Appendix I

Water Quality Management Plan

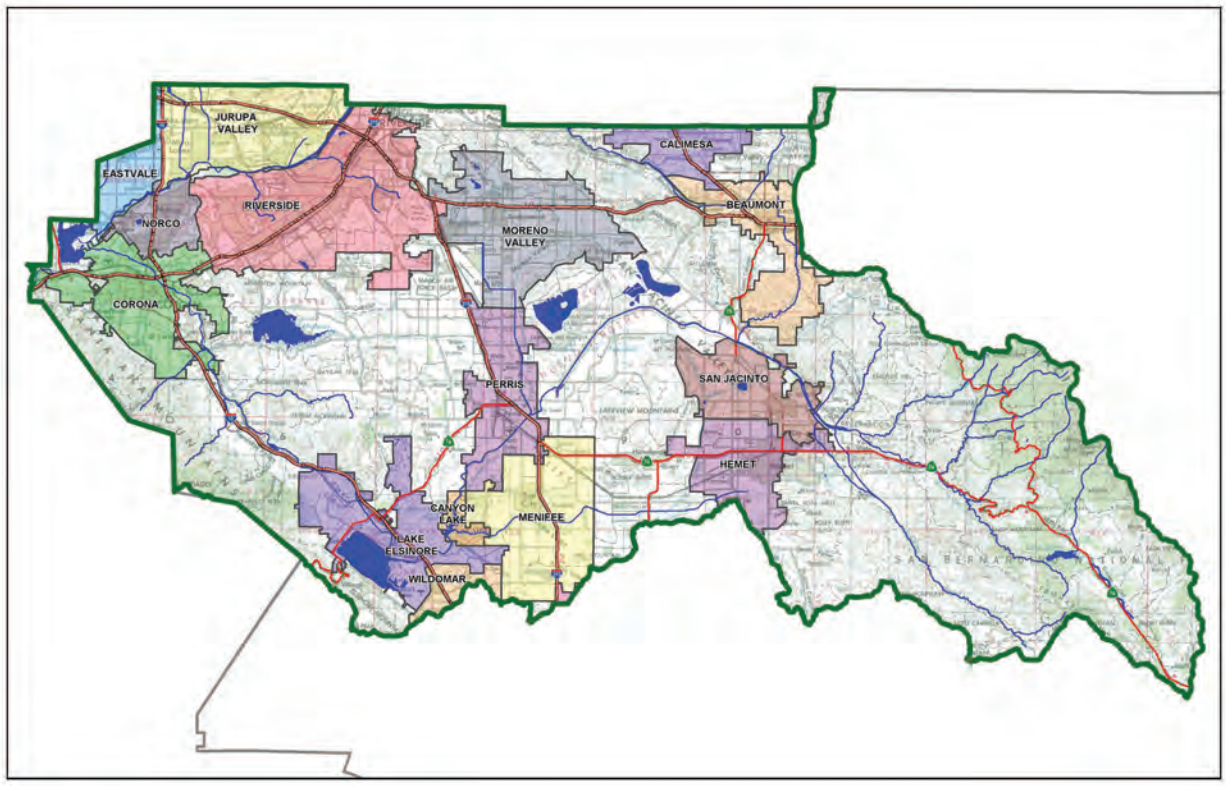
Project Specific Water Quality Management Plan

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

Project Title: Cordyon Gateway

Development No: Insert text here

Design Review/Case No: PWQMP-2020-00002



☒ **Preliminary**
☐ **Final**

Original Date Prepared: 02-05-2020

Revision Date(s): 09-02-2020

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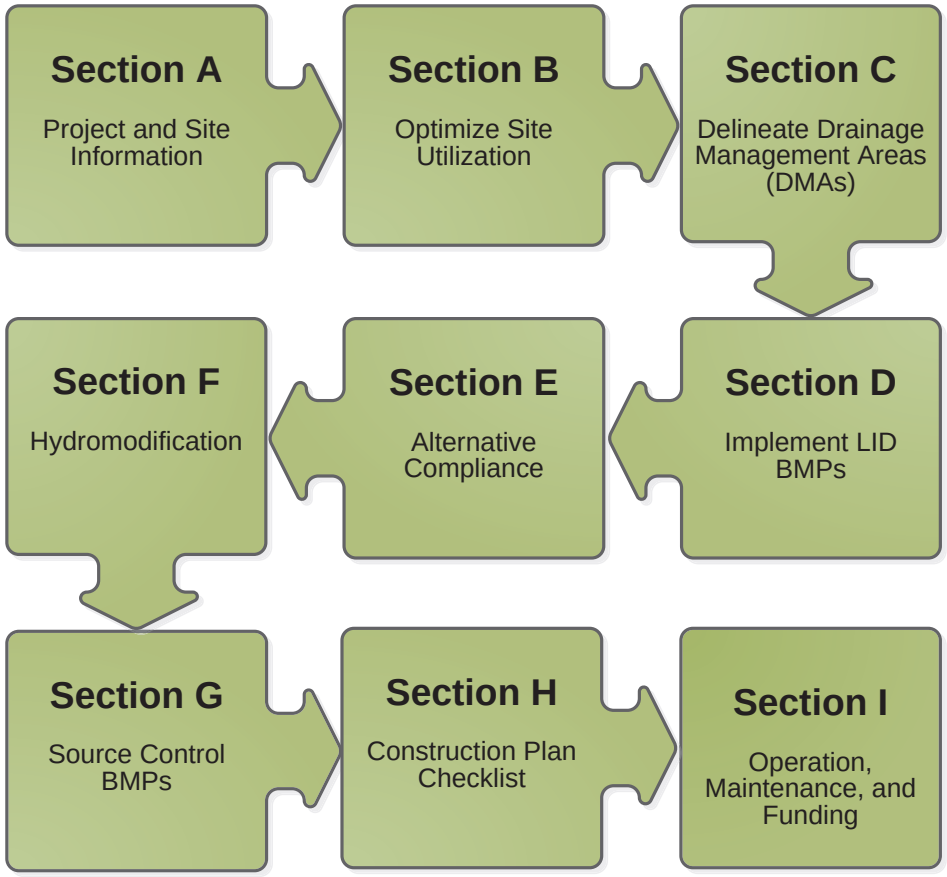
A Brief Introduction

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 R.E.D Corydon, LLC by KWC Engineers for the Corydon project.

This WQMP is intended to comply with the requirements of RIverside County for Storm Water Quality Ordinance 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 Riverside County Water Quality Ordinance (Municipal Code Section 14.12.315).

"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

9/1/2020

Date

Mark R. Cooper

Owner's Printed Name

President

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

9/2/2020

Date

Matthew Laninovich

Preparer's Printed Name

Project Engineer

Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

PROJECT INFORMATION		
Type of Project:	Commercial	
Planning Area:	East Lake specific Plan	
Community Name:	City of Lake Elsinore	
Development Name:	Corydon Gateway	
PROJECT LOCATION		
Latitude & Longitude (DMS): 33°38'03''N, 117°17'30''W		
Project Watershed and Sub-Watershed: Lake Elsinore		
Gross Acres: 6.05 APN(s): 370-050-026, and 370-050-030		
Map Book and Page No.: N/A		
PROJECT CHARACTERISTICS		
Proposed or Potential Land Use(s)	Commercial	
Proposed or Potential SIC Code(s)	N/A	
Area of Impervious Project Footprint (SF)	230,868	
Total Area of proposed Impervious Surfaces within the Project Footprint (SF)/or Replacement	230,868	
Does the project consist of offsite road improvements?	☐ Y	☒ N
Does the project propose to construct unpaved roads?	☐ Y	☒ N
Is the project part of a larger common plan of development (phased project)?	☒ Y	☐ N
EXISTING SITE CHARACTERISTICS		
Total area of existing Impervious Surfaces within the Project limits Footprint (SF)	0	
Is the project located within any MSHCP Criteria Cell?	☒ Y	☐ N
If so, identify the Cell number:	5131	
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?	0.68	

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
LAKE ELSINORE	DDT, NUTRIENTS, ORGANIC ENRICHMENT/LOW DISSOLVED OXYGEN, PCBS, AND TOXICITY	REC1, REC2, WARM, COMM, WILD, RARE	2.5 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 Lake Elsinore Grading, Improvements, and Building Permits.	☒ 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?

The existing drainage pattern of the site were identified and preserved. In the existing condition the site is draining generally from the East of the site into the West corner through natural ravines. Our proposed site will keep the same drainage pattern and create a low point Southwest corner of the site to collect all the water into a proposed Bio-retention Basin where the storm water runoff will be collected and treated before being diverted into the Riverside County Flood Control Channel that will eventually lead into Lake Elsinore.

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

Existing vegetation will be removed during the grading process; however, the project proposes to incorporate drought-tolerant landscaping within the site for all pervious surfaces.

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

The natural infiltration on the site is very poor, as shown on the percolation test performed by the soils engineer. In addition, the City of Lake Elsinore requires all new development project to direct stormwater runoff into the Lake and not attempt to infiltrate it on-site due to the Highest and Best use principle. Therefore, all flows onsite will be directed into a Bio-retention basin with underdrains.

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

Yes, impervious areas were minimized based on design standards to meet zoning and improvement requirements.

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

No, all runoff from impervious surfaces will drain to a Bio-retention basin along the western project boundary. Flows will exit into a Riverside County Flood Control Channel and ultimately into Lake Elsinore.

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
DMA 1A	Roofs	38,165	Type D
DMA 1B	Concrete/Asphalt	171,583	Type D
DMA 1C	Landscaping	54,060	Type 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)
N/A			

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

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

DMA Name or ID	BMP Name or ID
DMA 1A, 1B, and 1C	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:		
…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: Silty/Clayey soil found onsite that provides low infiltration rates that makes infiltration on site infeasible		

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

D.2 Harvest and Use Assessment

Please check what applies*:*

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

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

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

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

Irrigation Use Feasibility

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

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

Total Area of Irrigated Landscape:

Type of Landscaping (Conservation Design or Active Turf):

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:

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:

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:

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)

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:

Project Type:

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:

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:

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:

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)

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:

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:

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:

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:

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)**

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	
DMA 1A	☐	☐	☒	☐	☐
DMA 1B	☐	☐	☒	☐	☐
DMA 1C	☐	☐	☒	☐	☐

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	*Bio-retention Basin*		
	[A]		[B]	[C]	[A] x [C]			
1A	*38,165*	*Roofs*	*1.0*	*0.89*	*34,043*	*Design Storm Depth (in)*	*Design Capture Volume,* $\mathbf{V_{BMP}}$ *(cubic feet)*	*Proposed Volume on Plans (cubic feet)*
1B	*171,583*	*Concrete or Asphalt*	*1.0*	*0.89*	*153,052*			
1C	*54,060*	*Landscaping*	*0.1*	*0.11*	*5,971*			
	A_T = 263,808				Σ= 193,066.6	0.68	[F] = 10,940	***11,631***

[B], [C] is obtained as described in Section 2.3.1 of the WQMP Guidance Document

[E] is obtained from Exhibit A in the WQMP Guidance Document

[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6

Section E: Alternative Compliance (LID Waiver Program)

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

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

- *Or* -

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

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 ft²)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft²)	P	N	P	P	N	P	P	P
☒ Parking Lots (>5,000 ft²)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☒ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☐	☐	☒	☒	☒	☐	☐	☐

P = Potential

N = Not Potential

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

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

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

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

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

Table E.2 Water Quality Credits

Qualifying Project Categories	Credit Percentage[2]
N/A	
Total Credit Percentage[1]	

[1]Cannot Exceed 50%

[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

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

Table E.3 Treatment Control BMP Sizing

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

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document

[E] is for Flow-Based Treatment Control BMPs [E] = .2, for Volume-Based Control Treatment BMPs, [E] obtained from Exhibit A in the WQMP Guidance Document

[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12

[H] is from the Total Credit Percentage as Calculated from Table E.2 above

[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

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

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

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

Table E.4 Treatment Control BMP Selection

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

[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:

LAKE ELSINORE

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	• Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers shall be per local agency requirements	• Maintain and annually repaint or replace inlet markings. • Inspect for debris accumulation and evidence of illegal dumping monthly and clean to maintain functionality. • 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."
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	Final landscape plans will accomplish all of the following: • 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. • The biotreatment basin will be irrigated and planted with drought-tolerant plants that are also tolerant of saturated soil conditions during brief periods. • Use of pest-resistant plants, especially adjacent to hardscape. • To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	• Maintain landscaping using minimum or no pesticides. • See applicable operational BMPs in "What you should know for…..landscape and Gardening" at http://rcflood.org/stormwater/ • Provide IPM information to new owners, lessees and operators. • Maintain landscaping and irrigation system per CASQA BMPs SC-41, SD-10, and SD-12 fact sheets in Appendix 10.
Food Service	• Clean equipment in a designated indoor area, such as mop, sink, pot sink, or floor area with a drain connected to the sanitary sewer (indoor plumbing) • Clean equipment in a designated covered, bermed outdoor area with a drain connected to the sanitary sewer (indoor plumbing). Don't allow food waste	• 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.

	to accumulate in this area • Do not clean equipment outdoors in any area where water may flow to a street, gutter, storm drain or creek.	
Fuel Dispensing Areas	• Install Quick-shutoff nozzles • Use floor as a containment system for fuel dispensing 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.cabmphadbooks.com and attached in App. 10
Fire Sprinkler Test Water	• Owner shall 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 and attached in App. 10.
Plazas, sidewalks, and parking lots		• Owner shall vacuum, sweep plazas, sidewalks, and parking lots monthly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect wash water containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.
Trash Enclosure(s)	• All trash enclosures on the site shall be covered with a solid canopy style roof and shall have surrounding drainage directed away from them	• Owner shall maintain and sweep out trash enclosures monthly and shall require tenants to keep dumpster lid closed at all times and shall contract with the City to regularly empty dumpsters.
Vehicle Cleaning (Carwash)	• All carwash wastewater shall be plumbed to sanitary sewer drains for disposal	• Owner shall maintain wash bay and drains to prevent discharges to storm drains.

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)
DMA 1A, 1B, and 1C	Bio-retention Basin		

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:

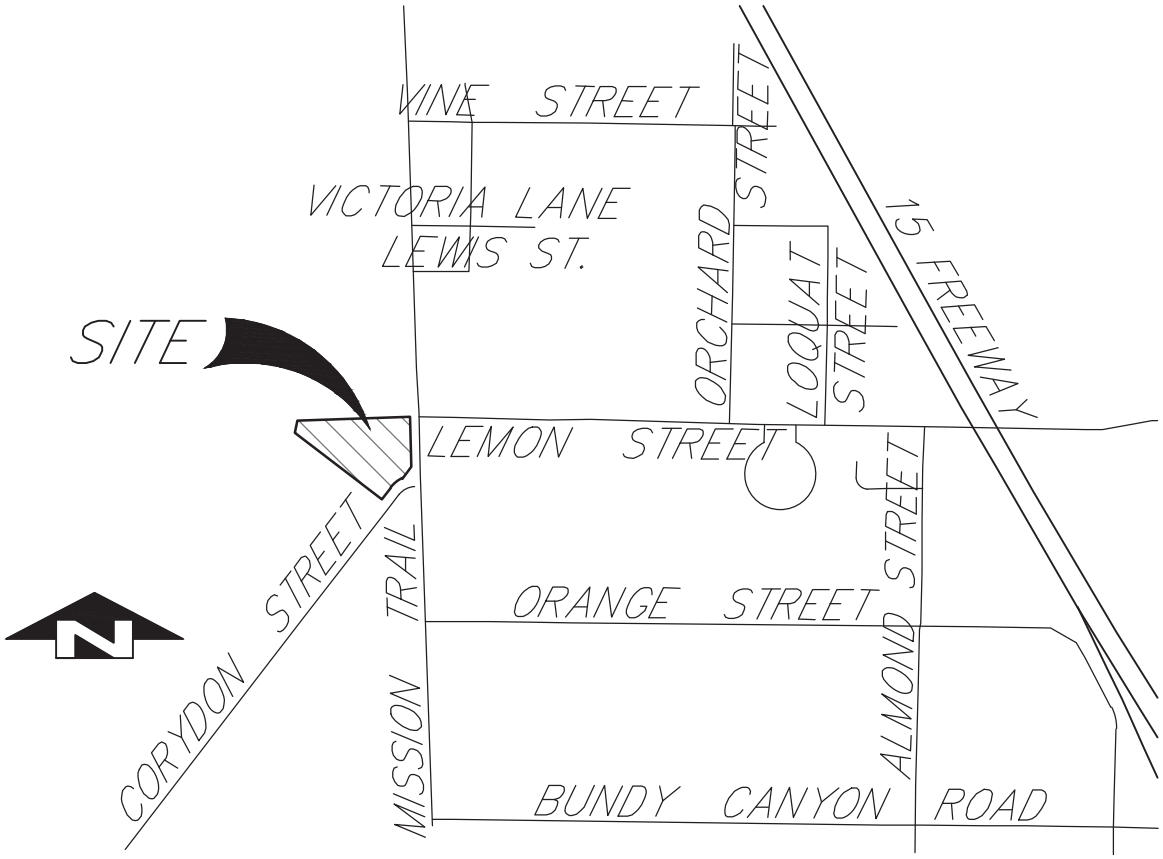
Will the proposed BMPs be maintained by a Home Owners' Association (HOA) or Property Owners Association (POA)?

☐ 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



VICINITY MAP

VICINITY MAP

NOT TO SCALE

FIGURE 1

PREPARED BY:

KWC ENGINEERS

CIVIL ENGINEERS ● PLANNERS ● SURVEYORS
1880 COMPTON AVENUE, SUITE 100 ● CORONA, CA. 92881-3370 ● 951-734-2130

CORYDON GATEWAY

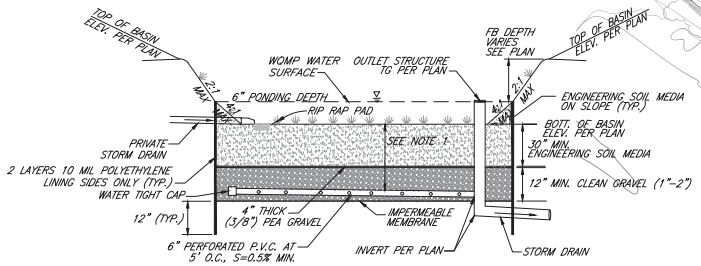
VICINITY MAP

DATE	DRAWN BY	CHECKED BY	J.N.
2-11-20	HC	ML	19.1990

R:\19\1990\PRELIM\REPORTS\HYDRO\Appendix A\1990 Vicinity Map.dwg

SOURCE CONTROL BMP:

1. CATCH BASIN INLET MESSAGES
2. SOLID ROOF COVERED TRASH ENCLOSURES
3. VACUUM-ASSISTED PAVEMENT SWEEPING
4. LANDSCAPING/IRRIGATION SYSTEM MAINTENANCE
5. FOOD SERVICE WASTE STORAGE/CLEANUP AREA
6. FUEL DISPENSING AREA, CASQA BMP# SD-30
7. CAR WASH FACILITY, CASQA BMP# SC-33
8. BIO CLEAN CATCH BASIN INLET FILTER
9. BIO CLEAN ARS SYSTEM INLET ON CURB CUT



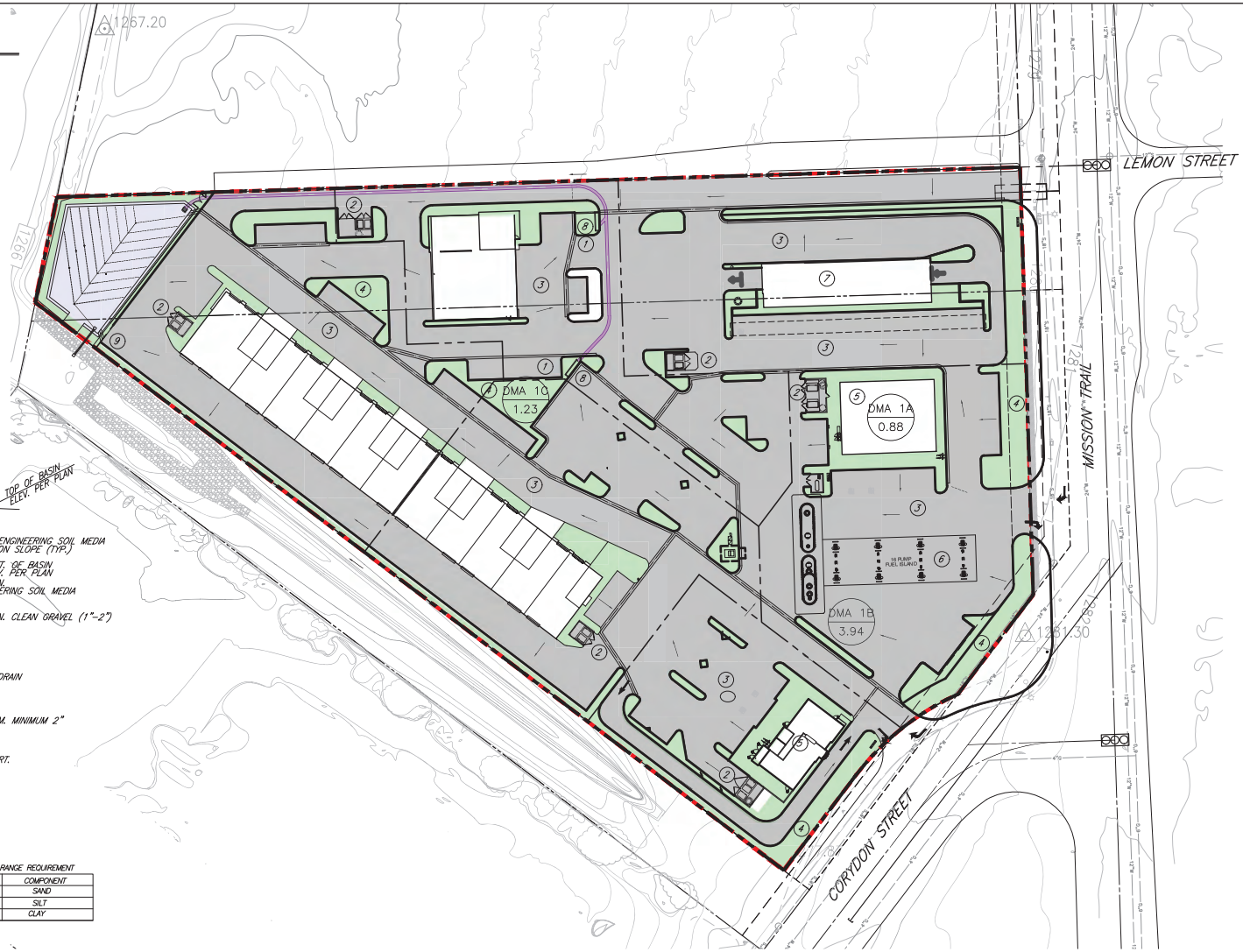
NOTE:
1. INVERT OF PERFORATED PIPE SHALL NOT BE GREATER THAN 48" FROM BASIN BOTTOM. MINIMUM 2" GRAVEL SECTION ABOVE TOP OF PIPE AND BELOW BOTTOM OF PIPE.
2. CLEANOUT ON UNDERDRAIN NOT SHOWN FOR CLARITY.
3. COUNTY RECOMMENDED PLANT LIST FOR THE BASIN IS INCLUDED IN THE WQMP REPORT.

BIO-RETENTION BASIN
NOT TO SCALE

ENGINEERED SOIL MEDIA REQUIREMENTS:
THE ENGINEERED SOIL MEDIA SHALL BE COMPRISED OF 85% MINERAL COMPONENT AND 15% ORGANIC COMPONENT, BY VOLUME, DRUM MIXED PRIOR TO PLACEMENT. THE MINERAL COMPONENT SHALL BE A CLASS A SANDY LOAM TOP SOIL THAT MEETS THE RANGE SPECIFIED IN TABLE BELOW. THE ORGANIC COMPONENT SHALL BE NITROGEN STABILIZED COMPOST.

MINERAL COMPONENT RANGE REQUIREMENT

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



LEGEND

- ROOF AREA
- STREET AREA
- CONCRETE AREA
- LANDSCAPING AREA
- WQMP BASIN
- DMA A / 0.41 — DMA NUMBER / TRIBUTARY AREA (ACRES)
- TRIBUTARY AREA BOUNDARY
- PROPOSED STORM DRAIN
- CB — PROPOSED CATCH BASIN
- AD/GI — AREA DRAIN/GRATE INLET
- DRAINAGE FLOW DIRECTION
- —R— RIDGE LINE

NOTE: ROOF LINES AND DOWNSPOUTS ARE NOT SHOWN FOR SAKE OF CLARITY ON THE SITE PLAN.

WQMP TREATMENT SUMMARY TABLE

UNIT	DMA AREA (AC)	IMPERVIOUS (AC)	PERVIOUS (AC)	DESIGN CAPTURE VOLUME (CU-FT)	PROPOSED CAPTURE VOLUME (CU-FT)
A	6.05	4.81	1.24	10,940	11,631
TOTAL	6.05	4.81	1.24	10,940	11,631

40' 0 40' 80' 120'
SCALE IN FEET

DATED: 02-20-20

PRELIMINARY WQMP EXHIBIT
CORYDON GATEWAY
CITY OF LAKE ELSINORE

PREPARED FOR:
R.E.D CORYDON, LLC
38122 STONE MEADOW DRIVE
MURRIETA, CA 92562

PREPARED BY:
KWC ENGINEERS
CIVIL ENGINEERS • PLANNERS • SURVEYORS
1880 COMPTON AVENUE, SUITE 100 CORONA, CA. 92881-3370 951-734-2130

SHEET 1 OF 1 SHEETS

18.1947.01 R:\19\1990\PRELIM\REPORTS\PRELIM WQMP\Appendix 1-Map and Site Plans\1990 Prelim WQMP Site Plan.dwg 08/24/2020 15:37

Bio Clean

A Forterra Company

Catch Basin Inlet Filters

A Stormwater Trash Capture Solution

OVERVIEW

The Bio Clean Catch Basin Inlet Filters are insertable systems designed to capture fine to coarse sediments, floatable trash, debris, total suspended solids (TSS), nutrients, metals, and hydrocarbons conveyed in stormwater runoff. The filter system is available in four different model types:

Full Capture Type	Multi-Level Screen Type	Kraken Filter Type	Media Filter Type
			
California Water Board Certified	Verified by the New Jersey Corporation for Advanced Technology	Advanced Pollutant Removal	Design for Industrial Applications
TESTING HIGHLIGHT: California Water Board 100% of Trash	TESTING HIGHLIGHT: NJDEP Testing Protocol 86.6% of TSS (Down to 100 Micron)	TESTING HIGHLIGHT: Third Party Testing 85% of TSS & 72% of TP	TESTING HIGHLIGHT: Port of San Diego Field Testing 82% of TSS

The Catch Basin Inlet Filters are an effective and economical solution to help property owners, developers, and municipalities meet local, state, and federal water quality requirements and regulations, as each filter can be custom built to meet specific project needs, and screen size and media type can be modified to remove specific pollutants.

Constructed of 100% high-grade stainless steel, it is built to last longer than any other filter brand, and the non-clogging screens provide higher levels of filtration and water flow. The filter is equipped with unimpeded high flow bypass to prevent backflow during the largest storm events.

ADVANTAGES

- 8-YEAR WARRANTY
- WORKS IN ANY SIZE CATCH BASIN
- NO NETS OR GEOFABRICS
- 15+ YEARS USER LIFE
- EASIEST TO MAINTAIN TROUGH SYSTEM ALLOWS FOR 15-MINUTE OR LESS SERVICE TIME
- MEETS LEED REQUIREMENTS
- STAINLESS STEEL AND FIBERGLASS CONSTRUCTION

APPLICATIONS

The Catch Basin Inlet Filters have been successfully used on numerous new construction and retrofit projects. The system's superior durability and customization make it ideal for a wide range of stormwater applications. Each filter fits within a shallow catch basin, giving them the ability to integrate with versatile curb inlet trough systems.

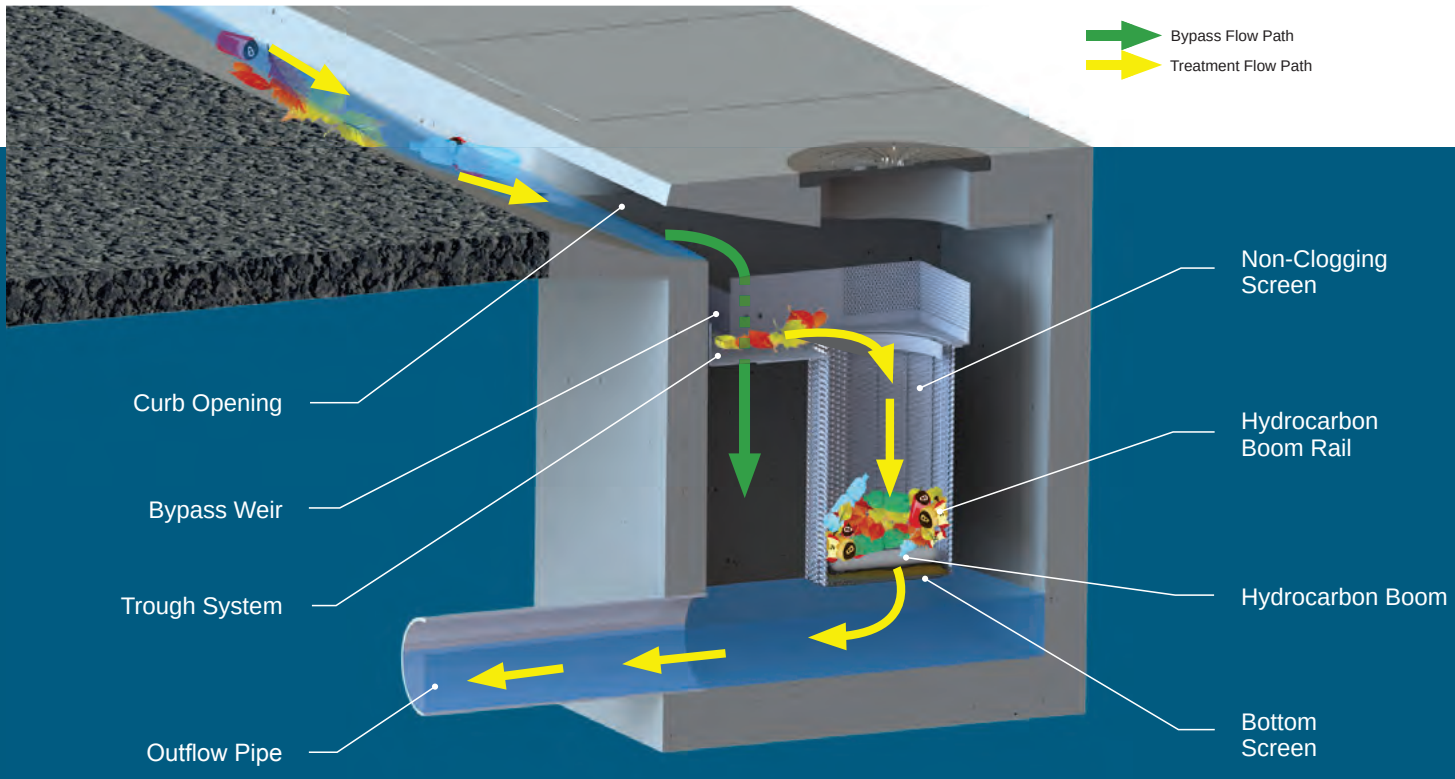
- Parking Lot Curb Inlets
- Parking Lot Grate Inlets
- Roadway Curb Inlets
- Roadway Grate Inlets
- Bioswale Bypass Structures
- Stormwater Pretreatment

CURB INLET APPLICATION

The curb inlet application or shelf system, provides easy access for maintenance from the surface without having to enter the catch basin. Maintenance service takes about 15 minutes and requires no confined space entry.

Each Catch Basin Inlet Filter is designed to be insertable and the expandable trough system is designed to convey water quality design flows through the filter basket while allowing peak flows to bypass over the trough without resuspending captured pollutants. The modular design of the trough system makes it adaptable to any size or type of curb inlet catch basin.

OPERATION



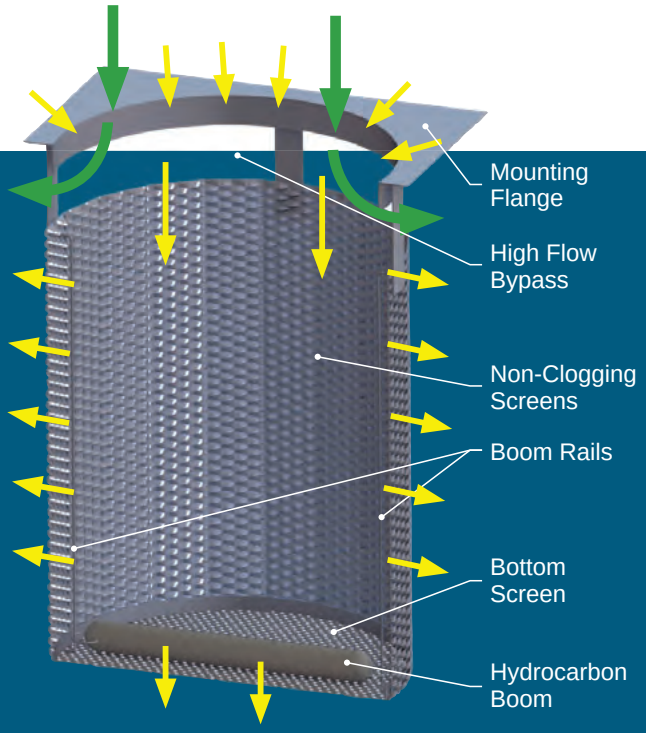
FULL CAPTURE TYPE

The Full Capture type inlet filter is California Full Capture approved and allows for a higher flow of water, making it more applicable for demanding applications. The screen has a specialized design that efficiently caputres all trash, but also makes cleaning more efficient while maintaining its ability to meet demanding flow requirements.

PERFORMANCE

100% REMOVAL OF TRASH

OPERATION



SPECIFICATIONS

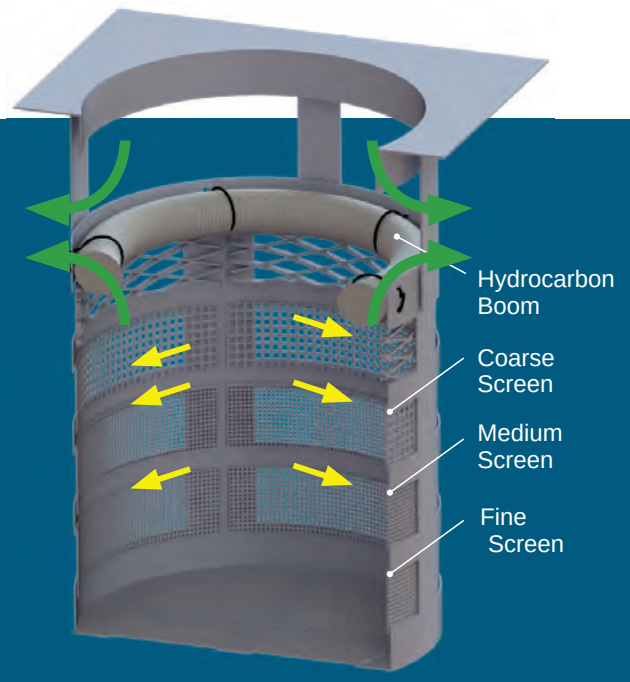
MODEL #	TREATMENT FLOW (cfs)	BYPASS FLOW (cfs)
BIO-CURB-FULL	2.85	UNLIMITED
BIO-GRATE-FULL-12-12-12	1.55	1.55
BIO-GRATE-FULL-18-18-18	4.32	3.68
BIO-GRATE-FULL-24-24-24	7.67	4.83
BIO-GRATE-FULL-30-30-24	12.97	6.21
BIO-GRATE-FULL-25-38-24	13.53	6.59
BIO-GRATE-FULL-36-36-24	19.64	7.60
BIO-GRATE-FULL-48-48-18	25.59	10.13

Note: Curb inlet application teatment flow rate limited to the weir capacity - actual flow rates of the filter basket is greater than 2.85 cfs.
Various depth filter baskets available. Treatment and bypass flow rates include a safety factor of 2.

MULTI-LEVEL SCREEN TYPE

The Bio Clean Multi-Level Screening Grate Inlet Filter is the standard configuration used for more than a decade and provides the best overall performance for all pollutants of concern.

OPERATION



PERFORMANCE

80% REMOVAL OF SEDIMENTS

100% REMOVAL OF TRASH

100% REMOVAL OF FOLIAGE

- MEDIUM LEVEL REMOVAL FOR PARTICULATE METALS AND NUTRIENTS
- INCLUDES HYDROCARBON BOOM FOR REMOVAL OF OILS AND GREASE

SPECIFICATIONS

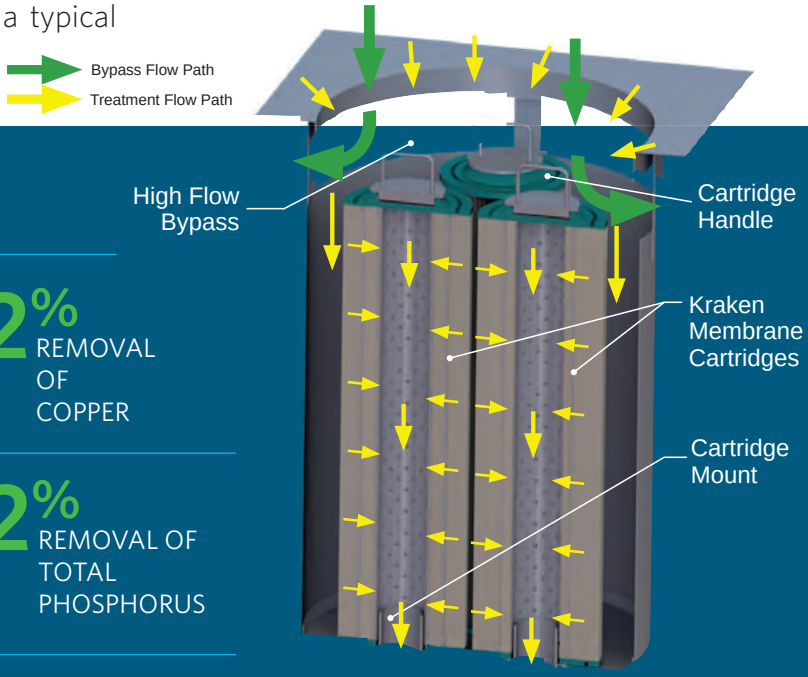
MODEL #	SCREEN TREATMENT FLOW (cfs)	BYPASS FLOW (cfs)
BIO-CURB-MLS	2.85	UNLIMITED
BIO-GRATE-MLS-12-12-12	0.52	0.52
BIO-GRATE-MLS-18-18-18	2.51	2.51
BIO-GRATE-MLS-24-24-24	5.31	5.31
BIO-GRATE-MLS-30-30-24	10.05	10.05
BIO-GRATE-MLS-25-38-24	10.39	10.39
BIO-GRATE-MLS-36-36-24	16.28	12.53
BIO-GRATE-MLS-48-48-18	16.94	17.05

Note: Curb inlet application teatment flow rate limited to the weir capacity - actual flow rates of the filter basket is greater than 2.85 cfs.
Various depth filter baskets available. Treatment and bypass flow rates include a safety factor of 2.

KRAKEN FILTER TYPE

The Bio Clean Grate Inlet Kraken Filter is an advanced-level filtration device designed with Kraken membrane cartridges for increased removal efficiencies. Kraken Filter cartridges are removable and reusable after spray cleaning with a typical garden hose.

OPERATION



PERFORMANCE

85% REMOVAL OF FINE TSS	**81%** REMOVAL OF OILS & GREASE	**52%** REMOVAL OF COPPER
58% REMOVAL OF ZINC	**60%** REMOVAL OF FECAL COLIFORM	**72%** REMOVAL OF TOTAL PHOSPHORUS

SPECIFICATIONS

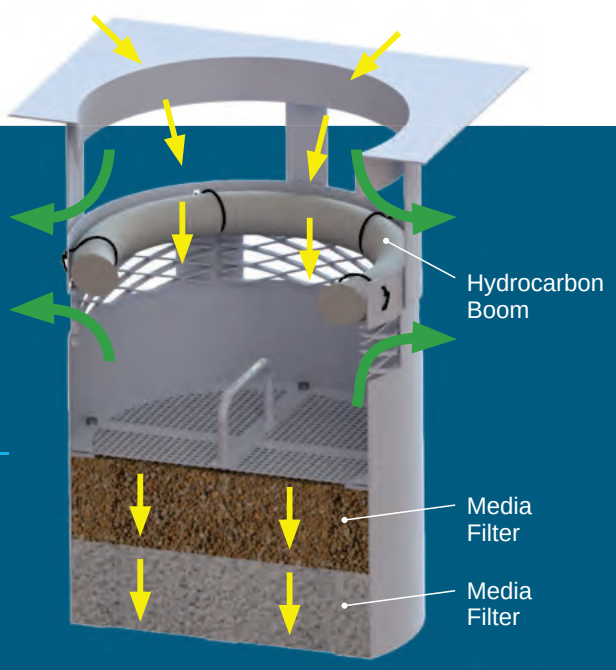
MODEL #	MEDIA TREATMENT FLOW (cfs)	BYPASS FLOW (cfs)
BIO-CURB-KMF-33	0.13	UNLIMITED
BIO-GRATE-KMF-12-12-39	0.04	0.52
BIO-GRATE-KMF-18-18-39	0.04	2.51
BIO-GRATE-KMF-24-24-39	0.17	5.31
BIO-GRATE-KMF-36-36-39	0.50	12.53
BIO-GRATE-KMF-48-48-39	0.88	17.05

Note: Media treatment flow rate based on three 30" tall Kraken filter cartridges. Various filter basket and Kraken Filter Cartridge heights available.

MEDIA FILTER TYPE

The Bio Clean Grate Inlet Media Filter is made of 100% stainless steel and is available in various sizes and depths allowing it to fit in any grated catch basin inlet. The filter's heavy duty construction allows for cleaning with any vacuum truck.

OPERATION



PERFORMANCE

85% REMOVAL OF FINE TSS	**95%** REMOVAL OF OILS & GREASE	**95%** REMOVAL OF COPPER
94% REMOVAL OF ZINC	**83%** REMOVAL OF LEAD	

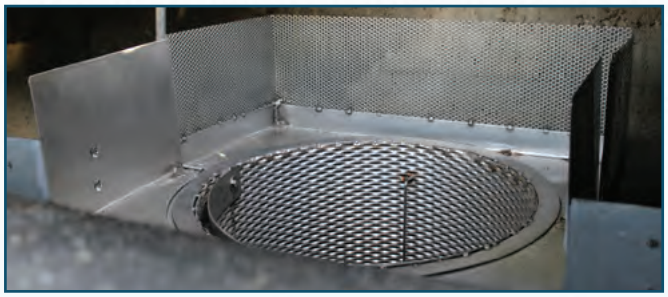
SPECIFICATIONS

MODEL #	MEDIA TREATMENT FLOW (cfs)	BYPASS FLOW (cfs)
BIO-CURB-MF-24	0.11	UNLIMITED
BIO-GRATE-MF-12-12-12	0.08	0.52
BIO-GRATE-MF-18-18-18	0.18	2.51
BIO-GRATE-MF-24-24-24	0.35	5.31
BIO-GRATE-MF-36-36-24	0.86	12.53
BIO-GRATE-MF-48-48-18	1.36	17.05

Note: Media treatment flow rate based on hydraulic conductivity of bulk media pack verified in labratory evalution. Various filter basket heights available.

INSTALLATION

CURB INLET FILTER



Bio Clean's Curb Inlet Filters are easily installed under catch basin access for ease of maintenance.

GRATE INLET FILTER

Grate Inlet Filters can be quickly installed directly under grated inlets with no special equipment.

MAINTENANCE

CURB INLET FILTER

Filters can be lifted out by hand for routine maintenance and inspections.

GRATE INLET FILTER

Bio Clean
A Forterra Company

5796 Armada Drive Suite 250
Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

Bio Clean

A Forterra Company

Bio Clean ARS™

A Stormwater Trash Capture Solution

OVERVIEW

The Bio Clean ARS™ (Automatic Retractable Screen) is the industry's most unique and dependable automatic retractable screen system, designed to block trash and debris from entering storm drains during dry weather flows and light to moderate rain.

Each blade moves independently to a controlled level, blocking trash, but allowing water to move freely underneath. The Bio Clean ARS blades can also be adjusted for more restrictive flow or a looser tolerance for increased water capacity, and individually changed for easy maintenance.

Every versatile Bio Clean ARS feature allows the system to adapt to the demands of different locations as well as various types of curb structures, making it one of the most cost-effective and reliable solutions available in the industry.

Bio Clean ARS Advantages	Common Disadvantages of Other Gates
✓ Blades work independently, so they will not jam.	✗ Many gates unlock when water level reaches a certain height.
✓ As water flow increases each blade reacts separately.	✗ Locking gates can get stuck and will not open at all.
✓ If debris gets stuck under a few blades, the overall system remains operational.	✗ Locking gates get stuck in the open position allowing all garbage to pass.

PERFORMANCE

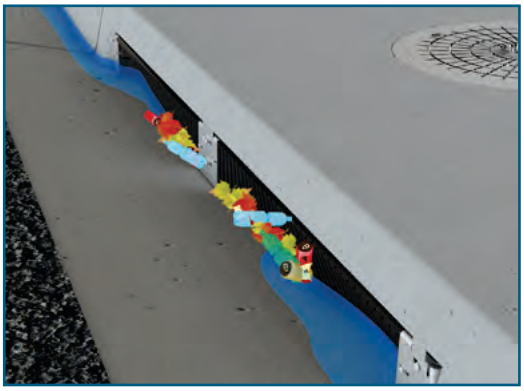
- LOS ANGELES COUNTY 92.6% TRASH CAPTURE SYSTEM
- WATER FLOWS MOVE THE INDIVIDUAL BLADES, FOR A MORE RESPONSIVE RESULT TO SITE AND FLOW CAPACITY
- POSITIVE FORCE RETURNS THE BIO CLEAN ARS TO THE CLOSED POSITION TO REDUCE THE POSSIBILITY OF DEBRIS BECOMING TRAPPED UNDER THE SCREEN
- BLADE SYSTEM CATCHES MATERIAL MORE EFFICIENTLY AND ALLOWS FOR EASIER CATCH BASIN CUSTOMIZATION
- INSTALLED WORLDWIDE AND OPERATIONAL IN 25 STATES
- THIS DESIGN WILL NOT GET STUCK IN THE OPEN POSITION, ALLOWING TRASH TO ENTER

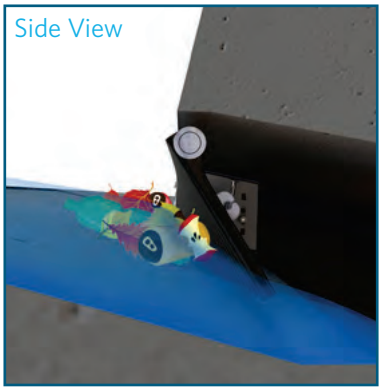
ADVANTAGES

- MINIMAL PARTS MAKES THIS A MORE COST-EFFECTIVE AND EASILY MAINTAINED DESIGN
- QUICK, EASILY ADJUSTABLE INSTALLATION ON ALL SIZE CATCH BASIN
- PLASTIC BLADES ARE DURABLE YET HARMLESS TO STREET SWEEPING EQUIPMENT
- ROUTINE STREET SWEEPING IS THE ONLY MAINTENANCE REQUIRED
- EASILY CUSTOMIZE-ABLE FOR CURB INLET HEIGHTS RANGING FROM 2" TO 10"

OPERATION

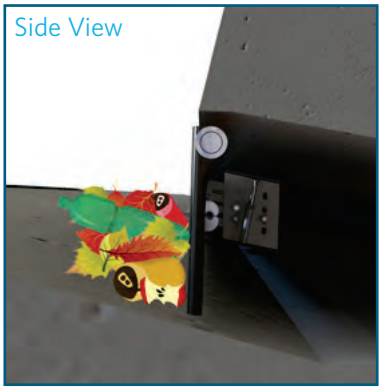
Design & Flow





- Effectively stops trash and debris
- Blades only open where water flows and trash is pushed toward closed section
- Gate blades open with the water flow and readjust to close right after
- Water flows easily through the moving blades
- Tension cables are adjusted to the water flow pressure

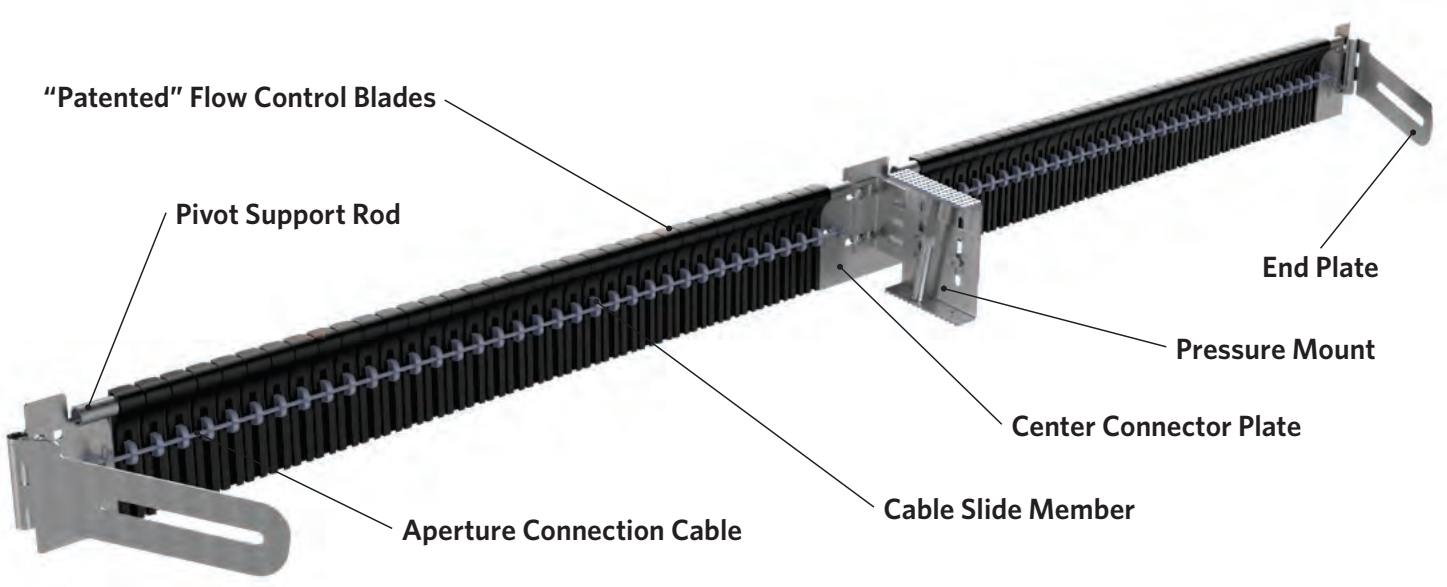
After a Storm Event



- Tension line keeps blades closed during dry weather and street sweeping
- Debris left in front of the gates after the storm
- The gate is not stuck open after the storm

SPECIFICATIONS

- MADE FROM RECYCLED, DURABLE POLYMER (NO SCRAP VALUE, ELIMINATING THEFT)



APPLICATIONS

Cast Iron Inlets

Standard Curb Inlets

Combination Inlets

MAINTENANCE

The Bio Clean ARS is durable enough to handle routine street sweeping, and it is the only maintenance necessary.

The Bio Clean Blades will not damage or harm any street sweeping equipment.

Bio Clean
A Forterra Company

5796 Armada Drive Suite 250
Carlsbad, CA 92008
855.566.3938
stormwater@forterrabp.com
biocleanenvironmental.com

Appendix 2: Construction Plans

Grading and Drainage Plans

Appendix 3: Soils Information

Geotechnical Study and Other Infiltration Testing Data

Earth Strata Geotechnical Services, Inc.
Geotechnical, Environmental and Materials Testing Consultants

September 30, 2019 Project No. 192846-12A

Mr. Mark Cooper
R.E.D. CORYDON, LLC
38122 Stone Meadow Drive
Murrieta, CA 92562

Subject: **Infiltration Testing for Water Quality Treatment Areas, Assessor's Parcel Number 370-050-026, Located on the Northwest Corner of Corydon Road and Mission Trail Road, City of Lake Elsinore, Riverside County, California**

INTRODUCTION

Earth Strata Geotechnical Services is pleased to present this infiltration feasibility report for the proposed commercial plaza, located on located on the northwest corner of Corydon Road and Mission Trail Road, Assessor Parcel Number 370-050-026, in the City of Lake Elsinore, Riverside County, California. The purpose of our study was to determine the infiltration rates and physical characteristics of the subsurface earth materials at the approximate depth of the proposed WQMP area within the proposed development. This feasibility report provides the infiltration rates to be used for the design and the development of the water quality management plan, where applicable.

PROPERTY DESCRIPTION

The subject property is located on the northwestern corner of Corydon Road and Mission Trail Road in the City of Lake Elsinore, Riverside County, California. The approximate location of the site is shown on the Vicinity Map, Figure 1.

The subject property is comprised of approximately 4.26 acres of undeveloped land. The site has not been graded. Topographic relief at the subject property is relatively low with the terrain being generally flat. Elevations at the site range from approximately 1,264 to 1,280 feet above mean sea level (msl), for a difference of about 16± feet across the entire site. Drainage within the subject property generally flows to the northwest.

The site is currently bordered by commercial development to the east, south and west, as well as vacant property to the north. Most of the vegetation on the site consists of moderate amounts of annual weeds/grasses.

PROPOSED CONSTRUCTION

Based on the site plan provided by the client, the proposed development as illustrated on the conceptual grading plans will consist of a commercial development complete with interior streets, utilities, driveways, parking, and two (2) onsite water quality treatment areas.

SUBSURFACE EXPLORATION

Subsurface Exploration

Subsurface exploration within the subject site was performed on August 30, 2019 for the exploratory excavations. A truck mounted hollow-stem-auger drill rig was utilized to drill eight (8) borings throughout the site to a maximum depth of 46½ feet. The exploratory holes were excavated for geotechnical evaluation purposes with respect to the proposed developments and to interpret whether groundwater or impermeable soil layers were present. An underground utilities clearance was obtained from Underground Service Alert of Southern California, prior to the subsurface exploration. The approximate locations of the exploratory excavations are shown on the attached Infiltration Location Map, Plate 1 and descriptive logs are presented in Appendix A.

Earth materials encountered during exploration were classified and logged in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) of ASTM D 2488. Upon completion of laboratory testing, exploratory logs and sample descriptions may have been reconciled to reflect laboratory test results with regard to ASTM D 2487.

Earth Materials

A general description of the earth materials observed on site is provided below.

- Artificial Fill, Undocumented (map symbol Afu): Undocumented artificial fill materials were encountered throughout the site within the upper 2 feet during exploration. These materials are typically locally derived from the native materials and consist generally of yellowish brown to dark yellowish brown silty sand and clayey sand. These materials are generally inconsistent, poorly consolidated fills.

- Quaternary Young Alluvial Valley Deposits (map symbol Qyv): Quaternary alluvial deposits were encountered to a maximum depth of 46½ feet. These alluvial deposits consist predominately of interlayered yellowish brown to dark yellowish brown, fine to coarse grained silty sand as well as olive brown to light olive gray sandy clay and sandy silt. These deposits were generally noted to be in a slightly moist to moist, medium dense to dense state.

INFILTRATION TESTING

The double ring infiltrometer test method was utilized to perform a total of two (2) infiltration tests on September 20, 2019 to evaluate near surface infiltration rates in order to estimate the amount of storm water runoff that can infiltrate into the onsite water quality treatment areas. The infiltration tests were performed in general accordance with the requirements of double ring infiltration testing, ASTM D3385 and Appendix A of the Riverside County Flood Control and Water Conservation District.

The infiltration tests were performed using double ring infiltrometer and Mariotte tubes at a depth of 5 feet below existing grades. The locations of the infiltration tests are indicated on the attached Infiltration Location Map, Plate 1. The double ring infiltrometer tests were located by property boundary measurement on the site plan and by using geographic features. Infiltration test data recorded in the field are summarized in the following table and is included within Appendix C including the graph of Infiltration Rate versus Elapsed Time.

Infiltration Test Summary

TEST NUMBER	INFILTRATION HOLE DEPTH (ft.)	INFILTRATION RATE (in/hr)	DESCRIPTION
DR-1	5	0.25	Silty SAND
DR-2	5	0.25	Silty SAND

The infiltration test rates were 0.25 inches per hour (in/hr).

CONCLUSIONS AND RECOMMENDATIONS

General

From geotechnical and engineering geologic points of view, the proposed WQMP areas, where tested, is considered suitable for infiltration for the proposed development, provided the following conclusions and recommendations are incorporated into the plans and are implemented during construction.

Groundwater

Groundwater was not observed during our subsurface exploration to a total depth of 46½ feet. Potential groundwater impact is considered very low. According to the California Department of Water Resources, local well data indicates no shallow groundwater is present in the area, as illustrated in the Historic Well Data in Appendix B, meeting the minimum separation of 10 feet from the bottom of infiltration facility to the groundwater mark.

Geologic/ Geotechnical Screening

The proposed WQMP areas (see Plate 1) are located at a lower elevation than the proposed structures in competent native earth materials.

The proposed structures will be supported by compacted fill and competent earth materials, with no shallow groundwater (see Appendix B). According to the County of Riverside reports, the subject site is located in an area where liquefaction potential is considered moderate. However, due to the recommended compacted fill, absence of shallow groundwater, and the dense nature of the deeper onsite earth materials, the potential for earthquake induced liquefaction and lateral spreading beneath the proposed structures is considered low.

Preliminary laboratory test results indicate onsite earth materials exhibit an expansion potential of **VERY LOW** as classified in accordance with 2016 CBC Section 1803.5.3 and ASTM D4829.

Therefore, infiltration within the proposed WQMP areas will not encroach on any proposed structures and will not increase the risk of geologic hazards.

Design Rate and Recommended Factor of Safety

In accordance with the Riverside County The recommended factor of safety for the infiltration design is 2.

Based on the data presented in this report and the recommendations set forth herein, it is the opinion of Earth Strata Geotechnical Services that the WQMP area can be designed for an infiltration rate of 0.125 inches per hour in the vicinity of DR-1 and DR-2.

GRADING PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **Mr. Mark Cooper** and their authorized representative. It likely does not contain sufficient information for other parties or other uses. Earth Strata should be engaged to review the final design plans and specifications prior to construction. This is to verify that the recommendations contained in this report have been properly incorporated into the project plans and specifications. Should Earth Strata not be accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

Earth Strata should be retained to provide observations during construction to validate this report. In order to allow for design changes in the event that the subsurface conditions differ from those anticipated prior to construction.

Earth Strata should review any changes in the project and modify and approve in writing the conclusions and recommendations of this report. This report and the drawings contained within are intended for design input purposes only and are not intended to act as construction drawings or specifications. In the

event that conditions encountered during grading or construction operations appear to be different than those indicated in this report, this office should be notified immediately, as revisions may be required.

REPORT LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists, practicing at the time and location this report was prepared. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Earth materials vary in type, strength, and other geotechnical properties between points of observation and exploration. Groundwater and moisture conditions can also vary due to natural processes or the works of man on this or adjacent properties. As a result, we do not and cannot have complete knowledge of the subsurface conditions beneath the subject property. No practical study can completely eliminate uncertainty with regard to the anticipated geotechnical conditions in connection with a subject property.

The conclusions and recommendations within this report are based upon the findings at the points of observation and are subject to confirmation by Earth Strata during construction. This report is considered valid for a period of one year from the time the report was issued.

This report was prepared with the understanding that it is the responsibility of the owner or their representative, to ensure that the conclusions and recommendations contained herein are brought to the attention of the other project consultants and are incorporated into the plans and specifications. The owners' contractor should properly implement the conclusions and recommendations during grading and construction, and notify the owner if they consider any of the recommendations presented herein to be unsafe or unsuitable.

Respectfully submitted,

EARTH STRATA GEOTECHNICAL SERVICES

Stephen M. Poole, PE 40219
President
Principal Engineer

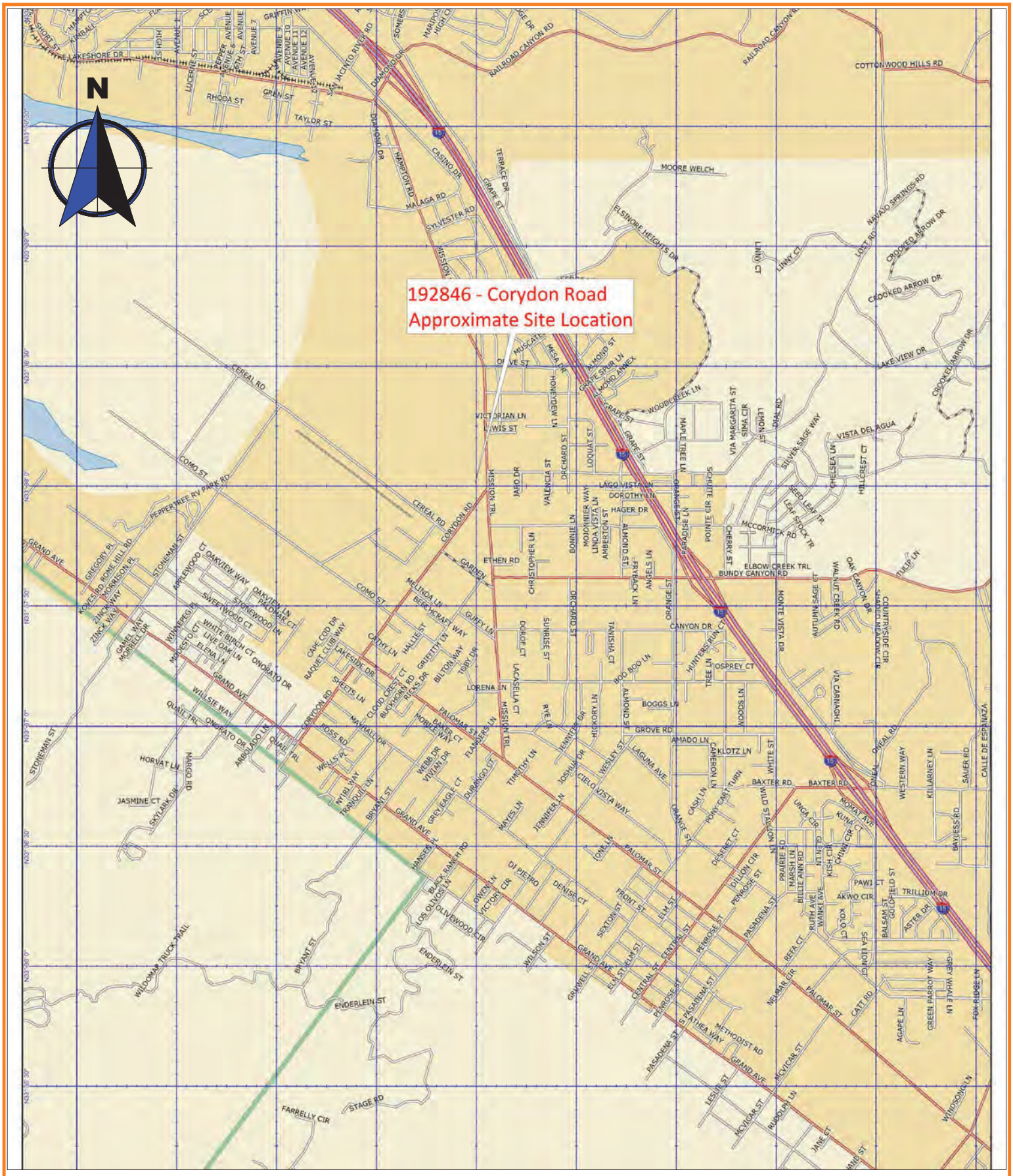
SMP/mam

Distribution: (1) Addressee

Attachments: Figure 1 – Vicinity Map *(Rear of Text)*
Appendix A – Exploratory Logs *(Rear of Text)*
Appendix B – Groundwater Data *(Rear of Text)*
Appendix C – Infiltration Test Sheets *(Rear of Text)*
Plate 1 – Infiltration Location Map *(Rear of Text)*

FIGURE 1

VICINITY MAP



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CORYDON ROAD		192846-12A
VICINITY MAP	SCALE 1:40,625	
	SEP 2019	FIGURE 1

APPENDIX A

EXPLORATORY LOGS

Geotechnical Boring Log B-1

Date: August 30, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 2**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0		0-5'				**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; dark yellowish brown, moist, medium dense, fine to coarse sand
	28	2.5'	113.8	6.7		with clay and trace gravel
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, dry, dense, fine to coarse sand with clay
5	34	5'	116.8	6.0		
	23	7.5'	113.2	4.7		Dark yellowish brown, slightly moist, medium dense
10	32	10'	116.0	9.0		
15	26	15'	118.8	13.1		
20	31	20'	123.7	10.9	ML	Sandy SILT; olive brown, moist, stiff, fine to coarse sand
25	33	25'	99.6	25.9	CL	CLAY; light olive gray, moist, very stiff, fine sand
30						

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Geotechnical Boring Log B-1

Date: August 30, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 2 of 2**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
30	27	30'	91.9	29.8		Olive gray, moist, very stiff, fine to medium sand
40	28	40'	102.2	26.4		
45	58	45'	98.6	7.9	ML	Sandy SILT; light olive gray, dry, very stiff, fine to medium sand
						Total Depth: 46.5 feet
						No Groundwater
50						
55						
60						

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Geotechnical Boring Log B-2

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SC	Clayey SAND; dark yellowish brown, dry, dense, fine to coarse sand with trace
	20	2.5'	115.8	8.8		gravel
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; dark yellowish brown, moist, medium dense, fine to coarse sand with
5	15	5'	103.7	15.2		clay
	22	7.5'	114.7	13.7	SC	Clayey SAND; dark yellowish brown, moist, medium dense, fine to coarse sand
10	33	10'	122.7	11.2		Yellowish brown
15	30	15'	118.4	8.6		
					ML	Sandy SILT; light olive gray to olive brown, moist, stiff, fine to medium sand
20	33	20'	126.9	10.8		
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-3

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SC	Clayey SAND; dark yellowish brown, slightly moist, very dense, fine to coarse
	72	2.5'	124.1	4.1		sand with trace gravel
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, dry, very dense, fine to coarse sand with clay and
5	23	5'	115.6	11.7		trace gravel
	19	7.5'	113.6	12.2		Dark yellowish brown
10	20	10'	107.0	10.2		
15	22	15'	116.3	11.0		
					CL	Sandy CLAY; olive gray, moist, stiff, fine sand
20	24	20'	95.6	25.1		
25						
30						

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Geotechnical Boring Log B-4

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse
	23	2.5'	103.9	5.6		sand with trace clay
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, dry, medium dense, fine to coarse sand
5	28	5'	113.0	2.7		
	24	7.5'	111.3	8.0	SC	Clayey SAND; yellowish brown, slightly moist, medium dense, fine to coarse sand
10	19	10'	113.8	11.4	SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse sand
						with clay
15	28	15'	118.1	8.9		
20	26	20'	115.1	16.7		Fine to medium sand
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-5

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; dark yellowish brown, slightly moist, medium dense, fine to coarse
	32	2.5'	126.5	6.2		sand
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse sand
5	16	5'	101.4	8.3		with clay
	19	7.5'	109.4	13.3		
10	23	10'	107.7	11.9		
15	16	15'	115.5	13.1	SC	Clayey SAND; yellow brown, slightly moist, medium dense, fine to coarse sand
20	33	20'	118.6	12.8		Olive brown, moist, dense, fine to coarse sand
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-6

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Filll, Undocumented (Afu):**
					SC	Clayey SAND; dark yellowish brown, moist, medium dense, fine to coarse sand
	13	2.5'	112.4	8.8		
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; dark yellowish brown, dry, medium dense, fine to coarse sand
5	11	5'	104.8	4.1		with trace clay
	17	7.5'	115.1	8.4		
10	30	10'	119.1	9.6		
15	26	15'	114.4	12.8	ML	Sandy SILT; yellowish brown, slightly moist, very stiff, fine sand
20	33	20'	110.2	13.7		
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-7

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0		0-5'				**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse
	26	2.5'	110.9	8.8		sand
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse
5	22	5'	112.1	7.0		with clay
	36	7.5'	113.2	3.6		
10	21	10'	120.7	12.8		
15	28	15'	110.8	18.4	SC	Clayey SAND; yellowish brown, slightly moist, medium dense, fine to coarse sand
20	23	20'	90.3	28.2	CL	CLAY; light grayish brown, moist, stiff
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-8

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SC	Clayey SAND; yellowish brown, dry, medium dense, fine to coarse sand
	19	2.5'	118.9	8.1		
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, slightly moist, dry, medium dense, fine to coarse sand
5	16	5'	121.0	8.7		with trace clay
	18	7.5'	99.5	7.0		
10	44	10'	125.3	8.3		
15	32	15'	109.9	13.1		
						Total Depth: 16.5 feet
						No Groundwater
20						
25						
30						

42184 Remington Avenue, Temecula, CA 92590

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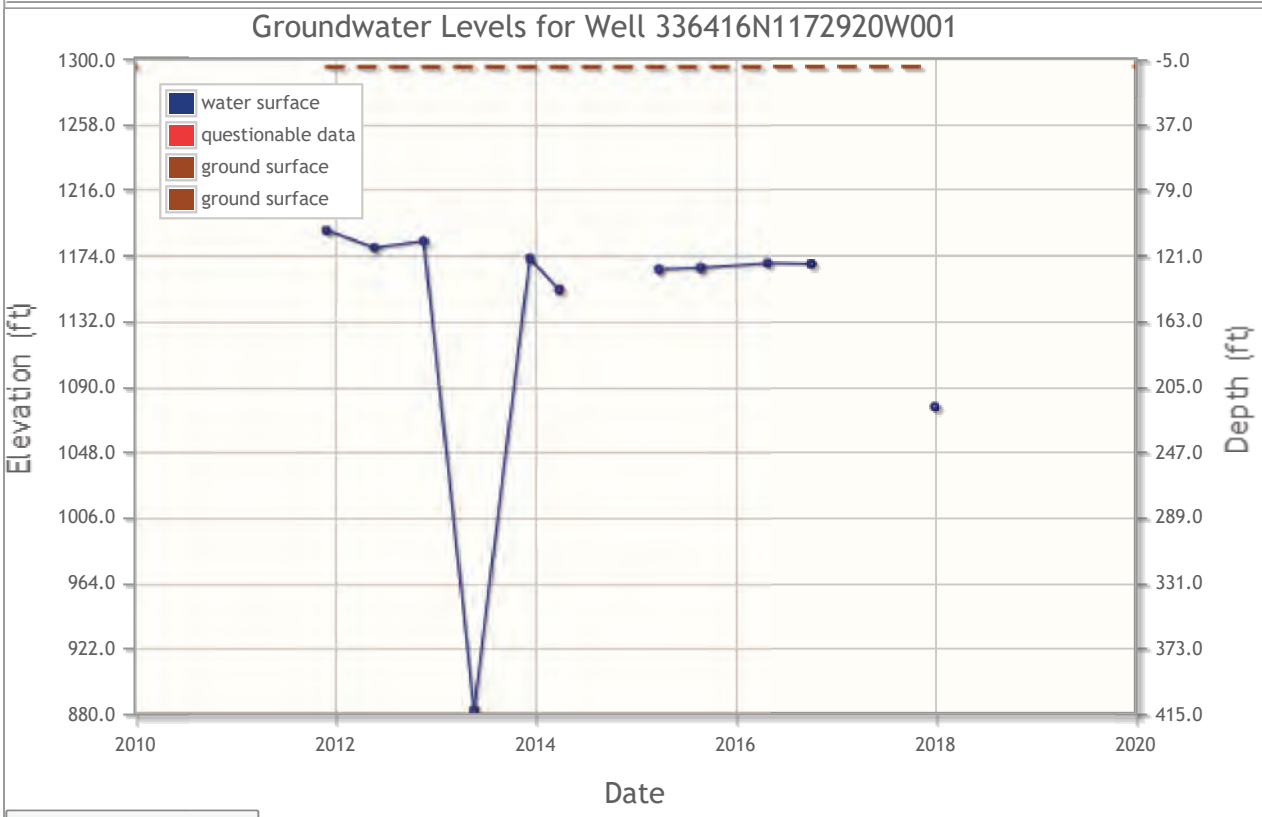
APPENDIX B

GROUNDWATER DATA

Groundwater Levels for Station 336416N1172920W001

Data for your selected well is shown in the tabbed interface below. To view data managed in the updated WDL tables, including data collected under the CASGEM program, click the "Recent Groundwater Level Data" tab. To view data stored in the former WDL tables, click the "Historical Groundwater Level Data" tab. To download the data in CSV format, click the "Download CSV File" button on the respective tab. Please note that the vertical datum for "recent" measurements is NAVD88, while the vertical datum for "historical" measurements is NGVD29. To change your well selection criteria, click the "Perform a New Well Search" button.

Station Data » **Recent Groundwater Level Data** » Historical Groundwater Level Data



Download CSV File

Date	RPE	GSE	RPWS	WSE	GS to WS	Msmt Code	CASGEM Msmt	Agency	Co
12/01/2011 12:00	1295.000	1295.000	105	1190	105		N	384	
05/23/2012 12:00	1295.000	1295.000	116	1179	116		N	384	
11/19/2012 12:00	1295.000	1295.000	111.8	1183.2	111.8		N	384	
05/20/2013 12:00	1295.000	1295.000	412.2	882.8	412.2		N	384	
12/10/2013 12:00	1295.000	1295.000	123	1172	123		N	384	
03/26/2014 12:00	1295.000	1295.000	143	1152	143		N	384	
10/18/2014 12:00	1295.000	1295.000				N-7	N	384	Do
03/24/2015 12:00	1295.000	1295.000	130	1165	130		N	384	
08/25/2015 12:00	1295.000	1295.000	129	1166	129		N	384	
04/26/2016 12:00	1295.000	1295.000	126	1169	126		N	384	
10/04/2016 12:00	1295.000	1295.000	126.5	1168.5	126.5		N	384	
05/12/2017 01:00	1295.000	1295.000				N-7	N	384	Did
12/29/2017 01:00	1295.000	1295.000	218.2	1076.8	218.2		N	384	

05/17/2018 01:00	1295.000	1295.000	N-3	N	384	can
12/18/2018 01:00	1295.000	1295.000	N-3	N	384	can
06/17/2019 01:00	1295.000	1295.000	N-3	N	384	can

All elevation and depth measurements are in feet. The vertical datum for recent measurements is NAVD88.

Perform a New Well Search

APPENDIX C

INFILTRATION TEST SHEETS

Test No.	DR-1	Location	See Map	Turf-Tec International - Record Chart for IN10-W - (12 & 24 Inch Infiltration Rings)

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Project Identification:	192846-12A				Constants	Area cm2	Depth of Liquid (cm)	Liquid Container Number		Marriotte Tube Volume			
Test Location:	DR-1				Inner Ring	729	10.0	1		10000			
Liquid Used:	TAP WATE	pH:	8.0		Annular Ring	2189	10.0	2		10000			
Tested By:	JMR2		Date	9/20/2019	Liquid level maintained	(X) Flow Valve	( ) Float Valve	( ) Mariotte Tubes					
Depth to water table:	> 30 Feet		Depth of Test	5'	Penetration Depth of Outer Ring:	9 cm	Other						

						Flow Readings					Infiltration Rates				Ground Temperature		Remarks
Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Time Increment /(Total)	Elapsed Time (Min)	Inner Ring Reading cm	Inner Maroitte Tube Flow (ml)	Annular Space Reading cm	Annular Space Marriotte Tube Flow (ml)	Liquid Temp °F	Inner Infiltration Rate cm/h	Inner Infiltration Rate In/h	Annular Infiltration Rate cm/h	Annular Infiltration Rate In/h	Ground Temp Depth (cm)	Temp at Depth (c)	Weather conditions Etc...
	Start Test	9/20/2019	11:40	0:25	25												
1	End Test	9/20/2019	12:05	0:25			463		1853.3		1.53	**0.60**	2.03	**0.80**			
	Start Test	9/20/2019	12:05	0:30	55												
2	End Test	9/20/2019	12:35	0:55			347.5		1389.9		0.95	**0.38**	1.27	**0.50**			
	Start Test	9/20/2019	12:35	0:30	85												
3	End Test	9/20/2019	13:05	1:25			231.7		1389.9		0.64	**0.25**	1.27	**0.50**			
	Start Test	9/20/2019	13:05	0:30	115												
4	End Test	9/20/2019	13:35	1:55			231.7		1389.9		0.64	**0.25**	1.27	**0.50**			
	Start Test	9/20/2019	13:35	0:30	145												
5	End Test	9/20/2019	14:05	2:25			347.5		1389.9		0.95	**0.38**	1.27	**0.50**			
	Start Test	9/20/2019	14:10	0:30	175												
6	End Test	9/20/2019	14:40	2:55			213.7		926.66		0.59	**0.23**	0.85	**0.33**			
	Start Test	9/20/2019	14:40	0:30	205												
7	End Test	9/20/2019	15:10	3:25			231.7		926.66		0.64	**0.25**	0.85	**0.33**			
	Start Test	9/20/2019	15:10	0:30	235												
8	End Test	9/20/2019	15:40	3:55			231.7		926.66		0.64	**0.25**	0.85	**0.33**			
	Start Test	9/20/2019	15:40	0:30	265												
9	End Test	9/20/2019	16:10	4:25			231.7		926.66		0.64	**0.25**	0.85	**0.33**			
	Start Test	9/20/2019	16:10	0:30	295												
10	End Test	9/20/2019	16:40	4:55			231.7		926.66		0.64	**0.25**	0.85	**0.33**			

Turf-Tec International

Project Identification:	192846-12A		
Test Location:	DR-1		
Liquid Used:	TAP WAT	**pH:**	8.0
Tested By:	JMR2		
Depth to water table:	> 30 Feet		

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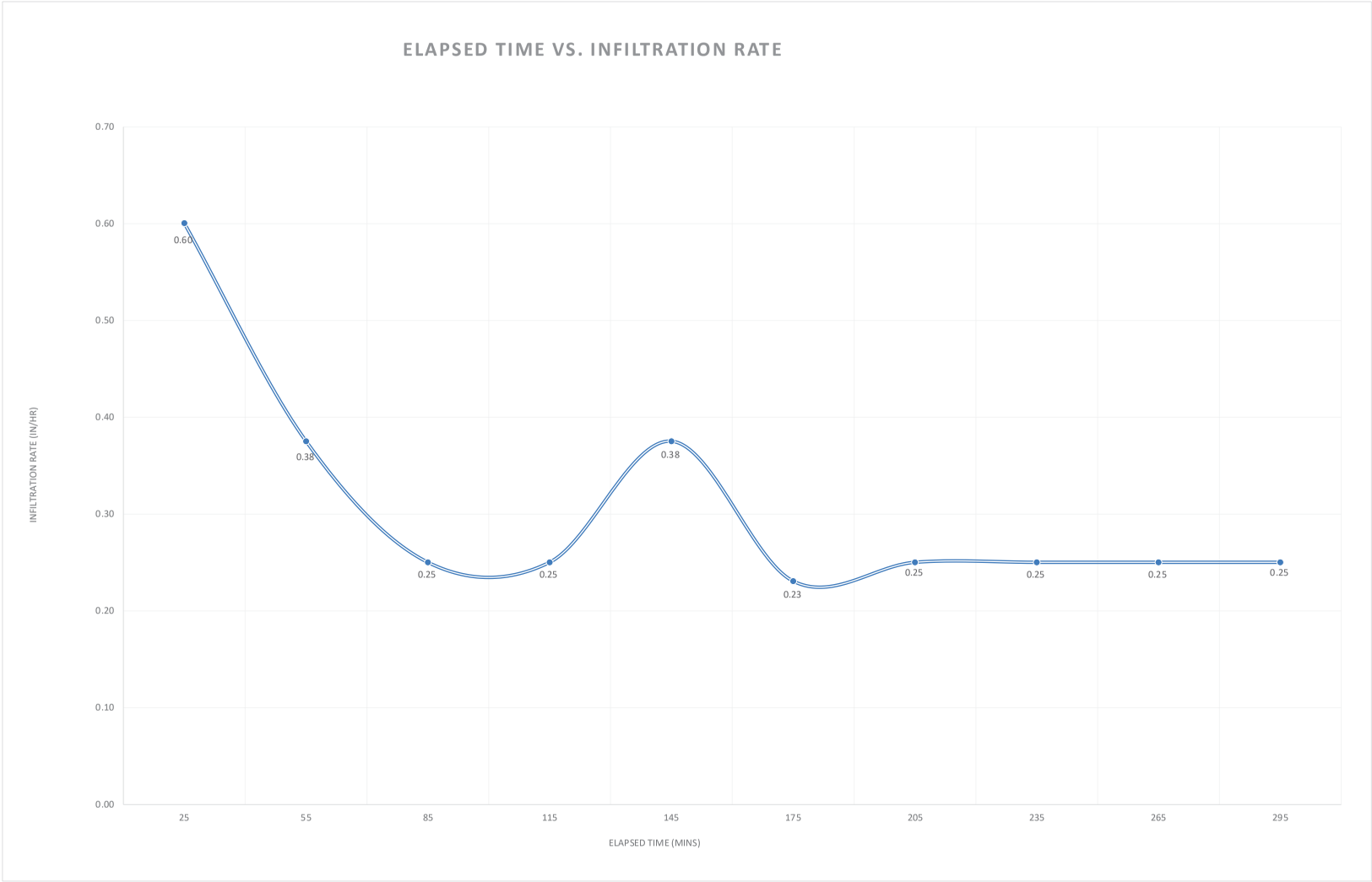

Test No. DR-2 **Location** See Map

Turf-Tec International - Record Chart for IN10-W - (12 & 24 Inch Infiltration Rings)

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Project Identification:	192846-12A	Constants	Area cm2	Depth of Liquid (cm)	Liquid Container Number	Marriotte Tube Volume
Test Location:	DR-2	Inner Ring	729	10.0	1	10000
Liquid Used:	TAP WAT pH: 8.0	Annular Ring	2189	10.0	2	10000
Tested By:	JMR2 Date 9/20/2019	Liquid level maintained (X) Flow Valve ( ) Float Valve ( ) Mariotte Tubes				
Depth to water table:	> 30 Feet Depth of Test 5'	Penetration Depth of Outer Ring: 9 cm				Other

Trial #	Start / End	Date MM/DD/YY	Time HR:MIN	Time Increment /(Total)	Elapsed Time (Min)	Flow Readings: Inner Ring Reading cm	Flow Readings: Inner Maroitte Tube Flow (ml)	Flow Readings: Annular Space Reading cm	Flow Readings: Annular Space Marriotte Tube Flow (ml)	Liquid Temp °F	Infiltration Rates: Inner Infiltration Rate cm/h	Infiltration Rates: Inner Infiltration Rate In/h	Infiltration Rates: Annular Infiltration Rate cm/h	Annular Infiltration Rate In/h	Ground Temperature: Ground Temp Depth (cm)	Ground Temperature: Temp at Depth (c)	Remarks: Weather conditions Etc...
	Start Test	9/20/2019	12:15	0:25	25												
1	End Test	9/20/2019	12:40	0:25			463		1853.3		1.53	**0.60**	2.03	**0.80**			
	Start Test	9/20/2019	12:40	0:30	55												
2	End Test	9/20/2019	13:10	0:55			347.5		1389.9		0.95	**0.38**	1.27	**0.50**			
	Start Test	9/20/2019	13:10	0:30	85												
3	End Test	9/20/2019	13:40	1:25			347.5		1389.9		0.95	**0.38**	1.27	**0.50**			
	Start Test	9/20/2019	13:40	0:30	115												
4	End Test	9/20/2019	14:10	1:55			463.33		1389.9		1.27	**0.50**	1.27	**0.50**			
	Start Test	9/20/2019	14:15	0:30	145												
5	End Test	9/20/2019	14:45	2:25			231.7		926.66		0.64	**0.25**	0.85	**0.33**			
	Start Test	9/20/2019	14:45	0:30	175												
6	End Test	9/20/2019	15:15	2:55			231.7		926.66		0.64	**0.25**	0.85	**0.33**			
	Start Test	9/20/2019	15:15	0:30	205												
7	End Test	9/20/2019	15:45	3:25			231.7		926.66		0.64	**0.25**	0.85	**0.33**			
	Start Test	9/20/2019	15:45	0:30	235												
8	End Test	9/20/2019	16:15	3:55			231.7		463.33		0.64	**0.25**	0.42	**0.17**			
	Start Test	9/20/2019	16:15	0:30	265												
9	End Test	9/20/2019	16:45	4:25			231.7		463.33		0.64	**0.25**	0.42	**0.17**			

Turf-Tec International

Project Identification:	192846-12A		
Test Location:	DR-2		
Liquid Used:	TAP WAT	**pH:**	8.0
Tested By:	JMR2		
Depth to water table:	> 30 Feet		

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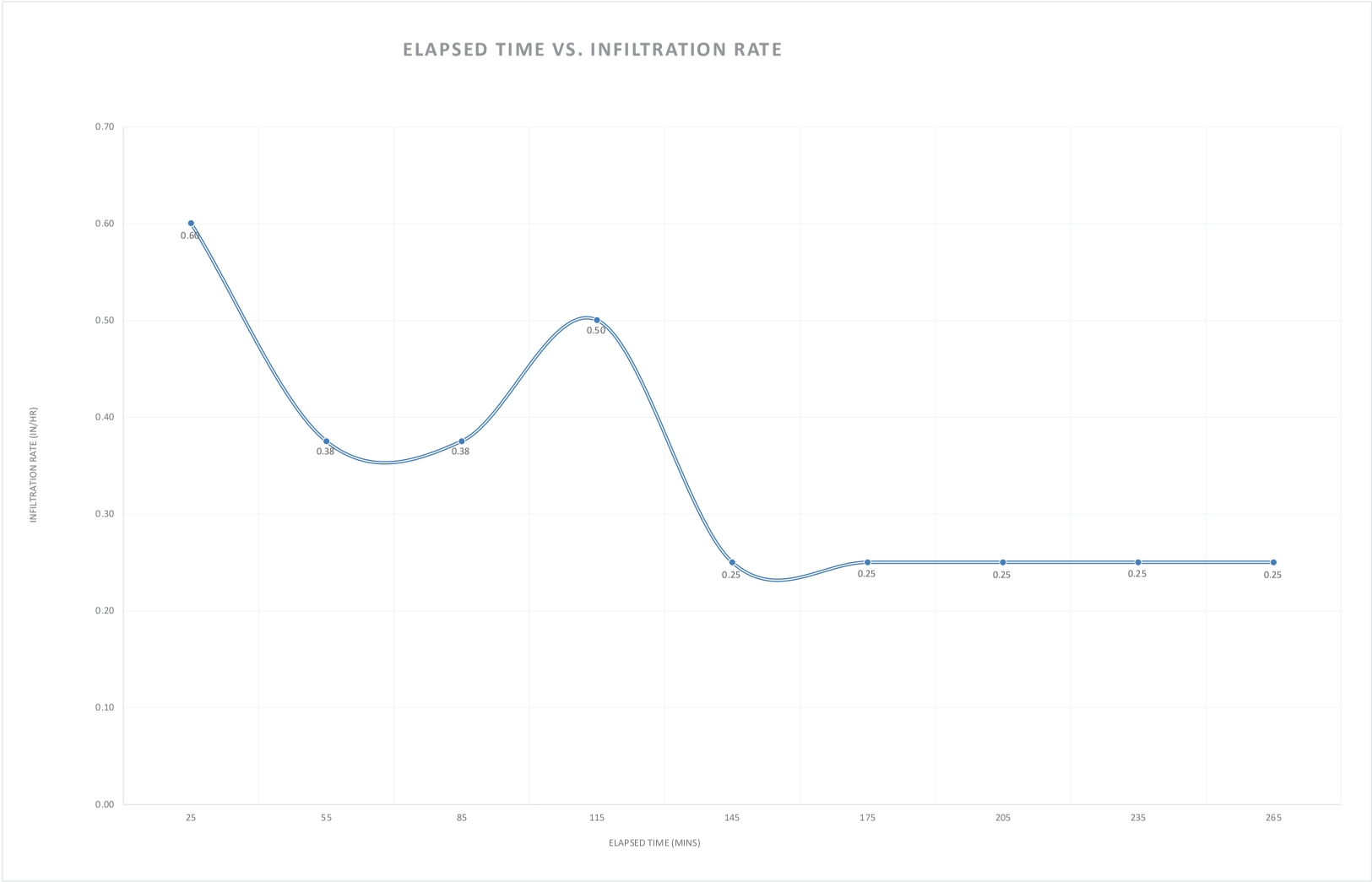

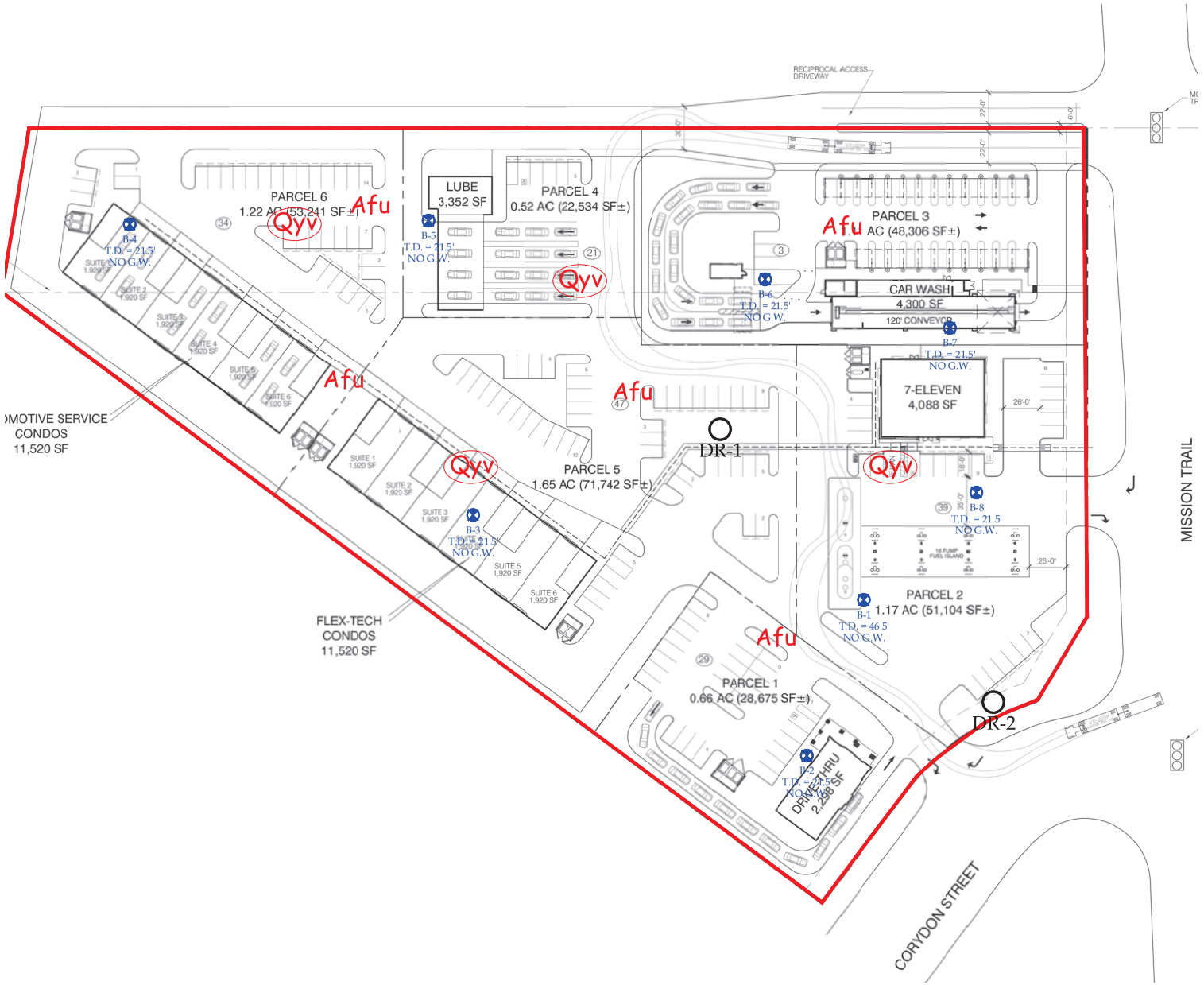

LEGEND

Locations are Approximate

Geologic Units

Afu - Artificial Fill, Undocumented

Qyv - Quaternary Young Alluvial Valley Deposits

Symbols

- Limits of Report

B-8 T.D. = 21.5' NO G.W. - Boring Location
Including Total Depth and Depth to Groundwater

DR-2 - Double Ring Test Location

INFILTRATION MAP

LOCATED NORTHWEST CORNER OF CORYDON ROAD AND MISSION TRAIL ROAD
CITY OF LAKE ELSINORE, RIVERSIDE COUNTY, CALIFORNIA
APN 370-050-026

PROJECT	PROPOSED COMMERCIAL PLAZA		
CLIENT	MR. MARK COOPER		
PROJECT NO.	192846-12A		
DATE	OCTOBER 2019		
SCALE	1:70		
DWG XREFS			
REVISION			
DRAWN BY	JDG	PLATE	1 OF 1

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Earth Strata Geotechnical Services, Inc.
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October 3, 2019 Project No. 192846-10A

Mr. Mark Cooper
R.E.D. CORYDON, LLC
38122 Stone Meadow Drive
Murrieta, CA 92562

Subject: **Preliminary Geotechnical Interpretive Report, Proposed Commercial Plaza, Assessor's Parcel Number 370-050-026, Located on the Northwest Corner of Corydon Road and Mission Trail Road, City of Lake Elsinore, Riverside County, California**

Earth Strata Geotechnical Services is pleased to present our preliminary geotechnical interpretive report for the proposed commercial plaza, Assessor's Parcel Number 370-050-026, located on the northwest corner of Corydon Road and Mission Trail Road in the City of Lake Elsinore, Riverside County, California. This work was performed in accordance with the scope of work described in our proposal, dated August 22, 2019. The purpose of this study is to evaluate the nature, distribution, engineering properties, and geologic strata underlying the site with respect to the proposed development.

Earth Strata Geotechnical Services appreciates the opportunity to offer our consultation and advice on this project. In the event that you have any questions, please do not hesitate to contact the undersigned at your earliest convenience.

Respectfully submitted,

EARTH STRATA GEOTECHNICAL SERVICES

Stephen M. Poole, PE, GE
Principal Engineer

Aaron G. Wood, PG, CEG
Principal Geologist

SMP/jf/mam

Distribution: (2) Addressee

TABLE OF CONTENTS

Attachments:

INTRODUCTION

Earth Strata Geotechnical Services is pleased to present our preliminary geotechnical interpretive report for the proposed development. The purpose of this study was to evaluate the nature, distribution, engineering properties, and geologic strata underlying the site with respect to the proposed development, and then provide preliminary grading and foundation design recommendations based on the plans you provided. The general location of the subject property is indicated on the Vicinity Map, Figure 1. The plans you provided were used as the base map to show geologic conditions within the subject site, see Geotechnical Map, Plate 1.

SITE DESCRIPTION

The subject property is located on the northwest corner of Mission Trail Road and Corydon Road in the City of Lake Elsinore, Riverside County, California. The approximate location of the site is shown on the Vicinity Map, Figure 1.

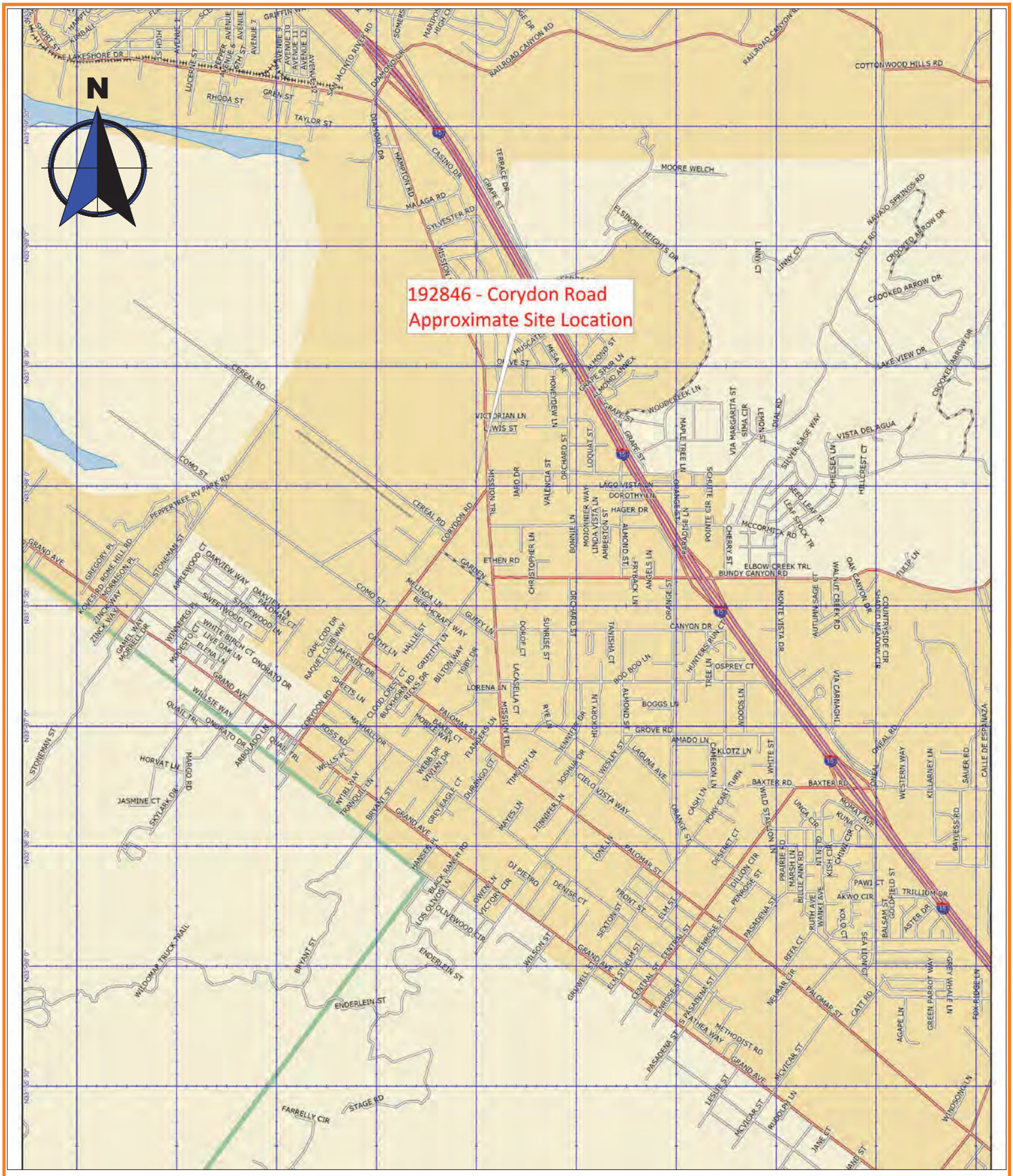
The subject property is comprised of approximately 4.26 acres of undeveloped land. The site has not been graded. Topographic relief at the subject property is relatively low with the terrain being generally flat. Elevations at the site range from approximately 1,264to 1,280 feet above mean sea level (msl), for a difference of about 16± feet across the entire site. Drainage within the subject property generally flows to the northwest.

The site is currently bordered by commercial development to the east, south, and west, as well as vacant property to the north. Most of the vegetation on the site consists of moderate amounts of annual weeds/grasses.

PROPOSED DEVELOPMENT AND GRADING

The proposed residential development is expected to consist of concrete, wood or steel framed one- and/or two-story structures utilizing slab on grade construction with associated streets, landscape areas, and utilities. The current development plans include seven (7) structures positioned throughout the site.

The plans provided by you were utilized in our exploration and form the base for our Geotechnical Map, Plate 1.



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CORYDON ROAD		192846-10A
VICINITY MAP	SCALE 1:40,625	
	SEP 2019	FIGURE 1

FIELD EXPLORATION AND LABORATORY TESTING

Field Exploration

Subsurface exploration within the subject site was performed on August 30, 2019 and September 6, 2019 for the exploratory excavations. A truck mounted hollow-stem-auger drill rig was utilized to drill eight (8) borings throughout the site to a maximum depth of 46 ½ feet. An underground utilities clearance was obtained from Underground Service Alert of Southern California, prior to the subsurface exploration.

Earth materials encountered during exploration were classified and logged in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) of ASTM D 2488. Upon completion of laboratory testing, exploratory logs and sample descriptions may have been reconciled to reflect laboratory test results with regard to ASTM D 2487.

Associated with the subsurface exploration was the collection of bulk (disturbed) samples and relatively undisturbed samples of earth materials for laboratory testing and analysis. The relatively undisturbed samples were obtained with a 3 inch outside diameter modified California split-spoon sampler lined with 1-inch-high brass rings. Samples obtained using a hollow stem auger drill rig, were mechanically driven with successive 30 inch drops of a 140-pound automatic trip safety hammer. The blow count per one-foot increment was recorded in the boring logs. The central portions of the driven samples were placed in sealed containers and transported to our laboratory for testing and analysis. The approximate exploratory locations are shown on Plate 1 and descriptive logs are presented in Appendix B.

Laboratory Testing

Maximum dry density/optimum moisture content, expansion potential, R-value, pH, resistivity, sulfate content, chloride content, and in-situ density/moisture content were determined for selected undisturbed and bulk samples of earth materials, considered representative of those encountered. An evaluation of the test data is reflected throughout the Conclusions and Recommendations section of this report. A brief description of laboratory test criteria and summaries of test data are presented in Appendix C.

FINDINGS

Regional Geology

Regionally, the site is located in the Peninsular Ranges Geomorphic Province of California. The Peninsular Ranges are characterized by northwest trending steep mountain ranges separated by sediment filled elongated valleys. The dominant structural geologic features reflect the northwest trend of the province. Associated with and subparallel to the San Andreas Fault are the San Jacinto Fault, Newport-Inglewood, and the Whittier-Elsinore Fault. The Santa Ana Mountains abut the west side of the Elsinore Fault while the Perris Block forms the other side of the fault zone to the east. The Perris Block is bounded to the east by the San Jacinto Fault. The northern perimeter of the Los Angeles basin forms part of a northerly dipping blind thrust fault at the boundary between the Peninsular Ranges Province and the Transverse Range Province.

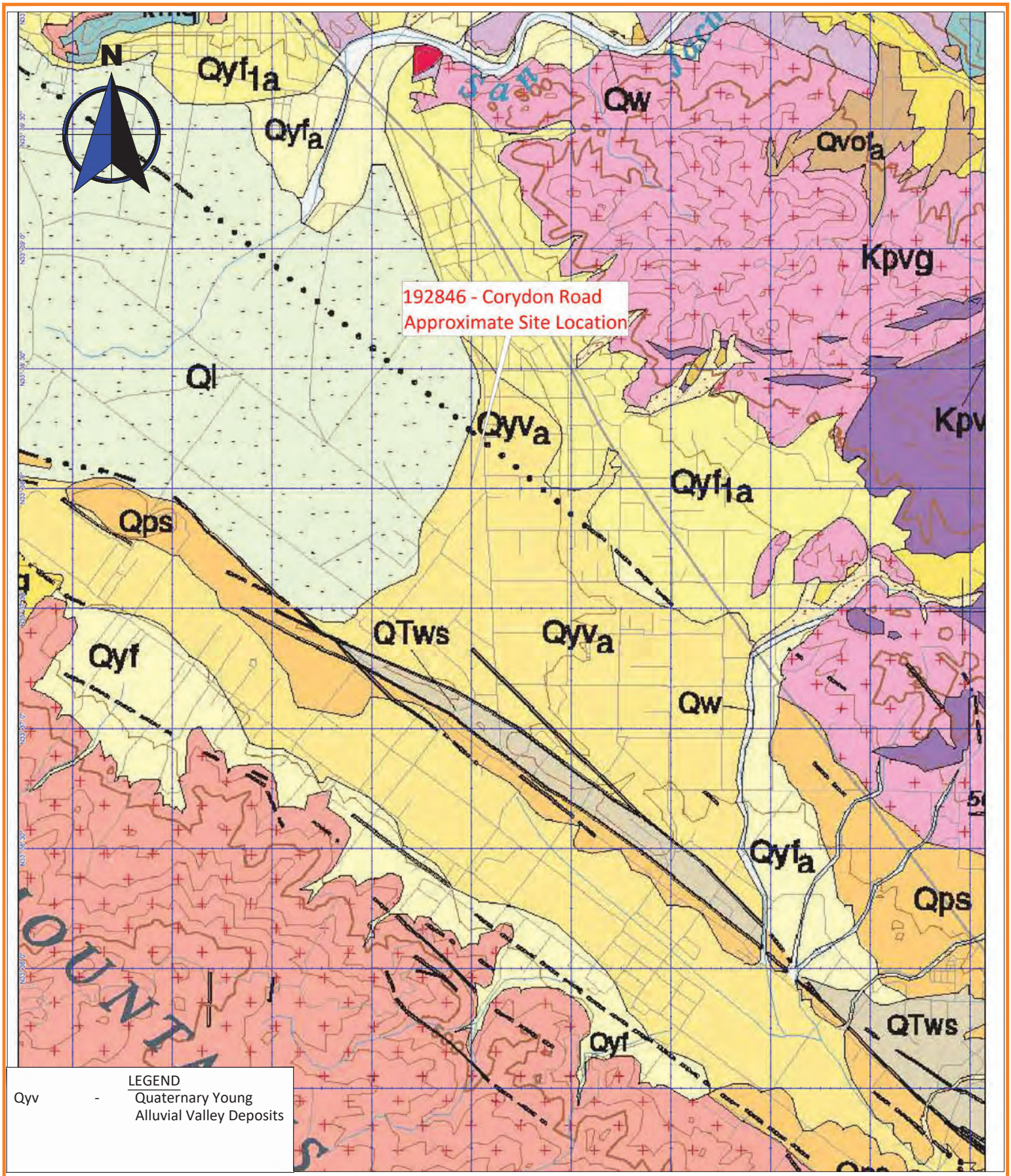
The mountainous regions within the Peninsular Ranges Province are comprised of Pre-Cretaceous, metasedimentary, and metavolcanic rocks along with Cretaceous plutonic rocks of the Southern California Batholith. The low lying areas are primarily comprised of Tertiary and Quaternary non-marine alluvial sediments consisting of alluvial deposits, sandstones, claystones, siltstones, conglomerates, and occasional volcanic units. A map illustrating the regional geology is presented on the Regional Geologic Map, Figure 2.

Local Geology

The earth materials on the site are primarily comprised of artificial fill and Quaternary young alluvial materials. A general description of the dominant earth materials observed on the site is provided below:

- Artificial Fill, Undocumented (map symbol Afu): Undocumented artificial fill materials were encountered throughout the site within the upper 2 feet during exploration. These materials are typically locally derived from the native materials and consist generally of yellowish brown to dark yellowish brown silty sand and clayey sand. These materials are generally inconsistent, poorly consolidated fills.

- Quaternary Young Alluvial Valley Deposits (map symbol Qyv): Quaternary young alluvial deposits were encountered to a maximum depth of 46 ½ feet. These alluvial deposits consist predominately of interlayered yellowish brown to dark yellowish brown, fine to coarse grained silty sand as well as olive brown to light olive gray sandy clay and sandy silt. These deposits were generally noted to be in a slightly moist to moist, medium dense to dense state.



LEGEND

Qyv - Quaternary Young Alluvial Valley Deposits

REFERNCES: Morton, D.M., Hauser, Rachel M., and Ruppert, Kelly R., 2004, Preliminary Digital Geologic Map of the San Bernardino and Santa Ana 30' x 60' Quadrangle, Southern California, Version 2.0: U.S. Geological Survey Open-File Report 99-0172.

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CORYDON ROAD | 192846-10A

REGIONAL GEOLOGIC MAP | SCALE 1:40,625 | SEP 2019 | FIGURE 2

Faulting

The project is located in a seismically active region and as a result, significant ground shaking will likely impact the site within the design life of the proposed project. The geologic structure of the entire southern California area is dominated by northwest-trending faults associated with the San Andreas Fault system, which accommodates for most of the right lateral movement associated with the relative motion between the Pacific and North American tectonic plates. Known active faults within this system include the Newport-Inglewood, Whittier-Elsinore, San Jacinto and San Andreas Faults.

No active faults are known to project through the site and the site is not located within an Alquist-Priolo Earthquake Fault Zone, established by the State of California to restrict the construction of new habitable structures across identifiable traces of known active faults. An active fault is defined by the State of California as having surface displacement within the past 11,000 years or during the Holocene geologic time period. Based on our mapping of the subject site, review of current and historical aerial imagery, lack of lineaments indicative of active faulting, and the data compiled during the preparation of this report, it is our interpretation that the potential for surface rupture to adversely impact the proposed structures is very low to remote.

Based on our review of regional geologic maps and applicable computer programs (USGS 2008 Interactive Deaggregation, Caltrans ARS online, and USGS Earthquake Hazard Programs), the Elsinore Fault with an approximate source to site distance of 0.38 kilometers is the closest known active fault anticipated to produce the highest ground accelerations, with an anticipated maximum modal magnitude of 7.7. A list of faults as well as a list of significant historical seismic events within a 100km radius of the subject site are included in Appendix D.

Landslides

Landslide debris was not observed during our subsurface exploration and no ancient landslides are known to exist on the site. No landslides are known to exist, or have been mapped, in the vicinity of the site. Geologic mapping of the site conducted during our investigation, and review of aerial imagery of the site, reveal no geomorphic expressions indicative of landsliding. No oversteepened slopes exist on the site or are proposed.

CONCLUSIONS AND RECOMMENDATIONS

General

From geotechnical and engineering geologic points of view, the subject property is considered suitable for the proposed development, provided the following conclusions and recommendations are incorporated into the plans and are implemented during construction.

Earthwork

Earthwork and Grading

The provisions of the 2016 California Building Code (CBC), including the General Earthwork and Grading Specifications in the last Appendix of this report, should be applied to all earthwork and grading operations, as well as in accordance with all applicable grading codes and requirements of the appropriate reviewing agency. Unless specifically revised or amended herein, grading operations should also be performed in accordance with applicable provisions of our General Earthwork and Grading Specifications within the last appendix of this report.

Clearing and Grubbing

Vegetation including trees, grasses, weeds, brush, shrubs, or any other debris should be stripped from the areas to be graded and properly disposed of offsite. In addition, laborers should be utilized to remove any roots, branches, or other deleterious materials during grading operations.

Earth Strata Geotechnical Services should be notified at the appropriate times to provide observation and testing services during Clearing and Grubbing operations. Any buried structures or unanticipated conditions should be brought to our immediate attention.

Excavation Characteristics

Based on the results of our exploration and experience with similar projects in similar settings, the near surface earth materials, will be readily excavated with conventional earth moving equipment.

Groundwater

Groundwater was not observed during our subsurface exploration. It should be noted that localized groundwater could be encountered during grading due to the limited number of exploratory locations or other factors.

Ground Preparation for Fill Areas

For each area to receive compacted fill, the removal of low density, compressible earth materials, such as undocumented artificial fill, should continue until firm competent alluvium is encountered. Removal excavations are subject to verification by the project engineer, geologist or their representative. Prior to placing compacted fills, the exposed bottom in each removal area should be scarified to a depth of 6 inches or more, watered or air dried as necessary to achieve near optimum moisture conditions and then compacted to a minimum of 90 percent of the maximum dry density determined by ASTM D 1557.

The intent of remedial grading is to diminish the potential for hydro-consolidation, slope instability, and/or settlement. Remedial grading should extend beyond the perimeter of the proposed structures a horizontal distance equal to the depth of excavation or a minimum of 5 feet, whichever is greater. For cursory purposes the anticipated removal depths are shown on the enclosed

Geotechnical Map, Plate 1. In general, the anticipated removal depths should vary from 3 to 5 feet below existing grade.

Wet Removals

Wet alluvial materials will probably not be encountered within the low lying areas of the site. If removals of wet alluvial materials are required, special grading equipment and procedures can greatly reduce overall costs. Careful planning by an experienced grading contractor can reduce the need for special equipment, such as swamp cats, draglines, excavators, pumps, and top loading earthmovers. Possible solutions may include the placement of imported angular rock and/or geotextile ground reinforcement. More specific recommendations can be provided based on the actual conditions encountered. Drying or mixing of wet materials with dry materials will be needed to bring the wet materials to near optimum moisture prior to placing wet materials into compacted fills.

Oversize Rock

Oversize rock is not expected to be encountered during grading. Oversize rock that is encountered (i.e., rock exceeding a maximum dimension of 12 inches) should be disposed of offsite or stockpiled onsite and crushed for future use. The disposal of oversize rock is discussed in greater detail in General Earthwork and Grading Specifications within the last appendix of this report.

Compacted Fill Placement

Compacted fill materials should be placed in 6 to 8 inch maximum (uncompacted) lifts, watered or air dried as necessary to achieve uniform near optimum moisture content and then compacted to a minimum of 90 percent of the maximum dry density determined by ASTM D 1557.

Import Earth Materials

Should import earth materials be needed to achieve final design grades, all potential import materials should be free of deleterious/oversize materials, non-expansive, and approved by the project geotechnical consultant prior to delivery onsite.

Fill Slopes

When properly constructed, fill slopes up to 10 feet high with inclinations of 2:1 (h:v) or flatter are considered to be grossly stable. Keyways are required at the toe of all fill slopes higher than 5 feet and steeper than 5:1 (h:v). Keyways should be a minimum of 10 feet wide and 2 feet into competent earth materials, as measured on the downhill side. In order to establish keyway removals, backcuts should be cut no steeper than 1:1 or as recommended by the geotechnical engineer or engineering geologist. Compacted fill should be benched into competent earth materials.

Cut Slopes

When properly constructed, cut slopes into older alluvium up to 10 feet high with inclinations of 2:1 (h:v) or flatter are considered grossly stable. Cut slopes should be observed by the engineering geologist or his representative during grading, but are anticipated to be stable.

Stabilization Fills

Currently, stabilization fills will not be required for cut slopes in the alluvium. Our engineering geologist or his representative should be called to evaluate all slopes during grading. In the event that unfavorable geologic conditions are encountered, recommendations for stabilization fills or flatter slopes will be provided.

Fill Over Cut Slopes

The fill portion of fill over cut slopes should not be constructed until the cut portion of the slope has been cut to finish grade. The earth materials and geologic structure exposed along the cut slope should be evaluated with regard to suitability for compacted fills or foundations and for stability. If the cut materials are determined to be competent, then the construction of the keyway and subdrain system may commence or additional remedial recommendations will be provided.

Temporary Backcuts

It is the responsibility of the grading contractor to follow all Cal-OSHA requirements with regard to excavation safety. Where existing developments are upslope, adequate slope stability to protect those developments must be maintained. Temporary backcuts will be required to accomplish removals of unsuitable materials and possibly, to perform canyon removals, stabilization fills, and/or keyways. Backcuts should be excavated at a gradient of 1:1 (h:v) or flatter. Flatter backcuts may be required where geologic structure or earth materials are unfavorable. It is imperative that grading schedules minimize the exposure time of the unsupported excavations. All excavations should be stabilized within 30 days of initial excavation.

Cut/Fill Transitions

Cut/fill transitions should be eliminated from all building areas where the depth of fill placed within the "fill" portion exceeds proposed footing depths. This is to diminish distress to structures resulting from excessive differential settlement. The entire foundation of each structure should be founded on a uniform bearing material. This should be accomplished by overexcavating the "cut" portion and replacing the excavated materials as properly compacted fill. Refer to the following table for recommended depths of overexcavation.

DEPTH OF FILL ("fill" portion)	DEPTH OF OVEREXCAVATION ("cut" portion)
Up to 5 feet	Equal Depth
5 to 10 feet	5 feet
Greater than 10 feet	One-half the thickness of fill placed on the "fill" portion (10 feet maximum)

Overexcavation of the "cut" portion should extend beyond the building perimeter a horizontal distance equal to the depth of overexcavation or a minimum of 5 feet, whichever is greater.

Cut Areas

In cut areas, an area a minimum of 5 feet beyond the footprint of the proposed structures should overexcavated until; competent bottoms are achieved; to a minimum 3 feet below the proposed foundations; or per the Overexcavation Table above; (whichever is greater) and replaced with compacted fill. Final determination of areas that require overexcavation should be determined in the field by a representative of Earth Strata Geotechnical Services.

Shrinkage, Bulking and Subsidence

Volumetric changes in earth material quantities will occur when poorly consolidated earth materials are replaced with properly compacted fill. Estimates of the percent shrinkage/bulking factors for the various geologic units observed on the subject property are based on in-place densities and on the estimated average percent of relative compaction achieved during grading.

GEOLOGIC UNIT	SHRINKAGE (%)
Artificial Fill	10 to 15
Alluvium	5 to 10

Subsidence from scarification and recompaction of exposed bottom surfaces is expected to be negligible to approximately 0.01 foot.

The estimates of shrinkage/bulking and subsidence are intended as an aid for project engineers in determining earthwork quantities. Since many variables can affect the accuracy of these estimates, they should be used with caution and contingency plans should be in place for balancing the project.

Geotechnical Observations

Clearing operations, removal of unsuitable materials, and general grading procedures should be observed by the project geotechnical consultant or his representative. No compacted fill should be placed without observations by the geotechnical consultant or his representative to verify the adequacy of the removals.

The project geotechnical consultant or his representative should be present to observe grading operations and to check that minimum compaction requirements and proper lift thicknesses are being met, as well as to verify compliance with the other recommendations presented herein.

Post Grading Considerations

Slope Landscaping and Maintenance

Adequate slope and building pad drainage is essential for the long term performance of the subject site. The gross stability of graded slopes should not be adversely affected, provided all drainage provisions are properly constructed and maintained. Engineered slopes should be landscaped with deep rooted, drought tolerant maintenance free plant species, as recommended by the project landscape architect.

Site Drainage

Control of site drainage is important for the performance of the proposed project. Roof gutters are recommended for the proposed structures. Pad and roof drainage should be collected and transferred to driveways, adjacent streets, storm-drain facilities, or other locations approved by the building official in non-erosive drainage devices. Drainage should not be allowed to pond on the pad or against any foundation or retaining wall. Drainage should not be allowed to flow uncontrolled over any descending slope. Planters located within retaining wall backfill should be sealed to prevent moisture intrusion into the backfill. Planters located next to structures should be sealed to the depth of the footings. Drainage control devices require periodic cleaning, testing and maintenance to remain effective.

At a minimum, pad drainage should be designed at the minimum gradients required by the CBC. To divert water away from foundations, the ground surface adjacent to foundations should also be graded at the minimum gradients required per the CBC.

Utility Trenches

All utility trench backfill should be compacted at near optimum moisture to a minimum of 90 percent of the maximum dry density determined by ASTM D 1557. For utility trench backfill within pavement areas the upper 6 inches of subgrade materials should be compacted to 95 percent of the maximum dry density determined by ASTM D 1557. This includes within the street right-of-ways, utility easements, under footings, sidewalks, driveways and building floor slabs, as well as within or adjacent to any slopes. Backfill should be placed in approximately 6 to 8 inch maximum loose lifts and then mechanically compacted with a hydro-hammer, rolling with a sheepsfoot, pneumatic tampers, or similar equipment. The utility trenches should be tested by the project geotechnical engineer or their representative to verify minimum compaction requirements are obtained.

In order to minimize the penetration of moisture below building slabs, all utility trenches should be backfilled with compacted fill, lean concrete or concrete slurry where they undercut the perimeter foundation. Utility trenches that are proposed parallel to any building footings (interior and/or exterior trenches), should not be located within a 1:1 (h:v) plane projected downward from the outside bottom edge of the footing.

SEISMIC DESIGN CONSIDERATIONS

Ground Motions

Structures are required to be designed and constructed to resist the effects of seismic ground motions as provided in the 2016 California Building Code Section 1613. The design is dependent on the site class, occupancy category I, II, III, or IV, mapped spectral accelerations for short periods (S_s), and mapped spectral acceleration for a 1-second period (S_1).

In order for structural design to comply with the 2016 CBC, the USGS "US Seismic Design Maps" online tool was used to compile spectral accelerations for the subject property based on data and maps jointly compiled by the United States Geological Survey (USGS) and the California Geological Survey (CGS). The data found in the following table is based on the Maximum Considered Earthquake (MCE) with 5% damped ground motions having a 2% probability of being exceeded in 50 years (2,475 year return period).

The seismic design coefficients were determined by a combination of the site class, mapped spectral accelerations, and occupancy category. The following seismic design coefficients should be implemented during design of the proposed structures. Summaries of the Seismic Hazard Deaggregation graphs and test data are presented in Appendix D.

2016 CBC	FACTOR
Site Location	Latitude: 33.633439° (North) Longitude: -117.291848°(West)
Site Class	D
Mapped Spectral Accelerations for short periods, S_s	2.389 g
Mapped Spectral Accelerations for 1-Second Period, S_1	0.965 g
Maximum Considered Earthquake Spectral Response Acceleration for Short Periods, S_{ms}	2.389 g
Maximum Considered Earthquake Spectral Response Acceleration for 1-Second Period, S_{m1}	1.447 g
Design Spectral Response Acceleration for Short Periods, S_{DS}	1.593 g
Design Spectral Response Acceleration for 1-Second Period, S_{D1}	0.965 g
Seismic Design Category	S_1 greater than .15, E
Importance Factor Based on Occupancy Category	III

We performed the probabilistic seismic hazard assessment for the site in accordance with the 2016 CBC, Section 1803.5.11 and 1803.5.12. The probabilistic seismic hazard maps and data files were jointly prepared by the United States Geological Survey (USGS) and the California Geological Survey (CGS) and can be found at the CGS Probabilistic Seismic Hazards Mapping Ground Motion Page. Actual ground shaking intensities at the site may be substantially higher or lower based on complex variables such as the near source directivity effects, depth and consistency of earth materials, topography, geologic structure, direction of fault rupture, and seismic wave reflection, refraction, and attenuation rates. The mean peak ground acceleration was calculated to be 0.958 g.

Secondary Seismic Hazards

Secondary effects of seismic shaking considered as potential hazards include several types of ground failure as well as induced flooding. Different types of ground failure, which could occur as a consequence of severe ground shaking at the site, include landslides, ground lurching, shallow ground rupture, and liquefaction/lateral spreading. The probability of occurrence of each type of ground failure depends on the severity of the earthquake, distance from faults, topography, the state of subsurface earth materials, groundwater conditions, and other factors. Based on our experience, subsurface exploration, and laboratory testing, all of the above secondary effects of seismic activity are considered unlikely.

Seismically induced flooding is normally a consequence of a tsunami (seismic sea wave), a seiche (i.e., a wave-like oscillation of surface water in an enclosed basin that may be initiated by a strong earthquake) or failure of a major reservoir or retention system up gradient of the site. Since the site is at an elevation of more than 1,200 feet above mean sea level and is located more than 30 miles inland from the nearest coastline of the Pacific Ocean, the potential for seismically induced flooding due to a tsunami is considered nonexistent. Since no enclosed bodies of water lie adjacent to or up gradient of the site, the likelihood for induced flooding due to a dam failure or a seiche overcoming the dam's freeboard is considered nonexistent.

Liquefaction and Lateral Spreading

Liquefaction occurs as a result of a substantial loss of shear strength or shearing resistance in loose, saturated, cohesionless earth materials subjected to earthquake induced ground shaking. Potential impacts from liquefaction include loss of bearing capacity, liquefaction related settlement, lateral movements, and surface manifestation such as sand boils. Seismically induced settlement occurs when loose sandy soils become denser when subjected to shaking during an earthquake. The three factors determining whether a site is likely to be subject to liquefaction include seismic shaking, type and consistency of earth materials, and groundwater level. The proposed structures will be supported by compacted fill and competent alluvium, with groundwater at a depth greater than 50 feet. As such, the potential for earthquake induced liquefaction and lateral spreading beneath the proposed structures is considered very low to remote due to the recommended compacted fill, relatively low groundwater level, and the dense nature of the deeper onsite earth materials.

Liquefaction analyses were performed for the existing un-graded and graded conditions, using a conservative groundwater level of 5 feet to represent the historic high groundwater level. We estimate that dynamic settlement of sands due to liquefaction will be on the order of 0.0 inches. The liquefaction potential and dynamic settlement of sands analyses are included within the appendices of this report.

TENTATIVE FOUNDATION DESIGN RECOMMENDATIONS

General

Provided grading is performed in accordance with the recommendations of this report, shallow foundations are considered feasible for support of the proposed structures. Tentative foundation recommendations are provided herein and graphic presentations of relevant recommendations may also be included on the enclosed map.

Allowable Bearing Values

An allowable bearing value of 2,500 pounds per square foot (psf) is recommended for design of 24-inch square pad footings and 12-inch-wide continuous footings founded at a minimum depth of 12 inches below the lowest adjacent final grade. This value may be increased by 20 percent for each additional 1-foot of width and/or depth to a maximum value of 3,000 psf. Recommended allowable bearing values include both dead and frequently applied live loads and may be increased by one third when designing for short duration wind or seismic forces.

Settlement

Based on the settlement characteristics of the earth materials that underlie the building sites and the anticipated loading, we estimate that the maximum total settlement of the footings will be less than approximately ¾ inch. Differential settlement is expected to be about ½ inch over a horizontal distance of approximately 20 feet, for an angular distortion ratio of 1:480. It is anticipated that the majority of the settlement will occur during construction or shortly after the initial application of loading.

The above settlement estimates are based on the assumption that the grading and construction are performed in accordance with the recommendations presented in this report and that the project geotechnical consultant will observe or test the earth material conditions in the footing excavations.

Lateral Resistance

Passive earth pressure of 250 psf per foot of depth to a maximum value of 2,500 psf may be used to establish lateral bearing resistance for footings. For areas coved with hardscape, passive earth pressure may be taken from the surface. For areas without hardscape, the upper 12 inches of the soil profile must be neglected when calculating passive earth pressure. A coefficient of friction of 0.36 times the dead load forces may be used between concrete and the supporting earth materials to determine lateral sliding resistance. The above values may be increased by one-third when designing for short duration wind or seismic forces. When combining passive and friction for lateral resistance, the passive component should be reduced by one third. In no case shall the lateral sliding resistance exceed one-half the dead load for clay, sandy clay, sandy silty clay, silty clay, and clayey silt.

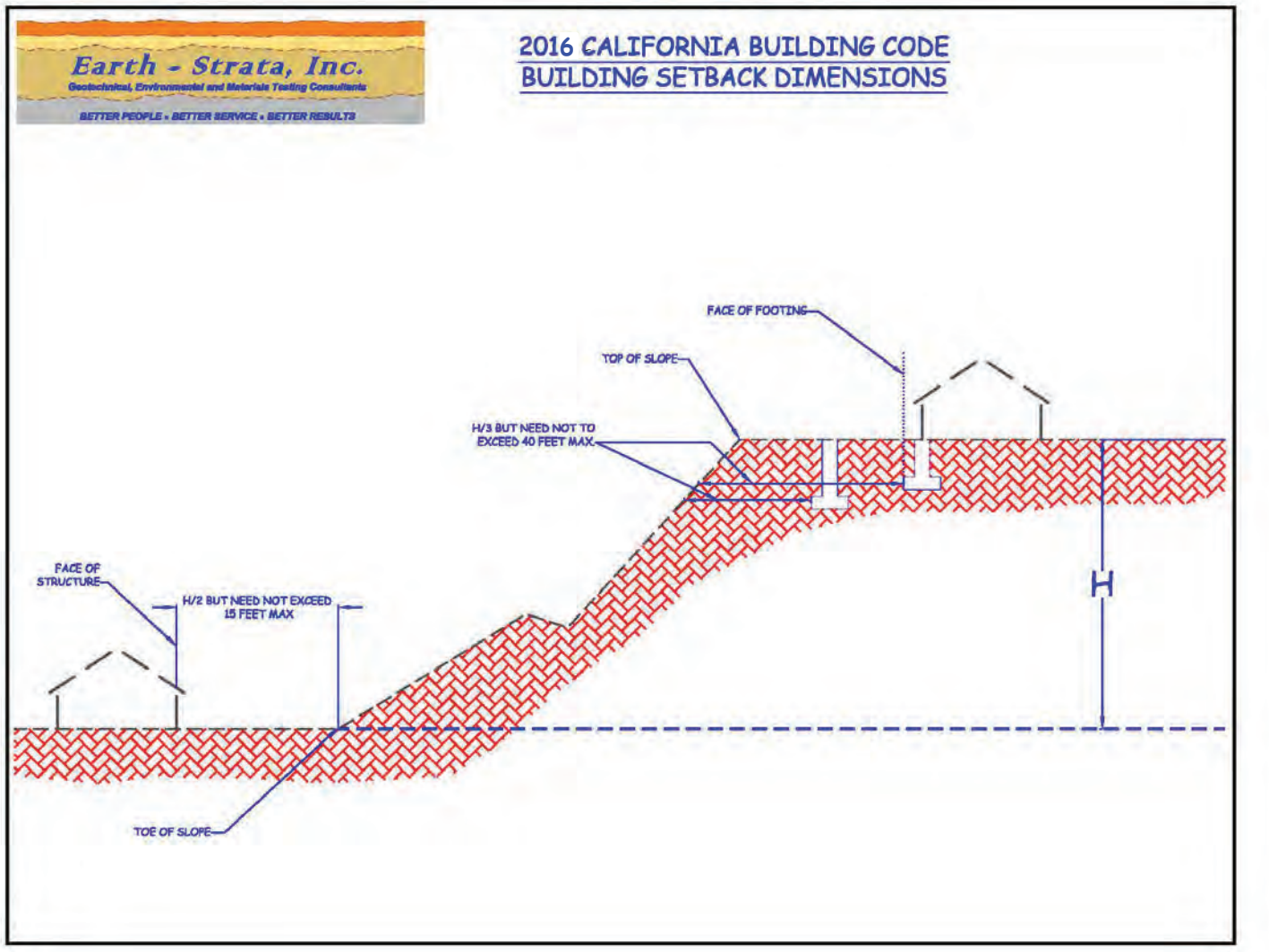
The above lateral resistance values are based on footings for an entire structure being placed directly against either compacted fill or competent alluvium.

Structural Setbacks and Building Clearance

Structural setbacks are required per the 2016 California Building Code (CBC). Additional structural setbacks are not required due to geologic or geotechnical conditions within the site. Improvements constructed in close proximity to natural or properly engineered and compacted slopes can, over time, be affected by natural processes including gravity forces, weathering, and long term secondary settlement. As a result, the CBC requires that buildings and structures be setback or footings deepened to resist the influence of these processes.

For structures that are planned near ascending and descending slopes, the footings should be embedded to satisfy the requirements presented in the CBC, Section 1808.7 as illustrated in the following Foundation Clearances from Slopes diagram.

FOUNDATION CLEARANCES FROM SLOPES



When determining the required clearance from ascending slopes with a retaining wall at the toe, the height of the slope shall be measured from the top of the wall to the top of the slope.

Foundation Observations

In accordance with the 2016 CBC and prior to the placement of forms, concrete, or steel, all foundation excavations should be observed by the geologist, engineer, or his representative to verify that they have been excavated into competent bearing materials. The excavations should be per the approved plans, moistened, cleaned of all loose materials, trimmed neat, level, and square. Any moisture softened earth materials should be removed prior to steel or concrete placement.

Earth materials from foundation excavations should not be placed in slab on grade areas unless the materials are tested for expansion potential and compacted to a minimum of 90 percent of the maximum dry density.

Expansive Soil Considerations

Preliminary laboratory test results indicate onsite earth materials exhibit an expansion potential of **VERY LOW** as classified in accordance with 2016 CBC Section 1803.5.3 and ASTM D4829-03. Additional, testing for expansive soil conditions should be conducted upon completion of rough grading. The following recommendations should be considered the very minimum requirements, for the earth materials tested. It is common practice for the project architect or structural engineer to require additional slab thickness, footing sizes, and/or reinforcement.

Very Low Expansion Potential (Expansion Index of 20 or Less)

Our laboratory test results indicate that the earth materials onsite exhibit a **VERY LOW** expansion potential as classified in accordance with 2016 CBC Section 1803.5.3 and ASTM D4829-03. Since the onsite earth materials exhibit expansion indices of 20 or less, the design of slab on ground foundations is exempt from the procedures outlined in Section 1808.6.1 or 1808.6.2.

Footings

- Exterior continuous footings may be founded at the minimum depths below the lowest adjacent final grade (i.e. 12-inch minimum depth for one-story, 18-inch minimum depth for two-story, and 24-inch minimum depth for three-story construction). Interior continuous footings for one-, two-, and three-story construction may be founded at a minimum depth of 12 inches below the lowest adjacent final grade. All continuous footings should have a minimum width of 12, 15, and 18 inches, for one-, two-, and three-story structures, respectively per Table 1809.7 of the 2016 CBC, and should be reinforced with a minimum of two (2) No. 4 bars, one (1) top and one (1) bottom.

- Exterior pad footings intended to support roof overhangs, such as second story decks, patio covers and similar construction should be a minimum of 24 inches square and founded at a minimum depth of 18 inches below the lowest adjacent final grade. No special reinforcement of the pad footings will be required.

Building Floor Slabs

- Building floor slabs should be a minimum of 4 inches thick and reinforced with a minimum of No. 3 bars spaced a maximum of 24 inches on center, each way. All floor slab reinforcement should be supported on concrete chairs or bricks to ensure the desired placement at mid-depth.

- Interior floor slabs, within living or moisture sensitive areas, should be underlain by a minimum 10-mil thick moisture/vapor barrier to help reduce the upward migration of moisture from the

underlying earth materials. The moisture/vapor barrier used should meet the performance standards of an ASTM E 1745 Class A material, and be properly installed in accordance with ACI publication 318-05. It is the responsibility of the contractor to ensure that the moisture/vapor barriers are free of openings, rips, or punctures prior to placing concrete. As an option for additional moisture reduction, higher strength concrete, such as a minimum 28-day compressive strength of 5,000 pounds per square inch (psi) may be used. Ultimately, the design of the moisture/vapor barrier system and recommendations for concrete placement and curing are the purview of the foundation engineer, taking into consideration the project requirements provided by the architect and owner.

- Garage floor slabs should be a minimum of 4 inches thick and should be reinforced in a similar manner as living area floor slabs. Garage floor slabs should be placed separately from adjacent wall footings with a positive separation maintained with ⅜ inch minimum felt expansion joint materials and quartered with weakened plane joints. A 12-inch-wide turn down founded at the same depth as adjacent footings should be provided across garage entrances. The turn down should be reinforced with a minimum of two (2) No. 4 bars, one (1) top and one (1) bottom.

- The subgrade earth materials below all floor slabs should be pre-watered to promote uniform curing of the concrete and minimize the development of shrinkage cracks, prior to placing concrete. The pre-watering should be verified by Earth Strata Geotechnical Services during construction.

Corrosivity

Corrosion is defined by the National Association of Corrosion Engineers (NACE) as "a deterioration of a substance or its properties because of a reaction with its environment." From a geotechnical viewpoint, the "substances" are the reinforced concrete foundations or buried metallic elements (not surrounded by concrete) and the "environment" is the prevailing earth materials in contact with them. Many factors can contribute to corrosivity, including the presence of chlorides, sulfates, salts, organic materials, different oxygen levels, poor drainage, different soil types, and moisture content. It is not considered practical or realistic to test for all of the factors which may contribute to corrosivity.

The potential for concrete exposure to chlorides is based upon the recognized Caltrans reference standard "Bridge Design Specifications", under Subsection 8.22.1 of that document, Caltrans has determined that "Corrosive water or soil contains more than 500 parts per million (ppm) of chlorides". Based on limited preliminary laboratory testing, the onsite earth materials have chloride contents *less* than 500 ppm. As such, specific requirements resulting from elevated chloride contents are not required.

Specific guidelines for concrete mix design are provided in 2016 CBC Section 1904.1 and ACI 318, Section 4.3 Table 4.3.1 when the soluble sulfate content of earth materials exceeds 0.1 percent by weight. Based on limited preliminary laboratory testing, the onsite earth materials are classified in accordance with Table 4.3.1 as having a *negligible* sulfate exposure condition. Therefore, structural concrete in contact with onsite earth materials should utilize Type I or II.

Based on our laboratory testing of resistivity, the onsite earth materials in contact with buried steel should be considered *mildly corrosive*. Additionally, pH values below 9.7 are recognized as being corrosive to most common metallic components including, copper, steel, iron, and aluminum. The pH values for the earth

materials tested were *lower* than 9.7. Therefore, any steel or metallic materials that are exposed to the earth materials should be encased in concrete or other measures should be taken to provide corrosion protection.

The preliminary test results for corrosivity are based on limited samples, and the initiation of grading may blend various earth materials together. This blending or imported material could alter and increase the detrimental properties of the onsite earth materials. Accordingly, additional testing for chlorides and sulfates along with testing for pH and resistivity should be performed upon completion of grading. Laboratory test results are presented in Appendix C.

RETAINING WALLS

Active and At-Rest Earth Pressures

Foundations may be designed in accordance with the recommendations provided in the Tentative Foundation Design Recommendation section of this report. The following table provides the minimum recommended equivalent fluid pressures for design of retaining walls a maximum of 8 feet high. The active earth pressure should be used for design of unrestrained retaining walls, which are free to tilt slightly. The at-rest earth pressure should be used for design of retaining walls that are restrained at the top, such as basement walls, curved walls with no joints, or walls restrained at corners. For curved walls, active pressure may be used if tilting is acceptable and construction joints are provided at each angle point and at a minimum of 15 foot intervals along the curved segments.

MINIMUM STATIC EQUIVALENT FLUID PRESSURES (pcf)		
PRESSURE TYPE	BACKSLOPE CONDITION	
	LEVEL	2:1 (h:v)
Active Earth Pressure	40	63
At-Rest Earth Pressure	60	95

The retaining wall parameters provided do not account for hydrostatic pressure behind the retaining walls. Therefore, the subdrain system is a very important part of the design. All retaining walls should be designed to resist surcharge loads imposed by other nearby walls, structures, or vehicles should be added to the above earth pressures, if the additional loads are being applied within a 1.5:1 (h:v) plane projected up from the heel of the retaining wall footing. As a way of minimizing surcharge loads and the settlement potential of nearby buildings, the footings for the building can be deepened below the 1.5:1 (h:v)plane projected up from the heel of the retaining wall footing.

Upon request and under a separate scope of work, more detailed analyses can be performed to address equivalent fluid pressures with regard to stepped retaining walls, actual retaining wall heights, actual backfill inclinations, specific backfill materials, higher retaining walls requiring earthquake design motions, etc.

Subdrain System

We recommend a perforated pipe and gravel subdrain system be provided behind all proposed retaining walls to prevent the buildup of hydrostatic pressure behind the proposed retaining walls. The perforated pipe should consist of 4-inch minimum diameter Schedule 40 PVC or ABS SDR-35, placed with the perforations facing down. The pipe should be surrounded by 1 cubic foot per foot of ¾- or 1½ inch open graded gravel wrapped in filter fabric. The filter fabric should consist of Mirafi 140N or equivalent to prevent infiltration of fines and subsequent clogging of the subdrain system.

In lieu of a perforated pipe and gravel subdrain system, weep holes or open vertical masonry joints may be provided in the lowest row of block exposed to the air to prevent the buildup of hydrostatic pressure behind the proposed retaining walls. Weep holes should be a minimum of 3 inches in diameter and provided at intervals of at least every 6 feet along the wall. Open vertical masonry joints should be provided at a minimum of 32 inch intervals. A continuous gravel fill, a minimum of 1 cubic foot per foot, should be placed behind the weep holes or open masonry joints. The gravel should be wrapped in filter fabric consisting of Mirafi 140N or equivalent.

The retaining walls should be adequately coated on the backfilled side of the walls with a proven waterproofing compound by an experienced professional to inhibit infiltration of moisture through the walls.

Temporary Excavations

All excavations should be made in accordance with Cal-OSHA requirements. Earth Strata Geotechnical Services is not responsible for job site safety.

Retaining Wall Backfill

Retaining wall backfill materials should be approved by the geotechnical engineer or his representative prior to placement as compacted fill. Retaining wall backfill should be placed in lifts no greater than 6 to 8 inches, watered or air dried as necessary to achieve near optimum moisture contents. All retaining wall backfill should be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM D 1557. Retaining wall backfill should be capped with a paved surface drain.

CONCRETE FLATWORK

Thickness and Joint Spacing

Concrete sidewalks and patio type slabs should be at least 3½ inches thick and provided with construction or expansion joints every 6 feet or less, to reduce the potential for excessive cracking. Concrete driveway slabs should be at least 4 inches thick and provided with construction or expansion joints every 10 feet or less.

Subgrade Preparation

In order to reduce the potential for unsightly cracking, subgrade earth materials underlying concrete flatwork should be compacted at near optimum moisture to 90 percent of the maximum dry density determined by ASTM D 1557 and then moistened to optimum or slightly above optimum moisture content.

This moisture should extend to a depth of 12 inches below subgrade and be maintained prior to placement of concrete. Pre-watering of the earth materials prior to placing concrete will promote uniform curing of the concrete and minimize the development of shrinkage cracks. The project geotechnical engineer or his representative should verify the density and moisture content of the earth materials and the depth of moisture penetration prior to placing concrete.

Cracking within concrete flatwork is often a result of factors such as the use of too high a water to cement ratio and/or inadequate steps taken to prevent moisture loss during the curing of the concrete. Concrete distress can be reduced by proper concrete mix design and proper placement and curing of the concrete. Minor cracking within concrete flatwork is normal and should be expected.

PRELIMINARY ASPHALTIC CONCRETE PAVEMENT DESIGN

Laboratory testing of representative earth materials indicate an R-value of 16 may be used for preliminary pavement design. The following table includes our minimum recommended asphaltic concrete pavement sections calculated in accordance with the State of California design procedures using assumed Traffic Indices. Final pavement design should be based on sampling and testing of post grading conditions. Alternative pavement sections and calculation sheets have been provided within the appendices of this report.

PRELIMINARY ASPHALTIC CONCRETE PAVEMENT DESIGN			
PARAMETERS	**AUTO PARKING**	**AUTO DRIVES**	**ENTRANCES**
Assumed Traffic Index	5.0	6.0	7.0
Design R-Value	16	16	16
AC Thickness (inches)	3	4	4½
AB Thickness (inches)	8	9	12

Notes: AC – Asphaltic Concrete
AB – Aggregate Base

The subgrade earth materials immediately below the aggregate base (base) should be compacted to a minimum of 95 percent of the maximum dry density determined by ASTM D 1557 to a minimum depth of 12 inches. Base materials should be compacted to a minimum of 95 percent of the maximum dry density determined by ASTM D 1557.

Base materials should consist of Class 2 aggregate base conforming to Section 26-1.02B of the State of California Standard Specifications or crushed aggregate base conforming to Section 200-2 of the Standard Specifications for Public Works Construction (Greenbook). Base materials should be compacted at or slightly below optimum moisture content. Asphaltic concrete materials and construction operations should conform to Section 203 of the Greenbook.

GRADING PLAN REVIEW AND CONSTRUCTION SERVICES

This report has been prepared for the exclusive use of **Mr. Mark Cooper** and their authorized representative. It likely does not contain sufficient information for other parties or other uses. Earth Strata

Geotechnical Services should be engaged to review the final design plans and specifications prior to construction. This is to verify that the recommendations contained in this report have been properly incorporated into the project plans and specifications. Should Earth Strata Geotechnical Services not be accorded the opportunity to review the project plans and specifications, we are not responsibility for misinterpretation of our recommendations.

We recommend that Earth Strata Geotechnical Services be retained to provide geologic and geotechnical engineering services during grading and foundation excavation phases of the work. In order to allow for design changes in the event that the subsurface conditions differ from those anticipated prior to construction.

Earth Strata Geotechnical Services should review any changes in the project and modify and approve in writing the conclusions and recommendations of this report. This report and the drawings contained within are intended for design input purposes only and are not intended to act as construction drawings or specifications. In the event that conditions encountered during grading or construction operations appear to be different than those indicated in this report, this office should be notified immediately, as revisions may be required.

REPORT LIMITATIONS

Our services were performed using the degree of care and skill ordinarily exercised, under similar circumstances, by reputable soils engineers and geologists, practicing at the time and location this report was prepared. No other warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Earth materials vary in type, strength, and other geotechnical properties between points of observation and exploration. Groundwater and moisture conditions can also vary due to natural processes or the works of man on this or adjacent properties. As a result, we do not and cannot have complete knowledge of the subsurface conditions beneath the subject property. No practical study can completely eliminate uncertainty with regard to the anticipated geotechnical conditions in connection with a subject property. The conclusions and recommendations within this report are based upon the findings at the points of observation and are subject to confirmation by Earth Strata Geotechnical Services based on the conditions revealed during grading and construction.

This report was prepared with the understanding that it is the responsibility of the owner or their representative, to ensure that the conclusions and recommendations contained herein are brought to the attention of the other project consultants and are incorporated into the plans and specifications. The owners' contractor should properly implement the conclusions and recommendations during grading and construction, and notify the owner if they consider any of the recommendations presented herein to be unsafe or unsuitable.

APPENDIX A

REFERENCES

APPENDIX A

References

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APPENDIX B

EXPLORATORY LOGS

Geotechnical Boring Log B-1

Date: August 30, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 2**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0		0-5'				**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; dark yellowish brown, moist, medium dense, fine to coarse sand
	28	2.5'	113.8	6.7		with clay and trace gravel
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, dry, dense, fine to coarse sand with clay
5	34	5'	116.8	6.0		
	23	7.5'	113.2	4.7		Dark yellowish brown, slightly moist, medium dense
10	32	10'	116.0	9.0		
15	26	15'	118.8	13.1		
20	31	20'	123.7	10.9	ML	Sandy SILT; olive brown, moist, stiff, fine to coarse sand
25	33	25'	99.6	25.9	CL	CLAY; light olive gray, moist, very stiff, fine sand
30						

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Geotechnical Boring Log B-1

Date: August 30, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 2 of 2**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
30	27	30'	91.9	29.8		Olive gray, moist, very stiff, fine to medium sand
35						
40	28	40'	102.2	26.4		
45	58	45'	98.6	7.9	ML	Sandy SILT; light olive gray, dry, very stiff, fine to medium sand
						Total Depth: 46.5 feet
						No Groundwater
50						
55						
60						

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Geotechnical Boring Log B-2

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SC	Clayey SAND; dark yellowish brown, dry, dense, fine to coarse sand with trace
	20	2.5'	115.8	8.8		gravel
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; dark yellowish brown, moist, medium dense, fine to coarse sand with
5	15	5'	103.7	15.2		clay
	22	7.5'	114.7	13.7	SC	Clayey SAND; dark yellowish brown, moist, medium dense, fine to coarse sand
10	33	10'	122.7	11.2		Yellowish brown
15	30	15'	118.4	8.6		
					ML	Sandy SILT; light olive gray to olive brown, moist, stiff, fine to medium sand
20	33	20'	126.9	10.8		
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-3

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SC	Clayey SAND; dark yellowish brown, slightly moist, very dense, fine to coarse
	72	2.5'	124.1	4.1		sand with trace gravel
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, dry, very dense, fine to coarse sand with clay and
5	23	5'	115.6	11.7		trace gravel
	19	7.5'	113.6	12.2		Dark yellowish brown
10	20	10'	107.0	10.2		
15	22	15'	116.3	11.0		
					CL	Sandy CLAY; olive gray, moist, stiff, fine sand
20	24	20'	95.6	25.1		
25						
30						

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Geotechnical Boring Log B-4

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse
	23	2.5'	103.9	5.6		sand with trace clay
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, dry, medium dense, fine to coarse sand
5	28	5'	113.0	2.7		
	24	7.5'	111.3	8.0	SC	Clayey SAND; yellowish brown, slightly moist, medium dense, fine to coarse sand
10	19	10'	113.8	11.4	SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse sand
						with clay
15	28	15'	118.1	8.9		
20	26	20'	115.1	16.7		Fine to medium sand
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-5

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; dark yellowish brown, slightly moist, medium dense, fine to coarse
	32	2.5'	126.5	6.2		sand
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse sand
5	16	5'	101.4	8.3		with clay
	19	7.5'	109.4	13.3		
10	23	10'	107.7	11.9		
15	16	15'	115.5	13.1	SC	Clayey SAND; yellow brown, slightly moist, medium dense, fine to coarse sand
20	33	20'	118.6	12.8		Olive brown, moist, dense, fine to coarse sand
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-6

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Filll, Undocumented (Afu):**
					SC	Clayey SAND; dark yellowish brown, moist, medium dense, fine to coarse sand
	13	2.5'	112.4	8.8		
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; dark yellowish brown, dry, medium dense, fine to coarse sand
5	11	5'	104.8	4.1		with trace clay
	17	7.5'	115.1	8.4		
10	30	10'	119.1	9.6		
15	26	15'	114.4	12.8	ML	Sandy SILT; yellowish brown, slightly moist, very stiff, fine sand
20	33	20'	110.2	13.7		
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-7

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0		0-5'				**Artificial Fill, Undocumented (Afu):**
					SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse
	26	2.5'	110.9	8.8		sand
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, slightly moist, medium dense, fine to coarse
5	22	5'	112.1	7.0		with clay
	36	7.5'	113.2	3.6		
10	21	10'	120.7	12.8		
15	28	15'	110.8	18.4	SC	Clayey SAND; yellowish brown, slightly moist, medium dense, fine to coarse sand
20	23	20'	90.3	28.2	CL	CLAY; light grayish brown, moist, stiff
						Total Depth: 21.5 feet
						No Groundwater
25						
30						

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Geotechnical Boring Log B-8

Date: September 6, 2019	**Project Name: Mission Trail Road & Corydon Road, Lake Elsinore** **Page: 1 of 1**
Project Number: 192846-10A	**Logged By: JF**
Drilling Company: Drilling It	**Type of Rig: B-61**
Drive Weight (lbs): 140	**Drop (in): 30** **Hole Diameter (in): 8**
Top of Hole Elevation (ft): See Map	**Hole Location: See Geotechnical Map**

Depth (ft)	Blow Count Per Foot	Sample Depth	Dry Density (pcf)	Moisture (%)	Classification Symbol	MATERIAL DESCRIPTION
0						**Artificial Fill, Undocumented (Afu):**
					SC	Clayey SAND; yellowish brown, dry, medium dense, fine to coarse sand
	19	2.5'	118.9	8.1		
						Quaternary Young Alluvial Valley Deposits (Qyv):
					SM	Silty SAND; yellowish brown, slightly moist, dry, medium dense, fine to coarse sand
5	16	5'	121.0	8.7		with trace clay
	18	7.5'	99.5	7.0		
10	44	10'	125.3	8.3		
15	32	15'	109.9	13.1		
						Total Depth: 16.5 feet
						No Groundwater
20						
25						
30						

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APPENDIX C

LABORATORY PROCEDURES AND TEST RESULTS

APPENDIX C

Laboratory Procedures and Test Results

Laboratory testing provided quantitative and qualitative data involving the relevant engineering properties of the representative earth materials selected for testing. The representative samples were tested in general accordance with American Society for Testing and Materials (ASTM) procedures and/or California Test Methods (CTM).

Soil Classification: Earth materials encountered during exploration were classified and logged in general accordance with the Standard Practice for Description and Identification of Soils (Visual-Manual Procedure) of ASTM D 2488. Upon completion of laboratory testing, exploratory logs and sample descriptions were reconciled to reflect laboratory test results with regard to ASTM D 2487.

Grain Size Distribution: Select samples were tested using the guidelines of ASTM D 1140. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	% PASSING # 200 SIEVE
B-1 @ 7.5 feet	Silty SAND	22
B-1 @ 15 feet	Sandy CLAY	52
B-1 @ 20 feet	Sandy CLAY	51
B-1 @ 30 feet	CLAY	96
B-1 @ 40 feet	CLAY	91
B-1 @ 45 feet	Silty SAND	42

Moisture and Density Tests: For select samples moisture content was determined using the guidelines of ASTM D 2216 and dry density determinations were made using the guidelines of ASTM D 2937. These tests were performed on relatively undisturbed samples and the test results are presented on the exploratory logs.

Maximum Density Tests: The maximum dry density and optimum moisture content of representative samples were determined using the guidelines of ASTM D 1557. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	MAXIMUM DRY DENSITY (pcf)	OPTIMUM MOISTURE CONTENT (%)
Bulk 1 @ 0 – 5 feet	Silty SAND	128.0	6.5

Expansion Index: The expansion potential of representative samples was evaluated using the guidelines of ASTM D 4829. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	EXPANSION INDEX	EXPANSION POTENTIAL
Bulk 1 @ 0 – 5 feet	Silty SAND	3	Very Low

R-Value: The R-value of representative samples was determined using the guidelines of CTM 301. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	R-VALUE
Bulk 1 @ 0 – 5 feet	Silty SAND	16

Minimum Resistivity and pH Tests: Minimum resistivity and pH Tests of select samples were performed using the guidelines of CTM 643. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	pH	MINIMUM RESISTIVITY (ohm-cm)
Bulk 1 @ 0 – 5 feet	Silty SAND	7.2	3,600

Soluble Sulfate: The soluble sulfate content of select samples was determined using the guidelines of CTM 417. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	SULFATE CONTENT (% by weight)	SULFATE EXPOSURE
Bulk 1 @ 0 – 5 feet	Silty SAND	0.002	Negligible

Chloride Content: Chloride content of select samples was determined using the guidelines of CTM 422. The test results are presented in the table below.

SAMPLE LOCATION	MATERIAL DESCRIPTION	CHLORIDE CONTENT (ppm)
Bulk 1 @ 0 – 5 feet	Silty SAND	30

APPENDIX D

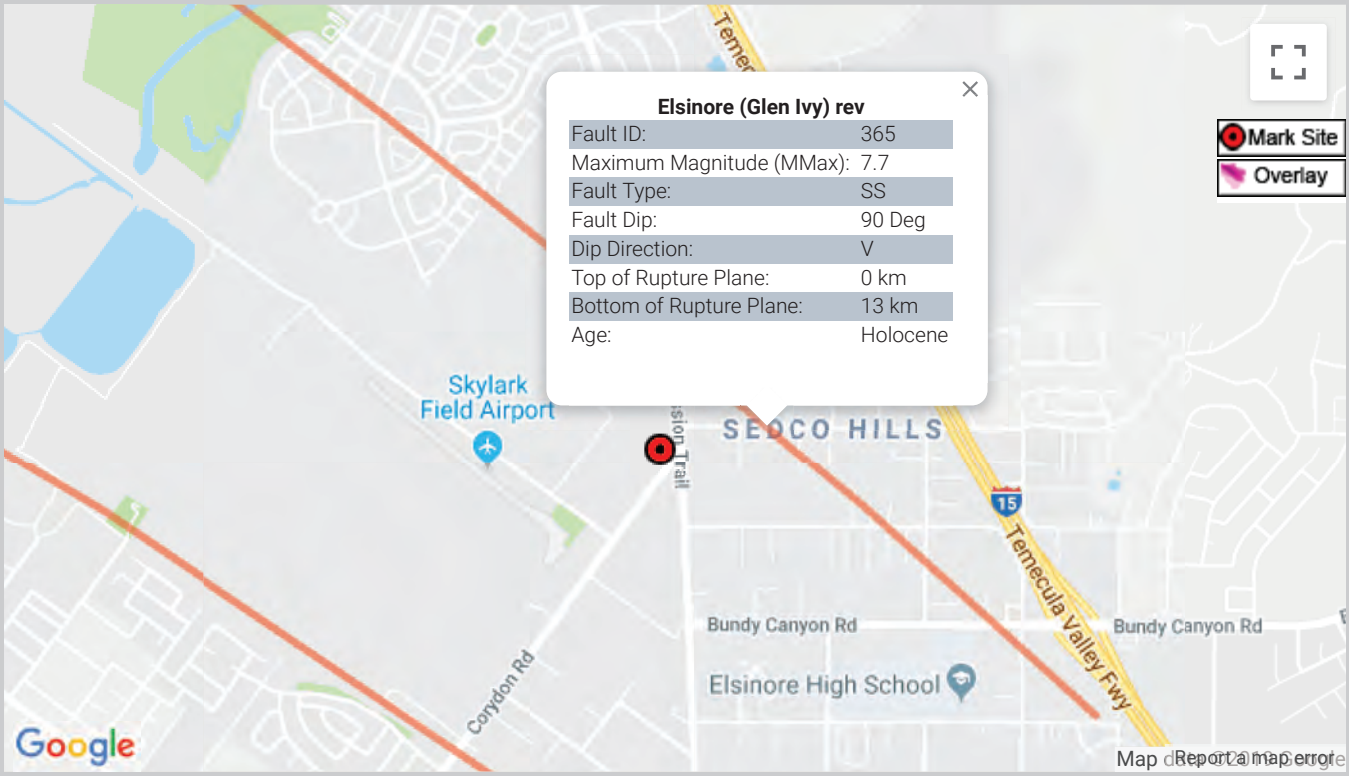
SEISMICITY

CALIFORNIA DEPARTMENT OF TRANSPORTATION

Caltrans ARS Online (v2.3.09)

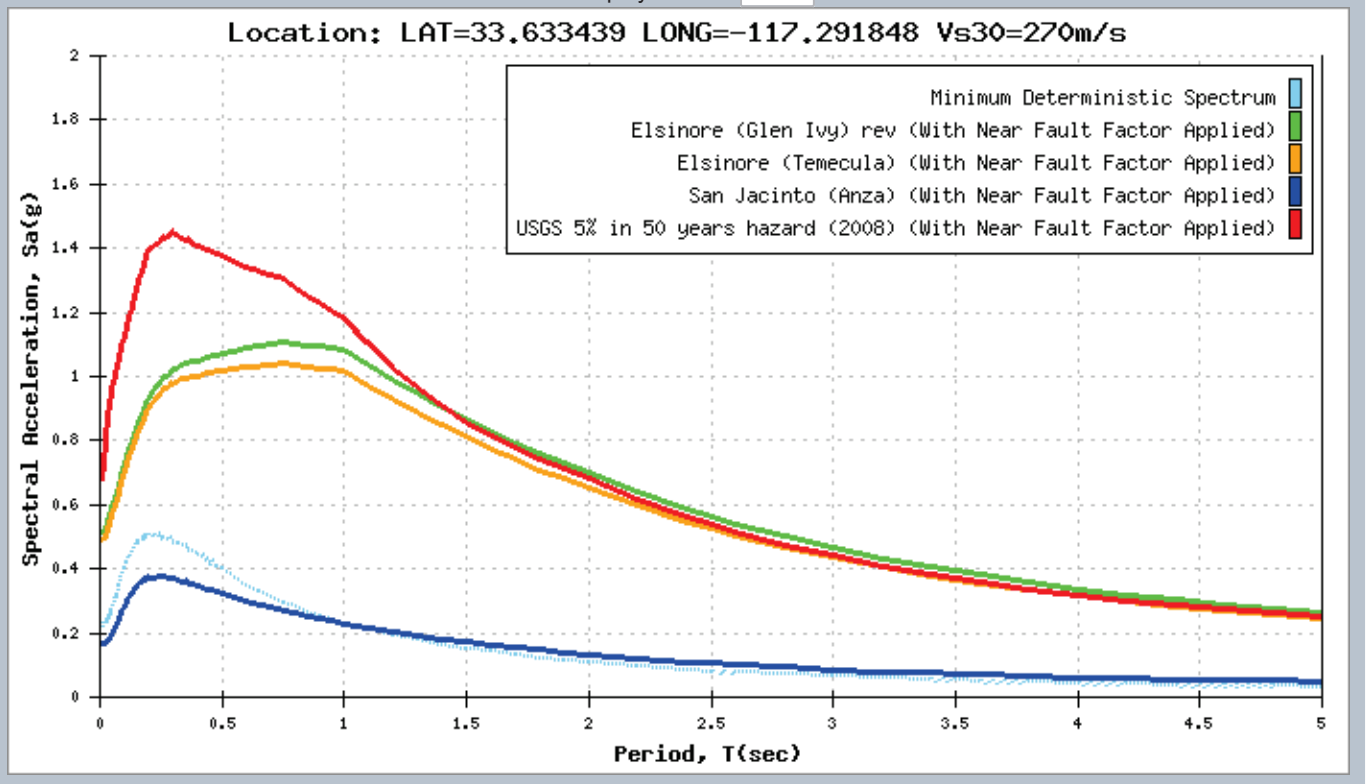
This web-based tool calculates both deterministic and probabilistic acceleration response spectra for any location in California based on criteria provided in *Appendix B of Caltrans Seismic Design Criteria*. More...

SELECT SITE LOCATION



Latitude: 33.633439 **Longitude:** -117.291848 ***V*S30:** 270 m/s Calculate

CALCULATED SPECTRA Display Curves: 3



Tabular Data | Envelope Only | Hide Near Fault | Axis Scale | Show Basin

Apply Near Fault Adjustment To:
NOTE: Caltrans SDC requires application of a Near Fault Adjustment factor for sites less than 25 km (Rrup) from the causative fault.

☑ Deterministic Spectrum Using

0.38 Km Elsinore (Glen Ivy) rev
1.49 Km Elsinore (Temecula)
31.57 Km San Jacinto (Anza)

☑ Probabilistic Spectrum Using

0.38 Km (Recommend Performing Deaggregation To Verify)

◉ Show Spectrum with Adjustment Only
○ Show Spectrum with and without near fault Adjustment

OK

U.S. Geological Survey - Earthquake Hazards Program

2008 National Seismic Hazard Maps - Source Parameters

New Search

Distance in Kilometers	Name	State	Pref Slip Rate (mm/yr)	Dip (degrees)	Dip Dir	Slip Sense	Rupture Top (km)	Rupture Bottom (km)	Length (km)
0.27	Elsinore;GI	CA	5	90	V	strike slip	0	13	37
0.27	Elsinore;W+GI	CA	n/a	81	NE	strike slip	0	14	83
1.10	Elsinore;W+GI+T+J	CA	n/a	84	NE	strike slip	0	16	199
1.10	Elsinore;W+GI+T	CA	n/a	84	NE	strike slip	0	14	124
1.10	Elsinore;GI+T+J	CA	n/a	86	NE	strike slip	0	17	153
1.10	Elsinore;W+GI+T+J+CM	CA	n/a	84	NE	strike slip	0	16	241
1.10	Elsinore;GI+T+J+CM	CA	n/a	86	NE	strike slip	0	16	195
1.10	Elsinore;GI+T	CA	5	90	V	strike slip	0	14	78
1.49	Elsinore;T+J+CM	CA	n/a	85	NE	strike slip	0	16	169
1.49	Elsinore;T+J	CA	n/a	86	NE	strike slip	0	17	127
1.49	Elsinore;T	CA	5	90	V	strike slip	0	14	52
31.97	San Jacinto;A+CC	CA	n/a	90	V	strike slip	0	16	118
31.97	San Jacinto;A+C	CA	n/a	90	V	strike slip	0	17	118
31.97	San Jacinto;A+CC+B	CA	n/a	90	V	strike slip	0.1	15	152
31.97	San Jacinto;A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	178
31.97	San Jacinto;A	CA	9	90	V	strike slip	0	17	71
33.11	Chino, alt 2	CA	1	65	SW	strike slip	0	14	29
33.83	San Jacinto;SJV+A+CC	CA	n/a	90	V	strike	0	16	136

						slip			
33.83	San Jacinto;SJV+A	CA	n/a	90	V	strike slip	0	17	89
33.83	San Jacinto;SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	196
33.83	San Jacinto;SBV+SJV+A+C	CA	n/a	90	V	strike slip	0	17	181
33.83	San Jacinto;SBV+SJV+A	CA	n/a	90	V	strike slip	0	16	134
33.83	San Jacinto;SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	170
33.83	San Jacinto;SBV+SJV+A+CC	CA	n/a	90	V	strike slip	0	16	181
33.83	San Jacinto;SBV+SJV+A+CC+B	CA	n/a	90	V	strike slip	0.1	15	215
33.83	San Jacinto;SBV+SJV+A+CC+B+SM	CA	n/a	90	V	strike slip	0.1	15	241
33.83	San Jacinto;SJV+A+C	CA	n/a	90	V	strike slip	0	17	136
34.99	San Jacinto;SBV+SJV	CA	n/a	90	V	strike slip	0	16	88
34.99	San Jacinto;SJV	CA	18	90	V	strike slip	0	16	43
35.19	Elsinore;W	CA	2.5	75	NE	strike slip	0	14	46
35.77	San Joaquin Hills	CA	0.5	23	SW	thrust	2	13	27
37.30	Chino, alt 1	CA	1	50	SW	strike slip	0	9	24
41.75	Elsinore; J	CA	3	84	NE	strike slip	0	19	75
41.75	Elsinore; J+CM	CA	3	84	NE	strike slip	0	17	118
42.85	San Jacinto;SBV	CA	6	90	V	strike slip	0	16	45
44.84	Newport-Inglewood Connected alt 2	CA	1.3	90	V	strike slip	0	11	208
44.84	Newport-Inglewood Connected alt 1	CA	1.3	89		strike slip	0	11	208
44.84	Newport-Inglewood (Offshore)	CA	1.5	90	V	strike slip	0	10	66
54.99	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	384
54.99	S. San	CA	n/a	86		strike	0.1	13	512

	Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG+CO					slip			
54.99	S. San Andreas;SSB+BG	CA	n/a	71		strike slip	0	13	101
54.99	S. San Andreas;NSB+SSB+BG+CO	CA	n/a	79		strike slip	0.2	12	206
54.99	S. San Andreas;CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	322
54.99	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	85		strike slip	0	14	380
54.99	S. San Andreas;CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	449
54.99	S. San Andreas;CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0	14	442
54.99	S. San Andreas;NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	213
54.99	S. San Andreas;NM+SM+NSB+SSB+BG	CA	n/a	83		strike slip	0	14	271
54.99	S. San Andreas;NM+SM+NSB+SSB+BG+CO	CA	n/a	84		strike slip	0.1	13	340
54.99	S. San Andreas;NSB+SSB	CA	n/a	90	V	strike slip	0	13	79
54.99	S. San Andreas;NSB+SSB+BG	CA	n/a	75		strike slip	0	14	136
54.99	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0.1	13	421
54.99	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG	CA	n/a	86		strike slip	0.1	13	479
54.99	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	86		strike slip	0.1	13	548
54.99	S. San Andreas;SM+NSB+SSB	CA	n/a	90	V	strike slip	0	13	176
54.99	S. San Andreas;SM+NSB+SSB+BG	CA	n/a	81		strike slip	0	13	234
54.99	S. San Andreas;SM+NSB+SSB+BG+CO	CA	n/a	83		strike slip	0.1	13	303
54.99	S. San Andreas;SSB	CA	16	90	V	strike slip	0	13	43
54.99	S. San Andreas;SSB+BG+CO	CA	n/a	77		strike slip	0.2	12	170
54.99	S. San Andreas;BB+NM+SM+NSB+SSB	CA	n/a	90	V	strike slip	0	14	263
54.99	S. San Andreas;BB+NM+SM+NSB+SSB+BG	CA	n/a	84		strike slip	0	14	321

54.99	S. San Andreas;BB+NM+SM+NSB+SSB+BG+CO	CA	n/a	85		strike slip	0.1	13	390
57.57	S. San Andreas;BG+CO	CA	n/a	72		strike slip	0.3	12	125
57.57	S. San Andreas;BG	CA	n/a	58		strike slip	0	13	56
57.66	S. San Andreas;NM+SM+NSB	CA	n/a	90	V	strike slip	0	13	170
57.66	S. San Andreas;BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	220
57.66	S. San Andreas;CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	279
57.66	S. San Andreas;NSB	CA	22	90	V	strike slip	0	13	35
57.66	S. San Andreas;SM+NSB	CA	n/a	90	V	strike slip	0	13	133
57.66	S. San Andreas;CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0	14	341
57.66	S. San Andreas;PK+CH+CC+BB+NM+SM+NSB	CA	n/a	90	V	strike slip	0.1	13	377
57.97	Rose Canyon	CA	1.5	90	V	strike slip	0	8	70
59.70	Newport-Inglewood, alt 1	CA	1	88		strike slip	0	15	65
60.91	Puente Hills (Coyote Hills)	CA	0.7	26	N	thrust	2.8	15	17
61.65	Cucamonga	CA	5	45	N	thrust	0	8	28
64.50	San Jose	CA	0.5	74	NW	strike slip	0	15	20
68.38	Sierra Madre	CA	2	53	N	reverse	0	14	57
68.38	Sierra Madre Connected	CA	2	51		reverse	0	14	76
69.48	Palos Verdes Connected	CA	3	90	V	strike slip	0	10	285
69.48	Coronado Bank	CA	3	90	V	strike slip	0	9	186
69.95	Palos Verdes	CA	3	90	V	strike slip	0	14	99
70.53	Pinto Mtn	CA	2.5	90	V	strike slip	0	16	74
71.17	Cleghorn	CA	3	90	V	strike slip	0	16	25
71.82	San Jacinto;CC	CA	4	90	V	strike slip	0	16	43

71.82	San Jacinto;CC+B	CA	n/a	90	V	strike slip	0.2	14	77
71.82	San Jacinto;CC+B+SM	CA	n/a	90	V	strike slip	0.2	14	103
73.95	San Jacinto;C	CA	14	90	V	strike slip	0	17	47
74.98	Puente Hills (Santa Fe Springs)	CA	0.7	29	N	thrust	2.8	15	11
75.86	North Frontal (West)	CA	1	49	S	reverse	0	16	50
79.41	S. San Andreas;NM+SM	CA	n/a	90	V	strike slip	0	14	134
79.41	S. San Andreas;BB+NM+SM	CA	n/a	90	V	strike slip	0	14	184
79.41	S. San Andreas;CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	306
79.41	S. San Andreas;PK+CH+CC+BB+NM+SM	CA	n/a	90	V	strike slip	0.1	13	342
79.41	S. San Andreas;SM	CA	29	90	V	strike slip	0	13	98
79.41	S. San Andreas;CC+BB+NM+SM	CA	n/a	90	V	strike slip	0	14	243
82.62	Earthquake Valley	CA	2	90	V	strike slip	0	19	20
84.63	Clamshell-Sawpit	CA	0.5	50	NW	reverse	0	14	16
85.81	Puente Hills (LA)	CA	0.7	27	N	thrust	2.1	15	22
87.36	Raymond	CA	1.5	79	N	strike slip	0	16	22
88.41	Helendale-So Lockhart	CA	0.6	90	V	strike slip	0	13	114
89.06	Elysian Park (Upper)	CA	1.3	50	NE	reverse	3	15	20
89.85	Burnt Mtn	CA	0.6	67	W	strike slip	0	16	21
90.27	North Frontal (East)	CA	0.5	41	S	thrust	0	16	27
95.08	Eureka Peak	CA	0.6	90	V	strike slip	0	15	19
97.04	Verdugo	CA	0.5	55	NE	reverse	0	15	29
98.35	S. San Andreas;CO	CA	20	90	V	strike slip	0.6	11	69
99.50	Lenwood-Lockhart-Old Woman Springs	CA	0.9	90	V	strike slip	0	13	145
99.97	Landers	CA	0.6	90	V	strike slip	0	15	95

USGS

Search Results

0 of 0 earthquakes in map area.

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Didn't find what you were looking for?

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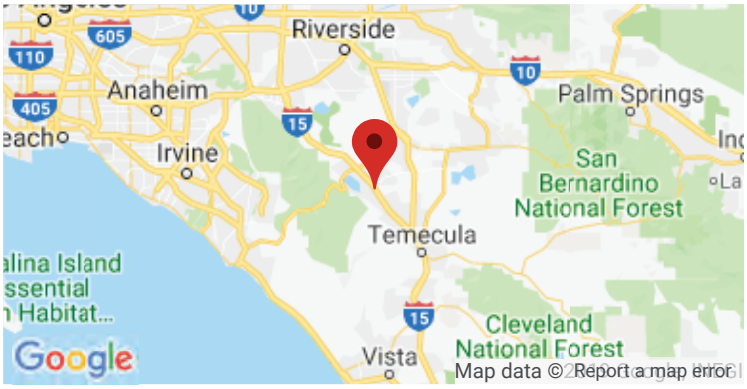
Hazards by Location

Search Information



Coordinates: 33.633439, -117.291848

Elevation: ft

Timestamp: 2019-08-30T19:38:28.623Z

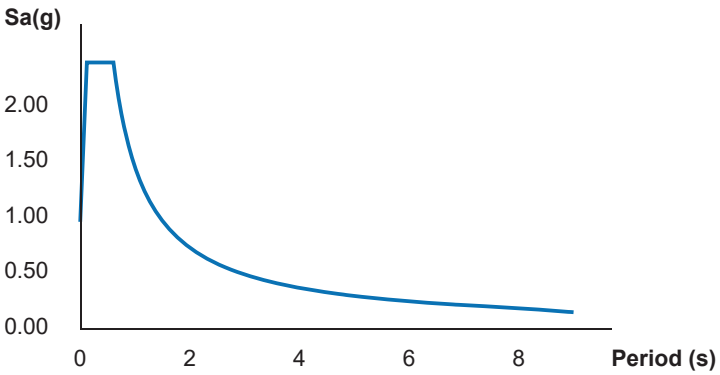
Hazard Type: Seismic

Reference Document: ASCE7-10

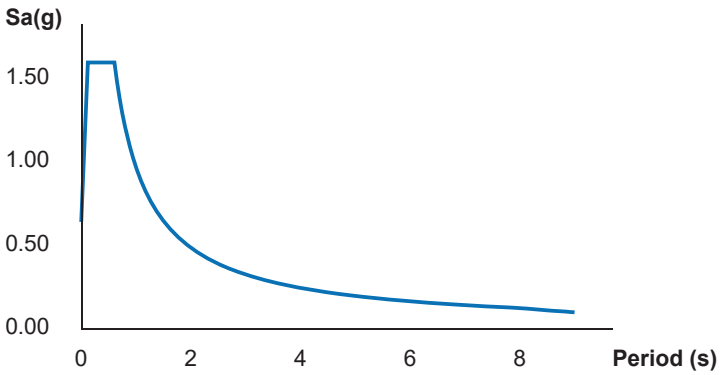
Risk Category: II

Site Class: D

MCER Horizontal Response Spectrum



Design Horizontal Response Spectrum



Basic Parameters

Name	Value	Description
S_S	2.389	MCE_R ground motion (period=0.2s)
S_1	0.965	MCE_R ground motion (period=1.0s)
S_{MS}	2.389	Site-modified spectral acceleration value
S_{M1}	1.447	Site-modified spectral acceleration value
S_{DS}	1.593	Numeric seismic design value at 0.2s SA
S_{D1}	0.965	Numeric seismic design value at 1.0s SA

Additional Information

Name	Value	Description
SDC	E	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	1.5	Site amplification factor at 1.0s
CR_S	0.904	Coefficient of risk (0.2s)

CR_1	0.891	Coefficient of risk (1.0s)
PGA	0.958	MCE_G peak ground acceleration
F_{PGA}	1	Site amplification factor at PGA
PGA_M	0.958	Site modified peak ground acceleration
T_L	8	Long-period transition period (s)
SsRT	2.389	Probabilistic risk-targeted ground motion (0.2s)
SsUH	2.643	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.587	Factored deterministic acceleration value (0.2s)
S1RT	0.965	Probabilistic risk-targeted ground motion (1.0s)
S1UH	1.083	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	1.174	Factored deterministic acceleration value (1.0s)
PGAd	0.998	Factored deterministic acceleration value (PGA)

The results indicated here DO NOT reflect any state or local amendments to the values or any delineation lines made during the building code adoption process. Users should confirm any output obtained from this tool with the local Authority Having Jurisdiction before proceeding with design.

Disclaimer

Hazard loads are provided by the U.S. Geological Survey Seismic Design Web Services.

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APPENDIX E

LIQUEFACTION ANALYSIS

LIQUEFACTION & SETTLEMENT OF SANDS ANALYSIS

Project Name: CORYDON RD/ MISSION TRAIL
Project Number: 192846-10A
Boring Number: B-1 (INSITU)

Horizontal Ground Acceleration (% g)	0.958	Energy Ratio C_E (Auto-hammer)	1.70
Analyzed Groundwater Depth (feet)	5.0	Borehole Diameter C_B (6 - 8 inches)	1.00
Average Wet Unit Weight (pcf)	124.2	Groundwater Depth in Boring (feet)	362.0
Design Magnitude Earthquake	7.7		
Magnitude Scaling Factor (MSF)	0.9		

Depth (feet)	Blow Count SPT	Blow Count Cal. Mod.	SPT N_m	Total Stress (tons/ft2)	Effective Stress (tons/ft2)	Fines Content FC(%)	C_R	Overburden C_N	rd	Sampler Type C_S	$(N_1)_{60}$	$(N_1)_{60cs}$	NCEER 1998 CSR	NCEER 1998 CRR*MSF	Liquefaction Safety Factor	Layer Thickness t (ft)	Layer Thickness t (inches)	Percent Volumetric Strain	Settlement Per Sand Layer (inches)
4		34	25.704	0.248	0.248	22	0.75	1.52	0.99	1.00	50	58	0.62	---	Corrected SPT >30*	4.00	48.00	0.00	0.00
7		23	17.388	0.435	0.372	22	0.75	1.35	0.98	1.00	30	37	0.72	---	Corrected SPT >30*	3.00	36.00	0.00	0.00
9		32	24.192	0.559	0.434	22	0.75	1.25	0.98	1.00	39	46	0.78	---	Corrected SPT >30*	2.00	24.00	0.00	0.00
13		26	19.656	0.807	0.558	52	0.85	1.10	0.97	1.00	31	42	0.87	---	Corrected SPT >30*	4.00	48.00	0.00	Fine Grained
18		31	23.436	1.118	0.712	51	0.95	0.95	0.96	1.00	36	48	0.94	---	Corrected SPT >30*	5.00	60.00	0.00	Fine Grained
23		33	24.948	1.428	0.867	51	0.95	0.84	0.95	1.00	34	45	0.97	---	Corrected SPT >30*	5.00	60.00	0.00	Fine Grained
28		27	20.412	1.739	1.021	96	0.95	0.75	0.93	1.00	25	35	0.99	---	Corrected SPT >30*	5.00	60.00	0.00	Fine Grained
33		27	20.412	2.049	1.176	96	1.00	0.68	0.91	1.00	23	33	0.98	---	Corrected SPT >30*	5.00	60.00	0.00	Fine Grained
40		28	21.168	2.484	1.392	91	1.00	0.60	0.85	1.00	21	31	0.94	0.4998	Corrected SPT >30*	7.00	84.00	0.00	Fine Grained
44		58	43.848	2.732	1.516	42	1.00	0.56	0.82	1.00	42	55	0.92	---	Corrected SPT >30*	4.00	48.00	0.00	0.00
															Total Settlement (inches):				0.0

Procedure established by T.L. Youd and I.M. Idriss, et. al., 1996 NCEER-96-0022 Workshop & S.C.E.C. SP117
Evaluation of settlements in sand due to earthquake shaking, Tokimatsu and Seed, 1987

3 Extension of rod above boring (feet)

* CRR 7.5 is not defined for $(N_1)60cs$ greater than 30. Soils with (N1)60cs > 30 are considered too dense to liquefy (NCEER Workshop)

$(N_1)_{60} = N_M C_N C_E C_B C_R C_S$ $(N_1)_{60CS} = K_S (N_1)_{60}$

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APPENDIX F

ASPHALTIC CONCRETE PAVEMENT CALCULATIONS

PAVING DESIGN

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JN: **192846-10A** CONSULT: **SMP**
PROJECT: **Corydon Road and Mission Trail Road**

CALCULATION SHEET # **AutoParking**

CALTRANS METHOD FOR DESIGN OF FLEXIBLE PAVEMENT

Input "R" value or "CBR" of native soil	16	
Type of Index Property - "R" value or "CBR" (C or R)	R	R Value
R Value used for Caltrans Method	16	
Input Traffic Index (TI)	5	
Calculated Total Gravel Equivalent (GE)	1.344	feet
Calculated Total Gravel Equivalent (GE)	16.128	inches
Calculated Gravel Factor (Gf) for A/C paving	2.53	
Gravel Factor for Base Course (Gf)	1.1	

Pavement sections provided below are considered equal; but, do not reflect reviewing agency minimums.

Gravel Equivalent GE (feet)	GE (inches)	Delta (inches)	INCHES A/C Section Thickness (inches)	Minimum Base (inches)	FEET A/C Section Thickness (feet)	Minimum Base (feet)
0.63	7.60	8.52	3.0	7.8	0.25	0.65
0.74	8.87	7.26	3.5	6.6	0.29	0.55
0.84	10.14	5.99	4.0	5.4	0.33	0.45
0.89	10.65	5.48	4.2	4.8	0.35	0.40
0.95	11.41	4.72	4.5	4.2	0.38	0.35
1.01	12.17	3.96	4.8	3.6	0.40	0.30
1.06	12.67	3.45	5.0	3.0	0.42	0.25
1.16	13.94	2.19	5.5	1.8	0.46	0.15
1.27	15.21	0.92	6.0	0.6	0.50	0.05
1.37	16.48	-0.35	6.5		0.54	
1.48	17.74	-1.62	7.0		0.58	

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JN: **192846-10A** CONSULT: **SMP**
PROJECT: **Corydon Road and Mission Trail Road**

CALCULATION SHEET # **Driveways**

CALTRANS METHOD FOR DESIGN OF FLEXIBLE PAVEMENT

Input "R" value or "CBR" of native soil	16	
Type of Index Property - "R" value or "CBR" (C or R)	R	R Value
R Value used for Caltrans Method	16	
Input Traffic Index (TI)	6	
Calculated Total Gravel Equivalent (GE)	1.6128	feet
Calculated Total Gravel Equivalent (GE)	19.3536	inches
Calculated Gravel Factor (Gf) for A/C paving	2.31	
Gravel Factor for Base Course (Gf)	1.1	

Pavement sections provided below are considered equal; but, do not reflect reviewing agency minimums.

Gravel Equivalent GE (feet)	Gravel Equivalent GE (inches)	Delta (inches)	INCHES A/C Section Thickness (inches)	INCHES Minimum Base (inches)	FEET A/C Section Thickness (feet)	FEET Minimum Base (feet)
0.77	9.26	10.10	4.0	9.0	0.33	0.75
0.87	10.41	8.94	4.5	8.4	0.38	0.70
0.96	11.57	7.78	5.0	7.2	0.42	0.60
1.06	12.73	6.63	5.5	6.0	0.46	0.50
1.16	13.88	5.47	6.0	4.8	0.50	0.40
1.25	15.04	4.31	6.5	4.2	0.54	0.35
1.35	16.20	3.16	7.0	3.0	0.58	0.25
1.45	17.35	2.00	7.5	1.8	0.63	0.15
1.54	18.51	0.84	8.0	0.6	0.67	0.05
1.64	19.67	-0.31	8.5	0.0	0.71	0.00
1.74	20.83	-1.47	9.0	0.0	0.75	0.00

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JN: **192846-10A** CONSULT: **SMP**
PROJECT: **Corydon Rd / Mission Trail Road**

CALCULATION SHEET # **Entrances**

CALTRANS METHOD FOR DESIGN OF FLEXIBLE PAVEMENT

Input "R" value or "CBR" of native soil	16	
Type of Index Property - "R" value or "CBR" (C or R)	R	R Value
R Value used for Caltrans Method	16	
Input Traffic Index (TI)	7	
Calculated Total Gravel Equivalent (GE)	1.8816	feet
Calculated Total Gravel Equivalent (GE)	22.5792	inches
Calculated Gravel Factor (Gf) for A/C paving	2.14	
Gravel Factor for Base Course (Gf)	1.1	

Pavement sections provided below are considered equal; but, do not reflect reviewing agency minimums.

Gravel Equivalent GE (feet)	GE (inches)	Delta (inches)	INCHES A/C Section Thickness (inches)	INCHES Minimum Base (inches)	FEET A/C Section Thickness (feet)	FEET Minimum Base (feet)
0.71	8.57	14.01	4.0	12.6	0.33	1.05
0.80	9.64	12.94	4.5	12.0	0.38	1.00
0.86	10.28	12.30	4.8	11.4	0.40	0.95
0.89	10.71	11.87	5.0	10.8	0.42	0.90
0.98	11.78	10.80	5.5	9.6	0.46	0.80
1.07	12.85	9.73	6.0	9.0	0.50	0.75
1.25	15.00	7.58	7.0	6.6	0.58	0.55
1.43	17.14	5.44	8.0	4.8	0.67	0.40
1.61	19.28	3.30	9.0	3.0	0.75	0.25
1.79	21.42	1.16	10.0	1.2	0.83	0.10
1.96	23.56	-0.99	11.0		0.92	

APPENDIX G

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

EARTH-STRATA

General Earthwork and Grading Specifications

General

Intent: These General Earthwork and Grading Specifications are intended to be the minimum requirements for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These General Earthwork and Grading Specifications should be considered a part of the recommendations contained in the geotechnical report(s) and if they are in conflict with the geotechnical report(s), the specific recommendations in the geotechnical report shall supersede these more general specifications. Observations made during earthwork operations by the project Geotechnical Consultant may result in new or revised recommendations that may supersede these specifications and/or the recommendations in the geotechnical report(s).

The Geotechnical Consultant of Record: The Owner shall employ a qualified Geotechnical Consultant of Record (Geotechnical Consultant), prior to commencement of grading or construction. The Geotechnical Consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of the grading or construction.

Prior to commencement of grading or construction, the Owner shall coordinate with the Geotechnical Consultant, and Earthwork Contractor (Contractor) to schedule sufficient personnel for the appropriate level of observation, mapping, and compaction testing.

During earthwork and grading operations, the Geotechnical Consultant shall observe, map, and document the subsurface conditions to confirm assumptions made during the geotechnical design phase of the project. Should the observed conditions differ significantly from the interpretive assumptions made during the design phase, the Geotechnical Consultant shall recommend appropriate changes to accommodate the observed conditions, and notify the reviewing agency where required.

The Geotechnical Consultant shall observe the moisture conditioning and processing of the excavations and fill materials. The Geotechnical Consultant should perform periodic relative density testing of fill materials to verify that the attained level of compaction is being accomplished as specified.

The Earthwork Contractor: The Earthwork Contractor (Contractor) shall be qualified, experienced, and knowledgeable in earthwork logistics, preparation and processing of earth materials to receive compacted fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall be provided with the approved grading plans and geotechnical report(s) for his review and acceptance of responsibilities, prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with the approved grading plans and geotechnical report(s). Prior to commencement of grading, the Contractor shall prepare and submit to the Owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "equipment" of work and the estimated quantities of daily earthwork contemplated for the site. The Contractor shall inform the Owner and the Geotechnical Consultant of work schedule changes and revisions to the work plan at least 24 hours in advance of such changes so that appropriate personnel will be available for observation and testing. No assumptions shall be made by the Contractor with regard to whether the Geotechnical Consultant is aware of all grading operations.

It is the sole responsibility of the Contractor to provide adequate equipment and methods to accomplish the earthwork operations in accordance with the applicable grading codes and agency ordinances, these specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). At the sole discretion of the Geotechnical Consultant, any unsatisfactory conditions, such as unsuitable earth materials, improper moisture conditioning, inadequate compaction, insufficient buttress keyway size, adverse weather conditions, etc., resulting in a quality of work less than required in the approved grading plans and geotechnical report(s), the Geotechnical Consultant shall reject the work and may recommend to the Owner that grading be stopped until conditions are corrected.

Preparation of Areas for Compacted Fill

Clearing and Grubbing: Vegetation, such as brush, grass, roots, and other deleterious material shall be sufficiently removed and properly disposed in a method acceptable to the Owner, Geotechnical Consultant, and governing agencies.

The Geotechnical Consultant shall evaluate the extent of these removals on a site by site basis. Earth materials to be placed as compacted fill shall not contain more than 1 percent organic materials (by volume). No compacted fill lift shall contain more than 10 percent organic matter.

Should potentially hazardous materials be encountered, the Contractor shall stop work in the affected area, and a hazardous materials specialist shall immediately be consulted to evaluate the potentially hazardous materials, prior to continuing to work in that area.

It is our understanding that the State of California defines most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) as hazardous waste. As such, indiscriminate dumping or spillage of these fluids may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall be prohibited. The contractor is responsible for all hazardous waste related to his operations. The Geotechnical Consultant does not have expertise in this area. If hazardous waste is a concern, then the Owner should contract the services of a qualified environmental assessor.

Processing: Exposed earth materials that have been observed to be satisfactory for support of compacted fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Exposed earth materials that are not observed to be satisfactory shall be removed or alternative recommendations may be provided by the Geotechnical Consultant. Scarification shall continue until the exposed earth materials are broken down and free of oversize material and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction. The earth materials should be moistened or air dried to near optimum moisture content, prior to compaction.

Overexcavation: The Cut Lot Typical Detail and Cut/Fill Transition Lot Typical Detail, included herein provides a graphic illustration that depicts typical overexcavation recommendations made in the approved geotechnical report(s) and/or grading plan(s).

Keyways and Benching: Where fills are to be placed on slopes steeper than 5:1 (horizontal to vertical units), the ground shall be thoroughly benched as compacted fill is placed. Please see the three Keyway and Benching Typical Details with subtitles Cut Over Fill Slope, Fill Over Cut Slope, and Fill Slope for a graphic illustration. The lowest bench or smallest keyway shall be a minimum of 15 feet wide (or ½ the proposed slope height) and at least 2 feet into competent earth materials as advised by the Geotechnical Consultant. Typical benches shall be excavated a minimum height of 4 feet into competent earth materials or as recommended by the Geotechnical Consultant. Fill placed on slopes steeper than 5:1 should be thoroughly benched or otherwise excavated to provide a flat subgrade for the compacted fill.

Evaluation/Acceptance of Bottom Excavations: All areas to receive compacted fill (bottom excavations), including removal excavations, processed areas, keyways, and benching, shall be observed, mapped, general elevations recorded, and/or tested prior to being accepted by the Geotechnical Consultant as suitable to receive compacted fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to placing compacted fill. A licensed surveyor shall provide the survey control for determining elevations of bottom excavations, processed areas, keyways, and

benching. The Geotechnical Consultant is not responsible for erroneously located, fills, subdrain systems, or excavations.

Fill Materials

General: Earth material to be used as compacted fill should to a large extent be free of organic matter and other deleterious substances as evaluated and accepted by the Geotechnical Consultant.

Oversize: Oversize material is rock that does not break down into smaller pieces and has a maximum diameter greater than 8 inches. Oversize rock shall not be included within compacted fill unless specific methods and guidelines acceptable to the Geotechnical Consultant are followed. For examples of methods and guidelines of oversize rock placement see the enclosed Oversize Rock Disposal Detail. The inclusion of oversize materials in the compacted fill shall only be acceptable if the oversize material is completely surrounded by compacted fill or thoroughly jetted granular materials. No oversize material shall be placed within 10 vertical feet of finish grade or within 2 feet of proposed utilities or underground improvements.

Import: Should imported earth materials be required, the proposed import materials shall meet the requirements of the Geotechnical Consultant. Well graded, very low expansion potential earth materials free of organic matter and other deleterious substances are usually sought after as import materials. However, it is generally in the Owners best interest that potential import earth materials are provided to the Geotechnical Consultant to determine their suitability for the intended purpose. At least 48 hours should be allotted for the appropriate laboratory testing to be performed, prior to starting the import operations.

Fill Placement and Compaction Procedures

Fill Layers: Fill materials shall be placed in areas prepared to receive fill in nearly horizontal layers not exceeding 8 inches in loose thickness. Thicker layers may be accepted by the Geotechnical Consultant, provided field density testing indicates that the grading procedures can adequately compact the thicker layers. Each layer of fill shall be spread evenly and thoroughly mixed to obtain uniformity within the earth materials and consistent moisture throughout the fill.

Moisture Conditioning of Fill: Earth materials to be placed as compacted fill shall be watered, dried, blended, and/or mixed, as needed to obtain relatively uniform moisture contents that are at or slightly above optimum. The maximum density and optimum moisture content tests should be performed in accordance with the American Society of Testing and Materials (ASTM test method D1557-00).

Compaction of Fill: After each layer has been moisture-conditioned, mixed, and evenly spread, it should be uniformly compacted to a minimum of 90 percent of maximum dry density as determined by ASTM test method D1557-00. Compaction equipment shall be adequately sized and be either specifically designed for compaction of earth materials or be proven to consistently achieve the required level of compaction.

Compaction of Fill Slopes: In addition to normal compaction procedures specified above, additional effort to obtain compaction on slopes is needed. This may be accomplished by backrolling of slopes with sheepsfoot rollers as the fill is being placed, by overbuilding the fill slopes, or by other methods producing results that are satisfactory to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill and the slope face shall be a minimum of 90 percent of maximum density per ASTM test method D1557-00.

Compaction Testing of Fill: Field tests for moisture content and relative density of the compacted fill earth materials shall be periodically performed by the Geotechnical Consultant. The location and frequency of tests shall be at the Geotechnical Consultant's discretion based on field observations. Compaction test locations will not necessarily be random. The test locations may or may not be selected to verify minimum compaction requirements in areas that are typically prone to inadequate compaction, such as close to slope faces and near benching.

Frequency of Compaction Testing: Compaction tests shall be taken at minimum intervals of every 2 vertical feet and/or per 1,000 cubic yards of compacted materials placed. Additionally, as a guideline, at least one (1) test shall be taken on slope faces for each 5,000 square feet of slope face and/or for each 10 vertical feet of slope. The Contractor shall assure that fill placement is such that the testing schedule described herein can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork operations to a safe level so that these minimum standards can be obtained.

Compaction Test Locations: The approximate elevation and horizontal coordinates of each test location shall be documented by the Geotechnical Consultant. The Contractor shall coordinate with the Surveyor to assure that sufficient grade stakes are established. This will provide the Geotechnical Consultant with sufficient accuracy to determine the approximate test locations and elevations. The Geotechnical Consultant can not be responsible for staking erroneously located by the Surveyor or Contractor. A minimum of two grade stakes should be provided at a maximum horizontal distance of 100 feet and vertical difference of less than 5 feet.

Subdrain System Installation

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the approved grading plan, and the typical details provided herein. The Geotechnical Consultant may recommend additional subdrain systems and/or changes to the subdrain systems described herein, with regard to the extent, location, grade, or material depending on conditions encountered during grading or other factors. All subdrain systems shall be surveyed by a licensed land surveyor (except for retaining wall subdrain systems) to verify line and grade after installation and prior to burial. Adequate time should be allowed by the Contractor to complete these surveys.

Excavation

All excavations and over-excavations for remedial purposes shall be evaluated by the Geotechnical Consultant during grading operations. Remedial removal depths indicated on the geotechnical plans are estimates only. The actual removal depths and extent shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading operations. Where fill over cut slopes are planned, the cut portion of the slope shall be excavated, evaluated, and accepted by the Geotechnical Consultant prior to placement of the fill portion of the proposed slope, unless specifically addressed by the Geotechnical Consultant. Typical details for cut over fill slopes and fill over cut slopes are provided herein.

Trench Backfill

1) The Contractor shall follow all OHSA and Cal/OSHA requirements for trench excavation safety.

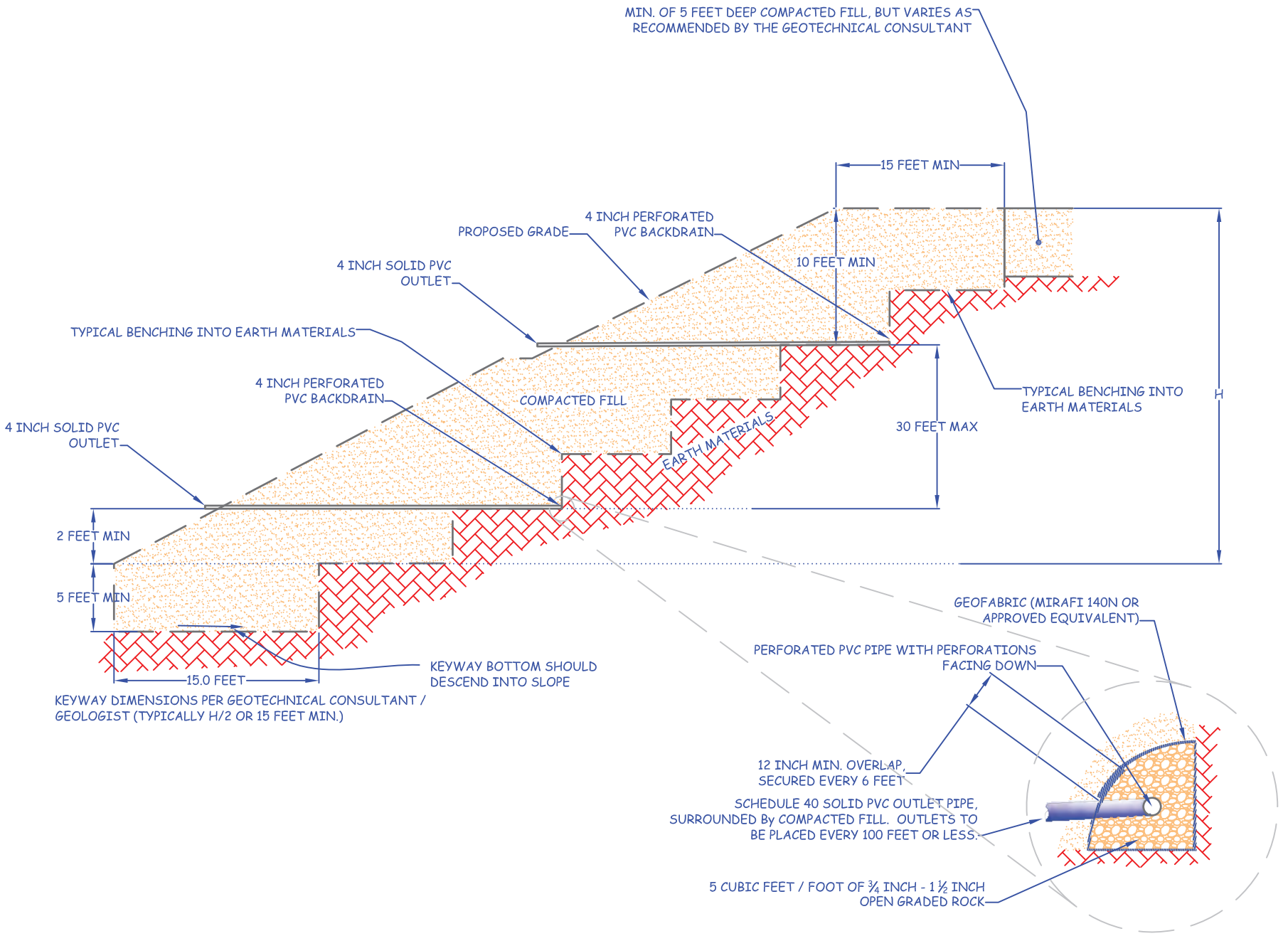
2) Bedding and backfill of utility trenches shall be done in accordance with the applicable provisions in the Standard Specifications of Public Works Construction. Bedding materials shall have a Sand Equivalency more than 30 (SE>30). The bedding shall be placed to 1 foot over the conduit and thoroughly jetting to provide densification. Backfill should be compacted to a minimum of 90 percent of maximum dry density, from 1 foot above the top of the conduit to the surface.

3) Jetting of the bedding materials around the conduits shall be observed by the Geotechnical Consultant.

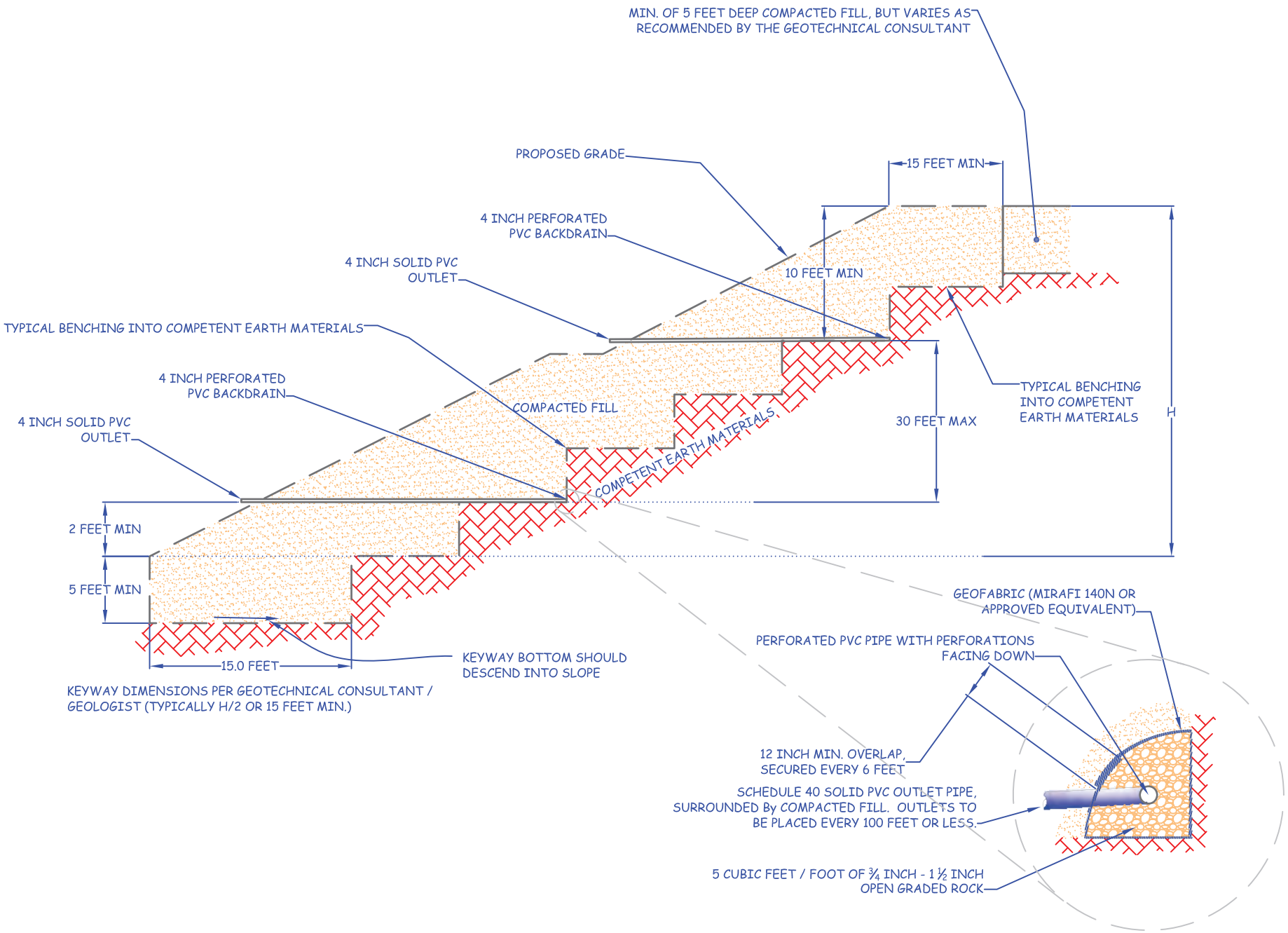
4) The Geotechnical Consultant shall test trench backfill for the minimum compaction requirements recommended herein. At least one test should be conducted for every 300 linear feet of trench and for each 2 vertical feet of backfill.

5) For trench backfill the lift thicknesses shall not exceed those allowed in the Standard Specifications of Public Works Construction, unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment or method.

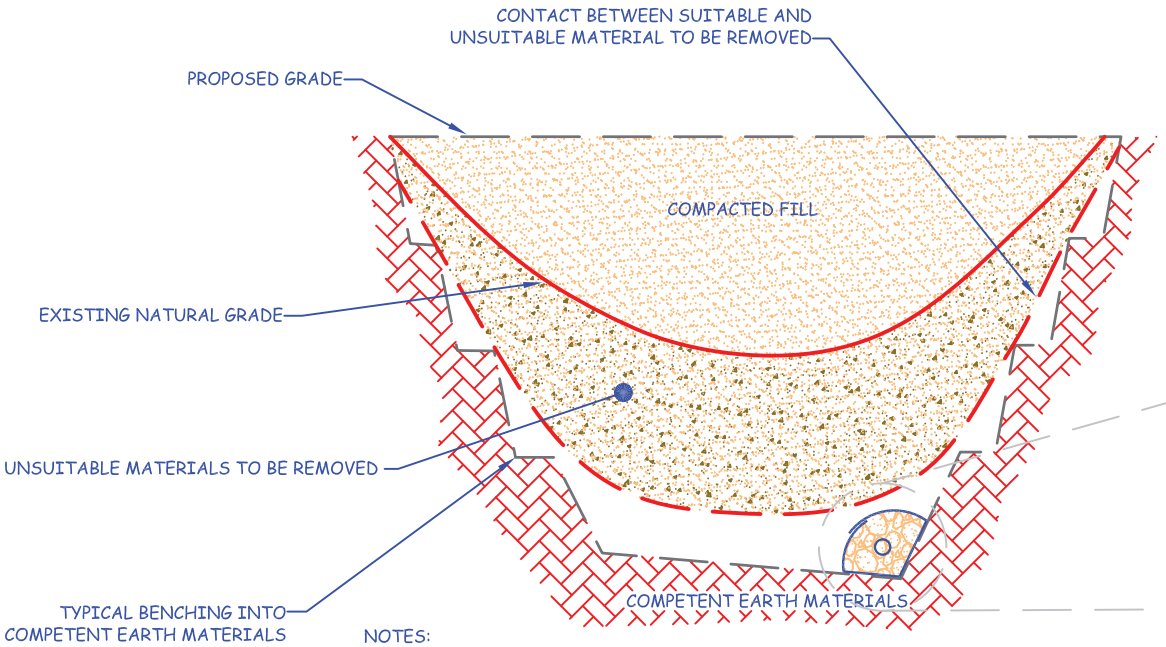
STABILIZATION FILL TYPICAL DETAIL

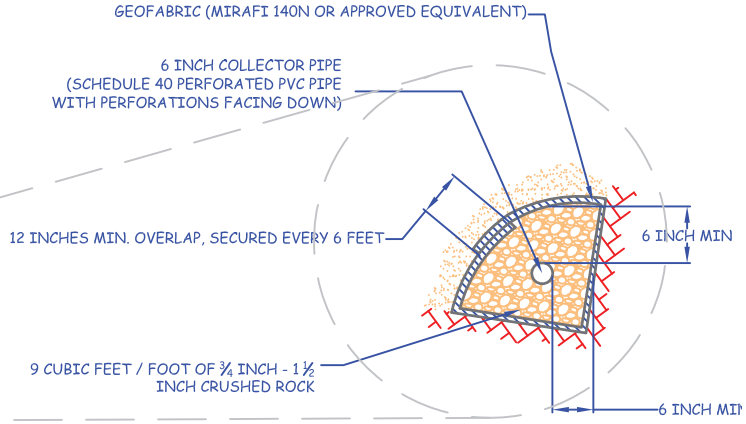


BUTTRESS TYPICAL DETAIL



CANYON SUBDRAIN SYSTEM TYPICAL DETAIL

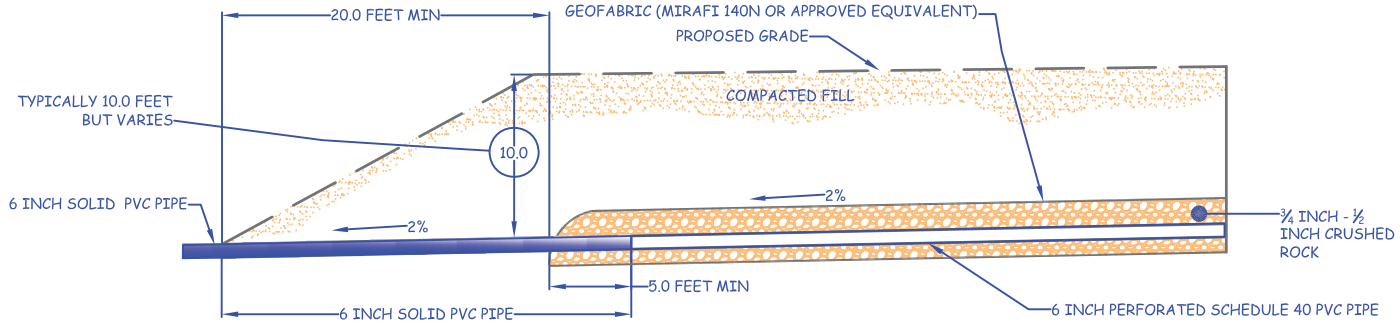




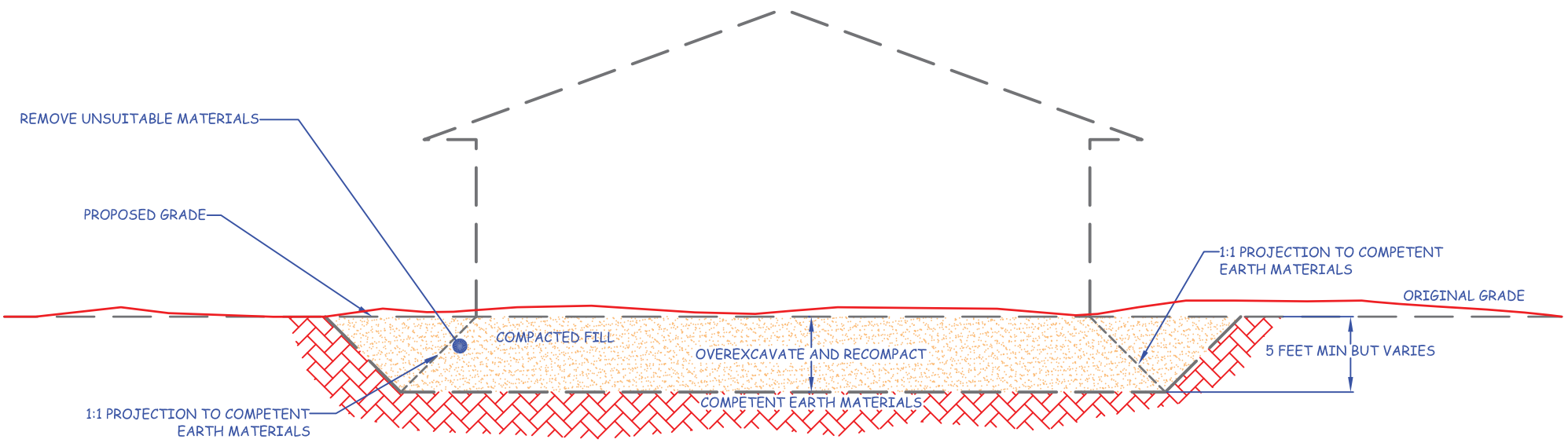
NOTES:
1 - CONTINUOUS RUNS IN EXCESS OF 500 FEET LONG WILL REQUIRE AN 8 INCH DIAMETER PIPE.

2 - FINAL 20 FEET OF PIPE AT OUTLET WILL BE SOLID AND BACKFILLED WITH COMPACTED FINE-GRAINED EARTH MATERIALS.

CANYON SUBDRAIN TYPICAL OUTLET



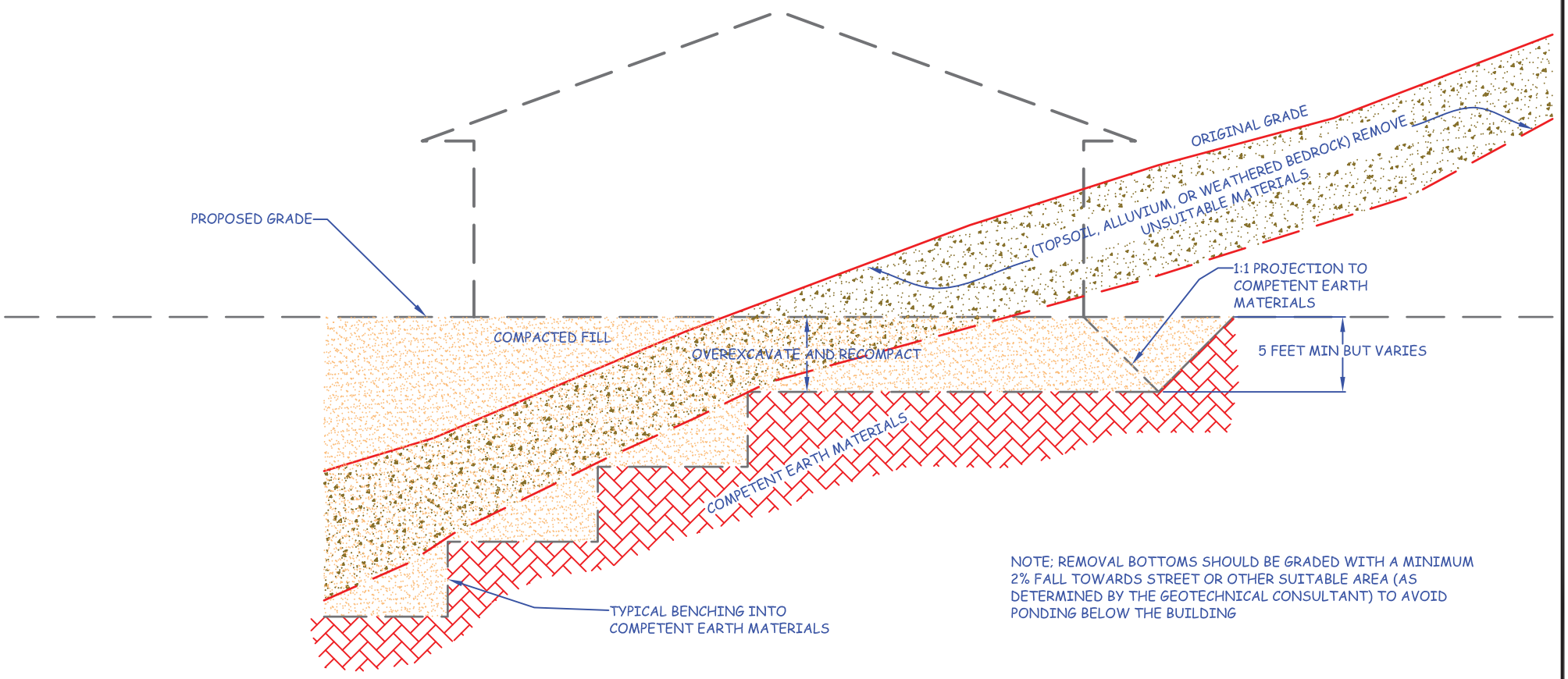
CUT LOT TYPICAL DETAIL



NOTE; REMOVAL BOTTOMS SHOULD BE GRADED WITH A MINIMUM 2% FALL TOWARDS STREET OR OTHER SUITABLE AREA (AS DETERMINED BY THE GEOTECHNICAL CONSULTANT) TO AVOID PONDING BELOW THE BUILDING

NOTE: WHERE DESIGN CUT LOTS ARE EXCAVATED ENTIRELY INTO COMPETENT EARTH MATERIALS, OVEREXCAVATION MAY STILL BY NEEDED FOR HARD-ROCK CONDITIONS OR MATERIALS WITH VARIABLE EXPANSION POTENTIALS

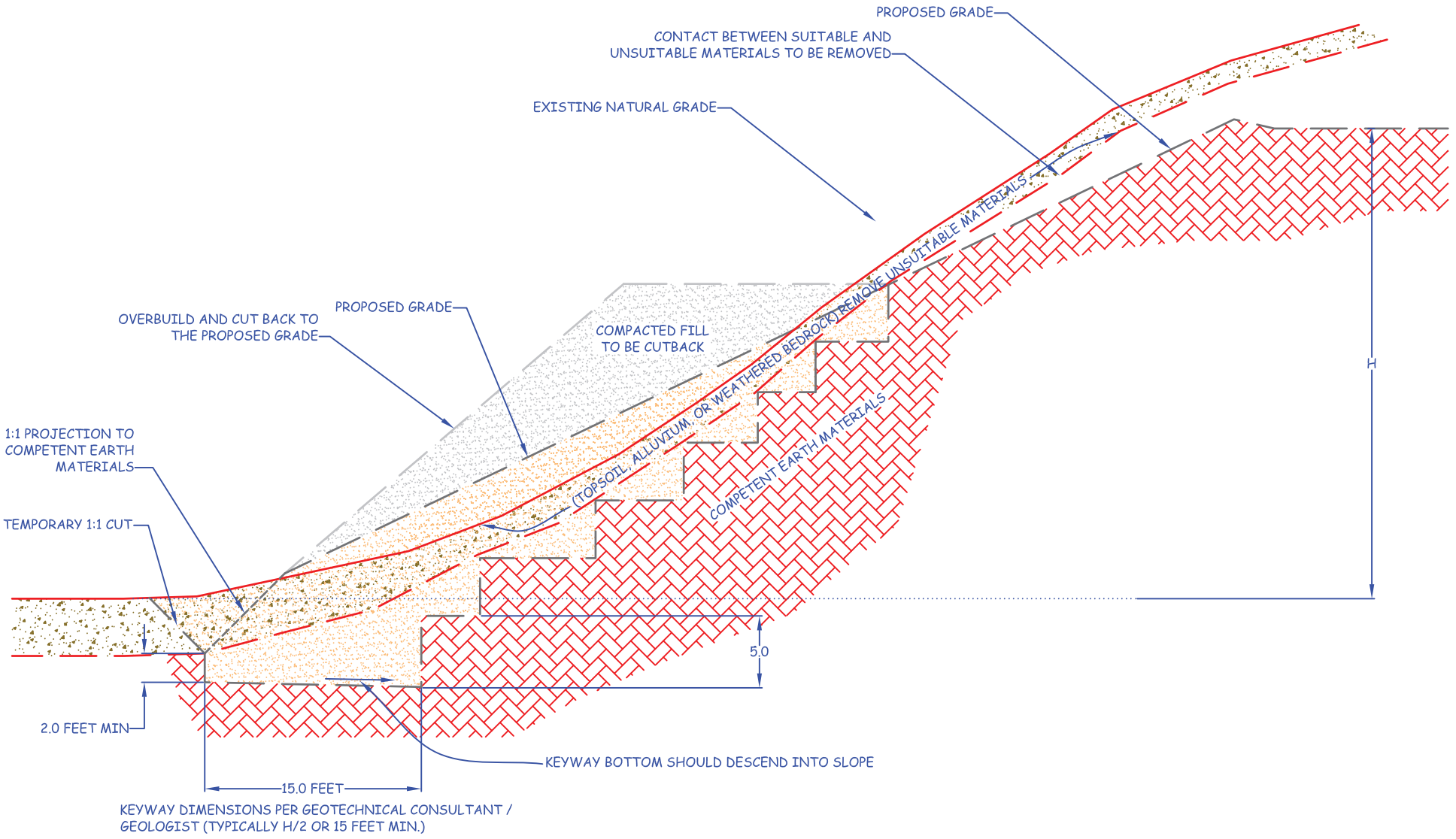
CUT / FILL TRANSITION LOT TYPICAL DETAIL



NOTE; REMOVAL BOTTOMS SHOULD BE GRADED WITH A MINIMUM 2% FALL TOWARDS STREET OR OTHER SUITABLE AREA (AS DETERMINED BY THE GEOTECHNICAL CONSULTANT) TO AVOID PONDING BELOW THE BUILDING

NOTE: WHERE DESIGN CUT LOTS ARE EXCAVATED ENTIRELY INTO COMPETENT EARTH MATERIALS, OVEREXCAVATION MAY STILL BY NEEDED FOR HARD-ROCK CONDITIONS OR MATERIALS WITH VARIABLE EXPANSION POTENTIALS

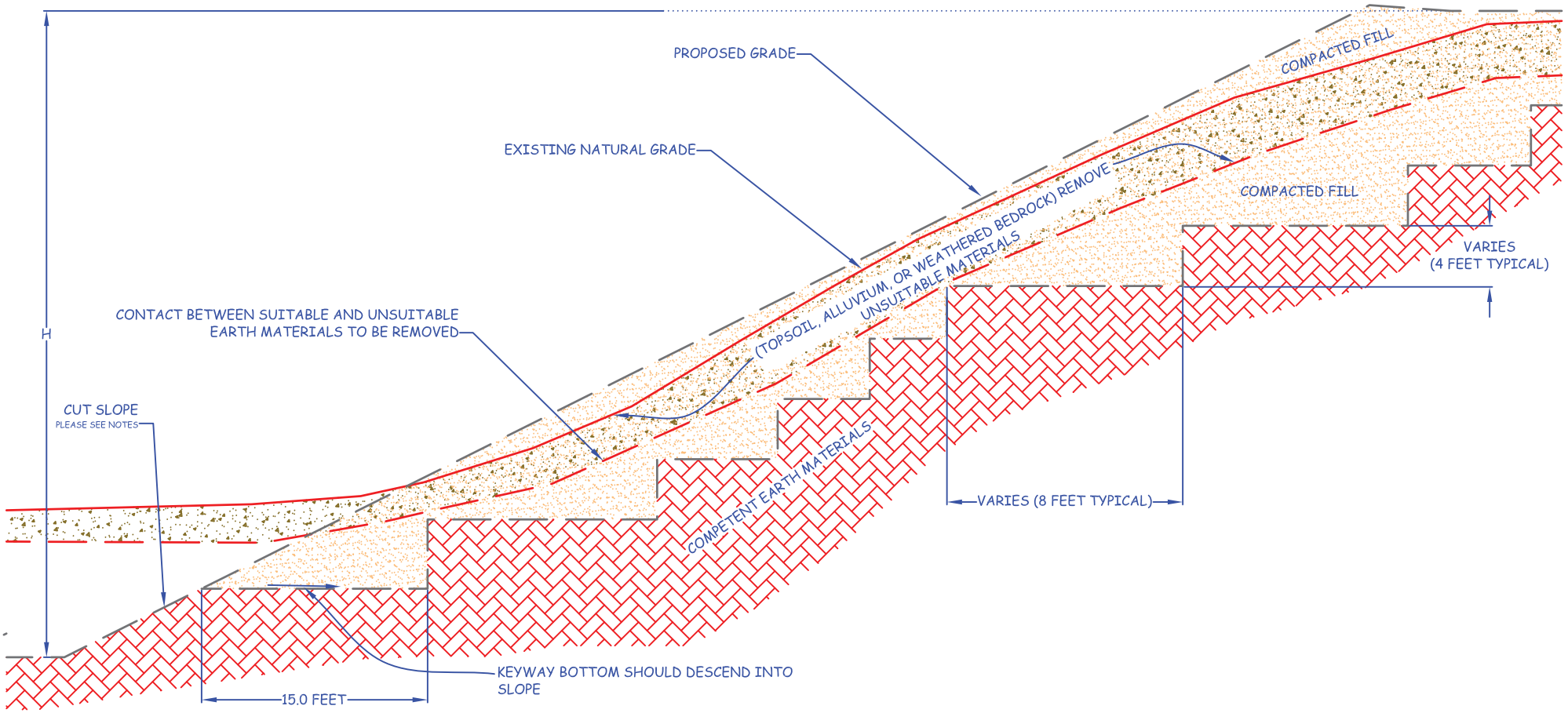
KEYWAY & BENCHING TYPICAL DETAILS
CUT OVER FILL SLOPE



NOTE:

NATURAL SLOPES STEEPER THAN 5:1 (H:V) MUST BE BENCHED INTO COMPETENT EARTH MATERIALS

KEYWAY & BENCHING TYPICAL DETAILS
FILL OVER CUT SLOPE



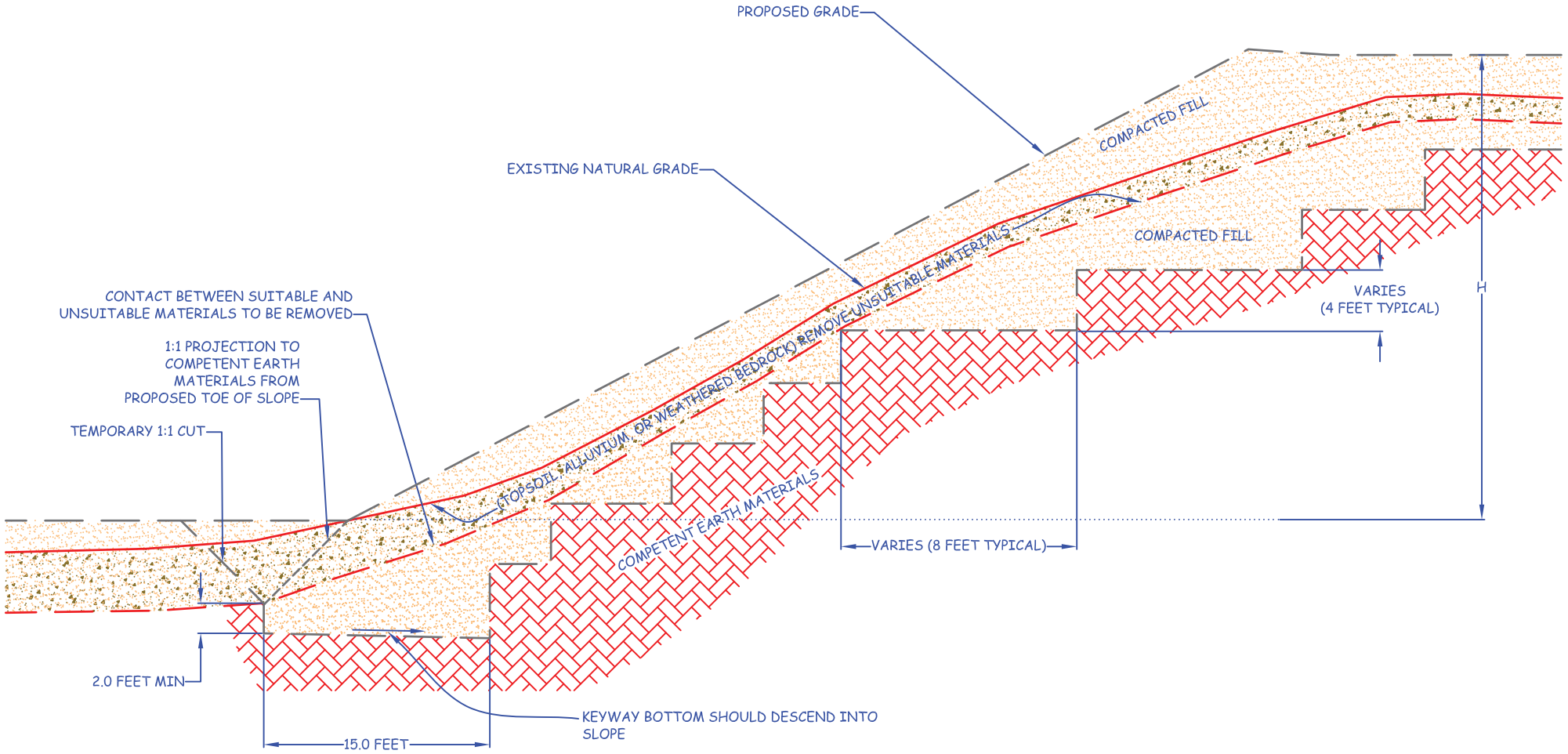
KEYWAY DIMENSIONS PER GEOTECHNICAL CONSULTANT / GEOLOGIST (TYPICALLY H/2 OR 15 FEET MIN.)

NOTES:

NATURAL SLOPES STEEPER THAN 5:1 (H:V) MUST BE BENCHED INTO COMPETENT EARTH MATERIALS

THE CUT SLOPE MUST BE CONSTRUCTED FIRST

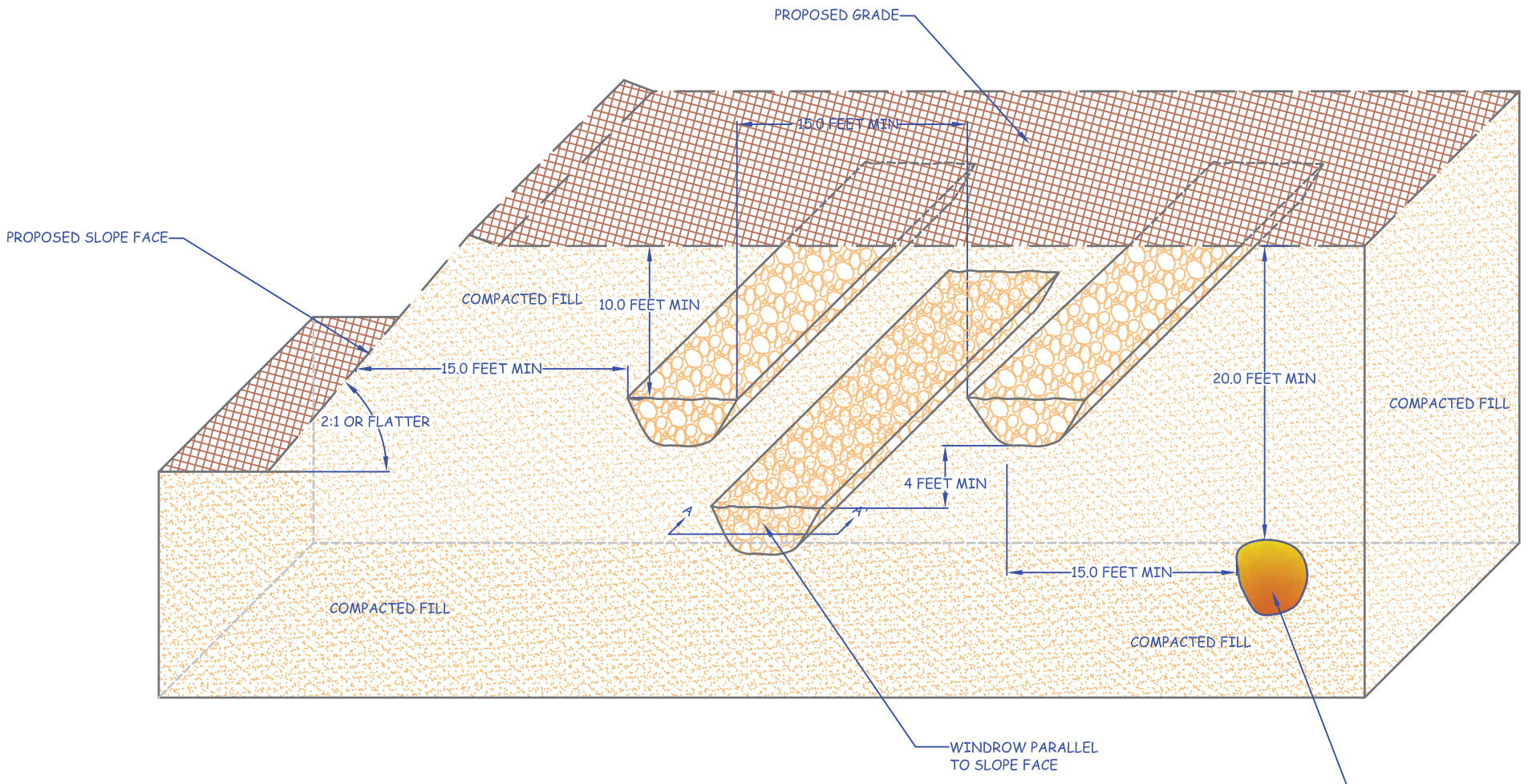
KEYWAY & BENCHING TYPICAL DETAILS
FILL SLOPE



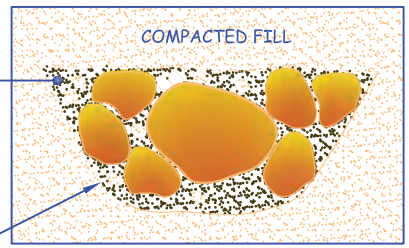
NOTES:

NATURAL SLOPES STEEPER THAN 5:1 (H:V) MUST BE BENCHED INTO COMPETENT EARTH MATERIALS

OVERSIZE ROCK TYPICAL DETAIL

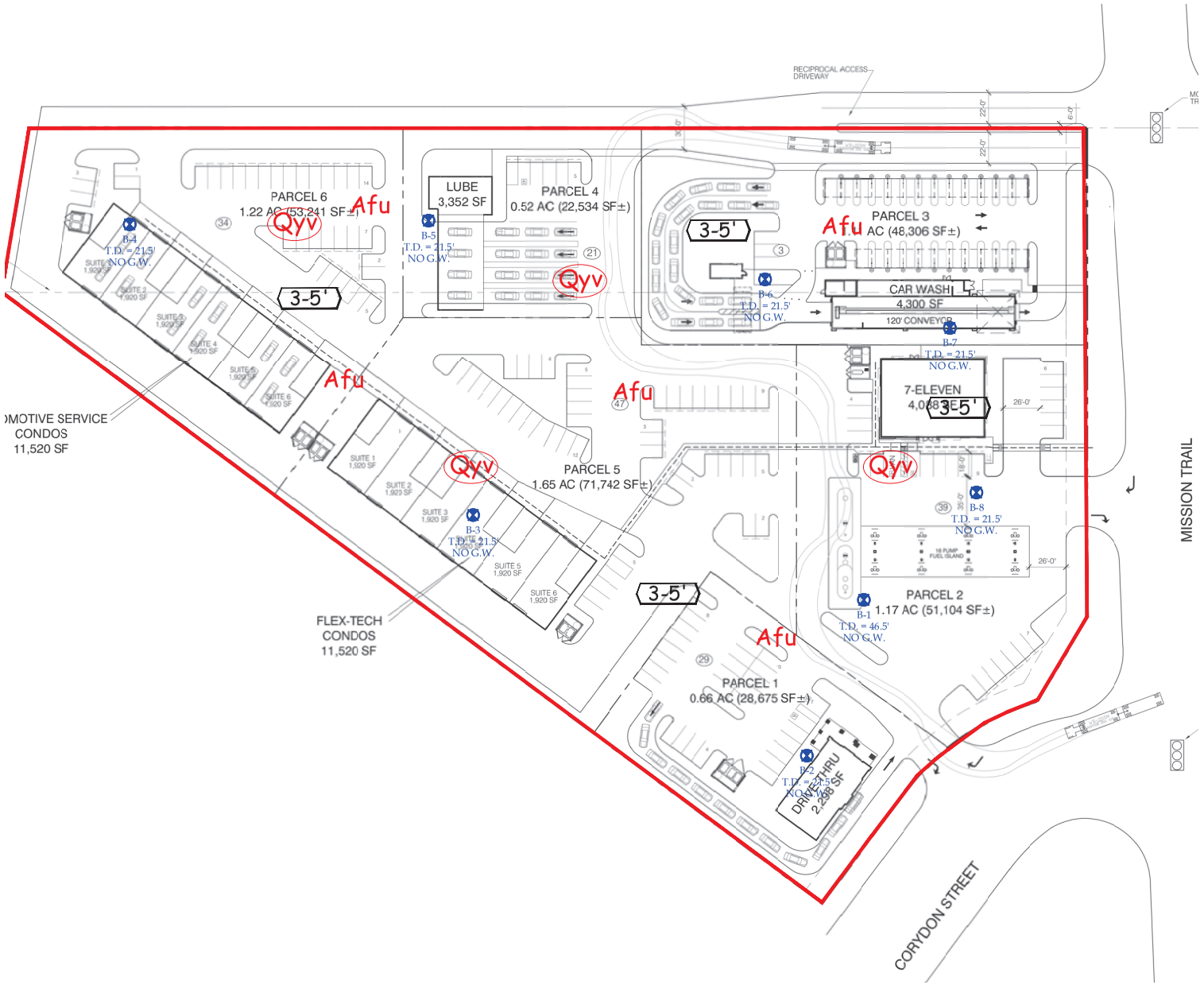


CROSS SECTION A-A'



NOTES:

OVERSIZE ROCK IS LARGER THAN
8 INCHES IN MAX DIAMETER



LEGEND

Locations are Approximate

Geologic Units

Afu - Artificial Fill, Undocumented

Qyv - Quaternary Young Alluvial Valley Deposits

Symbols

- Limits of Report

B-8 T.D. = 21.5' NO G.W. - Boring Location
Including Total Depth and Depth to Groundwater

3-5' - Recommended Removal Depths

North

GEOTECHNICAL MAP

LOCATED NORTHWEST CORNER OF CORYDON ROAD AND MISSION TRAIL ROAD
CITY OF LAKE ELSINORE, RIVERSIDE COUNTY, CALIFORNIA
APN 370-050-026

PROJECT	PROPOSED COMMERCIAL PLAZA		
CLIENT	MR. MARK COOPER		
PROJECT NO.	192846-10A		
DATE	SEP 2019		
SCALE	1:70		
DWG XREFS			
REVISION			
DRAWN BY	JF	PLATE	1 OF 1

Earth Strata Geotechnical Services, Inc.
Geotechnical, Environmental and Materials Testing Consultants
www.ESGSINC.com (951) 397-8315

Appendix 4: Historical Site Conditions

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

Earth Strata Geotechnical Services, Inc.
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www.ESGSINC.com (951) 397-8315

PHASE I ENVIRONMENTAL SITE ASSESSMENT

Of

UNDEVELOPED PROPERTY
ASSESSOR'S PARCEL NUMBER
370-050-026
LAKE ELSINORE, CALIFORNIA 92530

Prepared for:

Mr. Brandon Humann
R.E.D. Corydon LLC
Core States Group
4240 East Jurupa Street, Suite 402
Ontario, California 91761

Prepared by:

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www.earth-strata.com
E-S Project #P192846-60A

Issue Date: September 27, 2019

TABLE OF CONTENTS

Appendices:

PHASE I/II ESA EXECUTIVE SUMMARY OVERVIEW Undeveloped Vacant Property Lake Elsinore, CA				
Section Topic	**No RECs Identified**	**Non-REC Issue Identified**	**RECs Identified**	**Comments**
Historical Usage	✔			
Regulatory Database Review (on-site)	✔			
Regulatory Database Review (nearby sites)	✔			
On-site Operations	✔			
Haz. Mat. Handling	✔			
Haz. Waste Handling	✔			
USTs/ ASTs	✔			
ACMs	✔			
LBP	✔			
PCBs	✔			
Radon	✔			
Other	✔			

SECTION I.
EXECUTIVE SUMMARY & RECOMMENDATIONS

Earth Strata Geotechnical Services, (E-S) was retained by Core States Group, to perform a Phase I Environmental Site Assessment (Phase I ESA or Assessment) of a site Located on the northwest corner of Corydon Road and Mission Trail, City of Lake Elsinore, Riverside County, California. At the time of the September 20, 2019 site visit, the subject property consisted of one undeveloped parcel, totaling approximately 6 Acres. The subject site is located within a mixed-use area.

This Phase I ESA was performed in accordance with the scope and limitations of the *American Society for Testing and Materials (ASTM) Phase I ESA Standard E1527-2013*, (Equivalent to the USEPA's All Appropriate Inquiry [AAI] Standard), and the scope of work defined in this report, as well as the signed service agreement. The following summarizes E-S's independent conclusions and best professional judgment based upon information available to us at the time of this Assessment.

During the site visit, the E-S Assessor was not accompanied by anyone due to the undeveloped nature of the Site. However, Mr. Humann (Core States Group) was identified as the Key Site Managers defined by ASTM E1527-2013, the Key Site Manager is that person having good knowledge of the uses and physical characteristics of the subject property, and in a position to provide reasonably accurate information for the Key Site Manager Environmental Questionnaire. The questioner was performed by Mr. Humann and E-S and can be found in Appendix E. Based upon the limited site reconnaissance, historical review, regulatory records review, soil sampling and analysis and other information detailed within this report; this Assessment did not identify any evidence of ASTM Recognized Environmental Conditions (RECs) or other issues in connection with the subject property.

CONCLUSIONS AND RECOMMENDATIONS:

The Site consists of approximately 6 acres in Lake Elsinore, California, and currently vacant and undeveloped. Based on the results of this Phase I ESA, no further investigation is recommended for this site.

An Executive Summary Overview is also included in the previous section. However, when making any decisions concerning the findings of this Assessment, please also refer to the entirety of this report, which may present other items of interest that are not discussed in the Executive Summary, or further details regarding the above items. In addition, please refer to the Data Gaps section (IV-H) of this report regarding information that may have been unavailable or incomplete which may have a bearing on the findings or usage of this report.

SECTION II.
SCOPE OF WORK & LIMITATIONS

PURPOSE

The primary goal of this Phase I Environmental Site Assessment is to assist the client in satisfying one of the requirements to qualify for the "innocent landowner, contiguous property owner, or bona fide prospective purchaser limitations on CERCLA liability" (42 U.S.C. § 9601 et. seq.). Qualification for these limitations is predicated on the assumption that "…the defendant must have undertaken, at the time of acquisition, all appropriate inquiry into the previous ownership and uses of the property consistent with good commercial or customary practice in an effort to minimize liability…." The secondary goal of this Assessment is to provide information that will assist in evaluating the risk of potential significant value impairment of the security interest due to environmental impacts.

PROTOCOL

The *American Society for Testing and Materials (ASTM) Phase I ESA Standard E1527-2013* is the most current method used in attempting to perform the due diligence required to achieve the above purpose. The E1527-2013 Standard was created by the ASTM "…in an effort to define good commercial and customary practice in the United States of America for conducting an environmental site assessment.…" and is equivalent to the USEPA's All Appropriate Inquiry [AAI] Standard issued November 1, 2013. The ASTM Standard E1527-2013 is intended to identify recognized environmental conditions (RECs) in connection with a given property. The term recognized environmental conditions is not intended to include "*de minimus*" conditions that generally do not present a material risk of harm or that are unlikely to be the subject of enforcement actions by governmental agencies. Other conditions or issues that are beyond the ASTM scope may also be discussed in this report, as detailed within each section.

SCOPE OF WORK

Utilizing ASTM Standard E1527-2013, as well as the scope of work discussed below and in the work authorization document, this Assessment involved: A site reconnaissance of the subject property, limited observations of adjoining properties, a review of the historical usage of the subject property, and a review of relevant documentation provided by various public and private sources (including the client and/or owner of the subject property) to identify conditions indicative of releases or threatened releases of hazardous substances, as defined in CERCLA Section 101 (14) U.S.C. § 312.1(c) evaluate the presence or likely existence of:

- Recognized environmental conditions, specified by ASTM E1527-2013 as: "the presence or likely presence of any hazardous substances or petroleum products on a property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products

into structures on the property or into the ground, groundwater or surface water of the property."

- A brief evaluation and assessment of potential environmental issues which may not rise to the level of recognized environmental conditions, such as: obviously improper hazardous material or waste handling, suspect asbestos-containing materials, lead-based paint, polychlorinated bi-phenyls, and radon gas.

LIMITATIONS

As discussed in ASTM E1527-2013, no Phase I ESA can completely eliminate uncertainty regarding the potential for RECs in connection with a subject property. This investigation is simply intended to reduce uncertainty within reasonable limits of time and cost.

Refer to Section VI-A for a brief discussion of some (but not necessarily all) specific limitations to E-S's subject property observations at the time of the site visit. The observations contained within this Assessment are based upon conditions readily observable during the site visit. These observations are typically unable to address conditions of areas not inspected, hidden from view, subsurface soil, groundwater, underground storage tanks, neighboring properties, and the like, unless specifically mentioned. It is not the purpose of this Assessment to determine the actual presence, or degree or extent of contamination (if any) at the subject property. Unless specifically noted within this report, this Assessment does not include observations, testing, coring, or sampling analysis to address groundwater, soil, or extraneous materials contamination (including mold, bio-hazardous or radiologic issues) in or on the subject property. E-S also is not providing geological interpretations or recommendations. Potential Vapor Intrusion issues from on or off-site sources are not evaluated. Electromagnetic issues (e.g., proximity to high-voltage power lines) are also not included. This Assessment does not include or address reasonably ascertainable environmental liens recorded against the subject property, unless stated.

E-S makes no warranties or guarantees as to the accuracy or completeness of information obtained from or compiled by others. Information may also exist which was beyond the scope of this investigation or was not provided to E-S that may have an impact on the conclusions of this Assessment. This Assessment does not attempt to address past or forecast future site conditions. E-S also cannot forecast or be responsible for changes in regulatory guidelines or protocols, industry standards or the like, which may affect the conclusions and/or future usage of this report.

This Assessment has been conducted and prepared in accordance with generally accepted practices and procedures exercised by reputable professionals under similar circumstances. E-S makes no other warranties or guarantees, either expressed or implied, as to the findings, opinions, or recommendations contained in the report, or as to the existence or non-existence of RECs or other issues at the subject property.

SECTION III.
GENERAL SITE DESCRIPTION

During the site visit, the property is undeveloped and vacant. It is currently disturbed by mowing and sparsely covered with naturally occurring vegetation. A storm-water channel runs along the western border of the property, High voltage power lines are located along Mission Trails Road adjacent to the east of the property and water lines run along Corydon Road adjacent to the property. The subject property location and pictures are shown on various Figures in Appendix A.

A. CLIENT PROVIDED INFORMATION

As discussed in ASTM E1527-2013, the user (e.g., Client) is required to perform certain tasks or provide certain information to E-S in order to identify potential RECs. Tasks or information to be provided by the Client include: 1) review of judicial and title records for environmental liens, environmental deed restrictions or activity and use limitations (AULs); 2) provide specialized, actual, commonly known or reasonably ascertainable knowledge regarding the property; and, 3) identify reasons for a significantly lower purchase price (if applicable). The client has not provided any other information.

RELIANCE:

This report has been prepared for the benefit of the Client. The report may not be relied upon by any other person or entity without the express written consent of E-S and the Client. E-S and Client expressly authorize Core States Group and their respective successors and/or assigns to rely upon this report to the same extent as the Client.

B. ADJOINING AND ADJACENT PROPERTIES

As discussed in ASTM E1527-2013, an adjoining property is any real property whose border is contiguous or partially contiguous with the subject property or would be if the properties were not separated by a roadway, street or other public thoroughfare. For the purposes of this report, an adjacent property is any real property located within approximately one block or less of the subject property's border.

Specifically, the subject property is bordered by the following:

North: Immediately by an abandoned dirt bike sports track property.

East: Immediately by Mission Trail, residential and commercial properties.

South: Immediately by Corydon Road, commercial, residential and undeveloped properties.

West: Immediately by Aerofoam Industries, light industrial property.

C. USGS TOPOGRAPHIC MAP

The subject property's physical setting was 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 24,000 feet, and shows physical features such as wetlands, roadways, mines, and buildings. The USGS 7.5 Minute Quad Map was used as the Standard Physical Setting Source and is sufficient as a single reference. The Lake Elsinore, California Quad Map shows no physical features that are likely to environmentally impact the subject property. The subject property is identified as a rural residential developed, rectangular property. No mines, aboveground storage tanks, or wetlands were depicted in the immediate area of the subject property; however, there is an intermittent wash to the west and to the east. The elevation of the subject property is approximately 1275 feet above mean sea level with a gentle topographic gradient to the southeast (USGS Lake elsinore 7.5' Quadrangle). A copy of the map can be found in the Appendix B.

D. GENERAL HYDROGEOLOGIC CHARACTERISTICS

The Elsinore Groundwater Basin underlies the Elsinore Valley in western Riverside County. The basin is bounded on the southwest by the Santa Ana and Elsinore Mountains along the Willard fault, a splay of the active Elsinore fault zone. The basin adjoins the Temecula Valley Groundwater Basin on the southeast at a low surface drainage divide. The basin is bounded on the northwest by the Temescal Subbasin of the Upper Santa Ana River Valley Groundwater Basin at a constriction in Temescal Wash. The basin is bounded on the northeast by nonwater-bearing rocks of the Peninsular Ranges along the Glen Ivy fault. Average annual precipitation ranges from 12 to 14 inches. Lake Elsinore lies in a closed basin formed between strands of the active Elsinore fault zone. (California Department of Water Resources (DWR). 1975. *California's Ground Water*. Bulletin 118). The Elsinore Groundwater Basin contains alluvial fan, floodplain, and lucustrine deposits, which are underlain by alluvium of the Pauba Formation (DWR 1981). The maximum thickness of sedimentary deposits reaches 2,300 feet beneath Lake Elsinore (DWR 1981). Specific yield for the basin ranges from about 6 to 16 percent and averages about 7.6 percent (SWRB 1956). Please see the EDR Summary Radius Map Report for Hydrologic and Geologic information, Appendix C.

SECTION IV.
HISTORICAL REVIEW

The site historical review is used to develop an understanding of the previous uses of the subject property and surrounding area in an effort to identify the likelihood of past uses, or activities having environmentally impacted, the subject property. The historical review consisted of a search of various public and private Standard Historical Sources, as detailed in the sections below.

As defined by ASTM E1527-2013, a Standard Historical Source is considered complete if the information contained within the source identifies all uses of the subject property from the time the property was first used for residential, agricultural, commercial, industrial or governmental purposes. Ideally, the information should be available in either five-year intervals or site milestone events (i.e., initial construction activities, demolition activities, etc.). However, available public and private historical sources do not always fulfill this goal, in which case, the closest approximation is made based upon the sources readily available at the time of historical review.

Historical Review Summary: From the historical information review discussed below, E-S concludes that the subject property has never been developed and the adjacent commercial parcels were developed in the 2000's. No dry cleaners, gasoline stations, major landfills, military bases, or heavy industrial businesses were identified on the subject property. Currently the site is disturbed undeveloped land with naturally occurring vegetation.

A. AERIAL PHOTOGRAPH REVIEW

Aerial photographs were reviewed by E-S to evaluate past land-use patterns of the subject property and vicinity. The photos were supplied by EDR and are from the following years 1938, 1949, 1953, 1961, 1967, 1978, 1985, 1989, 1996, 2002, 2006, 2009, 2012 and 2016. Copies of representative aerial photographs can be found in Appendix B. This review revealed the following:

1938 to 2005
The subject property is in a rural sparsely residential developed area and has never been developed.

2005 to Present
The subject property has never been developed. The adjacent light industrial commercial properties appear in 2005. The surrounding area has continued to grow with commercial and residential properties as well as the typical infrastructure improvement of roads and utilities.

B. BUILDING PERMIT REVIEW

In an effort to evaluate the development history of the subject property, E-S reviewed the Riverside County, Department of Planning website (http://www3.tlma.co.riverside.ca.us/). Review of this information indicated the Assessor's Parcel Numbers for the subject property are 370-050-026. The recorded lot size for the above is approximately 6 acres. Thomas Bros. page 896, grid J3 and page 897 grid A3. No other information significant to this report was obtained from the Assessor's data. The data can also be found in the Appendix D.

C. SANBORN FIRE INSURANCE MAP REVIEW

E-S requested Sanborn Fire Insurance Maps for the subject property; however, no maps were available for the subject property.

D. CITY STREET DIRECTORY REVIEW

E-S did not request a "City Street Directory" for the area of the subject property due to the residential rural environment.

E. HISTORICAL TOPOGRAPHIC MAP REVIEW

Historical topographic maps were reviewed on line by E-S. No significant additional information was revealed after review.

F. INTERVIEWS

As specified in ASTM E1527-2013, interviews will be conducted with parties including present land owners and occupants, past land owners and occupants, and adjoining property owners, as appropriate and as available. E-S interviewed Mr. Humann the Key Site Manager and he was able to help answer questions and fill out the questionnaire. No significant additional information was revealed after the interviews.

G. RECORDED LAND TITLE RECORDS

As specified in ASTM E1527-2013 *recorded land title records* mean records of historical fee ownership, which may include leases, land contracts and AULs on or of the *property* recorded in the place where land title records are, by law or custom, recorded for the local jurisdiction in which the *property* is located (often such records are kept by a municipal or county recorder or clerk). Such records may be obtained from title companies or directly from the local government agency. Information about the title to the *property* that is recorded in a U.S. district court or any place other than where land title records are, by law or custom, recorded for the local jurisdiction in which the *property* is located, are not considered part of *recorded land title records*, because often this source will provide only names of previous *owners*, lessees, easement holders, etc., and little or no information about uses or occupancies of the *property*, but when employed in combination with another source *recorded land title records* may provide helpful information about uses of the *property*. This source cannot be the sole historical source consulted. If this source is consulted, at least one additional standard historical source must also be consulted.

A title report was provided, and such a report typically does not list all documents related to the subject property, simply those that the title insurer wants to exclude from coverage and/ or that are of potential interest to the transaction. Title reports may also be one method to evaluate the environmental liens search required by the ASTM E1527-2013 standard, which is required to be performed by the report User. A liens/use limitation search by the User is required by the ASTM/AAI standard 180 days or less prior to acquisition of a property. E-S reviewed the title report and did not find any significant information, the title report can be found in Appendix D.

H. DATA GAPS

As specified in ASTM E1527-2013, data gaps are defined as "a lack or inability to obtain information required by the standards and practices listed in the regulation despite good faith efforts by the Environmental Professional or prospective landowner to gather such information". Data failure occurs when historical research does not identify standard historical sources that are "reasonably ascertainable" and "likely to provide useful information to identify prior uses of the property". Per ASTM E1527-13, the assessment must document data failure and give reasons why historical sources were not available or excluded (if applicable). Based on E-S's research, no significant data gaps were identified for the subject site.

SECTION V.
AGENCY RECORDS REVIEW

In an effort to evaluate whether the subject property and/or nearby sites have reported USTs, hazardous waste generation, or hazardous material releases, regulatory information from the federal, state, and local agencies listed below were reviewed. The database report was compiled by a third-party database provider and is reportedly the most recent database information available from each agency. A copy of the database report is included in the appendix. According to the database provider, their search of the various databases conforms to ASTM E1527-2013 Standards. However, the accuracy of the information provided by the agencies is not without error or omission, and the information listed is limited to that which was reported to or gathered by that agency. A limited discussion of the number of sites identified, and of their potential impact to the subject property, follows this page. In addition, E-S may request state and/or local regulatory agency information for the subject property, targeting those agencies most likely to provide information useful for this Assessment. The primary databases reviewed, and their general search range criteria are below:

Federal Database	Search Range
USEPA NPL/Superfund databases:	Target Property to 1.0 mile
USEPA CERCLIS databases:	Target Property to 0.5 mile
USEPA RCRIS facilities databases	
Corrective Action Sites:	1.0 mile
TSD Facilities:	0.5 mile
Generators:	0.25 mile
USEPA ERNS database:	Target Property
US Engineering Controls:	0.5 mile
US Institutional Controls:	0.5 mile
US DOD/FUDS databases:	1.0 mile
US Brownfields:	0.5 mile
State/Local Database	**Search Range**
State Superfund databases:	
Hist Cal-Sites:	1.0 mile
CA Bond Exp. Plan	1.0 mile
State Landfills database:	0.5 mile
State Cortese	0.5 mile
State/Local LUST databases:	0.5 mile
State Spills databases:	
SLIC:	0.5 mile
CHMIRS:	Target Property
State/Local UST/AST databases:	0.25 mile
State Liens database:	Target Property
State Deed database:	0.5 mile
State VCP database:	0.5 mile
State EnviroStor/Response databases:	1.0 mile
State HAZNET database:	Target Property
Local Haz-Mat/Cleanup databases:	Target Property

A. REVIEW OF FEDERALLY REPORTED ENVIRONMENTAL DATA

The review of the federal environmental databases listed below attempts to identify environmental problem sites, activities, and occurrences from the records of the U.S. Environmental Protection Agency (USEPA). The detailed listing, and a map showing the location of the sites relative to the subject property, is included in the appendix.

National Priorities List (NPL) of Superfund Sites:
The NPL is the USEPA's database of hazardous waste sites currently identified and targeted for priority cleanup action under the Superfund program. This search includes Proposed NPL sites, Delisted NPL sites, and NPL Recovery sites. NPL sites may encompass relatively large areas. As such, polygon coverage for the site boundaries (for a majority of the NPL sites), as produced by the EPA may be provided. A search of the NPL database identified the following number of Superfund sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

National Priorities List Liens (NPL Liens):

The NPL Liens database contains a list of filed notices of Federal Superfund Liens. Under the authority granted the USEPA by CERCLA of 1980, the USEPA has the authority to file liens against real property in order to recover remedial action expenditures or when the property owner received notification of potential liability. A search of the NPL Liens database identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980:
Mandated as part of the 1980 Superfund Act, the CERCLIS (Comprehensive Environmental Response, Compensation and Liability Information System) list is an EPA compilation of the sites investigated, or currently being investigated, for a release or potential release of a regulated hazardous substance under the CERCLA regulations. A search of the CERCLIS and CERCLIS-NFRAP (no further remedial action planned) databases identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

RCRIS Corrective Action (RCRIS-CA) Sites:

The RCRIS-CA report contains information pertaining to hazardous waste handling facilities which have conducted, or are currently conducting corrective actions, as regulated by the Resource Conservation and Recovery Act. A search of the RCRIS-CA list identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Resource Conservation and Recovery Act Information System (RCRIS) Treatment, Storage, and Disposal (TSD) Facilities:

The RCRA program identifies and tracks hazardous waste from generation source to the point of ultimate disposal. The RCRIS-TSD facilities database is the composite of reporting facilities that transport, store, or dispose of controlled or hazardous waste. Identification on this list does not indicate that a site has impacted the environment. A search of the RCRIS-TSD database identified the following number of facilities within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

RCRIS Generator Facilities:

The RCRIS program identifies and tracks hazardous waste from generation source to the point of ultimate disposal. The RCRIS generator facilities database (large and small quantity generators and various derivations) is the composite of reporting facilities that generate hazardous waste. Identification on these lists does not indicate that a site has impacted the environment. A search of the RCRIS facilities databases identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
One	None

Emergency Response Notification System (ERNS):

The ERNS database is the historical record of releases of hazardous substances reported to the USEPA. A search of the ERNS database identified the following number of releases within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

EPA Engineering and Institutional Controls (US ENG/INST CONTROL) Sites:

These databases include listings of sites with engineering or institutional controls in place. Engineering controls include various forms of caps, building foundations, liners, and treatment methods to create pathway elimination for regulated substances to enter environmental media or effect human health. Institutional controls include administrative measures, such as groundwater use restrictions, construction restrictions, property use restrictions, and post remediation care requirements intended to prevent exposure to contaminants remaining on site. Deed restrictions are required as part of the institutional controls. A search of the US ENG/INST CONTROL database(s) identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Department of Defense (DOD) Sites:

The Unites States Geological Survey (USGS) maintains the DOD database, which consists of federally owned or administered lands, administered by the DOD, that have an area equal to or greater than 640 acres of the United States, Puerto Rico, and the US Virgin Islands. A search of the DOD database identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Formerly Used Defense Sites (FUDS):

The U.S. Army Corps of Engineers database contains a listing of locations of Formerly Used Defense Sites (FUDS) where the U.S. Army Corps of Engineers is actively working or will take necessary cleanup actions. A search of the FUDS database identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

US Brownfields Sites (Brownfields):

The US Brownfields site includes brownfields properties addressed by Cooperative Agreement Recipients (CAR) and brownfields properties addressed by Targeted Brownfields Assessments (TBA). EPA's TBA program is designed to help states, tribes, and municipalities minimize the uncertainties of contamination often associated with brownfields. Cooperative Agreement Recipients (states, political subdivisions, territories, and Indian tribes) become Brownfields Cleanup Revolving Loan Fund (BCRLF) cooperative agreement recipients when they enter into BCRLF cooperative agreements with the USEPA. EPA selects BCRLF cooperative agreement recipients based on a proposal and application process. BCRLF cooperative agreement recipients must use EPA funds provided through BCRLF cooperative agreement for specified brownfields-related cleanup activities. A search of the Brownfields database identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

CERCLA Lien Information (LIENS 2):

A Federal Superfund Lien can exist by operation of law at any site or property at which EPA has spent Superfund monies. These monies are spent to investigate and address releases and threatened releases of contamination. CERCLIS provides information as to the identity of these sites and properties. A search of the LEINS 2 database identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Facility Index System (FINDS) sites:

The FINDS Report is a computerized inventory of all facilities that are regulated or tracked by the U.S. Environmental Protection Agency. These facilities are assigned a unique identification number that serves as a cross-reference for databases in the EPA's program system. Identification on this database does not indicate that a site has impacted the environment. A search of the FINDS database identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

B. REVIEW OF STATE-REPORTED ENVIRONMENTAL DATA

Results of the state regulatory records search follow. Each section begins with a general description of the databases searched and the corresponding responsible state or local agency. The detailed listing, and a map showing the location of the sites relative to the subject property, is included in the appendix.

State Hazardous Waste Site (SHWS) Databases:

State Hazardous Waste Site records are the states' equivalent to CERCLIS. The Department of Toxic Substances Control (DTSC) Hist Cal-Sites database contains potential or confirmed hazardous substance release properties. The Calsites database was created by the Department of Toxic Substances and Control (DTSC), but DTSC no longer up-dates the Calsites database. The Calsites database was replaced by the EnviroStor database (see EnviroStor section below). The CA Bond Expenditure Plan database contains the Department of Health Services site-specific expenditure plan, which is the basis for an appropriation of Hazardous Substance Cleanup Bond Act funds. A search of the State Hazardous Waste Site database(s) identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Solid Waste Facilities, Landfills and Recycling Facilities:

The State Solid Waste Facilities and Landfills and Recycling databases include an inventory of active, closed, and inactive solid waste disposal facilities, landfills, refuse transfer stations, and recycling facilities (non-landfill sites). A search of these databases identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
One	None

Historical Cortese Database:

The Historical Cortese list contains hazardous waste and substance sites compiled pursuant to Assembly Bill 3750 (Cortese, Chapter 1048, Statutes of 1986). The information included in this list was compiled with information from the California DTSC, the State Water Resources Control Board, and the California Waste Management Board. This database contains primarily LUST sites, although other types of sites may be included. A search of the Cortese database identified the following number of sites within the specified search range:

Number of Sites	Number Listed at Subject Property
One	None

Leaking Underground Storage Tanks (LUSTs):

State and/or local agencies maintain inventories of LUSTs (also known as LTANKS) in a statewide database. A search of the LUST database identified the following number of reported LUST sites within the specified search range:

Number of Sites	Number Listed at Subject Property
Two	None

State/Local Spills Databases:

The Spills, Leaks, Investigations, and Cleanup (SLIC) Cost Recovery Listing program is designed to protect and restore water quality from spills, leaks, and similar discharges. The database(s) included in this section are the states' equivalent to the ERNS report and generally contain information for reported hazardous material/waste surface or groundwater contamination release investigations reported in that state or locality. The California Hazardous

Material Incident Report System (CHMIRS) database contains information on reported hazardous waste material incidents (accidental releases or spills). A search of these databases identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Underground Storage Tanks (USTs)/Aboveground Storage Tanks (ASTs):

USTs are regulated under Subtitle I of the RCRA (as well as various state regulations), and must be registered with the State Underground Storage Tank Program. These are registered USTs only, and identification on this list(s) does not necessarily indicate that the site has impacted the environment. This search includes review of the Active UST Facilities (UST) database, Facility Inventory Database (CA FID UST), Hazardous Substance Storage Container Database (HIST UST), and SWEEPS UST Listing database (SWEEPS UST). Also potentially included in this section are sites identified on historic UST databases that are no longer maintained. The AST database is the State Water Resources Control Board's Hazardous Substance Storage Container Database for registered ASTs. A search of these UST and AST databases identified the following number of sites within the specified search range:

Number of Sites	Number Listed at Subject Property
None	None

Environmental Liens Listing (LIENS):

The Department of Toxic Substances Control's (DTSC) LIENS database includes a listing of property locations with environmental liens for California where DTSC is a lien holder. A search of the LIENS database identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Deed Restriction Listing (DEED):

The Department of Toxic Substances Control's (DTSC) DEED database includes a listing of Site Mitigation and Brownfields Reuse Program (SMBRP) Facility Sites with Deed Restrictions and Hazardous Waste Management Program Facility Sites with Deed/Land Use Restrictions. The SMBRP list includes sites cleaned up under the program's oversight and generally does not include current or former hazardous waste facilities that required a hazardous waste facility permit. The list represents deed restrictions that are active, and some sites have multiple deed restrictions. The DTSC Hazardous Waste Management Program (HWMP) has developed a list of current or former hazardous waste facilities that have a recorded land use restriction at the local county recorder's office. The land use restrictions on this list were required by the DTSC HWMP as a result of the presence of hazardous substances that remain on site after the facility (or part of the facility) has been closed or cleaned up. The types of land use restriction include deed notice, deed restriction, or a land use restriction that binds current and future owners. A search of the DEED database identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Voluntary Cleanup Program (VCP):

The Department of Toxic Substances Control's (DTSC) VCP database contains low threat level properties with either confirmed or unconfirmed releases and the project proponents have requested that DTSC oversee the investigation and/or cleanup activities and have agreed to provide coverage for DTSC's costs. A search of the VCP database identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

State Response/EnviroStor Databases:

The Department of Toxic Substances Control's (DTSC) RESPONSE database identifies confirmed release sites where DTSC is involved in remediation, either in a lead or oversight capacity. These confirmed release sites are generally high-priority and high potential risk. The DTSC's Site Mitigation and Brownfields Reuse Program's (SMBRPs) EnviroStor database identifies sites that have reported contamination or sites for which there may be reason to investigate

further. The database includes the following site types: Federal Superfund Sites (National Priorities List (NPL)); State Response, including Military Facilities and State Superfund; Voluntary Cleanup; and School sites. EnviroStor provides similar information to the information that was available in Cal-Sites, and provides additional site information, including, but not limited to, identification of formerly-contaminated properties that have been released for reuse, properties where environmental deed restrictions have been recorded to prevent inappropriate land uses, and risk characterization information that is used to assess potential impacts to public health and the environment at contaminated sites. A search of the Response and EnviroStor databases identified the following number of sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
One	None

State and/or Local Agency Generators (HAZNET):

The HAZNET data is extracted from copies of hazardous waste manifests kept by the Cal-EPA, DTSC. These manifests track hazardous wastes from generation source to the point of ultimate disposal. Permit data is generally culled from local agency database(s) for hazardous material handlers and generators. Identification on these lists does not indicate that a site has impacted the environment and the data has not always been verified for accuracy by the DTSC or local agencies. A search of the HAZNET and Permit data identified the following number of reported sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

National Pollutant Discharge Elimination System (NPDES) Database:

The National Pollutant Discharge Elimination System (NPDES) includes sites that have had or have a permit for the discharge of wastewater or stormwater issued by the Regional Water Quality Control Board or a local agency (e.g., Public Works Department). The NPDES data identified the following number of reported sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

State and/or Local Agency Air Emissions Database (EMI):

The EMI data is extracted from permits for air emissions kept by the state or local air resources agency. Identification on these lists does not indicate that a site has impacted the environment. A search of the EMI database identified the following number of reported sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

Notify 65 Database:

Notify 65 listings generally indicate that some type of release and/or groundwater impact have occurred which was required to be reported under Proposition 65 rules. A search of the Notify 65 data identified the following number of reported sites within the specified database search range:

Number of Sites	Number Listed at Subject Property
None	None

EDR Historical Auto Stations, Historical Cleaners, & Manufactured Gas Plants Databases:

These databases include former gas stations, auto repair shops, dry cleaners, Laundromats, and manufactured gas plants that are typically no longer active. Identification on these databases does not necessarily indicate that such activities actually occurred at that site or that a site has impacted the environment. A search of these databases identified the following number of sites within the specified database search range:

Type of Site	Number of Sites	Number Listed at Subject Property
Historical Auto Stations	None	None
Historical Cleaners	None	None
Historical Manufactured Gas	None	None

Orphan Unplottable Sites:
"Orphan" sites are those which could not be plotted by the database provider using conventional geo-coding methods, typically because the information provided in the original government database was unclear, incorrect or missing. A listing of orphan sites (if any) appears at the end of the database, immediately after the last plottable site description.

E-S reviewed the orphan list for sites with the same name as the subject property (if applicable) and/or the same or similar property address. This review is inherently limited by the incomplete and/or possibly incorrect data reported in the orphan listings. For orphans apparently not related to the subject property, only those obviously located adjoining or within a short distance that may affect the property are discussed. Orphan sites which are also listed in the plotted section are not re-discussed. E-S's review of the orphan list revealed no obvious sites of concern listed at or adjoining the subject property.

Mapped Database Sites:
A review of the state and federal government agencies list, as provided by EDR, and dated 09/17/2019 has revealed that there are two LUST sites, on Historical Cortese site and one SWRCY site within .5 miles of the target property.

Elsinore Valley Muni, 33751 Mission Trail (LUST) SSE 1/8 – 1/4 (0.136 mi.)
Three Sites with this address.
Facility Id: 911100
Status: Cased closed

Tosco Circe K, 33982 Mission Trail (LUST) SSE 1/8 – 1/4 (0.450 mi.)
Two Sites with this address
Facility Id: T0606500523
Status: Cased closed

Peralta Enterprises 31949 Corydon Street (SWRCY) SSW 1/4 -1/2 (0.380 mi)
Facility Id: RC246836.001
Status: No violations.

E-S does not feel that any of these pose a REC based on the distance and the Status of each.

C. LOCAL AGENCY RECORDS SEARCH

The following is a discussion of the results of E-S's written records requests, online regulatory database review, and/or personal/telephone contacts (as applicable) made to state and/or local government agencies in an effort to obtain potential information relevant to the subject property:

County of Riverside Environmental Department:

E-S contacted the County of Riverside Environmental Health in an effort to evaluate whether hazardous material incidents, USTs, and/or LUSTs have been reported at the subject property. Because the property does not have a physical address the County of Riverside Environmental Department, had no incidents that were known to them.

California State Water Board:

E-S also reviewed the State Water Boards online database (Geotracker) in an effort to identify potentially hazardous waste generation/disposal activities associated with the subject property address. A search radius was performed, and no sites were identified within .5 miles of the Site, and can be found in Appendix D.

California Department of Water Resources:

E-S contacted the California Department of Water Resources in an effort to evaluate whether any state listed water wells or water resources are located on the subject property address. No water wells are located on the property.

D. TRIBAL RECORDS SEARCH

According ASTM E1527-2013, records for local and tribal records shall be checked to satisfy all appropriate inquiry for this assessment. The following is a discussion of the results of E-S's written records requests, online regulatory database review, and/or personal/telephone contacts (as applicable) made to tribal governmental agencies in an effort to obtain potential information relevant to the subject property:
The subject property is not located on tribal property and therefore no inquiry was necessary.

SECTION VI.
SITE VISIT OBSERVATIONS

A. SITE STRUCTURE CHARACTERISTICS

At the time of the site visit, the subject property consisted of one vacant undeveloped parcel of land, totaling approximately 6 Acres. No pesticides, sumps, clarifiers, swales, or surface impoundments potentially containing hazardous materials were observed on the subject property. Weather conditions at the time of the site visit consisted of cloudy skies, with temperatures in the 90's.

B. WASTEWATER AND STORMWATER MANAGEMENT

No wastewater was observed at the subject site.

Storm water and surface run-off from the subject property and adjacent properties inter the natural storm water and flood control conveyance systems.

C. POTABLE WATER SUPPLY

The subject property would utilize water from Eastern Municipal Water District.

E. BUSINESS OPERATIONS DESCRIPTION

According to the Riverside County Department of Planning, the subject property zone is not designated. E-S's research indicates no dry cleaners, gasoline stations, military bases, or major manufacturing operations have occupied the subject property.

SECTION VII.
HAZARDOUS MATERIAL/WASTE OBSERVATIONS

A. HAZARDOUS MATERIALS HANDLING AND STORAGE

No hazardous materials were observed at the subject property. No significant staining or spillage was observed in any of the areas inspected. No other significant hazardous materials handling, or storage were observed on the subject property during the site visit.

B. WASTESTREAM GENERATION, STORAGE AND DISPOSAL

During the inspection, no hazardous waste generation, storage, or improper hazardous waste disposal was observed on the subject property. Stained or discolored sinks, drains, catch basins, drip pads, or sumps were not observed. Additionally, significant spills or staining were not observed at the subject property.

C. SOLID WASTE DISPOSAL

During the inspection, no solid waste generation, storage, or improper solid waste disposal was observed on the subject property.

D. ABOVEGROUND STORAGE TANKS (ASTs)

Visual or physical indicators of current or former ASTs were not observed at the subject property during the site visit.

E. UNDERGROUND STORAGE TANKS (USTs)

As discussed in the Section V (Agency Records Review) of this report, no USTs were reported at the subject property. In addition, no visual or physical evidence of current or past USTs were discovered during the site visit in the readily visible areas of the property. In particular, E-S searched for: fill pipes, vent pipes, man-ways, manholes, access covers, and or concrete pads not homogeneous with surrounding surfaces, concrete built-up areas potentially indicating pump islands, abandoned pumping equipment, or fuel pumps.

SECTION VIII.
OTHER POTENTIAL ISSUES OF CONCERN

A. PCB-CONTAINING EXTERIOR ELECTRICAL TRANSFORMERS

No transformers were observed on the subject property.

B. OTHER PCB-CONTAINING INTERIOR OR EXTERIOR EQUIPMENT

During the on-site inspection, no evidence was observed of any equipment likely containing PCB-contaminated fluid (e.g., interior electric transformers, hydraulic elevators, hydraulic hoists/lifts, hydraulic loading dock ramps, other fluid containing equipment, etc.).

C. SUSPECT ASBESTOS-CONTAINING MATERIALS (ACMs)

No structures are present on the property, and asbestos-containing materials (ACMs) identification are beyond the scope of this assessment.

D. LEAD-BASED PAINT (LBP)

No structures are present on the property, and lead-based paint (LBP) identification are beyond the scope of this assessment.

E. LEAD IN DRINKING WATER

Federal regulations limit lead in publicly supplied water to no more than 15 parts per billion (ppb), however, the most common source of lead in tap water is from interior plumbing systems (piping, connections, faucets, etc.). Children are the most susceptible to possible health effects from consuming lead-tainted drinking water. Due to the nature of the property being undeveloped, no observations of these sources were observed. The presence or absence of elevated lead concentrations in the water can only be confirmed through laboratory testing, and such analysis is beyond the scope of this assessment.

F. AIR QUALITY

Unusual smells, noxious odors, or visual emissions were not observed during the inspection of the subject property. However, these observations are general in nature and should not be construed as an air quality assessment.

G. RADON

According to the USEPA, the general area of the site has a predicted average indoor screening level of less than the EPA guideline action level of 4.0 picoCuries per liter of air (EPA Radon Zone Level of 1). Therefore, based upon the reported subsurface characteristics of the area, the subject property exhibits no potential for high-level radon exposure.

H. RAILROAD RIGHTS-OF-WAY

There are several potential environmental risks associated with railroad rights-of-way, including the usage of herbicides, pesticides, petroleum materials and related heavy metals (e.g. arsenic) to maintain the tracks, as well as the potential spillage of hazardous materials from railcars. During the site visit, no railroad rights-of-way, spurs, or related features were observed immediately adjoining the subject property.

SECTION IX.
ADJOINING PROPERTY OBSERVATIONS

As discussed below, based upon limited observations of the adjoining properties from publicly accessible locations, as well as a review of federal, state, and local environmental databases, none of the adjoining properties appeared to have significantly environmentally impacted the subject property at this time.

A. ADJOINING PROPERTIES MATERIALS STORAGE

Visual observations of the portions of the adjoining properties visible from the subject property or public roadways did not indicate the exterior storage of hazardous materials or wastes. No indications of spillage or staining were observed in the observable exterior areas of these sites. Additionally, no obvious indications of improper hazardous material storage or unusual or suspicious materials handling, or storage practices were observed.

B. ADJOINING PROPERTIES WASTESTREAM DISPOSAL

No unusual or suspicious waste stream disposal activities were observed on the portions of the adjoining properties visible from the subject property or public roadways.

C. RECOMMENDATIONS

Based on the results of this Phase I, no further investigation is recommended for this Site.

SECTION X.
STATEMENT OF THE ENVIRONMENTAL PROFESSIONALS

This Assessment has been performed for the exclusive use and benefit of the addressee(s) identified on the cover of this report, or agents directly specified by it (them), for the transaction at issue concerning the subject property described in this report. This Assessment shall not be used or relied upon by others without the prior written consent of Earth-Strata, Inc. and of the addressee(s) named on the cover of this report.

STATEMENT OF QUALITY ASSURANCE

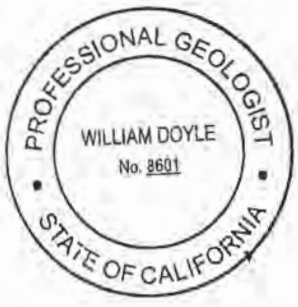
I declare that, to the best of my professional knowledge and belief, I meet the definition of an Environmental Professional as defined in § 312.10 of 40 CFR 312 and 12.13.2. I have the specific qualifications based on education, training, and experience to assess a property of the nature, history, and setting of the subject property. I have developed and performed the all appropriate inquiries in conformance with the standards and practices set forth in 40 CFR Part 312. The conclusions contained within this Assessment are based upon site conditions I readily observed and were reasonably ascertainable and present at the time of the site visit. The findings and conclusions represent my best professional opinion and judgment. In addition, the conclusions and recommendations stated in this report are based upon personal observations made by E-S and upon information provided by others. I have no reason to suspect or believe that the information provided is inaccurate.

STATEMENT OF QUALITY CONTROL

The objective of this Phase I ESA was to ascertain the potential presence or absence of RECs that could impact the subject property, as delineated in the scope of services and limitations identified in this report and in the service agreement. The procedure was to perform reasonable steps in accordance with the existing regulations, currently available technology, and generally accepted environmental consulting practices, in order to accomplish the stated objective.

Signature of Professional Geologist – *William T. Doyle, #8601*

Signature/Environmental Assessor



Acronyms and Abbreviations

Below are several abbreviations that E-S uses to describe various projects.

ACM	Asbestos-containing material
AQMD	Air Quality Management District
AST	aboveground storage tank
ASTM	American Society for Testing and Materials
bgs	Below Ground Surface
BTEX	Benzene-toluene-ethylbenzene-xylene
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation and Liability Information System
CFR	Code of Federal Regulations
CHMIRS	California Hazardous Material Incident Report System
COC's	Chemicals of Concern
CDL	Clandestine Drug Labs
DEP	Department of Environmental Protection
DOD	Department of Defense
DOE	Department of Energy
DTSC	Department of Toxic Substance Control
EDR	Environmental Data Resources, Inc.
ERNS	Emergency Response Notification System
ESA	Environmental Site Assessment
FINDS	Facility Index System
FUDS	Formerly Used Defense Sites
HMIRS	Hazardous Materials Information Reporting System
ICIS	Integrated Compliance Information System
LBP	Lead Based Paint
LDL	Laboratory Detection Limit
LEL	Lower Explosion Limit
LUCIS	Land Use Control Information System
LUST	leaking underground storage tank
MCL	Maximum Contaminant Level
MLTS	Material License Tracking System
mg/L	Milligrams per liter
MSDS	Material Safety Data Sheet
MTBE	Methyl Tertiary Butyl Ether
NFA	No Further Action
NPL	National Priority List
ODI	Open Dump Inventory
PADS	PCB Activity Database System
PCB	Poly Chlorinated Biphenyl
PEL	Permissible Exposure Limit
Ppb	Parts per billion
RAP	Remedial Action Plan
RCRA	Resource Conservation and Recovery Act
REC	Recognized environmental condition
RWQCB	Regional Water Quality Control Board
SVE	Soil Vapor Extraction
Ug/L	Micrograms per Liter
UST	Underground storage tank
VOC	Volatile Organic Compound

APPENDIX

A


Widomar Rd
Victorian Ln
Mission Trail
Lewis St
Apricot Ln
Lemon St
Jaro Dr
Valencia St
Orchard St
Cereal St
Subject Site
© 2018 Google
Google Earth
1994
33°38'07.67" N 117°17'27.80" W elev 1283 ft eye alt 5173 ft

SITE PHOTOS

APN 370-050-026 , LAKE ELSINORE, CALIFORNIA

View from Corydon Road, southwest corner of property looking west at Aerofoam Industries.

View from Corydon Road, southwest corner of property looking northwest at flood control channel.

View from Corydon Road, southwest corner of property looking northwest at property line adjacent to flood control channel.

View from Corydon Road, southwest corner of property looking northeast toward corner of Corydon Road and Mission Trail.

View from northwest corner of property looking south at Aerofoam Industries and flood control channel.

View from northwest corner of property looking northeast toward Mission Trail, abandoned dirt bike track to the left of photo.

View from northwest corner of property looking east toward Mission Trial.

View from northwest corner of property looking southeast toward Mission Trial and intersection of Corydon Road.

View from northeast corner of property looking south toward Mission Trial and intersection of Corydon Road.

View from northeast corner of property looking southwest toward Aerofoam Industries and flood control channel.

APPENDIX

B

R.E.D. Corydon LLC

Not Reported

Lake Elsinore, CA 92530

Inquiry Number: 5792354.5

September 17, 2019

The EDR Aerial Photo Decade Package

6 Armstrong Road, 4th floor
Shelton, CT 06484
Toll Free: 800.352.0050
www.edrnet.com

EDR Aerial Photo Decade Package

09/17/19

Site Name:

R.E.D. Corydon LLC
Not Reported
Lake Elsinore, CA 92530
EDR Inquiry # 5792354.5

Client Name:

Rainwater Consulting
24051 Golden Pheasant Lane
Murrieta, CA 92562
Contact: Tim Doyle

Environmental Data Resources, Inc. (EDR) Aerial Photo Decade Package is a screening tool designed to assist environmental professionals in evaluating potential liability on a target property resulting from past activities. EDR's professional researchers provide digitally reproduced historical aerial photographs, and when available, provide one photo per decade.

Search Results:

Year	*Scale*	*Details*	*Source*
2016	1"=500'	Flight Year: 2016	USDA/NAIP
2012	1"=500'	Flight Year: 2012	USDA/NAIP
2009	1"=500'	Flight Year: 2009	USDA/NAIP
2005	1"=500'	Flight Year: 2005	USDA/NAIP
1994	1"=500'	Acquisition Date: June 01, 1994	USGS/DOQQ
1990	1"=500'	Flight Date: September 06, 1990	USDA
1989	1"=500'	Flight Date: August 15, 1989	USDA
1985	1"=500'	Flight Date: February 24, 1985	USDA
1978	1"=500'	Flight Date: September 20, 1978	USDA
1974	1"=500'	Flight Date: November 06, 1974	USGS
1967	1"=500'	Flight Date: May 15, 1967	USDA
1961	1"=500'	Flight Date: June 14, 1961	USDA
1953	1"=500'	Flight Date: September 22, 1953	USDA
1949	1"=500'	Flight Date: May 06, 1949	USDA
1938	1"=500'	Flight Date: June 14, 1938	USDA

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INQUIRY #: 5792354.5
YEAR: 2016
= 500'
N
EDR

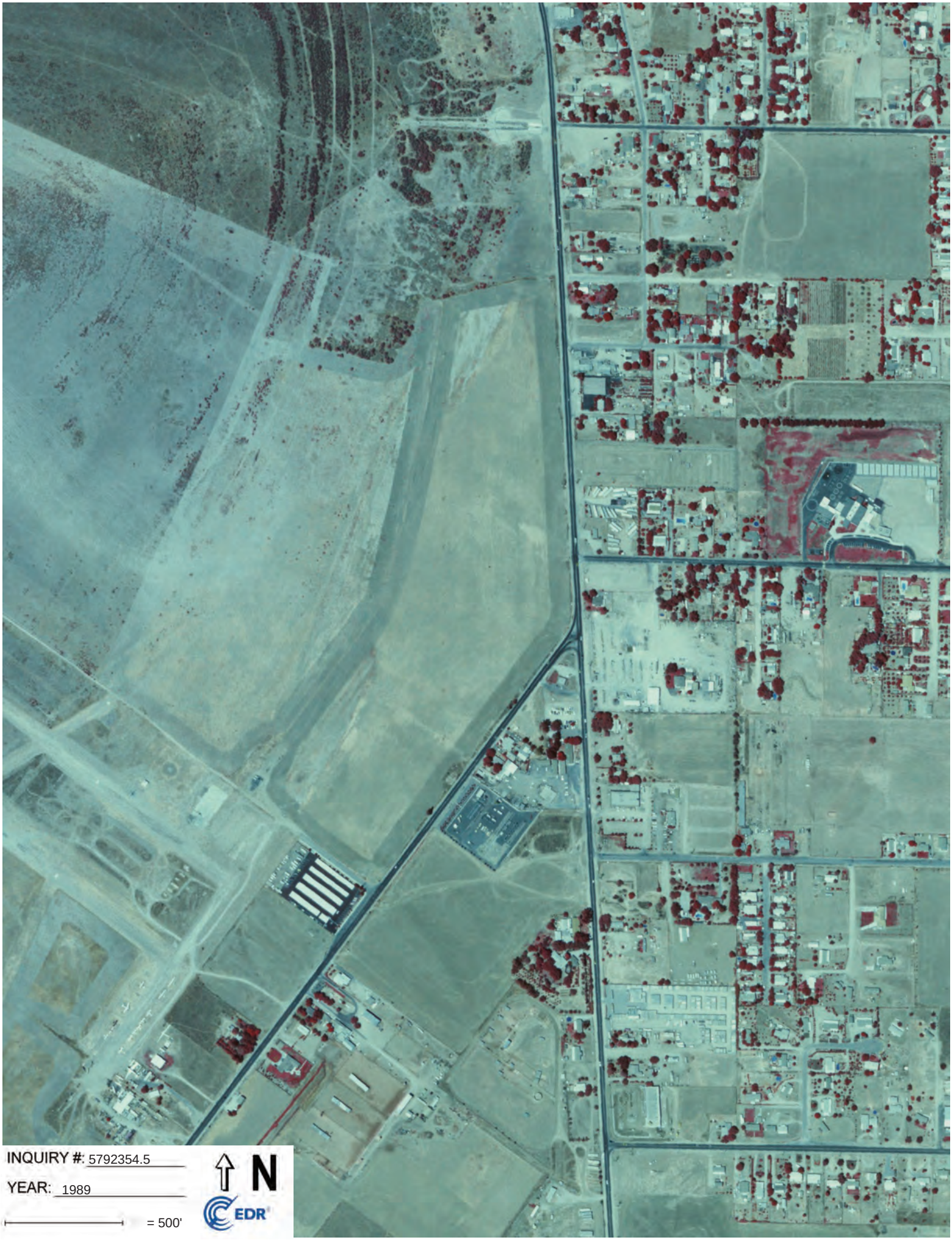

INQUIRY #: 5792354.5
YEAR: 2012
= 500'
N
EDR


INQUIRY #: 5792354.5
YEAR: 2009
= 500'
N
EDR


INQUIRY #: 5792354.5
YEAR: 2005
= 500'
N
EDR


INQUIRY #: 5792354.5
YEAR: 1994
= 500'
N
EDR


INQUIRY #: 5792354.5
YEAR: 1990
= 500'
N
EDR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YEAR: 1989
= 500'
N
EDR


INQUIRY #: 5792354.5
YEAR: 1985
= 500'
N
EDR

INQUIRY #: 5792354.5

YEAR: 1978

= 500'

N

EDR

INQUIRY #: 5792354.5

YEAR: 1974

= 500'

N

EDR


INQUIRY #: 5792354.5
YEAR: 1967
= 500'
N
EDR

INQUIRY #: 5792354.5

YEAR: 1961

= 500'

N

EDR

INQUIRY #: 5792354.5

YEAR: 1953

= 500'

N

EDR

INQUIRY #: 5792354.5

YEAR: 1949

= 500'

N

EDR

INQUIRY #: 5792354.5

YEAR: 1938

= 500'

N

EDR

APPENDIX

C