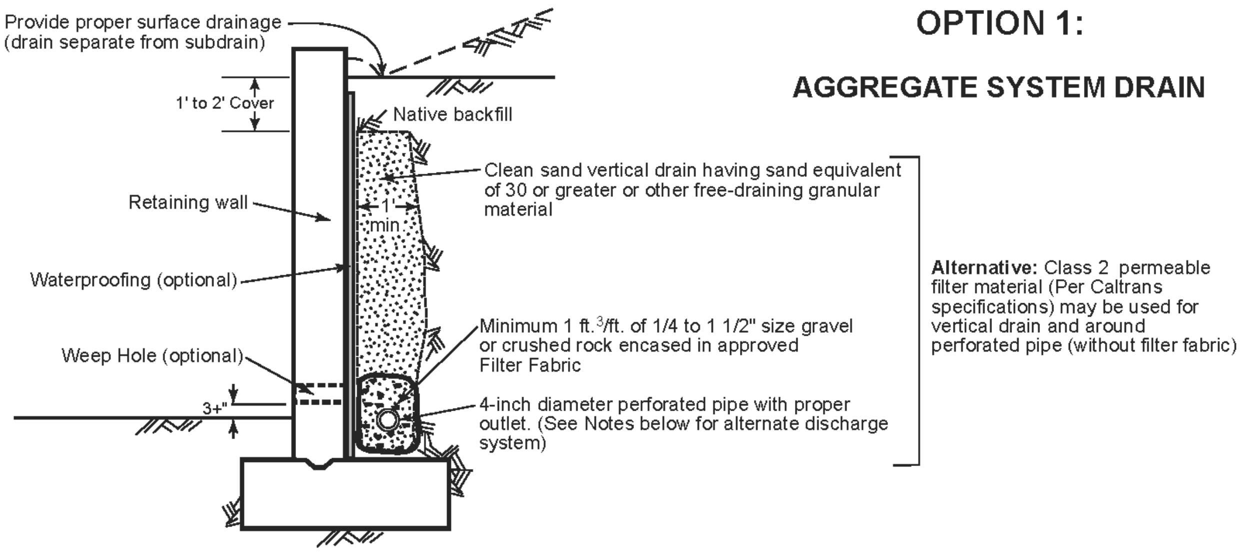

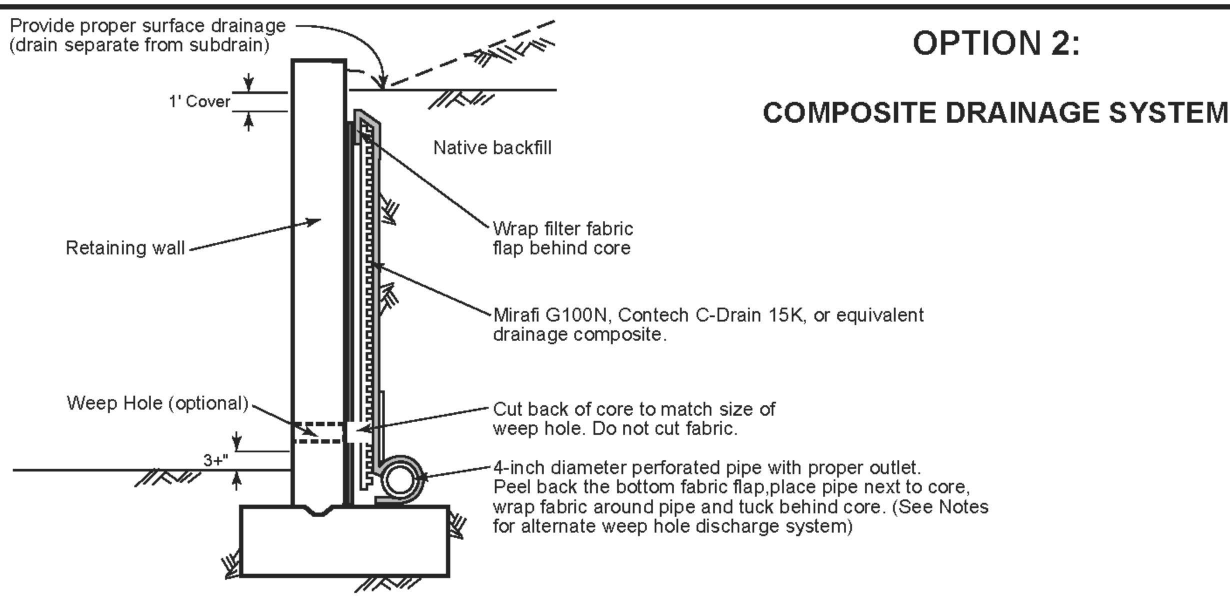

NOTES:

1. PIPE TYPE SHOULD BE PVC OR ABS, SCHEDULE 40 OR SDR35 SATISFYING THE REQUIREMENTS OF ASTM TEST STANDARD D1527, D1785, D2751 , OR D3034.
2. FILTER FABRIC SHALL BE APPROVED PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL.
3. DRAIN PIPE SHOULD HAVE A GRADIENT OF 1 PERCENT MINIMUM.
4. WATERPROOFING MEMBRANE MAY BE REQUIRED FOR A SPECIFIC RETAINING WALL (SUCH AS A STUCCO OR BASEMENT WALL).
5. WEEP HOLES MAY BE PROVIDED FOR LOW RETAINING WALLS (LESS THAN 3 FEET IN HEIGHT) IN LIEU OF A VERTICAL DRAIN AND PIPE AND WHERE POTENTIAL WATER FROM BEHIND THE RETAINING WALL WILL NOT CREATE A NUISANCE WATER CONDITION. IF EXPOSURE IS NOT PERMITTED, A PROPER SUBDRAIN OUTLET SYSTEM SHOULD BE PROVIDED.
6. IF EXPOSURE IS PERMITTED, WEEP HOLES SHOULD BE 2-INCH MINIMUM DIAMETER AND PROVIDED AT 25-FOOT MAXIMUM SPACING ALONG WALL. WEEP HOLES SHOULD BE LOCATED 3+ INCHES ABOVE FINISHED GRADE.
7. SCREENING SUCH AS WITH A FILTER FABRIC SHOULD BE PROVIDED FOR WEEP HOLES/OPEN JOINTS TO PREVENT EARTH MATERIALS FROM ENTERING THE HOLES/JOINTS.
8. OPEN VERTICAL MASONRY JOINTS (I.E., OMIT MORTAR FROM JOINTS OF FIRST COURSE ABOVE FINISHED GRADE) AT 32-INCH MAXIMUM INTERVALS MAY BE SUBSTITUTED FOR WEEP HOLES.
9. THE GEOTECHNICAL CONSULTANT MAY PROVIDE ADDITIONAL RECOMMENDATIONS FOR RETAINING WALLS DESIGNED FOR SELECT SAND BACKFILL.

Retaining Wall Drainage Detail

S/A

Figure 4

Appendix A

APPENDIX A

REFERENCES

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APPENDIX A (Cont'd)

REFERENCES

U.S. Geological Survey (USGS), 2002, Geologic Map of the Corona North 7.5' Quadrangle, Riverside and San Bernardino Counties, California, Version 1.0, Open File Report 02-22, 1:24,000 Scale.

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Appendix B

SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			SYMBOLS	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS MORE THAN 50% OF MATERIAL IS LARGER THAN NO. 200 SIEVE SIZE	*GRAVEL AND GRAVELLY SOILS* MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	*CLEAN GRAVELS* (LITTLE OR NO FINES)	GW	WELL-GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
			GP	POORLY GRADED GRAVELS, GRAVEL - SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)	GM	SILTY GRAVELS, GRAVEL - SAND - SILT MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL - SAND - CLAY MIXTURES
	SAND AND SANDY SOILS MORE THAN 50% OF COARSE FRACTION PASSING NO. 4 SIEVE	*CLEAN SANDS* (LITTLE OR NO FINES)	SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
		SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)	SM	SILTY SANDS, SAND - SILT MIXTURES
			SC	CLAYEY SANDS, SAND - CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% OF MATERIAL IS SMALLER THAN NO. 200 SIEVE SIZE	*SILTS AND CLAYS*	LIQUID LIMIT LESS THAN 50	ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50	MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SILTS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

NOTE: Dual symbols are used to indicate gravels or sand with 5-12% fines and soils with fines classifying as CL-ML. Symbols separated by a slash indicate borderline soil classifications.

Sampler and Symbol Descriptions

- Modified California sample (D-#)
- Standard Penetration Test (S-#)
- Shelby tube sample (T-#)
- Large bulk sample (B-#)
- Small bulk sample (SB-#)
- Approximate depth of groundwater during drilling
- Approximate depth of static groundwater

Note: Number of blows required to advance driven sample 12 inches (or length noted).

Laboratory and Field Test Abbreviations

AL	Atterberg limits (plasticity)
CC	Chemical Testing incl. Soluble Sulfate
CN	Consolidation
DS	Direct Shear
EI	Expansion Index
GS	Grain Size Analysis (Sieve, Hydro. and/or -No. 200)
MD	Maximum Density and Optimum Moisture
RV	Resistance Value (R-Value)
SE	Sand Equivalent
UU	Unconsolidated Undrained Shear Strength

Notes:

1. Soil classifications are based on the Unified Soil Classification System and include color, moisture, and relative density or consistency. Field descriptions have been modified to reflect results of laboratory tests where deemed appropriate. Bedrock descriptions are based on visual classification and include rock type, moisture, color, grain size, strength, and weathering.
2. Descriptions on these boring logs apply only at the specific boring locations and at the time the borings were drilled. They are not warranted to be representative of subsurface conditions at other locations or times.

S/A

KEY TO LOG OF BORING

Date(s) Drilled: 12-08-2023	**Logged By:** AC, AZ	**H-1** Page 1 of 1	
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 10”		
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30”)		
Sampling Method(s): Modified California, Bulk		**Total Depth Drilled (ft)**	8
Approximate Groundwater Depth: Groundwater Not Encountered		**Approximate Ground Surface Elevation (ft)**	
Comments:			

Depth (ft)	SAMPLES Type Number	SAMPLES Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
0	B-1		SM	**Granitic Bedrock (Kgr)** @ 0-2.5’: Pale yellow silty fine- to medium-grained GRANITE, damp, dense, highly weathered (decomposed granite).			B-1 @ 0-5’
	D-1	50/ 2"	SP-SM	@ 2.5’: Pale yellow to light grey silty to clean fine- to coarse-grained GRANITE, dry, very dense, weathered (decomposed granite). - No Ring Recovery -			
5	D-2	50/ 3"	SP-SM	@ 5’: Yellow to white fine- to coarse-grained GRANITE, dry to damp, very dense, weathered. - No Ring Recovery -			
				No 7' sample due to hard drilling conditions.			
10				Notes: Total Depth: 8 Feet (Refusal). No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
15							
20							
25							
30							

Log Of Boring

Meritage Homes Proposed Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s) Drilled: 12-08-2023	Logged By: AC, AZ	**H-2**
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 10”	
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30”)	Page 1 of 2
Sampling Method(s): Modified California, Bulk		**Total Depth Drilled (ft)** 30
Approximate Groundwater Depth: Groundwater Not Encountered		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	SAMPLES Type Number	SAMPLES Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
0				**Older Alluvium (Qalo)**			
	B-1		CL	@ 0-2.5’: Reddish brown silty fine-grained sandy CLAY, dry, medium stiff.			B-1 @ 0-5’ GS, AL, EI, CC
	D-1	50/ 6"	SM	@ 2.5’: Reddish brown silty fine- to medium-grained SAND, damp to slightly moist, very dense.	10.5	120.8	
5	D-2	50/ 4"	SP-SM	**Granitic Bedrock (Kgr)** @ 5’: Reddish brown to yellowish brown fine- to medium-grained GRANITE, damp, very dense, highly micaceous, weathered (decomposed granite).	6.0	105.0	
	D-3	50/ 3"	SP-SM	@ 7.5': Yellowish brown to grey fine- to medium-grained GRANITE, moist, very dense, highly micaceous, weathered (decomposed granite).	4.3		GS
10	D-4	50/ 3"	SP-SM	@ 10': Pale yellowish grey to light grey fine- to medium-grained GRANITE, damp, very dense, micaceous, highly silicic, weathered (decomposed granite).	4.6	108.0	Harder drilling at 11'
15	D-5	50/ 3"	SP-SM	@ 15': Dark grey to yellowish grey fine- to medium-grained GRANITE, damp, very dense, highly micaceous, weathered (decomposed granite).	4.5		
20	D-6	50/ 2"	SP-SM	@ 20': Dark grey to yellowish grey fine- to coarse-grained GRANITE, moist, very dense, highly micaceous, weathered (decomposed granite). - No Ring Recovery -			
25	D-7	50/ 3"	SP-SM	@ 25': Dark grey to light grey silty fine- to medium-grained GRANITE, damp, very dense, micaceous, weathered (decomposed granite). - No Ring Recovery -			
30							

Log Of Boring

Meritage Homes
Proposed Residential Development
La Sierra Ave & Alhambra Ave
Riverside, California

Project Number: 23145-01

Appendix B

Date(s) Drilled: 12-08-2023	**Logged By:** AC, AZ	**H-2**	
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 10"		
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30")	Page 2 of 2	
Sampling Method(s): Modified California, Bulk		**Total Depth Drilled (ft)**	30
Approximate Groundwater Depth: Groundwater Not Encountered		**Approximate Ground Surface Elevation (ft)**	
Comments:			

Depth (ft)	SAMPLES Type Number	Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
30	D-8	50/ 2"	SP-SM	@ 30': Pale yellow to light grey fine- to coarse-grained GRANITE, damp, very dense, weathered (decomposed granite). - No Ring Recovery -			
35				Notes: Total Depth: 30 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
40							
45							
50							
55							

Log Of Boring

Meritage Homes
Proposed Residential Development
La Sierra Ave & Alhambra Ave
Riverside, California

Project Number: 23145-01

Appendix B

Date(s) Drilled: 12-08-2023	**Logged By:** AC, AZ	**H-3**	
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 10”		
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30”)	Page 1 of 2	
Sampling Method(s): Modified California, Bulk		**Total Depth Drilled (ft)**	30.5
Approximate Groundwater Depth: Groundwater Not Encountered		**Approximate Ground Surface Elevation (ft)**	
Comments:			

Depth (ft)	Samples: Type Number	Samples: Blows Per Foot	USCS	MATERIAL DESCRIPTION Hand Augered to 3.5’ for Utility Clearance	Moisture Content (%)	Dry Density (pcf)	REMARKS
0	B-1		SM	**Older Alluvium (Qalo)** @ 0-3.5’: Reddish brown silty fine- to medium-grained SAND, dry to damp, loose.			B-1 @ 0-5’
	D-1	9	SM	@ 3.5’: Reddish brown silty fine- to medium-grained SAND, slightly moist, loose.	6.6	115.3	
5	D-2	13	SM/ML	@ 5’: Reddish brown silty fine-grained SAND/sandy SILT, moist, medium dense/stiff.	7.0	117.3	GS, CN
	D-3	32	ML	@ 7.5': Reddish brown fine sandy slightly clayey SILT, moist, very stiff.	14.6	118.7	
10	D-4	61	SM	@ 10’: Upper: Reddish brown silty fine- to coarse-grained SAND, moist, dense, some bedrock fragments.	11.6	123.5	
			SP-SM	**Granitic Bedrock (Kgr)** Lower: Yellowish brown to grey silty to clean fine- to coarse-grained GRANITE, moist, dense, highly weathered (decomposed granite).			
15	D-5	50/5"	SP	@ 15': Yellowish brown to brownish grey fine- to coarse-grained GRANITE, damp, very dense, micaceous, highly weathered (decomposed granite).	3.5	114.5	
20	D-6	50/3"	SP	@ 20': Light grey to yellowish grey fine- to coarse-grained GRANITE, damp, very dense, micaceous, weathered (decomposed granite).	3.7	115.7	
25	D-7	50/5"	SP	@ 25': Olive grey to grey fine- to coarse-grained GRANITE, damp, very dense, micaceous, weathered (decomposed granite).	3.7		
30							Harder drilling at 28'

Log Of Boring

Meritage Homes
Proposed Residential Development
La Sierra Ave & Alhambra Ave
Riverside, California

Project Number: 23145-01

Appendix B

Date(s) Drilled: 12-08-2023	Logged By: AC, AZ	H-3
Drilling Method: Hollow Stem	Drill Bit Size/Type: 10”	
Drill Rig Type: CME 75	Hammer Type: Auto (140lbs @ 30”)	Page 2 of 2
Sampling Method(s): Modified California, Bulk		Total Depth Drilled (ft): 30.5
Approximate Groundwater Depth: Groundwater Not Encountered		Approximate Ground Surface Elevation (ft)
Comments:		

Depth (ft)	Samples: Type Number	Samples: Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
30	D-8	50/ 3"	SP	@ 30': Dark grey to white fine- to coarse-grained GRANITE, damp, very dense, micaceous, weathered (decomposed granite), quartz veins up to 1" thick.	3.8		
				Notes: Total Depth: 30.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
35							
40							
45							
50							
55							

Log Of Boring

Meritage Homes
Proposed Residential Development
La Sierra Ave & Alhambra Ave
Riverside, California

Project Number: 23145-01

Appendix B

Date(s) Drilled: 12-08-2023	Logged By: AC, AZ	H-4
Drilling Method: Hollow Stem	Drill Bit Size/Type: 10"	
Drill Rig Type: CME 75	Hammer Type: Auto (140lbs @ 30")	Page 1 of 2
Sampling Method(s): Modified California, Bulk		Total Depth Drilled (ft): 30.5
Approximate Groundwater Depth: Groundwater Not Encountered		Approximate Ground Surface Elevation (ft)
Comments:		

Depth (ft)	SAMPLES Type Number	SAMPLES Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
0	B-1		SM/ ML	**Older Alluvium (Qalo)** @ 0-2.5': Reddish brown silty fine-grained SAND/sandy SILT, damp, medium dense/medium stiff.			B-1 @ 0-5' RV
	D-1	40	SM	@ 2.5': Reddish brown to brownish grey silty fine- to coarse-grained SAND, damp, medium dense, Kgr in sampler tip.	7.3	123.9	
5	D-2	50/ 4"	SC-CL	**Granitic Bedrock (Kgr)** @ 5': Reddish brown to pale reddish brown clayey fine to coarse grained GRANITE, moist, very dense, highly weathered (decomposed granite).	14.7	114.9	DS
	D-3	50/ 4"	SP-SM	@ 7.5': Pale reddish brown to yellowish brown fine- to coarse-grained GRANITE, damp, very dense, weathered (decomposed granite).	6.5		
10	D-4	50/ 4"	SP-SM	@ 10': Pale yellow to white fine- to coarse-grained GRANITE, damp, very dense, trace mica, weathered (decomposed granite).	4.5		
15	D-5	50/ 4"	SP-SM	@ 15': Pale yellow to pale reddish brown fine- to coarse-grained GRANITE, damp, very dense, trace mica, weathered (decomposed granite). - No Ring Recovery -			
20	D-6	50/ 4"	SP-SM	@ 20': Light grey to yellowish grey fine- to coarse-grained GRANITE, damp, very dense, micaceous, weathered (decomposed granite).	4.7		
25	D-7	50/ 4"	SP-SM	@ 25': Olive grey to grey fine- to coarse-grained GRANITE, damp, very dense, micaceous, weathered (decomposed granite).	3.9		
30							

Log Of Boring

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Proposed Residential Development
La Sierra Ave & Alhambra Ave
Riverside, California

Project Number: 23145-01

Appendix B

Date(s) Drilled: 12-08-2023	**Logged By:** AC, AZ	**H-4**	
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 10"		
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30")	Page 2 of 2	
Sampling Method(s): Modified California, Bulk		**Total Depth Drilled (ft)**	30.5
Approximate Groundwater Depth: Groundwater Not Encountered		**Approximate Ground Surface Elevation (ft)**	
Comments:			

Depth (ft)	SAMPLES Type Number	SAMPLES Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
30	D-8	50/ 5"	SP-SM	@ 30': Yellowish brown to brownish grey fine- to coarse-grained GRANITE, moist, very dense, highly micaceous, weathered (decomposed granite).	7.6		
35				Notes: Total Depth: 30.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
40							
45							
50							
55							

Log Of Boring

Meritage Homes Proposed Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s) Drilled: 12-08-2023	**Logged By:** AC, AZ	**H-5**
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 10”	
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30”)	Page 1 of 2
Sampling Method(s): Modified California, Bulk		**Total Depth Drilled (ft)** 30
Approximate Groundwater Depth: 26.5 feet		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	SAMPLES Type Number	SAMPLES Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
0				**Older Alluvium (Qalo)**			
	B-1		SM/ML	@ 0-2.5’: Reddish brown silty fine-grained SAND/sandy SILT, dry to damp, loose to medium dense/stiff.			B-1 @ 0-5’ GS, AL, DS, MD, EI, CC
	D-1	18	SM	@ 2.5’: Reddish brown silty fine- to medium-grained SAND, damp, medium dense.	3.0	110.1	
5	D-2	20	SM	@ 5’: Reddish brown silty fine- to coarse-grained SAND, damp, medium dense.	2.8	116.4	
	D-3	19	SM/ML	@ 7.5': Reddish brown silty fine-grained SAND/sandy SILT, damp, medium dense/stiff.	6.2	116.7	
10	D-4	34	ML	@ 10': Reddish brown fine sandy SILT, damp to moist, very stiff, Kgr in sampler tip.	9.1	123.5	
			SM	**Granitic Bedrock (Kgr)**			
15	D-5	50/4"	SM	@ 15': Reddish brown to yellowish brown to dark grey silty fine- to coarse-grained GRANITE, damp, very dense, weathered (decomposed granite), highly micaceous.	4.1	112.1	
20	D-6	50/4"	SP-SM	@ 20': Dark grey to yellowish grey fine- to coarse-grained GRANITE, damp, very dense, highly micaceous, weathered (decomposed granite).	3.1		
25	D-7	50/3"	SP-SM	@ 25': Dark grey to yellowish grey fine- to coarse-grained GRANITE, damp to moist, very dense, highly micaceous, weathered (decomposed granite).	3.6	102.5	
				Groundwater at 28' during drilling; 26.5' after 5 minutes			
30							

Log Of Boring

Meritage Homes Proposed Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s) Drilled: 12-08-2023	**Logged By:** AC, AZ	**H-5**	
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 10”		
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30”)	Page 2 of 2	
Sampling Method(s): Modified California, Bulk		**Total Depth Drilled (ft)**	30
Approximate Groundwater Depth: 26.5 Feet		**Approximate Ground Surface Elevation (ft)**	
Comments:			

Depth (ft)	SAMPLES Type Number	SAMPLES Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
30	D-8	50/ 1"	SP-SM	@ 30': Dark grey to yellowish grey fine- to coarse-grained GRANITE, saturated, very dense, highly micaceous, weathered (decomposed granite). - No Ring Recovery -			
35				Notes: Total Depth: 30 Feet. Groundwater Encountered at 26.5 feet. Backfilled with Cuttings and Tamped.			
40							
45							
50							
55							

Log Of Boring

Meritage Homes Proposed Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s) Drilled: 12-08-2023	Logged By: AC, AZ	**H-6**
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 10”	
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30”)	Page 1 of 2
Sampling Method(s): Modified California, Bulk		**Total Depth Drilled (ft)** 30.5
Approximate Groundwater Depth: Groundwater Not Encountered		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	SAMPLES Type Number	SAMPLES Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
0			SM	**Older Alluvium (Qalo)**			
	B-1			@ 0-2.5’: Reddish brown silty fine- to coarse-grained SAND, dry to damp, loose.			B-1 @ 0-5’
	D-1	11	SM	@ 2.5’: Reddish brown silty fine- to coarse-grained SAND, damp, loose.	3.1	115.4	
5	D-2	7	SM	@ 5’: Reddish brown silty fine-grained SAND, damp to moist, loose.	6.9	111.9	GS, CN
	D-3	14	ML	@ 7.5': Reddish brown silty fine-grained sandy SILT, damp to moist, medium stiff.	8.6	121.3	GS, CN
10	D-4	16	CL	@ 10': Reddish brown fine sandy CLAY, moist, stiff.	12.4	118.4	GS, AL
15	D-5	23	CL	@ 15': Reddish brown sandy CLAY, moist, very stiff.	13.4	117.6	GS, CN
20	D-6	30	CL	@ 20': Reddish brown sandy CLAY, moist, very stiff to hard. Kgr in sampler tip.	13.8	121.6	
			SM	**Granitic Bedrock (Kgr)**			
25	D-7	50/ 5"	SM	@ 25': Yellowish grey to white to pale olive grey fine- to coarse-grained GRANITE, very moist, very dense, micaceous, weathered (decomposed granite), quartz veins up to 0.25" thick.	15.5	118.9	
30							

Log Of Boring

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Riverside, California

Project Number: 23145-01

Appendix B

Date(s) Drilled: 12-08-2023	**Logged By:** AC, AZ	**H-6**
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 10”	
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30”)	Page 2 of 2
Sampling Method(s): Modified California, Bulk		**Total Depth Drilled (ft)** 30.5
Approximate Groundwater Depth: Groundwater Not Encountered		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	Type Number	Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
30	D-8	50/ 3"	SP-SM	@ 30': Yellowish grey to dark grey silty fine- to coarse-grained GRANITE, moist, very dense, highly micaceous, weathered (decomposed granite). - No Ring Recovery -			
35				Notes: Total Depth: 30.5 Feet. No Groundwater Encountered. Backfilled with Cuttings and Tamped.			
40							
45							
50							
55							

Log Of Boring

Date(s) Drilled: 12-11-2023	**Logged By:** AC, AZ	**P-1**
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 8”	
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30”)	Page 1 of 1
Sampling Method(s): Modified California		**Total Depth Drilled (ft)** 5
Approximate Groundwater Depth: Groundwater Not Encountered		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	SAMPLES: Type Number	SAMPLES: Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
0				**Older Alluvium (Qalo)**			
	D-1	22	SM	@ 2’: Reddish brown silty fine- to medium-grained SAND, damp, medium dense.	3.3	114.1	
	D-2	38	SM	@ 3.5’: Reddish brown silty fine- to coarse-grained SAND, damp, medium dense.	3.6	111.0	
5				Notes: Total Depth: 5 Feet. No Groundwater Encountered. Installed 3” Slotted Pipe. Annular Backfill with ¾" Gravel. Presoak Performed 12/11/23. Percolation Testing Performed 12/12/23. Backfilled with Gravel and Cuttings.			
10							
20							
25							
30							

Log Of Boring

Meritage Homes
Proposed Residential Development
La Sierra Ave & Alhambra Ave
Riverside, California

Project Number: 23145-01

Appendix B

Date(s) Drilled: 12-11-2023	Logged By: AC, AZ	P-2
Drilling Method: Hollow Stem	Drill Bit Size/Type: 8"	
Drill Rig Type: CME 75	Hammer Type: Auto (140lbs @ 30")	Page 1 of 1
Sampling Method(s): Modified California		Total Depth Drilled (ft) 5
Approximate Groundwater Depth: Groundwater Not Encountered		Approximate Ground Surface Elevation (ft)
Comments:		

Depth (ft)	SAMPLES: Type Number	SAMPLES: Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
0				**Older Alluvium (Qalo)**			
	D-1	15	SM	@ 2': Reddish brown to brownish grey silty fine- to medium-grained SAND, dry to damp, medium dense.	2.2	103.1	
	D-2	26	SM	@ 3.5': Reddish brown to brownish grey silty fine- to coarse-grained SAND, dry to damp, medium dense.	2.2	110.1	
5				Notes: Total Depth: 5 Feet. No Groundwater Encountered. Installed 3" Slotted Pipe. Annular Backfill with ¾" Gravel. Presoak Performed 12/11/23. Percolation Testing Performed 12/12/23. Backfilled with Gravel and Cuttings.			
10							
20							
25							
30							

Log Of Boring

Meritage Homes
Proposed Residential Development
La Sierra Ave & Alhambra Ave
Riverside, California

Project Number: 23145-01

Appendix B

Date(s) Drilled: 12-11-2023	Logged By: AC, AZ	P-3
Drilling Method: Hollow Stem	Drill Bit Size/Type: 8”	
Drill Rig Type: CME 75	Hammer Type: Auto (140lbs @ 30”)	Page 1 of 1
Sampling Method(s): Modified California		Total Depth Drilled (ft) 10
Approximate Groundwater Depth: Groundwater Not Encountered		Approximate Ground Surface Elevation (ft)
Comments:		

Depth (ft)	SAMPLES Type Number	SAMPLES Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
0				**Older Alluvium (Qalo)**			
	D-1	27	SM	@ 2.5’: Reddish brown silty fine- to coarse-grained SAND, dry, medium dense, slightly friable.	1.9	111.6	
5	D-2	26	SM	@ 5': Reddish brown silty fine-grained SAND, damp, medium dense, trace root hairs.	3.9	116.1	GS
	D-3	16	SM	@ 8': Reddish brown silty fine-grained SAND, damp to moist, medium dense.	9.1	119.8	
10				Notes: Total Depth: 10 Feet. No Groundwater Encountered. Installed 3” Slotted Pipe. Annular Backfill with ¾" Gravel. Presoak Performed 12/11/23. Percolation Testing Performed 12/12/23. Backfilled with Gravel and Cuttings.			
20							
25							
30							

Log Of Boring

Meritage Homes
Proposed Residential Development
La Sierra Ave & Alhambra Ave
Riverside, California

Project Number: 23145-01

Appendix B

Date(s) Drilled: 12-11-2023	**Logged By:** AC, AZ	**P-4**
Drilling Method: Hollow Stem	**Drill Bit Size/Type:** 8"	
Drill Rig Type: CME 75	**Hammer Type:** Auto (140lbs @ 30")	Page 1 of 1
Sampling Method(s): Modified California		**Total Depth Drilled (ft)** 7.5
Approximate Groundwater Depth: Groundwater Not Encountered		**Approximate Ground Surface Elevation (ft)** 836
Comments:		

Depth (ft)	SAMPLES Type Number	Blows Per Foot	USCS	MATERIAL DESCRIPTION	Moisture Content (%)	Dry Density (pcf)	REMARKS
0				**Older Alluvium (Qalo)**			
	D-1	18	SM	@ 2.5': Reddish brown silty fine- to medium-grained SAND, damp, medium dense.	4.5	117.1	
5	D-2	33	SM	@ 6': Reddish brown silty fine-grained SAND, damp to slightly moist, medium dense.	6.0	115.7	
10				Notes: Total Depth: 7.5 Feet. No Groundwater Encountered. Installed 3" Slotted Pipe. Annular Backfill with ¾" Gravel. Presoak Performed 12/11/23. Percolation Testing Performed 12/12/23. Backfilled with Gravel and Cuttings.			
20							
25							
30							

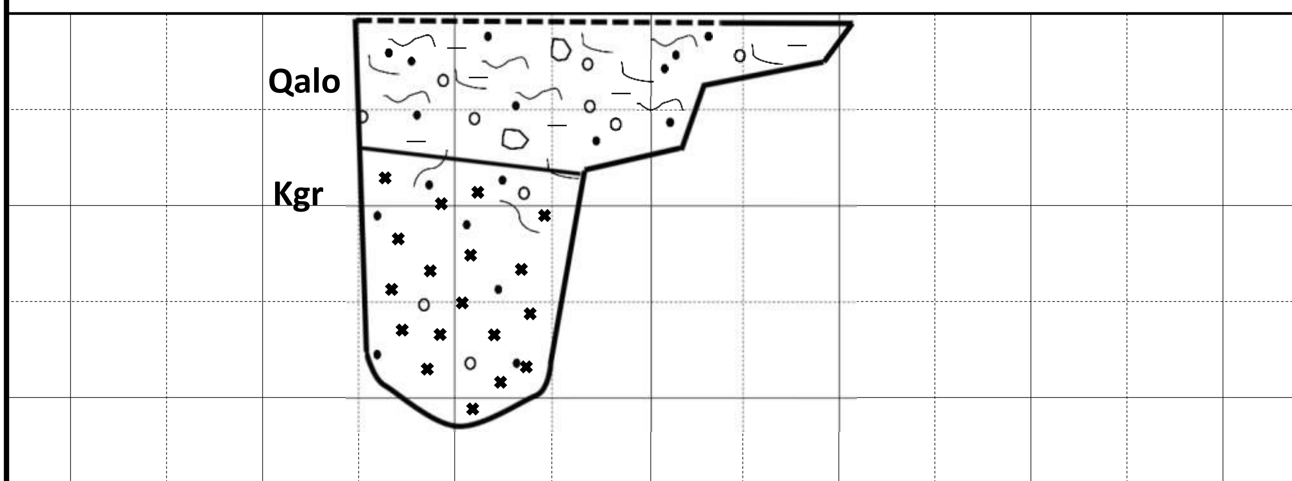
Log Of Boring

Meritage Homes Proposed Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s)Excavated: 12/06/2022	Logged By: AZ/AC	TP- 1
Excavation Method: Backhoe		
Equipment Type: Deere 310		
Sampling Method(s): Bulk		Total Depth (ft): 11.5
Approximate Groundwater Depth: Not Encountered		Approximate Ground Surface Elevation (ft)
Comments:		

Depth (ft)	SAMPLES Type Number	Blows Per Foot	USCS	Log Of Test Pit Surface: Dirt & weeds	Moisture Content (%)	Dry Density (pcf)	REMARKS
0				**Older Alluvium (Qalo)**			
			SM	@ 0-2.5': Reddish brown silty fine- to medium-grained SAND, dry, medium dense, root hairs in upper 8".			
				Granitic Bedrock (Kgr)			
			SM	@ 2.5-5': Yellow to red to grey fine- to medium-grained GRANITE, dry to damp, dense, highly weathered (D.G.), with local hard rock fragments.			
5	B-1		SP-SM	@ 5-11.5': Pale olive grey fine- to coarse-grained GRANITE, damp, dense, weathered (D.G.).			B-1 @ 5-7'
10				Notes: Total Depth: 11.5 Feet (Refusal). Groundwater Not Encountered. Backfilled with Cuttings.			
15							

Graphic Orientation: North Wall **Trend:** -N58E--> **Scale**: 1" = 5'



Log Of Test Pit

Meritage Homes
Proposed New Residential Development
La Sierra Ave & Alhambra Ave
Riverside, California

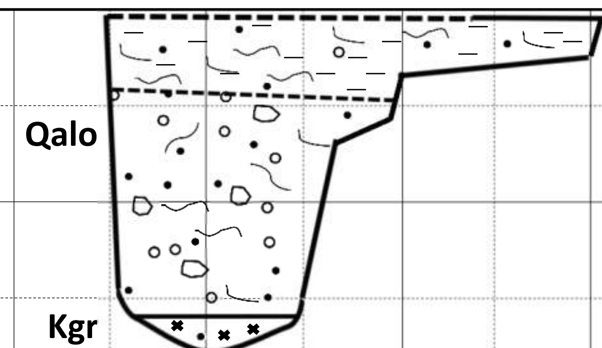
Project Number: 23145-01

Appendix B

Date(s)Excavated: 12/06/2022	**Logged By:** AZ/AC	**TP- 2**
Excavation Method: Backhoe		
Equipment Type: Deere 310		
Sampling Method(s): Bulk		**Total Depth (ft):** 8.5
Approximate Groundwater Depth: Not Encountered		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	SAMPLES Type Number	Blows Per Foot	USCS	Log Of Test Pit Surface: Dirt & weeds	Moisture Content (%)	Dry Density (pcf)	REMARKS
0				**Older Alluvium (Qalo)**			
			SM	@ 0-2': Reddish brown silty fine-grained SAND, dry, medium dense, root hairs in upper 12-18".			
	B-1		SM	@ 2-8': Reddish brown silty fine- to coarse-grained SAND, damp, dense, few coarse-grained bedrock fragments.			B-1 @ 2-6'
5							
				Granitic Bedrock (Kgr)			
			SP	@ 8-8.5': Pale olive grey fine- to coarse-grained GRANITE, damp, dense, weathered (D.G.).			
10							
				Notes: Total Depth: 8.5 Feet (Refusal). Groundwater Not Encountered. Backfilled with Cuttings.			
15							

Graphic Orientation: North Wall **Trend:** -N70E--> **Scale**: 1" = 5'



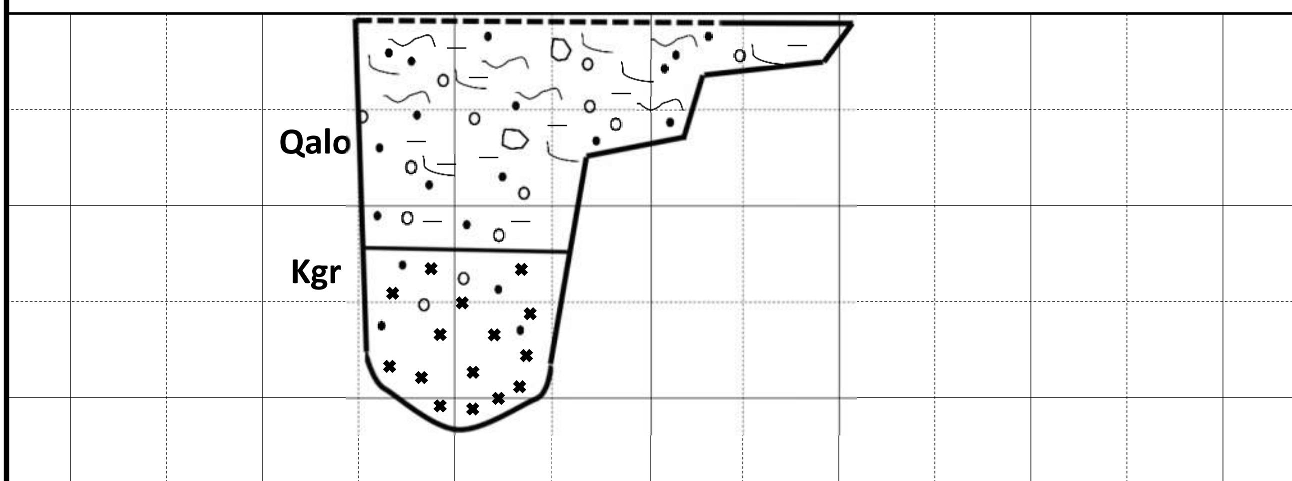
Log Of Test Pit

Meritage Homes Proposed New Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s)Excavated: 12/06/2022	Logged By: AZ/AC	TP- 3
Excavation Method: Backhoe		
Equipment Type: Deere 310		
Sampling Method(s): None		**Total Depth (ft):** 11.5
Approximate Groundwater Depth: Not Encountered		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	SAMPLES: Type Number	SAMPLES: Blows Per Foot	USCS	**Log Of Test Pit** Surface: Dirt & weeds	Moisture Content (%)	Dry Density (pcf)	REMARKS
0							
			SM/ ML	**<u>Older Alluvium (Qalo)</u>** @ 0-6.5': Reddish brown silty fine-grained SAND/sandy SILT, damp to moist, medium dense/stiff, soil pores up to ¼" in upper 1.5', roots and root hairs in upper 4'.			
5			SM	**<u>Granitic Bedrock (Kgr)</u>** @ 6.5-9': Yellow, reddish brown, and grey fine- to medium-grained GRANITE, dry to damp, dense, highly weathered (D.G.), with local hard rock fragments.			
10			SP-SM	@ 9-11.5': Pale olive grey fine- to coarse-grained GRANITE, damp, dense, weathered (D.G.).			
15				Notes: Total Depth: 11.5 Feet (Refusal). Groundwater Not Encountered. Backfilled with Cuttings.			

Graphic Orientation: North Wall **Trend:** -N74E--> **Scale**: 1" = 5'



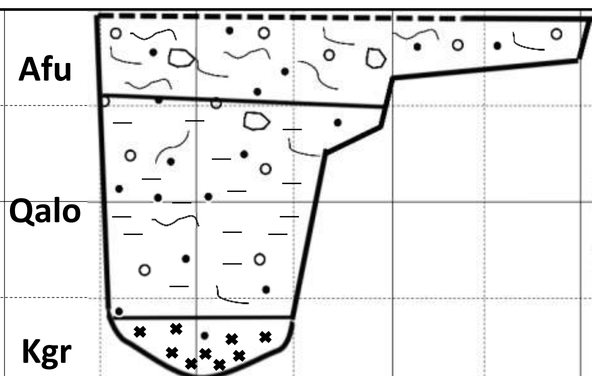
Log Of Test Pit

Meritage Homes Proposed New Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s)Excavated: 12/06/2022	**Logged By:** AZ/AC	**TP- 4**
Excavation Method: Backhoe		
Equipment Type: Deere 310		
Sampling Method(s): None		**Total Depth (ft):** 15
Approximate Groundwater Depth: Not Encountered		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	SAMPLES: Type Number	SAMPLES: Blows Per Foot	USCS	Log Of Test Pit Surface: Dirt & weeds	Moisture Content (%)	Dry Density (pcf)	REMARKS
0				**Undocumented Artificial Fill (Afu)**			
			SM	@ 0-2.5': Brown to reddish brown silty fine- to coarse-grained SAND, dry to damp, loose, root hairs in upper 2'.			
			SM	@ 2.5-5.5': Reddish brown silty fine- to medium-grained SAND, damp to moist, loose, some caving, slightly friable.			
5				**Older Alluvium (Qalo)**			
			SM/ ML	@ 5.5-12.5': Reddish brown to dark reddish brown silty fine-grained SAND/sandy SILT, moist, medium dense, scattered old root hairs.			
10				**Granitic Bedrock (Kgr)**			
			SP-SM	@ 12.5-15': Reddish brown to yellowish brown fine- to coarse-grained GRANITE, moist, medium dense, micaceous, highly weathered (D.G.).			
15							

Graphic Orientation: North Wall **Trend:** -N45E--> **Scale**: 1" = 8'



Notes:
Total Depth: 15 Feet (Equipment Limit).
Groundwater Not Encountered.
Backfilled with Cuttings.

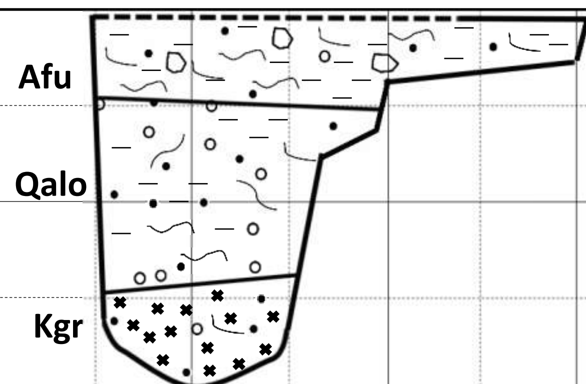
Log Of Test Pit

Meritage Homes Proposed New Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s)Excavated: 12/06/2022	Logged By: AZ/AC	# TP- 5
Excavation Method: Backhoe		
Equipment Type: Deere 310		
Sampling Method(s): None		**Total Depth (ft):** 9.5
Approximate Groundwater Depth: Not Encountered		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	SAMPLES: Type Number	SAMPLES: Blows Per Foot	USCS	Log Of Test Pit Surface: Dirt & weeds	Moisture Content (%)	Dry Density (pcf)	REMARKS
0			SM	**Undocumented Artificial Fill (Afu)** @ 0-2.5': Reddish brown to brown silty fine- to coarse-grained SAND, dry, loose to medium dense, root hairs in upper 6".			
5			SM	**Older Alluvium (Qalo)** @ 2.5-7': Reddish brown silty fine-grained SAND, damp to moist, loose to medium dense.			
			SP	**Granitic Bedrock (Kgr)** @ 7-9.5': Reddish brown to olive brown fine- to coarse-grained GRANITE, damp to moist, weathered (D.G.), with cohesive rock fragments 2-4".			
10				Notes: Total Depth: 9.5 Feet (Refusal). Groundwater Not Encountered. Backfilled with Cuttings.			
15							

Graphic Orientation: North Wall **Trend:** -N60E--> **Scale**: 1" = 5'



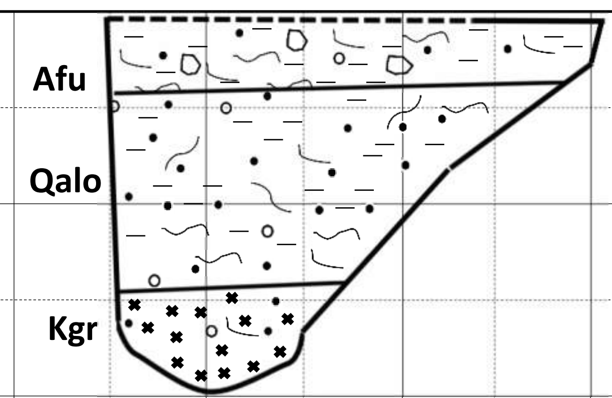
Log Of Test Pit

Meritage Homes Proposed New Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s)Excavated: 12/06/2022	Logged By: AZ/AC	TP- 6
Excavation Method: Backhoe		
Equipment Type: Deere 310		
Sampling Method(s): None		**Total Depth (ft):** 9.5
Approximate Groundwater Depth: Not Encountered		**Approximate Ground Surface Elevation (ft)**
Comments:		

Depth (ft)	SAMPLES: Type Number	SAMPLES: Blows Per Foot	USCS	Log Of Test Pit Surface: Dirt & weeds	Moisture Content (%)	Dry Density (pcf)	REMARKS
0			SM	**Undocumented Artificial Fill (Afu)** @ 0-1.5': Brown to reddish brown silty fine- to coarse-grained SAND, dry, loose to medium dense.			
5			SM	**Older Alluvium (Qalo)** @ 1.5-7': Reddish brown silty fine-grained SAND, moist, loose to medium dense, trace clay.			
10			SM	**Granitic Bedrock (Kgr)** @ 7-9.5': Pale reddish brown to light grey silty fine- to medium-grained GRANITE, moist, dense, hard rock fragments up to 14" in diameter, highly weathered (D.G.), last 6-12" very dense. Notes: Total Depth: 9.5 Feet (Refusal). Groundwater Not Encountered. Backfilled with Cuttings.			
15							

Graphic Orientation: North Wall **Trend:** -N44E--> **Scale**: 1" = 5'



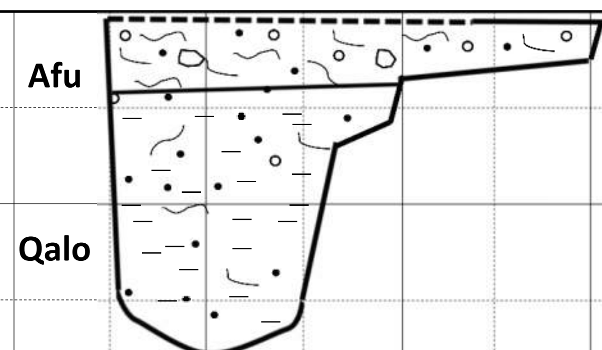
Log Of Test Pit

Meritage Homes Proposed New Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s)Excavated: 12/06/2022	**Logged By:** AZ/AC	**TP- 7**	
Excavation Method: Backhoe			
Equipment Type: Deere 310			
Sampling Method(s): None		**Total Depth (ft):** 14	
Approximate Groundwater Depth: Not Encountered		**Approximate Ground Surface Elevation (ft)**	
Comments:			

Depth (ft)	SAMPLES: Type Number	SAMPLES: Blows Per Foot	USCS	Log Of Test Pit Surface: Dirt & weeds	Moisture Content (%)	Dry Density (pcf)	REMARKS
0			SM	**Undocumented Artificial Fill (Afu)** @ 0-2.5’: Reddish brown to brownish grey silty fine- to coarse-grained SAND, dry to damp, loose, soil pores up to 2 millimeters in diameter.			
5	B-1		SM/ ML	**Older Alluvium (Qalo)** @ 2.5-14’: Reddish brown silty fine-grained SAND/sandy SILT, moist to very moist, loose/soft to medium stiff, soil pores present to 4’ in depth. @ 7-14’: Bedrock fragments up to 8” in diameter.			B-1 @ 2.5-7’
10				Notes: Total Depth: 14 Feet (Equipment Limit). Groundwater Not Encountered. Backfilled with Cuttings.			
15							

Graphic Orientation: North Wall **Trend:** -N18E--> **Scale**: 1” = 8’



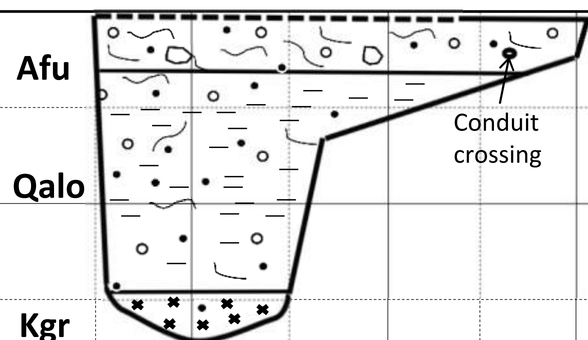
Log Of Test Pit

Meritage Homes Proposed New Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Date(s)Excavated: 12/06/2022	Logged By: AZ/AC	TP- 8
Excavation Method: Backhoe		
Equipment Type: Deere 310		
Sampling Method(s): None		Total Depth (ft): 13.5
Approximate Groundwater Depth: Not Encountered		Approximate Ground Surface Elevation (ft)
Comments:		

Depth (ft)	SAMPLES Type Number	SAMPLES Blows Per Foot	USCS	Log Of Test Pit Surface: Dirt & weeds	Moisture Content (%)	Dry Density (pcf)	REMARKS
0			SM	**Undocumented Artificial Fill (Afu)** @ 0-1.5': Reddish brown to brown fine- to coarse-grained silty SAND, dry, loose, slightly friable, scattered root hairs.			
5			SM	**Older Alluvium (Qalo)** @ 1.5-11': Reddish brown silty fine- to medium-grained SAND, damp to moist, loose to medium dense. @4.5': Becomes medium dense.			
10			SP-SM	**Granitic Bedrock (Kgr)** @ 11-13.5': Yellowish brown to reddish brown fine- to coarse-grained GRANITE, moist, dense, micaceous, highly weathered (D.G.). Notes: Total Depth: 13.5 Feet (Equipment Limit). Groundwater Not Encountered. Backfilled with Cuttings.			
15							

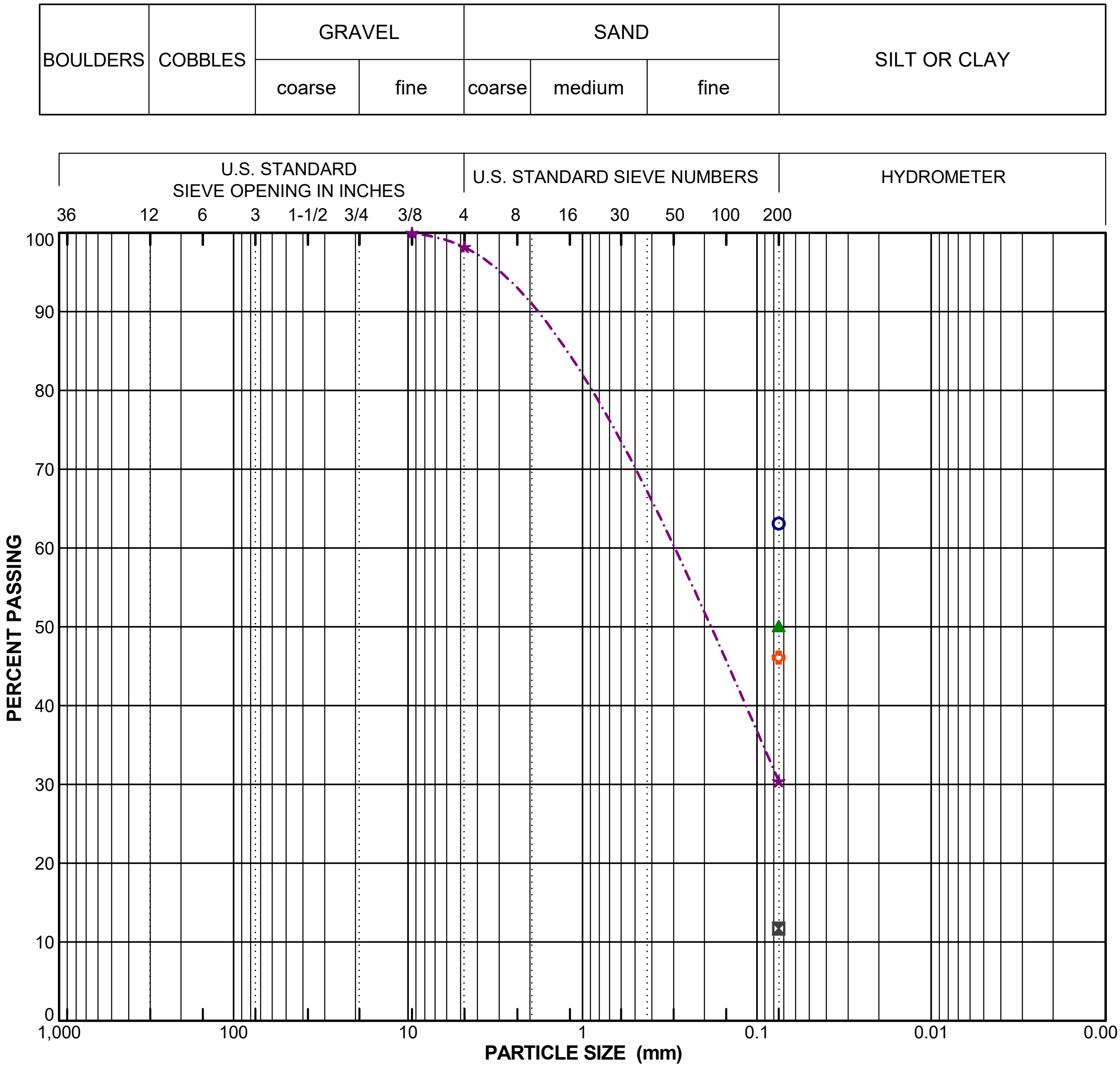
Graphic Orientation: North Wall **Trend:** -N65E--> **Scale**: 1" = 8'



Log Of Test Pit

Meritage Homes Proposed New Residential Development La Sierra Ave & Alhambra Ave Riverside, California	Project Number: 23145-01 Appendix B

Appendix C

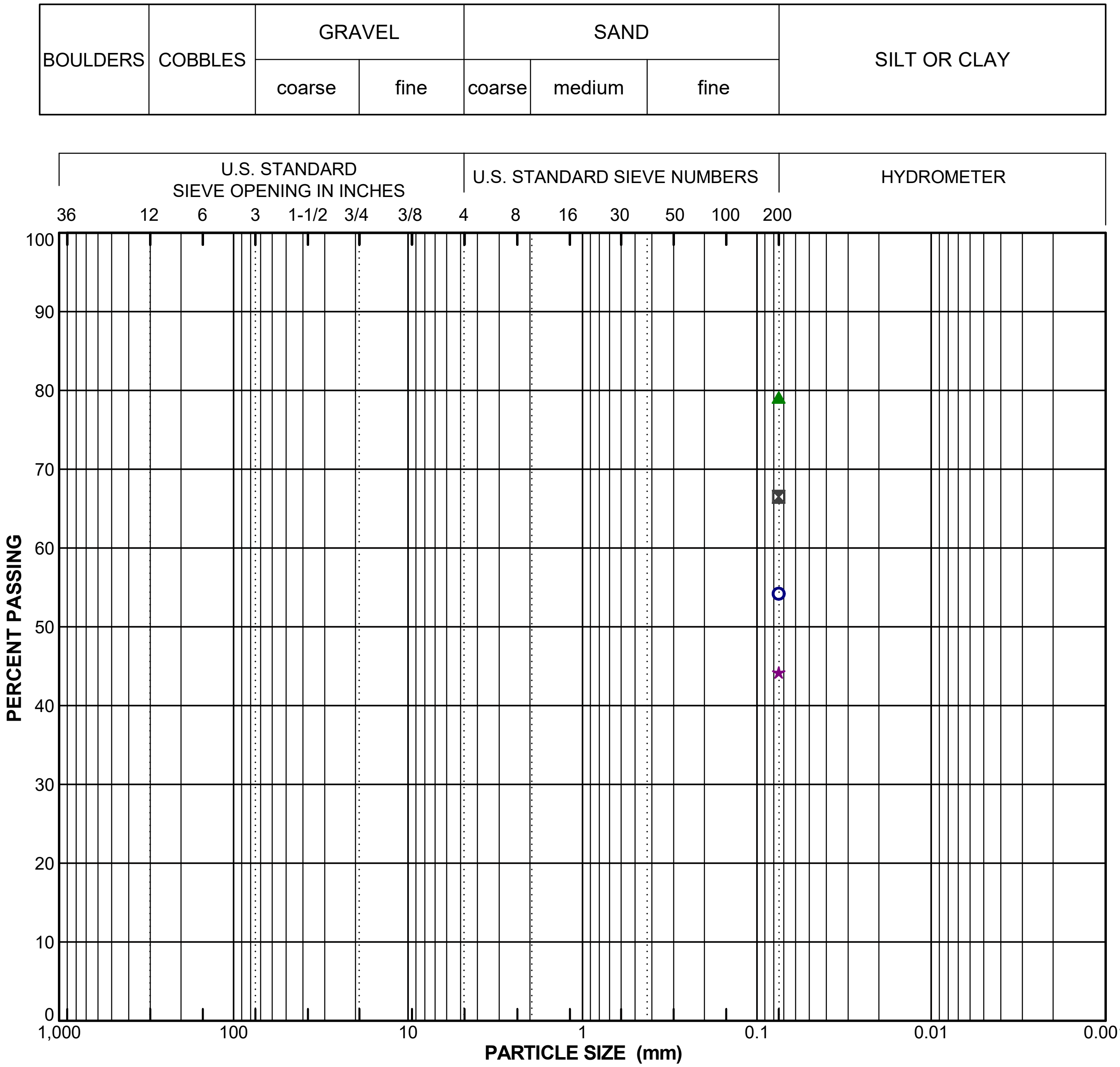


Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	H-2	B-1	0.0 - 5.0		30	13				63		CL
⊠	H-2	D-3	7.5	4						12		SP-SM
▲	H-3	D-2	5.0	7						50		ML/SM
★	H-5	B-1	0.0 - 5.0	15	NP	NP				30		SM
✿	H-6	D-2	5.0	7						46		SM

PARTICLE SIZE DISTRIBUTION

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.

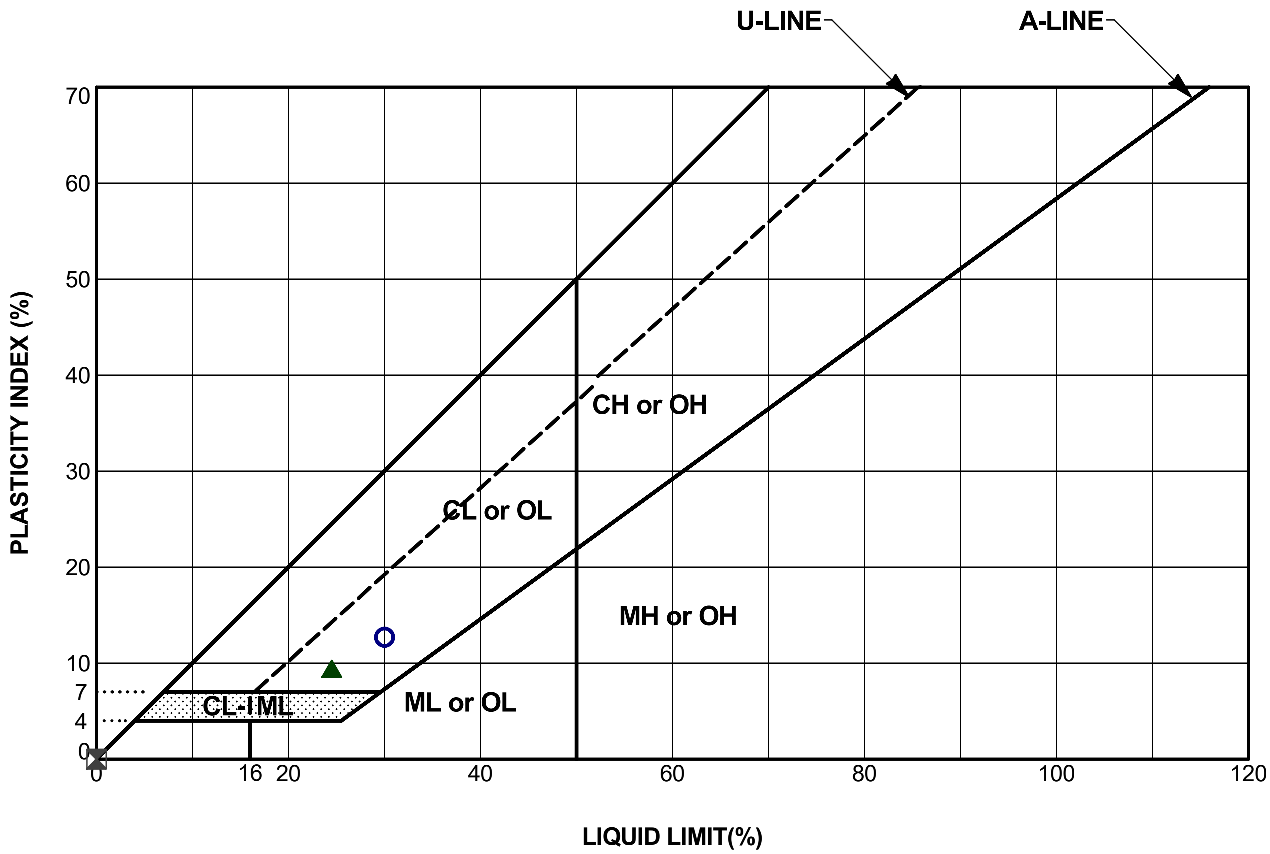


Symbol	Boring Number	Sample Number	Depth (feet)	Field Moisture (%)	LL	PI	Activity PI/-2μ	C_u	C_c	Passing No. 200 Sieve (%)	Passing 2μ (%)	USCS
○	H-6	D-3	7.5	9						54		ML
⊠	H-6	D-4	10.0	12	25	9				67		CL
▲	H-6	D-5	15.0	13						79		ML
★	P3	D2	5.0	4						44		SM

PARTICLE SIZE DISTRIBUTION

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.

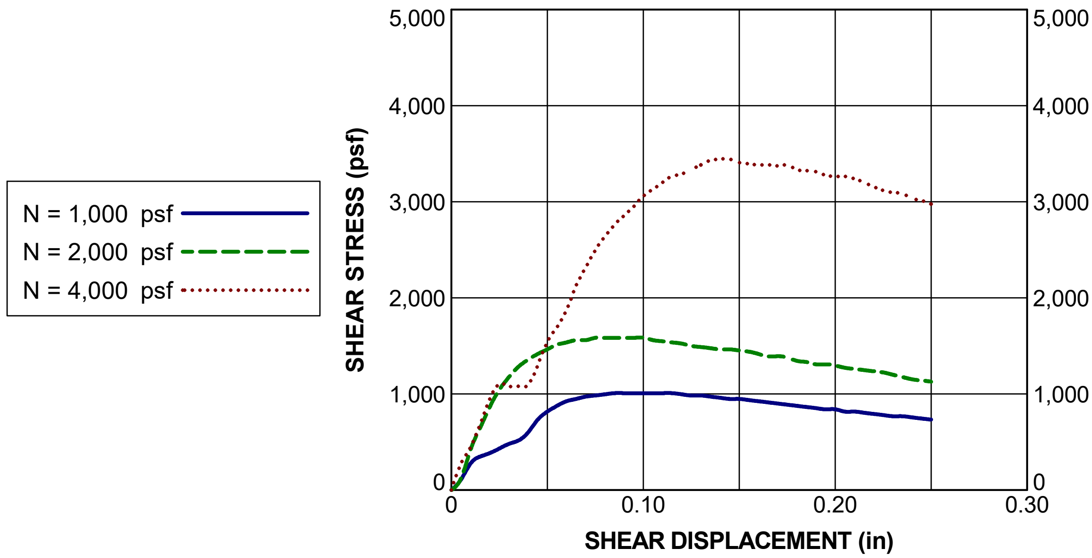


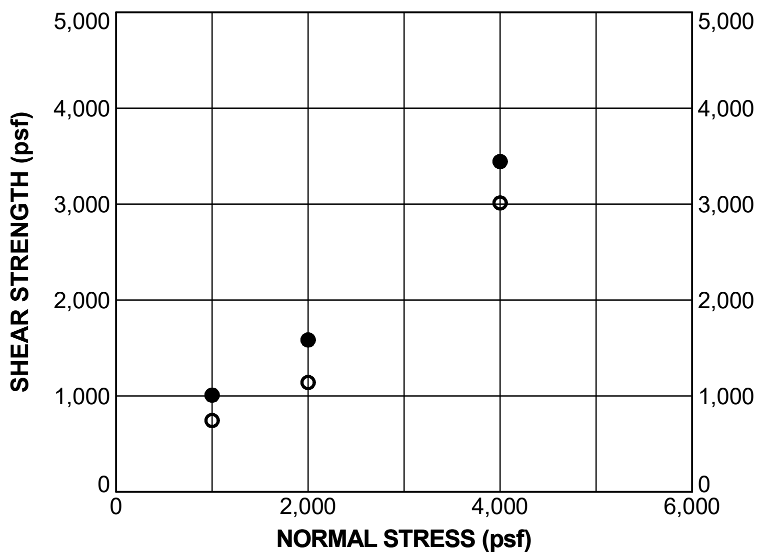
Symbol	Boring Number	Sample Number	Depth (feet)	Passing No. 200 Sieve (%)	LL	PI	USCS	Description
○	H-2	B-1	0.0 - 5.0	63	30	13	CL	Brown silty CLAY
⊠	H-5	B-1	0.0 - 5.0	30	NP	NP	SM	Dark yellowish brown silty SAND
▲	H-6	D-4	10.0	67	25	9	CL	Dark yellowish brown sandy CLAY

PLASTICITY CHART

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.





Boring No. H-4	Sample No. D-2	Depth: 5.0 ft
Sample Description: Light yellowish brown sandy CLAY		**USCS:** CL
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:**
Final Moisture Content (%): 25.5	**Final Dry Density (pcf):** 112.2	**Degree of Saturation (%):** 100
Sample Type: Undisturbed	**Rate of Shear (in./min.):** 0.005	

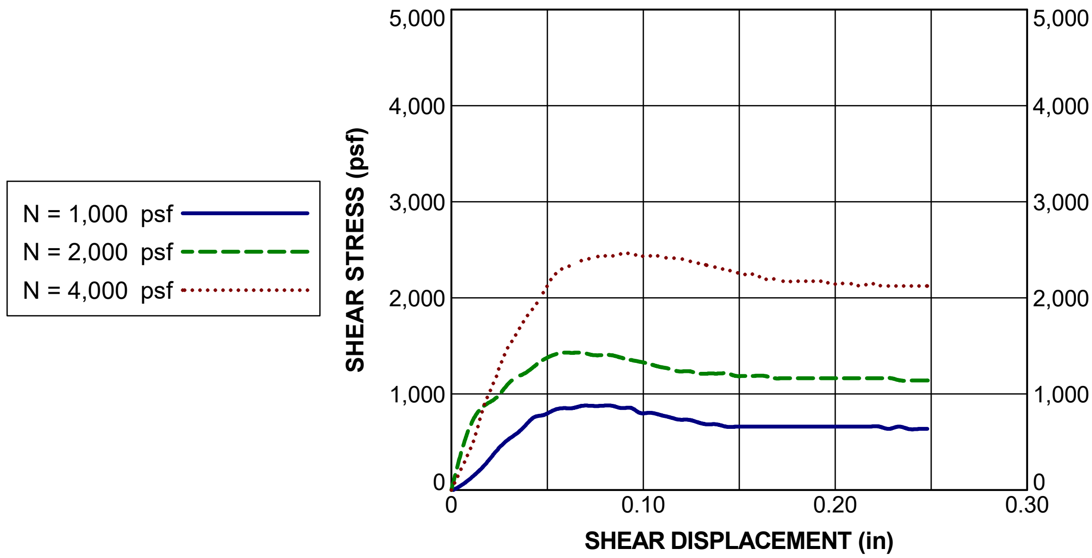
SHEAR STRENGTH PARAMETERS

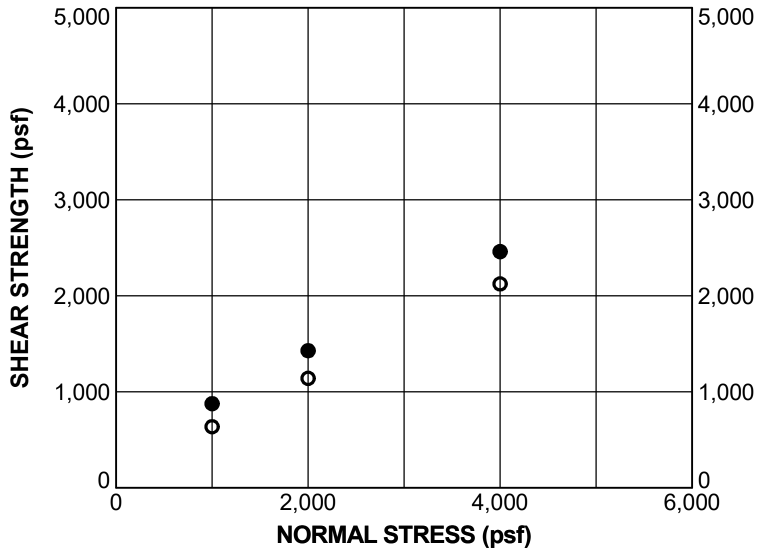
Parameter	Peak ●	Ultimate ○
Cohesion (psf)	100	0
Friction Angle (degrees)	39	32

DIRECT SHEAR TEST RESULTS

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.





Boring No. H-5	Sample No. B-1	Depth: 0.0 - 5.0 ft
Sample Description: Dark yellowish brown silty SAND		**USCS:** SM
Liquid Limit: NP	**Plasticity Index:** NP	**Percent Passing No. 200 Sieve:** 30
Final Moisture Content (%): 14.7	**Final Dry Density (pcf):** 118.8	**Degree of Saturation (%):** 99
Sample Type: Remolded to 90% RC	**Rate of Shear (in./min.):** 0.05	

SHEAR STRENGTH PARAMETERS

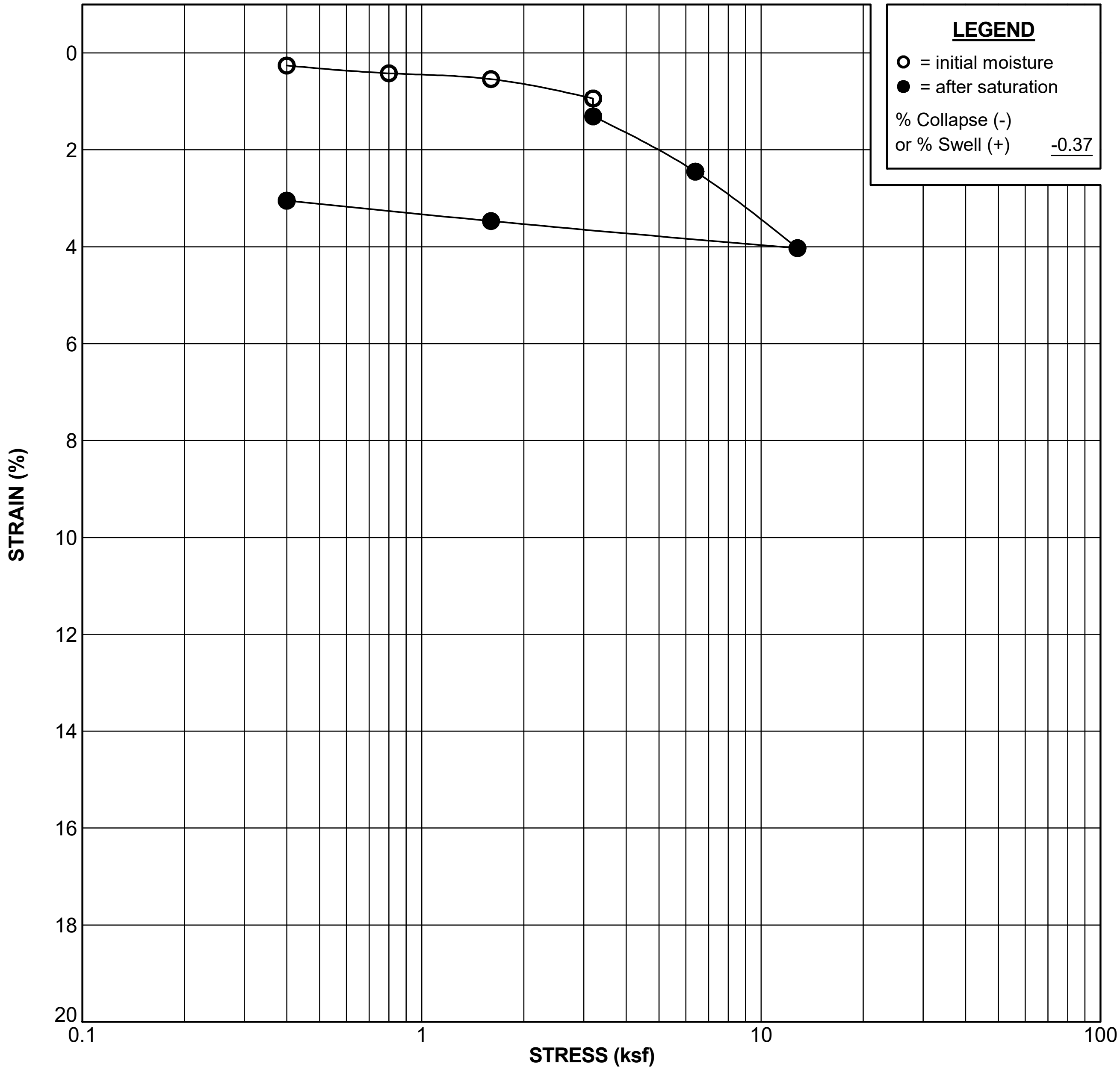
Parameter	Peak ●	Ultimate ○
Cohesion (psf)	350	150
Friction Angle (degrees)	28	27

DIRECT SHEAR TEST RESULTS

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.

Template: NMDSWGRAPH; Prj ID: 22026-88.GPJ; Printed: 12/19/23



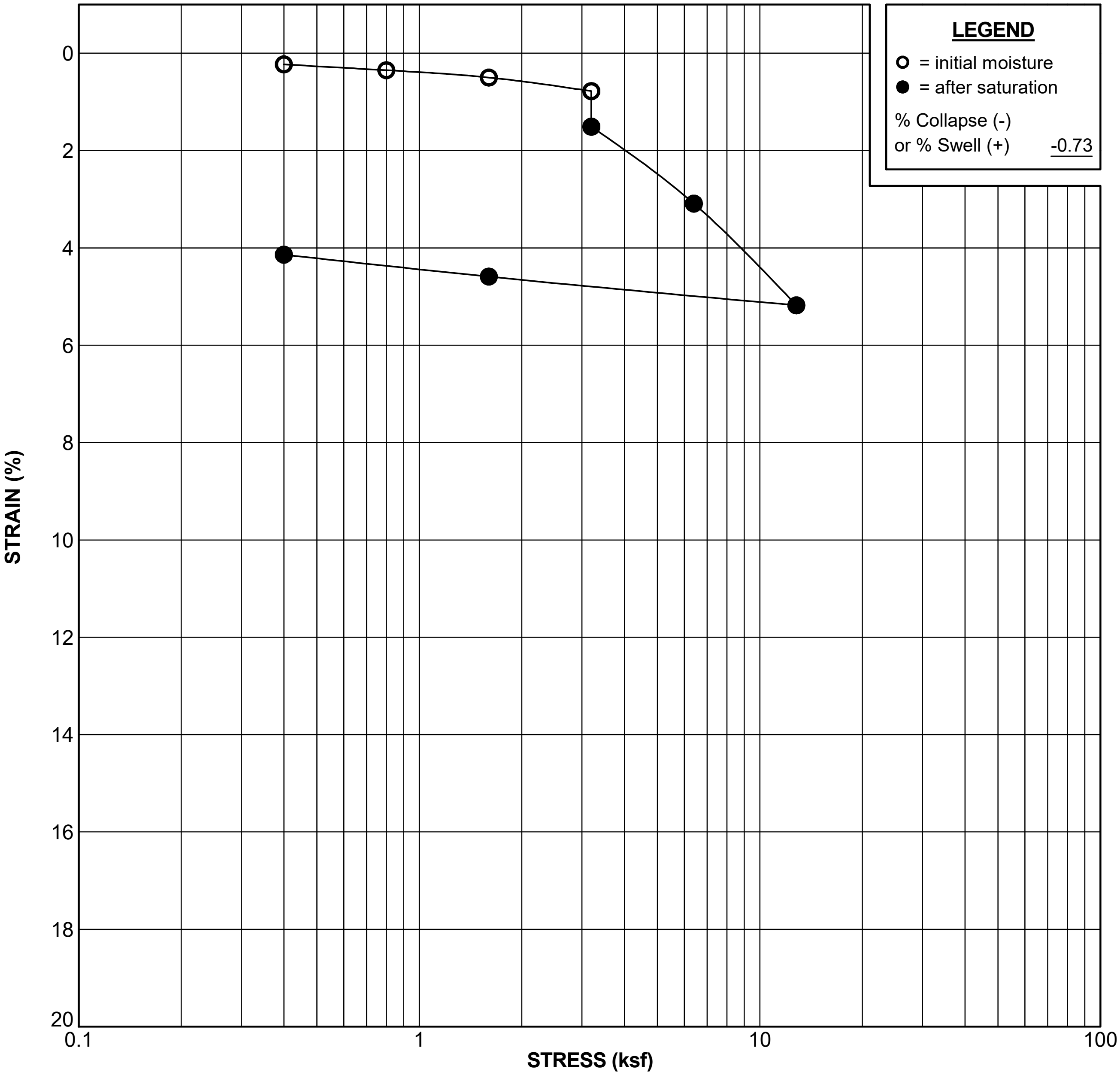
Boring No. H-3	Sample No. D-2	Depth: 5.0 ft
Sample Description: Dark yellowish brown sandy SILT/silty SAND	**USCS:** ML/SM	
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 50

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	7.3	115.2	44.8	0.430
Final	14.6	118.7	99.4	0.388

CONSOLIDATION TEST RESULTS

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.



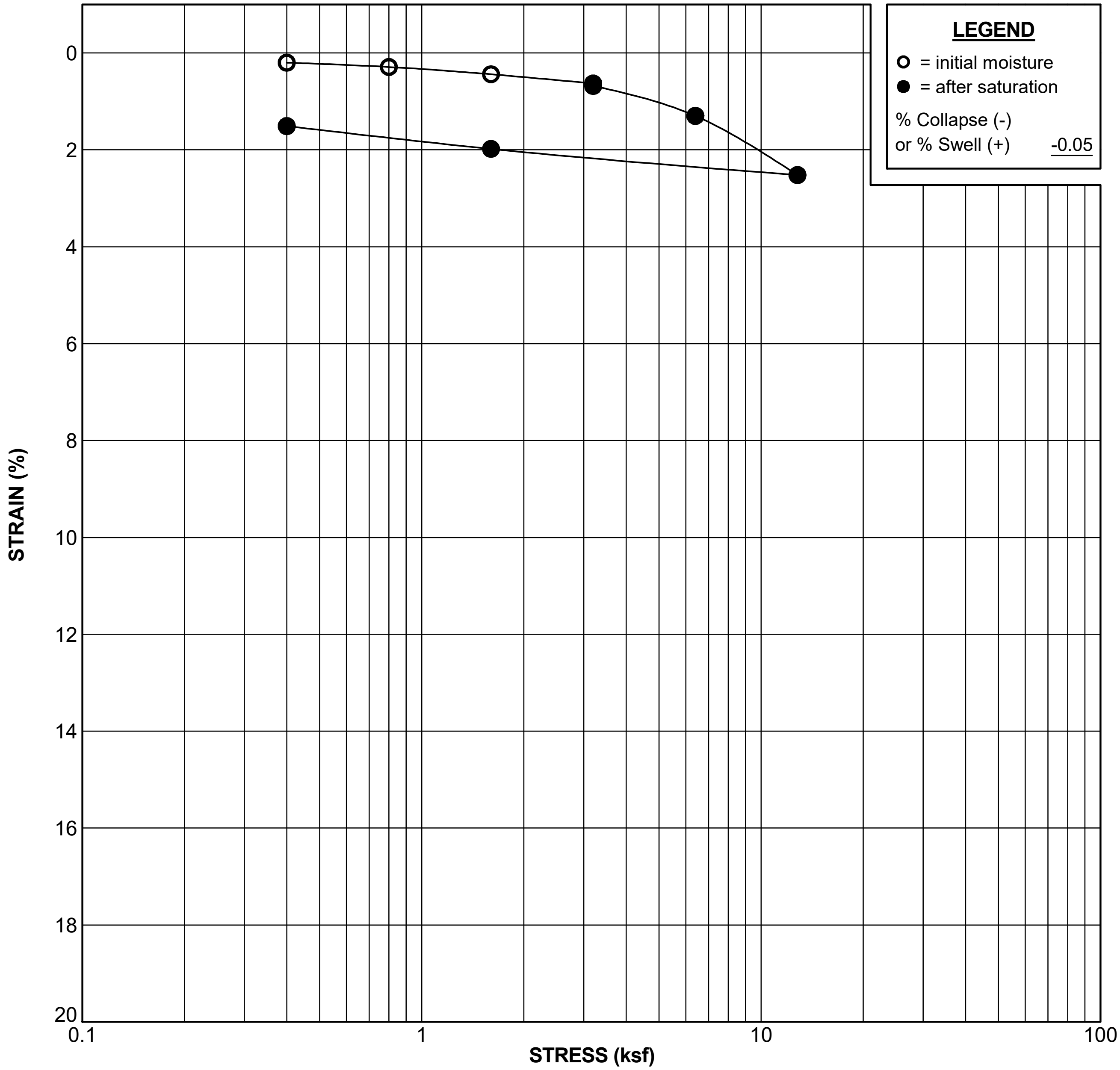
Boring No. H-6	Sample No. D-2	Depth: 5.0 ft
Sample Description: Dark yellowish brown silty SAND		**USCS:** SM
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 46

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	7.3	110.6	41.0	0.461
Final	15.5	115.1	99.3	0.404

CONSOLIDATION TEST RESULTS

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.



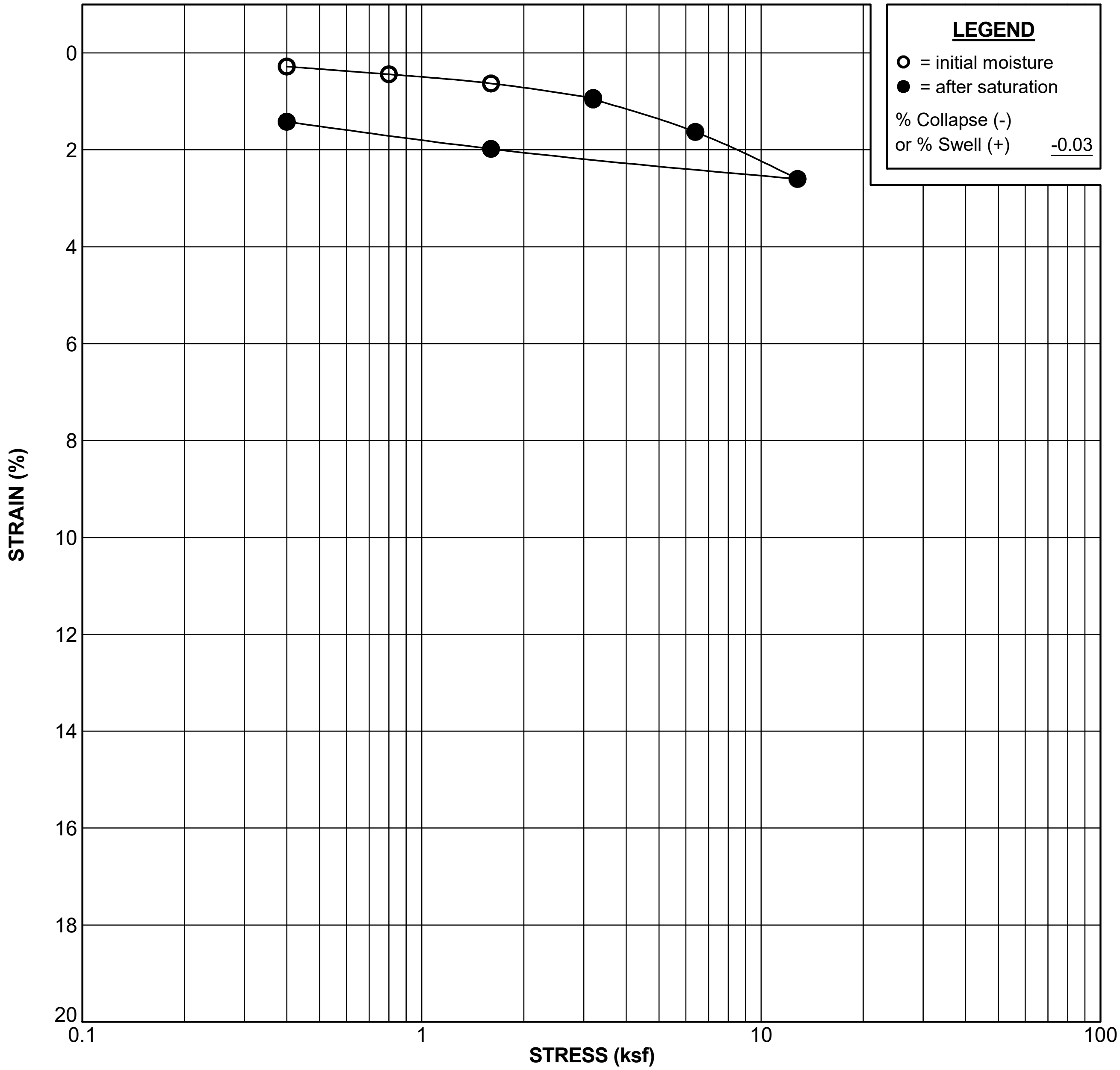
Boring No. H-6	Sample No. D-3	Depth: 7.5 ft
Sample Description: Dark yellowish brown sandy SILT		**USCS:** ML
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 54

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	9.0	119.4	60.2	0.401
Final	14.1	121.2	99.5	0.380

CONSOLIDATION TEST RESULTS

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.



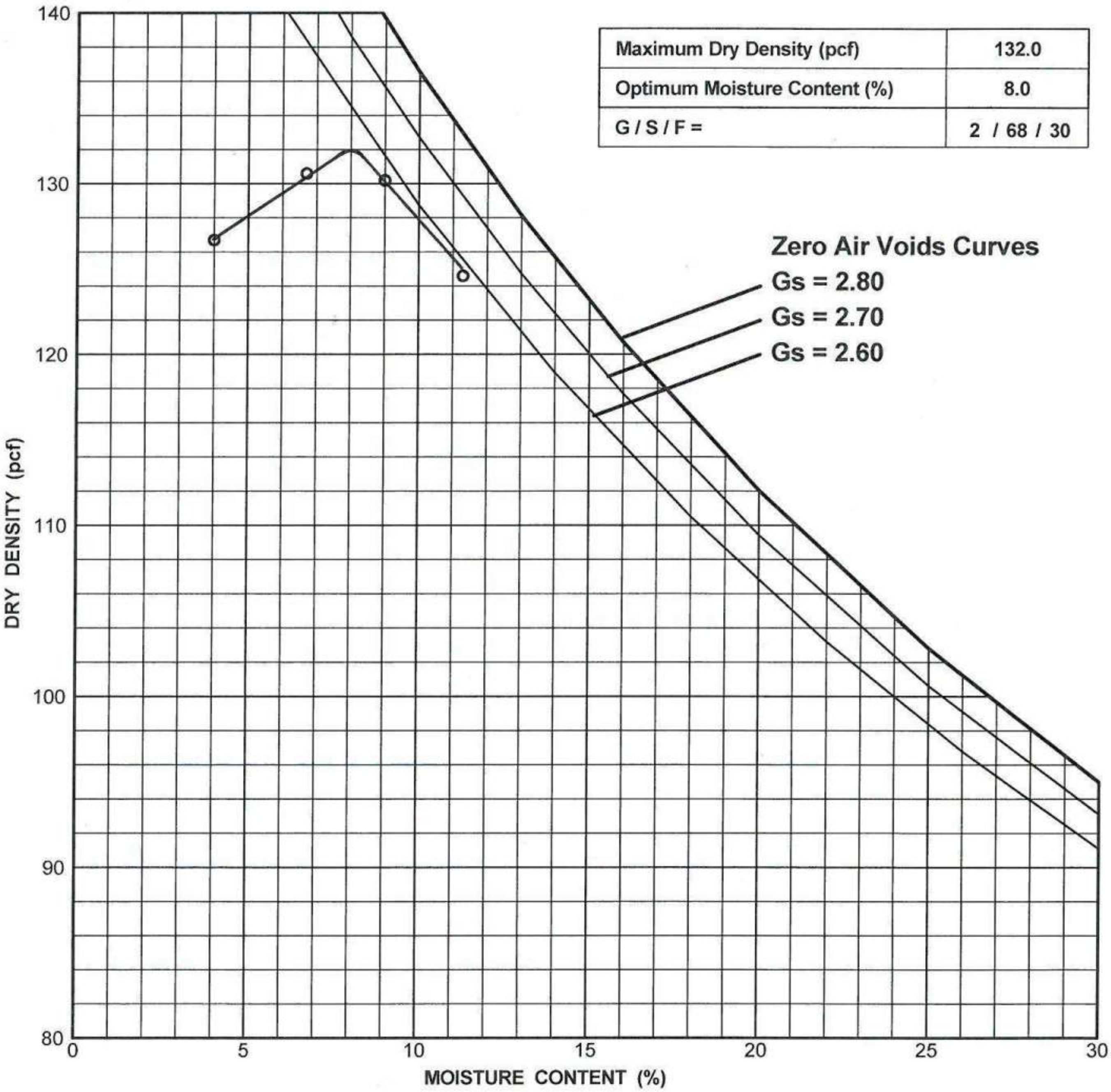
Boring No. H-6	**Sample No. D-5**	**Depth: 15.0 ft**
Sample Description: Dark yellowish brown sandy SILT		**USCS:** ML
Liquid Limit:	**Plasticity Index:**	**Percent Passing No. 200 Sieve:** 79

Test Stage	Moisture Content (%)	Dry Density (pcf)	Degree of Saturation (%)	Void Ratio
Initial	13.5	116.0	78.0	0.474
Final	16.4	117.6	99.0	0.454

CONSOLIDATION TEST RESULTS

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.



Maximum Dry Density (pcf)	132.0
Optimum Moisture Content (%)	8.0
G / S / F =	2 / 68 / 30

Boring No. H-5	**Sample No. B-1**	**Depth: 0.0 - 5.0 ft**
Sample Description: Dark yellowish brown silty SAND		**USCS:** SM
Liquid Limit: NP	**Plasticity Index:** NP	**Percent Passing No. 200 Sieve:** 30
Comments: 1557A		

COMPACTION TEST RESULTS

SA Geo / Meritage La Sierra (23145-01)
California
PROJECT NO. 22026-88

NMG Geotechnical, Inc.

R-VALUE TEST DATA CTM 301 / ASTM D2844

Project:	SA Geo/La Sierra	Project No:	22026-88	Date:	12/19/2023
Boring Trench No:	H-4	Sample No:	B-1	Sample Depth:	0-5'
Field Description:	SM				
Lab Description:	Dark reddish brown sandy SILT/silty SAND				

Specimen Number	1		2		3		4	
Mold Number	1		2		3			
Water Adjustment (g)	+80		+92		+107			
Compactor Pressure (psi)	350		350		175			
Exudation Pressure (psi)	500		365		130			
Gross Weight (g)	3211.5		3278.3		3266.3			
Mold Tare (g)	2094.9		2114.1		2098.8			
Wet Weight (g)	1116.6		1164.2		1167.5			
Sample Height (in)	2.41		2.53		2.56			
Initial Dial Reading	0.0514		0.0410		0.0610			
Final Dial Reading	0.0523		0.0412		0.0611			
Expansion (in $x10^{-4}$)	9		2		1			
Stability(psi) at 2,000 lbs (160 psi)	28	50	48	94	62	128		
Turns Displacement	3.92		4.80		4.68			
R-Value Uncorrected	58		27		12			
R-Value Corrected	55		27		12			
Moisture Content (%)	9.0		9.9		11.1			
Dry Density (pcf)	128.8		126.9		124.4			
Assumed Traffic Index	4.0		4.0		4.0			
G.E. by Stability	0.46		0.75		0.90			
G.E. by Expansion	0.30		0.07		0.03			
G_f	1.25							

Moisture Content				
Dish No.	ZZ	A	Q	
Weight of Moist Soil and Dish (g)	295.5	315.5	319.7	
Weight of Dry Soil and Dish (g)	275.2	291.7	292.8	
Water Loss (g)	20.3	23.8	26.9	
Weight of Dish (g)	50.3	50.1	50.3	
Dry Soil (g)	224.9	241.6	242.5	
Moisture Content (%)	9.0	9.9	11.1	

R-Value by Exudation = 18

R-Value by Expansion = 57

R-Value at Equilibrium = 18 by Exudation

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301 and/or ASTM Standard D2844

Remarks: A traffic index of 4.0 was used for calculation purposes.

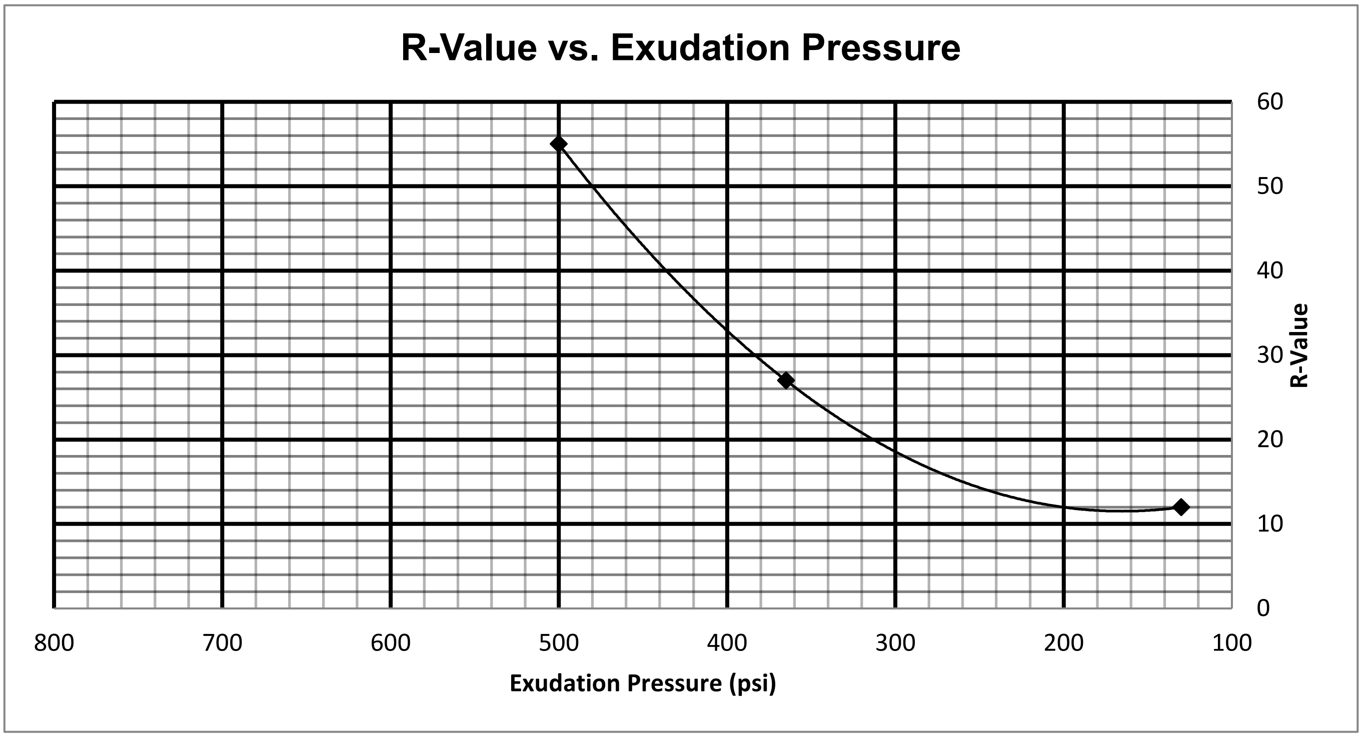
Set up by: AZE BAJ Run by: BAJ TG

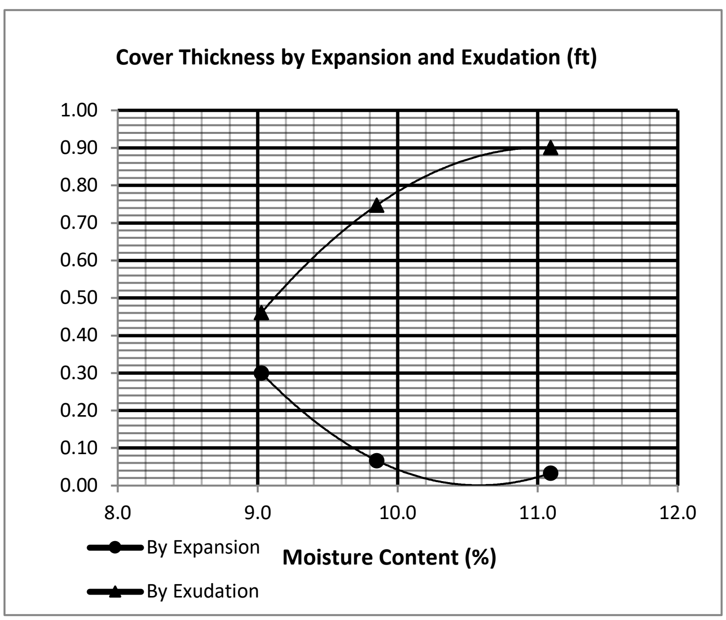
Calculated by: BAJ Checked by: BAJ Date Completed: 12/20/2023

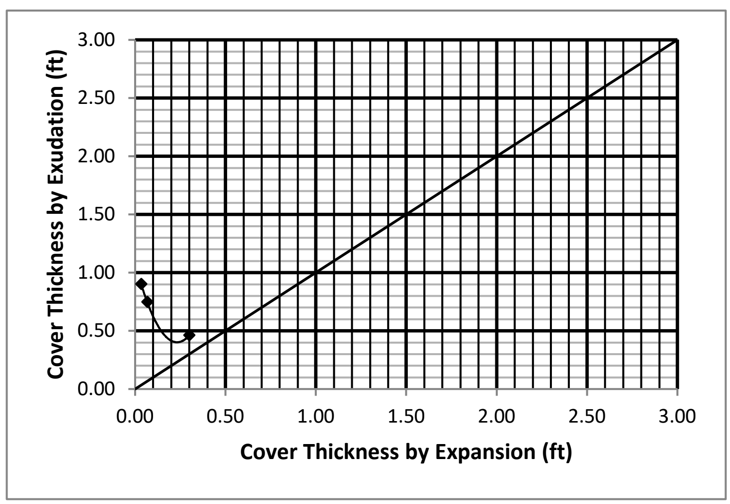
NMG Geotechnical, Inc.

R-VALUE GRAPHICAL PRESENTATION

Project:	SA Geo/La Sierra	Project No:	22026-88	Date:	12/19/2023
Boring Trench No:	H-4	Sample No:	B-1	Sample Depth:	0-5'
Field Description:	SM				
Lab Description:	Dark reddish brown sandy SILT/silty SAND				







Cover Thickness (ft) = 0.44

The data above is based upon processing and testing samples as received from the field. Test procedures in accordance with latest revisions to Department of Transportation, State of California, Materials & Research Test Method No. 301 and/or ASTM Standard D2844

Remarks:	A traffic index of 4.0 was used for calculation purposes.				
Set up by:	AZE BAJ	Run by:	BAJ		
Calculated by:	BAJ	Checked by:	BAJ	Date Completed:	12/20/2023

NMG Geotechnical, Inc.

Sample	Compacted Moisture (%)	Compacted Dry Density (pcf)	Final Moisture (%)	Volumetric Swell (%)	Expansion Index[1] Value/Method		Expansive Classification[2]	Soluble Sulfate (%)	Sulfate Exposure[3]
H-2 B-1 0-5'	9.0	112.9	20.4	5.88	59	A	Medium	0.05	S0
H-5 B-1 0-5'	8.0	117.0	13.8	-0.04	0	A	Very Low	0.05	S0

Test Method:

ASTM D4829

HACH SF-1 (Turbidimetric)

Notes:

1. Expansion Index (EI) method of determination*:*
   - **[A]** E.I. determined by adjusting water content to achieve a 50 ±2% degree of saturation
   - **[B]** E.I. calculated based on measured saturation within the range of 40% and 60%
2. ASTM D4829 *(Classification of Expansive Soil)*
3. ACI-318-14 Table 19.3.1.1 *(Requirement for Concrete Exposed to Sulfate-Containing Solutions)*

Expansion Index and Soluble Sulfate Test Results

(FRM001 Rev.5)

Project No. 22026-88

Project Name: SA Geo / Meritage La Sierra (23145-01)

NMG

Appendix D

REPORT

SEISMIC REFRACTION SURVEY

11130 Alhambra Avenue
Riverside, California

GEO*Vision* Project No. 23456

Prepared for

SA Geotechnical, Inc.
1000 N. Coast Highway, Suite 10
Laguna Beach, California 92651
(949) 403-7229

Prepared by

GEO*Vision*, Inc.
1124 Olympic Drive
Corona, CA 92881
(951) 549-1234

Report 23456-01 Rev 0

December 21, 2023

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LIST OF FIGURES

1 INTRODUCTION

A P-wave seismic refraction survey was conducted at the property located at 11130 Alhambra Avenue, Riverside, California on December 13, 2023. The purpose of this investigation was to determine the rippability of the Mesozoic crystalline rock at the site. P-wave seismic refraction data was acquired along two profiles, designated as Lines 1 and 2 (Figure 1).

Depending on the degree of weathering, jointing, etc., granitic rock may broadly be characterized as rippable using a Caterpillar D8R, D9R, and D10R ripper at P-wave velocities less than 5,800, 6,800, and 7,200 ft/s, respectively (Caterpillar, 2018). Granitic rock is expected to be marginally rippable by a D8R, D9R, and D10R between a P-wave velocity of 5,800 and 8,000 ft/s, 6,800 and 8,000 ft/s, and 7,200 and 8,500 ft/s, respectively, and nonrippable at higher seismic velocities (Caterpillar, 2018).

The following sections include a discussion of equipment and field procedures, methodology, data processing, and results of the geophysical survey.

Seismic Refraction Line

Notes:
Coordinate System: NAD 1983 StatePlane California VI FIPS 0406 Feet
Base map source: Nearmap (9-2023)

GEOVision geophysical services

Date:	12/21/2023
GV Project:	23456
Developed by:	C Xiong
Drawn by:	T Rodriguez
Approved by:	A Martin
File Name:	GV_23456

FIGURE 1
SITE MAP

11130 ALHAMBRA AVENUE
RIVERSIDE, CALIFORNIA

PREPARED FOR
SA GEOTECHNICAL, INC.

2 METHODOLOGY

Detailed discussions of the seismic refraction method can be found in Telford et al. (1990), Dobrin and Savit (1988), and Redpath (1973).

When conducting a seismic survey, acoustic energy is input to the subsurface by an energy source such as a sledgehammer impacting a metallic plate, weight drop, vibratory source, or explosive charge. The acoustic waves propagate into the subsurface at a velocity dependent upon the elastic properties of the material through which they travel. When the waves reach an interface where the density or velocity changes significantly, a portion of the energy is reflected to the surface and the remainder is transmitted into the lower layer. Where the velocity of the lower layer is higher than that of the upper layer, a portion of the energy is also critically refracted along the interface. Critically refracted waves travel along the interface at the velocity of the lower layer and continually refract energy back to the surface. Receivers (geophones) laid out in linear array on the surface record the incoming refracted and reflected waves. The seismic refraction method involves analysis of the travel times of the first energy to arrive at the geophones. These seismic first arrivals are from either the direct wave (at geophones close to the source) or critically refracted waves (at geophones further from the source).

Analysis of seismic refraction data depends upon the complexity of the subsurface velocity structure. If the subsurface target is planar then the slope intercept method (Telford et al., 1990) can be used to model multiple horizontal or dipping planar layers. A minimum of one end shot is required to model horizontal layers and reverse end shots are required to model dipping planar layers. If the subsurface target is undulating (i.e. bedrock valley) then layer based analysis routines such as the generalized reciprocal method (Palmer, 1980 and 1981, Lankston and Lankston, 1986 and Lankston, 1990); reciprocal method (Hawkins, 1961) also referred to as the ABC method; Hales' method (Hales, 1958); delay time method (Wyrobek, 1956 and Gardner, 1967); time-term inversion (Scheidegger and Willmore, 1959); plus-minus method (Hagedoorn, 1959); and wavefront method (Rockwell, 1967) are preferred to model subsurface velocity structure. These methods generally require a minimum of 5 shot points per spread (end shots, off end shots and a center shot). If subsurface velocity structure is complex and cannot be adequately modeled using layer-based modeling techniques (e.g., complex weathering profile in bedrock, numerous lateral velocity variations), then Monte Carlo or tomographic inversion techniques (Zhang and Toksoz, 1998; Schuster and Quintus-Bosz, 1993) are required to model the seismic refraction data. These techniques require a high shot density; typically, every 3 to 6 stations/geophones.

Errors in seismic refraction models not associated with errors in first arrival data can be caused by blind zones, hidden layers, and lateral velocity variability. A blind zone is a geologic layer with a lower seismic velocity than the overlying layer and, therefore, does not give rise to a seismic refraction. This type of layer, therefore, cannot be recognized or modeled and depths to underlying layers would be overestimated. The presence of blind zones will cause errors in depth averaged seismic velocity or slowness.

A hidden layer is a layer with a velocity increase, but of sufficiently small thickness relative to the velocities of overlying and underlying layers, that refracted arrivals do not arrive at the geophones before those from the deeper, higher velocity layer. Because the seismic refraction method generally only involves the interpretation of first arrivals, a hidden layer cannot be recognized or modeled and depths to underlying layers would be underestimated. However, it can be demonstrated that the presence of hidden layers does not cause significant errors in depth averaged seismic velocity or slowness, such as the average velocity of the upper 100 ft. A subsurface velocity structure that increases as a function of depth rather than as discrete layers, will also cause depths to subsurface refractors to be underestimated, in a manner very similar to that of the hidden layer problem.

Lateral velocity variability within a layer that is not characterized by the modeling scheme utilized for analysis will also result in depth errors to underlying layers. Additionally, at sites with steeply dipping or highly irregular bedrock surfaces, out-of-plane refractions (refractions from structures to the side of the line rather than from beneath the line) may severely complicate modeling. Tomographic inversion techniques can often resolve the complex velocity structures associated with hidden layers, velocity gradients and lateral velocity variations. However, in the event of an abrupt increase in velocity at a geologic horizon, the velocity model generated using tomographic inversion routines will smooth the horizon with velocity being underestimated at the interface and possibly overestimated at depth.

3 EQUIPMENT AND FIELD PROCEDURES

Seismic refraction equipment used during this investigation consisted of two Geometrics Geode 24-channel signal enhancement seismographs, 10 Hz vertical geophones, seismic cables with 10-foot spaced connectors, piezo hammer switches, and a 20-lb sledgehammer with an aluminum strike plate.

The locations of the seismic refraction profiles were established by SA Geotechnical, Inc. Seismic Lines 1 and 2 consisted of 42 and 48 geophones spaced 5 feet apart for line lengths of 205 and 235 feet, respectively. All geophone and shot point locations along each line were measured using a 300-foot tape measure. Elevations along each seismic refraction line were surveyed using a Trimble R10 GPS system with CenterPoint RTX real-time differential corrections.

Source locations included end shots at each end geophone, off-end shot locations as possible, and interior shot locations at nominal 15 to 30 ft intervals for a total of 12 to 15 source locations per line. The 20-lb sledgehammer was used as the energy source for all source locations. A hammer switch mounted on the hammer was used to trigger the seismograph upon impact with the aluminum plate. The final seismic record at each shot point was the result of stacking 8 to 13 shots to increase the signal to noise ratio. All seismic records were stored on a laptop computer. Data acquisition parameters, file names, and other observations were recorded on a field log, which is retained in project files.

4 DATA REDUCTION AND MODELING

The first step in data processing consisted of picking the arrival time of the first energy (first arrival) received at each geophone for each shot point. The first arrivals on each seismic record are either a direct arrival from a compressional (P) wave traveling in the uppermost layer or a refracted arrival from a subsurface interface where there is a velocity increase. First-arrival times were selected using the manual picking routines in the SeisImager™ software suite (Geometrics, Inc.). These first-arrival times were saved in an ASCII file containing shot location, geophone locations, and associated first-arrival time. Errors in the first-arrival times were variable with error generally increasing with distance from the shot point. Elevations for each geophone location were calculated from the GPS data.

Seismic refraction data were then modeled using the tomographic analysis technique available in the SeisImager™ Plotrefa software package. Refraction tomography techniques are often able to resolve complex velocity structure (e.g., velocity gradients) that can be observed in bedrock weathering profiles. Layer-based modeling techniques such as the GRM are more applicable to characterize geologic structure that exhibits layering (e.g., low velocity sediments over high velocity rock). It should be noted, however, that tomographic modeling techniques will generate a velocity model with a gradual increase in velocity with depth even though an abrupt velocity increase may be present.

Tomographic analysis was conducted as outlined in the following steps. A smooth velocity gradient initial model was developed covering the expected velocity range in weathered rock at the site. The initial model had 18 layers with the top of the bottom layer at a depth related to the effective depth of investigation of the model. Velocity ranges were also set to values outside of the starting model minimum and maximum. The velocity models were extended to permit the use of off-end shot points during the inversion, as applicable. A minimum of 10 iterations of non-linear raypath inversion were then implemented to model the seismic data. The starting model parameters were then adjusted, as necessary, and the modeling process repeated until an acceptable fit between observed and calculated first arrival data was achieved.

The final tomographic velocity models for the seismic line were exported as ASCII files and imported into the Golden Software Surfer® mapping system where the velocity model was gridded, contoured, and annotated for presentation.

5 DISCUSSION OF RESULTS

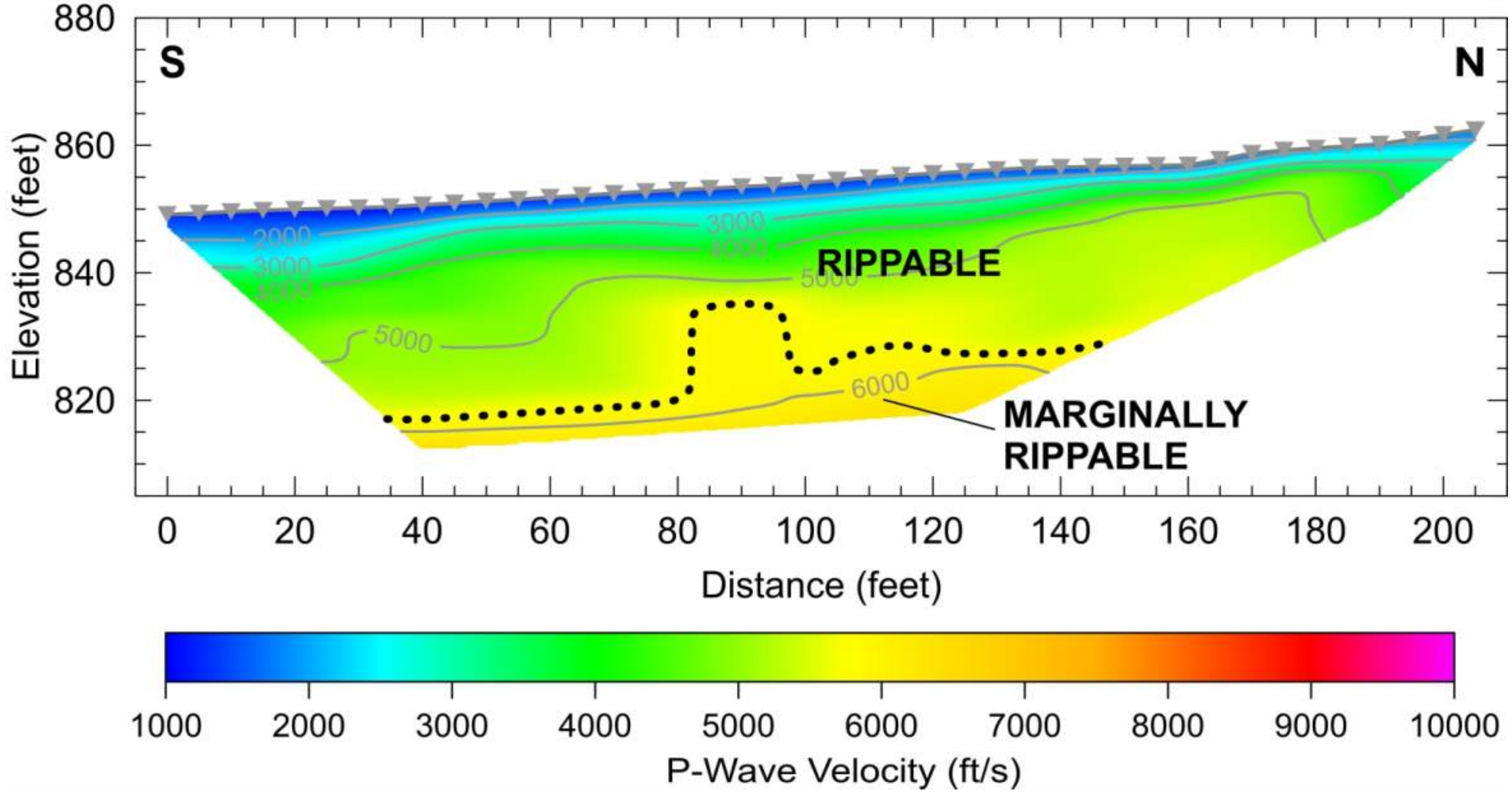
The P-wave seismic refraction models for Lines 1 and 2 are presented as Figures 2 and 3, respectively. A color scheme with blue-cyan, green-orange, and red-magenta representing low, intermediate, and high P-wave velocities, respectively, and velocity contours at 1,000 ft/s intervals are used to display the seismic velocity model. The depth of investigation for Lines 1 and 2 is about 35 and 70 feet, respectively.

Tomographic inversion techniques will typically model a gradual increase in seismic velocity with depth even if an abrupt velocity contact is present. Velocity gradients are, however, common in weathered rock geologic environments, such as the project site.

For the purpose of discussion, we assume that a Caterpillar D8R Ripper, or equivalent, will be used on site. Granitic rock with P-wave velocity of less than about 5,800 ft/s is considered rippable by a D8R assuming that the rock is sufficiently fractured and jointed. Granitic rock with P-wave velocity between about 5,800 and 8,000 ft/s is considered marginally rippable by a D8R, although it may be more cost effective to blast rather than rip rock in this velocity range. Granitic rock with P-wave velocity greater than 8,000 ft/s is considered nonrippable by a D8R.

P-wave velocity increases with depth beneath Line 1 (Figure 2) from about 1,250 to 2,000 ft/s at the surface to over 6,000 ft/s at a depth between about 30 and 35 ft. The rock is expected to be rippable by a D8R to a depth of about 18 to 32 ft and then marginally rippable to a depth of over 35 ft.

P-wave velocity increases with depth beneath Line 2 (Figure 3) from about 1,250 to 2,000 ft/s at the surface to over 9,000 ft/s at a depth between about 55 and 65 ft. The rock is expected to be rippable by a D8R to a depth of about 25 to 35 ft and then marginally rippable to a depth of about 50 and 55 ft. The granitic rock is considered nonrippable below a depth of 50 to 55 ft.



GEOVision geophysical services

Project No: 23456

Date: DEC 21, 2023

Drawn By: A MARTIN

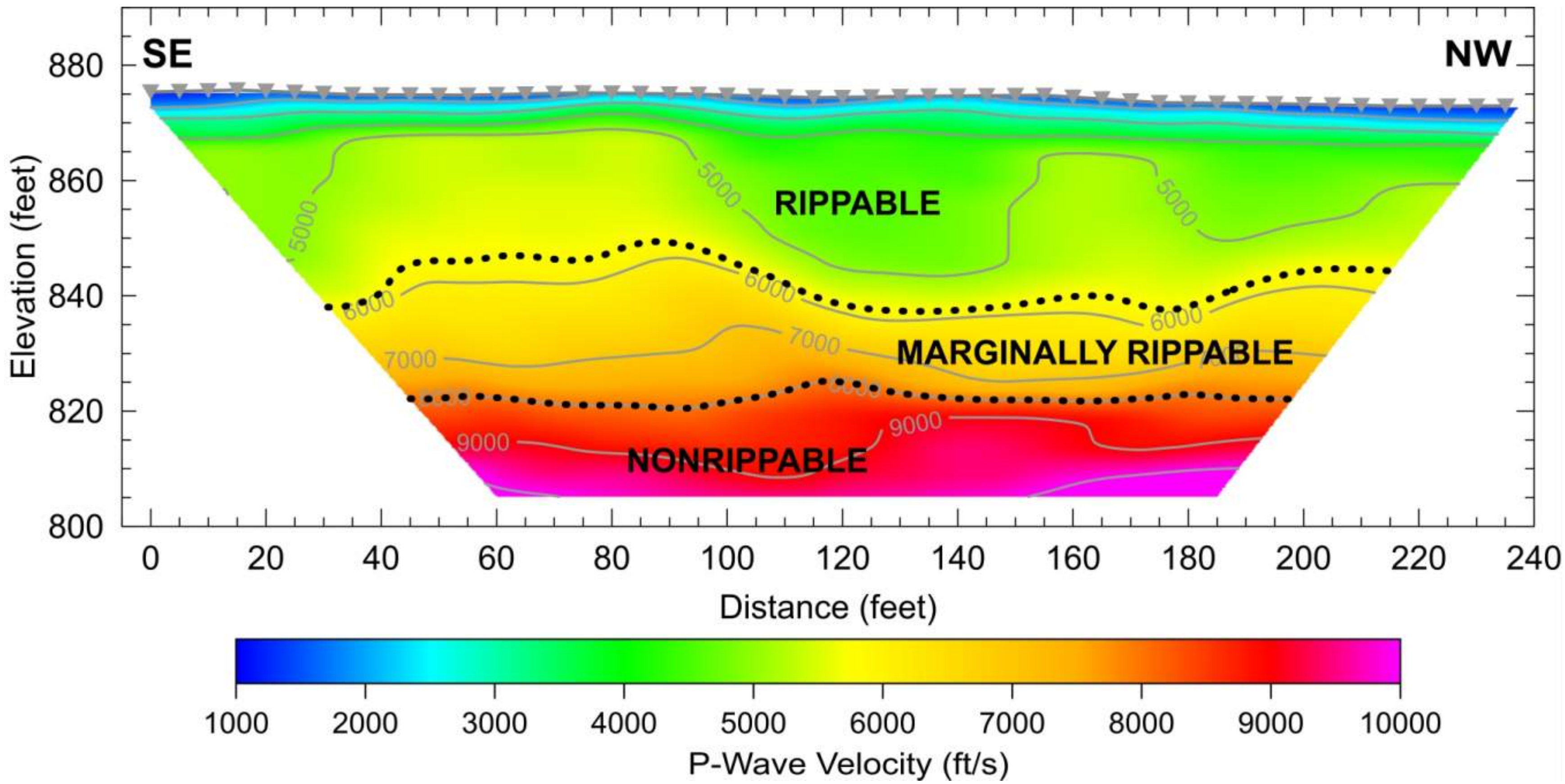
Approved By: Antony J Martin

R:\GVProjects\2023\23456 SA Geotechnical\Report\Figure 2.cdr

FIGURE 2
LINE 1 P-WAVE SEISMIC REFRACTION MODEL

11130 ALHAMBRA AVENUE
RIVERSIDE, CALIFORNIA

PREPARED FOR
SA GEOTECHNICAL, INC.



GEOVision geophysical services

Project No: 23456	FIGURE 3 LINE 2 P-WAVE SEISMIC REFRACTION MODEL
Date: DEC 21, 2023	11130 ALHAMBRA AVENUE RIVERSIDE, CALIFORNIA
Drawn By: A MARTIN	
Approved By: Antony J Martin	PREPARED FOR SA GEOTECHNICAL, INC.
R:\GVProjects\2023\23456 SA Geotechnical\Report\Figure 3.cdr	

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7 CERTIFICATION

All geophysical data, analysis, interpretations, conclusions, and recommendations in this document have been prepared under the supervision of and reviewed by a **GEO***Vision* California Professional Geophysicist.

Reviewed and approved by,

12/21/2023

Antony J. Martin — Date

California Professional Geophysicist, P. Gp. 989

GEO*Vision* Geophysical Services

* This geophysical investigation was conducted under the supervision of a California Professional Geophysicist using industry standard methods and equipment. A high degree of professionalism was maintained during all aspects of the project from the field investigation and data acquisition, through data processing, interpretation, and reporting. All original field data files, field notes, observations, and other pertinent information are maintained in the project files and are available for the client to review for a period of at least one year.

  A professional geophysicist's certification of interpreted geophysical conditions comprises a declaration of his/her professional judgment. It does not constitute a warranty or guarantee, expressed or implied, nor does it relieve any other party of its responsibility to abide by contract documents, applicable codes, standards, regulations, or ordinances

Appendix E

Percolation Data Sheet

Project Name: Meritage/La Sierra
Test Hole Number: P-1
Depth (in): 60 Radius (in.): 4
Tested By: AZ/AC Pipe Diameter (in.): 3

Project Number: 23145-01
Date Excavated: 12/11/2023
Date Presoak: 12/11/2023
Date Tested: 12/12/2023

Sandy Soil Criteria

Trial Number	Time	Time Interval (mins.)	Initial Water Level (in.)	Final Water Level (in.)	Δ in Water Level (in.)
1	8:16 8:26	10	24	33	9
2	8:26 8:38	12	33	40.2	7.2

Percolation Data

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
8:39 8:49	10	10	37.8	42.6	4.8	28.8
8:49 8:59	10	20	36.4	41.6	5.3	31.7
8:59 9:09	10	30	35.4	41.2	5.8	34.6
9:10 9:20	10	41	35.4	40.8	5.4	32.4
9:21 9:31	10	52	36.6	42.0	5.4	32.4
9:31 9:41	10	62	36.2	42.0	5.8	34.6

Initial Height of Water (Ho) = 23.8
Final Height of Water (Hf) = 18
Change in Height Over Time (ΔH) = 5.76
Average Head Over Time (Havg) = 20.9
Annulus Gravel/Sand Correction (C) = 0.5

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 3.0 in./hr.
C x I_t = **1.5** **in./hr.**

Percolation Data Sheet

Project Name: Meritage/La Sierra
Test Hole Number: P-2
Depth (in): 57 Radius (in.): 4
Tested By: AZ/AC Pipe Diameter (in.): 3

Project Number: 23145-01
Date Excavated: 12/11/2023
Date Presoak: 12/11/2023
Date Tested: 12/12/2023

Sandy Soil Criteria

Trial Number	Time	Time Interval (mins.)	Initial Water Level (in.)	Final Water Level (in.)	Δ in Water Level (in.)
1	8:11 8:17	6	28.8	37.2	8.4
2	8:17 8:25	8	37.2	43.2	6

Percolation Data

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
8:28 8:38	10	10	31.2	41.6	10.4	62.6
8:38 8:48	10	20	31.8	42.0	10.2	61.2
8:48 8:58	10	30	30.6	41.2	10.6	63.4
8:58 9:08	10	40	30.0	41.2	11.2	67.0
9:09 9:19	10	51	30.6	41.4	10.8	64.8
9:20 9:30	10	62	32.28	41.8	9.5	56.9

Initial Height of Water (Ho) = 24.7
Final Height of Water (Hf) = 15.2
Change in Height Over Time (ΔH) = 9.5
Average Head Over Time (Havg) = 20.0
Annulus Gravel/Sand Correction (C) = 0.5

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 5.2 in./hr.
C x I_t = **2.6** **in./hr.**

Percolation Data Sheet

Project Name: Meritage/La Sierra

Test Hole Number: P-3

Depth (in): 120 Radius (in.): 4

Tested By: AC Pipe Diameter (in.): 3

Project Number: 23145-01

Date Excavated: 12/11/2023

Date Presoak: 12/11/2023

Date Tested: 12/12/2023

Sandy Soil Criteria

Trial Number	Time	Time Interval (mins.)	Initial Water Level (in.)	Final Water Level (in.)	Δ in Water Level (in.)
1	10:23 10:33	10	58.4	64.7	6.2
2	10:33 10:53	20	64.7	74.6	10.0

Percolation Data

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
11:04 11:14	10	10	80.4	84.0	3.6	21.6
11:15 11:25	10	21	84.0	85.2	1.2	7.2
11:25 11:35	10	31	85.2	87.1	1.9	11.5
11:35 11:45	10	41	87.1	88.6	1.4	8.6
11:47 11:57	10	53	81.2	83.6	2.4	14.4
12:15 12:25	10	81	82.8	85.0	2.2	13.0

Initial Height of Water (Ho) = 37.2

Final Height of Water (Hf) = 35.0

Change in Height Over Time (ΔH) = 2.2

Average Head Over Time (Havg) = 36.1

Annulus Gravel/Sand Correction (C) = 0.5

$I_t = \Delta H(60r)/\Delta t(r+2Havg)$

$I_t =$ 0.7 in./hr.

$C \times I_t =$ **0.3** **in./hr.**

Percolation Data Sheet

Project Name: Meritage/La Sierra
Project Number: 23145-01
Test Hole Number: P-4
Date Excavated: 12/11/2023
Depth (in): 86
Radius (in.): 4
Date Presoak: 12/11/2023
Tested By: AC
Pipe Diameter (in.): 3
Date Tested: 12/12/2023

Sandy Soil Criteria

Trial Number	Time	Time Interval (mins.)	Initial Water Level (in.)	Final Water Level (in.)	Δ in Water Level (in.)
1	10:24 10:34	10	43.2	50.16	6.96
2	10:34 10:44	10	50.16	56.28	6.12

Percolation Data

Time	Time Interval (mins.)	Total Elapsed Time (mins)	Initial Depth to Water (in.)	Final Depth to Water (in.)	Δ in Water Level (in.)	Percolation Rate (in./hr.)
10:52 11:02	10	10	50.4	56.8	6.4	38.2
11:04 11:14	10	22	52.7	58.1	5.4	32.4
11:14 11:24	10	32	50.4	56.0	5.6	33.8
11:24 11:34	10	42	49.2	55.3	6.1	36.7
11:34 11:44	10	52	51.5	57.5	6.0	36.0
11:45 11:55	10	63	48.1	54.2	6.1	36.7

Initial Height of Water (Ho) = 37.9
Final Height of Water (Hf) = 31.8
Change in Height Over Time (ΔH) = 6.1
Average Head Over Time (Havg) = 34.8
Annulus Gravel/Sand Correction (C) = 0.5

I_t= ΔH(60r)/Δt(r+2Havg)
I_t= 2.0 in./hr.
C x I_t = **1.0** **in./hr.**

Appendix F

Latitude, Longitude: 33.94189, -117.50110

Date	12/13/2023, 4:22:41 PM
Design Code Reference Document	ASCE7-16
Risk Category	II
Site Class	C - Very Dense Soil and Soft Rock

Type	Value	Description
S_S	1.5	MCE_R ground motion. (for 0.2 second period)
S_1	0.57	MCE_R ground motion. (for 1.0s period)
S_{MS}	1.8	Site-modified spectral acceleration value
S_{M1}	0.815	Site-modified spectral acceleration value
S_{DS}	1.2	Numeric seismic design value at 0.2 second SA
S_{D1}	0.543	Numeric seismic design value at 1.0 second SA

Type	Value	Description
SDC	D	Seismic design category
F_a	1.2	Site amplification factor at 0.2 second
F_v	1.43	Site amplification factor at 1.0 second
PGA	0.515	MCE_G peak ground acceleration
F_{PGA}	1.2	Site amplification factor at PGA
PGA_M	0.618	Site modified peak ground acceleration
T_L	8	Long-period transition period in seconds
SsRT	1.578	Probabilistic risk-targeted ground motion. (0.2 second)
SsUH	1.671	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration
SsD	1.5	Factored deterministic acceleration value. (0.2 second)
S1RT	0.57	Probabilistic risk-targeted ground motion. (1.0 second)
S1UH	0.617	Factored uniform-hazard (2% probability of exceedance in 50 years) spectral acceleration.
S1D	0.6	Factored deterministic acceleration value. (1.0 second)
PGAd	0.515	Factored deterministic acceleration value. (Peak Ground Acceleration)
PGA_{UH}	0.645	Uniform-hazard (2% probability of exceedance in 50 years) Peak Ground Acceleration
C_{RS}	0.944	Mapped value of the risk coefficient at short periods
C_{R1}	0.924	Mapped value of the risk coefficient at a period of 1 s
C_V	1.2	Vertical coefficient

DISCLAIMER

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U.S. Geological Survey - Earthquake Hazards Program

Unified Hazard Tool

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

Please also see the new USGS Earthquake Hazard Toolbox for access to the most recent NSHMs for the conterminous U.S. and Hawaii.

Input

Edition

Dynamic: Conterminous U.S. 2014 (updat…

Spectral Period

Peak Ground Acceleration

Latitude

Decimal degrees

33.94189

Time Horizon

Return period in years

2475

Longitude

Decimal degrees, negative values for western longitudes

-117.5011

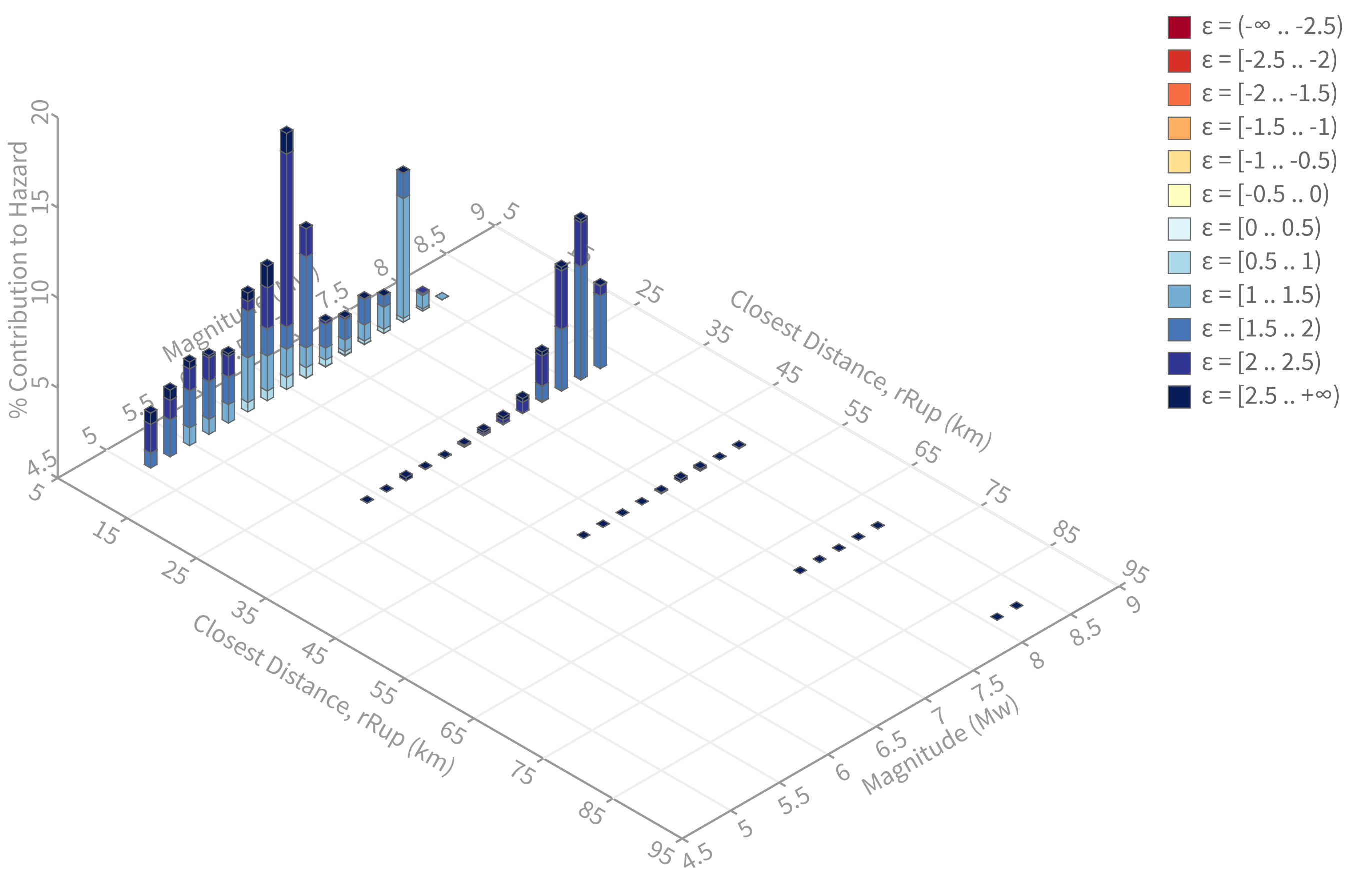
Site Class

537 m/s (Site class C)

^ Deaggregation

Component

Total



Summary statistics for, Deaggregation: Total

Deaggregation targets

Return period: 2475 yrs
Exceedance rate: 0.0004040404 yr^{-1}
PGA ground motion: 0.71174273 g

Recovered targets

Return period: 2944.9187 yrs
Exceedance rate: 0.00033956794 yr^{-1}

Totals

Binned: 100 %
Residual: 0 %
Trace: 0.07 %

Mean (over all sources)

m: 6.83
r: 15.41 km
ε_0: 1.81 σ

Mode (largest m-r bin)

m: 6.48
r: 13.3 km
ε_0: 2.06 σ
Contribution: 14.2 %

Mode (largest m-r-ε_0 bin)

m: 6.48
r: 14.84 km
ε_0: 2.26 σ
Contribution: 9.59 %

Discretization

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

Epsilon keys

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

Deaggregation Contributors

Source Set ↳ Source	Type	r	m	ε_0	lon	lat	az	%
UC33brAvg_FM31	System							31.51
San Jacinto (San Bernardino) [3]		23.89	8.06	1.79	117.303°W	34.080°N	49.95	7.11
Elsinore (Glen Ivy) rev [0]		14.90	6.54	2.26	117.572°W	33.822°N	206.11	6.37
Whittier alt 1 [0]		14.13	7.48	1.40	117.588°W	33.833°N	213.47	6.34
San Andreas (San Bernardino N) [4]		32.90	8.00	2.17	117.314°W	34.194°N	31.47	2.88
Fontana (Seismicity) [2]		9.46	6.61	1.58	117.572°W	34.001°N	315.28	2.51
Chino alt 1 [4]		13.90	6.90	1.92	117.623°W	33.869°N	234.23	2.16
UC33brAvg_FM32	System							30.92
San Jacinto (San Bernardino) [3]		23.89	8.06	1.80	117.303°W	34.080°N	49.95	7.04
Elsinore (Glen Ivy) rev [0]		14.90	6.52	2.26	117.572°W	33.822°N	206.11	6.48
Whittier alt 2 [0]		14.52	7.57	1.39	117.588°W	33.832°N	213.42	6.21
San Andreas (San Bernardino N) [4]		32.90	8.00	2.17	117.314°W	34.194°N	31.47	2.91
Chino alt 2 [3]		13.71	7.04	1.82	117.615°W	33.864°N	230.62	2.21
Fontana (Seismicity) [2]		9.46	6.61	1.58	117.572°W	34.001°N	315.28	2.05
UC33brAvg_FM31 (opt)	Grid							19.03
PointSourceFinite: -117.501, 33.982		6.57	5.78	1.44	117.501°W	33.982°N	0.00	3.25
PointSourceFinite: -117.501, 33.982		6.57	5.78	1.44	117.501°W	33.982°N	0.00	3.25
PointSourceFinite: -117.501, 34.000		7.94	5.75	1.68	117.501°W	34.000°N	0.00	2.28
PointSourceFinite: -117.501, 34.000		7.94	5.75	1.68	117.501°W	34.000°N	0.00	2.28
PointSourceFinite: -117.501, 34.036		9.72	6.18	1.72	117.501°W	34.036°N	0.00	1.74
PointSourceFinite: -117.501, 34.036		9.72	6.18	1.72	117.501°W	34.036°N	0.00	1.74
PointSourceFinite: -117.501, 34.045		10.67	6.12	1.87	117.501°W	34.045°N	0.00	1.66
PointSourceFinite: -117.501, 34.045		10.67	6.12	1.87	117.501°W	34.045°N	0.00	1.66
UC33brAvg_FM32 (opt)	Grid							18.54
PointSourceFinite: -117.501, 33.982		6.56	5.79	1.43	117.501°W	33.982°N	0.00	3.19
PointSourceFinite: -117.501, 33.982		6.56	5.79	1.43	117.501°W	33.982°N	0.00	3.19
PointSourceFinite: -117.501, 34.000		7.94	5.75	1.68	117.501°W	34.000°N	0.00	2.28
PointSourceFinite: -117.501, 34.000		7.94	5.75	1.68	117.501°W	34.000°N	0.00	2.28
PointSourceFinite: -117.501, 34.045		10.69	6.12	1.88	117.501°W	34.045°N	0.00	1.64
PointSourceFinite: -117.501, 34.045		10.69	6.12	1.88	117.501°W	34.045°N	0.00	1.64
PointSourceFinite: -117.501, 34.036		9.86	6.14	1.76	117.501°W	34.036°N	0.00	1.60
PointSourceFinite: -117.501, 34.036		9.86	6.14	1.76	117.501°W	34.036°N	0.00	1.60

Appendix G

APPENDIX E

GENERAL EARTHWORK AND GRADING SPECIFICATIONS

1.0 GENERAL

1.1 **Intent:** These General Earthwork and Grading Specifications are for the grading and earthwork shown on the approved grading plan(s) and/or indicated in the geotechnical report(s). These Specifications are a part of the recommendations contained in the geotechnical report(s). In case of conflict, the specific recommendations in the geotechnical report shall supersede these general Specifications. Observations of the earthwork by the project Geotechnical Consultant during grading may result in new or revised recommendations that could supersede these specifications or the recommendations in the geotechnical report(s).

1.2 **Geotechnical Consultant:** Prior to commencement of work, the project owner shall employ a geotechnical consultant. The geotechnical consultant shall be responsible for reviewing the approved geotechnical report(s) and accepting the adequacy of the preliminary geotechnical findings, conclusions, and recommendations prior to the commencement of grading.

Prior to commencement of grading, the Geotechnical Consultant shall review the "work plan" prepared by the Earthwork Contractor (Contractor) and schedule sufficient personnel to perform the appropriate level of observation, mapping, and compaction testing.

During grading and earthwork operations, the Geotechnical Consultant shall observe, map, and document the subsurface exposures to verify the geotechnical design assumptions. If the observed conditions are found to be significantly different than the interpreted assumptions during the design phase, the Geotechnical Consultant shall inform the owner, recommend appropriate changes in design to accommodate the observed conditions, and notify the review agency where required. Subsurface areas to be geotechnically observed, mapped, elevations recorded, and/or tested include natural ground after it has been cleared for receiving fill but before fill is placed, bottoms of all "remedial removal" areas, all keyway bottoms, and benches made on sloping ground to receive fill.

The Geotechnical Consultant shall observe the moisture-conditioning and processing of subgrade and fill materials and perform adequate relative compaction testing of fill to determine the attained level of compaction and assess if, in their opinion, if the work was performed in substantial compliance with the geotechnical report(s) and these specifications. The Geotechnical Consultant shall provide test results to the owner on a routine and frequent basis.

1.3 **<u>The Earthwork Contractor</u>:** 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 Specifications prior to commencement of grading. The Contractor shall be solely responsible for performing the grading in accordance with applicable grading codes, the project plans, and these specifications.

The Contractor shall prepare and submit to the owner and the Geotechnical Consultant a work plan that indicates the sequence of earthwork grading, the number of "spreads" of work and the estimated quantities of daily earthwork planned for the site prior to commencement of grading. The Contractor shall inform the owner and the Geotechnical Consultant of changes in work schedules and updates to the work plan at least 24 hours in advance of such changes so that appropriate observations and tests can be planned and accomplished. The Contractor shall not assume that the Geotechnical Consultant is aware of all grading operations.

The Contractor shall have the sole responsibility to provide adequate equipment and methods to accomplish the earthwork in accordance with the applicable grading codes and agency ordinances, these Specifications, and the recommendations in the approved geotechnical report(s) and grading plan(s). If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as unsuitable soil, improper moisture condition, inadequate compaction, insufficient buttress key size, adverse weather, etc., are resulting in a quality of work less than required in these specifications, the Geotechnical Consultant shall reject the work and may recommend to the owner that construction be stopped until the conditions are corrected.

2.0 PREPARATION OF FILL AREAS

2.1 **<u>Clearing and Grubbing</u>:** Areas to be excavated and filled shall be cleared and grubbed. Vegetation, such as brush, grass, roots, and other deleterious material, man-made structures, and similar debris shall be sufficiently removed and properly disposed of in a method acceptable to the owner, governing agencies, and the Geotechnical Consultant. Borrow areas shall be cleared and grubbed to the extent necessary to provide a suitable fill material.

Concrete fragments that are free of reinforcing street may be placed in fills, provided they are placed in accordance with Section 3 and 4. Earth fill material shall not contain more than 1 percent of organic materials (by volume). No fill lift shall contain more than 5 percent organic matter. Nesting of 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, etc.) have chemical constituents that are considered hazardous waste. As such, the indiscriminate dumping or spillage of such fluids may constitute a misdemeanor, punishable by fines and/or imprisonment, and shall not be allowed.

The Geotechnical Consultant shall not be responsible for the identification or analysis of potentially hazardous materials; however, if observations, odors, or soil discoloration are suspect, the Geotechnical Consultant may request from the owner the termination of grading operations until such materials are deemed not hazardous as defined by applicable laws and regulations.

2.2 **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 the Geotechnical Consultant as suitable to receive fill. The Contractor shall obtain a written acceptance from the Geotechnical Consultant prior to fill placement. A licensed surveyor shall provide the survey control for determining elevations of processed areas, keys, and benches.

2.3 **Processing:** Ground that has been declared satisfactory for support of fill by the Geotechnical Consultant shall be scarified to a minimum depth of 6 inches. Ground that is not satisfactory shall be removed/overexcavated as specified in the following section. 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. After scarification, the surface should be moisture conditioned, as necessary, to achieve the proper moisture content and compacted in accordance with Section 4 of these specifications.

2.4 **Overexcavation:** In addition to removals and overexcavations recommended in the approved geotechnical report(s) and the grading plan, soft, loose, dry, saturated, spongy, organic-rich, highly fractured, or otherwise unsuitable ground shall be overexcavated to competent ground as recommended by the Geotechnical Consultant during grading.

2.5 **Benching:** Fills to be placed on ground sloping steeper than 5H:1V (horizontal to vertical units) shall be stepped or benched. The lowest bench or key shall be a minimum of 15 feet wide and at least 2 feet deep, into competent material as evaluated by the Geotechnical Consultant. Other benches shall be excavated a minimum height of 4 feet into competent material or as otherwise recommended by the Geotechnical Consultant. Fill placed on ground sloping flatter than 5:1 shall also be benched or otherwise overexcavated to provide a flat subgrade for fill placement.

3.0 FILL MATERIAL

3.1 **General:** Material to be used as fill shall be essentially free of organic matter and other deleterious substances evaluated and accepted by the Geotechnical Consultant 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 the Geotechnical Consultant or mixed with other soils to achieve satisfactory fill material.

3.2 **Oversize:** Oversize material defined as rock, or other irreducible material with a maximum dimension greater than 12 inches, shall not be buried or placed in fill unless location, materials, and placement methods are specifically accepted by the Geotechnical Consultant. Placement operations shall be such that nesting of oversized material does not occur and that oversize material is completely surrounded by compacted or densified fill. Oversize material shall not be placed within 10 vertical feet of finish grade or within 2 feet of future utilities or other underground construction.

3.3 **Import:** If importing of fill material is required for grading, proposed import material shall meet the requirements of Section 3.1 and/or requirements defined in the project geotechnical report(s). The potential import source shall be given to the Geotechnical Consultant at least 48 hours (2 working days) before import begins so that suitability can be determined, and appropriate laboratory tests performed.

4.0 FILL PLACEMENT AND COMPACTION

4.1 **Fill Layers:** Approved fill material shall be placed in areas prepared to receive fill (per Section 3.0) in near-horizontal layers not exceeding 8 inches in loose thickness. The Geotechnical Consultant may accept thicker layers if testing indicates the grading procedures can adequately compact the thicker layers. Each layer shall be spread evenly and mixed thoroughly to attain relative uniformity of material and moisture throughout.

4.2 **<u>Fill Moisture Conditioning</u>:** 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 ASTM International (ASTM Test Method D1557).

4.3 **<u>Compaction of Fill</u>:** After each layer has been moisture-conditioned, mixed, and evenly spread, it shall be uniformly compacted to not less than 90 percent of maximum dry density (ASTM Test Method D1557). 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 and uniformity.

<u>Compaction of Fill Slopes</u>: In addition to normal compaction procedures specified above, compaction of slopes shall be accomplished by backrolling of slopes with sheepsfoot rollers at increments of 3 to 4 feet in fill elevation, or by other methods producing satisfactory results acceptable to the Geotechnical Consultant. Upon completion of grading, relative compaction of the fill, out to the slope face, shall be at least 90 percent of maximum density per ASTM Test Method D1557.

4.4 **<u>Compaction Testing</u>:** Field tests for moisture content and relative compaction of the fill soils shall be performed by the Geotechnical Consultant. Location and frequency of tests shall be at the Consultant'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).

4.5 **<u>Frequency of Compaction Testing</u>:** Tests shall be taken at intervals required by the governing agency and as deemed necessary by the Geotechnical Consultant in order to adequately qualify the fill material. In general, it should be anticipated that tests will be taken at intervals not exceeding 2 feet in vertical rise and/or 1,000 cubic yards of compacted fill, unless recommended otherwise by the Geotechnical Consultant. In addition, test(s) shall be taken on slope faces and/or each 10 feet of vertical height of slope as deemed necessary by the Geotechnical Consultant. The Contractor shall assure that fill construction is such that the testing schedule can be accomplished by the Geotechnical Consultant. The Contractor shall stop or slow down the earthwork construction if these minimum standards are not met.

4.6 **Compaction Test Locations:** The Geotechnical Consultant shall document the approximate elevation and location of each compaction test. The Contractor shall coordinate with the project surveyor to assure that sufficient grade stakes are established so the Geotechnical Consultant can determine the test locations with sufficient accuracy. At a minimum, two grade stakes within a horizontal distance of 100 feet and vertically less than 5 feet apart from potential test locations shall be provided. Alternatively, GPS units may be used to determine the approximate location/coordinates of the field density tests.

5.0 SUBDRAIN INSTALLATION

Subdrain systems shall be installed in accordance with the approved geotechnical report(s), the grading plan, and standard details. The Geotechnical Consultant may recommend additional subdrains and/or changes in subdrain extent, location, grade, or material depending on conditions encountered during grading. All subdrains shall be surveyed for line and grade after installation and prior to burial. Sufficient time should be allowed by the Contractor for these surveys. The Contractor should consider videoing the subdrains shortly after burial to check proper installation and functionality. The Contractor is responsible for the performance of subdrains.

6.0 EXCAVATION

Excavations, including over-excavation for remedial purposes, shall be evaluated by the Geotechnical Consultant during grading. Remedial removal depths shown on geotechnical report(s) and plans are estimates. The actual extent of removal shall be determined by the Geotechnical Consultant based on the field evaluation of exposed conditions during grading. Where fill-over-cut slopes are to be graded, the cut portion of the slope shall be made, evaluated, and accepted by the Geotechnical Consultant prior to placement of materials for construction of the fill portion of the slope, unless otherwise recommended by the Geotechnical Consultant.

7.0 TRENCH BACKFILLS

7.1 Contractor shall follow all OHSA and Cal/OSHA requirements for safety of trench excavations.

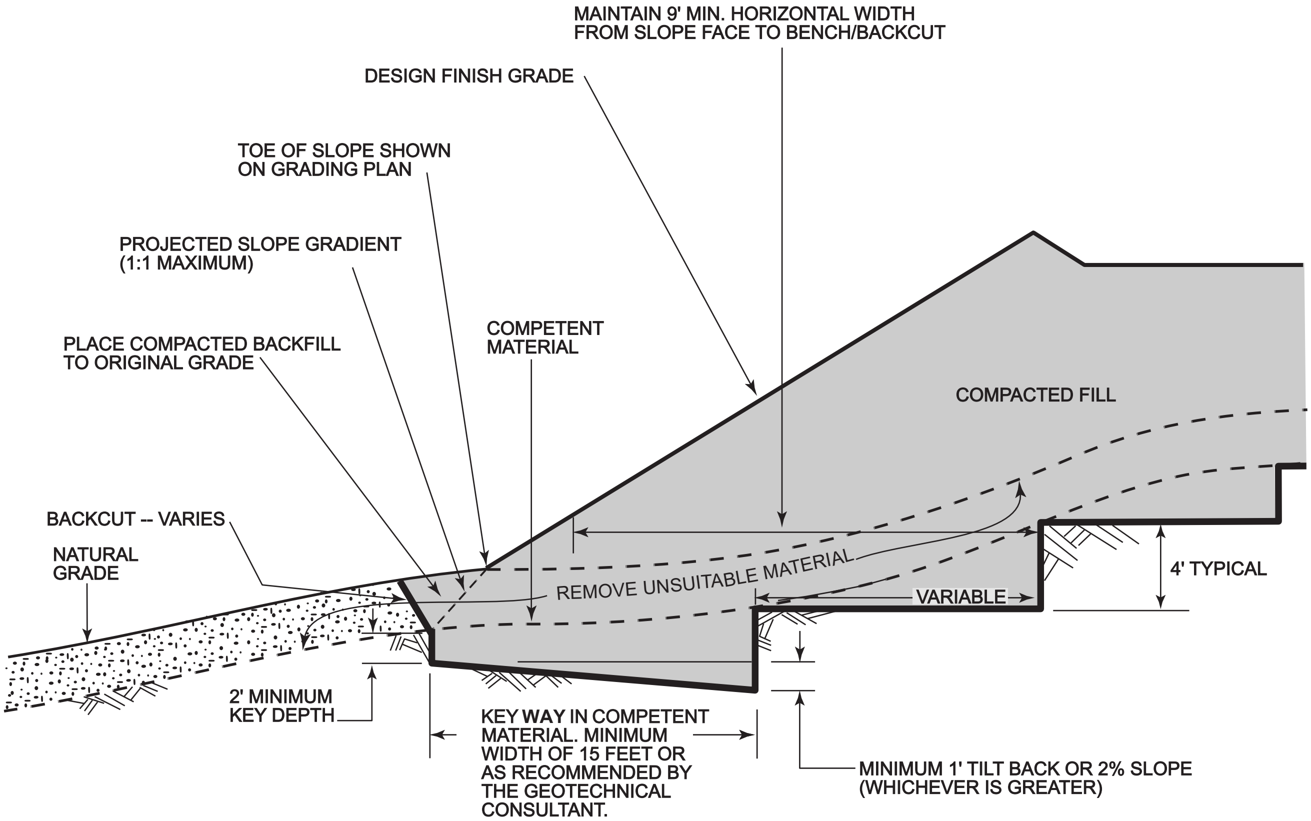
7.2 Bedding and backfill of utility trenches shall be done in accordance with the applicable provisions of Standard Specifications of Public Works Construction. Bedding material shall have a Sand Equivalent greater than 30 (SE>30). The bedding shall be placed to 1 foot over the top of the conduit and densified by jetting. Backfill shall be placed and densified to a minimum 90 percent of maximum from 1 foot above the top of the conduit to the surface, except in traveled ways (see Section 7.6 below).

7.3 Jetting of the bedding around the conduits shall be observed by the Geotechnical Consultant.

7.4 Geotechnical Consultant shall test the trench backfill for relative compaction. At least one test should be made for every 300 feet of trench and 2 feet of fill, unless required differently by the governing agency or the Geotechnical Consultant.

7.5 Lift thickness of trench backfill shall not exceed those allowed in the Standard Specifications of Public Works Construction unless the Contractor can demonstrate to the Geotechnical Consultant that the fill lift can be compacted to the minimum relative compaction by his alternative equipment and method.

7.6 Trench backfill in the upper foot measured from finish grade within existing or future traveled way, shoulder, and other paved areas (or areas to receive pavement) should be placed to a minimum 95 percent relative compaction.

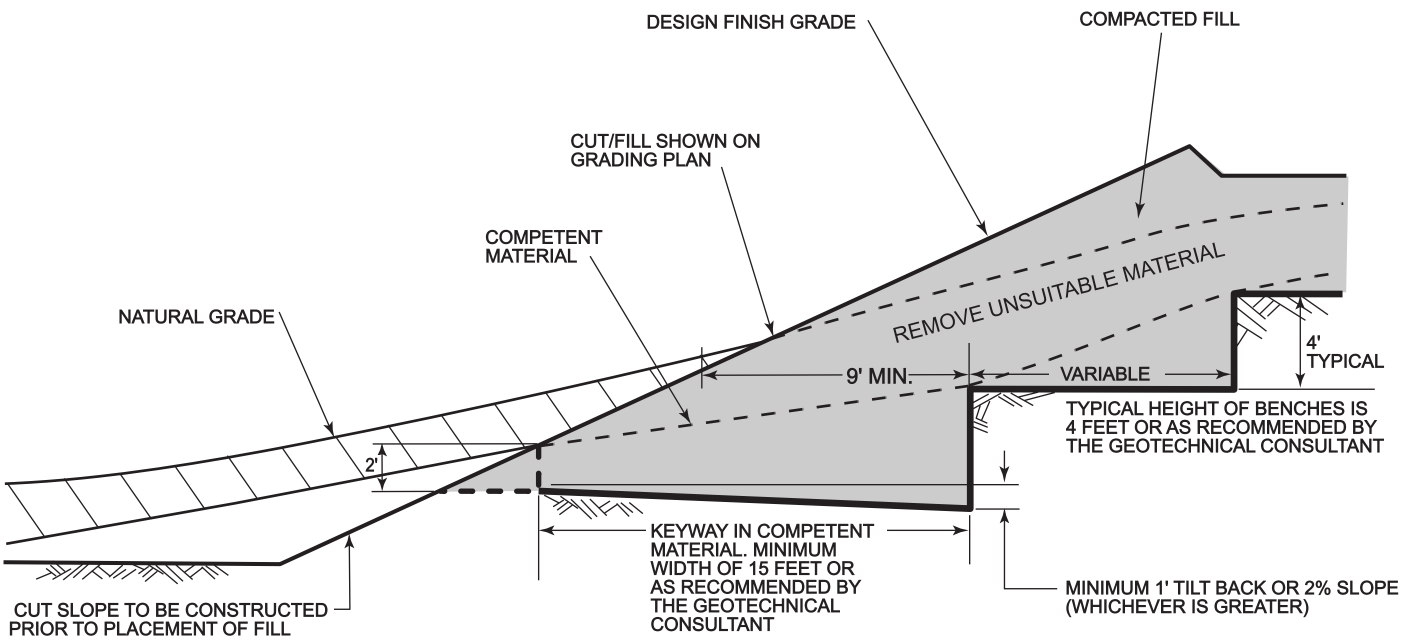


NOTE: BENCHING SHALL BE REQUIRED WHEN SLOPES ARE EQUAL TO OR STEEPER THAN 5H:1V OR WHEN RECOMMENDED BY THE GEOTECHNICAL CONSULTANT. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIFIC RECOMMENDATIONS SHOULD BE PROVIDED BY THE GEOTECHNICAL CONSULTANT.

FIGURE 1

TYPICAL FILL KEY ABOVE NATURAL SLOPE
MINIMUM STANDARD GRADING DETAIL

S/A

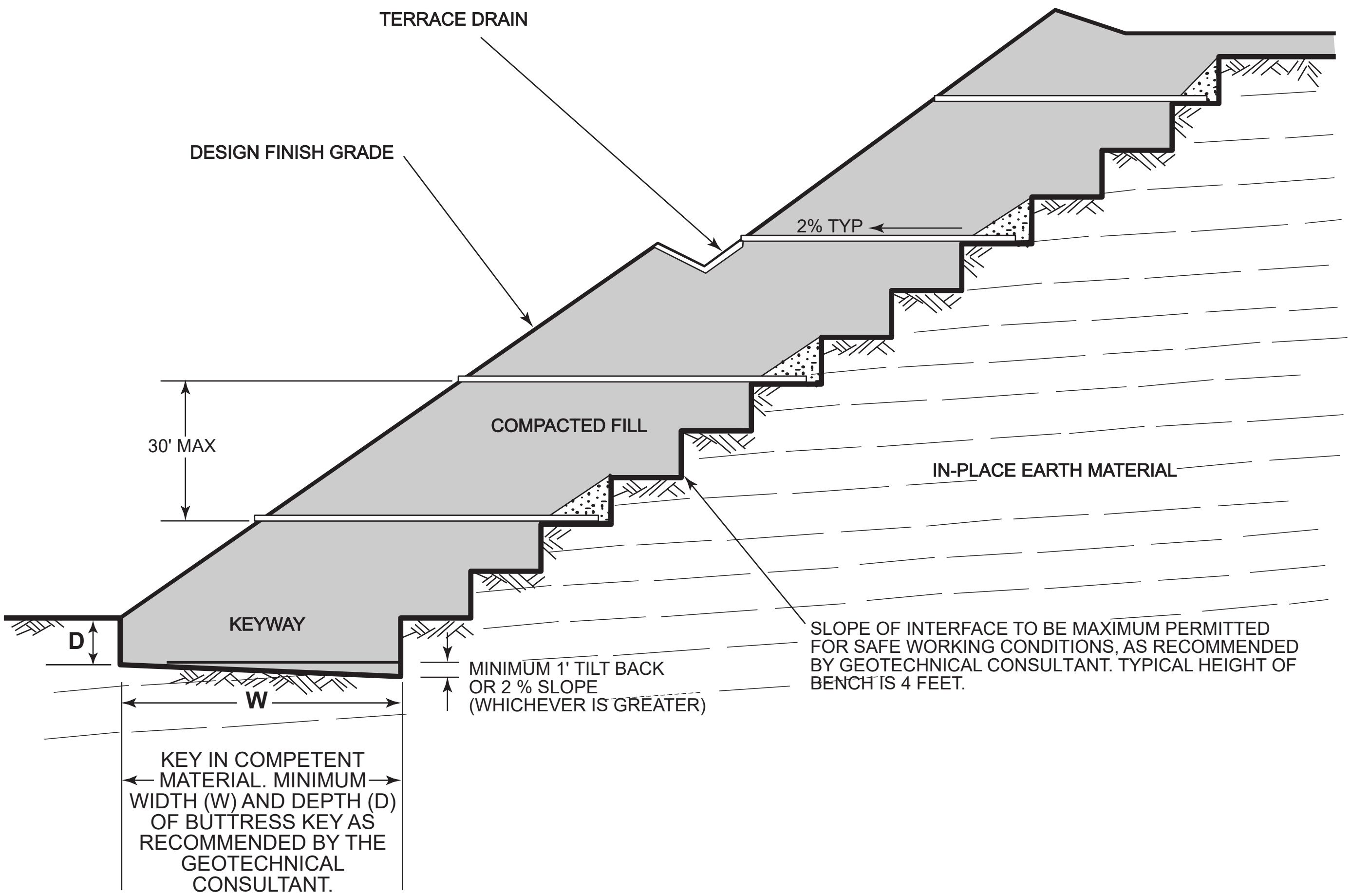


NOTE: BENCHING SHALL BE REQUIRED WHEN SLOPES ARE EQUAL TO OR STEEPER THAN 5H:1V OR WHEN RECOMMENDED BY THE GEOTECHNICAL CONSULTANT. WHERE THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN SLOPE RATIO, SPECIFIC RECOMMENDATIONS SHOULD BE PROVIDED BY THE GEOTECHNICAL CONSULTANT.

FIGURE 2

TYPICAL FILL ABOVE CUT SLOPE
MINIMUM STANDARD GRADING DETAIL

S/A

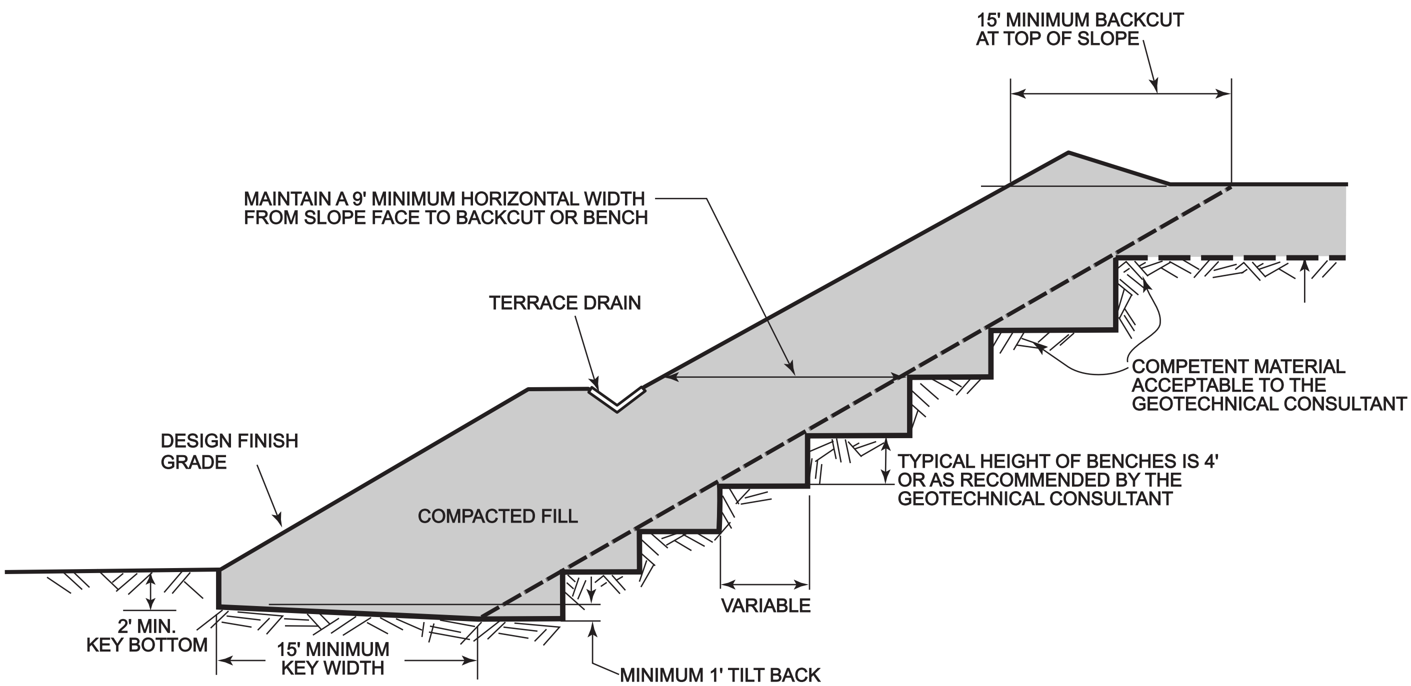


NOTE: FOR SUBDRAIN DETAILS, SEE FIGURE 5.

FIGURE 3

TYPICAL BUTTRESS FILL MINIMUM STANDARD GRADING DETAIL

S/A

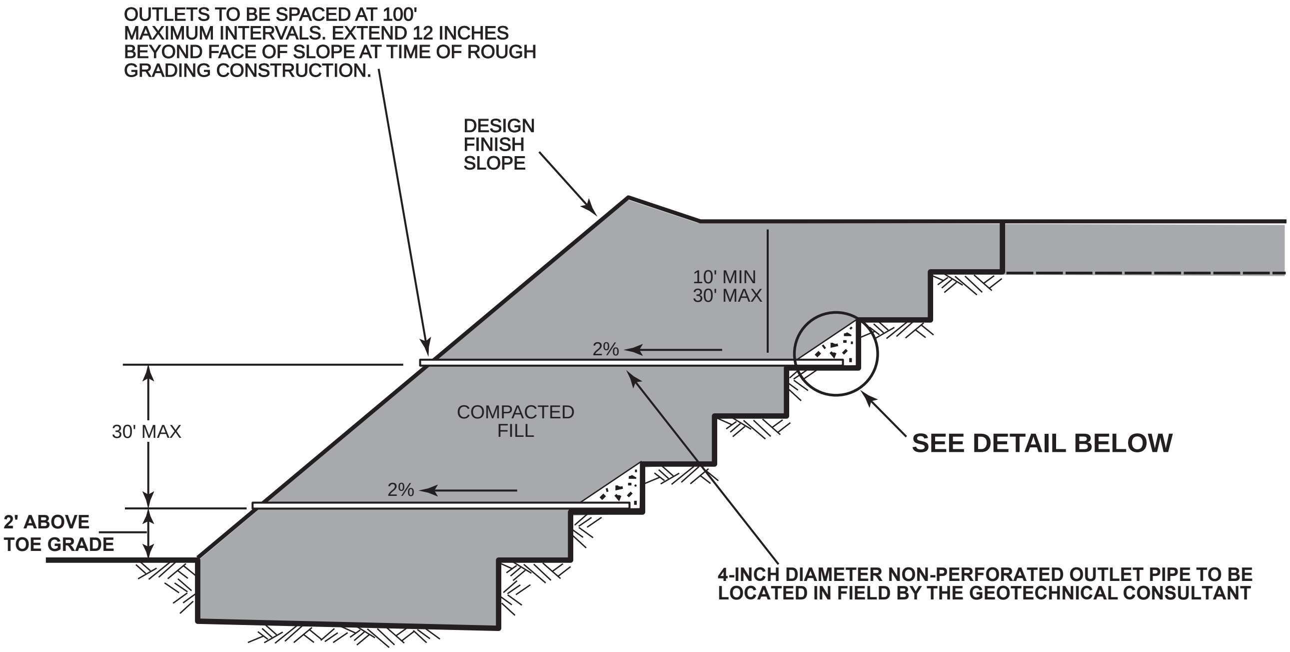


NOTE: FOR SUBDRAIN DETAILS, SEE FIGURE 5.

FIGURE 4

TYPICAL STABILIZATION FILL
MINIMUM STANDARD GRADING DETAIL

S/A



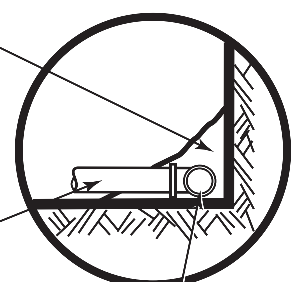
FILTER MATERIAL - MINIMUM OF THREE CUBIC FEET PER FOOT OF PIPE. SEE FILTER MATERIAL SPECIFICATION.

ALTERNATE: IN LIEU OF FILTER MATERIAL, THREE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC.

GRAVEL TO CONSIST OF 1/2" TO 1" CRUSHED ROCK PER STANDARD SPECIFICATIONS FOR PUBLIC WORKS CONSTRUCTION. FIGURE 6 FOR FILTER FABRIC SPECIFICATION

FILTER FABRIC SHALL BE LAPPED A MINIMUM OF 12 INCHES ON ALL JOINTS. SEE FIGURE 6 FOR FILTER FABRIC SPECIFICATION

DETAIL



OUTLET PIPE TO BE CONNECTED TO SUBDRAIN PIPE WITH TEE OR ELBOW

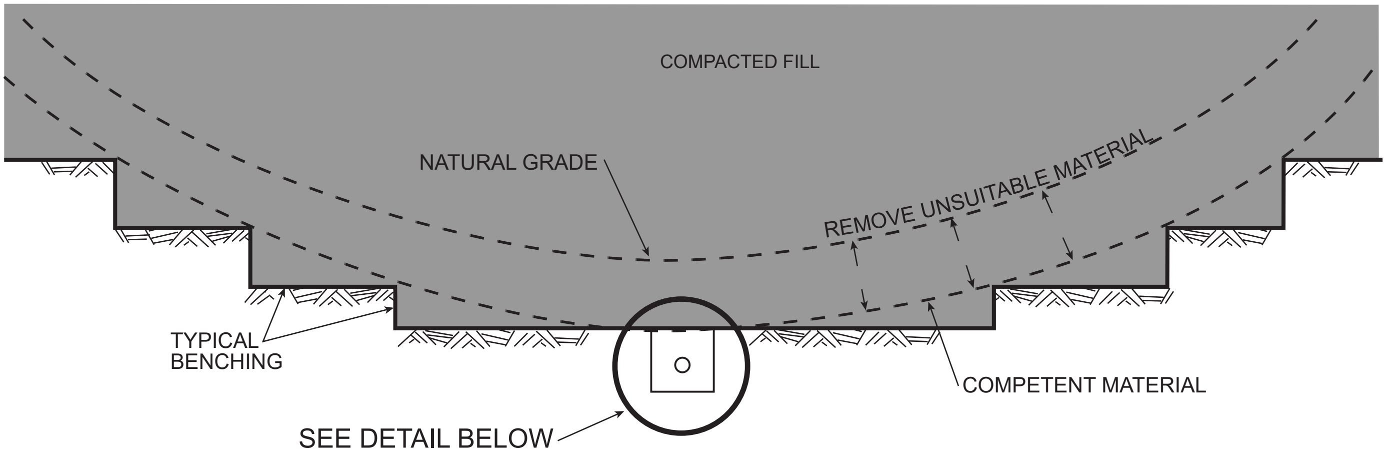
MINIMUM 4-INCH DIAMETER SCHEDULE 40 ASTM D1527 OR D1785 OR SDR 35 ASTM D2751 OR D 3034. FOR FILL DEPTH OF 60 FEET OR GREATER, USE ONLY SCHEDULE 40 OR EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE. PROVIDE CAP AT UPSTREAM END OF PIPE. SLOPE A MINIMUM OF 2 PERCENT TO OUTLET PIPE.

"FILTER MATERIAL" TO MEET FOLLOWING SPECIFICATION OR APPROVED EQUIVALENT.

SIEVE SIZE	PERCENTAGE PASSING
1"	100
3/4"	90-100
3/8"	40-100
NO. 4	25-40
NO. 8	18-33
NO. 30	5-15
NO. 50	0-7
NO. 200	0-3

FIGURE 5

TYPICAL STABILIZATION AND BUTTRESS FILL SUBDRAINS MINIMUM STANDARD GRADING DETAIL



FILTER FABRICS SHALL BE PERMEABLE NON-WOVEN POLYESTER, NYLON, OR POLYPROPYLENE MATERIAL CONFORMING TO THE FOLLOWING:

1) GRAB TENSILE STRENGTH. POUNDS, MIN. ASTM D 4632...90

2) ELONGATION, AT PEAK LOAD, PERCENT, MIN. ASTM D 4632..50

3) PUNCTURE STRENGTH, LBS., MIN. ASTM D 3787..45

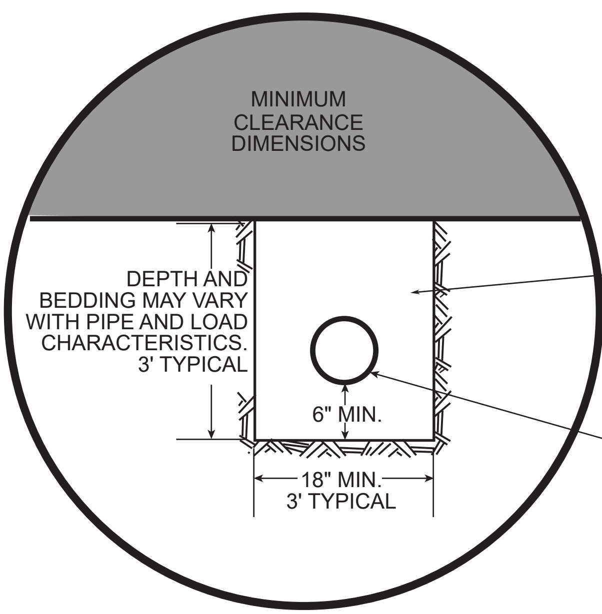
4) COEFFICIENT OF WATER PERMITTIVITY, 1/SEC. ASTM D 4491...>0.7

5) BURST STRENGTH, P.S.I., MIN. ASTM D 3786...180

NOTES: DOWNSTREAM 20' OF PIPE AT OUTLET SHALL BE NON-PERFORATED AND BACKFILLED WITH FINE-GRAINED MATERIAL

PIPE SHALL BE A MINIMUM OF 4-INCH DIAMETER. FOR RUNS OF 500 FEET OR MORE, USE 6-INCH DIAMETER PIPE, OR AS RECOMMENDED BY THE GEOTECHNICAL CONSULTANT

DETAIL



FILTER MATERIAL - MINIMUM OF NINE CUBIC FEET PER FOOT OF PIPE. SEE FIGURE 5 FOR FILTER MATERIAL SPECIFICATIONS.

ALTERNATE: IN LIEU OF FILTER MATERIAL, NINE CUBIC FEET OF GRAVEL PER FOOT OF SUBDRAIN (WITHOUT PIPE) MAY BE ENCASED IN FILTER FABRIC. SEE FIGURE 5 TO GRAVEL SPECIFICATION. SEE ABOVE FOR FILTER FABRIC SPECIFICATION. FILTER FABRIC SHALL BE LAPPED MINIMUM OF 12 INCHES ON ALL JOINTS.

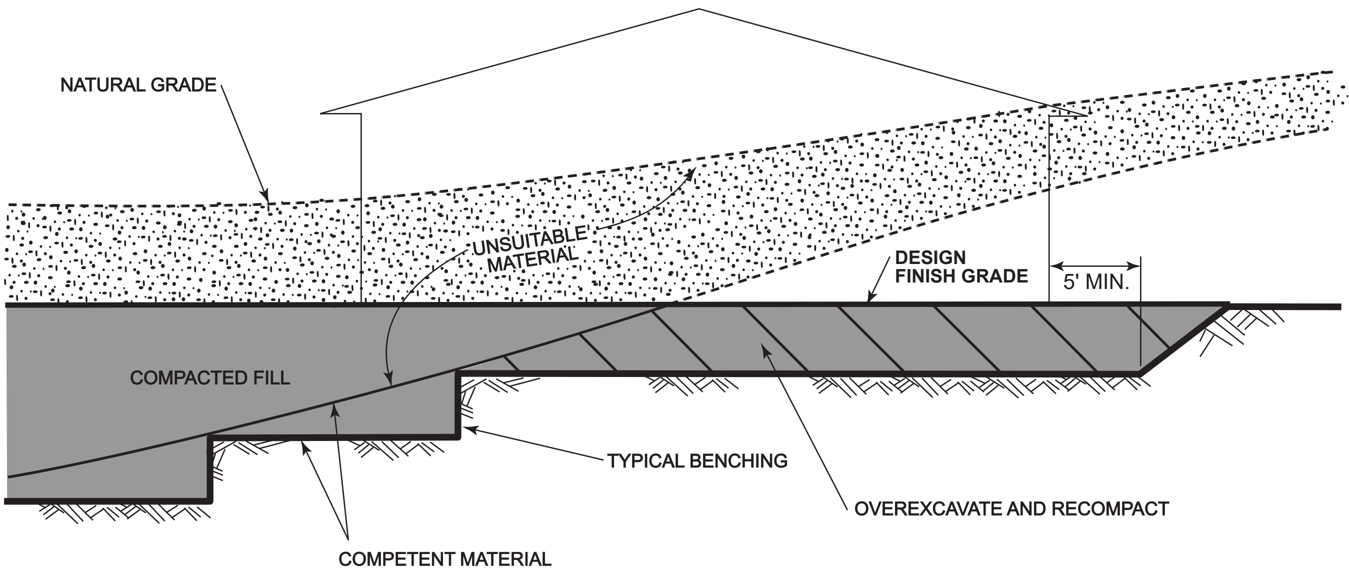
MINIMUM 4 INCH DIAMETER SCHEDULE 40 ASTM D 1527, OR D 1785, OR SDR 35 ASTM 2751 OR D 3034. FOR FILL DEPTH OF 60 FEET OR GREATER, USE ONLY SCHEDULE 40 OR APPROVED EQUIVALENT. THERE SHALL BE A MINIMUM OF 8 UNIFORMLY SPACED PERFORATIONS PER FOOT OF PIPE INSTALLED WITH PERFORATIONS ON BOTTOM OF PIPE.

FIGURE 6

TYPICAL CANYON SUBDRAIN
MINIMUM STANDARD GRADING DETAIL

S/A

CUT LOT



CUT/FILL LOT TRANSITION LOT

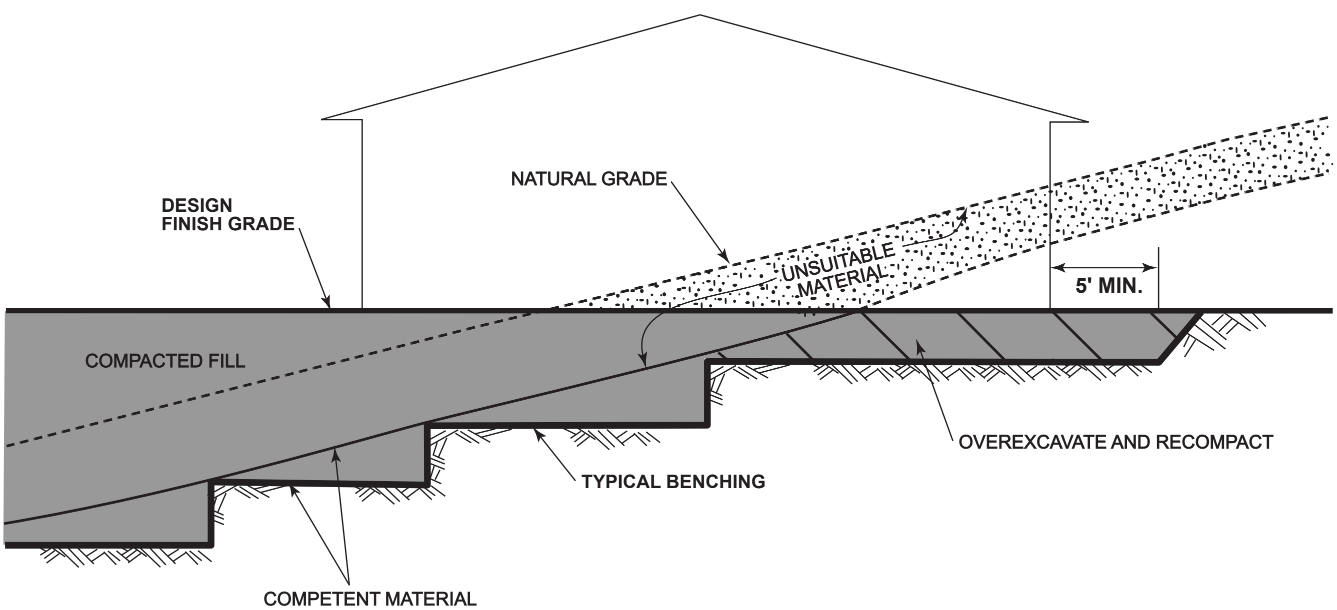
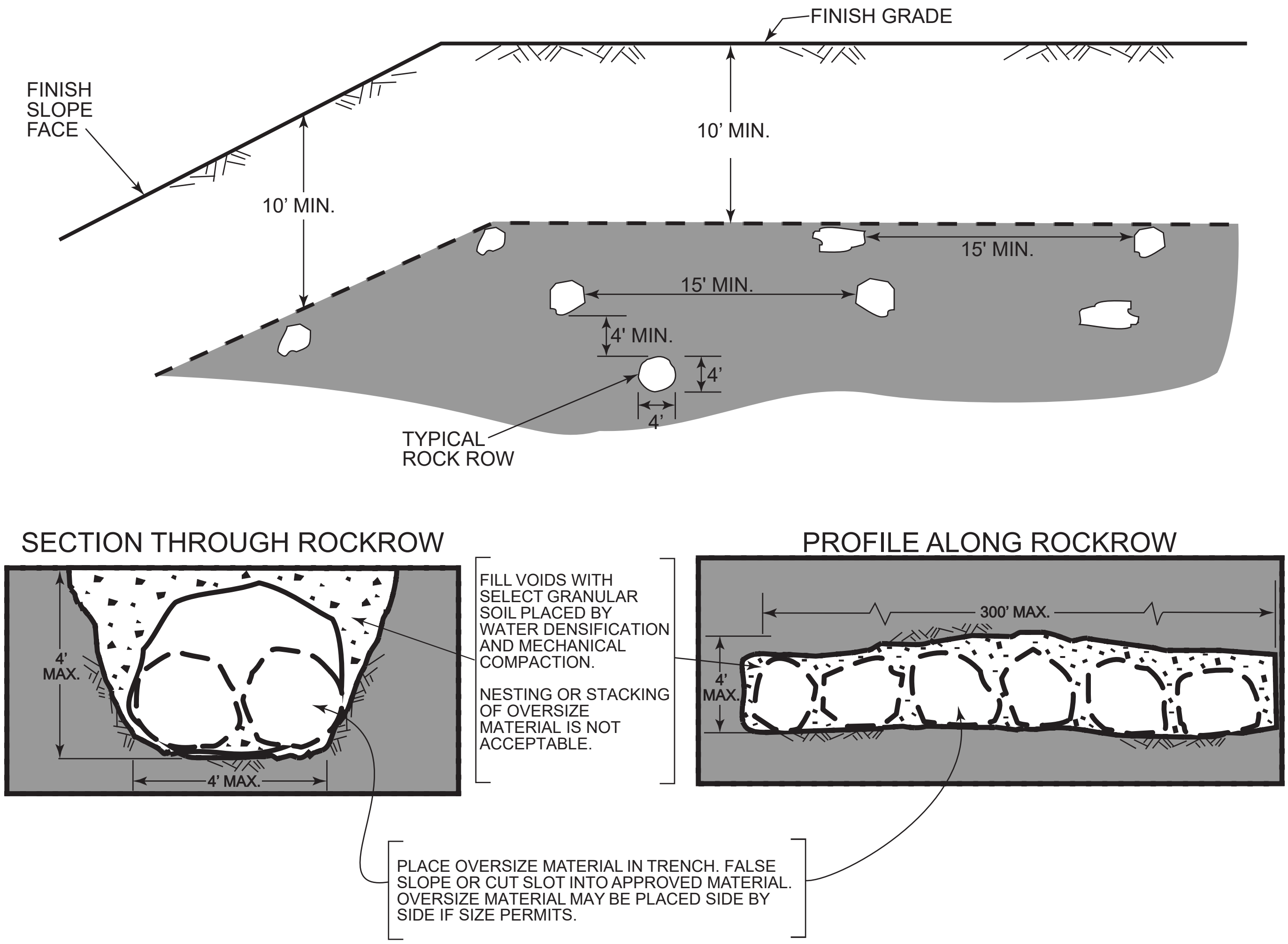


FIGURE 7

TYPICAL OVEREXCAVATION OF DAYLIGHT LINE
MINIMUM STANDARD GRADING DETAIL



NOTES:

A) OVERSIZED ROCK IS DEFINED AS LARGER THAN 12" IN SIZE IN GREATEST DIMENSION.

B) SPACE BETWEEN ROCKROWS SHOULD BE ONE EQUIPMENT WIDTH OR A MINIMUM OF 15 FEET.

C) THE WIDTH AND HEIGHT OF THE ROCKROW SHALL BE LIMITED TO FOUR FEET AND THE LENGTH LIMITED TO 300 FEET UNLESS APPROVED OTHERWISE BY THE GEOTECHNICAL CONSULTANT. OVERSIZE SHOULD BE PLACED WITH FLATEST SIDE ON THE BOTTOM.

D) OVERSIZE MATERIAL EXCEEDING FOUR FEET MAY BE PLACED ON AN INDIVIDUAL BASIS IF APPROVED BY THE GEOTECHNICAL CONSULTANT.

E) FILLING OF VOIDS WILL REQUIRE SELECT GRANULAR SOIL (SE > 20, OR LESS THAN 20 PERCENT FINES) AS APPROVED BY THE GEOTECHNICAL CONSULTANT. VOIDS IN THE ROCKROW TO BE FILLED BY WATER DENSIFYING GRANULAR SOIL INTO PLACE ALONG WITH MECHANICAL COMPACTION EFFORT.

F) IF APPROVED BY THE GEOTECHNICAL CONSULTANT, ROCKROWS MAY BE PLACED DIRECTLY ON COMPETENT MATERIALS OR BEDROCK, PROVIDED ADEQUATE SPACE IS AVAILABLE FOR COMPACTION.

G) THE FIRST LIFT OF MATERIAL ABOVE THE ROCKROW SHALL CONSIST OF GRANULAR MATERIAL AND SHALL BE PROOF-ROLLED WITH A D-8 OR LARGER DOZER OR EQUIVALENT.

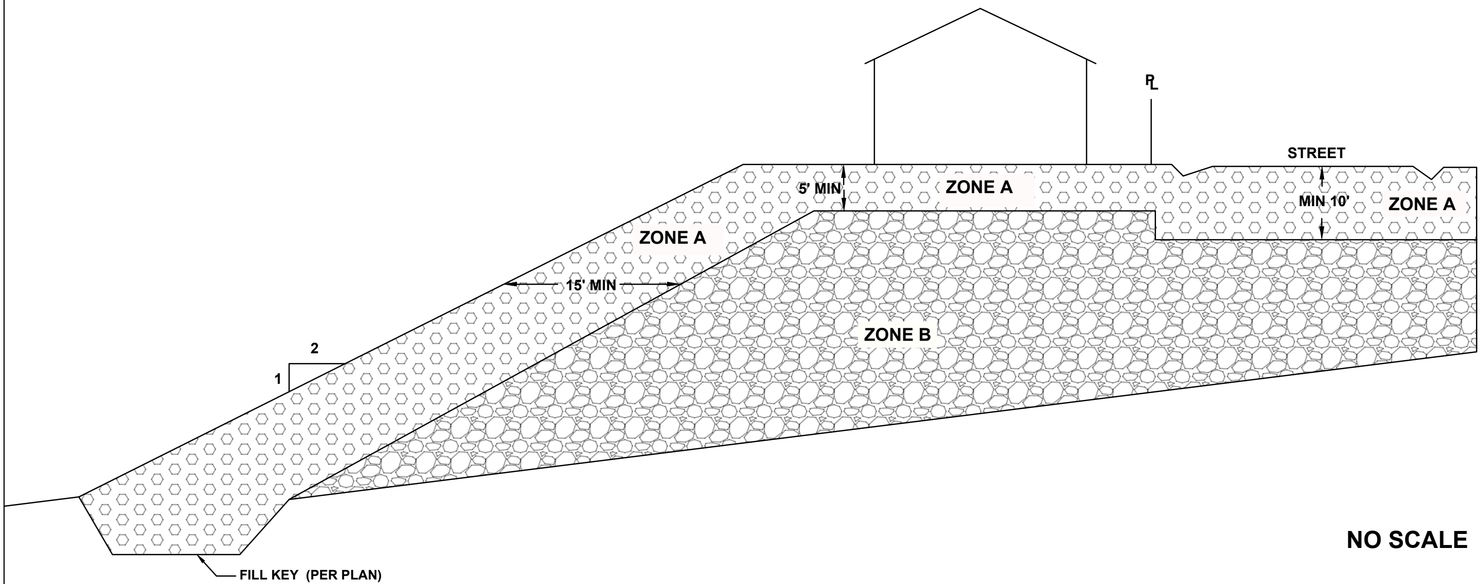
H) ROCKROWS NEAR SLOPES SHOULD BE ORIENTED PARALLEL TO SLOPE FACE.

I) NESTING OR STACKING OF ROCKS IS NOT ACCEPTABLE.

FIGURE 8

TYPICAL OVERSIZE ROCK PLACEMENT METHOD MINIMUM STANDARD GRADING DETAIL

S/A



NO SCALE

LEGEND

ZONE A:

- **THE UPPER 5 FEET OF FILL UNDER PADS SHOULD NOT HAVE ROCKS GREATER THAN 12 INCHES IN THE LARGEST DIMENSION (12-INCH MINUS).**
- **FILLS IN PUBLIC STREETS, RIGHT OF WAYS AND EASEMENTS SHOULD CONTAIN ONLY 12-INCH MINUS MATERIALS TO A DEPTH OF 10 FEET BELOW FINISH GRADE OR 2 FEET BELOW THE DEEPEST UTILITY, WHICHEVER IS DEEPER.**
- **FILLS IN SLOPE AREAS MAY HAVE OVERSIZE ROCK PLACED PER ROCK BLANKET DETAIL TO WITHIN 15 FEET OF SLOPE FACE. FILL WITHIN 15 FEET OF SLOPE FACE SHOULD ONLY CONSIST OF 12-INCH MINUS MATERIAL.**

ZONE B:

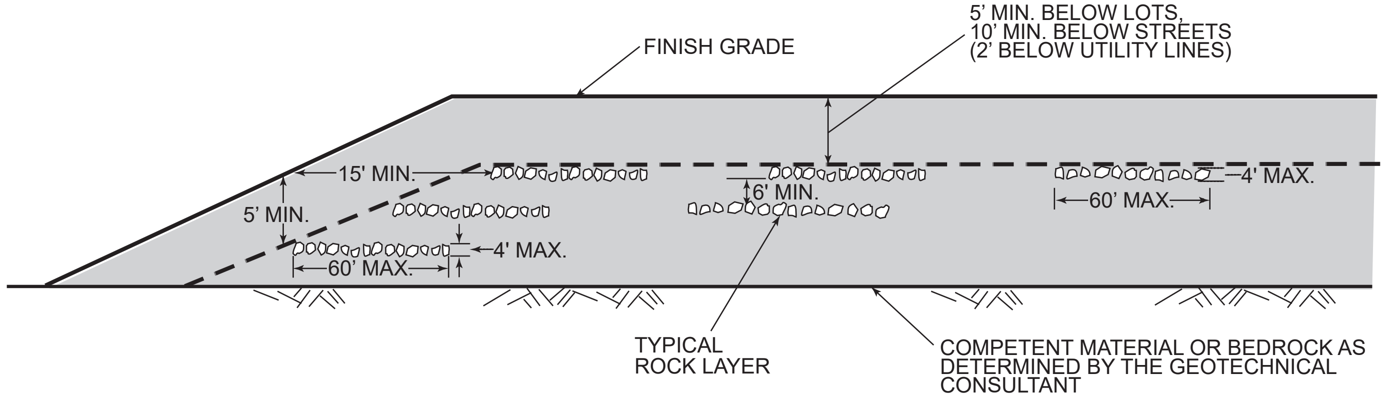
- **ROCKS UP TO 2 FEET IN HEIGHT (LYING FLAT) WITH OCCASIONAL INDIVIDUAL FRAGMENTS UP TO 4 FEET MAXIMUM DIMENSION MAY BE PLACED WITHIN ZONE B AREA.**
- **ROCKS EXCEEDING 2 FEET IN THE SMALLEST DIMENSION MAY BE PLACED IN ROWS WITH THE FLATTEST SIDE DOWN (SEE NEXT PAGE). THE WIDTH OF THE ROWS MAY EXCEED 4 FEET PROVIDED THE FILL OPERATION CAN ACCOMMODATE A MINIMUM OF 15 FEET BETWEEN ROWS, AND PROVIDED THAT THERE IS SUFFICIENT EQUIPMENT TO PLACE FILL AGAINST AND OVER THE ROWS.**
- **FILL SOILS PLACED AGAINST OR OVER ROCK ROWS SHOULD BE FREE OF ROCKS THAT MAY CAUSE NESTING/VOIDS WITHIN THE ROCK ROWS AND ROCK FILL. THIS CONDITION SHOULD BE CAREFULLY REVIEWED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT TO VERIFY SATISFACTORY OPERATIONS.**
- **ROCKS UP TO 10 FEET IN THE LEAST DIMENSION MAY BE PLACED AS INDIVIDUAL ROCKS WITHIN THE COMPACTED FILL. THE FILL SOILS NEAR AND AGAINST THESE ROCKS SHOULD BE FREE OF ROCKS THAT MAY CAUSE NESTING/VOIDS WITH THE LARGER ROCKS. THIS CONDITION SHOULD BE CAREFULLY REVIEWED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT TO VERIFY SATISFACTORY OPERATIONS.**
- **ROCKS, LARGER THAN 10 FEET IN THE SMALLEST DIMENSION, SHOULD BE REDUCED IN SIZE TO MEET THE SPECIFIED DIMENSIONS FOR INDIVIDUAL ROCK PLACEMENT AND/OR FOR PLACEMENT IN ROCK ROWS.**

NOTES: **CONTINUOUS OBSERVATION IS REQUIRED BY GEOTECHNICAL CONSULTANT DURING ROCK PLACEMENT.**

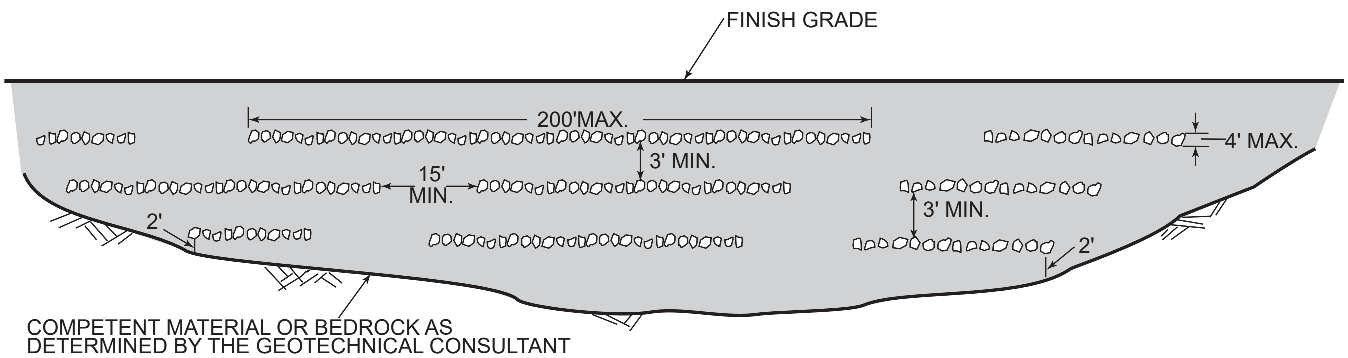
FIGURE 9

STRUCTURAL ROCK FILL PLACEMENT DETAIL

VIEW NORMAL TO SLOPE FACE



VIEW PARALLEL TO SLOPE FACE



NOTES:

1) ORIENTATION AND STAGGERING MAY VARY, BUT SHALL BE AS RECOMMENDED BY THE GEOTECHNICAL CONSULTANT.

2) ROCK LAYERS SHALL NOT BE MORE THAN 4 FEET IN HEIGHT. ROCK SHALL NOT BE STACKED OR NESTED.

3) EACH ROCK CELL MUST BE COVERED WITH A GRANULAR SOIL WITH A MINIMUM SAND EQUIVALENT (SE) OF 20 OR WITH LESS THAN 10% PASSING THE NO. 200 SIEVE AS DETERMINED BY THE GEOTECHNICAL CONSULTANT. THE GRANULAR SOIL IS TO BE FLUSHED, FLOODED, AND JETTED IN THE ROCK LAYER IN ORDER TO FILL THE VOIDS. ADDITIONAL LIFTS OF GRANULAR SOIL SHALL BE PLACED AS NECESSARY TO ALLOW FOR THE FILLING OF VOIDS BY FLOODING, AND JETTING. THE ROCK LAYER SHALL THEN BE ADEQUATELY COMPACTED WITH HEAVY EARTH MOVING EQUIPMENT.

4) ADEQUACY OF ABOVE PROCEDURE SHALL BE VERIFIED BY THE GEOTECHNICAL CONSULTANT.

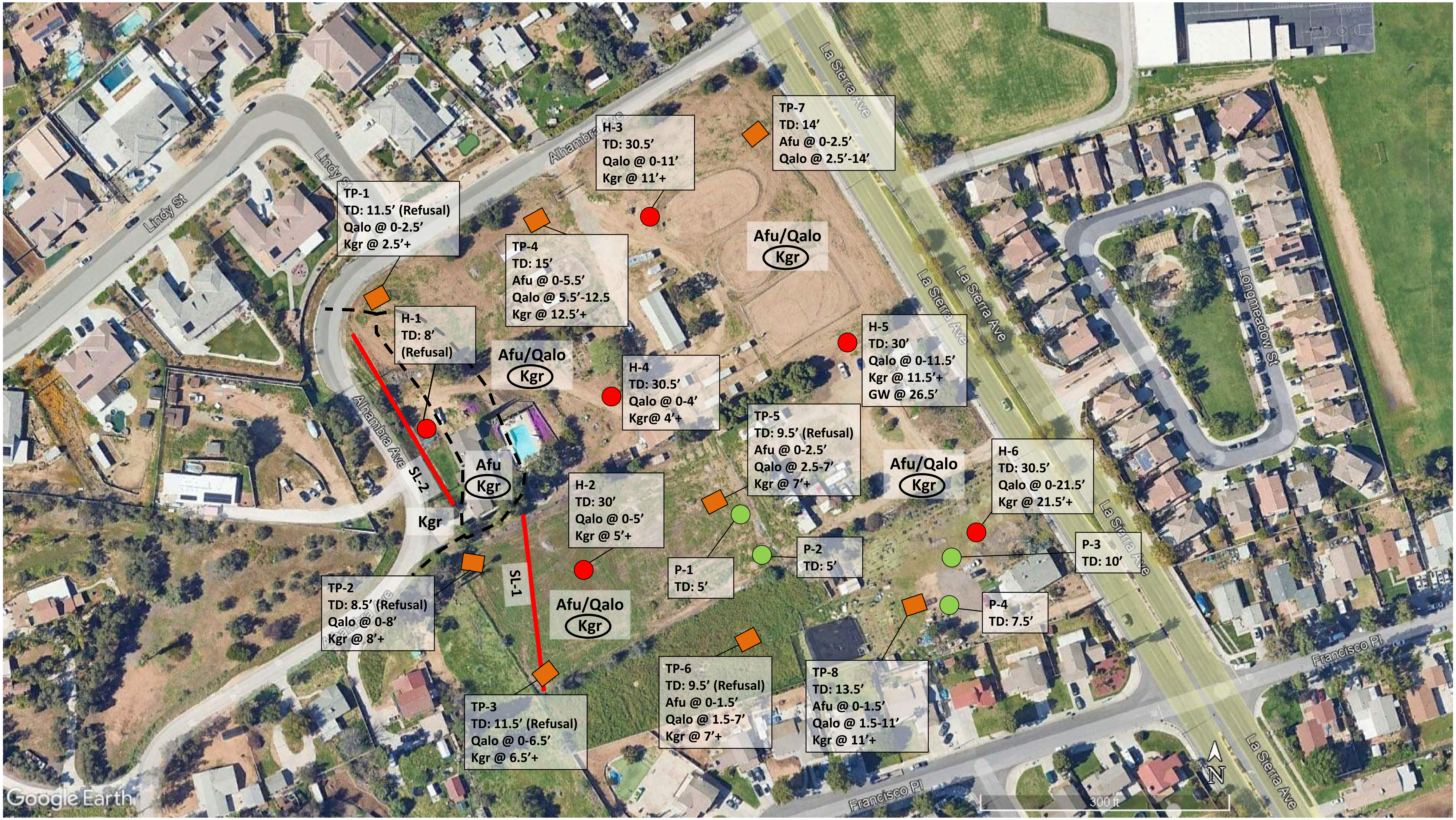
5) ROCKS EXCEEDING 2 FEET IN THE SMALLEST DIMENSION MAY BE PLACED IN ROWS AS SHOWN IN THE FIGURE WITH THE FLATTEST SIDE DOWN. THE WIDTH OF THE ROWS MAY EXCEED 4 FEET PROVIDED THE FILL OPERATION CAN ACCOMMODATE A MINIMUM OF 15 FEET BETWEEN ROWS, AND PROVIDED THAT THERE IS SUFFICIENT EQUIPMENT TO PLACE FILL AGAINST AND OVER THE ROWS. THE FILL SOILS SHOULD BE FREE OF ROCKS THAT MAY CAUSE NESTING/VOIDS WITHIN THE ROCK ROWS. THIS CONDITION SHOULD BE CAREFULLY REVIEWED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT TO VERIFY SATISFACTORY OPERATIONS.

6) ROCKS UP TO 10 FEET IN THE LEAST DIMENSION MAY BE PLACED AS INDIVIDUAL ROCKS WITHIN THE COMPACTED FILL. THE FILL SOILS NEAR AND AGAINST THESE ROCKS SHOULD BE FREE OF ROCKS THAT MAY CAUSE NESTING/VOIDS WITH THE LARGER ROCKS. THIS CONDITION SHOULD BE CAREFULLY REVIEWED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT TO VERIFY SATISFACTORY OPERATIONS.

7) ROCKS, LARGER THAN 10 FEET IN THE SMALLEST DIMENSION, SHOULD BE REDUCED IN SIZE TO MEET THE SPECIFIED DIMENSIONS FOR INDIVIDUAL ROCK PLACEMENT AND/OR FOR PLACEMENT IN ROCK ROWS.

FIGURE 10

OVERSIZE ROCK ROW PLACEMENT
FOR ZONE B STRUCTURAL ROCK FILL



Basemap Source: Google Earth

LEGEND

Symbol	Description
H-6 TD: 30.5' Qalo @ 0-21.5' Kgr @ 21.5'+	Approximate Location of Hollow Stem Auger Boring, Showing Total Depth, Depth to Earth Units, and Depth to Groundwater (if encountered) in Feet.
P-4 TD: 7.5'	Approximate Location of Hollow Stem Auger Boring and Percolation Test, Showing Total Depth in Feet.
TP-8 TD: 13.5 Afu @ 0-1.5' Qalo @ 1.5-11' Kgr @ 11'+	Approximate Test Pit Location, Showing Total Depth, and Depth to Earth Units in Feet.
(dashed line)	Geologic Contact, Dotted Where Buried
SL-2	Seismic Refraction Line

Earth Units - *Circled Where Buried*

Afu	Undocumented Artificial Fill
Qalo	Older Alluvium
Kgr	Granitic Bedrock

GEOTECHNICAL MAP

Meritage Homes
Proposed Residential Development
La Sierra Avenue/Alhambra Avenue
Riverside, California

Project Number: 23145-01
Date: December 22, 2023
Plate 1

S/A

United States Department of Agriculture

NRCS

Natural Resources Conservation Service

A product of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local participants

Custom Soil Resource Report for

Western Riverside Area, California

June 12, 2024

Preface

Soil surveys contain information that affects land use planning in survey areas. They highlight soil limitations that affect various land uses and provide information about the properties of the soils in the survey areas. Soil surveys are designed for many different users, including farmers, ranchers, foresters, agronomists, urban planners, community officials, engineers, developers, builders, and home buyers. Also, conservationists, teachers, students, and specialists in recreation, waste disposal, and pollution control can use the surveys to help them understand, protect, or enhance the environment.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. Soil surveys identify soil properties that are used in making various land use or land treatment decisions. The information is intended to help the land users identify and reduce the effects of soil limitations on various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

Although soil survey information can be used for general farm, local, and wider area planning, onsite investigation is needed to supplement this information in some cases. Examples include soil quality assessments (http://www.nrcs.usda.gov/wps/portal/nrcs/main/soils/health/) and certain conservation and engineering applications. For more detailed information, contact your local USDA Service Center (https://offices.sc.egov.usda.gov/locator/app?agency=nrcs) or your NRCS State Soil Scientist (http://www.nrcs.usda.gov/wps/portal/nrcs/detail/soils/contactus/?cid=nrcs142p2_053951).

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

The National Cooperative Soil Survey is a joint effort of the United States Department of Agriculture and other Federal agencies, State agencies including the Agricultural Experiment Stations, and local agencies. The Natural Resources Conservation Service (NRCS) has leadership for the Federal part of the National Cooperative Soil Survey.

Information about soils is updated periodically. Updated information is available through the NRCS Web Soil Survey, the site for official soil survey information.

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Contents

How Soil Surveys Are Made

Soil surveys are made to provide information about the soils and miscellaneous areas in a specific area. They include a description of the soils and miscellaneous areas and their location on the landscape and tables that show soil properties and limitations affecting various uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They observed and described many soil profiles. A soil profile is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the unconsolidated material in which the soil formed or from the surface down to bedrock. The unconsolidated material is devoid of roots and other living organisms and has not been changed by other biological activity.

Currently, soils are mapped according to the boundaries of major land resource areas (MLRAs). MLRAs are geographically associated land resource units that share common characteristics related to physiography, geology, climate, water resources, soils, biological resources, and land uses (USDA, 2006). Soil survey areas typically consist of parts of one or more MLRA.

The soils and miscellaneous areas in a survey area occur in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. Soil taxonomy, the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

The objective of soil mapping is not to delineate pure map unit components; the objective is to separate the landscape into landforms or landform segments that have similar use and management requirements. Each map unit is defined by a unique combination of soil components and/or miscellaneous areas in predictable proportions. Some components may be highly contrasting to the other components of the map unit. The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The delineation of such landforms and landform segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

Soil scientists make many field observations in the process of producing a soil map. The frequency of observation is dependent upon several factors, including scale of mapping, intensity of mapping, design of map units, complexity of the landscape, and experience of the soil scientist. Observations are made to test and refine the soil-landscape model and predictions and to verify the classification of the soils at specific locations. Once the soil-landscape model is refined, a significantly smaller number of measurements of individual soil properties are made and recorded. These measurements may include field measurements, such as those for color, depth to bedrock, and texture, and laboratory measurements, such as those for content of sand, silt, clay, salt, and other components. Properties of each soil typically vary from one point to another across the landscape.

Observations for map unit components are aggregated to develop ranges of characteristics for the components. The aggregated values are presented. Direct measurements do not exist for every property presented for every map unit component. Values for some properties are estimated from combinations of other properties.

While a soil survey is in progress, samples of some of the soils in the area generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations are developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Soil Map

The soil map section includes the soil map for the defined area of interest, a list of soil map units on the map and extent of each map unit, and cartographic symbols displayed on the map. Also presented are various metadata about data used to produce the map, and a description of each soil map unit.

Soil Map

Map Scale: 1:2,160 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

N

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)
- Area of Interest (AOI)

Soils
- Soil Map Unit Polygons
- Soil Map Unit Lines
- Soil Map Unit Points

Special Point Features
- Blowout
- Borrow Pit
- Clay Spot
- Closed Depression
- Gravel Pit
- Gravelly Spot
- Landfill
- Lava Flow
- Marsh or swamp
- Mine or Quarry
- Miscellaneous Water
- Perennial Water
- Rock Outcrop
- Saline Spot
- Sandy Spot
- Severely Eroded Spot
- Sinkhole
- Slide or Slip
- Sodic Spot
- Spoil Area
- Stony Spot
- Very Stony Spot
- Wet Spot
- Other
- Special Line Features

Water Features
- Streams and Canals

Transportation
- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background
- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 16, Aug 30, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 14, 2022—Mar 17, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AoC	Arlington fine sandy loam, deep, 2 to 8 percent slopes	7.6	79.6%
BdC	Bonsall fine sandy loam, 2 to 8 percent slopes	0.3	2.6%
BdD	Bonsall fine sandy loam, 8 to 15 percent slopes	1.7	17.8%
Totals for Area of Interest		**9.6**	**100.0%**

Map Unit Descriptions

The map units delineated on the detailed soil maps in a soil survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions, along with the maps, can be used to determine the composition and properties of a unit.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some minor components that belong to taxonomic classes other than those of the major soils.

Most minor soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting, or similar, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. If included in the database for a given area, the contrasting minor components are identified in the map unit descriptions along with some characteristics of each. A few areas of minor components may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of minor components in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into landforms or landform segments that have similar use and management requirements. The delineation of such segments on the map provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, onsite investigation is needed to define and locate the soils and miscellaneous areas.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives important soil properties and qualities.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer, slope, stoniness, salinity, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Alpha silt loam, 0 to 2 percent slopes, is a phase of the Alpha series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes, associations, or undifferentiated groups.

A *complex* consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Alpha-Beta complex, 0 to 6 percent slopes, is an example.

An *association* is made up of two or more geographically associated soils or miscellaneous areas that are shown as one unit on the maps. Because of present or anticipated uses of the map units in the survey area, it was not considered practical or necessary to map the soils or miscellaneous areas separately. The pattern and relative proportion of the soils or miscellaneous areas are somewhat similar. Alpha-Beta association, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Alpha and Beta soils, 0 to 2 percent slopes, is an example.

Some surveys include *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Rock outcrop is an example.

Western Riverside Area, California

AoC—Arlington fine sandy loam, deep, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hcr0
Elevation: 400 to 2,000 feet
Mean annual precipitation: 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 240 to 320 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Arlington and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Arlington

Setting

Landform: Alluvial fans
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 11 inches: fine sandy loam
H2 - 11 to 50 inches: sandy loam
H3 - 50 to 60 inches: cemented
H4 - 60 to 70 inches: coarse sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: 40 to 60 inches to duripan
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately low to moderately high (0.06 to 0.20 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.1 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 3e
Hydrologic Soil Group: B
Ecological site: R019XD029CA - LOAMY
Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 10 percent
Hydric soil rating: No

Greenfield

Percent of map unit: 5 percent
Hydric soil rating: No

BdC—Bonsall fine sandy loam, 2 to 8 percent slopes

Map Unit Setting

National map unit symbol: hcrf
Elevation: 200 to 2,500 feet
Mean annual precipitation: 14 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 240 to 340 days
Farmland classification: Not prime farmland

Map Unit Composition

Bonsall and similar soils: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonsall

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Residuum weathered from tonalite and/or granodiorite

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 25 inches: clay loam
H3 - 25 to 53 inches: sandy loam

Properties and qualities

Slope: 2 to 8 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None

Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 50.0
Available water supply, 0 to 60 inches: Very low (about 1.0 inches)

Interpretive groups
Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Minor Components

Bonsall
Percent of map unit: 5 percent
Hydric soil rating: No

Cieneba
Percent of map unit: 4 percent
Hydric soil rating: No

Fallbrook
Percent of map unit: 3 percent
Hydric soil rating: No

Vista
Percent of map unit: 1 percent
Hydric soil rating: No

Unnamed, ponded
Percent of map unit: 1 percent
Landform: Depressions
Hydric soil rating: Yes

Monserate
Percent of map unit: 1 percent
Hydric soil rating: No

BdD—Bonsall fine sandy loam, 8 to 15 percent slopes

Map Unit Setting
National map unit symbol: hcrg
Elevation: 200 to 2,500 feet
Mean annual precipitation: 14 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 240 to 340 days
Farmland classification: Not prime farmland

Map Unit Composition
Bonsall and similar soils: 85 percent
Minor components: 15 percent

Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Bonsall

Setting

Landform: Hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Side slope
Down-slope shape: Concave
Across-slope shape: Linear
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 9 inches: fine sandy loam
H2 - 9 to 25 inches: clay loam
H3 - 25 to 53 inches: sandy loam

Properties and qualities

Slope: 8 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Moderately well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low to moderately low (0.00 to 0.06 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Calcium carbonate, maximum content: 5 percent
Maximum salinity: Slightly saline to moderately saline (4.0 to 8.0 mmhos/cm)
Sodium adsorption ratio, maximum: 50.0
Available water supply, 0 to 60 inches: Very low (about 1.0 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: D
Ecological site: R019XD061CA - CLAYPAN
Hydric soil rating: No

Minor Components

Bonsall

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent
Hydric soil rating: No

Unnamed, ponded

Percent of map unit: 5 percent
Landform: Depressions
Hydric soil rating: Yes

Soil Information for All Uses

Soil Properties and Qualities

The Soil Properties and Qualities section includes various soil properties and qualities displayed as thematic maps with a summary table for the soil map units in the selected area of interest. A single value or rating for each map unit is generated by aggregating the interpretive ratings of individual map unit components. This aggregation process is defined for each property or quality.

Soil Qualities and Features

Soil qualities are behavior and performance attributes that are not directly measured, but are inferred from observations of dynamic conditions and from soil properties. Example soil qualities include natural drainage, and frost action. Soil features are attributes that are not directly part of the soil. Example soil features include slope and depth to restrictive layer. These features can greatly impact the use and management of the soil.

Hydrologic Soil Group

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The soils in the United States are assigned to four groups (A, B, C, and D) and three dual classes (A/D, B/D, and C/D). The groups are defined as follows:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

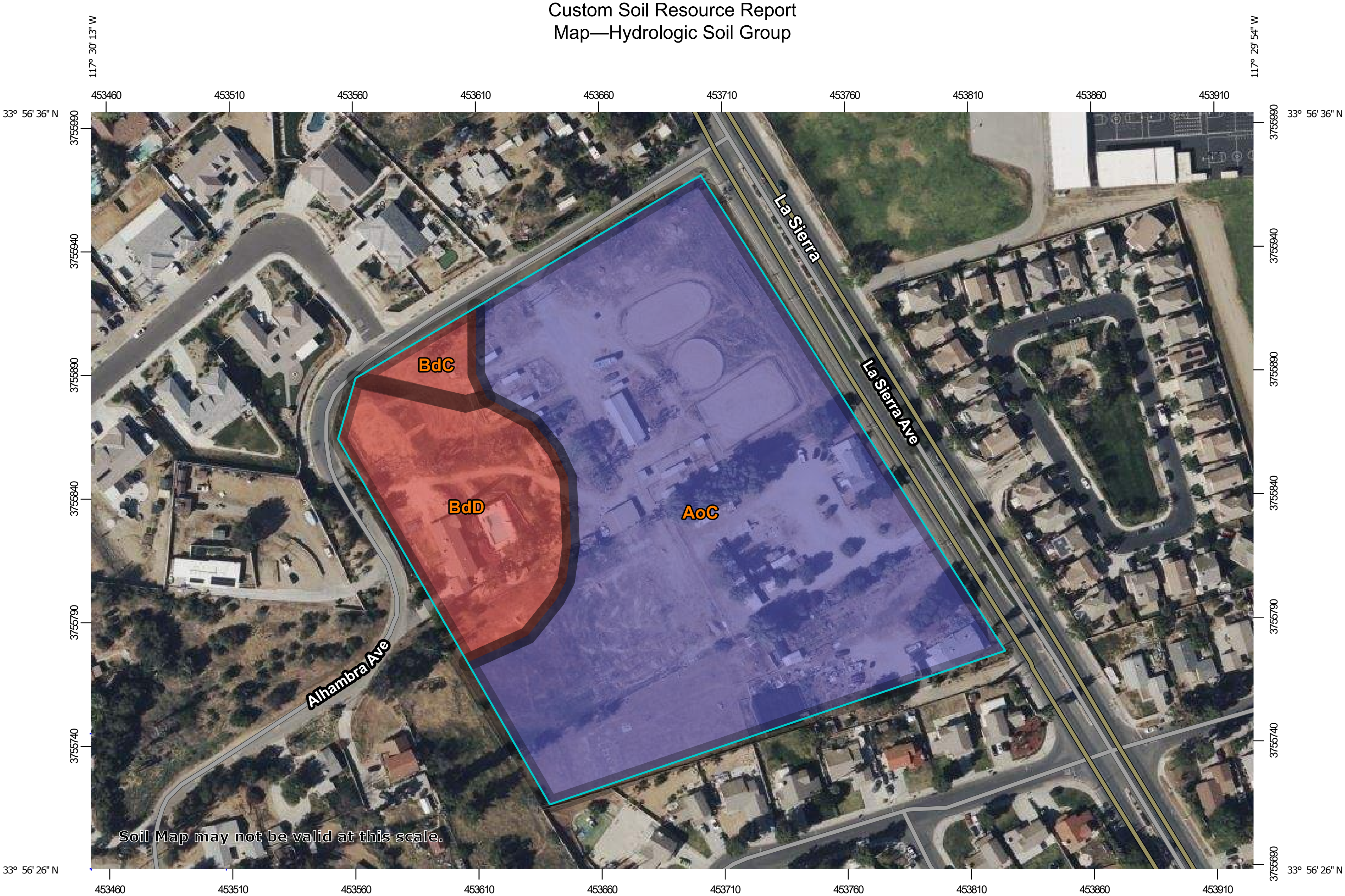
Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have a high shrink-swell potential, soils that have a high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas. Only the soils that in their natural condition are in group D are assigned to dual classes.

Map—Hydrologic Soil Group



Map Scale: 1:2,160 if printed on A landscape (11" x 8.5") sheet.

Meters: 0, 30, 60, 120, 180

Feet: 0, 100, 200, 400, 600

N

Map projection: Web Mercator   Corner coordinates: WGS84   Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Rating Polygons

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Lines

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Soil Rating Points

A

A/D

B

B/D

C

C/D

D

Not rated or not available

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:15,800.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Western Riverside Area, California
Survey Area Data: Version 16, Aug 30, 2023

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Mar 14, 2022—Mar 17, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Table—Hydrologic Soil Group

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
AoC	Arlington fine sandy loam, deep, 2 to 8 percent slopes	B	7.6	79.6%
BdC	Bonsall fine sandy loam, 2 to 8 percent slopes	D	0.3	2.6%
BdD	Bonsall fine sandy loam, 8 to 15 percent slopes	D	1.7	17.8%
Totals for Area of Interest			**9.6**	**100.0%**

Rating Options—Hydrologic Soil Group

Aggregation Method: Dominant Condition

Component Percent Cutoff: None Specified

Tie-break Rule: Higher

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Appendix 4: Historical Site Conditions

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

N/A

Appendix 5: LID Infeasibility

LID Technical Infeasibility Analysis

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	Kimley-Horn	Date	2/17/2025
Designed by	KPM	Case No	
Company Project Number/Name	MLC La Sierra		

BMP Identification

BMP NAME / ID: DMA A/South

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}= 0.69 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)*
A	*176679*	*Concrete or Asphalt*	*1*	*0.89*	*157597.7*			
A	*163088*	*Ornamental Landscaping*	*0.1*	*0.11*	*18014.4*			
	339767	***Total***			175612.1	**0.69**	***10097.7***	***10248***

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: Kimley-Horn — Date: 2/17/2025

Designed by: KPM — Case No:

Company Project Number/Name: MLC La Sierra

BMP Identification

BMP NAME / ID: DMA C-1

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}= 0.69 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)*
C-1	*15630*	*Concrete or Asphalt*	*1*	*0.89*	*13942*			
C-1	*7896*	*Ornamental Landscaping*	*0.1*	*0.11*	*872.2*			
	23526	**Total**			**14814.2**	**0.69**	**851.8**	**867**

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: Kimley-Horn
Date: 2/17/2025
Designed by: KPM
Case No:
Company Project Number/Name: MLC La Sierra

BMP Identification

BMP NAME / ID: DMA C-2

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}= 0.69 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 Impervious 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)*
C-2	*15630*	*Concrete or Asphalt*	*1*	*0.89*	*13942*			
C-2	*6288*	*Ornamental Landscaping*	*0.1*	*0.11*	*694.6*			
	21918	***Total***			**14636.6**	**0.69**	***841.6***	***867***

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: Kimley-Horn
Date: 2/17/2025
Designed by: KPM
Case No:
Company Project Number/Name: MLC La Sierra

BMP Identification

BMP NAME / ID: DMA C-3

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}= 0.69 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 Impervious 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)*
C-3	*15630*	*Concrete or Asphalt*	*1*	*0.89*	*13942*			
C-3	*6289*	*Ornamental Landscaping*	*0.1*	*0.11*	*694.7*			
	21919	***Total***			**14636.7**	**0.69**	**841.6**	**867**

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: Kimley-Horn | Date: 2/17/2025

Designed by: KPM | Case No:

Company Project Number/Name: MLC La Sierra

BMP Identification

BMP NAME / ID: DMA C-4

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}= 0.69 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 Impervious 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)*
C-4	*15630*	*Concrete or Asphalt*	*1*	*0.89*	*13942*			
C-4	*7176*	*Ornamental Landscaping*	*0.1*	*0.11*	*792.6*			
	22806	***Total***			**14734.6**	**0.69**	***847.2***	***867***

Notes:

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries
	Basin A		Calculated Cells

Company Name:	Kimley-Horn	Date:	2/17/2025
Designed by:	KPM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T= 7.8 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 10,098 ft^3

Type of Bioretention Facility Design

◉ Side slopes required (parallel to parking spaces or adjacent to walkways)

○ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 2.7 ft

Top Width of Bioretention Facility, excluding curb — w_T = 25.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.68 ft

Minimum Surface Area, A_m

$$A_M\,(ft^2) = \frac{V_{BMP}\,(ft^3)}{d_E\,(ft)}$$

A_M = 6,004 ft^2

Proposed Surface Area — A= 6,100 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0.5 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries
	Basin C-1		Calculated Cells

Company Name:	Kimley-Horn	Date:	2/17/2025
Designed by:	KPM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T= 0.54 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 852 ft^3

Type of Bioretention Facility Design

◉ Side slopes required (parallel to parking spaces or adjacent to walkways)

○ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 1.5 ft

Top Width of Bioretention Facility, excluding curb — w_T = 12.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.29 ft

Minimum Surface Area, A_m

$$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$$

A_M = 660 ft^2

Proposed Surface Area — A= 672 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0.5 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries
	Basin C-2		Calculated Cells

Company Name:	Kimley-Horn	Date:	2/17/2025
Designed by:	KPM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature — A_T= 0.5 acres

Enter V_{BMP} determined from Section 2.1 of this Handbook — V_{BMP}= 867 ft^3

Type of Bioretention Facility Design

◉ Side slopes required (parallel to parking spaces or adjacent to walkways)

○ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer — d_S = 1.5 ft

Top Width of Bioretention Facility, excluding curb — w_T = 12.0 ft

Total Effective Depth, d_E

$d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$ — d_E = 1.29 ft

Minimum Surface Area, A_m

$$A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$$

A_M = 672 ft^2

Proposed Surface Area — A= 672 ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility — z = 4 :1

Diameter of Underdrain — 6 inches

Longitudinal Slope of Site (3% maximum) — 0.5 %

6" Check Dam Spacing — 0 feet

Describe Vegetation:

Notes:

Bioretention Facility - Design Procedure	BMP ID	Legend:	Required Entries
	Basin C-3		Calculated Cells

Company Name:	Kimley-Horn	Date:	2/17/2025
Designed by:	KPM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.5	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	842	ft^3

Type of Bioretention Facility Design

- ◉ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◯ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	1.5	ft
Top Width of Bioretention Facility, excluding curb	w_T =	12.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.29	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \frac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	652	ft^2
Proposed Surface Area	A=	672	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0.5	%
6" Check Dam Spacing		0	feet

Describe Vegetation:

Notes:

Bioretention Facility - Design Procedure	BMP ID: Basin C-4	Legend:	Required Entries / Calculated Cells

Company Name:	Kimley-Horn	Date:	2/17/2025
Designed by:	KPM	County/City Case No.:	

Design Volume

Enter the area tributary to this feature	A_T=	0.52	acres
Enter V_{BMP} determined from Section 2.1 of this Handbook	V_{BMP}=	847	ft^3

Type of Bioretention Facility Design

- ◉ Side slopes required (parallel to parking spaces or adjacent to walkways)
- ◯ No side slopes required (perpendicular to parking space or Planter Boxes)

Bioretention Facility Surface Area

Depth of Soil Filter Media Layer	d_S =	1.5	ft
Top Width of Bioretention Facility, excluding curb	w_T =	12.0	ft
Total Effective Depth, d_E $d_E = (0.3) \times d_S + (0.4) \times 1 - (0.7/w_T) + 0.5$	d_E =	1.29	ft
Minimum Surface Area, A_m $A_M\ (ft^2) = \dfrac{V_{BMP}\ (ft^3)}{d_E\ (ft)}$	A_M =	656	ft^2
Proposed Surface Area	A=	672	ft^2

Bioretention Facility Properties

Side Slopes in Bioretention Facility	z =	4	:1
Diameter of Underdrain		6	inches
Longitudinal Slope of Site (3% maximum)		0.5	%
6" Check Dam Spacing		0	feet

Describe Vegetation:

Notes:

Appendix 7: Hydromodification

Supporting Detail Relating to Hydrologic Conditions of Concern