Appendix K-2

Project-Specific Water Quality Management Plan

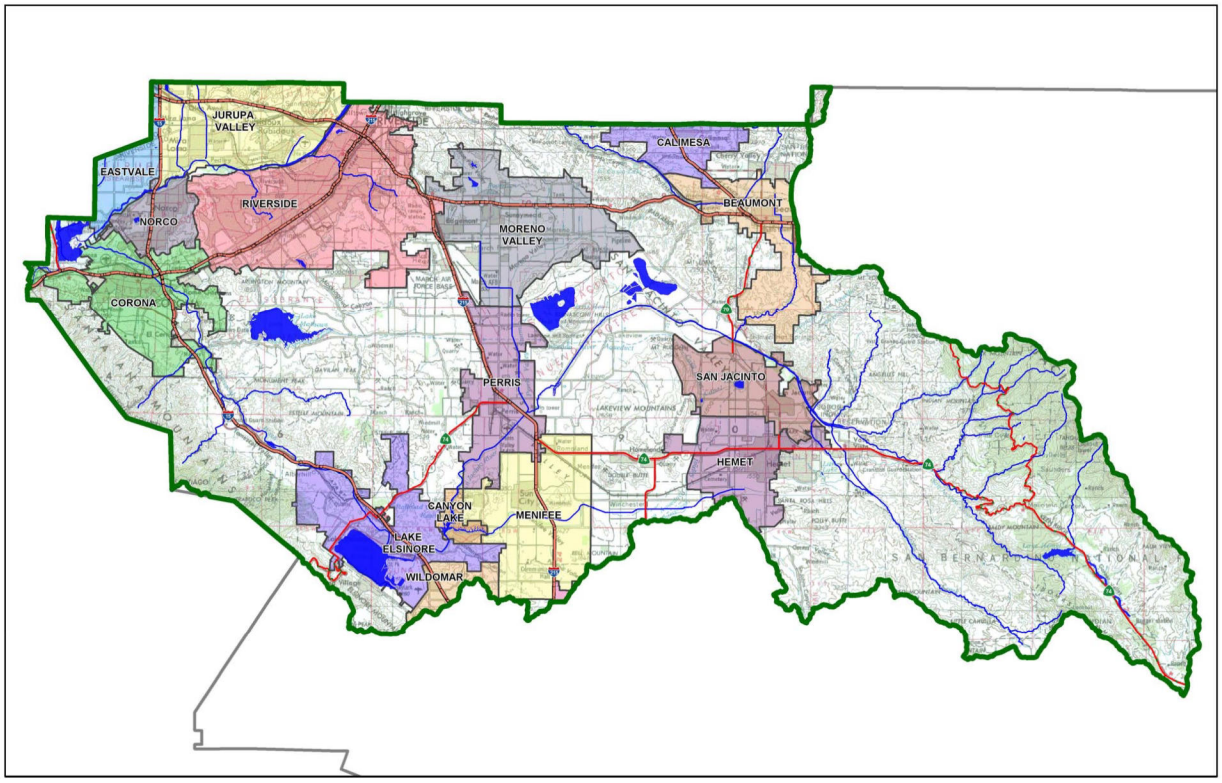
Project Specific Water Quality Management Plan

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

Project Title: D-1 Parcel

Development No:

Design Review/Case No: PP20-06



☒ **Preliminary**
☐ **Final**

Original Date Prepared: October 19, 2020

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

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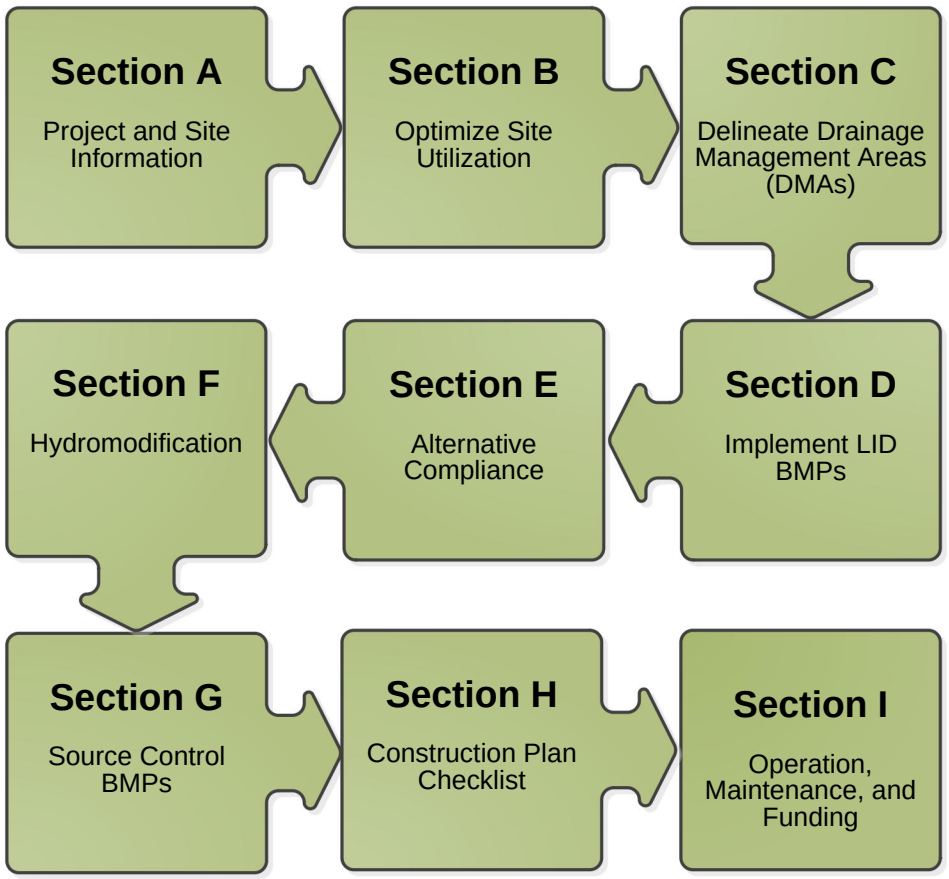
A Brief Introduction

This Project-Specific WQMP Template for the **Santa Ana Region** has been prepared to help guide you in documenting compliance for your project. Because this document has been designed to specifically document compliance, you will need to utilize the WQMP Guidance Document as your "how-to" manual to help guide you through this process. Both the Template and Guidance Document go hand-in-hand, and will help facilitate a well-prepared Project-Specific WQMP. Below is a flowchart for the layout of this Template that will provide the steps required to document compliance.



OWNER'S CERTIFICATION

This Project-Specific Water Quality Management Plan (WQMP) has been prepared for Lewis Retail Centers by DRC Engineering, Inc. for the D-1 Parcel project (PP20-06).

This WQMP is intended to comply with the requirements of March JPA Section 1.8 which includes the requirement for the preparation and implementation of a Project-Specific WQMP.

The undersigned, while owning the property/project described in the preceding paragraph, shall be responsible for the implementation and funding of this WQMP and will ensure that this WQMP is amended as appropriate to reflect up-to-date conditions on the site. In addition, the property owner accepts responsibility for interim operation and maintenance of Stormwater BMPs until such time as this responsibility is formally transferred to a subsequent owner. This WQMP will be reviewed with the facility operator, facility supervisors, employees, tenants, maintenance and service contractors, or any other party (or parties) having responsibility for implementing portions of this WQMP. At least one copy of this WQMP will be maintained at the project site or project office in perpetuity. The undersigned is authorized to certify and to approve implementation of this WQMP. The undersigned is aware that implementation of this WQMP is enforceable under March JPA Section 1.8.

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

Owner's Signature	Date
Gary Gosliga	Airport Director
Owner's Printed Name	Owner's Title/Position

PREPARER'S CERTIFICATION

"The selection, sizing and design of stormwater treatment and other stormwater quality and quantity control measures in this plan meet the requirements of Regional Water Quality Control Board Order No. **R8-2010-0033** and any subsequent amendments thereto."

Preparer's Signature	Date
Jeptha Brander	Project Engineer
Preparer's Printed Name	Preparer's Title/Position

Preparer's Licensure:

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Section A: Project and Site Information

The following water quality management report has been prepared for the proposed D-1 parcel development project. The D-1 parcel is approximately 56.1 acres bounded by Heacock Street to the east, an existing industrial warehouse/trucking facility to the south, and March Air Reserve Base to the north and west. The proposed development area will encompass approximately 22.7 acres of the D-1 parcel.

Off-site run-on drains via earthen swales constructed during the site's time as part of March Air Force Base. During transitional development as part of Base Realignment historic on-site drainage was altered to allow development with the site drainage being intercepted by a concrete V-ditch along the South P/L and conveyed to the channel. Subsequent development intercepted the earthen drainage channel and routed the combined flows into an underground dual 36" RCP culvert system which discharges back to historic pattern approximately 750 LF south of the site. The proposed development will extend the underground culverts to the existing taxiway culverts via underground culverts equipped with a duplex lift station system and sump pumps to allow the tributary off-site run-on to by-pass the site. On-site flows will be intercepted and post-development BMPs for Water Quality treatment be installed prior to discharge to the underground culvert system. Off-site runoff will be incorporated into the industrial SWPPP with MARB Airport Operations.

The D-1 Parcel lies on portions of FT007 Operational Unit 1 (Site 7) which has evidence of historical contamination. The entirety of Site 7 will undergo remediation and will be undeveloped in the proposed condition. Discussions with the environmental consultant and Air Base representatives concerning the remediation requirements are ongoing. Existing Air Force remediation and access for Air Force personnel will remain in place.

The project site is to be developed into a 180,800 SF warehouse building. The site will also include aircraft loading gates, paved parking areas, drive aisles, utilities, underground storm drain and associated landscaping areas.

The proposed development site can be broken into 4 distinct drainage areas. The project site is not allowed to have standing water within airport influence.

Drainage Management Area A (DMA A) will be approximately 15.59 acres in size and will drain to an underground detention basin (DET A) consisting of 19 rows of 54” HDPE pipe providing a total storage volume of 71,670 cubic feet. The detained water will outlet to a diversion manhole that will utilize a weir/orifice to control high flows. The design capture volume (DCV) will be pumped into a wet-vault and will discharge to dual proprietary treatment units (BIO-A1 Modular Wetlands System L-8-12-V and BIO-A2 Modular Wetlands System L-8-12-V). The modular wetland units have been sized to draw down the required treatment volume within 48-hours.

Drainage Management Area B (DMA B) will be approximately 4.78 acres in size and will drain to an underground detention basin (DET B) consisting of 4 rows of 54” HDPE pipe providing a total storage volume of 19,598 cubic feet. The detained water will outlet to a diversion manhole that will utilize a weir/orifice to control high flows. The design capture volume (DCV) will be pumped into a wet-vault and will discharge to a proprietary treatment unit (BIO-B Modular Wetlands System L-4-19-V). The modular wetland unit has been sized to draw down the required treatment volume within 48-hours.

Drainage Management Area C (DMA C) will be approximately 2.50 acres in size and will drain to the aforementioned underground detention basin (DET A). DET A and BIO-A1 and A2 has the capacity to treat both DMA A and DMA C.

Drainage Management Area D (DMA D) will be approximately 0.39 acres and is located in Site 7 contaminated soil area. The existing road drains to a concrete v-ditch located within Site 7. Minor road widening improvements are proposed and drainage will follow existing conditions. Future development of Site 7 will be responsible to implement storm water quality when Site 7 is remediated. Therefore, the implementation of LID BMPs to treat DMA D runoff is technically infeasible. DMA D area is omitted from the scope of this report.

All on-site stormwater will discharge to a series of proposed 36" RCP storm drain pipes that run through the site from the northwest property line to an existing dual 36-inch RCP storm drain pipe at the south property line. A Vicinity Map and Downstream Receiving Waters Map as well as the WQMP Post-Construction BMP Plans are included in Appendix 1. The precise grading and storm drain plans are included in Appendix 2.

PROJECT INFORMATION	
Type of Project:	Industrial/Commercial
Planning Area:	March Area Plan
Community Name:	Riverside County (Unincorporated)
Development Name:	N/A
PROJECT LOCATION	
Latitude & Longitude (DMS): 33°52'36.7"N, 117°14'51.8"W	
Project Watershed and Sub-Watershed: Santa Ana River Watershed, Subwatershed: Canyon Lake (Railroad Canyon Reservior)	
APN(s): 294-170-010	
Map Book and Page No.: Riverside County Thomas Guide, Page 746, Grids D-4 & E-4	
PROJECT CHARACTERISTICS	
Proposed or Potential Land Use(s)	Light Industrial/Commercial
Proposed or Potential SIC Code(s)	4212, 4513
Area of Impervious Project Footprint (SF)	803,386 SF (18.44 AC)
Total Area of proposed Impervious Surfaces within the Project Limits (SF)/or Replacement	803,386 SF (18.44 AC)
Does the project consist of offsite road improvements?	☒ Y ☐ N
Does the project propose to construct unpaved roads?	☐ Y ☒ N
Is the project part of a larger common plan of development (phased project)?	☐ Y ☒ N
EXISTING SITE CHARACTERISTICS	
Total area of existing Impervious Surfaces within the project limits (SF)	117,000 SF
Is the project located within any MSHCP Criteria Cell?	☐ Y ☒ N
If so, identify the Cell number:	N/A
Are there any natural hydrologic features on the project site?	☐ Y ☒ N
Is a Geotechnical Report attached?	☐ Y ☒ N
If no Geotech. Report, list the NRCS soils type(s) present on the site (A, B, C and/or D)	B,C
What is the Water Quality Design Storm Depth for the project?	0.63 inches

A.1 Maps and Site Plans

Refer to Appendix 1 for full-size WQMP Site plans and DMA Exhibits

A.2 Identify Receiving Waters

Table A.1 Identification of Receiving Waters

Receiving Waters	EPA Approved 303(d) List Impairments	Designated Beneficial Uses	Proximity to RARE Beneficial Use
Heacock Channel to Perris Valley Storm Drain	None Listed	N/A	N/A
San Jacinto River Reach 3	None Listed	AGR ("I"), GWR ("I"), REC1 ("I"), REC2 ("I"), WARM ("I"), WILD ("I")	N/A
San Jacinto River Reach 2	None Listed	N/A	N/A
Canyon Lake	Nutrients, Pathogens	MUN, AGR, GWR, REC1, REC2, WARM, WILD	N/A
San Jacinto River Reach 1	None Listed	MUN ("I"), AGR ("I"), GWR ("I"), REC1 ("I"), REC2 ("I"), WARM ("I"), WILD ("I")	N/A
Lake Elsinore	Nutrients, Organic Enrichment, PCB's, Sediment Toxicity, Unknown Toxicity	REC1, REC2, WARM, WILD	N/A

A.3 Additional Permits/Approvals required for the Project:

Table A.2 Other Applicable Permits

Agency	Permit Required	
State Department of Fish and Game, 1602 Streambed Alteration Agreement	☐ Y	☒ N
State Water Resources Control Board, Clean Water Act (CWA) Section 401 Water Quality Cert.	☐ Y	☒ N
US Army Corps of Engineers, CWA Section 404 Permit	☐ Y	☒ N
US Fish and Wildlife, Endangered Species Act Section 7 Biological Opinion	☐ Y	☒ N
Statewide Construction General Permit Coverage	☒ Y	☐ N
Statewide Industrial General Permit Coverage (as needed by individual case)	☒ Y	☐ N
Western Riverside MSHCP Consistency Approval (e.g., JPR, DBESP)	☐ Y	☒ N
Other *(please list in the space below as required)* Airport operational area will be added to existing Industrial SWPPP or have new industrial SWPPP prepared.	☒ Y	☐ N

Final determination of additional permits/approvals to be determined in EIR process and agency reviews.

Section B: Optimize Site Utilization (LID Principles)

Review of the information collected in Section 'A' will aid in identifying the principal constraints on site design and selection of LID BMPs as well as opportunities to reduce imperviousness and incorporate LID Principles into the site and landscape design. For example, **constraints** might include impermeable soils, high groundwater, groundwater pollution or contaminated soils, steep slopes, geotechnical instability, high-intensity land use, heavy pedestrian or vehicular traffic, utility locations or safety concerns. **Opportunities** might include existing natural areas, low areas, oddly configured or otherwise unbuildable parcels, easements and landscape amenities including open space and buffers (which can double as locations for bioretention BMPs), and differences in elevation (which can provide hydraulic head). Prepare a brief narrative for each of the site optimization strategies described below. This narrative will help you as you proceed with your LID design and explain your design decisions to others.

The 2010 Santa Ana MS4 Permit further requires that LID Retention BMPs (Infiltration Only or Harvest and Use) be used unless it can be shown that those BMPs are infeasible. As mentioned previously, the site was previously part of March Air Force Base with historic on-site soil contamination and does not allow for infiltration BMPs. Due to the project's location within airport influence and the risk of wildlife interference with airport operations, pervious project areas will not be irrigated; therefore, Harvest and Use BMPs need not be assessed for the project site. The site will utilize native vegetation for pervious areas.

Site Optimization

The following questions are based upon Section 3.2 of the WQMP Guidance Document. Review of the WQMP Guidance Document will help you determine how best to optimize your site and subsequently identify opportunities and/or constraints, and document compliance.

Did you identify and preserve existing drainage patterns? If so, how? If not, why?

The existing site consists of relatively flat, undisturbed land that generally surface flows in the south direction towards an existing dual 36-inch RCP storm drain which conveys flows to the existing Heacock Channel downstream of the project site where it is captured and conveyed to the existing Perris Valley storm drain system. The proposed developed site will detain runoff on-site before releasing the runoff to the existing dual 36-inch RCPs. Offsite run-on from the airfield to the north will be collected in a series of proposed RCP's to be constructed along the west portion of the proposed developed site and conveyed to the existing dual 36-inch RCP.

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

The existing vegetation at the site consists primarily of naturally-occurring grasses, weeds, and low-lying vegetation. Approximately 31.26 acres (11.80 acres of undisturbed area and 19.46 acres of Site 7 remediation area) will remain undisturbed in the final condition. The remaining vegetation will be removed as necessary for the proposed development. Site landscape plans will preserve or mitigate the removal of existing vegetation.

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

No. Geotechnical studies for the adjacent properties and USGS Soil maps suggest the site has very low water transmission through the soil that would not allow for water to infiltrate within a 48-hour drawdown period. The site is also part of former March Air Force Base with historic on-site contamination.

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

Proposed pervious area is shown to the maximum extent practicable while still allowing for another impervious site design requirements (ie. Meeting the minimum amount of parking stalls, fire lane widths, etc.)

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

Proposed facilities are part of expansion of March Inland Port Airport facilities. Building adjacent landscaping for roof drain discharge generally not viable as part of such type improvements.
Planned aircraft taxiways and adjacent paved access to Maintenance building have been designed to shed water to pervious areas for conveyance to drainage structures via pervious swales.

NOTE: This site is immediately adjacent to existing March Air Reserve Base airport facilities. As such Air Force and FAA Bird/Wildlife Aircraft Strike Hazard (BASH) programs preclude installation of above-ground basins and other such above ground water quality features that may increase wildlife and bird presence as a result of water or increased vegetation.

Section C: Delineate Drainage Management Areas (DMAs)

Utilizing the procedure in Section 3.3 of the WQMP Guidance Document which discusses the methods of delineating and mapping your project site into individual DMAs, complete Table C.1 below to appropriately categorize the types of classification (e.g., Type A, Type B, etc.) per DMA for your project site. Upon completion of this table, this information will then be used to populate and tabulate the corresponding tables for their respective DMA classifications.

Table C.1 DMA Classifications

DMA Name or ID	Surface Type(s)[1]	Area (Sq. Ft.)	DMA Type
A1	Roofs	88,500	Type D
A2	Concrete or Asphalt	440,364	Type D
A3	Ornamental Landscaping	150,001	Type D
B1	Roofs	70,393	Type D
B2	Ornamental Landscaping	10,941	Type D
B3	Concrete or Asphalt	118,016	Type D
C1	Roofs	21,926	Type D
C2	Concrete or Asphalt	60,787	Type D
C3	Concrete or Asphalt	2,708	Type D
C4	Concrete or Asphalt	140	Type D
C5	Concrete or Asphalt	119	Type D
C6	Ornamental Landscaping	291	Type D
C7	Ornamental Landscaping	473	Type D
C8	Ornamental Landscaping	5,711	Type D
C9	Ornamental Landscaping	1,784	Type D
C10	Ornamental Landscaping	1,585	Type D
C11	Ornamental Landscaping	4,263	Type D
C12	Concrete or Asphalt	3,055	Type D
C13	Ornamental Landscaping	198	Type D
C14	Ornamental Landscaping	4,029	Type D
C15	Ornamental Landscaping	1,081	Type D
C16	Concrete or Asphalt	433	Type D
D1	Concrete or Asphalt	12,249	N/A*
D2	Concrete or Asphalt	4,709	N/A*

*See Feasibility Assessment Summary Section D.4

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

DMA Name or ID	Area (Sq. Ft.)	Stabilization Type	Irrigation Type (if any)
N/A			

Table C.3 Type 'B', Self-Retaining Areas

Self-Retaining Area	**Type 'C' DMAs that are draining to the Self-Retaining Area**

DMA Name/ ID	Post-project surface type	Area (square feet) [A]	Storm Depth (inches) [B]	DMA Name / ID	[C] from Table C.4 = [C]	Required Retention Depth (inches) [D]
N/A			0.63	N/A	N/A	0.60

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

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

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

DMA Name or ID	BMP Name or ID
A1	Detention System A
A2	Detention System A
A3	Detention System A
B1	Detention System B
B2	Detention System B
B3	Detention System B
C1	Detention System A
C2	Detention System A
C3	Detention System A
C4	Detention System A
C5	Detention System A
C6	Detention System A
C7	Detention System A
C8	Detention System A
C9	Detention System A
C10	Detention System A
C11	Detention System A
C12	Detention System A
C13	Detention System A
C14	Detention System A
C15	Detention System A
C16	Detention System A

Section D: Implement LID BMPs

D.1 Infiltration Applicability

Is there an approved downstream 'Highest and Best Use' for stormwater runoff (see discussion in Chapter 2.4.4 of the WQMP Guidance Document for further details)? ☐ Y ☒ N

If yes has been checked, Infiltration BMPs shall not be used for the site. If no, continue working through this section to implement your LID BMPs. It is recommended that you contact your Co-Permittee to verify whether or not your project discharges to an approved downstream 'Highest and Best Use' feature.

Geotechnical Report

A Geotechnical Report or Phase I Environmental Site Assessment may be required by the Co-permittee to confirm present and past site characteristics that may affect the use of Infiltration BMPs. In addition, the Co-Permittee, at their discretion, may not require a geotechnical report for small projects as described in Chapter 2 of the WQMP Guidance Document. If a geotechnical report has been prepared, include it in Appendix 3. In addition, if a Phase I Environmental Site Assessment has been prepared, include it in Appendix 4.

Is this project classified as a small project consistent with the requirements of Chapter 2 of the WQMP Guidance Document? ☐ Y ☒ N

Infiltration Feasibility

Table D.1 below is meant to provide a simple means of assessing which DMAs on your site support Infiltration BMPs and is discussed in the WQMP Guidance Document in Chapter 2.4.5. Check the appropriate box for each question and then list affected DMAs as applicable. If additional space is needed, add a row below the corresponding answer.

Table D.1 Infiltration Feasibility

Does the project site…	YES	NO
…have any DMAs with a seasonal high groundwater mark shallower than 10 feet?		X
If Yes, list affected DMAs:		
…have any DMAs located within 100 feet of a water supply well?		X
If Yes, list affected DMAs:		
…have any areas identified by the geotechnical report as posing a public safety risk where infiltration of stormwater could have a negative impact?		X
If Yes, list affected DMAs:		
…have measured in-situ infiltration rates of less than 1.6 inches / hour?		X
If Yes, list affected DMAs:		
…have significant cut and/or fill conditions that would preclude in-situ testing of infiltration rates at the final infiltration surface?		X
If Yes, list affected DMAs:		
…geotechnical report identify other site-specific factors that would preclude effective and safe infiltration?	X	
Describe here: As noted previously, project site encompasses historically contaminated site identified as FT007 in Air Force records which has been in-process of remediation and is currently being evaluated for full extents of PFAS contamination are required remediation.		

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

D.2 Harvest and Use Assessment

Please check what applies*:*

- ☐ Downstream water rights may be impacted by Harvest and Use as approved by the Regional Board (verify with the Copermittee). Reclaimed water will be used for the non-potable water demands for the project.
- ☐ Reclaimed water will be used for the non-potable water demands for the project.
- ☐ The Design Capture Volume will be addressed using Infiltration Only BMPs. In such a case, Harvest and Use BMPs are still encouraged, but it would not be required if the Design Capture Volume will be infiltrated or evapotranspired.

If any of the above boxes have been checked, Harvest and Use BMPs need not be assessed for the site. If neither of the above criteria applies, follow the steps below to assess the feasibility of irrigation use, toilet use and other non-potable uses (e.g., industrial use).

Irrigation Use Feasibility

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

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

Total Area of Irrigated Landscape: 4.23 acres

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

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for irrigation use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 18.47 acres

Step 3: Cross reference the Design Storm depth for the project site (see Exhibit A of the WQMP Guidance Document) with the left column of Table 2-3 in Chapter 2 to determine the minimum area of Effective Irrigated Area per Tributary Impervious Area (EIATIA).

Enter your EIATIA factor: 0.95 (via interpolation)

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum irrigated area that would be required.

Minimum required irrigated area: 17.55 acres

Step 5: Determine if harvesting stormwater runoff for irrigation use is feasible for the project by comparing the total area of irrigated landscape (Step 1) to the minimum required irrigated area (Step 4).

Minimum required irrigated area (Step 4)	Available Irrigated Landscape (Step 1)
17.55	4.23

Toilet Use Feasibility

Complete the following steps to determine the feasibility of harvesting stormwater runoff for toilet flushing uses on your site:

Step 1: Identify the projected total number of daily toilet users during the wet season, and account for any periodic shut downs or other lapses in occupancy:

Projected Number of Daily Toilet Users: 100

Project Type: Industrial

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for toilet use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: 18.47 acres

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-1 in Chapter 2 to determine the minimum number or toilet users per tributary impervious acre (TUTIA).

Enter your TUTIA factor: 178.5 (via interpolation)

Step 4: Multiply the unit value obtained from Step 3 by the total of impervious areas from Step 2 to develop the minimum number of toilet users that would be required.

Minimum number of toilet users: 3,297

Step 5: Determine if harvesting stormwater runoff for toilet flushing use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required Toilet Users (Step 4)	Projected number of toilet users (Step 1)
3,297	100

Other Non-Potable Use Feasibility

Are there other non-potable uses for stormwater runoff on the site (e.g. industrial use)? See Chapter 2 of the Guidance for further information. If yes, describe below. If no, write N/A.

N/A. Proposed development will be cargo handling facility.

Step 1: Identify the projected average daily non-potable demand, in gallons per day, during the wet season and accounting for any periodic shut downs or other lapses in occupancy or operation.

Average Daily Demand: N/A

Step 2: Identify the planned total of all impervious areas on the proposed project from which runoff might be feasibly captured and stored for the identified non-potable use. Depending on the configuration of buildings and other impervious areas on the site, you may consider the site as a whole, or parts of the site, to evaluate reasonable scenarios for capturing and storing runoff and directing the stored runoff to the potential use(s) identified in Step 1 above.

Total Area of Impervious Surfaces: N/A

Step 3: Enter the Design Storm depth for the project site (see Exhibit A) into the left column of Table 2-3 in Chapter 2 to determine the minimum demand for non-potable uses per tributary impervious acre.

Enter the factor from Table 2-3: N/A

Step 4: Multiply the unit value obtained from Step 4 by the total of impervious areas from Step 3 to develop the minimum number of gallons per day of non-potable use that would be required.

Minimum required use: N/A

Step 5: Determine if harvesting stormwater runoff for other non-potable use is feasible for the project by comparing the Number of Daily Toilet Users (Step 1) to the minimum required number of toilet users (Step 4).

Minimum required non-potable use (Step 4)	**Projected average daily use (Step 1)**
N/A	N/A

If Irrigation, Toilet and Other Use feasibility anticipated demands are less than the applicable minimum values, Harvest and Use BMPs are not required and you should proceed to utilize LID Bioretention and Biotreatment, unless a site-specific analysis has been completed that demonstrates technical infeasibility as noted in D.3 below.

D.3 Bioretention and Biotreatment Assessment

Other LID Bioretention and Biotreatment BMPs as described in Chapter 2.4.7 of the WQMP Guidance Document are feasible on nearly all development sites with sufficient advance planning.

Select one of the following:

☒ LID Bioretention/Biotreatment BMPs will be used for some or all DMAs of the project as noted below in Section D.4 (note the requirements of Section 3.4.2 in the WQMP Guidance Document).

☐ A site-specific analysis demonstrating the technical infeasibility of all LID BMPs has been performed and is included in Appendix 5. If you plan to submit an analysis demonstrating the technical infeasibility of LID BMPs, request a pre-submittal meeting with the Co-permittee to discuss this option. Proceed to Section E to document your alternative compliance measures.

☐ None of the above.

Ultimate final owner will be responsible for provision and approval for precise grading plans and permit

D.4 Feasibility Assessment Summaries

From the Infiltration, Harvest and Use, Bioretention and Biotreatment Sections above, complete Table D.2 below to summarize which LID BMPs are technically feasible, and which are not, based upon the established hierarchy.

Table D.2 LID Prioritization Summary Matrix

DMA Name/ID	LID BMP Hierarchy				No LID (Alternative Compliance)
	1. Infiltration	2. Harvest and use	3. Bioretention	4. Biotreatment	
A/1	☐	☐	☐	☒	☐
A/2	☐	☐	☐	☒	☐
A/3	☐	☐	☐	☒	☐
B/1	☐	☐	☐	☒	☐
B/2	☐	☐	☐	☒	☐
B/3	☐	☐	☐	☒	☐
C/1	☐	☐	☐	☒	☐
C/2	☐	☐	☐	☒	☐
C/3	☐	☐	☐	☒	☐
C/4	☐	☐	☐	☒	☐
C/5	☐	☐	☐	☒	☐
C/6	☐	☐	☐	☒	☐
C/7	☐	☐	☐	☒	☐
C/8	☐	☐	☐	☒	☐
C/9	☐	☐	☐	☒	☐
C/10	☐	☐	☐	☒	☐
C/11	☐	☐	☐	☒	☐
C/12	☐	☐	☐	☒	☐
C/13	☐	☐	☐	☒	☐
C/14	☐	☐	☐	☒	☐
C/15	☐	☐	☐	☒	☐
C/16	☐	☐	☐	☒	☐
D/1	☐	☐	☐	☐	☒
D/2	☐	☐	☐	☐	☒

The project site will feature a cargo loading/unloading facility consisting of a proposed 180,800 square-foot building, aircraft parking and taxiway apron, auto parking, truck parking, drive aisles and associated landscaping. The soil type for the development area is primarily Type C, which is defined as having poor infiltration rates. The project site lies within airport influence and standing water is therefore discouraged. The proposed development can be defined by 4 Drainage Management Areas (DMA 'A', DMA 'B', DMA 'C', and DMA 'D').

- *DMA 'A' will drain to designated proprietary treatment units BIO-A1 & BIO-A2, both being Modular Wetlands System L-8-12-V.*
- *DMA 'B' will drain to designated proprietary treatment unit BIO-B Modular Wetlands System L-4-17-V.*
- *DMA 'C' will drain to the aforementioned designated proprietary treatment units BIO-A1 and BIO-A2. The modular wetland units have been sized to draw down the required treatment volume within a 48-hours.*
- *DMA D is located in Site 7 contaminated soil area. The existing road drains to a concrete v-ditch located within Site 7. Minor road widening improvements are proposed and drainage will follow existing conditions. Future development of Site 7 will be responsible to implement storm water quality when Site 7 is remediated. Therefore, the implementation of LID BMPs to treat DMA D runoff is technically infeasible. DMA D area is omitted from the scope of this report.*

D.5 LID BMP Sizing

Each LID BMP must be designed to ensure that the Design Capture Volume will be addressed by the selected BMPs. First, calculate the Design Capture Volume for each LID BMP using the V_{BMP} worksheet in Appendix F of the LID BMP Design Handbook. Second, design the LID BMP to meet the required V_{BMP} using a method approved by the Co-permittee. Utilize the worksheets found in the LID BMP Design Handbook or consult with your Co-permittee to assist you in correctly sizing your LID BMPs. Complete Table D.3 below to document the Design Capture Volume and the Proposed Volume for each LID BMP. Provide the completed design procedure sheets for each LID BMP in Appendix 6. You may add additional rows to the table below as needed.

Table D.3 DCV Calculations for LID BMPs

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* *Detention System A*		
	[A]		[B]	[C]	[A] x [C]			
A1	*88,500*	*Roofs*	*1*	*0.89*	*78942*			
A2	*440,364*	*Concrete or Asphalt*	*1*	*0.11*	*392804.7*			
A3	*150,001*	*Ornamental Landscaping*	*0.1*	*0.11*	*16568.8*	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Treated Volume on Plans (cf) (2) MWS-L-8-12-V (48 hr drain down)*
	$A_T = \Sigma[A]$ =678865				Σ= [D] =488315.5	[E] = 0.63	$[F] = \frac{[D]x[E]}{12}$ = 25636.6	[G] =30,400*

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

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

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

*See Detention System A summary below

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* *Detention System B*		
	[A]		[B]	[C]	[A] x [C]			
B1	70,393	Roofs	1	0.89	6279.6			
B2	10,941	Ornamental Landscaping	0.1	0.11	1208.5			
B3	118,016	Concrete or Asphalt	1	0.89	105270.3	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Treated Volume on Plans (cf) MWS-L-4-19-V (48 hr drain down)*
	$A_T = \Sigma[A]$ =199350				Σ= [D] =169269.4	[E] = 0.63	$[F] = \frac{[D]x[E]}{12}$ = 8886.6	[G] =8,890

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

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

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

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Impervious Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Enter BMP Name / Identifier Here* *Detention System A*		
	[A]		[B]	[C]	[A] x [C]			
C1	*21,926*	*Roofs*	*1*	*0.89*	*19558*			
C2	*60,787*	*Concrete or Asphalt*	*1*	*0.89*	*55585*			
C3	*2,708*	*Concrete or Asphalt*	*1*	*0.89*	*2332.6*			
C4	*140*	*Concrete or Asphalt*	*1*	*0.89*	*124.9*			
C5	119	*Concrete or Asphalt*	*1*	*0.89*	*106.1*			
C6	*291*	*Ornamental Landscaping*	*0.1*	*0.11*	*32.1*			
C7	*473*	*Ornamental Landscaping*	*0.1*	*0.11*	*52.2*			
C8	*5,711*	*Ornamental Landscaping*	*0.1*	*0.11*	*592.8*			
C9	*1,784*	*Ornamental Landscaping*	*0.1*	*0.11*	*197.1*			
C10	*1,585*	*Ornamental Landscaping*	*0.1*	*0.11*	*175.1*			
C11	*4,263*	*Ornamental Landscaping*	*0.1*	*0.11*	*704.4*			
C12	*3,055*	*Ornamental Landscaping*	*0.1*	*0.11*	*347.7*			
C13	*198*	*Ornamental Landscaping*	*0.1*	*0.11*	*21.9*			
C14	*4,029*	*Ornamental Landscaping*	*0.1*	*0.11*	*445*			
C15	*1,081*	*Ornamental Landscaping*	*0.1*	*0.11*	*119.4*			
C16	*433*	*Concrete or Asphalt*	*1*	*0.89*	*386.2*			
	A_T = Σ[A] =108,583				Σ= [D] =79,294.6	*Design Storm Depth (in)* [E] = 0.63	*Design Capture Volume,* V_{BMP} *(cubic feet)* $[F] = \frac{[D]x[E]}{12}$ = 4,163	*Proposed Treated Volume on Plans (cf)* *(2) MWS-L-8-12-V (48 hr drain down)* [G] =30,400*

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

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

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

*See Detention System A Summary below

Detention System A Summary

DMA	DCV (cf)
DMA A	25,636.6
DMA C	4,163.0
Total DCV	**29,800**
Detention System A Treatment Volume	**30,400**

Section E: Alternative Compliance (LID Waiver Program)

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

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

- *Or* -

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

DMA D is located in Site 7 contaminated soil area. The existing road drains to a concrete v-ditch located within Site 7. Minor road widening improvements are proposed and drainage will follow existing conditions. Future development of Site 7 will be responsible to implement storm water quality when Site 7 is remediated. Therefore, the implementation of LID BMPs to treat DMA D runoff is technically infeasible. DMA D area is omitted from the scope of this report.

E.1 Identify Pollutants of Concern

Utilizing Table A.1 from Section A above which noted your project's receiving waters and their associated EPA approved 303(d) listed impairments, cross reference this information with that of your selected Priority Development Project Category in Table E.1 below. If the identified General Pollutant Categories are the same as those listed for your receiving waters, then these will be your Pollutants of Concern and the appropriate box or boxes will be checked on the last row. The purpose of this is to document compliance and to help you appropriately plan for mitigating your Pollutants of Concern in lieu of implementing LID BMPs.

Table E.1 Potential Pollutants by Land Use Type

Priority Development Project Categories and/or Project Features (check those that apply)	General Pollutant Categories							
	Bacterial Indicators	Metals	Nutrients	Pesticides	Toxic Organic Compounds	Sediments	Trash & Debris	Oil & Grease
☐ Detached Residential Development	P	N	P	P	N	P	P	P
☐ Attached Residential Development	P	N	P	P	N	P	P	P(2)
☒ Commercial/Industrial Development	P(3)	P	P(1)	P(1)	P(5)	P(1)	P	P
☐ Automotive Repair Shops	N	P	N	N	P(4, 5)	N	P	P
☐ Restaurants (>5,000 ft^2)	P	N	N	N	N	N	P	P
☐ Hillside Development (>5,000 ft^2)	P	N	P	P	N	P	P	P
☒ Parking Lots (>5,000 ft^2)	P(6)	P	P(1)	P(1)	P(4)	P(1)	P	P
☐ Retail Gasoline Outlets	N	P	N	N	P	N	P	P
Project Priority Pollutant(s) of Concern	☒	☒	☒	☒	☒	☒	☒	☒

P = Potential

N = Not Potential

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

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

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

(4) Specifically petroleum hydrocarbons

(5) Specifically solvents

(6) Bacterial indicators are routinely detected in pavement runoff

E.2 Stormwater Credits

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

Table E.2 Water Quality Credits

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

[1]Cannot Exceed 50%
[2]Obtain corresponding data from Table 3-8 in the WQMP Guidance Document

E.3 Sizing Criteria

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

Table E.3 Treatment Control BMP Sizing

DMA Type/ID	**DMA Area (square feet)**	**Post-Project Surface Type**	**Effective Impervious Fraction, I_f**	**DMA Runoff Factor**	**DMA Area x Runoff Factor**		***Enter BMP Name / Identifier Here***		
	[A]		[B]	[C]	[A] x [C]				
N/A						*Design Storm Depth (in)*	*Minimum Design Capture Volume or Design Flow Rate (cubic feet or cfs)*	*Total Storm Water Credit % Reduction*	*Proposed Volume on Plans (cubic feet or cfs)*
	A_T = Σ[A] =				Σ= [D] =	[E] = 0.63	$[F] = \frac{[D]x[E]}{[G]}$ =	[F] X (1-[H]) =	[I]

[B], [C] is obtained as described in Section 2.3.1 from the WQMP Guidance Document
[E] is obtained from Exhibit A in the WQMP Guidance Document
[G] is for Flow-Based Treatment Control BMPs [G] = 43,560, for Volume-Based Control Treatment BMPs, [G] = 12
[H] is from the Total Credit Percentage as Calculated from Table E.2 above
[I] as obtained from a design procedure sheet from the BMP manufacturer and should be included in Appendix 6

E.4 Treatment Control BMP Selection

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

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

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

Table E.4 Treatment Control BMP Selection

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

[1] Treatment Control BMPs must not be constructed within Receiving Waters. In addition, a proposed Treatment Control BMP may be listed more than once if they possess more than one qualifying pollutant removal efficiency.

[2] Cross Reference Table E.1 above to populate this column.

[3] As documented in a Co-Permittee Approved Study and provided in Appendix 6.

Section F: Hydromodification

F.1 Hydrologic Conditions of Concern (HCOC) Analysis

Once you have determined that the LID design is adequate to address water quality requirements, you will need to assess if the proposed LID Design may still create a HCOC. Review Chapters 2 and 3 (including Figure 3-7) of the WQMP Guidance Document to determine if your project must mitigate for Hydromodification impacts. If your project meets one of the following criteria which will be indicated by the check boxes below, you do not need to address Hydromodification at this time. However, if the project does not qualify for Exemptions 1, 2 or 3, then additional measures must be added to the design to comply with HCOC criteria. This is discussed in further detail below in Section F.2.

HCOC EXEMPTION 1: The Priority Development Project disturbs less than one acre. The Copermittee has the discretion to require a Project-Specific WQMP to address HCOCs on projects less than one acre on a case by case basis. The disturbed area calculation should include all disturbances associated with larger common plans of development.

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, HCOC criteria do not apply.

HCOC EXEMPTION 2: The volume and time of concentration[1] of storm water runoff for the post-development condition is not significantly different from the pre-development condition for a 2-year return frequency storm (a difference of 5% or less is considered insignificant) using one of the following methods to calculate:

- Riverside County Hydrology Manual
- Technical Release 55 (TR-55): Urban Hydrology for Small Watersheds (NRCS 1986), or derivatives thereof, such as the Santa Barbara Urban Hydrograph Method
- Other methods acceptable to the Co-Permittee

Does the project qualify for this HCOC Exemption? ☐ Y ☒ N

If Yes, report results in Table F.1 below and provide your substantiated hydrologic analysis in Appendix 7.

Table F.1 Hydrologic Conditions of Concern Summary

	2 year – 24 hour		
	Pre-condition	**Post-condition**	**% Difference**
Time of Concentration			
Volume (Cubic Feet)			

[1] Time of concentration is defined as the time after the beginning of the rainfall when all portions of the drainage basin are contributing to flow at the outlet.

HCOC EXEMPTION 3: All downstream conveyance channels to an adequate sump (for example, Prado Dam, Lake Elsinore, Canyon Lake, Santa Ana River, or other lake, reservoir or naturally erosion resistant feature) that will receive runoff from the project are engineered and regularly maintained to ensure design flow capacity; no sensitive stream habitat areas will be adversely affected; or are not identified on the Co-Permittees Hydromodification Sensitivity Maps.

Does the project qualify for this HCOC Exemption? ☐ Y ☐ N ☒ N/A

If Yes, HCOC criteria do not apply and note below which adequate sump applies to this HCOC qualifier:

F.2 HCOC Mitigation

If none of the above HCOC Exemption Criteria are applicable, HCOC criteria is considered mitigated if they meet one of the following conditions:

a. Additional LID BMPS are implemented onsite or offsite to mitigate potential erosion or habitat impacts as a result of HCOCs. This can be conducted by an evaluation of site-specific conditions utilizing accepted professional methodologies published by entities such as the California Stormwater Quality Association (CASQA), the Southern California Coastal Water Research Project (SCCRWP), or other Co-Permittee approved methodologies for site-specific HCOC analysis.

b. The project is developed consistent with an approved Watershed Action Plan that addresses HCOC in Receiving Waters.

c. Mimicking the pre-development hydrograph with the post-development hydrograph, for a 2-year return frequency storm. Generally, the hydrologic conditions of concern are not significant, if the post-development hydrograph is no more than 10% greater than pre-development hydrograph. In cases where excess volume cannot be infiltrated or captured and reused, discharge from the site must be limited to a flow rate no greater than 110% of the pre-development 2-year peak flow.

Note: The project is located within the Riverside County Hydromodification exemption area as presented in the Riverside County Geodatabase approved April 20, 2017. See HCOC map in Appendix 1.

Section G: Source Control BMPs

Source control BMPs include permanent, structural features that may be required in your project plans — such as roofs over and berms around trash and recycling areas — and Operational BMPs, such as regular sweeping and "housekeeping", that must be implemented by the site's occupant or user. The MEP standard typically requires both types of BMPs. In general, Operational BMPs cannot be substituted for a feasible and effective permanent BMP. Using the Pollutant Sources/Source Control Checklist in Appendix 8, review the following procedure to specify Source Control BMPs for your site:

1. ***Identify Pollutant Sources*:** Review Column 1 in the Pollutant Sources/Source Control Checklist. Check off the potential sources of Pollutants that apply to your site.

2. ***Note Locations on Project-Specific WQMP Exhibit*:** Note the corresponding requirements listed in Column 2 of the Pollutant Sources/Source Control Checklist. Show the location of each Pollutant source and each permanent Source Control BMP in your Project-Specific WQMP Exhibit located in Appendix 1.

3. ***Prepare a Table and Narrative*:** Check off the corresponding requirements listed in Column 3 in the Pollutant Sources/Source Control Checklist. In the left column of Table G.1 below, list each potential source of runoff Pollutants on your site (from those that you checked in the Pollutant Sources/Source Control Checklist). In the middle column, list the corresponding permanent, Structural Source Control BMPs (from Columns 2 and 3 of the Pollutant Sources/Source Control Checklist) used to prevent Pollutants from entering runoff. **Add additional narrative** in this column that explains any special features, materials or methods of construction that will be used to implement these permanent, Structural Source Control BMPs.

4. ***Identify Operational Source Control BMPs:*** To complete your table, refer once again to the Pollutant Sources/Source Control Checklist. List in the right column of your table the Operational BMPs that should be implemented as long as the anticipated activities continue at the site. Copermittee stormwater ordinances require that applicable Source Control BMPs be implemented; the same BMPs may also be required as a condition of a use permit or other revocable Discretionary Approval for use of the site.

Table G.1 Permanent and Operational Source Control Measures

Potential Sources of Runoff pollutants	Permanent Structural Source Control BMPs	Operational Source Control BMPs
On-site storm drain inlets	☒ Mark all inlets with the words "Only Rain Down the Storm Drain" or similar. Catch Basin Markers may be available from the Riverside County Flood Control and Water Conservation District, call 951.955.1200 to verify. **(CASQA BMP SC-44, "Drainage System Maintenance"; SD-13, "Storm Drain System Signs")**	☒ Maintain and periodically repaint or replace inlet markings. ☒ Provide stormwater pollution prevention information to new site owners, lessees, or operators. ☒ See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com ☒ Include the following in lease agreements: "Tenant shall not allow anyone to discharge into storm drains or to store or deposit materials so as to create a potential discharge into storm drain."

Landscape/ Outdoor Pesticide Use	State that final landscape plans will accomplish all of the following. ☒ Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. ☒ Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. ☒ Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. ☒ Consider using pest-resistant plants, especially adjacent to hardscape. ☒ To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. **(CASQA BMP SD-12, "Efficient Irrigation")**	☒ Maintain landscaping using minimum or no pesticides. ☒ See applicable operational BMPs in "What you should know for… Landscape and Gardening" at http://rcflood.org/stormwater/ ☒ Provide IPM (Intergraded Pest Management) information to new owners, lessees and operators. Applicable operational BMPs in "What you should know for… Landscape and Gardening": ☒ Never apply pesticides or fertilizers when rain is predicted within the next 48 hours. ☒ Do not overwater. ☒ Do not rake or blow leaves, clippings or pruning waste into the street, gutter or storm drain. Dispose of green waste by composting, hauling it to a permitted landfill, or recycling it though city's program.

Refuse Areas	State how site refuse will be handled and provide supporting detail to what is shown on plans. State that signs will be posted on or near dumpsters with the words "Do not dump hazardous materials here" or similar. Trash enclosures shall have a solid impermeable roof with a minimum clearance height to allow the bin lid to completely open. Trash enclosures to be constructed of reinforced masonry without wooden gates. Walls shall be at least 6' high. Trash enclosures shall have a concrete slab floor. The concrete slab shall be graded to collect any spill within the enclosure. All trash bins in the trash enclosure shall be leak free and shall have a lid and be continuously closed. The enclosure area shall be protected from receiving direct rainfall or run-on from collateral surfaces. Method to handle site refuse: • Waste will be hauled by either public or commercial carriers. **(CASQA BMP SD-32, "Trash Storage Areas")**	State how the following will be implemented: Provide adequate number of receptacles. Inspect receptacles regularly; repair or replace leaky receptacles. Keep receptacles covered. Prohibit/prevent dumping of liquid or hazardous wastes. Post "no hazardous materials" signs. Inspect and pick up litter daily and clean up spills immediately. Keep spill control materials available on-site. See Fact Sheet SC-34, "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Any Standing liquids must be cleaned up and disposed of property using a mop and a bucket or a wet/dry vacuum machine. All non-hazardous liquids without solid trash may be put in the sanitary sewer.
Fuel Dispensing Area	A small tanker truck may be used to fuel aircraft on the proposed apron. The apron will be concrete to prevent infiltration and will be sloped towards the proposed oil-water separator.	The property owner shall dry sweep the fueling area, as needed. The oil-water separator shall be maintained in accordance with the manufacturer's guiedlines in Appendix 9.

Vehicle and Equipment Cleaning	☒ If a car wash area is not provided, describe any measures taken to discourage on-site car washing and explain how these will be enforced. ***Car wash area is not provided on the site. It will be stated in the CC&Rs that on-site car washing is not permitted and enforced by the management company.***	Describe operational measures to implement the following (if applicable): ☐ Washwater from vehicle and equipment washing operations shall not be discharged to the storm drain system. Refer to "Outdoor Cleaning Activities and Professional Mobile Service Providers" for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater/

Vehicle / Equipment Repair and Maintenance	☒ State that no vehicle repair or maintenance will be done outdoors, or else describe the required features of the outdoor work area. ***No vehicle repair or maintenance will be done on the site.*** ☒ State that there are no floor drains or if there are floor drains, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ***There are floor drains in the restrooms in the buildings. The floor drains will drain into sanitary sewer line.*** ☒ State that there are no tanks, containers or sinks to be used for parts cleaning or rinsing or, if there are, note the agency from which an industrial waste discharge permit will be obtained and that the design meets that agency's requirements. ***There are not tanks, containers or sinks to be used for parts cleaning or rinsing.***	In the Stormwater Control Plan, note that all of the following restrictions apply to use the site: ☒ No person shall dispose of, nor permit the disposal, directly or indirectly of vehicle fluids, hazardous materials, or rinse water from parts cleaning into storm drains. ☒ No vehicle fluid removal shall be performed outside a building, nor on asphalt or ground surfaces, whether inside or outside a building, except in such a manner as to ensure that any spilled fluid will be in an area of secondary containment. Leaking vehicle fluids shall be contained or drained from the vehicle immediately. ☒ No person shall leave unattended drip parts or other open containers containing vehicle fluid, unless such containers are in use or in an area of secondary containment. Refer to "Automotive Maintenance & Car Care Best Management Practices for Auto Body Shops, Auto Repair Shops, Car Dealerships, Gas Stations and Fleet Service Operations". Brochure can be found at http://rcflood.org/stormwater/ Refer to Outdoor Cleaning Activities and Professional Mobile Service Providers for many of the Potential Sources of Runoff Pollutants categories below. Brochure can be found at http://rcflood.org/stormwater

Loading Docks	Design loading docks to prevent stormwater run-on. Pave loading areas with concrete instead of asphalt. Loading dock areas are to be covered, or drainage is to be designed to preclude urban run-on and runoff. **(CASQA BMP SD-31, "Maintenance Bays and Docks")**	Move loaded and unloaded items indoors as soon as possible. See Fact Sheet SC-30, "Outdoor Loading and Unloading," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Additional Operational BMPs suggested on Fact Sheet SC-30: • Check equipment regularly for leaks. • Conduct loading and unloading in dry weather if possible. • Loading or unloading of liquid should occur in the manufacturing building so that any spills that are not completely retained can be discharged to the sanitary sewer, treatment plant, or treated in a manner consistent with local sewer authorities and permit requirements.
Fire Sprinkler Test Water	Provide a means to drain fire sprinkler test water to the sanitary sewer.	See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com Additional Operational BMPs suggested on Fact Sheet SC-41: • Do not allow discharge of fire sprinkler line flushing to storm drain or infiltration due to the potential high levels of pollutants in fire sprinkler line water.

Miscellaneous Drain or Wash Water or Other Sources ☐ Boiler drain lines ☒ Condensate drain lines ☒ Rooftop equipment ☒ Drainage sumps ☒ Roofing, gutters, and trim ☐ Other sources	☐ Boiler drain lines shall be directly or indirectly connected to the sanitary sewer system and may not discharge to the storm drain system. ☒ Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. ☒ Rooftop equipment with potential to produce pollutants shall be roofed and/or have secondary containment. ☒ Any drainage sumps on-site shall feature a sediment sump to reduce the quantity of sediment in pumped water. ☒ Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. **(CASQA BMP SD-10, "Site Design and Landscape Planning" and SD-11, "Roof Runoff Controls")**	Additional Operational BMPs suggested on Fact Sheet SC-10: • ☒ Train employees to identify non-stormwater discharges and report them to the appropriate departments.
Plazas, sidewalks, and parking lots	☒ Control the number of points for vehicle access ☒ Inspect BMP's prior to forecast rain, daily during extended rain events, after rain events, weekly during rainy season and at two-week intervals during the non-rainy season ☒ Do not sweep up any unknown substance or any object that may be potentially hazardous ☒ After sweeping is finished, properly dispose of sweeper wastes **(CASQA BMP SE-7, "Street Sweeping and Vacuuming")**	☒ Sweep plazas, sidewalks, and parking lots regularly to prevent accumulation of liter and debris. Collect debris from pressure washing to prevent entry into the storm drain system. Collect washwater containing any cleaning agent or degreaser and discharge to the sanitary sewer not to a storm drain.

Interior floor drains and elevator shaft sump pumps	State interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer.	Inspect and maintain drains to prevent blockages and overflow.

Permanent Source Control BMPs

- Mark all inlets with the words "No Dumping! Flows to River". Each drain inlet identified on the Source Control Exhibit shall be painted in either blue or white lettering on the drain inlet or immediately adjacent to the inlet.
- Interior floor drains and elevator shaft sump pumps will be plumbed to sanitary sewer. All drains located interior to the building will be directed into the sanitary sewer system within the building and discharge to the public sewer system.
- Minimize the number of entry ways and openings to the building at ground surface elevation. The building is designed to minimize the number of location where pests can enter the building. Doors are designed to close with minimal gaps to the frame and points of penetration into the walls by utilities are to be sealed.
- Preserve existing native trees, shrubs, and ground cover to the maximum extent possible. The existing project site contains grasses and low lying vegetation that has grown in since the site was rough graded as part of a previous project. There is no native vegetation remaining. Due to the grading requirements of the site, the new growth will be removed during the grading process and new vegetation planted per the landscape plans.
- Design landscaping to minimize irrigation and runoff, to promote surface infiltration where appropriate, and to minimize the use of fertilizers and pesticides that can contribute to stormwater pollution. Landscape materials have been chosen with water wise practices in mind and drought tolerant plantings. Landscape areas are designed as sumps with overflow drains located higher than the bottom of sump to infiltrate low flows and reduce runoff. The use of fertilizers and pesticides will be in conformance with the CASQA recommendations of SC-41.
- Where landscaped areas are used to retain or detain stormwater, specify plants that are tolerant of saturated soil conditions. Plants located in landscape retention areas are tolerant to over-saturated soils for short periods of time.
- Consider using pest-resistant plants, especially adjacent to hardscape.
- To ensure successful establishment, select plants appropriate to site soils, slopes, climate, sun, wind, rain, land use, air movement, ecological consistency, and plant interactions. The landscape plant list for this project has been specifically designed to work with the project site and to be in conformance with the area of Fallbrook design requirements.
- Design of designated cleaning areas in food uses to be determined in final design.
- Items to be cleaned in food uses and sizing of cleaning areas to be determined in final design.
- Site refuse will be contained in designated trash areas and equipped with roofs or be self-containing equipment (trash compactors) that will prevent run-on.
- Signs to be posted in designated trash areas reading "Do not dump hazardous materials here" or similar.
- Provide a means to drain fire sprinkler test water to the sanitary sewer. Drains located internal to the building will drain into the building's sanitary sewer system and discharge into the public sewer system.
- Condensate drain lines may discharge to landscaped areas if the flow is small enough that runoff will not occur. Condensate drain lines may not discharge to the storm drain system. Condensate drain lines will not directly connect to the storm drain system. Drain lines will either discharge into landscape areas for infiltration or connect directly to the sewer system.
- Rooftop mounted equipment with potential to produce pollutants shall be roofed and/or have secondary containment. Rooftop equipment will discharge through the roof drain system into landscape areas for infiltration.
- Avoid roofing, gutters, and trim made of copper or other unprotected metals that may leach into runoff. Unprotected metals will not be used for the roofing, gutter or building trim.

Operational Source Control BMPs

- Maintain and periodically repaint or replace inlet markings. Inlet markings to be inspected on an annual basis for fading. Markings to be repainted as required.
- Provide stormwater pollution prevention information to new site owner, lessees or operators. A copy of the SUSMP is to be kept on-site at all times by management. At time of hire, operation and maintenance staff are to be educated on the source control BMPs and treatment BMPs for the project.
- See applicable operational BMPs in Fact Sheet SC-44, "Drainage System Maintenance," in the CASQA Stormwater Quality Handbooks at www.cabmphandbooks.com. Educational material, included Fact Sheet SC-44, found within this SUSMP report is to be made available to maintenance staff by owner.
- Include the following in lease agreements: "Tenant shall not allow anyone to discharge anything to storm drains or to store or deposit materials so as to create a potential discharge to storm drains." While the current project is not intended to be leased, the owner shall include this language in the event that the property does become leased.
- Inspect and maintain drains to prevent blockages and overflow. Drains internal to the building will be routinely inspected and maintained by the maintenance staff.
- Provide Integrated Pest Management (IPM) information to owners, lessees, and operators. Owner shall develop an IPM prior to occupancy and provide this information to the maintenance staff at time of employment and provide to future property owner or lessees.
- Maintain landscaping using minimum or no pesticides. Plantings chosen for the site are to be pest-resistant plants around the building and pesticides used are to be environmentally sensitive varieties.
- See applicable operational BMPs in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks.
- Provide IPM information to new owners, lessees and operators. Owner to develop the IPM for the project and distribute to maintenance staff at time of employment and provide to future lessees and new owners.
- Owner/maintenance staff to maintain a proper number of trash receptacles on hand to ensure available storage space. Routine inspection of trash receptacles for leaking or trash accumulation. Inspection of "No hazardous materials" signage, replace as necessary. See Fact Sheet SC-34 "Waste Handling and Disposal" in the CASQA Stormwater Quality Handbook.
- Owner/maintenance staff to move unloaded items indoors as soon as possible.
- See Fact Sheet SC-30 "Outdoor Loading and Unloading" in the CASQA Stormwater Quality Handbook.
- See the note in Fact Sheet SC-41, "Building and Grounds Maintenance," in the CASQA Stormwater Quality Handbooks. Owner to provide BMP fact sheet to maintenance staff at time of employment and to future lessees.
- Plazas, sidewalks, and parking lots shall be swept regularly to prevent the accumulation of litter and debris. Debris from pressure washing shall be collected to prevent entry into the storm drain system. Washwater containing any cleaning agent or degreaser shall be collected and discharged to the sanitary sewer and not discharged to a storm drain. Owner to hire parking lot sweeping service or provide maintenance staff proper vacuuming equipment to collect litter and debris from the site. In the event water is used to clean the site, wastewater shall be collected and disposed of properly, not dumped down the storm drain system.

Section H: Construction Plan Checklist

Populate Table H.1 below to assist the plan checker in an expeditious review of your project. The first two columns will contain information that was prepared in previous steps, while the last column will be populated with the corresponding plan sheets. This table is to be completed with the submittal of your final Project-Specific WQMP.

Table H.1 Construction Plan Cross-reference

BMP No. or ID	BMP Identifier and Description	Corresponding Plan Sheet(s)

Note that the updated table — or Construction Plan WQMP Checklist — is **only a reference tool** to facilitate an easy comparison of the construction plans to your Project-Specific WQMP. Co-Permittee staff can advise you regarding the process required to propose changes to the approved Project-Specific WQMP.

This section will be completed and addressed at the time of the final WQMP Submittal.

Section I: Operation, Maintenance and Funding

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

1. A means to finance and implement facility maintenance in perpetuity, including replacement cost.
2. Acceptance of responsibility for maintenance from the time the BMPs are constructed until responsibility for operation and maintenance is legally transferred. A warranty covering a period following construction may also be required.
3. An outline of general maintenance requirements for the Stormwater BMPs you have selected.
4. Figures delineating and designating pervious and impervious areas, location, and type of Stormwater BMP, and tables of pervious and impervious areas served by each facility. Geo-locating the BMPs using a coordinate system of latitude and longitude is recommended to help facilitate a future statewide database system.
5. A separate list and location of self-retaining areas or areas addressed by LID Principles that do not require specialized O&M or inspections but will require typical landscape maintenance as noted in Chapter 5, pages 85-86, in the WQMP Guidance. Include a brief description of typical landscape maintenance for these areas.

Your local Co-Permittee will also require that you prepare and submit a detailed Stormwater BMP Operation and Maintenance Plan that sets forth a maintenance schedule for each of the Stormwater BMPs built on your site. An agreement assigning responsibility for maintenance and providing for inspections and certification may also be required.

Details of these requirements and instructions for preparing a Stormwater BMP Operation and Maintenance Plan are in Chapter 5 of the WQMP Guidance Document.

Maintenance Mechanism: The BMPs will be installed by the developer and maintained by the airport operator.

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

☐ Y ☒ N

Include your Operation and Maintenance Plan and Maintenance Mechanism in Appendix 9. Additionally, include all pertinent forms of educational materials for those personnel that will be maintaining the proposed BMPs within this Project-Specific WQMP in Appendix 10.

This section will be completed and addressed at the time of the final WQMP Submittal.

Appendix 1: Maps and Site Plans

Location Map, WQMP Site Plan and Receiving Waters Map

R 07 W | R 06 W | R 05 W | R 04 W | R 03 W | R 02 W | R 01 W | R 01 E | R 02 E | R 03 E | R 04 E | R 05 E

T 01 S
T 02 S
T 03 S
T 04 S
T 05 S
T 06 S
T 07 S
T 08 S

0.85 MiraLoma
0.61 Riverside North
0.54 Riverside South
0.68 PigeonPass
0.66 MorenoEast
0.85 Beaumont
0.88 PradoDam
0.51 Woodcrest
0.50 LakeMathews
0.68 PerrisReservoir
PROJECT SITE
0.70 SanJacintoNWS
0.87 VistaGrandeGS
1.18 Idyllwild
0.58 SunCity
0.68 Winchester
0.90 HurkeyCreek
0.70 ElsinoreNWS
1.11 ElCarisoStation
0.77 WildomarLaCresta
0.52 SkinnerLake
0.65 Anza
0.77 SantaRosaPlateau
1.00 TemeculaNWS
0.64 AguangaValley

Santa Ana River Watershed
Santa Margarita Watershed

JURUPA VALLEY | EASTVALE | NORCO | CORONA | RIVERSIDE | MORENO VALLEY | CALIMESA | BEAUMONT | SAN JACINTO | PERRIS | HEMET | CANYON LAKE | LAKE ELSINORE | WILDOMAR | MENIFEE | MURRIETA | TEMECULA

06 05 04 03 02 01
07 08 09 10 11 12
18 17 16 15 14 13
19 20 21 22 23 24
30 29 28 27 26 25
31 32 33 34 35 36

N

Rain Gage Locations

RIVERSIDE COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Isohyetal Map for the 85th Percentile 24 hour Storm Event

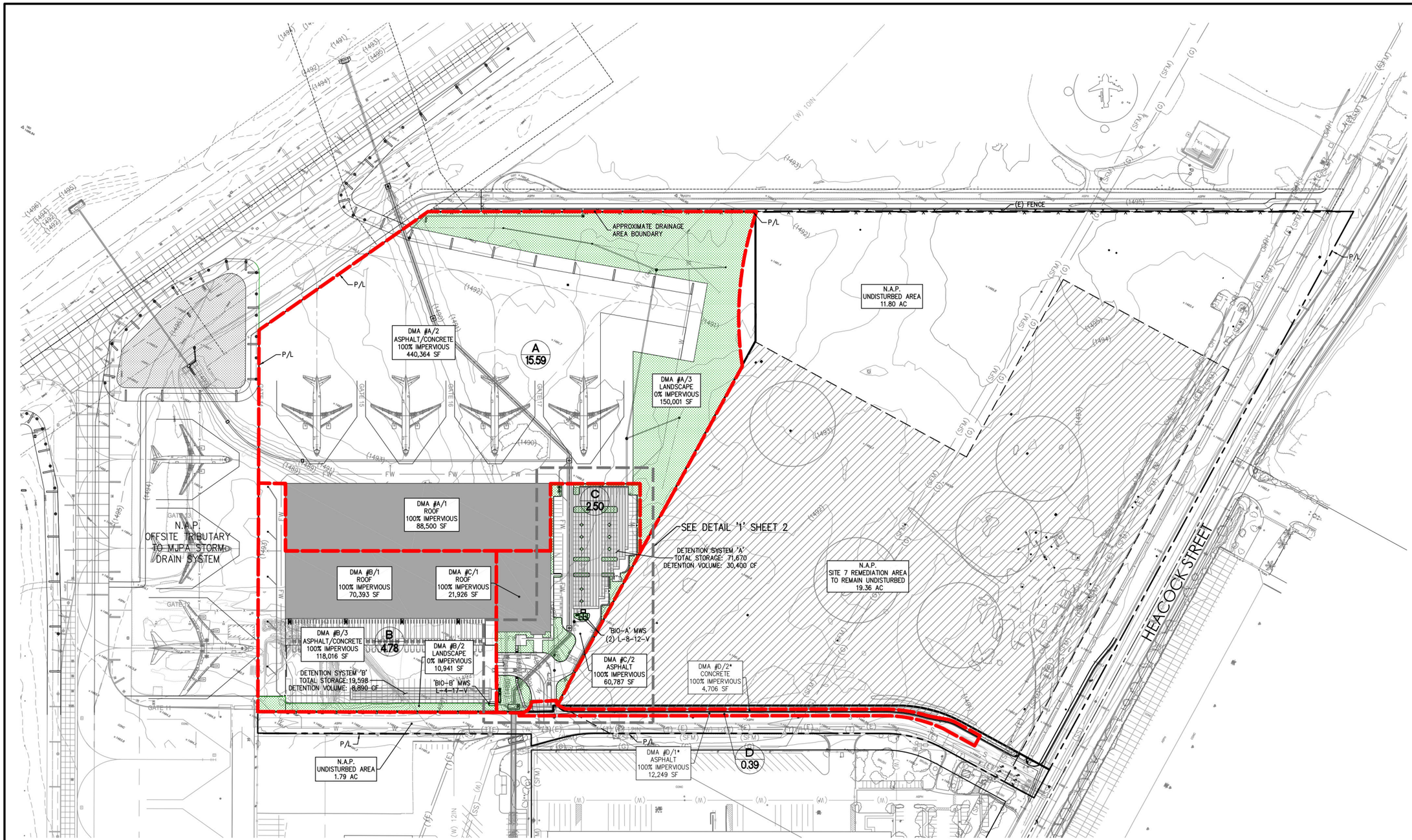
July 2011

D-1 PARCEL DEVELOPMENT

DOWNSTREAM RECEIVING WATERS

RIVERSIDE, CA

ORC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
160 S. Old Springs Road, Ste. 210
Anaheim Hills, California 92808
(714) 685-6860



BUILDING/GENERAL SOURCE CONTROL BMP NOTES

- *INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS TO BE PLUMBED TO SANITARY SEWER*
- *ALL PROCESS ACTIVITIES TO BE PERFORMED INDOORS. NO PROCESSES TO DRAIN TO EXTERIOR OR TO STORM DRAIN SYSTEM*
- *NO VEHICLE/EQUIPMENT REPAIR OR MAINTENANCE TO BE PERFORMED OUTSIDE.*
- *FIRE SPRINKLER TEST WATER TO DRAIN TO SANITARY SEWER.*
- *ROOF EQUIPMENT WITH POTENTIAL TO POLLUTE RUNOFF TO BE EQUIPPED WITH SECONDARY CONTAINMENT.*
- *CONDENSATE LINES TO DISCHARGE TO SANITARY SEWER*

BMP NOTES

- *NO RUN-ON ANTICIPATED FOR THE PROJECT SITE*

PARCEL AREA:	2,441,105 SF	56.0 ACRES
DEVELOPED AREA:	1,024,358 SF	22.7 ACRES
IMPERVIOUS:	828,400 SF	18.4 ACRES
PERVIOUS:	195,958 SF	4.2 ACRES

LEGEND

- DMA BOUNDARY
- LANDSCAPE AREA
- X / XXX — DMA NAME / DMA ACREAGE

DMA ID	Q2 (CFS)	Q10 (CFS)	QBMP (CFS)	VBMP (CF)
A	5.44	9.66	2.20	25,636.6
B	1.88	3.18	0.80	8,886.6
C	0.87	1.54	0.40	4,163.0

***NOTE: DMA D IS LOCATED IN SITE 7 CONTAMINATED SOIL AREA. THE EXISTING ROAD DRAINS TO A CONCRETE V-DITCH LOCATED WITHIN SITE 7. MINOR ROAD WIDENING IMPROVEMENTS ARE PROPOSED AND DRAINAGE WILL FOLLOW EXISTING CONDITION. FUTURE DEVELOPMENT OF SITE 7 WILL BE RESPONSIBLE TO IMPLEMENT STORM WATER QUALITY WHEN SITE 7 IS REMEDIATED.**

GRAPHIC SCALE: 1 INCH = 100 FT (100' 50' 0' 100' 200')

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

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

R.C.E. 83987
DATE
*EPTHA BRANDER

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT: D-1 PARCEL (PP 20-06)
MARCH AIR RESERVE BASE
RIVERSIDE, CA

DRAWING NAME: PWQMP DMA EXHIBIT

ISSUE:	EXHIBIT
DATE:	2022-01-19
CHECKED: JB	DRAWN: NS
DRAWING FILE: 20522EXH101	
PROJECT NO.: 20-522	
SHEET NUMBER:	1
OF 4	SHEETS
SCALE: AS NOTED	

FILENAME: M:\2020\20-522 Riverside Meridian Base D1 Parcel\WQMP\WQMP Site Plan\20-522_WQMP Site Plan.dwg, LAST SAVED ON: Feb 22 2022 11:06am PLOTTED BY: NICHOLAS, ON: Feb 22 2022 11:06am, CFG:

LEGEND

DMA BOUNDARY

LANDSCAPE AREA

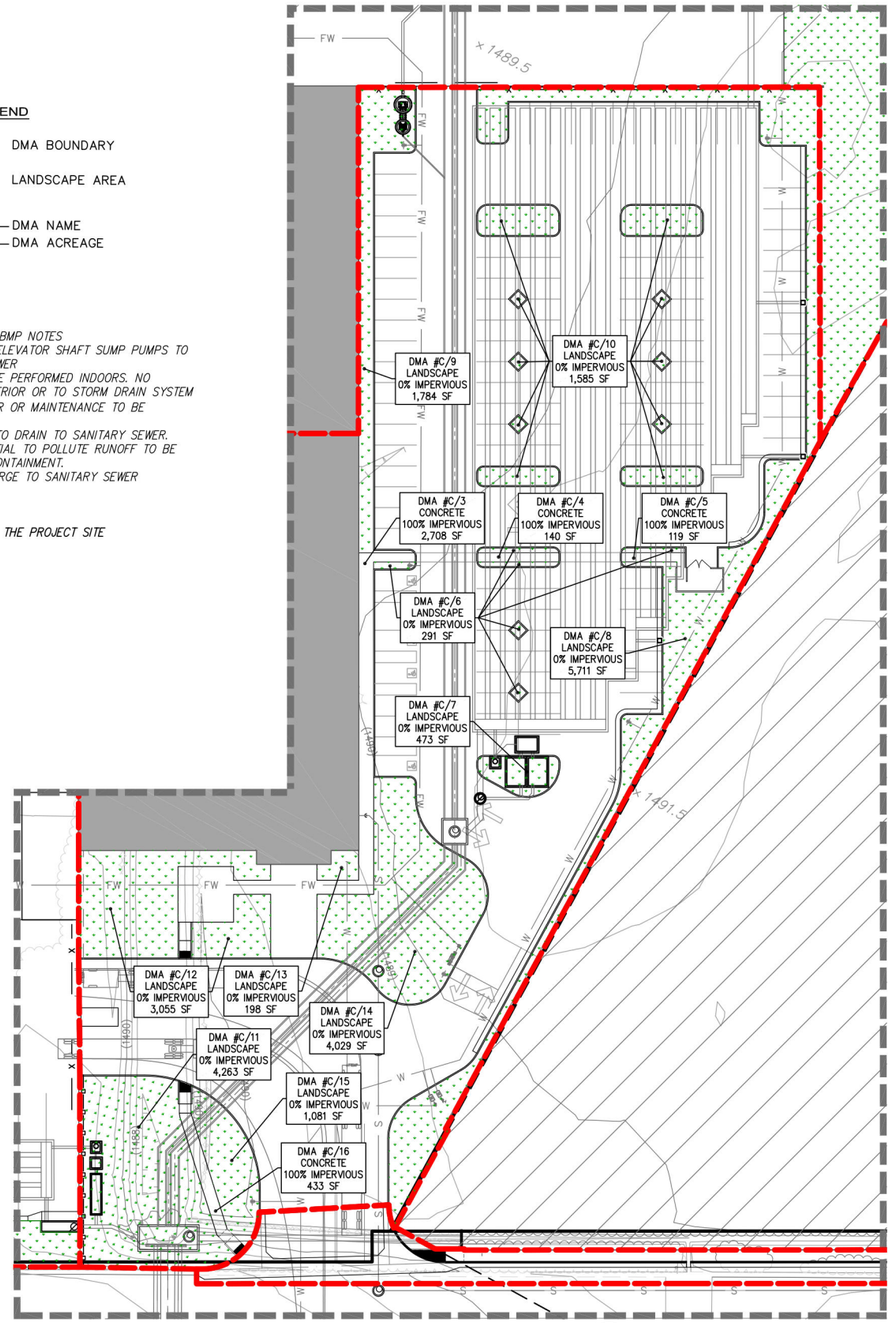
X — DMA NAME
XXX — DMA ACREAGE

BUILDING/GENERAL SOURCE CONTROL BMP NOTES

- *INTERIOR FLOOR DRAINS AND ELEVATOR SHAFT SUMP PUMPS TO BE PLUMBED TO SANITARY SEWER*
- *ALL PROCESS ACTIVITIES TO BE PERFORMED INDOORS. NO PROCESSES TO DRAIN TO EXTERIOR OR TO STORM DRAIN SYSTEM*
- *NO VEHICLE/EQUIPMENT REPAIR OR MAINTENANCE TO BE PERFORMED OUTSIDE.*
- *FIRE SPRINKLER TEST WATER TO DRAIN TO SANITARY SEWER.*
- *ROOF EQUIPMENT WITH POTENTIAL TO POLLUTE RUNOFF TO BE EQUIPPED WITH SECONDARY CONTAINMENT.*
- *CONDENSATE LINES TO DISCHARGE TO SANITARY SEWER*

BMP NOTES

- *NO RUN-ON ANTICIPATED FOR THE PROJECT SITE*



DMA 'C' DETAIL 1
1" = 30'

30' 15' 0' 30' 60'
GRAPHIC SCALE: 1 INCH = 30 FT

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Suite 210
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714-685-6860

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

#PTHA BRANDER
R.C.E. 83987
DATE

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT: D-1 PARCEL (PP 20-06)
MARCH AIR RESERVE BASE
RIVERSIDE, CA

DRAWING NAME: PWQMP DMA EXHIBIT

ISSUE:	EXHIBIT
DATE:	2021-01-05
CHECKED: JB	DRAWN: PP
DRAWING FILE:	20522EXH101
PROJECT NO.:	20-522
SHEET NUMBER:	2
OF	4 SHEETS
SCALE:	AS NOTED

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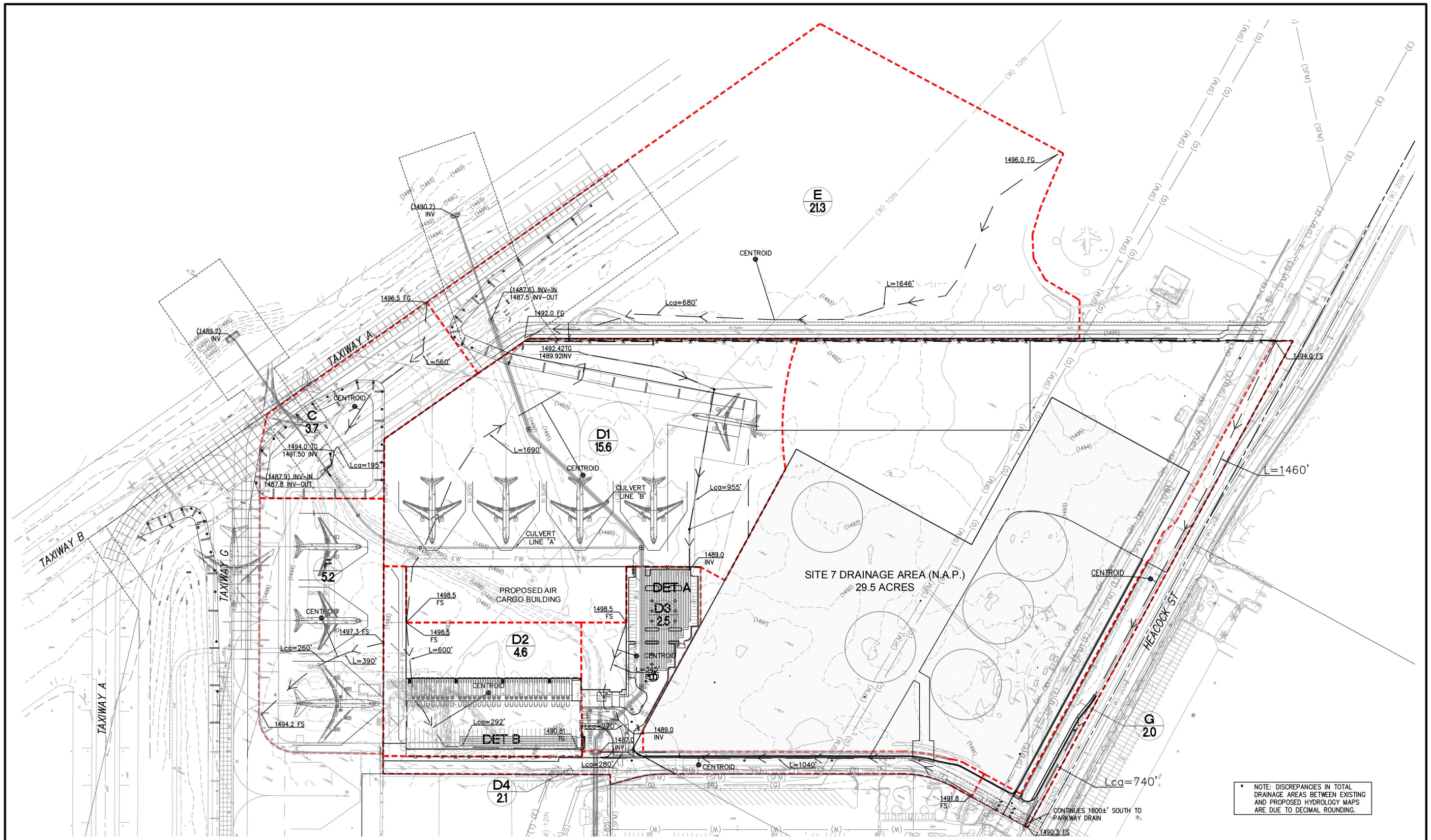

* NOTE: DISCREPANCIES IN TOTAL DRAINAGE AREAS BETWEEN EXISTING AND PROPOSED HYDROLOGY MAPS ARE DUE TO DECIMAL ROUNDING.

C

SOIL GROUP:	C [PLATE C-1.17]
AMC II RUNOFF INDEX NUMBER:	69 [COMMERCIAL LANDSCAPING (LAWNS, SHRUBS, ETC.)]
IMPERVIOUS PERCENTAGE:	66%
LENGTH:	560'
LENGTH FROM CENTROID:	195'
CHANGE IN ELEVATION:	2.8'

D2

SOIL GROUP:	C [PLATE C-1.17]
AMC II RUNOFF INDEX NUMBER:	69 [COMMERCIAL LANDSCAPING (LAWNS, SHRUBS, ETC.)]
IMPERVIOUS PERCENTAGE:	96%
LENGTH:	600'
LENGTH FROM CENTROID:	292'
CHANGE IN ELEVATION:	7.7'

D4

SOIL GROUP:	C [PLATE C-1.17]
AMC II RUNOFF INDEX NUMBER:	75 [OPEN BRUSH (SOFT WOOD SHRUBS – BUCKWHEAT, SAGE, ETC.)]
IMPERVIOUS PERCENTAGE:	82%
LENGTH:	1040'
LENGTH FROM CENTROID:	280'
CHANGE IN ELEVATION:	4.8'

F

SOIL GROUP:	C [PLATE C-1.17]
AMC II RUNOFF INDEX NUMBER:	69 [COMMERCIAL LANDSCAPING (LAWNS, SHRUBS, ETC.)]
IMPERVIOUS PERCENTAGE:	99%
LENGTH:	390'
LENGTH FROM CENTROID:	260'
CHANGE IN ELEVATION:	3.1'

D1

SOIL GROUP:	C [PLATE C-1.17]
AMC II RUNOFF INDEX NUMBER:	69 [COMMERCIAL LANDSCAPING (LAWNS, SHRUBS, ETC.)]
IMPERVIOUS PERCENTAGE:	91%
LENGTH:	1690'
LENGTH FROM CENTROID:	955'
CHANGE IN ELEVATION:	9.5'

D3

SOIL GROUP:	C [PLATE C-1.17]
AMC II RUNOFF INDEX NUMBER:	69 [COMMERCIAL LANDSCAPING (LAWNS, SHRUBS, ETC.)]
IMPERVIOUS PERCENTAGE:	79%
LENGTH:	345'
LENGTH FROM CENTROID:	270'
CHANGE IN ELEVATION:	9.5'

E

SOIL GROUP:	C [PLATE C1.17]
AMC II RUNOFF INDEX NUMBER:	75 [OPEN BRUSH (SOFT WOOD SHRUBS – BUCKWHEAT, SAGE, ETC.)]
IMPERVIOUS PERCENTAGE:	14.8%
LENGTH:	1646'
LENGTH FROM CENTROID:	680'
CHANGE IN ELEVATION:	4'

120' 60' 0' 120' 240'

GRAPHIC SCALE: 1 INCH = 120 FT

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714-685-6860

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

#PTHA BRANDER
R.C.E. 83987
DATE

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT: D-1 PARCEL DEVELOPMENT
MARCH AIR RESERVE BASE
RIVERSIDE, CA

DRAWING NAME: PROPOSED HYDROLOGY MAP

ISSUE:	EXHIBIT
DATE:	2020-10-15
CHECKED: JB	DRAWN: PP
DRAWING FILE: 522HMPR	
PROJECT NO.: 20-522	
SHEET NUMBER: 1 OF 1 SHEETS	
SCALE: AS NOTED	

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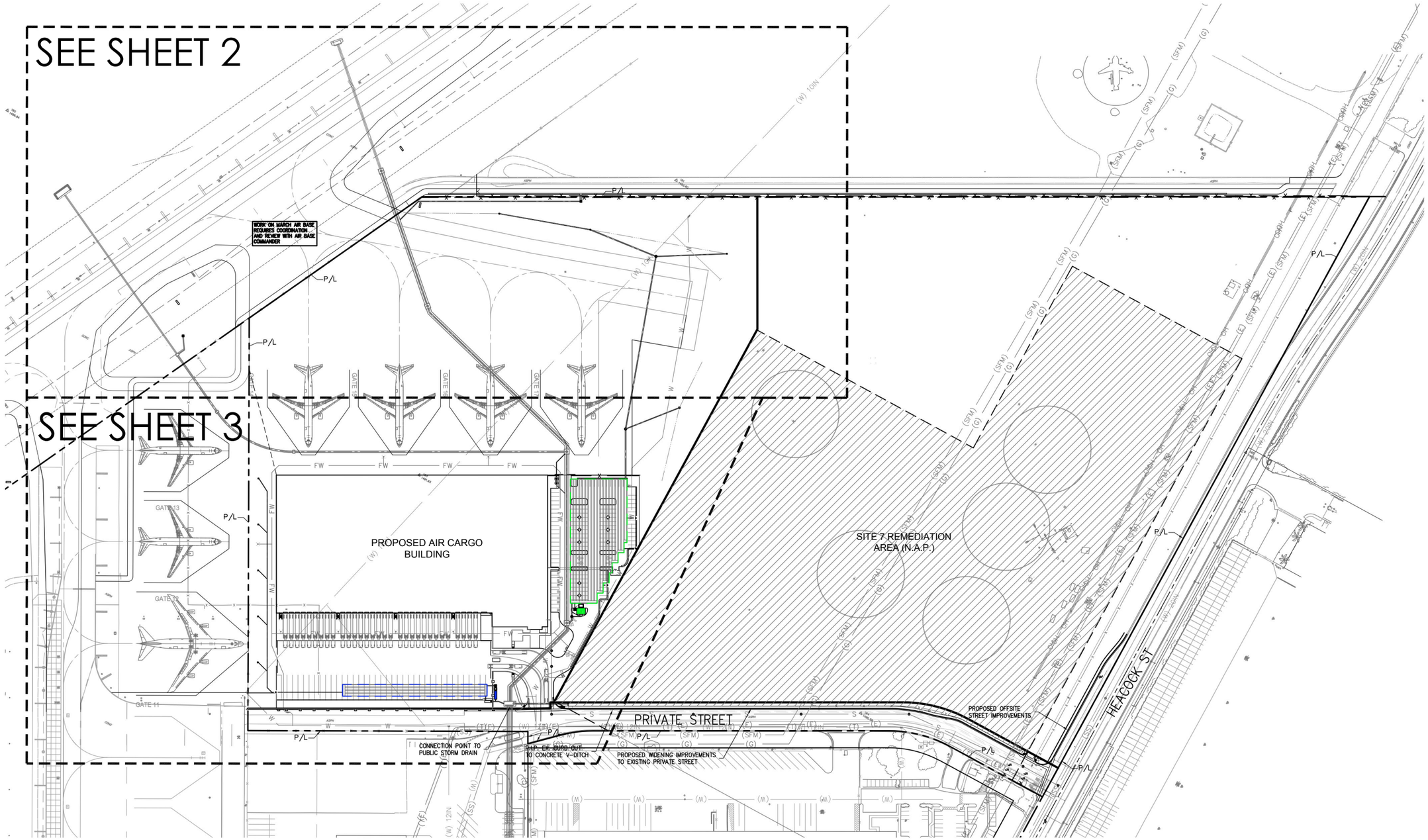

LEGEND

- DMA BOUNDARY
- LANDSCAPE AREA (PRIVATE)
- STORM DRAIN INLET/CATCH BASIN
- MANHOLE
- STORM DRAIN STRUCTURE
- STORM DRAIN PIPE
- MODULAR WETLANDS UNIT
- COVERED TRASH ENCLOSURE

FF	FINISH FLOOR
TC	TOP OF CURB
FL	FLOWLINE
INV	INVERT
FS	FINISH SURFACE
FG	FINISH GRADE
LP	LOW POINT
HP	HIGH POINT

SOURCE CONTROL NOTES

- ALL INLET/CATCH BASIN LOCATIONS ARE SHOWN ON BMP PLAN (SEE LEGEND)
- SELF-RETAINING LANDSCAPING AREAS SHOWN LABELED AS DEPRESSED LANDSCAPING (TYP.)
- SITE REFUSE AND RECYCLED MATERIALS WILL BE HANDLED AND STORED FOR PICKUP AT TRASH ENCLOSURE LOCATIONS (SEE LEGEND)

BMP NOTES

- NO SURFACE RUN-ON ANTICIPATED FOR THE PROJECT SITE

NOTES:

1. NO RUN-ON IS EXPECTED FOR THE SITE
2. INFILTRATION IS CONSIDERED INFEASIBLE ON THE PROJECT SITE.
3. THE SITE IS LOCATED IN HCOC EXEMPT AREA

100' 50' 0' 100' 200'
GRAPHIC SCALE: 1 INCH = 100 FT

NOT FOR CONSTRUCTION

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714-685-6860

JEPTHA BRANDER — R.C.E. 83987 — DATE

NO.:	REVISION:	DATE:

PROJECT: D-1 PARCEL (PP 20-06)
MARCH AIR RESERVE BASE
RIVERSIDE, CA

DRAWING NAME: POST-CONSTRUCTION BMP SITE PLAN

ISSUE:	EXHIBIT
DATE:	2022-01-14
CHECKED: JB	DRAWN: NS
DRAWING FILE:	20522EXH101
PROJECT NO.:	20-522
SHEET NUMBER:	1
OF	5 SHEETS
SCALE:	AS NOTED

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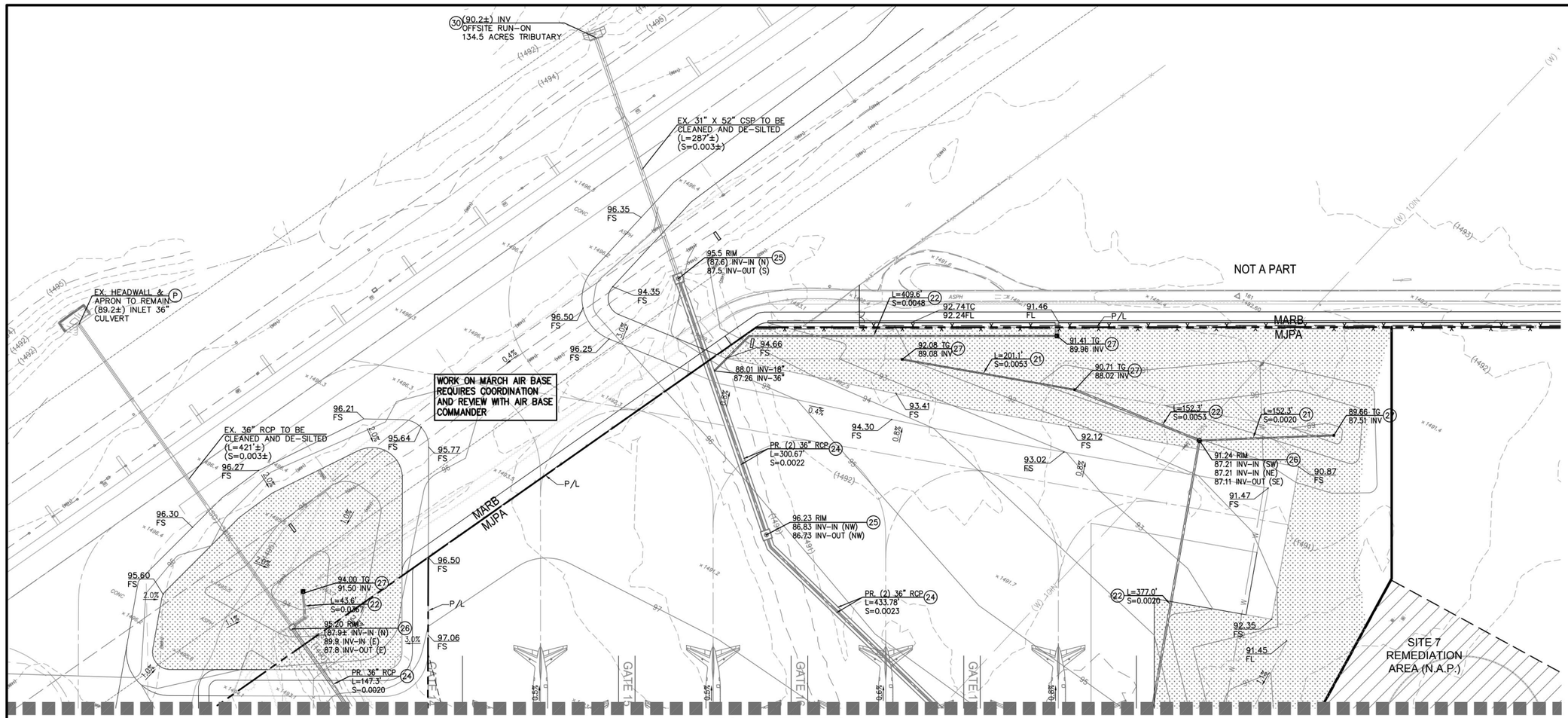


MATCHLINE SEE SH-3

LEGEND

- (TE) PROPOSED TRASH ENCLSOURE – SEE DETAIL ON SHEET 6
- (RD) PROPOSED ROOF RUNOFF DOWNSPOUT
- (DP) DISCHARGE POINT
- SELF TREATING AREA PER DETAIL ON SHEET 6
- LANDSCAPE AREA

NOTE: NO POINTS OF RUN-ON LOCATED ON SITE.

- DETENTION SYSTEM A (DET A)
- DETENTION SYSTEM B (DET B)
- MODULAR WETLANDS UNIT (BIO A)
- MODULAR WETLANDS UNIT (BIO B)

CONSTRUCTION NOTES:

(20) INSTALL 12" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(21) INSTALL 18" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(22) INSTALL 24" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(23) INSTALL 30" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(24) INSTALL 36" RCP STORM DRAIN PIPE (WATERTIGHT JOINTS & BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(25) CONSTRUCT MODIFIED JUNCTION STRUCTURE PER RCFC & WCD STD. NO. ___

(26) CONSTRUCT MANHOLE PER SPPWC STD. 321-2

(27) CONSTRUCT CATCH BASIN PER GRADING PLANS

(28) INSTALL UNDERGROUND DETENTION SYSTEM, SIZE PER PLAN

(29) INSTALL MODULAR WETLAND UNIT, SIZE PER PLAN

(30) CONSTRUCT HEADWALL STRUCTURE PER ___. APRON PER ___.

(31) CONSTRUCT WATER QUALITY SUMP PUMP STRUCTURE & PUMPS ON RAIL SYSTEM

(32) CONSTRUCT DUPLEX SD LIFT STATION JENSEN 472 (OR EQUAL) WITH HOMA PUMPS 0.5 CFS WITH 15' HEADLOSS

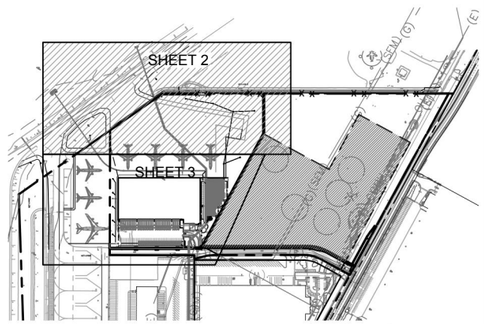
(33) CONSTRUCT 8" PVC SDFM WITH RESTRAINED JOINTS

(34) INSTALL STORM DRAIN CONNECTION FLAP GATE

(35) CONSTRUCT MANHOLE WITH STEEL WEIR PLATE

(36) CONSTRUCT CONCRETE WET VAULT SIZE PER PLAN

(37) CONSTRUCT 30" RCP STORM DRAIN CULVERT



KEY MAP
NTS

60' 0' 60' 120' 240'
GRAPHIC SCALE: 1"=60'

NOTES:

1. NO RUN-ON IS EXPECTED FOR THE SITE
2. INFILTRATION IS CONSIDERED INFEASIBLE ON THE PROJECT SITE.
3. THE SITE IS LOCATED IN HCOC EXEMPT AREA

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

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

JEPTHA BRANDER
R.C.E. 83987
DATE

NOT FOR CONSTRUCTION

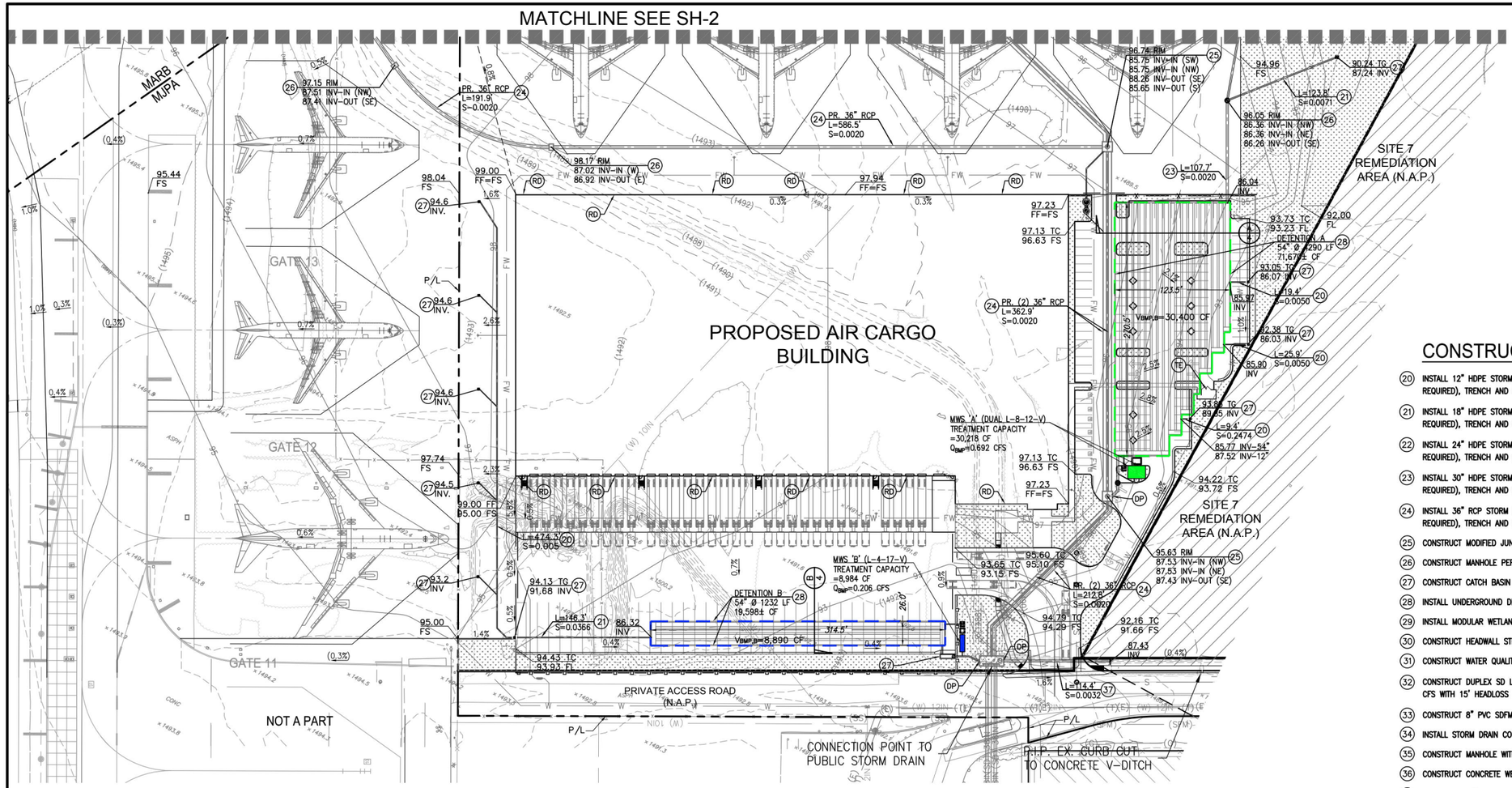
NO.:	REVISION:	DATE:

PROJECT: D-1 PARCEL (PP 20-06)
MARCH AIR RESERVE BASE
RIVERSIDE, CA

DRAWING NAME: POST-CONSTRUCTION BMP SITE PLAN

ISSUE:	EXHIBIT
DATE:	2022-01-14
CHECKED: JB	DRAWN: NS
DRAWING FILE: 20522EXH101	
PROJECT NO.: 20-522	
SHEET NUMBER: 2 OF 5 SHEETS	
SCALE: AS NOTED	

FILENAME: M:\2020\20-522 Riverside Meridian Base D1 Parcel\WQMP\WQMP Site Plan\20-522_WQMP Post-Construction BMP Site Plan.dwg, LAST SAVED ON: Feb 22 2022 11:10am PLOTTED BY: NICHOLAS, ON: Feb 22 2022 11:10am, CFG:



CONSTRUCTION NOTES:

20. INSTALL 12" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
21. INSTALL 18" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
22. INSTALL 24" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
23. INSTALL 30" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
24. INSTALL 36" RCP STORM DRAIN PIPE (WATERTIGHT JOINTS & BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
25. CONSTRUCT MODIFIED JUNCTION STRUCTURE PER RCFC & WCD STD. NO. ____
26. CONSTRUCT MANHOLE PER SPPWC STD. 321-2
27. CONSTRUCT CATCH BASIN PER GRADING PLANS
28. INSTALL UNDERGROUND DETENTION SYSTEM, SIZE PER PLAN
29. INSTALL MODULAR WETLAND UNIT, SIZE PER PLAN
30. CONSTRUCT HEADWALL STRUCTURE PER ____, APRON PER ____.
31. CONSTRUCT WATER QUALITY SUMP PUMP STRUCTURE & PUMPS ON RAIL SYSTEM
32. CONSTRUCT DUPLEX SD LIFT STATION JENSEN 472 (OR EQUAL) WITH HOMA PUMPS 0.5 CFS WITH 15' HEADLOSS
33. CONSTRUCT 8" PVC SDFM WITH RESTRAINED JOINTS
34. INSTALL STORM DRAIN CONNECTION FLAP GATE
35. CONSTRUCT MANHOLE WITH STEEL WEIR PLATE
36. CONSTRUCT CONCRETE WET VAULT SIZE PER PLAN
37. CONSTRUCT 30" RCP STORM DRAIN CULVERT

LEGEND

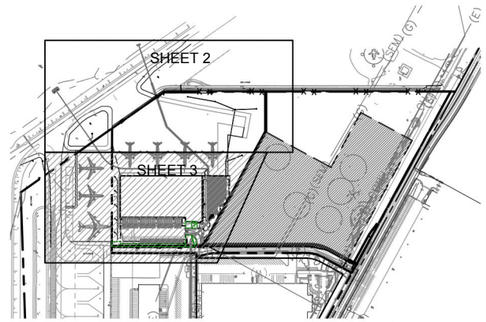
- TE — PROPOSED TRASH ENCLSOURE – SEE DETAIL ON SHEET 6
- RD — PROPOSED ROOF RUNOFF DOWNSPOUT
- DP — DISCHARGE POINT
- SELF TREATING AREA PER DETAIL ON SHEET 6
- LANDSCAPE AREA

NOTE: NO POINTS OF RUN-ON LOCATED ON SITE.

- DETENTION SYSTEM A (DET A)
- DETENTION SYSTEM B (DET B)
- MODULAR WETLANDS UNIT (BIO A)
- MODULAR WETLANDS UNIT (BIO B)

NOTES:

1. NO RUN-ON IS EXPECTED FOR THE SITE
2. INFILTRATION IS CONSIDERED INFEASIBLE ON THE PROJECT SITE.
3. THE SITE IS LOCATED IN HCOC EXEMPT AREA



KEY MAP
NTS

60' 0' 60' 120' 240'
GRAPHIC SCALE: 1"=60'

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

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

#PTHA BRANDER
R.C.E. 83987
DATE

NOT FOR CONSTRUCTION

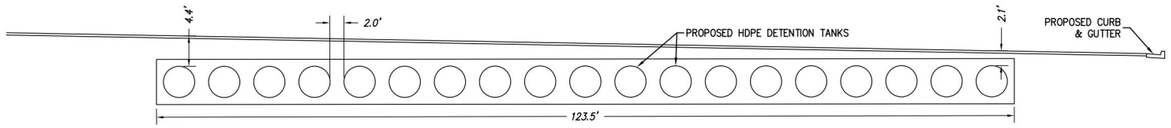
NO.:	REVISION:	DATE:

PROJECT: D-1 PARCEL (PP 20-06)
MARCH AIR RESERVE BASE
RIVERSIDE, CA

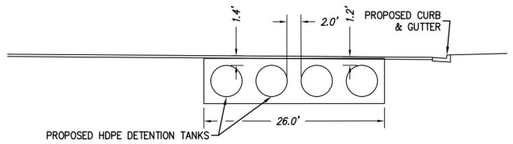
DRAWING NAME: POST-CONSTRUCTION BMP SITE PLAN

ISSUE:	EXHIBIT
DATE:	2022-01-14
CHECKED: JB	DRAWN: NS
DRAWING FILE:	20522EXH101
PROJECT NO.:	20-522
SHEET NUMBER:	4
OF	5 SHEETS
SCALE:	AS NOTED

FILENAME: M:\2020\20-522 Riverside Meridian Base D1 Parcel\WQMP\WQMP Site Plan\20-522_WQMP Post-Construction BMP Site Plan.dwg, LAST SAVED ON: Feb 22 2022 11:10am PLOTTED BY: NICHOLAS, ON: Feb 22 2022 11:10am, CFG:



SECTION A
N.T.S.



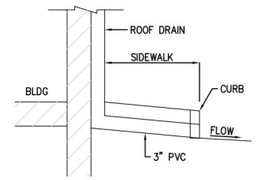
SECTION B
N.T.S.

LEGEND

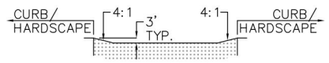
- (TE) PROPOSED TRASH ENCLSOURE – SEE DETAIL ON SHEET 6
- (RD) PROPOSED ROOF RUNOFF DOWNSPOUT
- (DP) DISCHARGE POINT
- SELF TREATING AREA PER DETAIL ON SHEET 6
- LANDSCAPE AREA

NOTE: NO POINTS OF RUN–ON LOCATED ON SITE.

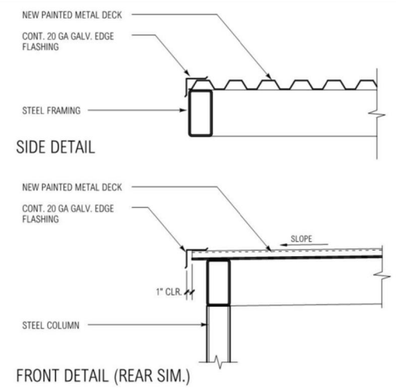
- DETENTION SYSTEM A (DET A)
- DETENTION SYSTEM B (DET B)
- MODULAR WETLANDS UNIT (BIO A)
- MODULAR WETLANDS UNIT (BIO B)

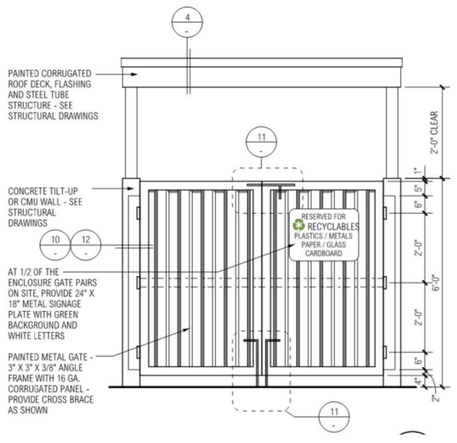


TYPICAL ROOF DRAIN DETAIL
N.T.S.



SELF–TREATING LANDSCAPE AREAS
N.T.S.





NOTE: FINAL TRASH ENCLOSURE (SIZE/LOCATION) SHALL BE PER INDIVIDUAL SITE GRADING AND BUILDING PLANS

TRASH ENCLOSURE DETAIL
SCALE: 1"=10'

60' 0' 60' 120' 240'
GRAPHIC SCALE: 1"=60'

160 S. Old Springs Road
Suite 210
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714-685-6860
JDRC Engineering, Inc.
Civil Engineering/Land Surveying/Land Planning
R.C.E. 83987
DATE
JEPTHA BRANDER

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT: D-1 PARCEL (PP 20-06)
MARCH AIR RESERVE BASE
RIVERSIDE, CA

DRAWING NAME: POST-CONSTRUCTION BMP SITE PLAN

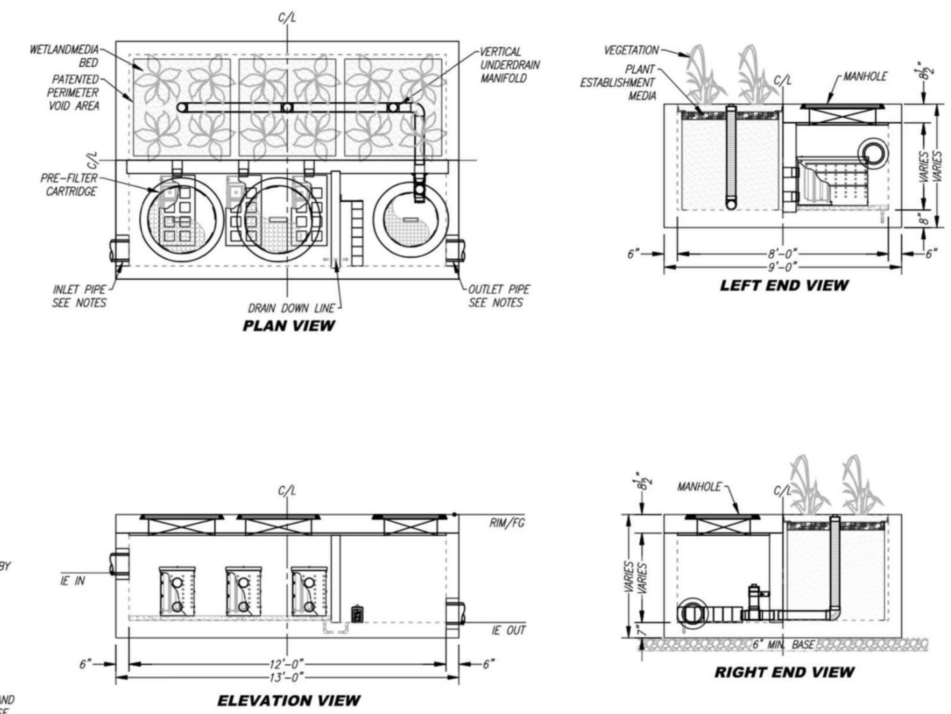
ISSUE:	EXHIBIT
DATE:	2022-01-14
CHECKED: JB	DRAWN: NS
DRAWING FILE: 20522EXH101	
PROJECT NO.: 20-522	
SHEET NUMBER: 6	
OF 5 SHEETS	
SCALE: AS NOTED	

FILENAME: M:\2020\20-522 Riverside Meridian Base 01 Parcel\WQMP\WQMP Site Plan\20-522_WQMP Post-Construction BMP Site Plan.dwg, LAST SAVED ON: Feb 22 2022 11:10am PLOTTED BY: NICHOLAS, ON: Feb 22 2022 11:11am, CFG:

SITE SPECIFIC DATA

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.346	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANT	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



INSTALLATION NOTES

1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

5/23/19TOLEE

TREATMENT FLOW (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

THIS PRODUCT MAY BE PROTECTED BY ONE OR MORE OF THE FOLLOWING US PATENTS: 7,425,262; 7,470,362; 7,674,378; 8,303,816; RELATED FOREIGN PATENTS OR OTHER PATENTS PENDING

PROPRIETARY AND CONFIDENTIAL:

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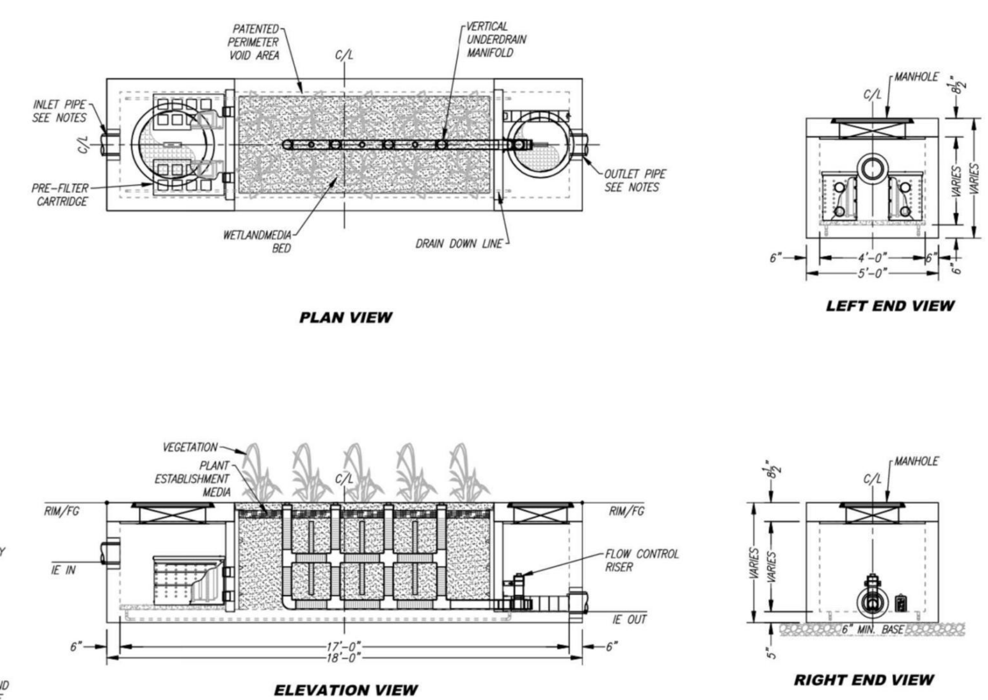
Bio Clean
A Forterra Company

MWS-L-8-12-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

SITE SPECIFIC DATA

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.206	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	ø30"	OPEN PLAN	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



INSTALLATION NOTES

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2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
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GENERAL NOTES

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2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.

5/23/19TOLEE

TREATMENT FLOW (CFS)	0.206
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.8
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MODULAR WETLANDS

PROPRIETARY AND CONFIDENTIAL:

THE INFORMATION CONTAINED IN THIS DRAWING IS THE SOLE PROPERTY OF MODULAR WETLANDS SYSTEMS. ANY REPRODUCTION IN PART OR AS A WHOLE WITHOUT THE WRITTEN PERMISSION OF MODULAR WETLANDS SYSTEMS IS PROHIBITED.

Bio Clean
A Forterra Company

MWS-L-4-17-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

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

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

JEPTHA BRANDER R.C.E. 83987 DATE

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT: **D-1 PARCEL (PP 20-06)**
MARCH AIR RESERVE BASE
RIVERSIDE, CA

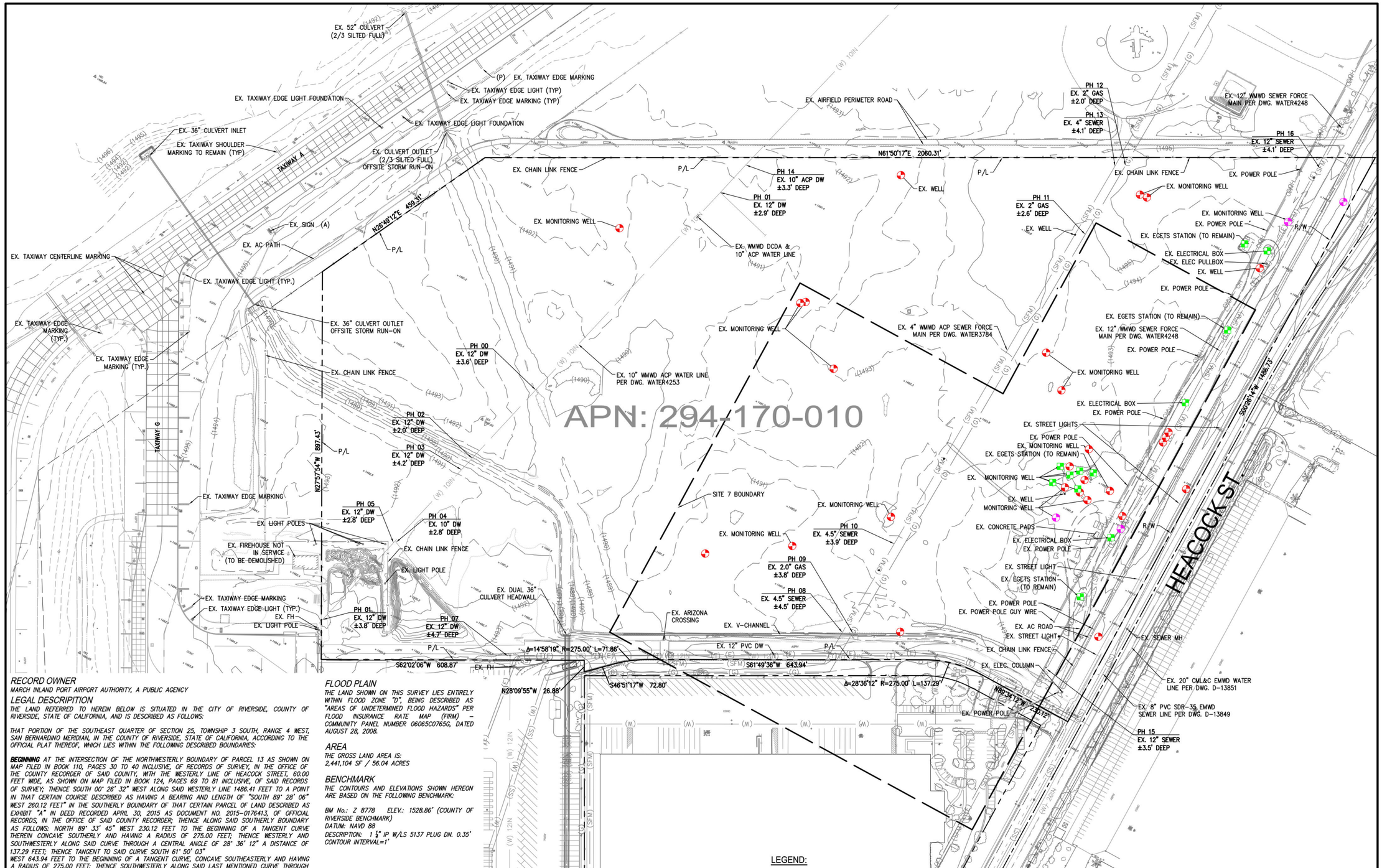
DRAWING NAME: **POST-CONSTRUCTION BMP SITE PLAN**

ISSUE:	EXHIBIT
DATE:	2022-01-14
CHECKED: JB	DRAWN: NS
DRAWING FILE:	20522EXH101
PROJECT NO.:	20-522
SHEET NUMBER:	7
OF 5 SHEETS	
SCALE:	AS NOTED

FILENAME: M:\2020\20-522 Riverside Meridian Base D1 Parcel\WQMP\WQMP Site Plan\20-522_WQMP Post-Construction BMP Site Plan.dwg, LAST SAVED ON: Feb 22 2022 11:10am PLOTTED BY: NICHOLAS, ON: Feb 22 2022 11:12am, CFG:

Appendix 2: Construction Plans

Grading and Drainage Plans



RECORD OWNER

MARCH INLAND PORT AIRPORT AUTHORITY, A PUBLIC AGENCY

LEGAL DESCRIPITION

THE LAND REFERRED TO HEREIN BELOW IS SITUATED IN THE CITY OF RIVERSIDE, COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, AND IS DESCRIBED AS FOLLOWS:

THAT PORTION OF THE SOUTHEAST QUARTER OF SECTION 25, TOWNSHIP 3 SOUTH, RANGE 4 WEST, SAN BERNARDINO MERIDIAN, IN THE COUNTY OF RIVERSIDE, STATE OF CALIFORNIA, ACCORDING TO THE OFFICIAL PLAT THEREOF, WHICH LIES WITHIN THE FOLLOWING DESCRIBED BOUNDARIES:

***BEGINNING** AT THE INTERSECTION OF THE NORTHWESTERLY BOUNDARY OF PARCEL 13 AS SHOWN ON MAP FILED IN BOOK 110, PAGES 30 TO 40 INCLUSIVE, OF RECORDS OF SURVEY, IN THE OFFICE OF THE COUNTY RECORDER OF SAID COUNTY, WITH THE WESTERLY LINE OF HEACOCK STREET, 60.00 FEET WIDE, AS SHOWN ON MAP FILED IN BOOK 124, PAGES 69 TO 81 INCLUSIVE, OF SAID RECORDS OF SURVEY; THENCE SOUTH 00° 26' 32" WEST ALONG SAID WESTERLY LINE 1486.41 FEET TO A POINT IN THAT CERTAIN COURSE DESCRIBED AS HAVING A BEARING AND LENGTH OF "SOUTH 89° 28' 06" WEST 260.12 FEET" IN THE SOUTHERLY BOUNDARY OF THAT CERTAIN PARCEL OF LAND DESCRIBED AS EXHIBIT "A" IN DEED RECORDED APRIL 30, 2015 AS DOCUMENT NO. 2015-0176413, OF OFFICIAL RECORDS, IN THE OFFICE OF SAID COUNTY RECORDER; THENCE ALONG SAID SOUTHERLY BOUNDARY AS FOLLOWS: NORTH 89° 33' 45" WEST 230.12 FEET TO THE BEGINNING OF A TANGENT CURVE THEREIN CONCAVE SOUTHERLY AND HAVING A RADIUS OF 275.00 FEET; THENCE WESTERLY AND SOUTHWESTERLY ALONG SAID CURVE THROUGH A CENTRAL ANGLE OF 28° 36' 12" A DISTANCE OF 137.29 FEET; THENCE TANGENT TO SAID CURVE SOUTH 61° 50' 03" WEST 643.94 FEET TO THE BEGINNING OF A TANGENT CURVE, CONCAVE SOUTHEASTERLY AND HAVING A RADIUS OF 275.00 FEET; THENCE SOUTHWESTERLY ALONG SAID LAST MENTIONED CURVE THROUGH A CENTRAL ANGLE OF 14° 58' 19" A DISTANCE OF 71.86 FEET; THENCE TANGENT TO SAID LAST MENTIONED CURVE SOUTH 46° 51' 44" WEST 72.73 FEET TO A POINT IN THAT CERTAIN COURSE DESCRIBED AS HAVING A BEARING AND LENGTH OF "NORTH 29° 07' 37" WEST 35.46 FEET IN THE NORTHEASTERLY BOUNDARY OF THAT CERTAIN PARCEL OF LAND DESCRIBED AS EXHIBIT A IN DEED RECORDED MAY 12, 2005 AS DOCUMENT NO. 2005-0377594, OF SAID OFFICIAL RECORDS; THENCE ALONG SAID LAST MENTIONED CERTAIN COURSE NORTH 28° 09' 28" WEST 26.34 FEET TO THE NORTHEASTERLY CORNER OF SAID LAST MENTIONED CERTAIN PARCEL OF LAND; THENCE ALONG THE NORTHWESTERLY BOUNDARY OF SAID LAST MENTIONED CERTAIN PARCEL OF LAND SOUTH 62° 02' 33" WEST 608.87 FEET; THENCE AT RIGHT ANGLES TO SAID LAST MENTIONED COURSE NORTH 27° 57' 27" WEST 897.73 FEET TO THE NORTHWESTERLY BOUNDARY OF SAID PARCEL 13; THENCE ALONG SAID LAST MENTIONED NORTHWESTERLY BOUNDARY THE FOLLOWING DESCRIBED TWO COURSES: NORTH 26° 49' 10" EAST 459.32 FEET AND NORTH 61° 50' 52" EAST 2,060.07 FEET TO THE **POINT OF BEGINNING**.*

FOR LEASEHOLD ESTATE CREATION.

FLOOD PLAIN

THE LAND SHOWN ON THIS SURVEY LIES ENTIRELY WITHIN FLOOD ZONE "D", BEING DESCRIBED AS "AREAS OF UNDETERMINED FLOOD HAZARDS" PER FLOOD INSURANCE RATE MAP (FIRM) – COMMUNITY PANEL NUMBER 06065C0765G, DATED AUGUST 28, 2008.

AREA

THE GROSS LAND AREA IS:
2,441,104 SF / 56.04 ACRES

BENCHMARK

THE CONTOURS AND ELEVATIONS SHOWN HEREON ARE BASED ON THE FOLLOWING BENCHMARK:

BM No.: Z 8778 ELEV.: 1528.86' (COUNTY OF RIVERSIDE BENCHMARK)
DATUM: NAVD 88
DESCRIPTION: 1 ½" IP W/LS 5137 PLUG DN. 0.35'
CONTOUR INTERVAL=1'

LEGEND:

- EXISTING MONITORING WELL
- EXISTING EXTRACTION WELL

NOTE: ALL WELLS SHOWN HEREON WITHIN PROPOSED SITE DEVELOPMENT WILL BE REMOVED, RELOCATED, AND/OR ADJUSTED TO GRADE PER SEPARATE PLAN & PERMIT PROCESS.

- PROPERTY LINE
- SITE 7 AS DEFINED DOCUMENT 2007-0675899
- STREET CENTERLINE

100' 50' 0' 100' 200'
GRAPHIC SCALE: 1 INCH = 100 FT

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

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

NOT FOR CONSTRUCTION

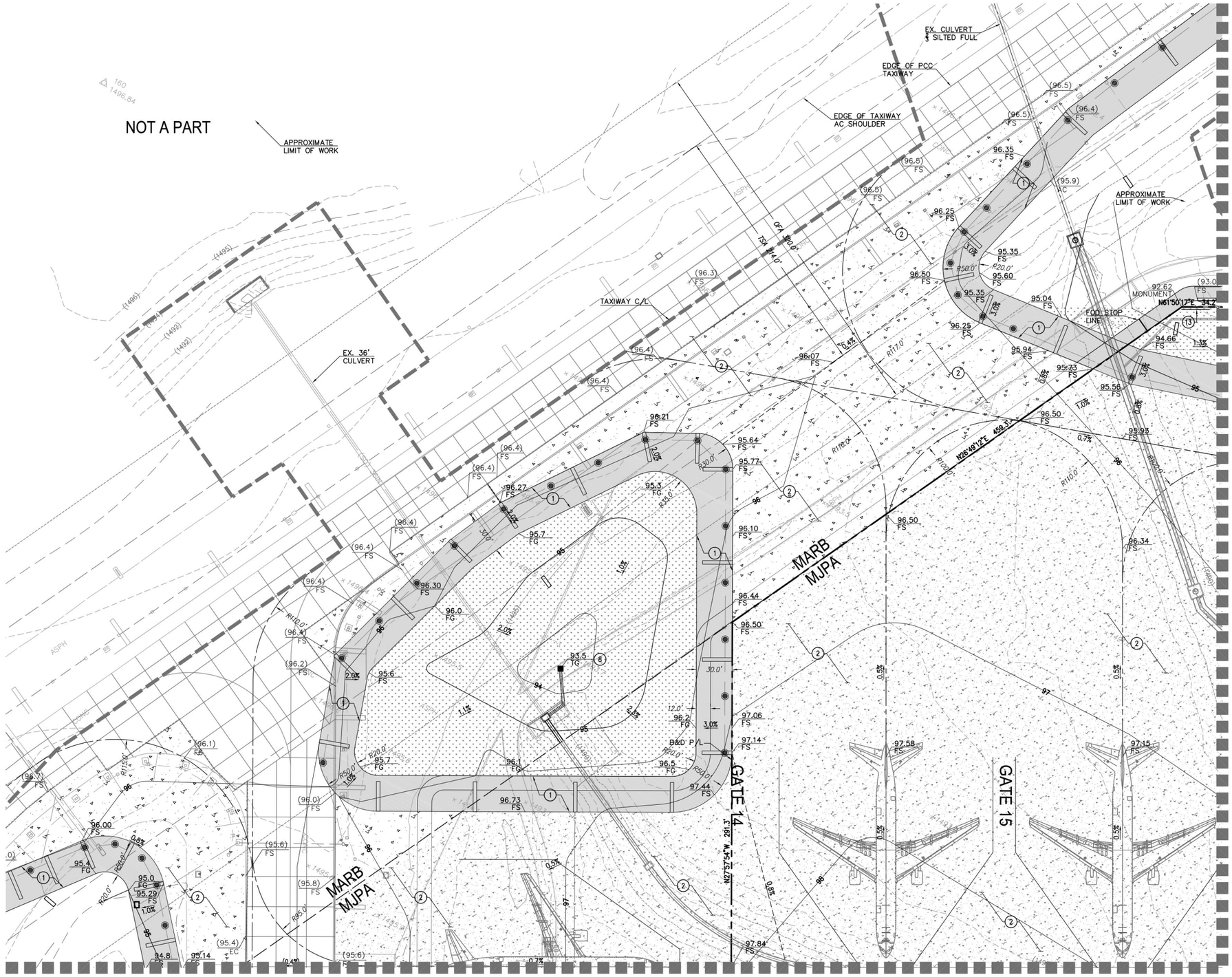
NO.:	REVISION:	DATE:

PROJECT: MARCH INLAND PORT AUTHORITY
CARGO GATEWAY D1 PARCEL
RIVERSIDE COUNTY, CA

DRAWING NAME: EXISTING GRADE SITE PLAN

ISSUE:	CONCEPTUAL
DATE:	2022/01/12
CHECKED: JB	DRAWN: NS
DRAWING FILE: 20-522 CG	
PROJECT NO.: 20-522	
SHEET NUMBER:	1
OF 11	SHEETS
SCALE: AS SHOWN	

FILENAME: M:\2020\20-522 Riverside Meridian Base D1 Parcel\CG\20-522 cg101 sp.dwg, LAST SAVED ON: Oct 12 2020 10:49am PLOTTED BY: NICHOLAS, ON: Feb 22 2022 11:16am, CFG:



CONSTRUCTION NOTES:

- (LS) INSTALL LANDSCAPING PER SEPARATE PLANS.
- (1) CONSTRUCT AIRCRAFT AC SHOULDER PAVEMENT PER GEO-TECH RECOMMENDATIONS
- (2) CONSTRUCT AIRCRAFT PCC PAVEMENT PER GEO-TECH RECOMMENDATIONS
- (3) CONSTRUCT PCC PAVEMENT PER GEO-TECH RECOMMENDATIONS
- (4) CONSTRUCT 6" CONCRETE CURB & GUTTER RIVERSIDE CO. STD. 200
- (5) CONSTRUCT 6" CONCRETE CURB
- (6) CONSTRUCT DRIVEWAY PER COUNTY OF RIVERSIDE CO. STD. 207 WITH CROSS GUTTER PER STD. 209
- (7) CONSTRUCT MODIFIED CURB OPENING CATCH BASIN WITH HIGH-FLOW BYPASS ORIFICE
- (8) CONSTRUCT DROP INLET 3' U.N.O.
- (9) CONSTRUCT V-GUTTER
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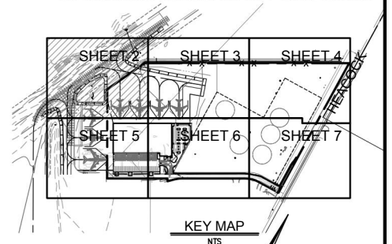
- (16) CONSTRUCT SD HEADWALL STRUCTURE WITH DEBRIS RACK
- (17) CONSTRUCT AC PAVING FOR PERIMETER PATROL ROAD
- (18) CONSTRUCT CMU RETAINING WALL
- (19) MONITORING WELL TO BE REMOVED, RELOCATED, OR ADJUSTED TO GRADE
- (20) CONSTRUCT CURB RAMP

GENERAL NOTES:

1. GC SHALL AT MINIMUM FOLLOW AND IMPLEMENT BMP RECOMMENDATIONS AS OUTLINED BY CASQA FOR WORK.
2. GC TO OBTAIN NECESSARY ENCROACHMENT PERMIT FOR ANY/ALL WORK IN THE PUBLIC RIGHT-OF-WAY.
3. ALL WORK IN THE PUBLIC RIGHT-OF-WAY TO CONFORM TO STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (CURRENT EDITION) AND AS AMENDMENTS AND SPECIFICATIONS BY MJPA.
4. GC TO PROVIDE NECESSARY TRAFFIC CONTROL/MANAGEMENT PLAN FOR PERMITS.
5. EXISTING UTILITIES SHOWN HEREON MAY REQUIRE ADJUSTMENT TO FINAL FINISH GRADE
6. EXISTING MONITORING WELLS LOCATED THROUGHOUT THE SITE WILL BE REMOVED, RELOCATED, AND/OR ADJUSTED TO FINAL FINISH GRADE.
7. GC SHALL COORDINATE WITH LANDSCAPE PLANS TO ACHIEVE FINISH GRADES SHOWN HEREON. (FINISH L/S GRADES TYPICALLY 1" - 2" BELOW ADJACENT HARDSCAPE FEATURES).
8. SIGNING, STRIPING, AND PAVEMENT MARKING SHOWN HEREON ARE FOR REFERENCE; SEE ARCHITECTURAL PLANS FOR DETAILS.
9. SEE ARCHITECTURAL PLANS FOR SITE LIGHTING.
10. DETECTABLE WARNINGS SHOWN AT LOCATIONS SHOWN HEREON SHALL BE FEDERAL YELLOW CONFORMING TO CBC.
11. ALL NON-METALLIC UNDERGROUND CONDUIT AND PIPE SHALL BE INSTALLED WITH CHRISTY'S (OR APPROVED EQUAL) DETECTABLE TAPE.
12. PRIVATE WATER AND SEWER PIPE INSTALLATION SHALL MAINTAIN:
    - 12.1. 1' HORIZONTAL SEPARATION (WALL TO WALL)
    - 12.2. WATER CROSSES OVER SEWER WITH MIN. 1' VERTICAL SEPARATION



KEY MAP
NTS

40' 20' 0' 40' 80'
GRAPHIC SCALE: 1 INCH = 40 FT

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

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

NOT FOR CONSTRUCTION

NO.:	REVISION:	DATE:

PROJECT: MARCH INLAND PORT AUTHORITY
CARGO GATEWAY D1 PARCEL
RIVERSIDE COUNTY, CA

DRAWING NAME: CONCEPTUAL GRADING PLAN

ISSUE:	CONCEPTUAL
DATE:	2022/01/12
CHECKED: JB	DRAWN: NS
DRAWING FILE: 20-522 CG	
PROJECT NO.: 20-522	
SHEET NUMBER:	2
OF	11 SHEETS
SCALE: AS SHOWN	

FILENAME: M:\2020\20-522 Riverside Meridian Base 01 Parcel\CG\20-522 cg102-107 cg.dwg, LAST SAVED ON: Jan 13 2022 10:05am PLOTTED BY: NICHOLAS, ON: Feb 22 2022 11:17am, CFG:

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- (1) CONSTRUCT AIRCRAFT AC SHOULDER PAVEMENT PER GEO-TECH RECOMMENDATIONS
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APPROXIMATE LIMIT OF WORK

NOT A PART

MARB
MJPA

EX. 10" WMWD WATER LINE

TAXILANE EDGE

RUNWAY 12-30 CLEAR ZONE

SITE 7 REMEDIATION AREA (N.A.P.) CONTAMINATED SOIL

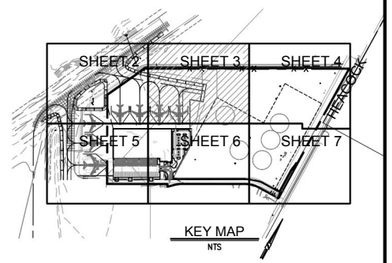
GATE 16

GATE 17

MATCHLINE SEE SH-02

MATCHLINE SEE SH-4

MATCHLINE SEE SH-6



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NOT A PART

APPROXIMATE LIMIT OF WORK

MARB

MJPA

MATCHLINE SEE SH-3

SITE 7 REMEDIATION AREA (N.A.P.) CONTAMINATED SOIL

MATCHLINE SEE SH-7

MATCHLINE SEE SH-7

HEACOCK

N61°30'17"E 1007.4'

N00°28'14"E 604.9'

CONSTRUCTION NOTES:

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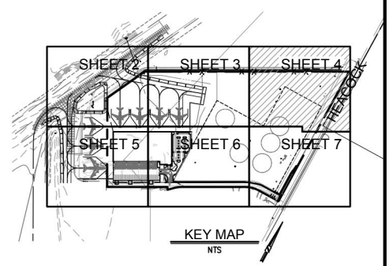

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MATCHLINE SEE SH-2

NOT A PART

GATE 13

GATE 12

GATE 11

NOT A PART

APPROXIMATE BUILDING OVEREXCAVATION LIMIT (SEE GEO-TECH REPORT)

PROPOSED AIR CARGO BUILDING

UNDERGROUND DETENTION BASIN (SEE SD PLANS)

FOD STOP LINE

APPROXIMATE LIMIT OF WORK

MATCHLINE SEE SH-6

CONSTRUCTION NOTES:

(LS) INSTALL LANDSCAPING PER SEPARATE PLANS.

(1) CONSTRUCT AIRCRAFT AC SHOULDER PAVEMENT PER GEO-TECH RECOMMENDATIONS

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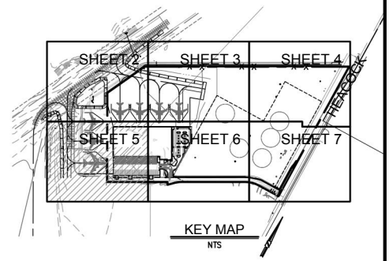

KEY MAP
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MATCHLINE SEE SH-3

MATCHLINE SEE SH-5

MATCHLINE SEE SH-07

PROPOSED AIR CARGO BUILDING

APPROXIMATE BUILDING OVEREXCAVATION LIMIT (SEE GEO-TECH REPORT)

UNDERGROUND DETENTION BASIN (SEE SD PLANS)

COVERED TRASH ENCLOSURE PER ARCH. PLANS

APPROXIMATE LIMIT OF WORK

SITE 7 REMEDIATION AREA (N.A.P.) CONTAMINATED SOIL

EX DUAL 36" RCP OUTLET HEADWALL

TWIN 36" INV.

NOT A PART

CONSTRUCTION NOTES:

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SHEET 2 | SHEET 3 | SHEET 4 | SHEET 5 | SHEET 6 | SHEET 7

KEY MAP
NTS

GRAPHIC SCALE: 1 INCH = 40 FT

NOT FOR CONSTRUCTION

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714-685-6860

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Civil Engineering/Land Surveying/Land Planning

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MATCHLINE SEE SH-4

MATCHLINE SEE SH-4

MATCHLINE SEE SH-6

SITE 7 REMEDIATION
AREA (N.A.P.)
CONTAMINATED SOIL

NOT A PART

EX. GATE AND AC ROAD TO REMAIN AS PRIMARY ACCESS POINT FOR SITE 7 REMEDIATION TEAM

CONSTRUCT RIGHT TURN POCKET WITH NEW 6" CURB & GUTTER AND 6' WALK

RELOCATE EX. STREET LINE FOR NEW TURN POCKET

RECONSTRUCT DRIVE APRON

TAPER PER SPPWC STD. DWG. 140-3

HEACOCK

(1491.39)TC
(1490.89)FL

(90.4) FL
(91.6) FL
(0.7%)
(91.68)TC
(91.18)FS
JOIN EX
Δ=20°42'24"
R=275.00'
L=99.38'
N89°34'12"W 230.1'
(90.57)TC
(90.07)FS
JOIN EX
(90.38)TC
(89.88)FL
JOIN EX
N00°28'14"E 791.8'
724.7'
8.5'
12.0'

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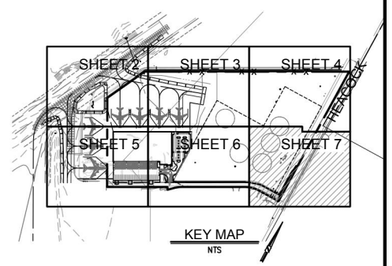

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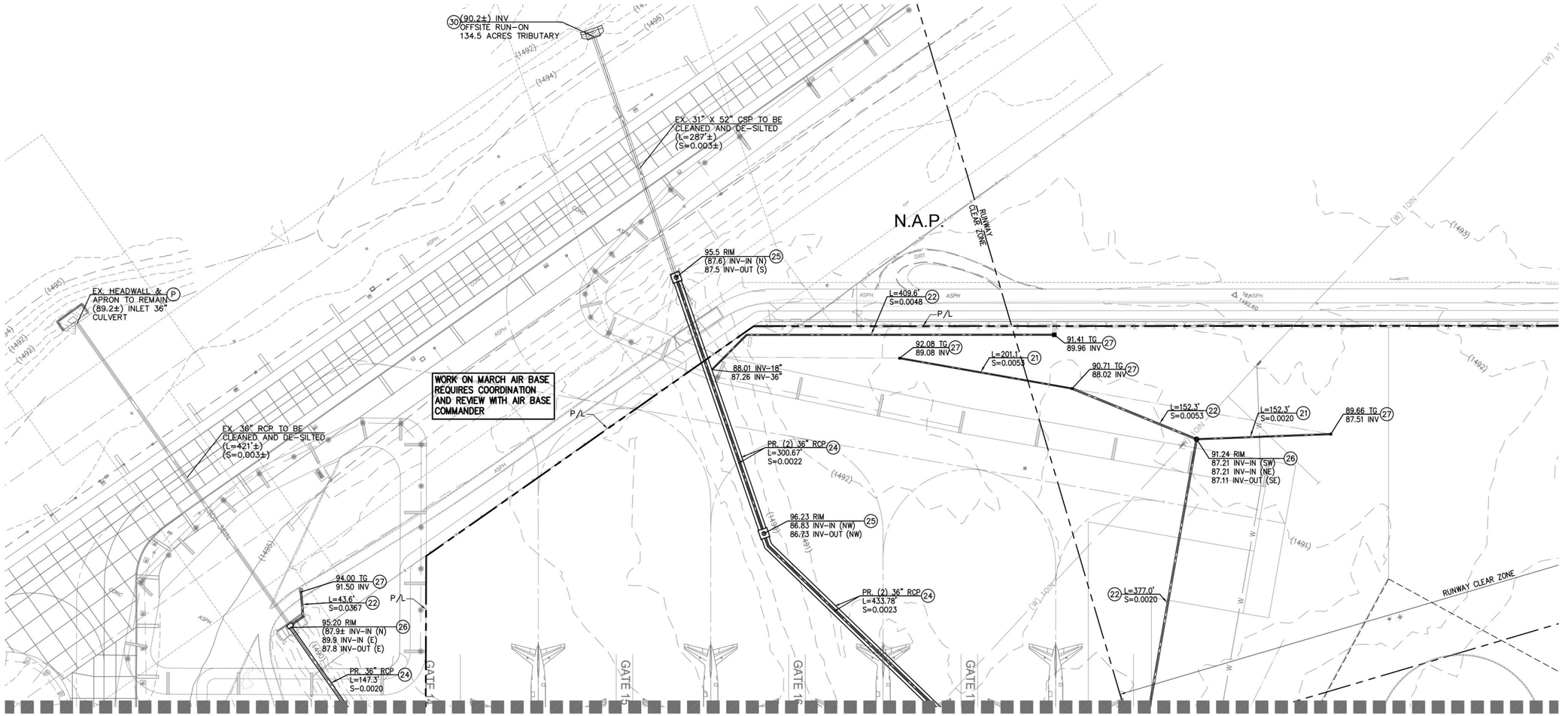


MATCHLINE SEE SH-10

NOTE:
STORM DRAIN VIDEO SHALL BE SUBMITTED TO THE MJPA PUBLIC WORKS ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PAVEMENT CAPPING OR CONCRETING.

NOTE:
ON-SITE STORM DRAINAGE FACILITIES SHALL BE PRIVATELY MAINTAINED.

NOTE:
THE ONSITE WQMP SYSTEM/EQUIPMENT SHALL BE INSPECTED AND CERTIFIED BY MJPA

NOTE:
CONTRACTOR IS RESPONSIBLE FOR EXCAVATION, BEDDING, BACKFILL AND ALL CONSTRUCTION COSTS RELATED TO INSTALLATION OF PIPE TO MEET MANUFACTURER'S INSTALLATION RECOMMENDATIONS AND GEOTECHNICAL RECOMMENDATIONS BASED UPON CONDITIONS SPECIFIC TO THIS PROJECT AND CONTRACTOR PRODUCT SUBMITTAL APPROVED BY CIVIL ENGINEER.

FOR THE UNDERGROUND STORAGE SYSTEM CONTRACTOR CAN PROPOSE ALTERNATE PIPE MATERIALS/LAYOUT PENDING APPROVAL BY OWNER, ENGINEER AND MJPA. CONTRACTOR IS RESPONSIBLE FOR FUNDING ANY POTENTIAL AGENCY FEES FOR REVIEW/APPROVAL OF AN ALTERNATE SYSTEM AND FOR COST OF ENGINEER DESIGN REVIEW/PLAN MODIFICATION. PLEASE NOTE THAT ALTERNATIVE PRODUCTS/LAYOUTS WILL NEED TO MEET OR EXCEED STORAGE CAPACITY, STRUCTURAL CAPACITY AND HYDRAULIC PERFORMANCE AS DETERMINED BY ENGINEER TO BE DEEMED ACCEPTABLE. CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH PROPOSED DESIGN ALTERNATIVE (FOR EXAMPLE REMOVAL OF BEDROCK DURING EXCAVATION OF ALTERNATE LAYOUT). CONTRACTOR IS ALSO RESPONSIBLE FOR TIME REQUIRED FOR REVIEW AND PROCESSING OF ALTERNATE DESIGN.

CONSTRUCTION NOTES:

(20) INSTALL 12" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(21) INSTALL 18" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(22) INSTALL 24" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(23) INSTALL 30" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(24) INSTALL 36" RCP STORM DRAIN PIPE (WATERTIGHT JOINTS & BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS

(25) CONSTRUCT MODIFIED JUNCTION STRUCTURE PER RCFC & WCD STD. NO. ___

(26) CONSTRUCT MANHOLE PER SPPWC STD. 321-2

(27) CONSTRUCT CATCH BASIN PER GRADING PLANS

(28) INSTALL UNDERGROUND DETENTION SYSTEM, SIZE PER PLAN

(29) INSTALL MODULAR WETLAND UNIT, SIZE PER PLAN

(30) CONSTRUCT HEADWALL STRUCTURE PER ___. APRON PER ___.

(31) CONSTRUCT WATER QUALITY SUMP PUMP STRUCTURE & PUMPS ON RAIL SYSTEM

(32) CONSTRUCT DUPLEX SD LIFT STATION JENSEN 472 (OR EQUAL) WITH HOMA PUMPS 0.5 CFS WITH 15' HEADLOSS

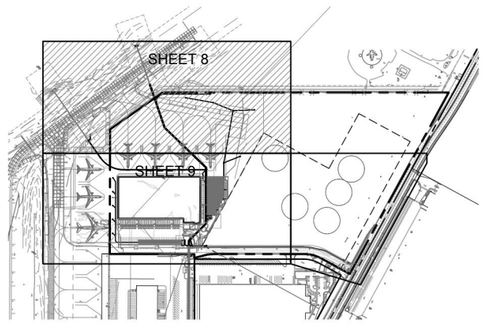
(33) CONSTRUCT 8" PVC SDFM WITH RESTRAINED JOINTS

(34) INSTALL STORM DRAIN CONNECTION FLAP GATE

(35) CONSTRUCT MANHOLE WITH STEEL WEIR PLATE

(36) CONSTRUCT CONCRETE WET VAULT SIZE PER PLAN

(37) CONSTRUCT 30" RCP STORM DRAIN CULVERT



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OF	11 SHEETS
SCALE: AS SHOWN	

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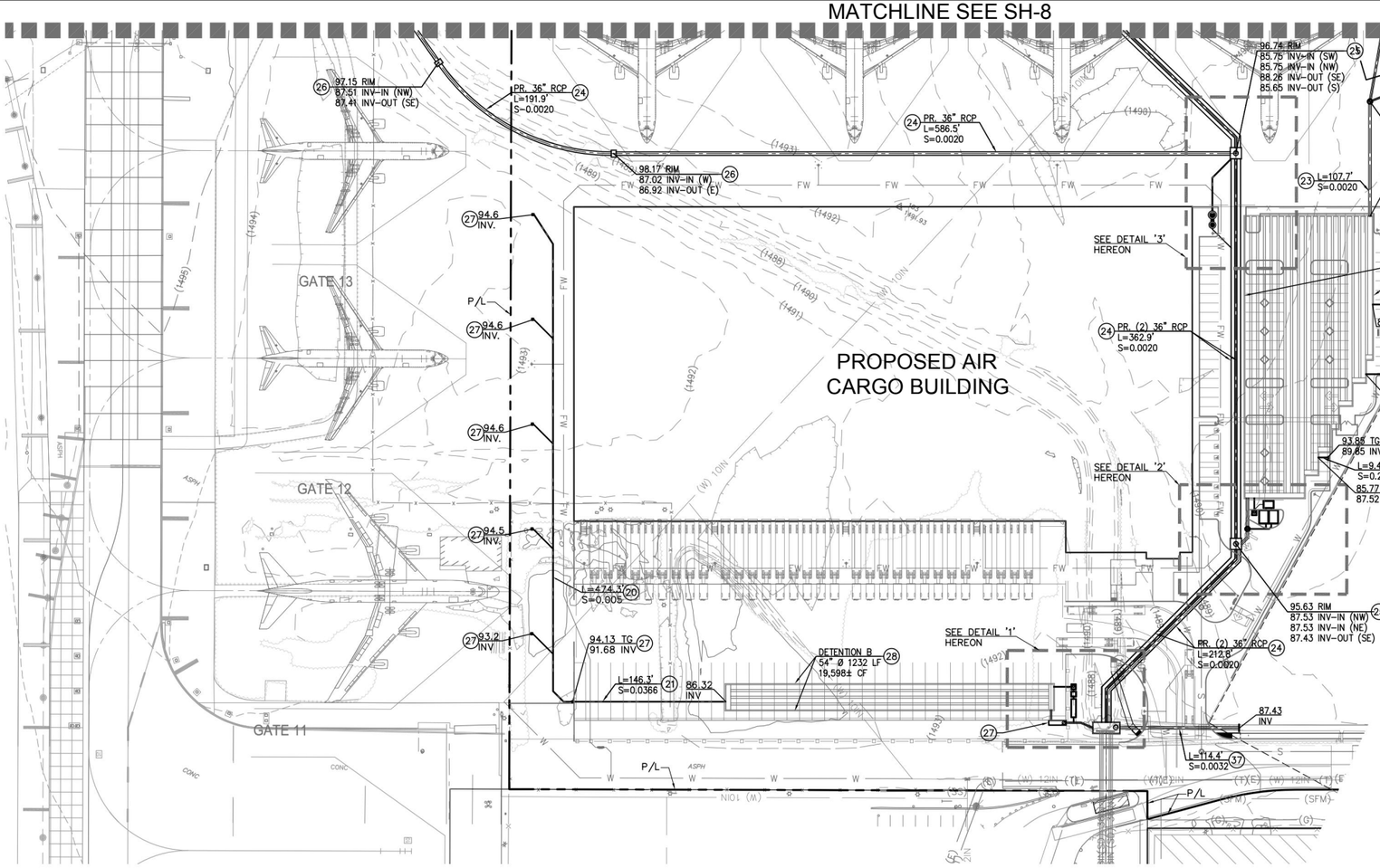

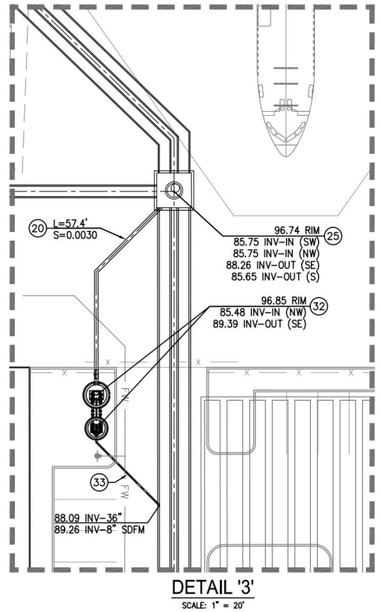

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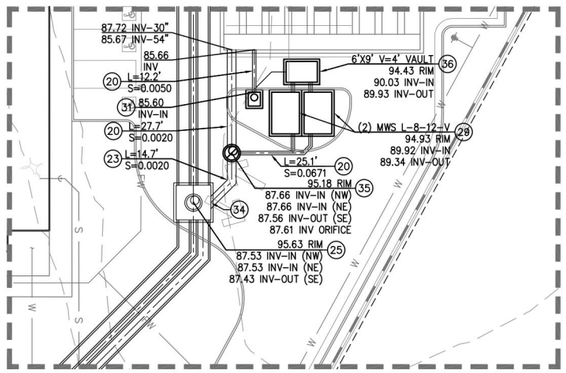

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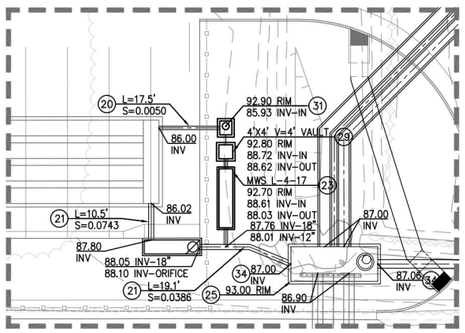


DETAIL '1'
SCALE: 1" = 20'

CONSTRUCTION NOTES:

20. INSTALL 12" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
21. INSTALL 18" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
22. INSTALL 24" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
23. INSTALL 30" HDPE STORM DRAIN PIPE (WATERTIGHT JOINTS WITH BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
24. INSTALL 36" RCP STORM DRAIN PIPE (WATERTIGHT JOINTS & BENDS & FITTINGS AS REQUIRED), TRENCH AND BEDDING PER STANDARD DETAILS
25. CONSTRUCT MODIFIED JUNCTION STRUCTURE PER RCFC & WCD STD. NO. ____
26. CONSTRUCT MANHOLE PER SPPWC STD. 321-2
27. CONSTRUCT CATCH BASIN PER GRADING PLANS
28. INSTALL UNDERGROUND DETENTION SYSTEM, SIZE PER PLAN
29. INSTALL MODULAR WETLAND UNIT, SIZE PER PLAN
30. CONSTRUCT HEADWALL STRUCTURE PER ____. APRON PER ____.
31. CONSTRUCT WATER QUALITY SUMP PUMP STRUCTURE & PUMPS ON RAIL SYSTEM
32. CONSTRUCT DUPLEX SD LIFT STATION JENSEN 472 (OR EQUAL) WITH HOMA PUMPS 0.5 CFS WITH 15' HEADLOSS
33. CONSTRUCT 8" PVC SDFM WITH RESTRAINED JOINTS
34. INSTALL STORM DRAIN CONNECTION FLAP GATE
35. CONSTRUCT MANHOLE WITH STEEL WEIR PLATE
36. CONSTRUCT CONCRETE WET VAULT SIZE PER PLAN
37. CONSTRUCT 30" RCP STORM DRAIN CULVERT

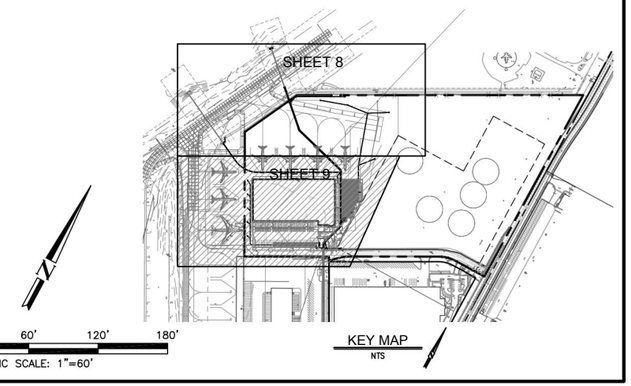
NOTE:
STORM DRAIN VIDEO SHALL BE SUBMITTED TO THE MJPA PUBLIC WORKS ENGINEER FOR REVIEW AND APPROVAL PRIOR TO PAVEMENT CAPPING OR CONCRETING.

NOTE:
ON-SITE STORM DRAINAGE FACILITIES SHALL BE PRIVATELY MAINTAINED.

NOTE:
THE ONSITE WQMP SYSTEM/EQUIPMENT SHALL BE INSPECTED AND CERTIFIED BY MJPA

NOTE:
CONTRACTOR IS RESPONSIBLE FOR EXCAVATION, BEDDING, BACKFILL AND ALL CONSTRUCTION COSTS RELATED TO INSTALLATION OF PIPE TO MEET MANUFACTURER'S INSTALLATION RECOMMENDATIONS AND GEOTECHNICAL RECOMMENDATIONS BASED UPON CONDITIONS SPECIFIC TO THIS PROJECT AND CONTRACTOR PRODUCT SUBMITTAL APPROVED BY CIVIL ENGINEER.

FOR THE UNDERGROUND STORAGE SYSTEM CONTRACTOR CAN PROPOSE ALTERNATE PIPE MATERIALS/LAYOUT PENDING APPROVAL BY OWNER, ENGINEER AND MJPA. CONTRACTOR IS RESPONSIBLE FOR FUNDING ANY POTENTIAL AGENCY FEES FOR REVIEW/APPROVAL OF AN ALTERNATE SYSTEM AND FOR COST OF ENGINEER DESIGN REVIEW/PLAN MODIFICATION. PLEASE NOTE THAT ALTERNATIVE PRODUCTS/LAYOUTS WILL NEED TO MEET OR EXCEED STORAGE CAPACITY, STRUCTURAL CAPACITY AND HYDRAULIC PERFORMANCE AS DETERMINED BY ENGINEER TO BE DEEMED ACCEPTABLE. CONTRACTOR IS RESPONSIBLE FOR ALL COSTS ASSOCIATED WITH PROPOSED DESIGN ALTERNATIVE (FOR EXAMPLE REMOVAL OF BEDROCK DURING EXCAVATION OF ALTERNATE LAYOUT). CONTRACTOR IS ALSO RESPONSIBLE FOR TIME REQUIRED FOR REVIEW AND PROCESSING OF ALTERNATE DESIGN.



KEY MAP
NTS

60' 0' 60' 120' 180'
GRAPHIC SCALE: 1"=60'

NOT FOR CONSTRUCTION

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

NO.:	REVISION:	DATE:

PROJECT: MARCH INLAND PORT AUTHORITY
CARGO GATEWAY D1 PARCEL
RIVERSIDE COUNTY, CA

DRAWING NAME: STORM DRAIN

ISSUE:	CONCEPTUAL
DATE:	2022/01/12
CHECKED: JB	DRAWN: NS
DRAWING FILE: 20-522 CG	
PROJECT NO.: 20-522	
SHEET NUMBER:	9
OF	11 SHEETS
SCALE: AS SHOWN	

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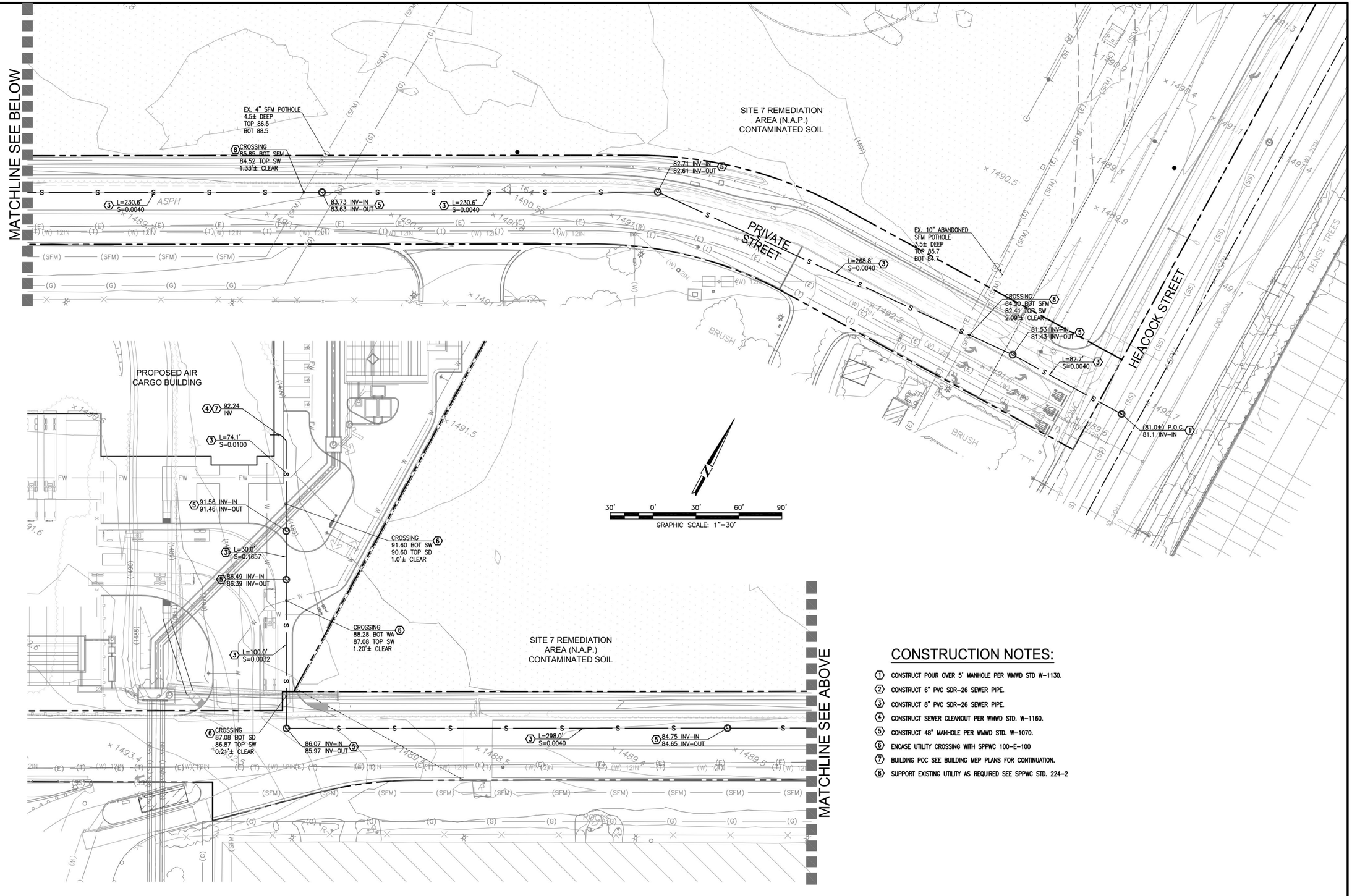

CONSTRUCTION NOTES:

1. CONSTRUCT POUR OVER 5' MANHOLE PER WMWD STD W-1130.
2. CONSTRUCT 6" PVC SDR-26 SEWER PIPE.
3. CONSTRUCT 8" PVC SDR-26 SEWER PIPE.
4. CONSTRUCT SEWER CLEANOUT PER WMWD STD. W-1160.
5. CONSTRUCT 48" MANHOLE PER WMWD STD. W-1070.
6. ENCASE UTILITY CROSSING WITH SPPWC 100-E-100
7. BUILDING POC SEE BUILDING MEP PLANS FOR CONTINUATION.
8. SUPPORT EXISTING UTILITY AS REQUIRED SEE SPPWC STD. 224-2

NOT FOR CONSTRUCTION

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

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

NO.:	REVISION:	DATE:

PROJECT: MARCH INLAND PORT AUTHORITY
CARGO GATEWAY D1 PARCEL
RIVERSIDE COUNTY, CA

DRAWING NAME: CONCEPTUAL SEWER PLAN

ISSUE:	CONCEPTUAL
DATE:	2022/01/12
CHECKED: JB	DRAWN: NS
DRAWING FILE:	20-522 CG
PROJECT NO.:	20-522
SHEET NUMBER:	10
OF	11 SHEETS
SCALE:	AS SHOWN

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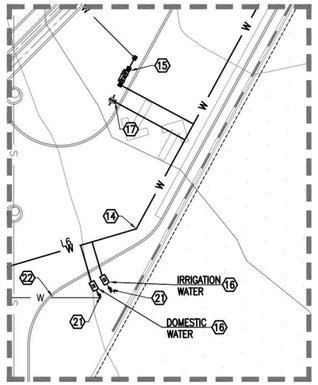
Line Table		
Line #	Length	Direction
L2	345.61'	N18°09'25.24"W
L8	86.02'	N28°09'13.58"W
L7	32.03'	N8°38'30.40"E
L6	51.75'	N45°26'14.38"E
L5	290.78'	N0°26'14.38"E
L4	179.90'	N28°09'13.58"W
L3	94.35'	N16°50'46.42"E
L1	139.01'	N30°04'42.42"W



DETAIL '1'
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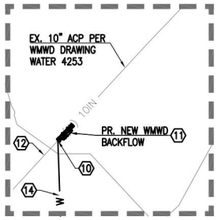

DETAIL '2'
SCALE: 1" = 20'

PUBLIC WATER NOTES:

ALL PUBLIC WATER CONSTRUCTION WILL BE PER SEPARATE PUBLIC UTILITY PLANS.

(10) LOCATE AND CONNECT TO EXISTING WWMD LINE.

(11) EXISTING DOUBLE CHECK VALVE TO BE REMOVED AND/OR RELOCATED PER WWMD PLANS.

(12) EXISTING WWMD WATER LINE TO BE ABANDONED IN PLACE (REMOVED /CRUSHED IN PLACE UNDER BUILDING AS PER GEO-TECHNICAL RECOMMENDATIONS)

(13) INSTALL 8" C-900 (DR-14) PVC WATER PIPELINE PER WWMD STD. DWGS. W-1540 & W-1550 WITH BENDS AND FITTINGS AS REQUIRED. FULLY RESTRAIN ALL JOINTS.

(14) INSTALL 12" C-900 (DR-14) PVC WATER PIPELINE PER WWMD STD. DWGS. W-1540 & W-1550 WITH BENDS AND FITTINGS AS REQUIRED. FULLY RESTRAIN ALL JOINTS.

(15) INSTALL FIRE DEPARTMENT SERVICE CONNECTION PER WWMD. STD. W-0530P1.

(16) INSTALL 2" DOMESTIC SERVICE WITH METER BOX AND ANGLE METER STOP PER WWMD STD. W-0110.

(17) INSTALL 6" SUPER FIRE HYDRANT PER WWMD STD. W-0610 AND PER COUNTY OF RIVERSIDE STD. 701.

(18) CONSTRUCT CONCRETE ENCASEMENT PER WWMD STD. W-1040.

GENERAL NOTES:

1. GC SHALL AT MINIMUM FOLLOW AND IMPLEMENT BMP RECOMMENDATIONS AS OUTLINED BY CASQA FOR WORK.
2. GC TO OBTAIN NECESSARY ENCROACHMENT PERMIT FOR ANY/ALL WORK IN THE PUBLIC RIGHT-OF-WAY.
3. ALL WORK IN THE PUBLIC RIGHT-OF-WAY TO CONFORM TO STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION (CURRENT EDITION) AND AS AMENDMENTS AND SPECIFICATIONS BY MJPA.
4. GC TO PROVIDE NECESSARY TRAFFIC CONTROL/MANAGEMENT PLAN FOR PERMITS.
5. GC TO COORDINATE WITH PUBLIC WORKS DEPARTMENT FOR FIELD WALK TO IDENTIFY LIMITS OF DEMOLITION IN THE PUBLIC RIGHT-OF-WAY PRIOR TO COMMENCING ANY DEMOLITION WORK IN PUBLIC ROW.
6. ALL PUBLIC WATER LINE SHALL CONFORM TO WESTERN MUNICIPAL WATER DISTRICT SPECIFICATIONS AND STANDARDS.
7. FIRE SERVICES AND LOOPS SHOWN HEREON FOR REFERENCE AND WILL BE PER FIRE PROTECTION SPECIALIST LAYOUT.
8. ALL NON-METALLIC UNDERGROUND CONDUIT AND PIPE SHALL BE INSTALLED WITH CHRISTY'S (OR APPROVED EQUAL) DETECTABLE TAPE.
9. PRIVATE WATER AND SEWER PIPE INSTALLATION SHALL MAINTAIN:

9.1. 1' HORIZONTAL SEPARATION (WALL TO WALL)

PRIVATE WATER NOTES:

(20) INSTALL 6" C-900 (DR-14) PVC FIRE-WATER PIPELINE PER WWMD STD. DWGS. W-1540 & W-1550 WITH BENDS AND FITTINGS AS REQUIRED. FULLY RESTRAIN ALL JOINTS.

(21) INSTALL RPPB PER WWMD STD. W-011A.

(22) INSTALL WATER SERVICE PIPE WITH BEDDING PER WWMD STD. W-1540

(23) INSTALL PRIVATE 6" SUPER FIRE HYDRANT PER WWMD STD. W-0610 AND PER COUNTY OF RIVERSIDE STD. 701.

60' 0' 60' 120' 240'
GRAPHIC SCALE: 1"=60'

NOT FOR CONSTRUCTION

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

NO.:	REVISION:	DATE:

PROJECT: MARCH INLAND PORT AUTHORITY
CARGO GATEWAY D1 PARCEL
RIVERSIDE COUNTY, CA

DRAWING NAME: CONCEPTUAL WATER PLAN

ISSUE:	CONCEPTUAL
DATE:	2022/01/12
CHECKED: JB	DRAWN: NS
DRAWING FILE: 20-522 CG	
PROJECT NO.: 20-522	
SHEET NUMBER:	11
OF	11 SHEETS
SCALE: AS SHOWN	

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Appendix 3: Soils Information

Geotechnical Study

GEOTECHNICAL EXPLORATION
PROPOSED GATEWAY AVIATION CENTER-MERIDIAN PARK D-1
SW OF HEACOCK STREET AND IRIS AVENUE
MARCH AIR RESERVE BASE, MORENO VALLEY, CALIFORNIA

Prepared for

MERIDIAN PARK LLC
1156 North Mountain Avenue
Upland, California 91786

Project No. 12762.002

October 19, 2020

October 19, 2020

Project No. 12762.002

Meridian Park LLC
1156 North Mountain Avenue
Upland, California 91786

Attention: Mr. Timothy Reeves

Subject: Geotechnical Exploration
Proposed Gateway Aviation Center- Meridian Park D-1
SW of Heacock Street and Iris Avenue
March Air Reserve Base, Moreno Valley, California

In accordance with your request, we are pleased to provide this geotechnical exploration report for the subject project summarizing our findings, conclusions and providing 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 generally 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 might be required based on final site development/grading plans and selected corrective actions recommended herein.

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.

Simon I. Saiid, GE 2641
Principal Engineer

Robert F. Riha, CEG 1921
Senior Principal Geologist

Distribution: (1) Addressee (PDF copy via email)

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Section Page

Accompanying Tables, Figures, Plates and Appendices

Tables

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Appendices

1.0 INTRODUCTION

1.1 Purpose and Scope

This geotechnical exploration is for the proposed commercial development referred to as Gateway Aviation Center/Meridian Park D-1, located generally southwest of the intersection of Heacock Street and Iris Avenue, within March Air Reserve Base, California (see Figure 1). Our scope of services for this exploration included the following:

- Review of available site-specific geologic information and Preliminary Site Plan by RGA.
- Coordination of our site access and exploration with representatives of March Air Force Base.
- A site reconnaissance and excavation of twenty-three (23) exploratory borings. Approximate locations of these geotechnical borings are depicted on the *Boring Location Map (Figure 2)*. The logs of exploratory borings are presented in Appendix A.
- Geotechnical laboratory testing of selected soil samples collected during this exploration. Test results are presented in Appendix B.
- 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 grading/foundation plan review.

1.2 Site and Project Description

The site is located in southern Moreno Valley area, generally southwest of the intersection of Heacock Street and Iris Avenue within the southern portion of March Air Reserve Base, California (see Figure 1, Site Location Map). Topographically, the site is relatively flat with two small drainages draining gently in a southeastern direction. The site, as depicted on Figure 2, is currently undeveloped and vacant land covered with small vegetative growth and seasonal weeds. The overall site/County Assessor Parcel Number (APN) 294-170-010 is surrounded to the West and north by March Air Reserve Base, to the east and south by industrial warehouses and vacant parcels. An area known as “Site 7” is located in the eastern portion of the site in which past firefighting training exercises were conducted. The

easterly portion of Site 7 that includes “fire pits”/Areas 1, 2, and 5 are currently considered “Not-A-Part” of this exploration work (See Figure 2 for site delineation).

As per the site development plan (see Figure 2), the project will include a proposed 201,200 square foot (SF) industrial warehouse building and a 70,140 SF maintenance building along with associated improvements such as commercial cargo aircraft parking and taxiway to be designed in accordance with FAA standards. Commercial truck and employee access roadways and parking will also be provided along with other hardscape improvements. Grading plans were not provided as of the date of this report; however, we anticipate cut and fill grading of less than 5 feet to create finish site grades. Structural loads are expected to be less than 150 kips per column load and 10 kips/LF of continuous wall footing. If site development plans significantly differ from those described herein, the report should be subject to further review and evaluation.

2.0 FIELD EXPLORATION AND LABORATORY TESTING

2.1 Field Exploration

Our field exploration consisted of the excavation of twenty-three (23) hollow stem borings located generally in areas of planned building and hardscape areas to provide basis for earthwork grading, foundation and pavement design. All explorations were conducted in accordance of the requirements of the Technical Memorandum for Waste Management Related to Geotechnical Investigation (Leighton, 2020). Two borings (LB-22 & LB-23) were located within Areas 3 and 4 identified as "burn Pits" by previous studies by CH2M (CH2M, 2017 & 2020). 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 *Boring Location Map* (see Figure 2). Sampling was conducted by a staff geologist from our firm. After logging and sampling, the excavations were loosely backfilled with spoils generated during excavation. LB-8 and LB-16 through LB-23 were backfilled with concrete and bentonite grout to within three feet of the surface and hydrated bentonite chips were used to complete backfill. LB-15 was backfilled to the surface with hydrated bentonite chips. Cuttings from LB-8 and LB-16 through LB-23 were contained in 50-gallon drums and stored on-site. Between each sample the sampler/rings were decontaminated using non phosphate detergent. After completion of each borehole, the augers and drill pipe used were steam cleaned prior to their next use. Decontamination water was collected and stored on-site in 50-gallon drums. A Photo-ionization detector (PID) was used to take metered air readings of the worker's breathing zones. A 4-gas meter was used to take air readings in the completed bore of borings LB-1 and LB-2 for tunnel classification of proposed jack and bore activities. The exploration logs from this exploration are provided in Appendix A.

2.2 Laboratory Testing

Laboratory tests were performed on representative bulk samples to provide a basis for development of earthwork control and foundation design. The laboratory testing program included in-situ density and moisture content, maximum density and moisture content relationship, expansion index, R-value, California Bearing Ratio (CBR), collapse potential, sieve analysis, soluble sulfate content, chloride content and minimum resistivity. The results of our laboratory testing are presented in Appendix B.

3.0 GEOTECHNICAL AND GEOLOGIC FINDINGS

3.1 Regional Geology

The site is located within a prominent natural 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.

The Perris Block, approximately 20 miles by 50 miles in extent, is bounded by the San Jacinto Fault Zone to the northeast, the Elsinore Fault Zone to the southwest. The Perris Block has had a complex tectonic history, apparently undergoing relative vertical land-movements of several thousand feet in response to movement on the Elsinore and San Jacinto Fault Zones. Thin sedimentary and volcanic materials locally 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 the site include is underlain by localized younger alluvial materials, older alluvium and granitic bedrock at depth. A more detailed description of each unit is provided on the logs of borings in Appendix A.

- **Undocumented Fill:** Undocumented fill materials are the result of previous test pit and trench excavations by others (CH2M) and “burn pit” backfill. Two reported “burn pits” (Area 3 & Area 4, see Figure 2) were evaluated during this study and found to contain loose silty sand to silty sand with gravel to depths up to 7.5 feet below ground surface (BGS). Previous trench excavations were report up to 7 feet deep and contained metal debris and small amount of concrete rubble (CH2M, Nov. 2017).
- **Quaternary Alluvium:** Younger alluvial materials were encountered throughout the site from the surface to depths ranging from approximately 2.5 to 10-feet below the existing grade. The younger alluvial materials generally consist of silty sand (SM) and lessor amounts of clayey sands (SC-SM) to well-graded sands (SW-SM). The younger alluvium is expected to generally possess a low expansion potential (EI<51).
- **Older Alluvium:** Older alluvial soils were encountered in all borings. As encountered, these soils generally consist of medium dense to very dense silty to clayey sand (SM/SC) and localized layers of sandy silt to sandy clay

(ML/CL). This older alluvium is expected to generally possess a low expansion potential (EI<51) and collapse potential up to 3.4%.

- **Granitic Bedrock:** Bedrock was encountered at a depth of 40-feet below the existing ground surface in LB-8. As encountered, the bedrock was moderately weathered and was recovered as well-graded sand with silt and varying amounts of gravel (SW-SM).

3.3 Groundwater and Surface Water

Groundwater was encountered during this exploration at a depth of approximately 20 feet (LB-8) below existing ground surface (bgs) and 14.5 feet bgs (LB-15). Historic groundwater data, as reported by Department of Water Resource (DWR) data for Well 338731N1172168W001 located approximately 1.5 miles east of the subject site, reflect a groundwater elevation of 1,476 feet (about 19 feet below site elevation) in March 2020. According to West San Jacinto Groundwater Management Plan, 2016 Annual Report, the groundwater elevation in the subject site vicinity are at the range of 1,520 feet msl (about 32 feet below site elevation). Surface water was not observed onsite during our exploration.

3.4 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. The principal source of seismic activity is movement along the northwest-trending regional fault systems such as the San Andreas, San Jacinto, and Elsinore Fault Zones. 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.

3.5 Seismicity

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. The seismic coefficients were calculated utilizing an interactive program on current United States Geological Survey (USGS) website using ASCE 7-16 procedures, as well as USGS Unified Hazard Maps. Based on our explorations and review, the site will be underlain by alluvial materials and granitic bedrock materials at depth. As such, the site is classified as a Class D site, and the site-

specific seismic coefficients following this USGS general procedure are as listed in the following table:

Table 1. 2019 CBC Seismic Coefficients per USGS General Procedure

Site Seismic Coefficients / Coordinates		Value
Latitude		**33.8763**
Longitude		**-117.2488**
Mapped Spectra (OSHPD)	Spectral Response – Class D (short), S_S	1.50
	Spectral Response – Class D (1 sec), S_1	0.60
	Site Modified Peak Ground Acceleration, PGA_M	0.59
	Max. Considered Earthquake Spectral Response Acceleration (short), S_{MS}	1.50
	Max. Considered Earthquake Spectral Response Acceleration – (1 sec), S_{M1}	1.02
	5% Damped Design Spectral Response Acceleration (short), SDS	1.00
	5% Damped Design Spectral Response Acceleration (1 sec), S_{D1}	0.68
	Peak Ground Acceleration, PGA	0.53

g = Gravity acceleration

3.6 Tunnel Classification

A potential bore-and-Jack tunnel excavation may be performed in the vicinity of boring LB-1 and LB-2 (See Figure 2). Tunnel Classification was performed in general accordance with California Department of Industrial Relations, Division of Industrial Safety (Cal/OSHA), Code of Regulations (CCR), Title 8, Chapter 4, Subchapter 20, Article 8, Section 8422. The borehole at the proposed jack-and-bore locations were “sniffed” with a standard 4-gas meter device to detect hazardous gasses that may emanate from the boreholes or samples. Based on the results of this testing, we did not detect flammable gas or petroleum vapors (i.e. concentration >5 percent of the lower explosive limit, LEL) in our borings during drilling. In addition, we are unaware of any oil and/or natural gas production in the immediate vicinity of these pits/shafts. In accordance with Cal/OSHA requirements, this proposed trenchless portion of the alignment may be classified as non-gassy. However, natural gas concentrations should be carefully monitored within excavated pits and bored tunnel during pipeline construction.

3.7 Secondary Seismic Hazards

Ground shaking can induce “secondary” seismic hazards such as liquefaction, dynamic densification, lateral spreading, flooding, seiche/tsunami, and ground rupture, as discussed in the following subsections:

3.7.1 Dynamic Settlement (Liquefaction and/or Dry Settlement)

Riverside County Geologic Hazards maps indicate that the site is located in a zone of high liquefaction potential (see Figure 4). However, liquefaction-induced or dynamic dry settlement is not expected to be a significant hazard at this site due to the absence of near surface saturated sand layers and underlying dense older alluvium and granitic bedrock. Our analysis of dynamic settlement due to ground shaking based on PGA of 0.53g with a moment magnitude of 7.0 Mw is estimated to be less than 1 inch. This settlement is expected to be generally global and over a large area. As such, the seismic differential settlement is not expected to exceed 0.5-inch in a 40-foot horizontal distance for the proposed buildings.

3.7.2 Collapsible Soils

Laboratory testing indicates that the onsite soils/alluvium in the eastern portion of the site (east of LB-13/LB-19) are expected to possess a moderate collapse potential (generally up to 3.4 percent). This collapse potential can be as high as 6 percent as found in burn pit of Area 4 (LB-23 at 7.5 feet BGS). Based on our laboratory test results the collapse settlement is estimated to be as follows:

- Former Burn Pits (Areas 3 and 4)- up to 8 inches of alluvium/fill settlement.
- Elsewhere/east of LB-13/LB-19: up to 4 inches of settlement.

3.7.3 Expansive Soils

Limited laboratory testing indicated that onsite soils generally possess a very low expansion potential (EI<21). However, due to the silty to clayey sand, low expansive potential (EI <51) soils may be encountered. The mitigation for this geologic hazard is presented in Section 4 of this report.

3.7.4 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.

4.0 CONCLUSIONS AND RECOMMENDATIONS

4.1 General

Based on the results of this exploration, it is our opinion that the site is generally suitable for the proposed development from a geotechnical viewpoint. The major geotechnical concerns associated with site development/grading is the presence of potentially contaminated soils within Area 7 potion of the site (especially former burn pits delineated as Areas 3 and 4). In addition, the upper 10 to 15 feet of site soils (fill and alluvium) in the eastern portion of the site (specifically burn pits areas and Maintenance Building) are relatively loose and possess slight to moderate collapse potential (up to 6 percent). As such, specific remedial grading and/or ground improvement measure will be required to reduce the potential for detrimental post construction settlement.

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 Country 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. To reduce the potential for excessive differential settlement, we recommend that the

existing soils be removed and re-compacted (R&R) / over-excavated (OX) as described below

D-1 Building: The depth of R&R should extend a minimum of 5 feet BGS or 3 feet below bottom of footings, whichever is deeper. Post construction settlement is expected to be 1-inch total and 0.5-inch differential in 40 feet.

Maintenance Building: The depth of R&R should extend a minimum of 7.5 feet BGS or 5 feet below bottom of footings, whichever is deeper. Post construction settlement is expected to be 2-inch total and 1-inch differential in 40 feet.

AC/PCC Pavement West of LB-13/LB-19: The depth of R&R should extend a minimum of 2 feet BGS or design soil subgrade elevation, whichever is deeper. Post construction settlement is expected to be 1-inch total and 0.5-inch differential in 40 feet.

AC/PCC Pavement East of LB-13/LB-19: The depth of R&R should extend a minimum of 3 feet BGS or design soil subgrade, whichever is deeper. Post construction settlement is expected to be 4-inch total and 2-inch differential in 40 feet. Alternatively, if the depth of R&R extends to a minimum of 7 feet BGS or 5 below finish subgrade, whichever is deeper, then post construction settlement is expected to be 2-inch total and 1-inch differential in 40 feet.

Burn Pit Areas 3 & 4: The depth of R&R should extend a minimum of 10 feet BGS or finish subgrade, whichever is deeper. Post construction settlement is expected to be 2-inch total and 1-inch differential in 40 feet. Soils removed from within the burn pit areas may need to be disposed of as recommended in the environmental site assessment/soil management plan documents and replace with clean suitable backfill soils. Alternatively, other ground improvement methods such as compaction grouting and dynamic deep compaction may need to be considered if these potentially contaminated soils are to remain in place.

The removal limit should be established by a 1:1 (horizontal:vertical) projected down and away from the edge of fill soils or footings supporting structural fill or settlement-sensitive structures to a 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.

4.2.2 Structural Fills

From a geotechnical perspective, the onsite soils are generally suitable for re-use as compacted fill, provided they are free of debris and organic matter. The site environmental assessment reports provide further guidance on handling/moving site soils.

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 expansive clayey soils layers (EI>21), if any, should be placed at a depth greater than 3 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.

Fills placed on slopes steeper than 5:1 (horizontal:vertical) should be benched into dense soils (see Appendix D 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.

4.2.3 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.

4.2.4 Utility Trenches

Utility trenches should be backfilled with compacted fill in accordance with the *Standard Specifications for Public Works Construction,* ("Greenbook"), 2018 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 alluvium) 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.

4.2.5 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 (when recompacted to an average 92 percent of ASTM D1557) and estimate the following earth volume changes will occur during grading, and for the alluvium, the shrinkage is expected to be in the 10 to 15% range.

4.2.6 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

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 2,000 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 3,500 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 150 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.

Building D-1foundd on compacted fill soils as required per Section 4.2.1 above should be designed in anticipation of 1 inch of total settlement and 0.5-inch of differential settlement within a 40-foot horizontal run. Maintenance Building should be designed in anticipation of 2 inches of total settlement and 1-inch of 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	85
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 Corrosivity Evaluation

Sulfate ions in the soil can lower soil resistivity and can be highly aggressive to Portland cement concrete by combining chemically with certain constituents of the concrete, principally tricalcium aluminate. This reaction is accompanied by expansion and eventual disruption of the concrete matrix. Potentially high sulfate content could also cause corrosion of the reinforcing steel in concrete. Table 3 below summarizes current standards for concrete exposed to sulfate-containing solutions.

Table 3. Sulfate Concentration and Sulfate Exposure

Sulfate In Water (parts-per-million)	Water-Soluble Sulfate (SO_4) in soil (percentage by weight)	Sulfate Exposure
0-150	0.00 - 0.10	Negligible
150-1,500	0.10 - 0.20	Moderate (Seawater)
1,500-10,000	0.20 - 2.00	Severe
>10,000	Over 2.00	Very Severe

The sulfate content was determined in the laboratory for representative onsite soil sample. The results indicate that the water soluble sulfate range is less than 0.2 percent by weight, which is considered moderate per Table 5 above. Based upon the test results, Type II cement or an equivalent may be used.

Many factors can affect corrosion potential of soil including soil moisture content, resistivity, permeability and pH, as well as chloride and sulfate concentration. In general, soil resistivity, which is a measure of how easily electrical current flows

through soils, is the most influential factor. Based on the findings of studies presented in ASTM STP 1013 titled "Effects of Soil Characteristics on Corrosion" (February, 1989), the approximate relationship between soil resistivity and soil corrosiveness was developed as shown in Table 4 below.

Table 4. Relationship between Soil Resistivity and Soil Corrosivity

Soil Resistivity (ohm-cm)	Classification of Soil Corrosiveness
0 to 900	Very Severely Corrosive
900 to 2,300	Severely Corrosive
2,300 to 5,000	Moderately Corrosive
5,000 to 10,000	Mildly Corrosive
10,000 to >100,000	Very Mildly Corrosive

Acidity is an important factor of soil corrosivity. The lower the pH (the more acidic the environment), the higher the soil corrosivity will be with respect to buried metallic structures and utilities. As soil pH increases above 7 (the neutral value), the soil is increasingly more alkaline and less corrosive to buried steel structures, due to protective surface films, which form on steel in high pH environments. The pH of site soils on representative samples vary from 7.7 to 7.9 which is generally considered less active from a corrosion standpoint. Chloride and sulfate ion concentrations, and pH appear to play secondary roles in affecting corrosion potential. High chloride levels tend to reduce soil resistivity and break down otherwise protective surface deposits, which can result in corrosion of buried steel or reinforced concrete structures.

Based on minimum resistivity laboratory test results (see Table 5 below), the onsite soil is considered moderately corrosive. Ferrous pipe can be protected by polyethylene bags, tape or coatings, di-electric fittings, concrete encasement or other means to separate the pipe from wet onsite soils. We understand that further testing and/or soil corrosivity evaluation is being performed by others and specific recommendations for corrosion protection is provided by the corrosion engineer.

Table 5. Corrosion Sample Results

Boring #	Sample Depth (ft)	Sulfate Content (ppm)	Chloride Content (ppm)	pH	Minimum Resistivity (ohm-cm)
LB-7	5.0-10.0	193	80	7.90	3,090
LB-15	0.0-5.0	148	60	7.70	2,810

4.7 Preliminary Pavement Design / Vehicular Parking Driveways

Our preliminary vehicle pavement design is based on an R-value of 10 and the Caltrans Highway Design Manual. For planning and estimating purposes, the vehicle pavement sections are calculated based on Traffic Indexes (TI) as indicated in Table below:

Table 6. Asphalt Pavement Sections

General Traffic Condition	Traffic Index (TI)	Asphalt Concrete (inches)	Aggregate Base* (inches)
Automobile Parking Lanes	4.5	3.0	7.5
	5.0	3.0	9.0
Truck Access & Driveways	6.0	4.0	10.5
	6.5	4.0	12.5

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 applicable, we recommend that a minimum of 7 inches of PCC pavement be used in high impact load areas or if to be subjected to truck traffic. The PCC pavement should be placed on a minimum 6-inch aggregate base. The PCC pavement may be placed directly on a compacted subgrade with an R-Value of 40 or higher. The PCC pavement should have a minimum of 28-day compressive strength of 3250 psi. Other requirements of Caltrans Standard Specifications regarding mixing and placing of concrete should be followed.

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.

4.8 Preliminary Pavement Design / Air Traffic - Taxiways

Our preliminary concrete (PCC) pavement section for air traffic aprons/taxiways has been developed using FAARFIELD computer program and based on the FAA Airport Advisory Circular (AC) No. 150/5320-6F (2016) and Errata Sheet dated September 20, 2017. Aprons' traffic information was not provided to us; therefore, the design assumes a maximum aircraft weight of 836,000 pounds (Boeing 747-300), and an equivalent annual departure rate of 2,750 total departures per year. The design was also based on a sub-grade CBR value of 10, and minimum subgrade modulus of 20 psi. Given the maximum aircraft weights indicated above, stabilized base and subbase are required. Initial pavement design section is presented below.

Table 7. Flexible Pavement Cross Section

Initial Flexible Pavement Cross Section	
17.5"	PCC Surface
5"	Pavement Stabilizing Layer (P-401)
6"	Base Layer (P-209)
28.5"	**Total Thickness Required** (inches)

Per FAA requirements, the subgrade soils should be compacted in accordance with the criteria in table below.

Table 8. FAA Subgrade Compaction

Subgrade Compaction Requirements for Design Aircraft Per FAA	
Relative Compaction (ASTM D1557)	**Depth Required (inches)**
95	0 - 6.2
90	6.2 - 12.4
85	12.4 - 19.4
80	19.4 - 25.6

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 E, 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: 12762.002	Eng/Geol: SIS/RFR
Scale: 1 " = 4,000 '	Date: October 2020

Base Map: Bing Maps 2020
Thematic Information: Leighton
Author: Leighton Geomatics (mmurphy)

SITE LOCATION MAP

Meridian D-1, LLC/Gateway Aviation Center
Moreno Valley, California

Figure 1

Leighton

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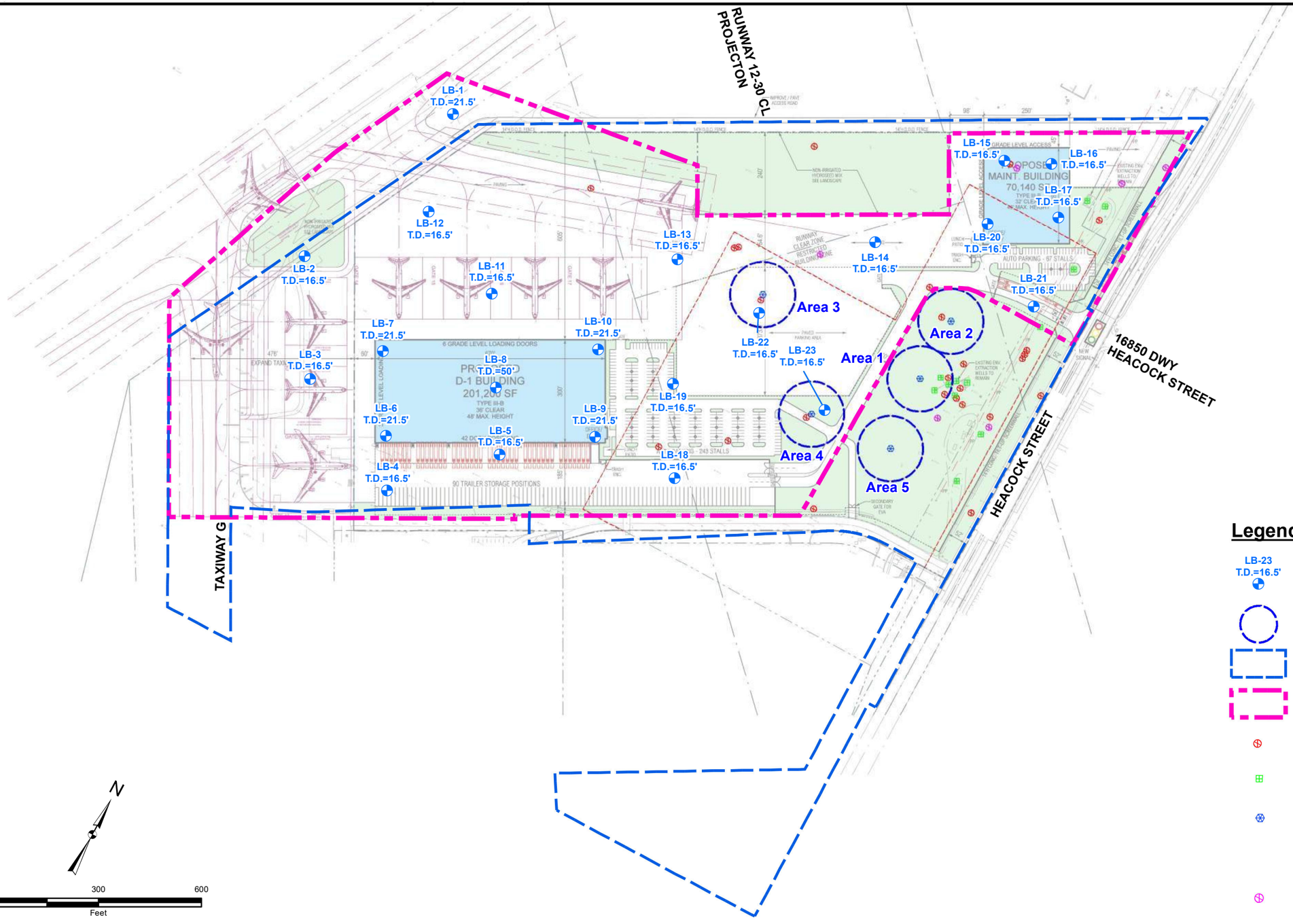

Legend

- LB-23 T.D.=16.5' — Approximate Location of Geotechnical Boring Showing Total Depth
- 95' Radius Offset of Burn Pit Location
- Approximate APN 294-170-010 Limits
- Approximate Site Limits
- Existing Monitoring Well
- Existing Extraction Well
- Burn Pit Locations shown hereon based on Appendix D Information of Final Site 007 Focused Investigation Report 2017-2019 Dated March 4, 2020, CH2M
- Unknown

Project: 12762.002	Eng/Geol: SIS/RFR
Scale: 1 " = 300 '	Date: October 2020
Base Map: Sheet A1-1P, D-1 Site by RGA.	
Author: Leighton Geomatics (mmurphy)	

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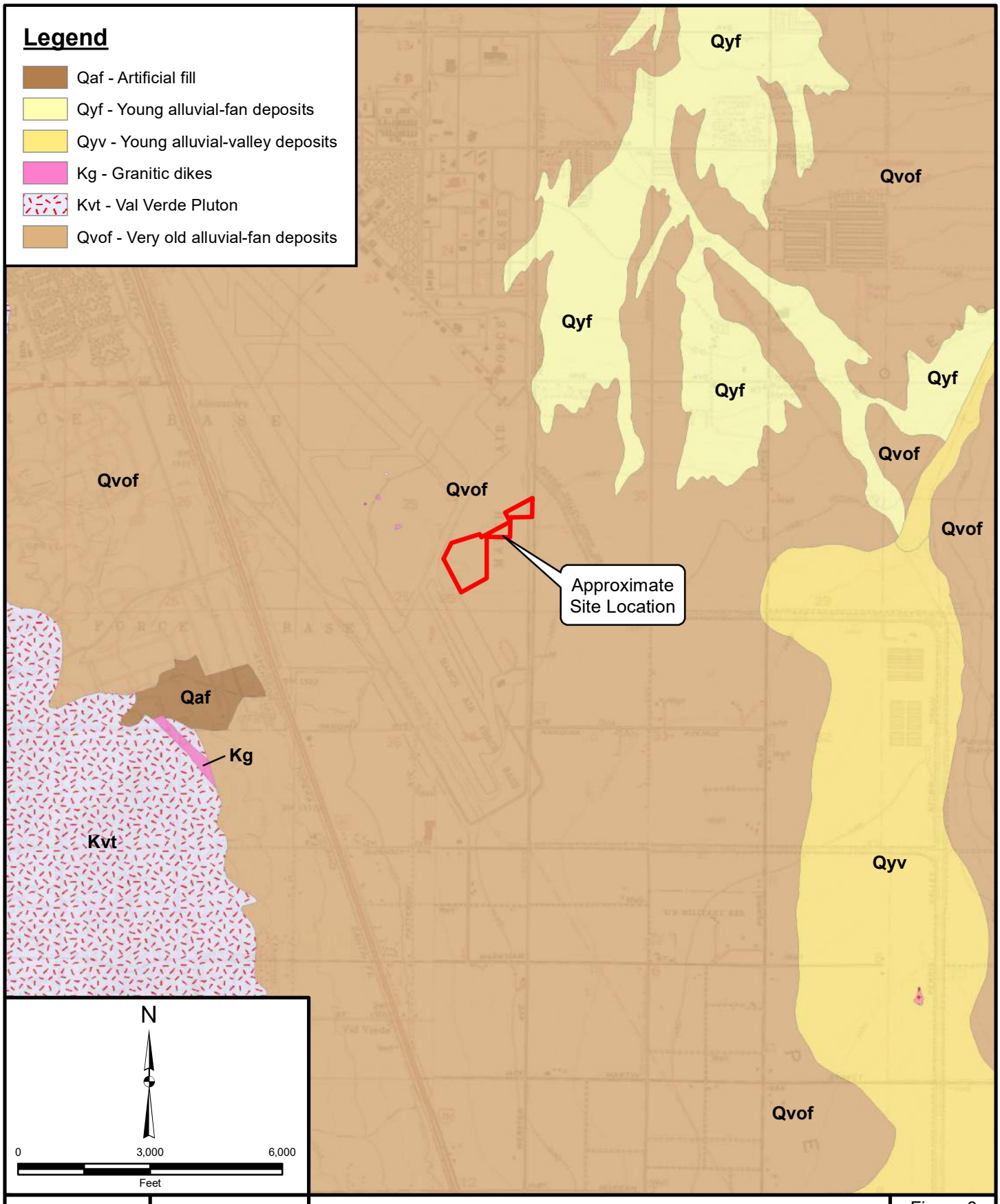
BORING LOCATON MAP

Meridian D-1, LLC/Gateway Aviation Center
Moreno Valley, California

Figure 2

Leighton



Project: 12762.002	Eng/Geol: SIS/RFR
Scale: 1 " = 3,000 '	Date: October 2020

Reference: USGS, 2006 Geologic map of the San Bernardino and Santa Ana 30'x60 quadrangle, California Version 1,0 Open File Report 2006-1217.

Author: Leighton Geomatics (mmurphy)

REGIONAL GEOLOGY MAP

Meridian D-1, LLC/Gateway Aviation Center
Moreno Valley, California

Figure 3

Leighton

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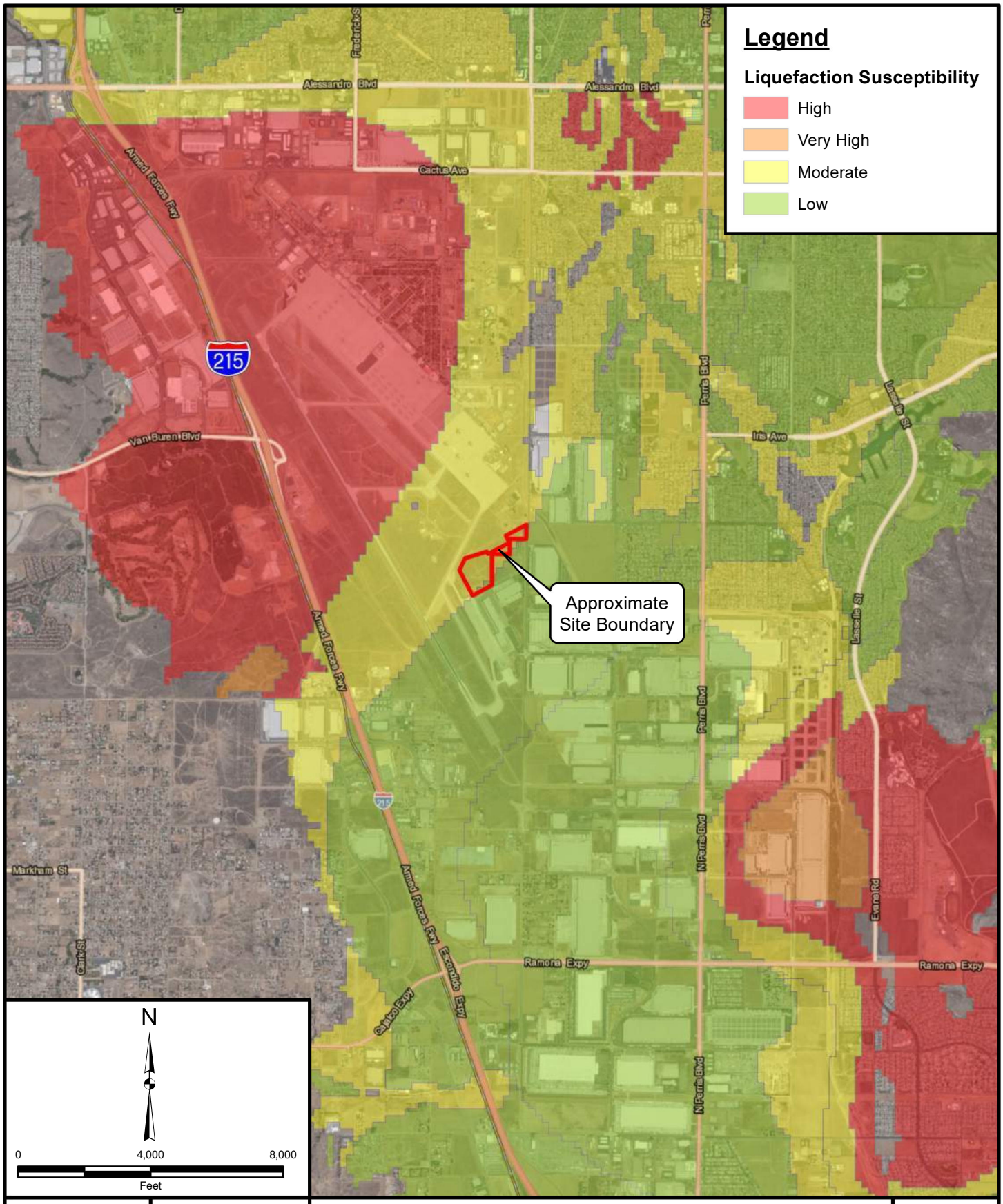

Project: 12762.002	Eng/Geol: SIS/RFR
Scale: 1 " = 4,000 '	Date: October 2020

Base Map: Bing Maps 2020
Thematic Information: Leighton, CGS
Author: Leighton Geomatics (mmurphy)

LIQUEFACTION MAP

Meridian D-1, LLC/Gateway Aviation Center
Moreno Valley, California

Figure 4

Leighton

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APPENDIX A

LOGS OF GEOTECHNICAL FIELD EXPLORATIONS

Encountered earth materials were logged and sampled in the field by our representative and described in accordance with the Unified Soil Classification System (ASTM D 2488). Representative soil samples were transported to our in-house Temecula laboratory for geotechnical testing. After logging and sampling, our borings were backfilled with spoils generated during drilling.

The attached subsurface exploration logs and related information depict subsurface conditions only at the locations indicated and at the particular date designated on these logs. Subsurface conditions at other locations may differ from conditions occurring at these logged locations. Passage of time may result in altered subsurface conditions due to environmental changes. In addition, any stratification lines on these logs represent an approximate boundary between sampling intervals and soil types; and transitions may be gradual.

GEOTECHNICAL BORING LOG LB-1

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1490'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*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.*	
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to medium grained sand, RV = 22 MD = 131.6 @ 6.8%	RV, SA, MD, CBR
				R-1	7 13 14	116	3		SILTY SAND, medium dense, brown, slightly moist, fine to coarse grained sand	
	5			R-2	11 11 17	111	3	SW-SM	Well-graded SAND with SILT, medium dense, brown, slightly moist, fine to coarse grained sand	
	10			R-3	13 18 30	119	13	SM	**Older Alluvium (Qalo)**; SILTY SAND, medium dense, dark grayish brown, moist, very fine to fine grained sand	
	15			R-4	7 13 23	119	13	SC	CLAYEY SAND, medium dense, dark grayish brown, moist, very fine to fine grained sand	
	20			R-5	18 40 50			CL	SANDY Lean CLAY, hard, dark gray, moist, very fine to fine grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings, CO = 0.0ppm, %LEL = 0%, H2S = 0.0ppm, O2 = 20.9%	
	25									
	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
CBR	CALIFORNIA BEARING RATION
CN	CONSOLIDATION
CO	COLLAPSE
CR	CORROSION
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

GEOTECHNICAL BORING LOG LB-2

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*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.*	
	0							SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
	5			R-1 B-1	17 31 50/5"	126	10	SC-SM	**Older Alluvium (Qalo)**; SILTY, CLAYEY SAND, dense, dark grayish brown, moist, very fine to fine grained sand	
				R-2	8 12 19	116	12		SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, very fine to fine grained sand, CO = -0.54%	CO
	10			R-3	8 12 19	115	14		SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, very fine to fine grained sand	
	15			R-4	8 39 46			SC	CLAYEY SAND, dense, dark yellowish brown, moist, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings, CO = 0.0ppm, %LEL = 0%, H2S = 0.0ppm, O2 = 20.9%	
	20									
	25									
	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

GEOTECHNICAL BORING LOG LB-3

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1493'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*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.*	
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
				R-1	11 17 24	124	9	SC	CLAYEY SAND, medium dense, dark brown, moist, very fine to fine grained sand	
	5			R-2	13 35 50/5"			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark grayish brown, moist, very fine to fine grained sand	
	10			R-3	11 14 28	116	10	ML	SILT with SAND, stiff, dark grayish brown, moist, very fine to fine grained sand	
	15			R-4	14 21 32			SM	SILTY SAND, dense, dark yellowish brown, moist, very fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	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	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICAL BORING LOG LB-4

Project No.	12762.002	**Date Drilled**	7-27-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1493'
Location	See Boring Location Map	**Sampled By**	JTD

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							SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
				R-1	10 22 36	129	3	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand	
	5			R-2	19 13 21				SILTY SAND, medium dense, yellowish brown, moist, fine to coarse grained sand	
	10			R-3	39 50/6"				SILTY SAND, dense, dark reddish brown, moist, fine to medium grained sand	
	15			R-4	5 17 20	122	10		SILTY SAND, medium dense, dark brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	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	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICAL BORING LOG LB-5

Project No.	12762.002	**Date Drilled**	7-27-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

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			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, light brownish gray, slightly moist, fine to coarse grained sand, MD = 135.0 @ 7.2%	MD
				R-1	12 10 11	111	3		SILTY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand	
	5			R-2	9 10 15	111	4		SILTY SAND, medium dense, light brown, moist, fine to medium grained sand	
	10			R-3	15 27 40	122	12	SC-SM	**Older Alluvium (Qalo)**; SILTY, CLAYEY SAND, dense, dark grayish brown, moist, fine to medium grained sand	
	15			R-4	16 21 35				SILTY, CLAYEY SAND, dense, dark grayish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	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

GEOTECHNICAL BORING LOG LB-6

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1497'
Location	See Boring Location Map	**Sampled By**	JTD

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			R-1	15 17 17	117	4	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, medium dense, grayish brown, slightly moist, fine to medium grained sand	
	5			R-2	17 18 21	120	3		SILTY SAND, medium dense, brown, moist, fine to coarse grained sand	
	10			R-3	12 24 35	122	12	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark grayish brown, moist, very fine to fine grained sand, CO = -0.47%	CO
	15			R-4	9 17 27			SC-SM	SILTY, CLAYEY SAND, medium dense, gray to dark yellowish brown, moist, fine to coarse grained sand	
	20			R-5	11 15 15	120	13	SM	SILTY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand	
	25								Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	30									

SOIL DESCRIPTION: 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	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICAL BORING LOG LB-7

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

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			R-1	3 10 10	110	2	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, medium dense, light brown, slightly moist, fine to coarse grained sand	
	5			R-2 B-1	27 30 50/5"	121	3	SC-SM	**Older Alluvium (Qalo)**; SILTY, CLAYEY SAND, dense, dark reddish brown, moist, fine to coarse grained sand, EI = 1 MD = 130.4 @ 8.5%	CR, EI, SA, MD, CBR
	10			R-3	18 32 43			SM	SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand	
	15			R-4	17 35 39	126	10		SILTY SAND, dense, dark reddish brown, moist, fine to coarse grained sand	
	20			R-5	13 18 22	114	15	SC	CLAYEY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand	
	25								Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	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
- CBR CALIFORNIA BEARING RATION
- CN CONSOLIDATION
- CO COLLAPSE
- CR CORROSION
- 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

GEOTECHNICAL BORING LOG LB-8

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

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			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
	5			R-1	5 6 7	109	2		SILTY SAND, loose, grayish brown, slightly moist, fine to medium grained sand	
	10			R-2	23 30 45			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand	
	15			R-3	10 20 32			SC	CLAYEY SAND, dense, dark reddish brown, moist, fine to medium grained sand	
	20			R-4	10 11 18	114	15		CLAYEY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand, MnO2 staining	
	25			R-5	5 24 38				CLAYEY SAND, dense, dark reddish brown to dark grayish brown, moist, fine to medium grained sand	
	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

GEOTECHNICAL BORING LOG LB-8

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*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.*	
	30			R-6	50/3"			SW-SC	Well-graded SAND with CLAY and GRAVEL (or SILTY CLAY and GRAVEL), dense, dark gray, wet, fine to coarse grained sand with fine gravel	
	35			R-7	50/2"			SW	Well-graded SAND with GRAVEL, dense, dark grayish brown, wet, fine to coarse grained sand with fine gravel	
	40			R-8	50/3"				**Granitic Bedrock (Kgr)**: Moderately weathered, recovered as: Well-graded SAND with SILT , dense, dark grayish brown, wet, fine to coarse grained sand	
	45									
	50			R-9	50/5"				Well-graded SAND with SILT and GRAVEL, dense, gray, moist to wet, fine to coarse grained sand with fine gravel	
									Drilled to 50.42' Sampled to 50.42' Groundwater at 20.16' Backfilled with cement and bentonite grout to 3' bgs, hydrated bentonite chips from 3' to surface	
	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	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICAL BORING LOG LB-9

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1490'
Location	See Boring Location Map	**Sampled By**	JTD

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			R-1	10 12 9	106	3	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, medium dense, light brown, slightly moist, fine to coarse grained sand, roots, trace pinhole voids	
	5			R-2	32 38 43			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, brown, moist, fine to coarse grained sand	
	10			R-3	16 18 33	114	15		SILTY SAND, dense, olive brown, moist, fine to medium grained sand, CO = -0.46%	CO
	15			R-4	13 18 26			SM-ML	SILTY SAND to SANDY SILT, medium dense, olive brown, moist, very fine to fine grained sand	
	20			R-5	8 17 19	118	15	SC-SM	SILTY, CLAYEY SAND, medium dense, dark grayish brown and dark yellowish brown, moist, very fine to fine grained sand	
	25								Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	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

GEOTECHNICAL BORING LOG LB-10

Project No.	12762.002	**Date Drilled**	7-27-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1489.5'
Location	See Boring Location Map	**Sampled By**	JTD

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			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, light brown, slightly moist, fine to coarse grained sand	
				R-1	13 30 45	122	8	SM	**Older Alluvim (Qalo)**; SILTY SAND, dense, dark grayish brown and dark yellowish brown, moist, fine to medium grained sand	
	5			R-2	13 30 43	118	8		SILTY SAND, dense, dark grayish brown, moist, fine to medium grained sand	
	10			R-3	12 21 29	116	15		SILTY SAND, dense, dark grayish brown, moist, fine grained sand, CO = -0.32%	CO
	15			R-4	8 14 35				SILTY SAND, dense, dark grayish brown, moist, very fine to fine grained sand	
	20			R-5	3 12 22	121	12	SC	CLAYEY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand	
									Drilled to 21.5' Sampled to 21.5' Groundwater not encountered Backfilled with cuttings	
	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

GEOTECHNICAL BORING LOG LB-11

Project No.	12762.002	**Date Drilled**	7-27-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*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.*	
	0			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, light brownish gray, slightly moist, fine to coarse grained sand	
				R-1	27 21 29	116	10	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark grayish brown, moist, very fine to medium grained sand	
	5			R-2	25 25 48	122	4	SC-SM	SILTY, CLAYEY SAND, dense, dark brown, moist, fine to coarse grained sand	
	10			R-3	17 21 29	121	10	SM	SILTY SAND, dense, dark grayish brown, moist, fine to medium grained sand	
	15			R-4	15 18 27			SC-SM	SILTY, CLAYEY SAND, medium dense, dark grayish brown, moist, very fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	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	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-12

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1492'
Location	See Boring Location Map	**Sampled By**	JTD

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							SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to medium grained sand	
				R-1	23 50/4"	120	5	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark yellowish brown, moist, very fine to fine grained sand	
	5			R-2	31 31 31	119	3	SC-SM	SILTY, CLAYEY SAND, dense, brown, slightly moist, fine to coarse grained sand	
	10			R-3	13 24 27			SM	SILTY SAND, dense, dark yellowish brown, moist, very fine to fine grained sand	
	15			R-4	20 31 30			SW	Well-graded SAND, dense, dark grayish brown, moist, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	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

GEOTECHNICAL BORING LOG LB-13

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1492'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*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.*	
	0			R-1 B-1	8 9 7	109	4	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, loose, light brownish gray, slightly moist, fine to medium grained sand, roots	
	5			R-2	36 36 33	116	8	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, yellowish brown, moist, fine grained sand	
	10			R-3	11 18 30	122	7		SILTY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, very fine to medium grained sand	
	15			R-4	11 17 18			SW-SM	Well-graded SAND with SILT, medium dense, dark grayish brown, moist, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	25									
	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

GEOTECHNICAL BORING LOG LB-14

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1495'
Location	See Boring Location Map	**Sampled By**	JTD

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							SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, moist, fine to medium grained sand	
				R-1	10 9 8	115	2		SILTY SAND, medium dense, dark reddish brown, moist, fine to coarse grained sand	
	5			R-2	7 9 18			SW-SM	**Older Alluvium (Qalo)**; Well-graded SAND with SILT, medium dense, reddish brown, moist, medium to coarse grained sand	
	10			R-3	10 17 19	119	12	SM	SILTY SAND, medium dense, dark grayish brown, moist, very fine to fine grained sand	
	15			R-4	17 30 39				SILTY SAND, dense, dark yellowish brown, moist, very fine to fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cuttings	
	20									
	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

GEOTECHNICAL BORING LOG LB-15

Project No.	12762.002	**Date Drilled**	7-28-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	2R Drilling	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1495'
Location	See Boring Location Map	**Sampled By**	JTD

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			R-1 B-1	17 25 21	125	4	SM/ML	**Quaternary Alluvium (Qal)**; SILTY SAND to SANDY SILT, medium dense, yellowish brown, slightly moist, fine grained sand	CR, SA
				R-2	20 23 16	124	5		SILTY SAND to SANDY SILT, medium dense, dark yellowish brown, moist, fine to medium grained sand	
	5			R-3	20 31 50/5"			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, yellowish brown, slightly moist, fine to medium grained sand	
				R-4	20 38 40				SILTY SAND, dense, dark brown, moist, fine to medium grained sand	
	10			R-5	12 20 20	118	10		SILTY SAND, dense, dark yellowish brown, moist, very fine to medium grained sand, CO = -3.40%	CO
	15			R-6	10 16 18	110	10	SC	CLAYEY SAND, medium dense, dark grayish brown, moist to wet, fine to coarse grained sand, approximately 5" layer of SW sand in top 6 rings	
									Drilled to 16.5' Sampled to 16.5' Groundwater at 14.58' Backfilled with hydrated bentonite chips to surface, cuttings drummed	
	20									
	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

GEOTECHNICAL BORING LOG LB-16

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1495'
Location	See Boring Location Map	**Sampled By**	JTD

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							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, grayish brown, slightly moist, fine to coarse grained sand with fine gravel	
				R-1	13 25 38	115	8	SM-ML	**Older Alluvium (Qalo)**; SILTY SAND to SANDY SILT, dense to hard, light brownish gray, slightly moist, very fine to medium grained sand	
	5			R-2	16 22 30	112	6	SM	SILTY SAND, dense, brown, slightly moist, very fine to medium grained sand, few pinhole voids, CO = 2.93%	CO
				R-3	6 12 13	114	11	ML	SANDY SILT, stiff, dark yellowish brown, moist, very fine to medium grained sand	
	10			R-4	7 13 16	111	6	SC-SM	SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand, (CO = 2.84%)	CO
	15			R-5	13 20 21	123	10	SC	CLAYEY SAND, medium dense, brown, moist to wet, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	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	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICAL BORING LOG LB-17

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1496'
Location	See Boring Location Map	**Sampled By**	JTD

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			R-1 B-1	7 12 18	107	4	SM	**Quaternary Alluvium (Qal)**; SILTY SAND, light brownish gray, medium dense, slightly moist, very fine to medium grained sand, EI = 14 MD = 130.7 @ 9%	MD, CR, EI
				R-2	12 20 32	108	10	SC	**Older Alluvium (Qalo)**; CLAYEY SAND, dense, dark brown, moist, fine to medium grained sand	
	5			R-3	19 23 27	108	6	SM	SILTY SAND, dense, yellowish brown, moist, very fine to medium grained sand	
	10			R-4	14 21 27	110	7		SILTY SAND, medium dense, yellowish brown to dark reddish brown, moist, fine to coarse grained sand	
	15			R-5	7 15 24			SC	CLAYEY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	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	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

GEOTECHNICAL BORING LOG LB-18

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

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							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, grayish brown, slightly moist, fine to coarse grained sand with fine gravel	
				R-1	10 21 34	111	3	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, brown, slightly moist, fine to coarse grained sand	
	5			R-2	17 30 31	119	8	SC	CLAYEY SAND, dense, dark gray, moist, fine to medium grained sand	
				R-3	9 21 33			SM	SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand, few pinhole voids	
	10			R-4	18 24 33			SC-SM	SILTY, CLAYEY SAND, dense, dark yellowish brown, moist, fine to coarse grained sand	
	15			R-5	15 16 19			SM	SILTY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	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

GEOTECHNICAL BORING LOG LB-19

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1491'
Location	See Boring Location Map	**Sampled By**	JTD

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			R1 B-1	7 12 20	105	4	ML	**Quaternary Alluvium (Qal)**; SANDY SILT, medium dense, dark yellowish brown and yellowish brown, slightly moist, fine to coarse grained sand, MD = 127.3 @ 9.8%, RV = 9	MD, RV, SA
				R-2	18 38 43	116	6	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, yellowish brown, slightly moist, fine to medium grained sand, few caliche	
	5			R-3	17 30 46	118	4		SILTY SAND, dense, yellowish brown, moist, fine to medium grained sand, few caliche, CO = 1.97%	CO
	10			R-4	7 11 17	110	4		SILTY SAND, medium dense, yellowish brown, moist, fine to medium grained sand	
	15			R-5	14 21 26				SILTY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	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

GEOTECHNICAL BORING LOG LB-20

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1495'
Location	See Boring Location Map	**Sampled By**	JTD

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							SM	**Quaternary Alluvium (Qal)**; SILTY SAND with GRAVEL, grayish brown, slightly moist, fine to coarse grained sand with fine gravel	
				R-1	10 20 40	118	5	SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark yellowish brown, slightly moist, fine to medium grained sand	
	5			R-2	23 30 37	118	6		SILTY SAND, dense, yellowish brown, slightly moist, fine to medium grained sand	
				R-3	11 20 28				SILTY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand	
	10			R-4	16 24 30	122	7	SC-SM	SILTY, CLAYEY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, fine to coarse grained sand	
	15			R-5	13 23 50				SILTY, CLAYEY SAND, dense, dark grayish brown to dark yellowish brown, moist, fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	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

GEOTECHNICAL BORING LOG LB-21

Project No.	12762.002	**Date Drilled**	9-16-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1492'
Location	See Boring Location Map	**Sampled By**	JTD

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			B-1				SM	**Quaternary Alluvium (Qal)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand, EI = 7, RV = 11	EI, RV
				R-1	12 24 32	121	5	SC	**Older Alluvium (Qalo)**; CLAYEY SAND, dense, dark yellowish brown, slightly moist, fine to coarse grained sand	
	5			R-2	19 27 50/2"	119	4		CLAYEY SAND, dense, brown, slightly moist, fine to coarse grained sand	
				R-3	15 50				CLAYEY SAND, dense, grayish brown, moist, fine to medium grained sand	
	10			R-4	19 28 30			SM	SILTY SAND, dense, yellowish brown, moist, fine grained sand, caliche nodules	
	15			R-5	16 20 24			SW-SM	Well-graded SAND with SILT, medium dense, yellowish brown, moist, fine to coarse grained sand	
								CL	SANDY Lean CLAY, stiff, dark yellowish brown, moist, fine to medium grained sand	
	20								Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	25									
	30									

SOIL DESCRIPTION: 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

GEOTECHNICAL BORING LOG LB-22

Project No.	12762.002	**Date Drilled**	9-15-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1494'
Location	See Boring Location Map	**Sampled By**	JTD

Elevation Feet	Depth Feet	Graphic Log	Attitudes	Sample No.	Blows Per 6 Inches	Dry Density pcf	Moisture Content, %	Soil Class. (U.S.C.S.)	SOIL DESCRIPTION	Type of Tests
		N S							*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.*	
	0							SM	**Artificial Fill Undocumented (Afu)**; SILTY SAND, grayish brown, slightly moist, fine to coarse grained sand	
				R-1	3 5 4	108	3		SILTY SAND, loose, brown, slightly moist, fine to coarse grained sand, abundant pinhole voids	
	5			R-2	4 9 18	108	2		SILTY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand, roots	
				R-3	20 35 32			SM	**Older Alluvium (Qalo)**; SILTY SAND, dense, dark yellowish brown, moist, fine to medium grained sand	
	10			R-4	11 12 16	103	9		SILTY SAND, medium dense, dark grayish brown to dark yellowish brown, moist, fine to medium grained sand, C0 = 1.9%	CO
	15			R-5	7 10 17			CL	SANDY Lean CLAY, stiff, dark yellowish brown, moist, very fine to fine grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	25									
	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	DS	DIRECT SHEAR	SA	SIEVE ANALYSIS
AL	ATTERBERG LIMITS	EI	EXPANSION INDEX	SE	SAND EQUIVALENT
CN	CONSOLIDATION	H	HYDROMETER	SG	SPECIFIC GRAVITY
CO	COLLAPSE	MD	MAXIMUM DENSITY	UC	UNCONFINED COMPRESSIVE STRENGTH
CR	CORROSION	PP	POCKET PENETROMETER		
CU	UNDRAINED TRIAXIAL	RV	R VALUE		

*** * * This log is a part of a report by Leighton and should not be used as a stand-alone document. * * ***

GEOTECHNICAL BORING LOG LB-23

Project No.	12762.002	**Date Drilled**	9-16-20
Project	Meridian D-1 Aviation	**Logged By**	JTD
Drilling Co.	Martini Drilling Corp	**Hole Diameter**	8"
Drilling Method	Hollow Stem Auger - 140lb - Autohammer - 30" Drop	**Ground Elevation**	~1492'
Location	See Boring Location Map	**Sampled By**	JTD

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							SM	**Artificial Fill Undocumented (Afu)**; SILTY SAND with GRAVEL, grayish brown, slightly moist, fine to coarse grained sand with fine gravel	
				R-1	5 10 20	106	8		SILTY SAND, medium dense, brown, slightly moist, fine to coarse grained sand, few pinhole voids	
	5			R-2	13 16 25	110	6	SC-SM	**Older Alluvium (Qalo)**; SILTY, CLAYEY SAND, medium dense, dark grayish brown, moist, fine to coarse grained sand, few pinhole voids	
				R-3	9 14 18	107	7	SC	CLAYEY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand, C0 = 5.94%	CO
	10			R-4	11 16 21	111	10	SC-SM	SILTY, CLAYEY SAND, medium dense, dark yellowish brown, moist, fine to medium grained sand, trace pinhole voids	
	15			R-5	14 19 38			SC	CLAYEY SAND, dense, dark grayish brown to dark yellowish brown, moist, fine to coarse grained sand	
									Drilled to 16.5' Sampled to 16.5' Groundwater not encountered Backfilled with cement grout containing at least 5% bentonite	
	20									
	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
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- SE SAND EQUIVALENT
- SG SPECIFIC GRAVITY
- UC UNCONFINED COMPRESSIVE STRENGTH

APPENDIX B

RESULTS OF GEOTECHNICAL LABORATORY TESTS

Leighton

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian D-1 Aviation Geo Inv		Tested By:	MRV	Date: 07/30/20
Project No.:	12762.002		Checked By:	MRV	Date: 08/11/20
Boring No.:	LB-1		Depth (feet):	0 - 5.0	
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Reddish Brown.				

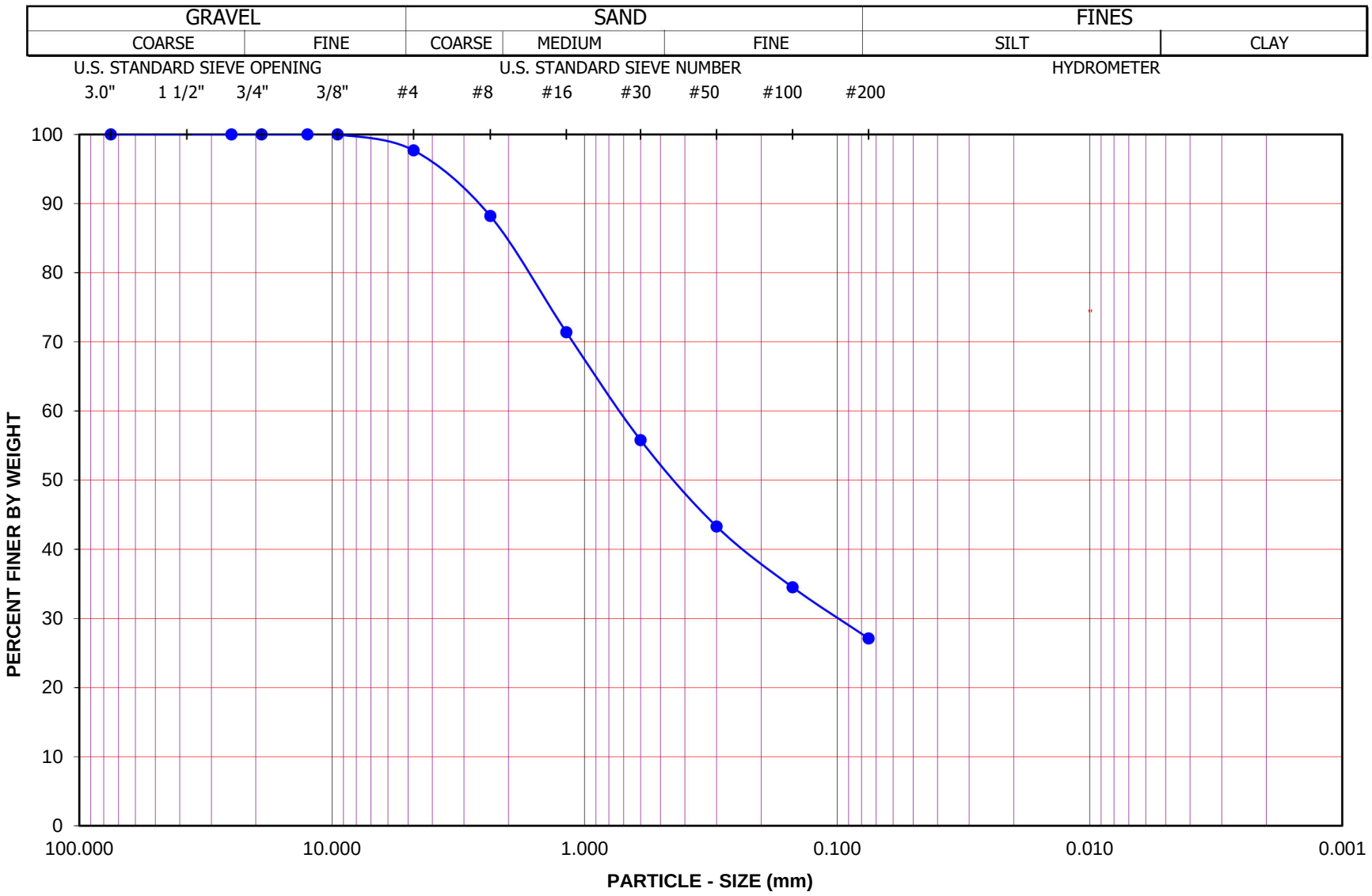
		Moisture Content of Total Air - Dry Soil	
Container No.:	X	Wt. of Air-Dry Soil + Cont. (g)	822.2
Wt. of Air-Dried Soil + Cont.(g)	822.2	Wt. of Dry Soil + Cont. (g)	808.2
Wt. of Container (g)	276.0	Wt. of Container No._____ (g)	276.0
Dry Wt. of Soil (g)	532.2	Moisture Content (%)	2.6

After Wet Sieve	Container No.	X
	Wt. of Dry Soil + Container (g)	670.8
	Wt. of Container (g)	276.0
	Dry Wt. of Soil Retained on # 200 Sieve (g)	394.8

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	12.2	97.7
#8	2.360	62.6	88.2
#16	1.180	152.1	71.4
#30	0.600	235.3	55.8
#50	0.300	301.8	43.3
#100	0.150	348.7	34.5
#200	0.075	387.8	27.1
PAN			

GRAVEL:	**2 %**		
SAND:	**71 %**		
FINES:	**27 %**		
GROUP SYMBOL:	**SM**	Cu = D60/D10 =	N/A
		Cc = (D30)²/(D60*D10) =	N/A

Remarks:



Project Name: Meridian D-1 Aviation Geo Inv

Project No.: 12762.002

Leighton

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Boring No.: LB-1 Sample No.: B-1

Depth (feet): 0 - 5.0 Soil Type : SM

Soil Identification: Silty Sand (SM), Reddish Brown.

GR:SA:FI : (%) 2 : 71 : 27

Aug-20

Leighton

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	FLM	Date:	08/07/20
Project No.:	12762.002	Checked By:	MRV	Date:	08/11/20
Boring No.:	LB-7	Depth (feet):	5.0 - 10.0		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	T	Wt. of Air-Dry Soil + Cont. (g)	2386.7
Wt. of Air-Dried Soil + Cont.(g)	2386.7	Wt. of Dry Soil + Cont. (g)	2333.5
Wt. of Container (g)	971.7	Wt. of Container No._____ (g)	971.7
Dry Wt. of Soil (g)	1361.8	Moisture Content (%)	3.9

After Wet Sieve	Container No.	T
	Wt. of Dry Soil + Container (g)	1877.2
	Wt. of Container (g)	971.7
	Dry Wt. of Soil Retained on # 200 Sieve (g)	905.5

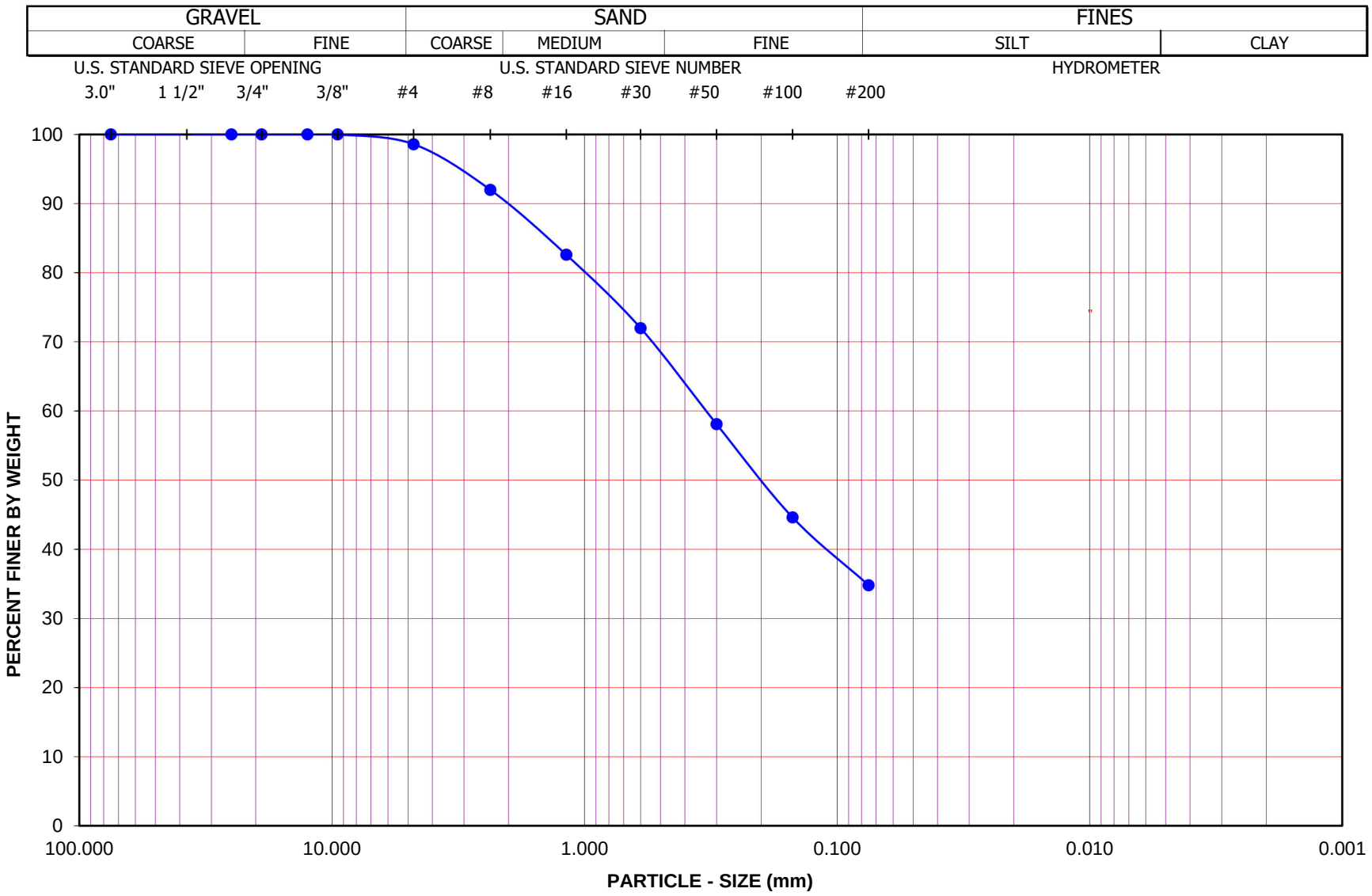
U. S. Sieve Size (in.)	U. S. Sieve Size (mm.)	Cumulative Weight Dry Soil Retained (g)	Percent Passing (%)
3"	75.000		100.0
1"	25.000		100.0
3/4"	19.000		100.0
1/2"	12.500		100.0
3/8"	9.500	0.0	100.0
#4	4.750	18.6	98.6
#8	2.360	109.2	92.0
#16	1.180	237.0	82.6
#30	0.600	381.8	72.0
#50	0.300	570.2	58.1
#100	0.150	754.0	44.6
#200	0.075	887.5	34.8
PAN			

GRAVEL:	**1 %**
SAND:	**64 %**
FINES:	**35 %**
GROUP SYMBOL:	**SM**

Cu = D60/D10 = N/A

Cc = $(D30)^2/(D60*D10)$ = N/A

Remarks:



Project Name: Meridian D-1 Aviation Geo Inv

Project No.: 12762.002

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Boring No.: LB-7 Sample No.: B-1

Depth (feet): 5.0 - 10.0 Soil Type : SM

Soil Identification: Silty Sand (SM), Brown.

GR:SA:FI : (%) 1 : 64 : 35

Aug-20

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	FLM	Date:	08/07/20
Project No.:	12762.002	Checked By:	MRV	Date:	08/11/20
Boring No.:	LB-15	Depth (feet):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Sandy Silt s(ML), Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	M	Wt. of Air-Dry Soil + Cont. (g)	1028.5
Wt. of Air-Dried Soil + Cont.(g)	1028.5	Wt. of Dry Soil + Cont. (g)	1008.6
Wt. of Container (g)	666.7	Wt. of Container No._____ (g)	666.7
Dry Wt. of Soil (g)	341.9	Moisture Content (%)	5.8

After Wet Sieve	Container No.	M
	Wt. of Dry Soil + Container (g)	840.0
	Wt. of Container (g)	666.7
	Dry Wt. of Soil Retained on # 200 Sieve (g)	173.3

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	0.0	100.0
#4	4.750	2.4	99.3
#8	2.360	21.5	93.7
#16	1.180	42.7	87.5
#30	0.600	62.1	81.8
#50	0.300	84.9	75.2
#100	0.150	122.1	64.3
#200	0.075	167.7	51.0
PAN			

GRAVEL: **1 %**

SAND: **48 %**

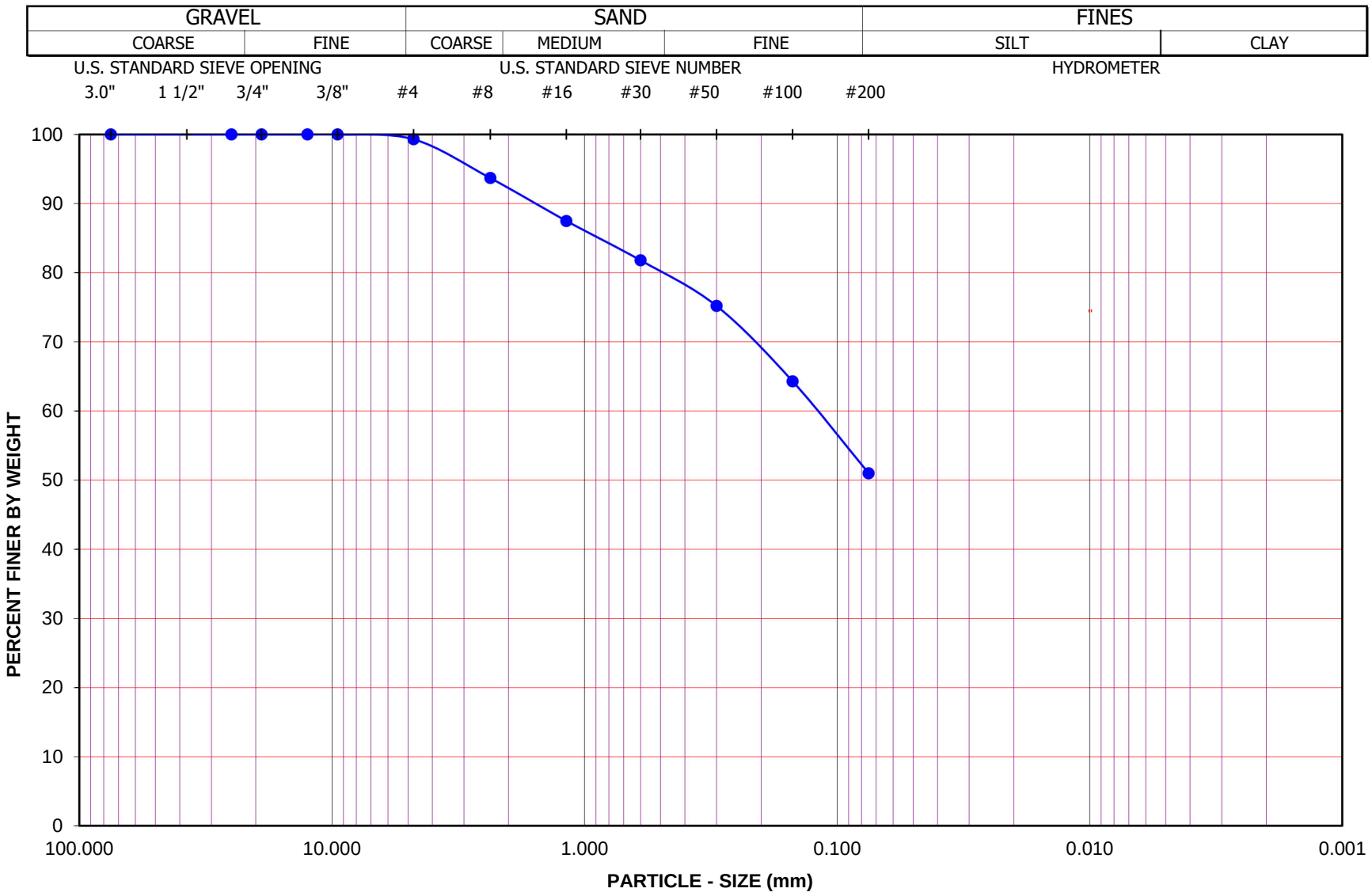
FINES: **51 %**

GROUP SYMBOL: **s(ML)**

Cu = D60/D10 = N/A

Cc = $(D30)^2/(D60*D10)$ = N/A

Remarks:



Project Name: Meridian D-1 Aviation Geo Inv

Project No.: 12762.002

Boring No.: LB-15 Sample No.: B-1

Depth (feet): 0 - 5.0 Soil Type : s(ML)

Soil Identification: Sandy Silt s(ML), Brown.

GR:SA:FI : (%) 1 : 48 : 51

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Aug-20

PARTICLE-SIZE DISTRIBUTION (GRADATION) of SOILS USING SIEVE ANALYSIS

ASTM D 6913

Project Name:	Meridian D-1 Aviation Geo		Tested By:	MRV	Date: 10/06/20
Project No.:	12762.002		Checked By:	MRV	Date: 10/08/20
Boring No.:	LB-19		Depth (feet):	0 - 5.0	
Sample No.:	B-1				
Soil Identification:	Sandy Silt s(ML), Dark Yellowish Brown.				

		Moisture Content of Total Air - Dry Soil	
Container No.:	BA	Wt. of Air-Dry Soil + Cont. (g)	810.1
Wt. of Air-Dried Soil + Cont.(g)	810.1	Wt. of Dry Soil + Cont. (g)	783.5
Wt. of Container (g)	278.1	Wt. of Container No._____ (g)	278.1
Dry Wt. of Soil (g)	505.4	Moisture Content (%)	5.3

After Wet Sieve	Container No.	BA
	Wt. of Dry Soil + Container (g)	519.1
	Wt. of Container (g)	278.1
	Dry Wt. of Soil Retained on # 200 Sieve (g)	241.0

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	11.1	97.8
#16	1.180	35.3	93.0
#30	0.600	68.8	86.4
#50	0.300	107.9	78.7
#100	0.150	158.6	68.6
#200	0.075	228.3	54.8
PAN			

GRAVEL: **0 %**

SAND: **45 %**

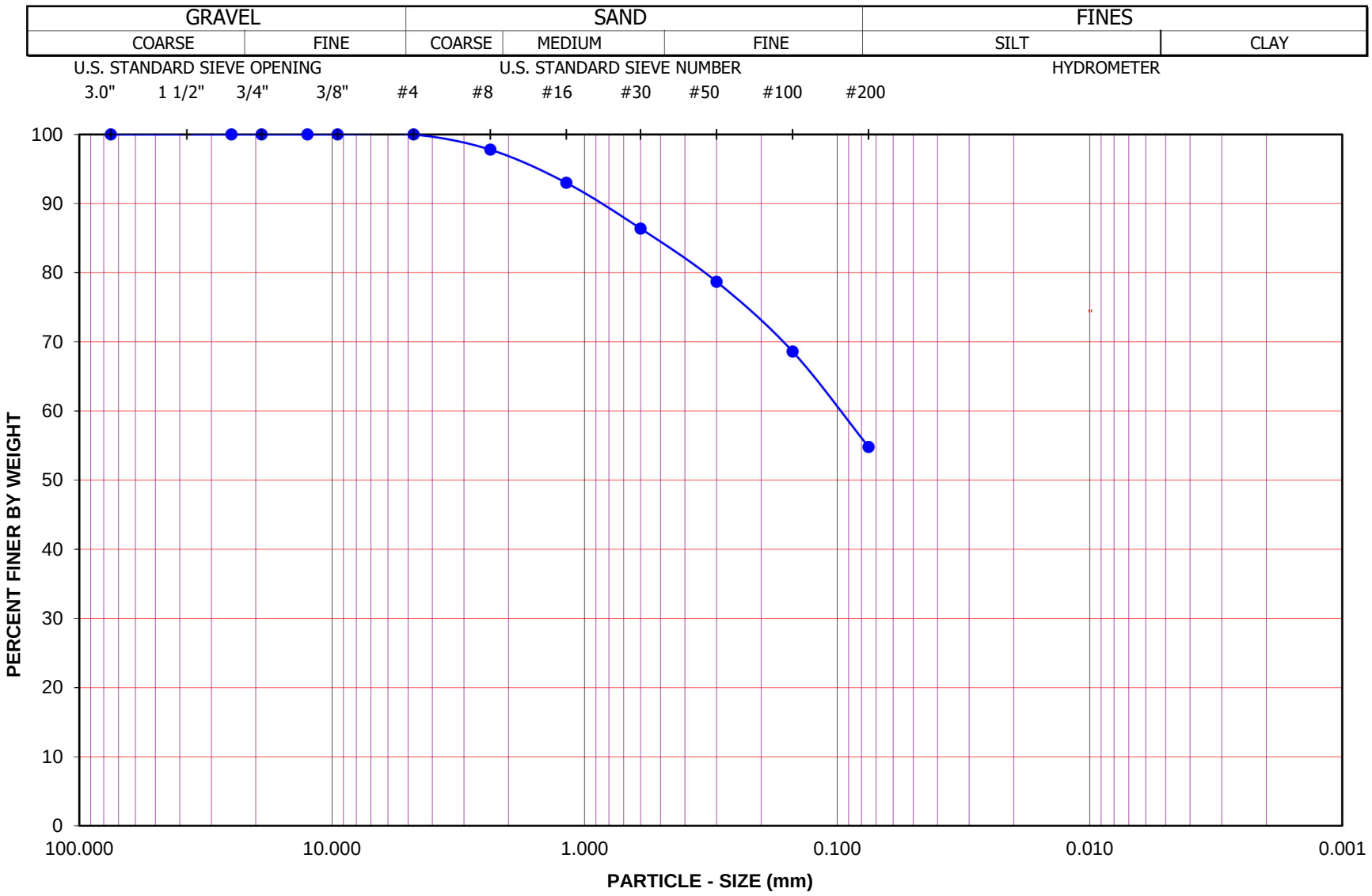
FINES: **55 %**

GROUP SYMBOL: **s(ML)**

Cu = D60/D10 = N/A

Cc = $(D30)^2/(D60*D10)$ = N/A

Remarks:



Project Name: Meridian D-1 Aviation Geo

Project No.: 12762.002

Boring No.: LB-19 Sample No.: B-1

Depth (feet): 0 - 5.0 Soil Type : s(ML)

Soil Identification: Sandy Silt s(ML), Dark Yellowish Brown.

GR:SA:FI : (%) 0 : 45 : 55

PARTICLE - SIZE DISTRIBUTION ASTM D 6913

Oct-20

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Meridian D-1 March Aviation	Tested By:	J. Gonzalez	Date:	08/11/20
Project No.:	12762.002	Input By:	A. Santos	Date:	08/12/20
Boring No.:	LB-1	Depth (ft.):	0-5		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Reddish Brown				

Preparation Method: [X] Moist [ ] Dry

[X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.07490 *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	7130	7479	7520			
Weight of Mold (g)	2734	2734	2734			
Net Weight of Soil (g)	4396	4745	4786			
Wet Weight of Soil + Cont. (g)	714.5	642.5	789.6			
Dry Weight of Soil + Cont. (g)	694.0	609.9	731.9			
Weight of Container (g)	88.2	88.9	77.3			
Moisture Content (%)	3.38	6.26	8.81			
Wet Density (pcf)	129.4	139.7	140.9			
Dry Density (pcf)	125.2	131.4	129.5			

Maximum Dry Density (pcf) **131.6** **Optimum Moisture Content (%)** **6.8**

PROCEDURE USED

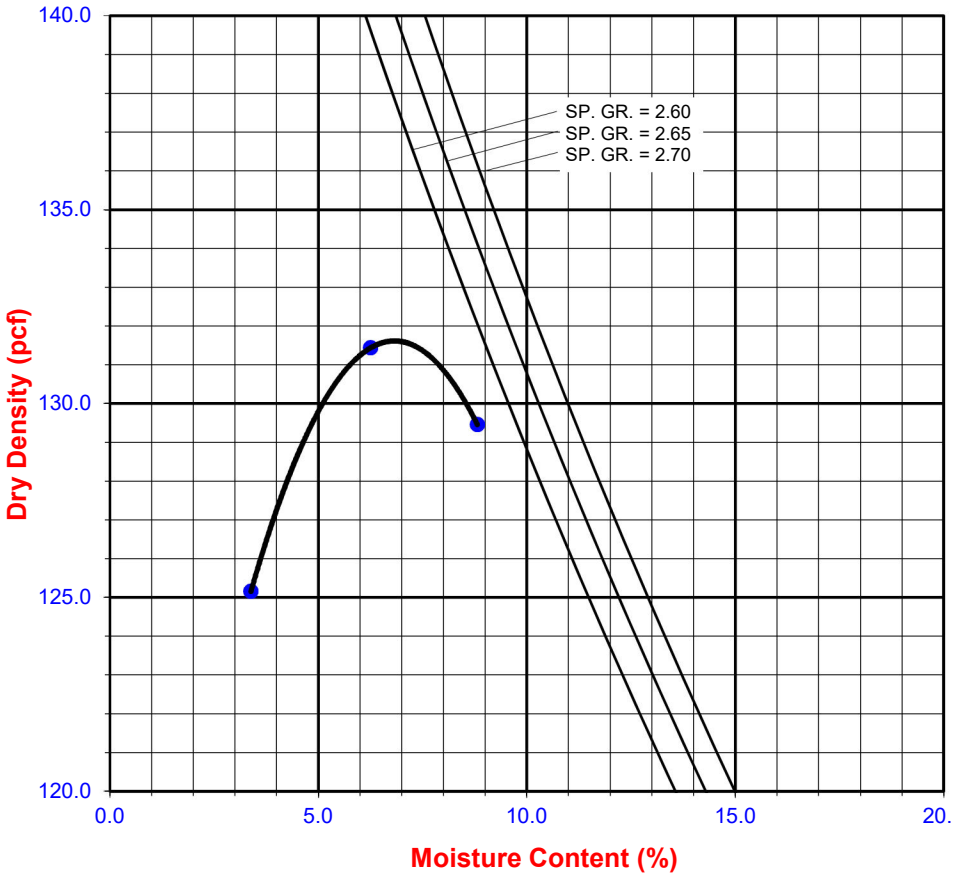
[ ] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **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

[X] **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:
2:71:27
GR:SA:FI

Atterberg Limits:
LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	M. Vinet	Date:	08/10/20
Project No.:	12762.002	Input By:	M. Vinet	Date:	08/11/20
Boring No.:	LB-5	Depth (ft.):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Silty Sand (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)	5628	5738	5760	5700		
Weight of Mold (g)	3562	3562	3562	3562		
Net Weight of Soil (g)	2066	2176	2198	2138		
Wet Weight of Soil + Cont. (g)	782.1	883.4	802.0	931.2		
Dry Weight of Soil + Cont. (g)	760.1	846.0	760.9	870.0		
Weight of Container (g)	278.5	281.3	280.6	278.8		
Moisture Content (%)	4.6	6.6	8.6	10.4		
Wet Density (pcf)	136.4	143.6	145.1	141.1		
Dry Density (pcf)	130.4	134.7	133.6	127.9		

Maximum Dry Density (pcf) **135.0** **Optimum Moisture Content (%)** **7.2**

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

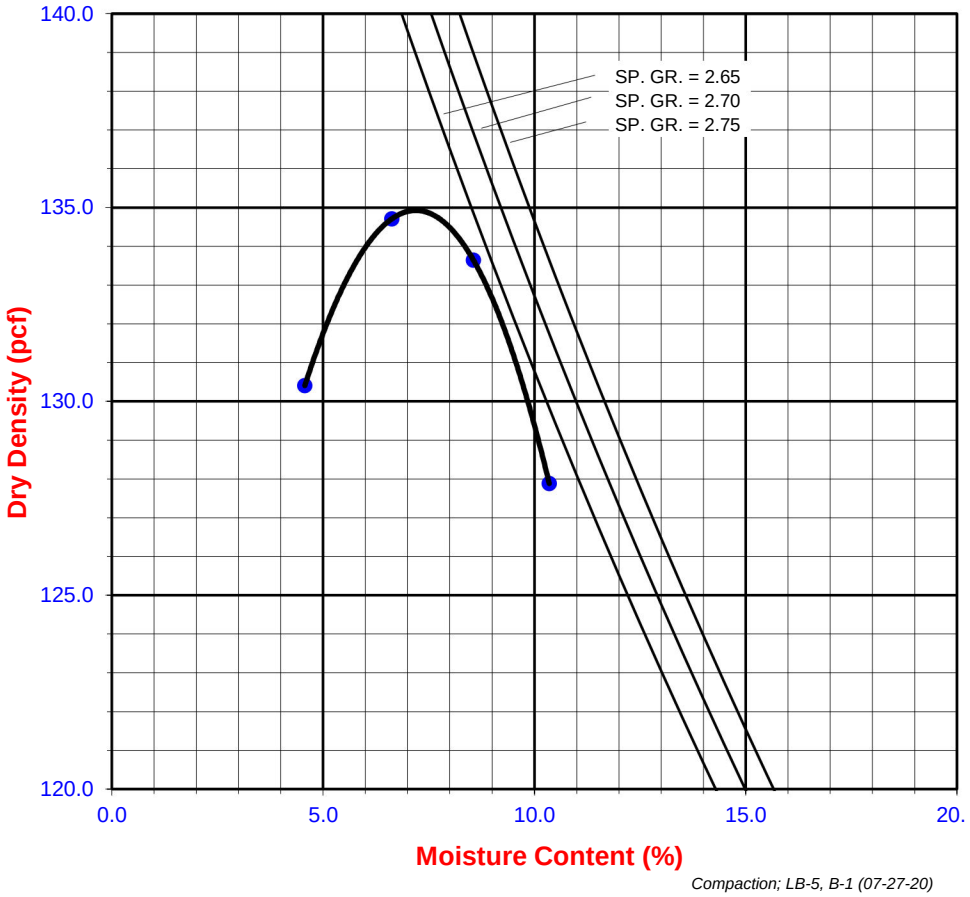
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Meridian D-1 March Aviation	Tested By:	J. Gonzalez	Date:	08/11/20
Project No.:	12762.002	Input By:	A. Santos	Date:	08/12/20
Boring No.:	LB-7	Depth (ft.):	5-10		
Sample No.:	B-1				
Soil Identification:	Silty Sand (SM), Brown				

Preparation Method: [X] Moist [ ] Dry

[X] Mechanical Ram [ ] Manual Ram

Mold Volume (ft³) 0.07490 *Ram Weight = 10 lb.; Drop = 18 in.*

TEST NO.	1	2	3	4	5	6
Wt. Compacted Soil + Mold (g)	6949	7492	7531			
Weight of Mold (g)	2734	2734	2734			
Net Weight of Soil (g)	4215	4758	4797			
Wet Weight of Soil + Cont. (g)	825.3	827.5	788.1			
Dry Weight of Soil + Cont. (g)	793.3	774.3	723.2			
Weight of Container (g)	88.0	88.4	88.9			
Moisture Content (%)	4.54	7.76	10.23			
Wet Density (pcf)	124.1	140.0	141.2			
Dry Density (pcf)	118.7	130.0	128.1			

Maximum Dry Density (pcf) **130.4** **Optimum Moisture Content (%)** **8.5**

PROCEDURE USED

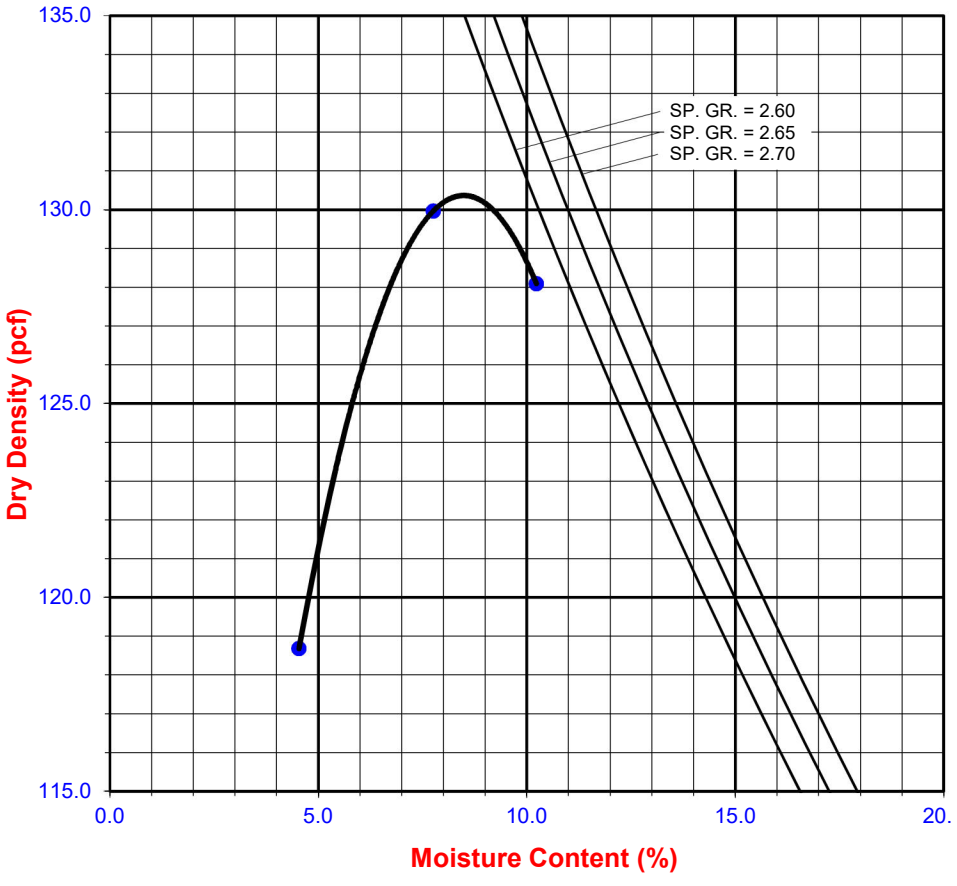
[ ] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **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

[X] **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:
1:64:35
GR:SA:FI

Atterberg Limits:
LL,PL,PI



MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	F. Mina	Date:	10/06/20
Project No.:	12762.002	Input By:	M. Vinet	Date:	10/08/20
Boring No.:	LB-17	Depth (ft.):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Silty, Clayey Sand (SC-SM), Dark Yellowish 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)	5619	5718	5688			
Weight of Mold (g)	3560	3560	3560			
Net Weight of Soil (g)	2059	2158	2128			
Wet Weight of Soil + Cont. (g)	1431.7	1329.4	1166.1			
Dry Weight of Soil + Cont. (g)	1359.4	1246.6	1082.4			
Weight of Container (g)	328.1	327.8	332.8			
Moisture Content (%)	7.0	9.0	11.2			
Wet Density (pcf)	135.9	142.4	140.5			
Dry Density (pcf)	127.0	130.7	126.4			

Maximum Dry Density (pcf) 130.7 **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

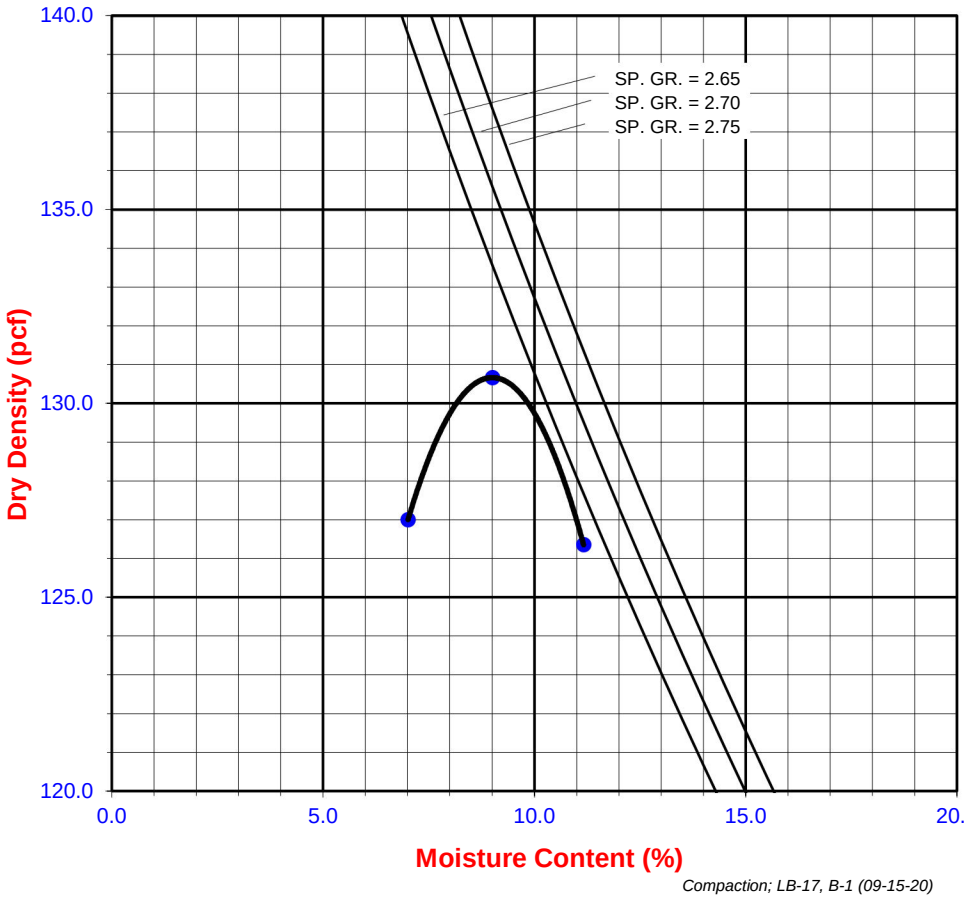
[ ] **Procedure C**
Soil Passing 3/4 in. (19.0 mm) Sieve
Mold : 6 in. (152.4 mm) diameter
Layers : 5 (Five)
Blows per layer : 56 (fifty-six)
Use if +3/8 in. is >20% and +¾ in. is <30%

Particle-Size Distribution:

GR:SA:FI

Atterberg Limits:

LL,PL,PI



Leighton

MODIFIED PROCTOR COMPACTION TEST

ASTM D 1557

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	F. Mina	Date:	10/06/20
Project No.:	12762.002	Input By:	M. Vinet	Date:	10/08/20
Boring No.:	LB-19	Depth (ft.):	0 - 5.0		
Sample No.:	B-1				
Soil Identification:	Sandy Silt s(ML), Dark Yellowish 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)	5525	5664	5682	5617		
Weight of Mold (g)	3560	3560	3560	3560		
Net Weight of Soil (g)	1965	2104	2122	2057		
Wet Weight of Soil + Cont. (g)	1403.6	1536.4	1261.1	1127.3		
Dry Weight of Soil + Cont. (g)	1333.0	1434.2	1173.4	1031.3		
Weight of Container (g)	327.6	329.3	414.9	326.1		
Moisture Content (%)	7.0	9.2	11.6	13.6		
Wet Density (pcf)	129.7	138.9	140.1	135.8		
Dry Density (pcf)	121.2	127.1	125.5	119.5		

Maximum Dry Density (pcf) 127.3 **Optimum Moisture Content (%)** 9.8

PROCEDURE USED

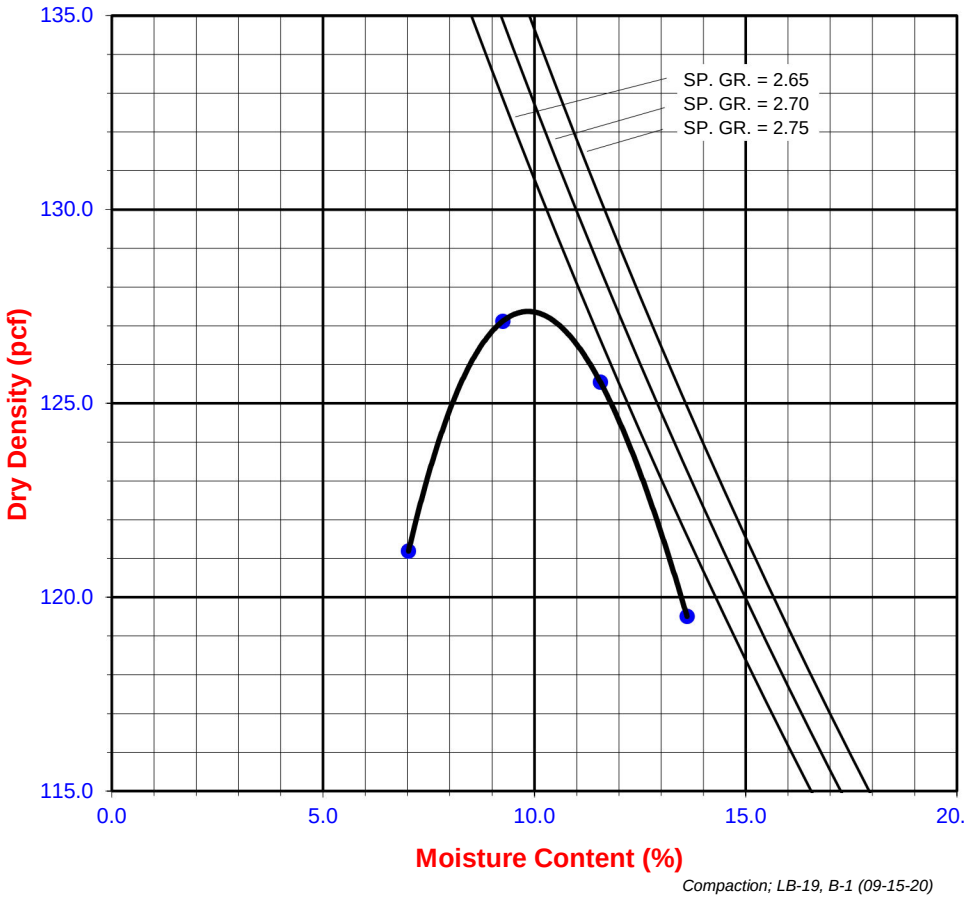
[X] **Procedure A**
Soil Passing No. 4 (4.75 mm) Sieve
Mold : 4 in. (101.6 mm) diameter
Layers : 5 (Five)
Blows per layer : 25 (twenty-five)
May be used if +#4 is 20% or less

[ ] **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:
0:45:55
GR:SA:FI

Atterberg Limits:
LL,PL,PI



Leighton

CALIFORNIA BEARING RATIO (CBR) OF LABORATORY-COMPACTED SOIL

ASTM D 1883

Project Name:	Meridian D-1 March Aviation		Tested By :	J. Gonzales	Date: 8/13/2020
Project No. :	12762.002		Height of Drop (in):	18.0	
Boring No.:	LB-1		Wt. of Rammer (lbs) :	10.0	
Sample No.:	B-1		Height of Sample (in) :	4.584	
Depth (ft.) :	0-5		Piston Diameter (in):	1.954	
Soil Description :	Silty Sand (SM), Reddish Brown		Load Constant:	5.456932	

SAMPLE PREPARATION

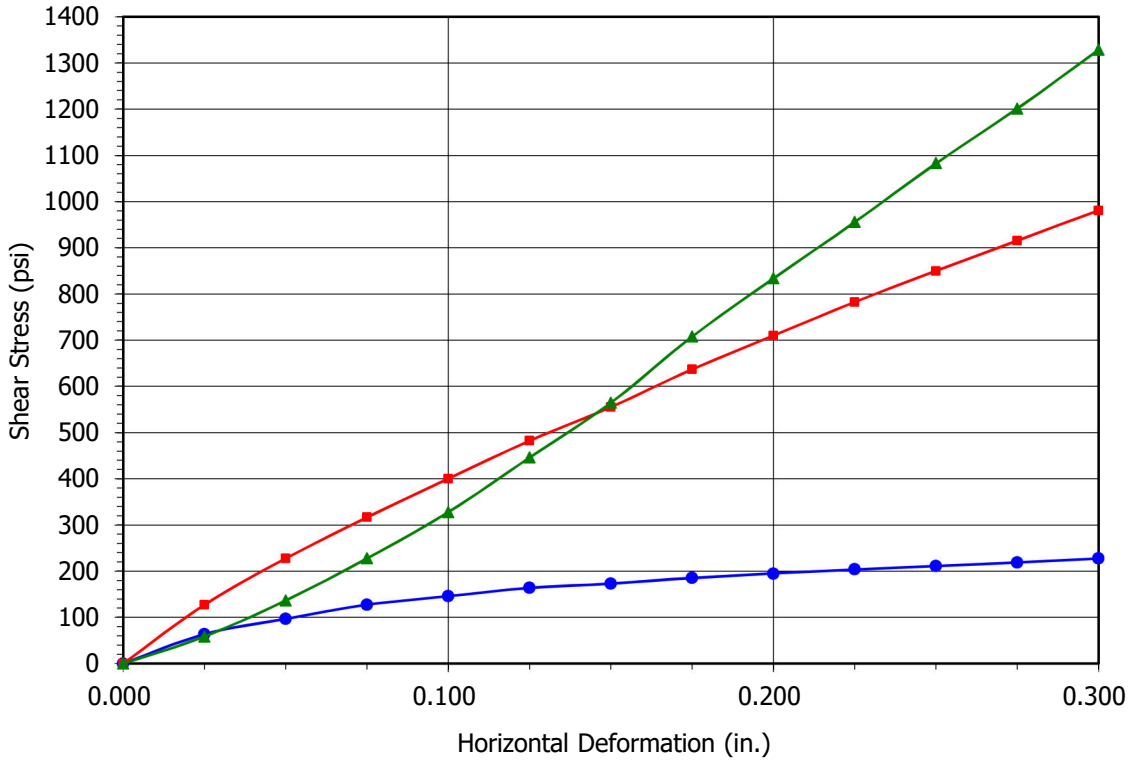
Blows Per Layer	● 10	■ 25	▲ 56
Mold Number	36	32	35
Weight of Wet Soil & Mold (g)	8608	8947	9131
Weight of Mold (g)	4183	4181	4181
Weight of Wet Soil (g)	4425	4766	4950
Mold Factor	0.02936	0.02937	0.02938
Wet Weight Soil + Container (g)	380.4	390.2	289.6
Dry Weight Soil + Container (g)	357.7	366.8	274.0
Weight of Container (g)	39.6	39.6	38.9
Initial Swell / Collapse Reading (in.)	0.2080	0.1140	0.2940

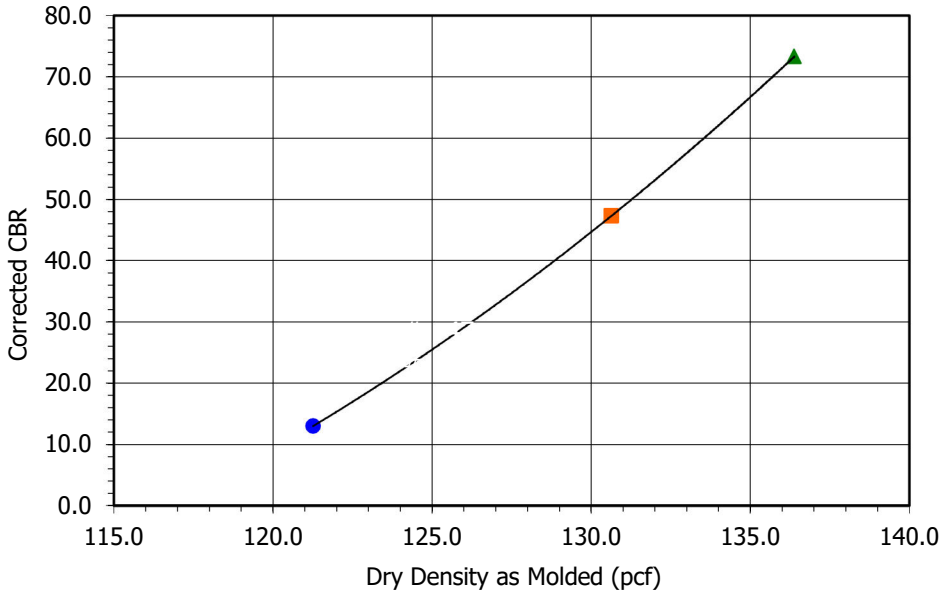
AFTER SOAKING

Final Swell / Collapse Reading (in.)	0.2025	0.1190	0.2980
Wt. Wet Soil + Mold + Base Plate (g)	11898	12128	12267
Weight of Mold+ Base Plate (g)	7280	7267	7264
Weight of Wet Soil (g)	4618	4861	5003
Wet Wt. Soil + Container (g)	355.3	327.7	287.8
Dry Wt. Soil + Container (g)	325.1	304.6	265.1
Weight of Container (g)	39.8	38.7	38.8

LOAD TEST DATA

Penetration (in.)	Load Rdg	Stress (psi)	Load Rdg	Stress (psi)	Load Rdg	Stress (psi)
0.000	0.0	0.0	0.0	0.0	0.0	0.0
0.025	35.0	63.7	70.0	127.4	32.0	58.2
0.050	53.0	96.4	125.0	227.5	75.0	136.5
0.075	70.0	127.4	174.0	316.6	125.0	227.5
0.100	80.0	145.6	220.0	400.3	180.0	327.6
0.125	90.0	163.8	265.0	482.2	245.0	445.8
0.150	95.0	172.9	305.0	555.0	310.0	564.1
0.175	102.0	185.6	350.0	636.9	389.0	707.9
0.200	107.0	194.7	390.0	709.7	458.0	833.4
0.225	112.0	203.8	430.0	782.5	525.0	955.4
0.250	116.0	211.1	467.0	849.8	595.0	1082.7
0.275	120.0	218.4	503.0	915.3	660.0	1201.0
0.300	125.0	227.5	539.0	980.8	730.0	1328.4
0.325	129.0	234.7	572.0	1040.9	800.0	1455.8
0.350	133.0	242.0	605.0	1100.9	865.0	1574.1
0.375	137.0	249.3	640.0	1164.6	938.0	1706.9
0.400	140.0	254.8	670.0	1219.2	1000.0	1819.7
0.425	144.0	262.0	704.0	1281.1	1065.0	1938.0
0.450	148.0	269.3	732.0	1332.1	1125.0	2047.2
0.475	151.0	274.8	763.0	1388.5	1185.0	2156.4
0.500	155.0	282.1	790.0	1437.6	1245.0	2265.6





Blows per layer	● 10		■ 25		▲ 56	
Condition	Before	After	Before	After	Before	After
Moisture Content (%)	7.1	10.6	7.2	8.7	6.6	10.0
Dry Density (pcf)	121.3	122.6	130.6	131.4	136.4	133.6
Swell(+)/Collapse(-) (%)	-0.12		0.11		0.09	
Bearing Ratio	13.0		47.3		73.3	

Boring No.: LB-1
Sample No.: B-1
Depth (ft): 0-5
Sample Description: Silty Sand (SM), Reddish Brown

Leighton

CALIFORNIA BEARING RATIO of LABORATORY-COMPACTED SOIL
ASTM D 1883

Project No.: 12762.002

Meridian D-1 March Aviation

08-20

Leighton

CALIFORNIA BEARING RATIO (CBR) OF LABORATORY-COMPACTED SOIL

ASTM D 1883

Project Name:	Meridian D-1 March Aviation		Tested By :	J. Gonzales	Date: 8/14/2020
Project No. :	12762.002		Height of Drop (in):	18.0	
Boring No.:	LB-7		Wt. of Rammer (lbs) :	10.0	
Sample No.:	B-1		Height of Sample (in) :	4.584	
Depth (ft.) :	0-5		Piston Diameter (in):	1.954	
Soil Description :	Silty Sand (SM), Brown		Load Constant:	5.456932	

SAMPLE PREPARATION

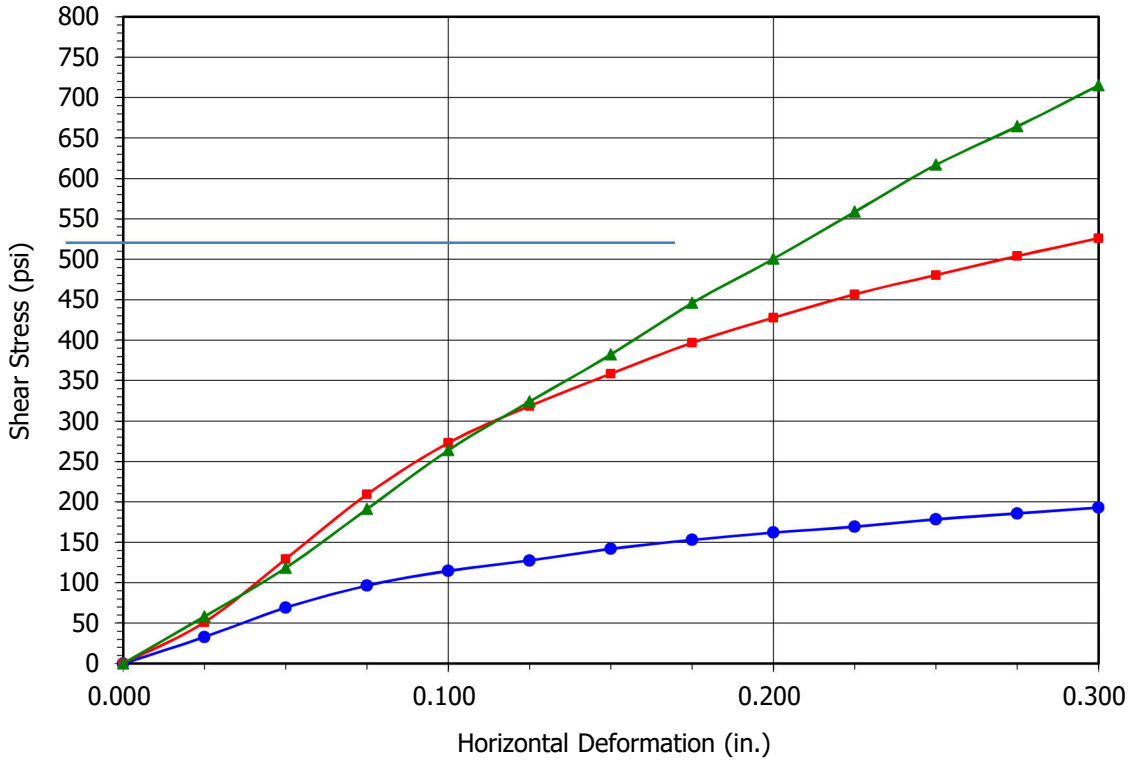
Blows Per Layer	● 10	■ 25	▲ 56
Mold Number	21	23	26
Weight of Wet Soil & Mold (g)	8594	8765	9098
Weight of Mold (g)	4181	4182	4182
Weight of Wet Soil (g)	4413	4583	4916
Mold Factor	0.02940	0.02938	0.02940
Wet Weight Soil + Container (g)	383.8	387.1	354.8
Dry Weight Soil + Container (g)	358.2	360.6	330.7
Weight of Container (g)	39.3	38.1	39.0
Initial Swell / Collapse Reading (in.)	0.1580	0.2700	0.3620

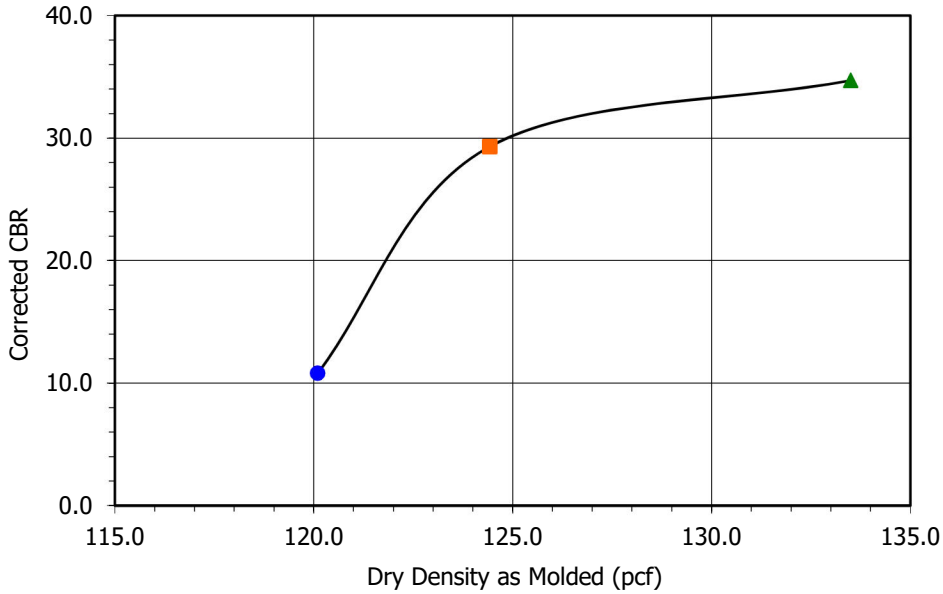
AFTER SOAKING

Final Swell / Collapse Reading (in.)	0.2030	0.2955	0.3830
Wt. Wet Soil + Mold + Base Plate (g)	11924	12132	12269
Weight of Mold+ Base Plate (g)	7298	7260	7290
Weight of Wet Soil (g)	4626	4872	4979
Wet Wt. Soil + Container (g)	339.8	316.3	300.9
Dry Wt. Soil + Container (g)	303.3	285.5	273.5
Weight of Container (g)	38.8	39.5	39.8

LOAD TEST DATA

Penetration (in.)	Load Rdg	Stress (psi)	Load Rdg	Stress (psi)	Load Rdg	Stress (psi)
0.000	0.0	0.0	0.0	0.0	0.0	0.0
0.025	18.0	32.8	28.0	51.0	32.0	58.2
0.050	38.0	69.2	71.0	129.2	65.0	118.3
0.075	53.0	96.4	115.0	209.3	105.0	191.1
0.100	63.0	114.6	150.0	273.0	145.0	263.9
0.125	70.0	127.4	175.0	318.5	178.0	323.9
0.150	78.0	141.9	197.0	358.5	210.0	382.1
0.175	84.0	152.9	218.0	396.7	245.0	445.8
0.200	89.0	162.0	235.0	427.6	275.0	500.4
0.225	93.0	169.2	251.0	456.8	307.0	558.7
0.250	98.0	178.3	264.0	480.4	339.0	616.9
0.275	102.0	185.6	277.0	504.1	365.0	664.2
0.300	106.0	192.9	289.0	525.9	393.0	715.2
0.325	110.0	200.2	302.0	549.6	422.0	767.9
0.350	114.0	207.5	309.0	562.3	450.0	818.9
0.375	118.0	214.7	318.0	578.7	475.0	864.4
0.400	121.0	220.2	327.0	595.1	501.0	911.7
0.425	125.0	227.5	336.0	611.4	525.0	955.4
0.450	127.0	231.1	346.0	629.6	555.0	1010.0
0.475	130.0	236.6	356.0	647.8	580.0	1055.4
0.500	134.0	243.8	365.0	664.2	600.0	1091.8





Blows per layer	● 10		■ 25		▲ 56	
Condition	Before	After	Before	After	Before	After
Moisture Content (%)	8.0	13.8	8.2	12.5	8.3	11.7
Dry Density (pcf)	120.1	119.5	124.4	127.2	133.5	131.0
Swell(+)/Collapse(-) (%)	0.98		0.56		0.46	
Bearing Ratio	10.8		29.3		34.7	

Boring No.: LB-7
Sample No.: B-1
Depth (ft): 0-5
Sample Description:
Silty Sand (SM), Brown

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CALIFORNIA BEARING RATIO of LABORATORY-COMPACTED SOIL
ASTM D 1883

Project No.: 12762.002
Meridian D-1 March Aviation

08-20

One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Project Name: Meridian D-1 Aviation Geo Inv | Tested By: M. Vinet | Date: 8/6/20

Project No.: 12762.002 | Checked By: M. Vinet | Date: 8/11/20

Boring No.: **LB-2** | Sample Type: IN SITU

Sample No.: **R-2** | Depth (ft.) 7.5

Sample Description: Silty, Clayey Sand (SC-SM), Reddish Brown.

Source and Type of Water Used for Inundation: Arrowhead (Distilled)

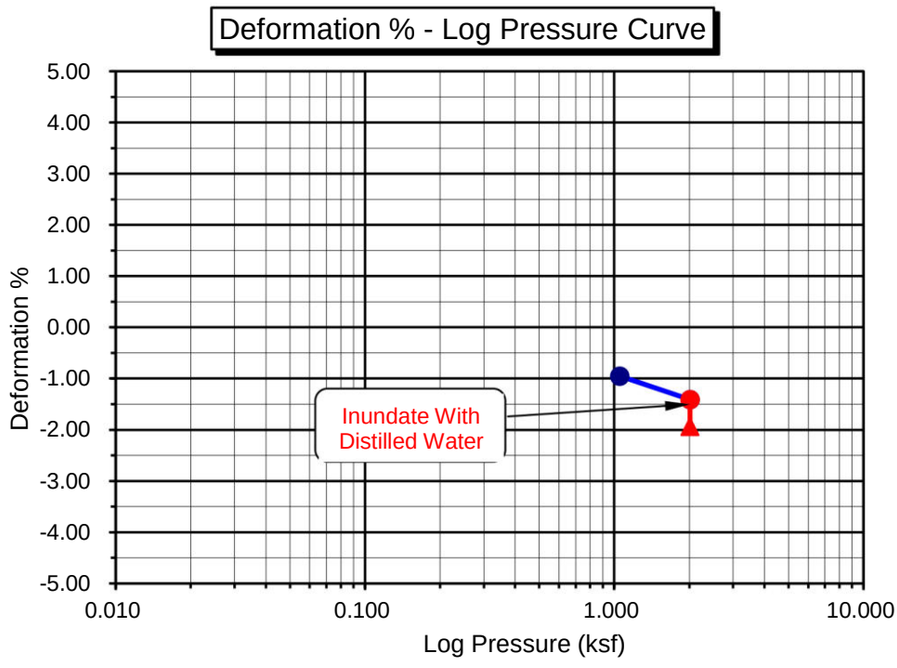
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	114.8
Initial Moisture (%):	14.2
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	117.0
Final Moisture (%) :	16.6
Initial Void ratio:	0.4688
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	81.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0095	0.9905	0.00	-0.95	0.4548	-0.95
2.013	0.0141	0.9859	0.00	-1.41	0.4481	-1.41
H2O	0.0194	0.9806	0.00	-1.94	0.4403	-1.94

Percent Swell / Settlement After Inundation = -0.54



One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Leighton

Project Name: Meridian D-1 Aviation Geo Inv
Project No.: 12762.002
Boring No.: **LB-6**
Sample No.: **R-3**
Sample Description: Silty Sand (SM), Brown.

Tested By: M. Vinet Date: 8/26/20
Checked By: M. Vinet Date: 8/11/20
Sample Type: IN SITU
Depth (ft.) 10.0

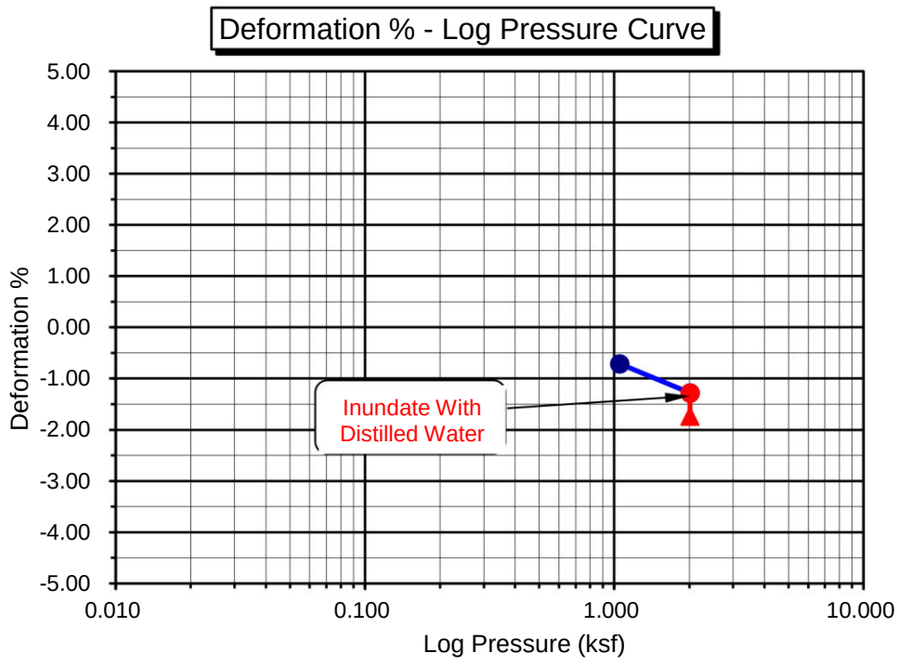
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	121.6
Initial Moisture (%):	11.4
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	123.7
Final Moisture (%) :	13.6
Initial Void ratio:	0.3865
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	79.7

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0071	0.9929	0.00	-0.71	0.3766	-0.71
2.013	0.0128	0.9872	0.00	-1.28	0.3687	-1.28
H2O	0.0174	0.9826	0.00	-1.74	0.3623	-1.74

Percent Swell / Settlement After Inundation = -0.47



One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	M. Vinet	Date:	8/26/20
Project No.:	12762.002	Checked By:	M. Vinet	Date:	8/11/20
Boring No.:	**LB-9**	Sample Type:	IN SITU		
Sample No.:	**R-3**	Depth (ft.)	10.0		

Sample Description: Silty Sand (SM), Brown.

Source and Type of Water Used for Inundation: Arrowhead (Distilled)

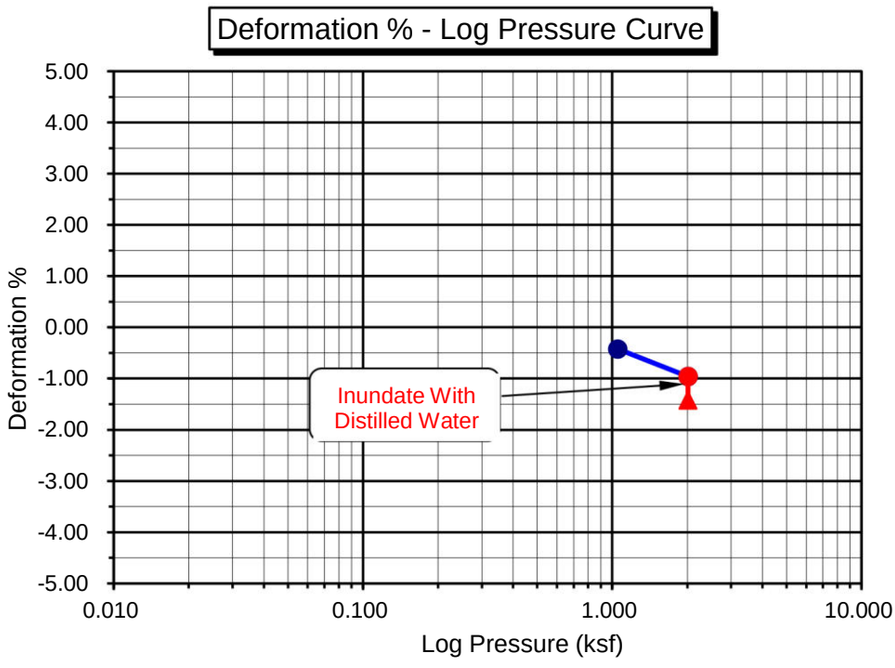
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	114.8
Initial Moisture (%):	14.7
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	116.5
Final Moisture (%) :	16.0
Initial Void ratio:	0.4677
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	84.8

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0042	0.9958	0.00	-0.42	0.4616	-0.42
2.013	0.0096	0.9904	0.00	-0.96	0.4536	-0.96
H2O	0.0142	0.9858	0.00	-1.42	0.4469	-1.42

Percent Swell / Settlement After Inundation = -0.46



One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Project Name: Meridian D-1 Aviation Geo Inv
Project No.: 12762.002
Boring No.: **LB-10**
Sample No.: **R-3**
Sample Description: Silty Sand (SM), Brown.

Tested By: M. Vinet Date: 8/26/20
Checked By: M. Vinet Date: 8/11/20
Sample Type: IN SITU
Depth (ft.) 10.0

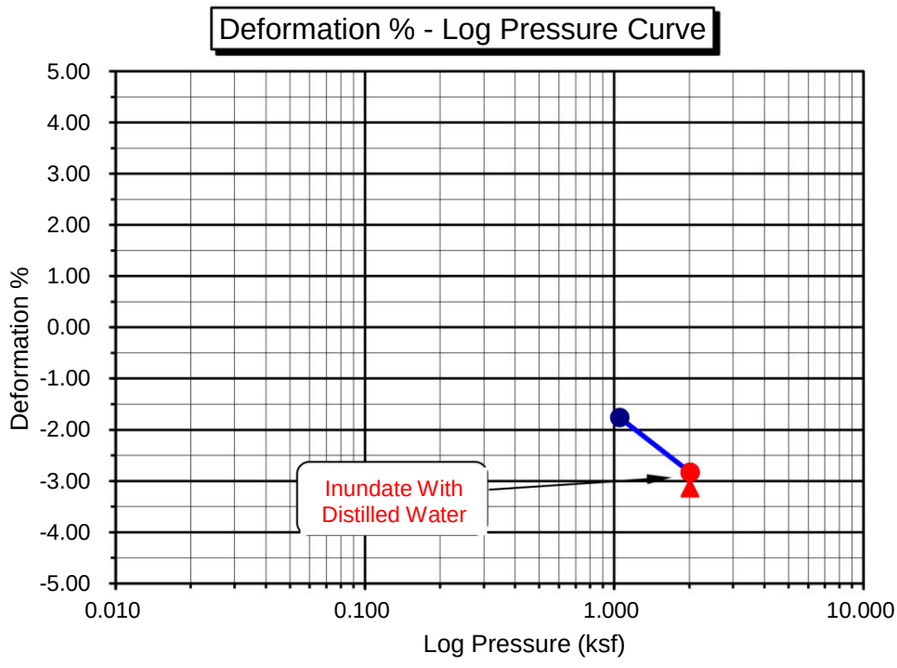
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	115.3
Initial Moisture (%):	14.6
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	119.0
Final Moisture (%) :	15.8
Initial Void ratio:	0.4624
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	85.5

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0176	0.9824	0.00	-1.76	0.4367	-1.76
2.013	0.0283	0.9717	0.00	-2.83	0.4211	-2.83
H2O	0.0314	0.9686	0.00	-3.14	0.4165	-3.14

Percent Swell / Settlement After Inundation = -0.32



One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Project Name: Meridian D-1 Aviation Geo Inv
Project No.: 12762.002
Boring No.: **LB-15**
Sample No.: **R-5**
Sample Description: Silty Sand (SM), Yellowish Brown.

Tested By: M. Vinet Date: 8/6/20
Checked By: M. Vinet Date: 8/11/20
Sample Type: IN SITU
Depth (ft.) 10.0

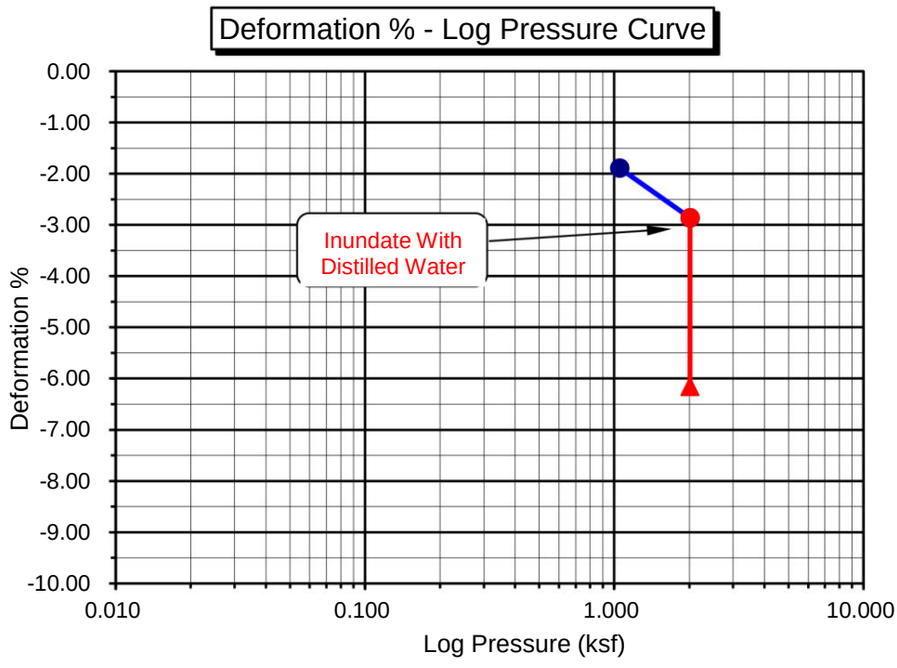
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	109.7
Initial Moisture (%):	9.2
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	116.9
Final Moisture (%) :	18.6
Initial Void ratio:	0.5367
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	46.5

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0189	0.9811	0.00	-1.89	0.5076	-1.89
2.013	0.0286	0.9714	0.00	-2.86	0.4927	-2.86
H2O	0.0616	0.9384	0.00	-6.16	0.4420	-6.16

Percent Swell / Settlement After Inundation = -3.40



One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Project Name: Meridian D-1 Aviation Geo Inv
Project No.: 12762.002
Boring No.: **LB-16**
Sample No.: **R-2**
Sample Description: Silty Sand (SM), Brown.

Tested By: M. Vinet Date: 10/6/20
Checked By: M. Vinet Date: 10/8/20
Sample Type: IN SITU
Depth (ft.) 7.5

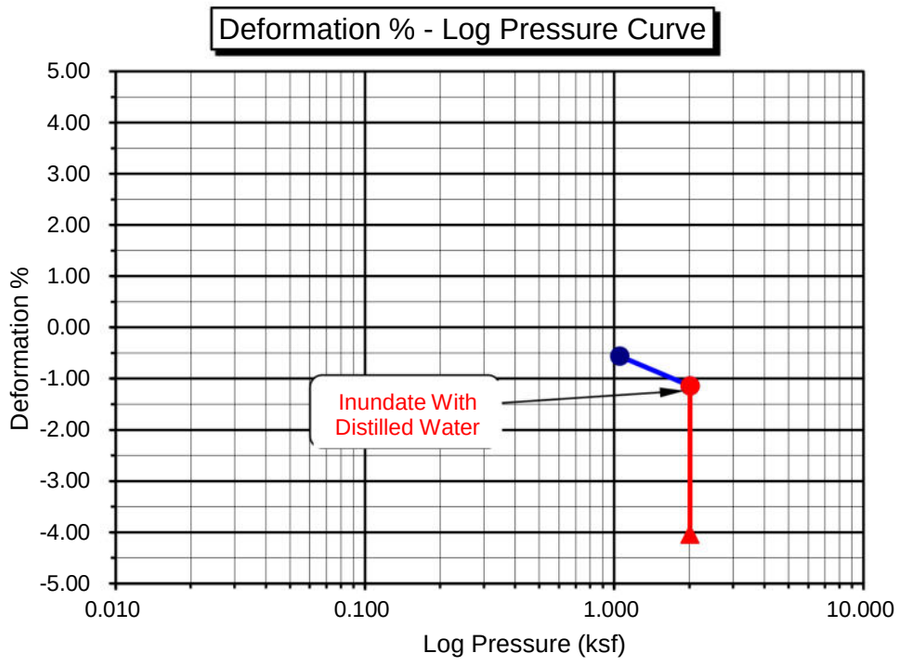
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	101.9
Initial Moisture (%):	6.1
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	106.1
Final Moisture (%) :	19.0
Initial Void ratio:	0.6549
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	25.3

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0056	0.9944	0.00	-0.56	0.6456	-0.56
2.013	0.0114	0.9886	0.00	-1.14	0.6360	-1.14
H2O	0.0404	0.9596	0.00	-4.04	0.5880	-4.04

Percent Swell / Settlement After Inundation = -2.93



One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Project Name: Meridian D-1 Aviation Geo Inv
Project No.: 12762.002
Boring No.: **LB-16**
Sample No.: **R-4**
Sample Description: Silty Sand (SM), Brown.

Tested By: M. Vinet Date: 10/6/20
Checked By: M. Vinet Date: 10/8/20
Sample Type: IN SITU
Depth (ft.) 10.0

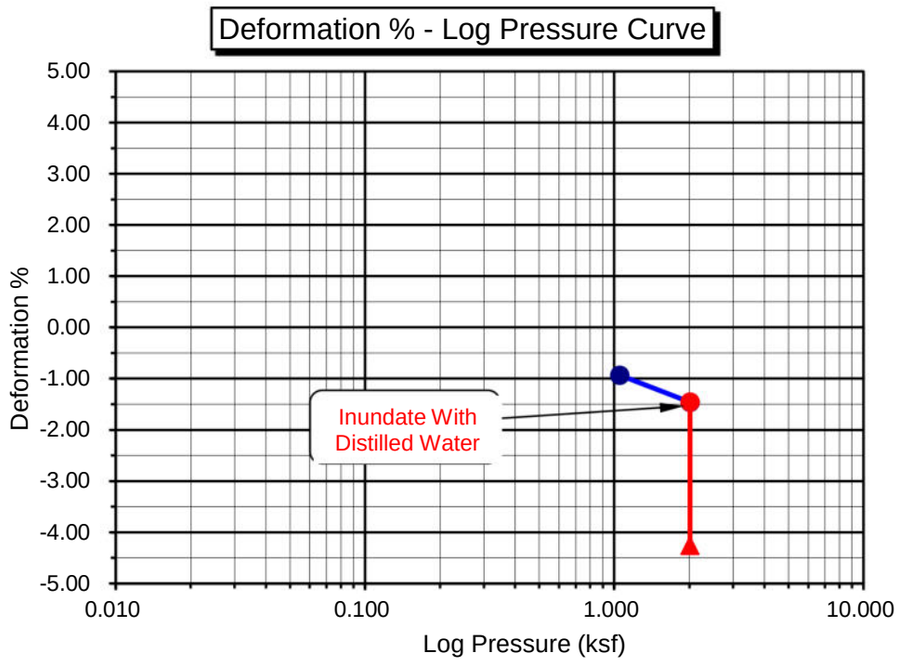
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	102.7
Initial Moisture (%):	5.3
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	107.2
Final Moisture (%) :	15.7
Initial Void ratio:	0.6419
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	22.3

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0093	0.9907	0.00	-0.93	0.6266	-0.93
2.013	0.0146	0.9854	0.00	-1.46	0.6179	-1.46
H2O	0.0426	0.9574	0.00	-4.26	0.5720	-4.26

Percent Swell / Settlement After Inundation = -2.84



One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Leighton

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	M. Vinet	Date:	10/6/20
Project No.:	12762.002	Checked By:	M. Vinet	Date:	10/8/20
Boring No.:	**LB-19**	Sample Type:	IN SITU		
Sample No.:	**R-3**	Depth (ft.)	5.0		

Sample Description: Silty Sand (SM), Brown.

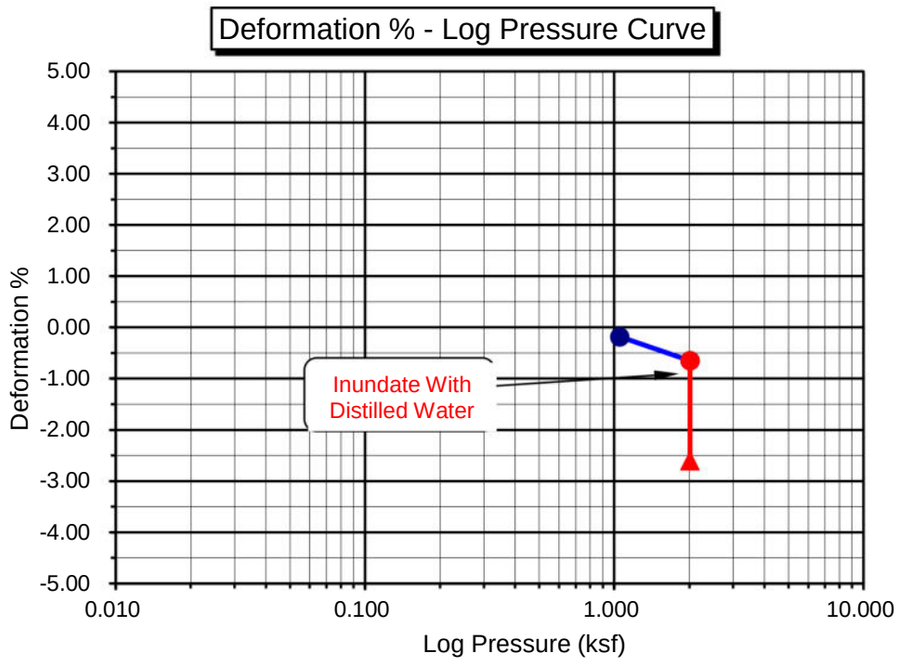
Source and Type of Water Used for Inundation: Arrowhead (Distilled)

** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	115.4	Final Dry Density (pcf):	118.4
Initial Moisture (%):	4.6	Final Moisture (%) :	14.9
Initial Height (in.):	1.0000	Initial Void ratio:	0.4613
Initial Dial Reading (in):	0.0000	Specific Gravity (assumed):	2.70
Inside Diameter of Ring (in):	2.416	Initial Degree of Saturation (%):	26.9

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0018	0.9982	0.00	-0.18	0.4587	-0.18
2.013	0.0065	0.9935	0.00	-0.65	0.4518	-0.65
H2O	0.0261	0.9739	0.00	-2.61	0.4231	-2.61

Percent Swell / Settlement After Inundation = -1.97



One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

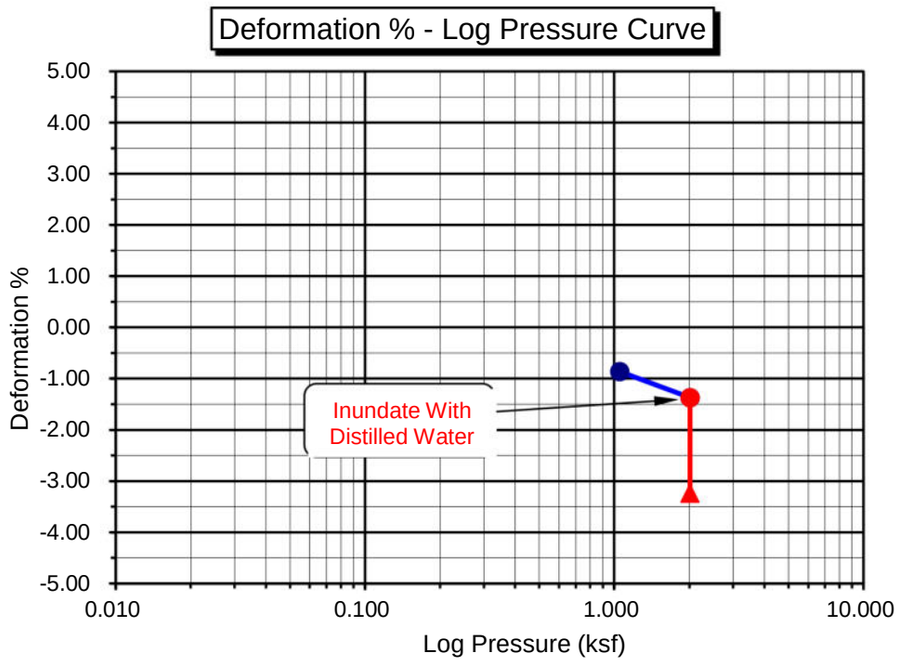
Project Name: Meridian D-1 Aviation Geo Inv
Tested By: M. Vinet Date: 10/6/20
Project No.: 12762.002
Checked By: M. Vinet Date: 10/8/20
Boring No.: **LB-22**
Sample Type: IN SITU
Sample No.: **R-4**
Depth (ft.) 10.0
Sample Description: Silty Sand (SM), Brown.
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	100.1
Initial Moisture (%):	10.0
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	103.4
Final Moisture (%) :	19.5
Initial Void ratio:	0.6847
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	39.6

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0086	0.9914	0.00	-0.86	0.6702	-0.86
2.013	0.0137	0.9863	0.00	-1.37	0.6616	-1.37
H2O	0.0324	0.9676	0.00	-3.24	0.6301	-3.24

Percent Swell / Settlement After Inundation = -1.90



One-Dimensional Swell or Settlement Potential of Cohesive Soils

(ASTM D 4546) -- Method 'B'

Project Name: Meridian D-1 Aviation Geo Inv
Project No.: 12762.002
Boring No.: **LB-23**
Sample No.: **R-3**
Sample Description: Silty Sand (SM), Brown.

Tested By: M. Vinet Date: 10/6/20
Checked By: M. Vinet Date: 10/8/20
Sample Type: IN SITU
Depth (ft.) 7.5

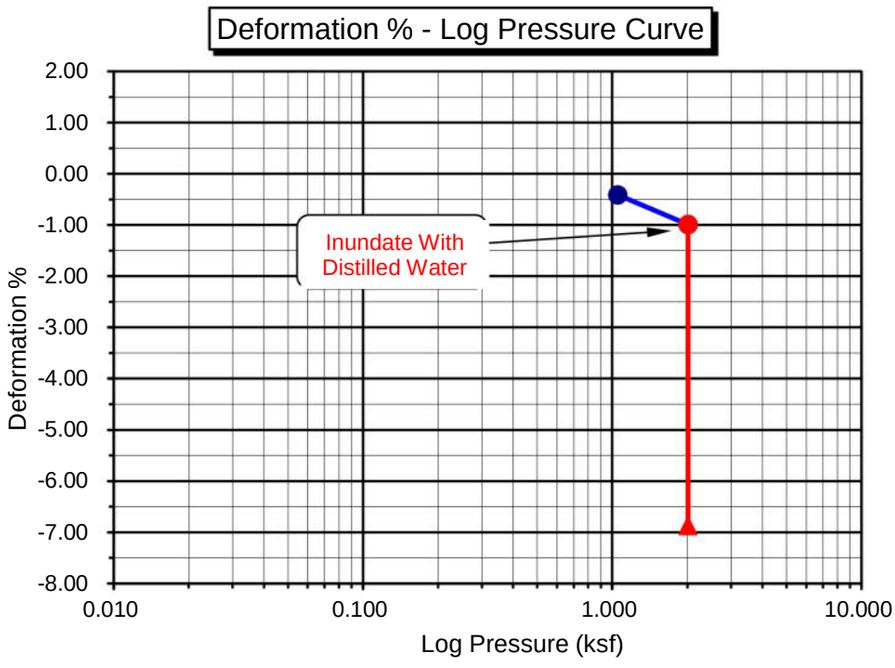
Source and Type of Water Used for Inundation: Arrowhead (Distilled)
** Note: Loading After Wetting (Inundation) not Performed Using this Test Method.

Initial Dry Density (pcf):	101.0
Initial Moisture (%):	7.5
Initial Height (in.):	1.0000
Initial Dial Reading (in):	0.0000
Inside Diameter of Ring (in):	2.416

Final Dry Density (pcf):	108.5
Final Moisture (%) :	16.5
Initial Void ratio:	0.6681
Specific Gravity (assumed):	2.70
Initial Degree of Saturation (%):	30.2

Pressure (p) (ksf)	Final Reading (in)	Apparent Thickness (in)	Load Compliance (%)	Swell (+) Settlement (-) % of Sample Thickness	Void Ratio	Corrected Deformation (%)
1.050	0.0041	0.9959	0.00	-0.41	0.6613	-0.41
2.013	0.0099	0.9901	0.00	-0.99	0.6516	-0.99
H2O	0.0687	0.9313	0.00	-6.87	0.5535	-6.87

Percent Swell / Settlement After Inundation = -5.94



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EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian D-1 Aviation Geo Inv	Tested By:	F. Mina	Date:	8/10/20
Project No. :	12762.002	Checked By:	M. Vinet	Date:	8/11/20
Boring No.:	LB-7	Depth:	5.0 - 10.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty Sand (SM), Brown.				

Dry Wt. of Soil + Cont. (gm.)	1361.8
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1361.8
Weight Soil Retained on #4 Sieve	18.6
Percent Passing # 4	98.6

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0012
Wt. Comp. Soil + Mold (gm.)	610.0	634.0
Wt. of Mold (gm.)	190.5	190.5
Specific Gravity (Assumed)	2.70	2.70
Container No.	10	10
Wet Wt. of Soil + Cont. (gm.)	1271.7	634.0
Dry Wt. of Soil + Cont. (gm.)	1248.2	386.6
Wt. of Container (gm.)	971.7	190.5
Moisture Content (%)	8.5	14.7
Wet Density (pcf)	126.5	133.6
Dry Density (pcf)	116.6	116.5
Void Ratio	0.446	0.447
Total Porosity	0.308	0.309
Pore Volume (cc)	63.8	64.0
Degree of Saturation (%) [S meas]	**51.5**	**88.8**

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.)
8/10/20	8:00	1.0	0	0.5000
8/10/20	8:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
8/11/20	8:00	1.0	1430	0.5012
8/11/20	9:00	1.0	1490	0.5012

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	1.2
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Height	**1**

Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian D-1 Aviation Geo	Tested By:	F. Mina	Date:	10/6/20
Project No. :	12762.002	Checked By:	M. Vinet	Date:	10/8/20
Boring No.:	LB-17	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty, Clayey Sand (SC-SM), Dark Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	1577.7
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1577.7
Weight Soil Retained on #4 Sieve	10.2
Percent Passing # 4	99.4

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0140
Wt. Comp. Soil + Mold (gm.)	606.3	631.3
Wt. of Mold (gm.)	190.5	190.5
Specific Gravity (Assumed)	2.70	2.70
Container No.	7	7
Wet Wt. of Soil + Cont. (gm.)	338.2	631.3
Dry Wt. of Soil + Cont. (gm.)	314.7	383.2
Wt. of Container (gm.)	38.2	190.5
Moisture Content (%)	8.5	15.0
Wet Density (pcf)	125.4	131.1
Dry Density (pcf)	115.6	114.0
Void Ratio	0.458	0.479
Total Porosity	0.314	0.324
Pore Volume (cc)	65.1	68.0
Degree of Saturation (%) [S meas]	**50.1**	**84.7**

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.)
10/6/20	13:00	1.0	0	0.5000
10/6/20	13:10	1.0	10	0.5000
	Add Distilled Water to the Specimen			
10/7/20	12:00	1.0	1370	0.5140
10/7/20	13:00	1.0	1430	0.5140

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	14.0
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**14**

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Leighton

EXPANSION INDEX of SOILS

ASTM D 4829

Project Name:	Meridian D-1 Aviation Geo	Tested By:	F. Mina	Date:	10/6/20
Project No. :	12762.002	Checked By:	M. Vinet	Date:	10/8/20
Boring No.:	LB-21	Depth:	0 - 5.0		
Sample No. :	B-1	Location:	N/A		
Sample Description:	Silty, Clayey Sand (SC-SM), Dark Yellowish Brown.				

Dry Wt. of Soil + Cont. (gm.)	1777.7
Wt. of Container No. (gm.)	0.0
Dry Wt. of Soil (gm.)	1777.7
Weight Soil Retained on #4 Sieve	0.0
Percent Passing # 4	100.0

MOLDED SPECIMEN	Before Test	After Test
Specimen Diameter (in.)	4.01	4.01
Specimen Height (in.)	1.0000	1.0070
Wt. Comp. Soil + Mold (gm.)	619.8	637.7
Wt. of Mold (gm.)	199.3	199.3
Specific Gravity (Assumed)	2.70	2.70
Container No.	8	8
Wet Wt. of Soil + Cont. (gm.)	350.6	637.7
Dry Wt. of Soil + Cont. (gm.)	327.1	387.6
Wt. of Container (gm.)	50.6	199.3
Moisture Content (%)	8.5	13.1
Wet Density (pcf)	126.8	131.3
Dry Density (pcf)	116.9	116.1
Void Ratio	0.442	0.452
Total Porosity	0.307	0.311
Pore Volume (cc)	63.5	64.9
Degree of Saturation (%) [S meas]	**51.9**	**78.3**

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.)
10/6/20	13:30	1.0	0	0.5000
10/6/20	13:40	1.0	10	0.5000
	Add Distilled Water to the Specimen			
10/7/20	13:00	1.0	1400	0.5070
10/7/20	14:00	1.0	1460	0.5070

Expansion Index (EI meas) = ((Final Rdg - Initial Rdg) / Initial Thick.) x 1000	7.0
Expansion Index (Report) = Nearest Whole Number or Zero (0) if Initial Height is > than Final Heigh	**7**

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R-VALUE TEST RESULTS

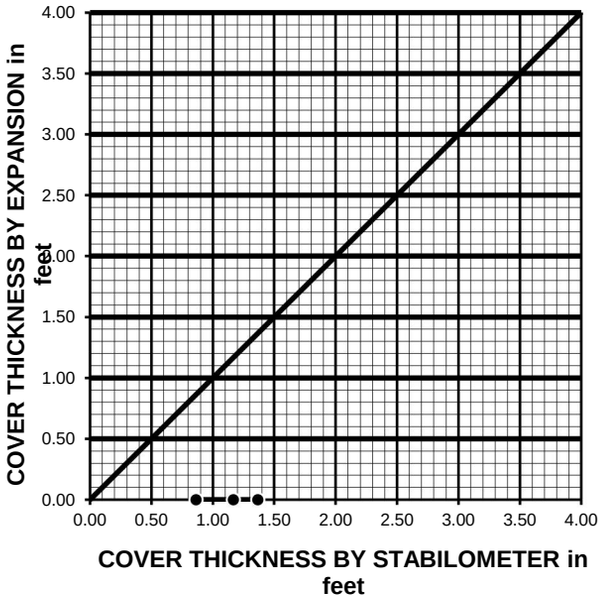
ASTM D 2844

Project Name:	Meridian D-1 Aviation Geo Inv	Date:	8/6/20
Project Number:	12762.002	Technician:	M. Vinet
Boring Number:	LB-1	Depth (ft.):	0 - 5.0
Sample Number:	B-1	Sample Location:	N/A
Sample Description:	Silty Sand (SM), Reddish Brown.		

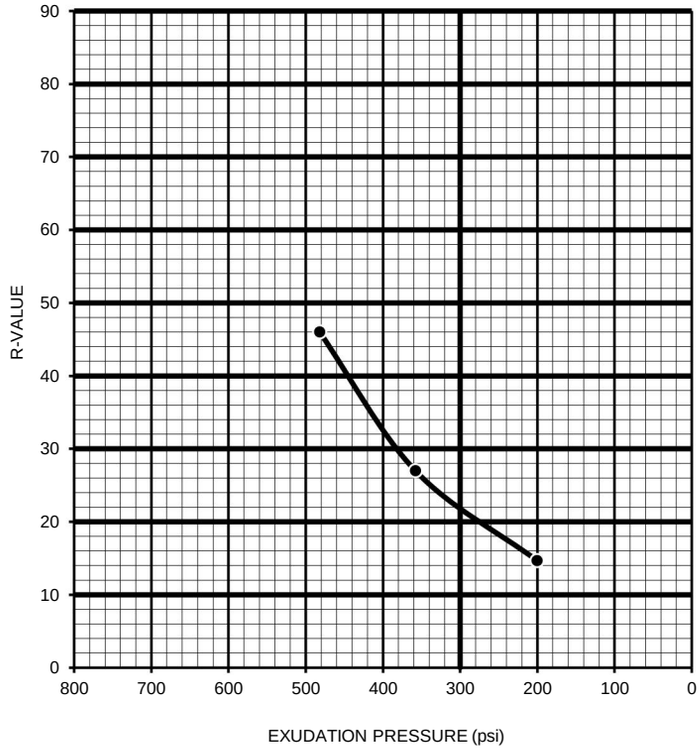
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	7.8	8.8	9.8
HEIGHT OF SAMPLE, Inches	2.45	2.65	2.49
DRY DENSITY, pcf	124.4	121.9	118.9
COMPACTOR AIR PRESSURE, psi	300	175	90
EXUDATION PRESSURE, psi	482	358	200
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	64	99	122
TURNS DISPLACEMENT	4.40	4.48	4.52
R-VALUE UNCORRECTED	46	26	15
R-VALUE CORRECTED	46	27	15

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.	0.86	1.17	1.36
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:	22
EQUILIBRIUM R-VALUE:	22

R-VALUE TEST RESULTS

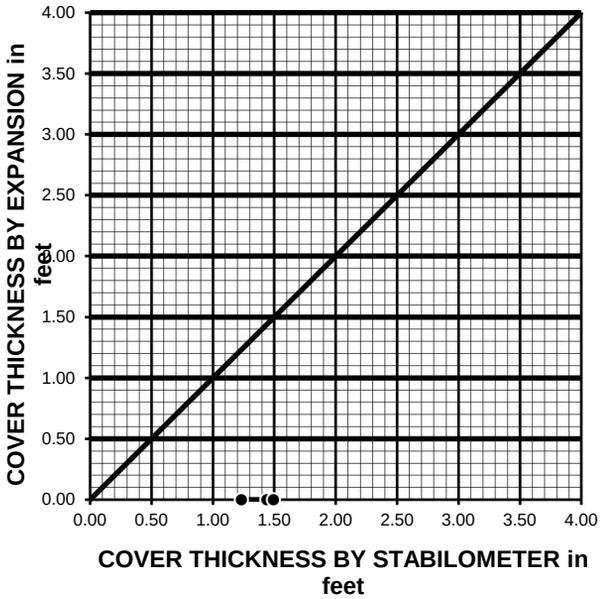
ASTM D 2844

Project Name:	Meridian D-1 Aviation Geo Inv	Date:	10/6/20
Project Number:	12762.002	Technician:	M. Vinet
Boring Number:	LB-19	Depth (ft.):	0 - 5.0
Sample Number:	B-1	Sample Location:	N/A
Sample Description:	Sandy Silt s(ML), Dark Yellowish Brown.		

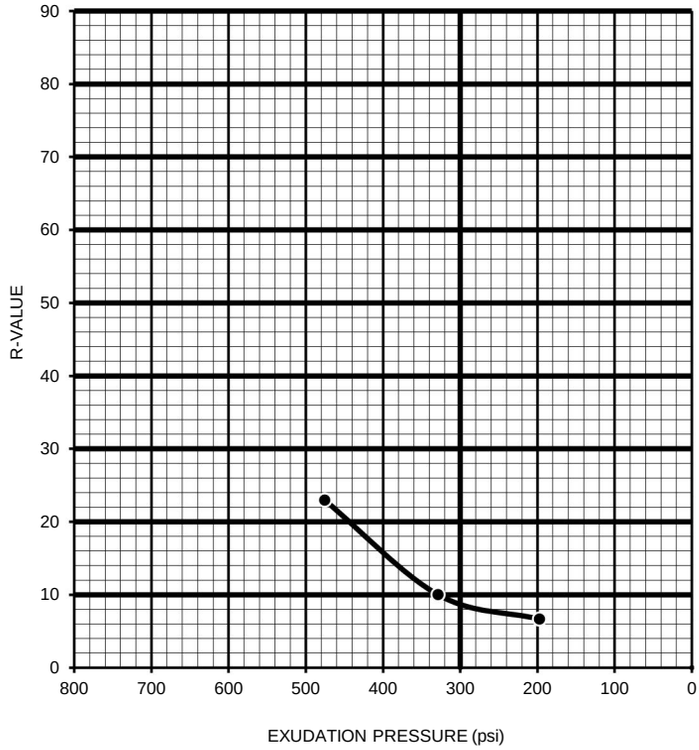
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	12.5	13.5	14.6
HEIGHT OF SAMPLE, Inches	2.48	2.55	2.55
DRY DENSITY, pcf	113.6	113.3	111.0
COMPACTOR AIR PRESSURE, psi	250	125	85
EXUDATION PRESSURE, psi	476	329	197
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	109	133	142
TURNS DISPLACEMENT	3.92	4.38	4.44
R-VALUE UNCORRECTED	23	10	7
R-VALUE CORRECTED	23	10	7

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.	1.23	1.44	1.49
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:	9
EQUILIBRIUM R-VALUE:	9

R-VALUE TEST RESULTS

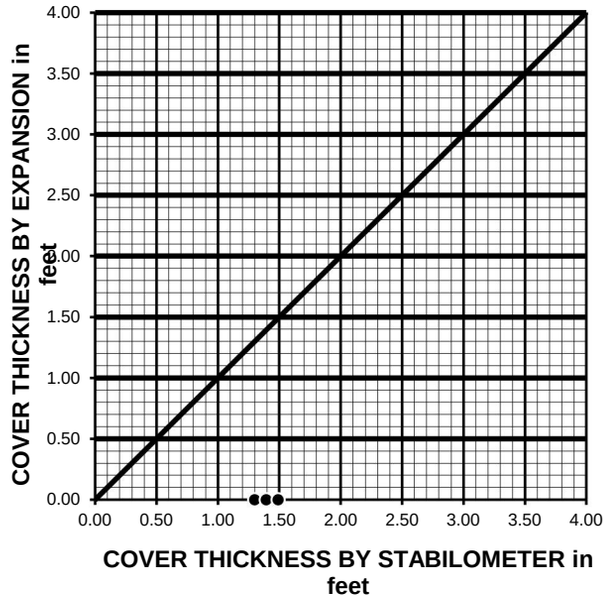
ASTM D 2844

Project Name:	Meridian D-1 Aviation Geo Inv	Date:	10/6/20
Project Number:	12762.002	Technician:	M. Vinet
Boring Number:	LB-21	Depth (ft.):	0 - 5.0
Sample Number:	B-1	Sample Location:	N/A
Sample Description:	Silty, Clayey Sand (SC-SM), Dark Yellowish Brown.		

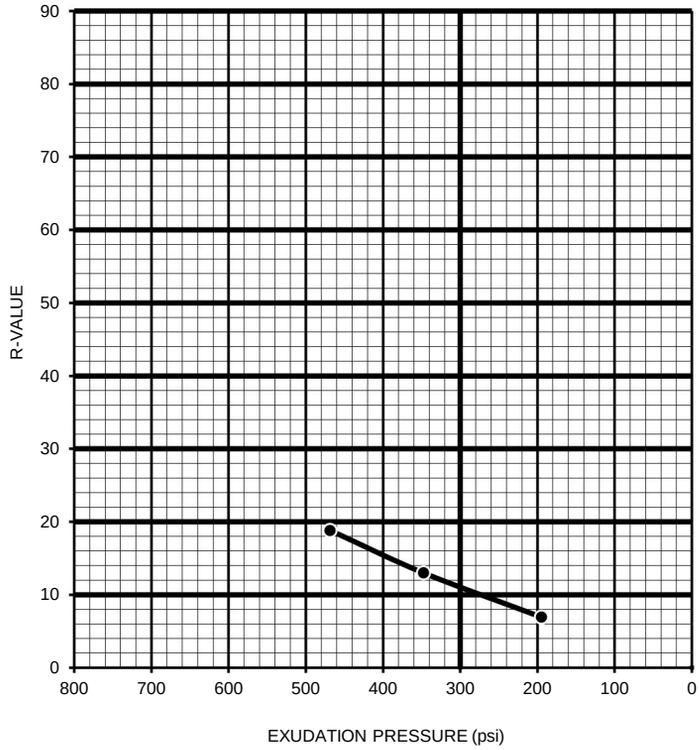
TEST SPECIMEN	A	B	C
MOISTURE AT COMPACTION %	9.9	11.0	12.2
HEIGHT OF SAMPLE, Inches	2.47	2.60	2.47
DRY DENSITY, pcf	118.7	116.5	113.9
COMPACTOR AIR PRESSURE, psi	200	125	55
EXUDATION PRESSURE, psi	469	348	195
EXPANSION, Inches x 10exp-4	0	0	0
STABILITY Ph 2,000 lbs (160 psi)	114	127	140
TURNS DISPLACEMENT	4.35	4.70	4.79
R-VALUE UNCORRECTED	19	12	7
R-VALUE CORRECTED	19	13	7

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.	1.30	1.39	1.49
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:	11
EQUILIBRIUM R-VALUE:	11

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TESTS for SULFATE CONTENT
CHLORIDE CONTENT and pH of SOILS

Project Name: Meridian D-1 Aviation Geo Inv Tested By : F. Mina Date: 08/11/20

Project No. : 12762.002 Data Input By: M. Vinet Date: 08/11/20

Boring No.	LB-7	LB-15		
Sample No.	B-1	B-1		
Sample Depth (ft)	5.0 - 10.0	0 - 5.0		
Soil Identification:	Silty Sand (SM)	Sandy Silt s(ML)		
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)	25.0236	24.8981		
Wt. of Crucible (g)	25.0189	24.8945		
Wt. of Residue (g) (A)	0.0047	0.0036		
PPM of Sulfate (A) x 41150	193.40	148.14		
PPM of Sulfate, Dry Weight Basis	**193**	**148**		

CHLORIDE CONTENT, DOT California Test 422

ml of Extract For Titration (B)	30	30		
ml of AgNO3 Soln. Used in Titration (C)	1.0	0.8		
PPM of Chloride (C -0.2) * 100 * 30 / B	80	60		
PPM of Chloride, Dry Wt. Basis	**80**	**60**		

pH TEST, DOT California Test 643

pH Value	**7.90**	**7.70**		
Temperature °C	21.0	21.0		

Leighton

SOIL RESISTIVITY TEST

DOT CA TEST 643

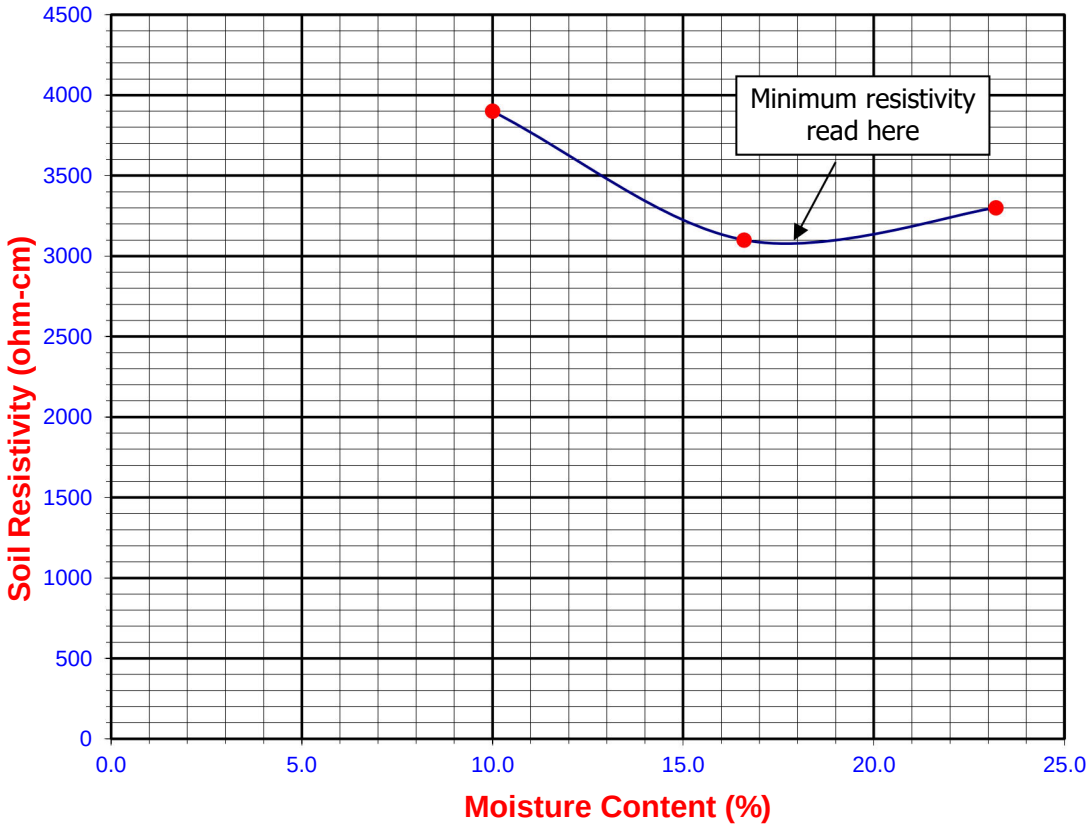
Project Name:	Meridian D-1 Aviation Geo Inv		Tested By :	F. Mina	Date: 08/11/20
Project No. :	12762.002		Data Input By:	M. Vinet	Date: 08/11/20
Boring No.:	LB-7		Depth (ft.) :	5.0 - 10.0	
Sample No. :	B-1				
Soil Identification:*	Silty Sand (SM)				

*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	3900	3900
2	83	16.60	3100	3100
3	116	23.20	3300	3300
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	
3090	**18.0**	**193**	**80**	**7.90**	**21.0**



SOIL RESISTIVITY TEST

DOT CA TEST 643

Project Name:	Meridian D-1 Aviation Geo Inv		Tested By :	F. Mina	Date: 08/11/20
Project No. :	12762.002		Data Input By:	M. Vinet	Date: 08/11/20
Boring No.:	LB-15		Depth (ft.) :	0 - 5.0	
Sample No. :	B-1				

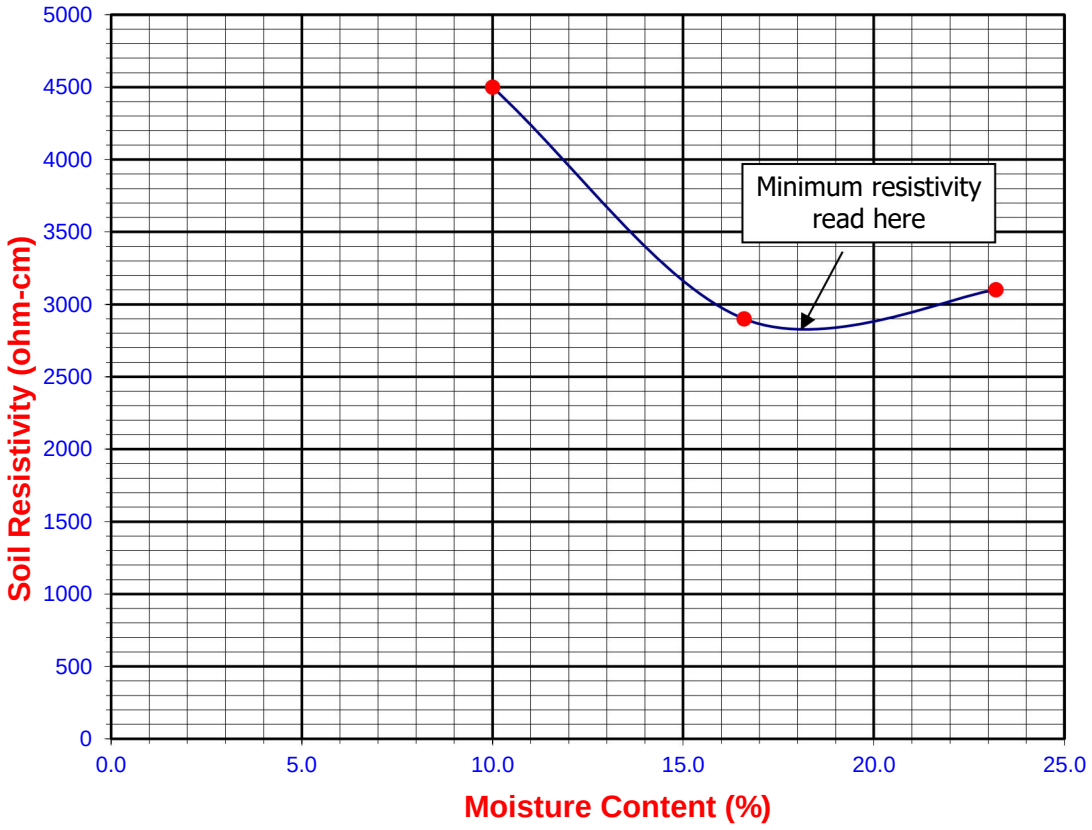
Soil Identification:* Sandy Silt s(ML)

*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	4500	4500
2	83	16.60	2900	2900
3	116	23.20	3100	3100
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	
2810	**18.0**	**148**	**60**	**7.70**	**21.0**



Leighton

TESTS for SULFATE CONTENT

Project Name: Meridian D-1 Aviation Geo Inv Tested By : M. Vinet Date: 10/07/20

Project No. : 12762.002 Data Input By: M. Vinet Date: 10/08/20

Boring No.	LB-17			
Sample No.	B-1			
Sample Depth (ft)	0 - 5.0			
Soil Identification:	SC-SM			
Wet Weight of Soil + Container (g)	100.00			
Dry Weight of Soil + Container (g)	100.00			
Weight of Container (g)	0.00			
Moisture Content (%)	0.00			
Weight of Soaked Soil (g)	100.00			

SULFATE CONTENT, DOT California Test 417, Part II

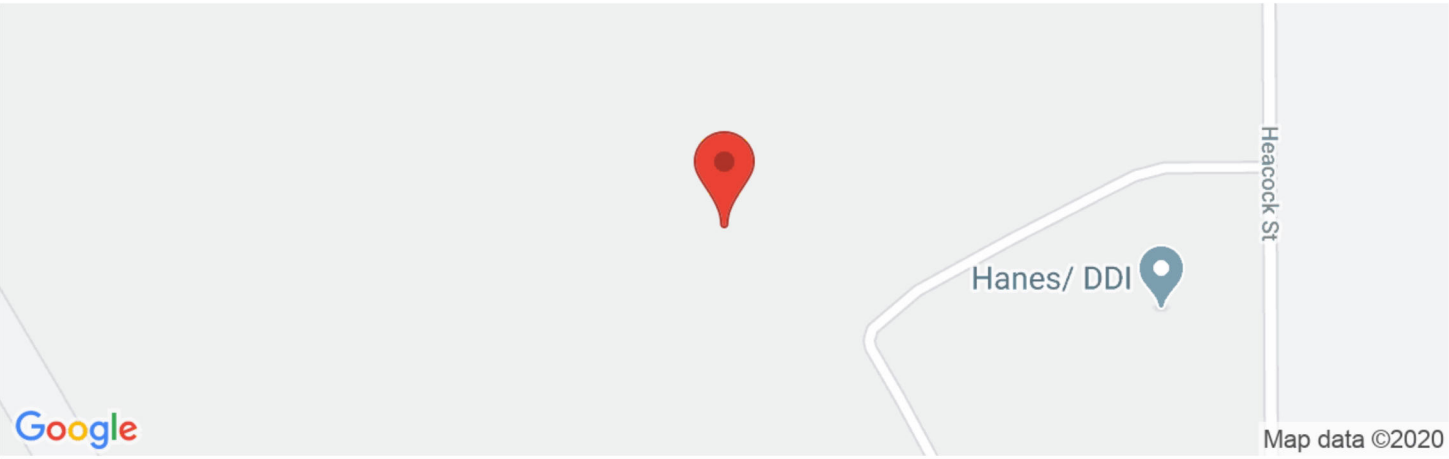
Beaker No.	5			
Crucible No.	5			
Furnace Temperature (°C)	850			
Time In / Time Out	Timer			
Duration of Combustion (min)	45			
Wt. of Crucible + Residue (g)	25.6970			
Wt. of Crucible (g)	25.6925			
Wt. of Residue (g) (A)	0.0045			
PPM of Sulfate (A) x 41150	185.18			
PPM of Sulfate, Dry Weight Basis	**185**			

APPENDIX C

SITE SPECIFIC ANALYSIS

D-1 Aviation

Latitude, Longitude: 33.8763, -117.2488



Date	8/11/2020, 2:20:35 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	D - Stiff Soil

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.6	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.5	Site-modified spectral acceleration value
S_{M1}	null -See Section 11.4.8	Site-modified spectral acceleration value
S_{DS}	1	Numeric seismic design value at 0.2 second SA
S_{D1}	null -See Section 11.4.8	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	null -See Section 11.4.8	Seismic design category
F_a	1	Site amplification factor at 0.2 second
F_v	null -See Section 11.4.8	Site amplification factor at 1.0 second
PGA	0.532	MCE_G peak ground acceleration
F_{PGA}	1.1	Site amplification factor at PGA
PGA_M	0.585	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.604	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.719	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.602	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.661	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.532	Factored deterministic acceleration value. (Peak Ground Acceleration)
C_{RS}	0.933	Mapped value of the risk coefficient at short periods
C_{R1}	0.91	Mapped value of the risk coefficient at a period of 1 s

Calculate F_v, S_{M1}, and S_{D1} for Site Class D sites using 2019 CBC and ASCE 7-16

Site Class	D

Structure Conditions	Enter Yes or No (Case Sensitive)
Is this a seismically isolated structure? (See Chapter 17 of ASCE 7-16)	No
Is this a structure with a damping system? (See Chapter 18 of ASCE 7-16)	No

Parameter	Value
S_1 (g)	0.600
F_v (ASCE 7-16 Table 11.4-1)	1.700
S_{M1} (g)	1.020
S_{D1} (g)	0.680

Obtain S1 from maps using web application
SEAOC/OSHPD Seismic Design Maps Tool ATC Hazards by Location Tool ASCE 7 Hazard Tool

Long-Period Site Coefficient, F_v

Site Class	Mapped MCE$_R$ Spectral Response Acceleration at 1-s Period, S_1	
	$S_1 \leq 0.1$	$S_1 = 0.2$
A	0.8	0.8
B	0.8	0.8
C	1.5	1.5
D	2.4	2.4[a]
E	4.2	See Section 11.4.8
F	See Section 11.4.8	See Section 11.4.8

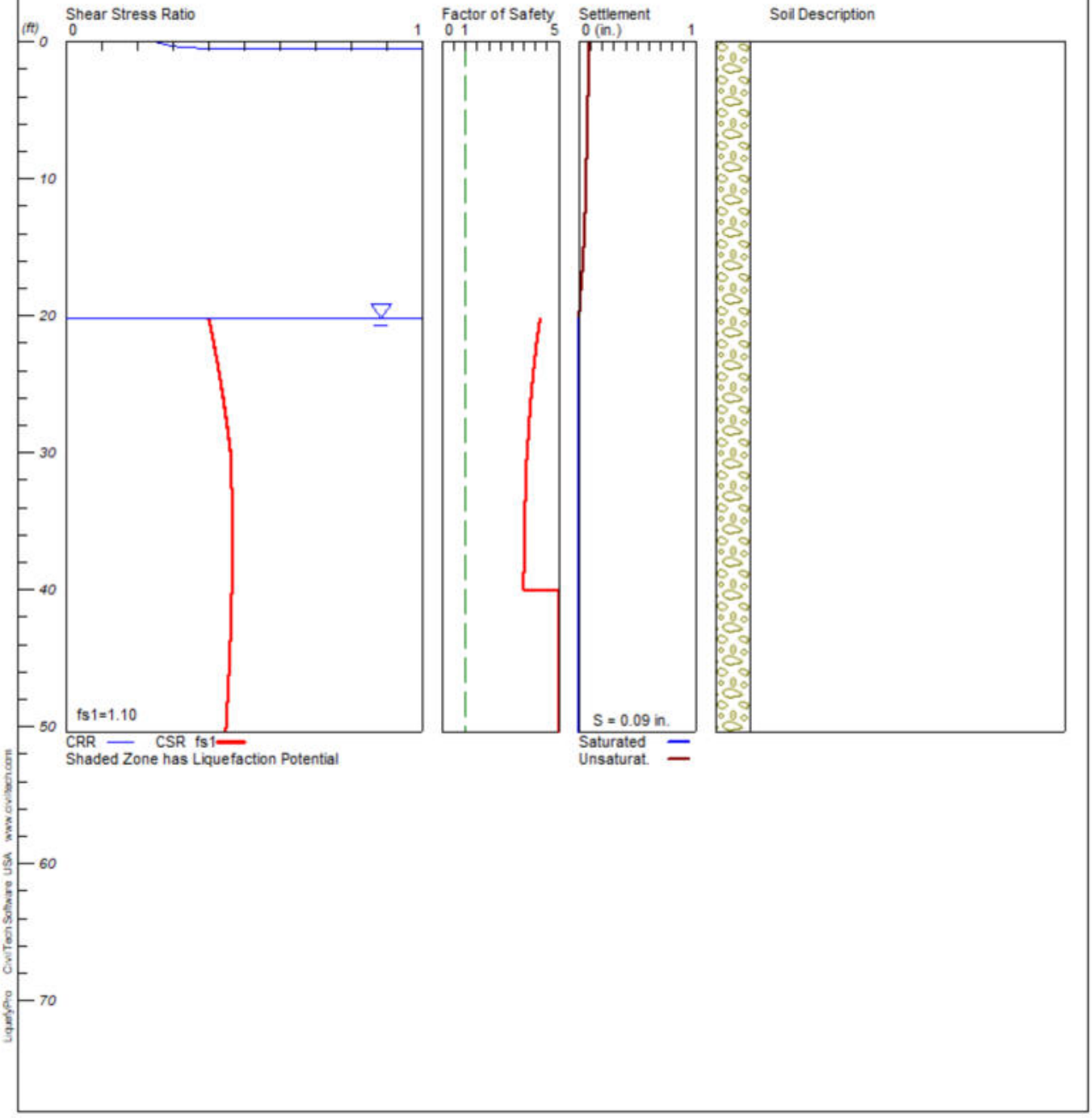
Note: Use straight-line interpolation for intermed
a Also, see requirements for site-specific ground m

LIQUEFACTION/SETTLEMENT ANALYSIS

Meridian Gateway Aviation Center

Hole No.=LB-8 Water Depth=20.16 ft

Magnitude=8.0
Acceleration=0.59g



Leighton **12762.002** **Plate A-1**

****
LIQUEFACTION ANALYSIS SUMMARY

****
Font: Courier New, Regular, Size 8 is recommended for this report.
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Input File Name: P:\Leighton - Infocus\12000 - 12999\12762 Meridian D-1 March Aviation\002 Prelim Geot\Analyses\Liquefy LB-8.liq
Title: Meridian Gateway Aviation Center
Subtitle: 12762.002

Surface Elev.=
Hole No.=LB-8
Depth of Hole= 50.42 ft
Water Table during Earthquake= 20.16 ft
Water Table during In-Situ Testing= 20.16 ft
Max. Acceleration= 0.59 g
Earthquake Magnitude= 8.00

Input Data:
Surface Elev.=
Hole No.=LB-8
Depth of Hole=50.42 ft
Water Table during Earthquake= 20.16 ft
Water Table during In-Situ Testing= 20.16 ft
Max. Acceleration=0.59 g
Earthquake Magnitude=8.00
No-Liquefiable Soils: CL, OL are Non-Liq. Soil

1. SPT or BPT Calculation.
2. Settlement Analysis Method: Ishihara / Yoshimine
3. Fines Correction for Liquefaction: Idriss/Seed
4. Fine Correction for Settlement: During Liquefaction*
5. Settlement Calculation in: All zones*
6. Hammer Energy Ratio, Ce = 1.25
7. Borehole Diameter, Cb= 1.15
8. Sampling Method, Cs= 1.2
9. User request factor of safety (apply to CSR) , User= 1.1
   Plot one CSR curve (fs1=User)
10. Use Curve Smoothing: Yes*
* Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
0.00	7.80	135.00	35.00
10.00	45.00	135.00	35.00
15.00	31.20	132.00	40.00
20.00	17.40	132.00	40.00
25.00	37.20	132.00	40.00
30.00	60.00	130.00	10.00
35.00	70.00	130.00	10.00
40.00	60.00	130.00	NoLiq
50.00	60.00	130.00	NoLiq

Output Results:

Settlement of Saturated Sands=0.00 in.
Settlement of Unsaturated Sands=0.09 in.
Total Settlement of Saturated and Unsaturated Sands=0.09 in.
Differential Settlement=0.044 to 0.058 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
0.00	0.25	0.42	5.00	0.00	0.09	0.09
5.00	1.69	0.42	5.00	0.00	0.08	0.08
10.00	1.69	0.41	5.00	0.00	0.06	0.06
15.00	1.69	0.41	5.00	0.00	0.04	0.04
20.00	1.69	0.40	5.00	0.00	0.00	0.00
25.00	1.69	0.44	3.88	0.00	0.00	0.00
30.00	1.69	0.46	3.66	0.00	0.00	0.00
35.00	1.67	0.47	3.56	0.00	0.00	0.00
40.00	1.64	0.47	3.52	0.00	0.00	0.00
45.00	2.00	0.46	5.00	0.00	0.00	0.00
50.00	2.00	0.45	5.00	0.00	0.00	0.00

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

Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

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1 atm (atmosphere) = 1 tsf (ton/ft2)
CRRm Cyclic resistance ratio from soils
CSRsf Cyclic stress ratio induced by a given earthquake (with user request factor of safety)
F.S. Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat Settlement from saturated sands

S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

APPENDIX D

EARTHWORK AND GRADING SPECIFICATIONS

APPENDIX D

LEIGHTON CONSULTING, INC.
EARTHWORK AND GRADING GUIDE SPECIFICATIONS

TABLE OF CONTENTS

D-1.0 GENERAL

D-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).

D-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.

D-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.

D-2.0 PREPARATION OF AREAS TO BE FILLED

D-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). 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.

D-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 over-excavated as specified in the following Section D-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.

D-2.3 Overexcavation

In addition to removals and over-excavations 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 over-excavated to competent ground as evaluated by Leighton Consulting, Inc. during grading. All undocumented fill soils under proposed structure footprints should be excavated

D-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 over-excavated to provide a flat subgrade for the fill.

D-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.

D-3.0 FILL MATERIAL

D-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.

D-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.

D-3.3 Import

If importing of fill material is required for grading, proposed import material shall meet the requirements of Section D-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.

D-4.0 FILL PLACEMENT AND COMPACTION

D-4.1 Fill Layers

Approved fill material shall be placed in areas prepared to receive fill, as described in Section D-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.

D-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.

D-4.3 Compaction of Fill

After each layer has been moisture-conditioned, mixed, and evenly spread, each layer shall be uniformly compacted to not-less-than (≥) 90 percent of the maximum dry density as determined by ASTM Test Method D 1557. In some cases, structural fill may be specified (see project-specific geotechnical report) to be uniformly compacted to at-least (≥) 95 percent of the ASTM D 1557 modified Proctor laboratory maximum dry density. For fills thicker than (>) 15 feet (4.5 m), the portion of 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.

D-4.4 Compaction of Fill Slopes

In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by back rolling 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.

D-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).

D-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.

D-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, then observed and reviewed 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..

D-6.0 TRENCH BACKFILLS

D-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*, 2009 Edition or more current (see also: http://www.dir.ca.gov/title8/sb4a6.html).

D-6.2 Bedding and Backfill

All utility trench bedding and backfill shall be performed in accordance with applicable provisions of the 2015 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 2015 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..

D-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.

APPENDIX E

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

Appendix 4: Historical Site Conditions

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

Included is the recorded instrument for the property defining the area referenced as Site 7 to provide historical context of contamination. Air Force led site clean-up and/or remediation is on-going and for best and current documentation the reviewer should refer to Air Force Civil Engineer Center: https://www.afcec.af.mil/

A Phase 1 ESA has been prepared for the site by Leighton Consulting, Inc. (project no. 12762.001 dated June 5th 2020) and included as part of this PWQMP by reference. A copy of the Phase 1 ESA document will be provided separately.

RECORDING REQUESTED BY:

March Joint Powers Authority
P.O. Box 7480
Moreno Valley, CA 92552
Attention: Marion Ashley, Chairman

WHEN RECORDED, MAIL TO:

Department of Toxic Substances Control
Region 4
5796 Corporate Ave
Cypress, CA 90630
Attention: John Scandura, Branch Chief
Southern California Operations Branch
Office of Military Facilities

DOC # 2007-0675899
11/06/2007 08:00A Fee:NC
Page 1 of 14
Recorded in Official Records
County of Riverside
Larry W. Ward
Assessor, County Clerk & Recorder

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SPACE ABOVE THIS LINE RESERVED FOR RECORDER'S USE

C
043

COVENANT TO RESTRICT USE OF PROPERTY

ENVIRONMENTAL RESTRICTION

(Re: Site 7, portion of Parcel D-1, former March Air Force Base, County of Riverside, DTSC Site Code 400090, 2007)

This Covenant and Agreement ("Covenant") is made by and between March Joint Powers Authority (the "Covenantor"), the current owner of Site 7, a portion of Parcel D-1 of the former March Air Force Base which is situated in Riverside, County of Riverside, State of California, described in Exhibit "A", attached hereto and incorporated herein by this reference (the "Property"), and the Department of Toxic Substances Control (the "Department"). Pursuant to Civil Code section 1471, the Department has determined that this Covenant is reasonably necessary to protect present or future human health or safety or the environment as a result of the presence on the land of hazardous materials as defined in Health and Safety Code section 25260. The Covenantor and the Department, collectively referred to as the "Parties", hereby agree pursuant to Civil Code section 1471 and Health and Safety Code section 25355.5, that the use of the Property be restricted as set forth in this Covenant; and the Parties further agree that the Covenant shall conform with the requirements of California Code of Regulations, title 22, section 67391.1.

ARTICLE I
STATEMENT OF FACTS

1.01. The Property, generally known as Site 7, a portion of Parcel D-1 and totaling approximately 24.51 acres, is located at the former March Air Force Base southeast of the runway area of the operational March Air Reserve Base, in the City of Moreno Valley, County of Riverside, State of California. The Air Force transferred the Property by grant of deed to the March Joint Powers Authority on September 18, 2007. The Property does not yet have an Assessor's Parcel Number ("APN") from the County of Riverside. Currently, no buildings exist at the Property. As part of Parcel D-1, the planned use for the Property is commercial. This Covenant applies to the Property only and does not apply to the rest of Parcel D-1.

1.02. Restricted Area — Site 7 – Former March Air Force Base Fire Training Area No. 2. In November 1989 the former March Air Force Base was placed on the United States Environmental Protection Agency's ("USEPA's") National Priority List ("NPL") of hazardous waste sites under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 U.S.C. §§ 9601-9675). The Property is located within the closed portion of the former March Air Force Base. The March Air Force Base Operable Unit 1 ("OU1") Record of Decision ("ROD"), dated December 1995, was approved by the Air Force, USEPA, Santa Ana Regional Water Quality Control Board, and the Department. The OU1 ROD states that between 1954 and 1978, fire training exercises were conducted at Site 7 in unlined training pits. Three distinct burn pits were identified and a portion of Site 7 may have been used for crash rescue training. Wastes used in training exercises reportedly included contaminated fuel, waste solids, and spent solvents. The OU1 ROD indicates that soil at Site 7 is impacted by dioxins (1,2,3,4,6,7,8-heptachlorodibenzo-p-dixoin, heptachlorinated dibenzo-p-dioxins, total, and hexachlorinated dibenzo-p-dioxins, total), beryllium, lead, and manganese. Detected maximum concentrations of these contaminants are 0.0013 milligrams per kilogram ("mg/kg") (heptachlorinated dibenzo-p-dioxins, total), 0.58 mg/kg (beryllium), 855 mg/kg (lead), and 449 mg/kg (manganese). The USEPA Region 9 residential preliminary remediation goals ("PRGs") for these chemicals provided in the OU1 ROD are 0.00038 mg/kg (heptachlorinated dibenzo-p-dioxins, total), 0.14 mg/kg, 130 mg/kg, and 380 mg/kg,

respectively.

During March 2007, the Air Force conducted a groundwater investigation at the Property and detected elevated levels of chlorinated solvents in groundwater. A maximum concentration of trichloroethene of 7,600 micrograms per liter ("ug/L") was detected at a depth of 55 feet below ground surface. This finding suggests that there may be potential indoor air risks for future residents and workers at the Property. This Covenant includes land use restrictions until further investigation at the Property demonstrates that contamination will not pose a threat to public health. Details of the restrictions are described in Article IV.

1.03. Site 7 Risk Assessment Information. The OU1 ROD states that the calculated incremental cancer risk from contaminated surface soils for a 30-year resident through ingestion and direct contact is 6 in one hundred thousand. The estimated Hazard Index for adults is 0.08. The OU1 ROD determined that no contaminants at Site 7 require remediation, based on industrial PRGs for beryllium and dioxins and on risk assessment of lead and manganese concentrations detected at the site. The OU1 ROD states that the Air Force will ensure that Site 7 is used appropriately in the future by implementing deed restrictions prohibiting residential land use. The Site 7 land use restrictions are described in Article IV of this Covenant.

ARTICLE II
DEFINITIONS

2.01. Department. "Department" means the California Department of Toxic Substances Control and includes its successor agencies, if any.

2.02. Environmental Restrictions. "Environmental Restrictions" means all protective provisions, covenants, restrictions, prohibitions, and terms and conditions as set forth in any section of this Covenant.

2.03. Improvements. "Improvements" includes, but is not limited to: buildings, structures, roads, driveways, improved parking areas, wells, pipelines, or other utilities.

2.04. Lease. "Lease" means lease, rental agreement, or any other document that creates a right to use or occupy any portion of the Property.

2.05. Occupant. "Occupant" means Owners and any person or entity entitled by ownership, leasehold, or other legal relationship to the right to occupy any portion of the Property.

2.06. Owner. "Owner" means the Covenantor, its successors in interest, and their successors in interest, including heirs and assigns, who at any time hold title to all or any portion of the Property.

ARTICLE III
GENERAL PROVISIONS

3.01. Runs with the Land. This Covenant sets forth Environmental Restrictions that apply to and encumber the Property and every portion of the Property no matter how it is improved, held, used, occupied, leased, sold, hypothecated, encumbered, or conveyed. This Covenant: (a) runs with the land pursuant to Health and Safety Code section 25355.5(a)(1)(C) and Civil Code section 1471; (b) inures to the benefit of and passes with each and every portion of the Property, (c) is for the benefit of, and is enforceable by the Department, and (d) is imposed upon the entire Property unless expressly stated as applicable only to a specific portion thereof.

3.02. Binding upon Owners/Occupants. Pursuant to the Health and Safety Code, this Covenant binds all owners of the Property, their heirs, successors, and assignees, and the agents, employees, and lessees of the owners, heirs, successors, and assignees. Pursuant to Civil Code section 1471, all successive owners of the Property are expressly bound hereby for the benefit of the Department.

3.03. Written Notice of the Presence of Hazardous Substances. Prior to the sale, lease or sublease of the Property, or any portion thereof, the owner, lessor, or sublessor shall give the buyer, lessee, or sublessee written notice of the existence of this Covenant and its Environmental Restrictions.

3.04. Incorporation into Deeds and Leases. The Restrictions set forth herein shall be incorporated by reference in each and every deed and Lease for any portion of the Property.

3.05. Conveyance of Property. The Owner shall provide written notice to the Department not later than thirty (30) days after any conveyance of any ownership interest in the Property (excluding Leases, and mortgages, liens, and other non-possessory encumbrances). The written notice shall include the name and mailing address of the new owner of the Property and shall reference the site name and site code as listed on page one of this Covenant. If the new owner's Property has been assigned APN(s), each such APN that covers the Property must be provided. The Department shall not, by reason of this Covenant, have authority to approve, disapprove, or otherwise affect proposed conveyance, except as otherwise provided by law, by administrative order, or by a specific provision of this Covenant.

3.06. Costs of Administering the Covenant to be paid by Owner. The Department has already incurred and will in the future incur costs associated with the administration of this Covenant. Therefore, the Owner hereby covenants for the current Owner and all subsequent Owners that, pursuant to California Code of Regulations, title 22, section 67391.1(h), the Owner agrees to pay the Department's cost in administering the Covenant.

ARTICLE IV
RESTRICTIONS

4.01. Prohibited Uses. The Property shall not be used for any of the following purposes:

(a) A residence, including any mobile home or factory built housing, constructed or installed for use as residential human habitation.
(b) A hospital for human care.
(c) A public or private school for persons under 18 years of age.
(d) A day care center for children.

4.02. Prohibited Activities. The Owner shall not construct any enclosed building

or structure at Site 7 unless an engineered control (e.g., vapor barriers, specialized fan systems, or other related engineered controls) is constructed between the foundation and the soil surface that prevents potential soil vapor from entering the building or structure. The Owner shall obtain the Department's prior written approval of any construction plans for enclosed buildings or structures on the Property to ensure construction of an adequate engineered control.

4.03. Soil Management. (a) The Owner shall not conduct or allow others to conduct any activity that would result in the movement of soils from the Property. (b) Any contaminated soils brought to the surface by grading, excavation, trenching or backfilling shall be managed in accordance with all applicable provisions of state and federal law. (c) The Owner shall provide the Department written notice at least fourteen (14) days prior to any building, filling, grading, mining or excavating at the Property.

4.04. Access for Department. The Department shall have reasonable right of entry and access to the Property for inspection, monitoring, soil sampling, and other activities consistent with the purposes of this Covenant as deemed necessary by the Department in order to protect the public health or safety, or the environment.

ARTICLE V
ENFORCEMENT

5.01. Enforcement. Failure of the Owner or Occupant to comply with this Covenant shall be grounds for the Department to require modification or removal of any improvements constructed or placed upon any portion of the Property in violation of this Covenant. Violation of this Covenant including but not limited to, failure to submit, or the submission of any false statement, record or report to the Department, shall be grounds for the Department to pursue administrative, civil or criminal actions.

ARTICLE VI

VARIANCE, TERMINATION, AND TERM

6.01. Variance. Covenantor, or any other aggrieved person, may apply to the Department for a written variance from the provisions of this Covenant. Such application shall be made in accordance with Health and Safety Code section 25233.

6.02. Termination. Owner, or any other aggrieved person, may apply to the Department for a termination or modification of one or more terms of this Covenant as they apply to all or any portion of the Property. Such application shall be made in accordance with Health and Safety Code section 25234.

6.03. Term. Unless ended in accordance with paragraph 6.02, by law, or by the Department in the exercise of its discretion, this Covenant shall continue in effect in perpetuity.

ARTICLE VII
MISCELLANEOUS

7.01. No Dedication Intended. Nothing set forth in this Covenant shall be construed to be a gift or dedication, or offer of a gift or dedication, of the Property, or any portion thereof to the general public or anyone else for any purpose whatsoever.

7.02. Department References. All references to the Department include successor agencies/departments or other successor entity.

7.03. Recordation. The Covenantor shall record this Covenant, with all referenced Exhibits, in the County of Riverside within ten (10) days of the Covenantor's receipt of a fully executed original.

7.04. Notices. Whenever any person gives or serves any Notice ("Notice" as used herein includes any demand or other communication with respect to this Covenant), each such Notice shall be in writing and shall be deemed effective: (1) when delivered, if personally delivered to the person being served or to an officer of a corporate party being served, or (2) three (3) business days after deposit in the mail, if mailed by United States mail, postage paid, certified, return receipt requested:

To Owner: Marion Ashley, Chairman
March Joint Powers Authority
P.O. Box 7480
Moreno Valley, CA 92552

To Department: John Scandura, Branch Chief
Southern California Operations Branch
Office of Military Facilities
Department of Toxic Substances Control
5796 Corporate Ave
Cypress, CA 90630

Any party may change its address or the individual to whose attention a Notice is to be sent by giving written Notice in compliance with this paragraph.

7.05. Partial Invalidity. If this Covenant or any of its terms are determined by a court of competent jurisdiction to be invalid for any reason, the surviving portions of this Covenant shall remain in full force and effect as if such portion found invalid had not been included herein.

7.06. Statutory References. All statutory references include successor provisions.

7.07. Inspection and Reporting Requirements. The Owner shall conduct an annual inspection and submit an Annual Inspection Report to the Department for its approval by January 15th of each year. The annual report must include the dates, times, and names of those who conducted and reviewed the annual inspection report. It also shall describe how the observations were performed that were the basis for the statements and conclusions in the annual report (e.g., drive by, fly over, walk in, etc.) If violations are noted, the annual report must detail the steps taken to return to compliance. If the Owner identifies any violations of this Covenant during the annual inspections or at any other time, the Owner must within 10 days of identifying the violation: determine the identity of the party in violation, send a letter advising the party of the violation of the Covenant and demand that the violation cease immediately. Additionally, copies of any correspondence related to the enforcement of this Covenant shall be sent to the Department within ten (10) days of its original transmission.

IN WITNESS WHEREOF, the Parties execute this Covenant.

Covenantor:

By: Marion Ashley

Title: Marion Ashley, Chairman
March Joint Powers Authority

Date: 9/19/07

STATE OF CALIFORNIA)
)
COUNTY OF RIVERSIDE)

On this 19 day of September, in the year 2007, before me Carey L. Allen, a notary public, personally appeared Marion Ashley personally known to me to be the person(s) whose name(s) is /are subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their authorized capacity(ies), and that by his/her/their signature(s) on the instrument the person(s), or the entity upon behalf of which the person(s) acted, executed the instrument.

WITNESS my hand and official seal.

Signature

CAREY L. ALLEN
Commission # 1496127
Notary Public - California
Riverside County
My Comm. Expires Jun 24, 2008

Department of Toxic Substances Control

By: _____

Title: John Scandura, Branch Chief
Office of Military Facilities
Southern California Operations Branch

Date: ~~Oct~~ Nov. 1, 2007

STATE OF CALIFORNIA)
)
COUNTY OF ORANGE)

On this 1st day of November, in the year 2007, before me Deborah R. Saito, a notary public, personally appeared John Scandura personally known to me to be the person~~(s)~~ whose name~~(s)~~ is ~~/are~~ subscribed to the within instrument and acknowledged to me that he~~/she/they~~ executed the same in his~~/her/their~~ authorized capacity~~(ies)~~, and that by his~~/her/their~~ signature~~(s)~~ on the instrument the person~~(s)~~, or the entity upon behalf of which the person~~(s)~~ acted, executed the instrument.

WITNESS my hand and official seal.

Signature _____

DEBORAH R. SAITO
COMM. #1571083
Notary Public - California
Orange County
My Comm. Expires Apr. 19, 2009

Exhibit A

A-1. Legal Description of Property

A-2. Engineering Survey Showing Property Boundaries

EXHIBIT A-1. Legal Description of Property

Installation Restoration Program (IRP) Site 7

That portion of Section 25, T3S, R4W, SBM in the County of Riverside, State of California, more particularly described as follows:

Commencing at the intersection of Heacock Street and Mariposa Avenue as shown on a plat recorded in Book 110 of Records of Survey, at pages 30-40, Official Records of Riverside County, California;

thence N 7°18'53" W a distance of 777.93 feet to a point lying 105.00 feet from and perpendicular to the centerline of Heacock Street as shown on said Record of Survey, said point being the **True Point of Beginning**;

thence N 89°33'28" W a distance of 955.00 feet;

thence N 0°26'32" E a distance of 920.00 feet;

thence S 89°33'28" E a distance of 535.00 feet;

thence N 0°26'32" E a distance of 450.00 feet;

thence S 89°33'28" E a distance of 420.00 feet;

thence S 0°26'32" W, along a line parallel with and 105.00 feet perpendicular from the centerline of Heacock Street, a distance of 1370.00 feet to the **True Point of Beginning**.

Containing an area of 1,067,600 ft2 or 24.51 Acres more or less.

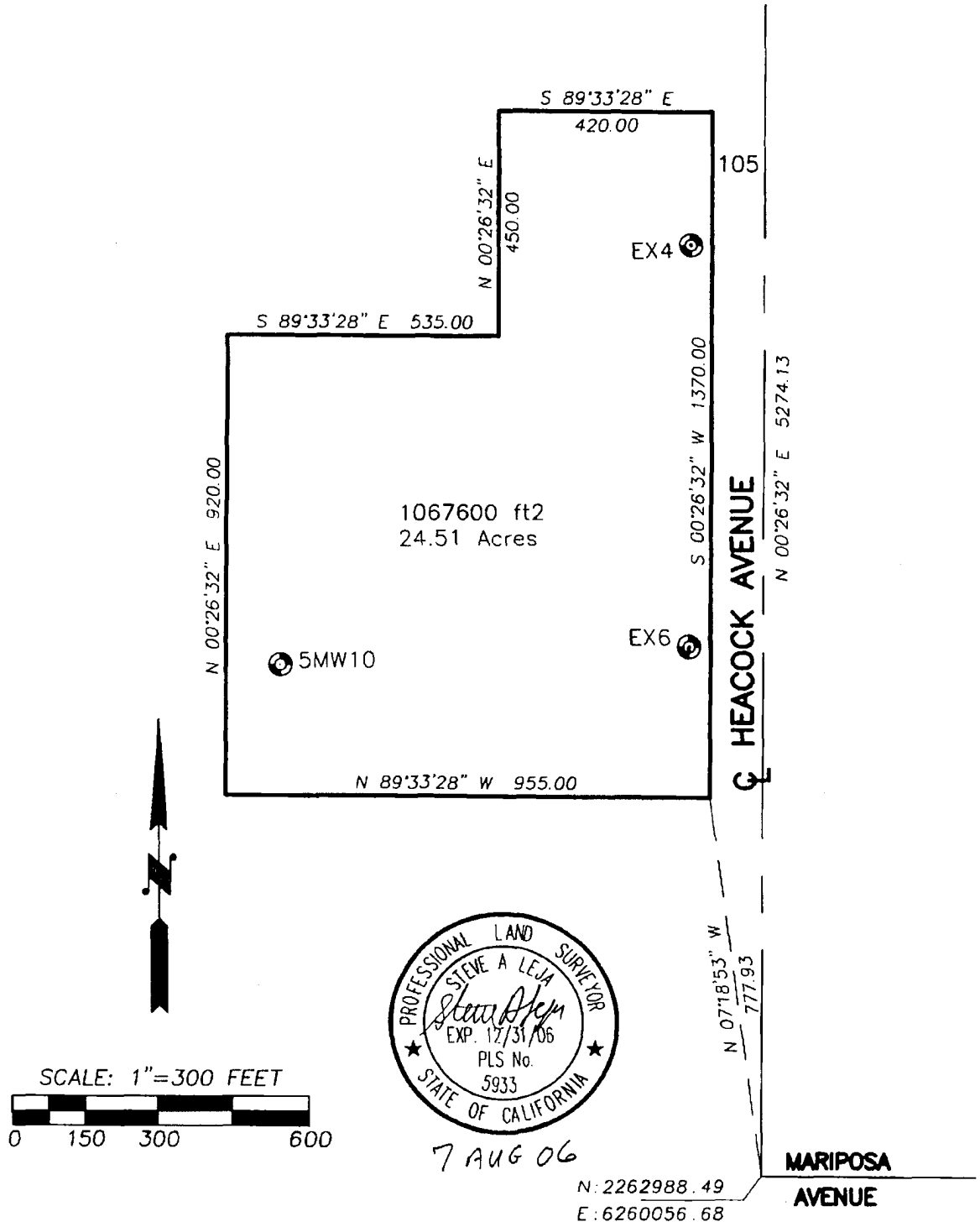
This description has been prepared by me for the purpose of describing an Environmentally Restrictive Area.

7 AUG 06

EXHIBIT A-2. Engineering Survey Showing Property Boundaries

Installation Restoration Program (IRP) Site 7

1,067,600 ft2
24.51 Acres



Appendix 5: LID Infeasibility

N/A

Appendix 6: BMP Design Details

BMP Sizing, Design Details and other Supporting Documentation

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: DRC Engineering, Inc.

Date: 1/18/2022

Designed by: Nick Saludo

Case No:

Company Project Number/Name: 20-522 D-1 Parcel

BMP Identification

BMP NAME / ID: DMA A/MWS A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

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

D_{85}= 0.63 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
A1	*88,500*	*Roofs*	*1*	*0.89*	*78942*			
A2	*440,364*	*Concrete or Asphalt*	*1*	*0.89*	*392804.7*			
A3	*150,001*	*Ornamental Landscaping*	*0.1*	*0.11*	*16568.8*			
	678865	***Total***			**488315.5**	**0.63**	***25636.6***	***30400***

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries | Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: DRC Engineering, Inc. Date: 1/18/2022

Designed by: Nick Saludo Case No:

Company Project Number/Name: 20-522 D-1 Parcel

BMP Identification

BMP NAME / ID: DMA B/MWS B

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

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

D_{85}= 0.63 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
B1	*70,393*	*Roofs*	*1*	*0.89*	*62790.6*			
B2	*10,941*	*Ornamental Landscaping*	*0.1*	*0.11*	*1208.5*			
B3	*118,016*	*Concrete or Asphalt*	*1*	*0.89*	*105270.3*			
	199350	**Total**			**169269.4**	**0.63**	**8886.6**	**8890**

Notes:

Santa Ana Watershed - BMP Design Volume, V_{BMP}

(Rev. 10-2011)

Legend: Required Entries / Calculated Cells

*(Note this worksheet shall **only** be used in conjunction with BMP designs from the **LID BMP Design Handbook**)*

Company Name: DRC Engineering, Inc. | Date: 1/18/2022

Designed by: Nick Saludo | Case No:

Company Project Number/Name: 20-522 D-1 Parcel

BMP Identification

BMP NAME / ID: DMA C/MWS A

Must match Name/ID used on BMP Design Calculation Sheet

Design Rainfall Depth

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

D_{85}= 0.63 inches

Drainage Management Area Tabulation

Insert additional rows if needed to accommodate all DMAs draining to the BMP

DMA Type/ID	DMA Area (square feet)	Post-Project Surface Type	Effective Imperivous Fraction, I_f	DMA Runoff Factor	DMA Areas x Runoff Factor	*Design Storm Depth (in)*	*Design Capture Volume, V_{BMP} (cubic feet)*	*Proposed Volume on Plans (cubic feet)*
C1	*21,926*	*Roofs*	*1*	*0.89*	*19558*			
C2	*60,787*	*Concrete or Asphalt*	*1*	*0.89*	*54222*			
C3	*2,708*	*Concrete or Asphalt*	*1*	*0.89*	*2415.5*			
C4	*140*	*Concrete or Asphalt*	*1*	*0.89*	*124.9*			
C5	*119*	*Concrete or Asphalt*	*1*	*0.89*	*106.1*			
C6	*291*	*Ornamental Landscaping*	*0.1*	*0.11*	*32.1*			
C7	*473*	*Ornamental Landscaping*	*0.1*	*0.11*	*52.2*			
C8	*5,711*	*Ornamental Landscaping*	*0.1*	*0.11*	*630.8*			
C9	*1,784*	*Ornamental Landscaping*	*0.1*	*0.11*	*197.1*			
C10	*1,585*	*Ornamental Landscaping*	*0.1*	*0.11*	*175.1*			
C11	*4,263*	*Ornamental Landscaping*	*0.1*	*0.11*	*470.9*			
C12	*3,055*	*Ornamental Landscaping*	*0.1*	*0.11*	*337.4*			
C13	*198*	*Ornamental Landscaping*	*0.1*	*0.11*	*21.9*			
C14	*4029*	*Ornamental Landscaping*	*0.1*	*0.11*	*445*			
C15	*1081*	*Ornamental Landscaping*	*0.1*	*0.11*	*119.4*			
C16	*433*	*Concrete or Asphalt*	*1*	*0.89*	*386.2*			
	108583	***Total***			***79294.6***	***0.63***	***4163***	***30400***

Notes:

20-522 D-1 Parcel
Rational Method for WQMP Q2 and Q10
2/22/2022

Input Cells
Output Cells

Soil Type	C

	AMC II	AMC I
Runoff Index[1]	69	50

	2 yr - 1 hr	10 yr -1 hr
Intensity[2]	0.453	0.756

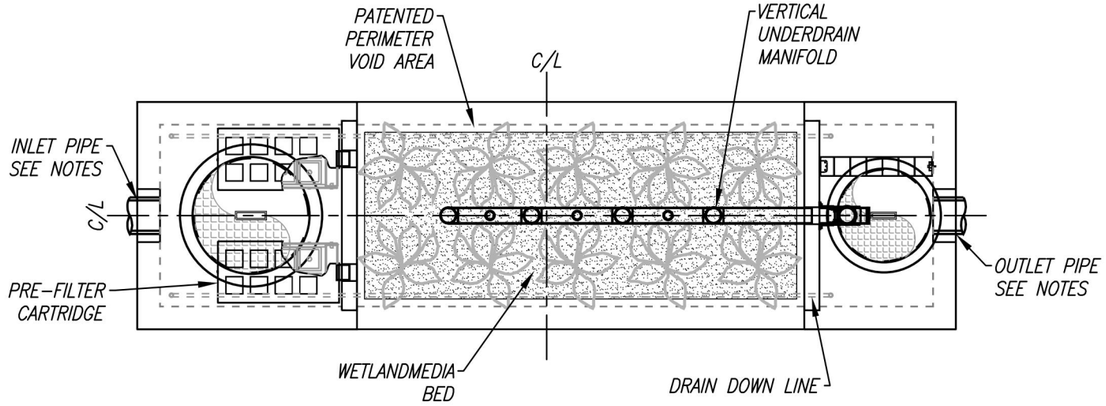
DMA	Area (ac)	Imp. %	Runoff coefficient[3] AMC I, 2yr 1hr	Runoff coefficient[3] AMC II, 10yr 1hr	Rational Method [4] Q2 (cfs)	Rational Method [4] Q10 (cfs)
A	15.59	0.779	0.77	0.82	5.44	9.66
B	4.78	0.945	0.87	0.88	1.88	3.18
C	2.49	0.793	0.77	0.82	0.87	1.54

References

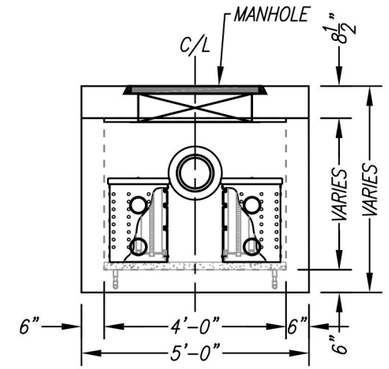
1 Riverside County Hydrology Manual Plate D-5.7
2 NOAA Atlas 14, Volume 6, Version 2 Preipation Frequency
3 Riverside County Hydrology Manual Plate D-5.7
4 Q=CIA

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.206	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



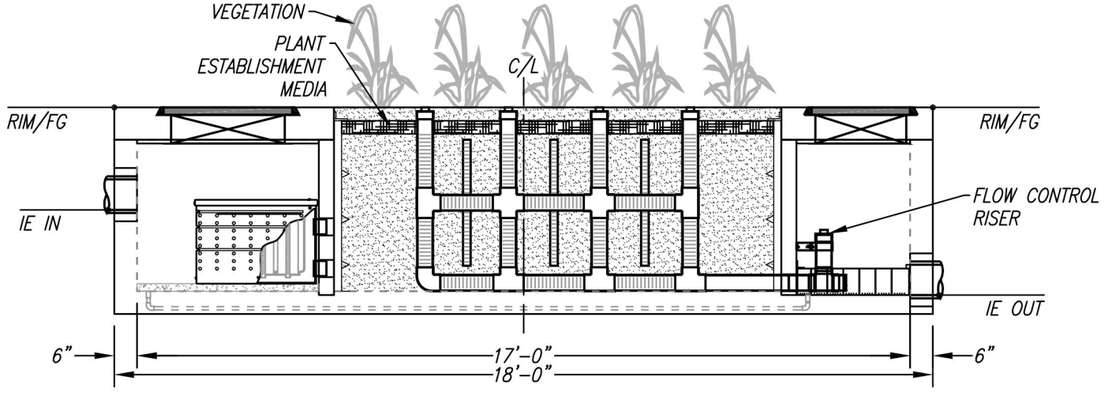
LEFT END VIEW

INSTALLATION NOTES

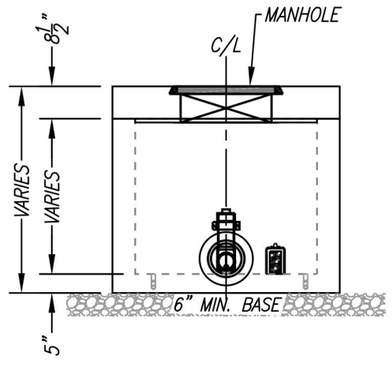
1. CONTRACTOR TO PROVIDE ALL LABOR, EQUIPMENT, MATERIALS AND INCIDENTALS REQUIRED TO OFFLOAD AND INSTALL THE SYSTEM AND APPURTENANCES IN ACCORDANCE WITH THIS DRAWING AND THE MANUFACTURERS SPECIFICATIONS, UNLESS OTHERWISE STATED IN MANUFACTURERS CONTRACT.
2. UNIT MUST BE INSTALLED ON LEVEL BASE. MANUFACTURER RECOMMENDS A MINIMUM 6" LEVEL ROCK BASE UNLESS SPECIFIED BY THE PROJECT ENGINEER. CONTRACTOR IS RESPONSIBLE TO VERIFY PROJECT ENGINEERS RECOMMENDED BASE SPECIFICATIONS.
4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
5. CONTRACTOR RESPONSIBLE FOR INSTALLATION OF ALL RISERS, MANHOLES, AND HATCHES. CONTRACTOR TO GROUT ALL MANHOLES AND HATCHES TO MATCH FINISHED SURFACE UNLESS SPECIFIED OTHERWISE.
6. VEGETATION SUPPLIED AND INSTALLED BY OTHERS. ALL UNITS WITH VEGETATION MUST HAVE DRIP OR SPRAY IRRIGATION SUPPLIED AND INSTALLED BY OTHERS.
7. CONTRACTOR RESPONSIBLE FOR CONTACTING BIO CLEAN FOR ACTIVATION OF UNIT. MANUFACTURERS WARRANTY IS VOID WITH OUT PROPER ACTIVATION BY A BIO CLEAN REPRESENTATIVE.

GENERAL NOTES

1. MANUFACTURER TO PROVIDE ALL MATERIALS UNLESS OTHERWISE NOTED.
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

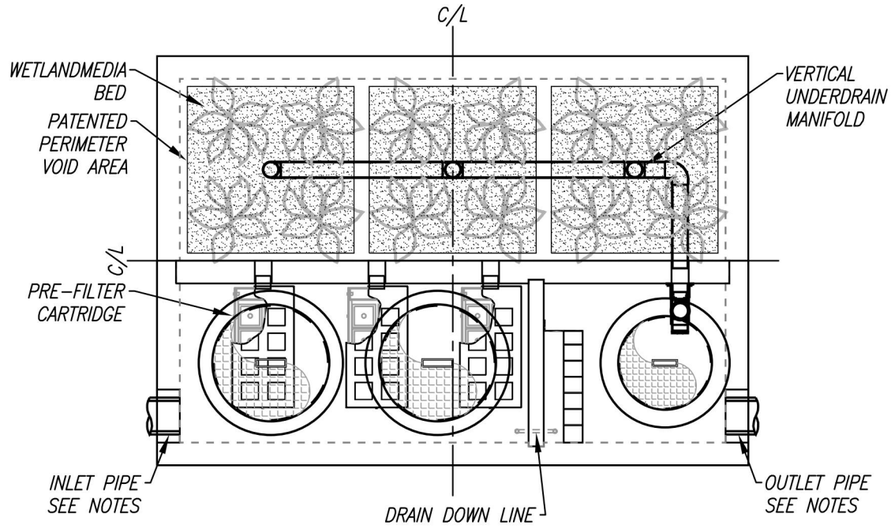
TREATMENT FLOW (CFS)	0.206
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	1.8
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-4-17-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

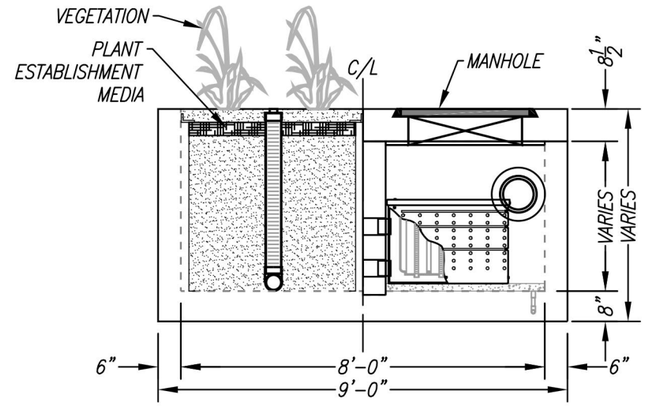
5/23/19TOLEE

SITE SPECIFIC DATA			
PROJECT NUMBER			
PROJECT NAME			
PROJECT LOCATION			
STRUCTURE ID			
TREATMENT REQUIRED			
VOLUME BASED (CF)		FLOW BASED (CFS)	
N/A		0.346	
PEAK BYPASS REQUIRED (CFS) – IF APPLICABLE			OFFLINE
PIPE DATA	I.E.	MATERIAL	DIAMETER
INLET PIPE 1			
INLET PIPE 2	N/A	N/A	N/A
OUTLET PIPE			
	PRETREATMENT	BIOFILTRATION	DISCHARGE
RIM ELEVATION			
SURFACE LOAD	PEDESTRIAN		
FRAME & COVER	2EA ø30"	OPEN PLANTER	ø24"
NOTES:			

* PRELIMINARY NOT FOR CONSTRUCTION



PLAN VIEW



LEFT END VIEW

INSTALLATION NOTES

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4. CONTRACTOR TO SUPPLY AND INSTALL ALL EXTERNAL CONNECTING PIPES. ALL PIPES MUST BE FLUSH WITH INSIDE SURFACE OF CONCRETE. (PIPES CANNOT INTRUDE BEYOND FLUSH). INVERT OF OUTFLOW PIPE MUST BE FLUSH WITH DISCHARGE CHAMBER FLOOR. ALL PIPES SHALL BE SEALED WATER TIGHT PER MANUFACTURERS STANDARD CONNECTION DETAIL.
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GENERAL NOTES

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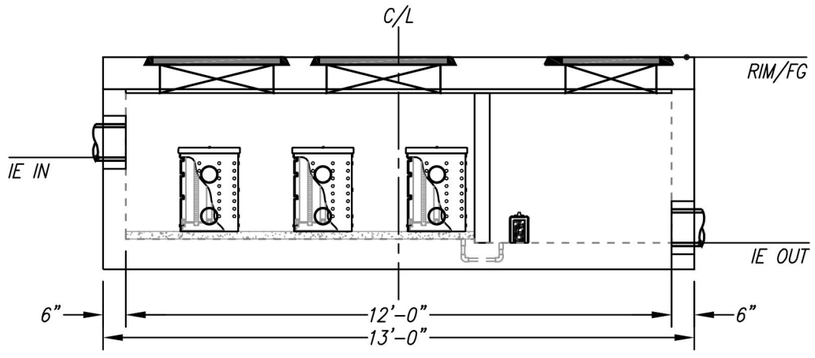
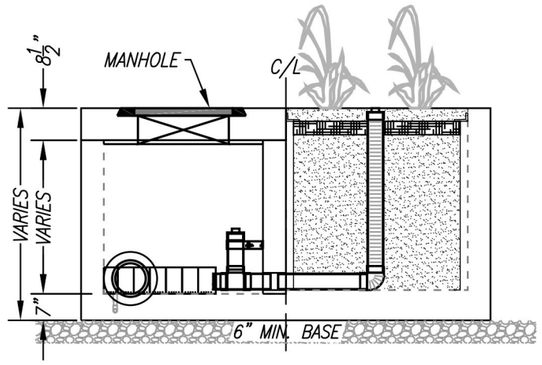
2. ALL DIMENSIONS, ELEVATIONS, SPECIFICATIONS AND CAPACITIES ARE SUBJECT TO CHANGE. FOR PROJECT SPECIFIC DRAWINGS DETAILING EXACT DIMENSIONS, WEIGHTS AND ACCESSORIES PLEASE CONTACT BIO CLEAN.



ELEVATION VIEW



RIGHT END VIEW

TREATMENT FLOW (CFS)	0.346
OPERATING HEAD (FT)	3.4
PRETREATMENT LOADING RATE (GPM/SF)	2.0
WETLAND MEDIA LOADING RATE (GPM/SF)	1.0

MWS-L-8-12-V
STORMWATER BIOFILTRATION SYSTEM
STANDARD DETAIL

5/23/19 10:LEF

PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 4,443 lf.

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 71,670 cf.
- PIPE STORAGE VOLUME = 70,655 cf.
- BACKFILL STORAGE VOLUME = 0 cf.
- TOTAL STORAGE PROVIDED = 70,655 cf.

PIPE DETAILS
- DIAMETER = 54 IN.
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = Solid
- BARRELL SPACING = 24 IN.

BACKFILL DETAILS
- WIDTH AT ENDS = 12 IN.
- ABOVE PIPE = 0 IN.
- WIDTH AT SIDES = 12 IN.
- BELOW PIPE = 0 IN.

NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY

SCALE: 1" = 30'

DATE	REVISION DESCRIPTION	BY

CONTECH® ENGINEERED SOLUTIONS LLC
www.ContechES.com
9025 Centre Pointe Dr., Suite 400, West Chester, OH 45069
800-338-1122 513-645-7000 513-645-7993 FAX

CONTECH® CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO12923 20-522 D-1 Parcel
Detention A
Moreno Valley, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
8099	12923	1/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D1		

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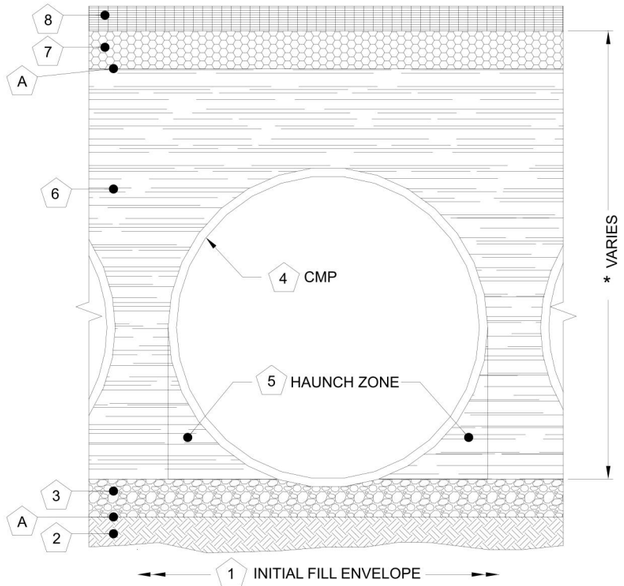


	DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE			
	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable)			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
6	Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation. See AASHTO 26.3.8.1 / 26.5.3 Bedding info.
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
*	*Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.*			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

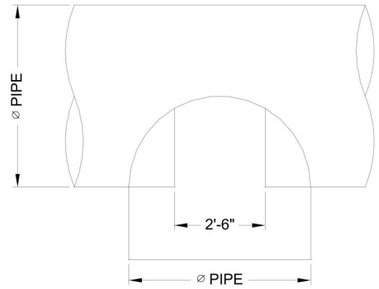
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

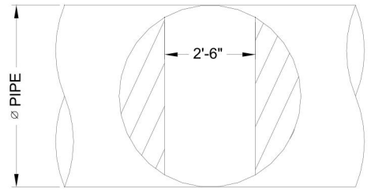
BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.



PLAN

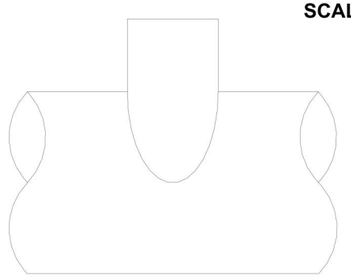


FRONT

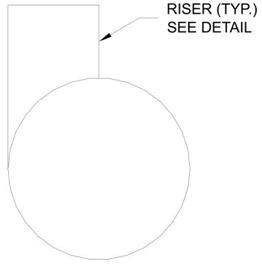
TYPICAL MANWAY DETAIL

SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



ELEVATION

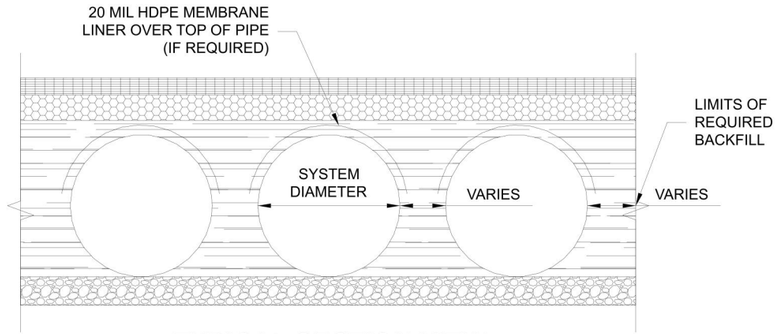


END

TYPICAL RISER DETAIL

SCALE: N.T.S.

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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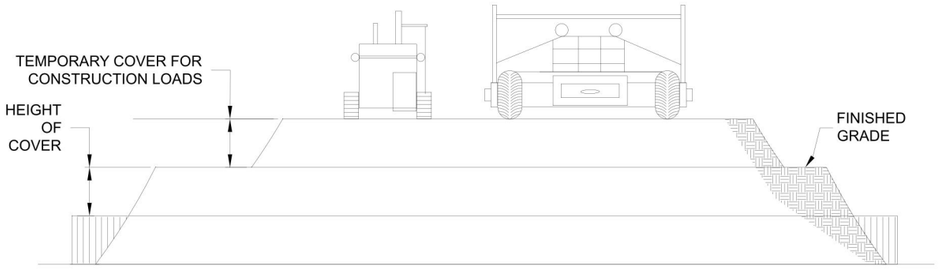
CONTECH® CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO12923 20-522 D-1 Parcel
Detention A
Moreno Valley, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
8099	12923	1/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D2		



CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

POLYMER COATED: AASHTO M-245 OR ASTM A-762

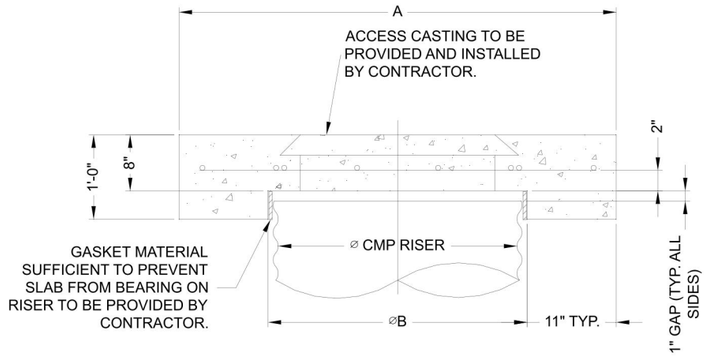
ALUMINUM: AASHTO M-196 OR ASTM B-745

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

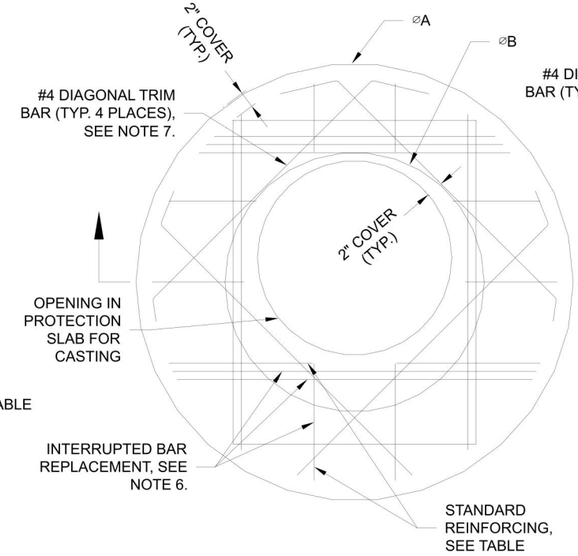
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



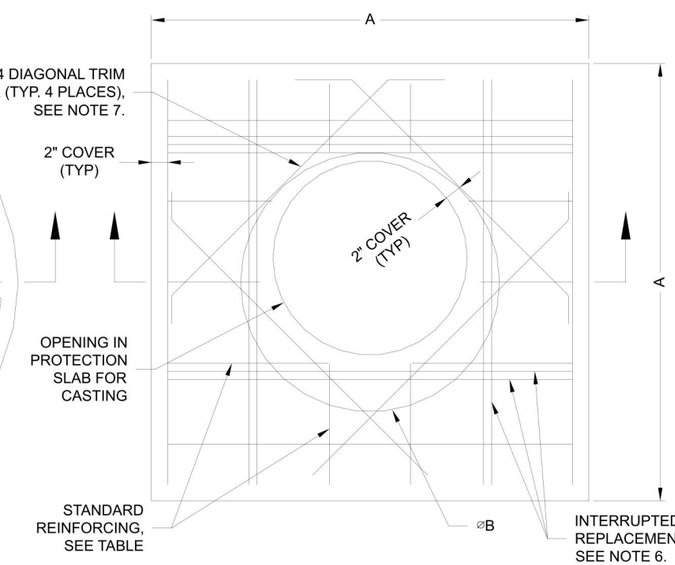
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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Detention A
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SHEET NO.: D3		

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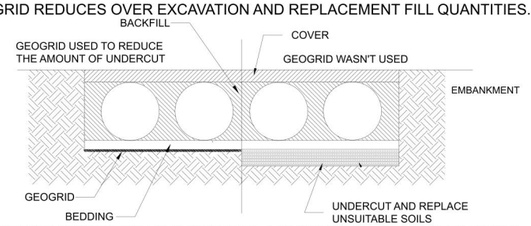
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

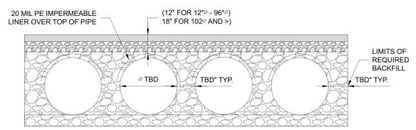


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

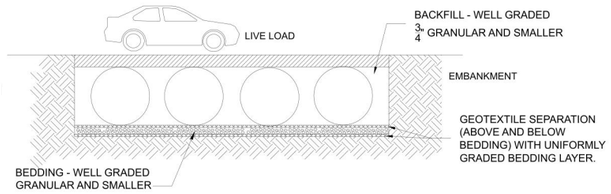
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

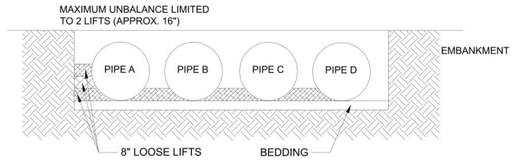
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



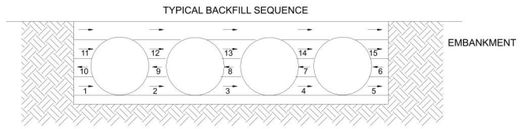
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

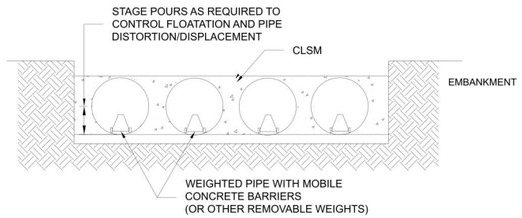


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

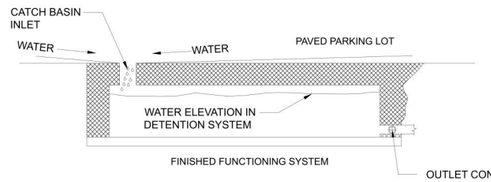


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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CONTECH® CMP DETENTION SYSTEMS
CONTECH **DYODS** DRAWING

DYO12923 20-522 D-1 Parcel
Detention A
Moreno Valley, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
8099	12923	1/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		

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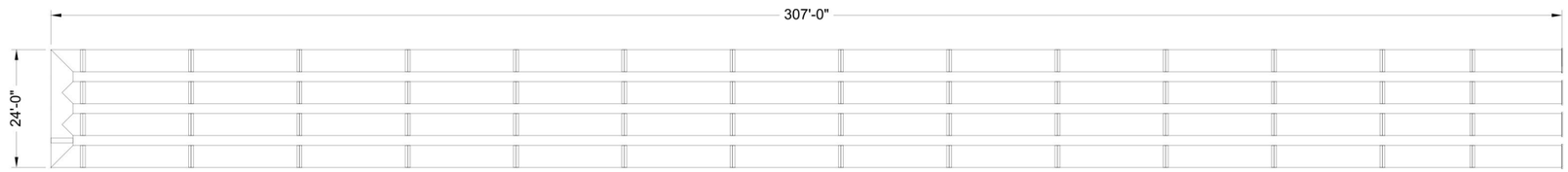
PROJECT SUMMARY

CALCULATION DETAILS
- LOADING = HS20 & HS25
- APPROX. LINEAR FOOTAGE = 1,234 lf.

STORAGE SUMMARY
- STORAGE VOLUME REQUIRED = 19,598 cf.
- PIPE STORAGE VOLUME = 19,626 cf.
- BACKFILL STORAGE VOLUME = 0 cf.
- TOTAL STORAGE PROVIDED = 19,626 cf.

PIPE DETAILS
- DIAMETER = 54 IN.
- CORRUGATION = 5x1
- GAGE = 16
- COATING = ALT2
- WALL TYPE = Solid
- BARRELL SPACING = 24 IN.

BACKFILL DETAILS
- WIDTH AT ENDS = 12 IN.
- ABOVE PIPE = 0 IN.
- WIDTH AT SIDES = 12 IN.
- BELOW PIPE = 0 IN.



NOTES

- ALL RISER AND STUB DIMENSIONS ARE TO CENTERLINE. ALL ELEVATIONS, DIMENSIONS, AND LOCATIONS OF RISERS AND INLETS, SHALL BE VERIFIED BY THE ENGINEER OF RECORD PRIOR TO RELEASING FOR FABRICATION.
- ALL FITTINGS AND REINFORCEMENT COMPLY WITH ASTM A998.
- ALL RISERS AND STUBS ARE $2\frac{2}{3}$" x $\frac{1}{2}$" CORRUGATION AND 16 GAGE UNLESS OTHERWISE NOTED.
- RISERS TO BE FIELD TRIMMED TO GRADE.
- QUANTITY OF PIPE SHOWN DOES NOT PROVIDE EXTRA PIPE FOR CONNECTING THE SYSTEM TO EXISTING PIPE OR DRAINAGE STRUCTURES. OUR SYSTEM AS DETAILED PROVIDES NOMINAL INLET AND/OR OUTLET PIPE STUB FOR CONNECTION TO EXISTING DRAINAGE FACILITIES. IF ADDITIONAL PIPE IS NEEDED IT IS THE RESPONSIBILITY OF THE CONTRACTOR.
- BAND TYPE TO BE DETERMINED UPON FINAL DESIGN.
- THE PROJECT SUMMARY IS REFLECTIVE OF THE DYODS DESIGN, QUANTITIES ARE APPROX. AND SHOULD BE VERIFIED UPON FINAL DESIGN AND APPROVAL. FOR EXAMPLE, TOTAL EXCAVATION DOES NOT CONSIDER ALL VARIABLES SUCH AS SHORING AND ONLY ACCOUNTS FOR MATERIAL WITHIN THE ESTIMATED EXCAVATION FOOTPRINT.
- THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.

ASSEMBLY
SCALE: 1" = 30'

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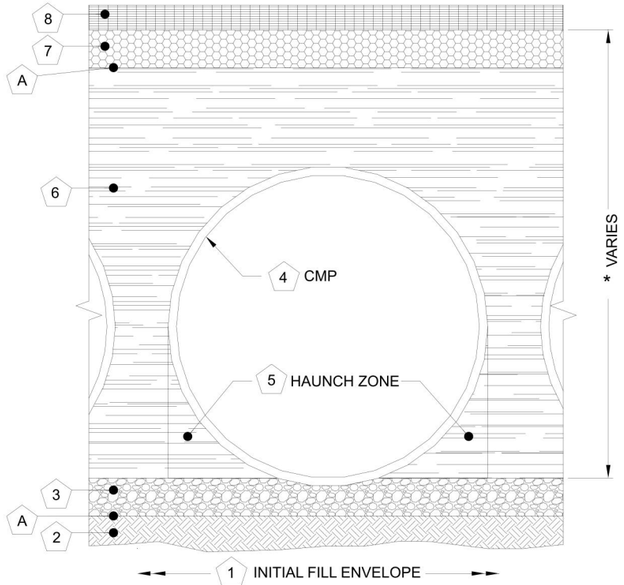


	DETENTION SYSTEMS - CMP DETENTION / CMP DRAINAGE			
	Material Location	Description	Material Designation	Designation
8	Rigid or Flexible Pavement (if applicable)			
7	Road Base (if applicable)			
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
6	Backfill	Well graded granular material which may contain small amounts of silt or clay.	AASHTO M 145- A-1, A-2, A-3	Placed in 8" +/- loose lifts and compacted to 90% Standard Proctor Per AASHTO T 99
3	Bedding Stone	Well graded granular bedding material w/maximum particle size of 3"	AASHTO M43 - 3,357,4,467, 5, 56, 57	Engineer to determine if bedding is required. Pipe may be placed on the trench bottom of a relatively loose, native suitable well graded & granular material. For Arch pipes it is recommended to be shaped to a relatively flat bottom or fine-grade the foundation to a slight v-shape. Unsuitable material should be over-excavated and re-placed with a 4"-6" layer of well graded & granular stone per the material designation. See AASHTO 26.3.8.1 / 26.5.3 Bedding info.
A	Geotextile Layer	Non-Woven Geotextile	CONTECH C-40 or C-45	Engineer Decision for consideration to prevent soil migration into varying soil types
*	*Note: Backfill using controlled low-strength material (CLSM, "flash fill" or "flowable fill") when the spacing between the pipes will not allow for placement and adequate compaction of the backfill.*			

1 MINIMUM WIDTH DEPENDS ON SITE CONDITIONS AND ENGINEERING JUDGEMENT

FOUNDATION/BEDDING PREPARATION

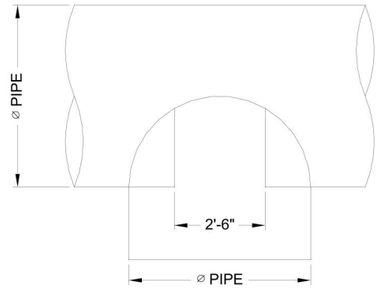
2 PRIOR TO PLACING THE BEDDING, THE FOUNDATION MUST BE CONSTRUCTED TO A UNIFORM AND STABLE GRADE. IN THE EVENT THAT UNSUITABLE FOUNDATION MATERIALS ARE ENCOUNTERED DURING EXCAVATION, THEY SHALL BE REMOVED AND BROUGHT BACK TO THE GRADE WITH A FILL MATERIAL AS APPROVED BY THE ENGINEER.

5 HAUNCH ZONE MATERIAL SHALL BE PLACED AND UNIFORMALLY COMPACTED WITHOUT SOFT SPOTS.

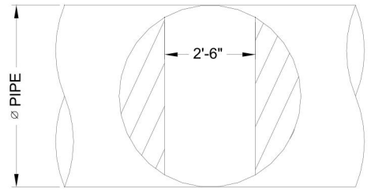
BACKFILL

WHEN PLACING THE FIRST LIFTS OF BACKFILL IT IS IMPORTANT TO MAKE SURE THAT THE BACKFILL IS PROPERLY COMPACTED UNDER AND AROUND THE PIPE HAUNCHES. BACKFILL SHALL BE PLACED SUCH THAT THERE IS NO MORE THAN A TWO LIFT (16") DIFFERENTIAL BETWEEN ANY OF THE PIPES AT ANY TIME DURING THE BACKFILL PROCESS. THE BACKFILL SHALL BE ADVANCED ALONG THE LENGTH OF THE DETENTION SYSTEM AT THE SAME RATE TO AVOID DIFFERENTIAL LOADING ON THE PIPE.

OTHER ALTERNATE BACKFILL MATERIAL MAY BE ALLOWED DEPENDING ON SITE SPECIFIC CONDITIONS, AS APPROVED BY SITE ENGINEER.



PLAN

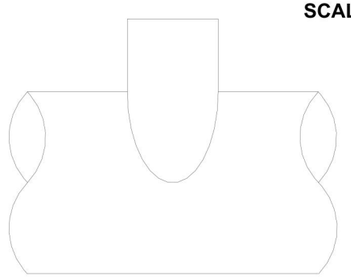


FRONT

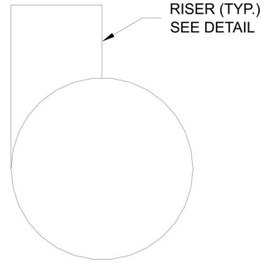
TYPICAL MANWAY DETAIL

SCALE: N.T.S.

NOTE:
MANWAY DETAIL APPLICABLE FOR CMP SYSTEMS WITH DIAMETERS 48" AND LARGER. MANWAYS MAY BE REQUIRED ON SMALLER SYSTEMS DEPENDING ON ACTUAL SITE SPECIFIC CONDITIONS.



ELEVATION

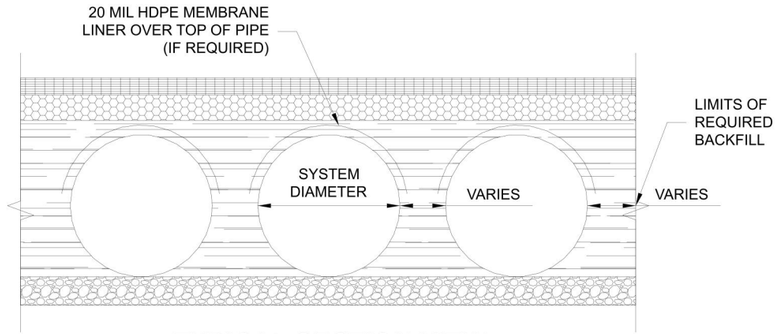


END

TYPICAL RISER DETAIL

SCALE: N.T.S.

NOTE:
LADDERS ARE OPTIONAL AND ARE NOT REQUIRED FOR ALL SYSTEMS.



TYPICAL SECTION VIEW

LINER OVER ROWS
SCALE: N.T.S.

NOTE: IF SALTING AGENTS FOR SNOW AND ICE REMOVAL ARE USED ON OR NEAR THE PROJECT, AN HDPE MEMBRANE LINER IS RECOMMENDED WITH THE SYSTEM. THE IMPERMEABLE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM A CHANGE IN THE SURROUNDING ENVIRONMENT OVER A PERIOD OF TIME. PLEASE REFER TO THE CORRUGATED METAL PIPE DETENTION DESIGN GUIDE FOR ADDITIONAL INFORMATION.

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CONTECH **DYODS** DRAWING

DYO12924 20-522 D-1 Parcel
Detention B
Moreno Valley, CA
DETENTION SYSTEM

PROJECT No.:	SEQ. No.:	DATE:
8099	12924	1/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D2		

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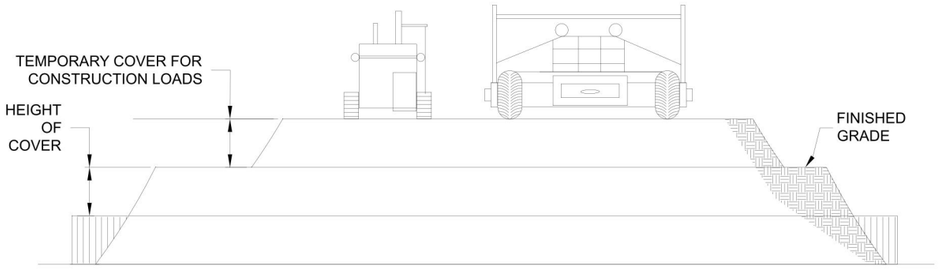


CONSTRUCTION LOADS

FOR TEMPORARY CONSTRUCTION VEHICLE LOADS, AN EXTRA AMOUNT OF COMPACTED COVER MAY BE REQUIRED OVER THE TOP OF THE PIPE. THE HEIGHT-OF-COVER SHALL MEET THE MINIMUM REQUIREMENTS SHOWN IN THE TABLE BELOW. THE USE OF HEAVY CONSTRUCTION EQUIPMENT NECESSITATES GREATER PROTECTION FOR THE PIPE THAN FINISHED GRADE COVER MINIMUMS FOR NORMAL HIGHWAY TRAFFIC.

PIPE SPAN, INCHES	AXLE LOADS (kips)			
	18-50	50-75	75-110	110-150
	MINIMUM COVER (FT)			
12-42	2.0	2.5	3.0	3.0
48-72	3.0	3.0	3.5	4.0
78-120	3.0	3.5	4.0	4.0
126-144	3.5	4.0	4.5	4.5

*MINIMUM COVER MAY VARY, DEPENDING ON LOCAL CONDITIONS. THE CONTRACTOR MUST PROVIDE THE ADDITIONAL COVER REQUIRED TO AVOID DAMAGE TO THE PIPE. MINIMUM COVER IS MEASURED FROM THE TOP OF THE PIPE TO THE TOP OF THE MAINTAINED CONSTRUCTION ROADWAY SURFACE.

CONSTRUCTION LOADING DIAGRAM

SCALE: N.T.S.

SPECIFICATION FOR DESIGNED DETENTION SYSTEM:

SCOPE
THIS SPECIFICATION COVERS THE MANUFACTURE AND INSTALLATION OF THE DESIGNED DETENTION SYSTEM DETAILED IN THE PROJECT PLANS.

MATERIAL
THE MATERIAL SHALL CONFORM TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2 STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-274 OR ASTM A-92.

THE GALVANIZED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-218 OR ASTM A-929.

THE POLYMER COATED STEEL COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-246 OR ASTM A-742.

THE ALUMINUM COILS SHALL CONFORM TO THE APPLICABLE REQUIREMENTS OF AASHTO M-197 OR ASTM B-744.

CONSTRUCTION LOADS
CONSTRUCTION LOADS MAY BE HIGHER THAN FINAL LOADS. FOLLOW THE MANUFACTURER'S OR NCSPA GUIDELINES.

PIPE
THE PIPE SHALL BE MANUFACTURED IN ACCORDANCE TO THE APPLICABLE REQUIREMENTS LISTED BELOW:

ALUMINIZED TYPE 2: AASHTO M-36 OR ASTM A-760

GALVANIZED: AASHTO M-36 OR ASTM A-760

POLYMER COATED: AASHTO M-245 OR ASTM A-762

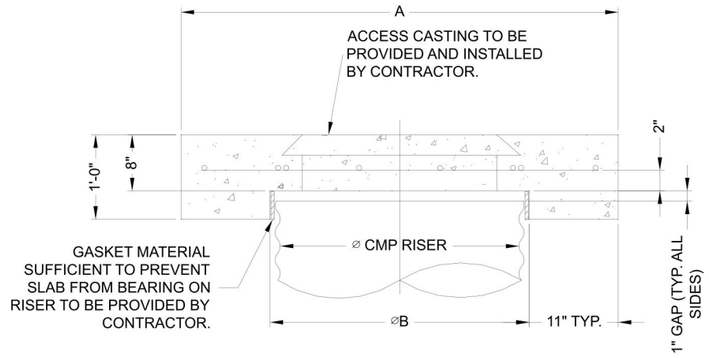
ALUMINUM: AASHTO M-196 OR ASTM B-745

HANDLING AND ASSEMBLY
SHALL BE IN ACCORDANCE WITH NCSP'S (NATIONAL CORRUGATED STEEL PIPE ASSOCIATION) FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL. SHALL BE IN ACCORDANCE WITH THE MANUFACTURER'S RECOMMENDATIONS FOR ALUMINUM PIPE.

INSTALLATION
SHALL BE IN ACCORDANCE WITH AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES, SECTION 26, DIVISION II DIVISION II OR ASTM A-798 (FOR ALUMINIZED TYPE 2, GALVANIZED OR POLYMER COATED STEEL) OR ASTM B-788 (FOR ALUMINUM PIPE) AND IN CONFORMANCE WITH THE PROJECT PLANS AND SPECIFICATIONS. IF THERE ARE ANY INCONSISTENCIES OR CONFLICTS THE CONTRACTOR SHOULD DISCUSS AND RESOLVE WITH THE SITE ENGINEER.

IT IS ALWAYS THE RESPONSIBILITY OF THE CONTRACTOR TO FOLLOW OSHA GUIDELINES FOR SAFE PRACTICES.

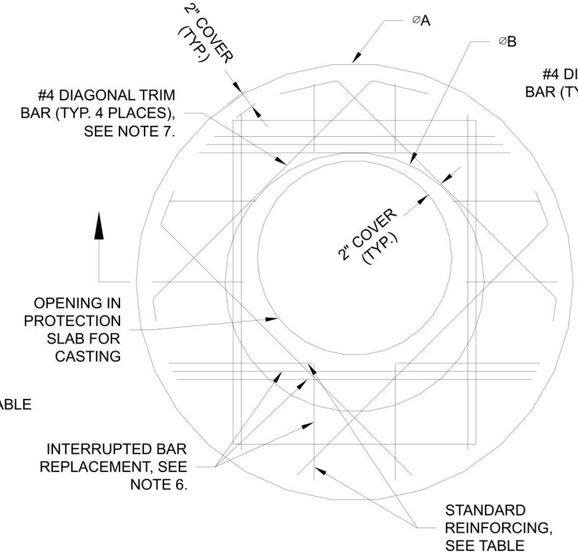
NOTE:
THESE DRAWINGS ARE FOR CONCEPTUAL PURPOSES AND DO NOT REFLECT ANY LOCAL PREFERENCES OR REGULATIONS. PLEASE CONTACT YOUR LOCAL CONTECH REP FOR MODIFICATIONS.



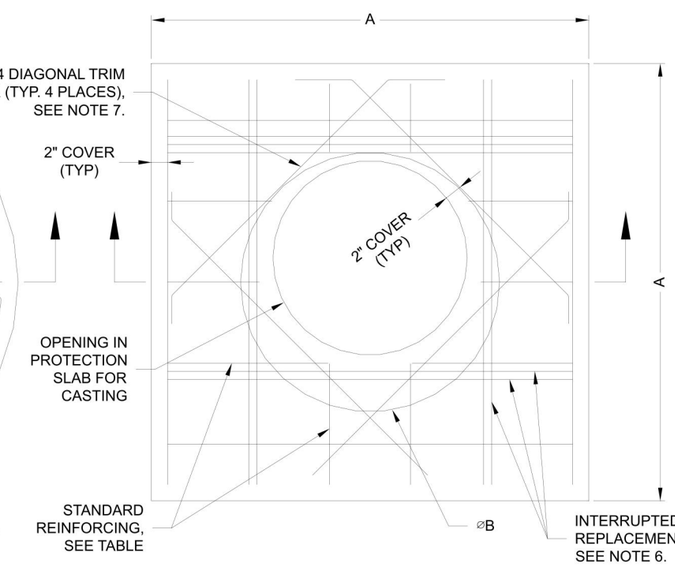
SECTION VIEW

REINFORCING TABLE				
⌀ CMP RISER	A	⌀ B	REINFORCING	**BEARING PRESSURE (PSF)
24"	⌀ 4' 4'X4'	26"	#5 @ 12" OCEW #5 @ 12" OCEW	2,410 1,780
30"	⌀ 4'-6" 4'-6" X 4'-6"	32"	#5 @ 12" OCEW #5 @ 12" OCEW	2,120 1,530
36"	⌀ 5' 5' X 5'	38"	#5 @ 10" OCEW #5 @ 10" OCEW	1,890 1,350
42"	⌀ 5'-6" 5'-6" X 5'-6"	44"	#5 @ 10" OCEW #5 @ 9" OCEW	1,720 1,210
48"	⌀ 6' 6' X 6'	50"	#5 @ 9" OCEW #5 @ 8" OCEW	1,600 1,100

** ASSUMED SOIL BEARING CAPACITY



ROUND OPTION PLAN VIEW



SQUARE OPTION PLAN VIEW

NOTES:

1. DESIGN IN ACCORDANCE WITH AASHTO, 17th EDITION.
2. DESIGN LOAD HS25.
3. EARTH COVER = 1' MAX.
4. CONCRETE STRENGTH = 3,500 psi
5. REINFORCING STEEL = ASTM A615, GRADE 60.
6. PROVIDE ADDITIONAL REINFORCING AROUND OPENINGS EQUAL TO THE BARS INTERRUPTED, HALF EACH SIDE. ADDITIONAL BARS TO BE IN THE SAME PLANE.
7. TRIM OPENING WITH DIAGONAL #4 BARS, EXTEND BARS A MINIMUM OF 12" BEYOND OPENING, BEND BARS AS REQUIRED TO MAINTAIN BAR COVER.
8. PROTECTION SLAB AND ALL MATERIALS TO BE PROVIDED AND INSTALLED BY CONTRACTOR.
9. DETAIL DESIGN BY DELTA ENGINEERING, BINGHAMTON, NY.

MANHOLE CAP DETAIL

SCALE: N.T.S.

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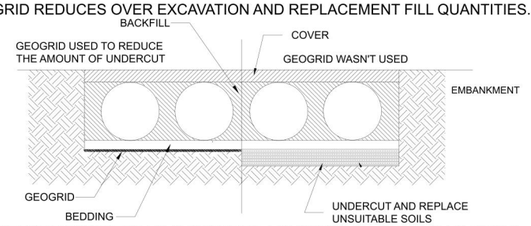
CMP DETENTION INSTALLATION GUIDE

PROPER INSTALLATION OF A FLEXIBLE UNDERGROUND DETENTION SYSTEM WILL ENSURE LONG-TERM PERFORMANCE. THE CONFIGURATION OF THESE SYSTEMS OFTEN REQUIRES SPECIAL CONSTRUCTION PRACTICES THAT DIFFER FROM CONVENTIONAL FLEXIBLE PIPE CONSTRUCTION. CONTECH ENGINEERED SOLUTIONS STRONGLY SUGGESTS SCHEDULING A PRE-CONSTRUCTION MEETING WITH YOUR LOCAL SALES ENGINEER TO DETERMINE IF ADDITIONAL MEASURES, NOT COVERED IN THIS GUIDE, ARE APPROPRIATE FOR YOUR SITE.

FOUNDATION

CONSTRUCT A FOUNDATION THAT CAN SUPPORT THE DESIGN LOADING APPLIED BY THE PIPE AND ADJACENT BACKFILL WEIGHT AS WELL AS MAINTAIN ITS INTEGRITY DURING CONSTRUCTION.

IF SOFT OR UNSUITABLE SOILS ARE ENCOUNTERED, REMOVE THE POOR SOILS DOWN TO A SUITABLE DEPTH AND THEN BUILD UP TO THE APPROPRIATE ELEVATION WITH A COMPETENT BACKFILL MATERIAL. THE STRUCTURAL FILL MATERIAL GRADATION SHOULD NOT ALLOW THE MIGRATION OF FINES, WHICH CAN CAUSE SETTLEMENT OF THE DETENTION SYSTEM OR PAVEMENT ABOVE. IF THE STRUCTURAL FILL MATERIAL IS NOT COMPATIBLE WITH THE UNDERLYING SOILS AN ENGINEERING FABRIC SHOULD BE USED AS A SEPARATOR. IN SOME CASES, USING A STIFF REINFORCING GEOGRID REDUCES OVER EXCAVATION AND REPLACEMENT FILL QUANTITIES.

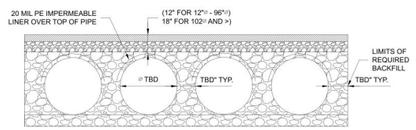


GRADE THE FOUNDATION SUBGRADE TO A UNIFORM OR SLIGHTLY SLOPING GRADE. IF THE SUBGRADE IS CLAY OR RELATIVELY NON-POROUS AND THE CONSTRUCTION SEQUENCE WILL LAST FOR AN EXTENDED PERIOD OF TIME, IT IS BEST TO SLOPE THE GRADE TO ONE END OF THE SYSTEM. THIS WILL ALLOW EXCESS WATER TO DRAIN QUICKLY, PREVENTING SATURATION OF THE SUBGRADE.

GEOMEMBRANE BARRIER

A SITE'S RESISTIVITY MAY CHANGE OVER TIME WHEN VARIOUS TYPES OF SALTING AGENTS ARE USED, SUCH AS ROAD SALTS FOR DEICING AGENTS. IF SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE, A GEOMEMBRANE BARRIER IS RECOMMENDED WITH THE SYSTEM. THE GEOMEMBRANE LINER IS INTENDED TO HELP PROTECT THE SYSTEM FROM THE POTENTIAL ADVERSE EFFECTS THAT MAY RESULT FROM THE USE OF SUCH AGENTS INCLUDING PREMATURE CORROSION AND REDUCED ACTUAL SERVICE LIFE.

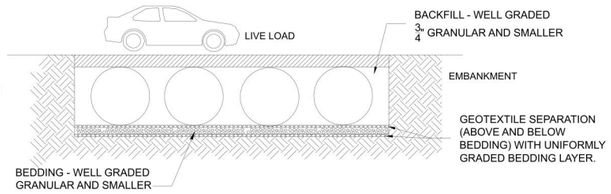
THE PROJECT'S ENGINEER OF RECORD IS TO EVALUATE WHETHER SALTING AGENTS WILL BE USED ON OR NEAR THE PROJECT SITE, AND USE HIS/HER BEST JUDGEMENT TO DETERMINE IF ANY ADDITIONAL PROTECTIVE MEASURES ARE REQUIRED. BELOW IS A TYPICAL DETAIL SHOWING THE PLACEMENT OF A GEOMEMBRANE BARRIER FOR PROJECTS WHERE SALTING AGENTS ARE USED ON OR NEAR THE PROJECT SITE.



IN-SITU TRENCH WALL

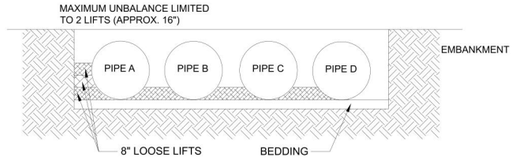
IF EXCAVATION IS REQUIRED, THE TRENCH WALL NEEDS TO BE CAPABLE OF SUPPORTING THE LOAD THAT THE PIPE SHEDS AS THE SYSTEM IS LOADED. IF SOILS ARE NOT CAPABLE OF SUPPORTING THESE LOADS, THE PIPE CAN DEFLECT. PERFORM A SIMPLE SOIL PRESSURE CHECK USING THE APPLIED LOADS TO DETERMINE THE LIMITS OF EXCAVATION BEYOND THE SPRING LINE OF THE OUTER MOST PIPES.

IN MOST CASES THE REQUIREMENTS FOR A SAFE WORK ENVIRONMENT AND PROPER BACKFILL PLACEMENT AND COMPACTION TAKE CARE OF THIS CONCERN.



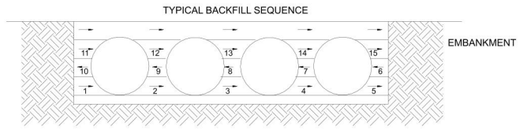
BACKFILL PLACEMENT

MATERIAL SHALL BE WORKED INTO THE PIPE HAUNCHES BY MEANS OF SHOVEL-SLICING, RODDING, AIR TAMPER, VIBRATORY ROD, OR OTHER EFFECTIVE METHODS.

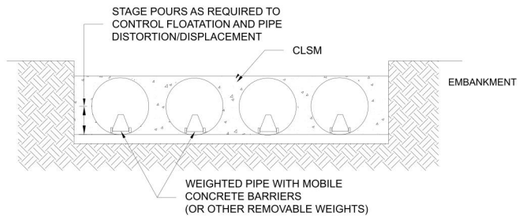


IF AASHTO T99 PROCEDURES ARE DETERMINED INFEASIBLE BY THE GEOTECHNICAL ENGINEER OF RECORD, COMPACTION IS CONSIDERED ADEQUATE WHEN NO FURTHER YIELDING OF THE MATERIAL IS OBSERVED UNDER THE COMPACTOR, OR UNDER FOOT, AND THE GEOTECHNICAL ENGINEER OF RECORD (OR REPRESENTATIVE THEREOF) IS SATISFIED WITH THE LEVEL OF COMPACTION.

FOR LARGE SYSTEMS, CONVEYOR SYSTEMS, BACKHOES WITH LONG REACHES OR DRAGLINES WITH STONE BUCKETS MAY BE USED TO PLACE BACKFILL. ONCE MINIMUM COVER FOR CONSTRUCTION LOADING ACROSS THE ENTIRE WIDTH OF THE SYSTEM IS REACHED, ADVANCE THE EQUIPMENT TO THE END OF THE RECENTLY PLACED FILL, AND BEGIN THE SEQUENCE AGAIN UNTIL THE SYSTEM IS COMPLETELY BACKFILLED. THIS TYPE OF CONSTRUCTION SEQUENCE PROVIDES ROOM FOR STOCKPILED BACKFILL DIRECTLY BEHIND THE BACKHOE, AS WELL AS THE MOVEMENT OF CONSTRUCTION TRAFFIC. MATERIAL STOCKPILES ON TOP OF THE BACKFILLED DETENTION SYSTEM SHOULD BE LIMITED TO 8- TO 10-FEET HIGH AND MUST PROVIDE BALANCED LOADING ACROSS ALL BARRELS. TO DETERMINE THE PROPER COVER OVER THE PIPES TO ALLOW THE MOVEMENT OF CONSTRUCTION EQUIPMENT SEE TABLE 1, OR CONTACT YOUR LOCAL CONTECH SALES ENGINEER.



WHEN FLOWABLE FILL IS USED, YOU MUST PREVENT PIPE FLOATATION. TYPICALLY, SMALL LIFTS ARE PLACED BETWEEN THE PIPES AND THEN ALLOWED TO SET-UP PRIOR TO THE PLACEMENT OF THE NEXT LIFT. THE ALLOWABLE THICKNESS OF THE CLSM LIFT IS A FUNCTION OF A PROPER BALANCE BETWEEN THE UPLIFT FORCE OF THE CLSM, THE OPPOSING WEIGHT OF THE PIPE, AND THE EFFECT OF OTHER RESTRAINING MEASURES. THE PIPE CAN CARRY LIMITED FLUID PRESSURE WITHOUT PIPE DISTORTION OR DISPLACEMENT, WHICH ALSO AFFECTS THE CLSM LIFT THICKNESS. YOUR LOCAL CONTECH SALES ENGINEER CAN HELP DETERMINE THE PROPER LIFT THICKNESS.

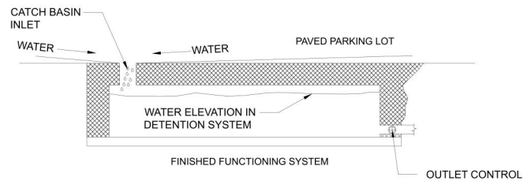


CONSTRUCTION LOADING

TYPICALLY, THE MINIMUM COVER SPECIFIED FOR A PROJECT ASSUMES H-20 LIVE LOAD. BECAUSE CONSTRUCTION LOADS OFTEN EXCEED DESIGN LIVE LOADS, INCREASED TEMPORARY MINIMUM COVER REQUIREMENTS ARE NECESSARY. SINCE CONSTRUCTION EQUIPMENT VARIES FROM JOB TO JOB, IT IS BEST TO ADDRESS EQUIPMENT SPECIFIC MINIMUM COVER REQUIREMENTS WITH YOUR LOCAL CONTECH SALES ENGINEER DURING YOUR PRE-CONSTRUCTION MEETING.

ADDITIONAL CONSIDERATIONS

BECAUSE MOST SYSTEMS ARE CONSTRUCTED BELOW-GRADE, RAINFALL CAN RAPIDLY FILL THE EXCAVATION; POTENTIALLY CAUSING FLOATATION AND MOVEMENT OF THE PREVIOUSLY PLACED PIPES. TO HELP MITIGATE POTENTIAL PROBLEMS, IT IS BEST TO START THE INSTALLATION AT THE DOWNSTREAM END WITH THE OUTLET ALREADY CONSTRUCTED TO ALLOW A ROUTE FOR THE WATER TO ESCAPE. TEMPORARY DIVERSION MEASURES MAY BE REQUIRED FOR HIGH FLOWS DUE TO THE RESTRICTED NATURE OF THE OUTLET PIPE.



CMP DETENTION SYSTEM INSPECTION AND MAINTENANCE

UNDERGROUND STORMWATER DETENTION AND INFILTRATION SYSTEMS MUST BE INSPECTED AND MAINTAINED AT REGULAR INTERVALS FOR PURPOSES OF PERFORMANCE AND LONGEVITY.

INSPECTION

INSPECTION IS THE KEY TO EFFECTIVE MAINTENANCE OF CMP DETENTION SYSTEMS AND IS EASILY PERFORMED. CONTECH RECOMMENDS ONGOING, ANNUAL INSPECTIONS. SITES WITH HIGH TRASH LOAD OR SMALL OUTLET CONTROL ORIFICES MAY NEED MORE FREQUENT INSPECTIONS. THE RATE AT WHICH THE SYSTEM COLLECTS POLLUTANTS WILL DEPEND MORE ON SITE SPECIFIC ACTIVITIES RATHER THAN THE SIZE OR CONFIGURATION OF THE SYSTEM.

INSPECTIONS SHOULD BE PERFORMED MORE OFTEN IN EQUIPMENT WASHDOWN AREAS, IN CLIMATES WHERE SANDING AND/OR SALTING OPERATIONS TAKE PLACE, AND IN OTHER VARIOUS INSTANCES IN WHICH ONE WOULD EXPECT HIGHER ACCUMULATIONS OF SEDIMENT OR ABRASIVE/ CORROSIVE CONDITIONS. A RECORD OF EACH INSPECTION IS TO BE MAINTAINED FOR THE LIFE OF THE SYSTEM

MAINTENANCE

CMP DETENTION SYSTEMS SHOULD BE CLEANED WHEN AN INSPECTION REVEALS ACCUMULATED SEDIMENT OR TRASH IS CLOGGING THE DISCHARGE ORIFICE.

ACCUMULATED SEDIMENT AND TRASH CAN TYPICALLY BE EVACUATED THROUGH THE MANHOLE OVER THE OUTLET ORIFICE. IF MAINTENANCE IS NOT PERFORMED AS RECOMMENDED, SEDIMENT AND TRASH MAY ACCUMULATE IN FRONT OF THE OUTLET ORIFICE. MANHOLE COVERS SHOULD BE SECURELY SEATED FOLLOWING CLEANING ACTIVITIES. CONTECH SUGGESTS THAT ALL SYSTEMS BE DESIGNED WITH AN ACCESS/INSPECTION MANHOLE SITUATED AT OR NEAR THE INLET AND THE OUTLET ORIFICE. SHOULD IT BE NECESSARY TO GET INSIDE THE SYSTEM TO PERFORM MAINTENANCE ACTIVITIES, ALL APPROPRIATE PRECAUTIONS REGARDING CONFINED SPACE ENTRY AND OSHA REGULATIONS SHOULD BE FOLLOWED.

ANNUAL INSPECTIONS ARE BEST PRACTICE FOR ALL UNDERGROUND SYSTEMS. DURING THIS INSPECTION, IF EVIDENCE OF SALTING/DE-ICING AGENTS IS OBSERVED WITHIN THE SYSTEM, IT IS BEST PRACTICE FOR THE SYSTEM TO BE RINSED, INCLUDING ABOVE THE SPRING LINE SOON AFTER THE SPRING THAW AS PART OF THE MAINTENANCE PROGRAM FOR THE SYSTEM.

MAINTAINING AN UNDERGROUND DETENTION OR INFILTRATION SYSTEM IS EASIEST WHEN THERE IS NO FLOW ENTERING THE SYSTEM. FOR THIS REASON, IT IS A GOOD IDEA TO SCHEDULE THE CLEANOUT DURING DRY WEATHER.

THE FOREGOING INSPECTION AND MAINTENANCE EFFORTS HELP ENSURE UNDERGROUND PIPE SYSTEMS USED FOR STORMWATER STORAGE CONTINUE TO FUNCTION AS INTENDED BY IDENTIFYING RECOMMENDED REGULAR INSPECTION AND MAINTENANCE PRACTICES. INSPECTION AND MAINTENANCE RELATED TO THE STRUCTURAL INTEGRITY OF THE PIPE OR THE SOUNDNESS OF PIPE JOINT CONNECTIONS IS BEYOND THE SCOPE OF THIS GUIDE.

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PROJECT No.:	SEQ. No.:	DATE:
8099	12924	1/21/2022
DESIGNED: DYO	DRAWN: DYO	
CHECKED: DYO	APPROVED: DYO	
SHEET NO.: D4		

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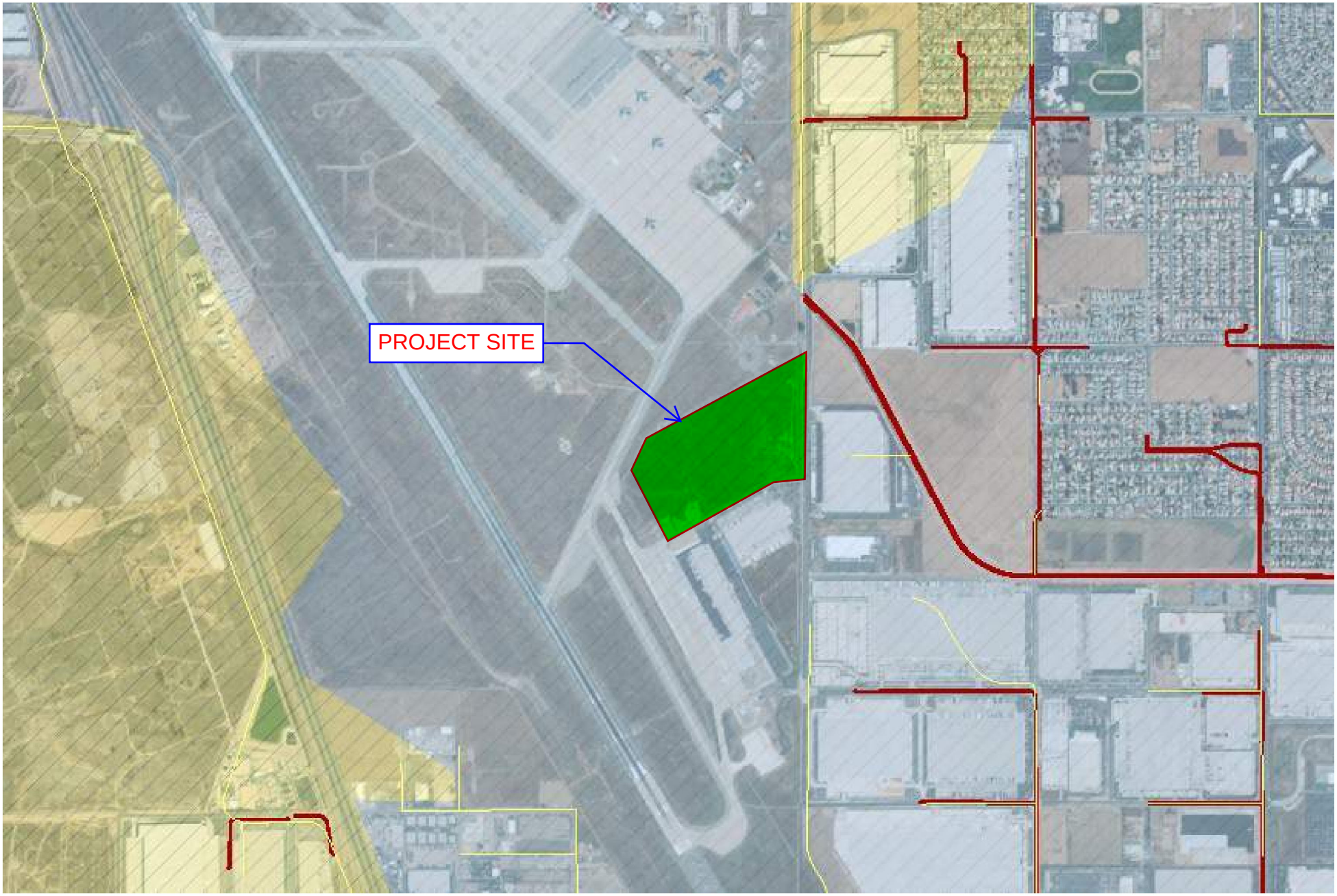
Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern


PROJECT SITE
Hydromodification Exemption Areas
Potentially Not Exempt
Potentially Exempt

Appendix 8: Source Control

Pollutant Sources/Source Control Checklist

This section to be completed at time of the amended FWQMP submittal.

Appendix 9: O&M

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

This section to be completed at time of the amended FWQMP submittal.

BMP Type	Inspection/Maintenance Required	Minimum Frequency of Activities
Irrigation	Inspect irrigation equipment. Check water sensors and adjust irrigation heads and timing.	Monthly or according to established maintenance schedule
Landscape Areas	Landscape maintenance will consist of trimming and replanting of vegetation, repair and maintenance of irrigation systems, and appropriate use of fertilizers and pesticides.	Monthly or according to established maintenance schedule
Proprietary Biotreatment (MWS)	Inspect for trash and debris in system inlet and outlet. Clean as necessary per manufacturer's recommendations. Inspect and record condition of plants. Replace media surface per manufacturer's recommendations. Cleanout unit per manufacturer's recommendations.	Prior to rainy season, immediately after rainy season, and after any storm events
Storm Drain (Detention System)	Inspect for structural issues, leaks, or damage.	Quarterly and after storm events
Trash Enclosure	Pick up trash on ground and place in receptacles. Close any lids that are left open. Make repairs to structural elements as necessary. Remove accumulations of trash.	Daily to inspect trash lids and dumpster areas. Monthly to inspect structural elements.

Irrigation Systems: Water conservation is to be maintained at all times per the approved irrigation plans. Monitoring of the irrigation system should be provided at least twice monthly or as necessary to ensure that appropriate watering levels are maintained as well as to verify that no piping or irrigation heads are leaking. Any debris, sediment, mineral and grit deposits should be removed from the irrigation system at regular intervals to provide consistent watering.

Landscaped Areas: Open space areas, including unpaved yards, shall be kept free of trash and debris. All trimming, pruning, and removal of fallen organic material from plants, shrubs, and trees are to be collected per an established landscape maintenance plan and disposed in the appropriate location or transported to a green-waste collection facility. The planting materials are to remain as indicated on the approved set of landscape planting plans. Additional actions should be taken to ensure that the surface flow paths, storm drain outlet and inlet in the area are cleared of debris or vegetation obstructions.

Biotreatment: The biotreatment system shall be inspected for erosion, dead vegetation, soggy soils, or standing water. The use of fertilizers and pesticides on the plants inside the Facility should be minimized. Keep adjacent landscape areas maintained, remove clippings from landscape maintenance activities, remove trash and debris, replace damaged grass and/or plants, and replace surface mulch/cobble as needed to maintain a 2-3 inch soil cover. Facilities should be inspected for ponding after storm events. See manufacturer's recommendations.

Storm Drain System: Inlets, outlets, cleanouts, manholes, and pipelines are to be inspected quarterly and after each storm event or according to an existing maintenance program. All parts of the system are to be periodically cleaned to ensure that the system works properly during any storm event. All hardscape, landscape, parking, and driveway areas shall be kept clean, sanitary and free from any accumulation of debris, sediments and waste materials that could enter the storm drain system.

Covered Trash Enclosure: Trash will be removed by the local solid waste management contractor on a weekly basis or as need to avoid overflow for proper disposal to a landfill. Recyclable materials and greenwastes to be processed offsite. The proposed trash enclosure shall be covered with a solid roof per MJPA requirements. And designed to not allow runon from adjoining areas. The trash enclosure is also designed to divert drainage from pavement around the area and walled off to prevent off-site transport of trash. Post signage on all dumpsters informing users that hazardous materials are not to be disposed of therein.

SAMPLE TRAINING/EDUCATIONAL LOG

Date of Training/Educational Activity: _____

Name of Person Performing Activity (Printed): _____

Signature: _____

Topic of Training/Educational Activity: _____

_____

Name of Participant	Signature of Participant

For newsletter or mailer educational activities, please include the following information:

- Date of mailing
- Number distributed
- Method of distribution
- Topics addressed

If a newsletter article was distributed, please include a copy of it.

Appendix 10: Educational Materials

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

This section to be completed at time of the amended FWQMP submittal.