

DOCKETED	
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Description:	N/A
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Organization:	Dudek
Submitter Role:	Applicant Consultant
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Appendix 3.15A

Water Quality Management Plan

2 of 6

Boring Log No. SUB-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4865° Longitude: -118.1375° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
2		SILTY SAND WITH GRAVEL (SM) , brown	5			21-28-32	2.3	125		28
		dense					2.1			
1		SILTY CLAYEY SAND (SC-SM) , light brown, dense	10			15-15-19 N=34	1.4	109	19-15-4	20
		brown, medium dense				13-16-17				
2		POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, light brown to brown, medium dense	10			8-11-14 N=25				10
			15			17-24-32				
			20			15-41-32 N=73				
		light brown and white, very dense	25			15-24-32 N=56				
			30							

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.
Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
Groundwater not encountered

Drill Rig
D-50
Hammer Type
Automatic
Driller
Terracon
Logged by
OW
Boring Started
12-18-2024
Boring Completed
12-18-2024

Advancement Method
Hollow Stem Auger
Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Boring Log No. SUB-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4865° Longitude: -118.1375° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
2		POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, brown, very dense			X	21-23-35 N=58				
		35.0 SILTY SAND (SM) , trace gravel, brown, very dense	35		X	30-33-48 N=81				
		45.0 POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, gray and brown, very dense	45		X	21-26-34 N=60				
		50.0 POORLY GRADED SAND (SP) , trace silt and gravel, light brown, dense	50		X	22-44-50/4"				
		51.5 Boring Terminated at 51.5 Feet			X	11-19-26 N=45				

Notes See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations obtained from Google Earth	Water Level Observations Groundwater not encountered	Drill Rig D-50
	Advancement Method Hollow Stem Auger	Hammer Type Automatic
	Abandonment Method Boring backfilled with Auger Cuttings and/or Bentonite	Driller Terracon
		Logged by OW
		Boring Started 12-18-2024
		Boring Completed 12-18-2024

Boring Log No. SUB-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4871° Longitude: -118.1358° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND (SM) , trace gravel, brown medium dense	5			6-11-10 N=21	1.7	110		20
						10-10-24				
2		POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, light brown, dense very dense medium dense	10			24-28-30 N=58	1.1	109		11
						12-25-28				
		POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, light brown, dense medium dense dense	25			14-18-20 N=38	1.8	112		
						12-20-31				
		POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, light brown, dense dense	30			15-24-26 N=50				

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
 See [Supporting Information](#) for explanation of symbols and abbreviations.
 Elevation Reference: Elevations obtained from Google Earth

Notes

Water Level Observations
 Groundwater not encountered

Drill Rig
 D-50

Hammer Type
 Automatic

Driller
 Terracon

Logged by
 OW

Boring Started
 12-19-2024

Boring Completed
 12-19-2024

Advancement Method
 Hollow Stem Auger

Abandonment Method
 Boring backfilled with Auger Cuttings and/or Bentonite

Boring Log No. SUB-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4871° Longitude: -118.1358° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
2		POORLY GRADED SAND WITH SILT (SP-SM) , trace gravel, light brown, very dense	35		X	19-29-50/4"				
					X	28-34-39 N=73				
		40.0	40		X	18-38-48 N=86				
		45.0	45		X	29-34-50/5"				
		50.9	50		X	25-50/5"				
		Boring Terminated at 50.9 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations obtained from Google Earth	Water Level Observations Groundwater not encountered	Drill Rig D-50
		Hammer Type Automatic
		Driller Terracon
Notes	Advancement Method Hollow Stem Auger	Logged by OW
		Boring Started 12-19-2024
	Abandonment Method Boring backfilled with Auger Cuttings and/or Bentonite	Boring Completed 12-19-2024

Boring Log No. OM-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4863° Longitude: -118.1385° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND WITH GRAVEL (SM) , brown							33-16-17	50
		medium dense				25-25-30	7.0	124		
		5.0	5							
		SILTY SAND (SM) , trace gravel, loose				6-4-4 N=8				
						5-8-8	4.2	116		
2						4-4-5 N=9				
		15.0	15							
		medium dense				7-12-18	3.8	113		
		20.0	20							
		POORLY GRADED SAND WITH GRAVEL (SP) , trace silt, brown, dense				19-19-20 N=39				
		21.5								
		Boring Terminated at 21.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations obtained from Google Earth	Water Level Observations Groundwater not encountered	Drill Rig D-50
		Hammer Type Automatic
		Driller Terracon
Notes	Advancement Method Hollow Stem Auger	Logged by OW
	Abandonment Method Boring backfilled with Auger Cuttings and/or Bentonite	Boring Started 12-18-2024
		Boring Completed 12-18-2024

Boring Log No. OM-2

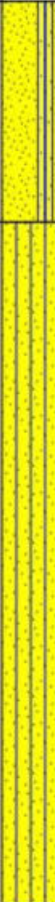
Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4860° Longitude: -118.1389° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		CLAYEY SAND (SC) , trace gravel, brown								
		loose				2-2-4 N=6				30
		5.0								
		SILTY CLAYEY SAND (SC-SM) , brown, loose	5			5-5-9	4.4	105		
						6-7-9 N=16			21-17-4	44
		10.0	10			9-10-12	2.5	110		
2		SILTY SAND (SM) , brown, medium dense								
						3-6-10 N=16				
		15.0	15							
		POORLY GRADED SAND (SP) , trace silt, light brown, medium dense								
		dense	20			46-46-37	3.0	118		
		21.5								
		Boring Terminated at 21.5 Feet								

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations. Elevation Reference: Elevations obtained from Google Earth	Water Level Observations Groundwater not encountered	Drill Rig D-50
		Hammer Type Automatic
		Driller Terracon
Notes	Advancement Method Hollow Stem Auger	Logged by OW
		Boring Started 12-18-2024
	Abandonment Method Boring backfilled with Auger Cuttings and/or Bentonite	Boring Completed 12-18-2024

Boring Log No. TL-1

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4818° Longitude: -118.1378° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND (SM) , light brown medium dense	5			12-11-10	1.1	111		14
						4-5-6 N=11	1.6	116		
						10-18-25				
						6-23-28 N=51				
2		very dense	15			20-50/5"	2.6	112		
						16-36-44 N=80				
						8-40-23 N=63				
See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations.			Water Level Observations Groundwater not encountered			Drill Rig D-50 Hammer Type Automatic Driller Terracon Logged by OW			Boring Started 01-08-2025 Boring Completed 01-08-2025	
Notes			Advancement Method Hollow Stem Auger Abandonment Method Boring backfilled with Auger Cuttings and/or Bentonite							

Boring Log No. TL-1A

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4818° Longitude: -118.1378° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
2		POORLY GRADED SAND WITH SILT (SP-SM) , brown, very dense	35.0			25-37-27 N=64				
		SILTY SAND (SM) , brown, very dense	40			12-34-50/4"				
						25-50/6"				
			45			28-50/6"				
			50			50/6"				
		Boring Terminated at 50.5 Feet								

Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations.	Water Level Observations Groundwater not encountered	Drill Rig D-50
		Advancement Method Hollow Stem Auger	Hammer Type Automatic
		Abandonment Method Boring backfilled with Auger Cuttings and/or Bentonite	Driller Terracon
			Logged by OW
			Boring Started 01-08-2025
			Boring Completed 01-08-2025

Boring Log No. TL-2

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4808° Longitude: -118.1379° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND (SM) , medium brown								24
		loose			4-4-4 N=8				NP	
1		5.0								
		POORLY GRADED SAND WITH SILT (SP-SM) , medium brown, medium dense	5		8-8-11		1.6			
					3-5-6 N=11					
			10		9-12-12		1.4			
2		dense	15		10-10-10 N=20					
			20		16-27-35		1.2	108		
2		medium dense	25		12-13-15 N=28					
			30							

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Water Level Observations
Groundwater not encountered

Drill Rig
D-50
Hammer Type
Automatic
Driller
Terracon
Logged by
JB
Boring Started
01-20-2025
Boring Completed
01-20-2025

Advancement Method
Hollow Stem Auger
Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

[illegible]

Boring Started
01-20-2025

Boring Completed
01-20-2025

Boring Log No. TL-3

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4838° Longitude: -118.1348° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND (SM) , medium brown								26
		loose				5-5-8	6.3	116		
			5			4-4-4 N=8			20-19-1	
		medium dense				8-12-12	6.4	118		
			10			4-6-5 N=11				
			15			13-17-18	14.5	117		
2		POORLY GRADED SAND WITH SILT (SP-SM) , brown, medium dense								6
			20			5-7-6 N=13			NP	
		SILTY SAND (SM) , medium brown, dense very dense				11-50/3"				
			25							
			30							

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
 See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Water Level Observations
 Groundwater not encountered

Drill Rig
 D-50

Hammer Type
 Automatic

Driller
 Terracon

Logged by
 JB

Boring Started
 01-20-2025

Boring Completed
 01-20-2025

Advancement Method
 Hollow Stem Auger

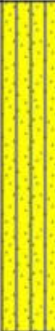
Abandonment Method
 Boring backfilled with Auger Cuttings and/or Bentonite

Boring Log No. TL-3

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4838° Longitude: -118.1348° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
2		SILTY SAND (SM) , medium brown, very dense (continued)			X	16-22-24 N=46				
			35		X	20-28-28 N=56				
			40		X	16-21-21 N=42				
			45		X	24-50/6"				
			50		X	31-42-40 N=82				
			51.5							
		Boring Terminated at 51.5 Feet								

Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any). See Supporting Information for explanation of symbols and abbreviations.	Water Level Observations Groundwater not encountered	Drill Rig D-50 Hammer Type Automatic Driller Terracon Logged by JB
		Advancement Method Hollow Stem Auger Abandonment Method Boring backfilled with Auger Cuttings and/or Bentonite	Boring Started 01-20-2025 Boring Completed 01-20-2025

Boring Log No. TL-4

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4802° Longitude: -118.1336° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND (SM) , medium brown loose	5			3-4-3 N=7	3.0	109	NP	
2		POORLY GRADED SAND WITH SILT (SP-SM) , light brown, medium dense loose medium dense very dense	10			4-5-5 N=10	14.0	116		
			15			7-11-16 N=27				
			20			50/6"	4.9	107		
			25			15-17-44 N=61				
			30							

See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).
See Supporting Information for explanation of symbols and abbreviations.

Notes

Water Level Observations
Groundwater not encountered

Drill Rig
D-50

Hammer Type
Automatic

Driller
Terracon

Logged by
JB

Boring Started
01-20-2025

Boring Completed
01-20-2025

Advancement Method
Hollow Stem Auger

Abandonment Method
Boring backfilled with Auger Cuttings and/or Bentonite

Boring Log No. TL-5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4832° Longitude: -118.1323° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND (SM) , brown							NP	13
		loose				2-2-5	4.8	102		
		medium dense	5			4-5-6 N=11				
						3-10-14	3.9	111		
			10			8-7-11 N=18				
2		POORLY GRADED SAND (SP) , trace silt, light brown, medium dense	15.0			13-20-23	7.2	120		
		very dense	20			39-37-21 N=58				
		POORLY GRADED SAND WITH SILT (SP-SM) , brown, medium dense	25.0			8-9-9 N=18				
			30							

Notes	See Exploration and Testing Procedures for a description of field and laboratory procedures used and additional data (If any).	Water Level Observations Groundwater not encountered	Drill Rig D-50 Hammer Type Automatic Driller Terracon Logged by JB
	See Supporting Information for explanation of symbols and abbreviations.		
	Advancement Method Hollow Stem Auger	Abandonment Method Boring backfilled with Auger Cuttings and/or Bentonite	Boring Started 01-21-2025
			Boring Completed 01-21-2025

Boring Log No. TL-5

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4832° Longitude: -118.1323° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
2		POORLY GRADED SAND WITH SILT (SP-SM) , brown, medium dense			X	9-11-10 N=21				
		35.0	35		X	7-10-10 N=20				
		SILTY SAND (SM) , medium brown, medium dense								
					X	7-15-15 N=30				
		dense	40							
					X	10-13-17 N=30				
			45							
					X	16-19-21 N=40				
		51.5	50							
		Boring Terminated at 51.5 Feet								

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
 See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Water Level Observations
 Groundwater not encountered

Drill Rig
 D-50

Hammer Type
 Automatic

Driller
 Terracon

Logged by
 JB

Boring Started
 01-21-2025

Boring Completed
 01-21-2025

Advancement Method
 Hollow Stem Auger

Abandonment Method
 Boring backfilled with Auger Cuttings and/or Bentonite

Boring Log No. TL-6

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4819° Longitude: -118.1290° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND (SM) , brown medium dense							NP	23
						4-6-6 N=12				
			5			8-13-16	2.2	117		
						5-7-7 N=14				
			10			6-8-12	4.1	118		
			15			4-8-8 N=16				
2		POORLY GRADED SAND WITH SILT (SP-SM) , medium brown, medium dense dense	20.0			10-20-20	4.1	124		
						6-16-21 N=37				
			25							
			30							

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
 See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Water Level Observations
 Groundwater not encountered

Drill Rig
 D-50

Hammer Type
 Automatic

Driller
 Terracon

Logged by
 JB

Advancement Method
 Hollow Stem Auger

Abandonment Method
 Boring backfilled with Auger Cuttings and/or Bentonite

Boring Started
 01-21-2025

Boring Completed
 01-21-2025

Boring Log No. TL-6

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4819° Longitude: -118.1290° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
2		POORLY GRADED SAND WITH SILT (SP-SM) , medium brown, medium dense <i>(continued)</i> very dense			X	16-21-27 N=48				
			35		X	21-21-27 N=48				
			40		X	26-50/6"				
		45.0	45		X	16-22-29 N=51				28
		SILTY SAND (SM) , brown, very dense								
		51.5	50		X	14-22-32 N=54				
		Boring Terminated at 51.5 Feet								

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
 See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Water Level Observations
 Groundwater not encountered

Drill Rig
 D-50

Hammer Type
 Automatic

Driller
 Terracon

Logged by
 JB

Advancement Method
 Hollow Stem Auger

Abandonment Method
 Boring backfilled with Auger Cuttings and/or Bentonite

Boring Started
 01-21-2025

Boring Completed
 01-21-2025

Boring Log No. TL-7

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4846° Longitude: -118.1332° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND (SM) , brown medium dense	5			12-20-20	3.5	124	18-17-1	27
						6-7-9 N=16				
						10-18-21	1.9	112		
						6-11-14 N=25				
2		POORLY GRADED SAND WITH SILT (SP-SM) , light brown, dense	15			13-30-40	5.3	109		6
			20			13-15-18 N=33				
			25			15-21-21 N=42				
		30.0	30							

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
 See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Water Level Observations
 Groundwater not encountered

Drill Rig
 D-50

Hammer Type
 Automatic

Driller
 Terracon

Logged by
 JB

Advancement Method
 Hollow Stem Auger

Abandonment Method
 Boring backfilled with Auger Cuttings and/or Bentonite

Boring Started
 01-21-2025

Boring Completed
 01-21-2025

Boring Log No. TL-7

Model Layer	Graphic Log	Location: See Exploration Plan Latitude: 34.4846° Longitude: -118.1332° Depth (Ft.)	Depth (Ft.)	Water Level Observations	Sample Type	Field Test Results	Water Content (%)	Dry Unit Weight (pcf)	Atterberg Limits	Percent Fines
									LL-PL-PI	
1		SILTY SAND (SM) , medium brown, dense			X	13-16-18 N=34				
		35.0	35		X	16-23-23 N=46				
2		POORLY GRADED SAND WITH SILT (SP-SM) , light brown, dense			X					
		40.0	40		X	13-28-29 N=57				
		SILTY CLAY (SM) , brown, very dense			X					
		dense	45		X	13-27-19 N=46				
		very dense	50		X	18-28-29 N=57				
		51.5								
		Boring Terminated at 51.5 Feet								

See [Exploration and Testing Procedures](#) for a description of field and laboratory procedures used and additional data (If any).
 See [Supporting Information](#) for explanation of symbols and abbreviations.

Notes

Water Level Observations
 Groundwater not encountered

Drill Rig
 D-50

Hammer Type
 Automatic

Driller
 Terracon

Logged by
 JB

Boring Started
 01-21-2025

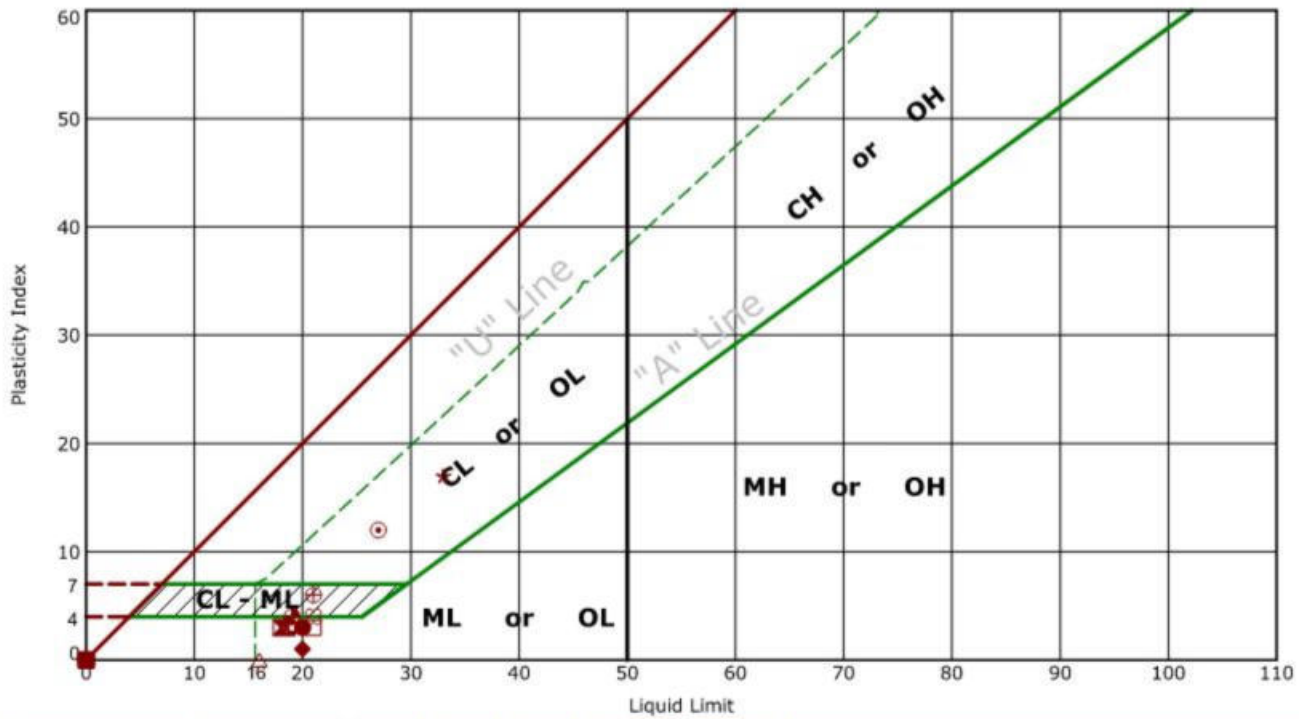
Boring Completed
 01-21-2025

Advancement Method
 Hollow Stem Auger

Abandonment Method
 Boring backfilled with Auger Cuttings and/or Bentonite

Atterberg Limit Results

ASTM D4318



	Boring ID	Depth (Ft)	LL	PL	PI	Fines	USCS	Description
●	BESS-1	10 - 11.5	20	17	3	25.2	SM	SILTY SAND
■	BESS-4	0 - 2.5	18	15	3	18.2	SM	SILTY SAND
▲	BESS-4	15 - 16.5	NP	NP	NP	11.2	SM	SILTY SAND
★	BESS-6	20 - 21.5	NP	NP	NP	15.6	SM	SILTY SAND
⊙	BESS-7	0 - 5	27	15	12	30.5	SC	CLAYEY SAND
⊕	BESS-8	2.5 - 4	19	16	3	25.6	SM	SILTY SAND
○	BESS-10	7.5 - 9	NP	NP	NP	26.4	SM	SILTY SAND
△	BESS-11	0 - 5	16	16	NP	18.6	SM	SILTY SAND with GRAVE
⊗	BESS-13	10 - 11.5	NP	NP	NP	12.1	SM	SILTY SAND with GRAVELL
⊕	BESS-15	0 - 5	21	15	6	41.0	SC-SM	SILTY, CLAYEY SAND
□	P-1	0 - 1.5	21	18	3	27.3	SC-SM	Silty Clayey Sand
⊕	P-4	0 - 2.5	NP	NP	NP	9.1	SP	Poorly Graded Sand
⊕	SUB-1	5 - 6.5	19	15	4	19.9	SC-SM	SILTY, CLAYEY SAND
★	OM-1	0 - 5	33	16	17	49.9	SC	CLAYEY SAND
⊗	OM-2	7.5 - 9	21	17	4	44.2	SC-SM	SILTY, CLAYEY SAND
■	TL-2	2.5 - 4	NP	NP	NP		SM	SILTY SAND
◆	TL-3	5 - 6.5	20	19	1		SM	SILTY SAND
◇	TL-3	20 - 21.5	NP	NP	NP	6.2	SP-SM	POORLY GRADED SAND with SILT
×	TL-4	0 - 2	NP	NP	NP		SM	SILTY SAND
■	TL-5	0 - 5	NP	NP	NP	12.9	SM	SILTY SAND

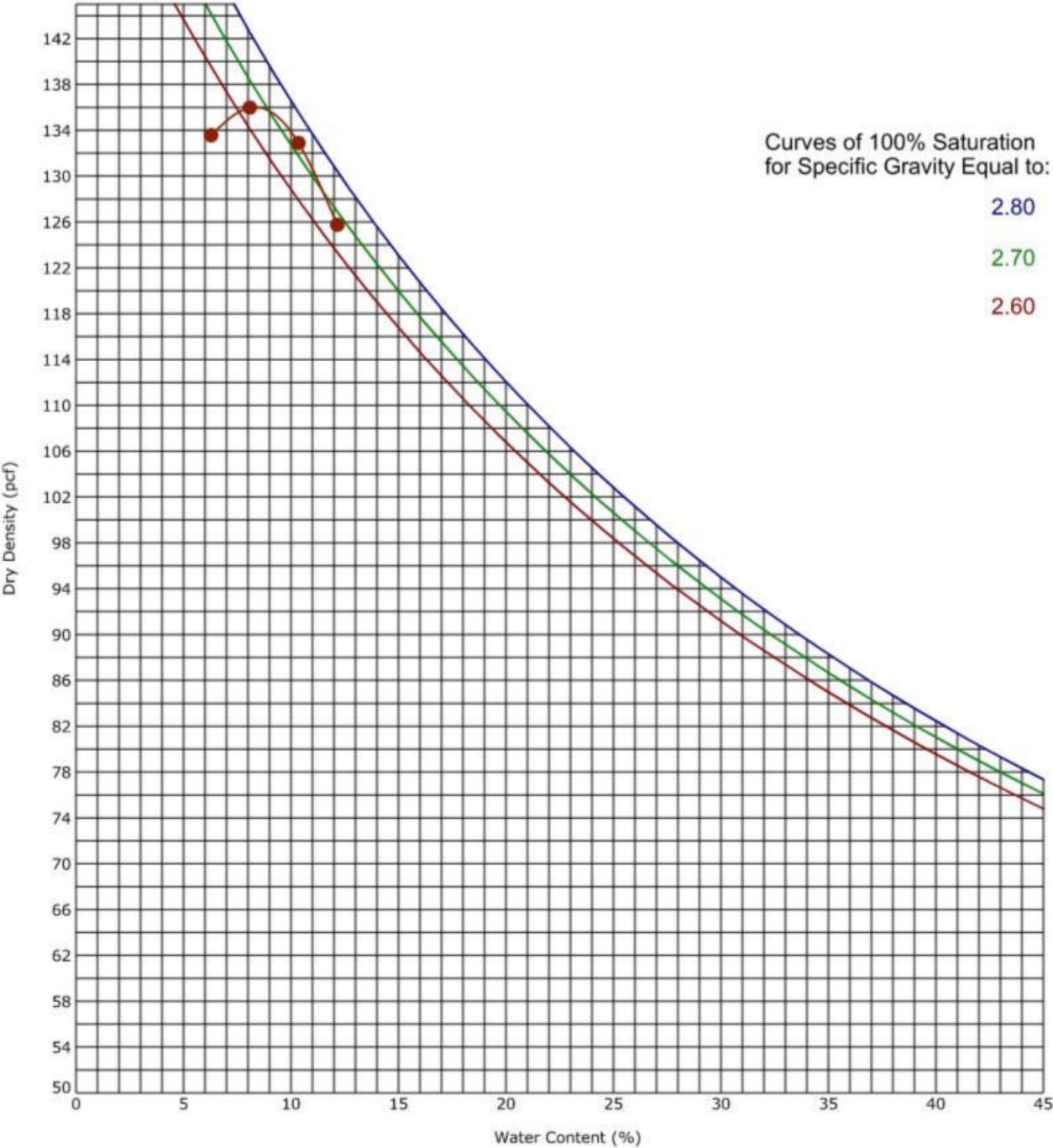
ASTM D4318



The graph displays the grain size distribution for three soil samples. The x-axis represents Grain Size (mm) on a logarithmic scale, and the y-axis represents Percent Finer by Weight on a linear scale. The three curves represent different soil types: the top curve (solid line with circles) is for sand, the middle curve (dashed line with triangles) is for silt, and the bottom curve (dotted line with crosses) is for clay. The curves show that the top sample is the coarsest, followed by the middle sample, and the bottom sample is the finest.

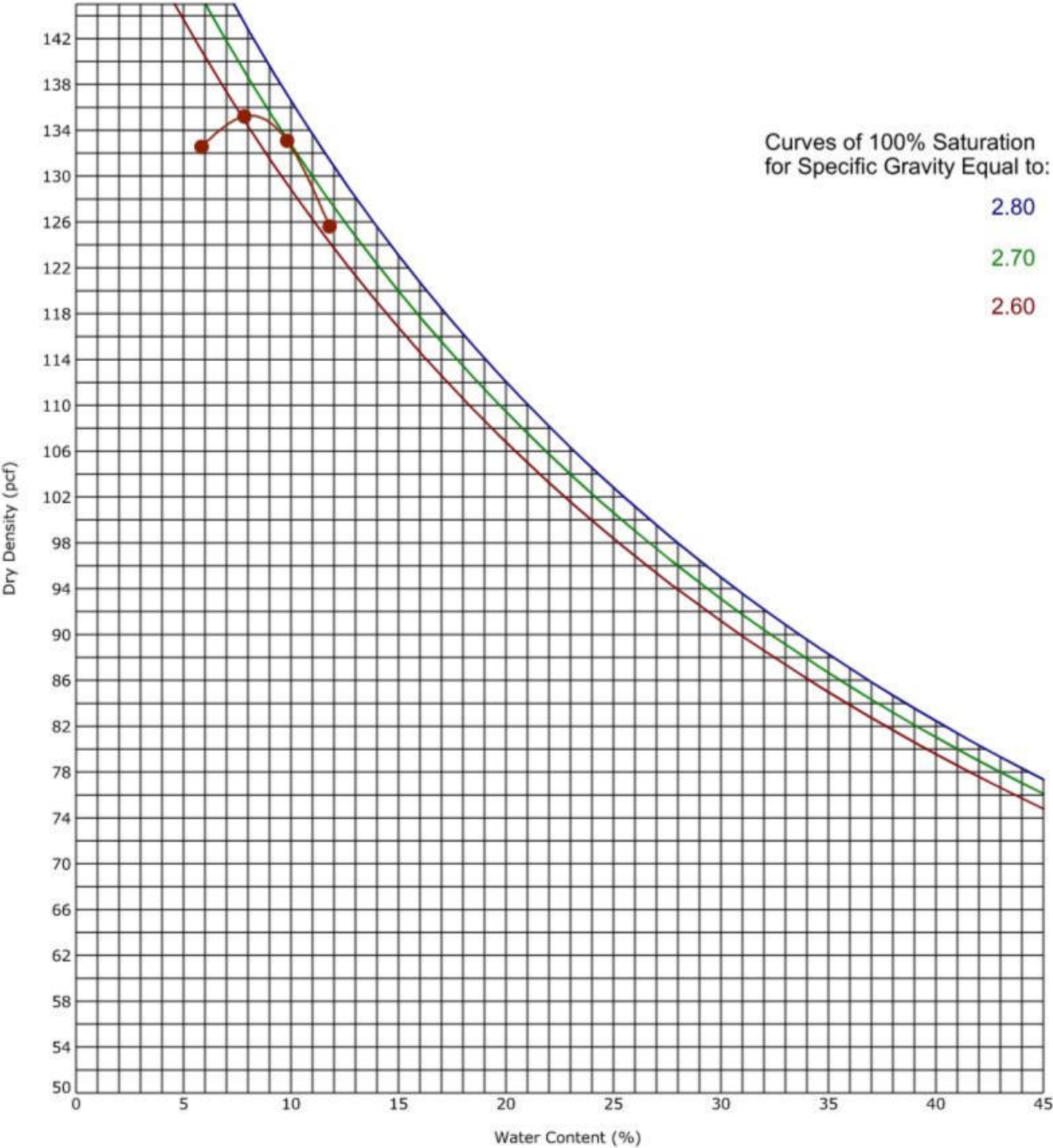
Grain Size (mm)	Percent Finer (%) - Sand (Circles)	Percent Finer (%) - Silt (Triangles)	Percent Finer (%) - Clay (Crosses)
100	100	100	100
4.75	100	100	100
2.0	98	95	92
0.85	85	78	72
0.425	65	55	48
0.25	50	40	35
0.15	35	28	25
0.075	20	18	18
0.0075	18	18	18
0.001	18	18	18

Moisture-Density Relationship
ASTM D1557-Method A



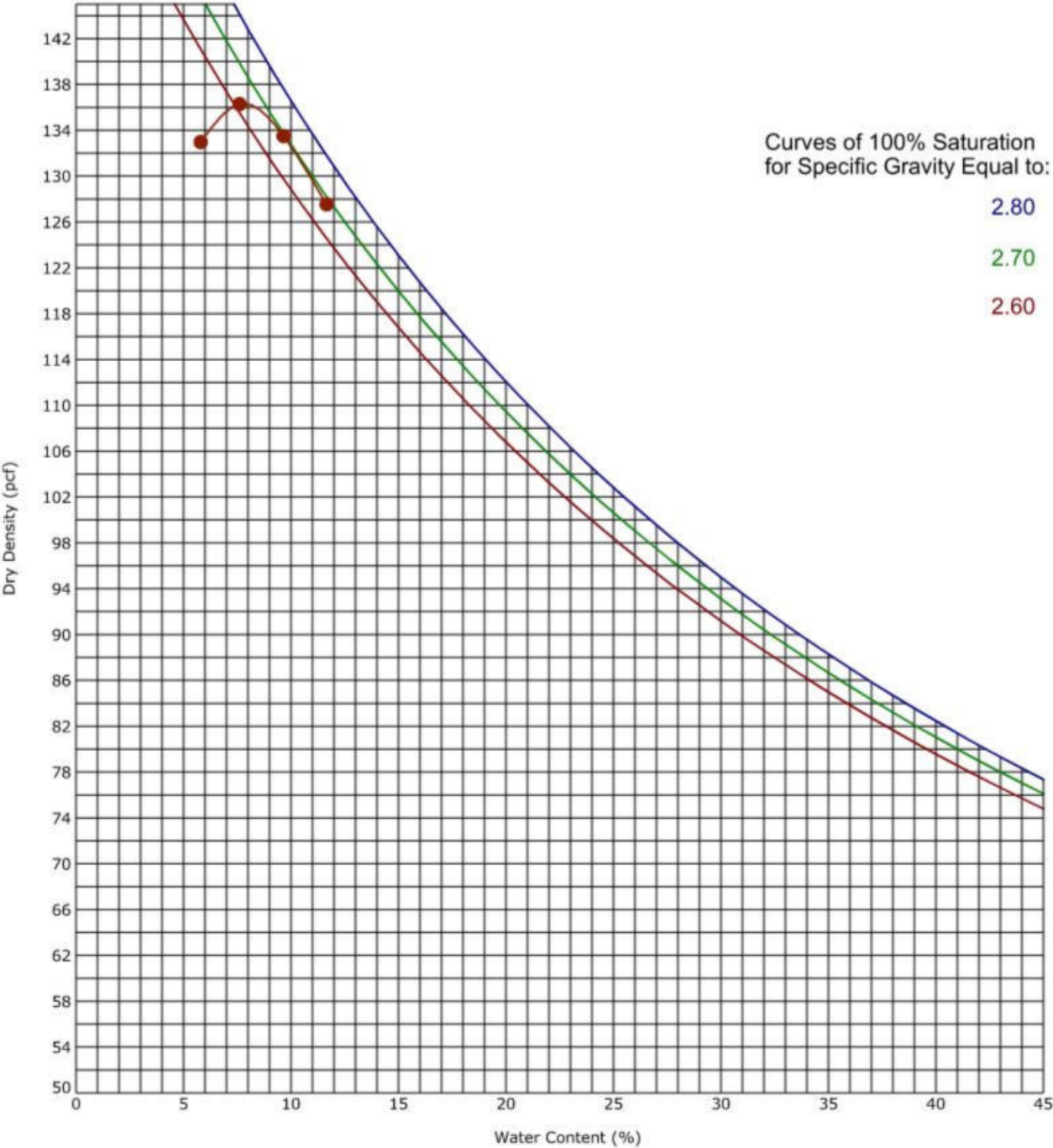
Boring ID		Depth (Ft)		Description of Materials			
BESS-1		0 - 5		SILTY SAND			
Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
32					ASTM D1557-Method A	136.0	8.3

Moisture-Density Relationship
ASTM D1557-Method A



Boring ID		Depth (Ft)		Description of Materials			
BESS-3		0 - 5		SILTY SAND			
Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
					ASTM D1557-Method A	135.3	8.1

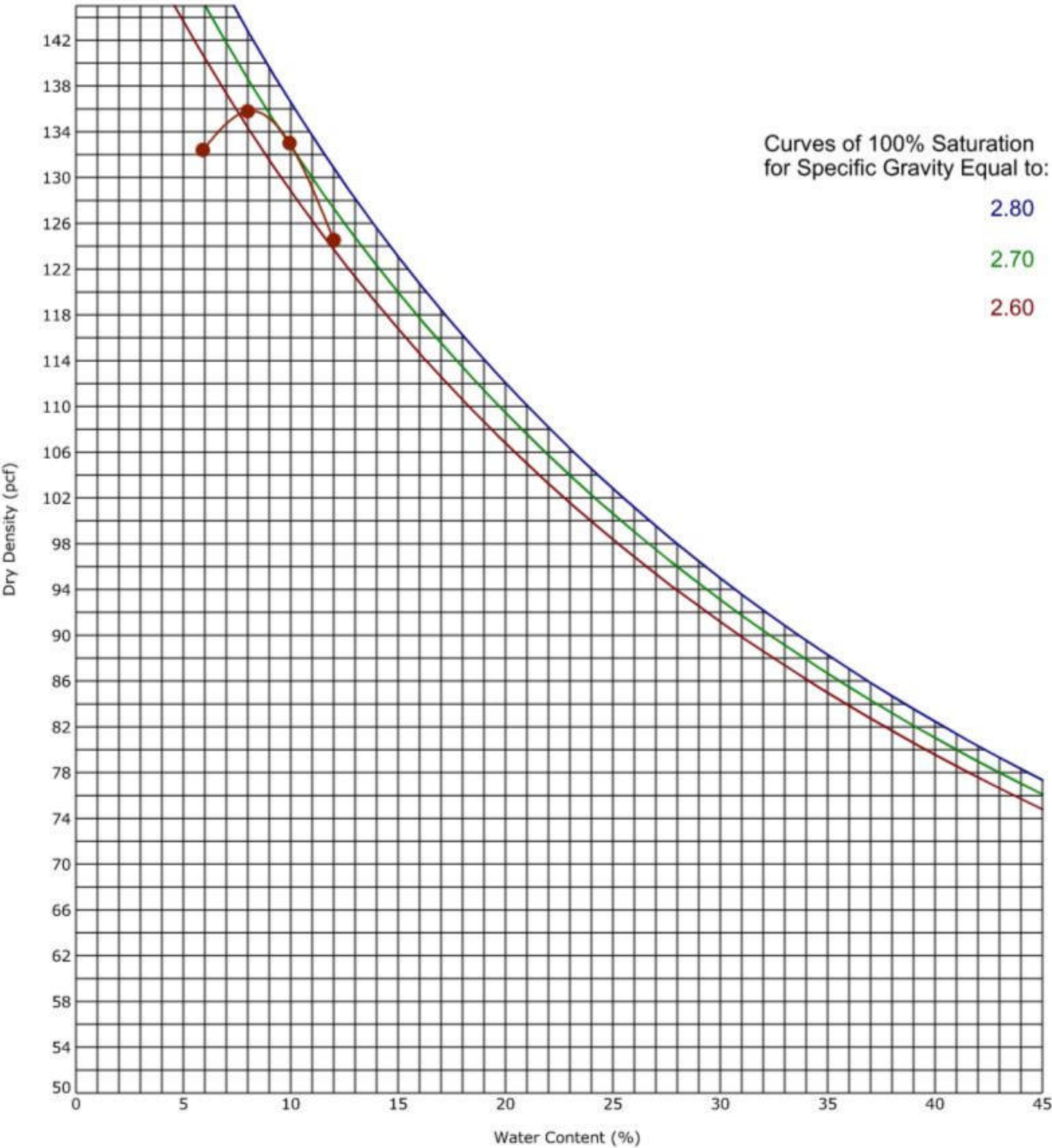
Moisture-Density Relationship
ASTM D1557-Method A



Boring ID		Depth (Ft)		Description of Materials			
BESS-5		0 - 5		SILTY SAND			
Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
17					ASTM D1557-Method A	136.3	7.8

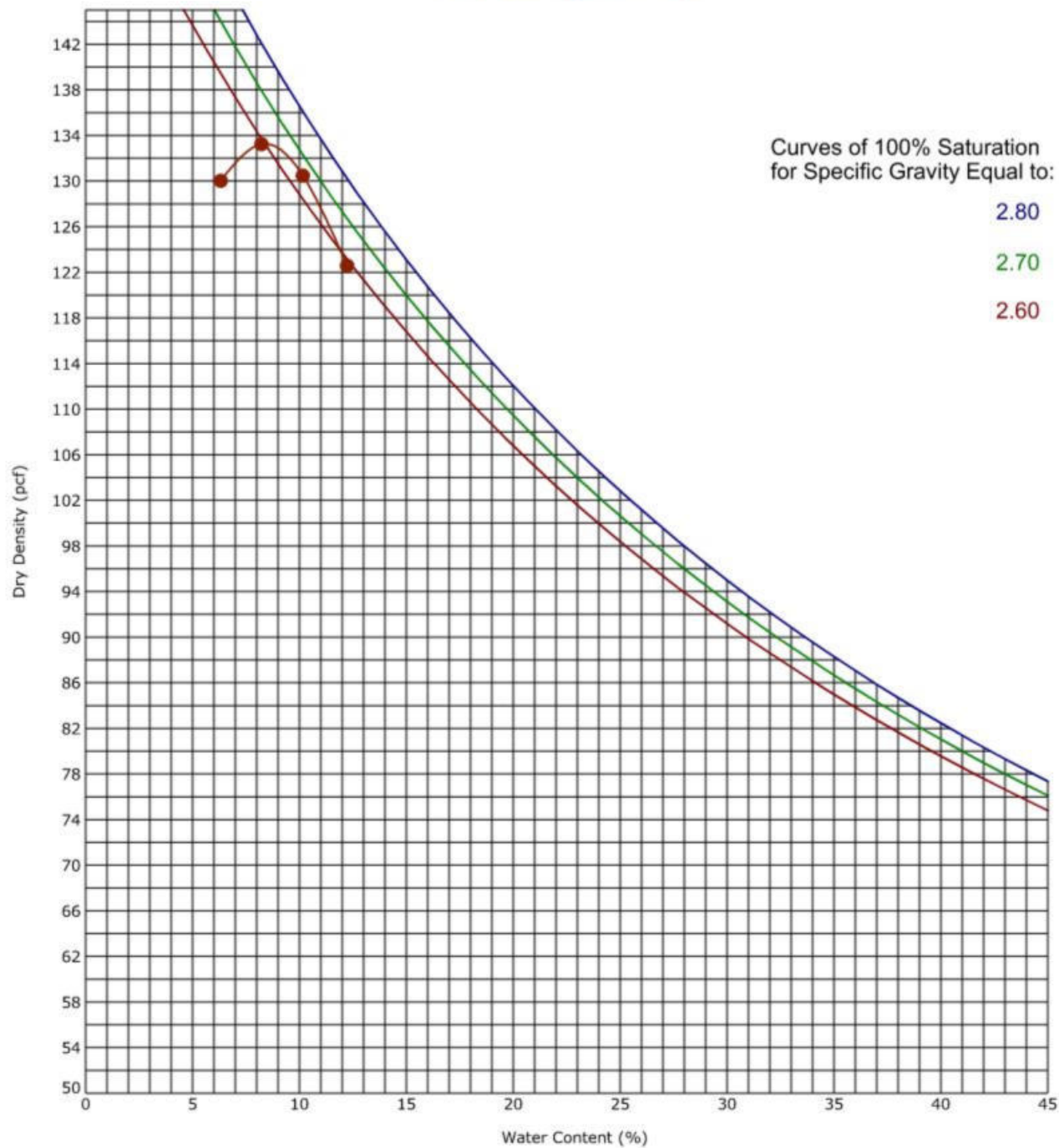
Moisture-Density Relationship

ASTM D1557-Method A



Boring ID		Depth (Ft)		Description of Materials			
BESS-13		0 - 5		SILTY SAND			
Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
41					ASTM D1557-Method A	135.8	8.2

Moisture-Density Relationship
ASTM D1557-Method A



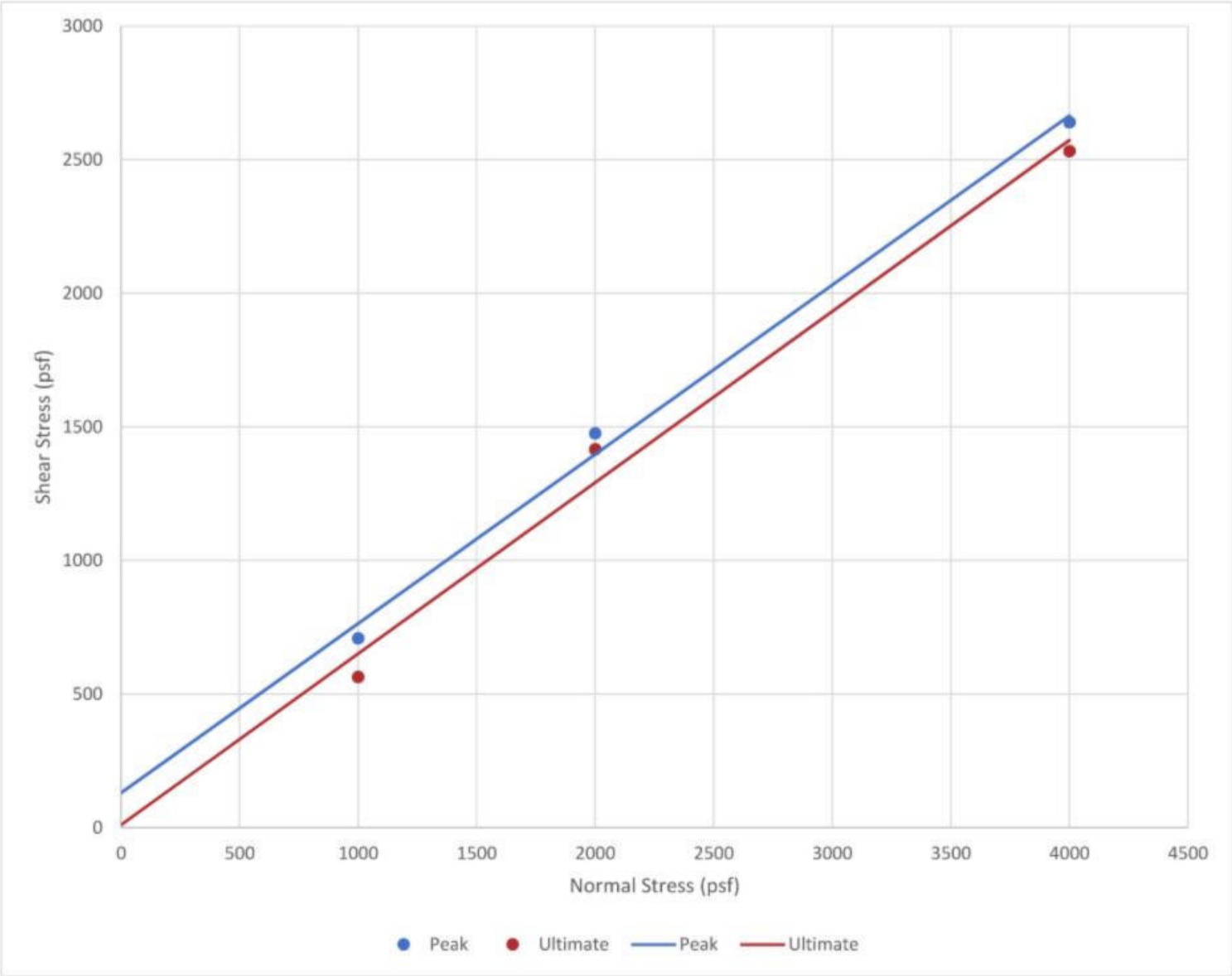
Boring ID		Depth (Ft)			Description of Materials		
SUB-1		0 - 5			SILTY SAND with GRAVEL		
Fines (%)	Fraction > mm size	LL	PL	PI	Test Method	Maximum Dry Density (pcf)	Optimum Water Content (%)
28					ASTM D1557-Method A	133.3	8.4

Direct Shear Test

ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
BESS-4	5	Silty Sand	SM	121	2.5

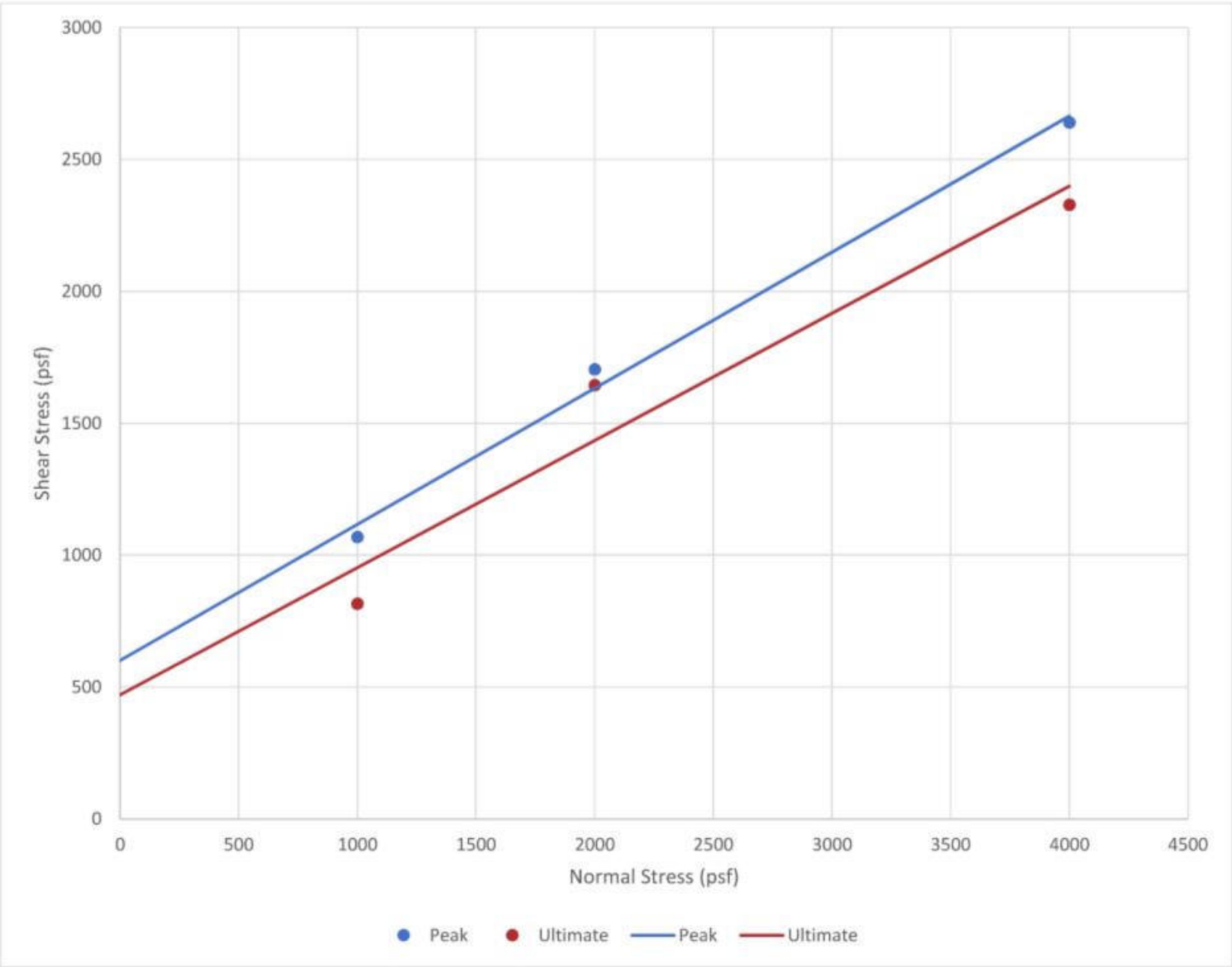
Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			ϕ°	C (psf)	ϕ°	C (psf)
1000	708	564	32.0	130	33.0	10
2000	1476	1416				
4000	2640	2532				



Direct Shear Test
ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
BESS-8	10	Silty Sand	SM	116	2.7

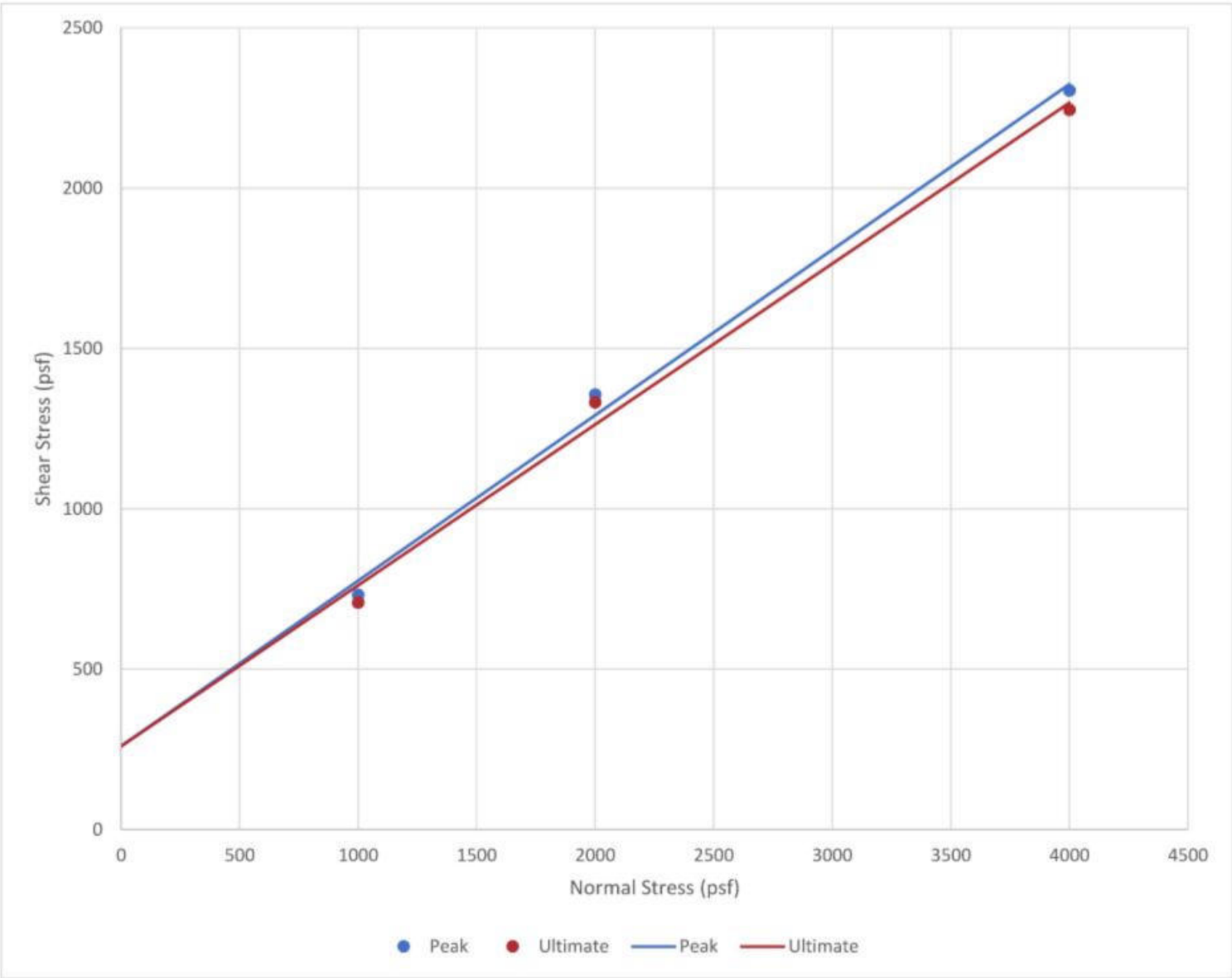
Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			ϕ°	C (psf)	ϕ°	C (psf)
1000	1068	816	27.0	600	26.0	470
2000	1704	1644				
4000	2640	2328				



Direct Shear Test
ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
BESS-14	5	Silty Sand with Gravel	SM	119	3.5

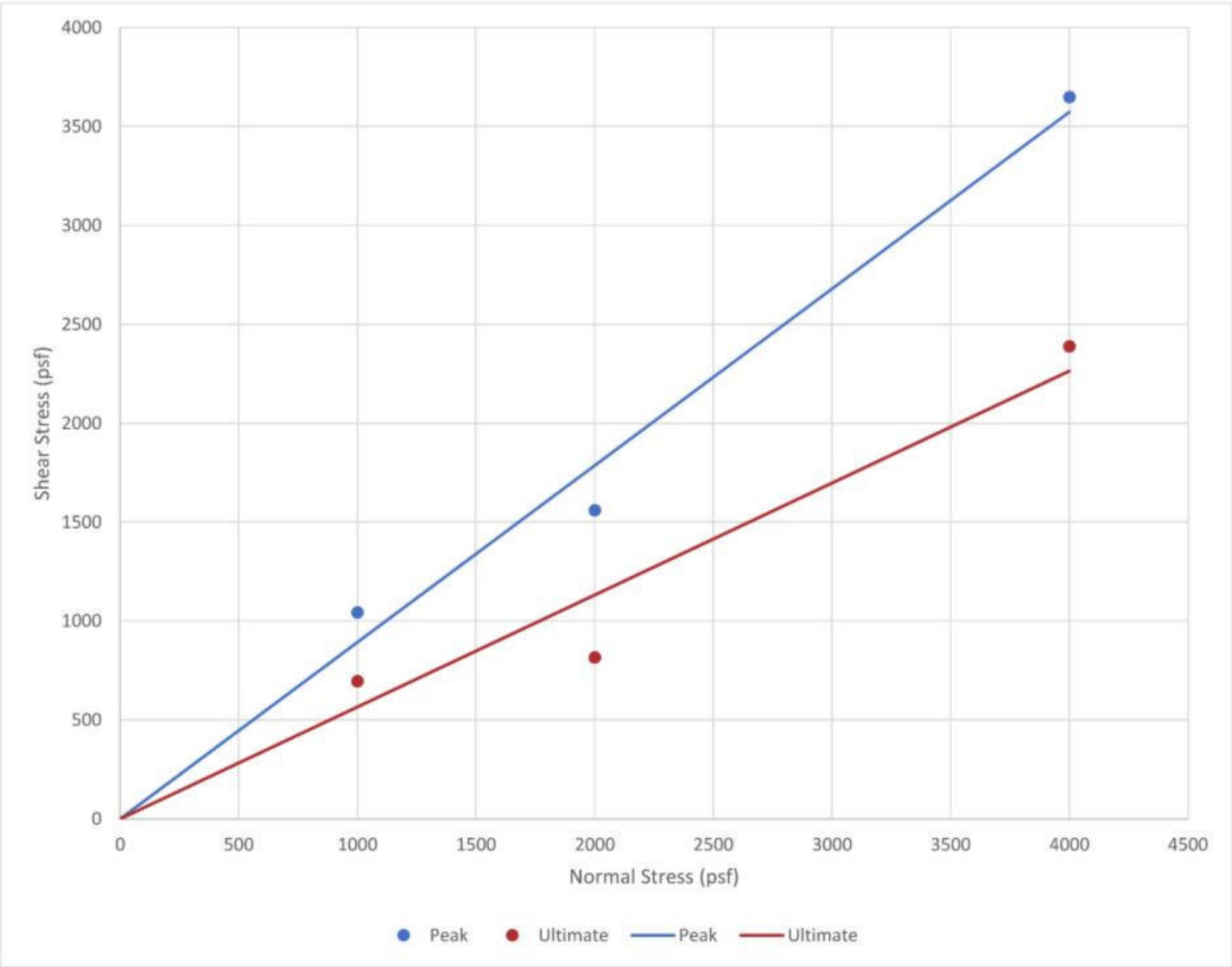
Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			ϕ°	C (psf)	ϕ°	C (psf)
1000	732	708	27.0	260	27.0	250
2000	1356	1332				
4000	2304	2244				



Direct Shear Test
ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
TL-2	10	Silty Sand	SM		1.4

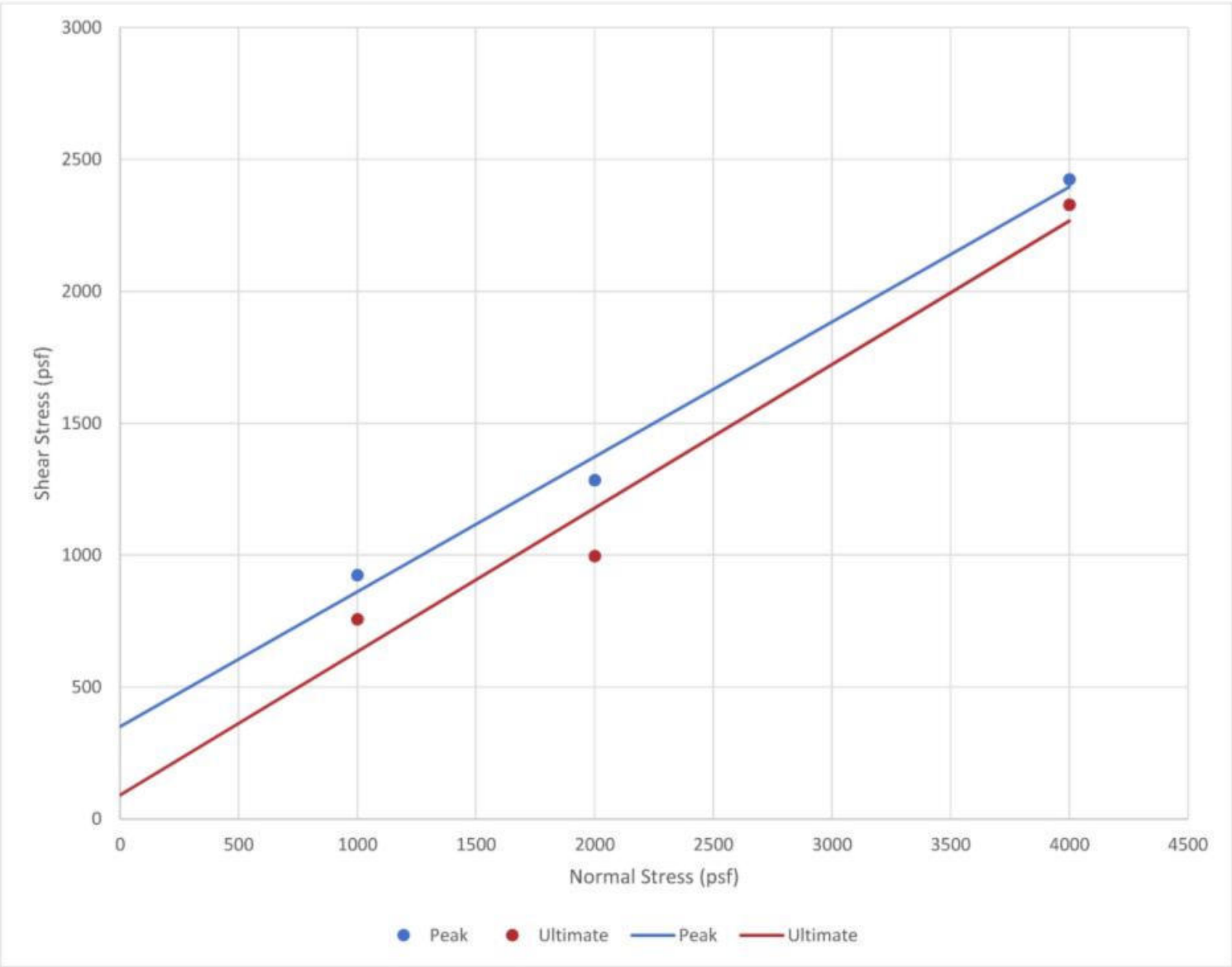
Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			ϕ°	C (psf)	ϕ°	C (psf)
1000	1044	696	42.0	0	31.0	0
2000	1560	816				
4000	3648	2388				



Direct Shear Test
ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
TL-3	2.5	Silty Sand	SM	116	6.3

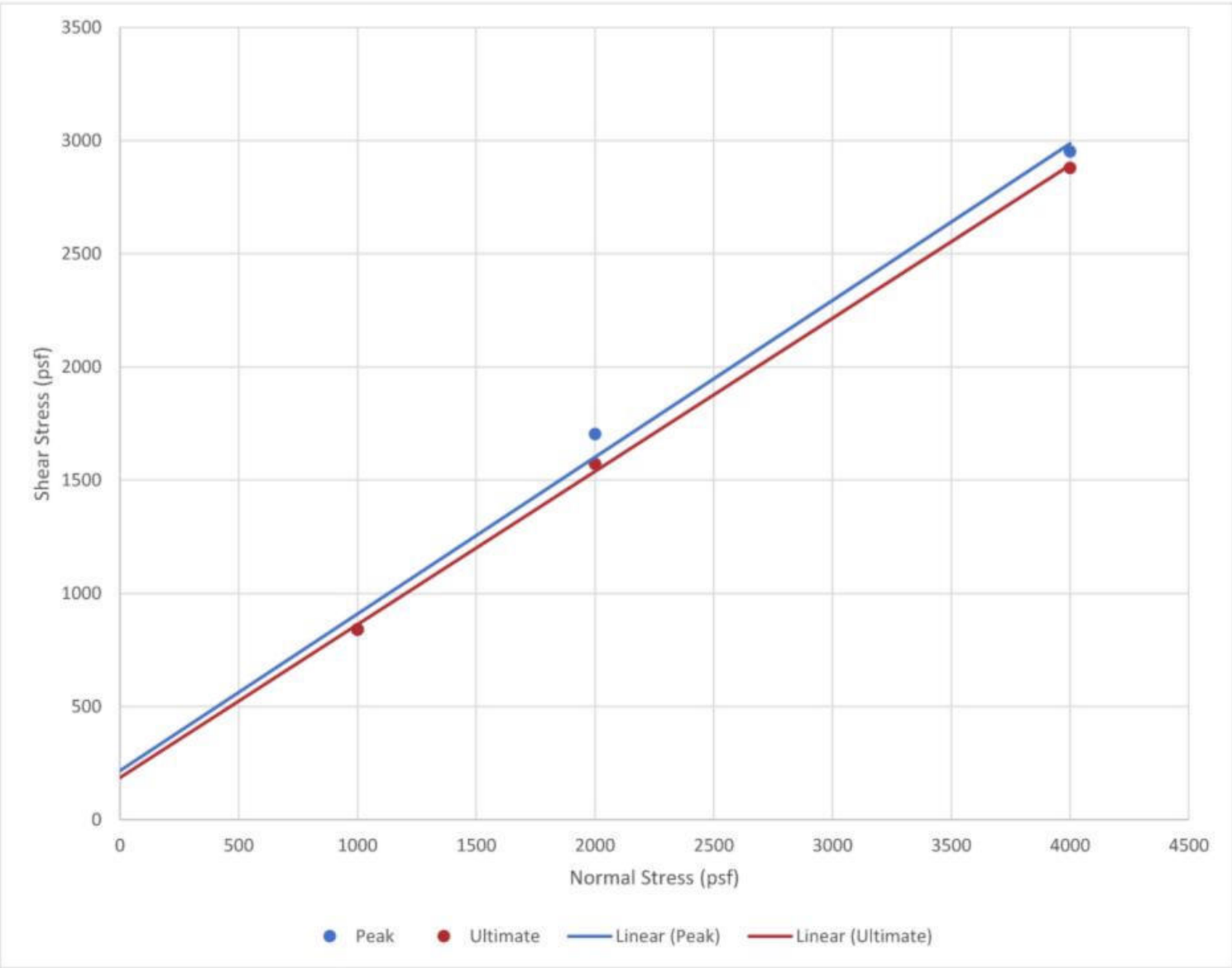
Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			ϕ°	C (psf)	ϕ°	C (psf)
1000	924	756	27.0	350	29.0	90
2000	1284	996				
4000	2424	2328				



Direct Shear Test
ASTM D3080

Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
TL-5	7.5	Silty Sand	SM	111	3.9

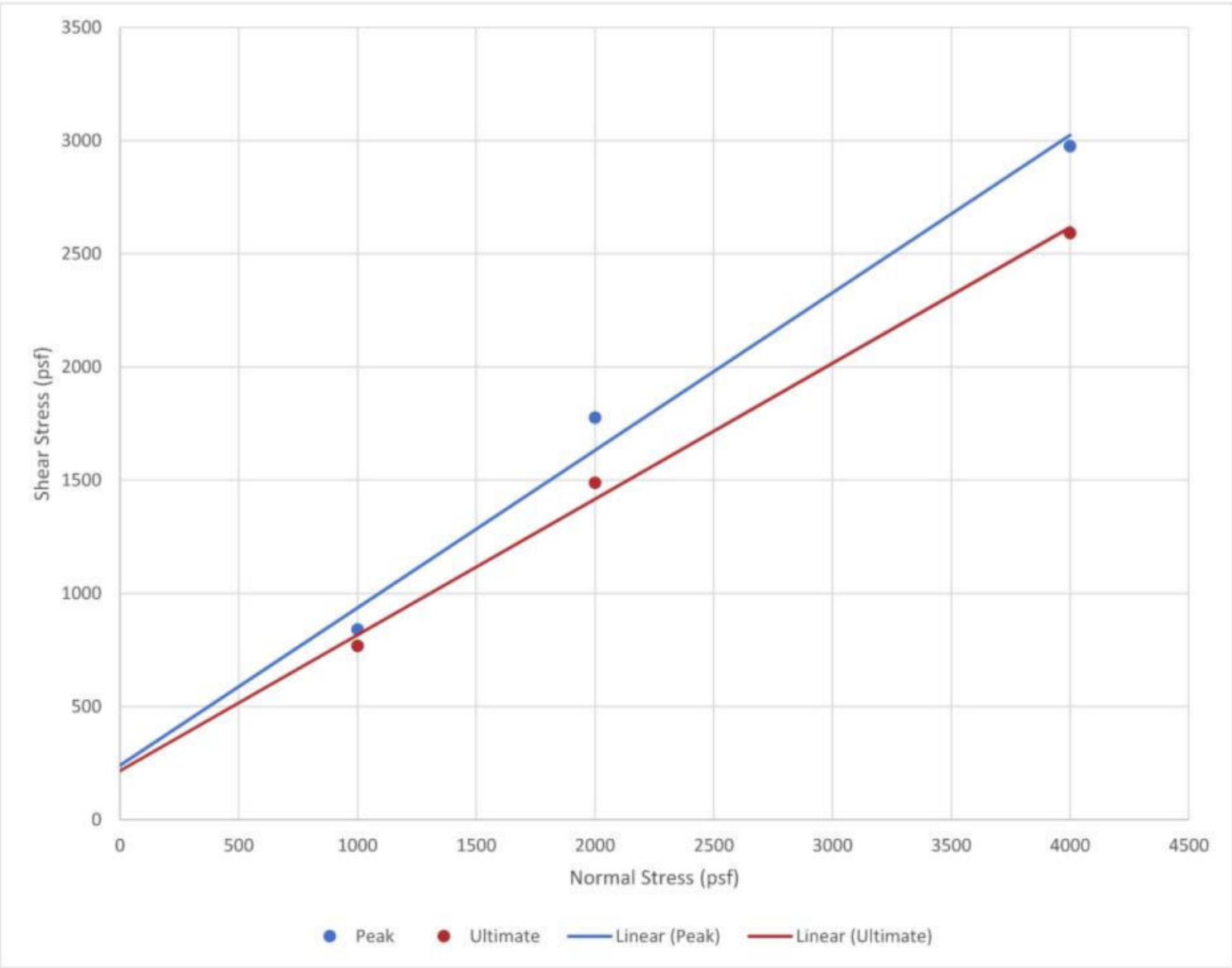
Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			ϕ°	C (psf)	ϕ°	C (psf)
1000	840	840	35.0	220	34.0	190
2000	1704	1572				
4000	2952	2880				



Direct Shear Test
ASTM D3080

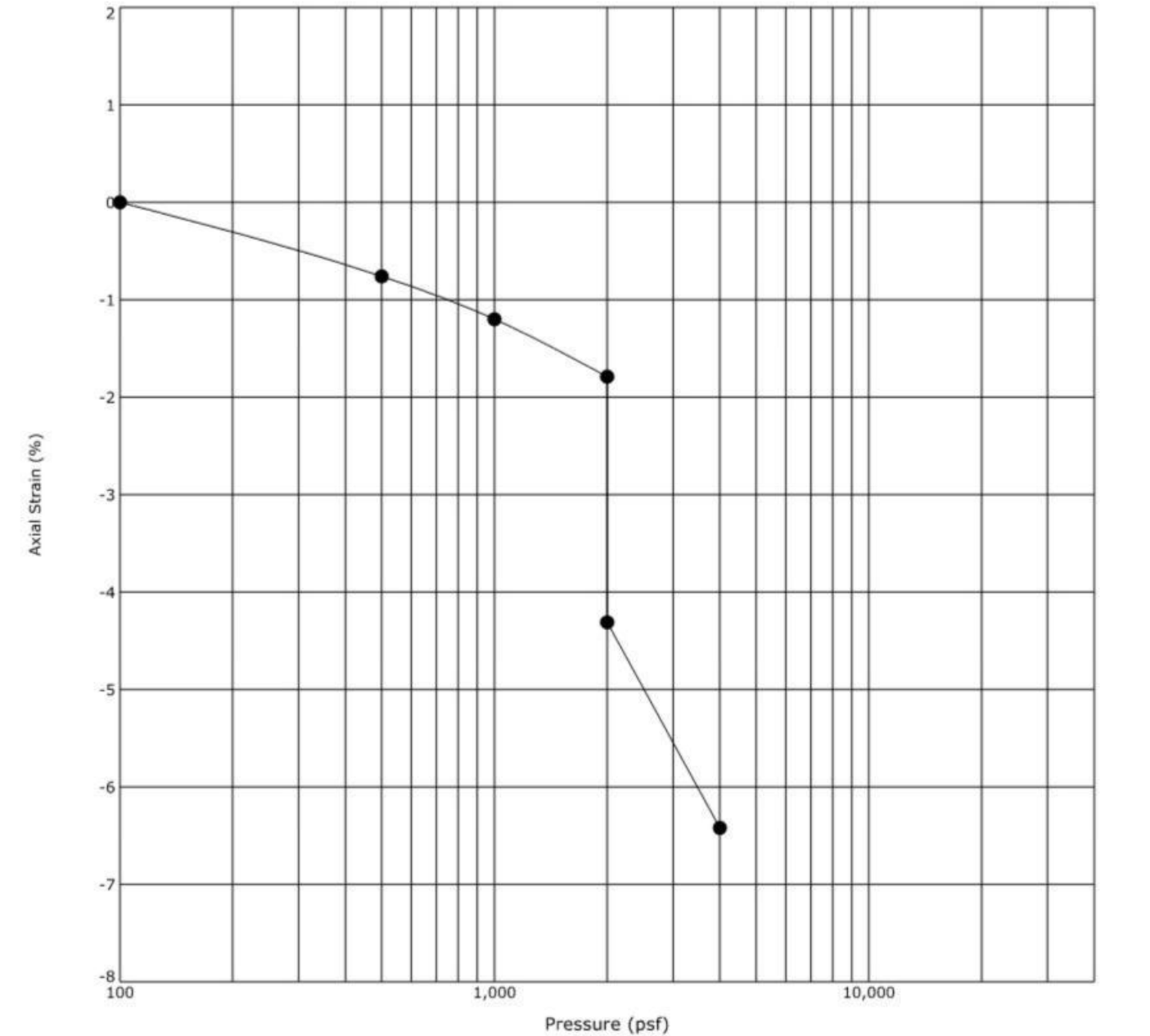
Boring ID	Depth (ft)	Description	USCS	γ_d (pcf)	W(%)
TL-6	5	Silty Sand	SM	117	2.2

Normal Stress (psf)	Peak Shear Stress (psf)	Ultimate Shear Stress (psf)	Peak		Ultimate	
			ϕ°	C (psf)	ϕ°	C (psf)
1000	840	768	35.0	240	31.0	220
2000	1776	1488				
4000	2976	2592				



One-Dimensional Swell or Collapse

ASTM D4546



Boring ID	Depth (Ft)	Description	USCS	γ_d (pcf)	WC (%)
● OM-2	5 - 6.5	CLAYEY SAND	SC	105	4.4
Notes: Water added at 200 pcf					



TRANSMITTAL LETTER

DATE: January 31, 2025

ATTENTION: Janna Valdez

TO: Terracon - Carson
145 W Walnut Street
Carson, CA 90248

SUBJECT: Laboratory Test Data
Prairie Song Reliability Project
Keegan Labs #25-0016
Terracon - Carson #LA245085

COMMENTS: Enclosed are the results for the subject project.

Dr. James T. Keegan
President and Founder



Table 1 - Laboratory Tests on Soil Samples

Terracon - Carson
Prairie Song Reliability Project
Keegan Labs #25-0016, Your #LA245085
31-Jan-25

Sample ID		BESS-2 @ 0-2'	BESS-8 @ 0-2.5'	BESS-14 @ 0-2.5'	SUB-2 @ 0-2.5'	TL-1 @ 0-5'
Resistivity	Units					
saturated	ohm-cm	10,250	8,140	5,230	6,840	18,100
pH		7.1	7.4	7.7	7.3	7.7
Electrical						
Conductivity	mS/cm	0.02	0.05	0.05	0.04	0.03
Chemical Analyses (Total Salts)						
Cations						
sodium	Na ¹⁺ mg/kg	6.1	4.4	5.7	6.0	6.0
ammonium	NH ₄ ¹⁺ mg/kg	0.3	1.0	0.5	0.4	0.4
potassium	K ¹⁺ mg/kg	1.7	26	17	5.4	5.4
magnesium	Mg ²⁺ mg/kg	1.5	2.3	3.9	0.7	0.9
calcium	Ca ²⁺ mg/kg	9.4	19	18	20	5.8
Anions						
carbonate	CO ₃ ²⁻ mg/kg	ND	ND	ND	ND	ND
bicarbonate	HCO ₃ ¹⁻ mg/kg	12	49	61	43	6.1
fluoride	F ¹⁻ mg/kg	4.5	5.1	4.8	4.7	4.4
chloride	Cl ¹⁻ mg/kg	5.8	7.7	6.2	6.6	6.5
nitrate	NO ₃ ¹⁻ mg/kg	6.3	7.8	7.1	7.4	6.3
phosphate	PO ₄ ³⁻ mg/kg	8.0	9.3	7.1	7.7	5.7
sulfate	SO ₄ ²⁻ mg/kg	1.6	9.7	6.5	4.1	9.2
Other Tests						
sulfide	S ²⁻ mg/kg	ND	ND	ND	ND	ND
Redox	mV	278	290	282	291	288
% Moisture	H ₂ O %	na	na	na	na	na

For test methods refer to Laboratory Test Methods attachment

Conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.

ND = not detected

na = not analyzed



Table 1 - Laboratory Tests on Soil Samples

Terracon - Carson
Prairie Song Reliability Project
Keegan Labs #25-0016, Your #LA245085
31-Jan-25

Sample ID	TL-3 @ 0-5'	TL-6 @ 0-5'
-----------	----------------	----------------

Resistivity	Units		
saturated	ohm-cm	13,070	21,110
pH		7.1	7.0

Electrical			
Conductivity	mS/cm	0.02	0.02

Chemical Analyses (Total Salts)

Cations

sodium	Na ¹⁺	mg/kg	3.8	4.2
ammonium	NH ₄ ¹⁺	mg/kg	0.3	0.3
potassium	K ¹⁺	mg/kg	9.6	4.4
magnesium	Mg ²⁺	mg/kg	1.5	1.3
calcium	Ca ²⁺	mg/kg	2.7	4.4

Anions

carbonate	CO ₃ ²⁻	mg/kg	ND	ND
bicarbonate	HCO ₃ ¹⁻	mg/kg	12	6.1
fluoride	F ¹⁻	mg/kg	4.5	4.5
chloride	Cl ¹⁻	mg/kg	6.5	5.4
nitrate	NO ₃ ¹⁻	mg/kg	6.5	5.8
phosphate	PO ₄ ³⁻	mg/kg	8.0	6.4
sulfate	SO ₄ ²⁻	mg/kg	2.4	0.2

Other Tests

sulfide	S ²⁻	mg/kg	ND	ND
Redox		mV	288	293
% Moisture	H ₂ O	%	na	na

For test methods refer to Laboratory Test Methods attachment

Conductivity in millisiemens/cm and chemical analyses were made on a 1:5 soil-to-water extract.
mg/kg = milligrams per kilogram (parts per million) of dry soil.

ND = not detected

na = not analyzed



LABORATORY TEST METHODS

DATE: January 1, 2024

LABORATORY TESTS	METHODS	RELEVANT ALTERNATE METHODS
Electrical Resistivity of Soil	ASTM G-187	ASTM G-57, AASHTO T288
Minimum Electrical Resistivity	CTM 643	AASHTO T-288
pH of Soil	ASTM G-51	CTM 643, SMWW-H*, ASSHTO T289
Anions in Water*	ASTM D4327	EPA 300, EPA 353.2, EPA 325.1, ASTM D516, SMWW 4500B
Cations in Water*	ASTM D6919	EPA 300
Chloride and Sulfate in Soil	CTM 422 & 417	ASSHTO T290 & T291
Alkalinity of Water*	ASTM D1067	SMWW 2320, EPA 305.1
Total Acidity/Alkalinity*	NIST RP539	
Sulfide (qualitative)	AWWA C-105	
Sulfide (quantitative)	ASTM D4658	EPA 376.2
Thermal Conductivity of Soil	ASTM D5334	
Oxidation/Reduction (Redox)	ASTM G200	
Linear Polarization	ASTM-G59	
MIC Bacteria in Soil	MICkit 5**	

*Adapted for soil

**Proprietary testing kit manufactured by BTI-Products



Geotherm

21239 FM529 Rd., Bldg F
Cypress, TX 77433
Office: 291-985-9344
info@geothermusa.com
<http://www.geothermusa.com>

REV01: Change project name from [REDACTED] BESS to Prairie Song Reliability Project
March 5, 2025

Terracon
145 W. Walnut Street
Carson, CA 90248
Attn: Janna Valdez

Thermal Resistivity Report
Prairie Song Reliability Project – Acton, CA (Project No. LA245085)

The following is the report of thermal dryout characterization tests conducted on four (4) bulk samples of native soil from the referenced project sent to our laboratory.

Thermal Resistivity Tests: The samples were tested at the 'optimum' moisture content and at 90% of the modified Proctor dry density ***provided by Terracon***. The tests were conducted in accordance with the **IEEE standard 442-2017**. The results are tabulated below and the thermal dry out curves are presented in **Figures 1 to 4**.

Sample ID, Description, Thermal Resistivity, Moisture Content and Density

Sample ID	Depth (ft)	Effort (%)	Description (Terracon)	Thermal Resistivity (°C-cm/W)		Moisture Content (%)	Dry Density (lb/ft³)
				Wet	Dry		
BESS-01	0 - 5	90	Silty Sand	69	148	8	121
BESS-05	0 - 5	90	Silty Sand	65	136	8	123
BESS-13	0 - 5	90	Silty Sand	67	151	8	121
SUB-01	0 - 5	90	Silty Sand with Gravel	68	144	8	120

Comments: The thermal characteristic depicted in the dryout curves apply for the soils at their respective test dry density.

Please contact us if you have any questions or if we can be of further assistance.

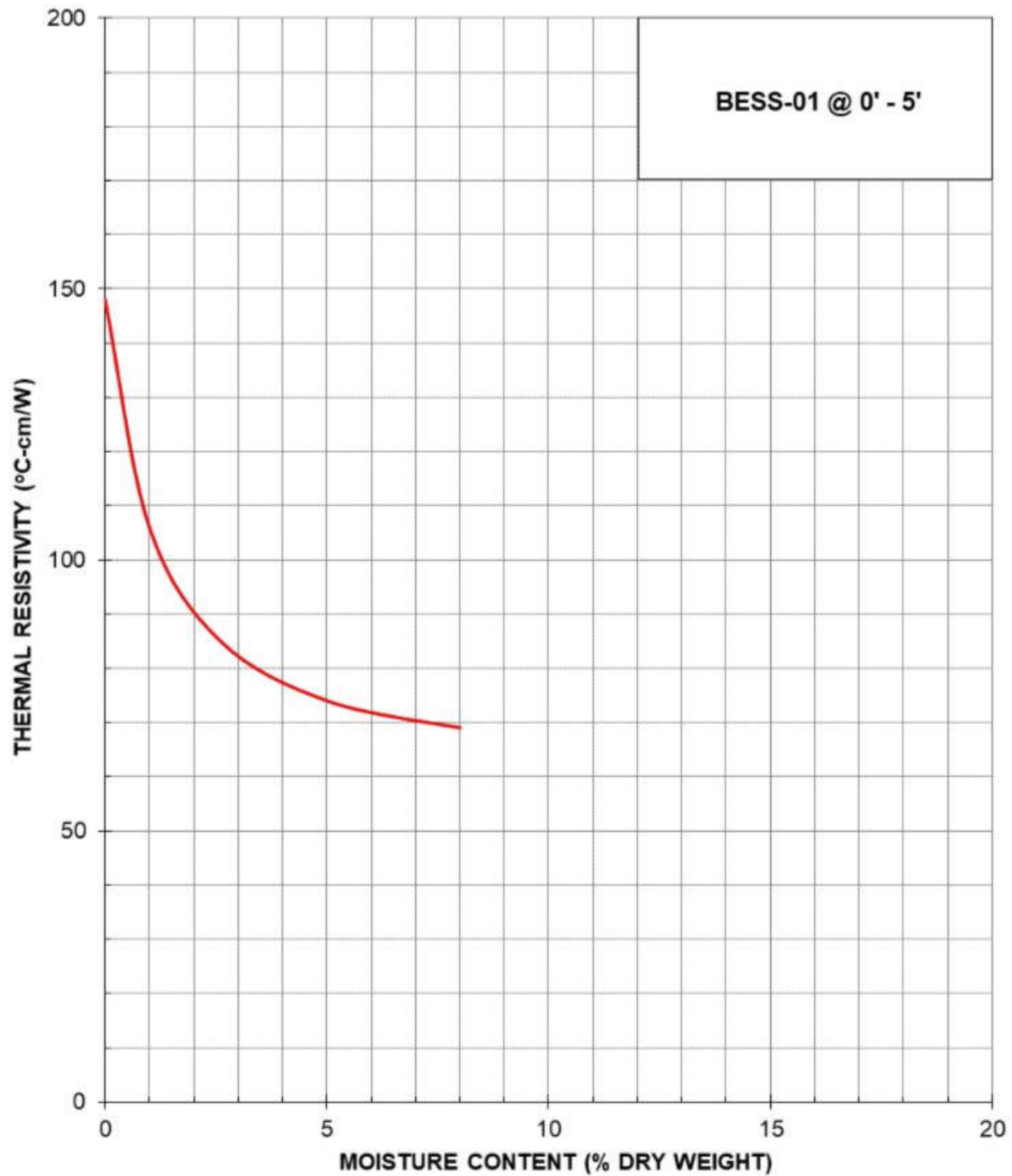
Geotherm USA, LLC

Nimesh Patel

COOL SOLUTIONS FOR UNDERGROUND POWER CABLES
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THERMAL DRYOUT CURVE



Terracon (Project No. LA245085)

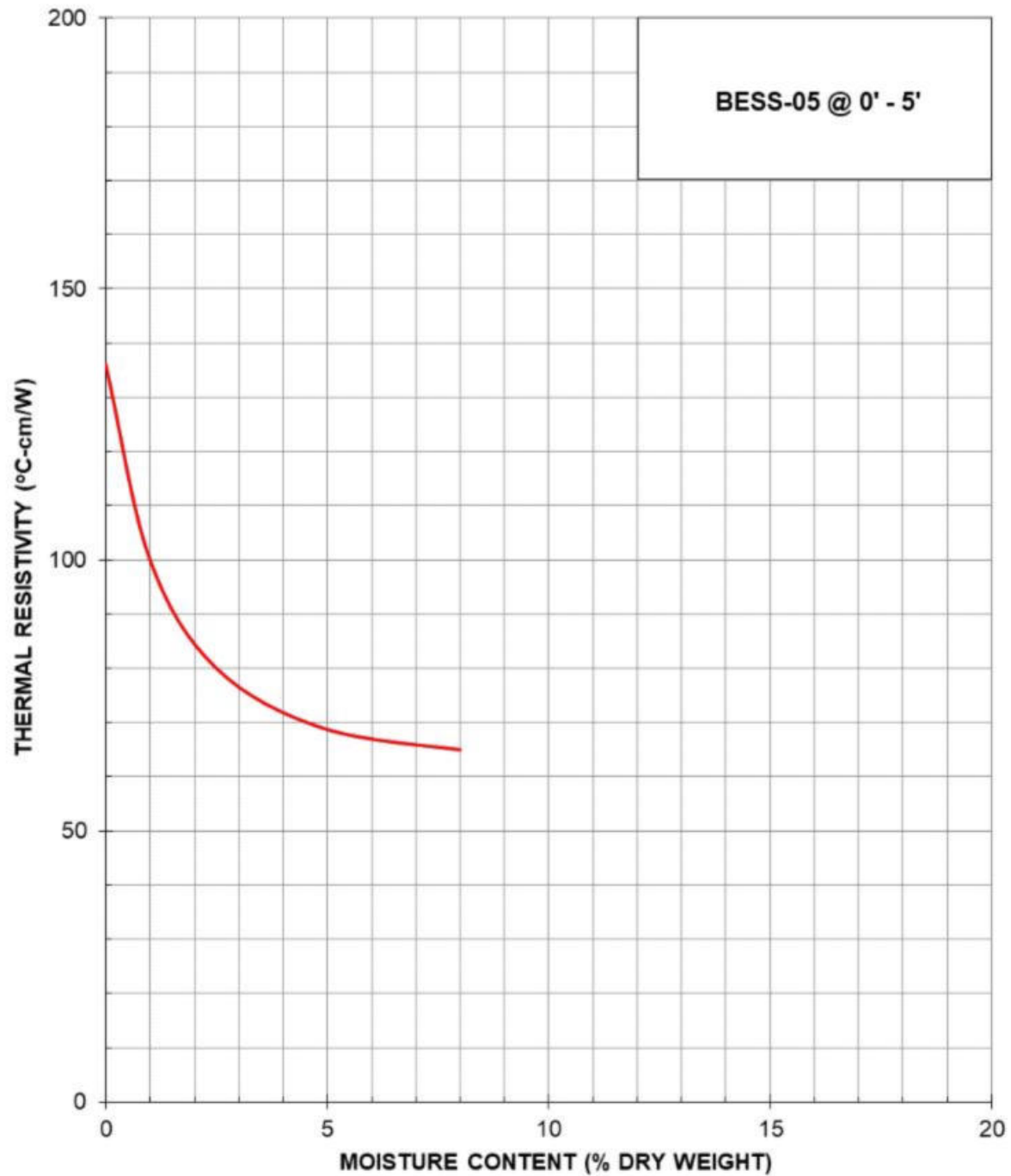
Prairie Song Reliability Project – Acton, CA

Thermal Resistivity Report

March 2023

Figure 1

THERMAL DRYOUT CURVE



Terracon (Project No. LA245085)

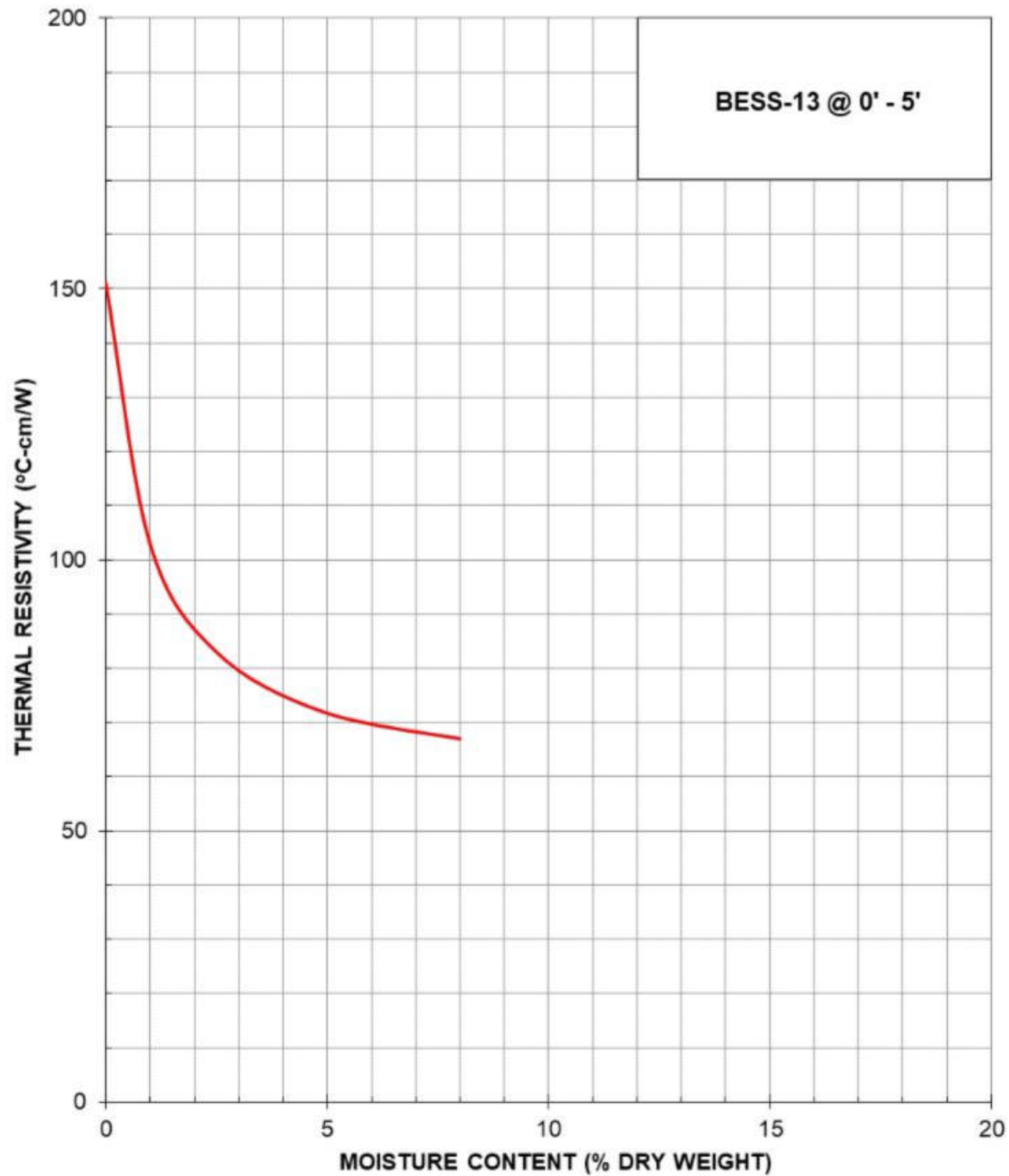
Prairie Song Reliability Project – Acton, CA

Thermal Resistivity Report

March 2023

Figure 2

THERMAL DRYOUT CURVE



Terracon (Project No. LA245085)

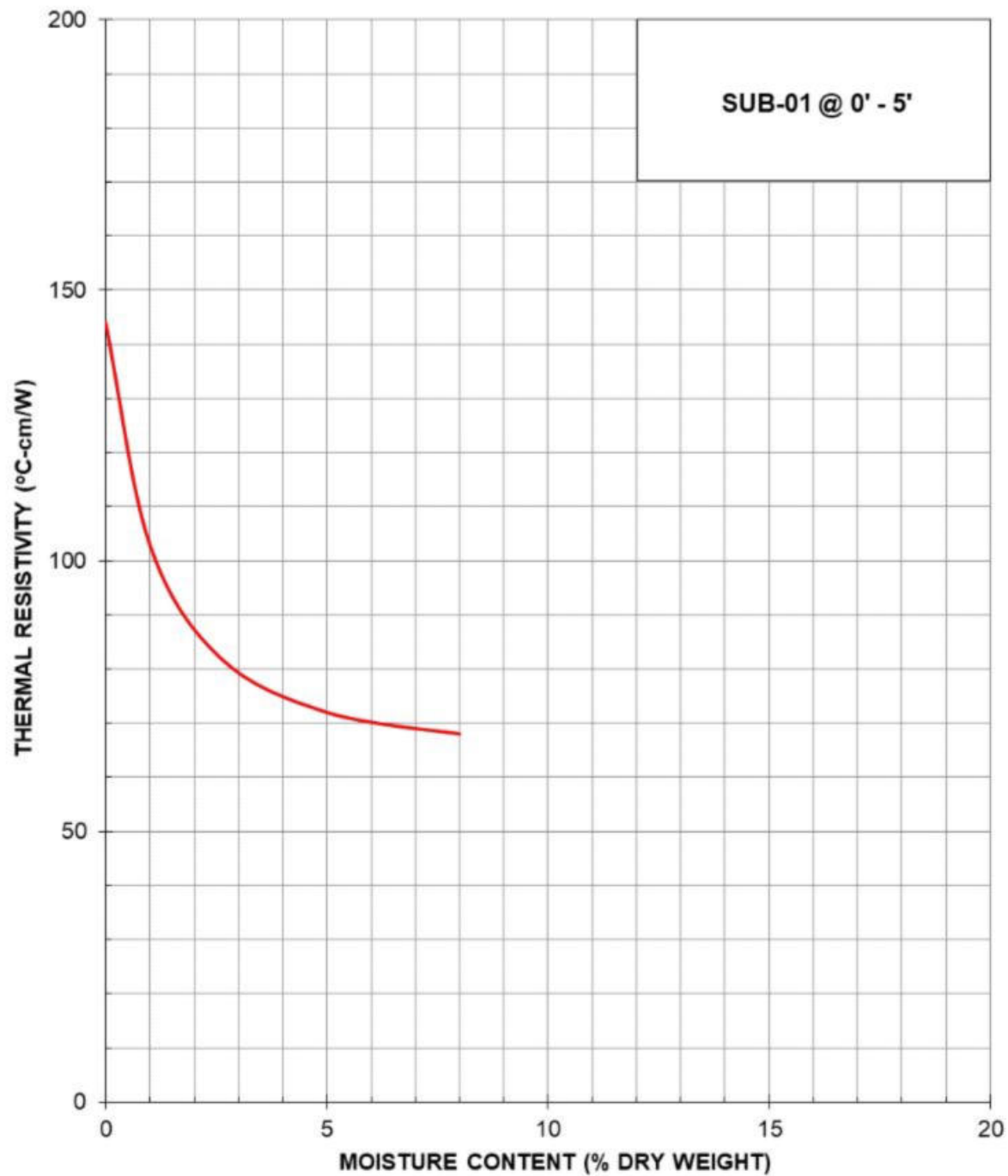
Prairie Song Reliability Project – Acton, CA

Thermal Resistivity Report

March 2023

Figure 3

THERMAL DRYOUT CURVE



Terracon (Project No. LA245085)

Prairie Song Reliability Project – Acton, CA

Thermal Resistivity Report

March 2023

Figure 4



**CALIFORNIA BEARING RATIO (CBR)
 OF LABORATORY-COMPACTED SOIL
 ASTM D 1883**

Project Name: Prairie Song Reliability Project
 Project No.: LA245085
 Boring No.: BESS-3
 Sample No.: -
 Depth (ft.): 0-5
 Soil Description: Silty, Clayey Sand

Tested By: SM
 Input By: JP
 Checked By: AP

Date: 01/23/25
 Date: 01/27/25
 Date: 05/05/25

SAMPLE DESCRIPTION BEFORE SOAKING

Mold Number	F
Blows Per Layer	25
Wt of Wet Soil & Mold (gm)	12527
Weight of Mold (gm)	7786
Weight of Wet Soil (gm)	4741
Mold Volume (cu.ft)	0.0750
Container No.	
Wet Wt. Soil + Container (gm)	666.49
Dry Wt. Soil + Container (gm)	649.74
Wt. Container (gm)	451.71
Moisture Content (%)	8.46
Wet Density (pcf)	139.4
Dry Density (pcf)	128.5

SAMPLE PREPARATION

Wt of Hammer (Lbs)	10
No. of Layers	5
No. of Blows/Layer	25
Drop Height (inches)	18
Surcharge Weight (Lbs)	10
Max. Dry Density (pcf)*	135.2
Molded Relative Comp (%)	95.0
Req'd % Moisture	8.0
No. of Trials	1
% Retained 3/4" Sieve	0.00%

*Note: Max. dry density provided by Terracon

TEST LOAD DATA

Piston Diameter (inches):		1.954
Penetration (inch)	Mold No.: F	
	LOAD (lb)	Stress (psi)
0.000	0	0.00
0.025	47	15.67
0.050	103	34.35
0.075	163	54.36
0.100	235	78.37
0.125	312	104.04
0.150	385	128.39
0.175	448	149.40
0.200	501	167.07
0.225	536	178.74
0.250	551	183.74
0.275	560	186.75
0.300	576	192.08
0.325	605	201.75
0.350	640	213.42
0.375	674	224.76
0.400	714	238.10
0.425	759	253.11
0.450	807	269.11
0.475	860	286.79
0.500	913	304.46

DEFORMATION DURING SOAKING PERIOD

Sample Length (inch) 4.584

DATE	TIME	Mold No.: F	
		Dial Rdgs	Swell (in)
02/06/25	16:40	0.1090	
02/07/25	08:10	0.1040	
02/10/25	08:10	0.1100	0.0010
Percent Swell/Collapse (+/-)		0.02	

AFTER SOAKING

Mold Number	F
Wt. of Wet Soil + Mold (gm)	12593
Weight of Mold (gm)	7786
Weight of Wet Soil (gm)	4807
Final Sample Volume (cu.ft)	0.0750
Container No.	
Wet Wt. Soil + Container (gm)	683.73
Dry Wt. Soil + Container (gm)	640.42
Wt. Container (gm)	151.00
Mosture Content (%)	8.8
Wet Density (pcf)	141.3
After Test Dry Density (pcf)	129.8

TEST RESULTS

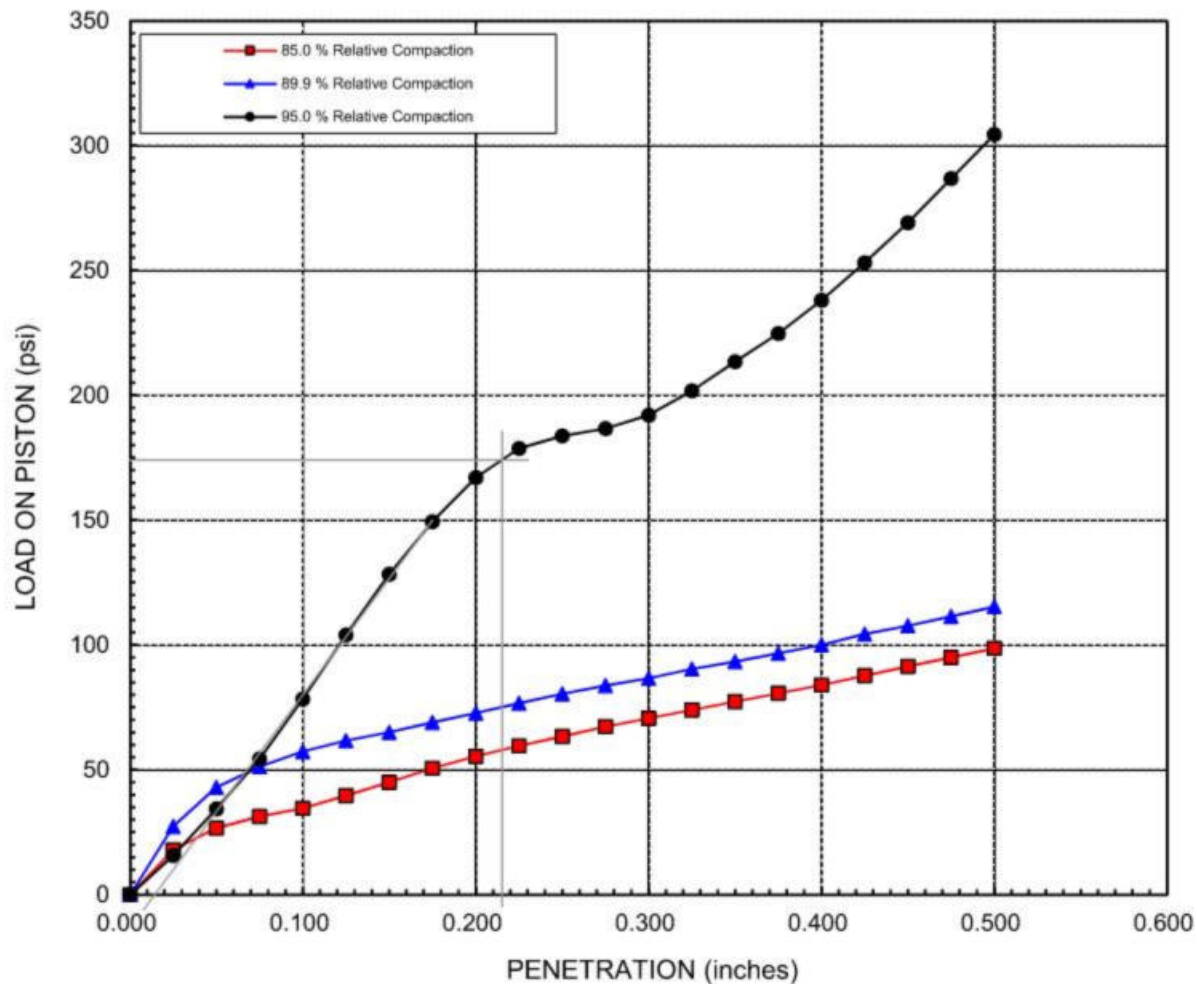
CBR @ .1": 10
 CBR @ .2": 12



CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOIL
ASTM D 1883

Project Name: Prairie Song Reliability Project
Project No.: LA245085
Boring No.: BESS-3
Sample No.: -
Depth (ft.): 0-5
Soil Description: Silty, Clayey Sand

Tested By: SM Date: 01/23/25
Data Input By: JP Date: 01/27/25
Checked By: AP Date: 05/05/25



**AP Engineering and Testing, Inc.**

DBE|MBE|SBE

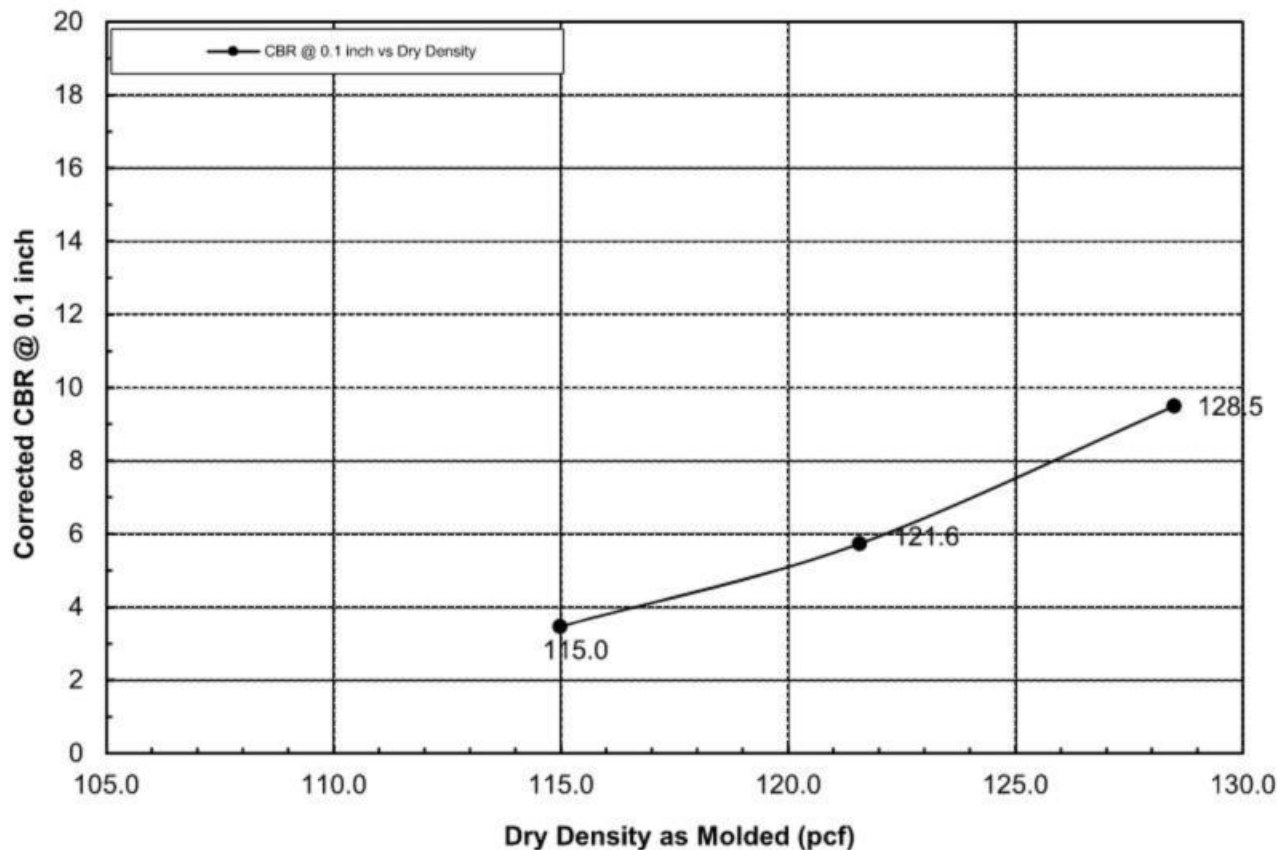
2607 Pomona Boulevard | Pomona, CA 91768

t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com**CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOIL
ASTM D 1883**

Project Name:	<u>Prairie Song Reliability Project</u>	Tested By :	<u>SM</u>	Date:	<u>01/23/25</u>
Project No. :	<u>LA245085</u>	Data Input By:	<u>JP</u>	Date:	<u>01/27/25</u>
Boring No.:	<u>BESS-3</u>	Checked By:	<u>AP</u>	Date:	<u>05/05/25</u>
Sample No.:	<u>-</u>				
Depth (ft.) :	<u>0-5</u>				
Soil Description :	<u>Silty, Clayey Sand</u>				

TEST RESULTS

Dry Density (pcf)	Maximum Dry Density by ASTM D 1557 (pcf)	Relative Compaction (%)	Blow Per Layer	CBR @0.1"	CBR @0.2"
115.0	135.2	85.0	8	3	4
121.6	135.2	89.9	10	6	5
128.5	135.2	95.0	25	10	12



**AP Engineering and Testing, Inc.**

DBE|MBE|SBE

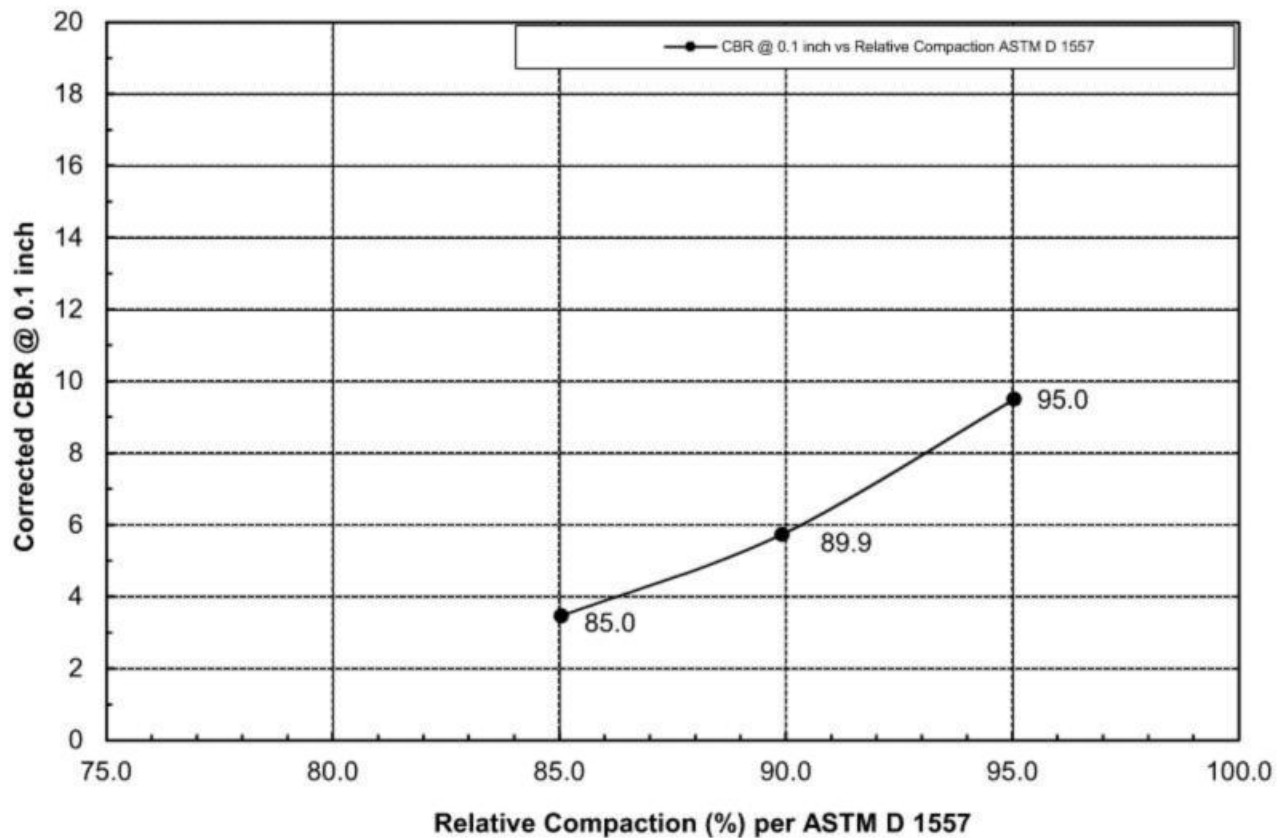
2607 Pomona Boulevard | Pomona, CA 91768

t. 909.869.6316 | f. 909.869.6318 | www.aplaboratory.com**CALIFORNIA BEARING RATIO (CBR)
OF LABORATORY-COMPACTED SOIL
ASTM D 1883**

Project Name:	<u>Prairie Song Reliability Project</u>	Tested By :	<u>SM</u>	Date:	<u>01/23/25</u>
Project No. :	<u>LA245085</u>	Data Input By:	<u>JP</u>	Date:	<u>01/27/25</u>
Boring No.:	<u>BESS-3</u>	Checked By:	<u>AP</u>	Date:	<u>05/05/25</u>
Sample No.:	<u>-</u>				
Depth (ft.) :	<u>0-5</u>				
Soil Description :	<u>Silty, Clayey Sand</u>				

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115.0	135.2	85.0	8	3	4
121.6	135.2	89.9	10	6	5
128.5	135.2	95.0	25	10	12



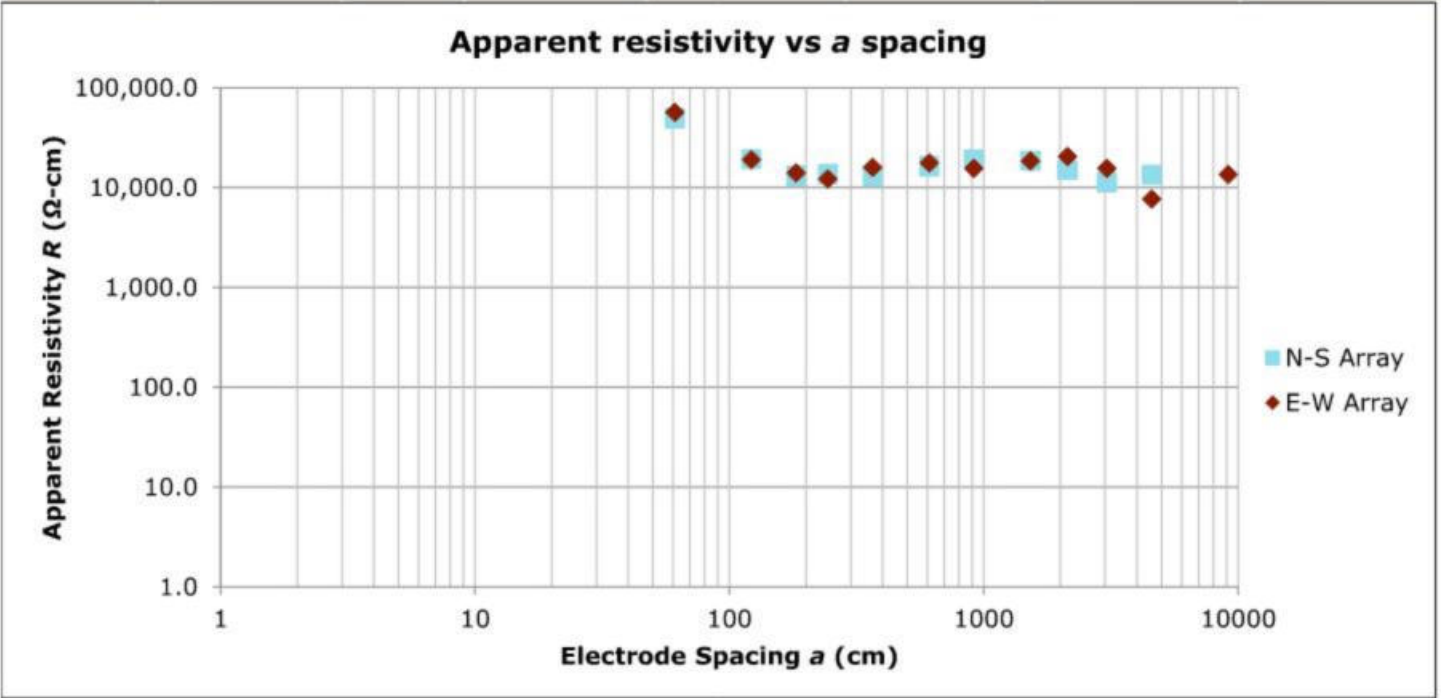


Array Loc.	ER-1 (34.4831, -118.1471)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Semi-Compacted Soil
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 12, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to highway		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing a		Electrode Depth b		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance R	Apparent Resistivity ρ	Measured Resistance R	Apparent Resistivity ρ
				Ω	(Ω -cm)	Ω	(Ω -cm)
2	61	2	5	128	49470	147	56960
4	122	2	3	25	19380	25	19010
6	183	2	5	11	13190	12	14070
8	244	2	5	8.9	13650	8.0	12270
12	366	2	5	5.7	13220	6.9	15990
20	610	2	5	4.3	16380	4.6	17760
30	914	3	8	3.3	19230	2.7	15570
50	1524	3	8	1.9	18610	1.9	18470
70	2134	3	8	1.1	15030	1.5	20480
100	3048	6	15	0.59	11310	0.82	15660
150	4572	6	15	0.47	13490	0.27	7680
300	9144	6	15			0.24	13550



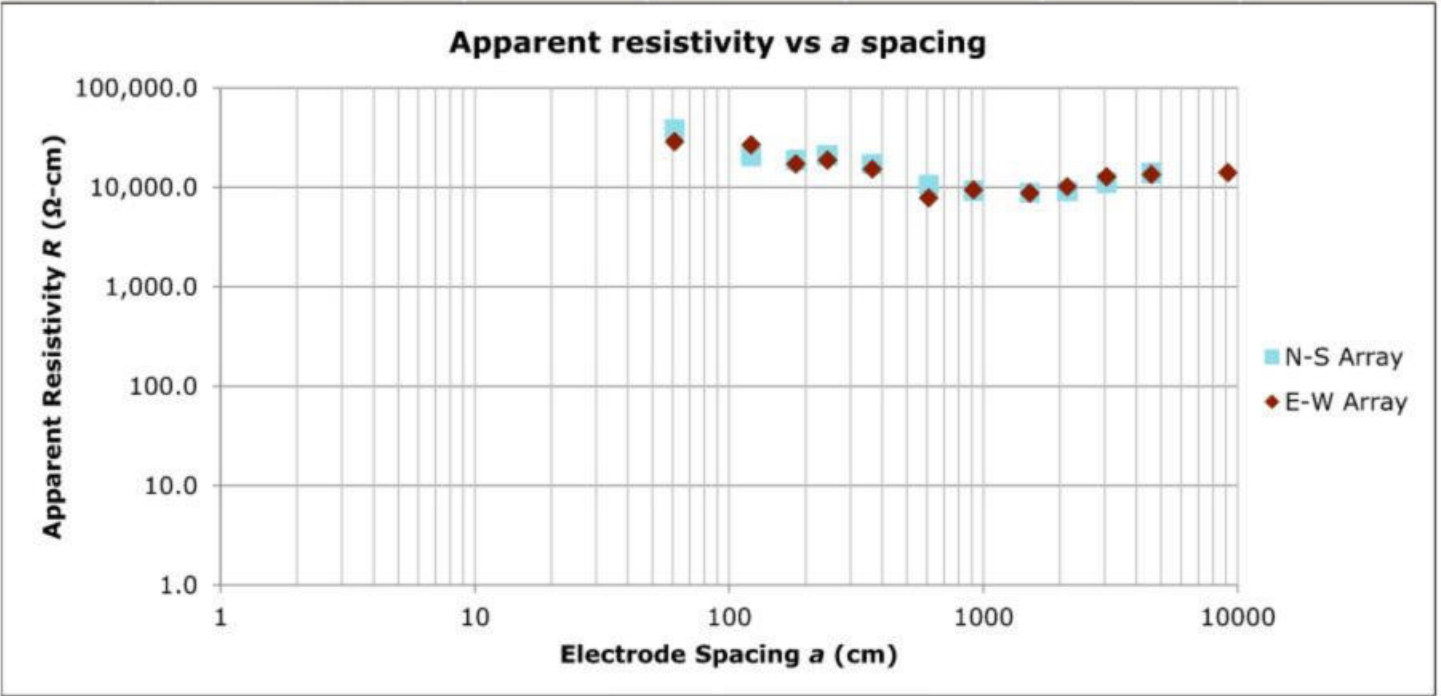


Array Loc.	ER-2 (34.4834, -118.1426)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Loose Soild
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 11, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to highway		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing a		Electrode Depth b		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance R	Apparent Resistivity ρ	Measured Resistance R	Apparent Resistivity ρ
				Ω	(Ω -cm)	Ω	(Ω -cm)
2	61	2	5	100	38710	75	28990
4	122	2	5	27	20570	35	26890
6	183	2	5	16	18640	15	17220
8	244	2	5	14	21220	12	18870
12	366	2	5	7.5	17140	6.6	15290
20	610	2	5	2.8	10590	2.0	7840
30	914	3	8	1.6	9240	1.6	9460
50	1524	3	8	0.92	8810	0.92	8790
70	2134	3	8	0.68	9130	0.76	10150
100	3048	6	15	0.59	11240	0.67	12770
150	4572	6	15	0.48	13830	0.47	13450
300	9144	6	15			0.25	14090

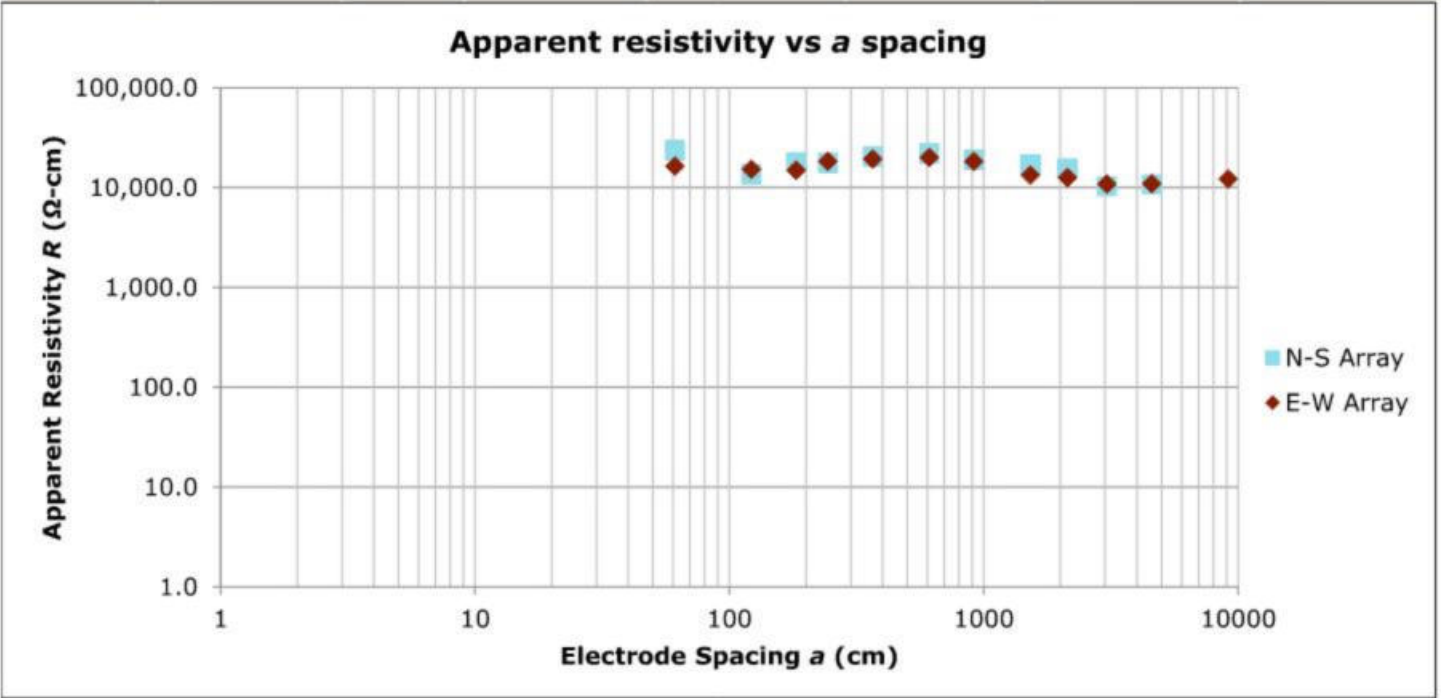


Array Loc.	ER-3 (34.4854, -118.1390)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Semi-Compacted Soil
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 11, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to roads		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing a		Electrode Depth b		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance R	Apparent Resistivity ρ	Measured Resistance R	Apparent Resistivity ρ
				Ω	(Ω -cm)	Ω	(Ω -cm)
2	61	2	5	61	23530	43	16500
4	122	2	3	18	13790	20	15330
6	183	2	5	16	17970	13	14910
8	244	2	5	12	17780	12	18440
12	366	2	5	8.9	20410	8.4	19310
20	610	2	5	5.8	22340	5.2	20030
30	914	3	8	3.3	18980	3.2	18310
50	1524	3	8	1.8	16880	1.4	13400
70	2134	3	8	1.2	15670	0.94	12640
100	3048	6	15	0.54	10330	0.57	10840
150	4572	6	15	0.38	10800	0.38	10990
300	9144	6	15			0.21	12250



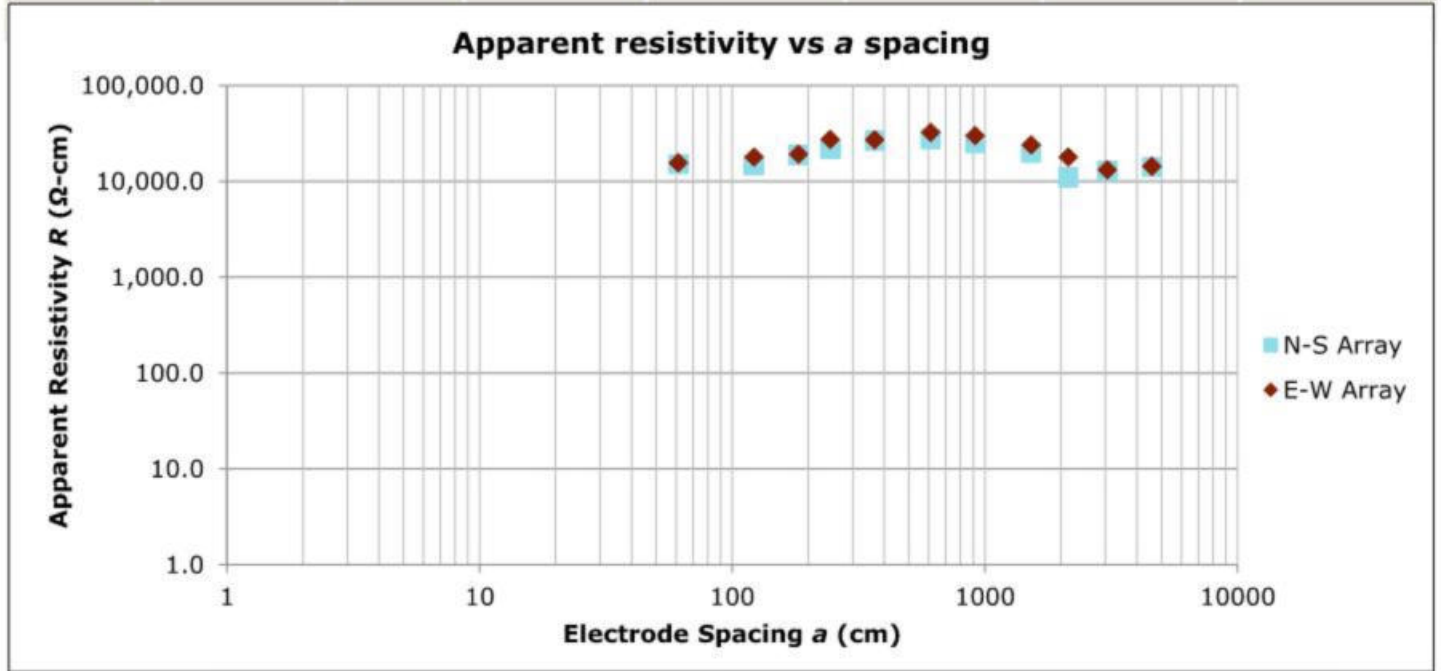


Array Loc.	ER-4 (34.4867, -118.1370)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Loose Soild
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 11, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the both arrays due to a sloped terrain on the south side and thick vegetation on east side		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing a		Electrode Depth b		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance R	Apparent Resistivity ρ	Measured Resistance R	Apparent Resistivity ρ
				Ω	(Ω -cm)	Ω	(Ω -cm)
2	61	2	5	39	15170	40	15640
4	122	2	5	19	14670	23	18010
6	183	2	5	16	18860	17	19160
8	244	2	5	14	21710	18	27450
12	366	2	5	12	26570	12	27210
20	610	2	5	7.3	27920	8.5	32490
30	914	3	8	4.4	25050	5.2	29940
50	1524	3	8	2.1	19900	2.5	24110
70	2134	3	8	0.82	11030	1.34	17990
100	3048	6	15	0.67	12800	0.69	13200
150	4572	6	15	0.49	14090	0.50	14410
300	9144	6	15				

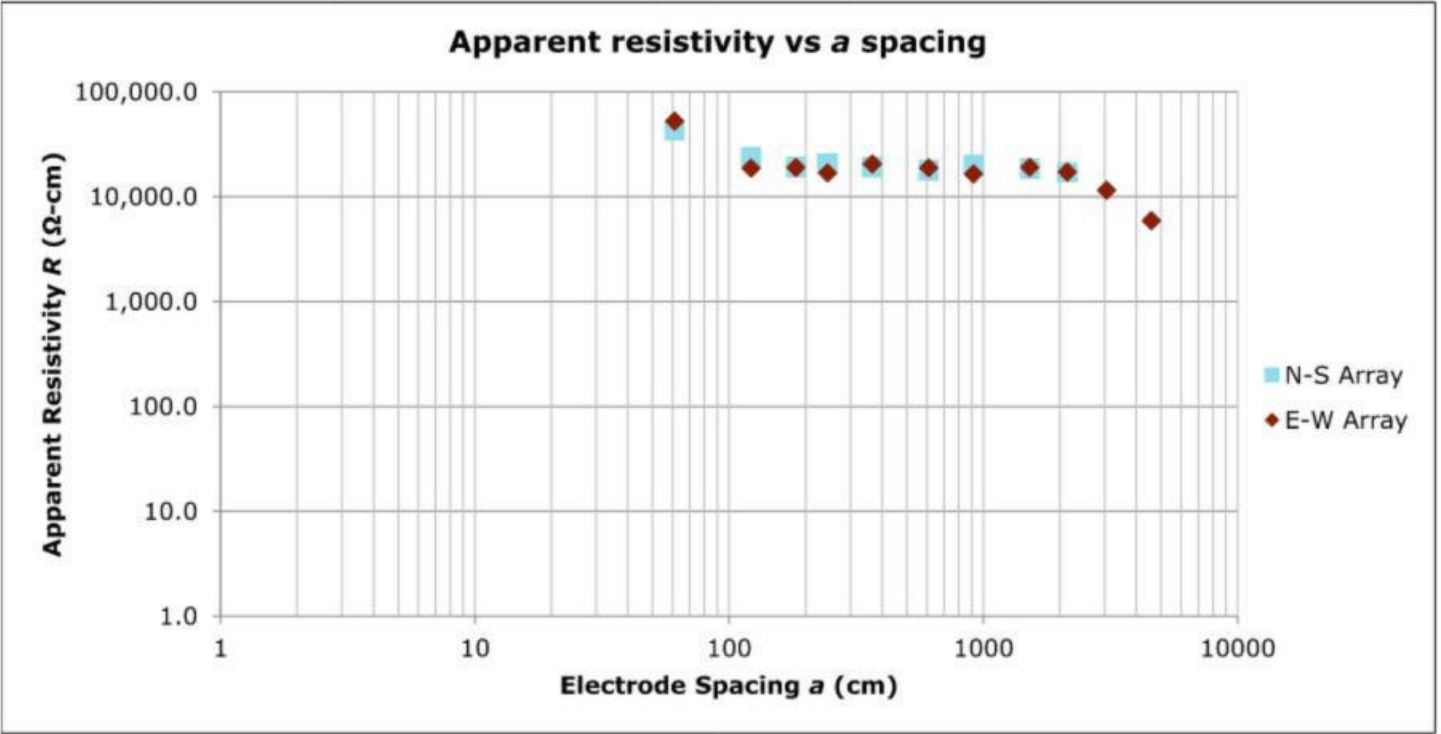


Array Loc.	ER-5 (34.4834, -118.1383)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Burrowed Ground
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 12, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to road in the north and wash in the south		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing a		Electrode Depth b		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance R	Apparent Resistivity ρ	Measured Resistance R	Apparent Resistivity ρ
				Ω	(Ω -cm)	Ω	(Ω -cm)
2	61	2	5	111	43120	136	52580
4	122	2	5	31	23790	24	18750
6	183	2	5	17	19090	17	19050
8	244	2	5	14	20870	11	16920
12	366	2	5	8.4	19310	8.9	20580
20	610	2	5	4.7	17990	4.9	18930
30	914	3	8	3.5	20250	2.9	16490
50	1524	3	8	2.0	18810	2.0	19120
70	2134	3	8	1.3	17080	1.3	17280
100	3048	6	15			0.60	11510
150	4572	6	15			0.21	5930



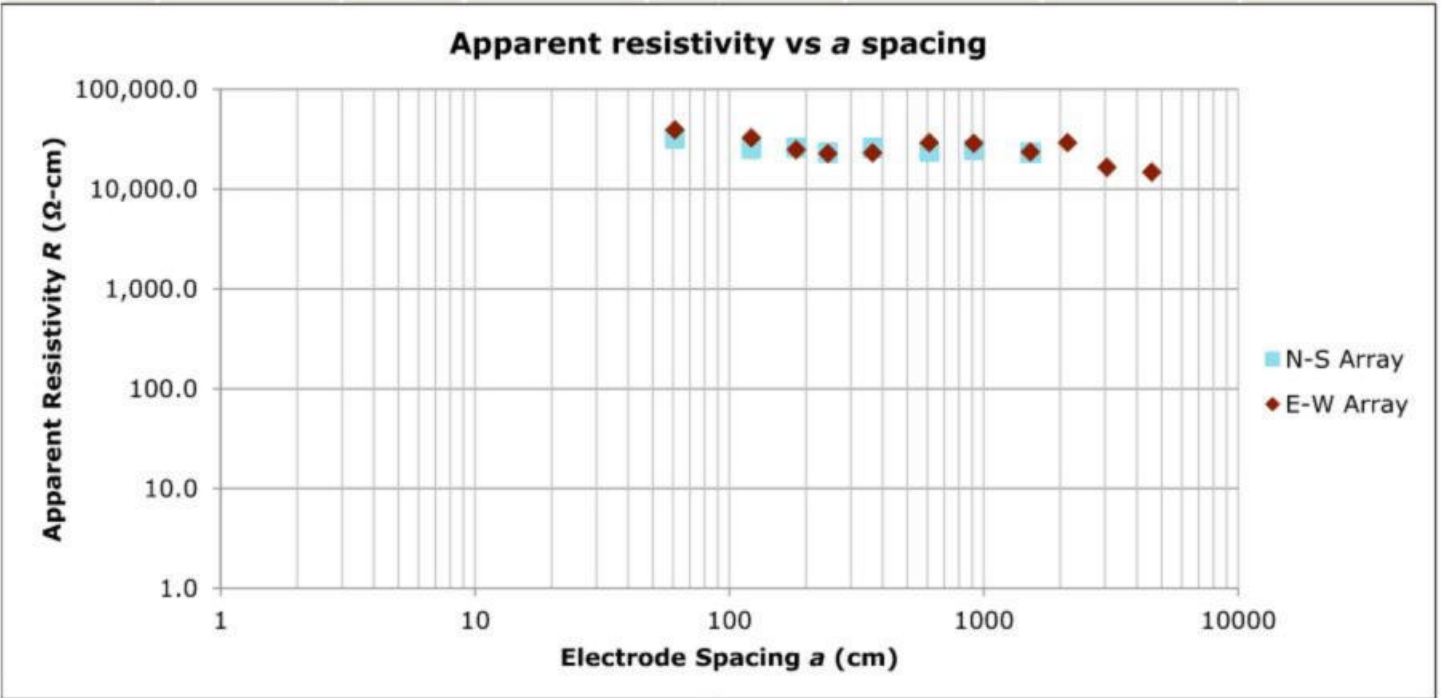


Array Loc.	ER-6 (34.4802, -118.1332)		
Instrument	MiniSting	Weather	Sunny
Serial #	SZ107129	Ground Cond.	Semi-Compacted Soil
Cal. Check	August 28, 2025	Tested By	AL/OW
Test Date	December 13, 2024	Method	Wenner 4-pin (ASTM G57-06 (2012); IEEE 81-2012)
Notes & Conflicts	Site Limitation on the N-S Array due to road in the north and descending slope in the south		

Apparent resistivity ρ is calculated as :

$$\rho = \frac{4\pi aR}{1 + \frac{2a}{\sqrt{a^2 + 4b^2}} - \frac{a}{\sqrt{a^2 + b^2}}}$$

Electrode Spacing a		Electrode Depth b		N-S Test		E-W Test	
(feet)	(centimeters)	(inches)	(centimeters)	Measured Resistance R	Apparent Resistivity ρ	Measured Resistance R	Apparent Resistivity ρ
				Ω	(Ω -cm)	Ω	(Ω -cm)
2	61	2	5	83	32320	101	39120
4	122	2	3	33	25240	43	32640
6	183	2	5	23	26140	22	24870
8	244	2	5	15	22980	15	22650
12	366	2	5	11	25650	10	22950
20	610	2	5	6.1	23520	7.6	29170
30	914	3	8	4.3	24580	5.0	28640
50	1524	3	8	2.4	22960	2.5	23470
70	2134	3	8			2.2	29260
100	3048	6	15			0.86	16480
150	4572	6	15			0.51	14750



Supporting Information

Contents:

Liquefaction Analyses
Shaft Analyses
General Notes
Unified Soil Classification System

Note: All attachments are one page unless noted above.

LIQUEFACTION ANALYSIS SUMMARY

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Input File Name: C:\Users\sdhital\OneDrive - Terracon Consultants
Inc\Desktop\New folder\LA245085 Prairie Song Reliability - TL-2.liq
Title: LA245085
Subtitle: Prairie Song Reliability Project

Surface Elev.=3011
Hole No.=TL-2
Depth of Hole= 51.50 ft
Water Table during Earthquake= 100.00 ft
Water Table during In-Situ Testing= 100.00 ft
Max. Acceleration= 0.87 g
Earthquake Magnitude= 7.76

Input Data:

Surface Elev.=3011
Hole No.=TL-2
Depth of Hole=51.50 ft
Water Table during Earthquake= 100.00 ft
Water Table during In-Situ Testing= 100.00 ft
Max. Acceleration=0.87 g
Earthquake Magnitude=7.76
No-Liquefiable Soils: Based on Analysis

1. SPT or BPT Calculation.
 2. Settlement Analysis Method: Ishihara / Yoshimine
 3. Fines Correction for Liquefaction: Idriss/Seed
 4. Fine Correction for Settlement: During Liquefaction*
 5. Settlement Calculation in: All zones*
 6. Hammer Energy Ratio, $C_e = 1.42$
 7. Borehole Diameter, $C_b = 1.15$
 8. Sampling Method, $C_s = 1.2$
 9. User request factor of safety (apply to CSR) , User= 1.3
Plot two CSR ($f_{s1}=1$, $f_{s2}=User$)
 10. Use Curve Smoothing: Yes*
- * Recommended Options

In-Situ Test Data:

Depth ft	SPT	gamma pcf	Fines %
2.50	8.00	120.00	24.00
5.00	12.00	120.00	24.00
7.50	11.00	120.00	10.00
10.00	15.00	115.00	10.00
15.00	20.00	110.00	10.00
20.00	40.00	110.00	10.00
25.00	28.00	120.00	10.00
30.00	41.00	120.00	10.00
35.00	46.00	120.00	10.00
40.00	33.00	120.00	10.00
45.00	37.00	120.00	10.00
50.00	27.00	120.00	10.00

Output Results:

Settlement of Saturated Sands=0.00 in.

Settlement of Unsaturated Sands=1.31 in.

Total Settlement of Saturated and Unsaturated Sands=1.31 in.

Differential Settlement=0.655 to 0.865 in.

Depth ft	CRRm	CSRfs	F.S.	S_sat. in.	S_dry in.	S_all in.
2.50	0.28	0.56	5.00	0.00	1.31	1.31
3.00	0.33	0.56	5.00	0.00	1.30	1.30
3.50	1.83	0.56	5.00	0.00	1.29	1.29
4.00	1.83	0.56	5.00	0.00	1.26	1.26
4.50	1.83	0.56	5.00	0.00	1.25	1.25
5.00	1.83	0.56	5.00	0.00	1.24	1.24
5.50	1.83	0.56	5.00	0.00	1.24	1.24
6.00	1.83	0.56	5.00	0.00	1.23	1.23
6.50	1.83	0.56	5.00	0.00	1.22	1.22
7.00	0.34	0.56	5.00	0.00	1.18	1.18
7.50	0.28	0.56	5.00	0.00	1.10	1.10
8.00	0.30	0.56	5.00	0.00	1.01	1.01
8.50	1.83	0.56	5.00	0.00	0.93	0.93
9.00	1.83	0.56	5.00	0.00	0.86	0.86
9.50	1.83	0.55	5.00	0.00	0.80	0.80
10.00	1.83	0.55	5.00	0.00	0.78	0.78
10.50	1.83	0.55	5.00	0.00	0.77	0.77
11.00	1.83	0.55	5.00	0.00	0.76	0.76
11.50	1.83	0.55	5.00	0.00	0.75	0.75
12.00	1.83	0.55	5.00	0.00	0.74	0.74
12.50	1.83	0.55	5.00	0.00	0.73	0.73
13.00	1.83	0.55	5.00	0.00	0.71	0.71
13.50	1.83	0.55	5.00	0.00	0.70	0.70

14.00	1.83	0.55	5.00	0.00	0.69	0.69
14.50	1.83	0.55	5.00	0.00	0.67	0.67
15.00	1.83	0.55	5.00	0.00	0.66	0.66
15.50	1.83	0.55	5.00	0.00	0.65	0.65
16.00	1.83	0.55	5.00	0.00	0.64	0.64
16.50	1.83	0.55	5.00	0.00	0.63	0.63
17.00	1.83	0.54	5.00	0.00	0.62	0.62
17.50	1.83	0.54	5.00	0.00	0.61	0.61
18.00	1.83	0.54	5.00	0.00	0.60	0.60
18.50	1.83	0.54	5.00	0.00	0.59	0.59
19.00	1.83	0.54	5.00	0.00	0.58	0.58
19.50	1.83	0.54	5.00	0.00	0.57	0.57
20.00	1.83	0.54	5.00	0.00	0.56	0.56
20.50	1.83	0.54	5.00	0.00	0.55	0.55
21.00	1.83	0.54	5.00	0.00	0.54	0.54
21.50	1.83	0.54	5.00	0.00	0.54	0.54
22.00	1.83	0.54	5.00	0.00	0.53	0.53
22.50	1.83	0.54	5.00	0.00	0.53	0.53
23.00	1.83	0.54	5.00	0.00	0.52	0.52
23.50	1.83	0.54	5.00	0.00	0.51	0.51
24.00	1.83	0.54	5.00	0.00	0.51	0.51
24.50	1.83	0.54	5.00	0.00	0.50	0.50
25.00	1.83	0.53	5.00	0.00	0.49	0.49
25.50	1.83	0.53	5.00	0.00	0.48	0.48
26.00	1.83	0.53	5.00	0.00	0.48	0.48
26.50	1.83	0.53	5.00	0.00	0.47	0.47
27.00	1.83	0.53	5.00	0.00	0.46	0.46
27.50	1.83	0.53	5.00	0.00	0.45	0.45
28.00	1.83	0.53	5.00	0.00	0.44	0.44
28.50	1.84	0.53	5.00	0.00	0.44	0.44
29.00	1.83	0.53	5.00	0.00	0.43	0.43
29.50	1.83	0.53	5.00	0.00	0.42	0.42
30.00	1.82	0.53	5.00	0.00	0.42	0.42
30.50	1.82	0.53	5.00	0.00	0.41	0.41
31.00	1.81	0.52	5.00	0.00	0.40	0.40
31.50	1.81	0.52	5.00	0.00	0.39	0.39
32.00	1.80	0.52	5.00	0.00	0.38	0.38
32.50	1.80	0.52	5.00	0.00	0.38	0.38
33.00	1.79	0.51	5.00	0.00	0.37	0.37
33.50	1.79	0.51	5.00	0.00	0.36	0.36
34.00	1.78	0.51	5.00	0.00	0.35	0.35
34.50	1.78	0.51	5.00	0.00	0.35	0.35
35.00	1.77	0.50	5.00	0.00	0.34	0.34
35.50	1.77	0.50	5.00	0.00	0.33	0.33
36.00	1.76	0.50	5.00	0.00	0.32	0.32
36.50	1.76	0.50	5.00	0.00	0.31	0.31
37.00	1.75	0.50	5.00	0.00	0.30	0.30
37.50	1.75	0.49	5.00	0.00	0.29	0.29
38.00	1.74	0.49	5.00	0.00	0.28	0.28
38.50	1.74	0.49	5.00	0.00	0.27	0.27

39.00	1.73	0.49	5.00	0.00	0.26	0.26
39.50	1.73	0.48	5.00	0.00	0.25	0.25
40.00	1.72	0.48	5.00	0.00	0.23	0.23
40.50	1.72	0.48	5.00	0.00	0.22	0.22
41.00	1.72	0.48	5.00	0.00	0.21	0.21
41.50	1.71	0.47	5.00	0.00	0.19	0.19
42.00	1.71	0.47	5.00	0.00	0.18	0.18
42.50	1.70	0.47	5.00	0.00	0.17	0.17
43.00	1.70	0.47	5.00	0.00	0.17	0.17
43.50	1.69	0.47	5.00	0.00	0.16	0.16
44.00	1.69	0.46	5.00	0.00	0.15	0.15
44.50	1.68	0.46	5.00	0.00	0.15	0.15
45.00	1.68	0.46	5.00	0.00	0.14	0.14
45.50	1.68	0.46	5.00	0.00	0.13	0.13
46.00	1.67	0.45	5.00	0.00	0.12	0.12
46.50	1.67	0.45	5.00	0.00	0.12	0.12
47.00	1.66	0.45	5.00	0.00	0.11	0.11
47.50	1.66	0.45	5.00	0.00	0.10	0.10
48.00	1.65	0.44	5.00	0.00	0.09	0.09
48.50	1.65	0.44	5.00	0.00	0.08	0.08
49.00	1.65	0.44	5.00	0.00	0.07	0.07
49.50	1.64	0.44	5.00	0.00	0.06	0.06
50.00	1.64	0.44	5.00	0.00	0.05	0.05
50.50	1.63	0.43	5.00	0.00	0.03	0.03
51.00	1.63	0.43	5.00	0.00	0.02	0.02
51.50	1.63	0.43	5.00	0.00	0.00	0.00

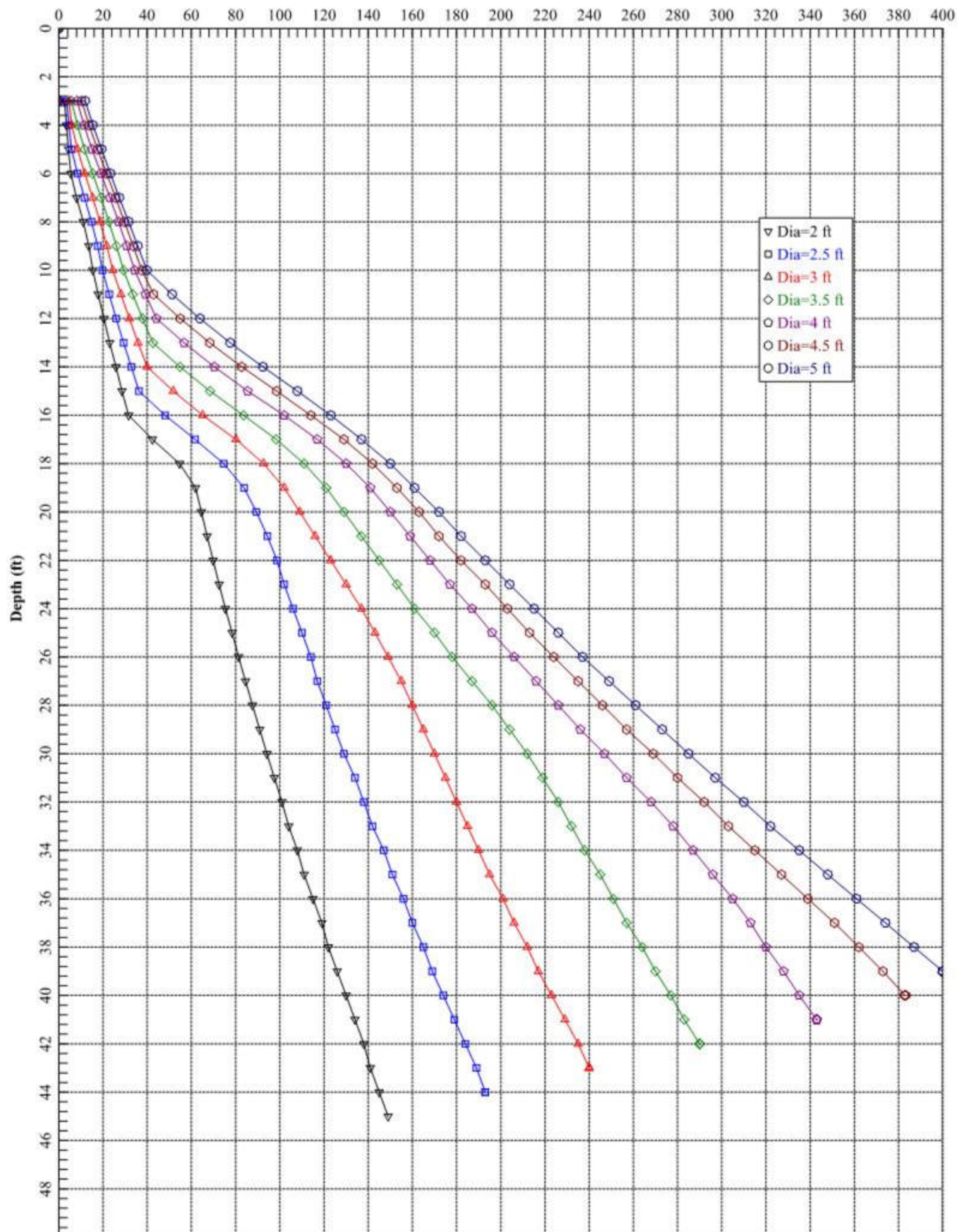
* F.S.<1, Liquefaction Potential Zone

(F.S. is limited to 5, CRR is limited to 2, CSR is limited to 2)

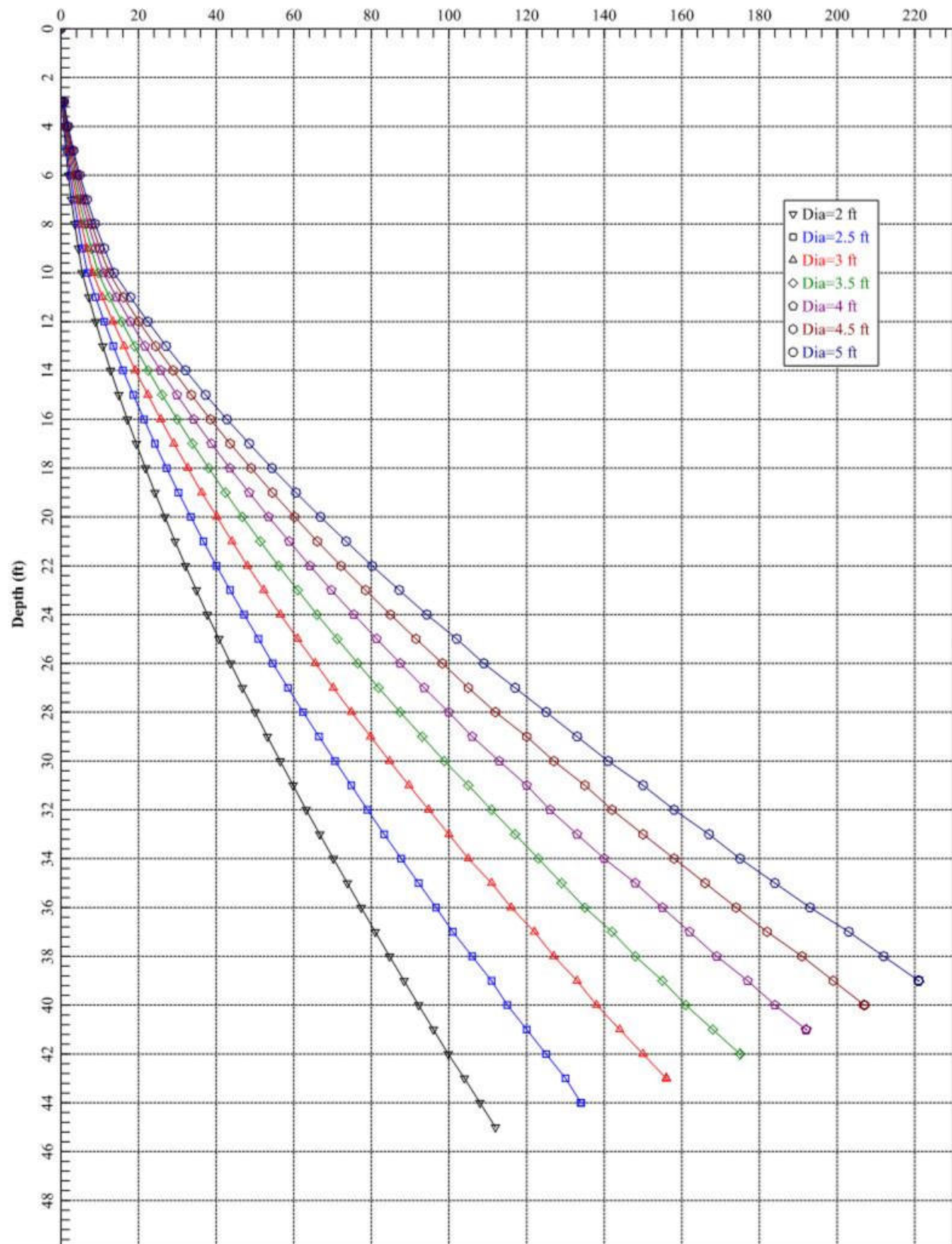
Units: Unit: qc, fs, Stress or Pressure = atm (1.0581tsf); Unit Weight = pcf; Depth = ft; Settlement = in.

1 atm (atmosphere)	= 1 tsf (ton/ft ²)
CRRm	Cyclic resistance ratio from soils
CSRsf	Cyclic stress ratio induced by a given earthquake (with user
request factor of safety)	
F.S.	Factor of Safety against liquefaction, F.S.=CRRm/CSRsf
S_sat	Settlement from saturated sands
S_dry	Settlement from Unsaturated Sands
S_all	Total Settlement from Saturated and Unsaturated Sands
NoLiq	No-Liquefy Soils

Allowable Downward Capacity
Total Resistance/F.S. (tons)



Allowable Skin Friction
Side Resistance/F.S. (tons)



GENERAL NOTES



DESCRIPTION OF SYMBOLS AND ABBREVIATIONS

SAMPLING				WATER LEVEL		Water Initially Encountered	FIELD TESTS	(HP) Hand Penetrometer
						Water Level After a Specified Period of Time		(T) Torvane
						Water Level After a Specified Period of Time		(b/f) Standard Penetration Test (blows per foot)
						Water levels indicated on the soil boring logs are the levels measured in the borehole at the times indicated. Groundwater level variations will occur over time. In low permeability soils, accurate determination of groundwater levels is not possible with short term water level observations.		N N value
								(PID) Photo-Ionization Detector
								(OVA) Organic Vapor Analyzer
								(WOH) Weight of Hammer

DESCRIPTIVE SOIL CLASSIFICATION

Soil classification is based on the Unified Soil Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

LOCATION AND ELEVATION NOTES

Unless otherwise noted, Latitude and Longitude are approximately determined using a hand-held GPS device. The accuracy of such devices is variable. Surface elevation data annotated with +/- indicates that no actual topographical survey was conducted to confirm the surface elevation. Instead, the surface elevation was approximately determined from topographic maps of the area.

STRENGTH TERMS	RELATIVE DENSITY OF COARSE-GRAINED SOILS (More than 50% retained on No. 200 sieve.) Density determined by Standard Penetration Resistance Includes gravels, sands and silts.			CONSISTENCY OF FINE-GRAINED SOILS (50% or more passing the No. 200 sieve.) Consistency determined by laboratory shear strength testing, field visual-manual procedures or standard penetration resistance		
	Descriptive Term (Density)	Standard Penetration or N-Value Blows/Ft.	Ring Sampler Blows/Ft.	Descriptive Term (Consistency)	Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-Value Blows/Ft.
	Very Loose	0 - 3	0 - 6	Very Soft	less than 500	0 - 1
	Loose	4 - 9	7 - 18	Soft	500 to 1,000	2 - 4
	Medium Dense	10 - 29	19 - 58	Medium-Stiff	1,000 to 2,000	4 - 8
	Dense	30 - 50	59 - 98	Stiff	2,000 to 4,000	8 - 15
	Very Dense	> 50	≥ 99	Very Stiff	4,000 to 8,000	15 - 30
				Hard	> 8,000	> 30

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 - 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300 mm)
Cobbles	12 in. to 3 in. (300mm to 75mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 - 12
Modifier	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1 - 10
Medium	11 - 30
High	> 30

Unified Soil Classification System

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests ^A				Soil Classification	
				Group Symbol	Group Name ^B
Coarse-Grained Soils: More than 50% retained on No. 200 sieve	Gravels: More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels: Less than 5% fines ^C	$Cu \geq 4$ and $1 \leq Cc \leq 3$ ^E	GW	Well-graded gravel ^F
		Gravels with Fines: More than 12% fines ^C	$Cu < 4$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	GP	Poorly graded gravel ^F
			Fines classify as ML or MH	GM	Silty gravel ^{F, G, H}
	Sands: 50% or more of coarse fraction passes No. 4 sieve	Clean Sands: Less than 5% fines ^D	Fines classify as CL or CH	GC	Clayey gravel ^{F, G, H}
			$Cu \geq 6$ and $1 \leq Cc \leq 3$ ^E	SW	Well-graded sand ^I
		Sands with Fines: More than 12% fines ^D	$Cu < 6$ and/or $[Cc < 1 \text{ or } Cc > 3.0]$ ^E	SP	Poorly graded sand ^I
Fines classify as ML or MH	SM		Silty sand ^{G, H, I}		
Fine-Grained Soils: 50% or more passes the No. 200 sieve	Silts and Clays: Liquid limit less than 50	Inorganic:	Fines classify as CL or CH	SC	Clayey sand ^{G, H, I}
			PI > 7 and plots above "A" line ^J	CL	Lean clay ^{K, L, M}
		Organic:	PI < 4 or plots below "A" line ^J	ML	Silt ^{K, L, M}
			$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OL	Organic clay ^{K, L, M, N} Organic silt ^{K, L, M, O}
	Silts and Clays: Liquid limit 50 or more	Inorganic:	PI plots on or above "A" line	CH	Fat clay ^{K, L, M}
			PI plots below "A" line	MH	Elastic silt ^{K, L, M}
		Organic:	$\frac{LL \text{ oven dried}}{LL \text{ not dried}} < 0.75$	OH	Organic clay ^{K, L, M, P} Organic silt ^{K, L, M, Q}
			Highly organic soils:		PT

^A Based on the material passing the 3-inch (75-mm) sieve.

^B If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

^C Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

^D Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay.

$$^E Cu = D_{60}/D_{10} \quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$$

^F If soil contains $\geq 15\%$ sand, add "with sand" to group name.

^G If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

^H If fines are organic, add "with organic fines" to group name.

^I If soil contains $\geq 15\%$ gravel, add "with gravel" to group name.

^J If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

^K If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

^L If soil contains $\geq 30\%$ plus No. 200 predominantly sand, add "sandy" to group name.

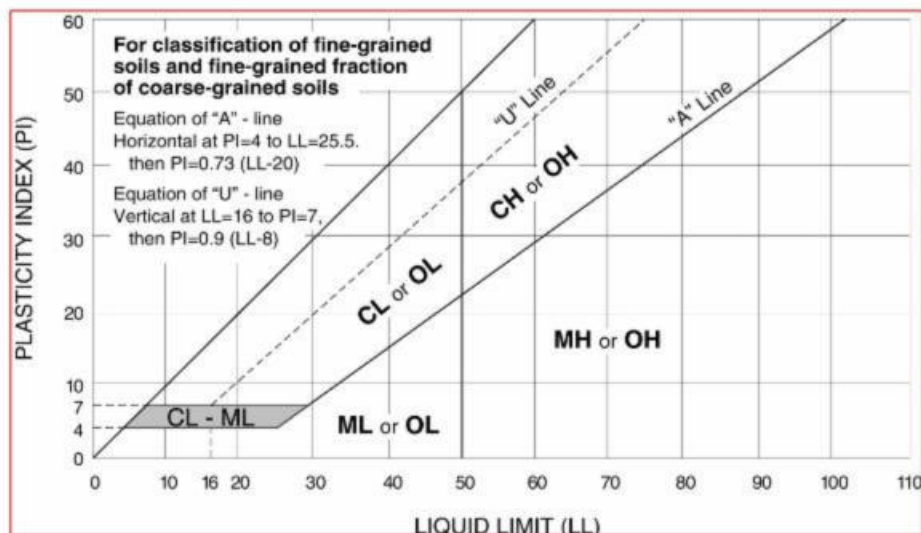
^M If soil contains $\geq 30\%$ plus No. 200, predominantly gravel, add "gravelly" to group name.

^N $PI \geq 4$ and plots on or above "A" line.

^O $PI < 4$ or plots below "A" line.

^P PI plots on or above "A" line.

^Q PI plots below "A" line.

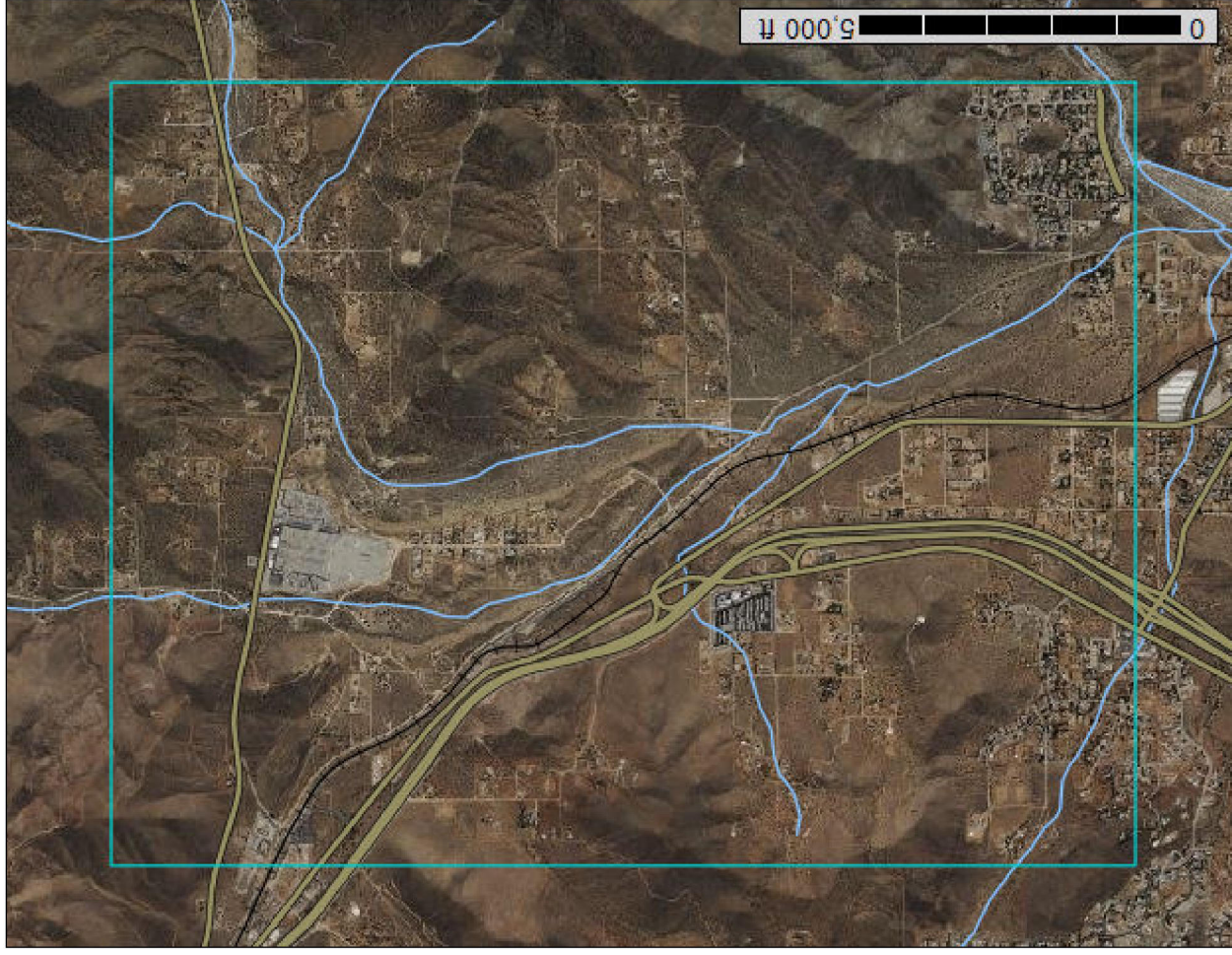


Attachment G: Soil Map

**Custom Soil Resource
Report for
Anges National Forest
Area, California, and
Antelope Valley Area,
California**

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

United States
Department of
Agriculture
NRCS
Natural
Resources
Conservation
Service



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

Preface	2
How Soil Surveys Are Made	5
Soil Map	8
Soil Map (.....)	9
Legend.....	10
Map Unit Legend (.....)	12
Map Unit Descriptions (.....)	13
Angeles National Forest Area, California.....	15
89—Pismo-Trigo, dry-Exchequer, dry families complex, 30 to 70 percent slopes.....	15
Antelope Valley Area, California.....	18
AmF2—Amargosa rocky coarse sandy loam, 9 to 55 percent slopes, eroded.....	18
GsC—Greenfield sandy loam, 2 to 9 percent slopes.....	19
GsD2—Greenfield sandy loam, 9 to 15 percent slopes, eroded.....	20
HbA—Hanford coarse sandy loam, 0 to 2 percent slopes.....	21
HbC—Hanford coarse sandy loam, 2 to 9 percent slopes.....	23
HbD—Hanford coarse sandy loam, 9 to 15 percent slopes.....	24
HcC—Hanford sandy loam, 2 to 9 percent slopes.....	25
HdC—Hanford gravelly sandy loam, 2 to 9 percent slopes.....	26
LdF—Las Posas-Toomes rocky loams, 30 to 50 percent slopes.....	28
Rg—Riverwash.....	30
Sa—Sandy alluvial land.....	31
TsF—Terrace escarpments.....	32
VsE—Vista coarse sandy loam, 15 to 30 percent slopes.....	33
VsE2—Vista coarse sandy loam, 15 to 30 percent slopes, eroded.....	34
VsF—Vista coarse sandy loam, 30 to 50 percent slopes.....	35
VsF2—Vista coarse sandy loam, 30 to 50 percent slopes, eroded.....	36
WgC—Wyman gravelly loam, 2 to 9 percent slopes.....	37
WgD—Wyman gravelly loam, 9 to 15 percent slopes.....	38
References	41

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

Custom Soil Resource Report

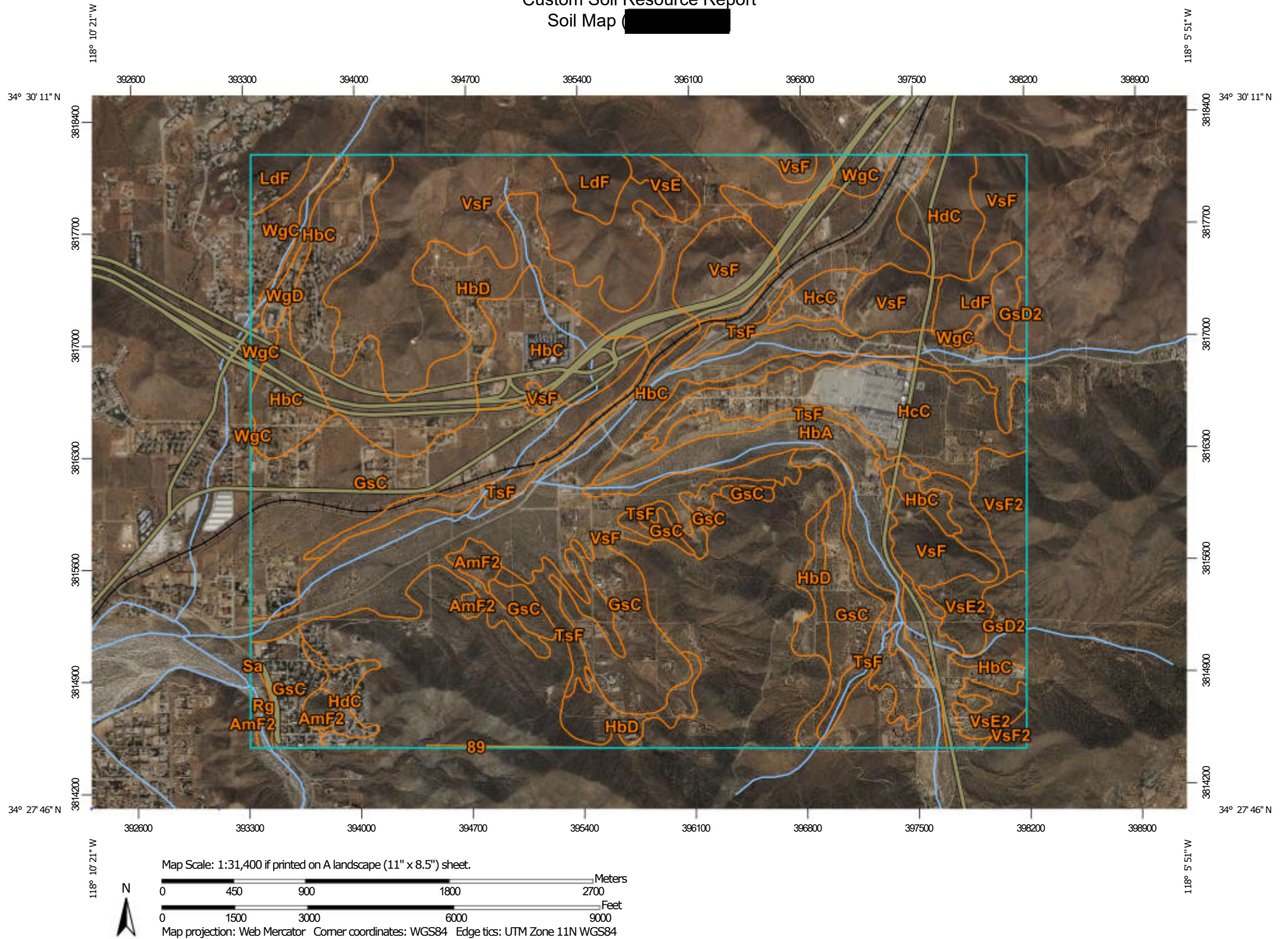
identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

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.

Custom Soil Resource Report

Soil Map ([REDACTED])



Custom Soil Resource Report

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 1:24,000.

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: Angeles National Forest Area, California

Survey Area Data: Version 18, Sep 3, 2024

Soil Survey Area: Antelope Valley Area, California

Survey Area Data: Version 17, Aug 30, 2024

Your area of interest (AOI) includes more than one soil survey area. These survey areas may have been mapped at different scales, with a different land use in mind, at different times, or at different levels of detail. This may result in map unit symbols, soil properties, and interpretations that do not completely agree across soil survey area boundaries.

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

Date(s) aerial images were photographed: Apr 14, 2022—Apr 23, 2022

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background

MAP LEGEND

MAP INFORMATION

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
89	Pismo-Trigo, dry-Exchequer, dry families complex, 30 to 70 percent slopes	2.4	0.1%
Subtotals for Soil Survey Area		2.4	0.1%
Totals for Area of Interest		4,475.1	100.0%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
AmF2	Amargosa rocky coarse sandy loam, 9 to 55 percent slopes, eroded	33.0	0.7%
GsC	Greenfield sandy loam, 2 to 9 percent slopes	590.8	13.2%
GsD2	Greenfield sandy loam, 9 to 15 percent slopes, eroded	45.2	1.0%
HbA	Hanford coarse sandy loam, 0 to 2 percent slopes	148.4	3.3%
HbC	Hanford coarse sandy loam, 2 to 9 percent slopes	864.2	19.3%
HbD	Hanford coarse sandy loam, 9 to 15 percent slopes	500.8	11.2%
HcC	Hanford sandy loam, 2 to 9 percent slopes	228.2	5.1%
HdC	Hanford gravelly sandy loam, 2 to 9 percent slopes	94.1	2.1%
LdF	Las Posas-Toomes rocky loams, 30 to 50 percent slopes	101.6	2.3%
Rg	Riverwash	11.6	0.3%
Sa	Sandy alluvial land	0.4	0.0%
TsF	Terrace escarpments	306.7	6.9%
VsE	Vista coarse sandy loam, 15 to 30 percent slopes	21.3	0.5%
VsE2	Vista coarse sandy loam, 15 to 30 percent slopes, eroded	86.3	1.9%
VsF	Vista coarse sandy loam, 30 to 50 percent slopes	1,285.1	28.7%
VsF2	Vista coarse sandy loam, 30 to 50 percent slopes, eroded	58.6	1.3%
WgC	Wyman gravelly loam, 2 to 9 percent slopes	81.7	1.8%
WgD	Wyman gravelly loam, 9 to 15 percent slopes	14.2	0.3%
Subtotals for Soil Survey Area		4,472.4	99.9%

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Totals for Area of Interest		4,475.1	100.0%

Map Unit Descriptions ([REDACTED])

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.

Custom Soil Resource Report

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.

Angeles National Forest Area, California

89—Pismo-Trigo, dry-Exchequer, dry families complex, 30 to 70 percent slopes

Map Unit Setting

National map unit symbol: hm8h
Elevation: 2,800 to 5,500 feet
Mean annual precipitation: 10 to 20 inches
Mean annual air temperature: 55 to 64 degrees F
Frost-free period: 150 to 200 days
Farmland classification: Not prime farmland

Map Unit Composition

Pismo family and similar soils: 40 percent
Trigo family, dry, and similar soils: 30 percent
Exchequer family, dry, and similar soils: 15 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Pismo Family

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from anorthosite

Typical profile

H1 - 0 to 9 inches: gravelly loamy sand
H2 - 9 to 13 inches: weathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 4 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 0.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: F019XG915CA - Sandy Hills <30"ppt
Hydric soil rating: No

Description of Trigo Family, Dry

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Concave
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 9 inches: sandy loam
H2 - 9 to 20 inches: sandy loam
H3 - 20 to 24 inches: weathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 9 to 20 inches to paralithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.6 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: F019XG913CA - Loamy Hills <30"ppt
Hydric soil rating: No

Description of Exchequer Family, Dry

Setting

Landform: Mountains
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank
Down-slope shape: Convex
Across-slope shape: Convex
Parent material: Residuum weathered from granodiorite

Typical profile

H1 - 0 to 10 inches: gravelly sandy loam
H2 - 10 to 14 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 70 percent
Depth to restrictive feature: 5 to 19 inches to lithic bedrock
Drainage class: Somewhat excessively drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None

Custom Soil Resource Report

Frequency of ponding: None

Available water supply, 0 to 60 inches: Very low (about 1.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: D

Ecological site: F019XG913CA - Loamy Hills <30"ppt

Hydric soil rating: No

Minor Components

Vista family

Percent of map unit: 4 percent

Chilao family

Percent of map unit: 4 percent

Hanford family

Percent of map unit: 4 percent

Rock outcrop

Percent of map unit: 3 percent

Antelope Valley Area, California

AmF2—Amargosa rocky coarse sandy loam, 9 to 55 percent slopes, eroded

Map Unit Setting

National map unit symbol: hccq
Elevation: 650 to 4,000 feet
Mean annual precipitation: 8 to 16 inches
Mean annual air temperature: 45 to 61 degrees F
Frost-free period: 110 to 240 days
Farmland classification: Not prime farmland

Map Unit Composition

Amargosa and similar soils: 90 percent
Minor components: 10 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Amargosa

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 13 inches: coarse sandy loam
H2 - 13 to 18 inches: gravelly coarse sandy loam
H3 - 18 to 22 inches: unweathered bedrock

Properties and qualities

Slope: 9 to 55 percent
Depth to restrictive feature: 14 to 20 inches to lithic bedrock
Drainage class: Excessively drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 1.7 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R019XD066CA - SHALLOW LOAMY 9-20"
Hydric soil rating: No

Minor Components

Godde

Percent of map unit: 2 percent
Hydric soil rating: No

Temescal

Percent of map unit: 2 percent
Hydric soil rating: No

Vista

Percent of map unit: 2 percent
Hydric soil rating: No

Unnamed

Percent of map unit: 2 percent
Hydric soil rating: No

Rock outcrop

Percent of map unit: 2 percent
Hydric soil rating: No

GsC—Greenfield sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcdw
Elevation: 2,600 to 4,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Greenfield

Setting

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

Typical profile

H1 - 0 to 20 inches: sandy loam
H2 - 20 to 60 inches: sandy loam
H3 - 60 to 80 inches: stratified loamy sand to coarse sandy loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low

Custom Soil Resource Report

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: R019XD964CA - LOAMY 9-20"

Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 8 percent

Hydric soil rating: No

Ramona

Percent of map unit: 5 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent

Hydric soil rating: No

GsD2—Greenfield sandy loam, 9 to 15 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcdy

Elevation: 2,600 to 4,200 feet

Mean annual precipitation: 9 to 12 inches

Mean annual air temperature: 63 degrees F

Frost-free period: 200 to 250 days

Farmland classification: Not prime farmland

Map Unit Composition

Greenfield and similar soils: 85 percent

Minor components: 15 percent

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

Description of Greenfield

Setting

Landform: Alluvial fans, terraces

Landform position (two-dimensional): Backslope

Custom Soil Resource Report

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 17 inches: sandy loam

H2 - 17 to 60 inches: sandy loam

H3 - 60 to 80 inches: stratified loamy sand to coarse sandy loam

Properties and qualities

Slope: 9 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 8.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: R019XD964CA - LOAMY 9-20"

Hydric soil rating: No

Minor Components

Hanford

Percent of map unit: 10 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 4 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent

Landform: Drainageways

Hydric soil rating: Yes

HbA—Hanford coarse sandy loam, 0 to 2 percent slopes

Map Unit Setting

National map unit symbol: hcf1

Elevation: 2,390 to 4,200 feet

Mean annual precipitation: 4 to 12 inches

Mean annual air temperature: 55 to 63 degrees F

Frost-free period: 150 to 270 days

Custom Soil Resource Report

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hanford and similar soils: 90 percent

Minor components: 10 percent

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

Description of Hanford

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite

Typical profile

A - 0 to 12 inches: coarse sandy loam

C1 - 12 to 36 inches: coarse sandy loam

C2 - 36 to 60 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 0 to 2 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Very low

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

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): 2s

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: R019XD964CA - LOAMY 9-20"

Hydric soil rating: No

Minor Components

Riverwash

Percent of map unit: 5 percent

Landform: Alluvial fans, drainageways

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Ecological site: R030XG022CA - SANDY 4-9"

Hydric soil rating: Yes

Greenfield

Percent of map unit: 5 percent

Landform: Alluvial fans

Custom Soil Resource Report

Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Ecological site: R019XD964CA - LOAMY 9-20"
Hydric soil rating: No

HbC—Hanford coarse sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcf2
Elevation: 2,600 to 4,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Hanford

Setting

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

Typical profile

H1 - 0 to 8 inches: coarse sandy loam
H2 - 8 to 39 inches: sandy loam
H3 - 39 to 70 inches: gravelly loamy coarse sand

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: R019XD964CA - LOAMY 9-20"

Hydric soil rating: No

Minor Components

Greenfield

Percent of map unit: 8 percent

Hydric soil rating: No

Ramona

Percent of map unit: 5 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 2 percent

Hydric soil rating: No

HbD—Hanford coarse sandy loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hcf3

Elevation: 2,600 to 4,200 feet

Mean annual precipitation: 9 to 12 inches

Mean annual air temperature: 63 degrees F

Frost-free period: 200 to 250 days

Farmland classification: Farmland of statewide importance

Map Unit Composition

Hanford and similar soils: 85 percent

Minor components: 15 percent

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

Description of Hanford

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 8 inches: coarse sandy loam

H2 - 8 to 39 inches: sandy loam

H3 - 39 to 70 inches: gravelly loamy coarse sand

Custom Soil Resource Report

Properties and qualities

Slope: 9 to 15 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R019XD964CA - LOAMY 9-20"
Hydric soil rating: No

Minor Components

Unnamed

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

Ramona

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

Greenfield

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

HcC—Hanford sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcf5
Elevation: 2,600 to 4,200 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F
Frost-free period: 200 to 250 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

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

Description of Hanford

Setting

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

Typical profile

H1 - 0 to 8 inches: sandy loam
H2 - 8 to 70 inches: fine sandy loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 7.8 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: A
Ecological site: R019XD964CA - LOAMY 9-20"
Hydric soil rating: No

Minor Components

Greenfield

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

Unnamed

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

HdC—Hanford gravelly sandy loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcf6
Elevation: 150 to 900 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 63 degrees F

Custom Soil Resource Report

Frost-free period: 200 to 250 days

Farmland classification: Prime farmland if irrigated

Map Unit Composition

Hanford and similar soils: 85 percent

Minor components: 15 percent

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

Description of Hanford

Setting

Landform: Alluvial fans

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from granite

Typical profile

H1 - 0 to 8 inches: gravelly sandy loam

H2 - 8 to 70 inches: gravelly fine sandy loam

Properties and qualities

Slope: 2 to 9 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Low

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)

Available water supply, 0 to 60 inches: Low (about 6.0 inches)

Interpretive groups

Land capability classification (irrigated): 2e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: A

Ecological site: R019XD964CA - LOAMY 9-20"

Hydric soil rating: No

Minor Components

Greenfield

Percent of map unit: 10 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent

Hydric soil rating: No

LdF—Las Posas-Toomes rocky loams, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hcfk
Elevation: 150 to 4,000 feet
Mean annual precipitation: 8 to 25 inches
Mean annual air temperature: 45 to 63 degrees F
Frost-free period: 110 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

Las posas and similar soils: 55 percent
Toomes and similar soils: 30 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Las Posas

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from basalt

Typical profile

H1 - 0 to 3 inches: loam
H2 - 3 to 24 inches: clay
H3 - 24 to 27 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.8 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R019XD964CA - LOAMY 9-20"
Hydric soil rating: No

Description of Toomes

Setting

Landform: Mountains, hills
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Mountainflank, side slope
Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from basalt

Typical profile

H1 - 0 to 17 inches: loam
H2 - 17 to 21 inches: unweathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 4 to 20 inches to lithic bedrock
Drainage class: Well drained
Runoff class: Very high
Capacity of the most limiting layer to transmit water (Ksat): Very low (0.00 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Very low (about 2.5 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: D
Ecological site: R019XD964CA - LOAMY 9-20"
Hydric soil rating: No

Minor Components

Rock outcrop

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

Unnamed

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

Unnamed

Percent of map unit: 1 percent
Landform: Drainageways
Hydric soil rating: Yes

Rg—Riverwash

Map Unit Composition

Riverwash: 85 percent

Minor components: 15 percent

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

Description of Riverwash

Setting

Landform: Drainageways

Landform position (two-dimensional): Footslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium

Typical profile

H1 - 0 to 6 inches: sand

H2 - 6 to 60 inches: stratified coarse sand to sandy loam

Properties and qualities

Slope: 0 to 2 percent

Drainage class: Excessively drained

Runoff class: Negligible

Capacity of the most limiting layer to transmit water (Ksat): High to very high (5.95 to 19.98 in/hr)

Depth to water table: About 0 inches

Frequency of flooding: Frequent

Available water supply, 0 to 60 inches: Very low (about 2.9 inches)

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 8

Hydrologic Soil Group: A

Ecological site: R019XG905CA - Riparian

Hydric soil rating: Yes

Minor Components

Sandy alluvial land

Percent of map unit: 10 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent

Hydric soil rating: No

Sa—Sandy alluvial land

Map Unit Setting

National map unit symbol: hch5
Mean annual precipitation: 14 inches
Mean annual air temperature: 61 degrees F
Farmland classification: Not prime farmland

Map Unit Composition

Sandy alluvial land: 85 percent
Minor components: 15 percent
Estimates are based on observations, descriptions, and transects of the mapunit.

Description of Sandy Alluvial Land

Setting

Landform: Flood plains
Landform position (two-dimensional): Footslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium

Typical profile

H1 - 0 to 10 inches: sand
H2 - 10 to 30 inches: stratified sand to loam
H3 - 30 to 60 inches: stratified gravelly sand to gravelly loam

Properties and qualities

Slope: 0 to 2 percent
Drainage class: Excessively drained
Runoff class: Very low
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: About 10 inches
Frequency of flooding: Frequent
Maximum salinity: Nonsaline to very slightly saline (0.0 to 2.0 mmhos/cm)
Available water supply, 0 to 60 inches: Moderate (about 6.1 inches)

Interpretive groups

Land capability classification (irrigated): None specified
Land capability classification (nonirrigated): 7w
Hydrologic Soil Group: B
Ecological site: R019XE025CA - SANDY 9-20"
Hydric soil rating: Yes

Minor Components

Riverwash

Percent of map unit: 10 percent
Landform: Drainageways
Hydric soil rating: Yes

Unnamed

Percent of map unit: 5 percent

Hydric soil rating: No

TsF—Terrace escarpments

Map Unit Setting

National map unit symbol: hchq

Mean annual precipitation: 14 inches

Mean annual air temperature: 61 degrees F

Farmland classification: Not prime farmland

Map Unit Composition

Terrace escarpments: 90 percent

Minor components: 10 percent

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

Description of Terrace Escarpments

Setting

Landform: Terraces

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Concave

Across-slope shape: Concave

Parent material: Alluvium

Typical profile

H1 - 0 to 60 inches: variable

Interpretive groups

Land capability classification (irrigated): None specified

Land capability classification (nonirrigated): 7e

Ecological site: R019XE024CA - LOAMY 9-20"

Hydric soil rating: No

Minor Components

Unnamed

Percent of map unit: 10 percent

Hydric soil rating: No

VsE—Vista coarse sandy loam, 15 to 30 percent slopes

Map Unit Setting

National map unit symbol: hcj1
Elevation: 400 to 3,900 feet
Mean annual precipitation: 10 to 18 inches
Mean annual air temperature: 59 to 64 degrees F
Frost-free period: 210 to 300 days
Farmland classification: Not prime farmland

Map Unit Composition

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

Description of Vista

Setting

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

Typical profile

H1 - 0 to 16 inches: coarse sandy loam
H2 - 16 to 32 inches: coarse sandy loam
H3 - 32 to 36 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 4e
Land capability classification (nonirrigated): 6e
Hydrologic Soil Group: B
Ecological site: R019XD964CA - LOAMY 9-20"
Hydric soil rating: No

Minor Components

Amargosa

Percent of map unit: 10 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent

Hydric soil rating: No

VsE2—Vista coarse sandy loam, 15 to 30 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcj2

Elevation: 400 to 3,900 feet

Mean annual precipitation: 10 to 18 inches

Mean annual air temperature: 59 to 64 degrees F

Frost-free period: 210 to 300 days

Farmland classification: Not prime farmland

Map Unit Composition

Vista and similar soils: 85 percent

Minor components: 15 percent

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

Description of Vista

Setting

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Convex

Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 12 inches: coarse sandy loam

H2 - 12 to 28 inches: coarse sandy loam

H3 - 28 to 32 inches: weathered bedrock

Properties and qualities

Slope: 15 to 30 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Custom Soil Resource Report

Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): 4e

Land capability classification (nonirrigated): 6e

Hydrologic Soil Group: B

Ecological site: R019XD964CA - LOAMY 9-20"

Hydric soil rating: No

Minor Components

Amargosa

Percent of map unit: 10 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 5 percent

Hydric soil rating: No

VsF—Vista coarse sandy loam, 30 to 50 percent slopes

Map Unit Setting

National map unit symbol: hcj3

Elevation: 400 to 3,900 feet

Mean annual precipitation: 10 to 18 inches

Mean annual air temperature: 59 to 64 degrees F

Frost-free period: 210 to 300 days

Farmland classification: Not prime farmland

Map Unit Composition

Vista and similar soils: 85 percent

Minor components: 15 percent

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

Description of Vista

Setting

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Down-slope shape: Concave

Across-slope shape: Convex

Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 16 inches: coarse sandy loam

H2 - 16 to 32 inches: coarse sandy loam

H3 - 32 to 36 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent

Depth to restrictive feature: 20 to 40 inches to paralithic bedrock

Custom Soil Resource Report

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Low (about 3.5 inches)

Interpretive groups

Land capability classification (irrigated): 6e

Land capability classification (nonirrigated): 7e

Hydrologic Soil Group: B

Ecological site: R019XD964CA - LOAMY 9-20"

Hydric soil rating: No

Minor Components

Amargosa

Percent of map unit: 10 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 3 percent

Hydric soil rating: No

Sheridan

Percent of map unit: 2 percent

Hydric soil rating: No

VsF2—Vista coarse sandy loam, 30 to 50 percent slopes, eroded

Map Unit Setting

National map unit symbol: hcj4

Elevation: 400 to 3,900 feet

Mean annual precipitation: 10 to 18 inches

Mean annual air temperature: 59 to 64 degrees F

Frost-free period: 210 to 300 days

Farmland classification: Not prime farmland

Map Unit Composition

Vista and similar soils: 85 percent

Minor components: 15 percent

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

Description of Vista

Setting

Landform: Hills

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Side slope

Custom Soil Resource Report

Down-slope shape: Concave
Across-slope shape: Concave
Parent material: Residuum weathered from granite

Typical profile

H1 - 0 to 12 inches: coarse sandy loam
H2 - 12 to 28 inches: coarse sandy loam
H3 - 28 to 32 inches: weathered bedrock

Properties and qualities

Slope: 30 to 50 percent
Depth to restrictive feature: 20 to 40 inches to paralithic bedrock
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): High (1.98 to 5.95 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Low (about 3.1 inches)

Interpretive groups

Land capability classification (irrigated): 6e
Land capability classification (nonirrigated): 7e
Hydrologic Soil Group: B
Ecological site: R019XD964CA - LOAMY 9-20"
Hydric soil rating: No

Minor Components

Amargosa

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

Unnamed

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

WgC—Wyman gravelly loam, 2 to 9 percent slopes

Map Unit Setting

National map unit symbol: hcj5
Elevation: 300 to 2,500 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 59 to 63 degrees F
Frost-free period: 200 to 300 days
Farmland classification: Prime farmland if irrigated

Map Unit Composition

Wyman and similar soils: 85 percent
Minor components: 15 percent

Custom Soil Resource Report

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

Description of Wyman

Setting

Landform: Alluvial fans, terraces
Landform position (two-dimensional): Backslope
Landform position (three-dimensional): Tread
Down-slope shape: Linear
Across-slope shape: Linear
Parent material: Alluvium derived from basic igneous rock

Typical profile

H1 - 0 to 10 inches: gravelly loam
H2 - 10 to 55 inches: gravelly loam

Properties and qualities

Slope: 2 to 9 percent
Depth to restrictive feature: More than 80 inches
Drainage class: Well drained
Runoff class: Medium
Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)
Depth to water table: More than 80 inches
Frequency of flooding: None
Frequency of ponding: None
Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 2e
Land capability classification (nonirrigated): 4e
Hydrologic Soil Group: B
Ecological site: R019XD964CA - LOAMY 9-20"
Hydric soil rating: No

Minor Components

Greenfield

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

Unnamed

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

WgD—Wyman gravelly loam, 9 to 15 percent slopes

Map Unit Setting

National map unit symbol: hcj6
Elevation: 300 to 2,500 feet
Mean annual precipitation: 9 to 12 inches
Mean annual air temperature: 59 to 63 degrees F

Custom Soil Resource Report

Frost-free period: 200 to 300 days

Farmland classification: Not prime farmland

Map Unit Composition

Wyman and similar soils: 85 percent

Minor components: 15 percent

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

Description of Wyman

Setting

Landform: Alluvial fans, terraces

Landform position (two-dimensional): Backslope

Landform position (three-dimensional): Tread

Down-slope shape: Linear

Across-slope shape: Linear

Parent material: Alluvium derived from basic igneous rock

Typical profile

H1 - 0 to 10 inches: gravelly loam

H2 - 10 to 55 inches: gravelly loam

Properties and qualities

Slope: 9 to 15 percent

Depth to restrictive feature: More than 80 inches

Drainage class: Well drained

Runoff class: Medium

Capacity of the most limiting layer to transmit water (Ksat): Moderately high to high
(0.57 to 1.98 in/hr)

Depth to water table: More than 80 inches

Frequency of flooding: None

Frequency of ponding: None

Available water supply, 0 to 60 inches: Moderate (about 7.2 inches)

Interpretive groups

Land capability classification (irrigated): 3e

Land capability classification (nonirrigated): 4e

Hydrologic Soil Group: B

Ecological site: R019XD964CA - LOAMY 9-20"

Hydric soil rating: No

Minor Components

Toomes

Percent of map unit: 5 percent

Hydric soil rating: No

Los posas

Percent of map unit: 5 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 4 percent

Hydric soil rating: No

Unnamed

Percent of map unit: 1 percent

Landform: Drainageways

Custom Soil Resource Report

Hydric soil rating: Yes

References

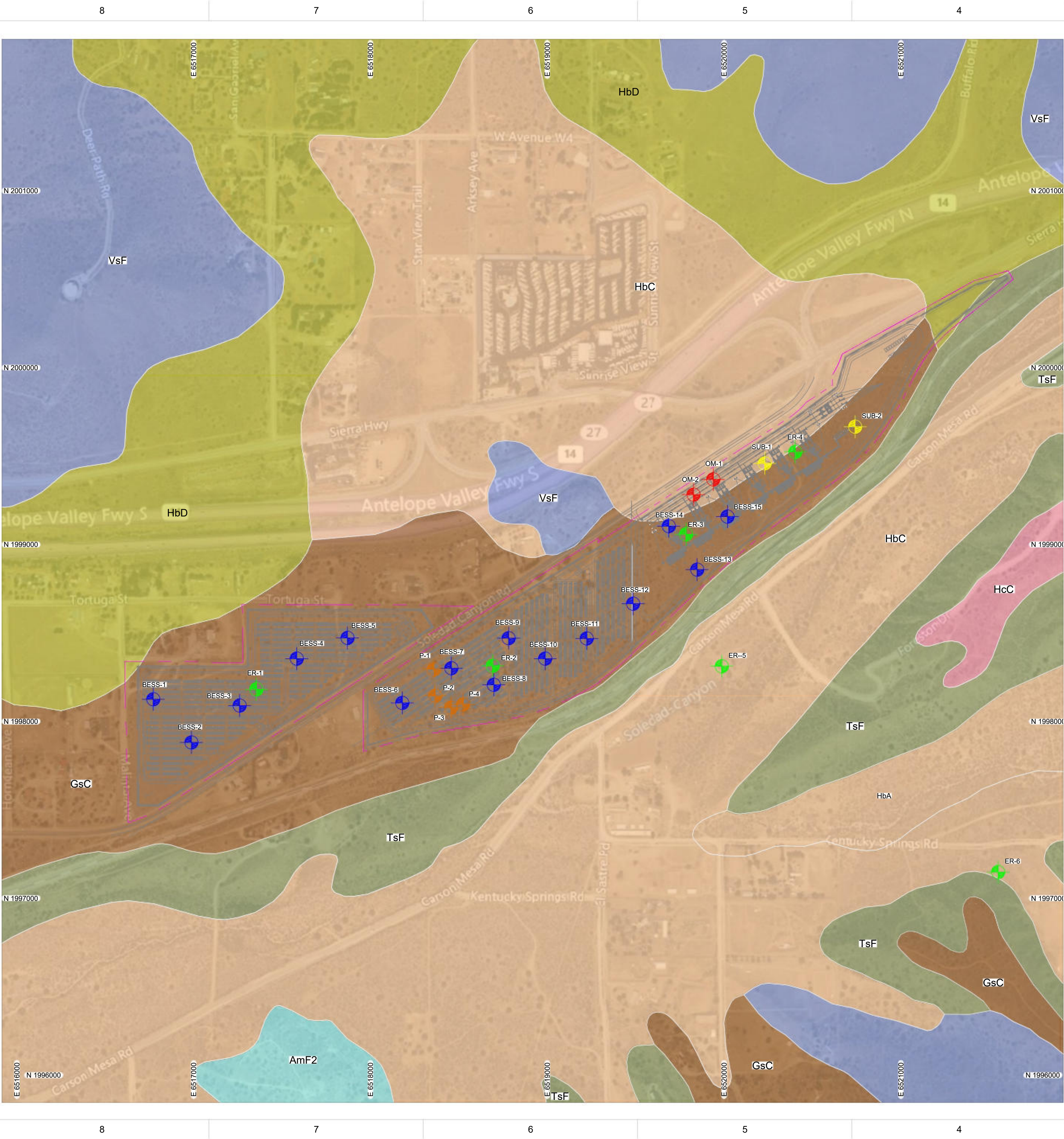
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- United States Department of Agriculture, Natural Resources Conservation Service. National range and pasture handbook. <http://www.nrcs.usda.gov/wps/portal/nrcs/detail/national/landuse/rangepasture/?cid=stelprdb1043084>

Custom Soil Resource Report

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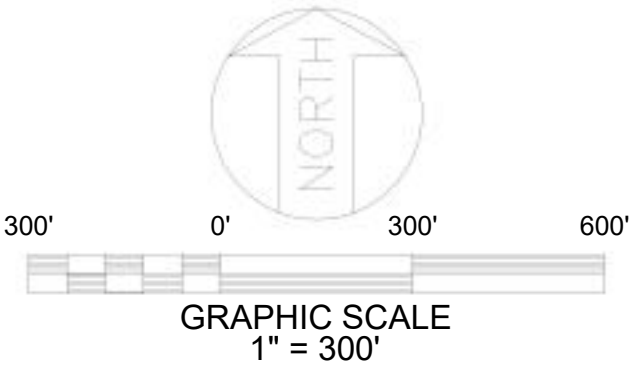
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PERMIT ONLY
NOT FOR CONSTRUCTION

Map Unit Symbol	Map Unit Name	HIDROLOGIC SOIL GROUP
AmF2	Amargosa rocky coarse sandy loam, 9 to 55 percent slopes, eroded	A
GsC	Greenfield sandy loam, 2 to 9 percent slopes	A
GsD2	Greenfield sandy loam, 9 to 15 percent slopes, eroded	A
HbA	Hanford coarse sandy loam, 0 to 2 percent slopes	A
HbC	Hanford coarse sandy loam, 2 to 9 percent slopes	A
HbD	Hanford coarse sandy loam, 9 to 15 percent slopes	A
HcC	Hanford sandy loam, 2 to 9 percent slopes	A
TsF	Terrace escarpments	N/A
VsF	Vista coarse sandy loam, 30 to 50 percent slopes	B



LEGEND

- APPROXIMATE BESS BORING LOCATION
- APPROXIMATE PERCOLATION LOCATION
- APPROXIMATE SUBSTATION BORING LOCATION
- APPROXIMATE O&M BORING LOCATION
- APPROXIMATE ER LOCATION

NOTES

- GEOTECHNICAL ENGINEERING REPORT PREPARED BY: TERRACON, PROJECT NO. LA245085, DATED 05-14-2025.
- FOR GENERAL NOTES, ABBREVIATIONS AND LEGEND SEE DRAWING PSR-CS-002.

REFERENCE DRAWINGS

UNDERGROUND OR EMBEDDED UTILITIES MAY BE LOCATED WITHIN OR ADJACENT TO THE AREA IN WHICH EXCAVATION, DEMOLITION, FOUNDATION, OR MODIFICATION WORK IS TO BE PERFORMED.

REFERENCES RELATING TO THE UNDERGROUND OR EMBEDDED UTILITIES ARE PROVIDED TO ASSIST THE CONTRACTOR/INSTALLER IN THE FIELD LOCATING THOSE UTILITIES AND OTHER POSSIBLE UNDERGROUND OR EMBEDDED INTERFERENCES WITH THE WORK.

THE CONTRACTOR/INSTALLER SHALL EXERCISE DUE CAUTION DURING ALL EXCAVATION/FOUNDATION/DEMOLITION WORK.

HOLD INFORMATION		
NO.	DESCRIPTION	
CONTRACTOR/INSTALLER SHALL TAKE ALL APPROPRIATE PRECAUTIONS TO ENSURE THE SAFETY OF ALL PEOPLE LOCATED ON THE WORK SITE, INCLUDING CONTRACTOR'S/INSTALLER'S PERSONNEL (OR THAT OF ITS SUB-CONTRACTOR(S)) PERFORMING THE WORK.		
RELEASE INFORMATION		
REV.	DATE	DESCRIPTION
0A	3/31/2025	ISSUED FOR PERMIT
0B	5/16/2025	ISSUED FOR PERMIT
ISSUE PURPOSE:		ISSUED FOR PERMIT
SPECIFICATION:		-
PROJECT NO.:		15474.001
I HEREBY CERTIFY THAT THIS ENGINEERING DOCUMENT WAS PREPARED BY ME OR UNDER MY DIRECT PERSONAL SUPERVISION AND THAT I AM A DULY LICENSED PROFESSIONAL ENGINEER UNDER THE LAWS OF THE STATE OF CALIFORNIA.		
ISSUED FOR PRELIMINARY PURPOSES JOSHUA BICKETT P.E. LICENSE #95825		
CAD FILE NAME:		EXHIBIT-PSR-003.DWG
PREPARED BY:		MP/CAF
REVIEWED BY:		JTP
APPROVED BY:		--
ANY MODIFICATION OR ADDITION TO THIS DRAWING BY AN ORGANIZATION OTHER THAN SARGENT & LUNDY, IS NOT THE RESPONSIBILITY OF SARGENT & LUNDY.		
		
SARGENT & LUNDY 55 EAST MONROE STREET CHICAGO, ILLINOIS 60603-5780		
PROJECT		
PRAIRIE SONG RELIABILITY PROJECT		
DRAWING TITLE		
SOIL BORING, INFILTRATION AND ELECTRICAL RESISTIVITY LOCATIONS		
DRAWING NUMBER		REVISION
EXHIBIT-PSR-003		0B
SHEET	1 OF 1	

Attachment H: ADS Chambers for Underground Detention Basin

Calculations for determining the number and volume of required ADS MC-3500 underground stormwater chambers are described in the following:

The hydrology study and stormwater sizing for the project area was conducted by Westwood. S&L proposed the underground stormwater chambers manufactured by ADS to help meet stormwater needs on site. Westwood agreed those would be acceptable to use on site and provided preliminary calculations of what would be required as seen below.

Preliminary Stormwater Sizing	DA 1	DA 2
Req. Infiltration Volume (ac-ft)	8.52	4.64
Req. Infiltration Volume (cu. ft)	371131	202118
Installed Storage/MC-3500 Chamber (cu. ft)*	175	
Approx Req. Number of MC-3500 Chambers*	2121	1155
*This calculation excludes storage provided by end caps, which is dependent upon the number of rows of chambers		

To help reduce some costs per [REDACTED] Power's request, S&L incorporated infiltration trenches along the south sides of the BESS and switchyard locations. The first step in S&L's calculation was determining the average volume the infiltration trenches would occupy. This was done by taking the length of trench multiplied by the assumed 2' wide trench width, and 5' trench depth. The trench would be backfilled with coarser stone aggregate to help the trenches withstand heavier vehicular traffic. In doing so, there would be more air gaps compared to using finer backfill. Therefore, a void ratio factor of 0.4 was multiplied to the average trench volumes. The average trench volumes were subtracted for each drainage areas required infiltration volumes to determine the new required volumes.

The number of ADS chambers required was calculated using a ratio between the new required volumes and the initial volumes provided by Westwood multiplied by Westwood's approximate estimation of the number of chambers required.

The approximate area required for each drainage area for the chambers was determined by first calculating the area of one chamber. Using ADS' product drawings and dividing the system area by number of chambers, S&L calculated an area per chamber of ~51 sq ft. The total required area per drainage area was determined by multiplying the unit area by the number of adjusted required ADS chambers calculated earlier.

PROJECT INFORMATION	
ENGINEERED PRODUCT MANAGER	
ADS SALES REP	
PROJECT NO.	



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LOS ANGELES, CA, USA

MC-3500 STORMTECH CHAMBER SPECIFICATIONS

- CHAMBERS SHALL BE STORMTECH MC-3500.
- CHAMBERS SHALL BE ARCH-SHAPED AND SHALL BE MANUFACTURED FROM VIRGIN, IMPACT-MODIFIED POLYPROPYLENE COPOLYMERS.
- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
- CHAMBER ROWS SHALL PROVIDE CONTINUOUS, UNOBSTRUCTED INTERNAL SPACE WITH NO INTERNAL SUPPORTS THAT WOULD IMPEDE FLOW OR LIMIT ACCESS FOR INSPECTION.
- THE STRUCTURAL DESIGN OF THE CHAMBERS, THE STRUCTURAL BACKFILL, AND THE INSTALLATION REQUIREMENTS SHALL ENSURE THAT THE LOAD FACTORS SPECIFIED IN THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, SECTION 12.12, ARE MET FOR: 1) LONG-DURATION DEAD LOADS AND 2) SHORT-DURATION LIVE LOADS, BASED ON THE AASHTO DESIGN TRUCK WITH CONSIDERATION FOR IMPACT AND MULTIPLE VEHICLE PRESENCES.
- CHAMBERS SHALL BE DESIGNED, TESTED AND ALLOWABLE LOAD CONFIGURATIONS DETERMINED IN ACCORDANCE WITH ASTM F2787, "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS". LOAD CONFIGURATIONS SHALL INCLUDE: 1) INSTANTANEOUS (<1 MIN) AASHTO DESIGN TRUCK LIVE LOAD ON MINIMUM COVER 2) MAXIMUM PERMANENT (75-YR) COVER LOAD AND 3) ALLOWABLE COVER WITH PARKED (1-WEEK) AASHTO DESIGN TRUCK.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT/%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.
- ONLY CHAMBERS THAT ARE APPROVED BY THE SITE DESIGN ENGINEER WILL BE ALLOWED. UPON REQUEST BY THE SITE DESIGN ENGINEER OR OWNER, THE CHAMBER MANUFACTURER SHALL SUBMIT A STRUCTURAL EVALUATION FOR APPROVAL BEFORE DELIVERING CHAMBERS TO THE PROJECT SITE AS FOLLOWS:
 - THE STRUCTURAL EVALUATION SHALL BE SEALED BY A REGISTERED PROFESSIONAL ENGINEER.
 - THE STRUCTURAL EVALUATION SHALL DEMONSTRATE THAT THE SAFETY FACTORS ARE GREATER THAN OR EQUAL TO 1.95 FOR DEAD LOAD AND 1.75 FOR LIVE LOAD, THE MINIMUM REQUIRED BY ASTM F2787 AND BY SECTIONS 3 AND 12.12 OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS FOR THERMOPLASTIC PIPE.
 - THE TEST DERIVED CREEP MODULUS AS SPECIFIED IN ASTM F2418 SHALL BE USED FOR PERMANENT DEAD LOAD DESIGN EXCEPT THAT IT SHALL BE THE 75-YEAR MODULUS USED FOR DESIGN.
- CHAMBERS AND END CAPS SHALL BE PRODUCED AT AN ISO 9001 CERTIFIED MANUFACTURING FACILITY.
- MANIFOLD SIZE TO BE DETERMINED BY SITE DESIGN ENGINEER. SEE TECH NOTE #6.32 FOR MANIFOLD SIZING GUIDANCE. DUE TO THE ADAPTATION OF THIS CHAMBER SYSTEM TO SPECIFIC SITE AND DESIGN CONSTRAINTS, IT MAY BE NECESSARY TO CUT AND COUPLE ADDITIONAL PIPE TO STANDARD MANIFOLD COMPONENTS IN THE FIELD.
- ADS DOES NOT DESIGN OR PROVIDE MEMBRANE LINER SYSTEMS. TO MINIMIZE THE LEAKAGE POTENTIAL OF LINER SYSTEMS, THE MEMBRANE LINER SYSTEM SHOULD BE DESIGNED BY A KNOWLEDGEABLE GEOTEXTILE PROFESSIONAL AND INSTALLED BY A QUALIFIED CONTRACTOR.

IMPORTANT - NOTES FOR THE BIDDING AND INSTALLATION OF MC-3500 CHAMBER SYSTEM

- STORMTECH MC-3500 CHAMBERS SHALL NOT BE INSTALLED UNTIL THE MANUFACTURER'S REPRESENTATIVE HAS COMPLETED A PRE-CONSTRUCTION MEETING WITH THE INSTALLERS.
- STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- CHAMBERS ARE NOT TO BE BACKFILLED WITH A DOZER OR AN EXCAVATOR SITUATED OVER THE CHAMBERS. STORMTECH RECOMMENDS 3 BACKFILL METHODS:
 - STONESHOOTER LOCATED OFF THE CHAMBER BED.
 - BACKFILL AS ROWS ARE BUILT USING AN EXCAVATOR ON THE FOUNDATION STONE OR SUBGRADE.
 - BACKFILL FROM OUTSIDE THE EXCAVATION USING A LONG BOOM HOE OR EXCAVATOR.
- THE FOUNDATION STONE SHALL BE LEVELED AND COMPACTED PRIOR TO PLACING CHAMBERS.
- JOINTS BETWEEN CHAMBERS SHALL BE PROPERLY SEATED PRIOR TO PLACING STONE.
- MAINTAIN MINIMUM - 6" (150 mm) SPACING BETWEEN THE CHAMBER ROWS.
- INLET AND OUTLET MANIFOLDS MUST BE INSERTED A MINIMUM OF 12" (300 mm) INTO CHAMBER END CAPS.
- EMBEDMENT STONE SURROUNDING CHAMBERS MUST BE A CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE; AASHTO M43 #3, 357, 4, 467, 5, 56, OR 57.
- STONE MUST BE PLACED ON THE TOP CENTER OF THE CHAMBER TO ANCHOR THE CHAMBERS IN PLACE AND PRESERVE ROW SPACING.
- THE CONTRACTOR MUST REPORT ANY DISCREPANCIES WITH CHAMBER FOUNDATION MATERIALS BEARING CAPACITIES TO THE SITE DESIGN ENGINEER.
- ADS RECOMMENDS THE USE OF "FLEXSTORM CATCH IT" INSERTS DURING CONSTRUCTION FOR ALL INLETS TO PROTECT THE SUBSURFACE STORMWATER MANAGEMENT SYSTEM FROM CONSTRUCTION SITE RUNOFF.

NOTES FOR CONSTRUCTION EQUIPMENT

- STORMTECH MC-3500 CHAMBERS SHALL BE INSTALLED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- THE USE OF EQUIPMENT OVER MC-3500 CHAMBERS IS LIMITED:
 - NO EQUIPMENT IS ALLOWED ON BARE CHAMBERS.
 - NO RUBBER TIRED LOADER, DUMP TRUCK, OR EXCAVATORS ARE ALLOWED UNTIL PROPER FILL DEPTHS ARE REACHED IN ACCORDANCE WITH THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
 - WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT CAN BE FOUND IN THE "STORMTECH MC-3500/MC-4500 CONSTRUCTION GUIDE".
- FULL 36" (900 mm) OF STABILIZED COVER MATERIALS OVER THE CHAMBERS IS REQUIRED FOR DUMP TRUCK TRAVEL OR DUMPING.

USE OF A DOZER TO PUSH EMBEDMENT STONE BETWEEN THE ROWS OF CHAMBERS MAY CAUSE DAMAGE TO CHAMBERS AND IS NOT AN ACCEPTABLE BACKFILL METHOD. ANY CHAMBERS DAMAGED BY USING THE "DUMP AND PUSH" METHOD ARE NOT COVERED UNDER THE STORMTECH STANDARD WARRANTY.

CONTACT STORMTECH AT 1-800-821-6710 WITH ANY QUESTIONS ON INSTALLATION REQUIREMENTS OR WEIGHT LIMITS FOR CONSTRUCTION EQUIPMENT.

PROPOSED LAYOUT

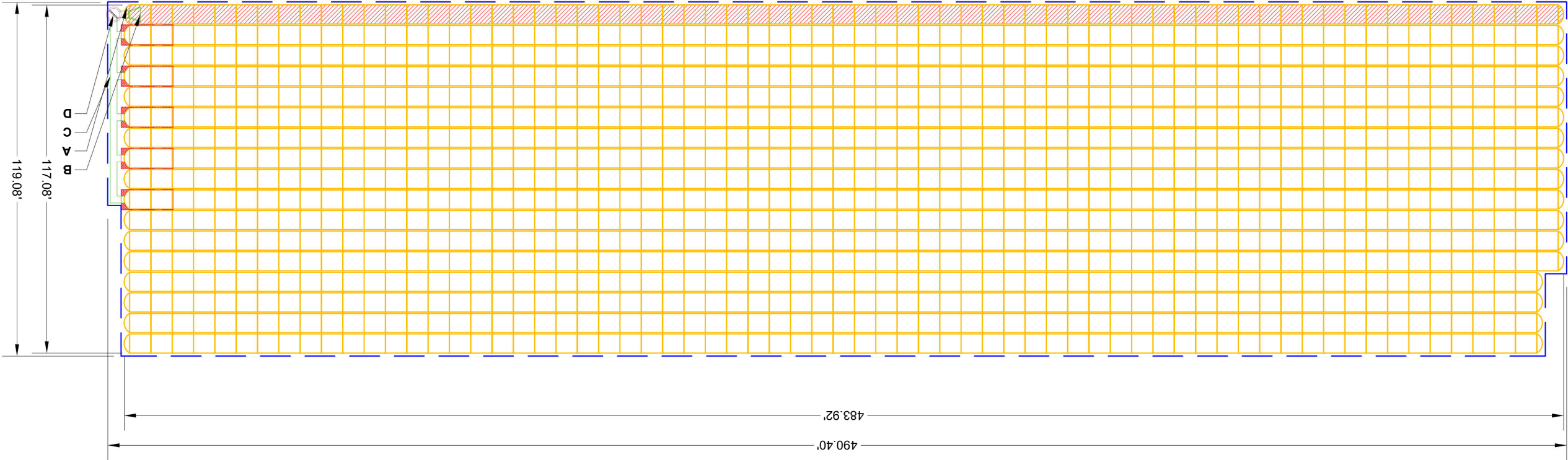
1135	STORMTECH MC-3500 CHAMBERS	34	STORMTECH MC-3500 END CAPS
12	STONE ABOVE (in)	12	STONE ABOVE (in)
9	STONE BELOW (in)	9	STONE BELOW (in)
40	STONE VOID	40	STONE VOID
202721	INSTALLED SYSTEM VOLUME (CF)	202721	(COVER STONE INCLUDED) 24" x 24" BOTTOM MANIFOLD INVERT:
67973	SYSTEM AREA (SF)	67973	(BASE STONE INCLUDED) 24" ISOLATOR ROW PLUS INVERT:
1219.0	SYSTEM PERIMETER (ft)	1219.0	BOTTOM OF MC-3500 CHAMBER:

CONCEPTUAL ELEVATIONS:

12.50	MAXIMUM ALLOWABLE GRADE (TOP OF PAVEMENT/UNPAVED):	12.50	PREFABRICATED END CAP
6.50	MINIMUM ALLOWABLE GRADE (UNPAVED WITH TRAFFIC):	6.50	FLAMP
6.00	MINIMUM ALLOWABLE GRADE (UNPAVED NO TRAFFIC):	6.00	MANIFOLD
6.00	MINIMUM ALLOWABLE GRADE (BASE OF FLEXIBLE PAVEMENT):	5.50	CONCRETE STRUCTURE
6.00	TOP OF STONE:	4.50	W/WEIR
4.50	TOP OF MC-3500 CHAMBER:	0.92	
0.92	24" ISOLATOR ROW PLUS INVERT:	0.75	
0.75	BOTTOM OF MC-3500 CHAMBER:	0.00	
	BOTTOM OF STONE:		

ITEM ON LAYOUT	PART TYPE	DESCRIPTION	INVERT*	MAX FLOW
A	PREFABRICATED END CAP	24" BOTTOM PRE-CORED END CAP, PART#: MC3500IEPP24BC / TYP OF ALL 24" BOTTOM CONNECTIONS AND ISOLATOR PLUS ROWS	2.06"	
B	FLAMP	INSTALL FLAMP ON 24" ACCESS PIPE / PART#: MCFLAMP		
C	MANIFOLD	24" x 24" BOTTOM MANIFOLD, ADS N-12	2.06"	
D	CONCRETE STRUCTURE	(DESIGN BY ENGINEER / PROVIDED BY OTHERS)		35.8 CFS IN

*INVERT ABOVE BASE OF CHAMBER



- ISOLATOR ROW PLUS (SEE DETAIL)
- PLACE MINIMUM 17.50' OF ADSPPLUS125 WOVEN GEOTEXTILE OVER BEDDING STONE AND UNDERNEATH CHAMBER FEET FOR SCOUR PROTECTION AT ALL CHAMBER INLET ROWS
- BED LIMITS

NOTES

THE SITE DESIGN ENGINEER MUST REVIEW ELEVATIONS AND IF NECESSARY ADJUST GRADING TO ENSURE THE CHAMBER STORAGE VOLUME CAN BE ACHIEVED ON SITE.
NOT FOR CONSTRUCTION

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2 OF 5

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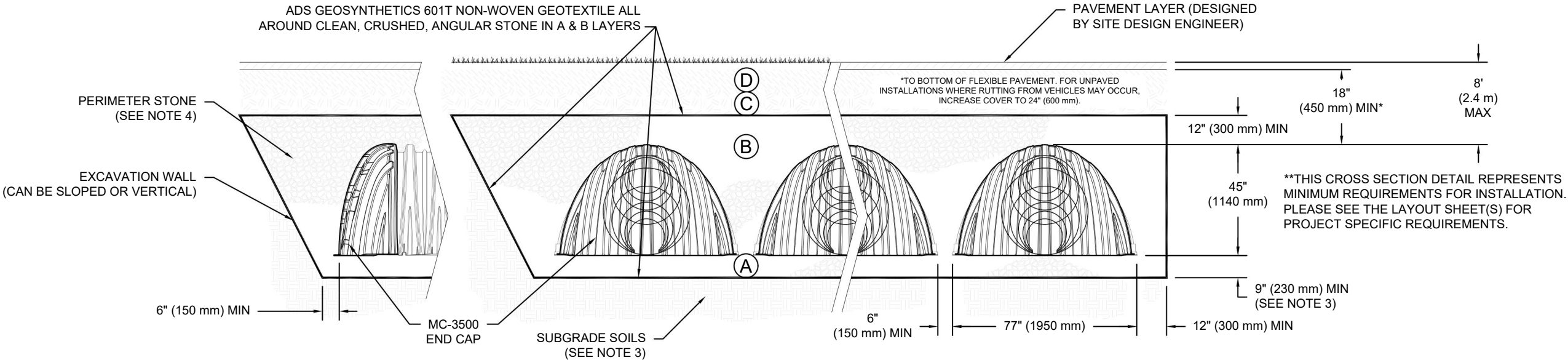
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ACCEPTABLE FILL MATERIALS: STORMTECH MC-3500 CHAMBER SYSTEMS

MATERIAL LOCATION		DESCRIPTION	AASHTO MATERIAL CLASSIFICATIONS	COMPACTION / DENSITY REQUIREMENT
D	FINAL FILL: FILL MATERIAL FOR LAYER 'D' STARTS FROM THE TOP OF THE 'C' LAYER TO THE BOTTOM OF FLEXIBLE PAVEMENT OR UNPAVED FINISHED GRADE ABOVE. NOTE THAT PAVEMENT SUBBASE MAY BE PART OF THE 'D' LAYER	ANY SOIL/ROCK MATERIALS, NATIVE SOILS, OR PER ENGINEER'S PLANS. CHECK PLANS FOR PAVEMENT SUBGRADE REQUIREMENTS.	N/A	PREPARE PER SITE DESIGN ENGINEER'S PLANS. PAVED INSTALLATIONS MAY HAVE STRINGENT MATERIAL AND PREPARATION REQUIREMENTS.
C	INITIAL FILL: FILL MATERIAL FOR LAYER 'C' STARTS FROM THE TOP OF THE EMBEDMENT STONE ('B' LAYER) TO 24" (600 mm) ABOVE THE TOP OF THE CHAMBER. NOTE THAT PAVEMENT SUBBASE MAY BE A PART OF THE 'C' LAYER.	GRANULAR WELL-GRADED SOIL/AGGREGATE MIXTURES, <35% FINES OR PROCESSED AGGREGATE. MOST PAVEMENT SUBBASE MATERIALS CAN BE USED IN LIEU OF THIS LAYER.	AASHTO M145 ¹ A-1, A-2-4, A-3 OR AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57, 6, 67, 68, 7, 78, 8, 89, 9, 10	BEGIN COMPACTIONS AFTER 24" (600 mm) OF MATERIAL OVER THE CHAMBERS IS REACHED. COMPACT ADDITIONAL LAYERS IN 12" (300 mm) MAX LIFTS TO A MIN. 95% PROCTOR DENSITY FOR WELL GRADED MATERIAL AND 95% RELATIVE DENSITY FOR PROCESSED AGGREGATE MATERIALS.
B	EMBEDMENT STONE: FILL SURROUNDING THE CHAMBERS FROM THE FOUNDATION STONE ('A' LAYER) TO THE 'C' LAYER ABOVE.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE ⁵	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	NO COMPACTION REQUIRED.
A	FOUNDATION STONE: FILL BELOW CHAMBERS FROM THE SUBGRADE UP TO THE FOOT (BOTTOM) OF THE CHAMBER.	CLEAN, CRUSHED, ANGULAR STONE OR RECYCLED CONCRETE ⁵	AASHTO M43 ¹ 3, 357, 4, 467, 5, 56, 57	PLATE COMPACT OR ROLL TO ACHIEVE A FLAT SURFACE. ^{2,3}

- PLEASE NOTE:
- THE LISTED AASHTO DESIGNATIONS ARE FOR GRADATIONS ONLY. THE STONE MUST ALSO BE CLEAN, CRUSHED, ANGULAR. FOR EXAMPLE, A SPECIFICATION FOR #4 STONE WOULD STATE: "CLEAN, CRUSHED, ANGULAR NO. 4 (AASHTO M43) STONE".
 - STORMTECH COMPACTION REQUIREMENTS ARE MET FOR 'A' LOCATION MATERIALS WHEN PLACED AND COMPACTED IN 9" (230 mm) (MAX) LIFTS USING TWO FULL COVERAGES WITH A VIBRATORY COMPACTOR.
 - WHERE INFILTRATION SURFACES MAY BE COMPROMISED BY COMPACTION, FOR STANDARD DESIGN LOAD CONDITIONS, A FLAT SURFACE MAY BE ACHIEVED BY RAKING OR DRAGGING WITHOUT COMPACTION EQUIPMENT. FOR SPECIAL LOAD DESIGNS, CONTACT STORMTECH FOR COMPACTION REQUIREMENTS.
 - ONCE LAYER 'C' IS PLACED, ANY SOIL/MATERIAL CAN BE PLACED IN LAYER 'D' UP TO THE FINISHED GRADE. MOST PAVEMENT SUBBASE SOILS CAN BE USED TO REPLACE THE MATERIAL REQUIREMENTS OF LAYER 'C' OR 'D' AT THE SITE DESIGN ENGINEER'S DISCRETION.
 - WHERE RECYCLED CONCRETE AGGREGATE IS USED IN LAYERS 'A' OR 'B' THE MATERIAL SHOULD ALSO MEET THE ACCEPTABILITY CRITERIA OUTLINED IN TECHNICAL NOTE 6.20 "RECYCLED CONCRETE STRUCTURAL BACKFILL".



NOTES:

- CHAMBERS SHALL MEET THE REQUIREMENTS OF ASTM F2418, "STANDARD SPECIFICATION FOR POLYPROPYLENE (PP) CORRUGATED WALL STORMWATER COLLECTION CHAMBERS" CHAMBER CLASSIFICATION 45x76 DESIGNATION SS.
- MC-3500 CHAMBERS SHALL BE DESIGNED IN ACCORDANCE WITH ASTM F2787 "STANDARD PRACTICE FOR STRUCTURAL DESIGN OF THERMOPLASTIC CORRUGATED WALL STORMWATER COLLECTION CHAMBERS".
- THE SITE DESIGN ENGINEER IS RESPONSIBLE FOR ASSESSING THE BEARING RESISTANCE (ALLOWABLE BEARING CAPACITY) OF THE SUBGRADE SOILS AND THE DEPTH OF FOUNDATION STONE WITH CONSIDERATION FOR THE RANGE OF EXPECTED SOIL MOISTURE CONDITIONS. REFERENCE STORMTECH DESIGN MANUAL FOR BEARING CAPACITY GUIDANCE.
- PERIMETER STONE MUST BE EXTENDED HORIZONTALLY TO THE EXCAVATION WALL FOR BOTH VERTICAL AND SLOPED EXCAVATION WALLS.
- REQUIREMENTS FOR HANDLING AND INSTALLATION:
 - TO MAINTAIN THE WIDTH OF CHAMBERS DURING SHIPPING AND HANDLING, CHAMBERS SHALL HAVE INTEGRAL, INTERLOCKING STACKING LUGS.
 - TO ENSURE A SECURE JOINT DURING INSTALLATION AND BACKFILL, THE HEIGHT OF THE CHAMBER JOINT SHALL NOT BE LESS THAN 3".
 - TO ENSURE THE INTEGRITY OF THE ARCH SHAPE DURING INSTALLATION, a) THE ARCH STIFFNESS CONSTANT SHALL BE GREATER THAN OR EQUAL TO 450 LBS/FT³%. THE ASC IS DEFINED IN SECTION 6.2.8 OF ASTM F2418. AND b) TO RESIST CHAMBER DEFORMATION DURING INSTALLATION AT ELEVATED TEMPERATURES (ABOVE 73° F / 23° C), CHAMBERS SHALL BE PRODUCED FROM REFLECTIVE GOLD OR YELLOW COLORS.

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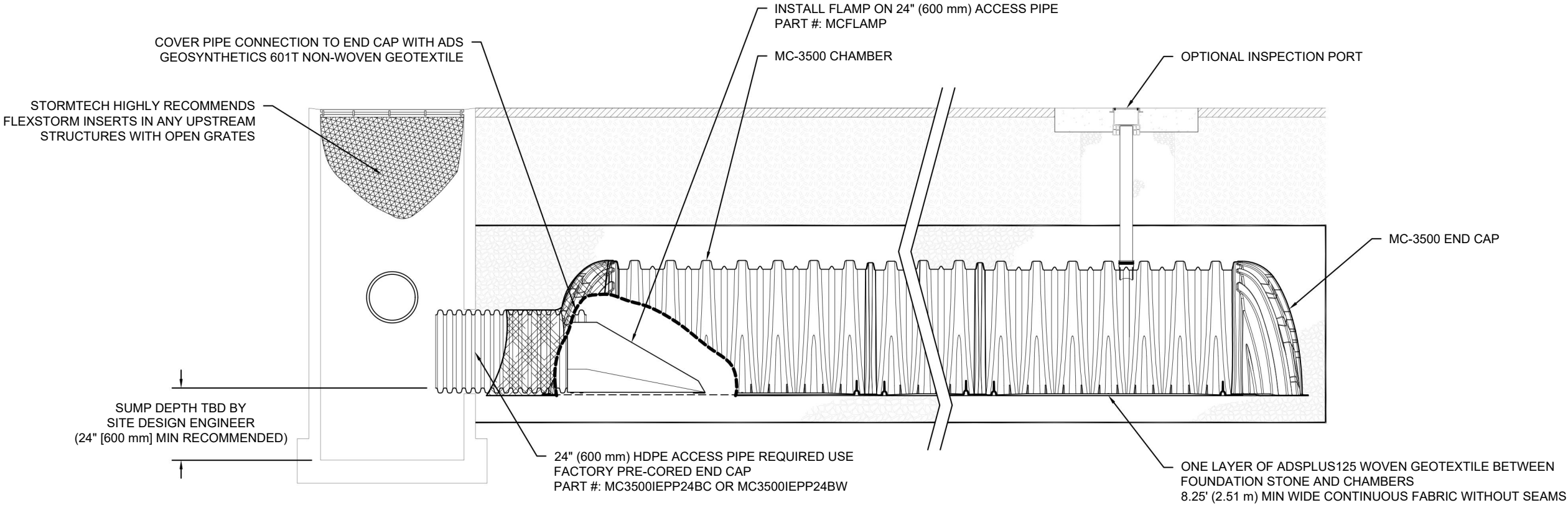
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3 OF 5



MC-3500 ISOLATOR ROW PLUS DETAIL
NTS

INSPECTION & MAINTENANCE

- STEP 1) INSPECT ISOLATOR ROW PLUS FOR SEDIMENT
- A. INSPECTION PORTS (IF PRESENT)
 - A.1. REMOVE/OPEN LID ON NYLOPLAST INLINE DRAIN
 - A.2. REMOVE AND CLEAN FLEXSTORM FILTER IF INSTALLED
 - A.3. USING A FLASHLIGHT AND STADIA ROD, MEASURE DEPTH OF SEDIMENT AND RECORD ON MAINTENANCE LOG
 - A.4. LOWER A CAMERA INTO ISOLATOR ROW PLUS FOR VISUAL INSPECTION OF SEDIMENT LEVELS (OPTIONAL)
 - A.5. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
 - B. ALL ISOLATOR PLUS ROWS
 - B.1. REMOVE COVER FROM STRUCTURE AT UPSTREAM END OF ISOLATOR ROW PLUS
 - B.2. USING A FLASHLIGHT, INSPECT DOWN THE ISOLATOR ROW PLUS THROUGH OUTLET PIPE
 - i) MIRRORS ON POLES OR CAMERAS MAY BE USED TO AVOID A CONFINED SPACE ENTRY
 - ii) FOLLOW OSHA REGULATIONS FOR CONFINED SPACE ENTRY IF ENTERING MANHOLE
 - B.3. IF SEDIMENT IS AT, OR ABOVE, 3" (80 mm) PROCEED TO STEP 2. IF NOT, PROCEED TO STEP 3.
- STEP 2) CLEAN OUT ISOLATOR ROW PLUS USING THE JETVAC PROCESS
- A. A FIXED CULVERT CLEANING NOZZLE WITH REAR FACING SPREAD OF 45" (1.1 m) OR MORE IS PREFERRED
 - B. APPLY MULTIPLE PASSES OF JETVAC UNTIL BACKFLUSH WATER IS CLEAN
 - C. VACUUM STRUCTURE SUMP AS REQUIRED
- STEP 3) REPLACE ALL COVERS, GRATES, FILTERS, AND LIDS; RECORD OBSERVATIONS AND ACTIONS.
- STEP 4) INSPECT AND CLEAN BASINS AND MANHOLES UPSTREAM OF THE STORMTECH SYSTEM.

NOTES

1. INSPECT EVERY 6 MONTHS DURING THE FIRST YEAR OF OPERATION. ADJUST THE INSPECTION INTERVAL BASED ON PREVIOUS OBSERVATIONS OF SEDIMENT ACCUMULATION AND HIGH WATER ELEVATIONS.
2. CONDUCT JETTING AND VACTORING ANNUALLY OR WHEN INSPECTION SHOWS THAT MAINTENANCE IS NECESSARY.



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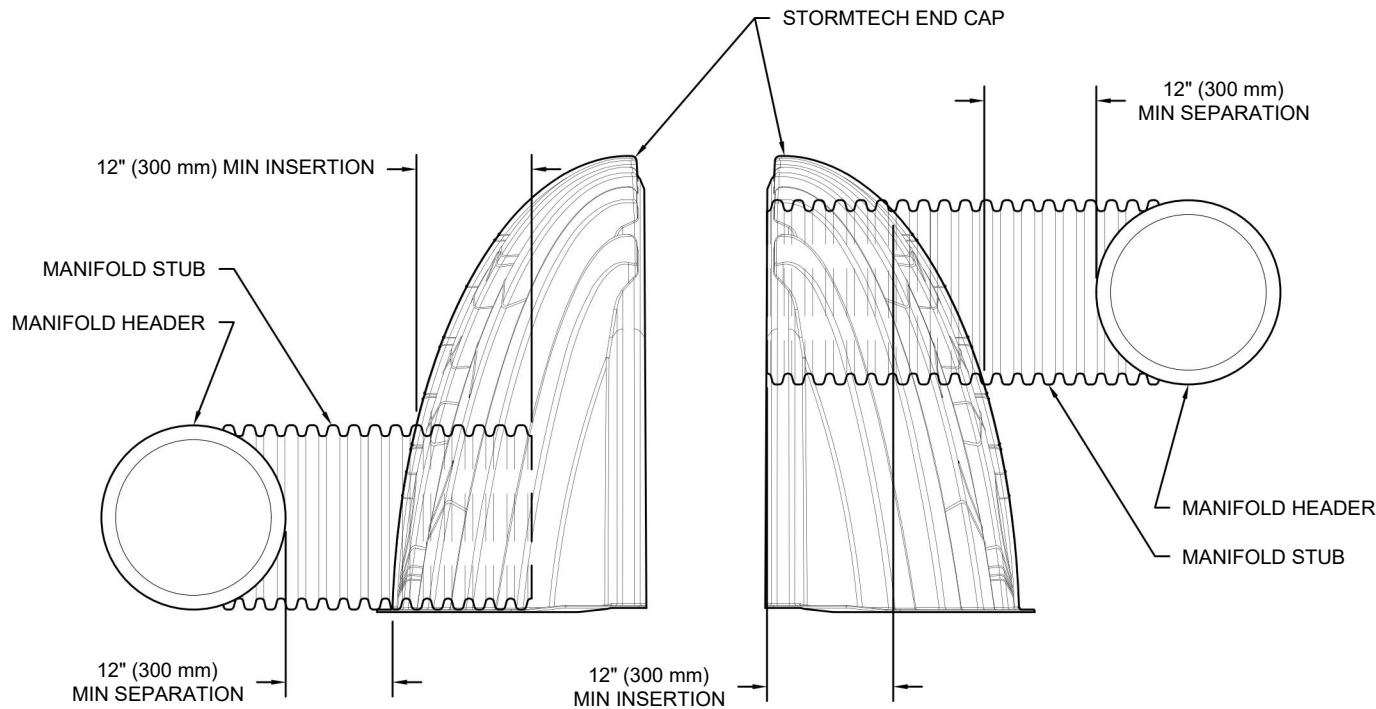
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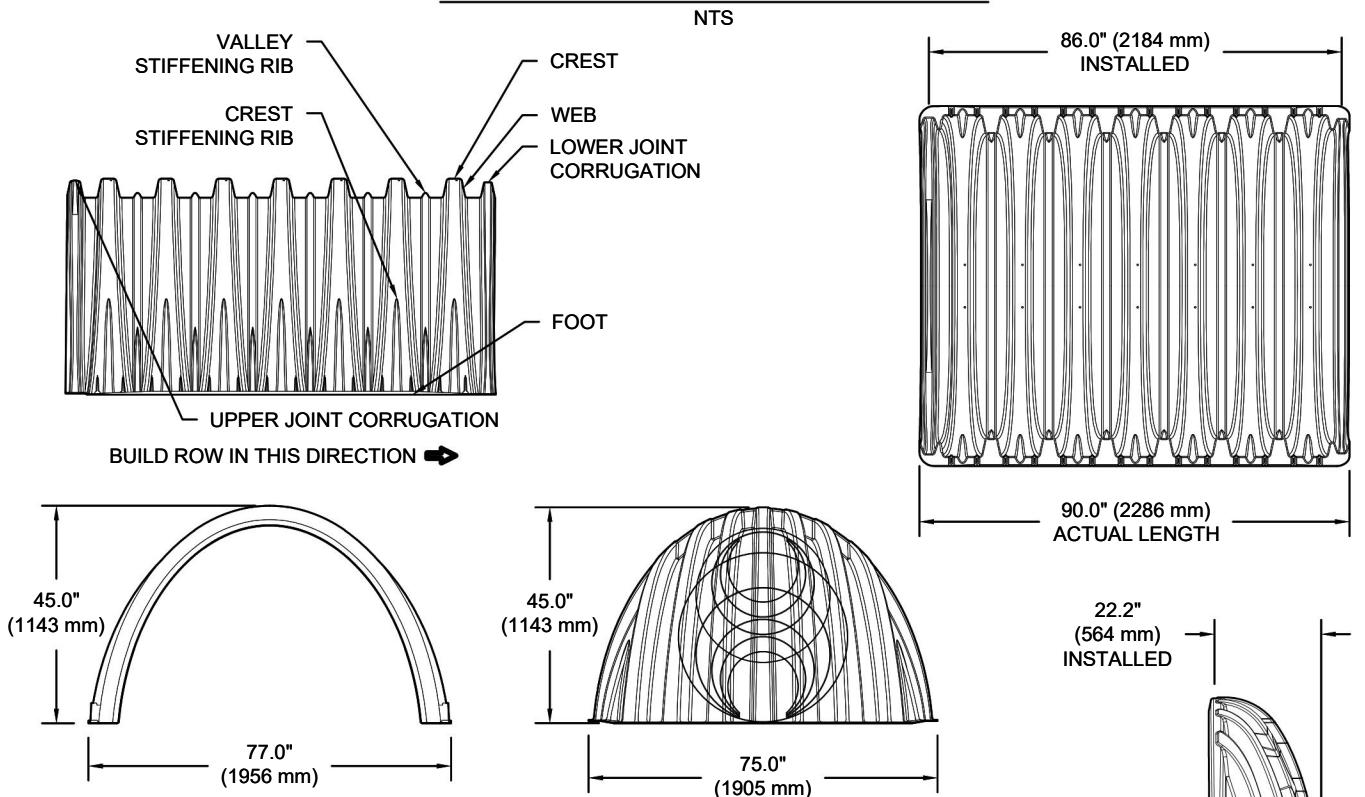
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MC-SERIES END CAP INSERTION DETAIL



NOTE: MANIFOLD STUB MUST BE LAID HORIZONTAL FOR A PROPER FIT IN END CAP OPENING.

MC-3500 TECHNICAL SPECIFICATION



NOMINAL CHAMBER SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	77.0\"	45.0\"	X 86.0\"	(1956 mm X 1143 mm X 2184 mm)
CHAMBER STORAGE	109.9 CUBIC FEET			(3.11 m³)
MINIMUM INSTALLED STORAGE*	175.0 CUBIC FEET			(4.96 m³)
WEIGHT	134 lbs.			(60.8 kg)

NOMINAL END CAP SPECIFICATIONS

SIZE (W X H X INSTALLED LENGTH)	75.0\"	45.0\"	X 22.2\"	(1905 mm X 1143 mm X 564 mm)
END CAP STORAGE	14.9 CUBIC FEET			(0.42 m³)
MINIMUM INSTALLED STORAGE*	45.1 CUBIC FEET			(1.28 m³)
WEIGHT	49 lbs.			(22.2 kg)

*ASSUMES 12\"

STUBS AT BOTTOM OF END CAP FOR PART NUMBERS ENDING WITH "B"
STUBS AT TOP OF END CAP FOR PART NUMBERS ENDING WITH "T"
END CAPS WITH A WELDED CROWN PLATE END WITH "C"
END CAPS WITH A PREFABRICATED WELDED STUB END WITH "W"

PART #	STUB	B	C
MC3500IEPP06T	6\"	33.21\" (844 mm)	---
MC3500IEPP06B		---	0.66\" (17 mm)
MC3500IEPP08T		31.16\" (791 mm)	---
MC3500IEPP08B	8\"	---	0.81\" (21 mm)
MC3500IEPP10T		29.04\" (738 mm)	---
MC3500IEPP10B		---	0.93\" (24 mm)
MC3500IEPP12T	12\"	26.36\" (670 mm)	---
MC3500IEPP12B		---	1.35\" (34 mm)
MC3500IEPP15T	15\"	23.39\" (594 mm)	---
MC3500IEPP15B		---	1.50\" (38 mm)
MC3500IEPP18TC	18\"	20.03\" (509 mm)	---
MC3500IEPP18TW		---	1.77\" (45 mm)
MC3500IEPP18BC			
MC3500IEPP18BW			
MC3500IEPP24TC	24\"	14.48\" (368 mm)	---
MC3500IEPP24TW		---	2.06\" (52 mm)
MC3500IEPP24BC			
MC3500IEPP24BW			
MC3500IEPP30BC	30\"	---	2.75\" (70 mm)

NOTE: ALL DIMENSIONS ARE NOMINAL

CUSTOM PRECORED INVERTS ARE AVAILABLE UPON REQUEST. INVENTORIED MANIFOLDS INCLUDE 12-24\"



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