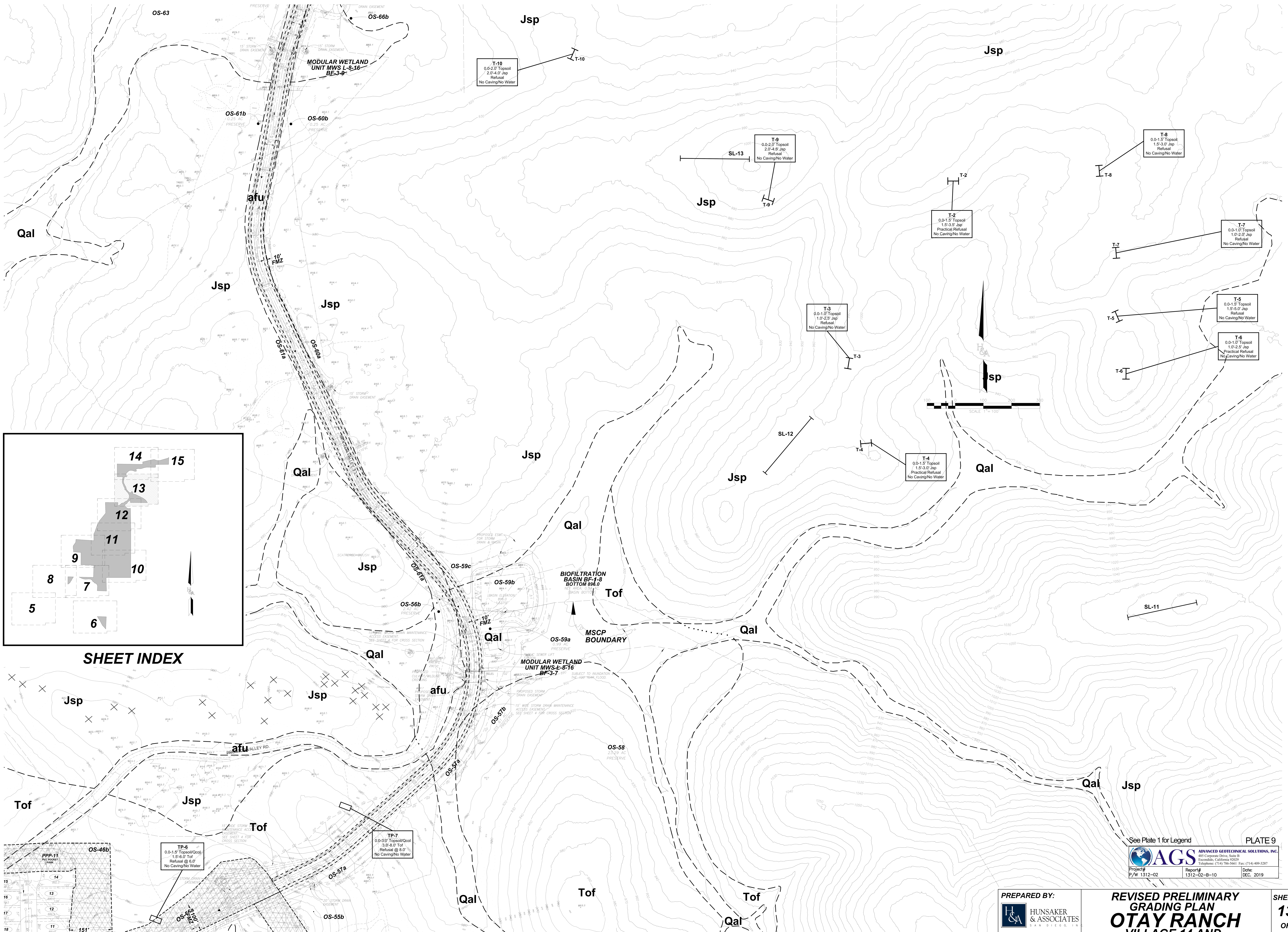
FOR CONTINUATION SEE SHEET NO. 14



PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC.

PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

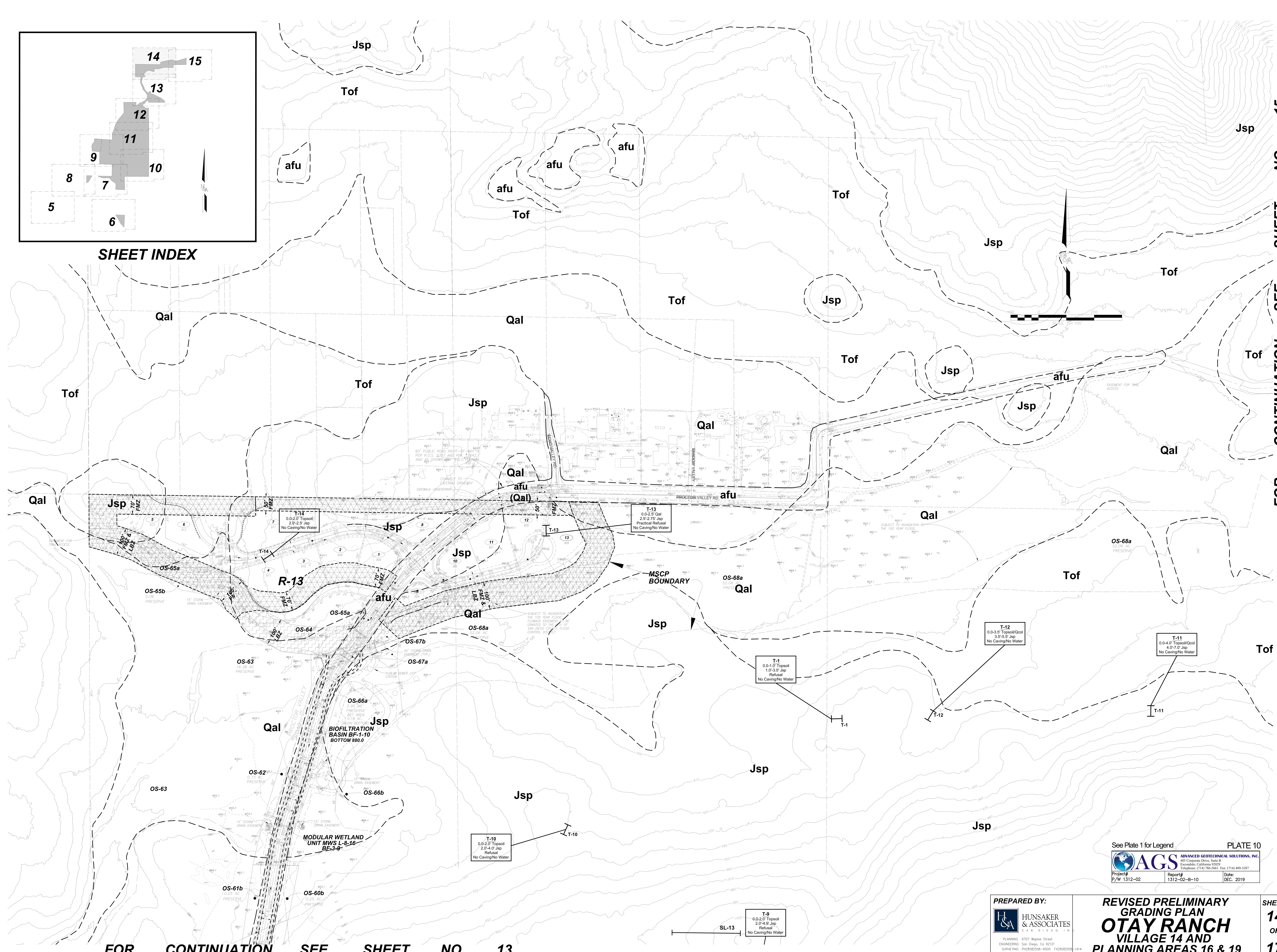
REVISED PRELIMINARY GRADING PLAN
OTAY RANCH
VILLAGE 14 AND PLANNING AREAS 16 & 19
County Of San Diego, California

SHEET 13 OF 17

W.O. 2421-0036

FOR CONTINUATION SEE SHEET NO. 12

PIn\TM-Grading Plan (Village 14 & PA 19)\PRELIM GRADING PLAN\Village 14 - PRELIM GRADING - Sht 13 (Village 14 & PA 19).dwg[]Sep-10-2019:12:15



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10
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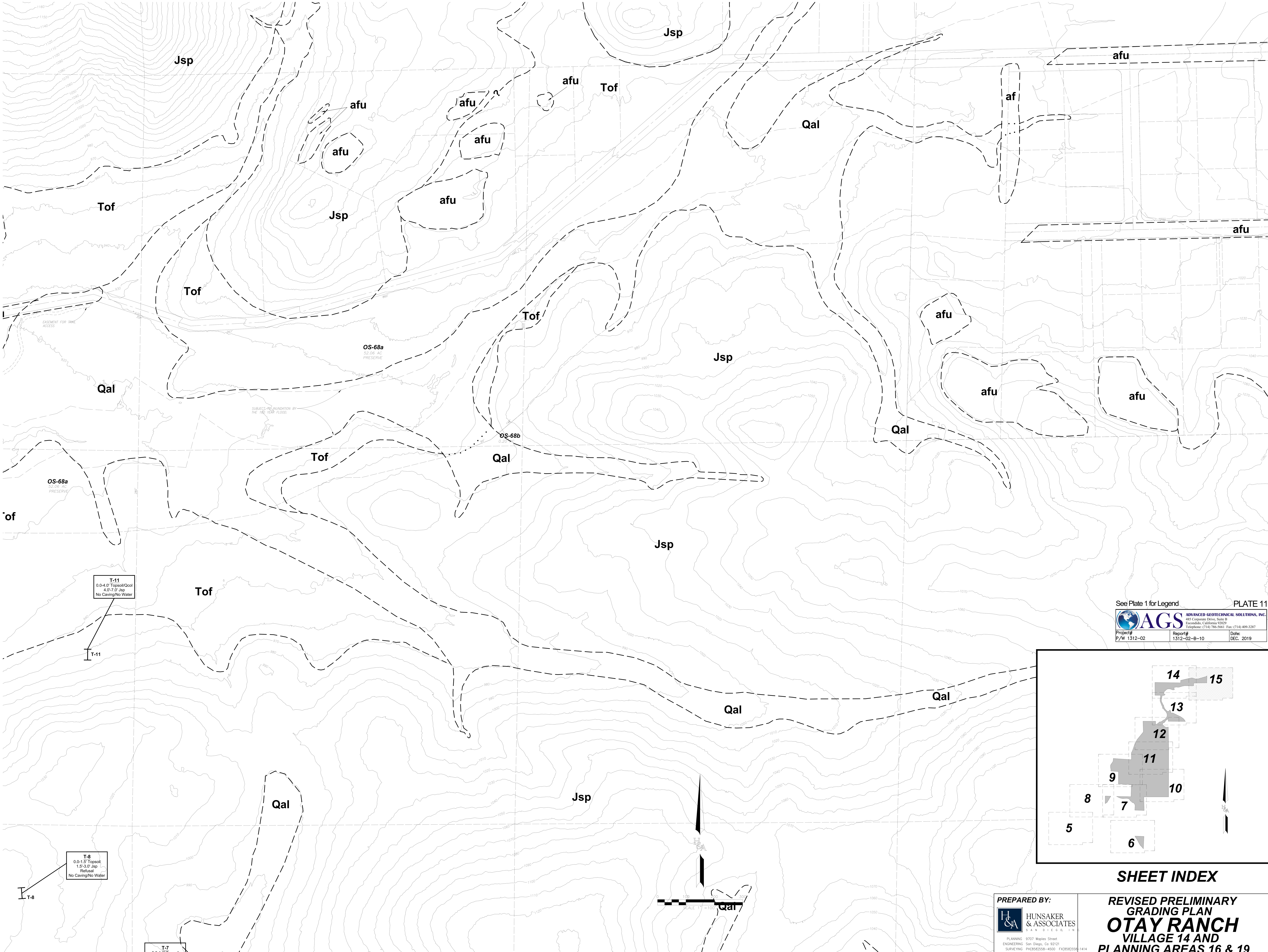
7
5
6
Jsp
Tof
afu
Qal
afu (Qal)
R-13
PROCTOR VALLEY RD
MSCP BOUNDARY
OS-65a
OS-65b
OS-64
OS-63
OS-62
OS-61b
OS-60b
OS-66a
OS-66b
OS-67a
OS-67b
OS-68a
BIOFILTRATION BASIN BF-1-10 BOTTOM 880.0
MODULAR WETLAND UNIT MWS L-8-16 BF-3-9
T-14 0.0-2.0' Topsoil 2.0'-2.5' Jsp No Caving/No Water
T-13 0.0-2.5' Qal 2.5'-2.75' Jsp Practical Refusal No Caving/No Water
T-1 0.0-1.0' Topsoil 1.0'-3.0' Jsp Refusal No Caving/No Water
T-12 0.0-3.5' Topsoil/Qcol 3.5'-5.5' Jsp No Caving/No Water
T-11 0.0-4.0' Topsoil/Qcol 4.0'-7.0' Jsp No Caving/No Water
T-10 0.0-2.0' Topsoil 2.0'-4.0' Jsp Refusal No Caving/No Water
T-9 0.0-2.0' Topsoil 2.0'-4.5' Jsp Refusal No Caving/No Water
SL-13
SEE SHEET NO. 15
FOR CONTINUATION SEE SHEET NO. 15
FOR CONTINUATION SEE SHEET NO. 13
See Plate 1 for Legend
PLATE 10
AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
Project# P/W 1312-02
Report# 1312-02-B-10
Date: DEC. 2019
PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO, INC.
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
REVISED PRELIMINARY GRADING PLAN
OTAY RANCH
VILLAGE 14 AND PLANNING AREAS 16 & 19
County Of San Diego, California
SHEET 14 OF 17
W.O. 2421-0036



See Plate 1 for Legend

PLATE 11

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, California 92029
Telephone: (714) 786-5661 Fax: (714) 409-3287

Project#	Report#	Date:
P/W 1312-02	1312-02-B-10	DEC. 2019

PREPARED BY:

HUNSAKER & ASSOCIATES SAN DIEGO, INC.
PLANNING 9707 Waples Street
ENGINEERING San Diego, Ca 92121
SURVEYING PH(858)558-4500 FX(858)558-1414

REVISED PRELIMINARY GRADING PLAN
OTAY RANCH
VILLAGE 14 AND PLANNING AREAS 16 & 19
County Of San Diego, California

SHEET 15 OF 17

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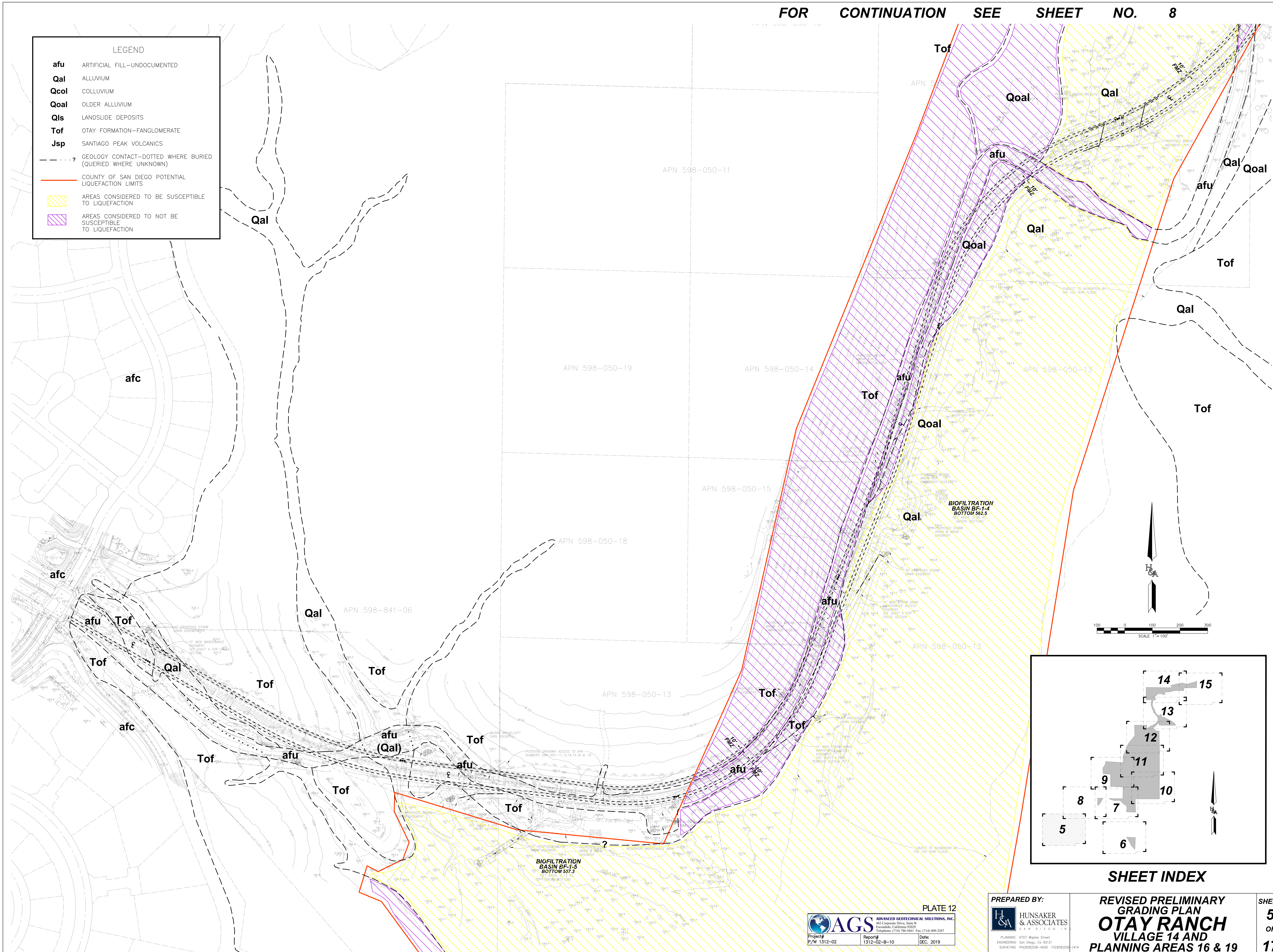
\TM-Grading Plan (Village 14 & PA 19)\PRELIM GRADING PLAN\Village 14 - PRELIM GRADING - Sht 15 (Village 14 & PA 19).dwg[]Sep-10-2019:12:15



FOR CONTINUATION SEE SHEET NO. 8
LEGEND
afu ARTIFICIAL FILL–UNDOCUMENTED
Qal ALLUVIUM
Qcol COLLUVIUM
Qoal OLDER ALLUVIUM
Qls LANDSLIDE DEPOSITS
Tof OTAY FORMATION–FANGLOMERATE
Jsp SANTIAGO PEAK VOLCANICS
GEOLOGY CONTACT–DOTTED WHERE BURIED (QUERIED WHERE UNKNOWN)
COUNTY OF SAN DIEGO POTENTIAL LIQUEFACTION LIMITS
AREAS CONSIDERED TO BE SUSCEPTIBLE TO LIQUEFACTION
AREAS CONSIDERED TO NOT BE SUSCEPTIBLE TO LIQUEFACTION
APN 598-050-11
APN 598-050-19
APN 598-050-14
APN 598-050-13
APN 598-050-15
APN 598-050-18
APN 598-841-06
BIOFILTRATION BASIN BF-1-4 BOTTOM 562.5
BIOFILTRATION BASIN BF-1-5 BOTTOM 557.3
afu
(Qal)
afc
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PLATE 12
AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.
Project# P/W 1312-02
Report# 1312-02-B-10
Date: DEC. 2019
PREPARED BY:
HUNSAKER & ASSOCIATES SAN DIEGO INC.
REVISED PRELIMINARY GRADING PLAN
OTAY RANCH
VILLAGE 14 AND PLANNING AREAS 16 & 19
County Of San Diego, California
SHEET 5 OF 17
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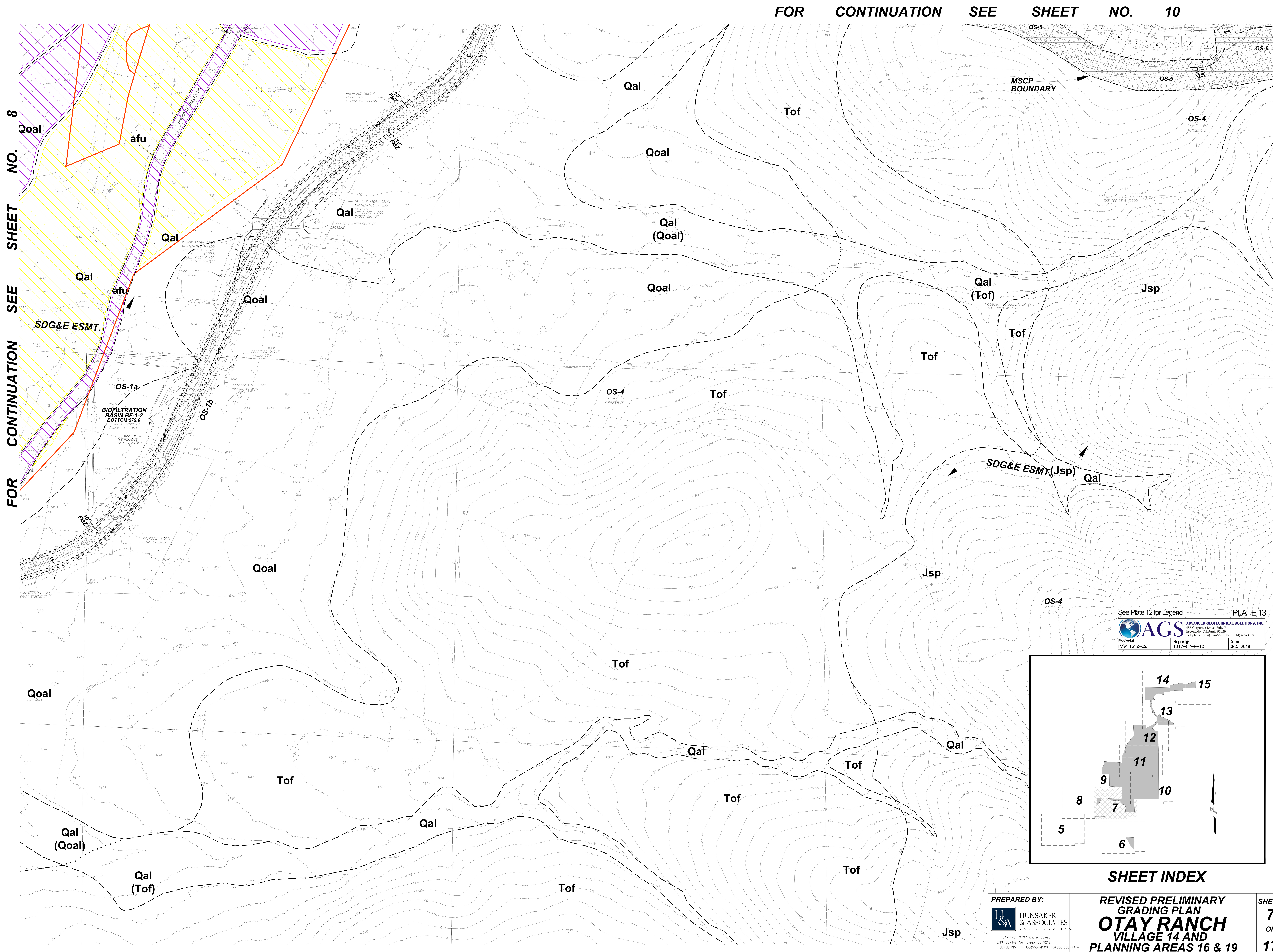
FOR CONTINUATION SEE SHEET NO. 10
FOR CONTINUATION SEE SHEET NO. 8
Qoal
afu
Qal
Qal
afu
SDG&E ESMT.
OS-1a
BIOFILTRATION BASIN BF-1-2 BOTTOM 579.0
OS-1b
Qal
Qoal
Qal
Qoal
Qal (Qoal)
Qoal
Tof
MSCP BOUNDARY
OS-5
OS-5
OS-6
OS-4
Qal (Tof)
Jsp
Tof
Tof
OS-4
Tof
SDG&E ESMT.
(Jsp)
Qal
Jsp
OS-4
Qoal
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Qal (Qoal)
Qal
Qal (Tof)
Tof
Tof
Jsp
See Plate 12 for Legend
PLATE 13
AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.
Project# P/W 1312-02
Report# 1312-02-B-10
Date: DEC. 2019
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SHEET INDEX
PREPARED BY:
HUNSAKER & ASSOCIATES
SAN DIEGO, INC.
REVISED PRELIMINARY GRADING PLAN
OTAY RANCH
VILLAGE 14 AND PLANNING AREAS 16 & 19
County Of San Diego, California
SHEET 7 OF 17

FOR CONTINUATION SEE SHEET NO. 9

PREPARED BY:

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OTAY RANCH
VILLAGE 14 AND PLANNING AREAS 16 & 19
County Of San Diego, California

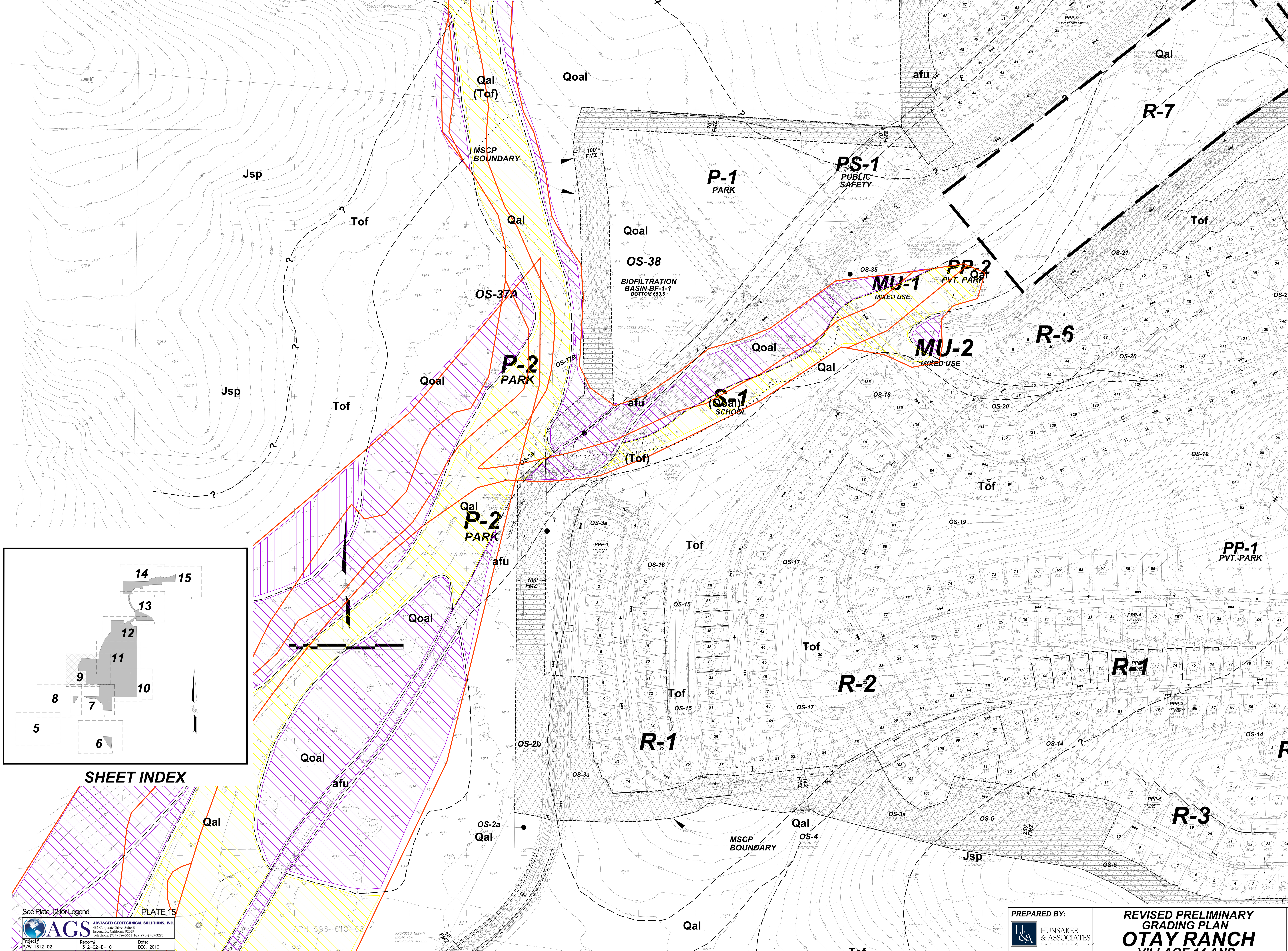
SHEET 8 OF 17

W.O. 2421-0036

FOR CONTINUATION SEE SHEET NO. 5

\TM-Grading Plan (Village 14 & PA 19)\PRELIM GRADING PLAN\Village 14 - PRELIM GRADING - Sht 08 (Village 14 & PA 19).dwg[]Sep-10-2019:12:10

FOR CONTINUATION SEE SHEET NO. 11



FOR CONTINUATION SEE SHEET NO. 10

FOR CONTINUATION SEE SHEET NO. 8

PREPARED BY:
HUNSAKER & ASSOCIATES
SAN DIEGO, INC.

REVISED PRELIMINARY GRADING PLAN
OTAY RANCH
VILLAGE 14 AND PLANNING AREAS 16 & 19
County Of San Diego, California

APPENDIX A

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References (continued)

Aerial Photographs Reviewed for Report			
Year	**Flight ID**	**Photo ID**	**Photo Scale**
1928	SD	69B- 1, 2, 3 69C- 1, 2, 3 69D- 1, 2, 3	1” = 1000’
1960-1970	SDCT2/T11	2- 74 14- 28, 29, 30	1” = 1000’
1968	AXN	3JJ- 101, 102, 175	1” = 2800’
1970	SDC	13- 7, 8	1” = 2000’
1971	GS-VCSQ	1- 5	1” = 2600’
1973-1975	SDPD	14- 11, 12, 13 15- 14	1” = 1000’
1974	SDC ORTHOS	Jamul Mtn.	1” = 2000’
1974	SDPD	2- 3,4	1” = 2000’
1976	SAN DIEGO	235, 236, 247, 248	1” = 2000’
1978-1979	SDCO (WEST)	33- F1,F2 34- D22, D23, D24	1” = 1000’
1983	C11109 (CAS)	139, 140	1” = 2000’
1989	WAC (WEST)	18- 49, 51	1” = 2640’

APPENDIX B

SUBSURFACE INVESTIGATION

BORING AND TRENCH LOGS

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo		**PROJECT NAME** Otay Village 14	
PROJECT NUMBER 1312-02		**PROJECT LOCATION** Proctor Valley	
DATE STARTED 1/29/15	**COMPLETED** 1/29/15	**GROUND ELEVATION** 752 ft	**HOLE SIZE** 30
DRILLING CONTRACTOR Dave's Drilling		**GROUND WATER LEVELS:**	
DRILLING METHOD Bucket Auger/Flight Auger		**AT TIME OF DRILLING** ---	
LOGGED BY FE	**CHECKED BY** PJD	**AT END OF DRILLING** ---	
NOTES drop = 12"; 0-27ft.-4500lbs; 28-62.5ft. 3500lbs		**AFTER DRILLING** ---	

ELEVATION (ft)	DEPTH (ft)	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
	0	SM	**Topsoil:** SILTY SAND, fine to coarse grained, brown, dry, loose; some clay.							
750			**Otay Formation - Fanglomerate (Tof):** CLAYEY SANDSTONE, brown, dry, soft, highly weathered; fractured; some secondary clay development.							
	5		@4 ft. fine to coarse grained, pale yellow, slightly moist to moist, moderately hard, slightly weathered.	UD	8	126	7.8	62	26	DS, PA
745				BU						
	10			UD	9	122	6.7	48	29	DS, PA
740			@11 ft. undulatory to flat-lying contact, SANDY CLAYSTONE, fine to medium grained, yellowish brown, moist, hard.							
	15		@15 ft. mottled light olive gray and light brownish yellow.	UD	9	127	10.9	89	87	PA
735										
	20			BU						MAX
730			@22 ft. grades down to BRECCIA.							
			@23 ft. CLAYEY SANDSTONE, brownish yellow, moist, hard; some subangular volcanic clasts to 10" diameter, one 12" clast.							
	25		@25 ft. BRECCIA, subangular volcanic clasts to 4" diameter in a clayey sandstone matrix; yellowish brown, moist, hard, massive.							
725										
	30		@29 ft. CLAYEY SANDSTONE, fine to coarse grained, light olive gray, moist, hard.							
720			@31 ft. abundant volcanic clasts to 6" diameter.							
	35									

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER BA-1

CLIENT Jackson Pendo

PROJECT NAME Otay Village 14

PROJECT NUMBER 1312-02

PROJECT LOCATION Proctor Valley

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
	35			@35 ft. using flight auger to advance through Breccia with subrounded clasts to 10" diameter.							
715											
				@38 ft. some SANDY CLAYSTONE lenses to 24" thick.							
	40										
710				@41 ft. BRECCIA, metavolcanic clasts to 8" diameter in a clayey sandstone matrix; fine to coarse grained, pale yellow, moist, hard.							
				@44 ft. yellowish brown.							
	45				BU						CHEM
705											
				@48 ft. SANDSTONE, fine to coarse grained, light yellowish brown, moist, moderately hard, massive.							
	50										
700											
				@53 ft. CLAYEY SANDSTONE, fine to coarse grained, pale yellow, moist, hard; abundant subrounded gravel to 1" diameter.							
	55										
695											
	60										
690											

TD = 62.5 ft. No Groundwater. No Caving.

BORING NUMBER BA-2

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo		**PROJECT NAME** Otay Village 14	
PROJECT NUMBER 1312-02		**PROJECT LOCATION** Proctor Valley	
DATE STARTED 1/29/15	**COMPLETED** 1/29/15	**GROUND ELEVATION** 690 ft	**HOLE SIZE** 30
DRILLING CONTRACTOR Dave's Drilling		**GROUND WATER LEVELS:**	
DRILLING METHOD Bucket Auger/Flight Auger		**AT TIME OF DRILLING** ---	
LOGGED BY FE	**CHECKED BY** PJD	**AT END OF DRILLING** ---	
NOTES no drive samples		**AFTER DRILLING** ---	

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
690	0		SC	**Topsoil:** CLAYEY SAND, fine to coarse grained, brown, loose; some angular volcanic clasts to 2" diameter.	BU					69	DS, PA
				Otay Formation - Fanglomerate (Tof): CLAYEY SANDSTONE, fine to coarse grained, reddish brown, moist, soft. @3 ft. light yellowish brown, moist, moderately hard, massive; abundant subangular to subrounded volcanic clasts to 4" diameter.							
685	5										
680	10				GB					24	PA
675	15										
				@19 ft. encountered large clast, switched to flight auger.							

TD = 19.5 ft. (refusal) No Groundwater. No Caving.

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER BA-3

CLIENT Jackson Pendo
PROJECT NAME Otay Village 14
PROJECT NUMBER 1312-02
PROJECT LOCATION Proctor Valley
DATE STARTED 1/29/15 **COMPLETED** 2/2/15
GROUND ELEVATION 700 ft **HOLE SIZE** 30
DRILLING CONTRACTOR Dave's Drilling
GROUND WATER LEVELS:
DRILLING METHOD Bucket Auger/Flight Auger
AT TIME OF DRILLING ---
LOGGED BY FE **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
700	0		SM	**Topsoil:** SILTY SAND, fine to medium grained, brown, slightly moist, loose; some clay.							
				Otay Formation - Fanglomerate (Tof): SANDY CLAYSTONE, reddish brown, slightly moist, soft; some subangular gravel to 2" diameter.							
				@2.5 ft. pale yellow, slightly weathered, moderately hard, massive; some subangular clasts to 8" diameter.							
695	5										
				@6 ft. CLAYEY SANDSTONE, fine to coarse grained, pale yellow, moist, moderately hard; some subangular clasts to 6" diameter.							
				@8 ft. one clast to 12" diameter, some olive siltstone clasts to 4" diameter.							
690	10			@9 ft. pale brown to light gray; one volcanic clast to 16" diameter.							
					UD	7	122	8.9	64	25	DS, PA
					BU						EI, MAX, R-VAL
685	15			@15 ft. pale yellow; some subangular gravel and cobbles to 4" diameter.	UD	10	125	8.4	64	20	DS, PA
				@15 ft. N70°E, 3°SE - faint bedding.							
680	20			@20 ft. hard, highly channelized.							
				@23 ft. BRECCIA; subangular to subrounded volcanic clasts to 8" diameter and abundant gravel in a dry, hard, massive, CLAYEY SANDSTONE matrix.							
675	25			@25 ft. one clast to 16" diameter; switched to flight auger.	BU						
670	30										
				@31 ft. very slow drilling through 12" clasts with flight auger.							
665	35										

(Continued Next Page)

BORING NUMBER BA-3

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo **PROJECT NAME** Otay Village 14

PROJECT NUMBER 1312-02 **PROJECT LOCATION** Proctor Valley

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
665	35			@35 ft. light yellowish brown.							
660	40			@39 ft. some CLAYEY SANDSTONE lenses to 16" thick.							
				@40 ft. BRECCIA, clasts to 14" diameter.							
655	45										

TD = 46 ft. (refusal on large clast) No Groundwater. No Caving.

BORING NUMBER BA-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo
PROJECT NAME Otay Village 14
PROJECT NUMBER 1312-02
PROJECT LOCATION Proctor Valley
DATE STARTED 1/30/15 **COMPLETED** 1/30/15
GROUND ELEVATION 823 ft **HOLE SIZE** 30
DRILLING CONTRACTOR Dave's Drilling
GROUND WATER LEVELS:
DRILLING METHOD Bucket Auger/Flight Auger
AT TIME OF DRILLING ---
LOGGED BY FE **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
	0	SM	**Topsoil:** SILTY SAND, fine to coarse grained, light brown, dry, loose; some clay; some volcanic clasts to 3" diameter.							
820			**Otay Formation - Fanglomerate (Tof):** BRECCIA, subrounded volcanic clasts to 8" diameter in a CLAYEY SANDSTONE matrix; fine to coarse grained, light yellowish brown, slightly moist, hard.							
	5			GB						
815			@6 ft. CLAYEY SANDSTONE, fine to coarse grained, pale yellow to light gray, dry to slightly moist, moderately hard to hard, massive; some gravel and subangular volcanic clasts to 6" diameter.							
	10			BU						MAX
810			@12 ft. light brownish yellow, moist, hard; abundant volcanic clasts to 6" diameter.							
	15			GB						
805			@18 ft. some SANDY CLAYSTONE lenses, fine to medium grained, light olive gray, moist, moderately hard; polished surfaces from 18 to 20 ft.	UD	8	101	14.3	57	32	PA
	20									
800			@23 ft. becomes fine grained, light olive gray, moist, moderately hard.							
	25			UD	5	99	19.8	76	89	DS, PA
				GB						EI, CHEM
795										
	30		@30 ft. BRECCIA, subangular volcanic clasts to 6" diameter in a CLAYEY SANDSTONE matrix, light yellowish brown, slightly moist, hard.							
790				GB						
			@33 ft. SANDY CLAYSTONE, fine grained, light olive gray, moist, moderately soft to moderately hard, massive.							
	35									

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER BA-4

CLIENT Jackson Pendo | **PROJECT NAME** Otay Village 14

PROJECT NUMBER 1312-02 | **PROJECT LOCATION** Proctor Valley

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
	35										
					UD	10	105	18.5	82	77	DS, PA
785											
	40										
					GB						
780											
	45										
					GB						
775											
	50										
				@51 ft. CLAYEY SANDSTONE, fine to coarse grained, light yellowish brown, moist, hard; abundant gravel and some volcanic clasts to 8" diameter.							
770				@52 ft. SANDY CLAYSTONE, fine to coarse grained, light olive gray, moist, hard.	UD	12	110	19.6	99	80	DS, PA
	55										
765											
	60										
760				@62 ft. BRECCIA, subangular volcanic clasts to 4" diameter in a CLAYEY SANDSTONE matrix, light yellowish brown, moist, moderately hard. @63 ft. light olive gray.	BU						
	65										
755											
	70										
750											

TD = 73 ft. No Groundwater. No Caving.

AGS
ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER BA-5

CLIENT Jackson Pendo
PROJECT NAME Otay Village 14
PROJECT NUMBER 1312-02
PROJECT LOCATION Proctor Valley
DATE STARTED 2/2/15 **COMPLETED** 2/3/15
GROUND ELEVATION 781 ft **HOLE SIZE** 30
DRILLING CONTRACTOR Dave's Drilling
GROUND WATER LEVELS:
DRILLING METHOD Bucket Auger/Flight Auger
AT TIME OF DRILLING ---
LOGGED BY FE **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
	0		SM	**Topsoil:** SILTY SAND, fine to coarse grained, light reddish brown, dry, loose.							
780				**Otay Formation - Fanglomerate (Tof):** SANDY CLAYSTONE, fine to medium grained, reddish brown, slightly moist, soft, highly weathered. @2 ft. light olive gray, moist, slightly weathered, moderately soft; abundant iron oxide.							
775	5			@7 ft. CLAYEY SANDSTONE, fine to medium grained, light olive gray, moist, moderately hard; with iron oxide staining. @8 ft. fine to coarse grained; abundant subangular gravel and clasts to 6" diameter.							
770	10			@10.5 ft. GRAVELY SANDSTONE.	UD	4	115	12.4	72	43	DS, PA
765	15			@14 ft. BRECCIA.							
				@17 ft. some clasts to 8" diameter.							
760	20				BU						EI, MAX
				@24 ft. subrounded clasts to 4" diameter.							
755	25			@26 ft. CLAYEY SANDSTONE, fine grained, light olive gray, moist, hard, massive; undulatory contact with overlying breccia. @26.5 ft. N15°E, 5°NW approximate bedding.							
750	30			@29.5 ft. BRECCIA							
	35			@34 ft. light brown, very slow drilling -alternating between							

(Continued Next Page)

BORING NUMBER BA-5

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo

PROJECT NAME Otay Village 14

PROJECT NUMBER 1312-02

PROJECT LOCATION Proctor Valley

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
	35			bucket auger and flight auger.							
745											
				@38 ft. pale yellow, moist.							
	40										
740				@40 ft. some fine grained CLAYEY SANDSTONE lenses to 18" thick, pinching out, highly channelized.	GB					34	PA
	45										
735				@45 ft. matrix is moist to very moist.							
	50										
730				@50 ft. BRECCIA.							
	55										
725					GB						
				@57 ft. CLAYEY SANDSTONE, light olive gray, moist, hard; undulatory contacts. Scour-fill contact with underlying clayey sandstone.							
	60										
720				@61 ft. BRECCIA lens, 6" thickness.							
				@62 ft. Grades in and out from SANDY CLAYSTONE to fine grained CLAYEY SANDSTONE, light olive gray, moist, hard, massive.							
	65										
715					GB						
					UD	20	108	14.1	67	80	DS, PA
				@67 ft. BRECCIA lens, 6" thickness, undulatory to flat lying contact with underlying SANDY CLAYSTONE, light olive gray, moist, hard. @67 ft. N70°W, 4°NE - approximate bedding.							
	70										
710											

TD = 74 ft. No Groundwater. No Caving.

BORING NUMBER BA-6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo	**PROJECT NAME** Otay Village 14
PROJECT NUMBER 1312-02	**PROJECT LOCATION** Proctor Valley
DATE STARTED 2/3/15 **COMPLETED** 2/4/15	**GROUND ELEVATION** 995 ft **HOLE SIZE** 30
DRILLING CONTRACTOR Dave's Drilling	**GROUND WATER LEVELS:**
DRILLING METHOD Bucket Auger/Flight Auger	**AT TIME OF DRILLING** ---
LOGGED BY FE **CHECKED BY** PJD	**AT END OF DRILLING** ---
NOTES	**AFTER DRILLING** ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
995	0		SM	**Topsoil:** SILTY SAND, fine to coarse grained, brown, dry, loose.							
				Santiago Peak Volcanics (Jsp): Metavolcanic bedrock, brown to reddish brown, slightly moist, moderately hard, highly weathered, tightly fractured, breaks into angular gravel to 3" diameter and silt. Hollow sounding with rock hammer.	UD	4	99	11.7	45		
990	5			@3 ft. light brownish gray, slightly weathered, moderately hard. @3 ft. N40°E, 75°NW - foliation.							
				@8 ft. N30°E, 75°NW - joint @8 ft. N73°W, 60°NE - joint	BU						
985	10			@10 ft. highly to moderately jointed, tight to blocky fracture spacing.							
980	15			@14 ft. fewer joints.							

TD = 15 ft. (refusal) No Groundwater. No Caving.

BORING NUMBER BA-7

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo
PROJECT NAME Otay Village 14
PROJECT NUMBER 1312-02
PROJECT LOCATION Proctor Valley
DATE STARTED 2/4/15 **COMPLETED** 2/4/15
GROUND ELEVATION 890 ft **HOLE SIZE** 30
DRILLING CONTRACTOR Dave's Drilling
GROUND WATER LEVELS:
DRILLING METHOD Bucket Auger/Flight Auger
AT TIME OF DRILLING ---
LOGGED BY FE **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
890	0		SM	**Artificial Fill - Undocumented (afu):** SILTY SAND, brown, moist, medium dense; abundant gravel and some subrounded cobbles to 4" diameter.							
				Otay Formation - Fanglomerate (Tof): PALEOSOL, red, 2" thickness, over BRECCIA, yellowish brown, slightly moist, moderately hard.							
885	5			@5 ft. tabular, subangular clasts to 14" diameter in a SILTY SANDSTONE matrix, fine to coarse grained, dry, hard; with some clay.							

TD = 7.5 ft. (refusal) No Groundwater. No Caving.

BORING NUMBER BA-8

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo
PROJECT NAME Otay Village 14
PROJECT NUMBER 1312-02
PROJECT LOCATION Proctor Valley
DATE STARTED 2/4/15 **COMPLETED** 2/4/15
GROUND ELEVATION 895 ft **HOLE SIZE** 30
DRILLING CONTRACTOR Dave's Drilling
GROUND WATER LEVELS:
DRILLING METHOD Bucket Auger/Flight Auger
AT TIME OF DRILLING ---
LOGGED BY FE **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

ELEVATION (ft)	DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	FINES CONTENT (%)	OTHER TESTS
895	0		SM	**Topsoil:** SILTY SAND, fine to coarse grained, brown, slightly moist, loose.							
				Otay Formation - Fanglomerate (Tof): BRECCIA, subangular volcanic clasts to 12" diameter in a CLAYEY SANDSTONE matrix, fine to coarse grained, slightly moist, moderately hard.	GB						
890	5			@3.5 ft. brownish yellow, slightly weathered; abundant gravel; some gabbro (?) clasts to 4" diameter.							
885	10										
880	15			@15 ft. CLAYEY SANDSTONE, pale yellow, slightly moist, moderately hard; highly channelized.	UD	8	83	14.4	37	49	DS, PA
				@17.5 ft. grades down to BRECCIA, subangular volcanic clasts to 16" diameter in a CLAYEY SANDSTONE matrix, light olive gray to pale yellow, moist, hard, massive.							
875	20				BU						
				@22 ft. encountered large clast.							

TD = 22.5 ft. (refusal) No Groundwater. No Caving.

Project: Otay Village 14
Date Excavated: Jan. 26-28, 2015
Logged by: FE/PJD
Equipment: Cat 349E

LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
EX-1	0.0 – 2.0	SM	**Topsoil:** SILTY SAND, fine to coarse grained, brown, slightly moist, loose.
	2.0 – 12.0		**Otay Formation - Fanglomerate (Tof):** CLAYEY SANDSTONE, fine to coarse grained, reddish brown, dry, soft; some subrounded clasts to 8” diameter; highly weathered. @4 ft. light olive, moist to slightly moist; slightly weathered; some iron oxide staining; abundant subrounded clasts to 8” diameter; one 16” diameter clast.
			TOTAL DEPTH 12.0 FT. NO WATER, NO CAVING
EX-2	0.0 – 1.5	SM	**Topsoil:** SILTY SAND, fine to medium grained, brown, dry, loose.
	1.5 – 11.5		**Otay Formation - Fanglomerate (Tof):** SANDY CLAYSTONE, reddish brown, dry, soft; some subrounded clasts to 3” diameter. @3 ft. interlensed olive CLAYSTONE and yellowish brown, fine grained CLAYEY SANDSTONE; soft to moderately hard. @5 ft. some subrounded cobbles to 4” diameter. @6 ft. light olive CLAYSTONE lens, 12” thick.
			TOTAL DEPTH 11.5 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-3	0.0 – 1.5	SM	**Topsoil:** SILTY SAND, fine to medium grained, dark brown, dry, loose.
	1.5 – 7.5		**Otay Formation - Fanglomerate (Tof):** BRECCIA, subangular to subrounded volcanic clasts to 3" diameter in a CLAYEY SAND matrix; brown, slightly moist, highly weathered, soft to moderately hard. @2.5 ft. olive gray, hard, slightly weathered. @7 ft. very hard, cemented. @7.5 ft. encountered large clast. TOTAL DEPTH 7.5 FT. (PRACTICAL REFUSAL) NO WATER, NO CAVING
EX-4	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, brown, slightly moist, loose; some angular gravel to 0.5" diameter.
	1.0 – 13.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, angular volcanic clasts to 4" diameter in a CLAYEY SAND matrix; light gray to pale yellow, moderately soft, highly weathered, soft to moderately hard. @3 ft. hard, cemented, slightly weathered. @6 ft. clasts to 1" diameter. @7 ft. CLAYEY SANDSTONE, olive, moist, moderately hard. @13 ft. slow digging. TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-5	0.0 – 1.5	SM	**Topsoil:** SILTY SAND, fine to medium grained, brown, dry, loose.
	1.5 – 20.0		**Otay Formation - Fanglomerate (Tof):** CLAYSTONE, brownish gray, moist, soft, massive; some weathered volcanic clasts to 1" diameter. @6 ft. light olive gray, hard. @8 ft. light olive to pale yellow. @17 ft. fine SANDY CLAYSTONE, light olive, moist, hard.
			TOTAL DEPTH 20.0 FT. NO WATER, NO CAVING
EX-6	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, brown, slightly moist, loose.
	1.0 – 12.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, subangular volcanic clasts in a CLAYEY SANDSTONE matrix, light olive, moist, soft, massive. @6 ft. CLAYSTONE, some fine grained sand, light olive, moist, soft to moderately hard, massive.
			TOTAL DEPTH 12.0 FT. NO WATER, NO CAVING
EX-7	0.0 – 3.5	SM	**Topsoil/Colluvium (Qcol):** SILTY SAND, fine to coarse grained, slightly moist, loose.
		SC	@0.5 ft. CLAYEY SAND, brown, dry, medium dense; visible porosity.
	3.5 – 11.0		**Otay Formation - Fanglomerate (Tof):** Fine SANDY CLAYSTONE, olive, moist, moderately soft, massive; some subangular clasts to 1" diameter; old root fractures near vertical to a depth of 7 feet. @9 ft. SANDSTONE, fine grained, light yellow, dry, hard; cemented; massive.
			TOTAL DEPTH 11.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-8	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, fine to medium grained, brown, dry, loose.
	1.0 – 9.0		**Otay Formation - Fanglomerate (Tof):** CLAYSTONE, brown, slightly moist, soft; highly weathered. @4 ft. BRECCIA, subangular volcanic clasts to 10" diameter in a SANDY CLAY matrix, light olive gray, moderately hard. @6.5 ft. SANDY CLAYSTONE, light olive gray, moist, hard; some gravel sized angular volcanic clasts. @8 ft. BRECCIA, subangular volcanic clasts to 8 diameter in a CLAYEY SANDSTONE matrix, light olive gray, moderately hard, massive.
			TOTAL DEPTH 9.0 FT. NO WATER, NO CAVING
EX-9	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, fine to coarse grained, brown, slightly moist, very loose.
	1.0 – 13.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, angular volcanic clasts to 6" diameter in a SANDY CLAYSTONE matrix, grayish brown, dry, moderately hard, highly weathered; clay-lined fractures. @3 ft. slightly weathered, hard, some SANDY CLAYSTONE lenses, light olive gray, moist, moderately hard.
			TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING
EX-10	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, reddish brown, slightly moist, loose.
	1.0 – 2.5		**Santiago Peak Volcanics (Jsp):** Meta-volcanic bedrock, reddish brown, moderately hard, highly weathered, fractured. @2 ft. Very hard, slightly weathered, light gray.
			TOTAL DEPTH 2.5 FT. (REFUSAL) NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-11	0.0 – 1.0	SP	**Topsoil:** GRAVELY SAND, brown, dry, loose; some clay.
	1.0 – 20.0		**Otay Formation - Fanglomerate (Tof):** SANDY CLAYSTONE, light gray and light brownish yellow, soft, highly weathered. @6 ft. slightly weathered, soft to moderately hard, some subrounded to angular gravel to 1" diameter. @16 ft. CLAYEY SANDSTONE, brownish yellow and light olive gray, moist, moderately hard; laminated. @19 ft. hard. TOTAL DEPTH 20.0 FT. NO WATER, NO CAVING
EX-12	0.0 – 0.5	SM	**Topsoil:** SILTY SAND, fine to coarse grained, brown, dry, loose; some clay.
	0.5 – 15.0		**Otay Formation - Fanglomerate (Tof):** SANDY CLAYSTONE, brown to reddish brown, highly weathered, dry, moderately hard; visible porosity. @4 ft. light yellow to light olive gray, slightly weathered, moderately hard. @11 ft. one 16" clast.
	15.0 – 16.0		**Santiago Peak Volcanics (Jsp):** Meta-volcanic bedrock, slightly weathered, hard, light gray; fractured. TOTAL DEPTH 16.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-13	0.0 – 0.5	SW	**Topsoil:** GRAVELY SAND, fine to coarse grained, brown, loose.
	0.5 – 20.0		**Otay Formation - Fanglomerate (Tof):** CLAYEY SANDSTONE, fine to medium grained, pale yellow to light yellow, dry, moderately hard, massive; moderately weathered. @3.5 ft. hard, moderately cemented, slightly weathered; some subrounded to subangular clasts to 2" diameter; some clay matrix. @9 ft. BRECCIA, clasts to 4" diameter. @10.5 BENTONITIC CLAYSTONE, pale red, moist, moderately hard, some manganese oxide, massive. TOTAL DEPTH 20.0 FT. (REFUSAL) NO WATER, NO CAVING
EX-14	0.0 – 1.0	SC	**Topsoil:** CLAYEY SAND, brown, dry, loose.
	1.0 – 17.5		**Otay Formation - Fanglomerate (Tof):** SANDY CLAYSTONE, brown, soft to moderately hard, moist; secondary clay development; fractured. @5 ft. light yellowish brown, slightly weathered, moderately hard. @6 ft. BENTONITIC CLAYSTONE, pale red, moist, moderately soft; some shrink-swell fractures. Flat-lying contact between breccia and bentonitic claystone. @13 ft. SANDY CLAYSTONE, yellowish brown, slightly moist, hard. @17 ft. very hard. TOTAL DEPTH 17.5 FT. (PRACTICAL REFUSAL) NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-15	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, fine to medium grained, brown, dry, loose.
	1.0 – 13.0		**Otay Formation - Fanglomerate (Tof):** CLAYEY SANDSTONE, fine to coarse grained, reddish brown, dry, soft; some angular volcanic clasts to 1" diameter; highly weathered. @2.5 ft. pale yellow and light gray, slightly weathered, moderately hard. @7.5 ft. abundant subangular volcanic clasts to 1" diameter. TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING
EX-16	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, fine to medium grained, brown, slightly moist, loose.
	1.0 – 13.0		**Otay Formation - Fanglomerate (Tof):** SANDY CLAYSTONE, brown, slightly moist, soft, fractured; one 24" diameter clast. @4 ft. light olive gray and light yellow, slightly weathered. @5 ft. BRECCIA, angular volcanic clast to 8" diameter in a CLAYEY SAND matrix, pale yellow, dry to slightly moist, hard. @10 ft. slow digging. TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING
EX-17	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, fine to medium grained, brown, slightly moist, loose.
	1.0 – 10.0		**Otay Formation - Fanglomerate (Tof):** CLAYEY SANDSTONE to SANDY CLAYSTONE, brown, dry, highly weathered, fractured. @3.5 ft. gray to brownish gray, moist, hard, slightly weathered, massive. TOTAL DEPTH 10.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-18	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, fine to medium grained, brown, slightly moist, loose.
	1.0 – 15.0		**Otay Formation - Fanglomerate (Tof):** Interlensed SANDY CLAYSTONE and CLAYEY SANDSTONE, reddish brown, moist, soft, fractured, highly weathered. @4 ft. light olive gray, hard, slightly weathered. @8 ft. SANDY CLAYSTONE, light olive gray, moist, hard, some gravel to 1” diameter. @12 ft. olive gray, moderate ripping to excavate. TOTAL DEPTH 15.0 FT. NO WATER, NO CAVING
EX-19	0.0 – 1.5	SM	**Topsoil:** SILTY SAND, fine to coarse grained, brown, slightly moist, loose; some subangular gravel to 3” diameter.
	1.5 – 17.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, angular volcanic clasts to 3” diameter in a CLAYEY SAND matrix, fine to coarse grained, brown, highly weathered, fractured; secondary clay development. @3ft. light olive gray, slightly weathered. @8 ft. some subangular clasts to 12” diameter; slow digging. @17 ft. refusal on large gray volcanic clasts >12” diameter. TOTAL DEPTH 17.0 FT. (REFUSAL) NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-20	0.0 – 0.5	SM	**Topsoil:** SILTY SAND, fine to medium grained, brown, slightly moist, loose.
	0.5 – 14.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, angular to subangular volcanic clasts to 6” diameter in a CLAYEY SAND matrix, reddish brown, soft, highly weathered, fractured. @3 ft. light olive gray, hard, slightly weathered. @10.5 ft. SANDY CLAYSTONE, olive gray, moist, moderately soft, polished surfaces. TOTAL DEPTH 14.0 FT. NO WATER, NO CAVING
EX-21	0.0 – 6.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, angular volcanic clasts to 10” diameter in a SANDY CLAY matrix. @3 ft. light olive gray, dry, slightly weathered, very hard; less matrix. @5 ft. very hard. TOTAL DEPTH 6.0 FT. (REFUSAL) NO WATER, NO CAVING
EX-22	0.0 – 3.0	CL	**Alluvium (Qal):** SANDY CLAY, brown, moist, soft; some angular clasts to 1.5” diameter.
	3.0 – 17.0		**Otay Formation - Fanglomerate (Tof):** CLAYSTONE, olive gray, very moist, soft, trace of pebbles; some fine grained sand; moderately weathered. @6 ft. CLAYEY SAND, fine to coarse grained; slightly weathered. @11.5 ft. CLAYEY SANDSTONE, light yellow, slightly moist, hard, abundant subangular clasts to 2” diameter. @14 ft. abundant subrounded pebbles. @15 ft. slow digging. @16 ft. very hard. TOTAL DEPTH 17.0 FT. (PRACTICAL REFUSAL) NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-23	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, fine to coarse grained, brown, slightly moist, loose.
	1.0 – 17.0		**Otay Formation - Fanglomerate (Tof):** SANDY CLAYSTONE, reddish brown, moist, moderately soft; highly weathered; fractured; secondary clay development. @3.5 ft. abundant subangular gravel. @4 ft. light olive gray, moderately hard; slightly weathered. @6.5 ft. CLAYEY SANDSTONE, pale yellow, moist, moderately hard, massive, some subrounded clasts to 8" diameter. @15 ft. more gravel, fine to coarse grained sand; some clasts to 16" diameter. TOTAL DEPTH 17.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-1A	0.0 – 2.0	SC/CL	**Topsoil/Colluvium (Qcol):** CLAYEY SAND to SANDY CLAY, dark brown to reddish brown, dry to slightly moist, loose/firm; with subangular to subrounded gravel and cobble.
	2.0 – 16.5		**Otay Formation - Fanglomerate (Tof):** SANDY CLAYSTONE, olive gray, slightly moist, moderately hard; with occasional small gravel; localized carbonate stringers (to 1" thick) to about 5.5 ft.; polished surfaces. @4.0 – 4.5 ft. gravelly layer, predominantly small, subrounded. @7.0 – 7.5 ft. SILTY CLAYSTONE, greenish gray to purplish brown; with occasional round to subrounded gravel/cobble; polished surfaces; manganese oxide staining.
			TOTAL DEPTH 16.5 FT. NO WATER, NO CAVING
EX-2A	0.0 – 1.0	SM/ML	**Topsoil:** SILTY SAND to SANDY SILT, reddish brown, dry, loose; with gravel and cobble.
	1.0 – 9.0		**Santiago Peak Volcanics (Jsp):** (RESIDUAL SOIL) SANDY CLAY matrix, dark reddish brown, with abundant angular to subangular gravel to boulders. @4.5 – 5.5 ft. Highly weathered, breaks into angular gravel to large cobble size fragments and occasional boulders; moderate clay development. @7.0 ft. Very hard digging; generally reducing to 8"-minus with some greater than 12".
			REFUSAL TOTAL DEPTH 9.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-3A	0.0 – 1.0	SM	**Topsoil:** SILTY SAND with clay, fine grained, dry, loose; with some gravel.
	1.0 – 9.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, SANDY CLAY, brown to dark reddish brown, slightly moist to moist, stiff; with abundant gravel to cobble size clasts. @4.0 ft. increased clast size (cobble with occasional boulder). @6.0 ft. CLAYEY SAND matrix, fine to coarse grained, pinkish brown to light brownish gray; moderately hard to hard; carbonate development on rock surfaces. @9.0 ft. Very hard digging, Jsp(?)
	9.0 – 11.5		**Santiago Peak Volcanics (Jsp):** Metavolcanic bedrock, moderately weathered, hard. REFUSAL TOTAL DEPTH 11.5 FT. NO WATER, NO CAVING
EX-4A	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, fine grained, brown, dry, loose; with clay and gravel.
	1.0 – 8.5		**Otay Formation - Fanglomerate (Tof):** BRECCIA with SANDY CLAY matrix, reddish brown, slightly moist, firm; with gravel and cobble size clasts; highly weathered; soft to moderately hard. @4.0 ft. abundant subangular to subrounded gravel and cobble with occasional boulders. @7.0 ft. hard. TERMINATED - LIMITED SPOIL AREA DUE TO SENSITIVE SPECIES TOTAL DEPTH 8.5 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
EX-5A	0.0 – 4.0	CL	**Topsoil/Colluvium (Qcol):** SILTY to SANDY CLAY, dark brown, dry, loose; abundant rootlets. At 1.5 ft. becomes slightly moist to moist, firm; occasional angular to subrounded gravel. At 2.5 ft. abundant carbonate spotting.
	4.0 – 9.0		**Otay Formation - Fanglomerate (Tof):** SILTY CLAYSTONE, olive gray to pale yellowish brown, dry to slightly moist, highly weathered, soft; iron oxide development. @6.0 ft. becomes moderately hard, blocky fracture spacing.
	9.0 – 13.0		**Santiago Peak Volcanics (Jsp):** Metavolanic bedrock, highly weathered, moderately hard, tight to blocky fracture spacing, generally reduces to 8”-minus. @10.0 ft. hard to very hard. REFUSAL TOTAL DEPTH 13.0 FT. NO WATER, NO CAVING
- - -	- - -	- - -	- - -
EX-6A	0.0 – 2.5	SC/CL	**Topsoil/Colluvium (Qcol):** CLAYEY SAND to SANDY CLAY, brown, dry, loose; roots to 1.0 ft.
		CL	@1.0 ft. SANDY CLAY, reddish brown, slightly moist, firm to stiff; with occasional gravel; porous.
	2.5 – 8.0		**Otay Formation - Fanglomerate (Tof):** SILTY CLAYSTONE, dark olive green to grayish green with iron oxide development, moderately weathered, slightly moist, moderately hard; breaks into small gravel chunks with polished surfaces.
	8.0 – 16.0		**Santiago Peak Volcanics (Jsp):** Metavolcanic bedrock, highly to completely weathered, moderately hard, moist, clay development along fracture surfaces, abundant manganese oxide staining; generally reduces to 8”-minus. @14.0 ft. less weathered, hard. TOTAL DEPTH 16.0 FT. NO WATER, NO CAVING

Project PV Village 14 and PA 16&19
Date Excavated 10/13/16
Logged by FE
Equipment CAT 420 F

LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
PT-1	0.0 – 1.0	SM	**Topsoil:** SILTY SAND; fine to coarse grained, light brown, dry, loose; some clay and gravel.
	1.0–2.5	SC	**Older Alluvium (Qoal):** CLAYEY SAND; fine to coarse grained, reddish brown, slightly moist, dense; highly weathered, some clay, secondary clay development along partings, few rounded volcanic clasts.
	2.5 – 10.0		**Otay Formation – Fanglomerate (Tof):** CLAYEY SILTSTONE; very pale brown, slightly moist, soft; weathered, massive, some fine grained sand. @ 7.5 ft. CLAYEY SANDSTONE; brownish yellow, moist, moderately hard; breaks up to clayey sand with some silt. TOTAL DEPTH 10 FT. NO WATER, NO CAVING

PT-2	0.0 – 1.0	SC	**Topsoil:** SILTY SAND; fine to coarse grained, brown, dry, loose; some clay, trace gravel.
	1.0 – 6.5	CL	**Older Alluvium (Qoal):** SANDY CLAY; fine to coarse grained, reddish brown, slightly moist, very stiff, secondary clay development, highly weathered (Paleosol). @ 2.5 ft. CLAYEY SAND; with gravel and cobbles to 8-inch diameter, yellowish brown, moist, dense.

	6.5 – 10.0		**Otay Formation – Fanglomerate (Tof):** BRECCIA; angular to subangular, tabular volcanic clasts to 2-inch diameter in a clayey silt matrix, olive with iron oxide along fine fractures, moist, moderately soft, massive, some fine grained sand. TOTAL DEPTH 10 FT. NO WATER, NO CAVING

PT-3	0.0 –1.5	SM	**Topsoil:** SILTY SAND; brown, dry, loose, blocky; visible porosity, some clay, trace angular gravel to 0.5 inch diameter.
	1.5 – 8.0		**Older Alluvium (Qoal):** SILTY SAND; brown, dry, loose, blocky to 2.5 feet; visible porosity, some clay, trace angular gravel to 0.5 inch diameter.
	8.0 – 10.0		**Otay Formation – Fanglomerate (Tof):** CLAYEY SANDSTONE; brownish yellow, moist, moderately soft, massive, some silt. TOTAL DEPTH 10 FT. NO WATER, NO CAVING

PT-4	0.0 – 1.5	SM	**Topsoil:** SILTY SAND; fine to coarse grained brown, dry, loose; some clay, trace gravel, visible porosity.
	1.5 –8.0		**Older Alluvium (Qoal):** CLAYEY SAND: brownish yellow, slightly moist to moist, moderately soft; massive, some silt. @ 3 ft. CLAYEY SILTSTONE; olive to reddish brown, mottled, slightly moist, moderately hard; massive.
	8.0 – 10.0		**Otay Formation – Fanglomerate (Tof):** CLAYEY SANDSTONE; fine to coarse grained, reddish brown, moist, moderately soft; some silt, some angular gravel to 1-inch diameter. TOTAL DEPTH 10 FT. NO WATER, NO CAVING

PT-5	0.0 –0.5	SM	**Topsoil:** SILTY SAND; fine to coarse grained, light brown, dry, loose; some clay and gravel.
	0.5–9.0	GP	**Older Alluvium (Qoal):** Subangular volcanic gravel and cobble size tabular clasts to 10-inch diameter in a sandy clay matrix; reddish brown, dry, very dense. @ 9 ft. refusal on boulder.
			TOTAL DEPTH 9 FT. /REFUSAL NO WATER, NO CAVING

PT-6	0.0 –1.5	SC	**Topsoil:** CLAYEY SAND; brown, dry, loose, fine to medium grained.
	1.5–4.0	GP	**Older Alluvium (Qoal):** Subangular volcanic gravel and cobble size tabular clasts to 10-inch diameter in a sandy clay matrix; reddish brown, dry, very stiff, fine to coarse grained sand. @ 4 ft. refusal on boulder.
			TOTAL DEPTH 4 FT. /REFUSAL NO WATER, NO CAVING

PT-7	0.0 – 1.0	SM	**Topsoil:** SILTY SAND; fine to medium grained, light yellowish brown, dry, loose; some clay and gravel.
	1.0 – 10.0		**Otay Formation – Fanglomerate (Tof):** BRECCIA; angular volcanic clasts to 2-inch diameter in a silty clay matrix; highly weathered, yellowish brown, dry, soft; massive, abundant white carbonates. @ 4 ft. CLAYSTONE; olive to reddish brown, mottled, slightly moist, moderately hard, less weathered; massive @ 6.5 ft. BRECCIA; fine to coarse grained, olive, moist, soft; some silt, some angular gravel to 1-inch diameter,
			TOTAL DEPTH 10 FT. NO WATER, NO CAVING

PT-8	0.0 – 1.0	SM	**Topsoil:** SILTY SAND; fine to coarse grained, light yellowish brown, dry, loose; some clay and gravel.
	1.0 – 9.5		**Otay Formation – Fanglomerate (Tof):** BRECCIA; subangular to subrounded volcanic clasts to 8-inch diameter in a clayey sand matrix; highly weathered, yellowish brown, dry, soft; massive, abundant white carbonates, one subangular tabular volcanic clasts to 14 inch diameter. @ 3 ft. angular gravel to 3-inch diameter in a sandy clay matrix; olive with red iron oxide along fine fractures, mottled, slightly moist, moderately soft, massive. @ 9 ft. large cobble size clasts. @ 9.5 ft. refusal on boulder.
			TOTAL DEPTH 9.5 FT. /REFUSAL NO WATER, NO CAVING

Work Order 1312-02
Report No. 1312-02-B-6
Date Excavated 11/22/16
Excavated by CI
Equipment Case 580 SM 4x4 Backhoe w/24" bucket

TABLE I
LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
T-1	0.0 – 1.0	ML/SM	**TOPSOIL** (No Map Symbol): SANDY SILT/SILTY SAND, medium to fine-grained, tan/ brown, dry, soft/loose.
	1.5 – 3.0		**SANTIAGO PEAK VOLCANICS** (Jsp): fine- to medium-grained, tan to light grey, dry, moderately hard to hard, highly weathered @ 2.5 ft Freshening @ 3.0 ft. hard/practical refusal. TOTAL DEPTH 3.0 FT. NO WATER, NO CAVING
T-2	0.0 – 1..5	SM/SC	**TOPSOIL** (No Map Symbol): SANDY SILT/SILTY SAND, medium to fine-grained, tan/ light brown, slightly moist, soft/moderately dense, scattered angular gravel to 1” diameter.
	1.5 – 3.5		**SANTIAGO PEAK VOLCANICS** (Jsp): fine- to medium-grained, tan to light grey, dry, moderately hard to hard, highly weathered, fractured, angular @ 2.5 ft freshening, becoming blocky, generating 6-inch diameter rock particles. @ 3.5 ft. hard/practical refusal. TOTAL DEPTH 3.5 FT. NO WATER, NO CAVING
T-3	0.0 – 1.0	SM	**TOPSOIL** (No Map Symbol): GRAVELLY SANDY SILT/SILTY SAND, medium to fine-grained, tan/ light brown, slightly moist/dry, soft/moderately dense, scattered angular gravel to 1” diameter.

TABLE I

LOG OF TEST PITS

.

	1.0 – 2.5		**SANTIAGO PEAK VOLCANICS** (Jsp): brownish red, dry, moderately hard to hard, highly weathered, fractured, generates angular rock particles to 4 -inches @ 2.5 ft. refusal. TOTAL DEPTH 2.5 FT. NO WATER, NO CAVING
T-4	0.0 – 1.5	SC	**TOPSOIL** (No Map Symbol): GRAVELLY CLAYEY SAND, medium to fine-grained, tan/ red brown, slightly moist, loose, angular gravel to 2" diameter.
	1.5 – 3.0		**SANTIAGO PEAK VOLCANICS** (Jsp): reddish brown, dry, moderately hard to hard, highly weathered, clay in-filled fractures, generates angular rock particles to 2 to 4 -inches @ 3.0 ft. refusal. TOTAL DEPTH 3.0 FT. NO WATER, NO CAVING
T-5	0.0 – 1.5	SC	**TOPSOIL** (No Map Symbol): GRAVELLY CLAYEY SAND to SANDY CLAY, medium to fine-grained, red brown, slightly moist, loose/soft, angular gravel to 2" diameter. @ 1.5 ft. becoming dark red, medium dense to firm.
	1.5 – 5.0		**SANTIAGO PEAK VOLCANICS** (Jsp): reddish brown, dry, moderately hard to hard, highly weathered, generates angular rock particles to 1 to 3 –inches. @ 5.0 ft. practical refusal. TOTAL DEPTH 5.0 FT. NO WATER, NO CAVING

TABLE I

LOG OF TEST PITS

T-6	0.0 – 1.0	**TOPSOIL:** (No Map Symbol): CLAYEY SAND/SANDY CLAY, medium to fine-grained, light tan/red brown, slightly moist, medium dense/firm, root hairs.
	1.0 – 2.5	**SANTIAGO PEAK VOLCANICS** (Jsp): reddish brown, dry, moderately hard to hard, highly weathered, clay rich, generates angular rock particles to 9 –inches. @ 2.5 ft. practical refusal. TOTAL DEPTH 2.5 FT. NO WATER, NO CAVING
T-7	0.0 – 1.0	**TOPSOIL** (No Map Symbol): GRAVELLEY SILTY CLAY/ CLAYEY SILT, medium to fine-grained, dark brown to red brown, slightly moist/dry, firm.
	1.0 – 2.0	**SANTIAGO PEAK VOLCANICS** (Jsp): reddish brown, dry, moderately hard to hard, highly weathered, clay rich, generates angular rock particles from 2 to 9 –inch diameter. @ 2.0 ft. practical refusal. TOTAL DEPTH 2.0 FT. NO WATER, NO CAVING
T-8	0.0 – 1.5	**TOPSOIL:** (No Map Symbol): CLAYEY SAND/SANDY SILTY, medium to fine-grained, red brown, loose to soft, occasional angular gravels to 2-inch diameter.
	1.5 – 3.0	**SANTIAGO PEAK VOLCANICS** (Jsp): reddish brown to grey brown, dry, moderately hard to hard, highly weathered, clay rich, generates angular rock particles from 2 to 9 –inch diameter. @ 3.0 ft. practical refusal. TOTAL DEPTH 3.0 FT. NO WATER, NO CAVING
T-9	0.0 – 2.0	**TOPSOIL** (No Map Symbol): CLAYEY SAND/SANDY SILT, medium to fine-grained, dark brown, slightly moist, soft, occasional gravel from 3inch.
	2.0 – 4.5	**SANTIAGO PEAK VOLCANICS** (Jsp): reddish brown, dry, moderately hard to hard, highly weathered, clay rich,

		generates angular rock particles from 2 to 8–inch diameter. @ 4.5 ft. practical refusal. TOTAL DEPTH 4.5 FT. NO WATER, NO CAVING
T-10	0.0 – 2.0	**TOPSOIL** (No Map Symbol): SANDY GRAVELLY CLAY, medium to fine-grained, dark brown, soft, dry, produces gravels from 3 to 8 inch slightly porous , root hairs.
	2.0 – 4.0	**SANTIAGO PEAK VOLCANICS** (Jsp): reddish brown, dry, soft, highly weathered, clay rich, generates angular rock particles from 2 to 8 –inch diameter, freshening with depth. @ 4.0 ft. practical refusal. (Note: test pit approximately 75 feet long) TOTAL DEPTH 3.0 FT (south end) to 4.0 FT (north end). NO WATER, NO CAVING
T-11	0.0 – 4.0	**TOPSOIL** (No Map Symbol): GRAVELLEY SILTY CLAY/ CLAYEY SILT, medium to coarse -grained, dark brown, dry, soft and porous. @ 1.5 ft. soft to firm.
	4.0 – 7.0	**SANTIAGO PEAK VOLCANICS** (Jsp): reddish brown, dry, moderately hard to hard, highly weathered, clay rich, generates angular rock particles from 2 to 6 –inch diameter TOTAL DEPTH 7.0 FT. NO WATER, NO CAVING
T-12	0.0 – 3.5	**TOPSOIL/COLLUVIUM** (No Map Symbol): SANDY CLAY fine-grained, dark grey/brown, dry and soft. @ 1.5 ft. slightly moist and less porosity.
	3.5 – 5.5	**SANTIAGO PEAK VOLCANICS** (Jsp): reddish brown, dry, moderately hard to hard, highly weathered, soft and dry breaks into 1.0 to 1.5 inch angular rock. @ 5 ft. Freshening. TOTAL DEPTH 5.5 FT. NO WATER, NO CAVING

T-13	0.0 – 2.5	**<u>TOPSOIL/ALLUVIUM</u>** (No Map Symbol): SANDY SILT, medium to fine-grained, dark brown, dry and soft, porous
	2.5 – 2.75	**<u>SANTIAGO PEAK VOLCANICS</u>** (Jsp): reddish brown, dry, moderately hard to hard, highly weathered, slightly moist, soft and fractured. @ 2.75 ft. practical refusal. TOTAL DEPTH 2.75 FT. NO WATER, NO CAVING

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T-14	0.0 – 2.0	**<u>TOPSOIL</u>** (No Map Symbol): CLAYEY SILT, medium to fine-grained, red brown, dry and soft, porous
	2.0 – 2.5	**<u>SANTIAGO PEAK VOLCANICS</u>** (Jsp): grey green, dry, moderately hard to hard, weathered, breaks into rock to 12 inches. TOTAL DEPTH 2.5 FT NO WATER, NO CAVING

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T-15	0.0 – 3.5	**<u>TOPSOIL</u>** (No Map Symbol): GRAVELLEY SANDY SILTY medium to fine-grained, red brown, dry and soft, porous
	3.5 – 5.5	**<u>SANTIAGO PEAK VOLCANICS</u>** (Jsp): fine grained, red brown to grey brown, dry, soft, freshening with depth, highly weathered. (Bulk @2-4 ft) TOTAL DEPTH 5.5 FT NO WATER, NO CAVING

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Project: Otay Village 14
Date Excavated: July 15-18 2014
Logged by: PJD
Equipment: Cat 416F, 328D, 430F

LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
TP-1	0.0 – 1.0	SC/CL	**Topsoil:** SANDY CLAY to CLAYEY SAND with gravel and angular rock fragments to 6", brown to reddish brown, dry, loose; roots.
	1.0 – 9.5		**Otay Formation – Fanglomerate (Tof):** SANDY CLAYSTONE, fine grained, reddish brown, slightly moist, stiff; with abundant angular to subrounded gravel to cobble. @4.5 ft. silty to fine grained SANDY CLAYSTONE matrix, pale greenish gray, dense. @5.5 ft. grades to sandier matrix; subrounded to subangular volcanic and siltstone/claystone clasts; generally reduces to 8"-minus. @7.5 ft. SILTY CLAYSTONE, pale olive gray with iron oxide development, moist, stiff; with occasional gravel and small cobble, polished surfaces and manganese oxide staining.
			TOTAL DEPTH 9.5 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-2	0.0 – 2.0	SM	**Topsoil/Colluvium (Qcol):** SILTY to CLAYEY SAND, brown to reddish brown, dry, loose; with some gravel and small cobble; roots to 1.5 ft.
	2.0 – 4.5	CL	**Older Alluvium (Qoal):** SANDY CLAY, fine grained, reddish brown, moist, firm to stiff; with silty @3.5 ft. abundant carbonate development; porous.
	4.5 – 12.0		**Otay Formation - Fanglomerate (Tof):** SANDY SILTSTONE with clay and CLAYEY fine-grained SANDSTONE, reddish brown to olive green, slightly moist, moderately hard. @7.0 ft. SILTY SANDSTONE, fine to coarse grained, greenish to purplish, slightly moist, moderately hard; occasional small angular to subrounded gravel; with clay; poorly indurated/weakly cemented. @9.0 ft. occasional cobble to small boulder. @9.5 ft. SILTY CLAYSTONE, greenish gray to purplish brown, slightly moist to moist, moderately hard; manganese oxide staining.
			TOTAL DEPTH 12.0 FT. NO WATER, NO CAVING
TP-3	0.0 – 0.5	SM	**Topsoil:** SILTY SAND, brown, dry, loose; porous.
	0.5 – 6.5	CL	**Older Alluvium (Qoal):** SANDY CLAY, dark reddish brown, slightly moist to moist, stiff; porous; roots to 1.5 ft.; occasional small subrounded gravel.
		SC	@2.5 ft. SANDY CLAY to CLAYEY SAND, brown to orange brown, moist, firm/medium dense. @3.5 ft. Abundant GRAVEL to large COBBLE size fragments, subangular to subrounded, with clayey sand matrix; hard digging.
			REFUSAL TOTAL DEPTH 6.5 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-4	0.0 – 2.0	SM/SC	**Topsoil/Paleosol:** SILTY to CLAYEY SAND, brown, dry, loose, fine grained sand.
		SC	@ 1 ft. CLAYEY SAND, fine-grained, dark reddish brown, slightly moist, loose to medium dense; with occasional angular to subangular gravel. @1.5 – 2.0 ft. gravelly layer.
	2.0 – 7.0		**Older Alluvium (Qoal):** SILTY to fine grained SANDY CLAY, olive gray, slightly moist to moist, stiff. @4.0 ft. grades to CLAYEY SAND, fine grained, olive brown, very dense.
			TOTAL DEPTH 7.0 FT. NO WATER, NO CAVING
TP-5	0.0 – 3.0	SM	**Topsoil/Colluvium (Qcol):** SILTY SAND, brown to reddish brown, dry, loose; with clay and occasional gravel.
		SC	@1.0 ft. CLAYEY SAND, brown to dark reddish brown, slightly moist, medium dense; with abundant angular to subrounded gravel.
	3.0 – 7.5		**Otay Formation - Fanglomerate (Tof):** BRECCIA with SANDY CLAY matrix, subrounded to subangular gravel to large cobble size clasts, subrounded to subangular, reddish brown, slightly moist, moderately hard to hard. @5.0 ft. becomes hard to very hard; difficult digging.
			PRACTICAL REFUSAL TOTAL DEPTH 7.5 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-6	0.0 – 1.5	SM/ML	**Topsoil/Colluvium (Qcol):** SILTY SAND to SANDY SILT, fine grained, light brown to light grayish brown, dry, loose; with gravel.
		SC/CL	@0.5 ft. SANDY CLAY to CLAYEY SAND, reddish brown, slightly moist, medium dense/stiff.
	1.5 – 6.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, gravel to large cobble size clasts in reddish brown to grayish brown clay matrix, slightly moist, moderately hard to hard; minor carbonate development. @2.5 ft. predominantly cobble to boulder size clasts, angular to subangular, in gray to olive gray, clayey sand matrix; very difficult digging.
			REFUSAL TOTAL DEPTH 6.0 FT. NO WATER, NO CAVING
TP-7	0.0 – 3.0	SM/SC	**Topsoil/Colluvium (Qcol):** SILTY to CLAYEY SAND to SANDY SILT, light brown, dry, loose.
		CL	@1.0 ft. GRAVELLY TO SANDY CLAY, reddish brown, slightly moist, loose to medium dense.
	3.0 – 8.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, gravel to cobble size clasts, angular to subrounded, highly weathered, moderately hard; with greenish gray clay to clayey sand matrix; carbonate development. @5.5 ft. hard, slightly weathered; occasional boulder size fragments, angular to subangular. @7.0 ft. primarily boulder size clasts; very hard digging.
			REFUSAL TOTAL DEPTH 8.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-8	0.0 – 0.5	SC	**Topsoil:** CLAYEY SAND, brown to reddish brown, dry, loose; with silt.
	0.5 – 4.5		**Santiago Peak Volcanics (Jsp):** (RESIDUAL SOIL) CLAYEY SAND, fine grained, reddish brown, slightly moist; with subangular gravel and small cobbles. REFUSAL AT 4.5 FT. NO WATER, NO CAVING
TP-9	0.0 – 2.0	SM SC	**Topsoil/Colluvium (Qcol):** SILTY SAND, light grayish brown to brown, dry, loose. @0.5 ft. CLAYEY SAND, reddish brown, slightly moist, medium dense; with angular to subangular gravel and small cobble; carbonate development.
	2.0 – 8.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, large cobble to boulder size clasts, light grayish brown sandy clay matrix, slightly moist, hard. @5.0 ft. difficult digging. @7.0 ft. very hard; more large cobble and small boulders. PRACTICAL REFUSAL TOTAL DEPTH 8.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-10	0.0 – 3.0	SM	**<u>Topsoil/Colluvium (Qcol):</u>** SILTY SAND, brown, loose; weakly carbonate cemented; porous; roots to 1.5 ft.; occasional angular cobble.
		SC	@1.0 ft. CLAYEY SAND, fine to coarse grained, reddish brown, slightly moist, medium dense; with angular to subangular gravel and cobble.
	3.0 – 5.5		**<u>Otay Formation - Fanglomerate (Tof):</u>** BRECCIA, cobble to boulder size clasts, angular, in a clayey sand matrix, reddish brown to greenish gray. @5.0 ft. Jsp(?) or large boulder(?), moderately weathered, very hard.
			REFUSAL TOTAL DEPTH 5.5 FT. NO WATER, NO CAVING

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Test Pit No.	Depth (ft.)	USCS	Description
TP-11	0.0 – 3.0	CL/SC	**<u>Topsoil/Colluvium (Qcol):</u>** SANDY CLAY to CLAYEY SAND with gravel, fine to coarse grained, reddish brown, slightly moist to moist, medium dense.
	3.0 – 5.5		**<u>Otay Formation - Fanglomerate (Tof):</u>** BRECCIA, gravel and cobble, angular to subangular, in a sandy clay matrix, reddish brown to greenish gray; with angular to subangular gravel and cobble; occasional boulder; moderately hard to hard; minor carbonate development at contact. @4.0 – 5.0 ft. more large cobble and boulders.
	5.5 – 6.0		**<u>Santiago Peak Volcanics (Jsp) (?):</u>** Highly weathered, hard.
			REFUSAL TOTAL DEPTH 6.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-12	0.0 – 1.0	SM	**Topsoil:** SILTY SAND, fine grained, reddish brown, dry, loose; with clay.
	1.0 – 3.5		**Santiago Peak Volcanics (Jsp):** Completely weathered, soft to moderately hard, breaks into SANDY GRAVEL with clay. @2.5 ft. moderately weathered, hard; Joint: N27W 89E. @3.0 ft. very hard.
			REFUSAL TOTAL DEPTH 3.5 FT. NO WATER, NO CAVING
TP-13	0.0 – 2.5	SM/ML	**Topsoil/Colluvium (Qcol):** SILTY SAND to SANDY SILT, dark brown, dry, loose; with subangular to subrounded gravel and cobble. @1.0 ft. reddish brown, slightly moist to moist, stiff/medium dense; with gravel and cobble.
	2.5 – 9.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, predominantly large gravel to cobble with occasional boulders (to 18"), in a clayey sand matrix, fine to coarse grained, greenish gray with abundant iron oxide development. @4.0 ft. grades to pinkish brown/greenish gray, soft to moderately hard. @4.5 ft. hard. @5.0 ft. more boulders (to 24"). @7.0 ft. difficult digging due to rock size.
			TOTAL DEPTH 9.0 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-14	0.0 – 1.0	SM/SC	**Topsoil:** SILTY to CLAYEY SAND, brown to reddish brown; with gravel and small cobble; scattered boulders at surface.
	1.0 – 6.0		**Older Alluvium (Qoal):** (RESIDUAL SOIL) SANDY CLAY to CLAYEY fine to coarse grained SAND with gravel, dark reddish brown, slightly moist to mosit, stiff/medium dense. @3.5 ft. Hard, abundant COBBLES AND BOULDERS in greenish gray, CLAYEY SAND matrix. @4.5 ft. Very hard, difficult excavation. @5.5 ft. Large boulders. (Jsp?) REFUSAL TOTAL DEPTH 6.0 FT. NO WATER, NO CAVING
TP-15	0.0 – 1.0	SM	**TOPSOIL:** SILTY SAND, reddish brown, dry, loose; porous.
	1.0 – 6.5		**Older Alluvium (Qoal):** Abundant large COBBLE and BOULDER size clasts in reddish brown, slightly moist, medium dense, CLAYEY SAND matrix; rock to 24” common. @3.0 – 3.5 ft. hard digging with pockets of loose soil. @5.5 ft. hard to very hard. TOTAL DEPTH 6.5 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
TP-16	0.0 – 4.0	SM	**Topsoil/Colluvium (Qcol):** SILTY SAND, fine grained, brown, dry, loose; with occasional gravel and cobble. @0.5 ft. SANDY CLAY, grayish brown to reddish brown, slightly moist to moist, stiff; with angular to subangular gravel; plastic; porous. @3.5 – 4.0 ft. more gravel and small cobble.
	4.0 – 17.0	SM/SC	**Older Alluvium (Qoal):** SILTY to CLAYEY SAND, fine to coarse grained, orange brown to pale yellowish brown; with subangular to subrounded gravel and small cobble; weakly cemented. @5.5 ft. BRECCIA (?) abundant gravel and cobble (to 8”); occasional small boulder (12-15”). @10.0 ft. less gravel and cobble. @14.0 ft. rocky. TOTAL DEPTH 17.0 FT. NO WATER, NO CAVING
TP-17	0.0 – 1.0	SM/SC	**Topsoil:** SILTY to CLAYEY SAND, dark brown, dry, loose; with gravel and cobbles; roots to 1.5 ft.
	1.0 – 9.0		**Otay Formation - Fanglomerate (Tof):** BRECCIA, abundant cobbles and boulders in clayey sand matrix, brown, slightly moist, loose. @5.0 ft. SILTY to SANDY CLAYSTONE, pale grayish green to pale yellowish brown, moderately hard. @6.5 ft. more sand, hard to moderately hard; iron oxide development; weakly cemented. @7.5 – 8.0 ft. more cobble.
	9.0 – 9.5		**Santiago Peak Volcanics (Jsp)?:** Hard to very hard REFUSAL TOTAL DEPTH 9.5 FT. NO WATER, NO CAVING

Project PV Village 14 and PA 19
Date Excavated 8/12-14/19
Logged by PJD
Equipment Hitatchi 350

LOG OF TEST PITS

Test Pit No.	Depth (ft.)	USCS	Description
ST-1	0.0 – 2.5	SM	**Topsoil/Colluvium:** SILTY SAND; fine grained with common small angular gravel, brown to dark brown, dry, loose; roots, porous.
	1.0 – 11.0		**Ancient Landslide Debris (Qls):** BRECCIA; angular to subangular gravel to cobble size clasts in silty fine sand matrix, slightly moist, moderately hard; weathered, abundant carbonate development, porous to 5 ft. @ 6 ft. hard digging; large boulders (2 ft.+). TOTAL DEPTH 11 FT. NO WATER, NO CAVING

Test Pit No.	Depth (ft.)	USCS	Description
ST-2	0.0 – 5.5	SM/SC	**Topsoil/Colluvium:** SILTY to CLAYEY SAND with abundant angular to subangular cobbles; brown, dry, loose; roots, porous. @ 2.0 ft. becomes more clayey, slightly moist @ 4.0 ft. abundant carbonate development
	5.5 – 14.0		**Otay Formation – Fanglomerate (Tof):** BRECCIA; subangular to subrounded gravel and small cobble size clasts in a clayey sand matrix, yellow brown to olive brown, slightly moist to moist, moderately hard. @ 7/7.5 ft. occasional boulder to 2 ft. TOTAL DEPTH 14 FT. NO WATER, NO CAVING

ST-3	0.0 –5.5	SM	**Topsoil/Colluvium:** SILTY SAND; fine grained with common small subangular to subrounded gravel and cobbles, brown to dark brown, dry, loose; roots, porous, occasional boulders.
			Ancient Landslide Debris (Qls):
	5.5 – 20.0		BRECCIA; angular to subangular gravel to cobble size clasts in silty to clayey fine sand matrix, slightly moist, moderately hard, light gray to olive gray with abundant iron oxide development. @ 7.0 ft. becomes finer, SILTY CLAY with common subangular to round coarse sand and small gravel. @ 8.0 ft. becomes SILTY to CLAYEY SAND with gravel; yellow brown to light olive brown; lense of boulders below 8 ft. @10.0 ft. becomes SILTY CLAY with sand and gravel; highly plastic, olive green, moist, soft; carbonate nodules, iron oxide development. @ 15.0 ft. becomes mottled red brown to olive gray, slightly moist; appears highly weathered with broken up/punky texture, abundant carbonate nodules. @ 19.0 ft. thick carbonate seams; soil clasts (?)
			TOTAL DEPTH 20 FT. NO WATER, NO CAVING

ST-4	0.0 – 6.0	SM	**Topsoil/Colluvium:** SILTY SAND with abundant gravel and cobbles; brown to dark brown, dry, loose; roots, porous, few boulders. @ 3.0 ft. becomes moderately dense; abundant carbonate development, porous.
	6.0 – 16.0		**Otay Formation – Fanglomerate (Tof):** CLAYEY SANDSTONE with abundant gravel and cobbles; fine to coarse grained, brown to dark yellow brown, moist, moderately hard. @ 9.0/10.0 ft. becomes olive green, SANDY CLAYSTONE to CLAYEY SANDSTONE; iron oxide development, trace to very few small carbonate nodules. TOTAL DEPTH 16 FT. NO WATER, NO CAVING

ST-5	0.0 –2.5	SM	**Topsoil/Colluvium:** SILTY to SANDY CLAY; light brown, slightly moist, stiff; abundant roots, porous.
	2.5–13.0	GP	**Otay Formation – Fanglomerate (Tof):** SANDY CLAYSTONE with common angular to subangular gravel; olive brown, moist, moderately hard. @ 7.0 ft. becomes SILTY SANDSTONE with CLAY; fine to medium grained, light orange brown to light gray brown, moist, moderately hard. @ 9.5/10.0 ft. becomes yellow brown, fine grained, less clay, slightly micaceaous. @ 12.0 ft. digging tightened. TOTAL DEPTH 13 FT. NO WATER, NO CAVING

ST-6	0.0 4.5	SM	**Topsoil/Colluvium:** SILTY SAND; light brown, dry, loose; some gravel and cobble. @ 2.0 ft. carbonate cemented layer; hard, difficult excavation to 4.5 ft.
	4.5– 13.5		**Otay Formation – Fanglomerate (Tof):** CLAYEY SANDSTONE with common gravel; fine to coarse grained, brown to dark yellow brown, moist, moderately hard, iron oxide on surface of volcanic gravels. @ 7.5 ft. abundant gravel and cobble; angular to subangular. @ 10' becomes BRECCIA; hard. TOTAL DEPTH 13.5 FT. NO WATER, NO CAVING

ST-7	0.0 – 2.5	SM	**Topsoil/Colluvium:** SILTY SAND with CLAY; common subangular gravel and cobbles, red brown, dry, loose; few large boulders.
	2.5 – 15.0		**Otay Formation – Fanglomerate (Tof):** SILTY SANDSTONE; common subangular to subrounded gravel and cobble, light olive gray, dry, moderately hard to hard; weak carbonate cementation to 4 ft. @ 4 ft. CLAYEY SANDSTONE; fine to coarse grained with common subangular to subrounded gravel and cobble, @ 8.0 ft. BRECCIA with clayey sand matrix. @ 10.0 ft. becomes hard; matrix becomes silty fine to coarse grained sand; difficult digging. @ 14.0 ft. very difficult digging; large boulders. PRACTICAL REFUSAL/TOTAL DEPTH 15 FT. NO WATER, NO CAVING

ST-8	0.0 – 3.0	SM	**Topsoil/Colluvium:** SILTY SAND; abundant gravel and cobbles, brown to red brown, dry, loose; few large boulders.
	3.0 – 13.5		**Otay Formation – Fanglomerate (Tof):** CLAYEY SANDSTONE with gravel and cobble; fine to coarse grained, red brown to light olive gray, slightly moist, moderately hard; some carbonate development, highly weathered. @ 5.5 ft. BRECCIA with silty to clayey sand matrix; hard; difficult digging. @ 10.0 ft. very difficult digging; abundant large boulders.
			PRACTICAL REFUSAL/TOTAL DEPTH 13.5 FT. NO WATER, NO CAVING

ST-9	0.0 – 3.0	SM	**Topsoil/Colluvium:** SILTY SAND; common gravel and occasional small angular cobbles, brown, dry, loose.
	3.0 – 12.5		**Otay Formation – Fanglomerate (Tof):** SILTY CLAYSTONE with SAND; olive gray to olive brown, slightly moist to moist, soft to moderately hard; plastic, some carbonate stringers, highly weathered, occasional gravel. @ 4.5/5.0 ft. increase sand. @ 8.5 ft. becomes slightly moist, hard; manganese oxide, occasional small rounded gravel and coarse sand.
			PRACTICAL REFUSAL/TOTAL DEPTH 12.5 FT. NO WATER, NO CAVING

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER LD-1

CLIENT Jackson Pendo Development Company
PROJECT NAME Village 14 & PA 19 Land Exchange
PROJECT NUMBER 1312-02
PROJECT LOCATION Otay Ranch
DATE STARTED 8/19/19 **COMPLETED** 8/19/19
GROUND ELEVATION **HOLE SIZE** 24
DRILLING CONTRACTOR Roy Brothers Drilling
GROUND WATER LEVELS:
DRILLING METHOD Lo Drill
AT TIME OF DRILLING ---
LOGGED BY PJD **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SC-SM	**Young Alluvial Deposits (Qya)** Silty to Clayey SAND with abundant Gravel to Cobble, red brown, dry, loose to moderately dense; few boulders										
		SC-SM	**Landslide Debris (Qls)** Silty to Clayey fine-grained SAND to Sandy CLAY, gray to olive gray, slightly moist, moderately dense to stiff; weathered										
5			@ 6.0 ft., mottled; mixed with brown Claystone										
10		SC	@ 10.0 ft., Clayey SAND, fine-grained, light gray brown to olive gray, slightly moist, moderately dense	MC	9								
			@ 12.0 ft., Shear: (T:S50E @ 5°) Weakly developed, paper thin to 1/8", discontinuous; seepage above										
15			@ 15.0 ft., Shear: (T:S45-50E @ 10-16°) Weakly developed, paper thin to 1/4", discontinuous; seepage above										
		SC	**Otay Formation (Tof)** Clayey SANDSTONE with Gravel to Cobble, fine- to coarse-grained, gray brown, slightly moist to moist, moderately hard										
20		GP-GC	@ 20.5 ft., BRECCIA with olive gray to green Sandy CLAY matrix,										
25		SC	@ 24.0 ft., SANDSTONE to Sandy CLAYSTONE, fine- to coarse-grained, gray brown, slightly moist, moderately hard to hard	MC	20								
		GP	@ 27.0 ft., 3" thick GRAVEL layer										
		GP	@ 28.5 ft., 8" thick GRAVEL layer, below becomes Clayey fine-grained SANDSTONE										
30		CL	@ 30.0 ft., Becomes Sandy CLAYSTONE										
35		SC	@ 34.0 ft., Becomes Clayey fine-grained SANDSTONE										

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo Development Company
PROJECT NAME Village 14 & PA 19 Land Exchange
PROJECT NUMBER 1312-02
PROJECT LOCATION Otay Ranch

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SC	to Sandy CLAYSTONE	MC	21								
		CL	@ 36.0 ft., Thin Sandy CLAYSTONE lense, gray, with occasional small Gravel										
40													
		GP	@ 42.0 ft., Gavel layer										
		SC											
45													
50				MC	25								

Total Depth = 51.0 feet
Seepage @ 12 feet
Backfilled with soil cuttings and bentonite chips

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo Development Company | **PROJECT NAME** Village 14 & PA 19 Land Exchange

PROJECT NUMBER 1312-02 | **PROJECT LOCATION** Otay Ranch

DATE STARTED 8/20/19 **COMPLETED** 8/20/19 | **GROUND ELEVATION** | **HOLE SIZE** 24

DRILLING CONTRACTOR Roy Brothers Drilling | **GROUND WATER LEVELS:**

DRILLING METHOD Lo Drill | **AT TIME OF DRILLING** ---

LOGGED BY PJD **CHECKED BY** PJD | **AT END OF DRILLING** ---

NOTES | **AFTER DRILLING** ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Young Alluvial Deposits (Qya)** Silty SAND with abundant sub-angular to sub-rounded Gravel to Cobble, red brown, dry, loose										
		SW	@ 2.5 ft., SAND, fine- to coarse-grained, dark red brown										
5		SM	**Otay Formation (Tof)** Silty SAND with subangular to subrounded Gravel to Cobble, fine- to coarse-grained, olive gray to green, slightly moist, moderately hard; abundant iron oxide staining										
		SC-SM	@ 7.5 ft., Scour/fill contact (N65E @ 8-10°): Small pieces, relic soils @ 8.5 ft., Scattered flecks of carbon/charcoal	MC	10								
10		SC	@ 10 ft., Clayey SANDSTONE to Sandy CLAYSTONE, fine-grained with trace coarse-grained, brown to olive gray, slightly moist, soft to moderately hard; trace calcium carbonate development @ 13 ft., Occasional CLAYSTONE rip-up clast										
15		CL	@ 15 ft., Silty SANDSTONE to Sandy CLAYSTONE, fine-grained with trace coarse-grained, brown to light brown, moist, moderately hard; with quartz gravel @ 15.5 ft., Sandy CLAYSTONE	MC	14								
		SP	@ 17.5 ft., Coarse-grained SAND lense										
20		SC	@ 18.0 ft., Sandy CLAYSTONE to Clayey SANDSTONE, very hard @ 19.0 ft., Iron oxide staining, micaceous										
		SW	@ 22.0 ft., SANDSTONE, fine- to coarse-grained, moist, very hard										
25		SC	@ 23.0 ft., Abundance of subrounded to subangular Gravels to Cobbles in a olive green CLAYSTONE to SANDSTONE matrix @ 25.0 ft., light olive green to gray pink	MC	20								
30		SM	@ 30.0 ft., Crude beddging: (S50E @ 10°), large cobbles @ 30.75 ft., Undulatory scour fill contact, back into Clayey SANDSTONE to SILTSTONE, fine-grained, olive gray to pink brown; iron oxide development										
35		SC	@ 34.0 ft., Clayey SANDSTONE, fine- to medium-grained										

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER LD-2

CLIENT Jackson Pendo Development Company
PROJECT NAME Village 14 & PA 19 Land Exchange
PROJECT NUMBER 1312-02
PROJECT LOCATION Otay Ranch

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35			@ 34.0 ft., Clayey SANDSTONE, fine- to medium-grained *(continued)*										
		CL-ML	@ 36.5 ft., Silty CLAY with fine-grained Sand, gray brown, hard; waxy, cabon nodules										
		SM	@ 38.5 ft., Silty SANDSTONE with Clay, fine-grained, olive gray to pink brown; moddled, minor iron oxide development										
40		CL	@ 40 ft., Silty CLAYSTONE, gray to olive green, moderately hard; minor iron oxide and calcium carbonate development	MC	33								
45		SC	@ 44 ft., Clayey SANDSTONE, fine-grained, olive gray with pink Clay matrix, calcium carbonate development										
50		CL	@ 50 ft., Silty to Sandy CLAYSTONE, light brown to olive green, moderately hard; minor calcium carbonate development	MC	21								

Total Depth = 51.0 feet
Backfilled with soil cuttings and bentonite chips

AGS ADVANCED GEOTECHNICAL SOLUTIONS, INC.

BORING NUMBER LD-3

CLIENT Jackson Pendo Development Company
PROJECT NAME Village 14 & PA 19 Land Exchange
PROJECT NUMBER 1312-02
PROJECT LOCATION Otay Ranch
DATE STARTED 8/21/19 **COMPLETED** 8/21/19
GROUND ELEVATION **HOLE SIZE** 24
DRILLING CONTRACTOR Roy Brothers Drilling
GROUND WATER LEVELS:
DRILLING METHOD Lo Drill
AT TIME OF DRILLING ---
LOGGED BY PJD **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	PLASTIC LIMIT	PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Young Alluvial Deposits (Qya)** Silty SAND with Clay, abundant gravel, red brown, dry, loose; roots, porous										
		SC	@ 3.0 ft., Clayey SAND with Gravel to Cobble, fine- to coarse-grained, red brown, slightly moist, loose to medium dense										
5		SC	**Landslide Debris (Qls)** Silty CLAY to Clayey SAND with scattered Gravel, olive gray to brown to pink brown, slightly moist to moist, soft to moderately hard; jumbled appearance @ 6.5 ft., Becomes moderately hard; iron oxide development, common charcoal	MC	10								
10		SC	@ 9.0 Clayey SAND with few small Gravel, fine- to coarse-grained; charcoal @ 12.5 ft NW wall has a 1/2" Charcoal layer										
15		SC	**Otay Formation (Tof)** Silty to Clayey SANDSTONE, fine- to coarse-grained, olive gray, slightly moist, hard; calcium carbonate cemented @ 15.0 ft., olive gray to pink brown, moddled, moderately hard; minor iron oxide development	MC	15								
			@ 17.0 ft., Rocky, difficult drilling										
20			@ 19.0 ft., Becomes rocky with abundant Gravel to Cobble size clasts, cemented; iron oxide development @ 20.5 ft., SANDSTONE with small gravel sized Claystone clasts, hard										
		GP	@ 22.0 ft., Becomes Gravely										
25		CL	@ 23.0 ft., Sandy CLAYSTONE with subangular to subrounded gravel, fine- to coarse-grained, olive gray; calcium carbonate nodules										
30		SC	@ 30 ft., Becomes Clayey SANDSTONE @ 31.0 ft., Gravel and small Cobble zone	MC	22								
35		CL	@ 32.0 ft., Sandy CLAYSTONE with occasional Gravel, gray										

(Continued Next Page)

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo Development Company

PROJECT NAME Village 14 & PA 19 Land Exchange

PROJECT NUMBER 1312-02

PROJECT LOCATION Otay Ranch

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
35		SC	@ 35.0 ft., Clayey SANDSTONE with occasional Gravel, fine- to coarse-grained @ 36.0 ft., Increased Gravel										
40			@ 40.0 ft., Large Gravel and Cobble										

Total Depth = 44.0 feet
Backfilled with soil cuttings and bentonite chips

BORING NUMBER LD-4

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

CLIENT Jackson Pendo Development Company
PROJECT NAME Village 14 & PA 19 Land Exchange
PROJECT NUMBER 1312-02
PROJECT LOCATION Otay Ranch
DATE STARTED 8/22/19 **COMPLETED** 8/22/19
GROUND ELEVATION **HOLE SIZE** 24
DRILLING CONTRACTOR Roy Brothers Drilling
GROUND WATER LEVELS:
DRILLING METHOD Lo Drill
AT TIME OF DRILLING ---
LOGGED BY PJD **CHECKED BY** PJD
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	GRAPHIC LOG	USCS	MATERIAL DESCRIPTION	SAMPLE TYPE NUMBER	BLOW COUNTS (N VALUE)	DRY UNIT WT. (pcf)	MOISTURE CONTENT (%)	SATURATION (%)	OTHER TESTS	ATTERBERG LIMITS: LIQUID LIMIT	ATTERBERG LIMITS: PLASTIC LIMIT	ATTERBERG LIMITS: PLASTICITY INDEX	FINES CONTENT (%)
0		SM	**Colluvium (Qcol)** Silty SAND trace Clay with abundant Gravel to Cobble, red brown, dry, loose; very porous, roots										
5			@ 4.0 ft., Large angular to subangular Gravel to small Cobbles, orange brown										
		CL	**Landslide Debris (Qls)** Rocky with Sandy CLAY matrix, olive brown, moderately hard, calcium carbonate @ 7.0 ft., CLAY, pink; abundant calcium carbonate, jumbled										
10			@ 10.0 ft., Occasional Gravel, iron oxide development, weathered										
		SC	@ 11.0 ft., Light olive gray Sandy CLAY to Clayey SAND matrix with waxy Claystone clasts and abundant Cobble clasts										
		CL	@ 12.0 ft., CLAY matrix with large Boulder and fragmented clasts with calcium carbonate formed around										
15		CL	@ 15.5 ft., Sandy CLAY with Gravel, olive green to gray; 24" boulder, abundant calcium carbonate										
20													

Total Depth = 20.0 feet
Backfilled with soil cuttings and bentonite chips

SEISMIC REFRACTION STUDY

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

SEISMIC REFRACTION SURVEY
PROCTOR VALLEY ROAD DEVELOPMENT
JAMUL, CALIFORNIA

PREPARED FOR:
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, CA 92029

PREPARED BY:
Southwest Geophysics, Inc.
8057 Raytheon Road, Suite 9
San Diego, CA 92111

November 29, 2016
Project No. 116547

SOUTHWEST GEOPHYSICS, INC.
YOUR SUBSURFACE SOLUTION

November 29, 2016
Project No. 116547

Mr. Jeff Chaney
Advanced Geotechnical Solutions, Inc.
485 Corporate Drive, Suite B
Escondido, CA 92029

Subject: Seismic Refraction Survey
Proctor Valley Road Development
Jamul, California

Dear Mr. Chaney:

In accordance with your authorization, we have performed a seismic refraction survey pertaining to the proposed Proctor Valley Road residential development located in the Jamul area of San Diego County, California. Specifically, our survey consisted of performing 13 seismic refraction traverses at the project site. The purpose of our study was to develop subsurface velocity profiles of the areas surveyed, and to assess the apparent rippability of the subsurface materials. This data report presents our survey methodology, equipment used, analysis, and results.

We appreciate the opportunity to be of service on this project. Should you have any questions please contact the undersigned at your convenience.

Sincerely,
SOUTHWEST GEOPHYSICS, INC.

Aaron Puente
Project Geophysicist

Hans van de Vrugt
Hans van de Vrugt, C.E.G., P.Gp.
Principal Geologist/Geophysicist

REGISTERED GEOPHYSICIST
Hans van de Vrugt
No 1012
Exp. 2/28/18
STATE OF CALIFORNIA

HV/ATP/hv

Distribution: Addressee (electronic)

TABLE OF CONTENTS

1. INTRODUCTION

In accordance with your authorization, we have performed a seismic refraction survey pertaining to the proposed Proctor Valley Road residential development located in the Jamul area of San Diego County, California (Figure 1). Specifically, our survey consisted of performing 13 seismic refraction traverses at the project site. The purpose of our study was to develop subsurface velocity profiles of the areas surveyed, and to assess the apparent rippability of the subsurface materials. This data report presents our survey methodology, equipment used, analysis, and results.

2. SCOPE OF SERVICES

Our scope of services included:

- Performance of 13 seismic P-wave refraction lines at the project site.
- Compilation and analysis of the data collected.
- Preparation of this data report presenting our results, conclusions and recommendations.

3. SITE DESCRIPTION

The project site is generally located along the south side of Proctor Valley Road in or near the Jamul area of San Diego County, California (Figure 1). The study areas included several slopes and ridges in the project area. Several dirt roads and trails cross portions of the site. Vegetation in the area consists of annual grass, brush, and scattered small trees. Numerous outcrops of crystalline rock were observed on and near the property. Figures 2a through 2g and 3a through 3c depict the site conditions in the area of the seismic traverses.

Based on our discussions with you it is our understanding that the project involves the construction of single family homes and associated infrastructure. Cuts in excess of 50 feet deep may be performed.

4. SURVEY METHODOLOGY

A seismic P-wave (compression wave) refraction survey was conducted at the site to evaluate the rippability characteristics of the subsurface materials and to develop subsurface velocity profiles of the areas surveyed. The seismic refraction method uses first-arrival times of refracted seismic waves to estimate the thicknesses and seismic velocities of subsurface layers. Seismic P-waves generated at the surface, using a hammer and plate, are refracted at boundaries separating materials of contrasting velocities. These refracted seismic waves are then detected by a series of surface vertical component geophones and recorded with a 24-channel Geometrics Geode seismograph. The travel times of the seismic P-waves are used in conjunction with the shot-to-geophone distances to obtain thickness and velocity information on the subsurface materials.

Thirteen seismic lines (SL-1 through SL-13) were conducted in the project area. The general locations and lengths of the lines were selected by your office. Shot points (signal generation locations) were conducted along the lines at the ends, midpoint, and intermediate points between the ends and the midpoint for a total of seven shot points.

The seismic refraction theory requires that subsurface velocities increase with depth. A layer having a velocity lower than that of the layer above will not generally be detectable by the seismic refraction method and, therefore, could lead to errors in the depth calculations of subsequent layers. In addition, lateral variations in velocity, such as those caused by fracture zones, intrusions or boulders can also result in the misinterpretation of the subsurface conditions.

In general, seismic wave velocities can be correlated to material density and/or rock hardness. The relationship between rippability and seismic velocity is empirical and assumes a homogenous mass. Localized areas of differing composition, texture, and/or structure may affect both the measured data and the actual rippability of the mass. The rippability of a mass is also dependent on the excavation equipment used and the skill and experience of the equipment operator.

The rippability values presented in Table 1 are based on our experience with similar materials and assumes that a Caterpillar D-9 dozer ripping with a single shank is used. We emphasize that the cutoffs in this classification scheme are approximate and that rock characteristics, such as fracture spacing and orientation, play a significant role in determining rock rippability. These characteristics may also vary with location and depth. For trenching operations, the rippability values should be scaled downward. For example, velocities as low as 3,500 feet/second may indicate difficult ripping during trenching operations. In addition, the presence of boulders, which can be troublesome in a narrow trench, should be anticipated.

Table 1 – Rippability Classification

Seismic P-wave Velocity	Rippability
0 to 2,000 feet/second	Easy
2,000 to 4,000 feet/second	Moderate
4,000 to 5,500 feet/second	Difficult, Possible Blasting
5,500 to 7,000 feet/second	Very Difficult, Probable Blasting
Greater than 7,000 feet/second	Blasting Generally Required

It should be noted that the rippability cutoffs presented in Table 1 are slightly more conservative than those published in the Caterpillar Performance Handbook (Caterpillar, 2011). Accordingly, the above classification scheme should be used with discretion, and contractors should not be relieved of making their own independent evaluation of the rippability of the on-site materials prior to submitting their bids.

5. ANALYSIS AND RESULTS

As previously indicated, 13 seismic traverses were conducted as part of our study. The collected data were processed using SIPwin (Rimrock Geophysics, 2003), a seismic interpretation program, and analyzed using SeisOpt Pro (Optim, 2008). SeisOpt Pro uses first arrival picks and elevation data to produce subsurface velocity models through a nonlinear optimization technique called adaptive simulated annealing. The resulting velocity model provides a tomography image of the estimated geologic conditions. Both vertical and lateral velocity information is contained in the tomography model. Changes in layer velocity are revealed as gradients rather than discrete contacts, which typically are more representative of actual conditions.

Figures 4a, through 4m present the velocity models generated from our study. The approximate locations of the seismic refraction traverses are shown on the Line Location Maps (Figures 2a through 2g). In general, the effective depth of evaluation for a seismic refraction traverse is approximately one-third to one-fifth the length of the traverse.

6. CONCLUSIONS AND RECOMMENDATIONS

The results from our seismic survey revealed distinct layers/zones in the near surface that likely represent soil overlying bedrock with varying degrees of weathering. Distinct vertical and lateral velocity variations are evident in the models. These inhomogeneities are likely related to the presence of remnant boulders, intrusions and differential weathering of the bedrock materials. It is also evident in the tomography models that the depth to bedrock is highly variable across the site.

Based on the refraction results, variability in the excavatability (including depth of rippability) of the subsurface materials should be expected across the project area. Furthermore, blasting may be required depending on the excavation depth, location, equipment used, and desired rate of production. In addition, oversized materials should be expected. A contractor with excavation experience in similar difficult conditions should be consulted for expert advice on excavation methodology, equipment and production rate.

7. LIMITATIONS

The field evaluation and geophysical analyses presented in this report have been conducted in general accordance with current practice and the standard of care exercised by consultants performing similar tasks in the project area. No warranty, express or implied, is made regarding the conclusions, recommendations, and opinions presented in this report. There is no evaluation detailed enough to reveal every subsurface condition. Variations may exist and conditions not observed or described in this report may be present. Uncertainties relative to subsurface conditions can be reduced through additional subsurface exploration. Additional subsurface surveying will be performed upon request.

This document is intended to be used only in its entirety. No portion of the document, by itself, is designed to completely represent any aspect of the project described herein. Southwest Geophysics, Inc. should be contacted if the reader requires additional information or has questions regarding the content, interpretations presented, or completeness of this document. This report is intended exclusively for use by the client. Any use or reuse of the findings, conclusions, and/or recommendations of this report by parties other than the client is undertaken at said parties' sole risk.

8. SELECTED REFERENCES

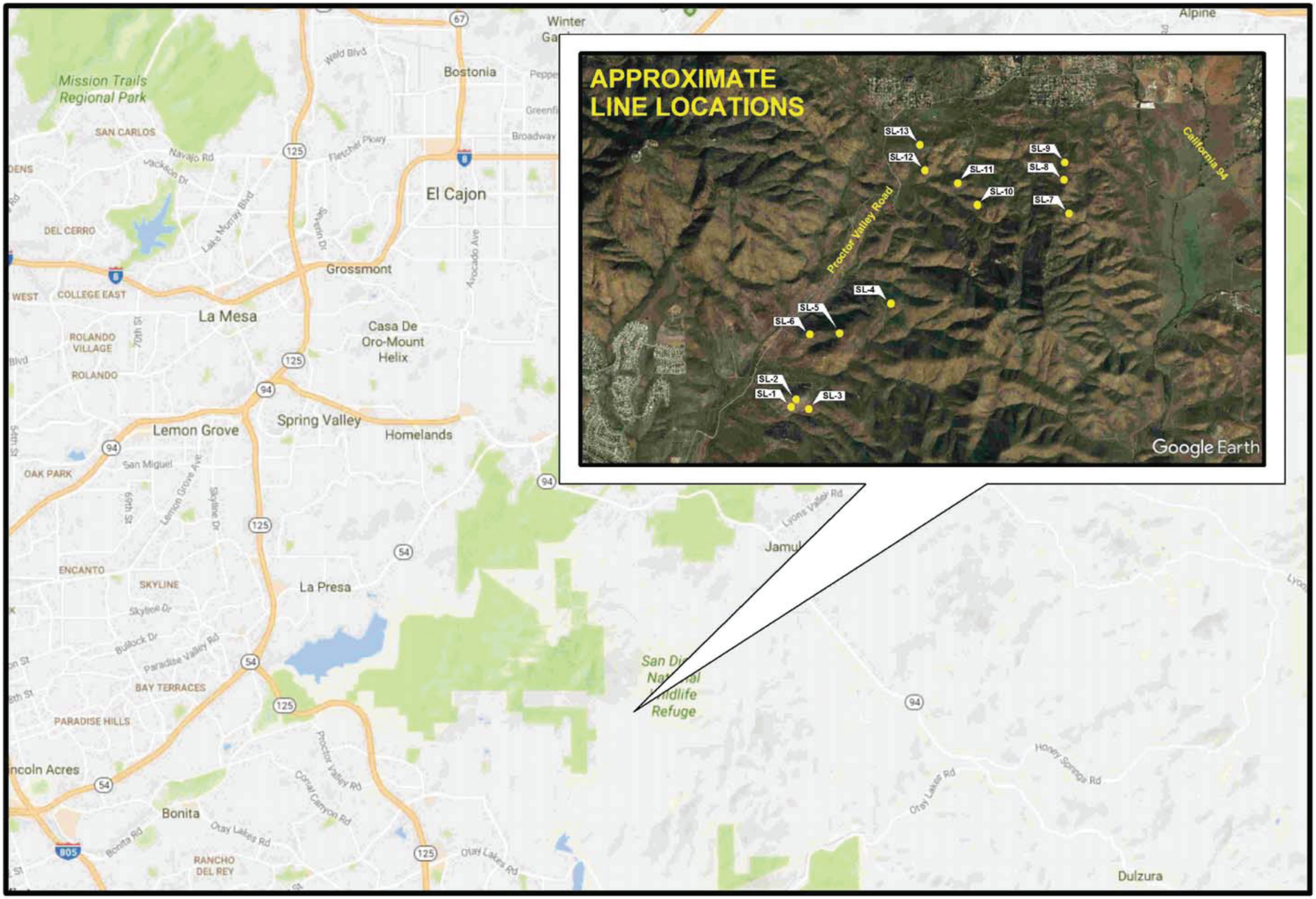
Caterpillar, Inc., 2011, Caterpillar Performance Handbook, Edition 41, Caterpillar, Inc., Peoria, Illinois.

Mooney, H.M., 1976, Handbook of Engineering Geophysics, dated February.

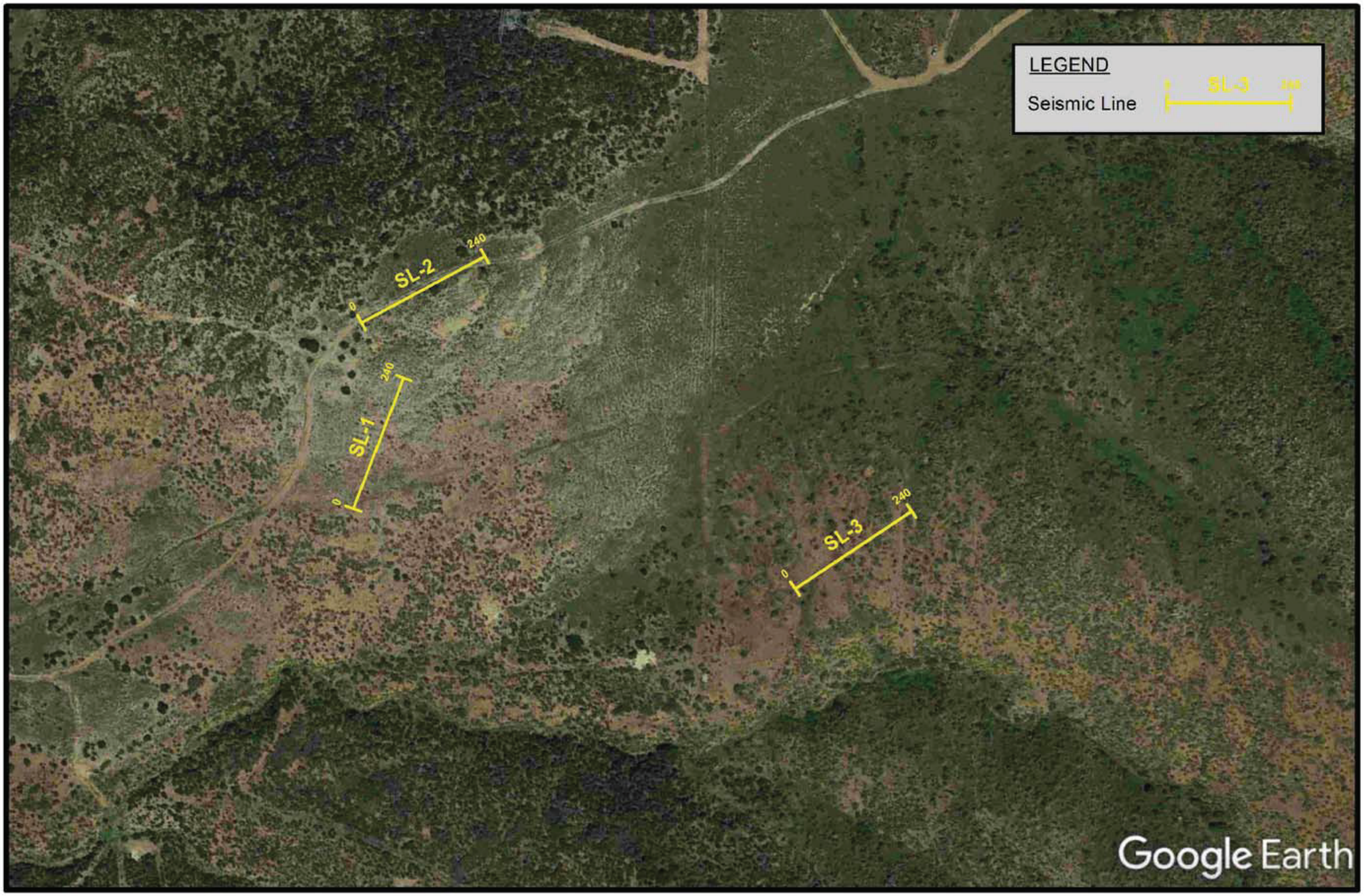
Optim, Inc., 2008, SeisOpt Pro, V-5.0.

Rimrock Geophysics, 2003, Seismic Refraction Interpretation Program (SIPwin), V-2.76.

Telford, W.M., Geldart, L.P., Sheriff, R.E., and Keys, D.A., 1976, Applied Geophysics, Cambridge University Press.



SITE LOCATION MAP	N	Proctor Valley Road Jamul, California	SOUTHWEST GEOPHYSICS INC. Figure 1
		Project No.: 116547 · Date: 11/16	



LINE LOCATION MAP
(SL-1 through SL-3)

N

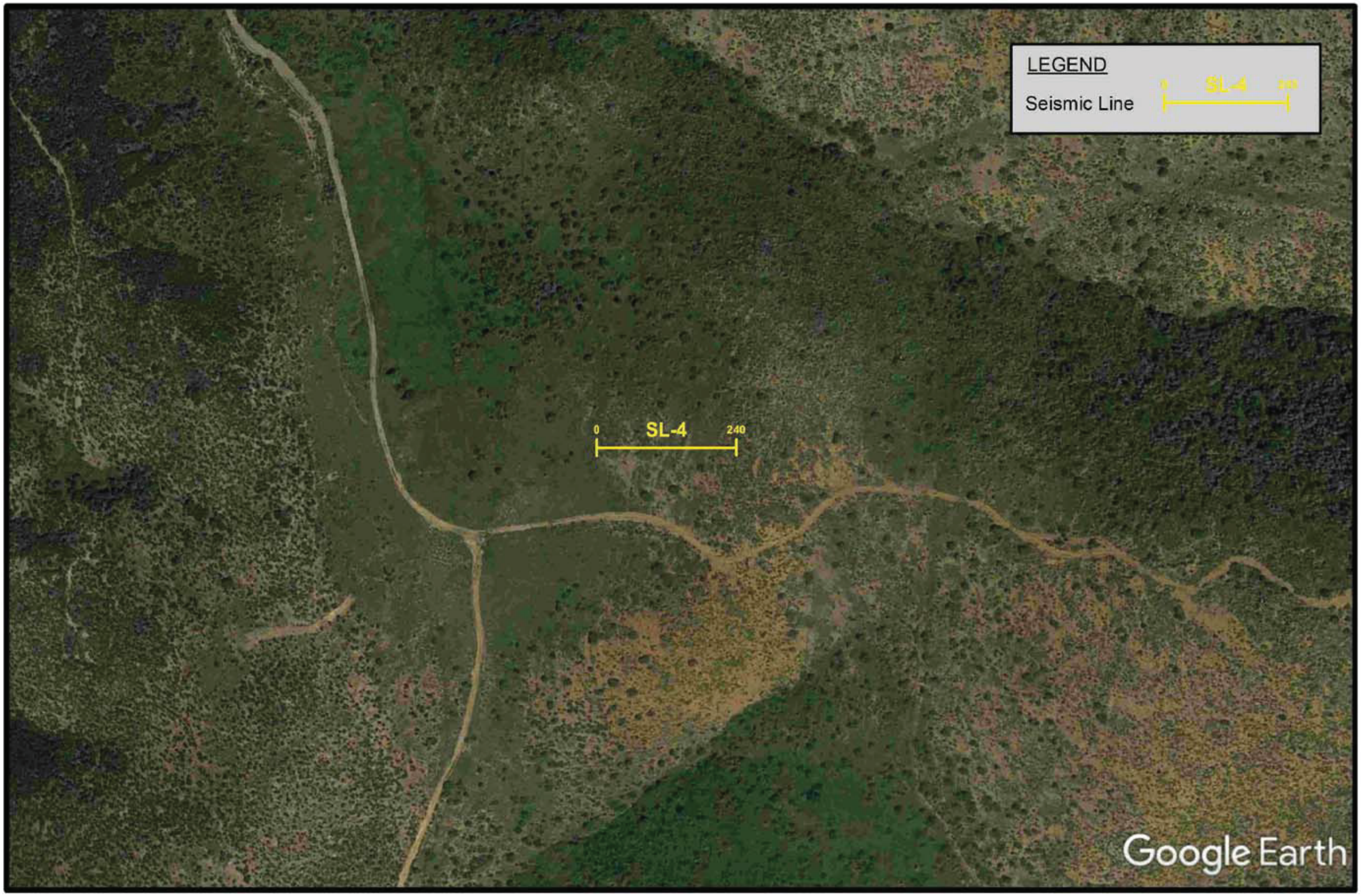
Proctor Valley Road
Jamul, California

Project No.: 116547 | Date: 11/16

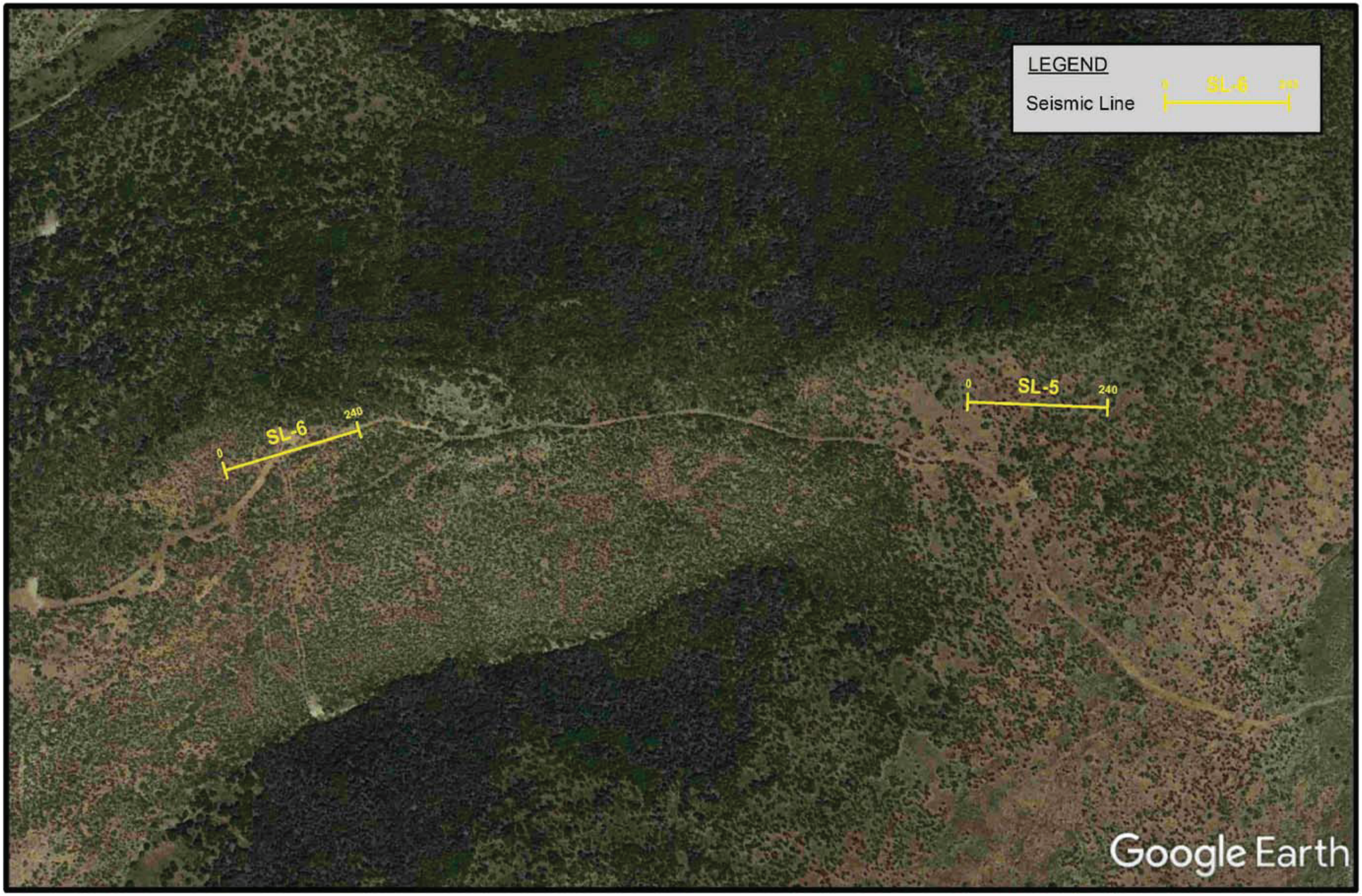
SOUTHWEST GEOPHYSICS INC.

Figure 2a

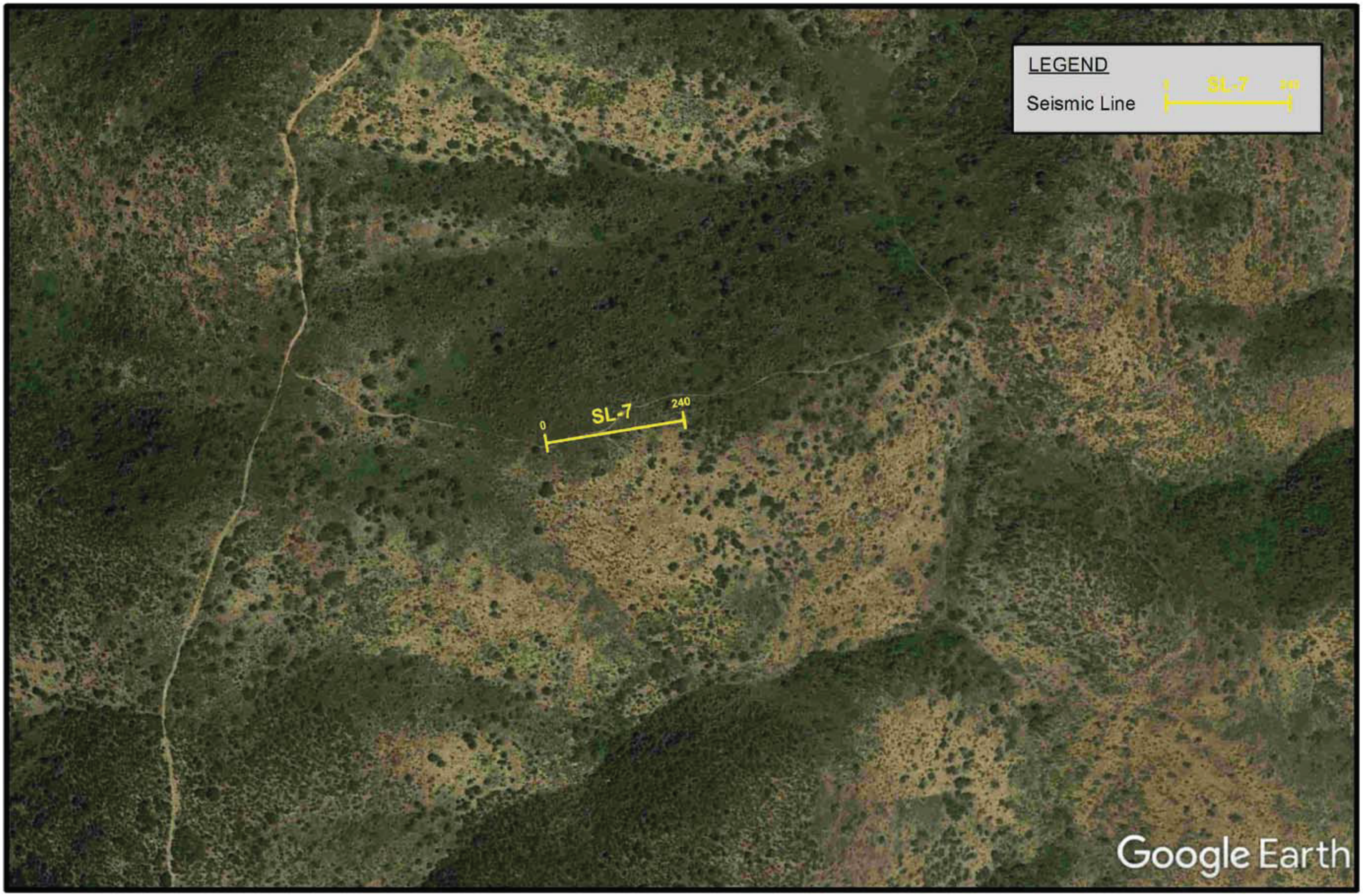
0 240 480
approximate scale in feet



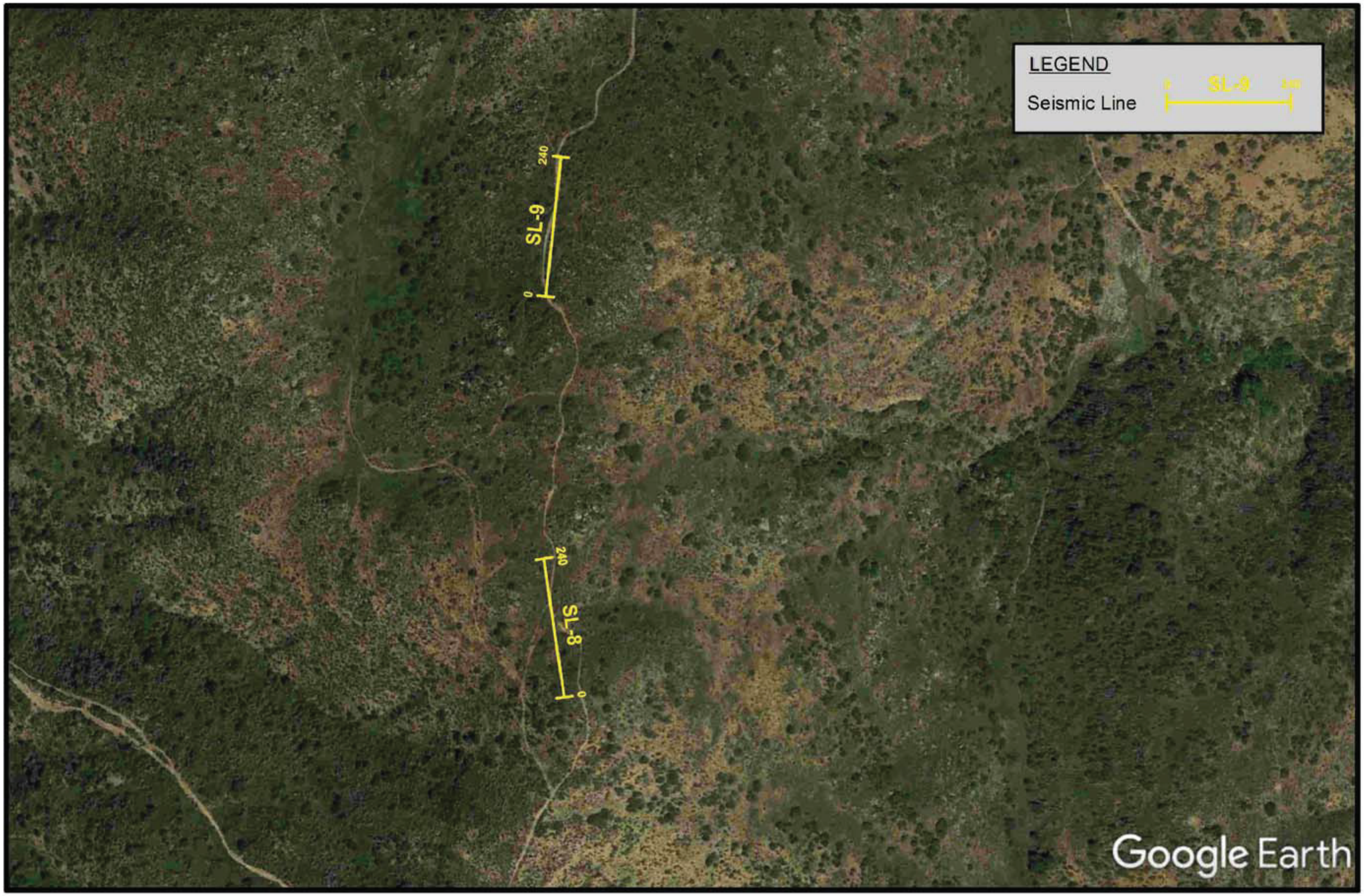
LINE LOCATION MAP (SL-4)	N	Proctor Valley Road Jamul, California Project No.: 116547 / Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 2b	0 240 480 approximate scale in feet



LINE LOCATION MAP (SL-5 and SL-6)	N	Proctor Valley Road Jamul, California Project No.: 116547 / Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 2c	0 240 480 approximate scale in feet



LINE LOCATION MAP (SL-7)	N	Proctor Valley Road Jamul, California Project No.: 116547 Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 2d	0 240 480 **approximate scale in feet**



LINE LOCATION MAP
(SL-8 and SL-9)

N

Proctor Valley Road
Jamul, California

Project No.: 116547

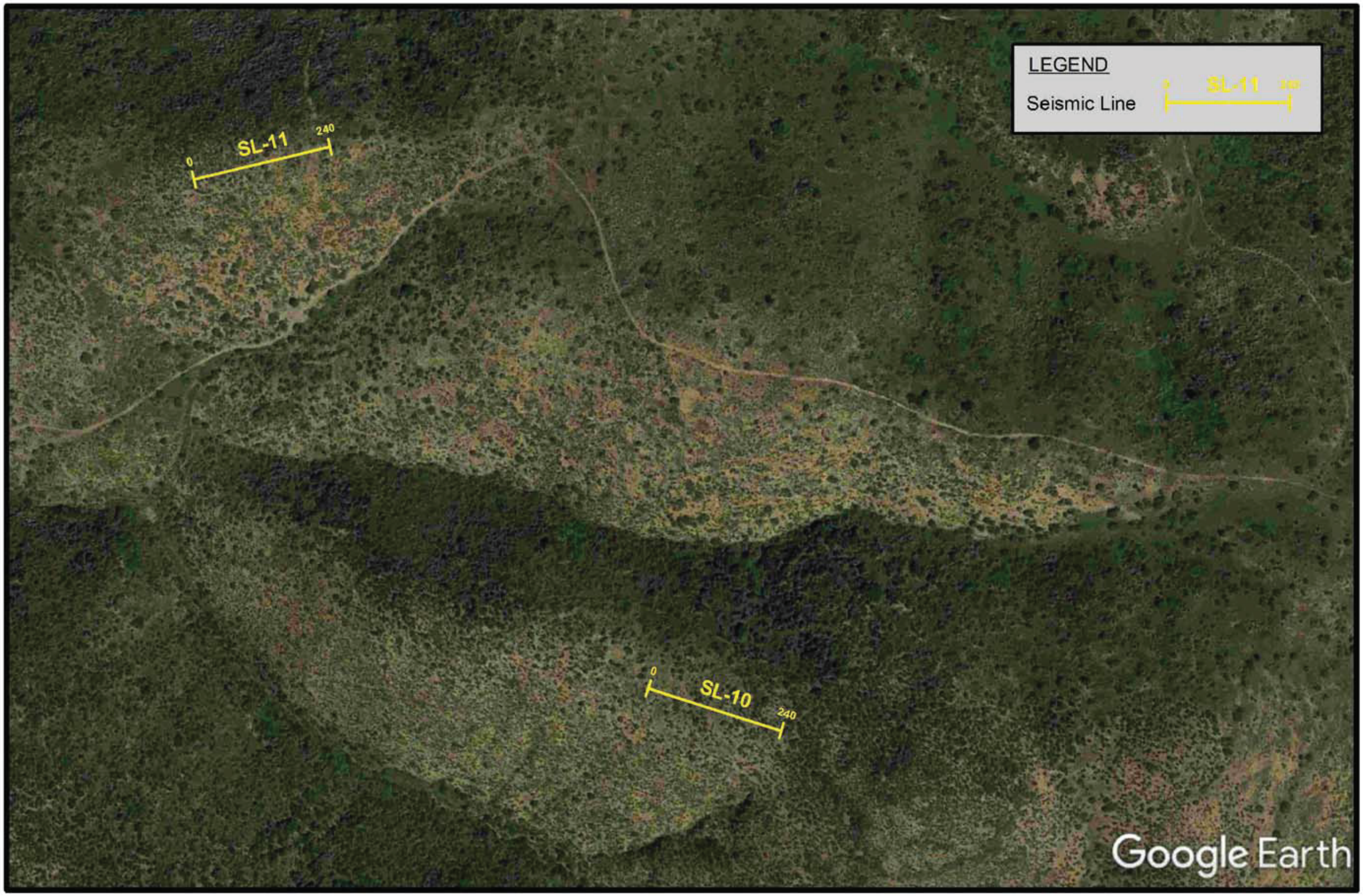
Date: 11/16

SOUTHWEST GEOPHYSICS INC.

Figure 2e

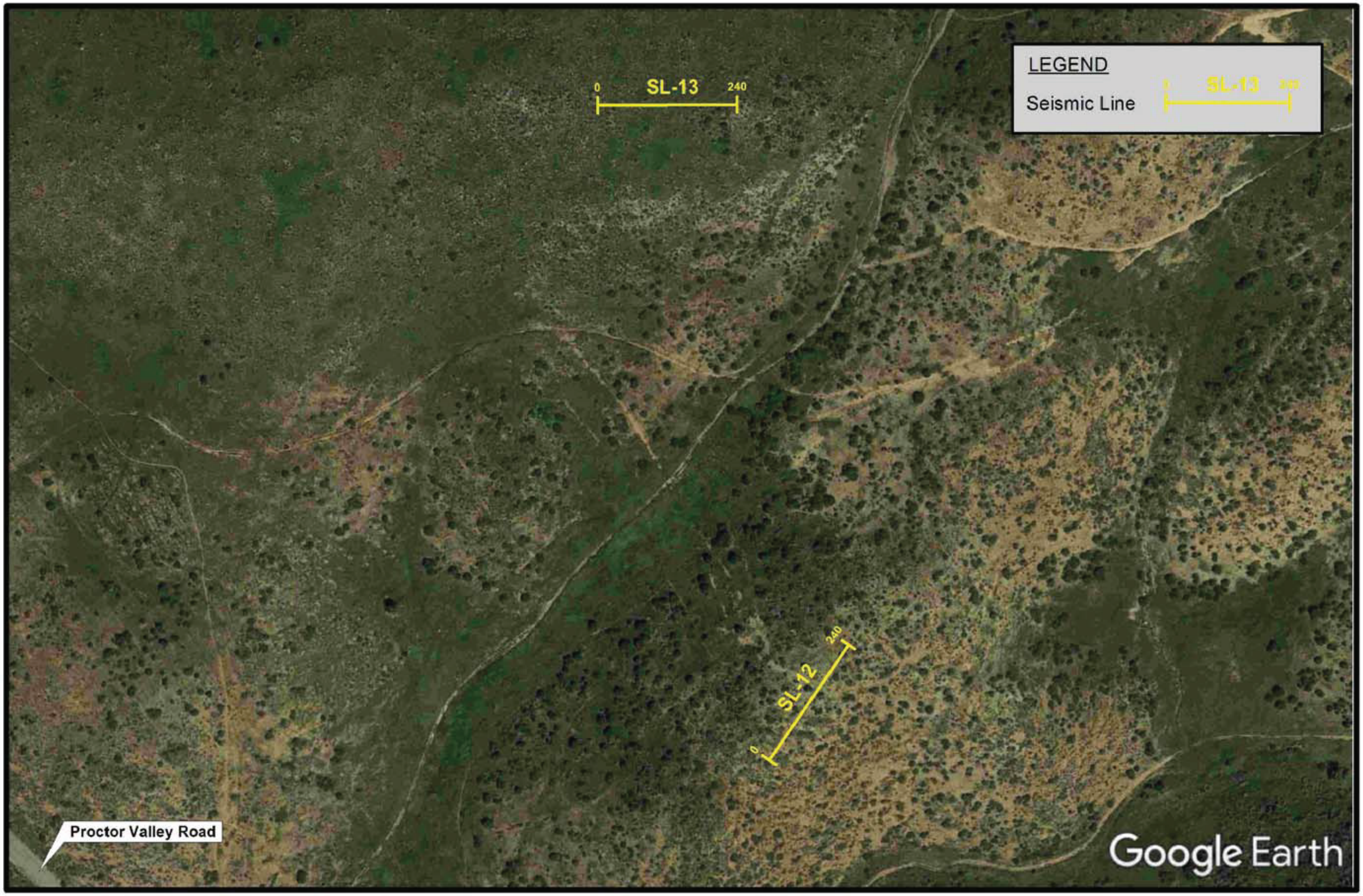
0 240 480

approximate scale in feet



LINE LOCATION MAP (SL-10 and SL-11)	N	Proctor Valley Road Jamul, California	SOUTHWEST GEOPHYSICS INC. Figure 2f
		Project No.: 116547 · Date: 11/16	

0 240 480
approximate scale in feet



LINE LOCATION MAP
(SL-12 and SL-13)

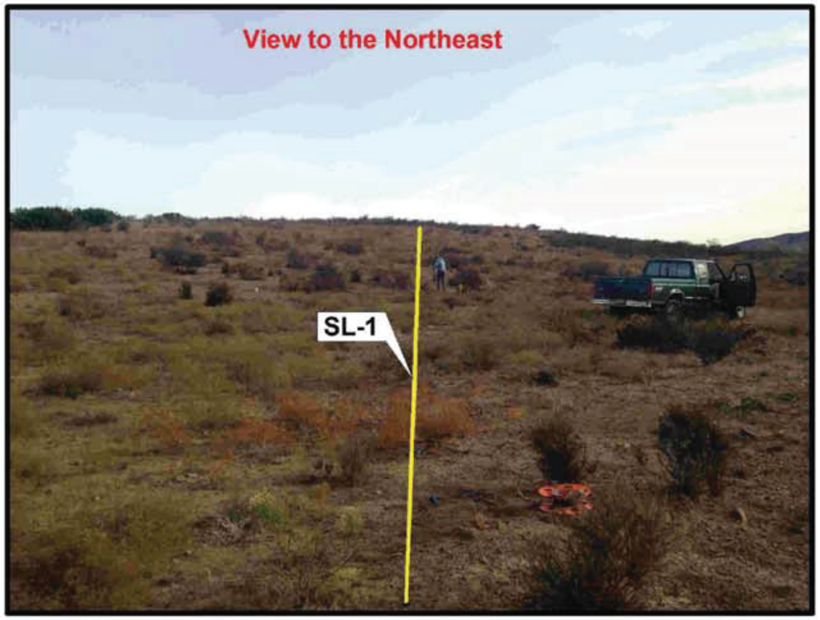
N

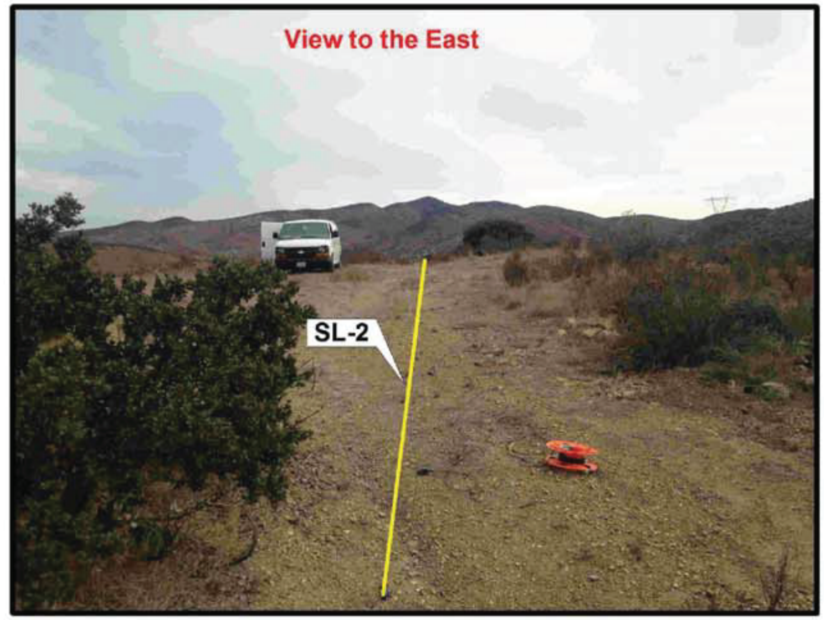
Proctor Valley Road
Jamul, California

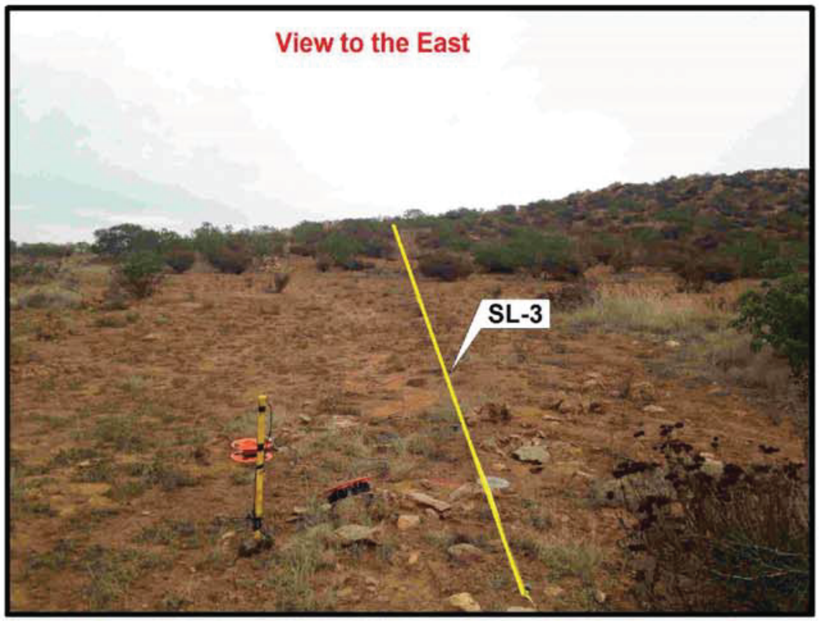
Project No.: 116547
Date: 11/16

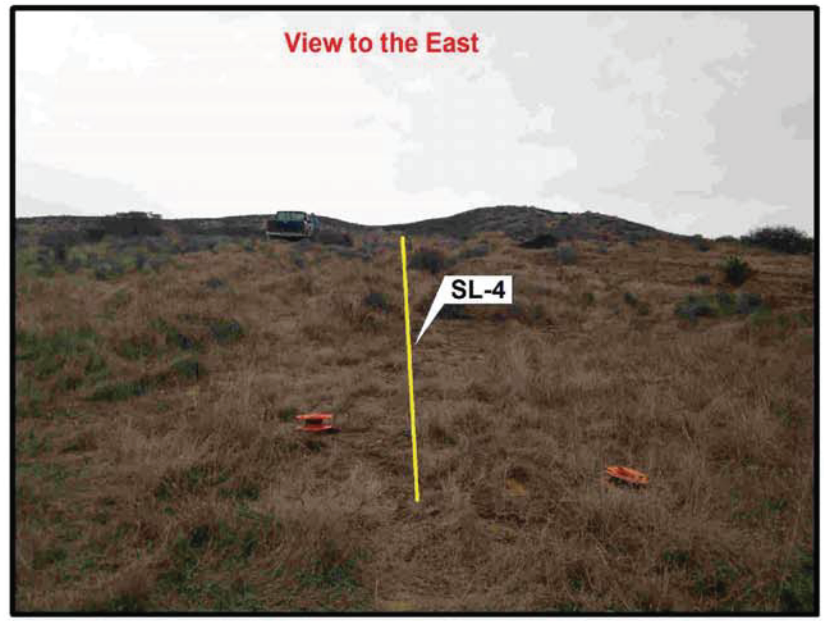
SOUTHWEST GEOPHYSICS INC.
Figure 2g

0 240 480
approximate scale in feet

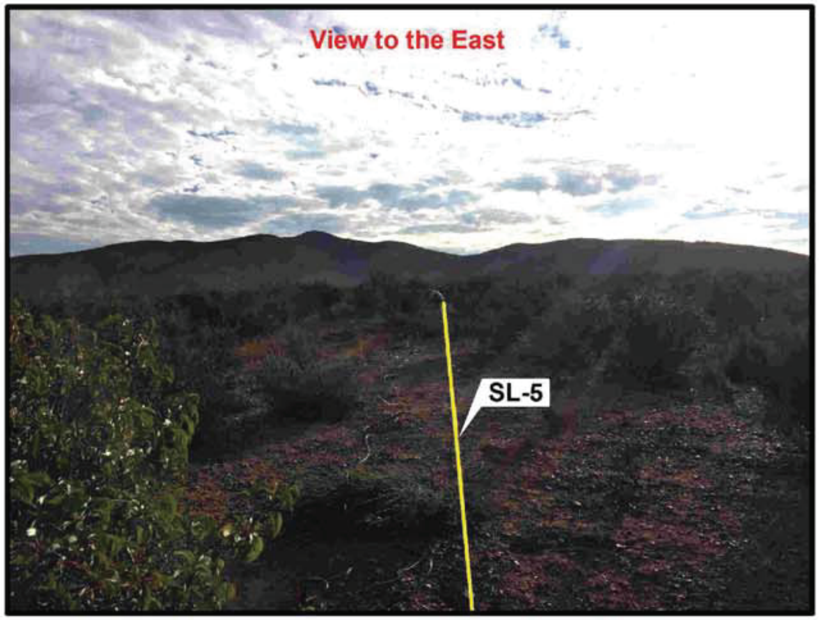


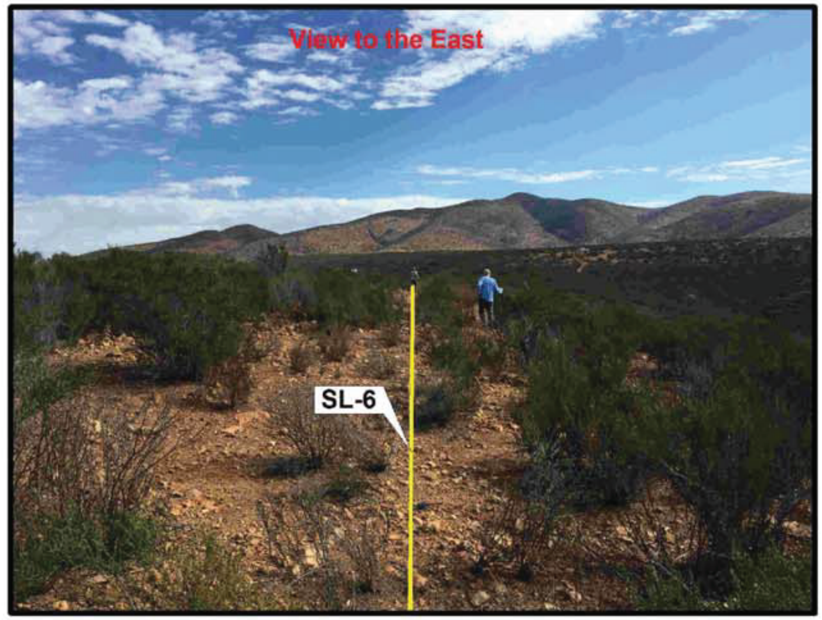


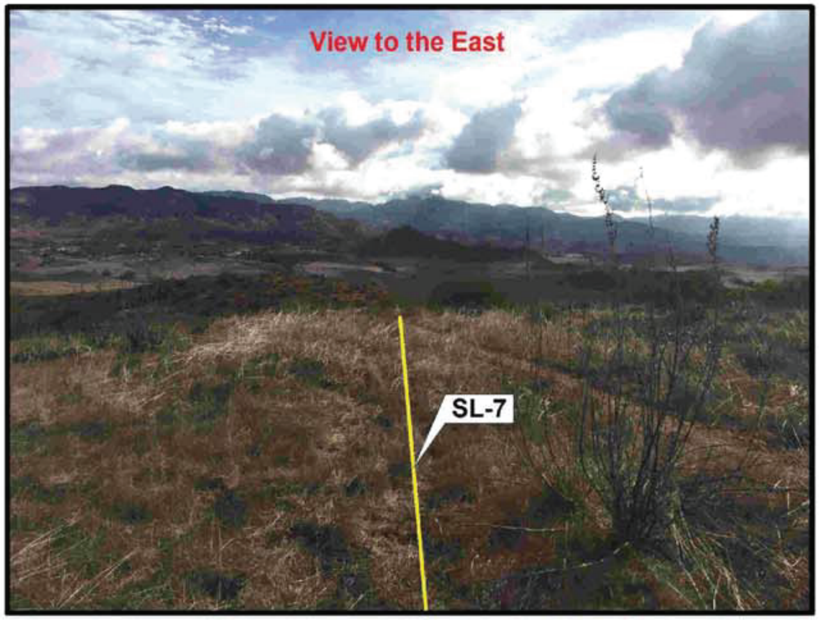


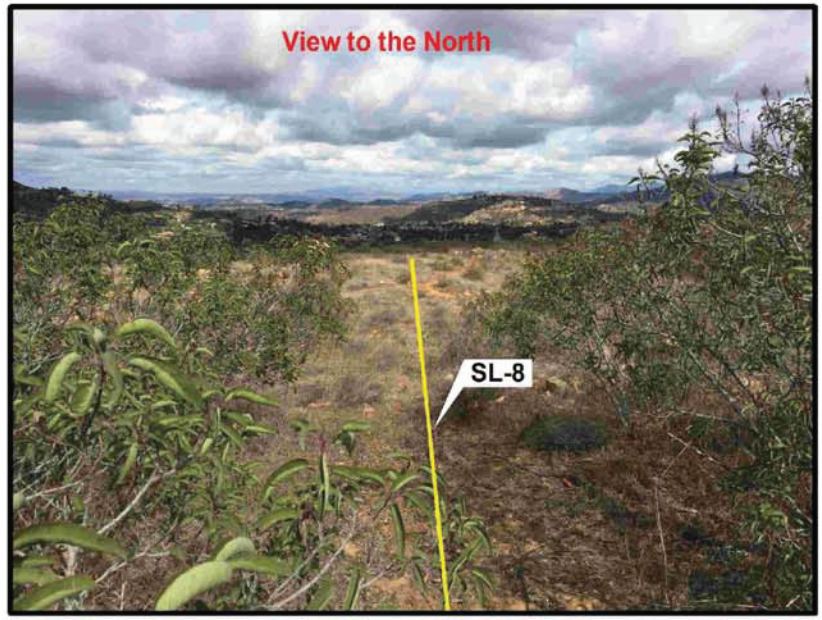


SITE PHOTOGRAPHS **(SL-1 through SL-4)**	Proctor Valley Road Jamul, California Project No.: 116547 Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 3a

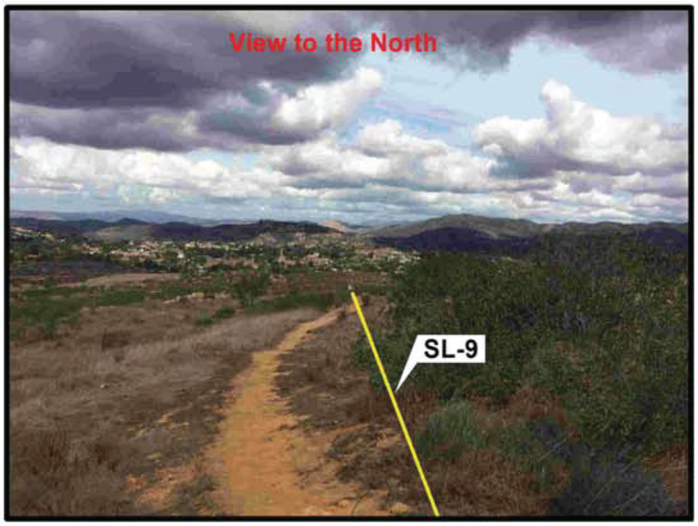


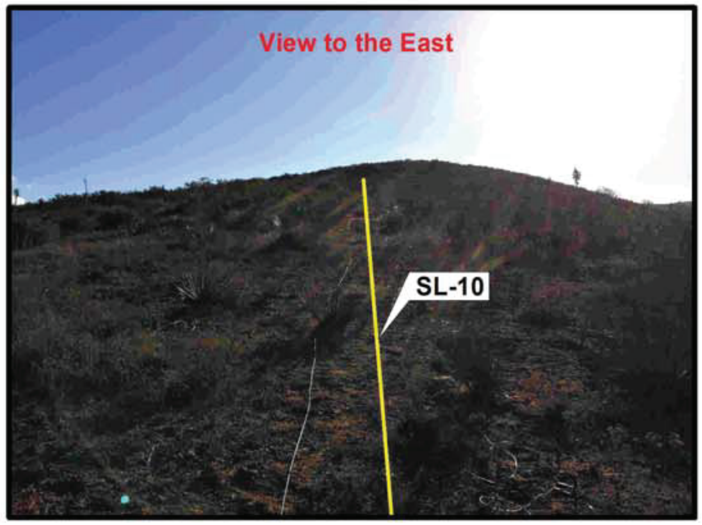


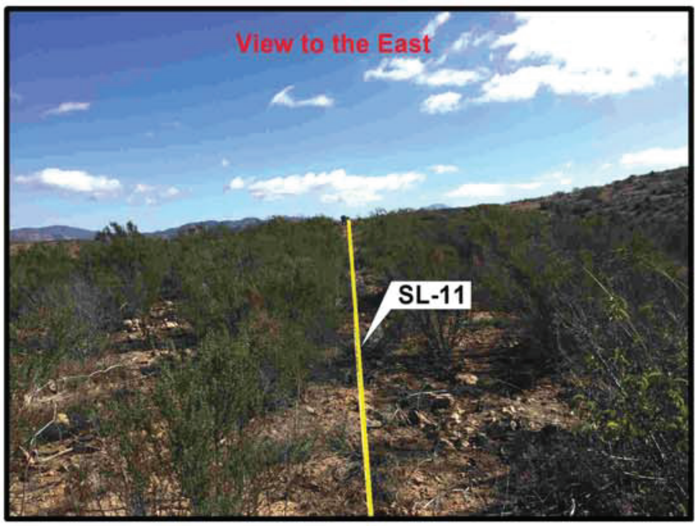


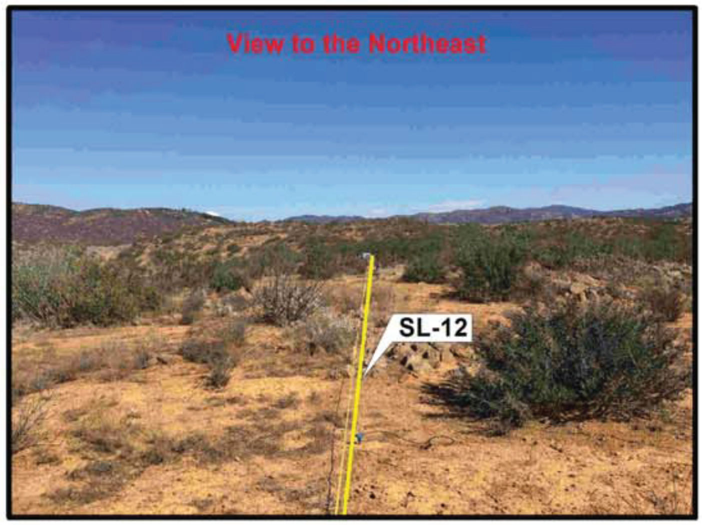


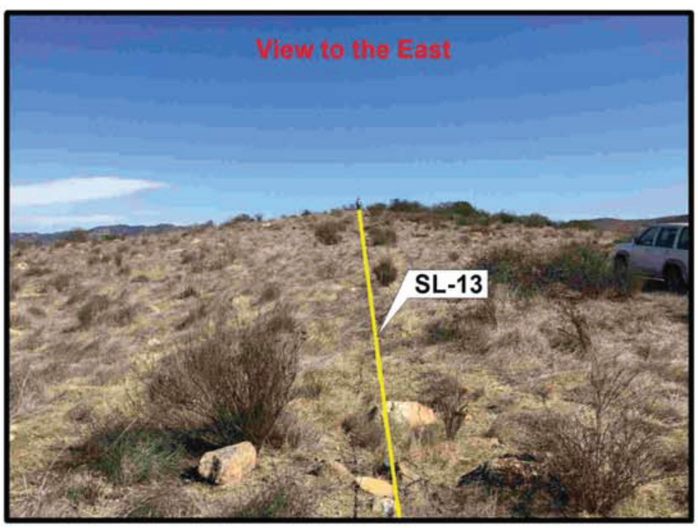
SITE PHOTOGRAPHS (SL-5 through SL-8)	Proctor Valley Road Jamul, California Project No.: 116547 Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 3b





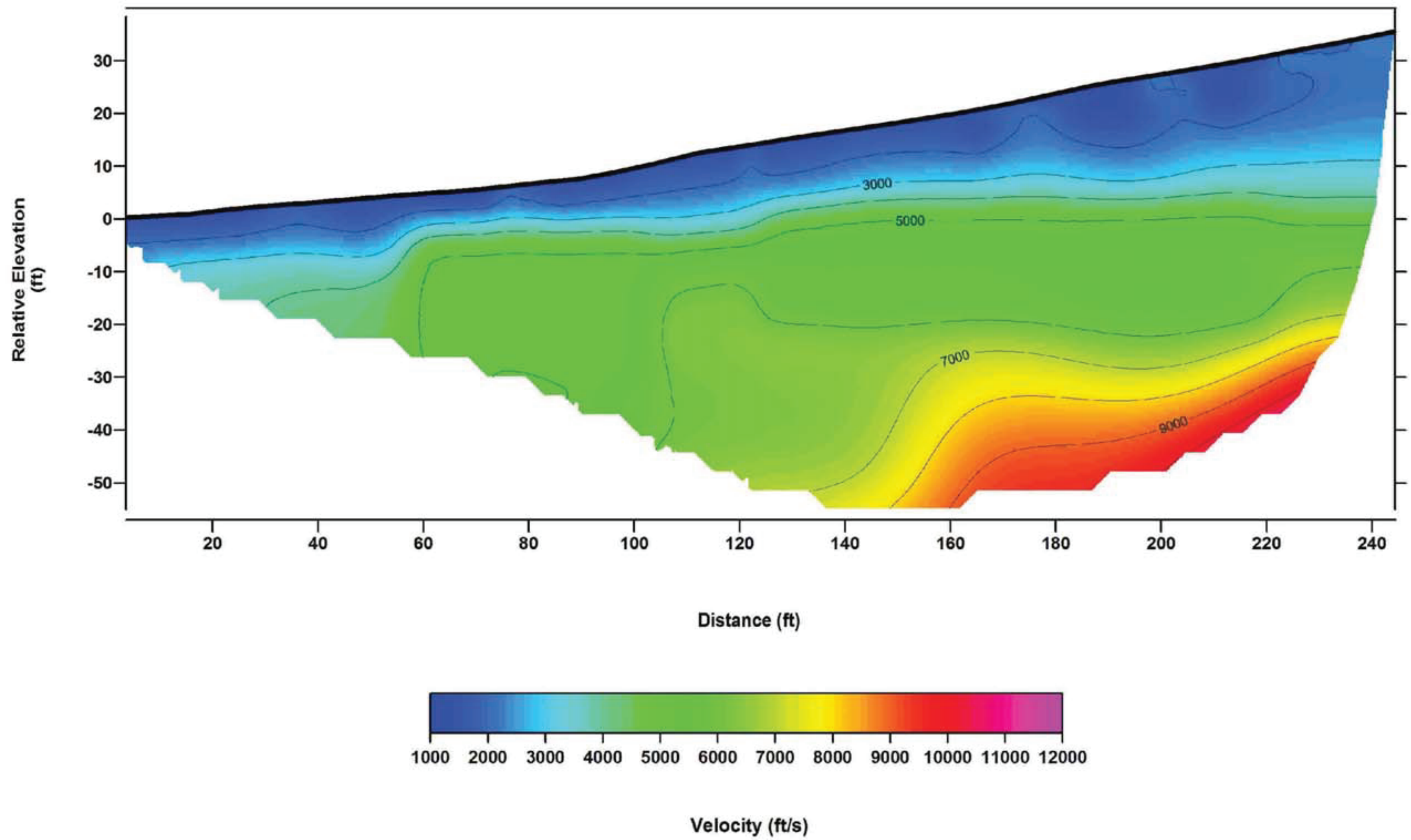






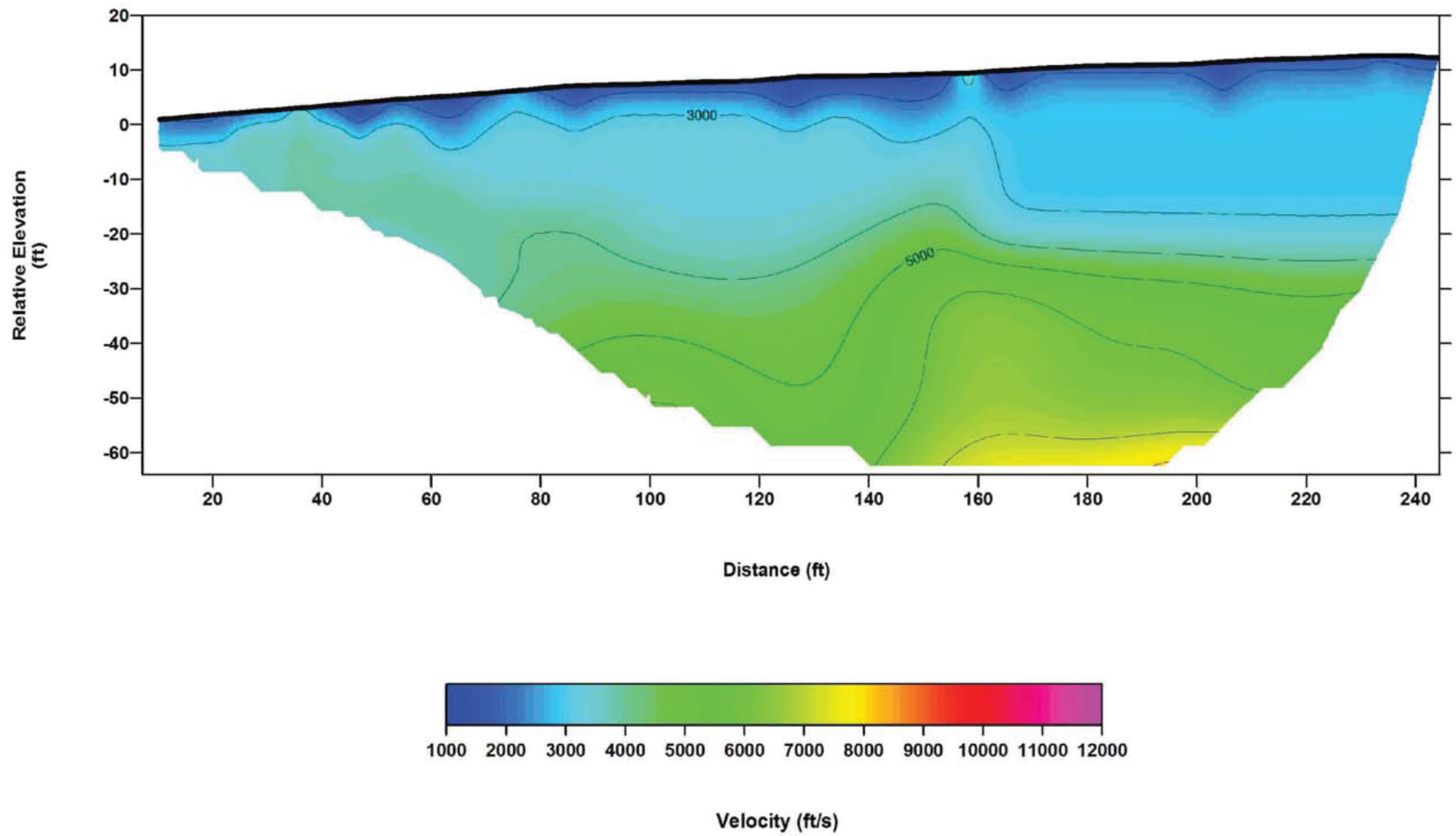
SITE PHOTOGRAPHS **(SL-9 through SL-13)**	Proctor Valley Road Jamul, California Project No.: 116547 — Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 3c

TOMOGRAPHY MODEL



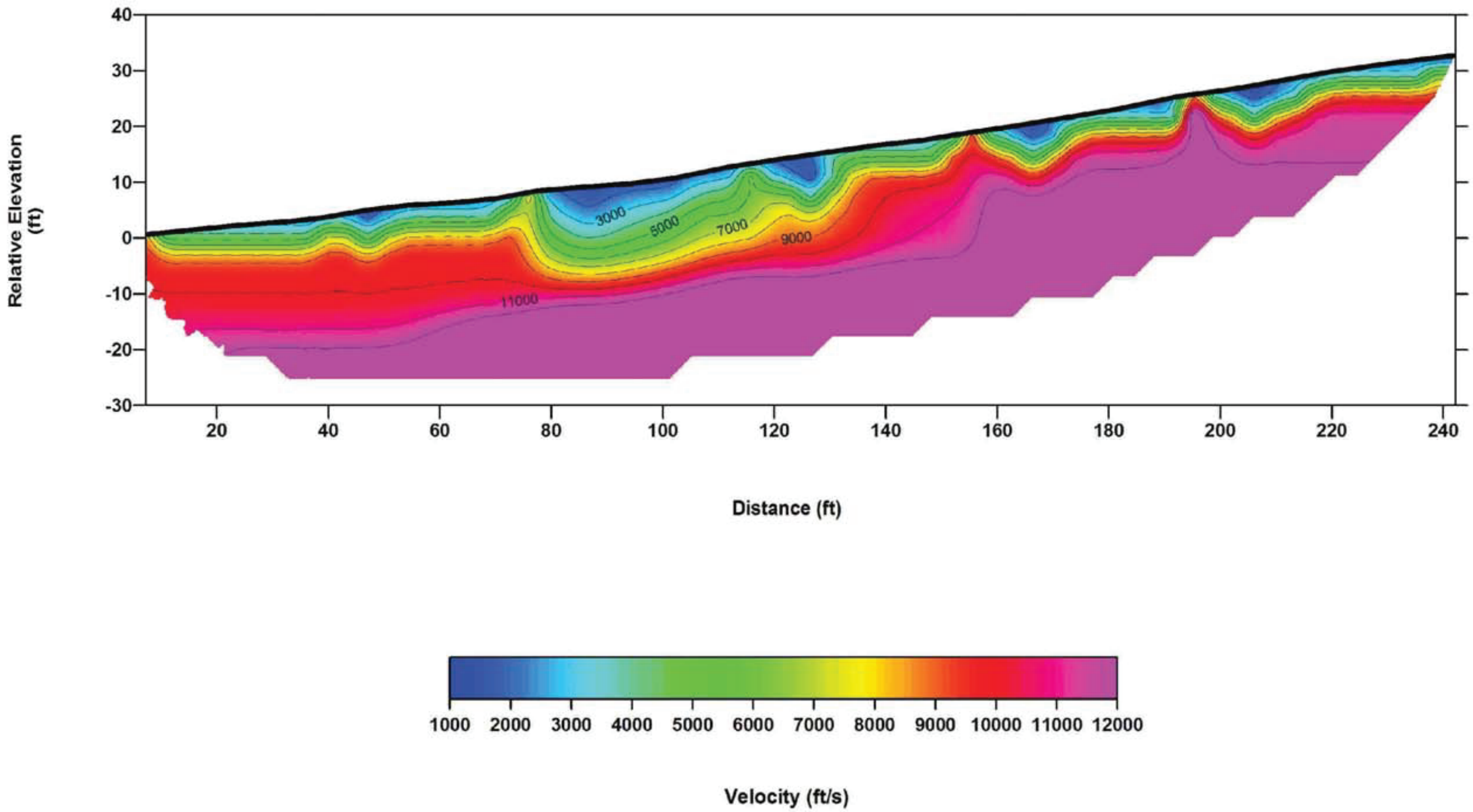
SEISMIC PROFILE SL-1	Proctor Valley Road Development Jamul, California Project No.: 116547 — Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4a	**Note: Contour Interval = 1,000 feet per second**

TOMOGRAPHY MODEL



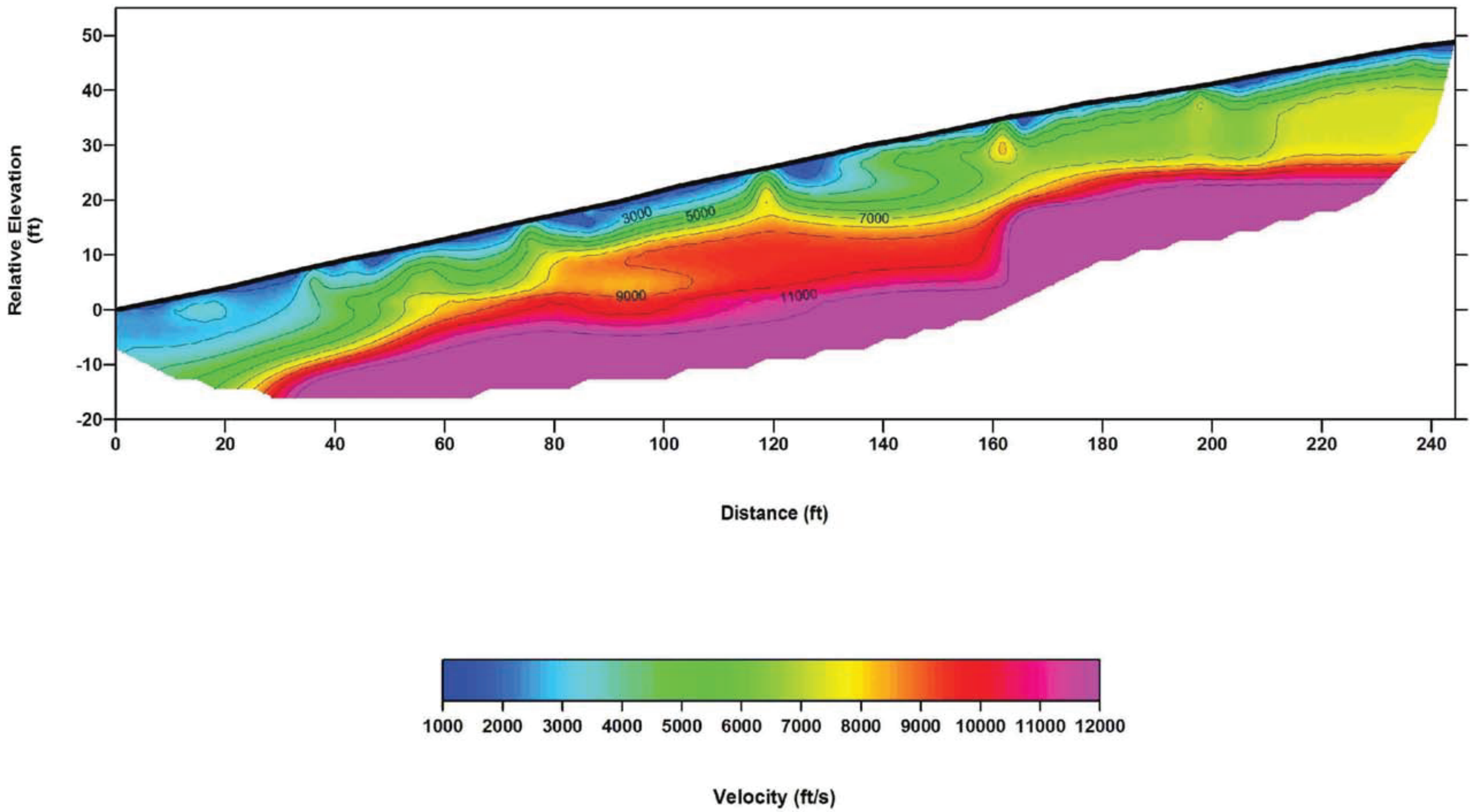
SEISMIC PROFILE SL-2	Proctor Valley Road Development Jamul, California Project No.: 116547 / Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4b	**Note: Contour Interval = 1,000 feet per second**

TOMOGRAPHY MODEL



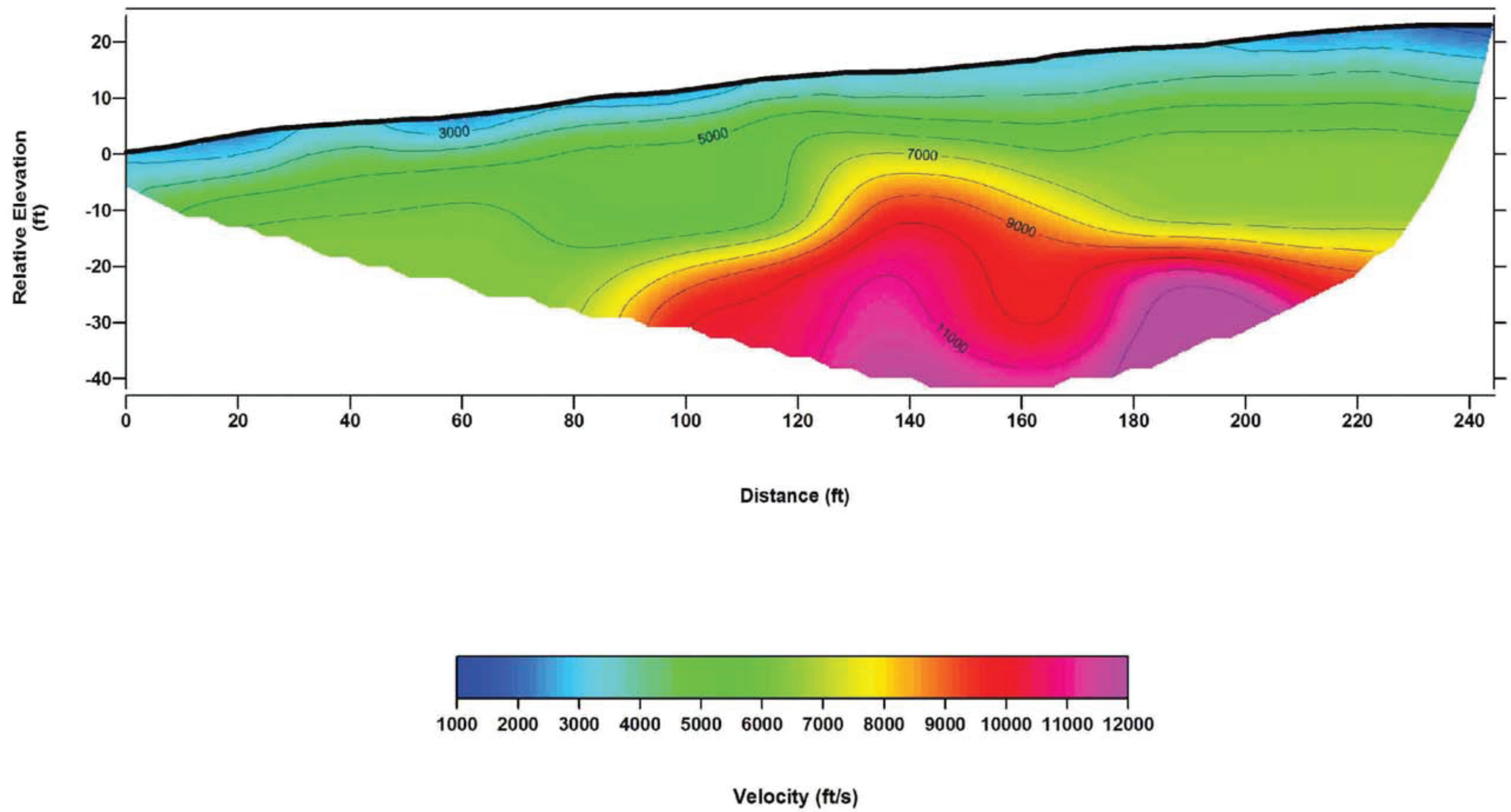
SEISMIC PROFILE SL-3	Proctor Valley Road Development Jamul, California Project No.: 116547 Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4c	**Note: Contour Interval = 1,000 feet per second**

TOMOGRAPHY MODEL



SEISMIC PROFILE SL-4	Proctor Valley Road Development Jamul, California Project No.: 116547 — Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4d	**Note: Contour Interval = 1,000 feet per second**

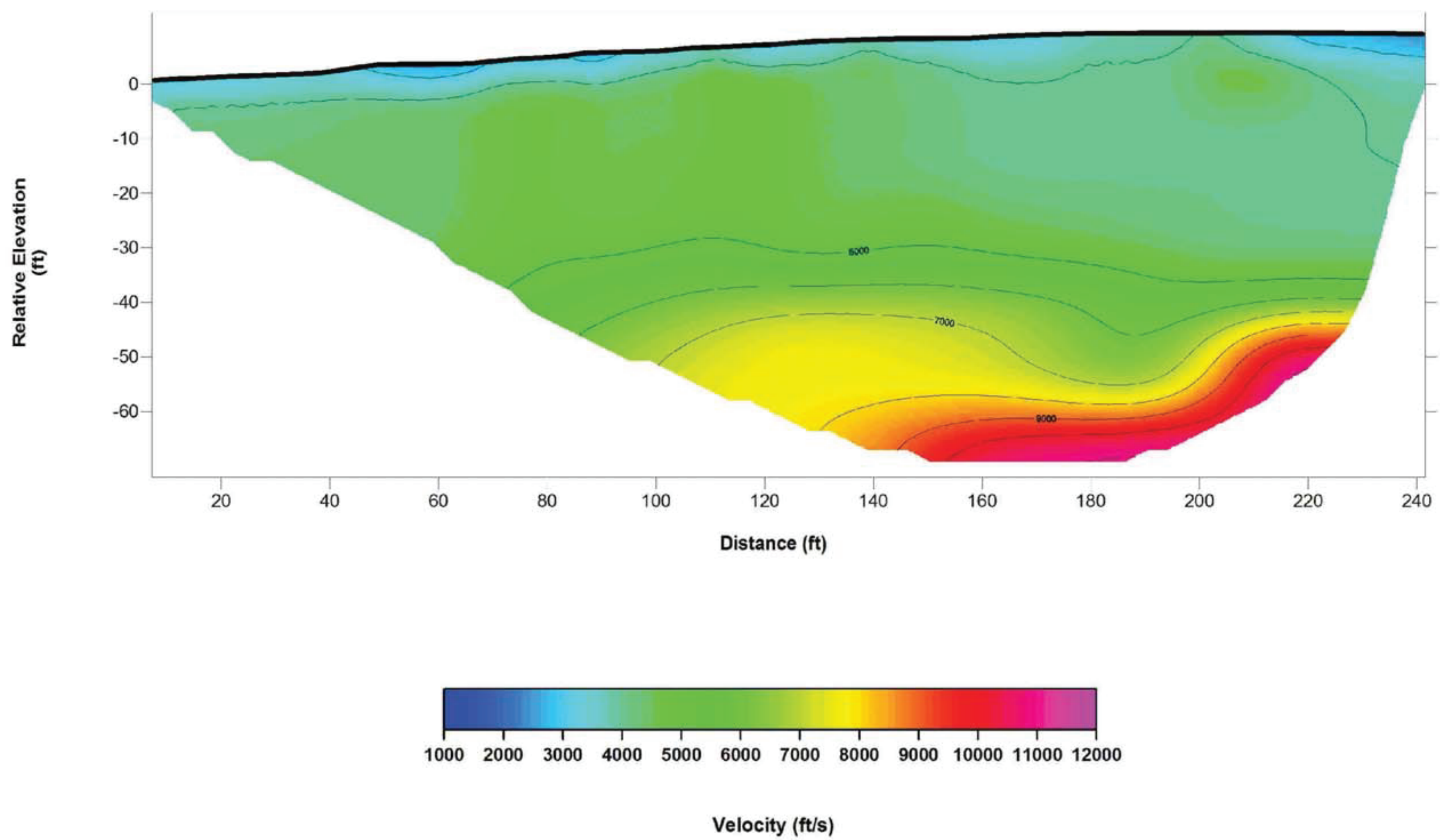
TOMOGRAPHY MODEL



SEISMIC PROFILE SL-5	Proctor Valley Road Development Jamul, California Project No.: 116547 Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4e

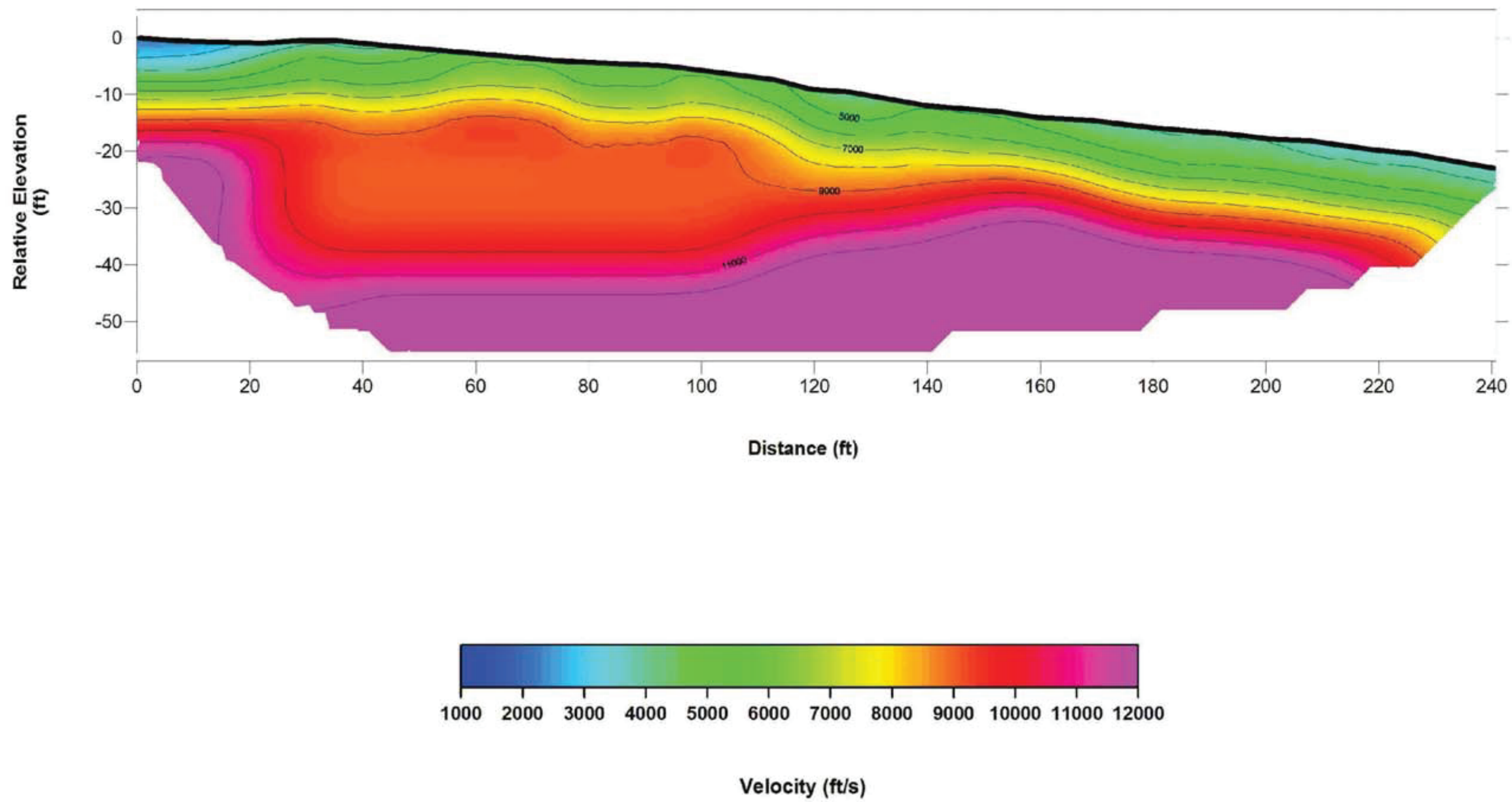
Note: Contour Interval = 1,000 feet per second

TOMOGRAPHY MODEL



SEISMIC PROFILE SL-6	Proctor Valley Road Development Jamul, California Project No.: 116547 Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4f	**Note: Contour Interval = 1,000 feet per second**

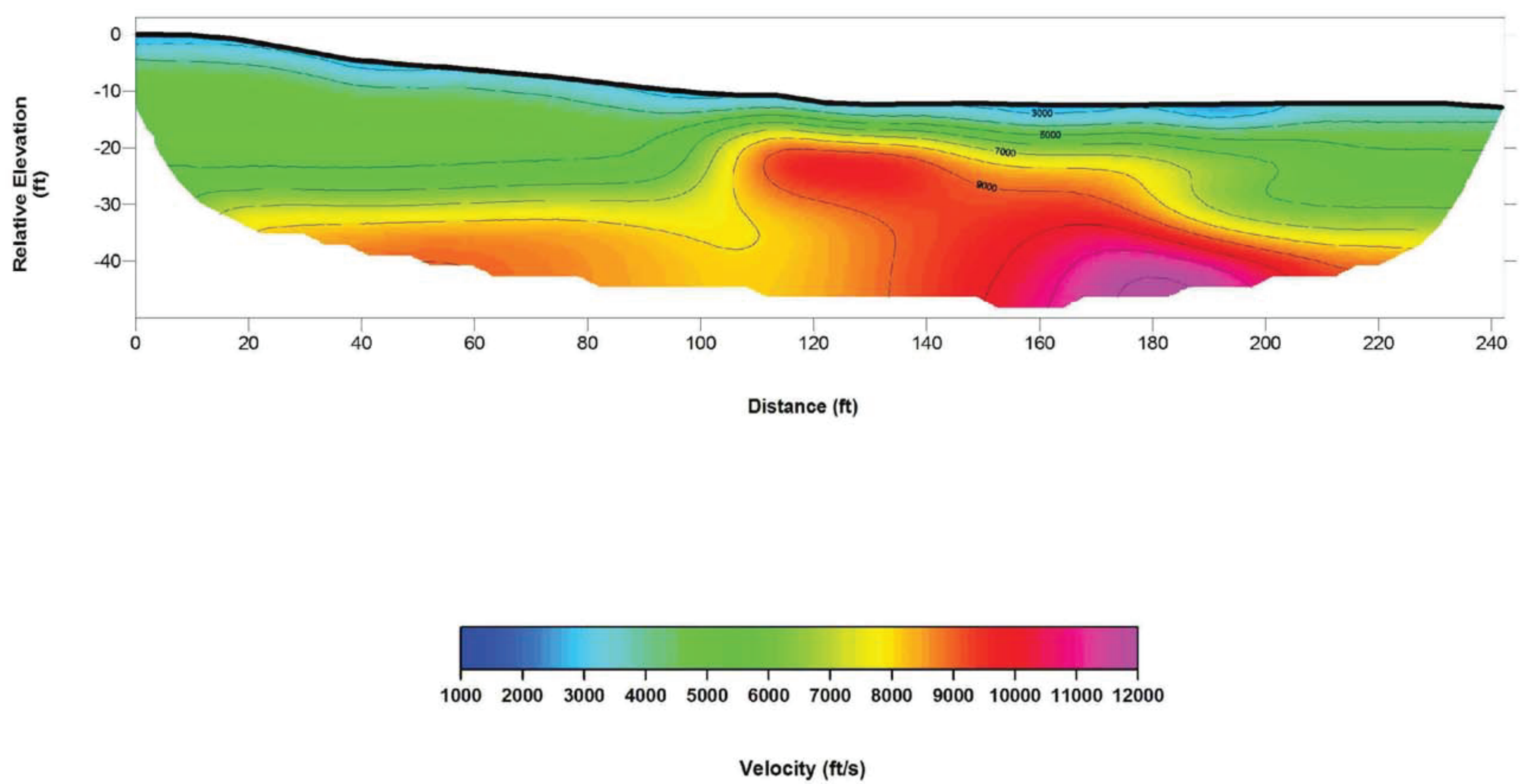
TOMOGRAPHY MODEL



SEISMIC PROFILE SL-7	Proctor Valley Road Development Jamul, California		SOUTHWEST GEOPHYSICS INC. Figure 4g
	Project No.: 116547	Date: 11/16	

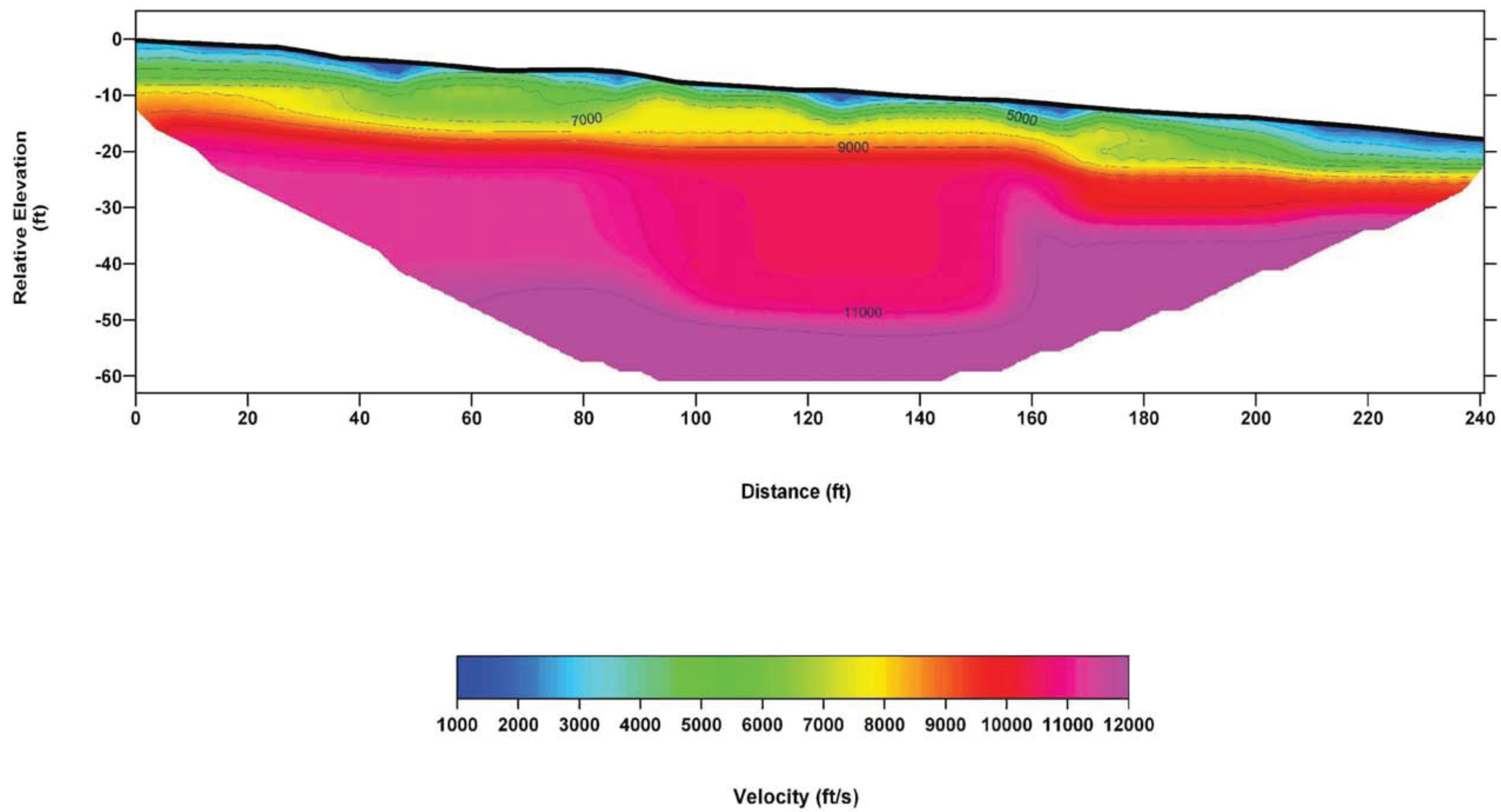
Note: Contour Interval = 1,000 feet per second

TOMOGRAPHY MODEL



SEISMIC PROFILE SL-8	Proctor Valley Road Development Jamul, California Project No.: 116547 · Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4h	**Note: Contour Interval = 1,000 feet per second**

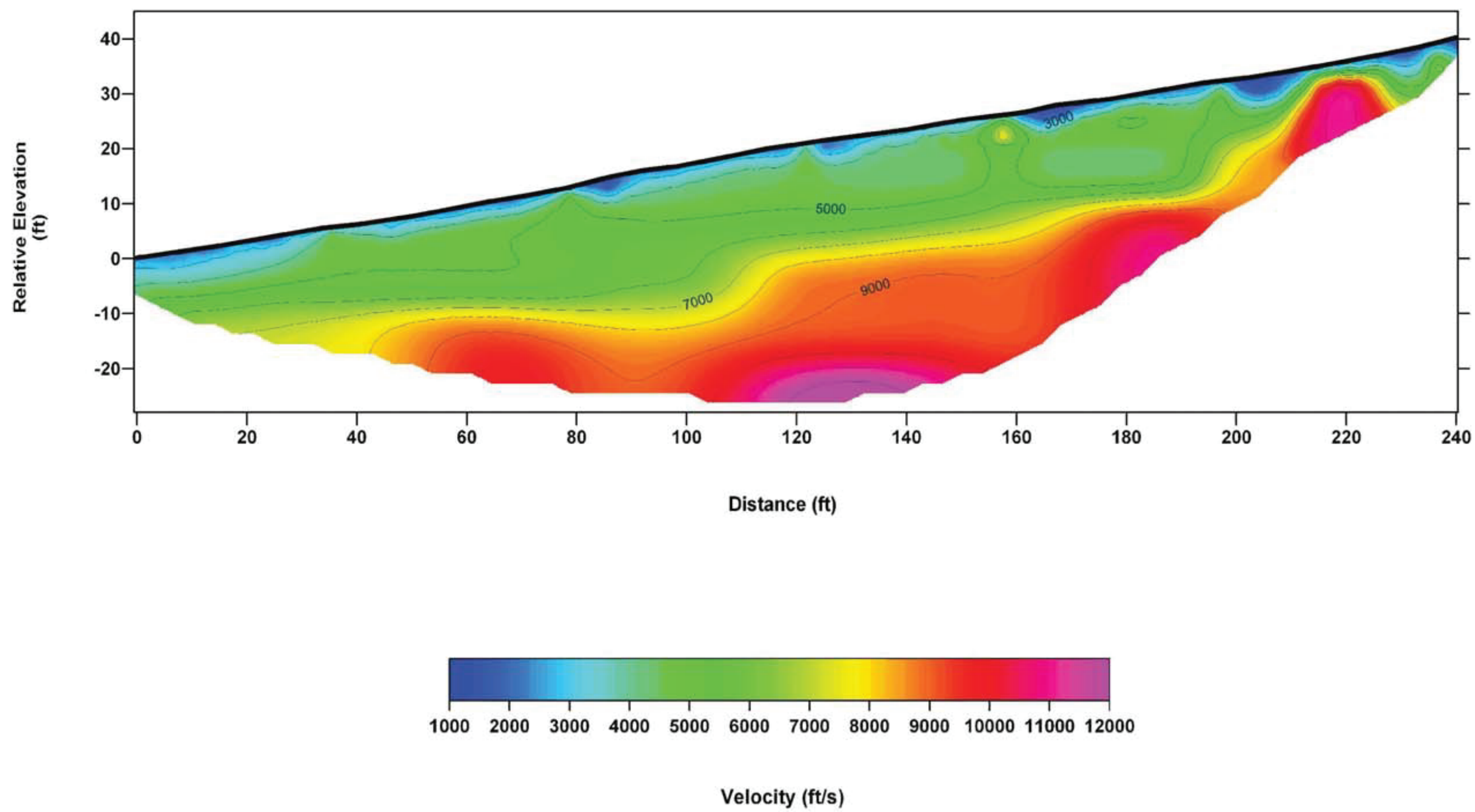
TOMOGRAPHY MODEL



SEISMIC PROFILE SL-9	Proctor Valley Road Development Jamul, California	SOUTHWEST GEOPHYSICS INC. Figure 4i
	Project No.: 116547 / Date: 11/16	

Note: Contour Interval = 1,000 feet per second

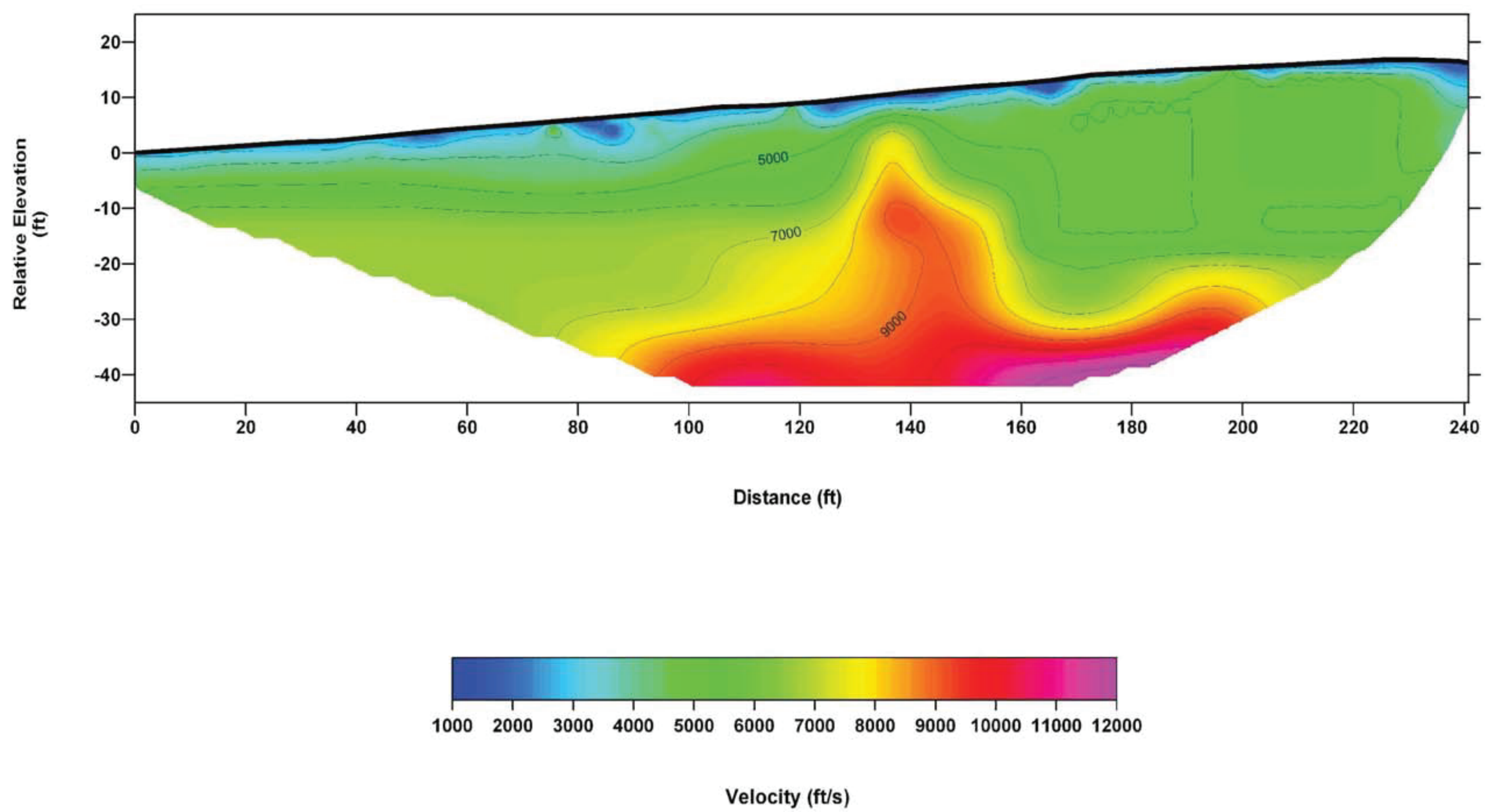
TOMOGRAPHY MODEL



SEISMIC PROFILE SL-10	Proctor Valley Road Development Jamul, California Project No.: 116547 — Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4j

Note: Contour Interval = 1,000 feet per second

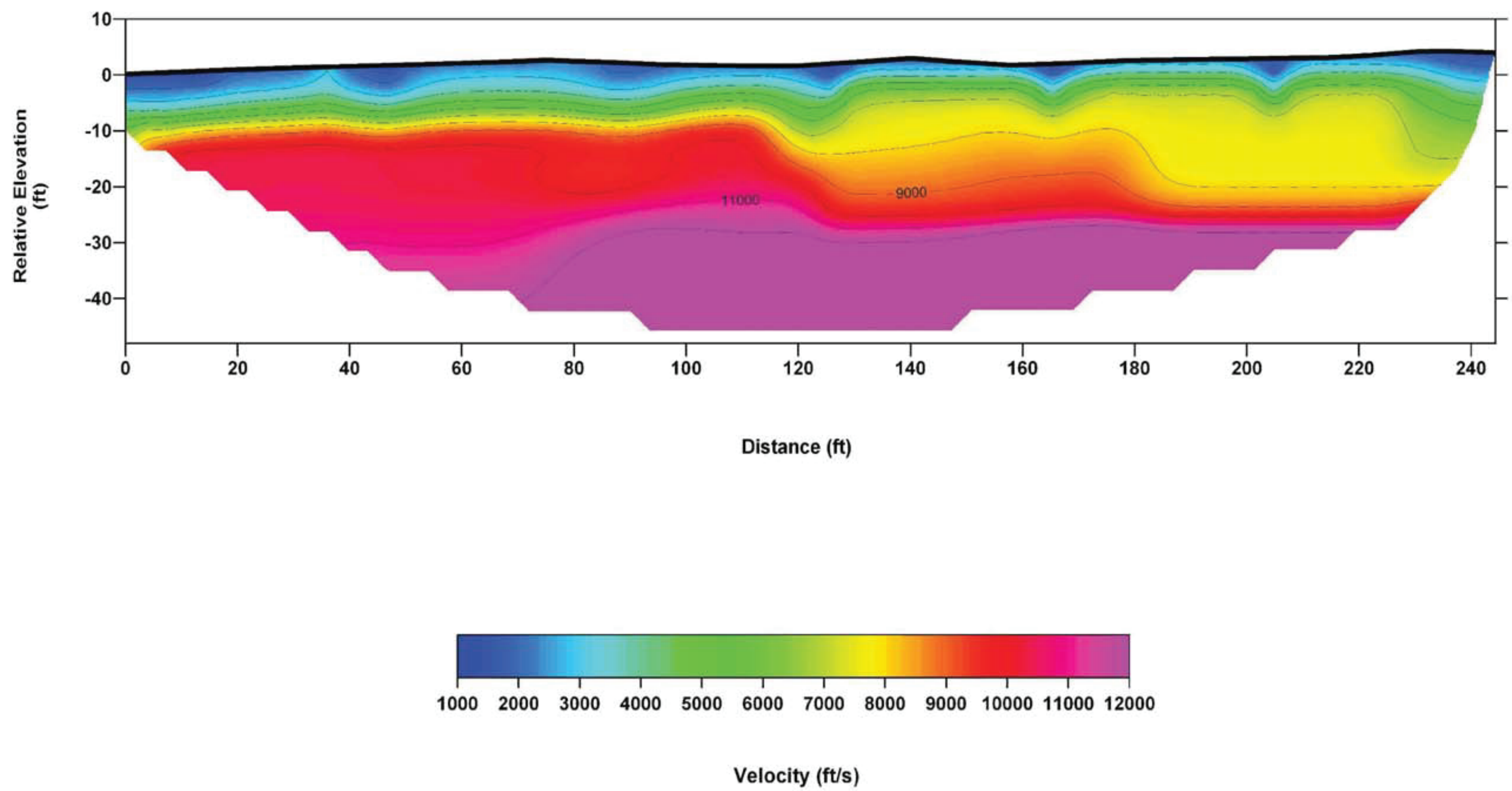
TOMOGRAPHY MODEL



SEISMIC PROFILE SL-11	Proctor Valley Road Development Jamul, California Project No.: 116547 — Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4k

Note: Contour Interval = 1,000 feet per second

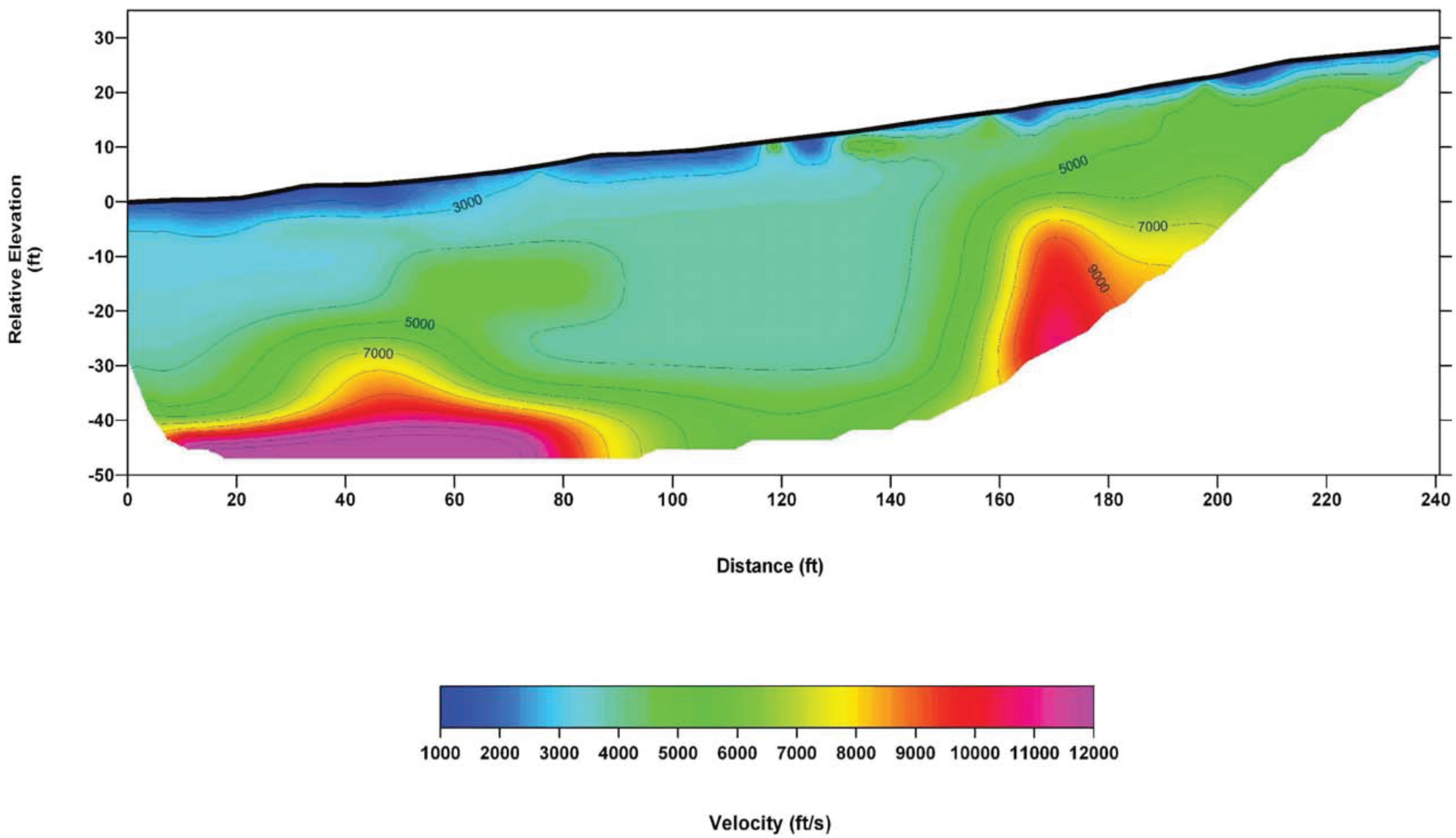
TOMOGRAPHY MODEL



SEISMIC PROFILE SL-12	Proctor Valley Road Development Jamul, California Project No.: 116547 / Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4l

Note: Contour Interval = 1,000 feet per second

TOMOGRAPHY MODEL



SEISMIC PROFILE SL-13	Proctor Valley Road Development Jamul, California Project No.: 116547 — Date: 11/16	SOUTHWEST GEOPHYSICS INC. Figure 4m

Note: Contour Interval = 1,000 feet per second

APPENDIX C

LABORATORY TEST RESULTS

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DRY DENSITY AND MOISTURE CONTENT - ASTM D2166

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No: 1312-02

Sample Date:	2/4/15	By:	FE
Submittal Date:	2/13/15	By:	PWM
Test Date:	2/25/15	By:	HM

Boring No.	BA-1	BA-1	BA-1	BA-3	BA-3	BA-4	BA-4	BA-4	BA-4
Depth (ft)	5-6 '	10-11 '	15-16 '	11-12 '	15-16 '	18-19 '	25-26 '	36-37 '	52-53 '
Moisture Content (%)	7.8	6.7	10.9	8.9	8.4	14.3	19.8	18.5	19.6
Dry Density (pcf)	125.7	122.4	126.7	122.3	124.6	100.8	98.7	104.9	109.7

Boring No.	BA-5	BA-5	BA-6	BA-8
Depth (ft)	10-11 '	66-77 '	1-2 '	15-16 '
Moisture Content (%)	12.4	14.1	11.7	14.4
Dry Density (pcf)	114.9	107.5	98.8	82.6

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

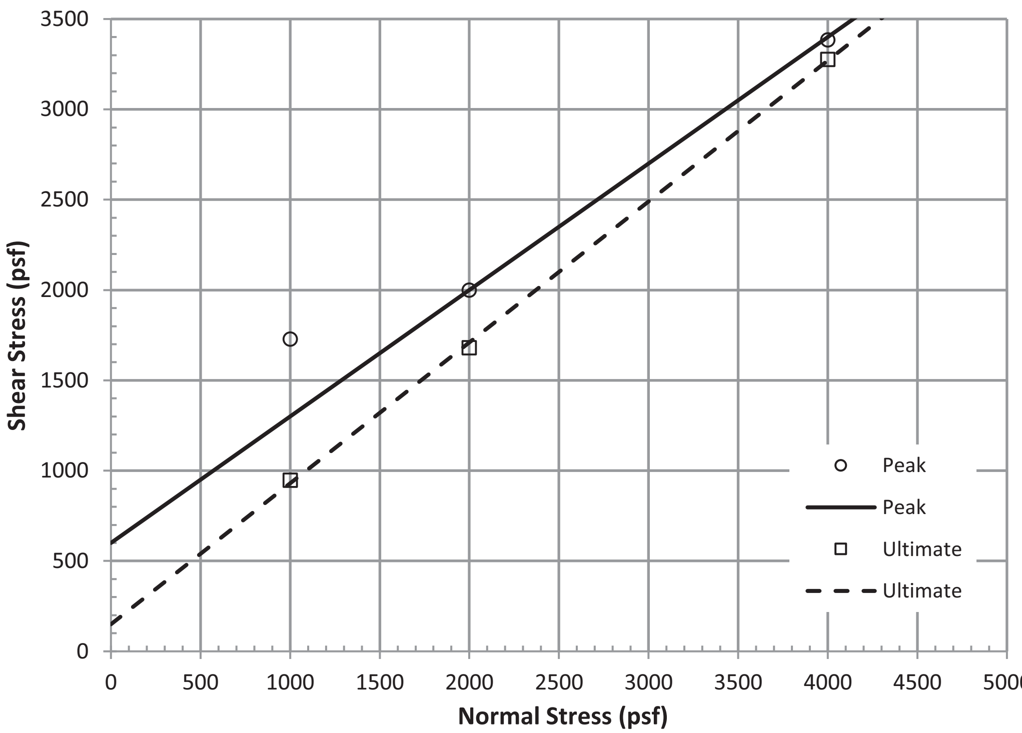
Project Name: Otay Village 14
Location: Proctor Valley Rd, SD County
Project No.: 1312-02
Date: 3/17/15

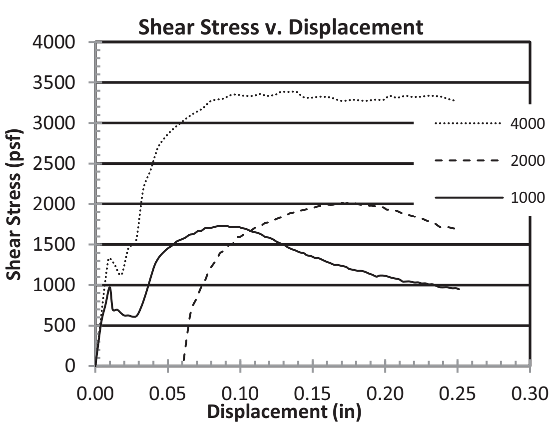
Excavation: BA-1
Depth: 5-6'
Sample Type: Undisturbed
By: HM

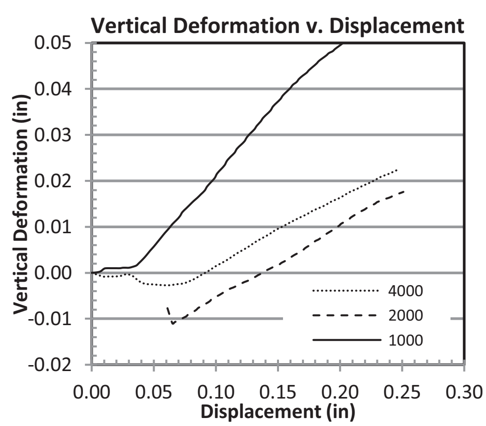
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	4000
Maximum Shear Stress (psf)	1728	2016	3384
Ultimate Shear Stress (psf)	948	1680	3276
Initial Moisture Content (%)	13.3	13.3	13.3
Initial Dry Density (pcf)	112.7	106.7	118.2

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): .04

	Peak	Ultimate
Friction Angle, phi (deg)	35	38
Cohesion (psf)	600	150







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

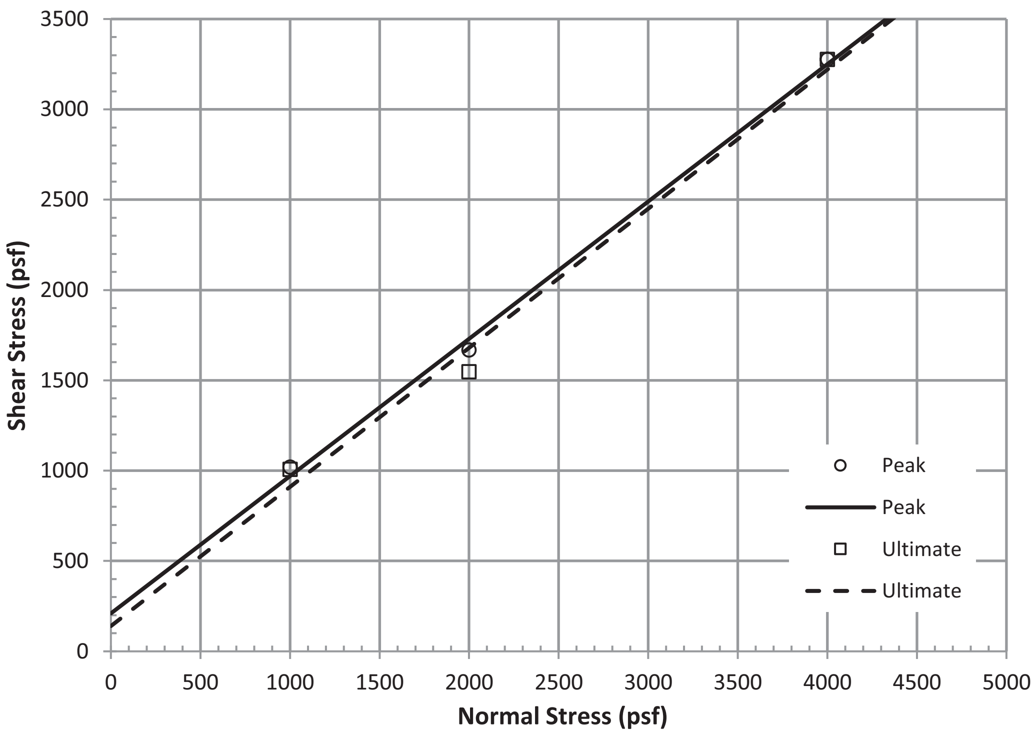
DIRECT SHEAR - ASTM D3080

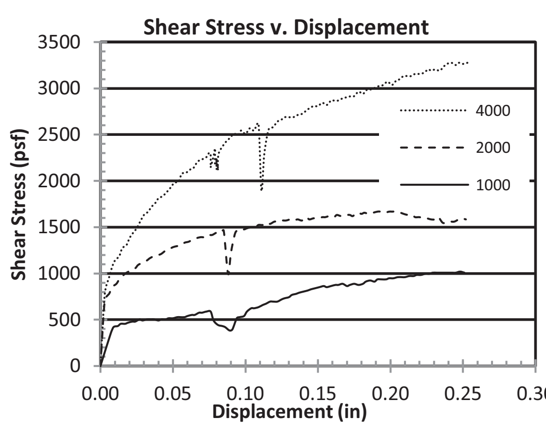
Project Name:	Otay Village 14	Excavation:	BA-1
Location:	Proctor Valley Rd, SD County	Depth:	10
Project No.:	1312-02	Sample Type:	Undisturbed
Date:	3/17/15	By:	HM

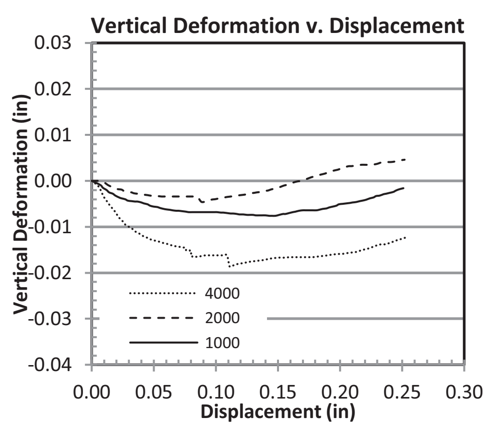
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	4000
Maximum Shear Stress (psf)	1020	1668	3276
Ultimate Shear Stress (psf)	1008	1548	3276
Initial Moisture Content (%)	6.7	6.7	6.7
Initial Dry Density (pcf)	121.4	120.7	123.9

Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shearing Rate (in/min):	0.04

	Peak	Ultimate
Friction Angle, phi (deg)	37	38
Cohesion (psf)	210	140







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

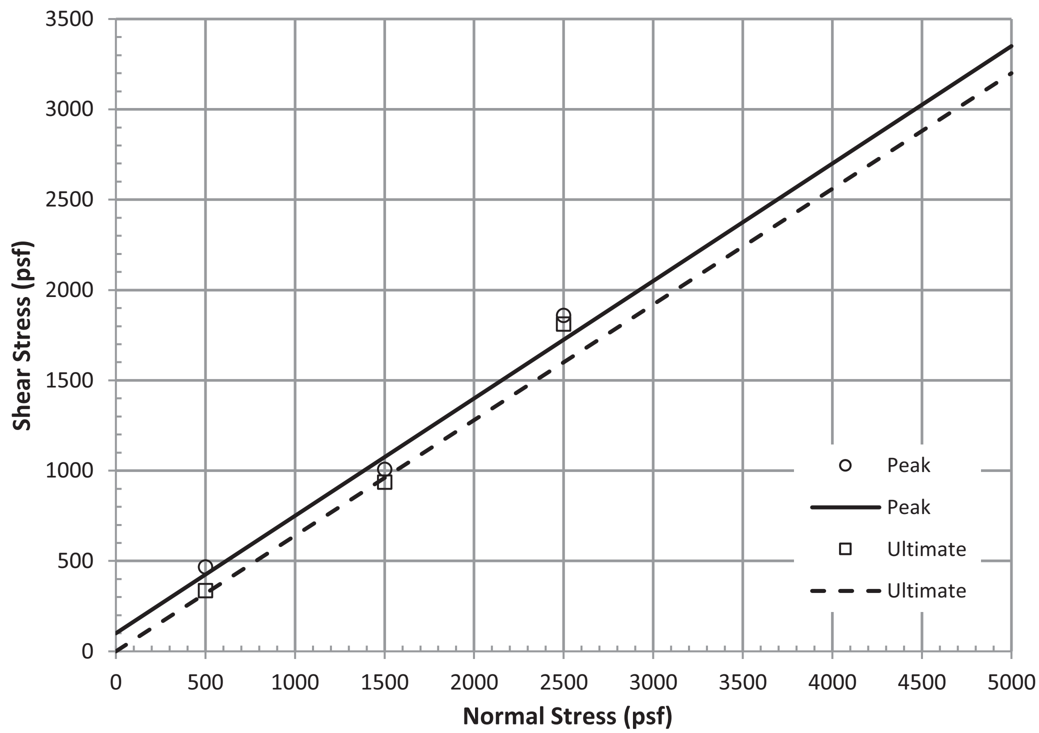
DIRECT SHEAR - ASTM D3080

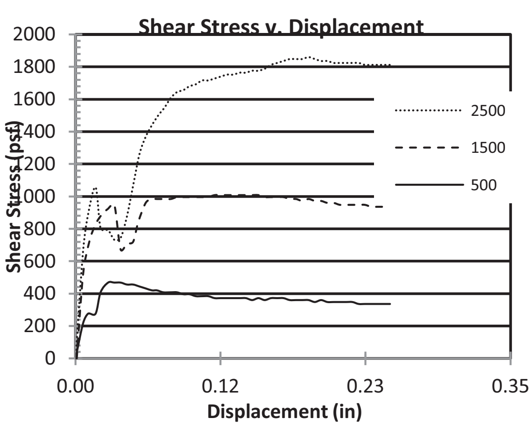
Project Name:	Otay Village	Excavation:	BA-2
Location:	Proctor Valley Rd, SD County	Depth:	1-2'
Project No.:	1312-02	Sample Type:	Remolded to 90% max
Date:	3/30/15	By:	HM

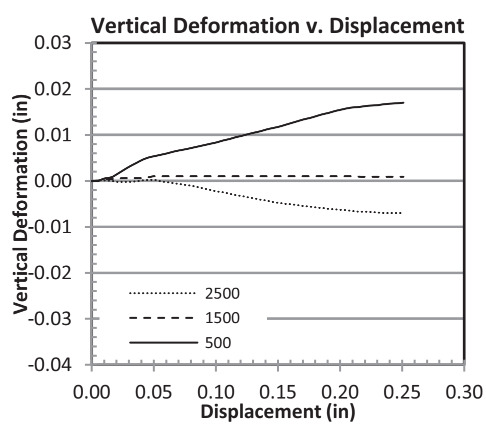
Samples Tested	1	2	3
Normal Stress (psf)	500	1500	2500
Maximum Shear Stress (psf)	468	1008	1860
Ultimate Shear Stress (psf)	336	936	1812
Initial Moisture Content (%)	13.0	13.3	109.7
Initial Dry Density (pcf)	109.8	109.8	123.9

Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shearing Rate (in/min):	0.04

	Peak	Ultimate
Friction Angle, phi (deg)	33	33
Cohesion (psf)	100	0







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

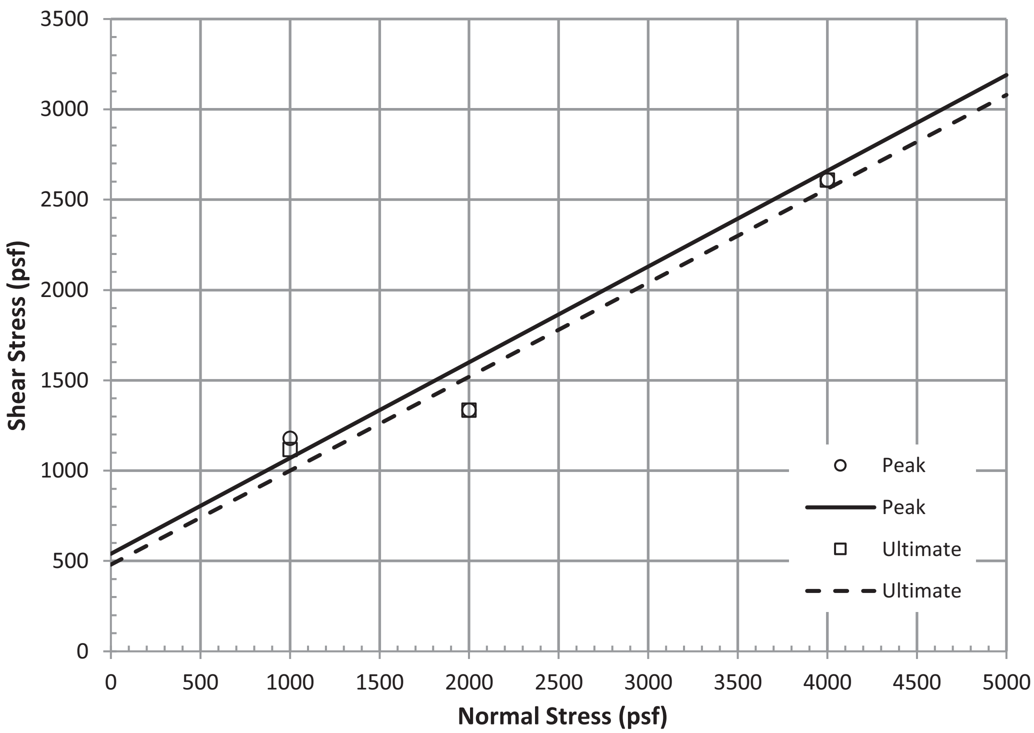
Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/18/15

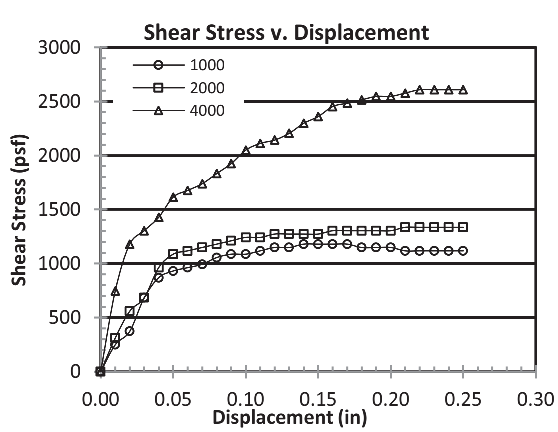
Excavation: BA-3
Depth: 11 '
Sample Type: Intact
By: H.M

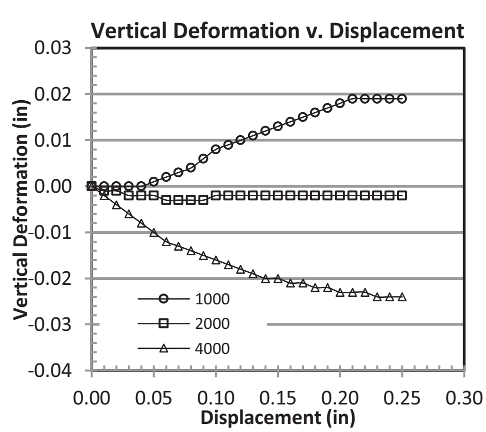
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	4000
Maximum Shear Stress (psf)	1180	1335	2608
Ultimate Shear Stress (psf)	1118	1335	2608
Initial Moisture Content (%)	8.9	8.9	8.9
Initial Dry Density (pcf)	112.4	107.9	110.4

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): 0.005

	Peak	Ultimate
Friction Angle, phi (deg)	28	27
Cohesion (psf)	540	480







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

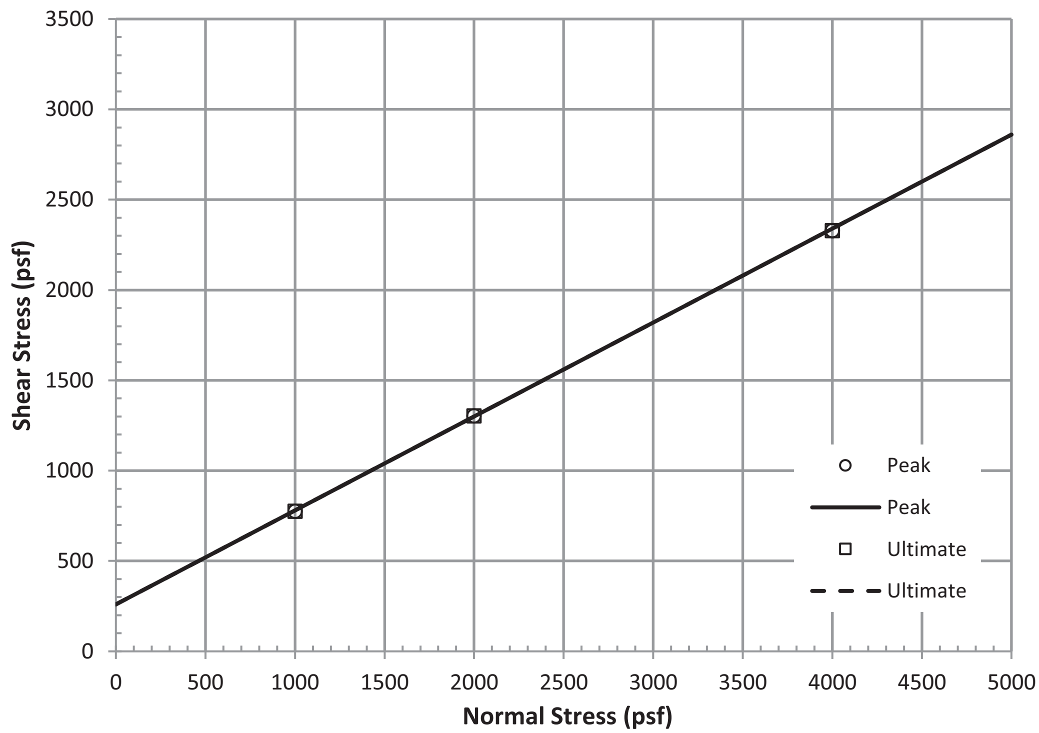
Project Name: Otay Village 14
Location: Proctor Valley Rd, SD County
Project No.: 1312-02
Date: 3/19/15

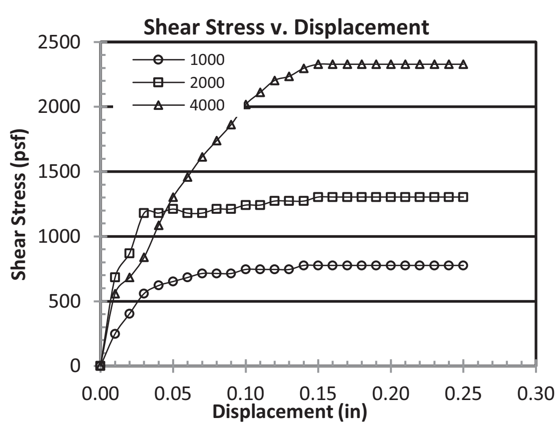
Excavation: BA-3
Depth: 15 '
Sample Type: Undisturbed
By: HM

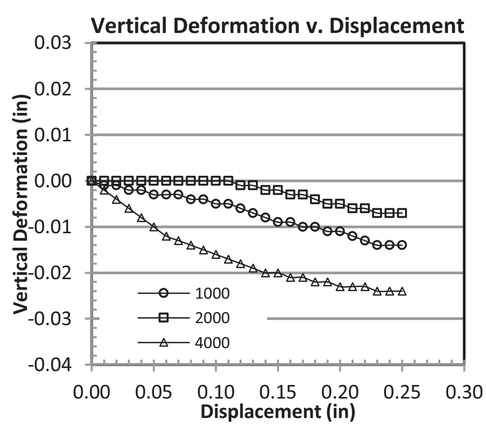
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	4000
Maximum Shear Stress (psf)	776	1304	2329
Ultimate Shear Stress (psf)	776	1304	2329
Initial Moisture Content (%)	8.4	8.4	8.4
Initial Dry Density (pcf)	113.6	116.6	108.8

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): 0.005

	Peak	Ultimate
Friction Angle, phi (deg)	27	27
Cohesion (psf)	260	260







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

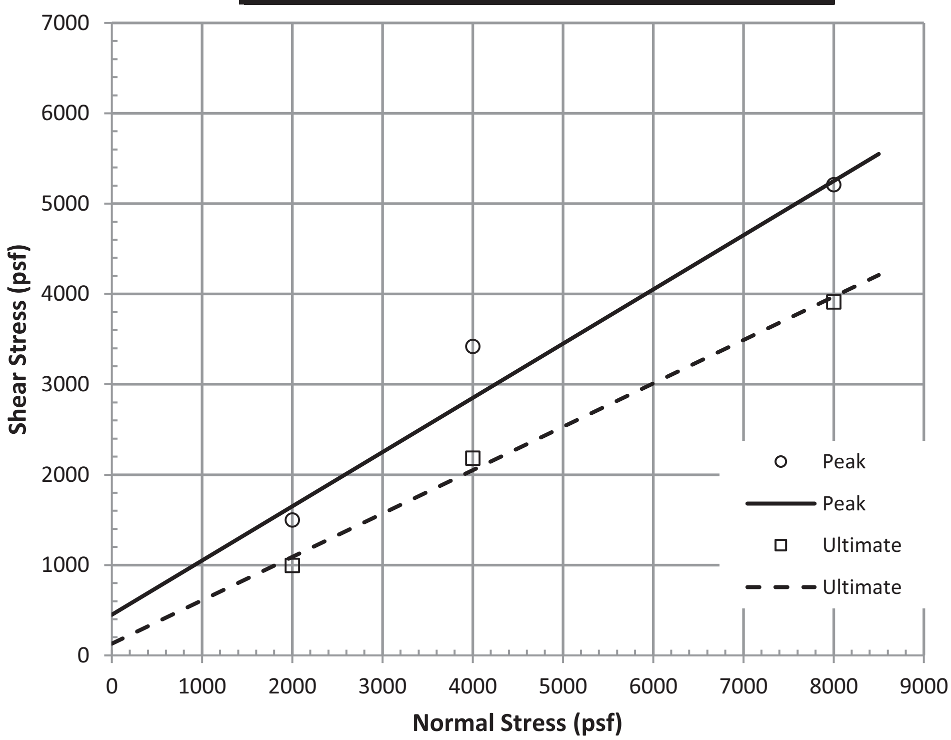
Project Name: Otay Village 14
Location: Proctor Valley Rd, SD County
Project No.: 1312-02
Date: 3/20/15

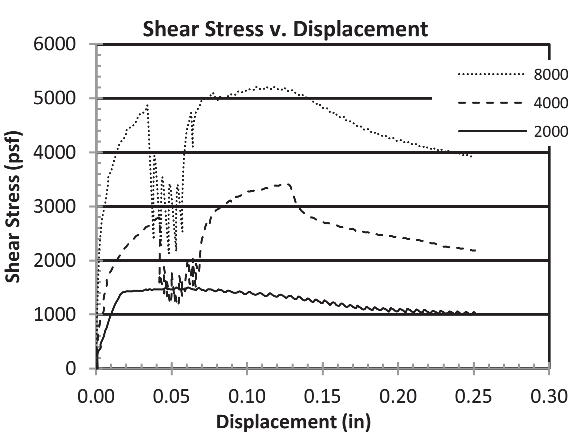
Excavation: BA-4
Depth: 25-26'
Sample Type: Undisturbed
By: HM

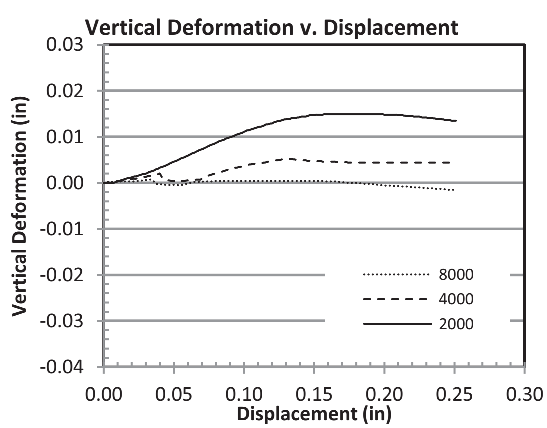
Samples Tested	1	2	3
Normal Stress (psf)	2000	4000	8000
Maximum Shear Stress (psf)	1500	3420	5208
Ultimate Shear Stress (psf)	996	2184	3912
Initial Moisture Content (%)	19.8	19.8	19.8
Initial Dry Density (pcf)	97.1	98.6	99.7

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): 0.04

	Peak	Ultimate
Friction Angle, phi (deg)	31	26
Cohesion (psf)	450	130







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

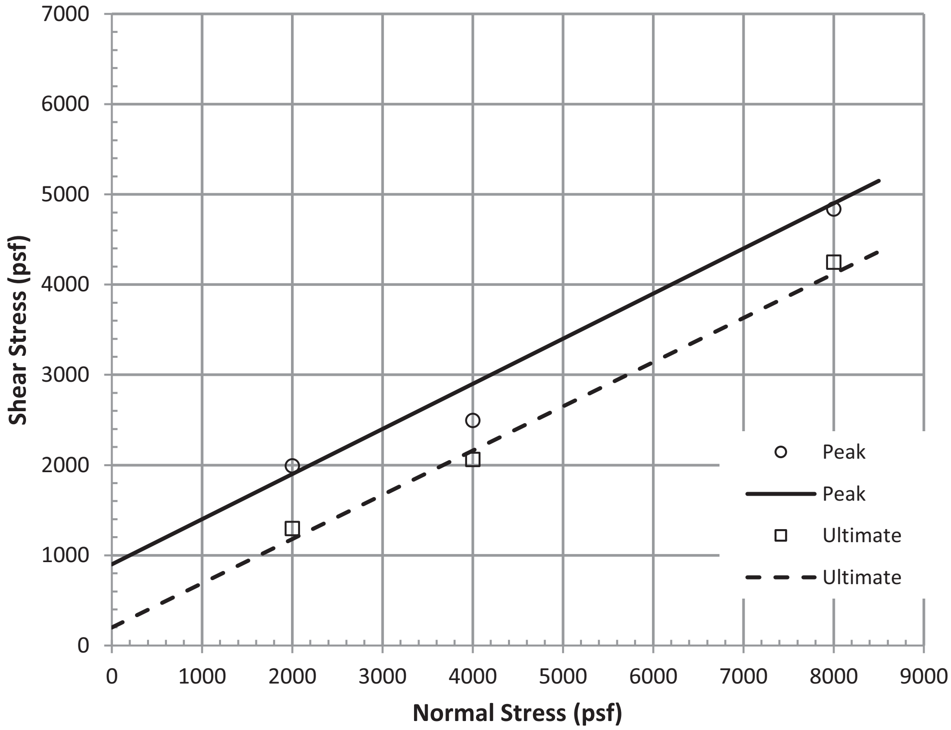
Project Name: Otay Village
Location: Proctor Valley Rd, SD County
Project No.: 1312-02
Date: 3/23/15

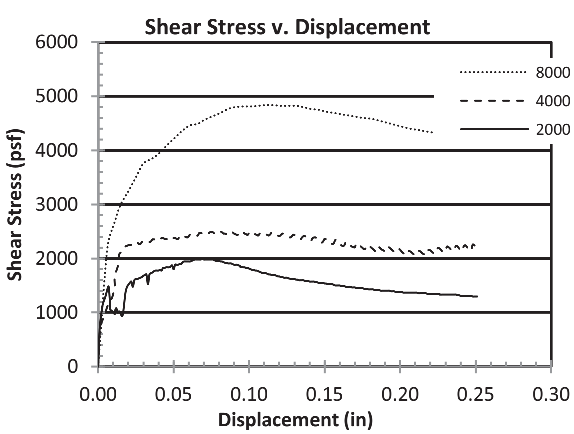
Excavation: BA-4
Depth: 36'
Sample Type: Undisturbed
By: HM

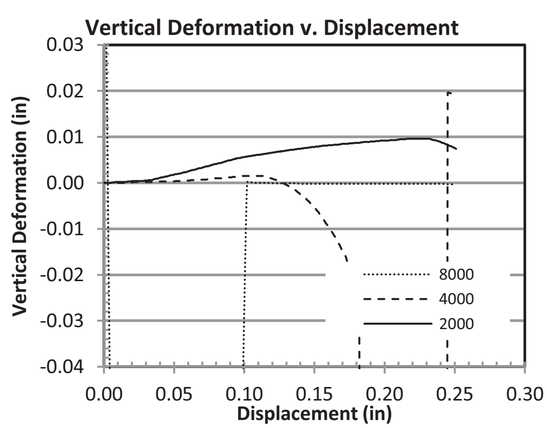
Samples Tested	1	2	3
Normal Stress (psf)	2000	4000	8000
Maximum Shear Stress (psf)	1992	2496	4836
Ultimate Shear Stress (psf)	1296	2064	4248
Initial Moisture Content (%)	18.5	18.5	18.5
Initial Dry Density (pcf)	104.1	105.3	103.2

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): 0.04

	Peak	Ultimate
Friction Angle, phi (deg)	27	26
Cohesion (psf)	900	200







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

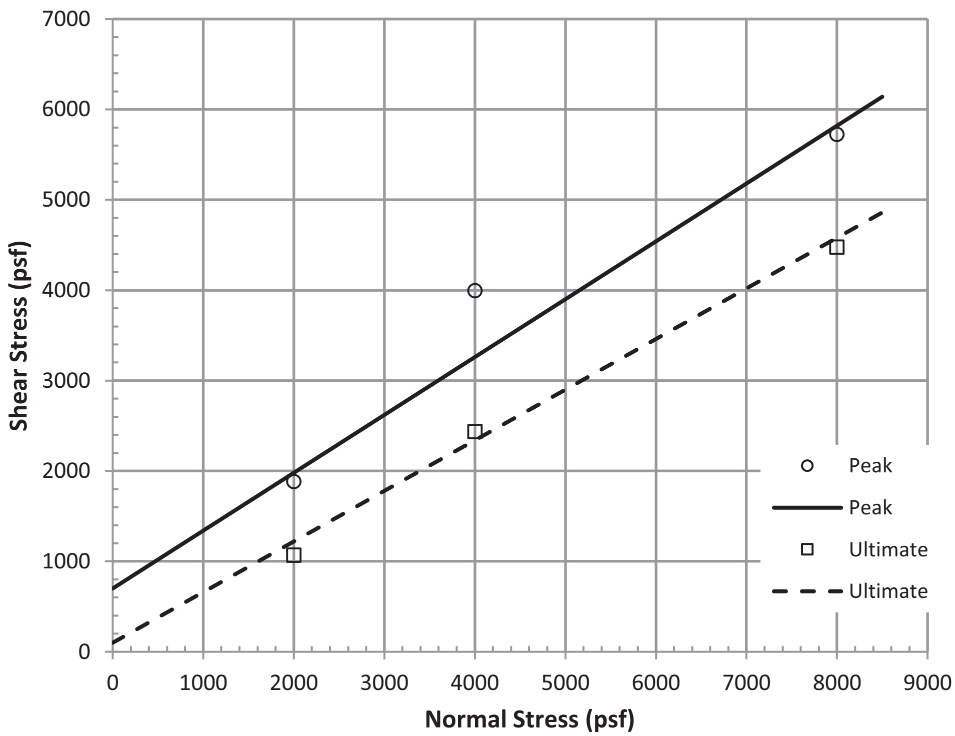
Project Name: Otay Village
Location: Proctor Valley Rd, SD County
Project No.: 1312-02
Date: 3/27/15

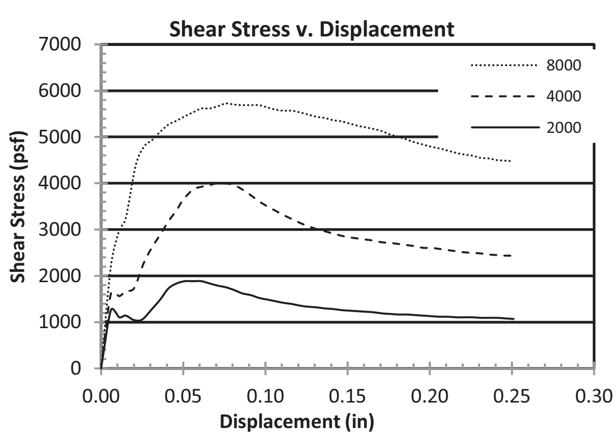
Excavation: BA-4
Depth: 52'
Sample Type: Undisturbed
By: HM

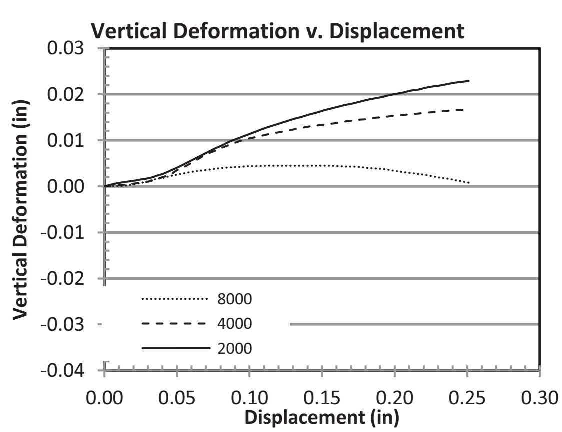
Samples Tested	1	2	3
Normal Stress (psf)	2000	4000	8000
Maximum Shear Stress (psf)	1884	3996	5724
Ultimate Shear Stress (psf)	1068	2436	4476
Initial Moisture Content (%)	19.6	19.6	19.6
Initial Dry Density (pcf)	105.4	104.3	102.2

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): 0.04

	Peak	Ultimate
Friction Angle, phi (deg)	33	29
Cohesion (psf)	700	100







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

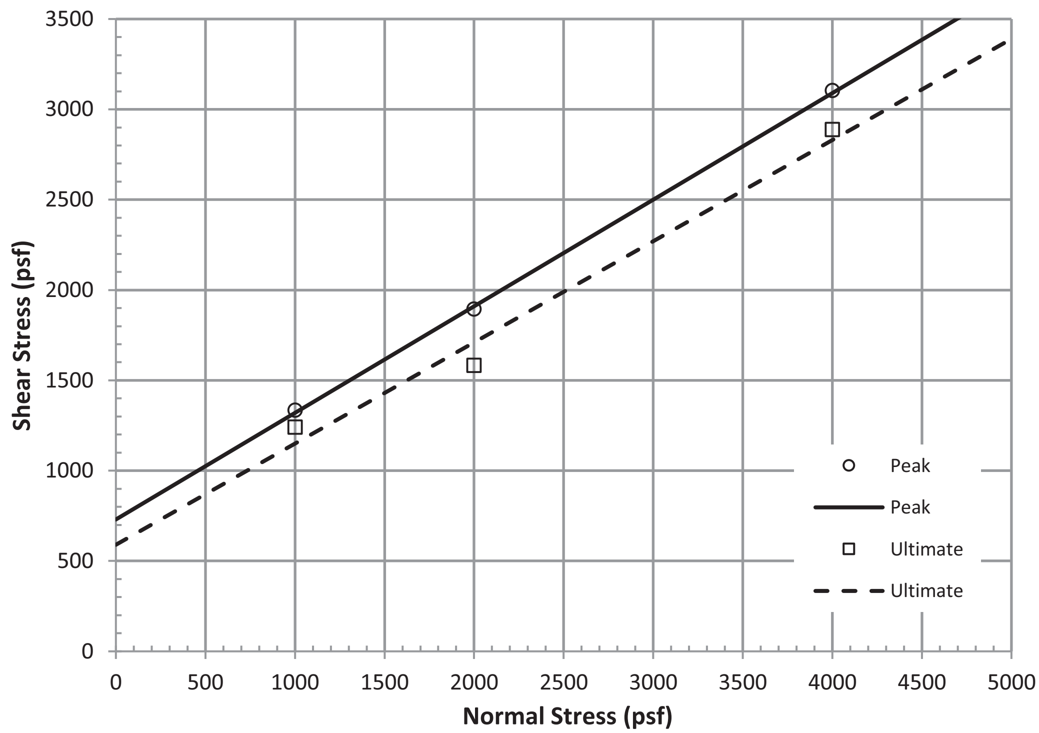
Project Name: Otay Village 14
Location: Proctor Valley Rd, SD County
Project No.: 1312-02
Date: 3/22/15

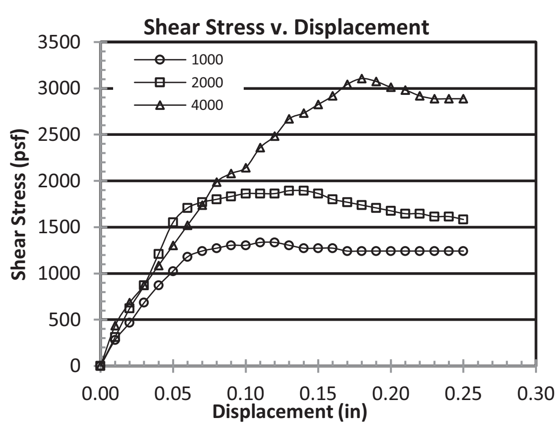
Excavation: BA-5
Depth: 10
Sample Type: Undisturbed
By: HM

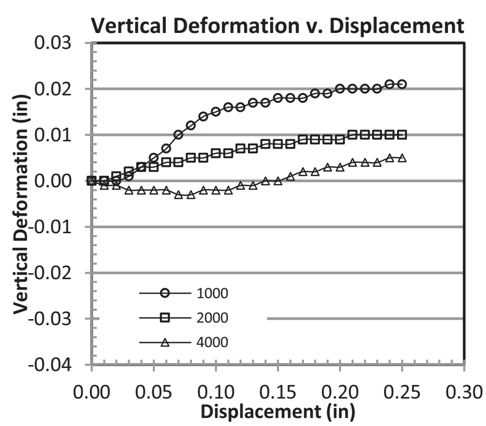
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	4000
Maximum Shear Stress (psf)	1335	1894	3105
Ultimate Shear Stress (psf)	1242	1584	2888
Initial Moisture Content (%)	12.4	12.4	12.4
Initial Dry Density (pcf)	113.6	114.8	110.8

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): 0.001

	Peak	Ultimate
Friction Angle, phi (deg)	31	29
Cohesion (psf)	730	590







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

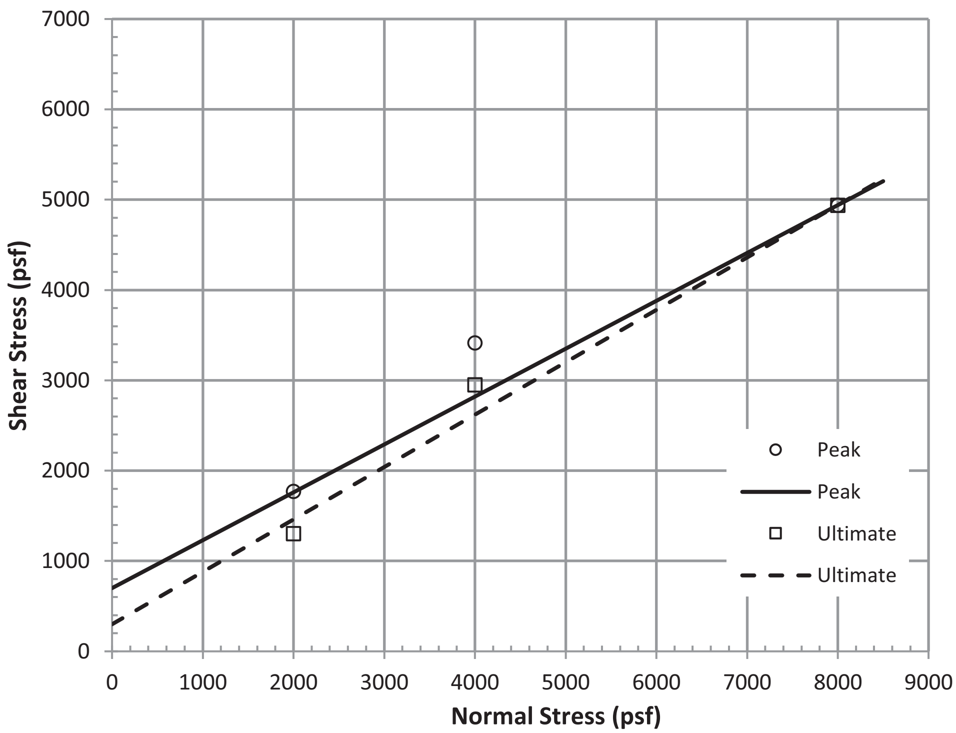
Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/25/15

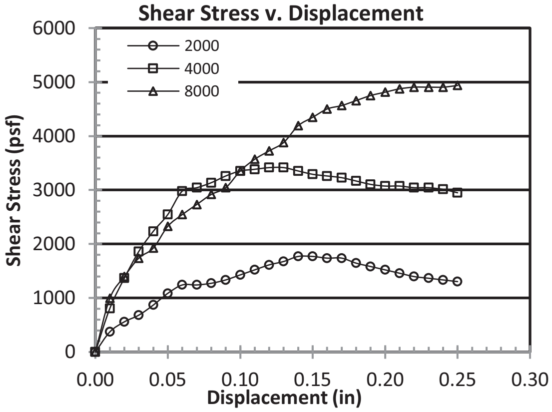
Excavation: BA-5
Depth: 66'
Sample Type: Intact
By: HM

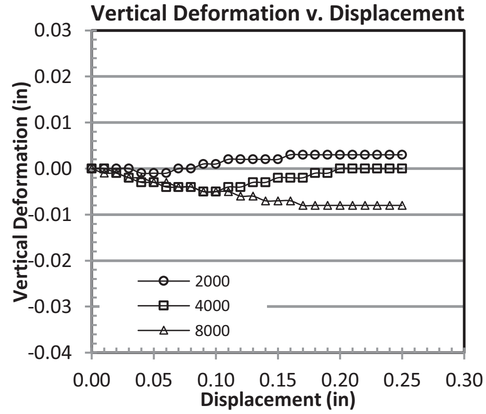
Samples Tested	1	2	3
Normal Stress (psf)	2000	4000	8000
Maximum Shear Stress (psf)	1770	3416	4937
Ultimate Shear Stress (psf)	1304	2950	4937
Initial Moisture Content (%)	14.1	14.1	14.1
Initial Dry Density (pcf)	103.5	108.3	107.1

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): 0.001

	Peak	Ultimate
Friction Angle, phi (deg)	28	30
Cohesion (psf)	700	300







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

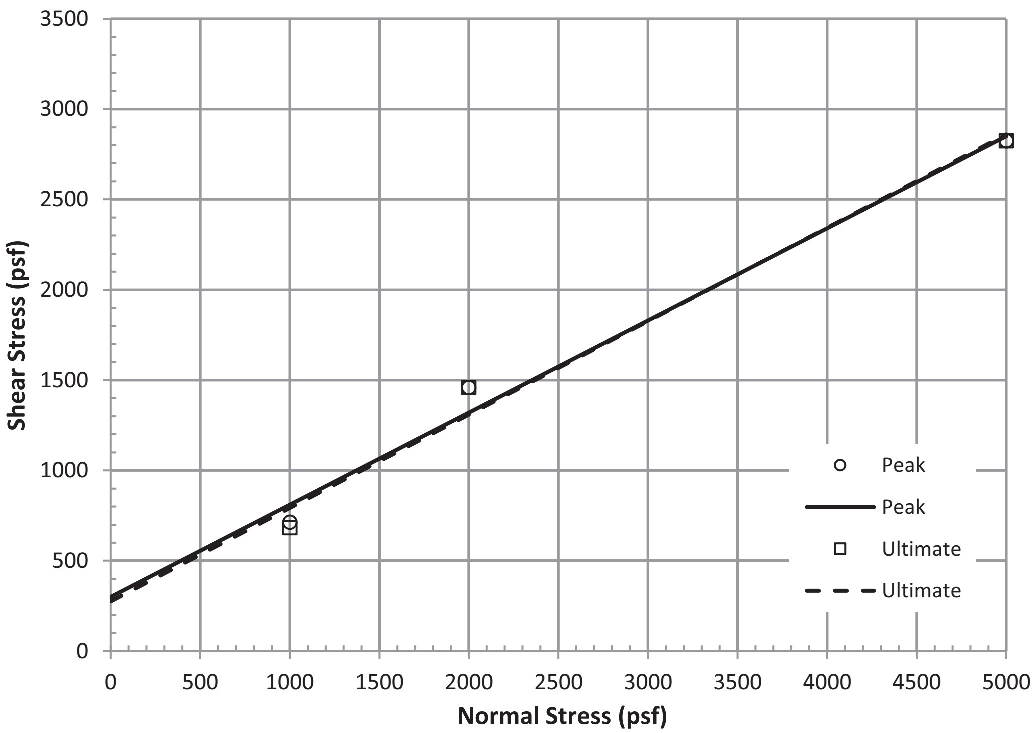
DIRECT SHEAR - ASTM D3080

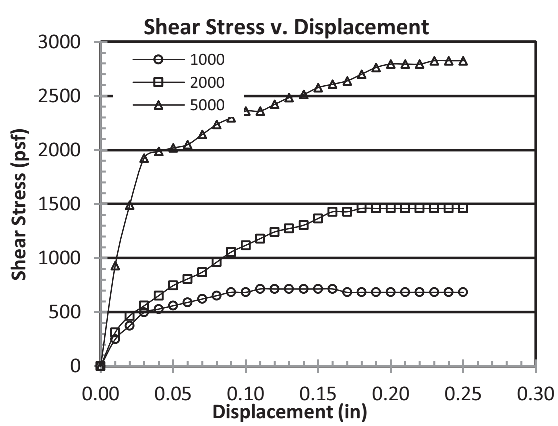
Project Name:	Otay Village 14	Excavation:	BA-8
Location:	Proctor Valley Rd, SD County	Depth:	15 '
Project No.:	1312-02	Sample Type:	Undisturbed
Date:	3/24/15	By:	HM

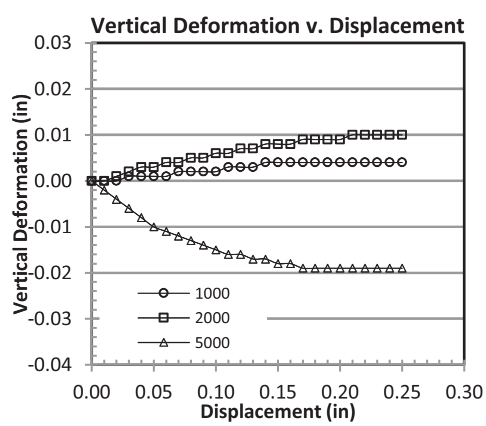
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	5000
Maximum Shear Stress (psf)	714	1459	2826
Ultimate Shear Stress (psf)	683	1459	2826
Initial Moisture Content (%)	14.4	14.4	14.4
Initial Dry Density (pcf)	99.0	100.9	108.6

Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shearing Rate (in/min):	0.001

	Peak	Ultimate
Friction Angle, phi (deg)	27	27
Cohesion (psf)	300	275







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

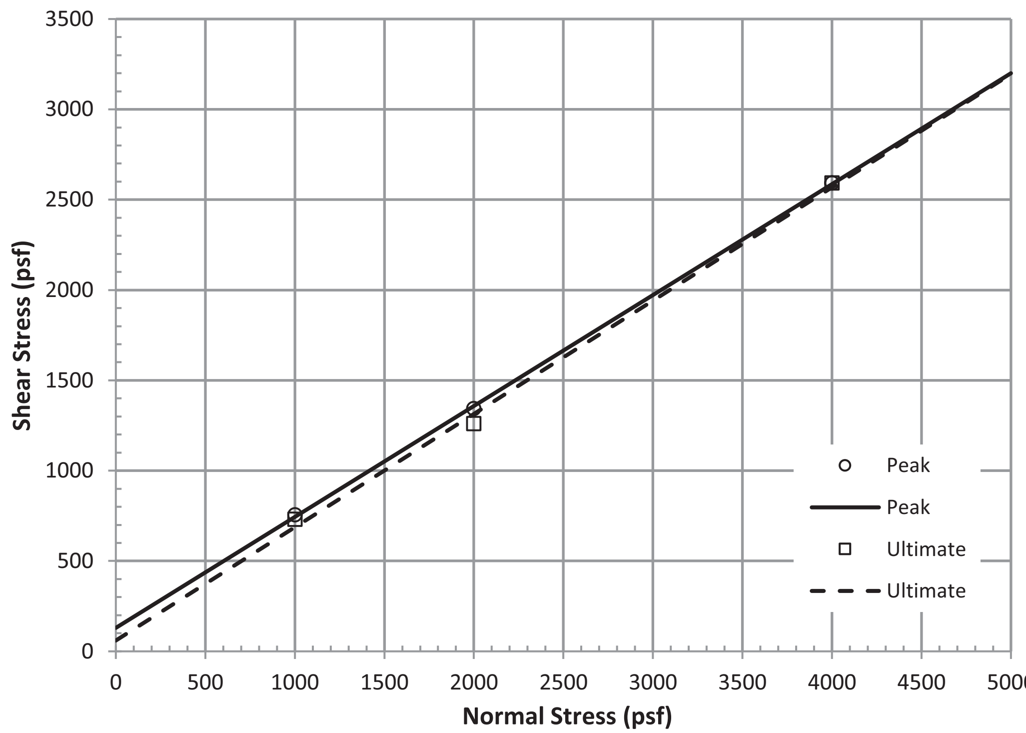
Project Name: Proctor Valley Village
Location: Chula Vista
Project No.: 1312-02
Date: 1/5/17

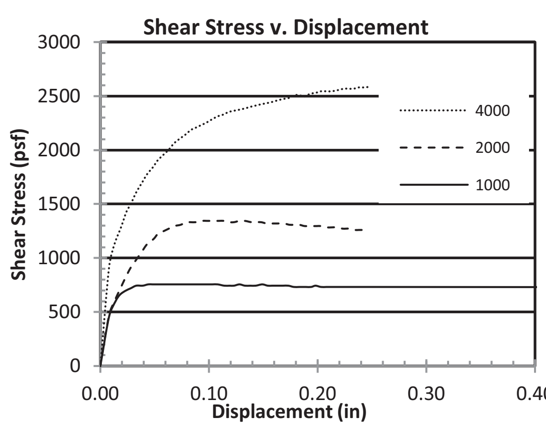
Excavation: T-7
Depth: 1-2 ft
Sample Type: Remold 90%
By: FV

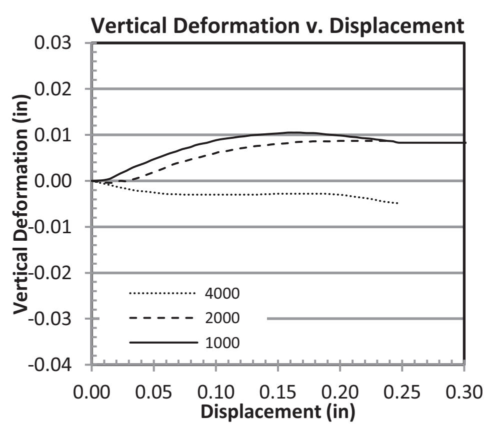
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	4000
Maximum Shear Stress (psf)	756	1344	2592
Ultimate Shear Stress (psf)	732	1260	2592
Initial Moisture Content (%)	11.0	11.0	11.0
Initial Dry Density (pcf)	111.1	111.1	111.1

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): 0.05

	Peak	Ultimate
Friction Angle, phi (deg)	32	32
Cohesion (psf)	130	60







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

DIRECT SHEAR - ASTM D3080

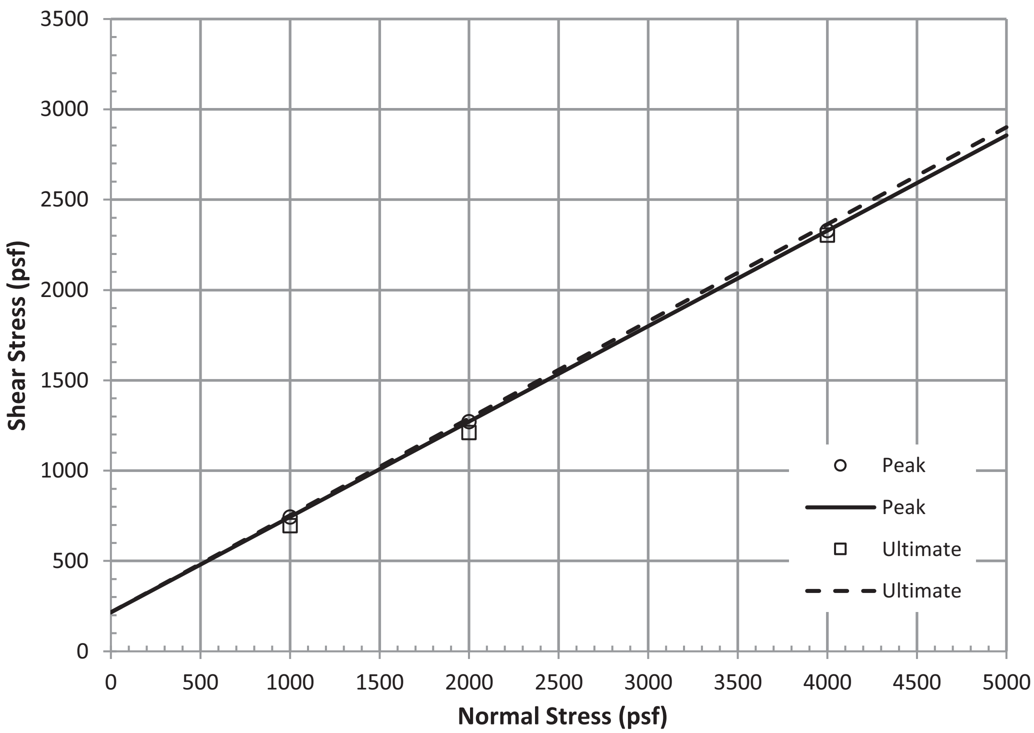
Project Name: Proctor Valley Village
Location: Chula Vista
Project No.: 1312-02
Date: 1/10/17

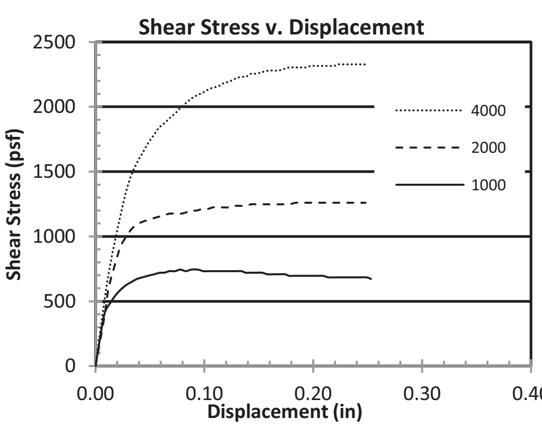
Excavation: T-15
Depth: 2-4 ft
Sample Type: Remolded 90%
By: FV

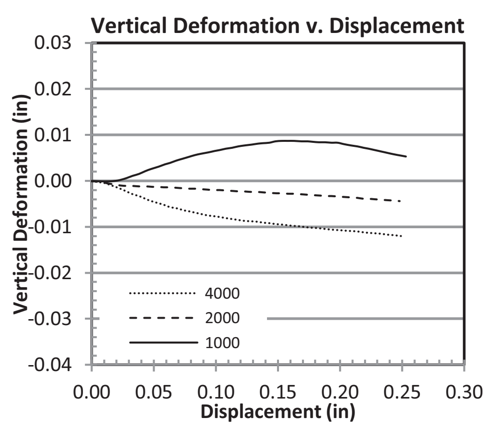
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	4000
Maximum Shear Stress (psf)	744	1272	2328
Ultimate Shear Stress (psf)	696	1212	2304
Initial Moisture Content (%)	11.0	11.0	11.0
Initial Dry Density (pcf)	110.2	110.2	110.2

Method: Drained
Consolidation: Yes
Saturation: Yes
Shearing Rate (in/min): 0.05

	Peak	Ultimate
Friction Angle, phi (deg)	28	28
Cohesion (psf)	216	216







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

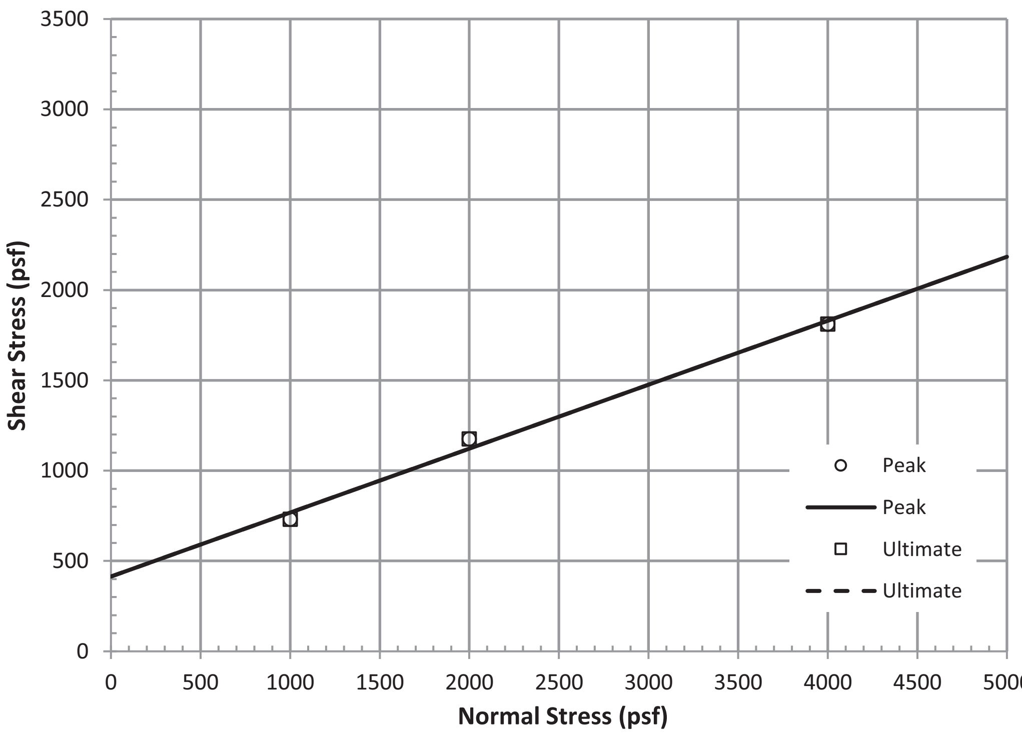
DIRECT SHEAR - ASTM D3080

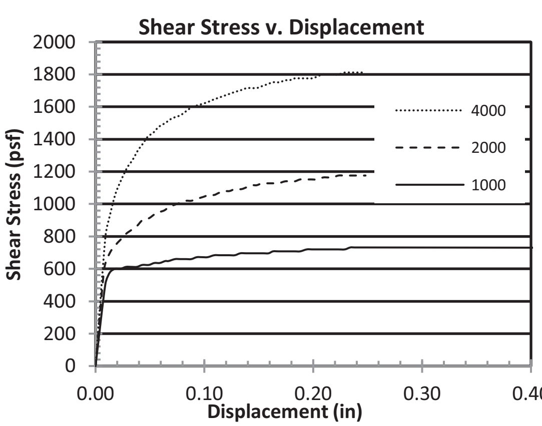
Project Name:	Proctor Valley Village	Excavation:	T-13
Location:	Chula Vista	Depth:	1-3 ft
Project No.:	1312-02	Sample Type:	Remold 90%
Date:	1/5/17	By:	FV

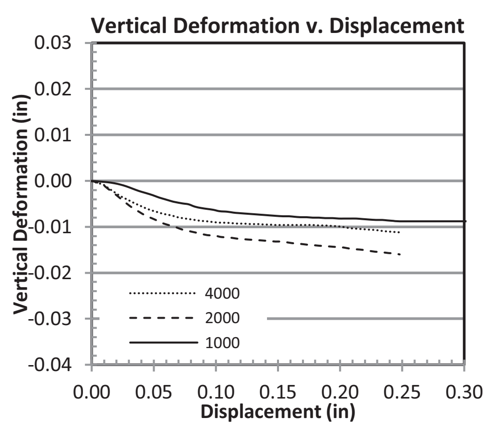
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	4000
Maximum Shear Stress (psf)	732	1176	1812
Ultimate Shear Stress (psf)	732	1176	1812
Initial Moisture Content (%)	11.0	11.0	11.0
Initial Dry Density (pcf)	109.4	109.4	109.4

Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Shearing Rate (in/min):	0.05

	Peak	Ultimate
Friction Angle, phi (deg)	19	19
Cohesion (psf)	414	414







ADVANCED GEOTECHNICAL SOLUTIONS, INC.

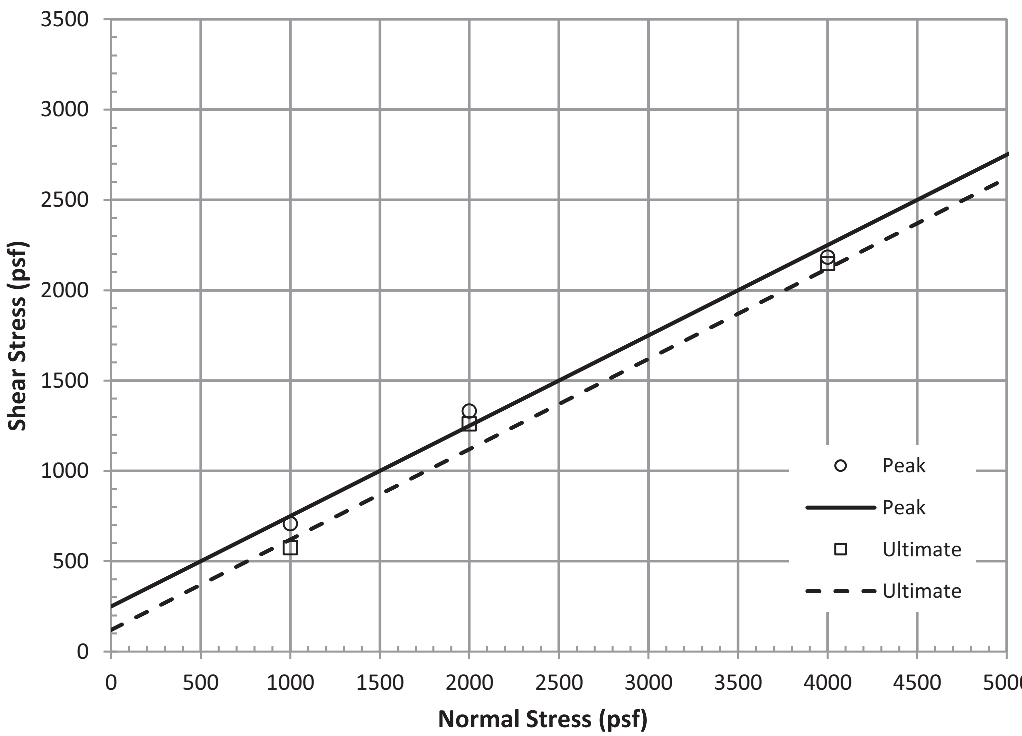
DIRECT SHEAR - ASTM D3080

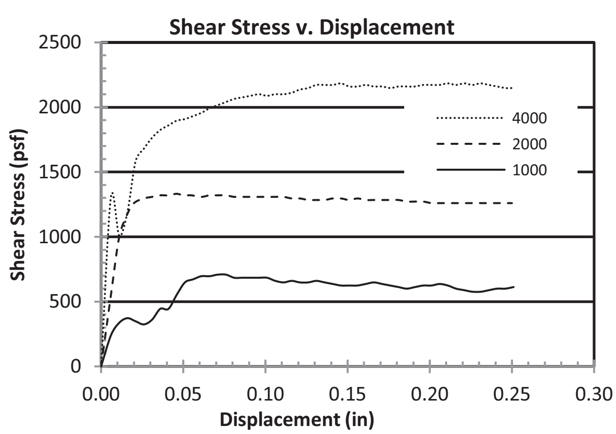
Project Name:	Otay Village 14	Excavation:	EX-11
Location:	Proctor Valley Rd, SD County	Depth:	9-10'
Project No.:	1312-02	Sample Type:	Remolded to 90% max
Date:	4/2/15	By:	HM

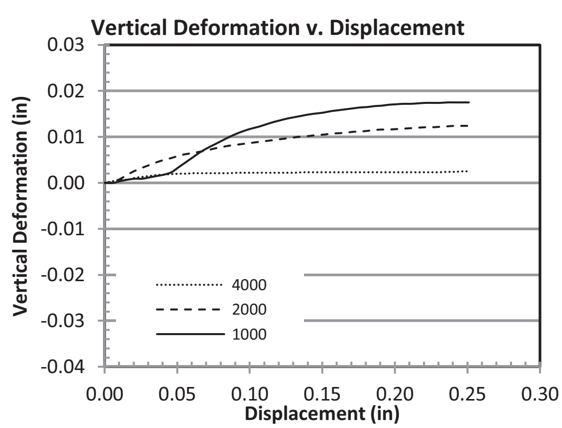
Samples Tested	1	2	3
Normal Stress (psf)	1000	2000	4000
Maximum Shear Stress (psf)	708	1332	2184
Ultimate Shear Stress (psf)	576	1260	2148
Initial Moisture Content (%)	12.0	12.0	12.0
Initial Dry Density (pcf)	103.5	103.5	103.5

Method:	Drained
Consolidation:	Yes
Saturation:	Yes
Strain Rate (in/min):	0.04

	Peak	Ultimate
Friction Angle, phi (deg)	27	27
Cohesion (psf)	250	120



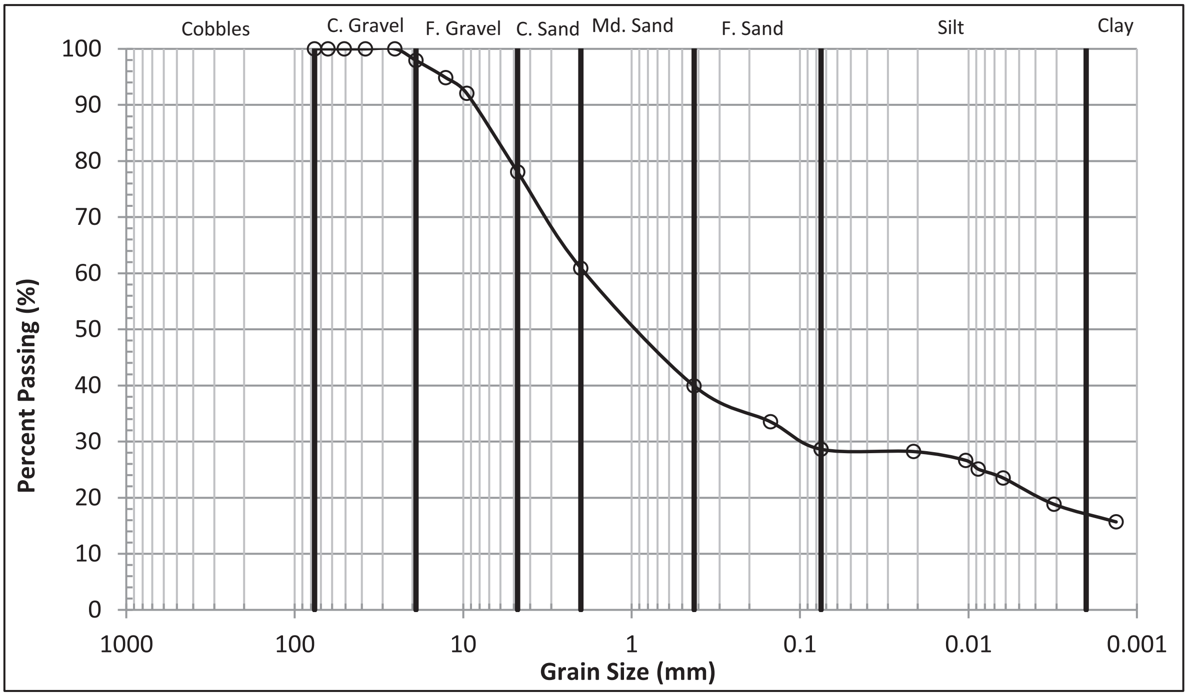




ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name:	Otay- Village 14	Excavation:	BA-1
Location:	Proctor Valley Road, SD County	Depth:	10-11 '
Project No.:	1312-02	By:	H M
Date:	3/10/15		



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	97.95
1/2 "	12.70	94.87
3/8 "	9.53	92.07
# 4	4.75	78.06
# 10	2.00	60.92
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	39.90
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	33.54
# 200	0.075	28.63
Hydro	0.0332	#N/A
Hydro	0.0212	28.22
Hydro	0.0104	26.65
Hydro	0.0087	25.08
Hydro	0.0062	23.52
Hydro	0.0031	18.81
Hydro	0.0013	15.68

Summary	
% Gravel =	21.9
% Sand =	49.4
% Fines =	28.6
Sum =	100.0

LL= ______

PL= ______

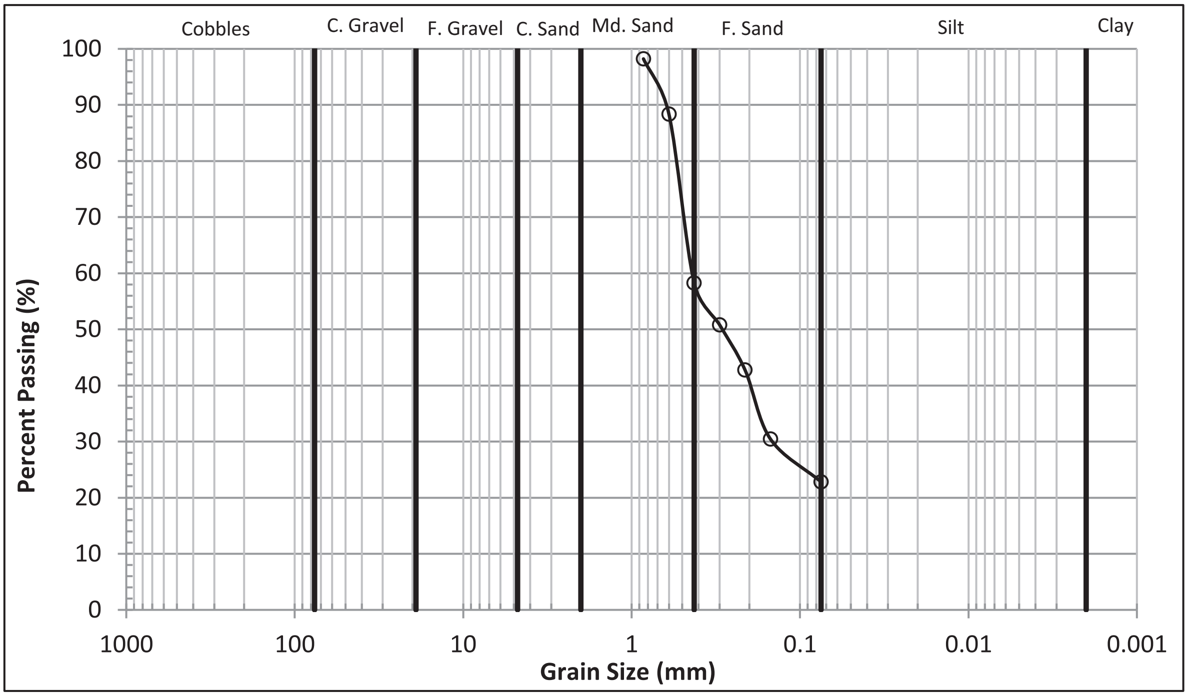
PI= ______

Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name:	Village14 Proctor Valley	Excavation:	T-1
Location:	Chula Vista	Depth:	9 ft
Project No.:	1312-02	By:	FV
Date:			



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	100.00
# 4	4.75	100.00
# 10	2.00	100.00
# 20	0.85	98.22
# 30	0.60	88.34
# 40	0.425	58.26
# 50	0.30	50.79
# 60	0.212	42.75
# 100	0.15	30.47
# 200	0.075	22.81
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!

Summary	
% Gravel =	0.0
% Sand =	77.2
% Fines =	22.8
Sum =	100.0

LL= ____________

PL= ____________

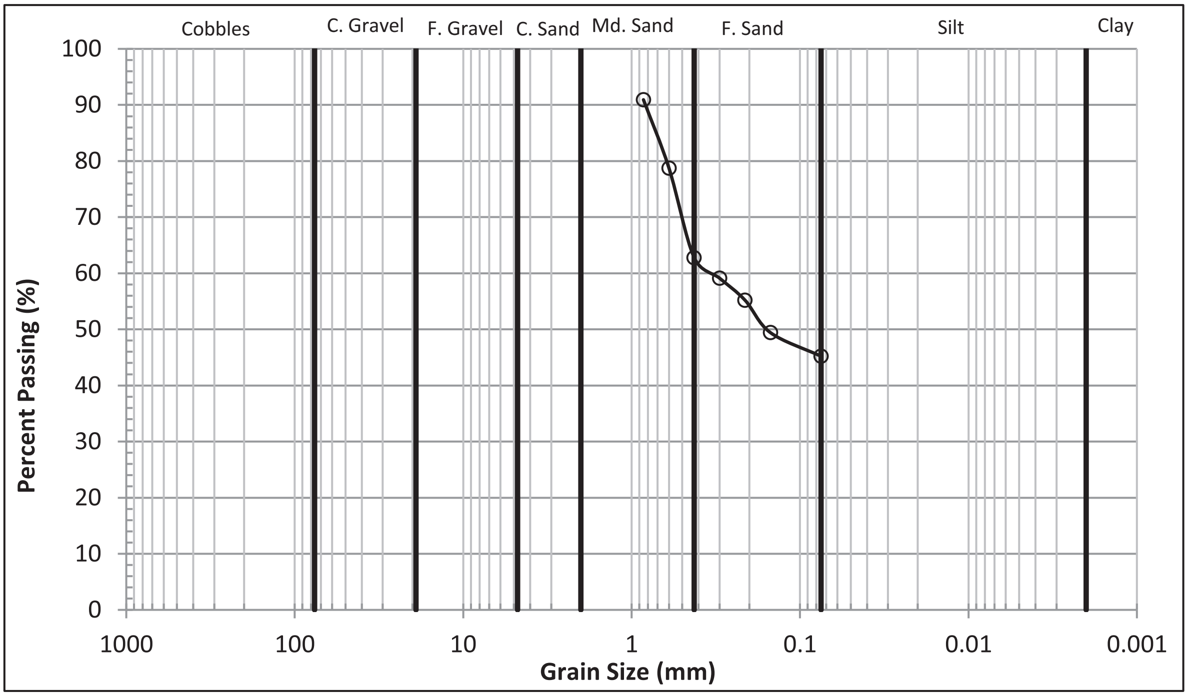
PI= ____________

Soil Type: ____________

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name:	Village14 Proctor Valley	Excavation:	T-8
Location:	Chula Vista	Depth:	2 Ft
Project No.:	1312-02	By:	FV
Date:			



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	100.00
# 4	4.75	100.00
# 10	2.00	100.00
# 20	0.85	90.92
# 30	0.60	78.76
# 40	0.425	62.78
# 50	0.30	59.11
# 60	0.212	55.19
# 100	0.15	49.43
# 200	0.075	45.21
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!

Summary	
% Gravel =	0.0
% Sand =	54.8
% Fines =	45.2
Sum =	100.0

LL= ____________

PL= ____________

PI= ____________

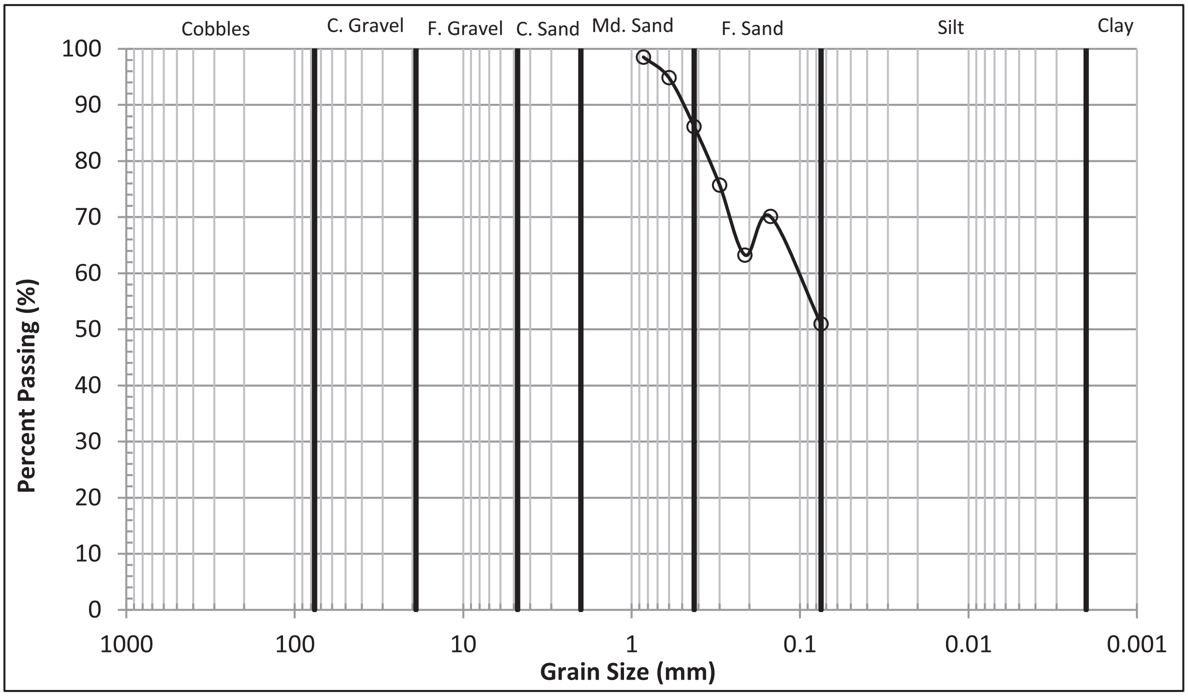
Soil Type: ____________

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Village14 Proctor Valley
Location: Chula Vista
Project No.: 1312-02
Date:

Excavation: T-7
Depth: 2 Ft
By: FV



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	100.00
# 4	4.75	100.00
# 10	2.00	100.00
# 20	0.85	98.52
# 30	0.60	94.85
# 40	0.425	86.15
# 50	0.30	75.74
# 60	0.212	63.24
# 100	0.15	70.12
# 200	0.075	50.95
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!

Summary	
% Gravel =	0.0
% Sand =	49.0
% Fines =	51.0
Sum =	100.0

LL=
PL=
PI=

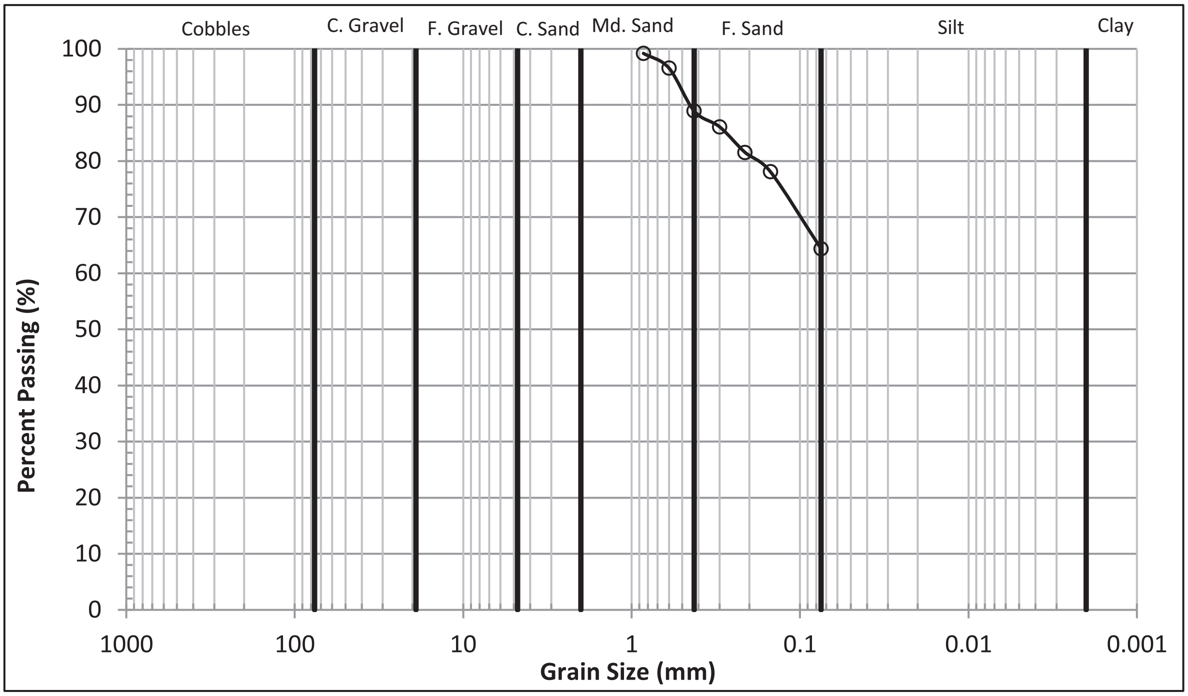
Soil Type:

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Village14 Proctor Valley
Location: Chula Vista
Project No.: 1312-02
Date:

Excavation: T-4
Depth: 5 ft
By: FV



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	100.00
# 4	4.75	100.00
# 10	2.00	100.00
# 20	0.85	99.19
# 30	0.60	96.57
# 40	0.425	88.91
# 50	0.30	86.10
# 60	0.212	81.54
# 100	0.15	78.11
# 200	0.075	64.36
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!
Hydro	#DIV/0!	#DIV/0!

Summary	
% Gravel =	0.0
% Sand =	35.6
% Fines =	64.4
Sum =	100.0

LL=
PL=
PI=

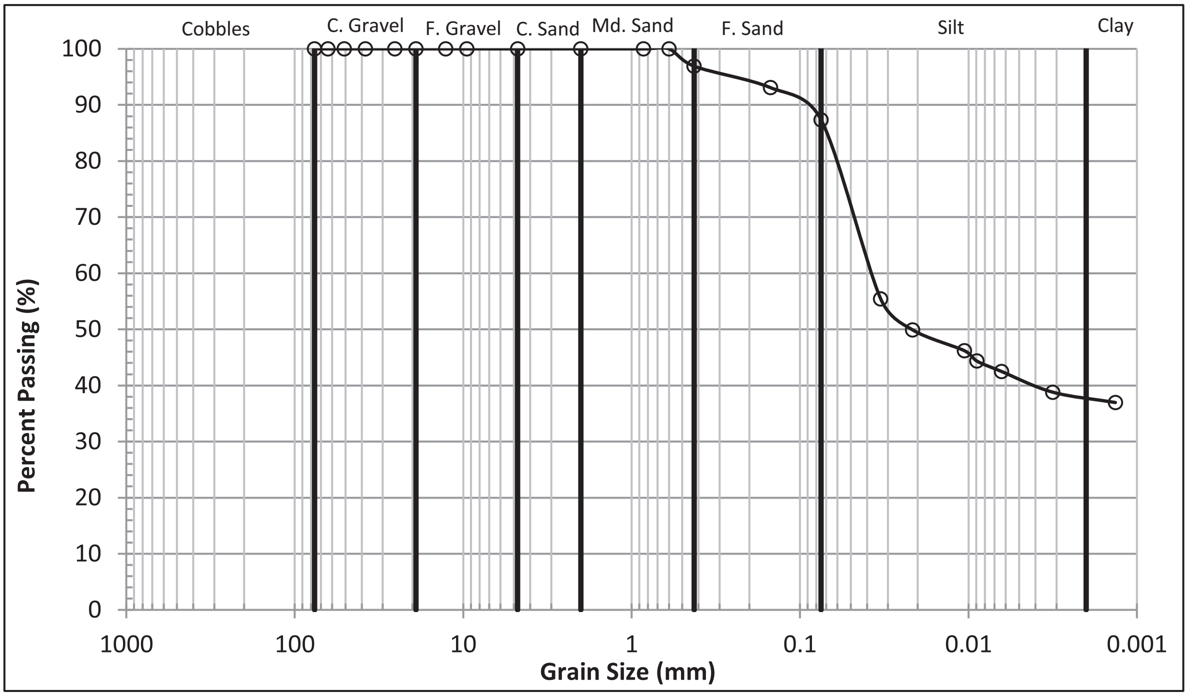
Soil Type:

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay- Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-1
Depth: 15-16 '
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	100.00
# 4	4.75	100.00
# 10	2.00	100.00
# 20	0.85	100.00
# 30	0.60	100.00
# 40	0.425	96.90
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	93.09
# 200	0.075	87.36
Hydro	0.0332	55.44
Hydro	0.0214	49.90
Hydro	0.0106	46.20
Hydro	0.0089	44.35
Hydro	0.0064	42.51
Hydro	0.0032	38.81
Hydro	0.0013	36.96

Summary	
% Gravel =	0.0
% Sand =	12.6
% Fines =	87.4
Sum =	100.0

LL= ______
PL= ______
PI= ______

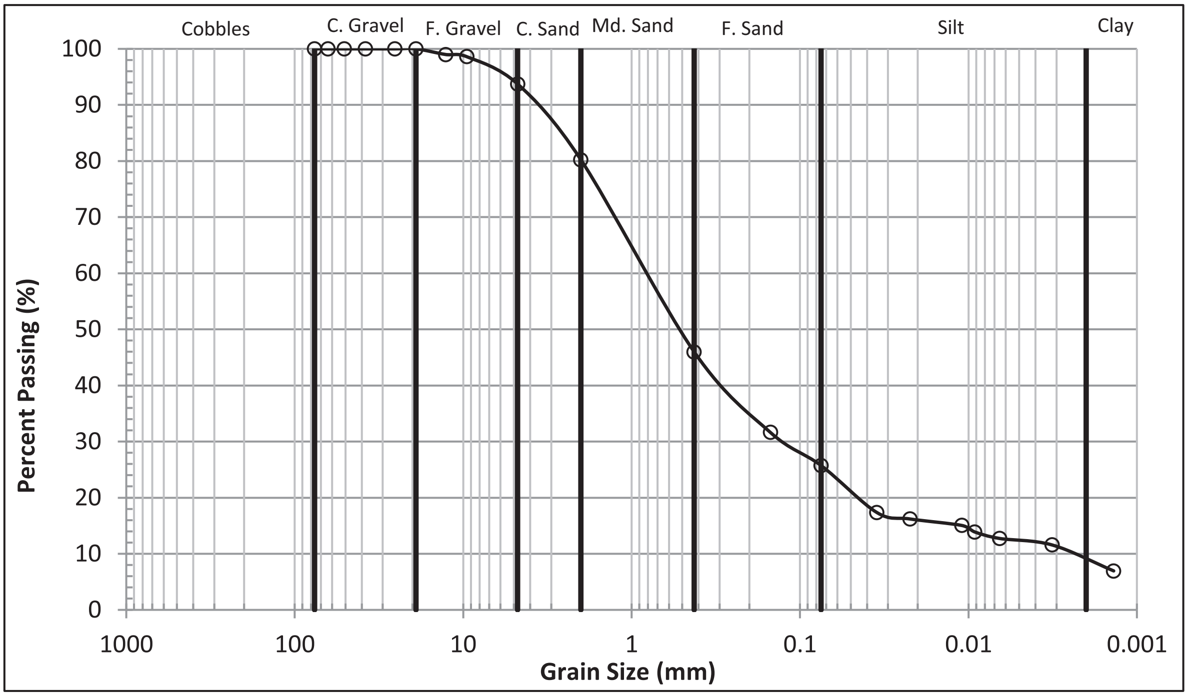
Soil Type: CL-ML

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay- Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-1
Depth: 5-6 '
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	98.99
3/8 "	9.53	98.61
# 4	4.75	93.74
# 10	2.00	80.24
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	45.99
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	31.63
# 200	0.075	25.73
Hydro	0.0350	17.36
Hydro	0.0222	16.20
Hydro	0.0109	15.04
Hydro	0.0092	13.89
Hydro	0.0065	12.73
Hydro	0.0032	11.57
Hydro	0.0014	6.94

Summary	
% Gravel =	6.3
% Sand =	68.0
% Fines =	25.7
Sum =	100.0

LL=
PL=
PI=

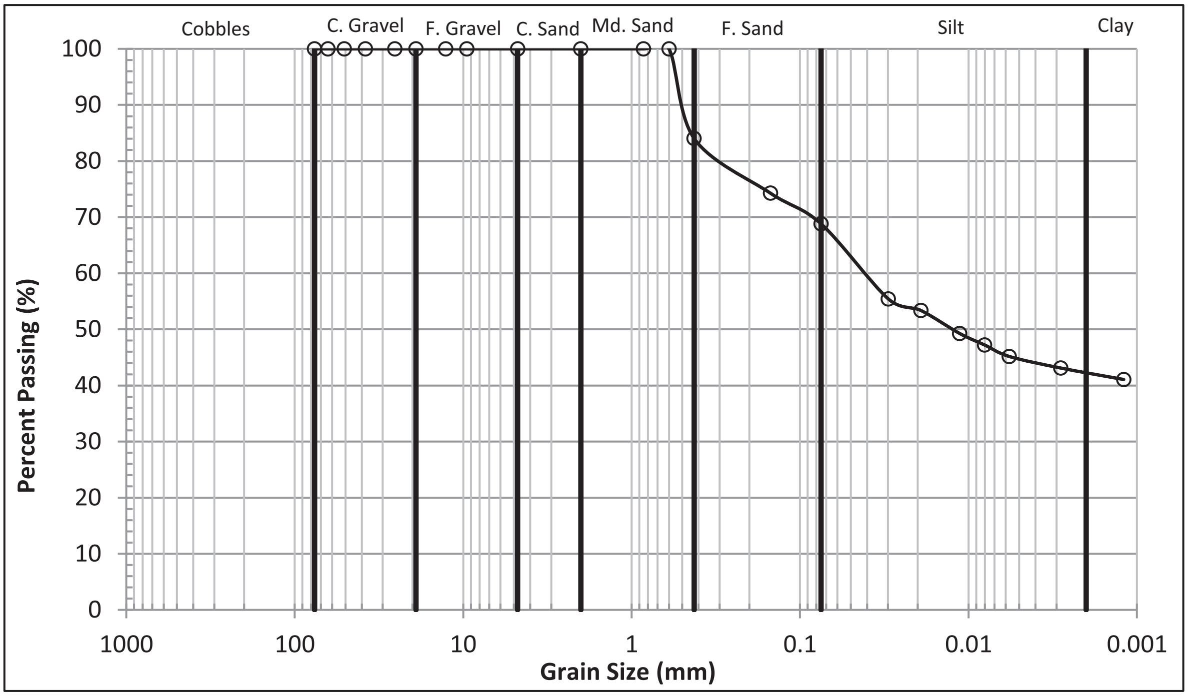
Soil Type: SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-2
Depth: 1-2 '
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	100.00
# 4	4.75	100.00
# 10	2.00	100.00
# 20	0.85	100.00
# 30	0.60	100.00
# 40	0.425	84.01
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	74.28
# 200	0.075	68.81
Hydro	0.0299	55.43
Hydro	0.0192	53.38
Hydro	0.0113	49.27
Hydro	0.0080	47.22
Hydro	0.0057	45.17
Hydro	0.0028	43.11
Hydro	0.0012	41.06

Summary	
% Gravel =	0.0
% Sand =	31.2
% Fines =	68.8
Sum =	100.0

LL= __________

PL= __________

PI= __________

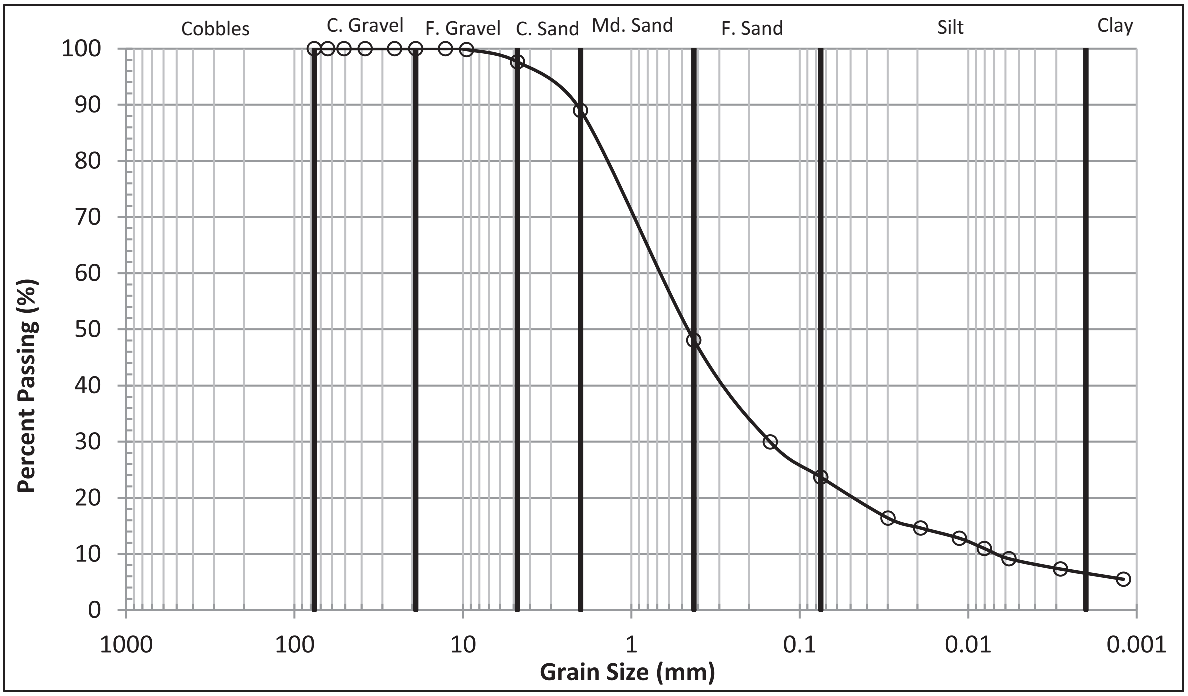
Soil Type: __________

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-2
Depth: 13-14 '
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	99.84
# 4	4.75	97.65
# 10	2.00	89.02
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	48.06
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	29.96
# 200	0.075	23.67
Hydro	0.0299	16.38
Hydro	0.0192	14.62
Hydro	0.0113	12.79
Hydro	0.0080	10.97
Hydro	0.0057	9.14
Hydro	0.0028	7.31
Hydro	0.0012	5.48

Summary	
% Gravel =	2.4
% Sand =	74.0
% Fines =	23.7
Sum =	100.0

LL=
PL=
PI=

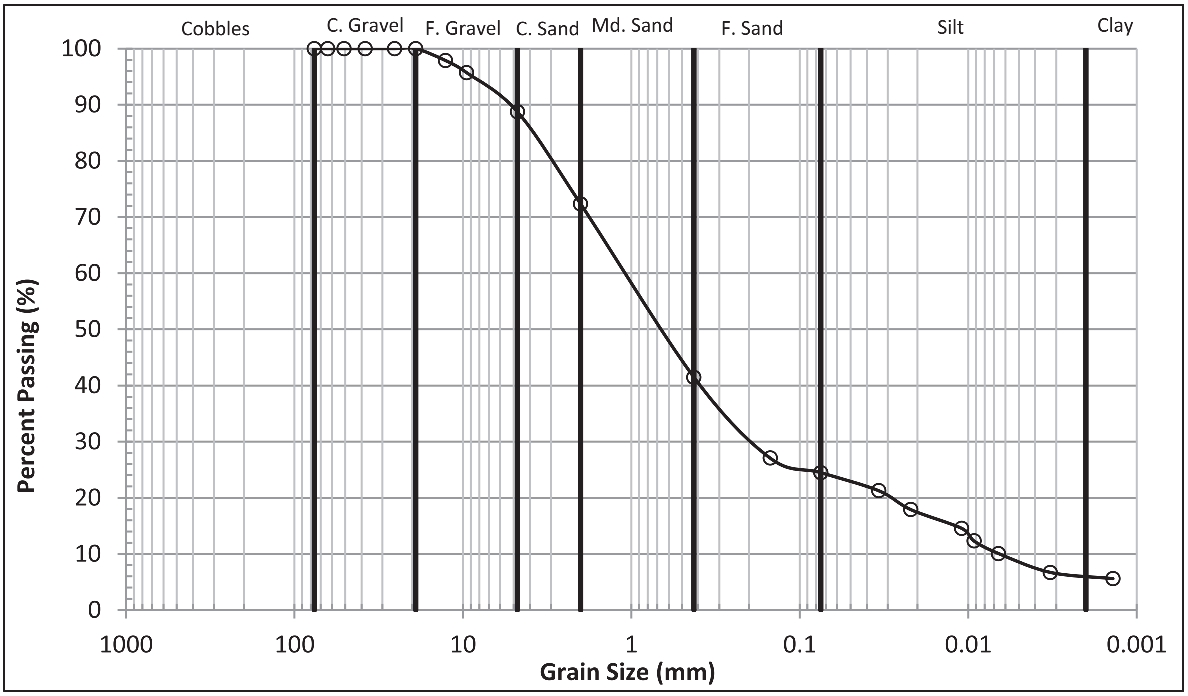
Soil Type: SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-3
Depth: 11-12'
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	97.89
3/8 "	9.53	95.74
# 4	4.75	88.76
# 10	2.00	72.35
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	41.47
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	27.07
# 200	0.075	24.47
Hydro	0.0340	21.26
Hydro	0.0220	17.90
Hydro	0.0109	14.55
Hydro	0.0092	12.31
Hydro	0.0066	10.07
Hydro	0.0033	6.71
Hydro	0.0014	5.60

Summary	
% Gravel =	11.2
% Sand =	64.3
% Fines =	24.5
Sum =	100.0

LL=
PL=
PI=

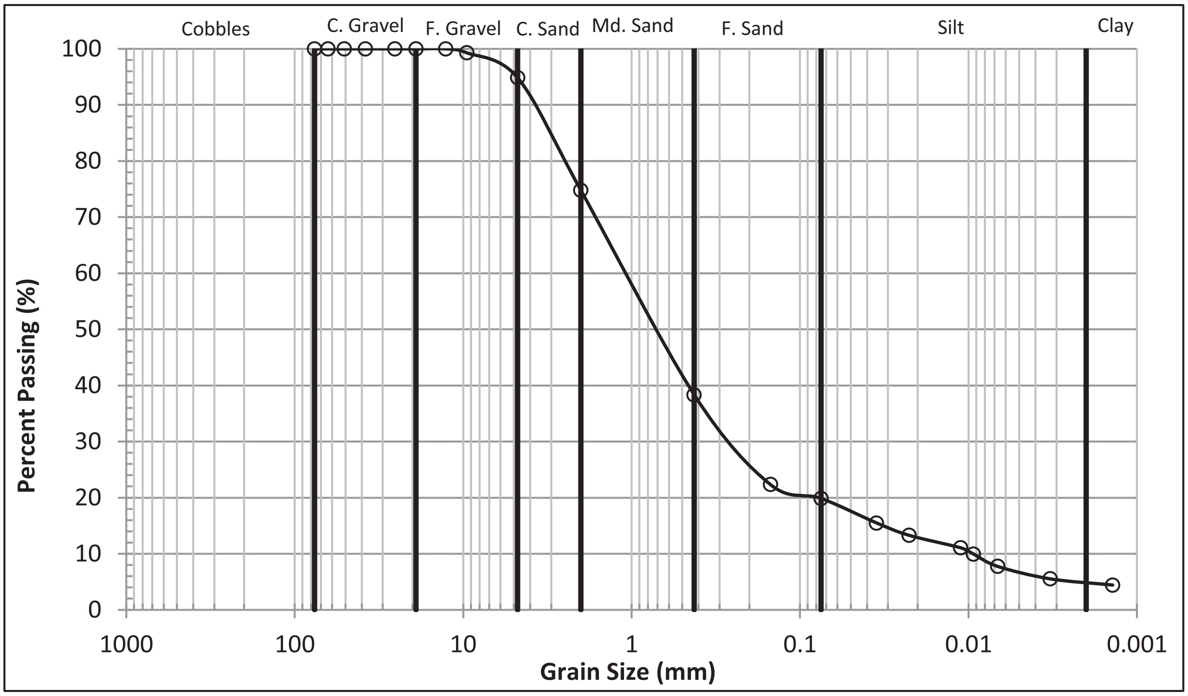
Soil Type: SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-3
Depth: 15-16 '
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	99.31
# 4	4.75	94.86
# 10	2.00	74.79
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	38.35
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	22.35
# 200	0.075	19.87
Hydro	0.0351	15.50
Hydro	0.0225	13.28
Hydro	0.0111	11.07
Hydro	0.0093	9.96
Hydro	0.0067	7.75
Hydro	0.0033	5.53
Hydro	0.0014	4.43

Summary	
% Gravel =	5.1
% Sand =	75.0
% Fines =	19.9
Sum =	100.0

LL= ______
PL= ______
PI= ______

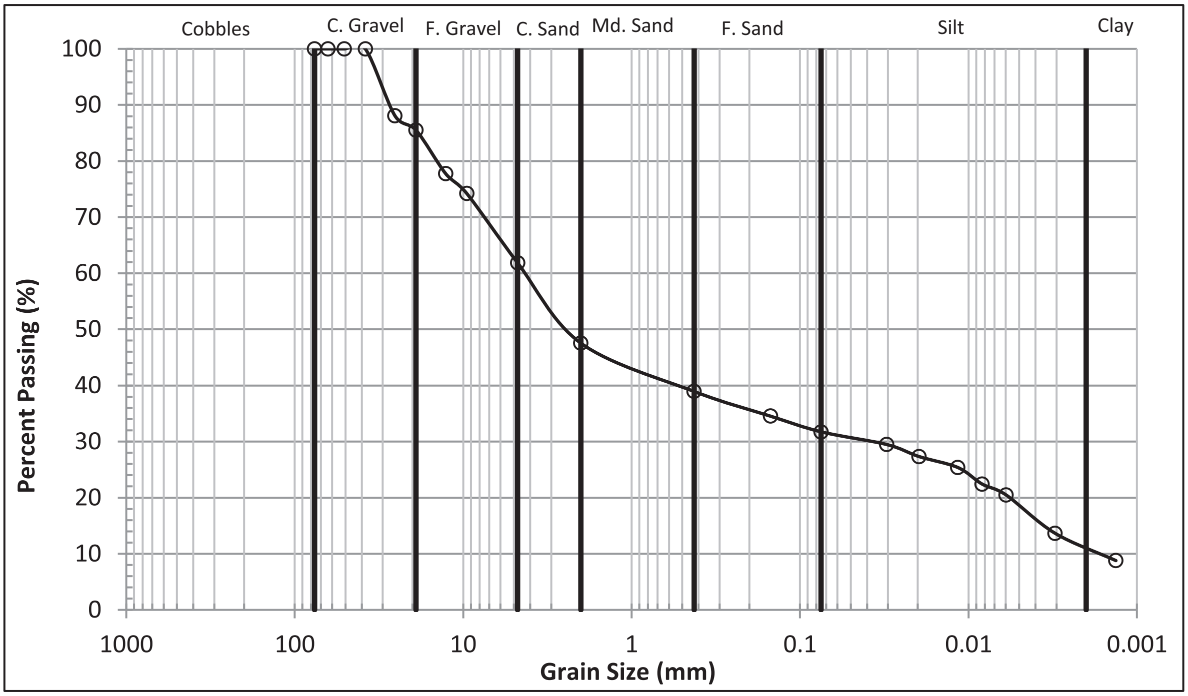
Soil Type: SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-4
Depth: 18-19 '
By: HM



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	88.07
3/4 "	19.05	85.52
1/2 "	12.70	77.76
3/8 "	9.53	74.24
# 4	4.75	61.86
# 10	2.00	47.54
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	38.93
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	34.54
# 200	0.075	31.74
Hydro	0.0306	29.48
Hydro	0.0197	27.33
Hydro	0.0116	25.38
Hydro	0.0083	22.45
Hydro	0.0060	20.50
Hydro	0.0031	13.66
Hydro	0.0013	8.78

Summary	
% Gravel =	38.1
% Sand =	30.1
% Fines =	31.7
Sum =	100.0

LL= ____________
PL= ____________
PI= ____________

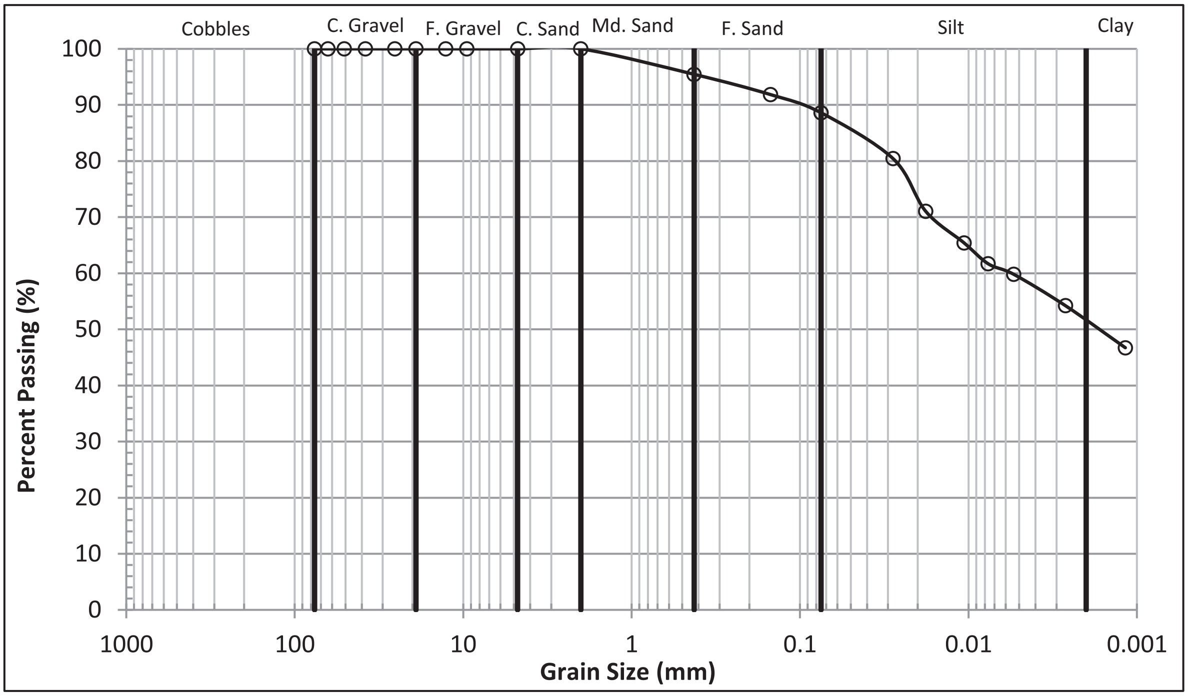
Soil Type: ____________

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-4
Depth: 25-26 '
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	100.00
# 4	4.75	100.00
# 10	2.00	100.00
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	95.46
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	91.86
# 200	0.075	88.61
Hydro	0.0280	80.43
Hydro	0.0179	71.02
Hydro	0.0106	65.42
Hydro	0.0076	61.68
Hydro	0.0054	59.81
Hydro	0.0027	54.20
Hydro	0.0012	46.73

Summary	
% Gravel =	0.0
% Sand =	11.4
% Fines =	88.6
Sum =	100.0

LL= ______
PL= ______
PI= ______

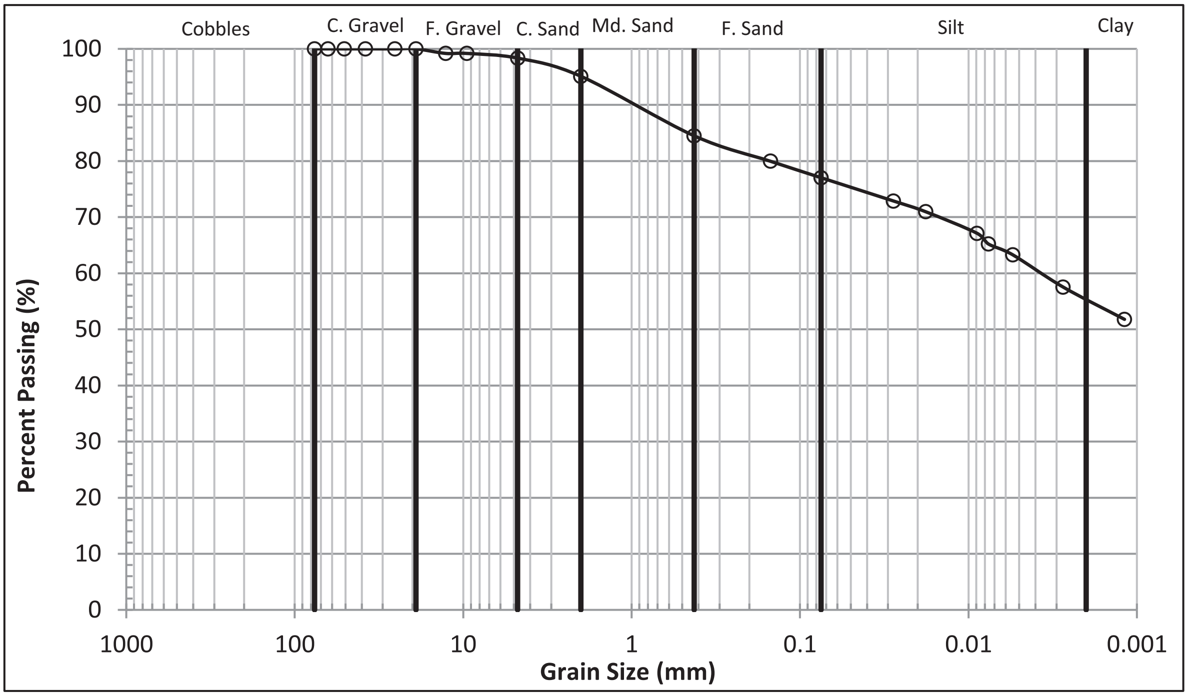
Soil Type: ______

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-4
Depth: 36-37 '
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	99.19
3/8 "	9.53	99.19
# 4	4.75	98.36
# 10	2.00	95.11
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	84.49
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	79.97
# 200	0.075	77.03
Hydro	0.0279	72.88
Hydro	0.0179	70.96
Hydro	0.0089	67.13
Hydro	0.0076	65.21
Hydro	0.0055	63.29
Hydro	0.0027	57.54
Hydro	0.0012	51.78

Summary	
% Gravel =	1.6
% Sand =	21.3
% Fines =	77.0
Sum =	100.0

LL= ________

PL= ________

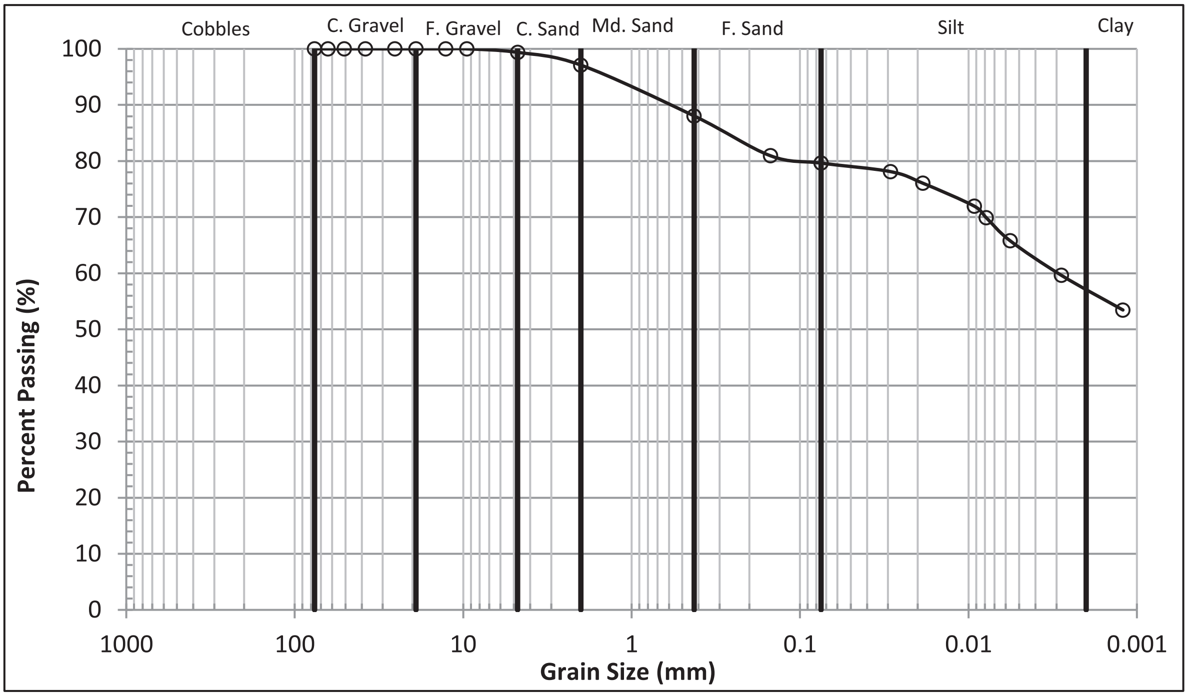
PI= ________

Soil Type: ________

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name:	Otay Village 14	Excavation:	BA-4
Location:	Proctor Valley Road, SD County	Depth:	52-53 '
Project No.:	1312-02	By:	H M
Date:	3/10/15		



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	100.00
# 4	4.75	99.38
# 10	2.00	97.10
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	88.04
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	80.95
# 200	0.075	79.63
Hydro	0.0291	78.12
Hydro	0.0187	76.07
Hydro	0.0092	71.95
Hydro	0.0078	69.90
Hydro	0.0057	65.79
Hydro	0.0028	59.62
Hydro	0.0012	53.45

Summary	
% Gravel =	0.6
% Sand =	19.7
% Fines =	79.6
Sum =	100.0

LL= ________

PL= ________

PI= ________

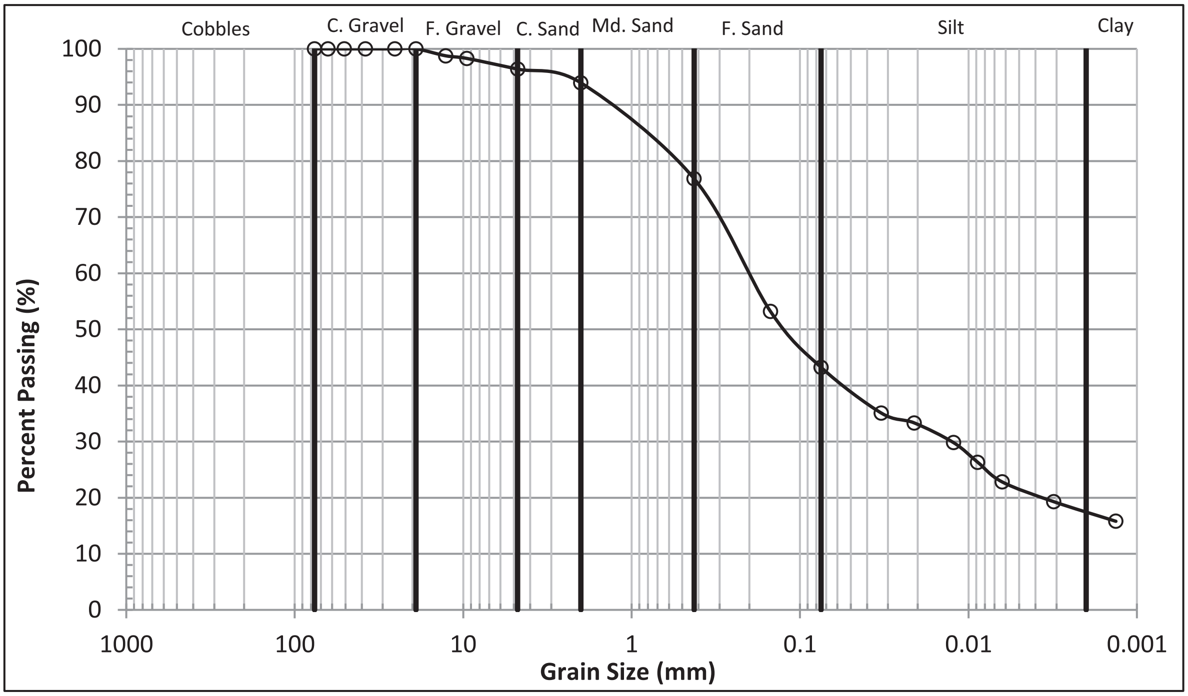
Soil Type: ________

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-5
Depth: 10-11 '
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	98.77
3/8 "	9.53	98.30
# 4	4.75	96.39
# 10	2.00	93.94
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	76.84
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	53.22
# 200	0.075	43.23
Hydro	0.0329	35.08
Hydro	0.0210	33.33
Hydro	0.0123	29.82
Hydro	0.0088	26.31
Hydro	0.0063	22.80
Hydro	0.0031	19.30
Hydro	0.0013	15.79

Summary	
% Gravel =	3.6
% Sand =	53.2
% Fines =	43.2
Sum =	100.0

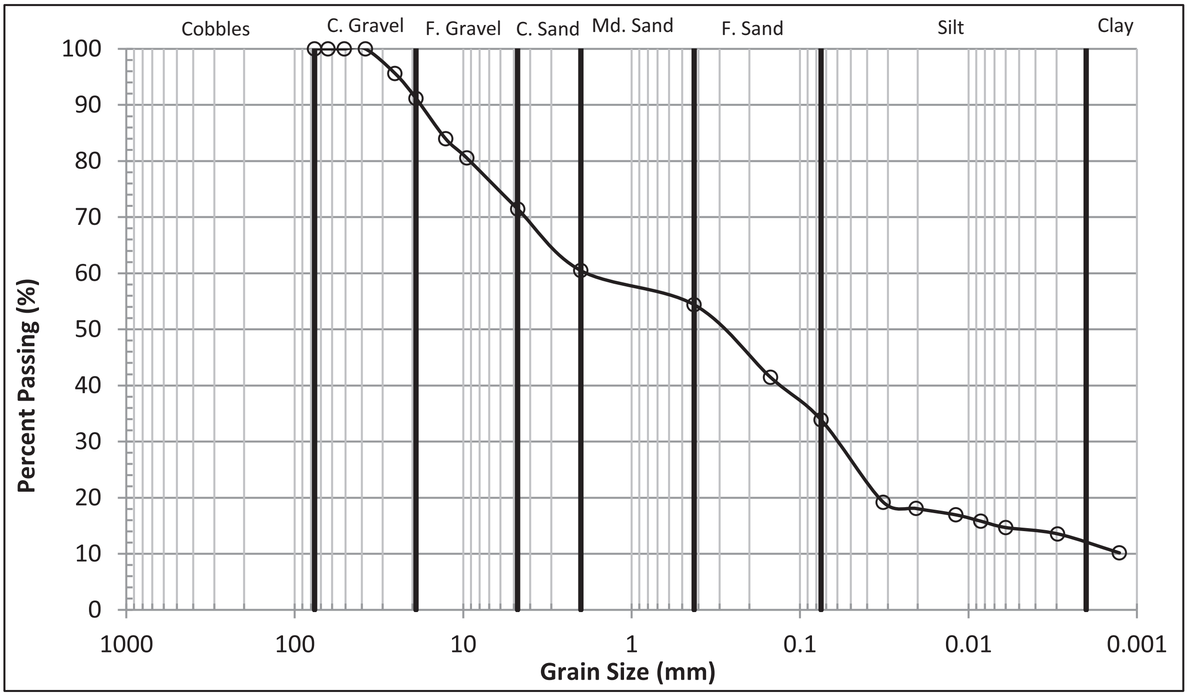
LL=
PL=
PI=

Soil Type: SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name:	Otay Village 14	Excavation:	BA-5
Location:	Proctor Valley Road, SD County	Depth:	40'
Project No.:	1312-02	By:	H M
Date:	3/10/15		



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	95.64
3/4 "	19.05	91.19
1/2 "	12.70	83.97
3/8 "	9.53	80.56
# 4	4.75	71.47
# 10	2.00	60.47
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	54.39
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	41.48
# 200	0.075	33.89
Hydro	0.0321	19.20
Hydro	0.0204	18.07
Hydro	0.0119	16.94
Hydro	0.0084	15.81
Hydro	0.0060	14.68
Hydro	0.0030	13.55
Hydro	0.0013	10.16

Summary	
% Gravel =	28.5
% Sand =	37.6
% Fines =	33.9
Sum =	100.0

LL= ________

PL= ________

PI= ________

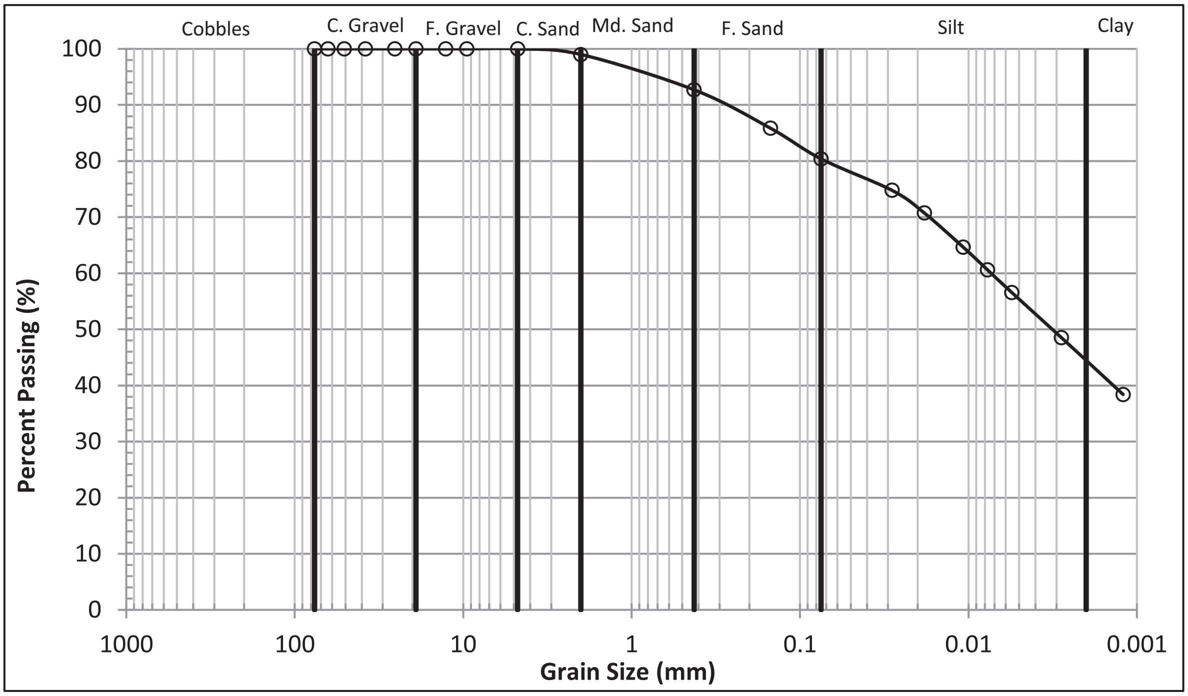
Soil Type: SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-5
Depth: 66-67
By: HM



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	100.00
3/8 "	9.53	100.00
# 4	4.75	100.00
# 10	2.00	99.00
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	92.69
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	85.86
# 200	0.075	80.38
Hydro	0.0284	74.78
Hydro	0.0183	70.74
Hydro	0.0108	64.67
Hydro	0.0077	60.63
Hydro	0.0055	56.59
Hydro	0.0028	48.51
Hydro	0.0012	38.40

Summary	
% Gravel =	0.0
% Sand =	19.6
% Fines =	80.4
Sum =	100.0

LL= ________

PL= ________

PI= ________

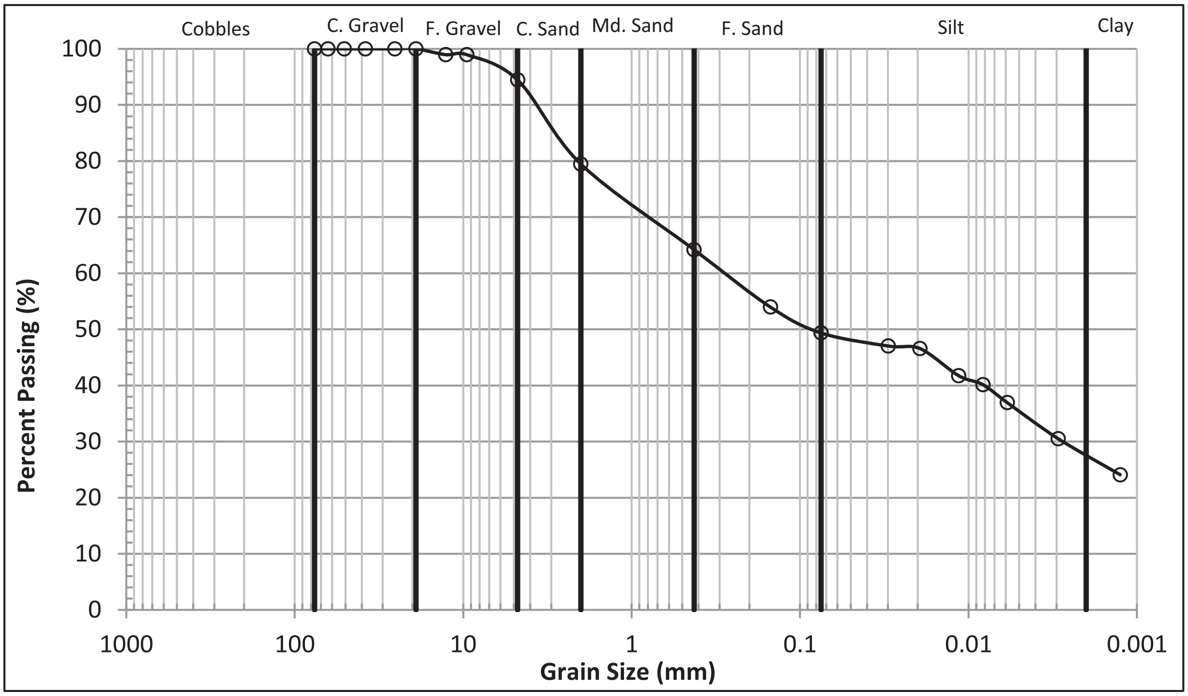
Soil Type: ________

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

PARTICLE SIZE ANALYSIS - ASTM D422

Project Name: Otay Village 14
Location: Proctor Valley Road, SD County
Project No.: 1312-02
Date: 3/10/15

Excavation: BA-8
Depth: 15-16'
By: H M



Grain Size (in/#)	Grain Size (mm)	Amount Passing (%)
3 "	76.20	100.00
2 1/2 "	63.50	100.00
2 "	50.80	100.00
1 1/2 "	38.10	100.00
1 "	25.40	100.00
3/4 "	19.05	100.00
1/2 "	12.70	98.96
3/8 "	9.53	98.96
# 4	4.75	94.45
# 10	2.00	79.46
# 20	0.85	#N/A
# 30	0.60	#N/A
# 40	0.425	64.19
# 50	0.30	#N/A
# 60	0.212	#N/A
# 100	0.15	53.97
# 200	0.075	49.36
Hydro	0.0299	47.03
Hydro	0.0194	46.57
Hydro	0.0115	41.75
Hydro	0.0082	40.15
Hydro	0.0059	36.94
Hydro	0.0029	30.51
Hydro	0.0013	24.09

Summary	
% Gravel =	5.5
% Sand =	45.1
% Fines =	49.4
Sum =	100.0

LL= ________
PL= ________
PI= ________

Soil Type: SC-SM

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

Project Name:	Otay Village 14	Excavation:	BA-3
Location:	Proctor Valley Road, SD County	Depth:	12 '
File No:	1312-02	Description:	Very Light Brown Clayey Sand
Date:		By:	HM

Sample Date:	1/29/15	By:	FE
Submittal Date:	2/14/15	By:	PWM
Test Date:		By:	HM

Expansion Index - ASTM D4829

Initial Dry Density (pcf):	112.5
Initial Moisture Content (%):	9.0
Initial Saturation (%):	48.8
Final Dry Density (pcf):	107.5
Final Moisture Content (%):	18.4
Final Saturation (%):	99.6
Expansion Index:	36
Potential Expansion:	Low

ASTM D4829 - Table 5.3

Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

Project Name:	Otay Village 14	Excavation:	BA-4
Location:	Proctor Valley Road, SD County	Depth:	26 '
File No:	1312-02	Description:	Olive Brown Sandy Clay
Date:		By:	H-M

Sample Date:	1/30/15	By:	FE
Submittal Date:	2/14/15	By:	PWM
Test Date:		By:	HM

Expansion Index - ASTM D4829

Initial Dry Density (pcf):	93.7
Initial Moisture Content (%):	15.0
Initial Saturation (%):	50.7
Final Dry Density (pcf):	94.5
Final Moisture Content (%):	28.6
Final Saturation (%):	96.7
Expansion Index:	113
Potential Expansion:	High

ASTM D4829 - Table 5.3

Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

Project Name:	Proctor Valley Villages	Excavation/Tract:	T-7/16-19
Location:	Chula Vista	Depth/Lot:	1-2 ft
P/W:	1312-02	Description:	Brown SC-SM
Date:	1/5/17	By:	FV

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	111.3
Initial Moisture Content (%):	9.7
Initial Saturation (%):	51.0
Final Dry Density (pcf):	111.3
Final Moisture Content (%):	18.3
Final Saturation (%):	96.3
Expansion Index:	0
Potential Expansion:	Very Low

ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

Project Name:	Proctor Valley Villages	Excavation/Tract:	T-15/16-19
Location:	Chula Vista	Depth/Lot:	4-10 ft
P/W:	1312-02	Description:	Brown SC-SM
Date:	1/5/17	By:	FV

Expansion Index - ASTM D4829	
Initial Dry Density (pcf):	112.3
Initial Moisture Content (%):	9.5
Initial Saturation (%):	51.3
Final Dry Density (pcf):	109.9
Final Moisture Content (%):	19.2
Final Saturation (%):	97.2
Expansion Index:	22
Potential Expansion:	Low

ASTM D4829 - Table 5.3	
Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

EXPANSION INDEX - ASTM D4829

Project Name:	Otay Village 14	Excavation:	BA-5
Location:	Proctor Valley Road, SD County	Depth:	20 '
File No:	1312-02	Description:	Very Lt Brown to White Silty/Clayey Sand w/ Gravel & Sandstone
Date:		By:	H-M

Sample Date:	1/30/15	By:	FE
Submittal Date:	2/14/15	By:	PWM
Test Date:		By:	HM

Expansion Index - ASTM D4829

Initial Dry Density (pcf):	109.5
Initial Moisture Content (%):	10.0
Initial Saturation (%):	50.2
Final Dry Density (pcf):	103.1
Final Moisture Content (%):	19.9
Final Saturation (%):	99.7
Expansion Index:	25
Potential Expansion:	Low

ASTM D4829 - Table 5.3

Expansion Index	Potential Expansion
0 - 20	Very Low
21 - 50	Low
51 - 90	Medium
91 - 130	High
>130	Very High

ANAHEIM TEST LAB, INC

3008 ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

DATE: 4/7/15

AGS
2842 Walnut Avenue, Suite C-1
Tustin, CA 92780

P.O. NO.: Verbal

LAB NO.: B-8193

SPECIFICATION: CA-417/422/643

Attn: Sean Donovan

MATERIAL: Soil

J.N.: 1312-02
Project: Otay Village 14
Date sampled: 02/24/15

ANALYTICAL REPORT

CORROSION SERIES
SUMMARY OF DATA

	PH	SOLUBLE SULFATES per CA. 417 ppm	SOLUBLE CHLORIDES per CA. 422 ppm	MIN. RESISTIVITY per CA. 643 ohm-cm
BA-1@45-46’	7.1	975	1,472	430
BA-4@26-27’	6.8	593	1,472	340
EX-13@7-8’	7.1	1,078	1,702	360

RESPECTFULLY SUBMITTED

ANAHEIM TEST LAB

WES BRIDGER CHEMIST

ANAHEIM TEST LAB, INC

3008 ORANGE AVENUE
SANTA ANA, CALIFORNIA 92707
PHONE (714) 549-7267

TO:
AGS
2842 Walnut Avenue, Suite C-1
Tustin, CA 92780

DATE: 3/30/15

P.O. NO.: Chain of Custody

LAB NO.: B-8151

SPECIFICATION: CA 301

MATERIAL: Soil

Project #: 1312-02
Otay Vil.4

ANALYTICAL REPORT

"R" VALUE

	BY EXUDATION	BY EXPANSION
1) BA-3 @ 13' Brown, F.M. Sandy Clay	32	23
2) EX-13 @ 18' Brown, Clay	15	6

RESPECTFULLY SUBMITTED

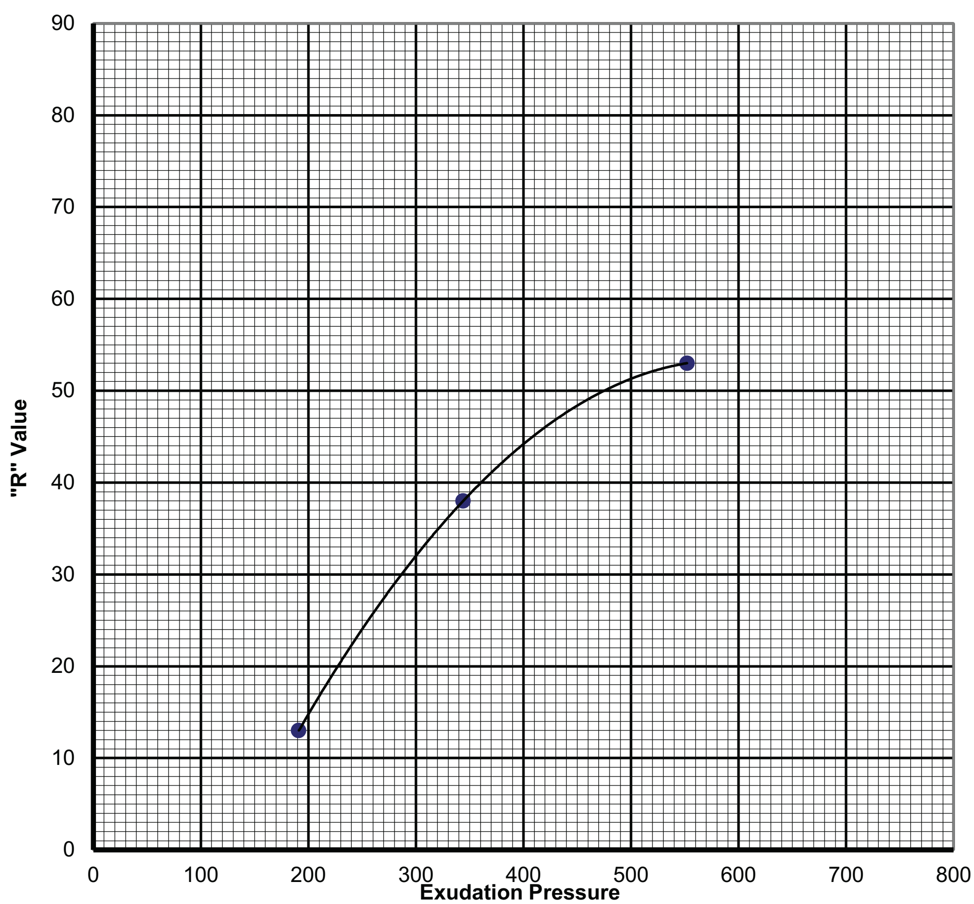
WES BRIDGER CHEMIST

"R" VALUE CA 301

Client: AGS **ATL No.:** B 8151-1 **Date:** 3/30/2015
Client Reference No.: 1312-02
Sample: BA-3 @ 13' **Soil Type:** Brown, F.M. Sandy Clay

TEST SPECIMEN		A	B	C	D
Compactor Air Pressure	psi	60	150	100	
Initial Moisture Content	%	3.4	3.4	3.4	
Moisture at Compaction	%	14.6	12.9	13.7	
Briquette Height	in.	2.52	2.49	2.47	
Dry Density	pcf	113.7	117.7	114.9	
EXUDATION PRESSURE	psi	191	552	344	
EXPANSION dial	(x .0001)	15	63	44	
Ph at 1000 pounds	psi	55	28	38	
Ph at 2000 pounds	psi	125	58	79	
Displacement	turns	4.6	3.84	4.21	
"R" Value		13	53	38	
CORRECTED "R" VALUE		13	53	38	

Final "R" Value	
BY EXUDATION: @ 300 psi	**32**
BY EXPANSION: TI = 5.0	**23**

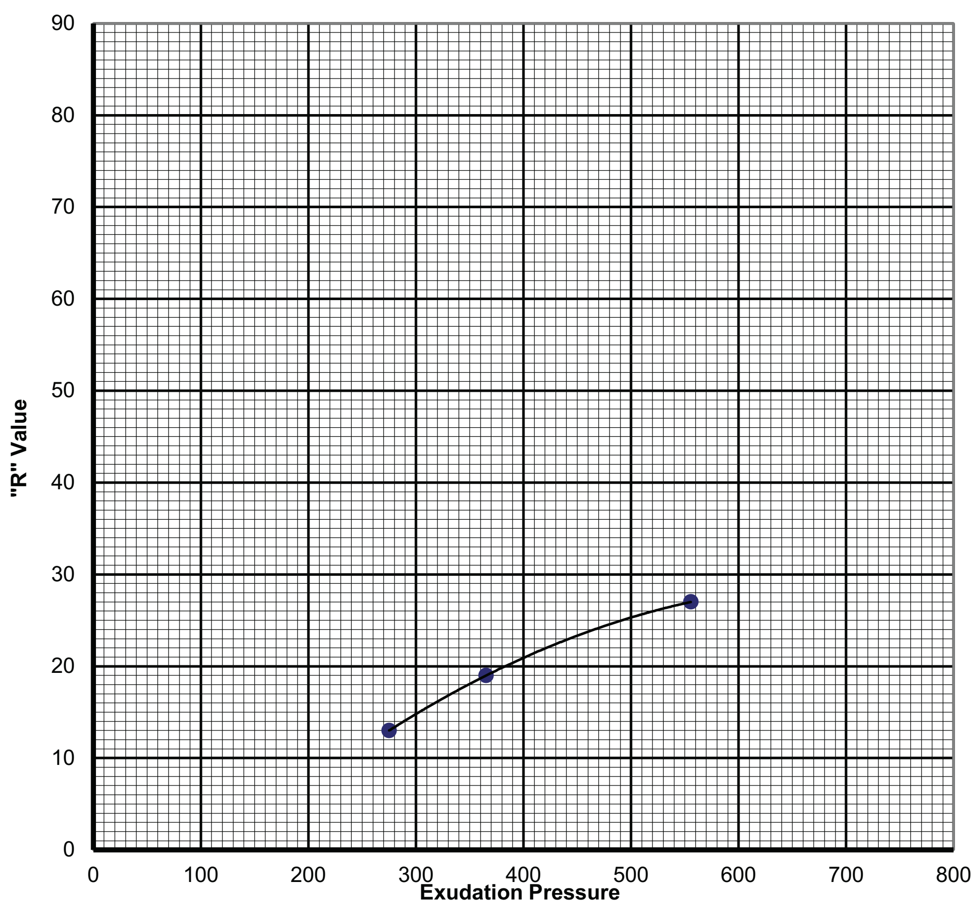


"R" VALUE CA 301

Client: AGS **ATL No.:** B 8151-2 **Date:** 3/30/2015
Client Reference No.: 1312-02
Sample: EX-13 @ 18' **Soil Type:** Brown, Clay

TEST SPECIMEN		A	B	C	D
Compactor Air Pressure	psi	100	60	150	
Initial Moisture Content	%	25.5	25.5	25.5	
Moisture at Compaction	%	32.8	34.9	30.8	
Briquette Height	in.	2.45	2.50	2.50	
Dry Density	pcf	85.0	82.8	88.3	
EXUDATION PRESSURE	psi	365	275	556	
EXPANSION dial	(x .0001)	53	42	68	
Ph at 1000 pounds	psi	43	62	31	
Ph at 2000 pounds	psi	120	130	107	
Displacement	turns	3.65	3.9	3.39	
"R" Value		19	13	27	
CORRECTED "R" VALUE		19	13	27	

Final "R" Value	
BY EXUDATION: @ 300 psi	**15**
BY EXPANSION: TI = 5.0	**6**



Preparation

2.43" Ring

Remolding Soil Sample

Equation		
Maximum Dry Density		115
Moisture %		12
Dry Density	90 % Of Max D.D.	103.5
Ring Volume	Cubic Meters	1.2178
(1.2866)(D.D) (100+Moist)		141.17

Wt. Wet Soil + Tere	g	125
Wt. Wet Dry + Tere	g	117.2
Wt of Tere	g	47.6
Moisture Lost	g	7.8
Dry Soil	g	69.6
Moisture	%	11.21

Equation		
Maximum Dry Density		115
Moisture %		11.2
Dry Density	90 % Of Max D.D.	103.5
Ring Volume		1.2178
(1.2685)(D.D) (100+Moist)		140.16

Total Soil For 4 Rings	g	560.6
Bowl	g	370.2
Total Mix Before Water Added	g	930.8
Total Mix For 4 Rings+ Bowl	g	934.9
Total Water added	g	**4.0**
Total Mix	g	**934.9**

ADVANCED GEOTECHNICAL SOLUTION, INC.

Excavation:	EX 11	Project Name:	Otay Village
Depth:	9-10 '		
Date:	3/28/2015		

Preparation

2.43" Ring

Remolding Soil Sample

Equation		
Maximum Dry Density		122
Moisture %		13
Dry Density	90 % Of Max D.D.	109.8
Ring Volume	Cubic Meters	1.2178
(1.2866)(D.D) (100+Moist)		151.10

Wt. Wet Soil + Tere	g	125
Wt. Wet Dry + Tere	g	117.2
Wt of Tere	g	47.6
Moisture Lost	g	7.8
Dry Soil	g	69.6
Moisture	%	11.21

Equation		
Maximum Dry Density		115
Moisture %		11.2
Dry Density	90 % Of Max D.D.	103.5
Ring Volume		1.2866
(1.2685)(D.D) (100+Moist)		148.08

Total Soil For 4 Rings	g	592.3
Bowl	g	370.2
Total Mix Before Water Added	g	962.5
Total Mix For 4 Rings+ Bowl	g	974.6
Total Water added	g	**12.1**
Total Mix	g	**974.6**

Excavation: BA-2 Project: Otay Village

Depth: 1-2 '

Date: 3/28/2015

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MAXIMUM DENSITY - ASTM D1557

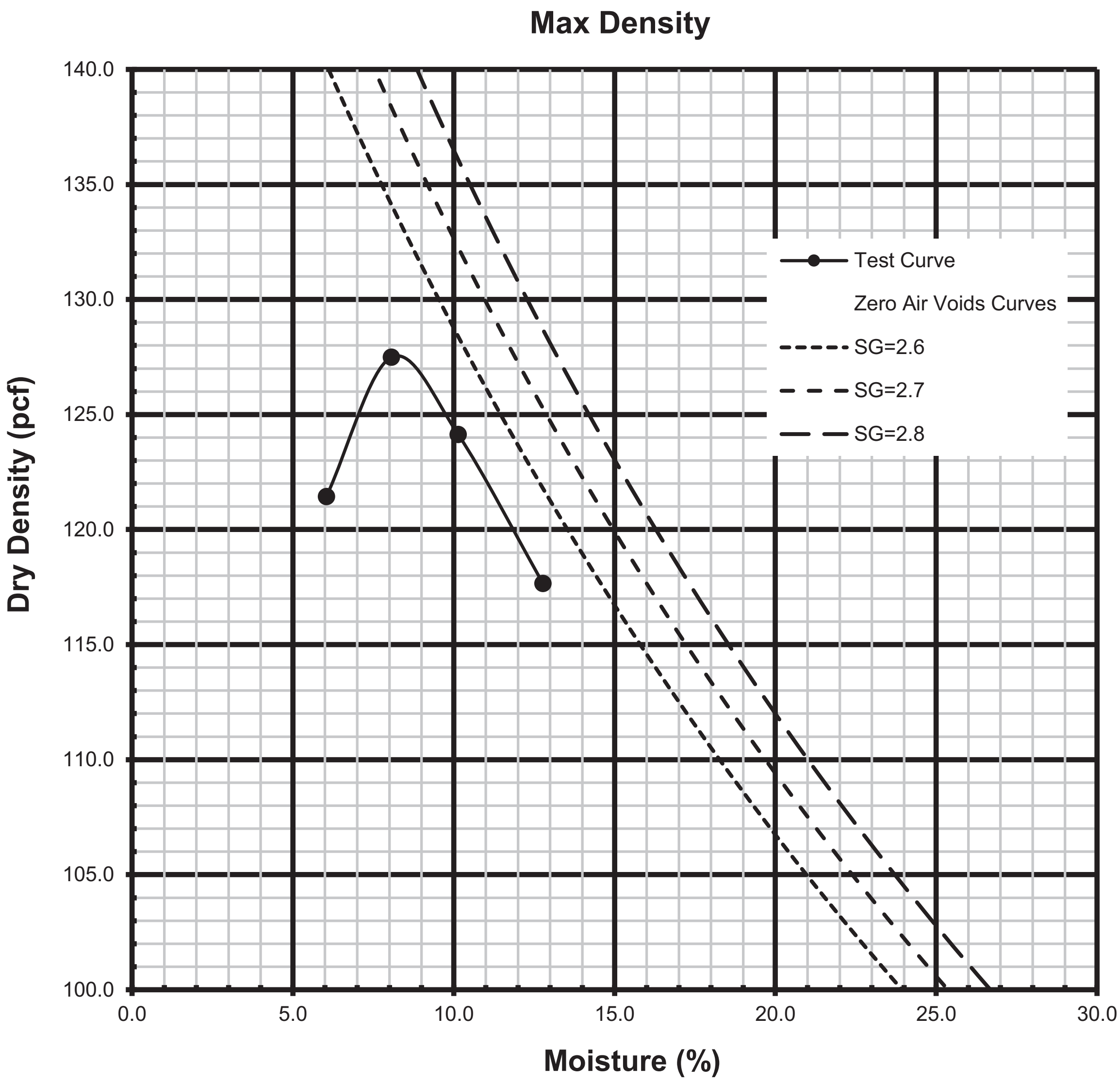
Project Name: Proctor Valley 16-19
Location: Chula Vista
Project No.: 1312-02
Date: 1/4/17

Excavation: T-10
Depth: 0-4 ft
Description: Brown SC-SM
Project Manager JC
By: FV

Method: C

Rock Coreection 3.5530342

Test Number	1	2	3	4
Dry Density (pcf)	121.4	127.5	124.1	117.7
Moisture Content (%)	6.0	8.1	10.1	12.8



Maximum Density **127.5** pcf

Optimum Moisture **8.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MAXIMUM DENSITY - ASTM D1557

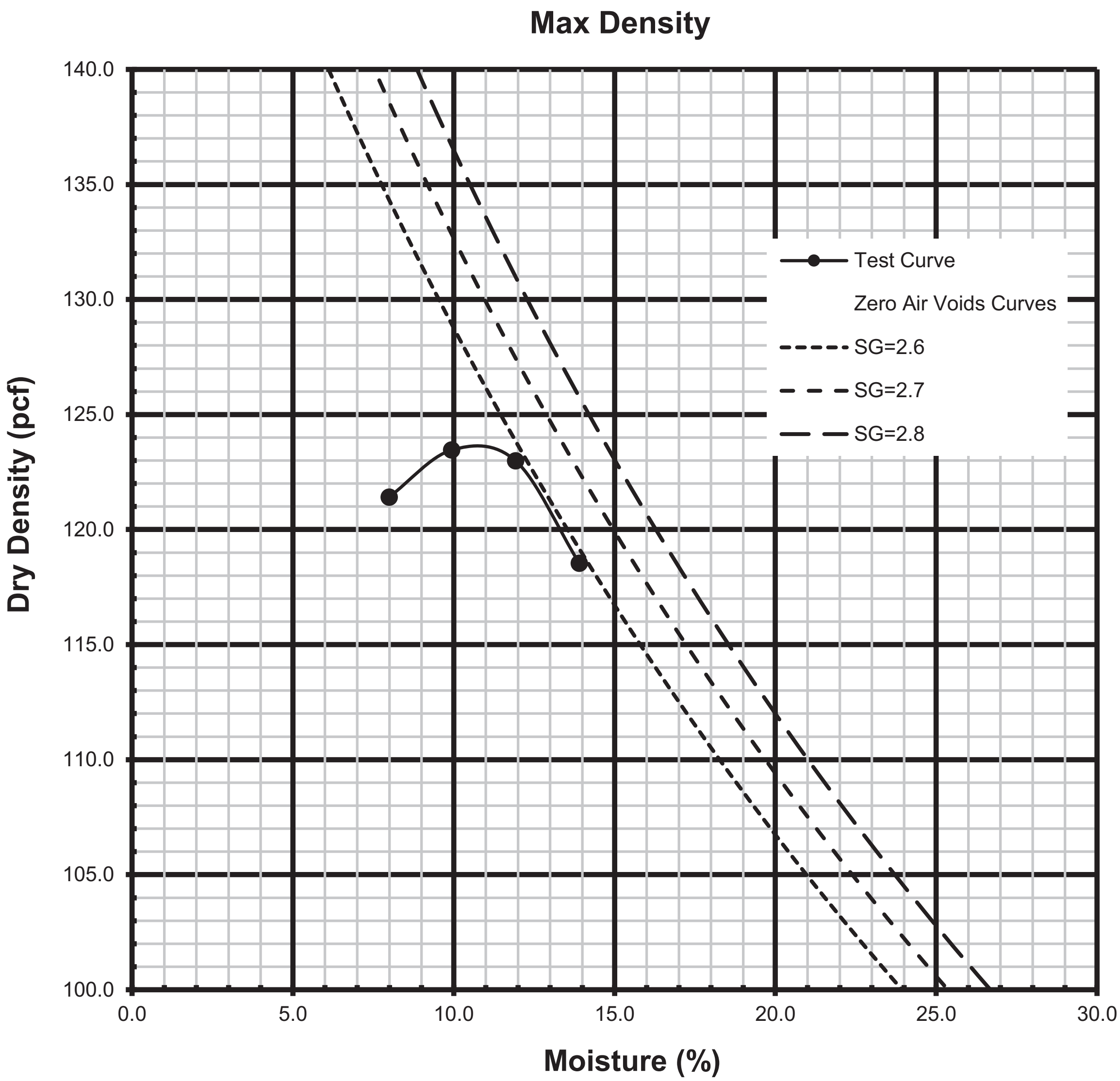
Project Name: Proctor Valley 16-19
Location: Chula Vista
Project No.: 1312-02
Date: 1/4/17

Excavation: T-7
Depth: 1-2 ft
Description: Reddish Brn. SC-SM
Project Manager JC
By: FV

Method: A

Rock Coreection 36.7

Test Number	1	2	3	4
Dry Density (pcf)	121.4	123.5	123.0	118.5
Moisture Content (%)	8.0	9.9	11.9	13.9



Maximum Density **123.5** pcf

Optimum Moisture **11.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MAXIMUM DENSITY - ASTM D1557

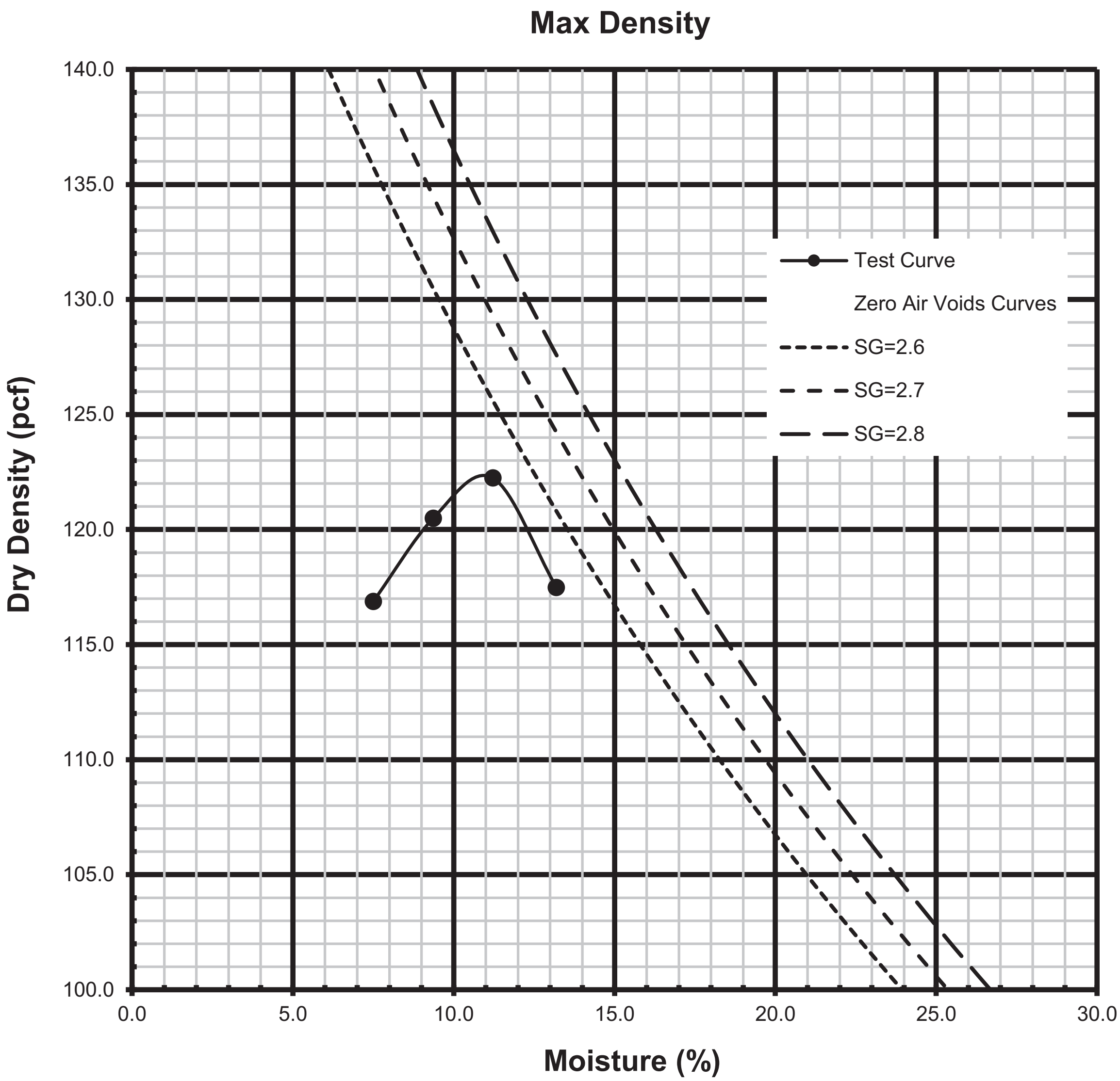
Project Name: Proctor Valley 16-19
Location: Chula Vista
Project No.: 1312-02
Date: 1/4/17

Excavation: T-15
Depth: 2-4 ft
Description: Reddish Brn. SC-SM
Project Manager JC
By: FV

Method: C

Rock Coreection 9.4

Test Number	1	2	3	4
Dry Density (pcf)	116.9	120.5	122.2	117.5
Moisture Content (%)	7.5	9.4	11.2	13.2



Maximum Density **122.5** pcf

Optimum Moisture **11.0** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MAXIMUM DENSITY - ASTM D1557

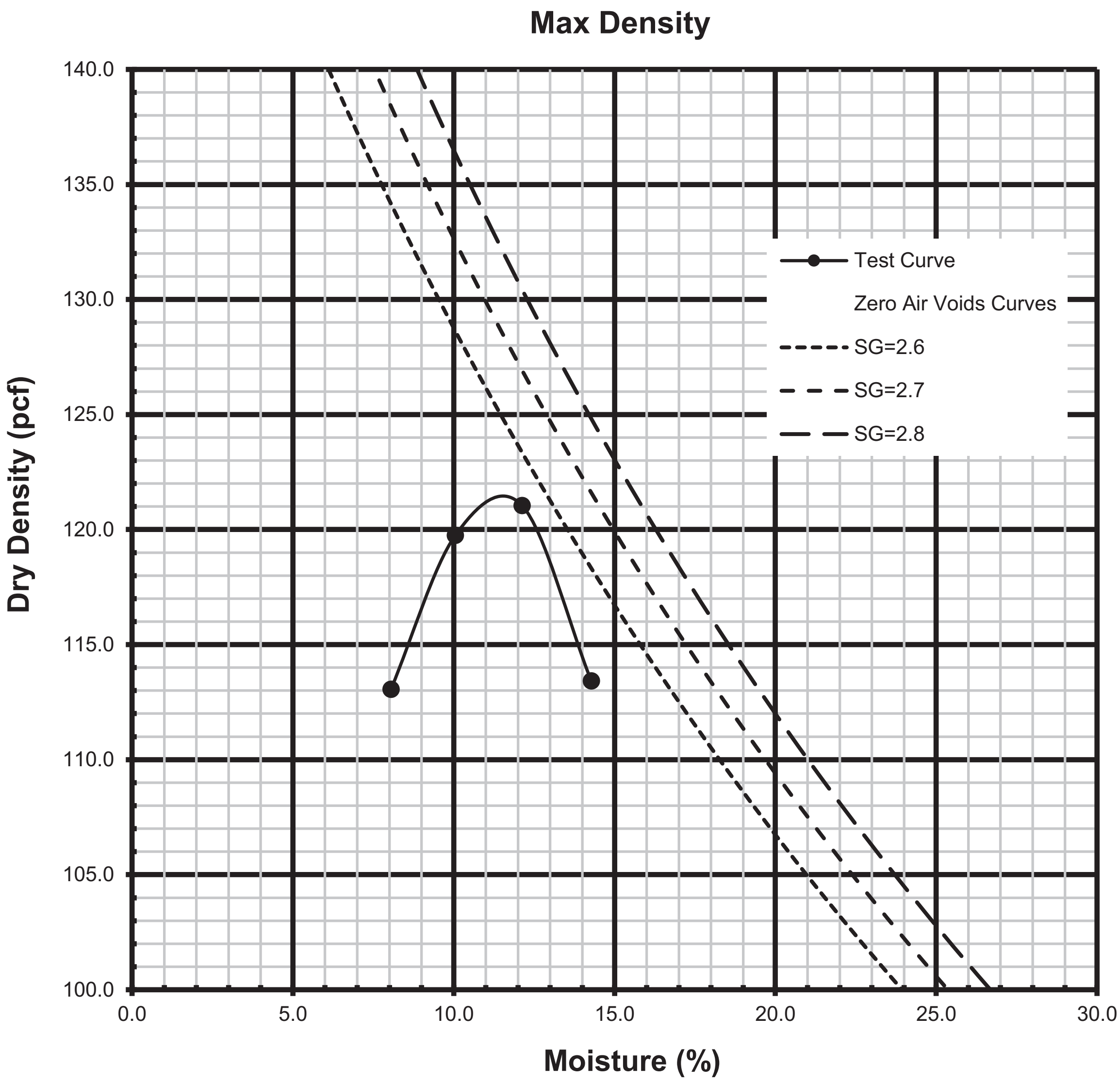
Project Name: Proctor Valley 16-19
Location: Chula Vista
Project No.: 1312-02
Date: 42725

Excavation: T-13
Depth: 1-3 ft
Description: Brown SC
Project Manager SD
By: JW

Method: C

Rock Coreection 0.491635

Test Number	1	2	3	4
Dry Density (pcf)	113.1	119.7	121.0	113.4
Moisture Content (%)	8.0	10.1	12.1	14.3



Maximum Density **121.5** pcf

Optimum Moisture **11.5** %

ADVANCED GEOTECHNICAL SOLUTIONS, INC.

MAXIMUM DENSITY - ASTM D1557

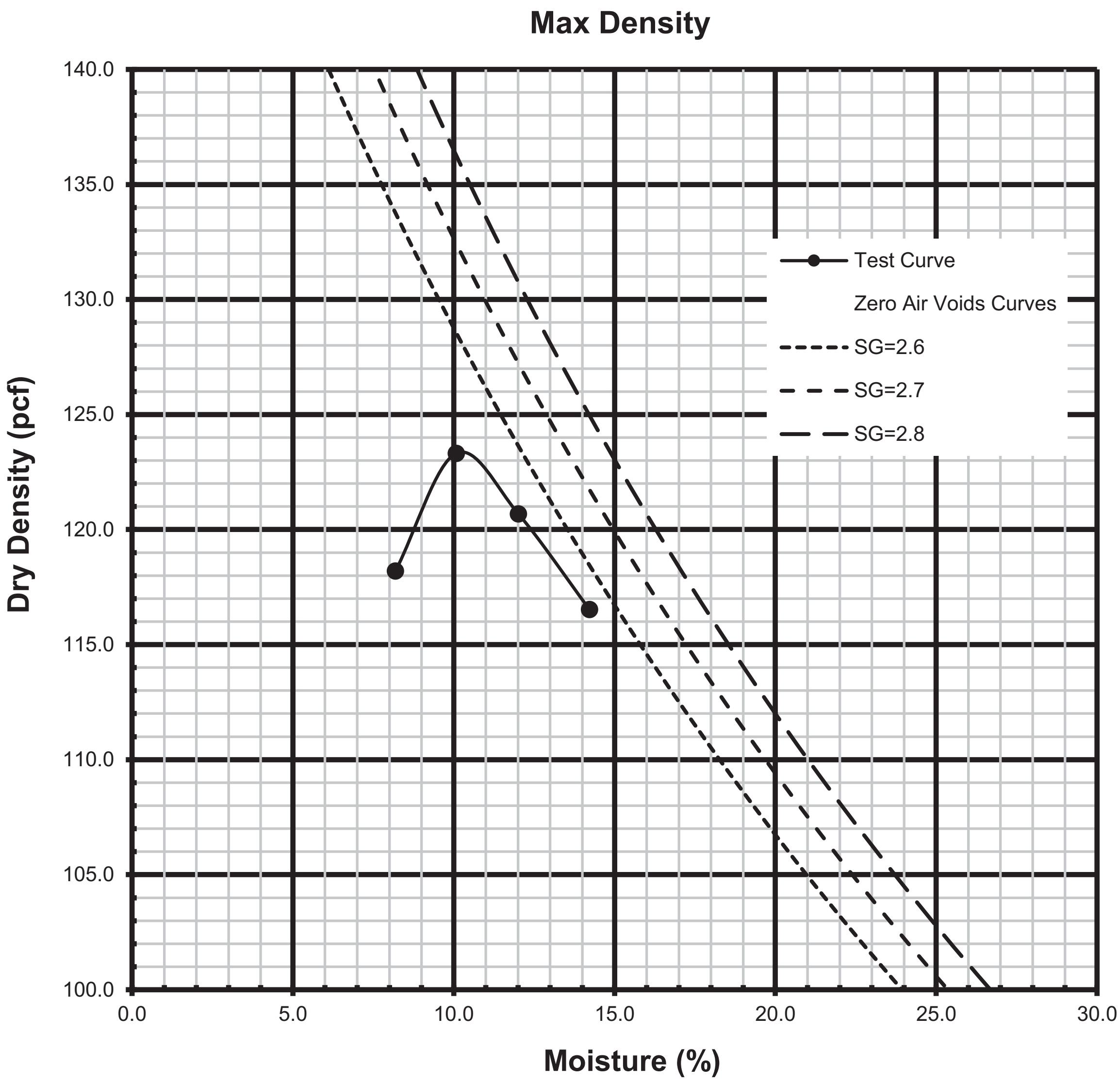
Project Name: Proctor Valley 16-19
Location: Chula Vista
Project No.: 1312-02
Date: 42724

Excavation: T-2
Depth: 1-2 ft
Description: Light Brn. CL-ML
Project Manager JC
By: JW/FV

Method: A

Rock Coreection 2.8548644

Test Number	1	2	3	4
Dry Density (pcf)	118.2	123.3	120.7	116.5
Moisture Content (%)	8.2	10.1	12.0	14.2



Maximum Density **123.0** pcf

Optimum Moisture **10.5** %

Advanced Geotechnical Solutions, Inc.

MAXIMUM DENSITY

ASTM D-1557

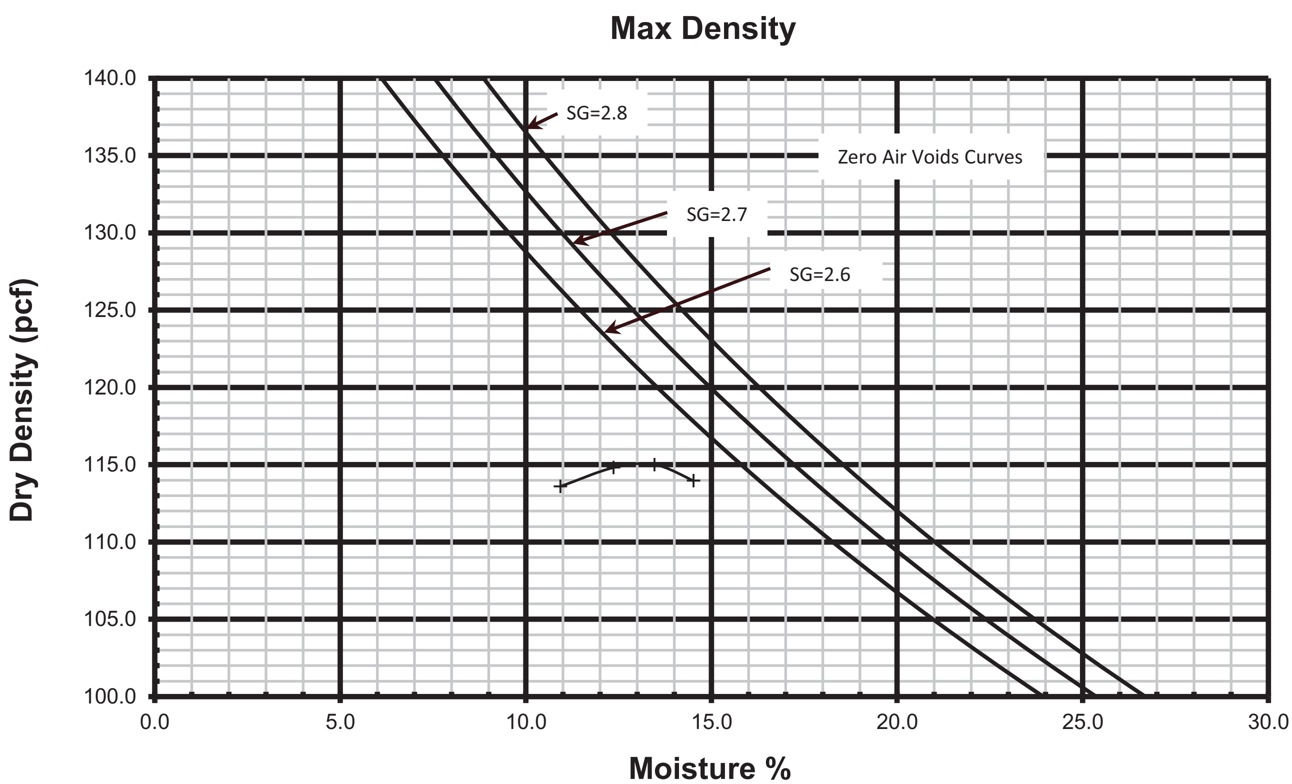
Project Name:	**Otay Village 14**	Excavation:	EX-11
Location:		Depth:	9-10 '
File No:	**1312-02**	Description:	Yellowish, White, Mixtur of Sand Clay, and Sand Stone
Date:	3/3/2015		

Sieve Size	4				
Mold Size	4 "	% Retained	None		
No. of Layers	5	Method	A	By:	H-M

Test point number		1	2	3	4		
Wt. wet soil + mold	g						
Wt. wet soil + mold	lbs	8.30	8.40	8.45	8.45		
Wt. of mold	lbs	4.10	4.10	4.10	4.10		
Wt. wet of soil	lbs	4.20	4.30	4.35	4.35		
Wet density	pcf	126.00	129.00	130.50	130.50		
Dry density	pcf	113.59	114.81	115.02	113.96		

Moisture Determination (Oven)

Container number		5	12	41	52		
Wt. wet of soil+tare	g	257.6	244.3	264.9	248.8		
Dry wt. soil+tare	g	233.1	218.4	234.5	218.4		
Tare wt.	g	8.8	8.8	8.7	8.9		
Wt. of moisture	g	24.50	25.90	30.40	30.40		
Dry wt. of soil	g	224.30	209.60	225.80	209.50		
Moisture Content	g	10.92	12.36	13.46	14.51		



Maximum Density **115.0** pcf Optimum Moisture **13.0** %

Advanced Geotechnical Solutions, Inc.

MAXIMUM DENSITY

ASTM D-1557

Project Name: **Otay Village 14**
Location:
File No: **1312-02**
Date: 2/27/2015

Excavation: BA-5
Depth: 20 "
Description: Light Brown Mixtur of Sand, Gravel, Rock Clay, and Sand Stone

Sieve Size 3/4 "
Mold Size 6 "
No. of Layers 5

% Retained 15
Method A

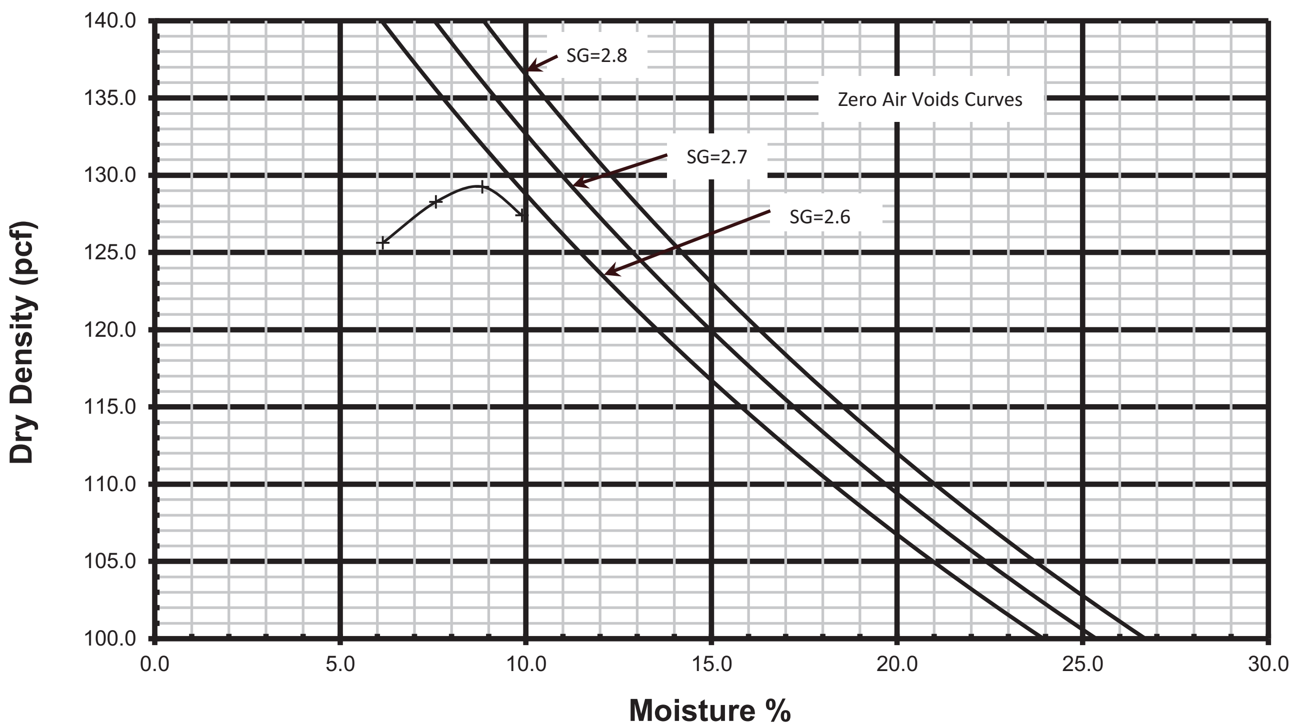
By: H-M

Test point number		1	2	3	4		
Wt. wet soil + mold	g						
Wt. wet soil + mold	lbs	16.00	16.35	16.55	16.50		
Wt. of mold	lbs	6.00	6.00	6.00	6.00		
Wt. wet of soil	lbs	10.00	10.35	10.55	10.50		
Wet density	pcf	133.33	138.00	140.67	140.00		
Dry density	pcf	125.62	128.28	129.26	127.40		

Moisture Determination (Oven)

Container number		55	74	28	11		
Wt. wet of soil+tare	g	745.2	752.6	689.4	704.5		
Dry wt. soil+tare	g	702.6	700.2	634.2	641.9		
Tare wt.	g	8.8	8.6	8.7	8.9		
Wt. of moisture	g	42.60	52.40	55.20	62.60		
Dry wt. of soil	g	693.80	691.60	625.50	633.00		
Moisture Content	g	6.14	7.58	8.82	9.89		

Max Density



Maximum Density **129.0** pcf   Optimum Moisture **8.5** %

Advanced Geotechnical Solutions, Inc.

MAXIMUM DENSITY

ASTM D-1557

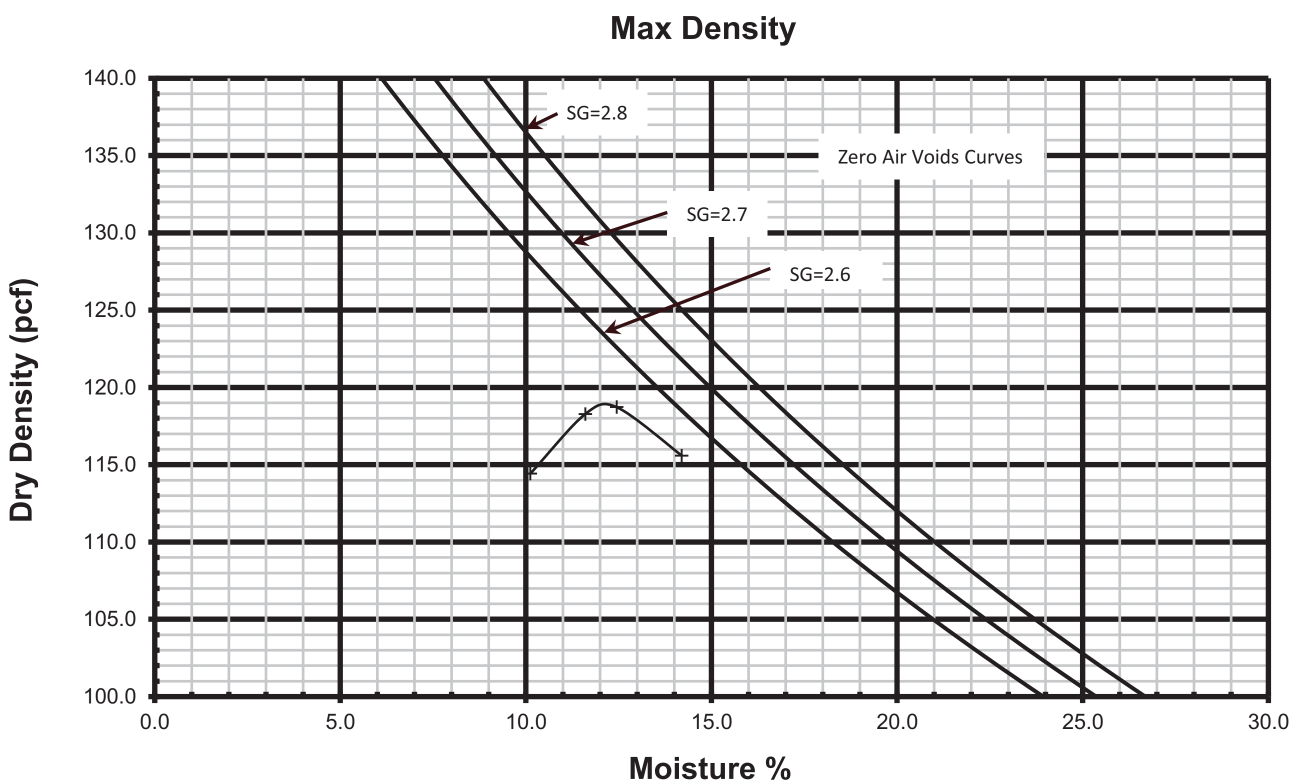
Project Name:	**Otay Village 14**	Excavation:	BA-4
Location:		Depth:	11 '
File No:	**1312-02**	Description:	Light Brown, White, Mixtur of Sand, Silt, Gravle and Sand Stone
Date:	2/27/2015		

Sieve Size	3/8 "				
Mold Size	4 "	% Retained	10		
No. of Layers	5	Method	A	By:	H-M

Test point number		1	2	3	4		
Wt. wet soil + mold	g						
Wt. wet soil + mold	lbs	8.30	8.50	8.55	8.50		
Wt. of mold	lbs	4.10	4.10	4.10	4.10		
Wt. wet of soil	lbs	4.20	4.40	4.45	4.40		
Wet density	pcf	126.00	132.00	133.50	132.00		
Dry density	pcf	114.42	118.28	118.73	115.59		

Moisture Determination (Oven)

Container number		21	25	12	18		
Wt. wet of soil+tare	g	235.2	245.3	281.6	265.5		
Dry wt. soil+tare	g	214.4	220.7	251.4	233.6		
Tare wt.	g	8.8	8.6	8.7	8.9		
Wt. of moisture	g	20.80	24.60	30.20	31.90		
Dry wt. of soil	g	205.60	212.10	242.70	224.70		
Moisture Content	g	10.12	11.60	12.44	14.20		



Maximum Density **119.0** pcf   Optimum Moisture **12.0** %

Advanced Geotechnical Solutions, Inc.

MAXIMUM DENSITY

ASTM D-1557

Project Name: **Otay Village 14**
Location:
File No: **1312-02**
Date: 2/25/2015

Excavation: BA-3
Depth: 13 '
Description: Very Light Olive Brown Clayey Sand With Bentonite

Sieve Size: 4
Mold Size: 4"
No. of Layers: 5

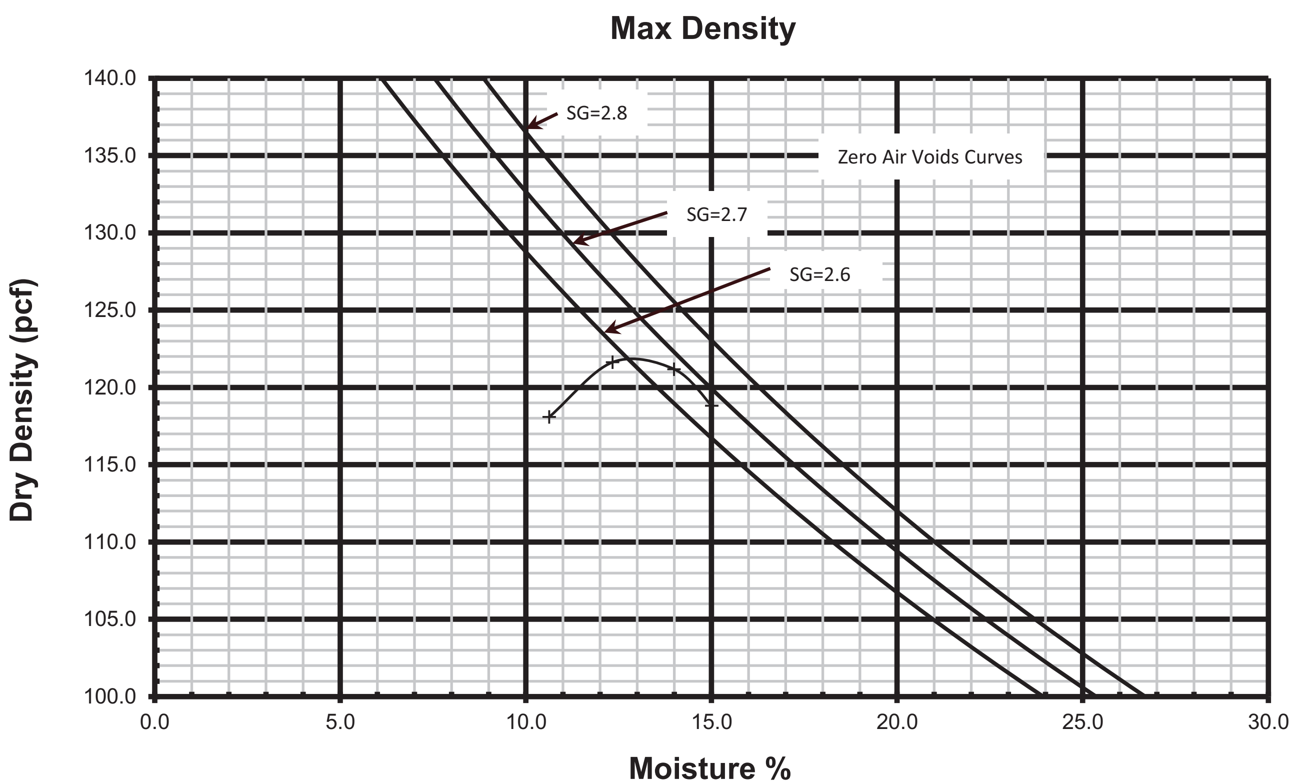
% Retained: 1
Method: A

By: H-M

Test point number		1	2	3	4		
Wt. wet soil + mold	g						
Wt. wet soil + mold	lbs	8.45	8.65	8.70	8.65		
Wt. of mold	lbs	4.10	4.10	4.10	4.10		
Wt. wet of soil	lbs	4.35	4.55	4.60	4.55		
Wet density	pcf	130.63	136.64	138.14	136.64		
Dry density	pcf	118.09	121.63	121.18	118.81		

Moisture Determination (Oven)

Container number		18	25	36	44		
Wt. wet of soil+tare	g	278	271.6	257.3	297.2		
Dry wt. soil+tare	g	252.1	242.7	226.8	259.5		
Tare wt.	g	8.3	8.4	8.8	8.2		
Wt. of moisture	g	25.90	28.90	30.50	37.70		
Dry wt. of soil	g	243.80	234.30	218.00	251.30		
Moisture Content	g	10.62	12.33	13.99	15.00		



Maximum Density **122.0** pcf Optimum Moisture **13.0** %

Advanced Geotechnical Solutions, Inc.

MAXIMUM DENSITY

ASTM D-1557

Project Name:	**Otay Village 14**	Excavation:	**BA-1**
Location:		Depth:	**20-22 '**
File No:	**1312-02**	Description:	Light Brown Silt, Sand Slightly Clay
Date:	2/27/2015		

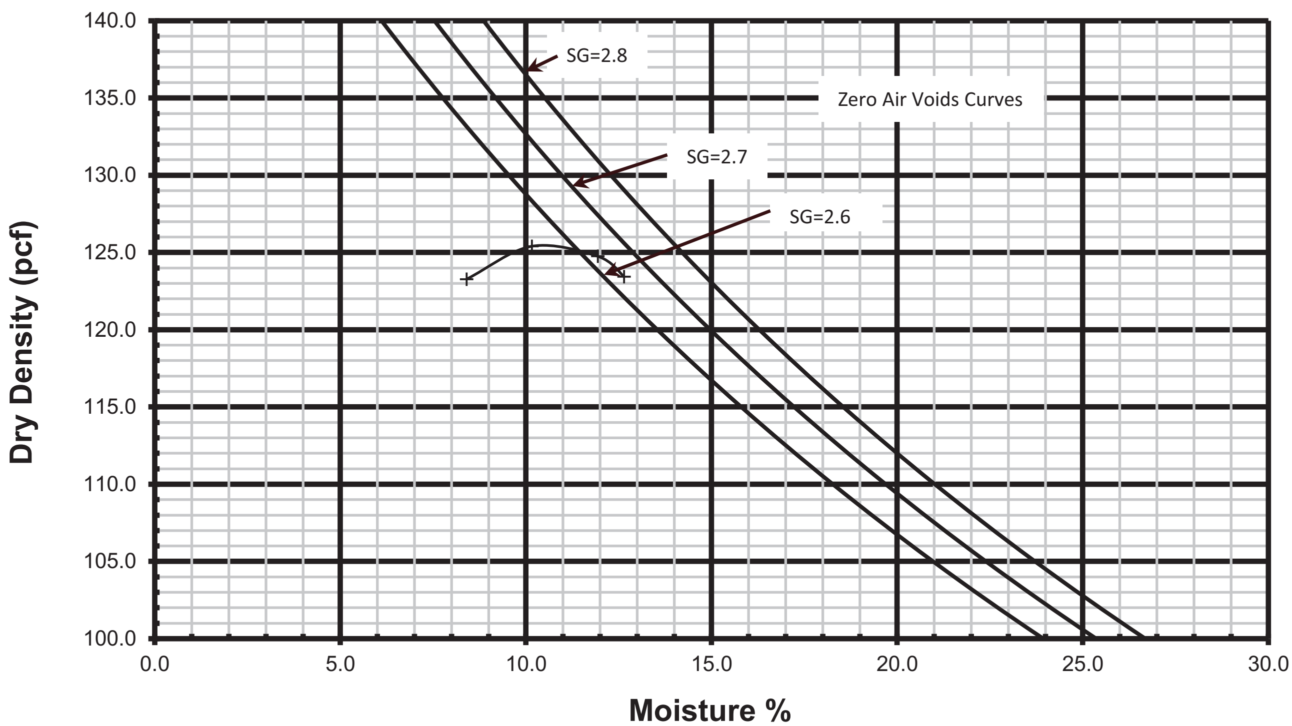
Sieve Size	4				
Mold Size	4"	% Retained	5		
No. of Layers	5	Method	A	By:	H-M

Test point number		1	2	3	4		
Wt. wet soil + mold	g						
Wt. wet soil + mold	lbs	8.55	8.70	8.75	8.73		
Wt. of mold	lbs	4.10	4.10	4.10	4.10		
Wt. wet of soil	lbs	4.45	4.60	4.65	4.63		
Wet density	pcf	133.63	138.14	139.64	139.04		
Dry density	pcf	123.28	125.40	124.75	123.43		

Moisture Determination (Oven)

Container number		27	44	36	81		
Wt. wet of soil+tare	g	271.5	291.5	288.3	276.4		
Dry wt. soil+tare	g	251.1	265.4	258.5	246.3		
Tare wt.	g	8.3	8.4	8.8	8.2		
Wt. of moisture	g	20.40	26.10	29.80	30.10		
Dry wt. of soil	g	242.80	257.00	249.70	238.10		
Moisture Content	g	8.40	10.16	11.93	12.64		

Max Density



Maximum Density **125.0** pcf   Optimum Moisture **11.0** %

AGS Inc.
Otay Village 14
AGS Inc. Project No: 1312-02

August 6, 2014
GF13797

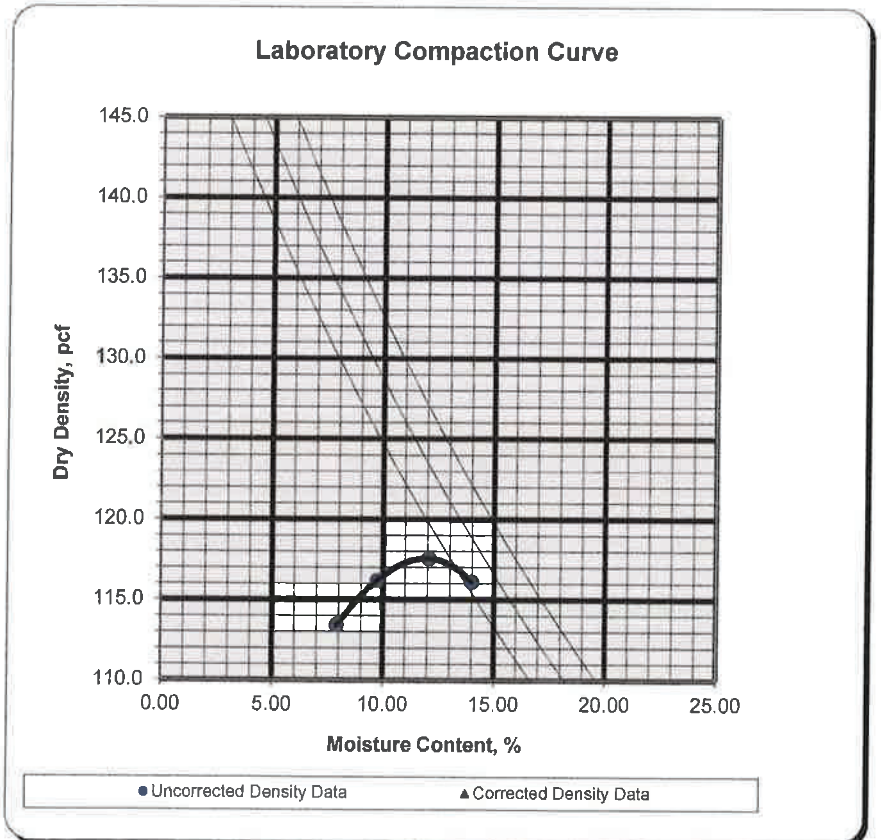
LABORATORY COMPACTION CURVE

G Force Lab No.: **10074**
Sample Location: **TP-17**
Soil Description: **Lt. Brown Tanish Clayey Siltstone (ML/MH)**
Source of Soil: **On Site**

Depth, ft.: **4-5'**
Sampled By: **PJD**
Date Sampled: **7-15-18-2014**

Test Designation: **ASTM_D1557**
Method **B**
% +3/4" **1.3** % +3/8" **4.0** % +#4 **12.8**
Oversize Correction Applied? **No**
Method of Sample Preparation: **Dry**
Type of Hammer Used: **Manual**

M/D Curve No. TP-17



Test Results

Maximum Density, pcf	117.6
Optimum Moisture, %	11.8

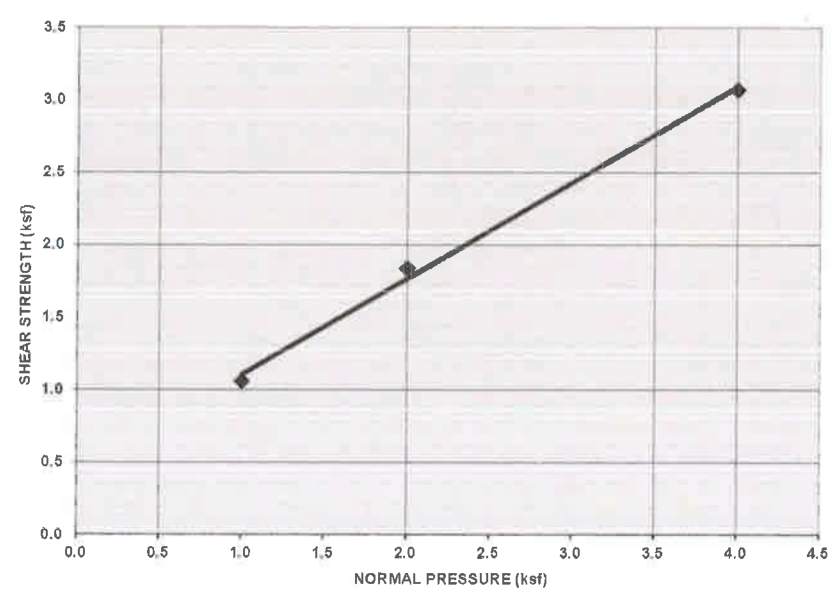
Oversize Corrected Results

Maximum Density, pcf	N/A
Optimum Moisture, %	N/A

Reviewed by: Joseph Bouknight, P.E., C81517

DIRECT SHEAR TEST REPORT

G-FORCE LAB NO.:	10077
SAMPLE LOCATION:	TP-21 @ 1-3'
SOIL TYPE:	Brownish Gray Sandy Clay (CL/SC)
SAMPLE TYPE:	Remolded at 114.8 @ 15.2% M.C. @ 90% RC



CALCULATED DATA

INITIAL					
	WET DENSITY	pcf	118.7	118.9	119.5
	DRY DENSITY	pcf	103.0	103.2	103.7
	MOISTURE	%	15.2	15.2	15.2
FINAL, at failure					
	MOISTURE	%	27.9	27.2	25.4

NORMAL PRESSURE, ksf	1.00	2.00	4.00
SHEAR STRENGTH, ksf	1.06	1.84	3.07
FRICTION ANGLE, degrees		33.5	
COHESION, ksf		0.44	

Reviewed by: Joe Bouknight
Joseph Bouknight, P.E., C81517

AGS Inc.
Otay Village 14
AGS Inc. Project No: 1312-02

August 1, 2014
GF13797

LABORATORY COMPACTION CURVE

G Force Lab No.:	**10077**	Depth, ft.:	**1-3'**
Sample Location:	**TP-21**	Sampled By:	**PJD**
Soil Description:	**Brownish Gray Sandy Clay (CL/SC)**	Date Sampled:	**7-15-18-2014**
Source of Soil:	**On Site**		

Test Designation: **ASTM_D1557** Method **B**

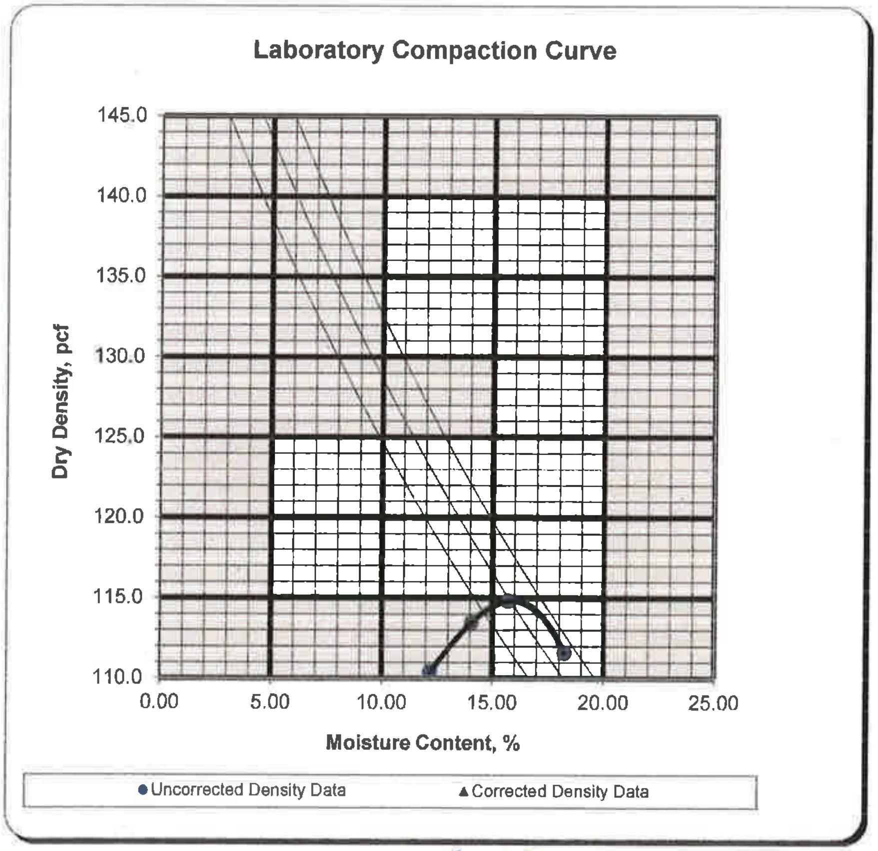
% +3/4" **2.2** % +3/8" **5.6** % +#4 **11.6**

Oversize Correction Applied? **No**

Method of Sample Preparation: **Dry**

Type of Hammer Used: **Manual**

M/D Curve No. TP-21



Test Results

Maximum Density, pcf	**114.8**
Optimum Moisture, %	**15.8**

Oversize Corrected Results

Maximum Density, pcf	**N/A**
Optimum Moisture, %	**N/A**

Reviewed by: Joseph Bouknight, P.E., C81517

♦ *4035 Pacific Highway, San Diego, CA 92110* ♦ *Tel: 619-583-6633* ♦
www.gforceca.com

Expansion Index
(ASTM D4829)

G Force Lab No.	10076	Sample No:	TP-21
Date Sampled:	7-15-18-2014	By:	PJD
Date Submitted:	7-15-18-2014	By:	PJD
Sample Location:	On Site Test Pits		
Sample Depth:	1-3'		
Sample Description:	Dk. Brown Silty Clay (CL/CH)		

Initial Water Content, %	13.3%
Dry Density, pcf	98.0
Saturation, %	49.7%
Initial Dial Reading, in.	0.0000
Final Dial Reading, in.	0.1246
Final Water Content, %	30.1%
Expansion Index	**124**
Potential Expansion	**High**

Reviewed by: Joe Bouknight

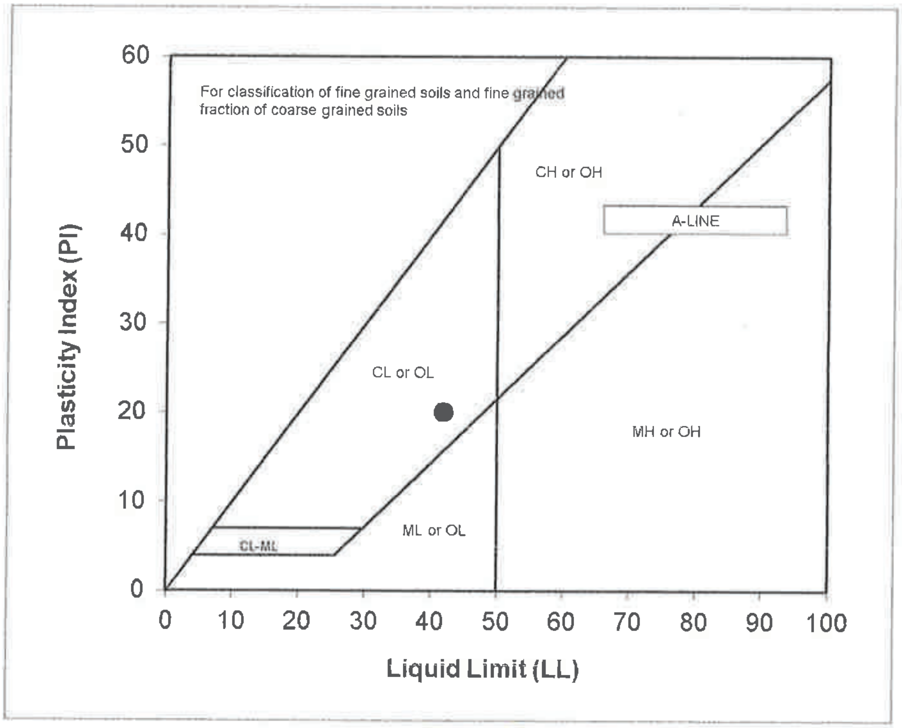
Joseph Bouknight, P.E., C81517

Atterberg Limits

(ASTM D4318)

G Force Lab No.	10075	Boring Number:	TP-17
Date Sampled:	7-15-18-2014	By:	PJD
Date Submitted:	7-15-18-2014	By:	PJD
Sample Location:	On Site Test Pits	Depth:	14-15'
Boring Number:	TP-17		
Sample Description:	LT Tanish White Silty Clay (CL)		
Special Specimen Selection Process:	0		
Sample Drying Method:	Air		
Estimated Retained on No. 40 Sieve (%):	25		
Liquid Limit Procedure Used:	Method A: Multipoint		

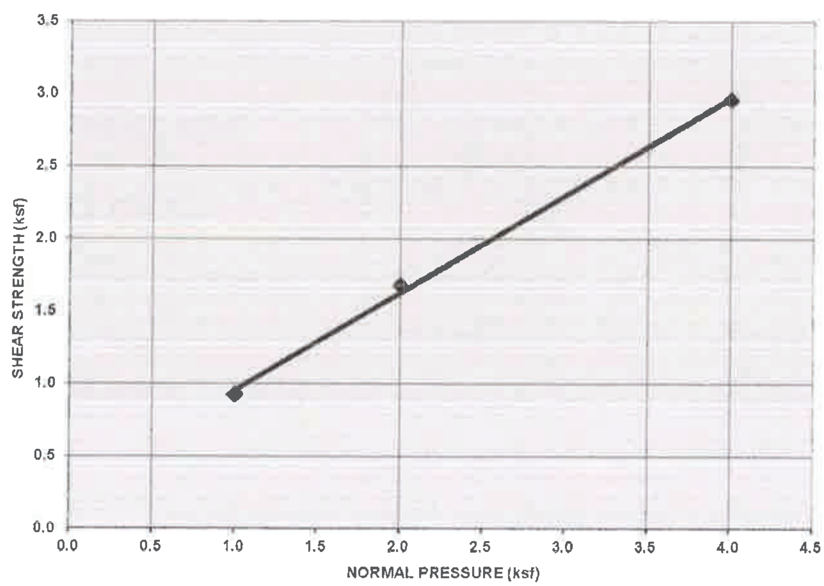
Liquid Limit	42
Plastic Limit	22
Plasticity Index	**20**
Classification	**CL**



Reviewed by: Joseph Bouknight, P.E., C81517

DIRECT SHEAR TEST REPORT

G-FORCE LAB NO.:	10074
SAMPLE LOCATION:	TP-17 @ 4-5'
SOIL TYPE:	Lt. Brown Tanish Clayey Siltstone (ML/MH)
SAMPLE TYPE:	Remolded at 117.6 @ 13.9% M.C. @ 90% RC



CALCULATED DATA

INITIAL					
	WET DENSITY	pcf	118.6	118.9	118.8
	DRY DENSITY	pcf	105.6	105.8	105.7
	MOISTURE	%	12.4	12.4	12.4
FINAL, at failure					
	MOISTURE	%	25.4	23.5	22.1

NORMAL PRESSURE, ksf	1.00	2.00	4.00
SHEAR STRENGTH, ksf	0.92	1.68	2.96
FRICTION ANGLE, degrees	33.9		
COHESION, ksf	0.28		

Reviewed by: Joseph Bouknight, P.E., C81517

DVBE SDVOSB SBE

Expansion Index
(ASTM D4829)

G Force Lab No.	10073	Sample No:	TP-16
Date Sampled:	7-15-18-2014	By:	PJD
Date Submitted:	7-15-18-2014	By:	PJD
Sample Location:	On Site Test Pits		
Sample Depth:	1-2.5'		
Sample Description:	Pale Brown Silty Clay (CL/CH)		

Initial Water Content, %	12.7%
Dry Density, pcf	99.7
Saturation, %	49.9%
Initial Dial Reading, in.	0.0000
Final Dial Reading, in.	0.2145
Final Water Content, %	36.7%
Expansion Index	**214**
Potential Expansion	**Very High**

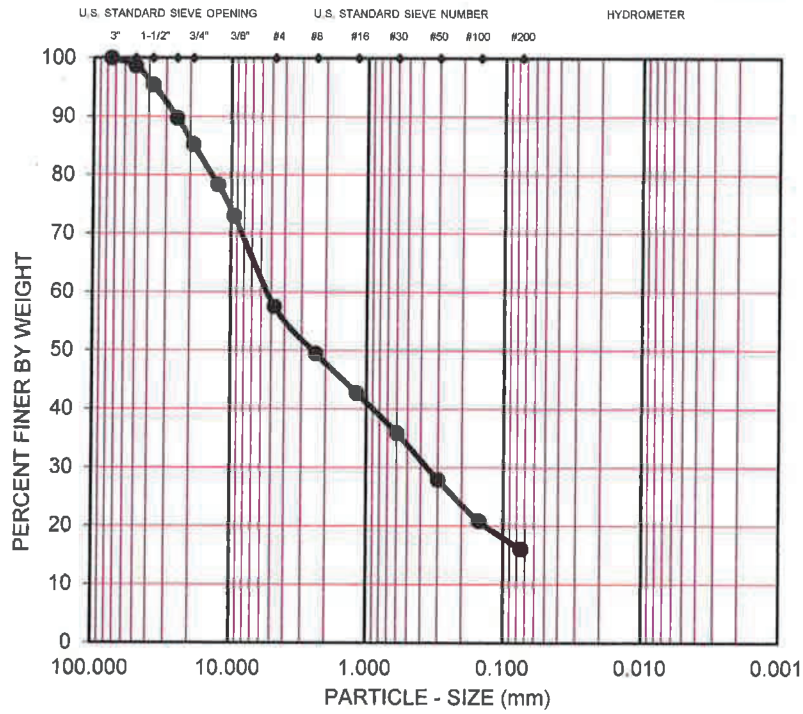
Reviewed by: Joe Bouknight
Joseph Bouknight, P.E., C81517

Sieve Analysis

(ASTM C136)

G Force Lab No. 10072 | Sample No: TP-9 @ 4-5'
Date Sampled: 7-15-18-2014 | By: PJD
Date Submitted: 7-15-18-2014 | By: PJD
Sample Location: On Site Test Pits
Sample Description: Lt. Brown Sandy Clay (SC)

Gravel		Sand			Fines
CRS	Fine	CR	Med	Fine	Clay and / or Silt



Sieve Size	% Passing
3"	100
2"	99
1-1/2"	95
1"	90
3/4"	85
1/2"	78
3/8"	73
#4	58
#8	49
#16	43
#30	36
#50	28
#100	21
#200	16

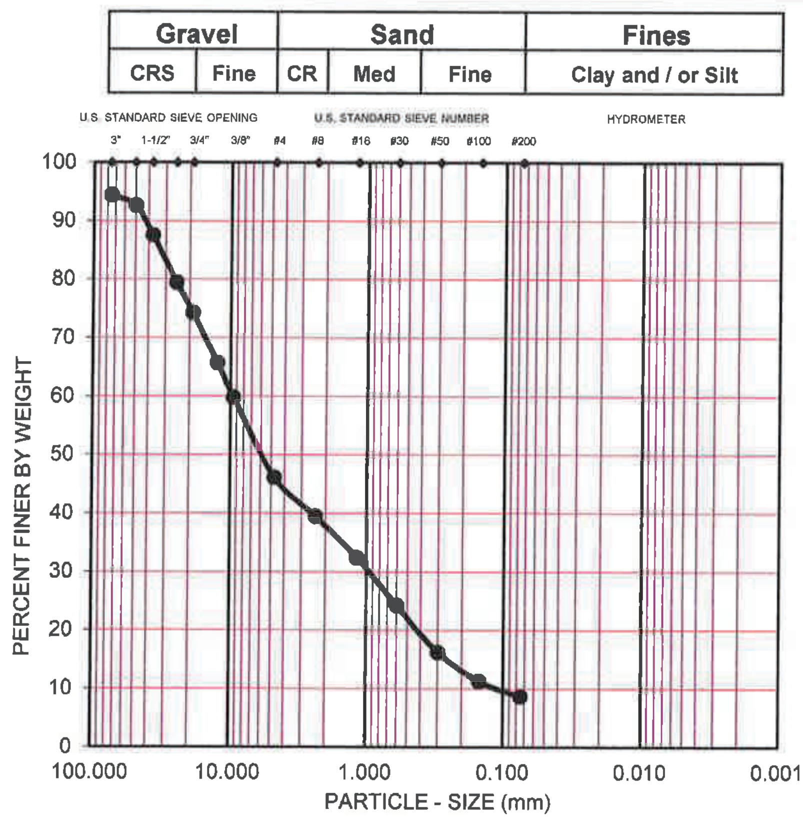
Reviewed by: ______________________________
Joseph C. Bouknight, P.E., C81517

Sieve Analysis

(ASTM C136)

G Force Lab No. 10071
Date Sampled: 7-15-18-2014
Date Submitted: 7-15-18-2014
Sample Location: On Site Test Pits
Sample Description: Lt. Gray Silty Sand (SM)

Sample No: TP-6 @ 4-5'
By: PJD
By: PJD



Sieve Size	% Passing
3"	94
2"	93
1-1/2"	88
1"	79
3/4"	74
1/2"	66
3/8"	60
#4	46
#8	39
#16	32
#30	24
#50	16
#100	11
#200	9

Reviewed by: Joe Bouknight

Joseph C. Bouknight, P.E., C81517

Soil Corrosivity

(CTM 643,CTM 417 & CTM 422)

Lab Number	Boring No.	Depth	Sulfate %	Chloride %	PH	Resistivity (OHM-cm)
10070	TP-2	3.5-4'	0.603	0.116	6.80	223

Lab Number	Boring No.	Depth	Sulfate %	Chloride %	PH	Resistivity (OHM-cm)
10076	TP-21	1-3'	0.012	0.019	6.2	776

Lab Number	Boring No.	Depth	Sulfate %	Chloride %	PH	Resistivity (OHM-cm)
10077	TP-21	6-7'	0.01	0.064	7.92	392

Sulfate and Chloride content test were performed by Southern California Soils & Testing Inc..

Date Sampled: 7-15-18-2014
Sampled By: PJ
Date Submitted: 7/25/2014
Submitted By: PJ

Reviewed by: Joe Bouknight
Joseph Bouknight, P.E., C81517

Expansion Index
(ASTM D4829)

G Force Lab No.	10069	Sample No:	TP-2-1
Date Sampled:	7-15-18-2014	By:	PJD
Date Submitted:	7-15-18-2014	By:	PJD
Sample Location:	On Site Test Pits		
Sample Depth:	2-3'		
Sample Description:	Brown Silty Clay (CL/CH)		

Initial Water Content, %	10.5%
Dry Density, pcf	107.9
Saturation, %	50.5%
Initial Dial Reading, in.	0.0000
Final Dial Reading, in.	0.1371
Final Water Content, %	24.9%
Expansion Index	**138**
Potential Expansion	**Very High**

Reviewed by: Joe Bouknight
Joseph Bouknight, P.E., C81517

Expansion Index
(ASTM D4829)

G Force Lab No.	10068	Sample No:	TP-1
Date Sampled:	7-15-18-2014	By:	PJD
Date Submitted:	7-15-18-2014	By:	PJD
Sample Location:	On Site Test Pits		
Sample Depth:	8-9'		
Sample Description:	Pale Olive Gray Clayey Silt (CL/SC)		

Initial Water Content, %	12.2%
Dry Density, pcf	102.6
Saturation, %	51.5%
Initial Dial Reading, in.	0.0000
Final Dial Reading, in.	0.1161
Final Water Content, %	26.9%
Expansion Index	**118**
Potential Expansion	**High**

Reviewed by: Joe Bouknight
Joseph Bouknight, P.E., C81517

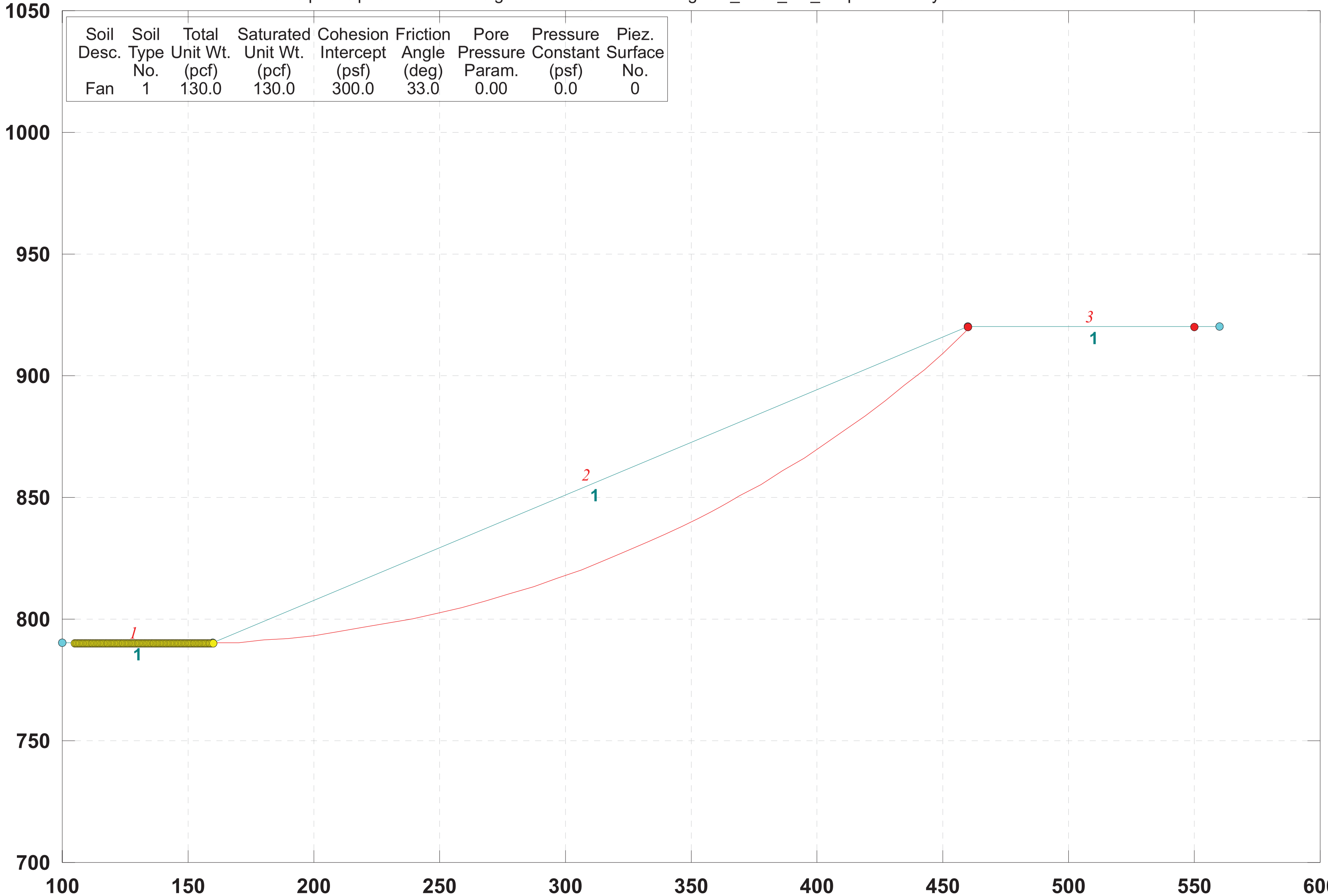
APPENDIX D

SLOPE STABILITY ANALYSIS

1312-02 Village 14 (120' 2:1 Cut Slope) Static

c:\users\public\public documents\gstabl7 data\1312-02 village 14_120ft_2.1_cut.pl2 Run By: ss 3/24/2017 01:28PM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
Fan	1	130.0	130.0	300.0	33.0	0.00	0.0	0

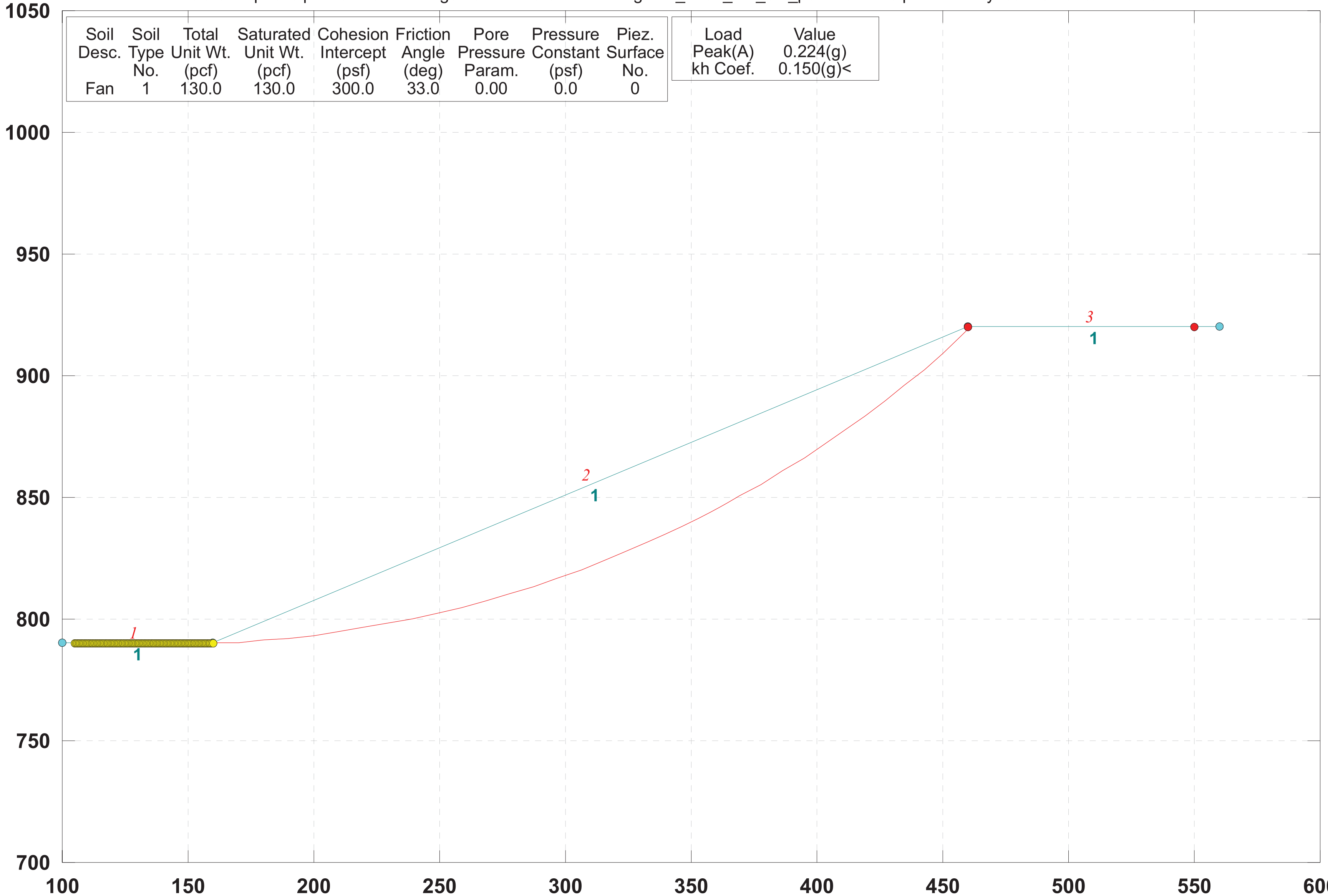


GSTABL7 v.2 FSmin=1.90
Safety Factors Are Calculated By The Modified Bishop Method

PLATE D-1

1312-02 Village 14 (120' 2:1 Cut Slope) Pseudo Static

c:\users\public\public documents\gstabl7 data\1312-02 village 14_120ft_2.1_cut_pseudo static.pl2   Run By: ss   3/24/2017   01:37PM

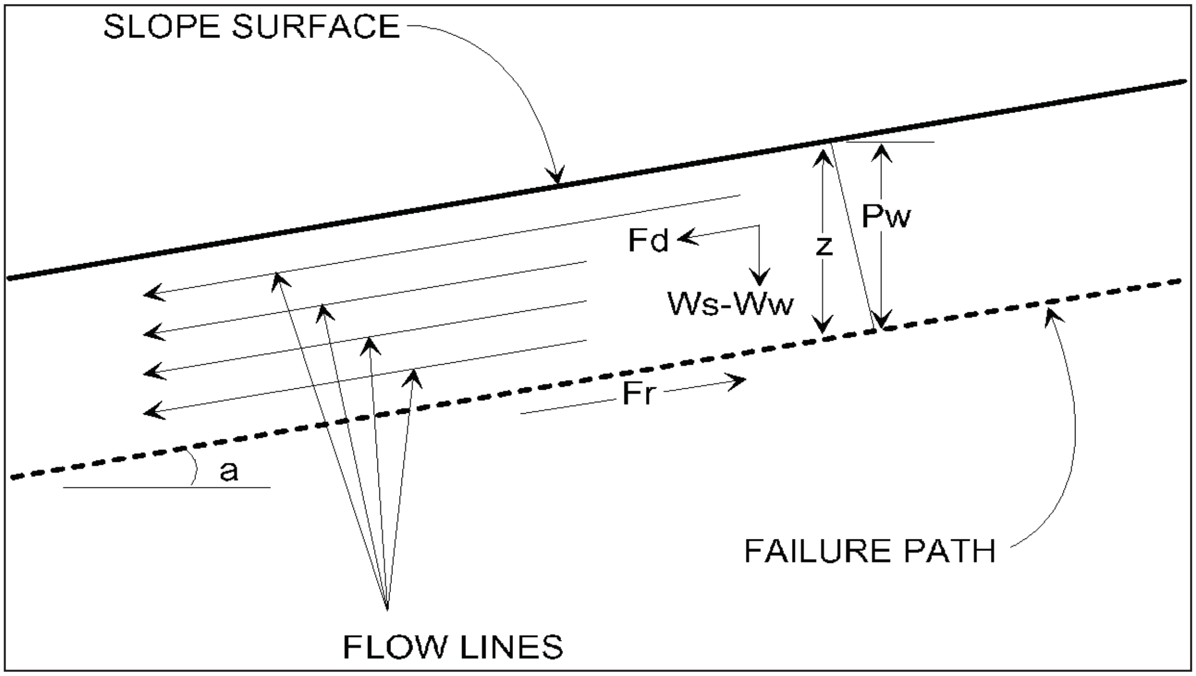


GSTABL7 v.2 FSmin=1.34

Safety Factors Are Calculated By The Modified Bishop Method

PLATE D-2

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 CUT SLOPE

Given:

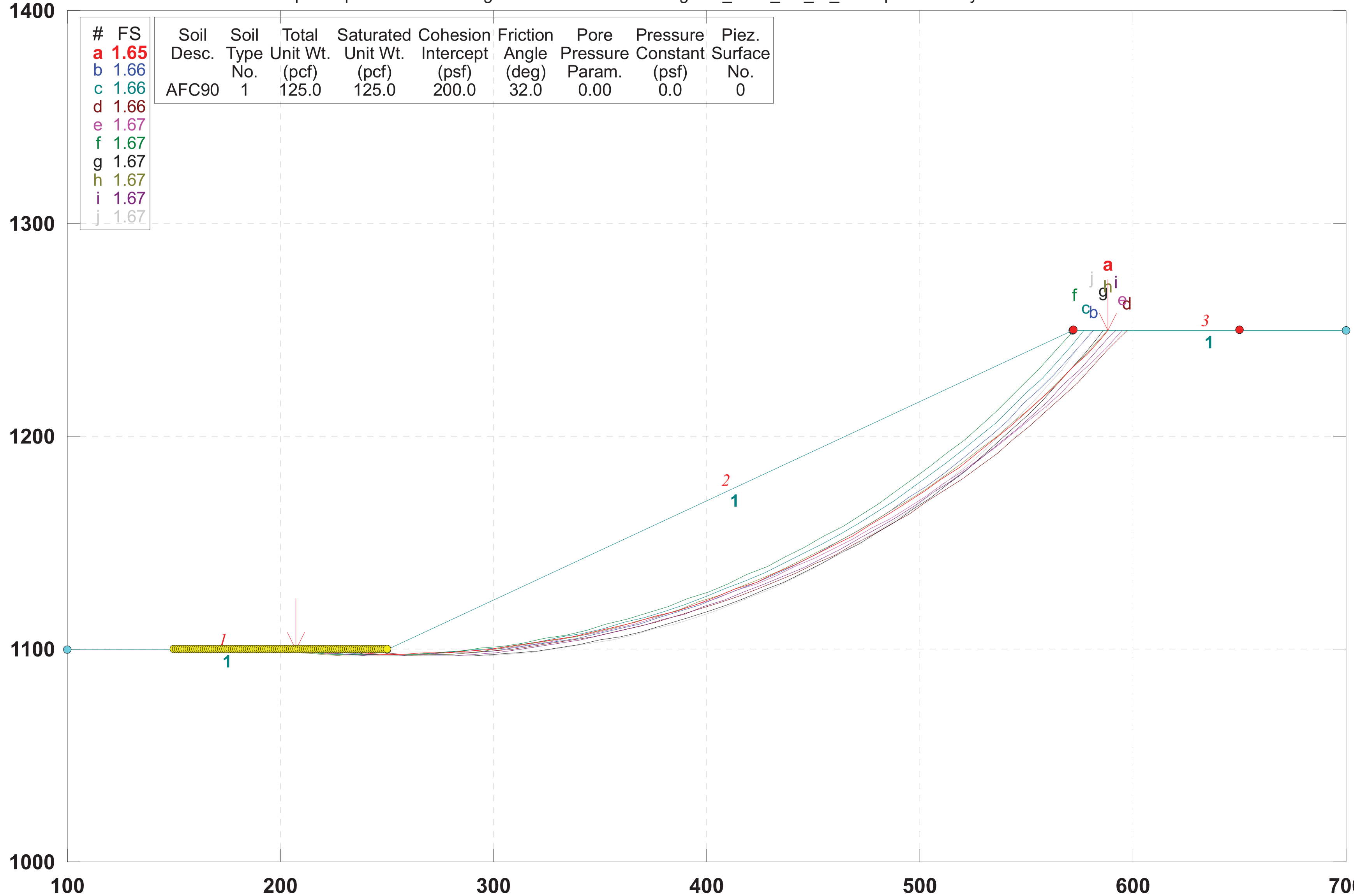
Ws	z	a		phi		c
(pcf)	(ft)	(degrees)	(radians)	(degrees)	(radians)	(psf)
130	4	26.5	0.4625123	33	0.5759587	300

Calculations:

Pw	u	Fd	Fr	**FS**
3.20	199.91	207.65	440.64	**2.12**

1312-02 Village 14 (150' 2:1 Fill Slope)Static

c:\users\public\public documents\gstabl7 data\1312-02 village 14_150ft_2.1_fill_static.pl2   Run By: SS   1/11/2017   02:35PM

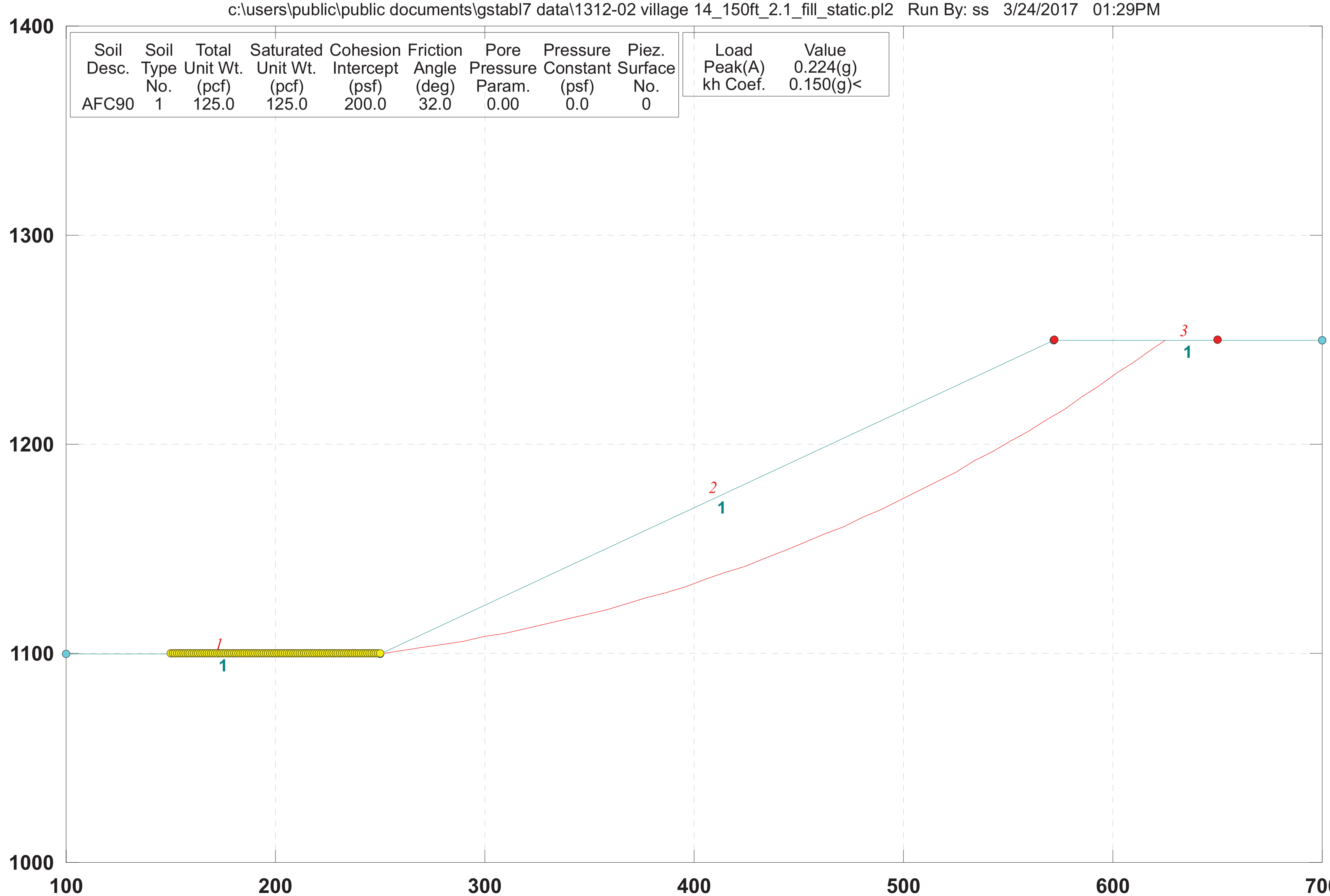


GSTABL7 v.2 FSmin=1.65
Safety Factors Are Calculated By The Modified Bishop Method

PLATE D-4

1312-02 Village 14 (150' 2:1 Fill Slope)Pseudo Static

c:\users\public\public documents\gstabl7 data\1312-02 village 14_150ft_2.1_fill_static.pl2 Run By: ss 3/24/2017 01:29PM



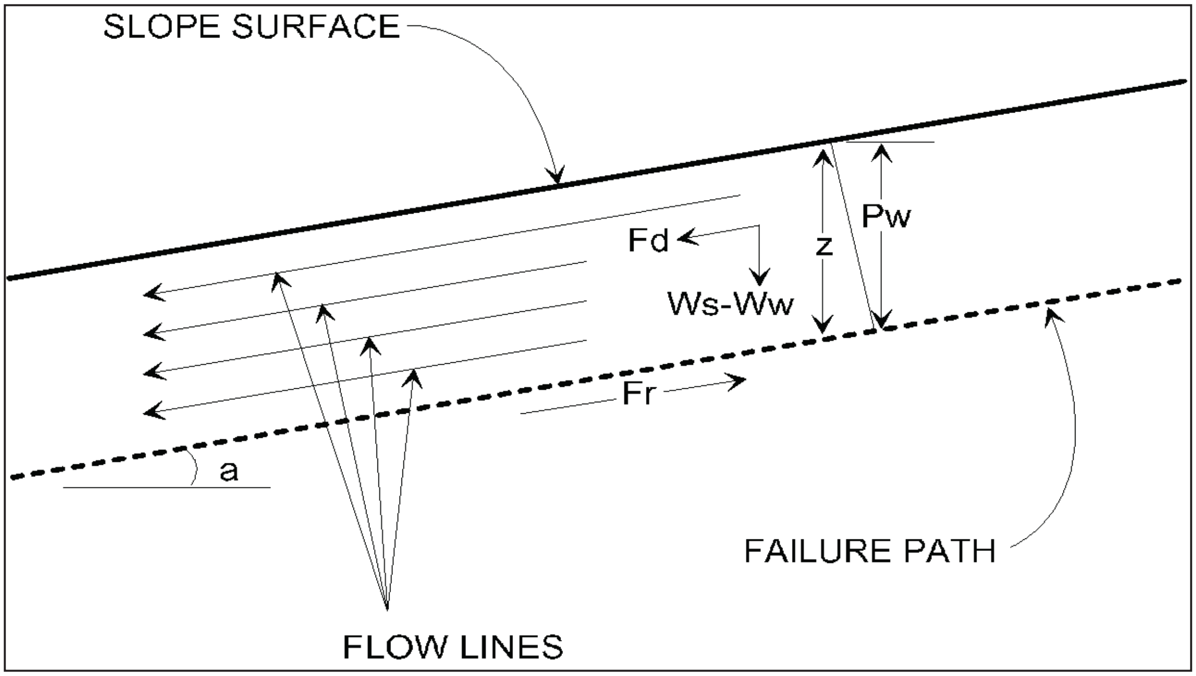
Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Pore Pressure Param.	Pressure Constant (psf)	Piez. Surface No.
AFC90	1	125.0	125.0	200.0	32.0	0.00	0.0	0

Load	Value
Peak(A)	0.224(g)
kh Coef.	0.150(g)<

GSTABL7 v.2 FSmin=1.17
Safety Factors Are Calculated By The Modified Bishop Method

PLATE D-5

SURFICIAL SLOPE STABILITY



Assume: (1) Saturation To Slope Surface
(2) Sufficient Permeability To Establish Water Flow

Pw = Water Pressure Head=(z)(cos^2(a))
Ws = Saturated Soil Unit Weight
Ww = Unit Weight of Water (62.4 lb/cu.ft.)
u = Pore Water Pressure=(Ww)(z)(cos^2(a))
z = Layer Thickness
a = Angle of Slope
phi = Angle of Friction
c = Cohesion
Fd = (0.5)(z)(Ws)(sin(2a))
Fr = (z)(Ws-Ww)(cos^2(a))(tan(phi)) + c
Factor of Safety (FS) = Fr/Fd

2:1 FILL SLOPE

Given:

Ws	z	a		phi		c
(pcf)	(ft)	(degrees)	(radians)	(degrees)	(radians)	(psf)
125	4	26.5	0.4625123	32	0.5585054	200

Calculations:

Pw	u	Fd	Fr	**FS**
3.20	199.91	199.66	325.32	**1.63**

APPENDIX E

INFILTRATION FEASIBILITY STUDY

ADVANCED GEOTECHNICAL SOLUTIONS, INC.
485 Corporate Drive, Suite B
Escondido, CA 92029
Telephone: (619) 867-0487

JacksonPendo Development Company
2245 San Diego Avenue, Suite 223
San Diego CA 92110

February 21, 2017
P/W 1312-02
Report No. 1312-02-B-7

Attention: **Ms. Liz Jackson**

Subject: ***Infiltration Feasibility Study, Otay Ranch – Village 14 and Planning Areas 16 and 19, County of San Diego, California***

References: See Appendix A

Gentleperson:

In accordance with your request, Advanced Geotechnical Solutions, Inc. (AGS) has prepared this preliminary infiltration feasibility study for proposed BMP basins at the subject site (Figure 1). This report is intended to evaluate the feasibility for storm water infiltration and provide preliminary infiltration rates in general accordance with the current Storm Water Standards – BMP Design Manual. A discussion of our field testing and findings are presented below. Worksheet Form C.4-1 and associated supporting worksheets and data are presented in Appendix A.

1. SITE DESCRIPTION AND PROPOSED DEVELOPMENT

The Proposed Project is located within Township 17 South, Range 1 East, Sections 8, 16, 17, 18, 19, 20, and 30 on the USGS 7.5' Jamul Mountains quadrangle, generally along Proctor Valley Road between the City of Chula Vista and Jamul, California. The project area is more specifically located within Proctor Valley Village 14 and Planning Areas 16 and 19 as depicted in Figure 1.

The total Project Area covers approximately 1,370 acres, of which approximately 724 acres are within Otay Ranch Village 14, 560 acres are within Planning Areas 16 and 19, and 86 acres are for offsite circulation. The Proposed Project area is in a natural state and is covered with a light to dense growth of annuals and some chaparral. A network of improved and unimproved roads provides access throughout the site. The existing elevations within the proposed development ranges from a high of approximately 1,345 feet above mean sea level (AMSL) in the northeastern portion of the site (R-16) to a low of approximately 550 feet AMSL within an active drainage near the southern limit of proposed development. Topography on site ranges from gently sloping terraces to moderately steep existing natural slopes approaching 1:1 (horizontal to vertical) slope inclinations. Two southerly flowing active drainages transect the site ultimately converging into a broad drainage adjacent to the existing Proctor Valley Road which drains into Upper Otay Lake.

Several BMP basins are proposed throughout the site, ranging in size from approximately 2,877 to 113,501 square feet.

2. FIELD INVESTIGATION

To evaluate the feasibility of storm water infiltration on the site, and to provide preliminary design infiltration rates, eight (8) borehole percolation tests (P-1 through P-8) were performed in general conformance with Appendix D, Section D.3.3.2 of the recently adopted BMP Design Manual. Testing was performed in areas of proposed and possible water quality basins (Plates 1 through 3).

A rubber tire backhoe equipped with a hydraulic 6-inch diameter auger attachment was used to advance the infiltration test borings to depths of approximately three (3) feet below existing grades. In addition, test pits were excavated to depths of up to ten feet below the surface using the rubber tire backhoe at each of the eight (8) percolation test localities, for a total of eight (8) test pits (PT-1 through PT-8). As part of the fieldwork our Geologist provided continuous soil/geology logging of the test pits. Test pit logs are presented in the Appendix B. Locations of the infiltration test borings and test pits are shown on Figure 2.

Infiltration test borings P-1, P-2, and P-5 extended into Quaternary aged Older Alluvium, the remaining infiltration test borings extended into Tertiarty aged Otay Formation - Fanglomerate. The Older Alluvium encountered within the test borings and adjacent backhoe test pits generally consisted of reddish brown, clayey sand to sandy clay with abundant gravel and cobbles in a dry to moist and dense to very dense condition. The Otay Formation – Fanglomerate encountered generally consisted of two subunits, a fine grained unit consisting of siltstone to claystone and a coarse grained unit consisting of an angular breccia with a silty clay to clayey sand matrix.

The resulting test holes were cleaned of loose debris then successively filled with more than 5 gallons of clean, potable water and allowed to pre-soak. The following day the test holes were cleaned of sediment and the bottom was lined with approximately 2-inches of washed gravel prior to infiltration testing. A series of falling head infiltration tests were performed. The test holes were filled with clean, potable water to approximately 24 inches above the infiltration surface and allowed to infiltrate. The water level was allowed to drop for a 30-minute period, the water level was then measured and the drop rate calculated in inches per hour. The test hole was then refilled with water as necessary and the test procedure was repeated over the course of 6 hours, and until a stabilized percolation rate was recorded. The stabilized percolation rate was then converted to an infiltration rate based on the "Porchet Method" utilizing the following equation:

$$I_t = \frac{\Delta H \, \pi r^2 \, 60}{\Delta t(\pi r^2 + 2\pi r H_{avg})} = \frac{\Delta H \, 60 \, r}{\Delta t(r + 2H_{avg})}$$

Where:

I_t = tested infiltration rate, inches/hour
ΔH = change in head over the time interval, inches
Δt = time interval, minutes
$^*r$ = effective radius of test hole
H_{avg} = average head over the time interval, inches

Logs of the field testing and graphical representations of the test data presented as infiltration versus time interval are included in Appendix A as supporting documents for Form C.4-1.

3. TEST RESULTS AND PRELIMINARY DESIGN VALUES

The results of our testing are summarized in Table 1 below.

TABLE 1
SUMMARY OF INFILTRATION TEST RESULTS

Test Hole No.	Depth of Test Hole	Approximate Test Elevation	Geologic Unit	Description	Tested Infiltration Rate (inches/hour)
P-1	36 inches	602 msl	Qoal	Clayey Sand	0.28
P-2	36 inches	591 msl	Qoal	Sandy Clay	0.18
P-3	36 inches	588 msl	Tof	Clayey Sandstone	0.64
P-4	36 inches	597 msl	Tof	Clayey Siltstone	0.22
P-5	36 inches	660 msl	Qoal	Gravelly sandy clay with Cobble	0.64
P-6	36 inches	671 msl	Tof	Gravelly sandy clay with Cobble	0.72
P-7	36 inches	760 msl	Tof	Breccia	0.20
P-8	36 inches	750 msl	Tof	Breccia	0.21

In accordance with Appendix D, Section D.5. of the BMP Design Manual, a ‘Factor of Safety’ should be applied to the tested infiltration rates to determine the design infiltration rates. The factor of safety is determined by Worksheet D-5.1 and possesses a numerical value between 2 and 9. For the proposed project site, the factor of safety worksheet yielded a Combined Factor of Safety (S_{total}) of 5.5. However, for the purposes of feasibility screening, the Factor of Safety is restricted to a maximum value of 2.0. Table 2 below summarizes the design infiltration rates for the subject test holes utilizing a factor of safety of 2.0.

TABLE 2
SUMMARY OF PRELIMINARY DESIGN INFILTRATION RATES

Test Hole No.	Tested Infiltration Rate (in./hr.)	Factor of Safety	Design Infiltration Rate (in./hr.)
P-1	0.28	2.0	0.14
P-2	0.18	2.0	0.09
P-3	0.64	2.0	0.32
P-4	0.22	2.0	0.11
P-5	0.64	2.0	0.32
P-6	0.72	2.0	0.36
P-7	0.20	2.0	0.10
P-8	0.21	2.0	0.10

4. DESIGN CONSIDERATIONS

4.1 Groundwater

Shallow groundwater (less than 2 feet below ground surface) was encountered during recent subsurface exploration in a broad drainage located in the northeasterly portion of Planning Area 16. One structural BMP (Biofiltration Basin BF-1-6) is proposed in this area. The shallow groundwater encountered is considered to be a transient condition related to recent prolonged rain events and the presence of an undocumented fill dam located at the confluence of this drainage and another tributary drainage approximately 500 feet south of the proposed BMP. In consideration of the potential for shallow groundwater to develop in the area of Basin BF-1-6, infiltration is not recommended.

No other groundwater was encountered or evidence of high groundwater observed within borings/excavations onsite. It is our opinion that the seasonal high groundwater elevation in the remaining proposed BMP locations is deeper than ten (10) feet below the bottom of the proposed infiltration surfaces.

4.2 Geotechnical Hazards

An offsite landslide has been postulated based on geomorphic evidence. There are no proposed BMP basins located superjacent or in close proximity to the potential landslide area. There are no significant geotechnical hazards known to exist on or adjacent to the project site that would preclude construction of the proposed BMPs.

4.3 Soil Contamination

During our recent site investigation, no evidence of soil contamination was observed, nor is any contamination known to exist onsite. Groundwater was not encountered during our subsurface investigations, and is not anticipated to be contaminated.

According to the State Water Resources Control Board Geotracker website, the closest contaminated site is located at 13330 Proctor Valley Road, approximately 500 feet north/northwest of the northerly boundary of the site and in excess of 1,500 feet from the nearest proposed BMP basin. This site had a leaking underground storage tank for diesel fuel. The cleanup case was opened on July 27, 2004 and is reported as Completed - Case Closed on October 10, 2006.

4.4 Soil Characteristics and Anticipated Flow Paths

The infiltration surfaces for the proposed BMP basins are anticipated to be located within the native material at the site (Older Alluvium, Otay Formation – Fanglomerate, or Santiago Peak Volcanics).

4.4.1 Older Alluvium

As encountered, the Older Alluvium generally consists of clayey fine to coarse-grained sand and sandy clay with variable amounts of gravel to cobble size clasts in a dense to very dense condition. Refusal to excavation occurred within trenches PT-5 and PT-6 at depths of 9 feet and 4 feet below ground surface, respectively. Tested infiltration rates within the Older Alluvium ranged from 0.18 to 0.64 inches/hour and are expected to vary from location to location due to variations in density and percentage of coarse-grained material (sand and gravel) versus fine-grained material (silt and clay). It is estimated that infiltration rates within the Older Alluvium will predominantly range between 0.10 and 0.35 inches/hour. For preliminary design purposes, it is recommended that the lower bound value of 0.10 inches/hour be used.

4.4.2 Otay Formation – Fanglomerate

This unit is typified by thickly to massively bedded breccia intertongued with a finer grained subunit consisting of claystone and sandstone. The breccia subunit is composed of subangular to angular, gravel to cobble size clasts in a clayey sand matrix. Occasional to common boulder sized clasts were encountered in our borings and excavator test pits. Rock clasts appear to be locally derived from the Santiago Peak Volcanics. The clay matrix is commonly waxy, highly expansive, and is likely bentonitic. The finer grained subunit is generally comprised of olive gray to pale brownish yellow, sandy claystone and clayey sandstone in slightly moist to moist and soft to hard condition. Tested infiltration rates within the Fanglomerate ranged from 0.20 to 0.72 inches/hour and are expected to vary from location to location due to variations in density and percentage of coarse-grained material (sand and gravel) versus fine-grained material (silt and clay). It is estimated that infiltration rates within the Fanglomerate will predominantly range between 0.05 and 0.20 inches/hour. For preliminary design purposes, it is recommended that the lower bound value of 0.05 be used. It should be noted that discrete bentonitic claystone lenses are common within the Otay Formation. These lenses are highly expansive and impermeable. Infiltration in areas where bentonitic claystone is present should be avoided.

4.4.3 Santiago Peak Volcanics

Santiago Peak Volcanics were not encountered during subsurface exploration for this study. However, subsurface excavations for previous geotechnical studies on the project site indicate the Santiago peak Volcanics are generally dense and mildly metamorphosed volcanic rocks. Composition of the volcanic rocks varies from basalt to rhyolite but is predominantly dacite and andesite. Typically the meta-volcanics display crude to moderate bedding and foliation. Fracturing is poorly to moderately well developed. In general, outside of boulder areas, a weathered halo of only a few feet thick exists. Below this, the rock is very dense and hard. The bedrock of the Santiago Peak Volcanics is impermeable. Flow of water through the Santiago Peak Volcanics occurs through fractures in the bedrock. Fracture networks within the bedrock are highly variable and accurate prediction of flow path is rarely possible. It is estimated that infiltration rates within the Santiago Peak Volcanics will predominantly range between 0.00 and 0.10 inches/hour. For preliminary design purposes, it is recommended that no infiltration be used.

4.5 Proximity to Water Supply Wells

No water supply wells are known to exist within 100 feet of the proposed basins.

5. CONCLUSIONS AND RECOMMENDATIONS

Several BMP basins are proposed throughout the project site and will be situated in varying soil/geologic units. Eight (8) borehole infiltration tests were performed at the locations depicted on the attached plans (Plates 1 through 3). Based on our site specific testing, partial infiltration in the areas tested is considered feasible. A lower bound preliminary design infiltration rate of 0.09 inches/hour was determined using a factor of safety of 2. However, it is recommended that a rate of 0.05 inches/hour be utilized in preliminary design of BMP basins sited within areas underlain by Otay Formation – Fanglomerate and a rate of 0.10 inches/hour be utilized in areas underlain by Older Alluvium. It is further recommended that no infiltration be utilized in preliminary design of BMP based sited in areas underlain by Santiago Peak Volcanics. Dependent upon the final location, size, and depth of the BMP basins, verification of the specific soil/geologic conditions and additional testing may be warranted.

6. FUTURE STUDY NEEDS

The overall project site encompasses approximately 1,370 acres and is underlain by varying geologic/soil conditions. Access to all proposed BMP locations with large excavation equipment was not possible at the time this report was prepared. The intent of this study was to evaluate the feasibility of infiltration type BMPs within the predominant geologic/soil units identified onsite. The infiltration rates presented herein are intended to be guidelines to aid in determining the size, location, and type of BMP during the preliminary design phase and are not suitable for final design purposes. When vehicle and equipment access to all proposed BMP locations becomes available, additional exploration and testing will be necessary to verify geologic/soil conditions and determine location specific infiltration rates.

Advanced Geotechnical Solutions, Inc. appreciates the opportunity to provide you with geotechnical consulting services and professional opinions. If you have any questions, please contact the undersigned at (619) 867-0487.

Respectfully Submitted,
Advanced Geotechnical Solutions, Inc.

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Distribution: (6) Addressee

Attachments: References
Plates 1 through 3 – Geologic Map and Exploration Location Plan
Appendix A- Storm Water Standards BMP Design Manual - Worksheet Form C.4-1, Support Documents and Field Data

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Advanced Geotechnical Solutions, Inc., 2017, Geotechnical Review of Preliminary Tentative Map and Grading Plan, Otay Ranch Village 14 and Planning Areas 16 and 19, County of San Diego, California, dated February 17, 2017 (Report No. 1312-02-B-6).

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County of San Diego, Guidelines for Determining Significance, Geologic Hazards – Near Source Shaking Zones and Potential Liquefaction Areas, July 30, 2007.

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State of California Water Boards, February 7, 2017, *http://geotracker.waterboards.ca.gov/*

Tan, S.S., Landslide Hazards in the Jamul Mountains, OFR 92-12, Map No. 29.

Todd, V.R., Preliminary Geologic Map of the El Cajon 30'x60' Quadrangle, 2004, USGS OFR 2004-1361

URS, 2004, San Diego County Multi-Jurisdictional Hazard Mitigation Plan, San Diego County, California, dated March 15, 2004, (URS Project No. 27653042.00500)

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Walsh, Steven L. and Demere, Thomas A., 1991, Age and Stratigraphy of the Sweetwater and Otay Formations, San Diego County California, in Abbot P.L. and May, J.A., eds., 1991, Eocene Geologic History San Diego Region, Pacific Section SEPM, Vol. 68, pp. 131-148.

APPENDIX F

EARTHWORK SPECIFICATIONS

AND

GRADING DETAILS

GENERAL EARTHWORK SPECIFICATIONS

I. General

A. General procedures and requirements for earthwork and grading are presented herein. The earthwork and grading recommendations provided in the geotechnical report are considered part of these specifications, and where the general specifications provided herein conflict with those provided in the geotechnical report, the recommendations in the geotechnical report shall govern. Recommendations provided herein and in the geotechnical report may need to be modified depending on the conditions encountered during grading.

B. The contractor is responsible for the satisfactory completion of all earthwork in accordance with the project plans, specifications, applicable building codes, and local governing agency requirements. Where these requirements conflict, the stricter requirements shall govern.

C. It is the contractor's responsibility to read and understand the guidelines presented herein and in the geotechnical report as well as the project plans and specifications. Information presented in the geotechnical report is subject to verification during grading. The information presented on the exploration logs depict conditions at the particular time of excavation and at the location of the excavation. Subsurface conditions present at other locations may differ, and the passage of time may result in different subsurface conditions being encountered at the locations of the exploratory excavations. The contractor shall perform an independent investigation and evaluate the nature of the surface and subsurface conditions to be encountered and the procedures and equipment to be used in performing his work.

D. The contractor shall have the responsibility to provide adequate equipment and procedures to accomplish the earthwork in accordance with applicable requirements. When the quality of work is less than that required, the Geotechnical Consultant may reject the work and may recommend that the operations be suspended until the conditions are corrected.

E. Prior to the start of grading, a qualified Geotechnical Consultant should be employed to observe grading procedures and provide testing of the fills for conformance with the project specifications, approved grading plan, and guidelines presented herein. All remedial removals, clean-outs, removal bottoms, keyways, and subdrain installations should be observed and documented by the Geotechnical Consultant prior to placing fill. It is the contractor's responsibility to appraise the Geotechnical Consultant of their schedules and notify the Geotechnical Consultant when those areas are ready for observation.

F. The contractor is responsible for providing a safe environment for the Geotechnical Consultant to observe grading and conduct tests.

II. Site Preparation

A. Clearing and Grubbing: Excessive vegetation and other deleterious material shall be sufficiently removed as required by the Geotechnical Consultant, and such materials shall be properly disposed of offsite in a method acceptable to the owner and governing agencies. Where applicable, the contractor may obtain permission from the Geotechnical Consultant, owner, and governing agencies to dispose of vegetation and other deleterious materials in designated areas onsite.

B. Unsuitable Soils Removals: Earth materials that are deemed unsuitable for the support of fill shall be removed as necessary to the satisfaction of the Geotechnical Consultant.

C. Any underground structures such as cesspools, cisterns, mining shafts, tunnels, septic tanks, wells, pipelines, other utilities, or other structures located within the limits of grading shall be removed and/or abandoned in accordance with the requirements of the governing agency and to the satisfaction of the Geotechnical Consultant.

D. Preparation of Areas to Receive Fill: After removals are completed, the exposed surfaces shall be scarified to a depth of approximately 8 inches, watered or dried, as needed, to achieve a generally uniform moisture content that is at or near optimum moisture content. The scarified materials shall then be compacted to the project requirements and tested as specified.

E. All areas receiving fill shall be observed and approved by the Geotechnical Consultant prior to the placement of fill. A licensed surveyor shall provide survey control for determining elevations of processed areas and keyways.

III. Placement of Fill

A. Suitability of fill materials: Any materials, derived onsite or imported, may be utilized as fill provided that the materials have been determined to be suitable by the Geotechnical Consultant. Such materials shall be essentially free of organic matter and other deleterious materials, and be of a gradation, expansion potential, and/or strength that is acceptable to the Geotechnical Consultant. Fill materials shall be tested in a laboratory approved by the Geotechnical Consultant, and import materials shall be tested and approved prior to being imported.

B. Generally, different fill materials shall be thoroughly mixed to provide a relatively uniform blend of materials and prevent abrupt changes in material type. Fill materials derived from benching should be dispersed throughout the fill area instead of placing the materials within only an equipment-width from the cut/fill contact.

C. Oversize Materials: Rocks greater than 8 inches in largest dimension shall be disposed of offsite or be placed in accordance with the recommendations by the Geotechnical Consultant in the areas that are designated as suitable for oversize rock placement. Rocks that are smaller than 8 inches in largest dimension may be utilized in the fill provided that they are not nested and are their quantity and distribution are acceptable to the Geotechnical Consultant.

D. The fill materials shall be placed in thin, horizontal layers such that, when compacted, shall not exceed 6 inches. Each layer shall be spread evenly and shall be thoroughly mixed to obtain a near uniform moisture content and uniform blend of materials.

E. Moisture Content: Fill materials shall be placed at or above the optimum moisture content or as recommended by the geotechnical report. Where the moisture content of the engineered fill is less than recommended, water shall be added, and the fill materials shall be blended so that a near uniform moisture content is achieved. If the moisture content is above the limits specified by the Geotechnical Consultant, the fill materials shall be aerated by discing, blading, or other methods until the moisture content is acceptable.

F. Each layer of fill shall be compacted to the project standards in accordance to the project specifications and recommendations of the Geotechnical Consultant. Unless otherwise specified by the Geotechnical

Consultant, the fill shall be compacted to a minimum of 90 percent of the maximum dry density as determined by ASTM Test Method: D1557-09.

G. Benching: Where placing fill on a slope exceeding a ratio of 5 to 1 (horizontal to vertical), the ground should be keyed or benched. The keyways and benches shall extend through all unsuitable materials into suitable materials such as firm materials or sound bedrock or as recommended by the Geotechnical Consultant. The minimum keyway width shall be 15 feet and extend into suitable materials, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. The minimum keyway width for fill over cut slopes is also 15 feet, or as recommended by the geotechnical report and approved by the Geotechnical Consultant. As a general rule, unless otherwise recommended by the Geotechnical Consultant, the minimum width of the keyway shall be equal to 1/2 the height of the fill slope.

H. Slope Face: The specified minimum relative compaction shall be maintained out to the finish face of fill and stabilization fill slopes. Generally, this may be achieved by overbuilding the slope and cutting back to the compacted core. The actual amount of overbuilding may vary as field conditions dictate. Alternately, this may be achieved by backrolling the slope face with suitable equipment or other methods that produce the designated result. Loose soil should not be allowed to build up on the slope face. If present, loose soils shall be trimmed to expose the compacted slope face.

I. Slope Ratio: Unless otherwise approved by the Geotechnical Consultant and governing agencies, permanent fill slopes shall be designed and constructed no steeper than 2 to 1 (horizontal to vertical).

J. Natural Ground and Cut Areas: Design grades that are in natural ground or in cuts should be evaluated by the Geotechnical Consultant to determine whether scarification and processing of the ground and/or overexcavation is needed.

K. Fill materials shall not be placed, spread, or compacted during unfavorable weather conditions. When grading is interrupted by rain, filing operations shall not resume until the Geotechnical Consultant approves the moisture and density of the previously placed compacted fill.

IV. Cut Slopes

A. The Geotechnical Consultant shall inspect all cut slopes, including fill over cut slopes, and shall be notified by the contractor when cut slopes are started.

B. If adverse or potentially adverse conditions are encountered during grading, the Geotechnical Consultant shall investigate, evaluate, and make recommendations to mitigate the adverse conditions.

C. Unless otherwise stated in the geotechnical report, cut slopes shall not be excavated higher or steeper than the requirements of the local governing agencies. Short-term stability of the cut slopes and other excavations is the contractor's responsibility.

V. Drainage

A. Backdrains and Subdrains: Backdrains and subdrains shall be provided in fill as recommended by the Geotechnical Consultant and shall be constructed in accordance with the governing agency and/or recommendations of the Geotechnical Consultant. The location of subdrains, especially outlets, shall be surveyed and recorded by the Civil Engineer.

B. Top-of-slope Drainage: Positive drainage shall be established away from the top of slope. Site drainage shall not be permitted to flow over the tops of slopes.

C. Drainage terraces shall be constructed in compliance with the governing agency requirements and/or in accordance with the recommendations of the Geotechnical Consultant.

D. Non-erodible interceptor swales shall be placed at the top of cut slopes that face the same direction as the prevailing drainage.

VI. Erosion Control

A. All finish cut and fill slopes shall be protected from erosion and/or planted in accordance with the project specifications and/or landscape architect's recommendations. Such measures to protect the slope face shall be undertaken as soon as practical after completion of grading.

B. During construction, the contractor shall maintain proper drainage and prevent the ponding of water. The contractor shall take remedial measures to prevent the erosion of graded areas until permanent drainage and erosion control measures have been installed.

VII. Trench Excavation and Backfill

A. Safety: The contractor shall follow all OSHA requirements for safety of trench excavations. Knowing and following these requirements is the contractor's responsibility. All trench excavations or open cuts in excess of 5 feet in depth shall be shored or laid back. Trench excavations and open cuts exposing adverse geologic conditions may require further evaluation by the Geotechnical Consultant. If a contractor fails to provide safe access for compaction testing, backfill not tested due to safety concerns may be subject to removal.

B. Bedding: Bedding materials shall be non-expansive and have a Sand Equivalent greater than 30. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting.

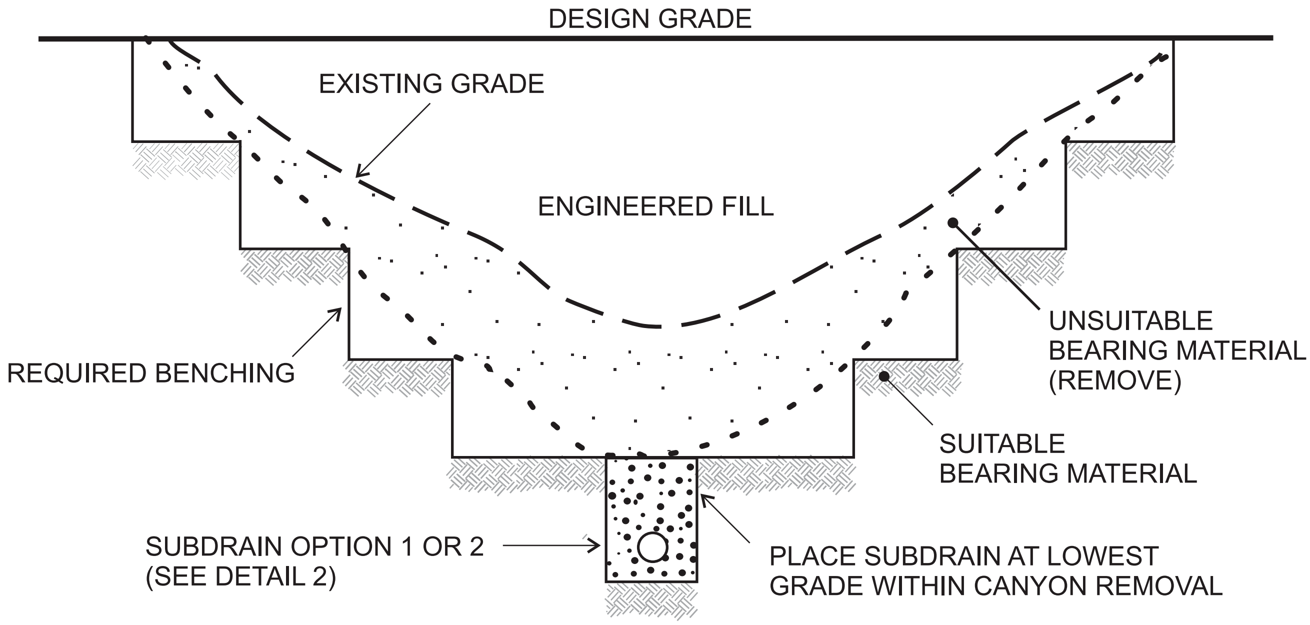
C. Backfill: Jetting of backfill materials is generally not acceptable. Where permitted by the Geotechnical Consultant, the bedding materials can be densified by jetting provided the backfill materials are granular, free-draining and have a Sand Equivalent greater than 30.

VIII. Geotechnical Observation and Testing During Grading

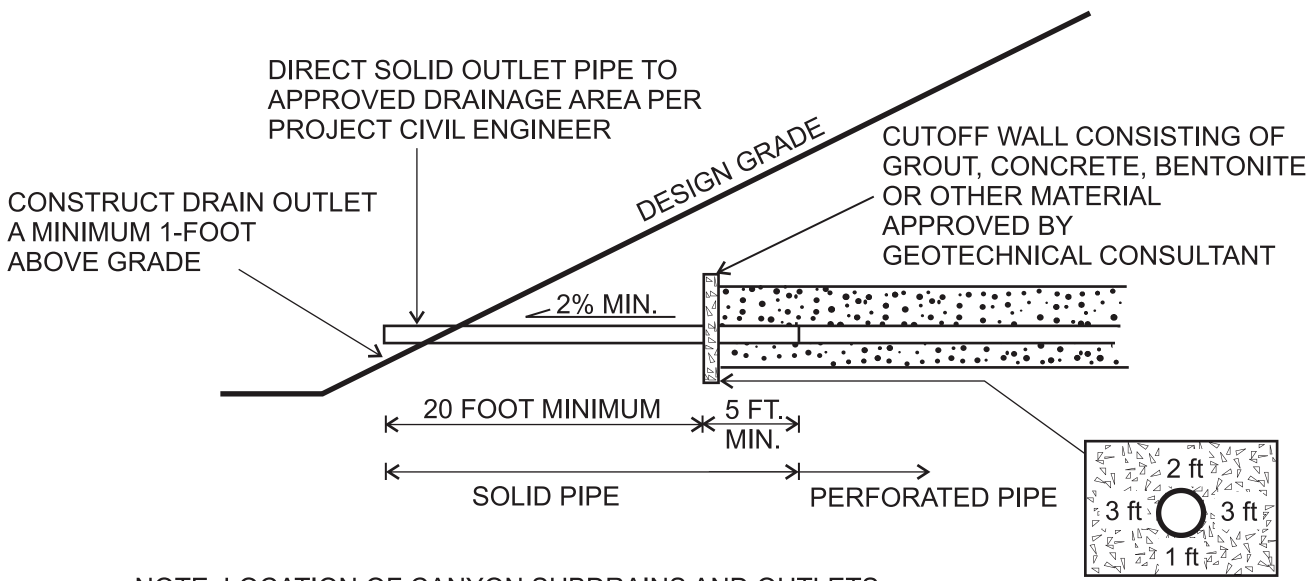
A. Compaction Testing: Fill shall be tested by the Geotechnical Consultant for evaluation of general compliance with the recommended compaction and moisture conditions. The tests shall be taken in the compacted soils beneath the surface if the surficial materials are disturbed. The contractor shall assist the Geotechnical Consultant by excavating suitable test pits for testing of compacted fill.

B. Where tests indicate that the density of a layer of fill is less than required, or the moisture content not within specifications, the Geotechnical Consultant shall notify the contractor of the unsatisfactory conditions of the fill. The portions of the fill that are not within specifications shall be reworked until the required density and/or moisture content has been attained. No additional fill shall be placed until the last lift of fill is tested and found to meet the project specifications and approved by the Geotechnical Consultant.

C. If, in the opinion of the Geotechnical Consultant, unsatisfactory conditions, such as adverse weather, excessive rock or deleterious materials being placed in the fill, insufficient equipment, excessive rate of fill placement, results in a quality of work that is unacceptable, the consultant shall notify the contractor, and the contractor shall rectify the conditions, and if necessary, stop work until conditions are satisfactory.



CANYON SUBDRAIN PROFILE



CUTOFF WALL DIMENSIONS

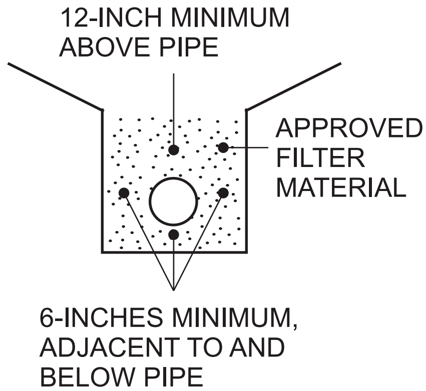
NOTE: LOCATION OF CANYON SUBDRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

CANYON SUBDRAIN TERMINUS

VER 1.0

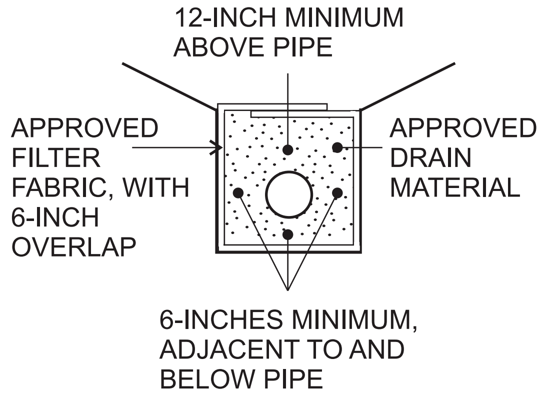
NTS

AGS ADVANCED GEOTECHNICAL SOLUTIONS	CANYON SUBDRAIN	DETAIL 1



OPTION 1

<u>FILTER MATERIAL:</u> MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF CALTRANS CLASS 2 PERMEABLE MATERIAL



OPTION 2

<u>DRAIN MATERIAL:</u> MINIMUM VOLUME OF 9 CUBIC FEET PER LINEAL FOOT OF 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

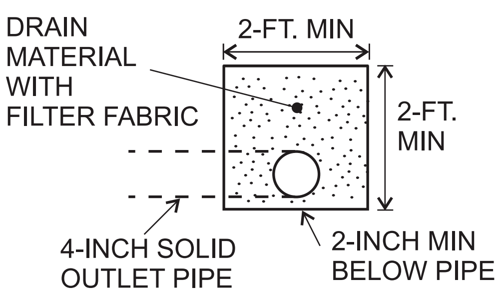
<u>FILTER FABRIC:</u> MIRAFI 140 FILTER FABRIC OR APPROVED EQUIVALENT SUBSTITUTE

<u>PIPE:</u> 6 OR 8-INCH ABS OR PVC PIPE OR APPROVED SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

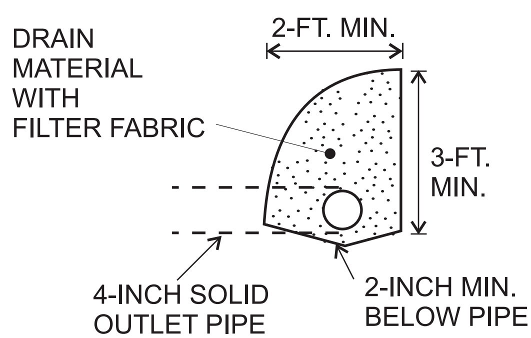
(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

<u>NOTE:</u> CONTINUOUS RUN IN EXCESS OF 5OO FEET REQUIRES 8-INCH DIAMETER PIPE (ASTM D3034, SDR-35, OR ASTM D1785, SCHD. 40)

CANYON SUBDRAIN



OPTION 1



OPTION 2

<u>DRAIN MATERIAL:</u> GRAVEL TRENCH TO BE FILLED WITH 3/4-INCH MAX ROCK OR APPROVED EQUIVALENT SUBSTITUTE

<u>FILTER FABRIC:</u> MIRAFI 140 FILTER FABRIC OR EQUIVALENT SUBSTITUTE WITH A MINIMUM 6-INCH OVERLAP

<u>PIPE:</u> 4-INCH ABS OR PVC PIPE OR APPROVED EQUIVALENT SUBSTITUTE WITH A MINIMUM OF 8 PERFORATIONS (1/4-INCH DIAMETER) PER LINEAL FOOT IN BOTTOM HALF OF PIPE

(ASTM D2751, SDR-35 OR ASTM D3034, SDR-35
ASTM D1527, SCHD. 40 OR ASTM D1785, SCHD. 40)

BUTTRESS/STABILIZATION DRAIN

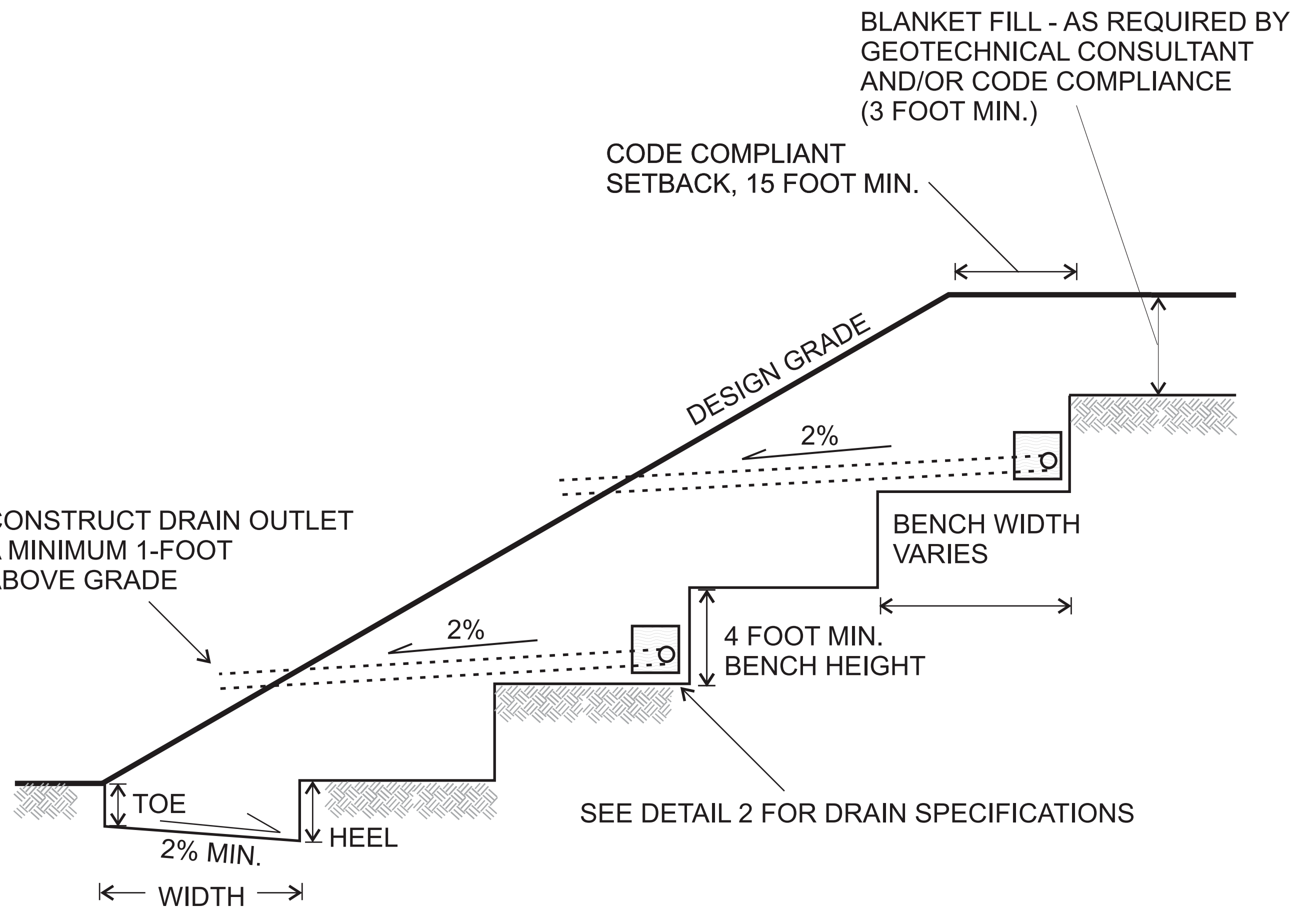
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

DRAIN SPECIFICATIONS

DETAIL 2



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE 2 FOOT MIN.
HEEL 3 FOOT MIN.
WIDTH 15 FOOT MIN.

NOTES:

1. DRAIN OUTLETS TO BE PROVIDED EVERY 100 FEET CONNECT TO PERFORATED DRAIN PIPE BY “L” OR “T” AT A MINIMUM 2% GRADIENT.

2. THE NECESSITY AND LOCATION OF ADDITIONAL DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT. UPPER STAGE OUTLETS SHOULD BE EMPTIED ONTO CONCRETE TERRACE DRAINS.

3. DRAIN PIPE TO EXTEND FULL LENGTH OF STABILIZATION/BUTTRESS WITH A MINIMUM GRADIENT OF 2% TO SOLID OUTLET PIPES.

4. LOCATION OF DRAINS AND OUTLETS SHOULD BE DOCUMENTED BY PROJECT CIVIL ENGINEER. OUTLETS MUST BE KEPT UNOBSTRUCTED AT ALL TIMES.

VER 1.0

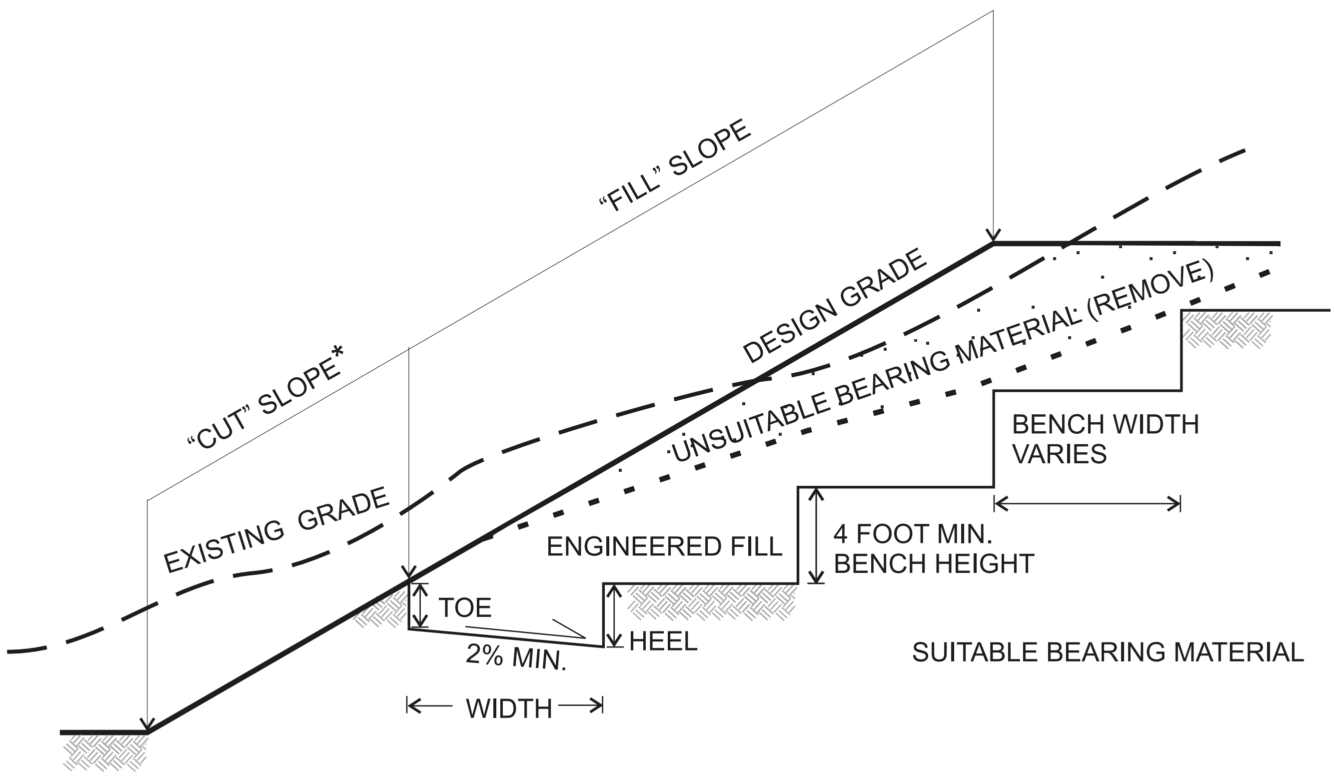
NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

STABILIZATION/BUTTRESS FILL

DETAIL 3

* THE “CUT” PORTION OF THE SLOPE SHALL BE EXCAVATED AND EVALUATED BY THE GEOTECHNICAL CONSULTANT PRIOR TO CONSTRUCTING THE “FILL” PORTION



SUITABLE
BEARING MATERIAL

CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. THE NECESSITY AND LOCATION OF DRAINS SHALL BE DETERMINED IN THE FIELD BY THE GEOTECHNICAL CONSULTANT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

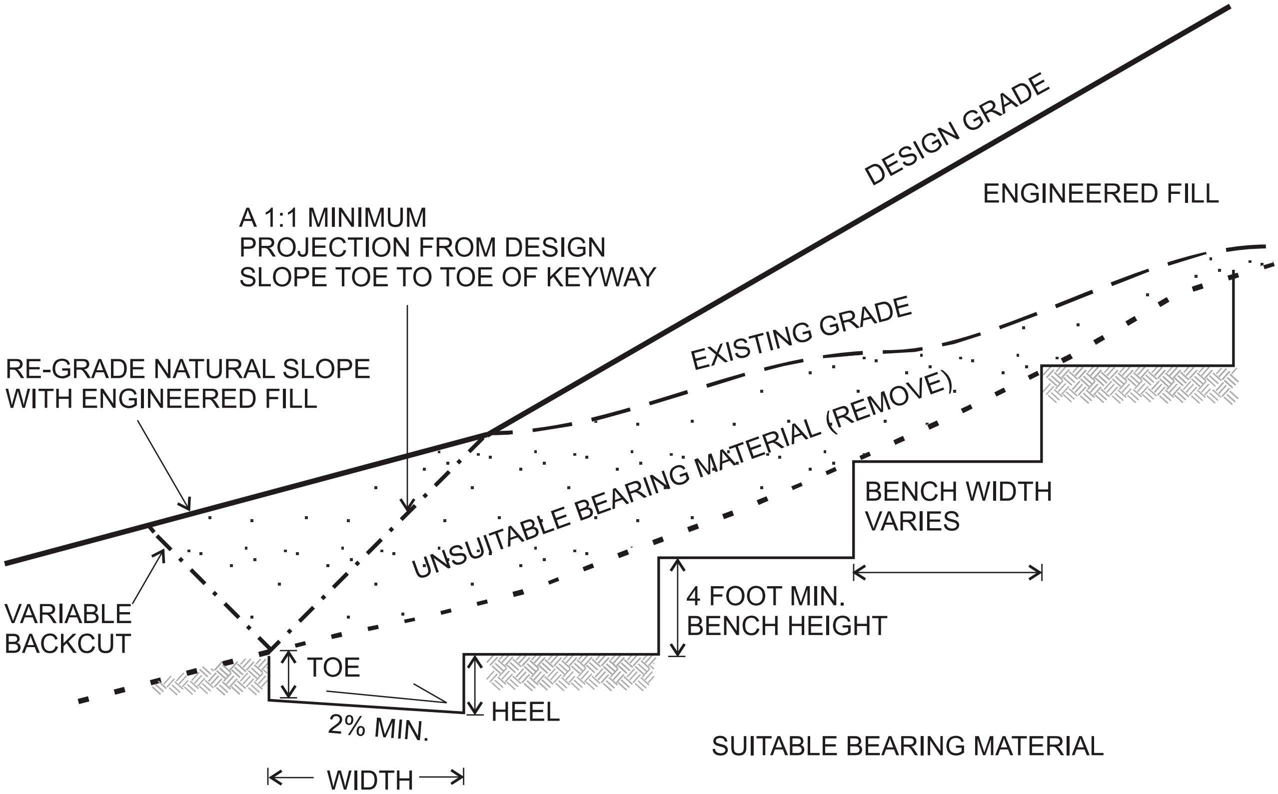
VER 1.0

NTS

AGS
ADVANCED GEOTECHNICAL SOLUTIONS

FILL OVER CUT SLOPE

DETAIL 4



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. WHEN THE NATURAL SLOPE APPROACHES OR EXCEEDS THE DESIGN GRADE SLOPE RATIO, SPECIAL RECOMMENDATIONS ARE NECESSARY BY THE GEOTECHNICAL CONSULTANT

2. THE GEOTECHNICAL CONSULTANT WILL DETERMINE THE REQUIREMENT FOR AND LOCATION OF SUBSURFACE DRAINAGE SYSTEMS.

3. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

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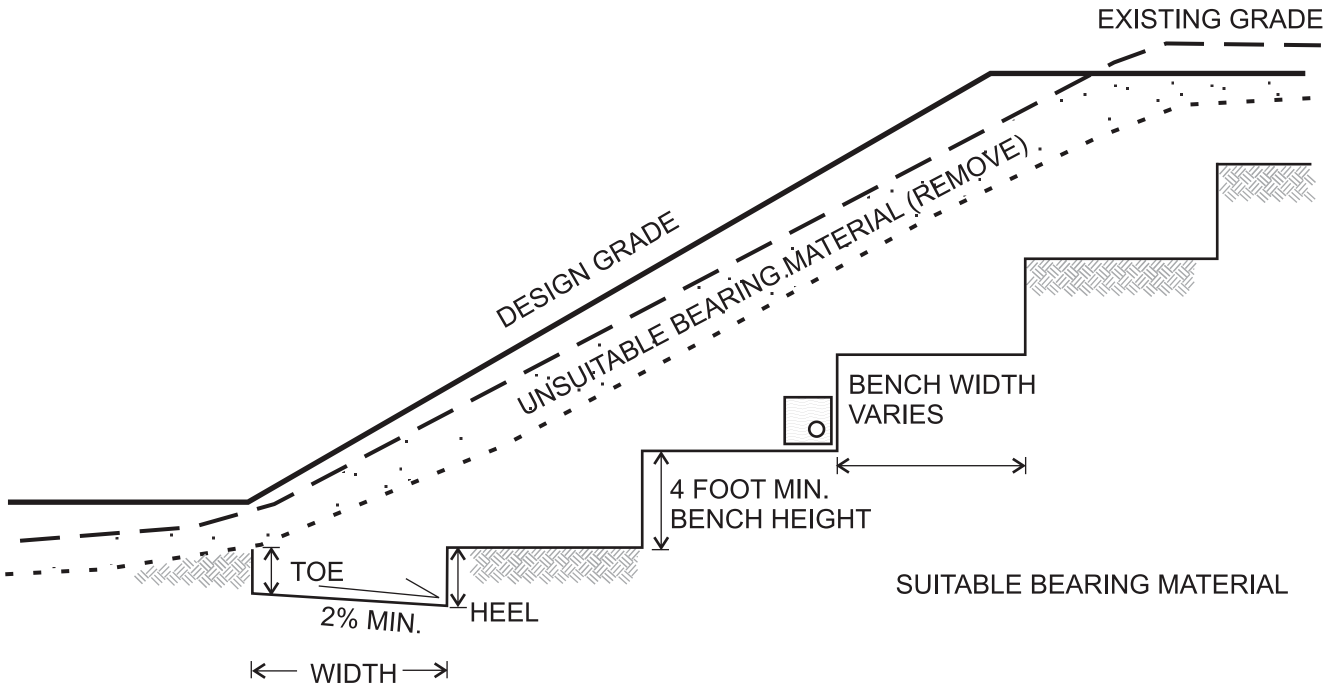
AGS ADVANCED GEOTECHNICAL SOLUTIONS	FILL OVER NATURAL SLOPE	DETAIL 5



CODE COMPLIANT KEYWAY
WITH MINIMUM DIMENSIONS:

TOE: 2 FOOT MIN.
HEEL: 3 FOOT MIN.
WIDTH: 15 FOOT MIN.

NOTES:

1. MAINTAIN MINIMUM 15 FOOT HORIZONTAL WIDTH FROM FACE OF SLOPE TO BENCH/BACKCUT

2. SEE DETAIL 2 FOR DRAIN SPECIFICATIONS

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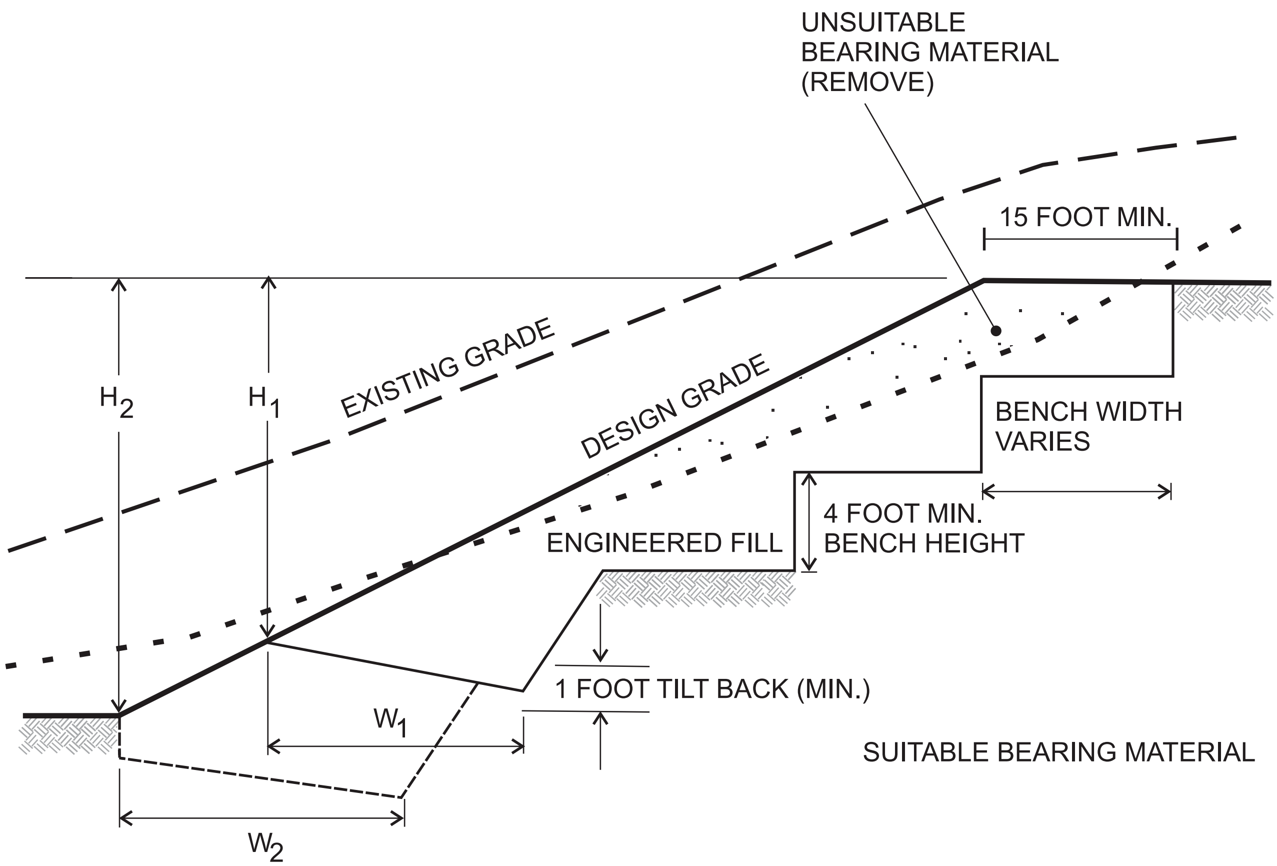
SKIN FILL CONDITION

DETAIL 6



NOTES:

1. IF RECOMMENDED BY THE GEOTECHNICAL CONSULTANT, THE REMAINING CUT PORTION OF THE SLOPE MAY REQUIRE REMOVAL AND REPLACEMENT WITH AN ENGINEERED FILL

2. “W” SHALL BE EQUIPMENT WIDTH (15 FEET) FOR SLOPE HEIGHT LESS THAN 25 FEET. FOR SLOPES GREATER THAN 25 FEET, “W” SHALL BE DETERMINED BY THE GEOTECHNICAL CONSULTANT. AT NO TIME SHALL “W” BE LESS THAN H/2

3. DRAINS WILL BE REQUIRED (SEE DETAIL 2)

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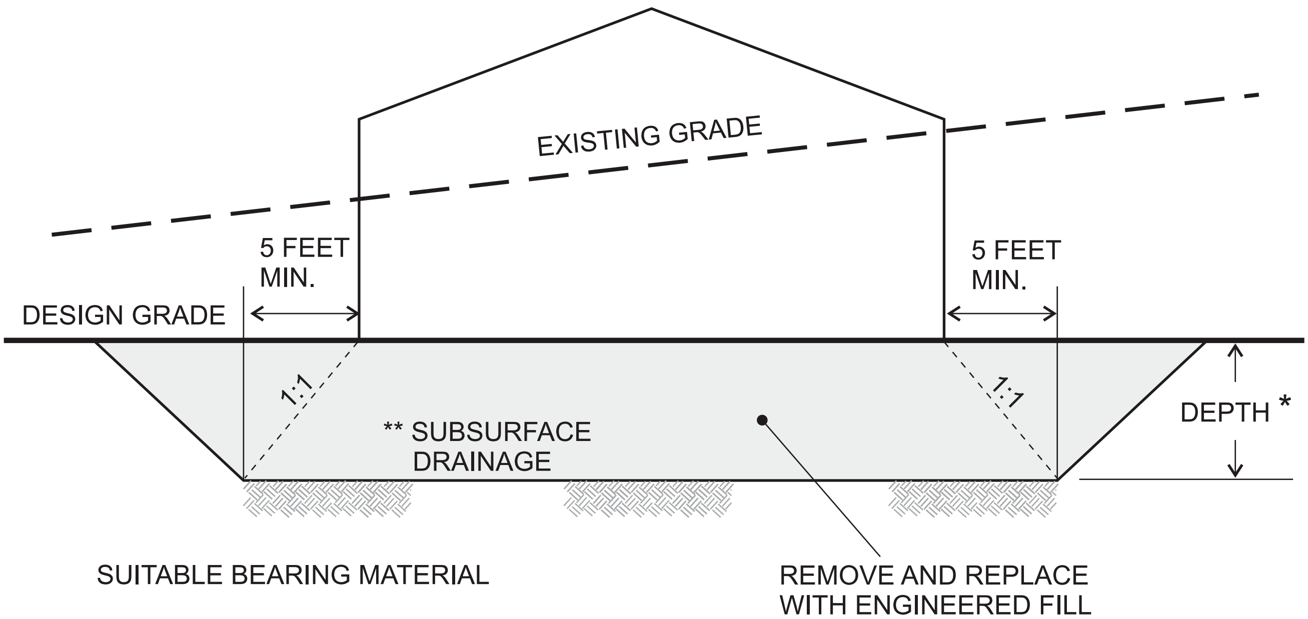
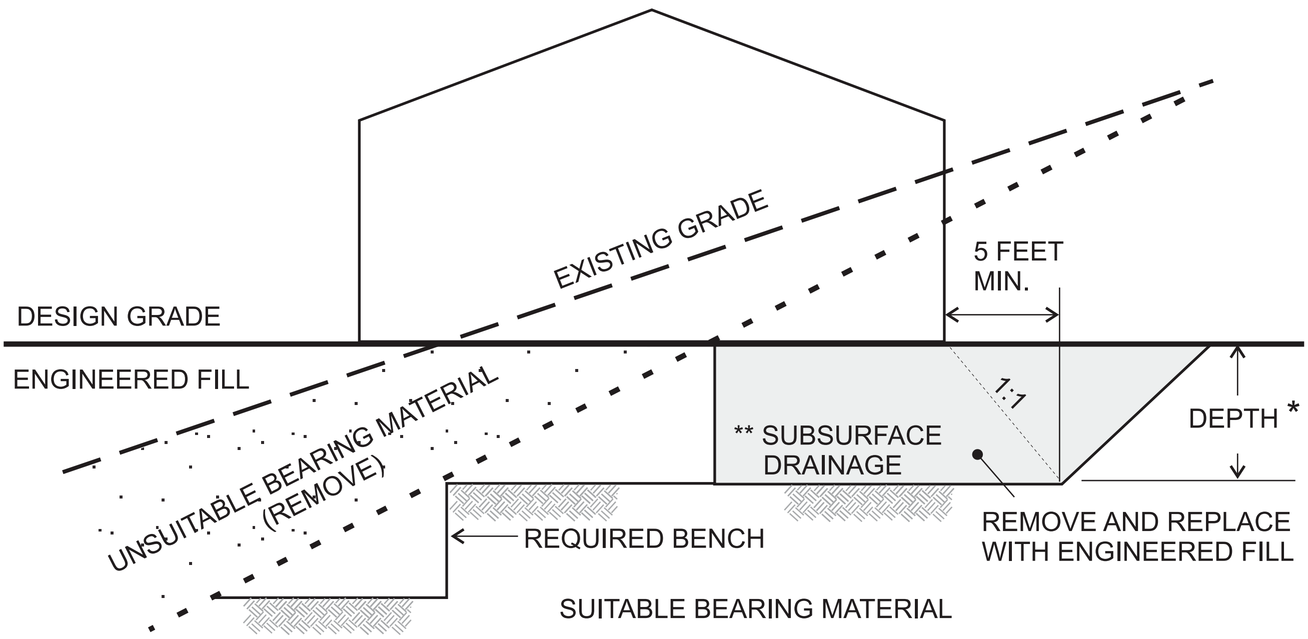
AGS ADVANCED GEOTECHNICAL SOLUTIONS	PARTIAL CUT SLOPE STABILIZATION	DETAIL 7



CUT LOT OVEREXCAVATION



CUT-FILL LOT OVEREXCAVATION

NOTES:

* SEE REPORT FOR RECOMMENDED DEPTHS, DEEPER OVEREXCAVATION MAY BE REQUIRED BY THE GEOTECHNICAL CONSULTANT BASED ON EXPOSED FIELD CONDITIONS

** CONSTRUCT EXCAVATION TO PROVIDE FOR POSITIVE DRAINAGE TOWARDS STREETS, DEEPER FILL AREAS OR APPROVED DRAINAGE DEVICES BASED ON FIELD CONDITIONS

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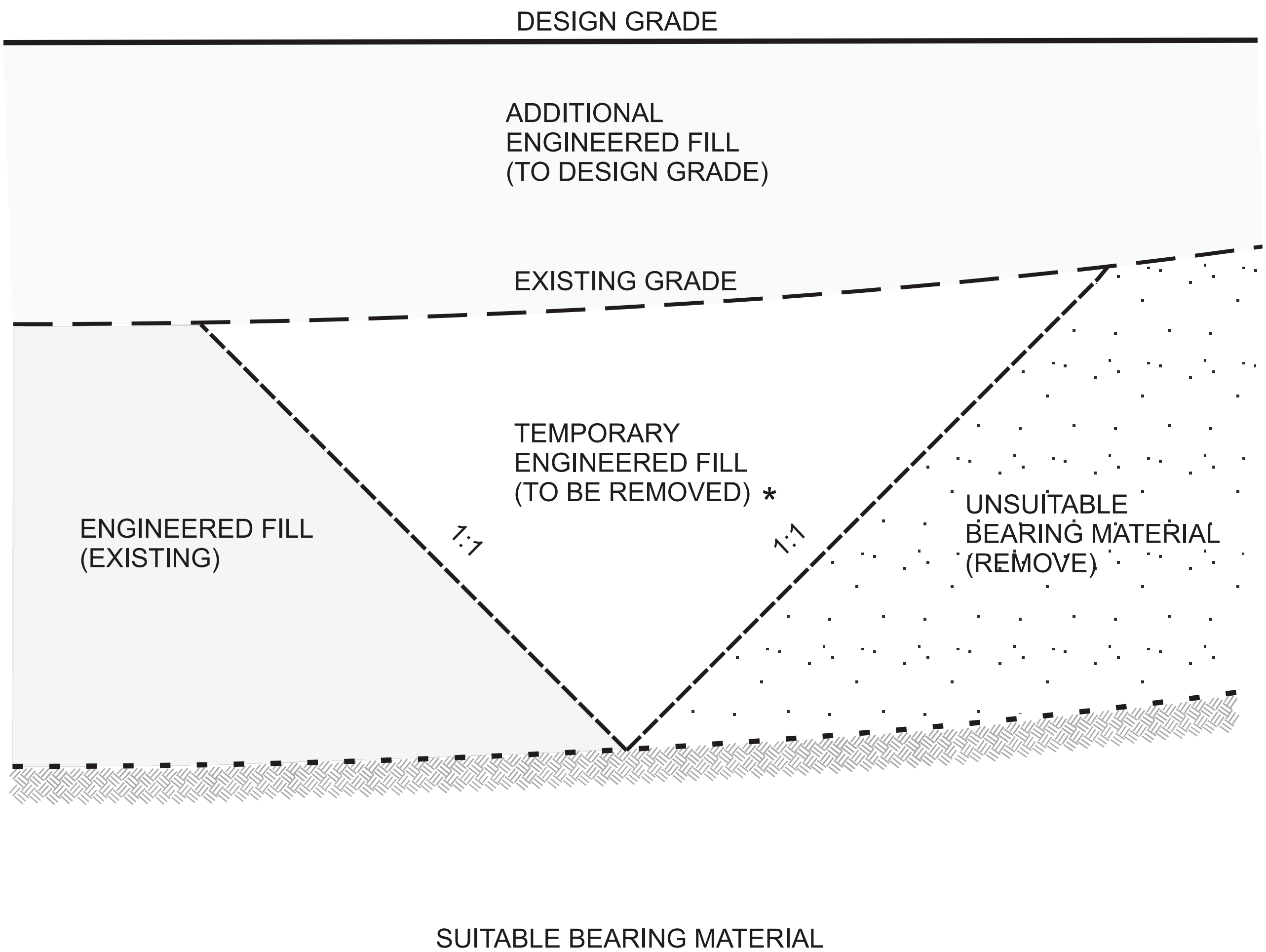
AGS ADVANCED GEOTECHNICAL SOLUTIONS	CUT & CUT-FILL LOT OVEREXCAVATION	DETAIL 8



* REMOVE BEFORE PLACING ADDITIONAL ENGINEERED FILL

TYPICAL UP-CANYON PROFILE

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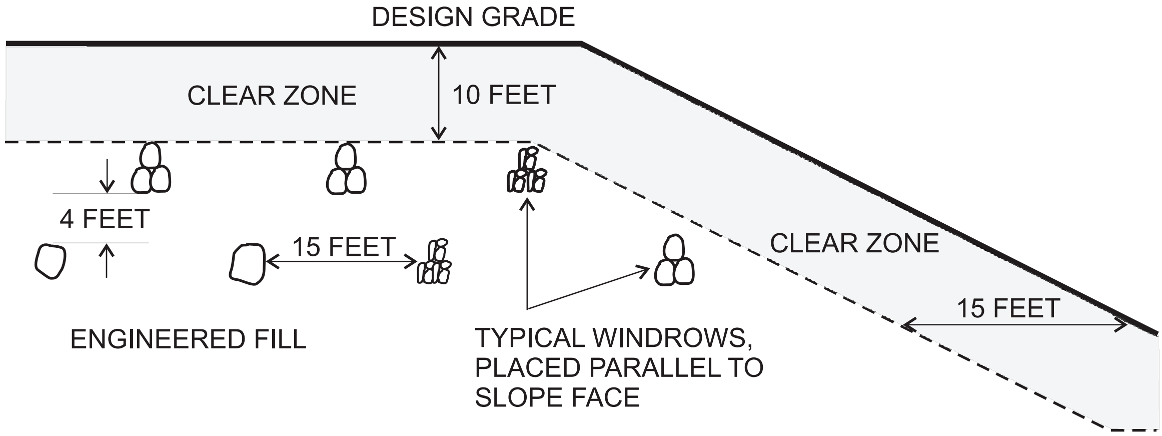
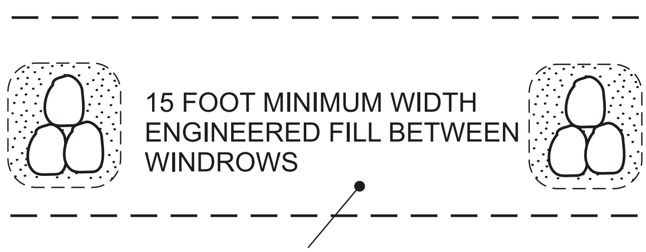
AGS ADVANCED GEOTECHNICAL SOLUTIONS	REMOVAL ADJACENT TO EXISTING FILL	DETAIL 9



CLEAR ZONE DIMENSIONS FOR REFERENCE ONLY, ACTUAL DEPTH, WIDTH, WINDROW LENGTH, ETC. TO BE BASED ON ELEVATIONS OF FOUNDATIONS, UTILITIES OR OTHER STRUCTURES PER THE GEOTECHNICAL CONSULTANT OR GOVERNING AGENCY APPROVAL

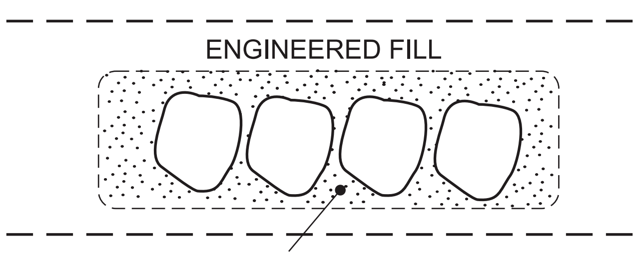
OVERSIZED MATERIAL DISPOSAL PROFILE



HORIZONTALLY PLACED ENGINEERED FILL, FREE OF OVERSIZED MATERIALS AND COMPACTED TO MINIMUM PROJECT STANDARDS

COMPACT ENGINEERED FILL ABOVE OVERSIZED MATERIALS TO FACILITATE "TRENCH" CONDITION PRIOR TO FLOODING GRANULAR MATERIALS

WINDROW CROSS-SECTION



GRANULAR MATERIAL APPROVED BY THE GEOTECHNICAL CONSULTANT AND CONSOLIDATED IN-PLACE BY FLOODING

WINDROW PROFILE

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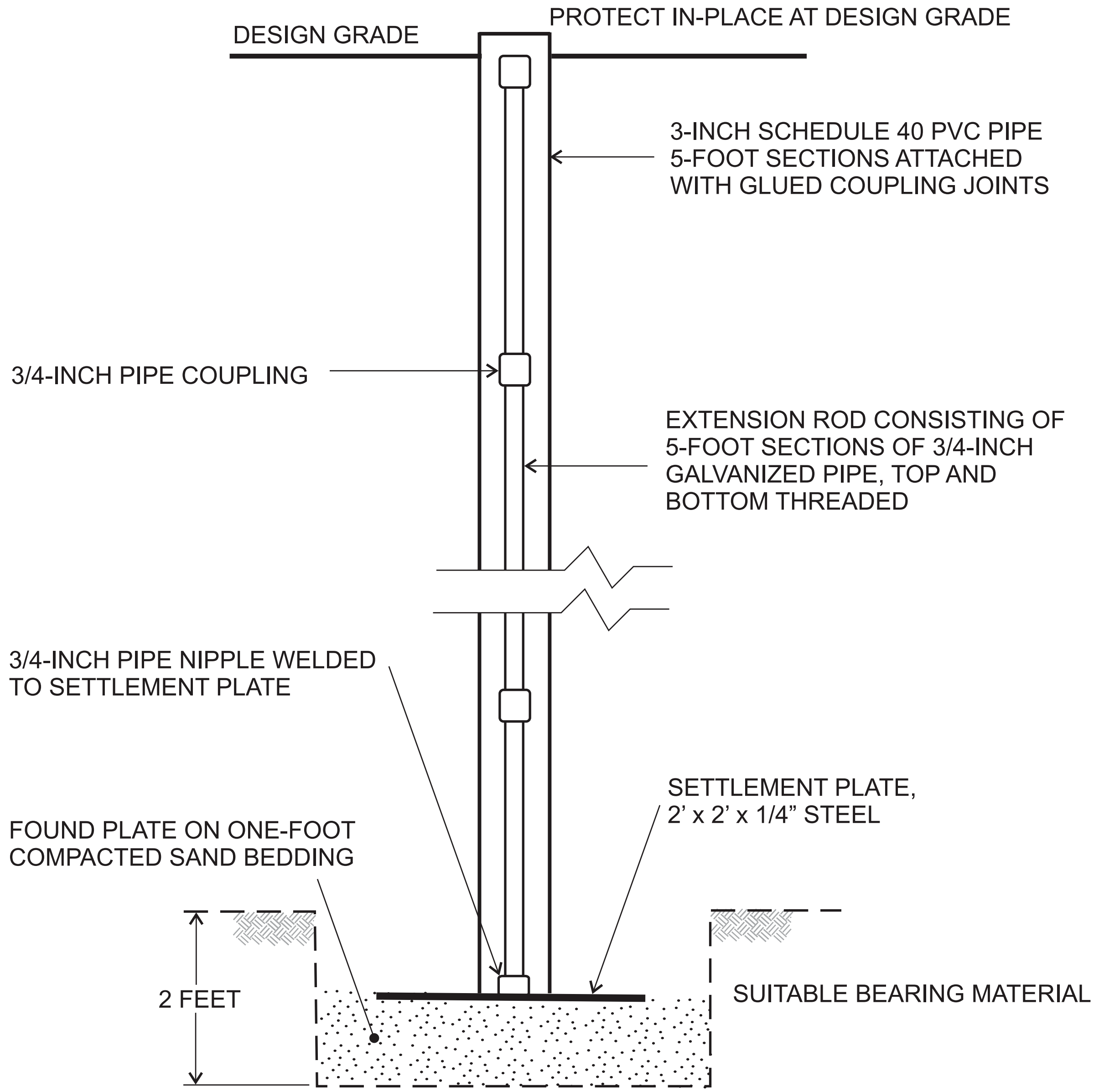
AGS ADVANCED GEOTECHNICAL SOLUTIONS	OVERSIZED MATERIAL DISPOSAL CRITERIA	DETAIL 10



NOTES:

1. SETTLEMENT PLATE LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED BY THE CONTRACTOR AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. CONTRACTOR SHALL MAINTAIN ADEQUATE HORIZONTAL CLEARANCE FOR EQUIPMENT OPERATION AND SHALL BE RESPONSIBLE FOR REPAIRING ANY DAMAGE TO SETTLEMENT PLATE DURING SITE CONSTRUCTION.

3. A MINIMUM 5-FOOT ZONE ADJACENT TO SETTLEMENT PLATE/EXTENSION RODS SHALL BE ESTABLISHED FOR HAND-HELD MECHANICAL COMPACTION OF ENGINEERED FILL. ENGINEERED FILL SHALL BE COMPACTED TO MINIMUM PROJECT STANDARD.

4. ELEVATIONS OF SETTLEMENT PLATE AND ALL EXTENSION ROD PLACEMENT SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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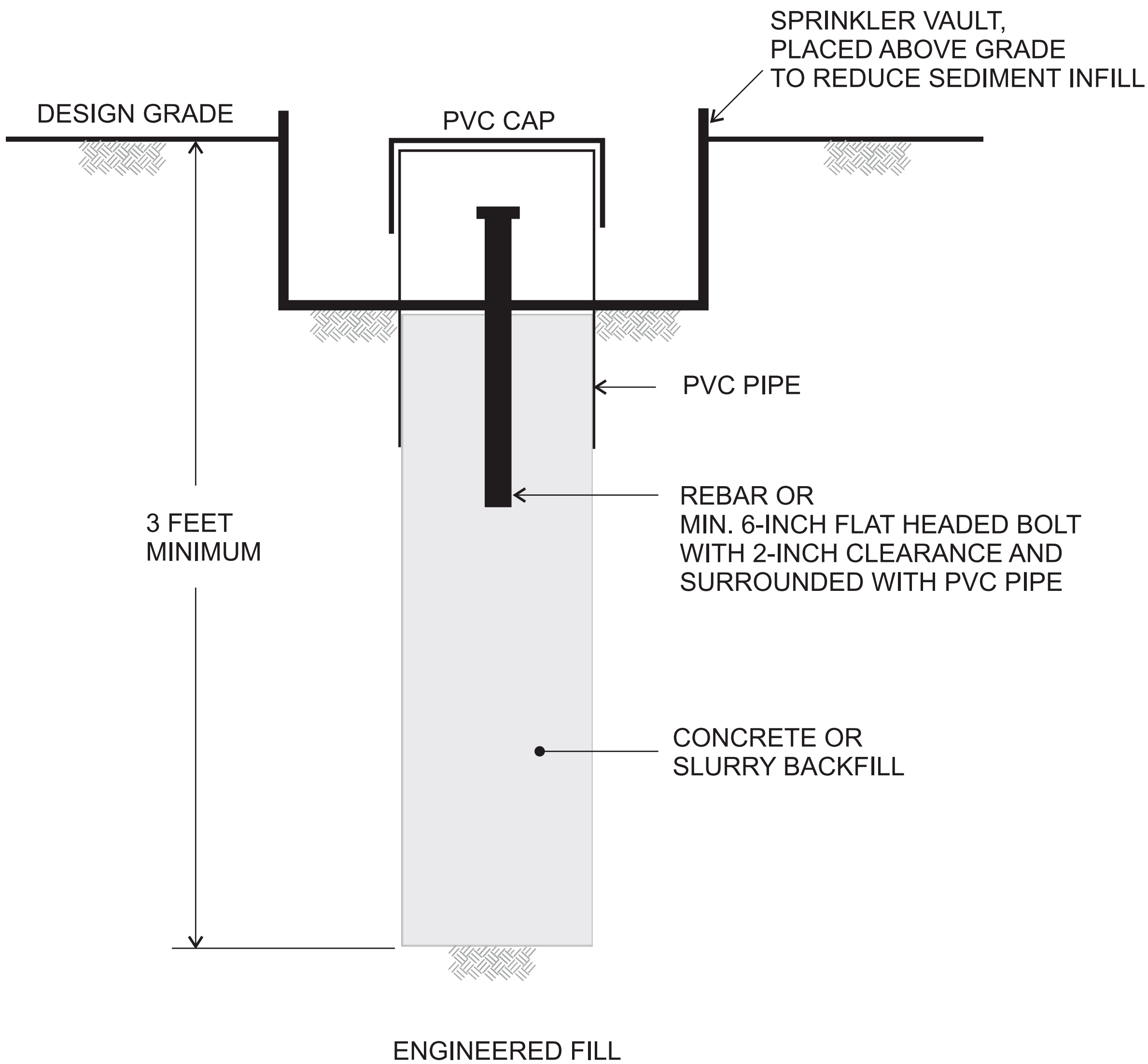
AGS ADVANCED GEOTECHNICAL SOLUTIONS	SETTLEMENT PLATE	DETAIL 11



NOTES:

1. SETTLEMENT MONUMENT LOCATIONS SHALL BE SUFFICIENTLY IDENTIFIED AND BE READILY VISIBLE TO EQUIPMENT OPERATORS.

2. ELEVATIONS OF SURFACE MONUMENTS SHALL BE DOCUMENTED BY PROJECT CIVIL ENGINEER OR SURVEYOR.

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SETTLEMENT MONUMENT

DETAIL 12