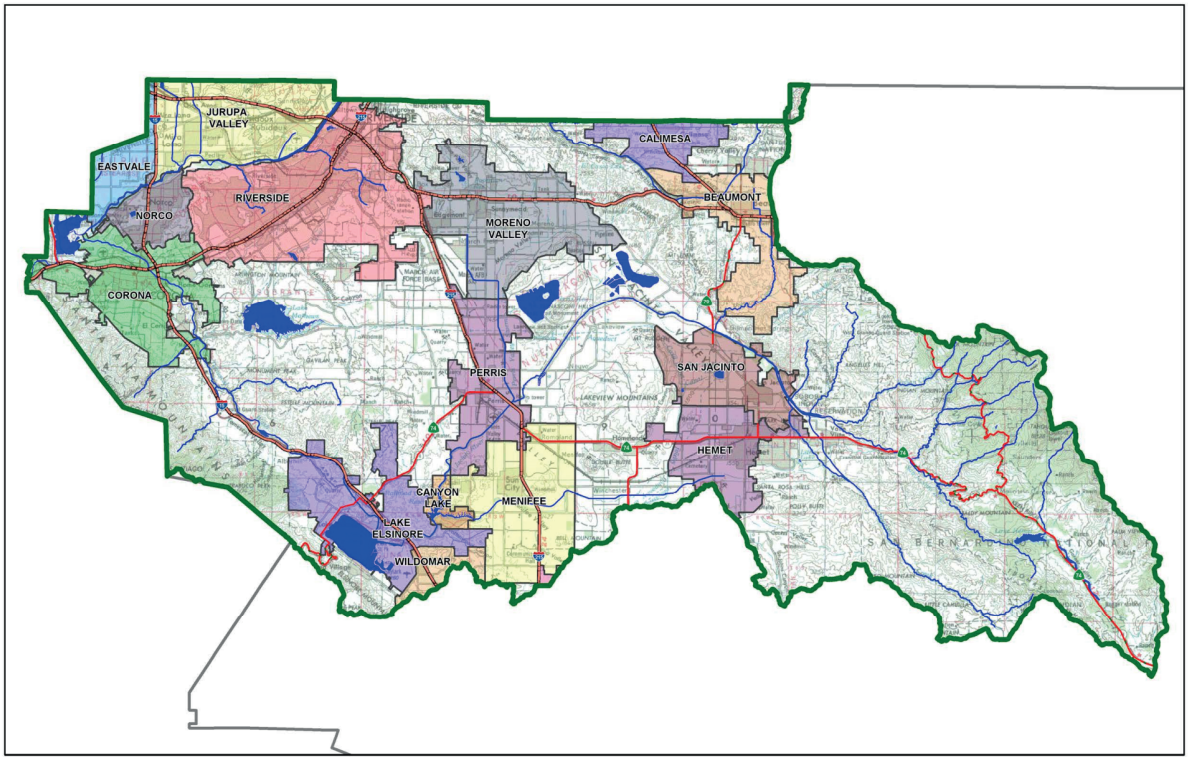
Project Specific Water Quality Management Plan

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

Project Title: Tract 39105

Development No:

Design Review/Case No:



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 11/14/2024

Revision Date(s): 09-24-2025

Prepared for Compliance with
Regional Board Order No. **R8-2010-0033**
Template revised June 30, 2016

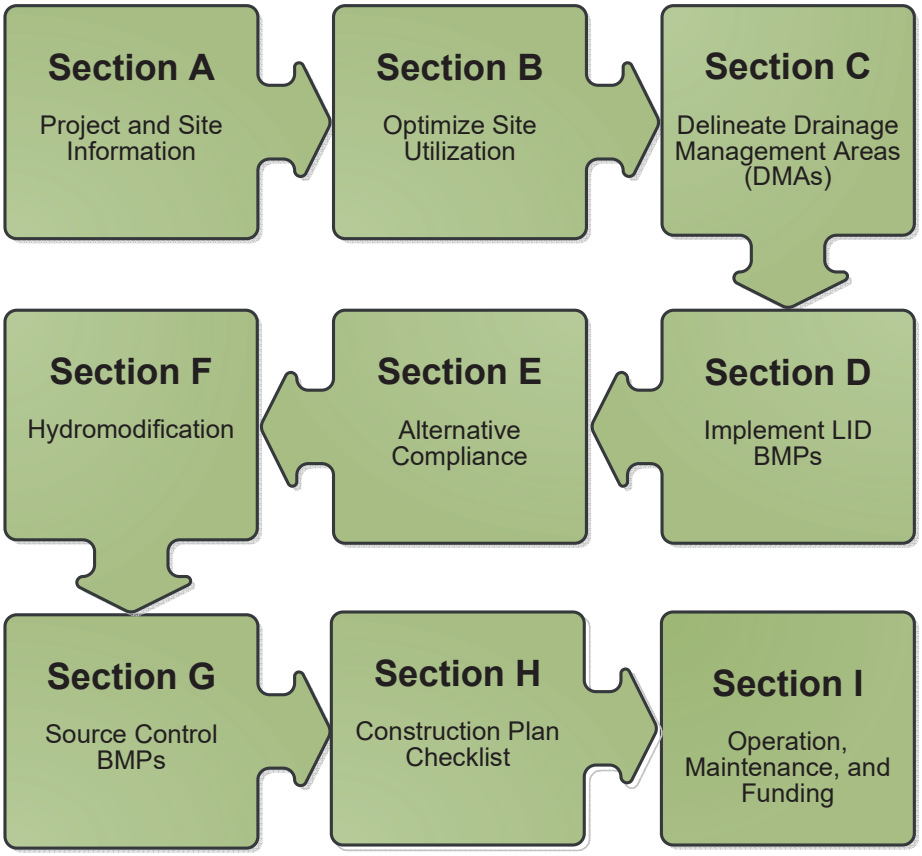
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A Brief Introduction

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 RC Hobbs Company by Adkan Engineers for the Tract 39105 project.

This WQMP is intended to comply with the requirements of City of Jurupa Valley for Ordinance No. 2012-07 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 Jurupa Valley, Water Quality Ordinance (Municipal Code Section 6.10).

"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	09/25/2025 Date
Michael Brendecke Preparer's Printed Name	Project Manager Preparer's Title/Position

Preparer's Licensure:



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Section A: Project and Site Information

PROJECT INFORMATION			
Type of Project:	Residential		
Planning Area:	BP/C-P-S: Scenic Highway Commercial		
Community Name:	Pedley		
Development Name:	Tract 39105- Residential		
PROJECT LOCATION			
Latitude & Longitude (DMS): 33.974783, -117.465968 Project Watershed and Sub-Watershed: Santa Ana Watershed, Gross Acres: 5.427 +/- APN(s): 163-400-042, 163-400-045 Map Book and Page No.: Assessor's MB 163-40, Thomas Bros. Map Page/Grid: 684/F5			
PROJECT CHARACTERISTICS			
Proposed or Potential Land Use(s)	HHDR-Highest Density Residential		
Proposed or Potential SIC Code(s)	1522		
Area of Impervious Project Footprint (SF)	77,393		
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	192,69		
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)	123,187		
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)	N/A		
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
1001 Ranch Storm Drain and Basin	N/A	N/A	Not a RARE water body
Santa Ana River Reach 3	Copper, Indicator Bacteria, Lead	MUN, AGR, GWR, REC1, REC2, WARM, WILD, RARE, SPWN	1 mile
Prado Basin	pH	MUN, REC1, REC2, WARM, WILD, RARE	9.7 miles

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 Jurupa Valley Grading 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, existing drainage patterns on site drain all run off from northeast to the southwest. The proposed design uses catch basins to direct the flow into proposed bio-retention basin for treatment prior to draining into the Ranch Storm Drain and Basin.

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

Existing natural vegetation will not be protected. All vegetation will be removed.

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

Natural infiltration will not be used due to rates below the minimum required infiltration rate.

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

Yes, site will have landscaping throughout.

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

Yes, roof runoff from proposed homes will flow through landscape all other flows will drain to the proposed bio-retention basin for treatment prior to draining into the Ranch Storm Drain and Basin.

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
D.1.1	Roof/Hardscape	97,785	D
D.1.2	Landscaping	17,257	D
D.1.3	Asphalt/Concrete	94,984	D
D.1.4	Landscaping	24,185	D

[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]

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

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

DMA	**Receiving Self-Retaining DMA**

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

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

DMA Name or ID	BMP Name or ID
D.1.1	Bio- Retention Basin
D.1.2	Bio- Retention Basin
D.1.3	Bio- Retention Basin
D.1.4	Bio- Retention Basin

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 2 and 3		
…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.

☒ N/A

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: **41,442 SF = 0.951 AC**

Type of Landscaping (Conservation Design or Active Turf): **Conservation Design**

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: **192,769 SF = 4.425 AC**

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: **1.05 AC/AC**

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: **4.646 AC**

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)
4.646 AC	**0.951 AC**

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: ***385 TU***

Project Type: ***Residential***

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: **192,769 SF = 4.425 AC**

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: ***108 TU/AC***

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: ***477.9 TU***

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)
477.9 TU	**385 TU**

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	
D.1.1	☐	☐	☒	☐	☐
D.1.2	☐	☐	☒	☐	☐
D.1.3	☐	☐	☒	☐	☐
D.1.4	☐	☐	☒	☐	☐

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	***BIOretention***		
	[A]		[B]	[C]	[A] x [C]			
D1.1	*97,785*	*Roofs*	*1*	*0.89*	*87,224.20*	*Design Storm Depth (in)*	*Design Capture Volume,* V_{BMP} *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
D1.2	*17,257*	*Ornamental Landscaping*	*0.1*	*0.11*	*1,906.20*			
D1.3	*94,984*	*Concrete or Asphalt*	*1*	*0.89*	*84,725.70*			
D1.4	*24,185*	*Ornamental Landscaping*	*0.1*	*0.11*	*2,671.40*			
	152,952				**176,527.50**	**0.65**	**9,561.90**	***22,689***

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.

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

[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]

[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			
Volume (Cubic Feet)			

[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:

The Project site is NOT located in an HCOC Exempt zone (see maps in Appendix 7). However, all downstream conveyance channels route to an adequate sump (Prado Basin) that will receive runoff from the project, these are engineered and regularly maintained to ensure design flow capacity therefore the project does not create a hydrologic condition of concern and no mitigation is necessary.

See receiving waters exhibit in Appendix 1 for downstream conveyance to Prado Basin.

See Appendix 7 for HCOC Applicability Map.

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
On-site storm drain inlets	Locations of inlets Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers are available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	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 CASQA Stormwater Quality Handbooks. 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."
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.
Landscape / Outdoor Pesticide Use	Show self-retaining landscape area, if any. Show stormwater treatment and hydrograph modification management BMPs. Landscaping will be designed 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. Pest-Resistant plants will be used adjacent to hardscaped areas. Plants deemed appropriate to site soil, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions will be used to ensure successful establishment.	Maintain landscaping using minimum or no pesticides. See applicable operational BMPs in Appendix 10. Provide IPM information to new owners, lessees, and operators.
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. Show 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.	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 on-site. see fact sheet SC-34. "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks.

Fire Sprinkler Test Water		See note in fact sheets SC-41 "Building and Grounds Maintenance" In the CASQA Stormwater Quality Handbooks
Boilers 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	
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	roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff will not be used.	
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 will not discharge to the storm drain system.	
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 washwater 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)
BIO	Bio-Retention Basin		33°58'28.0"N 117°27'59.8"W

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: HOA

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

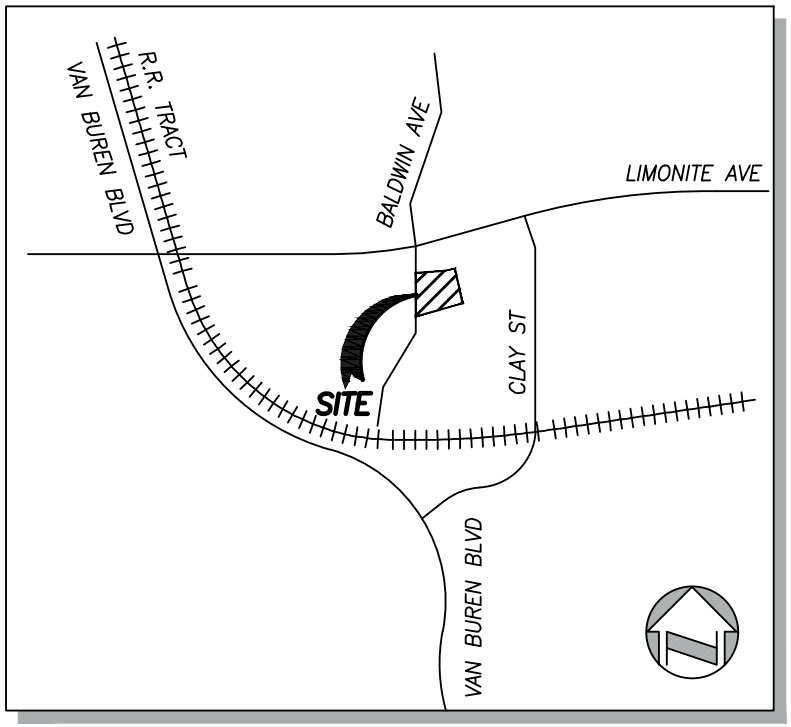
☒ Y ☐ N

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

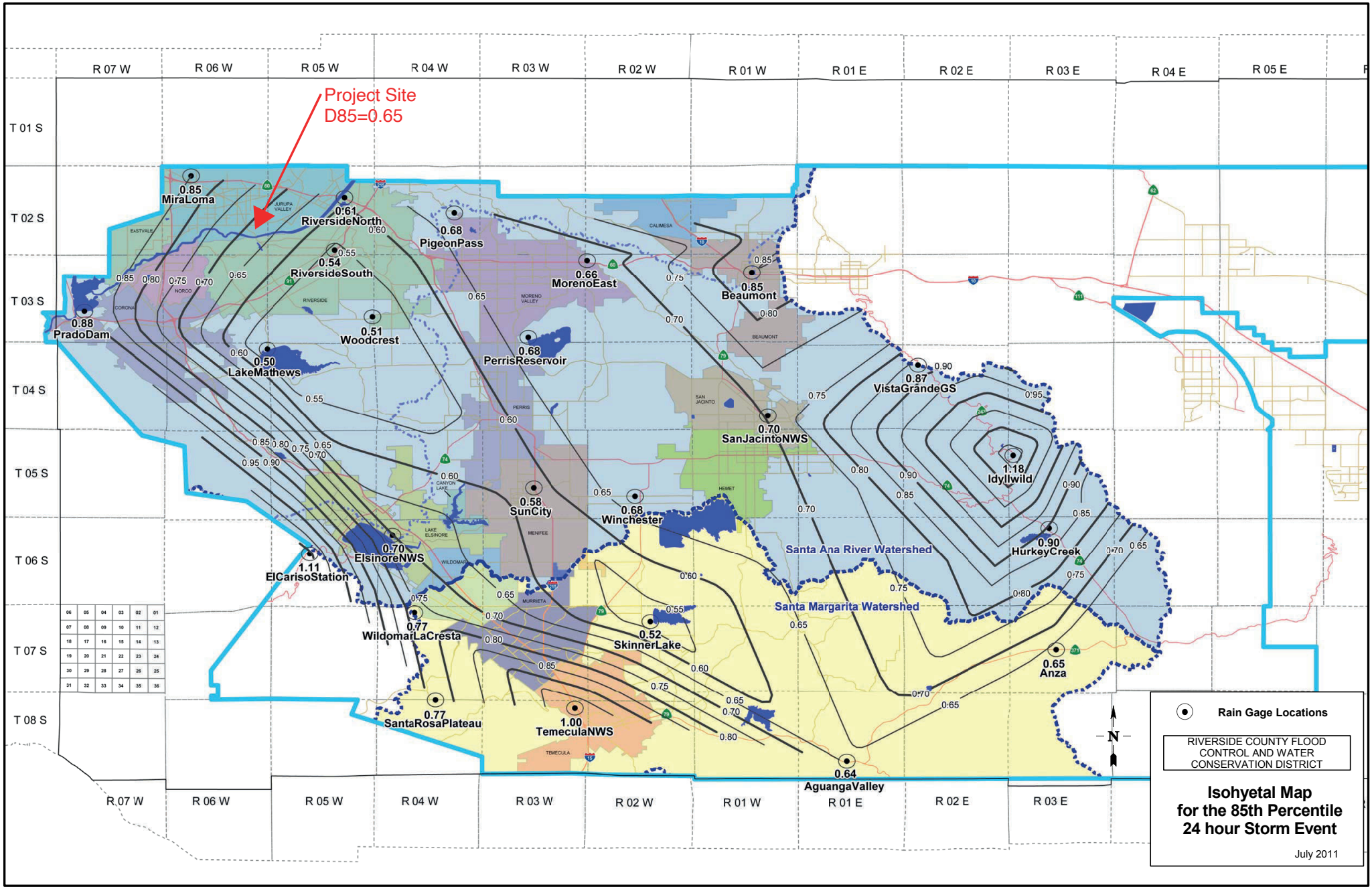
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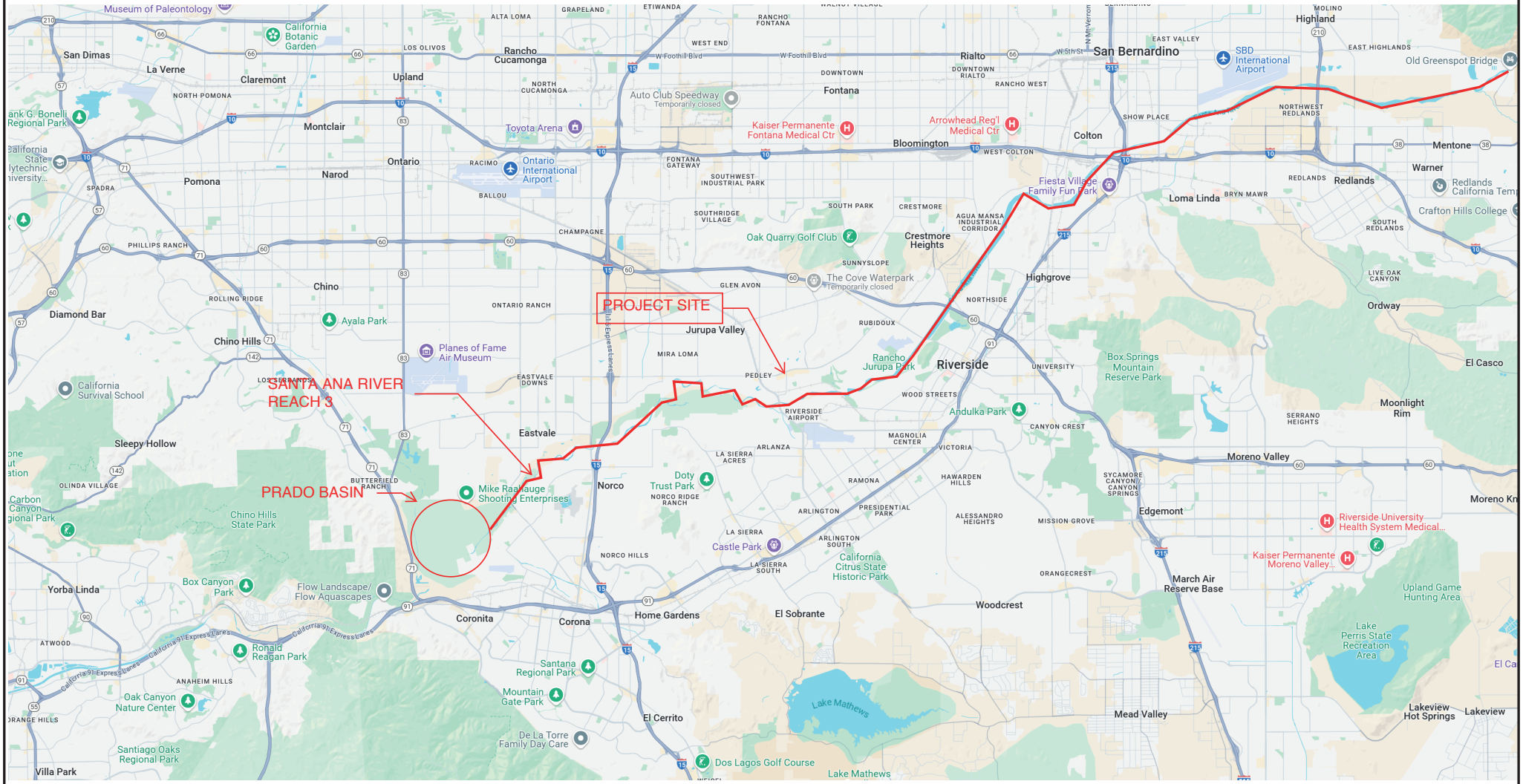
VICINITY MAP

N.T.S.

T2SR6W SEC25 SE


Project Site
D85=0.65
R 07 W
R 06 W
R 05 W
R 04 W
R 03 W
R 02 W
R 01 W
R 01 E
R 02 E
R 03 E
R 04 E
R 05 E
T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S
0.85 MiraLoma
0.61 RiversideNorth
0.54 RiversideSouth
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
0.87 VistaGrandeGS
0.70 SanJacintoNWS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.90 HurkeyCreek
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley
Santa Ana River Watershed
Santa Margarita Watershed
N
Rain Gage Locations
RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT
Isohyetal Map for the 85th Percentile 24 hour Storm Event
July 2011

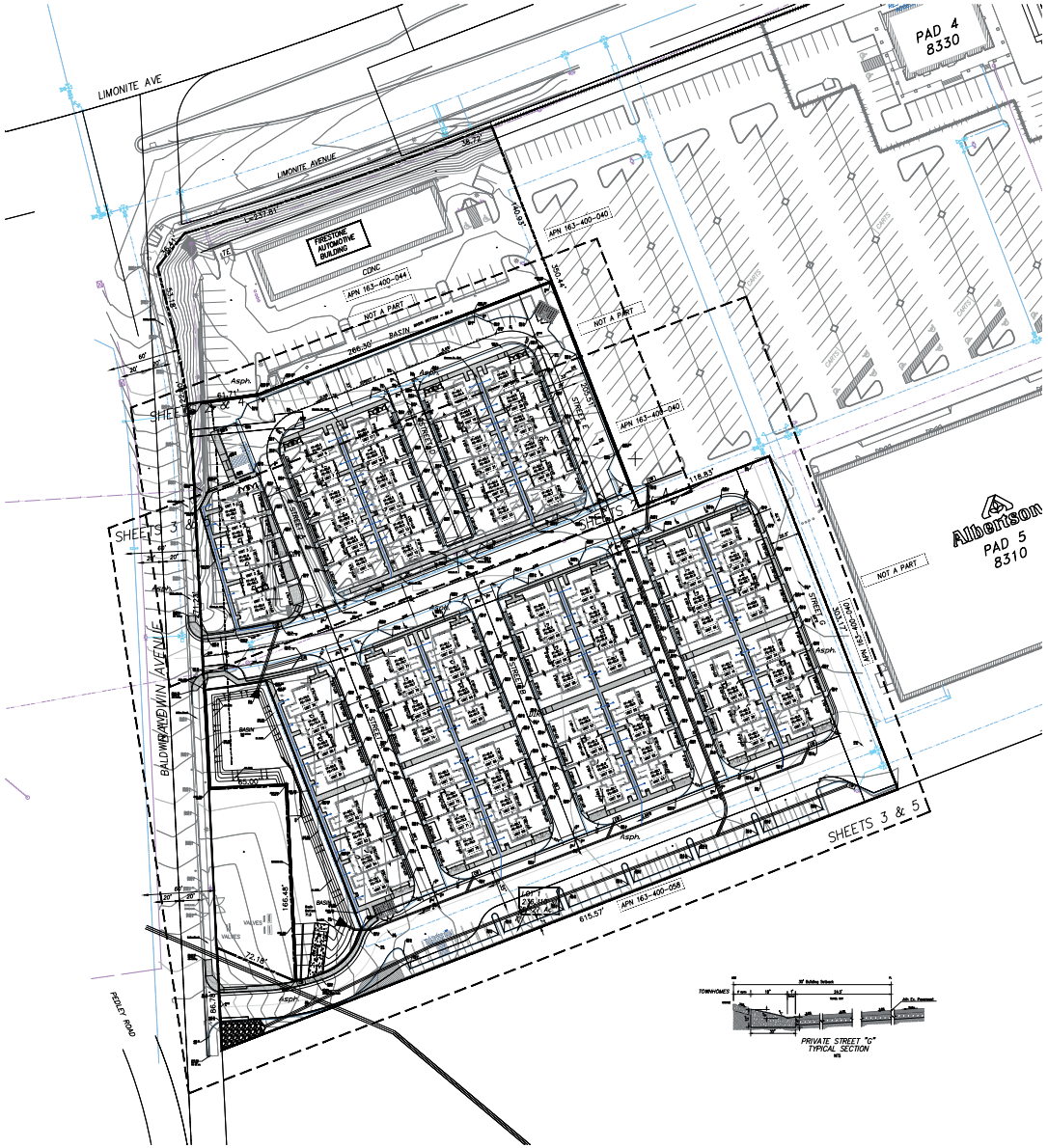
RECEIVING WATERS EXHIBIT



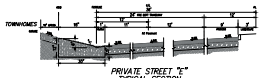
Appendix 2: Construction Plans

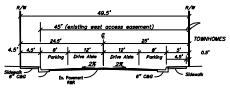
Grading and Drainage Plans

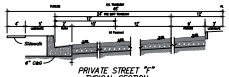
PRELIMINARY GRADING PLAN
TENTATIVE TRACT MAP NO. 39015
CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA











LEGAL DESCRIPTION:

ALL THAT REAL PROPERTY IN THE CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, DESCRIBED AS FOLLOWS:

THAT PORTION OF THE SOUTHWEST QUARTER OF SECTION 24 AND THE NORTHWEST QUARTER OF SECTION 25, TOWNSHIP 2 SOUTH, RANGE 6 WEST, SAN BERNARDINO BASE AND MERIDIAN, AS SHOWN BY A SECTIONALIZED SURVEY OF THE JURUPA RANCHO, AS SHOWN BY MAP ON FILE IN BOOK 9, PAGE 26 OF MAPS, RECORDS OF SAN BERNARDINO COUNTY, CALIFORNIA AND THAT PORTION OF BLOCK 1, JURUPA HEIGHTS, AS SHOWN BY MAP ON FILE IN BOOK 3, PAGES 1 AND 2 OF MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, AND SHOWN AS PARCEL 1 OF LOT LINE ADJUSTMENT NO. 4596, RECORDED JULY 10, 2001, AS INSTRUMENT NO. 2001-316010 OF OFFICIAL RECORDS OF RIVERSIDE COUNTY, CALIFORNIA, MORE PARTICULARLY DESCRIBED AS FOLLOWS:

COMMENCING AT THE NORTHEAST CORNER OF PARCEL 2 OF PARCEL MAP NO. 21017 AS PER MAP RECORDED IN BOOK 140, PAGES 31 AND 32 OF PARCEL MAPS, OFFICIAL RECORDS OF RIVERSIDE COUNTY;

Parcel 1 of PM 39161

APNS: 163-400-042 & 163-400-045

PROJECT NOTES

TOTAL GROSS PROJECT SIZE: 236,410 sf (5.427± ACRES)
TOPOGRAPHY SOURCE: Aerial Topographic Mapping
NUMBER OF LOTS: 1
GENERAL PLAN LOT 1: EXISTING – VHDR
ZONING LOT 1: EXISTING – R3

LOT 1: 5.427 ACRES GROSS 4.00 ACRES NET
NO. OF UNITS: 85
DENSITY: 21.25 DU/NET ACRE

DEVELOPER

RC HOBBS COMPANIES, INC.
1428 E. CHAPMAN AVENUE
ORANGE, CA 92866
ATTN: ROGER HOBBS
714-633-8100

OWNERS

DE ANZA MARKET PLACE II, A CALIFORNIA GENERAL PARTNERSHIP
2020 EAST ORANGETHORPE AVENUE, SUITE 210
FULLERTON, CA. 92831
ATTN: EDDIE FISCHER

UTILITY PURVEYORS

WATER:	JURUPA COMMUNITY SERVICES DISTRICT
SEWER:	JURUPA COMMUNITY SERVICES DISTRICT
GAS:	SOUTHERN CALIFORNIA GAS COMPANY
ELECTRICITY:	SOUTHERN CALIFORNIA EDISON
TELEPHONE:	AT&T
SCHOOL:	JURUPA VALLEY UNIFIED SCHOOL DISTRICT
CATV:	SPECTRUM
SOLID WASTE:	BURRTEC

GENERAL PLAN/ZONING/LANDUSE

EXISTING GENERAL PLAN:	VHDR
PROPOSED GENERAL PLAN:	VHDR
EXISTING ZONING:	R3
PROPOSED ZONING:	R3
EXISTING LANDUSE:	VACANT

TENTATIVE MAP SCHEDULE

TTM 39015 IS A SCHEDULE "A" SUBDIVISION PER SEC. 7.30.050 OF THE CITY OF JURUPA VALLEY MUNICIPAL CODE

GEOTECHNICAL REPORT

GEOTECHNICAL REPORT PREPARED BY GEO-TEK INC, PROJECT NO. 3925-CR – TRACT 39105 DATED JUNE 25, 2024

EARTHWORK QUANTITIES (RAW)

CUT	8,750 CY
FILL:	10,150 CY
NET (IMPORT)	1,400 CY

RAW EARTHWORK QUANTITIES HAVE NOT BEEN ADJUSTED FOR STRIPING LOSSES, SHRINKAGE, OR SUBSIDENCE

SOURCE OF TOPOGRAPHIC MAPPING

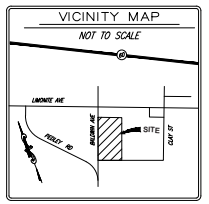
TOPOGRAPHIC MAPPING WAS DONE BY FIELD DATE COLLECTION METHODS AND IN JULY 2024

SEE SHEETS 2–5 FOR SECTIONS

SHEET INDEX

SHEET 1	TITLE SHEET
SHEET 2	PRELIMINARY GRADING – NORTHERLY PORTION
SHEET 3	PRELIMINARY GRADING – SOUTHERLY PORTION
SHEET 4	PRELIMINARY DRAINAGE – SOUTHERLY PORTION
SHEET 5	PRELIMINARY DRAINAGE – SOUTHERLY PORTION

VICINITY MAP
NOT TO SCALE



GRAPHIC SCALE
40 0 20 40 80 160
(IN FEET)
1 inch = 40 ft.

LEGEND

TC	TOP OF CURB
FL	FLOWLINE
FS	FINISHED SURFACE
PE=XX.X	PAD ELEVATION
C.B.	CATCH BASIN
H.P.	HIGH POINT
(XX)	UNIT NUMBER
	BOUNDARY
	LOT LINE
	EXIST. CONTOUR
	CHAIN LINK FENCE
	WATER LINE
	SEWER LINE
	PROPOSED STREET LIGHT

ROBERT BEERS
8175 Limonite Avenue, Suite E
Jurupa Valley, CA 92509
Ph. (951) 317-2041 Fax (909) 360-2070
Robert M. Beers
R.C.E. 39405
Expires 12-31-25

2025-09-15
Date

FIELD BOOK REF.

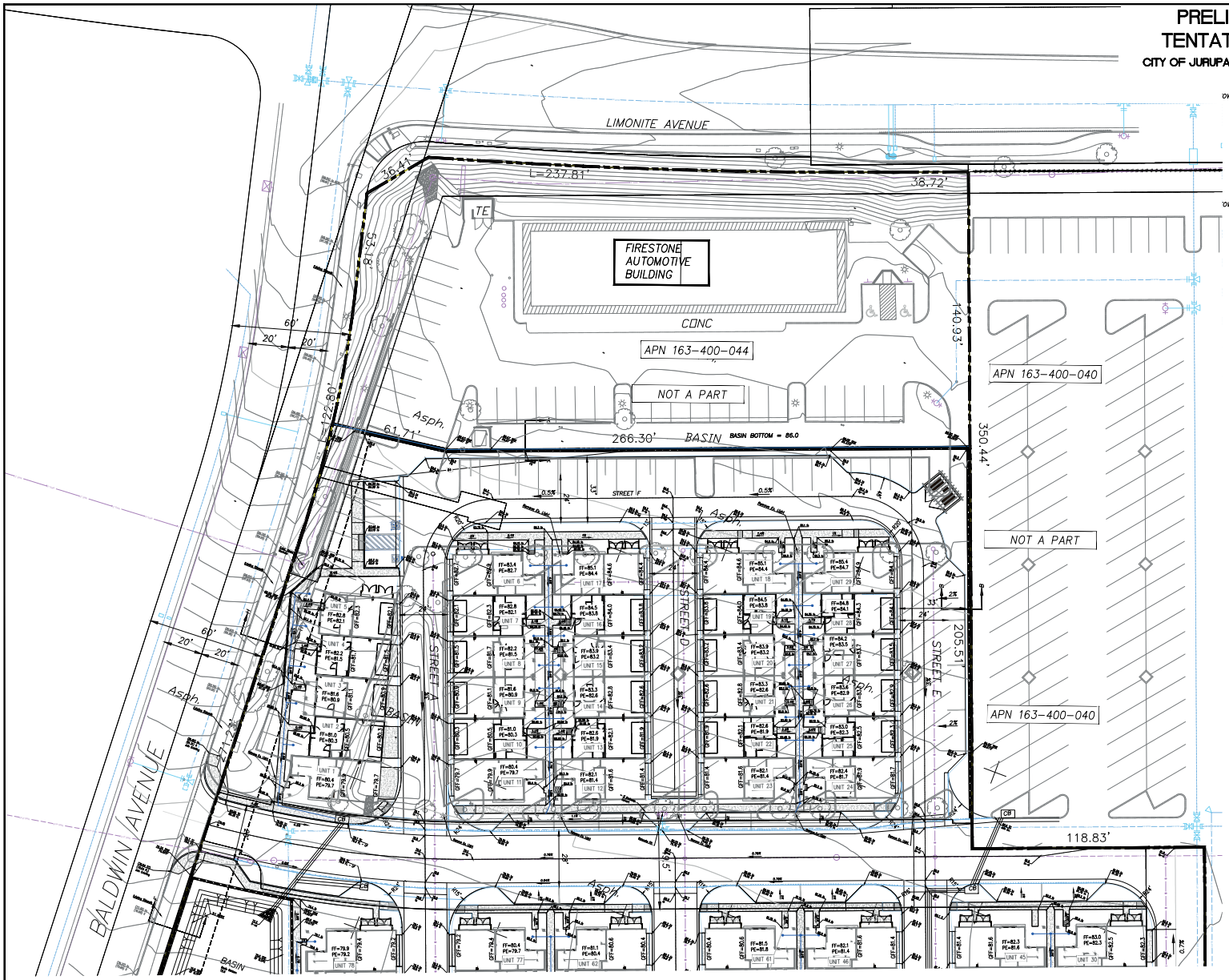
MARK	REVISIONS	APPR.	DATE

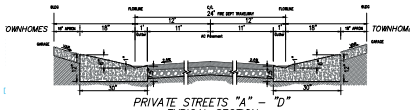
PREPARED FOR:
RC Hobbs Companies
1428 E. Chapman Avenue
Orange, CA 92866
PHONE: (714) 633-8100

TTM 39015
PRELIMINARY GRADING PLAN
City of Jurupa Valley
California

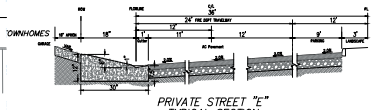
DATE Sept. 15, 2025
JOB NO. ,
DRAWN BY R.A.H.
CHECKED BY R.M.B.
SHEET 1 OF 5

PRELIMINARY GRADING PLAN
TENTATIVE TRACT MAP NO. 39015
CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

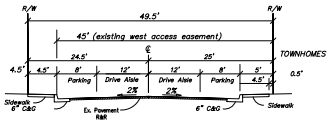


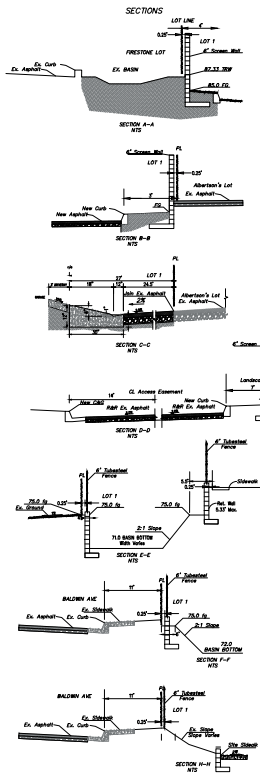


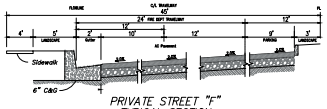
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TYPICAL SECTION
NTS



PRIVATE STREET "E"
TYPICAL SECTION
NTS







PRIVATE STREET "F"
TYPICAL SECTION
NTS

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.

LEGEND

T.C.	TOP OF CURB
F.L.	FLOWLINE
F.S.	FINISHED SURFACE
P=XX.X	PAD ELEVATION
C.B.	CATCH BASIN
H.P.	HIGH POINT
XX	LOT NUMBER
X	EXIST. ZONING
	BOUNDARY
	LOT LINE
	EXIST. CONTOUR
	CHAIN LINK FENCE
	PROPOSED STREET LIGHT

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2025-09-15
Date

FIELD BOOK REF.

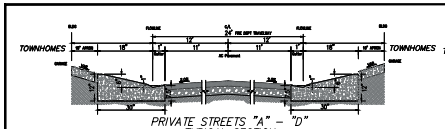
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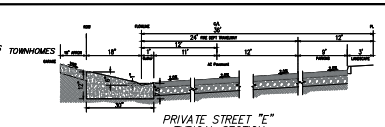
TTM 39015
PRELIMINARY GRADING PLAN
City of Jurupa Valley
California

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CHECKED BY R.M.B.
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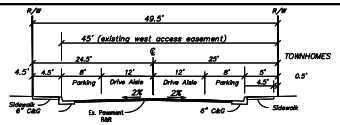
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TENTATIVE TRACT MAP NO. 39015
CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA



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NTS



PRIVATE STREET "E"
TYPICAL SECTION
NTS

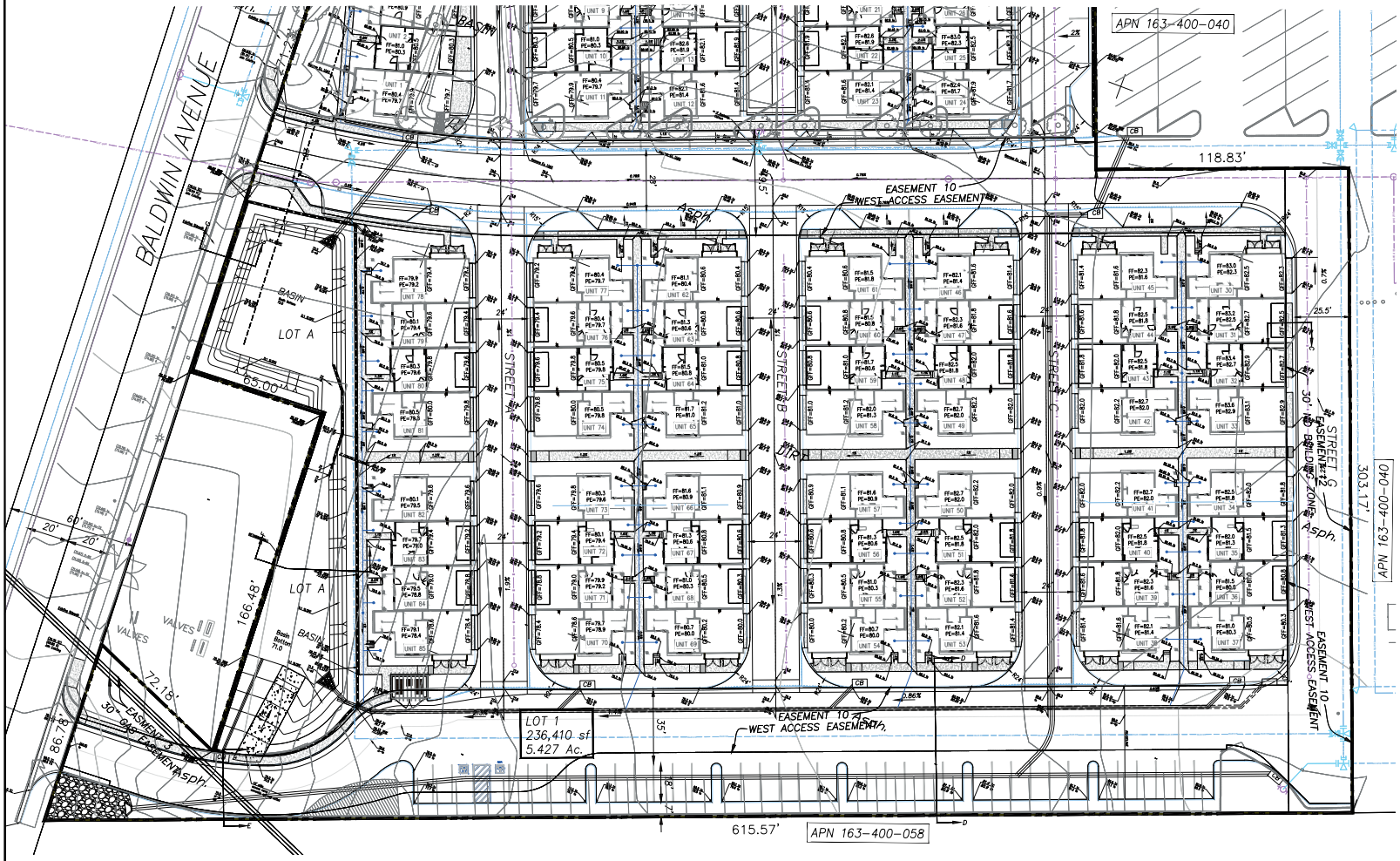


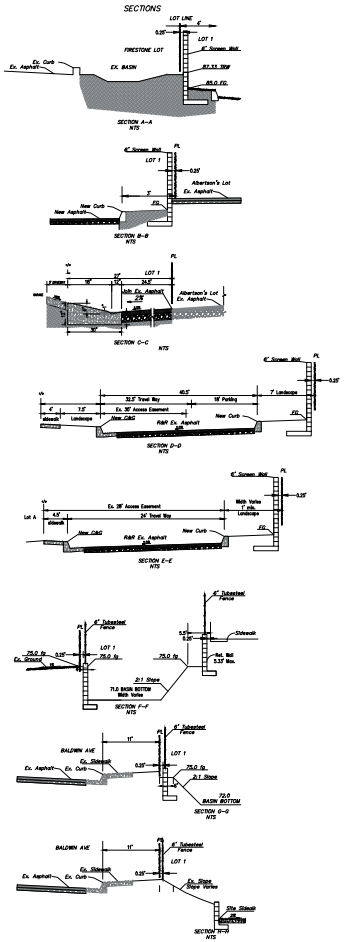
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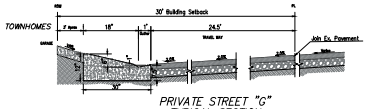
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SEE SHEET 2

SEE SHEET 2







PRIVATE STREET "G"
TYPICAL SECTION
NTS

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.

LEGEND
T.C. TOP OF CURB
F.L. FLOWLINE
F.S. FINISHED SURFACE
P=XX.X PAD ELEVATION
C.B. CATCH BASIN
H.P. HIGH POINT
(00) LOT NUMBER
EXIST. ZONING
BOUNDARY
LOT LINE
EXIST. CONTOUR
CHAIN LINK FENCE
PROPOSED STREET LIGHT

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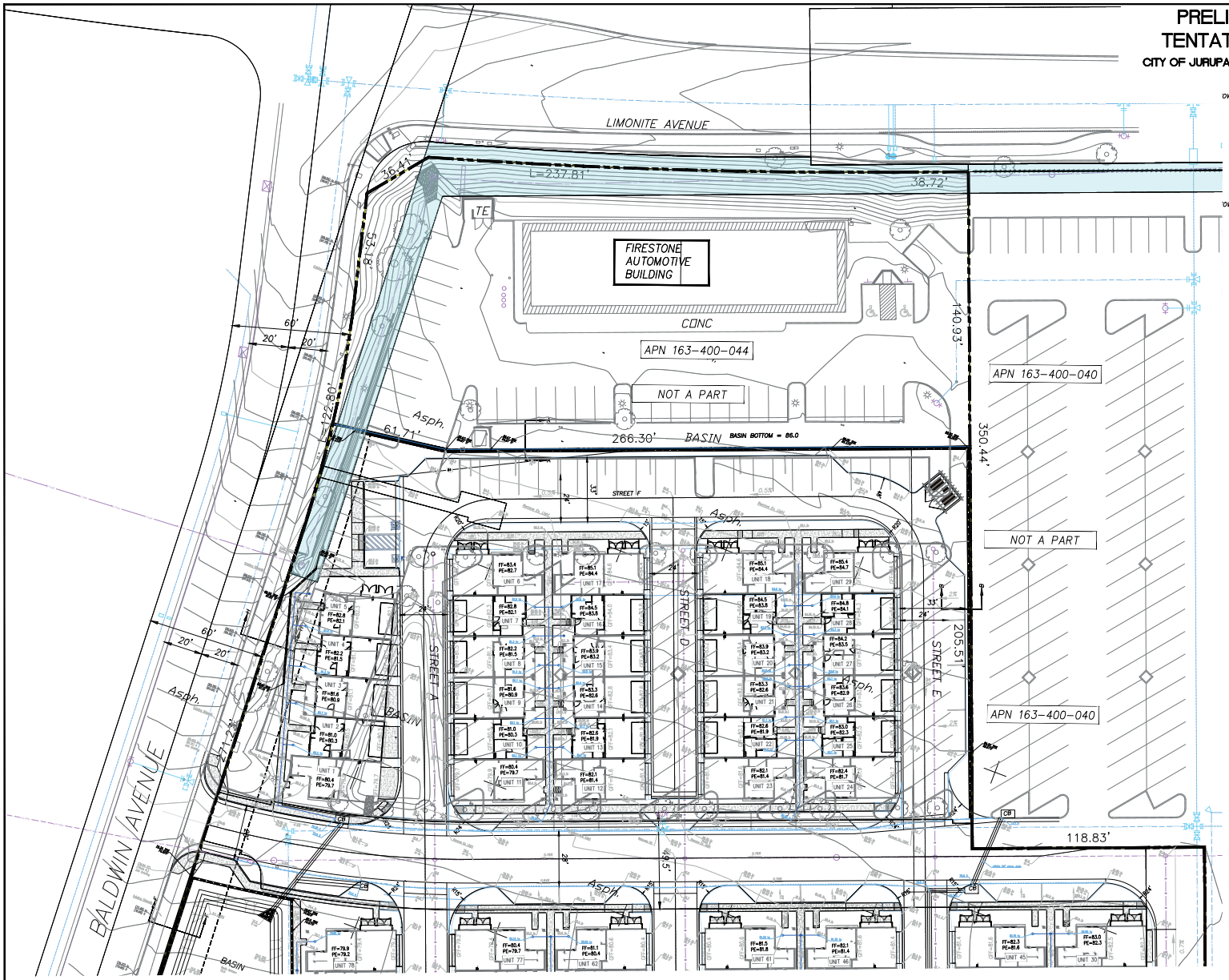
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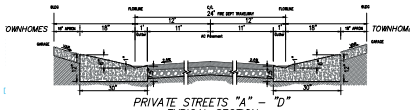
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City of Jurupa Valley
California

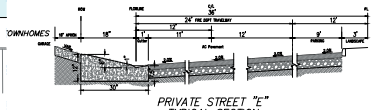
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CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

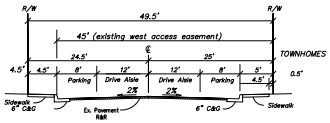


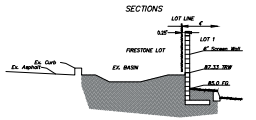


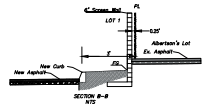
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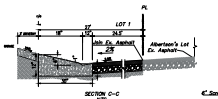


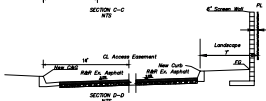
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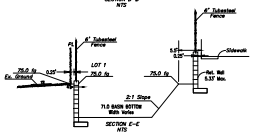


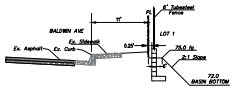


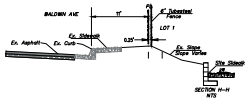








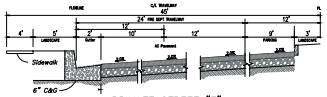




LEGEND

T.C.	TOP OF CURB
F.L.	FLOWLINE
F.S.	FINISHED SURFACE
P=XX.X	PAD ELEVATION
C.B.	CATCH BASIN
H.P.	HIGH POINT
(XX)	LOT NUMBER
X	EXIST. ZONING
	BOUNDARY
	LOT LINE
	EXIST. CONTOUR
	CHAIN LINK FENCE
	PROPOSED STREET LIGHT

GRAPHIC SCALE
(IN FEET)
1 inch = 20 ft.



PRIVATE STREET "F"
TYPICAL SECTION
NTS

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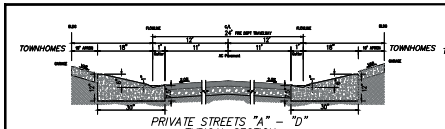
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Orange, CA 92866
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TTM 39015
PRELIMINARY DRAINAGE PLAN
City of Jurupa Valley
California

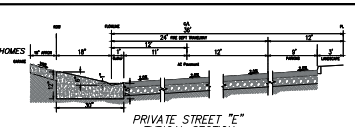
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CHECKED BY R.M.B.
SHEET 4 OF 5

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TENTATIVE TRACT MAP NO. 39015

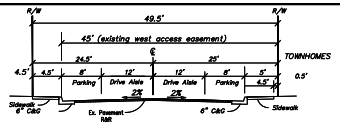
CITY OF JURUPA VALLEY, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA



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NTS



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TYPICAL SECTION
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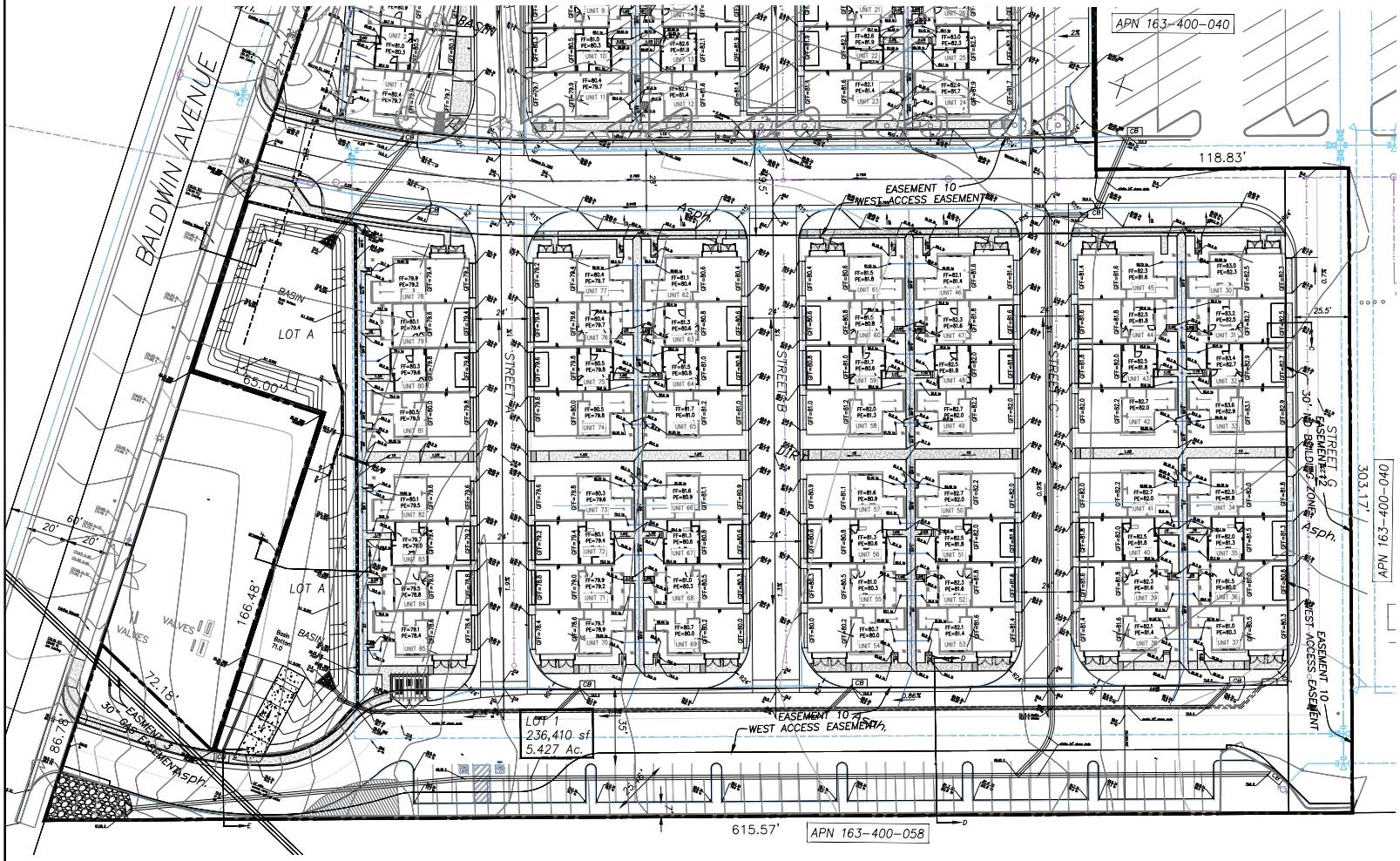


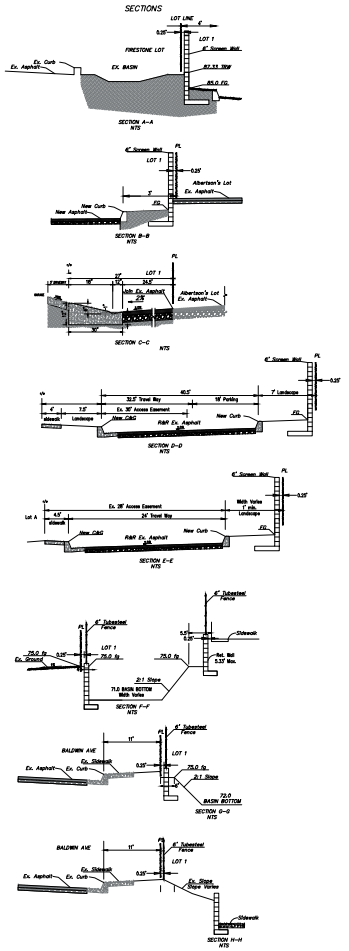
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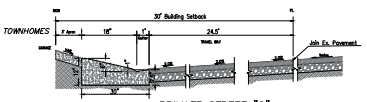
ICAL SECTION
NTS

SEE SHEET 4

SEE SHEET 4







PRIVATE STREET "G"
TYPICAL SECTION
NTS

GRAPHIC SCALE

(IN FEET)
1 inch = 20 ft.

LEGEND

T.C.	TOP OF CURB
F.L.	FLOWLINE
F.S.	FINISHED SURFACE
P=XX.X	PAD ELEVATION
C.B.	CATCH BASIN
H.P.	HIGH POINT
(00)	LOT NUMBER
Y	EXIST. ZONING
	BOUNDARY
	LOT LINE
	EXIST. CONTOUR
	CHAIN LINK FENCE
	PROPOSED STREET LIGHT

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2025-09-15
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City of Jurupa Valley
California

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CHECKED BY R.M.B.
SHEET 5 OF 5

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

GEOTECHNICAL AND INFILTRATION EVALUATION
PROPOSED MULTI-FAMILY RESIDENTIAL DEVELOPMENT
ASSESSOR'S PARCEL NUMBERS (APNS) 163-400-042 AND -045
SOUTHEAST OF LIMONITE AVENUE AND BALDWIN AVENUE
CITY OF JURUPA VALLEY, RIVERSIDE COUNTY, CALIFORNIA

PREPARED FOR

RC HOBBS COMPANY
1428 EAST CHAPMAN AVENUE
ORANGE, CALIFORNIA 92866

PREPARED BY

GEOTEK, INC.
1548 NORTH MAPLE STREET
CORONA, CALIFORNIA 92878

PROJECT NO. 3925-CR **JUNE 25, 2024**

GEOTEK

GeoTek, Inc.
1548 North Maple Street, Corona, California 92878
(951) 710-1160 Office (951) 710-1167 Fax www.geotekusa.com

June 25, 2024
Project No. 3925-CR

RC Hobbs Company
1428 East Chapman Avenue
Orange, California 92866

Attention: Mr. Shay Mueller

Subject: **Geotechnical and Infiltration Evaluation**
Proposed Multi-Family Residential Development
Assessor's Parcel Numbers (APNs) 163-400-042 and -045
Southeast of Limonite Avenue and Baldwin Avenue
City of Jurupa Valley, Riverside County, California

Dear Mr. Mueller:

GeoTek, Inc. (GeoTek) is pleased to provide the results of this Geotechnical and Infiltration Evaluation for the proposed multi-family residential project to be located southeasterly of the intersection of Limonite Avenue and Baldwin Avenue in the City of Jurupa Valley, Riverside County, California. This report presents the results of GeoTek's evaluation, discussion of findings, and provides geotechnical recommendations for foundation design and earthwork construction.

Based upon review and evaluation, site development appears feasible from a geotechnical viewpoint provided that the recommendations included in this report are incorporated into the design and construction phases of the project.

The opportunity to be of service is sincerely appreciated. If you should have any questions, please do not hesitate to contact GeoTek.

Respectfully submitted,
GeoTek, Inc.





Bruce A. Hick
GE 2284, Exp. 12/31/24
Geotechnical Engineer

Edward H. LaMont
CEG 1892, Exp. 07/31/26
Principal Geologist

Anna M. Scott
Project Geologist

Distribution: (1) Addressee via email (one PDF file)

\\geotekfs1\Riverside\Projects\3901 to 3950\3925CR RC Hobbs Company Baldwin Avenue Jurupa Valley\Geotechnical and Infiltration Evaluation\3925CR Geotechnical and Infiltration Evaluation Baldwin Ave Jurupa Valley.doc

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Figure 2 – Exploration Location Map

Appendix A – Log of Exploratory Borings
Appendix B – Results of Laboratory Testing
Appendix C – Infiltration Test Data & Porchet Calculations
Appendix D – General Earthwork Grading Guidelines

1. PURPOSE AND SCOPE OF SERVICES

The purpose of this study was to evaluate the geotechnical engineering and geologic conditions at the project site, as outlined in GeoTek's proposal P-0504924-CR, dated May 10, 2024. Services provided for this study included the following:

- Research and review of available geologic data and general information pertinent to the site,
- Site exploration consisting of the excavation, logging and sampling of five (5) exploratory test borings extending to depths ranging from about 14.5 to 51.5 feet below existing grade,
- Excavation of two (2) additional borings to depths of about five (5) feet below grade and performing an infiltration test in each boring,
- Laboratory testing of soil samples collected during the field investigation,
- Review and evaluation of site seismicity, and
- Preparation of this geotechnical report which presents GeoTek's findings, conclusions, and recommendations for this site.

2. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

2.1 SITE DESCRIPTION

The approximately 5.56-acre irregular-shaped project site is located southeast of the intersection of Limonite Avenue and Baldwin Avenue, in the City of Jurupa Valley, Riverside County, California (see Figure 1). The site is comprised of a total of two (2) parcels identified as Riverside County Assessor's Parcel Numbers (APNs) 163-400-042 and -045. Access to the site is available by Baldwin Avenue, a paved, improved street located adjacent to the western site boundary.

Topographically, the site has a relatively flat to gently sloping terrain, with site drainage generally directed down to the south-southwest. The site is elevated approximately 782 feet above mean sea level (amsl) with an approximately 18 foot relief down to the south-southwest.

The site partially consists of an asphalt concrete parking lot for the adjacent De Anza Marketplace, and partially of vacant land in the northern and southern portions, respectively. Based on review of available historic aerial photographs, the site was rough graded for the De Anza Marketplace in or about the year 2002. The site's condition has remained relatively unchanged since initial development.

The site is bound by Baldwin Avenue and Jurupa Community Services district property to the west. The De Anza Marketplace is located adjacent to the northern (Firestone Auto addressed as 8360 Limonite Avenue) and eastern (former Albertson's building addressed as 8310 Limonite Avenue) site boundaries, respectively. A natural watercourse is located adjacent to the southern site boundary, followed by the Appaloosa Springs residential development.

2.2 PROJECT DESCRIPTION

Based upon review of a *Conceptual Site Plan* prepared by IDEArc dated April 15, 2024, GeoTek understands the subject property is to be developed with twenty-two (22), three-story multi-family structures. A pocket park/community green, utility construction, access and drive lanes, pavement, hardscape and landscape improvements are also proposed as part of the site development. Stormwater management facilities by means of on-site basins are anticipated within the southwestern portion of the project site.

The proposed residential structures are anticipated to be of wood-frame construction, three-stories in height, and incorporate conventional shallow foundations and conventional slab-on-grade floors. Sewage disposal will be by a public sewer. For the purposes of this report, it is assumed maximum column and wall loads will be about 100 kips and 3.5 kips per foot, respectively. Specific site development plans were not provided as of the date of this report. Once actual loads are known that information should be provided to GeoTek to determine if modifications to the recommendations presented in this report are warranted.

If site development differs from the assumptions made herein, the recommendations included in this report should be subject to further review and evaluation. Site development plans should be reviewed by GeoTek when they become available.

3. FIELD EXPLORATION AND LABORATORY TESTING

3.1 FIELD EXPLORATION

The field exploration for this report was conducted on June 12, 2024, and consisted of excavating five (5) geotechnical exploratory borings with a hollow-stem drill rig to depths ranging from about 20 to 50 feet below existing grade at the boring locations. The approximate locations of the GeoTek excavations are shown on the Exploration Location Map (Figure 2). A geologist from GeoTek logged the excavations and collected soil samples for use in subsequent laboratory testing. The logs of the exploratory borings are included in Appendix A.

Relatively undisturbed soil samples were recovered at various intervals in the geotechnical borings with a California sampler. The California sampler is a 3-inch outside diameter, 2.5-inch inside diameter, split barrel sampler lined with brass rings. The sampler was 18 inches long. The sampler conformed to the requirements of ASTM D 3550. A 140-pound automatic trip hammer was utilized, dropping 30 inches for each blow. The relatively undisturbed samples, together with bulk samples of representative soil types, were returned to the laboratory for testing and evaluation. The California sampler test data are presented on the boring logs in Appendix A.

In Boring B-5, standard penetration tests (SPT) were performed with a 2.0-inch outside diameter, 1.5-inch inside diameter, split-barrel sampler. The sampler was 18 inches long. The inside diameter of the sampler shoe was 1.4 inches. The sampler was unlined. The sampler conformed to the requirements of ASTM D 1586. A 140-pound automatic trip hammer was utilized, dropping 30 inches for each blow. The sampler penetration test data are presented on the Logs of Boring for Boring B-5.

3.2 LABORATORY TESTING

Laboratory testing was performed on selected relatively undisturbed ring and bulk samples collected during the field exploration. The purpose of the laboratory testing was to confirm the field classification of the materials encountered and to evaluate their physical properties for use in the engineering design and analysis. Results of the laboratory testing program along with a brief description and relevant information regarding testing procedures are included on the exploratory borings logs included in Appendix A and in Appendix B.

3.3 INFILTRATION TESTING

In addition to the geotechnical exploratory borings, two (2) percolation test borings (I-1 and I-2) were excavated in the area of the proposed storm water management facilities to depths of about five (5) feet below existing grades. Infiltration/percolation testing was conducted in these borings in general accordance with the requirements of the County of Riverside.

The percolation tests consisted of drilling an eight-inch diameter test hole to the desired depth and installing approximately two inches of gravel in the bottom of the hole. A three-inch diameter perforated PVC pipe, wrapped in a filter sock, was placed in the excavations and the annular space was filled with gravel to prevent caving within the boring. Water was then placed in the borings to presoak the holes and percolation testing was performed the following the pre-soak period. The percolation tests were then performed which consisted of adding water to each test hole and measuring the water drop over a 30-minute period. The water drop was recorded for a minimum of twelve (12) test intervals. Water was added to the test holes after each test interval. The field percolation rates were then converted to an infiltration rate using the Porchet Method. The converted infiltration rates are summarized in the table below:

Infiltration Boring	Depth (ft.)	Infiltration Rate (in/hr)*
I-1	5	0.12
I-2	5	0.45

*Porchet Method calculated unfactored infiltration rate.

The results of the conversions indicate infiltration rates at the test locations between 0.12 and 0.45 inches per hour, which indicate relatively poor infiltration rates. Copies of the percolation data sheets and the Porchet infiltration rate conversion calculations are presented in Appendix C. No factors of safety were applied to the rates provided. Over the lifetime of the infiltration areas, the infiltration rates may be affected by sediment build up and biological activities, as well as local variations in near surface soil conditions. A suitable factor of safety should be applied to the field rate in designing the infiltration system.

It should be noted that the infiltration rates provided above were performed in relatively undisturbed on-site soils. Infiltration rates will vary and are mostly dependent on the underlying consistency of the site soils and relative density. Infiltration rates may be impacted by weight of equipment travelling over the soils, placement of engineered fill and other various factors. GeoTek assumes no responsibility or liability for the ultimate design or performance of the storm water facility.

4. GEOLOGIC AND SOILS CONDITIONS

4.1 REGIONAL SETTING

The subject property is situated in the Peninsular Ranges geomorphic province. The Peninsular Ranges province is one of the largest geomorphic units in western North America. It extends approximately 975 miles south of the Transverse Ranges geomorphic province to the tip of Baja California. This province varies in width from about 30 to 100 miles. It is bounded on the west by the Pacific Ocean, on the south by the Gulf of California and on the east by the Colorado Desert Province.

The Peninsular Ranges are essentially a series of northwest-southeast oriented fault blocks. Several major fault zones are found in this province. The Elsinore Fault zone and the San Jacinto Fault zone trend northwest-southeast and are found near the middle of the province. The San Andreas Fault zone borders the northeasterly margin of the province.

The site is located in an area geologically mapped by others to be underlain by older alluvium (Dibblee, T.W. and Minch, J.A., 2004). No active faults are shown in the immediate site vicinity on the maps reviewed for the area.

4.2 GENERAL SOIL CONDITIONS

A brief description of the earth materials encountered is presented in the following section. Based on the site reconnaissance, the exploratory excavations and review of published geologic maps, the area investigated is locally underlain by older alluvium and granitic bedrock.

4.2.1 Undocumented Fill

Asphalt concrete pavement, consisting of asphalt concrete and aggregate base, was encountered at the surface of Borings B-3 and B-4. Undocumented fill soils were encountered in all of the borings performed from either the existing grades or below the asphalt concrete pavement to depths of about 1.5 to 2.5 feet below grades. As encountered in the borings, the undocumented fill generally consisted of silty to clayey sands (SM and SC soil types based upon the Unified Soil Classification System). These fill soils were likely placed during the original site grading of the De Anza Marketplace and surrounding development.

4.2.2 Older Alluvium

Older alluvial soils were encountered in all of the borings below the undocumented fill soils to depths of about 9.5 and 25 feet below existing grades. As encountered in the borings, the alluvium generally consisted of interbedded layers of silty to clayey sands, and some relatively clean sands (SM, SC and SP soil types). These coarse-grained older alluvial soils were observed to generally be in a dense to very dense condition, based on penetration tests obtained from within the borings.

Based on the laboratory test results, the near surface soils have a "Very Low" (0-20) Expansion Index (EI) when tested in general accordance with ASTM D 4829. Based on the laboratory test results, the near surface soils have a soluble sulfate content of less than 0.1 percent (ASTM D 4327). The test results are provided in Appendix B.

4.2.3 Granitic Bedrock

Granitic bedrock, observed to primarily consist of quartz diorite, was encountered below the older alluvial soils within Borings B-4 and B-5. The bedrock was encountered as shallow as 9.5 feet within Boring B-4, and as deep as about 25 feet within Boring B-5. The granitic bedrock encountered generally excavates as fine to coarse grained sand (SP soil type), is generally gray to gray-brown in color, and slightly moist to saturated, with groundwater encountered at a depth of approximately 22 feet into the bedrock (depth of 47 feet from existing ground surface) in Boring B-5.

4.3 SURFACE WATER AND GROUNDWATER

4.3.1 Surface Water

If encountered during earthwork operations, surface water on this site will likely be the result of precipitation or possibly some minor surface run-off from the surrounding areas. Natural drainage at the site is interpreted to be to the south-southwest following the existing site topography in the area. Provisions for surface drainage will need to be accounted for by the project civil engineer.

Based on review of the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map No. 06065C0702G, the southeastern portion of the project site is located within a "Zone A" Flood Area, indicating a Special Flood Hazard Area with "No Base Flood Elevations Determined". The majority of the project site is located within a "Zone X" Flood Area, corresponding to areas with minimal flood hazard (e.g., the site is located outside a 0.2% annual chance floodplain).

4.3.2 Groundwater

Groundwater was encountered within Boring B-5 at a depth of approximately 47 feet below existing grades at the time of drilling. Based on the results of the field exploration, review of site area geomorphology and geology, groundwater is not anticipated to adversely affect the proposed improvements. Groundwater elevations are dependent on seasonal precipitation, irrigation, and land use, among other factors, and vary as a result. Based on a review of groundwater data, historic high groundwater levels within the site vicinity are greater than at least 45 feet below existing grades.

4.4 FAULTING AND SEISMICITY

4.4.1 Faulting

The geologic structure of the entire California area is dominated mainly by northwest-trending faults associated with the San Andreas system. The site is in a seismically active region. However, the site is not situated within a State of California designated *"Alquist-Priolo"* Earthquake Fault Zone.

The County of Riverside has designated the site area as "not within a fault zone", "not in a fault line", having a "high" potential for liquefaction and as "susceptible" to subsidence. The nearest known active faults to the site are an unnamed fault in Fontana, the San Jacinto fault zone (San Bernardino Valley section section), and the Elsinore fault zone (Glen Ivy North section), located approximately 6.6, 9.9, and 11.2 miles to the north, northeast, and southwest of the site, respectively. No known active faults project into or through the project site.

4.4.2 Seismic Design Parameters

The site is located at approximately 33.9745 degrees West Latitude and -117.4658 degrees North Longitude. Due to the relatively dense nature of the site soil (average blow counts greater than 15) a Site Class "D" is considered appropriate for this site. Site spectral accelerations (S_a and S_1) for 0.2 and 1.0 second periods for a Class "D" site, was determined from the SEAOC/OSHPD web interface that utilizes the USGS web services and retrieves the seismic design data and presents that information in a report format. Using the ASCE 7-16 option on the SEAOC/OSHPD website results in the values for S_{M1} and S_{D1} reported as "null-See Section 11.4.8" (of ASCE 7-16). As noted in ASCE 7-16, Section 11.4.8, a site-specific ground motion procedure is recommended for Site Class D when the value S_1 exceeds 0.2. The value S_1 for the subject site exceeds 0.2.

For a Site Class D, an exception to performing a site-specific ground motion analysis is allowed in ASCE 7-16 where S_1 exceeds 0.2 provided the value of the seismic response coefficient, Cs, is conservatively calculated by Eq 12.8-2 of ASCE 7-16 for values of T≤1.5Ts and taken as equal to 1.5 times the value computed in accordance with either Eq. 12.8-3 for T_L≥T>1.5Ts or Eq. 12.8-4 for T>T_L.

The results, based on the 2015 NEHRP and the 2022 CBC, are presented in the following table assuming that the exception as allowed in ASCE 7-16 is applicable. If the exception is deemed not appropriate, a site-specific ground motion analysis will be required.

SITE SEISMIC PARAMETERS	
Mapped 0.2 sec Period Spectral Acceleration, S_S	1.5g
Mapped 1.0 sec Period Spectral Acceleration, S_1	0.576g
Site Coefficient for Site Class "D", F_a	1.0
Site Coefficient for Site Class "D", F_V	1.724
Maximum Considered Earthquake Spectral Response Acceleration for 0.2 Second, S_{MS}	1.5g
Maximum Considered Earthquake Spectral Response Acceleration for 1.0 Second, S_{M1}	0.993g
5% Damped Design Spectral Response Acceleration Parameter at 0.2 Second, S_{DS}	1.00
5% Damped Design Spectral Response Acceleration Parameter at 1 second, S_{D1}	0.662
Peak Ground Acceleration (PGA_M)	0.55g
Seismic Design Category	D

Final selection of the appropriate seismic design coefficients should be made by the project structural engineer based upon the local practices and ordinances, expected building response and desired level of conservatism.

4.5 LIQUEFACTION

Liquefaction describes a phenomenon in which cyclic stresses, produced by earthquake-induced ground motion, create excess pore pressures in relatively cohesionless soils. These soils may thereby acquire a high degree of mobility, which can lead to lateral movement, sliding, consolidation and settlement of loose sediments, sand boils and other damaging deformations. This phenomenon occurs only below the water table, but, after liquefaction has developed, the effects can propagate upward into overlying non-saturated soil as excess pore water dissipates.

The factors known to influence liquefaction potential include soil type and grain size, relative density, groundwater level, confining pressures, and both intensity and duration of ground shaking. In general, materials that are susceptible to liquefaction are loose, saturated granular soils having low fines content under low confining pressures.

The project site is not located within an area mapped by the State of California for liquefaction potential. The County of Riverside (Map My County tool) and City of Jurupa Valley (2017) has designated the site as having a "high" potential for liquefaction. However, based on the relatively dense nature of the subsurface older alluvial soils, presence of relatively shallow bedrock, and relatively deep historic groundwater, it is GeoTek's opinion that the liquefaction potential at the site is very low.

4.6 OTHER SEISMIC HAZARDS

Due to the relatively dense nature of the underlying alluvium and proposed site grading, seismic induced ("dry sand") settlements are estimated to be minimal.

Due to the general flat terrain, the potential for seismic induced landslides or lateral spreading is considered nil. The potential for secondary seismic hazards such as a seiche and tsunami is considered negligible due to site elevation and distance from an open body of water.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1 GENERAL

Development of the site appears feasible from a geotechnical engineering viewpoint. The following recommendations should be incorporated into the design and construction phases of development.

Remedial grading, consisting of overexcavation and recompaction of the upper site soils is recommended to provide a uniform bearing for any proposed structures.

5.2 EARTHWORK CONSIDERATIONS

5.2.1 General

Earthwork and grading should be performed in accordance with the applicable grading ordinances of the City of Jurupa Valley and the 2022 California Building Code (CBC), and recommendations contained in this report. The Grading Guidelines included in Appendix D outline general procedures and do not anticipate all site-specific situations. In the event of conflict, the recommendations presented in the text of this report should supersede those contained in Appendix D.

5.2.2 Site Clearing

Initial site preparation should commence with removal of debris, existing structures, pavements, underground utilities, foundations, slabs-on-grade, deleterious materials and vegetation within the limits of the planned improvements. Demolition of existing buildings/structures should include removal of all shallow foundations, floor slabs and any of below-grade construction.

Existing utilities, not planned for re-use, should be capped off at the property boundaries and removed. All materials generated by demolition and site clearing operations should be properly disposed of off-site. Voids resulting from removing any materials should be replaced with engineered fill materials with expansion characteristics similar to the onsite materials.

5.2.3 Site Preparation

Following site clearing, lowering of site grades (where necessary) and prior to placement of new engineered fill, any undocumented fill and unsuitable older alluvial materials should be overexcavated to competent materials. It is recommended that the soils be removed beneath the planned building footprint to a depth of at least three (3) feet below existing grades, or two (2) feet below the base of the proposed foundations, whichever is greater. The actual depth of over-excavation should be determined by a GeoTek representative at the time of grading based on visual observations and in-place density testing. The lateral extent of this recommended over-excavation should extend at least five (5) feet beyond the building limits, where obtainable. Removal bottoms should be relatively uniform native soil which is not visibly porous and having an in-place density of at least 85 percent of the soil's maximum dry density as determined by ASTM D 1557 test procedures.

Beneath street pavements, sidewalks, hardscaping and driveway slabs, the native soil subgrade over-excavation can be limited to two (2) feet below existing or finished grade, whichever is

deeper, provided all undocumented fill is removed. The over-excavation should extend laterally at least two (2) feet beyond the edge of the improvement, where obtainable.

Following site clearing operations, over-excavation and lowering of site grades, where necessary, it is recommended that the exposed subgrade soils beneath all surface improvements be proof rolled with a heavy rubber-tired piece of construction equipment approved by and in the presence of the geotechnical engineering representative. All soil that ruts or excessively deflects during proof rolling should be removed as recommended by the GeoTek representative.

Following proof rolling and removal of any unsuitable bearing soil, the exposed subgrade should be scarified to a depth of about 12 inches, be moisture conditioned to slightly above the soil's optimum moisture content and then be compacted to at least 90 percent of the soil's maximum dry density as determined by ASTM D1557 test procedures.

5.2.4 Engineered Fill

The on-site soils are generally considered suitable for reuse as engineered fill provided they are free from vegetation, debris, oversized materials (6 inch diameter or greater) and other deleterious material. All areas should be brought to final subgrade elevations with fill materials that are placed and compacted in general accordance with minimum project standards. Engineered fill should be placed in 6-to-8-inch loose lifts, moisture conditioned to slightly above the optimum moisture content and compacted to a minimum relative compaction of 90 percent as determined by ASTM D1557 test procedures.

If wet soils are encountered during remedial grading, methods for drying soils such as stockpiling or mixing with dry soils may be required to bring the soils to the required moisture content for placement as engineered fill. Placement of engineered fill should be observed and tested on a full-time basis by a GeoTek representative during grading activities.

5.2.5 Transition Lots and Cut Lots

Building pads graded with a cut/fill transition should be undercut to reduce the potential for differential settlement. The cut portion of the cut/fill transition should be undercut to a depth of at least three (3) feet from natural grade or two (2) feet below the deepest proposed footing, whichever is deeper, and be backfilled with a properly compacted engineered fill. The maximum differential fill thickness across a single lot is 2:1 horizontal to vertical. The bottom of the undercut should be sloped at a minimum of 1 percent toward the adjacent street/parking lot area.

All cut lots should be overexcavated to a depth of three (3) feet below proposed grade and replaced with engineered fill.

5.2.6 Oversized Rock Disposal

Although unlikely, oversized cobbles, boulders and rock fragments may be encountered during rough grading and utility trench operations. If encountered, on-site disposal of oversized materials is possible, provided the oversized materials are placed as recommended on Plate 4 within Appendix D. Alternatively, oversized materials can be exported from the site.

5.2.7 Excavation Characteristics

Excavations in the on-site alluvium should be readily accomplished with heavy-duty earthmoving or excavating equipment in good operating condition. All excavations should be formed in accordance with current Cal-OSHA requirements.

5.2.8 Trench Excavations and Backfill

Temporary trench excavations within the on-site materials should be stable at a 1.5:1 inclination for short durations during construction and where cuts do not exceed 10 feet in height. Deeper temporary excavations should be reviewed by GeoTek prior to their planned excavation to determine if supplemental recommendations or analysis are warranted. It is anticipated that temporary cuts to a maximum height of 4 feet can be excavated vertically.

Trench excavations should conform to Cal-OSHA regulations. The contractor should have a competent person, per OSHA requirements, on site during construction to observe conditions and to make the appropriate recommendations.

Utility trench backfill should be compacted to at least 90 percent relative compaction (as determined by ASTM D-1557 test procedures). Under-slab trenches should also be compacted to project specifications. Where applicable, based on jurisdictional requirements, the top 12 inches of backfill below subgrade for road pavements should be compacted to at least 95 percent relative compaction. On-site materials may not be suitable for use as bedding material but should be suitable as backfill provided particles larger than 6 inches are removed. Relatively abundant amounts of oversize materials may be encountered during excavations.

Compaction should be achieved with a mechanical compaction device. Ponding or jetting of trench backfill is not recommended. If backfill soils have dried out, they should be properly moisture conditioned prior to placement in trenches.

5.2.9 Shrinkage and Bulking

For planning purposes, a shrinkage loss of about 10 to 15 percent is anticipated for excavations within the undocumented fill/alluvium at the site. Several factors will impact earthwork balancing on the site, including shrinkage, trench spoil from utilities and footing excavations, as well as the accuracy of topography. Shrinkage and bulking are primarily dependent upon the degree of compactive effort achieved during construction, depth of fill and underlying site conditions. A subsidence loss of up to about 0.20 feet is estimated for the site.

Site balance areas should be available in order to adjust project grades, depending on actual field conditions at the conclusion of earthwork construction.

5.2.10 Grading Plan Review

Upon completion of the site grading plans, it is recommended that those plans be provided to GeoTek for review. Based on that review, some modifications to the recommendations provided in this report may be necessary.

5.3 DESIGN RECOMMENDATIONS

5.3.1 Foundation Design Criteria

Foundation design criteria for a conventional foundation system, in general conformance with the 2022 CBC, are presented below. The soils are classified as having a "Very Low" (0-20) expansion index (EI) in accordance with ASTM D 4829. Typical design criteria for the site based upon a "Very Low" expansion index are tabulated below. These are minimal recommendations and are not intended to supersede the design by the project structural engineer. Once structural loading information is provided, revisions to the recommendations provided in this report may be necessary.

The conventional foundation elements for the proposed buildings should bear entirely in engineered fill soils. Foundations should be designed in accordance with the 2022 CBC.

Expansion index and soluble sulfate evaluation of the soils should be performed during construction to evaluate the as-graded conditions. Final recommendations should be based upon the as-graded soils conditions. A summary of the foundation design recommendations is presented in the following table:

GEOTECHNICAL RECOMMENDATIONS FOR FOUNDATION DESIGN

Design Parameter	"Very Low" (0-20) Expansion Index (ASTM D 4829)
Foundation Depth or Minimum Perimeter Beam Depth (inches below lowest adjacent grade)	12 – One- and two-stories 18 – Three-Stories
Minimum Foundation Width (Inches)*	12 – One-Story 15 – Two-Story 18 – Three-Story
Minimum Slab Thickness (actual)	4 – Actual
Minimum Slab Reinforcing	6" x 6" – W1.4 x W1.4 welded wire fabric placed in middle of slab or No. 3 bars at 18-inch centers
Minimum Footing Reinforcement	Two No. 4 reinforcing bars, one placed near the top and one near the bottom
Effective Plasticity Index	N/A
Presaturation of Subgrade Soil (Percent of Optimum)	Minimum of 100% of the optimum moisture content to a depth of at least 12 inches prior to placing concrete

*Code minimums per Table 1809.7 of the 2022 CBC should be complied with.

The following criteria for design of foundations are preliminary and should be re-evaluated based on the results of additional laboratory testing of samples obtained at/near finish pad grade.

5.3.1.1 An allowable bearing capacity of 2,500 pounds per square foot (psf) may be used for design of continuous and perimeter footings 12 inches deep and 12 inches wide, and pad footings 24 inches square and 12 inches deep. This allowable soil bearing capacity may be increased by 400 psf for each additional foot of footing depth and 250 psf for each additional foot of footing width to a maximum value of 3,500 psf. An increase of one-third may be applied when considering short-term live loads (e.g., seismic and wind loads). These bearing values contain a minimum factor of safety of three (3).

5.3.1.2 Structural foundations should be designed in accordance with the 2022 CBC, and to withstand a total static settlement of 1 inch and maximum differential static settlement of one-half of the total settlement over a horizontal distance of 40 feet. Seismic-induced settlements are estimated to be minimal.

5.3.1.3 The passive earth pressure may be computed as an equivalent fluid having a density of 300 psf per foot of depth, to a maximum earth pressure of 3,000 psf for footings founded on engineered fill or competent native soil. The allowable passive earth pressure contains a factor of safety of 1.5. A coefficient of friction between soil and concrete of 0.35 may be used with dead load forces. The coefficient of friction contains a reduction value of one-third (1/3). Passive pressure and frictional resistance

may be combined without reduction. The upper one foot of soil should be ignored in the passive pressure calculations unless the surface is covered with pavements.

5.3.1.4 Where the building slab is to be designed as a beam on an elastic foundation, a modulus of subgrade reaction (k-value) of 200 pounds per cubic inch (pci) may be considered for design based on a presumed value for a 1-foot by 1-foot plate load test. Dependent upon how the mat slab is loaded, the subgrade modulus value may need to be geometrically modified.

5.3.1.5 A grade beam, a minimum of 12 inches wide and 12 inches deep, should be utilized across large entrances. The base of the grade beam should be at the same elevation as the bottom of the adjoining footings.

5.3.1.6 It is recommended that control joints be placed in two directions spaced approximately 24 to 36 times the thickness of the slab in inches. These joints are a widely accepted means to control cracks and should be reviewed by the project structural engineer

5.3.1.7 A moisture and vapor retarding system should be placed below slabs-on-grade where moisture migration through the slab is undesirable. Guidelines for these are provided in the 2022 California Green Building Standards Code (CALGreen) Section 4.505.2, the 2022 CBC Section 1907.1 and ACI 360R-10. The vapor retarder design and construction should also meet the requirements of ASTM E 1643. A portion of the vapor retarder design should be the implementation of a moisture vapor retardant membrane.

It should be realized that the effectiveness of the vapor retarding membrane can be adversely impacted as a result of construction related punctures (e.g., stake penetrations, tears, punctures from walking on the vapor retarder placed atop the underlying aggregate layer, etc.). These occurrences should be limited as much as possible during construction. Thicker membranes are generally more resistant to accidental puncture than thinner ones. Products specifically designed for use as moisture/vapor retarders may also be more puncture resistant. Although the CBC specifies a 6-mil vapor retarder membrane, it is GeoTek's opinion that a minimum 10 mil thick membrane with joints properly overlapped and sealed should be considered, unless otherwise specified by the slab design professional. The membrane should consist of Stego wrap or the equivalent.

Moisture and vapor retarding systems are intended to provide a certain level of resistance to vapor and moisture transmission through the concrete, but do not eliminate it. The acceptable level of moisture transmission through the slab is to a

large extent based on the type of flooring used and environmental conditions. Ultimately, the vapor retarding system should be comprised of suitable elements to limit migration of water and reduce transmission of water vapor through the slab to acceptable levels. The selected elements should have suitable properties (i.e., thickness, composition, strength, and permeability) to achieve the desired performance level.

Moisture retarders can reduce, but not eliminate, moisture vapor rise from the underlying soils up through the slab. Moisture retarder systems should be designed and constructed in accordance with applicable American Concrete Institute, Portland Cement Association, Post-Tensioning Concrete Institute, ASTM and California Building Code requirements and guidelines.

GeoTek recommends that a qualified person, such as the flooring contractor, structural engineer, architect, and/or other experts specializing in moisture control within the building be consulted to evaluate the general and specific moisture and vapor transmission paths and associated potential impact on the proposed construction. That person (or persons) should provide recommendations relative to the slab moisture and vapor retarder systems and for migration of potential adverse impact of moisture vapor transmission on various components of the structures, as deemed appropriate.

In addition, the recommendations in this report and GeoTek's services in general are not intended to address mold prevention; since GeoTek, along with geotechnical consultants in general, do not practice in the area of mold prevention. If specific recommendations addressing potential mold issues are desired, then a professional mold prevention consultant should be contacted.

5.3.1 Miscellaneous Foundation Recommendations

5.3.1.1 To reduce moisture penetration beneath the slab on grade areas, utility trench excavations should be backfilled with engineered fill, lean concrete or concrete slurry where they intercept the perimeter footing or thickened slab edge.

5.3.1.2 Soils from the footing excavations should not be placed in the slab-on-grade areas unless properly compacted and tested. The excavations should be free of loose/sloughed materials and be neatly trimmed at the time of concrete placement.

5.3.2 Foundation Setbacks

Minimum setbacks for all foundations should comply with the 2022 CBC or City of Jurupa Valley requirements, whichever is more stringent. Improvements not conforming to these setbacks are subject to the increased likelihood of excessive lateral movements and/or differential settlements. If large enough, these movements can compromise the integrity of the improvements. The top outside edge of all footings should be set back a minimum of H/3 (where H is the slope height) from the face of any descending slope. The setback should be at least five feet and need not exceed 40 feet.

5.3.3 Soil Corrosivity

The soil resistivity at this site was tested in the laboratory on two (2) samples collected during the field investigation. The results of the testing indicate that the on-site soils are considered "highly corrosive" (1,072 ohm-cm) to "corrosive" (4,020 ohm-cm) (Roberge, 2000) to buried ferrous metal in accordance with current standards used by corrosion engineers. Recommendations for protection of buried ferrous metal should be provided by a corrosion engineer. Additional corrosion testing should be performed at the time of site grading to assess the corrosion potential of the as-graded soils.

5.3.4 Soil Sulfate Content

The sulfate content was determined in the laboratory on two (2) samples collected during the field investigation. The results indicate that the water-soluble sulfate result is less than 0.1 percent by weight, which is considered "negligible" as per Table 19.3.1.1 of ACI 318-19. Based on the test results and Table 19.3.1.1 of ACI 318-19, no special recommendations for concrete are required for this project due to soil sulfate exposure.

5.4 RETAINING WALL DESIGN AND CONSTRUCTION

5.4.1.1 General Design Criteria

Recommendations presented in this report apply to typical masonry or concrete vertical retaining walls. These are typical design criteria and are not intended to supersede the design by the structural engineer. Retaining wall foundations should be embedded a minimum of 18 inches into engineered fill. Retaining wall foundations should be designed in accordance with Section 5.3 of this report. Structural needs may govern and should be evaluated by the project structural engineer.

All earth retention structure plans, as applicable, should be reviewed by this office prior to finalization.

Earthwork considerations, site clearing and remedial earthwork for all earth retention structures should meet the requirements of this report, unless specifically provided otherwise, or more stringent requirements or recommendations are made by the designer. The backfill material placement for all earth retention structures should meet the requirement of Section 5.2.4 in this report.

In general, cantilever earth retention structures, which are designed to yield at least 0.001H, where H is equal to the height of the earth retention structure, may be designed using the "active" condition. Rigid earth retention structures (including but not limited to rigid walls, and walls braced at top, such as typical basement walls) should be designed using the "at-rest" condition.

In addition to the design lateral forces due to retained earth, surcharges due to improvements, such as an adjacent building or traffic loading, should be considered in the design of the earth retention structures. Loads applied within a 1:1 (horizontal: vertical) projection from the surcharge on the stem of the earth retention structure should be considered in the design.

Final selection of the appropriate design parameters should be made by the designer of the earth retention structures.

5.4.1.2 Cantilevered Walls

The recommendations presented below are for cantilevered retaining walls. Active earth pressure may be used for retaining wall design, provided the top of the wall is not restrained from minor deflections. An equivalent fluid pressure approach may be used to compute the horizontal pressure against the wall. Appropriate fluid unit weights are given below for specific slope gradients of the retained material. These do not include other superimposed loading conditions such as traffic, structures, seismic events, or adverse geologic conditions.

ACTIVE EARTH PRESSURES	
Surface Slope of Retained Materials (horizontal: vertical)	Equivalent Fluid Pressure (pcf) Select Backfill* and Native Soils
Level	42
2:1	65

*The design pressures assume the backfill material has an expansion index less than or equal to 20. Backfill zone includes area between back of the wall to a plane (1:1 horizontal: vertical) up from bottom of the wall foundation (on the backside of the wall) to the ground surface.

For walls with a retained height greater than six (6) feet, an incremental seismic pressure should be included into the wall design. Where needed, it is recommended that an incremental seismic load for unrestrained walls with level backfill of $11H^2$ [Units: pounds per lineal foot of wall] should be included into the wall design to account for seismic loading conditions, where H is the retained height of the wall. For unrestrained walls with a retained height greater than six (6) feet with backfill of a 2:1 [horizontal: vertical] gradient, a dynamic load increment of $18H^2$ should be included in the wall design. These incremental seismic loads may be assumed to be applied at a point 1/3H above the base of the wall.

5.4.1.3 Retaining Wall Backfill and Drainage

The wall backfill should also include a minimum one (1) foot wide section of ¾- to 1-inch clean crushed rock (or an approved equivalent). The rock should be placed immediately adjacent to the back of the wall and extend up from a back drain to within approximately 24 inches of the finish grade. The upper 24 inches should consist of compacted on-site materials. The rock should be separated from the earth with filter fabric. The presence of other materials might necessitate revision of the parameters provided and modification of the wall designs. The backfill materials should be placed in lifts no greater than eight (8) inches in thickness and compacted to a minimum of 90% relative compaction as determined by ASTM D 1557 test procedures. Proper surface drainage needs to be provided and maintained.

As an alternative to the drain, rock and fabric, a pre-manufactured wall drainage product (example: Mira Drain 6000 or approved equivalent) may be used behind the retaining wall. The wall drainage product should extend from the base of the wall to within two (2) feet of the ground surface. The subdrain should be placed in direct contact with the wall drainage product.

Retaining walls should be provided with an adequate pipe and gravel back drain system to help prevent buildup of hydrostatic pressures. Backdrains should consist of a four (4)-inch diameter perforated collector pipe (Schedule 40, SDR 35, or approved equivalent) embedded in a minimum of one (1) cubic foot per linear foot of ¾- to 1-inch clean crushed rock or an approved equivalent, wrapped in filter fabric (Mirafi 140N or an approved equivalent). The drain system should be connected to a suitable outlet. Waterproofing of site walls should be performed where moisture migration through the walls is undesirable.

5.4.1.4 Restrained Retaining Walls

Retaining walls that will be restrained at the top that support level backfill or that have reentrant or male corners, should be designed for an equivalent at-rest fluid pressure of 65 pcf, plus any applicable surcharge loading. For areas of male or reentrant corners, the restrained wall design should extend a minimum distance of twice the height of the wall laterally from the corner, or a distance otherwise determined by the project structural engineer.

5.4.1.5 Other Retaining Wall Design Considerations

- Wall design should consider the additional surcharge loads from superjacent slopes and/or footings, where appropriate.
- No backfill should be placed against concrete until minimum design strengths are evident by compression tests of cylinders.
- The retaining wall footing excavations, backcuts, and backfill materials should be approved by the project geotechnical engineer or their authorized representative.
- Positive separations should be provided in garden walls at horizontal distances not exceeding 20 feet.

5.5 PRELIMINARY PAVEMENT DESIGN RECOMMENDATIONS

5.5.1 Asphalt Concrete (AC) Pavement

Although planned final grades beneath the street improvements within the site are not yet known, the following preliminary pavement design recommendations are based on section minimums designated by the County of Riverside (Standard Plan No. 105). Preliminary pavement thickness design is based on the Caltrans Highway Design Manual (2018).

An R-value of 40 has been assumed for the preliminary design of the project pavement sections. Once the traffic loading information becomes more defined, revision to the pavement design recommendations may be warranted. It is recommended that the final pavement design be based on R-value testing of the as-graded subgrade soils within the pavement areas.

Based on the assumptions noted above the following preliminary pavement recommendations are provided for the site:

PRELIMINARY MINIMUM PAVEMENT SECTION		
Traffic Index	Thickness of Asphalt Concrete (inches)	Thickness of Aggregate Base (inches)
5.5 (Local Street)	3.0*	6.0*
7.0 (Collector Street)	4.0*	6.5*

*City of Jurupa Valley defers to County of Riverside Roadway Design Standards

Traffic Indices (TIs) used in the pavement design are designated by the County of Riverside and should provide a pavement life of approximately 20 years with a normal amount of flexible pavement maintenance. Irrigation adjacent to pavements, without a deep curb or other cutoff to separate landscaping from the paving may result in premature pavement failure. Traffic parameters used for design were selected based upon engineering judgment and not upon information furnished to us such as an equivalent wheel load analysis or a traffic study.

All base material and the upper 12 inches of subgrade should be compacted to at least 95 percent of the material's maximum dry density as determined by ASTM D1557 test procedures. All materials and methods of construction should conform to the requirements of the City of Jurupa Valley and/or County of Riverside.

5.5.2 Permeable Interlocking Concrete Pavers

Interlocking concrete pavers can be used for this project. The pavers are assumed to be approximately 3.2 inches (80 millimeters) in thickness. Concrete pavers should be underlain by 1.0 inch to 1.5 inches of bedding sand overlying four inches of aggregate base founded on compacted subgrade soils. The aggregate base should be compacted to at least 95 percent of maximum dry density as determined by ASTM D 1557 test procedures.

Where possible, the aggregate base should extend beyond the perimeter of the pavers a minimum distance of four inches.

The bedding sand should be placed lightly moistened and compacted. Since this compaction cannot be tested it should be observed by a representative of this firm.

Historically, paver systems have experienced failures in areas where water has degraded the support characteristics of the underlying base and/or subgrade soils. Since paver systems are permeable and allow transmission of water into the underlying materials, it may be prudent to discuss with the paver designer/manufacturer what methods may be employed to address the issue of potential water introduction into the underlying materials.

Underdrain systems, local subgrade reinforcement, tilting the pavement subgrade to drain away from paver areas and not pond, or additional structural elements such as geotextiles can be considered, particularly in high traffic areas and/or low areas where water will tend to collect. The recommendations of the designer/manufacturer should then be implemented in the design and construction of the paver system.

5.5.3 Portland Cement Concrete (PCC) Pavement

For the proposed vehicle parking and access lanes, it is recommended that a minimum of five (5) inches of PCC pavement over 12 inches subgrade compacted to at least 95 percent of maximum dry density as determined by ASTM D 1557 test procedures be utilized. For vehicle service lanes, it is recommended that a minimum of six (6.0) inches of PCC pavement over 12 inches subgrade compacted to at least 95 percent of maximum dry density be utilized. This section should also be used in heavy truck traffic areas such as fire lanes, trash dumpster pads and approaches.

Requirements of Section 90 of Caltrans Standard Specifications, and various ACI and ASTM standards regarding mixing and placing concrete should be followed. The PCC pavement should have a minimum modulus of rupture of 500 pounds per square inch, and a minimum 28-day compressive strength of 4,000 pounds per square inch. Concrete should incorporate 1-inch maximum size aggregate and should be proportioned to achieve a maximum slump of four inches. Instead of increasing the water content, a plasticizing admixture may be utilized to increase the workability of the concrete. The concrete should be properly cured after placement. Concrete should not be placed during hot and windy weather.

Crack control joints should be provided in the transverse direction spaced at horizontal intervals ranging from 24 to 36 times the thickness of the concrete.

5.5.4 Pavement Construction

All pavement installation, including preparation and compaction of subgrade and base material, placement and rolling of asphaltic concrete and placement of concrete pavement, should be done in accordance with the City of Jurupa Valley, County of Riverside guidelines, and under the observation and testing of GeoTek and a City/County inspector, where required.

Any aggregate base should consist of crushed rock with an R-Value and gradation in accordance with Crushed Aggregate Base (Section 400-2.4 of the "Greenbook" Regional Supplement Amendments). Any Crushed Miscellaneous Base shall conform to Section 200-2.4 of the Green Book.

Minimum compaction requirements for aggregate base should be 95 percent of maximum dry density as determined by ASTM D 1557 test procedures for both soil subgrade and aggregate base. Jurisdictional minimum compaction requirements in excess of the aforementioned minimums may govern. The upper 12 inches of subgrade should be moisture-conditioned to at least optimum moisture. The top of the subgrade and aggregate base should be graded to drain to the perimeter of the pavement.

5.6 CONCRETE CONSTRUCTION

5.6.1 General

Concrete construction should follow the 2022 CBC and ACI guidelines regarding design, mix placement and curing of the concrete. If desired, GeoTek could provide quality control testing of the concrete during construction.

5.6.2 Concrete Mix Design

As discussed in Section 5.3.5, no special recommendations for concrete are required for this project due to soil sulfate exposure. Additional testing should be performed during grading so that specific recommendations can be formulated based on the as-graded conditions.

5.6.3 Concrete Flatwork

Exterior concrete flatwork is often one of the most visible aspects of site development. They are typically given the least level of quality control, being considered "non-structural" components. Cracking of these features is common due to various factors. While cracking usually does not affect the structural performance of the concrete, it is unsightly. It is recommended that the same standards of care be applied to these features as to the structure itself.

Flatwork should consist of a minimum four-inch (actual) thick concrete and the use of temperature and shrinkage control reinforcement is suggested. The project structural engineer should provide final design recommendations.

5.6.4 Concrete Performance

Concrete cracks should be expected. These cracks can vary from sizes that are hairline to more than 1/8 inch in width. Most cracks in concrete while unsightly do not significantly impact long-term performance. While it is possible to take measures (proper concrete mix, placement, curing, control joints, etc.) to reduce the extent and size of cracks that occur, some cracking will occur despite the best efforts to minimize it. Concrete undergoes chemical processes that are dependent on a wide range of variables, which are difficult, at best, to control. Concrete, while seemingly a stable material, is subject to internal expansion and contraction due to external changes over time.

One of the simplest means to control cracking is to provide weakened control joints for cracking to occur along. These do not prevent cracks from developing; they simply provide a relief point for the stresses that develop. These joints are a widely accepted means to control cracks but are not always effective. Control joints are more effective the more closely spaced they are. GeoTek suggests that control joints be placed in two orthogonal directions and located at a distance approximately equal to 24 to 36 times the slab thickness.

5.7 PLAN REVIEW AND CONSTRUCTION OBSERVATIONS

It is recommended that site grading, specifications, and foundation plans be reviewed by this office prior to construction to check for conformance with the recommendations of this report. It is also recommended that GeoTek representatives be present during site grading and foundation construction to observe and document for proper implementation of the geotechnical recommendations. The owner/developer should have GeoTek perform at least the following duties:

- Observe site clearing and grubbing operations for proper removal of all unsuitable materials.
- Observe and test bottom of removals prior to fill placement.
- Evaluate the suitability of on-site and import materials for fill placement and collect soil samples for laboratory testing where necessary.
- Observe the fill for uniformity during placement, including utility trench excavation backfill. Also, test the fill for density, relative compaction and moisture content.

- Observe and probe foundation excavations to confirm suitability of bearing materials with respect to density.

If requested, a construction observation and compaction report can be provided by GeoTek which can comply with the requirements of the governmental agencies having jurisdiction over the project. It is recommended that these agencies be notified prior to commencement of construction so that necessary grading permits can be obtained.

6. INTENT

It is the intent of this report to aid in the design and construction of the proposed development. Implementation of the advice presented in this report is intended to reduce risk associated with construction projects. The professional opinions and geotechnical advice contained in this report are not intended to imply total performance of the project or guarantee that unusual or variable conditions will not be discovered during or after construction.

The scope of GeoTek's evaluation is limited to the area explored that is shown on the Exploration Location Map (Figure 2). This evaluation does not and should in no way be construed to encompass any areas beyond the specific area of the proposed construction as indicated to GeoTek by the client. Further, no evaluation of any existing site improvements is included. The scope is based on GeoTek's understanding of the project and the client's needs, GeoTek's proposal (Proposal No. P-0504924-CR) dated May 10, 2024, and geotechnical engineering standards normally used on similar projects in this region.

7. LIMITATIONS

GeoTek's findings are based on site conditions observed and the stated sources. Thus, GeoTek's comments are professional opinions that are limited to the extent of the available data.

GeoTek has prepared this report in a manner consistent with that level of care and skill ordinarily exercised by members of the engineering at this time and location and science professions currently practicing under similar conditions in the jurisdiction in which the services are provided, subject to the time limits and physical constraints applicable to this report.

Since GeoTek's recommendations are based on the site conditions observed and encountered at the stated times and laboratory testing. Thus, GeoTek's conclusions and recommendations are professional opinions that are limited to the extent of the available data. Observations during construction are important to allow for any change in recommendations found to be warranted. These opinions have been derived in accordance with current standards of practice and no warranty of any kind is expressed or implied. Standards of care/practice are subject to change with time.

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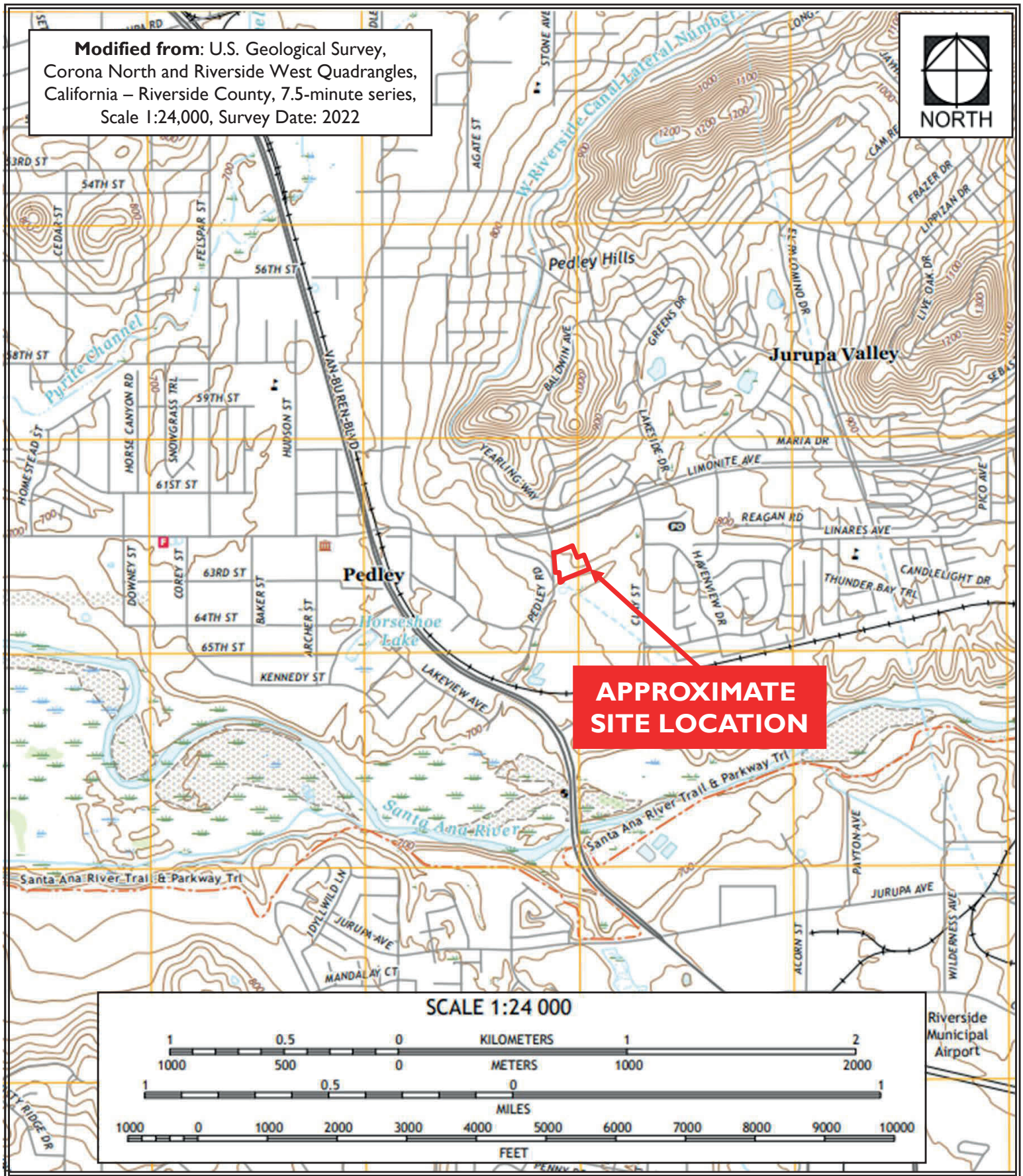
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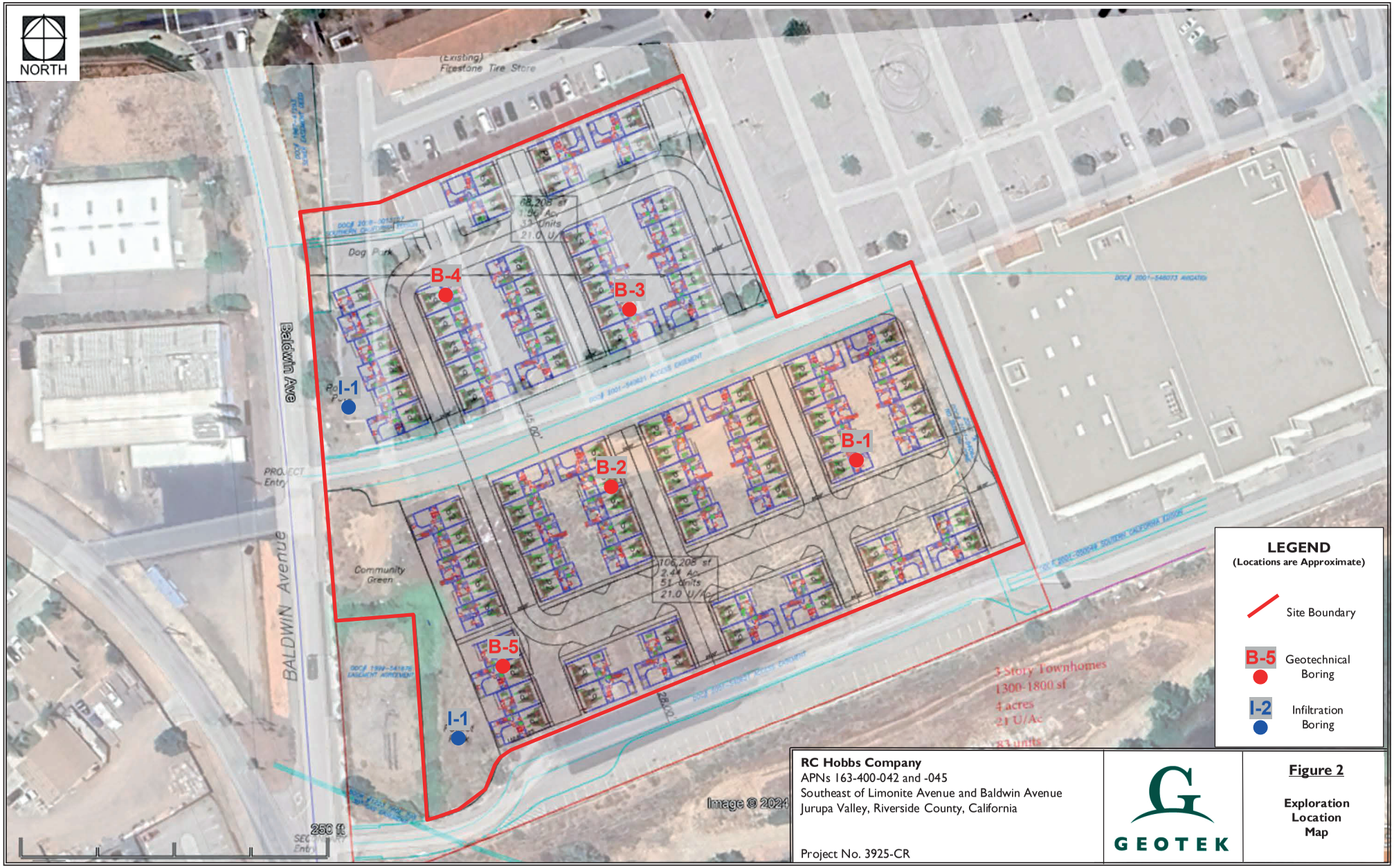
RC Hobbs Company
APNs 163-400-042 and -045
Baldwin Avenue Townhomes Project
City of Jurupa Valley, Riverside County, California

Project No. 3925-CR

Figure 1

Site Location and Topography Map

GEOTEK



RC Hobbs Company
APNs 163-400-042 and -045
Southeast of Limonite Avenue and Baldwin Avenue
Jurupa Valley, Riverside County, California

Project No. 3925-CR

GEOTEK

Figure 2

Exploration Location Map

APPENDIX A

LOGS OF EXPLORATORY BORINGS

Proposed Multi-Family Residential Development
Southeast of Limonite Avenue and Baldwin Avenue
Assessor's Parcel Numbers (APNs) 163-400-042 and -045
Jurupa Valley, Riverside County, California
Project No. 3925-CR

GEOTEK

A - FIELD TESTING AND SAMPLING PROCEDURES

The Modified Split-Barrel Sampler (Ring)

The ring sampler is driven into the ground at various depths in accordance with ASTM D 3550 test procedures. The sampler, with an external diameter of 3.0 inches, is lined with 1-inch long, thin brass rings with inside diameters of approximately 2.4 inches. The sampler is typically driven into the ground 12 or 18 inches with a 140-pound hammer free falling from a height of 30 inches. Blow counts are recorded for every 6 inches of penetration as indicated on the log of boring. The samples are removed from the sample barrel in the brass rings, sealed, and transported to the laboratory for testing.

The Standard Penetration Test (SPT) Sampler

Standard penetration tests (SPT) were performed with a 2.0-inch outside diameter, 1.5-inch inside diameter, split-barrel sampler. The sampler was 18 inches long. The inside diameter of the sampler shoe was 1.4 inches. The sampler was unlined. The sampler conformed to the requirements of ASTM D 1586. A 140-pound automatic trip hammer was utilized, dropping 30 inches for each blow. Blow counts are recorded for every 6 inches of penetration as indicated on the log of boring. Disturbed samples are removed from the sample barrel, sealed in a plastic bag, and transported to the laboratory for testing.

Bulk Samples (Large)

These samples are normally large bags of earth materials over 20 pounds in weight collected from the field by means of hand digging or exploratory cuttings.

Bulk Samples (Small)

These are plastic bag samples which are normally airtight and contain less than 5 pounds in weight of earth materials collected from the field by means of hand digging or exploratory cuttings. These samples are primarily used for determining natural moisture content and classification indices.

B - BORING LOG LEGEND

The following abbreviations and symbols often appear in the classification and description of soil and rock on the log of borings:

SOILS

USCS	Unified Soil Classification System
f-c	Fine to coarse
f-m	Fine to medium

GEOLOGIC

B: Attitudes	Bedding: strike/dip
J: Attitudes	Joint: strike/dip
C: Contact line	
……..	Dashed line denotes USCS material change
———	Solid Line denotes unit / formational change
———	Thick solid line denotes end of boring

(Additional denotations and symbols are provided on the boring logs)

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	RC Hobbs Company	**DRILLER:**	2R Drilling	**LOGGED BY:**	JC
PROJECT NAME:	Baldwin Ave Multi-Family	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Cody
PROJECT NO.:	3925-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	33.974695, -117.465355	**ELEVATION:**	777	**DATE:**	6/12/2024

Boring No.: B-1

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0				SM	**Undocumented Fill:** Silty f-c SAND, light brown, slightly moist, trace clay			MD, EI, SH, SR Expansion Index = 6
		35 50/2"	R1	SM/SC	**Older Alluvium:** Silty/clayey f-c SAND, orangish brown, moist, very dense	10.9	118.0	
5		28 50/4"	R2		Clayey/silty f-c SAND, orangish brown, moist, very dense	5.2	126.6	
		23 50/4"	R3		Trace gravels	9.3	122.2	
10		17 33 47	R4		Becomes dark brown, some oxidation staining	10.7	122.9	
		50/5"	R5	SP	Gravelly f-c SAND, brown, moist, very dense, some oxidation staining			
15		29 42 50/4"	R6	SM	Silty f-c SAND, brown, moist, very dense, trace oxidation staining	9.1	123.7	
20		14 25 50/4"	R7	SC/SM	Clayey/silty f-c SAND, dark greyish brown, moist, very dense			
25					**BORING TERMINATED AT 21.5 FEET** No groundwater encountered Boring backfilled with soil cuttings			
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	RC Hobbs Company	**DRILLER:**	2R Drilling	**LOGGED BY:**	JC
PROJECT NAME:	Baldwin Ave Multi-Family	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Cody
PROJECT NO.:	3925-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	33.974617, -117.465993	**ELEVATION:**	775	**DATE:**	6/12/2024

Boring No.: B-2

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Undocumented Fill:**			
		17 15 16	R1	SM	Silty f-c SAND, orangish brown, slightly moist, medium dense, trace clay	9.1	113.7	Collapse
		12 24 30	R2	SM	**Older Alluvium:** Silty f-c SAND, brown, moist, dense	8.3	128.3	
5		19 24 22	R3		Silty f-c SAND, dark brown, moist, dense, trace gravels	6.3	118.7	
		50/5"	R4		Becomes very dense	9.0	118.4	
		50/6"	R5					
10								
		41 50/2"	R6			9.1	117.8	
15					**BORING TERMINATED AT 14.5 FEET** No groundwater encountered Boring backfilled with soil cuttings			
20								
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	RC Hobbs Company	**DRILLER:**	2R Drilling	**LOGGED BY:**	JC
PROJECT NAME:	Baldwin Ave Multi-Family	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Cody
PROJECT NO.:	3925-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	33.975061, -117.465849	**ELEVATION:**	778	**DATE:**	6/12/2024

Boring No.: B-3

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**3" Asphalt Concrete over 3" Aggregate Base:**			
	Ring	50/6"	R1	SM	**Undocumented Fill:** Silty f-c SAND, dark brown, slightly moist, medium dense, trace clay	10.0	118.2	
	Ring	26 50/3"	R2	SM/SC	**Older Alluvium:** Silty/clayey f-c SAND, orangish brown, moist, very dense	10.0	122.2	
5	Ring	26 50/3"	R3	SM	Silty f-m SAND, dark brown, moist, very dense	9.1	126.2	
	Ring	26 50/3"	R3		Silty f-m SAND, dark brown, moist, very dense, micaceous	10.1	119.2	
10	Ring	28 50/4"	R5					
	Ring	37 50/3"	R6			8.5	124.4	
15					**BORING TERMINATED AT 14.5 FEET** No groundwater encountered Boring backfilled with soil cuttings			
20								
25								
30								

LEGEND

Sample type: Ring, SPT, Small Bulk, Large Bulk, No Recovery, Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	RC Hobbs Company	**DRILLER:**	2R Drilling	**LOGGED BY:**	JC
PROJECT NAME:	Baldwin Ave Multi-Family	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Cody
PROJECT NO.:	3925-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	33.975033, -117.466476	**ELEVATION:**	777	**DATE:**	6/12/2024

Boring No.: B-4

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**3" Asphalt Concrete over 5" Aggregate Base:**			
				SM	**Undocumented Fill:** Silty f-c SAND, brown, slightly moist, trace organics			SR
		16 50/4"	R1	SM/SC	**Older Alluvium:** Silty/clayey f-c SAND, orangish brown, moist, very dense	9.0	120.6	
5		50/6"	R2		Silty/clayey f-c SAND, orangish brown, moist, very dense	8.1	125.1	
		15 50/6"	R3			9.5	118.8	
		40 50/3"	R4					
10		50/6"	R5		**Granitic (Quartz Diorite) Bedrock:** Excavates as f-c SAND, brown, moist, micaceous	6.1	124.1	
15		50/6"	R6					
20		50/4"	R7					
					BORING TERMINATED AT 20.5 FEET No groundwater encountered Boring backfilled with soil cuttings			
25								
30								

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	RC Hobbs Company	**DRILLER:**	2R Drilling	**LOGGED BY:**	JC
PROJECT NAME:	Baldwin Ave Multi-Family	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Cody
PROJECT NO.:	3925-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	33.974170, -117.466350	**ELEVATION:**	772	**DATE:**	6/12/2024

Boring No.: B-5

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
0					**Undocumented Fill:**			
				SM/SC	Silty/clayey f-c SAND, light brown, slightly moist			EI, SR, MD EI = 4
		14 31 40	R1		**Older Alluvium:**			
				SM/SC	Silty/clayey f-c SAND, orangish brown, moist, very dense	10.7	122.8	
		14 25 24	R2		Silty/clayey f-c SAND, orangish brown, moist, very dense	11.7	120.8	
		7 21 27	R3	SC	Clayey f-m SAND, orangish brown, moist, very dense, trace clay	13.8	119.4	
		14 24 23	R4		Clayey f-c SAND, orangish brown, moist, dense	10.7	129.8	
10		12 32 50/5"	R5	SM	Silty f-m SAND, orangish brown, moist, very dense, trace clay	9.4	132.8	
15		17 50/5"	R6		Silty f-c SAND, brown, moist, very dense, trace oxidation staining			
20		31 50/2"	R6			9.5	123.7	
25		50/4"	S1		**Granitic (Quartz Diorite) Bedrock:** Excavates as f-c SAND, grey-brown, moist, micaceous			
30		50/4"	S2		Becomes light grey-brown	2.3		

LEGEND

Sample type: ---Ring ---SPT ---Small Bulk ---Large Bulk ---No Recovery ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

GeoTek, Inc.

LOG OF EXPLORATORY BORING

CLIENT:	RC Hobbs Company	**DRILLER:**	2R Drilling	**LOGGED BY:**	JC
PROJECT NAME:	Baldwin Ave Multi-Family	**DRILL METHOD:**	Hollow Stem	**OPERATOR:**	Cody
PROJECT NO.:	3925-CR	**HAMMER:**	140#/30"	**RIG TYPE:**	CME 75
LOCATION:	33.974170, -117.466350	**ELEVATION:**	772	**DATE:**	6/12/2024

Depth (ft)	SAMPLES: Sample Type	SAMPLES: Blows/ 6 in	SAMPLES: Sample Number	USCS Symbol	Boring No.: B-5 (continued) / MATERIAL DESCRIPTION AND COMMENTS	Laboratory Testing: Water Content (%)	Laboratory Testing: Dry Density (pcf)	Laboratory Testing: Others
35	■	50/3"	S3		Excavates as f-c SAND, light grey, moist			
40	■	50/3"	S4		Trace gravels	2.9		
45	■	50/5"	S5		Becomes dark grey, very moist			▽
50	■	50/4"	S6			15.2		
					BORING TERMINATED AT 50.5 FEET			
					Groundwater encountered at 47 feet b.g.s. @ time of drilling Boring backfilled with cuttings			

LEGEND

Sample type: ■ ---Ring ▮ ---SPT ▨ ---Small Bulk ⊠ ---Large Bulk □ ---No Recovery ▽ ---Water Table

Lab testing: AL = Atterberg Limits; EI = Expansion Index; SA = Sieve Analysis; RV = R-Value Test; SR = Sulfate/Resisitivity Test; SH = Shear Test; HC= Consolidation; MD = Maximum Density

APPENDIX B

RESULTS OF LABORATORY TESTING

Proposed Multi-Family Residential Development
Southeast of Limonite Avenue and Baldwin Avenue
Assessor's Parcel Number (APN) 163-400-042 and -045
Jurupa Valley, Riverside County, California
Project No. 3925-CR

GEOTEK

SUMMARY OF LABORATORY TESTING

Classification
Soils were classified visually in general accordance with the Unified Soil Classification System (ASTM Test Method D 2487). The soil classifications are shown on the logs of borings in Appendix A.

Collapse Test
Collapse tests were performed on selected samples of the site soils in general accordance with ASTM D 5333 test procedures. The results of this test are presented graphically in Appendix B.

Direct Shear
Shear testing was performed in a direct shear machine of the strain-control type in general accordance with ASTM D 3080 test procedures. The rate of deformation was approximately 0.035 inch per minute. The sample was sheared under varying confining loads in order to determine the coulomb shear strength parameters, angle of internal friction and cohesion. The tests were performed on soil samples remolded to approximately 90 percent of maximum dry density as determined by ASTM D 1557 test procedures. The shear test results are presented graphically in Appendix B.

Expansion Index
Expansion Index testing was performed on two (2) soil samples obtained from the field exploration. Testing was performed in general accordance with ASTM D 4829 test procedures. The results of the testing are provided below and in Appendix B.

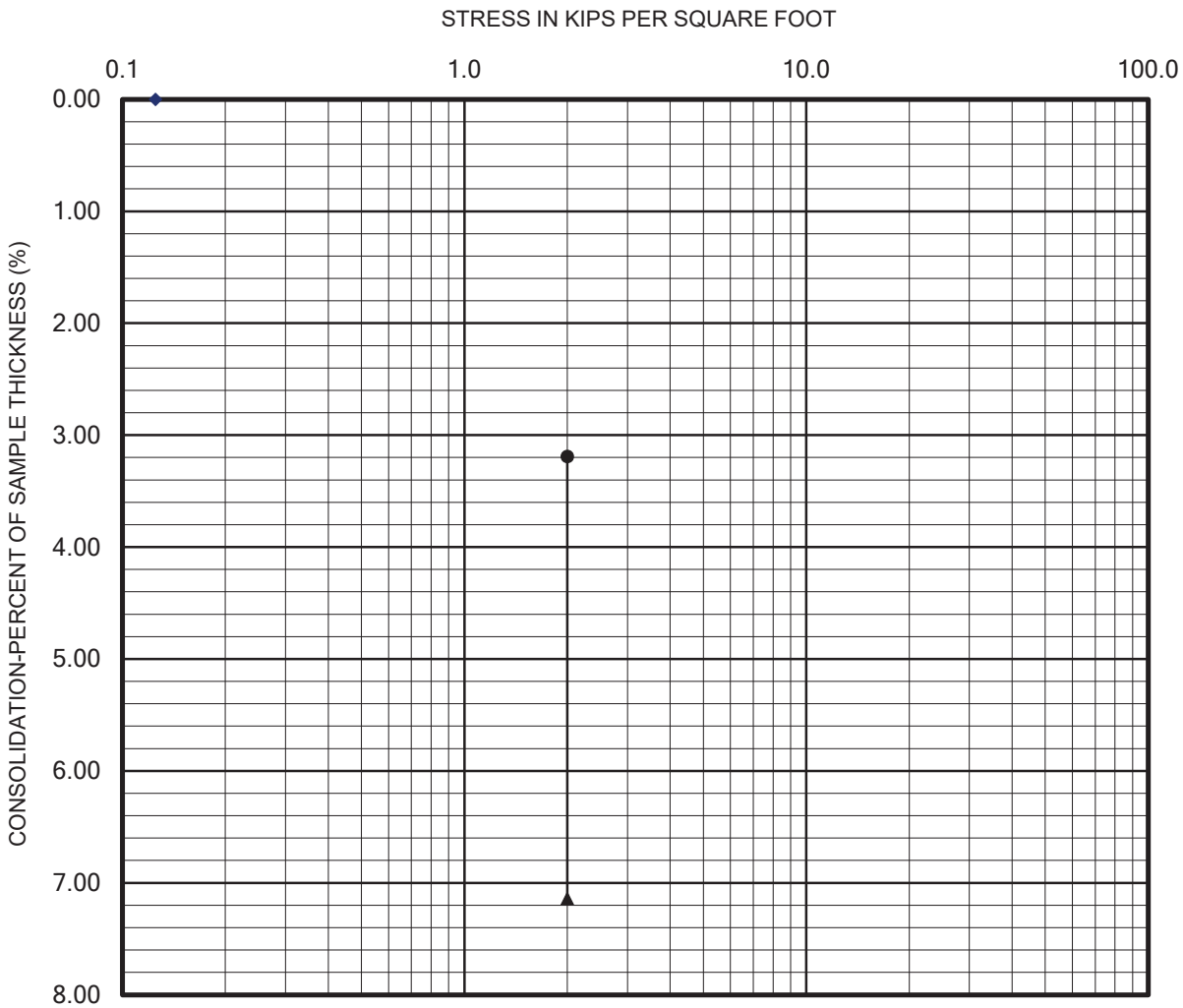
Boring #	Depth (ft.)	Description	Expansion Index	Classification
B-1	0-5	Silty/Clayey Sand (SM/SC)	6	Very Low
B-5	0-5	Silty/Clayey Sand (SM/SC)	4	Very Low

In-Situ Moisture and Density
The natural water content of sampled soils was determined in general accordance with ASTM D 2216 test procedures on samples of the materials recovered from the subsurface exploration. In addition, in-place dry density of the sampled soils was determined in general accordance with ASTM D 2937 test procedures on relatively undisturbed samples to measure the unit weight of the subsurface soils. Results of these tests are shown on the boring logs at the appropriate sample depths in Appendix A.

Moisture-Density Relationship
Laboratory testing was performed on two (2) soil samples collected during the subsurface exploration. The laboratory maximum dry density and optimum moisture content for the soil was determined in general accordance with ASTM D 1557 test procedures. The results are presented graphically in Appendix B.

Sulfate Content, Resistivity and Chloride Content
Testing to determine the water-soluble sulfate content was performed in general accordance with ASTM D4327 test procedures. Resistivity testing was completed in general accordance with ASTM G187 test procedures. Testing to determine the chloride content was performed in general accordance with ASTM D4327 test procedures. The results of the testing are provided below and in Appendix B.

Boring #	Depth (ft.)	pH ASTM D4972	Chloride ASTM D4327 (mg/kg)	Sulfate ASTM D4327 (% by weight)	Resistivity ASTM G187 (ohm-cm)
B-1	0-5	10.3	148.9	0.0325	1,072
B-4	0-5	8.6	25.8	0.0075	4,020



Seating Cycle
Loading Prior to Inundation
Loading After Inundation
Rebound Cycle

PERFORMED IN GENERAL ACCORDANCE WITH ASTM D 4546

GEOTEK

CHECKED BY: EC	Lab: Corona
PROJECT NO.: 3925-CR	Date: 6/20/2024

COLLAPSE REPORT

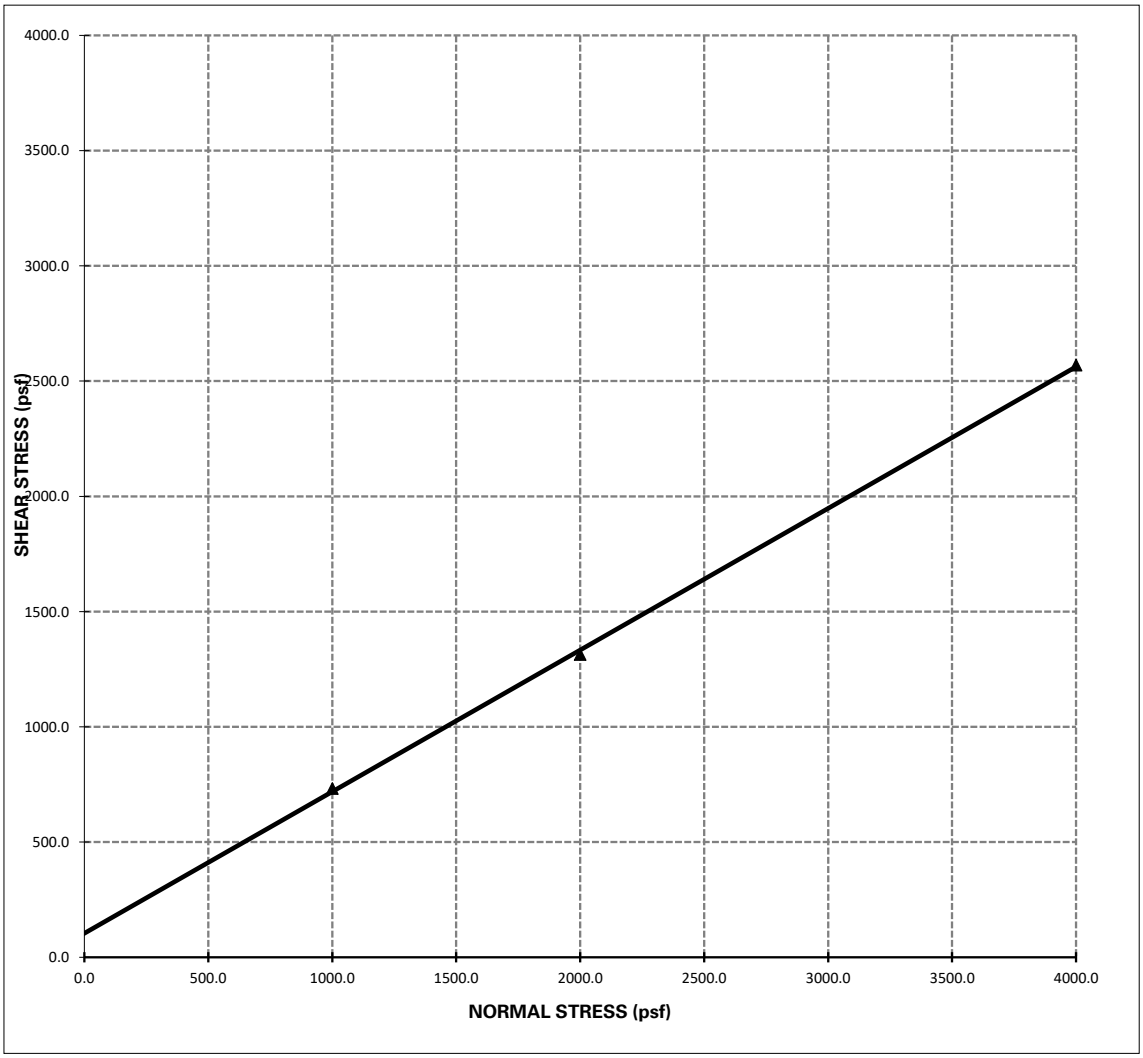
Sample: B-2 @ 1 Feet

RC Hobbs Company
Baldwin Avenue Townhomes

Plate B-1

DIRECT SHEAR TEST

Project Name:	Baldwin Avenue Townhomes	***Sample Location:***	B-1 @ 0-5 Feet
Project Number:	3925-CR	***Date Tested:***	6/24/2024



Shear Strength: Φ = **32** ^{o} , **C = 104 psf**

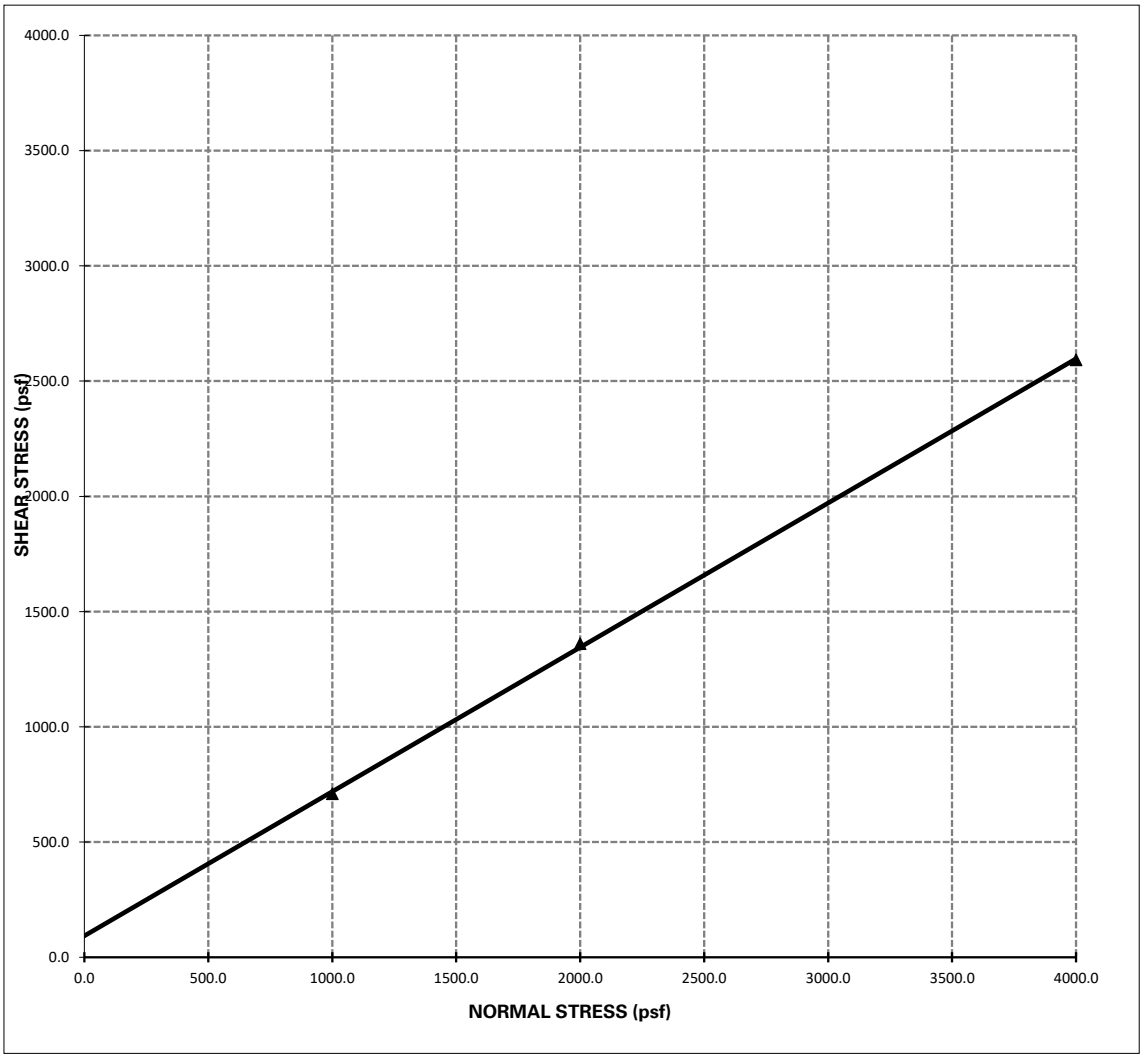
Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.01 in/min.

DIRECT SHEAR TEST

Project Name:	Baldwin Avenue Townhomes	***Sample Location:***	B-5 @ 0-5 Feet
Project Number:	3925-CR	***Date Tested:***	6/24/2024



Shear Strength: Φ = **32** ^{o} , **C = 93 psf**

Notes: 1 - The soil specimen used in the shear box was a ring sample remolded to approximately 90% relative compaction from a bulk sample collected during the field investigation.

2 - The above reflect direct shear strength at saturated conditions.

3 - The tests were run at a shear rate of 0.01 in/min.

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	RC Hobbs Company	***Tested/ Checked By:***	RY Lab No Corona
Project Number:	3925-CR	***Date Tested:***	6/18/2024
Project Location:	Baldwin Avenue Townhomes Project	***Sample Source:***	B-1 @ 0-5 Feet
		Sample Description:	

Ring #:_____ Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

Weight of compacted sample & ring (gm)	754.7
Weight of ring (gm)	363.5
Net weight of sample (gm)	**391.2**
Wet Density, lb / ft3 (C*0.3016)	**118.0**
Dry Density, lb / ft3 (D/1.F)	**106.3**

SATURATION DETERMINATION

Moisture Content, %	11.0
Specific Gravity, assumed	**2.70**
Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
% Saturation	**50.8**

READINGS

DATE	TIME	READING	
6/18/2024		0.6460	Initial
6/18/2024		0.6450	10 min/Dry
6/19/2024		0.6510	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
781.7	**17.9**

EXPANSION INDEX = 6

GEOTEK

EXPANSION INDEX TEST

(ASTM D4829)

Client:	RC Hobbs Company	***Tested/ Checked By:***	RY Lab No Corona
Project Number:	3925-CR	***Date Tested:***	6/18/2024
Project Location:	Baldwin Avenue Townhomes Project	***Sample Source:***	B-5 @ 0-5 Feet
		Sample Description:	

Ring #:_____ Ring Dia. : 4.01" Ring Ht.:1"

DENSITY DETERMINATION

Weight of compacted sample & ring (gm)	772.1
Weight of ring (gm)	371.2
Net weight of sample (gm)	**400.9**
Wet Density, lb / ft3 (C*0.3016)	**120.9**
Dry Density, lb / ft3 (D/1.F)	**110.4**

SATURATION DETERMINATION

Moisture Content, %	9.5
Specific Gravity, assumed	**2.70**
Unit Wt. of Water @ 20 °C, (pcf)	**62.4**
% Saturation	**48.8**

READINGS

DATE	TIME	READING	
6/18/2024		0.2060	Initial
6/18/2024		0.2050	10 min/Dry
6/19/2024		0.2090	Final

FINAL MOISTURE

Final Weight of wet sample & tare	% Moisture
797.5	**15.8**

EXPANSION INDEX = 4

GeoTek - Corona
1548 N. Maple St.
Corona, CA 92880
Phone: (951) 710-1160
Fax: (951) 710-1167

Report No: PTR:24-00116-S01

Proctor Report

Client: RC Hobbs Company
ATTN: George Meeker Jr.
Orange CA 92866

CC:

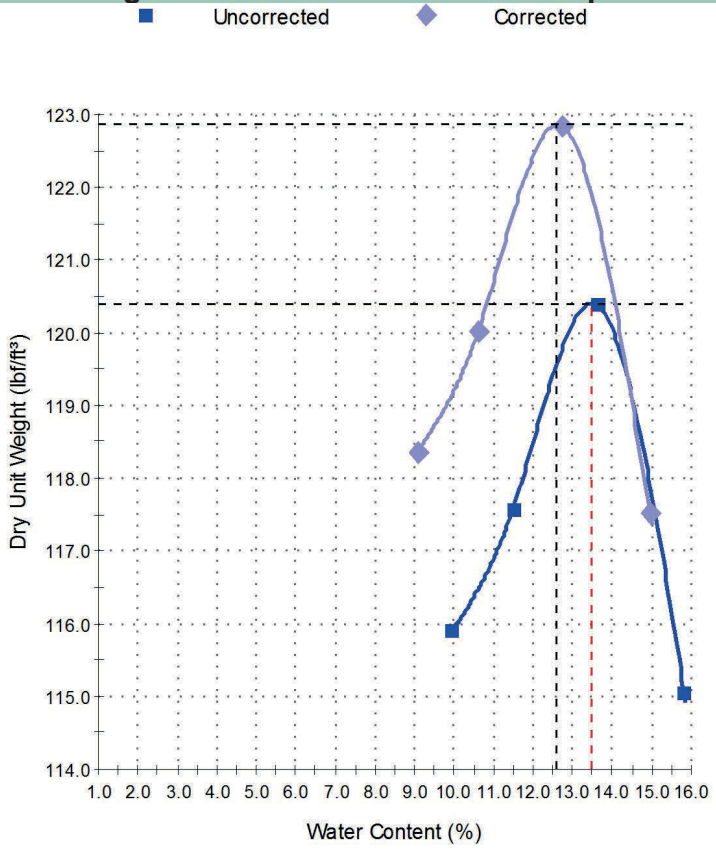
Project: 3925-CR
Baldwin Avenue Townhomes

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID: 24-00116-S01 **Date Sampled:** 6/12/2024
Sampled By:
Material: Silty/Clayey FIne to Course SAND
Location: B-1 @ 0-5 Feet

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 1557

Maximum Dry Unit Weight (lbf/ft³):	**120.4**
Optimum Water Content (%):	**13.5**
Method:	A
Preparation Method:	Moist
Retained Sieve No 4 (4.75mm) (%):	7
Passing Sieve No 4 (4.75mm) (%):	93
Tested By:	Eduardo Cuevas
Date Tested:	6/17/2024

ASTM D 4718

Corrected Maximum Dry Unit Weight (lbf/ft³):	**122.9**
Corrected Optimum Water Content (%):	**12.6**
Specific Gravity (Oversize):	2.70
Sieve Size (Oversize):	No 4
Oversize Particles (%):	7

Comments

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GeoTek - Corona
1548 N. Maple St.
Corona, CA 92880
Phone: (951) 710-1160
Fax: (951) 710-1167

Proctor Report

Report No: PTR:24-00116-S02

Client: RC Hobbs Company
ATTN: George Meeker Jr.
Orange CA 92866

CC:

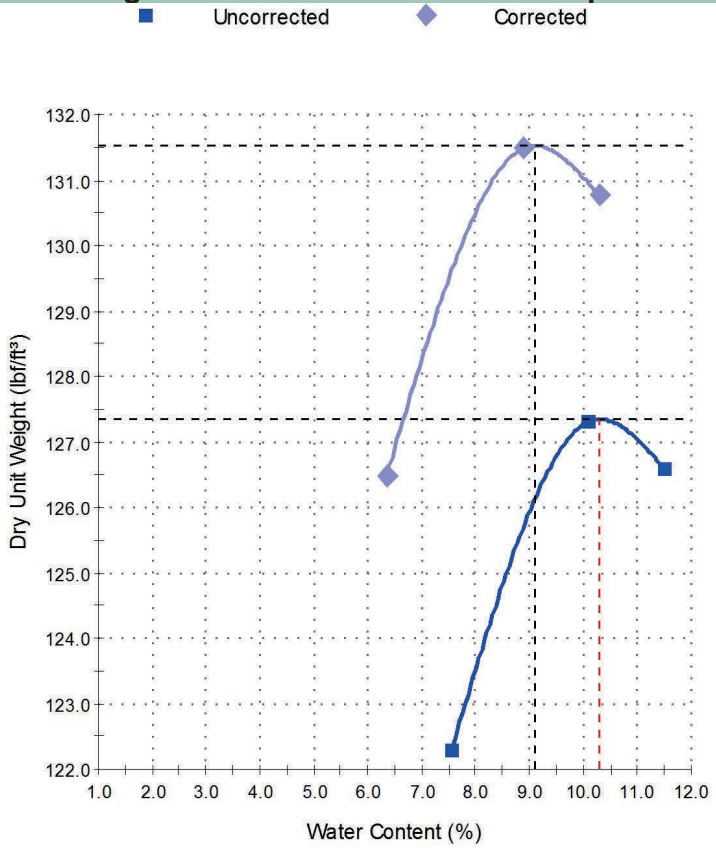
Project: 3925-CR
Baldwin Avenue Townhomes

THIS DOCUMENT SHALL NOT BE REPRODUCED EXCEPT IN FULL

Sample Details

Sample ID: 24-00116-S02 **Date Sampled:** 6/12/2024
Sampled By:
Material: Silty/Clayey FIne to Course SAND
Location: B-5 @ 0-5 Feet

Dry Unit Weight - Water Content Relationship



Test Results

ASTM D 1557

Maximum Dry Unit Weight (lbf/ft³):	**127.3**
Optimum Water Content (%):	**10.3**
Method:	A
Preparation Method:	Moist
Retained Sieve No 4 (4.75mm) (%):	13
Passing Sieve No 4 (4.75mm) (%):	87
Tested By:	Eduardo Cuevas
Date Tested:	6/17/2024

ASTM D 4718

Corrected Maximum Dry Unit Weight (lbf/ft³):	**131.5**
Corrected Optimum Water Content (%):	**9.1**
Specific Gravity (Oversize):	2.70
Sieve Size (Oversize):	No 4
Oversize Particles (%):	13

Comments

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Results Only Soil Testing for Baldwin Avenue Townhomes

June 14, 2024

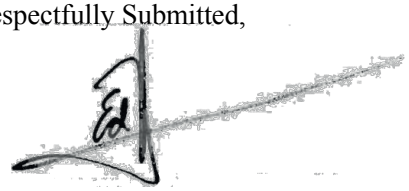
Prepared for:

Eddy Cuevas
GeoTek USA
1548 N. Maple Avenue
Corona, CA 92878
Ecuevas@geotekusa.com, jbrucelas@geotekusa.com

Project X Job#: S240613F
Client Job or PO#: 3925-CR

Prepared by:
N.Rabatin

Respectfully Submitted,





Eduardo Hernandez, M.Sc., P.E.
Sr. Corrosion Consultant
NACE Corrosion Technologist #16592
Professional Engineer
California No. M37102
ehernandez@projectxcorrosion.com

Soil Analysis Lab Results

Client: GeoTek USA
Job Name: Baldwin Avenue Townhomes
Client Job Number: 3925-CR
Project X Job Number: S240613F
June 14, 2024

	Method	ASTM D4327		ASTM D4327		ASTM G187		ASTM G51	ASTM G200	SM 4500-D	ASTM D4327	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D6919	ASTM D4327	ASTM D4327
Bore# / Description	**Depth**	**Sulfates** SO_4^{2-}		**Chlorides** Cl^-		**Resistivity** As Rec'd | Minimum		**pH**	**Redox**	**Sulfide** S^{2-}	**Nitrate** NO_3^-	**Ammonium** NH_4^+	**Lithium** Li^+	**Sodium** Na^+	**Potassium** K^+	**Magnesium** Mg^{2+}	**Calcium** Ca^{2+}	**Fluoride** F_2^{2-}	**Phosphate** PO_4^{3-}
	(ft)	(mg/kg)	(wt%)	(mg/kg)	(wt%)	(Ω-cm)	(Ω-cm)		(mV)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)	(mg/kg)
B1	0-5	325.0	0.0325	148.9	0.0149	10,050	1,072	10.3	140	0.2	140.0	26.5	ND	213.2	15.2	25.4	420.2	1.5	1.7
B4	0-5	75.3	0.0075	25.8	0.0026	8,040	4,020	8.6	127	0.5	2.6	0.7	ND	54.9	4.7	24.6	131.2	3.7	3.3

Cations and Anions, except Sulfide and Bicarbonate, tested with Ion Chromatography
mg/kg = milligrams per kilogram (parts per million) of dry soil weight
ND = 0 = Not Detected | NT = Not Tested | Unk = Unknown
Chemical Analysis performed on 1:3 Soil-To-Water extract
PPM = mg/kg (soil) = mg/L (Liquid)

Note: Sometimes a bad sulfate hit is a contaminated spot. Typical fertilizers are Potassium chloride, ammonium sulfate or ammonium sulfate nitrate (ASN). So this is another reason why testing full corrosion series is good because we then have the data to see if those other ingredients are present meaning the soil sample is just fertilizer-contaminated soil. This can happen often when the soil samples collected are simply surface scoops. This is why it's best to dig in a foot, throw away the top and test the deeper stuff. Dairy farms are also notorious for these items.

If one sample pops up much more corrosive than all others, we would recommend collecting more samples surrounding the problem sample location to determine if the peak is isolated to it. This allows us to conclude it was a contaminated sample and able to declare it an outlier.

Try out our new online forms: SOIL CORROSIVITY & THERMAL RESISTIVITY LAB REQUEST FORM & IN-SITU WENNER 4 PIN QUOTE REQUEST FORM

APPENDIX C

INFILTRATION TEST DATA & PORCHET CALCULATIONS

Proposed Multi-Family Residential Development
Southeast of Limonite Avenue and Baldwin Avenue
Assessor's Parcel Numbers (APNs) 163-400-042 and -045
Jurupa Valley, Riverside County, California
Project No. 3925-CR

GEOTEK

PERCOLATION DATA SHEET

Project:	RC Hobbs Company - APNs 163-400-042 & -045 (Baldwin Ave Jurupa Valley)			**Job No.:**	3925-CR
Test Hole No.:	I-I	**Tested By:**	RK	**Date:**	6/13/2024
Depth of Hole As Drilled:	60"	**Before Test:**	60"	**After Test:**	60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Rate (Minutes per Inch)	Comments
Trial	6:59 AM		60"	24			16.7	Pre-soaked with 5+ gallons
	7:24 AM	25			22.5	1.5		of clear water prior to Trials
Trial	7:25 AM		60"	24			16.7	
	7:50 AM	25			22.5	1.5		
1	7:51 AM		60"	24			20.0	
	8:21 AM	30			22.5	1.5		
2	8:22 AM		60"	24			20.0	
	8:52 AM	30			22.5	1.5		
3	8:53 AM		60"	24			30.0	
	9:23 AM	30			23	1		
4	9:24 AM		60"	24			30.0	
	9:54 AM	30			23	1		
5	9:55 AM		60"	24			30.0	
	10:25 AM	30			23	1		
6	10:26 AM		60"	24			40.0	
	10:56 AM	30			23.25	0.75		
7	10:57 AM		60"	24			40.0	
	11:27 AM	30			23.25	0.75		
8	11:28 AM		60"	24			40.0	
	11:58 AM	30			23.25	0.75		
9	11:59 AM		60"	24			40.0	
	12:29 PM	30			23.25	0.75		
10	12:30 PM		60"	24			40.0	
	1:00 PM	30			23.25	0.75		
11	1:01 PM		60"	24			40.0	
	1:31 PM	30			23.25	0.75		
12	1:32 PM		60"	24			40.0	
	2:02 PM	30			23.25	0.75		

GEOTEK

PERCOLATION DATA SHEET

Project: RC Hobbs Company - APNs 163-400-042 & -045 (Baldwin Ave Jurupa Valley) **Job No.:** 3925-CR

Test Hole No.: I-2 **Tested By:** RK **Date:** 6/13/2024

Depth of Hole As Drilled: 60" **Before Test:** 60" **After Test:** 60"

Reading No.	Time	Time Interval (Min)	Total Depth of Hole (Inches)	Initial Water Level (Inches)	Final Water Level (Inches)	Δ in Water Level (Inches)	Rate (Minutes per Inch)	Comments
Trial	7:11 AM		60"	24			7.1	Pre-soaked with 5+ gallons
	7:36 AM	25			20.5	3.5		of clear water prior to Trials
Trial	7:37 AM		60"	24			8.3	
	8:02 AM	25			21	3		
1	8:03 AM		60"	24			8.6	
	8:33 AM	30			20.5	3.5		
2	8:34 AM		60"	24			8.6	
	9:04 AM	30			20.5	3.5		
3	9:05 AM		60"	24			8.6	
	9:35 AM	30			20.5	3.5		
4	9:36 AM		60"	24			10.0	
	10:06 AM	30			21	3		
5	10:07 AM		60"	24			10.0	
	10:37 AM	30			21	3		
6	10:38 AM		60"	24			10.0	
	11:08 AM	30			21	3		
7	11:09 AM		60"	24			10.9	
	11:39 AM	30			21.25	2.75		
8	11:40 AM		60"	24			10.9	
	12:10 PM	30			21.25	2.75		
9	12:11 PM		60"	24			10.9	
	12:41 PM	30			21.25	2.75		
10	12:42 PM		60"	24			10.9	
	1:12 PM	30			21.25	2.75		
11	1:13 PM		60"	24			10.9	
	1:43 PM	30			21.25	2.75		
12	1:44 PM		60"	24			10.9	
	2:14 PM	30			21.25	2.75		

GEOTEK

Client:	**RC Hobbs Company**
Project:	**APNs 163-400-042 and -045**
Project No:	**3925-CR**
Date:	**6/13/2024**

Boring No. **I-1**

Percolation to Infiltration Rate (Porchet Method)

Time Interval, Δt =	30
Final Depth to Water, D_F =	36.75
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	36
Total Test Hole Depth, D_T =	60

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	24
$H_F = D_T - D_F$ =	23.25
$\Delta H = \Delta D = H_O - H_F$ =	0.75
$H_{avg} = (H_O+H_F)/2$ =	23.625

I_t = 0.12 **Inches per Hour**

GEOTEK

Client:	**RC Hobbs Company**
Project:	**APNs 163-400-042 and -045**
Project No:	**3925-CR**
Date:	**6/13/2024**

Boring No. **I-2**

Percolation to Infiltration Rate (Porchet Method)

Time Interval, Δt =	30
Final Depth to Water, D_F =	38.75
Test Hole Radius, r =	4
Initial Depth to Water, D_O =	36
Total Test Hole Depth, D_T =	60

Equation - $I_t = \dfrac{\Delta H\,(60r)}{\Delta t\,(r+2H_{avg})}$

$H_O = D_T - D_O$ =	24
$H_F = D_T - D_F$ =	21.25
$\Delta H = \Delta D = H_O - H_F$ =	2.75
$H_{avg} = (H_O+H_F)/2$ =	22.625

I_t = 0.45 **Inches per Hour**

GEOTEK

APPENDIX D

GENERAL EARTHWORK GRADING GUIDELINES

Proposed Multi-Family Residential Development
Southeast of Limonite Avenue and Baldwin Avenue
Assessor's Parcel Numbers (APNs) 163-400-042 and -045
Jurupa Valley, Riverside County, California
Project No. 3925-CR

GEOTEK

GENERAL GRADING GUIDELINES

Guidelines presented herein are intended to address general construction procedures for earthwork construction. Specific situations and conditions often arise which cannot reasonably be discussed in general guidelines, when anticipated these are discussed in the text of the report. Often unanticipated conditions are encountered which may necessitate modification or changes to these guidelines. It is our hope that these will assist the contractor to more efficiently complete the project by providing a reasonable understanding of the procedures that would be expected during earthwork and the testing and observation used to evaluate those procedures.

General

Grading should be performed to at least the minimum requirements of governing agencies, Chapters 18 and 33 of the Uniform Building Code, CBC (2022) and the guidelines presented below.

Preconstruction Meeting

A preconstruction meeting should be held prior to site earthwork. Any questions the contractor has regarding our recommendations, general site conditions, apparent discrepancies between reported and actual conditions and/or differences in procedures the contractor intends to use should be brought up at that meeting. The contractor (including the main onsite representative) should review our report and these guidelines in advance of the meeting. Any comments the contractor may have regarding these guidelines should be brought up at that meeting.

Grading Observation and Testing

1. Observation of the fill placement should be provided by our representative during grading. Verbal communication during the course of each day will be used to inform the contractor of test results. The contractor should receive a copy of the "Daily Field Report" indicating results of field density tests that day. If our representative does not provide the contractor with these reports, our office should be notified.
2. Testing and observation procedures are, by their nature, specific to the work or area observed and location of the tests taken, variability may occur in other locations. The contractor is responsible for the uniformity of the grading operations; our observations and test results are intended to evaluate the contractor's overall level of efforts during grading. The contractor's personnel are the only individuals participating in all aspects of site work. Compaction testing and observation should not be considered as relieving the contractor's responsibility to properly compact the fill.
3. Cleanouts, processed ground to receive fill, key excavations, and subdrains should be observed by our representative prior to placing any fill. It will be the contractor's responsibility to notify our representative or office when such areas are ready for observation.

4. Density tests may be done on the surface material to receive fill, as considered warranted by this firm.
5. In general, density tests would be made at maximum intervals of two feet of fill height, or every 1,000 cubic yards of fill placed. Criteria will vary depending on soil conditions and size of the fill. More frequent testing may be performed. In any case, an adequate number of field density tests should be made to evaluate the required compaction and moisture content is generally being obtained.
6. Laboratory testing to support field test procedures will be performed, as considered warranted, based on conditions encountered (e.g. change of material sources, types, etc.) Every effort will be made to process samples in the laboratory as quickly as possible and in progress construction projects are our first priority. However, laboratory workloads may cause delays and some soils may require a **minimum of 48 to 72 hours to complete test procedures**. Whenever possible, our representative(s) should be informed in advance of operational changes that might result in different source areas for materials.
7. Procedures for testing of fill slopes are as follows:
    a) Density tests should be taken periodically during grading on the flat surface of the fill, three to five feet horizontally from the face of the slope.
    b) If a method other than over building and cutting back to the compacted core is to be employed, slope compaction testing during construction should include testing the outer six inches to three feet in the slope face to determine if the required compaction is being achieved.
8. Finish grade testing of slopes and pad surfaces should be performed after construction is complete.

Site Clearing

1. All vegetation, and other deleterious materials, should be removed from the site. If material is not immediately removed from the site it should be stockpiled in a designated area(s) well outside of all current work areas and delineated with flagging or other means. Site clearing should be performed in advance of any grading in a specific area.
2. Efforts should be made by the contractor to remove all organic or other deleterious material from the fill, as even the most diligent efforts may result in the incorporation of some materials. This is especially important when grading is occurring near the natural grade. All equipment operators should be aware of these efforts. Laborers may be required as root pickers.
3. Nonorganic debris or concrete may be placed in deeper fill areas provided the procedures used are observed and found acceptable by our representative.

Treatment of Existing Ground

1. Following site clearing, all surficial deposits of alluvium and colluvium as well as weathered or creep effected bedrock, should be removed unless otherwise specifically indicated in the text of this report.
2. In some cases, removal may be recommended to a specified depth (e.g. flat sites where partial alluvial removals may be sufficient). The contractor should not exceed these depths unless directed otherwise by our representative.
3. Groundwater existing in alluvial areas may make excavation difficult. Deeper removals than indicated in the text of the report may be necessary due to saturation during winter months.
4. Subsequent to removals, the natural ground should be processed to a depth of six inches, moistened to near optimum moisture conditions and compacted to fill standards.
5. Exploratory back hoe or dozer trenches still remaining after site removal should be excavated and filled with compacted fill if they can be located.

Fill Placement

1. Unless otherwise indicated, all site soil and bedrock may be reused for compacted fill; however, some special processing or handling may be required (see text of report).
2. Material used in the compacting process should be evenly spread, moisture conditioned, processed, and compacted in thin lifts six (6) to eight (8) inches in compacted thickness to obtain a uniformly dense layer. The fill should be placed and compacted on a nearly horizontal plane, unless otherwise found acceptable by our representative.
3. If the moisture content or relative density varies from that recommended by this firm, the contractor should rework the fill until it is in accordance with the following:
    a) Moisture content of the fill should be at or above optimum moisture. Moisture should be evenly distributed without wet and dry pockets. Pre-watering of cut or removal areas should be considered in addition to watering during fill placement, particularly in clay or dry surficial soils. The ability of the contractor to obtain the proper moisture content will control production rates.
    b) Each six-inch layer should be compacted to at least 90 percent of the maximum dry density in compliance with the testing method specified by the controlling governmental agency. In most cases, the testing method is ASTM Test Designation D 1557.
4. Rock fragments less than eight inches in diameter may be utilized in the fill, provided:
    a) They are not placed in concentrated pockets;
    b) There is a sufficient percentage of fine-grained material to surround the rocks;
    c) The distribution of the rocks is observed by, and acceptable to, our representative.

5. Rocks exceeding eight (8) inches in diameter should be taken off site, broken into smaller fragments, or placed in accordance with recommendations of this firm in areas designated suitable for rock disposal. On projects where significant large quantities of oversized materials are anticipated, alternate guidelines for placement may be included. If significant oversize materials are encountered during construction, these guidelines should be requested.
6. In clay soil, dry or large chunks or blocks are common. If in excess of eight (8) inches minimum dimension, then they are considered as oversized. Sheepsfoot compactors or other suitable methods should be used to break up blocks. When dry, they should be moisture conditioned to provide a uniform condition with the surrounding fill.

Slope Construction

1. The contractor should obtain a minimum relative compaction of 90 percent out to the finished slope face of fill slopes. This may be achieved by either overbuilding the slope and cutting back to the compacted core, or by direct compaction of the slope face with suitable equipment.
2. Slopes trimmed to the compacted core should be overbuilt by at least three (3) feet with compaction efforts out to the edge of the false slope. Failure to properly compact the outer edge results in trimming not exposing the compacted core and additional compaction after trimming may be necessary.
3. If fill slopes are built "at grade" using direct compaction methods, then the slope construction should be performed so that a constant gradient is maintained throughout construction. Soil should not be "spilled" over the slope face nor should slopes be "pushed out" to obtain grades. Compaction equipment should compact each lift along the immediate top of slope. Slopes should be back rolled or otherwise compacted at approximately every 4 feet vertically as the slope is built.
4. Corners and bends in slopes should have special attention during construction as these are the most difficult areas to obtain proper compaction.
5. Cut slopes should be cut to the finished surface. Excessive undercutting and smoothing of the face with fill may necessitate stabilization.

UTILITY TRENCH CONSTRUCTION AND BACKFILL

Utility trench excavation and backfill is the contractor's responsibility. The geotechnical consultant typically provides periodic observation and testing of these operations. While efforts are made to make sufficient observations and tests to verify that the contractors' methods and procedures are adequate to achieve proper compaction, it is typically impractical to observe all backfill procedures. As such, it is critical that the contractor use consistent backfill procedures.

Compaction methods vary for trench compaction and experience indicates many methods can be successful. However, procedures that "worked" on previous projects may or may not prove effective on a given site. The contractor(s) should outline the procedures proposed, so that we may discuss them **prior** to construction. We will offer comments based on our knowledge of site conditions and experience.

1. Utility trench backfill in slopes, structural areas, in streets and beneath flat work or hardscape should be brought to at least optimum moisture and compacted to at least 90 percent of the laboratory standard. Soil should be moisture conditioned prior to placing in the trench.
2. Flooding and jetting are not typically recommended or acceptable for native soils. Flooding or jetting may be used with select sand having a Sand Equivalent (SE) of 30 or higher. This is typically limited to the following uses:
   a) shallow (12 + inches) under slab interior trenches and,
   b) as bedding in pipe zone.

   The water should be allowed to dissipate prior to pouring slabs or completing trench compaction.
3. Care should be taken not to place soils at high moisture content within the upper three feet of the trench backfill in street areas, as overly wet soils may impact subgrade preparation. Moisture may be reduced to 2% below optimum moisture in areas to be paved within the upper three feet below sub grade.
4. Sand backfill should not be allowed in exterior trenches adjacent to and within an area extending below a 1:1 projection from the outside bottom edge of a footing, unless it is similar to the surrounding soil.
5. Trench compaction testing is generally at the discretion of the geotechnical consultant. Testing frequency will be based on trench depth and the contractor's procedures. A probing rod would be used to assess the consistency of compaction between tested areas and untested areas. If zones are found that are considered less compact than other areas, this would be brought to the contractor's attention.

JOB SAFETY

General

Personnel safety is a primary concern on all job sites. The following summaries are safety considerations for use by all our employees on multi-employer construction sites. On ground personnel are at the highest risk of injury and possible fatality on grading construction projects. The company recognizes that construction activities will vary on each site and that job site safety is the contractor's responsibility. However, it is imperative that all personnel be safety conscious to avoid accidents and potential injury.

In an effort to minimize risks associated with geotechnical testing and observation, the following precautions are to be implemented for the safety of our field personnel on grading and construction projects.

1. Safety Meetings: Our field personnel are directed to attend the contractor's regularly scheduled safety meetings.
2. Safety Vests: Safety vests are provided for and are to be worn by our personnel while on the job site.
3. Safety Flags: Safety flags are provided to our field technicians; one is to be affixed to the vehicle when on site, the other is to be placed atop the spoil pile on all test pits.

In the event that the contractor's representative observes any of our personnel not following the above, we request that it be brought to the attention of our office.

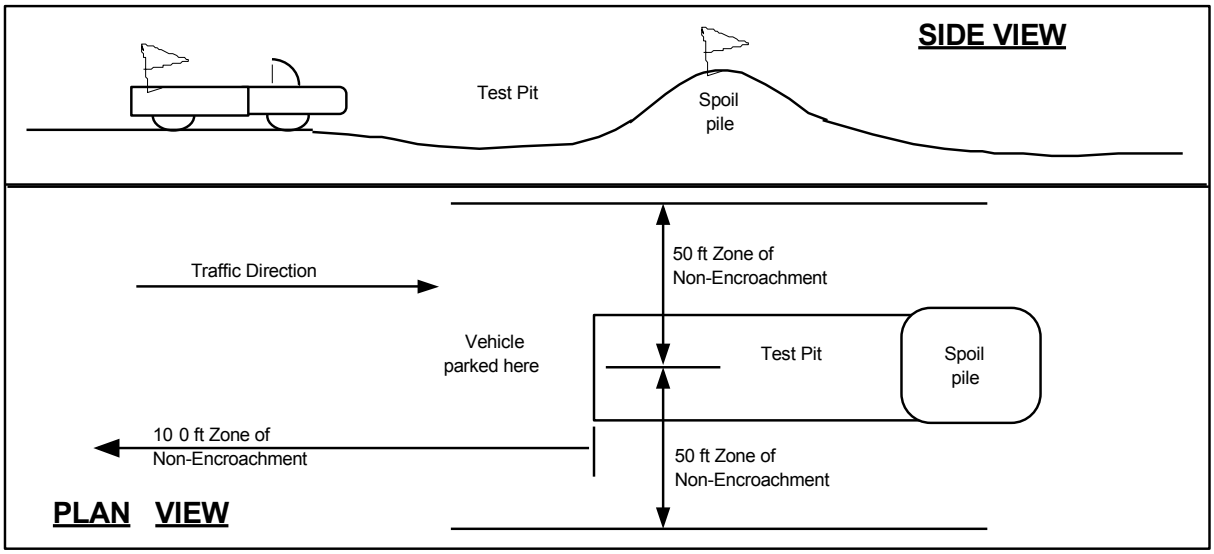
Test Pits Location, Orientation and Clearance

The technician is responsible for selecting test pit locations. The primary concern is the technician's safety. However, it is necessary to take sufficient tests at various locations to obtain a representative sampling of the fill. As such, efforts will be made to coordinate locations with the grading contractors authorized representatives (e.g. dump man, operator, supervisor, grade checker, etc.), and to select locations following or behind the established traffic pattern, preferably outside of current traffic. The contractors authorized representative should direct excavation of the pit and safety during the test period. Again, safety is the paramount concern.

Test pits should be excavated so that the spoil pile is placed away from oncoming traffic. The technician's vehicle is to be placed next to the test pit, opposite the spoil pile. This necessitates that the fill be maintained in a drivable condition. Alternatively, the contractor may opt to park a piece of equipment in front of test pits, particularly in small fill areas or those with limited access.

A zone of non-encroachment should be established for all test pits (see diagram below). No grading equipment should enter this zone during the test procedure. The zone should extend outward to the sides approximately 50 feet from the center of the test pit and 100 feet in the direction of traffic flow. This zone is established both for safety and to avoid excessive ground vibration, which typically decreases test results.

TEST PIT SAFETY PLAN



Slope Tests

When taking slope tests, the technician should park their vehicle directly above or below the test location on the slope. The contractor's representative should effectively keep all equipment at a safe operation distance (e.g. 50 feet) away from the slope during testing.

The technician is directed to withdraw from the active portion of the fill as soon as possible following testing. The technician's vehicle should be parked at the perimeter of the fill in a highly visible location.

Trench Safety

It is the contractor's responsibility to provide safe access into trenches where compaction testing is needed. Trenches for all utilities should be excavated in accordance with CAL-OSHA and any other applicable safety standards. Safe conditions will be required to enable compaction testing of the trench backfill.

All utility trench excavations in excess of 5 feet deep, which a person enters, are to be shored or laid back. Trench access should be provided in accordance with OSHA standards. Our personnel are directed not to enter any trench by being lowered or "riding down" on the equipment.

Our personnel are directed not to enter any excavation which;

1. is 5 feet or deeper unless shored or laid back,
2. exit points or ladders are not provided,
3. displays any evidence of instability, has any loose rock or other debris which could fall into the trench, or

4. displays any other evidence of any unsafe conditions regardless of depth.

If the contractor fails to provide safe access to trenches for compaction testing, our company policy requires that the soil technician withdraws and notifies their supervisor. The contractors representative will then be contacted in an effort to effect a solution. All backfill not tested due to safety concerns or other reasons is subject to reprocessing and/or removal.

Procedures

In the event that the technician's safety is jeopardized or compromised as a result of the contractor's failure to comply with any of the above, the technician is directed to inform both the developer's and contractor's representatives. If the condition is not rectified, the technician is required, by company policy, to immediately withdraw and notify their supervisor. The contractor's representative will then be contacted in an effort to affect a solution. No further testing will be performed until the situation is rectified. Any fill placed in the interim can be considered unacceptable and subject to reprocessing, recompaction or removal.

In the event that the soil technician does not comply with the above or other established safety guidelines, we request that the contractor bring this to the technician's attention and notify our project manager or office. Effective communication and coordination between the contractors' representative and the field technician(s) is strongly encouraged in order to implement the above safety program and safety in general.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures, particularly the zone of non-encroachment.

The safety procedures outlined above should be discussed at the contractor's safety meetings. This will serve to inform and remind equipment operators of these safety procedures, particularly the zone of non-encroachment.

Appendix 4: Historical Site Conditions

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

PHASE I
ENVIRONMENTAL ASSESSMENT REPORT

OCTOBER 20, 2024

APN 163-400-042 & 045
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1. INTRODUCTION

1.1 Objective

This report summarizes the results of a Phase I Environmental Site Assessment of the subject property performed by Robin Environmental Management (REM) in October 2024. The purpose of this Environmental Site Assessment is to evaluate the potential for environmental concerns or liabilities due to past and/or current land use practices at the subject site or from nearby properties. This assessment included in this report is solely targeted for CERCLA (Superfund) liability and the "innocent landowner defense", to permit user to satisfy one of the requirements to qualify for the innocent landowner defense to CERCLA liability, by conducting all appropriate inquiries to identify recognized environmental conditions (RECs).

1.2 Scope of Work

- Visual investigation of the property to obtain information regarding obvious visual signs of adverse environmental conditions, contamination, hazardous material usage, storage and handling on and in the adjoining sites (only up to one parcel next to the subject property) of the subject property

- Visual survey of the adjoining land uses (only up to one parcel next to the subject property) and determination of any current nearby operations which may potentially impact the subject site

- Government document search of records compiled by various government agencies for on site or nearby operations (past and present) to aid in the identification of any potential contamination sources

- Review of building permit records available at local agency and other pertinent documents to identify any potential past on-site operations which may have environmental implications.

2. PROPERTY DESCRIPTION

2.1 Geographical Description of Property

The subject property, APN 163-400-042 & 045, is an irregularly-shaped lot on the eastern block of (there generally N-S trending) Baldwin Avenue between Limonite Ave to the north and the southern end of Baldwin Avenue where is merges with (there generally NW-SE trending and connecting Limonite Ave to the north and Baldwin Avenue to the east) Pedley Road to become Padley Road to the south within a commercial usage zone in the city of Jurupa Valley, California as shown on Figure 1-Site Photos, Figure 2-Site Location Map, Figure 3-Co. Assessor's Office Parcel Map, and Figure 4-Recent Aerial Photograph Showing Site/Its Vicinity General Layout.

2.2 General Description of the Subject Property

The subject property, APN 163-400-042 & 045, is an irregularly-shaped lot on the eastern block of (there generally N-S trending) Baldwin Avenue between Limonite Ave to the north and the southern end of Baldwin Avenue where is merges with (there generally NW-SE trending and connecting Limonite Ave to the north and Baldwin Avenue to the east) Pedley Road to become Padley Road to the south in the city of Jurupa Valley, California. The site is currently generally unpaved vacant lot with asphalt-paved driveway along its south side for its southern portion; and asphalt-paved parking/driveways (for Denza Market Place to the east and to the north of the site) for its northern portion. There is one small roughly N-S trending trapezoid-shaped fenced compound housing aboveground gas pipelines manifolds near the southwestern corner of the site which is not part of the subject property.

No pits, ponds, swamps, dry wells, or lagoons were observed on the subject property. No apparently significant surface staining was observed on the paved/unpaved outdoor areas of the site.

2.3 Present Tenants and Business Operation

At the time of site inspection on October 15, 2024, the site was generally unpaved vacant lot with asphalt-paved driveway along its south side for its southern portion; and asphalt-paved parking/driveways (for Denza Market Place to the east and to the north of the site) for its northern portion. There were excavated soils stockpiles/construction debris (apparently derived from dumping of excavated soils from nearby properties under grading) present in

the eastern part of the southern portion of the site. No apparently significant evidence (i.e., odor, discoloration, etc.) of contamination was noticed for these excavated soils stockpiles.

2.4 Past Tenants and Business Operation

Methods of researching historic use of ownership of the subject property employed by REM are as follows:

- Historic Aerial Photo records
- Historic Topographic Map records
- County Building Permits records

2.4.1 Historic Aerial Photo Records

Historic aerial photo records for the site area also included in Appendix B revealed that, from prior to 1948 to at least 1966, the site was generally vacant lot with no unpaved trails noticed within the lot. From prior to 1985 to at least 1999, the site was generally vacant lot, but with certain unpaved trails noticed within the lot. In 2005, the site was generally unpaved vacant and with current generally E-W trending asphalt-paced driveway (leading from Baldwin Avenue to the west and Denza Market Place to the east) passing through the central portion of the site already present. In 2009, the site was generally with its current setting.

2.4.2 Historic Topographic Map Records

1939 topographic map for the site area also included in Appendix B, along with 1981 topo map for the site area included as Figure 2, showed that the site was with no improvement features in those two years.

2.4.3 County Building Permits Records

Records available at the Riverside County Building Division indicated that the northern portion of the site was developed into its current asphalt-paved parking/driveways for Denza Market Place setting in 2009.

2.4.4 Site Development/Occupancy History Summary

Based on historic site occupancy data listed above, the site development/occupancy history can be summarized as below:

The late 1930's to the early 1980's - The site was generally vacant lot with no unpaved trails noticed within the lot

The middle 1980's to at least 1999 - The site was generally vacant lot, but with certain unpaved trails noticed within the lot

The middle 2000's - The site was generally unpaved vacant and with current generally E-W trending asphalt-paced driveway (leading from Baldwin Avenue to the west and Denza Market Place to the east) passing through the central portion of the site already present

2009 - The northern portion of the site was generally developed into its current asphalt-paved parking/driveways for Denza Market Place setting; and the site has been generally with its current setting since

2.5 Regional Physical Setting

The subject property's physical locations were researched employing a United States Geological Survey (USGS) 7.5 Minute Topographic Quadrangle (Quad) Map relevant to the subject property. The USGS 7.5 Minute Quad Map has an approximate scale of 1 inch to 2,000 feet, and shows physical features with environmental significance such as wetlands, water bodies, roadways, mines, and buildings. Please refer to Appendix A, Figure 2.

The physical and natural features illustrated on the Quad Map served as areas of visual emphasis when conducting the site inspection of the subject property. The USGS 7.5 Minute Quad Map was used as the only Standard Physical Setting Source, and is sufficient as a single reference. The surface elevation of the subject site is approximately 760 feet above Mean Sea Level (MSL) and exhibits a local topographic down gradient generally towards south-southwest.

2.6 Hydrogeological Information

The subject site is located within the Riverside Groundwater Sub-Basin of the Upper Santa Ana River Groundwater Basin. General hydrogeology information for the Santa Ana River Groundwater Basin can be found in the California Department of Water Resources Bulletin 15 (1955), "Santa Ana River Investigation". Based on the above reference, the subject site area is generally underlain by alluvial fill more than several hundred feet thick.

The principal confined aquifer of the Riverside Groundwater Sub-Basin lies at depths greater than 100 feet, but groundwater has also been found to occur within 30 to 40 feet below the ground surface. Water in this shallow water zone is of limited use owing to low

yields, typically less than 25 gallons per minute (gpm), and is of poor quality. This zone is generally termed the "perched" or the "semi-perched groundwater. According to groundwater monitoring information for nearby Leaking Underground Storage Tank (LUST)/Spills sites available via State Water Board GeoTracker website, the first-encountered groundwater occurs at an approximate depth of 55 feet and exhibits a general groundwater flow direction towards southwest.

2.7 Historical Hazardous Substance Usage

2.7.1 Records search sources

REM's field engineer contacted the following public agencies to find any records of former operation of Underground Storage Tank (UST) for gasoline/product or any other hazardous substances on the subject site premise.

- City of Jurupa Valley Building Department
- Regional Water Quality Control Board – Santa Ana Region

No records were found in reference to historical usage or handling of UST or any hazardous substances on the subject property.

2.7.2 List and quantities of the hazardous materials

List and quantities of the hazardous materials previously or presently used, disposed, treated, stored, or generated at the subject property were searched and assessed. During the site inspection, the use, storage, and generation of any significant quantity of hazardous materials was not observed.

2.7.3 Permits, licenses, and registrations

All present and past records of permits, licenses, registrations, certificates of environmental relation were searched. No equipment requiring environmentally related licensing was observed. Thus, no permits or registrations were necessary for the operation of subject business.

2.7.4 Violation or non-compliance notice

No currently pending violation or notice of non-compliance was issued with the present

environmental regulations, according to the findings of our environmental assessment on the subject property.

2.7.5 Regulatory database record research

According to the conducted government records search (see Section 5.0), the subject property was not recognized being listed on the following environmental regulatory database record research (NETR database): NPL, RCRA-TSD, CERCLIS, NFRAP, RCRA-G, ERNS, CORRACTS, CORTESE, CALSITES, UST, LUST, and SWF.

2.7.6 Environmental lien records

Under current environment regulation, government agency may place an environmental lien on the property with known contamination and no cleanup/mitigation activities apparently intended being conducted by the site owner upon the agency issued the cleanup enforcement order. Based on historic site usage and government records search summary documented in this section, the subject property is not a known contamination site and no environmental liens are likely being imposed on the subject property.

Furthermore, the conducted government records search shows that there are no environmental liens placed by the federal environmental agency under CERCLA regulations for the subject site. REM staff searched the California State Department of Toxic Substances website EnviroStor data search and found no environmental liens were placed by the State environmental agency for the subject site. City of Jurupa Valley records also show that there are no environmental liens placed by the local environmental agency for the subject site.

3. PROPERTY RECONNAISSANCE

REM's environmental assessor/geologist performed the field survey of the subject site and adjacent properties on October 15, 2024. A site location map, a Co. Assessor's Office parcel map, and a recent aerial photograph showing site/its vicinity general layout are included as Figures 2 to 4, respectively.

3.1 Air Quality - Indoor and Visible Emissions

No unusual smells, obnoxious odors, or visual emissions were observed during the inspection of the subject property. Neither air emission stacks nor paint booth were present, thus no pertinent permits were searched for the previous records of violation history.

3.2 Asbestos-Containing Material (ACM)

Since the subject lot is currently with no improvement structures, asbestos-containing building materials are not of environmental concern.

3.3 Lead-Based Paint (LBP)

Since the subject lot is currently vacant with no improvement structures, lead-based paint is also not a potentially environmental concern.

3.4 Polychlorinated Biphenyl (PCB's)

Prior to 1978, PCBs were commonly used in dielectric fluids in transformers, capacitors, and light ballasts due to their desirable thermal characteristics, and hydraulic fluid compactor. Due to their demonstrated toxicity and persistence in the environment, PCB manufacturing in the United States was discontinued.

Pole-mounted transformers were found in the vicinity of the subject site, appearing in good condition without any sign of leakage. No potentially PCB-containing hydraulic fluid trash compactor or concrete pad-mounted transformers were noticed present on the subject site premise.

3.5 Underground Storage Tank (UST)

The visual inspection of the subject site revealed no evidence of surface or above ground features (e.g., fill pipe, vent pipes, fill connections, concrete pads, saw cuts, sumps, spill containment device, leak detection device, etc.) normally associated with underground storage tanks (UST's).

3.6 Aboveground Storage Tank

REM's field officer performed the visual inspection of the subject site to find evidence of surface or above ground features (e.g., fill pipe, vent pipes, fill connections, concrete pads, saw cuts, concrete pad, drains in vicinity, etc.) normally associated with aboveground storage tanks (AST's). Visual observation also includes the inspection to identify any surface markings indicating the existence of aboveground product pipelines. No evidence on the presence of any on-site aboveground storage tank was identified.

3.7 Fuel Islands

The visual inspection of the subject site revealed no evidence of fuel islands or dispensers either in operation or abandoned.

3.8 Hydraulic Hoist Unit

The visual inspection of the subject site revealed no presence of underground hydraulic hoist units within the subject site premise.

3.9 Hazardous Materials / Petroleum Products Storage & Handling

No containers storing automotive or industrial batteries, pesticides, or chemicals seemingly exhibiting toxic hazards were noticed present at the time of site inspection. No major spills, leakage, or staining were observed throughout the site

3.10 Other Containers

No other containers indicating any sign of environmental concern were observed during the site inspection.

3.11 Hazardous Waste Treatment, Storage, Disposal (TSD)

No storage, treatment, or disposal of hazardous waste was found during the site investigation. No severely improper waste stream processing or disposal practices were observed on the subject property.

3.12 Distress Vegetation

Planters and vegetation in the vicinity of the subject site were found well maintained on bare soil or within separate planters in relatively good appearance with no sign of chemical stress or unnatural appearance.

3.13 Stockpiled Soils and Construction Debris

As described in Section 2.3, at the time of site inspection on October 15, 2024, there were excavated soils stockpiles/construction debris (apparently derived from dumping of excavated soils from nearby properties under grading) present in the eastern part of the south portion of the site. No apparently significant evidence (i.e., odor, discoloration, etc.) of contamination was noticed for these excavated soils stockpiles.

3.14 Wastewater Treatment Unit / Clarifier

No underground industrial wastewater treatment facility, i.e., clarifier was observed on the subject property during the site visit.

Storm water drainage system in the close proximity of the subject area did not identify any abnormal accumulation of petroleum or chemical run-off or foreign materials. No unusual blockage of the storm-water control system was observed during the site visual inspection. REM recommends no investigation on described storm-water systems at the subject property.

3.15 Solid Waste Disposal

No improper activities of treatment or disposal of hazardous, medical, or toxic wastes are performed on the subject site.

3.16 Wells

REM's site walk-through did not discover any irrigation wells, injection wells, abandoned wells, groundwater-monitoring wells, dry wells, septic wells oil wells, gas wells, domestic water wells, other monitoring wells on the subject premises.

3.17 Underground Pipelines

REM's site inspection did not reveal any evidence of underground pipelines beneath the ground of subject property, other than public utility lines such as sewer, power, and electric lines, for which public "dig-alert" service would easily identify upon 48-hour telephone notice in advance.

3.18 Boilers & HVAC Systems

The subject lot is current with no improvement structures and there are no water heater and HVAC systems present on the site premise.

3.19 Visual Indication of Spills, Leakage, Staining

REM's site inspection did not reveal any evidence of on-site or off-site spills, leakages, or staining significant enough to pose immediate environmental concern onto the subject property. No significantly stained catch basins, drip pads, or sumps were observed. There were no major spills around surface drains, pipes, gutters, spouts, or tubes, if any, at the time of site investigation.

3.20 Soil Staining or Surface Staining on Unpaved/Natural Lands

No staining or surface staining on the bare soil or unpaved lands were identified during the site investigation.

3.21 Pits, Ponds, Lagoons

No visible evidence of wetlands such as pits, ponds, lagoons, or any other water bodies was observed within the subject property's boundary lines.

3.22 Herbicides/Pesticides

No evidence of herbicide or pesticide use on the subject property was observed during the inspection.

3.23 Radon

Radon sources can be found from earth and rock beneath building structures, well water, and building materials themselves. Though there is no immediate health effect, it is believed to account for approximately 10% of lung cancer deaths in the United States. Estimated national average is 1.5 picocuries per liter of air, however, levels as high as 200 picocuries per liter in some commercial buildings can be found. USEPA and California Department of Health Services' Radon Survey Interim Results report shows different U.S. regions. According to general geological and climate information, where Region 9 includes Imperial, Los Angeles, Orange, Riverside, San Bernardino and San Diego Counties. According to the California EPA, Los Angeles and Riverside County is classified as a "Zone 2" county having a predicted average screening level between 2-4 picocuries per liter of air. Orange and San Diego County is under Zone 3, having the level less than 2 picocuries/L, and Ventura County as Zone 1 has the level greater than 4 picocuries/L.

If a property region reportedly has radon concentration below 4 picocuries per liter of air in 99.5% of homes within the region, then, it is not likely impacted by the presence of radon gas, considering EPA action limit of 4 picocuries per liter of air volume. REM is not contracted to perform the testing of radon level on the subject property, thus the delineation of radon level is beyond the scope of the service covered in this report.

4. NEIGHBORING PROPERTIES

4.1 Adjacent/Adjoining Businesses

For the scope of this assessment, properties are defined and categorized based upon their physical proximity to the subject property. An adjoining property is any real estate property whose border is contiguous or partially contiguous with the subject properties, or that would be if the properties were not separated by a roadway, street, public thoroughfare, or stream.

Adjoining properties of the subject site are as follows:

North and East: By Denza Market Place

South: By vacant lot

West: Immediately by Baldwin Avenue, and then by the 6301 Baldwin Avenue light industrial property to the south and the 6251 Baldwin Avenue light industrial property to the north

4.2 Historical Hazardous Substance Usage in Neighboring Properties

REM's staff contacted the following public agencies to find any records of former operation of Underground Storage Tank (UST) for gasoline/product or any other hazardous substances in the vicinity of the subject site:

- Regional Water Quality Control Board, Santa Ana Region (RWQCB-SA)
- California Department of Toxic Substances Control

The conducted government records search identifies that (Former) Southwest Painting Corporation (6251 Baldwin Avenue, across Baldwin Avenue, to the west of the northern portion of the subject property) is listed on State Water Board-compiled Leaking Underground Storage Tank (LUST) facilities database with a "Case Closed" status. The former UST leakage case at the (Former) Southwest Painting Corporation site was apparently satisfactorily treated under the supervision of the lead agency to the degree that no apparently significant environmental concerns for its neighboring areas are likely being induced from remaining untreated UST leakage, if any, at the (Former) Southwest Painting Corporation site.

In summary, no locations in the neighborhood within close proximity are considered to pose any environmental threat to the subject property, based upon the data obtained via NETR governmental records database and the conducted government records search.

5. GOVERNMENT RECORDS SEARCH AND POTENTIAL OFF-SITE CONTAMINATION SOURCES

5.1 Historical Background and Scope of Coverage

Since the early 1970s, environmental agencies have been tracking the compliance of many facilities with the various laws that have been promulgated to halt the pollution of air, land and water. More recently, records have been maintained documenting spills of hazardous materials and the locations of known waste sites or regulated waste handling facilities. The following sections summarizes REM's review of database search of available records at the local, state and federal level and highlights the approximate location of such sites with respect to the subject property.

The conducted government record search was performed to aid:

1) Identification of facilities, located within a one-mile radius of the subject property, which might pose a potential threat to the subsurface environment at the subject property; and

2) Identification of any environmental violation notices associated with activities conducted at the subject property itself. The following lists were reviewed for sites within one mile of the property:

5.2 Database Sources

A. Federal Sources

- United States Environmental Protection Agency (U.S. EPA), Comprehensive Environmental Response, Compensation and Liability Information System (CERCLIS)
- U.S. EPA, National Priority List (NPL)
- Resource Conservation and Recovery Act (RCRA) Federal TSD Facilities
- Federal Emergency Response Notification System (ERNS)
- CERCLA Site Enforcement Tracking System
- RCRA Violators List (CORRACTS)
- U.S. EPA Federal Enforcement Docket
- Toxic Release Inventory System (TRIS)

- No Further Remedial Action Planned (NFRAP)

The CERCLIS is the EPA compilation of sites for which the EPA has evidence of, or is investigating, a release or threatened release, of hazardous substances which may be subject to review in accordance with the terms and conditions of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (Superfund Act). Sites to be included are identified primarily by the reporting requirements of hazardous substances including degreasing solvents, oily waste, acid solutions, alkaline solutions, and heavy metal solutions, Treatment, Storage and Disposal (TSD) facilities and releases larger than specific Reportable Quantities (RQ), established by EPA.

An NPL site is an uncontrolled or abandoned hazardous waste site identified for priority remedial action under Superfund Program. Such prioritized sites with significant risk to human health and the environment receive remedial funding under the Comprehensive Environmental Response Conservation and Liability Act (CERCLA). RCRA generator/TSD list is a compilation of hazardous waste generating facilities which have obtained an identification number from EPA.

ERNS database is a national computer database used to store information on unauthorized release of oil and hazardous substances. The program is a cooperative effort of the Environmental Protection Agency, the Department of Transportation Research and Special Program Administration's National Transportation System Center and the National Response Center. There are primarily five Federal statues that requires release reporting: CERCLA Section 103; the Superfund Amendments and Reauthorization Act (SARA) Title III Section 304; the Clean Water Act of 1972 (CWA) Section 311(b)(3); and the Hazardous Material Transportation Act of 1974 (HMTA) Section 1808 (b).

RCRA Violators List (CORRACTS): The Resource Conservation and Recovery Act of 1976 provides for "Cradle to Grave" regulation of hazardous wastes. RCRA requires regulation of hazardous waste generators, transporters, and TSD sites. Evaluation to potential violations, ranging from manifest requirements to hazardous waste discharges, is typically conducted by the US EPA. This database is also known as Corrective Action Report (CORRACTS).

Toxic Release Inventory System (TRIS): TRIS compiles database for a property having had a release of chemical compound, whose listing reflects permitted air releases rather than a release to soil or groundwater.

B. California State Sources

- State of California Office of Planning and Research (CORTESE), the State of California equivalent of CERCLIS
- Leaking Underground Storage Tanks (LUST)
- Solid Waste Information System (SWIS)
- Annual Work Plan (previously known as Bond Expenditure Plan), the State of California equivalent of NPL
- California Historical Abandoned Site Survey Program (CALSITES)

CALSITES: The Historical Abandoned Site Survey (HASS) Program, formerly the California Abandoned Sites Program Information System – ASPIS, identified certain potential hazardous waste sites. The identification of these sites was generally not made via sampling and site characterization, but as a result of file searches and windshield surveys.

No Further Action sites are also on the CALSITE list which has been marked for no further action by the California Environmental Protection Agency, Department of Toxic Substance Control (DTSC) in accordance with California Health & Safety Code.

CORTESE: This database is a consolidation of information from various sources. It is maintained by the State Office of Planning and Research and lists potential and confirmed hazardous waste or substances sites.

LUST(s): The Leaking Underground Storage Tanks (LUST) Information System is maintained by the State Water Resource Board pursuant to California Health & Safety Code.

SWIS (Solid Waste Information System): As legislated under Solid Waste Management and Resource Recovery Act of 1972, the California Waste Management Board maintains list of certain facilities, i.e. Active solid waste disposal sites, Inactive or Closed solid waste disposal sites and Transfer facilities.

AW (Annual Work Plan previously known as Bond Expenditure Plan): The California Health & Safety code requires the California EPA to develop a site-specific expenditure plan as the basis for an appropriation of California Hazardous Substance Cleanup Bond Act of 1984 funds. The Agency is also required to update annually and report any significant adjustments to the Legislature on an ongoing basis. The plan identifies California hazardous waste sites targeted for cleanup by responsible parties, the California and the Federal Environmental Protection Agency over the next coming years.

C. Regional Sources

- LUST - Regional
- Toxic Releases (NT)
- California Regional Water Resources Control Board, Solid Waste Assessment Test (SWAT)
- Well Investigation Program

NT (Toxic Releases): The California Regional Water Quality Control Boards or local Department of Health & Safety Services keeps track of toxic releases to the environment. These lists are known as Unauthorized Releases, Spill, Leaks, Investigation and Cleanups, Non-Tank Releases, Toxic List or similar, depending on the local agency

SWAT (Solid Waste Assessment Test): This program requires that disposal sites with more than 50,000 cubic yards of waste provide sufficient information to the regional water quality control board to determine whether or not the site has discharged hazardous substances which will impact the environment. Site operators are required to file Solid Waste Assessment Test reports on a staggered basis. Operators submit water quality tests to the Regional Water Quality Control Board, describing surface and groundwater quality and supply; and the geology

within 1 mile of the site. Air quality tests are submitted to the local Air Quality Management District or Air Pollution Control District.

D. Other Sources

- RCRA-Generator
- RCRA-TSD Facilities
- SWLF (Solid Waste Landfill)

RCRA-G: The EPA regulates generators of hazardous material through the Resource Conservation and Recovery Act (RCRA). All hazardous waste generators are required to notify EPA of their existence by submitting the Federal Notification of Regulated Waste Activity Form or a State equivalent form. The notification form provides basic identification information and specific waste activities.

RCRA-D: The EPA regulates the treatment, storage and disposal of hazardous material through the Resource Conservation and Recovery Act (RCRA). All hazardous waste TSD facilities are required to notify EPA of their existence by submitting the Federal Notification of Regulated Waste Activity Form or a State equivalent form.

SWLF: The California Waste Information system database consist both open as well closed and inactive solid waste disposal facilities and transfer stations pursuant to the Solid Waste Management and Resource Recovery Act of 1972. Generally the California Integrated Waste Management Board learns of locations of disposal facilities through permit applications and from local enforcement agencies.

5.3 Case Study References

A. Case-Closure

If sites are listed on the California Leaking Underground Storage Tank (LUST) database with a "case closed (no further remedial actions required)" status, it shall be interpreted as follows. The identified contamination at such sites was mitigated to a degree that the governing agency believed that these sites do not pose apparent concern/threat to the subsurface environment of the neighboring area.

B. Lawrence Livermore National Laboratory Reports on LUFT's

According to Lawrence Livermore National Laboratory / University of California Reports on Leaking Underground Fuel Tanks (LUFT's), approximately ninety percent of dissolved petroleum products are found less than 280 feet in distance from the origination source, and most of these plumes are either stable or decreasing in distance. And seventy percent of the plume is in shallow groundwater less than 25 feet below the ground surface.

C. Groundwater Flow Gradient

Environmentally-concerned sites located not directly at the up-gradient from the subject site can be deleted from anticipated target sites, since contamination from identified sites is unlikely to migrate along the groundwater flow direction to affect the subsurface environment underneath the subject site (Section 2.6 – Hydrogeologic Setting).

5.4 Potential Source of Contamination

Sites identified on referenced agency listing within the one-mile radius from the subject property are tabulated in the Appendix C of this Report. As shown in Appendix C, there are no open Leaking Underground Storage Tank (LUST)/Cleanup sites or other sites within the immediate vicinity (< 1/8 mile) of the referenced subject property being targeted as potential environmental concern.

5.5 UST, Disposal Sites, and Generators

As also summarized in Appendix C, there are no sites listed on federal EPA RCRA small quantities hazardous waste generators databases, no disposal sites, two sites listed on RCRA Information System facilities database, and no sites listed on permitted Underground Storage Tank (UST) database compiled by the State Water Resources Control Board, located within 1/8-mile radius of the subject property. Upon reviewing the information regarding the said facilities obtained via computer search, the conclusion was drawn that the subsurface environment at the subject property is not likely to have been impacted by operations of the said facilities.

6. USER PROVIDED INFORMATION

The User has not informed REM of any environmental liens that are filed or recorded against the Property; knowledge of activity and use limitations that are in pace on the Property, or that have been filed or recorded against the Property; any specialized knowledge of experience related to the Property or nearby properties; any information pertaining to the purchase price with respect to the fair market of the Property; any commonly known or reasonably ascertainable information about the Property that would identify conditions indicative of releases or threatened releases; and any obvious indications that point to the presence of contamination at the Property.

7. SUMMARY AND CONCLUSION

- The subject property, APN 163-400-042 & 045, is an irregularly-shaped lot on the eastern block of (there generally N-S trending) Baldwin Avenue between Limonite Ave to the north and the southern end of Baldwin Avenue where is merges with (there generally NW-SE trending and connecting Limonite Ave to the north and Baldwin Avenue to the east) Pedley Road to become Padley Road to the south in the city of Jurupa Valley, California. The site is currently generally unpaved vacant lot with asphalt-paved driveway along its south side for its southern portion; and asphalt-paved parking/driveways (for Denza Market Place to the east and to the north of the site) for its northern portion. There is one small roughly N-S trending trapezoid-shaped fenced compound housing aboveground gas pipelines manifolds near the southwestern corner of the site which is not part of the subject property.

  No pits, ponds, swamps, dry wells, or lagoons were observed on the subject property. No apparently significant surface staining was observed on the paved/unpaved outdoor areas of the site.

  At the time of site inspection on October 15, 2024, the site was generally unpaved vacant lot with asphalt-paved driveway along its south side for its southern portion; and asphalt-paved parking/driveways (for Denza Market Place to the east and to the north of the site) for its northern portion. There were excavated soils stockpiles/construction debris (apparently derived from dumping of excavated soils from nearby properties under grading) present in the eastern part of the southern portion of the site. No apparently significant evidence (i.e., odor, discoloration, etc.) of contamination was noticed for these excavated soils stockpiles.

- Various historic sources listed in Section 2.4 reveals the site development/occupancy history as follows:

  The late 1930's to the early 1980's - The site was generally vacant lot with no unpaved trails noticed within the lot
  The middle 1980's to at least 1999 - The site was generally vacant lot, but with certain unpaved trails noticed within the lot
  The middle 2000's - The site was generally unpaved vacant and with current generally E-W trending asphalt-paced driveway (leading from Baldwin Avenue to the west and Denza Market Place to the east) passing through the

central portion of the site already present

2009 - The northern portion of the site was generally developed into its current asphalt-paved parking/driveways for Denza Market Place setting; and the site has been generally with its current setting since

- According to the conducted government records search, the subject property was not recognized being listed on the following environmental regulatory database record research (NETR database): NPL, RCRA-TSD, CERCLIS, NFRAP, RCRA-G, ERNS, CORRACTS, CORTESE, CALSITES, LUST, UST, and SWF.

- The conducted government records search identifies that (Former) Southwest Painting Corporation (6251 Baldwin Avenue, across Baldwin Avenue, to the west of the northern portion of the subject property) is listed on State Water Board-compiled Leaking Underground Storage Tank (LUST) facilities database with a "Case Closed" status. The former UST leakage case at the (Former) Southwest Painting Corporation site was apparently satisfactorily treated under the supervision of the lead agency to the degree that no apparently significant environmental concerns for its neighboring areas are likely being induced from remaining untreated UST leakage, if any, at the (Former) Southwest Painting Corporation site.

  In summary, no locations in the neighborhood within close proximity are considered to pose any environmental threat to the subject property, based upon the data obtained via NETR governmental records database and the conducted government records search.

- Based on the conducted government records search, there are also no open Leaking Underground Storage Tank (LUST)/Cleanup sites or other sites identified as exhibiting potential environmental concern within the immediate vicinity (< 1/8 mile) of the referenced subject property.

- In conclusion, we have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E-1527-21 of APN 163-400-042 & 045, Jurupa Valley, CA. This assessment has revealed no evidence of apparently significant environmental concern in connection with the property. No Phase II subsurface investigation is recommended for the subject property. However, in case in the future, the site proposed development plan is submitted to the City for approval, if any excavated soils stockpiles then still present like today, the City may require soil sampling/analyses of excavated soils stockpiles.

8. LIMITATIONS AND CERTIFICATION STAMP

The opinion expressed herein is based on the information collected during our study, our present understanding of the site conditions and our professional judgment in light of such information at the time of preparation of this opinion. The report is a professional opinion work, and no warranty is either expressed, implied or made as to the conclusions, advice and recommendations offered in this report.

Our investigation was performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable Engineers and Geologists practicing in this or similar localities.

The findings, conclusions and recommendations in this report are considered valid as of the present date. However, changes in the conditions of the property can occur with the passage of time, due to natural process or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standard may occur. REM is not responsible for conditions found at or beneath the subject property or adjacent properties. Accordingly, portions of this report may be invalidated wholly or partially by the changes beyond our control.

This report is prepared for the exclusive use of the client, and opinions/recommendations contained in this report apply only to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated.

Report Prepared by:
ROBIN ENVIRONMENTAL MANAGEMENT

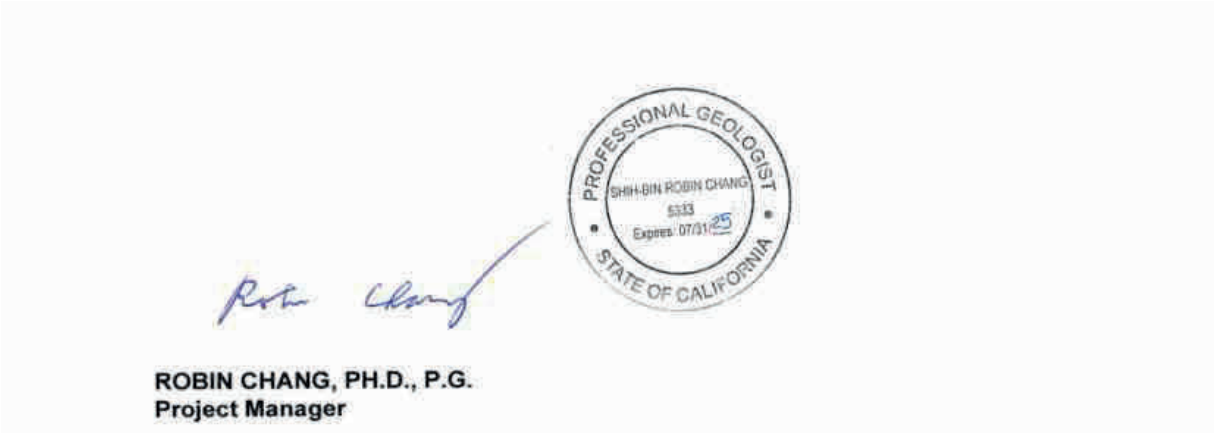


ROBIN CHANG, PH.D., P.G.
Project Manager

9. QUALIFICATION STATEMENT FOR PERSONNEL CONDUCTING THE PHASE I ASSESSMENT

Since Robin Chang, the personnel conducting the Phase I Environmental assessment is a California State Registered Professional Geologist, Robin Chang declares that, to the best of my professional knowledge and belief, I meet the definition of Environmental Professional as defined in Sec. 312.10 of 40 CFR. I have the specific qualifications based on education, training, experience, and license to assess a property of the nature, history, and setting of the subject property. I have developed and performed all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312.

ROBIN ENVIRONMENTAL MANAGEMENT



ROBIN CHANG, PH.D., P.G.
Project Manager

APPENDICES

APPENDIX A

FIGURES & PHOTOS

FIGURE 1

SITE PHOTOS

Photo 1
Viewing the southern portion of the site from near its northwestern corner; facing southeast



Photo 2
Viewing the southern portion of the site from near its northeastern corner; facing southwest



Photo 3
Viewig the northern portion of the site with northwestern corner of Denza Market Place to the north of the site on the back (facing north-northwest)



Photo 4
Main portion of Denza Market Place to the east of the site (facing east)



Photo 5
Vacant lot to the south of the site (facing southeast)



Photo 6
One small roughly N-S trending trapezoid-shaped fenced compound housing aboveground gas pipelines manifolds near the southwestern corner of the site which is not part of the subject property (facing south-southeast)



Photo 7

The 6301 Baldwin Avenue light industrial property in the middle and on the left (to the south; and the 6251 Baldwin Avenue light industrial property on the right (to the north), across Baldwin Avenue, to the west of the site (facing northwest)



FIGURE 2

SITE LOCATION MAP



1981 topographical map

USGS, 5521827 RIVERSIDE WEST 7.5 X 7.5 MINUTE (1967, Revised 1981)

FIGURE 3

CO. ASSESSOR'S OFFICE PARCEL MAP

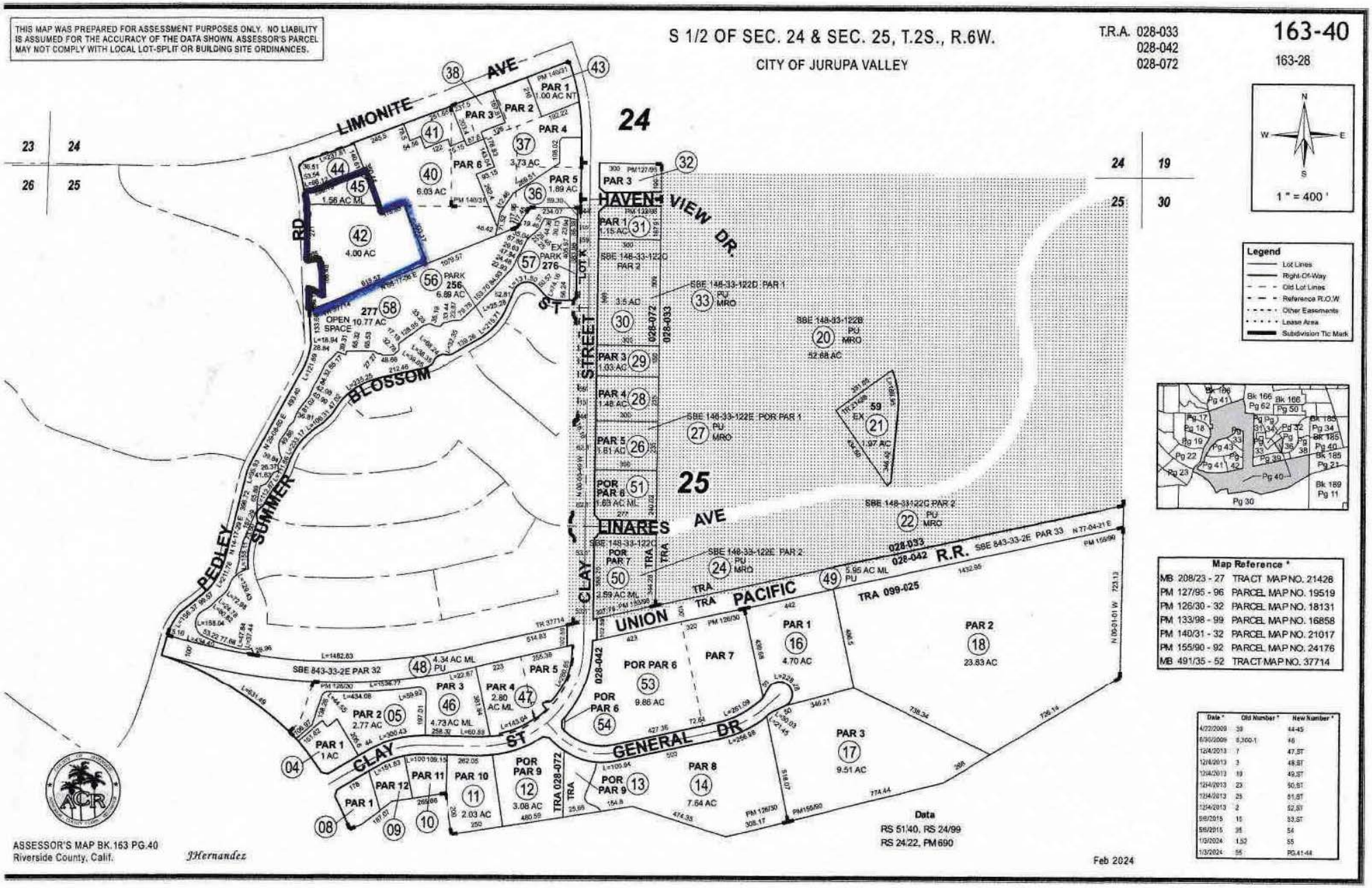
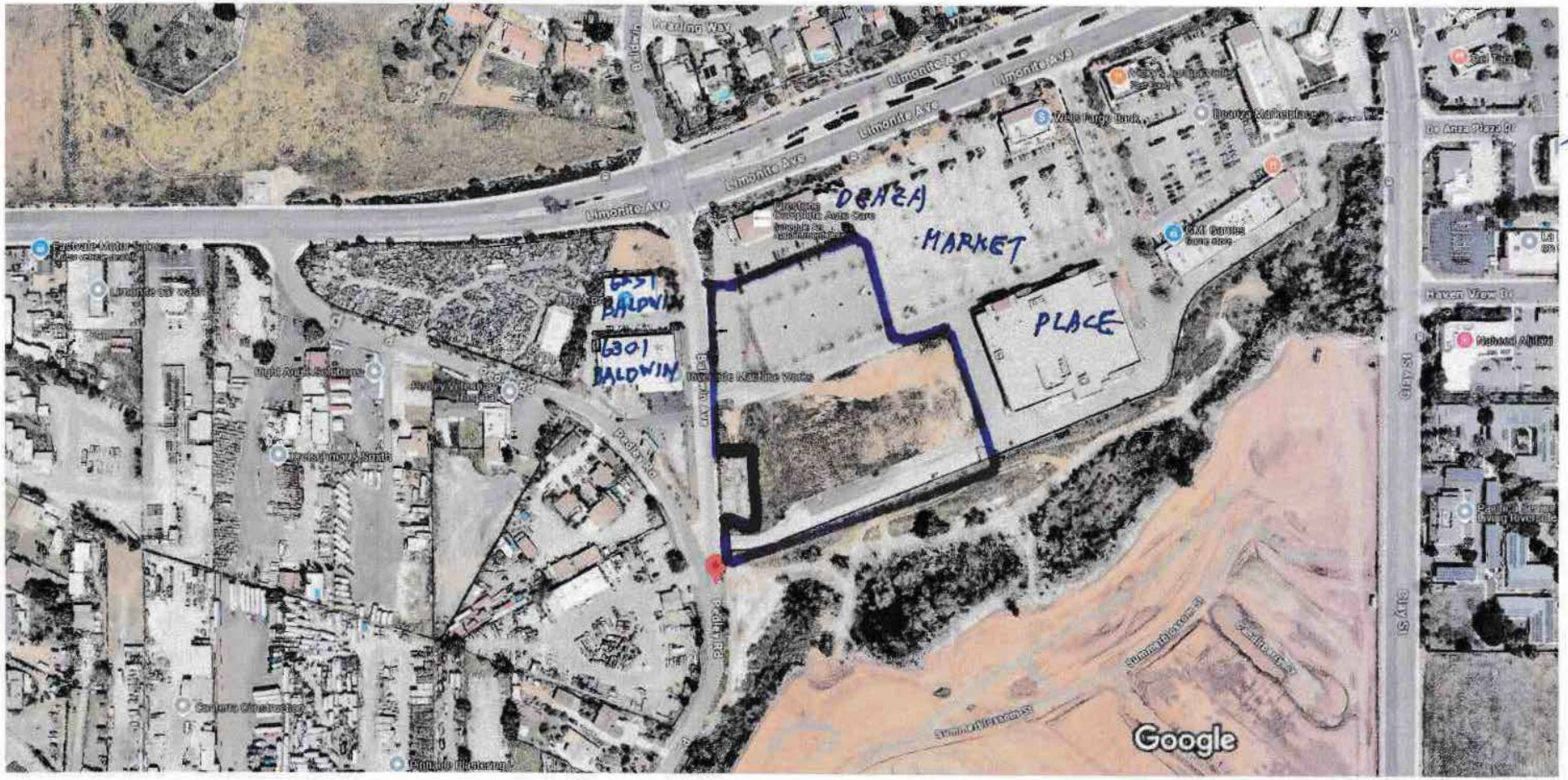

THIS MAP WAS PREPARED FOR ASSESSMENT PURPOSES ONLY. NO LIABILITY IS ASSUMED FOR THE ACCURACY OF THE DATA SHOWN. ASSESSOR'S PARCEL MAY NOT COMPLY WITH LOCAL LOT-SPLIT OR BUILDING SITE ORDINANCES.
S 1/2 OF SEC. 24 & SEC. 25, T.2S., R.6W.
CITY OF JURUPA VALLEY
T.R.A. 028-033
028-042
028-072
163-40
163-28
LIMONITE AVE
HAVEN VIEW DR.
CLAY STREET
LINARES AVE
PEDLEY RD
SUMMER BLOSSOM ST
UNION PACIFIC R.R.
CLAY ST
GENERAL DR
TRA 099-025
1 " = 400 '
Legend
Lot Lines
Right-Of-Way
Old Lot Lines
Reference R.O.W
Other Easements
Lease Area
Subdivision Tic Mark
Map Reference *
MB 208/23 - 27 TRACT MAP NO. 21426
PM 127/95 - 96 PARCEL MAP NO. 19519
PM 126/30 - 32 PARCEL MAP NO. 18131
PM 133/98 - 99 PARCEL MAP NO. 16858
PM 140/31 - 32 PARCEL MAP NO. 21017
PM 155/90 - 92 PARCEL MAP NO. 24176
MB 491/35 - 52 TRACT MAP NO. 37714
Date * Old Number * New Number *
4/22/2009 39 44-45
6/30/2009 5,300-1 46
12/4/2013 1 47,ST
12/4/2013 3 48,ST
12/4/2013 19 49,ST
12/4/2013 23 50,ST
12/4/2013 25 51,ST
12/4/2013 2 52,ST
5/6/2015 15 53,ST
5/6/2015 35 54
1/3/2024 1,52 55
1/3/2024 55 PG.41-44
Data
RS 51/40, RS 24/99
RS 24/22, PM 690
Feb 2024
ASSESSOR'S MAP BK.163 PG.40
Riverside County, Calif.
JHernandez

FIGURE 4

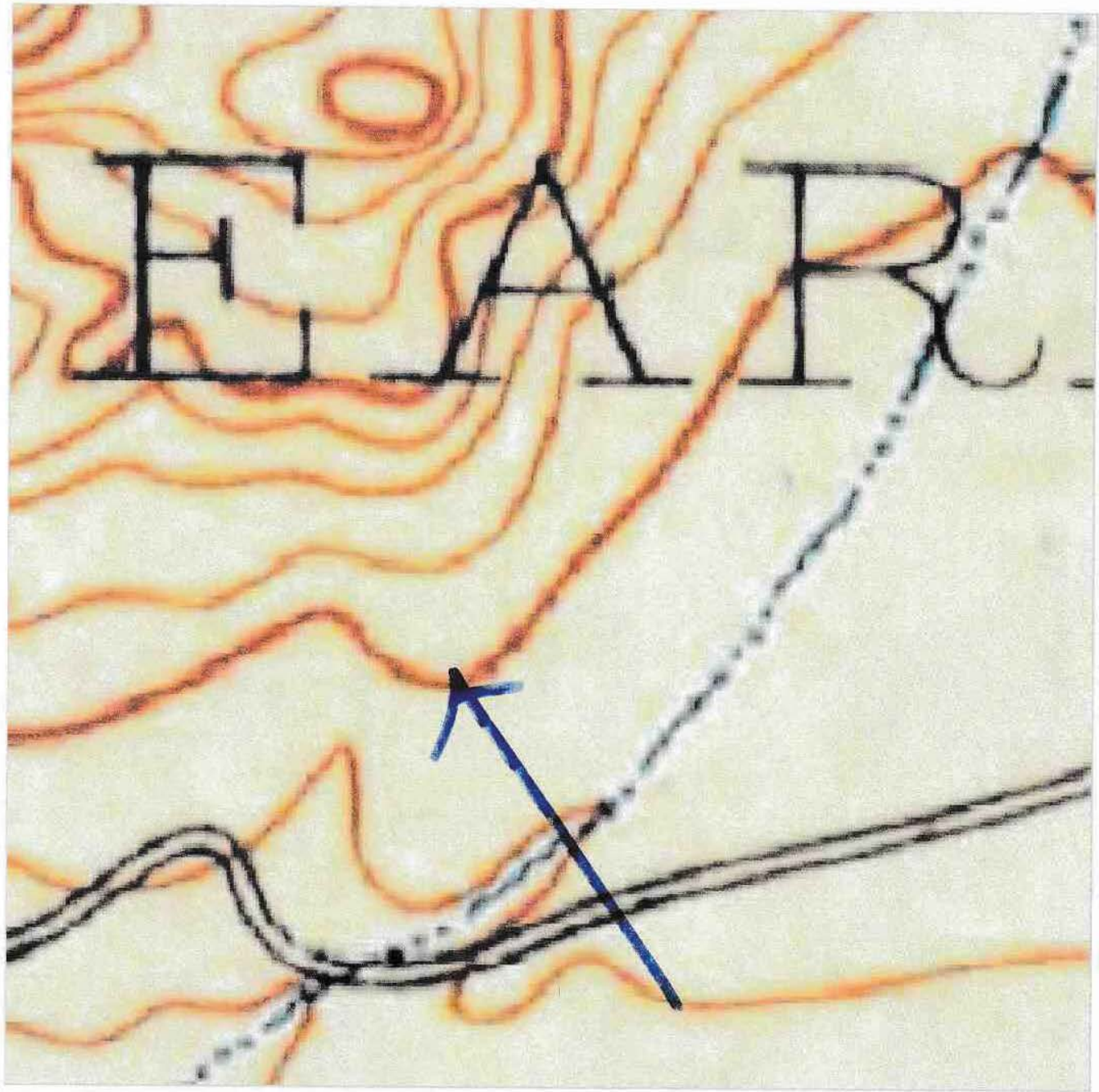
RECENT AERIAL PHOTO SHOWING SITE/ITS VICINITY GERNERAL LAYOUT

Baldwin Ave & Pedley Rd



APPENDIX B

HISTORIC AERIAL PHOTO/TOPOGRAPHIC MAP RECORDS

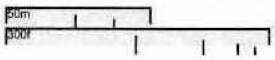


100m
500f

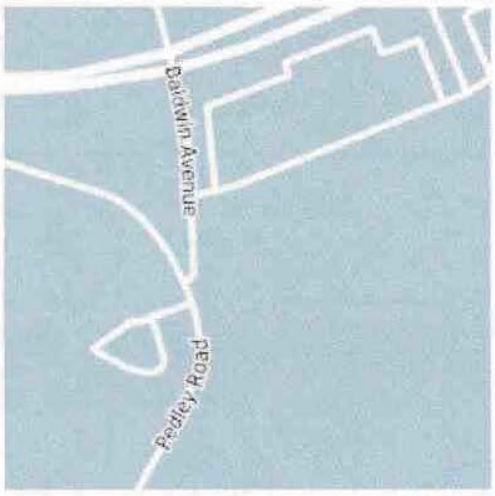
1939 topographical map

USGS, 5504005 RIVERSIDE 15 X 15 MINUTE (1901, Revised 1939)



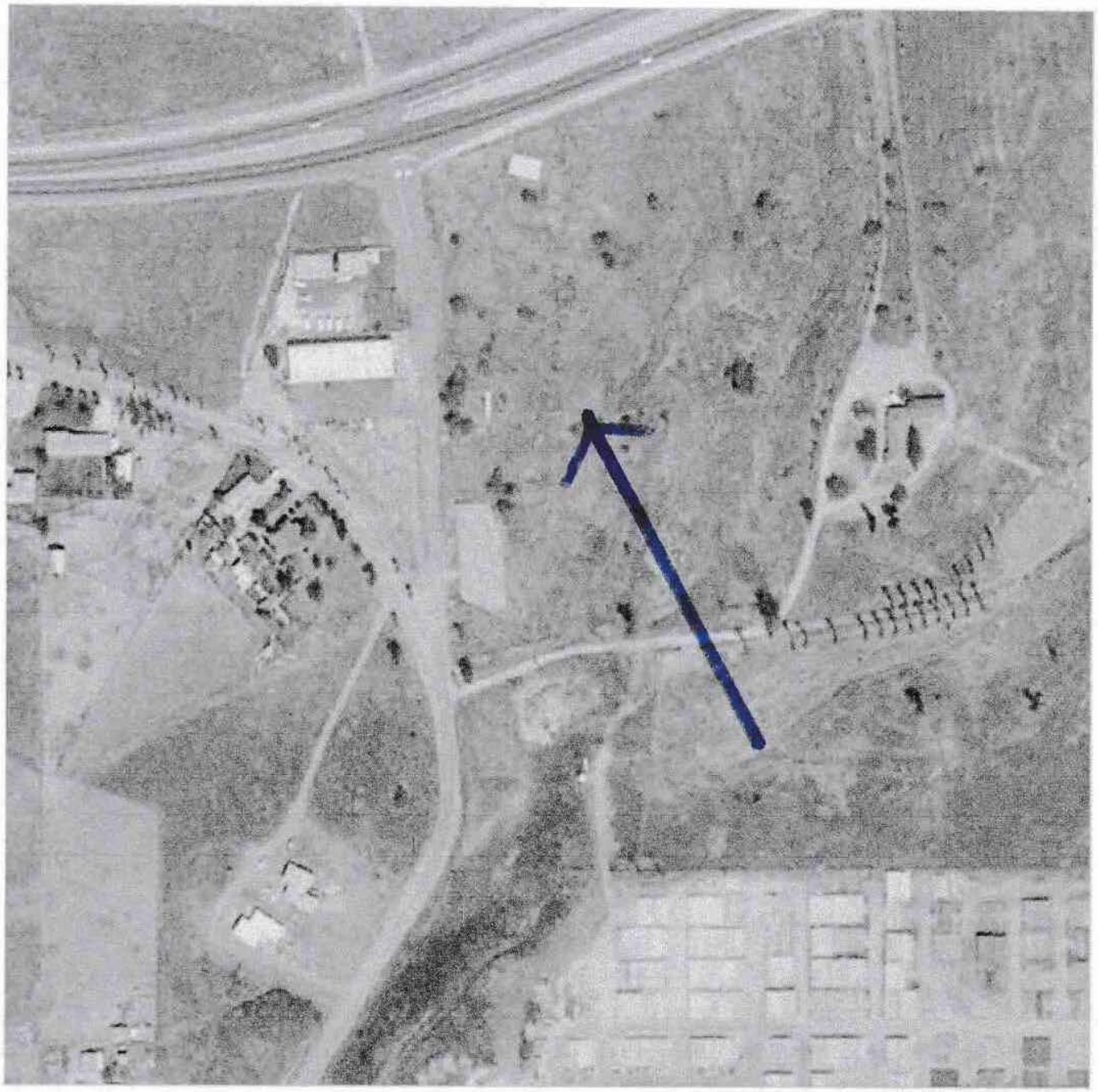


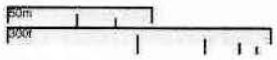




1948 aerial photograph
USGS (1948-07-10 - 1948-07-20)

prepared October 18, 2024 -- Historic Aerial imagery © 2024 , NETRonline, LLC.





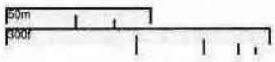




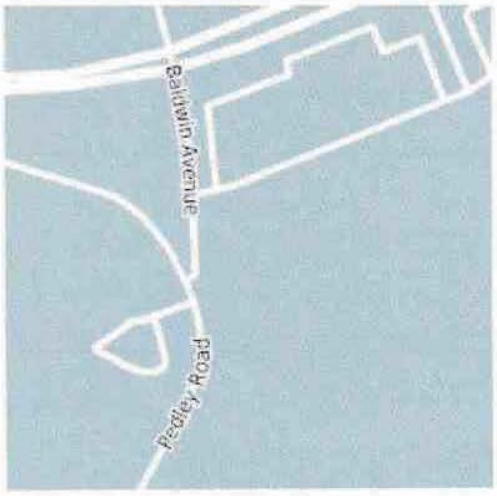
1966 aerial photograph
USGS (1966-04-16 - 1966-04-16)

prepared October 18, 2024 – Historic Aerial imagery © 2024 , NETRonline, LLC.



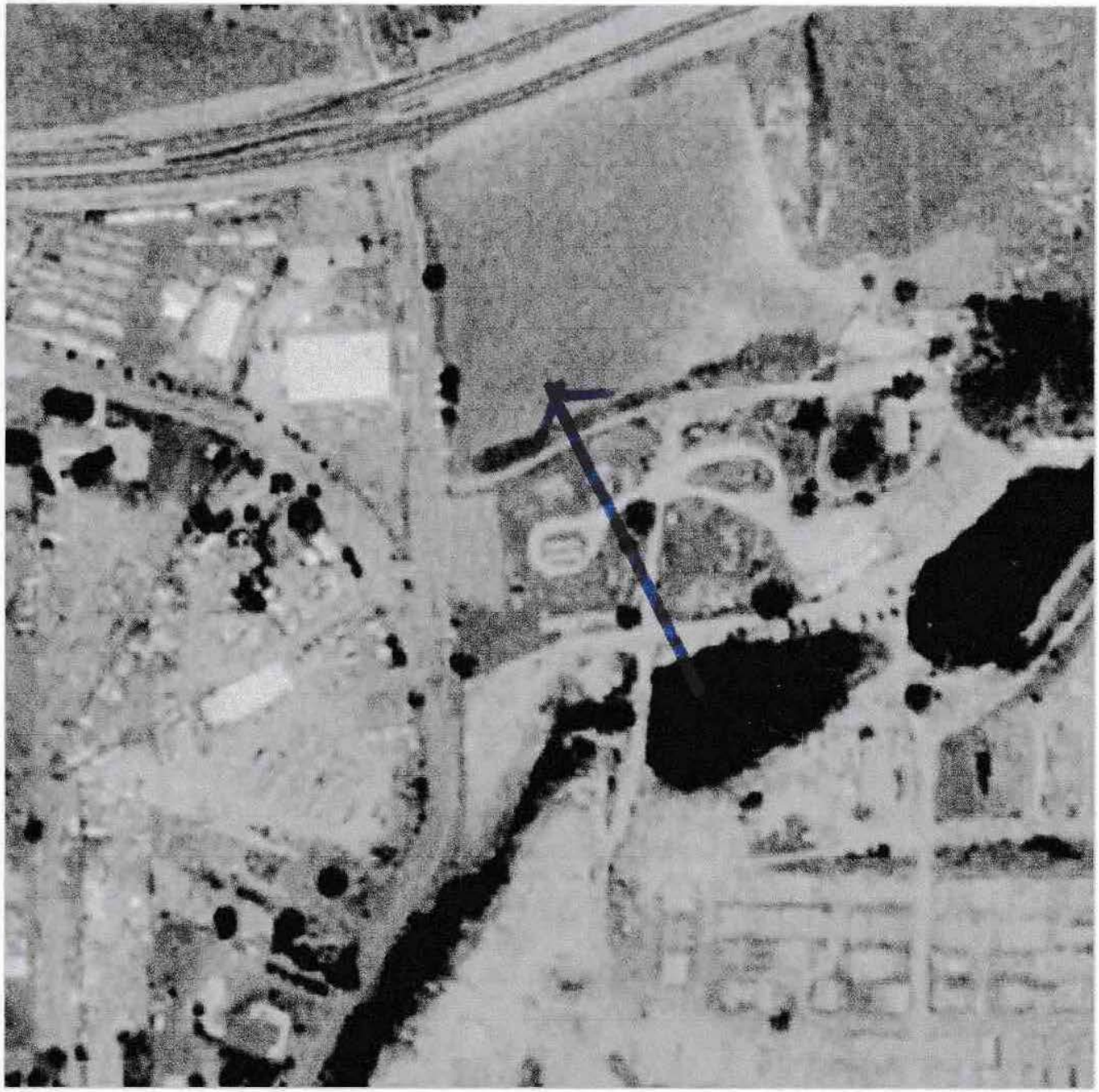


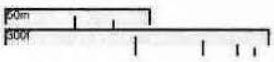




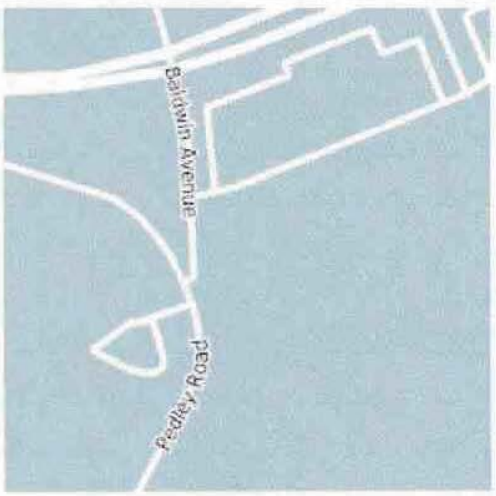
1985 aerial photograph
USDA NHAP84 (1985-02-24 - 1985-09-02)

prepared October 18, 2024 -- Historic Aerial imagery © 2024 , NETRonline, LLC.





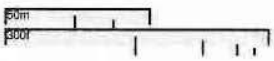




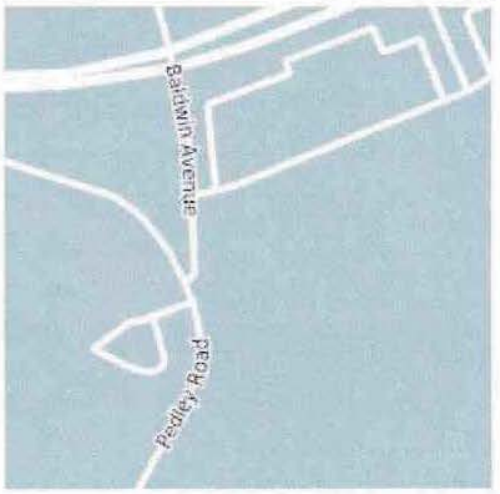
1994 aerial photograph
USGS DOQQ (1994-01-01 - 1994-10-02)

prepared October 18, 2024 -- Historic Aerial imagery © 2024 , NETRonline, LLC.





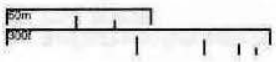




1999 aerial photograph
Landiscor (1999-01-05 - 1999-09-03)

prepared October 18, 2024 -- Historic Aerial imagery © 2024 , NETRonline, LLC.



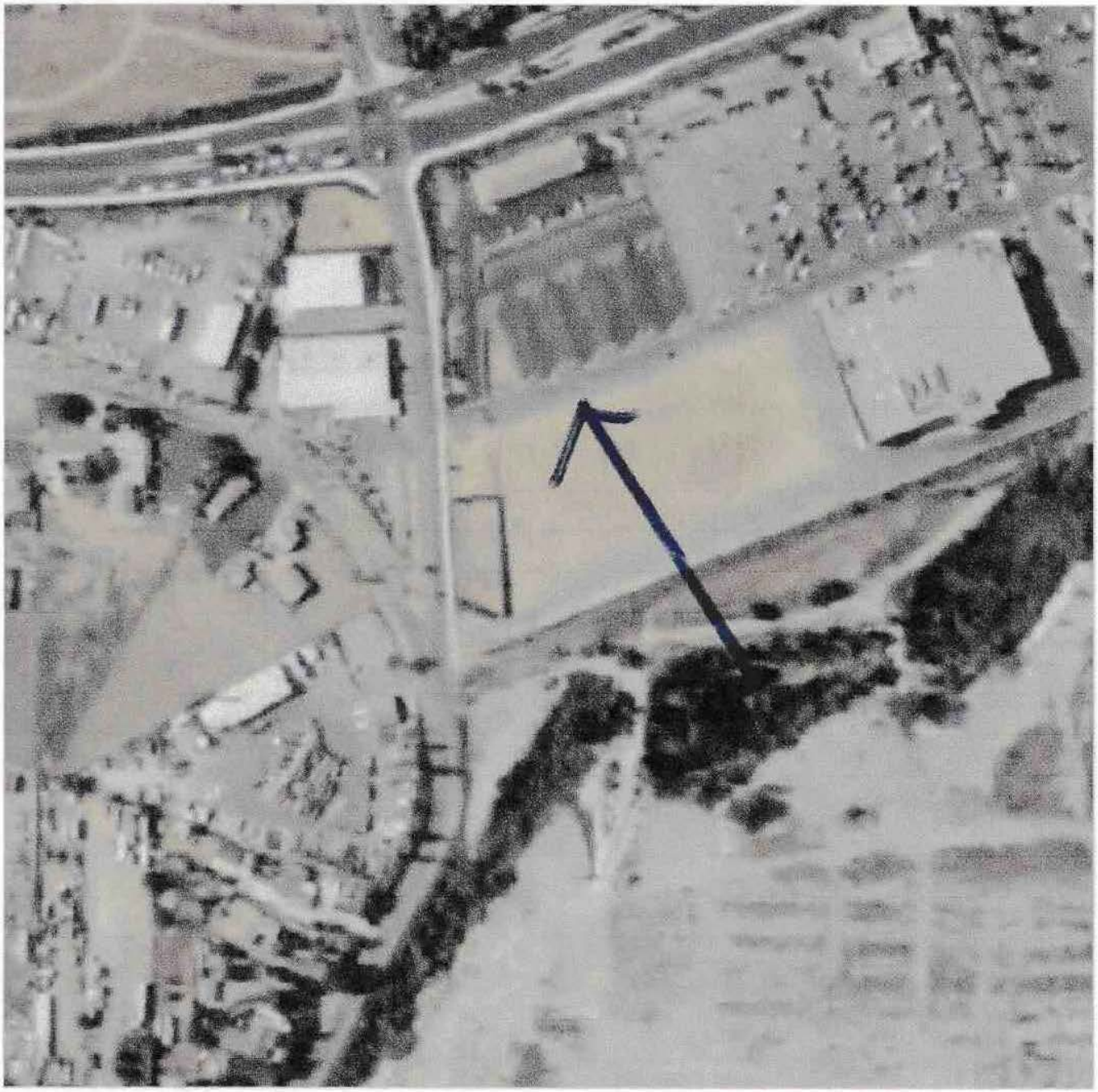






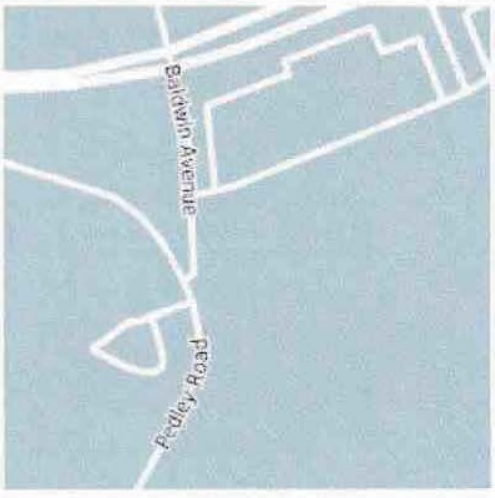
2005 aerial photograph
US Departmen of Agriculture (2005-05-29 - 2005-09-29)

prepared October 18, 2024 -- Historic Aerial imagery © 2024 , NETRonline, LLC.



50m
100f





2009 aerial photograph
USDA (2009-05-28 - 2009-07-18)

prepared October 18, 2024 -- Historic Aerial imagery © 2024 , NETRonline, LLC.

APPENDIX C

GOVERNMENT RECORDS SEARCH DATABASE

Site Name: APN 163-400-042
Location: APN 163-400-042, Jurupa Valley, CA
Prepared for: REM
Ref: 236524
Center Coordinates: 33.97475524049435,-117.46646404266357
Prepared Date: Fri Oct 18 2024 20:52:15 GMT+0000 (Coordinated Universal Time)

ENVIRONMENTAL RADIUS REPORT

ASTM E1527-21

NETR Online

2055 E. Rio Salado Pkwy, Tempe, AZ 85381 | 480-967-6752

Summary

Federal	< 1/4	1/4 - 1/2	1/2 - 1
Lists of Federal NPL (Superfund) sites	0	0	1
Lists of Federal Delisted NPL sites	0	0	0
Lists of Federal sites subject to CERCLA removals and CERCLA orders	0	0	0
Lists of Federal CERCLA sites with NFRAP	0	0	0
Lists of Federal RCRA facilities undergoing Corrective Action	0	0	0
Lists of Federal RCRA TSD facilities	0	0	0
Lists of Federal RCRA generators	0	0	0
Federal institutional control/engineering control registries	0	0	0
Federal ERNS list	0	0	0

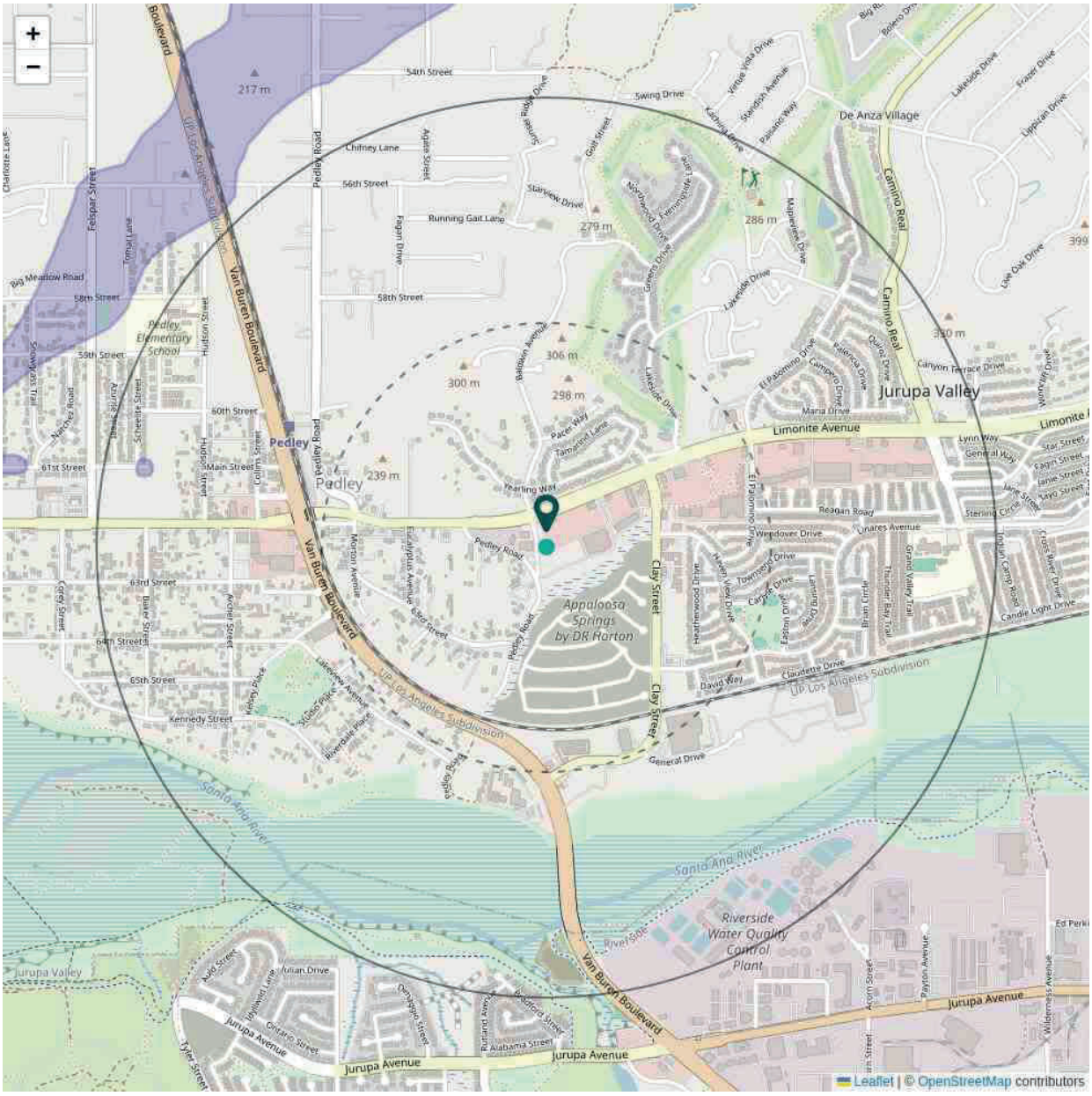
State	< 1/4	1/4 - 1/2	1/2 - 1
Lists of state and tribal Superfund equivalent sites	0	0	0
Lists of state and tribal hazardous waste facilities	0	0	0
Lists of state and tribal landfills and solid waste disposal facilities	0	1	0
Lists of state and tribal leaking storage tanks	1	3	0
Lists of state and tribal registered storage tanks	2	0	0
State and tribal institutional control/engineering control registries	0	0	0
Lists of state and tribal voluntary cleanup sites	1	1	0
Lists of state and tribal brownfields sites	0	0	0

Other	< 1/4	1/4 - 1/2	1/2 - 1
State and/or tribal lists of sites requiring further investigation / remediation	0	0	0
State list of Significant Environmental Hazards (SEH)	0	0	0
Lists of state and tribal mine sites requiring further investigation and/or remediation	0	0	0
State and/or tribal lists of spills and spill responses	0	0	0
State and/or tribal lists of emergency responses	0	0	0
State and/or tribal lists of dry cleaners	0	0	0
State and/or tribal lists of clandestine laboratory cleanups	0	0	0
State and/or tribal lists of scrap/used tire processing facilities	0	0	0
State and/or tribal lists of underground injection control sites	0	0	0
State and/or tribal listings of permitted drywells	0	0	0
Automobile salvage yards	0	0	0
Livestock Waste Control sites	0	0	0
Controlled Animal Feeding Operations (CAFOs)	0	0	0
State and/or tribal lists of registered aboveground storage tanks (ASTs)	0	0	0
C.A.A. Permitted Facilities	0	0	0
NPDES Permitted Facilities	0	0	0
Onsite Wastewater Treatment sites	0	0	0
State and/or tribal lists of permitted facilities	0	0	0
Resource Conservation and Recovery Act Information (RCRAInfo)	7	14	0
U.S. EPA Enforcement, Compliance History Online (ECHO)	0	0	0
U.S. EPA Underground Storage Tanks (UST)	1	0	0
U.S. EPA Toxic Substances Control Act (TSCA) database	0	0	0
U.S. EPA Toxic Release Inventory System (TRIS)	0	1	0

Lists of Federal NPL (Superfund) sites

FEDERAL NPL SUPERFUND SITES (BOUNDARIES)

The National Priority List (NPL) is the list of sites of national priority among the known releases or threatened releases of hazardous substances, pollutants, or contaminants throughout the United States and its territories. This data layer includes currently active NPL sites, proposed NPL sites, and delisted NPL sites. The NPL was searched for sites within a one-mile radius of the target property.



center: 33.97475524049435,-117.46646404266357

0.5 Miles 1.0 Miles

1

Site Title Not Available

3490 PYRITE ST

EPA Program: Superfund
EPA ID: CAT080012826
Site Name: STRINGFELLOW
Street Address: 3490 PYRITE ST
City: MIRA LOMA
County: RIVERSIDE
Acreage: 1.04553710650111
Original Creation Date:
Last Changed Date:
Source:
Site Contact: Daewon Rojas-Michelson
Telephone: (415) 947-4191
Email: rojas-michelson.daewon@epa.gov
Distance From Center (Miles): 0.8909
Site Source: last updated 02-10-2022 from EPA-NPL-BOUNDARIES

Lists of Federal Delisted NPL sites

The EPA may delete a final NPL site if it determines that no further response is required to protect human health or the environment. Under Section 300.425(e) of the NCP (55 FR 8845, March 8, 1990), a site may be deleted when no further response is appropriate if EPA determines that one of the following criteria has been met: 1) EPA, in conjunction with the state, has determined that responsible parties have implemented all appropriate response action required, 2) EPA, in consultation with the state, has determined that all appropriate Superfund-financed responses under CERCLA have been implemented and that no further response by responsible parties is appropriate, 3) A remedial investigation/feasibility study (RI/FS) has shown that the release poses no significant threat to public health or the environment and, therefore, remedial measures are not appropriate.

There were no Federal Delisted NPL sites found within a half-mile radius of the target property.

Lists of Federal sites subject to CERCLA removals and CERCLA orders

CERCLA identifies the classes of parties liable under CERCLA for the cost of responding to releases of hazardous substances. In addition, CERCLA contains provisions specifying when Federal installations must report releases of hazardous substances and the cleanup procedures they must follow. Executive Order No. 12580, Superfund Implementation, delegates response authorities to EPA and the Coast Guard. Generally, the head of the Federal agency has the delegated authority to address releases at the Federal facilities in its jurisdiction.

There were no Federal sites subject to CERCLA removals and/or orders found within a half-mile radius of the target property.

Lists of Federal CERCLA sites with NFRAP

No Further Remedial Action Planned (NFRAP) is a decision made as part of the Superfund remedial site evaluation process to denote that further remedial assessment activities are not required and that the facility/site does not pose a threat to public health or the environment sufficient to qualify for placement on the National Priorities List (NPL) based on currently available information. These facilities/sites may be re-evaluated if EPA receives new information or learns that site conditions have changed. A NFRAP decision does not mean the facility/site is free of contamination and does not preclude the facility/site from being addressed under another federal, state or tribal cleanup program.

There were no Federal CERCLA sites with No Further Remedial Action Planned (NFRAP) decisions found within a half-mile radius of the target property.

Lists of Federal RCRA facilities undergoing Corrective Action

Corrective action is a requirement under the Resource Conservation and Recovery Act (RCRA) that facilities that treat, store or dispose of hazardous wastes investigate and cleanup hazardous releases into soil, ground water, surface water and air. Corrective action is principally implemented through RCRA permits and orders. RCRA permits issued to TSDFs must include provisions for corrective action as well as financial assurance to cover the costs of implementing those cleanup measures. In addition to the EPA, 44 states and territories are authorized to run the Corrective Action program.

There were no Federal RCRA facilities undergoing corrective action(s) found within a one-mile radius of the target property.

Lists of Federal RCRA TSD facilities

The final link in RCRA's cradle-to-grave concept is the treatment, storage, and disposal facility (TSDF) that follows the generator and transporter in the chain of waste management activities. The regulations pertaining to TSDFs are more stringent than those that apply to generators or transporters. They include general facility standards as well as unit-specific design and operating criteria.
There were no Federal RCRA treatment, storage and disposal facilities (TSDFs) found within a half-mile radius of target property.

Lists of Federal RCRA generators

A generator is any person who produces a hazardous waste as listed or characterized in part 261 of title 40 of the Code of Federal Regulations (CFR). Recognizing that generators also produce waste in different quantities, EPA established three categories of generators in the regulations: very small quantity generators, small quantity generators, and large quantity generators. EPA regulates hazardous waste under the Resource Conservation and Recovery Act (RCRA) to ensure that these wastes are managed in ways that protet human health and the environment. Generators of hazardous waste are regulated based on the amount of hazardous waste they generate in a calendar month, not the size of their business or facility.

There were no Federal RCRA generators found at the target property and/or adjoining properties.

Federal institutional control/engineering control registries

Institutional Controls (IC) are defined as non-engineered and/or legal controls that minimize the potential human exposure to contamination by limiting land or resource use. Whereas, Engineering Controls (EC) consist of engineering measures (e.g, caps, treatment systems, etc.) designed to minimize the potential for human exposure to contamination by either limiting direct contact with contaminated areas or controlling migration of contaminants through environmental media.

There were no Federal institutional or engineering controls found at the target property.

Federal ERNS list

The Emergency Response Notification System (ERNS) is a database used to store information on notification of oil discharges and hazardous substances releases. The ERNS program is a cooperative data sharing effort encompassing the National Response Center (NRC), operated by the US Coast Guard, EPA HQ and EPA regional offices. ERNS data is used to analyze release notifications, track EPA responses and compliance to environmental laws, support emergency planning efforts, and assist decision-makers in developing spill prevention programs.

There were no Federally recorded releases of oil and/or hazardous substances at the target property.

Lists of state and tribal Superfund equivalent sites

In order to maintain close coordination with the states and tribes in the NPL listing decision process, the EPA's policy is to determine the position of states and tribes on sites that EPA is considering for listing. Consistent with this policy, since 1996, it has been the EPA's general practice to seek the state or tribe's position on sites under consideration for NPL listing by submitting a written requiest to the governor/state environmental agency or tribe. Various states may have their own program for identifying, investigating and cleaning up sites where consequential amounts of hazardous waste may have been disposed that work in conjunction with the EPA's Superfund remedial program.

There were no State and/or tribal Superfund equivalent sites found within a one-mile radius of target property.

Lists of state and tribal hazardous waste facilities

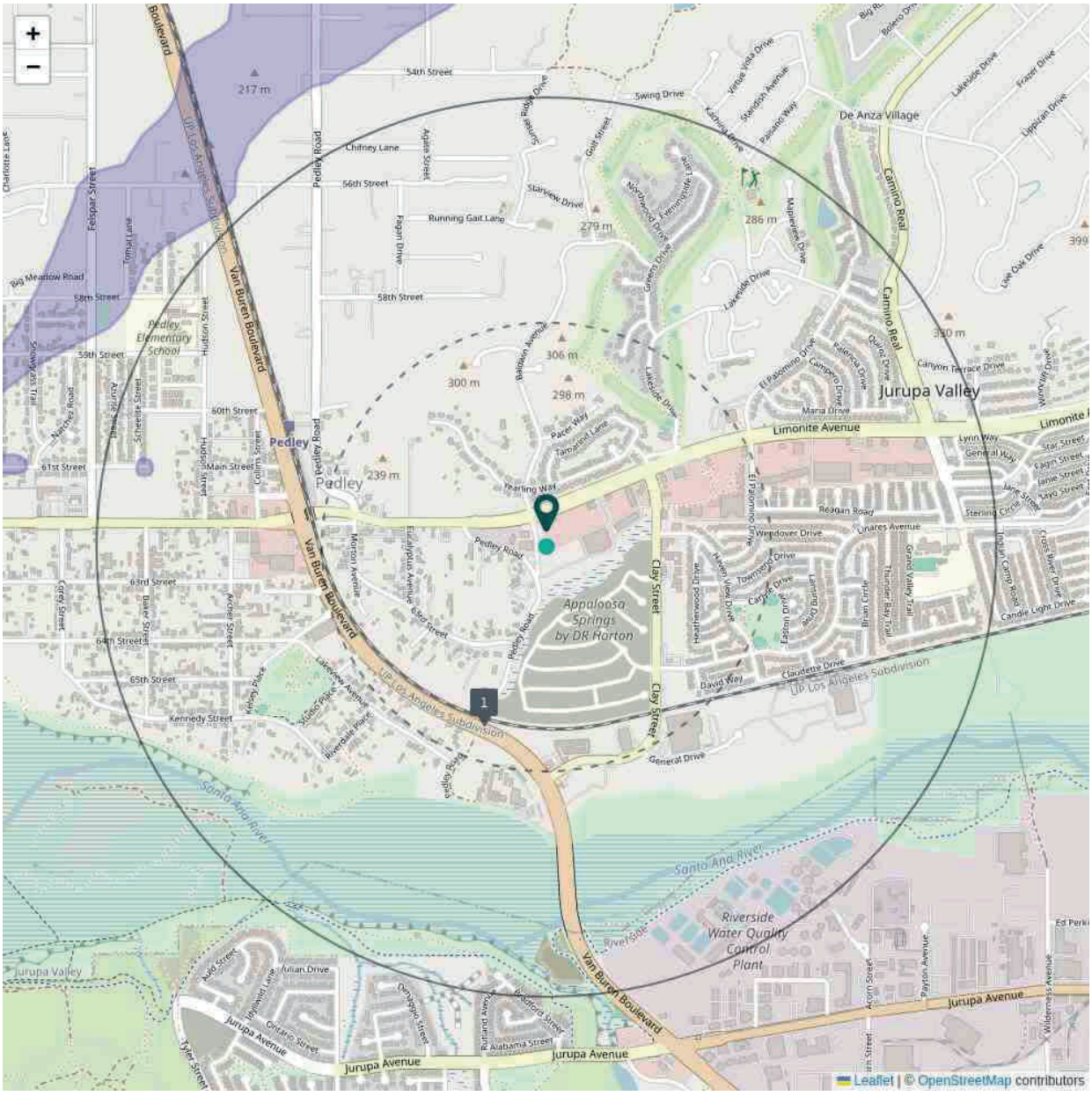
EPA established basic hazardous waste management standards for businesses who produce hazardous waste and categorized three businesses based on the volume of hazardous waste produced in a calendar month. On the federal level, there are three generator categories: large quantity generator, small quantity generator, and conditionally exempt small quantity generator. Some states are authorized to establish generator categories that are different from those that federal EPA set up. State regulatory requirements for generators of hazardous waste may be more stringent than the federal program.

There were no State and/or tribal hazardous waste facilities found within a half-mile radius of the target property.

Lists of state and tribal landfills and solid waste disposal facilities

SWRCB - LAND DISPOSAL SITES / LANDFILLS

The Department of Resources Recycling and Recovery (CalRecycle), along with local enforcement agencies, regulates the operation of solid waste facilities. It is a core value of CalRecycle to manage and mitigate the impacts of solid waste on public health and safety and the environment by enforcing compliance with regulations and state minimum standards, through integrated and consistent permitting, inspection, and enforcement efforts. The CASWIS database contains information on solid waste facilities, operations, and disposal sites throughout the State of California. This data set was searched to return all records within a half-mile of the target property.



center: 33.97475524049435,-117.46646404266357

0.5 Miles 1.0 Miles

1

RIVERSIDE SAND CO. DISPOSAL

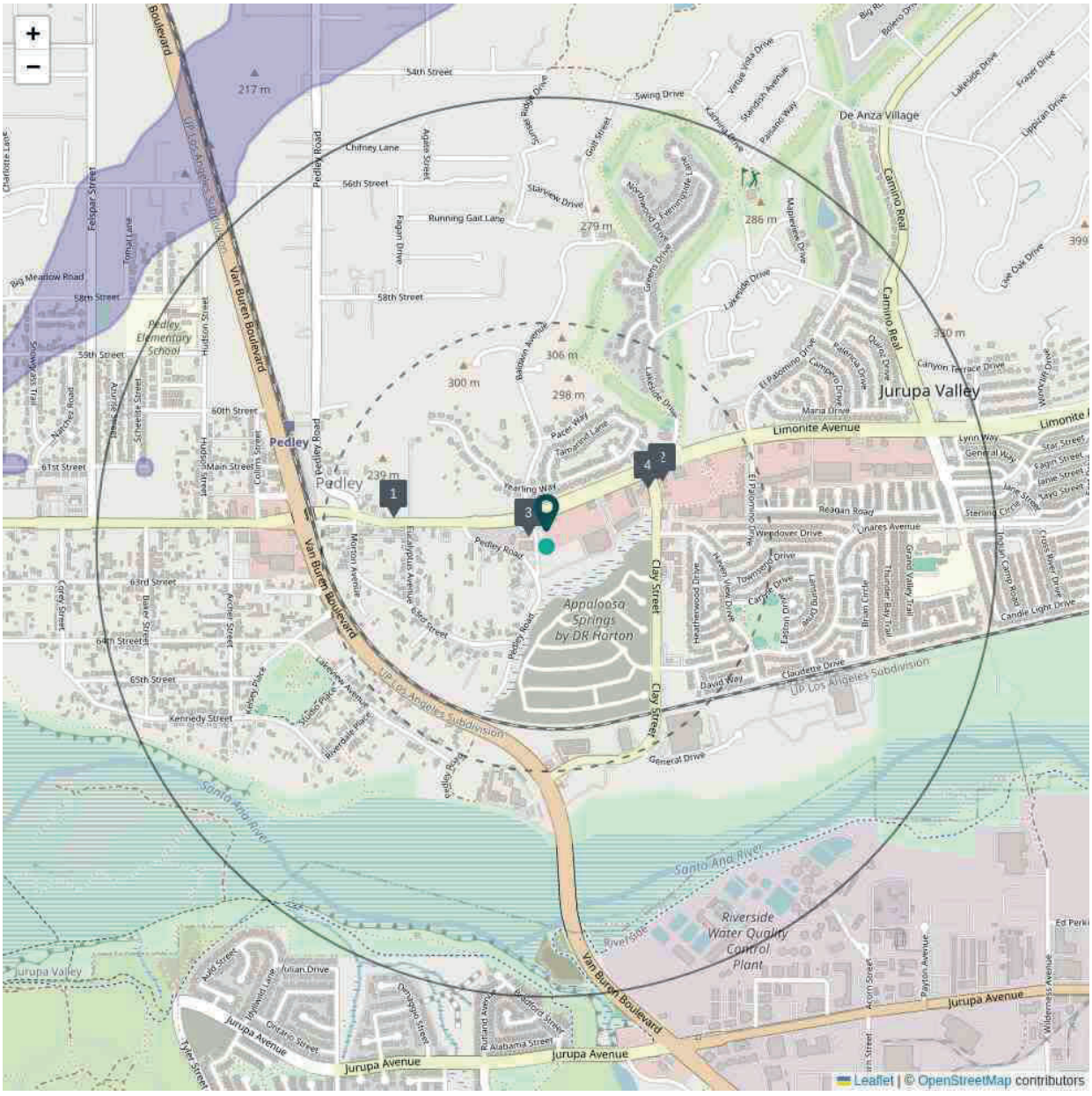
6800

Global ID: L10009386772
Business Name: RIVERSIDE SAND CO. DISPOSAL
Street Number: 6800
City: RIVERSIDE
Case Type: Land Disposal Site
Status: Completed - Case Closed
Status Date: 2009-11-04 00:00:00
CUF Case: NO
Lead Agency: SANTA ANA RWQCB (REGION 8)
Local Agency:
RB Case Number: 8 332601N01
LOC Case Number:
Contaminants of Concern:
Quantity Released:
Media of Concern:
Site History:
Leak Reported Date:
Discovery:
Discharge Source:
No Further Action Date: 2009-11-04 00:00:00
Watershed Name: Santa Ana River - Middle Santa Ana River - Chino (Split) (801.21)
EnviroScreen Score: 86-90%
Military DOD Site: No
Distance From Center (Miles): 0.4258
Site Source: last updated 06-22-2023 from CA-SWRCB-GEOTRACKER

Lists of state and tribal leaking storage tanks

SWRCB - LEAKING UNDERGROUND STORAGE TANK (LUST) SITES

If a UST leak occurs, the owner and operator (Responsible Party) must report the leak to the local regulatory agency. Soil and/or groundwater assessment may be required by the lead regulatory agency. Assessment and cleanup is governed by the Porter Cologne Water Quality Control Act (Water Code) and Chapter 16 (Article 11) of the Underground Storage Tank Regulations. This information was downloaded from the State Water Resources Control Board (SWRCB) GeoTracker database, and was searched to return all records within a half-mile of the target property.



center: 33.97475524049435,-117.46646404266357

0.5 Miles 1.0 Miles

1

MARSHMAN'S SERVICE

8665

Global ID: T0606500577
Business Name: MARSHMAN'S SERVICE
Street Number: 8665
City: RIVERSIDE
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 2015-02-10 00:00:00
CUF Case: NO
Lead Agency: SANTA ANA RWQCB (REGION 8)
Local Agency: RIVERSIDE COUNTY LOP
RB Case Number: 083303387T
LOC Case Number: 9914962
Contaminants of Concern: Gasoline
Quantity Released:
Media of Concern: Soil
Site History:
Leak Reported Date: 1999-03-08 00:00:00
Discovery:
Discharge Source: Other
No Further Action Date: 2015-02-10 00:00:00
Watershed Name: Santa Ana River - Middle Santa Ana River - Chino (Split) (801.21)
EnviroScreen Score: 71-75%
Military DOD Site: No
Distance From Center (Miles): 0.3491
Site Source: last updated 06-22-2023 from CA-SWRCB-GEOTRACKER

2

SHELL CLAY

6100

Global ID: T0606500542
Business Name: SHELL CLAY
Street Number: 6100
City: RIVERSIDE
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 2011-02-17 00:00:00
CUF Case: YES
Lead Agency: RIVERSIDE COUNTY LOP
Local Agency: RIVERSIDE COUNTY LOP
RB Case Number: 083303274T
LOC Case Number: 9814552
Contaminants of Concern: Gasoline
Quantity Released:
Media of Concern: Aquifer used for drinking water supply
Site History: ***Data prior to 2005 does not appear in GeoTracker. Consult agency files for all site data*** Site Description: The site is located on the southeast comer of Clay Street and Limonite Avenue in Riverside, California. The site is currently occupied by a Shell-branded station with three 10,000-gallon double-walled fiberglass underground storage tanks containing gasoline, six dispenser islands, a station building, and a car wash. Project Background: Unauthorized Release Report (URR) Filing Date: 1998 UST History (removed, replaced / dates): Piping Upgrades in 7/98 and 5/04. Release - Petroleum fuel hydrocarbons were detected during product piping upgrade activities in July 1998. Total petroleum hydrocarbons as gasoline (TPH-G), benzene, toluene, ethylbenzene, xylenes (BTEX), and methyl tertiary butyl ether (MTBE) were detected in samples collected from beneath the dispenser islands. During additional dispenser and piping upgrades in May 2004, samples were collected from beneath the petroleum fuel dispensers and product piping. Soil beneath the dispenser islands and product piping trench was excavated to a depth of approximately 5 feet. Benzene, MTBE and TBA were detected. Assessment Dates: 7/01 , 7/02, 10/03, 5/04, 1/06, 6/06-8/06, 1109, 5/09 RemediationlDates: 9/15/06 - 9/12/07,6125/09 - 12/9/09 Groundwater Monitoring: 2002 through Present Verification conducted: December/January 2008 and February 2010 Site Geology & Hydrogeology: Based on data from previous site assessments, soil to a depth of approximately 30 feet consists of predominantly fine to medium-grained silty sand with occasional layers of silt and clayey sand, and fine- to medium-grained sand (WPI, 2006). Groundwater was first measured in 2002 at depths ranging from13.99 feet to 19.57 feet. On September 2, 2009, depth to groundwater in the monitoring wells ranged from 16.14 feet (MW-8) to 19.86 feet (MW-7). The direction of groundwater flow was to the southwest (WPI, 2009). Remediation Method: Soil Vapor Extraction Date: 9/15/06 Date: 9/20/06 Date(s) Began: 9/15/06 & 6/25/09 Date(s) Ended: 9/12/07 & 12/9/09 Estimated Completion Date(s): N/A Treated Phase(s): Vapor Volume(s) Treated: 10,834 hours of operation Contaminant Mass Removed: 2,042 pounds ofTPH-G Remediation Method: Oxygen Injection Date(s) Began: 9/20/06 Date(s) Ended: 6/27/08 Treated Phase(s): Groundwater Volume(s) Treated: N/A Contaminant Mass Removed: N/ A Upon completion of remedial activities, confirmations soil borings GP-6 and GP-7 were drilled and sampled to confirm that the additional SVE efforts conducted in the area of SVE-3 and SVE-4 (or GP-I and GP-2) were effective. Analytical data from GP-6 and GP-7 was used to calculate the residual mass in soil. Based on the data, approximately 6.8 pounds of TPH-G and 0.0002 pounds of MTBE remain in soil. 12/2010 all wells destroyed 2/17/11 CASE CLOSED. RCDEH issued nfa letter.
Leak Reported Date: 1998-09-22 00:00:00
Discovery:
Discharge Source: Other
No Further Action Date: 2011-02-17 00:00:00
Watershed Name: Santa Ana River - Middle Santa Ana River - Chino (Split) (801.21)
EnviroScreen Score: 76-80%
Military DOD Site: No
Distance From Center (Miles): 0.2922
Site Source: last updated 06-22-2023 from CA-SWRCB-GEOTRACKER

3

SOUTHWEST PAINTING CORPORATION

6251 Baldwin Ave

Global ID: T0606500041
Business Name: SOUTHWEST PAINTING CORPORATION
Street Number: 6251 Baldwin Ave
City: PEDLEY
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 1989-04-04 00:00:00
CUF Case: NO
Lead Agency: RIVERSIDE COUNTY LOP
Local Agency: RIVERSIDE COUNTY LOP
RB Case Number: 083300383T
LOC Case Number:
Contaminants of Concern: Gasoline
Quantity Released:
Media of Concern: Soil
Site History:
Leak Reported Date: 1986-09-17 00:00:00
Discovery:
Discharge Source:
No Further Action Date: 1989-04-04 00:00:00
Watershed Name: Santa Ana River - Middle Santa Ana River - Chino (Split) (801.21)
EnviroScreen Score: 76-80%
Military DOD Site: No
Distance From Center (Miles): 0.0492
Site Source: last updated 06-22-2023 from CA-SWRCB-GEOTRACKER

4

TOSCO/ CIRCLE K STORE #5245

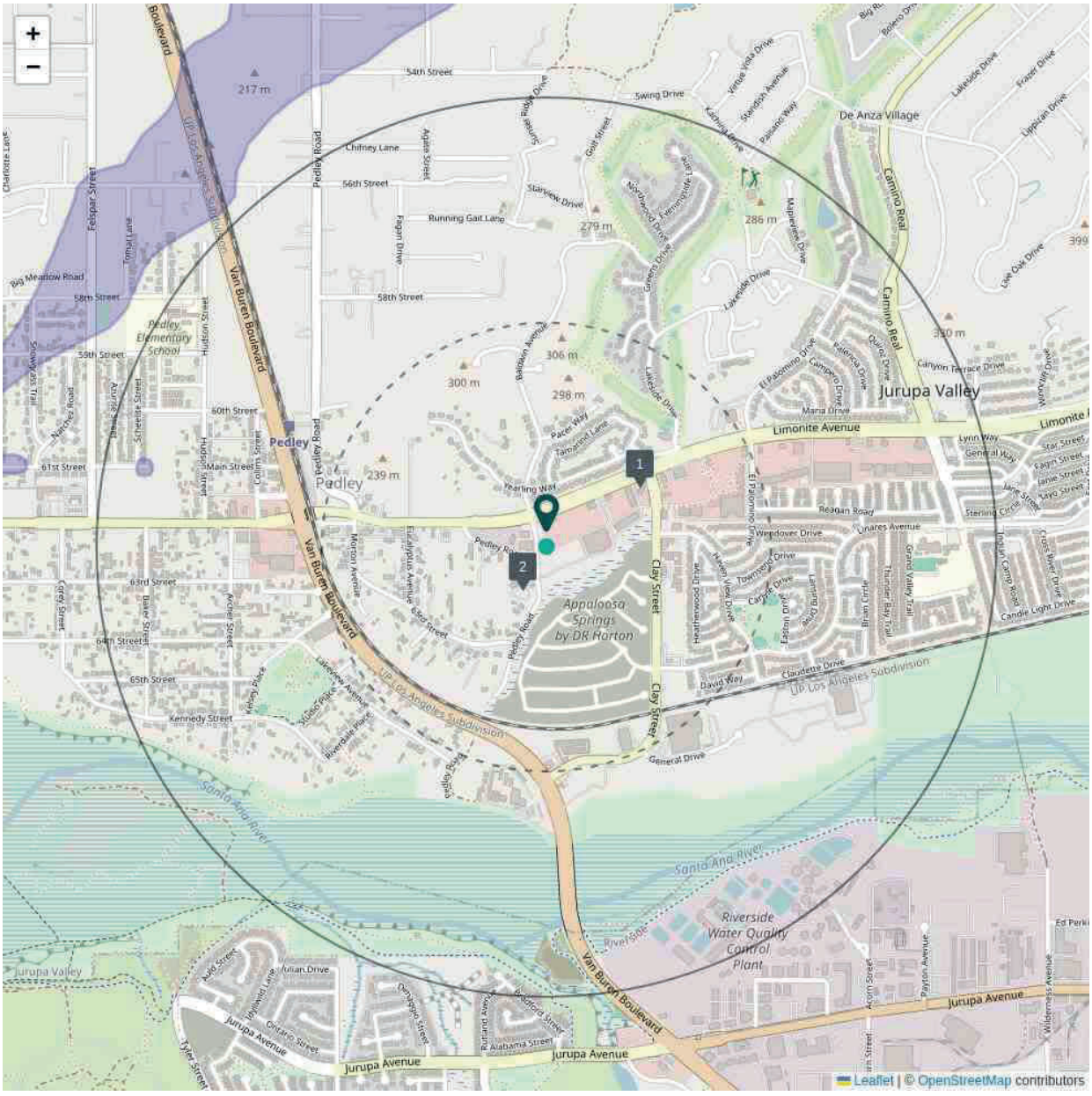
6105

Global ID: T0606500507
Business Name: TOSCO/ CIRCLE K STORE #5245
Street Number: 6105
City: RIVERSIDE
Case Type: LUST Cleanup Site
Status: Completed - Case Closed
Status Date: 2000-03-13 00:00:00
CUF Case: NO
Lead Agency: RIVERSIDE COUNTY LOP
Local Agency: RIVERSIDE COUNTY LOP
RB Case Number: 083303067T
LOC Case Number: 970924
Contaminants of Concern: Gasoline
Quantity Released:
Media of Concern: Aquifer used for drinking water supply
Site History:
Leak Reported Date: 1997-09-10 00:00:00
Discovery:
Discharge Source: Other
No Further Action Date: 2000-03-13 00:00:00
Watershed Name: Santa Ana River - Middle Santa Ana River - Chino (Split) (801.21)
EnviroScreen Score: 76-80%
Military DOD Site: No
Distance From Center (Miles): 0.2547
Site Source: last updated 06-22-2023 from CA-SWRCB-GEOTRACKER

Lists of state and tribal registered storage tanks

SWRCB - PERMITTED UNDERGROUND STORAGE TANK FACILITIES

An underground storage tank (UST) is defined by law as "any one or combination of tanks, including pipes connected thereto, that is used for the storage of hazardous substances and/or petroleum products and that is substantially or totally beneath the surface of the ground." The purpose of the UST Program is to protect the public health and safety, and the environment from releases of petroleum and other hazardous substances from USTs. This information was retrieved from the State Water Resources Control Board (SWRCB) GeoTracker database, and was searched to return all records regarding the target and/or subject properties.



center: 33.97475524049435,-117.46646404266357

0.5 Miles 1.0 Miles

1

Site Title Not Available

6445 Pedley Rd

CERS ID: 10737604
Facility ID: FA0014831
Business Name: Alcorn Fence Co
Address: 6445 Pedley Rd
City: Riverside
ZIP: 92509
County: Riverside
Permitting Agency: Riverside County Department of Environmental Health
Distance From Center (Miles): 0.1251
Site Source: last updated 02-09-2022 from CA-SWRCB-UST

2

Site Title Not Available

6105 Clay Street

CERS ID: 10176147
Facility ID: FA0015501
Business Name: Circle K Store #2705245
Address: 6105 Clay Street
City: Pedley
ZIP: 92509
County: Riverside
Permitting Agency: Riverside County Department of Environmental Health
Distance From Center (Miles): 0.2413
Site Source: last updated 02-09-2022 from CA-SWRCB-UST

State and tribal institutional control/engineering control registries

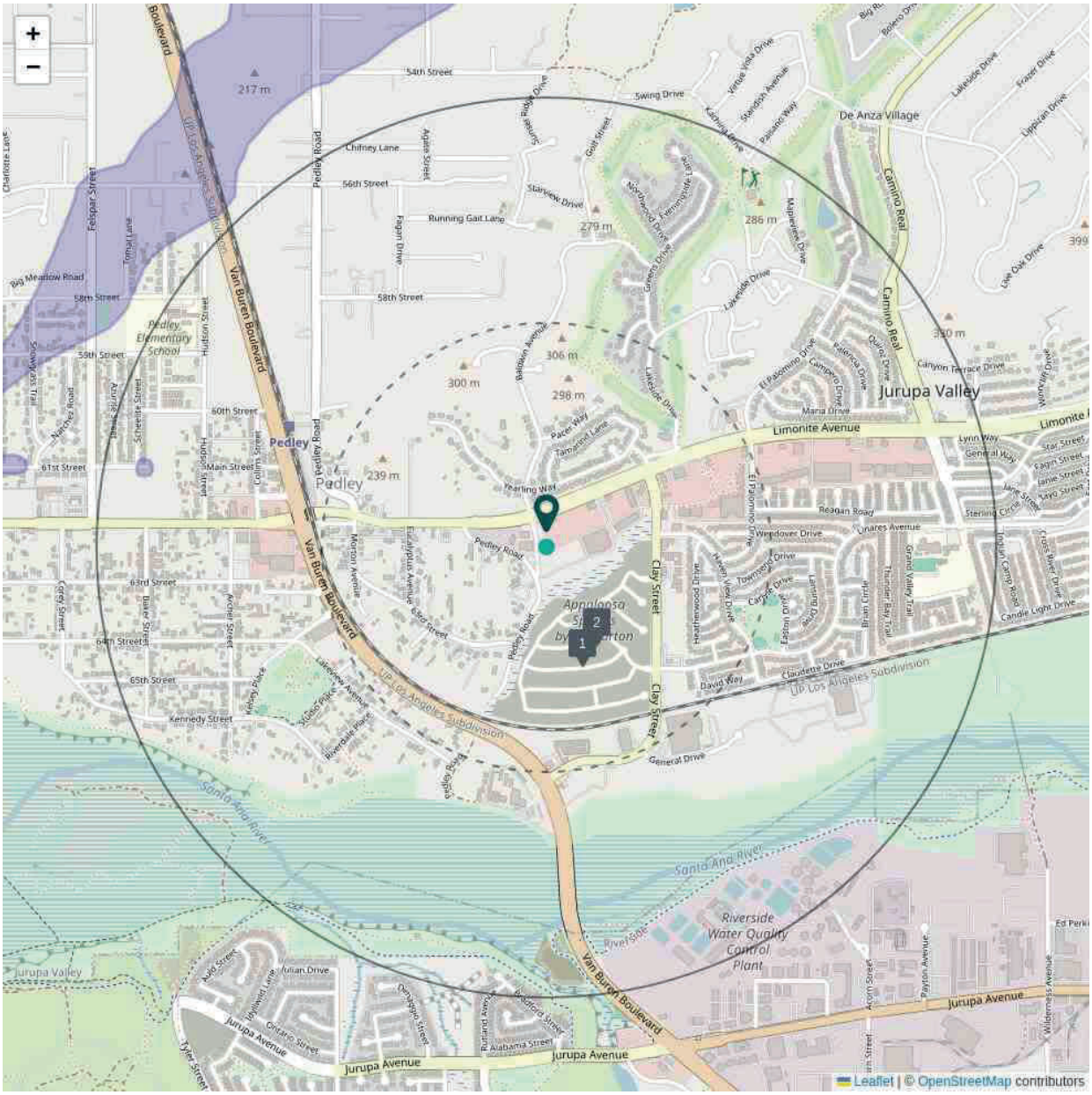
Institutional controls are non-engineered instruments such as administrative and legal controls that help minimize the potential for human exposure to contamination and/or protect the integrity of the remedy. Engineering controls consist of engineering measures (e.g, caps, treatment systems, etc.) designed to minimize the potential for human exposure to contamination by either limiting direct contact with contaminated areas or controlling migration of contaminants through environmental media. It is EPA's expectation that treatment or engineering controls will be used to address principal threat wastes and that groundwater will be returned to its beneficial use whenever practicable.

There were no State and/or tribal institutional and/or engineering controls found filed against the target property.

Lists of state and tribal voluntary cleanup sites

SWRCB - SITE CLEANUP PROGRAM

The Site Cleanup Program (SCP) regulates the investigation and cleanup of 'non-federally owned' sites where recent or historical unauthorized releases of pollutants to the environment, including soil, groundwater, surface water, and sediment, have occurred. Sites in the program are varied and include, but are not limited to, pesticide and fertilizer facilities, rail yards, ports, equipment supply facilities, metals facilities, industrial manufacturing and maintenance sites, dry cleaners, bulk transfer facilities, refineries, and some brownfields. These releases are generally not strictly from petroleum underground storage tanks (USTs). There are five main types of funding for sites in the SCP: (1) voluntary cleanups executed and funded by the discharger, (2) "Cleanup and Abatement Order" cleanups executed and funded by the discharger, (3) cleanups executed by the Regional Board or another public agency, county, municipality, or city and funded by the State via the Cleanup and Abatement Account (CAA), (4) Site Cleanup Subaccount Program (SCAP), and (5) brownfield cleanup using available grants and loans. This information was retrieved from the SWRCB's GeoTracker database, and was searched to return all records within a half-mile of the target property.



center: 33.97475524049435,-117.46646404266357

0.5 Miles 1.0 Miles

1

Site Title Not Available

6501 CLAY STREET

Project Name: US PIPE AND FOUNDRY COMPANY
Address: 6501 CLAY STREET
City: RIVERSIDE
ZIP: 92509
Site Type: Historical
Site Type Details: * Historical
Acres:
APN: NONE SPECIFIED
Present on NPL:
Regulatory Agencies Involved: NONE SPECIFIED
Lead Agency: NONE SPECIFIED
Project Manager:
EnviroStor ID: 33330021.0
Site Code:
Special Program: * RCRA 3012 - Past Haz Waste Disp Inven Site
Status: Refer: RWQCB
Status Date: 1994-10-25 00:00:00
Past Uses: NONE SPECIFIED
Media Affected: NONE SPECIFIED
Restricted Use: NO
Site Management Required: NONE SPECIFIED
Funding:
Potential COC:
Confirmed COC: * HOUSEHOLD WASTES
Distance From Center (Miles): 0.2777
Site Source: last updated 02-08-2022 from CA-DTSC-CLEAN

2

6501 Clay St

6501

Global ID: T10000010423
Business Name: 6501 Clay St
Street Number: 6501
City: Jurupa Valley
Case Type: Cleanup Program Site
Status: Open - Site Assessment
Status Date: 2017-05-26 00:00:00
CUF Case: NO
Lead Agency: RIVERSIDE COUNTY LOP
Local Agency: RIVERSIDE COUNTY LOP
RB Case Number:
LOC Case Number: SR0036295
Contaminants of Concern:
Quantity Released:
Media of Concern: Soil, Under Investigation
Site History:
Leak Reported Date: 2016-10-25 00:00:00
Discovery: Phase II ESA
Discharge Source:
No Further Action Date:
Watershed Name: Santa Ana River - Middle Santa Ana River - Chino (Split) (801.21)
EnviroScreen Score: 66-70%
Military DOD Site: No
Distance From Center (Miles): 0.2457
Site Source: last updated 06-22-2023 from CA-SWRCB-GEOTRACKER

Lists of state and tribal brownfields sites

Since its inception in 1995, EPA's Brownfields and Land Revitalization Program has grown into a proven, results-oriented program that has changed the way communities address and manage contaminated property. The program is designed to empower states, tribes, communities, and other stakeholders to work together to prevent, assess, safely clean up, and sustainably reuse brownfields. Beginning in the mid-1990s, EPA provided small amounts of seed money to local governments that launched hundreds of two-year Brownfields pilot projects and developed guidance and tools to help states, communities and other stakeholders in the cleanup and redevelopment of brownfields sites.

There were no State and/or tribal brownfields sites found within a half-mile radius of the target property.

State and/or tribal lists of sites requiring further investigation / remediation

No records found

State list of Significant Environmental Hazards (SEH)

No records found

Lists of state and tribal mine sites requiring further investigation and/or remediation

No records found

State and/or tribal lists of spills and spill responses

No records found

State and/or tribal lists of emergency responses

No records found

State and/or tribal lists of dry cleaners

No records found

State and/or tribal lists of clandestine laboratory cleanups

No records found

State and/or tribal lists of scrap/used tire processing facilities

No records found

State and/or tribal lists of underground injection control sites

No records found

State and/or tribal listings of permitted drywells

No state and/or tribal permitted drywells were found within a half-mile radius of the target property.

Automobile salvage yards

No records found

Livestock Waste Control sites

No records found

Controlled Animal Feeding Operations (CAFOs)

No records found

State and/or tribal lists of registered aboveground storage tanks (ASTs)

No records found

C.A.A. Permitted Facilities

No records found

NPDES Permitted Facilities

No records found

Onsite Wastewater Treatment sites

No records found

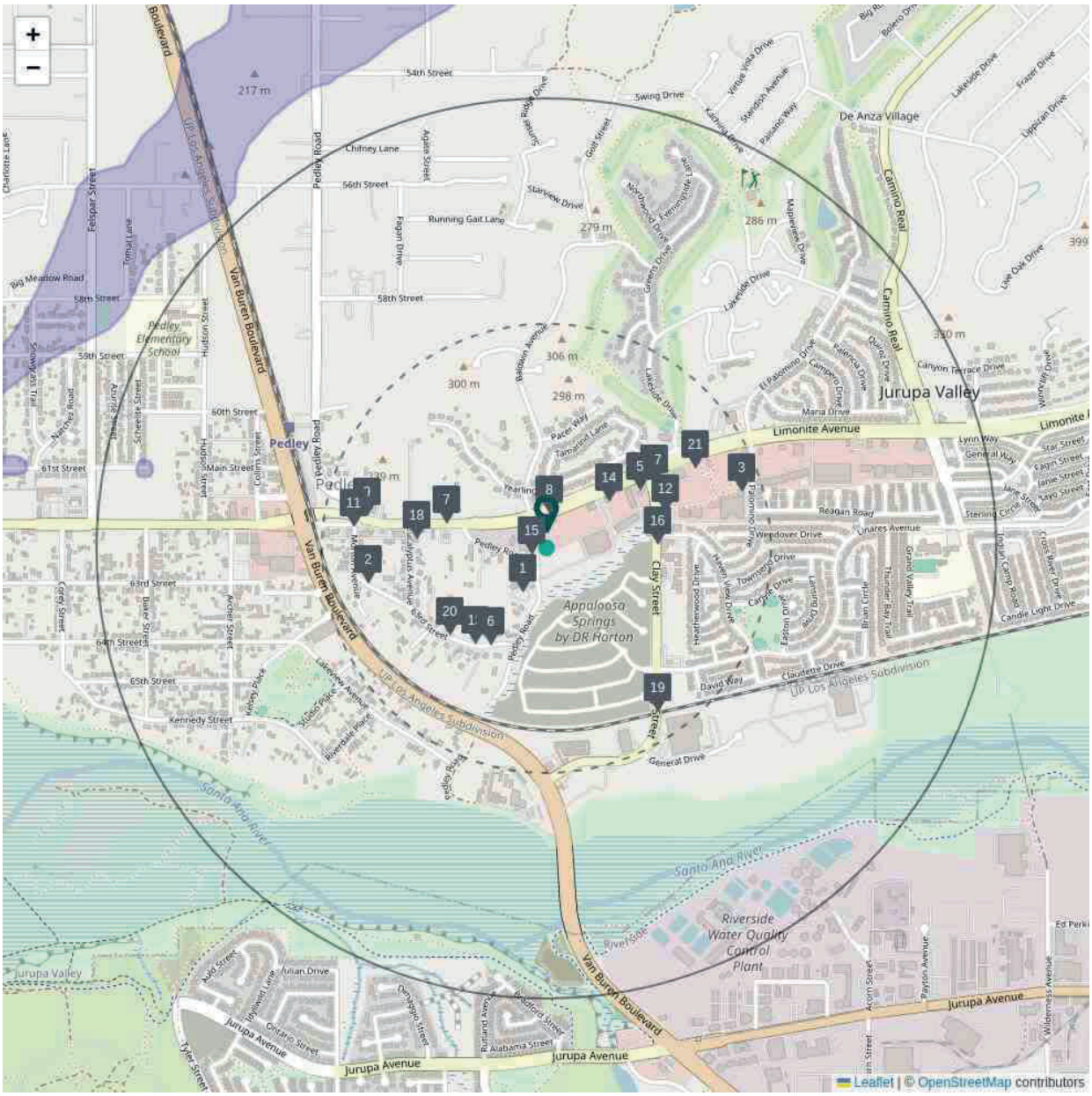
State and/or tribal lists of permitted facilities

No State and/or tribal permitted facilities found within a half-mile of the target property.

Resource Conservation and Recovery Act Information (RCRAInfo)

RESOURCE CONSERVATION AND RECOVERY ACT INFORMATION SYSTEM

RCRAInfo is EPA's comprehensive information system that supports the Resource Conservation and Recovery Act (RCRA) of 1976 and the Hazardous and Solid Waste Amendments (HSWA) of 1984 through the tracking of events and activities related to facilities that generate, transport, and treat, store, or dispose of hazardous waste.
Please note that RCRAInfo contains all hazardous waste handlers in addition to TSDFs, generators, and facilities undergoing RCRA corrective action. One may encounter duplicate records from the TSDF, generators, and/or the RCRA corrective action sections. This source was searched for all records within a half-mile of the target property.



center: 33.97475524049435,-117.46646404266357

0.5 Miles 1.0 Miles

1

ALCORN FENCE COMPANY

6445 PEDLEY RD

Registry ID: 110066131572
Name: ALCORN FENCE COMPANY
Address: 6445 PEDLEY RD
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: CA-ENVIROVIEW:4093, RCRAINFO:CAL000143610
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES, STATE MASTER
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 14-OCT-15
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.1251
Site Source: last updated from FACILITY REGISTRY SERVICE

2

ARTISTIC MAINTENANCE INC

8675 63RD ST

Registry ID: 110070469316
Name: ARTISTIC MAINTENANCE INC
Address: 8675 63RD ST
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000323779
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 02-JAN-19
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.4084
Site Source: last updated from FACILITY REGISTRY SERVICE

3

BIG 5 SPORTING GOODS #493

8052 LIMONITE AVE STE 102

Registry ID: 110070424131
Name: BIG 5 SPORTING GOODS #493
Address: 8052 LIMONITE AVE STE 102
City: JURUPA VALLEY
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000410458
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 31-DEC-18
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.4489
Site Source: last updated from FACILITY REGISTRY SERVICE

4

CAL STEEL PRESSURE PIPE

6501 CLAY ST

Registry ID: 110009533022
Name: CAL STEEL PRESSURE PIPE
Address: 6501 CLAY ST
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAD980636740
Interest Type: SQG
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 01-MAR-00
Date Updated: 26-JAN-12
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.4373
Site Source: last updated from FACILITY REGISTRY SERVICE

5

CIRCLE K STORES INC 2705245

6105 CLAY ST

Registry ID: 110055675933
Name: CIRCLE K STORES INC 2705245
Address: 6105 CLAY ST
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: CA-CERS:10176147, CA-ENVIROVIEW:19132, RCRAINFO:CAL000278581
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES, STATE MASTER
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 15-SEP-13
Date Updated: 14-OCT-15
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.2409
Site Source: last updated from FACILITY REGISTRY SERVICE

6

CRAFTSMAN LATH AND PLASTER INC

8325 63RD ST

Registry ID: 110070513800
Name: CRAFTSMAN LATH AND PLASTER INC
Address: 8325 63RD ST
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000440993
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 21-FEB-19
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.2505
Site Source: last updated from FACILITY REGISTRY SERVICE

7

DE ANZA CONTRACTORS INC

8550 LIMONITE AVE

Registry ID: 110070469436
Name: DE ANZA CONTRACTORS INC
Address: 8550 LIMONITE AVE
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000311544
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 02-JAN-19
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.2312
Site Source: last updated from FACILITY REGISTRY SERVICE

8

FIRESTONE COMPLETE AUTO CARE # 71E3

8360 LIMONITE AVENUE

Registry ID: 110038216524
Name: FIRESTONE COMPLETE AUTO CARE # 71E3
Address: 8360 LIMONITE AVENUE
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: CA-ENVIROVIEW:30390, RCRAINFO:CAL000330089, UORS:33-C-08558
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES, STATE MASTER
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 22-APR-09
Date Updated: 13-OCT-15
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.0764
Site Source: last updated from FACILITY REGISTRY SERVICE

9

G & M OIL #129

8677 LIMONITE AVE

Registry ID: 110070539640
Name: G & M OIL #129
Address: 8677 LIMONITE AVE
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000442862
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 19-APR-19
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.4087
Site Source: last updated from FACILITY REGISTRY SERVICE

10

MOSTAMAND INC DBA MOSTAMAND SHELL

6100 CLAY ST

Registry ID: 110070469740
Name: MOSTAMAND INC DBA MOSTAMAND SHELL
Address: 6100 CLAY ST
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000320570
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 02-JAN-19
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.2775
Site Source: last updated from FACILITY REGISTRY SERVICE

11

O'REILLY AUTO PARTS #2682

8702 LIMONITE CT

Registry ID: 110070413504
Name: O'REILLY AUTO PARTS #2682
Address: 8702 LIMONITE CT
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000392477
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 31-DEC-18
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.4352
Site Source: last updated from FACILITY REGISTRY SERVICE

12

PETERS & PETERS D.D.S.

6180 CLAY ST.

Registry ID: 110070448138
Name: PETERS & PETERS D.D.S.
Address: 6180 CLAY ST.
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000159545
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 02-JAN-19
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.2726
Site Source: last updated from FACILITY REGISTRY SERVICE

13

PINNACLE PLASTERING INC

8347 63RD ST

Registry ID: 110070476719
Name: PINNACLE PLASTERING INC
Address: 8347 63RD ST
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000349328
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 02-JAN-19
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.269
Site Source: last updated from FACILITY REGISTRY SERVICE

14

PLAZA CLEANERS

8304 LIMONITE AVE STE.G

Registry ID: 110066483898
Name: PLAZA CLEANERS
Address: 8304 LIMONITE AVE STE.G
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: CA-ENVIROVIEW:144152, RCRAINFO:CAL000428479
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES, STATE MASTER
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 14-OCT-15
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.1698
Site Source: last updated from FACILITY REGISTRY SERVICE

15

RIVERSIDE MACHINE WORKS INC

6301 BALDWIN AVE

Registry ID: 110066666085
Name: RIVERSIDE MACHINE WORKS INC
Address: 6301 BALDWIN AVE
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: CA-ENVIROVIEW:148362, NPDES:CAZ502218, RCRAINFO:CAL000048869
Interest Type: ICIS-NPDES NON-MAJOR, OTHER HAZARDOUS WASTE ACTIVITIES, STATE MASTER, STORM WATER INDUSTRIAL
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 14-OCT-15
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.0388
Site Source: last updated from FACILITY REGISTRY SERVICE

16

RIVERSIDE MEDICAL CLINIC

6250 CLAY ST

Registry ID: 110002935021
Name: RIVERSIDE MEDICAL CLINIC
Address: 6250 CLAY ST
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: HWTS-DATAMART:CAR000070102, RCRAINFO:CAL000143889, RCRAINFO:CAL000445401, RCRAINFO:CAR000070102
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES, SQG, STATE MASTER, UNSPECIFIED UNIVERSE
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 01-MAR-00
Date Updated: 26-JAN-12
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.2438
Site Source: last updated from FACILITY REGISTRY SERVICE

17

SHELL SERVICE STATION

6100 CLAY

Registry ID: 110012546414
Name: SHELL SERVICE STATION
Address: 6100 CLAY
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: HWTS-DATAMART:CAR000115816, RCRAINFO:CAR000115816
Interest Type: STATE MASTER, UNSPECIFIED UNIVERSE
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 29-AUG-02
Date Updated: 26-JAN-12
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.276
Site Source: last updated from FACILITY REGISTRY SERVICE

18

ULTIMATE PERFORMANCE

8584 LIMONITE AVE

Registry ID: 110070453218
Name: ULTIMATE PERFORMANCE
Address: 8584 LIMONITE AVE
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000209361
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 02-JAN-19
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.2939
Site Source: last updated from FACILITY REGISTRY SERVICE

19

UNITED CONCRETE PIPE CORP

6501 CLAY ST.

Registry ID: 110002144590
Name: UNITED CONCRETE PIPE CORP
Address: 6501 CLAY ST.
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAD982336877, TRIS:92509NTDCN6501C
Interest Type: TRI REPORTER, UNSPECIFIED UNIVERSE
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 01-MAR-00
Date Updated: 31-DEC-15
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.4373
Site Source: last updated from FACILITY REGISTRY SERVICE

20

VERDIN CONCRETE INC

8413 63RD ST

Registry ID: 110070490140
Name: VERDIN CONCRETE INC
Address: 8413 63RD ST
City: JURUPA VALLEY
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAL000440656
Interest Type: OTHER HAZARDOUS WASTE ACTIVITIES
Point of Reference Description: ENTRANCE POINT OF A FACILITY OR STATION
Date Created: 03-JAN-19
Date Updated:
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.2932
Site Source: last updated from FACILITY REGISTRY SERVICE

21

WALGREENS #2712

8044 LIMONITE AVE

Registry ID: 110055726308
Name: WALGREENS #2712
Address: 8044 LIMONITE AVE
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: BR:CAL000323656, BR:CAR000320093, CA-CERS:10324387, CA-ENVIROVIEW:169935, RCRAINFO:CAL000323656, RCRAINFO:CAR000320093
Interest Type: HAZARDOUS WASTE BIENNIAL REPORTER, STATE MASTER, VSQG
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 15-SEP-13
Date Updated: 14-OCT-15
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.3724
Site Source: last updated from FACILITY REGISTRY SERVICE

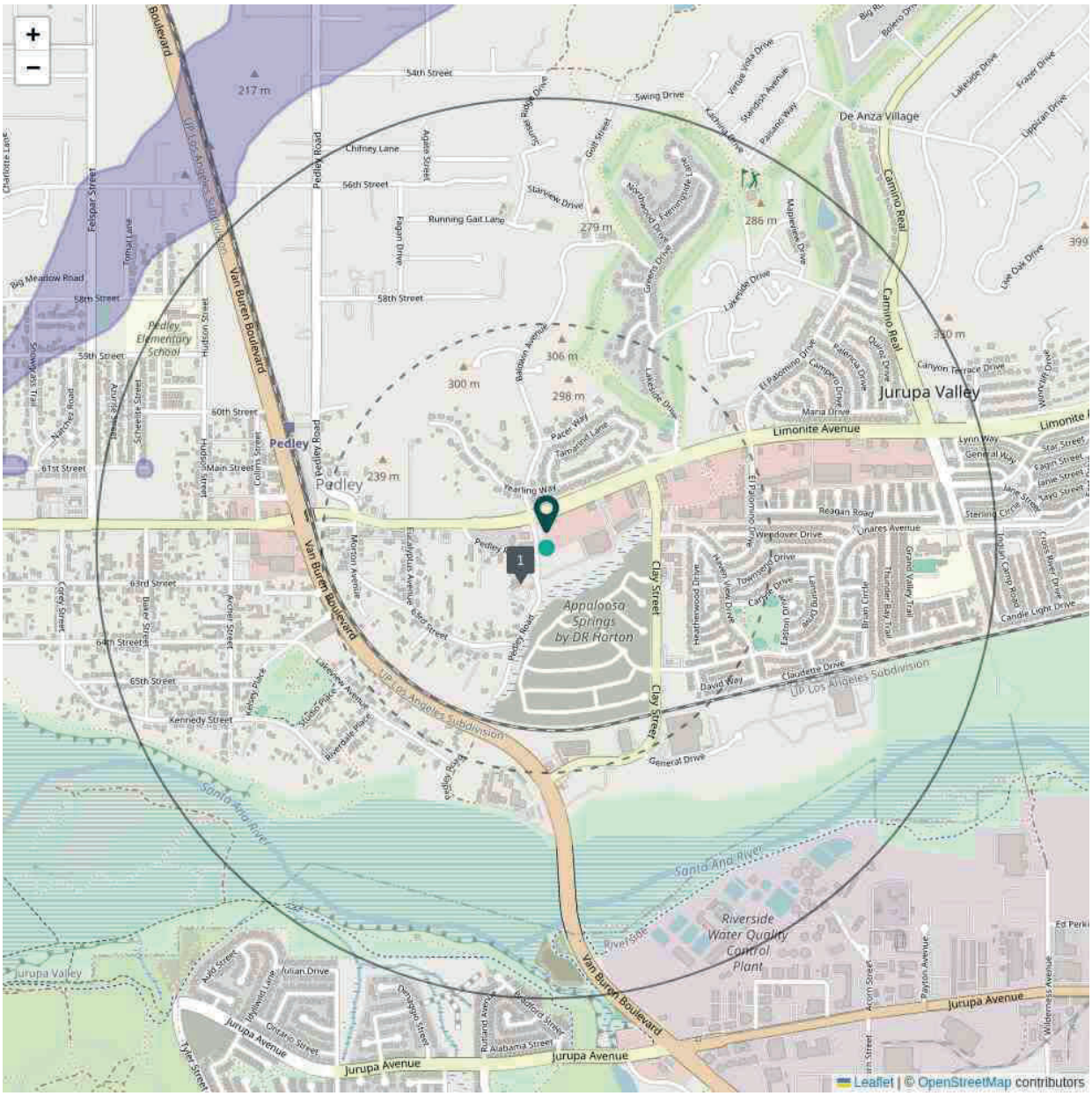
U.S. EPA Enforcement, Compliance History Online (ECHO)

No records found

U.S. EPA Underground Storage Tanks (UST)

EPA - UNDERGROUND STORAGE TANKS

Approximately 542,000 underground storage tanks (USTs) nationwide store petroleum or hazardous substances. The greatest potential threat from a leaking UST is contamination of groundwater, the source of drinking water for nearly half of all Americans. EPA, states, territories, and tribes work in partnership with industry to protect the environment and human health from potential releases. EPA developed UST Finder, a mapping application containing a comprehensive, state-sourced national map of UST and leaking UST data. It provides attributes and locations of active and closed USTs, UST facilities, and LUST sites from states as of 2018-2019 and from Tribal lands and US territories as of 2020-2021. This data set was searched to return all records regarding the target and/or adjoining properties.



center: 33.97475524049435,-117.46646404266357

0.5 Miles 1.0 Miles

1

Riverside Branch

6445 Old Pedley Rd

Facility ID: CA10737604
Name: Riverside Branch
Address: 6445 Old Pedley Rd
City: Jurupa Valley
County:
State: California
ZIP Code: 92509
Latitude: 33.9735669987153
Longitude: -117.467552990405
Open USTs: 1
Closed USTs:
Temporarily Out of Service USTs:
Facility Status: Open UST(s)
Land Use: Developed, Low Intensity
Population Within 1,500ft: 239
Private Wells Within 1,500ft: 0
Within Source Water Protection Area (SPA):
SPA Public Water System & Facility ID:
WHPA Public Water System & Facility ID:
Within Groundwater Wellhead Protection Area (WHPA):
Within 100-Year Floodplain: No
SPA Water Type:
SPA Facility Type:
Distance From Center (Miles): 0.1251
Site Source: last updated 11-18-2020 from USEPA-UST

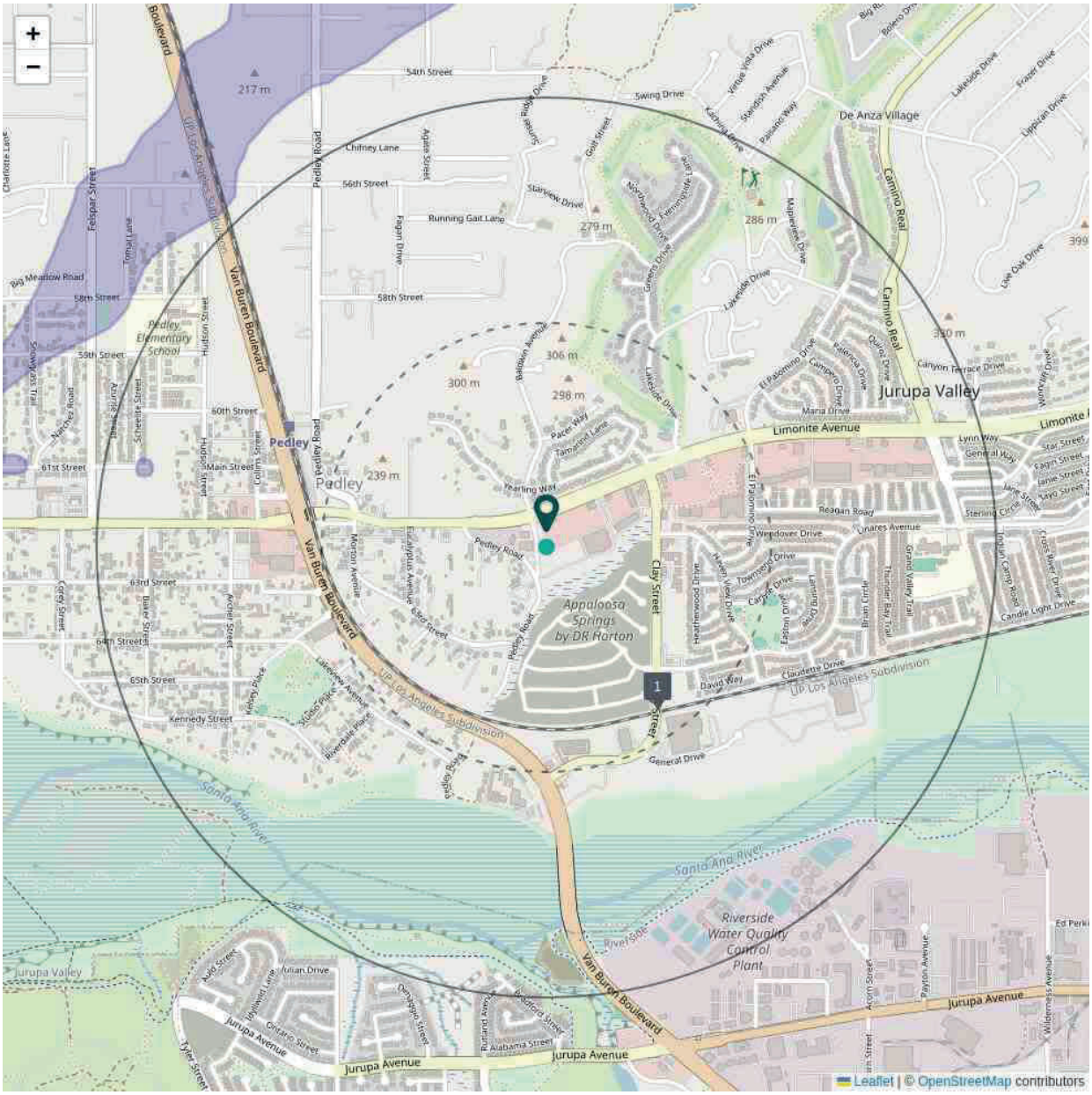
U.S. EPA Toxic Substances Control Act (TSCA) database

No records found

U.S. EPA Toxic Release Inventory System (TRIS)

TOXICS RELEASE INVENTORY SYSTEM

TRIS is a publicly available EPA database reported annually by certain covered industry groups, as well as federal facilities. It contains information about more than 650 toxic chemicals that are being used, manufactured, treated, transported, or released into the environment, and includes information about waste management and pollution prevention activities.



center: 33.97475524049435,-117.46646404266357

0.5 Miles 1.0 Miles

1

UNITED CONCRETE PIPE CORP

6501 CLAY ST.

Registry ID: 110002144590
Name: UNITED CONCRETE PIPE CORP
Address: 6501 CLAY ST.
City: RIVERSIDE
Site Type: STATIONARY
Program Acronyms: RCRAINFO:CAD982336877, TRIS:92509NTDCN6501C
Interest Type: TRI REPORTER, UNSPECIFIED UNIVERSE
Point of Reference Description: CENTER OF A FACILITY OR STATION
Date Created: 01-MAR-00
Date Updated: 31-DEC-15
FRS Facility Detail Report URL: Link
Distance From Center (Miles): 0.4373
Site Source: last updated from FACILITY REGISTRY SERVICE

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Site Infiltration Rates are below 1.6" per hour, therefore infiltration is infeasible.

Infiltration Boring	Depth (ft.)	Infiltration Rate (in/hr)*
I-1	5	0.12
I-2	5	0.45

*Porchet Method calculated unfactored infiltration rate.

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	Adkan Engineers	Date	9/24/2025
Designed by	JOSE CONTRERAS	Case No	
Company Project Number/Name	TTM 39105		

BMP Identification

BMP NAME / ID: BIO RETETNION

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)*
D2.1	*97785*	*Roofs*	*1*	*0.89*	*87224.2*			
D2.2	*17257*	*Ornamental Landscaping*	*0.1*	*0.11*	*1906.2*			
D2.3	*94984*	*Concrete or Asphalt*	*1*	*0.89*	*84725.7*			
D2.4	*24185*	*Ornamental Landscaping*	*0.1*	*0.11*	*2671.4*			
	234211	***Total***			**176527.5**	**0.65**	***9561.9***	***22689***

Notes:

Bioretention Facility - Design Procedure	BMP ID: BIO	Legend:	Required Entries / Calculated Cells

Company Name:	Adkan Engineers	Date:	9/24/2025
Designed by:	JOSE CONTRERAS	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	5.376	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	9,562	ft^3

Type of Bioretention Facility Design

- ○ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◉ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	3.0	ft
Top Width of Bioretention Facility, excluding curb	w_T =	50.0	ft
Total Effective Depth, d_E			
$d_E = [(0.3) \times d_S + (0.4) \times 1] + 0.5$	d_E =	1.80	ft
Minimum Surface Area, A_m			
$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$	A_M =	5,313	ft^2
Proposed Surface Area	A=	6,009	ft^2
Minimum Required Length of Bioretention Facility, L	L =	106.3	ft

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		1	%
6" Check Dam Spacing		25	feet
Describe Vegetation:			

Notes:

BMP MAP
TRACT 39105– RESIDENTIAL

LANDSCAPE & BIO-RETENTION IRRIGATION AND MAINTENANCE

- BMP VEGETATION (RED FESCUE) PER LANDSCAPING PLAN, (PEN21-196)
- REFER TO CASOA TC-32 FOR COMPLETE MAINTENANCE REQUIREMENTS
- BIO-RETENTION TO BE IRRIGATED DURING DRY PERIODS
- IRRIGATION DETAILS AND INSTALLATION PER APPROVED LANDSCAPING PLAN (PEN21-196)
- REQUIRED BIO-RETENTION VEGETATION TO COMPLY WITH CITY OF MORENO VALLEY STORM WATER GROUP APPROVED LIST.

BIORETENTION UNDERDRAIN SYSTEM

- A LONGITUDINAL 6 INCH PERFORATED PIPE PLACE IS RECOMMENDED FOR THIS BMP SYSTEM.
- OTHER ACCEPTABLE UNDERDRAIN SYSTEM PER LID BMP GUIDELINES CONSIST OF A SINGLE NONPERFORATED 6 INCH MAIN COLLECTOR PIPE WITH 6 INCH PERFORATED FEEDER PIPES PLACE 5 FEET APART.

ENGINEERED SOIL MEDIA REQUIREMENTS

THE ENGINEERED SOIL MEDIA SHALL BE COMPRISED OF 85 PERCENT MINERAL COMPONENT AND 15 PERCENT ORGANIC COMPONENT, BY VOLUME, DRUM MIXED PRIOR TO PLACEMEN. THE MINERAL COMPONENT SHALL BE CLASS A SANDY LOAM TOPSOIL THAT MEETS THE RANGE SPECIFIED IN TABLE 1 BELOW. THE ORGANIC COMPONENT SHALL BE NITROGEN STABILIZED COMPOST, SUCH THAT NITROGEN DOES NOT LEACH FROM THE MEDIA.

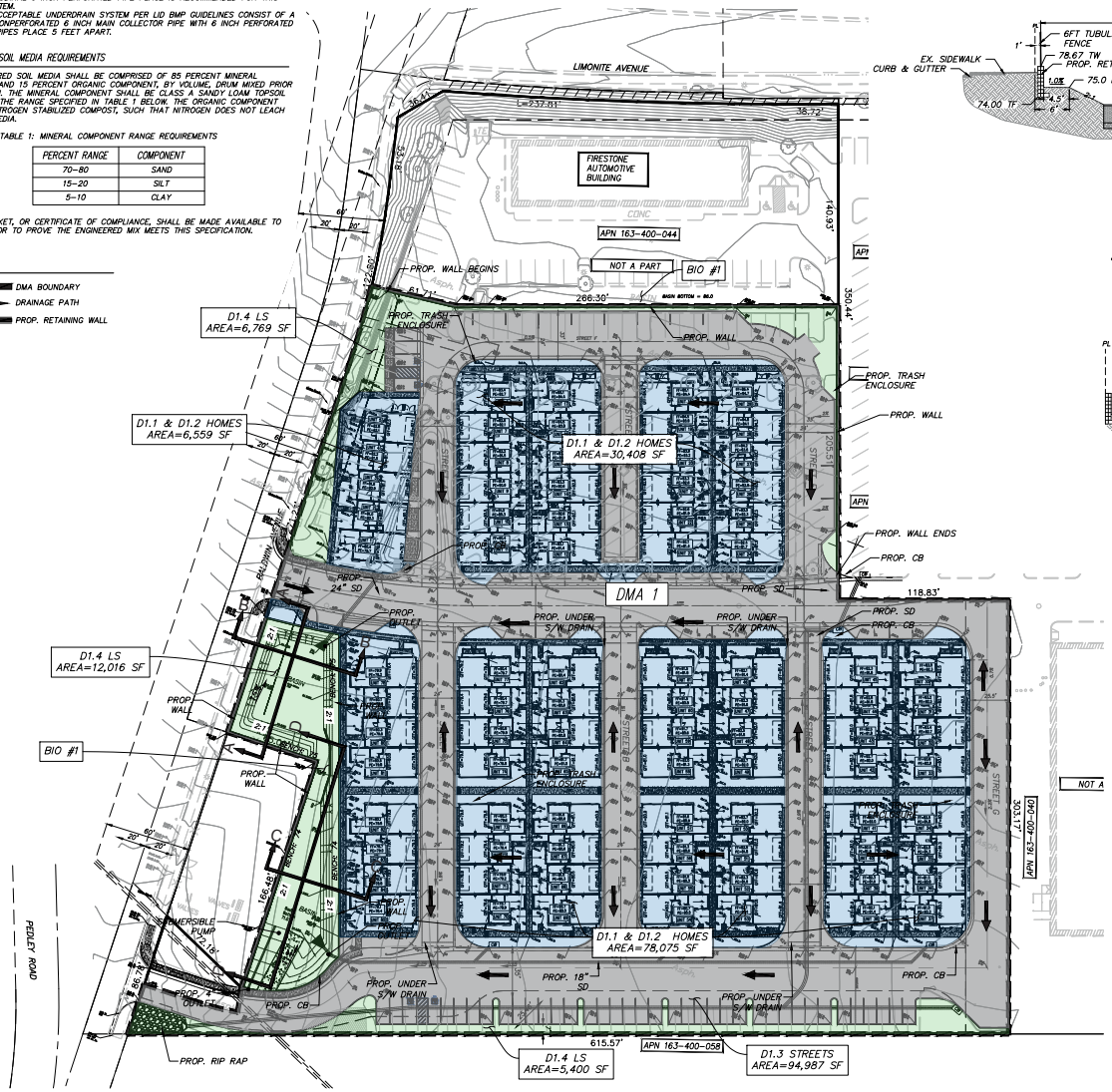
TABLE 1: MINERAL COMPONENT RANGE REQUIREMENTS

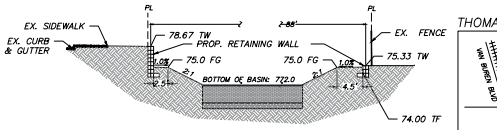
PERCENT RANGE	COMPONENT
70–80	SAND
15–20	SILT
5–10	CLAY

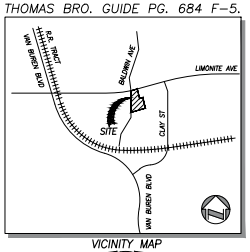
THE TRIP TICKET, OR CERTIFICATE OF COMPLIANCE, SHALL BE MADE AVAILABLE TO THE INSPECTOR TO PROVE THE ENGINEERED MIX MEETS THIS SPECIFICATION.

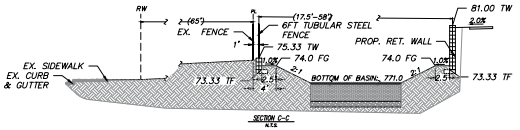
LEGEND

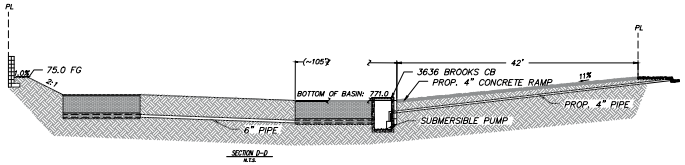
DMA BOUNDARY
DRAINAGE PATH
PROP. RETAINING WALL

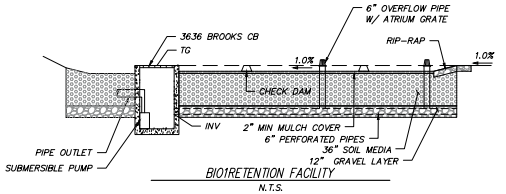












STORM DRAIN STENCIL

DMA 1				
DMA	DMA CLASSIFICATION	NAME	SURFACE TYPE	AREA (SF)
1.1	D	HOMES 85% IMPERVIOUS	ROOF /HARDSCAPE	97,785
1.2	D	HOMES 15% PERVIOUS	LANDSCAPE	17,257
1.3	D	STREETS	ASPHALT/CONCRETE	94,984
1.4	D	LANDSCAPE	ORNAMENTAL LANDSCAPING	24,185
TOTAL				234,211

TOTAL IMPERVIOUS SURFACE AREA = 192,769 SF = 4.425 AC
TOTAL PERVIOUS SURFACE AREA = 41,442 SF = 0.951 AC
TOTAL PROJECT SURFACE AREA = 234,211 SF = 5.376 AC

OWNER/APPLICANT
RC HOBBS COMPANY
1428 E. CHAPMAN AVE
ORANGE, CA 92866
TEL (714) 633-8100

SOILS ENGINEER
GEOTEK, INC.
1548 N MAPLE STREET
CORONA, CA 92878
REPORT PROJECT NO. 3925-CR
DATED: JUNE 25, 2024

BMP MAP
TRACT 39105
RESIDENTIAL
PREPARATION DATE : DECEMBER 2024
REVISION DATE : SEPTEMBER 2025

PLAN PREPARED BY:
adkan ENGINEERS
Civil Engineering • Surveying • Planning
6879 Airport Drive, Riverside, CA 92504
Tel:(951) 688-0241 • Fax:(951) 688-0599

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern

```
        U n i t   H y d r o g r a p h    A n a l y s i s

        Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
                Study date  09/22/25 File: EX12242.out

++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
------------------------------------------------------------------------------

Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 5006

------------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



------------------------------------------------------------------------
------------------------------------------------------------------------
Drainage Area =       5.85(Ac.)  =      0.009 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       5.85(Ac.)  =      0.009 Sq. Mi.
Length along longest watercourse =     707.00(Ft.)
Length along longest watercourse measured to centroid =     354.00(Ft.)
Length along longest watercourse =      0.134 Mi.
Length along longest watercourse measured to centroid =      0.067 Mi.
Difference in elevation =      12.50(Ft.)
Slope along watercourse =     93.3522 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.025 Hr.
Lag time =     1.52 Min.
25% of lag time =     0.38 Min.
40% of lag time =     0.61 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        5.85            1.85                 10.82

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        5.85            4.59                 26.85

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    1.850(In)
Area Averaged 100-Year Rainfall =    4.590(In)

Point rain (area averaged) =    1.850(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    1.850(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     5.850           75.00          0.500
 Total Area Entered =      5.85(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  57.0      0.501     0.500        0.275       1.000      0.275
                                                 Sum (F) =   0.275
Area averaged mean soil loss (F) (In/Hr) =  0.275
Minimum soil loss rate ((In/Hr)) =  0.138
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.500
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                      VALLEY S-Curve
------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %           (CFS)
```

1	0.083	328.580	59.435	3.504
2	0.167	657.160	35.611	2.100
3	0.250	985.740	4.954	0.292
			Sum = 100.000 Sum=	5.896

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.015	(0.488)	0.007	0.007
2	0.17	0.07	0.015	(0.486)	0.007	0.007
3	0.25	0.07	0.015	(0.484)	0.007	0.007
4	0.33	0.10	0.022	(0.482)	0.011	0.011
5	0.42	0.10	0.022	(0.481)	0.011	0.011
6	0.50	0.10	0.022	(0.479)	0.011	0.011
7	0.58	0.10	0.022	(0.477)	0.011	0.011
8	0.67	0.10	0.022	(0.475)	0.011	0.011
9	0.75	0.10	0.022	(0.473)	0.011	0.011
10	0.83	0.13	0.030	(0.471)	0.015	0.015
11	0.92	0.13	0.030	(0.469)	0.015	0.015
12	1.00	0.13	0.030	(0.468)	0.015	0.015
13	1.08	0.10	0.022	(0.466)	0.011	0.011
14	1.17	0.10	0.022	(0.464)	0.011	0.011
15	1.25	0.10	0.022	(0.462)	0.011	0.011
16	1.33	0.10	0.022	(0.460)	0.011	0.011
17	1.42	0.10	0.022	(0.458)	0.011	0.011
18	1.50	0.10	0.022	(0.456)	0.011	0.011
19	1.58	0.10	0.022	(0.455)	0.011	0.011
20	1.67	0.10	0.022	(0.453)	0.011	0.011
21	1.75	0.10	0.022	(0.451)	0.011	0.011
22	1.83	0.13	0.030	(0.449)	0.015	0.015
23	1.92	0.13	0.030	(0.447)	0.015	0.015
24	2.00	0.13	0.030	(0.446)	0.015	0.015
25	2.08	0.13	0.030	(0.444)	0.015	0.015
26	2.17	0.13	0.030	(0.442)	0.015	0.015
27	2.25	0.13	0.030	(0.440)	0.015	0.015
28	2.33	0.13	0.030	(0.438)	0.015	0.015
29	2.42	0.13	0.030	(0.437)	0.015	0.015
30	2.50	0.13	0.030	(0.435)	0.015	0.015
31	2.58	0.17	0.037	(0.433)	0.018	0.018
32	2.67	0.17	0.037	(0.431)	0.018	0.018
33	2.75	0.17	0.037	(0.430)	0.018	0.018
34	2.83	0.17	0.037	(0.428)	0.018	0.018
35	2.92	0.17	0.037	(0.426)	0.018	0.018
36	3.00	0.17	0.037	(0.424)	0.018	0.018
37	3.08	0.17	0.037	(0.422)	0.018	0.018
38	3.17	0.17	0.037	(0.421)	0.018	0.018
39	3.25	0.17	0.037	(0.419)	0.018	0.018
40	3.33	0.17	0.037	(0.417)	0.018	0.018
41	3.42	0.17	0.037	(0.415)	0.018	0.018
42	3.50	0.17	0.037	(0.414)	0.018	0.018
43	3.58	0.17	0.037	(0.412)	0.018	0.018
44	3.67	0.17	0.037	(0.410)	0.018	0.018
45	3.75	0.17	0.037	(0.409)	0.018	0.018
46	3.83	0.20	0.044	(0.407)	0.022	0.022
47	3.92	0.20	0.044	(0.405)	0.022	0.022
48	4.00	0.20	0.044	(0.403)	0.022	0.022
49	4.08	0.20	0.044	(0.402)	0.022	0.022
50	4.17	0.20	0.044	(0.400)	0.022	0.022
51	4.25	0.20	0.044	(0.398)	0.022	0.022
52	4.33	0.23	0.052	(0.397)	0.026	0.026
53	4.42	0.23	0.052	(0.395)	0.026	0.026
54	4.50	0.23	0.052	(0.393)	0.026	0.026
55	4.58	0.23	0.052	(0.391)	0.026	0.026
56	4.67	0.23	0.052	(0.390)	0.026	0.026
57	4.75	0.23	0.052	(0.388)	0.026	0.026
58	4.83	0.27	0.059	(0.386)	0.030	0.030
59	4.92	0.27	0.059	(0.385)	0.030	0.030
60	5.00	0.27	0.059	(0.383)	0.030	0.030
61	5.08	0.20	0.044	(0.381)	0.022	0.022
62	5.17	0.20	0.044	(0.380)	0.022	0.022
63	5.25	0.20	0.044	(0.378)	0.022	0.022
64	5.33	0.23	0.052	(0.376)	0.026	0.026
65	5.42	0.23	0.052	(0.375)	0.026	0.026
66	5.50	0.23	0.052	(0.373)	0.026	0.026
67	5.58	0.27	0.059	(0.372)	0.030	0.030
68	5.67	0.27	0.059	(0.370)	0.030	0.030
69	5.75	0.27	0.059	(0.368)	0.030	0.030
70	5.83	0.27	0.059	(0.367)	0.030	0.030
71	5.92	0.27	0.059	(0.365)	0.030	0.030
72	6.00	0.27	0.059	(0.363)	0.030	0.030
73	6.08	0.30	0.067	(0.362)	0.033	0.033

74	6.17	0.30	0.067	(0.360)	0.033	0.033
75	6.25	0.30	0.067	(0.359)	0.033	0.033
76	6.33	0.30	0.067	(0.357)	0.033	0.033
77	6.42	0.30	0.067	(0.355)	0.033	0.033
78	6.50	0.30	0.067	(0.354)	0.033	0.033
79	6.58	0.33	0.074	(0.352)	0.037	0.037
80	6.67	0.33	0.074	(0.351)	0.037	0.037
81	6.75	0.33	0.074	(0.349)	0.037	0.037
82	6.83	0.33	0.074	(0.347)	0.037	0.037
83	6.92	0.33	0.074	(0.346)	0.037	0.037
84	7.00	0.33	0.074	(0.344)	0.037	0.037
85	7.08	0.33	0.074	(0.343)	0.037	0.037
86	7.17	0.33	0.074	(0.341)	0.037	0.037
87	7.25	0.33	0.074	(0.340)	0.037	0.037
88	7.33	0.37	0.081	(0.338)	0.041	0.041
89	7.42	0.37	0.081	(0.337)	0.041	0.041
90	7.50	0.37	0.081	(0.335)	0.041	0.041
91	7.58	0.40	0.089	(0.333)	0.044	0.044
92	7.67	0.40	0.089	(0.332)	0.044	0.044
93	7.75	0.40	0.089	(0.330)	0.044	0.044
94	7.83	0.43	0.096	(0.329)	0.048	0.048
95	7.92	0.43	0.096	(0.327)	0.048	0.048
96	8.00	0.43	0.096	(0.326)	0.048	0.048
97	8.08	0.50	0.111	(0.324)	0.055	0.055
98	8.17	0.50	0.111	(0.323)	0.055	0.055
99	8.25	0.50	0.111	(0.321)	0.055	0.055
100	8.33	0.50	0.111	(0.320)	0.055	0.055
101	8.42	0.50	0.111	(0.318)	0.055	0.055
102	8.50	0.50	0.111	(0.317)	0.055	0.055
103	8.58	0.53	0.118	(0.315)	0.059	0.059
104	8.67	0.53	0.118	(0.314)	0.059	0.059
105	8.75	0.53	0.118	(0.312)	0.059	0.059
106	8.83	0.57	0.126	(0.311)	0.063	0.063
107	8.92	0.57	0.126	(0.309)	0.063	0.063
108	9.00	0.57	0.126	(0.308)	0.063	0.063
109	9.08	0.63	0.141	(0.307)	0.070	0.070
110	9.17	0.63	0.141	(0.305)	0.070	0.070
111	9.25	0.63	0.141	(0.304)	0.070	0.070
112	9.33	0.67	0.148	(0.302)	0.074	0.074
113	9.42	0.67	0.148	(0.301)	0.074	0.074
114	9.50	0.67	0.148	(0.299)	0.074	0.074
115	9.58	0.70	0.155	(0.298)	0.078	0.078
116	9.67	0.70	0.155	(0.296)	0.078	0.078
117	9.75	0.70	0.155	(0.295)	0.078	0.078
118	9.83	0.73	0.163	(0.294)	0.081	0.081
119	9.92	0.73	0.163	(0.292)	0.081	0.081
120	10.00	0.73	0.163	(0.291)	0.081	0.081
121	10.08	0.50	0.111	(0.289)	0.055	0.055
122	10.17	0.50	0.111	(0.288)	0.055	0.055
123	10.25	0.50	0.111	(0.287)	0.055	0.055
124	10.33	0.50	0.111	(0.285)	0.055	0.055
125	10.42	0.50	0.111	(0.284)	0.055	0.055
126	10.50	0.50	0.111	(0.282)	0.055	0.055
127	10.58	0.67	0.148	(0.281)	0.074	0.074
128	10.67	0.67	0.148	(0.280)	0.074	0.074
129	10.75	0.67	0.148	(0.278)	0.074	0.074
130	10.83	0.67	0.148	(0.277)	0.074	0.074
131	10.92	0.67	0.148	(0.276)	0.074	0.074
132	11.00	0.67	0.148	(0.274)	0.074	0.074
133	11.08	0.63	0.141	(0.273)	0.070	0.070
134	11.17	0.63	0.141	(0.271)	0.070	0.070
135	11.25	0.63	0.141	(0.270)	0.070	0.070
136	11.33	0.63	0.141	(0.269)	0.070	0.070
137	11.42	0.63	0.141	(0.267)	0.070	0.070
138	11.50	0.63	0.141	(0.266)	0.070	0.070
139	11.58	0.57	0.126	(0.265)	0.063	0.063
140	11.67	0.57	0.126	(0.264)	0.063	0.063
141	11.75	0.57	0.126	(0.262)	0.063	0.063
142	11.83	0.60	0.133	(0.261)	0.067	0.067
143	11.92	0.60	0.133	(0.260)	0.067	0.067
144	12.00	0.60	0.133	(0.258)	0.067	0.067
145	12.08	0.83	0.185	(0.257)	0.092	0.092
146	12.17	0.83	0.185	(0.256)	0.092	0.092
147	12.25	0.83	0.185	(0.254)	0.092	0.092
148	12.33	0.87	0.192	(0.253)	0.096	0.096
149	12.42	0.87	0.192	(0.252)	0.096	0.096
150	12.50	0.87	0.192	(0.251)	0.096	0.096
151	12.58	0.93	0.207	(0.249)	0.104	0.104
152	12.67	0.93	0.207	(0.248)	0.104	0.104
153	12.75	0.93	0.207	(0.247)	0.104	0.104
154	12.83	0.97	0.215	(0.246)	0.107	0.107
155	12.92	0.97	0.215	(0.244)	0.107	0.107
156	13.00	0.97	0.215	(0.243)	0.107	0.107
157	13.08	1.13	0.252	(0.242)	0.126	0.126
158	13.17	1.13	0.252	(0.241)	0.126	0.126
159	13.25	1.13	0.252	(0.239)	0.126	0.126

160	13.33	1.13	0.252	(0.238)	0.126	0.126
161	13.42	1.13	0.252	(0.237)	0.126	0.126
162	13.50	1.13	0.252	(0.236)	0.126	0.126
163	13.58	0.77	0.170	(0.235)	0.085	0.085
164	13.67	0.77	0.170	(0.233)	0.085	0.085
165	13.75	0.77	0.170	(0.232)	0.085	0.085
166	13.83	0.77	0.170	(0.231)	0.085	0.085
167	13.92	0.77	0.170	(0.230)	0.085	0.085
168	14.00	0.77	0.170	(0.229)	0.085	0.085
169	14.08	0.90	0.200	(0.228)	0.100	0.100
170	14.17	0.90	0.200	(0.226)	0.100	0.100
171	14.25	0.90	0.200	(0.225)	0.100	0.100
172	14.33	0.87	0.192	(0.224)	0.096	0.096
173	14.42	0.87	0.192	(0.223)	0.096	0.096
174	14.50	0.87	0.192	(0.222)	0.096	0.096
175	14.58	0.87	0.192	(0.221)	0.096	0.096
176	14.67	0.87	0.192	(0.220)	0.096	0.096
177	14.75	0.87	0.192	(0.218)	0.096	0.096
178	14.83	0.83	0.185	(0.217)	0.092	0.092
179	14.92	0.83	0.185	(0.216)	0.092	0.092
180	15.00	0.83	0.185	(0.215)	0.092	0.092
181	15.08	0.80	0.178	(0.214)	0.089	0.089
182	15.17	0.80	0.178	(0.213)	0.089	0.089
183	15.25	0.80	0.178	(0.212)	0.089	0.089
184	15.33	0.77	0.170	(0.211)	0.085	0.085
185	15.42	0.77	0.170	(0.210)	0.085	0.085
186	15.50	0.77	0.170	(0.209)	0.085	0.085
187	15.58	0.63	0.141	(0.207)	0.070	0.070
188	15.67	0.63	0.141	(0.206)	0.070	0.070
189	15.75	0.63	0.141	(0.205)	0.070	0.070
190	15.83	0.63	0.141	(0.204)	0.070	0.070
191	15.92	0.63	0.141	(0.203)	0.070	0.070
192	16.00	0.63	0.141	(0.202)	0.070	0.070
193	16.08	0.13	0.030	(0.201)	0.015	0.015
194	16.17	0.13	0.030	(0.200)	0.015	0.015
195	16.25	0.13	0.030	(0.199)	0.015	0.015
196	16.33	0.13	0.030	(0.198)	0.015	0.015
197	16.42	0.13	0.030	(0.197)	0.015	0.015
198	16.50	0.13	0.030	(0.196)	0.015	0.015
199	16.58	0.10	0.022	(0.195)	0.011	0.011
200	16.67	0.10	0.022	(0.194)	0.011	0.011
201	16.75	0.10	0.022	(0.193)	0.011	0.011
202	16.83	0.10	0.022	(0.192)	0.011	0.011
203	16.92	0.10	0.022	(0.191)	0.011	0.011
204	17.00	0.10	0.022	(0.190)	0.011	0.011
205	17.08	0.17	0.037	(0.189)	0.018	0.018
206	17.17	0.17	0.037	(0.188)	0.018	0.018
207	17.25	0.17	0.037	(0.187)	0.018	0.018
208	17.33	0.17	0.037	(0.186)	0.018	0.018
209	17.42	0.17	0.037	(0.185)	0.018	0.018
210	17.50	0.17	0.037	(0.185)	0.018	0.018
211	17.58	0.17	0.037	(0.184)	0.018	0.018
212	17.67	0.17	0.037	(0.183)	0.018	0.018
213	17.75	0.17	0.037	(0.182)	0.018	0.018
214	17.83	0.13	0.030	(0.181)	0.015	0.015
215	17.92	0.13	0.030	(0.180)	0.015	0.015
216	18.00	0.13	0.030	(0.179)	0.015	0.015
217	18.08	0.13	0.030	(0.178)	0.015	0.015
218	18.17	0.13	0.030	(0.177)	0.015	0.015
219	18.25	0.13	0.030	(0.176)	0.015	0.015
220	18.33	0.13	0.030	(0.176)	0.015	0.015
221	18.42	0.13	0.030	(0.175)	0.015	0.015
222	18.50	0.13	0.030	(0.174)	0.015	0.015
223	18.58	0.10	0.022	(0.173)	0.011	0.011
224	18.67	0.10	0.022	(0.172)	0.011	0.011
225	18.75	0.10	0.022	(0.171)	0.011	0.011
226	18.83	0.07	0.015	(0.171)	0.007	0.007
227	18.92	0.07	0.015	(0.170)	0.007	0.007
228	19.00	0.07	0.015	(0.169)	0.007	0.007
229	19.08	0.10	0.022	(0.168)	0.011	0.011
230	19.17	0.10	0.022	(0.167)	0.011	0.011
231	19.25	0.10	0.022	(0.167)	0.011	0.011
232	19.33	0.13	0.030	(0.166)	0.015	0.015
233	19.42	0.13	0.030	(0.165)	0.015	0.015
234	19.50	0.13	0.030	(0.164)	0.015	0.015
235	19.58	0.10	0.022	(0.164)	0.011	0.011
236	19.67	0.10	0.022	(0.163)	0.011	0.011
237	19.75	0.10	0.022	(0.162)	0.011	0.011
238	19.83	0.07	0.015	(0.161)	0.007	0.007
239	19.92	0.07	0.015	(0.161)	0.007	0.007
240	20.00	0.07	0.015	(0.160)	0.007	0.007
241	20.08	0.10	0.022	(0.159)	0.011	0.011
242	20.17	0.10	0.022	(0.158)	0.011	0.011
243	20.25	0.10	0.022	(0.158)	0.011	0.011
244	20.33	0.10	0.022	(0.157)	0.011	0.011
245	20.42	0.10	0.022	(0.156)	0.011	0.011

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246  20.50     0.10      0.022       (  0.156)       0.011        0.011
247  20.58     0.10      0.022       (  0.155)       0.011        0.011
248  20.67     0.10      0.022       (  0.154)       0.011        0.011
249  20.75     0.10      0.022       (  0.154)       0.011        0.011
250  20.83     0.07      0.015       (  0.153)       0.007        0.007
251  20.92     0.07      0.015       (  0.153)       0.007        0.007
252  21.00     0.07      0.015       (  0.152)       0.007        0.007
253  21.08     0.10      0.022       (  0.151)       0.011        0.011
254  21.17     0.10      0.022       (  0.151)       0.011        0.011
255  21.25     0.10      0.022       (  0.150)       0.011        0.011
256  21.33     0.07      0.015       (  0.150)       0.007        0.007
257  21.42     0.07      0.015       (  0.149)       0.007        0.007
258  21.50     0.07      0.015       (  0.148)       0.007        0.007
259  21.58     0.10      0.022       (  0.148)       0.011        0.011
260  21.67     0.10      0.022       (  0.147)       0.011        0.011
261  21.75     0.10      0.022       (  0.147)       0.011        0.011
262  21.83     0.07      0.015       (  0.146)       0.007        0.007
263  21.92     0.07      0.015       (  0.146)       0.007        0.007
264  22.00     0.07      0.015       (  0.145)       0.007        0.007
265  22.08     0.10      0.022       (  0.145)       0.011        0.011
266  22.17     0.10      0.022       (  0.144)       0.011        0.011
267  22.25     0.10      0.022       (  0.144)       0.011        0.011
268  22.33     0.07      0.015       (  0.144)       0.007        0.007
269  22.42     0.07      0.015       (  0.143)       0.007        0.007
270  22.50     0.07      0.015       (  0.143)       0.007        0.007
271  22.58     0.07      0.015       (  0.142)       0.007        0.007
272  22.67     0.07      0.015       (  0.142)       0.007        0.007
273  22.75     0.07      0.015       (  0.141)       0.007        0.007
274  22.83     0.07      0.015       (  0.141)       0.007        0.007
275  22.92     0.07      0.015       (  0.141)       0.007        0.007
276  23.00     0.07      0.015       (  0.140)       0.007        0.007
277  23.08     0.07      0.015       (  0.140)       0.007        0.007
278  23.17     0.07      0.015       (  0.140)       0.007        0.007
279  23.25     0.07      0.015       (  0.139)       0.007        0.007
280  23.33     0.07      0.015       (  0.139)       0.007        0.007
281  23.42     0.07      0.015       (  0.139)       0.007        0.007
282  23.50     0.07      0.015       (  0.139)       0.007        0.007
283  23.58     0.07      0.015       (  0.138)       0.007        0.007
284  23.67     0.07      0.015       (  0.138)       0.007        0.007
285  23.75     0.07      0.015       (  0.138)       0.007        0.007
286  23.83     0.07      0.015       (  0.138)       0.007        0.007
287  23.92     0.07      0.015       (  0.138)       0.007        0.007
288  24.00     0.07      0.015       (  0.138)       0.007        0.007
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    11.1
      Flood volume = Effective rainfall      0.92(In)
       times area       5.8(Ac.)/[(In)/(Ft.)] =       0.5(Ac.Ft)
      Total soil loss =      0.92(In)
      Total soil loss =     0.451(Ac.Ft)
      Total rainfall =      1.85(In)
      Flood volume =       19642.6 Cubic Feet
      Total soil loss =       19642.6 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      0.742(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                      R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0002      0.03  Q         |         |         |         |
   0+10       0.0005      0.04  Q         |         |         |         |
   0+15       0.0008      0.04  Q         |         |         |         |
   0+20       0.0012      0.06  Q         |         |         |         |
   0+25       0.0016      0.06  Q         |         |         |         |
   0+30       0.0020      0.07  Q         |         |         |         |
   0+35       0.0025      0.07  Q         |         |         |         |
   0+40       0.0030      0.07  Q         |         |         |         |
   0+45       0.0034      0.07  Q         |         |         |         |
   0+50       0.0039      0.08  Q         |         |         |         |
   0+55       0.0045      0.09  Q         |         |         |         |
   1+ 0       0.0051      0.09  Q         |         |         |         |
   1+ 5       0.0056      0.07  Q         |         |         |         |
   1+10       0.0061      0.07  Q         |         |         |         |
   1+15       0.0066      0.07  Q         |         |         |         |
   1+20       0.0070      0.07  Q         |         |         |         |
   1+25       0.0075      0.07  Q         |         |         |         |
   1+30       0.0079      0.07  Q         |         |         |         |
   1+35       0.0084      0.07  Q         |         |         |         |
   1+40       0.0088      0.07  Q         |         |         |         |
   1+45       0.0093      0.07  Q         |         |         |         |
   1+50       0.0098      0.08  Q         |         |         |         |
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1+55       0.0104      0.09  Q          |          |          |          |
2+ 0       0.0110      0.09  Q          |          |          |          |
2+ 5       0.0116      0.09  QV         |          |          |          |
2+10       0.0122      0.09  QV         |          |          |          |
2+15       0.0128      0.09  QV         |          |          |          |
2+20       0.0134      0.09  QV         |          |          |          |
2+25       0.0140      0.09  QV         |          |          |          |
2+30       0.0146      0.09  QV         |          |          |          |
2+35       0.0153      0.10  QV         |          |          |          |
2+40       0.0160      0.11  QV         |          |          |          |
2+45       0.0168      0.11  QV         |          |          |          |
2+50       0.0175      0.11  QV         |          |          |          |
2+55       0.0183      0.11  QV         |          |          |          |
3+ 0       0.0190      0.11  QV         |          |          |          |
3+ 5       0.0198      0.11  QV         |          |          |          |
3+10       0.0206      0.11  QV         |          |          |          |
3+15       0.0213      0.11  QV         |          |          |          |
3+20       0.0221      0.11  QV         |          |          |          |
3+25       0.0228      0.11  Q V        |          |          |          |
3+30       0.0236      0.11  Q V        |          |          |          |
3+35       0.0243      0.11  Q V        |          |          |          |
3+40       0.0251      0.11  Q V        |          |          |          |
3+45       0.0258      0.11  Q V        |          |          |          |
3+50       0.0267      0.12  Q V        |          |          |          |
3+55       0.0275      0.13  Q V        |          |          |          |
4+ 0       0.0284      0.13  Q V        |          |          |          |
4+ 5       0.0294      0.13  Q V        |          |          |          |
4+10       0.0303      0.13  Q V        |          |          |          |
4+15       0.0312      0.13  Q V        |          |          |          |
4+20       0.0321      0.14  Q V        |          |          |          |
4+25       0.0332      0.15  Q V        |          |          |          |
4+30       0.0342      0.15  Q  V       |          |          |          |
4+35       0.0353      0.15  Q  V       |          |          |          |
4+40       0.0363      0.15  Q  V       |          |          |          |
4+45       0.0374      0.15  Q  V       |          |          |          |
4+50       0.0385      0.17  Q  V       |          |          |          |
4+55       0.0397      0.17  Q  V       |          |          |          |
5+ 0       0.0409      0.17  Q  V       |          |          |          |
5+ 5       0.0420      0.15  Q  V       |          |          |          |
5+10       0.0429      0.13  Q  V       |          |          |          |
5+15       0.0438      0.13  Q  V       |          |          |          |
5+20       0.0448      0.14  Q  V       |          |          |          |
5+25       0.0458      0.15  Q   V      |          |          |          |
5+30       0.0469      0.15  Q   V      |          |          |          |
5+35       0.0480      0.17  Q   V      |          |          |          |
5+40       0.0492      0.17  Q   V      |          |          |          |
5+45       0.0504      0.17  Q   V      |          |          |          |
5+50       0.0516      0.17  Q   V      |          |          |          |
5+55       0.0528      0.17  Q   V      |          |          |          |
6+ 0       0.0540      0.17  Q   V      |          |          |          |
6+ 5       0.0553      0.19  Q   V      |          |          |          |
6+10       0.0567      0.20  Q    V     |          |          |          |
6+15       0.0580      0.20  Q    V     |          |          |          |
6+20       0.0594      0.20  Q    V     |          |          |          |
6+25       0.0607      0.20  Q    V     |          |          |          |
6+30       0.0621      0.20  Q    V     |          |          |          |
6+35       0.0635      0.21  Q    V     |          |          |          |
6+40       0.0650      0.22  Q    V     |          |          |          |
6+45       0.0665      0.22  Q    V     |          |          |          |
6+50       0.0680      0.22  Q     V    |          |          |          |
6+55       0.0695      0.22  Q     V    |          |          |          |
7+ 0       0.0710      0.22  Q     V    |          |          |          |
7+ 5       0.0725      0.22  Q     V    |          |          |          |
7+10       0.0740      0.22  Q     V    |          |          |          |
7+15       0.0755      0.22  Q     V    |          |          |          |
7+20       0.0771      0.23  Q     V    |          |          |          |
7+25       0.0788      0.24  Q     V    |          |          |          |
7+30       0.0804      0.24  Q      V   |          |          |          |
7+35       0.0822      0.25  |Q     V   |          |          |          |
7+40       0.0840      0.26  |Q     V   |          |          |          |
7+45       0.0858      0.26  |Q     V   |          |          |          |
7+50       0.0877      0.27  |Q     V   |          |          |          |
7+55       0.0896      0.28  |Q     V   |          |          |          |
8+ 0       0.0916      0.28  |Q      V  |          |          |          |
8+ 5       0.0937      0.31  |Q      V  |          |          |          |
8+10       0.0959      0.33  |Q      V  |          |          |          |
8+15       0.0982      0.33  |Q      V  |          |          |          |
8+20       0.1004      0.33  |Q      V  |          |          |          |
8+25       0.1027      0.33  |Q       V |          |          |          |
8+30       0.1049      0.33  |Q       V |          |          |          |
8+35       0.1073      0.34  |Q       V |          |          |          |
8+40       0.1097      0.35  |Q       V |          |          |          |
8+45       0.1121      0.35  |Q       V |          |          |          |
8+50       0.1146      0.36  |Q        V|          |          |          |
8+55       0.1171      0.37  |Q        V|          |          |          |
9+ 0       0.1197      0.37  |Q        V|          |          |          |
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 9+ 5       0.1224      0.40  |Q        V         |         |         |
 9+10       0.1253      0.41  |Q        |V        |         |         |
 9+15       0.1281      0.41  |Q        |V        |         |         |
 9+20       0.1311      0.43  |Q        |V        |         |         |
 9+25       0.1341      0.44  |Q        |V        |         |         |
 9+30       0.1371      0.44  |Q        | V       |         |         |
 9+35       0.1402      0.45  |Q        | V       |         |         |
 9+40       0.1433      0.46  |Q        | V       |         |         |
 9+45       0.1465      0.46  |Q        | V       |         |         |
 9+50       0.1497      0.47  |Q        |  V      |         |         |
 9+55       0.1530      0.48  |Q        |  V      |         |         |
10+ 0       0.1563      0.48  |Q        |  V      |         |         |
10+ 5       0.1590      0.39  |Q        |   V     |         |         |
10+10       0.1613      0.33  |Q        |   V     |         |         |
10+15       0.1636      0.33  |Q        |   V     |         |         |
10+20       0.1658      0.33  |Q        |   V     |         |         |
10+25       0.1681      0.33  |Q        |   V     |         |         |
10+30       0.1703      0.33  |Q        |    V    |         |         |
10+35       0.1730      0.39  |Q        |    V    |         |         |
10+40       0.1760      0.43  |Q        |    V    |         |         |
10+45       0.1790      0.44  |Q        |    V    |         |         |
10+50       0.1820      0.44  |Q        |     V   |         |         |
10+55       0.1850      0.44  |Q        |     V   |         |         |
11+ 0       0.1880      0.44  |Q        |     V   |         |         |
11+ 5       0.1909      0.42  |Q        |     V   |         |         |
11+10       0.1938      0.42  |Q        |      V  |         |         |
11+15       0.1967      0.41  |Q        |      V  |         |         |
11+20       0.1995      0.41  |Q        |      V  |         |         |
11+25       0.2024      0.41  |Q        |      V  |         |         |
11+30       0.2052      0.41  |Q        |       V |         |         |
11+35       0.2079      0.39  |Q        |       V |         |         |
11+40       0.2105      0.37  |Q        |       V |         |         |
11+45       0.2130      0.37  |Q        |       V |         |         |
11+50       0.2157      0.38  |Q        |        V|         |         |
11+55       0.2184      0.39  |Q        |        V|         |         |
12+ 0       0.2211      0.39  |Q        |        V|         |         |
12+ 5       0.2244      0.48  |Q        |        V|         |         |
12+10       0.2281      0.54  | Q       |         V         |         |
12+15       0.2319      0.55  | Q       |         V         |         |
12+20       0.2357      0.56  | Q       |         V         |         |
12+25       0.2396      0.57  | Q       |          V        |         |
12+30       0.2435      0.57  | Q       |          V        |         |
12+35       0.2476      0.59  | Q       |          V        |         |
12+40       0.2518      0.61  | Q       |           V       |         |
12+45       0.2560      0.61  | Q       |           V       |         |
12+50       0.2603      0.62  | Q       |            V      |         |
12+55       0.2647      0.63  | Q       |            V      |         |
13+ 0       0.2690      0.63  | Q       |            V      |         |
13+ 5       0.2738      0.70  | Q       |             V     |         |
13+10       0.2789      0.74  | Q       |             V     |         |
13+15       0.2840      0.74  | Q       |              V    |         |
13+20       0.2891      0.74  | Q       |              V    |         |
13+25       0.2942      0.74  | Q       |               V   |         |
13+30       0.2993      0.74  | Q       |               V   |         |
13+35       0.3035      0.60  | Q       |               V   |         |
13+40       0.3070      0.51  | Q       |                V  |         |
13+45       0.3105      0.50  | Q       |                V  |         |
13+50       0.3139      0.50  | Q       |                V  |         |
13+55       0.3174      0.50  | Q       |                 V |         |
14+ 0       0.3208      0.50  | Q       |                 V |         |
14+ 5       0.3247      0.55  | Q       |                 V |         |
14+10       0.3287      0.58  | Q       |                  V|         |
14+15       0.3327      0.59  | Q       |                  V|         |
14+20       0.3367      0.58  | Q       |                  V|         |
14+25       0.3406      0.57  | Q       |                   V         |
14+30       0.3445      0.57  | Q       |                   V         |
14+35       0.3484      0.57  | Q       |                   V         |
14+40       0.3524      0.57  | Q       |                    V        |
14+45       0.3563      0.57  | Q       |                    V        |
14+50       0.3601      0.55  | Q       |                    V        |
14+55       0.3638      0.55  | Q       |                     V       |
15+ 0       0.3676      0.55  | Q       |                     V       |
15+ 5       0.3713      0.53  | Q       |                     V       |
15+10       0.3749      0.52  | Q       |                      V      |
15+15       0.3785      0.52  | Q       |                      V      |
15+20       0.3820      0.51  | Q       |                      V      |
15+25       0.3855      0.50  | Q       |                       V     |
15+30       0.3889      0.50  | Q       |                       V     |
15+35       0.3920      0.45  |Q        |                       V     |
15+40       0.3949      0.42  |Q        |                        V    |
15+45       0.3978      0.41  |Q        |                        V    |
15+50       0.4006      0.41  |Q        |                        V    |
15+55       0.4035      0.41  |Q        |                        V    |
16+ 0       0.4063      0.41  |Q        |                         V   |
16+ 5       0.4079      0.22  Q         |                         V   |
16+10       0.4086      0.10  Q         |                         V   |
```

16+15	0.4092	0.09	Q	|	|	|	V |
16+20	0.4098	0.09	Q	|	|	|	V |
16+25	0.4104	0.09	Q	|	|	|	V |
16+30	0.4110	0.09	Q	|	|	|	V |
16+35	0.4115	0.07	Q	|	|	|	V |
16+40	0.4119	0.07	Q	|	|	|	V |
16+45	0.4124	0.07	Q	|	|	|	V |
16+50	0.4128	0.07	Q	|	|	|	V |
16+55	0.4133	0.07	Q	|	|	|	V |
17+ 0	0.4138	0.07	Q	|	|	|	V |
17+ 5	0.4144	0.09	Q	|	|	|	V |
17+10	0.4151	0.11	Q	|	|	|	V |
17+15	0.4159	0.11	Q	|	|	|	V |
17+20	0.4166	0.11	Q	|	|	|	V |
17+25	0.4174	0.11	Q	|	|	|	V |
17+30	0.4181	0.11	Q	|	|	|	V |
17+35	0.4189	0.11	Q	|	|	|	V |
17+40	0.4196	0.11	Q	|	|	|	V |
17+45	0.4204	0.11	Q	|	|	|	V |
17+50	0.4210	0.10	Q	|	|	|	V |
17+55	0.4216	0.09	Q	|	|	|	V |
18+ 0	0.4222	0.09	Q	|	|	|	V |
18+ 5	0.4229	0.09	Q	|	|	|	V |
18+10	0.4235	0.09	Q	|	|	|	V |
18+15	0.4241	0.09	Q	|	|	|	V |
18+20	0.4247	0.09	Q	|	|	|	V |
18+25	0.4253	0.09	Q	|	|	|	V |
18+30	0.4259	0.09	Q	|	|	|	V |
18+35	0.4264	0.07	Q	|	|	|	V |
18+40	0.4268	0.07	Q	|	|	|	V |
18+45	0.4273	0.07	Q	|	|	|	V |
18+50	0.4276	0.05	Q	|	|	|	V |
18+55	0.4279	0.04	Q	|	|	|	V |
19+ 0	0.4282	0.04	Q	|	|	|	V |
19+ 5	0.4286	0.06	Q	|	|	|	V |
19+10	0.4291	0.06	Q	|	|	|	V |
19+15	0.4295	0.07	Q	|	|	|	V |
19+20	0.4301	0.08	Q	|	|	|	V |
19+25	0.4307	0.09	Q	|	|	|	V |
19+30	0.4313	0.09	Q	|	|	|	V |
19+35	0.4318	0.07	Q	|	|	|	V |
19+40	0.4322	0.07	Q	|	|	|	V |
19+45	0.4327	0.07	Q	|	|	|	V |
19+50	0.4331	0.05	Q	|	|	|	V |
19+55	0.4334	0.04	Q	|	|	|	V |
20+ 0	0.4337	0.04	Q	|	|	|	V |
20+ 5	0.4341	0.06	Q	|	|	|	V |
20+10	0.4345	0.06	Q	|	|	|	V |
20+15	0.4349	0.07	Q	|	|	|	V |
20+20	0.4354	0.07	Q	|	|	|	V |
20+25	0.4358	0.07	Q	|	|	|	V |
20+30	0.4363	0.07	Q	|	|	|	V |
20+35	0.4367	0.07	Q	|	|	|	V |
20+40	0.4372	0.07	Q	|	|	|	V |
20+45	0.4377	0.07	Q	|	|	|	V |
20+50	0.4380	0.05	Q	|	|	|	V |
20+55	0.4383	0.04	Q	|	|	|	V |
21+ 0	0.4386	0.04	Q	|	|	|	V |
21+ 5	0.4390	0.06	Q	|	|	|	V |
21+10	0.4395	0.06	Q	|	|	|	V |
21+15	0.4399	0.07	Q	|	|	|	V|
21+20	0.4403	0.05	Q	|	|	|	V|
21+25	0.4406	0.04	Q	|	|	|	V|
21+30	0.4409	0.04	Q	|	|	|	V|
21+35	0.4413	0.06	Q	|	|	|	V|
21+40	0.4417	0.06	Q	|	|	|	V|
21+45	0.4422	0.07	Q	|	|	|	V|
21+50	0.4425	0.05	Q	|	|	|	V|
21+55	0.4428	0.04	Q	|	|	|	V|
22+ 0	0.4431	0.04	Q	|	|	|	V|
22+ 5	0.4435	0.06	Q	|	|	|	V|
22+10	0.4440	0.06	Q	|	|	|	V|
22+15	0.4444	0.07	Q	|	|	|	V|
22+20	0.4448	0.05	Q	|	|	|	V|
22+25	0.4451	0.04	Q	|	|	|	V|
22+30	0.4454	0.04	Q	|	|	|	V|
22+35	0.4457	0.04	Q	|	|	|	V|
22+40	0.4460	0.04	Q	|	|	|	V|
22+45	0.4463	0.04	Q	|	|	|	V|
22+50	0.4466	0.04	Q	|	|	|	V|
22+55	0.4469	0.04	Q	|	|	|	V|
23+ 0	0.4472	0.04	Q	|	|	|	V|
23+ 5	0.4475	0.04	Q	|	|	|	V|
23+10	0.4478	0.04	Q	|	|	|	V|
23+15	0.4481	0.04	Q	|	|	|	V|
23+20	0.4484	0.04	Q	|	|	|	V|

```
   23+25       0.4487      0.04  Q          |          |          |         V|
   23+30       0.4490      0.04  Q          |          |          |         V|
   23+35       0.4493      0.04  Q          |          |          |         V|
   23+40       0.4496      0.04  Q          |          |          |         V|
   23+45       0.4499      0.04  Q          |          |          |         V|
   23+50       0.4502      0.04  Q          |          |          |         V|
   23+55       0.4505      0.04  Q          |          |          |         V|
   24+ 0       0.4508      0.04  Q          |          |          |         V|
   24+ 5       0.4509      0.02  Q          |          |          |         V|
   24+10       0.4509      0.00  Q          |          |          |         V|
-------------------------------------------------------------------------------
```

```
       U n i t   H y d r o g r a p h   A n a l y s i s

       Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2008, Version 8.1
              Study date  09/22/25 File: PRO12242.out

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Riverside County Synthetic Unit Hydrology Method
RCFC & WCD Manual date - April 1978


Program License Serial Number 5006

------------------------------------------------------------------------
 English (in-lb) Input Units Used
 English Rainfall Data (Inches) Input Values Used

 English Units used in output format



------------------------------------------------------------------------
------------------------------------------------------------------------
Drainage Area =       5.85(Ac.)  =      0.009 Sq. Mi.
Drainage Area for Depth-Area Areal Adjustment =       5.85(Ac.)  =      0.009 Sq. Mi.
Length along longest watercourse =     780.00(Ft.)
Length along longest watercourse measured to centroid =     390.00(Ft.)
Length along longest watercourse =      0.148 Mi.
Length along longest watercourse measured to centroid =      0.074 Mi.
Difference in elevation =      15.50(Ft.)
Slope along watercourse =    104.9231 Ft./Mi.
Average Manning's 'N' = 0.015
Lag time =    0.027 Hr.
Lag time =     1.60 Min.
25% of lag time =     0.40 Min.
40% of lag time =     0.64 Min.
Unit time =     5.00 Min.
Duration of storm = 24 Hour(s)
User Entered Base Flow =     0.00(CFS)

2 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        5.85            1.85                 10.82

100 YEAR Area rainfall data:


Area(Ac.)[1]       Rainfall(In)[2]      Weighting[1*2]
        5.85            4.59                 26.85

STORM EVENT (YEAR) =    2.00
Area Averaged 2-Year Rainfall =    1.850(In)
Area Averaged 100-Year Rainfall =    4.590(In)

Point rain (area averaged) =    1.850(In)
Areal adjustment factor =  100.00 %
Adjusted average point rain =    1.850(In)

Sub-Area Data:
Area(Ac.)         Runoff Index   Impervious %
     5.850           75.00          0.800
 Total Area Entered =      5.85(Ac.)


RI    RI   Infil. Rate Impervious   Adj. Infil. Rate  Area%     F
AMC2 AMC-1     (In/Hr)    (Dec.%)     (In/Hr)      (Dec.)    (In/Hr)
75.0  57.0      0.501     0.800        0.140        1.000      0.140
                                                  Sum (F) =    0.140
Area averaged mean soil loss (F) (In/Hr) =  0.140
Minimum soil loss rate ((In/Hr)) =  0.070
(for 24 hour storm duration)
Soil low loss rate (decimal) =   0.260
------------------------------------------------------------------------

               U n i t  H y d r o g r a p h
                      VALLEY S-Curve
------------------------------------------------------------------
               Unit Hydrograph Data
------------------------------------------------------------------------
Unit time period   Time % of lag   Distribution   Unit Hydrograph
    (hrs)                          Graph %           (CFS)
```

1	0.083	311.949	57.874	3.412
2	0.167	623.897	36.481	2.151
3	0.250	935.846	5.645	0.333
			Sum = 100.000 Sum=	5.896

The following loss rate calculations reflect use of the minimum calculated loss rate subtracted from the Storm Rain to produce the maximum Effective Rain value

Unit	Time (Hr.)	Pattern Percent	Storm Rain (In/Hr)	Loss rate(In./Hr) Max	Low	Effective (In/Hr)
1	0.08	0.07	0.015	(0.248)	0.004	0.011
2	0.17	0.07	0.015	(0.248)	0.004	0.011
3	0.25	0.07	0.015	(0.247)	0.004	0.011
4	0.33	0.10	0.022	(0.246)	0.006	0.016
5	0.42	0.10	0.022	(0.245)	0.006	0.016
6	0.50	0.10	0.022	(0.244)	0.006	0.016
7	0.58	0.10	0.022	(0.243)	0.006	0.016
8	0.67	0.10	0.022	(0.242)	0.006	0.016
9	0.75	0.10	0.022	(0.241)	0.006	0.016
10	0.83	0.13	0.030	(0.240)	0.008	0.022
11	0.92	0.13	0.030	(0.239)	0.008	0.022
12	1.00	0.13	0.030	(0.238)	0.008	0.022
13	1.08	0.10	0.022	(0.237)	0.006	0.016
14	1.17	0.10	0.022	(0.236)	0.006	0.016
15	1.25	0.10	0.022	(0.235)	0.006	0.016
16	1.33	0.10	0.022	(0.234)	0.006	0.016
17	1.42	0.10	0.022	(0.233)	0.006	0.016
18	1.50	0.10	0.022	(0.232)	0.006	0.016
19	1.58	0.10	0.022	(0.231)	0.006	0.016
20	1.67	0.10	0.022	(0.231)	0.006	0.016
21	1.75	0.10	0.022	(0.230)	0.006	0.016
22	1.83	0.13	0.030	(0.229)	0.008	0.022
23	1.92	0.13	0.030	(0.228)	0.008	0.022
24	2.00	0.13	0.030	(0.227)	0.008	0.022
25	2.08	0.13	0.030	(0.226)	0.008	0.022
26	2.17	0.13	0.030	(0.225)	0.008	0.022
27	2.25	0.13	0.030	(0.224)	0.008	0.022
28	2.33	0.13	0.030	(0.223)	0.008	0.022
29	2.42	0.13	0.030	(0.222)	0.008	0.022
30	2.50	0.13	0.030	(0.221)	0.008	0.022
31	2.58	0.17	0.037	(0.220)	0.010	0.027
32	2.67	0.17	0.037	(0.220)	0.010	0.027
33	2.75	0.17	0.037	(0.219)	0.010	0.027
34	2.83	0.17	0.037	(0.218)	0.010	0.027
35	2.92	0.17	0.037	(0.217)	0.010	0.027
36	3.00	0.17	0.037	(0.216)	0.010	0.027
37	3.08	0.17	0.037	(0.215)	0.010	0.027
38	3.17	0.17	0.037	(0.214)	0.010	0.027
39	3.25	0.17	0.037	(0.213)	0.010	0.027
40	3.33	0.17	0.037	(0.212)	0.010	0.027
41	3.42	0.17	0.037	(0.212)	0.010	0.027
42	3.50	0.17	0.037	(0.211)	0.010	0.027
43	3.58	0.17	0.037	(0.210)	0.010	0.027
44	3.67	0.17	0.037	(0.209)	0.010	0.027
45	3.75	0.17	0.037	(0.208)	0.010	0.027
46	3.83	0.20	0.044	(0.207)	0.012	0.033
47	3.92	0.20	0.044	(0.206)	0.012	0.033
48	4.00	0.20	0.044	(0.205)	0.012	0.033
49	4.08	0.20	0.044	(0.204)	0.012	0.033
50	4.17	0.20	0.044	(0.204)	0.012	0.033
51	4.25	0.20	0.044	(0.203)	0.012	0.033
52	4.33	0.23	0.052	(0.202)	0.013	0.038
53	4.42	0.23	0.052	(0.201)	0.013	0.038
54	4.50	0.23	0.052	(0.200)	0.013	0.038
55	4.58	0.23	0.052	(0.199)	0.013	0.038
56	4.67	0.23	0.052	(0.198)	0.013	0.038
57	4.75	0.23	0.052	(0.198)	0.013	0.038
58	4.83	0.27	0.059	(0.197)	0.015	0.044
59	4.92	0.27	0.059	(0.196)	0.015	0.044
60	5.00	0.27	0.059	(0.195)	0.015	0.044
61	5.08	0.20	0.044	(0.194)	0.012	0.033
62	5.17	0.20	0.044	(0.193)	0.012	0.033
63	5.25	0.20	0.044	(0.193)	0.012	0.033
64	5.33	0.23	0.052	(0.192)	0.013	0.038
65	5.42	0.23	0.052	(0.191)	0.013	0.038
66	5.50	0.23	0.052	(0.190)	0.013	0.038
67	5.58	0.27	0.059	(0.189)	0.015	0.044
68	5.67	0.27	0.059	(0.188)	0.015	0.044
69	5.75	0.27	0.059	(0.187)	0.015	0.044
70	5.83	0.27	0.059	(0.187)	0.015	0.044
71	5.92	0.27	0.059	(0.186)	0.015	0.044
72	6.00	0.27	0.059	(0.185)	0.015	0.044
73	6.08	0.30	0.067	(0.184)	0.017	0.049

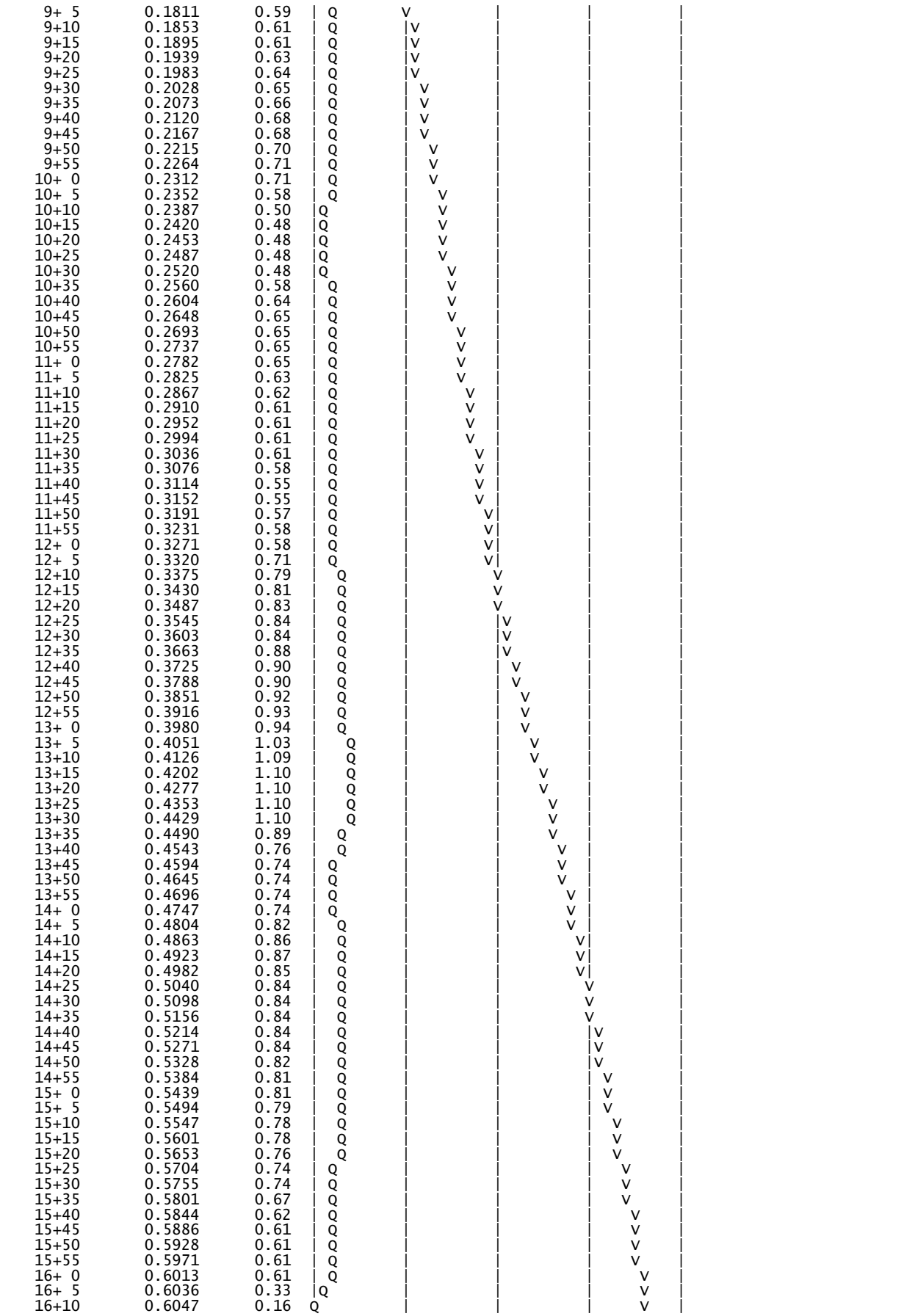
74	6.17	0.30	0.067	(0.183)	0.017	0.049
75	6.25	0.30	0.067	(0.183)	0.017	0.049
76	6.33	0.30	0.067	(0.182)	0.017	0.049
77	6.42	0.30	0.067	(0.181)	0.017	0.049
78	6.50	0.30	0.067	(0.180)	0.017	0.049
79	6.58	0.33	0.074	(0.179)	0.019	0.055
80	6.67	0.33	0.074	(0.179)	0.019	0.055
81	6.75	0.33	0.074	(0.178)	0.019	0.055
82	6.83	0.33	0.074	(0.177)	0.019	0.055
83	6.92	0.33	0.074	(0.176)	0.019	0.055
84	7.00	0.33	0.074	(0.175)	0.019	0.055
85	7.08	0.33	0.074	(0.175)	0.019	0.055
86	7.17	0.33	0.074	(0.174)	0.019	0.055
87	7.25	0.33	0.074	(0.173)	0.019	0.055
88	7.33	0.37	0.081	(0.172)	0.021	0.060
89	7.42	0.37	0.081	(0.171)	0.021	0.060
90	7.50	0.37	0.081	(0.171)	0.021	0.060
91	7.58	0.40	0.089	(0.170)	0.023	0.066
92	7.67	0.40	0.089	(0.169)	0.023	0.066
93	7.75	0.40	0.089	(0.168)	0.023	0.066
94	7.83	0.43	0.096	(0.167)	0.025	0.071
95	7.92	0.43	0.096	(0.167)	0.025	0.071
96	8.00	0.43	0.096	(0.166)	0.025	0.071
97	8.08	0.50	0.111	(0.165)	0.029	0.082
98	8.17	0.50	0.111	(0.164)	0.029	0.082
99	8.25	0.50	0.111	(0.164)	0.029	0.082
100	8.33	0.50	0.111	(0.163)	0.029	0.082
101	8.42	0.50	0.111	(0.162)	0.029	0.082
102	8.50	0.50	0.111	(0.161)	0.029	0.082
103	8.58	0.53	0.118	(0.161)	0.031	0.088
104	8.67	0.53	0.118	(0.160)	0.031	0.088
105	8.75	0.53	0.118	(0.159)	0.031	0.088
106	8.83	0.57	0.126	(0.158)	0.033	0.093
107	8.92	0.57	0.126	(0.158)	0.033	0.093
108	9.00	0.57	0.126	(0.157)	0.033	0.093
109	9.08	0.63	0.141	(0.156)	0.037	0.104
110	9.17	0.63	0.141	(0.155)	0.037	0.104
111	9.25	0.63	0.141	(0.155)	0.037	0.104
112	9.33	0.67	0.148	(0.154)	0.038	0.110
113	9.42	0.67	0.148	(0.153)	0.038	0.110
114	9.50	0.67	0.148	(0.152)	0.038	0.110
115	9.58	0.70	0.155	(0.152)	0.040	0.115
116	9.67	0.70	0.155	(0.151)	0.040	0.115
117	9.75	0.70	0.155	(0.150)	0.040	0.115
118	9.83	0.73	0.163	(0.149)	0.042	0.120
119	9.92	0.73	0.163	(0.149)	0.042	0.120
120	10.00	0.73	0.163	(0.148)	0.042	0.120
121	10.08	0.50	0.111	(0.147)	0.029	0.082
122	10.17	0.50	0.111	(0.147)	0.029	0.082
123	10.25	0.50	0.111	(0.146)	0.029	0.082
124	10.33	0.50	0.111	(0.145)	0.029	0.082
125	10.42	0.50	0.111	(0.144)	0.029	0.082
126	10.50	0.50	0.111	(0.144)	0.029	0.082
127	10.58	0.67	0.148	(0.143)	0.038	0.110
128	10.67	0.67	0.148	(0.142)	0.038	0.110
129	10.75	0.67	0.148	(0.142)	0.038	0.110
130	10.83	0.67	0.148	(0.141)	0.038	0.110
131	10.92	0.67	0.148	(0.140)	0.038	0.110
132	11.00	0.67	0.148	(0.140)	0.038	0.110
133	11.08	0.63	0.141	(0.139)	0.037	0.104
134	11.17	0.63	0.141	(0.138)	0.037	0.104
135	11.25	0.63	0.141	(0.138)	0.037	0.104
136	11.33	0.63	0.141	(0.137)	0.037	0.104
137	11.42	0.63	0.141	(0.136)	0.037	0.104
138	11.50	0.63	0.141	(0.135)	0.037	0.104
139	11.58	0.57	0.126	(0.135)	0.033	0.093
140	11.67	0.57	0.126	(0.134)	0.033	0.093
141	11.75	0.57	0.126	(0.133)	0.033	0.093
142	11.83	0.60	0.133	(0.133)	0.035	0.099
143	11.92	0.60	0.133	(0.132)	0.035	0.099
144	12.00	0.60	0.133	(0.132)	0.035	0.099
145	12.08	0.83	0.185	(0.131)	0.048	0.137
146	12.17	0.83	0.185	(0.130)	0.048	0.137
147	12.25	0.83	0.185	(0.130)	0.048	0.137
148	12.33	0.87	0.192	(0.129)	0.050	0.142
149	12.42	0.87	0.192	(0.128)	0.050	0.142
150	12.50	0.87	0.192	(0.128)	0.050	0.142
151	12.58	0.93	0.207	(0.127)	0.054	0.153
152	12.67	0.93	0.207	(0.126)	0.054	0.153
153	12.75	0.93	0.207	(0.126)	0.054	0.153
154	12.83	0.97	0.215	(0.125)	0.056	0.159
155	12.92	0.97	0.215	(0.124)	0.056	0.159
156	13.00	0.97	0.215	(0.124)	0.056	0.159
157	13.08	1.13	0.252	(0.123)	0.065	0.186
158	13.17	1.13	0.252	(0.123)	0.065	0.186
159	13.25	1.13	0.252	(0.122)	0.065	0.186

160	13.33	1.13	0.252	(0.121)	0.065	0.186
161	13.42	1.13	0.252	(0.121)	0.065	0.186
162	13.50	1.13	0.252	(0.120)	0.065	0.186
163	13.58	0.77	0.170	(0.119)	0.044	0.126
164	13.67	0.77	0.170	(0.119)	0.044	0.126
165	13.75	0.77	0.170	(0.118)	0.044	0.126
166	13.83	0.77	0.170	(0.118)	0.044	0.126
167	13.92	0.77	0.170	(0.117)	0.044	0.126
168	14.00	0.77	0.170	(0.116)	0.044	0.126
169	14.08	0.90	0.200	(0.116)	0.052	0.148
170	14.17	0.90	0.200	(0.115)	0.052	0.148
171	14.25	0.90	0.200	(0.115)	0.052	0.148
172	14.33	0.87	0.192	(0.114)	0.050	0.142
173	14.42	0.87	0.192	(0.113)	0.050	0.142
174	14.50	0.87	0.192	(0.113)	0.050	0.142
175	14.58	0.87	0.192	(0.112)	0.050	0.142
176	14.67	0.87	0.192	(0.112)	0.050	0.142
177	14.75	0.87	0.192	(0.111)	0.050	0.142
178	14.83	0.83	0.185	(0.111)	0.048	0.137
179	14.92	0.83	0.185	(0.110)	0.048	0.137
180	15.00	0.83	0.185	(0.109)	0.048	0.137
181	15.08	0.80	0.178	(0.109)	0.046	0.131
182	15.17	0.80	0.178	(0.108)	0.046	0.131
183	15.25	0.80	0.178	(0.108)	0.046	0.131
184	15.33	0.77	0.170	(0.107)	0.044	0.126
185	15.42	0.77	0.170	(0.107)	0.044	0.126
186	15.50	0.77	0.170	(0.106)	0.044	0.126
187	15.58	0.63	0.141	(0.106)	0.037	0.104
188	15.67	0.63	0.141	(0.105)	0.037	0.104
189	15.75	0.63	0.141	(0.105)	0.037	0.104
190	15.83	0.63	0.141	(0.104)	0.037	0.104
191	15.92	0.63	0.141	(0.103)	0.037	0.104
192	16.00	0.63	0.141	(0.103)	0.037	0.104
193	16.08	0.13	0.030	(0.102)	0.008	0.022
194	16.17	0.13	0.030	(0.102)	0.008	0.022
195	16.25	0.13	0.030	(0.101)	0.008	0.022
196	16.33	0.13	0.030	(0.101)	0.008	0.022
197	16.42	0.13	0.030	(0.100)	0.008	0.022
198	16.50	0.13	0.030	(0.100)	0.008	0.022
199	16.58	0.10	0.022	(0.099)	0.006	0.016
200	16.67	0.10	0.022	(0.099)	0.006	0.016
201	16.75	0.10	0.022	(0.098)	0.006	0.016
202	16.83	0.10	0.022	(0.098)	0.006	0.016
203	16.92	0.10	0.022	(0.097)	0.006	0.016
204	17.00	0.10	0.022	(0.097)	0.006	0.016
205	17.08	0.17	0.037	(0.096)	0.010	0.027
206	17.17	0.17	0.037	(0.096)	0.010	0.027
207	17.25	0.17	0.037	(0.095)	0.010	0.027
208	17.33	0.17	0.037	(0.095)	0.010	0.027
209	17.42	0.17	0.037	(0.094)	0.010	0.027
210	17.50	0.17	0.037	(0.094)	0.010	0.027
211	17.58	0.17	0.037	(0.093)	0.010	0.027
212	17.67	0.17	0.037	(0.093)	0.010	0.027
213	17.75	0.17	0.037	(0.093)	0.010	0.027
214	17.83	0.13	0.030	(0.092)	0.008	0.022
215	17.92	0.13	0.030	(0.092)	0.008	0.022
216	18.00	0.13	0.030	(0.091)	0.008	0.022
217	18.08	0.13	0.030	(0.091)	0.008	0.022
218	18.17	0.13	0.030	(0.090)	0.008	0.022
219	18.25	0.13	0.030	(0.090)	0.008	0.022
220	18.33	0.13	0.030	(0.089)	0.008	0.022
221	18.42	0.13	0.030	(0.089)	0.008	0.022
222	18.50	0.13	0.030	(0.089)	0.008	0.022
223	18.58	0.10	0.022	(0.088)	0.006	0.016
224	18.67	0.10	0.022	(0.088)	0.006	0.016
225	18.75	0.10	0.022	(0.087)	0.006	0.016
226	18.83	0.07	0.015	(0.087)	0.004	0.011
227	18.92	0.07	0.015	(0.086)	0.004	0.011
228	19.00	0.07	0.015	(0.086)	0.004	0.011
229	19.08	0.10	0.022	(0.086)	0.006	0.016
230	19.17	0.10	0.022	(0.085)	0.006	0.016
231	19.25	0.10	0.022	(0.085)	0.006	0.016
232	19.33	0.13	0.030	(0.084)	0.008	0.022
233	19.42	0.13	0.030	(0.084)	0.008	0.022
234	19.50	0.13	0.030	(0.084)	0.008	0.022
235	19.58	0.10	0.022	(0.083)	0.006	0.016
236	19.67	0.10	0.022	(0.083)	0.006	0.016
237	19.75	0.10	0.022	(0.082)	0.006	0.016
238	19.83	0.07	0.015	(0.082)	0.004	0.011
239	19.92	0.07	0.015	(0.082)	0.004	0.011
240	20.00	0.07	0.015	(0.081)	0.004	0.011
241	20.08	0.10	0.022	(0.081)	0.006	0.016
242	20.17	0.10	0.022	(0.081)	0.006	0.016
243	20.25	0.10	0.022	(0.080)	0.006	0.016
244	20.33	0.10	0.022	(0.080)	0.006	0.016
245	20.42	0.10	0.022	(0.080)	0.006	0.016

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246  20.50     0.10      0.022       (  0.079)       0.006        0.016
247  20.58     0.10      0.022       (  0.079)       0.006        0.016
248  20.67     0.10      0.022       (  0.079)       0.006        0.016
249  20.75     0.10      0.022       (  0.078)       0.006        0.016
250  20.83     0.07      0.015       (  0.078)       0.004        0.011
251  20.92     0.07      0.015       (  0.078)       0.004        0.011
252  21.00     0.07      0.015       (  0.077)       0.004        0.011
253  21.08     0.10      0.022       (  0.077)       0.006        0.016
254  21.17     0.10      0.022       (  0.077)       0.006        0.016
255  21.25     0.10      0.022       (  0.076)       0.006        0.016
256  21.33     0.07      0.015       (  0.076)       0.004        0.011
257  21.42     0.07      0.015       (  0.076)       0.004        0.011
258  21.50     0.07      0.015       (  0.076)       0.004        0.011
259  21.58     0.10      0.022       (  0.075)       0.006        0.016
260  21.67     0.10      0.022       (  0.075)       0.006        0.016
261  21.75     0.10      0.022       (  0.075)       0.006        0.016
262  21.83     0.07      0.015       (  0.075)       0.004        0.011
263  21.92     0.07      0.015       (  0.074)       0.004        0.011
264  22.00     0.07      0.015       (  0.074)       0.004        0.011
265  22.08     0.10      0.022       (  0.074)       0.006        0.016
266  22.17     0.10      0.022       (  0.074)       0.006        0.016
267  22.25     0.10      0.022       (  0.073)       0.006        0.016
268  22.33     0.07      0.015       (  0.073)       0.004        0.011
269  22.42     0.07      0.015       (  0.073)       0.004        0.011
270  22.50     0.07      0.015       (  0.073)       0.004        0.011
271  22.58     0.07      0.015       (  0.072)       0.004        0.011
272  22.67     0.07      0.015       (  0.072)       0.004        0.011
273  22.75     0.07      0.015       (  0.072)       0.004        0.011
274  22.83     0.07      0.015       (  0.072)       0.004        0.011
275  22.92     0.07      0.015       (  0.072)       0.004        0.011
276  23.00     0.07      0.015       (  0.071)       0.004        0.011
277  23.08     0.07      0.015       (  0.071)       0.004        0.011
278  23.17     0.07      0.015       (  0.071)       0.004        0.011
279  23.25     0.07      0.015       (  0.071)       0.004        0.011
280  23.33     0.07      0.015       (  0.071)       0.004        0.011
281  23.42     0.07      0.015       (  0.071)       0.004        0.011
282  23.50     0.07      0.015       (  0.071)       0.004        0.011
283  23.58     0.07      0.015       (  0.070)       0.004        0.011
284  23.67     0.07      0.015       (  0.070)       0.004        0.011
285  23.75     0.07      0.015       (  0.070)       0.004        0.011
286  23.83     0.07      0.015       (  0.070)       0.004        0.011
287  23.92     0.07      0.015       (  0.070)       0.004        0.011
288  24.00     0.07      0.015       (  0.070)       0.004        0.011
               (Loss Rate Not Used)
    Sum =     100.0                                  Sum =    16.4
      Flood volume = Effective rainfall      1.37(In)
       times area       5.8(Ac.)/[(In)/(Ft.)] =       0.7(Ac.Ft)
      Total soil loss =      0.48(In)
      Total soil loss =     0.234(Ac.Ft)
      Total rainfall =      1.85(In)
      Flood volume =       29071.1 Cubic Feet
      Total soil loss =       10214.2 Cubic Feet
      ---------------------------------------------------------------------
       Peak flow rate of this hydrograph =      1.098(CFS)
      ---------------------------------------------------------------------
      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
                          24 - H O U R    S T O R M
                      R u n o f f      H y d r o g r a p h
      ---------------------------------------------------------------------
                  Hydrograph in   5   Minute intervals ((CFS))

      ---------------------------------------------------------------------
 Time(h+m) Volume Ac.Ft   Q(CFS)  0        2.5       5.0       7.5      10.0
 ---------------------------------------------------------------------------
   0+ 5       0.0003      0.04  Q         |         |         |         |
   0+10       0.0007      0.06  Q         |         |         |         |
   0+15       0.0011      0.06  Q         |         |         |         |
   0+20       0.0017      0.08  Q         |         |         |         |
   0+25       0.0024      0.10  Q         |         |         |         |
   0+30       0.0030      0.10  Q         |         |         |         |
   0+35       0.0037      0.10  Q         |         |         |         |
   0+40       0.0044      0.10  Q         |         |         |         |
   0+45       0.0050      0.10  Q         |         |         |         |
   0+50       0.0058      0.12  Q         |         |         |         |
   0+55       0.0067      0.13  Q         |         |         |         |
   1+ 0       0.0076      0.13  Q         |         |         |         |
   1+ 5       0.0083      0.11  Q         |         |         |         |
   1+10       0.0090      0.10  Q         |         |         |         |
   1+15       0.0097      0.10  Q         |         |         |         |
   1+20       0.0104      0.10  Q         |         |         |         |
   1+25       0.0110      0.10  Q         |         |         |         |
   1+30       0.0117      0.10  Q         |         |         |         |
   1+35       0.0124      0.10  Q         |         |         |         |
   1+40       0.0130      0.10  Q         |         |         |         |
   1+45       0.0137      0.10  Q         |         |         |         |
   1+50       0.0145      0.12  Q         |         |         |         |
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1+55       0.0154      0.13  Q          |          |          |          |
2+ 0       0.0163      0.13  Q          |          |          |          |
2+ 5       0.0171      0.13  QV         |          |          |          |
2+10       0.0180      0.13  QV         |          |          |          |
2+15       0.0189      0.13  QV         |          |          |          |
2+20       0.0198      0.13  QV         |          |          |          |
2+25       0.0207      0.13  QV         |          |          |          |
2+30       0.0216      0.13  QV         |          |          |          |
2+35       0.0226      0.15  QV         |          |          |          |
2+40       0.0237      0.16  QV         |          |          |          |
2+45       0.0248      0.16  QV         |          |          |          |
2+50       0.0259      0.16  QV         |          |          |          |
2+55       0.0271      0.16  QV         |          |          |          |
3+ 0       0.0282      0.16  QV         |          |          |          |
3+ 5       0.0293      0.16  QV         |          |          |          |
3+10       0.0304      0.16  QV         |          |          |          |
3+15       0.0315      0.16  QV         |          |          |          |
3+20       0.0326      0.16  QV         |          |          |          |
3+25       0.0337      0.16  Q V        |          |          |          |
3+30       0.0348      0.16  Q V        |          |          |          |
3+35       0.0360      0.16  Q V        |          |          |          |
3+40       0.0371      0.16  Q V        |          |          |          |
3+45       0.0382      0.16  Q V        |          |          |          |
3+50       0.0394      0.18  Q V        |          |          |          |
3+55       0.0407      0.19  Q V        |          |          |          |
4+ 0       0.0421      0.19  Q V        |          |          |          |
4+ 5       0.0434      0.19  Q V        |          |          |          |
4+10       0.0447      0.19  Q V        |          |          |          |
4+15       0.0461      0.19  Q V        |          |          |          |
4+20       0.0475      0.21  Q V        |          |          |          |
4+25       0.0491      0.22  Q V        |          |          |          |
4+30       0.0506      0.23  Q  V       |          |          |          |
4+35       0.0522      0.23  Q  V       |          |          |          |
4+40       0.0538      0.23  Q  V       |          |          |          |
4+45       0.0553      0.23  Q  V       |          |          |          |
4+50       0.0570      0.24  Q  V       |          |          |          |
4+55       0.0588      0.26  |Q V       |          |          |          |
5+ 0       0.0605      0.26  |Q V       |          |          |          |
5+ 5       0.0621      0.22  Q  V       |          |          |          |
5+10       0.0634      0.20  Q  V       |          |          |          |
5+15       0.0648      0.19  Q  V       |          |          |          |
5+20       0.0662      0.21  Q  V       |          |          |          |
5+25       0.0678      0.22  Q   V      |          |          |          |
5+30       0.0693      0.23  Q   V      |          |          |          |
5+35       0.0710      0.24  Q   V      |          |          |          |
5+40       0.0728      0.26  |Q  V      |          |          |          |
5+45       0.0746      0.26  |Q  V      |          |          |          |
5+50       0.0763      0.26  |Q  V      |          |          |          |
5+55       0.0781      0.26  |Q  V      |          |          |          |
6+ 0       0.0799      0.26  |Q  V      |          |          |          |
6+ 5       0.0818      0.28  |Q  V      |          |          |          |
6+10       0.0838      0.29  |Q   V     |          |          |          |
6+15       0.0858      0.29  |Q   V     |          |          |          |
6+20       0.0878      0.29  |Q   V     |          |          |          |
6+25       0.0898      0.29  |Q   V     |          |          |          |
6+30       0.0918      0.29  |Q   V     |          |          |          |
6+35       0.0939      0.31  |Q   V     |          |          |          |
6+40       0.0962      0.32  |Q   V     |          |          |          |
6+45       0.0984      0.32  |Q   V     |          |          |          |
6+50       0.1006      0.32  |Q    V    |          |          |          |
6+55       0.1028      0.32  |Q    V    |          |          |          |
7+ 0       0.1051      0.32  |Q    V    |          |          |          |
7+ 5       0.1073      0.32  |Q    V    |          |          |          |
7+10       0.1095      0.32  |Q    V    |          |          |          |
7+15       0.1117      0.32  |Q    V    |          |          |          |
7+20       0.1141      0.34  |Q    V    |          |          |          |
7+25       0.1165      0.35  |Q    V    |          |          |          |
7+30       0.1190      0.36  |Q     V   |          |          |          |
7+35       0.1215      0.37  |Q     V   |          |          |          |
7+40       0.1242      0.39  |Q     V   |          |          |          |
7+45       0.1269      0.39  |Q     V   |          |          |          |
7+50       0.1297      0.41  |Q     V   |          |          |          |
7+55       0.1325      0.42  |Q     V   |          |          |          |
8+ 0       0.1354      0.42  |Q      V  |          |          |          |
8+ 5       0.1386      0.46  |Q      V  |          |          |          |
8+10       0.1419      0.48  |Q      V  |          |          |          |
8+15       0.1452      0.48  |Q      V  |          |          |          |
8+20       0.1486      0.48  |Q      V  |          |          |          |
8+25       0.1519      0.48  |Q       V |          |          |          |
8+30       0.1552      0.48  |Q       V |          |          |          |
8+35       0.1587      0.50  | Q      V |          |          |          |
8+40       0.1623      0.51  | Q      V |          |          |          |
8+45       0.1658      0.52  | Q      V |          |          |          |
8+50       0.1695      0.54  | Q       V|          |          |          |
8+55       0.1733      0.55  | Q       V|          |          |          |
9+ 0       0.1771      0.55  | Q       V|          |          |          |
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9+ 5	0.1811	0.59	Q V
9+10	0.1853	0.61	Q V
9+15	0.1895	0.61	Q V
9+20	0.1939	0.63	Q V
9+25	0.1983	0.64	Q V
9+30	0.2028	0.65	Q V
9+35	0.2073	0.66	Q V
9+40	0.2120	0.68	Q V
9+45	0.2167	0.68	Q V
9+50	0.2215	0.70	Q V
9+55	0.2264	0.71	Q V
10+ 0	0.2312	0.71	Q V
10+ 5	0.2352	0.58	Q V
10+10	0.2387	0.50	Q V
10+15	0.2420	0.48	Q V
10+20	0.2453	0.48	Q V
10+25	0.2487	0.48	Q V
10+30	0.2520	0.48	Q V
10+35	0.2560	0.58	Q V
10+40	0.2604	0.64	Q V
10+45	0.2648	0.65	Q V
10+50	0.2693	0.65	Q V
10+55	0.2737	0.65	Q V
11+ 0	0.2782	0.65	Q V
11+ 5	0.2825	0.63	Q V
11+10	0.2867	0.62	Q V
11+15	0.2910	0.61	Q V
11+20	0.2952	0.61	Q V
11+25	0.2994	0.61	Q V
11+30	0.3036	0.61	Q V
11+35	0.3076	0.58	Q V
11+40	0.3114	0.55	Q V
11+45	0.3152	0.55	Q V
11+50	0.3191	0.57	Q V
11+55	0.3231	0.58	Q V
12+ 0	0.3271	0.58	Q V
12+ 5	0.3320	0.71	Q V
12+10	0.3375	0.79	Q V
12+15	0.3430	0.81	Q V
12+20	0.3487	0.83	Q V
12+25	0.3545	0.84	Q V
12+30	0.3603	0.84	Q V
12+35	0.3663	0.88	Q V
12+40	0.3725	0.90	Q V
12+45	0.3788	0.90	Q V
12+50	0.3851	0.92	Q V
12+55	0.3916	0.93	Q V
13+ 0	0.3980	0.94	Q V
13+ 5	0.4051	1.03	Q V
13+10	0.4126	1.09	Q V
13+15	0.4202	1.10	Q V
13+20	0.4277	1.10	Q V
13+25	0.4353	1.10	Q V
13+30	0.4429	1.10	Q V
13+35	0.4490	0.89	Q V
13+40	0.4543	0.76	Q V
13+45	0.4594	0.74	Q V
13+50	0.4645	0.74	Q V
13+55	0.4696	0.74	Q V
14+ 0	0.4747	0.74	Q V
14+ 5	0.4804	0.82	Q V
14+10	0.4863	0.86	Q V
14+15	0.4923	0.87	Q V
14+20	0.4982	0.85	Q V
14+25	0.5040	0.84	Q V
14+30	0.5098	0.84	Q V
14+35	0.5156	0.84	Q V
14+40	0.5214	0.84	Q V
14+45	0.5271	0.84	Q V
14+50	0.5328	0.82	Q V
14+55	0.5384	0.81	Q V
15+ 0	0.5439	0.81	Q V
15+ 5	0.5494	0.79	Q V
15+10	0.5547	0.78	Q V
15+15	0.5601	0.78	Q V
15+20	0.5653	0.76	Q V
15+25	0.5704	0.74	Q V
15+30	0.5755	0.74	Q V
15+35	0.5801	0.67	Q V
15+40	0.5844	0.62	Q V
15+45	0.5886	0.61	Q V
15+50	0.5928	0.61	Q V
15+55	0.5971	0.61	Q V
16+ 0	0.6013	0.61	Q V
16+ 5	0.6036	0.33	Q V
16+10	0.6047	0.16	Q V

16+15	0.6056	0.13	Q	|	|	|	V |
16+20	0.6064	0.13	Q	|	|	|	V |
16+25	0.6073	0.13	Q	|	|	|	V |
16+30	0.6082	0.13	Q	|	|	|	V |
16+35	0.6090	0.11	Q	|	|	|	V |
16+40	0.6097	0.10	Q	|	|	|	V |
16+45	0.6103	0.10	Q	|	|	|	V |
16+50	0.6110	0.10	Q	|	|	|	V |
16+55	0.6117	0.10	Q	|	|	|	V |
17+ 0	0.6123	0.10	Q	|	|	|	V |
17+ 5	0.6133	0.13	Q	|	|	|	V |
17+10	0.6143	0.16	Q	|	|	|	V |
17+15	0.6155	0.16	Q	|	|	|	V |
17+20	0.6166	0.16	Q	|	|	|	V |
17+25	0.6177	0.16	Q	|	|	|	V |
17+30	0.6188	0.16	Q	|	|	|	V |
17+35	0.6199	0.16	Q	|	|	|	V |
17+40	0.6210	0.16	Q	|	|	|	V |
17+45	0.6221	0.16	Q	|	|	|	V |
17+50	0.6231	0.14	Q	|	|	|	V |
17+55	0.6240	0.13	Q	|	|	|	V |
18+ 0	0.6249	0.13	Q	|	|	|	V |
18+ 5	0.6258	0.13	Q	|	|	|	V |
18+10	0.6267	0.13	Q	|	|	|	V |
18+15	0.6276	0.13	Q	|	|	|	V |
18+20	0.6285	0.13	Q	|	|	|	V |
18+25	0.6294	0.13	Q	|	|	|	V |
18+30	0.6302	0.13	Q	|	|	|	V |
18+35	0.6310	0.11	Q	|	|	|	V |
18+40	0.6317	0.10	Q	|	|	|	V |
18+45	0.6324	0.10	Q	|	|	|	V |
18+50	0.6329	0.08	Q	|	|	|	V |
18+55	0.6334	0.07	Q	|	|	|	V |
19+ 0	0.6338	0.06	Q	|	|	|	V |
19+ 5	0.6344	0.08	Q	|	|	|	V |
19+10	0.6350	0.10	Q	|	|	|	V |
19+15	0.6357	0.10	Q	|	|	|	V |
19+20	0.6365	0.12	Q	|	|	|	V |
19+25	0.6374	0.13	Q	|	|	|	V |
19+30	0.6383	0.13	Q	|	|	|	V |
19+35	0.6390	0.11	Q	|	|	|	V |
19+40	0.6397	0.10	Q	|	|	|	V |
19+45	0.6404	0.10	Q	|	|	|	V |
19+50	0.6409	0.08	Q	|	|	|	V |
19+55	0.6414	0.07	Q	|	|	|	V |
20+ 0	0.6418	0.06	Q	|	|	|	V |
20+ 5	0.6424	0.08	Q	|	|	|	V |
20+10	0.6430	0.10	Q	|	|	|	V |
20+15	0.6437	0.10	Q	|	|	|	V |
20+20	0.6444	0.10	Q	|	|	|	V |
20+25	0.6450	0.10	Q	|	|	|	V |
20+30	0.6457	0.10	Q	|	|	|	V |
20+35	0.6464	0.10	Q	|	|	|	V |
20+40	0.6470	0.10	Q	|	|	|	V |
20+45	0.6477	0.10	Q	|	|	|	V |
20+50	0.6482	0.08	Q	|	|	|	V |
20+55	0.6487	0.07	Q	|	|	|	V |
21+ 0	0.6491	0.06	Q	|	|	|	V |
21+ 5	0.6497	0.08	Q	|	|	|	V |
21+10	0.6504	0.10	Q	|	|	|	V |
21+15	0.6510	0.10	Q	|	|	|	V|
21+20	0.6516	0.08	Q	|	|	|	V|
21+25	0.6520	0.07	Q	|	|	|	V|
21+30	0.6525	0.06	Q	|	|	|	V|
21+35	0.6531	0.08	Q	|	|	|	V|
21+40	0.6537	0.10	Q	|	|	|	V|
21+45	0.6544	0.10	Q	|	|	|	V|
21+50	0.6549	0.08	Q	|	|	|	V|
21+55	0.6554	0.07	Q	|	|	|	V|
22+ 0	0.6558	0.06	Q	|	|	|	V|
22+ 5	0.6564	0.08	Q	|	|	|	V|
22+10	0.6571	0.10	Q	|	|	|	V|
22+15	0.6577	0.10	Q	|	|	|	V|
22+20	0.6583	0.08	Q	|	|	|	V|
22+25	0.6587	0.07	Q	|	|	|	V|
22+30	0.6592	0.06	Q	|	|	|	V|
22+35	0.6596	0.06	Q	|	|	|	V|
22+40	0.6600	0.06	Q	|	|	|	V|
22+45	0.6605	0.06	Q	|	|	|	V|
22+50	0.6609	0.06	Q	|	|	|	V|
22+55	0.6614	0.06	Q	|	|	|	V|
23+ 0	0.6618	0.06	Q	|	|	|	V|
23+ 5	0.6623	0.06	Q	|	|	|	V|
23+10	0.6627	0.06	Q	|	|	|	V|
23+15	0.6632	0.06	Q	|	|	|	V|
23+20	0.6636	0.06	Q	|	|	|	V|

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   23+25       0.6641      0.06  Q          |          |          |         V|
   23+30       0.6645      0.06  Q          |          |          |         V|
   23+35       0.6649      0.06  Q          |          |          |         V|
   23+40       0.6654      0.06  Q          |          |          |         V|
   23+45       0.6658      0.06  Q          |          |          |         V|
   23+50       0.6663      0.06  Q          |          |          |         V|
   23+55       0.6667      0.06  Q          |          |          |         V|
   24+ 0       0.6672      0.06  Q          |          |          |         V|
   24+ 5       0.6674      0.03  Q          |          |          |         V|
   24+10       0.6674      0.00  Q          |          |          |          V
-------------------------------------------------------------------------------
```

Detention Basin Storm Event Summary								
Storm Event	Existing		Proposed		Routed			Ex (cfs) +10% Difference Max
	Volume (ac.ft.)	cfs	Volume (ac.ft.)	cfs	Volume (ac.ft.)	cfs	Depth (ft)	
2yr24hr	0.4509	0.742	0.6674	1.098	0.201	0.617	1.70	-14.3%

Extended Detention Basin 1 Size and Flow Calculations

	BASIN PARAMETERS							OUTLET					
	Basin Elevation	Depth	Area S.F.	Volume C.F.	Volume AC-FT	Chamber Volume C.F.	Effective Volume AC-FT	Q_1 Orifice Plate (cfs)	Q_2 Orifice Plate (cfs)	Q_3Orifice Plate (cfs)	Q Weir 1 (cfs)	Q Weir 2 (cfs)	Q Total (cfs)
TOP OF BASIN	775.0	4.0	9,448	27,262	0.626	0	0.626	1.010	0.000	0.000	97.882	53.280	152.172
Q100 OUTLET	774.5	3.5	8,843	22,689	0.521	0	0.521	0.941	0.000	0.000	53.280	18.837	73.058
	774.0	3.0	8,238	18,419	0.423	0	0.423	0.865	0.000	0.000	18.837	0.000	19.703
STOARAGE	773.5	2.5	7,668	14,443	0.332	0	0.332	0.783	0.000	0.000	0.000	0.000	0.783
	773.0	2.0	7,098	10,751	0.247	0	0.247	0.690	0.000	0.000	0.000	0.000	0.690
	772.0	1.0	6,009	4,198	0.096	0	0.096	0.452	0.000	0.000	0.000	0.000	0.452
BOTTOM STAGE	771.0	0.0	2,386	0	0.000	0	0.000	0.000	0.000	0.000	0.000	0.000	0.000

SUPPORTING DESIGN PARAMETERS

Orifice Coefficient	0.66		Dia of Orifice (in)	4.25			
Gravimetric Constant	32.2	ft/s^2	Eff Dia of Orifice (ft)	0.3542	0.0000	0.0000	
Number of Rows	1		Area of Orifice (sf)	0.0985	0.0000	0.0000	
Minimum Orifice Plate Height			Number of Orifeces	1	1	1	
Minimum Orifice Plate Width			Centroid Elev	771.25			

Sharp Crest Weir Coefficient	3.33		
Length of Weir	16.00	16	
Elev. at Crest of Weir	773.5	774.0	
VBMP	67,433	cf	

Orifice Equation

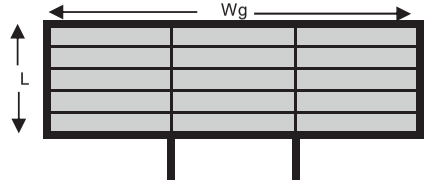
$Q=Cd(1/4\pi D2)\sqrt{2gh}$

Weir Equation

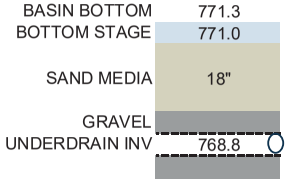
$(Q/(\text{Weir Length}* \text{Weir Coefficent}))^{(2/3)}$

Outlet Weir Calc (Q100)		
Grated Catch Basin		
Crest Wier Elev.	773.5	
Q100	16.62	cfs
Weir Length	16.00	ft
Weir Coeff.	3.33	
H Weir	0.46	ft
Q100 Elevation	**774.0**	

Standard	APWA 305-4	Surface Area	76.5 sf
No. of Grates	12	Perimeter	57.82 ft
L=	2.95 ft		
Wg=	26.0 ft		



Emergency Overflow Weir Calc (Q100)		
Concrete Spillway		
Crest Wier Elev.	774.0	`
Q100	16.62	cfs
Weir Length	16	ft
Weir Coeff.	3.33	
H Weir	0.46	ft
Q100 WS Elevation	**774.5**	
Top of Basin	775.0	
Basin Freeboard	**0.5**	**ft**



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                    FLOOD HYDROGRAPH ROUTING PROGRAM
                Copyright (c) CIVILCADD/CIVILDESIGN, 1989 - 2004
                            Study date: 09/22/25

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



      Program License Serial Number 5006

      ---------------------------------------------------------------------
      ********************* HYDROGRAPH INFORMATION **********************

                  From study/file name: PRO12242.rte
      ****************************HYDROGRAPH DATA****************************
                  Number of intervals =   290
                  Time interval =    5.0 (Min.)
                  Maximum/Peak flow rate =        1.098 (CFS)
                  Total volume =       0.667 (Ac.Ft)
            Status of hydrographs being held in storage
                        Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
            Peak (CFS)      0.000     0.000     0.000     0.000     0.000
            Vol (Ac.Ft)     0.000     0.000     0.000     0.000     0.000
      ***********************************************************************



      +++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++++
      Process from Point/Station        1.000 to Point/Station        2.000
      **** RETARDING BASIN ROUTING ****
      _______________________________________________________________________

      User entry of depth-outflow-storage data
      ---------------------------------------------------------------------
      Total number of inflow hydrograph intervals = 290
      Hydrograph time unit =  5.000 (Min.)
      Initial depth in storage basin =   0.00(Ft.)
      ---------------------------------------------------------------------
      ---------------------------------------------------------------------
      Initial basin depth =   0.00 (Ft.)
      Initial basin storage =      0.00 (Ac.Ft)
      Initial basin outflow =   0.00 (CFS)
      ---------------------------------------------------------------------
      ---------------------------------------------------------------------
      Depth vs. Storage and Depth vs. Discharge data:
       Basin Depth  Storage    Outflow   (S-O*dt/2)   (S+O*dt/2)
            (Ft.)    (Ac.Ft)    (CFS)     (Ac.Ft)    (Ac.Ft)
      ---------------------------------------------------------------------
         0.000      0.000      0.000      0.000        0.000
         1.000      0.096      0.452      0.094        0.098
         2.000      0.247      0.690      0.245        0.249
         2.500      0.332      0.782      0.329        0.335
         3.000      0.423     19.700      0.355        0.491
         3.500      0.521     73.058      0.269        0.773
         4.000      0.626    152.172      0.102        1.150
      ---------------------------------------------------------------------
                     Hydrograph Detention Basin Routing
      ---------------------------------------------------------------------

      Graph values: 'I'= unit inflow; 'O'=outflow at time shown
      ---------------------------------------------------------------------
       Time   Inflow  Outflow    Storage                                  Depth
      (Hours)  (CFS)   (CFS)     (Ac.Ft) .0       0.3    0.55    0.82    1.10 (Ft.)
       0.083    0.04    0.00      0.000  OI      |       |       |       |     0.00
       0.167    0.06    0.00      0.000  OI      |       |       |       |     0.00
       0.250    0.06    0.00      0.001  OI      |       |       |       |     0.01
       0.333    0.08    0.01      0.001  O I     |       |       |       |     0.01
       0.417    0.10    0.01      0.002  O I     |       |       |       |     0.02
       0.500    0.10    0.01      0.002  O I     |       |       |       |     0.03
       0.583    0.10    0.01      0.003  O I     |       |       |       |     0.03
       0.667    0.10    0.02      0.004  O I     |       |       |       |     0.04
       0.750    0.10    0.02      0.004  O I     |       |       |       |     0.04
       0.833    0.12    0.02      0.005  O  I    |       |       |       |     0.05
       0.917    0.13    0.03      0.005  O  I    |       |       |       |     0.06
       1.000    0.13    0.03      0.006  O  I    |       |       |       |     0.06
       1.083    0.11    0.03      0.007  O  I    |       |       |       |     0.07
       1.167    0.10    0.03      0.007  O I     |       |       |       |     0.08
       1.250    0.10    0.04      0.008  |OI     |       |       |       |     0.08
       1.333    0.10    0.04      0.008  |OI     |       |       |       |     0.08
       1.417    0.10    0.04      0.008  |OI     |       |       |       |     0.09
       1.500    0.10    0.04      0.009  |OI     |       |       |       |     0.09
       1.583    0.10    0.04      0.009  |OI     |       |       |       |     0.10
       1.667    0.10    0.05      0.010  |OI     |       |       |       |     0.10
```

1.750	0.10	0.05	0.010	oI					0.10
1.833	0.12	0.05	0.010	o I					0.11
1.917	0.13	0.05	0.011	o I					0.11
2.000	0.13	0.05	0.011	o I					0.12
2.083	0.13	0.06	0.012	o I					0.12
2.167	0.13	0.06	0.012	o I					0.13
2.250	0.13	0.06	0.013	o I					0.13
2.333	0.13	0.06	0.013	o I					0.14
2.417	0.13	0.06	0.014	o I					0.14
2.500	0.13	0.07	0.014	o I					0.15
2.583	0.15	0.07	0.015	o I					0.15
2.667	0.16	0.07	0.015	o I					0.16
2.750	0.16	0.07	0.016	o I					0.17
2.833	0.16	0.08	0.016	o I					0.17
2.917	0.16	0.08	0.017	o I					0.18
3.000	0.16	0.08	0.018	o I					0.18
3.083	0.16	0.09	0.018	o I					0.19
3.167	0.16	0.09	0.019	o I					0.19
3.250	0.16	0.09	0.019	o I					0.20
3.333	0.16	0.09	0.020	o I					0.20
3.417	0.16	0.09	0.020	o I					0.21
3.500	0.16	0.10	0.021	o I					0.21
3.583	0.16	0.10	0.021	o I					0.22
3.667	0.16	0.10	0.021	o I					0.22
3.750	0.16	0.10	0.022	o I					0.23
3.833	0.18	0.10	0.022	o I					0.23
3.917	0.19	0.11	0.023	o I					0.24
4.000	0.19	0.11	0.023	o I					0.24
4.083	0.19	0.11	0.024	o I					0.25
4.167	0.19	0.12	0.025	o I					0.26
4.250	0.19	0.12	0.025	o I					0.26
4.333	0.21	0.12	0.026	o I					0.27
4.417	0.22	0.12	0.026	o I					0.27
4.500	0.23	0.13	0.027	o I					0.28
4.583	0.23	0.13	0.028	o I					0.29
4.667	0.23	0.13	0.028	o I					0.29
4.750	0.23	0.14	0.029	o I					0.30
4.833	0.24	0.14	0.030	o I					0.31
4.917	0.26	0.14	0.030	o I					0.32
5.000	0.26	0.15	0.031	o I					0.32
5.083	0.22	0.15	0.032	o I					0.33
5.167	0.20	0.15	0.032	oI					0.34
5.250	0.19	0.15	0.032	oI					0.34
5.333	0.21	0.15	0.033	o I					0.34
5.417	0.22	0.16	0.033	o I					0.35
5.500	0.23	0.16	0.034	o I					0.35
5.583	0.24	0.16	0.034	o I					0.36
5.667	0.26	0.16	0.035	o I					0.36
5.750	0.26	0.17	0.035	o I					0.37
5.833	0.26	0.17	0.036	o I					0.38
5.917	0.26	0.17	0.037	o I					0.38
6.000	0.26	0.18	0.037	o I					0.39
6.083	0.28	0.18	0.038	o I					0.39
6.167	0.29	0.18	0.039	o I					0.40
6.250	0.29	0.19	0.039	o I					0.41
6.333	0.29	0.19	0.040	o I					0.42
6.417	0.29	0.19	0.041	o I					0.42
6.500	0.29	0.19	0.041	o I					0.43
6.583	0.31	0.20	0.042	o I					0.44
6.667	0.32	0.20	0.043	o I					0.45
6.750	0.32	0.21	0.044	o I					0.46
6.833	0.32	0.21	0.045	o I					0.46
6.917	0.32	0.21	0.045	o I					0.47
7.000	0.32	0.22	0.046	o I					0.48
7.083	0.32	0.22	0.047	o I					0.49
7.167	0.32	0.22	0.047	o I					0.49
7.250	0.32	0.23	0.048	o I					0.50
7.333	0.34	0.23	0.049	o I					0.51
7.417	0.35	0.23	0.050	o I					0.52
7.500	0.36	0.24	0.050	o I					0.53
7.583	0.37	0.24	0.051	o I					0.53
7.667	0.39	0.25	0.052	o I					0.54
7.750	0.39	0.25	0.053	o I					0.55
7.833	0.41	0.26	0.054	o I					0.56
7.917	0.42	0.26	0.055	o I					0.58
8.000	0.42	0.27	0.056	o I					0.59
8.083	0.46	0.27	0.058	o I					0.60
8.167	0.48	0.28	0.059	o I					0.61
8.250	0.48	0.28	0.060	o I					0.63
8.333	0.48	0.29	0.062	o I					0.64
8.417	0.48	0.30	0.063	o I					0.66
8.500	0.48	0.30	0.064	o I					0.67
8.583	0.50	0.31	0.066	o I					0.68
8.667	0.51	0.31	0.067	o I					0.70
8.750	0.52	0.32	0.068	o I					0.71
8.833	0.54	0.33	0.070	o I					0.73

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 8.917    0.55    0.33      0.071  |        |o     I|        |        |     0.74
 9.000    0.55    0.34      0.073  |        |o      I        |        |     0.76
 9.083    0.59    0.35      0.074  |        | o     |I       |        |     0.77
 9.167    0.61    0.36      0.076  |        | o     |I       |        |     0.79
 9.250    0.61    0.36      0.077  |        | o     |I       |        |     0.81
 9.333    0.63    0.37      0.079  |        | o     | I      |        |     0.83
 9.417    0.64    0.38      0.081  |        |  o    | I      |        |     0.84
 9.500    0.65    0.39      0.083  |        |  o    | I      |        |     0.86
 9.583    0.66    0.40      0.085  |        |  o    |  I     |        |     0.88
 9.667    0.68    0.41      0.086  |        |  o    |  I     |        |     0.90
 9.750    0.68    0.42      0.088  |        |   o   |  I     |        |     0.92
 9.833    0.70    0.42      0.090  |        |   o   |   I    |        |     0.94
 9.917    0.71    0.43      0.092  |        |   o   |   I    |        |     0.96
10.000    0.71    0.44      0.094  |        |   o   |   I    |        |     0.98
10.083    0.58    0.45      0.095  |        |    o  I        |        |     0.99
10.167    0.50    0.45      0.096  |        |    oI |        |        |     1.00
10.250    0.48    0.45      0.096  |        |    oI |        |        |     1.00
10.333    0.48    0.45      0.096  |        |    oI |        |        |     1.00
10.417    0.48    0.45      0.097  |        |    oI |        |        |     1.00
10.500    0.48    0.45      0.097  |        |    oI |        |        |     1.01
10.583    0.58    0.45      0.097  |        |    o  I        |        |     1.01
10.667    0.64    0.46      0.098  |        |    o  | I      |        |     1.02
10.750    0.65    0.46      0.100  |        |    o  | I      |        |     1.02
10.833    0.65    0.46      0.101  |        |    o  | I      |        |     1.03
10.917    0.65    0.46      0.102  |        |    o  | I      |        |     1.04
11.000    0.65    0.46      0.103  |        |    o  | I      |        |     1.05
11.083    0.63    0.47      0.105  |        |    o  | I      |        |     1.06
11.167    0.62    0.47      0.106  |        |    o  |I       |        |     1.06
11.250    0.61    0.47      0.107  |        |    o  |I       |        |     1.07
11.333    0.61    0.47      0.108  |        |    o  |I       |        |     1.08
11.417    0.61    0.47      0.109  |        |    o  |I       |        |     1.08
11.500    0.61    0.47      0.110  |        |    o  |I       |        |     1.09
11.583    0.58    0.47      0.111  |        |    o  I        |        |     1.10
11.667    0.55    0.48      0.111  |        |    o  I        |        |     1.10
11.750    0.55    0.48      0.112  |        |    o  I        |        |     1.10
11.833    0.57    0.48      0.112  |        |    o  I        |        |     1.11
11.917    0.58    0.48      0.113  |        |    o  I        |        |     1.11
12.000    0.58    0.48      0.114  |        |    o  I        |        |     1.12
12.083    0.71    0.48      0.115  |        |     o |   I    |        |     1.12
12.167    0.79    0.48      0.117  |        |     o |      I|        |     1.14
12.250    0.81    0.49      0.119  |        |     o |      I|        |     1.15
12.333    0.83    0.49      0.121  |        |     o |       I        |     1.17
12.417    0.84    0.50      0.123  |        |     o |       I        |     1.18
12.500    0.84    0.50      0.126  |        |     o |       I        |     1.20
12.583    0.88    0.50      0.128  |        |     o |        |I      |     1.21
12.667    0.90    0.51      0.131  |        |     o |        | I     |     1.23
12.750    0.90    0.51      0.134  |        |     o |        | I     |     1.25
12.833    0.92    0.52      0.136  |        |      o|        | I     |     1.27
12.917    0.93    0.52      0.139  |        |      o|        |  I    |     1.29
13.000    0.94    0.52      0.142  |        |      o|        |  I    |     1.30
13.083    1.03    0.53      0.145  |        |      o|        |     I |     1.33
13.167    1.09    0.54      0.149  |        |      o|        |      I|     1.35
13.250    1.10    0.54      0.153  |        |      o|        |       I     1.37
13.333    1.10    0.55      0.156  |        |      o|        |       I     1.40
13.417    1.10    0.55      0.160  |        |       o        |       I     1.42
13.500    1.10    0.56      0.164  |        |       o        |       I     1.45
13.583    0.89    0.56      0.167  |        |       o        | I     |     1.47
13.667    0.76    0.57      0.169  |        |       o     I  |       |     1.48
13.750    0.74    0.57      0.170  |        |       o    I   |       |     1.49
13.833    0.74    0.57      0.171  |        |       o    I   |       |     1.50
13.917    0.74    0.57      0.172  |        |       o    I   |       |     1.51
14.000    0.74    0.57      0.173  |        |       o    I   |       |     1.51
14.083    0.82    0.58      0.175  |        |       o      I|       |     1.52
14.167    0.86    0.58      0.177  |        |       o       |I      |     1.53
14.250    0.87    0.58      0.179  |        |       o       |I      |     1.55
14.333    0.85    0.59      0.181  |        |        |o      I       |     1.56
14.417    0.84    0.59      0.182  |        |        |o      I       |     1.57
14.500    0.84    0.59      0.184  |        |        |o      I       |     1.58
14.583    0.84    0.59      0.186  |        |        |o      I       |     1.60
14.667    0.84    0.60      0.188  |        |        |o      I       |     1.61
14.750    0.84    0.60      0.189  |        |        |o      I       |     1.62
14.833    0.82    0.60      0.191  |        |        |o     I|       |     1.63
14.917    0.81    0.60      0.192  |        |        |o     I|       |     1.64
15.000    0.81    0.61      0.194  |        |        |o     I|       |     1.65
15.083    0.79    0.61      0.195  |        |        |o    I |       |     1.66
15.167    0.78    0.61      0.196  |        |        |o    I |       |     1.66
15.250    0.78    0.61      0.197  |        |        |o    I |       |     1.67
15.333    0.76    0.61      0.198  |        |        |o    I |       |     1.68
15.417    0.74    0.61      0.199  |        |        |o   I  |       |     1.68
15.500    0.74    0.62      0.200  |        |        |o   I  |       |     1.69
15.583    0.67    0.62      0.201  |        |        |o I    |       |     1.69
15.667    0.62    0.62      0.201  |        |        |oI     |       |     1.70
15.750    0.61    0.62      0.201  |        |        |o      |       |     1.70
15.833    0.61    0.62      0.201  |        |        |o      |       |     1.70
15.917    0.61    0.62      0.201  |        |        |o      |       |     1.69
16.000    0.61    0.62      0.201  |        |        |o      |       |     1.69
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16.083    0.33    0.62      0.200  |        |I       |o       |        |      1.69
16.167    0.16    0.61      0.197  |    I   |        |o       |        |      1.67
16.250    0.13    0.61      0.194  |   I    |        |o       |        |      1.65
16.333    0.13    0.60      0.191  |   I    |        |o       |        |      1.63
16.417    0.13    0.60      0.188  |   I    |        |o       |        |      1.61
16.500    0.13    0.59      0.184  |   I    |        |o       |        |      1.59
16.583    0.11    0.59      0.181  |   I    |        |o       |        |      1.56
16.667    0.10    0.58      0.178  | I      |        o       |        |      1.54
16.750    0.10    0.58      0.175  | I      |        o       |        |      1.52
16.833    0.10    0.57      0.171  | I      |        o       |        |      1.50
16.917    0.10    0.57      0.168  | I      |        o       |        |      1.48
17.000    0.10    0.56      0.165  | I      |        o       |        |      1.46
17.083    0.13    0.56      0.162  |  I     |        o       |        |      1.44
17.167    0.16    0.55      0.159  |    I   |        o       |        |      1.42
17.250    0.16    0.55      0.156  |    I   |       o|       |        |      1.40
17.333    0.16    0.54      0.154  |    I   |       o|       |        |      1.38
17.417    0.16    0.54      0.151  |    I   |       o|       |        |      1.36
17.500    0.16    0.53      0.149  |    I   |       o|       |        |      1.35
17.583    0.16    0.53      0.146  |    I   |       o|       |        |      1.33
17.667    0.16    0.53      0.143  |    I   |       o|       |        |      1.31
17.750    0.16    0.52      0.141  |    I   |       o|       |        |      1.30
17.833    0.14    0.52      0.138  |    I   |       o|       |        |      1.28
17.917    0.13    0.51      0.136  |   I    |      o |       |        |      1.26
18.000    0.13    0.51      0.133  |   I    |      o |       |        |      1.25
18.083    0.13    0.51      0.131  |   I    |      o |       |        |      1.23
18.167    0.13    0.50      0.128  |   I    |      o |       |        |      1.21
18.250    0.13    0.50      0.125  |   I    |      o |       |        |      1.19
18.333    0.13    0.49      0.123  |   I    |      o |       |        |      1.18
18.417    0.13    0.49      0.120  |   I    |      o |       |        |      1.16
18.500    0.13    0.49      0.118  |   I    |      o |       |        |      1.14
18.583    0.11    0.48      0.115  |   I    |      o |       |        |      1.13
18.667    0.10    0.48      0.113  | I      |     o  |       |        |      1.11
18.750    0.10    0.47      0.110  | I      |     o  |       |        |      1.09
18.833    0.08    0.47      0.108  | I      |     o  |       |        |      1.08
18.917    0.07    0.47      0.105  |I       |     o  |       |        |      1.06
19.000    0.06    0.46      0.102  |I       |     o  |       |        |      1.04
19.083    0.08    0.46      0.099  | I      |     o  |       |        |      1.02
19.167    0.10    0.45      0.097  | I      |     o  |       |        |      1.01
19.250    0.10    0.44      0.094  | I      |    o   |       |        |      0.98
19.333    0.12    0.43      0.092  |  I     |    o   |       |        |      0.96
19.417    0.13    0.42      0.090  |  I     |    o   |       |        |      0.94
19.500    0.13    0.41      0.088  |  I     |    o   |       |        |      0.92
19.583    0.11    0.41      0.086  |  I     |   o    |       |        |      0.90
19.667    0.10    0.40      0.084  | I      |   o    |       |        |      0.88
19.750    0.10    0.39      0.082  | I      |   o    |       |        |      0.85
19.833    0.08    0.38      0.080  | I      |  o     |       |        |      0.83
19.917    0.07    0.37      0.078  |I       |  o     |       |        |      0.81
20.000    0.06    0.36      0.076  |I       |  o     |       |        |      0.79
20.083    0.08    0.35      0.074  | I      |  o     |       |        |      0.77
20.167    0.10    0.34      0.072  | I      |o       |       |        |      0.75
20.250    0.10    0.33      0.071  | I      |o       |       |        |      0.73
20.333    0.10    0.32      0.069  | I      |o       |       |        |      0.72
20.417    0.10    0.32      0.067  | I      |o       |       |        |      0.70
20.500    0.10    0.31      0.066  | I      |o       |       |        |      0.69
20.583    0.10    0.30      0.064  | I      o        |       |        |      0.67
20.667    0.10    0.30      0.063  | I      o        |       |        |      0.66
20.750    0.10    0.29      0.062  | I      o        |       |        |      0.64
20.833    0.08    0.28      0.060  | I      o        |       |        |      0.63
20.917    0.07    0.28      0.059  |I       o        |       |        |      0.61
21.000    0.06    0.27      0.057  |I      o|        |       |        |      0.60
21.083    0.08    0.26      0.056  | I     o|        |       |        |      0.58
21.167    0.10    0.26      0.055  | I     o|        |       |        |      0.57
21.250    0.10    0.25      0.054  | I     o|        |       |        |      0.56
21.333    0.08    0.25      0.053  | I     o|        |       |        |      0.55
21.417    0.07    0.24      0.052  |I      o|        |       |        |      0.54
21.500    0.06    0.24      0.050  |I     o |        |       |        |      0.52
21.583    0.08    0.23      0.049  | I    o |        |       |        |      0.51
21.667    0.10    0.23      0.048  | I    o |        |       |        |      0.50
21.750    0.10    0.22      0.047  | I    o |        |       |        |      0.49
21.833    0.08    0.22      0.046  | I    o |        |       |        |      0.48
21.917    0.07    0.21      0.045  |I     o |        |       |        |      0.47
22.000    0.06    0.21      0.044  |I     o |        |       |        |      0.46
22.083    0.08    0.20      0.044  | I  o   |        |       |        |      0.45
22.167    0.10    0.20      0.043  | I  o   |        |       |        |      0.45
22.250    0.10    0.20      0.042  | I  o   |        |       |        |      0.44
22.333    0.08    0.19      0.041  | I  o   |        |       |        |      0.43
22.417    0.07    0.19      0.040  |I   o   |        |       |        |      0.42
22.500    0.06    0.19      0.040  |I   o   |        |       |        |      0.41
22.583    0.06    0.18      0.039  |I   o   |        |       |        |      0.40
22.667    0.06    0.18      0.038  |I   o   |        |       |        |      0.40
22.750    0.06    0.18      0.037  |I   o   |        |       |        |      0.39
22.833    0.06    0.17      0.036  |I   o   |        |       |        |      0.38
22.917    0.06    0.17      0.036  |I  o    |        |       |        |      0.37
23.000    0.06    0.16      0.035  |I  o    |        |       |        |      0.36
23.083    0.06    0.16      0.034  |I  o    |        |       |        |      0.36
23.167    0.06    0.16      0.034  |I  o    |        |       |        |      0.35
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23.250    0.06    0.16      0.033  |I  O   |       |       |       |     0.34
23.333    0.06    0.15      0.032  |I  O   |       |       |       |     0.34
23.417    0.06    0.15      0.032  |I  O   |       |       |       |     0.33
23.500    0.06    0.15      0.031  |I  O   |       |       |       |     0.33
23.583    0.06    0.14      0.031  |I  O   |       |       |       |     0.32
23.667    0.06    0.14      0.030  |I  O   |       |       |       |     0.31
23.750    0.06    0.14      0.030  |I  O   |       |       |       |     0.31
23.833    0.06    0.14      0.029  |I O    |       |       |       |     0.30
23.917    0.06    0.13      0.029  |I O    |       |       |       |     0.30
24.000    0.06    0.13      0.028  |I O    |       |       |       |     0.29
24.083    0.03    0.13      0.028  I  O    |       |       |       |     0.29
24.167    0.00    0.13      0.027  I  O    |       |       |       |     0.28
24.250    0.00    0.12      0.026  I  O    |       |       |       |     0.27
24.333    0.00    0.12      0.025  I  O    |       |       |       |     0.26
24.417    0.00    0.11      0.024  I  O    |       |       |       |     0.25
24.500    0.00    0.11      0.024  I  O    |       |       |       |     0.25
24.583    0.00    0.11      0.023  I  O    |       |       |       |     0.24
24.667    0.00    0.10      0.022  I  O    |       |       |       |     0.23
24.750    0.00    0.10      0.021  I O     |       |       |       |     0.22
24.833    0.00    0.10      0.021  I O     |       |       |       |     0.22

      Remaining water in basin =    0.02 (Ac.Ft)

      ****************************HYDROGRAPH DATA****************************
                    Number of intervals =   298
                    Time interval =    5.0 (Min.)
                    Maximum/Peak flow rate =        0.617 (CFS)
                    Total volume =       0.647 (Ac.Ft)
             Status of hydrographs being held in storage
                       Stream 1  Stream 2  Stream 3  Stream 4  Stream 5
             Peak (CFS)      0.000     0.000     0.000     0.000     0.000
             Vol (Ac.Ft)     0.000     0.000     0.000     0.000     0.000
      ***********************************************************************

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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

How to use this worksheet (also see instructions in Section G of the WQMP Template):

1. Review Column 1 and identify which of these potential sources of stormwater pollutants apply to your site. Check each box that applies.
2. Review Column 2 and incorporate all of the corresponding applicable BMPs in your WQMP Exhibit.
3. Review Columns 3 and 4 and incorporate all of the corresponding applicable permanent controls and operational BMPs in your WQMP. Use the format shown in Table G.1on page 23 of this WQMP Template. Describe your specific BMPs in an accompanying narrative, and explain any special conditions or situations that required omitting BMPs or substituting alternative BMPs for those shown here.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	**... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE**		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
☒ **A.** On-site storm drain inlets	☒ Locations of inlets.	☒ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	☒ 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.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP 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	☐ 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 "What you should know for…..Landscape and Gardening" at http://rcflood.org/stormwater/Error! Hyperlink reference not valid. ☒ Provide IPM information to new owners, lessees and operators.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP 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. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee 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 "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at http://rcflood.org/stormwater/
❑ **F.** Food service	❑ 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.	❑ Describe the location and features of the designated cleaning area. ❑ 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.**
☒ **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 to prevent runoff from the area. ❑ 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 on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **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 See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at http://rcflood.org/stormwater/

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP 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 run-on or run-off from area. ❑ 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 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 www.cchealth.org/groups/hazmat/	❑ 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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP 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 shut-off 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 any 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. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/ ❑Car dealerships and similar may rinse cars with water only.

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP 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. ❑ 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. ❑ 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 no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ 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. ❑ 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.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ❑ 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. ❑ 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. Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
❑ **L.** Fuel Dispensing Areas	❑ Fueling areas[6] 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 area[1].] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

[6] The fueling area shall be defined as the area extending a minimum of 6.5 feet from the corner of each fuel dispenser or the length at which the hose and nozzle assembly may be operated plus a minimum of one foot, whichever is greater.

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP 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 shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ❑ 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

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

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1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
☒ **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
O. Miscellaneous Drain or Wash Water or Other Sources ☒ Boiler drain lines ☒ Condensate drain lines ☒ Rooftop equipment ☒ Drainage sumps ☒ Roofing, gutters, and trim. ☐ Other sources		☒ 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 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 with potential to produce pollutants shall be roofed and/or have secondary containment. ☒ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ☒ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. ☐ Include controls for other sources as specified by local reviewer.	

STORMWATER POLLUTANT SOURCES/SOURCE CONTROL CHECKLIST

IF THESE SOURCES WILL BE ON THE PROJECT SITE ...	... THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	2 **Permanent Controls—Show on WQMP Drawings**	3 **Permanent Controls—List in WQMP Table and Narrative**	4 **Operational BMPs—Include in WQMP Table and Narrative**
☒ **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 washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

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

Operations & Maintenance Responsibility for Treatment Control BMP's

	BMP Required Maintenance	Frequency	Maintenance Requirements	Responsibility
Source Control BMP	Trash	Weekly	- Collect and dispose of trash and debris	Home Owners Association
	Trash, Street Sweeping	Weekly	- Collect and dispose trash, debris and sediment by street sweeping and other approved County of Riverside's method.	RC Hobbs Company, until such time facilities are accepted by an HOA.
	Inlet Stencils	Semi-Annually	- Inspect and maintain legibility of markers and signs	RC Hobbs Company, until such time facilities are accepted by an HOA.
Structural BMP	Extended Detention Basin	Semi-Annually/ Beginning and end of the wet season	- Schedule inspections to identify and repair potential problems such as erosion, standing water, trash and debris, and sediment accumulation. - Trim vegetation Additional maintenance - Remove accumulated trash and debris in the basin - Revegetate and stabilize with erosion control mulch or mat at eroded areas. - Remove sediment and regrade when sediment volume exceeds 10% of basin volume	RC Hobbs Company, until such time facilities are accepted by an HOA.

BMP's should start and be inspected prior to forecast rain, daily during extended rain events, after rain events, weekly during the rainy season, and at two-week intervals during the non-rainy season.

Basin Site Maintenance Summary Form

Date: _____ **Inspector Name:** _____ **Basin:** _____

Maintenance Performed: _____

_____

Date: _____ **Inspector Name:** _____ **Basin:** _____

Maintenance Performed: _____

_____

Date: _____ **Inspector Name:** _____ **Basin:** _____

Maintenance Performed: _____

_____

Date: _____ **Inspector Name:** _____ **Basin:** _____

Maintenance Performed: _____

_____

Date: _____ **Inspector Name:** _____ **Basin:** _____

Maintenance Performed: _____

_____

Date: _____ **Inspector Name:** **Basin:**

Maintenance Performed: _____

_____

Appendix 10: Educational Materials

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

Site Design & Landscape Planning SD-10



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

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Designing New Installations

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

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

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

Conserve Natural Areas during Landscape Planning

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

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

Maximize Natural Water Storage and Infiltration Opportunities Within the Landscape Unit

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

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

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

Protection of Slopes and Channels during Landscape Design

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

Redeveloping Existing Installations

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

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

Other Resources

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

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

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

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

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

Roof Runoff Controls SD-11



Rain Garden

Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

Designing New Installations

Cisterns or Rain Barrels

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

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

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

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

Dry wells and Infiltration Trenches

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

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

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

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

Pop-up Drainage Emitter

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

Foundation Planting

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

Redeveloping Existing Installations

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

Supplemental Information

Examples

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

Other Resources

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

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

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

Efficient Irrigation SD-12



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

Designing New Installations

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

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

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

Redeveloping Existing Installations

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

Other Resources

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

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

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

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

Storm Drain Signage SD-13



Design Objectives

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

Description

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

Approach

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

Suitable Applications

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

Design Considerations

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

Designing New Installations

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

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

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

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

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

Redeveloping Existing Installations

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

Additional Information

Maintenance Considerations

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

Placement

- Signage on top of curbs tends to weather and fade.

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

Supplemental Information

Examples

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

Other Resources

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

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

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

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

Bioretention TC-32



Design Considerations

- Soil for Infiltration
- Tributary Area
- Slope
- Aesthetics
- Environmental Side-effects

Description

The bioretention best management practice (BMP) functions as a soil and plant-based filtration device that removes pollutants through a variety of physical, biological, and chemical treatment processes. These facilities normally consist of a grass buffer strip, sand bed, ponding area, organic layer or mulch layer, planting soil, and plants. The runoff's velocity is reduced by passing over or through buffer strip and subsequently distributed evenly along a ponding area. Exfiltration of the stored water in the bioretention area planting soil into the underlying soils occurs over a period of days.

Targeted Constituents

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

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

California Experience

None documented. Bioretention has been used as a stormwater BMP since 1992. In addition to Prince George's County, MD and Alexandria, VA, bioretention has been used successfully at urban and suburban areas in Montgomery County, MD; Baltimore County, MD; Chesterfield County, VA; Prince William County, VA; Smith Mountain Lake State Park, VA; and Cary, NC.

Advantages

- Bioretention provides stormwater treatment that enhances the quality of downstream water bodies by temporarily storing runoff in the BMP and releasing it over a period of four days to the receiving water (EPA, 1999).
- The vegetation provides shade and wind breaks, absorbs noise, and improves an area's landscape.

Limitations

- The bioretention BMP is not recommended for areas with slopes greater than 20% or where mature tree removal would

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be required since clogging may result, particularly if the BMP receives runoff with high sediment loads (EPA, 1999).

- Bioretention is not a suitable BMP at locations where the water table is within 6 feet of the ground surface and where the surrounding soil stratum is unstable.
- By design, bioretention BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water.
- In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

Design and Sizing Guidelines

- The bioretention area should be sized to capture the design storm runoff.
- In areas where the native soil permeability is less than 0.5 in/hr an underdrain should be provided.
- Recommended minimum dimensions are 15 feet by 40 feet, although the preferred width is 25 feet. Excavated depth should be 4 feet.
- Area should drain completely within 72 hours.
- Approximately 1 tree or shrub per 50 ft^2 of bioretention area should be included.
- Cover area with about 3 inches of mulch.

Construction/Inspection Considerations

Bioretention area should not be established until contributing watershed is stabilized.

Performance

Bioretention removes stormwater pollutants through physical and biological processes, including adsorption, filtration, plant uptake, microbial activity, decomposition, sedimentation and volatilization (EPA, 1999). Adsorption is the process whereby particulate pollutants attach to soil (e.g., clay) or vegetation surfaces. Adequate contact time between the surface and pollutant must be provided for in the design of the system for this removal process to occur. Thus, the infiltration rate of the soils must not exceed those specified in the design criteria or pollutant removal may decrease. Pollutants removed by adsorption include metals, phosphorus, and hydrocarbons. Filtration occurs as runoff passes through the bioretention area media, such as the sand bed, ground cover, and planting soil.

Common particulates removed from stormwater include particulate organic matter, phosphorus, and suspended solids. Biological processes that occur in wetlands result in pollutant uptake by plants and microorganisms in the soil. Plant growth is sustained by the uptake of nutrients from the soils, with woody plants locking up these nutrients through the seasons. Microbial activity within the soil also contributes to the removal of nitrogen and organic matter. Nitrogen is removed by nitrifying and denitrifying bacteria, while aerobic bacteria are responsible for the decomposition of the organic matter. Microbial processes require oxygen and can result in depleted oxygen levels if the bioretention area is not adequately

aerated. Sedimentation occurs in the swale or ponding area as the velocity slows and solids fall out of suspension.

The removal effectiveness of bioretention has been studied during field and laboratory studies conducted by the University of Maryland (Davis et al, 1998). During these experiments, synthetic stormwater runoff was pumped through several laboratory and field bioretention areas to simulate typical storm events in Prince George's County, MD. Removal rates for heavy metals and nutrients are shown in Table 1.

Table 1 Laboratory and Estimated Bioretention Davis et al. (1998); PGDER (1993)

Pollutant	Removal Rate
Total Phosphorus	70-83%
Metals (Cu, Zn, Pb)	93-98%
TKN	68-80%
Total Suspended Solids	90%
Organics	90%
Bacteria	90%

Results for both the laboratory and field experiments were similar for each of the pollutants analyzed. Doubling or halving the influent pollutant levels had little effect on the effluent pollutants concentrations (Davis et al, 1998).

The microbial activity and plant uptake occurring in the bioretention area will likely result in higher removal rates than those determined for infiltration BMPs.

Siting Criteria

Bioretention BMPs are generally used to treat stormwater from impervious surfaces at commercial, residential, and industrial areas (EPA, 1999). Implementation of bioretention for stormwater management is ideal for median strips, parking lot islands, and swales. Moreover, the runoff in these areas can be designed to either divert directly into the bioretention area or convey into the bioretention area by a curb and gutter collection system.

The best location for bioretention areas is upland from inlets that receive sheet flow from graded areas and at areas that will be excavated (EPA, 1999). In order to maximize treatment effectiveness, the site must be graded in such a way that minimizes erosive conditions as sheet flow is conveyed to the treatment area. Locations where a bioretention area can be readily incorporated into the site plan without further environmental damage are preferred. Furthermore, to effectively minimize sediment loading in the treatment area, bioretention only should be used in stabilized drainage areas.

Additional Design Guidelines

The layout of the bioretention area is determined after site constraints such as location of utilities, underlying soils, existing vegetation, and drainage are considered (EPA, 1999). Sites with loamy sand soils are especially appropriate for bioretention because the excavated soil can be backfilled and used as the planting soil, thus eliminating the cost of importing planting soil.

The use of bioretention may not be feasible given an unstable surrounding soil stratum, soils with clay content greater than 25 percent, a site with slopes greater than 20 percent, and/or a site with mature trees that would be removed during construction of the BMP.

Bioretention can be designed to be off-line or on-line of the existing drainage system (EPA, 1999). The drainage area for a bioretention area should be between 0.1 and 0.4 hectares (0.25 and 1.0 acres). Larger drainage areas may require multiple bioretention areas. Furthermore, the maximum drainage area for a bioretention area is determined by the expected rainfall intensity and runoff rate. Stabilized areas may erode when velocities are greater than 5 feet per second (1.5 meter per second). The designer should determine the potential for erosive conditions at the site.

The size of the bioretention area, which is a function of the drainage area and the runoff generated from the area is sized to capture the water quality volume.

The recommended minimum dimensions of the bioretention area are 15 feet (4.6 meters) wide by 40 feet (12.2 meters) long, where the minimum width allows enough space for a dense, randomly-distributed area of trees and shrubs to become established. Thus replicating a natural forest and creating a microclimate, thereby enabling the bioretention area to tolerate the effects of heat stress, acid rain, runoff pollutants, and insect and disease infestations which landscaped areas in urban settings typically are unable to tolerate. The preferred width is 25 feet (7.6 meters), with a length of twice the width. Essentially, any facilities wider than 20 feet (6.1 meters) should be twice as long as they are wide, which promotes the distribution of flow and decreases the chances of concentrated flow.

In order to provide adequate storage and prevent water from standing for excessive periods of time the ponding depth of the bioretention area should not exceed 6 inches (15 centimeters). Water should not be left to stand for more than 72 hours. A restriction on the type of plants that can be used may be necessary due to some plants' water intolerance. Furthermore, if water is left standing for longer than 72 hours mosquitoes and other insects may start to breed.

The appropriate planting soil should be backfilled into the excavated bioretention area. Planting soils should be sandy loam, loamy sand, or loam texture with a clay content ranging from 10 to 25 percent.

Generally the soil should have infiltration rates greater than 0.5 inches (1.25 centimeters) per hour, which is typical of sandy loams, loamy sands, or loams. The pH of the soil should range between 5.5 and 6.5, where pollutants such as organic nitrogen and phosphorus can be adsorbed by the soil and microbial activity can flourish. Additional requirements for the planting soil include a 1.5 to 3 percent organic content and a maximum 500 ppm concentration of soluble salts.

Soil tests should be performed for every 500 cubic yards (382 cubic meters) of planting soil, with the exception of pH and organic content tests, which are required only once per bioretention area (EPA, 1999). Planting soil should be 4 inches (10.1 centimeters) deeper than the bottom of the largest root ball and 4 feet (1.2 meters) altogether. This depth will provide adequate soil for the plants' root systems to become established, prevent plant damage due to severe wind, and provide adequate moisture capacity. Most sites will require excavation in order to obtain the recommended depth.

Planting soil depths of greater than 4 feet (1.2 meters) may require additional construction practices such as shoring measures (EPA, 1999). Planting soil should be placed in 18 inches or greater lifts and lightly compacted until the desired depth is reached. Since high canopy trees may be destroyed during maintenance the bioretention area should be vegetated to resemble a terrestrial forest community ecosystem that is dominated by understory trees. Three species each of both trees and shrubs are recommended to be planted at a rate of 2500 trees and shrubs per hectare (1000 per acre). For instance, a 15 foot (4.6 meter) by 40 foot (12.2 meter) bioretention area (600 square feet or 55.75 square meters) would require 14 trees and shrubs. The shrub-to-tree ratio should be 2:1 to 3:1.

Trees and shrubs should be planted when conditions are favorable. Vegetation should be watered at the end of each day for fourteen days following its planting. Plant species tolerant of pollutant loads and varying wet and dry conditions should be used in the bioretention area.

The designer should assess aesthetics, site layout, and maintenance requirements when selecting plant species. Adjacent non-native invasive species should be identified and the designer should take measures, such as providing a soil breach to eliminate the threat of these species invading the bioretention area. Regional landscaping manuals should be consulted to ensure that the planting of the bioretention area meets the landscaping requirements established by the local authorities. The designers should evaluate the best placement of vegetation within the bioretention area. Plants should be placed at irregular intervals to replicate a natural forest. Trees should be placed on the perimeter of the area to provide shade and shelter from the wind. Trees and shrubs can be sheltered from damaging flows if they are placed away from the path of the incoming runoff. In cold climates, species that are more tolerant to cold winds, such as evergreens, should be placed in windier areas of the site.

Following placement of the trees and shrubs, the ground cover and/or mulch should be established. Ground cover such as grasses or legumes can be planted at the beginning of the growing season. Mulch should be placed immediately after trees and shrubs are planted. Two to 3 inches (5 to 7.6 cm) of commercially-available fine shredded hardwood mulch or shredded hardwood chips should be applied to the bioretention area to protect from erosion.

Maintenance

The primary maintenance requirement for bioretention areas is that of inspection and repair or replacement of the treatment area's components. Generally, this involves nothing more than the routine periodic maintenance that is required of any landscaped area. Plants that are appropriate for the site, climatic, and watering conditions should be selected for use in the bioretention cell. Appropriately selected plants will aide in reducing fertilizer, pesticide, water, and overall maintenance requirements. Bioretention system components should blend over time through plant and root growth, organic decomposition, and the development of a natural

soil horizon. These biologic and physical processes over time will lengthen the facility's life span and reduce the need for extensive maintenance.

Routine maintenance should include a biannual health evaluation of the trees and shrubs and subsequent removal of any dead or diseased vegetation (EPA, 1999). Diseased vegetation should be treated as needed using preventative and low-toxic measures to the extent possible. BMPs have the potential to create very attractive habitats for mosquitoes and other vectors because of highly organic, often heavily vegetated areas mixed with shallow water. Routine inspections for areas of standing water within the BMP and corrective measures to restore proper infiltration rates are necessary to prevent creating mosquito and other vector habitat. In addition, bioretention BMPs are susceptible to invasion by aggressive plant species such as cattails, which increase the chances of water standing and subsequent vector production if not routinely maintained.

In order to maintain the treatment area's appearance it may be necessary to prune and weed. Furthermore, mulch replacement is suggested when erosion is evident or when the site begins to look unattractive. Specifically, the entire area may require mulch replacement every two to three years, although spot mulching may be sufficient when there are random void areas. Mulch replacement should be done prior to the start of the wet season.

New Jersey's Department of Environmental Protection states in their bioretention systems standards that accumulated sediment and debris removal (especially at the inflow point) will normally be the primary maintenance function. Other potential tasks include replacement of dead vegetation, soil pH regulation, erosion repair at inflow points, mulch replenishment, unclogging the underdrain, and repairing overflow structures. There is also the possibility that the cation exchange capacity of the soils in the cell will be significantly reduced over time. Depending on pollutant loads, soils may need to be replaced within 5-10 years of construction (LID, 2000).

Cost

Construction Cost

Construction cost estimates for a bioretention area are slightly greater than those for the required landscaping for a new development (EPA, 1999). A general rule of thumb (Coffman, 1999) is that residential bioretention areas average about $3 to $4 per square foot, depending on soil conditions and the density and types of plants used. Commercial, industrial and institutional site costs can range between $10 to $40 per square foot, based on the need for control structures, curbing, storm drains and underdrains.

Retrofitting a site typically costs more, averaging $6,500 per bioretention area. The higher costs are attributed to the demolition of existing concrete, asphalt, and existing structures and the replacement of fill material with planting soil. The costs of retrofitting a commercial site in Maryland, Kettering Development, with 15 bioretention areas were estimated at $111,600.

In any bioretention area design, the cost of plants varies substantially and can account for a significant portion of the expenditures. While these cost estimates are slightly greater than those of typical landscaping treatment (due to the increased number of plantings, additional soil excavation, backfill material, use of underdrains etc.), those landscaping expenses that would be required regardless of the bioretention installation should be subtracted when determining the net cost.

Perhaps of most importance, however, the cost savings compared to the use of traditional structural stormwater conveyance systems makes bioretention areas quite attractive financially. For example, the use of bioretention can decrease the cost required for constructing stormwater conveyance systems at a site. A medical office building in Maryland was able to reduce the amount of storm drain pipe that was needed from 800 to 230 feet - a cost savings of $24,000 (PGDER, 1993). And a new residential development spent a total of approximately $100,000 using bioretention cells on each lot instead of nearly $400,000 for the traditional stormwater ponds that were originally planned (Rappahanock,). Also, in residential areas, stormwater management controls become a part of each property owner's landscape, reducing the public burden to maintain large centralized facilities.

Maintenance Cost

The operation and maintenance costs for a bioretention facility will be comparable to those of typical landscaping required for a site. Costs beyond the normal landscaping fees will include the cost for testing the soils and may include costs for a sand bed and planting soil.

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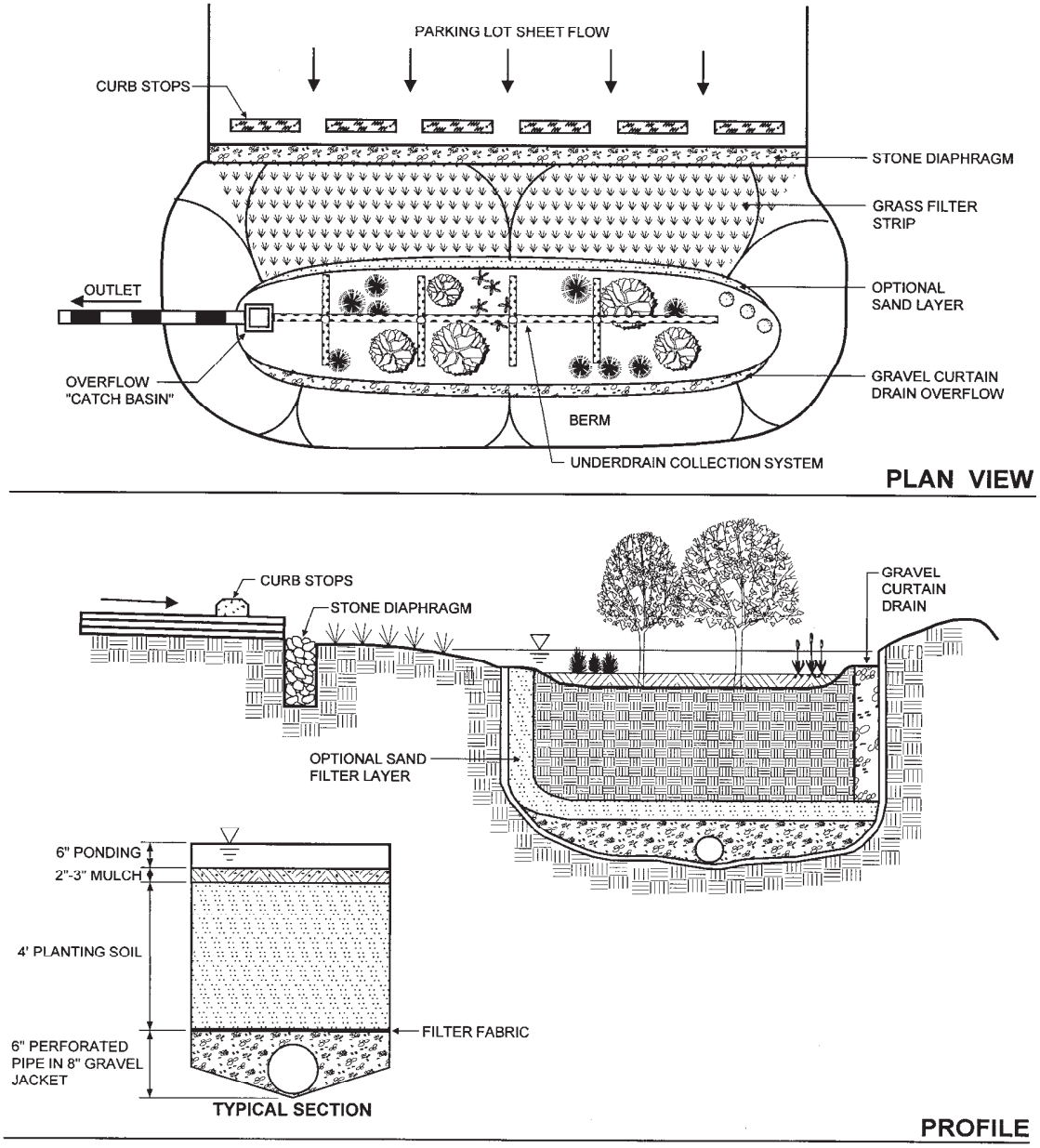
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Schematic of a Bioretention Facility (MDE, 2000)