options

A. The CULTEC system may be equipped with an inspection port located on the inlet row. The inspection port is a circular cast box placed in a rectangular concrete collar. When the lid is removed, a 6-inch (150 mm) pipe with a screw-in plug will be exposed. Remove the plug. This will provide access to the CULTEC Chamber row below. From the surface, through this access, the sediment may be measured at this location. A stadia rod may be used to measure the depth of sediment if any in this row. If the depth of sediment is in excess of 3 inches (76 mm), then this row should be cleaned with high pressure water through a culvert cleaning nozzle. This would be carried out through an upstream manhole or through the CULTEC StormFilter Unit (or other pretreatment device). CCTV inspection of this row can be deployed through this access port to deter mine if any sediment has accumulated in the inlet row.

B. If the CULTEC bed is not equipped with an inspection port, then access to the inlet row will be through an upstream manhole or the CULTEC StormFilter.

1. Manhole Access
This inspection should only be carried out by persons trained in confined space entry and sewer inspection services. After the manhole cover has been removed a gas detector must be lowered into the manhole to ensure that there are not high concentrations of toxic gases present. The inspector should be lowered into the manhole with the proper safety equipment as per OSHA requirements. The inspector may be able to observe sediment from this location. If this is not possible, the inspector will need to deploy a CCTV robot to permit viewing of the sediment.

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2. StormFilter Access
Remove the manhole cover to allow access to the unit. Typically a 30-inch (750 mm) pipe is used as a riser from the StormFilter to the surface. As in the case with manhole access, this access point requires a technician trained in confined space entry with proper gas detection equipment. This individual must be equipped with the proper safety equipment for entry into the StormFilter. The technician will be lowered onto the StormFilter unit. The hatch on the unit must be removed. Inside the unit are two filters which may be removed according to StormFilter maintenance guidelines. Once these filters are removed the inspector can enter the StormFilter unit to launch the CCTV camera robot.

C. The inlet row of the CULTEC system is placed on a polyethylene liner to prevent scouring of the washed stone beneath this row. This also facilitates the flushing of this row with high pressure water through a culvert cleaning nozzle. The nozzle is deployed through a manhole or the StormFilter and extended to the end of the row. The water is turned on and the inlet row is back-flushed into the manhole or StormFilter. This water is to be removed from the manhole or StormFilter using a vacuum truck.

III. Maintenance Guidelines

The following guidelines shall be adhered to for the operation and maintenance of the CULTEC stormwater management system:

A. The owner shall keep a maintenance log which shall include details of any events which would have an effect on the system's operational capacity.

B. The operation and maintenance procedure shall be reviewed periodically and changed to meet site conditions.

C. Maintenance of the stormwater management system shall be performed by qualified workers and shall follow applicable occupational health and safety requirements.

D. Debris removed from the stormwater management system shall be disposed of in accordance with applicable laws and regulations.

IV. Suggested Maintenance Schedules

A. Minor Maintenance
The following suggested schedule shall be followed for routine maintenance during the regular operation of the stormwater system:

Frequency	Action
Monthly in first year	Check inlets and outlets for clogging and remove any debris, as required.
Spring and Fall	Check inlets and outlets for clogging and remove any debris, as required.
One year after commissioning and every third year following	Check inlets and outlets for clogging and remove any debris, as required.

B. Major Maintenance
The following suggested maintenance schedule shall be followed to maintain the performance of the CULTEC stormwater management chambers. Additional work may be necessary due to insufficient performance and other issues that might be found during the inspection of the stormwater management chambers. (See table on next page)

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	Frequency	Action
Inlets and Outlets	Every 3 years	• Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
	Spring and Fall	• Check inlet and outlets for clogging and remove any debris as required.
CULTEC Stormwater Chambers	2 years after commissioning	• Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
	9 years after commissioning every 9 years following	• Clean stormwater management chambers and feed connectors of any debris. • Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. • Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
	45 years after commissioning	• Clean stormwater management chambers and feed connectors of any debris. • Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. • Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. • Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. • Attain the appropriate approvals as required. • Establish a new operation and maintenance schedule.
Surrounding Site	Monthly in 1st year	• Check for depressions in areas over and surrounding the stormwater management system.
	Spring and Fall	• Check for depressions in areas over and surrounding the stormwater management system.
	Yearly	• Confirm that no unauthorized modifications have been performed to the site.

For additional information concerning the maintenance of CULTEC Subsurface Stormwater Management Chambers, please contact CULTEC, Inc. at 1-800-428-5832.

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WQMP
Operation & Maintenance (O&M) Plan

Project Name:_____

Prepared for:

Project Name: _____

Address:_____

City, State Zip:_____

Prepared on:

Date:_____

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.

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This O&M Plan describes the designated responsible party for implementation of this WQMP, including: operation and maintenance of all the structural BMP(s), conducting the training/educational program and duties, and any other necessary activities. The O&M Plan includes detailed inspection and maintenance requirements for all structural BMPs, including copies of any maintenance contract agreements, manufacturer's maintenance requirements, permits, etc.

8.1.1 Project Information

Project name	
Address	
City, State Zip	
Site size	
List of structural BMPs, number of each	
Other notes	

8.1.2 Responsible Party

The responsible party for implementation of this WQMP is:

Name of Person or HOA Property Manager	
Address	
City, State Zip	
Phone number	
24-Hour Emergency Contact number	
Email	

8.1.3 Record Keeping

Parties responsible for the O&M plan shall retain records for at least 5 years.

All training and educational activities and BMP operation and maintenance shall be documented to verify compliance with this O&M Plan. A sample Training Log and Inspection and Maintenance Log are included in this document.

8.1.4 Electronic Data Submittal

This document along with the Site Plan and Attachments shall be provided in PDF format. AutoCAD files and/or GIS coordinates of BMPs shall also be submitted to the City.

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Appendix ____

BMP SITE PLAN

Site plan is preferred on minimum 11” by 17” colored sheets, as long as legible.

For more information, contact CULTEC at (203) 775-4416 or visit www.cultec.com.
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BMP OPERATION & MAINTENANCE LOG

Project Name: _____

Today's Date: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

BMP Name (As Shown in O&M Plan)	Brief Description of Implementation, Maintenance, and Inspection Activity Performed

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Minor Maintenance

Frequency		Action
Monthly in first year		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Month 1	Date:	
□ Month 2	Date:	
□ Month 3	Date:	
□ Month 4	Date	
□ Month 5	Date:	
□ Month 6	Date:	
□ Month 7	Date:	
□ Month 8	Date:	
□ Month 9	Date:	
□ Month 10	Date:	
□ Month 11	Date:	
□ Month 12	Date:	
Spring and Fall		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
□ Spring	Date:	
□ Fall	Date:	
One year after commissioning and every third year following		Check inlets and outlets for clogging and remove any debris, as required.
		Notes
□ Year 1	Date:	
□ Year 4	Date:	
□ Year 7	Date:	
□ Year 10	Date:	
□ Year 13	Date:	
□ Year 16	Date:	
□ Year 19	Date:	
□ Year 22	Date:	

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Major Maintenance

	Frequency		Action
Inlets and Outlets	**Every 3 years**		Obtain documentation that the inlets, outlets and vents have been cleaned and will function as intended.
			Notes
	□ Year 1	Date:	
	□ Year 4	Date:	
	□ Year 7	Date:	
	□ Year 10	Date:	
	□ Year 13	Date:	
	□ Year 16	Date:	
	□ Year 19	Date:	
	□ Year 22	Date:	
	Spring and Fall		Check inlet and outlets for clogging and remove any debris, as required.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
CULTEC Stormwater Chambers	**2 years after commissioning**		□ Inspect the interior of the stormwater management chambers through inspection port for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors will function as anticipated.
			Notes
	□ Year 2	Date:	

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Major Maintenance

	Frequency		Action
CULTEC Stormwater Chambers	**9 years after commissioning every 9 years following**		□ Clean stormwater management chambers and feed connectors of any debris. □ Inspect the interior of the stormwater management structures for deficiencies using CCTV or comparable technique. □ Obtain documentation that the stormwater management chambers and feed connectors have been cleaned and will function as intended.
			Notes
	□ Year 9	Date:	
	□ Year 18	Date:	
	□ Year 27	Date:	
	□ Year 36	Date:	
	45 years after commissioning		□ Clean stormwater management chambers and feed connectors of any debris. □ Determine the remaining life expectancy of the stormwater management chambers and recommended schedule and actions to rehabilitate the stormwater management chambers as required. □ Inspect the interior of the stormwater management chambers for deficiencies using CCTV or comparable technique. □ Replace or restore the stormwater management chambers in accordance with the schedule determined at the 45-year inspection. □ Attain the appropriate approvals as required. □ Establish a new operation and maintenance schedule.
			Notes
	□ Year 45	Date:	

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Major Maintenance

	Frequency		Action
Surrounding Site	**Monthly in 1st year**		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Month 1	Date:	
	□ Month 2	Date:	
	□ Month 3	Date:	
	□ Month 4	Date:	
	□ Month 5	Date:	
	□ Month 6	Date:	
	□ Month 7	Date:	
	□ Month 8	Date:	
	□ Month 9	Date:	
	□ Month 10	Date:	
	□ Month 11	Date:	
	□ Month 12	Date:	
	Spring and Fall		□ Check for depressions in areas over and surrounding the stormwater management system.
			Notes
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	□ Spring	Date:	
	□ Fall	Date:	
	Yearly		□ Confirm that no unauthorized modifications have been performed to the site.
			Notes
	□ Year 1	Date:	
	□ Year 2	Date:	
	□ Year 3	Date:	
	□ Year 4	Date:	
	□ Year 5	Date:	
	□ Year 6	Date:	
	□ Year 7	Date:	

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RETENTION • DETENTION • INFILTRATION • WATER QUALITY

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Appendix 10: Educational Materials

BMP Fact Sheets, Maintenance Guidelines and Other End-User BMP Information

Stormwater and the Construction Industry

Protect Natural Features



Bad

Good

- Minimize clearing.
- Minimize the amount of exposed soil.
- Identify and protect areas where existing vegetation, such as trees, will not be disturbed by construction activity.
- Protect streams, stream buffers, wild woodlands, wetlands, or other sensitive areas from any disturbance or construction activity by fencing or otherwise clearly marking these areas.

Construction Phasing



- Sequence construction activities so that the soil is not exposed for long periods of time.
- Schedule or limit grading to small areas.
- Install key sediment control practices before site grading begins.
- Schedule site stabilization activities, such as landscaping, to be completed immediately after the land has been graded to its final contour.

Vegetative Buffers

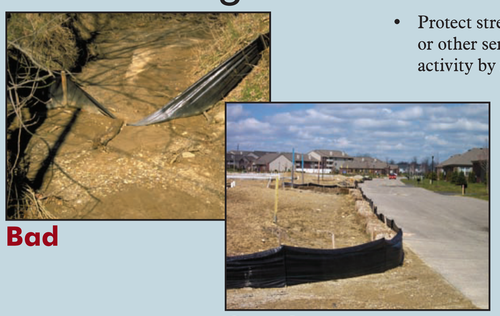


Bad

Good

- Protect and install vegetative buffers along waterbodies to slow and filter stormwater runoff.
- Maintain buffers by mowing or replanting periodically to ensure their effectiveness.

Silt Fencing



Bad

Good

- Inspect and maintain silt fences after each rainstorm.
- Make sure the bottom of the silt fence is buried in the ground.
- Securely attach the material to the stakes.
- Don't place silt fences in the middle of a waterway or use them as a check dam.
- Make sure stormwater is not flowing around the silt fence.

Maintain your BMPs!

IN RIVERSIDE COUNTY....Call 1-800-506-2555

TO REPORT ILLEGAL STORMDRAIN DISPOSAL

E-mail: Flood.fcnpdes@co.riverside.ca.us

Visit our website: www.floodcontrol.co.riverside.ca.us

Brought to you by the Storm Water/Clean Water Pollution Protection Program.....

REMEMBER, ONLY RAIN IN THE STORMDRAIN!

Site Stabilization



Bad

Good

- Vegetate, mulch, or otherwise stabilize all exposed areas as soon as land alterations have been completed.

Construction Entrances



Bad

Good

- Remove mud and dirt from the tires of construction vehicles before they enter a paved roadway.
- Properly size entrance BMPs for all anticipated vehicles.
- Make sure that the construction entrance does not become buried in soil.

Slopes



Bad

Good

- Rough grade or terrace slopes.
- Break up long slopes with sediment barriers, or under drain, or divert stormwater away from slopes.

Dirt Stockpiles



Bad

Good

- Cover or seed all dirt stockpiles.

Storm Drain Inlet Protection



Bad

Good

- Use rock or other appropriate material to cover the storm drain inlet to filter out trash and debris.
- Make sure the rock size is appropriate (usually 1 to 2 inches in diameter).
- If you use inlet filters, maintain them regularly.

www.epa.gov/npdes/menuofbmps

Stormwater and the Construction Industry

Planning and Implementing Erosion and Sediment Control Practices

The construction industry is a critical participant in the nation's efforts to protect streams, rivers, lakes, wetlands, and oceans. Through the use of best management practices (BMPs), construction site operators are the key defense against erosion and sedimentation.

As stormwater flows over a construction site, it picks up pollutants like sediment, debris, and chemicals. High volumes of stormwater can also cause stream bank erosion, and destroy downstream aquatic habitat. Preventing soil erosion and sedimentation is an important responsibility at all construction sites.

In addition to the environmental impact, uncontrolled erosion can have a significant financial impact on a construction project. It costs money and time to repair gullies, replace vegetation, clean sediment-clogged storm drains, replace poorly installed BMPs, and mitigate damage to other people's property or to natural resources.

Best Management Practice (BMP)
A BMP is a method used to prevent or control stormwater runoff and the discharge of pollutants, including sediment, into local waterbodies. Silt fences, inlet protection, and site-stabilization techniques are typical BMPs on a construction site.

Operator
An operator is someone who has control over and the ability to modify construction plans and specifications (e.g. owner, general contractor)

or

Someone who has control over the day-to-day operations at a site (e.g., owner, general contractor) that are necessary to ensure compliance with the permit requirements. It is the responsibility of a construction site owner or operator to contain stormwater runoff and prevent erosion during **all** stages of a project.

There may be more than one person at a site who meets these definitions and must apply for permit coverage. (States may have different definitions of the term "operator.")

So what's being done about polluted runoff?

The Clean Water Act includes the National Pollutant Discharge Elimination System (NPDES) permitting program. As of January 2003, 44 states and territories are authorized to issue NPDES stormwater permits. If your state isn't authorized to operate the NPDES stormwater permit program, EPA issues the permits. Permits vary from state to state, so contact your state or EPA for specific information. Your permitting authority has specific information on your state's NPDES stormwater permit program. In general, construction permits require construction operators to do all of the following:

- Develop and implement a stormwater pollution prevention plan
- Submit a permit application or notice of intent (NOI)
- Comply with the permit, including maintaining BMPs and inspecting the site

Under the NPDES program, construction activities that disturb 1 or more acres are required to obtain stormwater permit coverage. States have different names for the plans that construction operators must develop, such as

- Stormwater pollution prevention plan
- Erosion and sediment control plan
- Erosion control and stormwater management plan
- Stormwater management plan
- Water pollution control plan
- Pollution prevention plan

This document uses the term "*Plan*."

I think I need a permit... Where do I start?

All land-disturbing activities, including clearing, grading, and excavation, that disturb **1 or more acres** are required to be covered under a state or EPA-issued NPDES construction stormwater permit **prior to land disturbance**. Permit requirements vary by state. Begin by researching the specific requirements in your state. You might already be subject to local erosion and sediment control requirements, but that doesn't release you from the requirements of the NPDES program at the state or EPA level. Although you must comply with both sets of requirements, in most cases they have been designed to be complementary. Contact your permitting authority to find out exactly what you need to do. A good place to start your search is the Construction Industry Compliance Assistance web site at http://www.envcap.org/cica.

The NPDES permit requirements include small construction activities that are part of a larger common plan of development or sale, such as a single lot within a larger subdivision. For developments with multiple operators, all operators must have permit coverage for their individual parts of the larger development, no matter how large or small each operation happens to be. When there are multiple operators at one site, they're encouraged to develop and share one comprehensive Plan and obtain permit coverage as co-permitees.

The **owner or operator** of the construction site is responsible for complying with the requirements of the permit. Responsibilities include developing a Plan, obtaining permit coverage, implementing BMPs, and stabilizing the site at the end of the construction activity.

Construction sites that discharge unpermitted stormwater are in violation of the Clean Water Act and may be subject to fines of up to $27,500 a day per violation.

Determine your eligibility

All construction activity that disturbs 1 or more acres of land, as well as activity that disturbs less than 1 acre but is part of a larger common plan of development, must obtain permit coverage.

Read and understand your stormwater permit requirements

Get a copy of the permit for construction activities and a permit application (or notice of intent form) from your state or EPA permitting authority.

Develop a Plan

Most states do not require you to submit your Plan. However, you do need to keep the Plan on site. If that's impractical, you may post a notice that tells where the Plan is kept so it can be accessed by the permitting authority and other interested parties.

You'll need to post a copy of your completed application on site. Put it in a place where the public can see it so they'll know your site is covered by an NPDES permit!

Apply for permit coverage

Once you understand your permit requirements and have developed a Plan, you can submit a stormwater permit application (or notice of intent) to your permitting authority. This must be done before beginning any land disturbance on the site. Some states require a few days of lead time, so check with your permitting authority. Once you've submitted the application, you must satisfy the conditions of the permit.

Implement the Plan

Be prepared to implement the BMPs in your Plan before construction begins. Ensure that BMPs are properly maintained, and upgrade and repair them as necessary.

Developing and Implementing a Plan

You must have a Plan that includes erosion and sediment control and pollution prevention BMPs. These Plans require

- Advance planning and training to ensure proper implementation of the BMPs
- Erosion and sediment control BMPs in place until the area is permanently stabilized
- Pollution prevention BMPs to keep the construction site "clean"
- Regular inspection of the construction site to ensure proper installation and maintenance of BMPs

Fortunately, the practices and measures that must be included in your Plan are already part of the standard operating procedures at many construction sites.

Six steps are associated with developing and implementing a stormwater Plan. There's a wealth of information available on developing pollution prevention plans. Please contact your permitting authority for help in finding additional guidance materials, or visit www.epa.gov/npdes/stormwater. A sample construction plan is available at www.epa.gov/npdes/pubs/sample_swppp.pdf.

1. *Site Evaluation and Design Development*

- **Collect site information**
- **Develop site plan design**
- **Prepare pollution prevention site map**

The first step in preparing a Plan is to define the characteristics of the site and the type of construction that will occur. This involves collecting site information, identifying natural features that should be protected, developing a site plan design, describing the nature of the construction activity, and preparing a pollution prevention site map.

2. *Assessment*

- **Measure the site area**
- **Determine the drainage areas**
- **Calculate the runoff coefficient**

The next step is assessing the impact the project will have on stormwater runoff. Determine the drainage areas and estimate the runoff amounts and velocities. For more information on calculatng the runoff coefficient, go to www.epa.gov/npdes/pubs/chap02_conguide.pdf, page 11.

3. *Control Selection and Plan Design*

- **Review and incorporate state or local requirements**
- **Select erosion and sediment controls**
- **Select other controls**
- **Select stormwater management controls**
- **Indicate the location of controls on the site map**
- **Prepare an inspection and maintenance plan**
- **Coordinate controls with construction activity**
- **Prepare sequence of major activities**

In the third step you'll actually document your procedures to prevent and control polluted stormwater runoff. You must delineate areas that will not be disturbed, including critical natural areas like streamside areas, floodplains, and trees. You must also identify the measures (or BMPs) you'll use to protect these areas.

Phasing your project to minimize the amount of exposed soil at any given time is a highly effective way to prevent erosion. Erosion control measures designed to prevent soil from being mobilized include diversions to route stormwater away from exposed soils and stabilization with vegetation, mulch, and geotextiles. Sedimentation control measures designed to remove sediment from stormwater or prevent it from leaving the site include silt fences, sediment traps, and diversions.

You'll need to select erosion and sediment controls—including stabilization measures for protecting disturbed areas and structural controls for diverting run-off and removing sediment—that are appropriate for your particular site. The appropriateness of the control measures will depend on several factors, but will be influenced most directly by the site characteristics. Some stabilization measures you might consider are temporary seeding, permanent seeding, and mulching. Structural control measures include earth dikes, silt fences, and sediment traps. No single BMP will meet all of the erosion and sedimentation control needs of a construction site. A combination of BMPs is necessary. For more information on the types of BMPs appropriate for your construction site, see the BMP fact sheet series available at www.epa.gov/npdes/menuofbmps.

Soil erosion control tips...

- Design the site to infiltrate stormwater into the ground and to keep it out of storm drains. Eliminate or minimize the use of stormwater collection and conveyance systems while maximizing the use of stormwater infiltration and bioretention techniques.
- Minimize the amount of exposed soil on site.
  - To the extent possible, plan the project in stages to minimize the amount of area that is bare and subject to erosion. The less soil exposed, the easier and cheaper it will be to control erosion.
  - Vegetate disturbed areas with permanent or temporary seeding immediately upon reaching final grade.
  - Vegetate or cover stockpiles that will not be used immediately.
- Reduce the velocity of stormwater both onto and away from the project area.
  - Interceptors, diversions, vegetated buffers, and check dams are a few of the BMPs that can be used to slow down stormwater as it travels across and away from the project site.
  - Diversion measures can also be used to direct flow away from exposed areas toward stable portions of the site.
  - Silt fences and other types of perimeter filters should never be used to reduce the velocity of runoff.
- Protect defined channels immediately with measures adequate to handle the storm flows expected.
  - Sod, geotextile, natural fiber, riprap, or other stabilization measures should be used to allow the channels to carry water without causing erosion. Use softer measures like geotextile or vegetation where possible to prevent downstream impacts.
- Keep sediment on site.
  - Place aggregate or stone at construction site vehicle exits to accommodate at least two tire revolutions of large construction vehicles. Much of the dirt on the tires will fall off before the vehicle gets to the street.
  - Regular street sweeping at the construction entrance will prevent dirt from entering storm drains. Do not hose paved areas.
  - Sediment traps and basins are temporary structures and should be used in conjunction with other measures to reduce the amount of erosion.
- Maintaining all BMPs is critical to ensure their effectiveness during the life of the project.
  - Regularly remove collected sediment from silt fences, berms, traps, and other BMPs.
  - Ensure that geotextiles and mulch remain in place until vegetation is well established.
  - Maintain fences that protect sensitive areas, silt fences, diversion structures, and other BMPs.

Other BMPs and Activities to Control Polluted Runoff

You'll need to select other controls to address potential pollutant sources on your site. Construction materials, debris, trash, fuel, paint, and stockpiles become pollution sources when it rains. Basic pollution prevention practices can significantly reduce the amount of pollution leaving construction sites. The following are some simple practices that should be included in the Plan and implemented on site:

- Keep potential sources of pollution out of the rain as practicable (e.g., inside a building, covered with plastic or tarps, or sealed tightly in a leak-proof container).
- Clearly identify a protected, lined area for concrete truck washouts. This area should be located away from streams, storm drain inlets, or ditches and should be cleaned out periodically.
- Park, refuel, and maintain vehicles and equipment in one area of the site to minimize the area exposed to possible spills and fuel storage. This area should be well away from streams, storm drain inlets, or ditches. Keep spill kits close by and clean up any spills or leaks immediately, including spills on pavement or earthen surfaces.
- Practice good housekeeping. Keep the construction site free of litter, construction debris, and leaking containers. Keep all waste in one area to minimize cleaning.
- Never hose down paved surfaces to clean dust, debris, or trash. This water could wash directly into storm drains or streams. Sweep up materials and dispose of them in the trash. Never bury trash or debris!
- Dispose of hazardous materials properly.

4. *Certification and Notification*

- **Certify the Plan**
- **Submit permit application or notice of intent**

Once the Plan has been developed, an authorized representative must sign it. Now is the time to submit the permit application or notice of intent. Your permit might require that the Plan be kept on site, so be sure to keep it available for the staff implementing the Plan.

Erosion and sedimentation control practices are only as good as their installation and maintenance.

5. *Implementing and Maintaining a Plan*

- **Implement controls**
- **Inspect and maintain controls**
- **Update/change the Plan**
- **Report releases of hazardous materials**

A Plan describes the practices and activities you'll use to prevent stormwater contamination and meet the NPDES permit requirements. Make sure that the Plan is implemented and that the Plan is updated as necessary to reflect changes on the site.

Erosion and sedimentation control practices are only as good as their installation and maintenance. Train the contractors that will install the BMPs and inspect immediately to ensure that the BMPs have been installed correctly.

Regularly inspect the BMPs (especially before and after rain events) and perform any necessary repairs or maintenance immediately. Many BMPs are designed to handle a limited amount of sediment. If not maintained, they'll become ineffective and a source of sediment pollution.

It's also important to keep records of BMP installation, implementation, and maintenance. Keep track of major grading activities that occur on the site, when construction activities cease (temporarily or permanently), and when a site is temporarily or permanently stabilized.

If construction plans change at any time, or if more appropriate BMPs are chosen for the site, update the Plan accordingly.

6. *Completing the Project: Final Stabilization and Termination of the Permit*

- **Final stabilization**
- **Notice of Termination**
- **Record retention**

Many states and EPA require a Notice of Termination (NOT) or other notification signifying that the construction activity is completed. An NOT is required when

- Final stabilization has been achieved on all portions of the site for which the permittee is responsible.
- Another operator has assumed control over all areas of the site that have not been finally stabilized. That operator would need to submit a new permit application to the permitting authority.
- For residential construction only, temporary stabilization of a lot has been completed prior to transference of ownership to the homeowner, with the homeowner being made aware of the need to perform final stabilization.

Permittees must keep a copy of their permit application and their Plan for at least 3 years following final stabilization. This period may be longer depending on state and local requirements.

Preconstruction Checklist

- A site description, including
  - Nature of the activity
  - Intended sequence of major construction activities
  - Total area of the site
  - Existing soil type and rainfall runoff data
  - A site map with:
    - Drainage patterns
    - Approximate slopes after major grading
    - Area of soil disturbance
    - Outline of areas which will not be disturbed
    - Location of major structural and nonstructural soil erosion controls
    - Areas where stabilization practices are expected to occur
    - Surface waters
    - Stormwater discharge locations
  - Name of the receiving water(s)
- A description of controls:
  - Erosion and sediment controls, including
    - Stabilization practices for all areas disturbed by construction
    - Structural practices for all drainage/discharge locations
  - Stormwater management controls, including
    - Measures used to control pollutants occurring in stormwater discharges after construction activities are complete
    - Velocity dissipation devices to provide nonerosive flow conditions from the discharge point along the length of any outfall channel
  - Other controls, including
    - Waste disposal practices that prevent discharge of solid materials
    - Measures to minimize offset tracking of sediments by construction vehicles
    - Measures to ensure compliance with state or local waste disposal, sanitary sewer, or septic system regulations
  - Description of the timing during the construction when measures will be implemented
- State or local requirements incorporated into the Plan
- Inspection and maintenance procedures for control measures identified in the Plan
- Contractor certification and Plan certification

Implementation Checklist

- Maintain records of construction activities, including
  - Dates when major grading activities occur
  - Dates when construction activities temporarily cease on the site or a portion of the site
  - Dates when construction activities permanently cease on the site or a portion of the site
  - Dates when stabilization measures are completed on the site
- Prepare inspection reports summarizing
  - Name of person conducting BMP inspections
  - Qualifications of person conducting BMP inspections
  - BMPs/areas inspected
  - Observed conditions
  - Necessary changes to the Plan
- Report releases of reportable quantities of oil or hazardous materials
  - Notify the National Response Center at 800-424-8802 immediately
  - Report releases to your permitting authority immediately, or as specified in your permit. You must also provide a written report within 14 days.
  - Modify the Plan to include
    - The date of release
    - Circumstances leading to the release
    - Steps taken to prevent reoccurrence of the release
- Modify Plan as necessary
  - Incorporate requests of the permitting authority to bring the Plan into compliance
  - Address changes in design, construction operation, or maintenance that affect the potential for discharge of pollutants

An ounce of prevention is worth a pound of cure! It's far more efficient and cost-effective to prevent pollution than it is to try to correct problems later. Installing and maintaining simple BMPs and pollution prevention techniques on site can greatly reduce the potential for stormwater pollution and can also save you money!

Visit www.epa.gov/npdes/stormwater for more information.

StormWater CleanWater PROTECTION PROGRAM

Helpful telephone numbers and links:

Riverside County Stormwater Protection Partners

Flood Control District	(951) 955-1200
County of Riverside	(951) 955-1000
City of Banning	(951) 922-3105
City of Beaumont	(951) 769-8520
City of Calimesa	(909) 795-9801
City of Canyon Lake	(951) 244-2955
Cathedral City	(760) 770-0327
City of Coachella	(760) 398-4978
City of Corona	(951) 736-2447
City of Desert Hot Springs	(760) 329-6411
City of Eastvale	(951) 361-0900
City of Hemet	(951) 765-2300
City of Indian Wells	(760) 346-2489
City of Indio	(760) 391-4000
City of Lake Elsinore	(951) 674-3124
City of La Quinta	(760) 777-7000
City of Menifee	(951) 672-6777
City of Moreno Valley	(951) 413-3000
City of Murrieta	(951) 304-2489
City of Norco	(951) 270-5607
City of Palm Desert	(760) 346-0611
City of Palm Springs	(760) 323-8299
City of Perris	(951) 943-6100
City of Rancho Mirage	(760) 324-4511
City of Riverside	(951) 361-0900
City of San Jacinto	(951) 654-7337
City of Temecula	(951) 694-6444
City of Wildomar	(951) 677-7751

REPORT ILLEGAL STORM DRAIN DISPOSAL
1-800-506-2555 or e-mail us at
fcnpdes@rcflood.org

- Riverside County Flood Control and Water Conservation District
  www.rcflood.org

Online resources include:

- California Storm Water Quality Association
  www.casqa.org
- State Water Resources Control Board
  www.waterboards.ca.gov
- Power Washers of North America
  www.thepwna.org

Stormwater Pollution

What you should know for...

Outdoor Cleaning Activities and Professional Mobile Service Providers



Storm drain pollution prevention information for:

- Car Washing / Mobile Detailers
- Window and Carpet Cleaners
- Power Washers
- Waterproofers / Street Sweepers
- Equipment cleaners or degreasers and all mobile service providers

Do you know where street flows actually go?

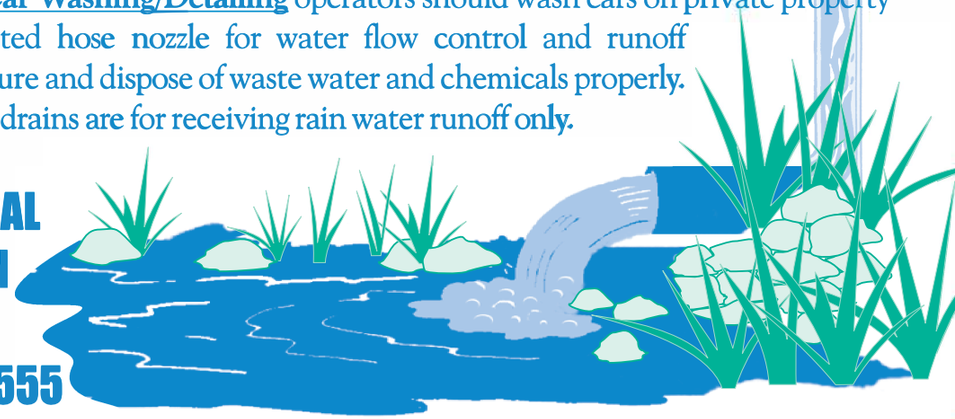
Storm drains are NOT connected to sanitary sewer systems and treatment plants!



The primary purpose of storm drains is to carry *rain* water away from developed areas to prevent flooding. Pollutants discharged to storm drains are transported directly into rivers, lakes and streams. Soaps, degreasers, automotive fluids, litter and a host of materials are washed off buildings, sidewalks, plazas and parking areas. Vehicles and equipment must be properly managed to prevent the pollution of local waterways.

Unintentional spills by mobile service operators can flow into storm drains and pollute our waterways. **Avoid mishaps.** *Always* have a **Spill Response Kit** on hand to clean up unintentional spills. Only emergency **Mechanical** repairs should be done in City streets, using drip pans for spills. **Plumbing** should be done on private property. Always store chemicals in a leak-proof container and keep covered when not in use. **Window/Power Washing** waste water shouldn't be released into the streets, but should be disposed of in a sanitary sewer, landscaped area or in the soil. Soiled **Carpet Cleaning** wash water should be filtered before being discharged into the sanitary sewer. Dispose of all filter debris properly. **Car Washing/Detailing** operators should wash cars on private property and use a regulated hose nozzle for water flow control and runoff prevention. Capture and dispose of waste water and chemicals properly. Remember, storm drains are for receiving rain water runoff only.

REPORT ILLEGAL STORM DRAIN DISPOSAL 1-800-506-2555



Help Protect Our Waterways!

Use these guidelines for Outdoor Cleaning Activities and Wash Water Disposal

Did you know that disposing of pollutants into the street, gutter, storm drain or body of water is *PROHIBITED* by law and can result in stiff penalties?

Best Management Practices

Waste wash water from Mechanics, Plumbers, Window/Power Washers, Carpet Cleaners, Car Washing and Mobile Detailing activities may contain significant quantities of motor oil, grease, chemicals, dirt, detergents, brake pad dust, litter and other materials.

Best Management Practices, or BMPs as they are known, are guides to prevent pollutants from entering the storm drains. ***Each of us*** can do our part to keep stormwater clean by using the suggested BMPs below:

Simple solutions for both light and heavy duty jobs:

Do...consider dry cleaning methods first such as a mop, broom, rag or wire brush. Always keep a spill response kit on site.

Do...prepare the work area before power cleaning by using sand bags, rubber mats, vacuum booms, containment pads or temporary berms to keep wash water away from the gutters and storm drains.

Do...use vacuums or other machines to remove and collect loose debris or litter before applying water.

Do...obtain the property owner's permission to dispose of ***small amounts*** of power washing waste water on to landscaped, gravel or unpaved surfaces.

Do...check your local sanitary sewer agency's policies on wash water disposal regulations before disposing of wash water into the sewer. (See list on reverse side)

Do...be aware that if discharging to landscape areas, soapy wash water may damage landscaping. Residual wash water may remain on paved surfaces to evaporate. Sweep up solid residuals and dispose of properly. Vacuum booms are another option for capturing and collecting wash water.

Do...check to see if local ordinances prevent certain activities.

Do not let...wash or waste water from sidewalk, plaza or building cleaning go into a street or storm drain.



Report illegal storm drain disposal
Call Toll Free
1-800-506-2555

Using Cleaning Agents

Try using biodegradable/phosphate-free products. They are easier on the environment, but don't confuse them with being toxic free. Soapy water entering the storm drain system can impact the delicate aquatic environment.



When cleaning surfaces with a ***high-pressure washer*** or ***steam cleaner***, additional precautions should be taken to prevent the discharge of pollutants into the storm drain system. These two methods of surface cleaning can loosen additional material that can contaminate local waterways.

Think Water Conservation

Minimize water use by using high pressure, low volume nozzles. Be sure to check all hoses for leaks. Water is a precious resource, don't let it flow freely and be sure to shut it off in between uses.

Screening Wash Water

Conduct thorough dry cleanup before washing exterior surfaces, such as buildings and decks ***with loose paint***, sidewalks or plaza areas. Keep debris from entering the storm drain after cleaning by first passing the wash water through a "20 mesh" or finer screen to catch the solid materials, then dispose of the mesh in a refuse container. Do not let the remaining wash water enter a street, gutter or storm drain.

Drain Inlet Protection & Collection of Wash Water

- Prior to any washing, block all storm drains with an impervious barrier such as sandbags or berms, or seal the storm drain with plugs or other appropriate materials.
- Create a containment area with berms and traps or take advantage of a low spot to keep wash water contained.
- Wash vehicles and equipment on grassy or gravel areas so that the wash water can seep into the ground.
- Pump or vacuum up all wash water in the contained area.

Concrete/Coring/Saw Cutting and Drilling Projects

Protect any down-gradient inlets by using dry activity techniques whenever possible. If water is used, minimize the amount of water used during the coring/drilling or saw cutting process. Place a barrier of sandbags and/or absorbent berms to protect the storm drain inlet or watercourse. Use a shovel or wet vacuum to remove the residue from the pavement. Do not wash residue or particulate matter into a storm drain inlet or watercourse.

For Information:

To report illegal dumping or a clogged storm drain
1-800-506-2555

Hazardous Materials Disposal,
Recycling/Disposal Vendors call:
951-486-3200 or 1-800-506-2555

County Code Enforcement Offices
(unincorporated area)
Lake Elsinore/Mead Valley.....951-245-3186
Jurupa Valley.....951-275-8739
Moreno Valley/Banning 951-485-5840
Murrieta So. County 951-600-6140
Thousand Palms District 760-343-4150

Environmental Crimes
1-800-304-6100

Spill Response Agency
1-800-304-2226 or 951-358-5172

Recycling and Hazardous Waste Disposal
1-800-366-SAVE

For pollution prevention brochures or to obtain information on other County Environmental Services, call 1-800-506-2555

Popular links:
www.rcflood.org
www.cabmphandbooks.com
www.cfpub.epa.gov/npdes

ONLY RAIN DOWN THE STORM DRAIN
POLLUTION PREVENTION PROGRAM
1-800-506-2555

Riverside County's "Only Rain Down the Storm Drain" Pollution Prevention Program members include:

Banning
Beaumont
Calimesa
Canyon Lake
Cathedral City
City of Riverside
Corona
Coachella
Coachella Valley Water District
Desert Hot Springs
Hemet
Indian Wells
Indio
Lake Elsinore
La Quinta
Menifee
Murrieta
Moreno Valley
Norco
Palm Desert
Palm Springs
Perris
Rancho Mirage
Riverside County
San Jacinto
Temecula
Wildomar

Stormwater Pollution

What you should know for...

Automotive Maintenance and Car Care

Best Management Practices (BMPS) for:

- Auto Body Shops
- Auto Repair Shops
- Car Dealerships
- Gas Stations
- Fleet Service Operations



Stormwater Pollution...What You Should Know

Riverside County has three major river systems, or watersheds, that are important to our communities and the environment. Improper automotive maintenance, storage and washing activities can cause pollution that endangers the health of these rivers.

Pollutants that can collect on the ground from automotive repair, storage and washing areas such as antifreeze, oil, grease, gas, lubricants, soaps and dirt can be washed into the street by rain, over-irrigation or wash water runoff. Once these pollutants are in the streets they can be carried to these rivers by the storm drain system. Unlike the sewer system, the storm drain system carries water (and pollution) to our rivers without treatment. Pollution from storm drains is a form of storm water pollution.

A common storm water pollution problem associated with automotive shops and businesses is the activity of hosing down service bays without proper capture of runoff water, illegal dumping of fluids to the street or storm drain inlets and not properly storing hazardous materials. Examples of pollutants that can be mobilized by these activities include oil and grease from cars, copper and asbestos from worn break linings, zinc from tires and toxics from spilled fluids.

The Cities and County of Riverside have adopted ordinances, in accordance with state and federal law, which prohibit the discharge of pollutants into the storm drain system or local lakes, rivers or streams. This brochure provides common practices that can prevent storm water pollution and keep your shop in compliance with the law.

Best Management Practices for Auto Body & Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations

Changing Automotive Fluids

- Locate storm drains on or near your property. Do not allow material to flow to these drains.
- Collect, and separately recycle motor oil, antifreeze, transmission fluid and gear oil. Combining waste fluid prevents recycling.
- Drain brake fluid and other non-recyclables into a proper container and handle as a hazardous waste.
- Use a recyclable radiator flushing fluid and discard safely.

Only rain is allowed down the storm drain! Don't be an offender!! Violations of local ordinances are prosecuted to the fullest extent of the law.

Identify specific activities with the potential to cause spills or release pollutants such as oil, grease, fuel, etc. Post signs and train employees on how to prevent and clean up spills during activities.

YOU can prevent Stormwater Pollution following these practices...

Working on Transmissions, Engines and Miscellaneous Repairs

- Keep a drip pan or a wide low-rimmed container under vehicles to catch fluids whenever you unclip hoses, unscrew filters, or change parts, to contain unexpected leaks.
- Drain all fluids from wrecked vehicles into proper containers before disassembly or repair.
- Store batteries indoors, on an open rack.
- Return used batteries to a battery vendor.
- Contain cracked batteries to prevent hazardous spills.
- Catch metal filings in an enclosed unit or on a tarpaulin.
- Sweep filing areas to prevent washing metals into floor drains.

Cleaning Parts

- Clean parts in a self-contained unit, solvent sink, or parts washer to prevent solvents and grease from entering a storm drain.



Fueling Vehicles



- Clean-up minor spills with a dry absorbent, rather than allowing them to evaporate.
- Use a damp cloth and a damp mop to keep the area clean rather than a hose or a wet mop.

Keeping your shop or work area pollutant clean and environmentally safe

- Never hose down your work area, as pollutants could be washed into the storm drain.
- Sweep or vacuum the shop floor frequently.
- Routinely check equipment. Wipe up spills and repair leaks.
- Use large pans or an inflatable portable berm under wrecked cars.
- Avoid spills by emptying and wiping drip pans, when they are half-full.
- Keep dry absorbent materials and/or a wet/dry vacuum cleaner on hand for mid-sized spills.
- Train your employees to be familiar with hazardous spill response plans and emergency procedures.
- Immediately report hazardous material spills that have entered the street or storm drain to OES and local authorities.

Outdoor Parking and Auto Maintenance

- Use covered or controlled areas to prevent offsite spills.
- Sweep-up trash and dirt from outdoor parking and maintenance areas. Do not hose down areas. All non-stormwater discharges to the street of storm drain are prohibited.

Storing and Disposing of Waste

- Store recyclable and non-recyclable waste separately.
- Place liquid waste (hazardous or otherwise) in proper containers with secondary containment.
- Cover outdoor storage areas to prevent contact with rain water.
- Collect used parts for delivery to a scrap metal dealer.



Washing vehicles and steam cleaning equipment

- For car washing, minimize wash water used and use designated areas. Never discharge wash water to the street, gutters or storm drain.
- Be sure to keep waste water from engine parts cleaning or steam cleaning from being discharged to the street, gutter or storm drain.
- Wash vehicles and steam clean with environmentally friendly soaps and polishes.



Selecting and Controlling Inventory

- Purchase recyclable or non-toxic materials.
- Select "closed-loop" suppliers and purchase supplies in bulk.

Stormwater Pollution

What you should know for...

Industrial & Commercial Facilities

Best Management Practices (BMPS) for:

- Industrial Facilities
- Commercial Facilities



Riverside County Stormwater Program Members

City of Banning
(951) 922-3105

City of Beaumont
(951) 769-8520

City of Calimesa
(909) 795-9801

City of Canyon Lake
(951) 244-2955

City of Cathedral City
(760) 770-0340

City of Coachella
(760) 398-3502

City of Corona
(951) 736-2447

City of Desert Hot Springs
(760) 329-6411

City of Eastvale
(951) 361-0900

City of Hemet
(951) 765-2300

City of Indian Wells
(760) 346-2489

City of Indio
(760) 391-4000

City of Jurupa Valley
(951) 332-6464

City of Lake Elsinore
(951) 674-3124

City of La Quinta
(760) 777-7000

City of Menifee
(951) 672-6777

City of Moreno Valley
(951) 413-3000

City of Murrieta
(951) 304-2489

City of Norco
(951) 270-5607

City of Palm Desert
(760) 346-0611

City of Palm Springs
(760) 323-8299

City of Perris
(951) 943-6100

City of Rancho Mirage
(760) 324-4511

City of Riverside
(951) 826-5311

City of San Jacinto
(951) 487-7330

City of Temecula
(951) 694-6444

City of Wildomar
(951) 677-7751

Coachella Valley Water District
(760) 398-2651

County of Riverside
(951) 955-1000

Riverside County Flood Control District
(951) 955-1200

YOU can prevent Stormwater Pollution following these practices...

Industrial and Commercial Facilities

The Riverside County Stormwater Program has identified a number of Best Management Practices (BMPs) for Industrial and Commercial Facilities. These BMPs control and reduce stormwater pollutants from reaching our storm drain system and ultimately our local water bodies. City and County ordinances require businesses to use these BMPs to protect our water quality. Local cities and the County are required to verify implementation of these BMPs by performing regular facility inspections.

Prohibited Discharges

Discontinue all non-stormwater discharges to the storm drain system. It is *prohibited* to discharge any chemicals, paints, debris, wastes or wastewater into the gutter, street or storm drain.

Outdoor Storage BMPs

- Install covers and secondary containment areas for all hazardous materials and wastes stored outdoors in accordance with County and/or City standards.
- Keep all temporary waste containers covered, at all times when not in use.
- Sweep outdoor areas instead of using a hose or pressure washer.
- Move all process operations including vehicle/equipment maintenance inside of the building or under a covered and contained area.
- Wash equipment and vehicles in a contained and covered wash bay which is closed-loop or connected to a clarifier sized to local standards and discharged to a sanitary sewer or take them to a commercial car wash.



Spills and Clean Up BMPs

- Keep the work site clean and orderly. Remove debris in a timely fashion. Sweep up the area.
- Clean up spills immediately when they occur, using dry clean up methods such as absorbent materials or sweep followed by proper disposal of materials.
- Always have a spill kit available near chemical loading dock doors and vehicle maintenance and fueling areas.
- Follow your Business Emergency Plan, as filed with the local Fire Department.
- Report all prohibited discharges and non-implementation of BMPs to your local Stormwater Coordinator as listed on the back of this pamphlet.
- Report hazardous materials spills to 951-358-5055 or call after hours to 951-782-2973 or, if an emergency, call the Fire Department's Haz Mat Team at 911.



Plastic Manufacturing Facilities BMPs

AB 258 requires plastic product manufacturers to use BMPs, such as safe storage and clean-up procedures to prevent plastic pellets (nurdles) from entering the waterway. The plastic pellets are released into the environment during transporting, packaging and processing and migrate to waterways through the storm drain system. AB 258 will help protect fish and wildlife from the hazards of plastic pollution.

Training BMPs

As prescribed by your City and County Stormwater Ordinance(s), train employees in spill procedures and prohibit non-stormwater discharges to the storm drain system. Applicable BMP examples can be found at www.cabmphandbooks.com.

Permitting

Stormwater discharges associated with specific categories for industrial facilities are regulated by the State Water Resources Control Board through an Industrial Stormwater General Permit. A copy of this General Permit and application forms are available at: www.waterboards.ca.gov, select stormwater then the industrial quick link.

To report illegal dumping or for more information on stormwater pollution prevention call: 1-800-506-2555 or e-mail us at: fcnpdes@rcflood.org.