Appendix K-8

DRC Responses to Comments

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

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Meridian West Campus Upper Plateau EIR April 19, 2023

Response to Comments

Comment
Conditions of Approval from Wester Municipal Water District dated Jan 27, 2023

Response
Meridian Development had a teleconference with WMWD staff to discuss the proposed conditions of approval on the development. Based on the discussion and the study of the WMWD infrastructure by the WMWD consultant the following revisions to proposed conditioned infrastructure is being made:

- Pending approval of a dual pipe system by WMWD, the development may install dual 12” water lines in the Deercreek Drive area.
- The Barton St water line improvement will be 18” water line.
- The Van Buren Blvd water line improvement will be removed from the Conditions of Approval.
- Minor text edits/typo corrections.

WESTERN WATER
Powered by water. Driven by service.

Western Municipal Water District
14205 Meridian Parkway
Riverside, CA 92518
District Business | 951.571.7100
Customer Service | 951.571.7104

Craig D. Miller
General Manager

Mike Gardner, Division 1 | Gracie Torres, Division 2 | Brenda Dennstedt, Division 3 | Laura Roughton, Division 4 | Fauzia Rizvi, Division 5

April 13, 2023

SENT VIA EMAIL

Dan Fairbanks
Planning Director
March Joint Powers Authority
14205 Meridian Pkwy., Suite 140
Riverside, CA 92518
fairbanks@marchjpa.com

CONDITIONS OF APPROVAL – REVISED
DEVELOPMENT PROJECT: MERIDIAN WEST CAMPUS UPPER PLATEAU DRAFT EIR

These Conditions of Approval for the above referenced Development Project ("project") are in response to the Specific Plan dated January 11, 2023. The project property is located within the water and sewer service area of the Western Municipal Water District ("Western Water"). The following are Western's Conditions of Approval:

1. All applicable Water and Sewer Connection Fees (Capacity Charges) and Meter Installation Fees must be paid prior to the installation of any water meter.

2. Proposed facilities for water and sewer service must be designed by a Registered Civil Engineer and reviewed and approved by the Western Water. Plan Check and Inspection Deposits are required prior to approval of the plans.

3. Developer's landscape architect is required to meet landscape and irrigation requirements of the agency of jurisdiction.

4. The property is located within the 1837 Pressure Zone. Currently, Western Water has an existing 24-inch water pipeline located Cactus Avenue. The available fire

flow must be determined by fire flow modeling and/or physical flow from a fire hydrant within the vicinity of the project. Developer's civil engineer can find the pressure zones available water storage for fire flows in Western's Water Master Plans. Available storage should be compared to fire flow requirements by the fire protection agency of jurisdiction.

5. The January 18, 2023, Final Technical Memorandum for the Meridian Upper Plateau Water, Recycled Water, Sewer Analysis was prepared by Dudek to determine impacts to the water, sewer, and recycled water systems due to the Project. This memorandum identified improvements that would be required to be able to provide service to the Project while meeting Western Water's standards. The improvements required to be in place prior to any service being provided to the Project include:

   Potable System
   - Upsize 1,300 feet of 12-inch diameter pipe on Deercreek Drive to 16-inch;
     Upsize 700 feet of 12-inch on Barton Street to 18-inch diameter pipe;
   - Construct the onsite potable water distribution system;

   Recycled System
   - Construct a new 0.5-million-gallon tank reservoir at the existing Orange Crest site;
   - Construct a new 12-inch diameter pipeline from the new recycled water tank to the on-site recycled water system;
   - Upsize the main supply line from the Cactus Avenue tie-in to the temporary tank to 12-inch diameter.
   - Construct the onsite recycled water distribution system;
   - Private Irrigation pumps and local recycled water priming tanks or pneumatic tanks required anywhere pressures are projected to drop below 30 psi at the service lateral.

   Sewer Collection System
   - Construct the onsite sewer collection system.

   These improvements are required to be designed and constructed by the Developer in compliance with all Western rules, regulations, standards, and requirements, and accepted by Western Water with all related costs and execution thereof to be the responsibility of the Developer.

   The impacts to common use facilities that will need to be addressed prior to ultimate buildout include:

Potable System

- Accommodate increased deficit of 1.45-MG in storage for Ultimate Buildout demand condition due to the MWUP development demands.

Recycled System

- Accommodate increased deficit of 0.41-MG in storage for Ultimate Buildout demand condition due to the MWUP development demands.

Sewer System

- Accommodate increased deficit of 0.45-MGD in flow for Ultimate Buildout demand condition due to the MWUP development demands.

These impacts are required to be addressed by the Project by either contribution of completed facilities to address the deficit as is the case for the proposed 0.5 MG tank for recycled water or by financial contribution in the form of Capacity Charges assessed to the project in proportion to the cost of the improvements required to address the project impacts.

There will be no credits or reimbursements available for infrastructure constructed.

6. Coordinate with the fire protection agency to determine required fire flow for proposed project and advise Western Water of the fire flow flowrate and duration. Submit request to Western Water for fire flow modeling to determine if existing water systems capacity is available to provide the required fire flow. Depending on the results of the fire flow modeling additional conditions of approval such as upsizing of existing pipes, extension of pipes, installation of parallel piping or installation of pumps, and additional water storage at the developer's cost, may be required.

7. Developer to submit a 24" x 36" Preliminary Project Utility Plan of public and private onsite and offsite water, sewer, and recycled water facilities (as applicable) to Western Water for review and approval before submittal of formal construction plan for plan check.

8. Preliminary Project Utility Plan shall show the following items:

    a. Provide basis of survey including benchmarks and horizontal control monuments with date, surveyor information, datum and basis of bearing.
    b. Delineate and label all existing utility facilities including potable water, sanitary sewer, and recycled/non-potable water (i.e., pipe diameters, pipe material, manholes, water meters, air/vac, blow-off, fire hydrants, valves,

gas, communication, electrical, and etc.) within project boundaries, along project boundaries and along areas of offsite improvements. Label any private streets and utilities as private. All other utilities will be considered as public utilities including utilities within easements and/or public right-of-way.

c. Delineate all existing and proposed easements and right of ways within and along project boundaries. Label showing typical widths. Label owner of interest and purpose of easements. Proposed Western Water easements for potable water, sanitary sewer, and recycled/nonpotable water require a minimum of 30 feet in width.
d. Delineate and label all proposed and existing lots, streets, and storm drains.
e. Delineate all proposed water, sewer, and recycled/non-potable water facilities within project boundaries along frontages and offsite. Include pipeline diameters and type of material. Label any private proposed utilities as private.
f. Commercial, Industrial and Residential projects are required to extend Western Water's water and sewer along frontages and rights of ways of all streets abutting or surrounding the project's property boundary unless otherwise approved on this submitted Preliminary Project Utility Plan
g. Water pipeline designed to be looped and valved such that no more than twenty parcels would be out of service during repairs to pipeline.
h. The water pipelines shall extend across the full width of the frontage of the parcels where they are adjacent to a public right-of-way.
i. All water meters shall be placed within either a public right-of-way or Western Water easement, in front of the parcel to which it serves, at a distance no greater than 60 feet from the pipeline.
j. Sewer extension shall include factory wye's, stub lateral, and cap for existing properties along the extension.

9. Developer shall submit all Tentative Parcel or Tract Maps for the project to Western Water for review to determine whether additional project conditions are required.

10. Developer shall pay all costs associated with reviews of the Preliminary Master Utility Plan and Tentative Parcel or Tract Map by Western Water at the time of review.

11. Developer may be required to perform studies and analyses to provide the potable water and recycled/non-potable at maximum day demands and sanitary sewer maximum discharge needs of the development and their impacts on the relevant existing offsite potable water, recycled/non-potable, and sanitary sewer systems at developers sole cost, as needed.

12. Provide and/or pay for all applicable cost and fees including connection fees (capacity charges), relocation of facilities, and additional facilities, including offsite

pipeline extensions, additional potable water and recycled/non-potable water storage capacity, sanitary sewer treatment capacity and pumping facilities that may be necessary to accommodate applicant's proposed water, sewer and recycled/non-potable water usage (as applicable), while maintaining resiliency of pipelines within Western Water's distribution system. Western Master Plan Facilities, constructed by the developer may be subject to the application of appropriate capacity fee credits as deemed by Western Water.

13. Developer to submit a detailed engineer's construction cost estimate for proposed sewer and water facilities to Western Water for review and approval. Once approved, developer shall make a deposit for plan checking services for Water and/or Sewer Improvement Plans.

14. Water, Sewer, and Recycled Water Improvement Plans (as applicable) shall be designed per Western Water's Developer Handbook and Standard Specifications and available at: http://www.wmwd.com/158/Standard-Specifications-Drawings.

15. Developer to submit grading plans for Western Water's review and approval before grading permit is issued.

16. Water and/or Sewer Improvement Plans shall not be approved until all items mentioned above are received and approved by Western Water.

17. All abandoned well casings and septic systems shall be capped and logged in accordance with all applicable requirements of the Riverside County Department of Environmental Services.

18. The developer is responsible for installing, paying all costs, and obtaining an encroachment permit from the local jurisdiction having authority over installation of a water lateral in the public right-of-way. If the customer chooses to propose to route water or sewer pipelines across private property, then the customer is responsible to obtain easements from adjacent property owners. The easement shall be dedicated to Western Water.

19. For water, sewer and/or recycled water service by Western Water, the developer must comply with these standard conditions, and all applicable Rules, Regulations, and General Policies of Western Water found in Western's Municipal Water District Code at: https://www.codepublishing.com/CA/WMWD/

20. Subdivision maps shall be signed by Western Water and include Western Water's standard statements for sewer and water (as applicable). These statements acknowledge surety for water and sewer facilities and adequate property rights as required by Western Water standards.

Western Water appreciates the opportunity to submit these Conditions of Approval, please contact Western Water's Development Services at (951) 571-7100 or development@wmwd.com for further information.

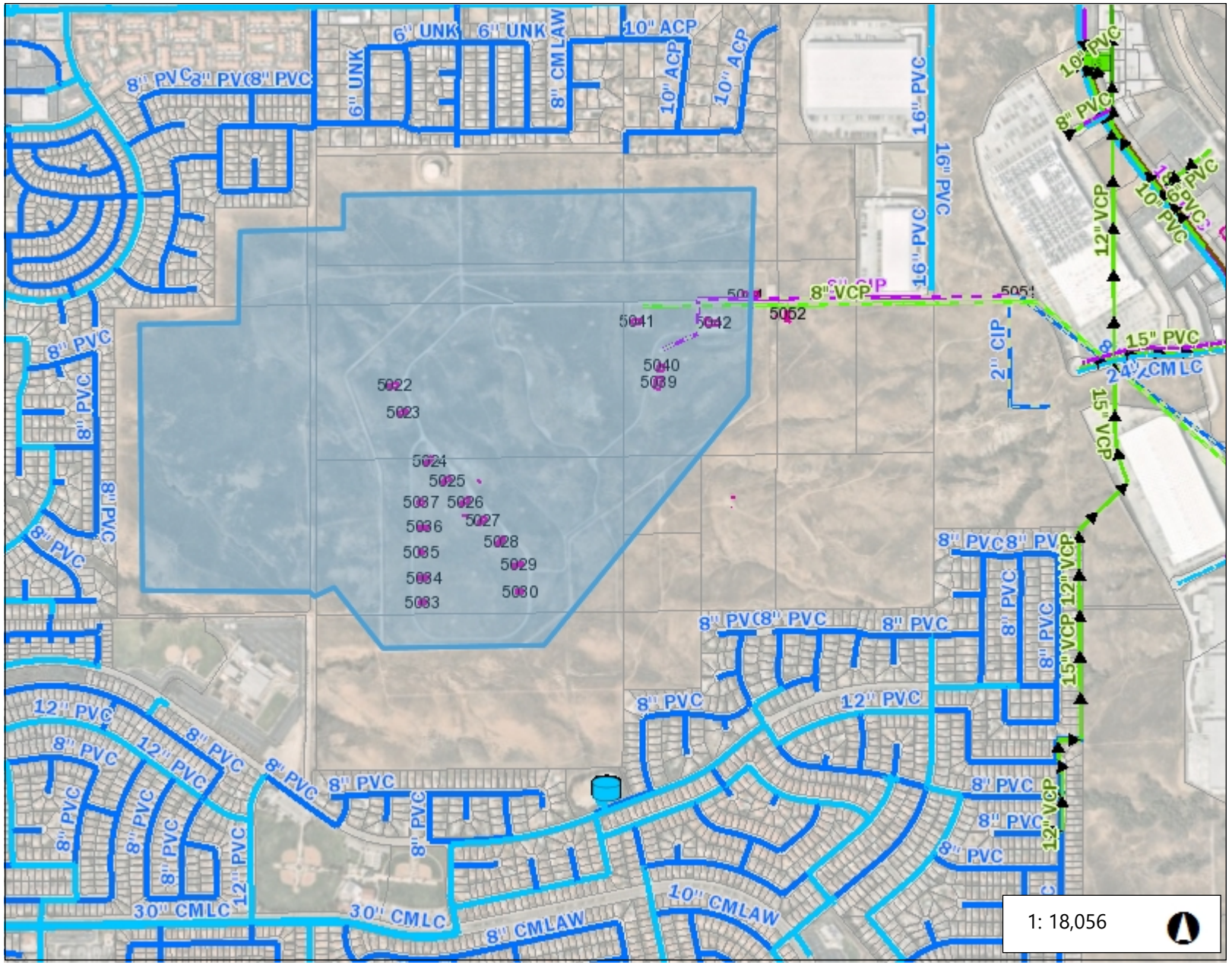
TERI PATTON
Senior Engineering Technician
Development Services

TP:kf:dk:sc

Attachment(s):

1. Western Municipal Water District GIS Exhibit
2. Dudek Final Technicial Memorandum

WMWD GIS Exhibit



Legend

- Water Main Line
  - Distribution
  - Transmission
  - Drain
- Sewer Mains
  - Force
  - Gravity
- Tentative Potable Tanks
- Tentative Potable Mains
  - TransmissionMain
  - DistributionMain
  - Bypass
- Tentative Recycled Pump Stat
- Tentative Recycled Tanks
- Tentative Recycled Main Lines
- Tentative Sewer Lift Stations
- Tentative Sewer Gravity Mains
  - Collector
  - Trunk
- Tentative Sewer Force Main
- Sewer Lift Stations
- Sewer Gravity Mains
  - Collector
  - Trunk
  - Inverted Siphon
- Abandoned Sewer Gravity Mai

Notes

Meridian West Campus Upper Plateau

0.6 0 0.28 0.6 Miles

WGS_1984_Web_Mercator_Auxiliary_Sphere

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FINAL TECHNICAL MEMORANDUM

To:	Karl Francis, WMWD; Derek Kawaii, WMWD
From:	Elizabeth Caliva, Dudek; Kate Palmer, Dudek; Jenny Li, Dudek
Subject:	Meridian Upper Plateau Water, Recycled Water, Sewer Development Analysis
Date:	January 18, 2023
cc:	Chris McKee, DRC Engineering; Adam Collier & Timothy Reeves, Lewis Retail Centers

1 Background, Goals & Objectives

The Riverside Service Area 2020 Facilities Master Plan (2020 FMP) for Western Municipal Water District (Western) was completed in November 2021. The 2020 FMP considered a large open space parcel in the northern portion of the service area to be developed as soccer fields, requiring recycled water service only. In 2022, a new specific plan was developed, called the Meridian West Upper Plateau (MWUP) Project for development in the near-term planning horizon, which would utilize the potable water, recycled water and sewer collection facilities of Western. No previous master plan or report had considered the impacts of the MWUP development on Western facilities. This report provides an update to the hydraulic models, applying specific water, recycled water and sewer demands and loadings based on the updated land use for the site.

The goal of this analysis is to identify the immediate and long-term project-specific needs of accommodating the MWUP development as well as determine the timing and sizing impact on the stated CIP project recommendations from the 2020 FMP. The objectives of this project include the following:

1. Update the three FMP hydraulic models with the most recent available information on the specific development plan for the MWUP development.

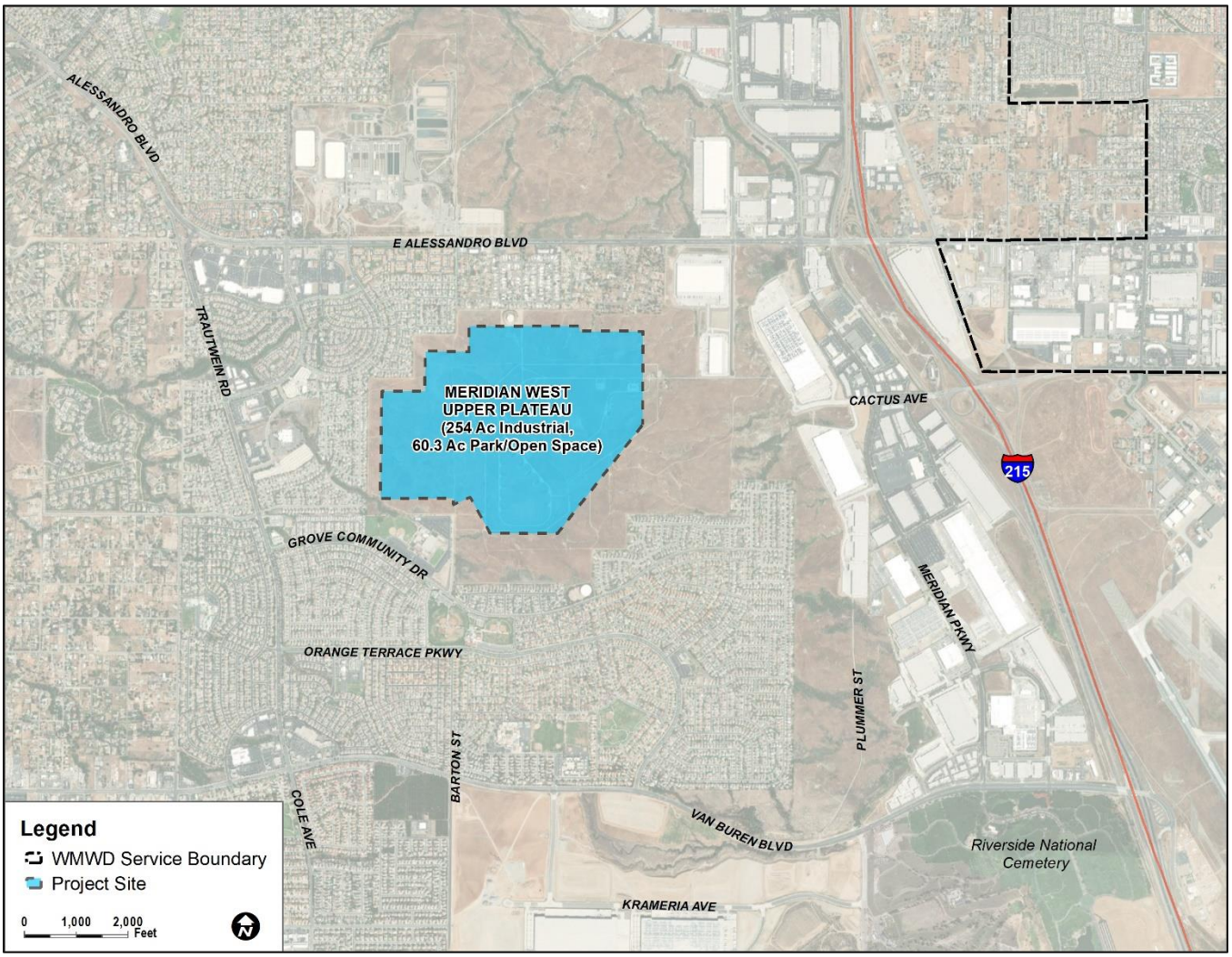
2. Determine if any improvements to the Western water, recycled water, and sewer facilities are required for immediate accommodation of the MWUP development.

3. Determine changes to recommended CIP project timing and sizing from the 2020 FMP as a result of accommodating the MWUP development.

2 Updated Land Use

The MWUP project is being developed on currently undeveloped land. In the 2020 FMP, the proposed land use type for the property was assumed to be soccer fields, with recycled water demand only. The updated proposed land use for the site includes 254 acres of Industrial and 60.3 acres of Park/Open Space. The location of the site is shown in Figure 1. Details of the site layout are included in Attachment A.

Figure 1. Location Map



3 Hydraulic Analyses

The following sections detail the potable water, recycled water and sewer analyses and results

3.1 Potable Water Analysis

The proposed MWUP project would be served by the 1900 pressure zone (PZ). The potable water hydraulic analysis includes consideration of six (6) demand scenarios:

Demand Condition	Maximum Day Demand	Maximum Day Demand + Fire Flow
Existing (2020)	Scenario 1	Scenario 2
Near Term (2030)	Scenario 3	Scenario 4
Buildout	Scenario 5	Scenario 6

Three analyses will be performed to update the potable water system results from the 2020 FMP, including a storage analysis, a distribution system analysis and a pump station analysis. **Table 1** presents the updated net water use projections for the project site used for the analyses.

Table 1. Updated Net Water Use Projections for the Project Site

Proposed Land Use	Acreage	Previous PW Demand (gpm)[1]	Proposed PW Average Day Demand (gpm)	Net ADD (gpm)	Net MDD (gpm)[2]
Industrial	254	0	352.8[3]	352.8	529.1
Park/Open Space	60.3	0	25.1[4]	25.1	37.7
			Total Net Increase in PW Demand:	**377.9**	**566.8**

Notes:
[1] In the 2020 FMP, the project site was anticipated to be developed into soccer fields in the Ultimate Buildout scenario only with no potable water demand anticipated for the site.
[2] MDD peaking factor is equal to 1.5 x ADD, per Table 3-3 of the 2020 FMP.
[3] Industrial potable water demand estimated using a water use factor of 2,000 gpd/acre.
[4] Park/Open Space potable water demand estimated using a water use factor of 600 gpd/acre.

3.1.1 Storage Analysis

Using the demand values from Table 1, an updated storage analysis was performed for the 1900 PZ. The results of the storage analysis for Existing, Near-Term and Buildout are presented in **Table 2**.

Table 2. Potable Water Storage Analysis for 1900 PZ

						Fire Storage				
Scenario	Pressure Zone	Existing Storage (MGD)	MDD (MGD)	Equalization 25% MDD (MG)	Emergency 100% MDD (MG)	Fire Flow (gpm)	Duration (hours)	Total (MGD)	Total Required (MG)	Surplus/ (Deficit) (MG)
Existing (2020)[1]	1900	13.6	6.75	1.69	6.75	3,000	3	0.54	8.98	4.63
Existing (2020) + MWUP	1900	13.6	7.57	1.89	7.57	4,000	4	0.96	10.42	3.18
Near-Term (2030) [2]	1900	13.6	8.75	2.19	8.75	3,000	3	0.54	11.48	2.12
Near-Term (2030) + MWUP	1900	13.6	9.57	2.39	9.57	4,000	4	0.96	12.92	0.68
Ultimate[3]	1900	13.6	10.96	2.74	10.96	3,000	3	0.54	14.24	(0.63)
Ultimate + MWUP	1900	13.6	11.78	2.94	11.78	4,000	4	0.96	15.68	(2.08)

Notes:

[1] Data from Table 6-1 of the 2020 FMP.

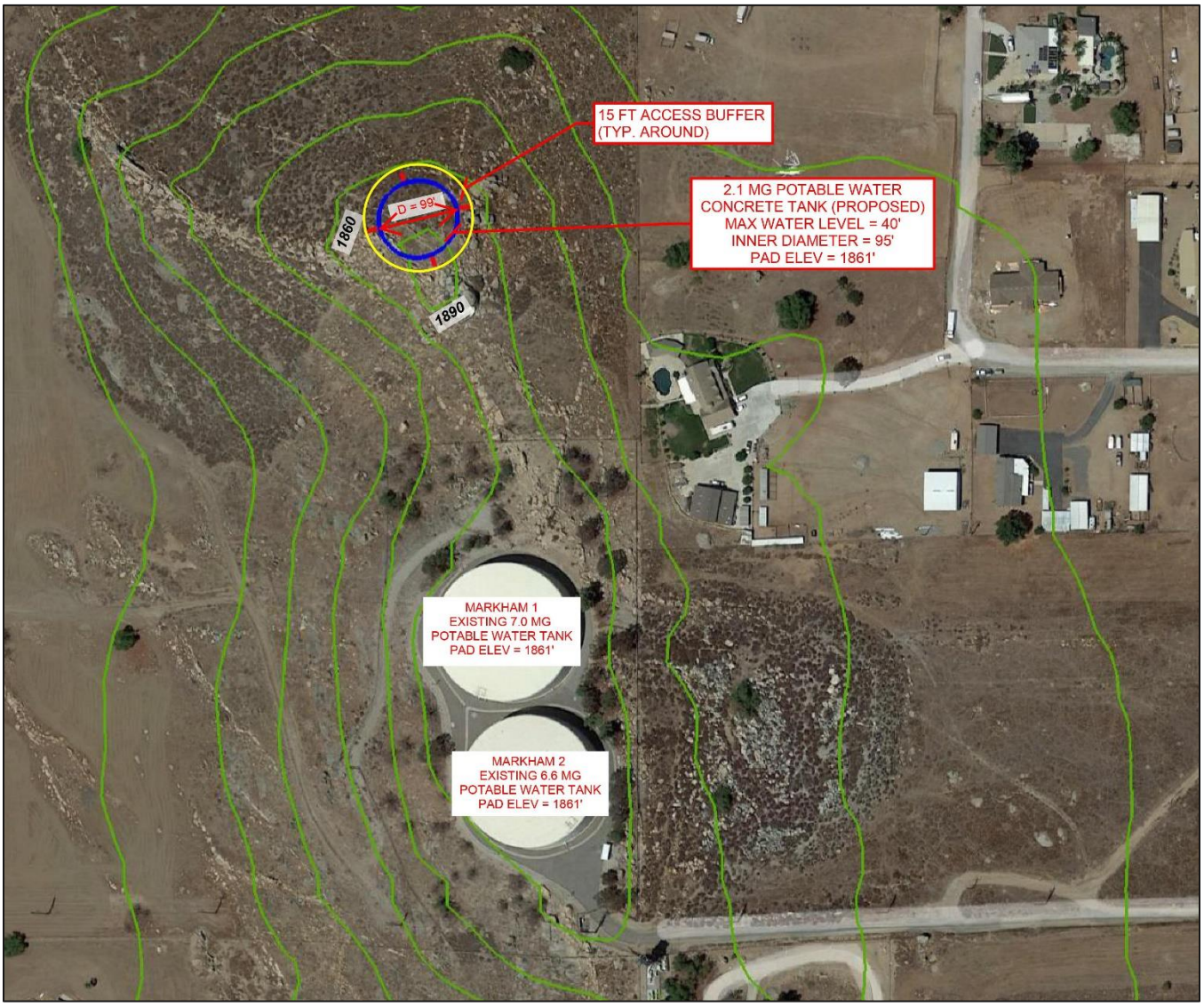
[2] Data from Table 6-4 of the 2020 FMP.

[3] Data from Table 6-6 of the 2020 FMP.

The above results indicate that there is sufficient storage anticipated in the Existing and Near-Term scenarios to accommodate the new MWUP development. However, the Ultimate Buildout scenario was previously anticipating a storage deficit in the 2020 FMP that would be further exacerbated by the MWUP development. The resulting storage deficit anticipated for Ultimate Buildout is increased to 2.08-MG, an increase of 1.45-MG from the 2020 FMP analysis, as a result of the new demands anticipated by the MWUP development.

Potential siting of a new 2.1-MG tank was evaluated as part of this study. **Figure 2** presents a potential location north of the existing Markham Tanks. Constructability would need to be addressed; location shown for potential siting purposes only.

Figure 2. Potential Siting of New 2.1-MG Reservoir for 1900 PZ



There are options to reduce storage needs, such as using reservoir management systems (RMSs) to maximize tank levels to minimize equalization volume requirements; however, this would require increased pumping during high

time of use (TOU) hours. Western is exploring purchasing Tesla batteries for energy during high TOU times and this may be an option to consider for this application as well in an effort to use RMS to reduce equalization storage needs while also reserving pumping times for low TOU rate hours (overnight).

3.1.2 Distribution System Analysis

A MDD of 566.8 gpm was point loaded on model junction ID N512 at the intersection of Grove Community Drive and Deercreek Drive, which is the anticipated tie-in of the MWUP development to Western's potable water system to the 1900PZ. The parallel 12-inch piping considered by the developer for this tie-in location was not added to the model as it is anticipated one of the lines is for backup supply in case of a line break of the primary supply line. A 24-hour extended period simulation (EPS) was run in the model for MDD and MDD plus fire flow for the Existing (2020), Near-Term (2030) and Ultimate Buildout scenarios and results compared to District evaluation criteria, including a minimum service pressure of 40 psi during MDD, minimum residual pressure of 20 psi during fire flow, and a maximum pipeline velocity of 7.5 fps during either condition. The Near-Term and Buildout modeling scenarios included the improvements recommended as part of the 2020 FMP.

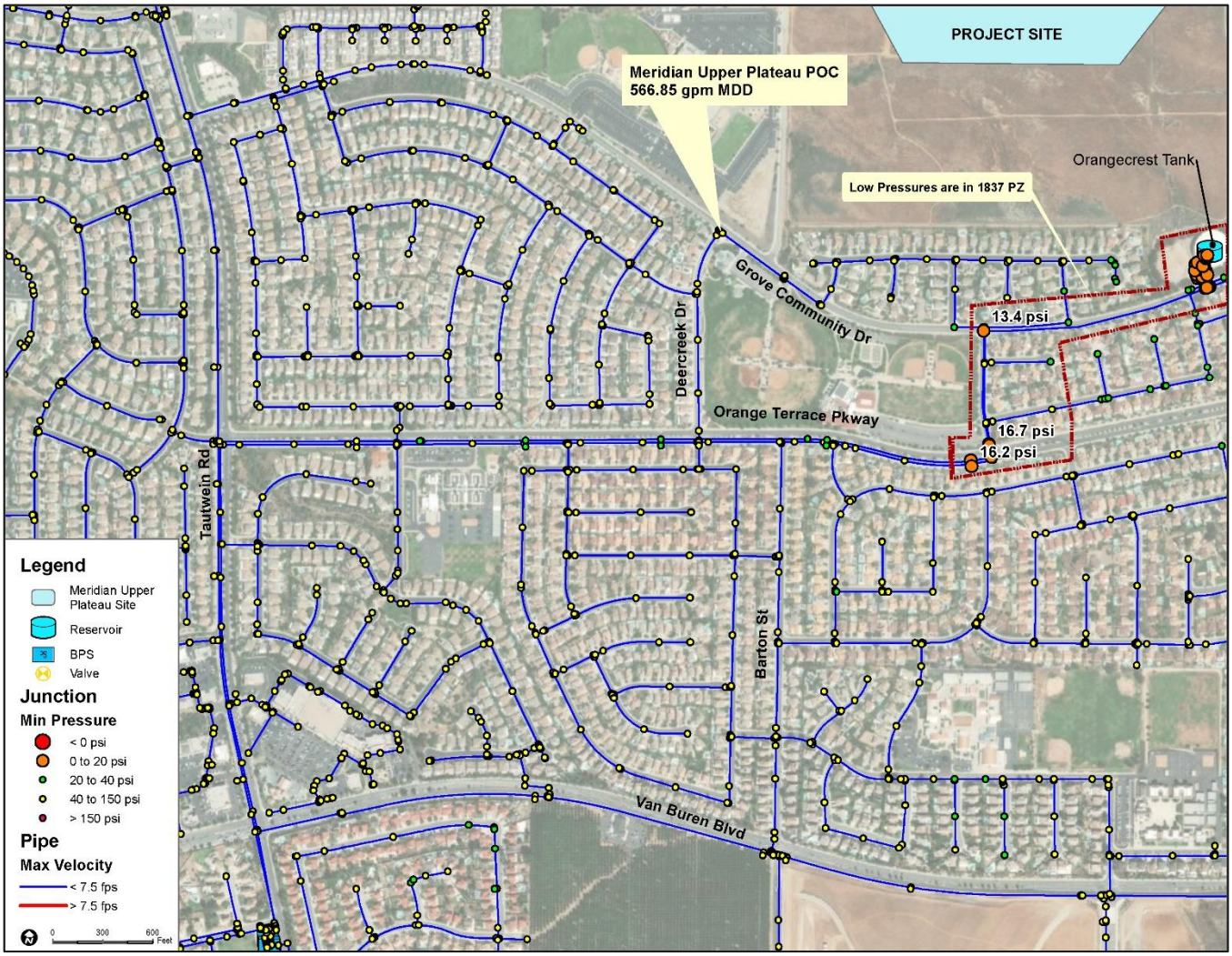
The goal of this analysis was to (1) identify what improvements the developer would need to construct as part of the initial MWUP development for potable water service within District criteria and (2) identify if any previously recommended projects from the master plan become triggered for earlier construction due to the additional demand of the development.

The following subsections provide the results of each scenario.

3.1.2.1 Scenario 1: Existing MDD

The existing MDD scenario results indicated that the 1900 PZ could accommodate the additional demand for the MWUP within design criteria. Minimum service pressure and maximum pipeline velocities are shown graphically on **Figure 3**. Note, the low pressures seen in Figure 4 southwest of the existing Orangecrest Tank are within the 1837 pressure zone and are unrelated to the MWUP development project.

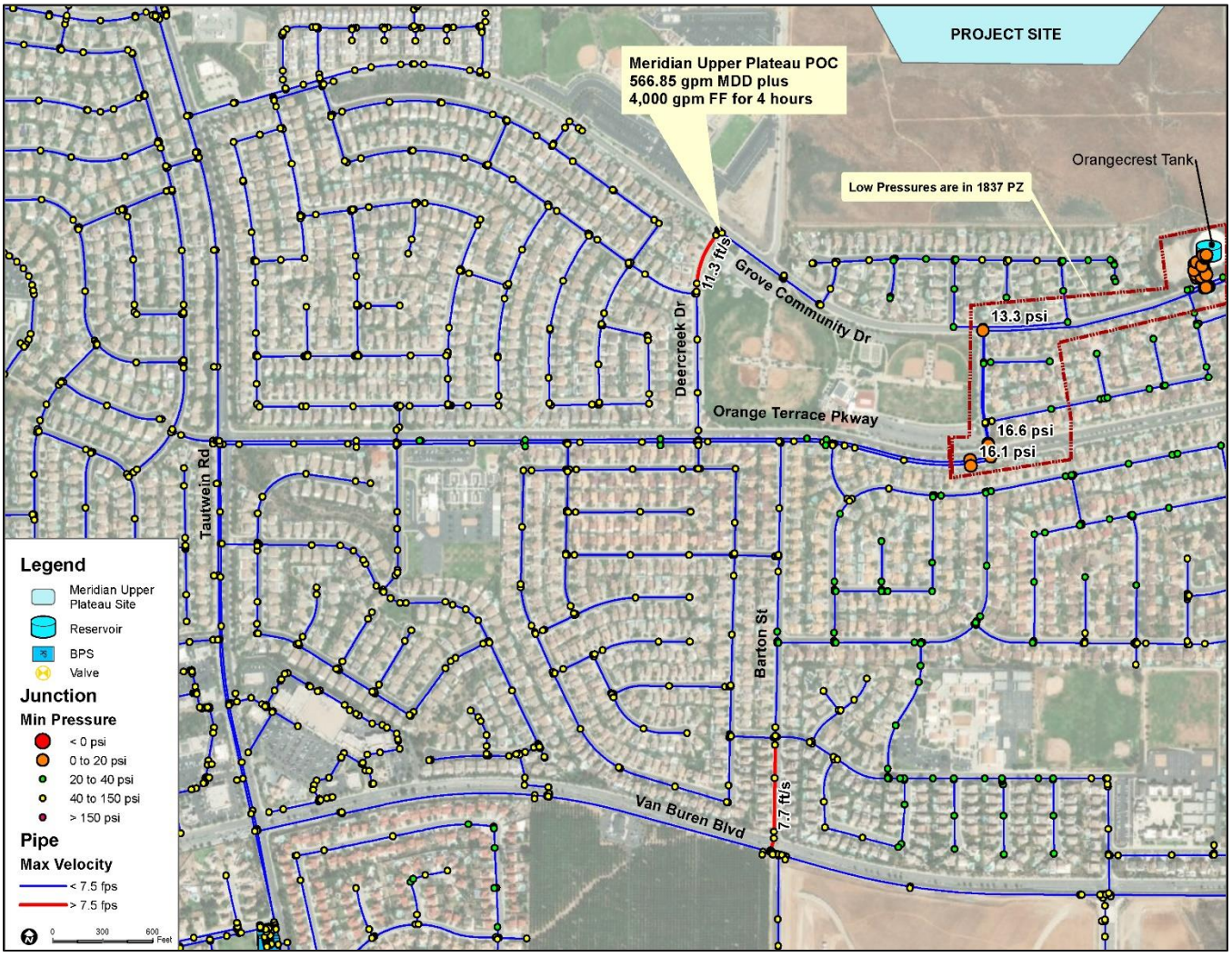
Figure 3. Potable Water Existing (2020) with MWUP – MDD Minimum Pressures and Maximum Velocities



3.1.2.2 Scenario 2: Existing MDD plus Fire Flow

The existing MDD plus fire flow scenario results indicates two pipelines within the 1900 PZ are anticipated to exceed Western maximum pipeline velocity requirements, as shown graphically on **Figure 4**. The model indicated the existing 12-inch pipeline at the tie-in location is anticipated to have maximum pipeline velocities in excess of 11 fps. Additionally, an existing 12-inch pipeline in Barton Street north of Van Buren Blvd is anticipated to have maximum velocities during fire flow at 7.7 fps, which exceeds the district criteria of 7.5 fps.

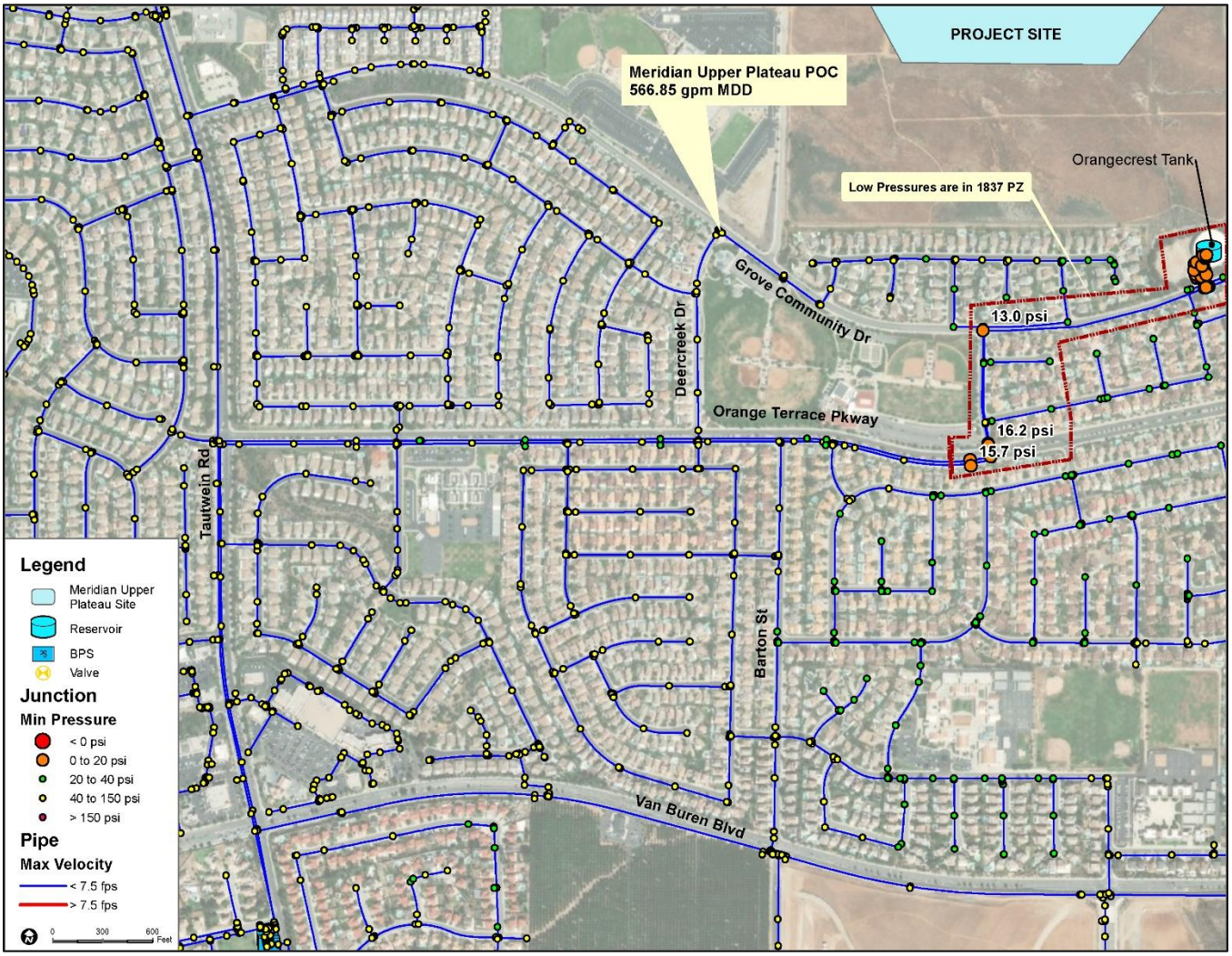
Figure 4. Existing (2020) with MWUP – MDD plus Fire Flow Minimum Pressures and Maximum Velocities



3.1.2.3 Scenario 3: Near-Term MDD

Under the Near-term MDD demand scenario, no potable water facilities are anticipated to exceed Western criteria, as shown in **Figure 5**. Note, the low pressures seen in Figure 4 are within the 1837 pressure zone and are unrelated to the MWUP development project.

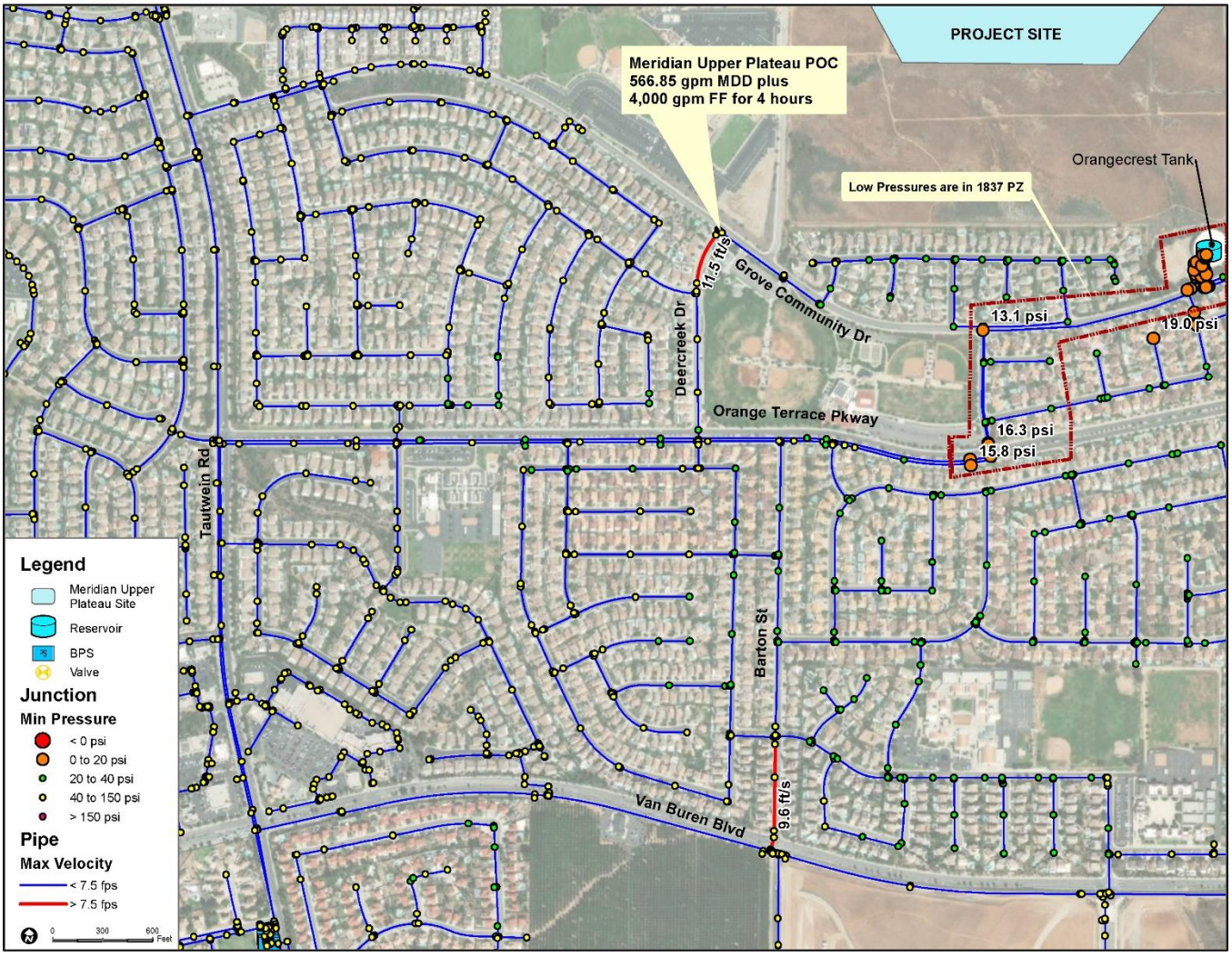
Figure 5. Potable Water Near-Term (2030) with MWUP – MDD Minimum Pressures and Maximum Velocities



3.1.2.4 Scenario 4: Near-Term MDD plus Fire Flow

The Near-Term MDD plus fire flow scenario results indicates two pipelines within the 1900 PZ are anticipated to exceed Western maximum pipeline velocity requirements, as shown graphically on **Figure 6**. The model indicated the existing 12-inch pipeline at the tie-in location is anticipated to have maximum pipeline velocities in excess of 11 fps. Additionally, an existing 12-inch pipeline in Barton Street north of Van Buren Blvd is anticipated to have maximum velocities during fire flow at approximately 9.6 fps.

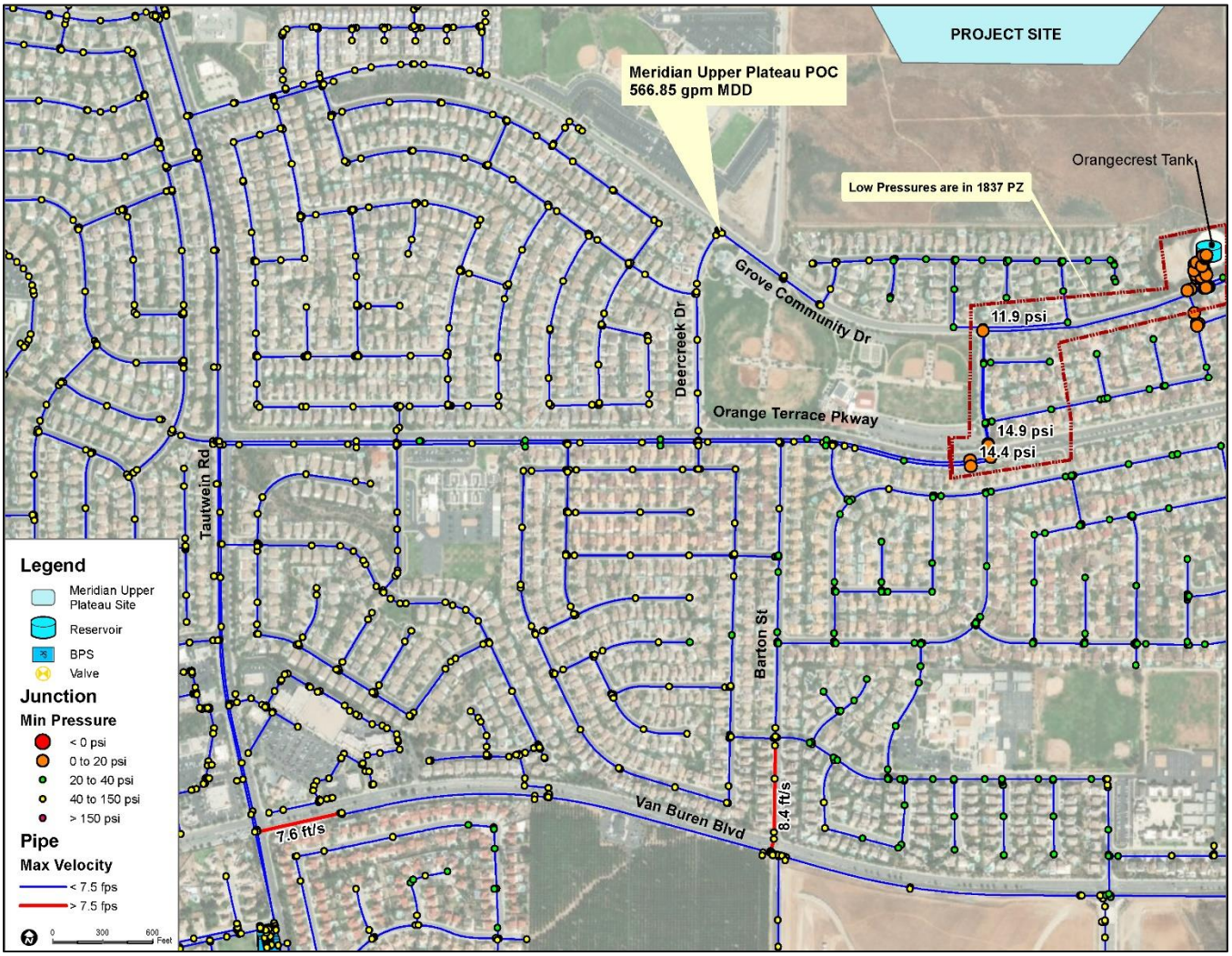
Figure 6. Near-Term (2030) with MWUP – MDD plus FF Minimum Pressures and Maximum Velocities



3.1.2.5 Scenario 5: Ultimate Buildout MDD

The Ultimate Buildout MDD scenario results indicate two pipelines within the 1900 PZ are anticipated to exceed Western maximum pipeline velocity requirements, as shown graphically on **Figure 7**. The model indicated the existing 12-inch pipeline in Barton Street north of Van Buren Blvd is anticipated to have maximum velocities during fire flow at approximately 8.4 fps. Additionally, an existing 18-inch pipeline in Van Buren Blvd just east of Tautwein Road is anticipated to slightly exceed the maximum velocity requirement of 7.5 fps.

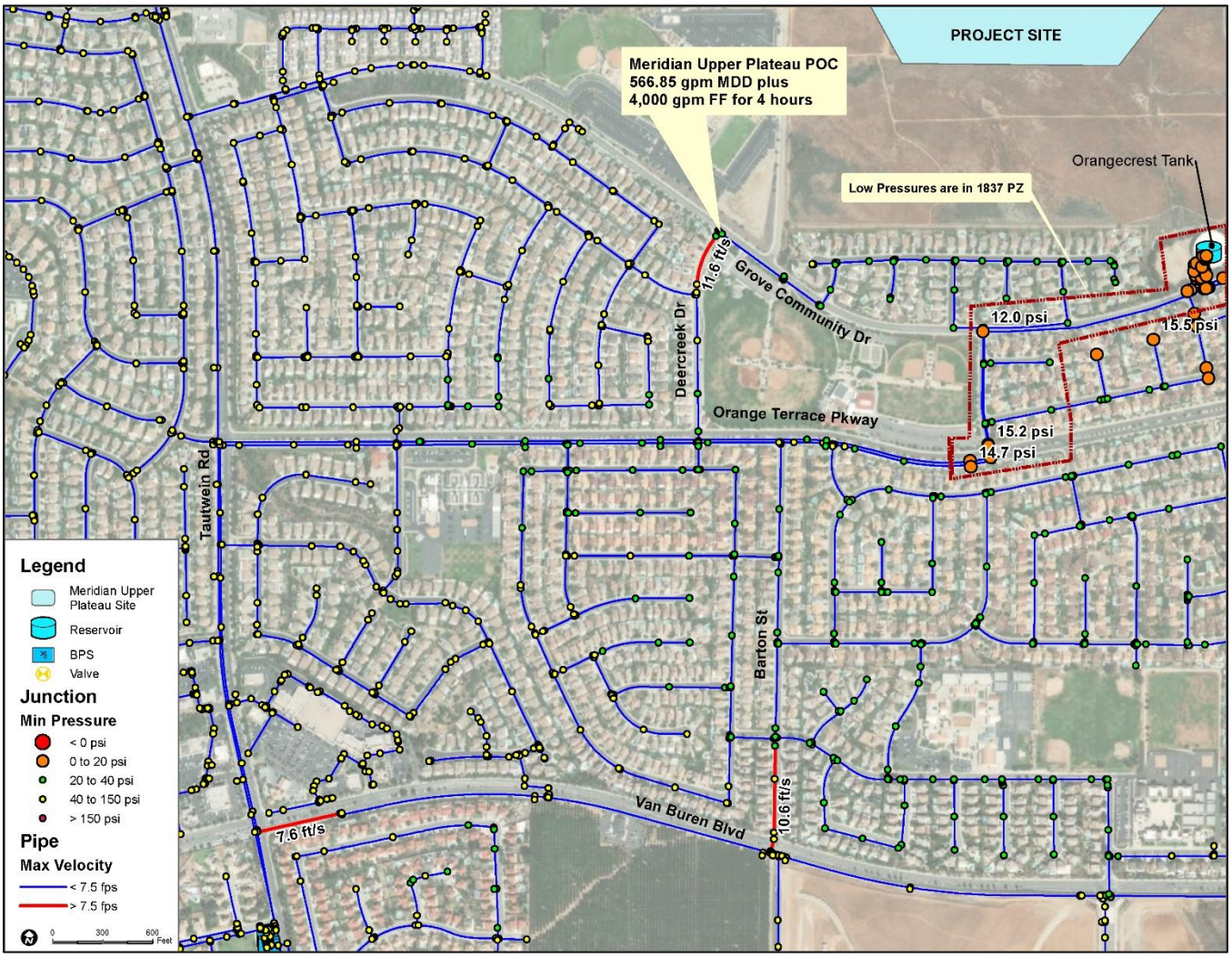
Figure 7. Ultimate Buildout with MWUP – MDD Minimum Pressures and Maximum Velocities



3.1.2.6 Scenario 6: Ultimate Buildout MDD plus Fire Flow

The Ultimate Buildout MDD plus fire flow scenario results indicates three pipelines within the 1900 PZ are anticipated to exceed Western maximum pipeline velocity requirements, as shown graphically on **Figure 8**. The model indicated the existing 12-inch pipeline at the tie-in location is anticipated to have maximum pipeline velocities in excess of 11 fps. An existing 12-inch pipeline in Barton Street north of Van Buren Blvd is anticipated to have maximum velocities in excess of 10 fps. Additionally, the existing 18-inch pipeline in Van Buren east of Tautwein Road is anticipated to slightly exceed the maximum velocity requirement of 7.5 fps.

Figure 8. Ultimate Buildout with MWUP – MDD plus FF Minimum Pressures and Maximum Velocities



3.1.2.7 Results with Improvements

System improvements were evaluated to maintain facilities within Western design criteria under MDD plus fire flow conditions for the Existing (2020), Near-Term (2030) and Ultimate Buildout demand scenarios. The following improvements are recommended for the potable water system:

- Upsize 1,300 LF of 12-inch on Deercreek Drive to 16-inch
- Upsize 700 LF of 12-inch on Barton St to 20-inch
- Upsize 600 LF of existing 18-inch on Van Buren Blvd to 20-inch (scenarios 2030 and Buildout only)

The results of the system analyses with improvements are shown in **Figures 9**, **10** and **11**.

Figure 9. Existing (2020) with MWUP – MDD plus Fire Flow with Improvements

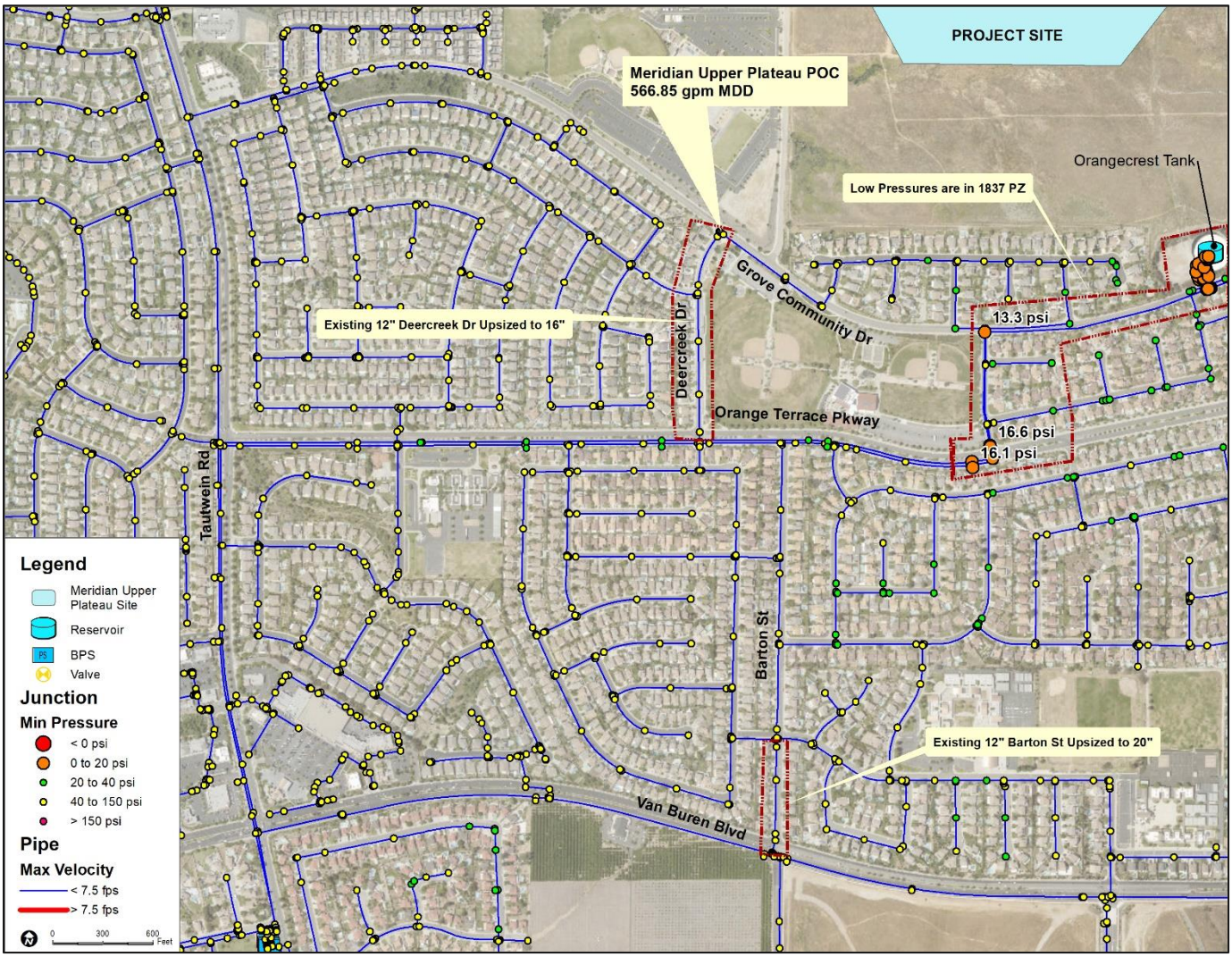


Figure 10. Near-Term (2030) with MWUP – MDD plus FF with Improvements

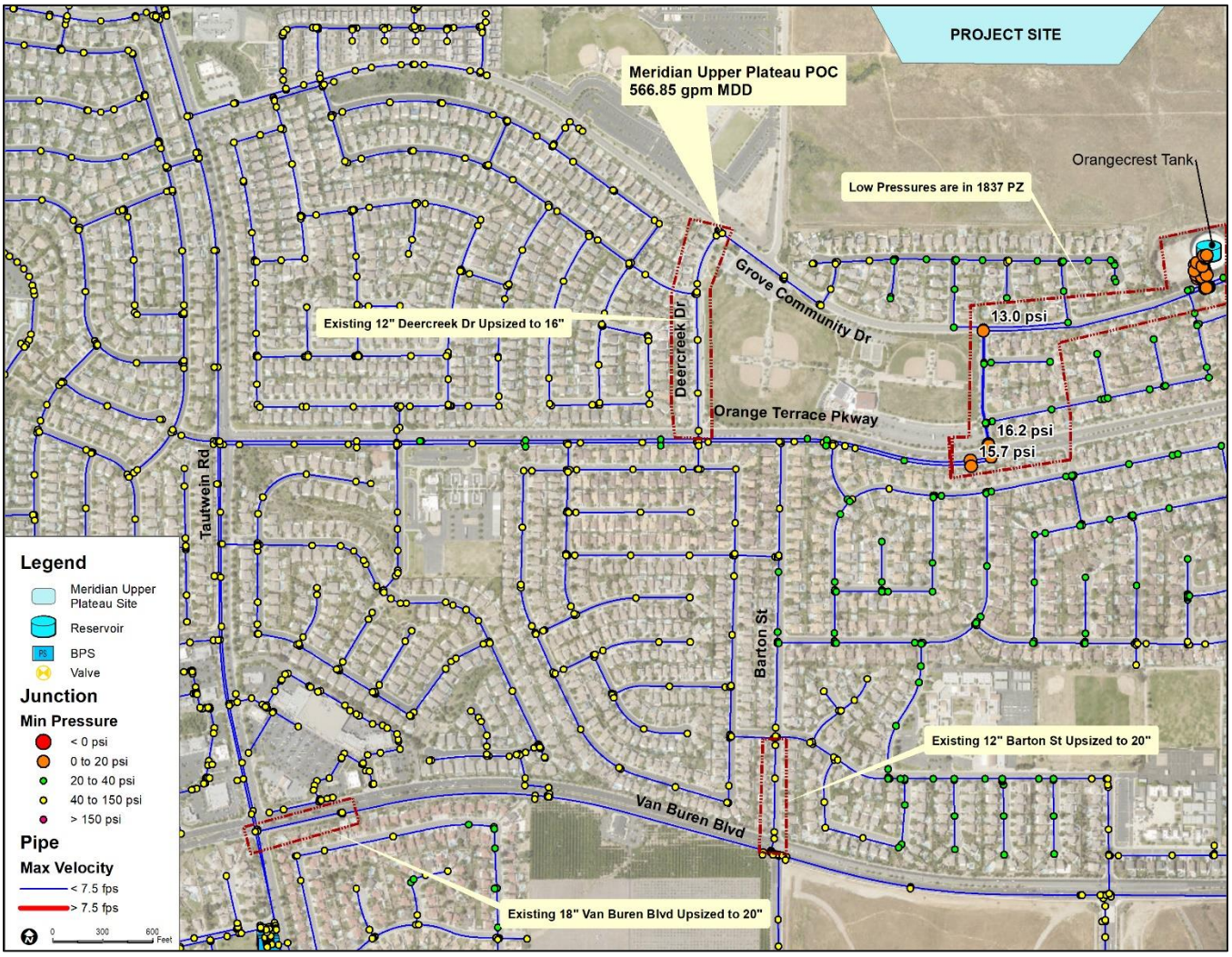
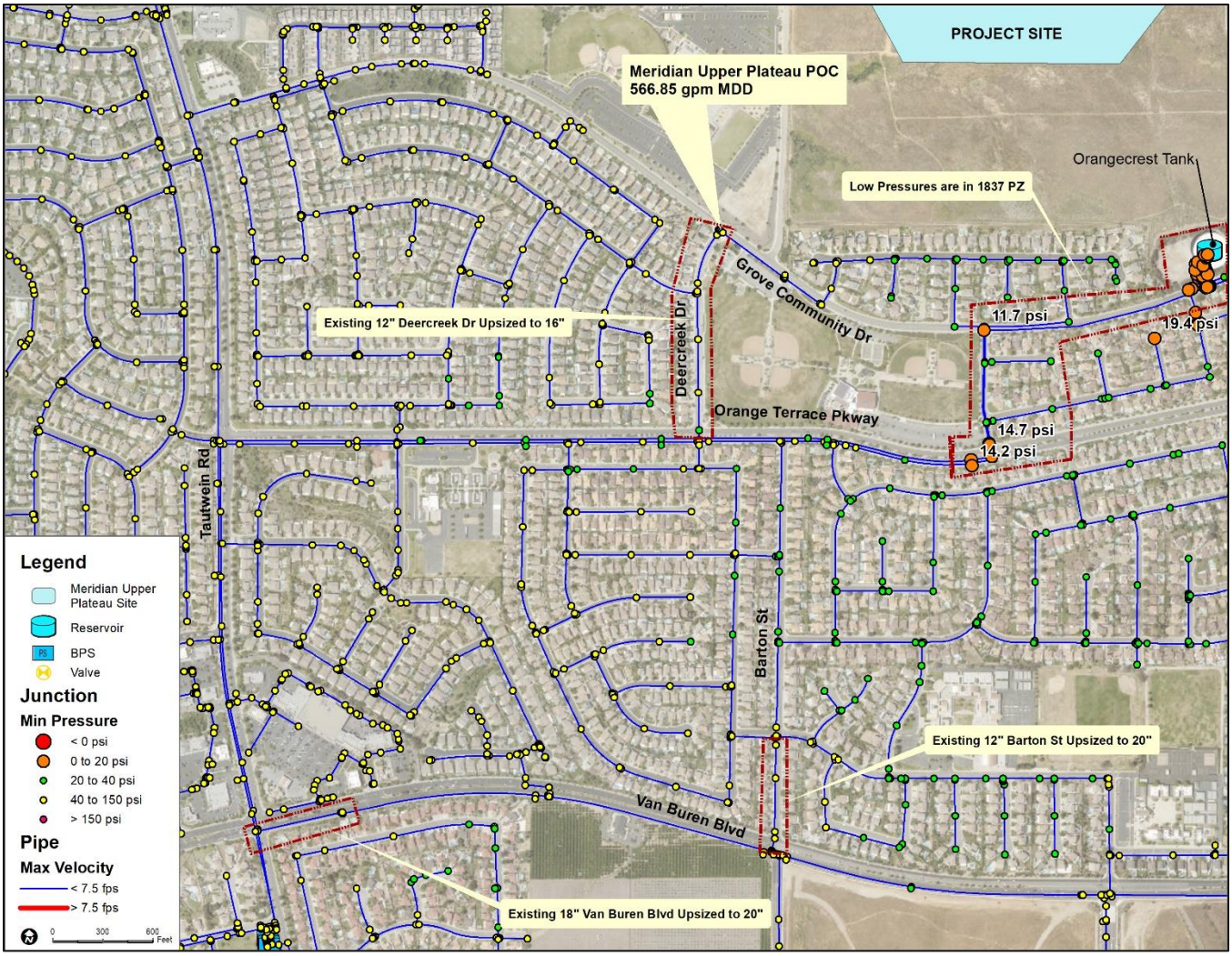


Figure 11. Ultimate Buildout with MWUP – MDD plus FF with Improvements



3.1.3 Potable Water Pump Station Analysis

An updated pump station analysis was performed for the Bergamont Pump Station, which supplies the 1900PZ from the 1837 PZ. The pump station currently has four (4) pumps with a total pumping capacity of 18,900 gpm and a firm capacity (largest pump out of service) of 12,000 gpm. The design criteria for potable water pump stations requires that the firm pumping capacity meet the MDD for each pressure zone. As shown in **Table 3**, the results of the analysis indicate that the Bergamont Pump Station is anticipated to have sufficient capacity to accommodate the MWUP through Buildout with no improvements required.

Table 3. Potable Water Pump Station Analysis for the 1900PZ

Scenario	Pressure Zone	Zone MDD (MGD)	Zone MDD (gpm)	Bergamont Firm Capacity (gpm)1	Surplus (gpm)
Existing (2020)	1900	6.75	4,700	12,000	7,300
Existing (2020) + MWUP	1900	7.57	5,300	12,000	6,700
Near-Term (2030)	1900	8.75	6,100	12,000	5,900
Near-Term (2030) + MWUP	1900	9.57	6,600	12,000	5,400
Ultimate	1900	10.96	7,600	12,000	4,400
Ultimate + MWUP	1900	11.78	8,200	12,000	3,800

Notes:
[1] Assumes largest pump out of service. Value from Table 6-3 of the 2020 FMP.

3.1.4 Potable Water Analysis Summary

The results of the potable water analysis indicate that several existing waterlines are anticipated to exceed Western evaluation criteria with the addition of the MWUP demand. The following water system pipeline improvements are recommended to maintain maximum waterline velocities below the design criteria of 7.5 fps.

The following potable water improvements are required to accommodate the immediate construction of the MWUP development:

- Upsize 1,300 LF of 12-inch on Deercreek Drive from Grove Community Drive to Orange Terrace Parkway to 16-inch.
- Upsize 700 LF of 12-inch on Barton St north of Van Buren to 20-inch.

The following are additional future (2030 and Buildout) potable water system recommendations not previously included in the 2020 FMP necessary to accommodate the MWUP development:

- Upsize 600 LF of existing 18-inch on Van Buren Blvd east of Tautwein Rd to 20-inch (for future scenarios 2030 and Buildout only).
- Accommodate increased deficit of 1.45-MG in Ultimate Buildout demand condition due to the MWUP development demands.

3.2 Recycled Water Analysis

The MWUP project is proposed to be served by the 1815 PZ. The recycled water hydraulic analysis includes maximum day demand (MDD) be evaluated for the Existing (2020), Near-Term (2030) and Buildout scenarios. Three analyses will be performed to update the recycled water system results from the 2020 FMP, including a storage analysis, a distribution system analysis, and a pump station analysis. **Table 4** presents the updated net recycled water use projections for the project site used for the analyses.

Table 4. Updated Net Recycled Water Use Projections for the Project Site

Proposed Land Use	Acreage	Previous RW Demand (gpm)[1]	Proposed RW Average Day Demand (gpm)	Net ADD Increase (gpm)	Net MDD Increase (gpm)[2]
Industrial	254	0	39.7[4]	39.7	99.2
Park/Open Space	78.1[3]	45.8	72.9[5]	27.1	67.9
			Total Net Increase in RW Demand:	**66.8**	**167.1**

Notes:

[1] In the 2020 FMP, the project site was anticipated to be developed into 30 acres of soccer fields in the Buildout scenario only.

[2] MDD peaking factor is equal to 2.5 x ADD, per Table 3-11 of the 2020 FMP.==

[3] This acreage value varies from the Park/Open Space acreage values for potable water and sewer because it includes some Landscape and Lighting Maintenance District (LLMD) areas (slope/landscape areas/maintenance roads) that would not have development but would have landscaping requiring a recycled water demand.

[4] Industrial recycled water demand estimated using a water use factor of 225 gpd/acre. Note: the water use factor provided by the developer used during the West Campus study in 2017/2018, which was 450 gpd/acre for Industrial for maximum month. The maximum month peaking factor in the 2020 FMP for recycled water is 2.0. Therefore, the average day demand water use factor assumed herein is 225 gpd/acre.

[5] Park/Open Space recycled water demand estimated using a water use factor of 1,345 gpd/acre. Note: the water use factor provided by the developer used during the West Campus study in 2017/2018, which was 2,690 gpd/acre for Park/Open Space for maximum month. The maximum month peaking factor in the 2020 FMP for recycled water is 2.0. Therefore, the average day demand water use factor assumed herein is 1,345 gpd/acre.

3.2.1 Storage & Siting Analysis

As discussed in the 2020 FMP, recycled storage in the 1815 PZ is currently in deficit by approximately 2.4MG. As a part of development, the MWUP project will be constructing a temporary bolted steel reservoir to accommodate the storage required for their development. Per the 2020 FMP, required recycled water storage is equal to one MDD. Therefore, the required storage for the MWUP is a minimum of 0.41-MG.

Two sites were proposed for the tank, including one site with a pad elevation of 1734 ft within the development and the existing Orangecrest site, with a pad elevation of 1799 ft. It was assumed a bolted steel tank with a maximum height of 32-ft would be constructed for the temporary storage. The site with the pad elevation of 1734-ft is unable to match the HGL of the existing Lurin Tank of 1815 ft. Therefore, the Orangecrest site is the preferred site for the temporary storage tank. In discussion with Western and the Developer, a tank with a diameter of 53.5 feet and maximum depth of 30 feet (total volume 0.5-MG) was assumed for the hydraulic analysis.

Using the updated recycled water demand values from Table 3, an updated storage analysis was performed for the 1815 PZ. The results of the storage analysis for Existing, Near-Term and Buildout are presented in **Table 5**. Note that the "Existing Storage" column for the Existing + MWUP scenario includes the temporary 0.5-MG tank constructed as part of the MWUP project. The Results indicate that the storage deficit predicted for the Ultimate Buildout demand condition will be exacerbated by the MWUP project.

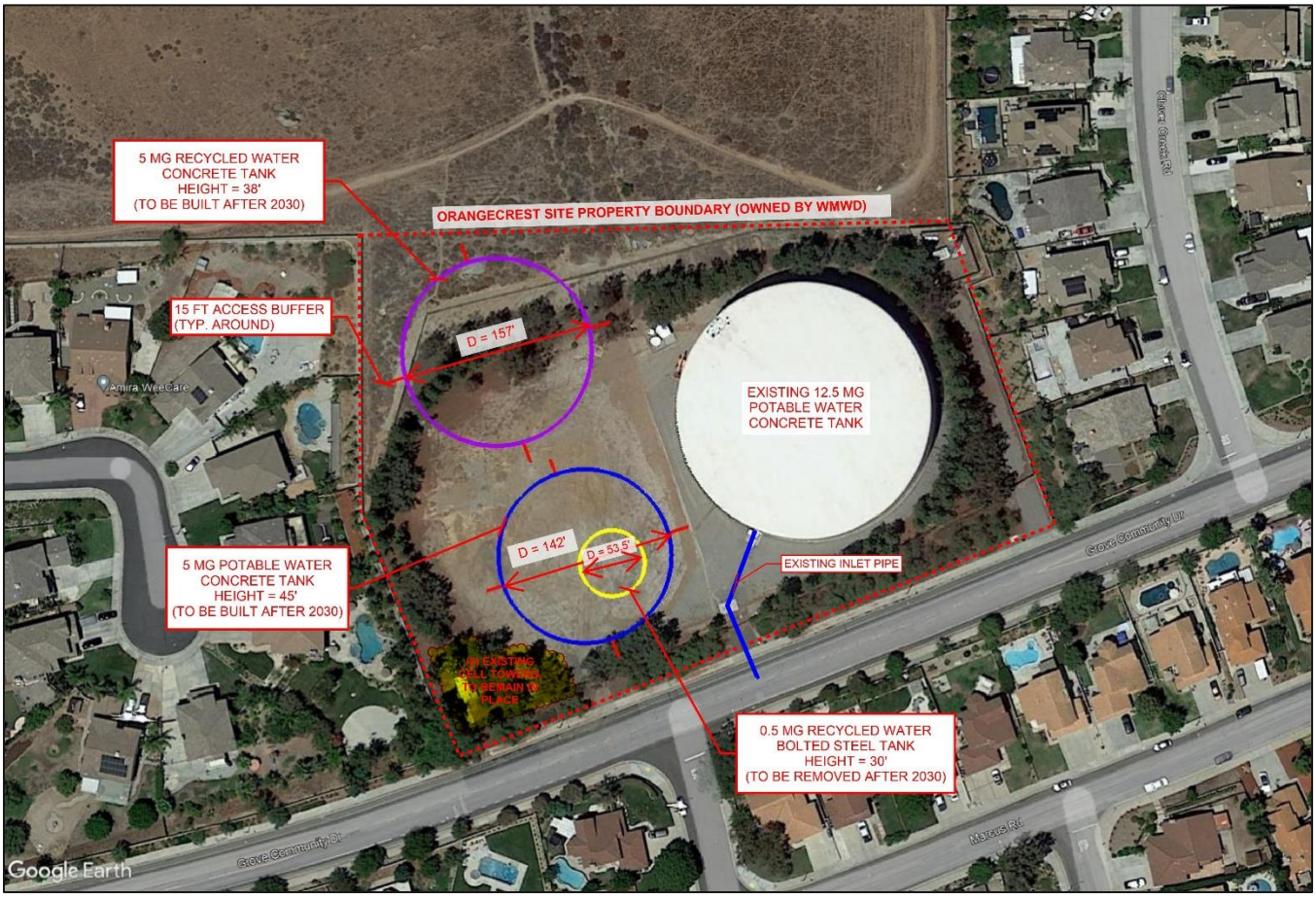
Table 5. Recycled Water Storage Analysis for the 1815PZ

Scenario	Pressure Zone	Existing Storage (MGD)	MDD (MGD)	Required Storage (MG)	Surplus/ (Deficit) (MG)
Existing (2020)	1815	0.3	2.67	2.67	(2.37)
Existing (2020) + MWUP	1815	0.8[1]	3.08	3.08	(2.28)
Near-Term (2030)	1815	5.3[2]	4.63	4.63	0.67
Near-Term (2030) + MWUP	1815	5.3[2]	5.04	5.04	0.26
Ultimate	1815	5.3[2]	6.54	6.54	**(1.24)**
Ultimate + MWUP	1815	5.3[2]	6.95	6.95	**(1.65)**

Notes:
[1] Includes the 0.3-MG existing Lurin Tank and the 0.5-MG planned temporary MWUP tank are both in operation.
[2] Assumes the new 5.0-MG tank at the Orangecrest site is constructed by 2030 per the 2020 FMP. The temporary 0.5-MG MWUP storage tank would be taken offline and relocated.

Placement of the tanks within the existing Orangecrest site were also evaluated to confirm the temporary 0.5-MG tank could remain during construction of the proposed 5-MG recycled water tank anticipated to be constructed by 2030. **Figure 12** provides a conceptual siting evaluation for the proposed 0.5-MG temporary recycled water tank, the proposed 5-MG permanent recycled water tank as well as the proposed 5-MG potable water tank, which would be constructed after removal of the temporary 0.5-MG recycled water tank in the 2030 timeframe.

Figure 12. Ultimate Buildout with MWUP – MDD plus FF with Improvements



3.2.2 Distribution System Analysis

The proposed recycled water lines for the project site were added to Western's most recent recycled water model. The project site's MDD of 281.5 gpm was split evenly between the nine (9) nodes in the proposed MWUP system. The previous water demand of 114.5 gpm and proposed pipelines for the soccer fields were removed from the hydraulic model. A 48-hour extended period simulation (EPS) was run in the model for MDD for the Existing (2020), Near-Term (2030) and Ultimate Buildout scenarios and results compared to District evaluation criteria, including a minimum service pressure of 40 psi during MDD, minimum residual pressure of 20 psi during fire flow, and a maximum pipeline velocity of 7.5 fps during any condition.

The following subsections provide the results of each scenario.

3.2.2.1 Existing MDD

Analysis of the originally-proposed single 8-inch service line in Cactus to the temporary 0.5-MG tank determined that the proposed infrastructure does not provide sufficient capacity for flows from the temporary in the event that the Oleander booster pump station is not pumping when the large RNC demand hits the 1815 zone, as shown in **Figure 13**. Maximum pipeline velocities are anticipated to exceed District criteria and minimum pressures could drop below zero psi. However, analysis indicates that upsizing the main supply line from 8-inch to 12-inch from the tie-in on Cactus Ave to the temporary tank is anticipated to provide sufficient capacity to utilize storage volumes at the temporary tank in the event Oleander PS is not pumping when demands significantly increase in the zone. These results are shown graphically in **Figure 14**. Therefore, it is recommended that the supply line be upsized to 12-inch diameter from Cactus to the temporary 0.5-MG tank.

Figure 13. Recycled Water Existing MDD – 8" Service from Cactus Ave

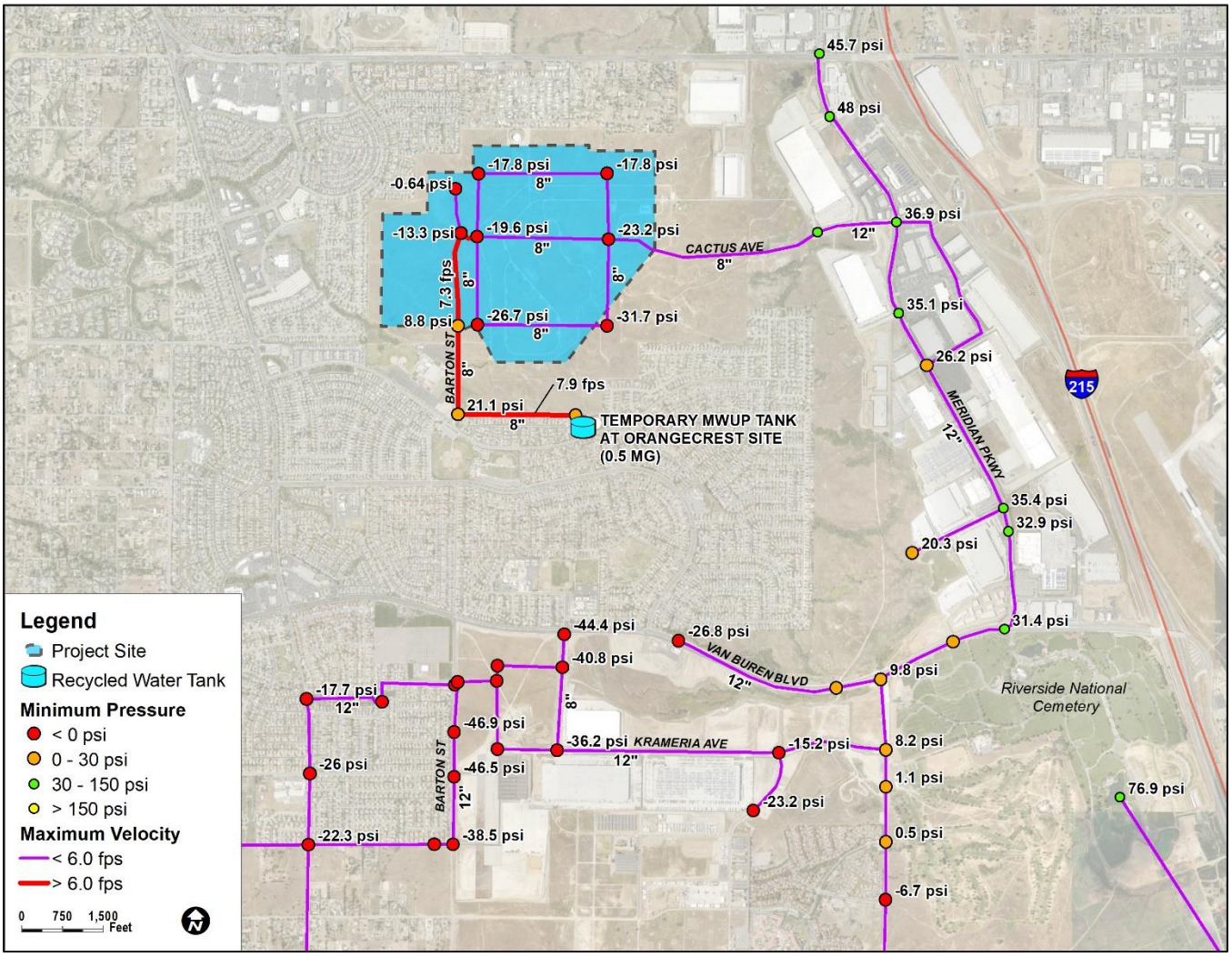
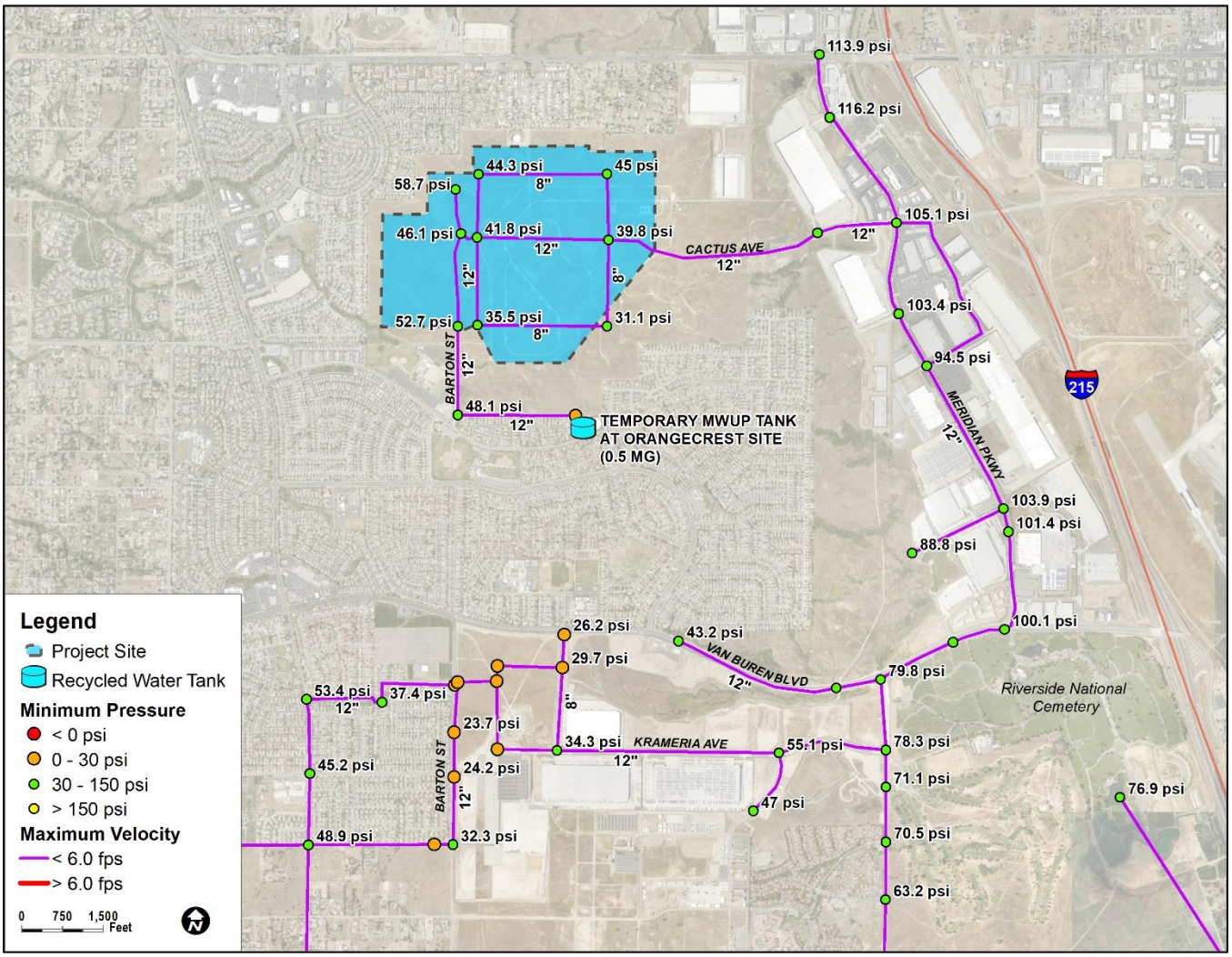


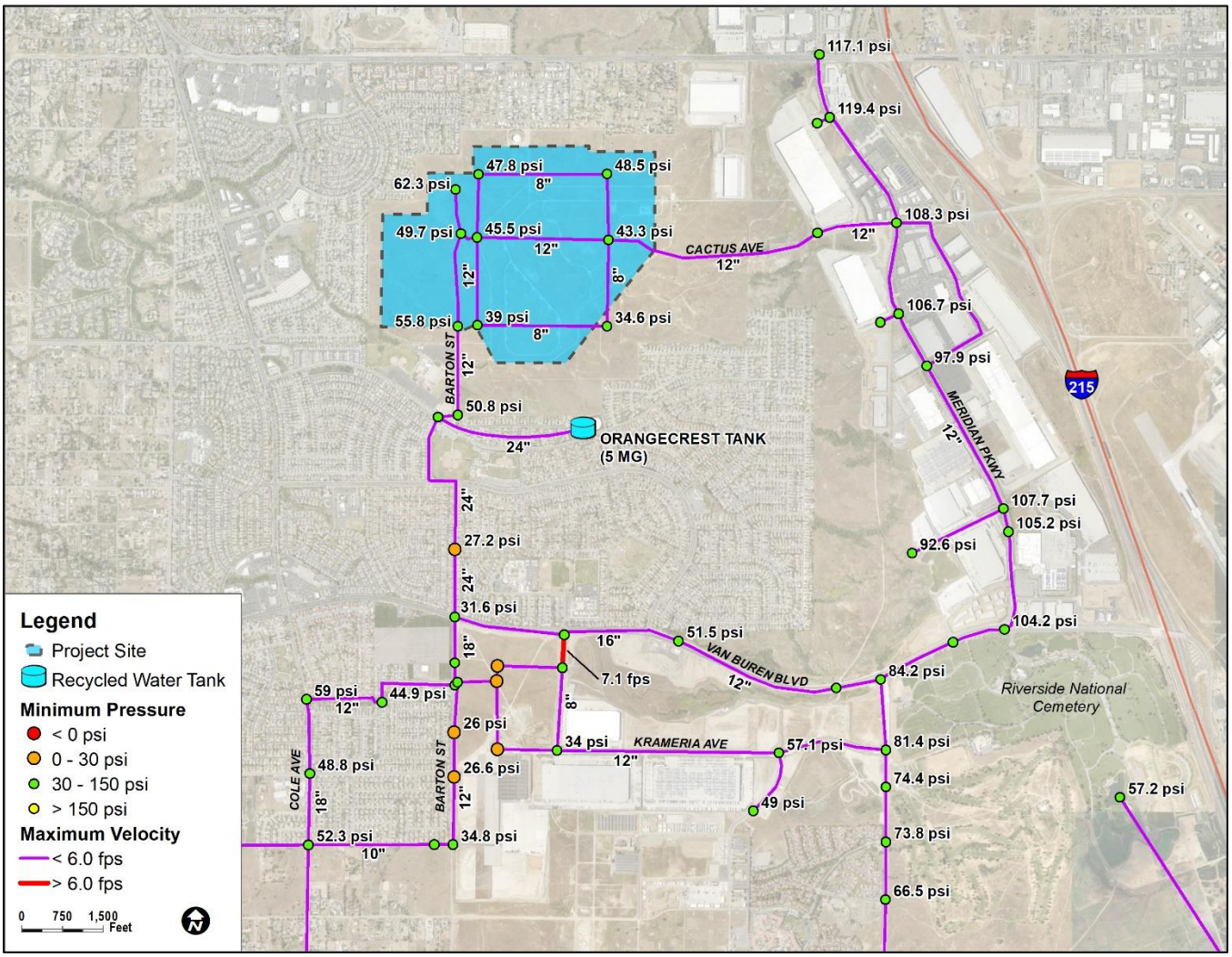
Figure 14. Recycled Water Existing MDD – 12" Service from Cactus Ave



3.2.2.2 Near-Term MDD

For the Near-Term MDD analysis with looped supply to the MWUP development with the 12-inch supply line in Cactus and Barton to the tank from the north, the results indicate minimum pressures in the development being maintained above 30 psi, as shown in **Figure 15**. One short (610 LF) portion of existing 8-inch in Coyote Bush Road just south of Van Buren Blvd reaches a maximum velocity of 7.4 fps, which exceeds the District maximum velocity criteria of 6 fps. No other new low pressure areas or high velocity pipelines were identified.

Figure 15. Recycled Water Near-Term MDD – Looped Service from Cactus Ave & Barton Dr

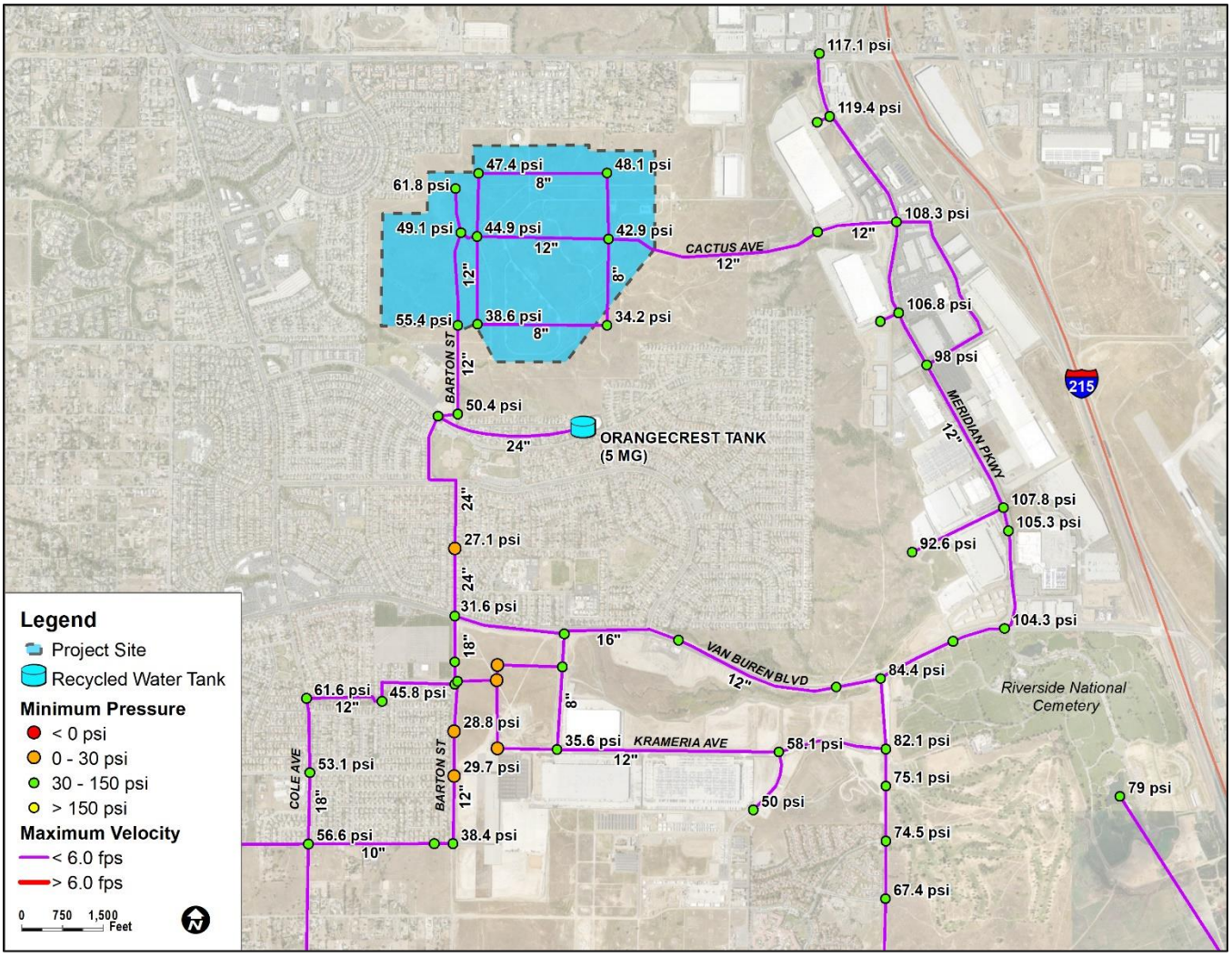


Note that modeling indicates that the infrastructure shown in Figure 15 with service to the new 5-MG Orangecrest tank via a 24-inch supply line in the south is required once demand levels in the zone, predominantly those of the Riverside National Cemetery, reach 2030 anticipated levels as the larger diameter pipeline is required to more efficiently move water in and out of the new 5-MG Orangecrest Reservoir.

3.2.2.3 Ultimate Buildout MDD

For the Ultimate Buildout MDD analysis with looped supply to the MWUP development, the results indicate minimum pressures in the development being maintained, as shown in **Figure 16.** No pipelines were found to exceed the District maximum velocity criteria of 6 fps. System pressures int the remainder of the 1815 zone were consistent with the findings of the 2020 FMP.

Figure 16. Recycled Water Ultimate Buildout MDD – Looped Service from Cactus Ave & Barton Dr



3.2.3 Recycled Water Pump Station Analysis

An updated pump station analysis was performed for the 1815 zone, which receives water from both the WWRF and Oleander pump stations. As shown in **Table 6**, the results of the analysis indicate that the 1815 zone is anticipated to have sufficient capacity to accommodate the MWUP through Buildout with no improvements required. Note that in the Ultimate demand scenario, supply from the Colorado River Aqueduct is anticipated to be required to satisfy the MDD of the zone.

Table 6. Recycled Water Pump Station Analysis for the 1815PZ

Scenario	Pressure Zone	Zone MDD (gpm)	Zone Total Pumping Capacity (gpm)[1]	Zone Firm Pumping Capacity (gpm)[2]	Surplus (gpm)
Existing (2020) + MWUP	1815	2,140	11,940	7,580	5,440
Near-Term (2030) + MWUP	1815	3,500	11,940	7,580	4,080
Ultimate + MWUP	1815	5,480[3]	11,940	7,580	2,100

Notes:
[1] Total capacity value shown is sum of all pumps at Oleander and WWRF pump stations, per Table 2-9 of the 2020 FMP.
[2] Firm pumping capacity assumes largest pump in each pump station is out of capacity. Values are some of firm pumping capacities of both Oleander and WWRF pump stations, per Table 2-9 of the 2020 FMP.
[3] Supply from the Colorado River Aqueduct (CRA) is anticipated to be required to satisfy the Ultimate demand in the zone. Maximum supply from the Riverside Canal was estimated at 11.1 CFS in the 2020 FMP and it was noted that, even prior to the Upper Plateau development, supply from the CRA would be required to satisfy the zone's demand needs.

3.2.4 Recycled Water Analysis Summary

The results of the recycled water analysis indicate that a 0.5-MG temporary bolted steel tank is required for the development at the Orangecrest location to maximize pressures within the development. Due to the distance between the Lurin Tank and a new tank at the Orangecrest site, the initial onsite recycled water system will require a 12-inch supply line from the tie-in on Cactus Ave to the new 0.5-MG temporary tank. In the near-term (~2030) with the construction of the full 5-MG Reservoir and 24-inch supply line from the south, there still may be some portions of the development that have pressures below 30 psi, which will require irrigation pumps.

The following recycled water improvements are required to accommodate the immediate construction of the MWUP development:

- Construct temporary 0.5-MG bolted steel tank at Orangecrest Tank site.
- Increase the size of the main supply line from the Cactus tie-in to the temporary tank to 12-inches

The following are additional future (2030 and Buildout) recycled water system recommendations not previously included in the 2020 FMP necessary to accommodate the MWUP development:

- Irrigation pumps required anywhere pressures drop below 30 psi.
- Recycled water storage deficit for 1815 PZ in Ultimate Buildout scenario of 1.65-MG, an increase of 0.41-MG from 2020 FMP analysis due the MWUP development.

- It is important Western construct the southern supply to the new 5-MG tank prior to the RNC reaching its anticipated 2030 demands in order to efficiently distribute water from the tank into the zone.

3.3 Sewer Analysis

The MWUP project will discharge into the existing Meridian trunk sewer that flows directly into the WWRF from the north. Per the developer, the anticipated average dry weather flow (ADWF) for the project is 448,000 gallons per day (0.45 MGD) using the Industrial sewer generation factor of 2,000 gpd/acre from Table 3-21 of the 2020 FMP and 224 acres tributary to the Western Riverside sewer collection system (the remaining 30 acres being tributary to the City of Riverside system). Note that the sewer generation factor of 2,000 gpd/acre is likely conservative for the MWUP development given light industrial is anticipated to be the typical tenet type, where sewer generation is often significantly lower than the 2,000 gpd/acre value used herein. The updated sewer analysis includes peak wet weather flow (PWWF) scenarios evaluated for the Existing (2020), Near-Term (2030) and Buildout scenarios. Three analyses will be performed to update the sewer system results from the 2020 FMP, including a treatment analysis, a collection system analysis and a lift station analysis.

3.3.1 Treatment Analysis

An updated treatment analysis was developed for this Study. Treatment plant capacity is based on average dry weather flows (ADWF). **Table 7** presents the updated ADWF projections for the WWRF, which has a current treatment capacity of 3.0 MGD. The results indicate that the MWUP development is projected to result in the capacity of the WWRF to be exceeded in the Ultimate Buildout by 1.07 MGD based on current conservative estimates. The totals shown below include a 0.35 MGD diversion flow from City of Riverside. One partial mitigation option would be to end the agreement with City of Riverside as flows at WWRF approach capacity to extend the life of the existing 3.0 MGD WWRF capacity.

Table 7. Average Daily Flows at WWRF

Scenario	WWRF Influent Flow Rate (MGD)	Surplus/(Deficit) Capacity (MGD)
Existing (2020)[1]	1.15	1.85
Existing (2020) + MWUP	1.60	1.40
Near-Term (2030) [1]	2.32	0.68
Near-Term (2030) + MWUP	2.77	0.23
Ultimate[1]	3.62	(0.62)
Ultimate + MWUP	4.07	(1.07)
Ultimate + MWUP without 0.35 MGD Riverside Diversion	3.72	(0.72)

Notes:
[1] Data from Table 3-24 of the 2020 FMP; includes 0.35 MGD scalped flow from City of Riverside.

3.3.2 Collection System Analysis

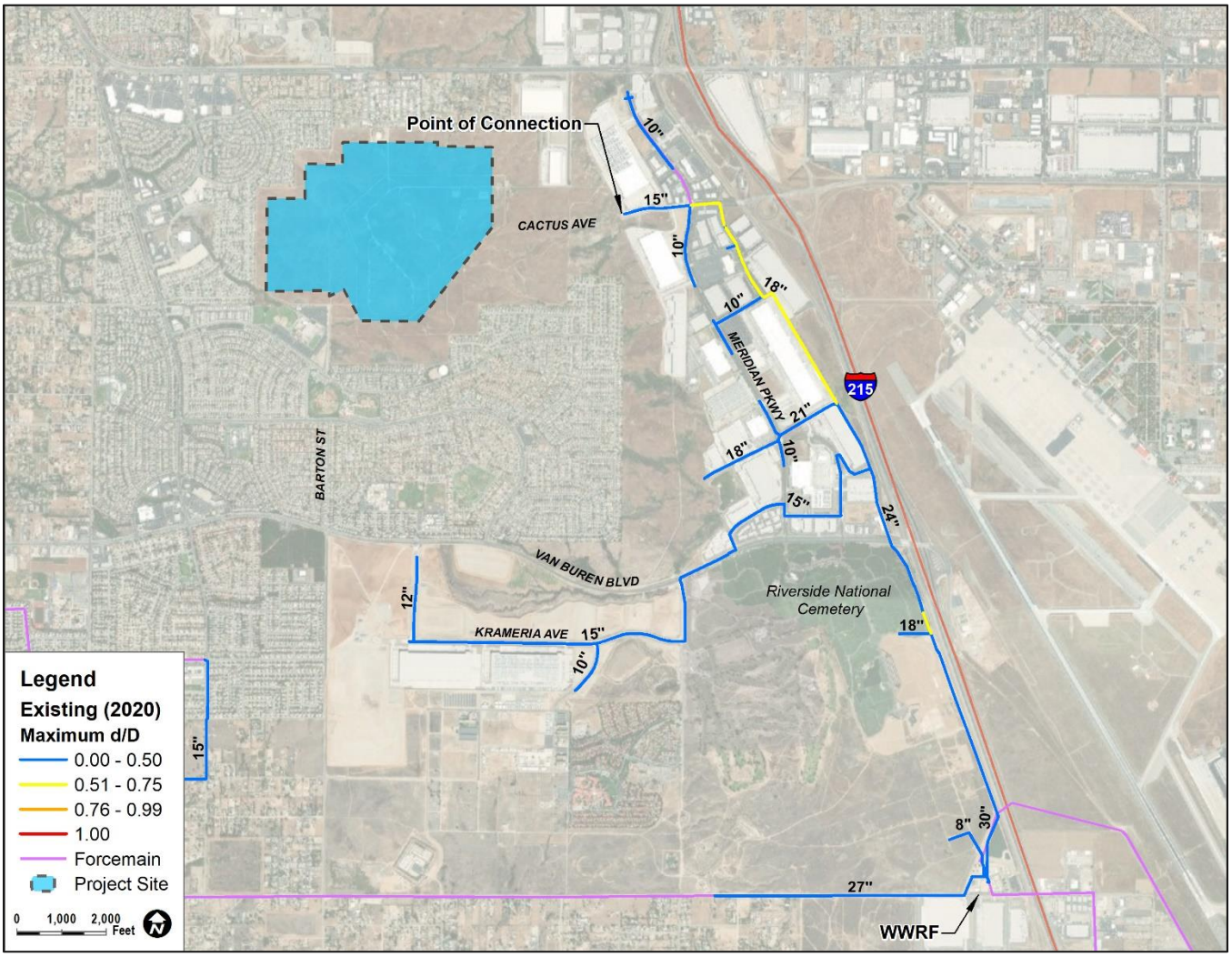
For the 2020 PWWF scenario for the 2020 FMP, a singular wet weather diurnal flow pattern was developed for the unmetered areas tributary to the WWRF for model calibration. As a part of this study, Dudek upgraded the hydraulic model by creating a new wet weather diurnal pattern to improve calibration at WWRF. A revised diurnal pattern with a peak of 2.6 resulted in modeled flows at WWRF being within 2% of measured average flows and within 6% of measured peak flows, an improvement from the calibration results in the 2020 FMP. This refined diurnal pattern was utilized for the unmonitored areas tributary to the Meridian trunk sewer for the PWWF scenarios for Existing (2020), Near-Term (2030) and Ultimate Buildout in the collection system analysis.

The average load of 311.1 gpm (448,000 gpd) provided by the developer was loaded onto the existing sewer model at manhole junction ID T36042100, which discharges into the existing 15-inch pipeline on Cactus Avenue prior to conveyance via the Meridian Trunk sewer for discharge into the WWRF. A 24-hour EPS was run for the Existing (2020), Near-Term (2030) and Ultimate Buildout scenarios in the hydraulic model. Maximum depth over diameter (d/D) ratio results from the model were compared against the Western maximum d/D criteria of 0.75 for pipelines 15-inches in diameter and greater to evaluate if the addition of the MWUP sewer loading is anticipated to result in sewerline capacity deficiencies.

3.3.2.1 Existing (2020) PWWF Analysis

Results of the Existing PWWF scenario with the addition of the MWUP load at the north end of the Meridian trunk sewer results in no new sewerline deficiencies (maximum d/D less than 0.75). The results are shown graphically in **Figure 17**.

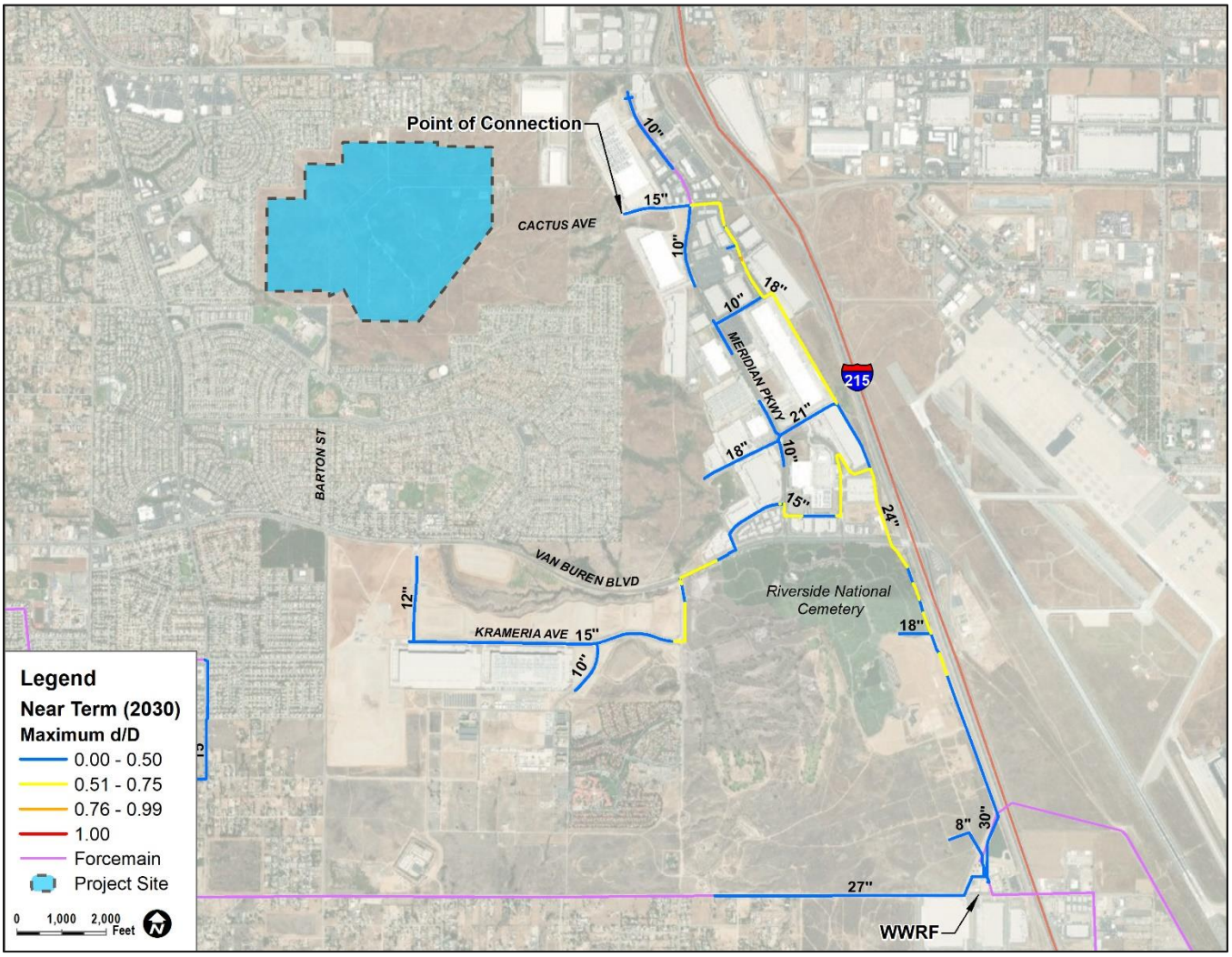
Figure 17. Sewer Existing (2020) PWWF Results – Maximum d/D



3.3.2.2 Near-Term (2030) PWWF Analysis

Results of the Near-Term PWWF scenario with the addition of the MWUP load at the north end of the Meridian trunk sewer results in no new sewerline deficiencies (maximum d/D less than 0.75). The results are shown graphically in **Figure 18**.

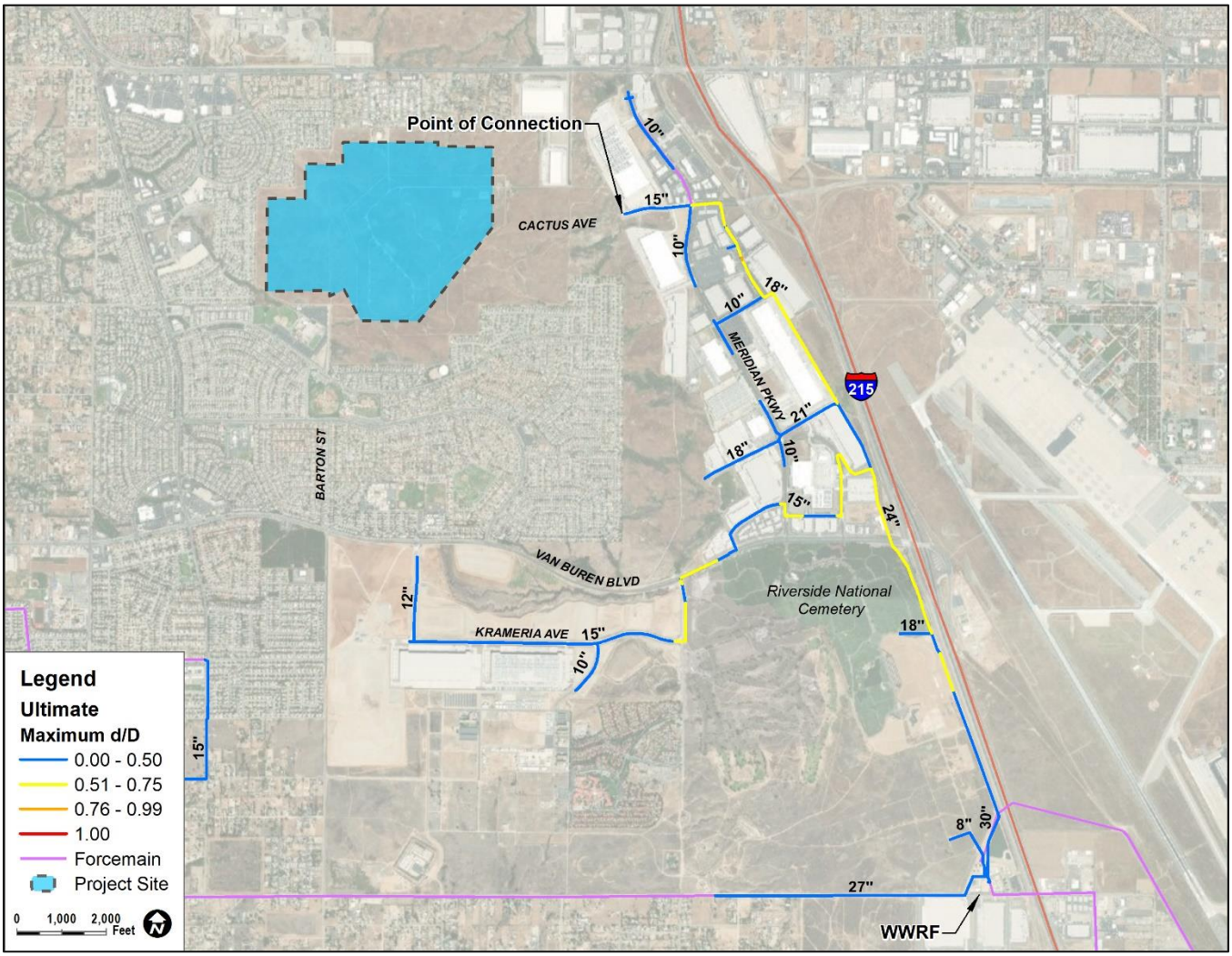
Figure 18. Sewer Near-Term (2030) PWWF Results – Maximum d/D



3.3.2.3 Ultimate Buildout PWWF Analysis

Results of the Ultimate Buildout PWWF scenario with the addition of the MWUP load at the north end of the Meridian trunk sewer results in no new sewerline deficiencies (maximum d/D less than 0.75). The results are shown graphically in **Figure 19**.

Figure 19. Sewer Ultimate Buildout PWWF Results – Maximum d/D



3.3.3 Lift Station Analysis

The sewer flow from the MWUP will not intercept any lift stations; therefore, a lift station analysis was not performed for this study.

3.3.4 Sewer Analysis Summary

The sewer analysis found that the addition of the MWUP sewer load is anticipated to result in an ultimate treatment capacity deficiency at WWRF of 1.07 MGD with the City of Riverside diversion into the Western system and 0.72 MGD without the City of Riverside diversion. No collection system deficiencies are anticipated with the development of the MWUP project assuming discharge into the existing 15-inch sewerline in Cactus Ave. Per the developer, the first flows from the development are anticipated in the next 3 to 4 years, with buildout anticipated within the next 10 years, depending on market conditions.

4 Findings & Recommendations

The following summarizes the findings and recommendations from this analysis. Note the findings for each system are broken into those improvements required to accommodate the immediate construction of the MWUP development and those required for future (2030 and Build out time frames) accommodation of the development.

<u>Immediate System Improvement Requirements:</u>

- Potable Water System:
    a. Upsize 1,300 LF of 12-inch on Deercreek Drive from Grove Community Drive to Orange Terrace Parkway to 16-inch (Note: if space is available for the parallel 12-inch pipeline proposed by the developer, the recommendation for this upsizing changes to the following: Upsize 350 LF of 8-inch on Grove Community Drive to Deercreek Drive to 12-inch [assumes sufficient space exists to construct parallel 12-inch on Deercreek and Grove Community Drive]).
    b. Upsize 700 LF of 12-inch on Barton St north of Van Buren to 20-inch.
- Recycled Water System:
    a. Construct temporary 0.5-MG bolted steel tank at Orangecrest Tank site.
    b. Upsize the main supply line from the Cactus Avenue tie-in to the temporary tank to 12-inch diameter.
- Sewer System: None

<u>Future System Improvements and Recommendations:</u>

- Potable Water
    a. Upsize 600 LF of existing 18-inch on Van Buren Blvd east of Tautwein Rd to 20-inch (scenarios 2030 and Buildout only).

b. Potable water storage deficit in 1900 PZ in Ultimate Buildout of 2.08 MG, an increased deficit of 1.45-MG from 2020 FMP analysis. Recommend either contribution to the construction of 2.1-MG of additional storage (1.45-MG attributable to MWUP) or an alternative method of reducing the equalization storage requirement for the zone, such as a reservoir management system (RMS) with a Tesla battery to accommodate the increased high-TOU pumping required to maintain reservoir levels during peak daytime demand hours.

- Recycled Water System:

  a. Irrigation pumps are required anywhere pressures drop below 30 psi, potentially in the southeast corner of property.

  b. Recycled water storage deficit for 1815 PZ in Ultimate Buildout scenario of 1.65-MG, an increase of 0.41-MG from 2020 FMP analysis due to MWUP development. Recommend contribution of 0.41-MG of buildout storage once buildout storage needs are determined and required.

- Sewer System:

  a. Ultimate Buildout sewage treatment anticipated deficit of 1.07-MGD at WWRF with the City of Riverside diversion into the Western system and 0.72-MGD without, which is an additional 0.1-MGD increased deficit due to the MWUP development. Recommend Western discuss removing 0.35 MGD City of Riverside diversion to WWRF as plant flows approach capacity to extend the life of the existing 3.0-MGD WWRF capacity. The additional ultimate buildout treatment deficit anticipated to result from MWUP and other future contributors is considered a long-term increase in treatment capacity needs that will be included in the future treatment capacity charges that will be equitably collected from all contributors to accommodate the increased treatment capacity needs at WWRF.

  b. No collection system pipeline improvements anticipated.

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Meridian West Campus Upper Plateau EIR April 19, 2023

Response to Comments

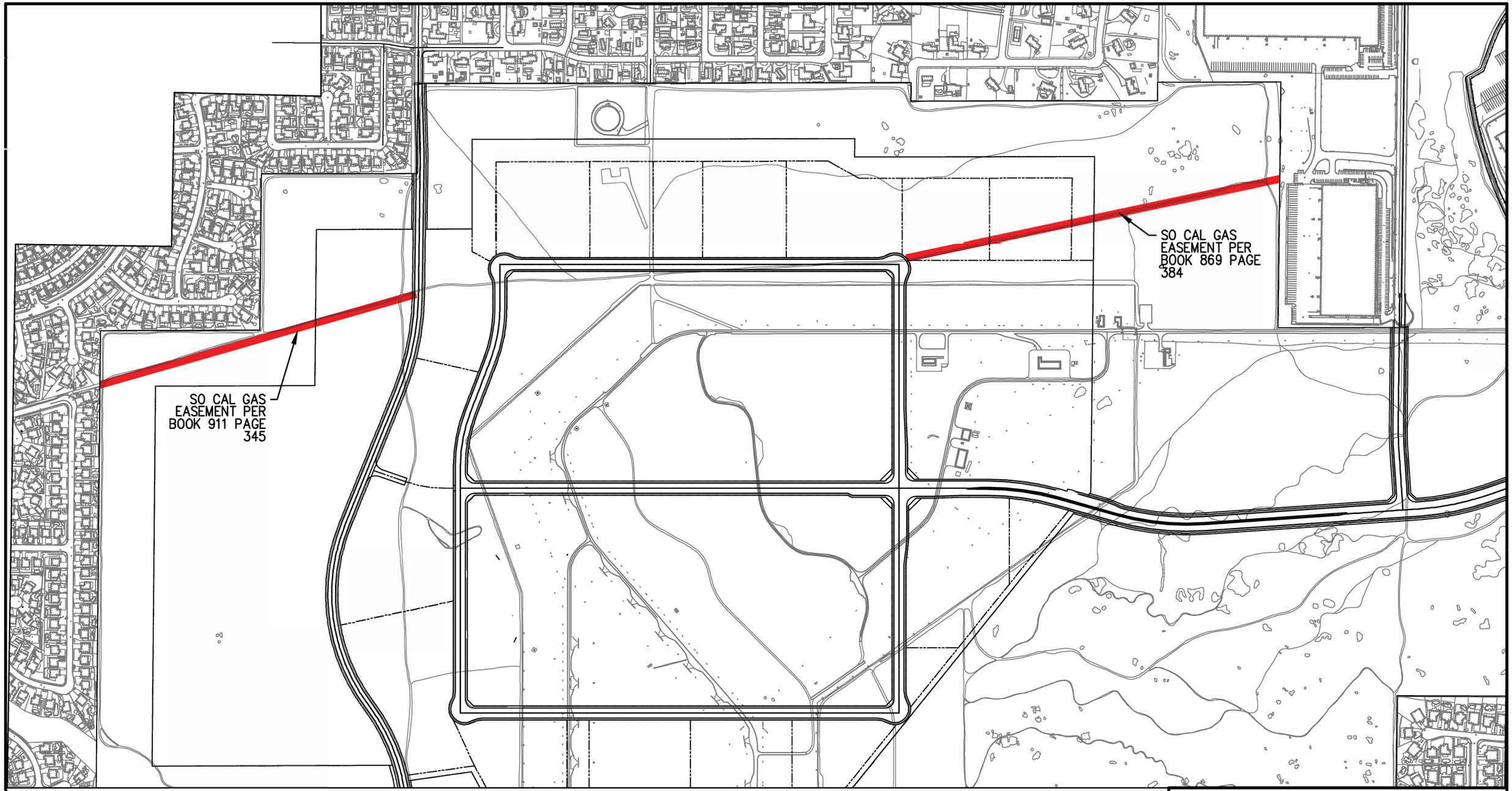
Comment
Email from SoCalGas dated March 7, 2023

Response
Meridian Development understands that SoCalGas has a gas main running through the proposed development. The development team has contacted SoCalGas about relocating the existing gas line to work the proposed development.

Research of existing documents by the project surveyor and the project title company has found that SoCalGas has partial easements over the property for the existing gas line. See attached exhibit showing locations of the current known easements.

The existing gas line will be relocated so that the new gas line will be located within public right of way locations to the maximum extent feasible at a depth that meets SoCalGas requirements/approval.

The development team is working on a design where with some initial grading of the development the new gas line can be installed in the ultimate location while leaving the existing gas line in place to reduce cut over time/down time. This is similar to the process that was done on the Meridian West Campus Lower Plateau project.



N

SCALE: 1"=500'

MERIDIAN WEST CAMPUS UPPER PLATEAU

KNOWN GAS EASEMENT EXHIBIT

MJPA, CA

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Meridian West Campus Upper Plateau EIR April 19, 2023

Response to Comments

Comment
Canyon Hills of Riverside Homeowners Association dated Feb 23, 2023

Response
Meridian Development understands that a portion of the proposed development is tributary to the existing wash running through Sycamore Canyon Park. The proposed development is designed to maintain an equivalent amount of land area that is currently draining through this watershed.

Industry practice in the County of Riverside and within the MJPA is to detain stormwater runoff so that the proposed development does not increase the peak discharge rate from the undeveloped condition for the design storm events (100 Year – 24 Hour and 2 Year – 24 Hour design storm events).

The proposed developments will utilize stormwater storage solutions and outlet controls to detain runoff in the design storm events down to the undeveloped peak flow rates. Examples of stormwater storage solutions include but are not limited to underground pipes, underground vaults, shallow surface ponding. Each sub-development within the larger development will be required to mitigate runoff as each property develops. See Hydrology studies as part of the environmental impact report.

Prior to development (creation of impervious surfaces) the undeveloped portions of the project will utilize desilting basins as outlined by the California Stormwater Quality Association (CASQA) guidelines for desilting basins. Attached for reference. The desilting basin is not a runoff reduction device and is for erosion/sediment control for undeveloped projects.

As stormwater discharges from the overall project (typically at the boundaries of the project as shown in the provided hydrology study) the development will reduce peak discharge velocities to a non-erosive velocity as it crosses the project property line at existing drainage points.

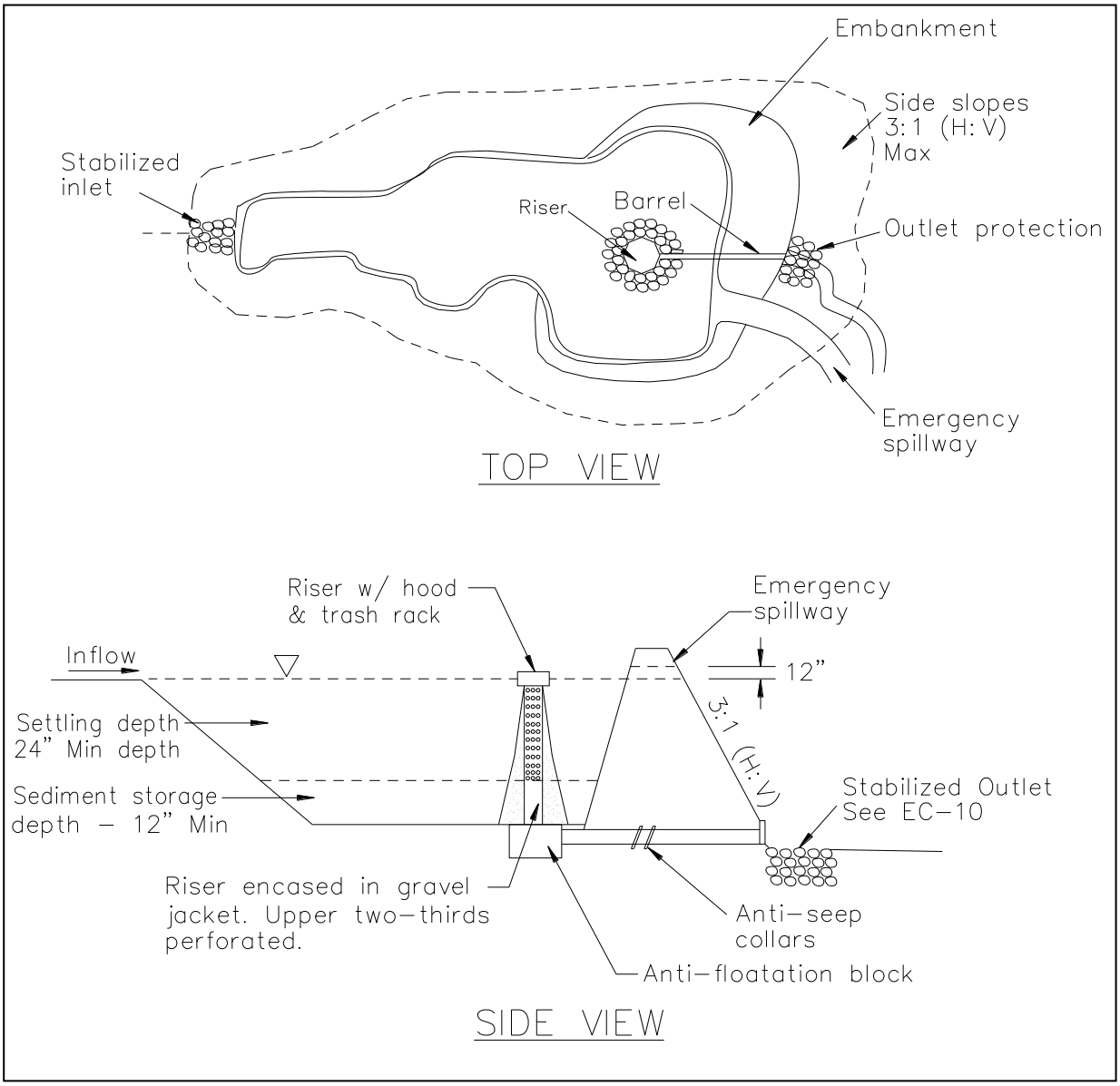

FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
MULTIPLE ORIFICE DESIGN
NOT TO SCALE

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Meridian West Campus Upper Plateau EIR April 19, 2023

Response to Comments

Comment
R-Now Letter dated Feb 26, 2023

Response
The installation of utilities will be almost exclusively done through open trenching. There may be some situations where using trenchless pipe installation would be beneficial on a limited basis.

The installation of utilities will be through existing improved areas or fall within the proposed scope area and does not contribute to additional disturbed/impacted unimproved areas in our adjacent to the proposed development.

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Civil Engineering/Land Surveying/Land Planning

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Meridian West Campus Upper Plateau EIR April 19, 2023

Response to Comments

Comment
R-Now Letter dated Feb 15, 2023

Response
Portions of the proposed development will discharge to land that then discharges to the homes along Camino Del Sol and through the neighborhood north of Camino Del Sol.

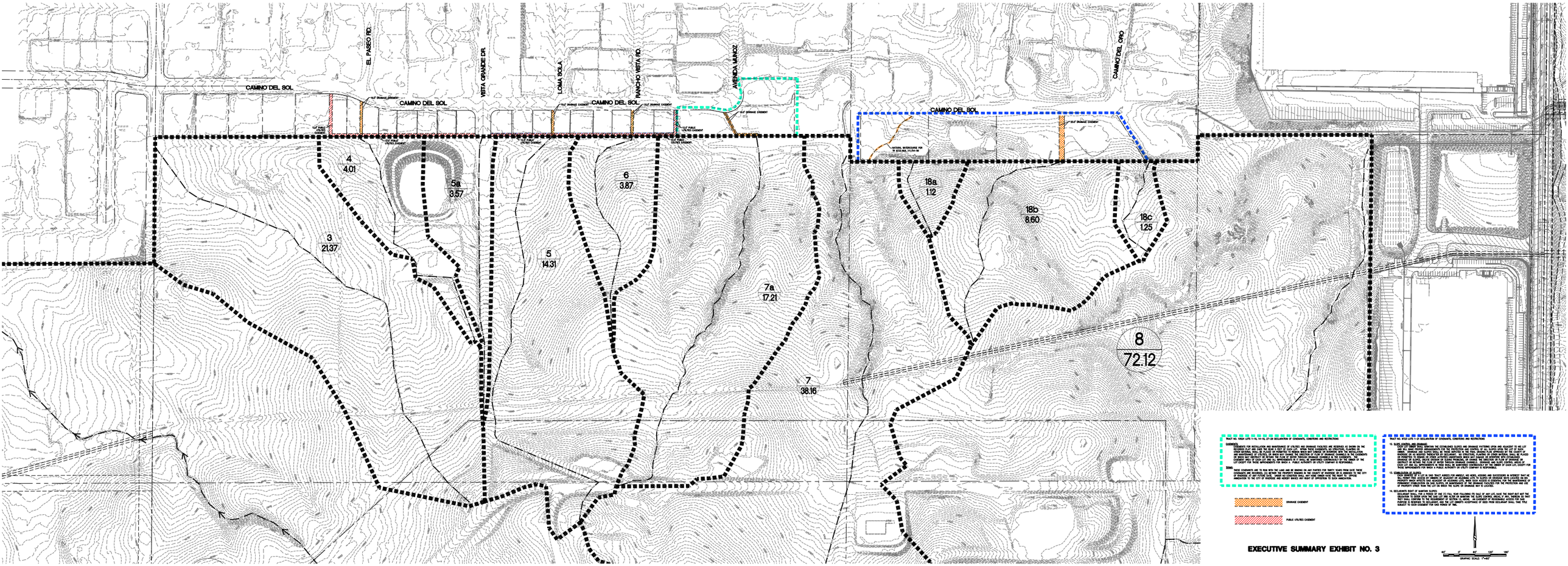
Industry practice in the County of Riverside and within the MJPA is to detain stormwater runoff so that the proposed development does not increase the peak discharge rate from the undeveloped condition for the design storm events (100 Year – 24 Hour and 2 Year – 24 Hour design storm events).

The existing parcels along the south side of Camino Del Sol that receive concentrated flows in the existing condition have drainage easements at approximately the locations where these existing concentrated flows drain through those properties. See attached exhibit.

The proposed developments will utilize stormwater storage solutions and outlet controls to detain runoff in the design storm events down to the undeveloped peak flow rates. Examples of stormwater storage solutions include but are not limited to underground pipes, underground vaults, shallow surface ponding. Each sub-development within the larger development will be required to mitigate runoff as each property develops.

Prior to development (creation of impervious surfaces) the undeveloped portions of the project will utilize desilting basins as outlined by the California Stormwater Quality Association (CASQA) guidelines for desilting basins. Attached for reference. The desilting basin is not a runoff reduction device and is for erosion/sediment control for undeveloped projects.

As stormwater discharges from the overall project (typically at the boundaries of the project as shown in the provided hydrology study) the development will reduce peak discharge velocities to a non-erosive velocity as it crosses the project property line at existing drainage points. The flow velocity leaving the proposed drainage pipes will be reduced using a headwall and rip-rap down to non-erosive velocity. See attached exhibit.



TRACT NO. 19304 LOTS 1-10, 14-18, 21-29 DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS

EASEMENTS

EASEMENT FOR INSTALLATION AND MAINTENANCE OF UTILITIES AND DRAINAGE FACILITIES ARE RESERVED AS SHOWN ON THE RECORDED MAP OVER ALL LOTS AND TRACTS AS SHOWN ON SAID MAP. THE EASEMENTS SHALL BE FOR THE BENEFIT OF SUCH INDIVIDUAL LOTS OR PARCELS AS NECESSARY TO PROVIDE WATER AND SEWER SERVICE AND DRAINAGE AND THE INSTALLATION AND MAINTENANCE OF UTILITIES AND DRAINAGE FACILITIES. THE EASEMENTS SHALL BE FOR THE BENEFIT OF THE OWNERS OF EACH SUCH LOT OR PARCEL AND THE OWNERS ASSOCIATION AS WHICH MAY DISTRICT OF STONE THE FLOW OF WATER THROUGH DRAINAGE CHANNELS IN THE EASEMENTS. THE AREA OF EACH EASEMENT SHALL BE KEPT FREE OF BUILDINGS, WALLS AND OTHER OBSTRUCTIONS THAT WOULD INTERFERE WITH ITS USE FOR SUCH PURPOSES. THE OWNERS OF EACH LOT SHALL MAINTAIN THE AREA OF EASEMENT FOR WHICH A PUBLIC AUTHORITY OR UTILITY COMPANY IS RESPONSIBLE.

3360

THESE COVENANTS ARE TO RUN WITH THE LAND AND BE BINDING ON ANY PARTIES FOR THIRTY YEARS FROM DATE THEIR DO RECORDED AND SHOULDBE, (1) BEFORE THE EXPIRATION OF THE TERM OF AGREEMENT OR (2) AMENDED TO THE CITY OF RIVERSIDE AND HEREBY BINDS ANY RIGHT OF OPPOSITION TO SUCH ANNEXATION.

TRACT NO. 8723 LOTS 1-21 DECLARATION OF COVENANTS, CONDITIONS AND RESTRICTIONS

13. SLOPE EASEMENT AND DRAINAGE
EASEMENTS FOR CUT AND FILL SLOPES ARE ESTABLISHED ALONG AND DRAINAGE PATTERNS LATER ARE ESTABLISHED TO RECEIVE AND CONVEY DRAINAGE FROM THE LOTS AND STREETS AS SHOWN ON THE RECORDED MAP. THE EASEMENTS SHALL BE FOR THE BENEFIT OF THE OWNERS. DRAINAGE AND SLOPES SHALL BE KEPT FREE OF BUILDINGS AND OTHER OBSTRUCTIONS THAT WOULD INTERFERE WITH THEIR USE FOR SUCH PURPOSES. THE OWNERS OF EACH LOT SHALL MAINTAIN THE AREA OF EASEMENT OR PORTIONS OF EASEMENT AS PROVIDED IN THE DECLARATION. THE OWNERS OF EACH LOT SHALL NOT CHANGE OR INTERFERE WITH ESTABLISHED DRAINAGE PATTERNS OVER THEIR LOTS. THE OWNERS OF EACH LOT SHALL MAINTAIN THE AREA OF EASEMENT OR PORTIONS OF EASEMENT AS PROVIDED IN THE DECLARATION. THE OWNERS OF EACH LOT SHALL NOT CHANGE OR INTERFERE WITH ESTABLISHED DRAINAGE PATTERNS OVER THEIR LOTS. THE OWNERS OF EACH LOT SHALL MAINTAIN THE AREA OF EASEMENT FOR WHICH A PUBLIC AUTHORITY OR UTILITY COMPANY IS RESPONSIBLE.

14. EASEMENTS RIGHT OF SHAPING SLOPES
EASEMENTS FOR CUT AND FILL SLOPES ALONG AND OUT CUT FILL FOR FOLLOWING THE SOLE OF ANY LOT, HAVE THE RIGHT AND NOT THE OBLIGATION TO ENTER UPON THE LOT OR LOTS AND ALTER OR SHAPING THE SLOPE CUTTING AREAS AS MAY BE NECESSARY TO PROVIDE SLOPES WITH THE RATIO OF NOT MORE THAN TWO HORIZONTAL TO ONE VERTICAL, AT ANY TIMEPRIOR TO THAT THEY SHALL CONFORM TO THE REQUIREMENT OF SECTION 13, ABOVE. NO EASEMENT OF REASONABLE ACCESS FOR SUCH PURPOSES SHALL BE DENIED. UPON THE CITY ENGINEER'S ACCEPTANCE OF DEED FROM DECLARANT SHALL TAKE TITLE SUBJECT TO SUCH EASEMENT FOR SAID PURPOSE OF

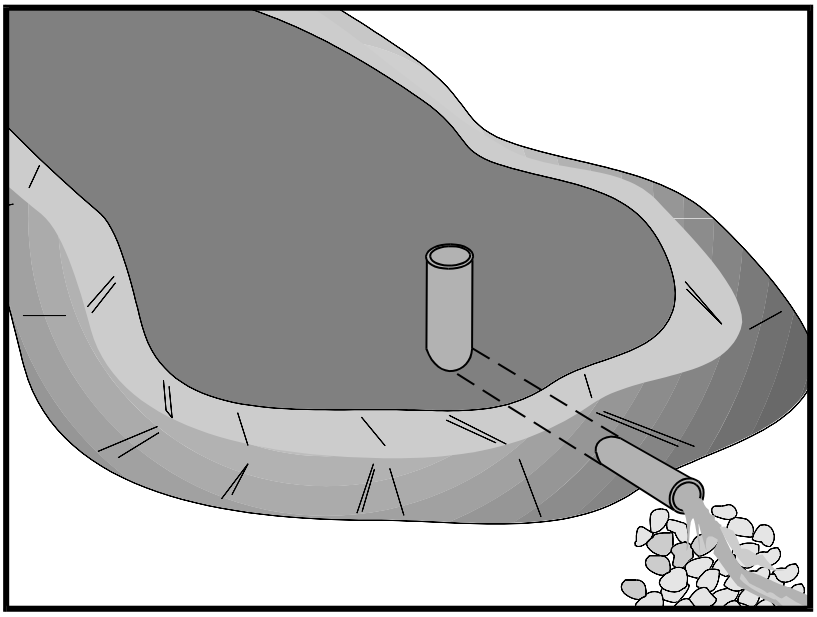
DRAINAGE EASEMENT

PUBLIC UTILITIES EASEMENT

EXECUTIVE SUMMARY EXHIBIT NO. 3

GRAPHIC SCALE: 1"=400'

Sediment Basin SE-2



Description and Purpose

A sediment basin is a temporary basin formed by excavation or by constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is released.

Sediment basin design guidance presented in this fact sheet is intended to provide options, methods, and techniques to optimize temporary sediment basin performance and basin sediment removal. Basin design guidance provided in this fact sheet is not intended to guarantee basin effluent compliance with numeric discharge limits (numeric action levels or numeric effluent limits for turbidity). Compliance with discharge limits requires a thoughtful approach to comprehensive BMP planning, implementation, and maintenance. Therefore, optimally designed and maintained sediment basins should be used in conjunction with a comprehensive system of BMPs that includes:

- Diverting runoff from undisturbed areas away from the basin
- Erosion control practices to minimize disturbed areas on-site and to provide temporary stabilization and interim sediment controls (e.g., stockpile perimeter control, check dams, perimeter controls around individual lots) to reduce the basin's influent sediment concentration.

At some sites, sediment basin design enhancements may be required to adequately remove sediment. Traditional

Categories

EC	Erosion Control	
SE	Sediment Control	☑
TC	Tracking Control	
WE	Wind Erosion Control	
NS	Non-Stormwater Management Control	
WM	Waste Management and Materials Pollution Control	

Legend:

☑ **Primary Category**

☒ **Secondary Category**

Targeted Constituents

Sediment	☑
Nutrients	
Trash	☑
Metals	
Bacteria	
Oil and Grease	
Organics	

Potential Alternatives

SE-3 Sediment Trap (for smaller areas)

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(a.k.a. "physical") enhancements such as alternative outlet configurations or flow deflection baffles increase detention time and other techniques such as outlet skimmers preferentially drain flows with lower sediment concentrations. These "physical" enhancement techniques are described in this fact sheet. To further enhance sediment removal particularly at sites with fine soils or turbidity sensitive receiving waters, some projects may need to consider implementing Active Treatment Systems (ATS) whereby coagulants and flocculants are used to enhance settling and removal of suspended sediments. Guidance on implementing ATS is provided in SE-11.

Suitable Applications

Sediment basins may be suitable for use on larger projects with sufficient space for constructing the basin. Sediment basins should be considered for use:

- Where sediment-laden water may enter the drainage system or watercourses
- On construction projects with disturbed areas during the rainy season
- At the outlet of disturbed watersheds between 5 acres and 75 acres and evaluated on a site by site basis
- Where post construction detention basins are required
- In association with dikes, temporary channels, and pipes used to convey runoff from disturbed areas

Limitations

Sediment basins must be installed only within the property limits and where failure of the structure will not result in loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities. In addition, sediment basins are attractive to children and can be very dangerous. Local ordinances regarding health and safety must be adhered to. If fencing of the basin is required, the type of fence and its location should be shown in the SWPPP and in the construction specifications.

- As a general guideline, sediment basins are suitable for drainage areas of 5 acres or more, but not appropriate for drainage areas greater than 75 acres. However, the tributary area should be evaluated on a site by site basis.
- Sediment basins may become an "attractive nuisance" and care must be taken to adhere to all safety practices. If safety is a concern, basin may require protective fencing.
- Sediment basins designed according to this fact sheet are only effective in removing sediment down to about the silt size fraction. Sediment-laden runoff with smaller size fractions (fine silt and clay) may not be adequately treated unless chemical (or other appropriate method) treatment is used in addition to the sediment basin.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft or more must obtain approval from California Department of Water Resources Division of Safety of Dams (http://www.water.ca.gov/damsafety/).

- Water that stands in sediment basins longer than 96 hours may become a source of mosquitoes (and midges), particularly along perimeter edges, in shallow zones, in scour or below-grade pools, around inlet pipes, along low-flow channels, and among protected habitats created by emergent or floating vegetation (e.g. cattails, water hyacinth), algal mats, riprap, etc.
- Basins require large surface areas to permit settling of sediment. Size may be limited by the available area.

Implementation

General

A sediment basin is a controlled stormwater release structure formed by excavation or by construction of an embankment of compacted soil across a drainage way, or other suitable location. It is intended to trap sediment before it leaves the construction site. The basin is a temporary measure expected to be used during active construction in most cases and is to be maintained until the site area is permanently protected against erosion or a permanent detention basin is constructed.

Sediment basins are suitable for nearly all types of construction projects. Whenever possible, construct the sediment basins before clearing and grading work begins. Basins should be located at the stormwater outlet from the site but not in any natural or undisturbed stream. A typical application would include temporary dikes, pipes, and/or channels to convey runoff to the basin inlet.

Many development projects in California are required by local ordinances to provide a stormwater detention basin for post-construction flood control, desilting, or stormwater pollution control. A temporary sediment basin may be constructed by rough grading the post-construction control basins early in the project.

Sediment basins if properly designed and maintained can trap a significant amount of the sediment that flows into them. However, traditional basins do not remove all inflowing sediment. Therefore, they should be used in conjunction with erosion control practices such as temporary seeding, mulching, diversion dikes, etc., to reduce the amount of sediment flowing into the basin.

Planning

To improve the effectiveness of the basin, it should be located to intercept runoff from the largest possible amount of disturbed area. Locations best suited for a sediment basin are generally in lower elevation areas of the site (or basin tributary area) where site drainage would not require significant diversion or other means to direct water to the basin but outside jurisdictional waterways. However, as necessary, drainage into the basin can be improved by the use of earth dikes and drainage swales (see BMP EC-9). . The basin should not be located where its failure would result in the loss of life or interruption of the use or service of public utilities or roads.

Construct before clearing and grading work begins when feasible.

- Do not locate the basin in a jurisdictional stream.

- Basin sites should be located where failure of the structure will not cause loss of life, damage to homes or buildings, or interruption of use or service of public roads or utilities.
- Basins with a height of 25 ft or more or an impounding capacity of 50 ac-ft must obtain approval from the Division of Dam Safety. Local dam safety requirements may be more stringent.
- Limit the contributing area to the sediment basin to only the runoff from the disturbed soil areas. Use temporary concentrated flow conveyance controls to divert runoff from undisturbed areas away from the sediment basin.
- The basin should be located: (1) by excavating a suitable area or where a low embankment can be constructed across a swale, (2) where post-construction (permanent) detention basins will be constructed, and (3) where the basins can be maintained on a year-round basis to provide access for maintenance, including sediment removal and sediment stockpiling in a protected area, and to maintain the basin to provide the required capacity.

Design

When designing a sediment basin, designers should evaluate the site constraints that could affect the efficiency of the BMP. Some of these constraints include: the relationship between basin capacity, anticipated sediment load, and freeboard, available footprint for the basin, maintenance frequency and access, and hydraulic capacity and efficiency of the temporary outlet infrastructure. Sediment basins should be designed to maximize sediment removal and to consider sediment load retained by the basin as it affects basin performance.

Three Basin Design Options (Part A) are presented below along with a Typical Sediment/Detention Basin Design Methodology (Part B). Regardless of the design option that is selected, designers also need to evaluate the sediment basin capacity with respect to sediment accumulation (See "*Step 3. Evaluate the Capacity of the Sediment Basin") and* should incorporate approaches identified in "*Step 4. Other Design Considerations*" to enhance basin performance.

A) Basin Design Options:

Option 1:

Design sediment basin(s) using the standard equation:

$$A_s = \frac{1.2Q}{V_s} \qquad \text{(Eq. 1)}$$

Where:

A_s = Minimum surface area for trapping soil particles of a certain size

V_s = Settling velocity of the design particle size chosen (V_s = 0.00028 ft/s for a design particle size of 0.01 mm at 68°F)

1.2 = Factor of safety recommended by USEPA to account for the reduction in basin efficiency caused due to turbulence and other non ideal conditions.

$Q = CIA$ (Eq.2)

Where

Q = Peak basin influent flow rate measured in cubic feet per second (ft^3/s)

C = Runoff coefficient (unitless)

I = Peak rainfall intensity for the 10-year, 6-hour rain event (in/hr)

A = Area draining into the sediment basin in acres

The design particle size should be the smallest soil grain size determined by wet sieve analysis, or the fine silt sized (0.01 mm [or 0.0004 in.]) particle, and the Vs used should be 100 percent of the calculated settling velocity.

This sizing basin method is dependent on the outlet structure design or the total basin length with an appropriate outlet. If the designer chooses to utilize the outlet structure to control the flow duration in the basin, the basin length (distance between the inlet and the outlet) should be a minimum of twice the basin width; the depth should not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency (2 ft of sediment storage, 2 ft of capacity). If the designer chooses to utilize the basin length (with appropriate basin outlet) to control the flow duration in the basin, the basin length (distance between the inlet and the outlet) should be a specifically designed to capture 100% of the design particle size; the depth should not be less than 3 ft nor greater than 5 ft for safety reasons and for maximum efficiency (2 ft of sediment storage, 2 ft of capacity).

Basin design guidance provided herein assumes standard water properties (e.g., estimated average water temperature, kinematic viscosity, etc.) as a basis of the design. Designers can use an alternative design (Option 3) with site specific water properties as long as the design is as protective as Option 1.

The design guidance uses the peak influent flow rate to size sediment basins. Designers can use an alternative design (Option 3) with site specific average flow rates as long as the design is as protective as Option 1.

The basin should be located on the site where it can be maintained on a year-round basis and should be maintained on a schedule to retain the 2 ft of capacity.

Option 2:

Design pursuant to local ordinance for sediment basin design and maintenance, provided that the design efficiency is as protective or more protective of water quality than Option 1.

Option 3:

The use of an equivalent surface area design or equation provided that the design efficiency is as protective or more protective of water quality than Option 1.

B) Typical Sediment/Detention Basin Design Methodology:

Design of a sediment basin requires the designer to have an understanding of the site constraints, knowledge of the local soil (e.g., particle size distribution of potentially contributing soils), drainage area of the basin, and local hydrology. Designers should not assume that a sediment basin for location A is applicable to location B. Therefore, designers can use this factsheet as guidance but will need to apply professional judgment and knowledge of the site to design an effective and efficient sediment basin. The following provides a general overview of typical design methodologies:

Step 1. Hydrologic Design

- Evaluate the site constraints and assess the drainage area for the sediment basin. Designers should consider on- and off-site flows as well as changes in the drainage area associated with site construction/disturbance. To minimize additional construction during the course of the project, the designer should consider identifying the maximum drainage area when calculating the basin dimensions.

- If a local hydrology manual is not available, it is recommended to follow standard rational method procedures to estimate the flow rate. The references section of this factsheet provides a reference to standard hydrology textbooks that can provide standard methodologies. If local rainfall depths are not available, values can be obtained from standard precipitation frequency maps from NOAA (downloaded from http://www.wrcc.dri.edu/pcpnfreq.html).

Step 2. Hydraulic Design

- Calculate the surface area required for the sediment basin using Equation 1. In which the flow rate is estimated for a 10-yr 6-hr event using rational method procedure listed in local hydrology manual and Vs is estimated using Stokes Law presented in Equation 3.

$$V_s = 2.81d^2 \qquad \text{(Eq.3)}$$

Where

V_s = Settling velocity in feet per second at 68˚F

d = diameter of sediment particle in millimeters (smallest soil grain size determined by wet sieve analysis or fine silt (0.01 mm [or 0.0004 in.])

- In general, the basin outlet design requires an iterative trial and error approach that considered the maximum water surface elevation, the elevation versus volume (stage-storage) relationship, the elevation verses basin outflow (a.k.a.-discharge) relationship, and the estimated inflow hydrograph. To adequately design the basins to settle sediment, the outlet configuration and associated outflow rates can be estimated by numerous methodologies. The following provides some guidance for design the basin outlet:

  - An outlet should have more than one orifice.

  - An outlet design typically utilizes multiple horizontal rows of orifices (approximately 3 or more) with at least 2 orifices per row (see Figures 1 and 2 at the end of this fact sheet).

- Orifices can vary in shape.
- Select the appropriate orifice diameter and number of perforations per row with the objective of minimizing the number of rows while maximizing the detention time.
- The diameter of each orifice is typically a maximum of 3-4 inches and a minimum of 0.25-0.5 inches.
- If a rectangular orifice is used, it is recommended to have minimum height of 0.5 inches and a maximum height of 6 inches.
- Rows are typically spaced at three times the diameter center to center vertically with a minimum distance of approximately 4 inches on center and a maximum distance of 1 foot on center.
- To estimate the outflow rate, each row is calculated separately based on the flow through a single orifice then multiplied by the number of orifices in the row. This step is repeated for each of the rows. Once all of the orifices are estimated, the total outflow rate versus elevation (stage-discharge curve) is developed to evaluate the detention time within the basin.
- Flow through a single orifice can be estimated using an Equation 4:

$$Q = BC' A(2gH)^{0.5} \qquad \text{(Eq.4)}$$

Where
Q = Outflow rate in ft^3/s
C′ = Orifice coefficient (unitless)
A = Area of the orifice (ft^2)
g = acceleration due to gravity (ft^3/s)
H = Head above the orifice (ft)
B = Anticipated Blockage or clogging factor (unitless), It is dependent on anticipated sediment and debris load, trash rack configuration etc, so the value is dependent on design engineer's professional judgment and/or local requirements (B is never greater than 1 and a value of 0.5 is generally used)

- Care must be taken in the selection of orifice coefficient ("C′"); 0.60 is most often recommended and used. However, based on actual tests, Young and Graziano (1989), "Outlet Hydraulics of Extended Detention Facilities for Northern Virginia Planning District Commission", recommends the following:
  - C′ = 0.66 for thin materials; where the thickness is equal to or less than the orifice diameter, or
  - C′ = 0.80 when the material is thicker than the orifice diameter
- If different sizes of orifices are used along the riser then they have to be sized such that not more than 50 percent of the design storm event drains in one-third of the drawdown time (to provide adequate settling time for events smaller than the design storm event)

and the entire volume drains within 96 hours or as regulated by the local vector control agency. If a basin fails to drain within 96 hours, the basin must be pumped dry.

- Because basins are not maintained for infiltration, water loss by infiltration should be disregarded when designing the hydraulic capacity of the outlet structure.

- Floating Outlet Skimmer: The floating skimmer (see Figure 3 at the end of this fact sheet is an alternative outlet configuration (patented) that drains water from upper portion of the water column. This configuration has been used for temporary and permanent basins and can improve basin performance by eliminating bottom orifices which have the potential of discharging solids. Some design considerations for this alternative outlet device includes the addition of a sand filter or perforated under drain at the low point in the basin and near the floating skimmer. These secondary drains allow the basin to fully drain. More detailed guidelines for sizing the skimmer can be downloaded from http://www.fairclothskimmer.com/.

- Hold and Release Valve: An ideal sediment/detention basin would hold all flows to the design storm level for sufficient time to settle solids, and then slowly release the storm water. Implementing a reliable valve system for releasing detention basins is critical to eliminate the potential for flooding in such a system. Some variations of hold and release valves include manual valves, bladder devices or electrically operated valves. When a precipitation event is forecast, the valve would be close for the duration of the storm and appropriate settling time. When the settling duration is met (approximately 24 or 48 hours), the valve would be opened and allow the stormwater to be released at a rate that does not resuspend settled solids and in a non-erosive manner. If this type of system is used the valve should be designed to empty the entire basin within 96 hours or as stipulated by local vector control regulations.

Step 3. Evaluate the Capacity of the Sediment Basin

- Typically, sediment basins do not perform as designed when they are not properly maintained or the sediment yield to the basin is larger than expected. As part of a good sediment basin design, designers should consider maintenance cycles, estimated soil loss and/or sediment yield, and basin sediment storage volume. The two equations below can be used to quantify the amount of soil entering the basin.

- The Revised Universal Soil Loss Equation (RUSLE, Eq.5) can be used to estimate annual soil loss and the Modified Universal Soil Equation (MUSLE, Eq.6) can be used to estimate sediment yield from a single storm event.

$$A = R \times K \times LS \times C \times P \qquad \text{(Eq.5)}$$

$$Y = 95\left(Q \times q_p\right)^{0.56} \times K \times LS \times C \times P \qquad \text{(Eq.6)}$$

Where:

A = annual soil loss, tons/acre-year

R = rainfall erosion index, in 100 ft. Tons/acre.in/hr.

K = soil erodibility factor, tons/acre per unit of R

LS = slope length and steepness factor (unitless)

C = vegetative cover factor (unitless)

P = erosion control practice factor (unitless)

Y = single storm sediment yield in tons

Q = runoff volume in acre-feet

q_p = peak flow in cfs

- Detailed descriptions and methodologies for estimating the soil loss can be obtained from standard hydrology text books (See References section).
- Determination of the appropriate equation should consider construction duration and local environmental factors (soils, hydrology, etc.). For example, if a basin is planned for a project duration of 1 year and the designer specifies one maintenance cycle, RUSLE could be used to estimate the soil loss and thereby the designer could indicate that the sediment storage volume would be half of the soil loss value estimated. As an example, for use of MUSLE, a project may have a short construction duration thereby requiring fewer maintenance cycles and a reduced sediment storage volume. MUSLE would be used to estimate the anticipated soil loss based on a specific storm event to evaluate the sediment storage volume and appropriate maintenance frequency.
- The soil loss estimates are an essential step in the design, and it is essential that the designer provide construction contractors with enough information to understand maintenance frequency and/or depths within the basin that would trigger maintenance. Providing maintenance methods, frequency and specification should be included in design bid documents such as the SWPPP Site Map.
- Once the designer has quantified the amount of soil entering the basin, the depth required for sediment storage can be determined by dividing the estimated sediment loss by the surface area of the basin.

Step 4. Other Design Considerations

- Consider designing the volume of the settling zone for the total storm volume associated with the 2-year event or other appropriate design storms specified by the local agency. This volume can be used as a guide for sizing the basin without iterative routing calculations. The depth of the settling zone can be estimated by dividing the estimated 2-yr storm volume by the surface area of the basin.
- The basin volume consists of two zones:
  - A sediment storage zone at least 1 ft deep.
  - A settling zone at least 2 ft deep.

- The basin depth must be no less than 3 ft (not including freeboard).

- Proper hydraulic design of the outlet is critical to achieving the desired performance of the basin. The outlet should be designed to drain the basin within 24 to 96 hours (also referred to as "drawdown time"). The 24-hour limit is specified to provide adequate settling time; the 96-hour limit is specified to mitigate vector control concerns.

- Confirmation of the basin performance can be evaluated by routing the design storm (10-yr 6-hr, or as directed by local regulations) through the basin based on the basin volume (stage-storage curve) and the outlet design (stage-discharge curve based on the orifice configuration or equivalent outlet design).

- Sediment basins, regardless of size and storage volume, should include features to accommodate overflow or bypass flows that exceed the design storm event.

  - Include an emergency spillway to accommodate flows not carried by the principal spillway. The spillway should consist of an open channel (earthen or vegetated) over undisturbed material (not fill) or constructed of a non-erodible riprap (or equivalent protection) on fill slopes.

  - The spillway control section, which is a level portion of the spillway channel at the highest elevation in the channel, should be a minimum of 20 ft in length.

- Rock, vegetation or appropriate erosion control should be used to protect the basin inlet, outlet, and slopes against erosion.

- The total depth of the sediment basin should include the depth required for sediment storage, depth required for settling zone and freeboard of at least 1 foot or as regulated by local flood control agency for a flood event specified by the local agency.

- The basin alignment should be designed such that the length of the basin is more than twice the width of the basin; the length should be determined by measuring the distance between the inlet and the outlet. If the site topography does not allow for this configuration baffles should be installed so that the ratio is satisfied. If a basin has more than one inflow point, any inflow point that conveys more than 30 percent of the total peak inflow rate has to meet the required length to width ratio.

- An alternative basin sizing method proposed by Fifield (2004) can be consulted to estimate an alternative length to width ratio and basin configuration. These methods can be considered as part of Option 3 which allows for alternative designs that are protective or more protective of water quality.

- Baffles (see Figure 4 at the end of this fact sheet) can be considered at project sites where the existing topography or site constraints limit the length to width ratio. Baffles should be constructed of earthen berms or other structural material within the basin to divert flow in the basin, thus increasing the effective flow length from the basin inlet to the outlet riser. Baffles also reduce the change of short circuiting and allows for settling throughout the basin.

- Baffles are typically constructed from the invert of the basin to the crest of the emergency spillway (i.e., design event flows are meant to flow around the baffles and flows greater than the design event would flow over the baffles to the emergency spillway).
- Use of other materials for construction of basin baffles (such as silt fence) may not be appropriate based on the material specifications and will require frequent maintenance (maintain after every storm event). Maintenance may not be feasible when required due to flooded conditions resulting from frequent (i.e., back to back) storm events. Use of alternative baffle materials should not deviate from the intended purpose of the material, as described by the manufacturer.
- Sediment basins are best used in conjunction with erosion controls.
- Basins with an impounding levee greater than 4.5 ft tall, measured from the lowest point to the impounding area to the highest point of the levee, and basins capable of impounding more than 35,000 ft^3, should be designed by a Registered Civil Engineer. The design should include maintenance requirements, including sediment and vegetation removal, to ensure continuous function of the basin outlet and bypass structures.
- A forebay, constructed upstream of the basin, may be provided to remove debris and larger particles.
- The outflow from the sediment basin should be provided with velocity dissipation devices (see BMP EC-10) to prevent erosion and scouring of the embankment and channel.
- The principal outlet should consist of a corrugated metal, high density polyethylene (HDPE), or reinforced concrete riser pipe with dewatering holes and an anti-vortex device and trash rack attached to the top of the riser, to prevent floating debris from flowing out of the basin or obstructing the system. This principal structure should be designed to accommodate the inflow design storm.
- A rock pile or rock-filled gabions can serve as alternatives to the debris screen, although the designer should be aware of the potential for extra maintenance involved should the pore spaces in the rock pile clog.
- The outlet structure should be placed on a firm, smooth foundation with the base securely anchored with concrete or other means to prevent floatation.
- Attach riser pipe (watertight connection) to a horizontal pipe (barrel). Provide anti-seep collars on the barrel.
- Cleanout level should be clearly marked on the riser pipe.

Installation

- Securely anchor and install an anti-seep collar on the outlet pipe/riser and provide an emergency spillway for passing major floods (see local flood control agency).
- Areas under embankments must be cleared and stripped of vegetation.

- Chain link fencing should be provided around each sediment basin to prevent unauthorized entry to the basin or if safety is a concern.

Costs

The cost of a sediment basin is highly variable and is dependent of the site configuration. To decrease basin construction costs, designers should consider using existing site features such as berms or depressed area to site the sediment basin. Designers should also consider potential savings associated with designing the basin to minimize the number of maintenance cycles and siting the basin in a location where a permanent BMP (e.g., extended detention basin) is required for the project site.

Inspection and Maintenance

- BMPs must be inspected in accordance with General Permit requirements for the associated project type and risk level and as required by local requirements. It is recommended that at a minimum, basins be inspected weekly, prior to forecasted rain events, daily during extended rain events, and after the conclusion of rain events.
- Examine basin banks for seepage and structural soundness.
- Check inlet and outlet structures and spillway for any damage or obstructions. Repair damage and remove obstructions as needed.
- Check inlet and outlet area for erosion and stabilize if required.
- Check fencing for damage and repair as needed.
- Sediment that accumulates in the basin must be periodically removed in order to maintain BMP effectiveness. Sediment should be removed when sediment accumulation reaches one-half the designated sediment storage volume. Sediment removed during maintenance should be managed properly. The sediment should be appropriately evaluated and used or disposed of accordingly. Options include: incorporating sediment into earthwork on the site (only if there is no risk that sediment is contaminated); or off-site export/disposal at an appropriate location (e.g., sediment characterization and disposal to an appropriate landfill).
- Remove standing water from basin within 96 hours after accumulation.
- If the basin does not drain adequately (e.g., due to storms that are more frequent or larger than the design storm or other unforeseen site conditions), dewatering should be conducted in accordance with appropriate dewatering BMPs (see NS-2) and in accordance with local permits as applicable.
- To minimize vector production:
  - Remove accumulation of live and dead floating vegetation in basins during every inspection.
  - Remove excessive emergent and perimeter vegetation as needed or as advised by local or state vector control agencies.

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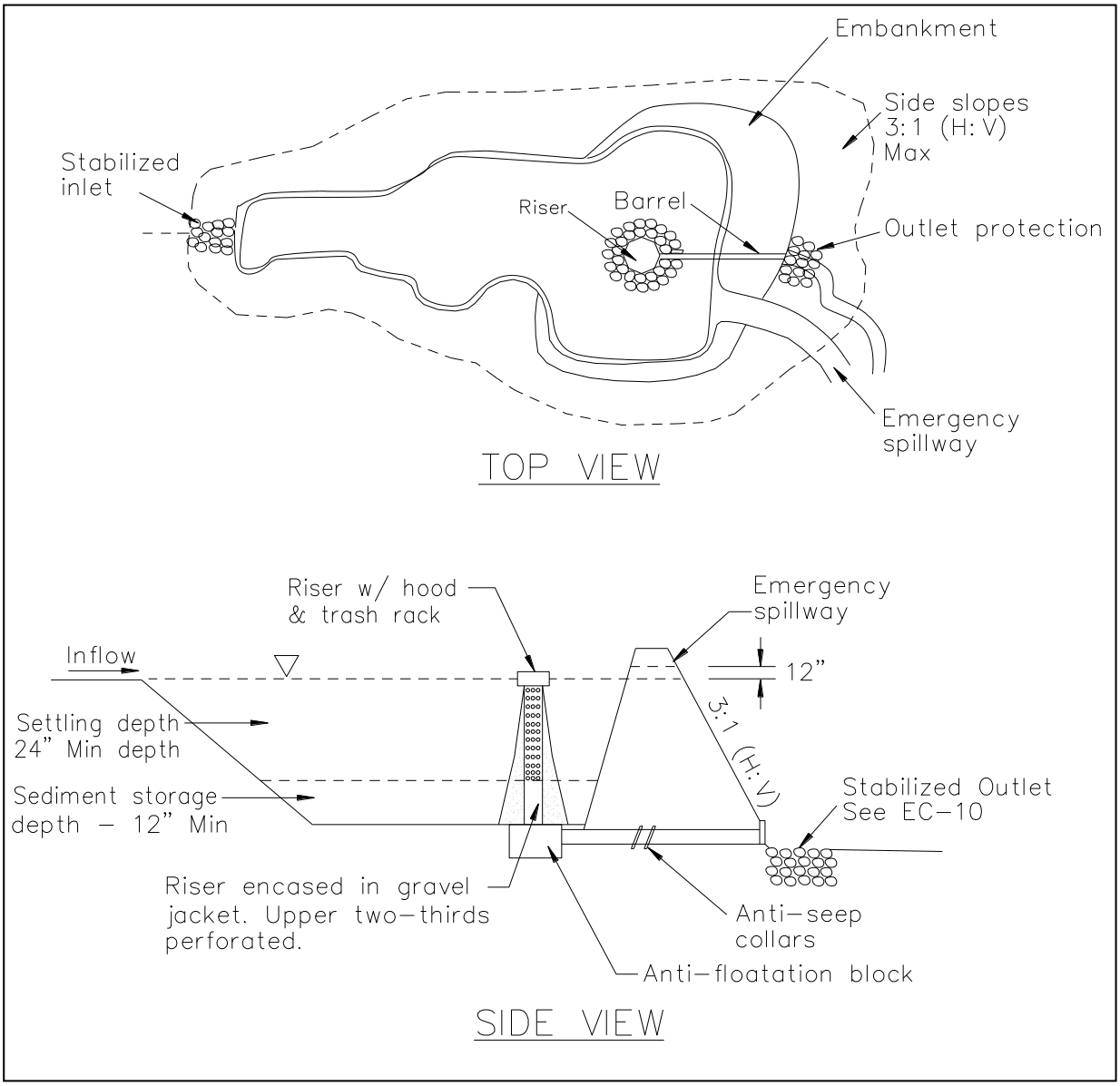


FIGURE 1: TYPICAL TEMPORARY SEDIMENT BASIN
MULTIPLE ORIFICE DESIGN
NOT TO SCALE

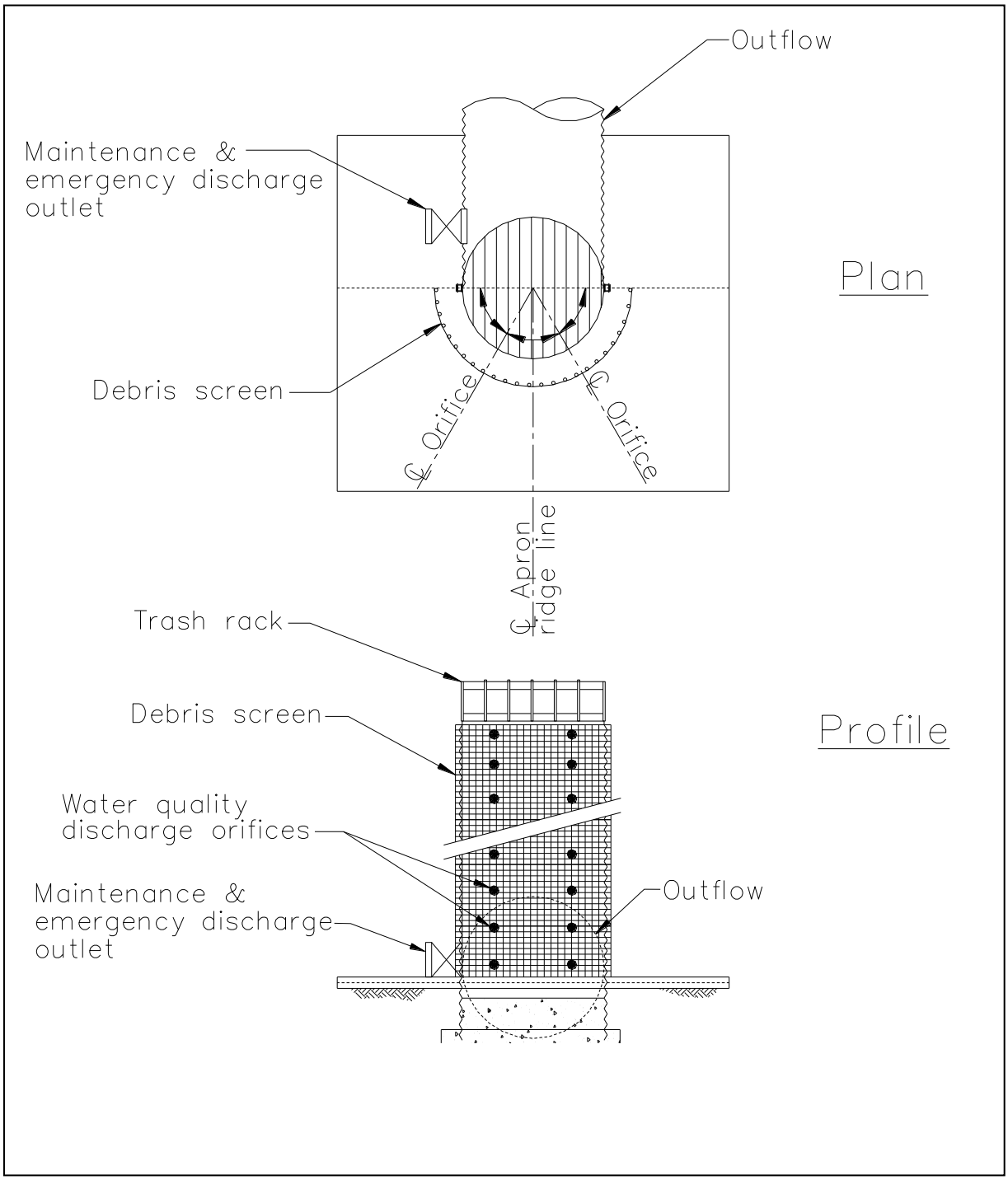


FIGURE 2: MULTIPLE ORIFICE OUTLET RISER

NOT TO SCALE

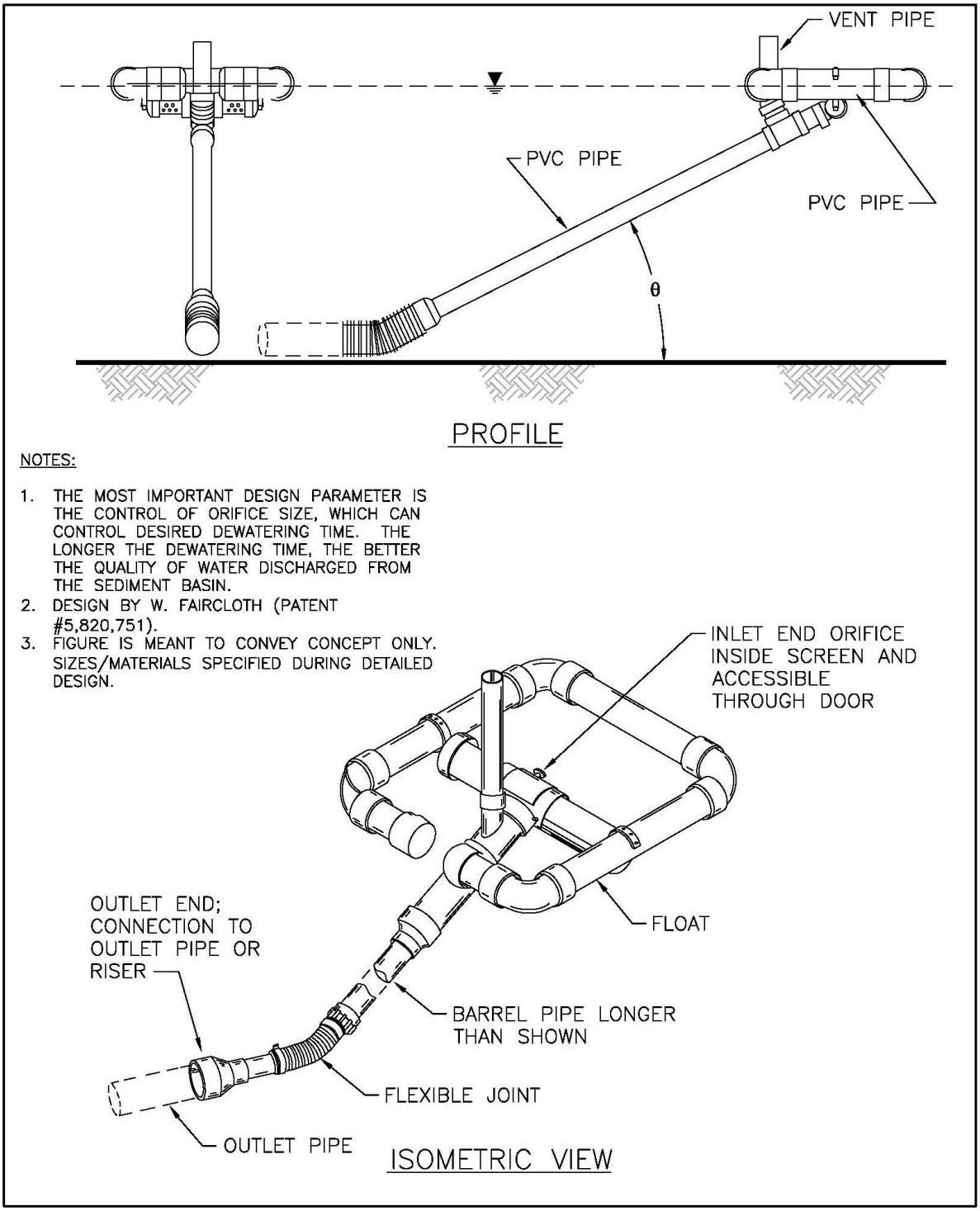


FIGURE 3: TYPICAL SKIMMER
NOT TO SCALE

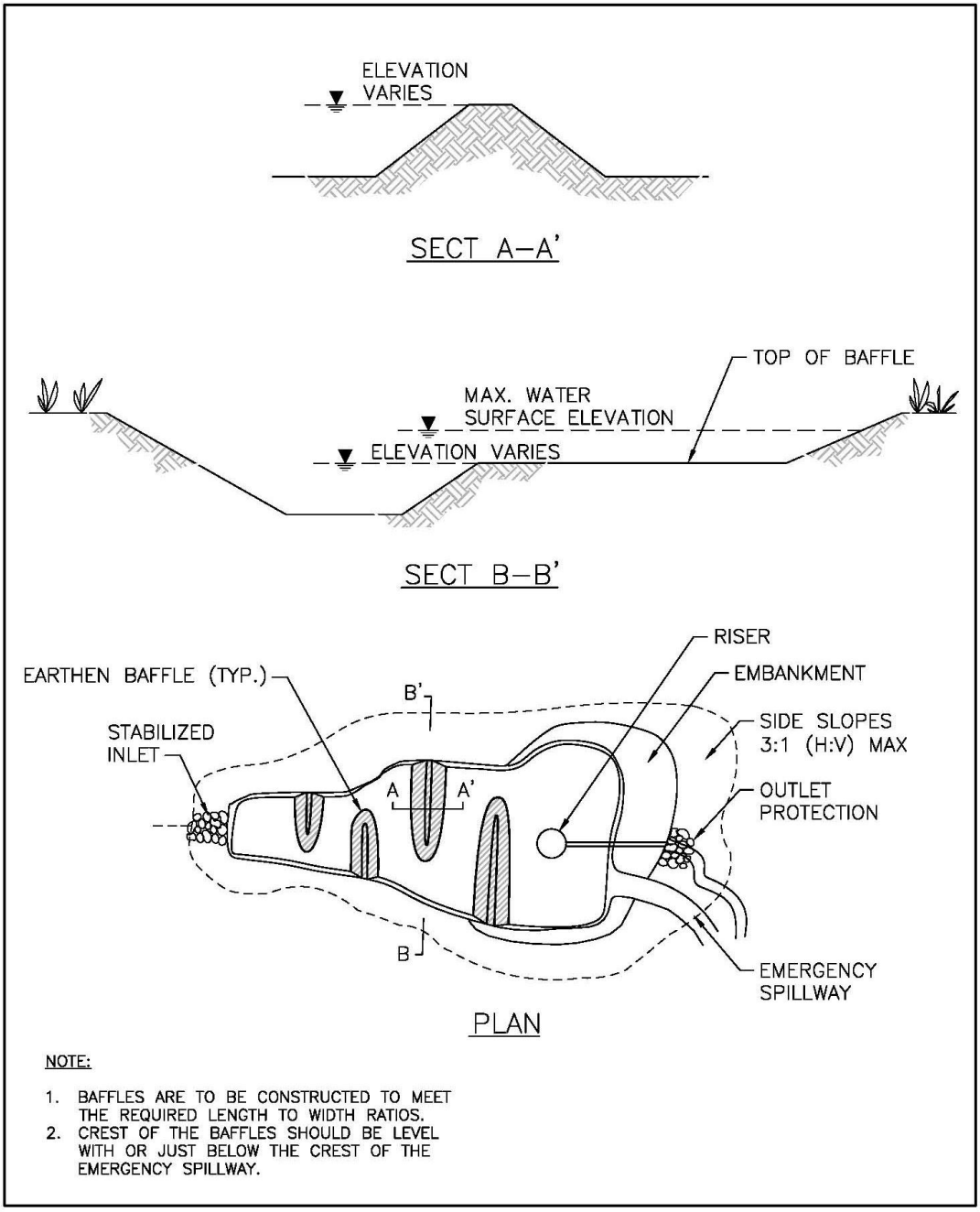
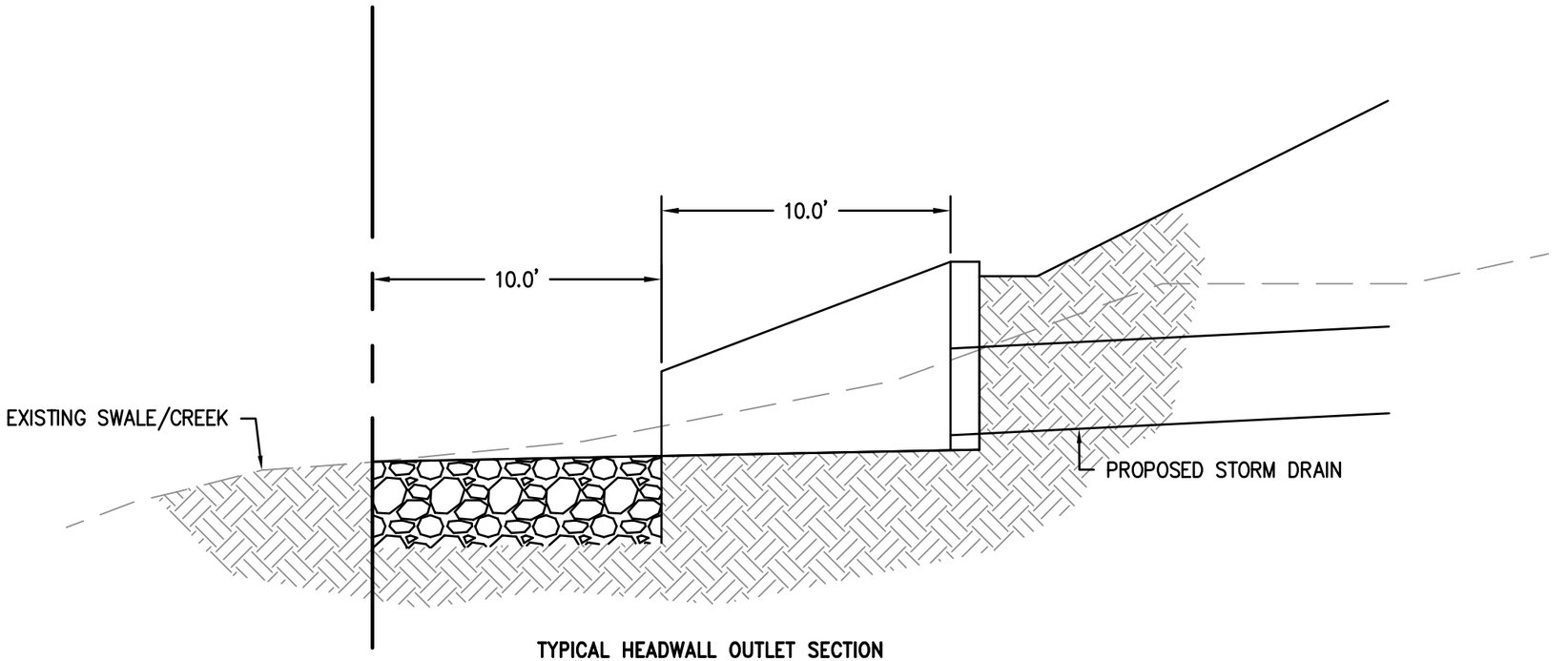
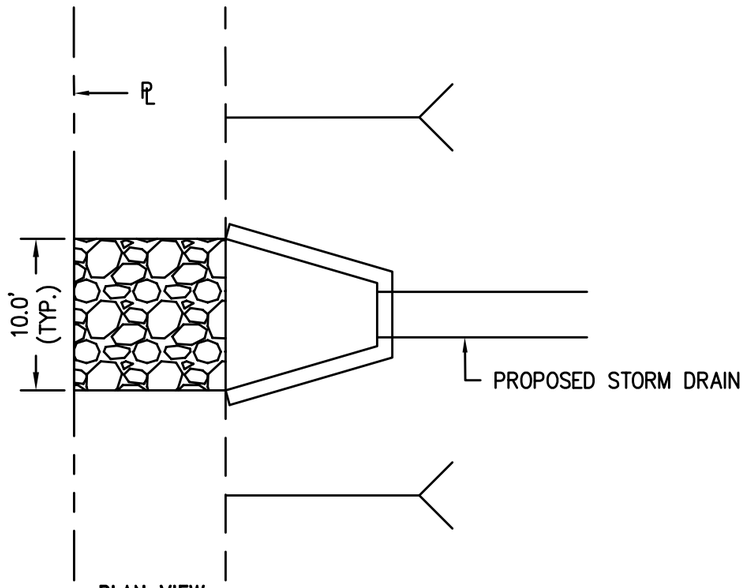


FIGURE 4: TYPICAL TEMPORARY SEDIMENT BASIN WITH BAFFLES

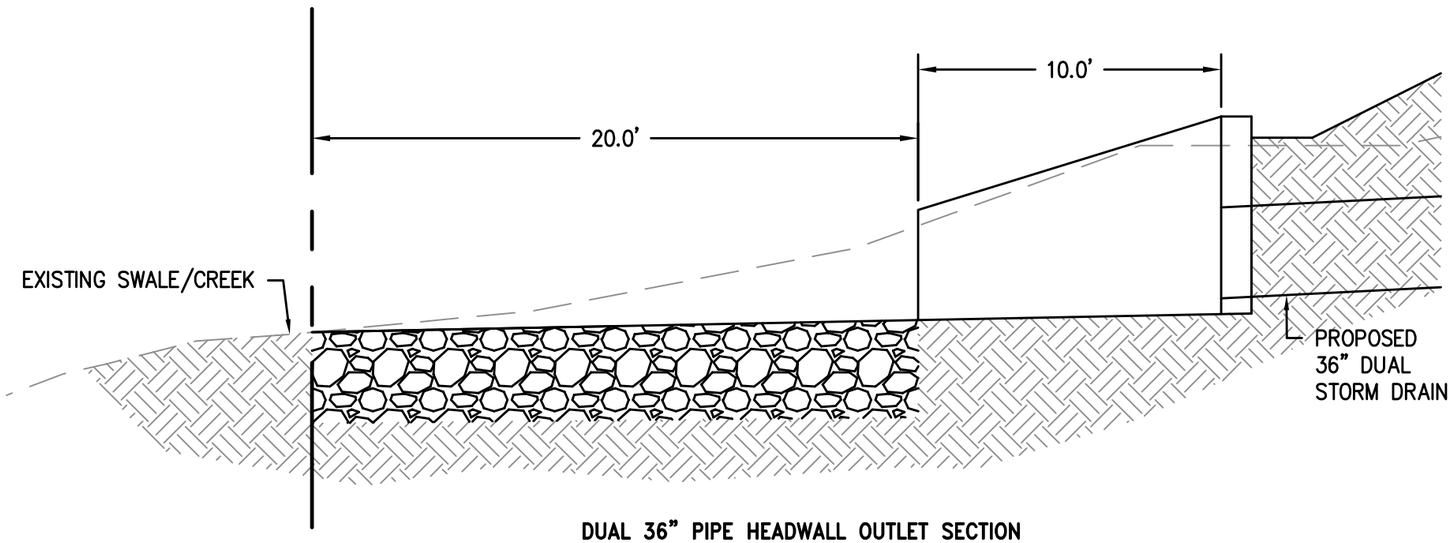
NOT TO SCALE



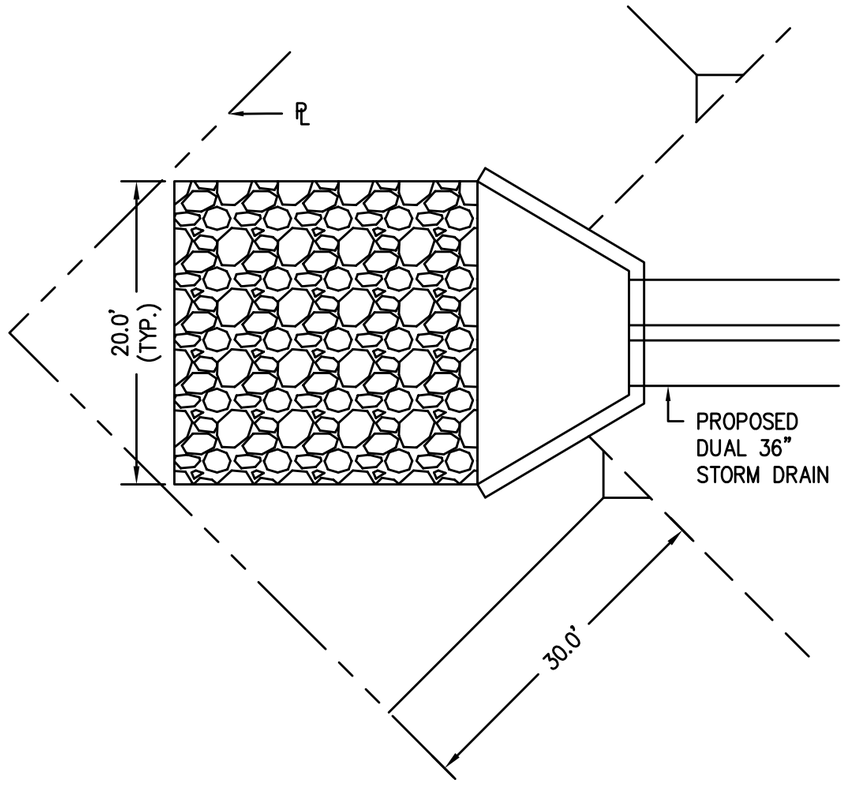
TYPICAL HEADWALL OUTLET SECTION



PLAN VIEW



DUAL 36" PIPE HEADWALL OUTLET SECTION



PLAN VIEW

EXECUTIVE SUMMARY EXHIBIT NO. 1

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

160 South Old Springs Road, Ste. 210
Anaheim Hills, California 92808
Phone: 714-685-6860
Fax: 714-685-6801

Meridian West Campus Upper Plateau EIR April 19, 2023

Response to Comments

Comment
R-Now Letter dated Feb 26, 2023

Response
The proposed project will meet State of California and MJPA construction and post construction requirements for water quality standards.

For the project construction water quality requirements the proposed project will meet the requirements outlined in the California Stormwater Construction General Permit. The construction requirements will include wind erosion control, sediment control and non-visible pollutant control through Best Management Practices (BMPs) as outlined the project Stormwater Pollution Prevention Plan (SWPPP). The development will also obtain a Notice of Intent through the California State Water Resources Control Board for state inspection and inspection by a contracted Qualified SWPPP Practitioner (QSP). See attached draft of the SWPPP.

For the post construction water quality requirements the proposed project will meet the requirements outlined in the Riverside County Water Quality Management Plan (WQMP). The WQMP will be revied by the MJPA and will outline the methods that the project will meet the required design requirements for stormwater quality mitigation. The exact methods of stormwater quality mitigation will be determined on a by development basis which will be based on bio-filtration devices/BMPs. See Preliminary Master WQMP in the environmental impact report.

STORMWATER POLLUTION PREVENTION PLAN

for

Meridian Park – Upper Plateau

RISK LEVEL ***2***

Legally Responsible Person (LRP):

Meridian Park, LLC
1156 N. Mountain Avenue
Upland, CA 91786
(909) 579 -1294

Approved Signatory:

Jeff Gordon
(949) 200 -6733

Prepared for:

Meridian Park, LLC
1156 N. Mountain Avenue
Upland, CA 91786

Project Address:

Portions of Sections 15, 16, 17, & 21
T.3S., R.4W., S.B.M.

SWPPP Prepared by:

DRC Engineering, Inc.
160 South Old Springs Road, Suite 210
Chris McKee QSD # 00959
DRC Job No: 20-750

SWPPP Preparation Date

March 8th, 2023

Estimated Project Dates:

Start of Construction	**February 1, 2024**	Completion of Construction	**February 1, 2027**

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Qualified SWPPP Developer

Approval and Certification of the Stormwater Pollution Prevention Plan

Project Name:	Meridian Park – Upper Plateau
Project Number/ID [if applicable]	20-750

"This Stormwater Pollution Prevention Plan and Attachments were prepared under my direction to meet the requirements of the California Construction General Permit (SWRCB Orders No. 2009-009-DWQ as amended by Order 2010-0014-DWQ and Order 2012-0006-DWQ). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below."

QSD Signature	*Date*
3-8-2023	
Chris McKee	QSD#00959
QSD Name	*QSD Certificate Number*
Qualified SWPPP Developer, DRC Engineering	(714) 685-6860
Title and Affiliation	*Telephone Number*
cmckee@drc-eng.com	
Email	

Legally Responsible Person

Approval and Certification of the Stormwater Pollution Prevention Plan

Project Name: Meridian Park – Upper Plateau

Project Number/ID 20-750

"I certify under penalty of law that this document and all Attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system or those persons directly responsible for gathering the information, to the best of my knowledge and belief, the information submitted is, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations."

Meridian Park, LLC

Legally Responsible Person

Signature of Approved Signatory

Date

Jeff Gordon

Name of Approved Signatory

949-200-6733

Telephone Number

Amendment Log

Project Name: Meridian Park – Upper Plateau

Project Number/ID [if applicable] 20-750

Amendment No.	Date	Brief Description of Amendment, include section and page number	Prepared and Approved By
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#
			Name: QSD#

Section 1 SWPPP Requirements

1.1 INTRODUCTION

Meridian Park – Upper Plateau, comprises approximately 359 acres of largely undeveloped property, of Portions of Sections 15, 16, 17, 21. T.3S., R.4W., S.B.M. in Riverside, California. The property is owned by Meridian Park West, LLC and is being developed by Meridian Park West, LLC. The projects' location is shown on the Vicinity Map in Appendix B.

This Stormwater Pollution Prevention Plan (SWPPP) is designed to comply with California's General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (General Permit) Order No. 2009-0009-DWQ as amended in 2010 and 2012 (NPDES No. CAS000002) issued by the State Water Resources Control Board (State Water Board). This SWPPP has been prepared following the SWPPP Template provided on the California Stormwater Quality Association Stormwater *Best Management Practice Handbook Portal: Construction* (CASQA, 2012). In accordance with the General Permit, Section XIV, this SWPPP is designed to address the following:

- Pollutants and their sources, including sources of sediment associated with construction, construction site erosion and other activities associated with construction activity are controlled;
- Where not otherwise required to be under a Regional Water Quality Control Board (Regional Water Board) permit, all non-stormwater discharges are identified and either eliminated, controlled, or treated;
- Site BMPs are effective and result in the reduction or elimination of pollutants in stormwater discharges and authorized non-stormwater discharges from construction activity to the Best Available Technology/Best Control Technology (BAT/BCT) standard;

1.2 PERMIT REGISTRATION DOCUMENTS

Required Permit Registration Documents (PRDs) shall be submitted to the State Water Board via the Stormwater Multi Application and Report Tracking System (SMARTS) by the Legally Responsible Person (LRP), or authorized personnel (i.e., Approved Signatory) under the direction of the LRP. The project-specific PRDs include:

1. Notice of Intent (NOI);
2. Risk Assessment (Construction Site Sediment and Receiving Water Risk Determination);
3. Site Map;
4. Annual Fee;
5. Signed Certification Statement (LRP Certification is provided electronically with SMARTS PRD submittal); and
6. SWPPP.

Site Maps can be found in Appendix B. A copy of the submitted PRDs shall also be kept in Appendix C along with the Waste Discharge Identification (WDID) confirmation.

1.3 SWPPP AVAILABILITY AND IMPLEMENTATION

The discharger shall make the SWPPP available at the construction site during working hours (see Section 7.5 of CSMP for working hours) while construction is occurring and shall be made available upon request by a State or Municipal inspector. When the original SWPPP is retained by a crewmember in a construction vehicle and is not currently at the construction site, current copies of the BMPs and map/drawing will be left with the field crew and the original SWPPP shall be made available via a request by radio/telephone. (CGP Section XIV.C)

The SWPPP shall be implemented concurrently with the start of ground disturbing activities.

1.4 SWPPP AMENDMENTS

The SWPPP should be revised when:

- If there is a General Permit violation.
- When there is a reduction or increase in total disturbed acreage (General Permit Section II Part C).
- BMPs do not meet the objectives of reducing or eliminating pollutants in stormwater discharges.

Additionally, the SWPPP shall be amended when:

- There is a change in construction or operations which may affect the discharge of pollutants to surface waters, groundwater(s), or a municipal separate storm sewer system (MS4);
- When there is a change in the project duration that changes the project's risk level; or
- When deemed necessary by the QSD. The QSD has determined that the changes listed in Table 1.1 can be field determined by the QSP. All other changes shall be made by the QSD as formal amendments to the SWPPP.

The following items shall be included in each amendment:

- Who requested the amendment;
- The location of proposed change;
- The reason for change;
- The original BMP proposed, if any; and
- The new BMP proposed.

Amendment shall be logged at the front of the SWPPP and certification kept in Appendix D. The SWPPP text shall be revised replaced, and/or hand annotated as necessary to properly convey the amendment. SWPPP amendments must be made by a QSD. The following changes have been designated by the QSD as "to be field determined" and constitute minor changes that the QSP may implement based on field conditions.

Table 1.1 List of Changes to be Field Determined

Candidate changes for field location or determination by QSP(1)	Check changes that can be field located or field determined by QSP
Increase quantity of an Erosion or Sediment Control Measure	✓
Relocate/Add stockpiles or stored materials	✓
Relocate or add toilets	✓
Relocate vehicle storage and/or fueling locations	
Relocate areas for waste storage	✓
Relocate water storage and/or water transfer location	
Changes to access points (entrance/exits)	
Change type of Erosion or Sediment Control Measure	✓
Changes to location of erosion or sediment control	✓
Minor changes to schedule or phases	✓
Changes in construction materials	
(1) Any field changes not identified for field location or field determination by QSP must be approved by QSD	

1.5 RETENTION OF RECORDS

Paper or electronic records of documents required by this SWPPP shall be retained for a minimum of three years from the date generated or date submitted, whichever is later, for the following items:

- The date, place, and time of facility inspections, sampling, visual observations (inspection), and/or measurements, including precipitation
- The individual(s) who performed the facility inspections, sampling, visual observation (inspections), and/or measurement
- The date and approximate time of analyses
- The individual(s) who performed the analyses
- A summary of all analytical results from the last three years, the method detection limits and reporting limits, and the analytical techniques or methods used
- Rain gauge readings from site inspections
- QA/QC records and results
- Non-stormwater discharge inspections and visual observations (inspections) and stormwater discharge visual observation records
- Visual observation and sample collection exemption records.

- The record of any corrective actions and follow-up activities that resulted from analytical results, visual observations (inspections), or inspections.

These records shall be available at the Site until construction is complete. Records assisting in the determination of compliance with the General Permit shall be made available within a reasonable time, to the Regional Water Board, State Water Board or U.S. Environmental Protection Agency (EPA) upon request. Requests by the Regional Water Board for retention of records for a period longer than three years shall be adhered to.

The records will be maintained at the office of Meridian Park, LLC.

Contact: Jeff Gordon

1156 N Mountain Avenue

Error! Reference source not found., **Error! Reference source not found.** 91786

949-200-6733

1.6 REQUIRED NON-COMPLIANCE REPORTING

If a General Permit discharge violation occurs the QSP shall immediately notify the LRP. The LRP shall include information on the violation with the Annual Report. Corrective measures will be implemented immediately following identification of the discharge or written notice of non-compliance from the Regional Water Board. Discharges and corrective actions must be documented and include the following items:

- The date, time, location, nature of operation and type of unauthorized discharge.
- The cause or nature of the notice or order.
- The control measures (BMPs) deployed before the discharge event, or prior to receiving notice or order.
- The date of deployment and type of control measures (BMPs) deployed after the discharge event, or after receiving the notice or order, including additional measures installed or planned to reduce or prevent re-occurrence.
- Self-reporting of any other discharge violations or to comply with RWQCB enforcement actions.
- Discharges which contain a hazardous substance in excess of reportable quantities established in 40 CFR §§ 117.3 and 302.4, unless a separate NPDES Permit has been issued to regulate those discharges.

Reporting requirements for Numeric Action Levels (NALs) exceedances are discussed in Section 7.7.2.7.

1.7 ANNUAL REPORT

The General Permit requires that permittees prepare, certify, and electronically submit an Annual Report no later than September 1st of each year. Reporting requirements are identified in Section

XVI of the General Permit. Annual reports will be filed in SMARTS and in accordance with information required by the on-line forms.

1.8 CHANGES TO PERMIT COVERAGE

The General Permit allows for the reduction or increase of the total acreage covered under the General Permit when: a portion of the project is complete and/or conditions for termination of coverage have been met; when ownership of a portion of the project is purchased by a different entity; or when new acreage is added to the project.

Modified PRDs shall be filed electronically within 30 days of a reduction or increase in total disturbed area if a change in permit covered acreage is to be sought. The SWPPP shall be modified appropriately, shall be logged at the front of the SWPPP and cetrification of SWPPP amendments are to be kept in Appendix D. Updated PRDs submitted electronically via SMARTS can be found in Appendix E.

1.9 NOTICE OF TERMINATION

A Notice of Termination (NOT) must be submitted electronically by the LRP via SMARTS to terminate coverage under the General Permit. The NOT must include a final Site Map and representative photographs of the project site that demonstrate final stabilization has been achieved. The NOT shall be submitted within 90 days of completion of construction. The Regional Water Board will consider a construction site complete when the conditions of the General Permit, Section II.D have been met including the following:

- The site will not pose any additional sediment discharge risk than it did prior to construction activity
- All construction related equipment, materials and any temporary BMPs no longer needed are removed from the site
- Post-construction stormwater management measures are installed and a long-term maintenance plan that is designed for a minimum of five years has been developed
- The NOT must demonstrate through photos, Revised Universal Soil Loss Equation (RUSLE) results, or results of testing and analysis that the project meets all of the requirements of Section II.D.1 of the General Permit by one of the following methods:
    - 70% final cover method (no computational proof required); or
    - RUSLE/RUSLE2 method (computational proof required); or
    - Custom method (discharger demonstrates that site complies with final stabilization)

Section 2 Project Information

2.1 PROJECT AND SITE DESCRIPTION

2.1.1 Site Description

The Meridian Park – Upper Plateau project site comprises approximately 722 acres of largely undeveloped property of Portions of Sections 15, 16, 17, 21. T.3S., R.4W., S.B.M. in Riverside, California. The project site is located d to the south of Alessandro Boulevard, East of Trautwein Road, North of Orange Terrace Parkway and west of Meridian Parkway. The development is located in the March Joint Powers Authority Jurisdictional Area of Riverside County and will connect to Cactus Avenue to the west, Barton Street to the North and South and Brown Street to the north. The subject site is approximately 722 acres of which 370 acres will be disturbed. The site is bounded by residential development to the north, east and south and commercial development to the west. The project is located at latitude 33º 54' 24" N and longitude 117º 18'27" W and is identified on the Site Map in Appendix B.

2.1.2 Existing Conditions

As of the initial date of this SWPPP, the project site is currently composed of mostly undeveloped land with existing paved and unpaved roads, three small existing buildings, a water tank, and several underground concrete bunkers. The existing undeveloped land consists of terrain being made up of undeveloped, hilly land draining to seventeen (17) different watersheds.

2.1.3 Existing Drainage

The existing site drainage has been divided into 17 different watershed areas per the Hydrology Study. The following table describes the drainage patterns of the site's different watersheds, as well as the area and eventual destination of the site's drainage:

Watershed	Acreage	Description	Downstream Destination
1	15.66	Flows to inlet structure east of Cairn Street into 30" storm drain flowing east under Northrop Drive and north on Mission Grove Drive. Stormwater outlets at creek south of White Dove Lane.	Creeks travel northwest towards Alessandro Dam. Overflow continues to flow through a creek northwest to Mary Street Dam. Overflow from Mary Street Dam continues underground and outlets at Santa Ana River.
2	147.94	Flows to inlet structure at the top of Moray Court to a 72" storm drain. Stormwater flows west under Botany Bay Road and outlets south of Alice Springs Place into creek.	
3	21.37	Surface flows to current dead end on Barton Street. No inlet structure, stormwater continues to flow down Barton Street into residential development.	Stormwater continues to flow north in residential development and outlets into Sycamore Canyon Wilderness Park. Creeks combine downstream and flow into Sycamore Dam to the northwest. Overflow
4	4.01	Surface flows to residential development to the north. No drain inlet or pickup location.	
5	14.31	Surface flows to residential development to the north. No drain inlet or pickup location.	

5a	3.57	Surface flows to Vista Grand Drive. No drain inlet or pickup location.	from Sycamore Dam flows northwest to Santa Ana River.
6	3.87	Surface flows to residential development to the north. No drain inlet or pickup location.	
7	38.16	Surface flows to current dead end on Alexander Street. No inlet structure, stormwater continues to flow down Alexander Street into residential development.	Stormwater continues to flow north in residential development and outlets into Sycamore Canyon Wilderness Park. Creeks combine downstream and flow into Sycamore Dam to the northwest. Overflow from Sycamore Dam flows northwest to Santa Ana River.
7a	17.21	Surface flows to residential development to the north. No drain inlet or pickup location.	
18a	1.12	Surface flows to residential development to the north. No drain inlet or pickup location.	
18b	8.60	Surface flows to residential development to the north. No drain inlet or pickup location.	
18c	1.25	Surface flows to residential development to the north. No drain inlet or pickup location.	
8	72.12	Surface flows to inlet structure to a 42" storm drain bypassing an existing development. Outlets and surface flows towards the SW corner of Meridian Parkway and Alessandro Boulevard. Enters storm drain, flows under Meridian Parkway and outlets at North Detention Basin (a part of the 1st phase of Meridian Business Park development).	Overflow from the detention basin flows Northwest through Sycamore Canyon Wilderness Park to Sycamore Dam to the northwest. Overflow from Sycamore Dam flows northwest Santa Ana River.
9	81.47	Surface flows to inlet structure and enters dual 36" storm drain pipes bypassing buildings to the west of Meridian Parkway. Storm drains continue to flow east under Meridian Parkway and into North Detention Basin (a part of the 1st phase of Meridian Business Park development).	
10	31.11	Flows to inlet structure and enters 54" storm drain south of Cactus Avenue. Storm drain continues to flow east under Meridian Parkway and into North Detention Basin (a part of the 1st phase of Meridian Business Park development).	
11	21.12	Flows to inlet structure and enters 30" storm drain that flows east under Authority Way and north under Meridian Parkway. Storm drain continues to flow east and outlets into North Detention Basin (a part of the 1st phase of Meridian Business Park development).	
12	34.26	Flows to inlet structure and through existing residential development to the southeast and outlets to creek flowing to the east. Picked up by inlet structure to a 30" storm drain that flows east under Authority Way and north under Meridian Parkway. Storm drain continues to flow east and outlets into North Detention Basin (a part of the 1st phase of Meridian Business Park development).	
13	11.00	Flows east through existing residential development and outlets near Bakal Drive and Orchard Park	Overflow from Lot E/49 basin crosses under 215 freeway and enters Perris Valley Strom Drain. Further

		Drive. Flows southeast to regional Lot E/49 detention basin.	downstream stormwater passes through Canyon Lake, Lake Elsinore, and the Santa Ana River.
14	92.15	Flows east to inlet structure and enters 48" RCP flowing north under Barton Street. Storm drain turns to the west and outlets to existing creek that is a part of Watershed 17.	Creeks travel northwest towards Alessandro Dam. Overflow continues to flow through a creek northwest to Mary Street Dam. Overflow from Mary Street Dam continues underground and outlets at Santa Ana River.
15	15.74	Flows east to inlet structure and enters 48" RCP flowing north under Barton Street. Storm drain turns to the west and outlets to existing creek that is a part of Watershed 17.	
16	77.66	Flows to inlet structure and enters 57" storm drain through residential development flowing west and outlets to existing creek flowing Northwest.	
17	14.93	Surface flows to creek flowing northwest (see watersheds 14 & 15).	

The Hydrology Site Map showing the 17 different watershed areas designated by the Hydrology Study has been included in Appendix B.

The project discharges to watershed associated with the Santa Ana River that are listed for water quality impairment on the most recent 303(d)-list for:

- Alachlor
- Aldrin
- Aluminum
- Anthracene
- Arsenic
- Atrazine
- Azinphos-Methyl (Guthion)
- Benthic Community Effects
- Benzo(a)anthacrene
- Benzo(a)pyrene
- Bifenthrin
- Cadmium
- Carbaryl
- Carbofuran
- Chlordane
- Chlordane
- Chloride

- Chlorpyrifos
- Chlorpyrifos
- Chromium
- Chromium, hexavalent
- Chrysene
- Cobalt
- COD (Chemical Oxygen Demand)
- Copper
- Cyalothrin, Lambda
- Cyfluthrin
- Cypermethrin
- DDD (Dichlorodiphenyldichloroethane)
- DDE (Dichlorodiphenyldichloroethylene)
- DDT (Dichlorodiphenyltrichloroethane)
- DDT (Dichlorodiphenyltrichloroethane)
- Deltamethrin
- Diazinon
- Dieldrin
- Dieldrin
- Dieldrin
- Disulfoton
- Endosulfan
- Endrin
- Endrin
- Esfenvalerate/Fenvalerate
- Fenpropathrin
- Fish Kills
- Fluoranthene
- Fluorene
- Heptachlor
- Heptachlor Epoxide

- Hexachlorobenzene (HCB)
- Indicator Bacteria
- Iron
- Lead
- Lindane/gamma Hexachlorocyclohexane (gamma-HCH)
- Malathion
- Mercury
- Mercury
- Methyl Parathion
- Methyl Parathion
- Mirex
- Molinate
- Naphthalene
- Nickel
- Nitrogen, Nitrate
- Nitrogen, Nitrite
- Nutrients
- Organic Enrichment/Low Dissolved Oxygen
- PAHs (Polycyclic Aromatic Hydrocarbons)
- PCBs (Polychlorinated biphenyls)
- PCBs (Polychlorinated biphenyls)
- Permethrin, total
- pH
- Phenanthrene
- Pyrene
- Salinity/TDS/Chlorides
- Sedimentation/Siltation
- Selenium
- Selenium
- Silver
- Simazine

- Sodium
- Sulfates
- Temperature, water
- Thiobencarb/Bolero
- Total Dissolved Solids
- Total Nitrogen as N
- Toxicity
- Toxicity
- Zinc

2.1.4 Geology and Groundwater

Per geotechnical report prepared by Leighton Consulting, Inc. dated September 24, 2021:
Field exploration, observations, and review of the pertinent literature indicate that materials on the site include the following units: top soil/residual soil, and granitic Val Verde Tonalite (Kvt). For the engineering purposes of this report, we have grouped the upper near surface soil materials into one unit, Topsoil/Residual Soil. These units are discussed in the following sections in order of increasing age.

- Undocumented Artificial Fill (not a mapped unit): Although not encountered in our subsurface exploration, undocumented fill should be expected as roadway embankments, previous utility trench backfill and fill associated with the various onsite structures. Fill soils are expected to have been generated from site excavations.
- Residual soil/Topsoil (not a mapped unit): Residual soil materials are expected to mantle the majority of the site. The residual soil generally consists of a thin surface layer up to 5 feet in depth in some areas. Encountered materials appear to be generally porous and relatively loose and have a low expansion potential. These materials are generally comprised of light to grayish brown silty sand (SM) and clayey sand (SC).
- Colluvium (Qcol): Colluvium was encountered in the gently sloping central portion of the site and generally extends to approximate depths of 3 to 9 feet BGS. Encountered materials generally consist of silty to clayey sand (SM/SC) and appear to be relatively porous and expected to have very low to low expansion potential (EI<51)
- Alluvium (Qal): Recent alluvial deposits are expected to exist within drainages or low-laying areas of the site. Where encountered, the alluvium generally extends to a depth of 6 feet BGS. Encountered materials generally consist of clayey sand to sandy clay (SC/CL) and appear to be relatively porous and expected to have very low to low expansion potential (EI<51)
- Val Verde Tonalite (Kvt): The Val Verde Tonalite (Cretaceous granite) was encountered near the surface across the majority of the site with the exception of TP-44. In TP-44, the Tonalite was encountered at an approximate depth of 9 feet BGS. As observed during the field exploration, the condition of the near-surface bedrock varies from that of completely disintegrated rock that has become a dense soil-like deposit to that of moderately to

highly weathered rock. Where encountered, the bedrock is generally massive and can be expected to ,range from readily rippable to non-rippable depending on the degree of weathering. The less weathered granitic rock is anticipated to generate sand, gravel, cobbles, and possibly oversize boulders. The more weathered bedrock produced fine to coarse sand with silt and gravel size rock fragments. The weathered bedrock is expected to be generally suitable for re-use as compacted fill. It should be anticipated that deep cuts will generate boulders or core stones (greater than 12 inches) that will require special placement described later in Section 5.2 of this report.

Groundwater was only encountered in one boring (B-6) during this exploration at an approximate depth of 48 feet below the existing ground surface. Groundwater was also encountered during previous grading of the western terminus of Cactus Avenues for Meridian Park West. The groundwater encountered within the Tonalite bedrock is associated with a joint/fracture system If encountered during grading and/or utility installation; this condition would likely be associated with localized seepages along existing joints and fractures. Groundwater may be encountered during grading and canyon subdrains are recommended in the canyon fill areas to mitigate water accumulation at the transition between native bedrock and engineered fill. In addition, groundwater seepage may appear in cut slopes exposing joints and fractures or earth materials of contrasting permeabilities. Mitigation of possible seepage within building pads or cut-slope areas can be provided on an individual basis after evaluation by the geotechnical consultant during grading operations. Surface water was not observed onsite during our field reconnaissance.

2.1.5 Project Description

The proposed development will consist of the construction of public streets, utilities, associated landscaping areas, mass graded pads, a storm drain system, desilting basins, headwall outlets and culvert drainage crossings. The Upper Plateau Development will have approximately 78 acres of Business Park, 139 acres of Industrial use, 39 acres of mixed use and 62 acres of park.

Approximately 370 acres of the site is proposed to be disturbed as part of this development including offsite roadways and future construction onsite. This accounts for nearly 51% of the 722-acre site. The limits of grading are shown on the SWPPP Site Map in Appendix B.

Grading will include both cut and fill activities (4,830,052 cubic yards of cut and 4,721,883 cubic yards of fill) The net total, approximately 108,168 cubic yards of cut material, will be exported during grading activities. Graded materials are expected to be hauled away. Soil will be stockpiled as shown on SWPPP Site Map in Appendix B.

2.1.6 Developed Condition

The proposed condition was designed to balance the watersheds as close to existing as possible. The public storm drain design along with conceptual grading for the project was used as a tool to reach this standard. Therefore, the development was once again broken up into 17 distinct watersheds each sharing the same outlets as existing. The following table summarizes both the existing and proposed areas of each watershed.

Area Summaries			
Watershed	**Existing (Acres)**	**Proposed (Acres)**	**Percent Change**
1 (undisturbed)	15.66	15.66	0.00%
2	147.94	148.88	+0.6%
3	21.37	21.26	-0.51%
4	4.01	3.09	-22.9%
5	14.31	15.00	+4.8%
5a	3.57	2.53	-29.1%
6	3.87	2.95	-23.8%
7	38.16	50.17	+31.5%
7a	17.21	6.11	-64.5%
8	72.12	75.06	+4.1%
9	81.47	83.11	+2.0%
10	31.11	31.11	0.0%
11 (undisturbed)	21.12	21.12	0.0%
12 (undisturbed)	34.26	34.26	0.0%
13 (undisturbed)	11.00	11.00	0.0%
14	92.15	87.88	-4.6%
15 (undisturbed)	15.74	15.74	0.0%
16	77.66	80.43	+3.6%
17 (undisturbed)	14.93	14.93	0.0%
18a (undisturbed)	1.12	1.12	0.0%
18b	8.60	5.99	-30.3%
18c (undisturbed)	1.25	1.25	0.0%

The boundaries of the proposed watershed areas are shown in the proposed Hydrology Site Map in Appendix B. These updates were designed to balance the watershed areas as close to existing as possible and not increase flows to outlet points. Watersheds 1, 11, 12, 13, 15, and 17 will remain as is undisturbed.

Runoff from proposed roadways will flow to detention tanks located within the landscape easements adjacent to the right of way. The detention tanks are sized to hold the respective 100 year 24-hour storm and 2 year 24 hour storm volumes needed to limit outflow to existing conditions and release them over 48 hours through Modular Wetland biofiltration units before

flowing into the storm drain mainlines under the streets. All parcels within the Upper Plateau project area will be required to detain storm volumes enough to maintain existing peak flow conditions for the 100 year 24 hour and 2 year 24 hour storm before flowing to the public storm drain.

Typical proposed headwalls within the project will outlet 10' from the proposed property line and feature rip rap to act as energy dissipation before stormwater enters existing flow patterns such as creeks. A proposed dual 36" storm drain near the northwest of the site will feature 20' of rip rap from the property line as the flows will be larger compared to the other headwalls. No grading will be done outside of the limits of the property lines.

Only one watershed (denoted in the Hydrology Site Map in Appendix B as Watershed 14) will feature runoff from undeveloped areas flowing onto the proposed parcels. A concrete gutter to the southeast of the parcels is proposed to capture this water and outlet it to the south into the existing creek flowing to the west.

Post construction drainage patterns and conveyance systems are presented on Proposed Hydrology Map in Appendix B.

Table 2.1 Construction Site Estimates

Construction site area	728	acres
Percent impervious before construction	0	%
Runoff coefficient before construction	0.86	
Percent impervious after construction	90	%
Runoff coefficient after construction	0.85	

2.2 PERMITS AND GOVERNING DOCUMENTS

In addition to the General Permit, the following documents have been taken into account while preparing this SWPPP:

- Regional Water Board requirements
- Basin Plan requirements
- Contract Documents
- Air Quality Regulations and Permits
- Federal Endangered Species Act
- National Historic Preservation Act/Requirements of the State Historic Preservation Office
- State of California Endangered Species Act

- Clean Water Act Section 401 Water Quality Certifications and 404 Permits
- CA Department of Fish and Game 1600 Streambed Alteration Agreement

2.3 STORMWATER RUN-ON FROM OFFSITE AREAS

There is no run-on to the site from off-site areas as the project site is centered at the top of a hilly grade.

2.4 FINDINGS OF THE CONSTRUCTION SITE SEDIMENT AND RECEIVING WATER RISK DETERMINATION

A construction site risk assessment has been performed for the project and the resultant risk level is Risk Level **Error! Reference source not found.**.

The risk level was determined through the use of the following:

A=R*K*LS*C*P

A=Estimated soil loss in tons/acre

R=Rainfall-runoff Erosivity factor

K=Soil erodibility factor

LS=Length-slope factor

C=Cover factor practices (Assumed to in this application to be 1.0 to simulate bare ground controls)

P=Management operations and support practices (Assumed to in this application to be 1.0 to simulate bare ground controls)

The risk level is based on project duration, location, proximity to impaired receiving waters and soil conditions. A copy of the Risk Level determination submitted on SMARTS with the PRDs is included in Appendix C.

Table 2.2 and Table 2.3 summarize the sediment and receiving water risk factors and document the sources of information used to derive the factors.

Table 2.2 Summary of Sediment Risk

RUSLE Factor	**Value**	**Method for establishing value**
R	106.65	EPA Website https://lew.epa.gov/
K	0.20	SMARTS online calculator
LS	2.29	Calculated using average watershed slope and sheet flow length
Total Predicted Sediment Loss (tons/acre)		**48.8457**
Overall Sediment Risk Low Sediment Risk < 15 tons/ acre- Medium Sediment Risk >= 15 and < 75 tons/acre High Sediment Risk >= 75 tons/acre		☐ **Low** ☒ **Medium** ☐ **High**

Runoff from the project site discharges into public storm drain systems that discharge Canyon Lake, Lake Elsinore, and the San Diego River and eventually into Pacific Ocean.

Table 2.3 Summary of Receiving Water Risk

Receiving Water Name	**303(d) Listed for Sediment Related Pollutant (1)**	**TMDL for Sediment Related Pollutant (1)**	**Beneficial Uses of COLD, SPAWN, and MIGRATORY (1)**
Santa Ana River, Reach 3	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Perris Valley Storm Drain	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Canyon Lake	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Lake Elsinore	☐ Yes ☒ No	☐ Yes ☒ No	☐ Yes ☒ No
Overall Receiving Water Risk			☒ **Low** ☐ **High**
(1) If yes is selected for any option the Receiving Water Risk is High			

Risk Level 2 sites are subject to both the narrative effluent limitations and numeric effluent standards. The narrative effluent limitations require stormwater discharges associated with construction activity to minimize or prevent pollutants in stormwater and authorized non-stormwater through the use of controls, structures and best management practices. Discharges from Risk Level 2 site are subject to NALs for pH and turbidity shown in Table 2-4. This SWPPP has been prepared to address Risk Level 2 requirements (General Permit Attachment D).

Table 2.4 Numeric Action Levels

Parameter	**Unit**	**Numeric Action Level Daily Average**
pH	pH units	Lower NAL = 6.5 Upper NAL = 8.5
Turbidity	NTU	250 NTU

2.5 CONSTRUCTION SCHEDULE

The site sediment risk was determined based on construction taking place between **Error! Reference source not found.**4 and February 1, 2027. Modification or extension of the schedule (start and end dates) may affect risk determination and permit requirements. The LRP shall contact the QSD if the schedule changes during construction to address potential impact to the SWPPP. The estimated schedule for planned work can be found in Appendix F.

2.6 POTENTIAL CONSTRUCTION ACTIVITY AND POLLUTANT SOURCES

Appendix G includes a list of construction activities and associated materials that are anticipated to be used onsite. These activities and associated materials will or could potentially contribute pollutants, other than sediment, to stormwater runoff.

The anticipated activities and associated pollutants were used in Section 3 to select the Best Management Practices for the project. Location of anticipated pollutants and associated BMPs are show on the Site Map in Appendix B.

For sampling requirements for non-visible pollutants associated with construction activity please refer to Section 7.7.1. For a full and complete list of onsite pollutants, refer to the Material Safety Data Sheets (MSDS), which are retained onsite at the construction trailer.

2.7 IDENTIFICATION OF NON-STORMWATER DISCHARGES

Non-stormwater discharges consist of discharges which do not originate from precipitation events. The General Permit provides allowances for specified non-stormwater discharges that do not cause erosion or carry other pollutants.

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the General Permit and listed in the SWPPP, or authorized under a separate NPDES permit, are prohibited.

Non-stormwater discharges that are authorized from this project site include the following:

- Discharges from fire-fighting activities;
- Fire hydrant flushings
- Waters used to wash vehicles where detergents are not used;
- Water used to control dust;
- Potable water including uncontaminated water line flushings;
- Routine external building wash down that does not use detergents;
- Pavement wash waters where spills or leaks of toxic or hazardous materials have not occured (unless all spilled material has been removed) and where detergents are not used;
- Uncontaminated air conditioning or compressor condensate;
- Uncontaminated ground water or spring water;
- Foundation or footing drains where flows are not contaminated with process materials such as solvents;
- Uncontaminated excavation dewatering;
- Landscape irrigation.

These authorized non-stormwater discharges will be managed with the stormwater and non-stormwater BMPs described in Section 3 of this SWPPP and will be minimized by the QSP.

Activities at this site that may result in unauthorized non-stormwater discharges include:

- None

Steps will be taken, including the implementation of appropriate BMPs, to ensure that unauthorized discharges are eliminated, controlled, disposed, or treated on-site.

Discharges of construction materials and wastes, such as fuel or paint, resulting from dumping, spills, or direct contact with rainwater or stormwater runoff, are also prohibited.

The following discharge(s) have been authorized by (a) regional NPDES permit(s):

- None

2.8 REQUIRED SITE MAP INFORMATION

The construction project's Site Map(s) showing the project location, surface water boundaries, geographic features, construction site perimeter and general topography and other requirements identified in Attachment B of the General Permit is located in Appendix B. Table 2.5 identifies Map or Sheet Nos. where required elements are illustrated.

Table 2.5 Required Map Information

Included on Map/Plan Sheet No. (1)	Required Element
Vicinity Map	The project's surrounding area (vicinity)
Site Map	Site layout
Site Map	Construction site boundaries
Proposed Hydrology Map	Drainage areas
Site Map	Discharge locations
Site Map	Sampling locations
Site Map	Areas of soil disturbance (temporary or permanent)
Site Map	Active areas of soil disturbance (cut or fill)
Sie Map	Locations of runoff BMPs
Site Map	Locations of erosion control BMPs
Site Map	Locations of sediment control BMPs
N/A	ATS location (if applicable)
N/A	Locations of sensitive habitats, watercourses, or other features which are not to be disturbed
BMP Exhibit	Locations of all post construction BMPs
Site Map	Waste storage areas
Site Map	Vehicle storage areas
Site Map	Material storage areas

Table 2.5 Required Map Information

Included on Map/Plan Sheet No. (1)	Required Element
Site Map	Entrance and Exits
N/A	Fueling Locations

Notes: (1) Indicate maps or drawings that information is included on (e.g., Vicinity Map, Site Map, Drainage Plans, Grading Plans, Progress Maps, etc.)

Section 3 Best Management Practices

3.1 SCHEDULE FOR BMP IMPLEMENTATION

Table 3.1 BMP Implementation Schedule

	BMP	Implementation	Duration
Erosion Control	EC-1, Scheduling	Prior to Construction	Entirety of Project
	EC-4, Hydroseeding	Start of Construction	As necessary
	EC-5, Soil Binders	Start of Construction	As necessary
	EC-6, Straw Mulch	Start of Construction	As necessary
	EC-7, Geotextiles and Mats	Start of Construction	As necessary
Sediment Control	SE-1, Silt Fence	Start of Construction	As necessary
	SE-5, Fiber Roll	As necessary	As necessary
	SE-6, Gravel Bag Berms	Start of Construction	As necessary
	SE-7, Street Sweeping and Vacuuming	Start of Construction	Entirety of Project
	SE-10, Storm Drain Inlet Protection	Start of Construction	As necessary
Tracking Control	TC-1, Stabilized Construction Entrance/Exit	Start of Construction	Duration of Project
Wind Erosion	WE-1, Wind Erosion Control	Start of Construction	Duration of Project
Non-Stormwater Management	NS-1, Water Conservation Practices	Start of Construction	Duration of Project
	NS-3, Paving and Grinding	Start of Construction	Duration of Project
	NS-6, Illicit Connection/Illegal Discharge Detection and Reporting	Start of Construction	Duration of Project

Table 3.1 BMP Implementation Schedule

	BMP	Implementation	Duration
	NS-7, Potable Water/Irrigation	As necessary	As necessary
	NS-8, Vehicle and Equipment Cleaning	As necessary	As necessary
	NS-9, Vehicle and Equipment Fueling	As necessary	As necessary
	NS-10, Vehicle and Equipment Maintenance	As necessary	As necessary
	NS-12, Concrete Curing	As necessary	As necessary
	NS-13, Concrete Finishing	As necessary	As necessary
Waste Management and Materials Pollution Control	WM-1, Material Delivery and Storage	Start of Construction	Duration of Project
	WM-2, Material Use	Start of Construction	Duration of Project
	WM-3, Stockpile Management	Start of Construction	Duration of Project
	WM-4, Spill Prevention and Control	Start of Construction	Duration of Project
	WM-5, Solid Waste Management	Start of Construction	Duration of Project
	WM-6, Hazardous Waste Management	Start of Construction	Duration of Project
	WM-8, Concrete Waste Management	Start of Construction	Duration of Project
	WM-9, Sanitary/Septic Waste Management	Start of Construction	Duration of Project
	WM-10, Liquid Waste Management	Start of Construction	Duration of Project

3.2 EROSION AND SEDIMENT CONTROL

Erosion and sediment controls are required by the General Permit to provide effective reduction or elimination of sediment related pollutants in stormwater discharges and authorized non-stormwater discharges from the Site. Applicable BMPs are identified in this section for erosion control, sediment control, tracking control, and wind erosion control.

3.2.1 Erosion Control

Erosion control, also referred to as soil stabilization, consists of source control measures that are designed to prevent soil particles from detaching and becoming transported in stormwater runoff. Erosion control BMPs protect the soil surface by covering and/or binding soil particles.

This construction project will implement the following practices to provide effective temporary and final erosion control during construction:

1. Preserve existing vegetation where required and when feasible.
2. The area of soil disturbing operations shall be controlled such that the Contractor is able to implement erosion control BMPs quickly and effectively.
3. Stabilize non-active areas within 14 days of cessation of construction activities or sooner if stipulated by local requirements.

4. Control erosion in concentrated flow paths by applying erosion control blankets, check dams, erosion control seeding or alternate methods.
5. Prior to the completion of construction, apply permanent erosion control to remaining disturbed soil areas.

Sufficient erosion control materials shall be maintained onsite to allow implementation in conformance with this SWPPP.

The following temporary erosion control BMP selection table indicates the BMPs that shall be implemented to control erosion on the construction site. Fact Sheets for temporary erosion control BMPs are provided in Appendix H.

Table 3.2 Temporary Erosion Control BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement [1]	BMP Used		If not used, state reason
			YES	NO	
EC-1	Scheduling	✓	X		
EC-2	Preservation of Existing Vegetation	✓		X	No existing vegetation that can be preserved
EC-3	Hydraulic Mulch	✓[2]		X	EC-4, EC-5, EC-6, or EC-7 used instead
EC-4	Hydroseed	✓[2]	X		
EC-5	Soil Binders	✓[2]	X		
EC-6	Straw Mulch	✓[2]	X		
EC-7	Geotextiles and Mats	✓[2]	X		
EC-8	Wood Mulching	✓[2]		X	EC-4, EC-5, EC-6, or EC-7 used instead
EC-9	Earth Dike and Drainage Swales	✓[3]	X		
EC-10	Velocity Dissipation Devices			X	Not needed
EC-11	Slope Drains			X	Not needed
EC-12	Stream Bank Stabilization			X	The site is not adjacent to a stream
EC-14	Compost Blankets	✓[2]		X	EC-4, EC-5, EC-6, or EC-7 used instead
EC-15	Soil Preparation-Roughening			X	EC-4, EC-5, EC-6, or EC-7 used instead
EC-16	Non-Vegetated Stabilization	✓[2]		X	EC-4, EC-5, EC-6, or EC-7 used instead
WE-1	Wind Erosion Control	✓	X		
Alternate BMPs Used:					**If used, state reason:**

[1] Applicability to a specific project shall be determined by the QSD.

[2] The QSD shall ensure implementation of one of the minimum measures listed or a combination thereof to achieve and maintain the Risk Level requirements.

[3] Run-on from offsite shall be directed away from all disturbed areas, diversion of offsite flows may require design/analysis by a licensed civil engineer and/or additional environmental permitting.

These temporary erosion control BMPs shall be implemented in conformance with the following guidelines and as outlined in the BMP Factsheets provided in Appendix H. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Scheduling

Scheduling is the development of a written plan that includes sequencing of construction activities and the implementation of BMPs such as erosion control and sediment control while taking local climate (rainfall, wind, etc.) into consideration. The purpose is to reduce the amount and duration of soil exposed to erosion by wind, rain, runoff, and vehicle tracking, and to perform the construction activities and control practices in accordance with the planned schedule.

Hydroseeding

Hydroseeding typically consists of applying a mixture of a hydraulic mulch, seed, and water with the possible addition of tackifier, compost, mycorrhizae inoculant, fertilizer, and/or soil conditioner, to temporarily protect exposed soils from erosion by water and wind. Hydraulic seeding, or hydroseeding, is simply the method by which temporary or permanent seed is applied to the soil surface and temporary erosion control is established by means of the mulch component.

Soil Binders

Soil binding consists of application and maintenance of a soil stabilizer to exposed soil surfaces. Soil binders are materials applied to the soil surface to temporarily prevent water and wind induced erosion of exposed soils on construction sites.

Straws Mulch

Straw mulch consists of placing a uniform layer of straw and incorporating it into the soil with a studded roller or crimper or anchoring it with a tackifier or stabilizing emulsion. Straw mulch protects the soil surface from the impact of rain drops, preventing soil particles from becoming dislodged.

Geotextiles and Mats

Rolled Erosion Control Products (RECPs), also known as erosion control matting or blankets, can be made of natural or synthetic materials or a combination of the two. RECPs are used to cover the soil surface to reduce erosion from rainfall impact, hold soil in place, and absorb and hold moisture near the soil surface. Additionally, RECPs may be used to stabilize soils until vegetation is established or to reinforce non-woody surface vegetation.

Earth Dikes and Drainage Swales

An earth dike is a temporary berm or ridge of compacted soil used to divert runoff or channel water to a desired location. A drainage swale is a shaped and sloped depression in the soil surface used to convey runoff to a desired location. Earth dikes and drainage swales are used to

divert off site runoff around the construction site, divert runoff from stabilized areas and disturbed areas, and direct runoff into sediment basins or traps.

Wind Erosion Control

Wind erosion or dust control consists of applying water or other chemical dust suppressants as necessary to prevent or alleviate dust nuisance generated by construction activities. Covering small stockpiles or areas is an alternative to applying water or other dust palliatives.

Dust Control

- Potable water will be applied to disturbed soil areas of the project site to control dust and maintain optimum moisture levels for compaction. The water will be applied using water trucks.
- Watering will be implemented to provide dust control and prevent discharges from dust control activities and water supply equipment. Water application rates will be minimized as necessary to prevent runoff and ponding and water equipment leaks will be repaired immediately.
- During windy conditions (forecast or actual wind conditions of approximately 25 mph or greater), dust control will be applied to DSAs to adequately control wind erosion.
- Plastic covers will be used to prevent wind dispersal of sediment from stockpiles.

BMPs will be deployed in a sequence to follow the progress of grading and construction. As the locations of soil disturbance change, erosion and sedimentation controls will be adjusted accordingly to control storm water runoff at the downgrade perimeter and drain inlets. BMPs will be mobilized as follows:

During Construction The owner/developer/contractor/lessee will monitor weather using National Weather Service reports and alert crews to the onset of rainfall events.

3.2.2 Sediment Controls

Sediment controls are temporary or permanent structural measures that are intended to complement the selected erosion control measures and reduce sediment discharges from active construction areas. Sediment controls are designed to intercept and settle out soil particles that have been detached and transported by the force of water.

The following sediment control BMP selection table indicates the BMPs that shall be implemented to control sediment on the construction site. Fact Sheets for temporary sediment control BMPs are provided in Appendix H.

Table 3.3 Temporary Sediment Control BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement (1)	BMP used		If not used, state reason
			YES	NO	
SE-1	Silt Fence	✓(2) (3)	X		
SE-2	Sediment Basin		X		
SE-3	Sediment Trap			X	Sediment Basins were used instead.
SE-4	Check Dams		X		
SE-5	Fiber Rolls	✓(2)(3)	X		
SE-6	Gravel Bag Berm	✓(3)	X		
SE-7	Street Sweeping	✓	X		
SE-8	Sandbag Barrier			X	The gravel bag berm was used instead.
SE-9	Straw Bale Barrier			X	The gravel bag berm was used instead.
SE-10	Storm Drain Inlet Protection	✓ RL2&3	X		
SE-11	ATS			X	ATS is not proposed for the site
SE-12	Manufactured Linear Sediment Controls			X	The gravel bag berm was used instead.
SE-13	Compost Sock and Berm	✓(3)		X	The gravel bag berm was used instead.
SE-14	Biofilter Bags	✓(3)		X	Storm drain inlet protection was used instead
TC-1	Stabilized Construction Entrance and Exit	✓	X		
TC-2	Stabilized Construction Roadway			X	TC-1 is implemented instead
TC-3	Entrance Outlet Tire Wash			X	The stabilized construction entrance and exit was used instead.
Alternate BMPs Used:					**If used, state reason:**

(1) Applicability to a specific project shall be determined by the QSD
(2) The QSD shall ensure implementation of one of the minimum measures listed or a combination thereof to achieve and maintain the Risk Level requirements
(3) Risk Level 2 &3 shall provide linear sediment control along toe of slope, face of slope, and at the grade breaks of exposed slope

These temporary sediment control BMPs shall be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix H. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Silt Fence

A silt fence is made of a woven geotextile that has been entrenched, attached to supporting poles, and sometimes backed by a plastic or wire mesh for support. The silt fence detains water, promoting sedimentation of coarse sediment behind the fence. Silt fence does not retain soil fine particles like clays or silts.

Sediment Basin

A sediment basin is a temporary basin formed by excavation or by constructing an embankment so that sediment-laden runoff is temporarily detained under quiescent conditions, allowing sediment to settle out before the runoff is released.

Check Dams

A check dam is a small barrier constructed of rock, gravel bags, sandbags, fiber rolls, or other proprietary products, placed across a constructed swale or drainage ditch. Check dams reduce the effective slope of the channel, thereby reducing scour and channel erosion by reducing flow velocity and increasing residence time within the channel, allowing sediment to settle

Fiber Rolls

A fiber roll consists of straw, coir, or other biodegradable materials bound into a tight tubular roll wrapped by netting, which can be photodegradable or natural. Additionally, gravel core fiber rolls are available, which contain an imbedded ballast material such as gravel or sand for additional weight when staking the rolls are not feasible (such as use as inlet protection). By interrupting the length of a slope, fiber rolls can also reduce sheet and rill erosion until vegetation is established.

Gravel Bag Berm

A gravel bag berm is a series of gravel-filled bags placed on a level contour to intercept sheet flows. Gravel bags pond sheet flow runoff, allowing sediment to settle out, and release runoff slowly as sheet flow, preventing erosion.

Street Sweeping

Street sweeping and vacuuming includes use of self-propelled and walk-behind equipment to remove sediment from streets and roadways, and to clean paved surfaces in preparation for

final paving. Sweeping and vacuuming prevents sediment from the project site from entering storm drains or receiving waters.

Storm Drain Inlet Protection

Storm drain inlet protection consists of a sediment filter or an impounding area in, around or upstream of a storm drain, drop inlet, or curb inlet. Storm drain inlet protection measures temporarily pond runoff before it enters the storm drain, allowing sediment to settle. Some filter

configurations also remove sediment by filtering, but usually the ponding action results in the greatest sediment reduction. Temporary geotextile storm drain inserts attach underneath storm drain grates to capture and filter storm water.

Stabilized Construction Entrance and Exit

A stabilized construction entrance/exit will be constructed and maintained at construction site entrances and exits as shown on the Site Map/Site Plans.

The site entrance/exit will be stabilized to reduce tracking of sediment as a result of construction traffic. The entrance will be designated and graded to prevent runoff from leaving the site. Installation will consist of ribbed steel plates and/or 6-inch coarse aggregate. The length will be determined by site conditions and will be increased as needed to prevent tracking. The entrance will be flared where it meets the existing road to provide an adequate turning radius.

3.3 NON-STORMWATER CONTROLS AND WASTE AND MATERIALS MANAGEMENT

3.3.1 Non-Stormwater Controls

Non-stormwater discharges into storm drainage systems or waterways, which are not authorized under the General Permit, are prohibited. Non-stormwater discharges for which a separate NPDES permit is required by the local Regional Water Board are prohibited unless coverage under the separate NPDES permit has been obtained for the discharge. The selection of non-stormwater BMPs is based on the list of construction activities with a potential for non-stormwater discharges identified in Section 2.7 of this SWPPP.

The following non-stormwater control BMP selection table indicates the BMPs that shall be implemented to control sediment on the construction site. Fact Sheets for temporary non-stormwater control BMPs are provided in Appendix H.

Table 3.4 Temporary Non-Stormwater BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement (1)	BMP used		If not used, state reason
			YES	NO	
NS-1	Water Conservation Practices	✓	X		
NS-2	Dewatering Operation			X	Fiber rolls and gravel bag berm used instead
NS-3	Paving and Grinding Operation		X		
NS-4	Temporary Stream Crossing			X	Site is not adjacent to a stream
NS-5	Clear Water Diversion			X	Site is not adjacent to a body of water
NS-6	Illicit Connection/Discharge	✓	X		
NS-7	Potable Water/Irrigation		X		
NS-8	Vehicle and Equipment Cleaning	✓	X		
NS-9	Vehicle and Equipment Fueling	✓	X		
NS-10	Vehicle and Equipment Maintenance	✓	X		
NS-11	Pile Driving Operation			X	Pile driving operations not occurring on this site.
NS-12	Concrete Curing		X		
NS-13	Concrete Finishing		X		
NS-14	Material and Equipment Use Over Water			X	The site is not adjacent to water
NS-15	Demolition Removal Adjacent to Water			X	The site is not adjacent to water
NS-16	Temporary Batch Plants			X	No batch plants on this site
Alternate BMPs Used:			**If used, state reason:**		

(1) Applicability to a specific project shall be determined by the QSD

Non-stormwater BMPs shall be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix H. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Water Conservation Practices

Water conservation practices are activities that use water during the construction of a project in a manner that avoids causing erosion and the transport of pollutants offsite. These practices can reduce or eliminate non-stormwater discharges.

Paving and Grinding Operation

Paving locations and adjacent storm drain inlets are shown on the Site Plan. Paving operations will be conducted during the times shown on the project schedule in Appendix F. BMPs will be implemented to prevent paving materials from being discharged offsite. Following paving operations, the area will be swept, inlet covers will be removed, and the inlets will be inspected for paving materials and cleaned as deemed necessary.

Illicit Connection/Discharge

The Contractor will implement BMP NS-6, Illicit Connection/Illegal Discharge Detection and Reporting, throughout the duration of the project.

Potable Water/Irrigation

Potable Water/Irrigation consists of practices and procedures to manage the discharge of potential pollutants generated during discharges from irrigation water lines, landscape irrigation, lawn or garden watering, planned and unplanned discharges from potable water sources, water line flushing, and hydrant flushing. The following procedures will be implemented:

- Water from offsite sources will be directed around or through the construction site, where feasible, in a way that minimizes contact with the construction site.
- The water source to broken lines, sprinklers, or valves will be shut off as soon as possible to prevent excess water flow.
- Downstream stormwater drainage systems will be protected from water pumped or bailed from trenches excavated to repair water lines.
- Irrigated areas will be inspected regularly for excess watering. Watering times and schedules will be adjusted to ensure that the appropriate amount of water is being used and to minimize runoff.
- To determine the appropriate amount of water needed for a specific area, factors such as soil structure, grade, time of year, and type of plant material will be considered.
- Chlorinated water from line flushing should be contained and not allowed to flow into drainage channels or receiving waters prior to treatment. Chlorinated water from line flushing should be contained in a controlled area such as a holding pit or sediment basin and may be infiltrated into the ground or used in water trucks for dust control. Water from line flushing, back flow testing, and fire flow testing that is not contaminated with chlorine or other non-visible or visible pollutants may be released off the site as a permitted discharge. Water with chlorine levels in excess of those established by the local

fire authority may need to be disposed of as a hazardous waste and not applied to site soils.

Vehicle and Equipment Cleaning

Vehicle and equipment cleaning procedures and practices eliminate or reduce the discharge of pollutants to stormwater from vehicle and equipment cleaning operations. Procedures and practices include but are not limited to: using offsite facilities; washing in designated, contained areas only; eliminating discharges to the storm drain by infiltrating the wash water; and training employees and subcontractors in proper cleaning procedures.

Vehicle Fueling

Vehicle equipment fueling procedures and practices are designed to prevent fuel spills and leaks and reduce or eliminate contamination of stormwater. This can be accomplished by using offsite facilities, fueling in designated areas only, enclosing or covering stored fuel, implementing spill controls, and training employees and subcontractors in proper fueling procedures.

Vehicle Maintenance

Prevent or reduce the contamination of stormwater resulting from vehicle and equipment maintenance by running a "dry and clean site". The best option would be to perform maintenance activities at an offsite facility. If this option is not available then work should be performed in designated areas only, while providing cover for materials stored outside, checking for leaks and spills, and containing and cleaning up spills immediately. Employees and subcontractors must be trained in proper procedures.

Concrete Curing

Concrete curing is used in the construction of structures such as bridges, retaining walls, pump houses, large slabs, and structured foundations. Concrete curing includes the use of both chemical and water methods.

Gravel bags will be used to contain the slurry and prevent discharges to the storm drain system. Once contained by the gravel bag barrier, the slurry will be vacuumed and discharged to the concrete washout facility described under "Concrete Residuals and Washout Wastes" in the following section. Dried and cured concrete wastes will be disposed of offsite during concrete washout maintenance activities

Concrete Finishing

Concrete finishing methods are used for bridge deck rehabilitation, paint removal, curing compound removal, and final surface finish appearances. Methods include sand blasting, shot blasting, grinding, or high-pressure water blasting.

Gravel bags will be used to contain the slurry and prevent discharges to the storm drain system. Once contained by the gravel bag barrier, the slurry will be vacuumed and discharged to the concrete washout facility described under "Concrete Residuals and Washout Wastes" in the following section. Dried and cured concrete wastes will be disposed of offsite during concrete washout maintenance activities.

3.3.2 Materials Management and Waste Management

Materials management control practices consist of implementing procedural and structural BMPs for handling, storing and using construction materials to prevent the release of those materials into stormwater discharges. The amount and type of construction materials to be utilized at the Site will depend upon the type of construction and the length of the construction period. The materials may be used continuously, such as fuel for vehicles and equipment, or the materials may be used for a discrete period, such as soil binders for temporary stabilization.

Waste management consist of implementing procedural and structural BMPs for handling, storing and ensuring proper disposal of wastes to prevent the release of those wastes into stormwater discharges. [If applicable to the project site, waste management should be conducted in accordance with the Project's Construction Waste Management Plan.]

Materials and waste management pollution control BMPs shall be implemented to minimize stormwater contact with construction materials, wastes and service areas; and to prevent materials and wastes from being discharged off-site. The primary mechanisms for stormwater contact that shall be addressed include:

- Direct contact with precipitation
- Contact with stormwater run-on and runoff
- Wind dispersion of loose materials
- Direct discharge to the storm drain system through spills or dumping
- Extended contact with some materials and wastes, such as asphalt cold mix and treated wood products, which can leach pollutants into stormwater.

A list of construction activities is provided in Section 2.6. The following Materials and Waste Management BMP selection table indicates the BMPs that shall be implemented to handle materials and control construction site wastes associated with these construction activities. Fact Sheets for Materials and Waste Management BMPs are provided in Appendix H.

Table 3.5 Temporary Materials Management BMPs

CASQA Fact Sheet	BMP Name	Meets a Minimum Requirement [(1)]	BMP used		If not used, state reason
			YES	NO	
WM-01	Material Delivery and Storage	✓	X		
WM-02	Material Use	✓	X		
WM-03	Stockpile Management	✓	X		
WM-04	Spill Prevention and Control	✓	X		
WM-05	Solid Waste Management	✓	X		
WM-06	Hazardous Waste Management	✓	X		
WM-07	Contaminated Soil Management			X	No contaminated soil on the site.
WM-08	Concrete Waste Management	✓	X		
WM-09	Sanitary-Septic Waste Management	✓	X		
WM-10	Liquid Waste Management		X		
Alternate BMPs Used:				**If used, state reason:**	

[(1)] Applicability to a specific project shall be determined by the QSD.

Material management BMPs shall be implemented in conformance with the following guidelines and in accordance with the BMP Fact Sheets provided in Appendix H. If there is a conflict between documents, the Site Map will prevail over narrative in the body of the SWPPP or guidance in the BMP Fact Sheets. Site specific details in the Site Map prevail over standard details included in the Site Map. The narrative in the body of the SWPPP prevails over guidance in the BMP Fact Sheets.

Material Delivery and Storage

Material Delivery and Storage will be implemented to help prevent discharges of construction materials during delivery and storage. Material delivery and storage areas should be located near the construction entrances, away from the waterways, if possible. Methods of storing used to minimize storm water contact with construction materials include:

- The use of watertight shipping containers to store hand tools, small parts, and most construction materials that can be carried by hand, such as paint cans, solvents, and grease.
- Very large items, such as light standards, framing materials, and stockpiled lumber, will be stored in the open in the general storage area. Such materials will be elevated with wood blocks to minimize contact with storm water.
- Landscaping and building materials will also be stockpiled in the general storage area and will be surrounded with additional sediment controls (i.e., Gravel Bag Barrier or Plastic Covers, if necessary, for wind/dust control.)
- Spill clean-up materials, material safety data sheets, a material inventory, and emergency contact numbers will be maintained and stored in the shipping containers.

Material Delivery and Storage

Prevent or reduce the discharge of pollutants to drainage systems or watercourses from leaks and spills by reducing the chance for spills, stopping the source of spills, containing and cleaning up spills, properly disposing of spill materials, and training employees.

Stockpile Management

Stockpile Management will be implemented to reduce or eliminate air and stormwater pollution from stockpiles of soil, paving materials such as Portland cement concrete (PCC) rubble, asphalt concrete (AC), asphalt concrete rubble, aggregate base, aggregate sub base or pre-mixed aggregate, and asphalt minder.

- Stockpiles will be located a minimum of 50 feet away from concentrated flows of stormwater, drainage courses, and inlets.
- All stockpiles will be protected from stormwater run-on by sandbags or gravel bags around the perimeter.

Spill Prevention and Control

Spill Prevention and Control, will be implemented to contain and clean-up spills and prevent material discharges to the storm drain system. Spill prevention is also discussed above in Material Delivery, Storage, and Use and below in the following Waste Management section.

Solid Waste Management

Solid Waste Management, will be implemented to minimize storm water contact with waste materials and prevent waste discharges. Solid wastes will be loaded directly into trucks for offsite disposal. When onsite storage is necessary, solid wastes will be stored in watertight dumpsters in the general storage area of the contractor's yard. AC and PCC rubble will be stockpiled in the general storage area and will be surrounded with sediment controls such as sandbags or gravel bags. Solid waste, including rubble stockpiles, will be removed and disposed offsite at least weekly.

Hazardous Waste Management

Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.

Concrete Waste Management

Due to the application of concrete on the site, discharges will consist of rinse water and residual concrete (Portland cement, aggregates, admixture, and water). Concrete pours will not be conducted during or immediately prior to rainfall events.

Metal low-boy bins lined with 6 ml (min) plastic will be used as concrete washout facilities and maintained at the contractor's storage yard. All excess concrete and concrete washout slurries will be discharged to the washout facility for drying. Bins should provide sufficient volume to contain concrete washout wastes and waste collected from concrete saw-cutting operations. BMP maintenance, waste disposal, and BMP removal will be conducted as described in WM-8.

Sanitary-Septic Waste Management

Portable toilets will be located and maintained at the contractor's yard for the duration of the project. Weekly maintenance will be provided and wastes will be disposed of offsite. The toilets will be located away from concentrated flow paths and drainage inlets.

Liquid Waste Management

Liquid waste management includes procedures and practices to prevent discharge of pollutants to the storm drain system or to watercourses as a result of the creation, collection, and disposal of non-hazardous liquid wastes.

3.4 POST CONSTRUCTION STORMWATER MANAGEMENT MEASURES

Post construction BMPs are permanent measures installed during construction, designed to reduce or eliminate pollutant discharges from the site after construction is completed.

This site is located in an area subject to a Phase I or Phase II Municipal Separate Storm Sewer System (MS4) permit approved Stormwater Management Plan. ☒ Yes ☐ No

Post construction runoff reduction requirements have been satisfied through the MS4 program; this project is exempt from provision XIII A of the General Permit.

The following source control post construction BMPs to comply with General Permit Section XIII.B and local requirements have been identified for the site:

- SD-13, Storm Drain Signage

A plan for the post construction funding and maintenance of these BMPs has been developed to address at minimum five years following construction. The post construction BMPs that are described above shall be funded and maintained by the **Error! Reference source not found.**. If required, post construction funding and maintenance will be submitted with the NOT.

Section 4 BMP Inspection, Maintenance and Rain Event Action Plans

4.1 BMP INSPECTION AND MAINTENANCE

The General Permit requires routine weekly inspections of BMPs, along with inspections before, during, and after qualifying rain events. A BMP inspection checklist must be filled out for inspections and maintained on-site with the SWPPP. The inspection checklist includes the necessary information covered in Section 7.6. A blank inspection checklist can be found in Appendix I. Completed checklists shall be kept in CSMP Attachment 2 "Monitoring Records.

BMPs shall be maintained regularly to ensure proper and effective functionality. If necessary, corrective actions shall be implemented within 72 hours of identified deficiencies and associated amendments to the SWPPP shall be prepared by the QSD.

Specific details for maintenance, inspection, and repair of Construction Site BMPs can be found in the BMP Factsheets in Appendix H.

4.2 RAIN EVENT ACTION PLANS

Risk Level 2 and 3 Project:

The Rain Event Action Plans (REAP) is written document designed to be used as a planning tool by the QSP to protect exposed portions of project sites and to ensure that the discharger has adequate materials, staff, and time to implement erosion and sediment control measures. These measures are intended to reduce the amount of sediment and other pollutants that could be generated during the rain event. It is the responsibility of the QSP to be aware of precipitation forecast and to obtain and print copies of forecasted precipitation from NOAA's National Weather Service Forecast Office.

The SWPPP includes REAP templates but the QSP will need to customize them for each rain event. Site-specific REAP templates for each applicable project phase can be found in Appendix J. The QSP shall maintain a paper copy of completed REAPs in compliance with the record retention requirements Section 1.5 of this SWPPP. Completed REAPs shall be maintained in Appendix J.

The QSP will develop an event specific REAP 48 hours in advance of a precipitation event forecast to have a 50% or greater chance of producing precipitation in the project area. The REAP will be onsite and be implemented 24 hours in advance of any the predicted precipitation event.

At minimum the REAP will include the following site and phase-specific information:

1. Project Address;
2. Calculated Risk Level;
3. Site Stormwater Manager Information including the name, company and 24-hour emergency telephone number;

4. Erosion and Sediment Control Provider information including the name, company and 24-hour emergency telephone number;
5. Stormwater Sampling Agent information including the name, company, and 24-hour emergency telephone number;
6. Activities associated with each construction phase;
7. Trades active on the construction site during each construction phase;
8. Trade contractor information; and
9. Recommended actions for each project phase.

Section 5 Training

Appendix L identifies the QSPs for the project. To promote stormwater management awareness specific for this project, periodic training of job-site personnel shall be included as part of routine project meetings (e.g., daily/weekly tailgate safety meetings), or task specific trainings as needed.

The QSP shall be responsible for providing this information at the meetings, and subsequently completing the training logs shown in Appendix K, which identifies the site-specific stormwater topics covered as well as the names of site personnel who attended the meeting. Tasks may be delegated to trained employees by the QSP provided adequate supervision and oversight is provided. Training shall correspond to the specific task delegated including: SWPPP implementation; BMP inspection and maintenance; and record keeping.

Documentation of training activities (formal and informal) is retained in SWPPP Appendix K.

Section 6 Responsible Parties and Operators

6.1 RESPONSIBLE PARTIES

Approved Signatory/Signatories who are responsible for SWPPP implementation and have authority to sign permit-related documents is/are listed below. Written authorizations from the LRP for these individuals are provided in Appendix L. The Approved Signatory/Signatories assigned to this project is /are:

Name	Title	Phone Number
Jeff Gordon	Approved Signatory	(949) 200 -6733

QSPs identified for the project are identified in Appendix L. The QSP shall have primary responsibility and significant authority for the implementation, maintenance and inspection/monitoring of SWPPP requirements. The QSP will be available at all times throughout the duration of the project. Duties of the QSP include but are not limited to:

- Implementing all elements of the General Permit and SWPPP, including but not limited to:
  - Ensuring all BMPs are implemented, inspected, and properly maintained;
  - Performing non-stormwater and stormwater visual observations and inspections;
  - Performing non-stormwater and storm sampling and analysis, as required;
  - Performing routine inspections and observations;
  - Implementing non-stormwater management, and materials and waste management activities such as: monitoring discharges; general Site clean-up; vehicle and equipment cleaning, fueling and maintenance; spill control; ensuring that no materials other than stormwater are discharged in quantities which will have an adverse effect on receiving waters or storm drain systems; etc.;
- The QSP may delegate these inspections and activities to an appropriately trained employee, but shall ensure adequacy and adequate deployment.
- Ensuring elimination of unauthorized discharges.
- The QSPs shall be assigned authority by the LRP to mobilize crews in order to make immediate repairs to the control measures.
- Coordinate with the Contractor(s) to assure all of the necessary corrections/repairs are made immediately and that the project complies with the SWPPP, the General Permit and approved plans at all times.

- Notifying the LRP or Authorized Signatory immediately of off-site discharges or other non-compliance events.

6.2 CONTRACTOR LIST

Contractor

Name:	TBD
Title:	TBD
Company:	TBD
Address:	TBD
Phone Number:	TBD
Number (24/7):	TBD

Section 7 Construction Site Monitoring Program

7.1 Purpose

This Construction Site Monitoring Program was developed to address the following objectives:

1. To demonstrate that the site is in compliance with the Discharge Prohibitions [and Numeric Action Levels (NALs)] of the Construction General Permit;
2. To determine whether non-visible pollutants are present at the construction site and are causing or contributing to exceedances of water quality objectives;
3. To determine whether immediate corrective actions, additional Best Management Practices (BMP) implementation, or SWPPP revisions are necessary to reduce pollutants in stormwater discharges and authorized non-stormwater discharges;
4. To determine whether BMPs included in the SWPPP [and REAP] are effective in preventing or reducing pollutants in stormwater discharges and authorized non-stormwater discharges.

7.2 Applicability of Permit Requirements

This project has been determined to be a Risk Level **Error! Reference source not found.** project. The General Permit identifies the following types of monitoring as being applicable for a Risk Level project **Error! Reference source not found.**.

Risk Level 2

- Visual inspections of Best Management Practices (BMPs);
- Visual monitoring of the site related to qualifying storm events;
- Visual monitoring of the site for non-stormwater discharges;
- Sampling and analysis of construction site runoff for pH and turbidity;
- Sampling and analysis of construction site runoff for non-visible pollutants when applicable; and
- Sampling and analysis of non-stormwater discharges when applicable.

7.3. Weather and Rain Event Tracking

Visual monitoring and inspections requirements of the General Permit are triggered by a qualifying rain event. The General Permit defines a qualifying rain event as any event that produces ½ inch of precipitation. A minimum of 48 hours of dry weather will be used to distinguish between separate qualifying storm events.

Visual monitoring, inspections, and sampling requirements of the General Permit are triggered by a qualifying rain event. The General Permit defines a qualifying rain event as any event that produces ½ inch of precipitation. A minimum of 48 hours of dry weather will be used to distinguish between separate qualifying storm events.

For the purposes of assessing exceptions to the Receiving Water Monitoring Triggers the General Permit establishes the compliance storm event at the 5-year, 24-hour event. Based on the Western Regional Climate Center, the 5-year, 24-hour event for this project is 2.25 inches.

7.3.1 Weather Tracking

The QSP should daily consult the National Oceanographic and Atmospheric Administration (NOAA) for the weather forecasts. These forecasts can be obtained at http://www.weather.gov/erh/gis_conus. Weather reports should be printed and maintained with the SWPPP in CSMP Attachment 1 "Weather Reports".

7.3.2 Rain Gauges

The QSP shall install 1 (one) rain gauge(s) on the project site. Locate the gauge in an open area away from obstructions such as trees or overhangs. Mount the gauge on a post at a height of 3 to 5 feet with the gauge extending several inches beyond the post. Make sure that the top of the gauge is level. Make sure the post is not in an area where rainwater can indirectly splash from sheds, equipment, trailers, etc.

The rain gauge shall be read daily during normal site scheduled hours. The rain gauge should be read at approximately the same time every day and the date and time of each reading recorded. Log rain gauge readings in CSMP Attachment 1 "Weather Records". Follow the rain gauge instructions to obtain accurate measurements.

Once the rain gauge reading has been recorded, accumulated rain shall be emptied and the gauge reset.

For comparison with the site rain gauge, the nearest appropriate governmental rain gauge(s) is located at Perris Rain Gauge 152, managed by Riverside County Flood. Information for this Gauge is found at this link: https://rcflood.org/content/rainreport.asp?StationID=152

7.4 Monitoring Locations

Monitoring locations are shown on the Site Maps in Appendix B. Monitoring locations are described in the Sections 7.6 and 7.7.

Whenever changes in the construction site might affect the appropriateness of sampling locations, the sampling locations shall be revised accordingly. All such revisions shall be

implemented as soon as feasible and the SWPPP amended. Temporary changes that result in a one-time additional sampling location do not require a SWPPP amendment.

7.5 Safety and Monitoring Exemptions

Safety practices for sample collection will be in accordance with the regulations approved by the State of California, Department of Industrial Relations, Occupational Safety & Health Standards Board, and the site health and safety procedures determined by the contractor. A summary of the safety requirements that apply to sampling personnel is provided below.

- Construction Safety
- General Industrial Safety
- Confined Spaces in Construction
- Public Convenience and Safety
- Public Safety and Traffic Control
- Barricading Open Trenches
- Excavation and Trench Safety

This project is not required to collect samples or conduct visual observations (inspections) under the following conditions:

- During dangerous weather conditions such as flooding and electrical storms.
- Outside of scheduled site business hours.

Scheduled site business hours are: Monday-Friday 7:00am-7:00pm.

If monitoring (visual monitoring or sample collection) of the site is unsafe because of the dangerous conditions noted above then the QSP shall document the conditions for why an exception to performing the monitoring was necessary. The exemption documentation shall be filed in CSMP Attachment 2 “Monitoring Records”.

7.6 Visual Monitoring

Visual monitoring includes observations and inspections. Inspections of BMPs are required to identify and record BMPs that need maintenance to operate effectively, that have failed, or that could fail to operate as intended. Visual observations of the site are required to observe Stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources.

Table 7.1 identifies the required frequency of visual observations and inspections. Inspections and observations will be conducted at the locations identified in Section 7.6.3.

Table 7.1 Summary of Visual Monitoring and Inspections

Type of Inspection	Frequency
Routine Inspections	
BMP Inspections	Weekly[1]

Table 7.1 Summary of Visual Monitoring and Inspections

Type of Inspection	Frequency
BMP Inspections – Tracking Control	Daily
Non-Stormwater Discharge Observations	Quarterly during daylight hours
Rain Event Triggered Inspections	
Site Inspections Prior to a Qualifying Event	Within 48 hours of a qualifying event [2]
BMP Inspections During an Extended Storm Event	Every 24-hour period of a rain event[3]
Site Inspections Following a Qualifying Event	Within 48 hours of a qualifying event[2]

[1] Most BMPs must be inspected weekly; those identified below must be inspected more frequently.

[2] Inspections are required during scheduled site operating hours.

[3] Inspections are required during scheduled site operating hours regardless of the amount of precipitation on any given day.

7.6.1 Routine Observations and Inspections

Routine site inspections and visual monitoring are necessary to ensure that the project is in compliance with the requirements of the Construction General Permit.

7.6.1.1 Routine BMP Inspections

Inspections of BMPs are conducted to identify and record:

- BMPs that are properly installed;
- BMPs that need maintenance to operate effectively;
- BMPs that have failed; or
- BMPs that could fail to operate as intended.

7.6.1.2 Non-Stormwater Discharge Observations

Each drainage area will be inspected for the presence of or indications of prior unauthorized and authorized non-stormwater discharges. Inspections will record:

- Presence or evidence of any non-stormwater discharge (authorized or unauthorized);
- Pollutant characteristics (floating and suspended material, sheen, discoloration, turbidity, odor, etc.); and
- Source of discharge.

7.6.2 Rain-Event Triggered Observations and Inspections

Visual observations of the site and inspections of BMPs are required prior to a qualifying rain event; following a qualifying rain event, and every 24-hour period during a qualifying rain event.

Pre-rain inspections will be conducted after consulting NOAA and determining that a precipitation event with a 50% or greater probability of precipitation has been predicted.

7.6.2.1 Visual Observations Prior to a Forecasted Qualifying Rain Event

Within 48-hours prior to a qualifying event a stormwater visual monitoring site inspection will include observations of the following locations:

- Stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources;
- BMPs to identify if they have been properly implemented;
- Any stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard.

BMP inspections and visual monitoring will be triggered by a NOAA quantitative predicted forecast (QPF) that indicates ½-inch or more of rain will occur in the project area.

7.6.2.2 BMP Inspections During an Extended Storm Event

During an extended rain event, BMP inspections will be conducted to identify and record:

- BMPs that are properly installed;
- BMPs that need maintenance to operate effectively;
- BMPs that have failed; or
- BMPs that could fail to operate as intended.

If the construction site is not accessible during the rain event, the visual inspections shall be performed at all relevant outfalls, discharge points, downstream locations. The inspections should record any projected maintenance activities.

7.6.2.3 Visual Observations Following a Qualifying Rain Event

Within 48 hours following a qualifying rain event (0.5 inches of rain) a stormwater visual monitoring site inspection is required to observe:

- Stormwater drainage areas to identify any spills, leaks, or uncontrolled pollutant sources;
- BMPs to identify if they have been properly designed, implemented, and effective;
- Need for additional BMPs;
- Any stormwater storage and containment areas to detect leaks and ensure maintenance of adequate freeboard; and
- Discharge of stored or contained rain water.

7.6.3 Visual Monitoring Procedures

Visual monitoring shall be conducted by the QSP or staff trained by and under the supervision of the QSP.

The name(s) and contact number(s) of the site visual monitoring personnel are listed below and their training qualifications are provided in Appendix K.

Assigned inspector: TBD Contact phone: TBD

Alternate inspector: TBD Contact phone: TBD

Stormwater observations shall be documented on the *Visual Inspection Field Log Sheet* (see CSMP Attachment 3 "Example Forms"). BMP inspections shall be documented on the site-specific BMP inspection checklist. Any photographs used to document observations will be referenced on stormwater site inspection report and maintained with the Monitoring Records in Attachment 2.

The QSP shall within 7 days of the inspection submit copies of the completed inspection report to the Approved Signatory: Jeff Gordon.

The completed reports will be kept in CSMP Attachment 2 "Monitoring Records".

7.6.4 Visual Monitoring Follow-Up and Reporting

Correction of deficiencies identified by the observations or inspections, including required repairs or maintenance of BMPs, shall be initiated and completed as soon as possible.

If identified deficiencies require design changes, including additional BMPs, the implementation of changes will be initiated within 72 hours of identification and be completed as soon as possible. When design changes to BMPs are required, the SWPPP shall be amended to reflect the changes.

Deficiencies identified in site inspection reports and correction of deficiencies will be tracked on the *Inspection Field Log Sheet* or *BMP Inspection Report* and shall be submitted to the QSP and shall be kept in CSMP Attachment 2 "Monitoring Records".

The QSP shall within 7 days of the inspection submit copies of the completed *Inspection Field Log Sheet* or *BMP Inspection Report* with the corrective actions to the approved signatory: Jeff Gordon.

Results of visual monitoring must be summarized and reported in the Annual Report.

7.6.5 Visual Monitoring Locations

The inspections and observations identified in Sections 7.6.1 and 7.6.2 will be conducted at the locations identified in this section.

BMP locations are shown on the Site Maps in SWPPP Appendix B.

There are 18 drainage area(s) on the project site and the contractor's yard, staging areas, and storage areas. Drainage area(s) are shown on the Proposed Hydrology Map in Appendix B and Table 7.2 identifies each drainage area by location.

Table 7.2 Site Drainage Areas

Location No.	Location
1	Located in the northwest corner of the lot, west of Barton Drive
2	Located in the middle of the site. This drainage area consists of both of the main mass graded pads. (The west half of the north pad and full south pad) as well as the north most areas adjacent to Barton st) and includes the streets Bunker Hill and Linebacker, as well as a portion of Cactus Ave, Airman, and Arclight
3	The northwesterly property corner and the north half of Airman
4	The north end of the property west of the existing water tank
5	Located North of Arclight including the east portion of the street.
5a	The north end of the property east of the existing water tank
6	The northerly center of the property
7	The easterly portion of the proposed mass graded pad to the north. Also included is the intersection of Linebacker and Arclight as well as a portion of the property north of this intersection.
7a	The northerly center of the property
8	This section includes the smallest of the mass graded pads to the east as well as the adjacent land east of it.
9	This includes the portion of Cactus Avenue leading up to the developed area and the land adjacent to this part of Cactus avenue as well as Brown.
10	Easterly most drainage area
11	South of Cactus Avenue and between drainage area 10 and 12.
12	South of Cactus Avenue and east of drainage boundary 11
13	Southeasterly most lot corner
14	Southerly most drainage boundary bounded by the southerly mass graded pad and southerly site boundary
15	Drainage boundary in the southerly most site corner to the west
16	West of Cactus Avenue from the southerly lot end leading up to Drainage Areas 1 and 2
17	Drainage boundary in the westerly most site corner to the south
18	Three drainage areas (18a, 18b, and 18c) are all located in the northeasterly most site corner.

There are 13 stormwater storage or containment area(s) on the project site. Stormwater storage or containment area(s) are shown on the Site Maps in Appendix B and Table 7.3 identifies each stormwater storage or containment area by location.

Table 7.3 Stormwater Storage and Containment Areas

Location No.	Location
DET #1	Shown on SWPPP Site Map in Appendix B
DET #2	Shown on SWPPP Site Map in Appendix B
DET #3	Shown on SWPPP Site Map in Appendix B
DET #4	Shown on SWPPP Site Map in Appendix B
DET #5	Shown on SWPPP Site Map in Appendix B
DET #6	Shown on SWPPP Site Map in Appendix B
DET #7	Shown on SWPPP Site Map in Appendix B
DET #8	Shown on SWPPP Site Map in Appendix B
DET #9	Shown on SWPPP Site Map in Appendix B
DET #10	Shown on SWPPP Site Map in Appendix B
DET #11	Shown on SWPPP Site Map in Appendix B
DET #12	Shown on SWPPP Site Map in Appendix B
DET #13	Shown on SWPPP Site Map in Appendix B

There are 9 discharge locations on the project site. Site stormwater discharge location are shown as headwalls shown on the Site Maps in Appendix B and Table 7.4 identifies each stormwater discharge location.

Table 7.4 Site Stormwater Discharge Locations

Location No.	Location
DL#1	Shown on Sheet 2 of the SWPPP Site Map in Appendix B at headwall, 33.91055688168939, -117.31556751423079
DL#2	Shown on Sheet 2 of the SWPPP Site Map in Appendix B at headwall 33.91076262577537, -117.31436514213716
DL#3	Shown on Sheet 2 of the SWPPP Site Map in Appendix B at headwall 33.911531766913235, -117.31214470080077
DL#4	Shown on Sheet 3 of the SWPPP Site Map in Appendix B at headwall 33.91164460919005, -117.30856509302544
DL#5	Shown on Sheet 4 of the SWPPP Site Map in Appendix B at headwall 33.911839784090795, -117.3050298156655

Table 7.4 Site Stormwater Discharge Locations

Location No.	Location
DL#6	Shown on Sheet 4 of the SWPPP Site Map in Appendix B at headwall 33.91150846174701, -117.30151632238037
DL#7	Shown on Sheet 9 of the SWPPP Site Map in Appendix B at headwall 33.90939967409777, -117.29549855245172
DL#8	Shown on Sheet 9 of the SWPPP Site Map in Appendix B at headwall 33.90789029313947, -117.29354346204073
DL#9	Shown on Sheet 9 of the SWPPP Site Map in Appendix B at headwall 33.905602592852965, -117.2987103054536
DL#10	Shown on Sheet 10 of the SWPPP Site Map in Appendix B at headwall 33.90600288013866, -117.31554768935285

7.7 Water Quality Sampling and Analysis

7.7.1 Sampling and Analysis Plan for Non-Visible Pollutants in Stormwater Runoff Discharges

This Sampling and Analysis Plan for Non-Visible Pollutants describes the sampling and analysis strategy and schedule for monitoring non-visible pollutants in stormwater runoff discharges from the project site.

Sampling for non-visible pollutants will be conducted when (1) a breach, leakage, malfunction, or spill is observed; and (2) the leak or spill has not been cleaned up prior to the rain event; and (3) there is the potential for discharge of non-visible pollutants to surface waters or drainage system.

The following construction materials, wastes, or activities, as identified in Section 2.6, are potential sources of non-visible pollutants to stormwater discharges from the project. Storage, use, and operational locations are shown on the Site Maps in Appendix B.

- Adhesive, glues, resins, epoxy synthetics, sealers, sealing agents;
- Cement and brick dust, concrete/masonry surface cleaners;
- Hydrostatic test water, pipe flushing;
- Polishes (metal, ceramic, tile), etching agents, cleaners, ammonia, lye, caustic sodas, bleaching agents and chromate salts;
- Wash waters, irrigation line testing/flushing;
- Acetone, paint solvents

- Oil and grease
- Trash/debris

The following existing site features, as identified in Section 2.6, are potential sources of non-visible pollutants to stormwater discharges from the project. Locations of existing site features contaminated with non-visible pollutants are shown on the Site Maps in Appendix B.

- NONE

The following soil amendments have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil and will be used on the project site. Locations of soil amendment application are shown on the Site Maps in Appendix B.

- NONE

The project has the potential to receive stormwater run-on from the following locations with the potential to contribute non-visible pollutants to stormwater discharges from the project. Locations of such run-on to the project site are shown on the Site Maps in Appendix B.

- NONE

7.7.1.1 Sampling Schedule

Samples for the potential non-visible pollutant(s) and a sufficiently large unaffected background sample shall be collected during the first two hours of discharge from rain events that result in a sufficient discharge for sample collection. Samples shall be collected during the site's scheduled hours and shall be collected regardless of the time of year and phase of the construction.

Collection of discharge samples for non-visible pollutant monitoring will be triggered when any of the following conditions are observed during site inspections conducted prior to or during a rain event.

- Materials or wastes containing potential non-visible pollutants are not stored under watertight conditions. Watertight conditions are defined as (1) storage in a watertight container, (2) storage under a watertight roof or within a building, or (3) protected by temporary cover and containment that prevents stormwater contact and runoff from the storage area.
- Materials or wastes containing potential non-visible pollutants are stored under watertight conditions, but (1) a breach, malfunction, leakage, or spill is observed, (2) the leak or spill is not cleaned up prior to the rain event, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- A construction activity, including but not limited to those in Section 2.6, with the potential to contribute non-visible pollutants (1) was occurring during or within 24 hours prior to the rain event, (2) BMPs were observed to be breached, malfunctioning, or

improperly implemented, and (3) there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.

- Soil amendments that have the potential to change the chemical properties, engineering properties, or erosion resistance of the soil have been applied, and there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.
- Stormwater runoff from an area contaminated by historical usage of the site has been observed to combine with stormwater runoff from the site, and there is the potential for discharge of non-visible pollutants to surface waters or a storm drain system.

7.7.1.2 Sampling Locations

Sampling locations are based on proximity to planned non-visible pollutant storage, occurrence or use; accessibility for sampling, and personnel safety. Planned non-visible pollutant sampling locations are shown on the Site Maps in Appendix B and include the locations identified in Tables 7.5 through 7.9.

12 sampling location(s) on the project site and the contractor's yard have been identified for the collection of samples of runoff from planned material and waste storage areas and areas where non-visible pollutant producing construction activities are planned.

Table 7.5 Non-Visible Pollutant Sample Locations – Contractors' Yard

Sample Location Number	Sample Location Description	Sample Location Latitude and Longitude
SL#1	Contractor Yard 1	33.90866509037326, -117.30111901468509
SL#2	Contractor Yard 2	33.90423630231366, -117.30845999421935
SL#3	DL#1	33.91055688168939, -117.31556751423079
SL#4	DL#2	33.91076262577537, -117.31436514213716
SL#5	DL#3	33.911531766913235, -117.31214470080077
SL#6	DL#4	33.91164460919005, -117.30856509302544
SL#7	DL#5	33.911839784090795, -117.3050298156655
SL#8	DL#6	33.91150846174701, -117.30151632238037

Table 7.5 Non-Visible Pollutant Sample Locations – Contractors' Yard

Sample Location Number	Sample Location Description	Sample Location Latitude and Longitude
SL#9	DL#7	33.90939967409777, -117.29549855245172
SL#10	DL#8	33.90789029313947, -117.29354346204073
SL#11	DL#9	33.905602592852965, -117.2987103054536
SL#12	DL#10	33.90600288013866, -117.31554768935285

No sampling locations have been identified for the collection of samples of runoff from drainage areas where soil amendments will be applied that have the potential to affect water quality.

Table 7.6 Non-Visible Pollutant Sample Locations – Soil Amendment Areas

Sample Location Number	Sample Location	Sample Location Latitude and Longitude
N/A	N/A	N/A N/A

No sampling locations have been identified for the collection of samples of runoff from drainage areas contaminated by historical usage of the site.

Table 7.7 Non-Visible Pollutant Sample Locations – Areas of Historical Contamination

Sample Location Number	Sample Location	Sample Location Latitude and Longitude
N/A	N/A	N/A N/A

One (1) sampling location(s) has been identified for the collection of an uncontaminated sample of runoff as a background sample for comparison with the samples being analyzed for non-visible pollutants. This location(s) was selected such that the sample will not have come in contact with the operations, activities, or areas identified in Section 7.7.1 or with disturbed soils areas.

Table 7.8 Non-Visible Pollutant Sample Locations – Background (Unaffected Sample)

Sample Location Number	Sample Location	Sample Location Latitude and Longitude
SL#13	At the southwesterly most site corner near the existing Barton Dr	33.899205215784235, -117.31291095096468

No sampling location has been identified for the collection of samples of run-on to the project site. Run-on from these locations has the potential to combine with discharges from the site being sampled for non-visible pollutants. These samples are intended to identify potential sources of non-visible pollutants that originate off the project site.

Table 7.9 Non-Visible Pollutant Sample Locations – Site Run-On

Sample Location Number	Sample Location	Sample Location Latitude and Longitude
N/A	N/A	N/A N/A

If a stormwater visual monitoring site inspection conducted prior to or during a storm event identifies the presence of a material storage, waste storage, or operations area with spills or the potential for the discharge of non-visible pollutants to surface waters or a storm drain system that is at a location not listed above and has not been identified on the Site Maps, sampling locations will be selected by the QSP using the same rationale as that used to identify planned locations. Non-visible pollutant sampling locations shall be identified by the QSP on the pre-rain event inspection form and/or Rain Event Action Plan prior to a forecasted qualifying rain event.

7.7.1.3 Monitoring Preparation

Non-visible pollutant samples will be collected by:

Contractor	☒ Yes	☐ No
Consultant	☐ Yes	☒ No
Laboratory	☐ Yes	☒ No

Samples on the project site will be collected by the following contractor sampling personnel:

Name/Telephone Number:	TBD
Alternate(s)/Telephone Number:	TBD

An adequate stock of monitoring supplies and equipment for monitoring non-visible pollutants will be available on the project site prior to a sampling event. Monitoring supplies and equipment will be stored in a cool temperature environment that will not come into contact with rain or direct sunlight. Sampling personnel will be available to collect samples in accordance with the sampling schedule. Supplies maintained at the project site will include, but are not limited to, clean powder-free nitrile gloves, sample collection equipment, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, ice, and *Effluent Sampling Field Log Sheets* and Chain of Custody (CoC) forms, which are provided in CSMP Attachment 3 "Example Forms".

7.7.1.4 Analytical Constituents

Table 7.10 lists the specific sources and types of potential non-visible pollutants on the project site and the water quality indicator constituent(s) for that pollutant.

Table 7.10 Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
	Adhesives	COD, Phenols, SVOCs
	Asphalt Work	VOCs
Cleaning	Acids	pH
Cleaning	Bleaches	Residual chlorines
Cleaning	TSP	Phosphate
Cleaning	Solvents	VOCs, SVOCs
Cleaning	Detergents	MBAS
Concrete / Masonry Work	Sealant (Methyl methacrylate)	SVOC
Asphalt Work	Curing compounds	VOCs
Cleaning	Acids	pH
Cleaning	Bleaches	Residual chlorines
Cleaning	TSP	Phosphate
Cleaning	Solvents	VOCs, SVOCs
Cleaning	Detergents	MBAS
Concrete / Masonry Work	Curing compounds	VOCs, SVOCs, pH
Concrete / Masonry Work	Ash, slag, sand	pH, Al, Ca, Va, Zn
Concrete / Masonry Work	Drywall	Cu, Al, General Minerals
Framing / Carpentry	Treated Wood	Cu, Cr, As, Zn
Framing / Carpentry	Particle board	Formaldehyde

Table 7.10 Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Framing / Carpentry	Untreated wood	BOD
Grading / Earthworks	Gypsum / Lime amendments	pH
Grading / Earthworks	Contaminated Soil	Constituents specific to known contaminants, check with Laboratory
Grading / Earthworks	Heating, Ventilation, Air Conditioning	Freon
Grading / Earthworks	Insulation	Al, Zn
Landscaping	Pesticides/Herbicides	Product dependent, see label and check with Laboratory
Landscaping	Fertilizers	TKN, NO3, BOD, COD, DOC, Sulfate, NH3, Phosphate, Potassium
Landscaping	Aluminum sulfate	Al, TDS, Sulfate
Landscaping	Liquid Waste	Constituents specific to materials, check with Laboratory
Painting	Resins	COD, SVOCs
Painting	Thinners	COD, VOCs
Painting	Paint strippers	VOCs, SVOCs, metals
Painting	Lacquers, varnishes, enamels	COD, VOCs, SVOCs
Painting	Sealants	COD
Painting	Adhesives	Phenols, SVOCs
Planting / Vegetation Management	Vegetation stockpiles	BOD
Planting / Vegetation Management	Fertilizers	TKN, NO3, BOD, COD, DOC, sulfate, NH3, Phosphate, Potassium
Planting / Vegetation Management	Pesticides/Herbicides	Product dependent, see label and check with Laboratory
Plumbing	Solder, flux, pipe fitting	Cu, Pb, Sn, Zn
Plumbing	Pools and Fountains	Residual chlorine, Cu, chloramines

Table 7.10 Potential Non-Visible Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Plumbing	Removal of existing structures	Zn, VOCs, PCBs (see also other applicable activity categories, e.g., grading, painting)
Sanitary Waste	Sanitary Waste Sewer line breaks and Portable Toilets (using clear fluid – blue fluid is visible if discharged)	BOD, Total/Fecal coliform
Soil Preparation / Amendments/Dust Control	Polymer/Co polymers	TKN, NO3, BOD, COD, DOC, Sulfate, Ni
Soil Preparation / Amendments/Dust Control	Lignin sulfate	TDS, alkalinity
Soil Preparation / Amendments/Dust Control	Psyllium	COD, TOC
Soil Preparation / Amendments/Dust Control	Guar/Plant Gums	COD, TOC, Ni
Soil Preparation / Amendments/Dust Control	Solid Waste (leakage)	BOD
Vehicle and Equipment Use	Batteries	Sulfuric acid; Pb, pH
Adapted from Attachment S, Caltrans SWPPP/WPCP Preparation Manual, February 2003, and CASQA Construction BMP Handbook, 2003		

7.7.1.5 Sample Collection

Samples of discharge shall be collected at the designated non-visible pollutant sampling locations shown on the Site Maps in Appendix B or in the locations determined by observed breaches, malfunctions, leakages, spills, operational areas, soil amendment application areas, and historical site usage areas that triggered the sampling event.

Grab samples shall be collected and preserved in accordance with the methods identified in the Table, "Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants" provided in Section 7.7.1.6. Only the QSP, or personnel trained in water quality sampling under the direction of the QSP shall collect samples.

Sample collection and handling requirements are described in Section 7.7.7.

7.7.1.6 Sample Analysis

Samples shall be analyzed using the analytical methods identified in Table 7.11.

Samples will be analyzed by the following:

Name of Lab	**Address / Phone No.**	**Cert. No.**
Babcock & Sons, Inc	6100 Quail Valley Ct, Riverside, CA 92507 Phone: 951-653-3351	#2698
A & R Laboratories – Mobile Lab 6	806 N Batavia Orange, CA 92868 Phone: 951-779-0310	#2747

Samples will be delivered to the laboratory by:

Driven by Contractor	☐ Yes	☒ No
Picked up by Laboratory Courier	☒ Yes	☐ No
Shipped	☐ Yes	☒ No

Table 7.11 Sample Collection, Preservation and Analysis for Monitoring Non-Visible Pollutants

Constituent	Analytical Method	Minimum Sample Volume	Sample Containers	Sample Preservation	Reporting Limit	Maximum Holding Time
Notes:						

7.7.1.7 Data Evaluation and Reporting

The QSP shall complete an evaluation of the water quality sample analytical results.

Runoff/downgradient results shall be compared with the associated upgradient/unaffected results and any associated run-on results. Should the runoff/downgradient sample show an increased level of the tested analyte relative to the unaffected background sample, which cannot be explained by run-on results, the BMPs, site conditions, and surrounding influences shall be assessed to determine the probable cause for the increase.

As determined by the site and data evaluation, appropriate BMPs shall be repaired or modified to mitigate discharges of non-visible pollutant concentrations. Any revisions to the BMPs shall be recorded as an amendment to the SWPPP.

The General Permit prohibits the Stormwater discharges that contain hazardous substances equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4. The results of any non-stormwater discharge results that indicate the presence of a hazardous substance in excess of established reportable quantities shall be immediately reported to the Regional Water Board and other agencies as required by 40 C.F.R. §§ 117.3 and 302.4.

Results of non-visible pollutant monitoring shall be reported in the Annual Report.

7.7.2 Sampling and Analysis Plan for pH and Turbidity in Stormwater Runoff Discharges

Sampling and analysis of runoff for pH and turbidity is required for this project. This Sampling and Analysis Plan describes the strategy for monitoring turbidity and pH levels of stormwater runoff discharges from the project site and run-on that may contribute to an exceedance of a Numeric Action Level (NAL).

Samples for turbidity will be collected from all drainage areas with disturbed soil areas and samples for pH will be collected from all drainage areas with a high risk of pH altering discharge.

7.7.2.1 Sampling Schedule

Stormwater runoff samples shall be collected for turbidity from each day of a qualifying rain event that results in a discharge from the project site. At minimum, turbidity samples will be collected from each site discharge location draining a disturbed area. A minimum of three samples will be collected per day of discharge during a qualifying event. Samples should be representative of the total discharge from the project each day of discharge during the qualifying event. Typically, representative samples will be spaced in time throughout the daily discharge event.

Stormwater runoff samples shall be collected for pH from each day of qualifying rain events that result in a discharge from the project site. Note that pH samples are only required to be collected during project phases and from drainage areas with a high risk of pH altering discharge. A minimum of three samples will be collected per day of discharge during a qualifying event. Samples should be representative of the total discharge from the location each day of discharge

during the qualifying event. Typically, representative samples will be spaced in time throughout the daily discharge event.

Stored or collected water from a qualifying storm event when discharged shall be tested for turbidity and pH (when applicable). Stored or collected water from a qualifying event may be sampled at the point it is released from the storage or containment area or at the site discharge location.

Run-on samples shall be collected whenever the QSP identifies that run-on has the potential to contribute to an exceedance of a NAL.

7.7.2.2 Sampling Locations

Sampling locations are based on the site runoff discharge locations and locations where run-on enters the site; accessibility for sampling; and personnel safety. Planned pH and turbidity sampling locations are shown on the Site Maps in Appendix B and include the locations identified in Table 7.13 and Table 7.14.

2 sampling locations at the contractor's yards have been identified for the collection of runoff samples. Table 7.12 also provides an estimate of the site's area that drains to each location.

Table 7.12 Turbidity and pH Runoff Sample Locations

Sample Location Number	Sample Location	Estimate of Site [Factor] (%)
SL#1	Contractor Yard 1	20
SL#2	Contractor Yard 2	40

No sampling locations have been identified for the collection of run-on samples where the run-on has the potential to contribute to an exceedance of an NAL. Since there is no run-on to the site. Table 7.13 identifies the run-on sample locations.

Table 7.13 Turbidity and pH Run-On Sample Locations

Sample Location Number	Sample Location	Sample Location Latitude and Longitude
N/A	N/A	N/A

The project does not receive run-on with the potential to exceed NALs or Receiving Water Monitoring Triggers.

7.7.2.3 Monitoring Preparation

Turbidity and pH samples will be collected and analyzed by:

Contractor	☐ Yes	☒ No
Consultant	☐ Yes	☒ No
Laboratory	☒ Yes	☐ No

Samples on the project site will be collected by the following contractor sampling personnel:

Name/Telephone Number: TBD

Alternate(s)/Telephone Number: TBD

An adequate stock of monitoring supplies and equipment for monitoring turbidity and will be available on the project site prior to a sampling event. Monitoring supplies and equipment will be stored in a cool temperature environment that will not come into contact with rain or direct sunlight. Sampling personnel will be available to collect samples in accordance with the sampling schedule. Supplies maintained at the project site will include, but are not limited to, field meters, extra batteries; clean powder-free nitrile gloves, sample collection equipment, appropriate sample containers, paper towels, personal rain gear, and *Effluent Sampling Field Log Sheets* and CoC forms provided in CSMP Attachment 3 "Example Forms".

The contractor will obtain and maintain the field testing instruments, as identified in Section 7.7.2.6, for analyzing samples in the field by contractor sampling personnel.

Babcock & Sons, Inc	6100 Quail Valley Ct, Riverside, CA 92507 Phone: 951-653-3351	#2698

Samples on the project site will be collected by the following:

Company Name: Babcock & Sons, Inc

Street Address: 6100 Quail Valley Ct

City, State, Zip: Riverside, CA 92507

Telephone Number: 951-653-3351

Point of Contact: N/A

Name of Sampler(s): N/A

Name of Alternate(s): N/A

The QSP or his/her designee will contact Babcock A& Sons, Inc 24 hours prior to a predicted rain event or for an unpredicted event, as soon as a rain event begins to ensure that adequate

sample collection personnel, supplies for monitoring pH and turbidity are available and will be mobilized to collect samples on the project site in accordance with the sampling schedule.

7.7.2.4 Field Parameters

Samples shall be analyzed for the constituents indicated in the Table 7.14.

Table 7.14 Sample Collection and Analysis for Monitoring Turbidity and pH

Parameter	Test Method	Minimum Sample Volume (1)	Sample Collection Container Type	Detection Limit (minimum)
Turbidity	Field meter/probe with calibrated portable instrument	500 mL	Polypropylene or Glass (Do not collect in meter sample cells)	1 NTU
pH	Field meter/probe with calibrated portable instrument or calibrated pH test kit	100 mL	Polypropylene	0.2 pH units

Notes: [1] Minimum sample volume recommended. Specific volume requirements will vary by instrument; check instrument manufacturer instructions.

L – Liter
mL – Milliliter
NTU – Nephelometric Turbidity Unit

7.7.2.5 Sample Collection

Samples of discharge shall be collected at the designated runoff and run-on sampling locations shown on the Site Maps in Appendix B. Run-on samples shall be collected within close proximity of the point of run-on to the project.

Only personnel trained in water quality sampling and field measurements working under the direction of the QSP shall collect samples.

Sample collection and handling requirements are described in Section 7.7.7.

7.7.2.6 Field Measurements

Samples collected for field analysis, collection, analysis and equipment calibration shall be in accordance with the field instrument manufacturer's specifications.

Immediately following collection, samples for field analysis shall be tested in accordance with the field instrument manufacturer's instructions and results recorded on the *Effluent Sampling Field Log Sheet*.

The field instrument(s) listed in Table 7.15 will be used to analyze the following constituents:

Table 7.15 Field Instruments

Field Instrument (Manufacturer and Model)	Constituent
TBD	pH
TBD	Turbidity

The manufacturers' instructions are included in CSMP Attachment 4 "Field Meter Instructions". Field sampling staff shall review the instructions prior to each sampling event and follow the instructions in completing measurement of the samples.

- The instrument(s) shall be maintained in accordance with manufacturer's instructions.
- The instrument(s) shall be calibrated before each sampling and analysis event.
- Maintenance and calibration records shall be maintained with the SWPPP.

The QSP may authorize alternate equipment provided that the equipment meets the Construction General Permit's requirements and the manufacturers' instructions for calibration and use are added to CSMP Attachment 4 "Field Meter Instructions".

7.7.2.7 Data Evaluation and Reporting

Immediately upon completing the measurements for the sampling event, provide the *Effluent Sampling Field Log Sheets* to the QSP for evaluation.

Numeric Action Levels

This project is subject to NALs for pH and turbidity (Table 7.16). Compliance with the NAL for pH and turbidity is based on a daily average. Upon receiving the field log sheets, the QSP shall immediately calculate the arithmetic average of the turbidity samples, and the logarithmic average of the pH samples[1] to determine if the NALs, shown in the table below, have been exceeded.

Table 7.16 Numeric Action Levels

Parameter	Unit	Daily Average
pH	pH units	Lower NAL = 6.5 Upper NAL = 8.5
Turbidity	NTU	250 NTU

The QSP shall within 7 days of the sample collection submit copies of the completed *Effluent Sampling Field Log Sheets* to Jeff Gordon

[1] Daily average pH values must be calculated through the logarithmic method. In order to calculate an average, you must: (1) Convert the pH measurements from logarithms to real numbers; (2) Take the average of the real numbers; and (3) Convert the average of the real numbers back to a logarithm.

In the event that the pH or turbidity NAL is exceeded, the QSP shall immediately notify Jeff Gordon and investigate the cause of the exceedance and identify corrective actions.

Exceedances of NALs shall be electronically reported to the State Water Board by Jeff Gordon through the SMARTs system within 10 days of the conclusion of the storm event. If requested by the Regional Board, a NAL Exceedance report will be submitted. The NAL Exceedance Report must contain the following information:

- Analytical method(s), method reporting unit(s), and MDL(s) of each parameter;
- Date, place, time of sampling, visual observation, and/or measurements, including precipitation; and
- Description of the current BMPs associated with the sample that exceeded the NAL and the proposed corrective actions taken.

Receiving Water Monitoring Triggers

This project is not subject to Receiving Water Monitoring Triggers because it does not have a direct discharge to the receiving water.

7.7.3 Sampling and Analysis Plan for pH, Turbidity, and SSC in Receiving Water

This project is not subject to Receiving Water Monitoring.

7.7.4 Sampling and Analysis Plan for Non-Stormwater Discharges

This Sampling and Analysis Plan for non-stormwater discharges describe the sampling and analysis strategy and schedule for monitoring pollutants in authorized and unauthorized non-stormwater discharges from the project site in accordance with the requirements of the Construction General Permit.

Sampling of non-stormwater discharges will be conducted when an authorized or unauthorized non-stormwater discharge is observed discharging from the project site. In the event that non-stormwater discharges run-on to the project site from offsite locations, and this run-on has the potential to contribute to a violation of a NAL, the run-on will also be sampled.

The following authorized non-stormwater discharges identified in Section 2.7, have the potential to be discharged from the project site.

- Sediment
- Nutrients
- Heavy Metals
- Organic Compounds
- Trash a& Debris
- Oxygen Demanding Substances
- Oil & Grease
- Bacteria & viruses

- Pesticides

In addition to the above authorized stormwater discharges, some construction activities have the potential to result in an unplanned (unauthorized) non-stormwater discharge if BMPs fail. These activities include:

- NONE

7.7.4.1 Sampling Schedule

Samples of authorized or unauthorized non-stormwater discharges shall be collected when they are observed.

7.7.4.2 Sampling Locations

Samples shall be collected from the discharge point of the construction site where the non-stormwater discharge is running off the project site. Site discharge locations are shown on the Site Maps in SWPPP Appendix A and include the locations identified below.

2 sampling locations at the contractor's yards has been identified where non-stormwater discharges may runoff from the project site. (Table 7.20)

Table 7.20 Non-stormwater Discharge Sample Locations

Sample Location Number	Sample Location	Sample Location Latitude and Longitude
SL#1	Contractor Yard 1	33.90866509037326, -117.30111901468509
SL#2	Contractor Yard 2	33.90423630231366, -117.30845999421935

One sampling location has been identified for the collection of non-stormwater discharges that run-on to the project site (Table 7.21).

Table 7.21 Non-stormwater Run-on Sample Locations

Sample Location Number	Sample Location	Sample Location Latitude and Longitude
N/A	N/A	N/A

7.7.4.3 Monitoring Preparation

Non-stormwater discharge samples will be collected by:

Contractor	☐ Yes	☒ No
Consultant	☐ Yes	☐ No
Laboratory	☒ Yes	☐ No

Samples on the project site will be collected by the following contractor sampling personnel:

Name/Telephone Number: TBD

Alternate(s)/Telephone Number: TBD

An adequate stock of monitoring supplies and equipment for monitoring non-stormwater discharges will be available on the project site. Monitoring supplies and equipment will be stored in a cool temperature environment that will not come into contact with rain or direct sunlight. Personnel trained in sampling will be available to collect samples in accordance with the sampling schedule. Supplies maintained at the project site will include, but are not limited to, clean powder-free nitrile gloves, sample collection equipment, field meters, coolers, appropriate number and volume of sample bottles, identification labels, re-sealable storage bags, paper towels, personal rain gear, ice, and *Effluent Sampling Field Log Sheets* and CoC forms provided in CSMP Attachment 3 "Example Forms".

The contractor will obtain and maintain the field testing instruments, as identified in Section 7.7.2, for analyzing samples in the field by contractor sampling personnel.

The QSP or his/her designee will contact Babcock & Sons, Inc, 24 hours prior to a planned non-stormwater discharge or as soon as an unplanned non-stormwater discharge is observed to ensure that adequate sample collection personnel, supplies for non-stormwater discharge monitoring are available and will be mobilized to collect samples on the project site in accordance with the sampling schedule.

7.7.4.4 Analytical Constituents

All non-stormwater discharges that flow through a disturbed area shall, at minimum, be monitored for turbidity.

All non-stormwater discharges that flow through an area where they are exposed to pH altering materials shall be monitored for pH.

The QSP shall identify additional pollutants to be monitored for each non-stormwater discharge incident based on the source of the non-stormwater discharge. If the source of an unauthorized non-stormwater discharge is not known, monitoring for pH, turbidity, MBAS, TOC, and residual chlorine or chloramines is recommended to help identify the source of the discharge.

Non-stormwater discharge run-on shall be monitored, at minimum, for pH and turbidity. The QSP shall identify additional pollutants to be monitored for each non-stormwater discharge incident based on the source of the non-stormwater discharge. If the source of an unauthorized

non-stormwater discharge is not known, monitoring for pH, turbidity, MBAS, TOC, and residual chlorine or chloramines is recommended to help identify the source of the discharge.

Table 7.22 lists the specific sources and types of potential non-visible pollutants on the project site and the water quality indicator constituent(s) for that pollutant.

Table 7.22 Potential Non-Stormwater Discharge Pollutants and Water Quality Indicator Constituents

Pollutant Source	Pollutant	Water Quality Indicator Constituent
Disturbed Areas	Sediment	Turbidity
Concrete Work	pH	pH

7.7.4.5 Sample Collection

Samples shall be collected at the discharge locations where the non-stormwater discharge is leaving the project site. Potential discharge locations are shown on the Site Maps in Appendix B and identified in Section 7.7.4.2.

Grab samples shall be collected and preserved in accordance with the methods identified in Table 7.23. Only personnel trained in water quality sampling under the direction of the QSP shall collect samples.

Sample collection and handling requirements are described in Section 7.7.7.

7.7.4.6 Sample Analysis

Samples shall be analyzed using the analytical methods identified in Table 7.23.

7.7.4.7 Data Evaluation and Reporting

The QSP shall complete an evaluation of the water quality sample analytical results.

Turbidity and pH results shall be evaluated for compliance with NAL as identified in Section 7.7.2.7.

Runoff results shall also be evaluated for the constituents suspected in the non-stormwater discharge. Should the runoff sample indicate the discharge of a pollutant which cannot be explained by run-on results, the BMPs, site conditions, and surrounding influences shall be assessed to determine the probable cause for the increase.

As determined by the site and data evaluation, appropriate BMPs shall be repaired or modified to mitigate discharges of non-visible pollutant concentrations. Any revisions to the BMPs shall be recorded as an amendment to the SWPPP.

Non-Stormwater discharge results shall be submitted with the Annual Report.

The General Permit prohibits the non-Stormwater discharges that contain hazardous substances equal to or in excess of reportable quantities established in 40 C.F.R. §§ 117.3 and 302.4. The results of any non-stormwater discharge results that indicate the presence of a hazardous substance in excess of established reportable quantities shall be immediately reported to the Regional Water Board.

Table 7.23 Sample Collection, Preservation and Analysis for Monitoring Pollutants in Non-Stormwater Discharges

Constituent	Analytical Method	Minimum Sample Volume	Sample Bottle	Sample Preservation	Reporting Limit	Maximum Holding Time
Notes:						

7.7.5 Sampling and Analysis Plan for Other Pollutants Required by the Regional Water Board

The Regional Water Board has not specified monitoring for additional pollutants.

7.7.6 Training of Sampling Personnel

Sampling personnel shall be trained to collect, maintain, and ship samples in accordance with the Surface Water Ambient Monitoring program (SWAMP) 2008 Quality Assurance Program Plan (QAPrP). Training records of designated contractor sampling personnel are provided in Appendix K.

The stormwater sampler(s) and alternate(s) have received the following stormwater sampling training:

Name	**Training**
TBD	
TBD	

The stormwater sampler(s) and alternates have the following stormwater sampling experience:

Name	**Experience**
TBD	
TBD	

7.7.7 Sample Collection and Handling

7.7.7.1 Sample Collection

Samples shall be collected at the designated sampling locations shown on the Site Maps and listed in the preceding sections. Samples shall be collected, maintained and shipped in accordance with the SWAMP 2008 Quality Assurance Program Plan (QAPrP).

Grab samples shall be collected and preserved in accordance with the methods identified in preceding sections.

To maintain sample integrity and prevent cross-contamination, sample collection personnel shall follow the protocols below.

- Collect samples (for laboratory analysis) only in analytical laboratory-provided sample containers;
- Wear clean, powder-free nitrile gloves when collecting samples;
- Change gloves whenever something not known to be clean has been touched;
- Change gloves between sites;
- Decontaminate all equipment (e.g. bucket, tubing) prior to sample collection using a trisodium phosphate water wash, distilled water rinse, and final rinse with distilled water. (Dispose of wash and rinse water appropriately, i.e., do not discharge to

storm drain or receiving water). Do not decontaminate laboratory provided sample containers;

- Do not smoke during sampling events;
- Never sample near a running vehicle;
- Do not park vehicles in the immediate sample collection area (even non-running vehicles);
- Do not eat or drink during sample collection; and
- Do not breathe, sneeze, or cough in the direction of an open sample container.

The most important aspect of grab sampling is to collect a sample that represents the entire runoff stream. Typically, samples are collected by dipping the collection container in the runoff flow paths and streams as noted below.

i. For small streams and flow paths, simply dip the bottle facing upstream until full.
ii. For larger stream that can be safely accessed, collect a sample in the middle of the flow stream by directly dipping the mouth of the bottle. Once again making sure that the opening of the bottle is facing upstream as to avoid any contamination by the sampler.
iii. For larger streams that cannot be safely waded, pole-samplers may be needed to safely access the representative flow.
iv. Avoid collecting samples from ponded, sluggish or stagnant water.
v. Avoid collecting samples directly downstream from a bridge as the samples can be affected by the bridge structure or runoff from the road surface.

Note, that depending upon the specific analytical test, some containers may contain preservatives. These containers should **never** be dipped into the stream, but filled indirectly from the collection container.

7.7.7.2 Sample Handling

Turbidity and pH measurements must be conducted immediately. Do not store turbidity or pH samples for later measurement.

Samples for laboratory analysis must be handled as follows. Immediately following sample collection:

- Cap sample containers;
- Complete sample container labels;
- Sealed containers in a re-sealable storage bag;
- Place sample containers into an ice-chilled cooler;
- Document sample information on the *Effluent Sampling Field Log Sheet*; and
- Complete the CoC.

All samples for laboratory analysis must be maintained between 0-6 degrees Celsius during delivery to the laboratory. Samples must be kept on ice, or refrigerated, from sample collection through delivery to the laboratory. Place samples to be shipped inside coolers with ice. Make sure the sample bottles are well packaged to prevent breakage and secure cooler lids with packaging tape.

Ship samples that will be laboratory analyzed to the analytical laboratory right away. Hold times are measured from the time the sample is collected to the time the sample is analyzed. The General Permit requires that samples be received by the analytical laboratory within 48 hours of the physical sampling (unless required sooner by the analytical laboratory).

Name of Lab	Address / Phone No.	Cert. No.
Babcock & Sons, Inc	6100 Quail Valley Ct, Riverside, CA 92507 Phone: 951-653-3351	#2698
A & R Laboratories – Mobile Lab 6	806 N Batavia Orange, CA 92868 Phone: 951-779-0310	#2747

7.7.7.3 Sample Documentation Procedures

All original data documented on sample bottle identification labels, *Effluent Sampling Field Log Sheet*, and CoCs shall be recorded using waterproof ink. These shall be considered accountable documents. If an error is made on an accountable document, the individual shall make corrections by lining through the error and entering the correct information. The erroneous information shall not be obliterated. All corrections shall be initialed and dated.

Duplicate samples shall be identified consistent with the numbering system for other samples to prevent the laboratory from identifying duplicate samples. Duplicate samples shall be identified in the Effluent Sampling Field Log Sheet.

Sample documentation procedures include the following:

Sample Bottle Identification Labels: Sampling personnel shall attach an identification label to each sample bottle. Sample identification shall uniquely identify each sample location.

Field Log Sheets: Sampling personnel shall complete the *Effluent Sampling Field Log Sheet* and *Receiving Water Sampling Field Log Sheet* for each sampling event, as appropriate.

Chain of Custody: Sampling personnel shall complete the CoC for each sampling event for which samples are collected for laboratory analysis. The sampler will sign the CoC when the sample(s) is turned over to the testing laboratory or courier.

7.8 Active Treatment System Monitoring

An Active Treatment System (ATS) will be deployed on the site?

☐ Yes ☒ No

This project does not require a project specific Sampling and Analysis Plan for an ATS and deployment of an ATS is not planned.

7.9 Bioassessment Monitoring

This project is not subject to bioassessment monitoring because it is not a Risk Level 3 project.

7.10 Watershed Monitoring Option

This project is not participating in a watershed monitoring option.

7.11 Quality Assurance and Quality Control

An effective Quality Assurance and Quality Control (QA/QC) plan shall be implemented as part of the CSMP to ensure that analytical data can be used with confidence. QA/QC procedures to be initiated include the following:

- Field logs;
- Clean sampling techniques;
- CoCs;
- QA/QC Samples; and
- Data verification.

Each of these procedures is discussed in more detail in the following sections.

7.11.1 Field Logs

The purpose of field logs is to record sampling information and field observations during monitoring that may explain any uncharacteristic analytical results. Sampling information to be included in the field log include the date and time of water quality sample collection, sampling personnel, sample container identification numbers, and types of samples that were collected. Field observations should be noted in the field log for any abnormalities at the sampling location (color, odor, BMPs, etc.). Field measurements for pH and turbidity should also be recorded in the field log. A Visual Inspection Field Log, an Effluent Sampling Field Log Sheet, [and a Receiving Water Sampling Field Log Sheet] are included in CSMP Attachment 3 "Example Forms".

7.11.2 Clean Sampling Techniques

Clean sampling techniques involve the use of certified clean containers for sample collection and clean powder-free nitrile gloves during sample collection and handling. As discussed in Section 7.7.7, adoption of a clean sampling approach will minimize the chance of field contamination and questionable data results.

7.11.3 Chain of Custody

The sample CoC is an important documentation step that tracks samples from collection through analysis to ensure the validity of the sample. Sample CoC procedures include the following:

- Proper labeling of samples;

- Use of CoC forms for all samples; and
- Prompt sample delivery to the analytical laboratory.

Analytical laboratories usually provide CoC forms to be filled out for sample containers. An example CoC is included in CSMP Attachment 3 "Example Forms".

7.11.4 QA/QC Samples

QA/QC samples provide an indication of the accuracy and precision of the sample collection; sample handling; field measurements; and analytical laboratory methods. The following types of QA/QC will be conducted for this project:

☒ Field Duplicates at a frequency of [5 percent or 1 duplicate minimum per sampling event] (Required for all sampling plans with field measurements or laboratory analysis)

☐ Equipment Blanks at a frequency of [Insert frequency required by method] (Only needed if equipment used to collect samples could add the pollutants to sample)

☐ Field Blanks at a frequency of [Insert frequency required by method] (Only required if sampling method calls for field blanks)

☐ Travel Blanks at a frequency of [Insert frequency required by method] (Required for sampling plans that include VOC laboratory analysis)

7.11.4.1 Field Duplicates

Field duplicates provide verification of laboratory or field analysis and sample collection. Duplicate samples shall be collected, handled, and analyzed using the same protocols as primary samples. The sample location where field duplicates are collected shall be randomly selected from the discharge locations. Duplicate samples shall be collected immediately after the primary sample has been collected. Duplicate samples must be collected in the same manner and as close in time as possible to the original sample. Duplicate samples shall not influence any evaluations or conclusion.

7.11.4.2 Equipment Blanks

Equipment blanks provide verification that equipment has not introduced a pollutant into the sample. Equipment blanks are typically collected when:

- New equipment is used;
- Equipment that has been cleaned after use at a contaminated site;
- Equipment that is not dedicated for surface water sampling is used; or
- Whenever a new lot of filters is used when sampling metals.

7.11.4.3 Field Blanks

Field blanks assess potential sample contamination levels that occur during field sampling activities. De-ionized water field blanks are taken to the field, transferred to the appropriate container, and treated the same as the corresponding sample type during the course of a sampling event.

7.11.4.4 Travel Blanks

Travel blanks assess the potential for cross-contamination of volatile constituents between sample containers during shipment from the field to the laboratory. De-ionized water blanks are taken along for the trip and held unopened in the same cooler with the VOC samples.

7.11.5 Data Verification

After results are received from the analytical laboratory, the QSP shall verify the data to ensure that it is complete, accurate, and the appropriate QA/QC requirements were met. Data must be verified as soon as the data reports are received. Data verification shall include:

- Check the CoC and laboratory reports.
  Make sure all requested analyses were performed and all samples are accounted for in the reports.
- Check laboratory reports to make sure hold times were met and that the reporting levels meet or are lower than the reporting levels agreed to in the contract.
- Check data for outlier values and follow up with the laboratory.
  Occasionally typographical errors, unit reporting errors, or incomplete results are reported and should be easily detected. These errors need to be identified, clarified, and corrected quickly by the laboratory. The QSP should especially note data that is an order of magnitude or more different than similar locations, or is inconsistent with previous data from the same location.
- Check laboratory QA/QC results.
  EPA establishes QA/QC checks and acceptable criteria for laboratory analyses. These data are typically reported along with the sample results. The QSP shall evaluate the reported QA/QC data to check for contamination (method, field, and equipment blanks), precision (laboratory matrix spike duplicates), and accuracy (matrix spikes and laboratory control samples). When QA/QC checks are outside acceptable ranges, the laboratory must flag the data, and usually provides an explanation of the potential impact to the sample results.
- Check the data set for outlier values and, accordingly, confirm results and re-analyze samples where appropriate.
  Sample re-analysis should only be undertaken when it appears that some part of the QA/QC resulted in a value out of the accepted range. Sample results may not be discounted unless the analytical laboratory identifies the required QA/QC criteria were not met and confirms this in writing.

Field data including inspections and observations must be verified as soon as the field logs are received, typically at the end of the sampling event. Field data verification shall include:

- Check field logs to make sure all required measurements were completed and appropriately documented;
- Check reported values that appear out of the typical range or inconsistent;
  Follow-up immediately to identify potential reporting or equipment problems, if appropriate, recalibrate equipment after sampling;
- Verify equipment calibrations;
- Review observations noted on the field logs; and

- Review notations of any errors and actions taken to correct the equipment or recording errors.

7.12 Records Retention

All records of stormwater monitoring information and copies of reports (including Annual Reports) must be retained for a period of at least three years from date of submittal or longer if required by the Regional Water Board.

Results of visual monitoring, field measurements, and laboratory analyses must be kept in the SWPPP along with CoCs, and other documentation related to the monitoring.

Records are to be kept onsite while construction is ongoing. Records to be retained include:

- The date, place, and time of inspections, sampling, visual observations, and/or measurements, including precipitation;
- The individual(s) who performed the inspections, sampling, visual observation, and/or field measurements;
- The date and approximate time of field measurements and laboratory analyses;
- The individual(s) who performed the laboratory analyses;
- A summary of all analytical results, the method detection limits and reporting limits, and the analytical techniques or methods used;
- Rain gauge readings from site inspections;
- QA/QC records and results;
- Calibration records;
- Visual observation and sample collection exemption records;
- The records of any corrective actions and follow-up activities that resulted from analytical results, visual observations, or inspections

CSMP Attachment 1: Weather Reports

CSMP Attachment 2: Monitoring Records

CSMP Attachment 3: Example Forms

Rain Gauge Log Sheet				
Construction Site Name: Meridian Park Upper Plateau				
WDID #:				
Date (mm/dd/yy)	Time (24-hr)	Initials	Rainfall Depth (Inches)	Notes:

Risk Level 1, 2, 3 ***Visual Inspection Field Log Sheet***						
Date and Time of Inspection:				Report Date:		
Inspection Type:	☐ Weekly	☐ Before predicted rain	☐ During rain event	☐ Following qualifying rain event	☐ Contained stormwater release	☐ Quarterly non-stormwater
Site Information						
Construction Site Name:						
Construction stage and completed activities:				Approximate area of exposed site:		
Weather and Observations						
Date Rain Predicted to Occur:				Predicted % chance of rain:		
Estimate storm beginning: _____ (date and time)		Estimate storm duration: _____ (hours)		Estimate time since last storm: _____ (days or hours)		Rain gauge reading:_____ (inches)
Observations: If yes identify location						
Odors	Yes ☐ No ☐					
Floating material	Yes ☐ No ☐					
Suspended Material	Yes ☐ No ☐					
Sheen	Yes ☐ No ☐					
Discolorations	Yes ☐ No ☐					
Turbidity	Yes ☐ No ☐					
Site Inspections						
Outfalls or BMPs Evaluated			**Deficiencies Noted**			
(add additional sheets or attached detailed BMP Inspection Checklists)						
Photos Taken:	Yes ☐	No ☐	Photo Reference IDs:			
Corrective Actions Identified (note if SWPPP/REAP change is needed)						
Inspector Information						
Inspector Name:				Inspector Title:		

Signature:	Date:

Risk Level 2 ***Effluent Sampling Field Log Sheets***			
Construction Site Name: Meridian Park Upper Plateau	Date:	Time Start:	
Sampler:			
Sampling Event Type:	☐ Stormwater	☐ Non-stormwater	☐ Non-visible pollutant

Field Meter Calibration	
pH Meter ID No./Desc.: Calibration Date/Time:	Turbidity Meter ID No./Desc.: Calibration Date/Time:

Field pH and Turbidity Measurements

Discharge Location Description	pH	Turbidity	Time

Grab Samples Collected

Discharge Location Description	Sample Type	Time

Additional Sampling Notes:
Time End:

NAL Exceedance Evaluation Summary Report	**Page __ of __**
Project Name	**Meridian Park Upper Plateau**
Project WDID	
Project Location	
Date of Exceedance	
Type of Exceedance	**NAL Daily Average ☐ pH ☐ Turbidity** **☐ Other (specify) _____**
Measurement or Analytical Method	**☐ Field meter** **(Sensitivity: _____)** **☐ Lab method (specify) _____** **(Reporting Limit: _____)** **(MDL: _____)**
Calculated Daily Average	**☐ pH _____ pH units** **☐ Turbidity _____ NTU**
Rain Gauge Measurement	**_____ inches**
Compliance Storm Event	**_____ inches (5-year, 24-hour event)**
Visual Observations on Day of Exceedance	

NAL Exceedance Evaluation Summary Report	**Page __ of __**
Description of BMPs in Place at Time of Event	
Initial Assessment of Cause	
Corrective Actions Taken (deployed after exceedance)	
Additional Corrective Actions Proposed	
Report Completed By	_____ **(Print Name, Title)**
Signature	_____

CHAIN-OF-CUSTODY **DATE:** **Lab ID:**

DESTINATION LAB: ATTN: **ADDRESS:** **Office Phone:** **Cell Phone:**							REQUESTED ANALYSIS				Notes:	
SAMPLED BY:												
Contact:												
Project Name												
Client Sample ID	**Sample Date**	**Sample Time**	**Sample Matrix**	**Container #**	**Container Type**	**Container Pres.**						

SENDER COMMENTS:	**RELINQUISHED BY**	
	Signature:	
	Print:	
	Company:	
	Date:	TIME:
LABORATORY COMMENTS:	**RECEIVED BY**	
	Signature:	
	Print:	
	Company:	
	Date:	TIME:

CSMP Attachment 4: Field Meter Instructions

CSMP Attachment 5: Supplemental Information

Section 8 References

State Water Resources Control Board (2009). Order 2009-0009-DWQ, NPDES General Permit No. CAS000002: National Pollutant Discharges Elimination System (NPDES) California General Permit for Stormwater Discharge Associated with Construction and Land Disturbing Activities. Available on-line at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml.

State Water Resources Control Board (2010). Order 2010-0014-DWQ, NPDES General Permit No. CAS000002: National Pollutant Discharges Elimination System (NPDES) California General Permit for Stormwater Discharge Associated with Construction and Land Disturbing Activities. Available on-line at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml.

State Water Resources Control Board (2012). Order 2012-0006-DWQ, NPDES General Permit No. CAS000002: National Pollutant Discharges Elimination System (NPDES) California General Permit for Stormwater Discharge Associated with Construction and Land Disturbing Activities. Available on-line at: http://www.waterboards.ca.gov/water_issues/programs/stormwater/construction.shtml.

CASQA 2009, *Stormwater BMP Handbook Portal: Construction*, November 2009, www.casqa.org

Appendix A: Calculations

R-FACTOR

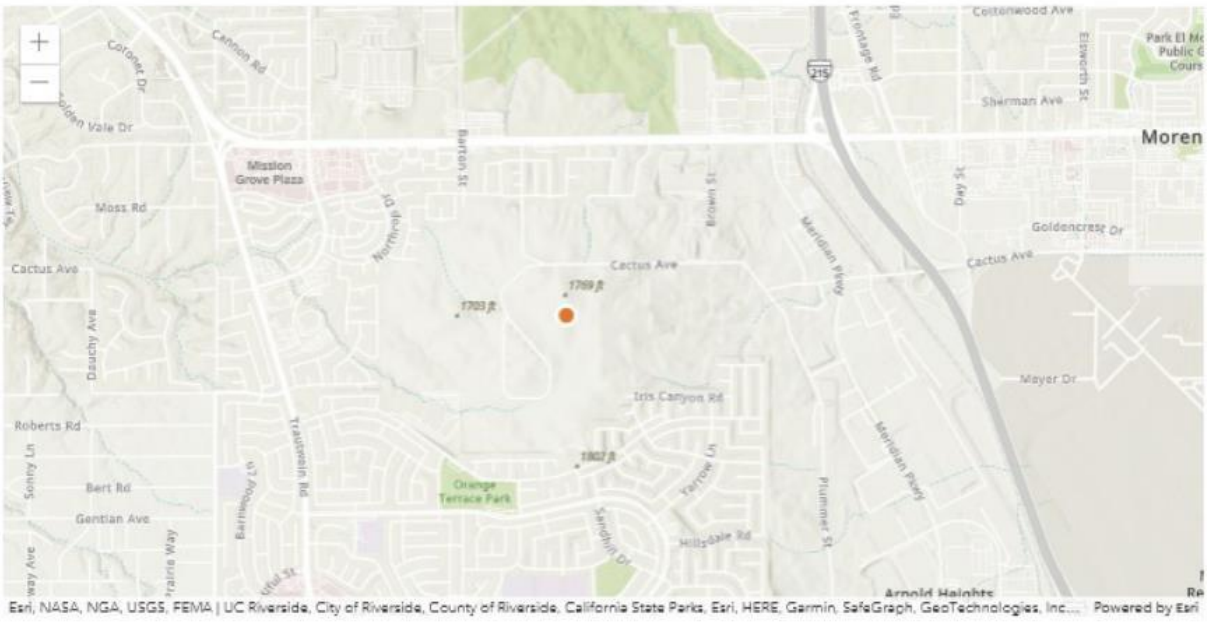
1 Select the estimated start and end dates of construction by clicking the boxes and using the dropdown calendar.

The period of construction activity begins at initial earth disturbance and ends with final stabilization.

Start Date: 02 / 01 / 2024 **End Date:** 02 / 01 / 2025

2 Locate your small construction project using the search box below or by clicking on the map.

Location: 33.906424773806826, -117.30653053419394 **Search**



3 Click the "Calculate R Factor" button below to calculate an R Factor for your small construction project.

Calculate R Factor

Facility Information

Start Date: 02/01/2024	**Latitude:** 33.9064
End Date: 02/01/2025	**Longitude:** -117.3065

Calculation Results

Rainfall erosivity factor (R Factor) = **35.55**

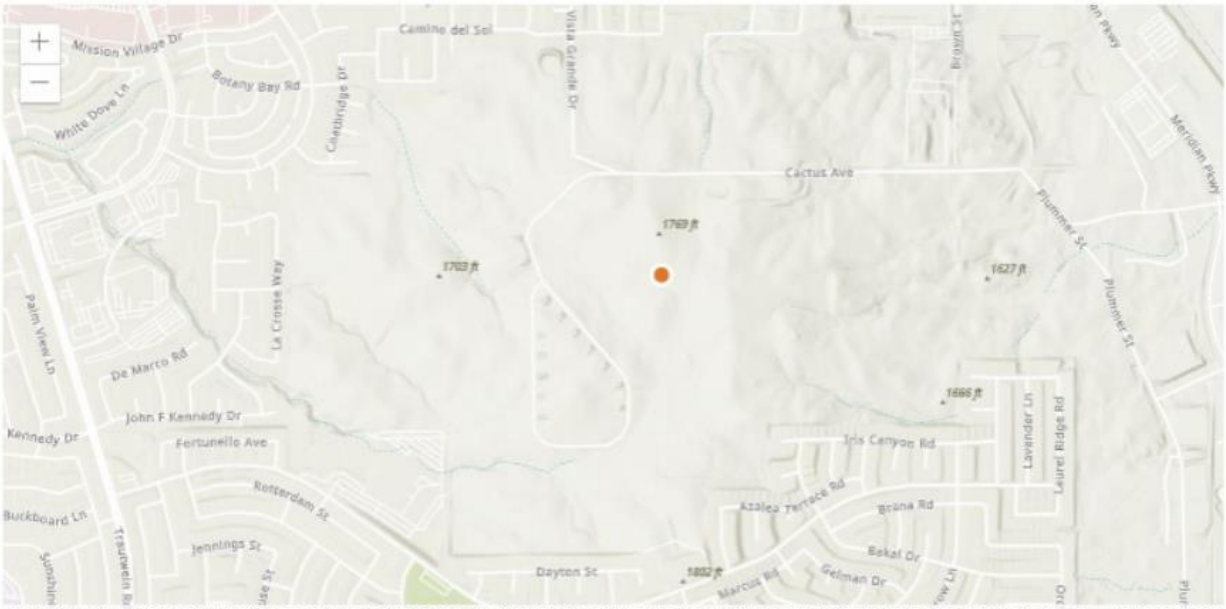
1 Select the estimated start and end dates of construction by clicking the boxes and using the dropdown calendar.

The period of construction activity begins at initial earth disturbance and ends with final stabilization.

Start Date: 02 / 01 / 2025 **End Date:** 02 / 01 / 2026

2 Locate your small construction project using the search box below or by clicking on the map.

Location: 33.906424773806826, -117.30653053419394 **Search**



3 Click the "Calculate R Factor" button below to calculate an R Factor for your small construction project.

Calculate R Factor

Facility Information

Start Date: 02/01/2025	**Latitude:** 33.9064
End Date: 02/01/2026	**Longitude:** -117.3065

Calculation Results

Rainfall erosivity factor (R Factor) = **35.55**

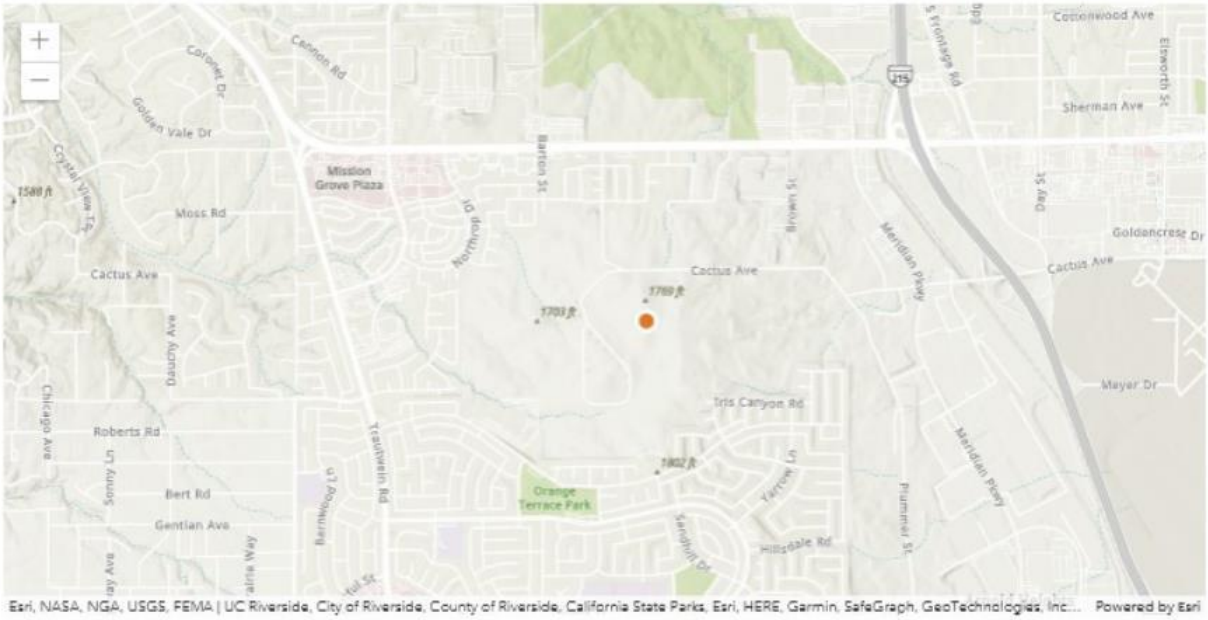
1 Select the estimated start and end dates of construction by clicking the boxes and using the dropdown calendar.

The period of construction activity begins at initial earth disturbance and ends with final stabilization.

Start Date: 02 / 01 / 2026 **End Date:** 02 / 01 / 2027

2 Locate your small construction project using the search box below or by clicking on the map.

Location: 33.906424773806826, -117.30653053419394 **Search**



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Calculate R Factor

Facility Information

Start Date: 02/01/2026	**Latitude:** 33.9064
End Date: 02/01/2027	**Longitude:** -117.3065

Calculation Results

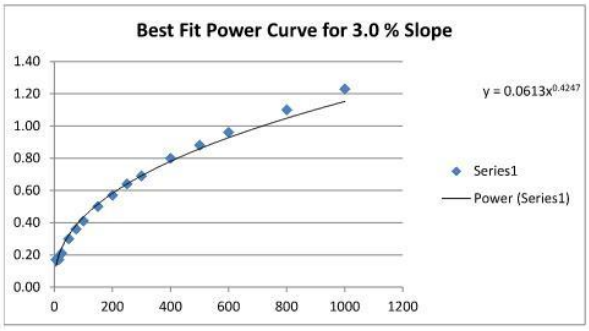
Rainfall erosivity factor (R Factor) = **35.55**

K-FACTOR

0.24
0.2
0.2
0.24
0.2
0.24
Image Landsat / Copernicus
Google Earth
1985
33°55'04.57" N 117°18'22.99" W elev 1598 ft eye alt 39782 ft

LS FACTOR

Sheet Flow Length (ft)	Average Watershed Slope (%) 0.2	0.5	1.0	2.0	3.0	4.0	5.0	6.0	8.0	10.0	12.0	14.0	16.0	20.0
<3	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.35	0.36	0.38	0.39	0.41
6	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.37	0.41	0.45	0.49	0.56
9	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.38	0.45	0.51	0.56	0.67
12	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.39	0.47	0.55	0.62	0.76
15	0.05	0.07	0.09	0.13	0.17	0.20	0.23	0.26	0.32	0.40	0.49	0.58	0.67	0.84
25	0.05	0.07	0.10	0.16	0.21	0.26	0.31	0.36	0.45	0.57	0.71	0.85	0.98	1.24
50	0.05	0.08	0.13	0.21	0.30	0.38	0.46	0.54	0.70	0.91	1.15	1.40	1.64	2.10
75	0.05	0.08	0.14	0.25	0.36	0.47	0.58	0.69	0.91	1.20	1.54	1.87	2.21	2.86
100	0.05	0.09	0.15	0.28	0.41	0.55	0.68	0.82	1.10	1.46	1.88	2.31	2.73	3.57
150	0.05	0.09	0.17	0.33	0.50	0.68	0.86	1.05	1.43	1.92	2.51	3.09	3.68	4.85
200	0.06	0.10	0.18	0.37	0.57	0.79	1.02	1.25	1.72	2.34	3.07	3.81	4.56	6.04
250	0.06	0.10	0.19	0.40	0.64	0.89	1.16	1.43	1.99	2.72	3.60	4.48	5.37	7.16
300	0.06	0.10	0.20	0.43	0.69	0.98	1.28	1.60	2.24	3.09	4.09	5.11	6.15	8.23
400	0.06	0.11	0.22	0.48	0.80	1.14	1.51	1.90	2.70	3.75	5.01	6.30	7.60	10.24
500	0.06	0.12	0.23	0.52	0.88	1.28	1.71	2.17	3.11	4.35	5.84	7.38	8.93	12.09
600	0.06	0.12	0.24	0.56	0.96	1.42	1.91	2.43	3.52	4.95	6.67	8.45	10.26	13.94
800	0.06	0.12	0.26	0.63	1.10	1.65	2.25	2.89	4.24	6.03	8.17	10.40	12.69	17.35
1000	0.06	0.13	0.27	0.69	1.23	1.86	2.55	3.30	4.91	7.02	9.57	12.23	14.96	20.57
5052					2.29									



Length	2350.00
height	147'
slope	2.91%

from hydrology map

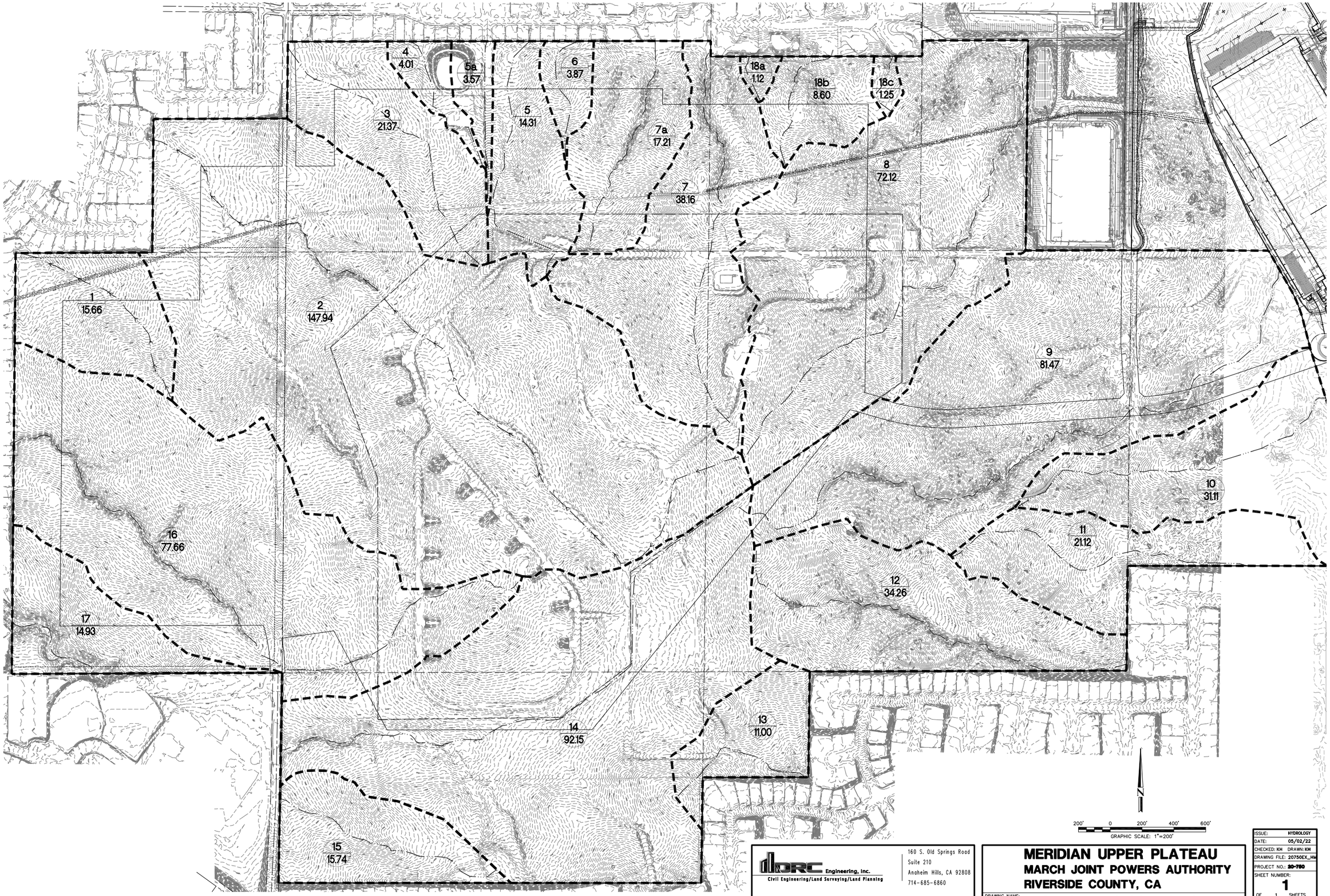
LS Factors for Construction Sites. *Table from Renard et. al., 1997.*

RISK ASSESEMENT

	A	B	C
1	**Sediment Risk Factor Worksheet**		**Entry**
2	**A) R Factor**		
3	Analyses of data indicated that when factors other than rainfall are held constant, soil loss is directly proportional to a rainfall factor composed of total storm kinetic energy (E) times the maximum 30-min intensity (I30) (Wischmeier and Smith, 1958). The numerical value of R is the average annual sum of EI30 for storm events during a rainfall record of at least 22 years. "Isoerodent" maps were developed based on R values calculated for more than 1000 locations in the Western U.S. Refer to the link below to determine the R factor for the project site.		
4	http://cfpub.epa.gov/npdes/stormwater/LEW/lewCalculator.cfm		
5	**R Factor Value**		106.65
6	**B) K Factor (weighted average, by area, for all site soils)**		
7	The soil-erodibility factor K represents: (1) susceptibility of soil or surface material to erosion, (2) transportability of the sediment, and (3) the amount and rate of runoff given a particular rainfall input, as measured under a standard condition. Fine-textured soils that are high in clay have low K values (about 0.05 to 0.15) because the particles are resistant to detachment. Coarse-textured soils, such as sandy soils, also have low K values (about 0.05 to 0.2) because of high infiltration resulting in low runoff even though these particles are easily detached. Medium-textured soils, such as a silt loam, have moderate K values (about 0.25 to 0.45) because they are moderately susceptible to particle detachment and they produce runoff at moderate rates. Soils having a high silt content are especially susceptible to erosion and have high K values, which can exceed 0.45 and can be as large as 0.65. Silt-size particles are easily detached and tend to crust, producing high rates and large volumes of runoff. Use Site-specific data must be submitted.		
8	Site-specific K factor guidance		
9	**K Factor Value**		0.2
10	**C) LS Factor (weighted average, by area, for all slopes)**		
11	The effect of topography on erosion is accounted for by the LS factor, which combines the effects of a hillslope-length factor, L, and a hillslope-gradient factor, S. Generally speaking, as hillslope length and/or hillslope gradient increase, soil loss increases. As hillslope length increases, total soil loss and soil loss per unit area increase due to the progressive accumulation of runoff in the downslope direction. As the hillslope gradient increases, the velocity and erosivity of runoff increases. Use the LS table located in separate tab of this spreadsheet to determine LS factors. Estimate the weighted LS for the site prior to construction.		
12	LS Table		
13	**LS Factor Value**		2.29
14			
15	**Watershed Erosion Estimate (=RxKxLS) in tons/acre**		48.8457
16	**Site Sediment Risk Factor**		
17	Low Sediment Risk: < 15 tons/acre		
18	Medium Sediment Risk: >=15 and <75 tons/acre		**Medium**
19	High Sediment Risk: >= 75 tons/acre		
20			

Appendix B: Site Maps

Vicinity Map



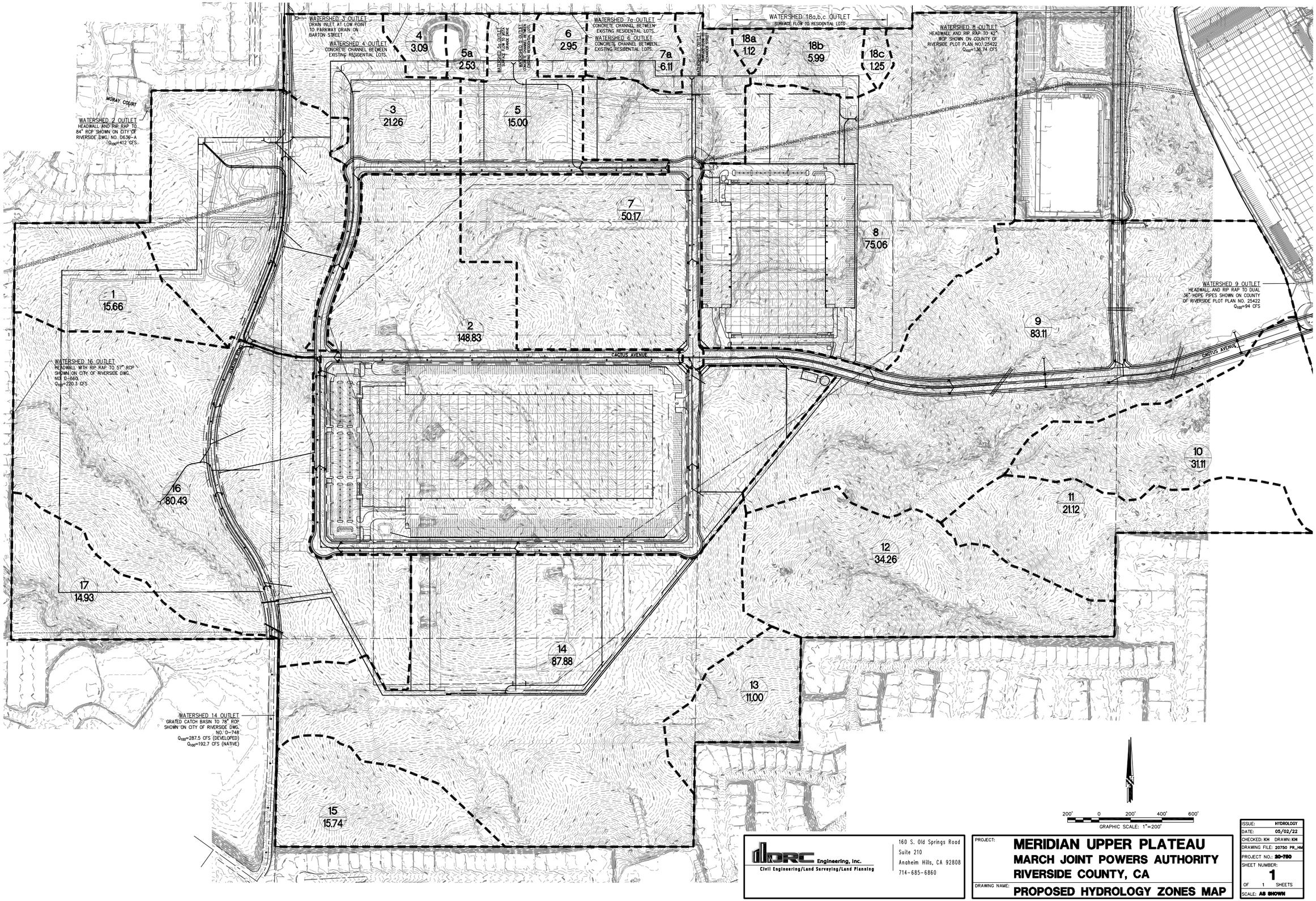
Engineering, inc.
Civil Engineering/Land Surveying/Land Planning

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

MERIDIAN UPPER PLATEAU
MARCH JOINT POWERS AUTHORITY
RIVERSIDE COUNTY, CA

DRAWING NAME: **EXISTING HYDROLOGY ZONES MAP**

ISSUE:	HYDROLOGY
DATE:	05/02/22
CHECKED: KH	DRAWN: KH
DRAWING FILE:	20750EX_HM
PROJECT NO.:	20-750
SHEET NUMBER:	1
OF 1	SHEETS
SCALE:	AS SHOWN

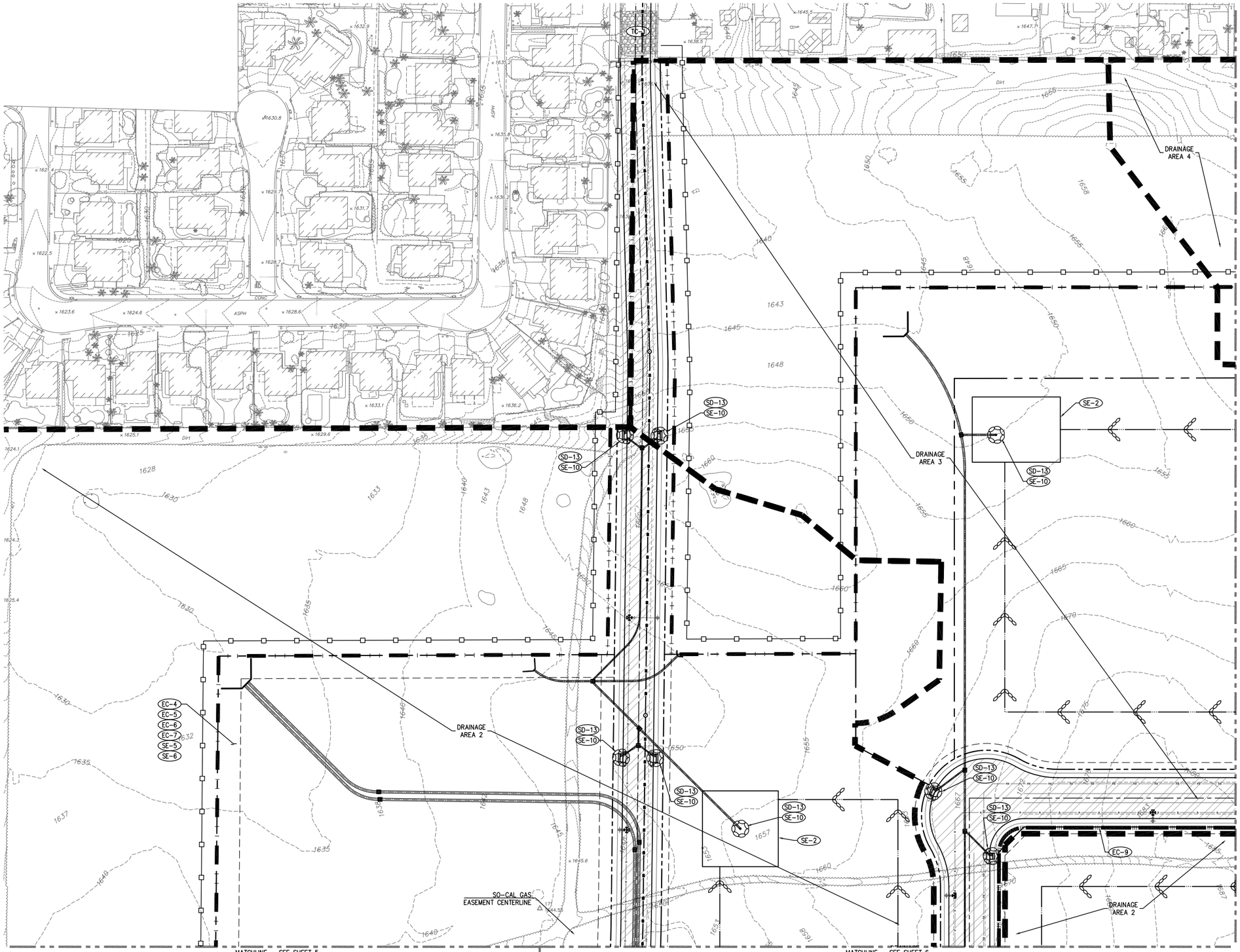


BRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

PROJECT: **MERIDIAN UPPER PLATEAU**
MARCH JOINT POWERS AUTHORITY
RIVERSIDE COUNTY, CA

DRAWING NAME: **PROPOSED HYDROLOGY ZONES MAP**

ISSUE:	HYDROLOGY
DATE:	05/02/22
CHECKED: KH	DRAWN: KH
DRAWING FILE:	20750 PR_HM
PROJECT NO.:	20-750
SHEET NUMBER:	1
OF 1	SHEETS
SCALE:	AS SHOWN



BMP NOTES:

- NS-3 PAVING OPERATIONS PER BMP NS-3
- NS-9 VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
- NS-10 VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
- SD-13 STORM DRAIN SIGNAGE PER BMP SD-13
- SD-32 TRASH STORAGE AREAS PER BMP SD-32
- [1] SE-1 INSTALL SILT FENCE PER BMP SE-1
- SE-2 CONSTRUCT SEDIMENT BASIN PER BMP SE-2
- SE-4 INSTALL GRAVEL BAG CHECK DAMS SE-4
- [1] SE-5 INSTALL FIBER ROLLS PER BMP SE-5
- [1] SE-6 INSTALL GRAVEL BAGS PER BMP SE-6
- [1] SE-10 CONSTRUCT STORM DRAIN INLET PROTECTION PER BMP SE-10
- [2] TC-1 CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP TC-1
- WM-1 CONSTRUCT MATERIAL AND DELIVERY STORAGE PER BMP WM-1
- WM-3 STOCKPILE MANAGEMENT PER BMP WM-3
- WM-8 CONCRETE WASTE MANAGEMENT PER BMP WM-8
- WM-9 SANITARY/SEPTIC WASTE MANAGEMENT PER BMP WM-9
- [3] EC-4 HYDROSEEDING PER BMP EC-4
- [3] EC-5 SOIL BINDERS PER BMP EC-5
- [3] EC-6 STRAW MULCH PER BMP EC-6
- [3] EC-7 GEOTEXTILES AND MATS PER BMP EC-7
- EC-9 EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
- [3] SE-5 FIBER ROLLS PER BMP SE-5
- [3] SE-6 GRAVEL BAG BERM PER BMP SE-6

[1] CONTRACTOR TO USE EITHER SILT FENCE, FIBER ROLLS, OR GRAVEL BAG BERMS BASED ON THE FIELD CONDITIONS

[2] CONTRACTOR SHALL PLACE TC-1 AS NEEDED

[3] CONTRACTOR WILL USE ONE OR MORE OF THESE BMP CONTROLS ON SLOPES

LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

EXTERNAL REFERENCES: 20-750bs101 20-750ond102 20750ma101 20750ulma101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD_ 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22, 2023 12:29pm, PLOTTED BY: SAADAT, ON: Mar 22, 2023 12:29pm, CTS:

Underground Service Alert
Call: TOLL FREE
811
TWO WORKING DAYS BEFORE YOU DIG

A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE

ENGINEER

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

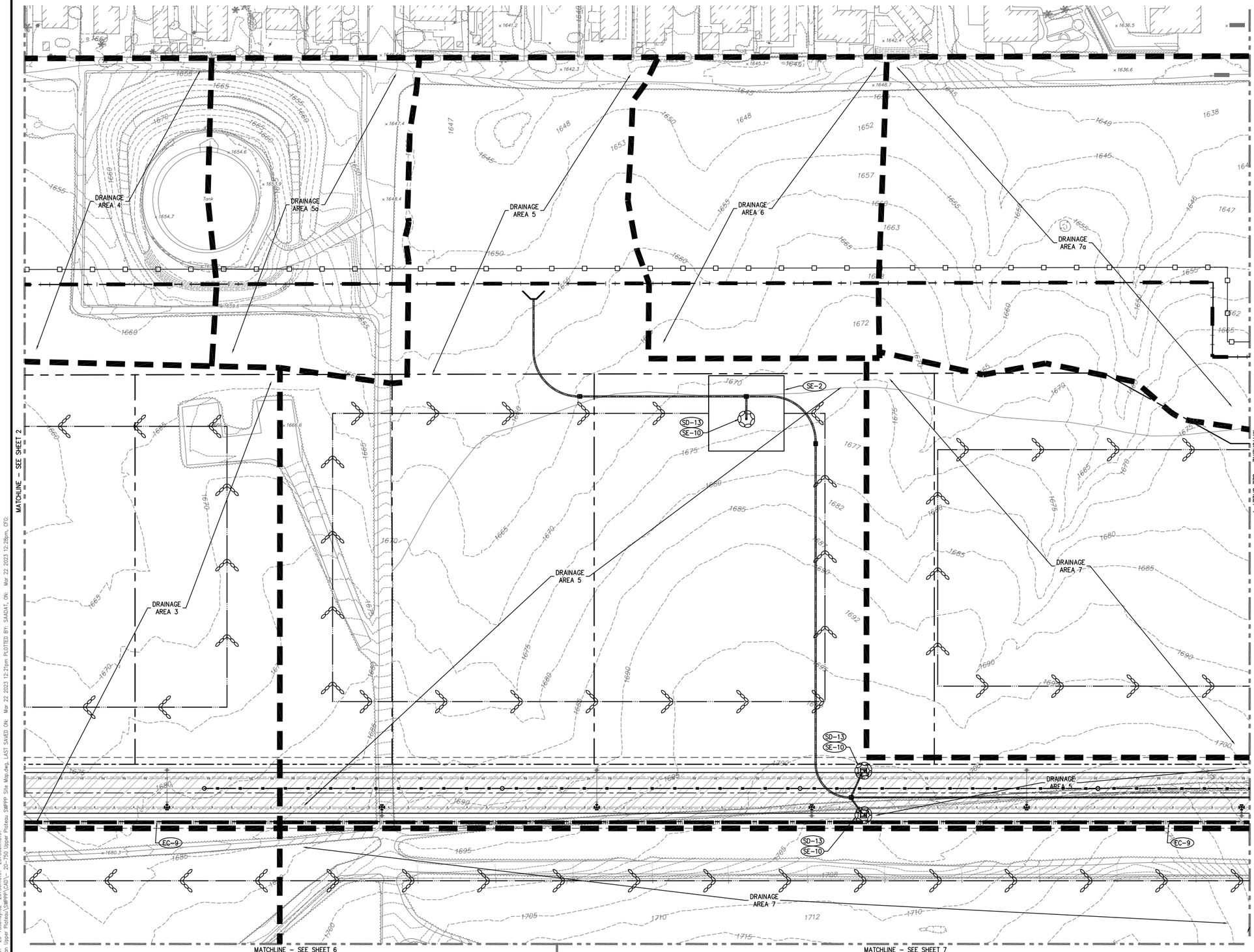
PREPARED BY:
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 2
OF 15 SHEETS



BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
NS-9	VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10	VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
SD-13	STORM DRAIN SIGNAGE PER BMP SD-13
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SE-2	CONSTRUCT SEDIMENT BASIN PER BMP SE-2
SE-4	INSTALL GRAVEL BAG CHECK DAMS SE-4
[1] SE-5	INSTALL FIBER ROLLS PER BMP SE-5
[1] SE-6	INSTALL GRAVEL BAGS PER BMP SE-6
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[3] EC-7	GEOTEXTILES AND MATS PER BMP EC-7
EC-9	EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
[3] SE-5	FIBER ROLLS PER BMP SE-5
[3] SE-6	GRAVEL BAG BERM PER BMP SE-6

[1] CONTRACTOR TO USE EITHER SILT FENCE, FIBER ROLLS, OR GRAVEL BAG BERMS BASED ON THE FIELD CONDITIONS

[2] CONTRACTOR SHALL PLACE TC-1 AS NEEDED

[3] CONTRACTOR WILL USE ONE OR MORE OF THESE BMP CONTROLS ON SLOPES

LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

Underground Service Alert

CALL BEFORE YOU DIG

Call: TOLL FREE

811

TWO WORKING DAYS BEFORE YOU DIG

BENCHMARK DESCRIPTION

A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971

ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE

ENGINEER

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:

RC Engineering, Inc.

Civil Engineering/Land Surveying/Land Planning

160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

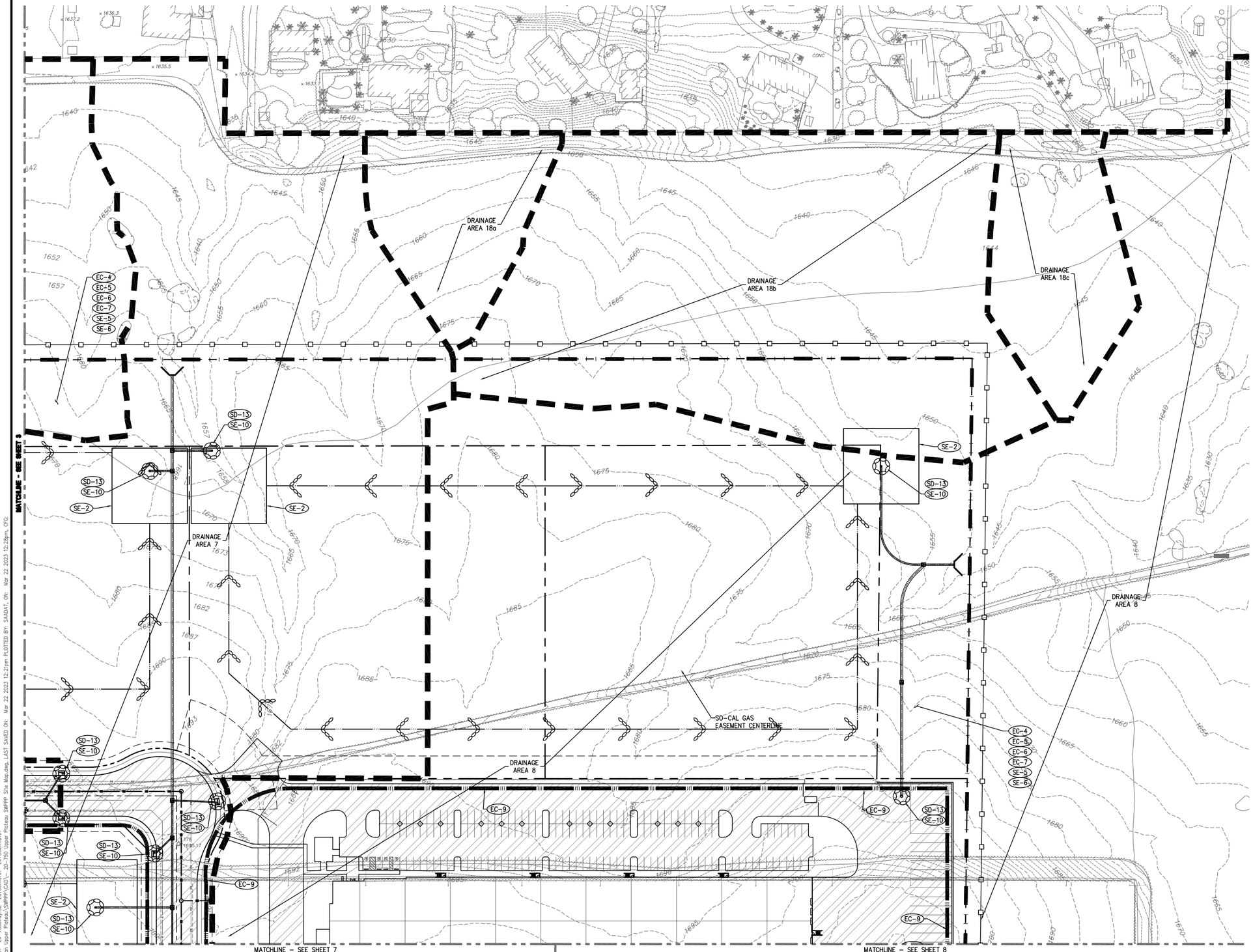
SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 3

OF 15 SHEETS

EXTERNAL REFERENCES: 20750tb101 20-750 Meridian Upper Plateau\SWPPP\CAD\ 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SAADAT, ON: Mar 22 2023 12:28pm, CFG: 20-750tbrdy102 20750tma101 20750tlma101



BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
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- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

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RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE

ENGINEER

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK - UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 4

OF 15 SHEETS

MATCHLINE - SEE SHEET 3

EXTERNAL REFERENCES: 20750tb101 20-750 Meridian Upper Plateau\SWPPP\CAD\ 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SAADAT, ON: Mar 22 2023 12:28pm, CFG:
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD\ 20750tb101 20750xrdy102 20750ma101 20750ulma101

MATCHLINE – SEE SHEET 2

SO-CAL GAS
EASEMENT CENTERLINE

DRAINAGE
AREA 1

DRAINAGE
AREA 2

DRAINAGE
AREA 1

DRAINAGE
AREA 16

EC-4
EC-5
EC-6
EC-7

EC-4
EC-5
EC-6
EC-7
SE-5
SE-6

SD-13
SE-10

MATCHLINE – SEE SHEET 6

MATCHLINE – SEE SHEET 10

BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
NS-9	VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10	VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
SD-13	STORM DRAIN SIGNAGE PER BMP SD-13
SD-32	TRASH STORAGE AREAS PER BMP SD-32
[1] SE-1	INSTALL SILT FENCE PER BMP SE-1
SE-2	CONSTRUCT SEDIMENT BASIN PER BMP SE-2
SE-4	INSTALL GRAVEL BAG CHECK DAMS SE-4
[1] SE-5	INSTALL FIBER ROLLS PER BMP SE-5
[1] SE-6	INSTALL GRAVEL BAGS PER BMP SE-6
[1] SE-10	CONSTRUCT STORM DRAIN INLET PROTECTION PER BMP SE-10
[2] TC-1	CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP TC-1
WM-1	CONSTRUCT MATERIAL AND DELIVERY STORAGE PER BMP WM-1
WM-3	STOCKPILE MANAGEMENT PER BMP WM-3
WM-8	CONCRETE WASTE MANAGEMENT PER BMP WM-8
WM-9	SANITARY/SEPTIC WASTE MANAGEMENT PER BMP WM-9
[3] EC-4	HYDROSEEDING PER BMP EC-4
[3] EC-5	SOIL BINDERS PER BMP EC-5
[3] EC-6	STRAW MULCH PER BMP EC-6
[3] EC-7	GEOTEXTILES AND MATS PER BMP EC-7
EC-9	EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
[3] SE-5	FIBER ROLLS PER BMP SE-5
[3] SE-6	GRAVEL BAG BERM PER BMP SE-6

[1] CONTRACTOR TO USE EITHER SILT FENCE, FIBER ROLLS, OR GRAVEL BAG BERMS BASED ON THE FIELD CONDITIONS

[2] CONTRACTOR SHALL PLACE TC-1 AS NEEDED

[3] CONTRACTOR WILL USE ONE OR MORE OF THESE BMP CONTROLS ON SLOPES

LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

Underground Service Alert
Call: TOLL FREE
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TWO WORKING DAYS BEFORE YOU DIG

BENCHMARK DESCRIPTION

A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE

ENGINEER

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 5
OF 15 SHEETS

EXTERNAL REFERENCES: 20750b1101 20-750ndy102 20750ma101 20750ulma101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD\20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SAADAT, ON: Mar 22 2023 12:28pm, CFG:

MATCHLINE – SEE SHEET 2

MATCHLINE – SEE SHEET 3

MATCHLINE – SEE SHEET 5

MATCHLINE – SEE SHEET 7

MATCHLINE – SEE SHEET 11

DRAINAGE AREA 2

DRAINAGE AREA 3

DRAINAGE AREA 7

DRAINAGE AREA 16

SD-13 SE-10

EC-9

SE-2

BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
NS-9	VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10	VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
SD-13	STORM DRAIN SIGNAGE PER BMP SD-13
SD-32	TRASH STORAGE AREAS PER BMP SD-32
[1] SE-1	INSTALL SILT FENCE PER BMP SE-1
SE-2	CONSTRUCT SEDIMENT BASIN PER BMP SE-2
SE-4	INSTALL GRAVEL BAG CHECK DAMS SE-4
[1] SE-5	INSTALL FIBER ROLLS PER BMP SE-5
[1] SE-6	INSTALL GRAVEL BAGS PER BMP SE-6
[1] SE-10	CONSTRUCT STORM DRAIN INLET PROTECTION PER BMP SE-10
[2] TC-1	CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP TC-1
WM-1	CONSTRUCT MATERIAL AND DELIVERY STORAGE PER BMP WM-1
WM-3	STOCKPILE MANAGEMENT PER BMP WM-3
WM-8	CONCRETE WASTE MANAGEMENT PER BMP WM-8
WM-9	SANITARY/SEPTIC WASTE MANAGEMENT PER BMP WM-9
[3] EC-4	HYDROSEEDING PER BMP EC-4
[3] EC-5	SOIL BINDERS PER BMP EC-5
[3] EC-6	STRAW MULCH PER BMP EC-6
[3] EC-7	GEOTEXTILES AND MATS PER BMP EC-7
EC-9	EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
[3] SE-5	FIBER ROLLS PER BMP SE-5
[3] SE-6	GRAVEL BAG BERM PER BMP SE-6

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[3] CONTRACTOR WILL USE ONE OR MORE OF THESE BMP CONTROLS ON SLOPES

LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

Underground Service Alert

DIG ALERT BEFORE YOU DIG

Call: TOLL FREE

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TWO WORKING DAYS BEFORE YOU DIG

A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE
	ENGINEER				

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 6 OF 15 SHEETS

EXTERNAL REFERENCES: 20-750bs101 20-750body102 20750ms101 20750ulms101
FILENAME M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD\ - 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SADAT, ON: Mar 22 2023 12:28pm, CPC

MATCHLINE – SEE SHEET 3

MATCHLINE – SEE SHEET 4

MATCHLINE – SEE SHEET 6

MATCHLINE – SEE SHEET 8

MATCHLINE – SEE SHEET 12

DRAINAGE AREA 7

DRAINAGE AREA 8

DRAINAGE AREA 2

SE-2

EC-9

SD-13

SE-10

BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
NS-9	VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10	VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
SD-13	STORM DRAIN SIGNAGE PER BMP SD-13
SD-32	TRASH STORAGE AREAS PER BMP SD-32
[1] SE-1	INSTALL SILT FENCE PER BMP SE-1
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[1] SE-5	INSTALL FIBER ROLLS PER BMP SE-5
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[2] TC-1	CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP TC-1
WM-1	CONSTRUCT MATERIAL AND DELIVERY STORAGE PER BMP WM-1
WM-3	STOCKPILE MANAGEMENT PER BMP WM-3
WM-8	CONCRETE WASTE MANAGEMENT PER BMP WM-8
WM-9	SANITARY/SEPTIC WASTE MANAGEMENT PER BMP WM-9
[3] EC-4	HYDROSEEDING PER BMP EC-4
[3] EC-5	SOIL BINDERS PER BMP EC-5
[3] EC-6	STRAW MULCH PER BMP EC-6
[3] EC-7	GEOTEXTILES AND MATS PER BMP EC-7
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[3] CONTRACTOR WILL USE ONE OR MORE OF THESE BMP CONTROLS ON SLOPES

LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

EXTERNAL REFERENCES: 20-750bndy102 20750ma101 20750utma101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD_ 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SAADAT, ON: Mar 22 2023 12:28pm, CTS

Underground Service Alert

Call: TOLL FREE

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TWO WORKING DAYS BEFORE YOU DIG

A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE

ENGINEER

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:

RC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 7

OF 15 SHEETS

MATCHLINE – SEE SHEET 4

MATCHLINE – SEE SHEET 7

MATCHLINE – SEE SHEET 9

MATCHLINE – SEE SHEET 13

EQUIPMENT STAGING AREA

DRAINAGE AREA 8

DRAINAGE AREA 9

DRAINAGE AREA 2

WMWD STRUCTURES

CLEAR SPAN CROSSING

EC-9

EC-4
EC-5
EC-6
EC-7
SE-5
SE-6

WM-1
WM-3

WM-8
WM-9
WM-10

SD-13
SE-10

BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
NS-9	VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10	VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
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[1] SE-1	INSTALL SILT FENCE PER BMP SE-1
SE-2	CONSTRUCT SEDIMENT BASIN PER BMP SE-2
SE-4	INSTALL GRAVEL BAG CHECK DAMS SE-4
[1] SE-5	INSTALL FIBER ROLLS PER BMP SE-5
[1] SE-6	INSTALL GRAVEL BAGS PER BMP SE-6
[1] SE-10	CONSTRUCT STORM DRAIN INLET PROTECTION PER BMP SE-10
[2] TC-1	CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP TC-1
WM-1	CONSTRUCT MATERIAL AND DELIVERY STORAGE PER BMP WM-1
WM-3	STOCKPILE MANAGEMENT PER BMP WM-3
WM-8	CONCRETE WASTE MANAGEMENT PER BMP WM-8
WM-9	SANITARY/SEPTIC WASTE MANAGEMENT PER BMP WM-9
[3] EC-4	HYDROSEEDING PER BMP EC-4
[3] EC-5	SOIL BINDERS PER BMP EC-5
[3] EC-6	STRAW MULCH PER BMP EC-6
[3] EC-7	GEOTEXTILES AND MATS PER BMP EC-7
EC-9	EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
[3] SE-5	FIBER ROLLS PER BMP SE-5
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[2] CONTRACTOR SHALL PLACE TC-1 AS NEEDED

[3] CONTRACTOR WILL USE ONE OR MORE OF THESE BMP CONTROLS ON SLOPES

LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

Underground Service Alert

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TWO WORKING DAYS BEFORE YOU DIG

A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE

ENGINEER

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

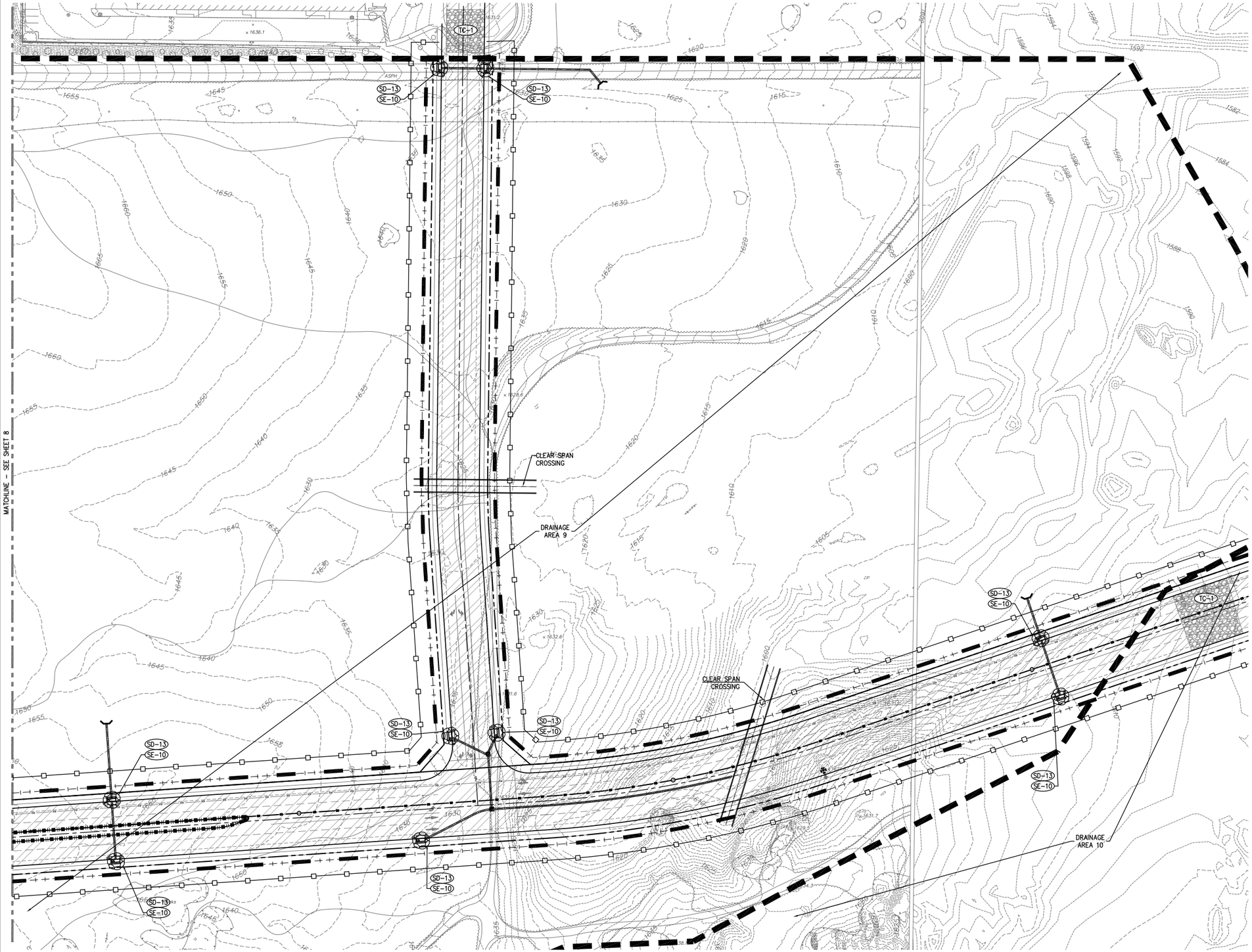
CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 8 OF 15 SHEETS

EXTERNAL REFERENCES: 20-750bs101 20-750xdy102 20750ma101 20750ul101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD\ - 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:22pm PLOTTED BY: SAADAT, ON: Mar 22 2023 12:29pm, CFS:



BMP NOTES:

- NS-3 PAVING OPERATIONS PER BMP NS-3
- NS-9 VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
- NS-10 VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
- SD-13 STORM DRAIN SIGNAGE PER BMP SD-13
- SD-32 TRASH STORAGE AREAS PER BMP SD-32
- [1] SE-1 INSTALL SILT FENCE PER BMP SE-1
- SE-2 CONSTRUCT SEDIMENT BASIN PER BMP SE-2
- SE-4 INSTALL GRAVEL BAG CHECK DAMS SE-4
- [1] SE-5 INSTALL FIBER ROLLS PER BMP SE-5
- [1] SE-6 INSTALL GRAVEL BAGS PER BMP SE-6
- [1] SE-10 CONSTRUCT STORM DRAIN INLET PROTECTION PER BMP SE-10
- [2] TC-1 CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP TC-1
- WM-1 CONSTRUCT MATERIAL AND DELIVERY STORAGE PER BMP WM-1
- WM-3 STOCKPILE MANAGEMENT PER BMP WM-3
- WM-8 CONCRETE WASTE MANAGEMENT PER BMP WM-8
- WM-9 SANITARY/SEPTIC WASTE MANAGEMENT PER BMP WM-9
- [3] EC-4 HYDROSEEDING PER BMP EC-4
- [3] EC-5 SOIL BINDERS PER BMP EC-5
- [3] EC-6 STRAW MULCH PER BMP EC-6
- [3] EC-7 GEOTEXTILES AND MATS PER BMP EC-7
- EC-9 EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
- [3] SE-5 FIBER ROLLS PER BMP SE-5
- [3] SE-6 GRAVEL BAG BERM PER BMP SE-6

[1] CONTRACTOR TO USE EITHER SILT FENCE, FIBER ROLLS, OR GRAVEL BAG BERMS BASED ON THE FIELD CONDITIONS

[2] CONTRACTOR SHALL PLACE TC-1 AS NEEDED

[3] CONTRACTOR WILL USE ONE OR MORE OF THESE BMP CONTROLS ON SLOPES

LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
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TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

Underground Service Alert

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TWO WORKING DAYS BEFORE YOU DIG

A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE
ENGINEER					

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 9 OF 15 SHEETS

EXTERNAL REFERENCES: 20-750xr101 20-750ndy102 20750sma101 20750xlma101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD_ 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SKADAY, ON: Mar 22 2023 12:29pm, CPC

MATCHLINE – SEE SHEET 5

DRAINAGE AREA 16

DRAINAGE AREA 17

MATCHLINE – SEE SHEET 11

MATCHLINE – SEE SHEET 14

BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
NS-9	VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10	VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
SD-13	STORM DRAIN SIGNAGE PER BMP SD-13
SD-32	TRASH STORAGE AREAS PER BMP SD-32
[1] SE-1	INSTALL SILT FENCE PER BMP SE-1
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[3] EC-4	HYDROSEEDING PER BMP EC-4
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[3] EC-6	STRAW MULCH PER BMP EC-6
[3] EC-7	GEOTEXTILES AND MATS PER BMP EC-7
EC-9	EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
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LEGEND:

- SILT FENCE (SE-1)
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- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
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TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

EXTERNAL REFERENCES: 20750b101 20-750bndy102 20750ma101 20750utma101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD\ 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SAADAT, ON: Mar 22 2023 12:29pm, CPC

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BENCHMARK DESCRIPTION

A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE

ENGINEER

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 10
OF 15 SHEETS

MATCHLINE – SEE SHEET 6

MATCHLINE – SEE SHEET 5

MATCHLINE – SEE SHEET 10

MATCHLINE – SEE SHEET 12

MATCHLINE – SEE SHEET 14

DRAINAGE AREA 2

DRAINAGE AREA 16

DRAINAGE AREA 14

EC-9

SD-13
SE-10

SE-2

SE-7

BMP NOTES:

- NS-3 PAVING OPERATIONS PER BMP NS-3
- NS-9 VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
- NS-10 VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
- SD-13 STORM DRAIN SIGNAGE PER BMP SD-13
- SD-32 TRASH STORAGE AREAS PER BMP SD-32
- [1] SE-1 INSTALL SILT FENCE PER BMP SE-1
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- SE-4 INSTALL GRAVEL BAG CHECK DAMS SE-4
- [1] SE-5 INSTALL FIBER ROLLS PER BMP SE-5
- [1] SE-6 INSTALL GRAVEL BAGS PER BMP SE-6
- [1] SE-10 CONSTRUCT STORM DRAIN INLET PROTECTION PER BMP SE-10
- [2] TC-1 CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP TC-1
- WM-1 CONSTRUCT MATERIAL AND DELIVERY STORAGE PER BMP WM-1
- WM-3 STOCKPILE MANAGEMENT PER BMP WM-3
- WM-8 CONCRETE WASTE MANAGEMENT PER BMP WM-8
- WM-9 SANITARY/SEPTIC WASTE MANAGEMENT PER BMP WM-9
- [3] EC-4 HYDROSEEDING PER BMP EC-4
- [3] EC-5 SOIL BINDERS PER BMP EC-5
- [3] EC-6 STRAW MULCH PER BMP EC-6
- [3] EC-7 GEOTEXTILES AND MATS PER BMP EC-7
- EC-9 EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
- [3] SE-5 FIBER ROLLS PER BMP SE-5
- [3] SE-6 GRAVEL BAG BERM PER BMP SE-6

[1] CONTRACTOR TO USE EITHER SILT FENCE, FIBER ROLLS, OR GRAVEL BAG BERMS BASED ON THE FIELD CONDITIONS

[2] CONTRACTOR SHALL PLACE TC-1 AS NEEDED

[3] CONTRACTOR WILL USE ONE OR MORE OF THESE BMP CONTROLS ON SLOPES

LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

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A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE

ENGINEER

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER MCKEE
No. 74414
Exp. 9-30-23
CIVIL
STATE OF CALIFORNIA

PREPARED BY:
RBF Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 11 OF 15 SHEETS

EXTERNAL REFERENCES: 20-750bndy102 20750ma101 20750ultma101 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SADAT, OK: Mar 22 2023 12:29pm, CFC:
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD\ - 20-750 Upper Plateau SWPPP Site Map.dwg

MATCHLINE – SEE SHEET 7

MATCHLINE – SEE SHEET 11

MATCHLINE – SEE SHEET 13

MATCHLINE – SEE SHEET 15

DRAINAGE AREA 2

DRAINAGE AREA 9

DRAINAGE AREA 14

EQUIPMENT STAGING AREA

SD-13
SE-10

EC-9

WM-1
WM-3
WM-8
WM-9
WM-10

EC-4
EC-5
EC-6
EC-7
SE-5
SE-6

BMP NOTES:

NS-3		PAVING OPERATIONS PER BMP NS-3
NS-9		VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10		VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
SD-13		STORM DRAIN SIGNAGE PER BMP SD-13
SD-32		TRASH STORAGE AREAS PER BMP SD-32
SE-1	[1]	INSTALL SILT FENCE PER BMP SE-1
SE-2		CONSTRUCT SEDIMENT BASIN PER BMP SE-2
SE-4		INSTALL GRAVEL BAG CHECK DAMS SE-4
SE-5	[1]	INSTALL FIBER ROLLS PER BMP SE-5
SE-6	[1]	INSTALL GRAVEL BAGS PER BMP SE-6
SE-10	[1]	CONSTRUCT STORM DRAIN INLET PROTECTION PER BMP SE-10
TC-1	[2]	CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP TC-1
WM-1		CONSTRUCT MATERIAL AND DELIVERY STORAGE PER BMP WM-1
WM-3		STOCKPILE MANAGEMENT PER BMP WM-3
WM-8		CONCRETE WASTE MANAGEMENT PER BMP WM-8
WM-9		SANITARY/SEPTIC WASTE MANAGEMENT PER BMP WM-9
EC-4	[3]	HYDROSEEDING PER BMP EC-4
EC-5	[3]	SOIL BINDERS PER BMP EC-5
EC-6	[3]	STRAW MULCH PER BMP EC-6
EC-7	[3]	GEOTEXTILES AND MATS PER BMP EC-7
EC-9		EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
SE-5	[3]	FIBER ROLLS PER BMP SE-5
SE-6	[3]	GRAVEL BAG BERM PER BMP SE-6

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[3] CONTRACTOR WILL USE ONE OR MORE OF THESE BMP CONTROLS ON SLOPES

LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

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BENCHMARK DESCRIPTION

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RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

DATUM: NAVD 29 ADJ. 1971
ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE
ENGINEER					

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:
ORC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 12
OF 15 SHEETS

EXTERNAL REFERENCES: 20750tb101 20-750bndy102 20750mp101 20750ulma101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD\ 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SAADAT, ON: Mar 22 2023 12:29pm, CFG

MATCHLINE – SEE SHEET 8

MATCHLINE – SEE SHEET 12

DRAINAGE AREA 2

DRAINAGE AREA 9

DRAINAGE AREA 10

DRAINAGE AREA 11

DRAINAGE AREA 12

CLEAR SPAN CROSSING

SD-13
SE-10

EC-4
EC-5
EC-6
EC-7
SE-5
SE-6

BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
NS-9	VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10	VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
SD-13	STORM DRAIN SIGNAGE PER BMP SD-13
SD-32	TRASH STORAGE AREAS PER BMP SD-32
[1] SE-1	INSTALL SILT FENCE PER BMP SE-1
SE-2	CONSTRUCT SEDIMENT BASIN PER BMP SE-2
SE-4	INSTALL GRAVEL BAG CHECK DAMS SE-4
[1] SE-5	INSTALL FIBER ROLLS PER BMP SE-5
[1] SE-6	INSTALL GRAVEL BAGS PER BMP SE-6
[1] SE-10	CONSTRUCT STORM DRAIN INLET PROTECTION PER BMP SE-10
[2] TC-1	CONSTRUCT STABILIZED CONSTRUCTION ENTRANCE PER BMP TC-1
WM-1	CONSTRUCT MATERIAL AND DELIVERY STORAGE PER BMP WM-1
WM-3	STOCKPILE MANAGEMENT PER BMP WM-3
WM-8	CONCRETE WASTE MANAGEMENT PER BMP WM-8
WM-9	SANITARY/SEPTIC WASTE MANAGEMENT PER BMP WM-9
[3] EC-4	HYDROSEEDING PER BMP EC-4
[3] EC-5	SOIL BINDERS PER BMP EC-5
[3] EC-6	STRAW MULCH PER BMP EC-6
[3] EC-7	GEOTEXTILES AND MATS PER BMP EC-7
EC-9	EARTH DIKE AND DRAINAGE SWALES PER BMP EC-9
[3] SE-5	FIBER ROLLS PER BMP SE-5
[3] SE-6	GRAVEL BAG BERM PER BMP SE-6

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LEGEND:

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- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- DRAINAGE BOUNDARY
- LIMIT OF GRADING
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

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ENGINEER					

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER MCKEE
No. 74414
Exp. 9-30-23
CIVIL
STATE OF CALIFORNIA

PREPARED BY:

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 13

OF 15 SHEETS

EXTERNAL REFERENCES: 20-750bnd101 20-750bnd102 20750ma101 20750ul ma101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD\ - 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SAADAT, ON: Mar 22 2023 12:30pm, CFS

MATCHLINE – SEE SHEET 11

MATCHLINE – SEE SHEET 10

MATCHLINE – SEE SHEET 15

DRAINAGE AREA 16

DRAINAGE AREA 14

DRAINAGE AREA 15

SD-13
SE-10
SE-2
EC-4
EC-5
EC-6
EC-7
SE-5
SE-6
TC-1

BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
NS-9	VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10	VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
SD-13	STORM DRAIN SIGNAGE PER BMP SD-13
SD-32	TRASH STORAGE AREAS PER BMP SD-32
[1] SE-1	INSTALL SILT FENCE PER BMP SE-1
SE-2	CONSTRUCT SEDIMENT BASIN PER BMP SE-2
SE-4	INSTALL GRAVEL BAG CHECK DAMS SE-4
[1] SE-5	INSTALL FIBER ROLLS PER BMP SE-5
[1] SE-6	INSTALL GRAVEL BAGS PER BMP SE-6
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WM-3	STOCKPILE MANAGEMENT PER BMP WM-3
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- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
- PAVING OPERATIONS (NS-3)
- RIGHT-OF-WAY
- DRAINAGE BOUNDARY
- CENTERLINE
- LIMIT OF GRADING
- EARTH DIKE / DRAINAGE SWALE (EC-9)
- EASEMENT
- PROPERTY LINE
- RIGHT-OF-WAY
- CENTERLINE
- EARTH DIKE / DRAINAGE SWALE (EC-9)

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

EXTERNAL REFERENCES: 20-7506nd101 20750sd102 20750md101 20750ut101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD_ 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22, 2023 12:21pm PLOTTED BY: SAADAT, ON: Mar 22, 2023 12:50pm, CPS

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A STANDARD U.S.C. & G.S. BRASS DISC STAMPED "Z 1143 1961" IN A CONCRETE POST ALONG THE A.T.S.F. RAILROAD SOUTH OF VAN BUREN BOULEVARD.

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ELEVATION 1532.70'

MARK	BY	DATE	REVISIONS	APPR	DATE
ENGINEER					

REGISTERED PROFESSIONAL ENGINEER
CHRISTOPHER MCKEE
No. 74414
Exp. 9-30-23
CIVIL
STATE OF CALIFORNIA

PREPARED BY:

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 14 OF 15 SHEETS

MATCHLINE – SEE SHEET 12

MATCHLINE – SEE SHEET 14

DRAINAGE AREA 14

DRAINAGE AREA 13

DRAINAGE AREA 14

EC-4
EC-5
EC-6
EC-7
SE-5
SE-6

SE-2

SD-13
SE-10

EC-4
EC-5
EC-6
EC-7
SE-5
SE-6

SE-2

SD-13
SE-10

SE-2

168
1750.13

BMP NOTES:

NS-3	PAVING OPERATIONS PER BMP NS-3
NS-9	VEHICLE AND EQUIPMENT FUELING OPERATION PER BMP NS-9
NS-10	VEHICLE AND EQUIPMENT MAINTENANCE OPERATION PER BMP NS-10
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[1] SE-1	INSTALL SILT FENCE PER BMP SE-1
SE-2	CONSTRUCT SEDIMENT BASIN PER BMP SE-2
SE-4	INSTALL GRAVEL BAG CHECK DAMS SE-4
[1] SE-5	INSTALL FIBER ROLLS PER BMP SE-5
[1] SE-6	INSTALL GRAVEL BAGS PER BMP SE-6
[1] SE-10	CONSTRUCT STORM DRAIN INLET PROTECTION PER BMP SE-10
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LEGEND:

- SILT FENCE (SE-1)
- CHECK DAMS (SE-4)
- INLET PROTECTION (SE-10)
- DIRECTION OF FLOW
- STABILIZED CONSTRUCTION ENTRANCE (TC-1)
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- DRAINAGE BOUNDARY
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TOTAL DISTURBED AREA = 370 ACRES

SITE RISK LEVEL 2

EXTERNAL REFERENCES: 20750bs101 20-750bndy102 20750ms101 20750utma101
FILENAME: M:\2020\20-750 Meridian Upper Plateau\SWPPP\CAD\ – 20-750 Upper Plateau SWPPP Site Map.dwg, LAST SAVED ON: Mar 22 2023 12:21pm PLOTTED BY: SAADAT, ON: Mar 22 2023 12:30pm, CFG:

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RIVERSIDE COUNTY SURVEYORS POINT ID 600-43-68

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MARK	BY	DATE	REVISIONS	APPR	DATE

ENGINEER

REGISTERED PROFESSIONAL ENGINEER CHRISTOPHER MCKEE No. 74414 Exp. 9-30-23 CIVIL STATE OF CALIFORNIA

PREPARED BY:
DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road
Suite 210
Anaheim Hills, CA 92808
714-685-6860

CHRISTOPHER MCKEE R.C.E. 74414 DATE

SWPPP SITE MAP

MERIDIAN PARK – UPPER PLATEAU
PORTIONS OF SECTION 15, 16, 17, 21, T.3S., R.4W., S.B.M.

SHEET NUMBER 15
OF 15 SHEETS

Appendix C:Permit Registration Documents

Permit Registration Documents included in this Appendix.

Y/N	Permit Registration Document
Y	Notice of Intent
Y	Risk Assessment
Y	Certification, see Page vi and vii
N/A	Post Construction Water Balance
	Copy of Annual Fee Receipt
N/A	ATS Design Documents
Y	Site Map, see Appendix B

Appendix D: SWPPP Amendment Certifications

SWPPP Amendment No.

Project Name: **Error! Reference source not found.**

Project Number: 20-750

Qualified SWPPP Developer's Certification of the

Stormwater Pollution Prevention Plan Amendment

"This Stormwater Pollution Prevention Plan and attachments were prepared under my direction to meet the requirements of the California Construction General Permit (SWRCB Order No. 2009-009-DWQ as amended by 2010-0014-DWQ and 2012-0006-DWQ). I certify that I am a Qualified SWPPP Developer in good standing as of the date signed below."

3-8-2023

QSD's Signature	Date
Chris McKee	QSD#00959
QSD Name	QSD Certificate Number
Error! Reference source not found. Error! Reference source not found.	**Error! Reference source not found.**
Title and Affiliation	Telephone
Error! Reference source not found. Error! Reference source not found.	cmckee@drc-eng.com
Address	Email

Appendix E: Submitted Changes to PRDs

Log of Updated PRDs

The General Permit allows for the reduction or increase of the total acreage covered under the General Permit when a portion of the project is complete and/or conditions for termination of coverage have been met; when ownership of a portion of the project is purchased by a different entity; or when new acreage is added to the project.

Modified PRDs shall be filed electronically within 30 days of a reduction or increase in total disturbed area if a change in permit covered acreage is to be sought. The SWPPP shall be modified appropriately, with revisions and amendments recorded in Appendix C. Updated PRDs submitted electronically via SMARTS can be found in this Appendix.

This appendix includes all of the following updated PRDs (check all that apply):

☐ Revised Notice of Intent (NOI);

☐ Revised Site Map;

☐ Revised Risk Assessment;

☐ New landowner's information (name, address, phone number, email address); and

☐ New signed certification statement.

Meridian Park, LLC

Legally Responsible Person [if organization]

Signature of Approved Signatory

Date

Jeff Gordon

Name of Approved Signatory

Error! Reference source not found.294

Telephone Number

Appendix F: Construction Schedule

Construction Schedule

A general construction schedule for the project is as follows*:

Estimate Construction Start: February 1, 2024 Estimate Construction Finish: February 1, 2027

Mobilization of equipment and materials to begin on _____.

Install erosion control perimeter gravel bags on _____.

Store temporary soil stabilization & sediment control products beginning on _____.

Install stabilized construction entrance on _____.

Site preparation: Clearing and grubbing will occur from _____ to _____.

Excavation to begin on _____ & continue through _____. Building pads graded.

Installation of utilities (water main & sewer line) from _____ to _____.

Schedule soil stabilization subcontractor for application of temporary soil stabilization on disturbed areas and permanent erosion control on areas substantially complete: _____.

Begin construction of buildings: _____ to _____.

Submit annual rainy season implementation schedule on _____.

Start implementation of temporary soil stabilization and sediment control BMPs on _____ (before rainy season starts). Continue to implement and maintain temporary BMPs throughout rainy season.

Complete installation of temporary soil stabilization & sediment control BMPs on _____.

Rainy season begins: _____ Rainy season ends: _____

SWPPP Annual Certification of Compliance form due on _____.

Implement final erosion control of substantially completed areas on _____.

Install temporary concrete washout on _____. Rainy season ends: _____

Begin final sub-grade preparation, paving, and hardscape by _____. Continue to apply soil stabilization and sediment controls as needed during construction. Have sufficient tarps available to cover pavement materials in the event of rain. Avoid conducting paving operations in the rain.

Remove concrete washout and restore area to original grade on _____.

Schedule subcontractors for application of permanent erosion control on _____.

Start final stabilization, re-vegetation and landscape by _____.

Project complete on _____.

*Construction Schedule to be completed by the Contractor prior to the onset of construction.

Appendix G: Construction Activities, Materials Used, and Associated Pollutants

Table G.1 Construction Activities and Associated Pollutants

Phase	Activity	Associated Materials or Pollutants	Pollutant Category(1)
Grading and Land Development	Adhesives	• Adhesives, glues, resins, epoxy synthetics, PVC cement • Caulks, sealers, putty, sealing agents and • Coal tars (naphtha, pitch)	Oil and Grease, Synthetic Organics[1]
	Asphalt paving/curbs	• Hot and cold mix asphalt	Oil and Grease
	Concrete / Masonry	• Cement and brick dust • Colored chalks • Concrete curing compounds • Glazing compounds • Surfaces cleaners • Saw cut slurries • Tile cutting	Metals, Synthetic Organics
	Removal of existing structures	• Demolition of asphalt, concrete, masonry, framing, roofing, metal structures.	Metals, Oil and Grease, Synthetic Organics
	Sanitary waste	• Portable toilets • Disturbance of existing sewer lines.	Nutrients
	Soil preparation/amendments	• Use of soil additives/amendments	Nutrients
	Solid waste	• Litter, trash and debris • Vegetation	Gross Pollutants
	Utility line testing and flushing	• Hydrostatic test water • Pipe flushing	Synthetic Organics
	Vehicle and equipment use	• Equipment operation • Equipment maintenance • Equipment washing • Equipment fueling	Oil and Grease
Streets and Utilities Phase	Asphalt paving/curbs	• Hot and cold mix asphalt	Oil and Grease
	Plumbing	• Solder (lead, tin), flux (zinc chloride), pipe fitting • Galvanized metal in nails, fences, and electric wiring	Metals, Synthetic Organics
	Solid waste	• Litter, trash and debris • Vegetation	Gross Pollutants
	Vehicle and equipment use	• Equipment operation • Equipment maintenance • Equipment washing • Equipment fueling	Oil and Grease
Vertical Construction Phase	Adhesives	• Adhesives, glues, resins, epoxy synthetics, PVC cement • Caulks, sealers, putty, sealing agents and • Coal tars (naphtha, pitch)	Oil and Grease, Synthetic Organics[1]

Table G.1 Construction Activities and Associated Pollutants

Phase	Activity	Associated Materials or Pollutants	Pollutant Category(1)
	Cleaners	• Polishes (metal, ceramic, tile) • Etching agents • Cleaners, ammonia, lye, caustic sodas, bleaching agents and chromate salts	Metals, Synthetic Organics
	Concrete / Masonry	• Cement and brick dust • Colored chalks • Concrete curing compounds • Glazing compounds • Surfaces cleaners • Saw cut slurries • Tile cutting	Metals, Synthetic Organics
	Drywall	• Saw-cutting drywall	Metals
	Framing/Carpentry	• Sawdust, particle board dust, and treated woods • Saw cut slurries	Metals, Synthetic Organics
	Heating, Ventilation, Air Conditioning	• Demolition or construction of air condition and heating systems	Metals, Synthetic Organics
	Heating, Ventilation, Air Conditioning	• Demolition or construction of air condition and heating systems	Metals, Synthetic Organics
	Insulation	• Demolition or construction involving insulation, venting systems	Metals, Synthetic Organics
	Liquid waste	• Wash waters • Irrigation line testing/flushing	Metals, Synthetic Organics
	Painting	• Paint thinners, acetone, methyl ethyl ketone, stripper paints, lacquers, varnish, enamels, turpentine, gum spirit, solvents, dyes, stripping pigments and sanding	Metals, Synthetic Organics
	Plumbing	• Solder (lead, tin), flux (zinc chloride), pipe fitting • Galvanized metal in nails, fences, and electric wiring	Metals, Synthetic Organics
	Roofing	• Flashing • Saw cut slurries (tile cutting) • Shingle scrap and debris	Metals, Oil and Grease, Synthetic Organics
	Sanitary waste	• Portable toilets • Disturbance of existing sewer lines.	Nutrients
	Solid waste	• Litter, trash and debris • Vegetation	Gross Pollutants
	Utility line testing and flushing	• Hydrostatic test water • Pipe flushing	Synthetic Organics
	Vehicle and equipment use	• Equipment operation • Equipment maintenance • Equipment washing • Equipment fueling	Oil and Grease
Landscape	Liquid waste	• Wash waters • Irrigation line testing/flushing	Metals, Synthetic Organics

Table G.1 Construction Activities and Associated Pollutants

Phase	Activity	Associated Materials or Pollutants	Pollutant Category(1)
	Planting / Vegetation Management	• Vegetation control (pesticides/herbicides) • Planting • Plant maintenance • Vegetation removal	Nutrients, Metals, Synthetic Organics
	Soil preparation/amendments	• Use of soil additives/amendments	Nutrients
	Solid waste	• Litter, trash and debris • Vegetation	Gross Pollutants
	Vehicle and equipment use	• Equipment operation • Equipment maintenance • Equipment washing • Equipment fueling	Oil and Grease

(1) Categories per CASQA BMP Handbook (i.e., Sediment, Nutrients, Bacteria and Viruses, Oil and Grease, Metals, Synthetic Organics, Pesticides, Gross Pollutants, and Vector Production)

Appendix H: CASQA Stormwater BMP Handbook Portal: Construction Fact Sheets

The Stormwater BMP Handbook Fact Sheets can be found at

https://www.casqa.org/sites/default/files/casqa-handbook-industrial/full_handbook_2014.pdf

Appendix I: BMP Inspection Form

BMP INSPECTION REPORT

Date and Time of Inspection:			Date Report Written:	
Inspection Type: (Circle one)	Weekly *Complete Parts I, II, III and VII*	Pre-Storm *Complete Parts I, II, III, IV and VII*	During Rain Event *Complete Parts I, II, III, V, and VII*	Post-Storm *Complete Parts I, II, III, VI and VII*

Part I. General Information

Site Information

Construction Site Name:			
Construction stage and completed activities:			Approximate area of site that is exposed:
Photos Taken: (Circle one)	Yes	No	Photo Reference IDs:

Weather

Estimate storm beginning: (Date and time)	Estimate storm duration: (hours)
Estimate time since last storm: (Days or hours)	Rain gauge reading and location: (in)
Is a "Qualifying Event" predicted or did one occur (i.e., 0.5" rain with 48-hrs or greater between events)? (Y/N) If yes, summarize forecast:	

Exemption Documentation (explanation required if inspection could not be conducted). Visual inspections are not required outside of business hours or during dangerous weather conditions such as flooding or electrical storms.

Inspector Information

Inspector Name:	Inspector Title:	
Signature:		Date:

Part II. BMP Observations. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Failures or other short comings (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Construction Materials			
Inventory of products (excluding materials designed to be outdoors)			
Stockpiled construction materials not actively in use are covered and bermed			
All chemicals are stored in watertight containers with appropriate secondary containment, or in a completely enclosed storage shed			
Construction materials are minimally exposed to precipitation			
BMPs preventing the off-site tracking of materials are implemented and properly effective			
Good Housekeeping for Waste Management			
Wash/rinse water and materials are prevented from being disposed into the storm drain system			
Portable toilets are contained to prevent discharges of waste			
Sanitation facilities are clean and with no apparent for leaks and spills			
Equipment is in place to cover waste disposal containers at the end of business day and during rain events			
Discharges from waste disposal containers are prevented from discharging to the storm drain system / receiving water			
Stockpiled waste material is securely protected from wind and rain if not actively in use			
Procedures are in place for addressing hazardous and non-hazardous spills			
Appropriate spill response personnel are assigned and trained			
Equipment and materials for cleanup of spills is available onsite			
Washout areas (e.g., concrete) are contained appropriately to prevent discharge or infiltration into the underlying soil			
Good Housekeeping for Vehicle Storage and Maintenance			
Measures are in place to prevent oil, grease, or fuel from leaking into the ground, storm drains, or surface waters			
All equipment or vehicles are fueled, maintained, and stored in a designated area with appropriate BMPs			
Vehicle and equipment leaks are cleaned immediately and disposed of properly			

Part II. BMP Observations Continued. Describe deficiencies in Part III.			
Minimum BMPs for Risk Level _____ Sites	Adequately designed, implemented and effective (yes, no, N/A)	Action Required (yes/no)	Action Implemented (Date)
Good Housekeeping for Landscape Materials			
Stockpiled landscape materials such as mulches and topsoil are contained and covered when not actively in use			
Erodible landscape material has not been applied 2 days before a forecasted rain event or during an event			
Erodible landscape materials are applied at quantities and rates in accordance with manufacturer recommendations			
Bagged erodible landscape materials are stored on pallets and covered			
Good Housekeeping for Air Deposition of Site Materials			
Good housekeeping measures are implemented onsite to control the air deposition of site materials and from site operations			
Non-Stormwater Management			
Non-Stormwater discharges are properly controlled			
Vehicles are washed in a manner to prevent non-stormwater discharges to surface waters or drainage systems			
Streets are cleaned in a manner to prevent unauthorized non-stormwater discharges to surface waters or drainage systems.			
Erosion Controls			
Wind erosion controls are effectively implemented			
Effective soil cover is provided for disturbed areas inactive (i.e., not scheduled to be disturbed for 14 days) as well as finished slopes, open space, utility backfill, and completed lots			
The use of plastic materials is limited in cases when a more sustainable, environmentally friendly alternative exists.			
Sediment Controls			
Perimeter controls are established and effective at controlling erosion and sediment discharges from the site			
Entrances and exits are stabilized to control erosion and sediment discharges from the site			
Sediment basins are properly maintained			
Linear sediment control along toe of slope, face of slope an at grade breaks (Risk Level 2 & 3 Only)			

Limit construction activity to and from site to entrances and exits that employ effective controls to prevent offsite tracking (Risk Level 2 & 3 Only)			
Ensure all storm, drain inlets and perimeter controls, runoff control BMPs and pollutants controls at entrances and exits are maintained and protected from activities the reduce their effectiveness (Risk Level 2 & 3 Only)			
Inspect all immediate access roads daily (Risk Level 2 & 3 Only)			
Run-On and Run-Off Controls			
Run-on to the site is effectively managed and directed away from all disturbed areas.			
Other			
Are the project SWPPP and BMP plan up to date, available on-site and being properly implemented?			

Part III. Descriptions of BMP Deficiencies

Deficiency	Repairs Implemented: Note - Repairs must begin within 72 hours of identification and, complete repairs as soon as possible.	
	Start Date	**Action**
1.		
2.		
3.		
4.		

Part IV. Additional Pre-Storm Observations. Note the presence or absence of floating and suspended materials, sheen, discoloration, turbidity, odors, and source(s) of pollutants(s).

	Yes, No, N/A
Do stormwater storage and containment areas have adequate freeboard? If no, complete Part III.	
Are drainage areas free of spills, leaks, or uncontrolled pollutant sources? If no, complete Part VII and describe below.	
Notes:	

Are stormwater storage and containment areas free of leaks? If no, complete Parts III and/or VII and describe below.	
Notes:	

Part V. Additional During Storm Observations. If BMPs cannot be inspected during inclement weather, list the results of visual inspections at all relevant outfalls, discharge points, and downstream locations. Note odors or visible sheen on the surface of discharges. Complete Part VII (Corrective Actions) as needed.	
Outfall, Discharge Point, or Other Downstream Location	
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description
Location	Description

Part VI. Additional Post-Storm Observations. Visually observe (inspect) stormwater discharges at all discharge locations within two business days (48 hours) after each qualifying rain event, and observe (inspect) the discharge of stored or contained stormwater that is derived from and discharged subsequent to a qualifying rain event producing precipitation of ½ inch or more at the time of discharge. Complete Part VII (Corrective Actions) as needed.	
Discharge Location, Storage or Containment Area	**Visual Observation**

Part VII. Additional Corrective Actions Required. Identify additional corrective actions not included with BMP Deficiencies (Part III) above. Note if SWPPP change is required.	
Required Actions	**Implementation Date**

Appendix J: Project Specific Rain Event Action Plan Template

Rain Event Action Plan (REAP)			
Date of REAP		**BWDID Number:**	
Date Rain Predicted to Occur:		**Predicted % chance of rain:**	

Predicted Rain Event Triggered Actions

Below is a list of suggested actions and items to review for this project. Each active Trade should check all material storage areas, stockpiles, waste management areas, vehicle and equipment storage and maintenance, areas of active soil disturbance, and areas of active work to ensure the proper implementation of BMPs. Project-wide BMPs should be checked and cross-referenced to the BMP progress map.

Trade or Activity	**Suggested action(s) to perform / item(s) to review prior to rain event**
❑ Information & Scheduling	❑ Inform trade supervisors of predicted rain ❑ Check scheduled activities and reschedule as needed ❑ Alert erosion/sediment control provider ❑ Alert sample collection contractor (if applicable) ❑ Schedule staff for extended rain inspections ❑ Check Erosion and Sediment Control (ESC) material stock ❑ Review BMP progress map ❑ Other: _____ ❑ _____ ❑ _____
❑ Material storage areas	❑ Material under cover or in sheds (ex: treated woods and metals) ❑ Perimeter control around stockpiles ❑ Other: _____ ❑ _____
❑ Waste management areas	❑ Dumpsters closed ❑ Drain holes plugged ❑ Recycling bins covered ❑ Sanitary stations bermed and protected from tipping ❑ Other: _____ ❑ _____ ❑ _____
❑ Trade operations	❑ Exterior operations shut down for event (e.g., no concrete pours or paving) ❑ Soil treatments (e.g., fertilizer) ceased within 24 hours of event ❑ Materials and equipment (e.g., tools) properly stored and covered ❑ Waste and debris disposed in covered dumpsters or removed from site ❑ Trenches and excavations protected ❑ Perimeter controls around disturbed areas ❑ Fueling and repair areas covered and bermed ❑ Other: _____ ❑ _____
❑ Site ESC BMPs	❑ Adequate capacity in sediment basins and traps ❑ Site perimeter controls in place ❑ Catch basin and drop inlet protection in place and cleaned ❑ Temporary erosion controls deployed ❑ Temporary perimeter controls deployed around disturbed areas and stockpiles ❑ Roads swept; site ingress and egress points stabilized ❑ Other: _____ ❑ _____
❑ Concrete rinse out area	❑ Adequate capacity for rain ❑ Wash-out bins covered ❑ Other: _____ ❑ _____

❑ Spill and drips	❑ All incident spills and drips, including paint, stucco, fuel, and oil cleaned ❑ Drip pans emptied ❑ Other: _____ ❑ _____ **Continued on next page.**

❑ Other / Discussion / Diagrams	❑ _____ ❑ _____ ❑ _____ ❑ _____ ❑ _____ ❑ _____ ❑ _____ ❑ _____ ❑ _____ ❑ _____ ❑ _____ ❑ _____ ❑ _____

Attach a printout of the weather forecast from the NOAA website to the REAP.

I certify under penalty of law that this Rain Event Action Plan (REAP) will be performed in accordance with the General Permit by me or under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gathered and evaluated the information submitted. Based on my inquiry of the persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

_____Date: _____
Qualified SWPPP Practitioner (Use ink please)

Appendix K: Training Reporting Form

Trained Contractor Personnel Log

Stormwater Management Training Log and Documentation

Project Name: Meridian Park, Upper Plateau

WDID #: TBD

Stormwater Management Topic: (check as appropriate)

☐ Erosion Control ☐ Sediment Control

☐ Wind Erosion Control ☐ Tracking Control

☐ Non-Stormwater Management ☐ Waste Management and Materials Pollution Control

☐ Stormwater Sampling

Specific Training Objective: _____

Location: _____ Date: _____

Instructor:_____ Telephone: _____

Course Length (hours): _____

Attendee Roster (Attach additional forms if necessary)

Name	Company	Phone

As needed, add proof of external training (e.g., course completion certificates, credentials for QSP, QSD).

Appendix L: Responsible Parties

OPTIONAL

Authorization of Approved Signatories

Project Name: **Error! Reference source not found.**

WDID #: TBD

Name of Personnel	Project Role	Company	Signature	Date

LRP's Signature

Date

Jeff Gordon

LRP Name and Title

949-579-1294

Telephone Number

Identification of QSP

Project Name: Meridian Park Upper Plateau

WDID #: TBD

The following are QSPs associated with this project

Name of Personnel (1)	Company	Date

(1) If additional QSPs are required on the job site add additional lines and include information here

Authorization of Data Submitters

Project Name: Meridian Park Upper Plateau

WDID #: TBD

Name of Personnel	Project Role	Company	Signature	Date

Approved Signatory's Signature

Date

Jeff Gordon

Approved Signatory

9449-200-6733

Telephone Number

Appendix M:Contractors and Subcontractors

[Insert Information of Contractors When Available]

Appendix N: Construction General Permit

The Construction General Permit can be found here:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_complete.pdf

Risk Level 2 requirements (Attachment D) can be found here:

http://www.waterboards.ca.gov/water_issues/programs/stormwater/docs/constpermits/wqo_2009_0009_att_d.pdf

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

160 South Old Springs Road, Ste. 210
Anaheim Hills, California 92808
Phone: 714-685-6860
Fax: 714-685-6801

Meridian West Campus Upper Plateau EIR April 19, 2023

Response to Comments

Comment
R-Now Letter dated Feb 26, 2023

Response
The underlying soils of the proposed project preclude the use of shallow infiltration based design components and the MJPA practices prohibit deep infiltration based designs regardless of the type of development proposed. See soils report for information regarding the underlying soil conditions.

The proposed development meets the MJPA development standards for the amount of permeable surface (landscape) and is proposing dedicated open space areas within the development limits.

GEOTECHNICAL EXPLORATION
PROPOSED MERIDIAN WEST CAMPUS UPPER PLATEAU
WEST OF LA CROSSE STREET AND SOUTH OF CAMINO DEL SOL
MORENO VALLEY, CALIFORNIA

Prepared For

LEWIS LAND DEVELOPERS, LLC
1156 NORTH MOUNTAIN AVENUE
UPLAND, CALIFORNIA 91786

Prepared By

LEIGHTON CONSULTING, INC.
41715 ENTERPRISE CIRCLE N, SUITE 103
TEMECULA, CA 92590

Project Number 13226.001

September 24, 2021

Leighton Consulting, Inc.
A Leighton Group Company

September 24, 2021
Project No. 13226.001

Lewis Land Developers, LLC
1156 North Mountain Avenue
Upland, California 91786

Attention: Mr. Adam Collier

Subject: Geotechnical Exploration
Proposed Meridian West Campus - Upper Plateau
West of La Crosse Street and South of Camino Del Sol
March JPA, Riverside County, California

In accordance with your request, we are pleased to provide this report for the subject project summarizing our geotechnical findings, conclusions and recommendations regarding the design and construction of the proposed development. Based on the results of our findings and conclusions, it is our opinion that the site is suitable for the intended use provided the recommendations included in herein are implemented during design and construction phases of development. However, it should be noted that additional geotechnical evaluations and/or reviews will be required based on final site development and/or grading plans.

If you have any questions regarding this report, please do not hesitate to contact the undersigned. We appreciate this opportunity to be of service on this project.

Respectfully submitted,
LEIGHTON CONSULTING, INC.

DRAFT

Simon I. Saiid, GE 2641
Principal Engineer

Robert F. Riha, CEG 1921
Senior Principal Geologist

DRAFT

Brent A. Adam, PG 9653
Project Geologist/PM

Distribution: (1) Addressee (PDF via email)

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Appendix A-2 – Seismic Refraction Survey
Appendix B – Results of Geotechnical Laboratory Tests
Appendix C – Earthwork and Grading Specifications
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1.0 INTRODUCTION

1.1 Purpose and Scope

This geotechnical exploration is for the proposed Meridian Upper Plateau commercial development, located generally south of Camino Del Sol and west of La Crosse Way, County of Riverside, California (see Figure 1). Our scope of services for this exploration included the following:

- A site reconnaissance, excavation of 44 exploratory excavator test pits and 6 small-diameter hollow stem auger borings. Approximate locations of these test pits and borings are depicted on the *Geotechnical Map*. The logs are presented in Appendix A-1.
- Geotechnical laboratory testing of selected soil samples collected during this exploration. Test results are presented in Appendix B.
- A geophysical study to further evaluate rippability and depth of onsite bedrock with 18 seismic refraction lines. Approximate locations of the seismic lines are depicted on the *Geotechnical Map*. The geophysical report is included as Appendix A-2.
- Geotechnical engineering analyses performed or as directed by a California registered Geotechnical Engineer (GE) and reviewed by a California Certified Engineering Geologist (CEG).
- Preparation of this report which presents our geotechnical conclusions and recommendations regarding the proposed structures.

This report is not intended to be used as an environmental assessment (Phase I or other), or foundation plan review.

1.2 Project and Site Description

The project site is approximately 312 acres of mostly vacant land located generally south of East Alessandro Boulevard and west of Meridian Parkway in the March JPA General Plan area of Riverside Country, California (*see* Figure 1, *Site Location Map*). Topographically, the property contains rolling hills with the highest elevation of approximately 1,765 feet MSL in the central portion of the site and the lowest elevation of approximately 1,645 feet MSL is located in the northeastern portion of the site. Drainage is generally from the elevated central portion of the site to the perimeters through natural drainage features incised in to the rolling hills.

The majority of the site is currently occupied by the former March Air Force Base ordnance area. This ordnance area is surrounded by approximately 10-foot high barbed-wire-topped chain link fencing, and makes up approximately 70% of the overall

Site. The remainder of the Site is vacant and undeveloped land. The ordnance area contains 14 single-story, concrete ordnance storage bunkers (circa 1940's and 1950's), and seven other associated single-story buildings (circa late 1950's to mid 1960's) in various states of abandonment. Numerous asphalt paved roads, as well as some dirt roads, exist within the ordnance area, and connect these various structures/bunkers. The facilities on-site are no longer in use by the military. A tenant is currently using the bunkers as storage for pyrotechnics. Existing nearby improvements include Industrial buildings to the east of the site, residential to the north, west and south, and a church to the southwest. It is our understanding that a buffer of undisturbed land will remain between the surrounding existing developments and the proposed new development.

Based on provided site plan (RGA, 2020) the proposed site development includes large industrial buildings ranging in size from approximately 200,000 to 1,000,000 square-feet (SF) and various future lots ranging in size from approximately 7 to 67 acres to host these industrial buildings and associated park sites and access roads. Access to the development will be through the extension of Cactus from the east, Brown Road from the north and Barton Road traversing the western portion of the site.

Based on the review of the provided preliminary grading plans, site grading is expected to have cuts of up to approximately 50 feet deep and fills of up to approximately 55 feet thick, plus remedial grading, where applicable. Although no structural loads or foundations plans are developed yet, we anticipate the structural loads to range up to 200 kips for isolated columns/pads and 10 kips/lineal-foot for continuous wall footings. If site development significantly differs from the assumptions made herein, the recommendations included in this report should be subject to further evaluation.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Our field exploration for this report consisted of the excavation of forty-four (44) excavator test pits located generally within areas of planned building footprints to provide basis for foundation and pavement design. Test pits were excavated utilizing a Cat 349F, with an operating weight of 105,000 pounds to further evaluate rock hardness in the field. In addition, six (6) small-diameter borings were advanced within the areas of planned building footprints. During exploration, relatively undisturbed and disturbed/bulk samples were collected for further laboratory testing and evaluation. Approximate locations of these explorations are depicted on the *Geotechnical Map* (see Plate 1). Sampling was conducted by a staff geologist from our firm. After logging and sampling, the excavations were loosely backfilled with spoils generated during excavation. The exploration logs are included in Appendix A.

A seismic refraction survey was performed by Atlas Geophysics to further evaluate rock rippability at depth. The full report is attached as Appendix A-2.

2.2 Laboratory Testing

Laboratory tests were performed on representative bulk samples to provide a basis for development of remedial earthwork and geotechnical design parameters. The laboratory testing program included expansion index, maximum density/optimum moisture content relationships, R-value, sieve analysis, and corrosion suites. The results of our laboratory testing from this exploration and previous investigations are presented in Appendix B.

3.0 GEOTECHNICAL AND GEOLOGIC FINDINGS

3.1 Regional Geology

The site is located within a prominent geomorphic province in southwestern California known as the Peninsular Ranges. This province is characterized by steep, elongated ranges and valleys that trend northwestward. More specifically, the proposed site is located within the relatively stable Perris Block of the Peninsular Ranges.

The Perris Block, approximately 20 miles by 50 miles in extent, is bounded by the San Jacinto Fault Zone to the northeast, and the Elsinore Fault Zone to the southwest. The Perris Block has had a complex tectonic history, undergoing relative vertical land-movements of several thousand feet in response to movement on the Elsinore and San Jacinto Fault Zones. Within the general site vicinity, thin residual sedimentary and volcanic materials mantle crystalline bedrock, consisting of the Val Verde Tonalite (Kvt) and lesser amounts of Cretaceous granitic dikes (Kg).

3.2 Site Specific Geology

3.2.1 Earth Materials

Our field exploration, observations, and review of the pertinent literature indicate that materials on the site include the following units; top soil/residual soil, and granitic Val Verde Tonalite (Kvt). For the engineering purposes of this report, we have grouped the upper near surface soil materials into one unit, Topsoil/Residual Soil. These units are discussed in the following sections in order of increasing age. A more detailed description of each unit is provided on the logs of borings in Appendix A.

- **Undocumented Artificial Fill (not a mapped unit):** Although not encountered in our subsurface exploration, undocumented fill should be expected as roadway embankments, previous utility trench backfill and fill associated with the various onsite structures. Fill soils are expected to have been generated from site excavations.
- **Residual soil/Topsoil (not a mapped unit):** Residual soil materials are expected to mantle the majority of the site. The residual soil generally consists of a thin surface layer up to 5 feet in depth in some areas. Encountered materials appear to be generally porous and relatively loose and have a low expansion potential. These materials are generally comprised of light to grayish brown silty sand (SM) and clayey sand (SC).
- **Colluvium (Qcol):** Colluvium was encountered in the gently sloping central portion of the site and generally extends to approximate depths of 3 to 9 feet BGS. Encountered materials generally consist of silty to clayey sand (SM/SC) and

appear to be relatively porous and expected to have very low to low expansion potential (EI<51)

- **Alluvium (Qal):** Recent alluvial deposits are expected to exist within drainages or low-laying areas of the site. Where encountered, the alluvium generally extends to a depth of 6 feet BGS. Encountered materials generally consist of clayey sand to sandy clay(SC/CL) and appear to be relatively porous and expected to have very low to low expansion potential (EI<51)
- **Val Verde Tonalite (Kvt):** The Val Verde Tonalite (Cretaceous granite) was encountered near the surface across the majority of the site with the exception of TP-44. In TP-44, the Tonalite was encountered at an approximate depth of 9 feet BGS. As observed during the field exploration, the condition of the near-surface bedrock varies from that of completely disintegrated rock that has become a dense soil-like deposit to that of moderately to highly weathered rock. Where encountered, the bedrock is generally massive and can be expected to range from readily rippable to non-rippable depending on the degree of weathering. The less weathered granitic rock is anticipated to generate sand, gravel, cobbles, and possibly oversize boulders. The more weathered bedrock produced fine to coarse sand with silt and gravel size rock fragments. The weathered bedrock is expected to be generally suitable for re-use as compacted fill. It should be anticipated that deep cuts will generate boulders or core stones (greater than 12 inches) that will require special placement described later in Section 5.2 of this report.

3.3 Groundwater and Surface Water

Groundwater was only encountered in one boring (B-6) during this exploration at an approximate depth of 48 feet below the existing ground surface. Groundwater was also encountered during previous grading of the western terminus of Cactus Avenues for Meridian Park West. The groundwater encountered within the Tonalite bedrock is associated with a joint/fracture system If encountered during grading and/or utility installation; this condition would likely be associated with localized seepages along existing joints and fractures. Groundwater may be encountered during grading and canyon subdrains are recommended in the canyon fill areas to mitigate water accumulation at the transition between native bedrock and engineered fill. In addition, groundwater seepage may appear in cut slopes exposing joints and fractures or earth materials of contrasting permeabilities. Mitigation of possible seepage within building pads or cut-slope areas can be provided on an individual basis after evaluation by the geotechnical consultant during grading operations. Surface water was not observed onsite during our field reconnaissance.

3.4 Landslides/Debris Flow and Rockfalls

No evidence of on-site landslides/debris flow or rock fall was observed during our field investigation. Thick deposits of surficial soils typically associated with landsliding or debris flows are not present and, therefore, landslide hazard at the sight is considered low. Based on the current proposed buildings, no prominent rock outcrop will remain onsite, therefore the rock fall hazard is considered very low. The potential for rock fall due to either erosion or seismic ground shaking is considered nil. Other soils susceptible to slumping (i.e. such as thick residual soil/colluvium) will be removed and compacted during the course of grading.

3.5 Rippability

Based on our geotechnical exploration and the seismic refraction survey conducted by Atlas Geophysics (See, Appendix C), we anticipate the bedrock in most of the site to be rippable to the proposed design grades with conventional heavy earth moving equipment in good operating conditions (Caterpillar D9L or D10 with single shank ripper and rock teeth). Localized marginally rippable to unrippable rock will be encountered, particularity in the areas of excavations deeper than 25 feet. However, unrippable rock or buried core stones (P-wave velocities typically >7,000 feet/second) may exist at depth of 15 to 25 feet BGS in some areas of the site (see SL-9 and SL-14). In addition, due to differential weathering of the bedrock materials, very heavy ripping and/or other specialized excavation techniques may be required to maintain desired excavation rates. For proposed building pads and utility trenches in marginally rippable to non-rippable rock areas, it may be desirable to over-excavate at least 2 feet below the bottom of proposed utilities, storm water storage basins or 3 to 4 feet below pad grade (or lower truck loading ramp areas) to facilitate future trenching operations. Pad over-excavation should be sloped a minimum of 1 percent towards the deeper fills or streets.

3.6 Regional Faulting and Fault Activity

The subject site, like the rest of Southern California, is located within a seismically active region as a result of being located near the active margin between the North American and Pacific tectonic plates. Based on published geologic hazard maps, this site is not located within a currently designated Alquist-Priolo (AP) Earthquake Fault Zone; nor is located within a County Fault Zone. The nearest zoned active faults are the San Bernardino segment of the San Jacinto Fault Zone, located approximately 8.8 miles (14.2 km) northeast of the site and the San Jacinto Valley Segment of the San Jacinto Fault Zone, located approximately 8.9 miles (14.4 km) east of the site (Blake, 2000c).

3.7 Seismic Coefficients per 2019 CBC

As is common for virtually all of Southern California, strong ground shaking can be expected at the site during moderate to severe earthquakes in this general region. Intensity of ground shaking at a given location depends primarily upon earthquake magnitude, site distance from the source, and site response (soil type) characteristics. Based on our explorations and review, the site is underlain by weathered granitic bedrock. As such, the site is classified as a Class C site. In accordance with ASCE 7-16 as the Design Code Reference Document, the 2019 CBC seismic coefficients for the site is listed in table below. The project structural engineer should confirm such assumption or else a site–specific ground motion analysis will be required.

Table 1. 2019 CBC Seismic Coefficients

Site Seismic Coefficients / Coordinates		Design Value (g)
Latitude: 33.9050		Site Class C
Longitude: -117.3067		
Mapped Spectra (OSHPD)	Spectral Response (short), S_S	1.50 g
	Spectral Response (1 sec), S_1	0.60 g
	Site Modified Peak Ground Acceleration, PGA_M	0.60 g
	Max. Considered Earthquake Spectral Response Acceleration (short), S_{MS}	1.80 g
	Max. Considered Earthquake Spectral Response Acceleration – (1 sec), S_{M1}	0.84 g
	5% Damped Design Spectral Response Acceleration (short), S_{DS}	1.20 g
	5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.56 g
	Site-Specific Peak Ground Acceleration, PGA	0.50 g

* g- Gravity acceleration

The results of the analysis also indicate that the adjusted Peak Ground Acceleration (PGA_M) for this site is 0.6g.

3.8 Secondary Seismic Hazards

Ground shaking can induce “secondary” seismic hazards such as liquefaction, dynamic densification, lateral spreading, flooding, seiche/tsunami, collapsible soils, and ground rupture, as discussed in the following subsections:

3.8.1 Dynamic Settlement (Liquefaction and/or Dry Settlement)

Due to the lack of shallow groundwater and relatively dense nature of underlying materials, dynamic settlement (Liquefaction and/or Dry Settlement) is not considered a geologic hazard on this site.

3.8.2 Lateral Spreading

Due to the lack of shallow groundwater and relatively dense nature of underlying materials lateral spreading is not considered a geologic hazard on this site.

3.8.3 Flooding

The site is not within a flood plain and potential for flooding is considered very low for this site.

3.8.4 Seiche and Tsunami

Due to the site location and lack of nearby open bodies of water, the possibility of the affects due to seiches or tsunami is considered non-existent.

3.8.5 Collapsible Soils

Laboratory testing indicates that the onsite soils (residual soils) are expected to possess a slight collapse potential. Based on the remedial grading recommendations to remove and compact the near surface soils (Section 4.2.1) as well as the anticipated deep cuts and fills, this geologic hazard on this site is considered very low.

3.8.6 Expansive Soils

Limited laboratory testing indicated that onsite soils generally possess a very low expansion potential (EI<21). However, localized deposits of residual soils may possess low expansion potential (EI<51). The mitigation for this geologic hazard is presented in Section 4.2.4 of this report.

3.8.7 Ground Rupture

Since this site is not located within a mapped Fault Zone, the possibility of ground surface-fault-rupture is very low at this site.

3.9 Slope Stability

Proposed 2:1 (horizontal to vertical) cut slopes in the weathered bedrock will be grossly stable under static and seismic conditions. Slope faces in highly weathered bedrock are inherently subject to erosion, particularly if exposed to rainfall and irrigation. Landscaping and slope maintenance should be conducted as soon as possible in order to increase long-term surficial stability. If unstable conditions are encountered during grading as identified by the geotechnical consultant, a stabilization fill may be considered as depicted in Appendix D. Proposed 2:1 fill slopes up to heights of 30 feet constructed with onsite soils are considered to be grossly stable. Slopes with greater heights should be reviewed prior to construction.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

Based on the results of this exploration, it is our opinion that the site is suitable for the proposed development from a geotechnical viewpoint. Grading of the site should be in accordance with our recommendations included in this report and future recommendations and evaluations made during construction by the geotechnical consultant.

4.2 Earthwork

Earthwork should be performed in accordance with the General Earthwork and Grading Specifications in Appendix D as well as the following recommendations. The recommendations contained in Appendix D, are general grading specifications provided for typical grading projects and some of the recommendations may not be strictly applicable to this project. The specific recommendations contained in the text of this report supersede the general recommendations in Appendix D.

The contract between the developer and earthwork contractor should be worded such that it is the responsibility of the contractor to place fill properly in accordance with the recommendations of this report, the specifications in Appendix D, applicable County Grading Ordinances, notwithstanding the testing and observation of the geotechnical consultant during construction.

4.2.1 Site Preparation and Remedial Grading

Prior to grading, the proposed structural improvement areas (i.e. all-structural fill areas, pavement areas, buildings, etc.) should be cleared of surface and subsurface pipelines and obstructions. Heavy vegetation, roots and debris should be disposed of offsite. Any onsite wells or septic waste system should be removed or abandoned in accordance with the Riverside County Department of Environmental Health. Voids created by removal of buried/unsuitable materials should be backfilled with properly compacted soil in general accordance with the recommendations of this report.

The near surface soils (including residual soils/colluvium and alluvium) are potentially compressible in their present state and may settle under the surcharge of fills or foundation loading. As such, these materials should be removed in all settlement-sensitive areas including building pads, pavement, and slopes. The depth of removal should extend into underlying dense bedrock, but not generally expected to exceed a depth of 3 to 9 feet. Acceptability of all removal bottoms should be reviewed by an engineering geologist or geotechnical engineer and documented in the as-graded geotechnical report. The removal limit should be established by a

1:1 (horizontal:vertical) projection from the edge of fill soils supporting structural fill or settlement-sensitive structures downward and outward to competent material identified by the geotechnical consultant. This may require remedial grading that extends beyond the limits of design grading. Removal will also include benching into competent material as the fills rise. Areas adjacent to existing property limits or protected habitat areas may require special considerations and monitoring. Steeper temporary slopes in these areas may be considered.

After completion of the recommended removal of unsuitable soils and prior to fill placement, the exposed surface should be scarified to a minimum depth of 8-inches, moisture conditioned as necessary to optimum moisture content and compacted using heavy compaction equipment to an unyielding condition. All structural fill should be compacted throughout to 90 percent of the ASTM D 1557 laboratory maximum density, at or slightly above optimum moisture.

The California Building Code and County of Riverside require that no oversize rock (>12-inches) be placed within 10 feet of the surface of a structural fill and/or building pad. The grading plan should be carefully reviewed during grading to verify that oversized rocks are buried below a 10-foot fill cap. Generally, oversize rock will require windrowing, individual burial, or other special placement methods as further described in Appendix D. In addition, an adequate supply of granular fill material will be needed for placement around the rocks. A grading contractor with experience in the handling and placement of oversize rock should be selected for this project.

4.2.2 Cut/Fill Transition and Streets

In order to mitigate the impact of underlying cut/fill transition conditions, we recommend overexcavation of the cut portion underlying building pads during grading to a minimum depth of 3 feet below finish pad elevation or 2 feet below bottom of footings, whichever is deeper. This overexcavation does not include scarification or preprocessing prior to placement of fill. Overexcavation should encompass the entire building limits a horizontal distance equal to the depth of overexcavation or to a minimum distance of 5 feet, whichever is greater. Overexcavation bottoms should be sloped as needed to reduce the accumulation of subsurface water.

We further recommend that streets located in the dense bedrock be overexcavated to a depth of 2 feet below the deepest utility and then brought back up to design grades with compacted fill.

4.2.3 Structural Fills

The onsite soils are generally suitable for re-use as compacted fill, provided they are free of debris and organic matter. Fills placed within 10 feet of finish pad grades or slope faces should contain no rocks over 12 inches in maximum dimension. In addition, encountered clayey soils layers (EI>21), if any, should be placed at a depth greater than 5 feet below finished grades.

Areas to receive structural fill and/or other surface improvements should be scarified to a minimum depth of 8 inches, conditioned to at least optimum moisture content, and recompacted. Fill soils should be placed at a minimum of 90 percent relative compaction (based on ASTM D1557) at or above optimum moisture content. Placement and compaction of fill should be performed in accordance with local grading ordinances under the observation and testing of the geotechnical consultant. The optimum lift thickness to produce a uniformly compacted fill will depend on the type and size of compaction equipment used. In general, fill should be placed in uniform lifts not exceeding 8 inches in thickness.

Fill slope keyways will be necessary at the toe of all fill slopes and at fill-over-cut contacts. Keyway schematics, including dimensions and subdrain recommendations, are provided in Appendix C. All keyways should be excavated into dense bedrock as determined by the geotechnical engineer. The cut portions of all slope and keyway excavations should be geologically mapped and approved by a geologist prior to fill placement.

Fills placed on slopes steeper than 5:1 (horizontal:vertical) should be benched into dense soils (see Appendix C for benching detail). Benching should be of sufficient depth to remove all loose material. A minimum bench height of 2 feet into approved material should be maintained at all times.

4.2.4 Suitability of Site Soils for Fills

Topsoil and vegetation layers, root zones, and similar surface materials should be striped and stockpiled or removed from the site. Existing on-site soils should be considered suitable for re-use as compacted fills provided the recommendations contained herein are followed. Fill materials with expansion index greater than 21 should not be used in upper 3 feet of subgrade soils below building pad. If cobbles and boulders larger than 6-inches in largest diameter are encountered or produced during grading, these oversized cobbles and boulders should be reduced to less than 6 inches or placed in structural fill as outlined in Appendix D.

4.2.5 Import Soils

Import soils and/or borrow sites, if needed, should be evaluated by us prior to import. Import soils should be uncontaminated, granular in nature, free of organic material (loss on ignition less-than 2 percent), have very low expansion potential (E<21) and have a low corrosion impact to the proposed improvements.

4.2.6 Utility Trenches

Utility trenches should be backfilled with compacted fill in accordance with the *Standard* Specifications *for Public Works Construction,* (“Greenbook”), 2021 Edition. Fill material above the pipe zone should be placed in lifts not exceeding 8 inches in uncompacted thickness and should be compacted to at least 90 percent relative compaction (ASTM D 1557) by mechanical means only. Site soils may generally be suitable as trench backfill provided these soils are screened of rocks over 1½ inches

in diameter and organic matter. If imported sand is used as backfill, the upper 3 feet in building and pavement areas should be compacted to 95 percent. The upper 6 inches of backfill in all pavement areas should be compacted to at least 95 percent relative compaction.

Where granular backfill is used in utility trenches adjacent to moisture sensitive subgrades and foundation soils, we recommend that a cut-off "plug" of impermeable material be placed in these trenches at the perimeter of buildings, and at pavement edges adjacent to irrigated landscaped areas. A "plug" can consist of a 5-foot long section of clayey soils with more than 35-percent passing the No. 200 sieve, or a Controlled Low Strength Material (CLSM) consisting of one sack of Portland-cement plus one sack of bentonite per cubic-yard of sand. CLSM should generally conform to requirements of the "Greenbook". This is intended to reduce the likelihood of water permeating trenches from landscaped areas, then seeping along permeable trench backfill into the building and pavement subgrades, resulting in wetting of moisture sensitive subgrade earth materials under buildings and pavements.

Excavation of utility trenches should be performed in accordance with the project plans, specifications and the *California Construction Safety Orders* (latest Edition). The contractor should be responsible for providing a "competent person" as defined in Article 6 of the *California Construction Safety Orders*. Contractors should be advised that sandy soils (such as fills generated from the onsite bedrock materials) could make excavations particularly unsafe if all safety precautions are not properly implemented. In addition, excavations at or near the toe of slopes and/or parallel to slopes may be highly unstable due to the increased driving force and load on the trench wall. Spoil piles from the excavation(s) and construction equipment should be kept away from the sides of the trenches. Leighton Consulting, Inc. does not consult in the area of safety engineering.

4.2.7 Shrinkage

The volume change of excavated onsite soils upon recompaction is expected to vary with materials, density, insitu moisture content, and location and compaction effort. The in-place and compacted densities of soil materials vary and accurate overall determination of shrinkage and bulking cannot be made. Therefore, we recommend site grading include, if possible, a balance area or ability to adjust grades slightly to accommodate some variation. Based on our geotechnical laboratory results, we expect recompaction shrinkage of subsurface soils and bulking of bedrock materials (when recompacted to an average 92 percent of ASTM D1557) and estimate the following earth volume changes will occur during grading:

Geologic Unit	Estimated Shrinkage/Bulking
Residual Soil/Colluvium/Alluvium	10% shrinkage, +/- 5%
Bedrock (Upper 30 ft)	5 to 10% bulking, +/- 3%

4.2.8 Drainage

All drainage should be directed away from structures and pavements by means of approved permanent/temporary drainage devices. Adequate storm drainage of any proposed pad should be provided to avoid wetting of foundation soils. Irrigation adjacent to buildings should be avoided when possible. As an option, sealed-bottom planter boxes and/or drought resistant vegetation should be used within 5-feet of buildings.

4.3 Foundation Design

Shallow spread or continuous footings bearing on a newly placed properly compacted fill are anticipated for the proposed structures.

4.3.1 Design Parameters – Spread/Continuous Shallow Footings

Footings should be embedded at least 12-inches below lowest adjacent grade for the proposed structure. Footing embedment should be measured from lowest adjacent finished grade, considered as the top of interior slabs-on-grade or the finished exterior grade, excluding landscape topsoil, whichever is lower. Footings located adjacent to utility trenches or vaults should be embedded below an imaginary 1:1 (horizontal:vertical) plane projected upward and outward from the bottom edge of the trench or vault, up towards the footing.

- **Bearing Capacity**: For footings on newly placed, properly compacted fill soil, an allowable vertical bearing capacity of 2,500 pounds-per-square-foot (psf) should be used. These footings should have a minimum base width of 18 inches for continuous wall footings and a minimum bearing area of 3 square feet (1.75-ft by 1.75-ft) for pad foundations. The bearing pressure value may be increased by 250 psf for each additional foot of embedment or each additional foot of width to a maximum vertical bearing value of 4,500 psf. Additionally, these bearing values may be increased by one-third when considering short-term seismic or wind loads. A modulus of subgrade reaction, K of 200 PCI may be used to relative dense bedrock or onsite soil compacted to minimum 90% relative compaction.
- **Lateral loads**: Lateral loads may be resisted by friction between the footings and the supporting subgrade. A maximum allowable frictional resistance of 0.35 may be used for design. In addition, lateral resistance may be provided by passive pressures acting against foundations poured neat against properly compacted granular fill. We recommend that an allowable passive pressure based on an equivalent fluid pressure of 350 pounds-per-cubic-foot (pcf) be used in design. These friction and passive values have already been reduced by a factor-of-safety of 1.5.

4.3.2 Settlement Estimates

For settlement estimates, we assumed that column loads will be no larger than 200 kips, with bearing wall loads not exceeding 10 kips per foot of wall. If greater column

or wall loads are required, we should re-evaluate our foundation recommendation, and re-calculate settlement estimates.

Buildings located on compacted fill soils as required per Section 4.2.1 above should be designed in anticipation of 1 inch of total static settlement and 0.5-inch of static differential settlement within a 40 foot horizontal run.

4.4 Vapor Retarder

It has been a standard of care to install a moisture-vapor retarder underneath all slabs where moisture condensation is undesirable. Moisture vapor retarders may retard but not totally eliminate moisture vapor movement from the underlying soils up through the slabs. Moisture vapor transmission may be additionally reduced by use of concrete additives. Leighton Consulting, Inc. does not practice in the field of moisture vapor transmission evaluation/mitigation. Therefore, we recommend that a qualified person/firm be engaged/consulted with to evaluate the general and specific moisture vapor transmission paths and any impact on the proposed construction. This person/firm should provide recommendations for mitigation of potential adverse impact of moisture vapor transmission on various components of the structure as deemed appropriate.

However, based on our experience, the standard of practice in Southern California has evolved over the last 15 to 20 years into a construction of a vapor retarder system that generally consisted of a membrane (such as 15-mil thick), underlain by a capillary break consisting of 4 inches of clean ½-inch-minimum gravel or 2-inch sand layer (SE>30). The structural engineer/architect or concrete contractor often require a sand layer be placed over the membrane (typically 2-inch thick layer) to help in curing and reduction of curling of concrete. If such sand layer is placed on top of the membrane, the contractor should not allow the sand to become wet prior to concrete placement (e.g., sand should not be placed if rain is expected).

In conclusion, the construction of the vapor barrier/retarder system is dependent on several variables which cannot be all geotechnically evaluated and/or tested. As such, the design of this system should be a design team/owner decision taking into consideration finish flooring materials and manufacture's installation requirements of proposed membrane. Moreover, we recommend that the design team also follow ACI Committee 302 publication for "Guide for Concrete Slabs that Receive Moisture-Sensitive Flooring Materials" (ACI 302.2R-06) which includes a flow chart that assists in determining if a vapor barrier/retarder is required and where it is to be placed.

4.5 Retaining Walls

Retaining wall earth pressures are a function of the amount of wall yielding horizontally under load. If the wall can yield enough to mobilize full shear strength of backfill soils, then the wall can be designed for "active" pressure. If the wall cannot yield under the applied load, the shear strength of the soil cannot be mobilized and the earth pressure will be higher. Such walls should be designed for "at rest" conditions. If a structure moves toward the soils, the resulting resistance developed by the soil is the "passive" resistance. Retaining walls backfilled with non-expansive soils can be designed using the following equivalent fluid pressures:

Table 2. Retaining Wall Design Earth Pressures (Static, Drained)

Loading Conditions	Equivalent Fluid Density (pcf)	
	Level Backfill	2:1 Backfill
Active	36	55
At-Rest	55	90
Passive*	350	150 (2:1, sloping down)

* This assumes level condition in front of the wall will remain for the duration of the project, not to exceed 3,500 psf at depth.

Unrestrained (yielding) cantilever walls should be designed for the active equivalent-fluid weight value provided above for very low to low expansive soils that are free draining. In the design of walls restrained from movement at the top (non-yielding) such as basement or elevator pit/utility vaults, the at-rest equivalent fluid weight value should be used. Total depth of retained earth for design of cantilever walls should be measured as the vertical distance below the ground surface measured at the wall face for stem design, or measured at the heel of the footing for overturning and sliding calculations. Should a sloping backfill other than a 2:1 (horizontal:vertical) be constructed above the wall (or a backfill is loaded by an adjacent surcharge load), the equivalent fluid weight values provided above should be re-evaluated on an individual case basis by us. Non-standard wall designs should also be reviewed by us prior to construction to check that the proper soil parameters have been incorporated into the wall design.

All retaining walls should be provided with appropriate drainage. The outlet pipe should be sloped to drain to a suitable outlet. Wall backfill should be non-expansive (EI $\leq$ 21) sands compacted by mechanical methods to a minimum of 90 percent relative compaction (ASTM D 1557). Clayey site soils should not be used as wall backfill. Walls should not be backfilled until wall concrete attains the 28-day compressive strength and/or as determined by the Structural Engineer that the wall is structurally capable of supporting backfill. Lightweight compaction equipment should be used, unless otherwise approved by the Structural Engineer.

4.6 Sulfate Attack

Based on past experience in this area, the onsite soils are expected to possess negligible sulfate content. Type II soils or equivalent may be used. Further testing should be performed at the completion of site grading to confirm such conditions.

4.7 Preliminary Pavement Design

Our preliminary HMA pavement design is based on an R-value of 57 and the Caltrans Highway Design Manual. For planning and estimating purposes, the pavement sections are calculated based on Traffic Indexes (TI) as indicated in Table below:

Table 3. Asphalt Pavement Sections

General Traffic Condition	Traffic Index (TI)	Asphalt Concrete (inches)	Aggregate Base* (inches)
Automobile Parking Lanes	4.5	3.0	4.0
	5.0	3.0	4.0
Truck Access & Driveways	6.0	3.0	4.0
	6.5	3.5	4.0
Roadways (Barton, Brown)	7.0	4.0	4.0
Roadways (Cactus)	9.0	5.0	5.0

Appropriate Traffic Index (TI) should be selected or verified by the project civil engineer and actual R-value of the subgrade soils will need to be verified after completion of site grading to finalize the pavement design. Pavement design and construction should also conform to applicable local, county and industry standards. The Caltrans pavement section design calculations were based on a pavement life of approximately 20 years with periodic flexible pavement maintenance.

Where PCC pavement is planned, the following table provides sections based on the design standards presented in the ACI “Guide for the Design and construction of Concrete Parking Lots” (ACI 330R-14), R-value test results, and the provided Average Daily Truck Traffic Indices (ADTT). The ADTT index is provided by Client/civil engineer.

Table 4. Pavement Sections

Street	ADTT	R-Value	PCC (Inches)
Heavy Truck Traffic	>700	>40	8.0
Moderate Truck Traffic/Parking	≤ 300		7.0
Parking/Light Traffic	≤ 50		6.5

- **Traffic Categories ACI 330, Table 3.3*

The above recommended concrete sections are based on properly compacted fill soils with a very low expansion potential (EI<21) and R-Value greater than 40. All utility trenches should be compacted to 90 percent relative compaction and pavement subgrade (upper 12-inches) uniformly compacted (non-yielding) to 95 percent of the laboratory maximum dry density (ASTM D1557) and at/or slightly above optimum moisture content. Compaction should extend a minimum of 12-inches beyond formlines. Slab edges and construction joint details provided by ACI should be followed. Slab edges that will be subject to through going traffic should be tapered from the heaviest traffic load into the lessor traffic load area a minimum of 3 feet. The PCC pavement should have a minimum of 28-day compressive strength of 3250 psi (or MOR of 550 psi). Construction and crack control joints should be designed per structural engineer's requirements and/or ACI or ACPA guidelines.

The upper 6 inches of the subgrade soils should be moisture-conditioned to near optimum moisture content, compacted to at least 95 percent relative compaction (ASTM D1557) and kept in this condition until the pavement section is constructed. Minimum relative compaction requirements for aggregate base should be 95 percent of the maximum laboratory density as determined by ASTM D1557. If applicable, aggregate base should conform to the "Standard Specifications for Public Works Construction" (green book) current edition or Caltrans Class 2 aggregate base.

If pavement areas are adjacent to heavily watered landscape areas, some deterioration of the subgrade load bearing capacity and pavement failure may result. Moisture control measures such as deepened curbs or other moisture barrier materials may be used to prevent the subgrade soils from becoming saturated. The use of concrete cutoff or edge barriers should be considered when pavement is planned adjacent to either open (unfinished) or irrigated landscaped areas.

5.0 GEOTECHNICAL CONSTRUCTION SERVICES

Geotechnical review is of paramount importance in engineering practice. Poor performances of many foundation and earthwork projects have been attributed to inadequate construction review. We recommend that Leighton Consulting, Inc. be provided the opportunity to review the grading plan and foundation plan(s) prior to bid.

Reasonably-continuous construction observation and review during site grading and foundation installation allows for evaluation of the actual soil conditions and the ability to provide appropriate revisions where required during construction. Geotechnical conclusions and preliminary recommendations should be reviewed and verified by Leighton Consulting, Inc. during construction, and revised accordingly if geotechnical conditions encountered vary from our findings and interpretations. Geotechnical observation and testing should be provided:

- After completion of site demolition and clearing,
- During over-excavation of compressible soil,
- During compaction of all fill materials,
- After excavation of all footings and prior to placement of concrete,
- During utility trench backfilling and compaction, and
- When any unusual conditions are encountered.

Additional geotechnical exploration and analysis may be required based on final development plans, for reasons such as significant changes in proposed structure locations/footprints. We should review grading (civil) and foundation (structural) plans, and comment further on geotechnical aspects of this project.

6.0 LIMITATIONS

This report was based in part on data obtained from a limited number of observations, site visits, soil excavations, samples and tests. Such information is, by necessity, incomplete. The nature of many sites is such that differing soil or geologic conditions can be present within small distances and under varying climatic conditions. Changes in subsurface conditions can and do occur over time. Therefore, our findings, conclusions and recommendations presented in this report are based on the assumption that we (Leighton Consulting, Inc.) will provide geotechnical observation and testing during construction as the Geotechnical Engineer of Record for this project. Please refer to Appendix D, GBA's *Important Information About This Geotechnical-Engineering Report*, prepared by the Geoprofessional Business Association (GBA) presenting additional information and limitations regarding geotechnical engineering studies and reports.

This report was prepared for the sole use of Client and their design team, for application to design of the proposed maintenance building, in accordance with generally accepted geotechnical engineering practices at this time in California. Any unauthorized use of or reliance on this report constitutes an agreement to defend and indemnify Leighton Consulting, Inc. from and against any liability, which may arise as a result of such use or reliance, regardless of any fault, negligence, or strict liability of Leighton Consulting, Inc.

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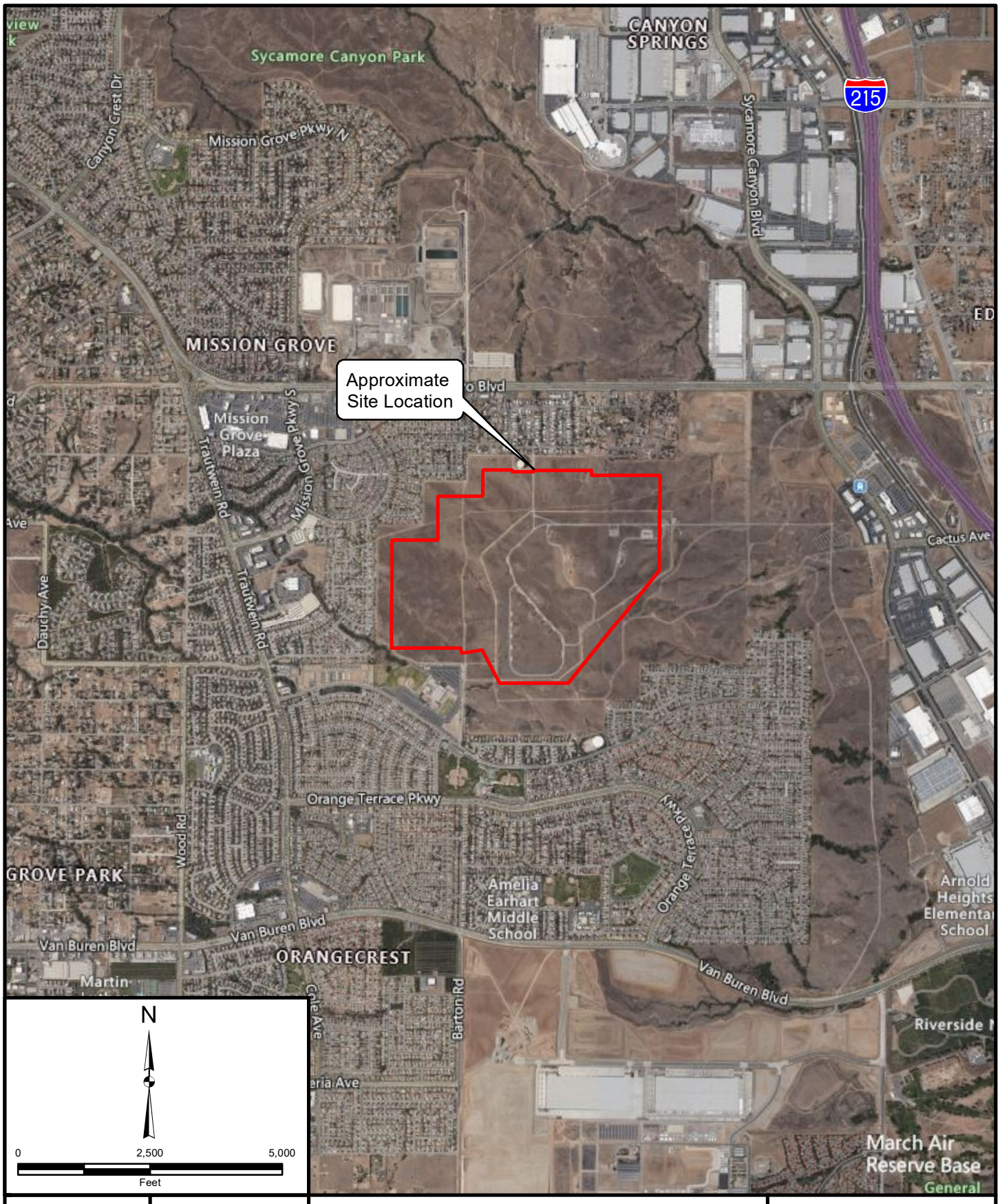

Project: 13226.001	Eng/Geol: SIS/BAA
Scale: 1 " = 2,500 '	Date: September 2021

Base Map: ESRI ArcGIS Online 2021

SITE LOCATION MAP

Proposed Meridian Upper Plateau
Vista Grande Drive, Riverside, California

FIGURE 1

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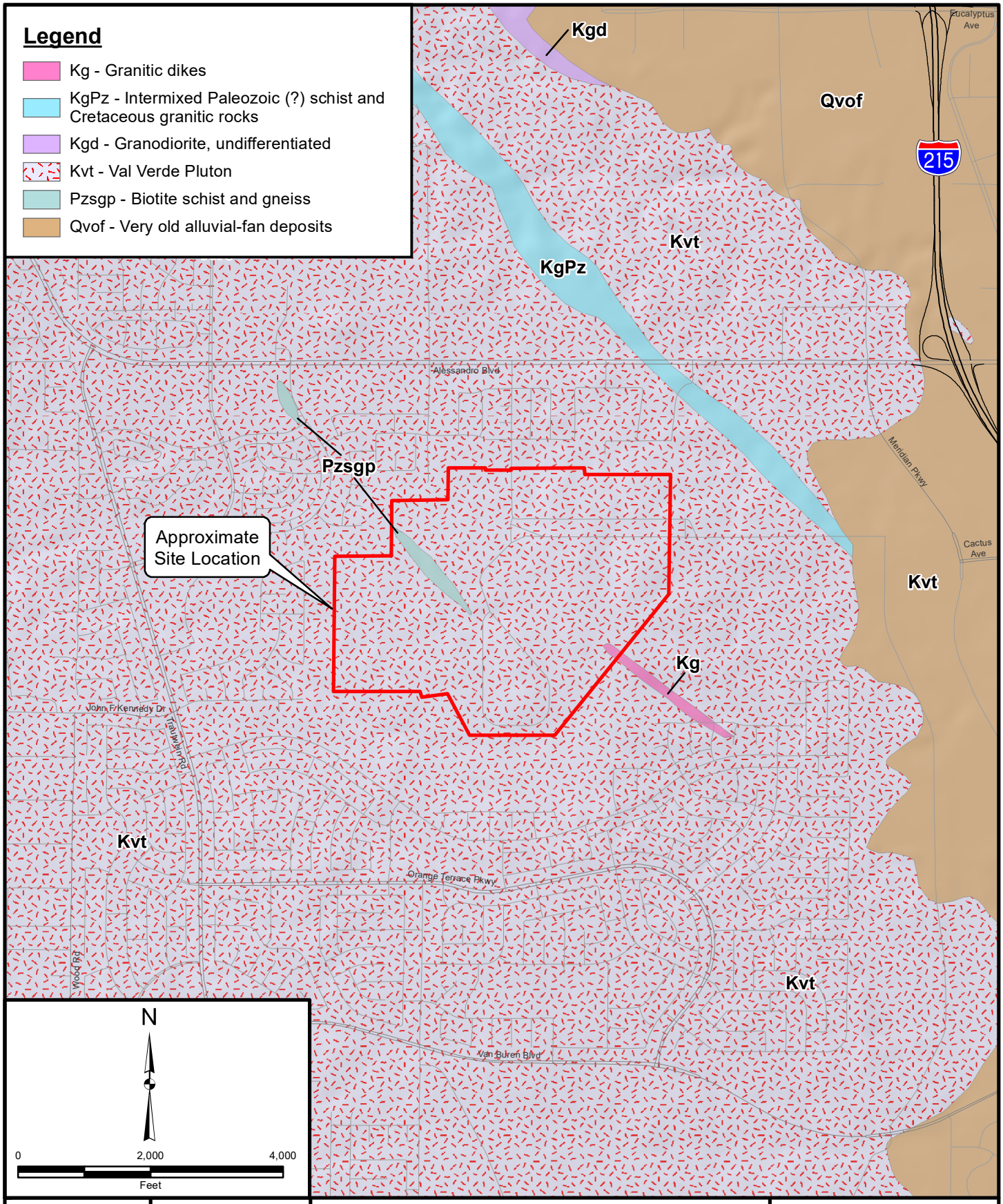
Map Saved as V:\Drafting\13226\001\Maps\13226.001_F01_SLM_2021-08-17.mxd on 9/23/2021 4:27:26 PM Author: Leighton Geomatics (mmurphy)



Project: 13226.001	Eng/Geol: SIS/BAA
Scale: 1 " = 2,000 '	Date: September 2021

Reference: USGS, 2006 Geologic map of the San Bermardino and Santa Ana 30'x60 quadrangle, California Version 1,0 Open File Report 2006-1217.

Author: Leighton Geomatics (mmurphy)

REGIONAL GEOLOGY MAP

Proposed Meridian Upper Plateau
Vista Grande Drive, Riverside, California

FIGURE 2

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Map Saved as V:\Drafting\13226\001\Maps\13226-001_F02_RGM_2021-09-23.mxd on 9/23/2021 4:50:00 PM

SCALE: 1"=150'

Legend

- B-6 T.D. 48' — Approximate location of hollow-stem auger soil boring showing total depth (T.D.) in feet below existing ground surface.
- TP-44 T.D. 13' — Approximate location of test pit showing total depth (T.D.) in feet below existing ground surface.
- Qrs@0-9' — Thickness of Residual Soil (in Feet)
- SL-15 — Approximate Location of Refraction Survey Line (Atlas Technical Consultant, August 2021)
- Approximate Location of Proposed Subdrain
- Approximate Geologic Contact
- Approximate Site Boundary

Geologic Units

- Qal — Recent Alluvium,
- Qcol — Recent Colluvium, Holocene
- Kgr — Valverde Tonalite, Cretaceous (circled where buried)

UNDISTURBED

PARK 10.03 AC

MIXED USE 10.87 AC

FUTURE PARK 51.73 AC

MIXED USE 22.93 AC

MIXED USE 5.45 AC

UNDISTURBED 2.48 AC

WMWD FACILITY 2.06 AC

UTILITY 1.41 AC

BARTON

CACTUS AVE.

1655 1685 1695 1701 1702 1703 1704 1714 1715 1715 FF 1716 1726 FF 1727 1727 1729 1731

Qal Qcol Kvt

TP-1 T.D. 20' Qrs@0-3'
TP-2 T.D. 10' Qrs@0-3'
TP-3 T.D. 75' Qrs@0-2'
TP-4 T.D. 6' Qrs@0-4'
TP-5 T.D. 16' Qrs@0-3'
TP-6 T.D. 7' No Qrs
TP-7 T.D. 17' Qrs@0-1'
TP-8 T.D. 15' Qcol@0-6'
TP-9 T.D. 10' Qcol@0-5'
TP-10 T.D. 17' Qrs@0-1'
TP-11 T.D. 17' Qrs@0-1'
TP-12 T.D. 7' Qrs@0-3'
TP-13 T.D. 15' Qcol@0-10'
TP-14 T.D. 13' Qcol@0-10'
TP-15 T.D. 9' Qrs@0-1'
TP-16 T.D. 17' Qrs@0-1'
TP-17 T.D. 10' Qrs@0-4'
TP-18 T.D. 11' Qrs@0-4'
TP-19 T.D. 7' Qrs@0-4'
TP-20 T.D. 5' Qrs@0-1'
TP-21 T.D. 7' Qrs@0-3'
TP-22 T.D. 7' Qal@0-6'
TP-23 T.D. 6' Qrs@0-2'
TP-24 T.D. 6' Qrs@0-2'
TP-25 T.D. 7' Qrs@0-3'
TP-26 T.D. 8' Qrs@0-2'
TP-27 T.D. 13' Qrs@0-4'
TP-28 T.D. 6' Qrs@0-1'
TP-29 T.D. 2' Qrs@0-2'
TP-30 T.D. 8' Qrs@0-2'
TP-31 T.D. 10' Qrs@0-4'
TP-32 T.D. 2' Qrs@0-3'
TP-33 T.D. 6' Qrs@0-3'
TP-34 T.D. 18' Qrs@0-2'
TP-35 T.D. 11' Qrs@0-2'
TP-36 T.D. 18' Qrs@0-2'
TP-37 T.D. 11' Qrs@0-2'
TP-38 T.D. 11' Qrs@0-3'
TP-39 T.D. 14' Qrs@0-1'
TP-40 T.D. 21' Qrs@0-3'
TP-41 T.D. 9' Qrs@0-2'
TP-42 T.D. 5' Qrs@0-1'
TP-43 T.D. 3.5' Qrs@0-1'
TP-44 T.D. 13' Qcol@0-9'

B-1 T.D. 50'
B-2 T.D. 41' Qrs@0-7'
B-3 T.D. 44' Qrs@0-2'
B-4 T.D. 27' Qrs@0-2'
B-5 T.D. 50' Qrs@0-2'
B-6 T.D. 48' Qrs@0-2'

SL-1 SL-2 SL-3 SL-4 SL-5 SL-6 SL-7 SL-8 SL-9 SL-10 SL-11 SL-12 SL-13 SL-14 SL-15 SL-16 SL-17 SL-18

N

0 200 400 Feet

GEOTECHNICAL MAP

Proposed Meridian Upper Plateau
Vista Grande Drive, Riverside, California

Leighton

PLATE 1
Scale: 1 " = 200 feet
Date: September 2021
Proj: 13226.001
Eng/Geol: SIS/BAA

Base Map: Prepared for Meridian Park, LLC, 2020

Map Saved as V:\Drafting\13226\001\Maps\13226_001_PG1_GM_2021-08-27.mxd on 9/22/2021 4:10:15 PM

APPENDIX A

GEOTECHNICAL FIELD EXPLORATIONS

APPENDIX A-1

LOGS OF EXPLORATORY BORINGS/TEST PITS

Leighton

GEOTECHNICAL BORING LOG B-1

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1742'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B1				SM	**Residual Soil** SILTY SAND, dense, reddish brown, slightly moist, medium sand	
1740				R1	50/6"	122	7			
									Granitic Bedrock recovered as Poorly graded SAND with silt, very dense, pale brown to grayish brown, slightly moist	
	5			R2	50/5"	116	5			
1735				R3	50/4"		3.2			
	10			S1	50/6"					
1730										
	15			S2	50/5"					
1725										
	20			S3	50/5"					
1720										
	25			S4	50/3"					
1715										
	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

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GEOTECHNICAL BORING LOG B-1

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1742'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30								*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
1710										
	35									
1705										
	40								@ 40'; becomes harder to drill	
1700										
	45									
1695										
	50			S5	50/2.5"				Total Depth 50' No Groundwater Encountered Backfilled 8/2/2021	
1690										
	55									
1685										
	60									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
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- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG B-2

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1730'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1730	0							SM/SC	**Colluvium** SILTY CLAYEY SAND, strong brown to reddish brown, slightly moist, fine to medium sand, trace fine gravel	
				R1	4 2 6	102	6			
1725	5			R2	7 11 4	116	7			
				R3	7 15 23				**Granitic Bedrock** Poorly graded SAND with silt, dense, slightly moist, medium to coarse sand	
1720	10			S1	9 15 18					
1715	15			S2	10 30 50/5"		8.1			
1710	20			S3	35 50/2"					
1705	25			S4	26 50/4"					
1700	30									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG B-2

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1730'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1700	30								@ 30'; becomes harder to drill	
1695	35									
1690	40								Refusal @ 41' No Groundwater Encountered Backfilled 8/2/2021	
1685	45									
1680	50									
1675	55									
1670	60									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG B-3

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1756'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1755	0							SM	**Residual Soil** SILTY SAND, medium dense, pale brown, slightly moist, medium sand	
				R1	50/3"	107	2		**Granitic Bedrock** recovered as SAND with silt, dense, grayish brown, slightly moist, medium to coarse sand	
1750	5			S1	50/5"				@ 7'; becomes harder to drill	
1745	10			S2	50/3.5"					
1740	15									
1735	20									
1730	25									
	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG B-3

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1756'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1725	30								*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
1720	35									
1715	40									
1710	45								Refusal @ 44' No Groundwater Encountered Backfill 8/2/2021	
1705	50									
1700	55									
	60									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

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GEOTECHNICAL BORING LOG B-4

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1755'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1755	0			B1				SC-SM	**Residual Soil** SILTY, CLAYEY SAND, medium dense, reddish brown, slightly moist, fine to medium sand	
				R1	16 50/4.5"	111	8		**Granitic Bedrock** recovered as Poorly graded SAND with silt, dense to very dense, slightly moist, medium to coarse sand	
1750	5			R2	50/6"					
1745	10			S1	50/5.5"					
1740	15								@ 15'; becomes harder to drill	
1735	20									
1730	25									
1725	30								Refusal @ 27' No Groundwater Encountered Backfilled 8/2/2021	

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

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GEOTECHNICAL BORING LOG B-5

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1739'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	0			B1				SM	**Topsoil** SILTY SAND, medium dense, pale brown, slightly moist, fine to medium sand	
				R1	50/6"	126	3		**Granitic Bedrock** recovered as Poorly graded SAND with silt, very dense, grayish brown, slightly moist, coarse sand	
1735	5			S1	34 50/5"					
1730	10			S2	34 50/5.5"					
1725	15			S3	50/5.5"					
1720	20									
1715	25									
1710	30									

This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

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GEOTECHNICAL BORING LOG B-5

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1739'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
	30								*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
1705	35								@ 35'; becomes harder to drill	
1700	40									
1695	45									
1690	50			S4	50/2"				Total Depth 50' No Groundwater Encountered Backfill 8/2/2021	
1685	55									
1680	60									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG B-6

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1750'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N / S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1750	0							SM	**Residual Soil** SILTY SAND, medium dense, pale brown, slightly moist, fine to coarse sand	
				R1	37 50/4"	122	4		**Granitic Bedrock** recovered as Poorly graded SAND with silt, very dense, grayish brown, slightly moist, coarse sand	
1745	5			S1	50/6"					
1740	10			S2	27 50/3"					
1735	15								@ 15' becomes harder to drill	
1730	20									
1725	25									
1720	30									

The Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

GEOTECHNICAL BORING LOG B-6

Project No.	13226.001	**Date Drilled**	8-2-21
Project	Meridian Upper Plateau	**Logged By**	BAA
Drilling Co.	MARTINI DRILLING	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	1750'
Location	See Geotechnical Map	**Sampled By**	BAA

Elevation Feet	Depth Feet	Graphic Log (N S)	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
1720	30								*This Soil Description applies only to a location of the exploration at the time of sampling. Subsurface conditions may differ at other locations and may change with time. The description is a simplification of the actual conditions encountered. Transitions between soil types may be gradual.*	
1715	35									
1710	40									
1705	45									
1700	50			S3	50/4"				Total Depth 50' Groundwater Encountered @ 47.75' Backfilled 8/2/2021	
1695	55									
1690	60									

SAMPLE TYPES:

- B BULK SAMPLE
- C CORE SAMPLE
- G GRAB SAMPLE
- R RING SAMPLE
- S SPLIT SPOON SAMPLE
- T TUBE SAMPLE

TYPE OF TESTS:

- -200 % FINES PASSING
- AL ATTERBERG LIMITS
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- CU UNDRAINED TRIAXIAL
- DS DIRECT SHEAR
- EI EXPANSION INDEX
- H HYDROMETER
- MD MAXIMUM DENSITY
- PP POCKET PENETROMETER
- RV R VALUE
- SA SIEVE ANALYSIS
- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

Leighton

*** This log is a part of a report by Leighton and should not be used as a stand-alone document. ***

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-1	B-1 B-2		SM	**Residual Soil (Qrs)**; 0' 3.0' – SILTY SAND, reddish brown, moist medium dense, trace gravel. **Bedrock (Kvt)**; 3.0'-19.0' – Granitic BEDROCK, gray to yellowish brown, completely weathered, moist, heavily fractured, soft. Total Depth 19.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-2			SM/ SC-SM	**Residual Soil (Qrs)**; 0'-3.0' – SILTY SAND to SILTY CLAYEY SAND, reddish brown, moist medium dense, medium to coarse sand **Granitic Bedrock (Kvt)**; 3.0-12.0' – Granitic Bedrock, grayish brown, soft, completely weathered to moderately weathered, heavily fractured. Total Depth 12.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-3			SM/ SC-SM	**Residual Soil (Qrs)**; 0'-2.0' – SILTY SAND to SILT CLAYEY SAND, reddish brown, moist, loose to medium dense, medium to coarse sand. **Granitic Bedrock (Kvt)**; 2.0'-25' – grayish brown, soft to moderately hard, completely to moderately weathered, heavily fractured. Total Depth 25.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-4			SM/ SC-SM	**Residual Soil (Qrs)**; 0-4.0' – SILTY SAND to SILTY CLAYEY SAND reddish brown, moist, medium dense, fine to medium sand. **Granitic Bedrock (Kvt)**; 4.0'-6.0' – grayish brown, moderately weathered, soft to moderately hard, moderately fractured. Total Depth 6.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-5			SM	**Residual Soil (Qrs)**; 0-3.0' – SILTY SAND, reddish brown, medium dense, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 3.0-16.0' – grayish brown, soft to moderately hard, completely to moderately weathered, heavily fractured. Total Depth 16.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-6				**Granitic Bedrock (Kvt)**; 0-7.0' – grayish brown, soft to moderately hard, moderately weathered, heavily fractured. Total Depth 7.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-7			SM/ SC-SM	**Residual Soil (Qrs)**; 0-1.0' – SILTY SAND to SILTY CLAYEY SAND, medium dense, slightly moist, medium to coarse sand. **Granitic Bedrock (Kvt)**; 1.0-17.0' – grayish brown, moderately hard, completely to moderately weathered, heavily fractured. Total Depth 17.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-8	B-1		SM	**Colluvium (Qcol)**; 0-3.0' – SILTY SAND, reddish brown, medium dense, moist, fine to medium sand.
			SC	**Colluvium (Qcol)**; 3.0-6.0' – CLAYEY SAND, olive brown, medium dense, moist , medium to coarse sand, trace angular crystalline cobbles.
				Granitic Bedrock (Kvt); 6.0-15.0' – dark gray to grayish brown, moderately hard, moderately weathered, heavily fractured.
				Total Depth 15.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-9			SC	**Colluvium (Qcol)**; 0-5.0' – CLAYEY SAND, pale brown to reddish brown, medium dense, moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 5.0-10.0' – grayish brown, soft to moderately hard, moderately weathered, heavily fractured. Total Depth 10.0', no groundwater, backfilled with spoils.

Leighton

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-10			SM	**Residual Soil (Qrs)**; 0-1.0' – SILTY SAND, reddish brown, medium dense, slightly moist, medium to coarse sand (weathered in place). **Granitic Bedrock (Kvt)**; 1.0-17.0' –grayish brown, soft to moderately hard, slightly moist, completely to moderately weathered, heavily fractured. Total Depth 17.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-11			SM	**Residual Soil (Qrs)**; 0-1.0' – SILTY SAND, reddish brown, medium dense, slightly moist, medium to coarse sand (weathered in place). **Granitic Bedrock (Kvt)**; 1.0-10.0' – grayish brown, soft to moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 10.0', no groundwater, backfilled with spoils.

Leighton

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-12			SC	**Residual Soil (Qrs)**; 0-3.0' – CLAYEY SAND, reddish brown, loose to medium dense, dry to slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 3.0-7.0' – gray to grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 7.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-13	B-1		SM	**Colluvium (Qcol)**; 0-10.0' – SILTY SAND, strong brown, medium dense to stiff, moist, fine to medium sand, wire fragments and concrete block encountered. **Granitic Bedrock (Kvt)**; 10.0-15.0' – pale brown to grayish brown, soft to moderately hard, slightly moist, completely to moderately weathered, heavily fractured. Total Depth 15.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-14			SC	**Colluvium (Qcol)**; 0-4.0' – CLAYEY SAND, reddish brown, medium dense, slightly moist. **Colluvium (Qcol)**; 4.0-10.0' – SANDY CLAY (Hard Pan), olive brown, moderately indurated, moist, trace angular gravel. **Granitic Bedrock (Kvt)**; 10.0-13.0' – gray brown, moderately hard, moderately weathered, heavily fractured. Total Depth 13.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

test PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-15			SC-SM	**Residual Soil (Qrs)**; 0-1.0' – SILTY CLAYEY SAND, reddish brown, moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 1.0-9.0' – reddish brown (1-4'), grayish brown (4-9'), moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 9.0', no groundwater, backfilled with spoils.

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LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-16			SC	**Residual Soil (Qrs)**; 0-1.0' – CLAYEY SAND, reddish brown, medium dense, slightly moist, medium to coarse sand. **Granitic Bedrock (Kvt)**; 1.0-12.0' – grayish brown, soft to moderately hard, moderately weathered, heavily fractured. Igneous Intrusion; 2.0-4.0' – olive brown to reddish brown, hard, fresh, moderately fractured, crystalline Total Depth 12.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-17			SM	**Residual Soil (Qrs)**; 0-4.0' – SILTY CLAYEY SAND, reddish brown, medium dense, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 4.0-10.0' – grayish brown, soft to moderately hard, slightly moist, completely to moderately weathered, heavily fractured. Total Depth 10.0', no groundwater, backfilled with spoils.

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LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-18			SC-SM	**Residual Soil (Qrs)**; 0-4.0' – SILTY CLAYEY SAND, reddish brown, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 4.0-11.0' – grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 11.0', no groundwater, backfilled with spoils.

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LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-19			SC	**Residual Soil (Qrs)**; 0-2.0' – SANDY CLAY to CLAYEY SAND, reddish brown, loose to medium dense, slightly moist. **Residual Soil (Qrs)**; 2.0-4.0' – SANDY CLAY to CLAYEY SAND (Hard Pan), reddish brown, slightly moist, moderately to strongly cemented **Granitic Bedrock (Kvt)**; 4.0-7.0' – grayish brown, soft to moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 7.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-20			SC	**Residual Soil (Qrs)**; 0-1.0' – CLAYEY SAND, reddish brown, medium dense, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 1.0-5.0' – grayish brown, soft to moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 5.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-21			SC-SM	**Residual Soil (Qrs)**; 0-3.0' – CLAYEY SAND, reddish brown, medium dense, moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 3.0-7.0' – grayish brown, soft to moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 7.0', no groundwater, backfilled with spoils.

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LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-22			SC SC/CL	**Alluvium (Qal)**; 0-3.0' – CLAYEY SAND, reddish brown, medium dense, slightly moist, fine to medium sand. **Alluvium (Qal)**; 3.0-6.0' – CLAYEY SAND to SANDY CLAY (Hard Pan), reddish brown to strong brown, slightly moist, medium sand, moderately to strongly cemented **Granitic Bedrock (Kvt)**; 6.0-7.0' – grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 7.0', no groundwater, backfilled with spoils.

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LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-23			SC	**Residual Soil (Qrs)**; 0-2.0' – CLAYEY SAND, reddish brown, medium dense, moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 2.0-6.0' – grayish brown, moderately hard, moderately weathered, heavily fractured, becomes darker when it becomes fresher/harder. Total Depth 6.0', no groundwater, backfilled with spoils.

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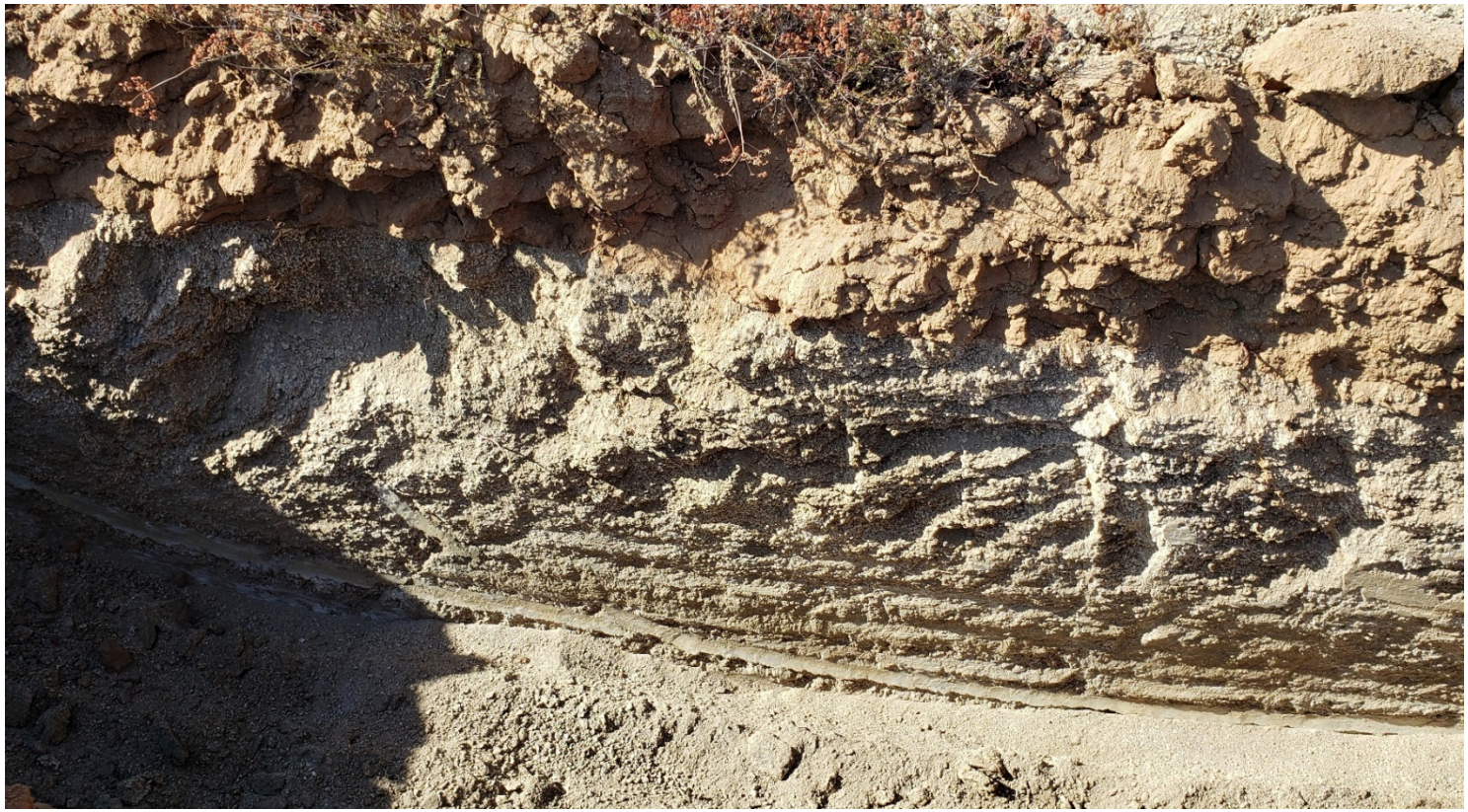
LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-24			SC	**Residual Soil (Qrs)**; 0-2.0' –CLAYEY SAND, reddish brown, medium dense, moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 2.0-6.0' – grayish brown, moderately hard, moderately weathered, heavily fractured, becomes dark gray when it becomes fresher/harder. Total Depth 6.0', no groundwater, backfilled with spoils.



LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-25			SC-SM	**Residual Soil (Qrs)**; 0-3.0' – SILTY CLAYEY SAND, reddish brown, medium dense, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 3.0-7.0' – grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured, becomes dark gray as it becomes fresher/harder. Total Depth 7.0', no groundwater, backfilled with spoils.

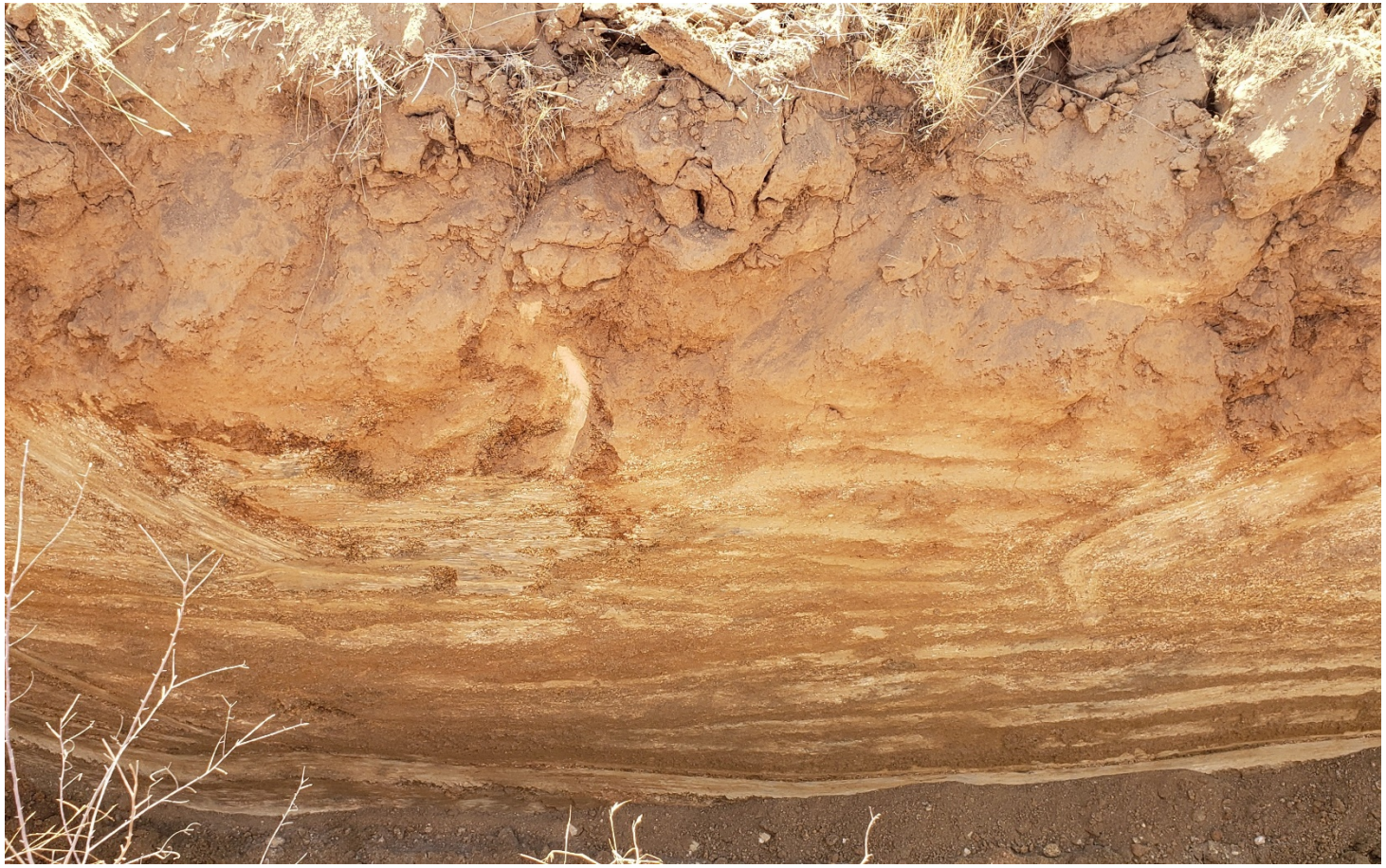
Leighton

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-26			SM	**Residual Soil (Qrs)**; 0-2.0' – SILTY SAND, reddish brown, medium dense, slightly moist, medium sand, trace clay. **Granitic Bedrock (Kvt)**; 2.0-8.0' – grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 8.0', no groundwater, backfilled with spoils.



LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-27			SC-SM	**Residual Soil (Qrs)**; 0-4.0' – SILTY CLAYEY SAND, reddish brown, medium dense, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 4.0-13.0' – grayish brown, moderately hard, slightly moist, completely to moderately weathered, heavily fractured, becomes dark gray as it becomes fresher/harder. Total Depth 13.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-28			SC-SM	**Residual Soil (Qrs)**; 0-1.0' – SILTY CLAYEY SAND, light brown to reddish brown, medium dense, moist, fine sand. **Granitic Bedrock (Kvt)**; 1.0-6.0' – grayish brown to yellowish brown, moderately hard to hard, slightly moist, moderately weathered, heavily fractured. Total Depth 6.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-29a			SC	**Residual Soil (Qrs)**; 0-2.0' – CLAYEY SAND, reddish brown, medium dense, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 2.0-3.0' – grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured. **Igneous Intrusion (T_{IG})**; gray to white with iron staining, very hard, slightly weathered to fresh, slightly fractured. Total Depth 3.0', no groundwater, backfilled with spoils.

Leighton

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-29b			SC	**Residual Soil (Qrs)**; 0-2.0' – CLAYEY SAND, reddish brown, medium dense, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 2.0-3.0' – grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured. **Igneous Intrusion (T_{IG})**; gray to white with iron staining, very hard, slightly weathered to fresh, slightly fractured. Total Depth 3.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-30			SM	**Residual Soil (Qrs)**; 0-2.0' – SILTY SAND, reddish brown, medium dense, moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 2.0-8.0' – grayish brown, moderately hard, moderately weathered, heavily fractured, grades to dark gray with fresher rock. Total Depth 8.0', no groundwater, backfilled with spoils.

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LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-31	B-1		SM	**Residual Soil (Qrs)**; 0-4.0' – SILTY SAND, reddish brown, medium dense, slightly moist, medium to coarse sand, trace clay. **Granitic Bedrock (Kvt)**; 4.0-10.0' – grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured, becomes dark gray as it become fresher Total Depth 10.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-32			SM	**Residual Soil (Qrs)**; 0-3.0' – SILTY SAND, reddish brown, medium dense, slightly moist, medium sand. **Granitic Bedrock (Kvt)**; 3.0-12.0' – grayish brown, soft to moderately hard, slightly moist, completely to moderately weathered, heavily fractured. Total Depth 12.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-33			SC-SM	**Residual Soil (Qrs)**; 0-3.0' – SILTY CLAYEY SAND, reddish brown, medium dense, slightly moist, medium sand. **Granitic Bedrock (Kvt)**; 3.0-6.0' – grayish brown, soft to moderately hard, slightly moist, completely to moderately weathered, heavily fractured. Total Depth 6.0', no groundwater, backfilled with spoils.

Leighton

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-34			SC-SM	**Residual Soil (Qrs)**; 0-2.0' – SILTY CLAYEY SAND, reddish brown, medium dense, slightly moist, medium to coarse sand. **Granitic Bedrock (Kvt)**; 2.0-18.0' – grayish brown, soft to moderately hard, slightly moist, completely to moderately weathered, heavily fractured. Total Depth 18.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-35	B-1		SM	**Residual Soil (Qrs)**; 0-2.0' – SILTY SAND, reddish brown, medium dense, slightly moist, medium to coarse sand. **Granitic Bedrock (Kvt)**; 2.0-11.0' – grayish brown, soft to moderately hard, slightly moist, completely to moderately weathered, heavily fractured. Total Depth 11.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-36			SM	**Residual Soil (Qrs)**; 0-2.0' – SILTY SAND, reddish brown, medium dense, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 2.0-18.0' – grayish brown, soft to moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 18.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-37			SM	**Residual Soil (Qrs)**; 0-2.0' – SILTY SAND, pale brown to reddish brown, medium dense, slightly moist, medium sand, trace clay. **Granitic Bedrock (Kvt)**; 2.0-11.0' – gray brown, moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 11.0', no groundwater, backfilled with spoils.

Leighton

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-38			SM	**Residual Soil (Qrs)**; 0-3.0' – SILTY SAND, reddish brown, medium dense, slightly moist, medium to coarse sand, trace clay. **Granitic Bedrock (Kvt)**; 3.0-11.0' – pale brown to grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured, becomes dark gray as it becomes fresher, some white intrusions. Total Depth 11.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-39			SM	**Residual Soil (Qrs)**; 0-1.0' – SILTY SAND, pale brown to reddish brown, medium dense, slightly moist, fine to medium sand. **Granitic Bedrock (Kvt)**; 1.0-14.0' – grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured, massive. Total Depth 14.0', no groundwater, backfilled with spoils.

Leighton

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-40	B-1		SM	**Residual Soil (Qrs)**; 0-3.0' – SILTY SAND, reddish brown, medium dense, slightly moist, medium to coarse sand. **Granitic Bedrock (Kvt)**; 3.0-21.0' – grayish brown, moderately hard, slightly moist, moderately weathered, heavily fractured. Total Depth 21.0', no groundwater, backfilled with spoils.

Leighton

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-41			SM	**Residual Soil (Qrs)**; 0-2.0' – SILTY SAND, pale brown, loose, dry, fine to medium sand. **Granitic Bedrock (Kvt)**; 2.0-9.0' – grayish brown, moderately hard, slightly moist, moderately weathered. Total Depth 9.0', no groundwater, backfilled with spoils.

Leighton

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-42			SM	**Residual Soil (Qrs)**; 0-1.0' – SILTY SAND, pale brown to reddish brown, loose, dry, fine to medium sand. **Granitic Bedrock (Kvt)**; 1.0-5.0' – grayish brown to dark gray, hard to very hard, moderately to slightly weathered, moderately fractured. Total Depth 5.0', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-43			SM	**Residual Soil (Qrs)**; 0-1.0' – SILTY SAND, pale brown, loose, dry, fine to medium sand. **Granitic Bedrock (Kvt)**; 1.0-3.5' – grayish brown, hard to very hard, slightly moist, moderately to slightly weathered, moderately to heavily fractured. Total Depth 3.5', no groundwater, backfilled with spoils.

LOG OF TEST PITS

PROJECT NO.: 13226.001
PROJECT NAME: Meridian Upper Plateau

LOGGED BY: BAA
DATE: 7/27-30/2021

TEST PIT#	SAMPLE TYPE & DEPTH	LAB TEST	USCS	DESCRIPTION
TP-44	B-1		SM	**Colluvium (Qcol)**; 0-9.0' – SILTY SAND, strong brown, loose, moist, fine to coarse sand, trace silt. **Granitic Bedrock (Kvt)**; 9.0-14.0' – grayish brown, moderately hard to hard, slightly moist, moderately weathered, heavily fractured. Total Depth 14.0', no groundwater, backfilled with spoils.

APPENDIX A-2

SEISMIC REFRACTION SURVEY

SEISMIC REFRACTION STUDY

MERIDIAN UPPER PLATEAU

Riverside, California

PREPARED FOR:

Brent Adam, PG
Leighton Consulting, Inc.
41715 Enterprise Circle North, Suite 103
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PREPARED BY:

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6280 Riverdale Street
San Diego, CA 92120

September 16, 2021

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San Diego, CA 92120
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September 16, 2021

Atlas No. 121300SWG
Report No. 1

MR. BRENT ADAM, P.G.
LEIGHTON CONSULTING, INC.
41715 ENTERPRISE CIRCLE NORTH, SUITE 103
TEMECULA, CA 92590

Subject: Seismic Refraction Study
Meridian Upper Plateau
Riverside, California

Dear Mr. Adam:

In accordance with your authorization, Atlas Technical Consultants has performed a seismic refraction study pertaining to the Meridian Upper Plateau project located in Riverside, California. Specifically, our evaluation consisted of performing 18 seismic P-wave refraction traverses at the site. The purpose of our study was to develop subsurface velocity profiles of the areas studied and to assess the depth to bedrock and apparent rippability of the subsurface materials. Our field services were conducted on August 2nd through 4th, 2021. This data report presents our methodology, equipment used, analysis, and results.

If you have any questions, please call us at (619) 280-4321.

Respectfully submitted,
Atlas Technical Consultants LLC

REGISTERED PROFESSIONAL GEOPHYSICIST
PATRICK F. LEHRMANN
No. 1043
Exp. 1/31/2022
STATE OF CALIFORNIA

Afrildo Iko Syahrial
Project Geophysicist

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Principal Geologist/Geophysicist

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1. INTRODUCTION

In accordance with your authorization, Atlas Technical Consultants has performed a seismic refraction study pertaining to the Meridian Upper Plateau project located in Riverside, California (Figure 1). Specifically, our evaluation consisted of performing 18 seismic P-wave refraction traverses at the site. The purpose of our study was to develop subsurface velocity profiles of the areas studied and to assess the depth to bedrock and apparent rippability of the subsurface materials. Our field services were conducted on August 2nd through 4th, 2021. This data report presents our methodology, equipment used, analysis, and results.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of 18 seismic P-wave refraction traverses at the project site.
- Compilation and analysis of the data collected.
- Preparation of this data report presenting our results and conclusions.

3. SITE AND PROJECT DESCRIPTION

The project site is a vacant lot on a rolling hill. The entrance to the project site is generally located at the south end of Vista Grande Drive in Riverside, California. The site was formerly owned by March Air Force Base and utilized as a munition storage. Several bunkers exist at the site and access to the bunkers is by dirt roads. Currently, some of these bunkers are abandoned and/or utilize as public storage. The seismic traverses were performed at various locations throughout the site over slightly sloping ground. Vegetation consisted of seasonal grass and a few granite outcrops with varying degrees of weathering were observed at the site. Figures 2 and 3a through 3c depict the general site conditions in the areas of the seismic traverses.

Based on our discussions with you, it is our understanding that your office requested this study in advance of proposed construction activities at the site. We also understand that the results of our study may be used in the formulation of design and construction parameters for the project.

4. STUDY METHODOLOGY

A seismic P-wave (compression wave) refraction study was conducted at the project site to develop subsurface velocity profiles, and to assess the depth to bedrock and apparent rippability of the subsurface materials. The seismic refraction method uses first-arrival times of refracted seismic waves to estimate the thicknesses and seismic velocities of subsurface layers. Seismic P-waves generated at the surface, using a hammer and plate, are refracted at boundaries separating materials of contrasting velocities. These refracted seismic waves are then detected by a series of surface vertical component 14-Hz geophones and recorded with a 24-channel Geometrics Geode seismograph. The travel times of the seismic P-waves are used in conjunction

with the shot-to-geophone distances to obtain thickness and velocity information on the subsurface materials.

Eighteen (18) seismic traverses labeled as SL-1 through SL-18, respectively, were conducted at the site. The general location and length of the line were determined by surface conditions, site access, and depth of investigation, as determined by you. Shot points (signal generation locations) were conducted along the lines at the ends, midpoint, and intermediate points between the ends and the midpoint.

The seismic refraction theory requires that subsurface velocities increase with depth. A layer having a velocity lower than that of the layer above will not generally be detectable by the seismic refraction method and, therefore, could lead to errors in the depth calculations of subsequent layers. In addition, lateral variations in velocity, such as those caused by core stones, intrusions, or boulders can also result in the misinterpretation of the subsurface conditions. In general, the effective depth of evaluation for a seismic refraction traverse is approximately one-third to one-fifth of the length of the spread.

In general, the seismic P-wave velocity of a material can be correlated to rippability (see Table 1 below), or to some degree "hardness." Table 1 is based on published information from the Caterpillar Performance Handbook (Caterpillar, 2018), as well as our experience with similar materials, and assumes that a Caterpillar D-9 dozer ripping with a single shank is used. We emphasize that the cutoffs in this classification scheme are approximate and that rock characteristic, such as fracture spacing and orientation, play a significant role in determining rock quality or rippability. The rippability of a mass is also dependent on the excavation equipment used and the skill and experience of the equipment operator.

For trenching operations, the rippability values should be scaled downward. For example, velocities as low as 3,500 feet/second may indicate difficult ripping during trenching operations. In addition, the presence of boulders, which can be troublesome in narrow trenching operations, should be anticipated.

Table 1 – Rippability Classification

Seismic P-wave Velocity	Rippability
0 to 2,000 feet/second	Easy
2,000 to 4,000 feet/second	Moderate
4,000 to 5,500 feet/second	Difficult, Possible Blasting
5,500 to 7,000 feet/second	Very Difficult, Probable Blasting
Greater than 7,000 feet/second	Blasting Generally Required

It should be noted that the rippability cutoffs presented in Table 1 are slightly more conservative than those published in the Caterpillar Performance Handbook. Accordingly, the above classification scheme should be used with discretion, and contractors should not be relieved of

making their own independent evaluation of the rippability of the on-site materials prior to submitting their bids.

5. DATA ANALYSIS

The collected data were processed using SIPwin (Rimrock Geophysics, 2003), a seismic interpretation program, and analyzed using SeisOpt Pro (Optim, 2008). SeisOpt Pro uses first arrival picks and elevation data to produce subsurface velocity models through a nonlinear optimization technique called adaptive simulated annealing. The resulting velocity model provides a tomography image of the estimated geologic conditions. Both vertical and lateral velocity information is contained in the tomography model. Changes in layer velocity are revealed as gradients rather than discrete contacts, which typically are more representative of actual conditions.

6. RESULTS AND CONCLUSIONS

As previously indicated, seismic traverses were performed at 18 preselected areas as part of our study. Figures 4a through 4r present the velocity models generated from our analysis with shot point locations at each seismic line represented by red triangles. The results from our seismic study revealed distinct layers/zones in the near-surface that likely represent soil overlying bedrock with varying degrees of weathering. Distinct vertical and lateral velocity variations are evident in the models. These inhomogeneities are likely related to the possible presence of intrusions, and/or differential weathering of the bedrock materials. It is also evident in the tomography models that the depth to bedrock, while varied in degrees of weathering, was fairly shallow in some of the study areas.

Based on the refraction results, variability in the excavatability (including depth of rippability) of the subsurface materials may be expected across the project area. Furthermore, blasting may be required depending on the excavation, depth, location, equipment used, and desired rate of production. In addition, oversized materials should be expected. A contractor with excavation experience in similarly difficult conditions should be consulted for expert advice on excavation methodology, equipment, and production rate.

7. LIMITATIONS

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface evaluations will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Atlas should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

8. SELECTED REFERENCES

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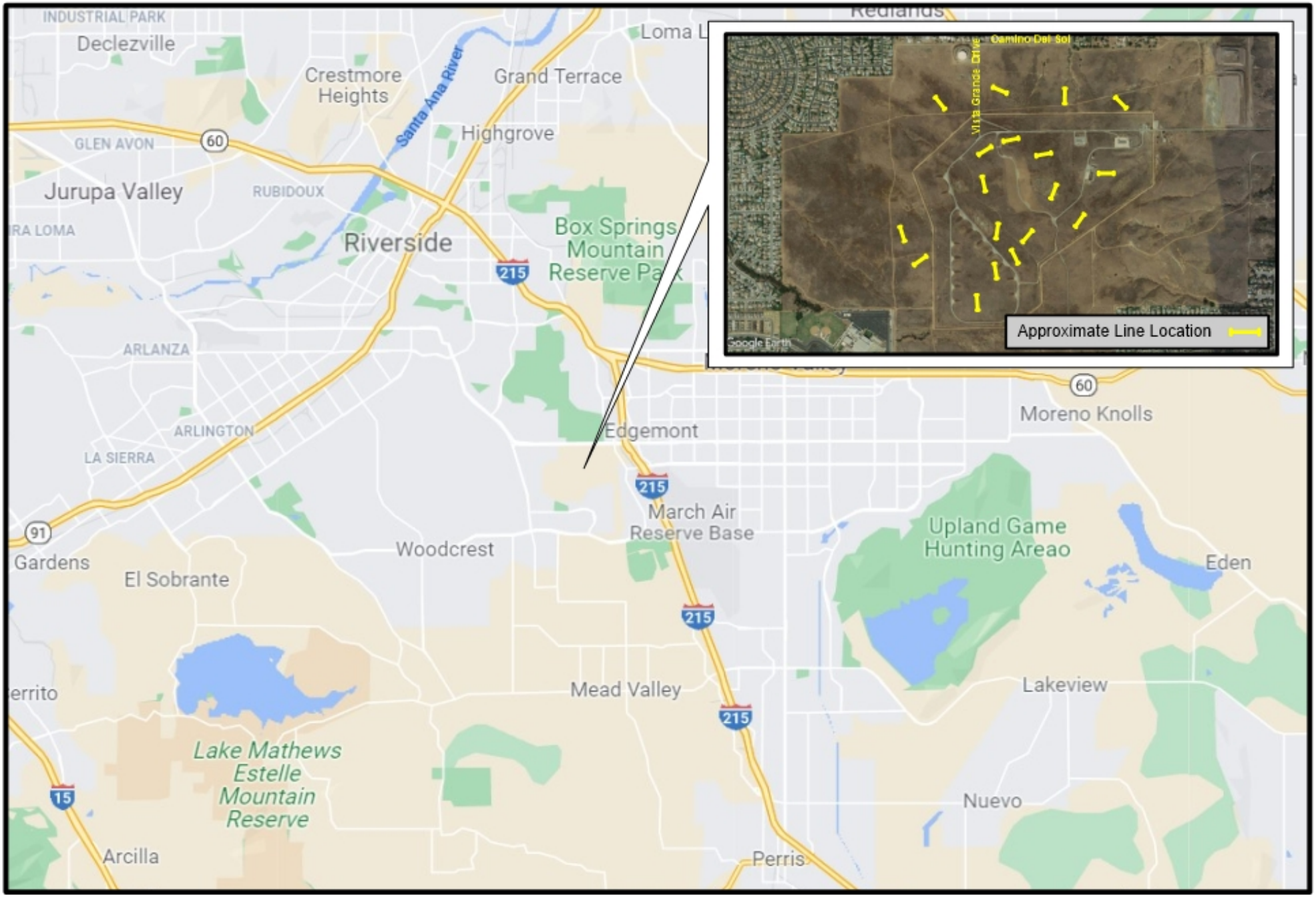


SITE LOCATION MAP

N

Meridian Upper Plateau
Riverside, California

Project No.: 121300SWG | Date: 09/21

ATLAS

Figure 1

LINE LOCATION MAP

N

Meridian Upper Plateau
Riverside, California

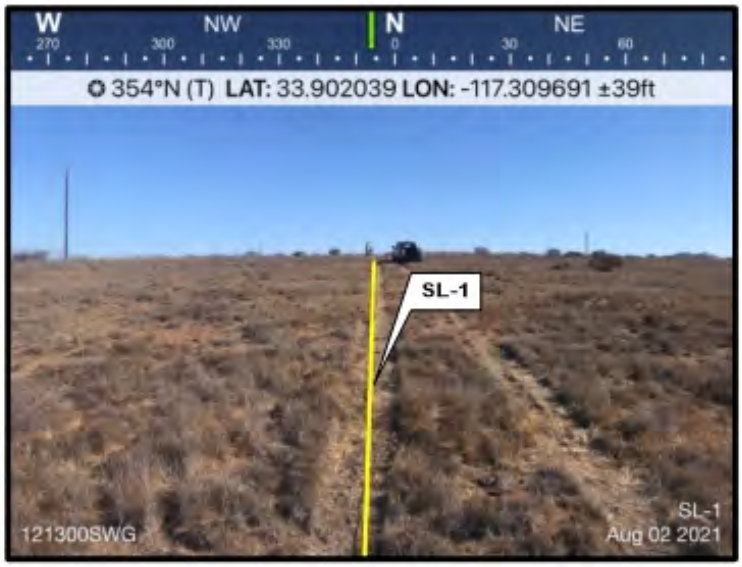
Project No.: 121300SWG | Date: 09/21

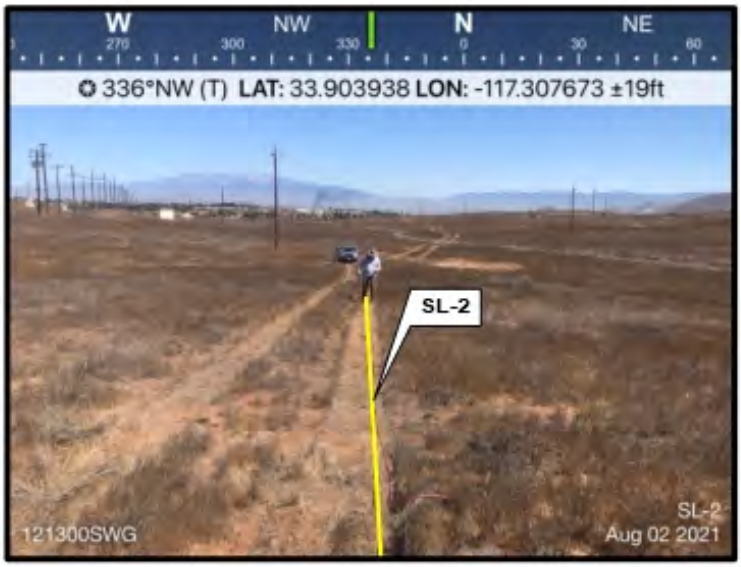
ATLAS

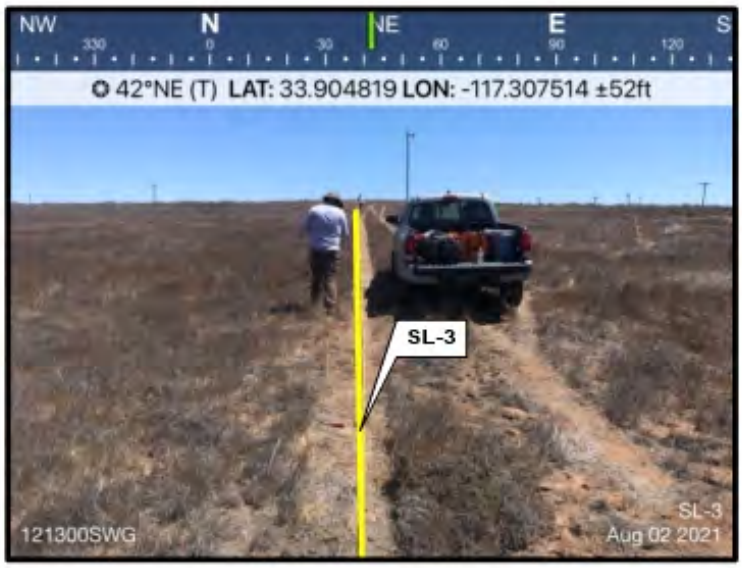
Figure 2

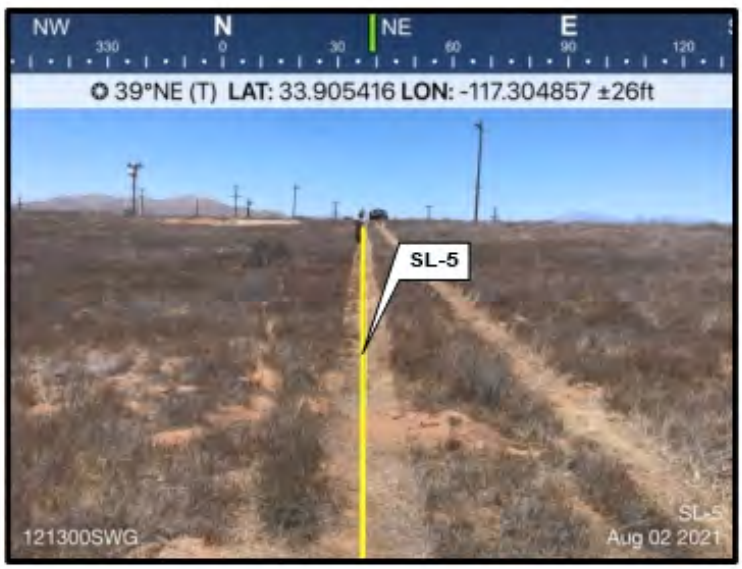
0 500 1000 1500 2000

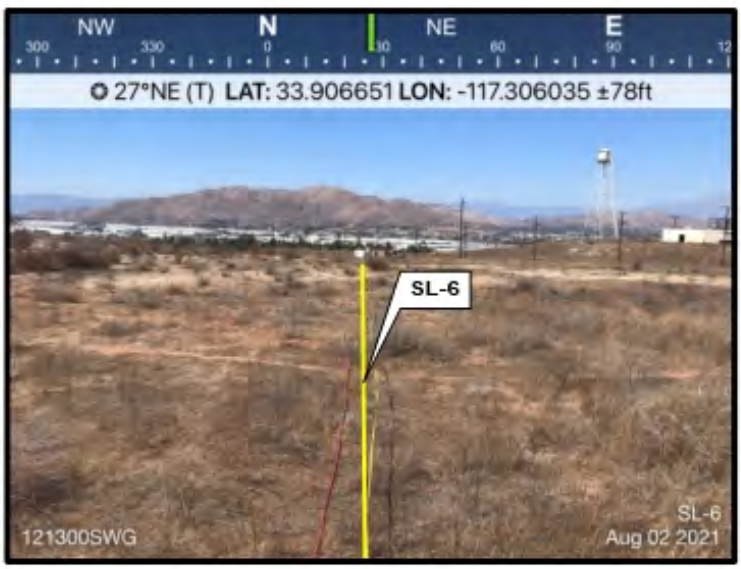
approximate scale in feet











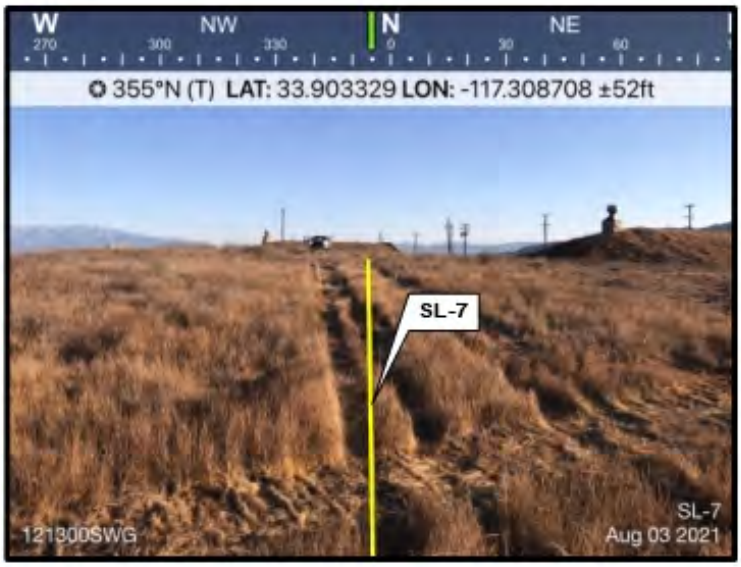
SITE PHOTOGRAPHS (SL-1 through SL-6)

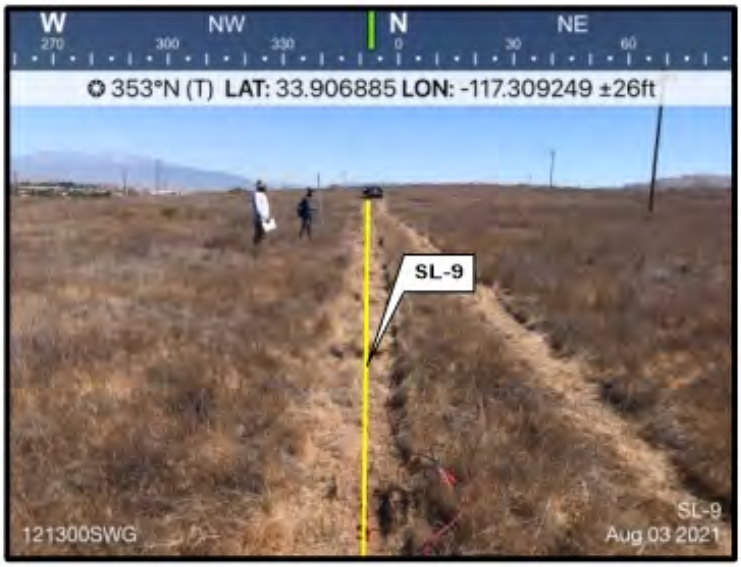
Meridian Upper Plateau
Riverside, California

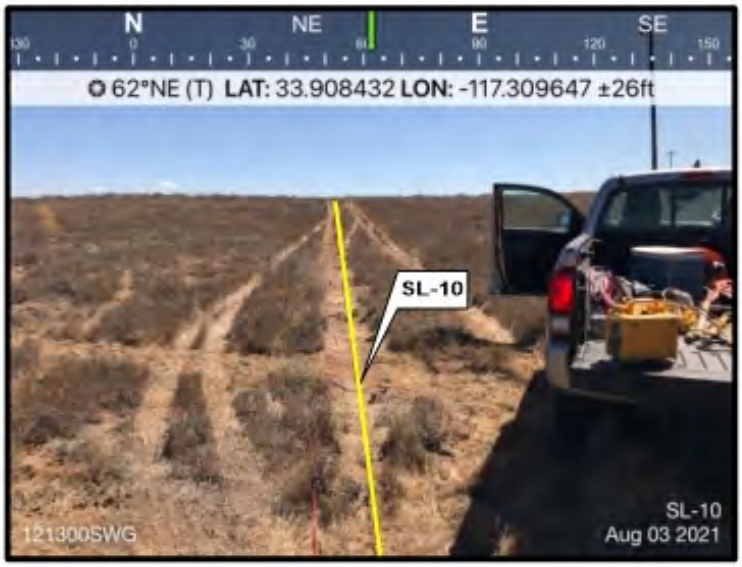
Project No.: 121300SWG | Date: 09/21

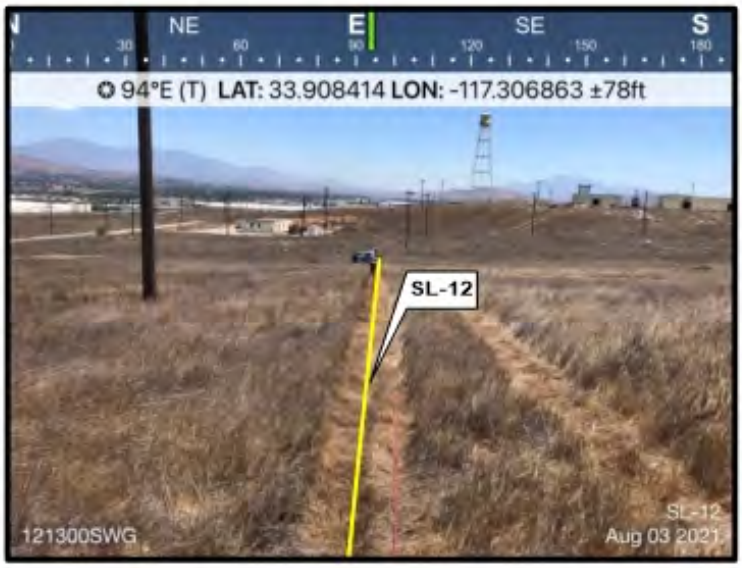
ATLAS

Figure 3a









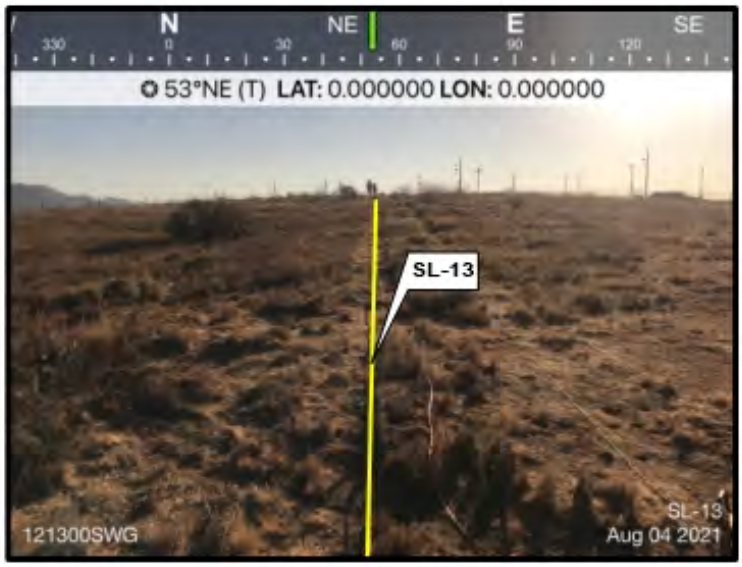
SITE PHOTOGRAPHS (SL-7 through SL-12)

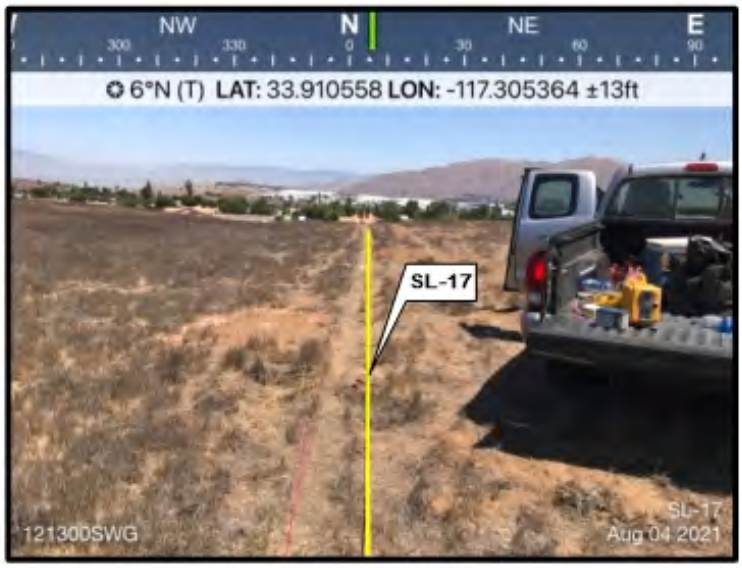
Meridian Upper Plateau
Riverside, California

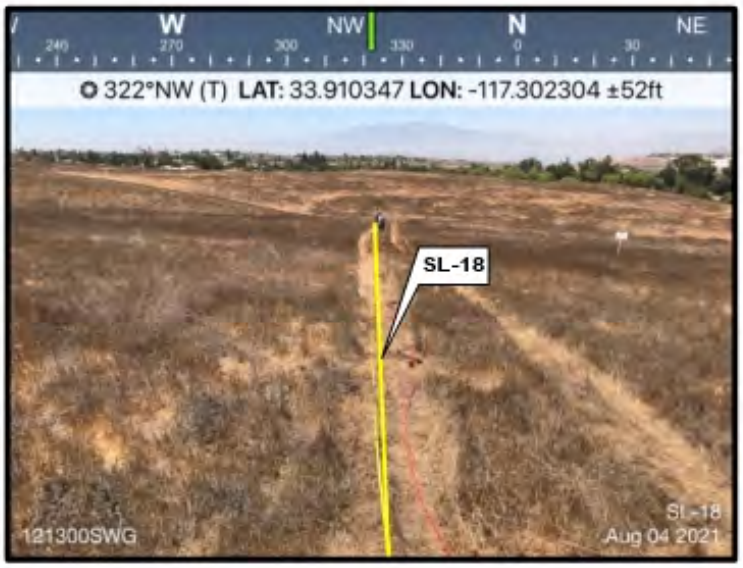
Project No.: 121300SWG | Date: 09/21

ATLAS

Figure 3b







SITE PHOTOGRAPHS (SL-13 through SL-18)

Meridian Upper Plateau
Riverside, California

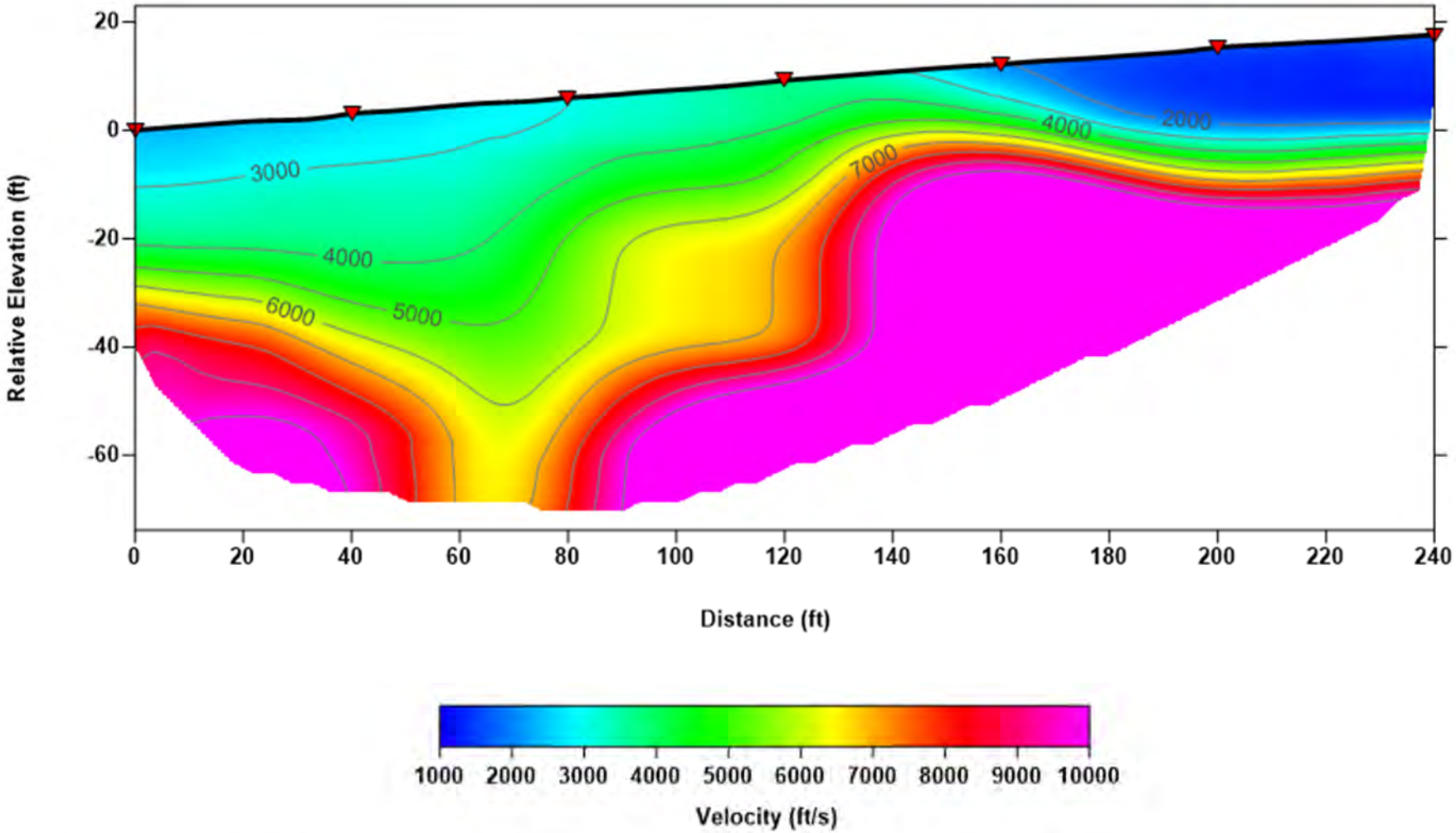
Project No.: 121300SWG | Date: 09/21

ATLAS

Figure 3c

TOMOGRAPHY MODEL

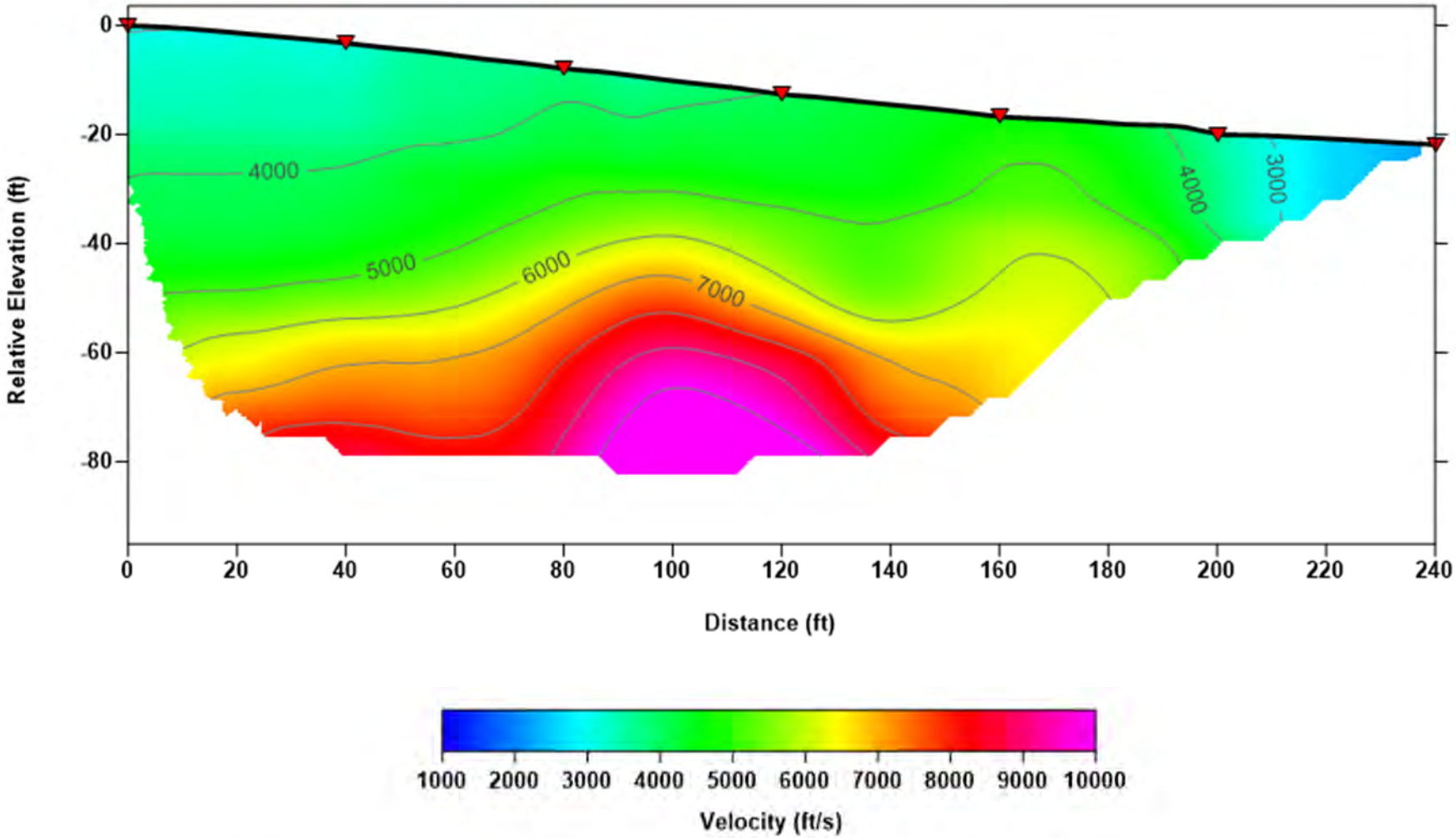
SL-1



P-WAVE PROFILE (SL-1)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4a	

TOMOGRAPHY MODEL

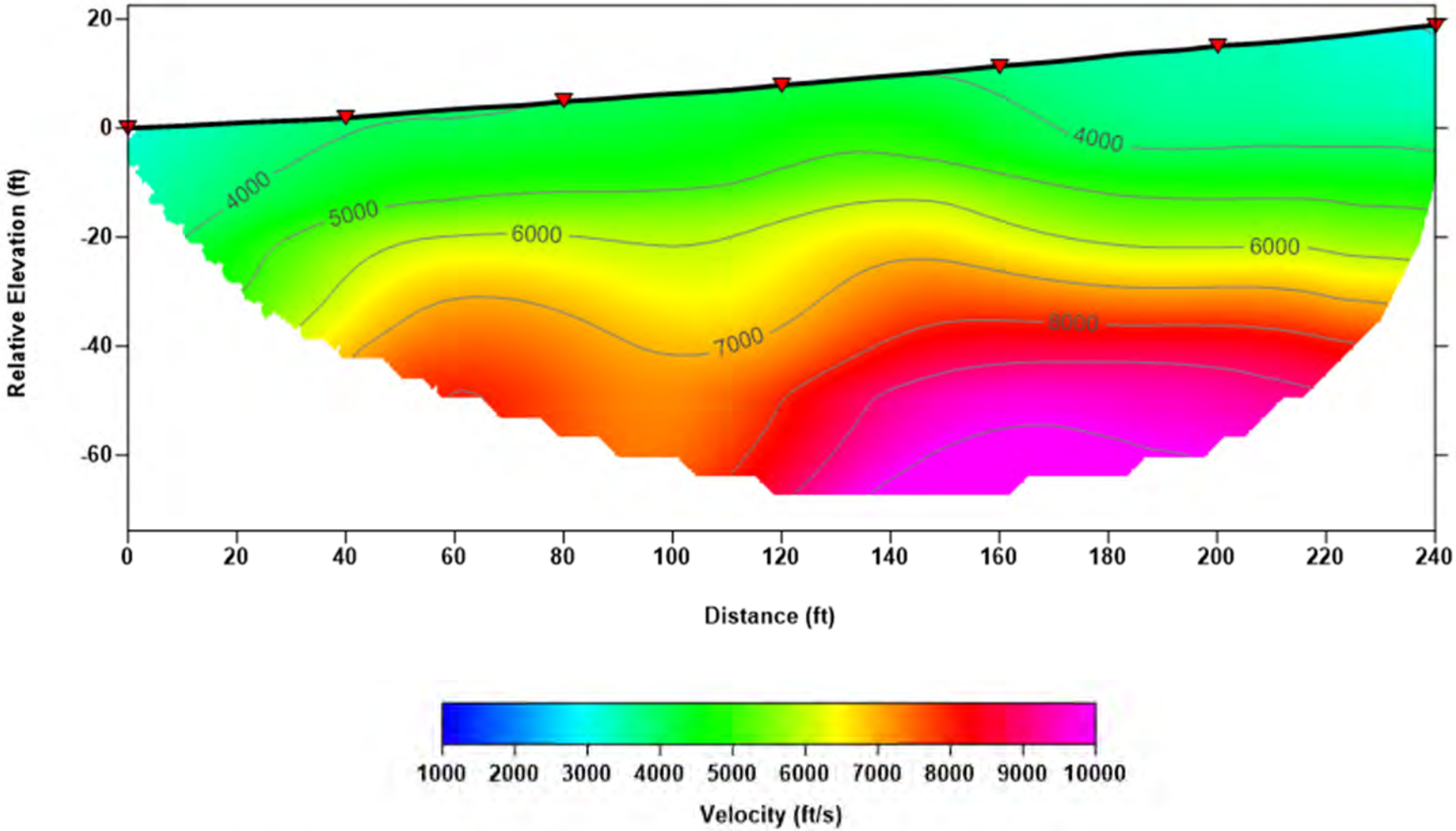
SL-2



P-WAVE PROFILE (SL-2)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 08/21	Figure 4b	

TOMOGRAPHY MODEL

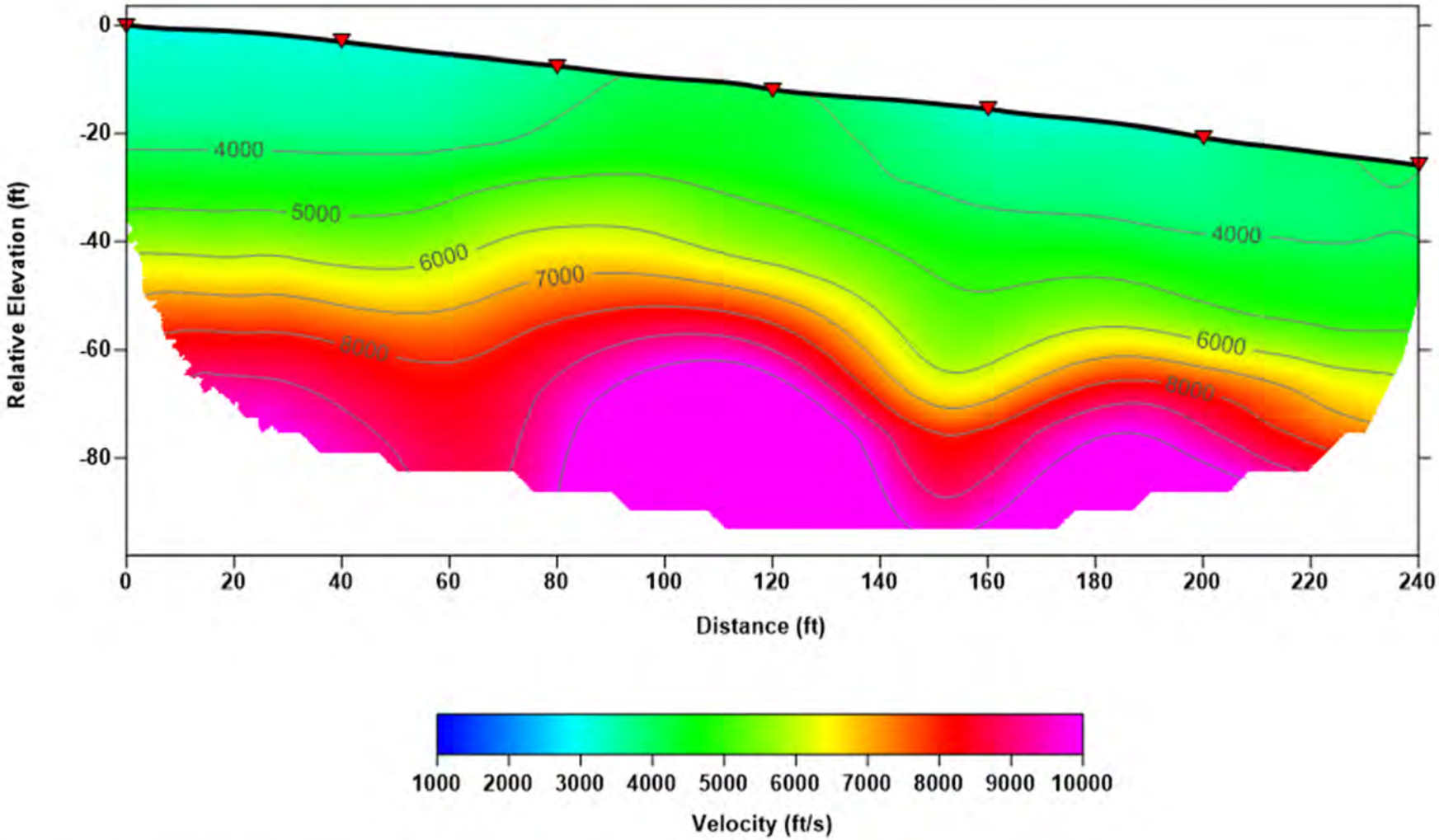
SL-3



P-WAVE PROFILE (SL-3)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4c	

TOMOGRAPHY MODEL

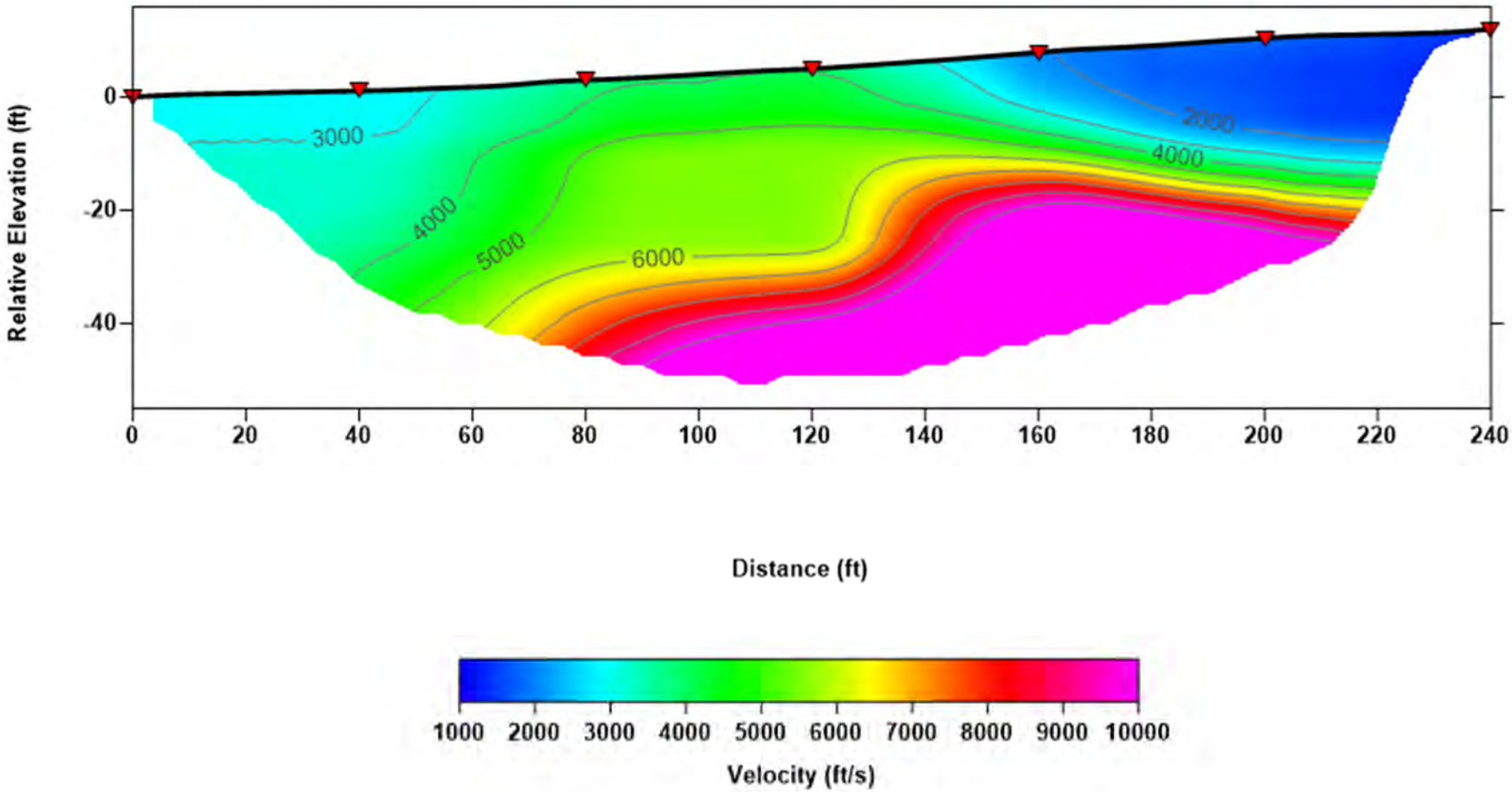
SL-4



P-WAVE PROFILE (SL-4)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4d	

TOMOGRAPHY MODEL

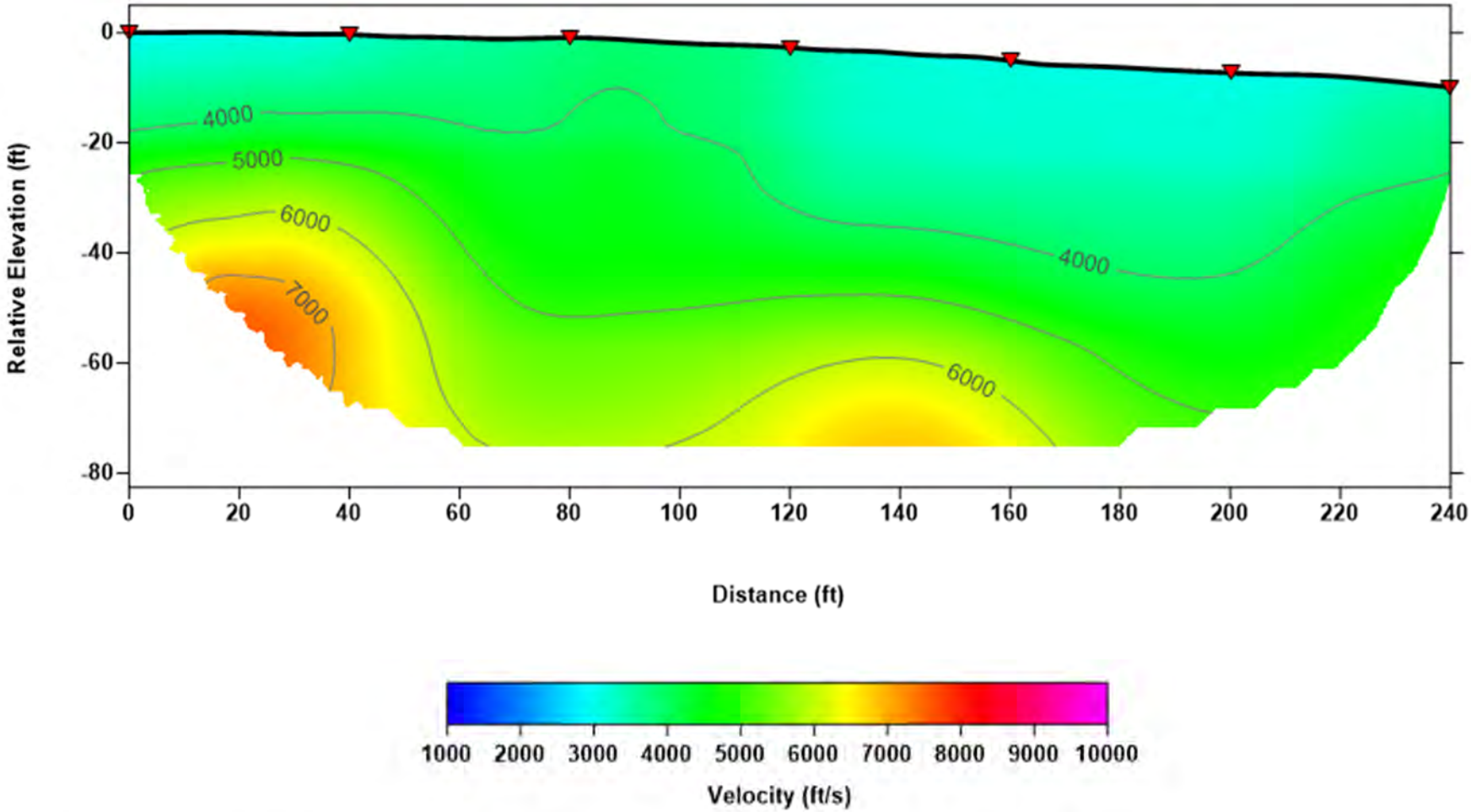
SL-5



P-WAVE PROFILE (SL-5)	Meridian Upper Plateau Riverside, California	ATLAS	Note: Contour Interval = 1,000 feet per second
	Project No.: 121300SWG / Date: 09/21	Figure 4e	

TOMOGRAPHY MODEL

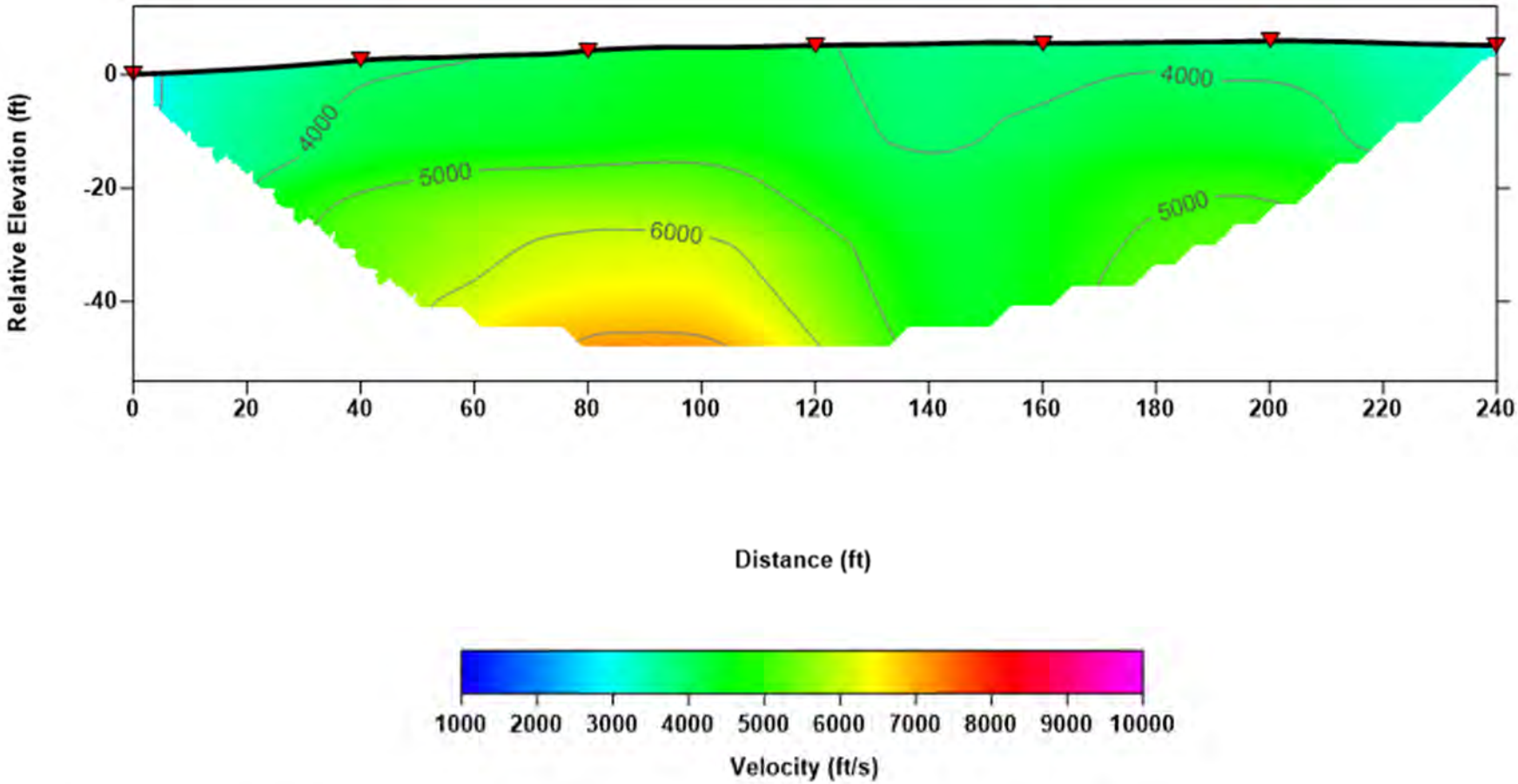
SL-6



P-WAVE PROFILE (SL-6)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4f	

TOMOGRAPHY MODEL

SL-7

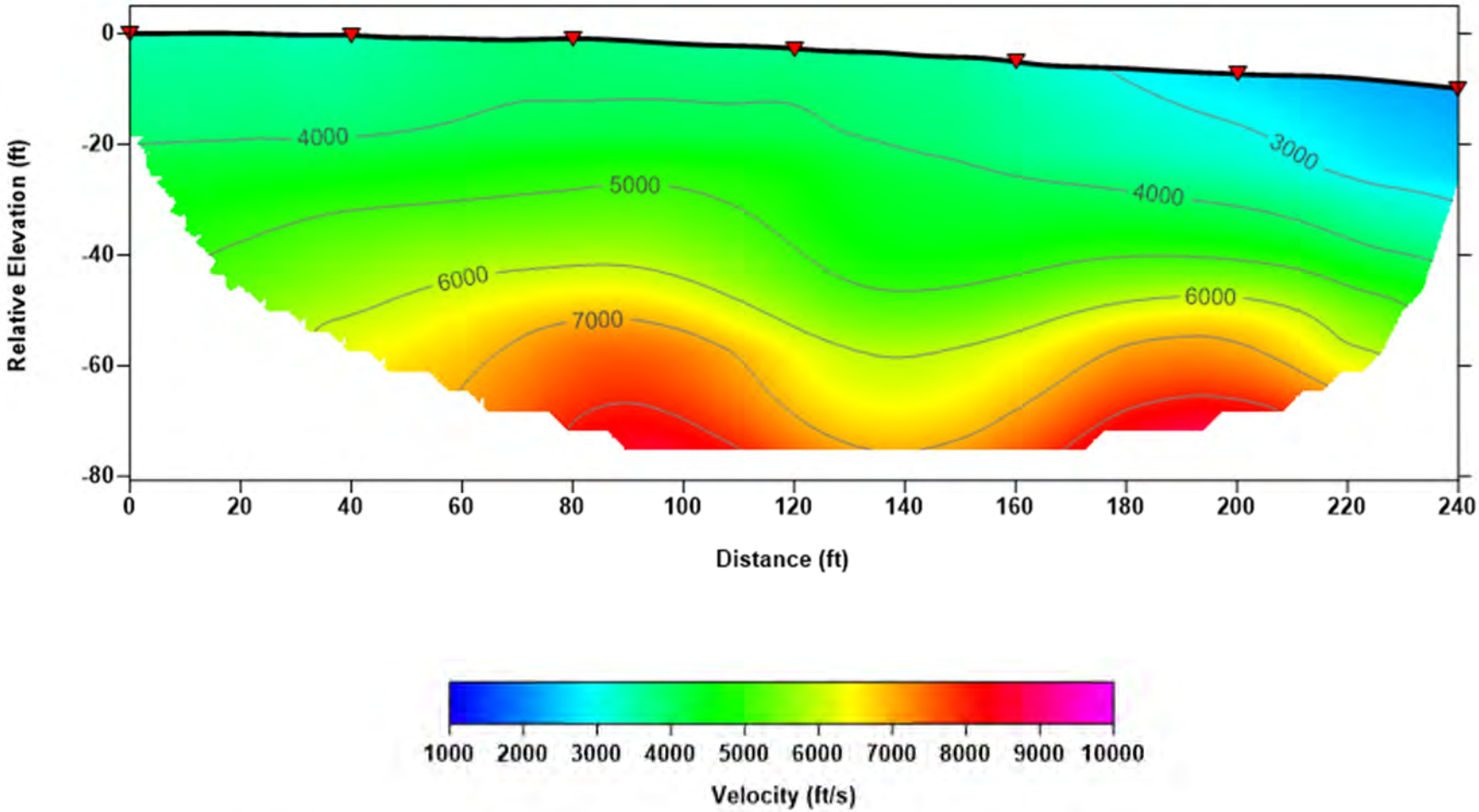


P-WAVE PROFILE (SL-7)	Meridian Upper Plateau Riverside, California Project No.: 121300SWG Date: 09/21	ATLAS Figure 4g

Note: Contour Interval = 1,000 feet per second

TOMOGRAPHY MODEL

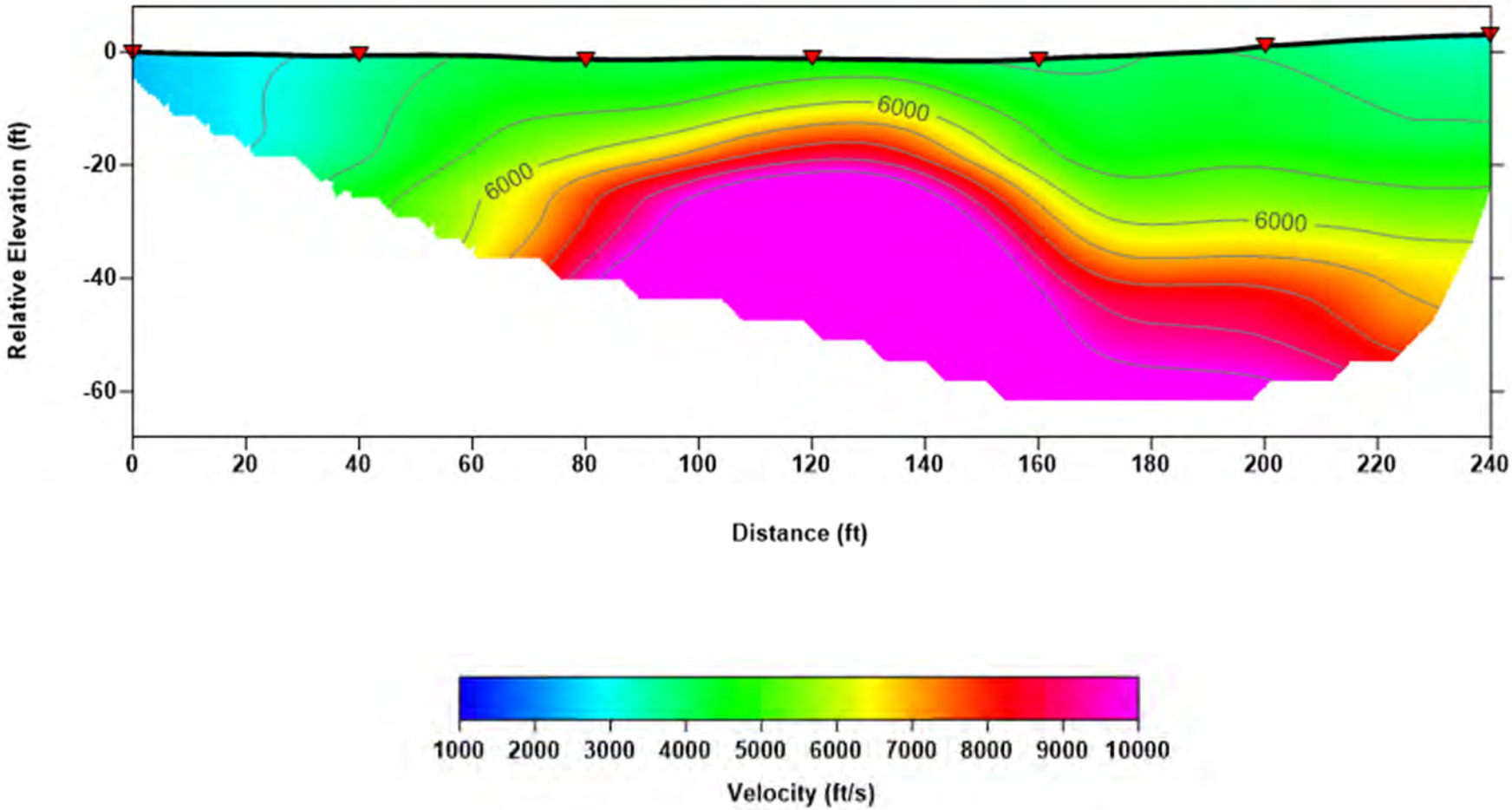
SL-8



P-WAVE PROFILE (SL-8)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4h	

TOMOGRAPHY MODEL

SL-9

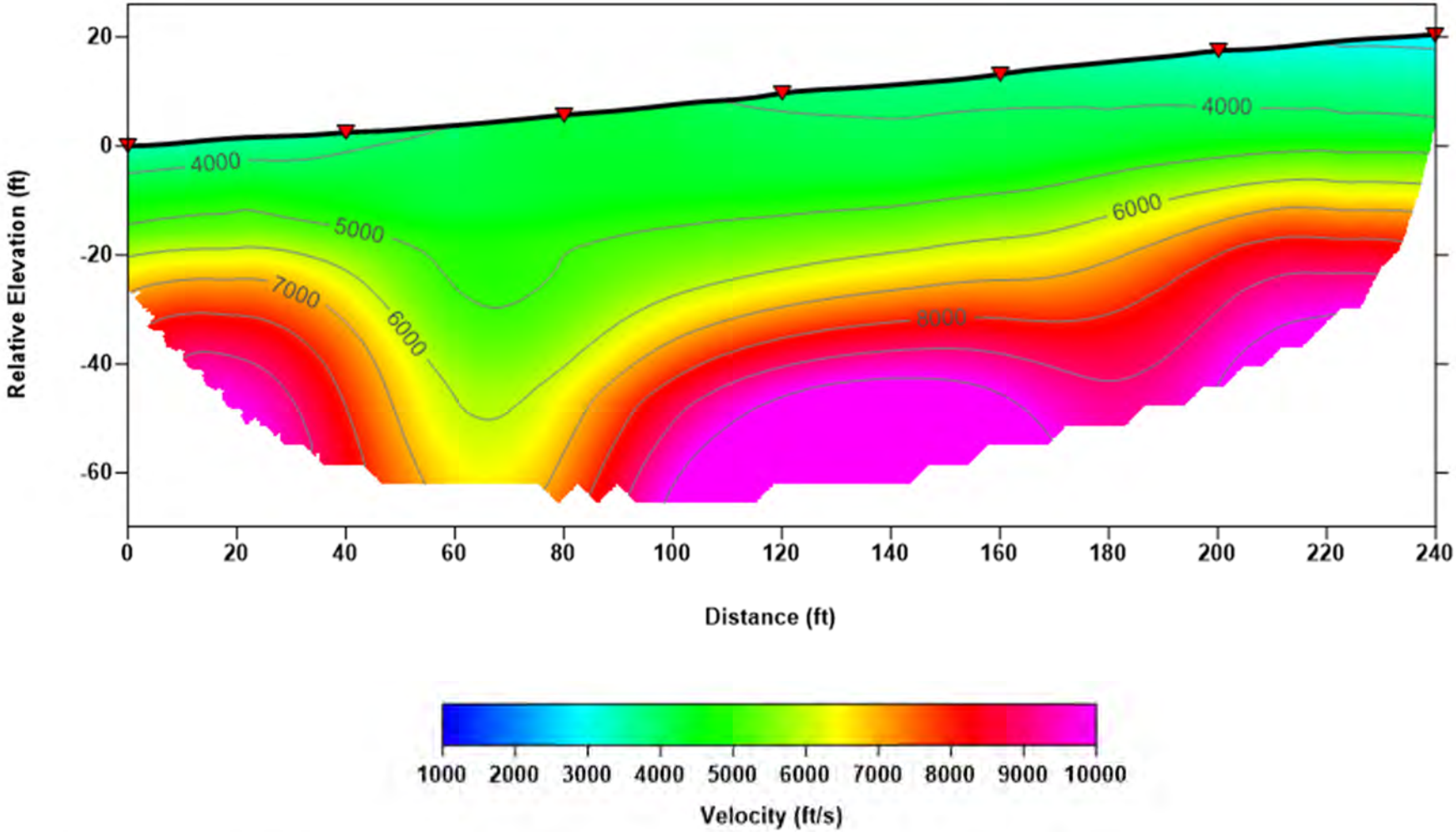


P-WAVE PROFILE (SL-9)	Meridian Upper Plateau Riverside, California Project No.: 121300SWG Date: 09/21	ATLAS Figure 4i

Note: Contour Interval = 1,000 feet per second

TOMOGRAPHY MODEL

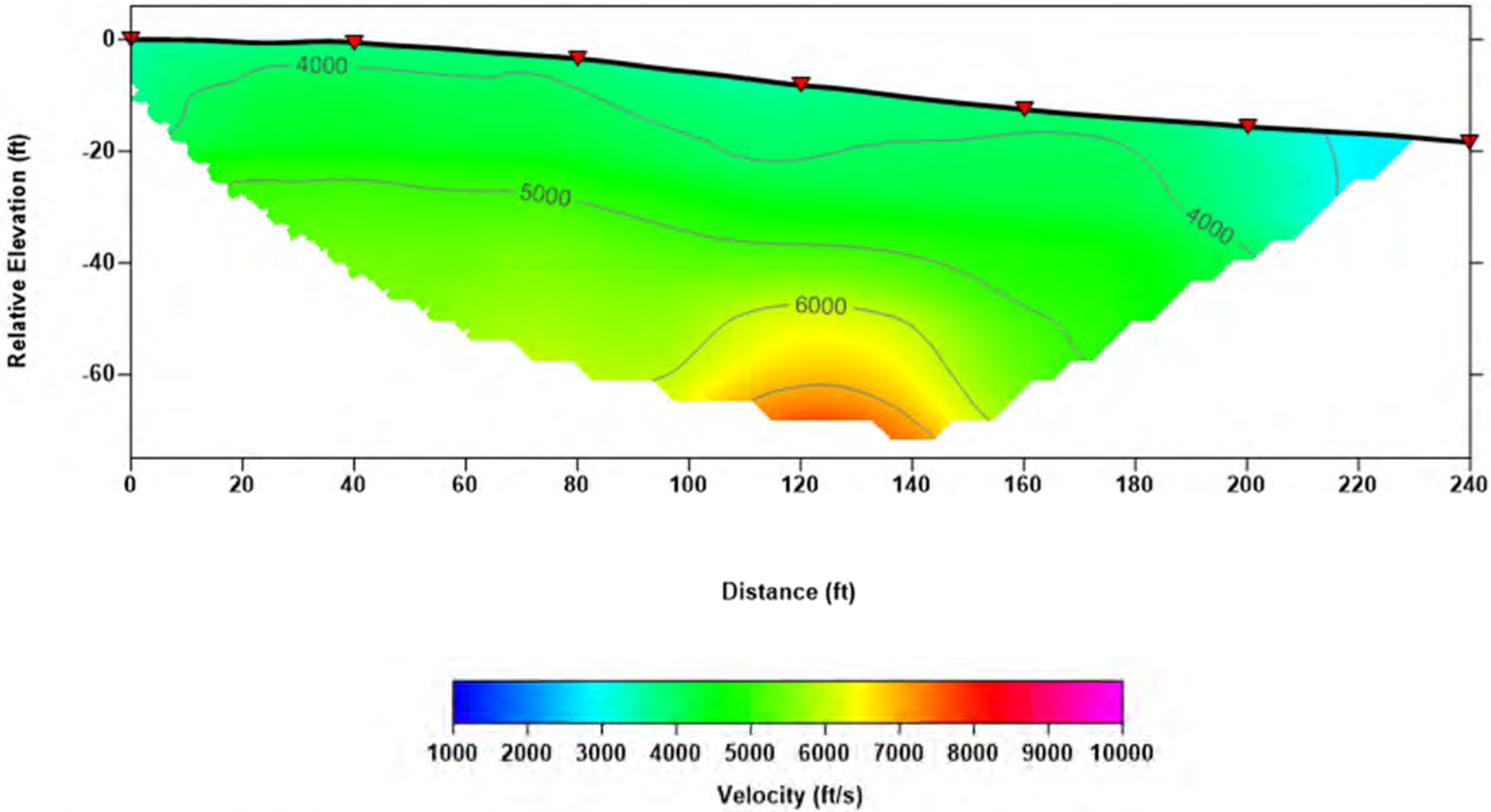
SL-10



P-WAVE PROFILE (SL-10)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4j	

TOMOGRAPHY MODEL

SL-11

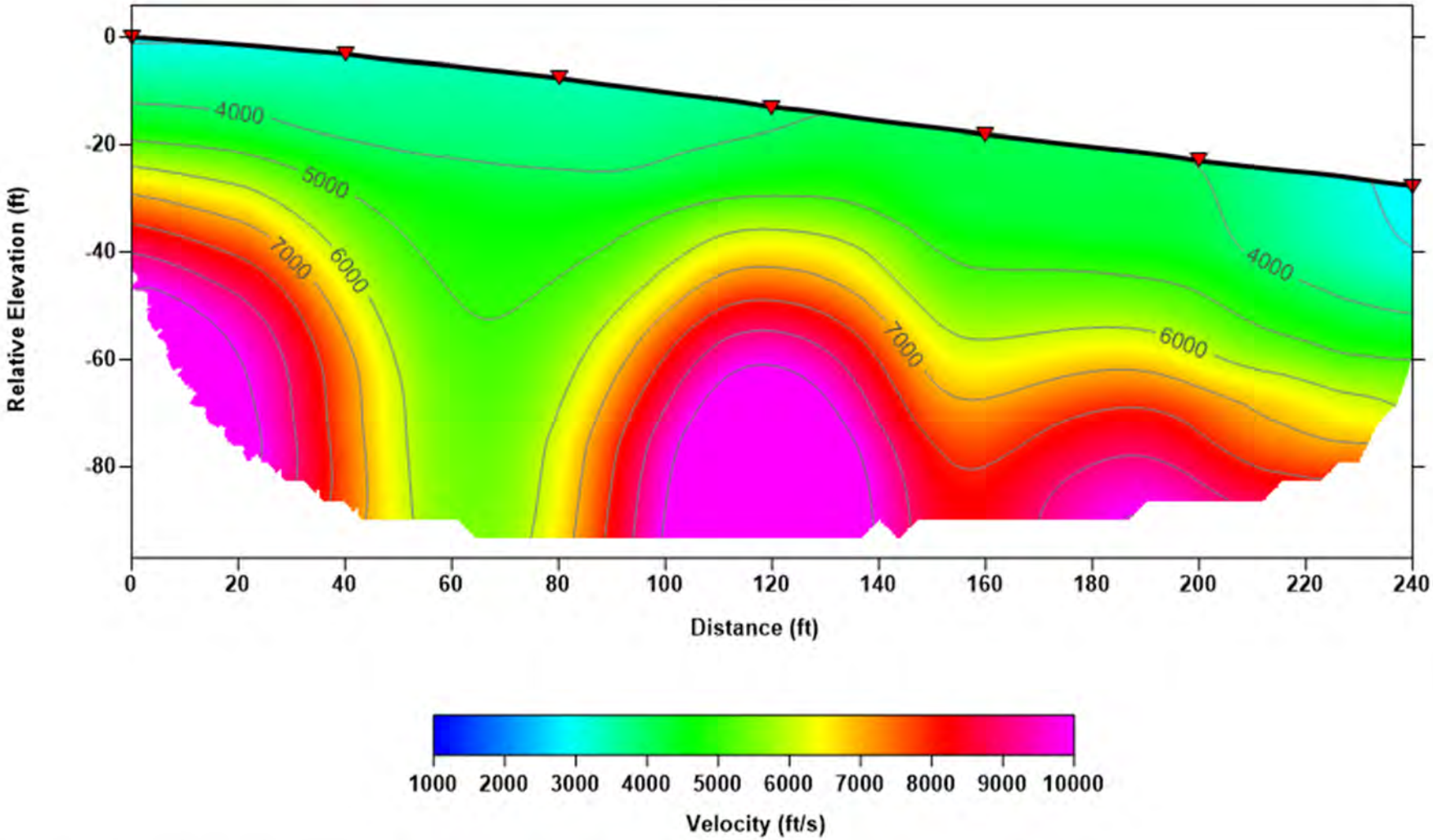


P-WAVE PROFILE (SL-11)	Meridian Upper Plateau Riverside, California Project No.: 121300SWG Date: 09/21	ATLAS Figure 4k

Note: Contour Interval = 1,000 feet per second

TOMOGRAPHY MODEL

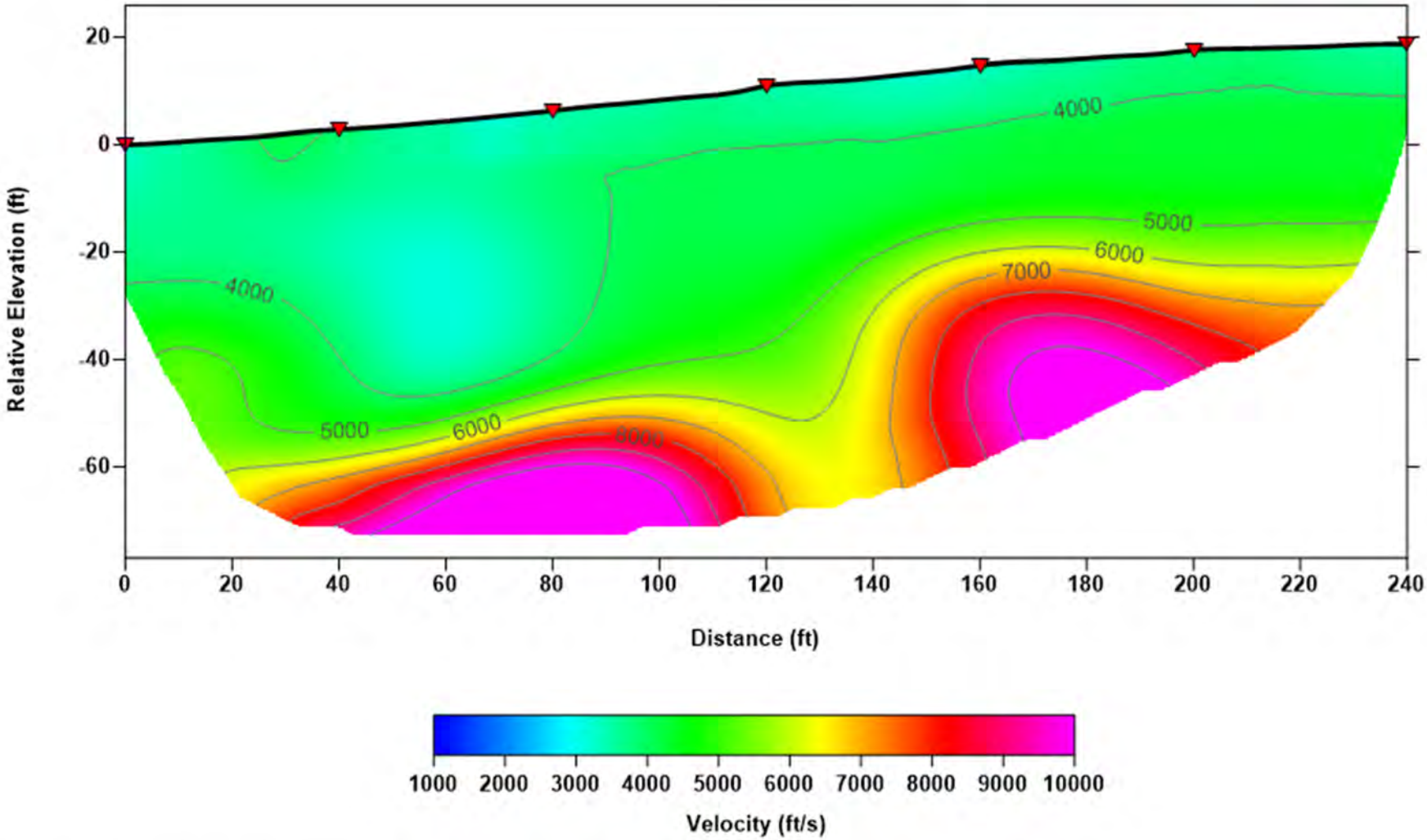
SL-12



P-WAVE PROFILE (SL-12)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4l	

TOMOGRAPHY MODEL

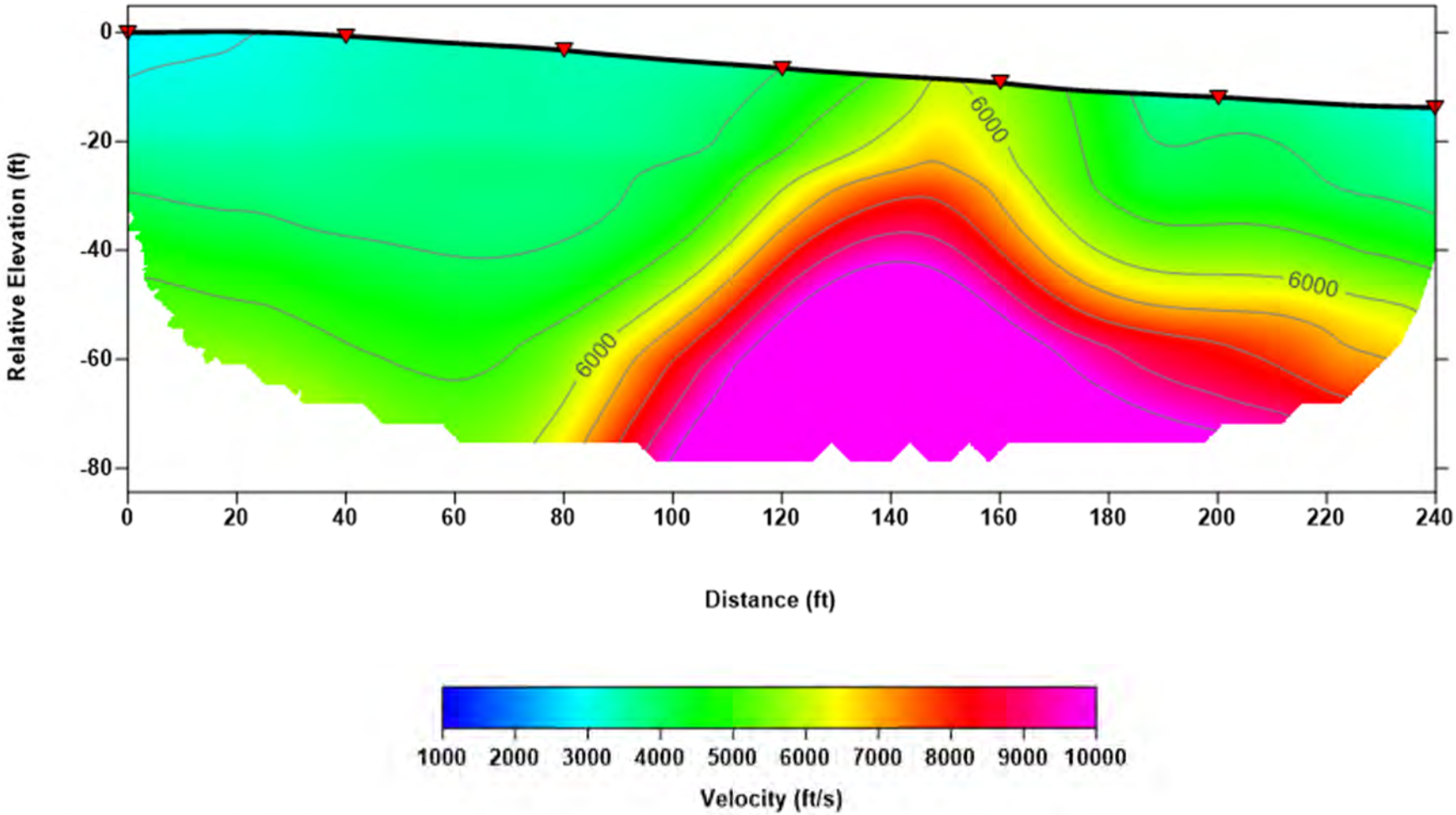
SL-13



P-WAVE PROFILE (SL-13)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4m	

TOMOGRAPHY MODEL

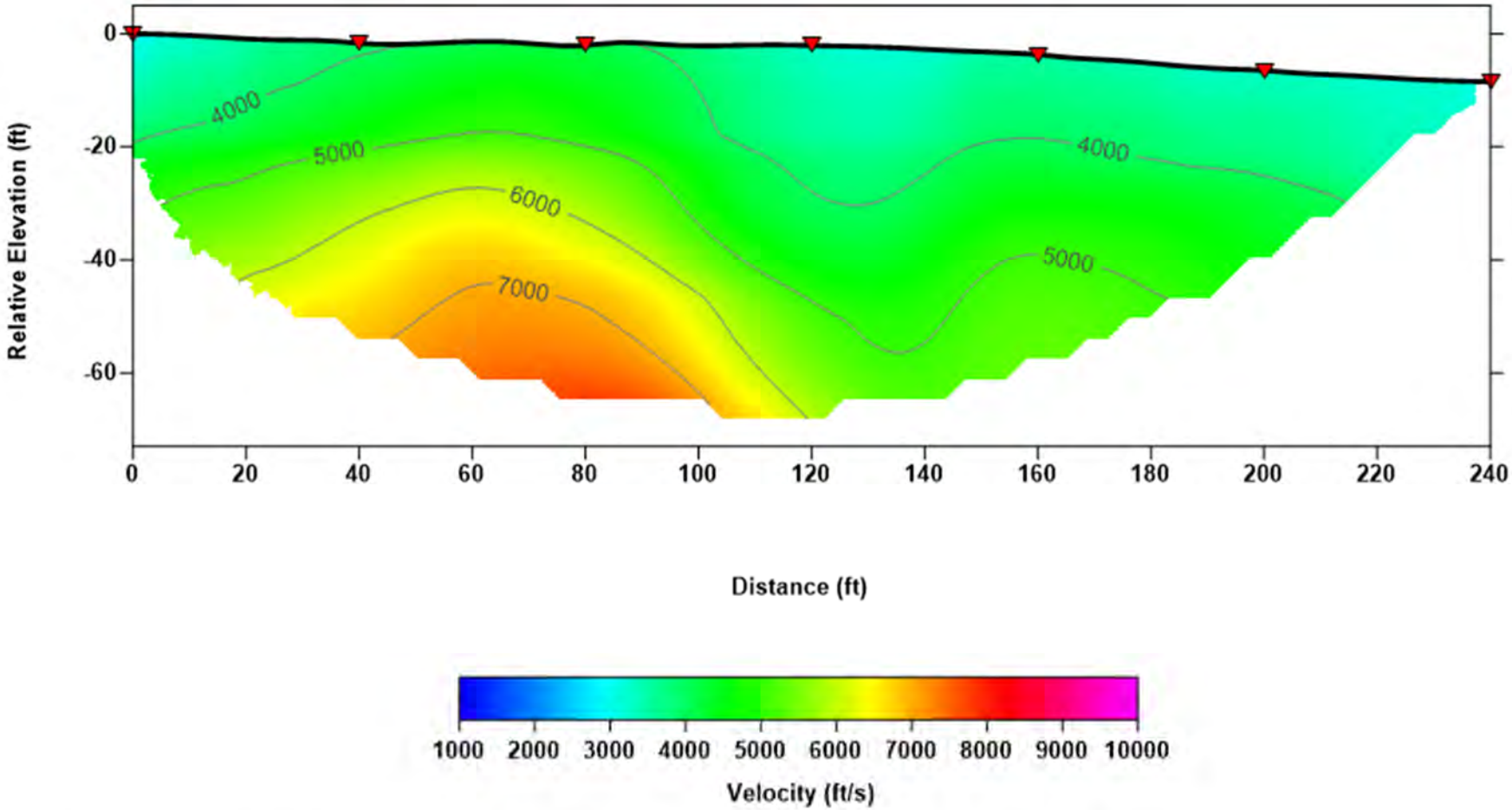
SL-14



P-WAVE PROFILE (SL-14)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4n	

TOMOGRAPHY MODEL

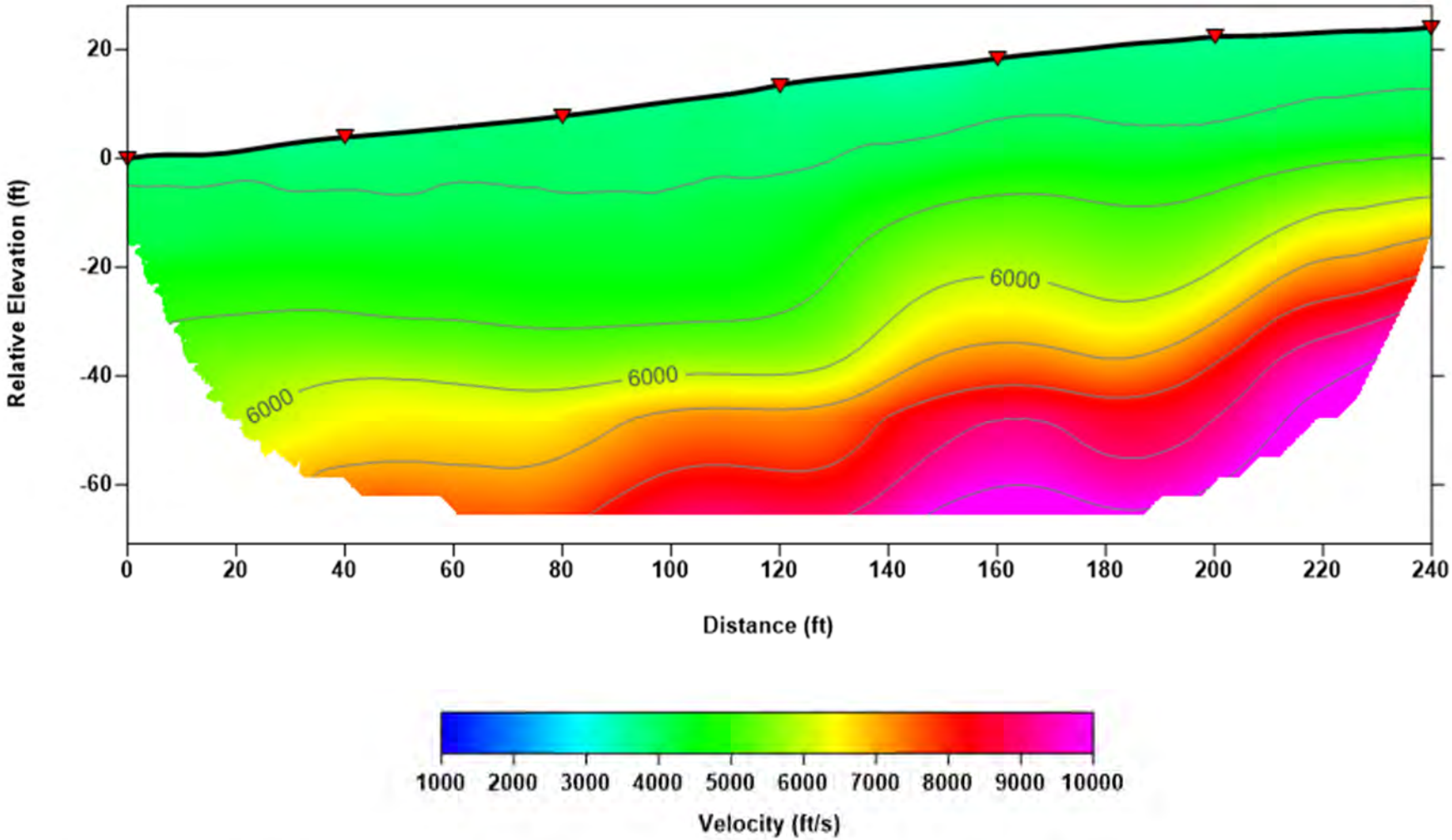
SL-15



P-WAVE PROFILE (SL-15)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4o	

TOMOGRAPHY MODEL

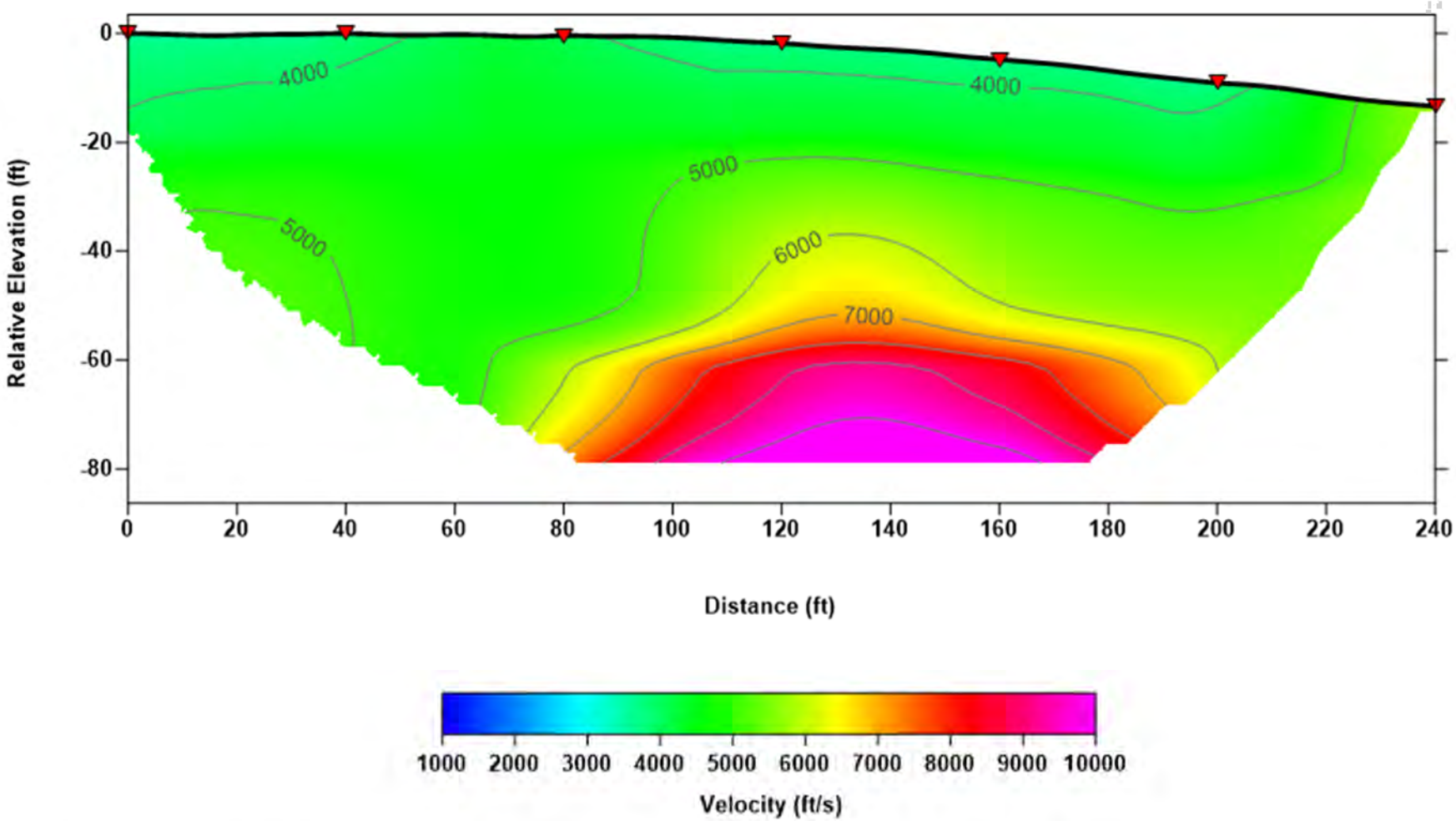
SL-16



P-WAVE PROFILE (SL-16)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4p	

TOMOGRAPHY MODEL

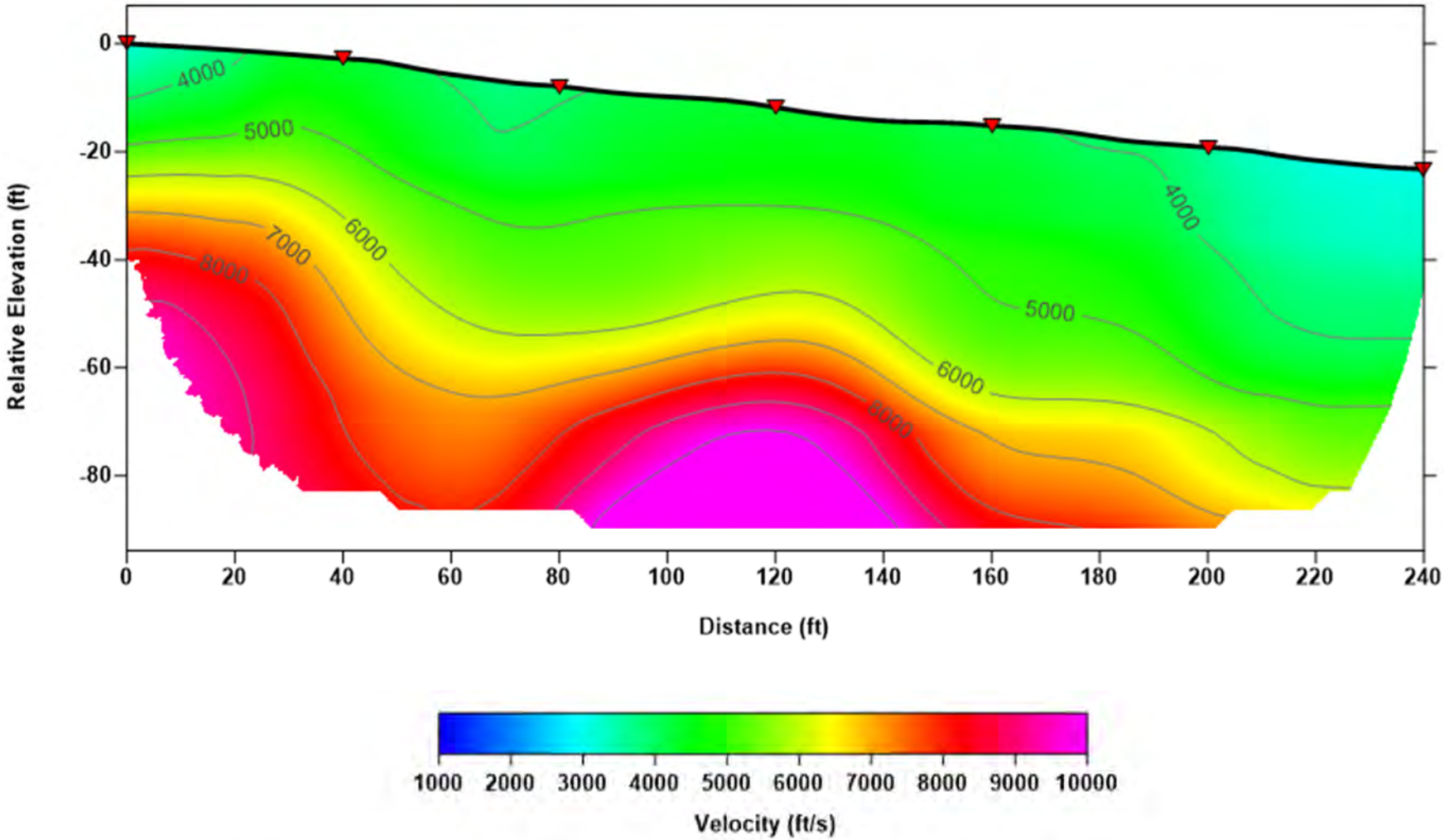
SL-17



P-WAVE PROFILE (SL-17)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4q	

TOMOGRAPHY MODEL

SL-18



P-WAVE PROFILE (SL-18)	Meridian Upper Plateau Riverside, California	ATLAS	**Note: Contour Interval = 1,000 feet per second**
	Project No.: 121300SWG / Date: 09/21	Figure 4r	

APPENDIX B

RESULTS OF GEOTECHNICAL LABORATORY TESTS

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Meridian West Upper Plateau GE	Tested By:	F. Mina	Date:	08/30/21
Project No.:	13226.001	Input By:	M. Vinet	Date:	09/01/21
Boring No.:	LB-4	Depth (ft.):	0 - 2.0		
Sample No.:	B-1				
Soil Identification:	Silty, Clayey Sand (SC-SM), Reddish Brown.				

Preparation Method: [X] Moist [ ] Dry

[X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340 *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5575	5649	5668	5589		
Weight of Mold (g)	3546	3546	3546	3546		
Net Weight of Soil (g)	2029	2103	2122	2043		
Wet Weight of Soil + Cont. (g)	1633.2	1522.3	1489.2	1612.2		
Dry Weight of Soil + Cont. (g)	1544.1	1418.7	1368.4	1458.0		
Weight of Container (g)	276.4	278.4	277.1	278.4		
Moisture Content (%)	7.0	9.1	11.1	13.1		
Wet Density (pcf)	133.9	138.8	140.1	134.8		
Dry Density (pcf)	125.1	127.2	126.1	119.3		

Maximum Dry Density (pcf) 127.3 **Optimum Moisture Content (%)** 9.5

PROCEDURE USED

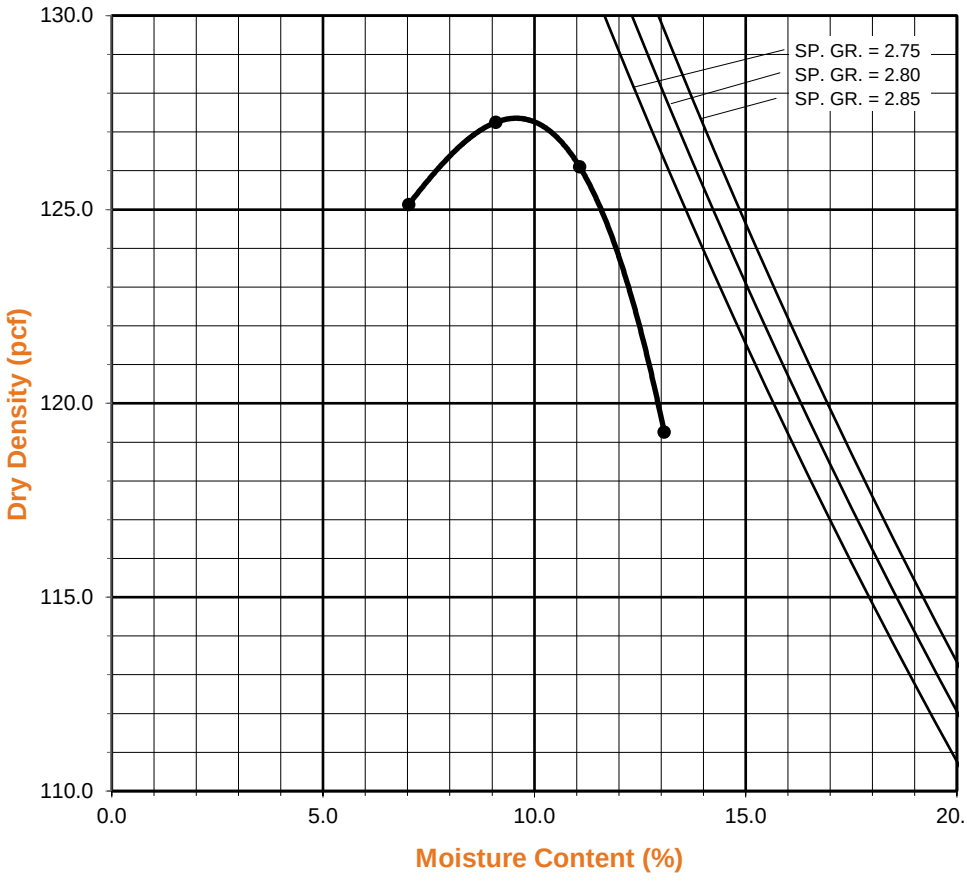
[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:
0:55:45
GR:SA:FI

Atterberg Limits:
LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Meridian West Upper Plateau GE	Tested By:	F. Mina	Date:	08/30/21
Project No.:	13226.001	Input By:	M. Vinet	Date:	09/01/21
Boring No.:	TP-8	Depth (ft.):	0 - 3.0		
Sample No.:	B-1				
Soil Identification:	Silty, Clayey Sand (SC-SM), Strong Brown.				

Preparation Method: [X] Moist [ ] Dry

[X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340 *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5601	5686	5665			
Weight of Mold (g)	3546	3546	3546			
Net Weight of Soil (g)	2055	2140	2119			
Wet Weight of Soil + Cont. (g)	811.2	720.7	966.2			
Dry Weight of Soil + Cont. (g)	776.0	687.6	897.0			
Weight of Container (g)	277.8	326.3	276.1			
Moisture Content (%)	7.1	9.2	11.1			
Wet Density (pcf)	135.6	141.3	139.9			
Dry Density (pcf)	126.7	129.4	125.8			

Maximum Dry Density (pcf) 129.5 **Optimum Moisture Content (%)** 9.0

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

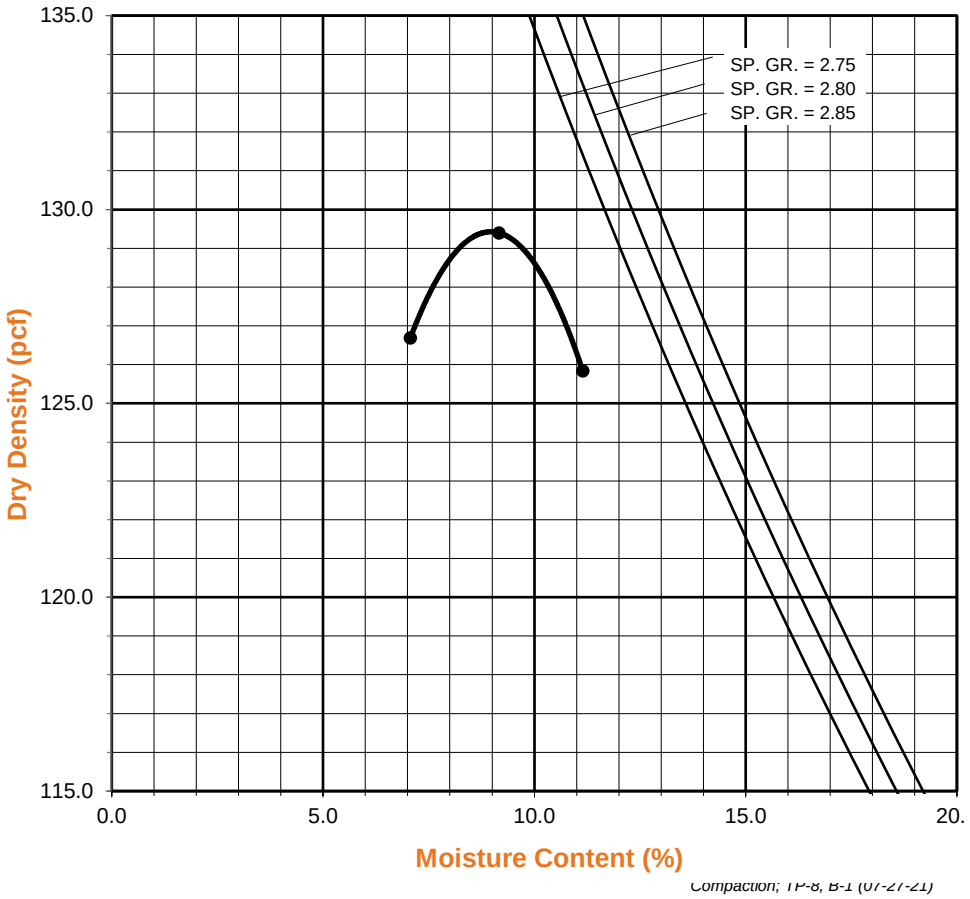
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Meridian West Upper Plateau GE	Tested By:	F. Mina	Date:	08/30/21
Project No.:	13226.001	Input By:	M. Vinet	Date:	09/01/21
Boring No.:	TP-40	Depth (ft.):	0 - 3.0		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Dark Brown.				

Preparation Method: [X] Moist [ ] Dry

[X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.03340

Ram Weight = 10 lb.; Drop = 18 in.

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	5616	5677	5645			
Weight of Mold (g)	3546	3546	3546			
Net Weight of Soil (g)	2070	2131	2099			
Wet Weight of Soil + Cont. (g)	1411.6	1533.2	1612.3			
Dry Weight of Soil + Cont. (g)	1333.4	1425.0	1475.0			
Weight of Container (g)	278.2	277.8	276.8			
Moisture Content (%)	7.4	9.4	11.5			
Wet Density (pcf)	136.6	140.7	138.5			
Dry Density (pcf)	127.2	128.5	124.3			

Maximum Dry Density (pcf) 128.7 **Optimum Moisture Content (%)** 9.0

PROCEDURE USED

[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **Procedure B**
Soil Passing 3/8 in. (9.5 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
Use if +#4 is >20% and +3/8 in. is 20% or less

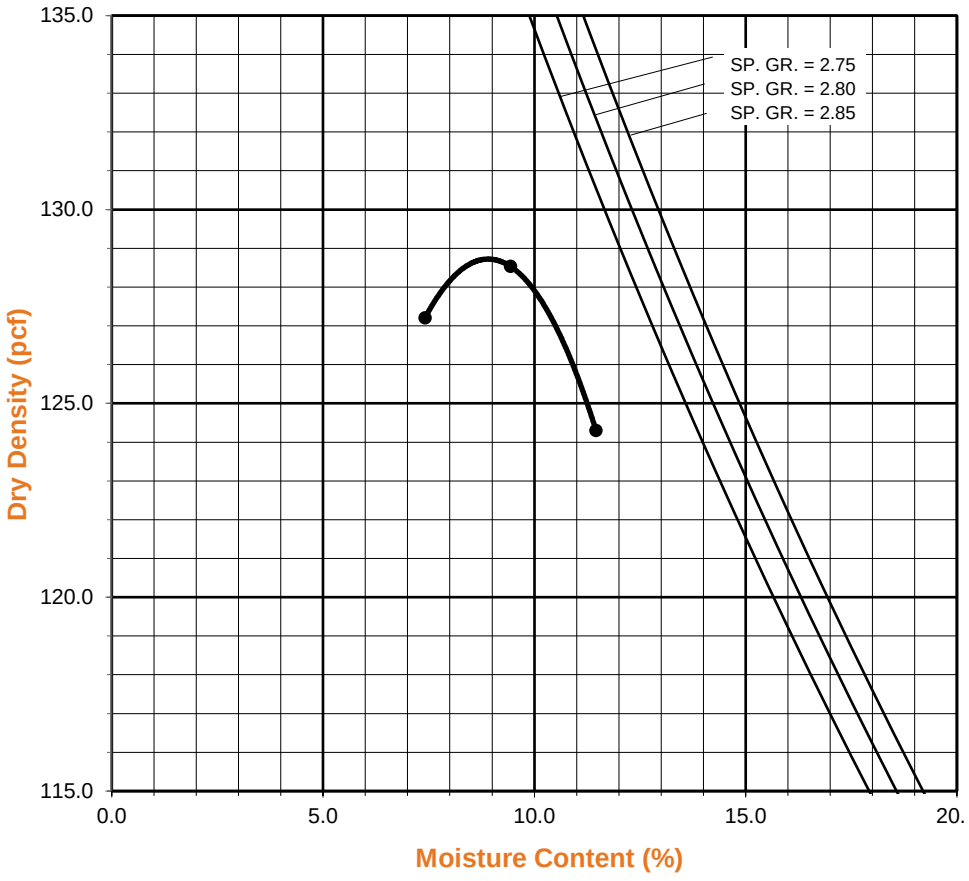
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Meridian West Upper Plateau GE Tested By : F. Mina Date: 08/31/21

Project No. : 13226.001 Data Input By: M. Vinet Date: 09/01/21

Boring No.	TP-1	TP-44		
Sample No.	B-2	B-1		
Sample Depth (ft)	3.0 - 19.0	0 - 9.0		
Soil Identification:	Well-Graded Sand (SW)	Silty Sand (SM)		
Wet Weight of Soil + Container (g)	100.00	100.00		
Dry Weight of Soil + Container (g)	100.00	100.00		
Weight of Container (g)	0.00	0.00		
Moisture Content (%)	0.00	0.00		
Weight of Soaked Soil (g)	100.00	100.00		

SULFATE CONTENT, DOT California Test 417, Part II

Beaker No.	1	2		
Crucible No.	1	2		
Furnace Temperature (°C)	850	850		
Time In / Time Out	Timer	Timer		
Duration of Combustion (min)	45	45		
Wt. of Crucible + Residue (g)	25.0136	24.8531		
Wt. of Crucible (g)	25.0112	24.8502		
Wt. of Residue (g) (A)	0.0024	0.0029		
PPM of Sulfate (A) x 41150	98.76	119.34		
PPM of Sulfate, Dry Weight Basis	**99**	**119**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	30	30		
ml of AgNO3 Soln. Used in Titration (C)	0.5	1.0		
PPM of Chloride (C -0.2) * 100 * 30 / B	30	80		
PPM of Chloride, Dry Wt. Basis	**30**	**80**		

pH TEST, DOT California Test 643

pH Value	**7.70**	**6.90**		
Temperature °C	21.0	21.0		

SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	Meridian West Upper Plateau GE		Tested By :	F. Mina	Date: 08/31/21
Project No. :	13226.001		Data Input By:	M. Vinet	Date: 09/01/21
Boring No.:	TP-1		Depth (ft.) :	3.0 - 19.0	
Sample No. :	B-2				

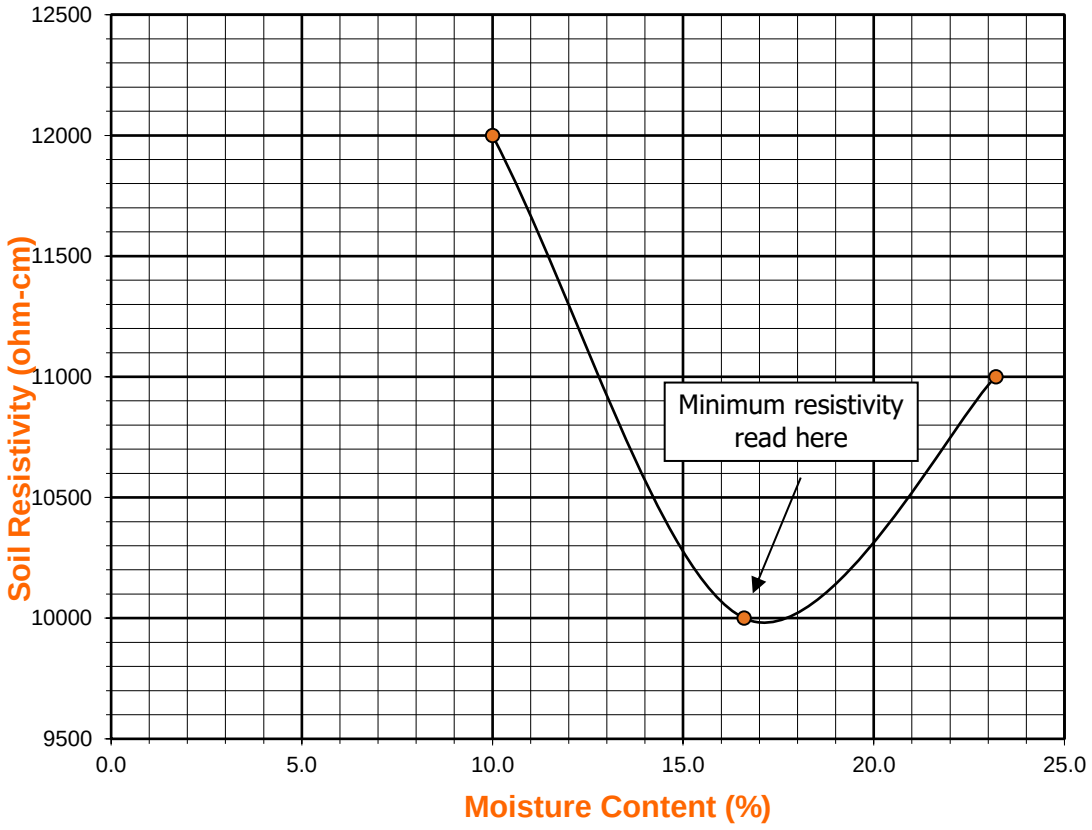
Soil Identification:* Well-Graded Sand (SW)

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	50	10.00	12000	12000
2	83	16.60	10000	10000
3	116	23.20	11000	11000
4				
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	100.00
Dry Wt. of Soil + Cont. (g)	100.00
Wt. of Container (g)	0.00
Container No.	A
Initial Soil Wt. (g) (Wt)	500.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
10000	**16.6**	**99**	**30**	**7.70**	**21.0**



SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	Meridian West Upper Plateau GE		Tested By :	F. Mina	Date: 08/31/21
Project No. :	13226.001		Data Input By:	M. Vinet	Date: 09/01/21
Boring No.:	TP-44		Depth (ft.) :	0 - 9.0	
Sample No. :	B-1				

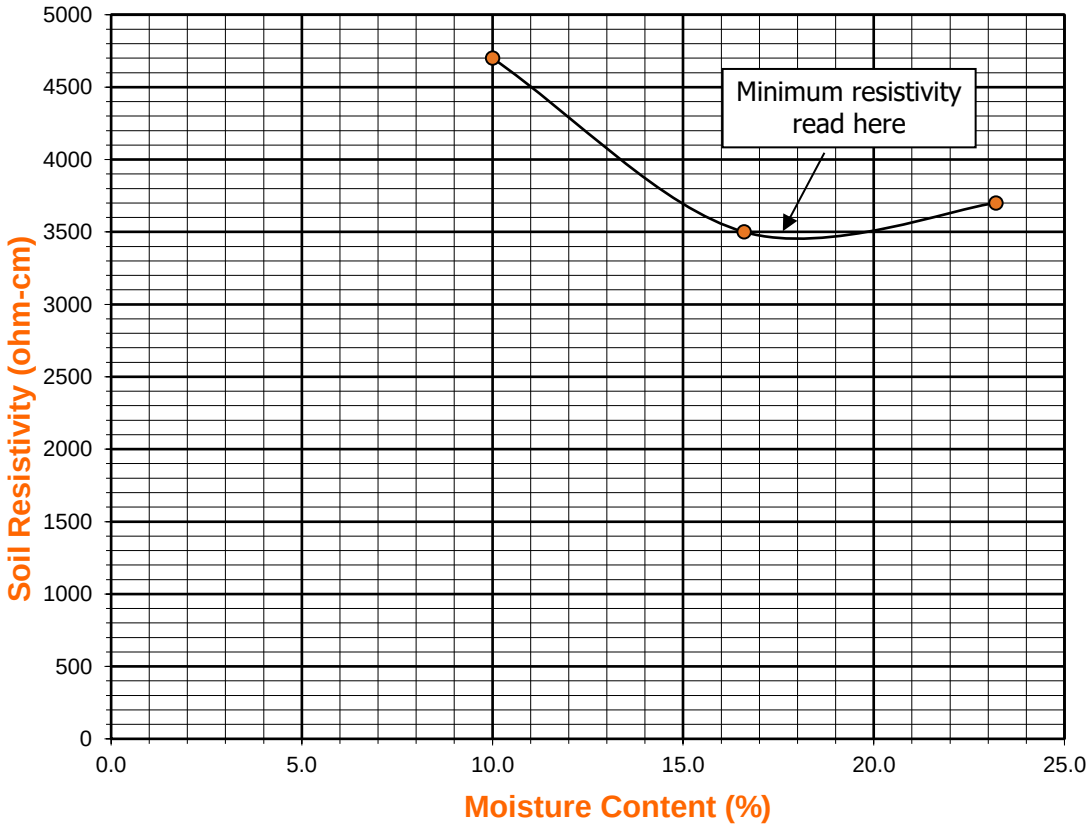
Soil Identification:* Silty Sand (SM)

*California Test 643 requires soil specimens to consist only of portions of samples passing through the No. 8 US Standard Sieve before resistivity testing. Therefore, this test method may not be representative for coarser materials.

Specimen No.	Water Added (ml) (Wa)	Adjusted Moisture Content (MC)	Resistance Reading (ohm)	Soil Resistivity (ohm-cm)
1	50	10.00	4700	4700
2	83	16.60	3500	3500
3	116	23.20	3700	3700
4				
5				

Moisture Content (%) (MCi)	0.00
Wet Wt. of Soil + Cont. (g)	100.00
Dry Wt. of Soil + Cont. (g)	100.00
Wt. of Container (g)	0.00
Container No.	A
Initial Soil Wt. (g) (Wt)	500.00
Box Constant	1.000
MC =(((1+Mci/100)x(Wa/Wt+1))-1)x100	

Min. Resistivity (ohm-cm)	Moisture Content (%)	Sulfate Content (ppm)	Chloride Content (ppm)	Soil pH	
				pH	Temp. (°C)
DOT CA Test 643		DOT CA Test 417 Part II	DOT CA Test 422	DOT CA Test 643	
3500	**16.6**	**119**	**80**	**6.90**	**21.0**



EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian West Upper Plateau GE	Tested By:	F. Mina	Date:	8/30/21
Project No. :	13226.001	Checked By:	M. Vinet	Date:	9/1/21
Boring No.:	TP-1	Depth:	0 - 3.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty Sand (SM), Reddish Brown.				

Dry Wt. of Soil + Cont. (gm.)	2733.2
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2733.2
Weight Soil Retained on #4 Sieve	42.8
Percent Passing # 4	98.4

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0039
Wt. Comp. Soil + Mold (gm.)	618.5	635.6
Wt. of Mold (gm.)	200.3	200.3
Specific Gravity (Assumed)	2.70	2.70
Container No.	7	7
Wet Wt. of Soil + Cont. (gm.)	300.0	635.6
Dry Wt. of Soil + Cont. (gm.)	276.5	385.4
Wt. of Container (gm.)	0.0	200.3
Moisture Content (%)	8.5	12.9
Wet Density (pcf)	126.1	130.8
Dry Density (pcf)	116.3	115.8
Void Ratio	0.450	0.456
Total Porosity	0.310	0.313
Pore Volume (cc)	64.2	65.0
Degree of Saturation (%) [S meas]	**51.0**	**76.7**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/30/21	14:30	1.0	0	0.5000
8/30/21	14:40	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/31/21	7:00	1.0	980	0.5039
8/31/21	8:00	1.0	1040	0.5039

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	3.9
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**4**

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EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian West Upper Plateau GE	Tested By:	F. Mina	Date:	8/31/21
Project No. :	13226.001	Checked By:	M. Vinet	Date:	9/1/21
Boring No.:	TP-8	Depth:	0 - 3.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty Sand (SM), Strong Brown.				

Dry Wt. of Soil + Cont. (gm.)	1770.7
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1770.7
Weight Soil Retained on #4 Sieve	32.7
Percent Passing # 4	98.2

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0096
Wt. Comp. Soil + Mold (gm.)	613.0	635.4
Wt. of Mold (gm.)	199.3	199.3
Specific Gravity (Assumed)	2.70	2.70
Container No.	7	7
Wet Wt. of Soil + Cont. (gm.)	300.0	635.4
Dry Wt. of Soil + Cont. (gm.)	276.5	381.3
Wt. of Container (gm.)	0.0	199.3
Moisture Content (%)	8.5	14.4
Wet Density (pcf)	124.8	130.3
Dry Density (pcf)	115.0	113.9
Void Ratio	0.466	0.480
Total Porosity	0.318	0.324
Pore Volume (cc)	65.8	67.8
Degree of Saturation (%) [S meas]	**49.3**	**80.9**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/31/21	13:00	1.0	0	0.5000
8/31/21	13:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
9/1/21	7:00	1.0	1070	0.5096
9/1/21	8:00	1.0	1130	0.5096

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	9.6
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**10**

Rev. 03-08

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian West Upper Plateau GE	Tested By:	F. Mina	Date:	8/31/21
Project No. :	13226.001	Checked By:	M. Vinet	Date:	9/1/21
Boring No.:	TP-13	Depth:	0 - 10.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty Sand (SM), Dark Reddish Brown.				

Dry Wt. of Soil + Cont. (gm.)	2589.4
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	2589.4
Weight Soil Retained on #4 Sieve	50.3
Percent Passing # 4	98.1

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0107
Wt. Comp. Soil + Mold (gm.)	600.9	626.3
Wt. of Mold (gm.)	182.7	182.7
Specific Gravity (Assumed)	2.70	2.70
Container No.	8	8
Wet Wt. of Soil + Cont. (gm.)	300.0	626.3
Dry Wt. of Soil + Cont. (gm.)	276.5	385.4
Wt. of Container (gm.)	0.0	182.7
Moisture Content (%)	8.5	15.1
Wet Density (pcf)	126.1	132.4
Dry Density (pcf)	116.3	115.0
Void Ratio	0.450	0.466
Total Porosity	0.310	0.318
Pore Volume (cc)	64.2	66.5
Degree of Saturation (%) [S meas]	**51.0**	**87.5**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/31/21	13:30	1.0	0	0.5000
8/31/21	13:40	1.0	10	0.5000
	Add Distilled Water to the Specimen			
9/1/21	7:00	1.0	1040	0.5107
9/1/21	8:00	1.0	1100	0.5107

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	10.7
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**11**

Rev. 03-08

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian West Upper Plateau GE	Tested By:	F. Mina	Date:	8/30/21
Project No. :	13226.001	Checked By:	M. Vinet	Date:	9/1/21
Boring No.:	TP-44	Depth:	0 - 9.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty Sand (SM), Dark Reddish Brown.				

Dry Wt. of Soil + Cont. (gm.)	3398.0
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	3398.0
Weight Soil Retained on #4 Sieve	19.0
Percent Passing # 4	99.4

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	0.9995
Wt. Comp. Soil + Mold (gm.)	605.2	631.0
Wt. of Mold (gm.)	190.4	190.4
Specific Gravity (Assumed)	2.70	2.70
Container No.	8	8
Wet Wt. of Soil + Cont. (gm.)	300.0	631.0
Dry Wt. of Soil + Cont. (gm.)	276.5	382.3
Wt. of Container (gm.)	0.0	190.4
Moisture Content (%)	8.5	15.2
Wet Density (pcf)	125.1	133.0
Dry Density (pcf)	115.3	115.4
Void Ratio	0.462	0.461
Total Porosity	0.316	0.316
Pore Volume (cc)	65.4	65.3
Degree of Saturation (%) [S meas]	**49.7**	**89.3**

SPECIMEN INUNDATION in distilled water for the period of 24 h or expansion rate < 0.0002 in./h.

Date	Time	Pressure (psi)	Elapsed Time (min.)	Dial Readings (in.)
8/30/21	14:45	1.0	0	0.5000
8/30/21	14:55	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/31/21	7:00	1.0	965	0.4995
8/31/21	8:00	1.0	1025	0.4995

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	-0.5
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**0**

Rev. 03-08

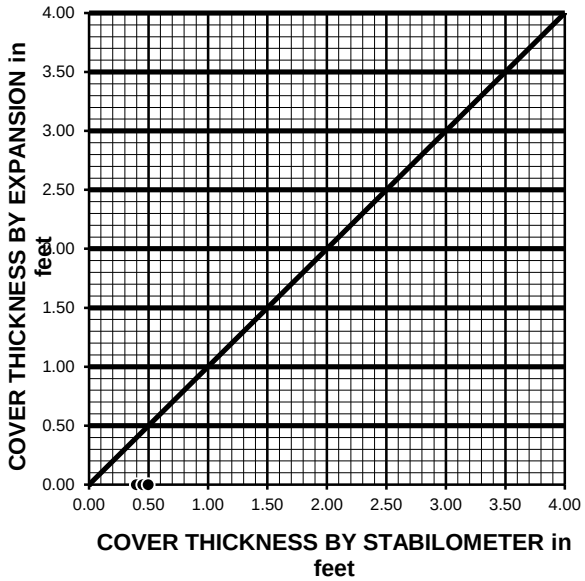
R-VALUE TEST RESULTS
ASTM D 2844

Project Name:	Meridian West Upper Plateau GE	Date:	8/30/21
Project Number:	13226.001	Technician:	F. Mina
Boring Number:	TP-1	Depth (ft.):	3.0 - 19.0
Sample Number:	B-2	Sample Location:	N/A
Sample Description:	Well-Graded Sand (SW), Reddish Brown.		

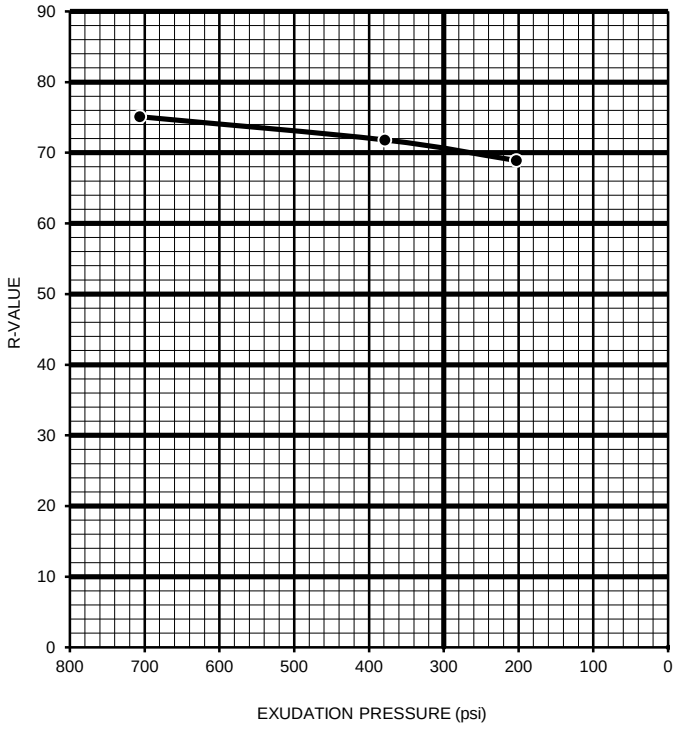
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	8.8	10.2	10.9
HEIGHT OF SAMPLE, Inches	2.50	2.51	2.52
DRY DENSITY, pcf	106.4	118.2	116.5
COMPACTOR AIR PRESSURE, psi	175	165	150
EXUDATION PRESSURE, psi	706	379	203
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	22	25	28
TURNS DISPLACEMENT	5.20	5.30	5.32
R-VALUE UNCORRECTED	75	72	69
R-VALUE CORRECTED	75	72	69

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.40	0.45	0.50
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	N/A
R-VALUE BY EXUDATION:	70
EQUILIBRIUM R-VALUE:	70

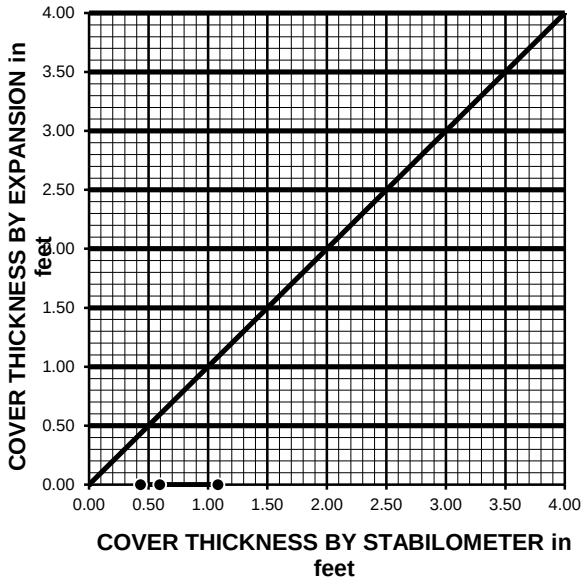
R-VALUE TEST RESULTS
ASTM D 2844

Project Name:	Meridian West Upper Plateau GE	Date:	8/30/21
Project Number:	13226.001	Technician:	F. Mina
Boring Number:	TP-31	Depth (ft.):	0 - 4.0
Sample Number:	B-1	Sample Location:	N/A
Sample Description:	Silty Sand (SM), Reddish Brown.		

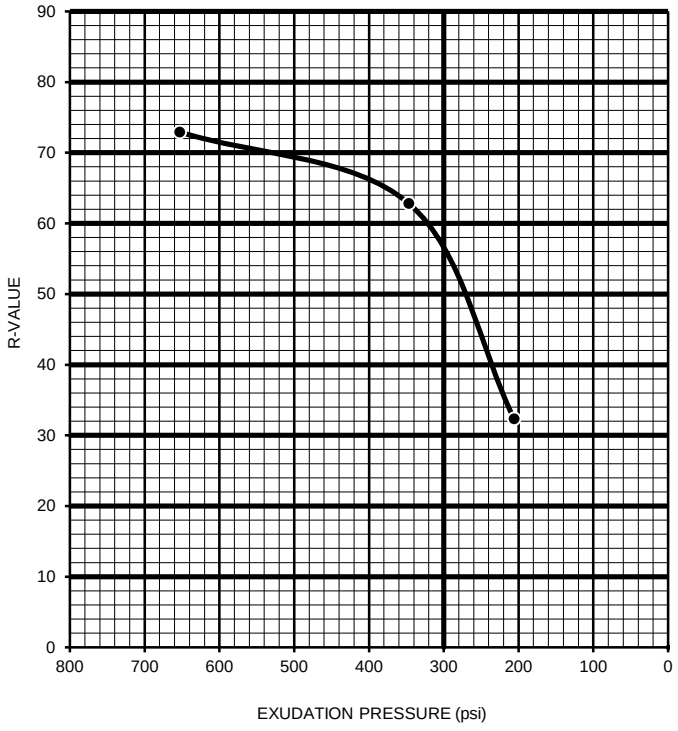
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	9.0	10.0	11.1
HEIGHT OF SAMPLE, Inches	2.49	2.50	2.55
DRY DENSITY, pcf	117.6	117.3	116.4
COMPACTOR AIR PRESSURE, psi	175	150	125
EXUDATION PRESSURE, psi	653	347	206
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	27	38	81
TURNS DISPLACEMENT	4.57	4.75	5.10
R-VALUE UNCORRECTED	73	63	32
R-VALUE CORRECTED	73	63	32

DESIGN CALCULATION DATA	a	b	c
GRAVEL EQUIVALENT FACTOR	1.0	1.0	1.0
TRAFFIC INDEX	5.0	5.0	5.0
STABILOMETER THICKNESS, ft.	0.43	0.59	1.08
EXPANSION PRESSURE THICKNESS, ft.	0.00	0.00	0.00

EXPANSION PRESSURE CHART



EXUDATION PRESSURE CHART



R-VALUE BY EXPANSION:	N/A
R-VALUE BY EXUDATION:	57
EQUILIBRIUM R-VALUE:	57

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian West Upper Plateau GE	Tested By:	FLM	Date:	08/31/21
Project No.:	13226.001	Checked By:	MRV	Date:	09/01/21
Boring No.:	LB-1	Depth (feet):	10.0		
Sample No.:	S-1				
Soil Identification:	Well-Graded Sand with Silt (SW-SM), Reddish Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	F	Wt. of Air-Dry Soil + Cont. (g)	544.4
Wt. of Air-Dried Soil + Cont.(g)	544.4	Wt. of Dry Soil + Cont. (g)	540.4
Wt. of Container (g)	328.1	Wt. of Container No._____ (g)	328.1
Dry Wt. of Soil (g)	212.3	Moisture Content (%)	1.9

After Wet Sieve	Container No.	F
	Wt. of Dry Soil + Container (g)	521.7
	Wt. of Container (g)	328.1
	Dry Wt. of Soil Retained on # 200 Sieve (g)	193.6

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500		100.0
#4	4.750	0.0	100.0
#8	2.360	4.7	97.8
#16	1.180	44.3	79.1
#30	0.600	98.6	53.6
#50	0.300	147.6	30.5
#100	0.150	176.6	16.8
#200	0.075	191.4	9.8
PAN			

GRAVEL: **0 %**

SAND: **90 %**

FINES: **10 %**

GROUP SYMBOL: **SW-SM**

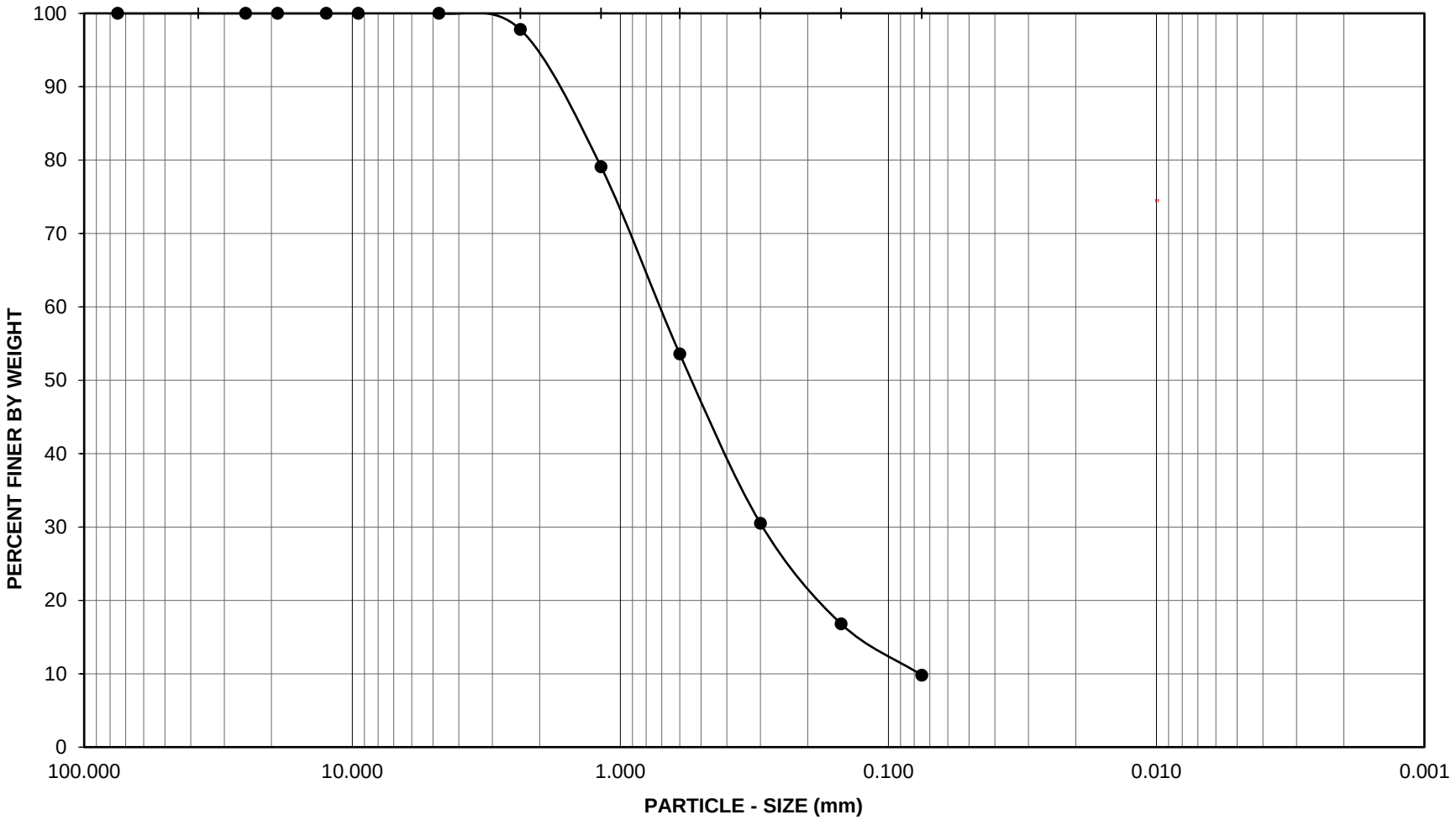
Cu = D60/D10 = 9.33

Cc = $(D30)^2/(D60*D10)$ = 1.71

Remarks:

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"
U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200
HYDROMETER



Project Name: Meridian West Upper Plateau GE

Project No.: 13226.001

Boring No.: LB-1 Sample No.: S-1

Depth (feet): 10.0 Soil Type : SW-SM

Soil Identification: Well-Graded Sand with Silt (SW-SM), Reddish Brown.

GR:SA:FI : (%) 0 : 90 : 10

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PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Sep-21

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian West Upper Plateau GE	Tested By:	FLM	Date:	08/31/21
Project No.:	13226.001	Checked By:	MRV	Date:	09/01/21
Boring No.:	LB-2	Depth (feet):	15.0		
Sample No.:	S-2				
Soil Identification:	Silty Sand (SM), Olive Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	Q	Wt. of Air-Dry Soil + Cont. (g)	713.3
Wt. of Air-Dried Soil + Cont.(g)	713.3	Wt. of Dry Soil + Cont. (g)	684.4
Wt. of Container (g)	328.7	Wt. of Container No._____ (g)	328.7
Dry Wt. of Soil (g)	355.7	Moisture Content (%)	8.1

After Wet Sieve	Container No.	Q
	Wt. of Dry Soil + Container (g)	594.4
	Wt. of Container (g)	328.7
	Dry Wt. of Soil Retained on # 200 Sieve (g)	265.7

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500		100.0
#4	4.750	0.0	100.0
#8	2.360	10.8	97.0
#16	1.180	41.9	88.2
#30	0.600	83.7	76.5
#50	0.300	140.3	60.6
#100	0.150	205.0	42.4
#200	0.075	264.3	25.7
PAN			

GRAVEL: **0 %**

SAND: **74 %**

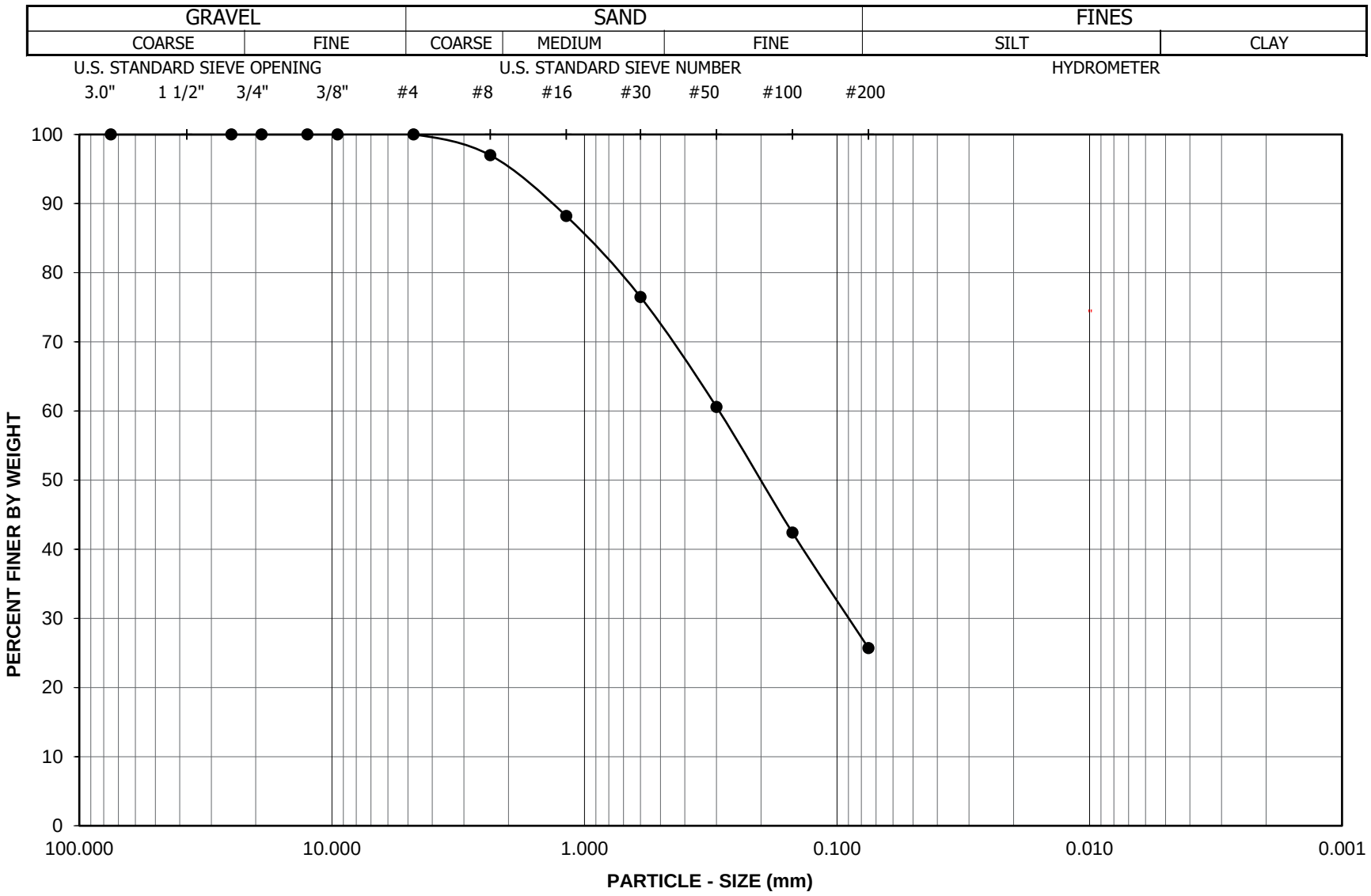
FINES: **26 %**

GROUP SYMBOL: **SM**

Cu = D60/D10 = N/A

Cc = $(D30)^2/(D60*D10)$ = N/A

Remarks:



Project Name: Meridian West Upper Plateau GE

Project No.: 13226.001

Boring No.: LB-2 Sample No.: S-2

Depth (feet): 15.0 Soil Type : SM

Soil Identification: Silty Sand (SM), Olive Brown.

GR:SA:FI : (%) 0 : 74 : 26

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PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Sep-21

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian West Upper Plateau GE	Tested By:	FLM	Date:	08/31/21
Project No.:	13226.001	Checked By:	MRV	Date:	09/01/21
Boring No.:	LB-4	Depth (feet):	0 - 20		
Sample No.:	B-1				
Soil Identification:	Silty, Clayey Sand (SC-SM), Reddish Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	B	Wt. of Air-Dry Soil + Cont. (g)	1045.1
Wt. of Air-Dried Soil + Cont.(g)	1045.1	Wt. of Dry Soil + Cont. (g)	1027.9
Wt. of Container (g)	673.2	Wt. of Container No._____ (g)	673.2
Dry Wt. of Soil (g)	354.7	Moisture Content (%)	4.8

After Wet Sieve	Container No.	B
	Wt. of Dry Soil + Container (g)	868.5
	Wt. of Container (g)	673.2
	Dry Wt. of Soil Retained on # 200 Sieve (g)	195.3

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500		100.0
#4	4.750	0.0	100.0
#8	2.360	5.4	98.5
#16	1.180	23.2	93.5
#30	0.600	55.7	84.3
#50	0.300	102.3	71.2
#100	0.150	149.1	58.0
#200	0.075	194.6	45.1
PAN			

GRAVEL: **0 %**

SAND: **55 %**

FINES: **45 %**

GROUP SYMBOL: **SC-SM**

Cu = D60/D10 = N/A

Cc = $(D30)^2/(D60*D10)$ = N/A

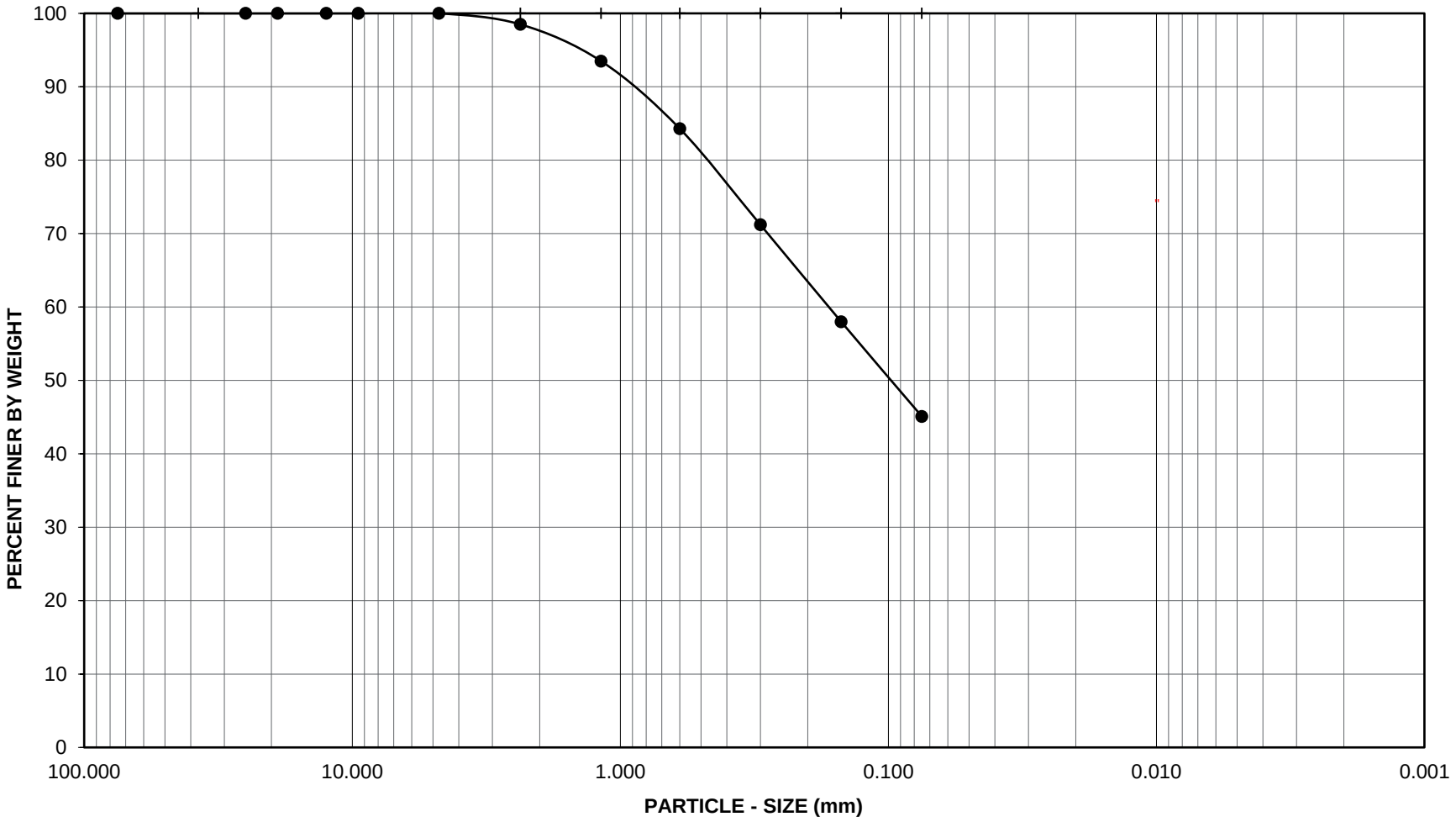
Remarks:

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"

U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200

HYDROMETER



Project Name: Meridian West Upper Plateau GE

Project No.: 13226.001

Boring No.: LB-4 Sample No.: B-1

Depth (feet): 0 - 20 Soil Type : SC-SM

Soil Identification: Silty, Clayey Sand (SC-SM), Reddish Brown.

GR:SA:FI : (%) 0 : 55 : 45

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PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Sep-21

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PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name: Meridian West Upper Plateau GE
Tested By: FLM Date: 08/31/21
Project No.: 13226.001
Checked By: MRV Date: 09/01/21
Boring No.: TP-1
Depth (feet): 3.0 - 19.0
Sample No.: B-2
Soil Identification: Well-Graded Sand (SW), Reddish Brown.

Calculation of Dry Weights	Whole Sample	Sample Passing #4	Moisture Contents	Whole Sample	Sample passing #4
Container No.:	K	K	Wt. of Air-Dry Soil + Cont.(g)	1783.4	652.2
Wt. Air-Dried Soil + Cont.(g)	1783.4	652.2	Wt. of Dry Soil + Cont. (g)	1738.9	652.2
Wt. of Container (g)	328.2	328.2	Wt. of Container No._____(g)	328.2	328.2
Dry Wt. of Soil (g)	1410.1	324.0	Moisture Content (%)	3.2	0.0

Passing #4 Material After Wet Sieve	
Container No.	K
Wt. of Dry Soil + Container (g)	633.3
Wt. of Container (g)	328.2
Dry Wt. of Soil Retained on # 200 Sieve (g)	305.1

U. S. Sieve Size		Cumulative Weight of Dry Soil Retained (g)		Percent Passing (%)
	(mm.)	Whole Sample	Sample Passing #4	
1 1/2"	37.500			100.0
1"	25.000			100.0
3/4"	19.000	0.0		100.0
1/2"	12.500	21.2		98.5
3/8"	9.500	56.2		96.0
#4	4.750	369.7		73.8
#8	2.360		94.9	52.2
#16	1.180		172.5	34.5
#30	0.600		223.8	22.8
#50	0.300		262.8	13.9
#100	0.150		287.6	8.3
#200	0.075		303.7	4.6
PAN				

GRAVEL: **26 %**
SAND: **69 %**
FINES: **5 %**
GROUP SYMBOL: **SW**

Cu = D60/D10 = 15.79
Cc = $(D30)^2/(D60*D10)$ = 1.58

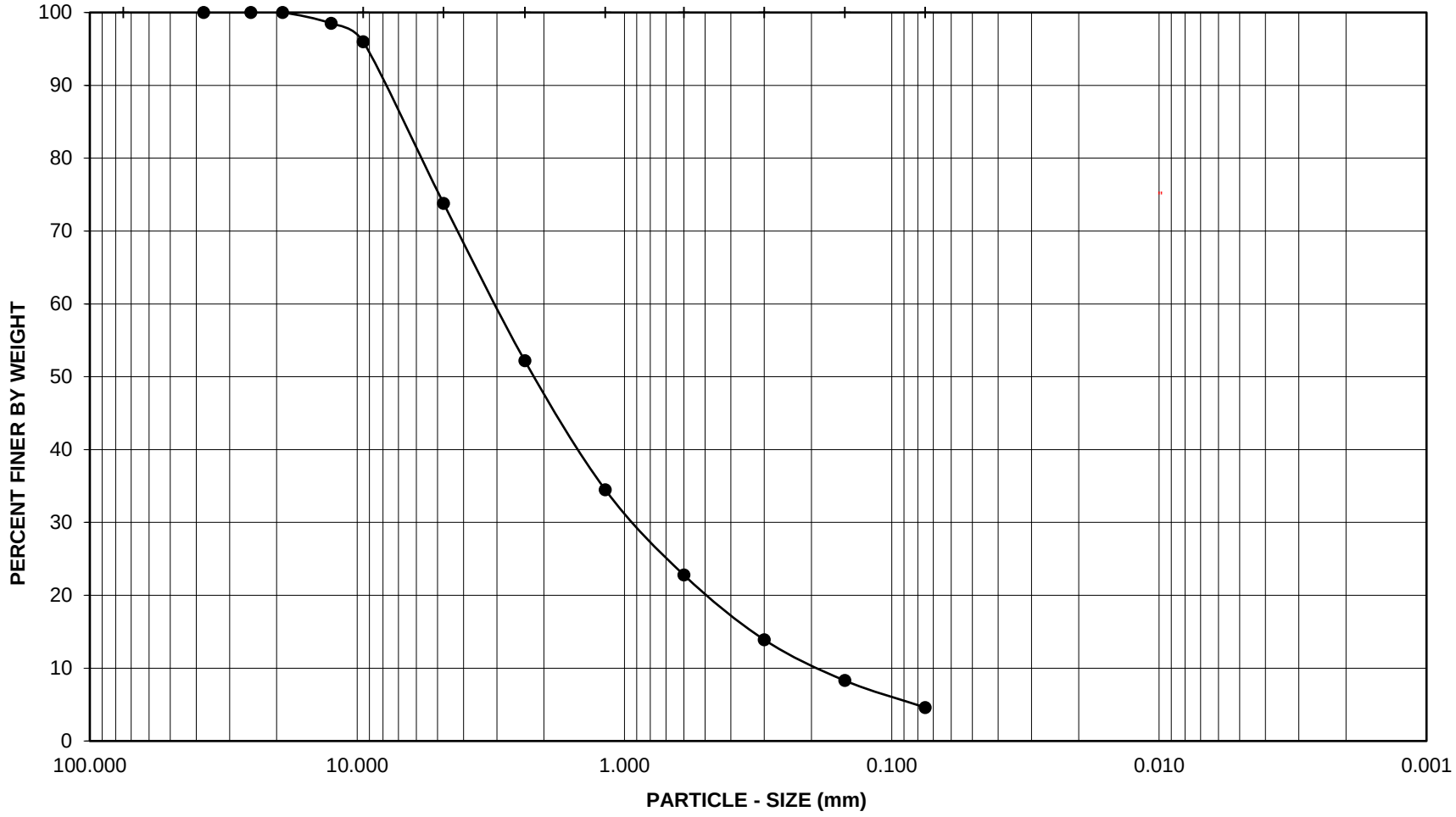
Remarks:

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"

U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200

HYDROMETER



Project Name: Meridian West Upper Plateau GE

Project No.: 13226.001

Boring No.: TP-1 Sample No.: B-2

Depth (feet): 3.0 - 19.0 Soil Type : SW

Soil Identification: Well-Graded Sand (SW), Reddish Brown.

GR:SA:FI : (%) 26 : 69 : 5

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PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Sep-21

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian West Upper Plateau GE		Tested By:	FLM	Date: 08/31/21
Project No.:	13226.001		Checked By:	MRV	Date: 09/01/21
Boring No.:	TP-31		Depth (feet):	0 - 4.0	
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Reddish Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	BA	Wt. of Air-Dry Soil + Cont. (g)	646.3
Wt. of Air-Dried Soil + Cont.(g)	646.3	Wt. of Dry Soil + Cont. (g)	646.3
Wt. of Container (g)	278.3	Wt. of Container No._____ (g)	278.3
Dry Wt. of Soil (g)	368.0	Moisture Content (%)	0.0

After Wet Sieve	Container No.	BA
	Wt. of Dry Soil + Container (g)	555.1
	Wt. of Container (g)	278.3
	Dry Wt. of Soil Retained on # 200 Sieve (g)	276.8

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500	0.0	100.0
#4	4.750	2.5	99.3
#8	2.360	22.8	93.8
#16	1.180	66.3	82.0
#30	0.600	116.8	68.3
#50	0.300	179.5	51.2
#100	0.150	233.9	36.4
#200	0.075	273.7	25.6
PAN			

GRAVEL: **1 %**

SAND: **73 %**

FINES: **26 %**

GROUP SYMBOL: **SM**

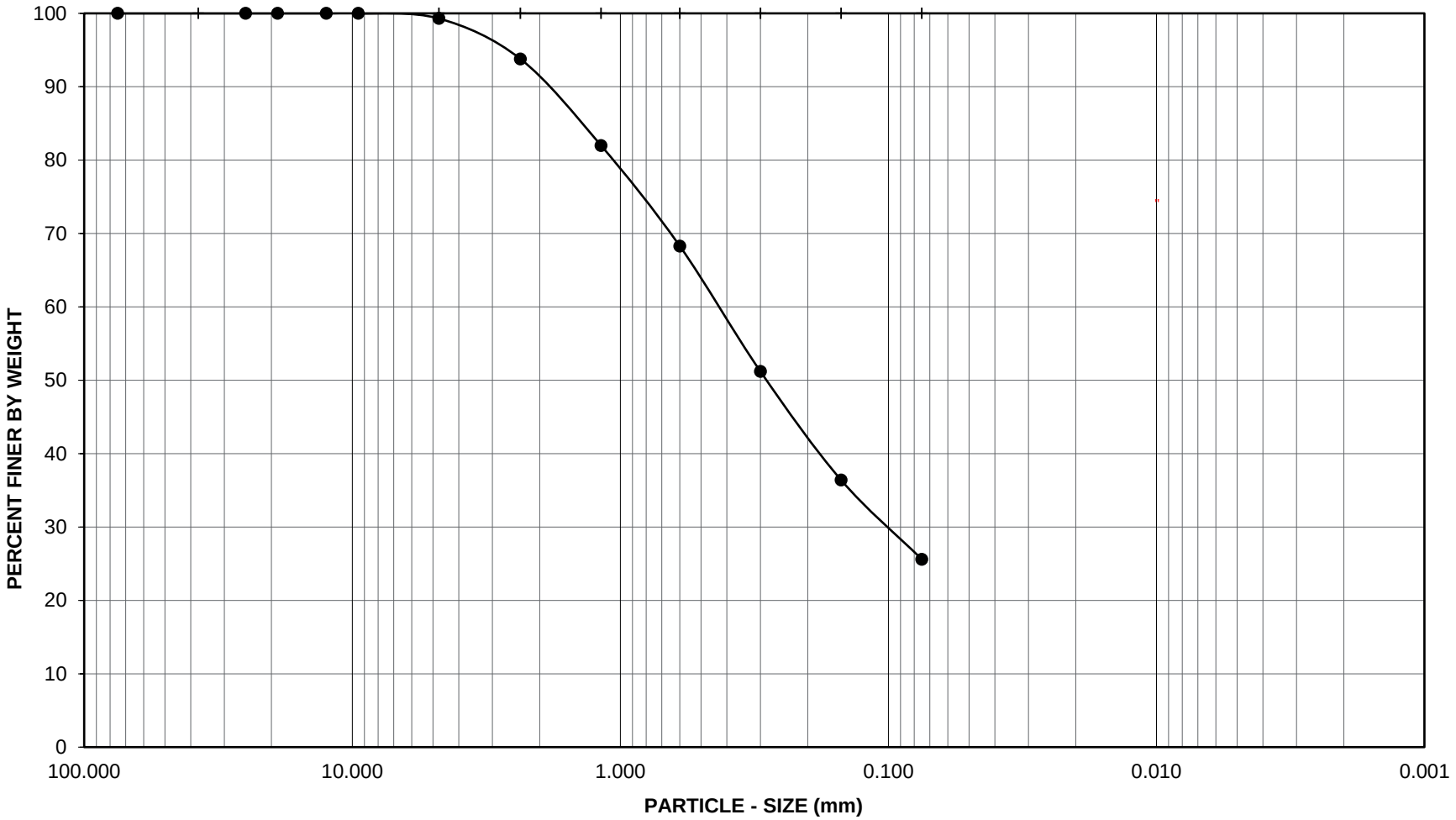
Cu = D60/D10 = N/A

Cc = $(D30)^2/(D60*D10)$ = N/A

Remarks:

GRAVEL		SAND			FINES	
COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY

U.S. STANDARD SIEVE OPENING: 3.0" 1 1/2" 3/4" 3/8"
U.S. STANDARD SIEVE NUMBER: #4 #8 #16 #30 #50 #100 #200
HYDROMETER



Project Name: Meridian West Upper Plateau GE

Project No.: 13226.001

Boring No.: TP-31 Sample No.: B-1

Depth (feet): 0 - 4.0 Soil Type : SM

Soil Identification: Silty Sand (SM), Reddish Brown.

GR:SA:FI : (%) 1 : 73 : 26

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Sep-21

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian West Upper Plateau GE	Tested By:	FLM	Date:	08/31/21
Project No.:	13226.001	Checked By:	MRV	Date:	09/01/21
Boring No.:	TP-40	Depth (feet):	0 - 3.0		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Dark Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	20	Wt. of Air-Dry Soil + Cont. (g)	613.8
Wt. of Air-Dried Soil + Cont.(g)	613.8	Wt. of Dry Soil + Cont. (g)	613.8
Wt. of Container (g)	280.1	Wt. of Container No._____ (g)	280.1
Dry Wt. of Soil (g)	333.7	Moisture Content (%)	0.0

After Wet Sieve	Container No.	20
	Wt. of Dry Soil + Container (g)	504.7
	Wt. of Container (g)	280.1
	Dry Wt. of Soil Retained on # 200 Sieve (g)	224.6

U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500		100.0
#4	4.750	0.0	100.0
#8	2.360	11.9	96.4
#16	1.180	46.6	86.0
#30	0.600	91.7	72.5
#50	0.300	144.4	56.7
#100	0.150	188.1	43.6
#200	0.075	221.4	33.7
PAN			

GRAVEL: **0 %**

SAND: **66 %**

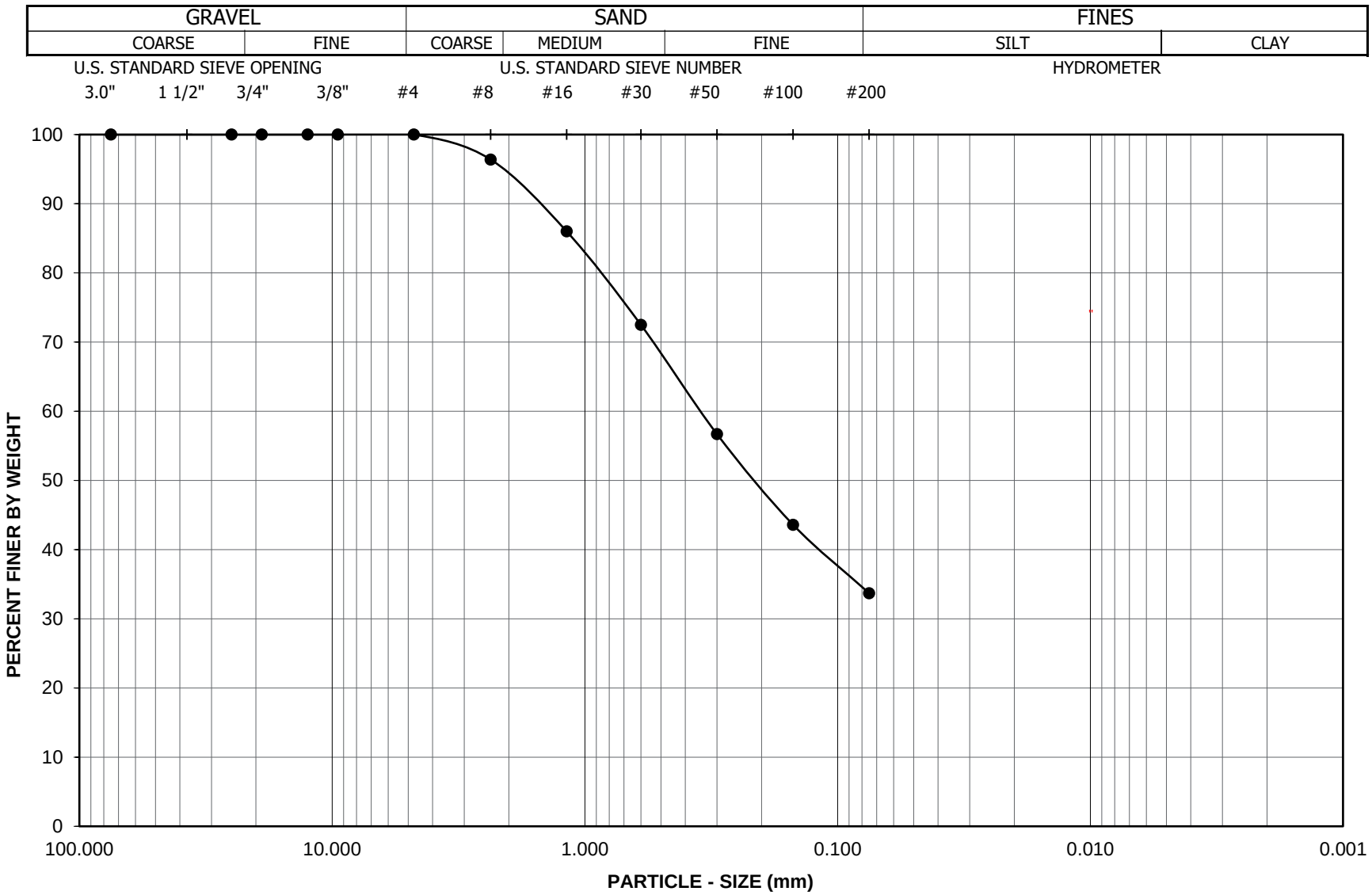
FINES: **34 %**

GROUP SYMBOL: **SM**

Cu = D60/D10 = N/A

Cc = $(D30)^2/(D60*D10)$ = N/A

Remarks:



Project Name: Meridian West Upper Plateau GE

Project No.: 13226.001

Boring No.: TP-40 Sample No.: B-1

Depth (feet): 0 - 3.0 Soil Type : SM

Soil Identification: Silty Sand (SM), Dark Brown.

GR:SA:FI : (%) 0 : 66 : 34

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Sep-21

APPENDIX C

EARTHWORK AND GRADING SPECIFICATIONS

Leighton

APPENDIX C

LEIGHTON CONSULTING, INC.
EARTHWORK AND GRADING GUIDE SPECIFICATIONS

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C-1.0 GENERAL

C-1.1 Intent

These Earthwork and Grading Guide Specifications are for grading and earthwork shown on the current, approved grading plan(s) and/or indicated in the Leighton Consulting, Inc. geotechnical report(s). These Guide Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the project-specific recommendations in the geotechnical report shall supersede these Guide Specifications. Leighton Consulting, Inc. shall provide geotechnical observation and testing during earthwork and grading. Based on these observations and tests, Leighton Consulting, Inc. may provide new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

C-1.2 Role of Leighton Consulting, Inc.

Prior to commencement of earthwork and grading, Leighton Consulting, Inc. shall meet with the earthwork contractor to review the earthwork contractor's work plan, to schedule sufficient personnel to perform the appropriate level of observation, mapping and compaction testing. During earthwork and grading, Leighton Consulting, Inc. shall observe, map, and document subsurface exposures to verify geotechnical design assumptions. If observed conditions are found to be significantly different than the interpreted assumptions during the design phase, Leighton Consulting, Inc. shall inform the owner, recommend appropriate changes in design to accommodate these observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include (1) natural ground after clearing to receiving fill but before fill is placed, (2) bottoms of all "remedial removal" areas, (3) all key bottoms, and (4) benches made on sloping ground to receive fill.

Leighton Consulting, Inc. shall observe moisture-conditioning and processing of the subgrade and fill materials, and perform relative compaction testing of fill to determine the attained relative compaction. Leighton Consulting, Inc. shall provide *Daily Field Reports* to the owner and the Contractor on a routine and frequent basis.

C-1.3 The Earthwork Contractor

The earthwork contractor (Contractor) shall be qualified, experienced and knowledgeable in earthwork logistics, preparation and processing of ground to receive fill, moisture-conditioning and processing of fill, and compacting fill. The Contractor shall review and accept the plans, geotechnical report(s), and these Guide Specifications prior to commencement of grading. The Contractor shall be solely responsible for

performing grading and backfilling in accordance with the current, approved plans and specifications.

The Contractor shall inform the owner and Leighton Consulting, Inc. of changes in work schedules at least one working day in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that Leighton Consulting, Inc. is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish earthwork and grading in accordance with the applicable grading codes and agency ordinances, these Guide Specifications, and recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of Leighton Consulting, Inc., unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, adverse weather, etc., are resulting in a quality of work less than required in these specifications, Leighton Consulting, Inc. shall reject the work and may recommend to the owner that earthwork and grading be stopped until unsatisfactory condition(s) are rectified.

C-2.0 PREPARATION OF AREAS TO BE FILLED

C-2.1 Clearing and Grubbing

Vegetation, such as brush, grass, roots and other deleterious material shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies and Leighton Consulting, Inc.. Care should be taken not to encroach upon or otherwise damage native and/or historic trees designated by the Owner or appropriate agencies to remain. Pavements, flatwork or other construction should not extend under the “drip line” of designated trees to remain.

Leighton Consulting, Inc. shall evaluate the extent of these removals depending on specific site conditions. Earth fill material shall not contain more than 3 percent of organic materials (by dry weight: ASTM D 2974-00). Nesting of the organic materials shall not be allowed.

If potentially hazardous materials are encountered, the Contractor shall stop work in the affected area, and a hazardous material specialist shall be informed immediately for proper evaluation and handling of these materials prior to continuing to work in that area. As presently defined by the State of California, most refined petroleum products (gasoline, diesel fuel, motor oil, grease, coolant, etc.) have chemical constituents that are considered to be hazardous waste. As such, the indiscriminate dumping or spillage

of these fluids onto the ground may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

C-2.2 Processing

Existing ground that has been declared satisfactory for support of fill, by Leighton Consulting, Inc., shall be scarified to a minimum depth of 6 inches (15 cm). Existing ground that is not satisfactory shall be overexcavated as specified in the following Section C-2.3. Scarification shall continue until soils are broken down and free of large clay lumps or clods and the working surface is reasonably uniform, flat, and free of uneven features that would inhibit uniform compaction.

C-2.3 Overexcavation

In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured or otherwise unsuitable ground shall be overexcavated to competent ground as evaluated by Leighton Consulting, Inc. during grading. All undocumented fill soils under proposed structure footprints should be excavated

C-2.4 Benching

Where fills are to be placed on ground with slopes steeper than 5:1 (horizontal to vertical units), (>20 percent grade) the ground shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet (4.5 m) wide and at least 2 feet (0.6 m) deep, into competent material as evaluated by Leighton Consulting, Inc.. Other benches shall be excavated a minimum height of 4 feet (1.2 m) into competent material or as otherwise recommended by Leighton Consulting, Inc.. Fill placed on ground sloping flatter than 5:1 (horizontal to vertical units), (<20 percent grade) shall also be benched or otherwise overexcavated to provide a flat subgrade for the fill.

C-2.5 Evaluation/Acceptance of Fill Areas

All areas to receive fill, including removal and processed areas, key bottoms, and benches, shall be observed, mapped, elevations recorded, and/or tested prior to being accepted by Leighton Consulting, Inc. as suitable to receive fill. The Contractor shall obtain a written acceptance (*Daily Field Report*) from Leighton Consulting, Inc. prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

C-3.0 FILL MATERIAL

C-3.1 Fill Quality

Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by Leighton Consulting, Inc. prior to placement. Soils of poor quality, such as those with unacceptable gradation, high expansion potential, or low strength shall be placed in areas acceptable to Leighton Consulting, Inc. or mixed with other soils to achieve satisfactory fill material.

C-3.2 Oversize

Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 6 inches (15 cm), shall not be buried or placed in fill unless location, materials and placement methods are specifically accepted by Leighton Consulting, Inc.. Placement operations shall be such that nesting of oversized material does not occur and such that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 feet (3 m) measured vertically from finish grade, or within 2 feet (0.61 m) of future utilities or underground construction.

C-3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section C-3.1, and be free of hazardous materials ("contaminants") and rock larger than 3-inches (8 cm) in largest dimension. All import soils shall have an Expansion Index (EI) of 20 or less and a sulfate content no greater than ($\leq$) 500 parts-per-million (ppm). A representative sample of a potential import source shall be given to Leighton Consulting, Inc. at least four full working days before importing begins, so that suitability of this import material can be determined and appropriate tests performed.

C-4.0 FILL PLACEMENT AND COMPACTION

C-4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill, as described in Section C-2.0, above, in near-horizontal layers not exceeding 8 inches (20 cm) in loose thickness. Leighton Consulting, Inc. may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers, and only if the building officials with the appropriate jurisdiction approve. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

C-4.2 Fill Moisture Conditioning

Fill soils shall be watered, dried back, blended, and/or mixed, as necessary to attain a relatively uniform moisture content at or slightly over optimum. Maximum density and optimum soil moisture content tests shall be performed in accordance with the American Society of Testing and Materials (ASTM) Test Method D 1557.

C-4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density as determined by ASTM Test Method D 1557. For fills thicker than 15 feet (4.5 m), the portion of the fill deeper than 15 feet below proposed finish grade shall be compacted to 95 percent of the ASTM D 1557 laboratory maximum density. Compaction equipment shall be adequately sized and be either specifically designed for soil compaction or of proven reliability to efficiently achieve the specified level of compaction with uniformity.

C-4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet (1 to 1.2 m) in fill elevation, or by other methods producing satisfactory results acceptable to Leighton Consulting, Inc.. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of the ASTM D 1557 laboratory maximum density.

C-4.5 Compaction Testing

Field-tests for moisture content and relative compaction of the fill soils shall be performed by Leighton Consulting, Inc.. Location and frequency of tests shall be at our field representative(s) discretion based on field conditions encountered. Compaction test locations will not necessarily be selected on a random basis. Test locations shall be selected to verify adequacy of compaction levels in areas that are judged to be prone to inadequate compaction (such as close to slope faces and at the fill/bedrock benches).

C-4.6 Compaction Test Locations

Leighton Consulting, Inc. shall document the approximate elevation and horizontal coordinates of each density test location. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so that Leighton Consulting, Inc. can determine the test locations with sufficient accuracy. Adequate grade stakes shall be provided.

C-5.0 EXCAVATION

Excavations, as well as over-excavation for remedial purposes, shall be evaluated by Leighton Consulting, Inc. during grading. Remedial removal depths shown on geotechnical plans are estimates only. The actual extent of removal shall be determined by Leighton Consulting, Inc. based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by Leighton Consulting, Inc. prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by Leighton Consulting, Inc..

C-6.0 TRENCH BACKFILLS

C-6.1 Safety

The Contractor shall follow all OSHA and Cal/OSHA requirements for safety of trench excavations. Work should be performed in accordance with Article 6 of the *California Construction Safety Orders*, 2003 Edition or more current (see also: http://www.dir.ca.gov/title8/sb4a6.html).

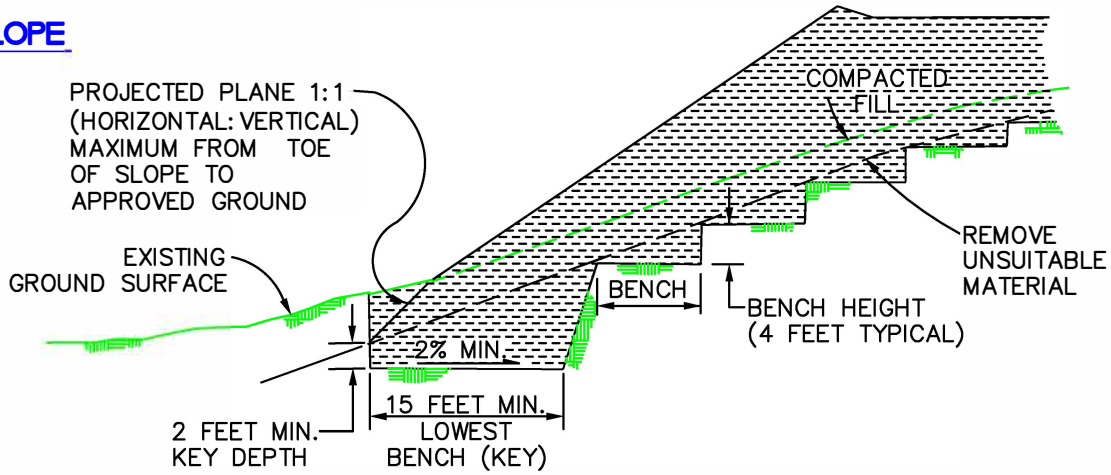
C-6.2 Bedding and Backfill

All utility trench bedding and backfill shall be performed in accordance with applicable provisions of the 2009 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Bedding material shall have a Sand Equivalent greater than 30 (SE>30). Bedding shall be placed to 1-foot (0.3 m) over the top of the conduit, and densified by jetting in areas of granular soils, if allowed by the permitting agency. Otherwise the pipe bedding zone should be backfilled with Controlled Low Strength Material (CLSM) consisting of at least one sack of Portland cement per cubic-yard of sand, and conforming to Section 201-6 of the 2009 Edition of the *Standard Specifications for Public Works Construction* (Green Book). Backfill over the bedding zone shall be placed and densified mechanically to a minimum of 90 percent of relative compaction (ASTM D 1557) from 1 foot (0.3 m) above the top of the conduit to the surface. Backfill above the pipe zone shall **not** be jetted. Jetting of the bedding around the conduits shall be observed by Leighton Consulting, Inc. and backfill above the pipe zone (bedding) shall be observed and tested by Leighton Consulting, Inc..

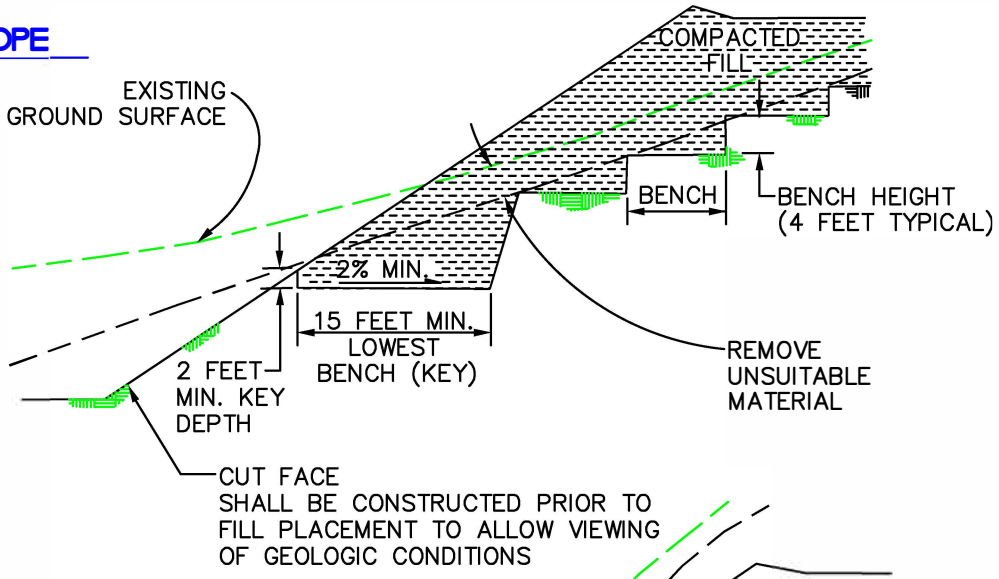
C-6.3 Lift Thickness

Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to Leighton Consulting, Inc. that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method, and only if the building officials with the appropriate jurisdiction approve.

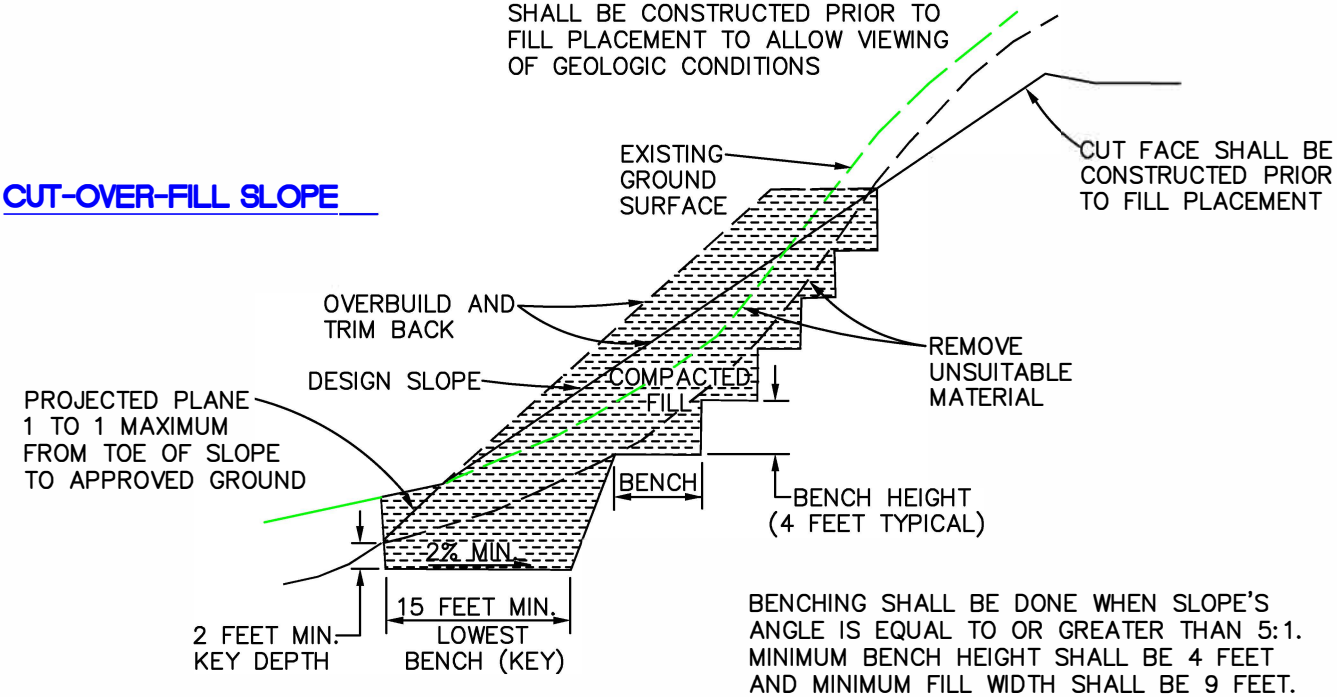
FILL SLOPE



FILL-OVER-CUT SLOPE

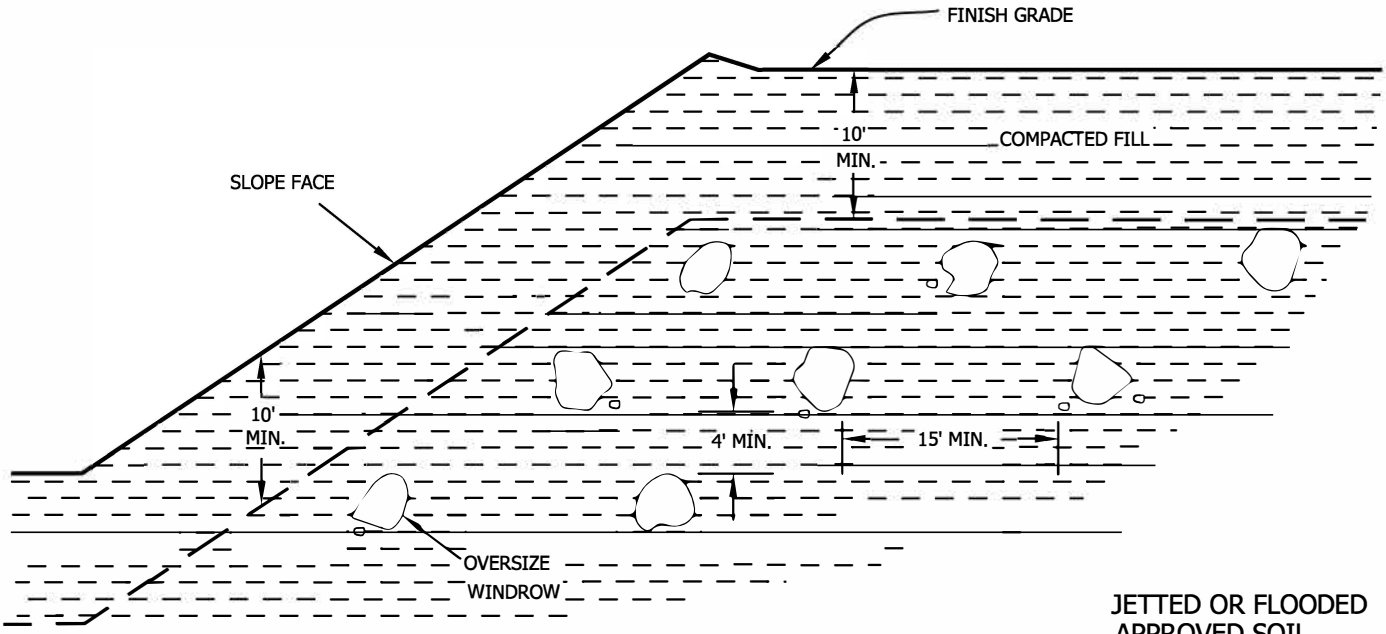


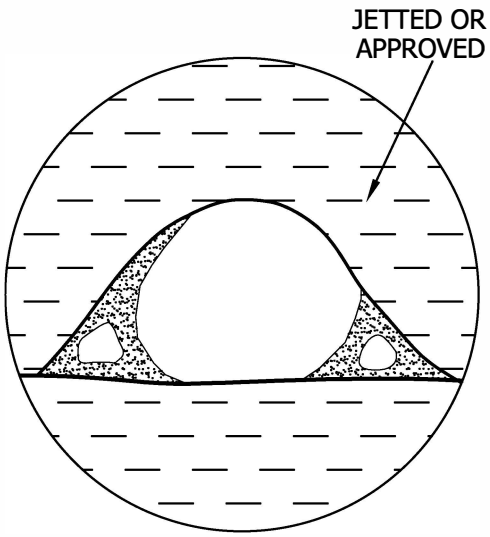
CUT-OVER-FILL SLOPE



BENCHING SHALL BE DONE WHEN SLOPE'S ANGLE IS EQUAL TO OR GREATER THAN 5:1. MINIMUM BENCH HEIGHT SHALL BE 4 FEET AND MINIMUM FILL WIDTH SHALL BE 9 FEET.

KEYING AND BENCHING	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS A	Leighton

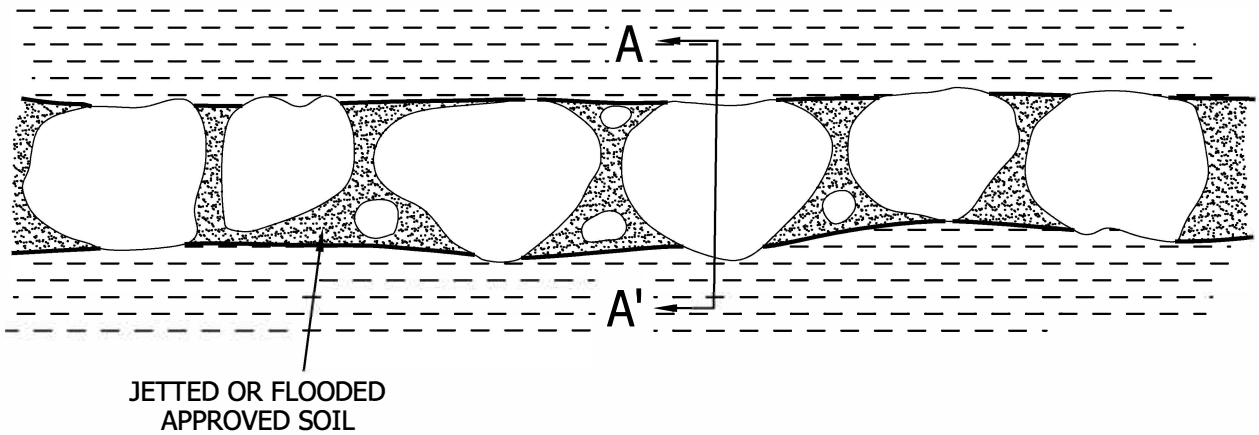




SECTION A-A'

- Oversize rock is larger than 8 inches in largest dimension.
- Backfill with approved soil jetted or flooded in place to fill all the voids.
- Do not bury rock within 10 feet of finish grade.
- Windrow of buried rock shall be parallel to the finished slope face.

PROFILE ALONG WINDROW



OVERSIZE ROCK DISPOSAL

GENERAL EARTHWORK AND GRADING SPECIFICATIONS
STANDARD DETAILS B

Leighton

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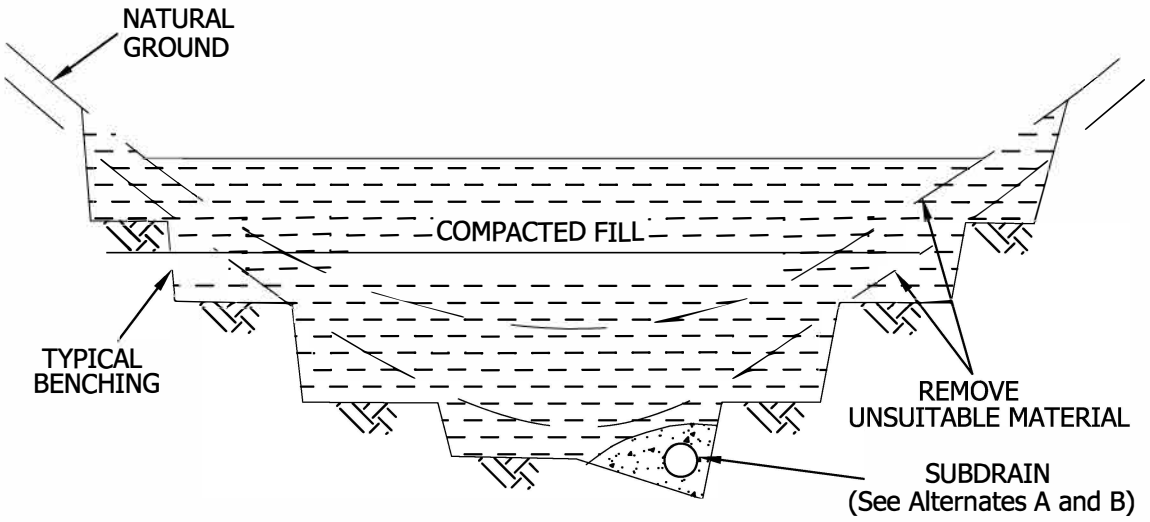
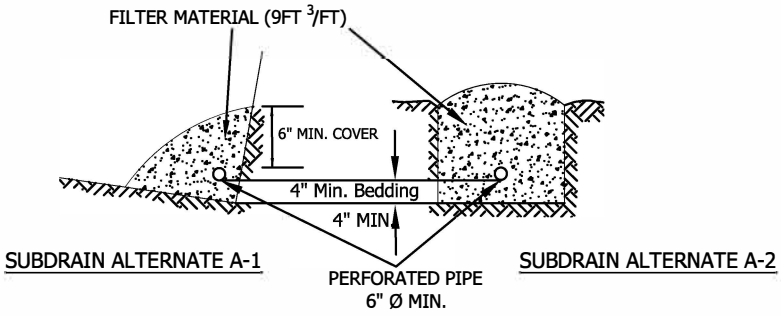


SUBDRAIN ALTERNATE A

PERFORATED PIPE SURROUNDED WITH FILTER MATERIAL

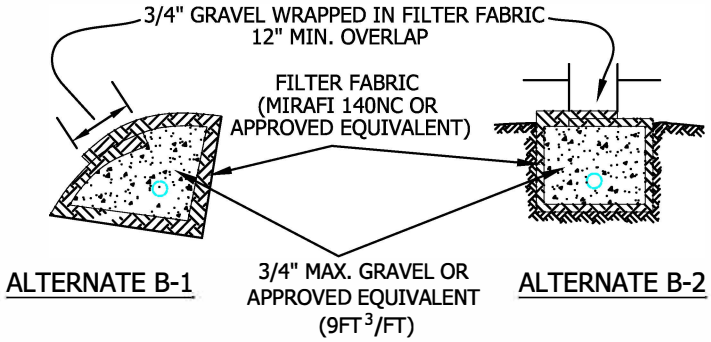


FILTER MATERIAL

FILTER MATERIAL SHALL BE CLASS 2 PERMEABLE MATERIAL PER STATE OF CALIFORNIA STANDARD SPECIFICATION, OR APPROVED ALTERNATE. CLASS 2 GRADING AS FOLLOWS:

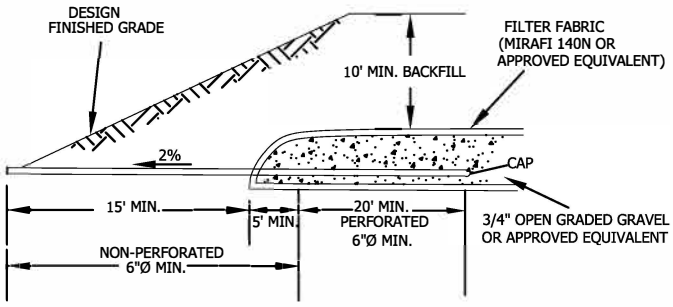
Sieve Size	Percent Passing
1"	100
3/4"	90-100
3/8"	40-100
No. 4	25-40
No. 8	18-33
No. 30	5-15
No. 50	0-7
No. 200	0-3

SUBDRAIN ALTERNATE B



○ PERFORATED PIPE IS OPTIONAL PER GOVERNING AGENCY'S REQUIREMENTS

DETAIL OF CANYON SUBDRAIN TERMINAL



CANYON SUBDRAIN

GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS C

Leighton

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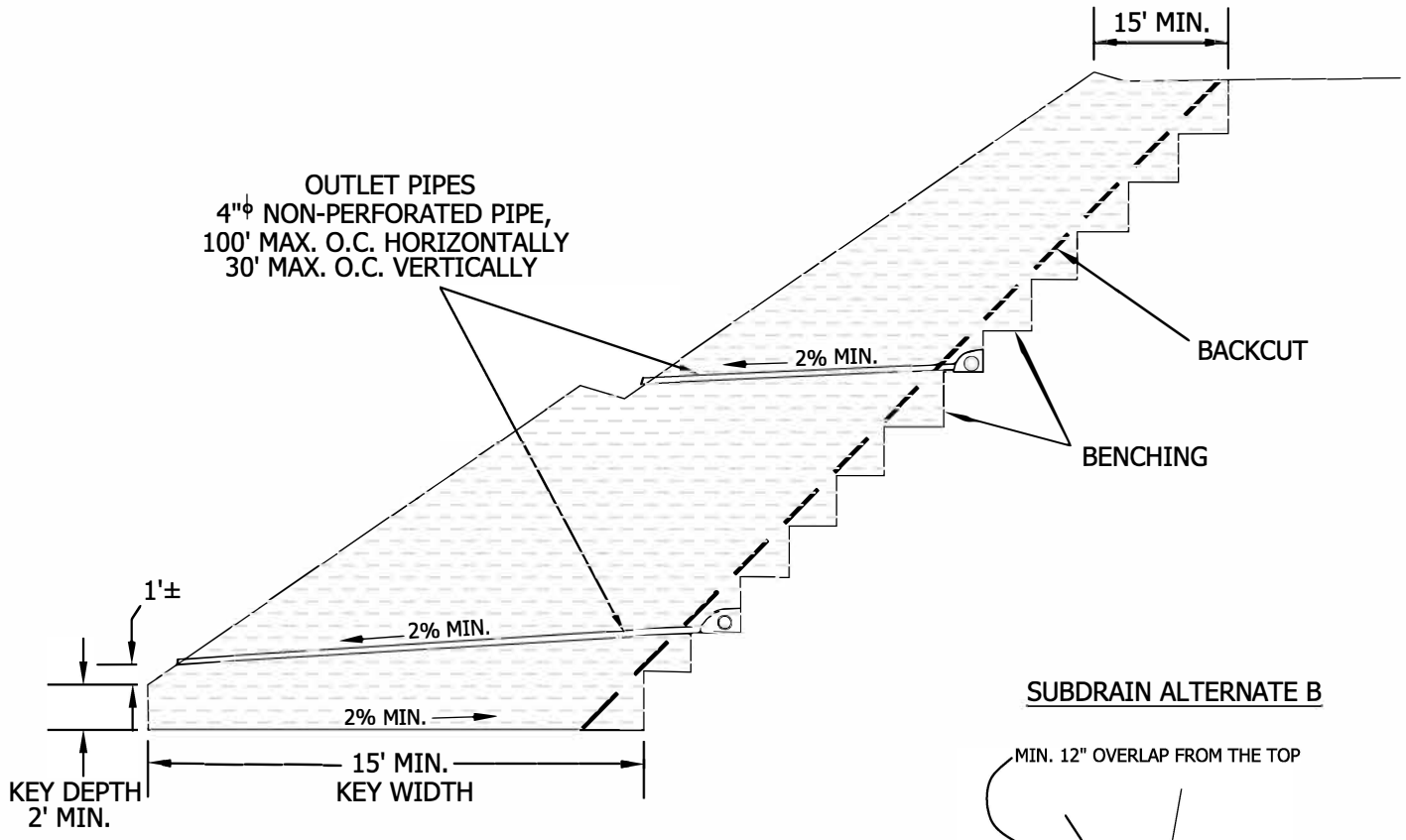
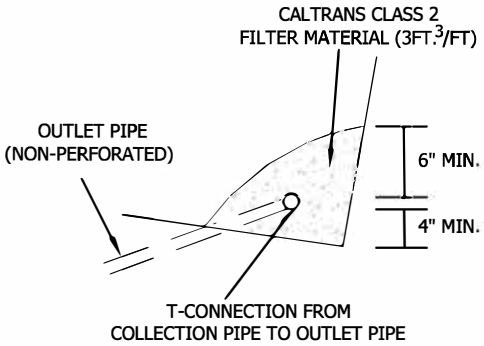
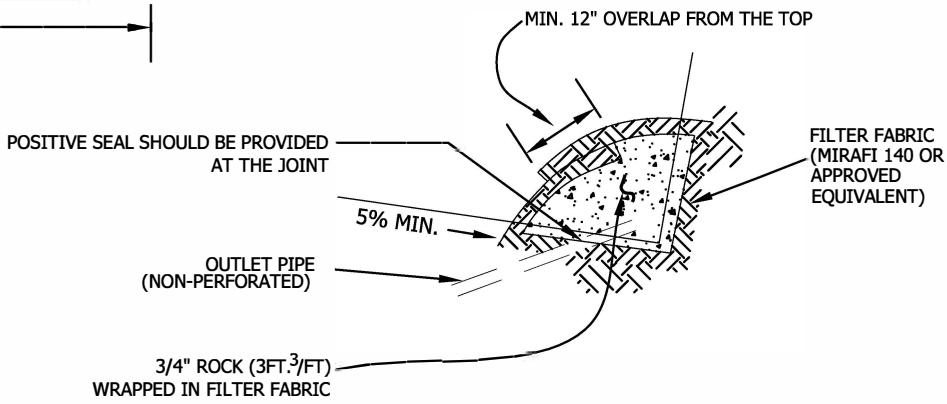


SUBDRAIN ALTERNATE A



SUBDRAIN ALTERNATE B



- SUBDRAIN INSTALLATION - Subdrain collector pipe shall be installed with perforations down or, unless otherwise designated by the geotechnical consultant. Outlet pipes shall be non-perforated pipe. The subdrain pipe shall have at least 8 perforations uniformly spaced per foot. Perforation shall be 1/4" to 1/2" if drilled holes are used. All subdrain pipes shall have a gradient at least 2% towards the outlet.
- SUBDRAIN PIPE - Subdrain pipe shall be ASTM D2751, ASTM D1527 (Schedule 40) or SDR 23.5 ABS pipe or ASTM D3034 (Schedule 40) or SDR 23.5 PVC pipe.
- All outlet pipe shall be placed in a trench and, after fill is placed above it, rodded to verify integrity.

BUTTRESS OR REPLACEMENT FILL SUBDRAINS	GENERAL EARTHWORK AND GRADING SPECIFICATIONS STANDARD DETAILS D	Leighton

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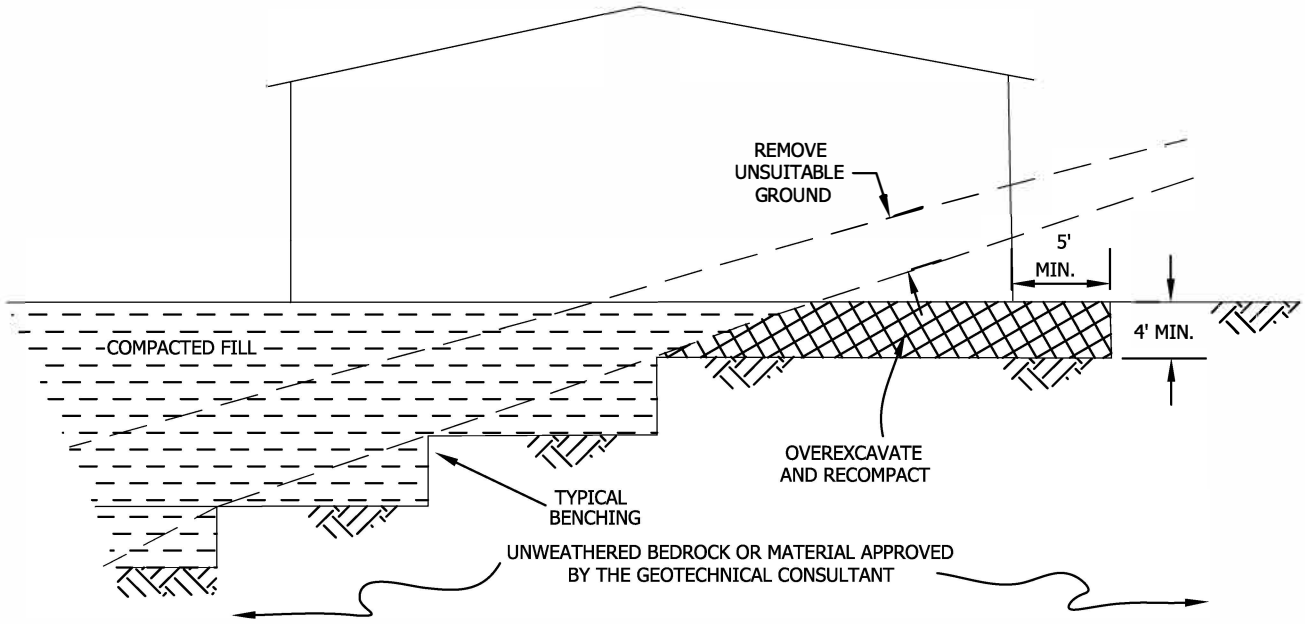
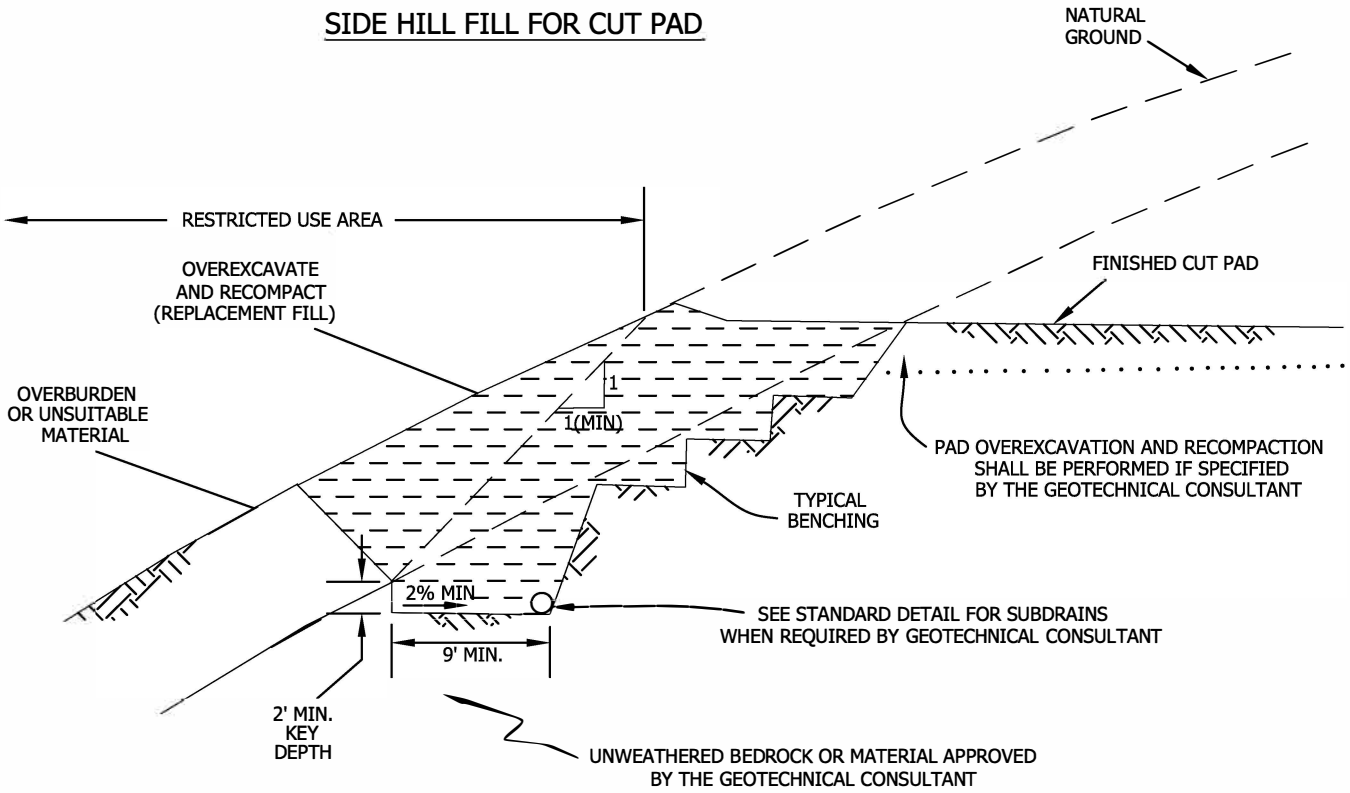
CUT-FILL TRANSITION LOT OVEREXCAVATION



SIDE HILL FILL FOR CUT PAD



TRANSITION LOT FILLS AND SIDE HILL FILLS

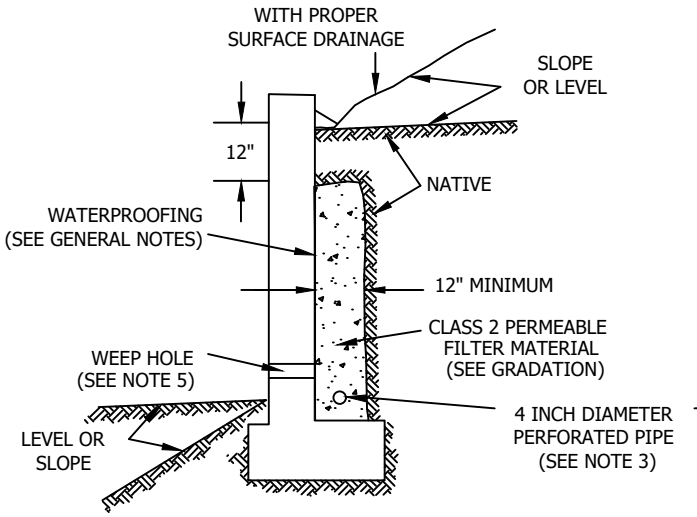
GENERAL EARTHWORK AND GRADING SPECIFICATIONS
STANDARD DETAILS E

Leighton

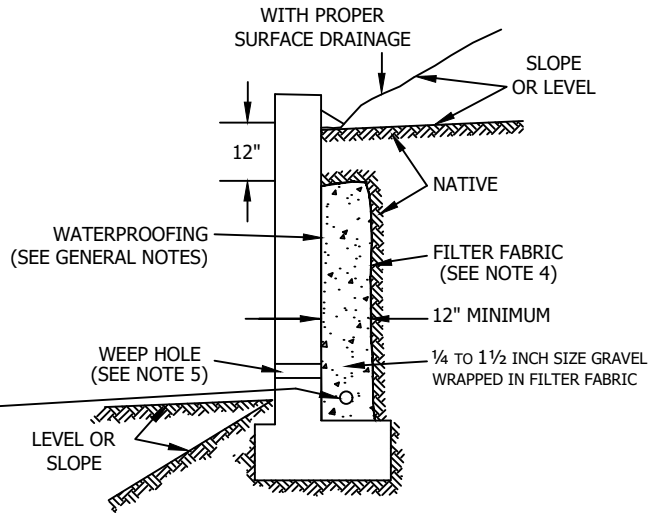
P:\Drawing\templates\details\transition_fills.dwg (7/00)

SUBDRAIN OPTIONS AND BACKFILL WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

OPTION 1: PIPE SURROUNDED WITH CLASS 2 PERMEABLE MATERIAL



OPTION 2: GRAVEL WRAPPED IN FILTER FABRIC



Class 2 Filter Permeable Material Gradation
Per Caltrans Specifications

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

GENERAL NOTES:

* Waterproofing should be provided where moisture nuisance problem through the wall is undesirable.
* Water proofing of the walls is not under purview of the geotechnical engineer
* All drains should have a gradient of 1 percent minimum
*Outlet portion of the subdrain should have a 4-inch diameter solid pipe discharged into a suitable disposal area designed by the project engineer. The subdrain pipe should be accessible for maintenance (rodding)
*Other subdrain backfill options are subject to the review by the geotechnical engineer and modification of design parameters.

Notes:
1) Sand should have a sand equivalent of 30 or greater and may be densified by water jetting.
2) 1 Cu. ft. per ft. of 1/4- to 1 1/2-inch size gravel wrapped in filter fabric
3) Pipe type should be ASTM D1527 Acrylonitrile Butadiene Styrene (ABS) SDR35 or ASTM D1785 Polyvinyl Chloride plastic (PVC), Schedule 40, Armco A2000 PVC, or approved equivalent. Pipe should be installed with perforations down. Perforations should be 3/8 inch in diameter placed at the ends of a 120-degree arc in two rows at 3-inch on center (staggered)
4) Filter fabric should be Mirafi 140NC or approved equivalent.
5) Weephole should be 3-inch minimum diameter and provided at 10-foot maximum intervals. If exposure is permitted, weepholes should be located 12 inches above finished grade. If exposure is not permitted such as for a wall adjacent to a sidewalk/curb, a pipe under the sidewalk to be discharged through the curb face or equivalent should be provided. For a basement-type wall, a proper subdrain outlet system should be provided.
6) Retaining wall plans should be reviewed and approved by the geotechnical engineer.
7) Walls over six feet in height are subject to a special review by the geotechnical engineer and modifications to the above requirements.

RETAINING WALL BACKFILL AND SUBDRAIN DETAIL FOR WALLS 6 FEET OR LESS IN HEIGHT

WHEN NATIVE MATERIAL HAS EXPANSION INDEX OF ≤50

Leighton

V:\DRAFTING\TEMPLATES\STANDARD-FIGURES\WALL-STANDARD-FIGURES.DWG (09-02-21 9:07:35AM) Plotted by bbain

APPENDIX D

GBA - IMPORTANT INFORMATION ABOUT THIS GEOTECHNICAL-ENGINEERING REPORT

Important Information about This

Geotechnical-Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

While you cannot eliminate all such risks, you can manage them. The following information is provided to help.

The Geoprofessional Business Association (GBA) has prepared this advisory to help you – assumedly a client representative – interpret and apply this geotechnical-engineering report as effectively as possible. In that way, you can benefit from a lowered exposure to problems associated with subsurface conditions at project sites and development of them that, for decades, have been a principal cause of construction delays, cost overruns, claims, and disputes. If you have questions or want more information about any of the issues discussed herein, contact your GBA-member geotechnical engineer. Active engagement in GBA exposes geotechnical engineers to a wide array of risk-confrontation techniques that can be of genuine benefit for everyone involved with a construction project.

Understand the Geotechnical-Engineering Services Provided for this Report

Geotechnical-engineering services typically include the planning, collection, interpretation, and analysis of exploratory data from widely spaced borings and/or test pits. Field data are combined with results from laboratory tests of soil and rock samples obtained from field exploration (if applicable), observations made during site reconnaissance, and historical information to form one or more models of the expected subsurface conditions beneath the site. Local geology and alterations of the site surface and subsurface by previous and proposed construction are also important considerations. Geotechnical engineers apply their engineering training, experience, and judgment to adapt the requirements of the prospective project to the subsurface model(s). Estimates are made of the subsurface conditions that will likely be exposed during construction as well as the expected performance of foundations and other structures being planned and/or affected by construction activities.

The culmination of these geotechnical-engineering services is typically a geotechnical-engineering report providing the data obtained, a discussion of the subsurface model(s), the engineering and geologic engineering assessments and analyses made, and the recommendations developed to satisfy the given requirements of the project. These reports may be titled investigations, explorations, studies, assessments, or evaluations. Regardless of the title used, the geotechnical-engineering report is an engineering interpretation of the subsurface conditions within the context of the project and does not represent a close examination, systematic inquiry, or thorough investigation of all site and subsurface conditions.

Geotechnical-Engineering Services are Performed for Specific Purposes, Persons, and Projects, and At Specific Times

Geotechnical engineers structure their services to meet the specific needs, goals, and risk management preferences of their clients. A geotechnical-engineering study conducted for a given civil engineer will not likely meet the needs of a civil-works constructor or even a different civil engineer. Because each geotechnical-engineering study is unique, each geotechnical-engineering report is unique, prepared *solely* for the client.

Likewise, geotechnical-engineering services are performed for a specific project and purpose. For example, it is unlikely that a geotechnical-engineering study for a refrigerated warehouse will be the same as one prepared for a parking garage; and a few borings drilled during a preliminary study to evaluate site feasibility will not be adequate to develop geotechnical design recommendations for the project.

Do not rely on this report if your geotechnical engineer prepared it:

- for a different client;
- for a different project or purpose;
- for a different site (that may or may not include all or a portion of the original site); or
- before important events occurred at the site or adjacent to it; e.g., man-made events like construction or environmental remediation, or natural events like floods, droughts, earthquakes, or groundwater fluctuations.

Note, too, the reliability of a geotechnical-engineering report can be affected by the passage of time, because of factors like changed subsurface conditions; new or modified codes, standards, or regulations; or new techniques or tools. *If you are the least bit uncertain* about the continued reliability of this report, contact your geotechnical engineer before applying the recommendations in it. A minor amount of additional testing or analysis after the passage of time – if any is required at all – could prevent major problems.

Read this Report in Full

Costly problems have occurred because those relying on a geotechnical-engineering report did not read the report in its entirety. Do not rely on an executive summary. Do not read selective elements only. *Read and refer to the report in full.*

You Need to Inform Your Geotechnical Engineer About Change

Your geotechnical engineer considered unique, project-specific factors when developing the scope of study behind this report and developing the confirmation-dependent recommendations the report conveys. Typical changes that could erode the reliability of this report include those that affect:

- the site's size or shape;
- the elevation, configuration, location, orientation, function or weight of the proposed structure and the desired performance criteria;
- the composition of the design team; or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project or site changes – even minor ones – and request an assessment of their impact. *The geotechnical engineer who prepared this report cannot accept*

responsibility or liability for problems that arise because the geotechnical engineer was not informed about developments the engineer otherwise would have considered.

Most of the "Findings" Related in This Report Are Professional Opinions

Before construction begins, geotechnical engineers explore a site's subsurface using various sampling and testing procedures. *Geotechnical engineers can observe actual subsurface conditions only at those specific locations where sampling and testing is performed.* The data derived from that sampling and testing were reviewed by your geotechnical engineer, who then applied professional judgement to form opinions about subsurface conditions throughout the site. Actual sitewide-subsurface conditions may differ – maybe significantly – from those indicated in this report. Confront that risk by retaining your geotechnical engineer to serve on the design team through project completion to obtain informed guidance quickly, whenever needed.

This Report's Recommendations Are Confirmation-Dependent

The recommendations included in this report – including any options or alternatives – are confirmation-dependent. In other words, they are not final, because the geotechnical engineer who developed them relied heavily on judgement and opinion to do so. Your geotechnical engineer can finalize the recommendations *only after observing actual subsurface conditions* exposed during construction. If through observation your geotechnical engineer confirms that the conditions assumed to exist actually do exist, the recommendations can be relied upon, assuming no other changes have occurred. *The geotechnical engineer who prepared this report cannot assume responsibility or liability for confirmation-dependent recommendations if you fail to retain that engineer to perform construction observation.*

This Report Could Be Misinterpreted

Other design professionals' misinterpretation of geotechnical-engineering reports has resulted in costly problems. Confront that risk by having your geotechnical engineer serve as a continuing member of the design team, to:

- confer with other design-team members;
- help develop specifications;
- review pertinent elements of other design professionals' plans and specifications; and
- be available whenever geotechnical-engineering guidance is needed.

You should also confront the risk of constructors misinterpreting this report. Do so by retaining your geotechnical engineer to participate in prebid and preconstruction conferences and to perform construction-phase observations.

Give Constructors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can shift unanticipated-subsurface-conditions liability to constructors by limiting the information they provide for bid preparation. To help prevent the costly, contentious problems this practice has caused, include the complete geotechnical-engineering report, along with any attachments or appendices, with your contract documents, *but be certain to note conspicuously that you've included the material for information purposes only.* To avoid misunderstanding, you may also want to note that "informational purposes" means constructors have no right to rely on the interpretations, opinions, conclusions, or recommendations in the report. Be certain that constructors know they may learn about specific project requirements, including options selected from the report, *only* from the design drawings and specifications. Remind constructors that they may perform their own studies if they want to, and *be sure to allow enough time* to permit them to do so. Only then might you be in a position to give constructors the information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions. Conducting prebid and preconstruction conferences can also be valuable in this respect.

Read Responsibility Provisions Closely

Some client representatives, design professionals, and constructors do not realize that geotechnical engineering is far less exact than other engineering disciplines. This happens in part because soil and rock on project sites are typically heterogeneous and not manufactured materials with well-defined engineering properties like steel and concrete. That lack of understanding has nurtured unrealistic expectations that have resulted in disappointments, delays, cost overruns, claims, and disputes. To confront that risk, geotechnical engineers commonly include explanatory provisions in their reports. Sometimes labeled "limitations," many of these provisions indicate where geotechnical engineers' responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The personnel, equipment, and techniques used to perform an environmental study – e.g., a "phase-one" or "phase-two" environmental site assessment – differ significantly from those used to perform a geotechnical-engineering study. For that reason, a geotechnical-engineering report does not usually provide environmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated subsurface environmental problems have led to project failures.* If you have not obtained your own environmental information about the project site, ask your geotechnical consultant for a recommendation on how to find environmental risk-management guidance.

Obtain Professional Assistance to Deal with Moisture Infiltration and Mold

While your geotechnical engineer may have addressed groundwater, water infiltration, or similar issues in this report, the engineer's services were not designed, conducted, or intended to prevent migration of moisture – including water vapor – from the soil through building slabs and walls and into the building interior, where it can cause mold growth and material-performance deficiencies. Accordingly, ***proper implementation of the geotechnical engineer's recommendations will not of itself be sufficient to prevent moisture infiltration. Confront the risk of moisture infiltration*** by including building-envelope or mold specialists on the design team. ***Geotechnical engineers are not building-envelope or mold specialists.***

GEOPROFESSIONAL BUSINESS ASSOCIATION

Telephone: 301/565-2733
e-mail: info@geoprofessional.org www.geoprofessional.org

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DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

160 South Old Springs Road, Ste. 210
Anaheim Hills, California 92808
Phone: 714-685-6860
Fax: 714-685-6801

Meridian West Campus Upper Plateau EIR April 19, 2023

Response to Comments

Comment
R-Now Letter dated Feb 26, 2023

Response
The proposed project will meet State of California and MJPA construction and post construction requirements for water quality standards.

For the project construction water quality requirements the proposed project will meet the requirements outlined in the California Stormwater Construction General Permit. The construction requirements will include wind erosion control, sediment control and non-visible pollutant control through Best Management Practices (BMPs) as outlined the project Stormwater Pollution Prevention Plan (SWPPP). The development will also obtain a Notice of Intent through the California State Water Resources Control Board for state inspection and inspection by a contracted Qualified SWPPP Practitioner (QSP). See attached draft of the SWPPP.

Construction BMPs such as open air desilting basins are not designed to detain stormwater runoff as they are used prior to the development of tributary impervious surface. These designs are used to reduce sediment runoff prior to development of the property. Desilting basins in undeveloped parcels of land will be installed in accordance with the California Stormwater Quality Association (CASQA) recommendations.

For the post construction water quality requirements the proposed project will meet the requirements outlined in the Riverside County Water Quality Management Plan (WQMP). The WQMP will be revied by the MJPA and will outline the methods that the project will meet the required design requirements for stormwater quality mitigation. The exact methods of stormwater quality mitigation will be determined on a by development basis which will be based on bio-filtration devices/BMPs. See Preliminary Master WQMP in the environmental impact report.

Post construction BMPs such as detention basins on the project will be designed to either be below ground facilities or above ground facilities will effectively drain within 24 Hours after the completion of the storm event.

The proposed water quality BMPs for the project will be based on bio-filtration systems and not infiltration based designs. The project does not propose stormwater systems that could introduce potential pollutants associated with development into the groundwater system.

DRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning

160 South Old Springs Road, Ste. 210
Anaheim Hills, California 92808
Phone: 714-685-6860
Fax: 714-685-6801

Meridian West Campus Upper Plateau EIR April 19, 2023

Response to Comments

Comment
R-Now Letter dated Feb 26, 2023

Response
The proposed project does not fall within a FEMA designated flood hazard zone. The project is designed as Zone D. See attached FEMA panels. Investigation of the existing condition of the proposed development does not show that there is currently a 100 Year flood hazard concern.

Industry practice in the County of Riverside and within the MJPA is to detain stormwater runoff so that the proposed development does not increase the peak discharge rate from the undeveloped condition for the design storm events (100 Year – 24 Hour and 2 Year – 24 Hour design storm events).

The proposed developments will utilize stormwater storage solutions and outlet controls to detain runoff in the design storm events down to the undeveloped peak flow rates. Examples of stormwater storage solutions include but are not limited to underground pipes, underground vaults, shallow surface ponding. Each sub-development within the larger development will be required to mitigate runoff as each property develops.

Prior to development (creation of impervious surfaces) the undeveloped portions of the project will utilize desilting basins as outlined by the California Stormwater Quality Association (CASQA) guidelines for desilting basins. Attached for reference. The desilting basin is not a runoff reduction device and is for erosion/sediment control for undeveloped projects.

As stormwater discharges from the overall project (typically at the boundaries of the project as shown in the provided hydrology study) the development will reduce peak discharge velocities to a non-erosive velocity as it crosses the project property line at existing drainage points.

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations** (BFEs) and/or **floodways** have been determined, users are encouraged to consult the Flood Profiles and Floodway Data and/or Summary of Stillwater Elevations tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0' North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations tables in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations tables should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Universal Transverse Mercator (UTM) zone 11. The **horizontal datum** was NAD 83, GRS80 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at http://www.ngs.noaa.gov or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/NGS12
National Geodetic Survey
SSMC-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

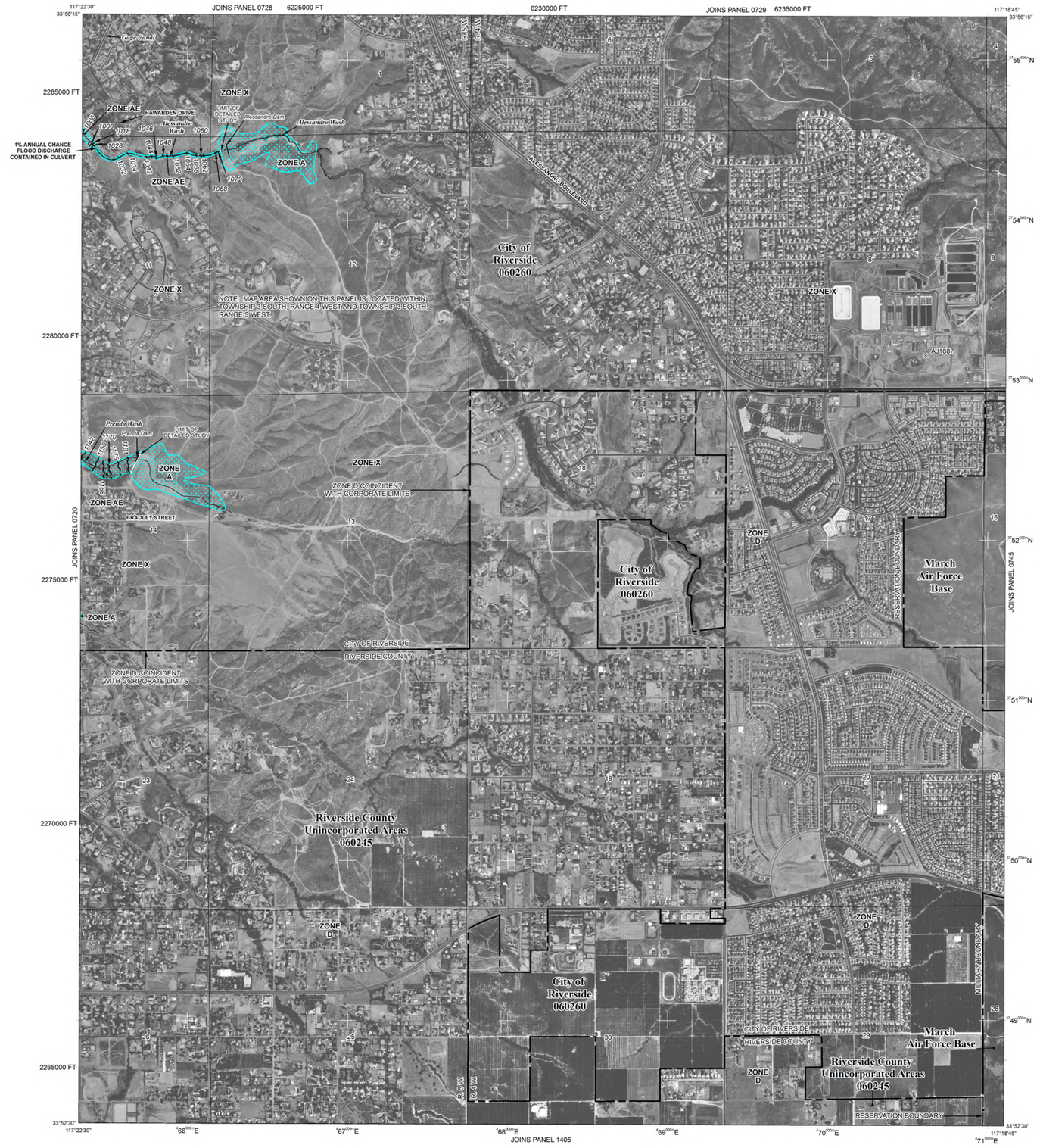
This map may reflect more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

	1% annual chance floodplain boundary
	0.2% annual chance floodplain boundary
	Floodway boundary
	Zone D boundary
	CBRS and OPA boundary
	Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.
513	Base Flood Elevation line and value; elevation in feet*
(EL 987)	Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A	Cross section line
23 — — — 23	Transect line
87°07'45", 32°22'30"	Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere
3976000mN	1000-meter Universal Transverse Mercator grid values, zone 11N
600000 FT	5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection
DX5510 ×	Bench mark (see explanation in Notes to Users section of this FIRM panel)
● M1.5	River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'
500 0 1000 2000 FEET
300 0 300 600 METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0740G

FIRM

FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 740 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
RIVERSIDE COUNTY	060245	0740	G
RIVERSIDE, CITY OF	060260	0740	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C0740G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency

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To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at **(301) 713-3242**, or visit its website at http://www.ngs.noaa.gov.

Base map information shown on this FIRM was derived from U.S. Geological Survey Digital Orthophoto Quadrangles produced at a scale of 1:12,000 from photography dated 1994 or later.

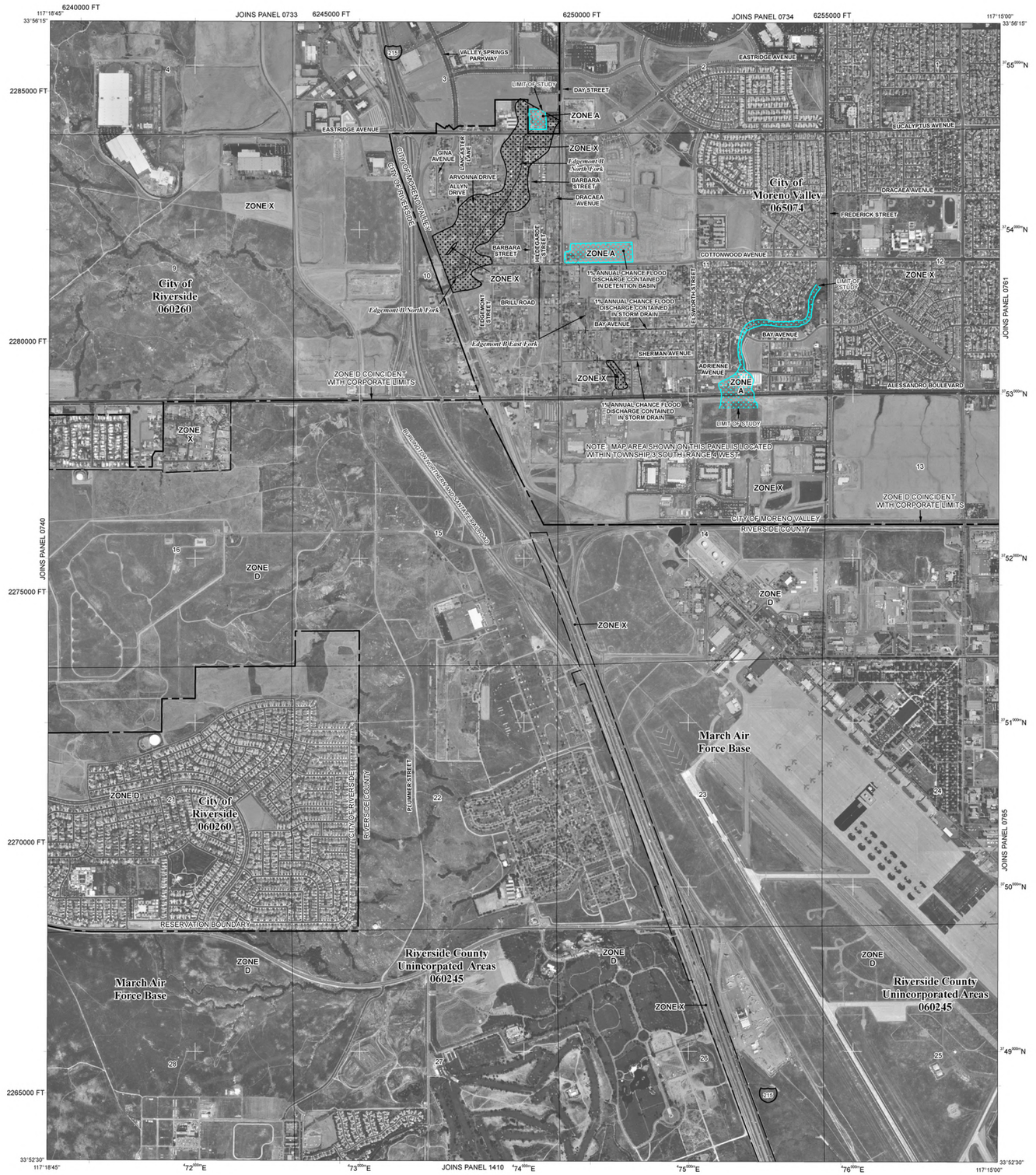
This map may reflect more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a Flood Insurance Study report, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at http://msc.fema.gov.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call **1-877-FEMA MAP** (1-877-336-2627) or visit the FEMA website at http://www.fema.gov.



LEGEND

SPECIAL FLOOD HAZARD AREAS SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD

The 1% annual flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

ZONE A	No Base Flood Elevations determined.
ZONE AE	Base Flood Elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE AR	Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
ZONE A99	Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
ZONE V	Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
ZONE VE	Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

ZONE X	Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

OTHER AREAS

ZONE X	Areas determined to be outside the 0.2% annual chance floodplain.
ZONE D	Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

1% annual chance floodplain boundary

0.2% annual chance floodplain boundary

Floodway boundary

Zone D boundary

CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities.

513 — Base Flood Elevation line and value; elevation in feet*

(EL 987) — Base Flood Elevation value where uniform within zone; elevation in feet*

* Referenced to the North American Vertical Datum of 1988

A — A — Cross section line

23 — 23 — Transect line

87°07'45", 32°22'30" — Geographic coordinates referenced to the North American Datum of 1983 (NAD 83), Western Hemisphere

3776000mN — 1000-meter Universal Transverse Mercator grid values, zone 11N

600000 FT — 5000-foot grid ticks: California State Plane coordinate system, zone VI (FIPSZONE 0406), Lambert Conformal Conic projection

DX5510 × — Bench mark (see explanation in Notes to Users section of this FIRM panel)

● M1.5 — River Mile

MAP REPOSITORY
Refer to listing of Map Repositories on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
August 28, 2008

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your Insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

300 0 300 600 METERS

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0745G

FIRM

FLOOD INSURANCE RATE MAP

RIVERSIDE COUNTY, CALIFORNIA
AND INCORPORATED AREAS

PANEL 745 OF 3805
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
MORENO VALLEY, CITY OF	065074	0745	G
RIVERSIDE COUNTY	060245	0745	G
RIVERSIDE, CITY OF	060260	0745	G

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
06065C0745G

EFFECTIVE DATE
AUGUST 28, 2008

Federal Emergency Management Agency