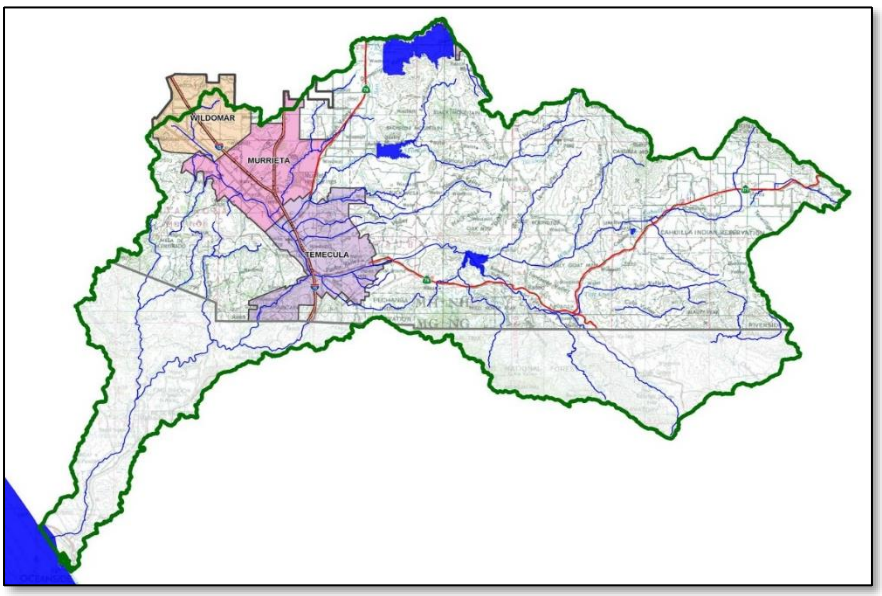
Project Specific Water Quality Management Plan (WQMP)

Project Title:	Medical Office Building	**Prepared for:**	CannonDesign 3737 Buffalo Speedway, Suite 1200 Houston, TX 77098
Development No:	Insert text here	**Prepared by:**	VCA Engineers, Inc. 1041 S. Garfield Ave, Suite 210 Alhambra, CA 91801
City Project No:	Insert text here	**WQMP Type:**	☒ **Preliminary (entitlement submittal)** ☐ **Final**



Original Date Prepared: 02/14/2020

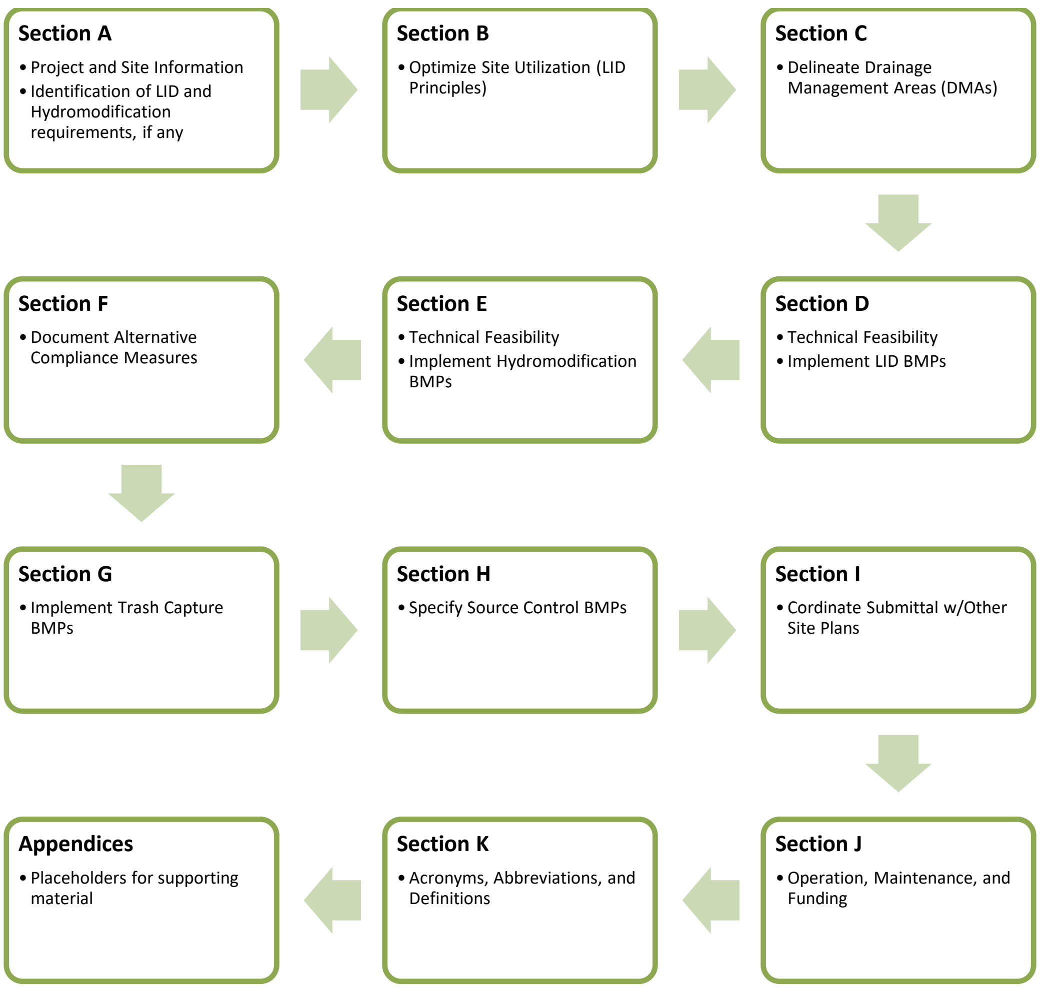
Revision Summary (post WQMP acceptance):

MARK	**BY**	**DATE**	**REVISIONS**	**APPRV.**	**DATE**
ENGINEER				**CITY**	

Prepared for Compliance with Regional Board Order No. **R9-2013-0001** *as amended by Order No.* **R9-2015-0001** *and Order No.* **R9-2015-0100**

A Brief Introduction

The Regional Municipal Separate Stormwater Sewer System (MS4) Permit[1] requires that a Project-Specific WQMP be prepared for all development projects within the Santa Margarita Region (SMR) that meet the 'Priority Development Project' categories and thresholds listed in the SMR Water Quality Management Plan (WQPM). This Project-Specific WQMP Template for Development Projects in the **Santa Margarita Region** has been prepared to help document compliance and prepare a WQMP submittal. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



[1] Order No. R9-2013-0001 as amended by Order Nos. R9-2015-0001 and R9-2015-0100, NPDES No. CAS0109266, National Pollutant Discharge Elimination System (NPDES) Permit and Waste Discharge Requirements for Discharges from the MS4s Draining the Watersheds within the San Diego Region, California Regional Water Quality Control Board, May 8, 2013.

OWNER'S CERTIFICATION

This Project-Specific WQMP has been prepared for <Owner's Name> by <Preparer's Name> for the <Project Name> project.

This WQMP is intended to comply with the requirements of the City of Wildomar for Wildomar Municipal Code Ch. 13.12 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 storm water Best Management Practices 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 the City of Wildomar Water Quality Ordinance (Wildomar Municipal Code Ch. 13.12).

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

______________________________	______________________________
Owner's Signature	Date
______________________________	______________________________
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control Best Management Practices (BMPs) in this plan meet the requirements of Regional Water Quality Control Board Order No. **R9-2013-0001** as amended by Order Nos. **R9-2015-0001 and R9-2015-0100**."

______________________________	02/14/2020
Preparer's Signature	Date
Virgil C. Aoanan	Principal
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

Use the table below to compile and summarize basic site information that will be important for completing subsequent steps. Subsections A.1 through A.4 provide additional detail on documentation of additional project and site information.

PROJECT INFORMATION		
Type of PDP:	New Development	
Type of Project:	Commercial	
Planning Area:	Insert Planning Area if known	
Community Name:	Insert Community Name if known	
Development Name:	Insert Development Name if known	
PROJECT LOCATION		
Latitude & Longitude (DMS):	33.613041, -117.263527	
Project Watershed and Sub-Watershed:	Santa Margarita River Murrieta Creek	
24-Hour 85th Percentile Storm Depth (inches):	0.70	
Is project subject to Hydromodification requirements?	☒ Y ☐ N (Select based on Section A.3)	
APN(s):	367180057	
Map Book and Page No.:	Insert text here	
PROJECT CHARACTERISTICS		
Proposed or Potential Land Use(s)	Medical Office Building	
Proposed or Potential SIC Code(s)	6324	
Existing Impervious Area of Project Footprint (SF)	0	
Total area of <u>proposed</u> Impervious Surfaces within the Project Limits (SF)/or Replacement	230,040	
Total Project Area (ac)	8.7	
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
Is the project exempt from Hydromodification Performance Standards?	☐ Y	☒ N
Does the project propose the use of Alternative Compliance to satisfy BMP requirements? (note, alternative compliance is not allowed for coarse sediment performance standards)	☐ Y	☒ N
Has preparation of Project-Specific WQMP included coordination with other site plans?	☒ Y	☐ N
EXISTING SITE CHARACTERISTICS		
Is the project located within any Multi-Species Habitat Conservation Plan area (MSHCP Criteria Cell?)	☐ Y	☒ N
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 Natural Resources Conservation Service (NRCS) soils type(s) present on the site (A, B, C and/or D)		

A.1 Maps and Site Plans

When completing your Project-Specific WQMP, include a map of the Project 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:

- Vicinity and location maps
- Parcel Boundary and Project Footprint
- Existing and Proposed Topography
- Drainage Management Areas (DMAs)
- Proposed Structural Best Management Practices (BMPs)
- Drainage Paths
- Drainage infrastructure, inlets, overflows
- Source Control BMPs
- Site Design BMPs
- Buildings, Roof Lines, Downspouts
- Impervious Surfaces
- Pervious Surfaces (i.e. Landscaping)
- Standard Labeling

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 Copermittee plan reviewer must be able to easily analyze your Project utilizing this template and its associated site plans and maps. Complete the checklists in Appendix 1 to verify that all exhibits and components are included.

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. This map should identify the path of the storm water discharged from the site all the way to the outlet of the Santa Margarita River to the Pacific Ocean. Use the most recent 303(d) list available from the State Water Resources Control Board Website.
(*http://www.waterboards.ca.gov/sandiego/water_issues/programs/basin_plan/*)

Table A-1 Identification of Receiving Waters

Receiving Waters	USEPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Murrieta Creek	Chlorpyrifos, Copper, Indicator Bacteria, Iron, Manganese, Nitrogen, Phosphorus, Toxicity	MUN, AGR, IND, PROC, REC2, WARM, WILD	12 Miles
Santa Margarita River (Upper)	Indicator Bacteria, Iron, Manganese, Nitrogen, Phosphorus, Toxicity	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE	18.2 Miles
Santa Margarita River (Lower)	Benthic Community Effects, Chlorpyrifos, Indicator Bacteria, Nitrogen, Phosphorus, Toxicity	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE	19.2 Miles
Santa Margarita Lagoon	Eutrophic	REC1, REC2, EST, WILD, RARE, MAR, MIGR, SPWN	

A.3 Drainage System Susceptibility to Hydromodification

Using Table A-2 below, list in order of the point of discharge at the project site down to the Santa Margarita River[2], each drainage system or receiving water that the project site is tributary to. Continue to fill each row with the material of the drainage system, and any exemption (if applicable). Based on the results, summarize the applicable hydromodification performance standards that will be documented in Section E. Exempted categories of receiving waters include:

- Existing storm drains that discharge directly to water storage reservoirs, lakes, or enclosed embayments, or
- Conveyance channels whose bed and bank are concrete lined all the way from the point of discharge to water storage reservoirs, lakes, enclosed embayments, or the Pacific Ocean.
- Other water bodies identified in an approved Watershed Management Area Analysis (WMAA) (See Exhibit G to the WQMP)

Include a map exhibiting each drainage system and the associated susceptibility in Appendix 1.

Table A-2 Identification of Susceptibility to Hydromodification

Drainage System	Drainage System Material	Hydromodification Exemption	Hydromodification Exempt
Murrieta Creek	Natural Forming, Soil	NONE	☐ Y ☒ N
Insert name and length (in miles) of 2nd drainage system	Identify either (1) the type of material of bed and bank for open channels; or (2) the material of storm drain pipes and conduits	Insert exemption justification for the 2nd receiving water may qualify for. If none, insert NONE.	☐ Y ☐ N
Insert name and length (in miles) of 3rd drainage system	Identify either (1) the type of material of bed and bank for open channels; or (2) the material of storm drain pipes and conduits	Insert exemption justification for the 3rd receiving water may qualify for. If none, insert NONE.	☐ Y ☐ N
Summary of Performance Standards			
☐ **Hydromodification Exempt** – Select if "Y" is selected in the Hydromodification Exempt column above, project is exempt from hydromodification requirements. ☒ **Not Exempt**-Select if "N" is selected in any row of the Hydromodification Exempt column above. Project is subject to hydrologic control requirements and may be subject to sediment supply requirements.			

A.4 Additional Permits/Approvals required for the Project:

Table A-3 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 Section 401 Water Quality Certification	☐ Y	☒ N
US Army Corps of Engineers, Clean Water Act Section 404 Permit	☐ Y	☒ N

[2] Refer to Exhibit G of the WQMP for a map of exempt and potentially exempt areas. These maps are from the Draft SMR WMAA as of January 5, 2018 and will be replaced upon acceptance of the SMR WMAA.

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 Multiple Species Habitat Conservation Plan (MSHCP) Consistency Approval (e.g., Joint Project Review (JPR), Determination of Biological Equivalent or Superior Preservation (DBESP))	☐ Y	☒ N
Other *(please list in the space below as required)*	☐ Y	☒ N

If yes is answered to any of the questions above, the Copermittee 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 LID 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 Low Impact Development (LID) design and explain your design decisions to others.

Apply the following LID Principles to the layout of the Priority Development Project (PDP) to the extent they are applicable and feasible. Putting thought upfront about how best to organize the various elements of a site can help to significantly reduce the PDP's potential impact on the environment and reduce the number and size of Structural LID BMPs that must be implemented. Integrate opportunities to accommodate the following LID Principles within the preliminary PDP site layout to maximize implementation of LID Principles.

Site Optimization

Complete checklist below to determine applicable Site Design BMPs for your site.

Project- Specific WQMP Site Design BMP Checklist	
The following questions below are based upon Section 3.2 of the SMR WQMP will help you determine how to best optimize your site and subsequently identify opportunities and/or constraints, and document compliance.	
SITE DESIGN REQUIREMENTS	
Answer the following questions below by indicating "Yes," "No," or "N/A" (Not Applicable). Justify all "No" and "N/A" answers by inserting a narrative at the end of the section. The narrative should include identification and justification of any constraints that would prevent the use of those categories of LID BMPs. Upon identifying Site Design BMP opportunities, include these on your WQMP Site plan in Appendix 1.	
☒ Yes ☐ No ☐ N/A	**Did you identify and preserve existing drainage patterns?** Integrating existing drainage patterns into the site plan helps to maintain the time of concentration and infiltration rates of runoff, decreasing peak flows, and may also help preserve the contribution of Critical Coarse Sediment (i.e., Bed Sediment Supply) from the PDP to the Receiving Water. Preserve existing drainage patterns by: • Minimizing unnecessary site grading that would eliminate small depressions, where appropriate add additional "micro" storage throughout the site landscaping. • Where possible conform the PDP site layout along natural landforms, avoid excessive grading and disturbance of vegetation and soils, preserve or replicate the sites natural drainage features and patterns. • Set back PDP improvements from creeks, wetlands, riparian habitats and any other natural water bodies. • Use existing and proposed site drainage patterns as a natural design element, rather than using expensive impervious conveyance systems. Use depressed landscaped areas, vegetated buffers, and bioretention areas as amenities and focal points within the site and landscape design.
Discuss how this was included or provide a discussion/justification for "No" or "N/A" answer. *Detention Pond BMP is put in place to mitigate any runoff from proposed development and comply with hydromodification.*	
☐ Yes ☐ No ☒ N/A	**Did you identify and protect existing vegetation?** Identify any areas containing dense native vegetation or well-established trees, and try to avoid disturbing these areas. Soils with thick, undisturbed vegetation have a much higher capacity to store and infiltrate runoff than do disturbed soils. Reestablishment of a mature vegetative community may take decades. Sensitive areas, such as streams and floodplains should also be avoided. • Define the development envelope and protected areas, identifying areas that are most suitable for development and areas that should be left undisturbed. • Establish setbacks and buffer zones surrounding sensitive areas. • Preserve significant trees and other natural vegetation where possible.
Discuss how this was included or provide a discussion/justification for "No" or "N/A" answer. *Geotechnical Report does not identify any vegetation or significant trees of note.*	

Project- Specific WQMP Site Design BMP Checklist	
☐ Yes ☐ No ☒ N/A	**Did you identify and preserve natural infiltration capacity?** A key component of LID is taking advantage of a site's natural infiltration and storage capacity. A site survey and geotechnical investigation can help define areas with high potential for infiltration and surface storage. • Identify opportunities to locate LID Principles and Structural BMPs in highly pervious areas. Doing so will maximize infiltration and limit the amount of runoff generated. • Concentrate development on portions of the site with less permeable soils, and preserve areas that can promote infiltration.
Discuss how this was included or provide a discussion/justification for "No" or "N/A" answer. *In conjunction with both the Geotechnical Report and the Hydrologic Soils Group Map For Wildomar, the site was identified as having soils that are not conductive for infiltration. Other BMP mitigation shall be implemented on the site.*	
☒ Yes ☐ No ☐ N/A	**Did you minimize impervious area?** Look for opportunities to limit impervious cover through identification of the smallest possible land area that can be practically impacted or disturbed during site development. • Limit overall coverage of paving and roofs. This can be accomplished by designing compact, taller structures, narrower and shorter streets and sidewalks, clustering buildings and sharing driveways, smaller parking lots (fewer stalls, smaller stalls, and more efficient lanes), and indoor or underground parking. • Inventory planned impervious areas on your preliminary site plan. Identify where permeable pavements, or other permeable materials, such as crushed aggregate, turf block, permeable modular blocks, pervious concrete or pervious asphalt could be substituted for impervious concrete or asphalt paving. This will help reduce the amount of Runoff that may need to be addressed through Structural BMPs. • Examine site layout and circulation patterns and identify areas where landscaping can be substituted for pavement, such as for overflow parking. • Consider green roofs. Green roofs are roofing systems that provide a layer of soil/vegetative cover over a waterproofing membrane. A green roof mimics pre-development conditions by filtering, absorbing, and evapotranspiring precipitation to help manage the effects of an otherwise impervious rooftop.
Discuss how this was included or provide a discussion/justification for "No" or "N/A" answer. *The development was designed to minimize impervious area and add landscape wherever possible.*	

Project- Specific WQMP Site Design BMP Checklist	
☒ Yes ☐ No ☐ N/A	**Did you identify and disperse runoff to adjacent pervious areas or small collection areas?** Look for opportunities to direct runoff from impervious areas to adjacent landscaping, other pervious areas, or small collection areas where such runoff may be retained. This is sometimes referred to as reducing Directly Connected Impervious Areas. • Direct roof runoff into landscaped areas such as medians, parking islands, planter boxes, etc., and/or areas of pervious paving. Instead of having landscaped areas raised above the surrounding impervious areas, design them as depressed areas that can receive Runoff from adjacent impervious pavement. For example, a lawn or garden depressed 3"-4" below surrounding walkways or driveways provides a simple but quite functional landscape design element. • Detain and retain runoff throughout the site. On flatter sites, smaller Structural BMPs may be interspersed in landscaped areas among the buildings and paving. • On hillside sites, drainage from upper areas may be collected in conventional catch basins and piped to landscaped areas and LID BMPs and/or Hydrologic Control BMPs in lower areas. Low retaining walls may also be used to create terraces that can accommodate LID BMPs. Wherever possible, direct drainage from landscaped slopes offsite and not to impervious surfaces like parking lots. • Reduce curb maintenance and provide for allowances for curb cuts. • Design landscaped areas or other pervious areas to receive and infiltrate runoff from nearby impervious areas. • Use Tree Wells to intercept, infiltrate, and evapotranspire precipitation and runoff before it reaches structural BMPs. Tree wells can be used to limit the size of Drainage Management Areas that must be treated by structural BMPs. Guidelines for Tree Wells are included in the Tree Well Fact Sheet in the LID BMP Design Handbook.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *All runoff generated by the impervious areas and adjacent undevelop landscape are taken into account and routed to a detention pond BMP.*	
☐ Yes ☐ No ☒ N/A	**Did you utilize native or drought tolerant species in site landscaping?** Wherever possible, use native or drought tolerant species within site landscaping instead of alternatives. These plants are uniquely suited to local soils and climate and can reduce the overall demands for potable water use associated with irrigation.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *Landscape options to be determined at a later time.*	

Project- Specific WQMP Site Design BMP Checklist	
☐ Yes ☒ No ☐ N/A	**Did implement harvest and use of runoff?** Under the Regional MS4 Permit, Harvest and Use BMPs must be employed to reduce runoff on any site where they are applicable and feasible. However, Harvest and Use BMPs are effective for retention of stormwater runoff only when there is adequate demand for non-potable water during the wet season. If demand for non-potable water is not sufficiently large, the actual retention of stormwater runoff will be diminished during larger storms or during back-to-back storms. For the purposes of planning level Harvest and Use BMP feasibility screening, Harvest and Use is only considered to be a feasible if the total average wet season demand for non-potable water is sufficiently large to use the entire DCV within 72 hours. If the average wet season demand for non-potable water is not sufficiently large to use the entire DCV within 72 hours, then Harvest and Use is not considered to be feasible and need not be considered further. The general feasibility and applicability of Harvest and Use BMPs should consider: • Any downstream impacts related to water rights that could arise from capturing storm water (not common). • Conflicts with recycled water used – where the project is conditioned to use recycled water for irrigation, this should be given priority over storm water capture as it is a year-round supply of water. • Code Compliance - If a particular use of captured storm water, and/or available methods for storage of captured storm water would be contrary to building codes in effect at the time of approval of the preliminary Project-Specific WQMP, then an evaluation of harvesting and use for that use would not be required. • Wet season demand – the applicant shall demonstrate, to the acceptance of the [Insert Jurisdiction], that there is adequate demand for harvested water during the wet season to drain the system in a reasonable amount of time.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *Proposed BMP for the site is biofiltration with an underdrain due to infeasibility of infiltration.*	
☐ Yes ☒ No ☐ N/A	**Did you keep the runoff from sediment producing pervious area hydrologically separate from developed areas that require treatment?** Pervious area that qualify as self-treating areas or off-site open space should be kept separate from drainage to structural BMPs whenever possible. This helps limit the required size of structural BMPs, helps avoid impacts to sediment supply, and helps reduce clogging risk to BMPs.
Discuss how this was included or provide a discussion/justification for “No” or “N/A” answer. *As part of the effort for complying with hydromodification, we are routing runoff from the development and runon from adjacent undeveloped areas to our proposed BMP. Our pretreatment BMP will be sized to treat what is required for LID and have an overflow for excess storm water.*	

Section C: Delineate Drainage Management Areas (DMAs)

This section provides streamlined guidance and documentation of the DMA delineation and categorization process, for additional information refer to the procedure in Section 3.3 of the SMR WQMP which discusses the methods of delineating and mapping your project site into individual DMAs. Complete Steps 1 to 4 to successfully delineate and categorize DMAs.

Step 1: Identify Surface Types and Drainage Pathways

Carefully delineate pervious areas and impervious areas (including roofs) throughout site and identify overland flow paths and above ground and below ground conveyances. Also identify common points (such as BMPs) that these areas drain to.

Step 2: DMA Delineation

Use the information in Step 1 to divide the entire PDP site into individual, discrete DMAs. Typically, lines delineating DMAs follow grade breaks and roof ridge lines. Where possible, establish separate DMAs for each surface type (e.g., landscaping, pervious paving, or roofs). Assign each DMA a unique code and determine its size in square feet. The total area of your site should total the sum of all of your DMAs (unless water from outside the project limits comingles with water from inside the project limits, i.e. run-on). Complete Table C-1

Table C-1 DMA Identification

DMA Name or Identification	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
1 – Roof	Impervious	28,445	To be Determined in Step 3
2 – Roads	Impervious	103,586	
3 – Sidewalks	Impervious	29,795	
4 – Parking	Impervious	68,215	
5 – Landscape	Pervious	39,204	
6 – Detention Pond	Pervious	38,638	
7 – Soil D	Pervious	36,590	
8 – Soil D	Pervious	34,412	

Add Columns as Needed

Step 3: DMA Classification

Determine how drainage from each DMA will be handled by using information from Steps 1 and 2 and by completing Steps 3.A to 3.C. Each DMA will be classified as one of the following four types:

- Type 'A': Self-Treating Areas:
- Type 'B': Self-Retaining Areas
- Type 'C': Areas Draining to Self-Retaining Areas
- Type 'D': Areas Draining to BMPs

Step 3.A – Identify Type 'A' Self-Treating Area

Indicate if the DMAs meet the following criteria by answering "Yes" or "No".

☒ Yes ☐ No — Area is undisturbed from their natural condition OR restored with Native and/or California Friendly vegetative covers.

☐ Yes ☒ No	Area is irrigated, if at all, with appropriate low water use irrigation systems to prevent irrigation runoff.
☐ Yes ☒ No	Runoff from the area will not comingle with runoff from the developed portion of the site, or across other landscaped areas that do not meet the above criteria.

If all answers indicate "Yes," complete Table C-2 to document the DMAs that are classified as Self-Treating Areas.

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

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

Step 3.B – Identify Type 'B' Self-Retaining Area and Type 'C' Areas Draining to Self-Retaining Areas

Type 'B' Self-Retaining Area: A Self-Retaining Area is shallowly depressed 'micro infiltration' areas designed to retain the Design Storm rainfall that reaches the area, without producing any Runoff.

Indicate if the DMAs meet the following criteria by answering "Yes," "No," or "N/A".

☒ Yes ☐ No ☐ N/A	Slopes will be graded toward the center of the pervious area.
☒ Yes ☐ No ☐ N/A	Soils will be freely draining to not create vector or nuisance conditions.
☒ Yes ☐ No ☐ N/A	Inlet elevations of area/overflow drains, if any, should be clearly specified to be three inches or more above the low point to promote ponding.
☐ Yes ☒ No ☐ N/A	Pervious pavements (e.g., crushed stone, porous asphalt, pervious concrete, or permeable pavers) can be self-retaining when constructed with a gravel base course four or more inches deep below any underdrain discharge elevation.

If all answers indicate "Yes," DMAs may be categorized as Type 'B', proceed to identify Type 'C' Areas Draining to Self-Retaining Areas.

Type 'C' Areas Draining to Self-Retaining Areas: Runoff from impervious or partially pervious areas can be managed by routing it to Self-Retaining Areas consistent with the LID Principle discussed in SMR WQMP Section 3.2.5 for 'Dispersing Runoff to Adjacent Pervious Areas'.
Indicate if the DMAs meet the following criteria by answering "Yes" or "No".

☒ Yes ☐ No	The drainage from the tributary area must be directed to and dispersed within the Self-Retaining Area.

☒ Yes ☐ No   Area must be designed to retain the entire Design Storm runoff without flowing offsite.

If all answers indicate "Yes," DMAs may be categorized as Type 'C'.

Complete Table C-3 and Table C-4 to identify Type 'B' Self-Retaining Areas and Type 'C' Areas Draining to Self-Retaining Areas.

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) $[D] = [B] + \frac{[B]\cdot[C]}{[A]}$
B/6	Detention Pond	38,638	0.70			

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

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

<u>Note:</u> (See Section 3.3 of SMR WQMP) Ensure that partially pervious areas draining to a Self-Retaining area do not exceed the following ratio:

$$\left(\frac{\mathbf{2}}{\boldsymbol{Impervious\ Fraction}}\right)\mathbf{:1}$$

(Tributary Area**:** Self-Retaining Area)

Step 3.C – Identify Type 'D' Areas Draining to BMPs

Areas draining to BMPs are those that could not be fully managed through LID Principles (DMA Types A through C) and will instead drain to an LID BMP and/or a Conventional Treatment BMP designed to manage water quality impacts from that area, and Hydromodification where necessary.

Complete Table C-5 to document which DMAs are classified as Areas Draining to BMPs

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

DMA Name or ID	BMP Name or ID Receiving Runoff from DMA
1 – Roof	Biofiltration with No Infiltration
2 – Roads	Biofiltration with No Infiltration
3 – Sidewalks	Biofiltration with No Infiltration
4 – Parking	Biofiltration with No Infiltration
5 – Landscape	Biofiltration with No Infiltration
7 – Soil D	Biofiltration with No Infiltration
8 – Soil D	Biofiltration with No Infiltration

<u>Note</u>: More than one DMA may drain to a single LID BMP; however, one DMA may not drain to more than one BMP.

Section D: Implement LID BMPs

The Regional MS4 Permit requires the use of LID BMPs to provide retention or treatment of the DCV and includes a BMP hierarchy which requires Full Retention BMPs (Priority 1) to be considered before Biofiltration BMPs (Priority 2) and Flow-Through Treatment BMPs and Alternative Compliance BMPs (Priority 3). LID BMP selection must be based on technical feasibility and should be considered early in the site planning and design process. Use this section to document the selection of LID BMPs for each DMA. Note that feasibility is based on the DMA scale and may vary between DMAs based on site conditions.

D.1 Full Infiltration Applicability

An assessment of the feasibility of utilizing full infiltration BMPs is required for all projects, *except where it can be shown that site design LID principals fully retain the DCV (i.e., all DMAs are Type A, B, or C), or where Harvest and Use BMPs fully retain the DCV. Check the following box if applicable:*

☐ Site design LID principals fully retain the DCV (i.e., all DMAs are Type A, B, or C), (Proceed to Section E).

If the above box remains unchecked, perform a site-specific evaluation of the feasibility of Infiltration BMPs using each of the applicable criteria identified in Chapter 2.3.3 of the SMR WQMP and complete the remainder of Section D.1.

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 Copermittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the SMR WQMP. 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.

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 SMR WQMP in Chapter 2.3.3. 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

Downstream Impacts (SMR WQMP Section 2.3.3.a)		
Does the project site…	**YES**	**NO**
…have any DMAs where infiltration would negatively impact downstream water rights or other Beneficial Uses[3]?		X
If Yes, list affected DMAs:		
Groundwater Protection (SMR WQMP Section 2.3.3.b)		
Does the project site…	**YES**	**NO**
…have any DMAs with industrial, and other land uses that pose a high threat to water quality, which cannot be treated by Bioretention BMPs? Or have DMAs with active industrial process areas?		X
If Yes, list affected DMAs:		
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?	X	
If Yes, list affected DMAs:	All	
…have any DMAs located within 100 feet horizontally of a water supply well?		X
If Yes, list affected DMAs:		
…have any DMAs that would restrict BMP locations to within a 2:1 (horizontal: vertical) influence line extending from any septic leach line?		X
If Yes, list affected DMAs:		
…have any DMAs been evaluated by a licensed Geotechnical Engineer, Hydrogeologist, or Environmental Engineer, who has concluded that the soils do not have adequate physical and chemical characteristics for the protection of groundwater, and has treatment provided by amended media layers in Bioretention BMPs been considered in evaluating this factor?		X
If Yes, list affected DMAs:		
Public Safety and Offsite Improvements (SMR WQMP Section 2.3.3.c)		
Does the project site…	**YES**	**NO**
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		
If Yes, list affected DMAs:		
Infiltration Characteristics For LID BMPs (SMR WQMP Section 2.3.3.d)		
Does the project site…	**YES**	**NO**
…have factored infiltration rates of less than 0.8 inches / hour? (Note: on a case-by-case basis, the City may allow a factor of safety as low as 1.0 to support selection of full infiltration BMPs. Therefore, measured infiltration rates could be as low as 0.8 in/hr to support full infiltration. A higher factor of safety would be required for design in accordance with the LID BMP Deign Handbook).	X	
If Yes, list affected DMAs:	All	
Cut/Fill Conditions (SMR WQMP Section 2.3.3.e)		
Does the project site…	**YES**	**NO**
…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:		
Other Site-Specific Factors (SMR WQMP Section 2.3.3.f)		
Does the project site…	**YES**	**NO**
…have DMAs where the geotechnical investigation discovered other site-specific factors that would preclude effective and/or safe infiltration?		X
Describe here:		

If you answered "Yes" to any of the questions above for any DMA, Infiltration BMPs that rely solely on infiltration should not be used for those DMAs and you should proceed to the assessment for Biofiltration BMPs below. Biofiltration BMPs that provide partial infiltration may still be feasible and should be

[3] Such a condition must be substantiated by sufficient modeling to demonstrate an impact and would be subject to [Insert Jurisdiction] discretion. There is not a standardized method for assessing this criterion. Water rights evaluations should be site-specific.

assessed in Section D.2. Summarize concerns identified in the Geotechnical Report, if any, that resulted in a "YES" response above in the table below.

Table D-2 Geotechnical Concerns for Onsite Infiltration

Type of Geotechnical Concern	DMAs Feasible (By Name or ID)	DMAs Infeasible (By Name or ID)
Collapsible Soil		
Expansive Soil		
Slopes		
Liquefaction		All DMAs
Other		

D.2 Biofiltration Applicability

This section should document the applicability of biofiltration BMPs for Type D DMAs that are not feasible for full infiltration BMPs. The key decisions to be documented in this section include:

1. Are biofiltration BMPs with partial infiltration feasible?
    a. Biofiltration BMPs must be designed to maximize incidental infiltration via a partial infiltration design unless it is demonstrated that this design is not feasible.
    b. These designs can be used at sites with low infiltration rates where other feasibility factors do not preclude incidental infiltration.

    Document summary in Table D-3.
2. If not, what are the factors that require the use of biofiltration with no infiltration? This may include:
    a. Geotechnical hazards
    b. Water rights issues
    c. Water balance issues
    d. Soil contamination or groundwater quality issues
    e. Very low infiltration rates (factored rates < 0.1 in/hr)
    f. Other factors, demonstrated to the acceptance of the City

    If this applies to any DMAs, then rationale must be documented in Table D-3.
3. Are biofiltration BMPs infeasible?
    a. If yes, then provide 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 with jurisdiction over the Project site to discuss this option. Proceed to Section F to document your alternative compliance measures.

Table D-3 Evaluation of Biofiltration BMP Feasibility

DMA ID	Is Partial/ Incidental Infiltration Allowable? (Y/N)	Basis for Infeasibility of Partial Infiltration (provide summary and include supporting basis if partial infiltration not feasible)
All	N	Very low infiltration rates, shallow groundwater table, potential for liquefaction.

Proprietary Biofiltration BMP Approval Criteria

If the project will use proprietary BMPs as biofiltration BMPs, then this section is completed to document that the proprietary BMPs are selected in accordance with Section 2.3.7 of the SMR WQMP. Proprietary Biofiltration BMPs must meet both of the following approval criteria:

1. Approval Criteria for All Proprietary BMPs, and
2. Acceptance Criteria for Proprietary Biofiltration BMPs.

When the use of proprietary biofiltration BMPs is proposed to meet the Pollutant Control performance standards, use Table D-4 to document that appropriate approval criteria have been met for the proposed BMPs. Add additional rows to document approval criteria are met for each type of BMP proposed.

Table D-4 Proprietary BMP Approval Requirement Summary

Proposed Proprietary Biofiltration BMP	Approval Criteria	Notes/Comments
Insert BMP Name and Manufacturer Here	☐ Proposed BMP has an active TAPE GULD Certification for the project pollutants of concern[4] or equivalent 3rd party demonstrated performance.	Insert text here
	☐ The BMP is used in a manner consistent with manufacturer guidelines and conditions of its third-party certification.	Insert text here
	☐ The BMP includes biological features including vegetation supported by engineered or other growing media.	Describe features here.
	☐ The BMP is designed to maximize infiltration, or supplemental infiltration is provided to achieve retention equivalent to Biofiltration with Partial Infiltration BMPs if factored infiltration rate is between 0.1 and 0.8 inches/hour.	Describe supplemental retention practices if applicable.

[4] Use Table F-1 and F-2 to identify and document the pollutants of concern and include these tables in Appendix 5.

	☐ The BMP is sized using one of two Biofiltration LID sizing options in Section 2.3.2 of the SRM WQMP.	List sizing method used, resulting size (i.e. volume or flow), and provided size (for proposed unit)

D.3 Feasibility Assessment Summaries

From the Infiltration, Biofiltration with Partial Infiltration and Biofiltration with No Infiltration Sections above, complete Table D-5 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D-5 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy			No LID (Alternative Compliance)
	1. Infiltration	2. Biofiltration with Partial Infiltration	3. Biofiltration with No Infiltration	
1 – Roof	☐	☐	☒	☐
2 – Roads	☐	☐	☒	☐
3 – Sidewalks	☐	☐	☒	☐
4 – Parking	☐	☐	☒	☐
5 – Landscape	☐	☐	☒	☐
6 – Detention Pond	☐	☐	☒	☐
7 – Soil D	☐	☐	☒	☐
8 – Soil D	☐	☐	☐	☐

For those DMAs where LID BMPs are not feasible, provide a narrative in Table D-6 below summarizing why they are not feasible, include your technical infeasibility criteria in Appendix 5, and proceed to Section F below to document Alternative Compliance measures for those DMAs. Recall that each proposed DMA must pass through the LID BMP hierarchy before alternative compliance measures may be considered.

This is based on the clarification letter titled "San Diego Water Board's Expectations of Documentation to Support a Determination of Priority Development Project Infiltration Infeasibility" (April 28, 2017, Via email from San Diego Regional Water Quality Control Board to San Diego County Municipal Storm Water Copermittees[5]).

Table D-6 Summary of Infeasibility Documentation

Question	Narrative Summary (include reference to applicable appendix/attachment/report, as applicable)
a) When in the entitlement process did a geotechnical engineer analyze the site for infiltration feasibility?	
b) When in the entitlement process were other	

[5] http://www.projectcleanwater.org/download/pdp-infiltration-infeasibility/

investigations conducted (e.g., groundwater quality, water rights) to evaluate infiltration feasibility?	
c) What was the scope and results of testing, if conducted, or rationale for why testing was not needed to reach findings?	
d) What public health and safety requirements affected infiltration locations?	
e) What were the conclusions and recommendations of the geotechnical engineer and/or other professional responsible for other investigations?	
f) What was the history of design discussions between the permittee and applicant for the proposed project, resulting in the final design determination related locations feasible for infiltration?	
g) What site design alternatives were considered to achieve infiltration or partial infiltration on site?	
h) What physical impairments (i.e., fire road egress, public safety considerations, utilities) and public safety concerns influenced site layout and infiltration feasibility?	
i) What LID Principles (site design BMPs) were included in the project site design?	

D.4 LID BMP Sizing

Each LID BMP must be designed to ensure that the DCV will be captured by the selected BMPs with no discharge to the storm drain or surface waters during the DCV size storm. Infiltration BMPs must at minimum be sized to capture the DCV to achieve pollutant control requirements.

Biofiltration BMPs must at a minimum be sized to:

- Treat 1.5 times the DCV not reliably retained on site using a volume-base or flow-based sizing method, or
- Include static storage volume, including pore spaces and pre-filter detention volume, at least 0.75 times the portion of the DCV not reliably retained on site.

First**,** calculate the DCV 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 the methods included in Section 3 of the LID BMP Design Handbook. Utilize the worksheets found in the LID BMP Design Handbook or consult with the Copermittee to assist you in correctly sizing your LID BMPs. Use Table D-7 below to document the DCV 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-7 DCV Calculations for LID BMPs

DMA Type/ID	**DMA (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Areas x Runoff Factor**	***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]			
1	*28444.68*	*Roof*	*1*	*0.89*	*25372.65*	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
2	*103585.68*	*Roads*	*1*	*0.89*	*92398.42*			
3	*29795.04*	*Sidewalks*	*1*	*0.89*	*26577.18*			
4	*68214.96*	*Parking*	*1*	*0.89*	*60847.74*			
5	*39204*	*Landscape*	*0.1*	*0.11*	*4330.40*			
6	*38637.72*	*Detention Pond*	*0.1*	*0.110458*	*4267.85*			
7	*36590.4*	*Soil D*	*0.4*	*0.28*	*10234.77*			
8	*34412.4*	*Soil D*	*0.4*	*0.28*	*9625.56*			
	$A_T = \Sigma[A]$	***378884.88***			Σ= 233655	0.70	[F] = 11,053	16,767.5

[B], [C] is obtained as described in Section 2.6.1.b of the SMR WQMP
[E] is obtained from Exhibit A in the SMR WQMP
[G] is obtained from a design procedure sheet, such as in LID BMP Design Handbook and placed in Appendix 6.

Complete Table D-8 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. You can add rows to the table as needed. Alternatively, the Santa Margarita Hydrology Model (SMRHM) can be used to size LID BMPs to address the DCV and, if applicable, to size Hydrologic Control BMPs to meet the Hydrologic Performance Standard described in the SMR WQMP, as identified in Section E.

Table D-8 LID BMP Sizing

BMP Name / ID	DMA No.	BMP Type / Description	Design Capture Volume (ft^3)	Proposed Volume (ft^3)
Biofiltration	All	Biofiltration with no Infiltration	11,053	16,767.5

If bioretention will include a capped underdrain, then include sizing calculations demonstrating that the BMP will meet infiltration sizing requirements with the underdrain capped and also meet biofiltration sizing requirements if the underdrain is uncapped.

Section E: Implement Hydrologic Control BMPs and Sediment Supply BMPs

If a completed Table 1.2 demonstrates that the project is exempt from Hydromodification Performance Standards, specify N/A and proceed to Section G.

☐ N/A Project is Exempt from Hydromodification Performance Standards.

If a PDP is not exempt from hydromodification requirements than the PDP must satisfy the requirements of the performance standards for hydrologic control BMPs and Sediment Supply BMPs. The PDP may choose to satisfy hydrologic control requirements using onsite or offsite BMPs (i.e. Alternative Compliance). Sediment supply requirements cannot be met via alternative compliance. If N/A is not selected above, select one of the two options below and complete the applicable sections.

☒ Project is Not Hydromodification Exempt and chooses to implement Hydrologic Control and Sediment Supply BMPs Onsite (complete Section E).

☐ Project is Not Hydromodification Exempt and chooses to implement Hydrologic Control Requirements using Alternative Compliance (complete Section F). Selection of this option must be approved by the Copermittee.

E.1 Hydrologic Control BMP Selection

Capture of the DCV and achievement of the Hydrologic Performance Standard may be met by combined and/or separate structural BMPs. The user should consider the full suite of Hydrologic Control BMPs to manage runoff from the post-development condition and meet the Hydrologic Performance Standard identified in this section.

The Hydrologic Performance Standard consists of matching or reducing the flow duration curve of post-development conditions to that of pre-existing, naturally occurring conditions, for the range of geomorphically significant flows (10% of the 2-year runoff event up to the 10-year runoff event). Select each of the hydrologic control BMP types that are applied to meet the above performance standard on the site.

☒ LID principles as defined in Section 3.2 of the SMR WQMP.

☐ Structural LID BMPs that may be modified or enlarged, if necessary, beyond the DCV.

☐ Structural Hydrologic Control BMPs that are distinct from the LID BMPs above. The LID BMP Design Handbook provides information not only on Hydrologic Control BMP design, but also on BMP design to meet the combined LID requirement and Hydrologic Performance Standard. The Handbook specifies the type of BMPs that can be used to meet the Hydrologic Performance Standard.

E.2 Hydrologic Control BMP Sizing

Hydrologic Control BMPs must be designed to ensure that the flow duration curve of the post-development DMA will not exceed that of the pre-existing, naturally occurring, DMA for the range of geomorphically significant flows. Using SMRHM, (or another acceptable continuous simulation model if approved by the Copermittee) the applicant shall demonstrate that the performance of the Hydrologic Control BMPs complies with the Hydrologic Performance Standard. Complete Table E-1 below and identify, for each DMA, the type of Hydrologic Control BMP, if the SMRHM model confirmed the management (Identified as "passed" in SMRHM), the total volume capacity of the Hydrologic Control BMP, the Hydrologic Control BMP footprint at top floor elevation, and the drawdown time of the Hydrologic Control BMP. SMRHM summary reports should be documented in Appendix 7. Refer to the SMRHM Guidance Document for additional information on SMRHM. You can add rows to the table as needed.

Table E-1 Hydrologic Control BMP Sizing

BMP Name / ID	DMA No.	BMP Type / Description	SMRHM Passed	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
Detention Pond	All	Detention Pond intended for biofiltration and detain what is required for Hydromodification.	☒	1.753	0.418	N/A
			☐			
			☐			
			☐			

If a bioretention BMP with capped underdrain is used and hydromodification requirements apply, then sizing calculations must demonstrate that the BMP meets flow duration control criteria with the underdrain capped and uncapped. Both calculations must be included.

E.3 Implement Sediment Supply BMPs

The sediment supply performance standard applies to PDPs for which hydromodification applied that have the potential to impact Potential Critical Coarse Sediment Yield Areas. Refer to Exhibit G of the WQMP to determine if there are onsite Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas. Select one of the two options below and include the Potential Critical Coarse Sediment Yield Area Exhibit showing your project location in Appendix 7.

☒ There are no mapped Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas on the site. The Sediment Supply Performance Standard is met with no further action.

☐ There are mapped Potential Critical Coarse Sediment Yield Areas or Potential Sediment Source Areas on the site, the Sediment Supply Performance Standard will be met through Option 1 or Option 2 below.

The applicant may refer to Section 3.6.4 of the SMR WQMP for a description of the methodology to meet the Sediment Supply Performance Standard. Select the applicable compliance pathway and complete the appropriate sections to demonstrate compliance with the Sediment Supply Performance Standard if the second box is selected above:

☐ Avoid impacts related to any PDP activities to Potential Critical Coarse Sediment Yield Areas. Proceed to Section E.3.1.

☐ Complete a Site-Specific Critical Coarse Sediment Analysis. Proceed to Section E.3.2.

E.3.1 Option 1: Avoid Potential Critical Coarse Sediment Yield Areas and Potential Sediment Source Areas

The simplest approach for complying with the Sediment Supply Performance Standard is to avoid impacts to areas identified as Potential Critical Coarse Sediment Yield Areas or Potential Sediment Supply Areas. If a portion of PDP is identified as a Potential Critical Coarse Sediment Yield Area or a Potential Sediment Source Area, that PDP may still achieve compliance with the Sediment Supply Performance Standards if Potential Critical Coarse Sediment Yield Areas and Potential Sediment Supply Areas are avoided, i.e. areas are not developed and thereby delivery of Critical Coarse Sediment to the receiving waters is not impeded by site developments.

Provide a narrative describing how the PDP has avoided impacts to Potential Critical Coarse Sediment Yield Areas and/or Potential Sediment Source Areas below.

Insert narrative description here

If it is not feasible to avoid these areas, proceed to Option 2 to complete a Site-Specific Critical Coarse Sediment Analysis.

E.3.2 Option 2: Site-Specific Critical Coarse Sediment Analysis

Perform a stepwise assessment to ensure the maintenance of the pre-project source(s) of Critical Coarse Sediment (i.e., Bed Sediment Supply):

1. Determine whether the site or a portion of the site is a Significant Source of Bed Sediment Supply to the Receiving Channel (i.e., an actual verified Critical Coarse Sediment Yield Area);
2. Avoid areas identified as actual verified Critical Coarse Sediment Yield Areas in the PDP design and maintain pathways for discharge of Bed Sediment Supply from these areas to receiving waters.

Step 1: Identify if the site is an actual verified Critical Coarse Sediment Yield Area supplying Bed Sediment Supply to the receiving channel

☐ **Step 1.A** – Is the Bed Sediment of onsite streams similar to that of receiving streams?

Rate the similarity: ☐ High
☐ Medium
☐ Low

Results from the geotechnical and sieve analysis to be performed both onsite and in the receiving channel should be documented in Appendix 7. Of particular interest, the results of the sieve analysis, the soil erodibility factor, a description of the topographic relief of the project area, and the lithology of onsite soils should be reported in Appendix 7.

☐ **Step 1.B** – Are onsite streams capable of delivering Bed Sediment Supply from the site, if any, to the receiving channel?

Rate the potential:

☐ High

☐ Medium

☐ Low

Results from the analyses of the sediment delivery potential to the receiving channel should be documented in Appendix 7 and identify, at a minimum, the Sediment Source, the distance to the receiving channel, the onsite channel density, the project watershed area, the slope, length, land use, and rainfall intensity.

☐ **Step 1.C** – Will the receiving channel adversely respond to a change in Bed Sediment Load?

Rate the need for bed sediment supply:

☐ High

☐ Medium

☐ Low

Results from the in-stream analysis to be performed both onsite should be documented in Appendix 7. The analysis should, at a minimum, quantify the bank stability and the degree of incision, provide a gradation of the Bed Sediment within the receiving channel, and identify if the channel is sediment supply-limited.

☐ **Step 1.D** – Summary of Step 1

Summarize in Table E.3 the findings of Step 1 and associate a score (in parenthesis) to each step. The sum of the three individual scores determines if a stream is a significant contributor to the receiving stream.

- Sum is equal to or greater than eight - Site is a significant source of sediment bed material – all on-site streams must be preserved or by-passed within the site plan. The applicant shall proceed to Step 2 for all onsite streams.
- Sum is greater than five but lower than eight. Site is a source of sediment bed material – some of the on-site streams must be preserved (with identified streams noted). The applicant shall proceed to Step 2 for the identified streams only.
- Sum is equal to or lower than five. Site is not a significant source of sediment bed material. The applicant may advance to Section F.

Table E-2 Triad Assessment Summary

Step	Rating			Total Score
1.A	☐ High (3)	☐ Medium (2)	☐ Low (1)	
1.B	☐ High (3)	☐ Medium (2)	☐ Low (1)	
1.C	☐ High (3)	☐ Medium (2)	☐ Low (1)	
Significant Source Rating of Bed Sediment to the receiving channel(s)				

Step 2: Avoid Development of Critical Coarse Sediment Yield Areas, Potential Sediment Sources Areas, and Preserve Pathways for Transport of Bed Sediment Supply to Receiving Waters

Onsite streams identified as a actual verified Critical Coarse Sediment Yield Areas should be avoided in the site design and transport pathways for Critical Coarse Sediment should be preserved

Check those that apply:

☐ The site design does avoid all onsite channels identified as actual verified Critical Coarse Sediment Yield Areas

AND

☐ The drainage design bypasses flow and sediment from onsite upstream drainages identified as actual verified Critical Coarse Sediment Yield Areas to maintain Critical Coarse Sediment supply to receiving waters

(If both are yes, the applicant may disregard subsequent steps of Section E.3 and directly advance directly to Section G).

\- *Or* -

☐ The site design **does NOT avoid** all onsite channels identified as actual verified Critical Coarse Sediment Yield Areas

OR

☐ The project impacts transport pathways of Critical Coarse Sediment from onsite upstream drainages.

(If either of these are the case, the applicant may proceed with the subsequent steps of Section E.3).

Provide in Appendix 7 a site map that identifies all onsite channels and highlights those onsite channels that were identified as a Significant Source of Bed Sediment. The site map shall demonstrate, if feasible, that the site design avoids those onsite channels identified as a Significant Source of Bed Sediment. In addition, the applicant shall describe the characteristics of each onsite channel identified as a Significant Source of Bed Sediment. If the design plan cannot avoid the onsite channels, please provide a rationale for each channel individually.

The site map shall demonstrate that the drainage design bypasses those onsite channels that supply Critical Coarse Sediment to the receiving channel(s). In addition, the applicant shall describe the characteristics of each onsite channel identified as an actual verified Critical Coarse Sediment Yield Area.

Identified Channel #1 - Insert narrative description here

Identified Channel #2 - Insert narrative description here

Identified Channel #3 - Insert narrative description here

E.3.3 Sediment Supply BMPs to Result in No Net Impact to Downstream Receiving Waters

If impacts to Critical Coarse Sediment Yield Areas cannot be avoided, sediment supply BMPs must be implemented such there is no net impact to receiving waters. Sediment supply BMPs may consist of approaches that permit flux of bed sediment supply from Critical Coarse Sediment Yield Areas within the project boundary. This approach is subject to acceptance by the [Insert Jurisdiction]. It may require extensive documentation and analysis by qualified professionals to support this demonstration.

Appendix H of the San Diego Model BMP Design Manual provides additional information on site-specific investigation of Critical Coarse Sediment Supply areas.

http://www.projectcleanwater.org/download/2018-model-bmp-design-manual/

If applicable, insert narrative description here

Documentation of sediment supply BMPs should be detailed in Appendix 7.

Section F: Alternative Compliance

Alternative Compliance may be used to achieve compliance with pollutant control and/or hydromodification requirements for a given PDP. Alternative Compliance may be used under two scenarios, check the applicable box if the PDP is proposing to use Alternative Compliance to satisfy all or a portion of the Pollutant Control and/or Hydrologic Control requirements (but not sediment supply requirements)

☐ If it is not feasible to fully implement Infiltration or Biofiltration BMPs at a PDP site, Flow-Through Treatment Control BMPs may be used to treat pollutants contained in the portion of DCV not reliably retained on site and Alternative Compliance measures must also be implemented to mitigate for those pollutants in the DCV that are not retained or removed on site prior to discharging to a receiving water.

☐ Alternative Compliance is selected to comply with either pollutant control or hydromodification flow control requirements even if complying with these requirements is potentially feasible on-site. If such voluntary Alternative Compliance is implemented, Flow-Through Treatment Control BMPs must still be used to treat those pollutants in the portion of the DCV not reliably retained on site prior to discharging to a receiving water.

Refer to Section 2.7 of the SMR WQMP and consult the City for currently available Alternative Compliance pathways. Coordinate with the Copermittee if electing to participate in Alternative Compliance and complete the sections below to document implementation of the Flow-Through BMP component of the program.

F.1 Identify Pollutants of Concern

The purpose of this section is to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs and to document compliance and.

Utilize Table A-1 from Section A, which noted your project's Receiving Waters, to identify impairments for Receiving Waters (including downstream receiving waters) by completing Table F-1. Table F-1 includes the watersheds identified as impaired in the Approved 2010 303(d) list; check box corresponding with the PDP's receiving water. The most recent 303(d) lists are available from the State Water Resources Control Board website:
https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml).https://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2010.shtml.

Table F-1 Summary of Approved 2010 303(d) listed waterbodies and associated pollutants of concern for the Riverside County SMR Region and downstream waterbodies.

Water Body		Nutrients[1]	Metals[2]	Toxicity	Bacteria and Pathogens	Pesticides and Herbicides	Sulfate	Total Dissolved Solids
☐	De Luz Creek	X	X				X	
☐	Long Canyon Creek		X		X	X		
☐	Murrieta Creek	X	X	X		X		
☐	Redhawk Channel	X	X		X	X		X
☐	Santa Gertudis Creek	X	X		X	X		
☐	Santa Margarita Estuary	X						
☐	Santa Margarita River (Lower)	X			X			
☐	Santa Margarita River (Upper)	X		X				
☐	Temecula Creek	X	X	X		X		X
☐	Warm Springs Creek	X	X		X	X		

[1] Nutrients include nitrogen, phosphorus and eutrophic conditions caused by excess nutrients.

[2] Metals includes copper, iron, and manganese.

Use Table F-2 to identify the pollutants identified with the project site. Indicate the applicable PDP Categories and/or Project Features by checking the boxes that apply. If the identified General Pollutant Categories are the same as those listed for your Receiving Waters, then these will be your Pollutants of Concern; check the appropriate box or boxes in the last row.

Table F-2 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	Total Dissolved Solids	Sulfate
☐	Detached Residential Development	P	N	P	P	N	P	P	P	N	N
☐	Attached Residential Development	P	N	P	P	N	P	P	P(2)	N	N
☐	Commercial/Industrial Development	P(3)	P(7)	P(1)	P(1)	P	P(1)	P	P	N	N
☐	Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P	N	N
☐	Restaurants (>5,000 ft^2)	P	N	N	P(1)	N	N	P	P	N	N
☐	Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P	N	N
☐	Parking Lots (>5,000 ft^2)	P(6)	P(7)	P(1)	P(1)	P(4)	P	P	P	N	N
☐	Streets, Highways, and Freeways	P(6)	P(7)	P(1)	P(1)	P(4)	P	P	P	N	N
☐	Retail Gasoline Outlets	N	P(7)	N	N	P(4)	N	P	P	N	N
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 products; otherwise not expected

(4) Including petroleum hydrocarbons

(5) Including solvents

(6) Bacterial indicators are routinely detected in pavement runoff

(7) A potential source of metals, primarily copper and zinc. Iron, magnesium, and aluminum are commonly found in the environment and are commonly associated with soils, but are not primarily of anthropogenic stormwater origin in the municipal environment.

F.2 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 be selected to address the Project Priority Pollutants of Concern (identified above) and meet the acceptance criteria described in Section 2.3.7 of the SMR WQMP. Documentation of acceptance criteria 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 F-3 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 Copermittee Approved Study and provided in Appendix 6.

F.3 Sizing Criteria

Utilize Table F-4 below to appropriately size flow-through BMPs to the DCV, or Design Flow Rate, as applicable. Please reference Chapter 3.5.1 of the SMR WQMP for further information.

Table F-4 Treatment Control BMP Sizing

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	***Enter BMP Name / Identifier Here***	
	[A]		[B]	[C]	[A] x [C]		
						Design Storm (in)	*Design Flow Rate (cfs)*
	$A_T = \Sigma[A]$				$\Sigma = [D]$	[E]	$[F] = \frac{[D]x[E]}{[G]}$

[B], [C] is obtained as described in Section 2.6.1.b from the SMR WQMP
[E] either 0.2 inches or 2 times the 85th percentile hourly rainfall intensity
[G] = 43,560,.

F.4 Hydrologic Performance Standard – Alternative Compliance Approach

Alternative compliance options are only available if the governing Copermittee has acknowledged the infeasibility of onsite Hydrologic Control BMPs and approved an alternative compliance approach. See Section 3.5 and 3.6 of the SMR WQMP.

Select the pursued alternative and describe the specifics of the alternative:

☐ Offsite Hydrologic Control Management within the same channel system

Insert narrative description here

☐ In-Stream Restoration Project

Insert narrative description here

<u>For Offsite Hydrologic Control BMP Option</u>

Each Hydrologic Control BMP must be designed to ensure that the flow duration curve of the post-development DMA will not exceed that of the pre-existing, naturally occurring, DMA by more than ten percent over a one-year period. Using SMRHM, the applicant shall demonstrate that the performance of each designed Hydrologic Control BMP is equivalent with the Hydrologic Performance Standard for onsite conditions. Complete Table F-5 below and identify, for each Hydrologic Control BMP, the equivalent DMA the Hydrologic Control BMP mitigates, that the SMRHM model passed, the total volume capacity of the BMP, the BMP footprint at top floor elevation, and the drawdown time of the BMP. SMRHM summary reports for the alternative approach should be documented in Appendix 7. Refer to the SMRHM Guidance Document for additional information on SMRHM. You can add rows to the table as needed.

Table F-5 Offsite Hydrologic Control BMP Sizing

BMP Name / Type	Equivalent DMA (ac)	SMRHM Passed	BMP Volume (ac-ft)	BMP Footprint (ac)	Drawdown time (hr)
		☐			
		☐			
		☐			
		☐			

<u>For Instream Restoration Option</u>

Attach to Appendix 7 the technical report detailing the condition of the receiving channel subject to the proposed hydrologic and sediment regimes. Provide the full design plans for the in-stream restoration project that have been approved by the Copermittee. Utilize the San Diego Regional Water Quality Equivalency Guidance Document.

Section G: Implement Trash Capture BMPs

The City may require full trash capture BMPs to be installed as part of the project. Consult with the City to determine applicability.

Trash Capture BMPs may be applicable to Type 'D' DMAs, as defined in Section 2.3.4 of the SMR WQMP. Trash Capture BMPs are designed to treat Q_{TRASH}, the runoff flow rate generated during the 1-year 1-hour precipitation depth. Utilize Table G-1 to size Trash Capture BMP. Refer to Table G-2 to determine the Trash Capture Design Storm Intensity (E).

Table G-1 Sizing Trash Capture 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	***Enter BMP Name / Identifier Here***	
	[A]		[B]	[C]	[A] x [C]		
3 – Sidewalks Sub Area	*2144.63*	*Concrete*	*1*	*0.89*	*1913*	*Trash Capture Design Storm Intensity (in)*	*Trash Capture Design Flow Rate (cubic feet or cfs)*
	$A_T = \Sigma[A]$	2144.63			$\Sigma = 1913$	0.47	0.02

[B], [C] is obtained as described in Section 2.6.1.b from the SMR WQMP
[G] = 43,560

Table G-2 Approximate precipitation depth/intensity values for calculation of the Trash Capture Design Storm

City	1-year 1-hour Precipitation Depth/Intensity (inches/hr)
Murrieta	0.47
Temecula	0.50
Wildomar	0.37

Use Table G-3 to summarize and document the selection and sizing of Trash Capture BMPs.

Table G-3 Trash Capture BMPs

BMP Name / ID	DMA No(s)	BMP Type / Description	Required Trash Capture Flowrate (cfs)	Provided Trash Capture Flowrate (cfs)
Fox Drain Diversion System	3	Diversion System which separates storm sewer and storm water runoff.	0.02	N/A

Section H: 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 Maximum Extent Practicable (MEP) standard typically requires both types of BMPs. In general, Operational Source Control BMPs cannot be substituted for a feasible and effective Structural Source Control BMP. Complete checklist below to determine applicable Source Control BMPs for your site.

Project-Specific WQMP Source Control BMP Checklist

All development projects must implement Source Control BMPs. Source Control BMPs are used to minimize pollutants that may discharge to the MS4. Refer to Chapter 3 (Section 3.8) of the SMR WQMP for additional information. Complete Steps 1 and 2 below to identify Source Control BMPs for the project site.

STEP 1: IDENTIFY POLLUTANT SOURCES

Review project site plans and identify the applicable pollutant sources. "Yes" indicates that the pollutant source is applicable to project site. "No" indicates that the pollutant source is not applicable to project site.

☒ Yes ☐ No	Storm Drain Inlets	☐ Yes ☒ No	Outdoor storage areas
☒ Yes ☐ No	Floor Drains	☐ Yes ☒ No	Material storage areas
☐ Yes ☒ No	Sump Pumps	☐ Yes ☒ No	Fueling areas
☐ Yes ☒ No	Pets Control/Herbicide Application	☐ Yes ☒ No	Loading Docks
☐ Yes ☒ No	Food Service Areas	☒ Yes ☐ No	Fire Sprinkler Test/Maintenance water
☒ Yes ☐ No	Trash Storage Areas	☒ Yes ☐ No	Plazas, Sidewalks and Parking Lots
☐ Yes ☒ No	Industrial Processes	☐ Yes ☒ No	Pools, Spas, Fountains and other water features
☐ Yes ☒ No	Vehicle and Equipment Cleaning and Maintenance/Repair Areas		

STEP 2: REQUIRED SOURCE CONTROL BMPS

List each Pollutant source identified above in column 1 and fill in the corresponding Structural Source Control BMPs and Operational Control BMPs by referring to the Stormwater Pollutant Sources/Source Control Checklist included in Appendix 8. The resulting list of structural and operational source control BMPs must be implemented as long as the associated sources are present on the project site. Add additional rows as needed.

Pollutant Source	Structural Source Control BMP	Operational Source Control BMP
Storm Drain Inlet	Contech CDS Unit	Refer to checklist on Appendix 8
Floor Drains	Contech CDS Unit	Refer to checklist on Appendix 8
Trash Storage Area	Fox Environmental Systems Diversion System	Refer to checklist on Appendix 8
Fire Sprinkler Test/Maintenance Water	Contech CDS Unit	Refer to checklist on Appendix 8
Plazas, Sidewalks and Parking Lots	Contech CDS Unit	Refer to checklist on Appendix 8
Insert text here	Insert text here	Insert text here

Section I: Coordinate Submittal with Other Site Plans

Populate Table I-1 below to assist the plan checker in an expeditious review of your project. During construction and at completion, City inspectors will verify the installation of BMPs against the approved plans. 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 I-1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)
Detention Pond	Pond used for hydromodification and Biofiltration LID BMP.	Utility Plan
Contech CDS Unit	Pretreatment used prior to routing to Detention Pond	Utility Plan
Fox Environmental Systems Diversion System	BMP used for trash enclosure area, separates storm sewer and waste sewer.	Utility Plan

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. The Copermittee with jurisdiction over the Project site can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

Use Table I-2 to identify other applicable permits that may impact design of the site. If yes is answered to any of the items below, the Copermittee may require proof of approval/coverage from those agencies as applicable including documentation of any associated requirements that may affect this Project-Specific WQMP.

Table I-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 Section 401 Water Quality Certification	☐ Y	☒ N
US Army Corps of Engineers, Clean Water Act 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)*	☐ Y	☒ N

Section J: Operation, Maintenance and Funding

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

1. A means to finance and implement maintenance of BMPs 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 Operations and Maintenance or inspections but will require typical landscape maintenance as noted in Chapter 5, in the SMR WQMP. Include a brief description of typical landscape maintenance for these areas.

The Copermittee with jurisdiction over the Project site will also require that you prepare and submit a detailed BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the 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 BMP Operation and Maintenance Plan are in Chapter 5 of the SMR WQMP.

Maintenance Mechanism: Insert text here.

Will the proposed BMPs be maintained by a Homeowners' 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.

Section K: Acronyms, Abbreviations and Definitions

Regional MS4 Permit	Order No. R9-2013-0001 as amended by Order No. R9-2015-0001 and Order No. R9-2015-0100 an NPDES Permit issued by the San Diego Regional Water Quality Control Board.
Applicant	Public or private entity seeking the discretionary approval of new or replaced improvements from the Copermittee with jurisdiction over the project site. The Applicant has overall responsibility for the implementation and the approval of a Priority Development Project. The WQMP uses consistently the term "user" to refer to the applicant such as developer or project proponent. The WQMP employs also the designation "user" to identify the Registered Professional Civil Engineer responsible for submitting the Project-Specific WQMP, and designing the required BMPs.
Best Management Practice (BMP)	Defined in 40 CFR 122.2 as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States. BMPs also include treatment requirements, operating procedures and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. In the case of municipal storm water permits, BMPs are typically used in place of numeric effluent limits.
BMP Fact Sheets	BMP Fact Sheets are available in the LID BMP Design Handbook. Individual BMP Fact Sheets include sitting considerations, and design and sizing guidelines for seven types of structural BMPs (infiltration basin, infiltration trench, permeable pavement, harvest-and-use, bioretention, extended detention basin, and sand filter).
California Stormwater Quality Association (CASQA)	Publisher of the California Stormwater Best Management Practices Handbooks, available at www.cabmphandbooks.com.
Conventional Treatment Control BMP	A type of BMP that provides treatment of storm water runoff. Conventional treatment control BMPs, while designed to treat particular Pollutants, typically do not provide the same level of volume reduction as LID BMPs, and commonly require more specialized maintenance than LID BMPs. As such, the Regional MS4 Permit and this WQMP require the use of LID BMPs wherever feasible, before Conventional Treatment BMPs can be considered or implemented.
Copermittees	The Regional MS4 Permit identifies the Cities of Murrieta, Temecula, and Wildomar, the County, and the District, as Copermittees for the SMR.
County	The abbreviation refers to the County of Riverside in this document.

CEQA	California Environmental Quality Act - a statute that requires state and local agencies to identify the significant environmental impacts of their actions and to avoid or mitigate those impacts, if feasible.
CIMIS	California Irrigation Management Information System - an integrated network of 118 automated active weather stations all over California managed by the California Department of Water Resources.
CWA	Clean Water Act - is the primary federal law governing water pollution. Passed in 1972, the CWA established the goals of eliminating releases of high amounts of toxic substances into water, eliminating additional water pollution by 1985, and ensuring that surface waters would meet standards necessary for human sports and recreation by 1983. CWA Section 402(p) is the federal statute requiring NPDES permits for discharges from MS4s.
CWA Section 303(d) Waterbody	Impaired water in which water quality does not meet applicable water quality standards and/or is not expected to meet water quality standards, even after the application of technology based pollution controls required by the CWA. The discharge of urban runoff to these water bodies by the Copermittees is significant because these discharges can cause or contribute to violations of applicable water quality standards.
Design Storm	The Regional MS4 Permit has established the 85th percentile, 24-hour storm event as the "Design Storm". The applicant may refer to Exhibit A to identify the applicable Design Storm Depth (D85) to the project.
DCV	Design Capture Volume (DCV) is the volume of runoff produced from the Design Storm to be mitigated through LID Retention BMPs, Other LID BMPs and Volume Based Conventional Treatment BMPs, as appropriate.
Design Flow Rate	The design flow rate represents the minimum flow rate capacity that flow-based conventional treatment control BMPs should treat to the MEP, when considered.
DCIA	Directly Connected Impervious Areas - those impervious areas that are hydraulically connected to the MS4 (i.e. street curbs, catch basins, storm drains, etc.) and thence to the structural BMP without flowing over pervious areas.
Discretionary Approval	A decision in which a Copermittee uses its judgment in deciding whether and how to carry out or approve a project.
District	Riverside County Flood Control and Water Conservation District.
DMA	A Drainage Management Area - a delineated portion of a project site that is hydraulically connected to a common structural BMP or conveyance point. The Applicant may refer to Section 3.3 for further guidelines on how to delineate DMAs.

Drawdown Time	Refers to the amount of time the design volume takes to pass through the BMP. The specified or incorporated drawdown times are to ensure that adequate contact or detention time has occurred for treatment, while not creating vector or other nuisance issues. It is important to abide by the drawdown time requirements stated in the fact sheet for each specific BMP.
Effective Area	Area which 1) is suitable for a BMP (for example, if infiltration is potentially feasible for the site based on infeasibility criteria, infiltration must be allowed over this area) and 2) receives runoff from impervious areas.
ESA	An Environmental Sensitive Area (ESA) designates an area "in which plants or animals life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which would be easily disturbed or degraded by human activities and developments". (Reference: California Public Resources Code § 30107.5).
ET	Evapotranspiration (ET) is the loss of water to the atmosphere by the combined processes of evaporation (from soil and plant surfaces) and transpiration (from plant tissues). It is also an indicator of how much water crops, lawn, garden, and trees need for healthy growth and productivity
FAR	The Floor Area Ratio (FAR) is the total square feet of a building divided by the total square feet of the lot the building is located on.
Flow-Based BMP	Flow-based BMPs are conventional treatment control BMPs that are sized to treat the design flow rate.
FPPP	Facility Pollution Prevention Plan
HCOC	Hydrologic Condition of Concern - Exists when the alteration of a site's hydrologic regime caused by development would cause significant impacts on downstream channels and aquatic habitats, alone or in conjunction with impacts of other projects.
HMP	Hydromodification Management Plan – Plan defining Performance Standards for PDPs to manage increases in runoff discharge rates and durations.
Hydrologic Control BMP	BMP to mitigate the increases in runoff discharge rates and durations and meet the Performance Standards set forth in the HMP.
HSG	Hydrologic Soil Groups – soil classification to indicate the minimum rate of infiltration obtained for bare soil after prolonged wetting. The HSGs are A (very low runoff potential/high infiltration rate), B, C, and D (high runoff potential/very low infiltration rate)

Hydromodification	The Regional MS4 Permit identifies that increased volume, velocity, frequency and discharge duration of storm water runoff from developed areas has the potential to greatly accelerate downstream erosion, impair stream habitat in natural drainages, and negatively impact beneficial uses.
JRMP	A separate Jurisdictional Runoff Management Plan (JRMP) has been developed by each Copermittee and identifies the local programs and activities that the Copermittee is implementing to meet the Regional MS4 Permit requirements.
LID	Low Impact Development (LID) is a site design strategy with a goal of maintaining or replicating the pre-development hydrologic regime through the use of design techniques. LID site design BMPs help preserve and restore the natural hydrologic cycle of the site, allowing for filtration and infiltration which can greatly reduce the volume, peak flow rate, velocity, and pollutant loads of storm water runoff.
LID BMP	A type of storm water BMP that is based upon Low Impact Development concepts. LID BMPs not only provide highly effective treatment of storm water runoff, but also yield potentially significant reductions in runoff volume – helping to mimic the pre-project hydrologic regime, and also require less ongoing maintenance than Treatment Control BMPs. The applicant may refer to Chapter 2.
LID BMP Design Handbook	The LID BMP Design Handbook was developed by the Copermittees to provide guidance for the planning, design and maintenance of LID BMPs which may be used to mitigate the water quality impacts of PDPs within the County.
LID Bioretention BMP	LID Bioretention BMPs are bioretention areas are vegetated (i.e., landscaped) shallow depressions that provide storage, infiltration, and evapotranspiration, and provide for pollutant removal (e.g., filtration, adsorption, nutrient uptake) by filtering storm water through the vegetation and soils. In bioretention areas, pore spaces and organic material in the soils help to retain water in the form of soil moisture and to promote the adsorption of pollutants (e.g., dissolved metals and petroleum hydrocarbons) into the soil matrix. Plants use soil moisture and promote the drying of the soil through transpiration. The Regional MS4 Permit defines "retain" as to keep or hold in a particular place, condition, or position without discharge to surface waters.
LID Biofiltration BMP	BMPs that reduce stormwater pollutant discharges by intercepting rainfall on vegetative canopy, and through incidental infiltration and/or evapotranspiration, and filtration, and other biological and chemical processes. As storm water passes down through the planting soil, pollutants are filtered, adsorbed, biodegraded, and sequestered by the soil and plants, and collected through an underdrain.

LID Harvest and Reuse BMP	BMPs used to facilitate capturing storm water runoff for later use without negatively impacting downstream water rights or other Beneficial Uses.
LID Infiltration BMP	BMPs to reduce storm water runoff by capturing and infiltrating the runoff into in-situ soils or amended onsite soils. Typical LID Infiltration BMPs include infiltration basins, infiltration trenches and pervious pavements.
LID Retention BMP	BMPs to ensure full onsite retention without runoff of the DCV such as infiltration basins, bioretention, chambers, trenches, permeable pavement and pavers, harvest and reuse.
LID Principles	Site design concepts that prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
MEP	Maximum Extent Practicable - standard established by the 1987 amendments to the Clean Water Act (CWA) for the reduction of Pollutant discharges from MS4s. Refer to Attachment C of the Regional MS4 Permit for a complete definition of MEP.
MF	Multi-family – zoning classification for parcels having 2 or more living residential units.
MS4	Municipal Separate Storm Sewer System (MS4) is a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains): (i) Owned or operated by a State, city, town, borough, county, parish, district, association, or other public body (created by or pursuant to State law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under State law such as a sewer district, flood control district or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, or designated and approved management agency under section 208 of the CWA that discharges to waters of the United States; (ii) Designated or used for collecting or conveying storm water; (iii) Which is not a combined sewer; (iv) Which is not part of the Publicly Owned Treatment Works (POTW) as defined at 40 CFR 122.26.
New Development Project	Defined by the Regional MS4 Permit as 'Priority Development Projects' if the project, or a component of the project meets the categories and thresholds described in Section 1.1.1.
NPDES	National Pollution Discharge Elimination System - Federal program for issuing, modifying, revoking and reissuing, terminating, monitoring and enforcing permits, and imposing and enforcing pretreatment requirements, under Sections 307, 318, 402, and 405 of the CWA.
NRCS	Natural Resources Conservation Service

PDP	Priority Development Project - Includes New Development and Redevelopment project categories listed in Provision E.3.b of the Regional MS4 Permit.
Priority Pollutants of Concern	Pollutants expected to be present on the project site and for which a downstream water body is also listed as Impaired under the CWA Section 303(d) list or by a TMDL.
Project-Specific WQMP	A plan specifying and documenting permanent LID Principles and storm water BMPs to control post-construction Pollutants and storm water runoff for the life of the PDP, and the plans for operation and maintenance of those BMPs for the life of the project.
Receiving Waters	Waters of the United States.
Redevelopment Project	The creation, addition, and or replacement of impervious surface on an already developed site. Examples include the expansion of a building footprint, road widening, the addition to or replacement of a structure, and creation or addition of impervious surfaces. Replacement of impervious surfaces includes any activity that is not part of a routine maintenance activity where impervious material(s) are removed, exposing underlying soil during construction. Redevelopment does not include trenching and resurfacing associated with utility work; resurfacing existing roadways; new sidewalk construction, pedestrian ramps, or bike lane on existing roads; and routine replacement of damaged pavement, such as pothole repair. Project that meets the criteria described in Section 1.
Runoff Fund	Runoff Funds have not been established by the Copermittees and are not available to the Applicant. If established, a Runoff Fund will develop regional mitigation projects where PDPs will be able to buy mitigation credits if it is determined that implementing onsite controls is infeasible.
San Diego Regional Board	San Diego Regional Water Quality Control Board - The term "Regional Board", as defined in Water Code section 13050(b), is intended to refer to the California Regional Water Quality Control Board for the San Diego Region as specified in Water Code Section 13200. State agency responsible for managing and regulating water quality in the SMR.
SCCWRP	Southern California Coastal Water Research Project
Site Design BMP	Site design BMPs prevent or minimize the causes (or drivers) of post-construction impacts, and help mimic the pre-development hydrologic regime.
SF	Parcels with a zoning classification for a single residential unit.
SMC	Southern California Stormwater Monitoring Coalition
SMR	The Santa Margarita Region (SMR) represents the portion of the Santa Margarita Watershed that is included within the County of Riverside.

Source Control BMP	Source Control BMPs land use or site planning practices, or structural or nonstructural measures that aim to prevent runoff pollution by reducing the potential for contamination at the source of pollution. Source control BMPs minimize the contact between Pollutants and runoff.
Structural BMP	Structures designed to remove pollutants from stormwater runoff and mitigate hydromodification impacts.
SWPPP	Storm Water Pollution Prevention Plan
Tentative Tract Map	Tentative Tract Maps are required for all subdivision creating five (5) or more parcels, five (5) or more condominiums as defined in Section 783 of the California Civil Code, a community apartment project containing five (5) or more parcels, or for the conversion of a dwelling to a stock cooperative containing five (5) or more dwelling units.
TMDL	Total Maximum Daily Load - the maximum amount of a Pollutant that can be discharged into a waterbody from all sources (point and non-point) and still maintain Water Quality Standards. Under CWA Section 303(d), TMDLs must be developed for all waterbodies that do not meet Water Quality Standards after application of technology-based controls.
USEPA	United States Environmental Protection Agency
Volume-Based BMP	Volume-Based BMPs applies to BMPs where the primary mode of pollutant removal depends upon the volumetric capacity such as detention, retention, and infiltration systems.
WQMP	Water Quality Management Plan
Wet Season	The Regional MS4 Permit defines the wet season from October 1 through April 30.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

Complete the checklist below to verify all exhibits and components are included in the Project-Specific WQMP. Refer Section 4 of the SMR WQMP and Section D of this Template.

Map and Site Plan Checklist
Indicate all Maps and Site Plans are included in your Project-Specific WQMP by checking the boxes below.
☒ Vicinity and Location Map
☒ Existing Site Map (unless exiting conditions are included in WQMP Site Plan)
☒ WQMP Site Plan
☒ Parcel Boundary and Project Footprint
☒ Existing and Proposed Topography
☒ Drainage Management Areas (DMAs)
☒ Proposed Structural Best Management Practices (BMPs)
☒ Drainage Paths
☒ Drainage infrastructure, inlets, overflows
☐ Source Control BMPs
☐ Site Design BMPs
☐ Buildings, Roof Lines, Downspouts
☒ Impervious Surfaces
☒ Pervious Surfaces (i.e. Landscaping)
☐ Standard Labeling

Vicinity Map

IN THE UNINCORPORATED TERRITORY OF THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA

A.L.T.A./A.C.S.M. SURVEY

A SURVEY OF A PORTION OF THE SOUTHEAST QUARTER OF SECTION 26 TOWNSHIP 6 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN

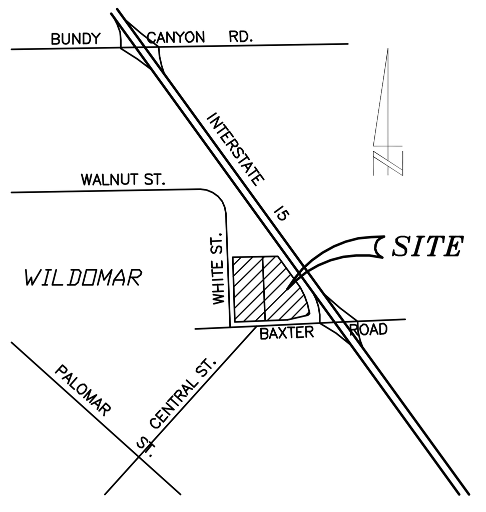
PROPERTY OWNER: △3

APN 367–180–015 AND APN 367–180–043:
WILDOMAR VENTURE, LLC, A DELAWARE LIMITED LIABILITY COMPANY

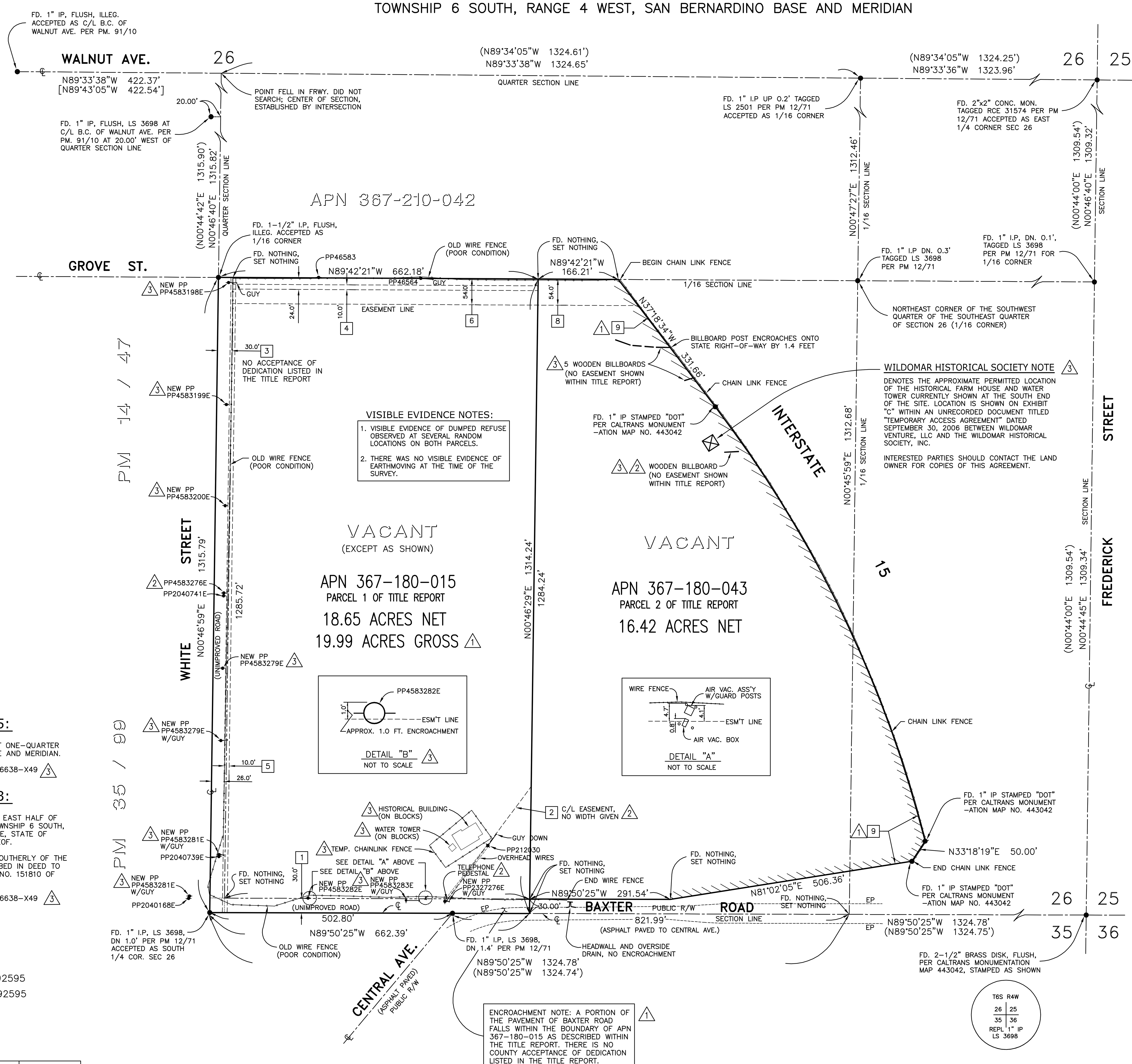
GRAPHIC SCALE

100 0 50 100 200

SCALE: 1" = 100'



VICINITY MAP
N.T.S.



△1 LEGEND:

	BOUNDARY LINE
	CENTERLINE OF STREET
	EASEMENT LINE
	EXISTING FENCE
	POWER POLE
8	PLOTTED EASEMENT
EP	EDGE OF PAVEMENT

CURRENT SPECIFIC ZONING:

C–P–S SCENIC HIGHWAY COMMERCIAL

△1 FLOOD ZONE DESIGNATION

ZONE C – MINIMAL FLOODING
COMMUNITY PANEL NO. 060245 2710C
MAP REVISED NOVEMBER 20, 1996

LEGAL DESCRIPTION FOR APN 367-180-015:

THE WEST ONE–HALF OF THE SOUTHWEST ONE–QUARTER OF THE SOUTHEAST ONE–QUARTER OF SECTION 26, TOWNSHIP 6 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN.

NOTE: LEGAL DESCRIPTION IS AS SHOWN ON TITLE REPORT, ORDER NO. 71066638–X49 △3

LEGAL DESCRIPTION FOR APN 367-180-043:

THE SOUTHEAST ONE–QUARTER OF THE SOUTHEAST ONE–QUARTER AND THE EAST HALF OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 26, TOWNSHIP 6 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ACCORDING TO THE UNITED STATES GOVERNMENT SURVEY THEREOF.

EXCEPT THEREFROM THAT PORTION LYING NORTHEASTERLY, EASTERLY AND SOUTHERLY OF THE SOUTHWESTERLY, WESTERLY AND NORTHERLY LINES OF PARCEL 2 AS DESCRIBED IN DEED TO THE STATE OF CALIFORNIA, RECORDED ON AUGUST 8, 1977 AS INSTRUMENT NO. 151810 OF OFFICIAL RECORDS.

NOTE: LEGAL DESCRIPTION IS AS SHOWN ON TITLE REPORT, ORDER NO. 71066638–X49 △3

JOB ADDRESSES:

APN 367–180–015: 22600 BAXTER ROAD, WILDOMAR, CA 92595
APN 367–180–043: 22580 BAXTER ROAD, WILDOMAR, CA 92595

△3 △1 SURVEYOR'S NOTES:

( ) INDICATES RECORD DATA PER PARCEL MAP 5968 AS SHOWN BY MAP ON FILE IN BOOK 12 PAGE 71 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIF.

[ ] INDICATES RECORD DATA PER PARCEL MAP 16137 AS SHOWN BY MAP ON FILE IN BOOK 91 PAGE 10 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIF.

● INDICATES FOUND MONUMENT AS NOTED HEREON

INDICATES RESTRICTED ACCESS PER EASEMENT NOTE NO. 9

8 INDICATES EASEMENT ANNOTATION, SEE EASEMENT NOTES BELOW

AREA: APN 367–180–015 = 18.65 ACRES NET OR 19.99 ACRES GROSS △1
APN 367–180–043 = 16.42 ACRES NET
TOTAL AREA = 35.07 ACRES NET

NOTE: NET ACREAGE SHOWN IS BASED ON CURRENT STREET HALF WIDTHS BEING 30.00 FEET ON WHITE STREET AND BAXTER AVENUE.

THE BASIS OF BEARINGS FOR THIS SURVEY IS THE CENTERLINE OF BAXTER ROAD BEING NORTH 89°50'25" WEST PER PARCEL MAP 5968 AS SHOWN BY MAP ON FILE IN BOOK 12 PAGE 71 OF PARCEL MAPS, RECORDS OF RIVERSIDE COUNTY, CALIFORNIA.

△3 △1 THE SURVEY FOR APN 367–180–015 AND APN 367–180–043 WAS BASED UPON DATA CONTAINED WITHIN A TITLE REPORT PREPARED BY CHICAGO TITLE COMPANY OF LOS ANGELES, CALIFORNIA ON NOVEMBER 28, 2007 AT 7:30 A.M. AS ORDER NO. 71066638–X49. THIS OFFICE OR THIS SURVEYOR MAKES NO STATEMENT AS TO THE ACCURACY OR INTEGRITY OF SAID TITLE REPORTS OR THE INFORMATION CONTAINED THEREIN. REFERENCE IS HEREBY MADE TO SAID TITLE REPORTS FOR ENCUMBRANCES NOT PLOTTED OR OTHERWISE NOT SHOWN HEREON.

ALL UTILITIES SHOWN HEREON WERE OBTAINED BY A FIELD SURVEY ONLY. THIS SURVEY DOES NOT INCLUDE ANY LOCATION OR RESEARCH DATA FOR UNDERGROUND UTILITIES OR OTHER FACILITIES OTHER THAN SHOWN HEREON.

THE BOUNDARY DATA SHOWN WAS CALCULATED BY LOCATION OF FOUND MONUMENTS, RECORD DATA AND LEGAL DESCRIPTIONS SHOWN ON GRANT DEEDS WHEN LEGIBLE.

△3 △1 SURVEYOR'S CERTIFICATION:

TO JULIET PROPERTY CO., INC., WILDOMAR VENTURE, L.L.C., AND CHICAGO TITLE COMPANY:

THIS IS TO CERTIFY THAT THIS MAP OR PLAT AND THE SURVEY ON WHICH IT IS BASED WERE MADE IN ACCORDANCE WITH "MINIMUM STANDARD DETAIL REQUIREMENTS FOR ALTA/ACSM LAND TITLE SURVEYS", JOINTLY ESTABLISHED AND ADOPTED BY ALTA, ACSM AND NSPS IN 1999, AND INCLUDES ITEMS 2, 3, 4, 8, 14, 16 AND 17 OF TABLE "A" THEREOF. PURSUANT TO THE ACCURACY STANDARDS AS ADOPTED BY ALTA, ACSM AND NSPS AND IN EFFECT ON THE DATE OF THIS CERTIFICATION, UNDERSIGNED FURTHER CERTIFIES THAT THE POSITIONAL UNCERTAINTIES RESULTING FROM THE SURVEY MEASUREMENTS MADE ON THE SURVEY DO NOT EXCEED THE ALLOWABLE POSITIONAL TOLERANCE.

THE SURVEY SHOWN HEREON WAS MADE BY THE UNDERSIGNED, A DULY REGISTERED PROFESSIONAL LAND SURVEYOR UNDER THE LAWS OF THE STATE OF CALIFORNIA, OR UNDER MY DIRECT PERSONAL SUPERVISION ON FEBRUARY 24, 2005 AND UPDATED ON DECEMBER 13, 2007 FOR THE HEREON DESCRIBED PARCELS OF LAND, NOW INCLUDED IN AND FORMING A PART OF THE COUNTY OF RIVERSIDE.

THE UNDERSIGNED FURTHER STATES THAT THERE ARE NO ENCROACHMENTS EITHER UPON THE LAND SHOWN HEREON OR OVER THE CONTIGUOUS BOUNDARIES OF ANY PROPERTY IMMEDIATELY ADJACENT TO THE PROPERTY SURVEYED EXCEPT AS SHOWN HEREON. THERE ARE NO ABOVE–GROUND VISIBLE IMPROVEMENTS EXCEPT AS SHOWN HEREON.

ALL EASEMENTS OF RECORD AFFECTING SAID LANDS AS DISCLOSED BY THE HEREON REFERENCED TITLE REPORT ARE NOTED ON SAID SURVEY. ALL BUILDINGS AND STRUCTURES AFFECTING SAID LANDS ARE OF THE TYPE AND IN THE LOCATIONS SHOWN HEREON, AND THAT THE NET AREA SHOWN HEREON IS CORRECT.

LEONARD C. FOWLER DATE
LS 7238, EXP. 12/31/08

△1 EASEMENT AND ENCUMBRANCE NOTES:

THE FOLLOWING ITEMS ARE REFERENCED IN A PRELIMINARY TITLE REPORT PREPARED BY CHICAGO TITLE COMPANY OF LOS ANGELES, CALIFORNIA ON NOVEMBER 28, 2007 AT 7:30 A.M. AS ORDER NO. 71066638–X49.

EASEMENTS AND ENCUMBRANCES LISTED IN TITLE REPORT FOR APN 367–180–015 (PARCEL 1):

1 AN EASEMENT FOR PUBLIC HIGHWAY AND PUBLIC UTILITY PURPOSES IN FAVOR OF THE COUNTY OF RIVERSIDE RECORDED FEBRUARY 5, 1935 IN BOOK 217 PAGE 84 OF OFFICIAL RECORDS. AFFECTS THE SOUTHERLY 30 FEET.

△2 2 AN EASEMENT FOR UTILITY PURPOSES IN FAVOR OF CALIFORNIA ELECTRIC POWER COMPANY, RECORDED JUNE 21, 1950 AS INSTRUMENT NO. 2876, OF OFFICIAL RECORDS. AFFECTS SAID LAND.

3 A DECLARATION OF DEDICATION FOR PUBLIC ROAD, PUBLIC UTILTY AND INCIDENTAL PURPOSES, RECORDED OCTOBER, 3, 1968 AS INSTRUMENT NO. 95449, OFFICIAL RECORDS.

4 AN EASEMENT FOR THE PURPOSE OF UNDERGROUND ELECTRICAL SUPPLY SYSTEMS IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION AND GENERAL TELEPHONE COMPANY OF CALIFORNIA, A CORPORATION RECORDED JUNE 1, 1970 AS INSTRUMENT NO. 51276 OF OFFICIAL RECORDS. AFFECTS THE SOUTH 10 FEET OF THE NORTH 24 FEET OF SAID LAND.

5 AN EASEMENT FOR PUBLIC UTILITY PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY, A CORPORATION RECORDED SEPTEMBER 18, 1974 AS INSTRUMENT NO. 120768 OF OFFICIAL RECORDS. AFFECTS THE EAST 10 FEET OF THE WEST 36 FEET OF SAID LAND.

6 AN EASEMENT FOR INGRESS, EGRESS, ROAD AND PUBLIC UTILITY PURPOSES IN FAVOR OF SOUTHWEST PROPERTIES, A SOLE PROPRIETORSHIP, COMPOSED OF VINCENT P. KOWSKY, A SINGLE MAN RECORDED JUNE 17, 1987 AS INSTRUMENT NO. 172476, OF OFFICIAL RECORDS. AFFECTS THE NORTHERLY 54 FT.

EASEMENTS AND ENCUMBRANCES LISTED IN TITLE REPORT FOR APN 367–180–043 (PARCEL 2):

△2 7. AN EASEMENT FOR PUBLIC UTILITY PURPOSES IN FAVOR OF SOUTHERN CALIFORNIA EDISON COMPANY RECORDED SEPTEMBER 18, 1974 AS INSTRUMENT NO. 120768 OF OFFICIAL RECORDS. AFFECTS THE EAST 10 FEET OF THE WEST 36 FEET. (SAME AS NO. 5 ABOVE, NO AFFECT TO THIS PARCEL)

△3 9 THE FACT THAT THE OWNERSHIP OF SAID LAND DOES NOT INCLUDE RIGHTS OF ACCESS TO OR FROM THE STREET, HIGHWAY OR FREEWAY ABUTTING SAID LAND, SUCH RIGHTS HAVING BEEN RELINQUISHED BY THE DOCUMENT RECORDED AUGUST 8, 1977 AS INSTRUMENT NO. 151810, OFFICIAL RECORDS. AFFECTS STATE HIGHWAY 15.

THE FOLLOWING MATTERS AFFECT PARCELS 1 AND 2 OF TITLE REPORT:

△3 10. RIGHTS OF THE PUBLIC IN AND TO ANY PORTION OF THE PROPERTY HEREIN DESCRIBED LYING WITHIN BAXTER ROAD.

△3 11. THE RIGHT TO SINK WELLS, TO ESTABLISH AND MAINTAIN PUMPING PLANTS UPON THE HEREIN DESCRIBED PROPERTY AND TO DEVELOP WATER FOR IRRIGATION AND DOMESTIC USE; ALSO RIGHTS OF WAY THROUGH AND ACROSS ANY PORTION OF SAID PROPERTY FOR SURFACE OR UNDERGROUND PIPELINES; ALSO RIGHTS OF WAY THROUGH AND ACROSS ANY PORTION OF SAID PROPERTY FOR THE CONSTRUCTION OF ELECTRIC TRANSMISSION LINES WITH PERPETUAL RIGHT OF ENTRY FOR THE AFORESAID PURPOSES, AS CONVEYED TO SOUTH ELSINORE MUTUAL WATER COMPANY, A CORPORATION, AS DISCLOSED BY THE DECLARATION OF OWNERSHIP OF EXCESS WATER RIGHT RECORDED JUNE 20, 1934 IN BOKK 176 PAGE 293, OFFICIAL RECORDS.

△3 12. THE EFFECT OF A QUITCLAIM DEED RECORDED NOVEMBER 30, 2005 AS INSTRUMENT NO. 2005–0985597 OF OFFICIAL RECORDS.

SEE ADDITIONAL EASEMENT NOTE HEREON:

△3 ADDITIONAL EASEMENT NOTE:

THE FOLLOWING EASEMENT WAS NOT SHOWN IN THE TITLE REPORT AND HAS AN AFFECT ON APN 367–180–043 (PARCEL 2):

8 AN EASEMENT FOR INGRESS, EGRESS, ROAD AND PUBLIC UTILITY PURPOSES OVER, UNDER, THROUGH AND ACROSS THE NORTHERLY 54 FEET OF THE WEST HALF OF THE SOUTHWEST QUARTER OF THE SOUTHEAST QUARTER OF SECTION 26, TOWNSHIP 6 SOUTH, RANGE 4 WEST, SAN BERNARDINO BASE AND MERIDIAN, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ACCORDING TO THE UNITED STATES GOVERNMENT SURVEY THEREOF. EXCEPT THAT PORTION LYING WITHIN WHITE STREET.

NO.	DATE	DESCRIPTION	BY
△3	12–14–07	UPDATED A.L.T.A. SURVEY AND MAP BASED ON FIELD SURVEY AND PRELIMINARY TITLE REPORT DATED NOV. 28, 2007 BY CHICAGO TITLE COMPANY ORDER NO. 71066638–X49	LCF
△2	10–26–05	PLOTTED ESMT #2, REV. ESMTS 2 & 7, REV. BILLBOARDS (SIGNS), ADDED NEW PP4583276E	LCF
△1	10–24–05	VARIOUS REVISIONS BASED ON TITLE REPORT DATED 6–22–05 ADDED VISIBLE EVIDENCE NOTES, ADDED ENCROACHMENT NOTE REVISED BOUNDARY PARCEL –015, REV. SURVEYOR'S CERT.	LCF

REVISIONS

UPDATED A.L.T.A./A.C.S.M. SURVEY

ORIGINALLY PREPARED MARCH 3, 2005

PROFESSIONAL LAND SURVEYOR LEONARD C. FOWLER EXP. 12/31/08 No. 7238 STATE OF CALIFORNIA

PREPARED BY:

LEONARD C. FOWLER, PLS DATE
LCF SURVEYING, INC., PRESIDENT
LS 7238, EXPIRES 12/31/08

PREPARED FOR: △3

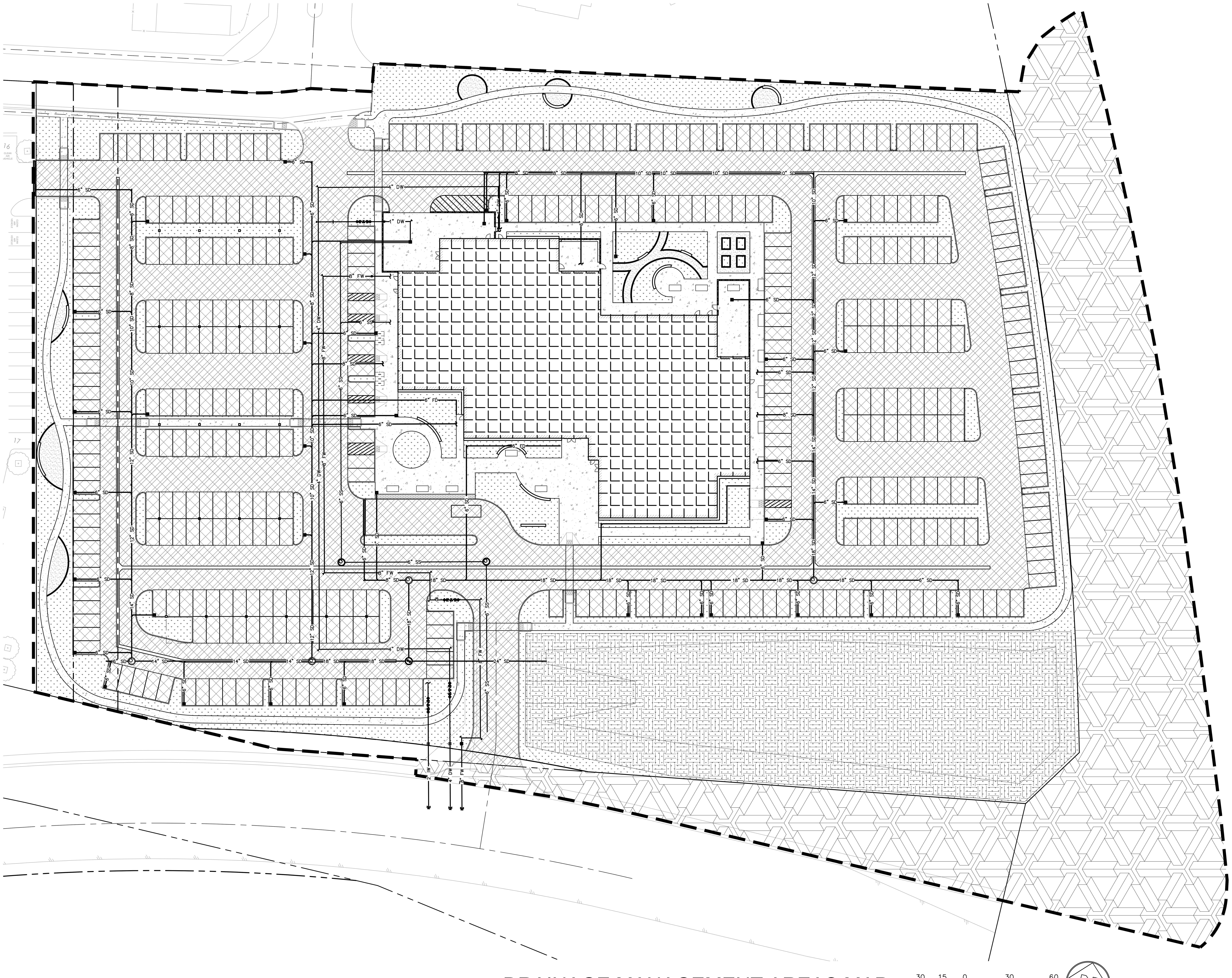
JULIET PROPERTY CO., INC.
8375 W. FLAMINGO ROAD, #200
LAS VEGAS, NV 89147–4149
ATTN: MR. JOHN STEWART
PH: (702) 368–5800

DRAWN BY:	LCF
CHECKED BY:	LCF
SCALE:	1" = 100'
DATE:	DEC., 14, 2007

LCF SURVEYING, INC.
39888 SWEETBRIER CIRCLE
TEMECULA, CALIF. 92591
Ph. (951) 699–2603
Fax (951) 699–5157

JN 850.02 ALTA–JULIET.DWG

ALTA–JULIET.dwg 12–19–07 9:56:42 am PST



SITE TOTAL DRAINAGE AREA

PROPERTY LINE

DMA 1 - ROOF (IMPERVIOUS)

DMA 2 - ROADS (IMPERVIOUS)

DMA 3 - SIDEWALKS (IMPERVIOUS)

DMA 4 - PARKING (IMPERVIOUS)

DMA 5 - LANDSCAPE (PERVIOUS)

DMA 6 - DETENTION POND (PERVIOUS)

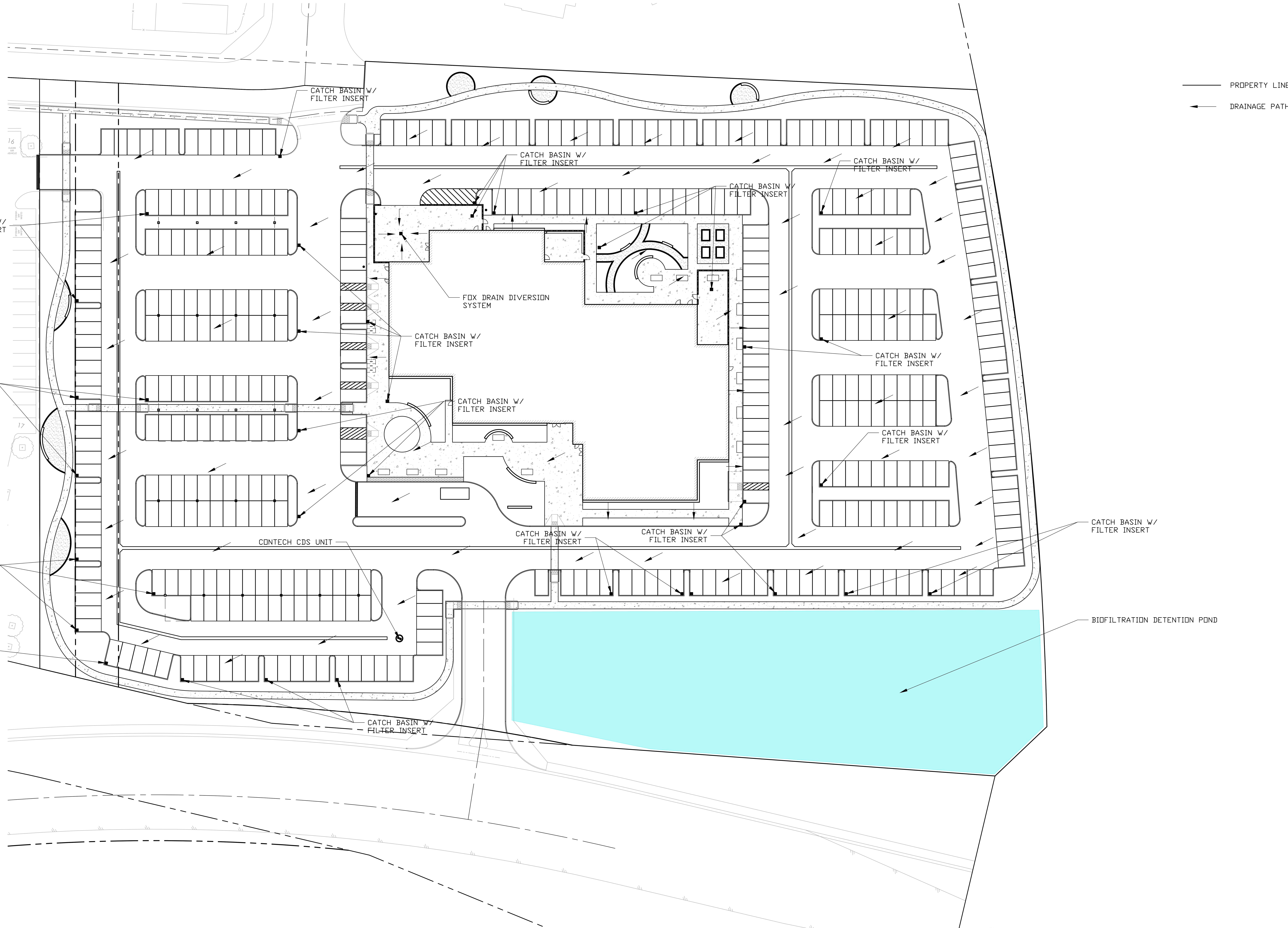
DMA 7 & 8 - SOIL D (PERVIOUS)

DRAINAGE MANAGEMENT AREAS MAP

30 15 0 30 60

GRAPHIC SCALE

SCALE 1" – 30'



BMP AND DRAINAGE MAP

30 15 0 30 60
GRAPHIC SCALE
SCALE 1" – 30'

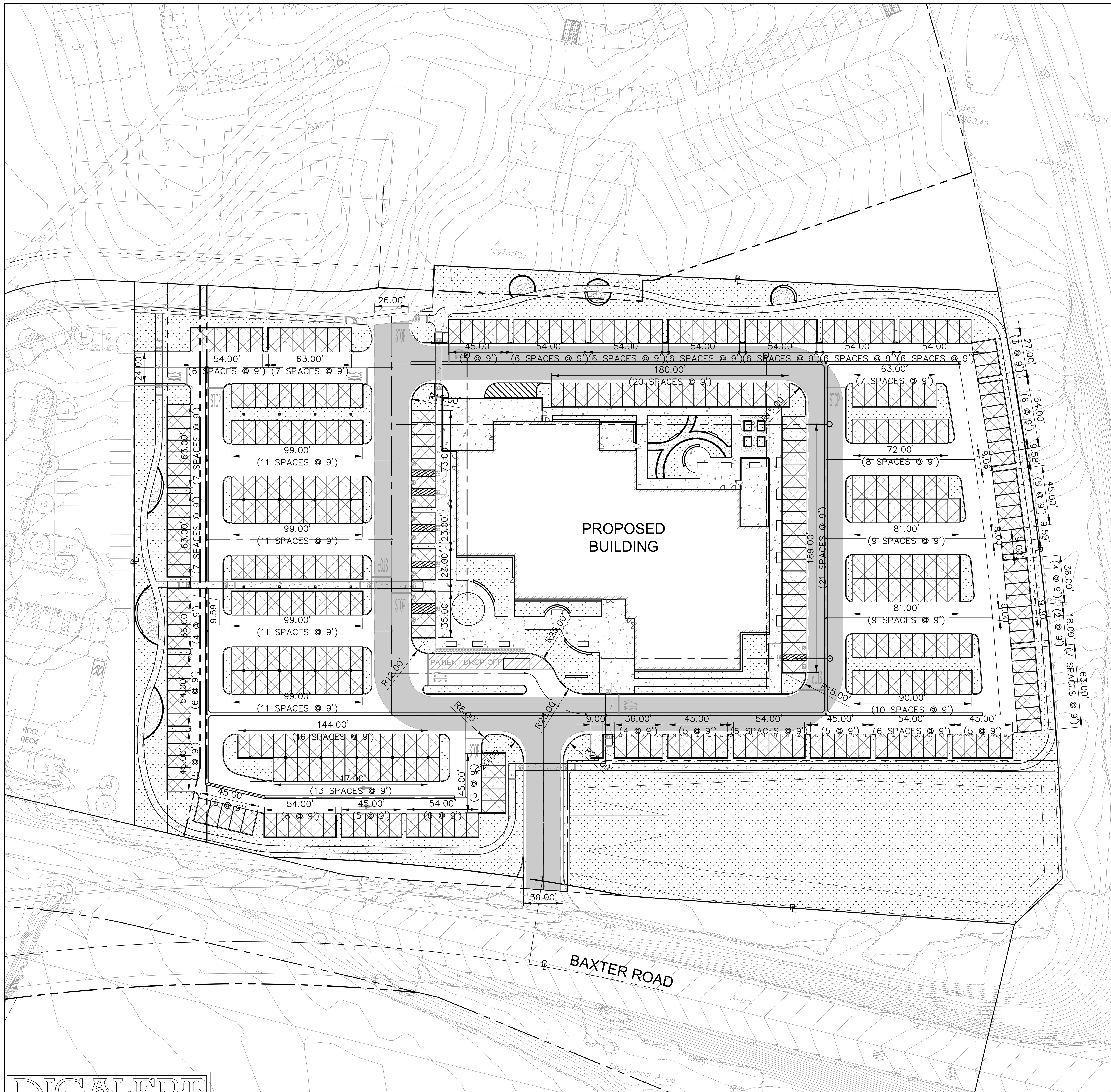
Appendix 2: Construction Plans

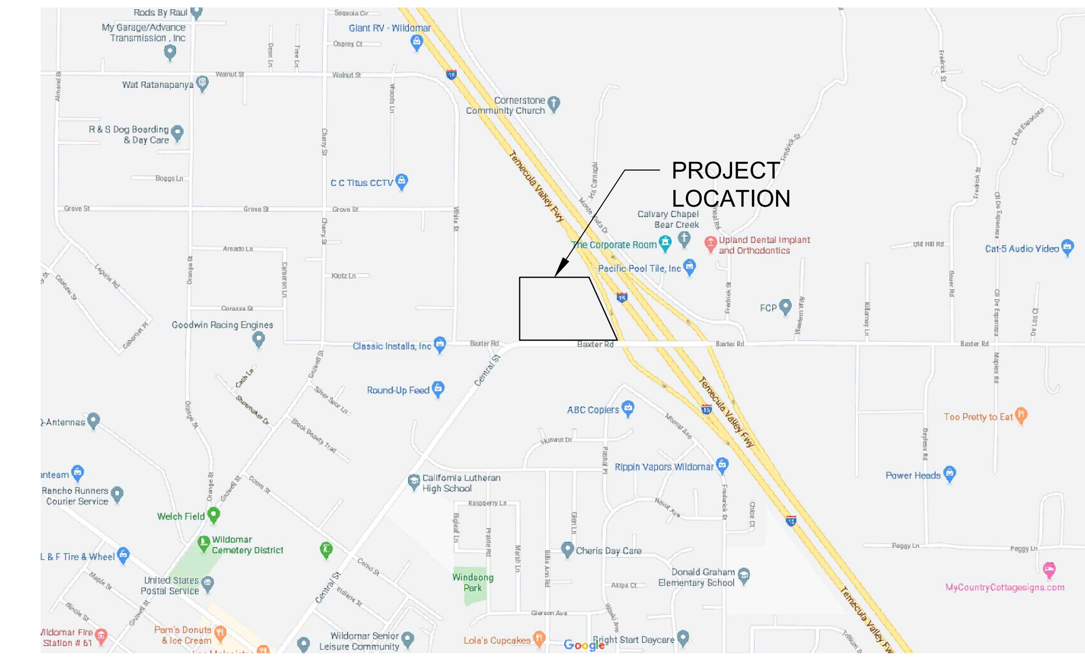
Grading and Drainage Plans

Examples of material to provide in Appendix 2 may include but are not limited to the following:

- Site grading plans from the Project's Civil Plan Set,
- Drainage plans showing the exiting condition and proposed drainage system from the project's drainage report,
- Other plan sheets containing elements that impact site grading and drainage.

Refer to Section 4 of the SMR WQMP and Section I of this Template.





VICINITY MAP
NTS

SITE STATUS

ZONING:	MEDICAL USES OVERLAY DISTRICT OF MIXED USE/RESIDENTIAL OVERLAY OF BUSINESS PARK-1 AND RESIDENTIAL VERY HIGH DENSITY.
GENERAL PLAN DESIGNATION:	MIXED USE/RESIDENTIAL (MUIR) OVERLAY
BUILDING OCCUPANCY TYPE:	B (MEDICAL OFFICE BUILDING)
PARKING REQUIRED:	KAISER REQUIRED 1 SPACES PER 200 = 42,657 SF / 200 SF X 1 = 214 SPACES 6 SPACES WILL BE DEDICATED TO LANDSCAPE FOR A TOTAL OF 208 SPACES
PARKING PROVIDED:	STD SPACES 373 ACCESSIBLE SPACES 11 EV STD SPACES 23 CLEAN AIR VEHICLES 8 TOTAL SPACES 415 BICYCLE 6 SPACES
FLOOR AREA RATIO:	FIRST FLOOR AREA XXXXX SF SECOND FLOOR AREA XXXXX SF TOTAL XXXXX SF
VACANT LOT AREA:	XXXXX ACRES +/- (XXXXX SF)
FAR	BP-1 BUILDING PARK. ZONING ALLOWS A 1.0 FAR. (BUILDING AREA / LOT AREA) XXXXX SF / XXXXX SF = XXXXX FAR

40 20 0 40 80
GRAPHIC SCALE
SCALE 1" – 40'

SHEET NOTE:

1. SEE ENLARGED PLANS FOR CONSTRUCTION NOTES.

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A PUBLIC SERVICE BY UNDERGROUND SERVICE ALERT

NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

The private engineer signing these plans is responsible for assuring the accuracy and acceptability of the design hereon. In the event of discrepancies arising after city acceptance or during construction, the private engineer shall be responsible for determining an acceptable solution and revising the plans for acceptance by the city.

MARK	BY	DATE	REVISIONS	APPR.	DATE
	ENGINEER			CITY	

CITY OF WILDOMAR
ACCEPTED BY:
Date:
Daniel A. York, Director of Public Works/ City Engineer, PE 43212
ACCEPTANCE AS TO CONFORMANCE WITH APPLICABLE CITY STANDARDS AND PRACTICES

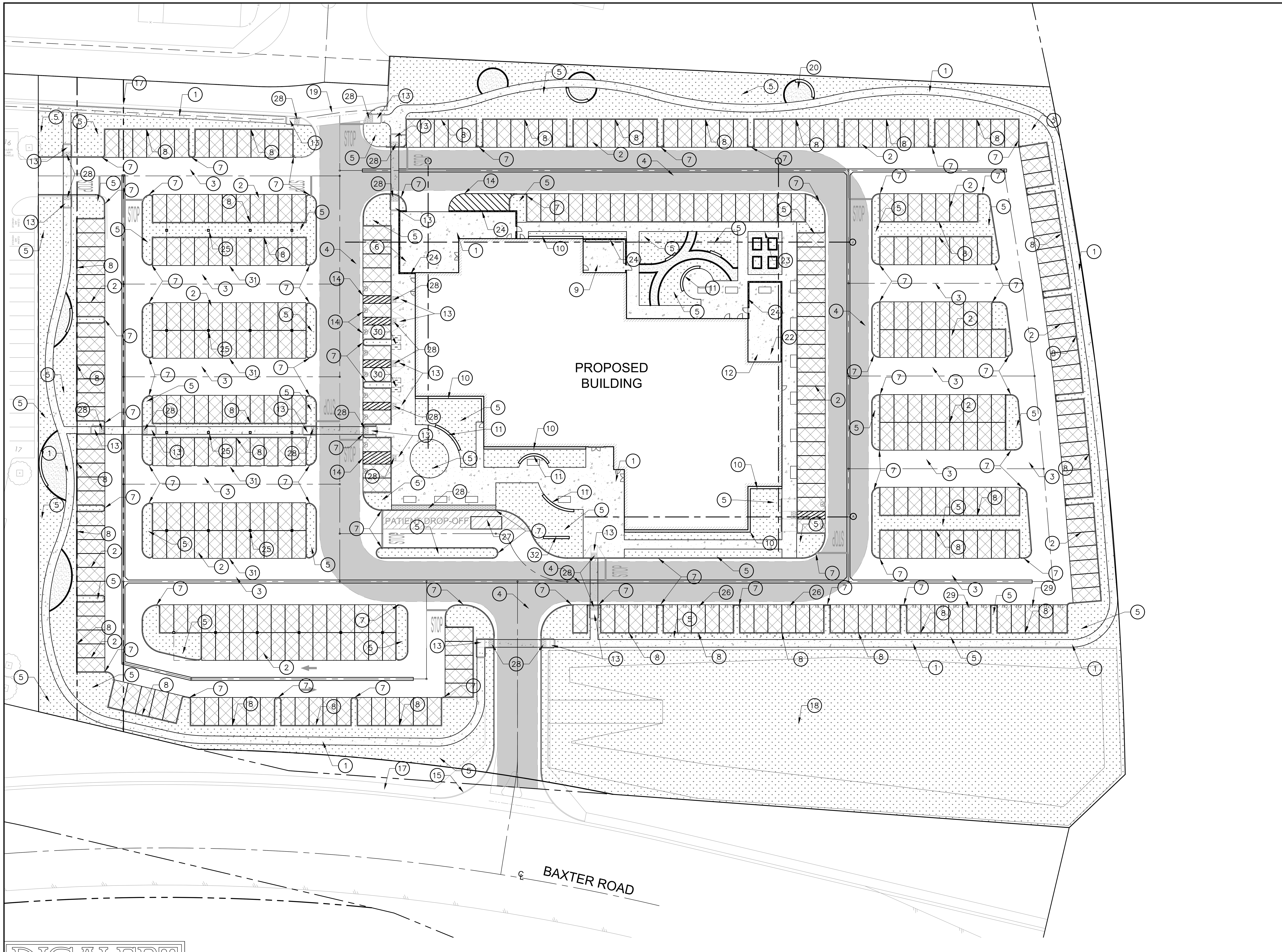
SEAL-ENGINEER:
REGISTERED PROFESSIONAL ENGINEER VIRGILIO C. AOANAN No. C36079 Exp. 6/30/20 CIVIL STATE OF CALIFORNIA

VCA ENGINEERS INC
CIVIL • STRUCTURAL
1041 S. Garfield Avenue, Suite #210
Alhambra, CA 91801
Tel. 323.729.6098 Fax. 323.729.6043
PREPARED BY:
R.C.E. No. EXP.

BENCHMARK:
Elevation =
Datum =
BENCHMARK #
THIS SURVEY WAS PERFORMED ON (date) BY (surveyor) L.S. (number), EXP. (date)
SCALE:
H: As Noted V: As Noted

CITY OF WILDOMAR
BAXTER VILLAGE - MEDICAL OFFICE BUILDING
ENTITLEMENT SUBMITTAL
OVERALL SITE CONTROL PLAN

SHEET No.
OF SHTS



LEGEND:

- 4" THK. CONCRETE PAVEMENT
- 6.5" THK. AC PAVEMENT
- 4" THK. AC PAVEMENT
- PLANTER AREA
- PLANTER WALL/RETAINING WALL
- 6" THK. FIRELANE
- DECOMPOSE GRANITE

CONSTRUCTION NOTES:

1. 4" THK. CONCRETE PAVEMENT
2. 4" THK. AC PAVEMENT
3. 6.5" THK. AC PAVEMENT
4. 6" THK. FIRELANE
5. PLANTER AREA
6. TRASH ENCLOSURE
7. CONCRETE CURB
8. CONCRETE CURB AND GUTTER
9. EMPLOYEE PATIO
10. CONCRETE MOW STRIP
11. CONCRETE SEAT WALL
12. PHYSICAL THERAPY YARD
13. ACCESSIBLE RAMP
14. ACCESSIBLE PARKING
15. EXISTING STREET CURB LINE
16. EXISTING FIRE HYDRANT TO REMAIN
17. EXISTING CITY SIDEWALK
18. BIO FILTRATION DETENTION POND
19. CONCRETE CROSS/RIBBON GUTTER
20. DECOMPOSE GRANITE
21. CONCRETE TRANSFORMER PAD
22. SYNTHETIC TURF MATERIAL OVER CONCRETE PAVEMENT
23. DECORATIVE FENCE
24. STRUCTURAL FREE STANDING WING WALL
25. PHOTOVOLTAIC CARPORT COLUMN OUTSIDE 9X18 PARKING SPACE
26. ELECTRIC VEHICLE DESIGNATED AREA
27. EMERGENCY VEHICLE DESIGNATED AREA
28. TRUNCATED DOMES
29. CLEAN AIR VEHICLE
30. BIKE RACK
31. PHOTOVOLTAIC (PV PANEL) CANOPY
32. MONUMENT SIGN FOR ILLUSTRATION PURPOSES ONLY. PERMIT REQUIRED SUBSEQUENT TO ENTITLEMENT

SHEET NOTES:

1. REFER TO ARCHITECTURAL DRAWINGS FOR OTHER SITE DIMENSIONS AND IMPROVEMENTS NOT SHOWN ON THIS DRAWING.

SITE CONTROL PLAN

30 15 0 30 60

GRAPHIC SCALE
SCALE 1" = 30'

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MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				CITY	

CITY OF WILDOMAR
ACCEPTED BY:
Date:
Daniel A. York, Director of Public Works/ City Engineer, PE 43212
ACCEPTANCE AS TO CONFORMANCE WITH APPLICABLE CITY STANDARDS AND PRACTICES

SEAL-ENGINEER:
REGISTERED PROFESSIONAL ENGINEER VIRGILIO C. AOANAN No. C36079 Exp. 6/30/20 CIVIL STATE OF CALIFORNIA

VCA ENGINEERS INC
CIVIL • STRUCTURAL MBE•DBE•SBE
1041 S. Garfield Avenue, Suite #210
Alhambra, CA 91801
Tel. 323.729.6098 Fax. 323.729.6043

PREPARED BY: ____
R.C.E. No. ____ EXP. ____

BENCHMARK:
Elevation = ____
Datum = ____
BENCHMARK # ____
THIS SURVEY WAS PERFORMED ON (date) BY (surveyor) L.S. (number), EXP. (date)

SCALE:
H: As Noted V: As Noted

CITY OF WILDOMAR
BAXTER VILLAGE - MEDICAL OFFICE BUILDING
ENTITLEMENT SUBMITTAL
SITE CONTROL PLAN

SHEET No.
OF SHTS

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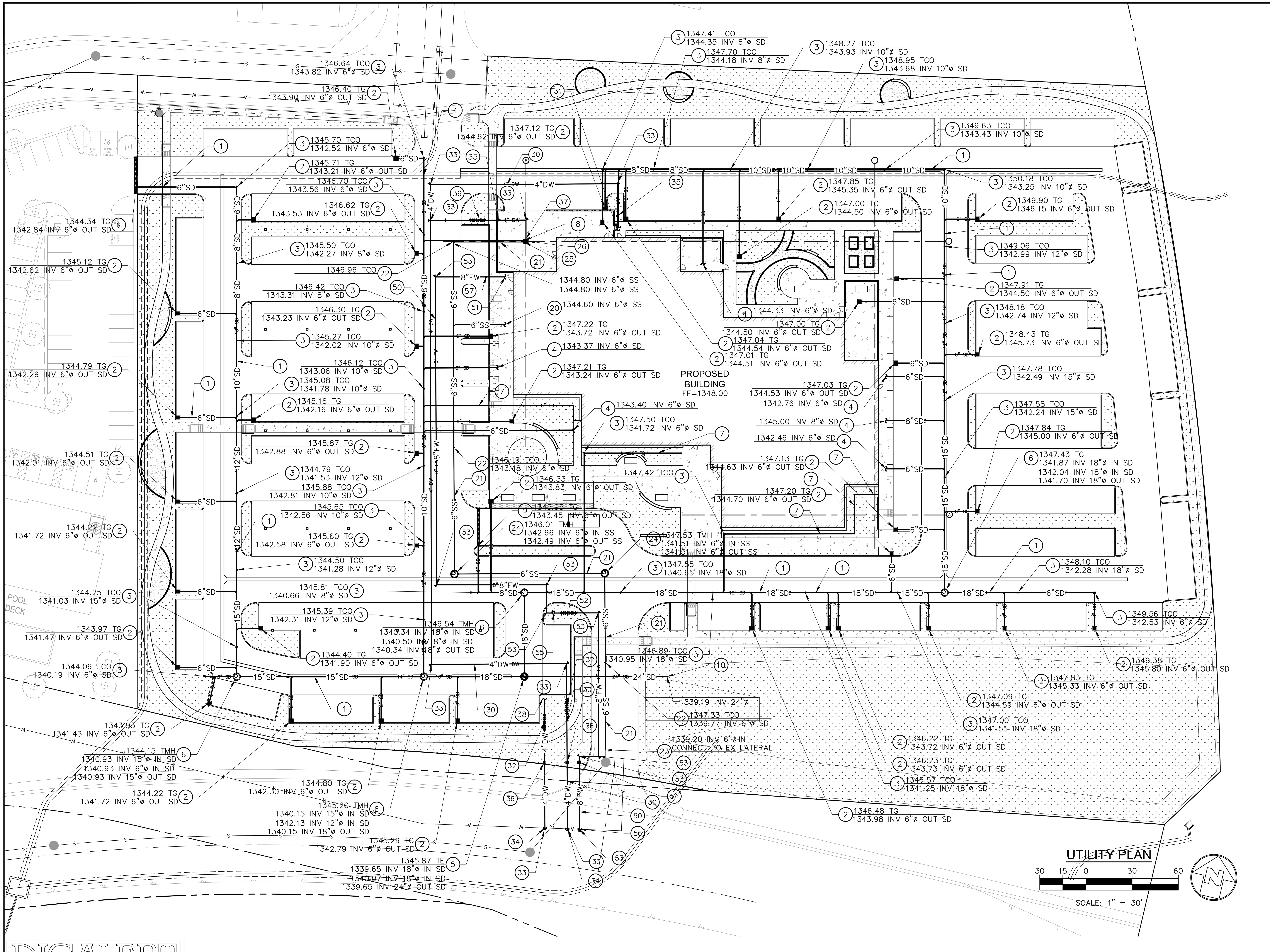
PREPARED BY: ____
R.C.E. No. ____ EXP. ____

BENCHMARK:
Elevation = ____
Datum = ____
BENCHMARK # ____
THIS SURVEY WAS PERFORMED ON (date) BY (surveyor) L.S. (number), EXP. (date)

SCALE:
H: As Noted V: As Noted

CITY OF WILDOMAR
BAXTER VILLAGE - MEDICAL OFFICE BUILDING
ENTITLEMENT SUBMITTAL
OVERALL UTILITY PLAN

SHEET No.
OF SHTS



CONSTRUCTION NOTES:

STORM DRAIN:

1. INSTALL PVC SCH 40 PIPE FOR STORM DRAIN LINE.
2. CONSTRUCT CATCH BASIN.
3. INSTALL CLEANOUT.
4. CONNECT TO BUILDING DOWN SPOUT. COORDINATE AND MATCH LOCATION WITH PLUMBING DRAWINGS. PROVIDE REDUCER AND FITTINGS AS REQUIRED TO MATCH SIZE OF BUILDING DOWN SPOUT.
5. INSTALL CDS UNIT.
6. CONSTRUCT SD MANHOLE PER APWA STD PLAN 321-2.
7. INSTALL 6" FRENCH DRAIN.
8. CONNECT STORM DRAIN LINE TO FOX DRAIN SYSTEM AND VALVE.
9. INSTALL TRENCH DRAIN.
10. POINT OF DISCHARGE TO BIOINFILTRATION DETENTION POND.

SANITARY SEWER:

20. CONNECT TO BUILDING SANITARY SEWER CONNECTION. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. FOR CONTINUATION SEE PLUMBING PLANS.
21. INSTALL ABS SCH 40 SANITARY SEWER PIPE.
22. INSTALL CLEANOUT.
23. CONNECT TO THE EXISTING SEWER LINE. PROVIDE REDUCING FITTINGS AND COUPLINGS AND CONTRACTOR SHALL POTHOLE AND FIELD VERIFY EXACT SIZE, DEPTH AND LOCATION OF EX LATERAL PRIOR TO THE TRENCHING OF NEW SYSTEM.
24. CONSTRUCT SS MANHOLE PER APWA STD PLAN 200-3.
25. CONNECT SANITARY LINE TO FOX DRAIN SYSTEM AND VALVE.
26. CONSTRUCT FOX DRAIN SYSTEM.

DOMESTIC WATER:

30. INSTALL COPPER PIPE TYPE K TUBING FOR DOMESTIC WATER LINE.
31. CONNECT TO BUILDING DOMESTIC WATER CONNECTION. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. FOR CONTINUATION SEE PLUMBING PLANS.
32. INSTALL DOMESTIC/IRRIGATION WATER REDUCED PRESSURE BACKFLOW PREVENTER. COORDINATE AND VERIFY POINT OF CONNECTION.
33. INSTALL CONCRETE THRUST BLOCK AND TIES FOR WATERLINE.
34. CONNECT TO EXISTING WATER LINE. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. VERIFY LOCATION IN FIELD BY POT HOLING PRIOR TO CONSTRUCTION/INSTALLATION OF NEW WATER SYSTEM.
35. INSTALL GATE VALVE.
36. PROPOSED WATER METER TO BE USED FOR DOMESTIC/IRRIGATION WATER SERVICE.
37. CONNECT DOMESTIC WATER LINE TO FOX DRAIN SYSTEM AND VALVE.
38. POINT OF CONNECTION FOR PROPOSED IRRIGATION LINE.
39. FOX DRAIN SYSTEM AND VALVE.

FIRE WATER:

50. INSTALL 8" AWWA C900 PVC PRESSURE CLASS DR14, FIRE WATER LINE.
51. CONNECT TO BUILDING FIRE WATER CONNECTION. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. FOR CONTINUATION SEE PLUMBING PLANS.
52. INSTALL DOUBLE CHECK DETECTOR ASSEMBLY.
53. INSTALL CONCRETE THRUST BLOCK AND TIES.
54. PROPOSED WATER METER TO BE USED FOR FIRE WATER.
55. INSTALL FIRE DEPARTMENT CONNECTION.
56. CONNECT TO EXISTING WATER LINE. PROVIDE REDUCING FITTINGS AND COUPLINGS AS NEEDED. VERIFY LOCATION IN FIELD BY POT HOLING PRIOR TO CONSTRUCTION/INSTALLATION OF NEW WATER SYSTEM.
57. INSTALL GATE VALVE.

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NOTE:
WORK CONTAINED WITHIN THESE PLANS SHALL NOT COMMENCE UNTIL AN ENCROACHMENT PERMIT AND/OR A GRADING PERMIT HAS BEEN ISSUED.

The private engineer signing these plans is responsible for assuring the accuracy and acceptability of the design hereon. In the event of discrepancies arising after city acceptance or during construction, the private engineer shall be responsible for determining an acceptable solution and revising the plans for acceptance by the city.

MARK	BY	DATE	REVISIONS	APPR.	DATE
ENGINEER				CITY	

CITY OF WILDOMAR
ACCEPTED BY:
Date:
Daniel A. York, Director of Public Works/ City Engineer, PE 43212
ACCEPTANCE AS TO CONFORMANCE WITH APPLICABLE CITY STANDARDS AND PRACTICES

SEAL-ENGINEER:
REGISTERED PROFESSIONAL ENGINEER
VIRGILIO C. ADANZA
No. C36079
Exp. 6/30/20
CIVIL
STATE OF CALIFORNIA

VCA ENGINEERS INC
1041 S. Garfield Avenue, Suite #210
Alhambra, CA 91801
Tel. 323.729.6098 Fax. 323.729.6043

PREPARED BY:
R.C.E. No. ________ EXP. ________

BENCHMARK:
Elevation = ________
Datum = ________
BENCHMARK # ________
THIS SURVEY WAS PERFORMED ON (date) BY (surveyor) L.S. (number), EXP. (date)

SCALE:
H: As Noted V: As Noted

CITY OF WILDOMAR
BAXTER VILLAGE - MEDICAL OFFICE BUILDING
ENTITLEMENT SUBMITTAL
UTILITY PLAN

SHEET No.
OF SHTS

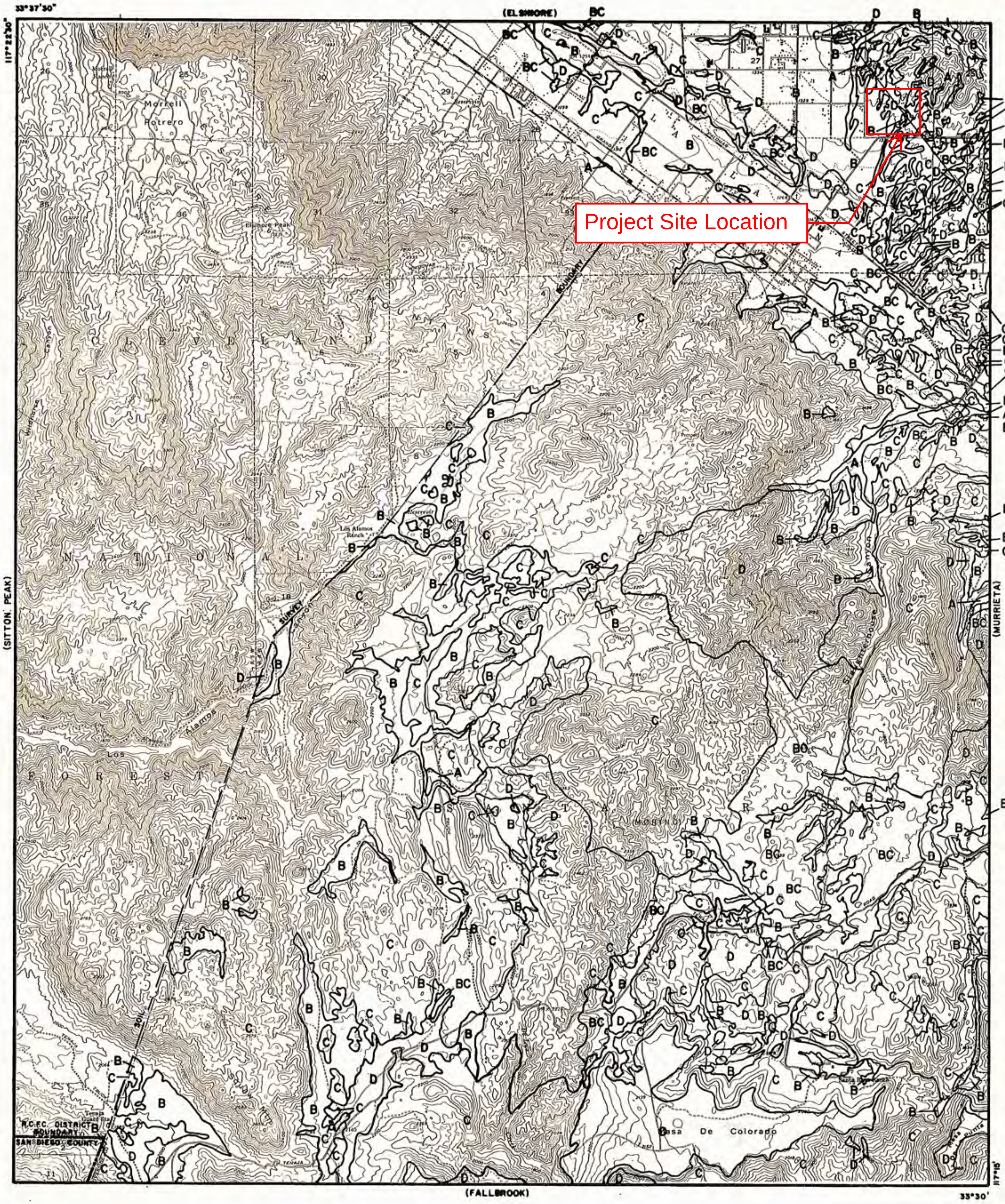
Appendix 3: Soils Information

Geotechnical Study, Other Infiltration Testing Data, and/or Other Documentation

Examples of material to provide in Appendix 3 may include but are not limited to the following:

- Geotechnical Study/Report prepared for the project,
- Additional soils testing data (if not included in the Geotechnical Study),
- Exhibits/Maps/Other Documentation of the Hydrologic Soils Groups (HSG)s at the project site.

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections A and D of this Template.



LEGEND

—— SOILS GROUP BOUNDARY

A SOILS GROUP DESIGNATION

RCFC & WCD

HYDROLOGY MANUAL

0 FEET 5000

HYDROLOGIC SOILS GROUP MAP FOR WILDOMAR

PLATE C-1.51

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GEOTECHNICAL INVESTIGATION
FOR
MEDICAL OFFICE BUILDING AT BAXTER VILLAGE
NORTHWEST CORNER OF BAXTER ROAD AND INTERSTATE 15
WILDOMAR, CA

for

Medical Office Building at Baxter Village
Northwest Corner of Baxter Road and Interstate 15
Wildomar, CA

December 12, 2019

19-1135-01

RMA Group
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December 12, 2019

Medical Office Building at Baxter Village
Northwest Corner of Baxter Road and Interstate 15
Wildomar, CA

Subject: Geotechnical Investigation for
Medical Office Building at Baxter Village
Northwest Corner of Baxter Road and Interstate 15
Wildomar, CA

In accordance with your request, a geotechnical investigation has been completed for the above referenced project. The report addresses both engineering geologic and geotechnical conditions. The results of the investigation are presented in the accompanying report, which includes a description of site conditions, results of our field exploration, laboratory testing, conclusions, and recommendations.

We appreciate this opportunity to be of continued service to you. If you have any questions regarding this report, please do not hesitate to contact us at your convenience.

Respectfully submitted,

RMA Group

Ken Dowell, PG, CEG
Project Geologist
CEG 2470

PROFESSIONAL GEOLOGIST
KENNETH R. DOWELL
No. 2470
CERTIFIED ENGINEERING GEOLOGIST
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1.00 INTRODUCTION

1.01 Purpose

A geotechnical investigation has been completed for a medical office building to be constructed at the subject site at the northwest corner of Baxter Road and Interstate 15 in Wildomar, California. The purpose of the investigation was to summarize geotechnical and geologic conditions at the site, to assess their potential impact on the proposed development, and to develop geotechnical and engineering geologic design parameters.

1.02 Scope of the Investigation

The general scope of this investigation included the following:

- Review of published and unpublished geologic, seismic, groundwater and geotechnical literature.
- Review of prior reports prepared by Geobase, Inc., and Geocon West
- Examination of aerial photographs.
- Contacting of underground service alert to locate onsite utility lines.
- Logging, sampling and backfilling of 6 exploratory borings drilled with a CME-75 drill rig.
- Laboratory testing of representative soil samples.
- Geotechnical evaluation of the compiled data.
- Preparation of this report presenting our findings, conclusions and recommendations.

Our scope of work did not include a preliminary site assessment for the potential of hazardous materials onsite.

1.03 Site Location and Description

The proposed building site will be located in the southeast corner of the proposed Baxter Village Development within a vacant field at the northwest corner of Baxter Road and Interstate 15 in the City of Wildomar, California. The boundaries of the proposed Baxter Village are Baxter Road to the south, White Street to the west, the easterly extension of Grove Street to the north and I-15 to the east and northeast.

The proposed Medical Office Building (MOB) site is bounded by Interstate 15 to the east, Baxter Road to the south and vacant land to the north and west. The site is approximately 7.16 acres in size. Topographically, the site consists of gently rolling terrain with a shallow drainage that runs from the northeast corner of the site to the southwest. The geographic position of the building site is at Latitude 33.61322° and Longitude -117.26328°. The approximate location of the site is shown on Figure 1. Elevations range from about 1,338 feet above sea level to 1,355 feet above sea level.

The site contains three small natural drainages. The main drainage enters in the northeast portion of the site and runs through the middle of the site and exits at the southwest corner of the site. Another one enters the north side of the site and combines with the main drainage in the center of the site. The last one enters the northwest corner of the site and runs along the far west side of the site and combines with the other drainages in the southwest corner of the site. The site also contains numerous ungraded dirt roads.

Vegetation consists primarily of weeds and grasses that had been recently plowed prior to our fieldwork, a few large shrubs or small trees scattered on the site and several large trees in the southwest corner of the site and a few in the southeast corner.

1.04 Current and Past Land Usage

The proposed site is currently vacant.

Aerial photographs, as far back as 1938, indicate that the site has been vacant.

1.05 Planned Usage

It is our understanding that the proposed construction may consist of a 2-3 story building encompassing approximately 36,000 ground square feet. It is our understanding that the planned improvements to the site will also include asphalt parking and at least one stormwater basin at the southeast corner of the site. Based upon plans provided by Cannon Design, the basin is proposed to be up to 11 feet deep.

Our investigation was performed prior to the preparation of grading or foundation plans. To aid in preparation of this report, we utilized the following assumptions:

- Maximum foundation loads of 2 to 3 kips per linear foot for continuous footings and 60 kips for isolated spread footings.
- Cuts and fills will be less than 10 feet.

1.06 Investigation Methods

Our investigation consisted of office research, field exploration, laboratory testing, review of the compiled data, and preparation of this report. It has been performed in a manner consistent with generally accepted engineering and geologic principles and practices, and has incorporated applicable requirements of California Building Code. Definitions of technical terms and symbols used in this report include those of the ASTM International, the California Building Code, and commonly used geologic nomenclature.

Technical supporting data are presented in the attached appendices. Appendix A presents a description of the methods and equipment used in performing the field exploration and logs of our subsurface exploration. Appendix B presents a description of our laboratory testing and the test results. Standard grading specifications and liquefaction and seismic settlements are presented in Appendices C and D, respectively. References and Geobase report are presented in Appendices E and F, respectively.

2.00 FINDINGS

2.01 Geologic Setting

The site is located within the Elsinore Trough, an elongate sediment filled basin. The Elsinore Trough is a graben bounded by the Santa Ana Mountains on the southwest and the Perris Block on the northeast. It formed as a structural block that was lowered relative to the surrounding highlands by vertical movements along faults. The northwest trending Elsinore fault zone is the most dominate structural feature of the Elsinore Trough.

A regional geologic map of the site and nearby vicinity is presented as Figure 2.

2.02 Prior Geotechnical and Percolation Test Reports

A prior geotechnical investigation was completed for the Baxter Village development by LandMark Consulting in 2005 and a Preliminary Geotechnical and Fault Hazard Investigation report was completed by Geocon West, Inc. in 2015. In addition, a geotechnical review report of the Geocon report was completed by Geobase, Inc. in 2015 for the proposed medical office building (MOB) in the southeast portion of the Baxter Village development. We were provided a copy of the geotechnical review report by Geobase, Inc., which included a copy of the Geocon West, Inc. report and the Landmark boring logs.

According to the Geocon West report the eastern half of the Baxter Village development site is located within a Riverside County Fault Zone. They completed two fault trenches in the southeast portion of the Baxter Village site as part of their investigation. These trenches are located adjacent to the MOB site and span the entire width of the County Fault Zone. They concluded that no active faults are present at the site. According to information provided in the Geobase report from a Riverside County Parcel Report a geotechnical report for development is indicated as approved. Additionally, the reports indicate that the MOB parcel is underlain by alluvial soil, sedimentary Pauba formation sandstone bedrock and granitic bedrock. A copy of the Riverside County Parcel Report in included after Figure 8.

Geocon West also completed a Percolation Test Results Report for the Baxter Central Development, where the subject site is located in the southeast corner. They completed 2 percolation tests in the proposed southeast basin and two in the proposed northeast basin. All of the percolation tests were done in Pauba Formation Sandstone and their results indicated that the infiltration rates of 0.24 to 0.08 inches per hour in the northeast basin and 0.02 and one they indicated that was “slower than the accuracy of the Handbook” for the proposed basin in the southeast portion of the site. The tests run on the proposed basin were completed at depth of 4 and 7 feet. Based upon plans provided by Cannon Design, the proposed basin is to be up to 11 feet deep. We would anticipate that infiltration rates at the depth of the bottom of the basin to be similar or lower than those achieved in Geocon West’s testing.

Based upon Geobase’s Geologic Map and Site Plan, none of the prior borings or the fault trenches are located within the planned building footprint and only three of the borings were located in the proposed parking areas.

2.03 Earth Materials

Our subsurface investigation encountered alluvium, older alluvium, Pauba Formation sandstone and granitic bedrock.

The alluvium was found to consist of light brown to brown silty sand with some layers of brown to yellow-brown sand with silt and brown clayey sand. The alluvium that ranged from loose at the surface to dense a few feet below the surface, except in the bottom of the active drainage, where the loose soils extended up to five feet. The alluvium was mainly located in the low lying areas of the site.

The older alluvium consisted of reddish-brown or dark brown silty sand and clayey sand that was generally dense to very dense and generally exposed in the hilly portions of the site and beneath the alluvium in the low lying areas.

The Pauba formation is an early Pleistocene-age fine to coarse grained sandstone that ranged in color from yellow, yellow-brown, light gray and gray. It was generally dense and dry to wet. Groundwater, when encountered, was generally found within the sandstone. The Pauba formation was generally found below the alluvium and older alluvium, however, surface exposures were observed in the southeast corner of the site.

The granitic bedrock is a Cretaceous aged granodiorite and is not exposed at the surface at the site. Where encountered in our borings, it was at depths below 20 feet from the ground surface. It was generally black and white in color, coarse grained and very dense.

A Site Geologic Map showing the locations of our borings and approximate earth material unit contacts is presented as Figure 3. Geologic cross sections are presented as Figure 4.

The subsurface soils encountered in the exploratory borings drilled at the site are described in greater detail on the logs contained in Appendix A.

2.04 Expansive Soils

Expansion testing performed in accordance with ASTM D4829 indicates that earth materials underlying the site have an expansion classification of very low.

Results of expansion test and other soil index tests are presented in Appendix B. Since site grading will redistribute earth materials, potential expansive properties should be verified at the completion of rough grading.

2.05 Surface and Groundwater Conditions

No areas of ponding or standing water were present at the time of our study. Further, no springs or areas of natural seepage were found.

Groundwater was encountered during our subsurface exploration at depths of 10 to 21 feet below the ground surface. The variations in the depth to groundwater are due to variations in the surface topography. Elevations of the measured groundwater surface in our borings range from 1,325 to 1,332 feet above sea level. The higher groundwater elevations correspond to the drainage that enters the north side of the site, and where the Pauba formation was encountered at a lower elevation. The groundwater was mainly perched within the Pauba formation as indicated by the variable moisture contents of the samples collected in the Pauba formation, where much lower moisture contents were encountered below the measured depth of groundwater.

2.06 Faults

The site is not located within the boundaries of an Earthquake Fault Zone for fault-rupture hazard as defined by the Alquist-Priolo Earthquake Fault Zoning Act (Figure 5). The nearest Earthquake Fault Zone is located about 3,500 feet to the southwest along the Wildomar fault. However, the site is located within a County of Riverside Fault Zone that has been established along a suspected “unnamed fault in Elsinore fault zone” (Figure 6). The suspected fault is mapped through the northeast corner of the side in an area currently planned to be a parking lot. Identification of this suspected fault apparently originated from geologic mapping by Kennedy along the Elsinore fault zone, as presented in California Division of Mines and Geology Special Report 131.

A Fault Rupture Hazard Investigation was completed by Geocon West in 2015 and is included as Appendix E along with the prior Geobase Report. Their report indicates the inferred fault included in the County zone is based upon prior studies by Kennedy (1977). Their investigation included a lineament analysis, excavation of 2 fault trenches and a report of their findings.

In their photo lineament analysis Geocon indicated that they observed a lineament in the same location as the fault mapped by Kennedy in historic aerial photographs. They described it as a weak lineament that appears to coincide with what appears to be a discontinuous break in slope across some planar ridgelines.

Geocon excavated two fault trenches, one (FT-1) was 450 feet long, and the other (FT-2) t was 240 feet long. FT-1 was excavated from the eastern property line toward the southwest and roughly perpendicular to the County Fault Zone. It ranged from 5 to 9 feet deep. The trench exposed granitic bedrock in its eastern end, soil they identified as colluvium that was reddish-brown in color and finally alluvium. They identified alluvium as the surficial unit along the entire length of the trench. They concluded that the geologic units were laterally continuous and that there was no evidence which indicated faulting occurred within the units exposed in the trench. FT-1 terminated in the northeast corner of the site.

Geocon excavated FT-2 north of FT-1 to continue coverage of the fault zone in their excavation and to give further coverage to the older geologic units that they were losing in the deepening alluvium. They again encountered the same geologic units and found no evidence that would indicate faulting in the geologic units encountered. FT-2 terminated just northwest of the northwest corner of the site.

Their final conclusion was that active faults are not present on the site and that no restrictions on future development are necessary due to the hazard of fault rupture beyond the standard seismic engineering requirements. According to the County of Riverside parcel search website parcel report for APN 367-180-057, the Geocon report was approved by the County (a copy of the parcel report is included in Appendix F).

The accompanying Regional Fault Map (Figure 7) illustrates the location of the site with respect to major faults in the region. The distance to notable faults within 100 kilometers of the site is presented on Table 1.

2.07 Historic Seismicity

The nearest large historic earthquake in the vicinity of the site was the 1910 Lake Elsinore Earthquake which was epicentered approximately 10 miles from the site. The magnitude of this earthquake was approximately 6.0. However, since this event occurred prior to the development of seismic monitoring networks, its location and magnitude is only approximate.

Our research of regional geologic and seismic data did not reveal any known instances of ground failure within the site associated with regional seismic activity.

Strong earthquakes that have occurred in this region in historic time and their approximate epicentral distances are summarized in Table 2.

Seismic design parameters relative to the requirements of the 2019 California Building Code are presented in Section 3.09.

2.08 Flooding Potential

According to Federal Emergency Management Agency (2008), the site is located within Flood Zone X, which is defined as an "area of minimal flood hazard."

Control of surface runoff originating from within and outside of the site should, of course, be included in design of the project, particularly since there are natural drainages that enter the site for the north and northeast.

2.09 Landslides

Landslides were not encountered during the current subsurface investigation or during prior site grading. Topographic landforms suggestive of landslides were not apparent in the field or on aerial photographs.

Regional geologic mapping does not show landslides within the site.

3.00 CONCLUSIONS AND RECOMMENDATIONS

3.01 General Conclusion

Based on specific data and information contained in this report, our understanding of the project and our general experience in engineering geology and geotechnical engineering, it is our professional judgment that the proposed development is geologically and geotechnically feasible. This is provided that the recommendations presented below are fully implemented during design, grading and construction.

3.02 General Earthwork and Grading

All grading should be performed in accordance with the General Earthwork and Grading Specifications outlined in Appendix C, unless specifically revised or amended below. Recommendations contained in Appendix C are general specifications for typical grading projects and may not be entirely applicable to this project.

It is also recommended that all earthwork and grading be performed in accordance with Appendix J of the 2019 California Building Code and all applicable governmental agency requirements. In the event of conflicts between this report and Appendix J, this report shall govern.

3.03 Earthwork Shrinkage and Subsidence

Shrinkage is the decrease in volume of soil upon removal and recompaction expressed as a percentage of the original in-place volume. Subsidence occurs as natural ground is densified to receive fill. These factors account for changes in earth volumes that will occur during grading. Our estimates are as follows:

- Shrinkage factor = 5%-7% for older alluvium and 10%-15% for alluvium soil removed and replaced as compacted fill.
- Subsidence factor = 0.1 foot.

The degree to which fill soils are compacted and variations in the insitu density of existing soils will influence earth volume changes. Consequently, some adjustments in grades near the completion of grading could be required to balance the earthwork.

3.04 Removals and Overexcavation

All vegetation, trash and debris should be cleared from the grading area and removed from the site. Prior to placement of compacted fills, all non-engineered fills and loose, porous, or compressible soils will need to be removed down to competent ground. Removal and requirements will also apply to cut areas, if the depth of cut is not sufficient to reach competent ground. Removed and/or overexcavated soils may be moisture-conditioned and recompacted as engineered fill, except for soils containing detrimental amounts of organic material. Estimated depths of removals are as follows:

- Loose, porous and compressible native soils were encountered to depths of about 2 to 5 feet below existing grades and particularly in the low lying areas of the site. The average depth of removal of these soils is expected to be 3 feet with some local areas extending to 5-6 feet below the existing ground surface particularly in the low lying areas of the site.

In addition to the above requirements, overexcavation will also need to meet the following criteria for the building pads, concrete flatwork and pavement areas:

- All footing areas, both continuous and spread, shall be undercut, moistened, and compacted as necessary to produce soils compacted to a minimum of 90% relative compaction to a depth equal to the width of the footing below the bottom of the footing or to a depth of 3 feet below the bottom of the footing, whichever is less. Footing areas shall be defined as the area extending from the edge of the footing for a distance of 5 feet.

- All floor slabs, concrete flatwork and paved areas shall be underlain by a minimum of 12 inches of soil compacted to a minimum of 90% relative compaction.

The exposed soils beneath all overexcavation should be scarified an additional 12 inches, moisture conditioned and compacted to a minimum of 90% relative compaction.

The above recommendations are based on the assumption that soils encountered during field exploration are representative of soils throughout the site. However, there can be unforeseen and unanticipated variations in soils between points of subsurface exploration. Hence, overexcavation depths must be verified, and adjusted if necessary, at the time of grading. The overexcavated materials may be moisture-conditioned and re-compacted as engineered fill.

3.05 Rippability and Rock Disposal

Our exploratory borings were advanced without difficulty and no oversize materials were encountered in our subsurface investigation. Accordingly we expect that all earth materials will be rippable with conventional heavy duty grading equipment and oversized materials are not expected.

3.06 Subdrains

Surface water was not present at the time of our investigation. Ground water was encountered in our Borings at elevations of 1,325 to 1,332 above sea level and the site contains an ephemeral drainage. However, this is well below the anticipated depths of grading. Consequently, installation of canyon subdrains may not be necessary. However, this should be re-evaluated once a grading plan is available and at the time of grading.

3.07 Fill and Cut Slopes

Fill and cut slopes, if necessary, should be constructed at inclinations of 2 horizontal to 1 vertical or flatter.

Due to the low gradient of the property, it appears that construction of cut and fill slopes will not be required. If such slopes are proposed, they should be inclined no steeper than 2 horizontal to 1 vertical.

3.08 Faulting

Since the site is not located within the boundaries of an Earthquake Fault Zone and no faults are known to pass through the property, surface fault rupture within the site is considered unlikely. Additionally, based upon conclusions in Geocon West's Fault Rupture Hazard Investigation of the Riverside County Fault Zone that they did not find indications of past faulting or active faults within the onsite County Fault Zone, fault rupture along the "unnamed fault in Elsinore fault zone" is considered unlikely also.

3.09 Seismic Design Parameters

The potential damaging effects of regional earthquake activity must be considered in the design of structures.

Mapped seismic design parameters have been developed in accordance with Section 1613 of the 2019 California Building Code (CBC) using the online U.S. Geological Survey Seismic Design Maps Calculator (ASCE 10 Standard), a site location based on latitude and longitude, and site characterization as Site Class D based on our preliminary geotechnical investigation.

The parameters generated for the subject site are presented below:

2019 California Building Code (CBC) Seismic Parameters

Parameter	Value
Site Location	Latitude = 33.61322 degrees Longitude = -117.26328 degrees
Site Class	Site Class = D Soil Profile Name = Stiff soil
Mapped Spectral Accelerations (Site Class B)	S_s (0.2- second period) = 1.668g S_1 (1-second period) = 0.619g
Site Coefficients (Site Class D)	F_a = 1.00 F_v = 1.70
Risk-Targeted Maximum Considered Earthquake Spectral Accelerations (Site Class D)	S_{MS} (0.2- second period) = 1.668g S_{M1} (1-second period) = 1.052g
Risk-Targeted Design Earthquake Spectral Accelerations (Site Class D)	S_{DS} (0.2- second period) = 1.112g S_{D1} (1-second period) = 0.702g
Seismic Design Category	D

The calculated value of S_1 is greater than 0.2g. Therefore, a site-specific ground motion analysis is required per ASCE7-16, Section 11.4.8 unless the proposed structure is exempted from site-specific analysis per Exception 2, Section 11.4.8. Hence the seismic response coefficient Cs should be calculated to determine if Exception 2 in

Section 11.4.8 is applicable or if a site-specific ground motion analysis is required.

The above table shows that the mapped spectral response acceleration parameter a 1-second period (S_1) < 0.75g and spectral response acceleration parameters are S_{DS} > 0.50g and S_{D1} > 0.20g. Therefore, the Seismic Design Category per Tables 1613.2.5(1) and 1613.2.5(2) is D for all Risk Categories (CBC Section 1613.2.5). Consequently, as required for Seismic Design Categories C through F by CBC Section 1803.5.11, slope instability, liquefaction, total and differential settlement, and surface displacement by faulting or seismically lateral spreading or lateral flow have been evaluated. Applicable portions of CBC Section 1803.5.12 have also been evaluated including dynamic lateral loading of retaining walls.

Peak earthquake ground acceleration adjusted for site class effects (PGA_M) has been calculated in accordance with ASCE 7-16 Section 11.8.3 as follows: $PGA_M = F_{PGA} \times PGA = 1.1 \times 0.726 = 0.799$ g.

3.10 Liquefaction and Secondary Earthquake Hazards

Potential secondary seismic hazards that can affect land development projects include liquefaction, tsunamis, seiches, seismically induced settlement, seismically induced flooding and seismically induced landsliding.

Liquefaction

Liquefaction is a phenomenon where earthquake-induced ground motions increase the pore pressure in saturated, sand-like soils until it is equal to the confining, overburden pressure. When this occurs, the soil can completely lose its shear strength and enter a liquefied state. The possibility of liquefaction is dependent upon grain size, plasticity index, relative density, confining pressure, saturation of the soils, and intensity and duration of ground motion. In order for liquefaction to occur, three criteria must be met: underlying loose, coarse sand-like soils, a groundwater depth of less than about 50 feet, and a potential for seismic shaking from nearby large-magnitude earthquake.

According to the County of Riverside, the site is located within an area potentially susceptible to liquefaction (Figure 8). However, the California Geological Survey has not yet prepared a Seismic Hazard Zone Map of potential liquefaction hazards for the quadrangle in which the site is located.

Conditions favorable to the occurrence of liquefaction at the site include the potential for intense ground shaking from regional seismic activity and the occurrence of groundwater within 10 feet of the ground surface. Calculations of liquefaction potential, which are presented in Appendix D, indicate that the soil just above the Pauba formation and below design ground water table may liquefy. Liquefaction triggering was evaluated using the method by Youd et al, NCEER (2001) as implemented by the commercially available computer program LiquefyPro v5.8 (CivilTech 2012). Ground motions parameters used in the evaluation included the PGA_M=0.799g (Section 3.09) and magnitude M_w=7.71 (evaluated from deaggregation analysis using the USGS interactive website, see Appendix D).

Tsunamis and Seiches

Tsunamis are sea waves that are generated in response to large-magnitude earthquakes. When these waves reach shorelines, they sometimes produce coastal flooding. Seiches are the oscillation of large bodies of standing water, such as lakes, that can occur in response to ground shaking. Tsunamis and seiches do not pose hazards due to the inland location of the site and lack of nearby bodies of standing water.

Seismically Induced Settlement

Seismically induced settlement occurs most frequently in areas underlain by loose, granular sediments. Damage as a result of seismically induced settlement is most dramatic when differential settlement occurs in areas with large variations in the thickness of underlying sediments. Settlement caused by ground shaking is often non-uniformly distributed, which can result in differential settlement.

Seismic settlement was evaluated using an empirical method developed by Tokimatsu and Seed (1987) as implemented by the commercially available computer program LiquefyPro v5.8 (CivilTech 2012). We used the same seismic parameters PGA_M and M_w as used in the liquefaction triggering evaluation. This method is based on site-specific SPT blow count and grain size data obtained from our borings. We estimate 1 ½ -inch of total seismically induced ground settlement may occur at the site. In our opinion, differential seismic settlement may be taken as one-half of the computed total seismic settlement. Calculations of seismically induced settlements are presented in Appendix D.

Seismically Induced Flooding

According to the Riverside County online maps (Map My county database), the site is not located within a potential dam inundation area. In addition, there are no up gradient water reservoirs or dams located in close proximity of the site. Consequently seismically induced flooding at the site is unlikely.

Seismically Induced Landsliding

Due to the low gradient of the site, the potential for seismically induced landsliding is nil. This assumes that any slopes created during development of the site will be properly designed and constructed. It should be noted that the California Geological Survey has not yet prepared a Seismic Hazard Zone Map of potential earthquake-induced landslide hazards for the quadrangle in which the site is located.

3.11 Foundations

Isolated spread footings and/or continuous wall footings are recommended to support the proposed structures. If the recommendations in the section on grading are followed and footings are established in firm native soils or compacted fill materials, footings may be designed using the following allowable soil bearing values:

- Continuous Wall Footings:

  Footings having a minimum width of 12 inches and a minimum depth of 12 inches below the lowest adjacent grade have allowable bearing capacity of 3,000 pounds per square foot (psf). This value may be increased by 10% for each additional foot of width and/or depth to a maximum value of 4,000 psf.

- Isolated Spread Footings:

  Footings having a minimum width of 24 inches and a minimum depth of 12 inches below the lowest adjacent grade have allowable bearing capacity of 3,000 psf. This value may be increased by 10% for each additional foot of width or depth to a maximum value of 4,000 psf.

- Retaining Wall Footings:

  Footings for retaining walls should be founded a minimum depth of 12 inches and have a minimum width of 12 inches. Footings may be designed using the allowable bearing capacity and lateral resistance values recommended for building footings. However, when calculating passive resistance, the upper 6 inches of the footings should be ignored in areas where the footings will not be covered with concrete flatwork. This value may also be increased by 10% for each additional foot of width or depth to a maximum value of 4,000 psf. Reinforcement should be provided for structural considerations as determined by the design engineer.

The above bearing capacities represent an allowable net increase in soil pressure over existing soil pressure and may be increased by one-third for short-term wind or seismic loads. The maximum expected settlement of footings designed with the recommended allowable bearing capacity is expected to be on the order of ½ inch with differential settlement on the order of ¼ inch.

Expansion testing indicates near surface soils at the site have a few low expansion potential. Therefore, reinforcement of footings for expansive soil is not required. Due to the preliminary nature of the expansion tests performed for this study, we recommend additional testing be performed near the completion of rough grading to verify the test results and recommended foundation design criteria.

3.12 Foundation Setbacks from Slopes

Setbacks for footings adjacent to slopes should conform to the requirements of the California Building Code. Specifically, footings should maintain a horizontal distance or setback between any adjacent slope face and the bottom outer edge of the footing.

For slopes descending away from the foundation, the horizontal distance may be calculated by using h/3, where h is the height of the slope. The horizontal setback should not be less than 5 feet, nor need not be greater than 40 feet per the California Building Code. Where structures encroach within the zone of h/3 from the top of the slope the setback may be maintained by deepening the foundations. Flatwork and utilities within the zone of h/3 from the top of slope may be subject to lateral distortion caused by gradual downslope creep. Walls, fences and landscaping improvements constructed at the top of descending slopes should be designed with consideration of the potential for gradual downslope creep.

For ascending slopes, the horizontal setback required may be calculated by using h/2 where h is the height of the slope. The horizontal setback need not be greater than 15 feet per the California Building Code.

3.13 Slabs on Grade

Concrete floors with a minimum thickness of 4 inches are recommended for slabs on grade for the proposed building, considering normal floor loading conditions. However, if heavy concentrated or moving loads are anticipated, slabs should be designed using a modulus of subgrade reaction (k) of 150 Kip/ft^2/ft when soils are prepared in conformance with the grading recommendations contained within the report.

Special care should be taken on floors slabs to be covered with thin-set tile or other inflexible coverings. These areas may be reinforced with 6x6-10/10 welded wire fabric placed at mid-height of the slab, to mitigate drying shrinkage cracks. Alternatively, inflexible flooring may be installed with unbonded fabric or liners to prevent reflection of slab cracks through the flooring.

A moisture vapor retarder/barrier is recommended beneath all slabs-on-grade that will be covered by moisture-sensitive flooring materials such as vinyl, linoleum, wood, carpet, rubber, rubber-backed carpet, tile, impermeable floor coatings, adhesives, or where moisture-sensitive equipment, products, or environments will exist. We recommend that design and construction of the vapor retarder or barrier conform to Section 1805 of the 2019 California Building Code (CBC) and pertinent sections of American Concrete Institute (ACI) guidance documents 302.1R-04, 302.2R-06 and 360R-10.

The moisture vapor retarder/barrier should consist of a minimum 10 mils thick polyethylene with a maximum perm rating of 0.3 in accordance with ASTM E 1745. Seams in the moisture vapor retarder/barrier should be overlapped no less than 6 inches or in accordance with the manufacturer's recommendations. Joints and penetrations should be sealed with the manufacturer's recommended adhesives, pressure-sensitive tape, or both. The contractor must avoid damaging or puncturing the vapor retarder/barrier and repair any punctures with additional polyethylene properly lapped and sealed.

ACI guidelines allow for the placement of moisture vapor retarder/barriers either directly beneath floor slabs or below an intermediate granular soil layer.

Placing the moisture retarder/barrier directly beneath the floor slab will provide improved curing of the slab bottom and will eliminate potential problems caused by water being trapped in a granular fill layer. Concrete slabs poured directly on a vapor retarder/barrier can experience shrinkage cracking and curling due to differential rates of curing through the thickness of the slab. Therefore, for concrete placed directly on the vapor retarded, we recommend a maximum water cement ratio of 0.45 and the use of water-reducing admixtures to increase workability and decrease bleeding.

If granular soil is placed over the vapor retarder/barrier, we recommend that the layer be at least 2 inches thick in accordance with traditional practice in southern California. Granular fill should consist of clean fine graded materials with 10 to 30% passing the No. 100 sieve and free from clay or silt. The granular layer should be uniformly compacted and trimmed to provide the full design thickness of the proposed slab. The granular fill layer should not be left exposed to rain or other sources of water such as wet-grinding, power washing, pipe leaks or other processes, and should be dry at the time of concrete placement. Granular fill layers that become saturated should be removed and replaced prior to concrete placement.

An additional layer of sand may be placed beneath the vapor retarder/barrier at the developer's discretion to minimize the potential of the retarder/barrier being punctured by underlying soils.

3.14 Miscellaneous Concrete Flatwork

Miscellaneous concrete flatwork and walkways may be designed with a minimum thickness of 4 inches. Large slabs should be reinforced with a minimum of 6x6-10/10 welded wire mesh placed at mid-height in the slab. Control joints should be constructed to create squares or rectangles with a maximum spacing of 15 feet.

Walkways may be constructed without reinforcement. Walkways should be separated from foundations with a thick expansion joint filler. Control joints should be constructed into non-reinforced walkways at a maximum of 5 feet spacing.

The subgrade soils beneath all miscellaneous concrete flatwork should be compacted to a minimum of 90 percent relative compaction for a minimum depth of 12 inches. The geotechnical engineer should monitor the compaction of the subgrade soils and perform testing to verify that proper compaction has been obtained.

3.15 Footing Excavation and Slab Preparations

All footing excavations should be observed by the geotechnical consultant to verify that they have been excavated into competent soils. The foundation excavations should be observed prior to the placement of forms, reinforcement steel, or concrete. These excavations should be evenly trimmed and level. Prior to concrete placement, any loose or soft soils should be removed. Excavated soils should not be placed on slab or footing areas unless properly compacted.

Prior to the placement of the moisture barrier and sand, the subgrade soils underlying the slab should be observed by the geotechnical consultant to verify that all under-slab utility trenches have been properly backfilled and compacted, that no loose or soft soils are present, and that the slab subgrade has been properly compacted to a minimum of 90 percent relative compaction within the upper 12 inches.

Footings may experience and overall loss in bearing capacity or an increased potential to settle where located in close proximity to existing or future utility trenches. Furthermore, stresses imposed by the footings on the utility lines may cause cracking, collapse and/or a loss of serviceability. To reduce this risk, footings should extend below a 1:1 plane projected upward from the closest bottom of the trench.

3.16 Lateral Load Resistance

Lateral loads may be resisted by soil friction and the passive resistance of the soil. The following parameters are recommended.

- Passive Earth Pressure = 360 pcf (equivalent fluid weight).
- Coefficient of Friction (soil to footing) = 0.34
- Retaining structures should be designed to resist the following lateral active earth pressures:

Surface Slope of Retained Materials (Horizontal:Vertical)	Equivalent Fluid Weight (pcf)
Level	48
5:1	51
4:1	53
3:1	58
2:1	86

These active earth pressures are only applicable if the retained earth is allowed to strain sufficiently to achieve the active state. The required minimum horizontal strain to achieve the active state is approximately 0.0025H. Retaining structures should be designed to resist an at-rest lateral earth pressure if this horizontal strain cannot be achieved.

- At-rest Lateral Earth Pressure = 70 pcf (equivalent fluid weight)

The Mononobe-Okabe method is commonly utilized for determining seismically induced active and passive lateral earth pressures and is based on the limit equilibrium Coulomb theory for static stress conditions. This method entails three fundamental assumptions (e.g., Seed and Whitman, 1970): Wall movement is sufficient to ensure either active or passive conditions, the driving soil wedge inducing the lateral earth pressures is formed by a planar failure surface starting at the heel of the wall and extending to the free surface of the backfill, and the driving soil wedge and the retaining structure act as rigid bodies, and therefore, experiences uniform accelerations throughout the respective bodies (U.S. Army Corps of Engineers, 2003, Engineering and Design - Stability Analysis of Concrete Structures).

- Seismic Lateral Earth Pressure = 30 pcf (equivalent fluid weight).

The seismic lateral earth pressure given above is an inverted triangle, and the resultant of this pressure is an increment of force which should be applied to the back of the wall in the upper 1/3 of the wall height.

Per CBC Section 1803.5.12 dynamic seismic lateral earth pressures shall be applied to foundation walls and retaining walls supporting more than 6 feet of backfill. Dynamic seismic lateral earth pressures may also be applied to shorter walls at the discretion of the structural engineer.

3.17 Drainage and Moisture Proofing

Surface drainage should be directed away from the proposed structure into suitable drainage devices. Neither excess irrigation nor rainwater should be allowed to collect or pond against building foundations or within low-lying or level areas of the lot. Surface waters should be diverted away from the tops of slopes and prevented from draining over the top of slopes and down the slope face.

Walls and portions thereof that retain soil and enclose interior spaces and floors below grade should be waterproofed and dampproofed in accordance with CBC Section 1805.

Retaining structures should be drained to prevent the accumulation of subsurface water behind the walls. Backdrains should be installed behind all retaining walls exceeding 3 feet in height. A typical detail for retaining wall back drains is presented in Appendix C. All backdrains should be outlet to suitable drainage devices. Retaining wall less than 3 feet in height should be provided with backdrains or weep holes. Dampproofing and/or waterproofing should also be provided on all retaining walls exceeding 3 feet in height.

3.18 Cement Type and Corrosion Potential

Soluble sulfate tests indicate that concrete at the subject site will have a negligible exposure to water-soluble sulfate in the soil. Our recommendations for concrete exposed to sulfate-containing soils are presented in the table below.

Recommendations for Concrete exposed to Sulfate-containing Soils

Sulfate Exposure	Water Soluble Sulfate (SO_4) in Soil (% by Weight)	Sulfate (SO_4) in Water (ppm)	Cement Type (ASTM C150)	Maximum Water-Cement Ratio (by Weight)	Minimum Compressive Strength (psi)
Negligible	0.00 - 0.10	0-150	--	--	2,500
Moderate	0.10 - 0.20	150-1,500	II	0.50	4,000
Severe	0.20 - 2.00	1,500-10,000	V	0.45	4,500
Very Severe	Over 2.00	Over 10,000	V plus pozzolan or slag	0.45	4,500

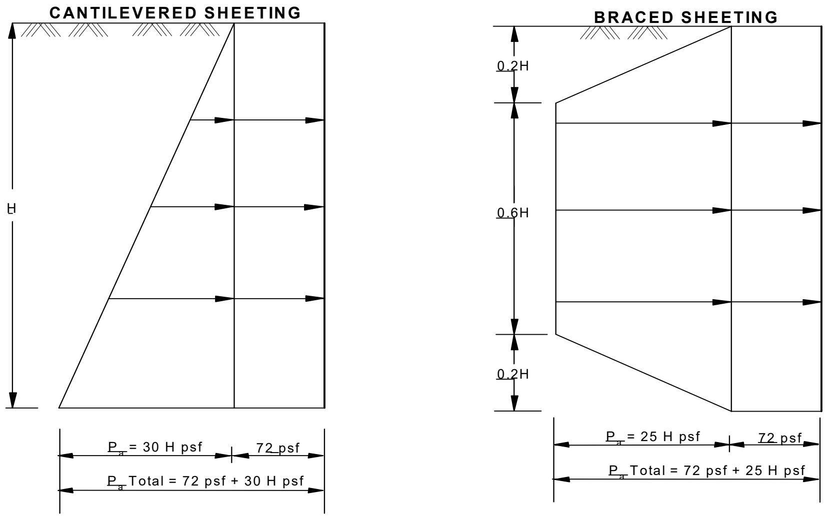
Use of alternate combinations of cementitious materials may be permitted if the combinations meet design recommendations contained in American Concrete Institute guideline ACI 318-11.

The soils were also tested for soil reactivity (pH), electrical resistivity (ohm-cm) and chloride content. The test results indicate that the on-site soils have a soil reactivity of 7.4, an electrical resistivity of 5,700 ohm-cm, and a chloride content of 113 ppm. A neutral or non-corrosive soil has a soil reactivity value ranging from 5.5 to 8.4. Generally, soils that could be considered moderately corrosive to ferrous metals have resistivity values of about 3,000 ohm-cm to 10,000 ohm-cm. Soils with resistivity values less than 3,000 ohm-cm can be considered corrosive and soils with resistivity values less than 1,000 ohm-cm can be considered extremely corrosive. Soil with a chloride content of 500 ppm or greater are generally considered corrosive.

Based on our preliminary analysis, it appears that the underlying onsite soils are moderately corrosive to ferrous metals. Protection of buried pipes utilizing coatings on all underground pipes; clean backfills and a cathodic protection system can be effective in controlling corrosion. As RMA Group, Inc. does not practice corrosion engineering, a qualified corrosion engineer may be consulted to further assess the corrosive properties of the soil.

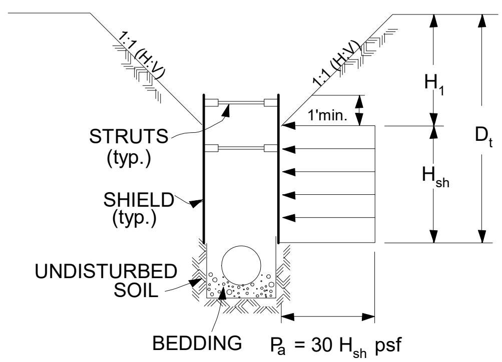
3.19 Temporary Slopes

Excavation of utility trenches will require either temporary sloped excavations or shoring. Temporary excavations in existing alluvial soils may be safely made at an inclination of 1:1 or flatter. If vertical sidewalls are required in excavations greater than 5 feet in depth, the use of cantilevered or braced shoring is recommended. Excavations less than 5 feet in depth may be constructed with vertical sidewalls without shoring or shielding. Our recommendations for lateral earth pressures to be used in the design of cantilevered and/or braced shoring are presented below. These values incorporate a uniform lateral pressure of 72 psf to provide for the normal construction loads imposed by vehicles, equipment, materials, and workmen on the surface adjacent to the trench excavation. However, if vehicles, equipment, materials, etc., are kept a minimum distance equal to the height of the excavation away from the edge of the excavation, this surcharge load need not be applied.



SHORING DESIGN: LATERAL SHORING PRESSURES

Design of the shield struts should be based on a value of 0.65 times the indicated pressure, Pa, for the approximate trench depth. The wales and sheeting can be designed for a value of 2/3 the design strut value.



HEIGHT OF SHIELD, H_{sh} = DEPTH OF TRENCH, D_t , MINUS DEPTH OF SLOPE, H_1

TYPICAL SHORING DETAIL

Placement of the shield may be made after the excavation is completed or driven down as the material is excavated from inside of the shield. If placed after the excavation, some overexcavation may be required to allow for the shield width and advancement of the shield. The shield may be placed at either the top or the bottom of the pipe zone. Due to the anticipated thinness of the shield walls, removal of the shield after construction should have negligible effects on the load factor of pipes. Shields may be successively placed with conventional trenching equipment.

Vehicles, equipment, materials, etc. should be set back away from the edge of temporary excavations a minimum distance of 15 feet from the top edge of the excavation. Surface waters should be diverted away from temporary excavations and prevented from draining over the top of the excavation and down the slope face. During periods of heavy rain, the slope face should be protected with sandbags to prevent drainage over the edge of the slope, and a visqueen liner placed on the slope face to prevent erosion of the slope face.

Periodic observations of the excavations should be made by the geotechnical consultant to verify that the soil conditions have not varied from those anticipated and to monitor the overall condition of the temporary excavations over time. If at any time during construction conditions are encountered which differ from those anticipated, the geotechnical consultant should be contacted and allowed to analyze the field conditions prior to commencing work within the excavation.

Cal/OSHA construction safety orders should be observed during all underground work.

3.20 Soil Infiltration Testing

Geocon West completed a Percolation Test Results Report in 2019 for the Baxter Central Development, where the subject site is located in the southeast corner. They completed 2 percolation tests in the proposed southeast basin and two in the proposed northeast basin. All of the percolation tests were done in Pauba Formation Sandstone and their results indicated that the infiltration rates of 0.24 to 0.08 inches per hour in the northeast basin and 0.02 and one they indicated that was “slower than the accuracy of the Handbook” for the proposed basin in the southeast portion of the site. The tests run on the proposed basin were completed at depth of 4 and 7 feet. Based upon plans provided by Cannon Design, the proposed basin is to be up to 11 feet deep. We would anticipate that infiltration rates at the depth of the bottom of the basin to be similar or lower than those achieved in Geocon West’s testing.

3.21 Utility Trench Backfill

The onsite fill soils will not be suitable for use as pipe bedding for buried utilities. All pipes should be bedded in a sand, gravel or crushed aggregate imported material complying with the requirements of the Standard Specifications for Public Works Construction Section 217. Crushed rock products that do not contain appreciable fines should not be utilized as pipe bedding and/or backfill. Bedding materials should be densified to at least 90% relative compaction (ASTM D1557) by mechanical methods. The geotechnical consultant should review and approve of proposed bedding materials prior to use.

All utility trench backfill within street right of way, utility easements, under or adjacent to sidewalks, driveways, or building pads should be observed and tested by the geotechnical consultant to verify proper compaction. Trenches excavated adjacent to foundations should not extend within the footing influence zone defined as the area within a line projected at a 1:1 drawn from the bottom edge of the footing. Trenches crossing perpendicular to foundations should be excavated and backfilled prior to the construction of the foundations. The excavations should be backfilled in the presence of the geotechnical engineer and tested to verify adequate compaction beneath the proposed footing.

Cal/OSHA construction safety orders should be observed during all underground work.

3.22 Pavement Sections

R-value tests were performed on anticipated subgrade soils at the site in order to provide information on their soil properties for design of pavement structural sections. Structural sections were designed using the procedures outlined in Chapter 630 of the California Highway Design Manual (Caltrans, 2017). This procedure uses the principle that the pavement structural section must be of adequate thickness to distribute the load from the design traffic index (TI) to the subgrade soils in such a manner that the stresses from the applied loads do not exceed the strength of the soil (R-value). The proposed pavement section below is based upon tests of the soil collected during our investigation. Based upon the topography of the site import soil will most likely be needed to achieve finish grades at the site. These import soils could change the R-value of the ultimate subgrade soils, therefore we would recommend that samples be collected of the subgrade soils when the site is at or near finish grade and a final pavement section be calculated based upon the actual subgrade soils.

Development of the design traffic indexes on the basis of a traffic study is beyond the scope of this report; however, our experience indicates that traffic indexes of 7 is typical for traffic lanes and 5 is typical for parking lots. We have provided structural sections for each traffic index. Selection of the final pavement structural section should be based on economic considerations which are beyond the scope of this investigation. Recommended structural sections are as follows:

- <u>Traffic Lanes including Truck Lanes (TI=7, R-Value=18):</u>
  6.5 inches of asphaltic concrete over
  8.0 inches of crushed aggregate base

- <u>Light Auto Parking Lot (TI=5, R-Value=18):</u>
  4.0 inches of asphaltic concrete over
  6.5 inches of crushed aggregate base

Portland cement concrete (PCC) pavements for areas which are not subject to traffic loads may be designed with a minimum thickness of 4.0 inches of Portland cement concrete on compacted native soils. If traffic loads are anticipated, PCC pavements should be designed for a minimum thickness of 6.0 inches of Portland cement concrete on 4.0 inches of crushed aggregate base.

Prior to paving, the subgrade soils should be scarified and the moisture adjusted to within 2% of the optimum moisture content. The subgrade soils should be compacted to a minimum of 90% relative compaction. All aggregate base courses should be compacted to a minimum of 95% relative compaction.

3.23 Plan Review

Once a formal grading and foundation plans are prepared for the subject property, this office should review the plans from a geotechnical viewpoint, comment on changes from the plan used during preparation of this report and revise the recommendations of this report where necessary.

3.24 Geotechnical Observation and Testing During Rough Grading

The geotechnical engineer should be contacted to provide observation and testing during the following stages of grading:

- During the clearing and grubbing of the site.
- During the demolition of any existing structures, buried utilities or other existing improvements.
- During excavation and overexcavation of compressible soils.
- During all phases of grading including ground preparation and filling operations.

- When any unusual conditions are encountered during grading.

A final geotechnical report summarizing conditions encountered during grading should be submitted upon completion of the rough grading operations.

3.25 Post-Grading Geotechnical Observation and Testing

After the completion of grading the geotechnical engineer should be contacted to provide additional observation and testing during the following construction activities:

- During trenching and backfilling operations of buried improvements and utilities to verify proper backfill and compaction of the utility trenches.
- After excavation and prior to placement of reinforcing steel or concrete within footing trenches to verify that footings are properly founded in competent materials.
- During fine or precise grading involving the placement of any fills underlying driveways, sidewalks, walkways, or other miscellaneous concrete flatwork to verify proper placement, mixing and compaction of fills.
- When any unusual conditions are encountered during construction.

4.00 Closure

The findings, conclusions and recommendations in this report were prepared in accordance with generally accepted engineering and geologic principles and practices. No other warranty, either expressed or implied, is made. This report has been prepared for Medical Office Building at Baxter Village to be used solely for design purposes. Anyone using this report for any other purpose must draw their own conclusions regarding required construction procedures and subsurface conditions.

The geotechnical and geologic consultant should be retained during the earthwork and foundation phases of construction to monitor compliance with the design concepts and recommendations and to provide additional recommendations as needed. Should subsurface conditions be encountered during construction that are different from those described in this report, this office should be notified immediately so that our recommendations may be re-evaluated.

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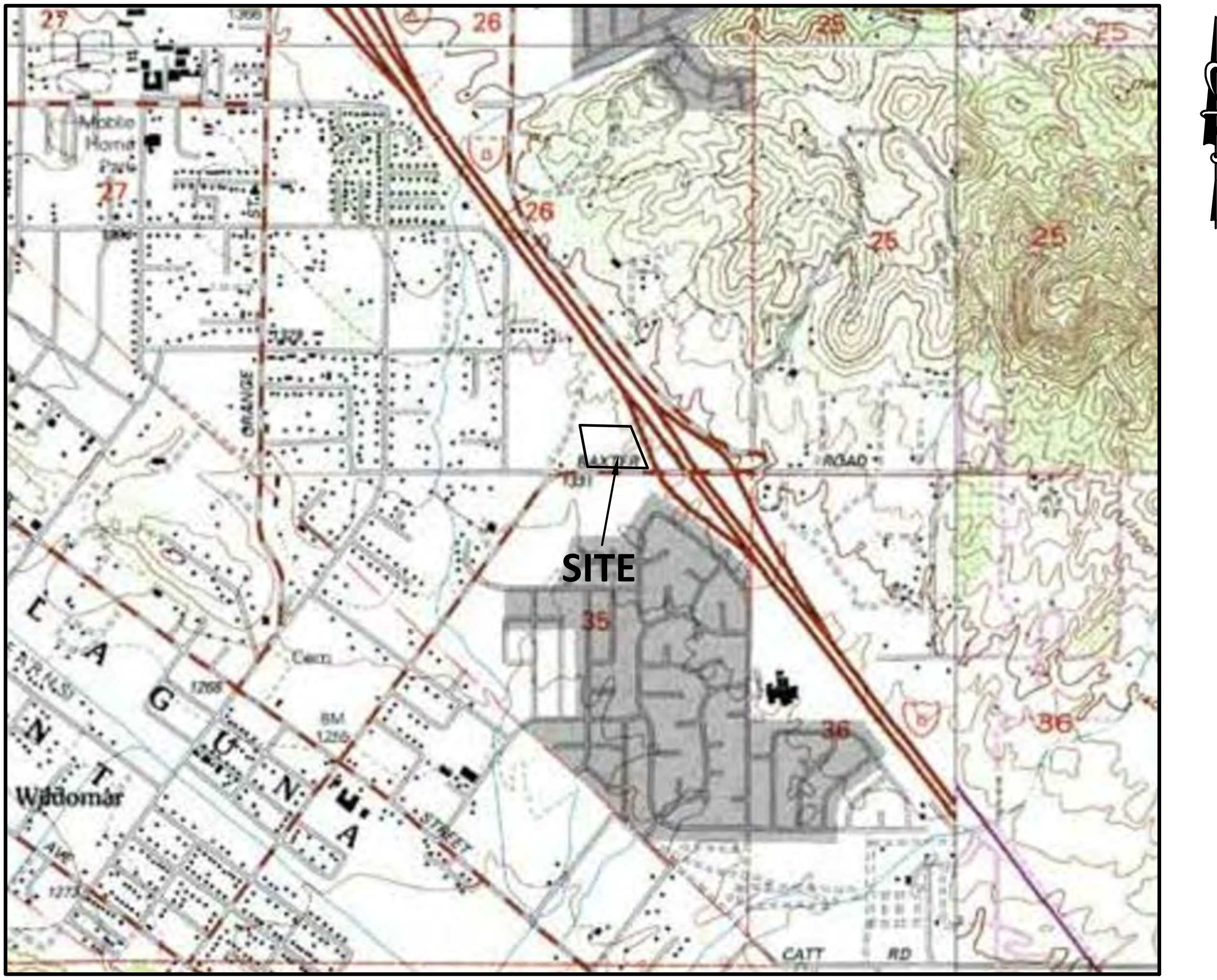
FIGURES AND TABLES



SITE LOCATION MAP

Scale: 1" = 2000'

Base Map: U.S. Geological Survey, 1997, Wildomar 7.5' Quadrangle,

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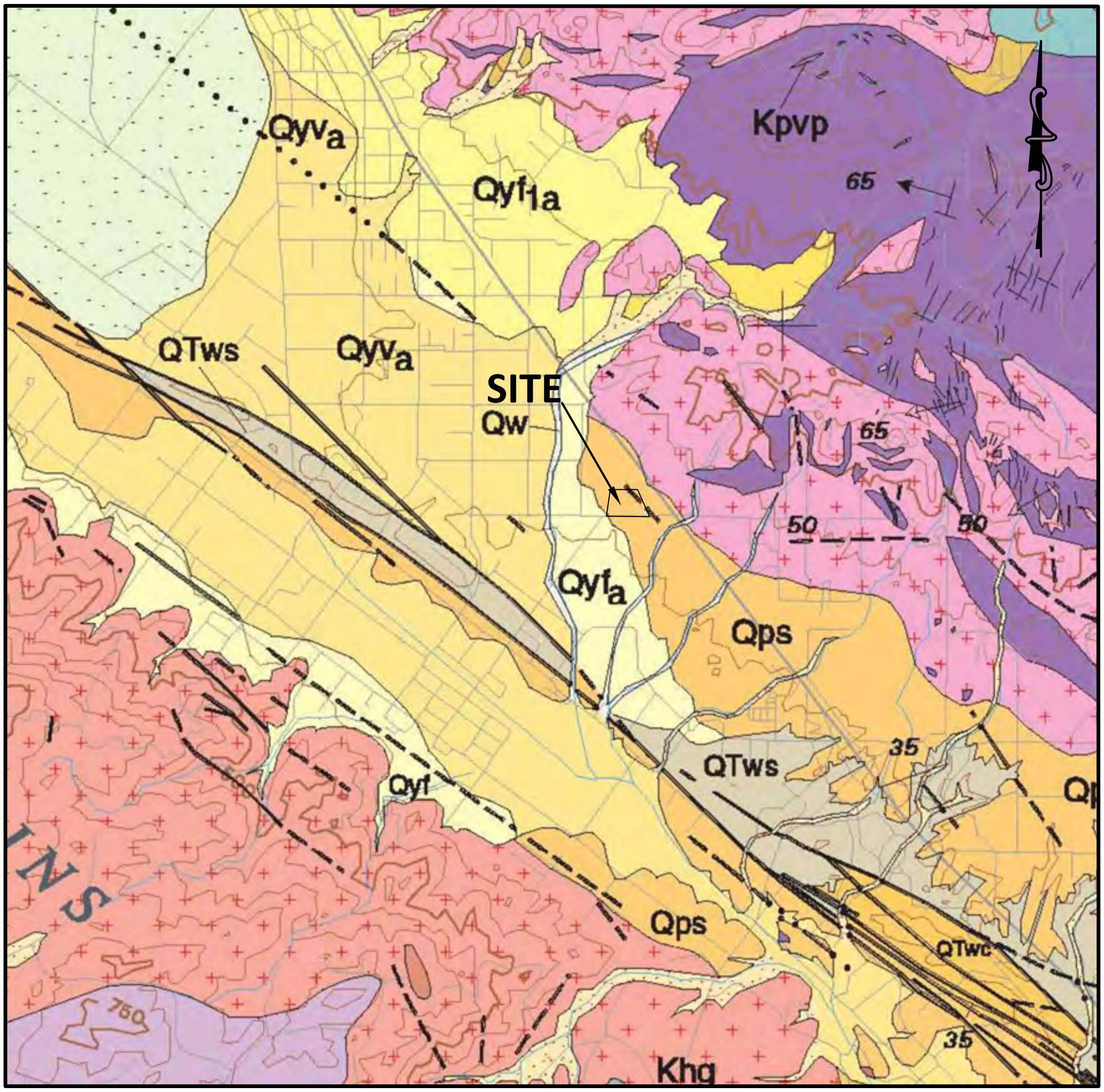
GEOTECHNICAL CONSULTANTS



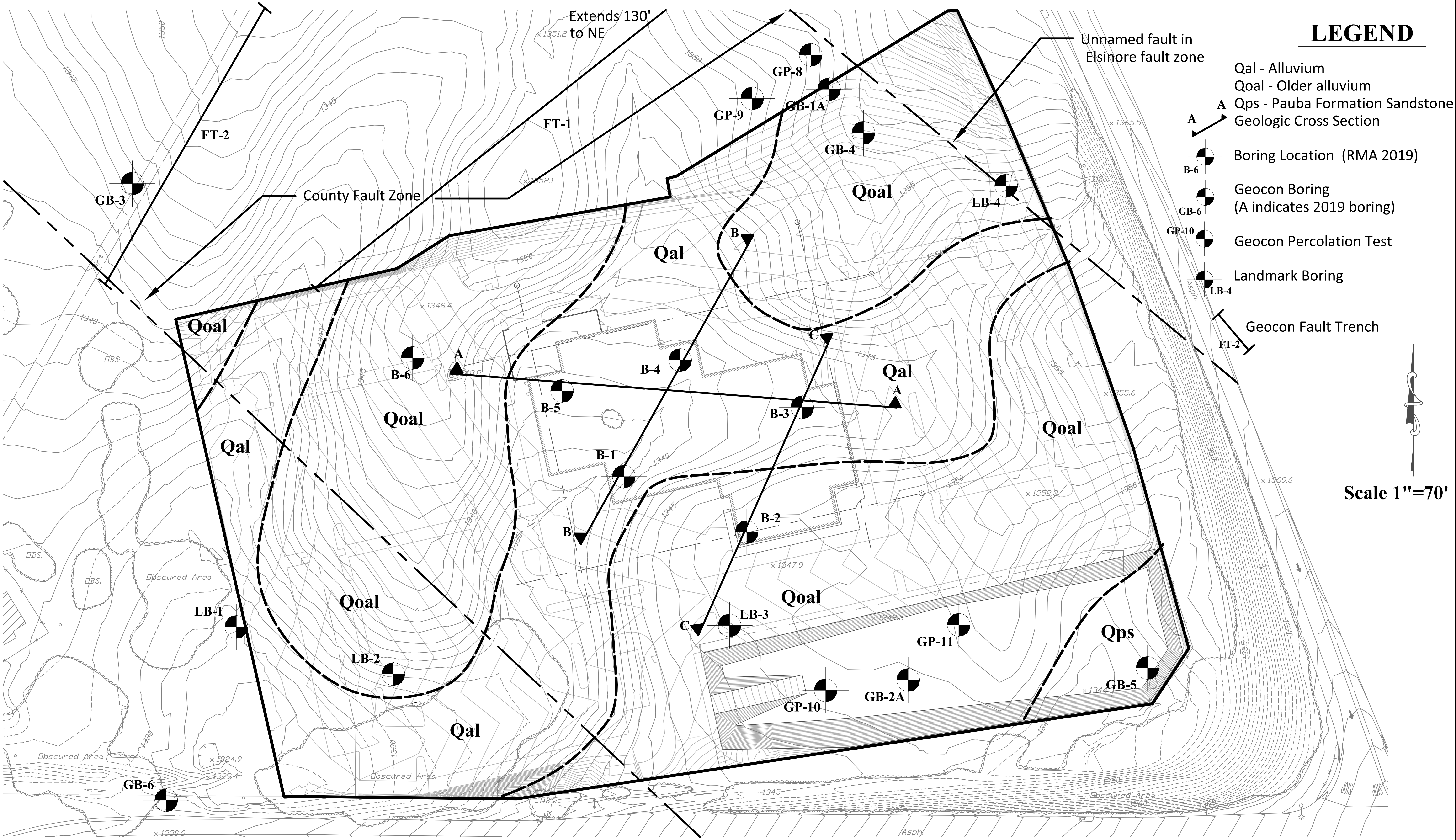
REGIONAL GEOLOGIC MAP

Scale: 1" ≈ 4,000'

Partial Legend

Qyf, Qyv - Young alluvial deposits
Qof - Older alluvium
Qps - Pauba Formation sandstone
Qtws - Wildomar sandstones
Kgb, Kpvg, Kpvt - Granitic rocks

Source: Morton, M.M. & Matti J.C., Geologic Map of the San Bernardino and Santa Ana 30 x 60-Minute Quadrangles, California, 2006.



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GEOTECHNICAL ENGINEERING CONSTRUCTION INSPECTION MATERIALS TESTING

PLAN CHANGES

ITEM	DESCRIPTION	BY	DATE

BASE MAP PROVIDED BY:
Cannon Design

DRAWN BY: KRD

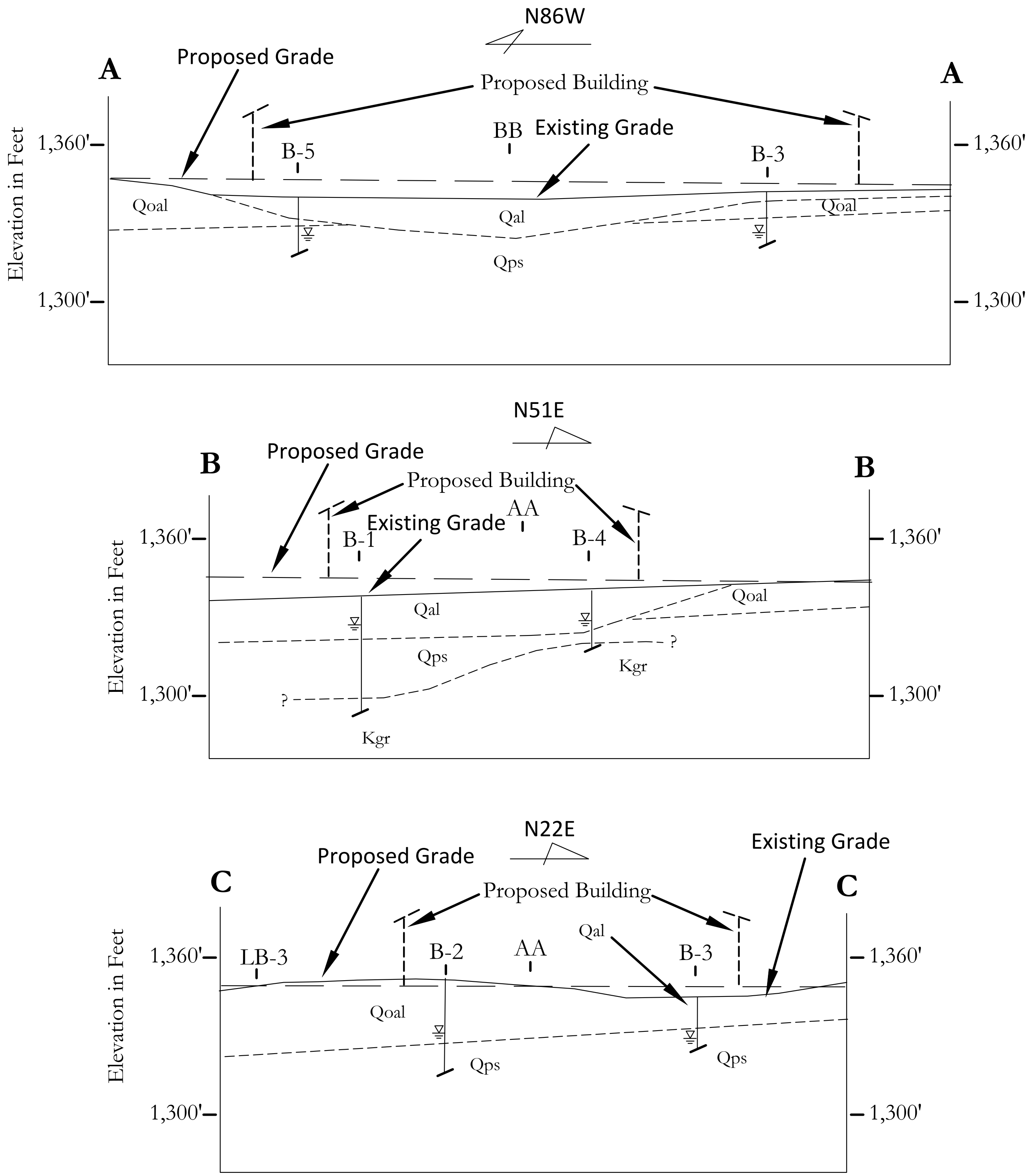
DATE: December 2019

Medical Office Building at
Baxter Village
NW Baxter Road and Interstate 15
Wildomar, CA

RMA JOB NO.: 19-1135-01

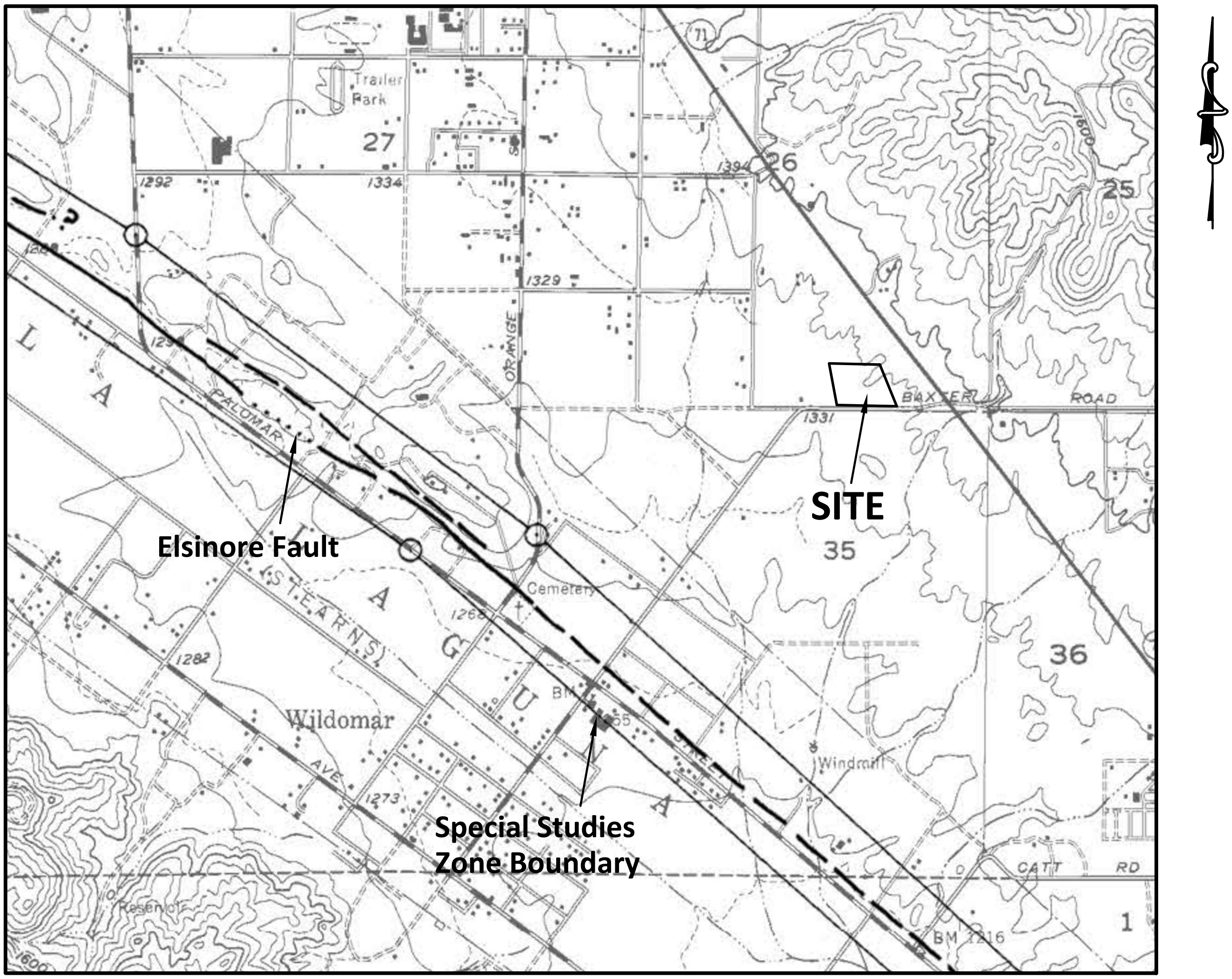
SHEET NO.: 1 OF 1

FIGURE NO.: 3



GEOLOGIC CROSS SECTIONS

Horizontal Scale: 1" = 60'
Vertical Scale: 1" 60'



EARTHQUAKE FAULT ONE MAP

Scale: 1" = 2000'

Base Map: Special Studies Zones Map, Wildomar 7.5' Quadrangle, 1980

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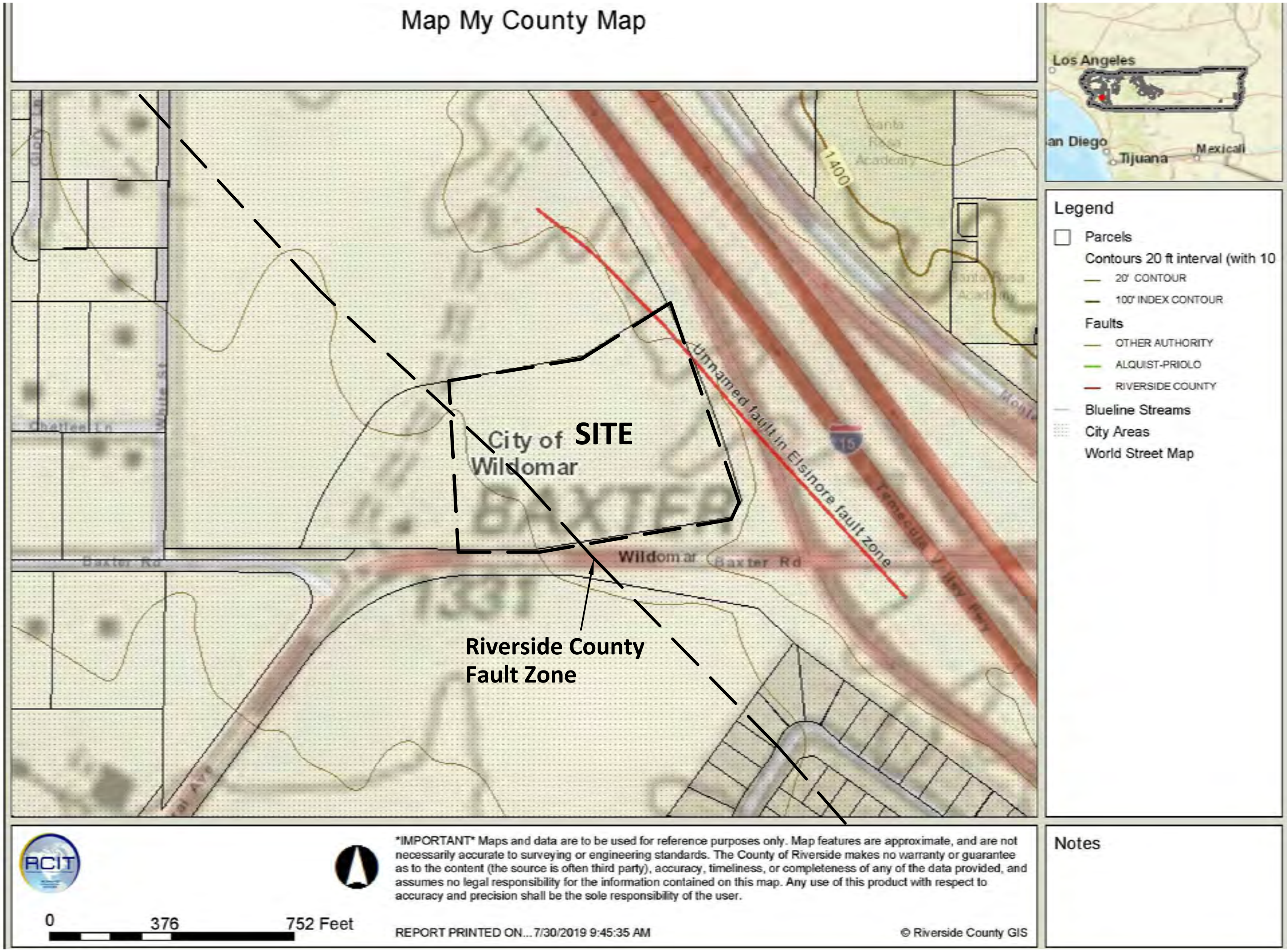
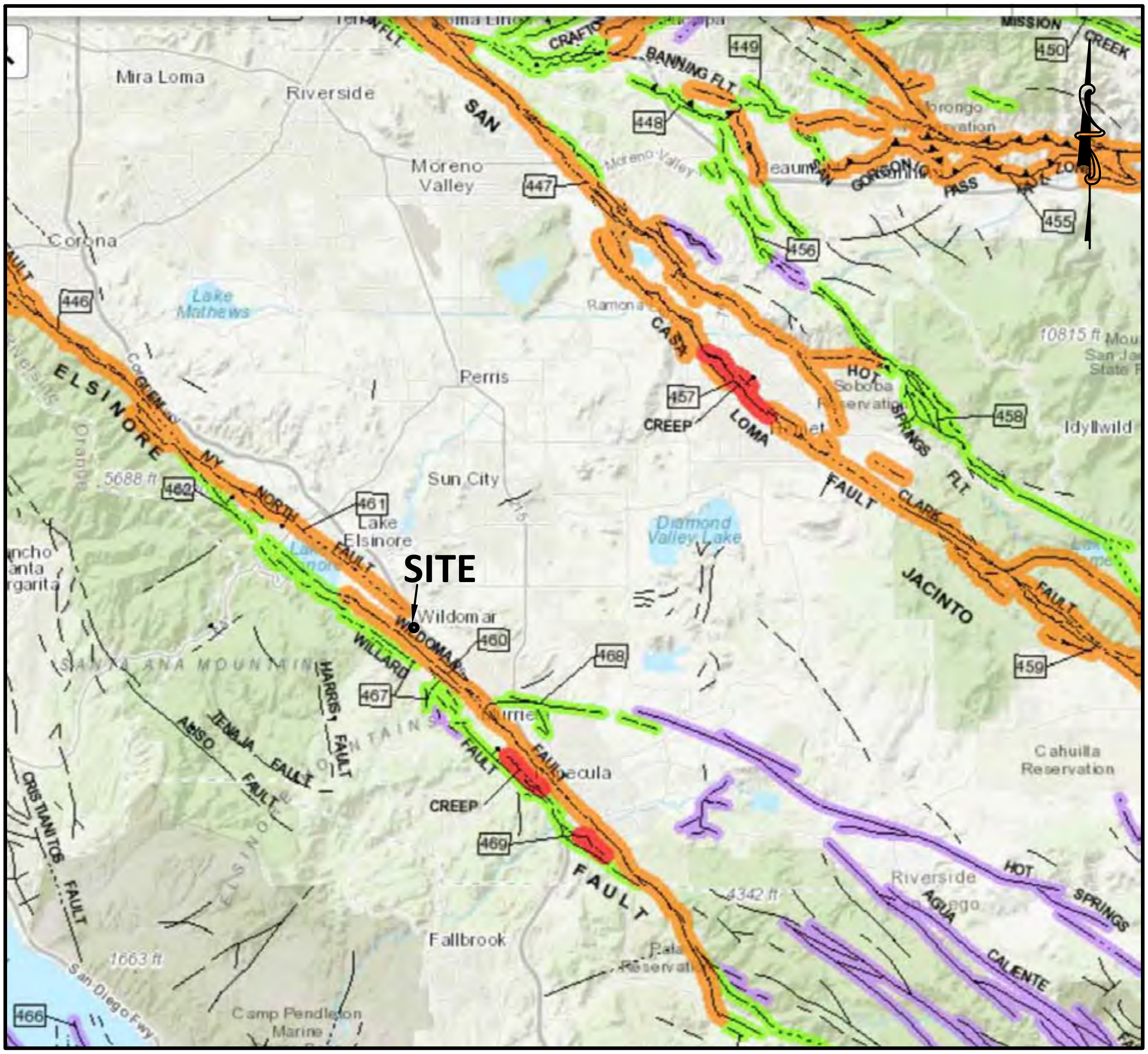
GEOTECHNICAL CONSULTANTS





REGIONAL FAULT MAP

Scale: 1" ≈ 3 miles

Partial Legend

Orange - Holocene fault displacement

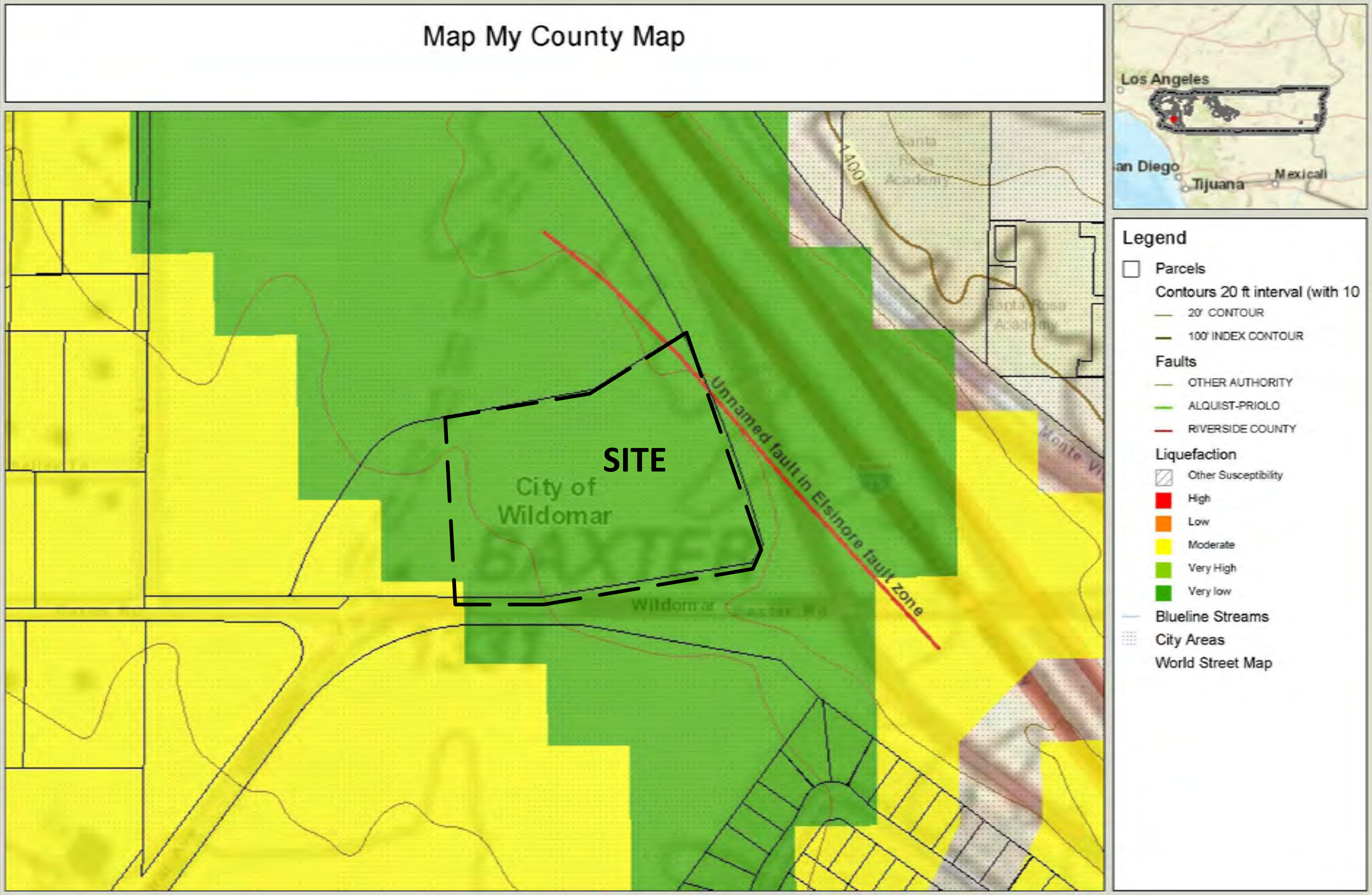
Green - Late Quaternary fault displacement

Purple - Quaternary fault

Black - Pre-Quaternary fault

Base Map: California Geological Survey Fault Activity Map of California, 2010

Map My County Map



Legend

- Parcels
- Contours 20 ft interval (with 10
  - 20' CONTOUR
  - 100' INDEX CONTOUR
- Faults
  - OTHER AUTHORITY
  - ALQUIST-PRIOLO
  - RIVERSIDE COUNTY
- Liquefaction
  - Other Susceptibility
  - High
  - Low
  - Moderate
  - Very High
  - Very low
- Blueline Streams
- City Areas
- World Street Map

Notes

0 376 752 Feet

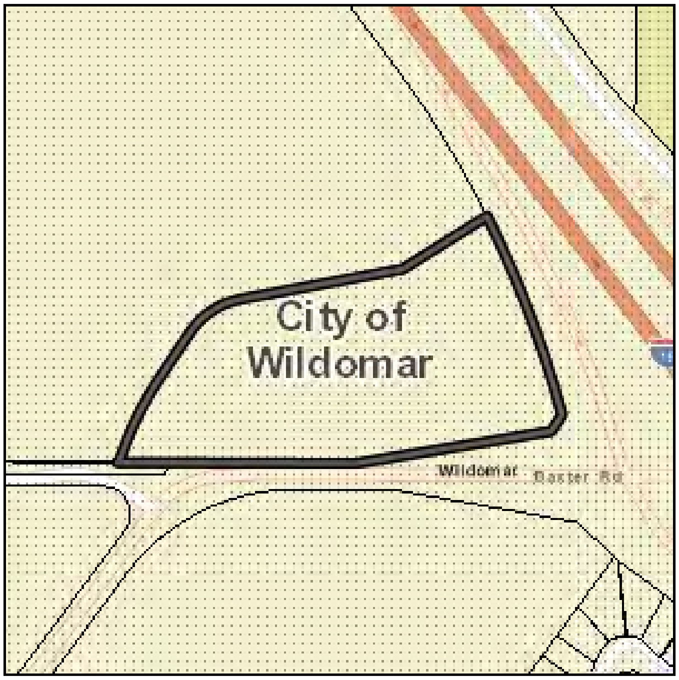
IMPORTANT Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. The County of Riverside makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

REPORT PRINTED ON... 7/30/2019 9:48:50 AM

Riverside County Parcel Report

APN(s) 367-180-057

MAPS/IMAGES



PARCEL

APN	367-180-057-9
Previous APN	367-180-057 came from 367-180-005
Owners	Not Available Online
Address	367-180-057 NOT AVAILABLE
Mailing Address	367-180-057 4370 LA JOLLA VLG STE 960 SAN DIEGO CA 92122
Legal Description	367-180-057 Recorded Book/Page: Subdivision Name: Lot/Parcel: Block: Tract Number: 0
Lot Size	367-180-057 10.25
Property Characteristics	367-180-057 Year Constructed: Baths: 0.00 Bedrooms: 0 Construction Type: SPECIAL Garage Type: CONSTRUCTION Property Area (sq ft): 0 Roof Type: UNKNOWN Stories: Pool: NO Central Cool: NO Central Heat: NO
Supervisorial District	KEVIN JEFFRIES, DISTRICT 1
Township/Range	T6SR4W SEC 26 SE
Elevation Range (ft.)	MIN: 1328, AVG: 1349, MAX: 1368
Thomas Bros. Maps Page/Grid	PAGE: 897, GRID: D5 PAGE: 897, GRID: D6
Indian Tribal Land	NOT IN A TRIBAL LAND
City Boundary	WILDOMAR
City Spheres of Influence	NOT IN A CITY SPHERE
LAFCO Annexation	2007-107-1&3 RECORDED DATE 07/01/2008
Proposals	PROPOSED_CITY
March Joint Powers Authority	NOT A THE JURSIDICTION OF THE MARCH POWERS AUTHORITY

County Service Area

County Service Area	NOT IN A COUNTY SERVICE AREA

PLANNING more...

Specific Plans	NOT IN A SPECIFIC PLAN
Land Use Designations	CITY
General Plan Policy Overlays	NOT IN A GENERAL PLAN POLICY OVERLAY
Area Plan (RCIP)	Elsinore
General Plan Policy Areas	NOT IN A GENERAL PLAN POLICY AREA
Zoning Classifications (ORD. 348)	CONTACT THE CITY FOR MORE INFORMATION
Zoning Overlays	NOT IN A ZONING OVERLAY
Historical Preservation Districts	NOT IN A HISTORIC PRESERVATION DISTRICT
Agricultural Preserve	NOT IN AN AGRICULTURAL PRESERVE
Airport Influence Areas	NOT IN AN AIRPORT INFLUENCE AREA
Airport Compatibility Zones	NOT IN AN AIRPORT COMPATIBILITY AREA
Zoning Districts/Areas	NOT IN A ZONING DISTRICT/AREA
Community Advisory Councils	NOT IN A COMMUNITY ADVISORY COUNCIL
Residential Permit Statistics	N/A Expected Units: BRS Permit Units: Final Issued Active Current Permits: Cumulative Total: % of Expected:

ENVIRONMENTAL more...

CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Plan Area	NOT IN A COACHELLA VALLEY MSHCP FEE AREA
CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Conservation Area	NOT COACHELLA VALLEY CONSERVATION AREA
CVMSHCP Fluvial Sand Transport Special Provision Areas	NOT IN A FLUVIAL SAND TRANSPORT SPECIAL PROVISION AREA
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Plan Area	WESTERN RIVERSIDE COUNTY
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Cell Group	NOT IN A CELL GROUP
WRMSHCP Cell Number	NOT IN A CELL NUMBER
HANS/ERP (Habitat Acquisition and Negotiation Strategy/Expedited Review Process)	Project: NOT IN A PROJECT Conserve: Status: Notes: Intake Num: LMS Case:
Vegetation (2005)	Eucalyptus Alliance Urban Interface Mapping Unit

FIRE

Fire Hazard Classification (Ord. 787)	NOT IN A FIRE HAZARD ZONE
Fire Responsibility Area	NOT IN A FIRE RESPONSIBILITY AREA

DEVELOPMENT FEES

CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Fee Area (Ord 875)	NOT IN A COACHELLA VALLEY MSHCP FEE AREA
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Fee Area (Ord 810)	WESTERN RIVERSIDE COUNTY
Western TUMF (Transportation Uniform Mitigation Fee Ord. 824)	SOUTHWEST
Eastern TUMF (Transportation Uniform Mitigation Fee Ord. 673)	NOT IN THE EASTERN TUMF FEE AREA
Road & Bridge Benefit District	SOUTHWEST AREA ZONE A
DIF (Development Impact Fee Area Ord. 659)	ELSINORE, AREA 15
SKR Fee Area (Stephen's Kagaroo Rat Ord. 663.10)	IN OR PARTIALLY WITHIN THE SKR FEE AREA
Development Agreements	AGREEMENT: NOT IN A AMENDMENT: DEVELOPMENT

	EXPERATION DATE: AGREEMENT

TRANSPORTATION more...

Circulation Element Ultimate Right-of-Way	IN OR PARTIALLY WITHIN A CIRCULATION ELEMENT RIGHT-OF-WAY
Road Book Page	77
Transportation Agreements	NOT IN A TRANS AGREEMENT
CETAP (Community and Environmental Transportation Acceptability Process) Corridors	NOT IN A CETAP CORRIDOR

HYDROLOGY

Flood Plain Review	OUTSIDE FLOODPLAIN, REVIEW NOT REQUIRED
Flood Control District	RIVERSIDE COUNTY FLOOD CONTROL
Watershed	SANTA MARGARITA
Water District	WESTERN MUNICIPAL WATER DISTRICT

GEOLOGIC

Fault Zone	COUNTY FAULT ZONE
Faults	UNNAMED FAULT IN ELSINORE FAULT ZONE
Liquefaction Potential	Moderate Very low
Subsidence	Susceptible
Paleontological Sensitivity	HIGH SENSITIVITY (HIGH A): BASED ON GEOLOGIC FORMATIONS OR MAPPABLE ROCK UNITS THAT ARE ROCKS THAT CONTAIN FOSSILIZED BODY ELEMENTS, AND TRACE FOSSILS SUCH AS TRACKS, NESTS AND EGGS. THESE FOSSILS OCCUR ON OR BELOW THE SURFACE

MISCELLANEOUS

School Districts	LAKE ELSINORE UNIFIED
Communities	WILDOMAR
Lighting (Ord. 655)	ZONE: B
2010 Census Tract	464.05
Farmland	LOCAL IMPORTANCE
Special Notes	NO SPECIAL NOTES
Tax Rate Area & District Name	025022 - CITY OF WILDOMAR 025022 - CITY OF WILDOMAR FIRE 025022 - CO FREE LIBRARY 025022 - CSA 152 025022 - ELS MURRIETA ANZA RESOURCE 025022 - ELSINORE AREA ELEM SCHOOL 025022 - ELSINORE VALLEY MUNICIPAL 025022 - FLOOD CONTROL ADMIN 025022 - FLOOD CONTROL ZN 7 025022 - GENERAL 025022 - GENERAL PURPOSE 025022 - LAKE ELSINORE UNI IMP NO 96-1 025022 - LAKE ELSINORE UNIFIED 025022 - MT SAN JACINTO JR COLLEGE 025022 - MWD WEST 1302999 025022 - RIV CO REGIONAL PARK & OPEN SP 025022 - RIVERSIDE CO OFC OF EDUCATION 025022 - SO. CALIF,JT(19,30,33,36,37,56) 025022 - WESTERN MUNICIPAL WATER 025022 - WILDOMAR CEMETERY

PLUS PERMITS & CASES

Administrative Cases

Case	Case Description	Status
N/A	N/A	N/A

Building and Safety Cases

Case	Case Description	Status
214911	DEMO DWELL	ISSUED

Code Cases

Case	Case Description	Status
SE0800897		Closed - Field

Fire Cases

Case	Case Description	Status
FHAZ0006478		Closed - Verified Non-Billable
FHAZ0006481		Closed - Verified Non-Billable
FHAZ0102320		Closed - Verified Non-Billable
FHAZ0102323		Closed - Verified Non-Billable
FHAZ0306720		Closed - Verified Non-Billable
FHAZ0306736		Closed - Verified Non-Billable
FHAZ0409058		Closed - Verified Non-Billable
FHAZ0502823		Closed - Verified Non-Billable
FHAZ0502833		Closed - Verified Non-Billable
FHAZ0608853		Closed - Verified Non-Billable
FHAZ0608868		Closed - Verified Non-Billable
FHAZ0704611		Closed - Verified Non-Billable
FHAZ0704627		Closed - Verified Non-Billable
FHAZ0806905		Closed - Verified Non-Billable
FHAZ9202270		Closed - Verified Non-Billable
FHAZ9202276		Closed - Verified Non-Billable
FHAZ9304775		Closed - Verified Non-Billable
FHAZ9304779		Closed - Verified Non-Billable
FHAZ9407540		Closed - Verified Non-Billable
FHAZ9407545		Closed - Verified Non-Billable
FHAZ9507466		Closed - Verified Non-Billable
FHAZ9507472		Closed - Verified Non-Billable
FHAZ9602821		Closed - Verified Non-Billable
FHAZ9602826		Closed - Verified Non-Billable

FHAZ9704797	Closed - Verified Non-Billable
FHAZ9704803	Closed - Verified Non-Billable
FHAZ9805892	Closed - Verified Non-Billable
FHAZ9805896	Closed - Verified Non-Billable

Planning Cases

Case	Case Description	Status
CFG04280	CALIFORNIA FISH AND GAME FOR EA40858	PAID
CFG04700	CFG FOR EA41330	PAID
CZ04988	CHANGE OF ZONE FROM R-R TO C-P-S EA 31869	ABANDONED
CZ05293	CHANGE OF ZONE FROM ? TO ? EA 33153	WITHDRAWN
CZ05671	CZ FROM R-R TO CPS CHANGE OF ZONE FROM R-R TO C-P-S EA 34623	APPROVED
CZ05876	CHANGE ZONING FROM R-R TO C-P-S CHANGE OF ZONE FROM R-R TO C-P-S EA 35387	APPROVED
CZ07337	PROPSD CHG FROM CPS TO R-1 & R-2A(MULTIPLE ZONE) (TR34301)	ANNEXED
EA34623	EA FOR CZ 5627 ENVIRONMENTAL ASSESSMENT FOR CZ 05671 EA 34623	APPROVED
EA35387	EA FOR CZ 5876 ENVIRONMENTAL ASSESSMENT FOR CZ 05876 EA 35387	APPROVED
EA40858	ENVIRONMENTAL ASSESSMENT FOR TR34301	ANNEXED
EA41330	EA FOR PP22685	WITHDRAWN
GEO01656	GEOTECHNICAL REPORT TR 34301	APPROVED
GPA00808	PROSPD HIGH DENSITY (CR) TO CR,HDR & VHDR DENSITY.	ANNEXED
GPA00884	TO AMEND THE LAND USE AND CIRCULATION ELEMENT	APPROVED
PDB04664	BUOWL SURVEY REPORT:8/28/06	APPLIED
PDB04773	GEN BIO RESOURCES ASSESSMENT REPORT:11/13/06 SURVEY:8/17/06	APPLIED
PP22685	10.06 AC COMMERCIAL/RETAIL	ANNEXED
TR34301	SUBDIVIDE 35.61 AC INTO 10.9 AC/COMM RETAIL & RES.	ANNEXED

Survey Cases

Case	Case Description	Status
MAP36674		ISSUED
MAP37097		ISSUED

Transportation Cases

Case	Case Description	Status
ST00652	BAXTER CROSSING TR34301	APPLIED

DEPARTMENT of ENVIRONMENTAL HEALTH PERMITS

Septic Permits

Record Id	Application Date	Plan Check Approved Date	Final Inspection Date	Approved Date
N/A	N/A	N/A	N/A	N/A

Well Water Permits

Record Id	PE	Permit Paid Date	Permit Approved Date	Well Finaled Date
N/A	N/A	N/A	N/A	N/A

* DISCLAIMER *

NOTABLE FAULTS WITHIN 100 KILOMETERS AND SEISMIC DATA

Fault Zone & geometry	Distance (km)	Distance (mi.)	Maximum Moment Magnitude	Slip Rate (mm/yr)
Chino-Central Ave. (rl-r-o)	37	23	6.7	1.0
Clamshell-Sawpit (r)	88	55	6.5	0.5
Cleghorn (ll-ss)	74	46	6.5	3.0
Coronado Bank (rl-ss)	72	45	7.4	3.0
Cucamonga (r)	65	40	6.9	5.0
Earthquake Valley (rl-ss)	79	49	6.5	2.0
Elsinore - Wildomar (rl-ss)	1	0.6	6.8	5.0
Eureka Peak (rl-ss)	94	58	6.4	0.6
Helendale - S Lockhart (rl-ss)	92	57	7.3	0.6
Holser (r)	99	62	6.5	0.4
Landers (rl-ss)	99	62	7.3	0.6
Newport-Inglewood (rl-ss)	46	29	6.9	1.5
North Frontal - Western (r)	78	48	7.2	1.0
North Frontal - Eastern (r)	91	57	6.7	0.5
Palos Verde (rl-ss)	73	45	7.3	3.0
Puente Hills Blind Thrust (r)	66	41	7.1	0.7
Raymond (ll-r-o)	91	57	6.5	1.5
Rose Canyon (rl-ss)	57	35	6.9	1.5
San Andreas (rl-ss)	78	48	7.5	24.0
San Jacinto (rl-ss)	35	22	6.7	12.0
San Joaquin Hills (r)	38	24	6.6	0.5
San Jose (ll-r-o)	68	42	6.4	0.5
Sierra Madre (r)	72	45	7.2	2.0
Upper Elysian Park (r)	93	58	6.4	1.3
Whittier (rl-ss)	44	27	6.8	2.5

Notes:

Fault geometry - (ss) strike slip, (r) reverse, (n) normal, (rl) right lateral, (ll) left lateral, (o) oblique

Fault and Seismic Data - California Geological Survey (Cao), 2003

HISTORIC STRONG EARTHQUAKES IN SOUTHERN CALIFORNIA SINCE 1812

Date	Event	Causitive Fault	Magnitude	Epicentral Distance (miles)
Dec. 12, 1812	Wrightwood	San Andreas?	7.3	63
Jan. 9, 1857	Fort Tejon	San Andreas	7.9	275
Dec. 16, 1858	San Bernardino Area	uncertain	6.0	27
Feb. 9,1890	San Jacinto	uncertain	6.3	58
May 28, 1892	San Jacinto	uncertain	6.3	58
July 30, 1894	Lytle Creek	uncertain	6.0	52
July 22, 1899	Cajon Pass	uncertain	6.4	50
Dec.25, 1899	San Jacinto	San Jacinto	6.7	20
Sept. 20, 1907	San Bernardino Area	uncertain	5.3	42
May 15, 1910	Elsinore	Elsinore	6.0	10
April 21, 1918	Hemet	San Jacinto	6.8	18
July 23, 1923	San Bernardino	San Jacinto	6.0	27
March 11, 1933	Long Beach	Newport-Inglewood	6.4	44
April 10, 1947	Manix	Manix	6.4	104
Dec. 4, 1948	Desert Hot Springs	San Andreas or Banning	6.5	57
July 21, 1952	Wheeler Ridge	White Wolf	7.3	141
Feb. 9, 1971	San Fernando	San Fernando	6.6	87
July 8, 1986	North Palm Springs	Banning or Garnet Hills	5.6	47
Oct. 1, 1987	Whittier Narrows	Puente Hills Thrust	6.0	57
Feb. 28, 1990	Upland	San Jose	5.5	44
June 28, 1991	Sierra Madre	Clamshell Sawpit	5.8	62
April 22, 1992	Joshua Tree	Eureka Peak	6.1	61
June 28, 1992	Landers	Johnson Valley & others	7.3	63
June 28, 1992	Big Bear	uncertain	6.5	46
Jan. 17, 1994	Northridge	Northridge Thrust	6.7	86
Oct. 16, 1999	Hector Mine	Lavic Lake	7.1	90

Notes:

Earthquake data: U.S.G.S. P.P. 1515 & online data, Southern California Earthquake Center & California Geological Survey online data

Magnitudes prior to 1932 are estimated from intensity.

Magnitudes after 1932 are moment, local or surface wave magnitudes.

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APPENDIX A

FIELD INVESTIGATION

APPENDIX A

FIELD INVESTIGATION

A-1.00 FIELD EXPLORATION

A-1.01 Number of Borings

Our subsurface investigation consisted of 6 borings drilled with a CME-75 drill rig.

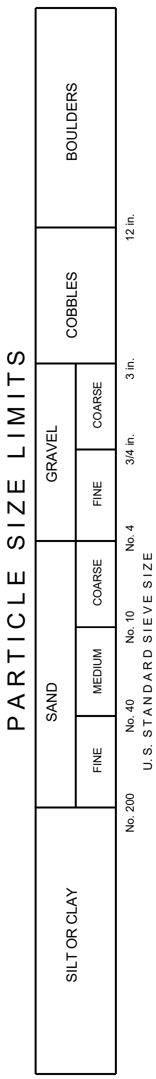
A-1.02 Location of Borings

A Site Geologic Map showing the approximate locations of the borings is presented as Figure 3.

A-1.03 Boring Logging

Logs of borings were prepared by one of our staff and are attached in this appendix. The logs contain factual information and interpretation of subsurface conditions between samples. The strata indicated on these logs represent the approximate boundary between earth units and the transition may be gradual. The logs show subsurface conditions at the dates and locations indicated, and may not be representative of subsurface conditions at other locations and times.

Identification of the soils encountered during the subsurface exploration was made using the field identification procedure of the Unified Soils Classification System (ASTM D2488). A legend indicating the symbols and definitions used in this classification system and a legend defining the terms used in describing the relative compaction, consistency or firmness of the soil are attached in this appendix. Bag samples of the major earth units were obtained for laboratory inspection and testing, and the in-place density of the various strata encountered in the exploration was determined



MAJOR DIVISIONS			GROUP SYMBOLS	TYPICAL NAMES
COARSE GRAINED SOILS (More than 50% of material is LARGER than No. 200 sieve size)	GRAVELS (More than 50% of coarse fraction is LARGER than the No. 4 sieve size.	CLEAN GRAVELS (Little or no fines)	GW	Well graded gravel, gravel-sand mixtures. little or no fines.
			GP	Poorly graded gravel or gravel-sand mixtures, little or no fines.
		GRAVELS WITH FINES (Appreciable amt. of fines)	GM	Silty gravels, gravel-sand-silt mixtures.
			GC	Clayey gravels, gravel-sand-clay mixtures.
	SANDS (More than 50% of coarse fraction is SMALLER than the No. 4 sieve size)	CLEAN SANDS (Little or no fines)	SW	Well graded sands, gravelly sands, little or no fines.
			SP	Poorly graded sands or gravelly sands, little or no fines.
		SANDS WITH FINES (Appreciable amount of fines)	SM	Silty sands, sand-silt mixtures.
			SC	Clayey sands, sand-clay mixtures.
FINE GRAINED SOILS (More than 50% of material is SMALLER than No. 200 sieve size)	SILTS AND CLAYS (Liquid limit LESS than 50)		ML	Inorganic silts and very fine sands, rock flour silty or clayey fine sands or clayey silts with slight plasticity
			CL	Inorganic clays of low to medium plasticity, gravelly clays, sandy clays, silty clays, lean clays.
			OL	Organic silts and organic silty clays of low plasticity.
	SILTS AND CLAYS (Liquid limit GREATER than 50)		MH	Inorganic silts, micaceous or diatamaceous fine sandy or silty soils, elastic silts.
			CH	Inorganic clays of high plasticity, fat clays.
			OH	Organic clays of medium to high plasticity, organic silts.
HIGHLY ORGANIC SOILS			Pt	Peat and other highly organic soils.

<u>BOUNDARY CLASSIFICATIONS:</u> Soils possessing characteristics of two groups are designated by combinations of group symbols.

<u>UNIFIED SOIL CLASSIFICATION SYSTEM</u>

I. SOIL STRENGTH/DENSITY

BASED ON STANDARD PENETRATION TESTS

Apparent density of sand		Consistency of clay	
Penetration Resistance N (blows/Ft)	Apparent density	Penetration Resistance N (blows/ft)	Consistency
0-4	Very Loose	<2	Very Soft
4-10	Loose	2-4	Soft
10-30	Medium Dense	4-8	Medium Stiff
30-50	Dense	8-15	Stiff
>50	Very Dense	15-30	Very Stiff
		>30	Hard

N = Number of blows of 140 lb. weight falling 30 in. to drive 2-in OD sampler 1 ft.

BASED ON RELATIVE COMPACTION

Compactness of sand		Consistency of clay	
% Compaction	Compactness	% Compaction	Consistency
<75	Loose	<80	Soft
75-83	Medium Dense	80-85	Medium Stiff
83-90	Dense	85-90	Stiff
>90	Very Dense	>90	Very Stiff

II. SOIL MOISTURE

Moisture of sands		Moisture of clays	
% Moisture	Description	% Moisture	Description
<5%	Dry	<12%	Dry
5-12%	Moist	12-20%	Moist
>12%	Very Moist	>20%	Very Moist, wet

SOIL DESCRIPTION LEGEND

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Exploratory Boring Log

Boring No. B-1

Date Drilled:	8-8-19	Drilling Equipment:	CME -55
Logged By:	KD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation (ft):	1,338'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
								This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
	R	11	Bulk	4.3	126.7	SM		Alluvium (Qal): Brown silty fine to coarse sand, slight trace of fine gravel, dry to 1 foot then moist, non-cohesive, non-porous, medium dense to 10', medium dense.
5	R	32		2.9	117.8	SP/SM		Brown to yellow-brown fine to coarse sand with silt, moist, poorly sorted, dense.
10	R	16		4.3	127.0	SC		Gray brown clayey sand, fine to coarse sand, wet, moderately cohesive, medium dense, Groundwater at 11'.
15	R	36		1.6	119.3	--		Pauba Formation (Qps): Yellow fine to coarse sand with trace clay, wet, slightly micaceous dense.
20	S	36		13.7				Thin (1" thick orange silt layer at 21'.
25	S	38		11.7				

Sample Types:

R - Ring Sample
- Bulk Sample
- Groundwater
T - Tube Sample
S - SPT Sample
- End of Boring

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Exploratory Boring Log

Boring No. B-1

Date Drilled:	8-8-19	Drilling Equipment:	CME -55
Logged By:	KD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation (ft):	1,338'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
								This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
	S	29		13.5		--		Pauba Sandstone (Qps): Yellow to yellow brown fine to coarse sandstone with minor clay and silt, wet, dense.
35	S	50		14.5				Red brown sandy claystone
40	S	50/5"		9.1				Granite (Kgr): Black, gray and white, coarse grained, very dense, moderately weathered.
45	S	50/ 3.5"		9.8		--		
								Total depth 45.5' Groundwater at 10 feet. Hole backfilled
50								

Sample Types:

- R - Ring Sample
- Bulk Sample
- Groundwater
- T - Tube Sample
- S - SPT Sample
- End of Boring

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Exploratory Boring Log

Boring No. B-2

Sheet 1 of 1

Date Drilled:	8-8-19	Drilling Equipment:	CME-55
Logged By:	KD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	1,347'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
								This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
	R	68	Bulk	2.2	134.0	SM		Older alluvium (Qoal): Reddish brown silty fine to medium sand, dry, trace of white carbonate specks, non-porous, very dense.
5	R	58		3.7	132.0			Trace clay trace fine to medium gravel.
10	R	92		5.0	141.9			Increasing moisture content.
15	R	80/ 10"		5.9	121.4	SC		Thin layers gray red-brown and brown clayey fine to coarse sand, trace fine gravel, moist, very dense.
20	R	59		15.5	119.6	CL		Brown clay with sand, cohesive, slightly plastic, moist, hard.
25	S	26		10.3		--		Pauba Sandstone (Qps): Yellow brown, yellow and orange brown fine to coarse sandstone, moist to wet, poorly cemented, medium dense to dense.
								Total depth 26.5' Groundwater at 21' 10" Hole backfilled

Sample Types:

R - Ring Sample; Bulk Sample; Groundwater

T - Tube Sample; S - SPT Sample; End of Boring

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Exploratory Boring Log

Boring No. B-3

Date Drilled:	10-2-19	Drilling Equipment:	CME-55
Logged By:	KD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	1,342'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
								This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
						SM		Alluvium (Qal): Brown silty fine to coarse sand, dry to 1' then moist, Upper 1' loose (plow zone), then dense.
5	R	80		6.9	126.6			
						SC		Older alluvium (Qoal): Dark brown clayey fine to coarse moist, moderately cohesive, dense to very dense.
10	R	69/8"		5.7	113.6	--		Pauba Sandstone (Qps): Light gray to white fine to coarse sandstone mostly made of granitic rock fragments, moist, very dense.
15	R	50/2"		5.4	117.8			
20	R	50/1"		0.6	124.2			Thin silt layer (<½" thick) at 20'.
								Total depth 20' Groundwater at 17' 10" Hole backfilled
25								

Sample Types:

R - Ring Sample
- Bulk Sample
- Groundwater
T - Tube Sample
S - SPT Sample
- End of Boring

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Exploratory Boring Log

Boring No. B-4

Sheet 1 of 1

Date Drilled:	10-2-19	Drilling Equipment:	CME-55
Logged By:	KD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	1,340'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
0–2.8						SM		Alluvium (Qal): Light brown to brown silty fine to coarse sand, upper to 1' dry and loose, then slightly moist and medium dense to dense.
2.8–8.7			Bulk (approx. 1.8–4.5)			SC		Brown clayey fine to coarse sand, moist, slightly cohesive, dense.
5	R	35		10.0	112.9			
8.7–10.8						ML		Gray-brown sandy silt, fine sand, moist.
10	R	47		27.2	96.4			
10.8–14.3						SP-SM		Gray fine sand with silt, very moist, non-cohesive, moderately well sorted, dense (weathered Pauba?).
14.3–20.2						--		Pauba Sandstone (Qps): Gray silty sandstone, fine sand, very moist, very dense.
15	R	71/ 10"		20.0	105.9			
20.2–21						--		Granite (Kgr): Gray, fine to medium grained, moist, very dense.
20	R	83/9"		8.4	134.8			

Total depth 21'
Groundwater at 13' 10"
Hole backfilled

Material Description: This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample

Bulk Sample

- Groundwater

T - Tube Sample

S - SPT Sample

- End of Boring

Exploratory Boring Log

Boring No. B-5

Date Drilled:	10-2-19	Drilling Equipment:	CME-55
Logged By:	KD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	1,339'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
						SM		Alluvium (Qal): Light brown silty fine to coarse sand, upper to 1'-1.5' dry and loose (plow zone), then slightly moist and medium dense.
5	R	14		6.9	124.4			
10	R	41		7.7	129.4			
						SC-SM		Older alluvium (Qoal): Clayey, silty, fine to coarse, moist, dense to very dense.
						--		Pauba Sandstone (Qps): Yellow sandstone, fine to coarse sand with clay, slightly cohesive, friable, dense to very dense.
15	R	47		17.2	109.3			
20	R	63		12.6	129.6			Gray silty sandstone, fine sand.
								Total depth 21.5' Groundwater at 15' 11" Hole backfilled
25								

This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.

Sample Types:

R - Ring Sample
- Bulk Sample
- Groundwater
T - Tube Sample
S - SPT Sample
- End of Boring

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Exploratory Boring Log

Boring No. B-6
Sheet 1 of 1

Date Drilled:	10-2-19	Drilling Equipment:	CME-55
Logged By:	KD	Boring Hole Diameter:	8"
Location:	See Site Geologic Map	Drive Weights:	140 lbs.
Elevation:	1,347'	Drop:	30"

Depth (ft)	Samples: Sample Type	Samples: Blows (blows/ft)	Samples: Bulk Sample	Moisture Content (%)	Dry Density (pcf)	USCS	Graphic Symbol	Material Description
								This log contains factual information and interpretation of the subsurface conditions between the samples. The stratum indicated on this log represent the approximate boundary between earth units and the transition may be gradual. The log show subsurface conditions at the date and location indicated, and may not be representative of subsurface conditions at other locations and times.
0–5	R	65	Bulk	3.8	113.1	SM		Older alluvium (Qoal): Reddish brown silty fine to coarse sand, dry to slightly moist.
5								Total depth 5' No groundwater Hole backfilled
10								
15								
20								
25								

Sample Types:
R - Ring Sample
Bulk Sample
Groundwater
T - Tube Sample
S - SPT Sample
End of Boring

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APPENDIX B

LABORATORY TESTS

APPENDIX B

LABORATORY TESTS

B-1.00 LABORATORY TESTS

B-1.01 Maximum Density

Maximum density - optimum moisture relationships for the major soil types encountered during the field exploration were performed in the laboratory using the standard procedures of ASTM D1557.

B-1.02 Expansion Tests

Expansion index tests were performed on representative samples of the major soil types encountered by the test methods outlined in ASTM D4829.

B-1.03 Soluble Sulfates and Chlorides

A test was performed on representative sample encountered during the investigation using the Caltrans Test Methods CTM 417 and CTM 422.

B-1.04 Sand Equivalence

A Sand Equivalent test was performed on representative soil sample by the test methods of ASTM D2419.

B-1.05 Soil Reactivity (pH) and Electrical Resistivity

A Representative soil sample was tested for soil reactivity (pH) and electrical resistivity using California Test Method 643. The pH measures the degree of acidity or alkalinity in the soils.

B-1.06 Particle Size Analysis

Particle size analysis was performed on representative samples of the major soils types in accordance to the standard test methods of the ASTM D422. The hydrometer portion of the standard procedure was not performed and the material retained on the #200 screen was washed.

B-1.07 Direct Shear

A direct shear test was performed on a representative soil sample using the standard test method of ASTM D3080 (consolidated and drained). Tests were performed on a sample remolded to 90% relative compaction.

The test was performed on a direct shear machine of the strain-controlled type. To simulate possible adverse field conditions, the sample was saturated prior to shearing. Several specimens were sheared at varying normal loads and the results plotted to establish the angle of the internal friction and cohesion of the tested samples.

B-1.08 Resistance Value (R-Value)

A Resistance Value test was performed on representative soil sample by the test methods outlined in California 301.

B-1.09 Moisture Measurement

Moisture content of the soil samples was performed in accordance to standard method for measurement of water content of soil by drying oven, ASTM D2216. The mass of material remaining after oven drying is used as the mass of the solid particles.

B-1.10 Density of Split-Barrel Samples

Soil samples were obtained by using a split-barrel sampler in accordance to standard method of ASTM D1586.

B-1.11 Test Results

Test results for all laboratory tests performed on the subject project are presented in this appendix.

SAMPLE INFORMATION

Sample Number	Sample Description	Sample Location	
		Boring No.	Depth (ft)
1	Brown silty sand	1	1-5
2	Reddish brown silty sand	2	1-5
3	Brown silty sand	3	2-5
4	Brown to light brown silty & clayey sand	4	2-5
5	Light brown silty sand	5	1-5
6	Reddish brown silty sand	6	1-5

MAXIMUM DENSITY - OPTIMUM MOISTURE
Test Method: ASTM D1557

Sample Number	Optimum Moisture (Percent)	Maximum Density (lbs/ft^3)
2	9.1	134.0
4	7.1	136.5

EXPANSION TEST
Test Method: ASTM D4829

Sample Number	Molding Moisture Content (Percent)	Final Moisture Content (Percent)	Initial Dry Density (lbs/ft^3)	Expansion Index	Expansion Classification
2	8.0	14.2	116.1	5	Very low
4	7.4	12.8	120.0	2	Very low

SOLUBLE SULFATES AND CHLORIDES

Test Method: CTM 417 and CTM 422

Sample Number	Soluble Sulfate (ppm)	Chlorides (ppm)
2	370	113

SAND EQUIVALENT

Test Method: ASTM D2419

Sample Number	Sand Equivalent
2	68

SOIL REACTIVITY (pH) AND ELECTRICAL RESISTIVITY

Test Method: CTM 643

Sample Number	pH	Resistivity (Ohm-cm)
2	7.4	5,700

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PARTICLE SIZE ANALYSIS

ASTM D422

Sample ID: 1

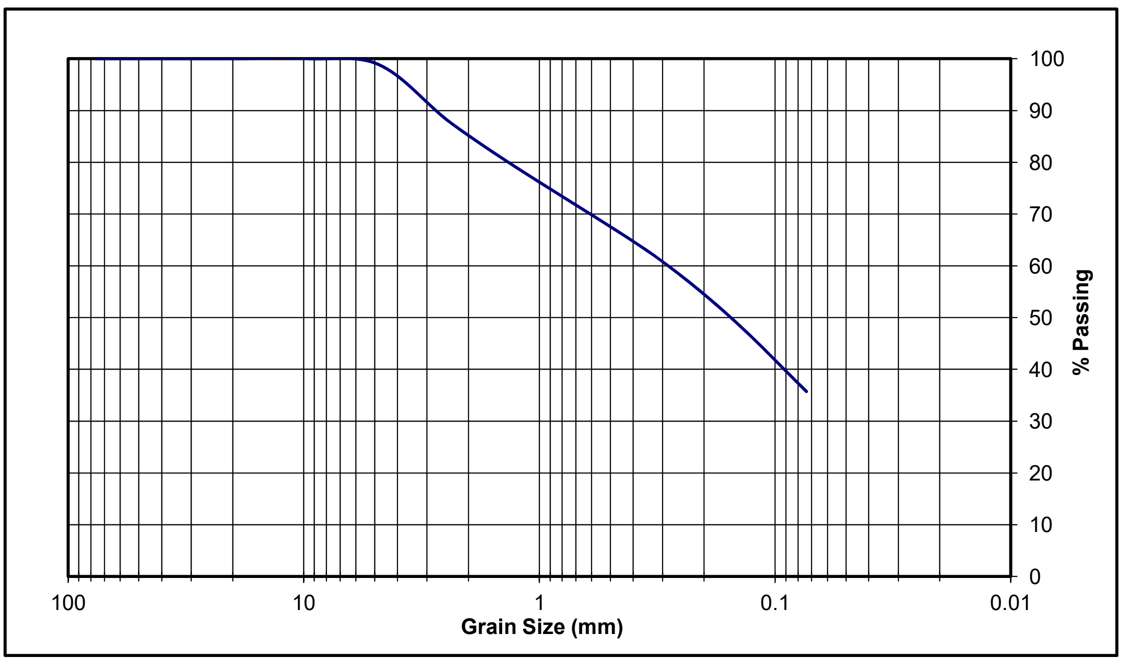
Location: B-1 @1'-5'

Fraction A: Dry Net Weight (gms): 1,320

Fraction B: Dry Net Weight (gms): 516.8

	Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
Fraction A:	3"		1319.5	100
	1-1/2"	0	1319.5	100
	3/4"	0	1319.5	100
	3/8"	0	1319.5	100
	#4	16.6	1302.9	99

	Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
Fraction B:	#8	58.3	458.5	88
	#16	106.8	410.0	78
	#30	152.6	364.2	70
	#50	199.4	317.4	61
	#100	257.7	259.1	50
	#200	329.8	187.0	36



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PARTICLE SIZE ANALYSIS

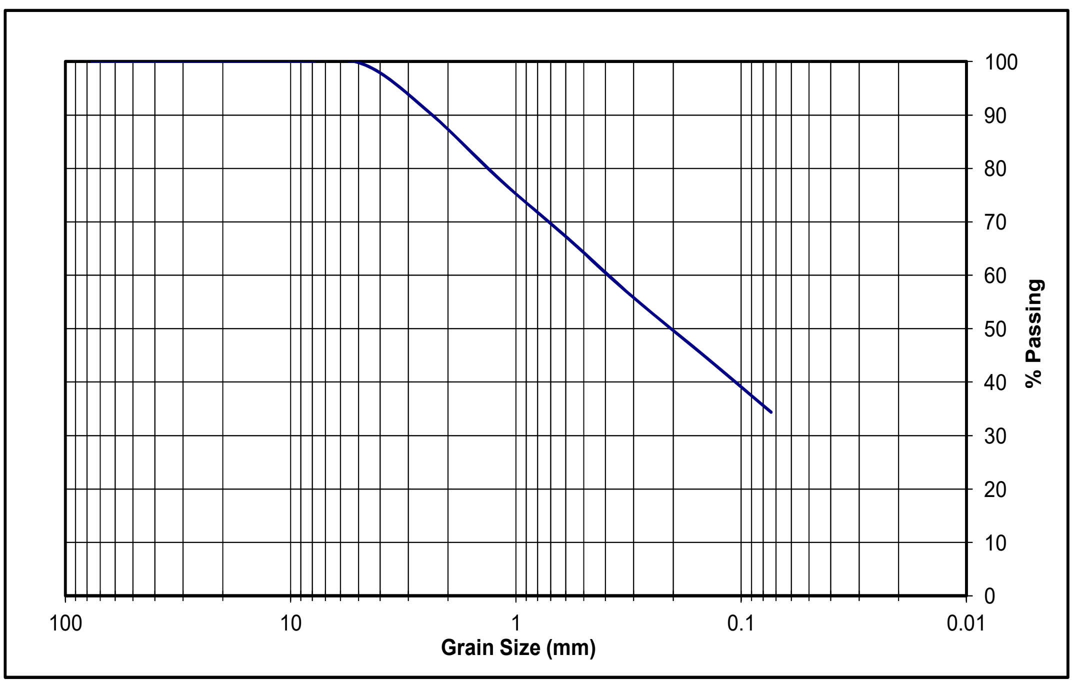
ASTM D422

Sample ID: 2
Location: B-2 @ 1'-5'

Fraction A: Dry Net Weight (gms): 1,570
Fraction B: Dry Net Weight (gms): 504.5

	Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
Fraction A:	3"	0	1569.6	100
	1-1/2"	0	1569.6	100
	3/4"	0	1569.6	100
	3/8"	0	1569.6	100
	#4	8.3	1561.3	99

	Screen Size	Net Retained Weight (gms)	Net Passing Weight (gms)	% Passing
Fraction B:	#8	47.2	457.3	90
	#16	108.5	396.0	78
	#30	165.0	339.5	67
	#50	222.3	282.2	56
	#100	274.5	230.0	45
	#200	330.0	174.5	34



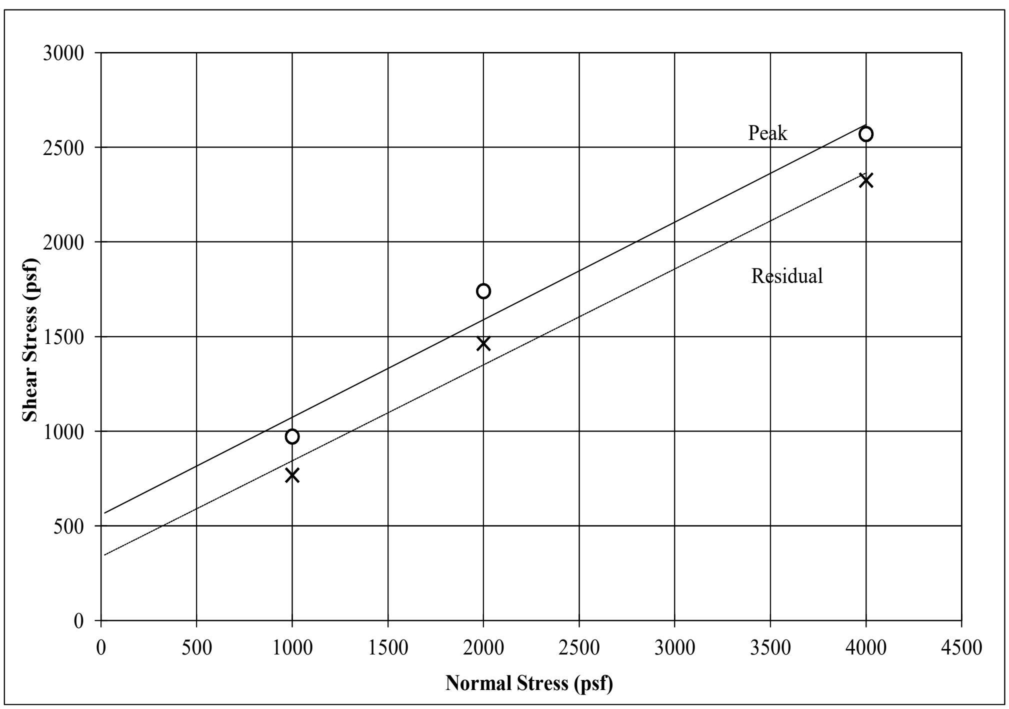
DIRECT SHEAR TEST
ASTM D3080

Sample ID: 2
Location: B-2 @ 1'-5'

Maximum Dry Density (pcf) = 134.0
Optimum Moisture Content (%) = 9.1
Initial Dry Density (pcf) = 120.6
Initial Moisture Content (%) = 9.1
Final Moisture Content (%) = 13.0

Normal Pressure	Peak Shear Resist	Residual Shear Resist
1000	972	768
2000	1740	1464
4000	2570	2326

	Peak	Residual
Cohesion (psf) =	560	340
Friction Angle (deg) =	27	27



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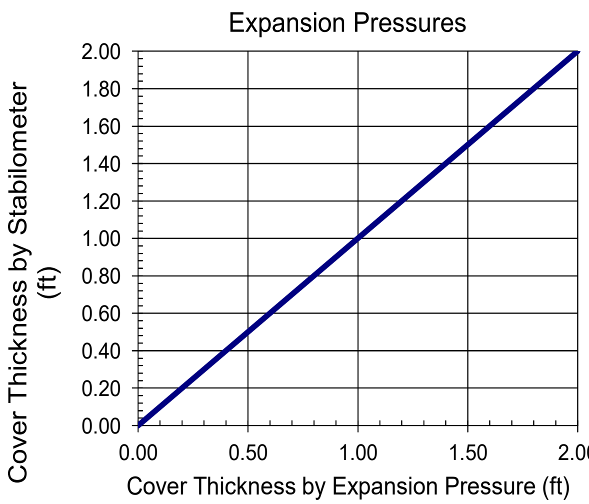
CTM 301 - DETERMINATION OF RESISTANCE "R" VALUE OF TREATED AND UNTREATED BASES, SUBBASES, AND BASEMENT SOILS BY THE STABILOMETER

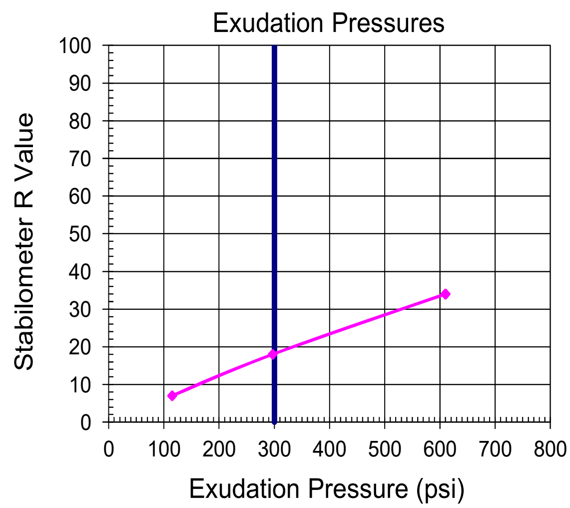
Sample ID: 6

Specimen No	A	B	C
Moisture Content (%)	9.5	11.4	10.5
Dry Density (pcf)	128.8	125.0	127.3
Exudation Pressure (psi)	610	115	297
Stabilometer R Value	34	7	18
Expansion Pressure Dial	0	0	0

Use: Traffic Index = 5.0 Gravel Factor = 1.00			
Thickness by Expansion (ft)			
Thickness by Stabilometer (ft)	1.06	1.49	1.31
Equilibrium Thick (ft)		-	
Equilibrium Pressure R Value		**n/a**	
Exudation Pressure R Value @ 300 psi		**18**	

Use Exudation R Value





Expansion Pressure R-Value is based on the following structural section:

Thickness of AC (ft)=	**0.25**	G_f(ac) =	2.50	W(ac) =	145
Thickness of Aggregate Base (ft)=	**0.42**	G_f(base) =	1.10	W(base) =	130
		G_f(avg) =	1.62	W(avg) =	136

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APPENDIX C

GENERAL EARTHWORK AND
GRADING SPECIFICATIONS

APPENDIX C

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

C-1.00 GENERAL DESCRIPTION

C-1.01 Introduction

These specifications present our general recommendations for earthwork and grading as shown on the approved grading plans for the subject project. These specifications shall cover all clearing and grubbing, removal of existing structures, preparation of land to be filled, filling of the land, spreading, compaction and control of the fill, and all subsidiary work necessary to complete the grading of the filled areas to conform with the lines, grades and slopes as shown on the approved plans.

The recommendations contained in the geotechnical report of which these general specifications are a part of shall supersede the provisions contained hereinafter in case of conflict.

C-1.02 Laboratory Standard and Field Test Methods

The laboratory standard used to establish the maximum density and optimum moisture shall be ASTM D1557.

The insitu density of earth materials (field compaction tests) shall be determined by the sand cone method (ASTM D1556), direct transmission nuclear method (ASTM D6938) or other test methods as considered appropriate by the geotechnical consultant.

Relative compaction is defined, for purposes of these specifications, as the ratio of the in-place density to the maximum density as determined in the previously mentioned laboratory standard.

C-2.00 CLEARING

C-2.01 Surface Clearing

All structures marked for removal, timber, logs, trees, brush and other rubbish shall be removed and disposed of off the site. Any trees to be removed shall be pulled in such a manner so as to remove as much of the root system as possible.

C-2.02 Subsurface Removals

A thorough search should be made for possible underground storage tanks and/or septic tanks and cesspools. If found, tanks should be removed and cesspools pumped dry.

Any concrete irrigation lines shall be crushed in place and all metal underground lines shall be removed from the site.

C-2.03 Backfill of Cavities

All cavities created or exposed during clearing and grubbing operations or by previous use of the site shall be cleared of deleterious material and backfilled with native soils or other materials approved by the soil engineer. Said backfill shall be compacted to a minimum of 90% relative compaction.

C-3.00 ORIGINAL GROUND PREPARATION

C-3.01 Stripping of Vegetation

After the site has been properly cleared, all vegetation and topsoil containing the root systems of former vegetation shall be stripped from areas to be graded. Materials removed in this stripping process may be used as fill in areas designated by the soil engineer, provided the vegetation is mixed with a sufficient amount of soil to assure that no appreciable settlement or other detriment will occur due to decaying of the organic matter. Soil materials containing more than 3% organics shall not be used as structural fill.

C-3.02 Removals of Non-Engineered Fills

Any non-engineered fills encountered during grading shall be completely removed and the underlying ground shall be prepared in accordance to the recommendations for original ground preparation contained in this section. After cleansing of any organic matter the fill material may be used for engineered fill.

C-3.03 Overexcavation of Fill Areas

The existing ground in all areas determined to be satisfactory for the support of fills shall be scarified to a minimum depth of 6 inches. Scarification shall continue until the soils are broken down and free from lumps or clods and until the scarified zone is uniform. The moisture content of the scarified zone shall be adjusted to within 2% of optimum moisture. The scarified zone shall then be uniformly compacted to 90% relative compaction.

Where fill material is to be placed on ground with slopes steeper than 5:1 (H:V) the sloping ground shall be benched. The lowermost bench shall be a minimum of 15 feet wide, shall be a minimum of 2 feet deep, and shall expose firm material as determined by the geotechnical consultant. Other benches shall be excavated to firm material as determined by the geotechnical consultant and shall have a minimum width of 4 feet.

Existing ground that is determined to be unsatisfactory for the support of fills shall be overexcavated in accordance to the recommendations contained in the geotechnical report of which these general specifications are a part.

C-4.00 FILL MATERIALS

C-4.01 General

Materials for the fill shall be free from vegetable matter and other deleterious substances, shall not contain rocks or lumps of a greater dimension than is recommended by the geotechnical consultant, and shall be approved by the geotechnical consultant. Soils of poor gradation, expansion, or strength properties shall be placed in areas designated by the geotechnical consultant or shall be mixed with other soils providing satisfactory fill material.

C-4.02 Oversize Material

Oversize material, rock or other irreducible material with a maximum dimension greater than 12 inches, shall not be placed in fills, unless the location, materials, and disposal methods are specifically approved by the geotechnical consultant. Oversize material shall be placed in such a manner that nesting of oversize material does not occur and in such a manner that the oversize material is completely surrounded by fill material compacted to a minimum of

90% relative compaction. Oversize material shall not be placed within 10 feet of finished grade without the approval of the geotechnical consultant.

C-4.03 Import

Material imported to the site shall conform to the requirements of Section 4.01 of these specifications. Potential import material shall be approved by the geotechnical consultant prior to importation to the subject site.

C-5.00 PLACING AND SPREADING OF FILL

C-5.01 Fill Lifts

The selected fill material shall be placed in nearly horizontal layers which when compacted will not exceed approximately 6 inches in thickness. Thicker lifts may be placed if testing indicates the compaction procedures are such that the required compaction is being achieved and the geotechnical consultant approves their use.
Each layer shall be spread evenly and shall be thoroughly blade mixed during the spreading to insure uniformity of material in each layer.

C-5.02 Fill Moisture

When the moisture content of the fill material is below that recommended by the soils engineer, water shall then be added until he moisture content is as specified to assure thorough bonding during the compacting process.

When the moisture content of the fill material is above that recommended by the soils engineer, the fill material shall be aerated by blading or other satisfactory methods until the moisture content is as specified.

C-5.03 Fill Compaction

After each layer has been placed, mixed, and spread evenly, it shall be thoroughly compacted to not less than 90% relative compaction. Compaction shall be by sheepsfoot rollers, multiple-wheel pneumatic tired rollers, or other types approved by the soil engineer.

Rolling shall be accomplished while the fill material is at the specified moisture content. Rolling of each layer shall be continuous over its entire area and the roller shall make sufficient trips to insure that the desired density has been obtained.

C-5.04 Fill Slopes

Fill slopes shall be compacted by means of sheepsfoot rollers or other suitable equipment. Compacting of the slopes may be done progressively in increments of 3 to 4 feet in fill height. At the completion of grading, the slope face shall be compacted to a minimum of 90% relative compaction. This may require track rolling or rolling with a grid roller attached to a tractor mounted side-boom.

Slopes may be over filled and cut back in such a manner that the exposed slope faces are compacted to a minimum of 90% relative compaction.

The fill operation shall be continued in six inch (6") compacted layers, or as specified above, until the fill has been brought to the finished slopes and grades as shown on the accepted plans.

C-5.05 Compaction Testing

Field density tests shall be made by the geotechnical consultant of the compaction of each layer of fill. Density tests shall be made at locations selected by the geotechnical consultant.

Frequency of field density tests shall be not less than one test for each 2.0 feet of fill height and at least every one thousand cubic yards of fill. Where fill slopes exceed four feet in height their finished faces shall be tested at a frequency of one test for each 1000 square feet of slope face.

Where sheepsfoot rollers are used, the soil may be disturbed to a depth of several inches. Density reading shall be taken in the compacted material below the disturbed surface. When these readings indicate that the density of any layer of fill or portion thereof is below the required density, the particular layer or portion shall be reworked until the required density has been obtained.

C-6.00 SUBDRAINS

C-6.01 Subdrain Material

Subdrains shall be constructed of a minimum 4-inch diameter pipe encased in a suitable filter material. The subdrain pipe shall be Schedule 40 Acrylonitrile Butadiene Styrene (ABS) or Schedule 40 Polyvinyl Chloride Plastic (PVC) pipe or approved equivalent. Subdrain pipe shall be installed with perforations down. Filter material shall consist of 3/4" to 1 1/2" clean gravel wrapped in an envelope of filter fabric consisting of Mirafi 140N or approved equivalent.

C-6.02 Subdrain Installation

Subdrain systems, if required, shall be installed in approved ground to conform the approximate alignment and details shown on the plans or herein. The subdrain locations shall not be changed or modified without the approval of the geotechnical consultant. The geotechnical consultant may recommend and direct changes in the subdrain line, grade or material upon approval by the design civil engineer and the appropriate governmental agencies.

C-7.00 EXCAVATIONS

C-7.01 General

Excavations and cut slopes shall be examined by the geotechnical consultant. If determined necessary by the geotechnical consultant, further excavation or overexcavation and refilling of overexcavated areas shall be performed, and/or remedial grading of cut slopes shall be performed.

C-7.02 Fill-Over-Cut Slopes

Where fill-over-cut slopes are to be graded the cut portion of the slope shall be made and approved by the geotechnical consultant prior to placement of materials for construction of the fill portion of the slope.

C-8.00 TRENCH BACKFILL

C-.01 General

Trench backfill within street right of ways shall be compacted to 90% relative compaction as determined by the ASTM D1557 test method. Backfill may be jetted as a means of initial compaction; however, mechanical compaction will be required to obtain the required percentage of relative compaction. If trenches are jetted, there must be a suitable delay for drainage of excess water before mechanical compaction is applied.

C-9.00 Seasonal Limits

C-9.01 General

No fill material shall be placed, spread or rolled while it is frozen or thawing or during unfavorable weather conditions. When the work is interrupted by heavy rain, fill operations shall not be resumed until field tests by the soils engineer indicate that the moisture content and density of the fill are as previously specified.

C-10.00 Supervision

C-10.01 Prior to Grading

The site shall be observed by the geotechnical consultant upon completion of clearing and grubbing, prior to the preparation of any original ground for preparation of fill.

The supervisor of the grading contractor and the field representative of the geotechnical consultant shall have a meeting and discuss the geotechnical aspects of the earthwork prior to commencement of grading.

C-10.02 During Grading

Site preparation of all areas to receive fill shall be tested and approved by the geotechnical consultant prior to the placement of any fill.

The geotechnical consultant or his representative shall observe the fill and compaction operations so that he can provide an opinion regarding the conformance of the work to the recommendations contained in this report.

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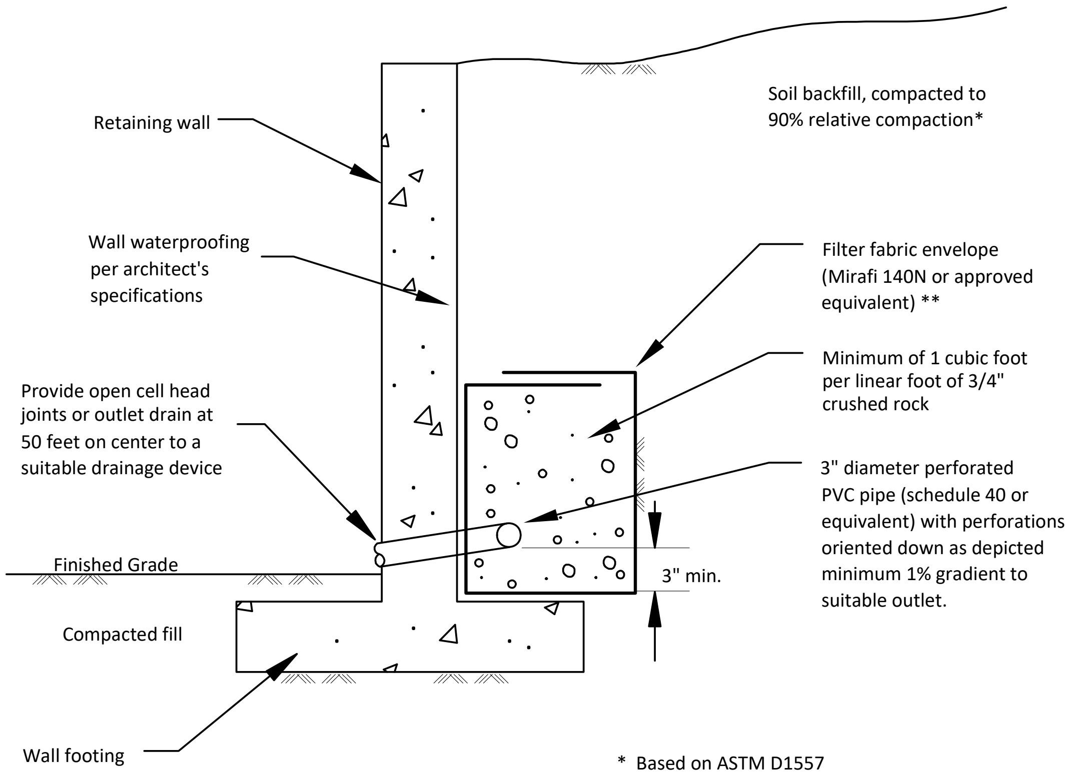

* Based on ASTM D1557

** If class 2 permeable material (See gradation to left) is used in place of 3/4" - 1 1/2" gravel. Filter fabric may be deleted. Class 2 permeable material compacted to 90% relative compaction. *

SPECIFICATIONS FOR CLASS 2
PERMEABLE MATERIAL
(CAL TRANS SPECIFICATIONS)

Sieve Size	% Passing
1"	100
3/4"	90-100
3/8"	40-100
No.4	25-40
No.8	18-33
No.30	5-15
No.50	0-7
No.200	0-3

RETAINING WALL DRAINAGE DETAIL

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APPENDIX D

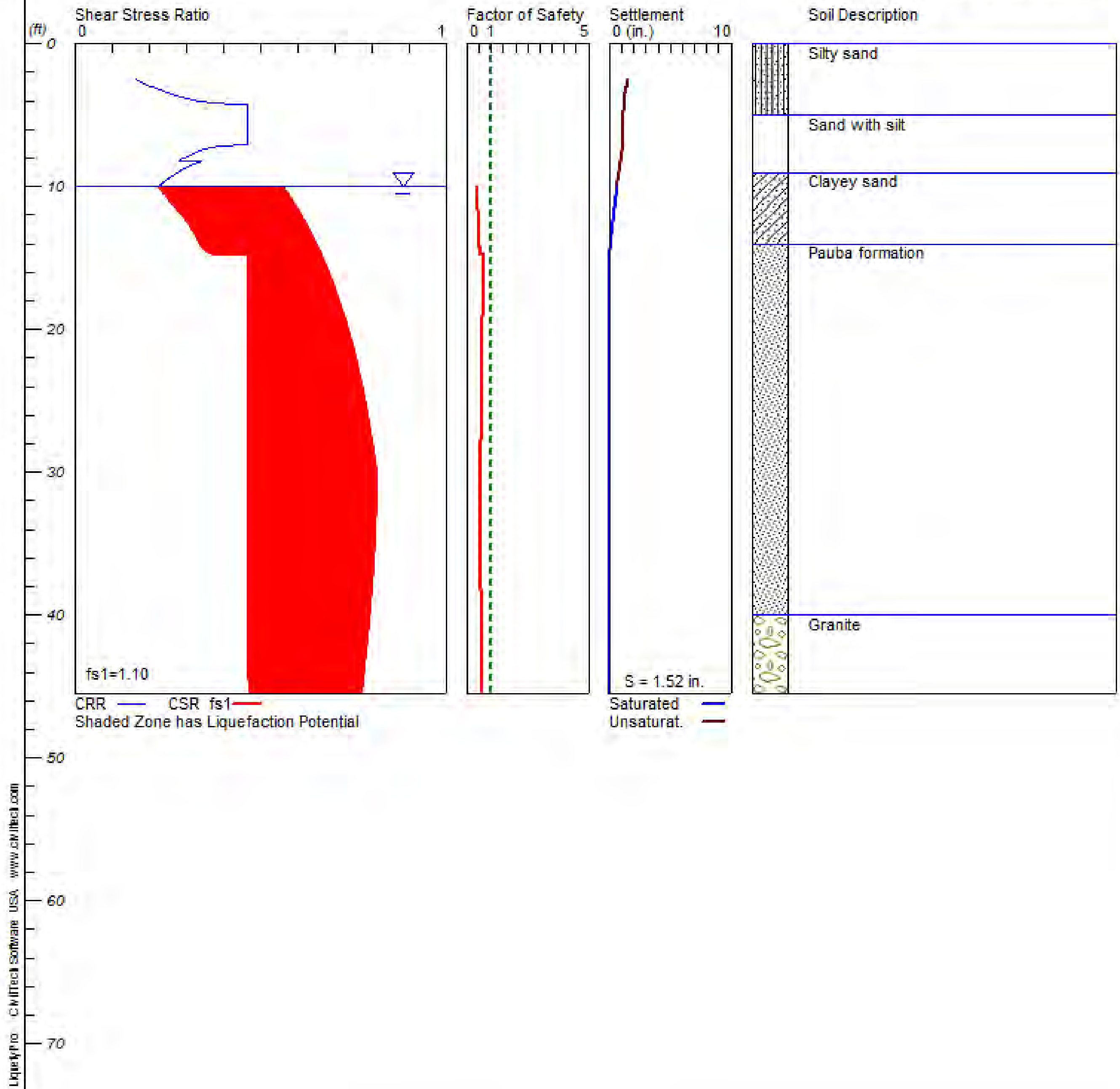
LIQUEFACTION AND SEISMIC SETTLEMENTS

LIQUEFACTION ANALYSIS

Kaiser Wildomar

Hole No.=B-1 Water Depth=10 ft Surface Elev.=1338

Magnitude=7.71
Acceleration=0.799g



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LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: C:\Users\jmeneses\Desktop\Liquefaction Runs\19-1135-0 Wildomar\Boring B-1.liq

Title: Wildomar
Subtitle: Boring B-1

Surface Elev.=1338
Hole No.=B-1
Depth of Hole= 45.50 ft
Water Table during Earthquake= 10.00 ft
Water Table during In-Situ Testing= 11.00 ft
Max. Acceleration= 0.8 g
Earthquake Magnitude= 7.71

Input Data:

Surface Elev.=1338
Hole No.=B-1
Depth of Hole=45.50 ft
Water Table during Earthquake= 10.00 ft
Water Table during In-Situ Testing= 11.00 ft
Max. Acceleration=0.8 g
Earthquake Magnitude=7.71
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Tokimatsu, M-correction
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.1
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*

* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
2.50	6.10	120.00	20.00
5.00	17.90	120.00	10.00
10.00	8.90	120.00	30.00
15.00	20.10	120.00	5.00
20.00	36.00	120.00	5.00
25.00	38.00	120.00	5.00
30.00	29.00	120.00	5.00
35.00	50.00	120.00	5.00
40.00	100.00	120.00	5.00
45.00	100.00	120.00	5.00

Output Results:

Settlement of Saturated Sands=0.64 in.
Settlement of Unsaturated Sands=0.88 in.
Total Settlement of Saturated and Unsaturated Sands=1.52 in.
Differential Settlement=0.762 to 1.006 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
2.50	0.16	0.57	5.00	0.64	0.88	1.52
2.55	0.17	0.57	5.00	0.64	0.87	1.51
2.60	0.17	0.57	5.00	0.64	0.85	1.50
2.65	0.18	0.57	5.00	0.64	0.84	1.48
2.70	0.18	0.57	5.00	0.64	0.83	1.47
2.75	0.18	0.57	5.00	0.64	0.81	1.46
2.80	0.19	0.57	5.00	0.64	0.80	1.44
2.85	0.19	0.57	5.00	0.64	0.79	1.43
2.90	0.20	0.57	5.00	0.64	0.77	1.42
2.95	0.20	0.57	5.00	0.64	0.76	1.40
3.00	0.21	0.57	5.00	0.64	0.75	1.39
3.05	0.21	0.57	5.00	0.64	0.73	1.38
3.10	0.22	0.57	5.00	0.64	0.72	1.36
3.15	0.22	0.57	5.00	0.64	0.71	1.35
3.20	0.23	0.57	5.00	0.64	0.70	1.34
3.25	0.23	0.57	5.00	0.64	0.69	1.33
3.30	0.24	0.57	5.00	0.64	0.67	1.32
3.35	0.24	0.57	5.00	0.64	0.66	1.31
3.40	0.25	0.57	5.00	0.64	0.65	1.30
3.45	0.25	0.57	5.00	0.64	0.64	1.29
3.50	0.26	0.57	5.00	0.64	0.63	1.28
3.55	0.26	0.57	5.00	0.64	0.62	1.27
3.60	0.27	0.57	5.00	0.64	0.61	1.26
3.65	0.28	0.57	5.00	0.64	0.60	1.25
3.70	0.28	0.57	5.00	0.64	0.59	1.24
3.75	0.29	0.57	5.00	0.64	0.59	1.23
3.80	0.30	0.57	5.00	0.64	0.58	1.22
3.85	0.30	0.57	5.00	0.64	0.57	1.21
3.90	0.31	0.57	5.00	0.64	0.56	1.20
3.95	0.32	0.57	5.00	0.64	0.55	1.19
4.00	0.33	0.57	5.00	0.64	0.54	1.19
4.05	0.34	0.57	5.00	0.64	0.53	1.18
4.10	0.36	0.57	5.00	0.64	0.53	1.17
4.15	0.38	0.57	5.00	0.64	0.53	1.17
4.20	0.43	0.57	5.00	0.64	0.53	1.17
4.25	0.47	0.57	5.00	0.64	0.52	1.17
4.30	0.47	0.57	5.00	0.64	0.52	1.17
4.35	0.47	0.57	5.00	0.64	0.52	1.17
4.40	0.47	0.57	5.00	0.64	0.52	1.17
4.45	0.47	0.57	5.00	0.64	0.52	1.17
4.50	0.47	0.57	5.00	0.64	0.52	1.17
4.55	0.47	0.57	5.00	0.64	0.52	1.16
4.60	0.47	0.57	5.00	0.64	0.52	1.16
4.65	0.47	0.57	5.00	0.64	0.52	1.16
4.70	0.47	0.57	5.00	0.64	0.52	1.16
4.75	0.47	0.56	5.00	0.64	0.52	1.16
4.80	0.47	0.56	5.00	0.64	0.52	1.16
4.85	0.47	0.56	5.00	0.64	0.52	1.16
4.90	0.47	0.56	5.00	0.64	0.52	1.16
4.95	0.47	0.56	5.00	0.64	0.52	1.16

5.00	0.47	0.56	5.00	0.64	0.52	1.16
5.05	0.47	0.56	5.00	0.64	0.52	1.16
5.10	0.47	0.56	5.00	0.64	0.52	1.16
5.15	0.47	0.56	5.00	0.64	0.52	1.16
5.20	0.47	0.56	5.00	0.64	0.52	1.16
5.25	0.47	0.56	5.00	0.64	0.51	1.16
5.30	0.47	0.56	5.00	0.64	0.51	1.16
5.35	0.47	0.56	5.00	0.64	0.51	1.16
5.40	0.47	0.56	5.00	0.64	0.51	1.16
5.45	0.47	0.56	5.00	0.64	0.51	1.16
5.50	0.47	0.56	5.00	0.64	0.51	1.16
5.55	0.47	0.56	5.00	0.64	0.51	1.15
5.60	0.47	0.56	5.00	0.64	0.51	1.15
5.65	0.47	0.56	5.00	0.64	0.51	1.15
5.70	0.47	0.56	5.00	0.64	0.51	1.15
5.75	0.47	0.56	5.00	0.64	0.51	1.15
5.80	0.47	0.56	5.00	0.64	0.51	1.15
5.85	0.47	0.56	5.00	0.64	0.51	1.15
5.90	0.47	0.56	5.00	0.64	0.51	1.15
5.95	0.47	0.56	5.00	0.64	0.51	1.15
6.00	0.47	0.56	5.00	0.64	0.50	1.15
6.05	0.47	0.56	5.00	0.64	0.50	1.15
6.10	0.47	0.56	5.00	0.64	0.50	1.15
6.15	0.47	0.56	5.00	0.64	0.50	1.14
6.20	0.47	0.56	5.00	0.64	0.50	1.14
6.25	0.47	0.56	5.00	0.64	0.50	1.14
6.30	0.47	0.56	5.00	0.64	0.50	1.14
6.35	0.47	0.56	5.00	0.64	0.50	1.14
6.40	0.47	0.56	5.00	0.64	0.49	1.14
6.45	0.47	0.56	5.00	0.64	0.49	1.14
6.50	0.47	0.56	5.00	0.64	0.49	1.13
6.55	0.47	0.56	5.00	0.64	0.49	1.13
6.60	0.47	0.56	5.00	0.64	0.49	1.13
6.65	0.47	0.56	5.00	0.64	0.48	1.13
6.70	0.47	0.56	5.00	0.64	0.48	1.12
6.75	0.47	0.56	5.00	0.64	0.48	1.12
6.80	0.47	0.56	5.00	0.64	0.47	1.12
6.85	0.47	0.56	5.00	0.64	0.47	1.11
6.90	0.47	0.56	5.00	0.64	0.47	1.11
6.95	0.47	0.56	5.00	0.64	0.46	1.11
7.00	0.47	0.56	5.00	0.64	0.46	1.10
7.05	0.47	0.56	5.00	0.64	0.45	1.10
7.10	0.45	0.56	5.00	0.64	0.45	1.09
7.15	0.41	0.56	5.00	0.64	0.44	1.08
7.20	0.39	0.56	5.00	0.64	0.43	1.08
7.25	0.37	0.56	5.00	0.64	0.43	1.07
7.30	0.36	0.56	5.00	0.64	0.42	1.06
7.35	0.35	0.56	5.00	0.64	0.41	1.06
7.40	0.35	0.56	5.00	0.64	0.40	1.05
7.45	0.34	0.56	5.00	0.64	0.40	1.04
7.50	0.33	0.56	5.00	0.64	0.39	1.03
7.55	0.33	0.56	5.00	0.64	0.38	1.02
7.60	0.32	0.56	5.00	0.64	0.37	1.01
7.65	0.32	0.56	5.00	0.64	0.36	1.01
7.70	0.32	0.56	5.00	0.64	0.36	1.00
7.75	0.31	0.56	5.00	0.64	0.35	0.99
7.80	0.31	0.56	5.00	0.64	0.34	0.98
7.85	0.30	0.56	5.00	0.64	0.33	0.97
7.90	0.30	0.56	5.00	0.64	0.32	0.96

7.95	0.30	0.56	5.00	0.64	0.31	0.96
8.00	0.29	0.56	5.00	0.64	0.30	0.95
8.05	0.29	0.56	5.00	0.64	0.29	0.94
8.10	0.29	0.56	5.00	0.64	0.29	0.93
8.15	0.28	0.56	5.00	0.64	0.28	0.92
8.20	0.28	0.56	5.00	0.64	0.27	0.91
8.25	0.34	0.56	5.00	0.64	0.26	0.90
8.30	0.33	0.56	5.00	0.64	0.25	0.89
8.35	0.33	0.56	5.00	0.64	0.24	0.89
8.40	0.32	0.56	5.00	0.64	0.23	0.88
8.45	0.32	0.56	5.00	0.64	0.23	0.87
8.50	0.31	0.56	5.00	0.64	0.22	0.86
8.55	0.31	0.56	5.00	0.64	0.21	0.85
8.60	0.31	0.56	5.00	0.64	0.20	0.84
8.65	0.30	0.56	5.00	0.64	0.19	0.84
8.70	0.30	0.56	5.00	0.64	0.18	0.83
8.75	0.29	0.56	5.00	0.64	0.17	0.82
8.80	0.29	0.56	5.00	0.64	0.17	0.81
8.85	0.29	0.56	5.00	0.64	0.16	0.80
8.90	0.28	0.56	5.00	0.64	0.15	0.79
8.95	0.28	0.56	5.00	0.64	0.14	0.78
9.00	0.28	0.56	5.00	0.64	0.13	0.77
9.05	0.27	0.56	5.00	0.64	0.12	0.76
9.10	0.27	0.56	5.00	0.64	0.11	0.75
9.15	0.27	0.56	5.00	0.64	0.10	0.74
9.20	0.26	0.56	5.00	0.64	0.09	0.74
9.25	0.26	0.56	5.00	0.64	0.08	0.73
9.30	0.26	0.56	5.00	0.64	0.07	0.72
9.35	0.26	0.56	5.00	0.64	0.06	0.71
9.40	0.25	0.56	5.00	0.64	0.05	0.70
9.45	0.25	0.56	5.00	0.64	0.04	0.69
9.50	0.25	0.56	5.00	0.64	0.03	0.68
9.55	0.25	0.56	5.00	0.64	0.03	0.67
9.60	0.24	0.56	5.00	0.64	0.03	0.67
9.65	0.24	0.56	5.00	0.64	0.02	0.67
9.70	0.24	0.56	5.00	0.64	0.02	0.66
9.75	0.24	0.56	5.00	0.64	0.02	0.66
9.80	0.23	0.56	5.00	0.64	0.01	0.66
9.85	0.23	0.56	5.00	0.64	0.01	0.65
9.90	0.23	0.56	5.00	0.64	0.01	0.65
9.95	0.23	0.56	5.00	0.64	0.00	0.65
10.00	0.22	0.56	0.40*	0.64	0.00	0.64
10.05	0.23	0.56	0.40*	0.64	0.00	0.64
10.10	0.23	0.56	0.41*	0.63	0.00	0.63
10.15	0.23	0.56	0.41*	0.62	0.00	0.62
10.20	0.23	0.56	0.41*	0.61	0.00	0.61
10.25	0.23	0.56	0.41*	0.60	0.00	0.60
10.30	0.23	0.57	0.41*	0.59	0.00	0.59
10.35	0.24	0.57	0.41*	0.59	0.00	0.59
10.40	0.24	0.57	0.42*	0.58	0.00	0.58
10.45	0.24	0.57	0.42*	0.57	0.00	0.57
10.50	0.24	0.57	0.42*	0.56	0.00	0.56
10.55	0.24	0.57	0.42*	0.56	0.00	0.56
10.60	0.24	0.57	0.42*	0.55	0.00	0.55
10.65	0.24	0.58	0.42*	0.54	0.00	0.54
10.70	0.25	0.58	0.43*	0.53	0.00	0.53
10.75	0.25	0.58	0.43*	0.52	0.00	0.52
10.80	0.25	0.58	0.43*	0.52	0.00	0.52
10.85	0.25	0.58	0.43*	0.51	0.00	0.51

10.90	0.25	0.58	0.43*	0.50	0.00	0.50
10.95	0.25	0.58	0.43*	0.49	0.00	0.49
11.00	0.25	0.58	0.43*	0.49	0.00	0.49
11.05	0.26	0.59	0.44*	0.48	0.00	0.48
11.10	0.26	0.59	0.44*	0.47	0.00	0.47
11.15	0.26	0.59	0.44*	0.47	0.00	0.47
11.20	0.26	0.59	0.44*	0.46	0.00	0.46
11.25	0.26	0.59	0.44*	0.45	0.00	0.45
11.30	0.26	0.59	0.45*	0.44	0.00	0.44
11.35	0.27	0.59	0.45*	0.44	0.00	0.44
11.40	0.27	0.59	0.45*	0.43	0.00	0.43
11.45	0.27	0.60	0.45*	0.42	0.00	0.42
11.50	0.27	0.60	0.45*	0.42	0.00	0.42
11.55	0.27	0.60	0.46*	0.41	0.00	0.41
11.60	0.27	0.60	0.46*	0.40	0.00	0.40
11.65	0.28	0.60	0.46*	0.39	0.00	0.39
11.70	0.28	0.60	0.46*	0.39	0.00	0.39
11.75	0.28	0.60	0.46*	0.38	0.00	0.38
11.80	0.28	0.60	0.46*	0.37	0.00	0.37
11.85	0.28	0.60	0.47*	0.37	0.00	0.37
11.90	0.28	0.61	0.47*	0.36	0.00	0.36
11.95	0.29	0.61	0.47*	0.35	0.00	0.35
12.00	0.29	0.61	0.47*	0.35	0.00	0.35
12.05	0.29	0.61	0.47*	0.34	0.00	0.34
12.10	0.29	0.61	0.48*	0.33	0.00	0.33
12.15	0.29	0.61	0.48*	0.33	0.00	0.33
12.20	0.29	0.61	0.48*	0.32	0.00	0.32
12.25	0.29	0.61	0.48*	0.31	0.00	0.31
12.30	0.30	0.61	0.48*	0.31	0.00	0.31
12.35	0.30	0.62	0.48*	0.30	0.00	0.30
12.40	0.30	0.62	0.49*	0.30	0.00	0.30
12.45	0.30	0.62	0.49*	0.29	0.00	0.29
12.50	0.30	0.62	0.49*	0.28	0.00	0.28
12.55	0.30	0.62	0.49*	0.28	0.00	0.28
12.60	0.31	0.62	0.49*	0.27	0.00	0.27
12.65	0.31	0.62	0.49*	0.26	0.00	0.26
12.70	0.31	0.62	0.49*	0.26	0.00	0.26
12.75	0.31	0.62	0.50*	0.25	0.00	0.25
12.80	0.31	0.63	0.50*	0.25	0.00	0.25
12.85	0.31	0.63	0.50*	0.24	0.00	0.24
12.90	0.31	0.63	0.50*	0.23	0.00	0.23
12.95	0.31	0.63	0.50*	0.23	0.00	0.23
13.00	0.32	0.63	0.50*	0.22	0.00	0.22
13.05	0.32	0.63	0.50*	0.21	0.00	0.21
13.10	0.32	0.63	0.50*	0.21	0.00	0.21
13.15	0.32	0.63	0.50*	0.20	0.00	0.20
13.20	0.32	0.63	0.51*	0.20	0.00	0.20
13.25	0.32	0.63	0.51*	0.19	0.00	0.19
13.30	0.32	0.64	0.51*	0.18	0.00	0.18
13.35	0.32	0.64	0.51*	0.18	0.00	0.18
13.40	0.32	0.64	0.51*	0.17	0.00	0.17
13.45	0.33	0.64	0.51*	0.17	0.00	0.17
13.50	0.33	0.64	0.51*	0.16	0.00	0.16
13.55	0.33	0.64	0.51*	0.16	0.00	0.16
13.60	0.33	0.64	0.51*	0.15	0.00	0.15
13.65	0.33	0.64	0.51*	0.14	0.00	0.14
13.70	0.33	0.64	0.51*	0.14	0.00	0.14
13.75	0.33	0.64	0.51*	0.13	0.00	0.13
13.80	0.33	0.65	0.51*	0.13	0.00	0.13

13.85	0.33	0.65	0.51*	0.12	0.00	0.12
13.90	0.33	0.65	0.51*	0.12	0.00	0.12
13.95	0.33	0.65	0.52*	0.11	0.00	0.11
14.00	0.33	0.65	0.52*	0.10	0.00	0.10
14.05	0.34	0.65	0.52*	0.10	0.00	0.10
14.10	0.34	0.65	0.52*	0.09	0.00	0.09
14.15	0.34	0.65	0.52*	0.09	0.00	0.09
14.20	0.34	0.65	0.52*	0.08	0.00	0.08
14.25	0.34	0.65	0.52*	0.08	0.00	0.08
14.30	0.34	0.65	0.52*	0.07	0.00	0.07
14.35	0.34	0.66	0.52*	0.07	0.00	0.07
14.40	0.35	0.66	0.53*	0.06	0.00	0.06
14.45	0.35	0.66	0.53*	0.05	0.00	0.05
14.50	0.35	0.66	0.53*	0.05	0.00	0.05
14.55	0.35	0.66	0.54*	0.04	0.00	0.04
14.60	0.36	0.66	0.54*	0.04	0.00	0.04
14.65	0.36	0.66	0.55*	0.03	0.00	0.03
14.70	0.36	0.66	0.55*	0.03	0.00	0.03
14.75	0.37	0.66	0.56*	0.02	0.00	0.02
14.80	0.47	0.66	0.70*	0.02	0.00	0.02
14.85	0.47	0.66	0.70*	0.02	0.00	0.02
14.90	0.47	0.67	0.70*	0.02	0.00	0.02
14.95	0.47	0.67	0.70*	0.01	0.00	0.01
15.00	0.47	0.67	0.70*	0.01	0.00	0.01
15.05	0.47	0.67	0.70*	0.01	0.00	0.01
15.10	0.47	0.67	0.70*	0.01	0.00	0.01
15.15	0.47	0.67	0.70*	0.01	0.00	0.01
15.20	0.47	0.67	0.69*	0.01	0.00	0.01
15.25	0.47	0.67	0.69*	0.01	0.00	0.01
15.30	0.47	0.67	0.69*	0.01	0.00	0.01
15.35	0.47	0.67	0.69*	0.01	0.00	0.01
15.40	0.47	0.67	0.69*	0.00	0.00	0.00
15.45	0.47	0.67	0.69*	0.00	0.00	0.00
15.50	0.47	0.68	0.69*	0.00	0.00	0.00
15.55	0.47	0.68	0.69*	0.00	0.00	0.00
15.60	0.47	0.68	0.69*	0.00	0.00	0.00
15.65	0.47	0.68	0.69*	0.00	0.00	0.00
15.70	0.47	0.68	0.69*	0.00	0.00	0.00
15.75	0.47	0.68	0.69*	0.00	0.00	0.00
15.80	0.47	0.68	0.68*	0.00	0.00	0.00
15.85	0.47	0.68	0.68*	0.00	0.00	0.00
15.90	0.47	0.68	0.68*	0.00	0.00	0.00
15.95	0.47	0.68	0.68*	0.00	0.00	0.00
16.00	0.47	0.68	0.68*	0.00	0.00	0.00
16.05	0.47	0.68	0.68*	0.00	0.00	0.00
16.10	0.47	0.68	0.68*	0.00	0.00	0.00
16.15	0.47	0.69	0.68*	0.00	0.00	0.00
16.20	0.47	0.69	0.68*	0.00	0.00	0.00
16.25	0.47	0.69	0.68*	0.00	0.00	0.00
16.30	0.47	0.69	0.68*	0.00	0.00	0.00
16.35	0.47	0.69	0.68*	0.00	0.00	0.00
16.40	0.47	0.69	0.68*	0.00	0.00	0.00
16.45	0.47	0.69	0.67*	0.00	0.00	0.00
16.50	0.47	0.69	0.67*	0.00	0.00	0.00
16.55	0.47	0.69	0.67*	0.00	0.00	0.00
16.60	0.47	0.69	0.67*	0.00	0.00	0.00
16.65	0.47	0.69	0.67*	0.00	0.00	0.00
16.70	0.47	0.69	0.67*	0.00	0.00	0.00
16.75	0.47	0.69	0.67*	0.00	0.00	0.00

16.80	0.47	0.70	0.67*	0.00	0.00	0.00
16.85	0.47	0.70	0.67*	0.00	0.00	0.00
16.90	0.47	0.70	0.67*	0.00	0.00	0.00
16.95	0.47	0.70	0.67*	0.00	0.00	0.00
17.00	0.47	0.70	0.67*	0.00	0.00	0.00
17.05	0.47	0.70	0.67*	0.00	0.00	0.00
17.10	0.47	0.70	0.67*	0.00	0.00	0.00
17.15	0.47	0.70	0.67*	0.00	0.00	0.00
17.20	0.47	0.70	0.66*	0.00	0.00	0.00
17.25	0.47	0.70	0.66*	0.00	0.00	0.00
17.30	0.47	0.70	0.66*	0.00	0.00	0.00
17.35	0.47	0.70	0.66*	0.00	0.00	0.00
17.40	0.47	0.70	0.66*	0.00	0.00	0.00
17.45	0.47	0.70	0.66*	0.00	0.00	0.00
17.50	0.47	0.71	0.66*	0.00	0.00	0.00
17.55	0.47	0.71	0.66*	0.00	0.00	0.00
17.60	0.47	0.71	0.66*	0.00	0.00	0.00
17.65	0.47	0.71	0.66*	0.00	0.00	0.00
17.70	0.47	0.71	0.66*	0.00	0.00	0.00
17.75	0.47	0.71	0.66*	0.00	0.00	0.00
17.80	0.47	0.71	0.66*	0.00	0.00	0.00
17.85	0.47	0.71	0.66*	0.00	0.00	0.00
17.90	0.47	0.71	0.66*	0.00	0.00	0.00
17.95	0.47	0.71	0.65*	0.00	0.00	0.00
18.00	0.47	0.71	0.65*	0.00	0.00	0.00
18.05	0.47	0.71	0.65*	0.00	0.00	0.00
18.10	0.47	0.71	0.65*	0.00	0.00	0.00
18.15	0.47	0.71	0.65*	0.00	0.00	0.00
18.20	0.47	0.71	0.65*	0.00	0.00	0.00
18.25	0.47	0.72	0.65*	0.00	0.00	0.00
18.30	0.47	0.72	0.65*	0.00	0.00	0.00
18.35	0.47	0.72	0.65*	0.00	0.00	0.00
18.40	0.47	0.72	0.65*	0.00	0.00	0.00
18.45	0.47	0.72	0.65*	0.00	0.00	0.00
18.50	0.47	0.72	0.65*	0.00	0.00	0.00
18.55	0.47	0.72	0.65*	0.00	0.00	0.00
18.60	0.47	0.72	0.65*	0.00	0.00	0.00
18.65	0.47	0.72	0.65*	0.00	0.00	0.00
18.70	0.47	0.72	0.65*	0.00	0.00	0.00
18.75	0.47	0.72	0.65*	0.00	0.00	0.00
18.80	0.47	0.72	0.65*	0.00	0.00	0.00
18.85	0.47	0.72	0.64*	0.00	0.00	0.00
18.90	0.47	0.72	0.64*	0.00	0.00	0.00
18.95	0.47	0.72	0.64*	0.00	0.00	0.00
19.00	0.47	0.72	0.64*	0.00	0.00	0.00
19.05	0.47	0.73	0.64*	0.00	0.00	0.00
19.10	0.47	0.73	0.64*	0.00	0.00	0.00
19.15	0.47	0.73	0.64*	0.00	0.00	0.00
19.20	0.47	0.73	0.64*	0.00	0.00	0.00
19.25	0.47	0.73	0.64*	0.00	0.00	0.00
19.30	0.47	0.73	0.64*	0.00	0.00	0.00
19.35	0.47	0.73	0.64*	0.00	0.00	0.00
19.40	0.47	0.73	0.64*	0.00	0.00	0.00
19.45	0.47	0.73	0.64*	0.00	0.00	0.00
19.50	0.47	0.73	0.64*	0.00	0.00	0.00
19.55	0.47	0.73	0.64*	0.00	0.00	0.00
19.60	0.47	0.73	0.64*	0.00	0.00	0.00
19.65	0.47	0.73	0.64*	0.00	0.00	0.00
19.70	0.47	0.73	0.64*	0.00	0.00	0.00

19.75	0.47	0.73	0.64*	0.00	0.00	0.00
19.80	0.47	0.73	0.63*	0.00	0.00	0.00
19.85	0.47	0.73	0.63*	0.00	0.00	0.00
19.90	0.47	0.73	0.63*	0.00	0.00	0.00
19.95	0.47	0.74	0.63*	0.00	0.00	0.00
20.00	0.47	0.74	0.63*	0.00	0.00	0.00
20.05	0.47	0.74	0.63*	0.00	0.00	0.00
20.10	0.47	0.74	0.63*	0.00	0.00	0.00
20.15	0.47	0.74	0.63*	0.00	0.00	0.00
20.20	0.47	0.74	0.63*	0.00	0.00	0.00
20.25	0.47	0.74	0.63*	0.00	0.00	0.00
20.30	0.47	0.74	0.63*	0.00	0.00	0.00
20.35	0.47	0.74	0.63*	0.00	0.00	0.00
20.40	0.47	0.74	0.63*	0.00	0.00	0.00
20.45	0.47	0.74	0.63*	0.00	0.00	0.00
20.50	0.47	0.74	0.63*	0.00	0.00	0.00
20.55	0.47	0.74	0.63*	0.00	0.00	0.00
20.60	0.47	0.74	0.63*	0.00	0.00	0.00
20.65	0.47	0.74	0.63*	0.00	0.00	0.00
20.70	0.47	0.74	0.63*	0.00	0.00	0.00
20.75	0.47	0.74	0.63*	0.00	0.00	0.00
20.80	0.47	0.74	0.63*	0.00	0.00	0.00
20.85	0.47	0.75	0.62*	0.00	0.00	0.00
20.90	0.47	0.75	0.62*	0.00	0.00	0.00
20.95	0.47	0.75	0.62*	0.00	0.00	0.00
21.00	0.47	0.75	0.62*	0.00	0.00	0.00
21.05	0.47	0.75	0.62*	0.00	0.00	0.00
21.10	0.47	0.75	0.62*	0.00	0.00	0.00
21.15	0.47	0.75	0.62*	0.00	0.00	0.00
21.20	0.47	0.75	0.62*	0.00	0.00	0.00
21.25	0.47	0.75	0.62*	0.00	0.00	0.00
21.30	0.47	0.75	0.62*	0.00	0.00	0.00
21.35	0.47	0.75	0.62*	0.00	0.00	0.00
21.40	0.47	0.75	0.62*	0.00	0.00	0.00
21.45	0.47	0.75	0.62*	0.00	0.00	0.00
21.50	0.47	0.75	0.62*	0.00	0.00	0.00
21.55	0.47	0.75	0.62*	0.00	0.00	0.00
21.60	0.47	0.75	0.62*	0.00	0.00	0.00
21.65	0.47	0.75	0.62*	0.00	0.00	0.00
21.70	0.47	0.75	0.62*	0.00	0.00	0.00
21.75	0.47	0.75	0.62*	0.00	0.00	0.00
21.80	0.47	0.75	0.62*	0.00	0.00	0.00
21.85	0.47	0.76	0.62*	0.00	0.00	0.00
21.90	0.47	0.76	0.62*	0.00	0.00	0.00
21.95	0.47	0.76	0.62*	0.00	0.00	0.00
22.00	0.47	0.76	0.62*	0.00	0.00	0.00
22.05	0.47	0.76	0.62*	0.00	0.00	0.00
22.10	0.47	0.76	0.61*	0.00	0.00	0.00
22.15	0.47	0.76	0.61*	0.00	0.00	0.00
22.20	0.47	0.76	0.61*	0.00	0.00	0.00
22.25	0.47	0.76	0.61*	0.00	0.00	0.00
22.30	0.47	0.76	0.61*	0.00	0.00	0.00
22.35	0.47	0.76	0.61*	0.00	0.00	0.00
22.40	0.47	0.76	0.61*	0.00	0.00	0.00
22.45	0.47	0.76	0.61*	0.00	0.00	0.00
22.50	0.47	0.76	0.61*	0.00	0.00	0.00
22.55	0.47	0.76	0.61*	0.00	0.00	0.00
22.60	0.47	0.76	0.61*	0.00	0.00	0.00
22.65	0.47	0.76	0.61*	0.00	0.00	0.00

22.70	0.47	0.76	0.61*	0.00	0.00	0.00
22.75	0.47	0.76	0.61*	0.00	0.00	0.00
22.80	0.47	0.76	0.61*	0.00	0.00	0.00
22.85	0.47	0.76	0.61*	0.00	0.00	0.00
22.90	0.47	0.76	0.61*	0.00	0.00	0.00
22.95	0.47	0.77	0.61*	0.00	0.00	0.00
23.00	0.47	0.77	0.61*	0.00	0.00	0.00
23.05	0.47	0.77	0.61*	0.00	0.00	0.00
23.10	0.47	0.77	0.61*	0.00	0.00	0.00
23.15	0.47	0.77	0.61*	0.00	0.00	0.00
23.20	0.47	0.77	0.61*	0.00	0.00	0.00
23.25	0.47	0.77	0.61*	0.00	0.00	0.00
23.30	0.47	0.77	0.61*	0.00	0.00	0.00
23.35	0.47	0.77	0.61*	0.00	0.00	0.00
23.40	0.47	0.77	0.61*	0.00	0.00	0.00
23.45	0.47	0.77	0.61*	0.00	0.00	0.00
23.50	0.47	0.77	0.60*	0.00	0.00	0.00
23.55	0.47	0.77	0.60*	0.00	0.00	0.00
23.60	0.47	0.77	0.60*	0.00	0.00	0.00
23.65	0.47	0.77	0.60*	0.00	0.00	0.00
23.70	0.47	0.77	0.60*	0.00	0.00	0.00
23.75	0.47	0.77	0.60*	0.00	0.00	0.00
23.80	0.47	0.77	0.60*	0.00	0.00	0.00
23.85	0.47	0.77	0.60*	0.00	0.00	0.00
23.90	0.47	0.77	0.60*	0.00	0.00	0.00
23.95	0.47	0.77	0.60*	0.00	0.00	0.00
24.00	0.47	0.77	0.60*	0.00	0.00	0.00
24.05	0.47	0.77	0.60*	0.00	0.00	0.00
24.10	0.47	0.77	0.60*	0.00	0.00	0.00
24.15	0.47	0.78	0.60*	0.00	0.00	0.00
24.20	0.47	0.78	0.60*	0.00	0.00	0.00
24.25	0.47	0.78	0.60*	0.00	0.00	0.00
24.30	0.47	0.78	0.60*	0.00	0.00	0.00
24.35	0.47	0.78	0.60*	0.00	0.00	0.00
24.40	0.47	0.78	0.60*	0.00	0.00	0.00
24.45	0.47	0.78	0.60*	0.00	0.00	0.00
24.50	0.47	0.78	0.60*	0.00	0.00	0.00
24.55	0.47	0.78	0.60*	0.00	0.00	0.00
24.60	0.47	0.78	0.60*	0.00	0.00	0.00
24.65	0.47	0.78	0.60*	0.00	0.00	0.00
24.70	0.47	0.78	0.60*	0.00	0.00	0.00
24.75	0.47	0.78	0.60*	0.00	0.00	0.00
24.80	0.47	0.78	0.60*	0.00	0.00	0.00
24.85	0.47	0.78	0.60*	0.00	0.00	0.00
24.90	0.47	0.78	0.60*	0.00	0.00	0.00
24.95	0.47	0.78	0.60*	0.00	0.00	0.00
25.00	0.47	0.78	0.60*	0.00	0.00	0.00
25.05	0.47	0.78	0.60*	0.00	0.00	0.00
25.10	0.47	0.78	0.59*	0.00	0.00	0.00
25.15	0.47	0.78	0.59*	0.00	0.00	0.00
25.20	0.47	0.78	0.59*	0.00	0.00	0.00
25.25	0.47	0.78	0.59*	0.00	0.00	0.00
25.30	0.47	0.78	0.59*	0.00	0.00	0.00
25.35	0.47	0.78	0.59*	0.00	0.00	0.00
25.40	0.47	0.78	0.59*	0.00	0.00	0.00
25.45	0.47	0.79	0.59*	0.00	0.00	0.00
25.50	0.47	0.79	0.59*	0.00	0.00	0.00
25.55	0.47	0.79	0.59*	0.00	0.00	0.00
25.60	0.47	0.79	0.59*	0.00	0.00	0.00

25.65	0.47	0.79	0.59*	0.00	0.00	0.00
25.70	0.47	0.79	0.59*	0.00	0.00	0.00
25.75	0.47	0.79	0.59*	0.00	0.00	0.00
25.80	0.47	0.79	0.59*	0.00	0.00	0.00
25.85	0.47	0.79	0.59*	0.00	0.00	0.00
25.90	0.47	0.79	0.59*	0.00	0.00	0.00
25.95	0.47	0.79	0.59*	0.00	0.00	0.00
26.00	0.47	0.79	0.59*	0.00	0.00	0.00
26.05	0.47	0.79	0.59*	0.00	0.00	0.00
26.10	0.47	0.79	0.59*	0.00	0.00	0.00
26.15	0.47	0.79	0.59*	0.00	0.00	0.00
26.20	0.47	0.79	0.59*	0.00	0.00	0.00
26.25	0.47	0.79	0.59*	0.00	0.00	0.00
26.30	0.47	0.79	0.59*	0.00	0.00	0.00
26.35	0.47	0.79	0.59*	0.00	0.00	0.00
26.40	0.47	0.79	0.59*	0.00	0.00	0.00
26.45	0.47	0.79	0.59*	0.00	0.00	0.00
26.50	0.47	0.79	0.59*	0.00	0.00	0.00
26.55	0.47	0.79	0.59*	0.00	0.00	0.00
26.60	0.47	0.79	0.59*	0.00	0.00	0.00
26.65	0.47	0.79	0.59*	0.00	0.00	0.00
26.70	0.47	0.79	0.59*	0.00	0.00	0.00
26.75	0.47	0.79	0.59*	0.00	0.00	0.00
26.80	0.47	0.79	0.59*	0.00	0.00	0.00
26.85	0.47	0.79	0.59*	0.00	0.00	0.00
26.90	0.47	0.80	0.59*	0.00	0.00	0.00
26.95	0.47	0.80	0.59*	0.00	0.00	0.00
27.00	0.47	0.80	0.59*	0.00	0.00	0.00
27.05	0.47	0.80	0.58*	0.00	0.00	0.00
27.10	0.47	0.80	0.58*	0.00	0.00	0.00
27.15	0.47	0.80	0.58*	0.00	0.00	0.00
27.20	0.47	0.80	0.58*	0.00	0.00	0.00
27.25	0.47	0.80	0.58*	0.00	0.00	0.00
27.30	0.47	0.80	0.58*	0.00	0.00	0.00
27.35	0.47	0.80	0.58*	0.00	0.00	0.00
27.40	0.47	0.80	0.58*	0.00	0.00	0.00
27.45	0.47	0.80	0.58*	0.00	0.00	0.00
27.50	0.47	0.80	0.58*	0.00	0.00	0.00
27.55	0.47	0.80	0.58*	0.00	0.00	0.00
27.60	0.47	0.80	0.58*	0.00	0.00	0.00
27.65	0.47	0.80	0.58*	0.00	0.00	0.00
27.70	0.47	0.80	0.58*	0.00	0.00	0.00
27.75	0.47	0.80	0.58*	0.00	0.00	0.00
27.80	0.47	0.80	0.58*	0.00	0.00	0.00
27.85	0.47	0.80	0.58*	0.00	0.00	0.00
27.90	0.47	0.80	0.58*	0.00	0.00	0.00
27.95	0.47	0.80	0.58*	0.00	0.00	0.00
28.00	0.47	0.80	0.58*	0.00	0.00	0.00
28.05	0.47	0.80	0.58*	0.00	0.00	0.00
28.10	0.47	0.80	0.58*	0.00	0.00	0.00
28.15	0.47	0.80	0.58*	0.00	0.00	0.00
28.20	0.47	0.80	0.58*	0.00	0.00	0.00
28.25	0.47	0.80	0.58*	0.00	0.00	0.00
28.30	0.47	0.80	0.58*	0.00	0.00	0.00
28.35	0.47	0.80	0.58*	0.00	0.00	0.00
28.40	0.47	0.80	0.58*	0.00	0.00	0.00
28.45	0.47	0.80	0.58*	0.00	0.00	0.00
28.50	0.47	0.81	0.58*	0.00	0.00	0.00
28.55	0.47	0.81	0.58*	0.00	0.00	0.00

28.60	0.47	0.81	0.58*	0.00	0.00	0.00
28.65	0.47	0.81	0.58*	0.00	0.00	0.00
28.70	0.47	0.81	0.58*	0.00	0.00	0.00
28.75	0.47	0.81	0.58*	0.00	0.00	0.00
28.80	0.47	0.81	0.58*	0.00	0.00	0.00
28.85	0.47	0.81	0.58*	0.00	0.00	0.00
28.90	0.47	0.81	0.58*	0.00	0.00	0.00
28.95	0.47	0.81	0.58*	0.00	0.00	0.00
29.00	0.47	0.81	0.58*	0.00	0.00	0.00
29.05	0.47	0.81	0.58*	0.00	0.00	0.00
29.10	0.47	0.81	0.58*	0.00	0.00	0.00
29.15	0.47	0.81	0.58*	0.00	0.00	0.00
29.20	0.47	0.81	0.58*	0.00	0.00	0.00
29.25	0.47	0.81	0.58*	0.00	0.00	0.00
29.30	0.47	0.81	0.58*	0.00	0.00	0.00
29.35	0.47	0.81	0.58*	0.00	0.00	0.00
29.40	0.47	0.81	0.57*	0.00	0.00	0.00
29.45	0.47	0.81	0.57*	0.00	0.00	0.00
29.50	0.47	0.81	0.57*	0.00	0.00	0.00
29.55	0.47	0.81	0.57*	0.00	0.00	0.00
29.60	0.47	0.81	0.57*	0.00	0.00	0.00
29.65	0.47	0.81	0.57*	0.00	0.00	0.00
29.70	0.47	0.81	0.57*	0.00	0.00	0.00
29.75	0.47	0.81	0.57*	0.00	0.00	0.00
29.80	0.47	0.81	0.57*	0.00	0.00	0.00
29.85	0.47	0.81	0.57*	0.00	0.00	0.00
29.90	0.47	0.81	0.57*	0.00	0.00	0.00
29.95	0.47	0.81	0.57*	0.00	0.00	0.00
30.00	0.47	0.81	0.57*	0.00	0.00	0.00
30.05	0.47	0.81	0.57*	0.00	0.00	0.00
30.10	0.47	0.81	0.57*	0.00	0.00	0.00
30.15	0.47	0.81	0.57*	0.00	0.00	0.00
30.20	0.47	0.81	0.57*	0.00	0.00	0.00
30.25	0.47	0.81	0.57*	0.00	0.00	0.00
30.30	0.47	0.81	0.57*	0.00	0.00	0.00
30.35	0.47	0.81	0.57*	0.00	0.00	0.00
30.40	0.47	0.81	0.57*	0.00	0.00	0.00
30.45	0.47	0.81	0.57*	0.00	0.00	0.00
30.50	0.47	0.81	0.57*	0.00	0.00	0.00
30.55	0.47	0.81	0.57*	0.00	0.00	0.00
30.60	0.47	0.81	0.57*	0.00	0.00	0.00
30.65	0.47	0.81	0.57*	0.00	0.00	0.00
30.70	0.47	0.81	0.57*	0.00	0.00	0.00
30.75	0.47	0.81	0.57*	0.00	0.00	0.00
30.80	0.47	0.81	0.57*	0.00	0.00	0.00
30.85	0.47	0.81	0.57*	0.00	0.00	0.00
30.90	0.47	0.81	0.57*	0.00	0.00	0.00
30.95	0.47	0.81	0.57*	0.00	0.00	0.00
31.00	0.47	0.81	0.57*	0.00	0.00	0.00
31.05	0.47	0.81	0.57*	0.00	0.00	0.00
31.10	0.47	0.81	0.57*	0.00	0.00	0.00
31.15	0.47	0.81	0.57*	0.00	0.00	0.00
31.20	0.47	0.81	0.57*	0.00	0.00	0.00
31.25	0.47	0.81	0.57*	0.00	0.00	0.00
31.30	0.47	0.81	0.57*	0.00	0.00	0.00
31.35	0.47	0.81	0.57*	0.00	0.00	0.00
31.40	0.47	0.81	0.57*	0.00	0.00	0.00
31.45	0.47	0.81	0.57*	0.00	0.00	0.00
31.50	0.47	0.81	0.57*	0.00	0.00	0.00

31.55	0.47	0.81	0.57*	0.00	0.00	0.00
31.60	0.47	0.81	0.57*	0.00	0.00	0.00
31.65	0.47	0.81	0.57*	0.00	0.00	0.00
31.70	0.47	0.81	0.57*	0.00	0.00	0.00
31.75	0.47	0.81	0.57*	0.00	0.00	0.00
31.80	0.47	0.81	0.57*	0.00	0.00	0.00
31.85	0.47	0.81	0.57*	0.00	0.00	0.00
31.90	0.47	0.81	0.57*	0.00	0.00	0.00
31.95	0.47	0.81	0.57*	0.00	0.00	0.00
32.00	0.47	0.81	0.57*	0.00	0.00	0.00
32.05	0.47	0.81	0.57*	0.00	0.00	0.00
32.10	0.47	0.81	0.57*	0.00	0.00	0.00
32.15	0.47	0.81	0.57*	0.00	0.00	0.00
32.20	0.47	0.81	0.57*	0.00	0.00	0.00
32.25	0.47	0.81	0.57*	0.00	0.00	0.00
32.30	0.47	0.81	0.57*	0.00	0.00	0.00
32.35	0.47	0.81	0.57*	0.00	0.00	0.00
32.40	0.47	0.81	0.57*	0.00	0.00	0.00
32.45	0.47	0.81	0.57*	0.00	0.00	0.00
32.50	0.47	0.81	0.57*	0.00	0.00	0.00
32.55	0.47	0.81	0.57*	0.00	0.00	0.00
32.60	0.47	0.81	0.57*	0.00	0.00	0.00
32.65	0.47	0.81	0.57*	0.00	0.00	0.00
32.70	0.47	0.81	0.57*	0.00	0.00	0.00
32.75	0.47	0.81	0.57*	0.00	0.00	0.00
32.80	0.47	0.81	0.57*	0.00	0.00	0.00
32.85	0.47	0.81	0.57*	0.00	0.00	0.00
32.90	0.47	0.81	0.57*	0.00	0.00	0.00
32.95	0.47	0.81	0.57*	0.00	0.00	0.00
33.00	0.47	0.81	0.57*	0.00	0.00	0.00
33.05	0.47	0.81	0.57*	0.00	0.00	0.00
33.10	0.47	0.81	0.57*	0.00	0.00	0.00
33.15	0.47	0.81	0.57*	0.00	0.00	0.00
33.20	0.47	0.81	0.57*	0.00	0.00	0.00
33.25	0.47	0.81	0.57*	0.00	0.00	0.00
33.30	0.47	0.81	0.57*	0.00	0.00	0.00
33.35	0.47	0.81	0.57*	0.00	0.00	0.00
33.40	0.47	0.81	0.57*	0.00	0.00	0.00
33.45	0.47	0.81	0.57*	0.00	0.00	0.00
33.50	0.47	0.81	0.57*	0.00	0.00	0.00
33.55	0.47	0.81	0.57*	0.00	0.00	0.00
33.60	0.47	0.81	0.57*	0.00	0.00	0.00
33.65	0.47	0.81	0.57*	0.00	0.00	0.00
33.70	0.47	0.81	0.57*	0.00	0.00	0.00
33.75	0.47	0.81	0.57*	0.00	0.00	0.00
33.80	0.47	0.81	0.57*	0.00	0.00	0.00
33.85	0.47	0.81	0.57*	0.00	0.00	0.00
33.90	0.47	0.81	0.57*	0.00	0.00	0.00
33.95	0.47	0.81	0.57*	0.00	0.00	0.00
34.00	0.47	0.81	0.58*	0.00	0.00	0.00
34.05	0.47	0.81	0.58*	0.00	0.00	0.00
34.10	0.47	0.81	0.58*	0.00	0.00	0.00
34.15	0.47	0.81	0.58*	0.00	0.00	0.00
34.20	0.47	0.81	0.58*	0.00	0.00	0.00
34.25	0.47	0.81	0.58*	0.00	0.00	0.00
34.30	0.47	0.81	0.58*	0.00	0.00	0.00
34.35	0.47	0.81	0.58*	0.00	0.00	0.00
34.40	0.47	0.81	0.58*	0.00	0.00	0.00
34.45	0.47	0.81	0.58*	0.00	0.00	0.00

34.50	0.47	0.81	0.58*	0.00	0.00	0.00
34.55	0.47	0.81	0.58*	0.00	0.00	0.00
34.60	0.47	0.81	0.58*	0.00	0.00	0.00
34.65	0.47	0.81	0.58*	0.00	0.00	0.00
34.70	0.47	0.81	0.58*	0.00	0.00	0.00
34.75	0.47	0.81	0.58*	0.00	0.00	0.00
34.80	0.47	0.81	0.58*	0.00	0.00	0.00
34.85	0.47	0.81	0.58*	0.00	0.00	0.00
34.90	0.47	0.81	0.58*	0.00	0.00	0.00
34.95	0.47	0.81	0.58*	0.00	0.00	0.00
35.00	0.47	0.81	0.58*	0.00	0.00	0.00
35.05	0.47	0.81	0.58*	0.00	0.00	0.00
35.10	0.47	0.81	0.58*	0.00	0.00	0.00
35.15	0.47	0.81	0.58*	0.00	0.00	0.00
35.20	0.47	0.81	0.58*	0.00	0.00	0.00
35.25	0.47	0.81	0.58*	0.00	0.00	0.00
35.30	0.47	0.81	0.58*	0.00	0.00	0.00
35.35	0.47	0.81	0.58*	0.00	0.00	0.00
35.40	0.47	0.81	0.58*	0.00	0.00	0.00
35.45	0.47	0.81	0.58*	0.00	0.00	0.00
35.50	0.47	0.81	0.58*	0.00	0.00	0.00
35.55	0.47	0.81	0.58*	0.00	0.00	0.00
35.60	0.47	0.81	0.58*	0.00	0.00	0.00
35.65	0.47	0.81	0.58*	0.00	0.00	0.00
35.70	0.47	0.81	0.58*	0.00	0.00	0.00
35.75	0.47	0.81	0.58*	0.00	0.00	0.00
35.80	0.47	0.81	0.58*	0.00	0.00	0.00
35.85	0.47	0.81	0.58*	0.00	0.00	0.00
35.90	0.47	0.81	0.58*	0.00	0.00	0.00
35.95	0.47	0.81	0.58*	0.00	0.00	0.00
36.00	0.47	0.81	0.58*	0.00	0.00	0.00
36.05	0.47	0.81	0.58*	0.00	0.00	0.00
36.10	0.47	0.81	0.58*	0.00	0.00	0.00
36.15	0.47	0.81	0.58*	0.00	0.00	0.00
36.20	0.47	0.81	0.58*	0.00	0.00	0.00
36.25	0.47	0.81	0.58*	0.00	0.00	0.00
36.30	0.47	0.81	0.58*	0.00	0.00	0.00
36.35	0.47	0.81	0.58*	0.00	0.00	0.00
36.40	0.47	0.81	0.58*	0.00	0.00	0.00
36.45	0.47	0.80	0.58*	0.00	0.00	0.00
36.50	0.47	0.80	0.58*	0.00	0.00	0.00
36.55	0.47	0.80	0.58*	0.00	0.00	0.00
36.60	0.47	0.80	0.58*	0.00	0.00	0.00
36.65	0.47	0.80	0.58*	0.00	0.00	0.00
36.70	0.47	0.80	0.58*	0.00	0.00	0.00
36.75	0.47	0.80	0.58*	0.00	0.00	0.00
36.80	0.47	0.80	0.58*	0.00	0.00	0.00
36.85	0.47	0.80	0.58*	0.00	0.00	0.00
36.90	0.47	0.80	0.58*	0.00	0.00	0.00
36.95	0.47	0.80	0.58*	0.00	0.00	0.00
37.00	0.47	0.80	0.58*	0.00	0.00	0.00
37.05	0.47	0.80	0.58*	0.00	0.00	0.00
37.10	0.47	0.80	0.58*	0.00	0.00	0.00
37.15	0.47	0.80	0.58*	0.00	0.00	0.00
37.20	0.47	0.80	0.58*	0.00	0.00	0.00
37.25	0.47	0.80	0.58*	0.00	0.00	0.00
37.30	0.47	0.80	0.58*	0.00	0.00	0.00
37.35	0.47	0.80	0.58*	0.00	0.00	0.00
37.40	0.47	0.80	0.58*	0.00	0.00	0.00

37.45	0.47	0.80	0.58*	0.00	0.00	0.00
37.50	0.47	0.80	0.58*	0.00	0.00	0.00
37.55	0.47	0.80	0.58*	0.00	0.00	0.00
37.60	0.47	0.80	0.58*	0.00	0.00	0.00
37.65	0.47	0.80	0.58*	0.00	0.00	0.00
37.70	0.47	0.80	0.58*	0.00	0.00	0.00
37.75	0.47	0.80	0.58*	0.00	0.00	0.00
37.80	0.47	0.80	0.58*	0.00	0.00	0.00
37.85	0.47	0.80	0.58*	0.00	0.00	0.00
37.90	0.47	0.80	0.58*	0.00	0.00	0.00
37.95	0.47	0.80	0.58*	0.00	0.00	0.00
38.00	0.47	0.80	0.58*	0.00	0.00	0.00
38.05	0.47	0.80	0.58*	0.00	0.00	0.00
38.10	0.47	0.80	0.58*	0.00	0.00	0.00
38.15	0.47	0.80	0.58*	0.00	0.00	0.00
38.20	0.47	0.80	0.58*	0.00	0.00	0.00
38.25	0.47	0.80	0.58*	0.00	0.00	0.00
38.30	0.47	0.80	0.58*	0.00	0.00	0.00
38.35	0.47	0.80	0.58*	0.00	0.00	0.00
38.40	0.47	0.80	0.58*	0.00	0.00	0.00
38.45	0.47	0.80	0.58*	0.00	0.00	0.00
38.50	0.47	0.80	0.58*	0.00	0.00	0.00
38.55	0.47	0.80	0.58*	0.00	0.00	0.00
38.60	0.47	0.80	0.58*	0.00	0.00	0.00
38.65	0.47	0.80	0.58*	0.00	0.00	0.00
38.70	0.47	0.80	0.58*	0.00	0.00	0.00
38.75	0.47	0.80	0.58*	0.00	0.00	0.00
38.80	0.47	0.80	0.58*	0.00	0.00	0.00
38.85	0.47	0.80	0.58*	0.00	0.00	0.00
38.90	0.47	0.80	0.58*	0.00	0.00	0.00
38.95	0.47	0.80	0.58*	0.00	0.00	0.00
39.00	0.47	0.80	0.58*	0.00	0.00	0.00
39.05	0.47	0.80	0.58*	0.00	0.00	0.00
39.10	0.47	0.80	0.58*	0.00	0.00	0.00
39.15	0.47	0.80	0.58*	0.00	0.00	0.00
39.20	0.47	0.80	0.58*	0.00	0.00	0.00
39.25	0.47	0.80	0.58*	0.00	0.00	0.00
39.30	0.47	0.80	0.58*	0.00	0.00	0.00
39.35	0.47	0.80	0.58*	0.00	0.00	0.00
39.40	0.47	0.80	0.58*	0.00	0.00	0.00
39.45	0.47	0.80	0.58*	0.00	0.00	0.00
39.50	0.47	0.80	0.58*	0.00	0.00	0.00
39.55	0.47	0.80	0.58*	0.00	0.00	0.00
39.60	0.47	0.80	0.59*	0.00	0.00	0.00
39.65	0.47	0.80	0.59*	0.00	0.00	0.00
39.70	0.47	0.80	0.59*	0.00	0.00	0.00
39.75	0.47	0.80	0.59*	0.00	0.00	0.00
39.80	0.47	0.80	0.59*	0.00	0.00	0.00
39.85	0.47	0.80	0.59*	0.00	0.00	0.00
39.90	0.47	0.79	0.59*	0.00	0.00	0.00
39.95	0.47	0.79	0.59*	0.00	0.00	0.00
40.00	0.47	0.79	0.59*	0.00	0.00	0.00
40.05	0.47	0.79	0.59*	0.00	0.00	0.00
40.10	0.47	0.79	0.59*	0.00	0.00	0.00
40.15	0.47	0.79	0.59*	0.00	0.00	0.00
40.20	0.47	0.79	0.59*	0.00	0.00	0.00
40.25	0.47	0.79	0.59*	0.00	0.00	0.00
40.30	0.47	0.79	0.59*	0.00	0.00	0.00
40.35	0.47	0.79	0.59*	0.00	0.00	0.00

40.40	0.47	0.79	0.59*	0.00	0.00	0.00
40.45	0.47	0.79	0.59*	0.00	0.00	0.00
40.50	0.47	0.79	0.59*	0.00	0.00	0.00
40.55	0.47	0.79	0.59*	0.00	0.00	0.00
40.60	0.47	0.79	0.59*	0.00	0.00	0.00
40.65	0.47	0.79	0.59*	0.00	0.00	0.00
40.70	0.47	0.79	0.59*	0.00	0.00	0.00
40.75	0.47	0.79	0.59*	0.00	0.00	0.00
40.80	0.47	0.79	0.59*	0.00	0.00	0.00
40.85	0.47	0.79	0.59*	0.00	0.00	0.00
40.90	0.47	0.79	0.59*	0.00	0.00	0.00
40.95	0.47	0.79	0.59*	0.00	0.00	0.00
41.00	0.47	0.79	0.59*	0.00	0.00	0.00
41.05	0.47	0.79	0.59*	0.00	0.00	0.00
41.10	0.47	0.79	0.59*	0.00	0.00	0.00
41.15	0.47	0.79	0.59*	0.00	0.00	0.00
41.20	0.47	0.79	0.59*	0.00	0.00	0.00
41.25	0.47	0.79	0.59*	0.00	0.00	0.00
41.30	0.47	0.79	0.59*	0.00	0.00	0.00
41.35	0.47	0.79	0.59*	0.00	0.00	0.00
41.40	0.47	0.79	0.59*	0.00	0.00	0.00
41.45	0.47	0.79	0.59*	0.00	0.00	0.00
41.50	0.47	0.79	0.59*	0.00	0.00	0.00
41.55	0.47	0.79	0.59*	0.00	0.00	0.00
41.60	0.47	0.79	0.59*	0.00	0.00	0.00
41.65	0.47	0.79	0.59*	0.00	0.00	0.00
41.70	0.47	0.79	0.59*	0.00	0.00	0.00
41.75	0.47	0.79	0.59*	0.00	0.00	0.00
41.80	0.47	0.79	0.59*	0.00	0.00	0.00
41.85	0.47	0.79	0.59*	0.00	0.00	0.00
41.90	0.47	0.79	0.59*	0.00	0.00	0.00
41.95	0.47	0.79	0.59*	0.00	0.00	0.00
42.00	0.47	0.79	0.59*	0.00	0.00	0.00
42.05	0.47	0.79	0.59*	0.00	0.00	0.00
42.10	0.47	0.79	0.59*	0.00	0.00	0.00
42.15	0.47	0.79	0.59*	0.00	0.00	0.00
42.20	0.47	0.79	0.59*	0.00	0.00	0.00
42.25	0.47	0.79	0.59*	0.00	0.00	0.00
42.30	0.47	0.79	0.59*	0.00	0.00	0.00
42.35	0.47	0.79	0.59*	0.00	0.00	0.00
42.40	0.47	0.79	0.59*	0.00	0.00	0.00
42.45	0.47	0.79	0.59*	0.00	0.00	0.00
42.50	0.47	0.79	0.59*	0.00	0.00	0.00
42.55	0.47	0.79	0.59*	0.00	0.00	0.00
42.60	0.47	0.79	0.59*	0.00	0.00	0.00
42.65	0.47	0.78	0.59*	0.00	0.00	0.00
42.70	0.47	0.78	0.59*	0.00	0.00	0.00
42.75	0.47	0.78	0.59*	0.00	0.00	0.00
42.80	0.47	0.78	0.59*	0.00	0.00	0.00
42.85	0.47	0.78	0.59*	0.00	0.00	0.00
42.90	0.47	0.78	0.59*	0.00	0.00	0.00
42.95	0.47	0.78	0.59*	0.00	0.00	0.00
43.00	0.47	0.78	0.59*	0.00	0.00	0.00
43.05	0.47	0.78	0.59*	0.00	0.00	0.00
43.10	0.47	0.78	0.59*	0.00	0.00	0.00
43.15	0.47	0.78	0.59*	0.00	0.00	0.00
43.20	0.47	0.78	0.60*	0.00	0.00	0.00
43.25	0.47	0.78	0.60*	0.00	0.00	0.00
43.30	0.47	0.78	0.60*	0.00	0.00	0.00

43.35	0.47	0.78	0.60*	0.00	0.00	0.00
43.40	0.47	0.78	0.60*	0.00	0.00	0.00
43.45	0.47	0.78	0.60*	0.00	0.00	0.00
43.50	0.47	0.78	0.60*	0.00	0.00	0.00
43.55	0.47	0.78	0.60*	0.00	0.00	0.00
43.60	0.47	0.78	0.60*	0.00	0.00	0.00
43.65	0.47	0.78	0.60*	0.00	0.00	0.00
43.70	0.47	0.78	0.60*	0.00	0.00	0.00
43.75	0.47	0.78	0.60*	0.00	0.00	0.00
43.80	0.47	0.78	0.60*	0.00	0.00	0.00
43.85	0.47	0.78	0.60*	0.00	0.00	0.00
43.90	0.47	0.78	0.60*	0.00	0.00	0.00
43.95	0.47	0.78	0.60*	0.00	0.00	0.00
44.00	0.47	0.78	0.60*	0.00	0.00	0.00
44.05	0.47	0.78	0.60*	0.00	0.00	0.00
44.10	0.47	0.78	0.60*	0.00	0.00	0.00
44.15	0.47	0.78	0.60*	0.00	0.00	0.00
44.20	0.47	0.78	0.60*	0.00	0.00	0.00
44.25	0.47	0.78	0.60*	0.00	0.00	0.00
44.30	0.47	0.78	0.60*	0.00	0.00	0.00
44.35	0.47	0.78	0.60*	0.00	0.00	0.00
44.40	0.47	0.78	0.60*	0.00	0.00	0.00
44.45	0.47	0.78	0.60*	0.00	0.00	0.00
44.50	0.47	0.78	0.60*	0.00	0.00	0.00
44.55	0.47	0.78	0.60*	0.00	0.00	0.00
44.60	0.47	0.78	0.60*	0.00	0.00	0.00
44.65	0.47	0.78	0.60*	0.00	0.00	0.00
44.70	0.47	0.78	0.60*	0.00	0.00	0.00
44.75	0.47	0.78	0.60*	0.00	0.00	0.00
44.80	0.47	0.78	0.60*	0.00	0.00	0.00
44.85	0.47	0.78	0.60*	0.00	0.00	0.00
44.90	0.47	0.78	0.60*	0.00	0.00	0.00
44.95	0.47	0.78	0.60*	0.00	0.00	0.00
45.00	0.47	0.77	0.60*	0.00	0.00	0.00
45.05	0.47	0.77	0.60*	0.00	0.00	0.00
45.10	0.47	0.77	0.60*	0.00	0.00	0.00
45.15	0.47	0.77	0.60*	0.00	0.00	0.00
45.20	0.47	0.77	0.60*	0.00	0.00	0.00
45.25	0.47	0.77	0.60*	0.00	0.00	0.00
45.30	0.47	0.77	0.60*	0.00	0.00	0.00
45.35	0.47	0.77	0.60*	0.00	0.00	0.00
45.40	0.47	0.77	0.60*	0.00	0.00	0.00
45.45	0.47	0.77	0.60*	0.00	0.00	0.00
45.50	0.47	0.77	0.60*	0.00	0.00	0.00

* F.S.<1, Liquefaction Potential Zone
(F.S. is limited to 5, CRR is limited to 2,   CSR is limited to 2)

Units: Welcome to LiquefyPro!

1 atm (atmosphere) = 1 tsf (ton/ft2)

CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

ATC Hazards by Location

Search Information

Coordinates: 33.61322, -117.26328

Elevation: ft

Timestamp: 2019-12-11T20:47:45.840Z

Hazard Type: Seismic

Reference Document: ASCE7-16

Risk Category: III

Site Class: D

Basic Parameters

Name	Value	Description
S_S	1.668	MCE_R ground motion (period=0.2s)
S_1	0.619	MCE_R ground motion (period=1.0s)
S_{MS}	1.668	Site-modified spectral acceleration value
S_{M1}	* null	Site-modified spectral acceleration value
S_{DS}	1.112	Numeric seismic design value at 0.2s SA
S_{D1}	* null	Numeric seismic design value at 1.0s SA

* See Section 11.4.8

Additional Information

Name	Value	Description
SDC	* null	Seismic design category
F_a	1	Site amplification factor at 0.2s
F_v	* null	Site amplification factor at 1.0s
CR_S	0.909	Coefficient of risk (0.2s)
CR_1	0.907	Coefficient of risk (1.0s)
PGA	0.726	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.799	Site modified peak ground acceleration
T_L	8	Long-period transition period (s)

SsRT	1.668	Probabilistic risk-targeted ground motion (0.2s)
SsUH	1.836	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
SsD	2.376	Factored deterministic acceleration value (0.2s)
S1RT	0.619	Probabilistic risk-targeted ground motion (1.0s)
S1UH	0.682	Factored uniform-hazard spectral acceleration (2% probability of exceedance in 50 years)
S1D	0.948	Factored deterministic acceleration value (1.0s)
PGAd	1.001	Factored deterministic acceleration value (PGA)

* See Section 11.4.8

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.

While the information presented on this website is believed to be correct, ATC and its sponsors and contributors assume no responsibility or liability for its accuracy. The material presented in the report should not be used or relied upon for any specific application without competent examination and verification of its accuracy, suitability and applicability by engineers or other licensed professionals. ATC does not intend that the use of this information replace the sound judgment of such competent professionals, having experience and knowledge in the field of practice, nor to substitute for the standard of care required of such professionals in interpreting and applying the results of the report provided by this website. Users of the information from this website assume all liability arising from such use. Use of the output of this website does not imply approval by the governing building code bodies responsible for building code approval and interpretation for the building site described by latitude/longitude location in the report.

U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

Please do not use this tool to obtain ground motion parameter values for the design code reference documents covered by the U.S. Seismic Design Maps web tools (e.g., the International Building Code and the ASCE 7 or 41 Standard). The values returned by the two applications are not identical.

Input

Edition

Dynamic: Conterminous U.S. 2014 (upda

Latitude

Decimal degrees

33.61322

Longitude

Decimal degrees, negative values for western longitudes

-117.26328

Site Class

259 m/s (Site class D)

Spectral Period

Peak Ground Acceleration

Time Horizon

Return period in years

2475

Hazard Curve

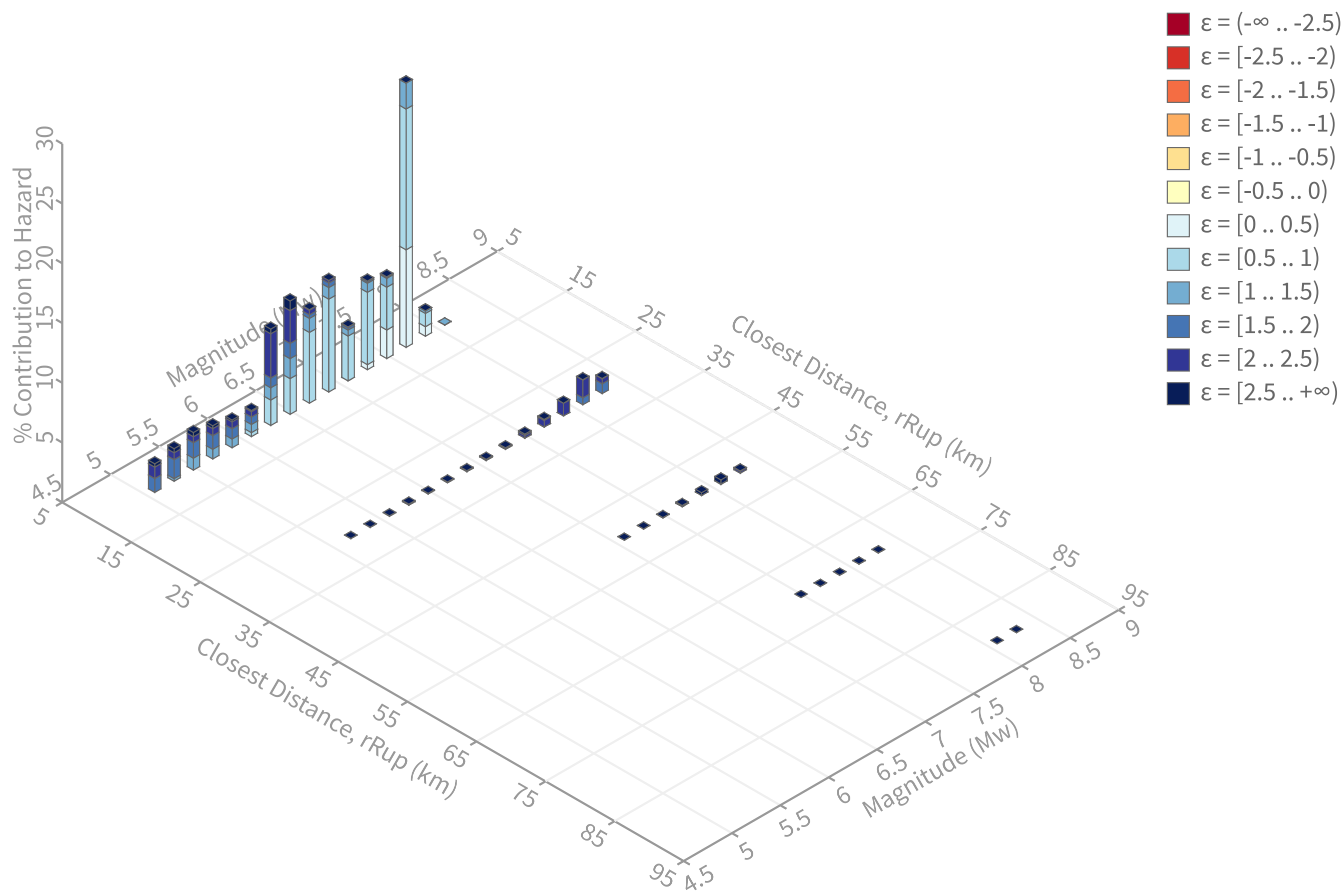
Please select “Edition”, “Location” & “Site Class” above to compute a hazard curve.

Compute Hazard Curve

Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.76243885 g

Recovered targets

Return period: 2821.2035 yrs
Exceedance rate: 0.00035445866 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.09 %

Mean (over all sources)

m: 6.94
r: 6.72 km
ε_0: 1.18 σ

Mode (largest m-r bin)

m: 7.71
r: 1.88 km
ε_0: 0.64 σ
Contribution: 22.11 %

Mode (largest m-r-ε_0 bin)

m: 7.71
r: 1.86 km
ε_0: 0.67 σ
Contribution: 11.78 %

Discretization

r: min = 0.0, max = 1000.0, Δ = 20.0 km
m: min = 4.4, max = 9.4, Δ = 0.2
ε: min = -3.0, max = 3.0, Δ = 0.5 σ

Epsilon keys

ε0: [-∞ .. -2.5)
ε1: [-2.5 .. -2.0)
ε2: [-2.0 .. -1.5)
ε3: [-1.5 .. -1.0)
ε4: [-1.0 .. -0.5)
ε5: [-0.5 .. 0.0)
ε6: [0.0 .. 0.5)
ε7: [0.5 .. 1.0)
ε8: [1.0 .. 1.5)
ε9: [1.5 .. 2.0)
ε10: [2.0 .. 2.5)
ε11: [2.5 .. +∞]

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							40.98
Elsinore (Temecula) rev [0]		1.86	7.33	0.71	117.273°W	33.606°N	229.03	27.91
Elsinore (Stepovers Combined) [1]		2.14	6.62	0.89	117.281°W	33.612°N	263.74	4.73
Elsinore (Glen Ivy) rev [3]		12.98	6.42	2.15	117.373°W	33.685°N	308.36	3.02
San Jacinto (Stepovers Combined) [2]		33.37	8.04	2.13	116.989°W	33.809°N	49.33	2.54
Elsinore (Glen Ivy) rev [2]		19.42	6.51	2.50	117.428°W	33.721°N	308.19	1.24
UC33brAvg_FM32	System							40.47
Elsinore (Temecula) rev [0]		1.86	7.38	0.70	117.273°W	33.606°N	229.03	27.24
Elsinore (Stepovers Combined) [1]		2.14	6.66	0.88	117.281°W	33.612°N	263.74	4.85
Elsinore (Glen Ivy) rev [3]		12.98	6.42	2.15	117.373°W	33.685°N	308.36	3.09
San Jacinto (Stepovers Combined) [2]		33.37	8.04	2.14	116.989°W	33.809°N	49.33	2.52
Elsinore (Glen Ivy) rev [2]		19.42	6.54	2.48	117.428°W	33.721°N	308.19	1.30
UC33brAvg_FM31 (opt)	Grid							9.28
PointSourceFinite: -117.263, 33.645		6.30	5.53	1.56	117.263°W	33.645°N	0.00	2.14
PointSourceFinite: -117.263, 33.645		6.30	5.53	1.56	117.263°W	33.645°N	0.00	2.14
UC33brAvg_FM32 (opt)	Grid							9.27
PointSourceFinite: -117.263, 33.645		6.30	5.53	1.56	117.263°W	33.645°N	0.00	2.14
PointSourceFinite: -117.263, 33.645		6.30	5.53	1.56	117.263°W	33.645°N	0.00	2.14

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APPENDIX E

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Appendix E

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APPENDIX F

GEOBASE AND GEOCON WEST REPORTS

GEOTECHNICAL REVIEW

PURCHASE TEN (10) ACRES - WILDOMAR REPLACEMENT
NORTHWEST CORNER OF BAXTER ROAD
AND INTERSTATE 15 (I-15)

WILDOMAR, CALIFORNIA

GEOBASE, INC.

GEOTECHNICAL REVIEW

PURCHASE TEN (10) ACRES - WILDOMAR REPLACEMENT
NORTHWEST CORNER OF BAXTER ROAD AND INTERSTATE 15 (I-15)

WILDOMAR, CALIFORNIA

Prepared for:

Kaiser Foundation Health Plan, Inc.
Corona, California

By:

GEOBASE, INC.
23362 Peralta Drive, Unit 4
Laguna Hills, California 92653
(949) 588-3744

May 2017
Project No. C.314.73.02

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I. INTRODUCTION

1.1 General

GEOBASE, INC. (GEOBASE) was retained by Kaiser Foundation Health Plan, Inc. to undertake a geotechnical review for the site (Site 7) located at the northwest corner of Baxter Road and Interstate 15 (I-15), in the City of Wildomar, Riverside County, California. The proposed site is part of Tract 34301, Assessor's Parcel numbers 376-180-015 and 316-180-043. Previously, GEOBASE had evaluated the following sites as part of GEOBASE's Geotechnical Review reports, project number C.314.73.00 and C.314.73.01, dated October 2015 and June 2016, respectively:

- Orange Street and Bundy Canyon Road (Site 1)
- George Avenue and Clinton Keith Road (Site 3)
- Hidden Springs Road and Clinton Keith Road (Site 5)
- Catt Road and Est of the I-15 Freeway (Site 6)

The approximate location of these sites are shown on the Site Locations Map, Figure A-1, Appendix A.

This report presents the results of the geotechnical review for Site 7.

1.2 Objective of the Geotechnical Review

The objective of this review was to assist with the selection of a site for future development. This was accomplished by performing a review of previous soil reports and pertinent geotechnical information to identify, at each site, geotechnical constraints that may have a bearing on the proposed developments.

1.3 Scope of Services

The scope of services provided during the course of this review included:

- Site reconnaissance on May 03, 2017;

- Review of the referenced site specific soils report titled "Preliminary Geotechnical and Fault Rupture Hazard Investigation, Tract 34301, NWC Baxter Road and I-15, Wildomar, California", prepared by GEOCON West, Inc., dated December 12, 2012, revised March 26, 2015;

- Review of the County of Riverside General Plan;
- Discussions with the County of Riverside regarding County Fault Studies Zones;
- Review of readily available published geologic literature for the site and vicinity (see references); and,
- Preparation of this report presenting our findings, conclusions and recommendations.

No subsurface drilling, sampling or laboratory testing was performed as part of this review.

II. PROPOSED DEVELOPMENT

It is understood that proposed development will consist of construction of a medical office building (MOB) and supporting facilities.

III. SITE DESCRIPTION

The property is located west of the Interstate 15 (I-15) Freeway, north of Baxter Road and east of White Street. The subject property is comprised of approximately thirty-five (35) acres of undeveloped land. It is understood that the property will be subdivided and the project site for the proposed development will consist of approximately ten (10) acres. The north and west side of the property is bordered by developed residential housing.

The property is relatively flat to rolling hills with elevations ranging from approximately 1324 to 1372 feet above mean-sea-level (amsl). The majority of the land is covered with medium dense weeds and scattered trees. Drainage appears directed towards the east and south of the property.

The property features can be observed from the Site Map and Site Photographs, Figures A-2 and A-3, respectively, Appendix A.

IV. SUBSURFACE CONDITIONS

4.1 Subsoil Conditions

A regional geologic map showing the geologic units at each site is given as Figure A-4, Appendix A. Subsoil conditions at the site are described below, based on the geologic map and Site Plan (Figure A-5, Appendix A), and the GEOCON West, Inc.'s (GEOCON) soils report. This report is included herein, Appendix C, for ease of reference.

Based on the GEOCON report dated December 12, 2012 and revised March 26, 2015, subsoils at the site include:

- Younger alluvium encountered primarily within the drainage areas consisting of loose to medium dense inter-layered silty sands, sands and clays. At the locations observed, the younger alluvium ranged in thickness from two (2) to eighteen (18) feet.

- Colluvium overlying granitic bedrock consisting of red-brown clayey sands with abundant carbonate nodules and stringers. Where encountered, in borings and trenches, the colluvium ranges in thickness from one (1) to eight (8) feet.

- Pauba Formation sandstone consisting of brown to reddish-brown silty sand.

- Granitic bedrock encountered at depths of three (3) to thirty-nine (39) feet within the borings and trenches.

Distribution of the above materials within the site is shown on GEOCON Geologic Map and Site Plan, reproduced herein as Figure A-5, Appendix A.

4.2 Groundwater Conditions

GEOCON stated that groundwater depths observed primarily in drainage areas range from thirteen and one-half (13.5) to twenty-nine (29) feet below ground surface. Additionally, groundwater seepage is common at soil/bedrock contact. Therefore, groundwater may be encountered during grading and appropriate drainage measure should be implemented.

4.3 Excavatability

The sandstone bedrock may be cemented in localized areas. Excavation in these cemented zones may require heavy tractor and/or ripper, and can generate oversize material not suitable as fill.

The granitic bedrock, where ***not*** weathered, may be difficult to excavate.

4.4 Oversize Material

Excavation of bedrock can generate some oversize materials. In addition, excavation in alluvium may also generate some oversize material, where cobbles and boulders are encountered. Oversize materials, typically greater than six (6) inches in maximum dimension, require special handling if they are to be incorporated into fill, otherwise they need to be exported.

V. FAULTING

The fault classification system adopted by the California Geological Survey (CGS), relative to the State legislation, delineates Earthquake Fault Zones along active or potentially active faults (Alquist-Priolo Act). Such Earthquake Fault Zones are in turn used to establish setbacks of structures from active fault zones. An active fault is defined by the CGS as a "sufficiently active and well defined fault" that has exhibited surface displacement within Holocene time (approximately the last 11,000 years). A potentially active fault is defined by the State as a fault with a history of movement within Pleistocene time (between 11,000 and 1.6 million years ago). Any fault proven not to have moved within the last 1.6 million years is considered inactive.

Although not zoned by the State of California (Figure A-6, Appendix A, Geologic Hazards Map), geologic mapping by Morton and Webber indicates that a branch of the Elsinore Fault Zone (Glen Ivy segment) is believed to traverse the eastern portion of Site 7, as shown on the County of Riverside Fault Map, Figure A-7, Appendix A.

Using the same website that provides the County of Riverside Fault Map, but researching at the parcel level, the individual report indicates that the referenced GEOCON report, Appendix C, was approved as shown on the parcel reports (page 4 of 4) provided in Appendix B.

VI. SITE GEOTECHNICAL REPORT REVIEW COMMENTS

GEOCON completed a geotechnical and fault rupture hazard report dated December 12, 2012 and revised March 26, 2016 (Appendix C). Based on the Riverside County Parcel Report, Appendix B, this report was approved. It is recommended that the following comments be addressed:

6.1 Update Letter

The site report is based on CBC 2013. Therefore an update letter is required since the current code is CBC 2016.

6.2 Seismic Design Criteria

Subsection 7.6, Seismic Design Criteria, of the site geotechnical report prepared by GEOCON, Appendix C, does not meet the requirements of CBC 2013, which the report is based on, and CBC 2016. ***These requirements are the same for both CBC 2013 and 2016*** and are outlined below.

Table 7.6.1 of GEOCON's report (Appendix C), titled 2013 CBC Seismic Design Parameters, indicates that $S_1 = 0.927g$. CBC 2013 subsection 1613.3.5 states: "*Structures classified as Risk Category I, II or III that are located where the mapped spectral response acceleration parameter at 1-second period, S_1, is greater than or equal to 0.75 shall be assigned to Seismic Design Category E. Structures classified as Risk Category IV that are located where the mapped spectral response acceleration parameter at 1-second period, S_1, is greater than or equal to 0.75 shall be assigned to Seismic Design Category F.*" Further, CBC 2013 subsection 1616.10.2 states: "*For buildings assigned to Seismic Design Category E and F, or when required by the building official, a ground motion hazard analysis shall be performed in accordance with ASCE 7 Chapter 21, as modified by Section 1803A.6 of this code.*"

Based on the above the 2013 CBC Seismic Design Parameters are inadequate and a site-specific ground motion hazard analysis (GMHA) should be performed.

VII. SUMMARY

Based on our review of the site geotechnical report prepared by GEOCON, geological and seismological information pertinent to the site, and a site reconnaissance visit, the following findings and observations were noted:

1. The Geotechnical and Fault Rupture Hazard Investigation report was approved by the County of Riverside and should therefore be adequate for non-OSHPD projects.

2. The site geotechnical report is based on CBC 2013. Therefore an update letter is required since the current code is CBC 2016.

3. Seismic Design Criteria does not meet the requirements of CBC 2013 or CBC 2016; these requirements are the same.

4. Removal and recompaction is recommended for alluvium soils, upper three (3) feet of colluvium, completely weathered sandstones and granitic bedrock and the fault trenches excavations. The alluviums, at the locations observed, extend to depths of eighteen (18) feet.

5. Recommended allowable bearing pressures (up to 3,500 psf) are assumed based on ninety (90) percent relative compaction for the materials overexcavated and replaced; ninety-five (95) percent relative compaction will result in higher bearing pressures.

6. Undocumented fills were not observed at the boring and trench locations.

VIII. LIMITATIONS

This geotechnical review was performed in accordance with generally accepted geotechnical engineering principles and practice. No warranty, expressed or implied, is made as to the conclusions and professional advice included in this report.

Conclusions and recommendations presented herein are partly based on the evaluation of GEOCON's site geotechnical report, geological and seismological information pertinent to the site and on experience and professional judgment.

This review was limited to the geotechnical aspects of the site. The potential for hazardous and/or contaminated materials existing at the site was not evaluated.

Respectfully submitted
GEOBASE, INC.

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R.C.E. 82460
Associate Engineer

J-M. Chevallier, P.E., G.E.
R.C.E. 39198; G.E. 2056
Managing Principal

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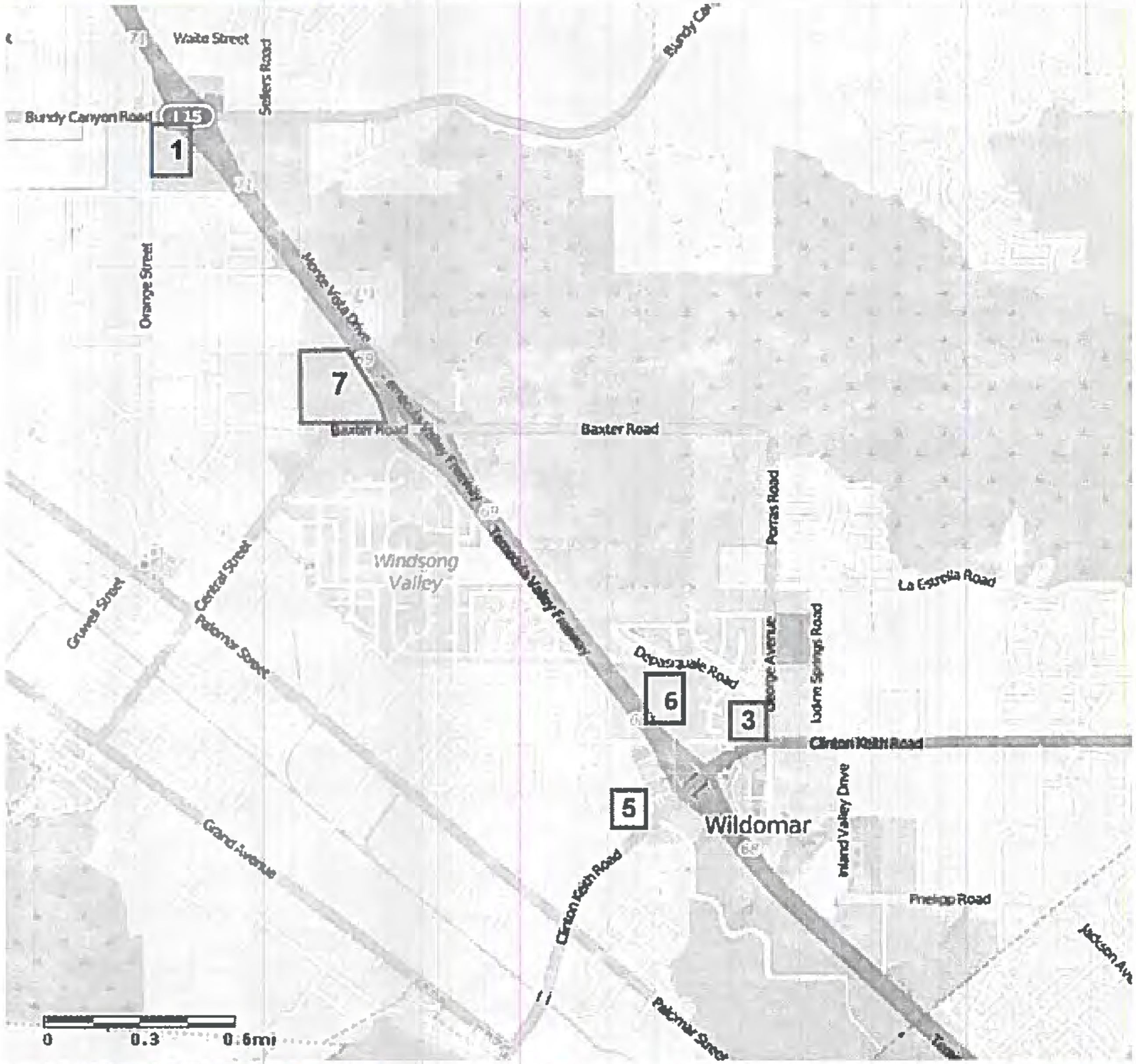
APPENDIX A

Explanations:

Site Location 7

1. Orange Street and Bundy Canyon Road
3. George Avenue and Clinton Keith Road
5. Hidden Springs Road and Clinton Keith Road
6. North of Catt Rd and East of I-15 Freeway
7. NWC of Baxter Road and I-15 Freeway



GEOBASE

SITE LOCATIONS MAP

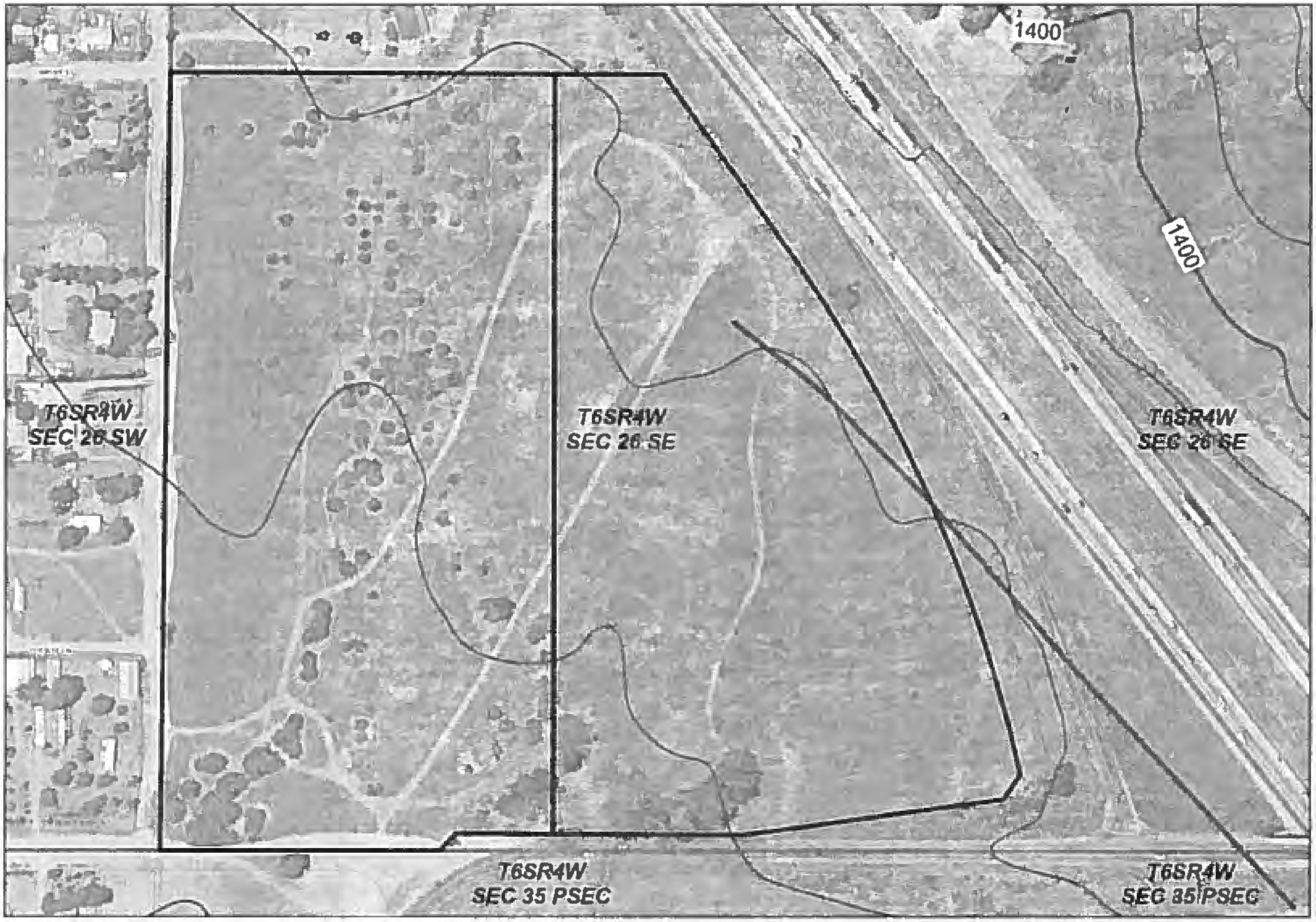
Kaiser Permanente – TRACT 34301
NWC OF BAXTER ROAD AND I-15 FREEWAY
Wildomar, California

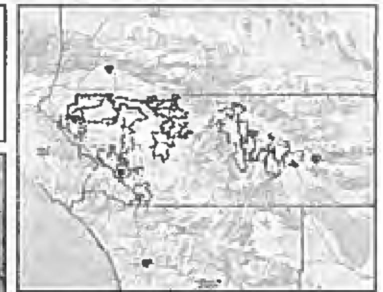
C.314.73.02

FIGURE A-1

NWC Baxter Road and I-15

TRACT 34301





Legend

- Display Parcels
- Townships
- Survey
- Contours 20 ft interval (with 10
  - 20' CONTOUR
  - 100' INDEX CONTOUR
- Faults
  - <all other values>
  - ALQUIST-PRIOLO
  - RIVERSIDE COUNTY
- Fluvial Sand Transport Areas
- Coachella Valley MSHCP Bou
- CV Conservation Area
  - Cabazon Conservation Area
  - Coachella Valley Stormwater Chan Conservation Area
  - Desert Tortoise and Linkage Conse
  - Dos Palmas Conservation Area
  - East Indio Hills Conservation Area
  - Edom Hill Conservation Area
  - Highway 111/I-10 Conservation Are
  - Indio Hills Palms Conservation Are
  - Indio Hills/Joshua Tree National Pa Area
  - Joshua Tree National Park Consen
  - Long Canyon Conservation Area
  - Mecca Hills/Orocopia Mountains Co
  - Santa Rosa and San Jacinto Mount

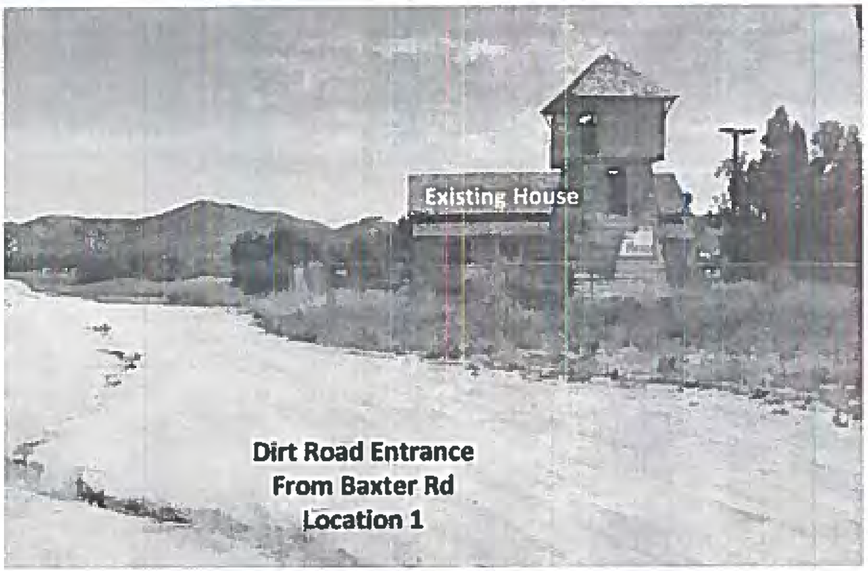
Notes

RCIT

0 312 625 Feet

IMPORTANT Maps and data are to be used for reference purposes only. Map features are approximate, and are not necessarily accurate to surveying or engineering standards. The County of Riverside makes no warranty or guarantee as to the content (the source is often third party), accuracy, timeliness, or completeness of any of the data provided, and assumes no legal responsibility for the information contained on this map. Any use of this product with respect to accuracy and precision shall be the sole responsibility of the user.

REPORT PRINTED ON ...5/4/2017 12:42:01 PM



GEOBASE

C.314.73.02

SITE 7 PHOTOGRAPHS
Kaiser Permanente – TRACT 34301
NWC OF BAXTER ROAD AND I-15 FREEWAY
Wildomar, California

FIGURE A-3

Explanations:

Site Location [7]

1. Orange St and Bundy Canyon Road
3. George Ave and Clinton Keith Road
5. Hidden Springs Rd and Clinton Keith Road
6. North Catt Rd and East 15 Freeway
7. NWC of Baxter and I-15 Freeway

Geologic Unit Description:

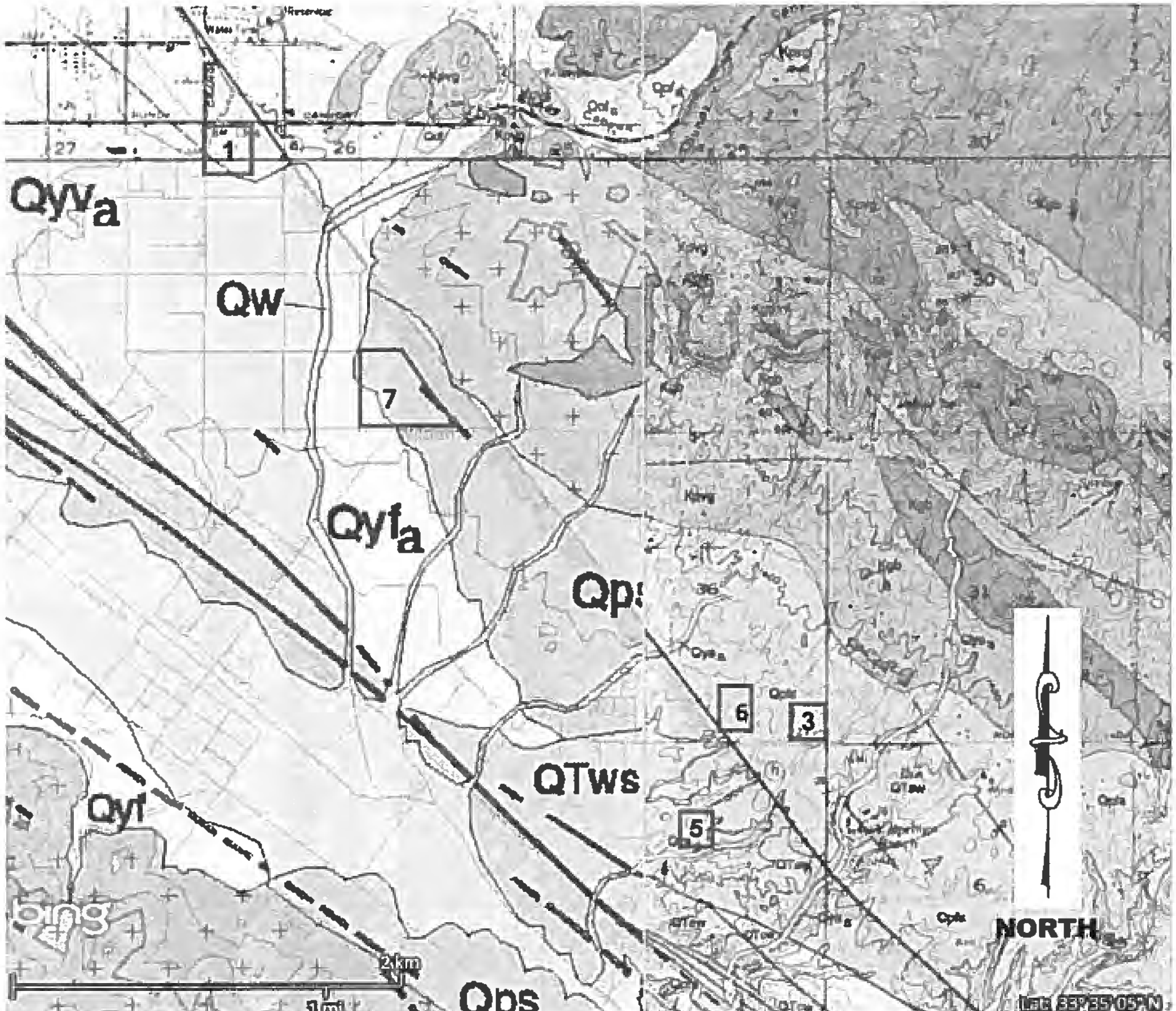
Qyf1 -- Young alluvial-fan deposits, Unit 1 (early Holocene and Late Pleistocene) – Slightly to moderately consolidated silt, sand, and coarse-grained sand to boulder alluvial-fan deposits having moderately dissected surfaces. Has well-developed S_5 soils on outside of San Grabriel and San Bernardino mountains.

Qyv -- Young alluvial-valley deposits, (Holocene and Late Pleistocene) – Fluvial deposits along valley floors. Consists of unconsolidated sand, silt and clay-bearing alluvium.

Pauba Formation (Qp) (Pleistocene) – Siltstone, sandstone, and conglomerate (Murrieta, Wildomar and Bachelor Mountain 7.5' quandrangels). Named by Mann (1955) for exposures in Rancho Pauba area about 3.2 km southeast of Temecula. Vertebrate fauna from Pauba Formation are of late Irvingstonian and early Rancholabrean ages (Reynolds and Reynolds, 1990a: 1990b).

Qps – Sandstone member, Brown, moderately well-indurated, cross-bedded sanstone containing sparse cobble-to boulder-conglomerate beds.

QTws – Sandstone, Primarily friable, pale yellowish-green, medium-grained, caliche-rich sandstone.

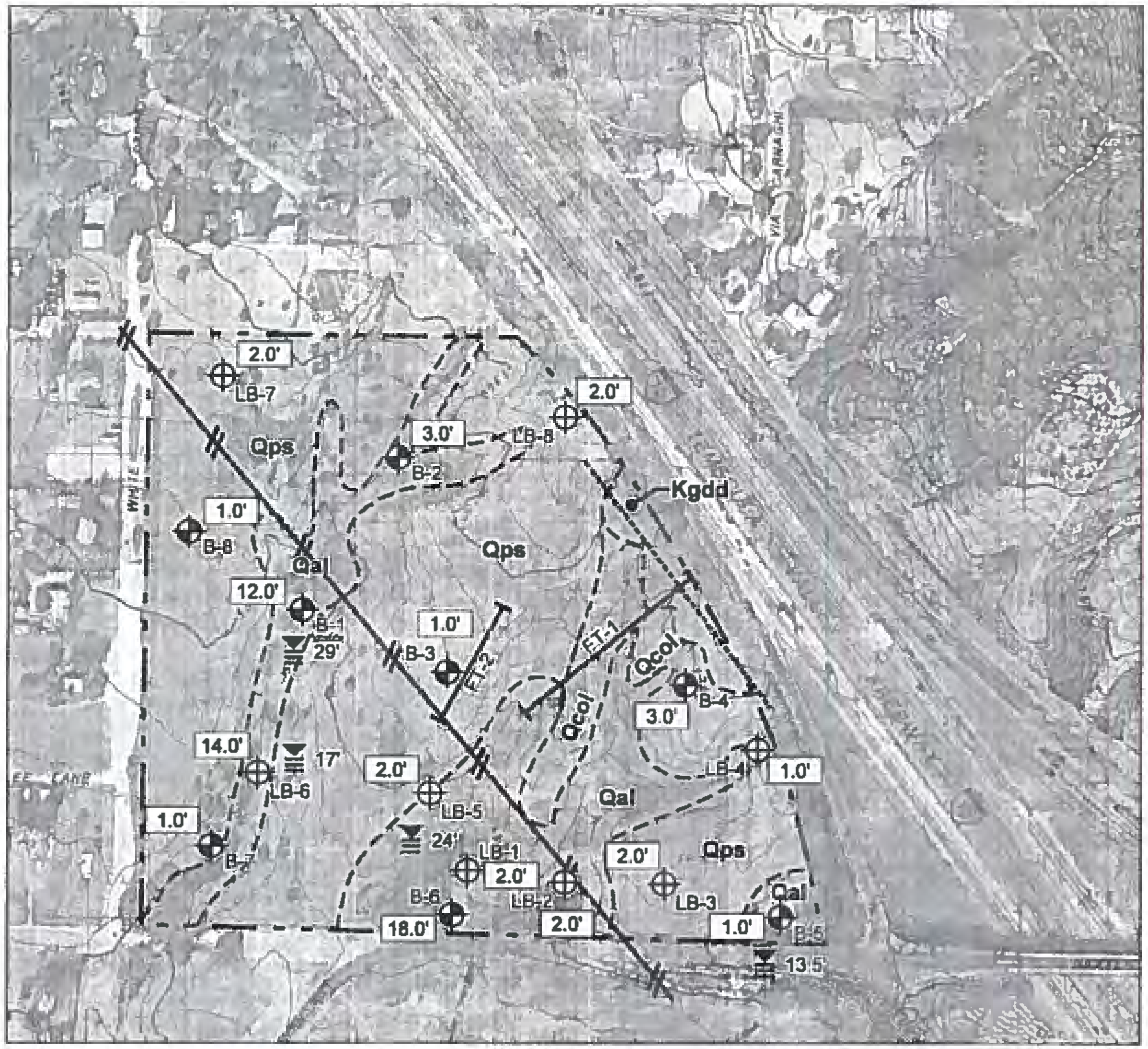


GEOBASE

REGIONAL GEOLOGIC MAP
Kaiser Permanente – TRACT 34301
NWC OF BAXTER ROAD AND I-15 FREEWAY
Wildomar, California

C.314.73.02

FIGURE A-4



LEGEND

B-8	Geotechnical Boring, Geocon (this investigation)
LB-8	Geotechnical Boring, LandMark Consultants (2005)
13.5'	Groundwater Depth Encountered During Drilling
FT-2	Fault Trench Location
18.0'	Estimated Depth of Remedial Removal Recommendation
	Western Limit of Riverside County Fault Zone Limit
	Mapped Trace of Unnamed Riverside County Fault
Qal	Young Alluvium
Qcol	Colluvium
Qps	Pauba Sandstone
Kgdd	Granitic Bedrock
	Geologic Contact
	Site Boundary

Note: Geologic contacts based on Kennedy, (1977)

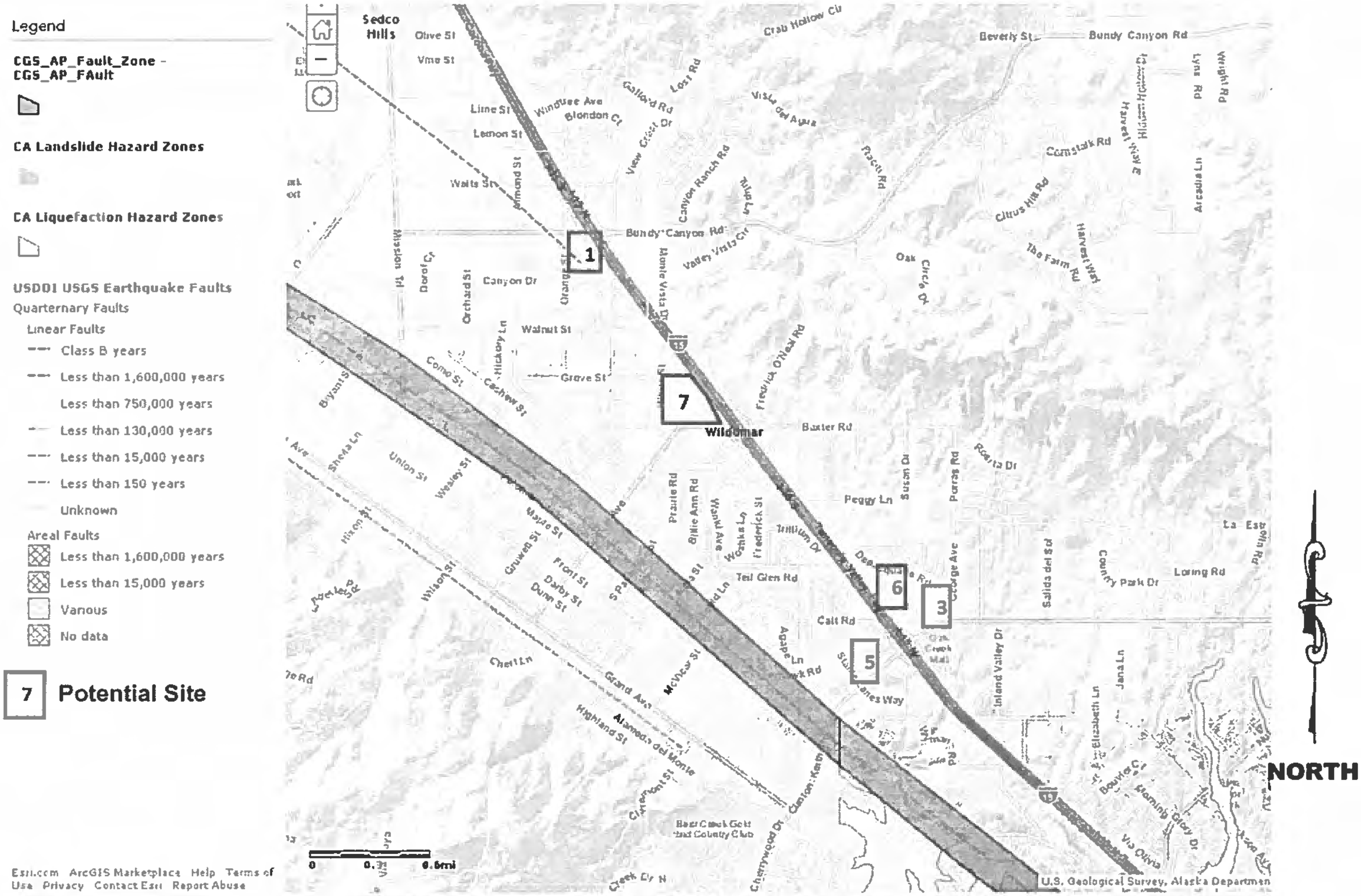
0 250' 500'

GEOCON
WEST, INC.
ENVIRONMENTAL GEOTECHNICAL MATERIALS
41571 CORNING PLACE, SUITE 101, MURRIETA, CALIFORNIA 92562
PHONE 951.304.2300 FAX 951.304.2392

JL | 2000

GEOLOGIC MAP AND SITE PLAN
TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

12 / 2012 | PROJECT NO. T2540-22-02 | FIG. 2



GEOBASE

GEOLOGIC HAZARDS MAP
Kaiser Permanente – TRACT 34301
NWC OF BAXTER ROAD AND I-15 FREEWAY
Wildomar, California

C.314.73.02

FIGURE A-6

Sources: USGS, California Division of Mining and Geology | City of Riverside, County of Riverside, Esri, HERE, DeLorme, METI/NASA, USGS, EPA, USDA

GEOBASE	C.314.73.02	**COUNTY OF RIVERSIDE FAULT MAP** Kaiser Permanente – TRACT 34301 NWC OF BAXTER ROAD AND I-15 FREEWAY Wildomar, California
		FIGURE A-7

APPENDIX B

Riverside County Parcel Report
APN 367-180-043
Baxter Rd and I-15
Disclaimer

Report Date: Thursday, May 04, 2017

MAPS/IMAGES

PARCEL

APN	367-180-043-6	**Supervisorial District 2011** **Supervisorial District 2001**	KEVIN JEFFRIES, DISTRICT 1 BOB BUSTER, DISTRICT 1
Previous APN	367180014	**Township/Range**	T6SR4W SEC 26
Address	No address available	**Elevation Range**	1,336 - 1,372
Mailing Address	4370 LA JOLLA VLG STE 960 SAN DIEGO CA, CA 92122	**Thomas Bros. Map Page/Grid**	PAGE: 897 GRID: D5 PAGE: 897 GRID: D6
Legal Description	Recorded Page: Not Available Subdivision Name: Lot/Parcel: Not Available Block: Not Available Tract Number: Not Available	**Indian Tribal Land**	Not in Tribal Land
Lot Size	Recorded lot size is 15.98 acres	**City Boundary/Sphere**	City Boundary: WILDOMAR Not within a City Sphere Annexation Date: Not Applicable LAFCO Case #: 2007-107-1&3 Proposals: Not Applicable
Property Characteristcs	No Property Description Available	**March Joint Powers Authority**	NOT WITHIN THE JURISDICTION OF THE MARCH JOINT POWERS AUTHORITY
		County Service Area	Not in a County Service Area

PLANNING

Specific Plans	Not within a Specific Plan	**Historic Preservation Districts**	Not in an Historic Preservation District
Land Use Designations	CITY	**Agricultural Preserve**	Not in an agricultural preserve
General Plan Policy Overlays	Not in a General Plan Policy Overlay Area	**Redevelopment Areas**	Not in a Redevelopment Area
Area Plan (RCIP)	Elsinore	**Airport Influence Areas**	Not in an Airport Influence Area
General Plan Policy Areas	None	**Airport Compatibility Zones**	Not in an Airport Compatibility Zone

PLANNING

Zoning Classifications (ORD. 348)	See the city for more information	**Zoning Districts and Zoning Areas**	Not in a Zoning District/Area
Zoning Overlays	Not in a Zoning Overlay	**Community Advisory Councils**	Not in a Community Advisory Council Area

ENVIRONMENTAL

CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Plan Area	NOT WITHIN THE COACHELLA VALLEY MSHCP FEE AREA MSHCP Plan Area	**WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Cell Group**	Not in a Cell Group
CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Conservation Area	Not in a Conservation Area	**WRMSHCP Cell Number**	None
CVMSHCP Fluvial Sand Transport Special Provision Areas	Not in a Fluvial Sand Transport Special Provision Area	**HANS/ERP (Habitat Acquisition and Negotiation Strategy/Expedited Review Process)**	None
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Plan Area	None	**Vegetation (2005)**	Agricultural Land

FIRE

Fire Hazard Classification (Ord. 787)	Not in a High Fire Area	**Fire Responsibility Area**	Not in a Fire Responsibility Area

DEVELOPMENT FEES

CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) **Fee Area** (Ord 875)	NOT WITHIN THE COACHELLA VALLEY MSHCP FEE AREA MSHCP Fee Area	**RBBD (Road & Bridge Benefit District)**	SOUTHWEST AREA , A
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Fee Area (Ord. 810)	IN OR PARTIALLY WITHIN THE WESTERN RIVERSIDE MSHCP FEE AREA. SEE MAP FOR MORE INFORMATION	**DIF** (Development Impact Fee Area Ord. 659)	ELSINORE
Western TUMF (Transportation Uniform Mitigation Fee Ord. 824)	IN OR PARTIALLY WITHIN A TUMF FEE AREA. SEE MAP FOR MORE INFORMATION. SOUTHWEST	**SKR Fee Area** (Stephen's Kagaroo Rat Ord. 663.10)	In or partially within an SKR Fee Area
Eastern TUMF (Transportation Uniform Mitigation Fee Ord. 673)	NOT WITHIN THE EASTERN TUMF FEE AREA	**DA (Development Agreements)**	Not in a Development Agreement Area

TRANSPORTATION

Circulation Element Ultimate Right-of-Way	IN OR PARTIALLY WITHIN A CIRCULATION ELEMENT RIGHT-OF-WAY. SEE MAP FOR MORE INFORMATION. CONTACT THE TRANSPORTATION DEPT. PERMITS SECTION AT (951) 955-6790 FOR INFORMATION REGARDING THIS PARCEL IF IT IS IN AN UNINCORPORATED AREA.	**Road Book Page**	77
		Transportation Agreements	Not in a Transportation Agreement
		CETAP (Community and Environmental Transportation Acceptability Process) Corridors	Not in a CETAP Corridor

HYDROLOGY

Flood Plan Review	OUTSIDE FLOODPLAIN, REVIEW NOT REQUIRED	**Watershed**	SANTA MARGARITA
Water District	WMWD	**California Water Board**	None

HYDROLOGY

Flood Control District	RIVERSIDE COUNTY FLOOD CONTROL DISTRICT

GEOLOGIC

Fault Zone	Not in a Fault Zone	**Paleontological Sensitivity**	High Sensitivity (High A): BASED ON GEOLOGIC FORMATIONS OR MAPPABLE ROCK UNITS THAT ARE ROCKS THAT CONTAIN FOSSILIZED BODY ELEMENTS, AND TRACE FOSSILS SUCH AS TRACKS, NESTS AND EGGS. THESE FOSSILS OCCUR ON OR BELOW THE SURFACE.
Faults	WITHIN A 1/2 MILE OF Unnamed fault in Elsinore fault zone		
Liquefaction Potential	Moderate Very low		
Subsidence	Susceptible		

MISCELLANEOUS

School District	LAKE ELSINORE UNIFIED	**Tax Rate Areas**	025022 CITY OF WILDOMAR CITY OF WILDOMAR FIRE PROTECTION CO FREE LIBRARY CSA 152 ELS MURRIETA ANZA RESOURCE CONS ELSINORE AREA ELEM SCHOOL FUND ELSINORE VALLEY MUNICIPAL WATER FLOOD CONTROL ADMIN FLOOD CONTROL ZN 7 GENERAL GENERAL PURPOSE LAKE ELSINORE UNI IMP NO 96-1 LAKE ELSINORE UNIFIED MT SAN JACINTO JR COLLEGE MWD WEST 1302999 RIV CO REGIONAL PARK & OPEN SP RIVERSIDE CO OFC OF EDUCATION SO. CALIF,JT(19,30,33,36,37,56) WESTERN MUNICIPAL WATER WILDOMAR CEMETERY
Communities	Wildomar		
Lighting (Ord. 655)	Zone B, 28.96 Miles From Mt. Palomar Observatory		
2010 Census Tract	046405		
Farmland	LOCAL IMPORTANCE		
Special Notes	No Special Notes		

PERMITS/CASES/ADDITIONAL

Building Permits

Case #	Description	Status
No Building Permits	Not Applicable	Not Applicable

Environmental Health Permits

Case #	Description	Status
No Environmental Health Permits	Not Applicable	Not Applicable

Planning Cases

PERMITS/CASES/ADDITIONAL

Case #	Description	Status
CFG04280	CALIFORNIA FISH AND GAME FOR EA40858	PAID
CZ05293	CHANGE OF ZONE FROM ? TO ?	WITHDRWN
CZ05671	CZ FROM R-R TO CPS	APPROVED
CZ07337	PROPSD CHG FROM CPS TO R-1 & R-2A(MULTIPLE ZONE)	ANNEXED
EA34623	EA FOR CZ 5627	APPROVED
EA40858	ENVIRONMENTAL ASSESSMENT FOR TR34301	ANNEXED
EA41330	EA FOR PP22685	WITHDRWN
GEO01656	GEOTECHNICAL REPORT TR 34301	APPROVED
GPA00808	PROSPD HIGH DENSITY (CR) TO CR,HDR & VHDR DENSITY.	ANNEXED
GPA00884	TO AMEND THE LAND USE AND CIRCULATION ELEMENT	APPROVED
PDB04664	BUOWL SURVEY	REQUEST
PDB04773	GEN BIO RESOURCES ASSESSMENT	REQUEST
PP22685	10.06 AC COMMERCIAL/RETAIL	ANNEXED
TR34301	SUBDIVIDE 35.61 AC INTO 10.9 AC/COMM RETAIL & RES.	ANNEXED

Code Cases

Case #	Description	Status
No Code Cases	Not Applicable	Not Applicable

Riverside County Parcel Report
APN 367-180-015
Baxter
Disclaimer

Report Date: Thursday, May 04, 2017

MAPS/IMAGES

PARCEL

APN	367-180-015-1	**Supervisorial District 2011** **Supervisorial District 2001**	KEVIN JEFFRIES, DISTRICT 1 BOB BUSTER, DISTRICT 1
Previous APN	192100146	**Township/Range**	T6SR4W SEC 26
Address	No address available	**Elevation Range**	1,324 - 1,360
Mailing Address	4370 LA JOLLA VLG STE 960 SAN DIEGO CA, CA 92122	**Thomas Bros. Map Page/Grid**	PAGE: 897 GRID: C5 PAGE: 897 GRID: C6 PAGE: 897 GRID: D5 PAGE: 897 GRID: D6
Legal Description	Recorded Page: Not Available Subdivision Name: Lot/Parcel: Not Available Block: Not Available Tract Number: Not Available	**Indian Tribal Land**	Not in Tribal Land
Lot Size	Recorded lot size is 19.50 acres	**City Boundary/Sphere**	City Boundary: WILDOMAR Not within a City Sphere Annexation Date: Not Applicable LAFCO Case #: 2007-107-1&3 Proposals: Not Applicable
Property Characteristcs	Constructed: 1940 Baths: 0.50 Bedrooms: 2 Const. Type: CONCRETE BLOCK THROUGHOUT Prop Area: 810 SqFt Roof Type: COMPOSITION Stories: 1	**March Joint Powers Authority**	NOT WITHIN THE JURISDICTION OF THE MARCH JOINT POWERS AUTHORITY
		County Service Area	Not in a County Service Area

PLANNING

Specific Plans	Not within a Specific Plan	**Historic Preservation Districts**	Not in an Historic Preservation District
Land Use Designations	CITY	**Agricultural Preserve**	Not in an agricultural preserve
General Plan Policy Overlays	Not in a General Plan Policy Overlay Area	**Redevelopment Areas**	Not in a Redevelopment Area

PLANNING			
Area Plan (RCIP)	Elsinore	**Airport Influence Areas**	Not in an Airport Influence Area
General Plan Policy Areas	None	**Airport Compatibility Zones**	Not in an Airport Compatibility Zone
Zoning Classifications (ORD. 348)	See the city for more information	**Zoning Districts and Zoning Areas**	Not in a Zoning District/Area
Zoning Overlays	Not in a Zoning Overlay	**Community Advisory Councils**	Not in a Community Advisory Council Area

ENVIRONMENTAL			
CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Plan Area	NOT WITHIN THE COACHELLA VALLEY MSHCP FEE AREA MSHCP Plan Area	**WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Cell Group**	Not in a Cell Group
CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Conservation Area	Not in a Conservation Area	**WRMSHCP Cell Number**	None
CVMSHCP Fluvial Sand Transport Special Provision Areas	Not in a Fluvial Sand Transport Special Provision Area	**HANS/ERP (Habitat Acquisition and Negotiation Strategy/Expedited Review Process)**	None
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Plan Area	None	**Vegetation (2005)**	Agricultural Land Developed or Disturbed Land Grassland

FIRE			
Fire Hazard Classification (Ord. 787)	Not in a High Fire Area	**Fire Responsibility Area**	Not in a Fire Responsibility Area

DEVELOPMENT FEES			
CVMSHCP (Coachella Valley Multi-Species Habitat Conservation Plan) Fee Area (Ord 875)	NOT WITHIN THE COACHELLA VALLEY MSHCP FEE AREA MSHCP Fee Area	**RBBD (Road & Bridge Benefit District)**	SOUTHWEST AREA , A
WRMSHCP (Western Riverside County Multi-Species Habitat Conservation Plan) Fee Area (Ord. 810)	IN OR PARTIALLY WITHIN THE WESTERN RIVERSIDE MSHCP FEE AREA. SEE MAP FOR MORE INFORMATION	**DIF (Development Impact Fee Area Ord. 659)**	ELSINORE
Western TUMF (Transportation Uniform Mitigation Fee Ord. 824)	IN OR PARTIALLY WITHIN A TUMF FEE AREA. SEE MAP FOR MORE INFORMATION. SOUTHWEST	**SKR Fee Area (Stephen's Kangaroo Rat Ord. 663.10)**	In or partially within an SKR Fee Area
Eastern TUMF (Transportation Uniform Mitigation Fee Ord. 673)	NOT WITHIN THE EASTERN TUMF FEE AREA	**DA (Development Agreements)**	Not in a Development Agreement Area

TRANSPORTATION			
Circulation Element Ultimate Right-of-Way	IN OR PARTIALLY WITHIN A CIRCULATION ELEMENT RIGHT-OF-WAY. SEE MAP FOR MORE INFORMATION. CONTACT THE TRANSPORTATION DEPT. PERMITS SECTION AT (951) 955-6790 FOR INFORMATION REGARDING THIS PARCEL IF IT IS IN AN UNINCORPORATED AREA.	**Road Book Page**	77
		Transportation Agreements	Not in a Transportation Agreement
		CETAP (Community and Environmental Transportation Acceptability Process) Corridors	Not in a CETAP Corridor

HYDROLOGY

Flood Plan Review	OUTSIDE FLOODPLAIN, REVIEW NOT REQUIRED	**Watershed**	SANTA MARGARITA
Water District	WMWD	**California Water Board**	None
Flood Control District	RIVERSIDE COUNTY FLOOD CONTROL DISTRICT		

GEOLOGIC

Fault Zone	Not in a Fault Zone	**Paleontological Sensitivity**	High Sensitivity (High A): BASED ON GEOLOGIC FORMATIONS OR MAPPABLE ROCK UNITS THAT ARE ROCKS THAT CONTAIN FOSSILIZED BODY ELEMENTS, AND TRACE FOSSILS SUCH AS TRACKS, NESTS AND EGGS. THESE FOSSILS OCCUR ON OR BELOW THE SURFACE.
Faults	WITHIN A 1/2 MILE OF Unnamed fault in Elsinore fault zone		
Liquefaction Potential	Moderate Very low		
Subsidence	Susceptible		

MISCELLANEOUS

School District	LAKE ELSINORE UNIFIED	**Tax Rate Areas**	025022 CITY OF WILDOMAR CITY OF WILDOMAR FIRE PROTECTION CO FREE LIBRARY CSA 152 ELS MURRIETA ANZA RESOURCE CONS ELSINORE AREA ELEM SCHOOL FUND ELSINORE VALLEY MUNICIPAL WATER FLOOD CONTROL ADMIN FLOOD CONTROL ZN 7 GENERAL GENERAL PURPOSE LAKE ELSINORE UNI IMP NO 96-1 LAKE ELSINORE UNIFIED MT SAN JACINTO JR COLLEGE MWD WEST 1302999 RIV CO REGIONAL PARK & OPEN SP RIVERSIDE CO OFC OF EDUCATION SO. CALIF,JT(19,30,33,36,37,56) WESTERN MUNICIPAL WATER WILDOMAR CEMETERY
Communities	Wildomar		
Lighting (Ord. 655)	Zone B, 29.07 Miles From Mt. Palomar Observatory		
2010 Census Tract	046405		
Farmland	LOCAL IMPORTANCE URBAN-BUILT UP LAND		
Special Notes	No Special Notes		

PERMITS/CASES/ADDITIONAL

Building Permits

Case #	Description	Status
214911	DEMO DWELL	ISSUED

Environmental Health Permits

Case #	Description	Status
No Environmental Health Permits	Not Applicable	Not Applicable

Planning Cases

PERMITS/CASES/ADDITIONAL

Case #	Description	Status
CFG04280	CALIFORNIA FISH AND GAME FOR EA40858	PAID
CFG04700	CFG FOR EA41330	PAID
CZ04988	CHANGE OF ZONE FROM R-R TO C-P-S	ABANDON
CZ05876	CHANGE ZONING FROM R-R TO C-P-S	APPROVED
CZ07337	PROPSD CHG FROM CPS TO R-1 & R-2A(MULTIPLE ZONE)	ANNEXED
EA35387	EA FOR CZ 5876	APPROVED
EA40858	ENVIRONMENTAL ASSESSMENT FOR TR34301	ANNEXED
EA41330	EA FOR PP22685	WITHDRWN
GEO01656	GEOTECHNICAL REPORT TR 34301	APPROVED
GPA00808	PROSPD HIGH DENSITY (CR) TO CR,HDR & VHDR DENSITY.	ANNEXED
GPA00884	TO AMEND THE LAND USE AND CIRCULATION ELEMENT	APPROVED
PDB04664	BUOWL SURVEY	REQUEST
PDB04773	GEN BIO RESOURCES ASSESSMENT	REQUEST
PP22685	10.06 AC COMMERCIAL/RETAIL	ANNEXED
TR34301	SUBDIVIDE 35.61 AC INTO 10.9 AC/COMM RETAIL & RES.	ANNEXED

Code Cases

Case #	Description	Status
No Code Cases	Not Applicable	Not Applicable

APPENDIX C

GEOCON West, Inc., December 12, 2012, Preliminary Geotechnical and Fault Rupture Hazard Investigation, Tract 34301, NWC Baxter Road and I-15, Wildomar, California, project number: T2540-22-02, Revised March 26, 2015.

PRELIMINARY GEOTECHNICAL AND FAULT RUPTURE HAZARD INVESTIGATION

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

GEOCON
WEST, INC.

GEOTECHNICAL
ENVIRONMENTAL
MATERIALS

DECEMBER 12, 2012
REVISED MARCH 26, 2015
PROJECT NO. T2540-22-02

TABLE OF CONTENTS

PRELIMINARY GEOTECHNICAL AND FAULT RUPTURE HAZARD INVESTIGATION

1. PURPOSE AND SCOPE

This report presents the results of a preliminary geotechnical and fault rupture hazard investigation for the approximately 35 acre site located immediately northwest of the intersection of Baxter Road and Interstate 15 (I-15) in Wildomar, California, see *Vicinity Map*, Figure 1. The purpose of the investigation was to evaluate subsurface soil and geologic conditions underlying the property, and based on conditions encountered to provide conclusions and recommendations pertaining to the geotechnical and geologic aspects of future design and construction.

The scope of our investigation included a site reconnaissance, review of previous geotechnical reports for the site prepared by LandMark Consultants (LandMark), review of published and unpublished geologic reports and maps, review of aerial photographs, geotechnical field exploration, laboratory testing, engineering analysis, fault trench excavations, geologic logging, and the preparation of this report. Geotechnical drilling was performed on November 7th, 2012 by excavating eight 8-inch diameter borings with a CME 75 drill rig. The borings were excavated to depths between 20 and 51.25 feet below the existing ground surface. The approximate locations of the exploratory borings are depicted on Figure 2, *Geologic Map and Site Plan*. A detailed discussion of the geotechnical field investigation, including boring logs, is presented in Appendix A. Laboratory tests were performed on selected soil samples obtained during the investigation to determine pertinent physical and chemical soil properties. Appendix B presents a summary of the laboratory test results. Boring logs presented in a 2005 LandMark report for the site are presented in Appendix C and the locations of these borings are depicted on the Figure 2.

The eastern portion of the site is located within a Riverside County Fault Hazard Zone. A fault rupture hazard investigation is required with the county-designated fault hazard zone prior to site development. To evaluate the absence or presence of faults within the county-designated fault hazard zone at the site, we performed a fault rupture hazard investigation that included the excavation of two fault trenches, totaling 690 lineal feet of trench. The trenching was performed from October 23 through October 30, 2012. The details and results of our fault rupture hazard investigation are presented in Appendix D.

The recommendations presented herein are based on analysis of the data obtained during the investigation and our experience with similar soil and geologic conditions. References reviewed to prepare this report are provided in the *List of References* section. If project details vary significantly from those described above, Geocon should be contacted to determine the necessity for review and possible revision of this report.

2. SITE AND PROJECT DESCRIPTION

2.1 Site and Project Description

The property is bounded on the south by Baxter Road; the east by I-15; the north by rural residential housing; and the west by White Road (mapped but not present), a horse ranch, and rural residential housing. The site is currently vacant with the exception of a former residence and an agricultural observation tower in the southern portion of the site. Both structures have been raised for relocation. Large trees are present in the southeastern and south-central areas of the site, and within a main drainage which meanders in a south-southwesterly direction across the western portion of the site. Topographically the site consists of a dissected alluvial fan which descends gently to the southwest from granitic hills to the northeast. Site elevations range from approximately 1,365 feet above mean sea level (MSL) in the northeastern area to approximately 1,335 feet MSL at the southwest corner. A main drainage is present within the western portion of the site and consists of a gently sloping valley approximately ten feet below the adjacent alluvial plain with a smaller stream incised about two to three feet into the valley. Several smaller southwest trending drainages cut the alluvial plain in the eastern area of the site. A drainage channel is also present along the southern boundary of the site and extends from the south central site area deepening to the southeast corner where it is approximately five feet below the surrounding elevations. On-site sewage disposal systems and domestic water wells may be present in association with the previous land use.

The locations and descriptions herein are based on a site reconnaissance, review of the referenced aerial photographs, previous geotechnical reports, and project information provided by the client, as well as our knowledge and experience of the surrounding areas.

Site development is planned to consist of mixed-use commercial, multi-family and single-family residential construction. Grading is anticipated to result in cuts and fills on the order of 10 feet or less, exclusive of remedial grading. The structures are anticipated to be lightly loaded wood frame structures three stories or less in height. It is estimated that column loads for the proposed structures may be up to 10 kips. Wall loads are for the proposed structures may be up to 1.5 kips per linear foot.

Once the design phase and foundation loading configuration are developed, the recommendations within this report should be reviewed and revised, if necessary. Any changes in the design, location or elevation of any structure, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

2.2 Site History

The site history was determined based on a review of aerial photographs for the years 1962, 1974, 1980, 1983, 1990, 1995, 2000, 2005, and 2010 obtained at the Riverside County Flood Control and Water

Conservation District (RCFC), and geotechnical research at the County and local level. Based on our aerial photograph review, an olive grove occupied the western half of the site between 1962 and 1974. A former residence was observed in the 1983 and later aerial photos. It is our understanding that the existing raised house and tower were transported to and are now stored on the site. The remainder of the site appears to have been unimproved. Partial plowing of the site and dirt trails were observed on the aerial photos since 1974.

3. PREVIOUS GEOTECHNICAL INVESTIGATION

LandMark performed a geotechnical investigation of the site in 2005 and subsequently updated their geotechnical report in 2007 with no additional information or analyses. LandMark excavated eight borings within the property from depths of 16.5 to 51.5 feet, mostly within the southern portion of the site. The locations of the borings are indicated on the *Geologic Map and Site Plan* (Figure 2). Based on a review of the boring logs, groundwater was encountered at depths of 17 and 24 feet below the existing grade in borings LB-6 and LB-1, respectively. LandMark reported encountering medium dense to very dense interbedded sands, clayey sandy silts, silty clays, and silty sands. They did not identify the formation name of the geologic units on their logs.

Based on geologic mapping (Kennedy, 1977) and our knowledge of the soil conditions in the vicinity of the site, it appears the geologic units encountered in the LandMark borings are primarily Pauba Sandstone. Younger alluvium to a depth of 14 feet below the existing grade was encountered within one boring drilled in the drainage area (LB-6).

Landmark reported low sulfate, low chloride, high resistivity, and generally neutral pH. Atterberg Limit tests were performed on two samples and the test results indicated a plasticity index of 21 and 26. They stated that no active faulting was present on the site, and no landslide, seiche, or tsunami hazards were present at the site. Results of their liquefaction analysis indicate a liquefiable layer is present at 47 to 50 feet below existing ground. They identified Bundy Canyon Creek as the closest 100 year flood plain to the site. LandMark did not perform direct shear testing, consolidation or collapse testing, and did not test the soil samples for in-place moisture and density. The liquefaction analysis was based on assumptions and not grain-size analyses or moisture/density data from the boring samples. Although they reportedly encountered clayey soils, no Expansion Index testing was performed to provide site specific foundation recommendations. The pavement recommendations provided by LandMark are based on an assumed R-value and not actual test data for the site. Accordingly, it appears as though the geotechnical recommendations provided by LandMark are very conservative, including the estimated settlement values and foundation design parameters. The boring logs from the 2005 LandMark report are presented in Appendix C.

4. GEOLOGIC SETTING

The site is located within the Peninsular Ranges Geomorphic Province, characterized by northwest trending alluviated valleys and geologic structures such as the nearby Elsinore Fault Zone and Santa Ana Mountains. The Peninsular Ranges are bounded on the north by the Santa Monica, Hollywood, Raymond, Cucamonga, and Sierra Madre Fault Zones, the east by the San Jacinto Fault, and the west by the Pacific Ocean. The Peninsular Ranges extend southward into Mexico.

Locally, the site is located on the eastern edge of the Elsinore Trough, a graben which formed as a result of a left step over from the Wildomar to the Willard faults on the eastern and western sides of Lake Elsinore, respectively. Ground fissures have been documented south of the site in the Elsinore Trough since the 1980s. The ground fissures have generally developed along pre-existing fault traces as a result of groundwater withdrawal (Kuperman, 1998).

5. SOIL AND GEOLOGIC CONDITIONS

Based on our field investigation and published geologic maps of the area, the soils underlying the site consist of younger alluvium, colluvium, Pauba Sandstone, and granitic bedrock. Geologic mapping by Kennedy (1977) identifies the geologic units at the site as primarily Pauba Sandstone with granitic bedrock occurring along the eastern site boundary. The granitic bedrock underlies the site at depth. In general the upper foot of existing site soils has been disturbed by periodic plowing. Detailed stratigraphic profiles are presented in the boring logs in Appendix A.

5.1 Younger Alluvium (Qal)

Younger alluvium of Holocene age was encountered within the drainage areas consisting of loose to medium dense interlayered silty sands, sands, and clays. The younger alluvium was generally moist and medium dense and very stiff. Younger alluvium within the main drainage ranged in thickness from 2 to 18 feet with the thickness increasing toward the south. The area of deepest younger alluvium was encountered in the south-central portion of the site (B-6) in a low lying area.

5.2 Colluvium (Qcol)

Colluvium of Pleistocene age is locally present at the ground surface and was observed to overlie the granitic bedrock where encountered in boring B-4. The colluvium and consists of red-brown clayey sand with abundant carbonate nodules and stringers. Where encountered in our borings and trenches, the colluvium ranges in thickness from 1 to 8 feet and is generally dense and dry to moist, and blocky.

5.3 Pauba Sandstone (Qps)

Early Pleistocene-age Pauba Sandstone was encountered within the borings drilled as part of this study with exception of boring B-4 in the eastern portion of the site where colluvium was observed to directly overlie the granitic bedrock. Where encountered in the borings, the Pauba Sandstone consists of brown to reddish-brown, massive, silty sand that is dry to wet and generally dense. The sandstone is locally exposed at the ground surface and was encountered to a maximum depth of 39 feet in boring B-1

5.4 Granitic Bedrock (Kgdd)

Granitic bedrock (granodiorite) of Cretaceous-age underlies the site at depth and is locally present within a few feet of the ground surface along the eastern portion of the site. The granitic bedrock was encountered at depths of 3 to 39 feet within the borings and trenches excavated for this study. The bedrock is highly weathered with some slightly weathered core stones to approximately three feet in diameter. Localized areas of completely weathered rock were observed in the upper approximately one foot within Fault Trench FT-1.

6. GROUNDWATER

Groundwater was encountered at depths of 29 feet and 13.5 feet below the existing ground surface in borings B-1 (in main drainage) and B-5 (in southeastern area), respectively. Groundwater was encountered in the previous borings by LandMark drilled at the site in 2005 at depths of 17 feet (LB-6 in main drainage) and 24 feet (LB-1 in south-central area of the site near Baxter Road) in 2005.

Groundwater is locally present at the site, particularly within the drainages and the southeastern portion of the site. Additionally, groundwater seepage is common at a soil/bedrock contact. Based on these considerations, groundwater may be encountered during grading and drainage measures such as sub-drains and back-drains may be recommended to mitigate subsurface water. In addition, recent requirements for storm water infiltration could result in shallower seepage conditions in the region. Proper surface drainage of irrigation and precipitation will be critical to future performance of the project. Recommendations for drainage are provided in the *Surface Drainage* section of this report (see Section 7.16).

7. GEOLOGIC HAZARDS

7.1 Surface Fault Rupture

The numerous faults in southern California include active, potentially active, and inactive faults. The criteria for these major groups are based on criteria developed by the California Geological Survey (CGS, formerly known as California Division of Mines and Geology) for the Alquist-Priolo Earthquake Fault Zone Program (Byrant and Hart, 2007). By definition, an active fault is one that has had surface displacement within Holocene time (about the last 11,000 years). A potentially active fault has demonstrated surface displacement during Quaternary time (approximately the last 1.6 million years), but has had no known Holocene movement. Faults that have not moved in the last 1.6 million years are considered inactive.

The site is not within a currently established Alquist-Priolo Earthquake Fault Zone for surface fault rupture hazards. However, the eastern portion of the site is located within a Riverside County Fault Hazard Zone established for a possible fault shown to traverse the eastern portion of the site on Riverside County Fault Maps (see Figure 2). The fault location is based on Kennedy's mapping (1977) and may be associated with the Glen Ivy fault known to be active northwest of the site (Rockwell, McElwain, Millman and Lamar, 1986; Millman, and Rockwell, 1986; Lamar and Rockwell, 1986). The potential for faulting at the site was not addressed by LandMark in their geotechnical investigation report (2005) or updated report (2007).

Geocon performed a fault rupture hazard investigation. A detailed discussion and the results of our fault rupture hazard investigation are presented in Appendix D.

The closest surface trace of an active fault to the site is the Temecula branch of the Elsinore fault located approximately 2 miles west of the site. Other nearby active faults are the Glen Ivy branch of the Elsinore fault, the San Jacinto fault, the Julian branch of the Elsinore fault, and the Chino-Central Avenue fault located approximately 5 miles northwest, 21 miles east, 22 miles south, and 23 miles north of the site, respectively (EZ-FRISK V 7.62).

The site is located in the seismically active southern California region, and could be subjected to moderate to strong ground shaking in the event of an earthquake on one of the many active southern California faults. The faults in the vicinity of the site are shown in Figure 3, *Regional Fault Map*.

7.2 Seismicity

As with all of southern California, the site has experienced historic earthquakes from various regional faults. The seismicity of the region surrounding the site was formulated based on research of an electronic database of earthquake data. The epicenters of recorded earthquakes with magnitudes equal to or greater than 4.0 within a radius of 60 miles of the site are depicted on Figure 4, *Regional Seismicity Map*. A number of earthquakes of moderate to major magnitude have occurred in the southern California area within the last 110 years. A partial list of these earthquakes is included in Table 7.2, below.

TABLE 7.2
LIST OF HISTORIC EARTHQUAKES

Earthquake (Oldest to Youngest)	Date of Earthquake	Magnitude	Distance to Epicenter (Miles)	Direction to Epicenter
Lake Elsinore area	May 15, 1910	6.0	10	W
San Jacinto-Hemet area	April 21, 1918	6.8	18	NE
Near Redlands	July 23, 1923	6.3	27	NE
Long Beach	March 10, 1933	6.4	40	W
North San Diego County	March 25, 1937	6.0	60	S
Desert Hot Springs	December 4, 1948	6.0	55	ENE
Pinto Mountain	May 2, 1949	5.8	66	E
Arroyo Salada	March 19, 1954	6.4	66	SE
Borrego Mountain	April 9, 1968	6.5	72	SE
Borrego Springs	April 28, 1969	5.8	56	SE
Palm Springs	April 23, 1992	6.1	60	E
Landers	June 28, 1992	7.3	62	NE
Big Bear	June 28, 1992	6.4	48	NE
Hector Mine	October 16, 1999	7.1	88	NE

The site could be subjected to strong ground shaking in the event of an earthquake. However, this hazard is common in southern California and the effects of ground shaking can be mitigated if the proposed structures are designed and constructed in conformance with current building codes and engineering practices.

7.3 Estimation of Peak Ground Accelerations

The seismic exposure of the site may be investigated in two ways. The deterministic approach recognizes the Maximum Earthquake, which is the theoretical maximum event that could occur along a fault. The deterministic method assigns a maximum earthquake to a fault derived from formulas that correlate the length and other characteristics of the fault trace to the theoretical maximum magnitude earthquake. The probabilistic method considers the probability of exceedance of various levels of ground motion and is calculated by consideration of risk contributions from regional faults.

7.4 Deterministic Analysis

Table 1, after the report text, shows known faults within a 60 mile radius of the site. The maximum earthquake magnitude is indicated for each fault. In order to measure the distance of known faults to the site, the computer program *EQFAULT*, (Blake, 2000), was utilized. Principal references used within *EQFAULT* in selecting faults to be included are Jennings (1994), Anderson (1984) and Wesnousky (1986). For this investigation, the ground motion generated by maximum earthquakes on each of the faults is assumed to attenuate to the site per the attenuation relation by Campbell and Bozorgnia (1997 Revised). The resulting calculated peak horizontal accelerations at the site are shown on Table 1. These values are one standard deviation above the mean.

Using this methodology, the maximum earthquake resulting in the highest peak horizontal accelerations at the site would be a magnitude 6.8 event on the Elsinore fault. Such an event would be expected to generate peak horizontal accelerations at the site of 0.84g. This value is provided as geologic background information. The code specified peak ground acceleration in Section 7.6 is used to calculate seismic and liquefaction settlement, for evaluation of seismic lateral earth pressures, and for structural design.

While listing of peak accelerations is useful for comparison of potential effects of fault activity in a region, other considerations are important in seismic design, including the frequency and duration of motion and the soil conditions underlying the site.

The site could be subjected to moderate to severe ground shaking in the event of a major earthquake on any of the faults referenced above or other faults in southern California. With respect to seismic shaking, the site is considered comparable to the surrounding developed area.

7.5 Probabilistic Analysis

The computer program *FRISKSP* (Blake, 2000) was used to perform a site-specific probabilistic seismic hazard analysis. The program is a modified version of FRISK (McGuire, 1978) that models faults as lines to evaluate site-specific probabilities of exceedance for given horizontal accelerations for each line source. Geologic parameters not included in the deterministic analysis are included in this analysis. The program operates under the assumption that the occurrence rate of earthquakes on each mapped Quaternary fault is proportional to the faults' slip rate. The program accounts for fault rupture length as a function of earthquake magnitude, and site acceleration estimates are made using the earthquake magnitude and closest distance from the site to the rupture zone.

Uncertainty in each of following are accounted for: (1) earthquake magnitude, (2) rupture length for a given magnitude, (3) location of the rupture zone, (4) maximum magnitude of a given earthquake, and (5) acceleration at the site from a given earthquake along each fault.

After calculating the expected accelerations from the earthquake sources, the program then calculates the total average annual expected number of occurrences of the site acceleration greater than a specified value. Attenuation relationships suggested by Campbell and Bozorgnia (1997 Revised) were utilized in the analysis.

The Maximum Considered Earthquake Ground Motion (MCE) is the level of ground motion that has a 2 percent chance of exceedance in 50 years, with a statistical return period of 2,500 years. According to 2013 California Building Code and ASCE 7-10, the MCE is to be utilized for the design of critical structures such as schools and hospitals. The Design-Basis Earthquake Ground Motion (DBE) is the level of ground motion that has a 10 percent chance of exceedance in 50 years, with a statistical return period of 475 years. The DBE is typically used for the design of non-critical structures.

Based on the computer program *FRISKSP* (Blake, 2000), the MCE and DBE is expected to generate ground motions at the site of approximately 1.05g and 0.75g, respectively. Graphical representation of the analysis is presented on Figure 5. These values are provided as geologic background information. The code specified peak ground acceleration in Section 7.6 is used to calculate seismic and liquefaction settlement, for evaluation of seismic lateral earth pressures, and for structural design.

7.6 Seismic Design Criteria

7.6.1 We used the computer program *U.S. Seismic Design Maps*, provided by the USGS. Table 6.4.1 summarizes site-specific design criteria obtained from the 2013 California Building Code (CBC; based on the 2012 International Building Code [IBC] and ASCE 7-10), Chapter 16 Structural Design, Section 1613 Earthquake Loads. The short spectral response uses a period of 0.2 second. The building structure and improvements should be designed using a Site Class C. We evaluated the Site Class based on the discussion in Section 1613.3.2 of the 2013 CBC and Table 20.3-1 of ASCE 7-10. The values presented in Table 7.6.1 are for the risk-targeted maximum considered earthquake (MCE_R).

TABLE 7.6.1
2013 CBC SEISMIC DESIGN PARAMETERS

Parameter	Value	2013 CBC Reference
Site Class	C	Section 1613.3.2
MCE_R Ground Motion Spectral Response Acceleration – Class B (short), S_S	2.298g	Figure 1613.3.1(1)
MCE_R Ground Motion Spectral Response Acceleration – Class B (1 sec), S_1	0.927g	Figure 1613.3.1(2)
Site Coefficient, F_A	1.0	Table 1613.3.3(1)
Site Coefficient, F_V	1.3	Table 1613.3.3(2)
Site Class Modified MCE_R Spectral Response Acceleration (short), S_{MS}	2.298g	Section 1613.3.3 (Eqn 16-37)
Site Class Modified MCE_R Spectral Response Acceleration (1 sec), S_{M1}	1.205g	Section 1613.3.3 (Eqn 16-38)
5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.532g	Section 1613.3.4 (Eqn 16-39)
5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.803g	Section 1613.3.4 (Eqn 16-40)

7.6.2 Table 7.6.2 presents additional seismic design parameters for projects located in Seismic Design Categories of D through F in accordance with ASCE 7-10 for the mapped maximum considered geometric mean (MCE_G).

TABLE 7.6.2
2013 CBC SITE ACCELERATION DESIGN PARAMETERS

Parameter	Value	ASCE 7-10 Reference
Mapped MCE_G Peak Ground Acceleration, PGA	0.914g	Figure 22-7
Site Coefficient, F_{PGA}	1.000	Table 11.8-1
Site Class Modified MCE_G Peak Ground Acceleration, PGA_M	0.914g	Section 11.8.3 (Eqn 11.8-1)

7.6.3 Conformance to the criteria in Tables 7.6.1 and 7.6.2 for seismic design does not constitute any kind of guarantee or assurance that significant structural damage or ground failure will not occur if a large earthquake occurs. The primary goal of seismic design is to protect life, not to avoid all damage, since such design may be economically prohibitive.

7.7 Liquefaction Potential

Liquefaction is a phenomenon in which loose, saturated, relatively cohesionless soil deposits lose shear strength during strong ground motions. Primary factors controlling liquefaction include intensity and duration of ground motion, gradation characteristics of the subsurface soils, in-situ stress conditions, and the depth to groundwater. Liquefaction is typified by a loss of shear strength in the liquefied layers due to rapid increases in pore water pressure generated by earthquake accelerations.

The current standard of practice, as outlined in the "Recommended Procedures for Implementation of DMG Special Publication 117A, Guidelines for Analyzing and Mitigating Liquefaction in California" requires liquefaction analysis to a depth of 50 feet below the lowest portion of the proposed structure. Liquefaction typically occurs in areas where the soils below the water table are composed of poorly consolidated, fine to medium-grained, primarily sandy soil. In addition to the requisite soil conditions, the ground acceleration and duration of the earthquake must also be of a sufficient level to induce liquefaction.

According to the Riverside County Land Information System, 2003, the site is located within an area of moderate liquefaction potential based on the underlying soil deposits. The younger alluvium present in the drainages at the site may be subject to liquefaction during strong ground motion. However, the Pauba Sandstone and the granitic bedrock are well-consolidated and are not considered to be susceptible to liquefaction. Provided the recommendations for remedial grading presented herein are followed, it is our opinion that the potential for liquefaction of the site soils is not a design consideration. Further, no surface manifestations of liquefaction are expected at the site.

7.8 Seismically-Induced Settlement

Dynamic compaction of dry and loose sands may occur during a major earthquake. Typically, settlements occur in thick beds of such soils. Based on the dense and well consolidated nature of the soils underlying the site, appreciable seismically-induced settlements are not anticipated.

7.9 Landslides

The gently sloping topography at the site precludes slope stability hazards. There are no known landslides near the site, nor is the site in the path of any known or potential landslides.

7.10 Earthquake-Induced Flooding

Earthquake-induced flooding is inundation caused by failure of dams or other water-retaining structures due to earthquakes. There are no water-retaining structures up gradient from the site. Therefore, the probability of earthquake-induced flooding is not a design consideration.

7.11 Tsunamis and Seiches

The site is not located within a coastal area. Therefore, tsunamis, seismic sea waves, are not a design consideration at the site.

Seiches are large waves generated in enclosed bodies of water in response to ground shaking. No major water-retaining structures are located immediately up gradient from the project site. The site is located approximately 5 miles south of and at a higher elevation than Lake Elsinore. The potential for flooding from a seismically induced seiche is not a design consideration.

The site is in FEMA Zone X per Flood Insurance Rate Map Panel 06065C2682G dated August 28, 2008. Therefore, potential for flood hazards at the site is not a design consideration.

7.12 Subsidence

Subsidence and associated ground fissuring has been well documented in Riverside County. Subsidence occurs when a large portion of land is displaced vertically, usually due to the withdrawal of groundwater, oil, or natural gas. Soils that are particularly subject to subsidence include those with high silt or clay content. Areas subject to subsidence and fissuring are primarily alluviated structural valleys such as the San Jacinto Valley and Elsinore Trough that are bound by active faults that offset unconsolidated Holocene age alluvium. The location of ground fissures are typically controlled by underlying geologic structure and typically coincide with pre-existing fault traces.

In southerly portion of the Elsinore Trough, ground subsidence and associated ground fissuring related to changes in groundwater levels has occurred from Murrieta on the north to the upper Wolf Valley on the south. The documented subsidence and fissuring has been confined to the area between fault traces where significant groundwater pumping has occurred.

The site is within an area that is considered susceptible to subsidence per Riverside County. The site conditions include Pauba Sandstone and alluvium over lying granitic bedrock which was a factor in subsidence in the Murrieta area to the south in the late 1980s and 1990s. After remedial grading at the site the subsurface conditions which make the site vulnerable to subsidence will no longer be present and the possibly of subsidence will not be a design consideration.

8. CONCLUSIONS AND RECOMMENDATIONS

8.1 General

8.1.1 It is our opinion that neither soil nor geologic conditions were encountered during the investigation that would preclude development of the site provided the recommendations presented herein are followed and implemented during design and construction. This report should be considered "preliminary" and a more detailed, design level geotechnical study will be required in order to verify the suitability of the preliminary geotechnical design parameters presented herein once development plans become available.

8.1.2 We did not encounter evidence of faulting during our subsurface geotechnical investigation. Therefore, no building setback zones due to surface fault rupture are recommended for the site.

8.1.3 We encountered younger alluvial soils and colluvium overlying Pauba sandstone and granitic bedrock within the site. It is our opinion that the younger alluvium and the upper three feet of colluvium are not suitable for direct support of proposed foundations or slabs. The alluvium and colluvium are suitable for re-use as engineered fill provided the recommendations in the *Grading* section of this report are followed (see Section 8.4).

8.1.4 Based on these considerations, it is recommended that existing alluvium as well as the upper three feet of colluvium, and completely weathered Pauba Sandstone and granitic bedrock, within proposed building footprint areas be excavated and properly compacted for foundation and slab support. Deeper excavations should be conducted as necessary to completely remove existing artificial fill (if encountered), alluvium, colluvium, Pauba Sandstone, or granitic bedrock at the direction of the Geocon representative.

8.1.5 Where building foundations will be supported on compacted fill, the removal depths should be deepened where necessary to create a minimum fill depth of 18 inches below the bottom of the proposed footings.

8.1.6 Where excavation and compaction is to be performed, the excavation should extend laterally a minimum distance of 3 feet beyond the building footprint area or for a distance equal to the depth of fill below the foundation, whichever is greater. Appurtenances, such as patio or canopy footings and other improvements that are adjacent to or structurally connected to the building should also be included in the required lateral over-excavation. Recommendations for earthwork are provided in the *Grading* section of this report (see Section 8.4).

8.1.7 The fault trench excavations were loosely backfilled with no moisture conditioning or compactive effort. During site grading operations, the fault trenches should be re-excavated and properly backfilled with engineered fill. The grading contractor should be prepared for excavations on the order of 9 feet in height to excavate the artificial fill associated with the fault trench excavations.

8.1.8 Laboratory tests indicate site soils are not corrosive and have a moderate sulfate exposure rating in accordance with the 2013 California Building Code. Grading operations and soil mixing will likely result in different values at finish grade. Additional testing should be performed on the finish grade soil. Corrosion protection for metal piping and structures as well as appropriate concrete mix design may be required for the design of improvements for the site.

8.1.9 Subsequent to the recommended grading, the structures may be supported on conventional foundation systems deriving support in the newly placed engineered fill or competent Pauba sandstone.

8.1.10 It is anticipated that stable excavations for the recommended grading associated with the proposed structure can be achieved with sloping measures. Excavation recommendations are provided in the *Temporary Excavations* section of this report (Section 8.17).

8.1.11 Foundations for small outlying structures, such as block walls less than 6 feet in height, planter walls or trash enclosures, which will not be tied-in to the proposed structure, may be supported on conventional foundations bearing on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. The foundation excavation bottom must be observed and approved by a Geocon representative.

8.1.12 Once the design and foundation loading configuration for the proposed development proceeds, the recommendations within this report should be reviewed and revised, if necessary. Based on the final foundation loading configurations, the potential for settlement should be re-evaluated by this office.

8.1.13 Any changes in the design, location or elevation, as outlined in this report, should be reviewed by this office. Geocon should be contacted to determine the necessity for review and possible revision of this report.

8.2 Soil and Excavation Characteristics

8.2.1 The in-situ soil can be excavated with moderate to heavy effort using conventional excavation equipment. Some caving or sloughing should be anticipated if loose or granular soil is encountered. In addition, due to the presence of localized core stones within the granitic bedrock, the contractor should be prepared to handle some over-sized material (greater than 6 inches) in accordance with section 8.4.

8.2.2 It is the responsibility of the contractor to ensure that excavations and trenches are properly shored and maintained in accordance with applicable OSHA rules and regulations to maintain safety and maintain the stability of adjacent existing improvements.

8.2.3 Onsite excavations must be conducted in such a manner that potential surcharges from existing structures, construction equipment, and vehicle loads are resisted. The surcharge area may be defined by a 1:1 projection down and away from the bottom of an existing foundation or vehicle load. Penetrations below this 1:1 projection will require special excavation measures such as sloping and possibly shoring. Excavation recommendations are provided in the *Temporary Excavations* section of this report (see Section 8.17).

8.2.4 The upper few feet of soil encountered during this investigation are considered to have a "very low" (EI = 18) expansive potential and is classified as "non-expansive" based on the 2013 California Building Code (CBC) Section 1803.5.3. The recommendations in this report assume that foundations and slabs will derive support in soil with an EI less than 20.

8.3 Minimum Resistivity, pH, and Water-Soluble Sulfate

8.3.1 Potential of Hydrogen (pH) and resistivity testing were performed on a representative sample of the surficial soil to generally evaluate the corrosion potential to buried utilities. The tests were performed in accordance with California Test Method Nos. 643 and 422 and indicate that the site would not be classified as corrosive in accordance with Caltrans Corrosion Criteria (Caltrans, 2012). The results are presented in Appendix B (Figure B4) and should be considered for design of underground structures.

8.3.2 Laboratory tests were performed on representative samples of the surficial soil to measure the percentage of water-soluble sulfate content. Results from the laboratory water-soluble sulfate tests are presented in Appendix B (Figure B4) and indicate that the on-site soil possesses "moderate" sulfate exposure to concrete structures as defined by 2013 CBC Section 1904.3 and ACI 318-11 Sections 4.2 and 4.3. The table below presents a summary of concrete requirements set forth by 2013 CBC and ACI 318. Additional testing should be performed at the time of grading to verify the need for specific concrete mix designs. The presence of water-soluble sulfates is not a visually discernible characteristic; therefore, other soil samples from the site could yield different concentrations. Additionally, over time landscaping activities (i.e., addition of fertilizers and other soil nutrients) may affect the concentration.

TABLE 8.3.2 - REQUIREMENTS FOR CONCRETE EXPOSED TO SULFATE-CONTAINING SOLUTIONS

Sulfate Exposure	Exposure Class	Water-Soluble Sulfate Percent by Weight	Cement Type	Maximum Water to Cement Ratio by Weight	Minimum Compressive Strength (psi)
Negligible	S0	0.00-0.10	--	--	2,500
Moderate	S1	0.10-0.20	II	0.50	4,000
Severe	S2	0.20-2.00	V	0.45	4,500
Very Severe	S3	> 2.00	V+Pozzolan or Slag	0.45	4,500

8.3.3 Geocon does not practice in the field of corrosion engineering and mitigation. If corrosion sensitive improvements are planned, it is recommended that a corrosion engineer be retained to evaluate the corrosion test results and recommend the necessary precautions to avoid premature corrosion of buried metal pipes and concrete structures in direct contact with the soil.

8.4 Grading

8.4.1 A preconstruction conference should be held at the site prior to the beginning of grading operations with the owner, contractor, civil engineer, geotechnical engineer, and, if applicable, building official in attendance. Special soil handling requirements can be discussed at that time.

8.4.2 Earthwork should be observed, and compacted fill tested by representatives of Geocon. The existing geologic units encountered during exploration are suitable for re-use as an engineered fill, provided oversize material (greater than 6 inches) and deleterious debris is removed.

8.4.3 The fault trench excavations were loosely backfilled with no moisture conditioning or compactive effort. During site grading operations, the fault trenches should be re-excavated and properly backfilled with engineered fill. The grading contractor should be prepared for excavations on the order of 9 feet in height to excavate artificial fill associated with the fault trench excavations.

8.4.4 Grading should commence with the removal of existing vegetation and existing improvements from the area to be graded. Once a clean excavation bottom has been established it must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon). Deleterious debris such as wood and root structures should be exported from the site and should not be mixed with the fill soil. Asphalt and concrete should not be mixed with the fill soil unless approved by the Geotechnical Engineer. Any existing underground improvements planned for removal should be completely excavated and the resulting depressions properly backfilled in accordance with the procedures described herein.

8.4.5 Due to the preliminary nature of the project at this time, the grading recommendations should also be considered preliminary. Once information regarding existing and proposed site elevations becomes available, the recommendations presented herein should be reviewed and revised if necessary.

8.4.6 As a minimum in building pad areas or areas to receive structural fill it is recommended that the existing alluvium, the upper 3 feet of colluvium, and completely weathered Pauba Sandstone and granitic bedrock, where exposed at the surface, be excavated and properly compacted for foundation and slab support. Anticipated depths of removals at the boring locations are indicated on the *Geologic Map and Site Plan*, Figure 2. Deeper excavations should be conducted as necessary to completely remove existing unsuitable soils at the direction of the Geocon representative.

8.4.7 Where excavation and compaction is to be conducted, the excavations should extend laterally a minimum distance of three feet beyond the building footprint area or for a distance equal to the depth of fill below the foundation, whichever is greater. Appurtenances, such as patio or canopy footings and other improvements that are adjacent to or structurally connected to the building should also be included in the required lateral over-excavation.

8.4.8 Building pads graded with a cut/fill transition will require undercutting to reduce the potential for differential settlement. The cut portion of the cut/fill transition should be undercut to a depth of at least 3 feet and replaced with properly compacted low expansive fill. The bottom of the undercut should be sloped at a minimum of 1 percent towards the adjacent street. In areas where a steep transition exists, additional removal will be required such that the maximum fill differential across any one building pad will be less than H/3, where H is the maximum fill thickness.

8.4.9 Over-excavation of cut lots exposing granitic bedrock should be performed to reduce the difficulty of excavating footing trenches within the bedrock. Cut lots which expose granitic bedrock should be over-excavated three feet, or 18inches below the bottom of the proposed footings, whichever is deeper. The bedrock should be sloped 1 percent or more toward the street.

8.4.10 Excavations must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon), prior to placing fill. If unsuitable soils are exposed at the excavation bottom, additional excavation may be required at the direction of the Geotechnical Engineer (a representative of Geocon).

8.4.11 Fill and backfill soil should be placed in horizontal loose layers approximately 6 to 8 inches thick, moisture conditioned to near optimum moisture content, and properly compacted. Fill shall be compacted to a minimum 90 percent of the maximum dry density per ASTM International (ASTM) D 1557 (latest edition).

8.4.12 Where new paving is to be placed, it is recommended that existing unsuitable soil be excavated and properly compacted for paving support. As a minimum, the upper twelve inches of soil should be scarified and compacted to at least 95 percent relative compaction for paving support. Paving recommendations are provided in *Preliminary Pavement Recommendations* section of this report (see Section 8.10).

8.4.13 Foundations for small outlying structures, such as block walls less than 6 feet high, planter walls or trash enclosures, which will not be structurally tied into the proposed building, may be supported on conventional foundations bearing on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. If foundations for small outlying structures cannot be supported in engineered fill, Geocon should be contacted to provide alternate recommendations once project plans are available for review. If the soil exposed in the excavation bottom is soft or loose, compaction of the soil will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative.

8.4.14 Utility trenches should be properly backfilled in accordance with the requirements of the Greenbook (latest edition). The pipe should be bedded with clean sands (Sand Equivalent greater than 30) to a depth of at least one foot over the pipe, and the bedding material must be inspected and approved in writing by the Geotechnical Engineer (a representative of Geocon). The use of gravel is not acceptable unless used in conjunction with filter fabric to prevent the gravel from having direct contact with soil. The remainder of the trench backfill may be derived from onsite soil or approved import soil, compacted as necessary, until the required compaction is obtained.

The use of minimum 2-sack slurry is also acceptable. Prior to placing any bedding materials or pipes, the excavation bottom must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon).

8.4.15 Jetting of backfill should only be performed where trench sidewalls have an SE of 15 or greater to allow the water to dissipate and prevent future settlement. Geotechnical laboratory testing of the sidewall soil should be performed in areas where jetting is considered to verify acceptable sand equivalent values are present within the trench.

8.4.16 Imported fill shall be observed, tested, and approved by Geocon prior to bringing soil to the site. Rocks larger than six inches in diameter shall not be used in the fill. If necessary, import soil used as structural fill should have an expansion index less than 20 and corrosivity properties that are equally or less detrimental than those of the existing onsite soil (see Figure B4). Direct shear properties of import soils should be at or higher than site soils. Import soil placed in the building area should be placed uniformly or in a manner that is approved by the Geotechnical Engineer (a representative of Geocon). If the engineering properties of the import soil are significantly different from those of the onsite soil presented herein, updated foundation, wall, and slope recommendations may be required.8.4.17 Excavation bottoms must be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon), prior to placing bedding materials, fill, steel, gravel or concrete.

8.5 Shrinkage

8.5.1 Shrinkage results when a volume of material removed at one density is compacted to a higher density. A shrinkage factor of between 0 and 10 percent should be anticipated when excavating and compacting the existing alluvium; 0 to 5 percent should be anticipated for colluvium; Pauba Sandstone will likely result in 0 shrinkage and bulking; and granitic bedrock will likely bulk 5 percent when compacted to an average relative compaction of 92 percent.

8.6 Foundation Design

8.6.1 Subsequent to the recommended grading, the proposed structures may be supported on a conventional foundation system deriving support in either newly placed engineered fill or the competent Pauba Sandstone.

8.6.2 Continuous footings may be designed for an allowable bearing capacity of 2,000 pounds per square foot, and should be a minimum of 12 inches in width, 18 inches in depth below the lowest adjacent grade, and 12 inches into the recommended bearing material.

8.6.3 Isolated spread foundations may be designed for an allowable bearing capacity of 2,400 pounds per square foot, and should be a minimum of 24 inches in width, 18 inches in depth below the lowest adjacent grade, and 12 inches into the recommended bearing material.

8.6.4 The soil bearing pressure above may be increased by 250 psf and 500 psf for each additional foot of foundation width and depth, respectively. In order to minimize static settlement of the proposed foundations, a maximum allowable soil bearing value of 3,500 pounds per square foot should be utilized.

8.6.5 The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

8.6.6 Continuous footings should be reinforced with a minimum of four No. 4 steel reinforcing bars, two placed near the top of the footing and two near the bottom. Reinforcement for spread footings should be designed by the project structural engineer.

8.6.7 If depth increases are utilized for the exterior wall footings, this office should be provided a copy of the final construction plans so that the excavation recommendations presented herein could be properly reviewed and revised if necessary.

8.6.8 The above foundation dimensions and minimum reinforcement recommendations are based on soil conditions and building code requirements only, and are not intended to be used in lieu of those required for structural purposes.

8.6.9 No special subgrade presaturation is required prior to placement of concrete. However, the slab and foundation subgrade should be sprinkled as necessary; to maintain a moist condition as would be expected in any concrete placement.

8.6.10 The maximum expected static settlement for structures supported on a conventional foundation system is estimated to be less than ½ inch and occur below the heaviest loaded structural element. Settlement of the foundation system is expected to occur on initial application of loading. Differential settlement is not expected to exceed ½ inch over a distance of twenty feet. If construction details differ significantly from those presented herein, modifications to the foundation recommendations including anticipated settlement will be required.

8.6.11 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon), prior to the placement of reinforcing steel and concrete to verify that the excavations and exposed soil conditions are consistent with those anticipated. If unanticipated soil conditions are encountered, foundation modifications may be required.

8.6.12 This office should be provided a copy of the final construction plans so that the excavation recommendations presented herein can be properly reviewed and revised if necessary.

8.7 Miscellaneous Foundations

8.7.1 Foundations for small outlying structures, such as block walls less than 6 feet in height, planter walls or trash enclosures, which will not be structurally supported by the proposed building, may be supported on conventional foundations bearing on a minimum of 12 inches of newly placed engineered fill which extends laterally at least 12 inches beyond the foundation area. If foundations for small outlying structures cannot be supported in engineered fill, Geocon should be contacted to provide alternate recommendations once project plans are available for review.

8.7.2 If the soil exposed in the excavation bottom is soft, compaction of the soft soil will be required prior to placing steel or concrete. Compaction of the foundation excavation bottom is typically accomplished with a compaction wheel or mechanical whacker and must be observed and approved by a Geocon representative. Miscellaneous foundations may be designed for a bearing value of 1,500 pounds per square foot, and should be a minimum of 12 inches in width, 24 inches in depth below the lowest adjacent grade and 12 inches into the recommended bearing material. The allowable bearing pressure may be increased by up to one-third for transient loads due to wind or seismic forces.

8.7.3 Foundation excavations should be observed and approved in writing by the Geotechnical Engineer (a representative of Geocon), prior to the placement of reinforcing steel and concrete to verify that the excavations and exposed soil conditions are consistent with those anticipated.

8.8 Lateral Design

8.8.1 Resistance to lateral loading may be provided by friction acting at the base of foundations, slabs and by passive earth pressure. An allowable coefficient of friction of 0.38 may be used with the dead load forces for concrete footings bearing in properly compacted engineered fill, and 0.4 may be used in formational units (Pauba or granitic bedrock).

8.8.2 Passive earth pressure for the sides of foundations and slabs poured against engineered fill or formational units may be computed as an equivalent fluid having a density of 350 pcf with a maximum earth pressure of 3,500 pcf. When combining passive and friction for lateral resistance, the passive component should be reduced by one-third.

8.9 Concrete Slabs-on-Grade

8.9.1 Concrete slabs-on-grade subject to vehicle loading should be designed in accordance with the recommendations in the *Preliminary Pavement Recommendations* section of this report (Section 8.10).

8.9.2 Subsequent to the recommended grading, concrete slabs-on-grade for structures, not subject to vehicle loading, should be a minimum of 4-inches thick and minimum slab reinforcement should consist of No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. Steel reinforcing should be positioned vertically near the slab midpoint.

8.9.3 Slabs that may receive moisture-sensitive floor coverings or may be used to store moisture-sensitive materials should be underlain by a vapor retarder placed directly beneath the slab. The vapor retarder used should be specified by the project architect or developer based on the type of floor covering that will be installed. The vapor retarder design should be consistent with the guidelines presented in Section 9.3 of the American Concrete Institute's (ACI) *Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials* (ACI 302.2R-06) and should be installed in general conformance with ASTM E 1643 and the manufacturer's recommendations. If California Green Code requirements apply to this project, the vapor retarder should be underlain by 4 inches of ½-inch clean aggregate and the vapor retarder should be in direct contact with the concrete slab. It is important that the vapor retarder be puncture resistant since it will be in direct contact with angular gravel.

8.9.4 For seismic design purposes, a coefficient of friction of 0.38 may be utilized between concrete slabs and subgrade soil without a moisture barrier, and 0.15 for slabs underlain by a moisture barrier.

8.9.5 Exterior slabs, not subject to traffic loads, should be at least 4 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions, positioned near the slab midpoint. Prior to construction of slabs, the upper 12 inches of subgrade should be moisture conditioned to near optimum moisture content and properly compacted to at least 90 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition). Crack control joints should be spaced at intervals not greater than 10 feet and should be constructed using saw-cuts or other methods as soon as practical following concrete placement. Crack control joints should extend a minimum depth of one-fourth the slab thickness. The project structural engineer should design construction joints as necessary.

8.9.6 The recommendations of this report are intended to reduce the potential for cracking of slabs due to settlement. However, even with the incorporation of the recommendations presented herein, foundations, stucco walls, and slabs-on-grade may exhibit some cracking due to minor soil movement or concrete shrinkage. The occurrence of concrete shrinkage cracks is independent of the supporting soil characteristics. Their occurrence may be reduced or controlled by limiting the slump of the concrete, proper concrete placement and curing, and by the placement of crack control joints at periodic intervals, in particular, where re-entrant slab corners occur.

8.10 Preliminary Pavement Recommendations

8.10.1 Where new paving is to be placed, it is recommended that existing undocumented fill and soft or disturbed alluvium be excavated and properly compacted for paving support. The client should be aware that excavation and compaction of soft or unsuitable soil in the area of new paving is not required, however, paving constructed over existing unsuitable soil may experience increased settlement or cracking, and may therefore have a shorter design life and increased maintenance costs. As a minimum, the upper twelve inches of soil should be scarified and compacted to at least 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

8.10.2 The following pavement sections are based on an assumed R-Value of 30. Once site grading activities are complete, it is recommended that laboratory testing confirm the properties of the soils serving as paving subgrade prior to placing pavement. The Traffic Indices listed below are estimates. Geocon does not practice in the field of traffic engineering. The actual Traffic Index for each area should be determined by the project civil engineer or the building official. If pavement sections for Traffic Indices other than those listed below are required, Geocon should be contacted to provide additional recommendations. Pavement thicknesses were determined following procedures outlined in the *California Highway Design Manual* (Caltrans). It is anticipated that the majority of traffic will consist of automobile and large truck traffic.

PRELIMINARY PAVEMENT DESIGN SECTIONS

Location	Estimated Traffic Index (TI)	Asphalt Concrete (inches)	Class 2 Aggregate Base (inches)
Automobile Parking & Driveways	Up to 5	3.0	5.5
Trash Truck & Fire Lanes	7	4.0	9.5

8.10.3 Asphalt concrete should conform to Section 203-6 of the "*Standard Specifications for Public Works Construction*" (Greenbook). Class 2 aggregate base should conform to Section 26-1.02A of the *"Standard Specifications of the State of California, Department of Transportation"* (Caltrans). Crushed Miscellaneous Base should conform to Section 200-2.4 of the *"Standard Specifications for Public Works Construction"* (Greenbook).

8.10.4 Unless specifically designed and evaluated by the project structural engineer, where concrete paving will be utilized for support of vehicles at the ground surface, it is recommended that the concrete be a minimum of 5 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions. Concrete paving supporting vehicular traffic should be underlain by a minimum of 4 inches of aggregate base and a properly compacted subgrade. The subgrade and base material should be compacted to at least 95 percent relative compaction, as determined by ASTM Test Method D 1557 (latest edition).

8.10.5 The performance of pavements is highly dependent upon providing positive surface drainage away from the edge of pavements. Ponding of water on or adjacent to the pavement will likely result in saturation of the subgrade materials and subsequent cracking, subsidence and pavement distress. If planters are planned adjacent to paving, it is recommended that the perimeter curb be extended at least 12 inches below the bottom of the aggregate base to minimize the introduction of water beneath the paving.

8.11 Swimming Pool/Spa

8.11.1 If swimming pools or spas are planned, the proposed swimming pool shell bottom should be designed as a free-standing structure and may derive support in newly placed engineered fill or undisturbed alluvium found at or below a depth of 2 feet. It is recommended that uniformity be maintained beneath the proposed swimming pools where possible. However, swimming pool foundations may derive support in both engineered fill and undisturbed alluvium found at or below a depth of two feet. It is the intent of the Geotechnical Engineer to allow swimming pool foundation systems to bear in the competent undisturbed alluvium or newly placed engineered fill or both as necessary.

8.11.2 Swimming pool foundations and walls may be designed in accordance with the *Conventional Foundation Design* and *Retaining Wall Design* sections of this report (See Sections 8.6 and 8.12). A hydrostatic relief valve should be considered as part of the swimming pool design unless a gravity drain system can be placed beneath the pool shell.

8.11.3 If a spa is proposed it should be constructed independent of the swimming pool and must not be cantilevered from the swimming pool shell.

8.11.4 If a proposed pool is in proximity to a proposed structure, consideration should be given to construction sequence. If the proposed pool is constructed after building foundation construction, the excavation required for pool construction could remove a component of lateral support from the foundations and would therefore require shoring. Once information regarding the pool location and depth becomes available, this information should be provided to Geocon for review and possible revision of these recommendations.

8.12 Retaining Wall Design

8.12.1 The recommendations presented below are generally applicable to the design of rigid concrete or masonry retaining walls having a maximum height of 7 feet. In the event that walls significantly higher than 7 feet are planned, Geocon should be contacted for additional recommendations.

8.12.2 Retaining wall foundations may be designed in accordance with the recommendations provided in the *Foundation Design* sections of this report (see Section 8.6).

8.12.3 Retaining walls with a level backfill surface that are not restrained at the top should be designed utilizing a triangular distribution of pressure (active pressure) of 31 pcf.

8.12.4 Restrained walls are those that are not allowed to rotate more than 0.001H (where H equals the height of the retaining portion of the wall in feet) at the top of the wall. Where walls are restrained from movement at the top, walls may be designed utilizing a triangular distribution of pressure (at-rest pressure) of 51 pcf.

8.12.5 These pressures assume non expansive granular soil is placed as the wall backfill. If expansive, or fine grained soils are used, Geocon should be contacted to provide additional recommendations.

8.12.6 The wall pressures provided above assume that the retaining wall will be properly drained preventing the buildup of hydrostatic pressure. If retaining wall drainage is not implemented, the equivalent fluid pressure to be used in design of undrained walls is 80 pcf. This value includes hydrostatic pressures plus buoyant lateral earth pressures.

8.12.7 Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent structures and should be designed for each condition as the project progresses. In addition, seismic lateral forces presented below should be incorporated into the design as necessary.

8.13 Dynamic (Seismic) Lateral Forces

8.13.1 In accordance with the 2013 California Building Code, if the project possesses a seismic design category of D, E, or F, retaining walls should be designed with seismic lateral earth pressure. The structural engineer should determine the seismic design category for the project. The maximum dynamic (seismic) lateral pressure is equal to the sum of the initial static active pressure and the dynamic (seismic) pressure increment.

8.13.2 The seismic lateral earth pressure on unbraced retaining walls is applied to check the overall sliding resistance of the structure. Braced retaining walls should be designed for the greater of either the at-rest earth pressure or the seismic lateral earth pressure.

8.13.3 The application of seismic loading should be performed at the discretion of the project Structural Engineer and in accordance with the requirements of the Building Official. If seismic loading is to be applied, we recommend a seismic load of 26 pounds per cubic foot be used for design applied as a triangular distribution of pressure along the wall height. This dynamic (seismic) pressure increment is for horizontal backfill behind the wall and does not account for an inclined backfill surface. The seismic pressure is based on a site modified peak ground acceleration of 0.914g and by applying a pseudo-static coefficient of 0.33.

8.14 Retaining Wall Drainage

8.14.1 Retaining walls should be provided with a drainage system extended at least two-thirds the height of the wall. At the base of the drain system, a subdrain covered with a minimum of 12 inches of gravel should be installed, and a compacted fill blanket or other seal placed at the surface (see Figure 6). The clean bottom and subdrain pipe, behind a retaining wall, should be observed by the Geotechnical Engineer (a representative of Geocon), prior to placement of gravel or compacting backfill.

8.14.2 As an alternative, a plastic drainage composite such as Miradrain or equivalent may be installed in continuous, 4-foot wide columns along the entire back face of the wall, at 8 feet on center. The top of these drainage composite columns should terminate approximately 18 inches below the ground surface, where either hardscape or a minimum of 18 inches of relatively cohesive material should be placed as a cap (see Figure 7). These vertical columns of drainage material would then be connected at the bottom of the wall to a collection panel or a one-cubic-foot rock pocket drained by a 4-inch subdrain pipe.

8.14.3 Moisture affecting below grade walls is one of the most common post-construction complaints. Poorly applied or omitted waterproofing can lead to efflorescence or standing water. Particular care should be taken in the design and installation of waterproofing to avoid moisture problems, or actual water seepage into the structure through any normal shrinkage cracks which may develop in the concrete walls, floor slab, foundations or construction joints. The design and inspection of the waterproofing is not the responsibility of the geotechnical engineer. A waterproofing consultant should be retained in order to recommend a product or method, which would provide protection to subterranean walls, floor slabs and foundations.

8.15 Elevator Pit Design

8.15.1 The elevator pit slab and retaining wall should be designed by the project structural engineer. As a minimum the slab-on-grade should be at least 4 inches thick and reinforced with No. 3 steel reinforcing bars placed 18 inches on center in both horizontal directions, positioned near the slab midpoint. Elevator pit walls may be designed in accordance with the recommendations in the *Retaining Wall Design* section of this report (see Section 8.12).

8.15.2 Additional active pressure should be added for a surcharge condition due to sloping ground, vehicular traffic or adjacent foundations and should be designed for each condition as the project progresses. Once the design becomes more finalized, an addendum letter can be prepared addressing specific surcharge conditions throughout the project, if necessary.

8.15.3 If retaining wall drainage is to be provided, the drainage system should be designed in accordance with the *Retaining Wall Drainage* section of this report (see Section 8.14).

8.15.4 It is suggested that the elevator pit walls and slab be waterproofed to prevent excessive moisture inside of the elevator pit. Waterproofing design and installation is not the responsibility of the geotechnical engineer.

8.16 Elevator Piston

8.16.1 If a plunger-type elevator piston is installed for this project, a deep drilled excavation will be required. It is important to verify that the drilled excavation is not situated immediately adjacent to a foundation, or the drilled excavation could compromise the existing foundation support, especially if the drilling is performed subsequent to the foundation construction.

8.16.2 Casing may be required if caving is experienced in the drilled excavation. The contractor should be prepared to use casing and should have it readily available at the commencement of drilling activities. Continuous observation of the drilling and installation of the elevator piston by the Geotechnical Engineer (a representative of Geocon) is required.

8.16.3 The annular space between the piston casing and drilled excavation wall should be filled with a minimum of 1½-sack slurry pumped from the bottom up. As an alternative, pea gravel may be utilized. The use of soil to backfill the annular space is not acceptable.

8.17 Temporary Excavations

8.17.1 The excavations are expected to expose alluvium, dense native soil, and bedrock which are suitable for vertical excavations up to five feet where loose soil or caving sand is not present, or where not surcharged by adjacent traffic or structures.

8.17.2 Vertical excavations greater than five feet or where surcharged by existing structures will require sloping or shoring measures in order to provide a stable excavation.

8.17.3 It is anticipated that sufficient space is available to complete the required earthwork for this project using sloping measures. Where sufficient space is available, temporary unsurcharged embankments may be sloped back at a uniform 1:1 slope gradient or flatter to a maximum height of 10 feet. A uniform slope does not have a vertical portion.

8.17.4 Where sloped embankments are utilized, the top of the slope should be barricaded to prevent vehicles and storage loads at the top of the slope within a horizontal distance equal to the height of the slope. If the temporary construction embankments are to be maintained during the rainy season, berms are suggested along the tops of the slopes where necessary to prevent runoff water from entering the excavation and eroding the slope faces. The contractor's competent person should inspect the soil exposed in the cut slopes during excavation in accordance with OSHA requirements so that modifications of the slopes can be made if variations in the soil conditions occur. Excavations should be stabilized within 30 days of initial excavation.

8.18 Surface Drainage

8.18.1 Proper surface drainage is critical to the future performance of the project. Uncontrolled infiltration of irrigation excess and storm runoff into the supporting soil can adversely affect the performance of the planned improvements. Saturation of a soil can cause it to lose internal shear strength and increase its compressibility, resulting in a change in the original designed engineering properties. Proper drainage should be maintained at all times.

8.18.2 Site drainage should be collected and controlled in non-erosive drainage devices. Drainage should not be allowed to pond anywhere on the site, and especially not against any foundation or retaining wall. The site should be graded and maintained such that surface drainage is directed away from structures in accordance with 2013 CBC 1804.3 or other applicable standards. In addition, drainage should not be allowed to flow uncontrolled over any descending slope. The proposed structure should be provided with roof gutters. Discharge from downspouts, roof drains and scuppers not recommended onto unprotected soil within five feet of the building perimeter. Planters which are located adjacent to foundations should be sealed to prevent moisture intrusion into the engineered fill providing foundation support. Landscape irrigation is not recommended within five feet of the building perimeter footings except when enclosed in protected planters.

8.18.3 Positive site drainage should be provided away from structures, pavement, and the tops of slopes to swales or other controlled drainage structures. The building pad and pavement areas should be fine graded such that water is not allowed to pond.

8.18.4 Landscaping planters immediately adjacent to paved areas are not recommended due to the potential for surface or irrigation water to infiltrate the pavement's subgrade and base course. Either a subdrain, which collects excess irrigation water and transmits it to drainage structures, or impervious above-grade planter boxes should be used. In addition, where landscaping is planned adjacent to the pavement, it is recommended that consideration be given to providing a cutoff wall along the edge of the pavement that extends at least 12 inches below the base material.

8.19 Plan Review

8.19.1 Grading and foundation should be reviewed by the Geotechnical Engineer (a representative of Geocon), prior to finalization to verify that the plans have been prepared in substantial conformance with the recommendations of this report and to provide additional analyses or recommendations.

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in the investigation. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon West, Inc. should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous or corrosive materials was not part of the scope of services provided by Geocon West, Inc.

2. This report is issued with the understanding that it is the responsibility of the owner, or of his representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the present date. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

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Riverside County Flood Control and Water Conservation District Aerial Photographs:

Date	Photograph Number	Scale
1/28/62	1-69/1-70	1" = 2000'
6/20/74	727/728	1" = 2000'
5/4/80	756/757	1" = 2000'
12/15/83	584/585	1" = 1600'
1/25/90	15-15/15-16	1" = 1600'
1/29/95	15-12/15-13	1" = 1600'

3/18/00	15-15/15-16	1" = 1600'
4/14/05	15-14/15-15	1" = 1600'
4/2/10	15-14/15-15	1" = 1600'

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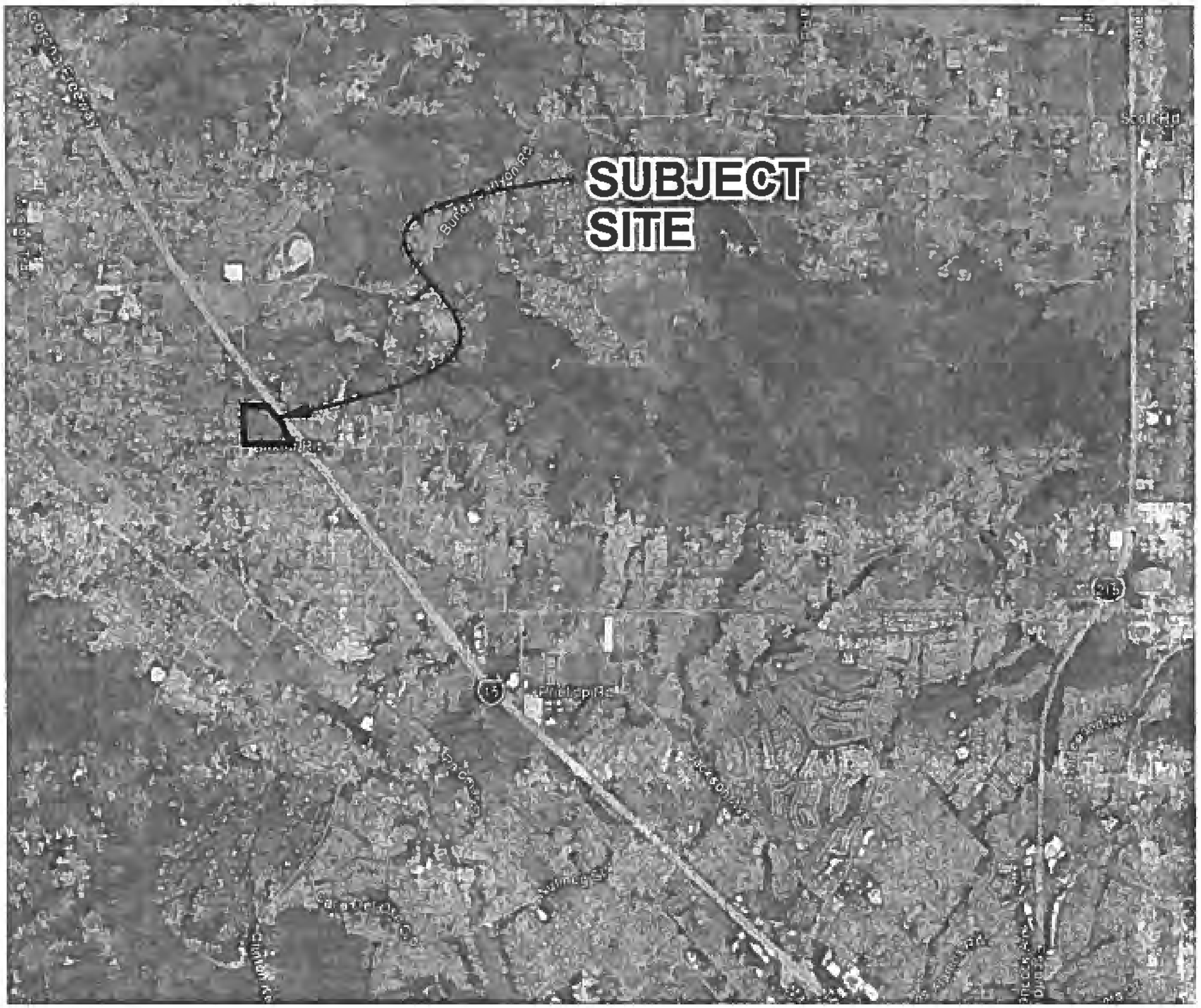

REFERENCE: GOOGLE EARTH, 2012

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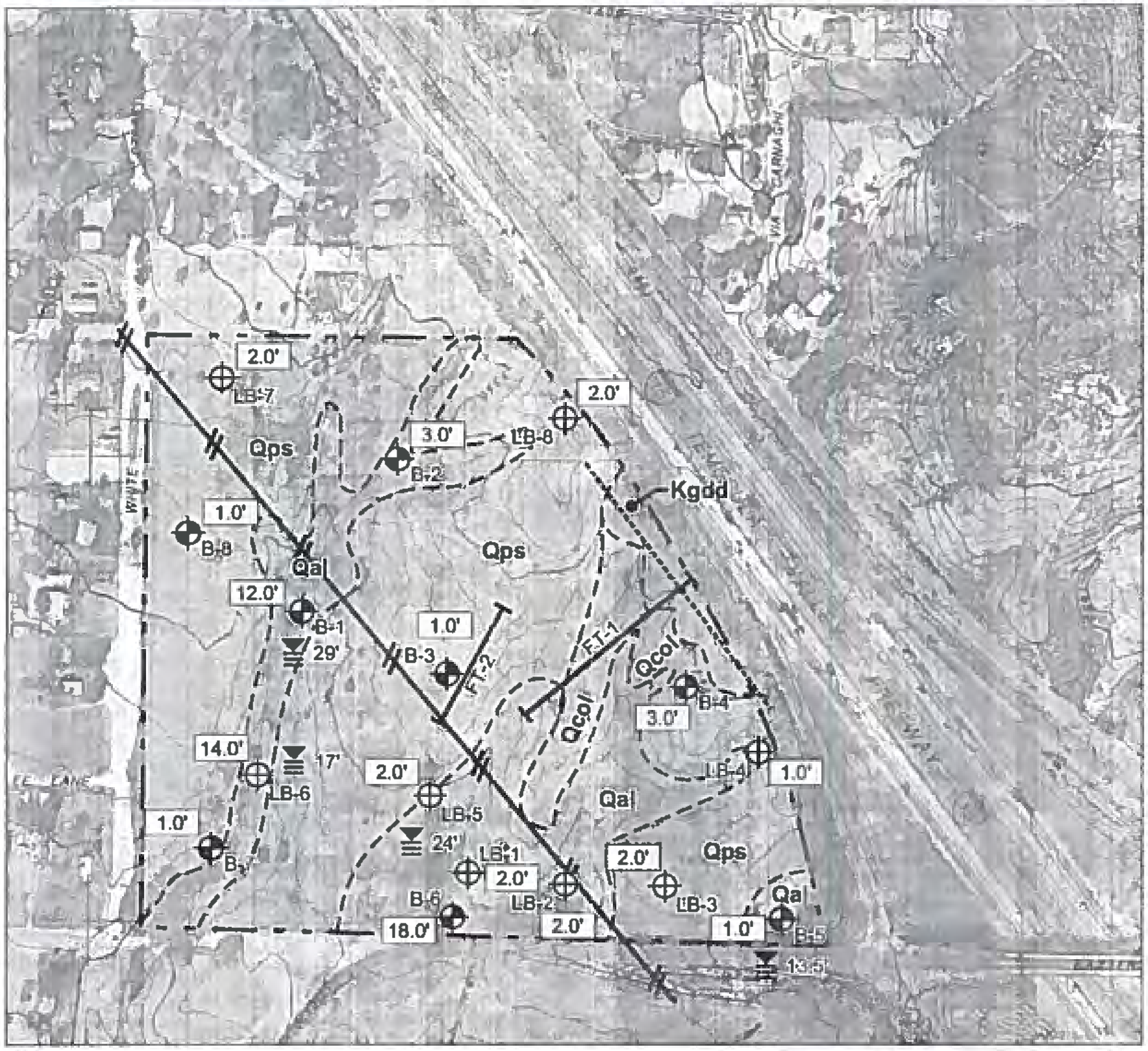
VICINITY MAP

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

CHL / JL		2000	12 / 2012	PROJECT NO T2540-22-02	FIG. 1



LEGEND

B-8	Geotechnical Boring, Geocon (this investigation)
LB-8	Geotechnical Boring, LandMark Consultants (2005)
13 5'	Groundwater Depth Encountered During Drilling
FT-2	Fault Trench Location
18.0'	Estimated Depth of Remedial Removal Recommendation
	Western Limit of Riverside County Fault Zone Limit
	Mapped Trace of Unnamed Riverside County Fault
Qal	Young Alluvium
Qcol	Colluvium
Qps	Pauba Sandstone
Kgdd	Granitic Bedrock
	Geologic Contact
	Site Boundary

Note: Geologic contacts based on Kennedy, (1977)

0 250' 500'

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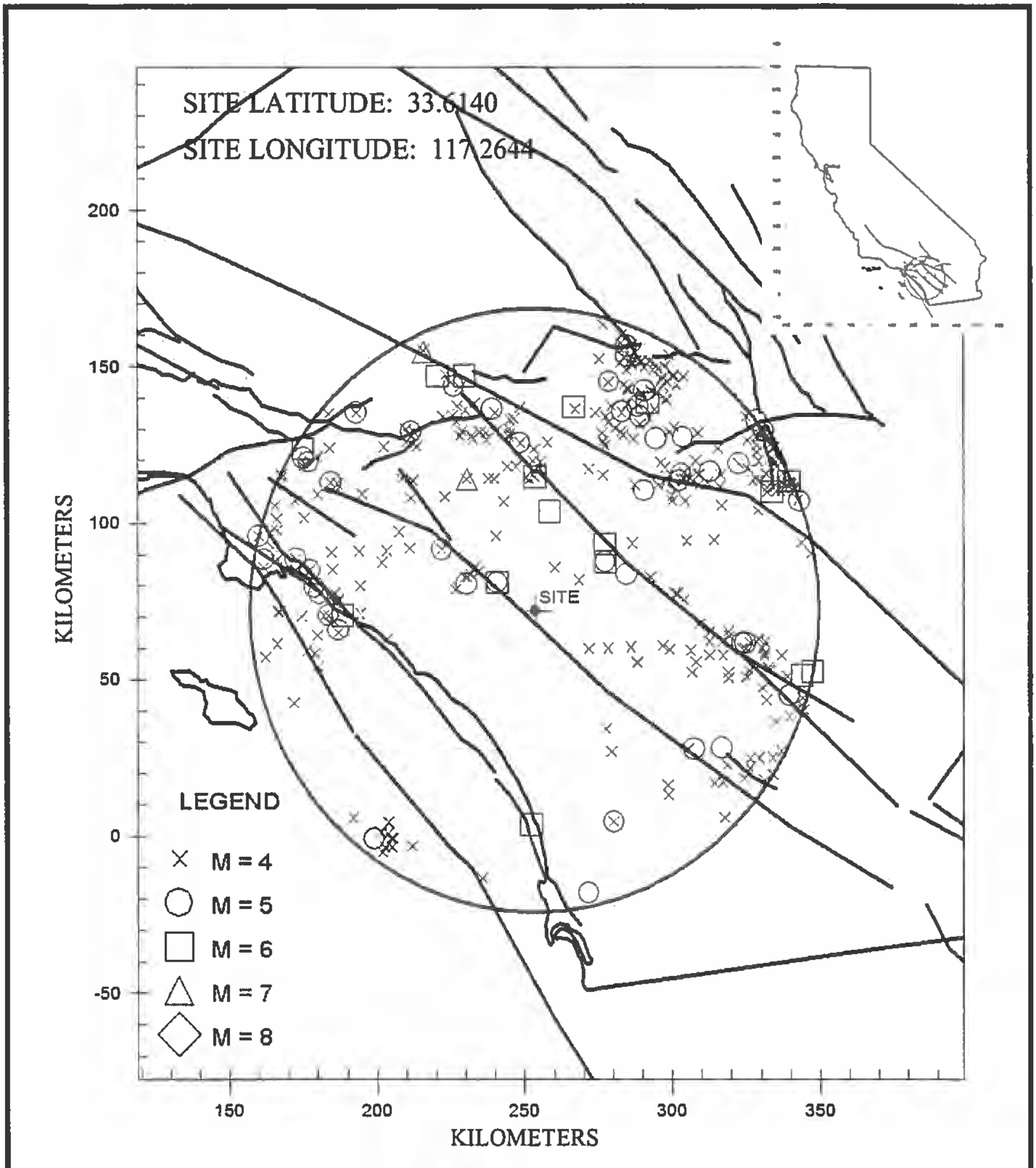
JL		2000

GEOLOGIC MAP AND SITE PLAN

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

12 / 2012	PROJECT NO. T2540-22-02	FIG. 2



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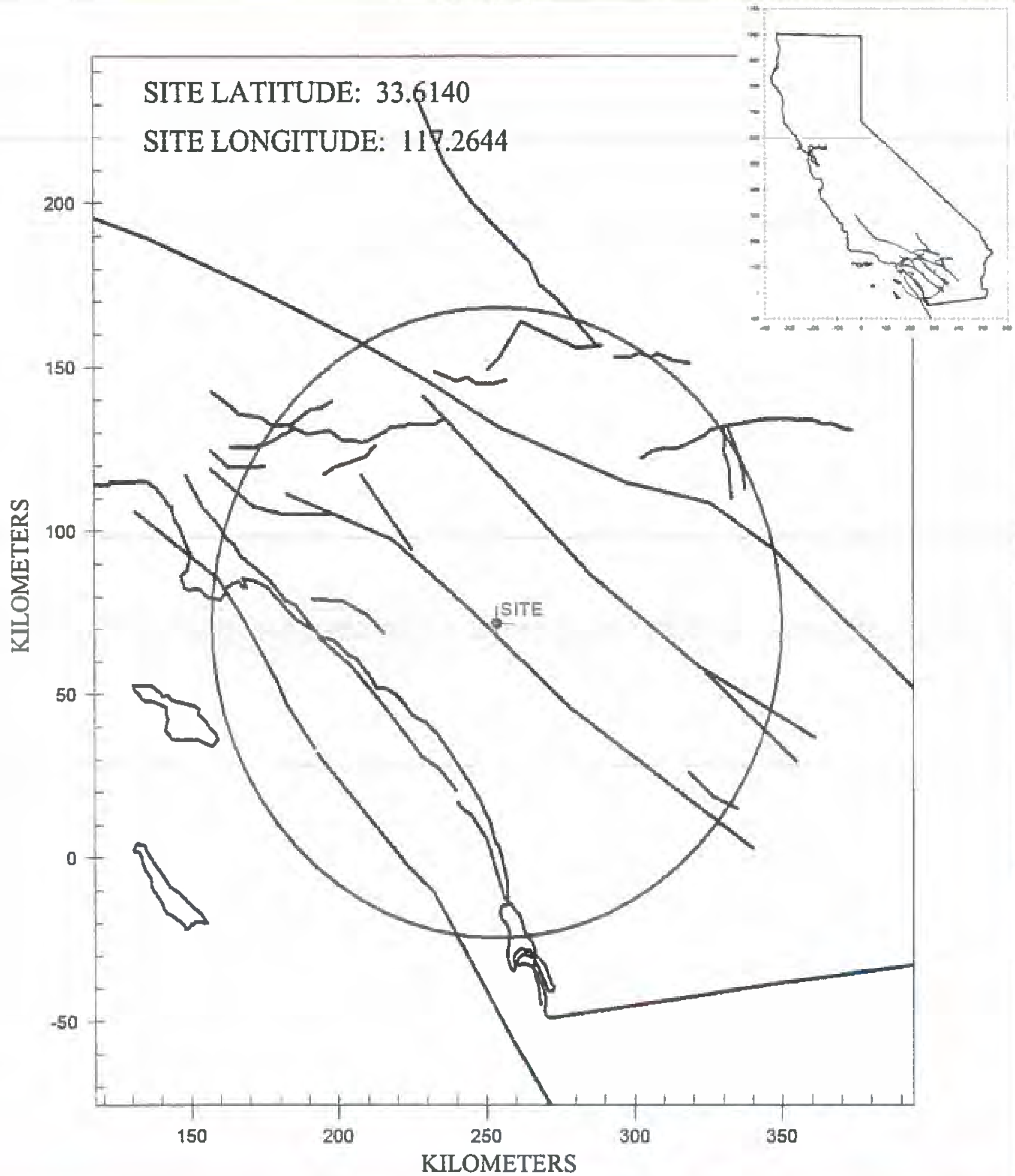
REGIONAL SEISMICITY MAP

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

CHL / JL		2000	12 / 2012	PROJECT NO. T2540-22-02	FIG. 4



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REGIONAL FAULT MAP

TRACT 34301

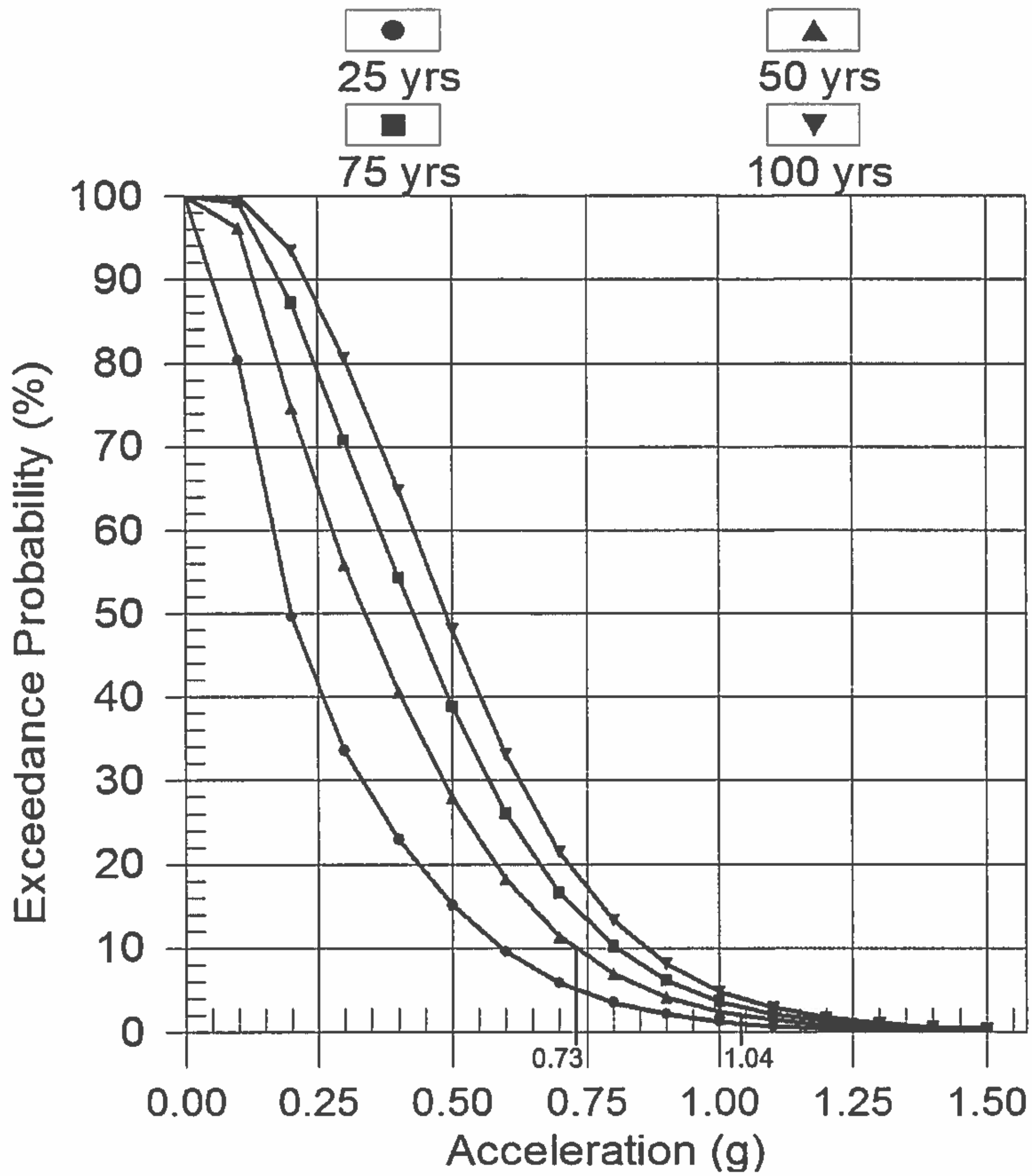
NWC BAXTER ROAD AND I-15

WILDOMAR, CALIFORNIA

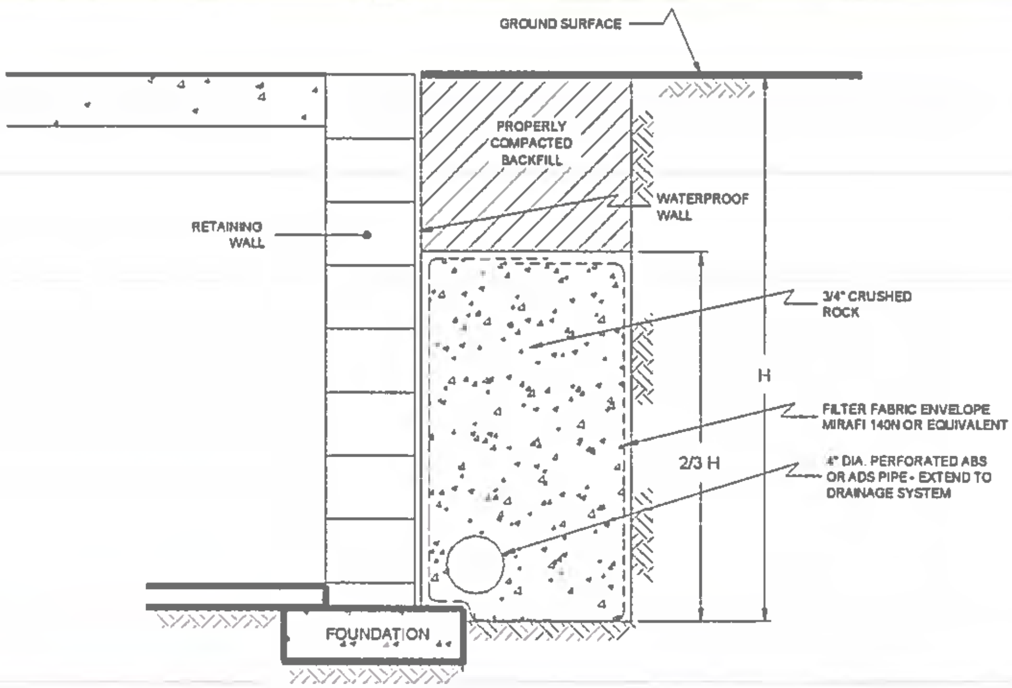
CHL / JL		2000	12 / 2012	PROJECT NO. T2540-22-02	FIG. 3

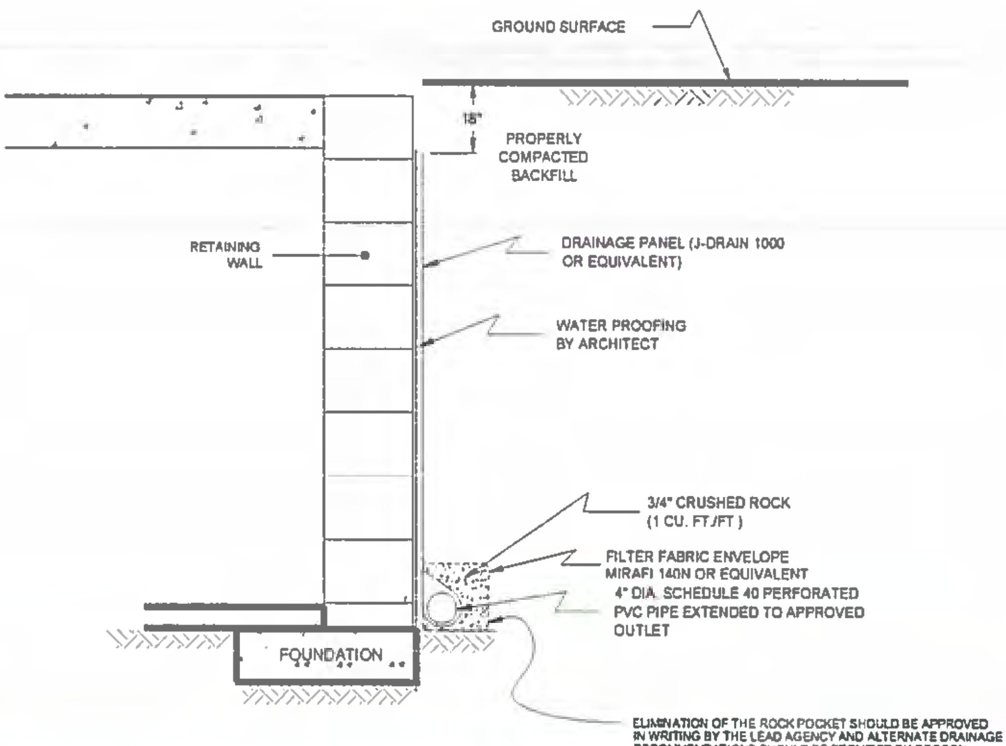
PROBABILITY OF EXCEEDANCE

CAMP. & BOZ. (1997 Rev.) SR 1



GEOCON WEST, INC. ENVIRONMENTAL GEOTECHNICAL MATERIALS 41571 CORNING PLACE, SUITE 101, MURRIETA, CA 92562 PHONE 951.304.2300 FAX 951.304.2392	PROBABILITY OF EXCEEDANCE TRACT 34301 NWC BAXTER ROAD AND I-15 WILDOMAR, CALIFORNIA
CHL / JL		2000	12 / 2012	PROJECT NO. T2540-22-02	FIG. 5





NO SCALE

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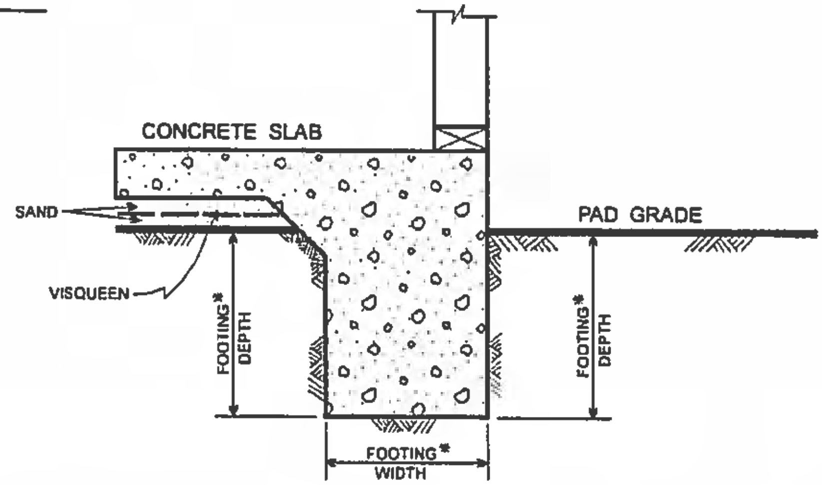
RETAINING WALL DRAIN DETAIL

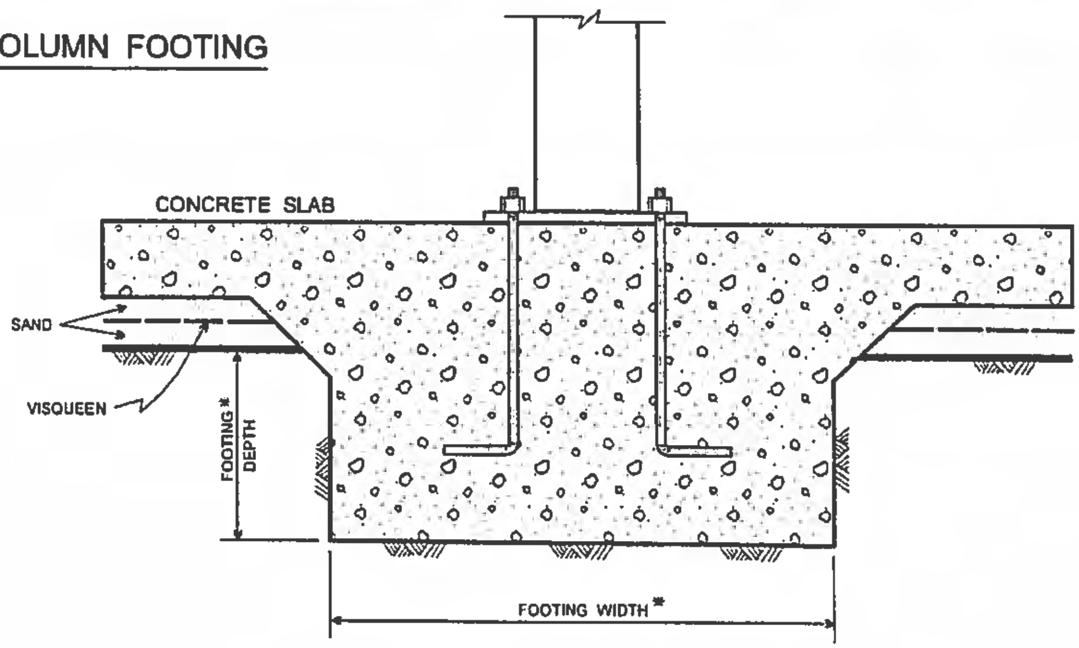
TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

CHL / JL		2000	12 / 2012	PROJECT NO. T2540-22-02	FIG. 6

WALL FOOTING



COLUMN FOOTING



*......SEE REPORT FOR FOUNDATION WIDTH AND DEPTH RECOMMENDATION

NO SCALE

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JL		2000

WALL / COLUMN FOOTING DETAIL

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

12 / 2012	PROJECT NO. T2540-22-02	FIG. 7

GEOCON

TABLE 1
FAULTS WITHIN 60 MILES OF THE SITE
DETERMINISTIC SITE PARAMETERS

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi	(km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG.(Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
ELSINORE (TEMECULA)	2.6	(4.2)	6.8	0.844	XI
ELSINORE (GLEN IVY)	5.7	(9.1)	6.8	0.593	X
SAN JACINTO-SAN JACINTO VALLEY	20.6	(33.1)	6.9	0.183	VIII
ELSINORE (JULIAN)	21.8	(35.1)	7.1	0.196	VIII
SAN JACINTO-ANZA	21.9	(35.2)	7.2	0.209	VIII
CHINO-CENTRAL AVE. (Elsinore)	23.3	(37.5)	6.7	0.147	VIII
SAN JOAQUIN HILLS	24.9	(40.0)	6.6	0.127	VIII
WHITTIER	27.5	(44.2)	6.8	0.121	VII
SAN JACINTO-SAN BERNARDINO	28.1	(45.2)	6.7	0.109	VII
NEWPORT-INGLEWOOD (Offshore)	28.3	(45.5)	7.1	0.146	VIII
SAN ANDREAS - SB-Coach. M-1b-2	35.0	(56.3)	7.7	0.172	VIII
SAN ANDREAS - SB-Coach. M-2b	35.0	(56.3)	7.7	0.172	VIII
SAN ANDREAS - San Bernardino M-1	35.0	(56.3)	7.5	0.150	VIII
SAN ANDREAS - Whole M-1a	35.0	(56.3)	8.0	0.210	VIII
ROSE CANYON	35.1	(56.5)	7.2	0.121	VII
NEWPORT-INGLEWOOD (L.A.Basin)	38.2	(61.4)	7.1	0.099	VII
PUENTE HILLS BLIND THRUST	41.1	(66.2)	7.1	0.087	VII
CUCAMONGA	42.2	(67.9)	6.9	0.071	VI
SAN JOSE	42.8	(68.9)	6.4	0.047	VI
NORTH FRONTAL FAULT ZONE (West)	43.4	(69.8)	7.2	0.086	VII
PINTO MOUNTAIN	43.7	(70.4)	7.2	0.089	VII
CORONADO BANK	44.6	(71.8)	7.6	0.121	VII
SAN JACINTO-COYOTE CREEK	44.8	(72.1)	6.6	0.051	VI
PALOS VERDES	45.1	(72.6)	7.3	0.093	VII
CLEGHORN	45.8	(73.7)	6.5	0.045	VI
SIERRA MADRE	45.8	(73.7)	7.2	0.079	VII
SAN ANDREAS - Cho-Moj M-1b-1	48.7	(78.4)	7.8	0.125	VIII
SAN ANDREAS - Mojave M-1c-3	48.7	(78.4)	7.4	0.090	VII
SAN ANDREAS - 1857 Rupture M-2a	48.7	(78.4)	7.8	0.125	VIII
EARTHQUAKE VALLEY	49.3	(79.3)	6.5	0.040	V
NORTH FRONTAL FAULT ZONE (East)	50.1	(80.6)	6.7	0.047	VI
SAN ANDREAS - Coachella M-1c-5	50.5	(81.2)	7.2	0.072	VI
BURNT MTN.	54.9	(88.4)	6.5	0.034	V
CLAMSHELL-SAWPIT	56.7	(91.3)	6.5	0.033	V
RAYMOND	57.0	(91.7)	6.5	0.032	V
HELENDALE - S. LOCKHARDT	57.1	(91.9)	7.3	0.066	VI
UPPER ELYSIAN PARK BLIND THRUST	57.5	(92.6)	6.4	0.029	V
EUREKA PEAK	58.2	(93.7)	6.4	0.029	V

38 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.
THE ELSINORE (TEMECULA) FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.6 MILES (4.2 km) AWAY.
LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.8438 g

APPENDIX A

APPENDIX A

FIELD INVESTIGATION

The site was explored on October 23 through 30 (fault trenching) and November 7, 2012 (geotechnical borings). Eight borings were excavated with a CME 75 truck mounted drill rig to depths between 20 and 50.25 feet. Representative and relatively undisturbed samples were obtained by driving a 3 inch O. D., California Modified Sampler into the "undisturbed" soil mass with blows from an above-ground auto-hammer. The sampler was equipped with 1-inch by 2$^3/_8$-inch brass sampler rings to facilitate removal and testing. Bulk samples were also obtained. Standard Penetrometer (SPT) samples were alternated with California ring samplers in areas where ground water was encountered. SPT soil samples were bagged, sealed, and transported to our laboratory for testing. The soil conditions encountered in the excavations were visually examined, classified and logged in general accordance with the Unified Soil Classification System (USCS). Logs of the borings are presented on Figures A-1 through A-8. The logs depict the soil and geologic conditions encountered and the depth at which samples were obtained. The approximate locations of the borings are indicated on the Geologic Map and Site Plan (see Figure 2).

BORING B-1

ELEV. (MSL.) 1336 DATE COMPLETED 11/7/2012

EQUIPMENT CME 75 HSA BY: LAB/PDT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B1@0-5			SM	**YOUNG ALLUVIUM (Qal):** Silty SAND, loose, dry to moist, red brown, coarse - granitic detritus			
5	B1@5				-becomes dense (cemented), slightly porous	57	125.3	3.4
9					-becomes loose, easy drilling			
10	B1@10				-becomes brown, moist to wet, loose, coarse	13	118.4	16.3
11.5					**PAUBA SANDSTONE (Qps):** Silty SANDSTONE, poorly graded, dense, moist, brown, hard drilling, weakly cemented			
15	B1@15				Clayey SANDSTONE, dense, moist, red brown, motled coloring, coarse grained sand, weathered granitic clasts, weakly cemented	87/11"	121.2	12.2
20	B1@20					47	126.8	13.5
23					Silty SANDSTONE to Clayey SANDSTONE, moist, yellow brown, coarse grained, manganese staining, mottled coloring, weakly cemented			
25	B1@25				SANDSTONE, poorly graded, medium dense, light yellow brown, coarse grained, non indurated, locally massive, granitic, weakly cemented @ 25.5'-26.0' blow sampler dropped - possible void	42		18.2
28			▼		-very soft easy drilling			

Figure A-1,
Log of Boring B-1, Page 1 of 2

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. T2540-22-02

BORING B-1

ELEV. (MSL.) 1336 DATE COMPLETED 11/7/2012

EQUIPMENT CME 75 HSA BY: LAB/PDT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30	B1@30				Silty SANDSTONE, very dense, moist, reddish brown, fine to coarse grained, slow advance, micaceous, trace clay, weakly cemented	70		
32								
34								
	B1@35				-disturbed sample, water added to extract sample	50/3.5"		
36								
38								
					GRANITIC BEDROCK (Kgdd): Black and white, fine to medium grained, granitic rock weathered, some clay			
40	B1@40				-Olive, very fine grained, moist, hard	50/5"		
42								
44								
	B1@45				-Black and white fine grained granitic rock weathered	50/3"		
46								
48								
50	B1@50					50/3.5"		

Total depth: 50.25'
Groundwater encountered at 29'
No caving
Backfilled with cuttings and tamped
Penetration resistance for 140-lb hammer falling 30 inches by auto-hammer

Figure A-1,
Log of Boring B-1, Page 2 of 2

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-02

BORING B-2

ELEV. (MSL.) 1348 DATE COMPLETED 11/7/2012

EQUIPMENT CME 75 HSA BY: PDT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B2@0-0			SM	**YOUNG ALLUVIUM (Qal):** Silty SAND, dense, dry, brown, fine to coarse, upper 12" disturbed (disked), annual grasses, some shrubs			
2	B2@2.5				**PAUBA SANDSTONE (Qps):** Silty SANDSTONE, very dense, moist, reddish brown, fine to coarse grained, some porosity, weakly cemented	64	138.2	5.3
4	B2@5				Clayey SANDSTONE, dense, damp, brown, fine to coarse grained, some brownish red mottling, increase in fine sand, non porous, micaceous, weakly cemented	43	124.1	11.4
6								
8	B2@7.5					39	126.8	11.3
					-conglomerate layer			
10	B2@10				-becomes reddish brown, moist, some orange mottling	62	133.7	7.7
12								
	B2@13				-increase in sand, conglomerate in shoe	57		
14								
	B2@15				-becomes light brown with orange mottling, fine grained, trace coarse sand, increase in clay	45		
16								
18								
20	B2@20				**GRANITIC BEDROCK (Kgdd):** Highly weathered, clayey, fine to medium grained	41		

Total depth: 21'
No groundwater encountered
No caving
Backfilled with cuttings and tamped
Penetration resistance for 140-lb hammer falling 30 inches by auto-hammer

Figure A-2,
Log of Boring B-2, Page 1 of 1

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-02

BORING B-3

ELEV. (MSL.) 1352 DATE COMPLETED 11/7/2012

EQUIPMENT CME 75 HSA BY: PDT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B3@0-5				PAUBA SANDSTONE (Qps): Silty SANDSTONE/Sandy SILTSTONE, medium dense, dry, reddish brown, fine grained, trace medium to coarse grained sand, weakly cemented			
	B3@2.5				-becomes very dense	53	131.0	4.0
4					Silty SANDSTONE, very dense, damp, reddish brown, fine to coarse grained, moderately cemented			
	B3@5-10 B3@5				-conglomerate layer	50/4.5"	107.3	5.7
8	B3@7.5					50/5"		
10	B3@10				-becomes fine to medium grained, trace coarse grained sand, moist, well cemented	94		
12	B3@12.5				Clayey SANDSTONE, very dense, moist, fine to medium grained, trace coarse grained sand, well cemented, trace carbonate stringers	90		
14					-conglomerate layer			
	B3@15				Silty SANDSTONE, very dense, moist, fine to medium grained, some clay, well cemented	92/10"		
					GRANITIC BEDROCK (Kgdd): Weathered, moist, gray, white, orange, clayey, fine to medium grained, micaceous			
20	B3@20					50/5.5"		

Total depth: 20.5'
No groundwater encountered
No caving
Backfilled with cuttings and tamped
Penetration resistance for 140-lb hammer falling 30 inches by auto-hammer

Figure A-3,
Log of Boring B-3, Page 1 of 1

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-02

BORING B-4

ELEV. (MSL.) 1356 DATE COMPLETED 11/7/2012

EQUIPMENT CME 75 HSA BY: PDT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B4@0-5			SM	**COLLUVIUM (Qcol):** Silty SAND, dense, dry, reddish brown, fine to coarse, trace gravel, upper 1' disturbed			
2	B4@2.5				-becomes very dense, chattering, brownish red, well cemented, damp	50/3.5"	111.8	4.0
4								
6	B4@5-10 B4@5				-becomes moist	50/3"	117.4	7.6
8	B4@7.5				-becomes fine to medium grained, some coarse grained sand	50/3.5"		
10	B4@10				**GRANITIC BEDROCK (Kgdd):** Highly weathered, black, gray and white, fine to coarse grained, some clay, moist, micaceous -some olive very fine grained rock with clay	50/4"		
12	B4@12.5					50/4"		
14	B4@15					50/5"		
16								
18								
20	B4@20					50/3.5"		

Total depth: 20.25'
No groundwater encountered
No caving
Backfilled with cuttings and tamped
Penetration resistance for 140-lb hammer falling 30 inches by auto-hammer

Figure A-4,
Log of Boring B-4, Page 1 of 1

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-02

BORING B-5

ELEV. (MSL.) 1346 DATE COMPLETED 11/7/2012

EQUIPMENT CME 75 HSA BY: PDT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B5@0-5				**PAUBA SANDSTONE (Qps):** Silty SANDSTONE, very dense, dry, light brown, fine to coarse, trace fine gravel, micaceous, weakly cemented			
2	B5@2.5					50/5"		
4	B5@5				-Conglomerate layer, moist	50/3.5"		
6					**GRANITIC BEDROCK (Kgdd):** Completely weathered granitic rock, wet, light brown, fine to coarse, micaceous			
8	B5@7.5					50/4"		
10	B5@10				-becomes saturated	50/3"		
12	B5@12.5		▼			50/3"		
14	B5@15					50/2"		
16								
18					Moderately weathered, white, gray and pink, medium to coarse grained, micaceous			
20	B5@20				-no recovery	50/0.5"		

Total depth: 20'
Groundwater encountered at 13/5'
No caving
Backfilled with cuttings and tamped
Penetration resistance for 140-lb hammer falling 30 inches by auto-hammer

Figure A-5,
Log of Boring B-5, Page 1 of 1

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS
- SAMPLING UNSUCCESSFUL
- STANDARD PENETRATION TEST
- DRIVE SAMPLE (UNDISTURBED)
- DISTURBED OR BAG SAMPLE
- CHUNK SAMPLE
- WATER TABLE OR SEEPAGE

GEOCON

PROJECT NO. T2540-22-02

BORING B-6

ELEV. (MSL.) 1332 DATE COMPLETED 11/7/2012

EQUIPMENT CME 75 HSA BY: PDT

DEPTH IN FEET	SAMPLE NO.	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B6@0-5	SM	**YOUNG ALLUVIUM (Qal):** Silty SAND, medium dense, moist, black, fine to medium grained, some coarse grained sand, micaceous			
		CL	Sandy CLAY, very stiff, moist, fine to medium grained, micaceous			
2	B6@2.5			19	123.4	13.1
4						
	B6@5		-becomes hard	32	122.0	13.3
6						
8	B6@7.5		-becomes very stiff, dark grayish brown	20	121.3	15.0
10	B6@10	SW	SAND, loose, wet, gray, fine to coarse grained, micaceous, some silt	6	113.3	17.6
		CL	Sandy CLAY, soft, wet, dark brown, fine grained sand, some coarse sand			
12	B6@12.5			20	121.8	14.8
		SW	SAND, medium dense, wet, light brown, fine to coarse grained,			
14						
	B6@15			15	97.4	26.3
16			-cobbles and sandy gravel			
		CH	CLAY, stiff, moist, olive			
18			**PAUBA SANDSTONE (Qps):** Silty SANDSTONE, loose, brown with orange mottling, micaceous, weakly cemented			
20	B6@20			73		

Total depth: 21'
No groundwater encountered
No caving
Backfilled with cuttings and tamped
Penetration resistance for 140-lb hammer falling 30 inches by auto-hammer

Figure A-6,
Log of Boring B-6, Page 1 of 1

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	SAMPLING UNSUCCESSFUL	STANDARD PENETRATION TEST	DRIVE SAMPLE (UNDISTURBED)
	DISTURBED OR BAG SAMPLE	CHUNK SAMPLE	WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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PROJECT NO. T2540-22-02

BORING B-7

ELEV. (MSL.) 1320 DATE COMPLETED 11/7/2012

EQUIPMENT CME 75 HSA BY: PDT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B7@0-5				**PAUBA SANDSTONE (Qps):** Silty SANDSTONE, dense, damp, brown, fine to medium grained, trace coarse grained sand, weakly cemented, porous up to 1/8", rootlets			
2	B7@2.5					57	132.2	6.3
4	B7@5				-becomes olive brown, non porous	48	116.0	5.3
6								
8	B7@7.5				-becomes damp, light grayish brown, fine to coarse grained	69		
10	B7@10				-becomes reddish brown	50/5"		
12	B7@12.5					50/4"		
14	B7@15				Clayey SANDSTONE, medium dense, moist, reddish brown, fine to coarse grained, weakly cemented	45		
16					-becomes brown			
					-becomes reddish brown with orange mottling			
18								
20	B7@20					72		

Total depth: 21'
No groundwater encountered
No caving
Backfilled with cuttings and tamped
Penetration resistance for 140-lb hammer falling 30 inches by auto-hammer

Figure A-7,
Log of Boring B-7, Page 1 of 1

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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PROJECT NO. T2540-22-02

BORING B-8

ELEV. (MSL.) 1344 DATE COMPLETED 11/7/2012

EQUIPMENT CME 75 HSA BY: PDT

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0	B8@0-5				**PAUBA SANDSTONE (Qps):** Silty SANDSTONE, medium dense, dry, reddish brown, fine to medium grained, some coarse grained sand, micaceous, weakly cemented			
2	B8@2.5					55	123.7	3.0
4								
	B8@5-10				-becomes damp, trace fine gravel	64	128.2	4.3
6	B8@5							
8	B8@7.5				-becomes moist	63	122.0	5.9
10	B8@10				-becomes very dense	86		
12	B8@12.5				Clayey SANDSTONE, dense, moist, reddish brown, fine to coarse grained micaceous, weakly cemented	56		
14	B8@15				Sandy CLAYSTONE, hard, moist, reddish brown, fine to medium grained, weakly cemented	58		
16								
18					Clayey SANDSTONE, medium dense, moist, reddish brown, fine to medium grained, weakly cemented			
20	B8@20					47		

Total depth: 21'
No groundwater encountered
No caving
Backfilled with cuttings and tamped
Penetration resistance for 140-lb hammer falling 30 inches by auto-hammer

Figure A-8,
Log of Boring B-8, Page 1 of 1

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

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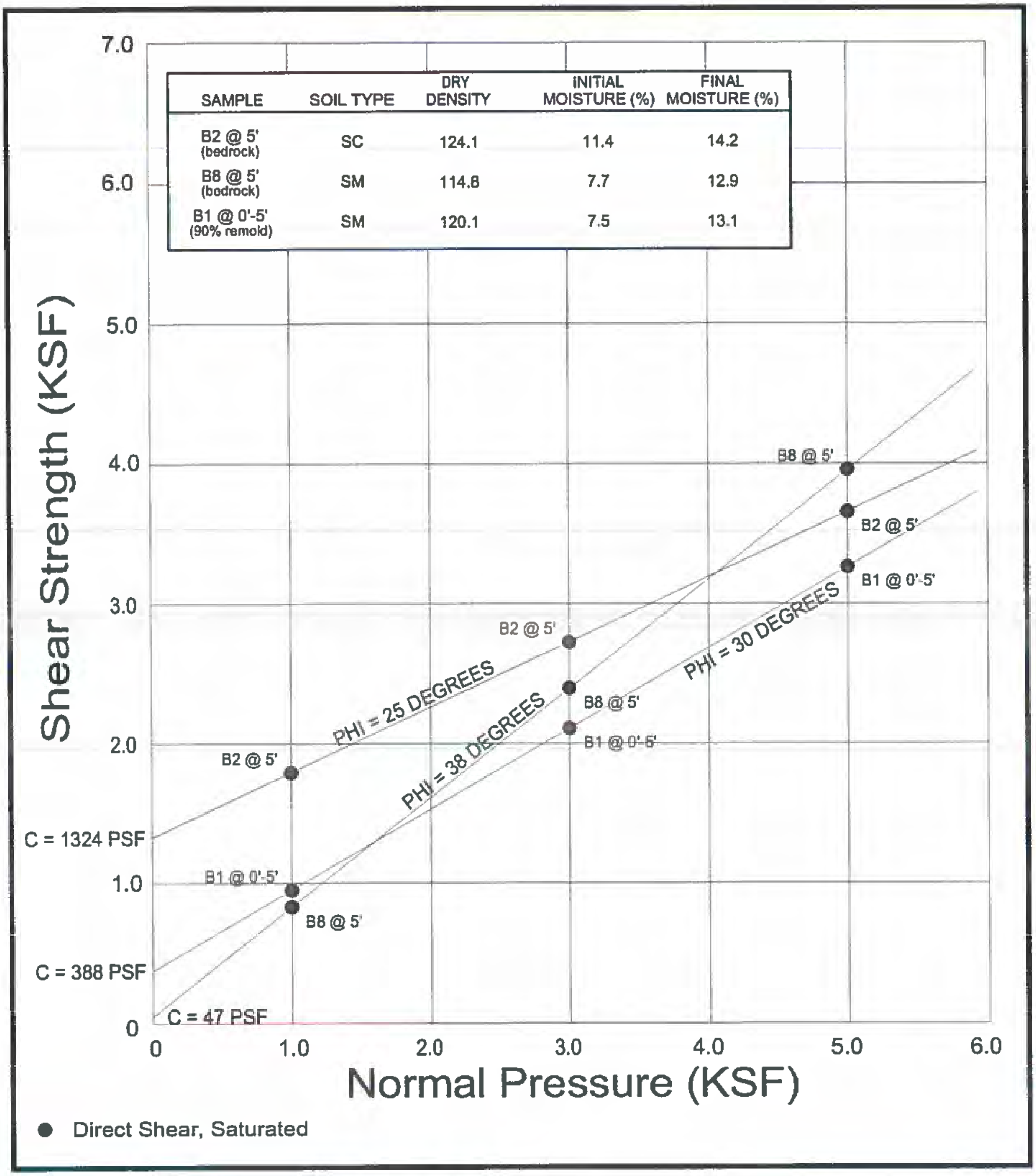
APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of ASTM International (ASTM), or other suggested procedures. Selected samples were tested for direct shear strength, compaction characteristics, expansion characteristics, corrosivity, in-place dry density and moisture content. The results of the laboratory tests are summarized in Figures B1 through B4. The in-place dry density and moisture content of the samples tested are presented on the boring logs, Appendix A.

SAMPLE	SOIL TYPE	DRY DENSITY	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2 @ 5' (bedrock)	SC	124.1	11.4	14.2
B8 @ 5' (bedrock)	SM	114.8	7.7	12.9
B1 @ 0'-5' (90% remold)	SM	120.1	7.5	13.1



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JL		2000

DIRECT SHEAR TEST RESULTS

TRACT 34301

NWC BAXTER ROAD AND I-15

WILDOMAR, CALIFORNIA

12 / 2012	PROJECT NO. T2540-22-02	FIG. B1

SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829-08A

Sample No.	Moisture Content (%)		Dry Density (pcf)	Expansion Index	*UBC Classification	**CBC Classification
	Before	After				
B6 @ 0'-5'	7.8	16.6	117.1	18	Very Low	Non-Expansive

* Reference: 1997 Uniform Building Code, Table 18-I-B.

** Reference: 2010 California Building Code, Section 1803.5.3

SUMMARY OF LABORATORY MAXIMUM DENSITY AND
AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557-12

Sample No.	Soil Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
B1 @ 0'-5'	Reddish Brown Silty Sand	133.0	8.0
B8 @ 0'-5'	Reddish Brown Silty Sand	133.5	8.0

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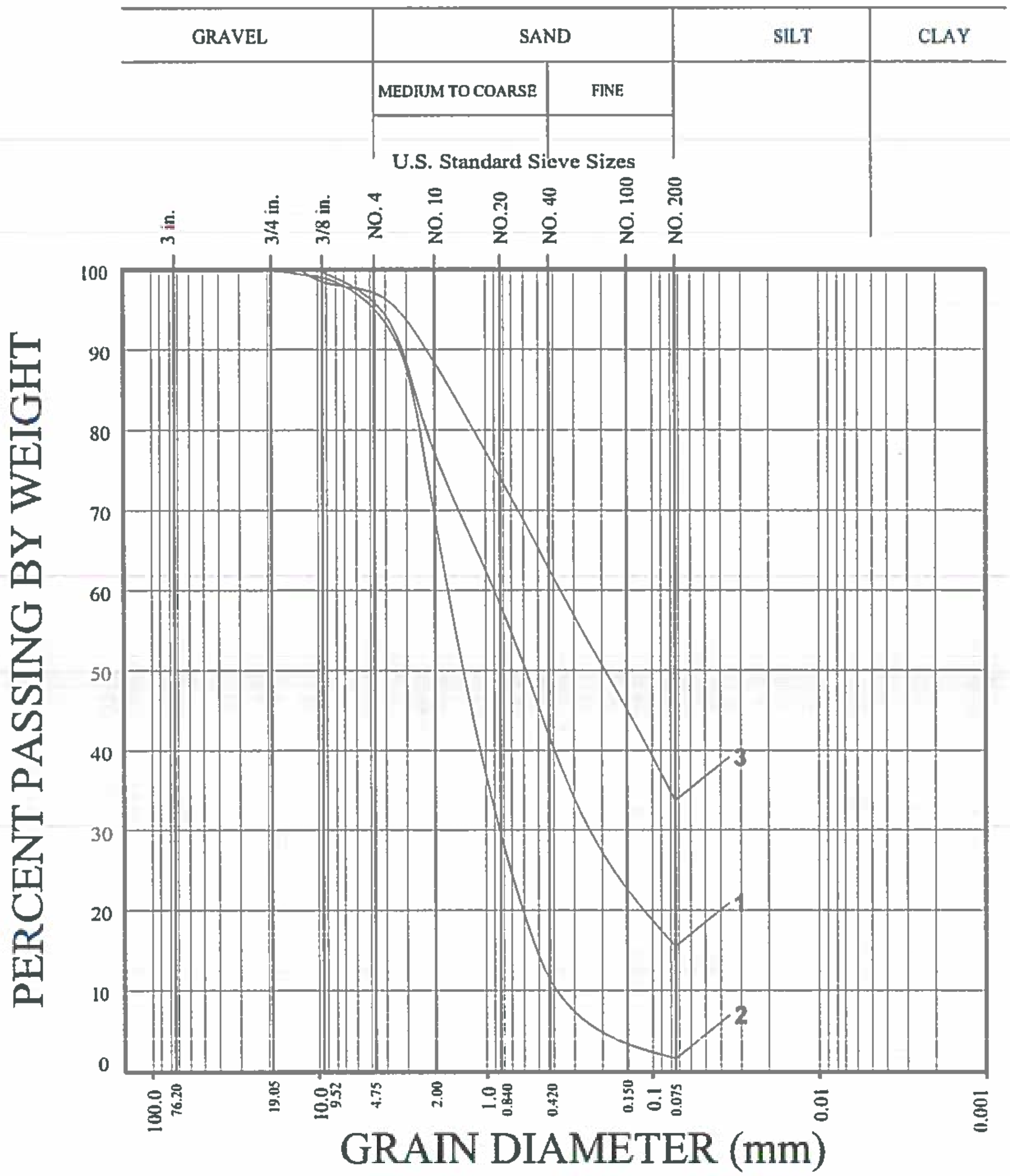
LABORATORY TEST RESULTS

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA



SAMPLE		UNIFIED SOIL CLASSIFICATION
1 -	B1 @ 20'	SC
2 -	B1 @ 25'	SP
3 -	B1 @ 30'	SM

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GRAIN SIZE DISTRIBUTION

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

JL		2000	12 / 2012	PROJECT NO. T2540-22-02	FIG. B3

SUMMARY OF LABORATORY POTENTIAL OF HYDROGEN (pH) AND RESISTIVITY TEST RESULTS CALIFORNIA TEST NO. 643

Sample No.	pH	Resistivity (ohm centimeters)
B5 @ 0'-5'	7.57	3600 (Corrosive)

SUMMARY OF LABORATORY CHLORIDE CONTENT TEST RESULTS AASHTO T291-94

Sample No.	Chloride Ion Content (%)
B5 @ 0'-5'	0.009

SUMMARY OF LABORATORY WATER SOLUBLE SULFATE TEST RESULTS CALIFORNIA TEST NO. 417

Sample No.	Water Soluble Sulfate (% SO_4)	Sulfate Exposure*
B5 @ 0'-5'	0.507	Severe

* Reference: 2010 California Building Code, Section 1904.3 and ACI 381 Section 4.3.

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JL		2000

CORROSIVITY TEST RESULTS

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

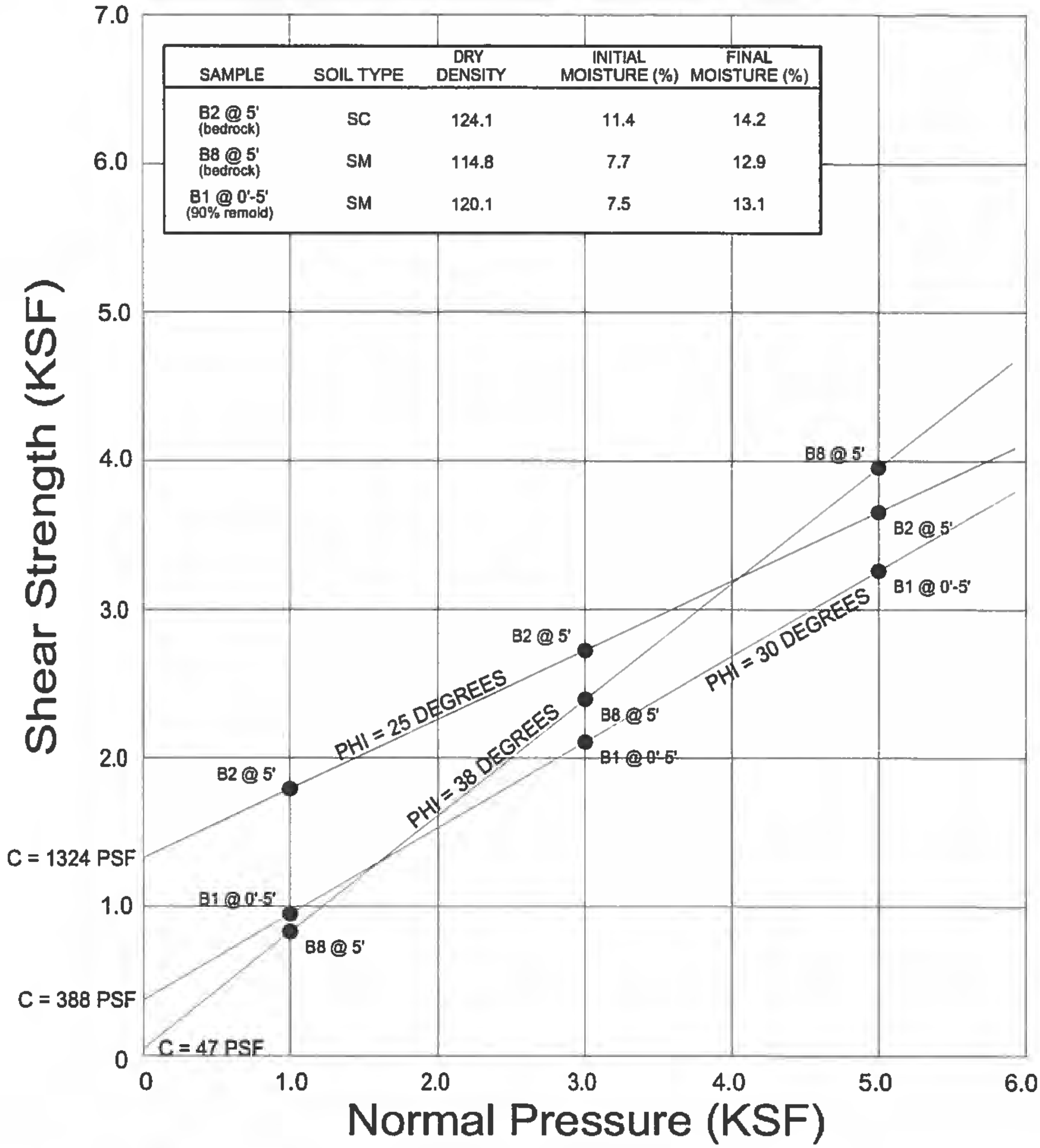
12 / 2012	PROJECT NO. T2540-22-02	FIG. B4

APPENDIX B

APPENDIX B

LABORATORY TESTING

Laboratory tests were performed in accordance with generally accepted test methods of ASTM International (ASTM), or other suggested procedures. Selected samples were tested for direct shear strength, compaction characteristics, expansion characteristics, corrosivity, in-place dry density and moisture content. The results of the laboratory tests are summarized in Figures B1 through B4. The in-place dry density and moisture content of the samples tested are presented on the boring logs, Appendix A.



SAMPLE	SOIL TYPE	DRY DENSITY	INITIAL MOISTURE (%)	FINAL MOISTURE (%)
B2 @ 5' (bedrock)	SC	124.1	11.4	14.2
B8 @ 5' (bedrock)	SM	114.8	7.7	12.9
B1 @ 0'-5' (90% remold)	SM	120.1	7.5	13.1

● Direct Shear, Saturated

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JL		2000

DIRECT SHEAR TEST RESULTS

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

12 / 2012	PROJECT NO. T2540-22-02	FIG. B1

SUMMARY OF LABORATORY EXPANSION INDEX TEST RESULTS
ASTM D 4829-08A

Sample No.	Moisture Content (%)		Dry Density (pcf)	Expansion Index	*UBC Classification	**CBC Classification
	Before	After				
B6 @ 0'-5'	7.8	16.6	117.1	18	Very Low	Non-Expansive

* Reference: 1997 Uniform Building Code, Table 18-I-B.

** Reference: 2010 California Building Code, Section 1803.5.3

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AND OPTIMUM MOISTURE CONTENT TEST RESULTS
ASTM D 1557-12

Sample No.	Soil Description	Maximum Dry Density (pcf)	Optimum Moisture (%)
B1 @ 0'-5'	Reddish Brown Silty Sand	133.0	8.0
B8 @ 0'-5'	Reddish Brown Silty Sand	133.5	8.0

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LABORATORY TEST RESULTS

TRACT 34301
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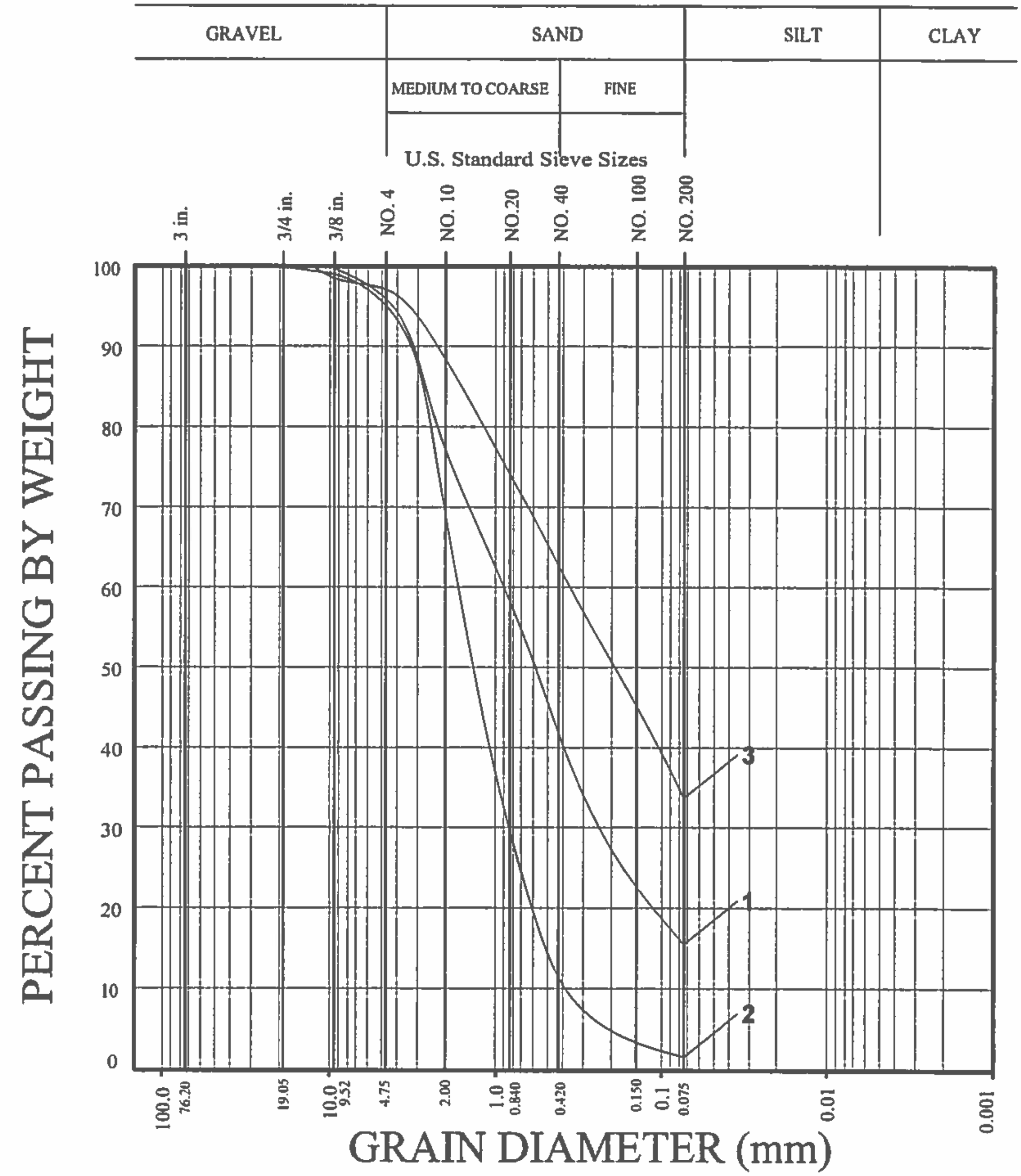
WILDOMAR, CALIFORNIA

12 / 2012	PROJECT NO. T2540-22-02	FIG. B2



SAMPLE		UNIFIED SOIL CLASSIFICATION
1 -	B1 @ 20'	SC
2 -	B1 @ 25'	SP
3 -	B1 @ 30'	SM

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GRAIN SIZE DISTRIBUTION

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

JL		2000	12 / 2012	PROJECT NO. T2540-22-02	FIG. B3

SUMMARY OF LABORATORY POTENTIAL OF HYDROGEN (pH) AND RESISTIVITY TEST RESULTS CALIFORNIA TEST NO. 643

Sample No.	pH	Resistivity (ohm centimeters)
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Sample No.	Chloride Ion Content (%)
B5 @ 0'-5'	0.009

SUMMARY OF LABORATORY WATER SOLUBLE SULFATE TEST RESULTS CALIFORNIA TEST NO. 417

Sample No.	Water Soluble Sulfate (% SO_4)	Sulfate Exposure*
B5 @ 0'-5'	0.507	Severe

* Reference: 2010 California Building Code, Section 1904.3 and ACI 381 Section 4.3.

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CORROSIVITY TEST RESULTS

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

JL		2000	12 / 2012	PROJECT NO. T2540-22-02	FIG. B4

APPENDIX D

APPENDIX D

FAULT RUPTURE HAZARD INVESTIGATION

GEOLOGIC REVIEW

The eastern portion of the site is located within a Riverside County Fault Hazard Zone established on either side of a previously mapped fault shown to traverse the eastern portion of the site (see Figure 2). The inferred (dashed line) fault location is based on prior studies by Kennedy (1977). The location and orientation of the fault suggests it may be a possible southerly extension of the Glen Ivy fault. The Glen Ivy fault is known to be active northwest of the site (Rockwell, McElwain, Millman and Lamar, 1986; Millman, and Rockwell, 1986; Lamar and Rockwell, 1986).

FAULT ACTIVITY CRITERIA

The criteria used in our investigation to evaluate fault activity are the same criteria used by the California Geological Survey (CGS) that defines an active fault one that has had surface displacement within Holocene time (about the last 11,000 years). These criteria for defining an active fault are based on standards developed by the CGS (Bryant and Hart, 2007) for the Alquist-Priolo Earthquake Fault Zoning Program. Faults that have not moved in the last 11,000 years are not considered active.

In general, the activity rating of a fault is determined by establishing the age of the youngest materials displaced by the fault. If datable material is present, an absolute age can sometimes be established; if no datable material exists, then only a relative age can be assigned to movement on the fault. For faults that have evidence of movement in the last 11,000 years, to be included in an Alquist-Priolo fault zone, these faults must demonstrate evidence of being "sufficiently active and well-defined".

As indicted in CGS Special Publication 42:

- A fault is deemed "sufficiently active" if there is evidence of Holocene surface displacement along one or more of its segments or branches. Holocene surface displacement may be directly observable or inferred and does not need to be present everywhere along a fault to qualify a fault for zoning.

- A fault is considered "well-defined" if its trace is clearly detectable by a trained geologist as a physical feature at or just below the ground surface. The fault may be identified by direct observation or by indirect methods. The critical consideration is that the fault or some part of it can be located in the field with sufficient precision and confidence to indicate that the required site-specific investigations would meet with some success.

LINEAMENT ANALYSIS

We performed an aerial photograph review to evaluate the location of mapped and unmapped fault traces that may be present at the site. Faults that cannot be observed in the field can often be identified by linear topographic expression or tonal lineaments observed on aerial photographs.

Aerial photographs obtained from Riverside County Flood Control and Water Conservation District and Continental Aerial Photo were reviewed. The photographs covered the years 1962 through 2010 and were at scales ranging from 1 inch equals 1,600 feet to 1 inch equals 2,000 feet, see References.

Lineaments observed on the aerial photographs were classified according to their development as strong, moderate or weak. A strong lineament is a well-defined feature, which can be continuously traced several hundred feet to a few thousand feet. A moderate lineament is less well defined, somewhat discontinuous and can be traced for only a few hundred feet. A weak lineament is discontinuous, poorly defined, and can be traced for a few hundred feet or less.

The lineament associated with the mapped fault by Kennedy (1977) was observed on the aerial photographs. Kennedy's mapped lineament trends N33W and is dashed indicating the fault is inferred but no direct physical evidence for its existence has been observed in the field at the location. We observed the same location and trend of the lineament as Kennedy (1977). The lineament is weak and is the only linear feature identified on the aerial photos to be present on or projecting toward the site. The lineament location coincided with what appeared to be a discontinuous break in slope across some planar ridgelines.

FIELD INVESTIGATION

A fault rupture hazard investigation was performed to determine the presence, location, and relative age of faults that may be present within the county-designated fault hazard zone at the site. Our investigation was performed in general accordance with the Alquist-Priolo Act of 1972, with the California Geological Survey (CGS) *Guidelines for Evaluating the Hazard of Surface Fault Rupture* (Note 49) and with *Guidelines for Evaluating and Mitigating Seismic Hazards in California* (CGS Special Publication 117A, 2008).

Our field investigation was performed October 23 through 30, 2012 and consisted of excavation of two fault trenches totaling 690 lineal feet. The trenches extended from the eastern property line toward the west-southwest and encompassed the limits of the Riverside County Fault Hazard Zone at the site. The trenches were excavated approximately perpendicular to the mapped fault trace shown on the county fault maps. The depth of the trenches ranged from 4 to 9 feet deep. Where necessary, the trenches were benched at an effective slope ratio of 1:1 (horizontal:vertical) to provide safe working conditions. We were looking for evidence of fault rupture which extended through the bedrock units and the overlying younger soils. Features such as through going fractures/ground cracks, faults, soft or disturbed zones, or abrupt changes in geologic units were examined and traced out to determine if they extended into overlying soils or extended into the bottom of the trench and were also present on the opposite trench wall. Where features were not present on the opposite trench wall, were underlain by continuous unbroken formation below the feature, or which were overlaid my unbroken colluvial soils the features were classified as fractures/ground cracks. The trench walls were scraped clean of smeared soils and a level line was strung to accurately depict the trench geometry. Soil and rock conditions encountered in the trench excavations were visually observed, classified and logged at a scale of 1 inch equals 5 feet in general accordance with California Geologc Survey (CGS) criteria by a Certified Engineering Geologist from our firm. The soil color was classified in accordance with the 2000 Munsel Soil Color Chart. Logs of the trenches are presented in this Appendix as Plates D1 and D2. Locations of the trenches are shown on the Geologic map and Site Plan, Figure 2. Trenches were backfilled with little compactive effort and should be re-excavated during grading and replaced with compacted fill.

SUMMARY OF FINDINGS

Fault Trench 1 (FT-1): FT-1 was excavated from the eastern property line toward the southwest to intercept the mapped lineament (fault) and to encompass the majority of the Riverside County Fault Hazard Zone. FT-1 was 450 feet long and ranged in depth from 5 to 9 feet below the existing ground surface. The trench excavation exposed granitic bedrock (granodiorite) overlain by colluvium and younger alluvium. The contacts between these units was distinct and generally dipped gently to the west and southwest. Granodiorite was observed in the trench between Stations 0+00 and 2+35. The granodiorite was highly weathered and exhibited abundant joints which trended generally east-west to nearly east-west and dipped steeply to the north and south. Colluvium was observed in the trench between Stations 0+00 and 3+45 overlying the granitic bedrock. The colluvium consists of clayey sand which is dark red-brown (5YR 3/3) with abundant carbonate stringers and nodules. Soil structure was observed to be columnar prismatic with clay developed on parting surfaces and weathering rinds around granitic grains. The alluvium consisted of silty sand which was dark brown (7.5 YR 3/3) loose to medium dense, porous, weakly to moderately blocky with some clay development on ped facies, and had weak horizontal bedding. The alluvium was observed to be continuous for the total length of the trench.

The geologic units observed in FT-1 were laterally continuous and there is no evidence which indicates faulting occurred within the geologic units exposed in the trench excavation.

Fault Trench 2 (FT-2): FT-2 was excavated approximately 162 feet north of FT-1 from FT-1 Station 3+35, southeastward for 240 feet to cover the remaining Riverside County Fault Hazard Zone. FT-2 was necessary to provide coverage in older geologic units due to the deepening alluvium within the southwestern portion of FT-1. FT-2 was 4 to 6 feet deep and exposed Pauba sandstone overlain by 6- to 12-inches of alluvium/topsoil. The excavation exposed locally massive Pauba sandstone consisting of brown (7.5 YR 4/4) dense silty sand. The overlying alluvial soils consisted of silty sand which is dark brown (7.5 YR 3/3) loose to medium dense, porous, weakly blocky, and weak horizontal bedding. Both units extended the entire length of the trench. Locally, fractures were observed within the Pauba but did not extend to the top of the unit. Where they could be traced across the trench, they trended nearly east-west, similar to the jointing underlying granitic bedrock. Some fractures could not be traced across the trench. There was no evidence of movement (slickensides, clay development, offset units) that would indicate faulting has occurred within the geologic units exposed on the site.

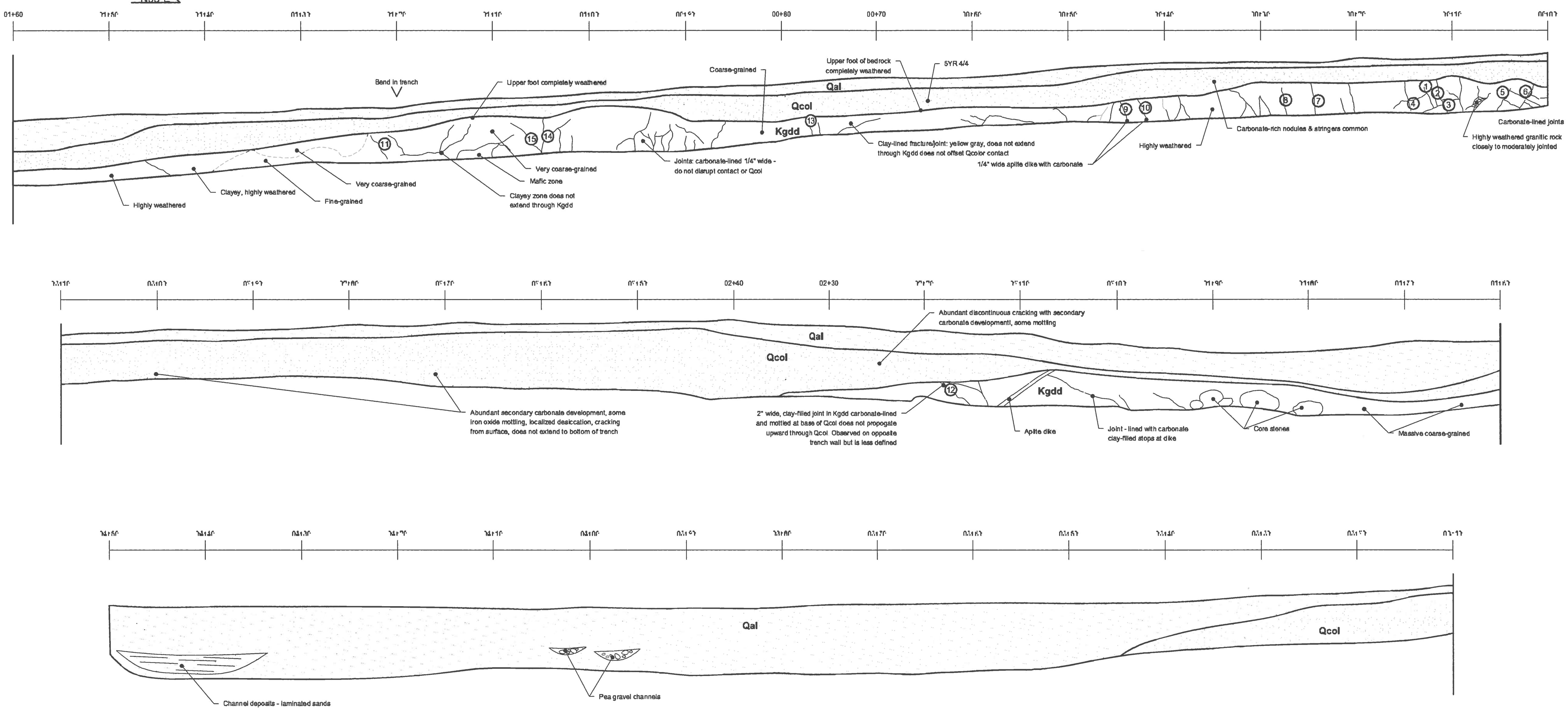
CONCLUSIONS

Based on the results of our investigation, we conclude that active faults are not present at the site. The contacts between geologic units are laterally continuous in the trench exposures and no evidence of offset or faulting was observed. If faults are present at depths below our explorations, these faults would not be considered active based on the minimum age of the sediments exposed at the base of the trench (Pleistocene age or older).

Based on our findings, no restrictions on future development of the site are necessary with respect to the hazard of surface fault rupture, beyond the standard seismic engineering requirements for all buildings in California.

FT-1

NORTHWEST WALL



1	Joint: EW, 84N	10	Joint: EW, V
2	Joint: EW, 81N	11	Joint: N80E, V
3	Joint: N80E, 83N	12	Joint: N80E, 60N
4	Joint: N3W, 76SE	13	Joint set: N79E, 82N N73W 33SW
5	Joint: N70W, 60SW	14	Joint: N85E, 87N
6	Joint: N73W, 64SW	15	Joint: N80E, 81N
7	Joint: N80E, 83S, carbonate filled		
8	Joint: EW, 86N		
9	Joint: N80E, 81N		

LEGEND

Qal	Alluvium - (topsoil in upper 6"-1') Silty Sand, loose to medium dense, dry, dark brown 7.5 YR 3/3 to dark yellow brown 10 YR 3/4, fine to coarse, some angular to subrounded gravel to 1/4" in diameter weakly developed horizontal bedding, porous, weak to moderate columnar structure with some clay development on ped facies
Qcol	Colluvium: Clayey Sand, dense, dry to moist, dark red brown 5 YR 3/3, abundant carbonate nodules and stringers, clay development on ped facies, well developed prismatic and columnar structure
Qps	Pauba Sandstone, dense, dry to moist, brown 7.5 YR 4/4, locally massive, coarse, slightly to moderately weathered, soft, unfractured
Kgdd	Granodiorite: Hard, moist, highly weathered complete weathering in upper foot is common, localized areas of fresh core stones, predominantly fine to medium grained with localized areas of coarse grained rock, occasionally cut by aplite dikes closely to moderately jointed
K	Krotovina (Animal Burrow)

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PHONE 951 304 2300 FAX 951 304 2392

JL		2000

TRENCH LOGS

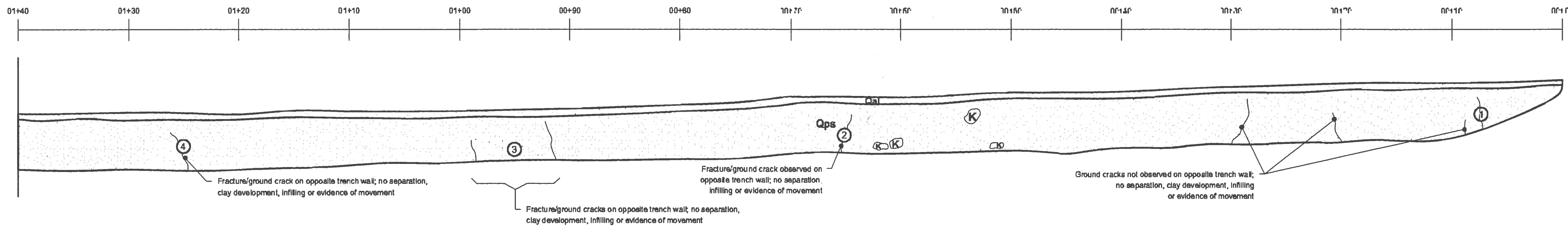
TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

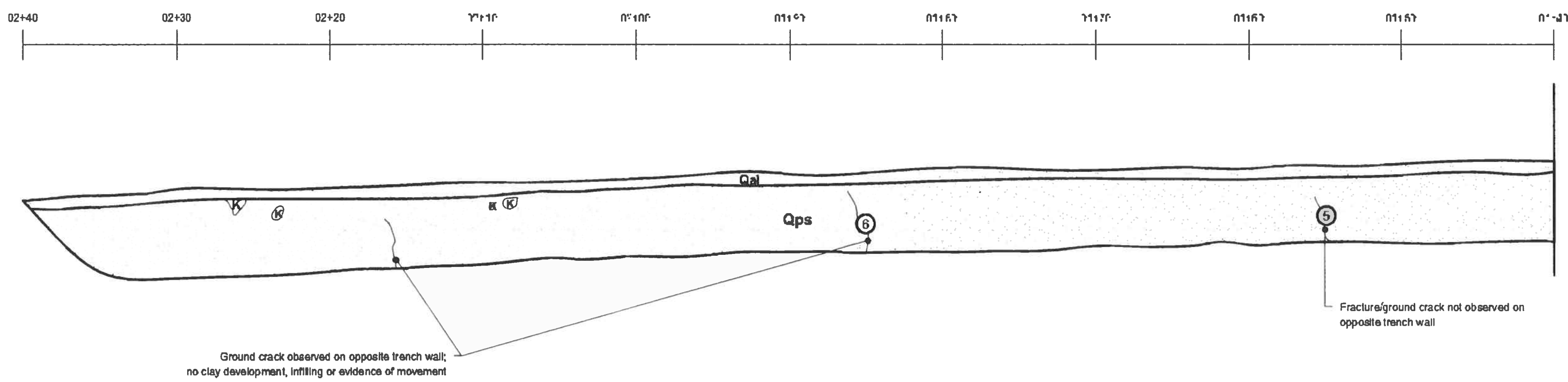
12 / 2012	PROJECT NO. T2540-22-02	PLATE 01

FT-2

N30°E

NORTHWEST WALL





1 fracture/ground crack: N80W, variable dip

2 fracture/ground crack: N80W, variable dip

3 fracture/ground cracks: N80W, variable dip

4 fracture/ground crack: N82W, variable dip

5 fracture/ground crack: N83W, variable dip

6 fracture/ground crack: N81W, variable dip

LEGEND

Qal	Alluvium - (topsoil in upper 6"-1') Silty Sand, loose to medium dense, dry, dark brown 7.5 YR 3/3 to dark yellow brown 10 YR 3/4, fine to coarse, some angular to subrounded gravel to 1/4" in diameter weakly developed horizontal bedding, porous, weak to moderate columnar structure with some clay development on ped facies
Qcol	Colluvium: Clayey Sand, dense, dry to moist, dark red brown 5 YR 3/3, abundant carbonate nodules and stringers, clay development on ped facies, well developed prismatic and columnar structure
Qps	Pauba Sandstone, dense, dry to moist, brown 7.5 YR 4/4, locally massive, coarse, slightly to moderately weathered, soft, unfractured
Kgdd	Granodiorite: Hard, moist, highly weathered complete weathering in upper foot is common, localized areas of fresh core stones, predominantly fine to medium grained with localized areas of coarse grained rock, occasionally cut by aplite dikes closely to moderately jointed
K	Krotovina (Animal Burrow)

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JL		2000

TRENCH LOGS

TRACT 34301
NWC BAXTER ROAD AND I-15
WILDOMAR, CALIFORNIA

12 / 2012	PROJECT NO. T2540-22-02	PLATE 02

Project No. T2540-22-03
November 26, 2019

Strata Equity Group
4370 La Jolla Village Drive, Suite 960
San Diego, California 92122

Attention: Mr. Eric Flodine

Subject: PERCOLATION TEST RESULTS
BAXTER CENTRAL
TRACT 34301
NWC BAXTER ROAD AND INTERSTATE 15
WILDOMAR, CALIFORNIA

References: 1. Michael Baker International, *Baxter Central Basin Sizing Minimum Requirements,* dated October 10, 2019.

2. Geocon West, Inc., *Preliminary Geotechnical and Fault Rupture Hazard Investigation Tract 34301 NWC Baxter Road and Interstate 15 Wildomar, California.*, revised March 26, 2015.

Dear Mr. Flodine:

In accordance with the authorization of our proposal IE-2491 dated October 28, 2019, Geocon West, Inc. (Geocon) herein submits the results of our percolation testing for proposed infiltration basins A, B, 1, 2, 3, and 4 associated with Tact 34301 in Wildomar, California (*Vicinity Map*, Figure 1). Percolation testing for the proposed infiltration basins was performed in accordance with the Riverside County Flood Control and Water Conservation District *Design Handbook for Low Impact Development Best Management Practices Appendix A-Infiltration Testing (Handbook).*

Field work included excavating 5 deep geotechnical borings and 14 percolation borings utilizing a CME 75 truck-mounted drill rig with an 8-inch diameter hollow stem auger on November 11 and 12, 2019. Percolation testing was performed on November 12 through 14. One deep geotechnical boring was excavated within each of the proposed basins, with the exception of Basin 1, where a previous boring (see Reference 2) was used. Percolation testing was performed 2 feet below the bottom of the proposed basins for Basins A, B, 1, and 3. Groundwater was encountered at an elevation of 1,339 and 1,334 feet above mean seal level for Basins 2 and 4, respectively. After consultation with the design team, percolation testing in Basins 2 and 4 was performed at approximately 10 feet above the encountered groundwater level.

Geologic units encountered during excavation include alluvium (Qal) and Pauba Formation (Qps). The alluvium consists of loose to medium dense, dry to damp, silty sand that varies in color from light yellow brown to brown. The Pauba Formation consists of medium dense to hard, dry to saturated, silty sandstone to sandy siltstone that are light reddish brown to dark brown. Minor amounts of olive claystone were also encountered.

The bottoms of the percolation test holes were covered with 2 inches of gravel. A 3-inch diameter perforated pipe fitted with a filter fabric sock was placed in the hole to mitigate potential caving. Additional gravel was placed around the annular space between the pipe and the boring wall to prevent the pipe from floating when water was added to the holes. The basin test holes were presoaked with 5 gallons of water. Locations of the percolation tests are shown on the *Percolation Test Location Map*, Figure 2, which used the Basin Sizing Minimum Requirements Plan (Reference 1) as a base. Boring logs are included as Figures 3 through 22, with Figure 22 being the previous geotechnical boring from Reference 2. Field data sheets for the percolation tests are included as Figures 23 through 36. Grain size analyses are included as Figures 37 through 50. Test results for the infiltration basins are provided in the table below. All test holes had a radius of 4 inches and were read every 30 mins. A safety factor of 3 is required per the Handbook.

INFILTRATION TEST RESULTS

Percolation Test Number	Proposed Basin	Depth (ft)	Change in head over time: ΔH (inches)	Average head: Havg (inches)	Percolation Rate (Min/inches)	Infiltration Rate: It (inches/hour)
P-1	3	15.0	0.4	49.6	83.3	0.03
P-2	3	11.0	1.6	36.9	19.2	0.16
P-3	1	14.0	0.1	63.9	250.0	0.01
P-4	1	10.0	4.4	39.4	6.8	0.43
P-5	1	11.0	1.3	35.9	22.7	0.29
P-6	B	12.0	0.4	40.5	83.3	0.03
P-7	B	11.0	0.5	31.0	62.5	0.06
P-8	2	8.0	1.8	27.9	16.7	0.24
P-9	2	2.0	0.1	16.1	250.0	0.08
P-10	4	4.0	0.0	34.6	*	*
P-11	4	7.0	0.1	47.2	250.0	0.02
P-12	A	20.0	0.0	66.0	*	*
P-13	A	21.0	1.2	74.2	25.0	0.06
P-14	A	22.0	0.8	31.6	35.7	0.10

**Indicates a rate slower than the accuracy required by the Handbook.*

Compaction of soils should not be performed at the bottom of the proposed infiltration systems, as this could impact the actual infiltration rate.

An on-going maintenance program for the infiltration systems should be implemented to remove silt build-up within the system, as the migration of silt particles into the system over time can reduce the effectiveness of the system.

Should you have any questions regarding this report, or if we may be of further service, please contact the undersigned at your convenience.

Very truly yours,

GEOCON WEST, INC.

Luke C. Weidman
Staff Geologist, GIT 891

Paul D. Theriault
CEG 2374

PROFESSIONAL GEOLOGIST
PAUL D. THERIAULT
No. 2374
CERTIFIED
ENGINEERING
GEOLOGIST
STATE OF CALIFORNIA

LIMITATIONS AND UNIFORMITY OF CONDITIONS

Attachments: Figure 1, Vicinity Map
Figure 2, Percolation Test Location Map
Figures 3 to 22, Boring Logs
Figures 23 to 36, Percolation Test Data
Figures 37 to 50, Grain Size Analyses

LIMITATIONS AND UNIFORMITY OF CONDITIONS

1. The recommendations of this report pertain only to the site investigated and are based upon the assumption that the soil conditions do not deviate from those disclosed in this and the referenced investigations. If any variations or undesirable conditions are encountered during construction, or if the proposed construction will differ from that anticipated herein, Geocon should be notified so that supplemental recommendations can be given. The evaluation or identification of the potential presence of hazardous materials was not part of the scope of services provided by Geocon.

2. This report is issued with the understanding that it is the responsibility of the owner, or of their representative, to ensure that the information and recommendations contained herein are brought to the attention of the architect and engineer for the project and incorporated into the plans, and the necessary steps are taken to see that the contractor and subcontractors carry out such recommendations in the field.

3. The findings of this report are valid as of the date of this report. However, changes in the conditions of a property can occur with the passage of time, whether they are due to natural processes or the works of man on this or adjacent properties. In addition, changes in applicable or appropriate standards may occur, whether they result from legislation or the broadening of knowledge. Accordingly, the findings of this report may be invalidated wholly or partially by changes outside our control. Therefore, this report is subject to review and should not be relied upon after a period of three years.

4. The firm that performed the geotechnical investigation for the project should be retained to provide testing and observation services during construction to provide continuity of geotechnical interpretation and to check that the recommendations presented for geotechnical aspects of site development are incorporated during site grading, construction of improvements, and excavation of foundations. If another geotechnical firm is selected to perform the testing and observation services during construction operations, that firm should prepare a letter indicating their intent to assume the responsibilities of project geotechnical engineer of record. A copy of the letter should be provided to the regulatory agency for their records. In addition, that firm should provide revised recommendations concerning the geotechnical aspects of the proposed development, or a written acknowledgement of their concurrence with the recommendations presented in our report. They should also perform additional analyses deemed necessary to assume the role of Geotechnical Engineer of Record.

0' 1500' 3000'

N

SOURCE: Google Earth, 2019

VICINITY MAP

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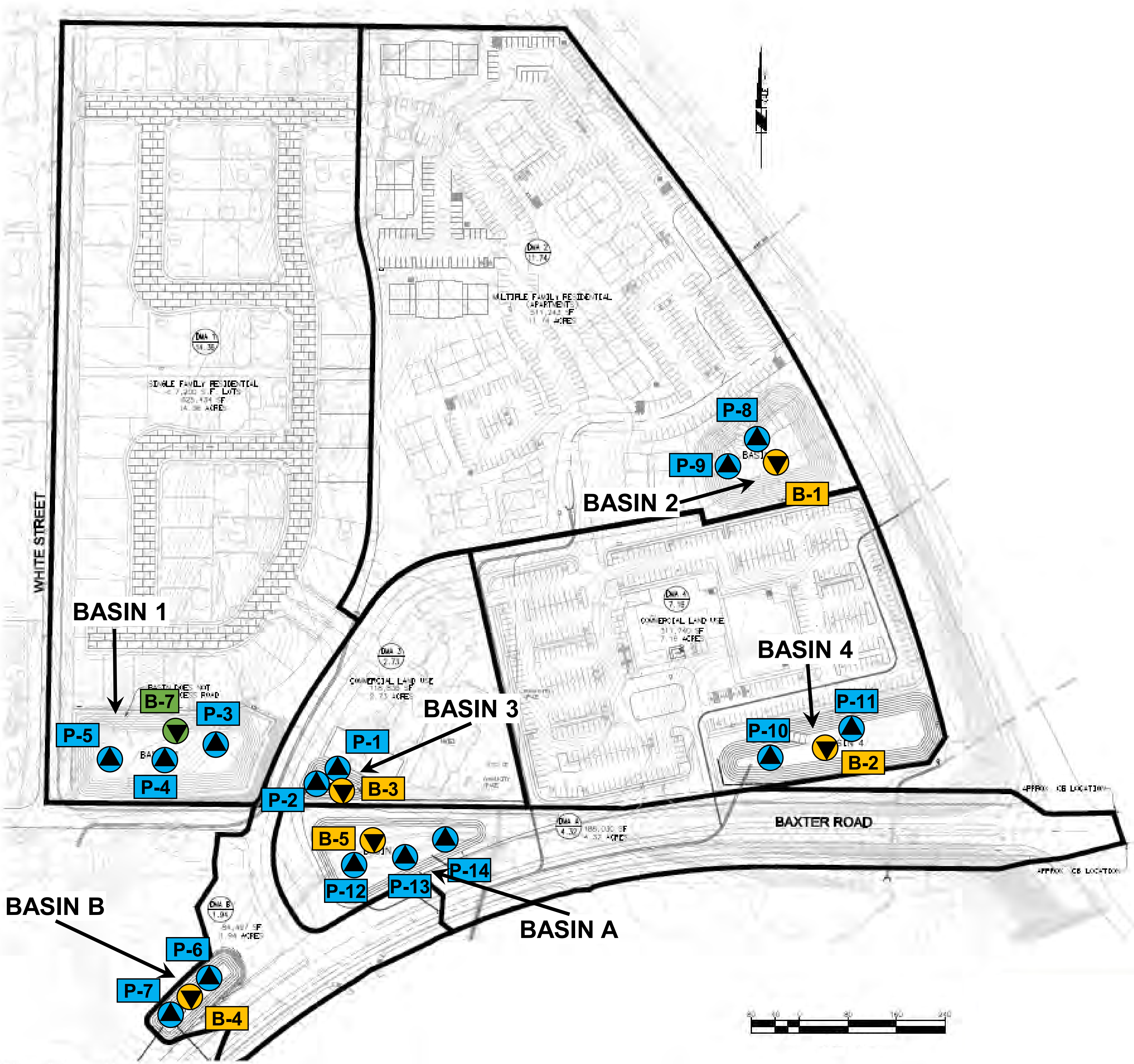
BAXTER CENTRAL
TRACT 34301
NWC BAXTER ROAD AND INTERSTATE 15
WILDOMAR, CALIFORNIA

LCW			NOVEMBER 2019	PROJECT NO. T2540-22-03	FIG. 1



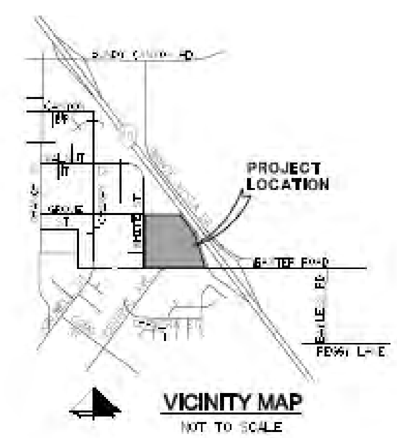
GEOCON LEGEND

Locations are approximate

P-14 …. PERCOLATION TEST LOCATION, THIS REPORT

B-5 …. GEOTECHNICAL BORING LOCATION, THIS REPORT

B-7 …. GEOTECHNICAL BORING LOCATION, GEOCON, 2015



Source: Michael Baker International, *Baxter Central*, October 3, 2019.

GEOCON WEST, INC. GEOTECHNICAL, ENVIRONMENTAL, MATERIALS 41571 CORNING PLACE #101, MURRIETA, CALIFORNIA 92562 PHONE 951-304-2300 FAX 951-304-2392			PERCOLATION TEST LOCATION MAP BAXTER CENTRAL TRACT 34301 NWC BAXTER ROAD AND INTERSTATE 15 WILDOMAR, CALIFORNIA		
LCW			NOVEMBER 2019	PROJECT NO. T2540-22-03	FIG. 2

PROJECT NO. T2540-22-03

BORING B-1

ELEV. (MSL.) **1355** DATE COMPLETED **11/11/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, brown; fine to coarse sand, upper foot plowed.			
2				SC	Clayey SAND, damp, reddish brown; fine to coarse sand			
4				SM	Silty SAND, moist, yellowish brown; fine to medium sand			
6					-Becomes reddish brown; fine to coarse sand			
8					- Becomes olive; fine to medium sand; some coarse sand			
10				SC	Clayey SAND, olive; fine to medium sand			
12				SM	Silty SAND, olive; fine to coarse sand; some gravel; slow advance. H2O added to extract cuttings.			
14								
16			▼					
18				CL	Sandy CLAY, moist, olive; fine to medium sand			
20								
22					- Some gravel			
24				SC	Clayey SAND with gravel, moist, olive; fine to coarse sand			
26								
28								

Figure 3,
Log of Boring B-1, Page 1 of 2

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

GEOCON

BORING B-1

ELEV. (MSL.) **1355** DATE COMPLETED **11/11/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
30								
32								
34								
36								
					Total Depth = 37' Groundwater encountered at elevation 1339 Backfilled with cuttings 11/11/2019			

Figure 3,
Log of Boring B-1, Page 2 of 2

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	☐ ... SAMPLING UNSUCCESSFUL	◧ ... STANDARD PENETRATION TEST	■ ... DRIVE SAMPLE (UNDISTURBED)
	⊠ ... DISTURBED OR BAG SAMPLE	◪ ... CHUNK SAMPLE	▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-03

BORING B-2

ELEV. (MSL.) **1348** DATE COMPLETED **11/11/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, yellowish brown; fine to coarse sand, some gravel, upper foot plowed.			
2								
4								
6								
8					- Becomes moist			
10					- Slow advance			
12					- Some clay			
14			▼					
16								
18								
20								
22				SM	Silty SAND with fine gravel, light brown			
24								
26								
28				GS	Sandy GRAVEL; ~90% gravel, fine to medium sand; some silt			

Figure 4,
Log of Boring B-2, Page 1 of 2

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS
- ☐ ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ▼ ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-03

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B-2 ELEV. (MSL.) 1348 DATE COMPLETED 11/11/19 EQUIPMENT CME 75 4x4 BY: Theriault	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
					Total Depth = 30' Groundwater encountered at elevation 1334 Backfilled with cuttings 11/11/2019			

Figure 4,
Log of Boring B-2, Page 2 of 2

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-03

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	**BORING B-3** ELEV. (MSL.) **1331** DATE COMPLETED **11/11/19** EQUIPMENT **CME 75 4x4** BY: **Theriault**	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, reddish brown; fine to coarse sand, upper foot plowed.			
2								
4								
6								
8								
10					- Becomes moist; strong brown; slow advance			
12								
14				SC	Clayey SAND, moist, reddish brown; fine to coarse sand			
16								
18								
20								
22								
24								
					Total Depth = 25' Groundwater not encountered Backfilled with cuttings 11/11/2019			

Figure 5,
Log of Boring B-3, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B-4 ELEV. (MSL.) 1323 DATE COMPLETED 11/11/19 EQUIPMENT CME 75 4x4 BY: Theriault	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, dark reddish brown; fine to medium sand; some coarse sand.			
2								
4								
6					-Becomes damp			
8								
10								
12								
14								
16				CL	Sandy CLAY hard, olive moist; fine to coarse sand			
18								
20								
22					Total Depth = 22' Groundwater not encountered Backfilled with cuttings 11/11/2019			

Figure 6,
Log of Boring B-4, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... DISTURBED OR BAG SAMPLE
- ... STANDARD PENETRATION TEST
- ... CHUNK SAMPLE
- ... DRIVE SAMPLE (UNDISTURBED)
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-03

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B-5 ELEV. (MSL.) 1331 DATE COMPLETED 11/12/19 EQUIPMENT CME 75 4x4 BY: Battiato	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Silty SAND, medium dense, dry, light brown; fine to coarse sand			
4				SM	**PAUBA FORMATION (Qps)** Silty SAND, dense, damp, light brown; coarse sand. -Slow advance			
8					- Becomes reddish brown; increase in coarse sand			
18				ML	SILT, hard, damp, yellowish brown; difficulty drilling			

Figure 7,
Log of Boring B-5, Page 1 of 2

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B-5 ELEV. (MSL.) 1331 DATE COMPLETED 11/12/19 EQUIPMENT CME 75 4x4 BY: Battiato	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
30								
32					Total Depth = 32' Groundwater not encountered Backfilled with cuttings 11/12/2019			

Figure 7,
Log of Boring B-5, Page 2 of 2

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-03

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING P-1 ELEV. (MSL.) 1331 DATE COMPLETED 11/11/19 EQUIPMENT CME 75 4x4 BY: Theriault	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, reddish brown; fine to medium sand; some coarse sand; trace gravel.			
2								
4								
6					-Becomes damp			
8					- Becomes strong brown; moist			
10								
12								
14	P1@14-15'							
					Total Depth = 15' Groundwater not encountered Backfilled with cuttings 11/12/2019			

Figure 8,
Log of Boring P-1, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

BORING P-2

ELEV. (MSL.) **1331** DATE COMPLETED **11/11/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, reddish brown; fine to medium sand; some coarse sand; trace gravel.			
2								
4								
6					-Becomes damp			
8								
10	P-2@10-11							
					Total Depth = 11' Groundwater not encountered Backfilled with cuttings 11/12/2019			

Figure 9,
Log of Boring P-2, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

BORING P-3

ELEV. (MSL.) 1325 DATE COMPLETED 11/11/19

EQUIPMENT CME 75 4x4 BY: Theriault

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM (Qal)** Silty SAND, loose, dry, brown; fine to coarse sand			
4				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, damp, reddish brown; fine to medium sand; some coarse sand.			
8					-Becomes moist; some clay			
14	P3@14-15'							

Total Depth =15'
Groundwater not encountered
Backfilled with cuttings 11/12/2019

Figure 10,
Log of Boring P-3, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-03

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING P-4 ELEV. (MSL.) 1320 DATE COMPLETED 11/11/19 EQUIPMENT CME 75 4x4 BY: Theriault	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**ALLUVIUM (Qal)** Silty SAND, loose, dry, brown; fine to coarse sand			
2								
4								
6				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, damp, reddish brown; fine to medium sand; some coarse sand, trace gravel.			
8								
	P-4@9-10							
10					Total Depth =10' Groundwater not encountered Backfilled with cuttings 11/12/2019			

Figure 11,
Log of Boring P-4, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-03

BORING P-5

ELEV. (MSL.) **1318** DATE COMPLETED **11/11/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM (Qal)** Silty SAND, loose, dry, brown; fine to coarse sand			
2								
4								
6					-Becomes damp			
8				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, moist, dark brown; fine to medium sand; some coarse sand; few gravel.			
10	P-5@10-11							
					Total Depth =11' Groundwater not encountered Backfilled with cuttings 11/12/2019			

Figure 12,
Log of Boring P-5, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-03

BORING P-6

ELEV. (MSL.) **1325** DATE COMPLETED **11/11/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, moist, dark brown; fine to medium sand; some coarse sand.			
2								
4								
6					-Becomes damp			
8								
10								
	P-6@11-12				-Few gravel			
12					Total Depth =12' Groundwater not encountered Backfilled with cuttings 11/12/2019			

Figure 13,
Log of Boring P-6, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS

- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

BORING P-7

ELEV. (MSL.) **1322** DATE COMPLETED **11/11/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, dark reddish brown; fine to coarse sand.			
2								
4								
6								
8					-Becomes moist			
					-Trace gravel			
10	P-7@10-11							
					Total Depth =11' Groundwater not encountered Backfilled with cuttings 11/12/2019			

Figure 14,
Log of Boring P-7, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

BORING P-8

ELEV. (MSL.) **1355** DATE COMPLETED **11/12/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, light reddish brown; fine to medium sand; trace coarse sand			
2								
4					-Becomes damp -Becomes dark yellowish brown; fine to coarse sand; trace gravel and cobble			
6								
8	P-9@7-8							

Total Depth =8'
Groundwater not encountered
Backfilled with cuttings 11/13/2019

Figure 15,
Log of Boring P-8, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

PROJECT NO. T2540-22-03

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING P-9 ELEV. (MSL.) 1351 DATE COMPLETED 11/12/19 EQUIPMENT CME 75 4x4 BY: Theriault	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**PAUBA FORMATION (Qps)**			
	P-10@1-2				Silty SAND, medium dense, dry, light reddish brown; fine to medium sand; some coarse sand; trace gravel	–		
2					Total Depth =2' Groundwater not encountered Backfilled with cuttings 11/13/2019			

Figure 16,
Log of Boring P-9, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING P-10 ELEV. (MSL.) 1347 DATE COMPLETED 11/12/19 EQUIPMENT CME 75 4x4 BY: Theriault	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, light reddish brown; fine to medium sand; some coarse sand; trace gravel			
2								
4	P-11@3-4							
					Total Depth =4' Groundwater not encountered Backfilled with cuttings 11/13/2019			

Figure 17,
Log of Boring P-10, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

BORING P-11

ELEV. (MSL.) **1350** DATE COMPLETED **11/12/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, medium dense, dry, reddish brown; fine to coarse sand			
2								
4					-Becomes damp			
6	P-12@6-7				-Trace gravel			
					Total Depth =7' Groundwater not encountered Backfilled with cuttings 11/13/2019			

Figure 18,
Log of Boring P-11, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS
- ... SAMPLING UNSUCCESSFUL
- ... STANDARD PENETRATION TEST
- ... DRIVE SAMPLE (UNDISTURBED)
- ... DISTURBED OR BAG SAMPLE
- ... CHUNK SAMPLE
- ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING P-12 ELEV. (MSL.) 1329 DATE COMPLETED 11/12/19 EQUIPMENT CME 75 4x4 BY: Battiato	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, loose to medium dense, dry, light yellowish brown; fine to coarse sand			
2								
4								
6								
8					-Becomes light reddish brown			
10								
12								
14								
16								
18								
20	P-14@20				-Trace gravel			
					Total Depth =21.5' Groundwater not encountered Backfilled with cuttings 11/14/2019			

Figure 19,
Log of Boring P-12, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

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PROJECT NO. T2540-22-03

BORING P-13

ELEV. (MSL.) **1330** DATE COMPLETED **11/12/19**

EQUIPMENT **CME 75 4x4** BY: **Battiato**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**ALLUVIUM (Qal)** Silty SAND, loose, dry, light yellow brown; fine to coarse sand			
2								
4				SM	**PAUBA FORMATION (Qps)** Silty SAND, loose, dry, brown; fine to coarse sand			
6								
8								
10								
12								
14								
16								
18					- Becomes dark brown			
20								
22	P-15@21				-Becomes very dense; moist reddish brown with mottling; trace gravel			
					Total Depth =22.5' Groundwater not encountered Backfilled with cuttings 11/14/2019			

Figure 20,
Log of Boring P-13, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS

... SAMPLING UNSUCCESSFUL ... STANDARD PENETRATION TEST ... DRIVE SAMPLE (UNDISTURBED)

... DISTURBED OR BAG SAMPLE ... CHUNK SAMPLE ... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-03

BORING P-14

ELEV. (MSL.) **1330** DATE COMPLETED **11/12/19**

EQUIPMENT **CME 75 4x4** BY: **Theriault**

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	MATERIAL DESCRIPTION	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
0				SM	**PAUBA FORMATION (Qps)** Silty SAND, loose, dry, brown; fine to coarse sand			
2								
4								
6					-Becomes damp; medium dense			
8								
10								
12								
14					-Becomes dense; slow advance			
16								
18								
20					-Becomes olive brown; trace gravel			
	P-15@21							
22					Total Depth =22' Groundwater not encountered Backfilled with cuttings 11/14/2019			

Figure 21, Log of Boring P-14, Page 1 of 1

T2540-22-03 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PROJECT NO. T2540-22-02

DEPTH IN FEET	SAMPLE NO.	LITHOLOGY	GROUNDWATER	SOIL CLASS (USCS)	BORING B-7 ELEV. (MSL.) 1320 DATE COMPLETED 11/7/2012 EQUIPMENT CME 75 HSA BY: PDT	PENETRATION RESISTANCE (BLOWS/FT.)	DRY DENSITY (P.C.F.)	MOISTURE CONTENT (%)
					MATERIAL DESCRIPTION			
0	B7@0-5				**PAUBA SANDSTONE (Qps):** Silty SANDSTONE, dense, damp, brown, fine to medium grained, trace coarse grained sand, weakly cemented, porous up to 1/8", rootlets			
2	B7@2.5					57	132.2	6.3
4	B7@5				-becomes olive brown, non porous	48	116.0	5.3
6								
8	B7@7.5				-becomes damp, light grayish brown, fine to coarse grained	69		
10	B7@10				-becomes reddish brown	50/5"		
12	B7@12.5					50/4"		
14					Clayey SANDSTONE, medium dense, moist, reddish brown, fine to coarse grained, weakly cemented			
	B7@15					45		
16					-becomes brown			
					-becomes reddish brown with orange mottling			
18								
20	B7@20					72		
					Total depth: 21' No groundwater encountered No caving Backfilled with cuttings and tamped Penetration resistance for 140-lb hammer falling 30 inches by auto-hammer			

Figure 22,
Log of Boring B-7, Page 1 of 1

T2540-22-02 BORING LOGS.GPJ

SAMPLE SYMBOLS			
	... SAMPLING UNSUCCESSFUL	... STANDARD PENETRATION TEST	... DRIVE SAMPLE (UNDISTURBED)
	... DISTURBED OR BAG SAMPLE	... CHUNK SAMPLE	... WATER TABLE OR SEEPAGE

NOTE: THE LOG OF SUBSURFACE CONDITIONS SHOWN HEREON APPLIES ONLY AT THE SPECIFIC BORING OR TRENCH LOCATION AND AT THE DATE INDICATED. IT IS NOT WARRANTED TO BE REPRESENTATIVE OF SUBSURFACE CONDITIONS AT OTHER LOCATIONS AND TIMES.

GEOCON

PERCOLATION TEST REPORT

Project Name:	Baxter and Central	**Project No.:**	T2540-22-03
Test Hole No.:	P-1	**Date Excavated:**	11/11/2019
Length of Test Pipe:	180.0 inches	**Soil Classification:**	SM
Height of Pipe above Ground:	9.6 inches	**Presoak Date:**	11/11/2019
Depth of Test Hole:	170.4 inches	**Perc Test Date:**	11/12/2019
Check for Sandy Soil Criteria Tested by:	Weidman	**Percolation Tested by:**	Weldman

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:28 AM 9:53 AM	25	25	46.1	45.1	1.0	26.0
2	9:53 AM 10:18 AM	25	50	45.1	44.6	0.5	52.1

Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:18 AM 10:48 AM	30	30	54.2	53.5	0.7	41.7
2	10:48 AM 11:18 AM	30	60	53.5	53.0	0.5	62.5
3	11:18 AM 11:48 AM	30	90	53.0	52.6	0.5	62.5
4	11:48 AM 12:18 PM	30	120	52.6	52.1	0.5	62.5
5	12:18 PM 12:48 PM	30	150	52.1	51.6	0.5	62.5
6	12:48 PM 1:18 PM	30	180	51.6	51.5	0.1	250.0
7	1:18 PM 1:48 PM	30	210	51.5	51.0	0.5	62.5
8	1:48 PM 2:18 PM	30	240	51.0	50.8	0.2	125.0
9	2:18 PM 2:48 PM	30	270	50.8	50.4	0.4	83.3
10	2:48 PM 3:18 PM	30	300	50.4	50.2	0.2	125.0
11	3:18 PM 3:48 PM	30	330	50.2	49.8	0.4	83.3
12	3:48 PM 4:18 PM	30	360	49.8	49.4	0.4	83.3

Infiltration Rate (in/hr):	0.03
Radius of test hole (in):	4
Average Head (in):	49.6

Figure 23

PERCOLATION TEST REPORT

Project Name:	Baxter and Central	**Project No.:**	T2540-22-03
Test Hole No.:	P-2	**Date Excavated:**	11/11/2019
Length of Test Pipe:	134.6 inches	**Soil Classification:**	SM
Height of Pipe above Ground:	7.2 inches	**Presoak Date:**	11/11/2019
Depth of Test Hole:	127.4 inches	**Perc Test Date:**	11/12/2019
Check for Sandy Soil Criteria Tested by:	Weidman	**Percolation Tested by:**	Weidman

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:28 AM 9:53 AM	25	25	37.2	35.2	2.0	12.3
2	9:53 AM 10:18 AM	25	50	35.2	34.1	1.1	23.1

Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:18 AM 10:48 AM	30	30	41.3	40.1	1.2	25.0
2	10:48 AM 11:18 AM	30	60	40.1	39.2	0.8	35.7
3	11:18 AM 11:48 AM	30	90	39.2	38.0	1.2	25.0
4	11:48 AM 12:18 PM	30	120	38.0	35.2	2.9	10.4
5	12:18 PM 12:48 PM	30	150	35.2	31.7	3.5	8.6
6	12:48 PM 1:18 PM	30	180	31.7	29.4	2.3	13.2
7	1:18 PM 1:48 PM	30	210	29.4	26.9	2.5	11.9
8	1:48 PM 2:18 PM	30	240	26.9	26.5	0.4	83.3
9	2:18 PM 2:48 PM	30	270	40.9	39.8	1.1	27.8
10	2:48 PM 3:18 PM	30	300	39.8	38.8	1.1	27.8
11	3:18 PM 3:48 PM	30	330	38.8	37.7	1.1	27.8
12	3:48 PM 4:18 PM	30	360	37.7	36.1	1.6	19.2

Infiltration Rate (in/hr):	0.16
Radius of test hole (in):	4
Average Head (in):	36.9

Figure 24

PERCOLATION TEST REPORT							
Project Name:		Baxter and Central			**Project No.:**		T2540-22-03
Test Hole No.:		P-3			**Date Excavated:**		11/11/2019
Length of Test Pipe:			166.6	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			6.0	inches	**Presoak Date:**		11/11/2019
Depth of Test Hole:			160.6	inches	**Perc Test Date:**		11/12/2019
Check for Sandy Soil Criteria Tested by:				Weidman	**Percolation Tested by:**		Weidman
Water level measured from BOTTOM of hole							
Sandy Soil Criteria Test							
Trial No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Level (in)**	**Final Water Level (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	9:32 AM 9:57 AM	25	25	61.1	60.6	0.5	52.1
2	9:57 AM 10:22 AM	25	50	60.6	60.4	0.2	104.2
		Soil Criteria: Normal					
Percolation Test							
Reading No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Head (in)**	**Final Water Head (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	10:22 AM 10:52 AM	30	30	66.4	66.0	0.4	83.3
2	10:52 AM 11:22 AM	30	60	66.0	65.8	0.2	125.0
3	11:22 AM 11:52 AM	30	90	65.8	65.6	0.1	250.0
4	11:52 AM 12:22 PM	30	120	65.6	65.3	0.4	83.3
5	12:22 PM 12:52 PM	30	150	65.3	65.2	0.1	250.0
6	12:52 PM 1:22 PM	30	180	65.2	64.9	0.2	125.0
7	1:22 PM 1:52 PM	30	210	64.9	64.8	0.1	250.0
8	1:52 PM 2:22 PM	30	240	64.8	64.7	0.1	250.0
9	2:22 PM 2:52 PM	30	270	64.7	64.4	0.2	125.0
10	2:52 PM 3:22 PM	30	300	64.4	64.2	0.2	125.0
11	3:22 PM 3:52 PM	30	330	64.2	64.0	0.2	125.0
12	3:52 PM 4:22 PM	30	360	64.0	63.8	0.1	250.0
Infiltration Rate (in/hr):			0.01				
Radius of test hole (in):			4				**Figure 25**
Average Head (in):			63.9				

PERCOLATION TEST REPORT							
Project Name:		Baxter and Central			**Project No.:**		T2540-22-03
Test Hole No.:		P-4			**Date Excavated:**		11/11/2019
Length of Test Pipe:			122.2	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			6.0	inches	**Presoak Date:**		11/11/2019
Depth of Test Hole:			116.2	inches	**Perc Test Date:**		11/12/2019
Check for Sandy Soil Criteria Tested by:				Weidman	**Percolation Tested by:**		Weidman
Water level measured from BOTTOM of hole							
Sandy Soil Criteria Test							
Trial No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Level (in)**	**Final Water Level (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	9:33 AM 9:58 AM	25	25	34.8	33.0	1.8	13.9
2	9:58 AM 10:23 AM	25	50	33.0	31.6	1.4	17.4
			Soil Criteria: Normal				
			Percolation Test				
Reading No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Head (in)**	**Final Water Head (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	10:23 AM 10:53 AM	30	30	37.6	31.8	5.8	5.2
2	10:53 AM 11:23 AM	30	60	31.8	25.0	6.8	4.4
3	11:23 AM 11:53 AM	30	90	43.7	40.7	3.0	10.0
4	11:53 AM 12:23 PM	30	120	40.7	34.8	5.9	5.1
5	12:23 PM 12:53 PM	30	150	34.8	27.2	7.6	4.0
6	12:53 PM 1:23 PM	30	180	27.1	21.0	6.1	4.9
7	1:23 PM 1:53 PM	30	210	44.9	42.1	2.8	10.9
8	1:53 PM 2:23 PM	30	240	42.1	36.6	5.5	5.4
9	2:23 PM 2:53 PM	30	270	36.6	32.8	3.8	7.8
10	2:53 PM 3:23 PM	30	300	32.8	23.8	9.0	3.3
11	3:23 PM 3:53 PM	30	330	44.2	41.6	2.5	11.9
12	3:53 PM 4:23 PM	30	360	41.6	37.2	4.4	6.8
Infiltration Rate (in/hr):			0.43				
Radius of test hole (in):			4				**Figure 26**
Average Head (in):			39.4				

PERCOLATION TEST REPORT							
Project Name:		Baxter and Central			**Project No.:**		T2540-22-03
Test Hole No.:		P-5			**Date Excavated:**		11/11/2019
Length of Test Pipe:			134.2	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			3.6	inches	**Presoak Date:**		11/11/2019
Depth of Test Hole:			130.6	inches	**Perc Test Date:**		11/12/2019
Check for Sandy Soil Criteria Tested by:				Weidman	**Percolation Tested by:**		Weidman
Water level measured from BOTTOM of hole							
Sandy Soil Criteria Test							
Trial No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Level (in)**	**Final Water Level (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	9:34 AM 9:59 AM	25	25	62.8	62.8	0.0	#DIV/0!
2	9:59 AM 10:24 AM	25	50	59.8	53.0	6.7	3.7
			Soil Criteria: Normal				
			Percolation Test				
Reading No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Head (in)**	**Final Water Head (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	10:24 AM 10:54 AM	30	30	56.6	50.5	6.1	4.9
2	10:54 AM 11:24 AM	30	60	50.5	47.3	3.2	9.3
3	11:24 AM 11:54 AM	30	90	47.3	43.8	3.5	8.6
4	11:54 AM 12:24 PM	30	120	43.8	40.2	3.6	8.3
5	12:24 PM 12:54 PM	30	150	40.2	37.3	2.9	10.4
6	12:54 PM 1:24 PM	30	180	37.3	34.6	2.8	10.9
7	1:24 PM 1:54 PM	30	210	34.6	32.2	2.4	12.5
8	1:54 PM 2:24 PM	30	240	32.2	30.2	1.9	15.6
9	2:24 PM 2:54 PM	30	270	30.2	28.8	1.4	20.8
10	2:54 PM 3:24 PM	30	300	28.8	27.0	1.8	16.7
11	3:24 PM 3:54 PM	30	330	27.0	25.2	1.8	16.7
12	3:54 PM 4:24 PM	30	360	25.2	23.9	1.3	22.7
Infiltration Rate (in/hr):			0.29				
Radius of test hole (in):			4				**Figure 27**
Average Head (in):			35.9				

PERCOLATION TEST REPORT

Project Name:	Baxter and Central	**Project No.:**	T2540-22-03
Test Hole No.:	P-6	**Date Excavated:**	11/11/2019
Length of Test Pipe:	144.0 inches	**Soil Classification:**	SM
Height of Pipe above Ground:	7.2 inches	**Presoak Date:**	11/11/2019
Depth of Test Hole:	136.8 inches	**Perc Test Date:**	11/12/2019
Check for Sandy Soil Criteria Tested by:	Weidman	**Percolation Tested by:**	Weidman

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:25 AM 9:50 AM	25	25	38.4	37.7	0.7	34.7
2	9:50 AM 10:15 AM	25	50	37.7	37.1	0.6	41.7

Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:15 AM 10:45 AM	30	30	44.3	43.8	0.5	62.5
2	10:45 AM 11:15 AM	30	60	43.8	43.3	0.5	62.5
3	11:15 AM 11:45 AM	30	90	43.3	43.0	0.4	83.3
4	11:45 AM 12:15 PM	30	120	43.0	42.5	0.5	62.5
5	12:15 PM 12:45 PM	30	150	42.5	42.0	0.5	62.5
6	12:45 PM 1:15 PM	30	180	42.0	41.9	0.1	250.0
7	1:15 PM 1:45 PM	30	210	41.9	41.6	0.2	125.0
8	1:45 PM 2:15 PM	30	240	41.6	41.5	0.1	250.0
9	2:15 PM 2:45 PM	30	270	41.5	41.4	0.1	250.0
10	2:45 PM 3:15 PM	30	300	41.4	41.0	0.4	83.3
11	3:15 PM 3:45 PM	30	330	41.0	40.7	0.4	83.3
12	3:45 PM 4:15 PM	30	360	40.7	40.3	0.4	83.3

Infiltration Rate (in/hr):	0.03
Radius of test hole (in):	4
Average Head (in):	40.5

Figure 28

PERCOLATION TEST REPORT

Project Name:		Baxter and Central			**Project No.:**		T2540-22-03
Test Hole No.:		P-7			**Date Excavated:**		11/11/2019
Length of Test Pipe:			133.7	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			6.0	inches	**Presoak Date:**		11/11/2019
Depth of Test Hole:			127.7	inches	**Perc Test Date:**		11/12/2019
Check for Sandy Soil Criteria Tested by:				Weidman	**Percolation Tested by:**		Weidman

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:25 AM 9:50 AM	25	25	28.6	27.0	1.6	16.0
2	9:50 AM 10:15 AM	25	50	27.0	26.2	0.8	29.8

Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:15 AM 10:45 AM	30	30	32.2	31.6	0.6	50.0
2	10:45 AM 11:15 AM	30	60	31.6	30.7	0.8	35.7
3	11:15 AM 11:45 AM	30	90	30.7	30.2	0.5	62.5
4	11:45 AM 12:15 PM	30	120	30.1	29.5	0.6	50.0
5	12:15 PM 12:45 PM	30	150	29.5	28.9	0.6	50.0
6	12:45 PM 1:15 PM	30	180	28.9	26.3	2.6	11.4
7	1:15 PM 1:45 PM	30	210	26.3	23.5	2.8	10.9
8	1:45 PM 2:15 PM	30	240	23.5	21.7	1.8	16.7
9	2:15 PM 2:45 PM	30	270	32.8	32.3	0.5	62.5
10	2:45 PM 3:15 PM	30	300	32.3	31.7	0.6	50.0
11	3:15 PM 3:45 PM	30	330	31.7	31.2	0.5	62.5
12	3:45 PM 4:15 PM	30	360	31.2	30.7	0.5	62.5

Infiltration Rate (in/hr):	0.06	
Radius of test hole (in):	4	**Figure 29**
Average Head (in):	31.0	

PERCOLATION TEST REPORT							
Project Name:		Baxter and Central			**Project No.:**		T2540-22-03
Test Hole No.:		P-8			**Date Excavated:**		11/11/2019
Length of Test Pipe:			98.2	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			13.4	inches	**Presoak Date:**		11/12/2019
Depth of Test Hole:			84.7	inches	**Perc Test Date:**		11/13/2019
Check for Sandy Soil Criteria Tested by:				Weidman	**Percolation Tested by:**		Weidman
Water level measured from BOTTOM of hole							
Sandy Soil Criteria Test							
Trial No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Level (in)**	**Final Water Level (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	9:26 AM 9:51 AM	25	25	24.7	23.2	1.6	16.0
2	9:51 AM 10:16 AM	25	50	23.2	22.3	0.8	29.8
			Soil Criteria: Normal				
			Percolation Test				
Reading No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Head (in)**	**Final Water Head (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	10:16 AM 10:46 AM	30	30	35.8	35.2	0.6	50.0
2	10:46 AM 11:16 AM	30	60	35.2	34.6	0.6	50.0
3	11:16 AM 11:46 AM	30	90	34.6	34.3	0.2	125.0
4	11:46 AM 12:16 PM	30	120	34.3	34.0	0.4	83.3
5	12:16 PM 12:46 PM	30	150	34.0	33.7	0.2	125.0
6	12:46 PM 1:16 PM	30	180	33.7	33.5	0.2	125.0
7	1:16 PM 1:46 PM	30	210	33.5	33.4	0.1	250.0
8	1:46 PM 2:16 PM	30	240	33.4	32.5	0.8	35.7
9	2:16 PM 2:46 PM	30	270	32.5	31.9	0.6	50.0
10	2:46 PM 3:16 PM	30	300	31.9	31.4	0.5	62.5
11	3:16 PM 3:46 PM	30	330	31.4	28.8	2.6	11.4
12	3:46 PM 4:16 PM	30	360	28.8	27.0	1.8	16.7
Infiltration Rate (in/hr):			0.24				
Radius of test hole (in):			4				**Figure 30**
Average Head (in):			27.9				

PERCOLATION TEST REPORT

Project Name:		Baxter and Central			**Project No.:**		T2540-22-03
Test Hole No.:		P-9			**Date Excavated:**		11/11/2019
Length of Test Pipe:			24.6	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			3.6	inches	**Presoak Date:**		11/12/2019
Depth of Test Hole:			21.0	inches	**Perc Test Date:**		11/13/2019
Check for Sandy Soil Criteria Tested by:				Weidman	**Percolation Tested by:**		Weidman

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Level (in)**	**Final Water Level (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	9:27 AM 9:52 AM	25	25	18.0	13.8	4.2	6.0
2	9:52 AM 10:17 AM	25	50	13.8	12.4	1.4	17.4

Soil Criteria: Normal

Percolation Test

Reading No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Head (in)**	**Final Water Head (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	10:17 AM 10:47 AM	30	30	16.0	14.4	1.6	19.2
2	10:47 AM 11:17 AM	30	60	14.0	13.6	0.5	62.5
3	11:17 AM 11:47 AM	30	90	13.6	13.2	0.4	83.3
4	11:47 AM 12:17 PM	30	120	14.4	13.9	0.5	62.5
5	12:17 PM 12:47 PM	30	150	13.9	13.2	0.7	41.7
6	12:47 PM 1:17 PM	30	180	16.3	16.0	0.4	83.3
7	1:17 PM 1:47 PM	30	210	16.0	15.5	0.5	62.5
8	1:47 PM 2:17 PM	30	240	15.5	15.0	0.5	62.5
9	2:17 PM 2:47 PM	30	270	15.0	13.7	1.3	22.7
10	2:47 PM 3:17 PM	30	300	13.7	13.3	0.4	83.3
11	3:17 PM 3:47 PM	30	330	15.1	15.0	0.1	250.0
12	3:47 PM 4:17 PM	30	360	15.0	14.9	0.1	250.0

Infiltration Rate (in/hr):	0.08	
Radius of test hole (in):	4	**Figure 31**
Average Head (in):	16.1	

PERCOLATION TEST REPORT							
Project Name:		Baxter and Central			**Project No.:**		T2540-22-03
Test Hole No.:		P-10			**Date Excavated:**		11/11/2019
Length of Test Pipe:			48.6	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			7.4	inches	**Presoak Date:**		11/12/2019
Depth of Test Hole:			41.2	inches	**Perc Test Date:**		11/13/2019
Check for Sandy Soil Criteria Tested by:				Weidman	**Percolation Tested by:**		Weidman
Water level measured from BOTTOM of hole							

Sandy Soil Criteria Test							
Trial No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Level (in)**	**Final Water Level (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	9:29 AM 9:54 AM	25	25	30.4	28.8	1.6	16.0
2	9:54 AM 10:19 AM	25	50	28.8	28.7	0.1	208.3
			Soil Criteria: Normal				

Percolation Test							
Reading No.	**Time**	**Time Interval (min)**	**Total Elapsed Time (min)**	**Initial Water Head (in)**	**Final Water Head (in)**	**Δ in Water Level (in)**	**Percolation Rate (min/inch)**
1	10:19 AM 10:49 AM	30	30	36.1	35.8	0.4	83.3
2	10:49 AM 11:19 AM	30	60	35.8	35.3	0.5	62.5
3	11:19 AM 11:49 AM	30	90	35.3	35.0	0.2	125.0
4	11:49 AM 12:19 PM	30	120	35.0	34.8	0.2	125.0
5	12:19 PM 12:49 PM	30	150	34.8	34.7	0.1	250.0
6	12:49 PM 1:19 PM	30	180	34.7	34.7	0.0	2500.0
7	1:19 PM 1:49 PM	30	210	34.7	34.6	0.0	1250.0
8	1:49 PM 2:19 PM	30	240	34.6	34.6	0.0	1250.0
9	2:19 PM 2:49 PM	30	270	34.6	34.6	0.0	1250.0
10	2:49 PM 3:19 PM	30	300	34.6	34.6	0.0	1250.0
11	3:19 PM 3:49 PM	30	330	34.6	34.6	0.0	2500.0
12	3:49 PM 4:19 PM	30	360	34.6	34.5	0.0	2500.0

Infiltration Rate (in/hr):	0.00			
Radius of test hole (in):	4			**Figure 32**
Average Head (in):	34.6			

PERCOLATION TEST REPORT

Project Name:	Baxter and Central	**Project No.:**	T2540-22-03
Test Hole No.:	P-11	**Date Excavated:**	11/11/2019
Length of Test Pipe:	84.6 inches	**Soil Classification:**	SM
Height of Pipe above Ground:	4.8 inches	**Presoak Date:**	11/12/2019
Depth of Test Hole:	79.8 inches	**Perc Test Date:**	11/13/2019
Check for Sandy Soil Criteria Tested by:	Weidman	**Percolation Tested by:**	Weidman

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:30 AM 9:55 AM	25	25	45.5	44.2	1.3	18.9
2	9:55 AM 10:20 AM	25	50	44.2	43.7	0.5	52.1

Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:20 AM 10:50 AM	30	30	48.5	48.2	0.2	125.0
2	10:50 AM 11:20 AM	30	60	48.2	48.0	0.2	125.0
3	11:20 AM 11:50 AM	30	90	48.0	47.6	0.4	83.3
4	11:50 AM 12:20 PM	30	120	47.6	47.4	0.2	125.0
5	12:20 PM 12:50 PM	30	150	47.4	47.3	0.1	250.0
6	12:50 PM 1:20 PM	30	180	47.3	47.0	0.2	125.0
7	1:20 PM 1:50 PM	30	210	47.0	47.0	0.0	1250.0
8	1:50 PM 2:20 PM	30	240	47.0	47.0	0.0	1250.0
9	2:20 PM 2:50 PM	30	270	47.0	47.0	0.0	1250.0
10	2:50 PM 3:20 PM	30	300	47.0	46.9	0.0	1250.0
11	3:20 PM 3:50 PM	30	330	46.9	46.9	0.0	1250.0
12	3:50 PM 4:20 PM	30	360	46.9	46.8	0.1	250.0

Infiltration Rate (in/hr):	0.02
Radius of test hole (in):	4
Average Head (in):	47.2

Figure 33

PERCOLATION TEST REPORT

Project Name:		Baxter and Central			**Project No.:**		T2540-22-03
Test Hole No.:		P-12			**Date Excavated:**		11/11/2019
Length of Test Pipe:			242.5	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			7.2	inches	**Presoak Date:**		11/13/2019
Depth of Test Hole:			235.3	inches	**Perc Test Date:**		11/14/2019
Check for Sandy Soil Criteria Tested by:				Weidman	**Percolation Tested by:**		Weidman

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:15 AM 9:40 AM	25	25	66.0	66.0	0.0	#DIV/0!
2	9:40 AM 10:05 AM	25	50	66.0	66.0	0.0	#DIV/0!

Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:05 AM 10:35 AM	30	30	66.0	66.0	0.0	25000.0
2	10:35 AM 11:05 AM	30	60	66.0	66.0	0.0	25000.0
3	11:05 AM 11:35 AM	30	90	66.0	66.0	0.0	25000.0
4	11:35 AM 12:05 PM	30	120	66.0	66.0	0.0	25000.0
5	12:05 PM 12:35 PM	30	150	66.0	66.0	0.0	25000.0
6	12:35 PM 1:05 PM	30	180	66.0	66.0	0.0	25000.0
7	1:05 PM 1:35 PM	30	210	66.0	66.0	0.0	25000.0
8	1:35 PM 2:05 PM	30	240	66.0	66.0	0.0	25000.0
9	2:05 PM 2:35 PM	30	270	66.0	66.0	0.0	25000.0
10	2:35 PM 3:05 PM	30	300	66.0	66.0	0.0	25000.0
11	3:05 PM 3:35 PM	30	330	66.0	66.0	0.0	25000.0
12	3:35 PM 4:05 PM	30	360	66.0	66.0	0.0	25000.0

Infiltration Rate (in/hr):	0.00	
Radius of test hole (in):	4	**Figure 34**
Average Head (in):	66.0	

PERCOLATION TEST REPORT

Project Name:		Baxter and Central			**Project No.:**		T2540-22-03
Test Hole No.:		P-13			**Date Excavated:**		11/11/2019
Length of Test Pipe:			253.9	inches	**Soil Classification:**		SM
Height of Pipe above Ground:			2.4	inches	**Presoak Date:**		11/13/2019
Depth of Test Hole:			251.5	inches	**Perc Test Date:**		11/14/2019
Check for Sandy Soil Criteria Tested by:				Weidman	**Percolation Tested by:**		Weidman

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:16 AM 9:41 AM	25	25	95.0	92.8	2.3	11.0
2	9:41 AM 10:06 AM	25	50	92.8	89.6	3.1	8.0

Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:06 AM 10:36 AM	30	30	92.0	89.5	2.5	11.9
2	10:36 AM 11:06 AM	30	60	89.5	87.4	2.2	13.9
3	11:06 AM 11:36 AM	30	90	87.4	85.9	1.4	20.8
4	11:36 AM 12:06 PM	30	120	85.9	83.5	2.4	12.5
5	12:06 PM 12:36 PM	30	150	83.5	82.3	1.2	25.0
6	12:36 PM 1:06 PM	30	180	82.3	81.0	1.3	22.7
7	1:06 PM 1:36 PM	30	210	81.0	79.8	1.2	25.0
8	1:36 PM 2:06 PM	30	240	79.8	78.5	1.3	22.7
9	2:06 PM 2:36 PM	30	270	78.5	77.3	1.2	25.0
10	2:36 PM 3:06 PM	30	300	77.3	76.1	1.2	25.0
11	3:06 PM 3:36 PM	30	330	76.1	74.8	1.3	22.7
12	3:36 PM 4:06 PM	30	360	74.8	73.6	1.2	25.0

Infiltration Rate (in/hr):	0.06	
Radius of test hole (in):	4	**Figure 35**
Average Head (in):	74.2	

PERCOLATION TEST REPORT

Project Name:	Baxter and Central	**Project No.:**	T2540-22-03
Test Hole No.:	P-14	**Date Excavated:**	11/11/2019
Length of Test Pipe:	265.1 inches	**Soil Classification:**	SM
Height of Pipe above Ground:	6.0 inches	**Presoak Date:**	11/13/2019
Depth of Test Hole:	259.1 inches	**Perc Test Date:**	11/14/2019
Check for Sandy Soil Criteria Tested by:	Weidman	**Percolation Tested by:**	Weidman

Water level measured from BOTTOM of hole

Sandy Soil Criteria Test

Trial No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Level (in)	Final Water Level (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	9:17 AM 9:42 AM	25	25	52.7	47.5	5.2	4.8
2	9:42 AM 10:07 AM	25	50	47.5	43.0	4.6	5.5

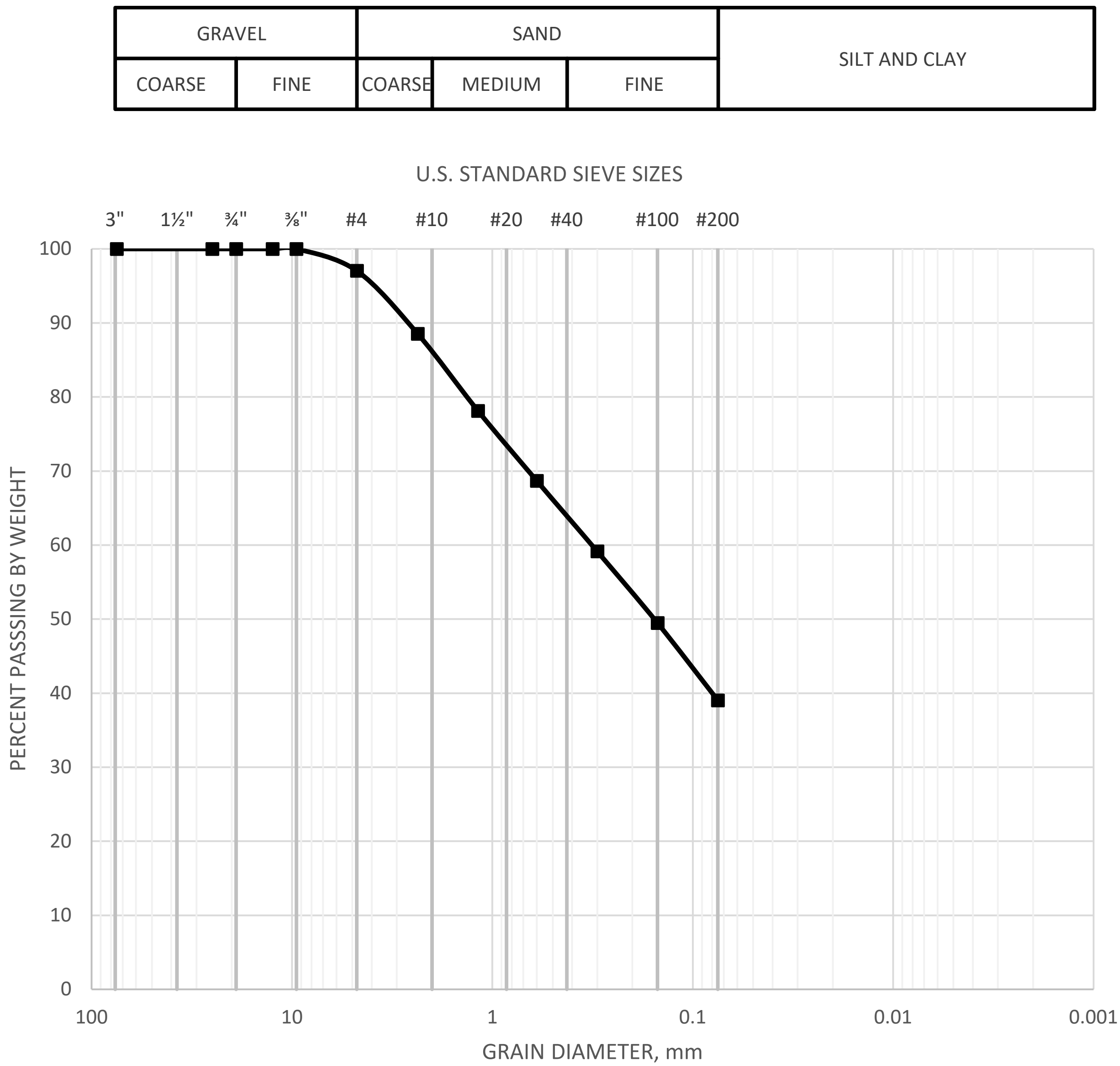
Soil Criteria: Normal

Percolation Test

Reading No.	Time	Time Interval (min)	Total Elapsed Time (min)	Initial Water Head (in)	Final Water Head (in)	Δ in Water Level (in)	Percolation Rate (min/inch)
1	10:07 AM 10:37 AM	30	30	49.0	46.1	2.9	10.4
2	10:37 AM 11:07 AM	30	60	46.1	43.6	2.5	11.9
3	11:07 AM 11:37 AM	30	90	43.6	41.8	1.8	16.7
4	11:37 AM 12:07 PM	30	120	41.8	39.6	2.2	13.9
5	12:07 PM 12:37 PM	30	150	39.6	38.2	1.4	20.8
6	12:37 PM 1:07 PM	30	180	38.2	37.1	1.1	27.8
7	1:07 PM 1:37 PM	30	210	37.1	36.0	1.1	27.8
8	1:37 PM 2:07 PM	30	240	36.0	34.4	1.6	19.2
9	2:07 PM 2:37 PM	30	270	34.4	33.6	0.8	35.7
10	2:37 PM 3:07 PM	30	300	33.6	32.8	0.8	35.7
11	3:07 PM 3:37 PM	30	330	32.8	32.0	0.7	41.7
12	3:37 PM 4:07 PM	30	360	32.0	31.2	0.8	35.7

Infiltration Rate (in/hr):	0.10
Radius of test hole (in):	4
Average Head (in):	31.6

Figure 36



SAMPLE	CLASSIFICATION	D60	D30	D10
P-1	silty SAND with trace gravel (SM), reddish brown			

GEOCON

GRAIN SIZE DISTRIBUTION

ASTM D-422

Checked by:

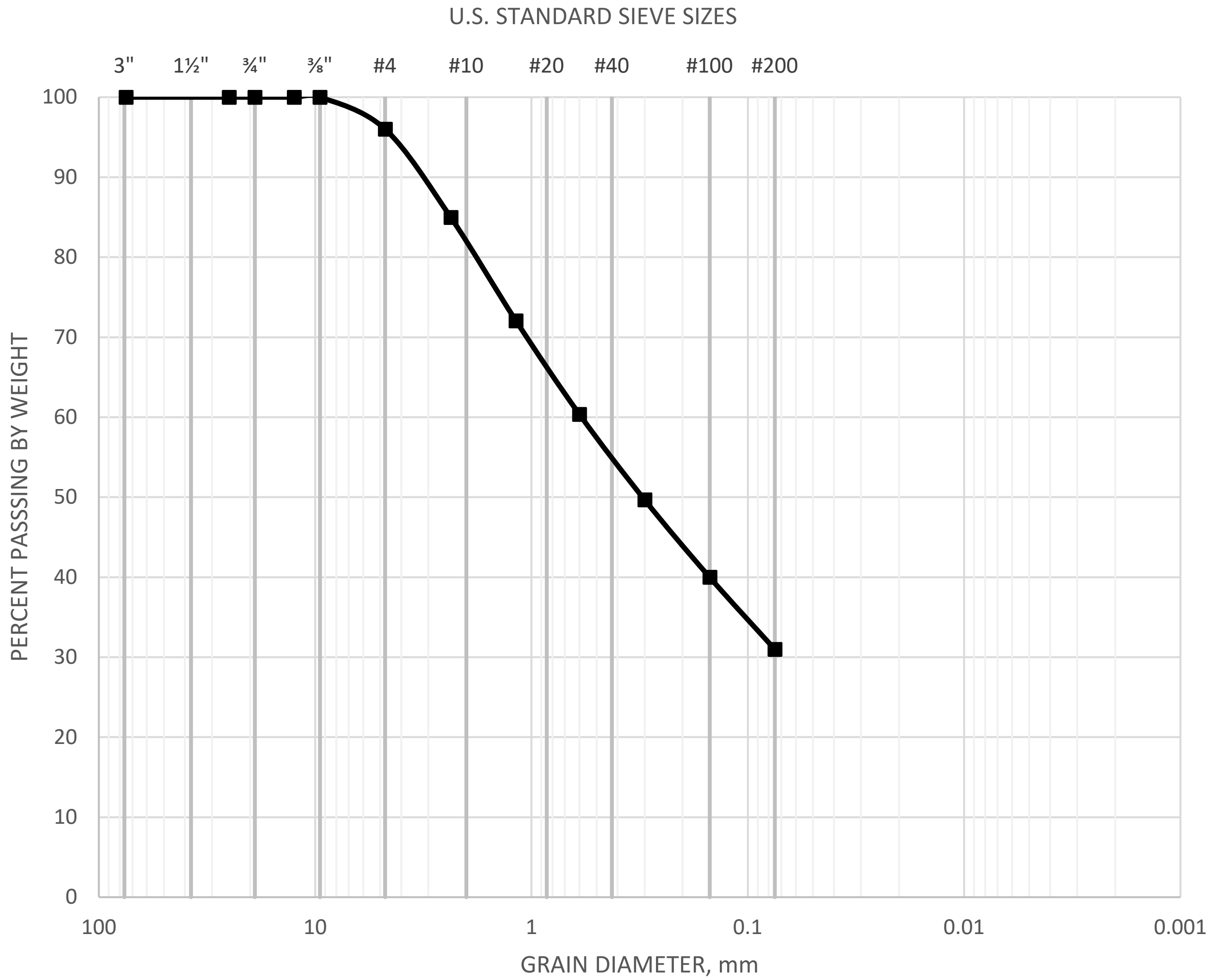
Project No.: T2540-22-03

Strata Baxter Tract 34301
NWC Baxter Rd and I-15
Wildomar, California

Nov 19

Figure 37

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P-2	silty SAND with trace gravel (SM), reddish brown			

GEOCON

GRAIN SIZE DISTRIBUTION

ASTM D-422

Checked by:

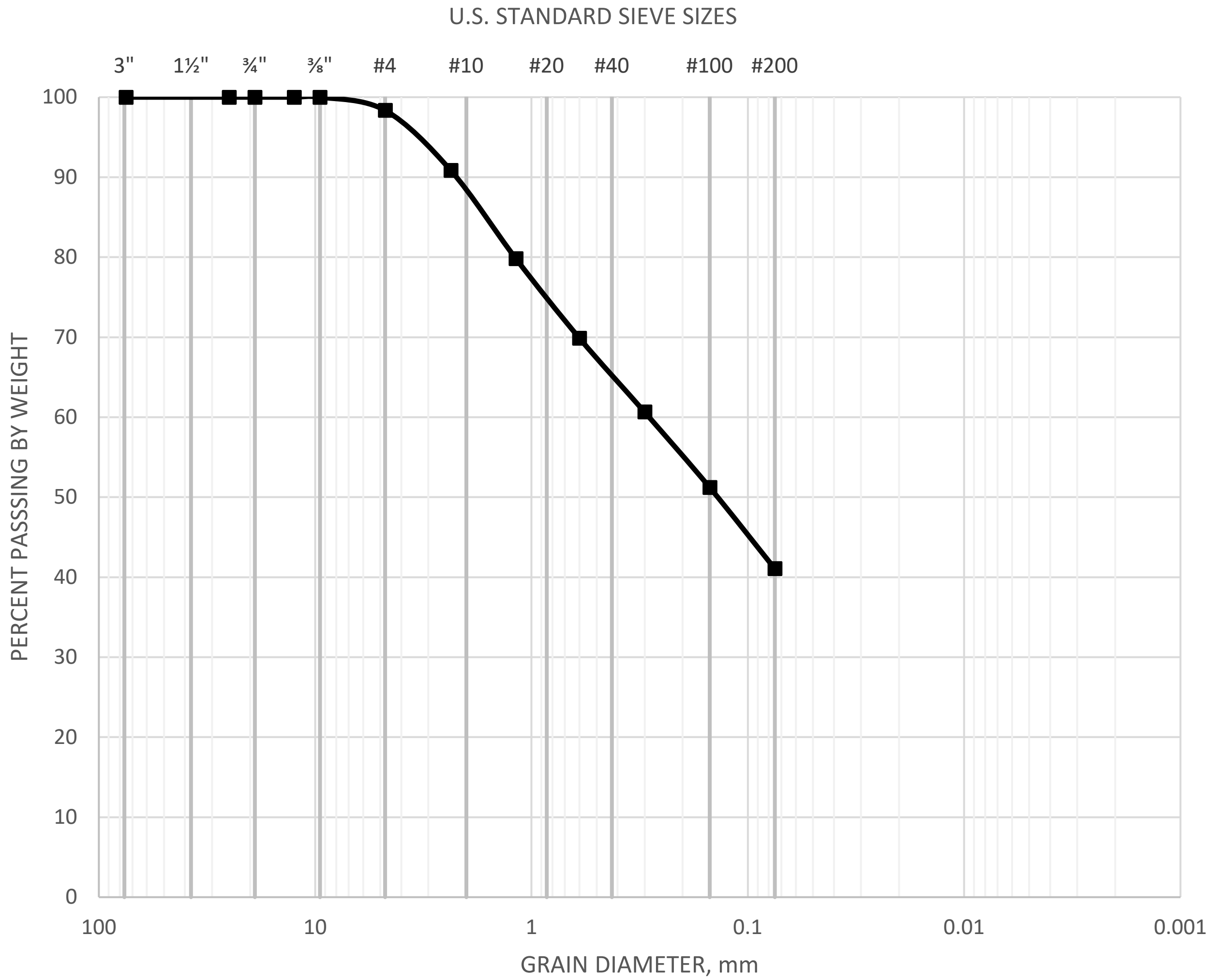
Project No.: T2540-22-03

Strata Baxter Tract 34301
NWC Baxter Rd and I-15
Wildomar, California

Nov 19

Figure 38

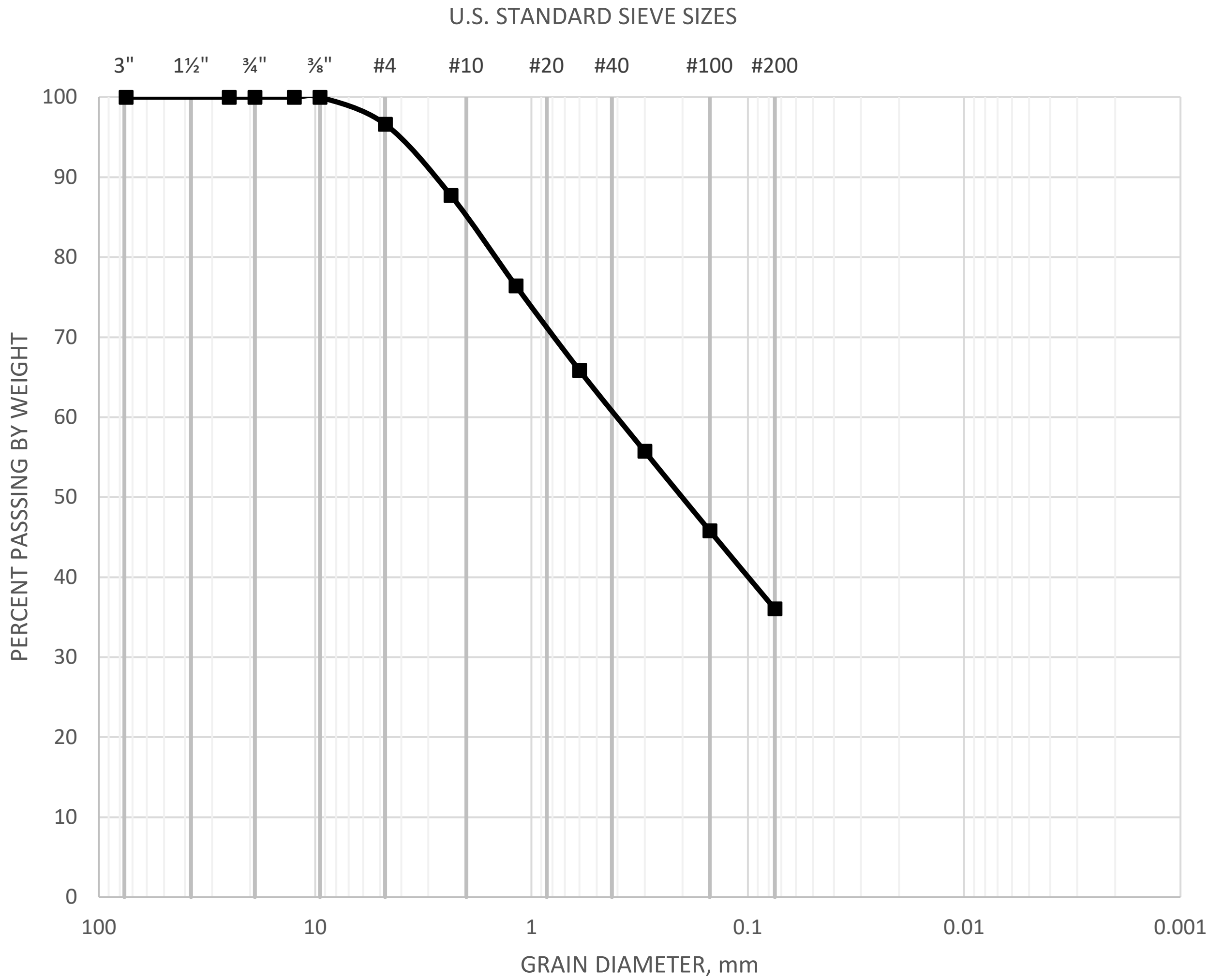
GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P-3	silty SAND with trace gravel (SM), reddish brown			

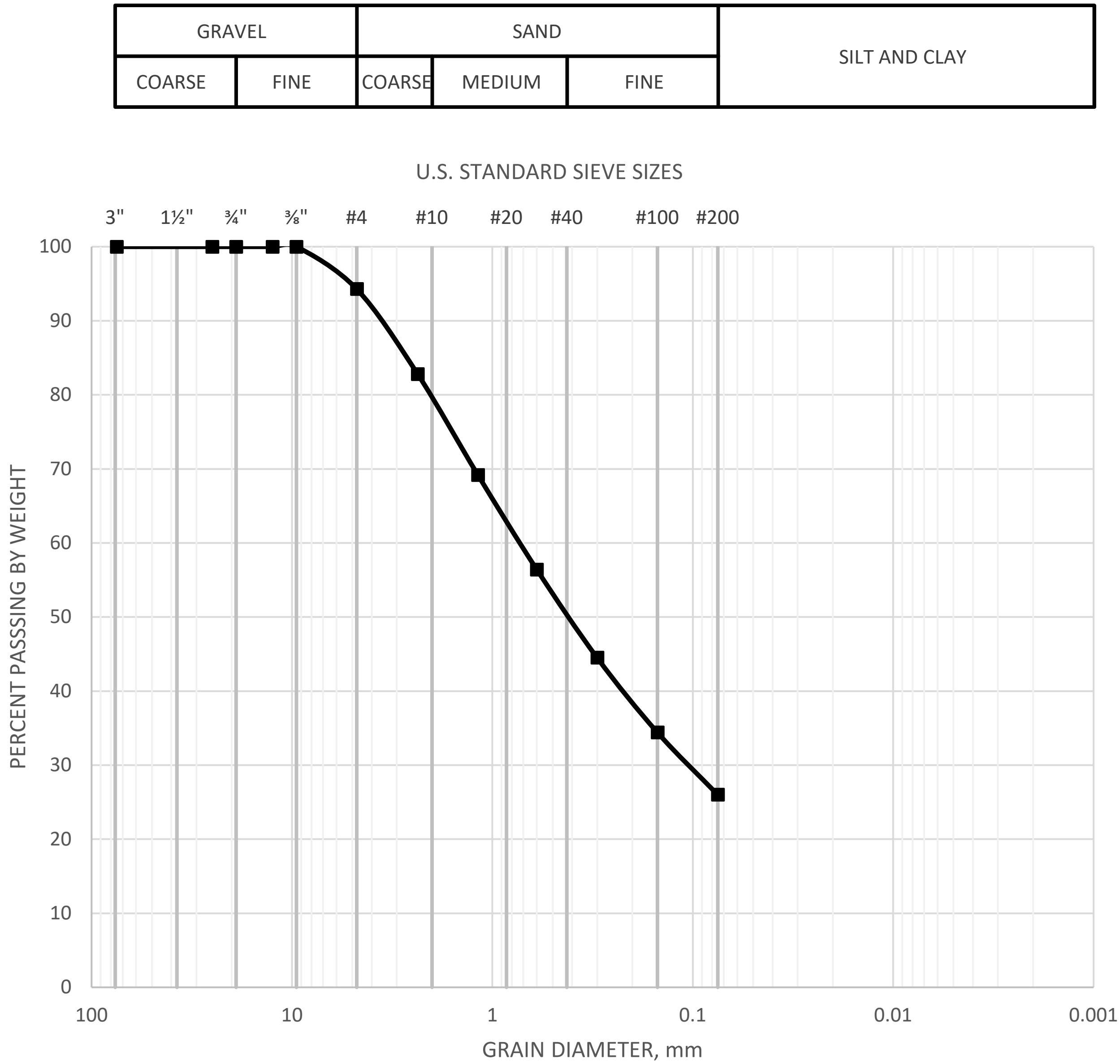
GEOCON	**GRAIN SIZE DISTRIBUTION** ASTM D-422	Project No.: T2540-22-03
		Strata Baxter Tract 34301 NWC Baxter Rd and I-15 Wildomar, California
	Checked by:	Nov 19 Figure 39

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P-4	silty SAND with trace gravel (SM), reddish brown			

GEOCON	**GRAIN SIZE DISTRIBUTION**	Project No.:	T2540-22-03
	ASTM D-422	Strata Baxter Tract 34301 NWC Baxter Rd and I-15 Wildomar, California	
	Checked by:	Nov 19	Figure 40



SAMPLE	CLASSIFICATION	D60	D30	D10
P-5	silty SAND with few gravel (SM), dark brown			

GEOCON

GRAIN SIZE DISTRIBUTION

ASTM D-422

Checked by:

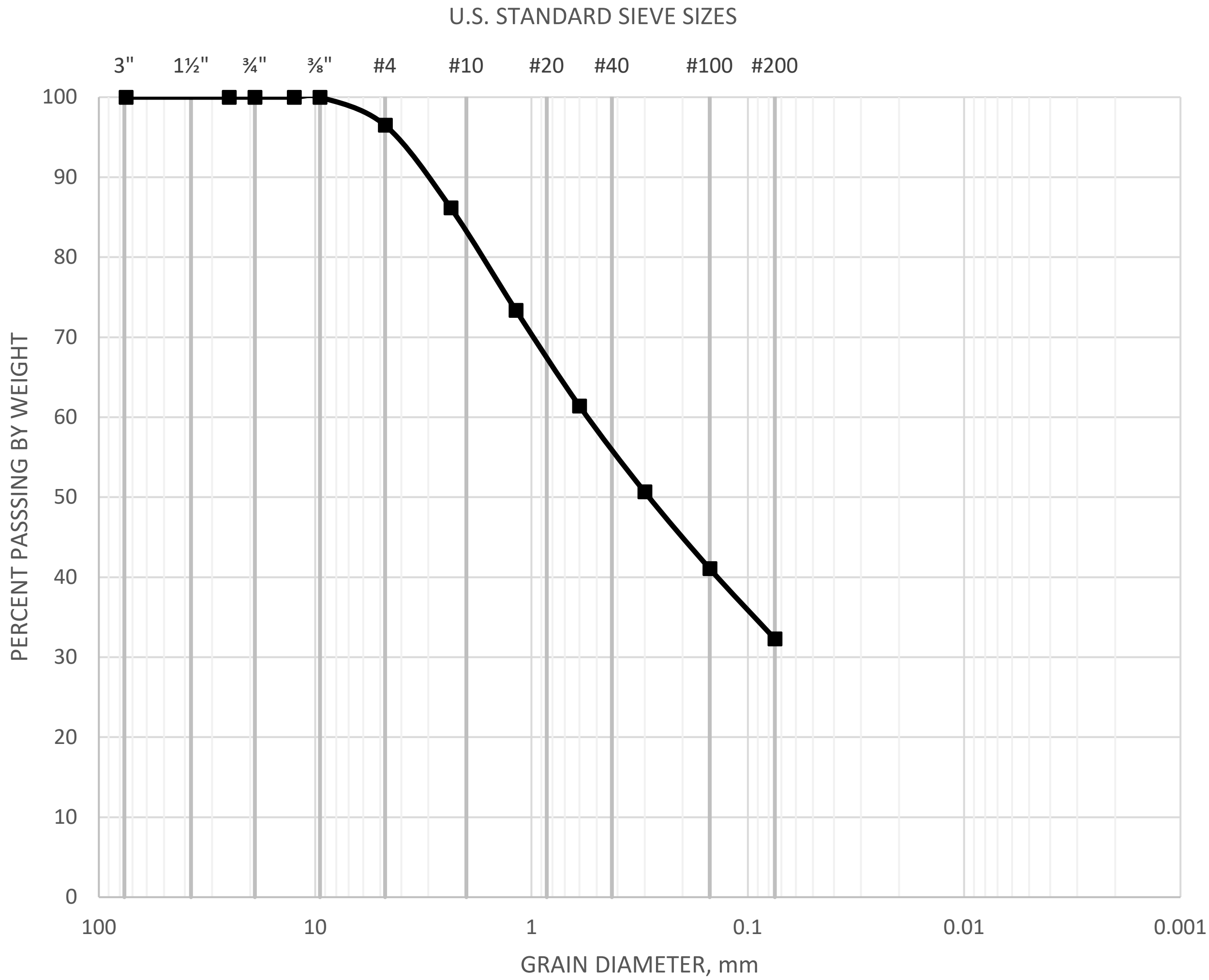
Project No.: T2540-22-03

Strata Baxter Tract 34301
NWC Baxter Rd and I-15
Wildomar, California

Nov 19

Figure 41

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P-6	silty SAND with few gravel (SM), dark brown			

GEOCON

GRAIN SIZE DISTRIBUTION

ASTM D-422

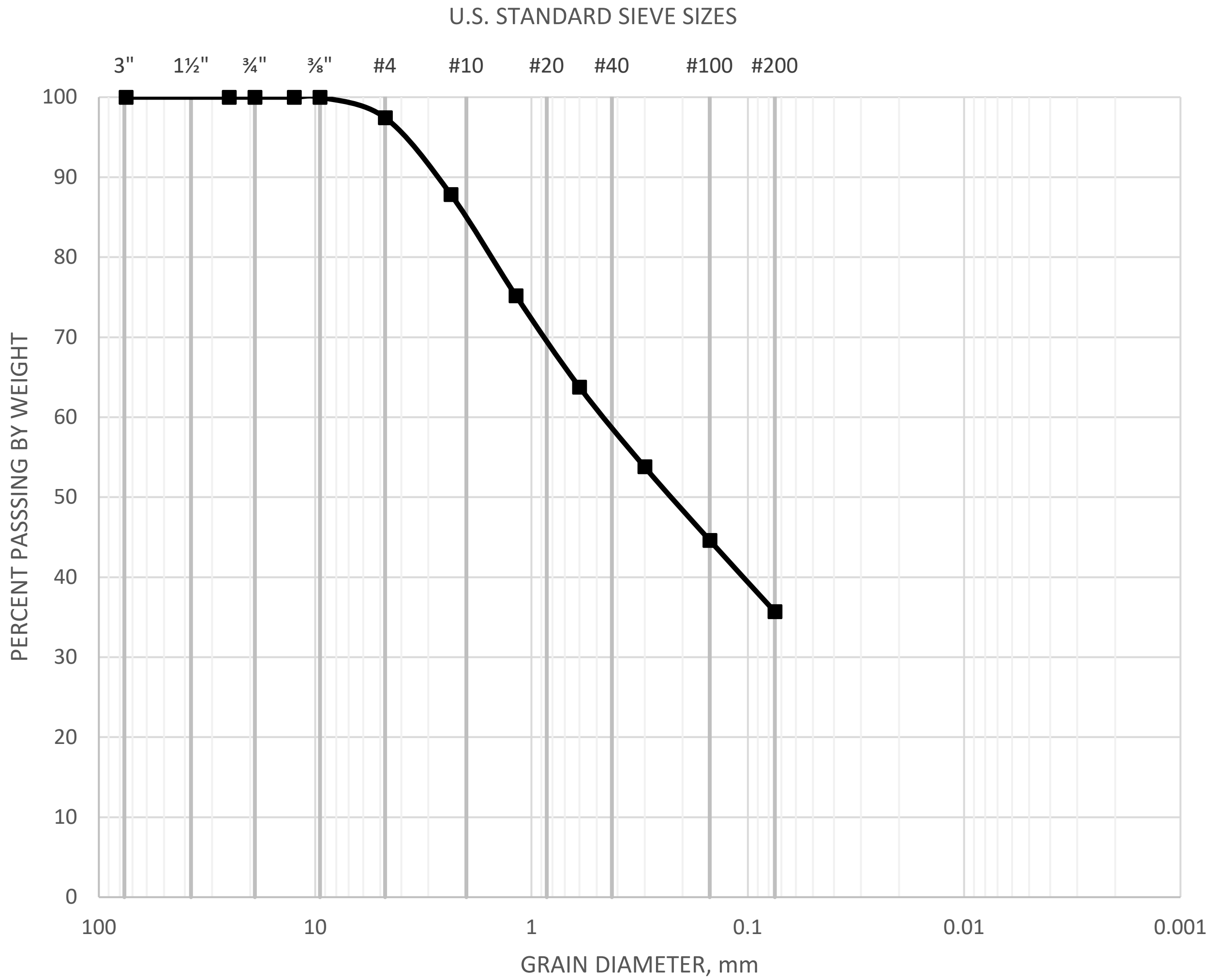
Checked by:

Project No.: T2540-22-03

Strata Baxter Tract 34301
NWC Baxter Rd and I-15
Wildomar, California

Nov 19

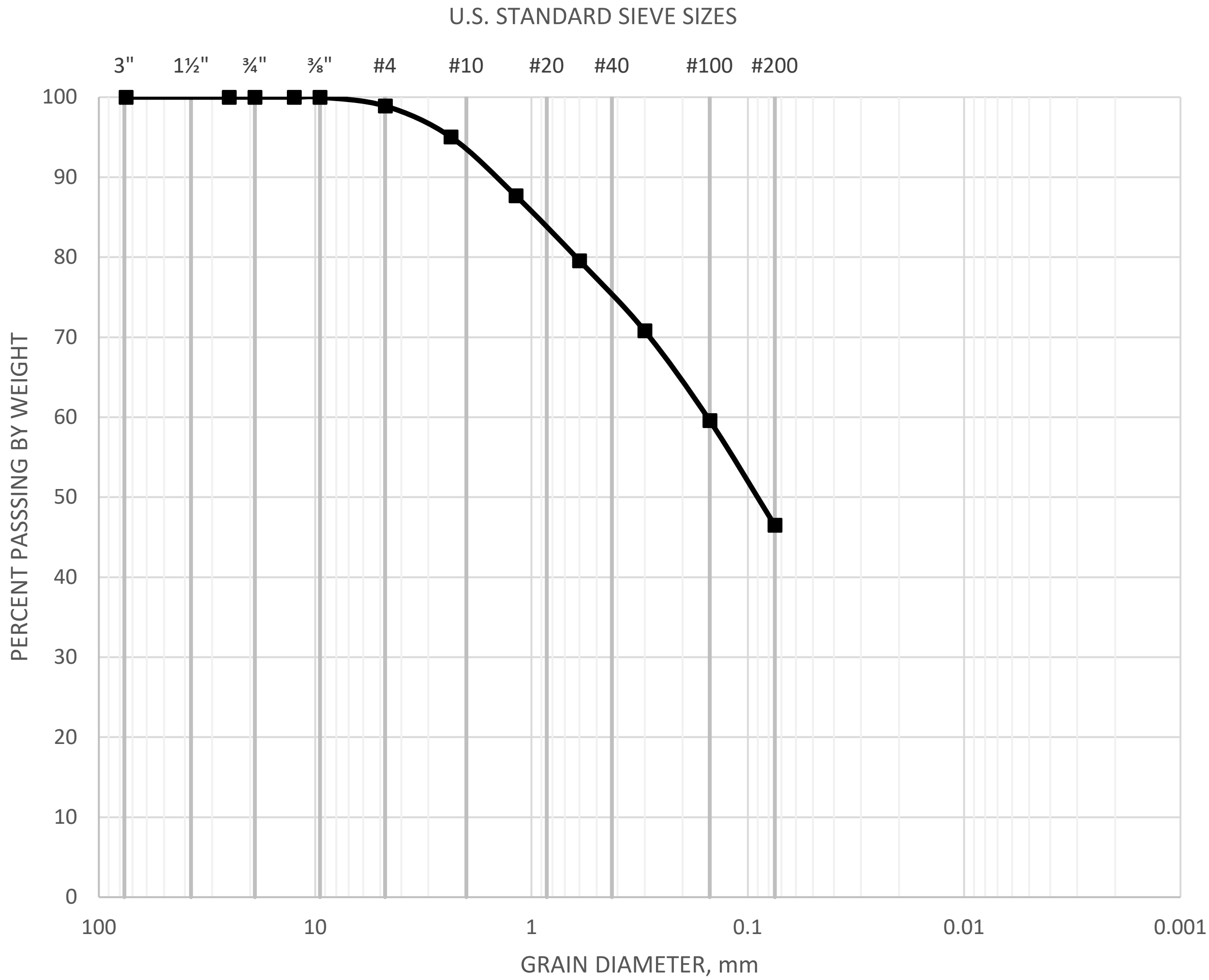
Figure 42



SAMPLE	CLASSIFICATION	D60	D30	D10
P-7	silty SAND with trace gravel (SM), dark reddish brown			

GEOCON	**GRAIN SIZE DISTRIBUTION** ASTM D-422 Checked by:	Project No.: T2540-22-03 Strata Baxter Tract 34301 NWC Baxter Rd and I-15 Wildomar, California Nov 19 Figure 43

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P-8	silty SAND with trace gravel (SM), dark yellowish brown			

GEOCON

GRAIN SIZE DISTRIBUTION

ASTM D-422

Checked by:

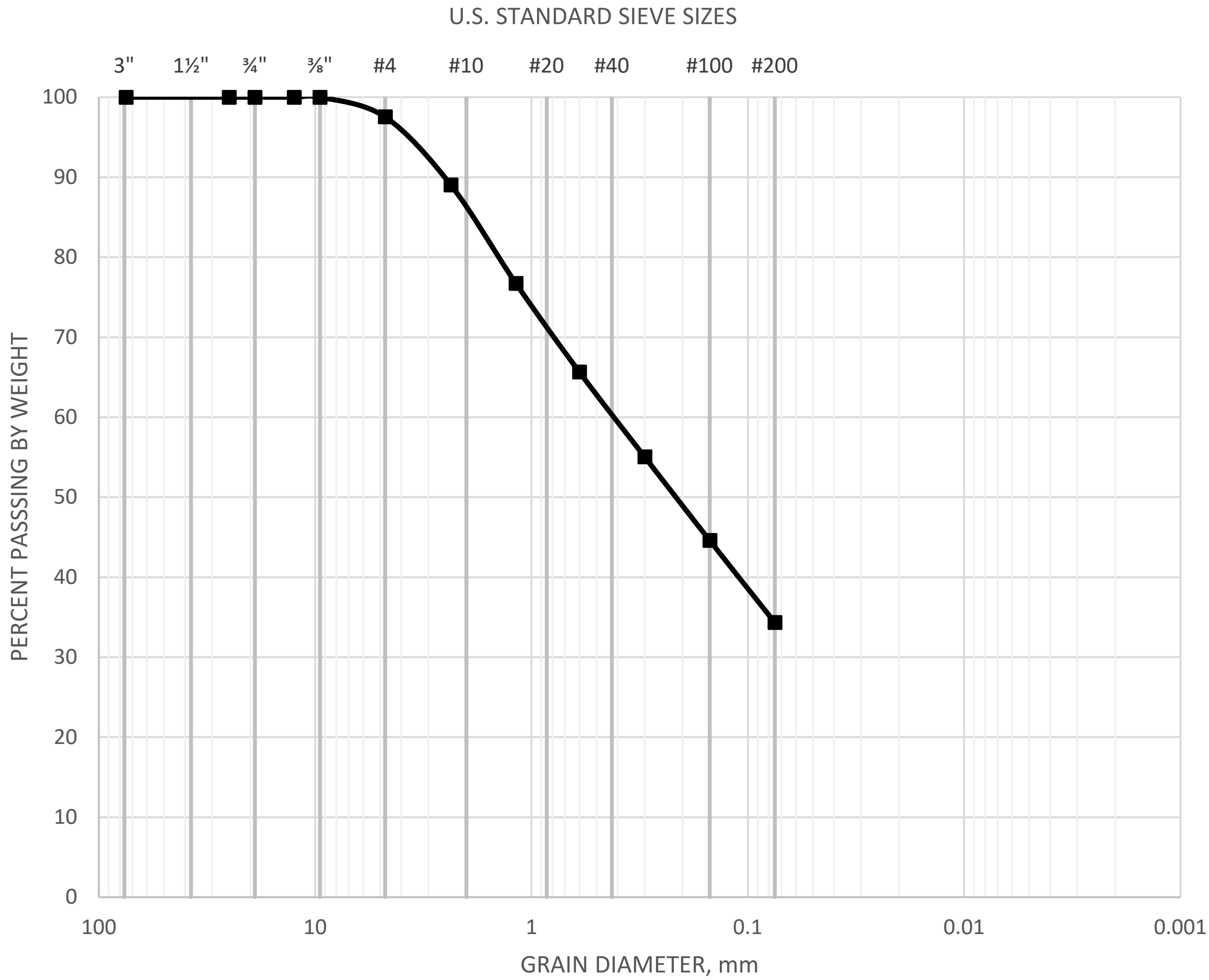
Project No.: T2540-22-03

Strata Baxter Tract 34301
NWC Baxter Rd and I-15
Wildomar, California

Nov 19

Figure 44

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P-9	silty SAND with trace gravel (SM), light reddish brown			

GEOCON

GRAIN SIZE DISTRIBUTION

ASTM D-422

Checked by:

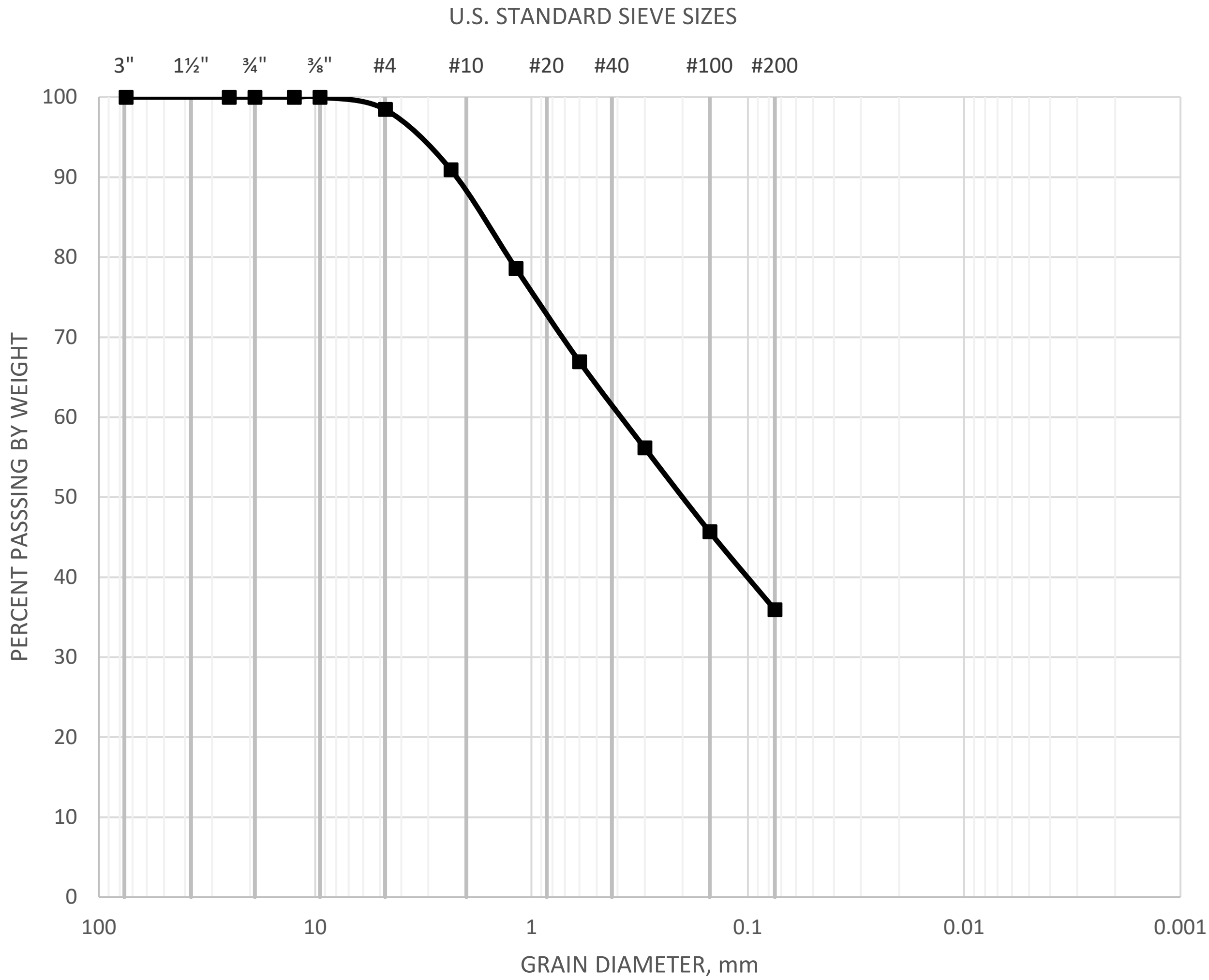
Project No.: T2540-22-03

Strata Baxter Tract 34301
NWC Baxter Rd and I-15
Wildomar, California

Nov 19

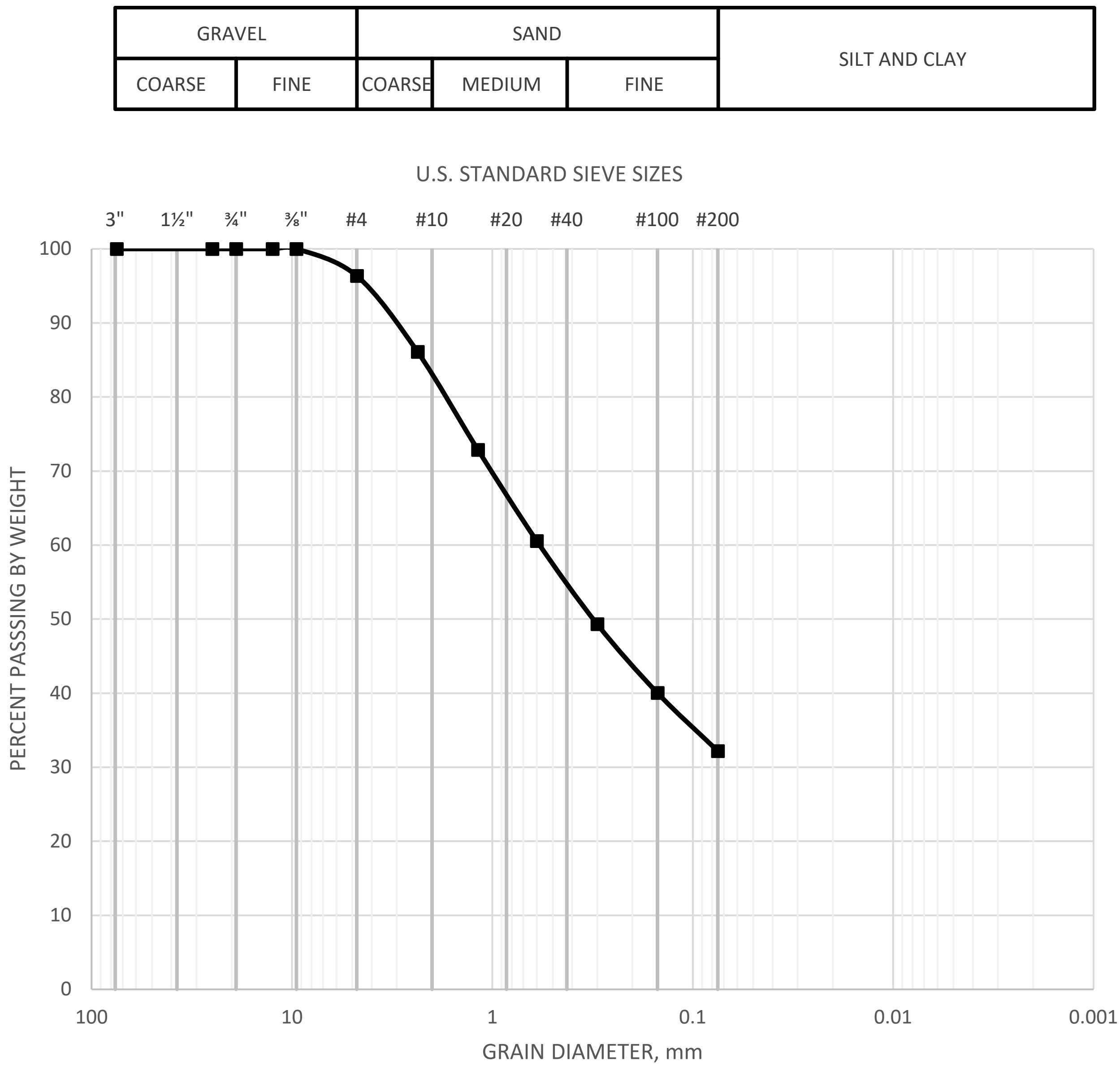
Figure 45

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



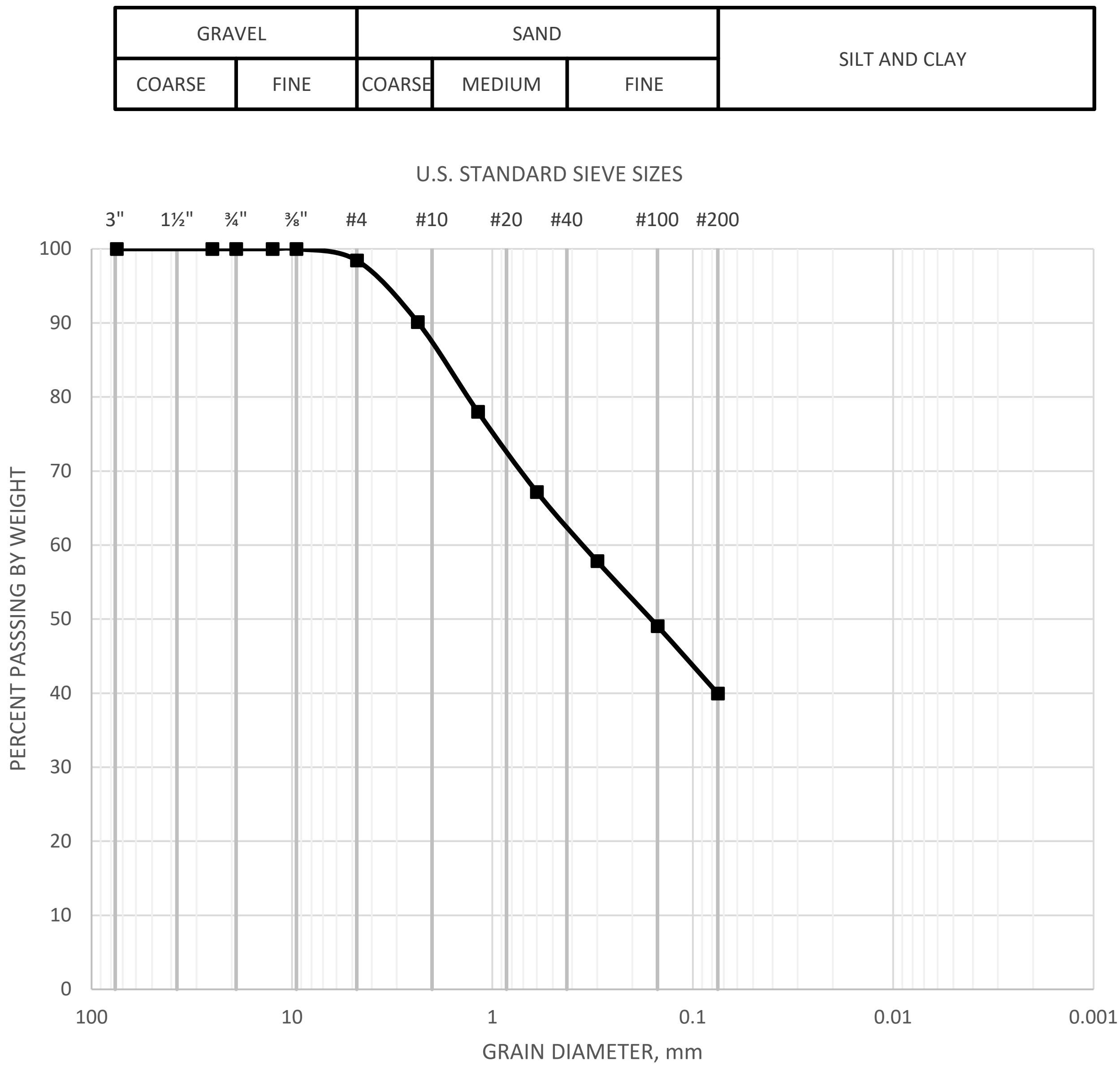
SAMPLE	CLASSIFICATION	D60	D30	D10
P-10	silty SAND with trace gravel (SM), light reddish brown			

GEOCON	**GRAIN SIZE DISTRIBUTION** ASTM D-422 Checked by:	Project No.: T2540-22-03 Strata Baxter Tract 34301 NWC Baxter Rd and I-15 Wildomar, California Nov 19 Figure 46



SAMPLE	CLASSIFICATION	D60	D30	D10
P-11	silty SAND with trace gravel (SM), reddish brown			

GEOCON	**GRAIN SIZE DISTRIBUTION**	Project No.:	T2540-22-03
	ASTM D-422	Strata Baxter Tract 34301 NWC Baxter Rd and I-15 Wildomar, California	
	Checked by:	Nov 19	Figure 47



SAMPLE	CLASSIFICATION	D60	D30	D10
P-12	silty SAND with trace gravel (SM), light reddish brown			

GEOCON

GRAIN SIZE DISTRIBUTION

ASTM D-422

Checked by:

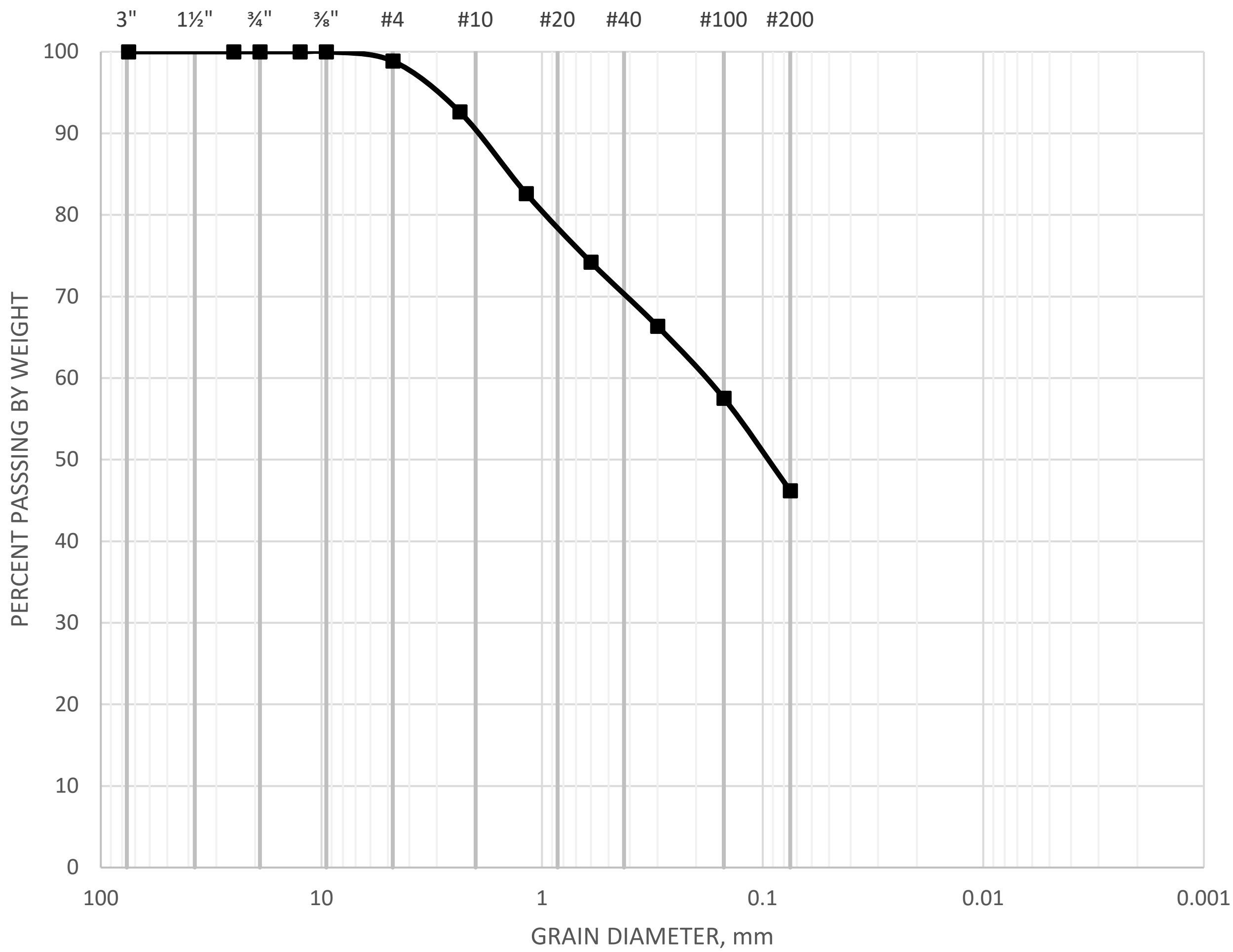
Project No.: T2540-22-03

Strata Baxter Tract 34301
NWC Baxter Rd and I-15
Wildomar, California

Nov 19

Figure 48

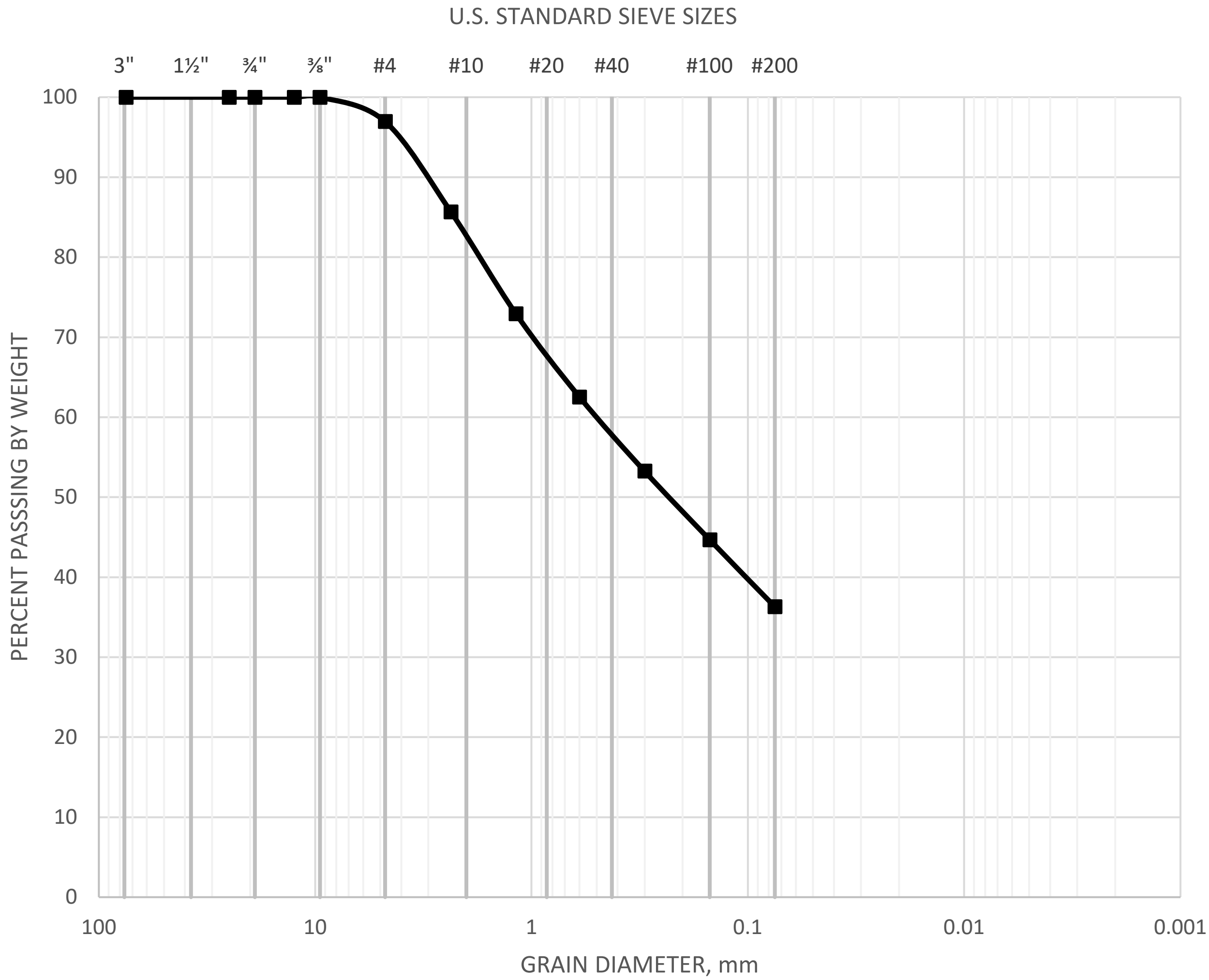
GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P-13	silty SAND with trace gravel (SM), reddish brown			

GEOCON	**GRAIN SIZE DISTRIBUTION** ASTM D-422	Project No.: T2540-22-03
		Strata Baxter Tract 34301 NWC Baxter Rd and I-15 Wildomar, California
	Checked by:	Nov 19 Figure 49

GRAVEL		SAND			SILT AND CLAY
COARSE	FINE	COARSE	MEDIUM	FINE	



SAMPLE	CLASSIFICATION	D60	D30	D10
P-14	silty SAND with trace gravel (SM), olive brown			

GEOCON	**GRAIN SIZE DISTRIBUTION** ASTM D-422 Checked by:	Project No.: T2540-22-03 Strata Baxter Tract 34301 NWC Baxter Rd and I-15 Wildomar, California Nov 19 Figure 50

Appendix 5: LID Feasibility Supplemental Information

Information that supports or supplements the determination of LID technical feasibility documented in Section D

Examples of material to provide in Appendix 5 may include but are not limited to the following:

- Technical feasibility criteria for DMAs
- Site specific analysis of technical infeasibility of all LID BMPs (if Alternative Compliance is needed)
- Documentation of Approval criteria for Proprietary Biofiltration BMPs

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 2.3 of the SMR WQMP and Sections D of this Template.

Appendix 6: LID BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation to supplement Section D

Examples of material to provide in Appendix 6 may include but are not limited to the following:

- DCV calculations,
- LID BMP sizing calculations from Exhibit C of the SMR WQMP
- Design details/drawings from manufacturers for proprietary BMPs

This information should support the Full Infiltration Applicability, and Biofiltration Applicability sections of this Template. Refer to Section 3.4 of the SMR WQMP and Sections D.4 of this Template.

	Wildomar MOB Effective Impervious Fraction Calculation			
DMA	*Surface Type*	*Area (acres)*	*Effective Impervious Fraction.* I_F	*Area x* I_F
1	Roof	0.653	1	0.653
2	Roads	2.378	1	2.378
3	Sidewalks	0.684	1	0.684
4	Parking	1.566	1	1.566
5	Landscape	0.9	0.1	0.09
6	Detention Pond	0.887	0.1	0.0887
7	Soil D	0.84	0.4	0.336
8	Soil D	0.79	0.4	0.316
	A_T =	8.70		
	$I_F = \frac{\sum_{n=1}^{7}\left((I_{Fn}) * A_n\right)}{A_T} =$	0.70		

Santa Margarita Watershed

BMP Design Volume, V_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

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

Company Name	VCA Engineers, Inc.	Date	2/14/2020
Designed by	VCA Engineers, Inc.	County/City Case No	
Company Project Number/Name	Medical Office Building		
Drainage Area Number/Name	All DMAs		

Enter the Area Tributary to this Feature A_T = 8.7 acres

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

Site Location

Township	Wildomar
Range	
Section	

Enter the 85^{th} Percentile, 24-hour Rainfall Depth D_{85} = 0.70

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.70

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ C = 0.50

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$ V_u = 0.35 (in*ac)/ac

Calculate the design storage volume of the BMP, V_{BMP}.

$$V_{BMP}\ (ft^3) = \frac{V_U\ (in\text{-}ac/ac) \times A_T\ (ac) \times 43{,}560\ (ft^2/ac)}{12\ (in/ft)}$$

V_{BMP} = 11,053 ft^3

Notes:

Santa Margarita Watershed

BMP Design Flow Rate, Q_{BMP} (Rev. 03-2012)

Legend: Required Entries / Calculated Cells

Company Name	VCA Engineers, Inc.	Date	2/14/2020
Designed by	VCA Engineers, Inc.	County/City Case No	
Company Project Number/Name	Medical Office Building		
Drainage Area Number/Name	All DMAs		

Enter the Area Tributary to this Feature $A_T =$ 8.7 acres

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction $I_f =$ 0.70

Calculate the composite Runoff Coefficient, C for the BMP Tributary Area

Use the following equation based on the WEF/ASCE Method

$C = 0.858I_f^3 - 0.78I_f^2 + 0.774I_f + 0.04$ $C =$ 0.49

BMP Design Flow Rate

$Q_{BMP} = C \times I \times A_T$ $Q_{BMP} =$ 0.9 ft^3/s

Notes:

Biofiltration with No Infiltration Facility - Design Procedure	BMP ID	Legend:	Required Entries	
			Calculated Cells	

Company Name:	VCA Engineers, Inc.	Date:	2/14/2020
Designed by:	VCA Engineers, Inc.	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	8.7	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	11,053	ft^3
Estimated footprint of BMP, $Area_{BMP}$ (available space or 3% imp. area)	$Area_{BMP}$=	5,700	ft^2

Note: This area shall be measured at the mid-ponding depth of the BMP. For systems with side-slopes, this should be the contour that is midway between the floor of the basin and the maximum water quality ponding elevation of the basin. The underlying gravel layer for drain pipes should extend to this contour. For systems with vertical walls, the effective area is the full footprint.

Biofiltration with No Infiltration Facility Surface Area

Depth of Surface Ponding Layer (6" minimum, 12" maximum)	d_P =	12.0	inches
Depth of Engineered Soil Media (24" to 36"; 18" if vertically constrained)	d_S =	36.0	inches
Design Media Filtration Rate (2.5 in/hr)	I_{design} =	2.5	in/hr
Allowable Routing Period, $T_{routing}$ (5 hrs)	$T_{routing}$ =	5.0	hr
Effective Biofiltration Depth, d_{E_bio} d_{E_bio} (ft) = (d_P + (0.3 x d_S) + (I_{design} * $T_{routing}$)) (ft)	d_{E_bio} =	2.9	ft
Effective Static Depth, $d_{E\_bio\_static}$ $d_{E\_bio\_static}$ = (d_P + (0.3 * d_S)) (ft)	$d_{E\_bio\_static}$ =	1.9	ft
$V_{biofiltered} = d_{E\_bio} * Area_{BMP}$	$V_{biofiltered}$ =	16767.5	ft^3
$V_{biofiltered\_static} = d_{E\_bio\_static} * Area_{BMP}$	$V_{biofiltered\_static}$ =	10830.0	ft^3

Sizing Option 1 Result

Criteria 1: $V_{biofiltered\ (with\ routing)} \geq$ 150% of V_{BMP} — Results: PASS

Sizing Option 2 Result

Criteria 2: $V_{biofiltered\_static} \geq 0.75 \times V_{BMP}$ — Results: PASS

Note

If neither of these criteria are met increase the footprint and rerun calculations. This calculation is inherently iterative.

Biofiltration with No Retention Facility Properties

Side Slopes in Partial Retention with Biofiltration Facility	z = 4	:1
Diameter of Underdrain	6	inches
Longitudinal Slope of Site (3% maximum)	0	%
Check Dam Spacing	0	feet
Describe Vegetation:	Natural Grasses	

Notes:

Appendix 7: Hydromodification

Supporting Detail Relating to compliance with the Hydromodification Performance Standards

Examples of material to provide in Appendix 7 may include but are not limited to the following:

- Hydromodification Exemption Exhibit,
- Potential Critical Coarse Sediment Yield Area Mapping
- Hydromodification BMP sizing calculations,
- SMRHM report files,
- Site-Specific Critical Coarse Sediment Analysis,
- Design details/drawings from manufacturers for proprietary BMPs

This information should support the hydromodification exemption (if applicable) and hydrologic control BMP and Sediment Supply BMP sections of this Template. Refer to Section 2.4 and 3.6 of the SMR WQMP and Sections E of this Template.

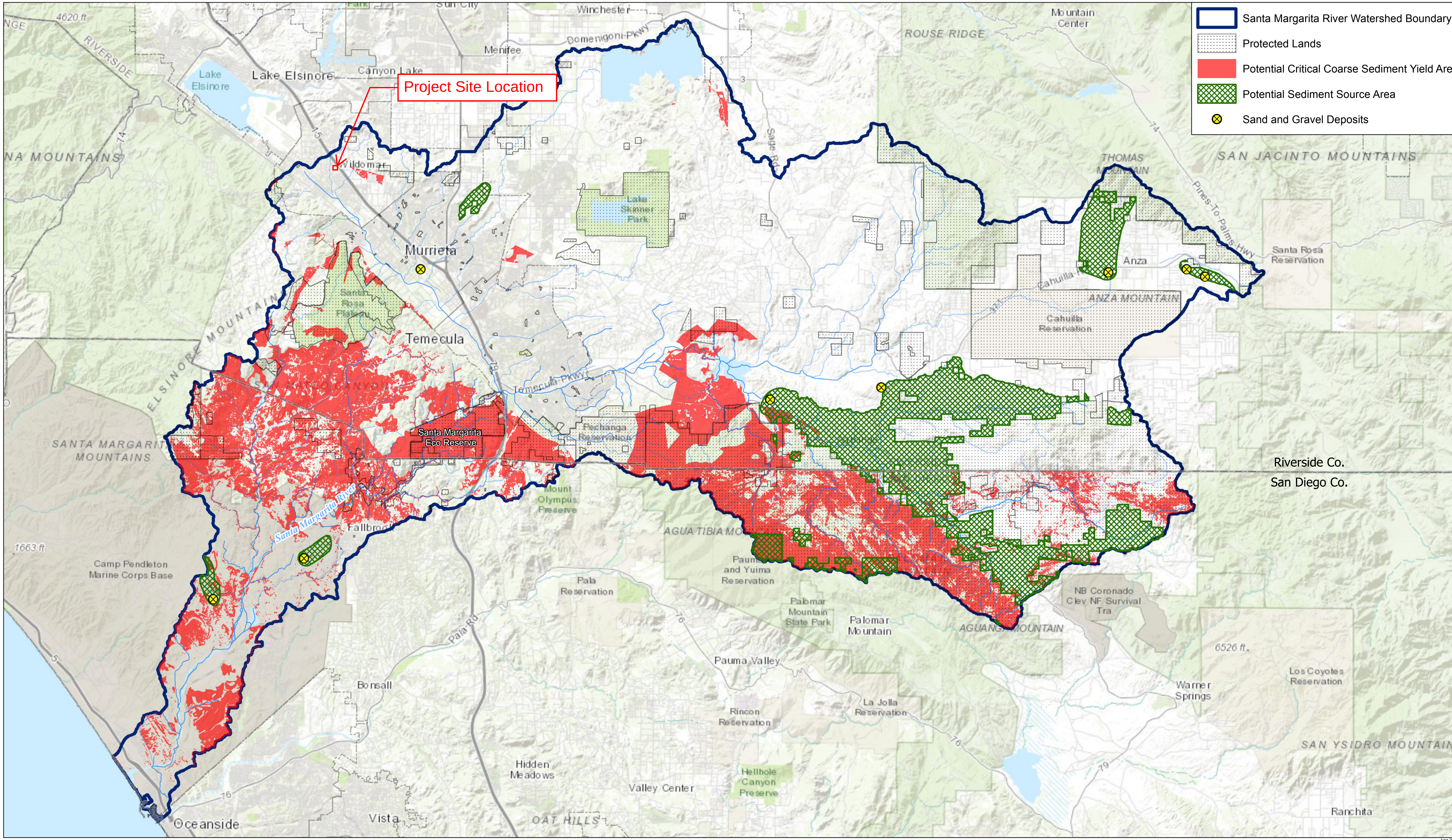


Exhibit G-1

SANTA MARGARITA RIVER WATERSHED

POTENTIAL CRITICAL COARSE SEDIMENT YIELD AREAS AND POTENTIAL SEDIMENT SOURCE AREAS

SMRHM

PROJECT REPORT

General Model Information

Project Name:	Wildomar MOB
Site Name:	Medical Office Building
Site Address:	Baxter Rd and the 15 Interstate Freeqay
City:	Wildomar
Report Date:	2/13/2020
Gage:	Wildomar / North Murrieta
Data Start:	1949/10/01
Data End:	2011/09/30
Timestep:	15 Minute
Precip Scale:	1.000
Version Date:	2019/12/01

POC Thresholds

Low Flow Threshold for POC1:	10 Percent of the 2 Year
High Flow Threshold for POC1:	10 Year

Landuse Basin Data
Predeveloped Land Use

DMA 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
C D,Grass,Mod(5-10%)	7.91
C D,Grass,Very(>20%)	0.79
Pervious Total	8.7
Impervious Land Use	acre
Impervious Total	0
Basin Total	8.7

Element Flows To:

Surface	Interflow	Groundwater

Mitigated Land Use

DMA 1

Bypass:	No
GroundWater:	No
Pervious Land Use	acre
A,Grass,Flat(0-5%)	1.789
C D,Grass,Mod(5-10%)	0.84
C D,Grass,Very(>20%)	0.79
Pervious Total	3.419
Impervious Land Use	acre
Roads,Flat(0-5%)	2.378
Roof Area	0.653
Sidewalks,Flat(0-5%)	0.684
Parking,Flat(0-5%)	1.566
Impervious Total	5.281
Basin Total	8.7

Element Flows To:

Surface	Interflow	Groundwater
Trapezoidal Pond 1	Trapezoidal Pond 1	

Routing Elements
Predeveloped Routing

Mitigated Routing

Trapezoidal Pond 1

Bottom Length:	260.00 ft.
Bottom Width:	70.00 ft.
Depth:	4.5 ft.
Volume at riser head:	1.7526 acre-feet.
Side slope 1:	3 To 1
Side slope 2:	3 To 1
Side slope 3:	3 To 1
Side slope 4:	3 To 1
Discharge Structure	
Riser Height:	3.5 ft.
Riser Diameter:	36 in.
Notch Type:	Rectangular
Notch Width:	1.500 ft.
Notch Height:	0.500 ft.
Orifice 1 Diameter:	1.842 in. Elevation:0 ft.
Element Flows To:	
Outlet 1	Outlet 2

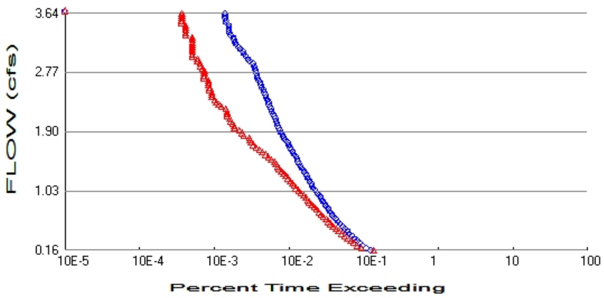
Pond Hydraulic Table

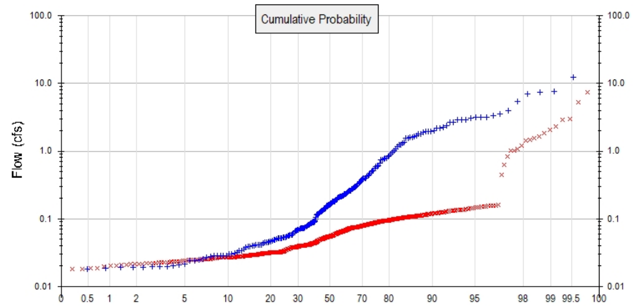
Stage(feet)	**Area(ac.)**	**Volume(ac-ft.)**	**Discharge(cfs)**	**Infilt(cfs)**
0.0000	0.417	0.000	0.000	0.000
0.0500	0.420	0.020	0.020	0.000
0.1000	0.422	0.042	0.029	0.000
0.1500	0.424	0.063	0.035	0.000
0.2000	0.426	0.084	0.041	0.000
0.2500	0.429	0.105	0.046	0.000
0.3000	0.431	0.127	0.050	0.000
0.3500	0.433	0.149	0.054	0.000
0.4000	0.436	0.170	0.058	0.000
0.4500	0.438	0.192	0.061	0.000
0.5000	0.440	0.214	0.065	0.000
0.5500	0.443	0.236	0.068	0.000
0.6000	0.445	0.258	0.071	0.000
0.6500	0.447	0.281	0.074	0.000
0.7000	0.450	0.303	0.077	0.000
0.7500	0.452	0.326	0.079	0.000
0.8000	0.454	0.348	0.082	0.000
0.8500	0.457	0.371	0.084	0.000
0.9000	0.459	0.394	0.087	0.000
0.9500	0.461	0.417	0.089	0.000
1.0000	0.464	0.440	0.092	0.000
1.0500	0.466	0.464	0.094	0.000
1.1000	0.468	0.487	0.096	0.000
1.1500	0.471	0.511	0.098	0.000
1.2000	0.473	0.534	0.100	0.000
1.2500	0.475	0.558	0.102	0.000
1.3000	0.478	0.582	0.105	0.000
1.3500	0.480	0.606	0.107	0.000
1.4000	0.483	0.630	0.108	0.000
1.4500	0.485	0.654	0.110	0.000
1.5000	0.487	0.678	0.112	0.000
1.5500	0.490	0.703	0.114	0.000

1.6000	0.492	0.727	0.116	0.000
1.6500	0.495	0.752	0.118	0.000
1.7000	0.497	0.777	0.120	0.000
1.7500	0.499	0.802	0.121	0.000
1.8000	0.502	0.827	0.123	0.000
1.8500	0.504	0.852	0.125	0.000
1.9000	0.507	0.877	0.126	0.000
1.9500	0.509	0.903	0.128	0.000
2.0000	0.512	0.928	0.130	0.000
2.0500	0.514	0.954	0.131	0.000
2.1000	0.516	0.980	0.133	0.000
2.1500	0.519	1.006	0.135	0.000
2.2000	0.521	1.032	0.136	0.000
2.2500	0.524	1.058	0.138	0.000
2.3000	0.526	1.084	0.139	0.000
2.3500	0.529	1.111	0.141	0.000
2.4000	0.531	1.137	0.142	0.000
2.4500	0.534	1.164	0.144	0.000
2.5000	0.536	1.190	0.145	0.000
2.5500	0.539	1.217	0.147	0.000
2.6000	0.541	1.244	0.148	0.000
2.6500	0.544	1.271	0.149	0.000
2.7000	0.546	1.299	0.151	0.000
2.7500	0.549	1.326	0.152	0.000
2.8000	0.551	1.354	0.154	0.000
2.8500	0.554	1.381	0.155	0.000
2.9000	0.556	1.409	0.156	0.000
2.9500	0.559	1.437	0.158	0.000
3.0000	0.561	1.465	0.159	0.000
3.0500	0.564	1.493	0.216	0.000
3.1000	0.566	1.521	0.320	0.000
3.1500	0.569	1.550	0.453	0.000
3.2000	0.571	1.578	0.611	0.000
3.2500	0.574	1.607	0.790	0.000
3.3000	0.576	1.636	0.988	0.000
3.3500	0.579	1.665	1.202	0.000
3.4000	0.581	1.694	1.433	0.000
3.4500	0.584	1.723	1.678	0.000
3.5000	0.587	1.752	1.938	0.000
3.5500	0.589	1.782	2.295	0.000
3.6000	0.592	1.811	2.946	0.000
3.6500	0.594	1.841	3.788	0.000
3.7000	0.597	1.871	4.783	0.000
3.7500	0.599	1.900	5.908	0.000
3.8000	0.602	1.931	7.144	0.000
3.8500	0.605	1.961	8.477	0.000
3.9000	0.607	1.991	9.892	0.000
3.9500	0.610	2.021	11.37	0.000
4.0000	0.612	2.052	12.91	0.000
4.0500	0.615	2.083	14.49	0.000
4.1000	0.618	2.114	16.10	0.000
4.1500	0.620	2.145	17.72	0.000
4.2000	0.623	2.176	19.33	0.000
4.2500	0.625	2.207	20.93	0.000
4.3000	0.628	2.238	22.50	0.000
4.3500	0.631	2.270	24.02	0.000
4.4000	0.633	2.301	25.49	0.000
4.4500	0.636	2.333	26.88	0.000

4.5000	0.639	2.365	28.20	0.000
4.5500	0.641	2.397	29.43	0.000

Analysis Results
POC 1





+ Predeveloped x Mitigated

Predeveloped Landuse Totals for POC #1
Total Pervious Area: 8.7
Total Impervious Area: 0

Mitigated Landuse Totals for POC #1
Total Pervious Area: 3.419
Total Impervious Area: 5.281

Flow Frequency Method: Cunnane

Flow Frequency Return Periods for Predeveloped. POC #1

Return Period	**Flow(cfs)**
2 year	1.582068
5 year	2.964769
10 year	3.642447
25 year	7.464015

Flow Frequency Return Periods for Mitigated. POC #1

Return Period	**Flow(cfs)**
2 year	0.143008
5 year	1.108705
10 year	1.89563
25 year	3.141289

Duration Flows

The Facility PASSED

Flow(cfs)	Predev	Mit	Percentage	Pass/Fail
0.1582	2665	2950	110	Pass
0.1934	2346	2029	86	Pass
0.2286	2111	1762	83	Pass
0.2638	1925	1594	82	Pass
0.2990	1760	1445	82	Pass
0.3342	1631	1321	80	Pass
0.3694	1523	1213	79	Pass
0.4046	1410	1099	77	Pass
0.4398	1319	1006	76	Pass
0.4750	1218	928	76	Pass
0.5102	1139	850	74	Pass
0.5453	1053	787	74	Pass
0.5805	988	737	74	Pass
0.6157	917	686	74	Pass
0.6509	853	628	73	Pass
0.6861	813	582	71	Pass
0.7213	777	547	70	Pass
0.7565	735	508	69	Pass
0.7917	696	477	68	Pass
0.8269	664	438	65	Pass
0.8621	630	408	64	Pass
0.8973	610	387	63	Pass
0.9325	576	367	63	Pass
0.9677	543	340	62	Pass
1.0029	521	315	60	Pass
1.0381	486	292	60	Pass
1.0733	460	272	59	Pass
1.1085	440	254	57	Pass
1.1436	428	241	56	Pass
1.1788	410	226	55	Pass
1.2140	393	213	54	Pass
1.2492	374	199	53	Pass
1.2844	361	185	51	Pass
1.3196	345	173	50	Pass
1.3548	328	161	49	Pass
1.3900	312	153	49	Pass
1.4252	296	146	49	Pass
1.4604	288	138	47	Pass
1.4956	279	125	44	Pass
1.5308	269	115	42	Pass
1.5660	256	106	41	Pass
1.6012	244	95	38	Pass
1.6364	233	88	37	Pass
1.6716	224	79	35	Pass
1.7068	217	72	33	Pass
1.7420	207	68	32	Pass
1.7771	195	65	33	Pass
1.8123	184	64	34	Pass
1.8475	179	54	30	Pass
1.8827	170	51	30	Pass
1.9179	163	47	28	Pass
1.9531	157	40	25	Pass
1.9883	153	40	26	Pass

2.0235	151	38	25	Pass
2.0587	146	36	24	Pass
2.0939	143	35	24	Pass
2.1291	137	32	23	Pass
2.1643	132	32	24	Pass
2.1995	127	32	25	Pass
2.2347	123	31	25	Pass
2.2699	119	27	22	Pass
2.3051	116	25	21	Pass
2.3403	115	23	20	Pass
2.3755	113	22	19	Pass
2.4106	107	20	18	Pass
2.4458	104	20	19	Pass
2.4810	101	20	19	Pass
2.5162	99	19	19	Pass
2.5514	93	19	20	Pass
2.5866	91	18	19	Pass
2.6218	90	18	20	Pass
2.6570	86	18	20	Pass
2.6922	83	16	19	Pass
2.7274	81	16	19	Pass
2.7626	79	16	20	Pass
2.7978	78	16	20	Pass
2.8330	75	15	20	Pass
2.8682	74	14	18	Pass
2.9034	72	14	19	Pass
2.9386	65	13	20	Pass
2.9738	61	13	21	Pass
3.0089	57	11	19	Pass
3.0441	54	11	20	Pass
3.0793	53	11	20	Pass
3.1145	48	11	22	Pass
3.1497	46	11	23	Pass
3.1849	43	11	25	Pass
3.2201	41	11	26	Pass
3.2553	40	11	27	Pass
3.2905	39	11	28	Pass
3.3257	36	9	25	Pass
3.3609	35	9	25	Pass
3.3961	34	9	26	Pass
3.4313	34	9	26	Pass
3.4665	34	9	26	Pass
3.5017	31	8	25	Pass
3.5369	31	8	25	Pass
3.5721	30	8	26	Pass
3.6073	30	8	26	Pass
3.6424	30	8	26	Pass

Water Quality

Rational Method

Data for Rational Method is not available.

Model Default Modifications

Total of 0 changes have been made.

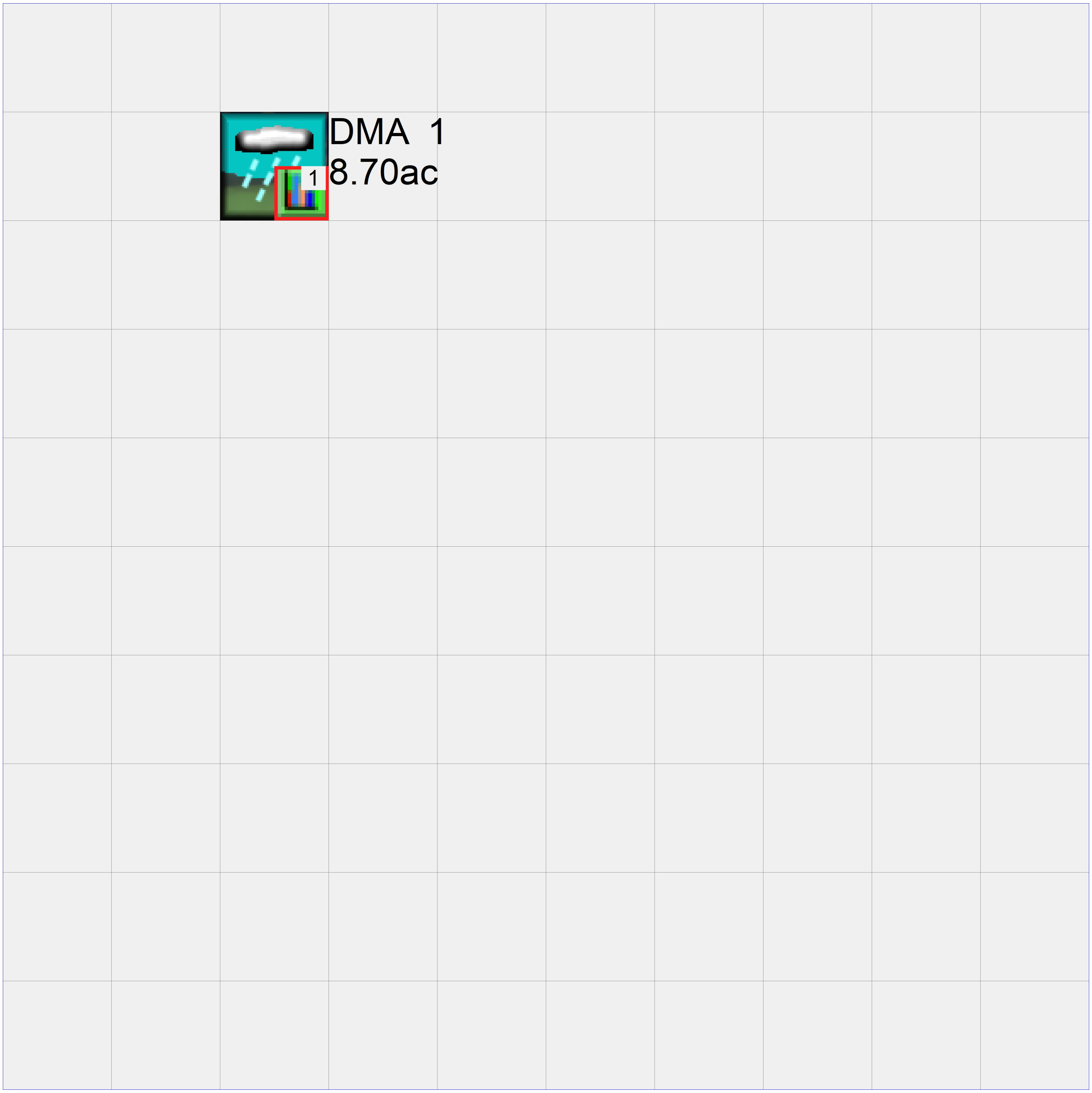
PERLND Changes

No PERLND changes have been made.

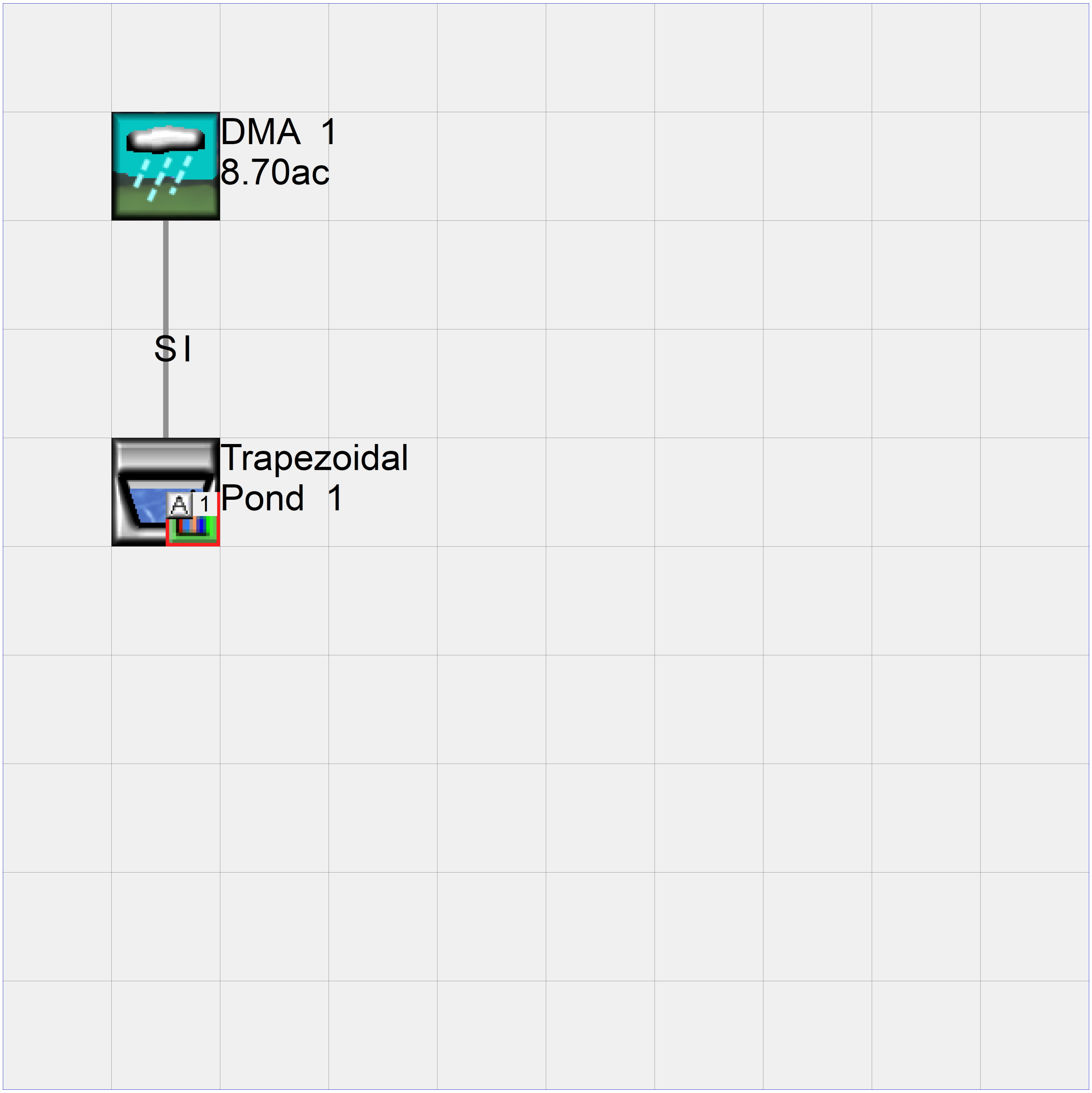
IMPLND Changes

No IMPLND changes have been made.

Appendix
Predeveloped Schematic



Mitigated Schematic



Predeveloped UCI File

Mitigated UCI File

Predeveloped HSPF Message File

Mitigated HSPF Message File

Disclaimer

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Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

Include a copy of the completed Pollutant Sources/Source Control Checklist used to document Source Control BMPs in Section H of this Template.

Attachment 1
S T O R M W A T E R   P O L L U T A N T   S O U R C E S / S O U R C E   C O N T R O L   C H E C K L I S T

How to use this worksheet (also see instructions in Section H of the 2018 SMR WQMP Template):

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

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	**… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE**		
1 Potential Sources of Runoff Pollutants	**2 Permanent Controls—Show on WQMP Drawings**	**3 Permanent Controls—List in WQMP Table and Narrative**	**4 Operational BMPs—Include in WQMP Table and Narrative**
❑ **A.** On-site storm drain inlets	❑ Locations of inlets.	❑ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify.	❑ Maintain and periodically repaint or replace inlet markings. ❑ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ❑ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ❑ Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains."
❑ **B.** Interior floor drains and elevator shaft sump pumps		❑ State that interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.
❑ **C.** Interior parking garages		❑ State that parking garage floor drains will be plumbed to the sanitary sewer.	❑ Inspect and maintain drains to prevent blockages and overflow.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	**… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE**		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **D1.** Need for future indoor & structural pest control		❑ Note building design features that discourage entry of pests.	❑ Provide Integrated Pest Management information to owners, lessees, and operators.
❑ **D2.** Landscape/ Outdoor Pesticide Use	❑ Show locations of native trees or areas of shrubs and ground cover to be undisturbed and retained. ❑ Show self-retaining landscape areas, if any. ❑ Show stormwater treatment and hydrograph modification management BMPs.	State that final landscape plans will accomplish all of the following. ❑ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ❑ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ❑ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ❑ Consider using pest-resistant plants, especially adjacent to hardscape. To insure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions.	❑ Maintain landscaping using minimum or no pesticides. ❑ See applicable operational BMPs in "What you should know for…..Landscape and Gardening" at: http://www.rcwatershed.org/about/materials-library/#1450469138395-bb76dd39-d810 ❑ Provide IPM information to new owners, lessees and operators.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **E.** Pools, spas, ponds, decorative fountains, and other water features.	❑ Show location of water feature and a sanitary sewer cleanout in an accessible area within 10 feet. (Exception: Public pools must be plumbed according to County Department of Environmental Health Guidelines.)	If the Co-Permittee requires pools to be plumbed to the sanitary sewer, place a note on the plans and state in the narrative that this connection will be made according to local requirements.	❑ See applicable operational BMPs in "Guidelines for Maintaining Your Swimming Pool, Jacuzzi and Garden Fountain" at: http://www.rcwatershed.org/about/materials-library/#1450469201433-f5f358c9-6008
❑ **F.** Food service	❑ For restaurants, grocery stores, and other food service operations, show location (indoors or in a covered area outdoors) of a floor sink or other area for cleaning floor mats, containers, and equipment. ❑ On the drawing, show a note that this drain will be connected to a grease interceptor before discharging to the sanitary sewer.	❑ Describe the location and features of the designated cleaning area. ❑ Describe the items to be cleaned in this facility and how it has been sized to insure that the largest items can be accommodated.	❑ See the brochure, "The Food Service Industry Best Management Practices for: Restaurants, Grocery Stores, Delicatessens and Bakeries" at http://www.rcwatershed.org/about/materials-library/#1450389926766-61e8af0b-53a9 Provide this brochure to new site owners, lessees, and operators.
❑ **G.** Refuse areas	❑ Show where site refuse and recycled materials will be handled and stored for pickup. See local municipal requirements for sizes and other details of refuse areas. ❑ If dumpsters or other receptacles are outdoors, show how the designated area will be covered, graded, and paved to prevent run-on and show locations of berms to prevent runoff from the area. ❑ Any drains from dumpsters, compactors, and tallow bin areas shall be connected to a grease removal device before discharge to sanitary sewer.	❑ State how site refuse will be handled and provide supporting detail to what is shown on plans. ❑ State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar.	❑ State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 Potential Sources of Runoff Pollutants	**2 Permanent Controls—Show on WQMP Drawings**	**3 Permanent Controls—List in WQMP Table and Narrative**	**4 Operational BMPs—Include in WQMP Table and Narrative**
❑ **H.** Industrial processes.	❑ Show process area.	❑ If industrial processes are to be located on site, state: "All process activities to be performed indoors. No processes to drain to exterior or to storm drain system."	❑ See Fact Sheet SC-10, "Non-Stormwater Discharges" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com See the brochure "Industrial & Commercial Facilities Best Management Practices for: Industrial, Commercial Facilities" at: http://www.rcwatershed.org/about/materials-library/#1450389926766-61e8af0b-53a9
❑ **I.** Outdoor storage of equipment or materials. (See rows J and K for source control measures for vehicle cleaning, repair, and maintenance.)	❑ Show any outdoor storage areas, including how materials will be covered. Show how areas will be graded and bermed to prevent run-on or run-off from area. ❑ Storage of non-hazardous liquids shall be covered by a roof and/or drain to the sanitary sewer system, and be contained by berms, dikes, liners, or vaults. ❑ Storage of hazardous materials and wastes must be in compliance with the local hazardous materials ordinance and a Hazardous Materials Management Plan for the site.	❑ Include a detailed description of materials to be stored, storage areas, and structural features to prevent pollutants from entering storm drains. Where appropriate, reference documentation of compliance with the requirements of Hazardous Materials Programs for: ▪ Hazardous Waste Generation ▪ Hazardous Materials Release Response and Inventory ▪ California Accidental Release (CalARP) ▪ Aboveground Storage Tank ▪ Uniform Fire Code Article 80 Section 103(b) & (c) 1991 ▪ Underground Storage Tank www.cchealth.org/groups/hazmat/	❑ See the Fact Sheets SC-31, "Outdoor Liquid Container Storage" and SC-33, "Outdoor Storage of Raw Materials " in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **J.** Vehicle and Equipment Cleaning	❑ Show on drawings as appropriate: (1) Commercial/industrial facilities having vehicle/equipment cleaning needs shall either provide a covered, bermed area for washing activities or discourage vehicle/equipment washing by removing hose bibs and installing signs prohibiting such uses. (2) Multi-dwelling complexes shall have a paved, bermed, and covered car wash area (unless car washing is prohibited on-site and hoses are provided with an automatic shut-off to discourage such use). (3) Washing areas for cars, vehicles, and equipment shall be paved, designed to prevent run-on to or runoff from the area, and plumbed to drain to the sanitary sewer. (4) Commercial car wash facilities shall be designed such that no runoff from the facility is discharged to the storm drain system. Wastewater from the facility shall discharge to the sanitary sewer, or a wastewater reclamation system shall be installed.	❑ If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced.	Describe operational measures to implement the following (if applicable): ❑ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at: http://www.rcwatershed.org/about/materials-library/#1450389926766-61e8af0b-53a9 ❑ Car dealerships and similar may rinse cars with water only.

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **K.** Vehicle/Equipment Repair and Maintenance	❑ Accommodate all vehicle equipment repair and maintenance indoors. Or designate an outdoor work area and design the area to prevent run-on and runoff of stormwater. ❑ Show secondary containment for exterior work areas where motor oil, brake fluid, gasoline, diesel fuel, radiator fluid, acid-containing batteries or other hazardous materials or hazardous wastes are used or stored. Drains shall not be installed within the secondary containment areas. ❑ Add a note on the plans that states either (1) there are no floor drains, or (2) floor drains are connected to wastewater pretreatment systems prior to discharge to the sanitary sewer and an industrial waste discharge permit will be obtained.	❑ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ❑ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ❑ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements.	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ❑ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinsewater from parts cleaning into storm drains. ❑ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ❑ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment. Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations; "Outdoor Cleaning Activities;" and "Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants. Brochures can be found at: http://www.rcwatershed.org/about/materials-library/#1450389926766-61e8af0b-53a9

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	**… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE**		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **L.** Fuel Dispensing Areas	❑ Fueling areas[6] shall have impermeable floors (i.e., portland cement concrete or equivalent smooth impervious surface) that are: a) graded at the minimum slope necessary to prevent ponding; and b) separated from the rest of the site by a grade break that prevents run-on of stormwater to the maximum extent practicable. ❑ Fueling areas shall be covered by a canopy that extends a minimum of ten feet in each direction from each pump. [Alternative: The fueling area must be covered and the cover's minimum dimensions must be equal to or greater than the area within the grade break or fuel dispensing area[1].] The canopy [or cover] shall not drain onto the fueling area.		❑ The property owner shall dry sweep the fueling area routinely. ❑ See the Fact Sheet SD-30 , "Fueling Areas" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

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

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **M.** Loading Docks	❑ Show a preliminary design for the loading dock area, including roofing and drainage. Loading docks shall be covered and/or graded to minimize run-on to and runoff from the loading area. Roof downspouts shall be positioned to direct stormwater away from the loading area. Water from loading dock areas shall be drained to the sanitary sewer, or diverted and collected for ultimate discharge to the sanitary sewer. ❑ Loading dock areas draining directly to the sanitary sewer shall be equipped with a spill control valve or equivalent device, which shall be kept closed during periods of operation. ❑ Provide a roof overhang over the loading area or install door skirts (cowling) at each bay that enclose the end of the trailer.		❑ Move loaded and unloaded items indoors as soon as possible. ❑ See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **N.** Fire Sprinkler Test Water		❑ Provide a means to drain fire sprinkler test water to the sanitary sewer.	❑ See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com
O. Miscellaneous Drain or Wash Water or Other Sources ❑ Boiler drain lines ❑ Condensate drain lines ❑ Rooftop equipment ❑ Drainage sumps ❑ Roofing, gutters, and trim. ❑ Other sources		❑ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ❑ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ❑ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ❑ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ❑ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. ❑ Include controls for other sources as specified by local reviewer.	

IF THESE SOURCES WILL BE ON THE PROJECT SITE …	… THEN YOUR WQMP SHOULD INCLUDE THESE SOURCE CONTROL BMPs, AS APPLICABLE		
1 **Potential Sources of Runoff Pollutants**	**2** **Permanent Controls—Show on WQMP Drawings**	**3** **Permanent Controls—List in WQMP Table and Narrative**	**4** **Operational BMPs—Include in WQMP Table and Narrative**
❑ **P.** Plazas, sidewalks, and parking lots.			❑ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of litter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Appendix 9: O&M

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

Include the completed Operation and Maintenance Plan in this Appendix along with additional documentation of Finance and Maintenance Recording Mechanisms for the site. Refer to Sections 3.10 and 5 of the SMR WQMP and Section J of this Template.

Operation and Maintenance Plan for Permanent BMPs at Wildomar MOB

Background

The project is located in an area bounded by the I-15 freeway to the east, Baxter Rd to the south, and undeveloped land to the west and north of the site. The following water quality best management practices (BMP) or flood control measures are proposed for the project area:

- Detention Pond for Hydromodification and Biofiltration with no Underdrain
- Contech CDS Unit
- Fox Drain Diversion System
- Catch Basin and Trench Drain inserts

The project's utility plans also show the locations of the BMPs.

Maintenance Responsibility

The property owner is responsible for BMP maintenance. The owner shall prove the financial ability to necessary to maintain the BMPs and shall sign an agreement with the City of Wildomar to uphold maintenance required.

Maintenance Actions and Frequency

Maintenance actions are generally grouped into two categories: routine and intermittent.

Routine Maintenance

Routine inspections of above ground detention basin is expected to be done twice per year. During these inspections, the staff shall evaluate if there is significant accumulation of trash, debris, or sediment that would need to be removed. Cleaning is done as needed based on the results of the inspections. The inspection frequency may be adjusted based on experience at the site (e.g., if inspections rarely find any material that needs to be cleaned out, then the inspection frequency can be reduced).

Routine inspections for proprietary units such as the CDS Unit and Fox Drain system shall be done per the manufacturer's recommendations. Additional information shall be included in Appendix 10 of the WQMP.

Catch Basin and Trench Drain inserts shall be inspected at least three times a year. Refer to Appendix 10 for recommendations.

Intermittent Maintenance

Intermittent maintenance activities include more substantial maintenance that is not required as frequently as routine maintenance. The most likely form of intermediate maintenance is removal of sediment from the detention basin where necessary to maintain the capacity of the basin. Given the infrequency of the rain in the City of Wildomar, this type of maintenance is expected to be required approximately once every five to 10 years, with a frequency closer to once every 10 years being more likely.

Maintenance Procedures

During each maintenance visit, the maintenance crew will evaluate the detention basin by inspecting for the maintenance indicators in Table 1. When a maintenance indicator is observed, the action described in the "Maintenance Actions" column will be taken. Note that regardless of the projected maintenance type (routine or intermittent) described in the previous section, when a maintenance indicator is observed, the required maintenance action will be taken. For example, if significant sediment accumulation in an above ground basin is observed in year three instead, then the accumulated sediment will still be cleaned out, even though the estimated frequency was once every five to 10 years.

Table 1. Maintenance Indicators and Actions for Vegetated BMPs

Typical Maintenance Indicator(s) for Detention Basins	Maintenance Actions
Poor vegetation establishment	Repair/re-seed/re-plant or re-establish vegetation per original plans. Apply routine watering and controlled nutrient release to help establish vegetation.
Overgrown vegetation	Mow or trim as appropriate, but not less than the design height of the vegetation per original plans when applicable (e.g. a vegetated swale may require a minimum vegetation height).
Erosion due to concentrated irrigation flow	Repair/re-seed/re-plant eroded areas and adjust the irrigation system. Install rock-slope-protection to control concentrated flows.
Erosion due to concentrated storm water runoff flow	Repair/re-seed/re-plant eroded areas and make appropriate corrective measures such as adding erosion control blankets, adding stone at flow entry points, or re-grading where necessary.
Accumulation of sediment, litter, or debris	Remove and properly dispose of accumulated materials, without damage to the basin or cleanout structures.
Standing water	Adjust irrigation system, remove any obstructions of debris or invasive vegetation, loosen or replace top soil to allow for better infiltration, or minor re-grading for proper drainage. If the issue is not corrected by restoring the basin to the original plan and grade, the Director of Public Works shall be contacted prior to any additional repairs or reconstruction.
Obstructed inlet or outlet structure	Clear obstructions.
Damage to structural components such as weirs, inlet or outlet structures	Repair or replace as applicable.

Appendix 10: Educational Materials

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

Examples of material to provide in Appendix 10 may include but are not limited to the following:

- BMP Fact Sheets for proposed BMPs form Exhibit C: LID BMP Design Handbook of the SMR WQMP,
- Source control information and training material for site owners and operators,
- O&M training material,
- Other educational/training material related to site drainage and BMPs.

Catch Basin and Trench Drain Filter Inserts

The inspection and maintenance program will include the following key components:

1. Regular Sweeping and Removal of Debris:

Sediment and debris (litter, leaves, papers and cans, etc.) within the area, especially around the drainage inlet, will be collected and removed. The frequency of sweeping will be based on the amount of sediment and debris generated.

2. Regular Inspections:

The catch basin or trench drain filter insert will be inspected on a regular basis. The frequency of inspection will be based on pollutant loading, amount of debris, leaves, etc., and amount of runoff. At a minimum, there will be three inspections per year.

3. Conduct of The Visual Inspections:

a. Broom sweep around the inlet and remove the inlet grate.

b. Inspect the filter liner for serviceability. If called for, the filter body will be replaced.

c. Check the condition of the adsorbent pouches and visually check the condition of the enclosed adsorbent. If the surface of the granules is more than 50% coated with a dark gray or black substance, the pouches will be replaced with new ones.

d. Check for loose or missing nuts (on some models) and gaps between the filter and the inlet wall, which would allow bypass of the filter during low flows.

e. The filter components will be replaced in the inlet and the grate replaced.

4. Cleaning Out The Filter Insert:

Regardless of the model of filter insert, the devices must be cleaned out on a recurring basis. It is recommended that there be at least three cleanings per year – more in high exposure areas. The filter should be cleaned when the solids level reaches close to the full tip.

a. The Standard Filter, in most cases, can be cleaned out by removing the device from the inlet and dumping the contents into a DOT approved drum for later disposal. If the oil-absorbent pouches need to be changed, the time to change them is immediately after dumping and before the filter is replaced in the inlet.

b. Because of weight, method of installation and so forth, some filter inserts will be cleaned with the aid of a vector truck. If necessary, the oil-absorbent pouches will be changed after the pollutants have been removed and as the filter is being returned to service.

5. Stenciling

Legibility of stencils and/ or signs at all storm drain inlets and catch basins within the project area must be maintained at all time.

6. Maintenance Log

Keep a log of all inspection and maintenance performed on the catch basin and trench drain filter inserts. Keep this log on-site.

CONTECH®
ENGINEERED SOLUTIONS

CDS® Inspection and Maintenance Guide

CDS TECHNOLOGIES

Maintenance

The CDS system should be inspected at regular intervals and maintained when necessary to ensure optimum performance. The rate at which the system collects pollutants will depend more heavily on site activities than the size of the unit. For example, unstable soils or heavy winter sanding will cause the grit chamber to fill more quickly but regular sweeping of paved surfaces will slow accumulation.

Inspection

Inspection is the key to effective maintenance and is easily performed. Pollutant transport and deposition may vary from year to year and regular inspections will help ensure that the system is cleaned out at the appropriate time. At a minimum, inspections should be performed twice per year (e.g. spring and fall) however more frequent inspections may be necessary in climates where winter sanding operations may lead to rapid accumulations, or in equipment washdown areas. Installations should also be inspected more frequently where excessive amounts of trash are expected.

The visual inspection should ascertain that the system components are in working order and that there are no blockages or obstructions in the inlet and separation screen. The inspection should also quantify the accumulation of hydrocarbons, trash, and sediment in the system. Measuring pollutant accumulation can be done with a calibrated dipstick, tape measure or other measuring instrument. If absorbent material is used for enhanced removal of hydrocarbons, the level of discoloration of the sorbent material should also be identified during inspection. It is useful and often required as part of an operating permit to keep a record of each inspection. A simple form for doing so is provided.

Access to the CDS unit is typically achieved through two manhole access covers. One opening allows for inspection and cleanout of the separation chamber (cylinder and screen) and isolated sump. The other allows for inspection and cleanout of sediment captured and retained outside the screen. For deep units, a single manhole access point would allows both sump cleanout and access outside the screen.

The CDS system should be cleaned when the level of sediment has reached 75% of capacity in the isolated sump or when an appreciable level of hydrocarbons and trash has accumulated. If absorbent material is used, it should be replaced when significant discoloration has occurred. Performance will not be impacted until 100% of the sump capacity is exceeded however it is recommended that the system be cleaned prior to that for easier removal of sediment. The level of sediment is easily determined by measuring from finished grade down to the top of the sediment pile. To avoid underestimating the level of sediment in the chamber, the measuring device must be lowered to the top of the sediment pile carefully. Particles at the top of the pile typically offer less resistance to the end of the rod than consolidated particles toward the bottom of the pile. Once this measurement is recorded, it should be compared to the as-built drawing for the unit to determine weather the height of the sediment pile off the bottom of the sump floor exceeds 75% of the total height of isolated sump.

Cleaning

Cleaning of a CDS systems should be done during dry weather conditions when no flow is entering the system. The use of a vacuum truck is generally the most effective and convenient method of removing pollutants from the system. Simply remove the manhole covers and insert the vacuum hose into the sump. The system should be completely drained down and the sump fully evacuated of sediment. The area outside the screen should also be cleaned out if pollutant build-up exists in this area.

In installations where the risk of petroleum spills is small, liquid contaminants may not accumulate as quickly as sediment. However, the system should be cleaned out immediately in the event of an oil or gasoline spill should be cleaned out immediately. Motor oil and other hydrocarbons that accumulate on a more routine basis should be removed when an appreciable layer has been captured. To remove these pollutants, it may be preferable to use absorbent pads since they are usually less expensive to dispose than the oil/water emulsion that may be created by vacuuming the oily layer. Trash and debris can be netted out to separate it from the other pollutants. The screen should be power washed to ensure it is free of trash and debris.

Manhole covers should be securely seated following cleaning activities to prevent leakage of runoff into the system from above and also to ensure that proper safety precautions have been followed. Confined space entry procedures need to be followed if physical access is required. Disposal of all material removed from the CDS system should be done in accordance with local regulations. In many jurisdictions, disposal of the sediments may be handled in the same manner as the disposal of sediments removed from catch basins or deep sump manholes.

CDS Model	Diameter		Distance from Water Surface to Top of Sediment Pile		Sediment Storage Capacity	
	ft	m	ft	m	y^3	m^3
CDS1515	3	0.9	3.0	0.9	0.5	0.4
CDS2015	4	1.2	3.0	0.9	0.9	0.7
CDS2015	5	1.3	3.0	0.9	1.3	1.0
CDS2020	5	1.3	3.5	1.1	1.3	1.0
CDS2025	5	1.3	4.0	1.2	1.3	1.0
CDS3020	6	1.8	4.0	1.2	2.1	1.6
CDS3025	6	1.8	4.0	1.2	2.1	1.6
CDS3030	6	1.8	4.6	1.4	2.1	1.6
CDS3035	6	1.8	5.0	1.5	2.1	1.6
CDS4030	8	2.4	4.6	1.4	5.6	4.3
CDS4040	8	2.4	5.7	1.7	5.6	4.3
CDS4045	8	2.4	6.2	1.9	5.6	4.3
CDS5640	10	3.0	6.3	1.9	8.7	6.7
CDS5653	10	3.0	7.7	2.3	8.7	6.7
CDS5668	10	3.0	9.3	2.8	8.7	6.7
CDS5678	10	3.0	10.3	3.1	8.7	6.7

Table 1: CDS Maintenance Indicators and Sediment Storage Capacities

Support

- Drawings and specifications are available at www.contechstormwater.com.
- Site-specific design support is available from our engineers.

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CDS Inspection & Maintenance Log

CDS Model: ____________________ Location: ____________________

Date	Water depth to sediment[1]	Floatable Layer Thickness[2]	Describe Maintenance Performed	Maintenance Personnel	Comments

1. The water depth to sediment is determined by taking two measurements with a stadia rod: one measurement from the manhole opening to the top of the sediment pile and the other from the manhole opening to the water surface. If the difference between these measurements is less than the values listed in table 1 the system should be cleaned out. **Note: to avoid underestimating the volume of sediment in the chamber, the measuring device must be carefully lowered to the top of the sediment pile.**

2. For optimum performance, the system should be cleaned out when the floating hydrocarbon layer accumulates to an appreciable thickness. In the event of an oil spill, the system should be cleaned immediately.