Project Specific Water Quality Management Plan

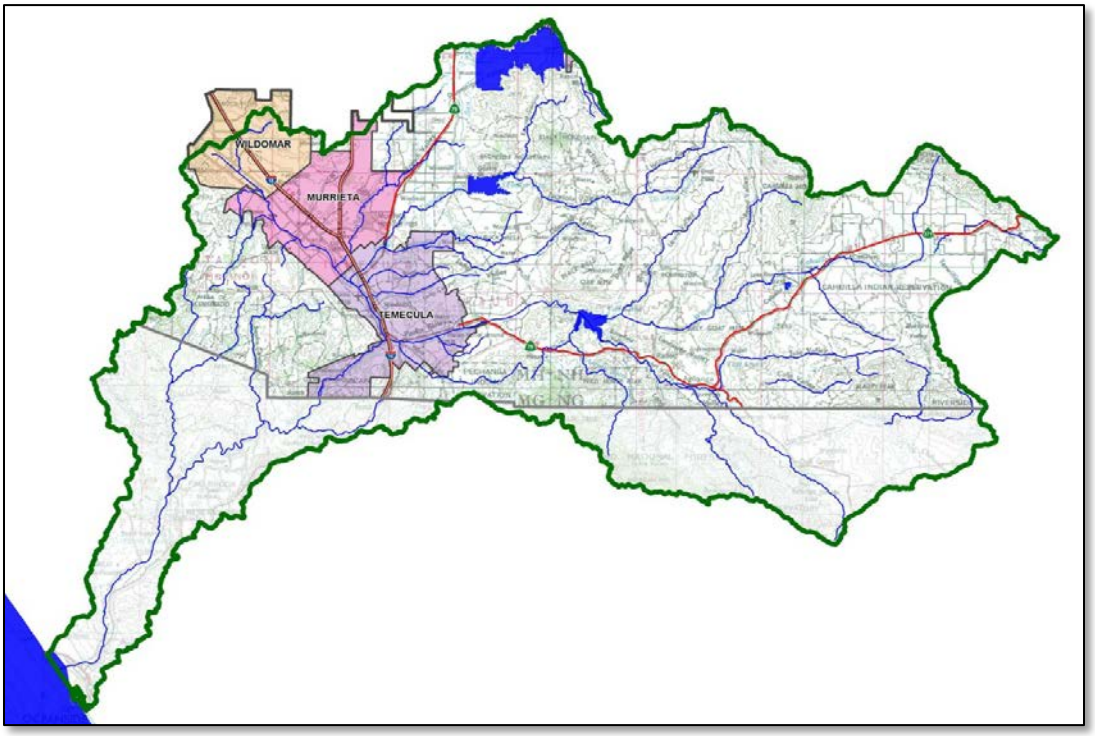
*A Template for preparing Project Specific WQMPs for Priority Development Projects located within the **Santa Margarita Region** of **Riverside County**. This template does not apply to projects in other watersheds within Riverside County. It does not apply to projects in San Diego or Orange County.*

Project Title: ADAMS AVENUE STOAGE FACILITY

Development No: Insert text here

Design Review/Case No: DEVELOPMENT PLAN 2020-2231

Prepared for: HOWARD OMDAHL
LARCHMONT PARK, LLC
41911 5TH ST., STE 202
TEMECULA, CA 92590
TEL: (909)732-1963
EMAIL: homdahl@hotmail.com
Prepared by: Rich Soltysiak
RDS and Associates
30519 Wailea Ct
Temecula, CA 92592
TEL: (951) 691-7706
EMAIL: rds11@dslextreme.com



☒ **Preliminary**
☐ **Final**

Original Date Prepared: **June 23, 2021**

Revision Date(s): Insert text here

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 PRELIMINARY WQMP

This Project-Specific WQMP has been prepared for Howard Omdahl, Larchmont Park, LLC by Rich Soltysiak, RDS and Associates for the Adams Avenue Storage Facility project.

This WQMP is intended to comply with the requirements of City of Murrieta Stormwater and Runoff Management and Discharge Controls Municipal Code Section 8.36.320, Water Quality Management Plan, which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater 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 Murrieta Stormwater and Runoff Management and Discharge Controls (Municipal Code Section 8.36).

"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
Howard Omdahl	Larchmont Park, LLC
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 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**."

Preparer's Signature	Date
Rich Soltysiak	Principal Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

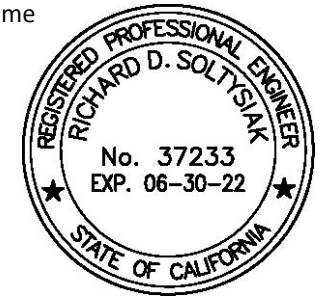


Table of Contents

List of Tables

List of Appendices

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.

Note: WQMP covers onsite treatment only. Offsite Adams Avenue treatment is not feasible do to Adams Avenue draining along project frontage to an interim Arizona crossing within the future Larchmont Channel. The Arizona crossing drains directly to unnamed open channel that outlets directly into Warm Springs Creek adjacent to confluence with Murrieta Creek. In addition, Adams Avenue is also within the Murrieta Creek 100-yr floodplain and is subject to frequent flooding under high frequency storms. Until Larchmont Channel is improved along with the Adams Avenue crossing, frequent low intensity flooding will occur that will preclude the ability to treat Adams Avenue run-off.

PROJECT INFORMATION		
Type of PDP:	New Development	
Type of Project:	RV and Storage Facility	
Planning Area:	Insert Planning Area if known	
Community Name:	City of Murrieta	
Development Name:	Adams Avenue Storage Facility	
PROJECT LOCATION		
Latitude & Longitude (DMS):	33.5383/-117.1882	
Project Watershed and Sub-Watershed:	Santa Margarita River, Murrieta Creek	
24-Hour 85th Percentile Storm Depth (inches):	0.9"	
Is project subject to Hydromodification requirements?	☐ Y ☒ N (Select based on Section A.3)	
APN(s):	909-060-044	
Map Book and Page No.:	Lot 76 of Book 8 Page 359 Riverside County	
PROJECT CHARACTERISTICS		
Proposed or Potential Land Use(s)		RV and Storage Facility
Proposed or Potential SIC Code(s)		4225
Existing Impervious Area of Project Footprint (SF)		0 SF
Total area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement		36,367 SF
Total Project Area (ac)		5.53 Acres
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 If "Y" insert Cell Number
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 stormwater 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 2.32	None	MUN, AGR, IND, PROC, REC2, WARM, WILD	
Santa Margarita River 2.21	None	MUN, AGR, IND, REC1, REC2, WARM, COLD, WILD, RARE	5.2 Miles
Santa Margarita River 2.13	None	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	
Santa Margarita River 2.12	None	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	
Santa Margarita River 2.11	None	MUN, AGR, IND, PROC, REC1, REC2, WARM, COLD, WILD, RARE	
Santa Margarita	None	REC1, REC2, EST, WILD, RARE, MAR, MIGR	20.2 Miles

Lagoon 2.11			

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 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
Larchmont Channel	Graded Open Channel	None	☒ Y ☐ N
Murrieta Creek	Soil Stabilized	Yes	☒ Y ☐ N
Santa Margarita River	Natural Channel	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	☐ 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.

Certification		
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)* City of Murrieta Development Plan, Parcel Map, and Precise Grading Plan Approvals	☒ 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 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.
Yes, majority of project drains to future Larchmont Channel with balance following existing Adams Avenue street grades.

☒ 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.
Yes, via resource agency permits. 3.17 Acres were preserved as natural drainage areas with vegetation to be protected.

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. 3.18 acres are set aside as natural mitigation areas.	
☒ 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. Site consists of pervious dg surfacing with impervious areas limited to concrete paved fire access.	

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. Onsite drainage was directed to bioretention BMP's prior to discharging offsite.	
☒ 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. Yes, plant material suitable to local climates with minimum irrigation will be used.	

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 stormwater (not common).
- Conflicts with recycled water used – where the project is conditioned to use recycled water for irrigation, this should be given priority over stormwater capture as it is a year-round supply of water.
- Code Compliance - If a particular use of captured stormwater, and/or available methods for storage of captured stormwater 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. No, property is located within an industrial zone and consists of RV and general storage with minimum landscape requirements.

☐ 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. Project surface consists of pervious dg and concrete paved fire truck access. There are no self treating areas proposed.

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
DMA 1	PCC Paving, Pervious CL 2 Base, Landscaping	114,127 SF	To be Determined in Step 3
DMA 2	PCC Paving, Pervious CL 2 Base, Landscaping	126,760 SF	
Enter Unique Code	Enter Pervious, Impervious, or Mixed	Enter Area in Square Feet	
Enter Unique Code	Enter Pervious, Impervious, or Mixed	Enter Area in Square Feet	
Enter Unique Code	Enter Pervious, Impervious, or Mixed	Enter Area in Square Feet	
Enter Unique Code	Enter Pervious, Impervious, or Mixed	Enter Area in Square Feet	

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)	Storm Depth (inches)	DMA Name / ID	[C] from Table C-4=	Required Retention Depth (inches)
		[A]	[B]		[C]	[D] = $[B] + \frac{[B]\cdot[C]}{[A]}$

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

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

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

(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
DMA 1	BMP 1
DMA 2	BMP 2

Note: 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:		
…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?		X
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 Local Jurisdiction 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: DMA 1 and DMA 2		
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: DMA 1 and DMA 2		
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: Site Consists of Compacted Fill		

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

[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.

Biofiltration BMPs below. Biofiltration BMPs that provide partial infiltration may still be feasible and should be 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		
Other		DMA 1 and DMA 2

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 local jurisdiction

    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)
DMA 1	N	Compacted Fill Blanket
DMA 2	N	Compacted Fill Blanket
Insert text here		
Insert text here		

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.
	☐ The BMP is sized using one of two	List sizing method used, resulting size

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

	Biofiltration LID sizing options in Section 2.3.2 of the SRM WQMP.	(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	
DMA 1	☐	☐	☒	☐
DMA 2	☐	☐	☒	☐
Insert text here	☐	☐	☐	☐
Insert text here	☐	☐	☐	☐
Insert text here	☐	☐	☐	☐
Insert text here	☐	☐	☐	☐

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?	No
b) When in the entitlement process were other investigations conducted (e.g., groundwater quality, water rights) to	No

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

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?	Compacted Fill Blanket
d) What public health and safety requirements affected infiltration locations?	None
e) What were the conclusions and recommendations of the geotechnical engineer and/or other professional responsible for other investigations?	N/A
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?	Maintain Existing Drainage Pattern
g) What site design alternatives were considered to achieve infiltration or partial infiltration on site?	None
h) What physical impairments (i.e., fire road egress, public safety considerations, utilities) and public safety concerns influenced site layout and infiltration feasibility?	None
i) What LID Principles (site design BMPs) were included in the project site design?	Biofiltration With No Infiltration

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 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	*BMP 1*		
	[A]		[B]	[C]	[A] x [C]			
DMA1	**88,120**	**CL 2 Permeable Base**	**0.1**	**0.31**	**27,317**	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	25,054	**PCC Pavement**	**1.0**	**0.31**	**7,767**			
	953	**Trash Enclosure with Apron**	**1.0**	**0.31**	**295**			
	114,127				**35,379**	**0.9**	**1,997**	**1,997**

[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.

DMA Type/ID	DMA (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*BMP 2*		
	[A]		[B]	[C]	[A] x [C]			
DMA2	**116,400**	**CL 2 Permeable Base**	**0.1**	**0.19**	**22,116**	*Design Storm Depth (in)*	*DCV, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
	10,360	**PCC**	**1.0**	**0.19**	**1,968**			

		Pavement						
	126,760				**24,084**	**0.9**	**1,479**	**1,479**

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)
BMP 1	DMA 1	BIOFILTRATION BASIN	1,997	1,997
BMP 2	DMA 2	BIOFILTRATION BASIN	1,479	1,479

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)
			☐			
			☐			
			☐			
			☐			

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 Local Jurisdiction 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

For Offsite Hydrologic Control BMP Option

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)
		☐			
		☐			
		☐			
		☐			

For Instream Restoration Option

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 Local Jurisdiction may require full trash capture BMPs to be installed as part of the project. Consult with the Local Jurisdiction 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]		
						Trash Capture Design Storm Intensity (in)	*Trash Capture Design Flow Rate (cubic feet or 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
[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)

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	TC-32 Biofiltration Basin	SC-44 Drainage System Maintenance
Outdoor Storage Area	TC-32 Biofiltration Basin	SC-43 Parking Storage Area Maintenance
Parking Lots	TC-32 Biofiltration Basin	SC-43 Parking Storage Area Maintenance
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
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, [Insert Jurisdiction] 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)
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here

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)* City of Murrieta Development Plan, Parcel Map, and Grading Permit Approvals	☒ Y	☐ N

Section J: Operation, Maintenance and Funding

PRELIMINARY WQMP

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: Adams Storage Owner Maintained

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 stormwater 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 stormwater BMP that is based upon Low Impact Development concepts. LID BMPs not only provide highly effective treatment of stormwater 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 stormwater 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 stormwater 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 Stormwater Runoff for later use without negatively impacting downstream water rights or other Beneficial Uses.

LID Infiltration BMP	BMPs to reduce stormwater 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 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 Stormwater BMPs to control post-construction Pollutants and stormwater 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.

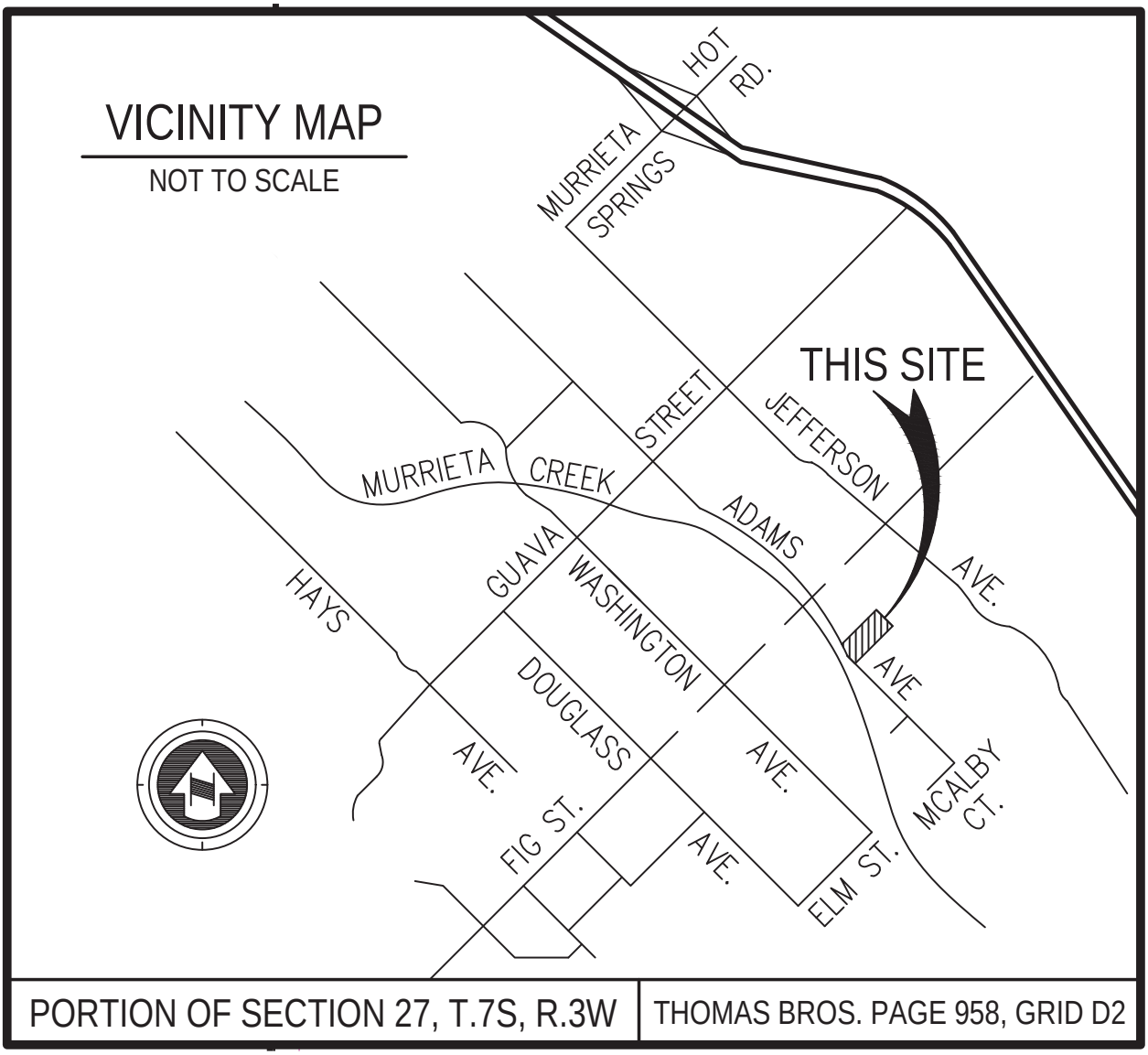
Appendix 1: Maps and Site Plans

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
N/A	☐ Buildings, Roof Lines, Downspouts
	☒ Impervious Surfaces
	☒ Pervious Surfaces (i.e. Landscaping)
	☒ Standard Labeling

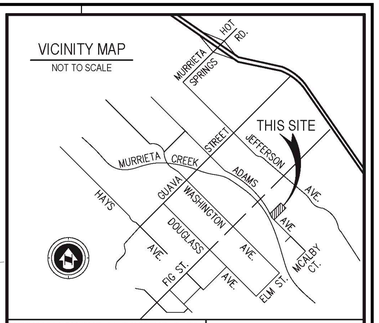
ADAMS STORAGE AND ALLIANCE PROPANE
VICINITY MAP



ADAMS AVENUE STORAGE AND ALLIANCE PROPANE FACILITIES

WQMP SITE PLAN

VICINITY MAP
NOT TO SCALE



PORTION OF SECTION 27, T.7S, R.3W | THOMAS BROS. PAGE 958, GRID D2

(Old Adams Ave.)

EX ADAMS AVE CL

FUTURE R/W

ADAMS AVE.

FUTURE R/W

PROPOSED CURB & GUTTER
PROPOSED SIDEWALK

PROPOSED WALL ON PL

(Existing Lane Stripe & CL Ex. Pavement)

43.12 TC
Landscape
45.7 FS
1041.84 EX
1041.52 EX
Landscape
1041.23 EX
1041.28 EX
45.8 FS
41.2 INV
1041.36 EX
1041.67 EX
1042.27 EX
1042.98 EX
1042.31 EX
1044.38 EX
44.9 FS
45.0 FS
45.2 FS
Landscape
46.4 FS
LS

PROPOSED WALL
SEWER DUMP STATION
1045
DMA 1
2.62 AC
1045
ADAMS STORAGE
PARCEL 2 RV STORAGE
5.56 Acres Gross
5.56 Acres Net
1045
1046
PROPOSED RETAINING WALL

43.40 TC HP
Landscape
12'
44'
43.19 TC
ECR
45.6 FS
(0.813 Acres)
EXISTING CULVERT
CONCRETE FIRE ACCESS WITH HAMMERHEAD
43.08 FS
ACCESS
1045
PROPOSED COMMERCIAL DRIVEWAY ENTRANCE PER CITY OF MURRIETA STD. NO. 310a
42.78 TC
BCR
45.6
ALLIANCE PROPANE
44.0 FS
1040.49 EX
Landscape
44.9 FS
40.5 INV
PROPOSED RETAINING WALL
1040.60 EX
44.1 FS
DMA 2
2.91 AC
1045
Landscape
OPEN SPACE DRAINAGE EASEMENT
ADAMS AVE
PARCEL 1 PROPANE
1.15 Acres Gross
1.08 Acres Net
PROPERTY LINE
10' x 65' TANK
10' x 65' TANK
10' x 65' TANK
10' x 65' TANK
10' x 65' TANK
95'
75'
1045
(0.206 Acres)
ADAMS STORAGE BMP 1
6' X 352'
BIOFILTRATION BASIN
Landscape
ALLIANCE PROPANE BMP 1
8' x 108'
BIOFILTRATION BASIN
OPEN SPACE DRAINAGE EASEMENT
3.17 Acres
ADAMS STORAGE BMP 2
8' X 175'
BIOFILTRATION BASIN
Landscape
44.4 FS
Landscape
Landscape
44.1 FS
42.15 TC
ECR
42.05 FS
45.9
1040.38 EX
1040.48 EX
1040.73 EX
DMA 1
1.08 AC
1040.59 EX
44.3 FS
1040.97 EX
45.7 FS
LS
41.8 TC
CURB
PROPOSED RETAINING WALL
1040.70 EX
PROPOSED COMMERCIAL DRIVEWAY ENTRANCE PER CITY OF MURRIETA STD. NO. 310c
Landscape
1041.56 EX
1040.72 EX
1040.82 EX
1042.68 EX
OPEN SPACE DRAINAGE EASEMENT

1 CLASS 2 PERMEABLE BASE.
2 P.C.C. FIRE TRUCK ACCESS.

1042.46 EX
1041.00 EX
1040.71 EX
1040.82 EX
1042.09 EX
1042.61 EX
1042.94 EX
1043.00 EX
1043.26 EX

PERIMETER WALL
8' Top Width
UNGROUTED MASONRY BLOCK @ 16" ON CENTER FOR DRAINAGE OUTLET
2' (Depth x Side Slope)
4'
2' (Depth x Side Slope)
4:1
3"
3"
2 ngineered Soil Media
p ect. 3.8 of Riverside Co
S a Margarita Watershed
L MP Design Handbook
Cleanout
PONDING DEPTH
6" Subdrain

BIOFILTRATION BASIN TRENCH DETAILS

FUTURE R/W
EX. ST. IMPROVEMENT PLANS FOR ADAMS AVENUE SHEET 5 OF 8 DWG. NO. 02-1089
R/W

PARCEL 9
PM 30188
PM 202/18-19
PARCEL 1

RS 144 / 82-83
O.R. 2002-621867 REC. 10/31/2002
RECORD OF SURVEY RS 144/82-83
O.R. 2002-621867 REC. 10/31/2002
LOT 84
TEMECULA LAND AND WATER CO.
MB 8 / 329 S.D.

50 0 25 50 100
SCALE: 1"= 50'

SEAL: REGISTERED PROFESSIONAL ENGINEER RICHARD D. SOLTYSIAK No. 37233 EXP. 06-30-22 CIVIL STATE OF CALIFORNIA

RDS And Associates
Civil Engineering
Project Management
Construction Management
rds11@dslextreme.com
(951) 691-7706
Rich Soltysiak

BENCH MARK
DESCRIPTON: COUNTY OF RIVERSIDE T-89-81
LOCATION: WASHINGTON AVE. AND BROWN ST. N/W CORNER OF WASHINGTON ST, BRIDGE OVER MURRIETA BRIDGE ABUTMENT
RECORDED:
ELEVATION: 1069.40 DATUM: NAVD88

SCALE
HORIZONTAL
1" = 50'
VERTICAL

DATE	INITIAL	REVISION DESCRIPTION	SHT. NO.	DATE	INITIAL
ENGINEER OF WORK				CITY APPROVAL	

SHEET 1 | CITY OF MURRIETA ENGINEERING DEPARTMENT | OF SHEET 1

WQMP SITE PLAN
C.O.M. No. 2020-2231
ADAMS AVENUE STORAGE AND ALLIANCE PROPANE FACILITIES

Engineering Data
JMM CONSULTANT
Phone: 951-852-6625 / Email: jmmcon98@gmail.com
25060 Hancock Ave. Suite 103, #428, Murrieta, CA 92562

DWG: ADAMS10 DP-PGP.dwg SHEET:PGP DATE: Feb 19, 2021 - 11:59:11am

REGION 9 INDEX

- 501.00 SAN JUAN HYDROLOGIC UNIT
- 901.10 Laguna HA
  - 1.11 San Joaquin Hills HSA
  - 1.12 Laguna Beach HSA
  - 1.13 Aliso HSA
  - 1.14 Dana Point HSA
- 901.20 Mission Viejo HA
  - 1.21 Oso HSA
  - 1.22 Upper Trabuco HSA
  - 1.23 Middle Trabuco HSA
  - 1.24 Gobernadora HSA
  - 1.25 Upper San Juan HSA
  - 1.26 Middle San Juan HSA
  - 1.27 Lower San Juan HSA
  - 1.28 Ortega HSA
- 901.30 San Clemente HA
  - 1.31 Prima Deshecha HSA
  - 1.32 Segunda Deshecha HSA
- 901.40 San Mateo Canyon HA
- 901.50 San Onofre HA
  - 1.51 San Onofre Valley HSA
  - 1.52 Las Pulgas HSA
  - 1.53 Stuart HSA

- 902.00 SANTA MARGARITA HYDROLOGIC UNIT
- 902.10 Ysidora HA
  - 2.11 Lower Ysidora HSA
  - 2.12 Chappo HSA
  - 2.13 Upper Ysidora HSA
- 902.20 DeLuz HA
  - 2.21 DeLuz Creek HSA
  - 2.22 Gavilan HSA
  - 2.23 Vallecitos HSA
- 902.30 Murrieta HA
  - 2.31 Wildomar HSA
  - 2.32 Murrieta HSA
  - 2.33 French HSA
  - 2.34 Lower Domenigoni HSA
  - 2.35 Domenigoni HSA
  - 2.36 Diamond HSA
- 902.40 Auld HA
  - 2.41 Bachelor Mountain HSA
  - 2.42 Gertrudis HSA
  - 2.43 Lower Tucalota HSA
  - 2.44 Tucalota HSA
- 902.50 Pechanga HA
  - 2.51 Pauba HSA
  - 2.52 Wolf HSA
- 902.60 Wilson HA
  - 2.61 Lancaster Valley HSA
  - 2.62 Lewis HSA
  - 2.63 Reed Valley HSA
- 902.70 Cave Rocks HA
  - 2.71 Lower Coahuila HSA
  - 2.72 Upper Coahuila HSA
  - 2.73 Anza HSA
  - 2.74 Burnt HSA
- 902.80 Aguanga HA
  - 2.81 Vail HSA
  - 2.82 Devils Hole HSA
  - 2.83 Redec HSA
  - 2.84 Tule Creek HSA
- 902.90 Oakgrove HA
  - 2.91 Lower Culp HSA
  - 2.92 Previtt Canyon HSA
  - 2.93 Dodge HSA
  - 2.94 Chihuahua HSA

- 903.00 SAN LUIS REY HYDROLOGIC UNIT
- 903.10 Lower San Luis HA
  - 3.11 Mission HSA
  - 3.12 Bonsall HSA
  - 3.13 Moosa HSA
  - 3.14 Valley Center HSA
  - 3.15 Woods HSA
  - 3.16 Rincon HSA
- 903.20 Monserate HA
  - 3.21 Pala HSA
  - 3.22 Pauma HSA
  - 3.23 La Jolla Amago HSA
- 903.30 Warner Valley HA
  - 3.31 Warner HSA
  - 3.32 Combs HSA

- 904.00 CARLSBAD HYDROLOGIC UNIT
- 904.10 Loma Alta HA
- 904.20 Buena Vista Creek HA
  - 4.21 El Salto HSA
  - 4.22 Vista HSA
- 904.30 Agua Hedionda HA
  - 4.31 Los Monos HSA
  - 4.32 Buena HSA
- 904.40 Encinas HA
- 904.50 San Marcos HA
  - 4.51 Batiquitos HSA
  - 4.52 Richland HSA
  - 4.53 Twin Oaks HSA
- 904.60 Escondido Creek HA
  - 4.61 San Elijo HSA
  - 4.62 Escondido HSA
  - 4.63 Lake Wohlford HSA

- 905.00 SAN DIEGUITO HYDROLOGIC UNIT
- 905.10 Solana Beach HA
  - 5.11 Rancho Santa Fe HSA
  - 5.12 La Jolla HSA
- 905.20 Hodges HA
  - 5.21 Del Dios HSA
  - 5.22 Green HSA
  - 5.23 Felicita HSA
  - 5.24 Bear HSA
- 905.30 San Pasqual HA
  - 5.31 Highland HSA
  - 5.32 Las Lomas Muertas HSA
  - 5.33 Reed HSA
  - 5.34 Hidden HSA
  - 5.35 Guejito HSA
  - 5.36 Vineyard HSA
- 905.40 Santa Maria Valley HA
  - 5.41 Ramona HSA
  - 5.42 Lower Hatfield HSA
  - 5.43 Wash Hollow HSA
  - 5.44 Upper Hatfield HSA
  - 5.45 Ballena HSA
  - 5.46 East Santa Teresa HSA
  - 5.47 West Santa Teresa HSA
- 905.50 Santa Ysabel HA
  - 5.51 Boden HSA
  - 5.52 Pamo HSA
  - 5.53 Sutherland HSA
  - 5.54 Witch Creek HSA

- 906.00 PENASQUITOS HYDROLOGIC UNIT
- 906.10 Miramar Reservoir HA
- 906.20 Poway HA
- 906.30 Scripps HA
- 906.40 Miramar HA
- 906.50 Tecolote HA

- 907.00 SAN DIEGO HYDROLOGIC UNIT
- 907.10 Lower San Diego HA
  - 7.11 Mission San Diego HSA
  - 7.12 Santee HSA
  - 7.13 El Cajon HSA
  - 7.14 Coches HSA
  - 7.15 El Monte HSA
- 907.20 San Vicente HA
  - 7.21 Fernbrook HSA
  - 7.22 Kimball HSA
  - 7.23 Gower HSA
  - 7.24 Barona HSA
- 907.30 El Capitan HA
  - 7.31 Conejos Creek HSA
  - 7.32 Glen Oaks HSA
  - 7.33 Alpine HSA
- 907.40 Boulder Creek HA
  - 7.41 Inaja HSA
  - 7.42 Spencer HSA
  - 7.43 Cuyamaca HSA

- 908.00 PUEBLO SAN DIEGO HYDROLOGIC UNIT
- 908.10 Point Loma HA
- 908.20 San Diego Mesa HA
  - 8.21 Lindbergh HSA
  - 8.22 Chollas HSA
- National City HA
  - 8.31 El Toyan HSA
  - 8.32 Paradise HSA

- 909.00 SWEETWATER HYDROLOGIC UNIT
- 909.10 Lower Sweetwater HA
  - 9.11 Telegraph HSA
  - 9.12 La Nacion HSA
- 909.20 Middle Sweetwater HA
  - 9.21 Jamacha HSA
  - 9.22 Hillsdale HSA
  - 9.23 Dehesa HSA
  - 9.24 Galloway HSA
  - 9.25 Sequan HSA
  - 9.26 Alpine Heights HSA
- 909.30 Upper Sweetwater HA
  - 9.31 Loveland HSA
  - 9.32 Japatul HSA
  - 9.33 Viejas HSA
  - 9.34 Descanso HSA
  - 9.35 Garnet HSA

- 910.00 OTAY HYDROLOGIC UNIT
- 910.10 Coronado HA
- 910.20 Otay Valley HA
- 910.30 Dulzura HA
  - 10.31 Savage HSA
  - 10.32 Proctor HSA
  - 10.33 Jamul HSA
  - 10.34 Lee HSA
  - 10.35 Lyon HSA
  - 10.36 Hollenbeck HSA
  - 10.37 Engineer Springs HSA

- 911.00 TIJUANA HYDROLOGIC UNIT
- 911.10 Tijuana Valley HA
  - 11.11 San Ysidro HSA
  - 11.12 Water Tanks HSA
- 911.20 Potrero HA
  - 11.21 Marron HSA
  - 11.22 Bee Canyon HSA
  - 11.23 Barrett HSA
  - 11.24 Round Potrero HSA
  - 11.25 Long Potrero HSA
- Barrett Lake HA
- 911.40 Monument HA
  - 11.41 Pine HSA
  - 11.42 Mount Laguna HSA
- Morena HA
- Cottonwood HA
- Cameron HA
- Campo HA
  - 11.81 Tecate HSA
  - 11.82 Canyon City HSA
  - 11.83 Clover Flat HSA
  - 11.84 Hill HSA
  - 11.85 Hipass HSA

NOTE:

1. ***The names and areas shown on this map are the same as used by the Department of Water Resources (DWR) in their Bulletin 130 Series.***
2. ***The numbering system used on this map is an adaption of the numbering system used in the 130 Series.***
3. ***The 1986 updated names and boundaries shown on the map are in accordance with an agreement with DWR and US Geological Survey.***
4. ***The 1995 revision of this map includes newly recognized hydrologic subareas within the Mission Viejo HA (901.20). Notes 1 & 3 do not apply to these subareas.***

LEGEND

- Regional Boundary
- Hydrologic Unit Boundary (HU)
- Hydrologic Area Boundary (HA)
- Hydrologic Subarea Boundary (SA)

N

REGION NO. / HYDROLOGIC UNIT / HYDROLOGIC AREA / HYDROLOGIC SUBAREA

9 07. 4 1

KEY TO REGION

April 1973
Revised: July 1976
Revised: August 1986
State Water Resources Control Board
Surveillance and Monitoring Section
T.E. Lavenda, P.E.

Revised: April 1995
Regional Water Quality Control Board - San Diego Region
Water Quality Standards Unit
D.F. Hoirup Jr.

State of California

REGIONAL WATER QUALITY CONTROL BOARD

San Diego Region (9)

SAN DIEGO HYDROLOGIC BASIN PLANNING AREA (SD)

Scale 1:250,000

5 0 5 10 15 20 Miles

Appendix 2: Construction Plans

PRELIMINARY WQMP

The latest set of Grading, Drainage and Street Improvement Plans **shall be included.**

For Bioretention and Biofiltration facilities, the following construction notes shall be shown on the Grading and/or Drainage plans.

1) BSM and Aggregates should not be delivered or placed in frozen, wet or muddy conditions. The Contractor should protect materials from absorbing excess water and from erosion at all times. The Contractor shall not store materials unprotected during large rainfall events (>.25 inches). If water is introduced into material while it is stockpiled, the Contractor shall allow the material to drain to an acceptable level before it is placed.
2) The Engineer shall furnish to the City a copy of the source testing and a signed certification that the fully blended Bioretention/Biofiltration Soil Media (BSM) material meets all of the WQMP requirements before the material is imported or if the material is mixed onsite prior to installation. Onsite mixing may only occur if sand or topsoil components are sourced from the Project site. Onsite mixing may be conducted by using loaders.
3) BSM shall be lightly compacted and placed in loose lifts of 12 inches thick. Compaction should not exceed 75% standard procter. Machinery should not be used in the BSM area to place BSM. As BSM material is being installed, Quality Assurance (QA) tests shall be conducted or for every 1,200 tons or 800 cubic yards mixed on-site from a completely mixed stockpile or windrow, with a minimum of three tests. For imported material from a supplier with a quality control program the QA tests shall be conducted 2,400 tons or 1,600 cubic yards from the supplier.
4) The Engineer conducting the Quality Control testing shall furnish to the City a copy of the QA testing and a certification that the BSM for the project meets all of the following requirements.
    a. BSM shall consist of 60-80% clean sand, up to 20% clean topsoil, and 20% of a nutrient-stabilized organic amendment. The initial infiltration rate shall be greater than 8 inches per hour per laboratory test.
    b. pH: 6.0 – 8.5; Salinity: 0.5 to 3.0 mmho/cm as electrical conductivity; sodium absorption ratio: < 6.0; Chloride: <800 ppm in saturated extract; Cation Exchange Capacity (CEC): > 10 meq/100 g; Organic Matter: 2 to 5 percent on a dry weight basis; Carbon: Nitrogen ratio: 12 to 40, preferably 15 to 40; Gravel larger than 2mm: 0 to 25-percent of the total sample; Clay smaller than 0.005 mm: 0 to 5 percent of the non-gravel fraction.
    c. BSM shall be tested to limit the leaching of potential inherent pollutants. BSM used in Biofiltration BMPs shall conform to the following limits for pollutant concentrations in saturated extract: Phosphorous: < 1 mg/L; Nitrate < 3 mg/L, Copper <0.025 mg/L. These pollutant limits are for the amount that is leached from the sample, not from the soil sample itself. Testing may be performed after laboratory rinsing of media with up to 15 pore volumes of water. Equivalent test results will be accepted if certified by a laboratory or appropriate testing facility.

d. Low nutrient compost used in BSM shall be sourced from a facility permitted through CalRecyle, preferably through USCC STA program. Compost shall conform to the following requirements: Physical contaminants <1% by dry weight; Carbon:Nitrogen ratio: 12:1 to 40:1, Maturity/Stability shall conform to either: Solvita Maturity Index: ≥ 5.5, CO2 Evolution: < 2.5 mg CO2-C per g compost organic matter per day, or < 5 mg CO2 – shall be more than 6 months old and representative of current stockpiles.
e. Coconut coir pith used in BSM shall be thoroughly rinsed with freshwater and screened to remove coarse fibers as part of production and aged > 6 months. Peat used in BSM shall be sphagnum peat.

Potential BSM sources may include (not part of construction note): Gail Materials (Temescal Valley), Agriservice (Oceanside), Greatsoils (Escondido), and Earthworks (Riverside).

Potential Laboratories may include (not part of construction note): Fruit Growers Laboratory, Inc. (Santa Paula, http://www.fglinc.com/), Wallace Laboratories (El Segundo, http://us.wlabs.com/), Control Labs (Watsonville, http://controllabs.com) and A&L Western Laboratories (Modesto, http://www.al-labs-west.com/)

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.

COLEMAN GEOTECHNICAL

9272 JERONIMO ROAD, SUITE 104
IRVINE, CA 92618
PHONE (949) 461-5260 FAX (949) 461-5262
GEOTECHNICAL ENGINEERING SERVICES

GEOTECHNICAL FEASIBILITY INVESTIGATION

10 Acre Parcel
Northeast Side of Adams Avenue, about 1,000 Feet Southeast of Fig Street
Murrieta, CA

Client:

Murrieta Commercial Land Property #2
1301 South Sunkist
Anaheim, CA 92806

Attention: Mr. George Gamor

Job No: 2692
May 31, 2007

TABLE OF CONTENTS

APPENDIX

1. INTRODUCTION

1.1 General

This report presents the results of a geotechnical study of a currently undeveloped 10 acre parcel located on Adams Avenue, just south of Fig Street in Murrieta, California. It is understood that the parcel will be developed for several future small industrial buildings. At this time, there are no specific site plans available. Based on our study, the site is feasible for development provided that our recommendations are included in the project design and implemented during the construction and occupancy phases of the project.

Due to the close proximity of the parcel to the active Elsinore-Temecula Fault Zone, the site could be susceptible to high site acceleration and related ground motion effects. This report provides appropriate design parameters and recommendations for seismic design. Due to the presence of soft or loose upper surface soils, the site will require some overexcavation and recompaction in order to provide adequate support of the proposed building structures.

In the absence of actual loading data from the structural engineer, the following footing loadings will be assumed.

Continuous Footings-	3 to 4 kips per lineal foot
Pad Footings-	50 to 70 kips each

1.2 Purpose and Scope of Work

The purposes of this investigation were to: (1) obtain information on the general regional geologic conditions and specific subsurface conditions within the project area; (2) perform an engineering and geologic evaluation of the collected data and its influence on the project; and (3) provide geotechnical conclusions and recommendations for design and construction.

The work performed during this study included the following:

1. Collect and review project data available to us and developed an exploration program.
2. Performed a subsurface investigation by drilling 5 test borings to depths ranging from 21 to 51 feet below existing grades.
3. Performed laboratory testing to establish the engineering properties of the subsurface materials in order to develop suitable recommendations for geotechnical design and construction aspects of the project.
4. Performed a visual reconnaissance of the site and surrounding area to discern if any obvious unstable or otherwise adverse geologic conditions exist.
5. Analyzed the collected data and prepare this report of our geotechnical conclusions and recommendations.

2. INVESTIGATION AND LABORATORY TESTING

2.1 Field Exploration

The field investigation consisted of excavating five exploratory borings to depths ranging from 21 to 51 feet below the existing grades. The borings were excavated using an 8 inch diameter hollow-stem auger drilling rig. Selected specimens of the in-situ soils were obtained by using a 2.5 inch I.D. drive tube sampler equipped with one-inch high liner rings and a 2 inch O.D. by 1-3/8 inch I.D. Standard Penetration Test sampler. In addition to these relatively undisturbed specimens, bulk samples of the soils were obtained for additional laboratory analysis. These soil samples served as the basis for the laboratory testing and the engineering conclusions contained in this report. The logs of the borings and a plot plan showing the approximate boring locations are included with this report.

2.2 Laboratory Testing

The laboratory testing consisted of performing classification, strength, settlement, soluble sulfate, corrosion potential, and expansion tests, determining the in-situ dry density, R-value and moisture content, and determining the moisture-density relationship of major soil types.

Descriptions of the test standards used in this investigation in addition to other tests not used in this investigation are included in the Appendix of this report.

The results of all laboratory tests are presented in the text below, in the Appendix, or on the boring logs.

The results of Atterberg Limits classification tests are as follows:

Sample Location	Liquid Limit (LL)	Plastic Limit (PL)	Plasticity Index (PI)
Combined B-3 + B-4 @ 20'-21'	31	19	12
B-1 @ 1-4'	Could not roll to a 1/8 inch thread, considered non plastic		
B-1 @ 15-16'	Could not roll to a 1/8 inch thread, considered non plastic		
B-1 @ 25-26'	Could not roll to a 1/8 inch thread, considered non plastic		
B-1 @ 45-46'	Could not roll to a 1/8 inch thread, considered non plastic		

3. SURFACE AND SUBSURFACE CONDITIONS

3.1 Site Description and Observations

The site consists of a rectangular shaped 10 Acre parcel. The site is undeveloped and is on Adams Avenue. At the time of our investigation the parcel was vacant and free of manmade structures. The site is bordered on the southeast by a concrete batch plant which is about 6 to 10 feet higher in elevation that the subject property, to the northwest by an open field at site level, and to the northeast, by a light industrial complex consisting of several new tilt-up buildings which are about 10 to 15 feet above the site. The parcel is relatively flat. The site has been recently tilled for weed control and therefore the near-surface soils are loose. A

shallow unlined culvert along the southeast property is draining into the property and saturating the central portion of the site as shown on the attached Geotechnical Plan.

3.2 Soil and Geologic Conditions

Our borings revealed that this site is underlain by a thick deposit of alluvium to a least 50 feet, the maximum depth drilled. The site occurs within a broad linear northwest depression which is commonly knows as the Elsinore Trough. Created by tectonic forces along an active fault, the Elisinore Trough is an area of sedimentary deposition. Most sediments deposited in the trough are from nearby adjacent mountain sources such as the Santa Ana Mountains and the Gavilan Hills. The total depth of the alluvium below the project site is unknown, but based on the location of the site with respect to the closest bedrock exposures, the alluvium below this site is probably several hundred feet thick.

Our subsurface investigation, indicated that the alluvium below this site consists predominantly of poorly-bedded deposits of sandy silts and silty sand. Interbedded deposits of silt, clayey silt, and silty clay also occur but in lesser quantities. In general, the soils range from loose to compact within the upper 50 foot depth explored. Below about 20 feet, the alluvium was found to be generally dense or compact. From the surface down to approximately 20 feet the soils range from loose to moderately compact.

Perched groundwater and saturated soil conditions were first encountered at approximately 15 feet below the existing ground surface. Some unsaturated zones were noted at various horizons between 20 and 50 feet.

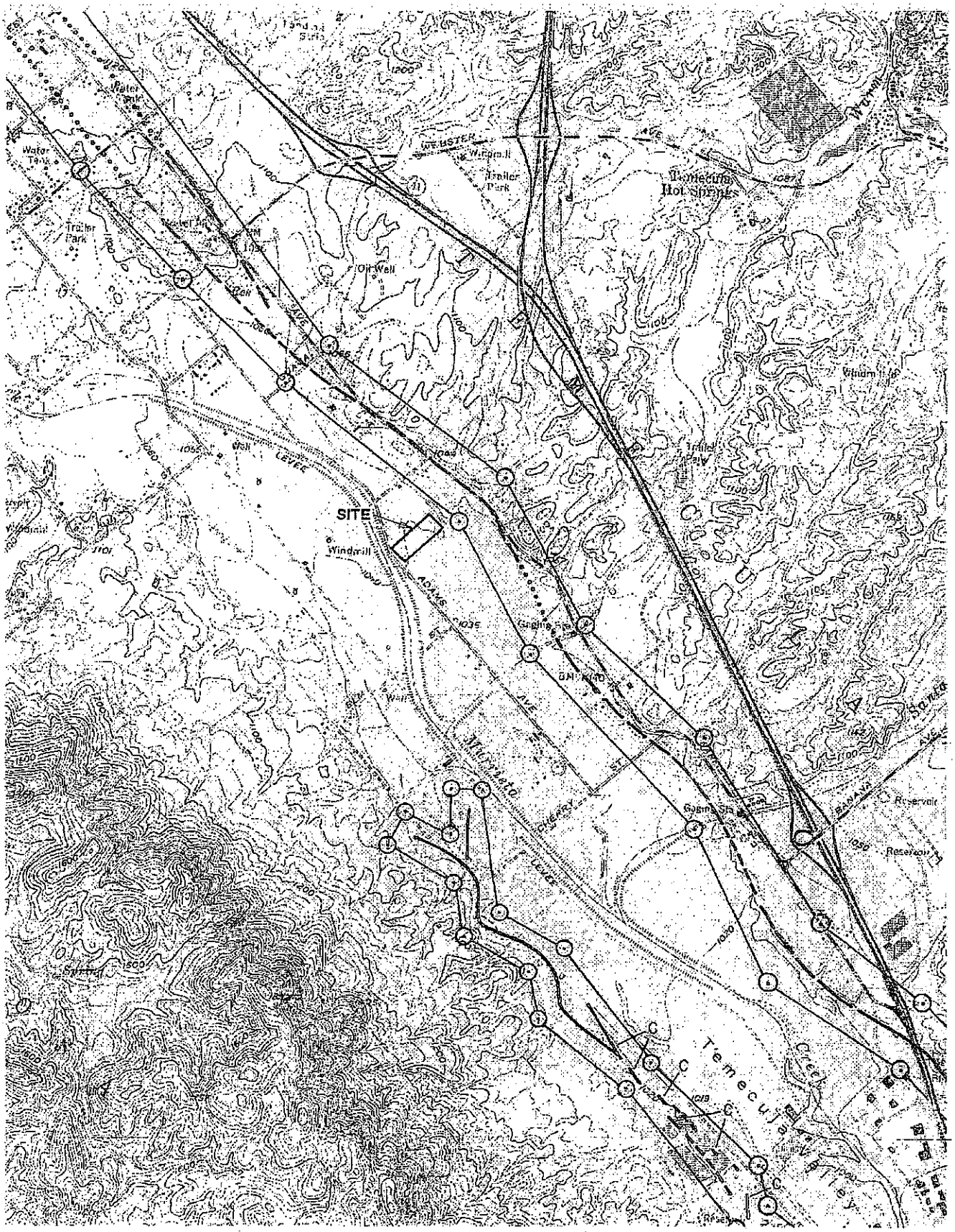
No evidence of shallow or perched ground water has been noted in the form of seeps, springs, tufa deposits, mineral efflorescence, or concentrated growth of phreatophyte plants was encountered during this investigation.

More detailed descriptions of the subsurface conditions are shown on the attached boring logs.

3.2.1 Seismicity

The subject property is not located within any State of California Earthquake Hazard Zones or astride a known, active or potentially active fault, and, accordingly, need not be considered for potential surface fault rupture. This site however, does border a State of California Earthquake Hazard Zone which may contain one or several branches of the Elsinore-Temecula Fault. The limits of the seismic hazard zone roughly trends parallel to Adams Avenue and the site location is shown on the map on the next page. The State of California has determined that a branch or branches of the active Elisinore-Temecula Fault has a significant probability (based on their research) of occurring within this zone which is beyond the limits of the subject site. If the site were within the Special Studies Zone boundary a fault study would be required, but should not be needed for this site. The state typically requires a 50 foot setback from any fault found in a fault trench study and it is therefore our recommendation that any buildings proposed for this site be set back 50 feet from the northeast property boundary.

As the site is located near an active fault, it will be subject to strong ground shaking by a nearby or distant strong earthquake.



Approximate Site Location on State of California Special Studies Zone Murrieta Quadrangle Map
COLEMAN GEOTECHNICAL Job No. 2692 05/2007

Earthquakes which might occur on faults within a 60 mile (100 km.) radius from the site are listed below on Appendix Pages "seis-1-9" of this report, along with their seismic parameters.

Secondary seismic hazards that are also considered for this project are liquefaction, seismic settlement, differential compaction, landsliding, earthquake induced flooding, tsunamis, and seiches. Each is addressed below.

Potential for liquefaction, seismic settlement and differential compaction - is discussed in detail in the section immediately below.

Potential for landsliding - is considered to be negligible, based on the limited height of slopes along the northeast and southeast sides of the site.

Potential for earthquake induced flooding, tsunamis, and seiches - can be precluded, as no upstream dams or other nearby bodies of water are present.

3.3 Liquefaction Potential and Seismic Settlement

The potential for liquefaction and dynamic settlement has been evaluated as outlined in Chapter 6 of the California Division of Mines and Geology (DMC) Special Publication 117 ("Guidelines for Evaluation and Mitigation of Seismic Hazards in California") and "Recommended Procedures for Implementation of DMG Special Publication 117 - Guidelines for Analyzing and Mitigating Liquefaction in California", published by the Southern California Earthquake Center, 1999. The LIQUEFY2 computer program and DMG fault data has been utilized, along with the simplified procedures for estimating seismic settlement outlined by Tokimatsu and Seed (1987). The design and construction recommendations presented below in this report include consideration of possible liquefaction and/or dynamic settlement. The analysis results are included in the Appendix as pages liq-1-4 and set-1.

The general purposes of this analysis have been to respond to 2 general questions stated by Bartlett and Youd (1995), as follows:

1. "Are the sediments susceptible to liquefaction?": and
2. "If liquefaction does occur, what will be the ensuing amount of ground deformation?"

The analysis indicates that the sediments are susceptible to liquefaction. The resulting ground deformation is anticipated to include some settlement, but not lateral spreading or any other horizontal deformation.

The safety factor against liquefaction is generally below the 1.3 minimum which can be considered an acceptable level of risk from about 15 to 25 feet and from 30 to 40 feet below existing grades. The dynamic settlement has been calculated to be about 4.5 inches, assuming that the maximum probable earthquake occurs at the closest point to the site on the Eldinore-Temecula fault.

It is our opinion that the presence of a 15 foot overburden along with clay seam at 25 to 30 foot layer and dense soils below 40 feet precludes any surface manifestation and associated significant differential settlements at the ground surface. A relatively thick overexcavated and recompacted soils and the proposed light buildings warrants the use of mat foundation system. The rigid mat footings on compacted soils will likely limit anticipated to-

tal settlements to less than 2 inches with less than 1 inch differential, which we believe to be tolerable for the planned structures.

4. GEOTECHNICAL ANALYSIS AND CONCLUSIONS

1. It is the opinion of this office that the subject site is suitable for support of the proposed development without detrimental effects on the adjacent properties. The grading, building construction, backfilling, and other construction supported by the earth materials should be conducted in accordance with the provisions of the applicable edition of the Uniform Building Code (UBC) or California Building Code (CBC), as adopted by the controlling agency. References to the UBC within this report shall also be considered to refer to the same section of the CBC.
2. The site is underlain by thick deposits of natural alluvium which, when properly prepared by grading will be considered suitable for support of the proposed facilities.
3. The soils at the site possess very low expansion potential and negligible soluble sulfate concentrations and were not found to be potentially corrosive to buried metal pipes. Recommendations are presented below in this report to reduce the effects of soil expansion and other chemical factors.
4. An active faults is known to transect or trend towards the site, however the project is not expected to be affected by ground rupture. It will be affected by substantial ground motion from earthquakes during the design life of the project due to the nearby Temecula Elsinore Fault. More detailed seismicity data is included in the appendix of this report.
5. Ground water and/or saturated soil conditions were encountered during our investigation and are not considered a significant site development condition.
6. Adverse surface water discharge from runoff onto or from the site is not anticipated, providing proper engineering design, construction, and maintenance of graded surfaces and drainage devices is implemented.
7. Conventional mat foundations seated into compacted fill can be used to support the structures providing the design and construction recommendations presented in this report and the requirements of applicable codes are followed. Concrete floor and hardscape slabs may be founded entirely on firm competent compacted fill.

5. DESIGN AND CONSTRUCTION RECOMMENDATIONS

5.1 Foundation Design and Construction

5.1.1 Vertical and Lateral Bearing

Vertical

The earth materials on this site when properly prepared are considered suitable for the support of the proposed structures using conventional mat footings.

Mat foundations may be designed using an allowable bearing value of 2,000 pounds per square foot for footings placed to a minimum depth of 12 inches below the lowest adjacent

finished grade. An increase of 1/3 of the aforementioned bearing value is permissible for short duration wind or seismic loading.

The above bearing values have been based on mat footings placed into approved compacted fill. These bearing values are considered to be net values and as a result the weight of the footings and/or backfill above the footings may be ignored in calculating the footing loads.

Lateral

For purposes of resisting lateral forces, an allowable lateral soil pressure of 250 pounds per square foot per foot of depth may be used for the design. A coefficient of friction of 0.40 may be used for concrete placed directly on the natural soils or compacted fill. These values may be combined without reduction for resisting lateral forces.

The above values are based on footings placed directly against previously compacted fill. In the case where footing sides are formed, all backfill against footings should be compacted to at least 90 percent of maximum density.

Foundation Construction

All foundation excavations should be observed by the project soils engineer prior to the placement of forms, reinforcement, or concrete. The excavations should be trimmed neat, level, and square. All loose, sloughed, or moisture softened soil should be removed prior to concrete placement.

Excavated material from footing excavations should not be placed in slab-on-grade areas unless properly compacted and tested.

5.1.2 Settlement

Static

Based on the general settlement characteristics of the in-situ soil types and the anticipated loading, it has been estimated that footings will settle approximately ½ inch.

Differential settlement is expected to be about one-half of the total settlement. It is anticipated that the majority of the settlement will occur during or shortly following the completion of construction as the loads are applied. Differential settlement is not expected to exceed ¼ inch in any 20 foot horizontal distance.

The above settlement estimates are based on the assumption that the grading will be performed in accordance with the grading recommendations presented elsewhere in this report and that representatives of this firm will observe or test the bearing conditions in the footing excavations.

Seismic

Seismic settlement is discussed above in Section 3.3.

5.1.3 Soil Design Parameters (Section 1815, 1997 UBC)

The following geotechnical design parameters are presented, as defined in UBC Section 1815.2, Symbols and Notations:

Parameter	Design Value
C_o	1.8
C_s	1.0
C_w	15
PI	non-plastic- could not be rolled
q_u	100 psf
Effective PI = C_o x C_s x PI = 1.8 x 1.0 x 0=	0

As a result, no special slab design is considered necessary for expansive/plastic soils.

5.1.4 Seismic Design

Seismic design of the structures should be performed using criteria presented in the Uniform Building Code (UBC) for Zone 4 seismic conditions.

Seismic design parameters required by the 1997 UBC and the State of California Seismic Hazards Act are included on Appendix Pages "seis-1-8" of this report. Recommended design parameters are as follows:

Design Parameter	Recommended Value
Design Fault	The Elsinore-Temecula Fault
Fault/Site Distance	<0.5 km (Special Studies Zone Map)
Maximum Site Acceleration	0.56 g (CGS Web Site)
Soil Profile Type	S_D
N_a	1.3
N_v	1.6
C_a	0.57
C_v	1.02
T_s	0.716
T_o	0.143

5.2 Retaining Walls

Retaining walls may be designed using the following parameters:

Bearing - See Soil Bearing Section above

Active Earth Pressure (Cantilevered Walls)
Level Backfill - 35 psf/ft

At-Rest Earth Pressure (Restrained At Top Walls)
Level Backfill - 54 psf/ft

Passive Earth Pressure - 250 psf/ft

Sliding Coefficient - 0.40

Sliding friction and passive resistance may be combined without reduction in calculating the total lateral resistance. Passive pressures may be assumed to become constant at a value of 5 times the above values below a depth of 5 feet.

All retaining wall backfill should consist of soil with an expansion index of 20 or less.

The soils existing on the site were found to possess very low expansion potential. These soils can be used for backfill of retaining walls.

Retaining walls should be provided with adequate drainage to reduce hydrostatic pressures.

5.3 Concrete Slabs

All concrete slabs must be designed in accordance with the applicable UBC or CBC.

It is cautioned that slabs in areas to receive ceramic tile or other rigid, crack sensitive floor coverings must be designed and constructed to reduce hairline cracking. Extra reinforcing and careful control of concrete slump to reduce concrete shrinkage are recommended.

Wherever the floor slab is to be subjected to traffic loading such as forklifts, especially those with hard rubber wheels, the performance of the floor slab is critical with respect to movements between adjacent slab areas and spalling of joints. Proper design and construction to provide shear transfer between adjacent slab units and proper joint details is critical to proper service of these floors. Proper control of concrete slump and curing to reduce slab "curling" and the resultant voids under the slab is also critical.

The following geotechnical recommendations are presented for your consideration:

1. The finished grade of the building pad should be made by overfilling and cutting back to a firm, compact surface. The required depth of overfilling will depend on the soil types, contractors equipment, and other factors.
2. The concrete contractor and underground subcontractors should be prohibited from placing excess soil from excavations on the building pad unless these materials are compacted and tested.
3. The project structural engineer should be consulted regarding the design of the slab thickness, reinforcing, and joint design spacing and details. A coefficient of subgrade reaction (K value) of 120 psi/inch may be used for design of the concrete floor slabs.

Moisture conditions below slabs-on-grade vary greatly due to soil conditions, ground water depth, and other conditions. The construction details of a moisture retarder membrane below slabs-on-grade, particularly where floor coverings are to be used, must be based on several factors, including concrete placement and curing, whether floor coverings will be glued to the slab, and other factors.

It has been typical to place slabs-on-grade on top of a layer of sand over the plastic membrane over a layer of sand over the subgrade soils, however this can result in water being trapped in the sand layer between the slab and the plastic membrane. This trapped moisture can then only leave the sand layer by vapor flow upward through the slab. This condition can potentially soften and loosen current water based floor mastics.

The alternative in areas to receive carpet, tile, or other moisture sensitive coverings or mastics, to construct the slab over a 15 mil (or equivalent puncture resistant) plastic membrane. The plastic membrane should be properly lapped, sealed, and protected with at least a two inch thick layer of sand below the plastic membrane, however the concrete should be placed directly on the plastic membrane. This construction detail will reduce future vapor movement upward through the slab. Slab placement using proper concrete mix slump and careful proper curing of the slab must be implemented.

The detailed design of the vapor retarder, if used, should be performed by the architect, structural engineer, and/or contractor after consideration of the above factors.

5.4 Expansive Soils

The results of tests indicate that the near-surface soils on the site possess very low expansion potential. The test results are as follows:

Sample Location	Expansion Index
B-1 @ 1-4'	14

As a result, no special design or construction is considered necessary for expansive soil purposes on this project

Additional testing will be performed during grading and final recommendations will be presented in our Geotechnical Report of Rough Grading. It should be noted that slab, footing, and other construction details may change based on testing during grading.

5.5 Soil Chemistry Considerations

5.5.1 Soluble Sulfates

The results of tests show that the on-site soils possess negligible concentrations of soluble sulfates. The test results are as follows:

Sample Location	% Soluble Sulfates
B-1 @ 1-4'	0.030

A soluble sulfate content less than 0.10 percent is not considered detrimental to standard concrete mixes. As a result, no special design or construction is considered necessary for soluble sulfates on this project.

5.5.2 Corrosion Potential

Several governing agencies in southern California require that corrosion potential of soils toward buried metal facilities be determined by the geotechnical engineer. As a result, and due to changing agency requirements with time, we routinely test for this potential by submitting samples for "corrosion series" tests on each and every project. Coleman Geotechnical does not have corrosion engineering expertise, and therefore we present the test results

below for the use of the client and other consultants as they determine necessary. The test results are as follows:

Sample Location	pH	Soluble Chlorides	Minimum Resistivity
B-1 @ 1-4'	9.8	170 ppm	1,752 ohm-cm

5.5.3 Hazardous Materials

This investigation does not include any evaluation or assessment of hazardous or toxic materials which may or may not exist on the site.

5.6 Pavement Design

The stability of the soil at the site was determined in accordance with California Test Method 301G. The test results are as follows:

Sample Location	R-Value
B-1 @ 1-4'	11

Based on the test results and our estimate of traffic conditions, the following pavement sections have been computed in accordance with State of California design procedures:

Pavement Area	Traffic Index - TI	Pavement Section
Parking Stalls	4.5	3" AC over 7" AB
Driving Lanes	5.0	4" AC over 8" AB
Truck Docks/Truck Parking	6.0	4" AC over 10" AB

Unless otherwise specified by others, aggregate base should conform to either Processed Miscellaneous Base as per the Standard Specifications for Public Works Construction, latest edition or Class II Aggregate Base as per Caltrans Specifications, latest edition. Aggregate base should be compacted to at least 95 percent of the maximum density determined in accordance with California Test Method 216.

Unless otherwise specified by others, asphaltic concrete (AC) should conform to Section 39 of the State of California, Caltrans Standard Specifications, latest edition. Asphaltic concrete should be Type B, 1/2 inch maximum size, medium graded.

Since this design is based on assumed traffic data, this office should be notified if definite information becomes available which warrants an alteration of the design sections.

This pavement design may be subject to approval by the governing agency who may have minimum sections in excess of those presented above.

5.7 Stability Considerations

5.7.1 Trenches and Other Excavations

Excavations

Even though no caving was experienced during the subsurface exploration, it can be expected that instability of utility trenches or other excavations will be experienced and, as a consequence, shoring or sloping excavation walls will be required to protect workers. The contractor should refer to the State of California, Division of Industrial Safety for minimum safety standards.

No surcharge loads should be permitted above unshored or unretained excavations. This includes, but is not limited to vehicles carrying material or stockpiles of lumber, concrete block, or soil. Drainage above excavations must be directed away from the banks. Care must be taken to prevent saturation of the soils.

Backfills

It should be noted that the City of Murrieta requires that the compaction of all utility trench backfills be tested and commented on by the project soil engineer prior to final completion of the project and issuance of a certificate of occupancy.

Materials to be used for backfilling utility trenches may consist of sand, "birds-eye", or pea gravel having a sand equivalent (SE) of 30 or more, or the excavated soil, at the contractor's option.

Materials used for backfill should be placed in thin lifts and each lift should be mechanically compacted to at least 90 percent relative compaction and tested by the soil engineer.

This firm will give an opinion of the adequacy of the backfill of utility trenches only if the backfill operations are observed during the backfilling work and only if tests are obtained as the work progresses.

If testing is performed after all backfilling is complete, without the benefit of observation of the work, only the test results at the test locations can be reported.

5.7.2 Graded Slopes

All permanent slopes on this project should be constructed at slope ratios of 2 horizontal to 1 vertical or flatter.

5.8 Site Design

5.8.1 Shrinkage and Subsidence

Calculations have been performed based on the in-situ density of the soils and the estimated compacted density of the soils after grading to estimate the shrinkage which might be expected between cutting and filling. It is estimated that shrinkage on this project could range from 5 to 10 percent. Subsidence as a result of the grading operations could range up to 0.1 feet in these types of soils. Please note that these estimates should be used with extreme caution.

Contingencies must be developed for balancing the earthwork quantities based on the actual shrinkage and subsidence which occurs during grading.

This firm assumes no responsibility for the use of these earthwork factors or the balancing of earthwork quantities on this project.

5.8.2 Drainage Design

This project should be designed and constructed with drainage devices at gradients adequate to insure proper drainage after the completion of construction.

It is important that drainage patterns established during finish grading of the site be maintained throughout the life of the structures. Property owners should be aware that altering drainage patterns during landscaping or at any other time can affect the performance of the structures and other site improvements. In addition, variations in irrigation and seasonal rainfall can also affect the performance of on site facilities.

5.9 Grading Recommendations

The following special grading provisions are recommended for the grading of this project in addition to the Grading Specifications, General Provisions included in the Appendix of this report.

1. The construction may include retaining or garden walls which may or may not be shown on the currently available plans. Such walls should be considered as part of the structures to be constructed, and foundation design, construction, and grading recommendations presented in this report should apply to these walls as if they were part of the building.
2. The natural soils in areas to receive fill outside the structure and hardscape areas shall be scarified and compacted to a depth of 12 inches below the existing surface after clearing and grubbing.
3. The existing soil in the building pad and hardscape areas shall be overexcavated to a depth of 4 feet below rough pad grade or existing grade, whichever is deeper, and the resulting surface scarified to a depth of 9 to 12 inches prior to placing new compacted fill.
4. All scarification and removals specified herein shall extend to a distance of at least 5 feet beyond all footing, building, and hardscape edges unless property line or other constraints exist. Special recommendations will be presented during grading for grading in those areas where constraints are present.
5. Some soft or loose soils were encountered in the areas of recommended overexcavation which may limit the mobility of conventional grading equipment and may cause difficulty with the compaction of soil. This must be determined at the time of grading and will be dependent on the grading equipment selected by the contractor. It is recommended that the drainage channel along the southeast side of the site be evaluated and re-graded to reduce free surface water from entering the property. This should be done prior to site grading in order to allow the wet site area to dry somewhat prior to the start of grading for the buildings.

6. Soil utilized for filling shall consist of approved on-site or imported soil. On-site soils which are free of trash, debris, and organic materials can be considered as suitable.
7. Any imported soil shall be approved by the soil engineer for both expansive and strength qualities prior to importation to the project site. Final acceptance of any imported soil will be based on observation of the soil actually delivered to the site.
8. All fill shall be compacted to at least 90 percent relative compaction.
9. The maximum density of all soils shall be determined in accordance with A.S.T.M. Test Method D-1557. The maximum density of aggregate base shall be determined in accordance with California Test Method 216.
10. Any surface soils showing wet spots on the ground surface shall be examined at the time of grading and a solution proposed at the same time by our field representative.
11. All other fill shall be placed with a moisture content of optimum or greater.
12. All grading plans shall be forwarded to the soil engineer for review and comment prior to the start of construction.

6. ADDITIONAL GEOTECHNICAL SERVICES

The recommended bearing values presented in this report are based on the assumption that the footings will be supported directly on firm, competent compacted fill. All footing excavations should be observed prior to placing steel or concrete to insure that the footings are founded on suitable material.

All grading and fill compaction should be observed and/or tested by this firm, including rough grading, installation of special drainage devices, retaining wall backfills, utility trench backfills, precise grading, and pavement subgrade and aggregate base, if applicable.

It is the responsibility of the owner or his representative to review the recommendations presented herein and to authorize the other design consultants and contractors to perform such work as necessary to comply with the recommendations as well as to inform this firm when necessary observations or testing are needed.

7. PROJECT MAINTENANCE CONSIDERATIONS

Attached to this report is a "Maintenance Guidelines - Commercial/Industrial Sites") sheet which discusses items which should be a part of the homeowners maintenance of the lot. The conditions discussed on this attachment are of paramount importance to the long-term stability of slopes, but should be read and considered at any site, especially those where the expansion index is reported as being greater than 40.

8. CLOSURE

This report has been prepared for the exclusive use of Murrieta Commercial Land Property #2 to assist the project design consultants and contractors in the design and construction of the proposed development. It is recommended that this firm be engaged to review the design drawings and specifications prior to construction to verify that our recommendations have been properly interpreted and included in the design. If we do not perform this review, we can accept no responsibility for misinterpretation of our recommendations.

This firm strives to perform it's services in a manner consistent with generally accepted current professional principles and practice in geotechnical engineering. We make no other warranty, either expressed or implied.

It has been assumed, and it is expected, that the geotechnical conditions which exist between the test excavations are similar to those encountered in the test excavations. However, no warranty of such is implied in this report.

The conclusions and opinions contained in this report are based on the results of the described geotechnical evaluations and represent our best professional judgment. The findings, conclusions, and opinions contained in this report are to be considered tentative only, and subject to confirmation by the undersigned during the construction process. Without this confirmation, this report is to be considered incomplete and this firm or the undersigned professionals assume no responsibility for its use. In addition, this report should be reviewed and updated after a period of one year or if the site ownership or project concept changes from that described herein.

This report is issued with the understanding that it is the responsibility of the owner or his representative to insure that interested parties have this information.

This report is subject to review by the controlling governing authorities for the subject project. It must be noted that this report may not meet all the requirements of the controlling agency since codes and agency interpretation of same are continually changing, and a review document may be issued which requires additional analysis and follow up information. This additional work will be performed at the billing rates which have been established.

Respectfully submitted,

COLEMAN GEOTECHNICAL

REGISTERED PROFESSIONAL ENGINEER
JAMES R. COLEMAN
No. GE 229
Exp: 6-30-07
GEOTECHNICAL
STATE OF CALIFORNIA

James R. Coleman
G.E. 229

PROFESSIONAL GEOLOGIST
LEE A. SHOEMAKER
NO. 1961
CERTIFIED ENGINEERING GEOLOGIST
EXP. 11/30/08
STATE OF CALIFORNIA

Lee A. Shoemaker
C.E.G. 1961

Liiban A. Affi
Project Engineer

APPENDIX

LABORATORY TESTING PROCEDURES

Below are brief descriptions of the laboratory tests which are performed by our firm on various projects. All of these may, or may not, have been performed as part of our analysis on the subject project. The selection of which samples to be tested and which tests to perform is a part of the professional services performed.

SHEAR STRENGTH

The shear strength of the soil is determined by performing direct shear tests in accordance with A.S.T.M. Test Method D-3080.

Direct shear tests are performed on either "undisturbed" or remolded samples which represent anticipated conditions at the finished site. The samples are either tested at in-situ moisture or are saturated to simulate the most severe field conditions expected. The relationship between the normal stress and shear stress are shown on the Direct Shear Summary.

EXPANSION

Tests for Expansion Index are performed on compacted samples in accordance with Uniform Building Code (UBC) Test Method 18-2. Test results are included within the report body.

SETTLEMENT

The settlement characteristics of soil samples are determined by performing consolidation tests on "undisturbed" or remolded specimens in accordance with A.S.T.M. Test Method D-2435. The samples are tested in the original sample liner ring and the incremental loads for consolidation are applied for periods of 12 or 24 hours by means of a single counterbalanced lever system. Sample consolidation is measured in increments of 0.0001 inches. The pressure-consolidation curves are shown in the appendix.

MOISTURE-DENSITY

The moisture-density relationship of the various soil types is determined in accordance with A.S.T.M. Test Method D-1557. The results are shown on the subsurface logs.

CLASSIFICATION

The following test methods are used to aid in the classification of soils in accordance with the Unified Soil Classification system:

1. Particle size analysis - A.S.T.M Test Method D-422
2. Liquid Limit / Plastic Limit - A.S.T.M. Test Method D-423

The results of these tests are included on the Grading Analysis sheets or are tabulated within the report body.

RESISTANCE "R"-VALUE

The resistance "R"-Value of soils is determined in accordance with California Test Method 301. The results are used for pavement design purposes.

SAND EQUIVALENT

The sand equivalent (S.E.) of granular soils and fine aggregates in determined in accordance with A.S.T.M. Test Method D-2419. The results are used to determine the applicability of the material for use as fill or backfill and to establish whether flooding or jetting is a suitable compaction method.

SOLUBLE SULFATE CONTENT

The concentration of soluble sulfates in the soil is determined by A.S.T.M. Test Method D-516, Method A, and is expressed as a percentage by weight of the dry soil. The results are included within the body of the report and are utilized in determining suitable concrete mixes.

CORROSION POTENTIAL

The potential for the soil to corrode buried metal components is consists of determining the following:

1. Soil pH (Acidity-Alkalinity)
2. Soluble Chloride content in accordance with California Test Method 417.
3. Minimum Resistivity in accordance with California Test Method 643.

These results are included within the body of the report and are intended to be utilized by a Corrosion Engineer in determining protection methods for various buried metal components of the project.

GRADING SPECIFICATIONS
GENERAL PROVISIONS

These specifications are presented to be used wholly, or in part, either as presented or as a guide for the preparation of separate grading specifications.

RESPONSIBILITY

1. The geotechnical consultants are his clients representative on the project. For the purposes of these specifications, observations and/or testing by the soil engineer includes the observation and/or testing performed by any person or persons assigned by, and responsible to, the licensed geotechnical engineer signing the report.

2. All clearing, site preparation, or earthwork performed on this project shall be conducted by the contractor(s) with periodic or full-time observation and testing by the geotechnical engineer.

3. It is the contractors responsibility to conform to the Grading Specifications for the project and the applicable grading ordinances for the jurisdiction in which the project is located. Services performed, and test results obtained, by the geotechnical consultants in no way relieve the contractor(s) from their responsibilities.

CLEARING

1. The site shall be cleared of all vegetable growth and other deleterious materials including, but not limited to, trees, stumps, logs, trash, heavy weed growth, and organic deposits.

2. Unless otherwise approved, all remnants of any previous facilities on the site shall be removed from the site. Included with the removal of foundations and slabs shall be the removal of basements, cellars, cisterns, septic tanks, paving, curbs, pipes, storage tanks, improperly abandoned water or petroleum wells, and other deleterious materials. No cavity created by demolition shall be backfilled until it has been observed by the geotechnical engineer.

3. Unless otherwise specified, all cleared materials shall be removed from the boundaries of the project to an approved disposal site. The determination of the acceptability of the material for disposal or the disposal site is not the responsibility of Coleman Geotechnical.

SITE PREPARATION

1. Loose soils within areas of fill shall be processed by either excavating and stockpiling the loose soil or by scarifying, adjusting the soil moisture content to the amount specified elsewhere in this report, and compacting to the recommended relative compaction as determined by A.S.T.M. Test Method D-1557.

2. The soils within areas of fill placement shall be processed to a depth adequate to insure the removal of major tree roots and pipelines and the compaction of cavaties left from tree removal.

3. Excavation voids created following the removal of subsurface structures shall be cleared of any loose soil, the resulting surface moisture conditioned, and filled with compacted soil. The backfill of such excavations shall be compacted to the relative compaction recommended elsewhere in this report.

4. Cesspools shall be pumped of liquids and solids and backfilled with clean sand, pea gravel, "birds eye", or sand-cement slurry. Sand backfill may be flooded and jetted into place for compaction. Any unsuitable backfill shall be removed when found to not be in compliance with the recommendations contained in this report. Preparation of cesspools for backfilling shall be observed by the soil engineer. Permits may be required by governing agencies for the project, and any specifications which the agency has should be complied with, unless the above is more restrictive.

5. Abandonment of oil, gas, or water wells shall be performed in accordance with applicable state or local laws. The backfilling of any voids left from such abandonment shall be performed as specified in Section 3.3, above.

6. Unless otherwise specified, the tops of any abandoned subsurface structure shall be removed to a depth of 5 feet below any planned improvements, such as footings, slabs, utility lines, future swimming pools, etc.

FILL PLACEMENT

1. Unless otherwise approved and unless a specific rock disposal plan is shown on the plans in this report, no cobbles over 12 inches in diameter shall be accepted in any fill.

2. All on-site and imported soils to be used for an engineered fill shall be subject to the approval of the geotechnical engineer prior to placement. Preliminary approval of a source of imported soil shall not relieve the contractor of delivering proper material to the site. Final acceptance of imported soil will be based upon the material actually delivered to the site.

3. Fill shall be placed in near horizontal lifts with a maximum placed thickness such that the required compaction can be achieved for the entire lift thickness with the available equipment and methods.

4. Site and project specific recommendations for overexcavation, processing, special materials, fill placement, and compaction shall be as recommended in the "Grading Recommendations" section in the main body of this report and any addendum reports which have been prepared by the geotechnical consultants for the project.

COLEMAN GEOTECHNICAL

9272 JERONIMO ROAD, SUITE 104
IRVINE, CA 92618
PHONE (949) 461-5260 FAX (949) 461-5262
GEOTECHNICAL ENGINEERING SERVICES

KEY TO SOIL TERMS

Terms used for describing soils according to their Texture, Grain Size, and Moisture Content. Terms are generally in accordance with the Unified Soil Classification System.

MAJOR DIVISION	FINE GRAINED SOILS (More than 50% finer than #200 sieve)				COARSE GRAINED SOILS (More than 50% coarser than #200 sieve)							
	HIGHLY ORGANIC SOILS	SILTS & CLAYS (Liquid Limit more than 50)		SILTS & CLAYS (Liquid Limit less than 50)	SANDS (More than half of coarse fraction is finer than #4 sieve)				GRAVELS (More than half of coarse fraction is larger than #4 sieve)			
					SANDS WITH FINES		CLEAN SANDS		GRAVEL WITH FINES		CLEAN GRAVEL	
SYMBOL	PT	OH	CH	MH	OL	CL	ML	SC	SM	SP	SW	GC	GM	GP	GW
TYPICAL NAMES	PEAT and other Highly Organic Soils	Organic Clays and Silts of High Plasticity	Inorganic Clays of High Plasticity	Inorganic Clays and Silts of High Plasticity	Organic Silts and Organic Silty Clays of Low Plasticity	Inorganic Clays of Low Plasticity, Sandy Clays, Silty Clays	Inorganic Silts and Very Fine Sands, Rock Flour, clayey Silts with slight plasticity	Clayey Sands, Sand-Clay Mixtures	Silty Sands, Sand – Silt Mixtures	Poorly Graded Sands, gravelly Sands; little or no fines	Well Graded Sands, gravelly Sands; little or no fines	Clayey Gravels, Gravel – Sand - Clay Mixtures	Silty Gravels, Gravel – Sand – Silt Mixtures	Poorly Graded Gravels, Gravel-Sand Mixtures, little fines	Well Graded Gravels, Gravel -Sand Mixtures, little fines

HARDNESS AND DENSITY

CONSISTENCY	SHEAR STRENGTH	SPT "N" VALUE
Very Soft	Less Than 0.25 tsf	Less Than 2
Soft	0.25 – 0.50 tsf	2 – 4
Firm	0.50 – 1.00 tsf	5 - 8
Stiff	1.00 – 2.00 tsf	9 – 15
Very Stiff	2.00 – 4.00 tsf	16 – 30
Hard	> 4.00 tsf	> 30

RELATIVE DENSITY	SPT "N" VALUE
Very Loose	< 4
Loose	4 – 10
Medium Compact (Firm)	11 – 30
Compact	31 – 50
Very Compact	> 50

MOISTURE

From low to high, the soil moisture is indicated by:

Dry (Very Rare)
Damp
Slightly Moist
Moist (Near Optimum)
Very Moist
Wet (Saturated)

TERMS CHARACTERIZING SOIL STRUCTURE

Slickensided - having inclined planes that are slick and glossy in appearance
Fissured - containing near vertical shrinkage cracks, frequently filled with fine soil
Laminated - composed of thin layers of varying color and texture
Calcareous - contains significant amounts of calcium carbonate
Porous - having visibly apparent void spaces through which air and water may pass

SAMPLER TYPES

(Shown in SAMPLE column on log)

R = Ring
S = Standard Penetration Test
B = Bulk

MAINTENANCE GUIDELINES - COMMERCIAL / INDUSTRIAL SITES

Commercial / Industrial sites, in general, and hillside lots, in particular, need maintenance to continue to function and retain their value. Many occupants are unaware of this and allow deterioration of their property. It is important to be familiar with some guidelines for maintenance of property and that they be aware of the importance of maintenance. These guidelines are NOT all encompassing, but discuss some items which may be important.

Governing agencies require hillside property developers to utilize specific methods of engineering and construction to protect those investing in improved lots or buildings. For example, the developer may be required to grade the property in such a manner that surface water will be drained away from the lot and to plant slopes so that erosion will be minimized. He may also be required to install permanent drains.

It is the owner / occupant's responsibility to maintain these safety features by pursuing a prudent program of lot care and maintenance. Failure to make regular inspection and to maintain drainage devices and sloping areas may cause severe financial loss. In addition to his own property damage, the owner may be subject to civil liability for damage occurring to neighboring properties as a result of his negligence.

If slope ownership and maintenance is the responsibility of an association, individual owners can aid their association by observing conditions in the immediate area of their site, and reporting any possible problems to their association.

The following maintenance guidelines are provided for the protection of the owner's investment:

1. Landscape irrigation adjacent to buildings and pavement areas MUST be carefully controlled to reduce water entering beneath floor slabs and subgrade areas, since such water can cause slab heave and pavement failure.
2. Care should be taken that slopes, terraces, berms (ridges at crown of slopes) and proper lot drainage are not disturbed or impaired. Surface drainage should be conducted to the street through the approved devices or by maintained surfaces.
3. In general, roof and landscape area runoff should be directed to the street or storm drain by nonerosive devices such as sidewalks, drainage pipes, or ground gutters. Drainage systems installed by the developer should not be altered without expert consultation.
4. All drains should be kept cleaned and unclogged, including gutters and downspouts. Terrace drains or gunite ditches should be kept free of debris to allow proper drainage. During heavy rain periods, performance of the drainage system should be observed. Problems, such as gullying and/or ponding, if observed, should be corrected as soon as possible.
5. Any leakage from waterlines or surface flow by-passing drains should be repaired or corrected as soon as practical.
6. Animal burrows should be eliminated since they may cause diversion of surface runoff or deep saturation of surficial soils, promote accelerated erosion, and even trigger shallow soil slumps or failures due to loosened and saturated surficial soils.
7. Slopes and near slope areas should not be altered without expert consultation. Whenever an owner plans a significant topographic modification of the lot or slope, a qualified geotechnical consultant should be contacted. In the case of areas near the top of slope, a "significant" topographic modification could be the addition of as little as one foot of soil against a wall to create a planter area. This type of modification is often performed as a part of landscape construction, and often causes wall distress, movement, and possibly failure of the nearby slope.
8. If the owner plans modification of cut, fill, or natural slopes within his property, a geotechnical consultant should be contacted. Any oversteepening will likely result in a need for retaining devices, per building code requirements. Undercutting of a toe-of-slope would reduce the safety factor of the slope and should not be undertaken without expert consultation.
9. If any unusual cracking, settling or earth slippage occurs on the property, the owner should consult a qualified soil engineer or engineering geologist immediately.
10. The most common causes of slope erosion and shallow slope failures are as follows:
    - ** Neglect of the care and maintenance of the slopes and drainage devices.
    - ** Inadequate and/or improper planting. Barren areas should be replanted as soon as possible.
    - ** Excessive or insufficient irrigation or diversion of runoff over the top of slope.
11. Whether required by the governing agency, or not, a geotechnical consultant should be contacted prior to and during any near slope construction, ESPECIALLY slabs or landscaping which results in the placement of ANY fill.
12. Hillside lot owners should not let conditions on their property create a problem for their neighbors. Cooperation with neighbors in maintaining proper drainage and landscaping could reduce problems, promote slope stability, and also increase the aesthetic attractiveness of the community.

COLEMAN GEOTECHNICAL SUBSURFACE LOG

CLIENT: Murrieta Commercial Land Property | **JOB NO:** 2692 | **DATE:** 5/1/2007

BORING NO: B-1

EQUIPMENT: [x] HOLLOW STEM AUGER [ ] BACKHOE - SAMPLERS ADVANCED BY 140 POUND TRIP HAMMER FALLING 30 INCHES OR [ ] BUCKET AUGER - _____ POUND KELLY BAR FALLING _____ INCHES [ ] HAND AUGER

DIAMETER: 8"

ADDRESS: NE of Adams & 1000 feet SE of Fig St. Murrieta, CA

LOGGED BY: AA

LABORATORY DATA				DEPTH (feet)	FIELD DATA			SOIL / GEOLOGY CLASSIFICATION	SOIL/BEDROCK DESCRIPTION
DRY DENSITY (pcf)	MAX. DENSITY (pcf)	RELATIVE COMPACTION%	MOISTURE CONTENT (%)		BULK SAMPLE	DRIVE SAMPLE	"N" VALUE		
									ALLUVIUM: Sandy SILT, dry, very soft, tilled in upper 12"
				2'					
105	126		13.7			R		SM-ML	Sandy SILT, moist, soft to firm, gray brown
				5'					
114			13.6			R		ML	-Sandy SILT, moist, brown, firm to stiff
				10'					
116			17.5			R		ML	-Sandy SILT, trace of clay, very moist, firm to stiff
				15'				v	- very moist , nearly saturated
			17.9			S	9		- Sandy SILT, brown, very moist, firm to stiff
				20'					
122			13.7			R		SC	- Clayey SAND, gray brown, moist, dense
				25'					
			20.3			S	12	SM-ML	- Sandy SILT and Silty SAND, brown, moist, dense
				30'					
126			13.2			R		SC	- Clayey SAND, brown, moist, very dense
			25.3	35'		S	17	SM-ML	- Sandy SILT to Silty SAND, brown, very moist, dense

This log is a representation of conditions at the time and place of excavation. With the passage of time and at other locations, conditions may vary.

DRIVE SAMPLER: S = Standard Penetration Test, R = Ring Sampler, M = Moisture

COLEMAN GEOTECHNICAL SUBSURFACE LOG

CLIENT: Murrieta Commercial Land Property | **JOB NO:** 2692 | **DATE:** 5/1/2007

BORING NO: B-1

EQUIPMENT: [x] HOLLOW STEM AUGER [ ] BACKHOE - SAMPLERS ADVANCED BY 140 POUND TRIP HAMMER FALLING 30 INCHES OR
[ ] BUCKET AUGER - _____ POUND KELLY BAR FALLING _____ INCHES
[ ] HAND AUGER

DIAMETER: 8"

ADDRESS: NE of Adams & 1000 feet SE of Fig St. Murrieta, CA

LOGGED BY: AA

LABORATORY DATA				DEPTH (feet)	FIELD DATA			SOIL / GEOLOGY CLASSIFICATION	SOIL/BEDROCK DESCRIPTION
DRY DENSITY (pcf)	MAX. DENSITY (pcf)	RELATIVE COMPACTION%	MOISTURE CONTENT (%)		BULK SAMPLE	DRIVE SAMPLE	"N" VALUE		
									ALLUVIUM cont....
				40'					
89			34.2			R		SC	- Silty CLAY, gray, very moist, stiff
				45'					
			27.9			S	31	SM	- Silty SAND, clay, gray, very moist, dense
				50'					
						R			- no sample recovery
									Bottom of Boring @ 51.0 Feet
									Groundwater and Saturated @ 14.5'

This log is a representation of conditions at the time and place of excavation. With the passage of time and at other locations, conditions may vary.

DRIVE SAMPLER: S = Standard Penetration Test, R = Ring Sampler, M = Moisture

COLEMAN GEOTECHNICAL SUBSURFACE LOG

CLIENT: Murrieta Commercial Land Property | **JOB NO:** 2692 | **DATE:** 5/1/2007

BORING NO: B-2

EQUIPMENT: [x] HOLLOW STEM AUGER [ ] BACKHOE - SAMPLERS ADVANCED BY 140 POUND TRIP HAMMER FALLING 30 INCHES OR [ ] BUCKET AUGER - _____ POUND KELLY BAR FALLING _____ INCHES [ ] HAND AUGER

DIAMETER: 8"

ADDRESS: NE of Adams & 1000 feet SE of Fig St. Murrieta, CA

LOGGED BY: AA

LABORATORY DATA				DEPTH (feet)	FIELD DATA			SOIL / GEOLOGY CLASSIFICATION	SOIL/BEDROCK DESCRIPTION
DRY DENSITY (pcf)	MAX. DENSITY (pcf)	RELATIVE COMPACTION%	MOISTURE CONTENT (%)		BULK SAMPLE	DRIVE SAMPLE	"N" VALUE		
									ALLUVIUM: Sandy SILT and SILT, gray brown, dry, very soft, tilled in upper 12"
			5.0			S	13	ML-SM	- Sandy SILT, brown, moist, firm to stiff
				5'					
			14.6			S	7	ML-SM	- Sandy SILT, brown, moist, firm
				10'					
			18.3			S	13	ML-SM	- Sandy SILT, brown, moist, firm to stiff
				15'					
			20.0			S	15	SC	- SAND, gray, very moist, medium dense
				20'					
			14.6			S	17	SM	- Silty SAND, brown, moist, medium dense
									Bottom of Boring @ 21.0 Feet No Groundwater Noted, Soils nearly Saturated at 15.0'

This log is a representation of conditions at the time and place of excavation. With the passage of time and at other locations, conditions may vary.

DRIVE SAMPLER: S = Standard Penetration Test, R = Ring Sampler, M = Moisture

COLEMAN GEOTECHNICAL SUBSURFACE LOG

CLIENT: Murrieta Land Property #2	**JOB NO: 2692**	**DATE: 5/16/2007**
BORING NO: B-3	**EQUIPMENT:** [X] HOLLOW STEM AUGER [ ] BACKHOE - SAMPLERS ADVANCED BY 140 POUND TRIP HAMMER FALLING 30 INCHES OR [ ] BUCKET AUGER - _____ POUND KELLY BAR FALLING _____ INCHES [ ] HAND AUGER	**DIAMETER: 8"**
ADDRESS: NE Side of Adams Ave., 1000' SE of Fig St., Murrieta CA		**LOGGED BY: LAS**

LABORATORY DATA					FIELD DATA				
DRY DENSITY (pcf)	MAX. DENSITY (pcf)	RELATIVE COMPACTION%	MOISTURE CONTENT (%)	DEPTH (feet)	BULK SAMPLE	DRIVE SAMPLE	"N" VALUE	SOIL / GEOLOGY CLASSIFICATION	SOIL/BEDROCK DESCRIPTION
									Alluvium: Mixed SILT and Sandy SILT, gray brown, top 12" is dry and very soft(tilled), firm and damp below
				2'					
			7.2			S	9		- Silty Fine SAND and Sandy SILT, moderate brown damp to moist, medium dense, no open pores
				5'					
			10.5			S	9		- Silty Fine Sand, SILT, Sandy SILT, trace of clay moderate brown, moist, medium dense
				10'					
			7.7			S	14		- Silty SAND, dark gray brown, well graded, poorly sorted moist, thin interbed of silt
				15'					
			21.1			S	6		- Silty SAND, SILT, and Clayey SILT, soft, wet, slightly plastic
								▽ ≈≈≈	- water
				20'					
			18.8			S	8		- Clayey SILT to Silty CLAY, trace of sand, dark gray brown, very moist, firm to stiff, moderately plastic
				25'					Bottom of Boring @ 21.0 Feet Saturated and wet @ 18.0 Feet
				30'					

This log is a representation of conditions at the time and place of excavation. With the passage of time and at other locations, conditions may vary. DRIVE SAMPLER: S = Standard Penetration Test, R = Ring Sampler, M = Moisture

COLEMAN GEOTECHNICAL SUBSURFACE LOG

CLIENT: Murrieta Land Property #2	**JOB NO: 2692**	**DATE: 5/16/2007**
BORING NO: B-4	EQUIPMENT: [X] HOLLOW STEM AUGER [ ] BACKHOE - SAMPLERS ADVANCED BY 140 POUND TRIP HAMMER FALLING 30 INCHES OR [ ] BUCKET AUGER - _____ POUND KELLY BAR FALLING _____ INCHES [ ] HAND AUGER	**DIAMETER: 8"**
ADDRESS: NE Side of Adams Ave., 1000' SE of Fig St., Murrieta CA		**LOGGED BY: LAS**

LABORATORY DATA					FIELD DATA				
DRY DENSITY (pcf)	MAX. DENSITY (pcf)	RELATIVE COMPACTION%	MOISTURE CONTENT (%)	DEPTH (feet)	BULK SAMPLE	DRIVE SAMPLE	"N" VALUE	SOIL / GEOLOGY CLASSIFICATION	SOIL/BEDROCK DESCRIPTION
									Alluvium: Mixed SILT and Sandy SILT, gray brown, top 12" is dry and very soft(tilled), firm to stiff below
				2'					
			2.9			S	14		- Sandy SILT, brown, dry to damp, stiff
				5'					
			14.7			S	6		- SILT and Sandy SILT, dark gray brown, moist , firm
				10'					
			12.1			S	10		- Silty SAND and Sandy SILT, trace of clay, dark gray Brown, medium dense
				15'					
			22.0			S	4		- Sandy CLAY to Clayey SILT, dark gray brown, very moist, moderately plastic
								▽ ≈≈≈	
				20'					
			26.3			S	4		- Clayey SILT, very moist, firm, slightly to moderately plastic
				25'					Bottom of Boring @ 21.0 Feet Saturated and Wet At 17.0 Feet
				30'					

This log is a representation of conditions at the time and place of excavation. With the passage of time and at other locations, conditions may vary. DRIVE SAMPLER: S = Standard Penetration Test, R = Ring Sampler, M = Moisture

COLEMAN GEOTECHNICAL SUBSURFACE LOG

CLIENT: Murrieta Land Property #2	**JOB NO: 2692**	**DATE: 5/16/2007**
BORING NO: B-5	**EQUIPMENT:** [X] HOLLOW STEM AUGER [ ] BACKHOE - SAMPLERS ADVANCED BY 140 POUND TRIP HAMMER FALLING 30 INCHES OR [ ] BUCKET AUGER - _____ POUND KELLY BAR FALLING ____ INCHES [ ] HAND AUGER	**DIAMETER: 8"**
ADDRESS: NE Side of Adams Ave., 1000' SE of Fig St., Murrieta CA		**LOGGED BY: LAS**

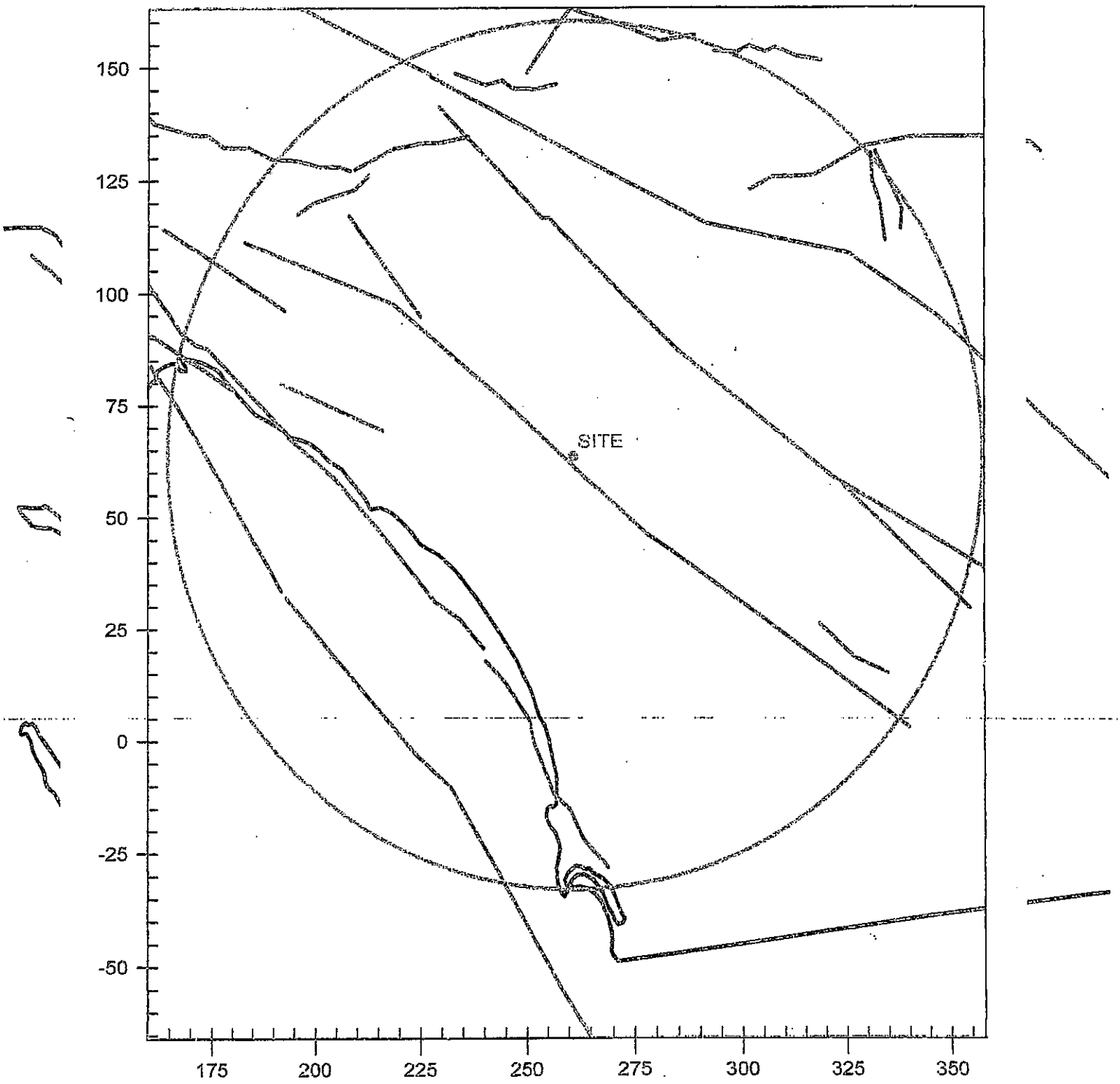
LABORATORY DATA					FIELD DATA				
DRY DENSITY (pcf)	MAX. DENSITY (pcf)	RELATIVE COMPACTION%	MOISTURE CONTENT (%)	DEPTH (feet)	BULK SAMPLE	DRIVE SAMPLE	"N" VALUE	SOIL / GEOLOGY CLASSIFICATION	SOIL/BEDROCK DESCRIPTION
									Alluvium: Mixed SILT and Sandy SILT, gray brown, top 18" is dry and very soft(tilled), firm to stiff below
				2'					
118			8.1			R			- Sandy SILT and Silty SAND, brown, damp, medium Dense
				5'					
107			16.6			R			- SILT, trace of clay and sand, gray brown, moist, firm
				10'					
120			11.9			R			-Sandy SILT to Silty SAND, gray brown, moist, medium Dense
				15'					
124			12.9			R			- Silty SAND, poorly sorted, trace of clay, sand varies from fine to coarse, moist
				20'					
						R			- no sample recovery
				25'				∇ ≈≈≈	
			15.2			S	17		- Interbedded Sandy SILT, and Silty SAND, Fine SAND trace of clay, yellow brown, moist, moderately dense
				30'					Bottom of Boring @ 25.0 Feet Wet and Saturated at 22 Feet

This log is a representation of conditions at the time and place of excavation. With the passage of time and at other locations, conditions may vary.

DRIVE SAMPLER: S = Standard Penetration Test, R = Ring Sampler, M = Moisture

CALIFORNIA FAULT MAP

Industrial Building



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DETERMINISTIC ESTIMATION OF
PEAK ACCELERATION FROM DIGITIZED FAULTS

JOB NUMBER: Proposal DATE: 04-05-2007
JOB NAME: Industrial Buildings, 26100± Adams Avenue, Murrieta, CA
CLIENT: Mr. George Gamor, c/o Grubb & Ellis (Mr. Roger Rhoades)
FAULT-DATA-FILE NAME: CDMGFLTE.DAT
SITE COORDINATES: SITE LATITUDE: 33.5361 SITE LONGITUDE: 117.1866
SEARCH RADIUS: 60 mi
ATTENUATION RELATION: 14) Campbell & Bozorgnia (1997 Rev.) - Alluvium
UNCERTAINTY (M=Median, S=Sigma): M Number of Sigmas: 0.0
DISTANCE MEASURE: cdist
SCOND: 0
Basement Depth: 5.00 km Campbell SSR: 0 Campbell SHR: 0
COMPUTE PEAK HORIZONTAL ACCELERATION

FAULT-DATA FILE USED: CDMGFLTE.DAT
MINIMUM DEPTH VALUE (km): 3.0

EQFAULT SUMMARY

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	2.2(3.5)	6.8	0.481	X
ELSINORE-GLEN IVY	12.0(19.3)	6.8	0.219	IX
ELSINORE-JULIAN	15.0(24.1)	7.1	0.216	VIII
SAN JACINTO-ANZA	21.1(33.9)	7.2	0.163	VIII
SAN JACINTO-SAN JACINTO VALLEY	21.1(33.9)	6.9	0.130	VIII
NEWPORT-INGLEWOOD (Offshore)	28.1(45.3)	6.9	0.092	VII
SAN JOAQUIN HILLS THRUST	28.3(45.5)	6.6	0.075	VII
CHINO-CENTRAL AVE. (Elsinore)	30.1(48.4)	6.7	0.075	VII
ROSE CANYON	31.3(50.4)	6.9	0.080	VII
SAN JACINTO-SAN BERNARDINO	33.4(53.8)	6.7	0.062	VI
WHITTIER	34.1(54.8)	6.8	0.066	VI
SAN ANDREAS - Southern	37.5(60.4)	7.4	0.098	VII
SAN ANDREAS - San Bernardino	37.5(60.4)	7.3	0.090	VII
SAN JACINTO-COYOTE CREEK	39.5(63.6)	6.8	0.055	VI
EARTHQUAKE VALLEY	42.6(68.6)	6.5	0.038	V
NEWPORT-INGLEWOOD (L.A.Basin)	42.8(68.9)	6.9	0.054	VI
CORONADO BANK	44.7(71.9)	7.4	0.079	VII
PINTO MOUNTAIN	44.9(72.3)	7.0	0.055	VI
PALOS VERDES	46.8(75.3)	7.1	0.057	VI
ELYSIAN PARK THRUST	47.6(76.6)	6.7	0.039	V
CUCAMONGA	48.9(78.7)	7.0	0.048	VI
NORTH FRONTAL FAULT ZONE (West)	49.1(79.0)	7.0	0.048	VI

ABBREVIATED FAULT NAME	APPROXIMATE DISTANCE mi (km)	ESTIMATED MAX. EARTHQUAKE EVENT: MAXIMUM EARTHQUAKE MAG. (Mw)	PEAK SITE ACCEL. g	EST. SITE INTENSITY MOD.MERC.
SAN ANDREAS - Coachella	49.2(79.2)	7.1	0.054	VI
COMPTON THRUST	49.2(79.2)	6.8	0.041	V
SAN JOSE	49.7(80.0)	6.5	0.032	V
CLEGHORN	51.2(82.4)	6.5	0.030	V
SIERRA MADRE	52.6(84.7)	7.0	0.043	VI
NORTH FRONTAL FAULT ZONE (East)	52.8(84.9)	6.7	0.034	V
BURNT MTN.	54.6(87.8)	6.4	0.025	V
SAN ANDREAS - 1857 Rupture	57.1(91.9)	7.8	0.082	VII
SAN ANDREAS - Mojave	57.1(91.9)	7.1	0.044	VI
EUREKA PEAK	57.4(92.4)	6.4	0.024	IV

-END OF SEARCH- 32 FAULTS FOUND WITHIN THE SPECIFIED SEARCH RADIUS.

THE ELSINORE-TEMECULA FAULT IS CLOSEST TO THE SITE.
IT IS ABOUT 2.2 MILES (3.5 km) AWAY.

LARGEST MAXIMUM-EARTHQUAKE SITE ACCELERATION: 0.4808 g

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*    Version  1.03   *
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COMPUTATION OF 1997
UNIFORM BUILDING CODE
SEISMIC DESIGN PARAMETERS

JOB NUMBER: Proposal DATE: 04-05-2007
JOB NAME: Industrial Buildings, 26100± Adams Avenue, Murrieta, CA
CLIENT: Mr. George Gamor, c/o Grubb & Ellis (Mr. Roger Rhoades)
FAULT-DATA-FILE NAME: CDMGUBCR.DAT
SITE COORDINATES: SITE LATITUDE: 33.5361 SITE LONGITUDE: 117.1866

UBC SEISMIC ZONE: 0.4
UBC SOIL PROFILE TYPE: SD

NEAREST TYPE A FAULT: NAME: ELSINORE-JULIAN DISTANCE: 23.9 km
NEAREST TYPE B FAULT: NAME: ELSINORE-TEMECULA DISTANCE: 1.7 km
NEAREST TYPE C FAULT: NAME: DISTANCE: 99999.0 km

SELECTED UBC SEISMIC COEFFICIENTS:
Na: 1.3
Nv: 1.6
Ca: 0.57
Cv: 1.02
Ts: 0.716
To: 0.143

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**********************************************************************
* CAUTION:  The digitized data points used to model faults are       *
*           limited in number and have been digitized from small-    *
*           scale maps (e.g., 1:750,000 scale).  Consequently,       *
*           the estimated fault-site-distances may be in error by    *
*           several kilometers.  Therefore, it is important that     *
*           the distances be carefully checked for accuracy and      *
*           adjusted as needed, before they are used in design.      *
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SUMMARY OF FAULT PARAMETERS

ABBREVIATED FAULT NAME	APPROX. DISTANCE (km)	SOURCE TYPE (A,B,C)	MAX. MAG. (Mw)	SLIP RATE (mm/yr)	FAULT TYPE (SS,DS,BT)
ELSINORE-TEMECULA	1.7	B	6.8	5.00	SS
ELSINORE-GLEN IVY	19.1	B	6.8	5.00	SS
ELSINORE-JULIAN	23.9	A	7.1	5.00	SS
SAN JACINTO-ANZA	33.7	A	7.2	12.00	SS
SAN JACINTO-SAN JACINTO VALLEY	33.7	B	6.9	12.00	SS
NEWPORT-INGLEWOOD (Offshore)	45.2	B	6.9	1.50	SS
SAN JOAQUIN HILLS THRUST	45.4	B	6.6	0.50	BT
CHINO-CENTRAL AVE. (Elsinore)	48.0	B	6.7	1.00	DS
ROSE CANYON	50.3	B	6.9	1.50	SS
SAN JACINTO-SAN BERNARDINO	53.7	B	6.7	12.00	SS

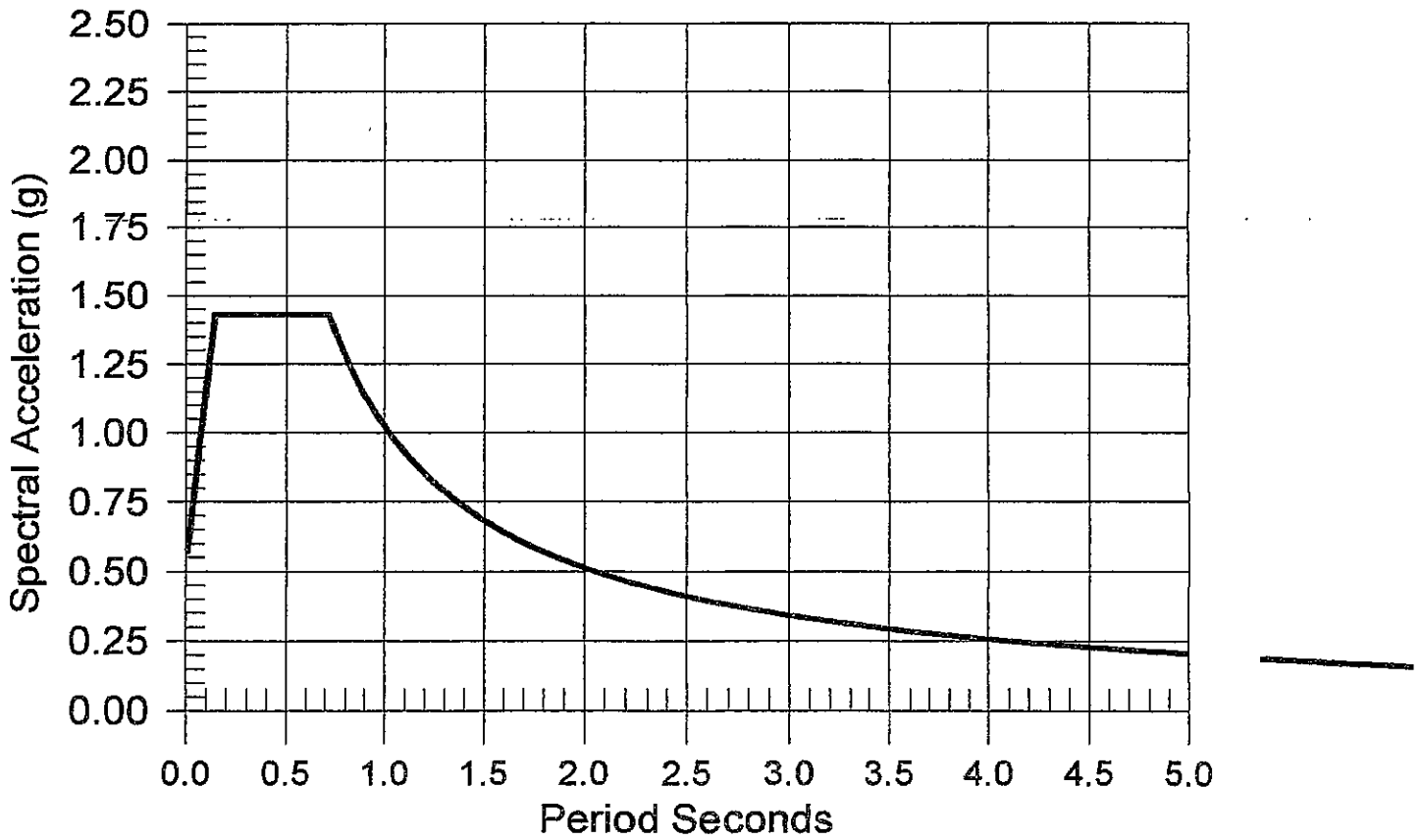
ABBREVIATED FAULT NAME	APPROX. DISTANCE (km)	SOURCE TYPE (A,B,C)	MAX. MAG. (Mw)	SLIP RATE (mm/yr)	FAULT TYPE (SS,DS,BT)
ELSINORE-WHITTIER	54.7	B	6.8	2.50	SS
SAN ANDREAS - Southern	60.3	A	7.4	24.00	SS
SAN JACINTO-COYOTE CREEK	63.5	B	6.8	4.00	SS
EARTHQUAKE VALLEY	68.5	B	6.5	2.00	SS
NEWPORT-INGLEWOOD (L.A.Basin)	68.7	B	6.9	1.00	SS
CORONADO BANK	71.8	B	7.4	3.00	SS
PINTO MOUNTAIN	72.2	B	7.0	2.50	SS
PALOS VERDES	75.0	B	7.1	3.00	SS
CUCAMONGA	75.6	A	7.0	5.00	DS
SAN JOSE	79.1	B	6.5	0.50	DS
NORTH FRONTAL FAULT ZONE (West)	79.6	B	7.0	1.00	DS
CLEGHORN	82.4	B	6.5	3.00	SS
SIERRA MADRE (Central)	83.0	B	7.0	3.00	DS
NORTH FRONTAL FAULT ZONE (East)	86.5	B	6.7	0.50	DS
BURNT MTN.	87.8	B	6.5	0.60	SS
SAN ANDREAS - 1857 Rupture	91.8	A	7.8	34.00	SS
EUREKA PEAK	92.3	B	6.5	0.60	SS
HELENDALE - S. LOCKHARDT	97.3	B	7.1	0.60	SS
SAN JACINTO - BORREGO	99.3	B	6.6	4.00	SS
CLAMSHELL-SAWPIT	99.3	B	6.5	0.50	DS
ELSINORE-COYOTE MOUNTAIN	99.4	B	6.8	4.00	SS
LANDERS	99.8	B	7.3	0.60	SS
RAYMOND	103.3	B	6.5	0.50	DS
LENWOOD-LOCKHART-OLD WOMAN SPRGS	104.3	B	7.3	0.60	SS
JOHNSON VALLEY (Northern)	110.7	B	6.7	0.60	SS
VERDUGO	111.4	B	6.7	0.50	DS
EMERSON So. - COPPER MTN.	114.8	B	6.9	0.60	SS
HOLLYWOOD	116.4	B	6.5	1.00	DS
CALICO - HIDALGO	125.3	B	7.1	0.60	SS
PISGAH-BULLION MTN.-MESQUITE LK	127.4	B	7.1	0.60	SS
SANTA MONICA	128.5	B	6.6	1.00	DS
SIERRA MADRE (San Fernando)	131.7	B	6.7	2.00	DS
SUPERSTITION MTN. (San Jacinto)	131.9	B	6.6	5.00	SS
SAN GABRIEL	133.5	B	7.0	1.00	SS
ELMORE RANCH	135.7	B	6.6	1.00	SS
MALIBU COAST	136.4	B	6.7	0.30	DS
SUPERSTITION HILLS (San Jacinto)	137.9	B	6.6	4.00	SS
BRAWLEY SEISMIC ZONE	138.8	B	6.5	25.00	SS
ANACAPA-DUME	148.4	B	7.3	3.00	DS
SANTA SUSANA	149.6	B	6.6	5.00	DS
GRAVEL HILLS - HARPER LAKE	150.7	B	6.9	0.60	SS
ELSINORE-LAGUNA SALADA	150.8	B	7.0	3.50	SS
HOLSER	158.6	B	6.5	0.40	DS
IMPERIAL	165.0	A	7.0	20.00	SS
BLACKWATER	166.2	B	6.9	0.60	SS
OAK RIDGE (Onshore)	169.6	B	6.9	4.00	DS
SIMI-SANTA ROSA	171.3	B	6.7	1.00	DS
SAN CAYETANO	177.0	B	6.8	6.00	DS
SANTA YNEZ (East)	196.1	B	7.0	2.00	SS
GARLOCK (West)	201.6	A	7.1	6.00	SS
VENTURA - PITAS POINT	202.3	B	6.8	1.00	DS
GARLOCK (East)	209.3	A	7.3	7.00	SS
M.RIDGE-ARROYO PARIDA-SANTA ANA	210.8	B	6.7	0.40	DS
PLEITO THRUST	213.1	B	6.8	2.00	DS
RED MOUNTAIN	216.6	B	6.8	2.00	DS

ABBREVIATED FAULT NAME	APPROX. DISTANCE (km)	SOURCE TYPE (A,B,C)	MAX. MAG. (Mw)	SLIP RATE (mm/yr)	FAULT TYPE (SS,DS,BT)
BIG PINE	221.1	B	6.7	0.80	SS
SANTA CRUZ ISLAND	221.7	B	6.8	1.00	DS
WHITE WOLF	228.2	B	7.2	2.00	DS
OWL LAKE	232.0	B	6.5	2.00	SS
PANAMINT VALLEY	232.3	B	7.2	2.50	SS
So. SIERRA NEVADA	232.4	B	7.1	0.10	DS
TANK CANYON	234.2	B	6.5	1.00	DS
LITTLE LAKE	234.6	B	6.7	0.70	SS
DEATH VALLEY (South)	240.7	B	6.9	4.00	SS
SANTA YNEZ (West)	250.2	B	6.9	2.00	SS
SANTA ROSA ISLAND	257.9	B	6.9	1.00	DS
DEATH VALLEY (Graben)	282.3	B	6.9	4.00	DS
LOS ALAMOS-W. BASELINE	293.2	B	6.8	0.70	DS
OWENS VALLEY	304.3	B	7.6	1.50	SS
LIONS HEAD	310.7	B	6.6	0.02	DS
SAN JUAN	313.4	B	7.0	1.00	SS
SAN LUIS RANGE (S. Margin)	318.1	B	7.0	0.20	DS
CASMALIA (Orcutt Frontal Fault)	327.8	B	6.5	0.25	DS
HUNTER MTN. - SALINE VALLEY	327.8	B	7.0	2.50	SS
DEATH VALLEY (Northern)	336.0	A	7.2	5.00	SS
INDEPENDENCE	340.3	B	6.9	0.20	DS
LOS OSOS	347.5	B	6.8	0.50	DS
HOSGRI	356.8	B	7.3	2.50	SS
RINCONADA	365.6	B	7.3	1.00	SS
BIRCH CREEK	397.1	B	6.5	0.70	DS
WHITE MOUNTAINS	400.8	B	7.1	1.00	SS
SAN ANDREAS (Creeping)	415.9	B	5.0	34.00	SS
DEEP SPRINGS	418.7	B	6.6	0.80	DS
DEATH VALLEY (N. of Cucamongo)	422.3	A	7.0	5.00	SS
ROUND VALLEY (E. of S.N.Mtns.)	433.0	B	6.8	1.00	DS
FISH SLOUGH	439.8	B	6.6	0.20	DS
HILTON CREEK	459.3	B	6.7	2.50	DS
HARTLEY SPRINGS	484.2	B	6.6	0.50	DS
ORTIGALITA	497.2	B	6.9	1.00	SS
CALAVERAS (So.of Calaveras Res)	504.9	B	6.2	15.00	SS
MONTEREY BAY - TULARCITOS	510.8	B	7.1	0.50	DS
PALO COLORADO - SUR	514.0	B	7.0	3.00	SS
QUIEN SABE	517.5	B	6.5	1.00	SS
MONO LAKE	520.4	B	6.6	2.50	DS
ZAYANTE-VERGELES	536.9	B	6.8	0.10	SS
SARGENT	541.7	B	6.8	3.00	SS
SAN ANDREAS (1906)	542.1	A	7.9	24.00	SS
ROBINSON CREEK	551.8	B	6.5	0.50	DS
SAN GREGORIO	585.9	A	7.3	5.00	SS
GREENVILLE	588.9	B	6.9	2.00	SS
HAYWARD (SE Extension)	590.9	B	6.5	3.00	SS
MONTE VISTA - SHANNON	591.9	B	6.5	0.40	DS
ANTELOPE VALLEY	592.5	B	6.7	0.80	DS
CALAVERAS (No.of Calaveras Res)	610.2	B	6.8	6.00	SS
HAYWARD (Total Length)	610.2	A	7.1	9.00	SS
GENOA	618.5	B	6.9	1.00	DS
CONCORD - GREEN VALLEY	656.6	B	6.9	6.00	SS
RODGERS CREEK	695.9	A	7.0	9.00	SS
WEST NAPA	696.2	B	6.5	1.00	SS
POINT REYES	717.0	B	6.8	0.30	DS

ABBREVIATED FAULT NAME	APPROX. DISTANCE (km)	SOURCE TYPE (A,B,C)	MAX. MAG. (Mw)	SLIP RATE (mm/yr)	FAULT TYPE (SS,DS,BT)
HUNTING CREEK - BERRYESSA	717.4	B	6.9	6.00	SS
MAACAMA (South)	758.0	B	6.9	9.00	SS
COLLAYOMI	774.1	B	6.5	0.60	SS
BARTLETT SPRINGS	776.6	A	7.1	6.00	SS
MAACAMA (Central)	799.5	A	7.1	9.00	SS
MAACAMA (North)	858.4	A	7.1	9.00	SS
ROUND VALLEY (N. S.F.Bay)	863.2	B	6.8	6.00	SS
BATTLE CREEK	881.5	B	6.5	0.50	DS
LAKE MOUNTAIN	921.6	B	6.7	6.00	SS
GARBERVILLE-BRICELAND	939.3	B	6.9	9.00	SS
MENDOCINO FAULT ZONE	996.4	A	7.4	35.00	DS
LITTLE SALMON (Onshore)	1001.6	A	7.0	5.00	DS
MAD RIVER	1003.4	B	7.1	0.70	DS
CASCADIA SUBDUCTION ZONE	1010.8	A	8.3	35.00	DS
McKINLEYVILLE	1014.1	B	7.0	0.60	DS
TRINIDAD	1015.4	B	7.3	2.50	DS
FICKLE HILL	1016.2	B	6.9	0.60	DS
TABLE BLUFF	1022.3	B	7.0	0.60	DS
LITTLE SALMON (Offshore)	1035.5	B	7.1	1.00	DS
BIG LAGOON - BALD MTN.FLT.ZONE	1051.9	B	7.3	0.50	DS

DESIGN RESPONSE SPECTRUM

Seismic Zone: 0.4 Soil Profile: SD



Probabilistic Seismic Hazards Mapping Ground Motion Page

User Selected Site

Longitude	-117.1866
Latitude	33.5361

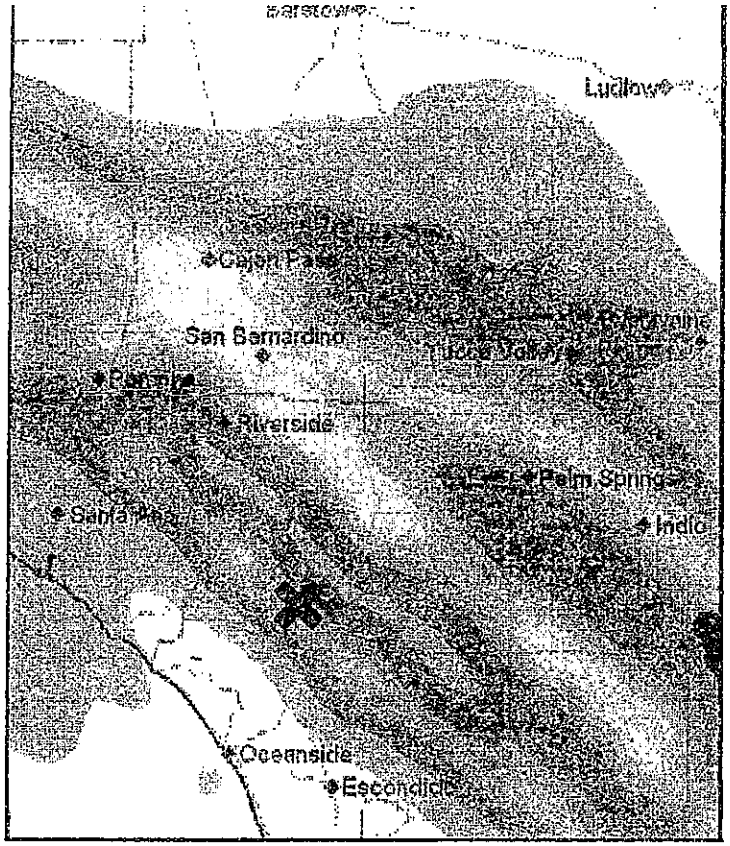
Ground Motions for User Selected Site

Ground motions (10% probability of being exceeded in 50 years) are expressed as a fraction of the acceleration due to gravity (g). Three values of ground motion are shown, peak ground acceleration (Pga), spectral acceleration(Sa) at short (0.2 second) and moderately long (1.0 second) periods. Ground motion values are also modified by the local site soil conditions. Each ground motion value is shown for 3 different site conditions: firm rock (conditions on the boundary between site categories B and C as defined by the building code), soft rock (site category C) and alluvium (site category D).

Ground Motion	Firm Rock	Soft Rock	Alluvium
Pga	0.564	0.564	0.564
Sa 0.2 sec	1.295	1.295	1.295
Sa 1.0 sec	0.484	0.578	0.661

NEHRP Soil Corrections were used to calculate Soft Rock and Alluvium.

Ground Motion values were interpolated from a grid (0.05 degree spacing)
of calculated values. Interpolated ground motion may not equal values
calculated for a specific site, therefore these values are not intended for
design or analysis.



Shaking (%g)
Pga (Peak Ground Acceleration)
Firm Rock
< 10%
10 - 20%
20 - 30%
30 - 40%
40 - 50%
50 - 60%
60 - 70%
70 - 80%
> 80%
The unit "g" is acceleration of gravity.

Click here to return to the statewide PSHA map or enter new coordinates below:

Longitude: Latitude: Submit

Please enter coordinates as Decimal Degrees
Example: Longitude -122.0017 Latitude 36.9894

Back to Top of Page

Last edited on October 30, 2006

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*                           *
*      L I Q U E F Y 2      *
*                           *
*       Version 1.50        *
*                           *
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EMPIRICAL PREDICTION OF
EARTHQUAKE-INDUCED LIQUEFACTION POTENTIAL

JOB NUMBER: 2692 DATE: 05-31-2007
JOB NAME: Industrial Building, Adams Ave, Murrieta, CA
SOIL-PROFILE NAME: 2692liquefy.LDW
BORING GROUNDWATER DEPTH: 15.00 ft
CALCULATION GROUNDWATER DEPTH: 15.00 ft
DESIGN EARTHQUAKE MAGNITUDE: 6.80 Mw
SITE PEAK GROUND ACCELERATION: 0.481 g
BOREHOLE DIAMETER CORRECTION FACTOR: 1.15
SAMPLER SIZE CORRECTION FACTOR: 1.00
N60 HAMMER CORRECTION FACTOR: 1.00
MAGNITUDE SCALING FACTOR METHOD: Idriss (1997, in press)
Magnitude Scaling Factor: 1.285
rd-CORRECTION METHOD: Seed (1985)
FIELD SPT N-VALUES ARE CORRECTED FOR THE LENGTH OF THE DRIVE RODS.
Rod Stick-Up Above Ground: 3.0 ft
CN NORMALIZATION FACTOR: 1.044 tsf
MINIMUM CN VALUE: 0.6

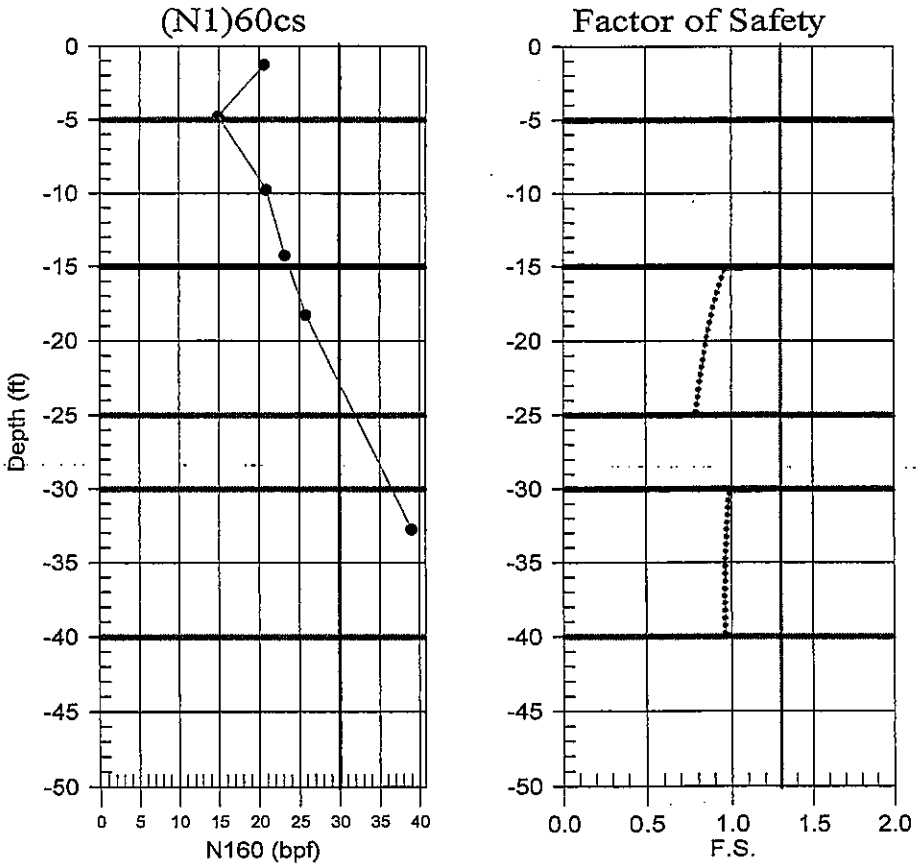
NCEER [1997] Method — LIQUEFACTION ANALYSIS SUMMARY

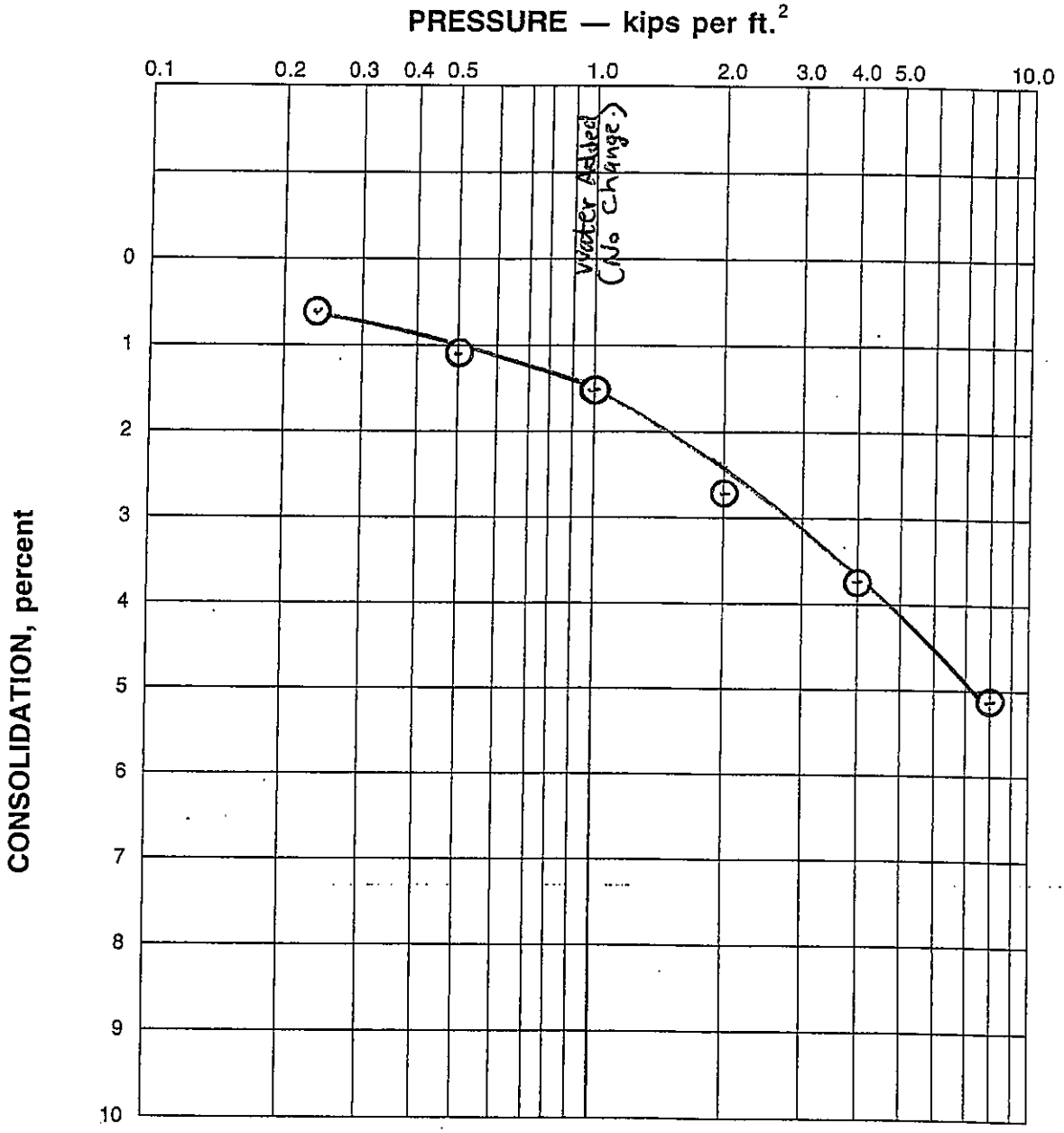
File Name: 2692liq2.txt

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
1	0.25	0.014	0.014	10	~	*	*	*	*	*	**
1	0.75	0.042	0.042	10	~	*	*	*	*	*	**
1	1.25	0.070	0.070	10	~	*	*	*	*	*	**
1	1.75	0.098	0.098	10	~	*	*	*	*	*	**
1	2.25	0.126	0.126	10	~	*	*	*	*	*	**
1	2.75	0.154	0.154	10	~	*	*	*	*	*	**
1	3.25	0.182	0.182	10	~	*	*	*	*	*	**
1	3.75	0.210	0.210	10	~	*	*	*	*	*	**
1	4.25	0.238	0.238	10	~	*	*	*	*	*	**
1	4.75	0.266	0.266	10	~	*	*	*	*	*	**
2	5.25	0.295	0.295	8	~	*	*	*	*	*	**
2	5.75	0.326	0.326	8	~	*	*	*	*	*	**
2	6.25	0.357	0.357	8	~	*	*	*	*	*	**
2	6.75	0.388	0.388	8	~	*	*	*	*	*	**
2	7.25	0.418	0.418	8	~	*	*	*	*	*	**
2	7.75	0.449	0.449	8	~	*	*	*	*	*	**
2	8.25	0.480	0.480	8	~	*	*	*	*	*	**
2	8.75	0.511	0.511	8	~	*	*	*	*	*	**
2	9.25	0.541	0.541	8	~	*	*	*	*	*	**
2	9.75	0.572	0.572	8	~	*	*	*	*	*	**
2	10.25	0.603	0.603	8	~	*	*	*	*	*	**
2	10.75	0.634	0.634	8	~	*	*	*	*	*	**
2	11.25	0.664	0.664	8	~	*	*	*	*	*	**
2	11.75	0.695	0.695	8	~	*	*	*	*	*	**
2	12.25	0.726	0.726	8	~	*	*	*	*	*	**
2	12.75	0.757	0.757	8	~	*	*	*	*	*	**

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
2	13.25	0.787	0.787	8	~	*	*	*	*	*	**
2	13.75	0.818	0.818	8	~	*	*	*	*	*	**
2	14.25	0.849	0.849	8	~	*	*	*	*	*	**
2	14.75	0.880	0.880	8	~	*	*	*	*	*	**
3	15.25	0.911	0.903	12	6.86	1.351	20.8	0.228	0.968	0.305	0.96
3	15.75	0.942	0.918	12	6.86	1.351	20.8	0.228	0.967	0.310	0.94
3	16.25	0.973	0.934	12	6.86	1.351	20.8	0.228	0.966	0.315	0.93
3	16.75	1.004	0.950	12	6.86	1.351	20.8	0.228	0.965	0.319	0.92
3	17.25	1.036	0.965	12	6.86	1.351	20.8	0.228	0.964	0.323	0.91
3	17.75	1.067	0.981	12	6.86	1.351	20.8	0.228	0.963	0.327	0.89
3	18.25	1.098	0.997	12	6.86	1.351	20.8	0.228	0.961	0.331	0.88
3	18.75	1.129	1.012	12	6.86	1.351	20.8	0.228	0.960	0.335	0.87
3	19.25	1.161	1.028	12	6.86	1.351	20.8	0.228	0.959	0.338	0.86
3	19.75	1.192	1.044	12	6.86	1.351	20.8	0.228	0.958	0.342	0.86
3	20.25	1.223	1.059	12	6.86	1.351	20.8	0.228	0.956	0.345	0.85
3	20.75	1.254	1.075	12	6.86	1.351	20.8	0.228	0.955	0.348	0.84
3	21.25	1.286	1.091	12	6.86	1.351	20.8	0.228	0.954	0.352	0.83
3	21.75	1.317	1.106	12	6.86	1.351	20.8	0.228	0.952	0.354	0.83
3	22.25	1.348	1.122	12	6.86	1.351	20.8	0.228	0.951	0.357	0.82
3	22.75	1.379	1.138	12	6.86	1.351	20.8	0.228	0.949	0.360	0.81
3	23.25	1.411	1.153	12	6.86	1.351	20.8	0.228	0.948	0.363	0.81
3	23.75	1.442	1.169	12	6.86	1.351	20.8	0.228	0.946	0.365	0.80
3	24.25	1.473	1.185	12	6.86	1.351	20.8	0.228	0.945	0.367	0.80
3	24.75	1.504	1.200	12	6.86	1.351	20.8	0.228	0.943	0.370	0.79
4	25.25	1.534	1.214	14	~	~	~	~	~	~	~~
4	25.75	1.563	1.227	14	~	~	~	~	~	~	~~
4	26.25	1.591	1.240	14	~	~	~	~	~	~	~~
4	26.75	1.620	1.253	14	~	~	~	~	~	~	~~
4	27.25	1.648	1.266	14	~	~	~	~	~	~	~~
4	27.75	1.677	1.279	14	~	~	~	~	~	~	~~
4	28.25	1.705	1.292	14	~	~	~	~	~	~	~~
4	28.75	1.734	1.305	14	~	~	~	~	~	~	~~
4	29.25	1.762	1.318	14	~	~	~	~	~	~	~~
4	29.75	1.791	1.331	14	~	~	~	~	~	~	~~
5	30.25	1.819	1.343	17	7.52	1.023	25.8	0.299	0.920	0.389	0.99
5	30.75	1.846	1.354	17	7.52	1.023	25.8	0.299	0.917	0.391	0.98
5	31.25	1.873	1.366	17	7.52	1.023	25.8	0.299	0.914	0.392	0.98
5	31.75	1.900	1.377	17	7.52	1.023	25.8	0.299	0.912	0.393	0.98
5	32.25	1.927	1.388	17	7.52	1.023	25.8	0.299	0.909	0.394	0.97
5	32.75	1.954	1.400	17	7.52	1.023	25.8	0.299	0.906	0.395	0.97
5	33.25	1.981	1.411	17	7.52	1.023	25.8	0.299	0.903	0.396	0.97
5	33.75	2.008	1.423	17	7.52	1.023	25.8	0.299	0.899	0.397	0.97
5	34.25	2.035	1.434	17	7.52	1.023	25.8	0.299	0.896	0.398	0.97
5	34.75	2.062	1.445	17	7.52	1.023	25.8	0.299	0.893	0.398	0.96
5	35.25	2.089	1.457	17	7.52	1.023	25.8	0.299	0.889	0.399	0.96
5	35.75	2.116	1.468	17	7.52	1.023	25.8	0.299	0.886	0.399	0.96
5	36.25	2.143	1.480	17	7.52	1.023	25.8	0.299	0.882	0.399	0.96
5	36.75	2.170	1.491	17	7.52	1.023	25.8	0.299	0.878	0.400	0.96
5	37.25	2.197	1.502	17	7.52	1.023	25.8	0.299	0.874	0.400	0.96
5	37.75	2.224	1.514	17	7.52	1.023	25.8	0.299	0.871	0.400	0.96
5	38.25	2.251	1.525	17	7.52	1.023	25.8	0.299	0.866	0.400	0.96
5	38.75	2.278	1.537	17	7.52	1.023	25.8	0.299	0.862	0.400	0.96
5	39.25	2.305	1.548	17	7.52	1.023	25.8	0.299	0.858	0.399	0.96
5	39.75	2.332	1.559	17	7.52	1.023	25.8	0.299	0.854	0.399	0.96
6	40.25	2.359	1.571	33	6.22	0.864	39.0	Infin	0.849	0.399	NonLiq
6	40.75	2.386	1.583	33	6.22	0.864	39.0	Infin	0.845	0.398	NonLiq
6	41.25	2.414	1.595	33	6.22	0.864	39.0	Infin	0.840	0.398	NonLiq
6	41.75	2.441	1.607	33	6.22	0.864	39.0	Infin	0.836	0.397	NonLiq

SOIL NO.	CALC. DEPTH (ft)	TOTAL STRESS (tsf)	EFF. STRESS (tsf)	FIELD N (B/ft)	FC DELTA N1_60	C N	CORR. (N1)60 (B/ft)	LIQUE. RESIST RATIO	r d	INDUC. STRESS RATIO	LIQUE. SAFETY FACTOR
6	42.25	2.469	1.619	33	6.22	0.864	39.0	Infin	0.831	0.396	NonLiq
6	42.75	2.496	1.630	33	6.22	0.864	39.0	Infin	0.826	0.396	NonLiq
6	43.25	2.524	1.642	33	6.22	0.864	39.0	Infin	0.822	0.395	NonLiq
6	43.75	2.551	1.654	33	6.22	0.864	39.0	Infin	0.817	0.394	NonLiq
6	44.25	2.579	1.666	33	6.22	0.864	39.0	Infin	0.812	0.393	NonLiq
6	44.75	2.606	1.678	33	6.22	0.864	39.0	Infin	0.807	0.392	NonLiq
6	45.25	2.634	1.690	33	6.22	0.864	39.0	Infin	0.802	0.391	NonLiq
6	45.75	2.661	1.702	33	6.22	0.864	39.0	Infin	0.797	0.390	NonLiq
6	46.25	2.689	1.714	33	6.22	0.864	39.0	Infin	0.792	0.388	NonLiq
6	46.75	2.716	1.726	33	6.22	0.864	39.0	Infin	0.787	0.387	NonLiq
6	47.25	2.744	1.738	33	6.22	0.864	39.0	Infin	0.782	0.386	NonLiq
6	47.75	2.771	1.749	33	6.22	0.864	39.0	Infin	0.776	0.385	NonLiq
6	48.25	2.799	1.761	33	6.22	0.864	39.0	Infin	0.771	0.383	NonLiq
6	48.75	2.826	1.773	33	6.22	0.864	39.0	Infin	0.766	0.382	NonLiq
6	49.25	2.854	1.785	33	6.22	0.864	39.0	Infin	0.761	0.380	NonLiq
6	49.75	2.881	1.797	33	6.22	0.864	39.0	Infin	0.756	0.379	NonLiq





SAMPLE INFORMATION
Boring No. B-1
Sample Depth: 10-11'

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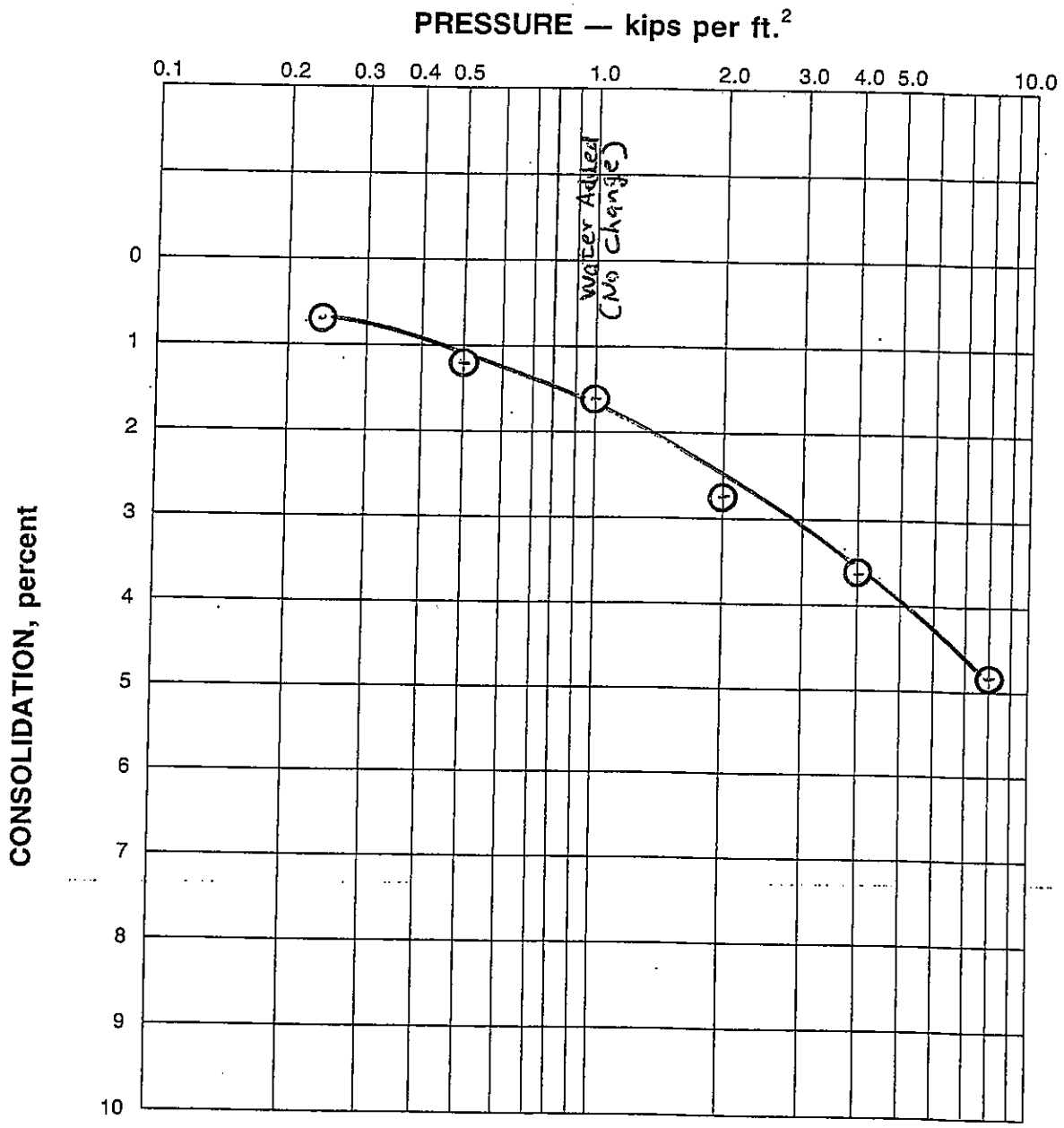
IRVINE, CA 92618
PHONE (949) 461-5260 FAX (949) 461-5262

PRESSURE - CONSOLIDATION

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	JRC	Page I



SAMPLE INFORMATION
Boring No. B-1
Sample Depth: 20-21'

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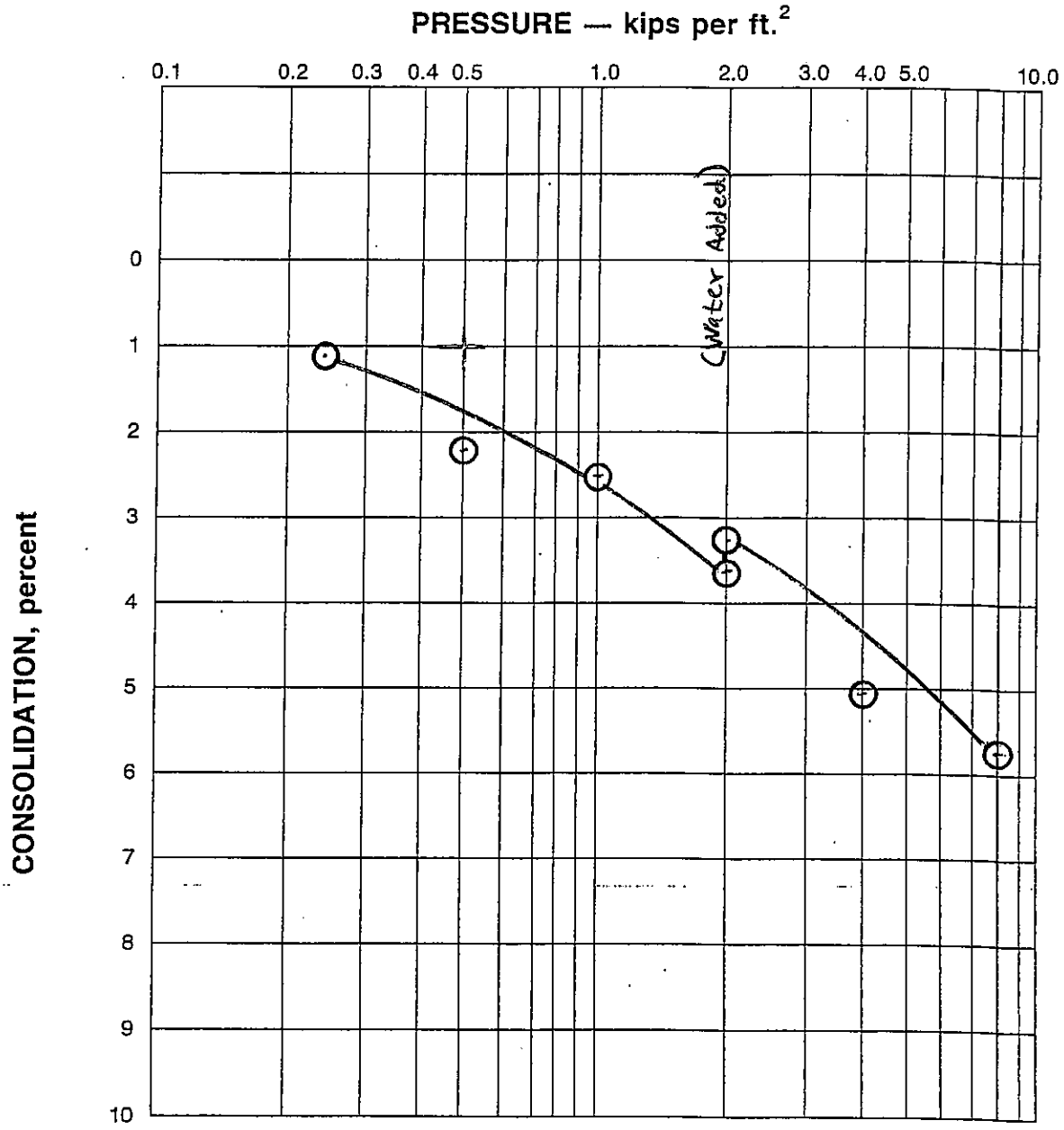
PRESSURE - CONSOLIDATION

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	JRC	Page J



SAMPLE INFORMATION
Boring No. B-1
Sample Depth: 40'

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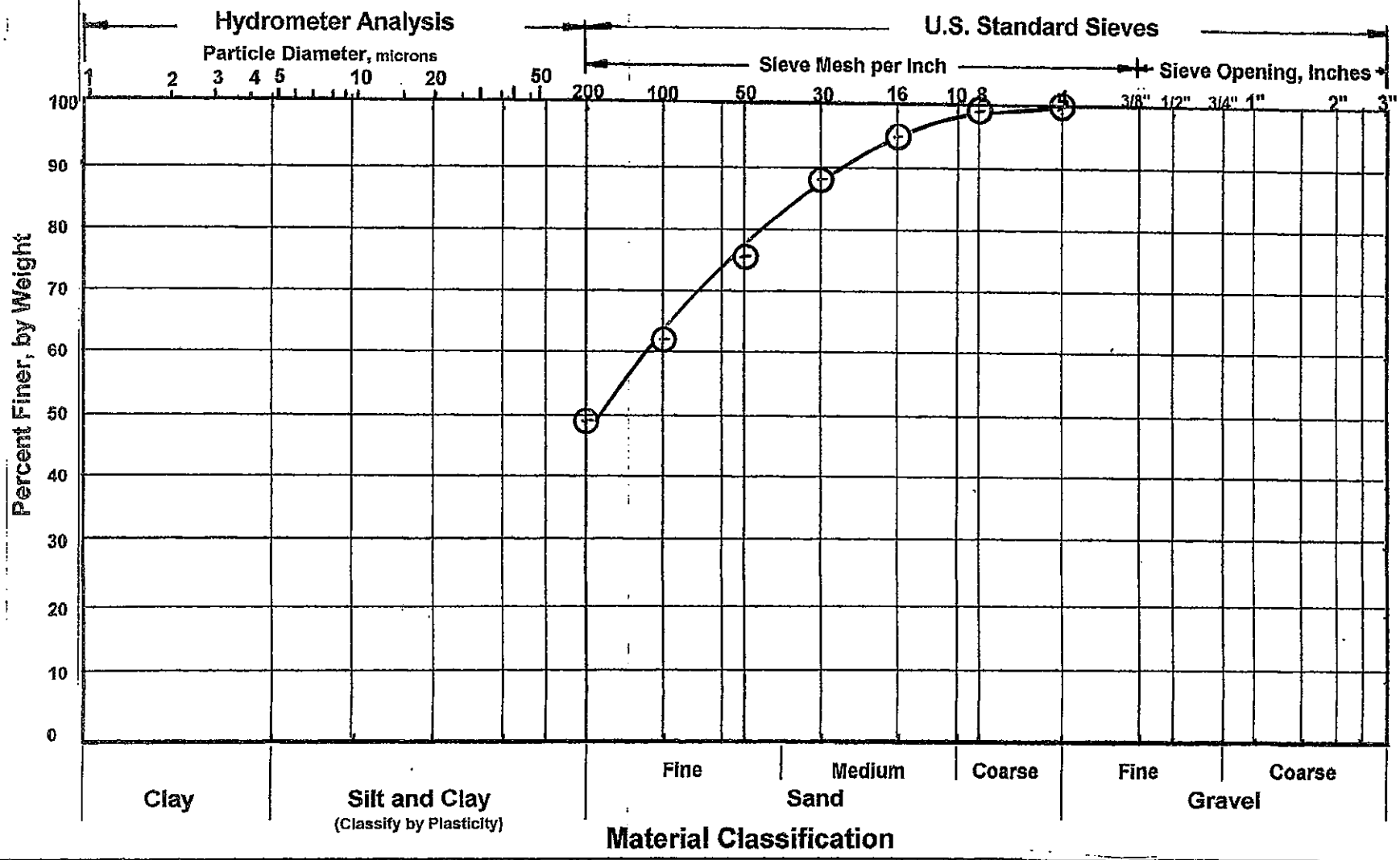
PRESSURE - CONSOLIDATION

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	JRC	Page K



Sample Information:

Symbol	Boring	Depth	Liquid Limit	Plastic Limit	Plasticity Index
⊙	B-1	1-4'			
⊡					
△					

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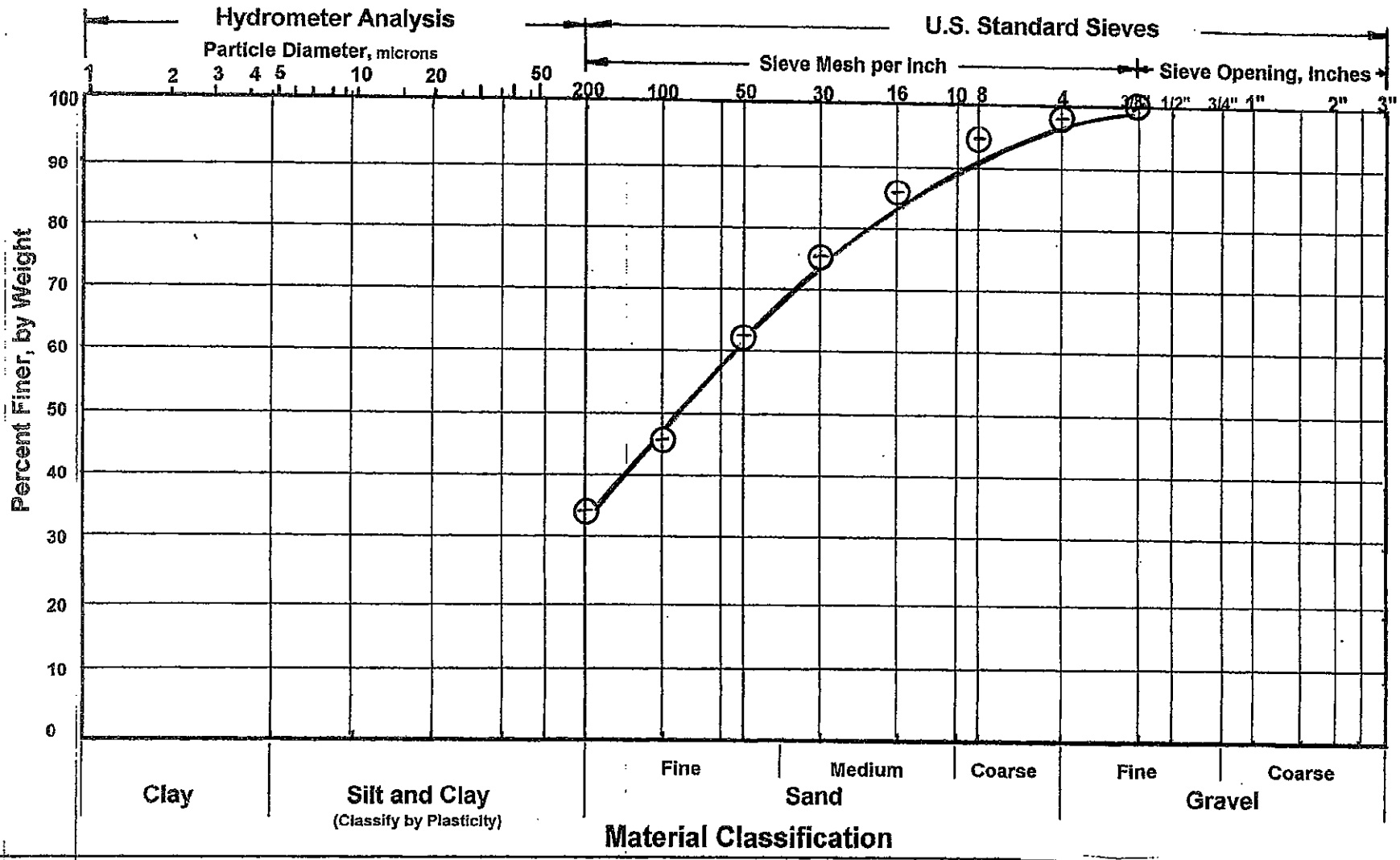
GRADATION TESTS

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	JRC	Page L



Sample Information:

Symbol	Boring	Depth	Liquid Limit	Plastic Limit	Plasticity Index
⊙	B-1	15-16'			
⊡					
△					

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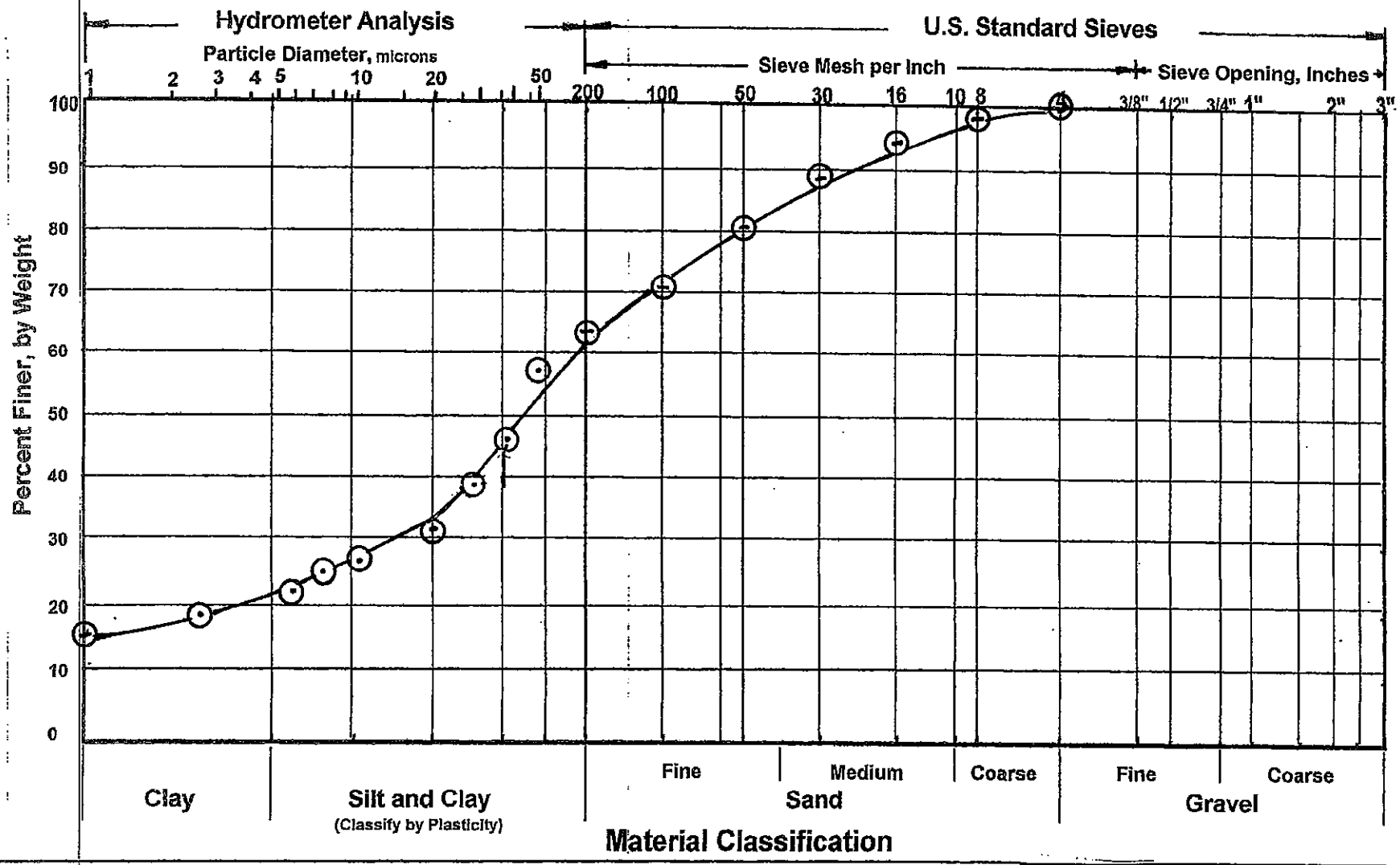
GRADATION TESTS

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	JRC	Page M



Sample Information:

Symbol	Boring	Depth	Liquid Limit	Plastic Limit	Plasticity Index
⊙	B-3+ B-4	20'			
⊡					
△					

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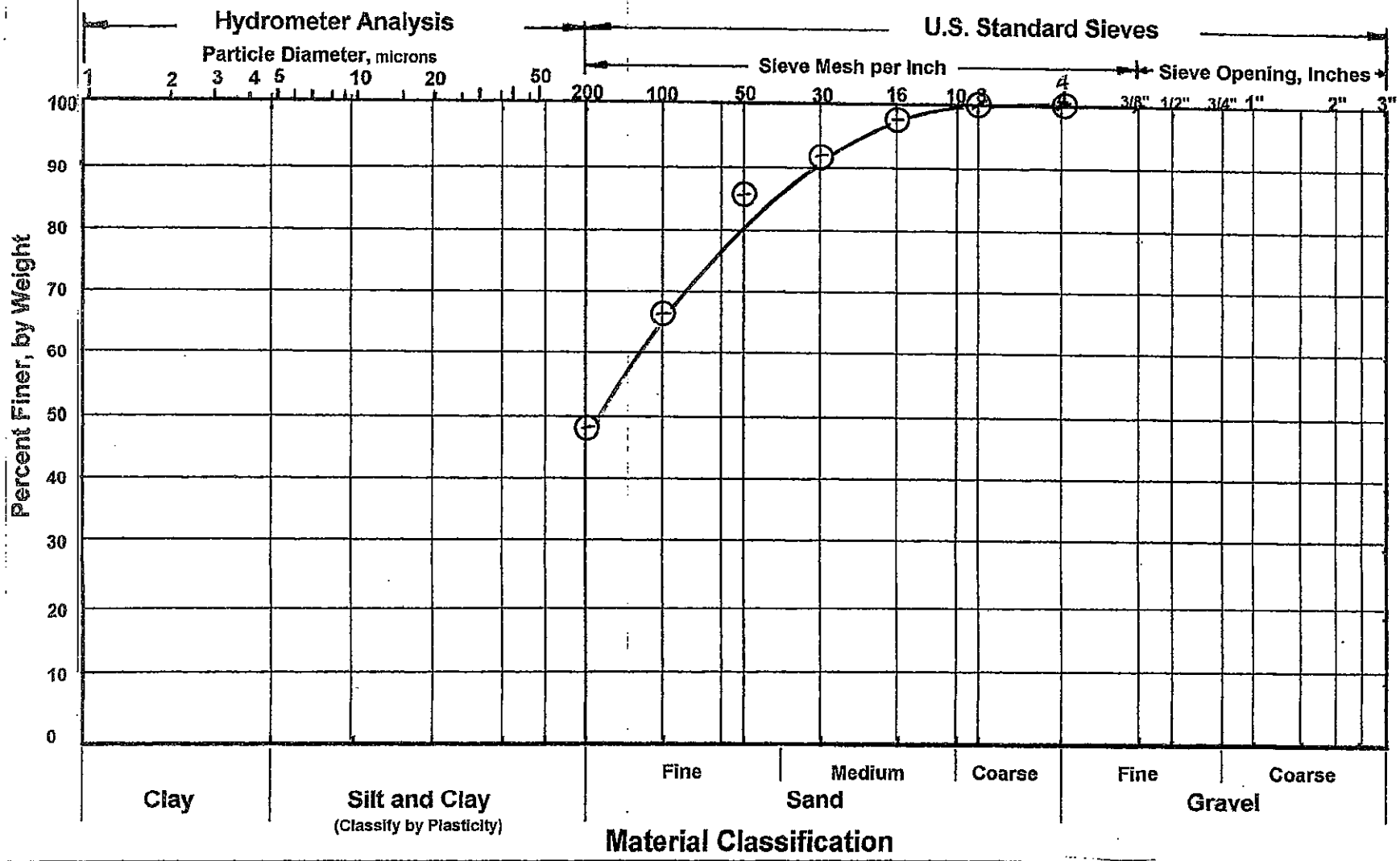
GRADATION TESTS

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	JRC	Page N



Sample Information:

Symbol	Boring	Depth	Liquid Limit	Plastic Limit	Plasticity Index
⊙	B-1	25-26'			
⊡					
△					

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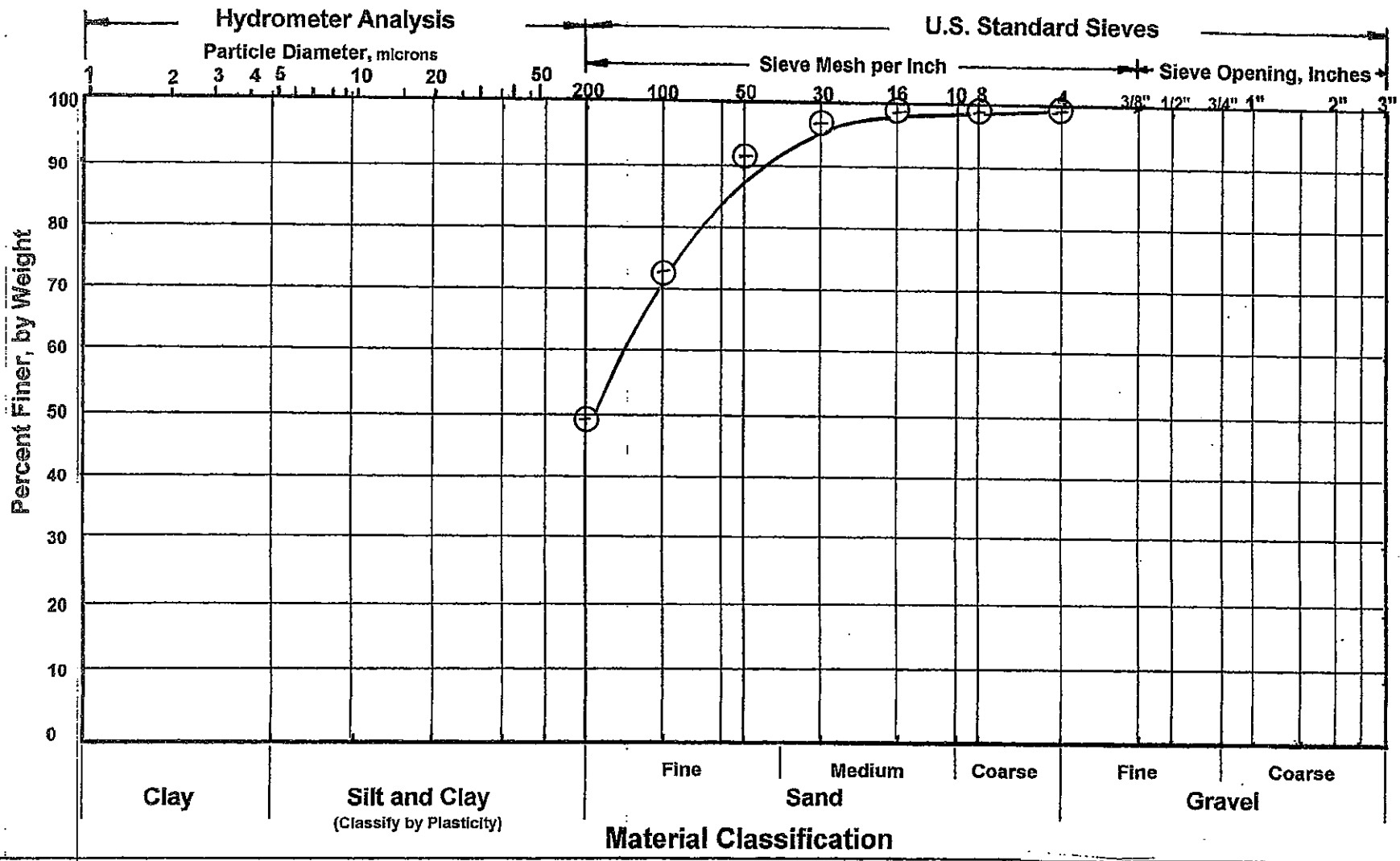
GRADATION TESTS

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	JRC	Page D



Sample Information:

Symbol	Boring	Depth	Liquid Limit	Plastic Limit	Plasticity Index
⊙	B-1	45-46'			
⊡					
△					

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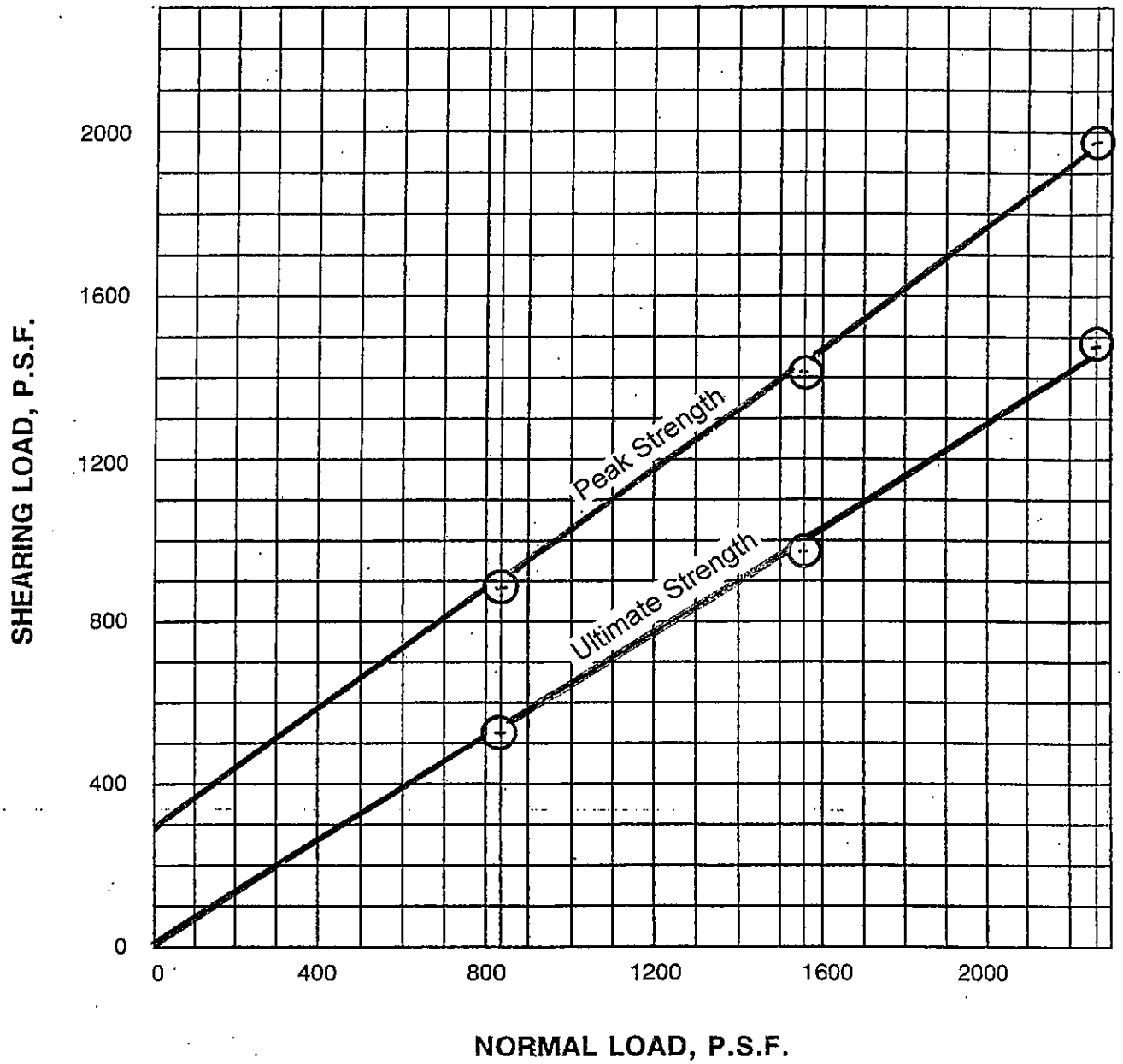
GRADATION TESTS

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	JRC	Page P



SAMPLE INFORMATION	
Boring/Test Pit No.	B-1
Sample Depth (feet)	5-6'

TEST CONDITIONS		
	[x] Undisturbed	[ ] Remolded
Moisture Condition	[x] Saturated	[ ] Natural
Remolded Density	[ ] 90% of Max.	[x] Natural

TEST RESULTS	Cohesion (psf)	Friction Angle (φ)
Peak Strength	290	36°
Ultimate/Residual Strength	0	33°

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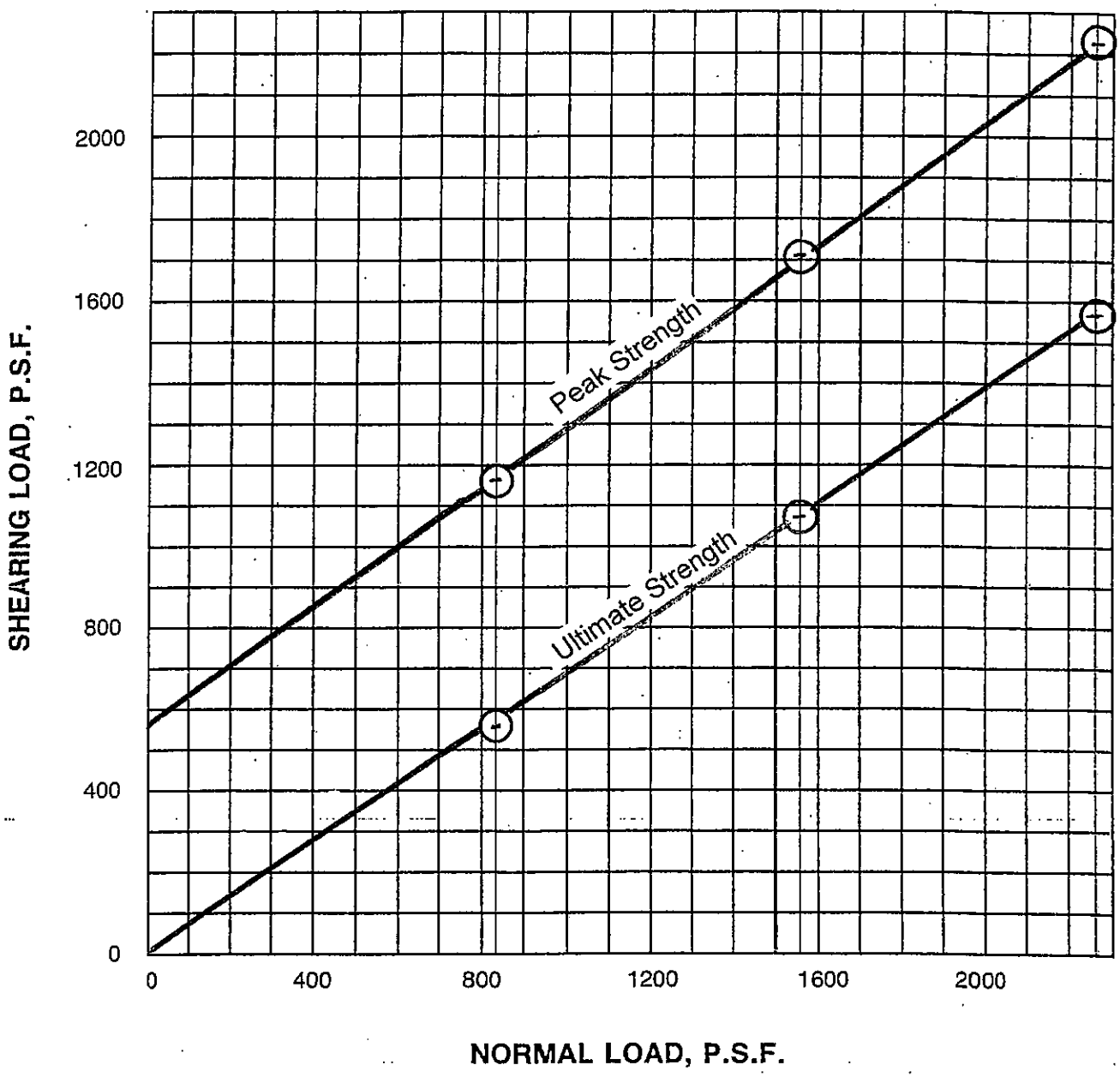
DIRECT SHEAR SUMMARY

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	ARC	Page C



SAMPLE INFORMATION	
Boring/Test Pit No.	B-1
Sample Depth (feet)	20-21'

TEST CONDITIONS		
	[✓] Undisturbed	[ ] Remolded
Moisture Condition	[✓] Saturated	[ ] Natural
Remolded Density	[ ] 90% of Max.	[✓] Natural

TEST RESULTS	Cohesion (psf)	Friction Angle (φ)
Peak Strength	570	36°
Ultimate/Residual Strength	0	34°

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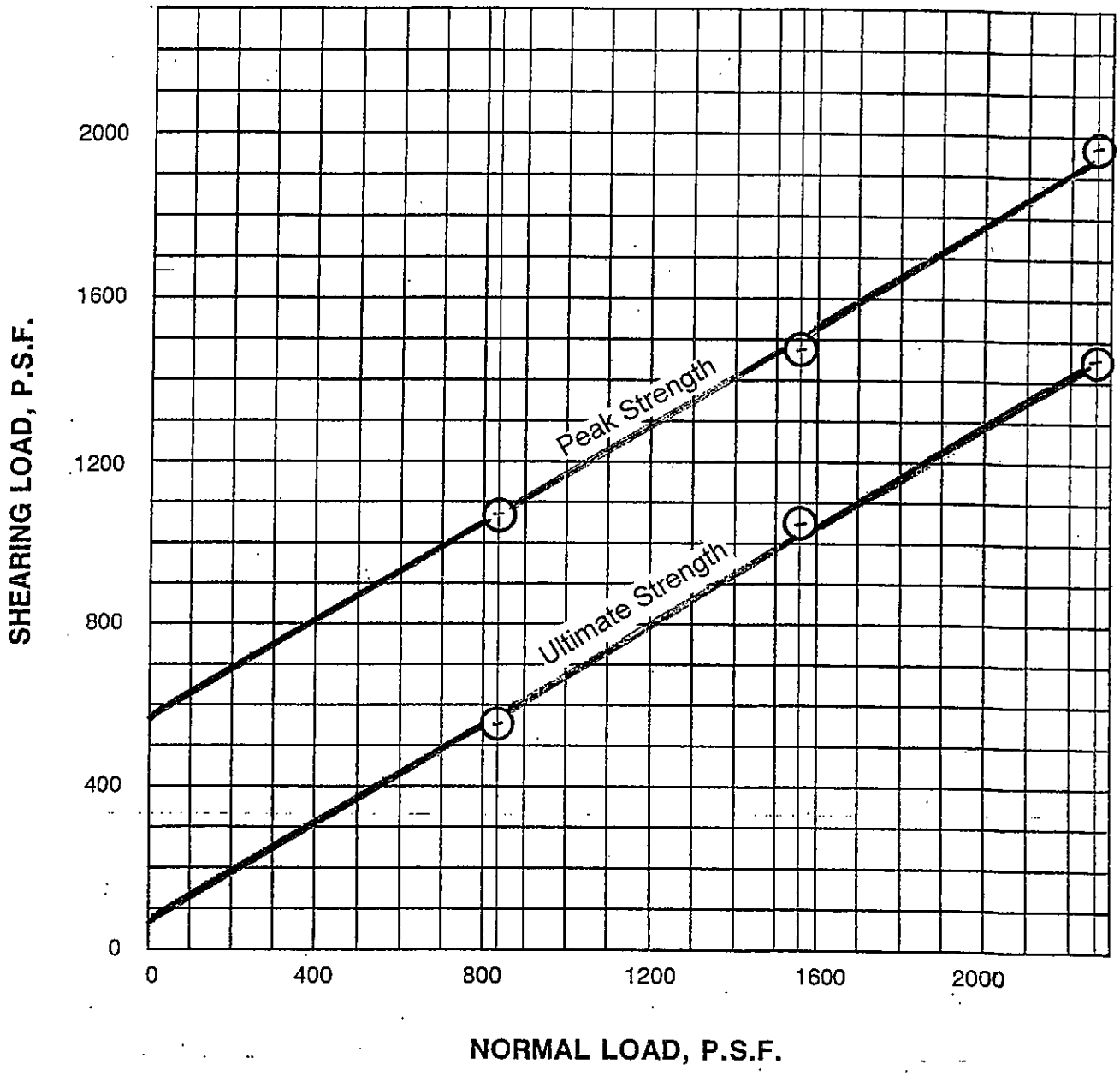
DIRECT SHEAR SUMMARY

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	JRC	Page B



SAMPLE INFORMATION	
Boring/Test Pit No.	B-1
Sample Depth (feet)	40 - 41

TEST CONDITIONS		
	[X] Undisturbed	[ ] Remolded
Moisture Condition	[X] Saturated	[ ] Natural
Remolded Density	[ ] 90% of Max.	[ ] Natural

TEST RESULTS	Cohesion (psf)	Friction Angle (φ)
Peak Strength	570	31°
Ultimate/Residual Strength	80	31°

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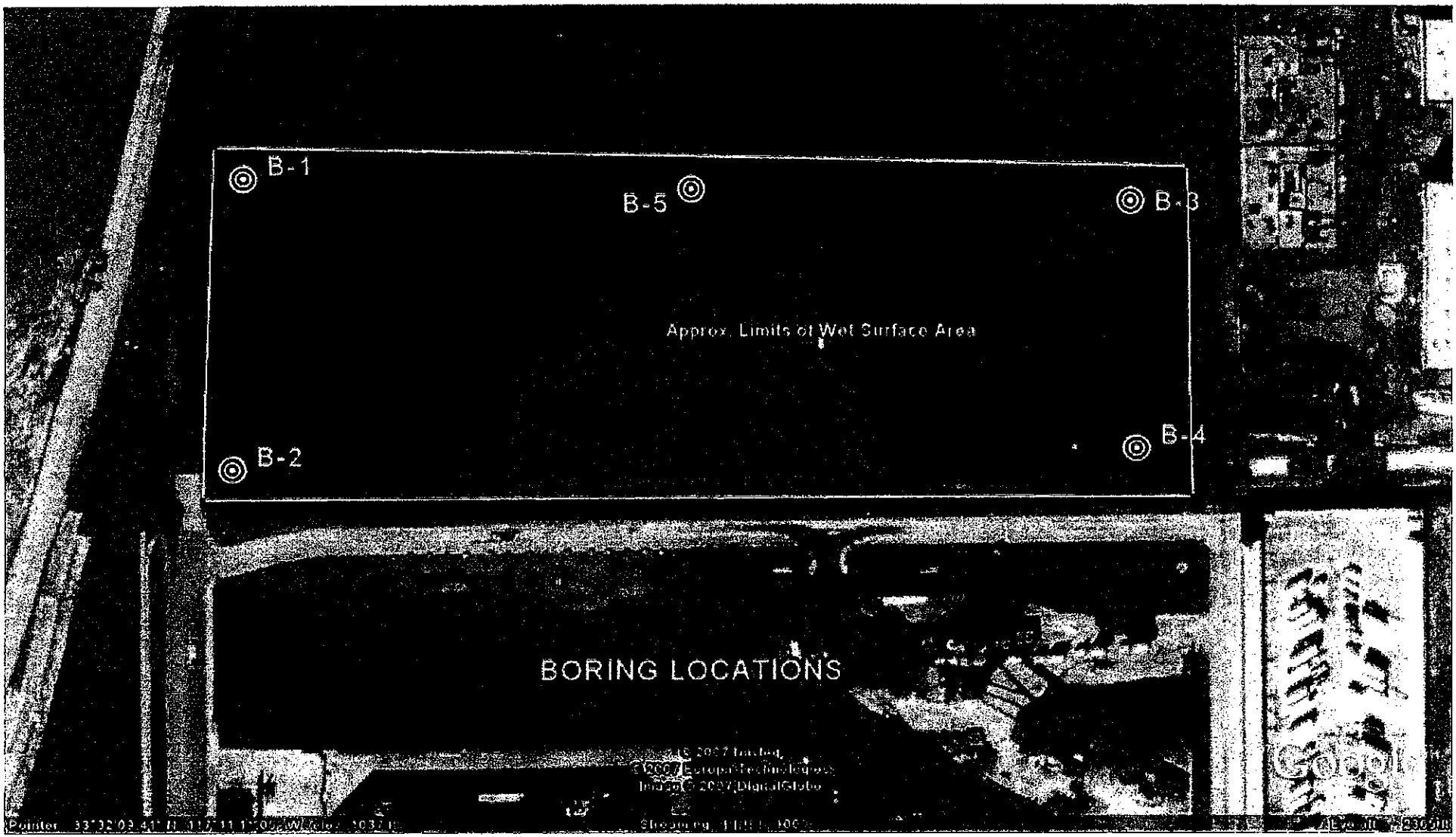
DIRECT SHEAR SUMMARY

JOB NO.	DATE	DRAWN BY	APPENDIX
2692	5/07	ARC	Page 5


B-1
B-5
B-3
Approx. Limits of Wet Surface Area
B-2
B-4
BORING LOCATIONS

Appendix 4: Historical Site Conditions

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

N/A

Examples of material to provide in Appendix 4 may include but are not limited to the following:

- Environmental Site Assessments conducted for the project,
- Other information on Past Site Use that impacts the feasibility of LID BMP implementation on the 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 D of this Template.

Appendix 5: LID Feasibility Supplemental Information

Information that supports or supplements the determination of LID technical feasibility documented in Section D

N/A

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.

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	RDS	Date	5/27/2021
Designed by	Rich Soltysiak	County/City Case No	DP-2020-2231
Company Project Number/Name	Adams Storage		
Drainage Area Number/Name	DMA 1		

Enter the Area Tributary to this Feature A_T = 2.62 acres

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

Site Location

Township: T7S

Range: R3W

Section: SEC 27

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.90

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.31

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 = 0.23

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$

V_u = 0.21 (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} = 1,997 ft^3

Notes:

Adams Storage

BMP 1

Biofiltration with No Infiltration Facility - Design Procedure	BMP ID: 1	Legend: Required Entries / Calculated Cells
Company Name: RDS and Associates		Date: 5/21/2021
Designed by: Rich Soltysiak		County/City Case No.: DP-2020-2231

Design Volume

Enter the area tributary to this feature	A_T =	2.62	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} =	1,997	ft^3
Estimated footprint of BMP, $Area_{BMP}$ (available space or 3% imp. area)	$Area_{BMP}$ =	1,399	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 =	6.0	inches
Depth of Engineered Soil Media (24" to 36"; 18" if vertically constrained)	d_S =	24.0	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} = 2.1 ft

Effective Static Depth, $d_{E\_bio\_static}$

$d_{E\_bio\_static}$ = (d_P + (0.3 * d_S)) (ft) — $d_{E\_bio\_static}$ = 1.1 ft

$V_{biofiltered}$ = d_{E_bio} * $Area_{BMP}$ — $V_{biofiltered}$ = 2996.2 ft^3

$V_{biofiltered\_static}$ = $d_{E\_bio\_static}$ * $Area_{BMP}$ — $V_{biofiltered\_static}$ = 1538.9 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: $V_{biofiltered\_static} \geq 0.75$ x V_{BMP} — Results: PASS

Note

If neither of these criteria are met increase the footprint and rerun calculations. This calculation is inherently iterative.

Adams Storage
BMP 1

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)	0.5	%
Check Dam Spacing	0	feet
Describe Vegetation:	Shrubs	

Notes: Top width = (0.5' Depth x 4:1 Side Slope) x 2 + 2' Base Width = 6'

Mid Ponding Top width = (0.25' Depth x 4:1 Side Slope) x 2 + 2' Base Width=4' 1,399 SF/4= 349.75' 350.0' Long

Total Length = 352'

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	RDS	Date	5/27/2021
Designed by	Rich Soltysiak	County/City Case No	DP-2020-2231
Company Project Number/Name	Adams Storage		
Drainage Area Number/Name	DMA 2		

Enter the Area Tributary to this Feature A_T = 2.91 acres

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

Site Location

Township: T7S

Range: R3W

Section: SEC 27

Enter the 85th Percentile, 24-hour Rainfall Depth D_{85} = 0.90

Determine the Effective Impervious Fraction

Type of post-development surface cover (use pull down menu): Mixed Surface Types

Effective Impervious Fraction I_f = 0.17

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 = 0.15

Determine Design Storage Volume, V_{BMP}

Calculate V_U, the 85% Unit Storage Volume $V_U = D_{85} \times C$

V_u = 0.14 (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} = 1,479 ft^3

Notes:

Biofiltration with No Infiltration Facility - Design Procedure	BMP ID: 2	Legend:	Required Entries / Calculated Cells
Company Name:	RDS and Associates	Date:	5/27/2021
Designed by:	Rich Soltysiak	County/City Case No.:	DP-2020-2231

Design Volume

Enter the area tributary to this feature	A_T =	2.91	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP} =	1,479	ft^3
Estimated footprint of BMP, $Area_{BMP}$ (available space or 3% imp. area)	$Area_{BMP}$ =	1,036	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 =	6.0	inches
Depth of Engineered Soil Media (24" to 36"; 18" if vertically constrained)	d_S =	24.0	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} = 2.1 ft

Effective Static Depth, $d_{E\_bio\_static}$

$d_{E\_bio\_static}$ = (d_P + (0.3 * d_S)) (ft)

$d_{E\_bio\_static}$ = 1.1 ft

$V_{biofiltered}$ = d_{E_bio} * $Area_{BMP}$

$V_{biofiltered}$ = 2218.8 ft^3

$V_{biofiltered\_static}$ = $d_{E\_bio\_static}$ * $Area_{BMP}$

$V_{biofiltered\_static}$ = 1139.6 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: $V_{biofiltered\_static} \geq 0.75$ x 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)	0.5	%
Check Dam Spacing	0	feet
Describe Vegetation:	Shrubs	

Notes: Top width = (0.5' Depth x 4:1 Side Slope) x 2 + 2' Base Width = 8'

Mid Ponding Top width = (0.25' Depth x 4:1 Side Slope) x 2 + 2' Base Width=6' 1,036 SF/6= 172.7' 173' Long

Total Length = 175'

Appendix 7: Hydromodification

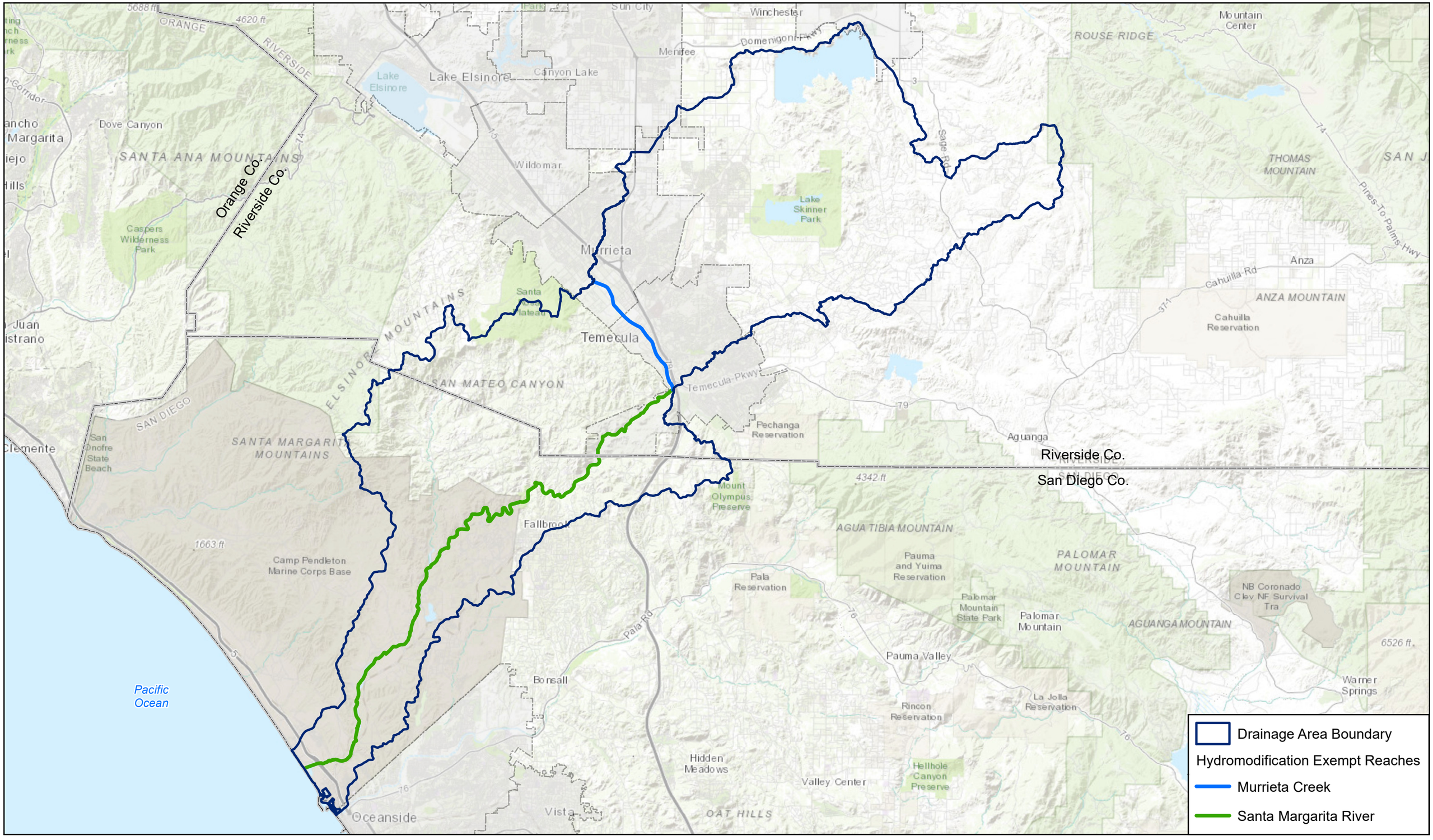
Supporting Detail Relating to compliance with the Hydromodification Performance Standards

SEE ATTACHED EXEMPTION EXHIBIT

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.



0 1 2 3 4 Miles

Exhibit G-2

SANTA MARGARITA RIVER WATERSHED
HYDROMODIFICATION EXEMPT REACHES

RIVERSIDE COUNTY WATERSHED PROTECTION

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.

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	TC-32 Biofiltration Basin	SC-44 Drainage System Maintenance
Outdoor Storage Area	TC-32 Biofiltration Basin	SC-43 Parking Storage Area Maintenance
Parking Lots	TC-32 Biofiltration Basin	SC-43 Parking Storage Area Maintenance
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here
Insert text here	Insert text here	Insert text here

Drainage System Maintenance SC-44

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize

Description

As a consequence of its function, the stormwater conveyance system collects and transports urban runoff and stormwater that may contain certain pollutants. The protocols in this fact sheet are intended to reduce pollutants reaching receiving waters through proper conveyance system operation and maintenance.

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	
Bacteria	✓
Oil and Grease	
Organics	

Approach

Pollution Prevention

Maintain catch basins, stormwater inlets, and other stormwater conveyance structures on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, restore catch basins' sediment trapping capacity, and ensure the system functions properly hydraulically to avoid flooding.

Suggested Protocols

Catch Basins/Inlet Structures

- Staff should regularly inspect facilities to ensure compliance with the following:
  - Immediate repair of any deterioration threatening structural integrity.
  - Cleaning before the sump is 40% full. Catch basins should be cleaned as frequently as needed to meet this standard.
  - Stenciling of catch basins and inlets (see SC34 Waste Handling and Disposal).

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- Clean catch basins, storm drain inlets, and other conveyance structures before the wet season to remove sediments and debris accumulated during the summer.
- Conduct inspections more frequently during the wet season for problem areas where sediment or trash accumulates more often. Clean and repair as needed.
- Keep accurate logs of the number of catch basins cleaned.
- Store wastes collected from cleaning activities of the drainage system in appropriate containers or temporary storage sites in a manner that prevents discharge to the storm drain.
- Dewater the wastes if necessary with outflow into the sanitary sewer if permitted. Water should be treated with an appropriate filtering device prior to discharge to the sanitary sewer. If discharge to the sanitary sewer is not allowed, water should be pumped or vacuumed to a tank and properly disposed. Do not dewater near a storm drain or stream.

Storm Drain Conveyance System

- Locate reaches of storm drain with deposit problems and develop a flushing schedule that keeps the pipe clear of excessive buildup.
- Collect and pump flushed effluent to the sanitary sewer for treatment whenever possible.

Pump Stations

- Clean all storm drain pump stations prior to the wet season to remove silt and trash.
- Do not allow discharge to reach the storm drain system when cleaning a storm drain pump station or other facility.
- Conduct routine maintenance at each pump station.
- Inspect, clean, and repair as necessary all outlet structures prior to the wet season.

Open Channel

- Modify storm channel characteristics to improve channel hydraulics, increase pollutant removals, and enhance channel/creek aesthetic and habitat value.
- Conduct channel modification/improvement in accordance with existing laws. Any person, government agency, or public utility proposing an activity that will change the natural (emphasis added) state of any river, stream, or lake in California, must enter into a Steam or Lake Alteration Agreement with the Department of Fish and Game. The developer-applicant should also contact local governments (city, county, special districts), other state agencies (SWRCB, RWQCB, Department of Forestry, Department of Water Resources), and Federal Corps of Engineers and USFWS.

Illicit Connections and Discharges

- Look for evidence of illegal discharges or illicit connections during routine maintenance of conveyance system and drainage structures:
  - Is there evidence of spills such as paints, discoloring, etc?

- Are there any odors associated with the drainage system?
- Record locations of apparent illegal discharges/illicit connections?
- Track flows back to potential dischargers and conduct aboveground inspections. This can be done through visual inspection of upgradient manholes or alternate techniques including zinc chloride smoke testing, fluorometric dye testing, physical inspection testing, or television camera inspection.
- Eliminate the discharge once the origin of flow is established.

- Stencil or demarcate storm drains, where applicable, to prevent illegal disposal of pollutants. Storm drain inlets should have messages such as "Dump No Waste Drains to Stream" stenciled next to them to warn against ignorant or intentional dumping of pollutants into the storm drainage system.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Illegal Dumping

- Inspect and clean up hot spots and other storm drainage areas regularly where illegal dumping and disposal occurs.
- Establish a system for tracking incidents. The system should be designed to identify the following:
  - Illegal dumping hot spots
  - Types and quantities (in some cases) of wastes
  - Patterns in time of occurrence (time of day/night, month, or year)
  - Mode of dumping (abandoned containers, "midnight dumping" from moving vehicles, direct dumping of materials, accidents/spills)
  - Responsible parties
- Post "No Dumping" signs in problem areas with a phone number for reporting dumping and disposal. Signs should also indicate fines and penalties for illegal dumping.
- Refer to fact sheet SC-10 Non-Stormwater Discharges.

Training

- Train crews in proper maintenance activities, including record keeping and disposal.
- Allow only properly trained individuals to handle hazardous materials/wastes.
- Have staff involved in detection and removal of illicit connections trained in the following:
  - OSHA-required Health and Safety Training (29 CFR 1910.120) plus annual refresher training (as needed).

- OSHA Confined Space Entry training (Cal-OSHA Confined Space, Title 8 and Federal OSHA 29 CFR 1910.146).

- Procedural training (field screening, sampling, smoke/dye testing, TV inspection).

Spill Response and Prevention

- Investigate all reports of spills, leaks, and/or illegal dumping promptly.
- Clean up all spills and leaks using "dry" methods (with absorbent materials and/or rags) or dig up, remove, and properly dispose of contaminated soil.
- Refer to fact sheet SC-11 Spill Prevention, Control, and Cleanup.

Other Considerations (Limitations and Regulations)

- Clean-up activities may create a slight disturbance for local aquatic species. Access to items and material on private property may be limited. Trade-offs may exist between channel hydraulics and water quality/riparian habitat. If storm channels or basins are recognized as wetlands, many activities, including maintenance, may be subject to regulation and permitting.
- Storm drain flushing is most effective in small diameter pipes (36-inch diameter pipe or less, depending on water supply and sediment collection capacity). Other considerations associated with storm drain flushing may include the availability of a water source, finding a downstream area to collect sediments, liquid/sediment disposal, and prohibition against disposal of flushed effluent to sanitary sewer in some areas.
- Regulations may include adoption of substantial penalties for illegal dumping and disposal.
- Local municipal codes may include sections prohibiting discharge of soil, debris, refuse, hazardous wastes, and other pollutants into the storm drain system.

Requirements

Costs

- An aggressive catch basin cleaning program could require a significant capital and O&M budget.
- The elimination of illegal dumping is dependent on the availability, convenience, and cost of alternative means of disposal. The primary cost is for staff time. Cost depends on how aggressively a program is implemented. Other cost considerations for an illegal dumping program include:

  - Purchase and installation of signs.

  - Rental of vehicle(s) to haul illegally-disposed items and material to landfills.

  - Rental of heavy equipment to remove larger items (e.g., car bodies) from channels.

  - Purchase of landfill space to dispose of illegally-dumped items and material.

- Methods used for illicit connection detection (smoke testing, dye testing, visual inspection, and flow monitoring) can be costly and time-consuming. Site-specific factors, such as the level of impervious area, the density and ages of buildings, and type of land use will determine the level of investigation necessary.

Maintenance

- Two-person teams may be required to clean catch basins with vactor trucks.
- Teams of at least two people plus administrative personnel are required to identify illicit discharges, depending on the complexity of the storm sewer system.
- Arrangements must be made for proper disposal of collected wastes.
- Technical staff are required to detect and investigate illegal dumping violations.

Supplemental Information

Further Detail of the BMP

Storm Drain Flushing

Flushing is a common maintenance activity used to improve pipe hydraulics and to remove pollutants in storm drainage systems. Flushing may be designed to hydraulically convey accumulated material to strategic locations, such as an open channel, another point where flushing will be initiated, or the sanitary sewer and the treatment facilities, thus preventing resuspension and overflow of a portion of the solids during storm events. Flushing prevents "plug flow" discharges of concentrated pollutant loadings and sediments. Deposits can hinder the designed conveyance capacity of the storm drain system and potentially cause backwater conditions in severe cases of clogging.

Storm drain flushing usually takes place along segments of pipe with grades that are too flat to maintain adequate velocity to keep particles in suspension. An upstream manhole is selected to place an inflatable device that temporarily plugs the pipe. Further upstream, water is pumped into the line to create a flushing wave. When the upstream reach of pipe is sufficiently full to cause a flushing wave, the inflated device is rapidly deflated with the assistance of a vacuum pump, thereby releasing the backed up water and resulting in the cleaning of the storm drain segment.

To further reduce impacts of stormwater pollution, a second inflatable device placed well downstream may be used to recollect the water after the force of the flushing wave has dissipated. A pump may then be used to transfer the water and accumulated material to the sanitary sewer for treatment. In some cases, an interceptor structure may be more practical or required to recollect the flushed waters.

It has been found that cleansing efficiency of periodic flush waves is dependent upon flush volume, flush discharge rate, sewer slope, sewer length, sewer flow rate, sewer diameter, and population density. As a rule of thumb, the length of line to be flushed should not exceed 700 feet. At this maximum recommended length, the percent removal efficiency ranges between 65-75% for organics and 55-65% for dry weather grit/inorganic material. The percent removal efficiency drops rapidly beyond that. Water is commonly supplied by a water truck, but fire hydrants can also supply water. To make the best use of water, it is recommended that reclaimed water be used or that fire hydrant line flushing coincide with storm sewer flushing.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

Ferguson, B.K. 1991. Urban Stream Reclamation, p. 324-322, Journal of Soil and Water Conservation.

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net

United States Environmental Protection Agency (USEPA). 2002. Pollution Prevention/Good Housekeeping for Municipal Operations Storm Drain System Cleaning. On line:
http://www.epa.gov/npdes/menuofbmps/poll_16.htm

Parking/Storage Area Maintenance SC-43

Objectives

- Cover
- Contain
- Educate
- Reduce/Minimize
- Product Substitution

Targeted Constituents

Sediment	✓
Nutrients	
Trash	✓
Metals	✓
Bacteria	
Oil and Grease	✓
Organics	✓

Description

Parking lots and storage areas can contribute a number of substances, such as trash, suspended solids, hydrocarbons, oil and grease, and heavy metals that can enter receiving waters through stormwater runoff or non-stormwater discharges. The protocols in this fact sheet are intended to prevent or reduce the discharge of pollutants from parking/storage areas and include using good housekeeping practices, following appropriate cleaning BMPs, and training employees.

Approach

The goal of this program is to ensure stormwater pollution prevention practices are considered when conducting activities on or around parking areas and storage areas to reduce potential for pollutant discharge to receiving waters. Successful implementation depends on effective training of employees on applicable BMPs and general pollution prevention strategies and objectives.

Pollution Prevention

- Encourage alternative designs and maintenance strategies for impervious parking lots. (See New Development and Redevelopment BMP Handbook)
- Keep accurate maintenance logs to evaluate BMP implementation.

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SC-43 Parking/Storage Area Maintenance

Suggested Protocols

General

- Keep the parking and storage areas clean and orderly. Remove debris in a timely fashion.
- Allow sheet runoff to flow into biofilters (vegetated strip and swale) and/or infiltration devices.
- Utilize sand filters or oleophilic collectors for oily waste in low quantities.
- Arrange rooftop drains to prevent drainage directly onto paved surfaces.
- Design lot to include semi-permeable hardscape.
- Discharge soapy water remaining in mop or wash buckets to the sanitary sewer through a sink, toilet, clean-out, or wash area with drain.

Controlling Litter

- Post "No Littering" signs and enforce anti-litter laws.
- Provide an adequate number of litter receptacles.
- Clean out and cover litter receptacles frequently to prevent spillage.
- Provide trash receptacles in parking lots to discourage litter.
- Routinely sweep, shovel, and dispose of litter in the trash.

Surface Cleaning

- Use dry cleaning methods (e.g., sweeping, vacuuming) to prevent the discharge of pollutants into the stormwater conveyance system if possible.
- Establish frequency of public parking lot sweeping based on usage and field observations of waste accumulation.
- Sweep all parking lots at least once before the onset of the wet season.
- Follow the procedures below if water is used to clean surfaces:
  - Block the storm drain or contain runoff.
  - Collect and pump wash water to the sanitary sewer or discharge to a pervious surface. Do not allow wash water to enter storm drains.
  - Dispose of parking lot sweeping debris and dirt at a landfill.
- Follow the procedures below when cleaning heavy oily deposits:
  - Clean oily spots with absorbent materials.
  - Use a screen or filter fabric over inlet, then wash surfaces.

- Do not allow discharges to the storm drain.
- Vacuum/pump discharges to a tank or discharge to sanitary sewer.
- Appropriately dispose of spilled materials and absorbents.

Surface Repair

- Preheat, transfer or load hot bituminous material away from storm drain inlets.
- Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff.
- Cover and seal nearby storm drain inlets where applicable (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal.
- Use only as much water as necessary for dust control, to avoid runoff.
- Catch drips from paving equipment that is not in use with pans or absorbent material placed under the machines. Dispose of collected material and absorbents properly.

Inspection

- Have designated personnel conduct inspections of parking facilities and stormwater conveyance systems associated with parking facilities on a regular basis.
- Inspect cleaning equipment/sweepers for leaks on a regular basis.

Training

- Provide regular training to field employees and/or contractors regarding cleaning of paved areas and proper operation of equipment.
- Train employees and contractors in proper techniques for spill containment and cleanup.

Spill Response and Prevention

- Keep your Spill Prevention Control and Countermeasure (SPCC) Plan up-to-date.
- Place a stockpile of spill cleanup materials where it will be readily accessible or at a central location.
- Clean up fluid spills immediately with absorbent rags or material.
- Dispose of spilled material and absorbents properly.

Other Considerations

Limitations related to sweeping activities at large parking facilities may include high equipment costs, the need for sweeper operator training, and the inability of current sweeper technology to remove oil and grease.

SC-43 Parking/Storage Area Maintenance

Requirements

Costs

Cleaning/sweeping costs can be quite large. Construction and maintenance of stormwater structural controls can be quite expensive as well.

Maintenance

- Sweep parking lot regularly to minimize cleaning with water.
- Clean out oil/water/sand separators regularly, especially after heavy storms.
- Clean parking facilities regularly to prevent accumulated wastes and pollutants from being discharged into conveyance systems during rainy conditions.

Supplemental Information

Further Detail of the BMP

Surface Repair

Apply concrete, asphalt, and seal coat during dry weather to prevent contamination from contacting stormwater runoff. Where applicable, cover and seal nearby storm drain inlets (with waterproof material or mesh) and manholes before applying seal coat, slurry seal, etc. Leave covers in place until job is complete and all water from emulsified oil sealants has drained or evaporated. Clean any debris from these covered manholes and drains for proper disposal. Only use only as much water as is necessary for dust control to avoid runoff.

References and Resources

California's Nonpoint Source Program Plan http://www.swrcb.ca.gov/nps/index.html

Clark County Storm Water Pollution Control Manual
http://www.co.clark.wa.us/pubworks/bmpman.pdf

King County Storm Water Pollution Control Manual http://dnr.metrokc.gov/wlr/dss/spcm.htm

Pollution from Surface Cleaning Folder. 1996. Bay Area Stormwater Management Agencies Association (BASMAA). http://www.basmaa.org/

Oregon Association of Clean Water Agencies. Oregon Municipal Stormwater Toolbox for Maintenance Practices. June 1998.

Santa Clara Valley Urban Runoff Pollution Prevention Program http://www.scvurppp.org

The Storm Water Managers Resource Center http://www.stormwatercenter.net/

Appendix 9: O&M

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

PRELIMINARY WQMP

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.

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.

Bioretention TC-32

Maintenance Concerns, Objectives, and Goals

- Clogged Soil or Outlet Structures
- Invasive Species
- Vegetation/Landscape Maintenance
- Erosion
- Channelization of Flow
- Aesthetics

General Description

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

Targeted Constituents

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

Legend ***(Removal Effectiveness)***

● Low ■ High

▲ Medium

Inspection/Maintenance Considerations

Bioretention requires frequent landscaping maintenance, including measures to ensure that the area is functioning properly, as well as maintenance of the landscaping on the practice. In many cases, bioretention areas initially require intense maintenance, but less maintenance is needed over time. In many cases, maintenance tasks can be completed by a landscaping contractor, who may already be hired at the site. In cold climates the soil may freeze, preventing runoff from infiltrating into the planting soil.

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Inspection Activities	Suggested Frequency
■ Inspect soil and repair eroded areas.	Monthly
■ Inspect for erosion or damage to vegetation, preferably at the end of the wet season to schedule summer maintenance and before major fall runoff to be sure the strips are ready for winter. However, additional inspection after periods of heavy runoff is desirable.	Semi-annual inspection
■ Inspect to ensure grass is well established. If not, either prepare soil and reseed or replace with alternative species. Install erosion control blanket. ■ Check for debris and litter, and areas of sediment accumulation. ■ Inspect health of trees and shrubs.	
Maintenance Activities	**Suggested Frequency**
■ Water plants daily for 2 weeks.	At project completion
■ Remove litter and debris.	Monthly
■ Remove sediment. ■ Remulch void areas. ■ Treat diseased trees and shrubs. ■ Mow turf areas. ■ Repair erosion at inflow points. ■ Repair outflow structures. ■ Unclog underdrain. ■ Regulate soil pH regulation.	As needed
■ Remove and replace dead and diseased vegetation.	Semi-annual
■ Add mulch. ■ Replace tree stakes and wires.	Annual
■ Mulch should be replaced every 2 to 3 years or when bare spots appear. Remulch prior to the wet season.	Every 2-3 years, or as needed

Additional Information

Landscaping is critical to the function and aesthetic value of bioretention areas. It is preferable to plant the area with native vegetation, or plants that provide habitat value, where possible. Another important design feature is to select species that can withstand the hydrologic regime they will experience. At the bottom of the bioretention facility, plants that tolerate both wet and dry conditions are preferable. At the edges, which will remain primarily dry, upland species will be the most resilient. It is best to select a combination of trees, shrubs, and herbaceous materials.

References

Metropolitan Council, Urban Small Sites Best Management Practices Manual. Available at: http://www.metrocouncil.org/environment/Watershed/BMP/manual.htm

Model Urban Runoff Program: A How-To Guide for Developing Urban Runoff Programs for Small Municipalities. Prepared by City of Monterey, City of Santa Cruz, California Coastal Commission, Monterey Bay National Marine Sanctuary, Association of Monterey Bay Area Governments, Woodward-Clyde, Central Coast Regional Water Quality Control Board. July, 1998, revised February, 2002.

U.S. Environmental Protection Agency, Post-Construction Stormwater Management in New Development & Redevelopment BMP Factsheets. Available at: cfpub.epa.gov/npdes/stormwater/menuofbmps/bmp_files.cfm

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