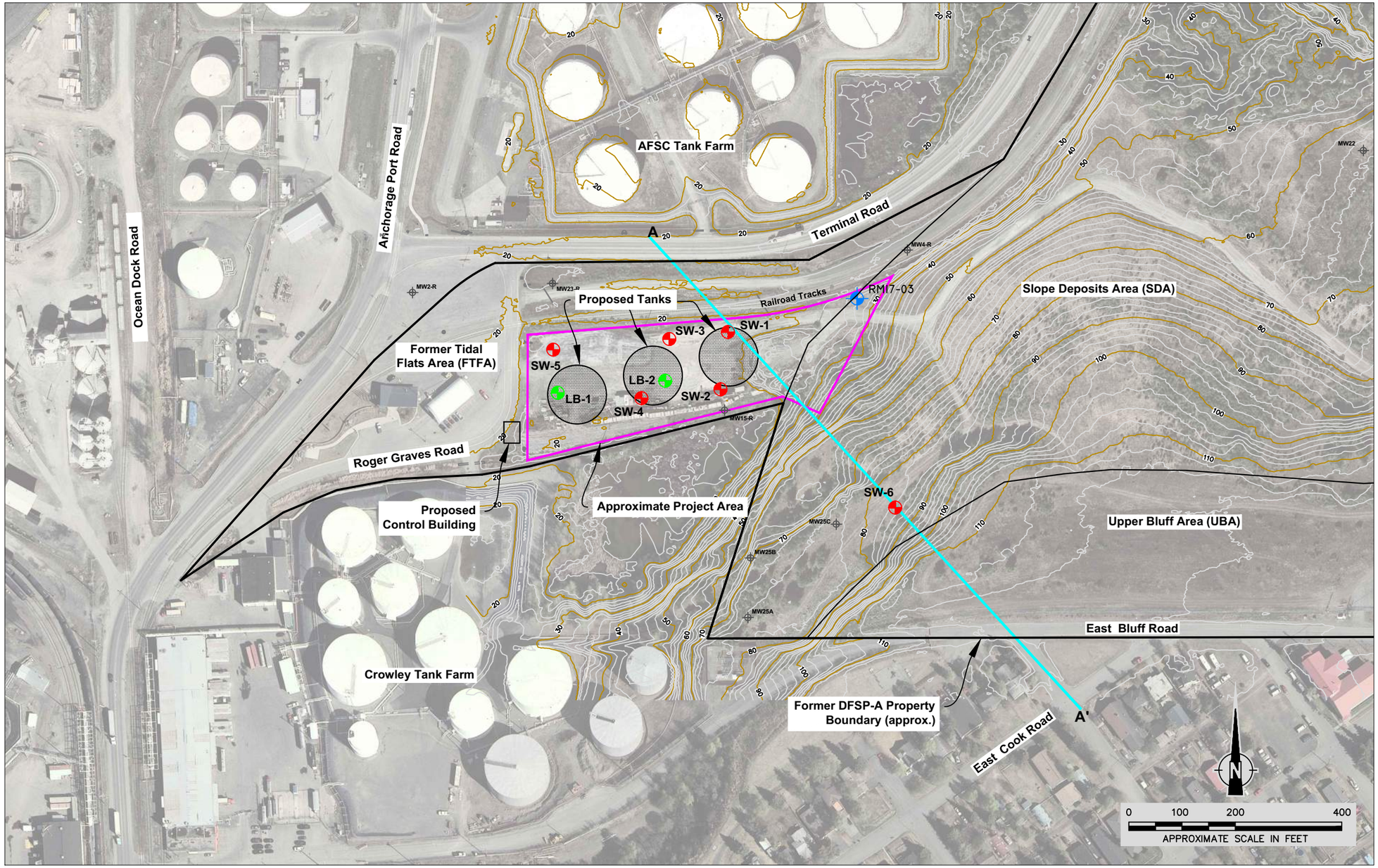

LEGEND

- SW-1 — Approximate Location of Boring SW-1, Advanced by Shannon & Wilson, November 2017
- LB-1 — Approximate Location of Boring LB-1, Advanced by Shannon & Wilson, September 2015
- RM17-03 — Approximate Location of Boring RM17-03, Advanced by R&M Consultants, July 2017
- MW-2R — Approximate Locations of Existing Monitoring Wells
- A — A' — Subsurface Profile Line A-A'
- Topographic Contours. 2-foot Contour Interval. Vertical Datum - Mean Sea Level (MSL).

NOTES

1. Basemap and topographic contours provided by Rancho Mesa Partners. September 2017
2. Aerial imagery provided by the Municipality of Anchorage. Image date: May 2015

Rancho Mesa Tank Farm
Port of Anchorage, Alaska

SITE PLAN

January 2018 32-1-20034-002

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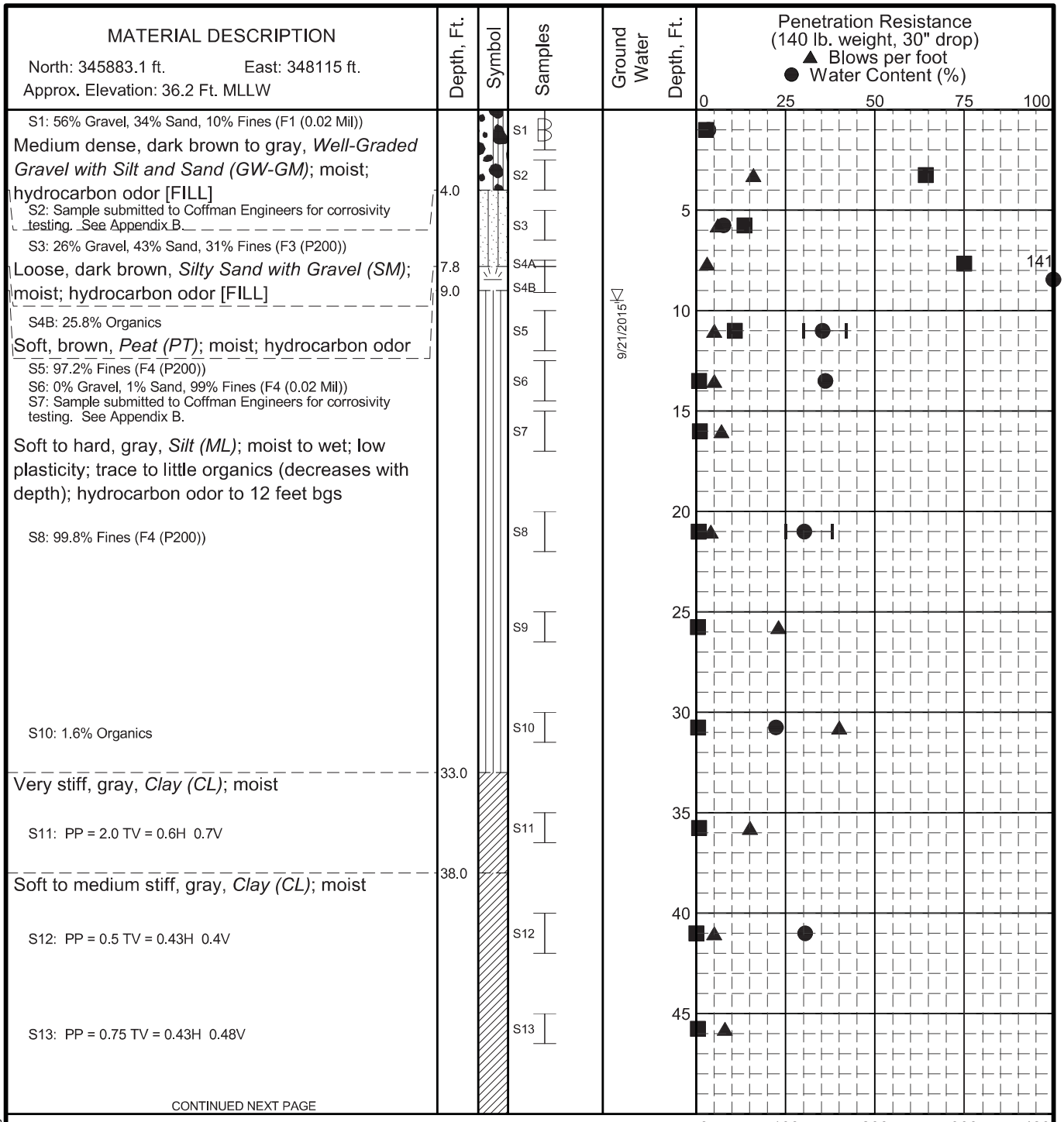
FIG. 2



NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. PP (Pocket Penetrometer) tests estimate Unconfined Compressive Strength of Cohesive Soils. TV (Torvane) tests estimate the Undrained Shear Strength of Cohesive Soils. All measurements in tons per square foot.

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

LOG OF BORING LB-1

February 2016 32-1-02480-005

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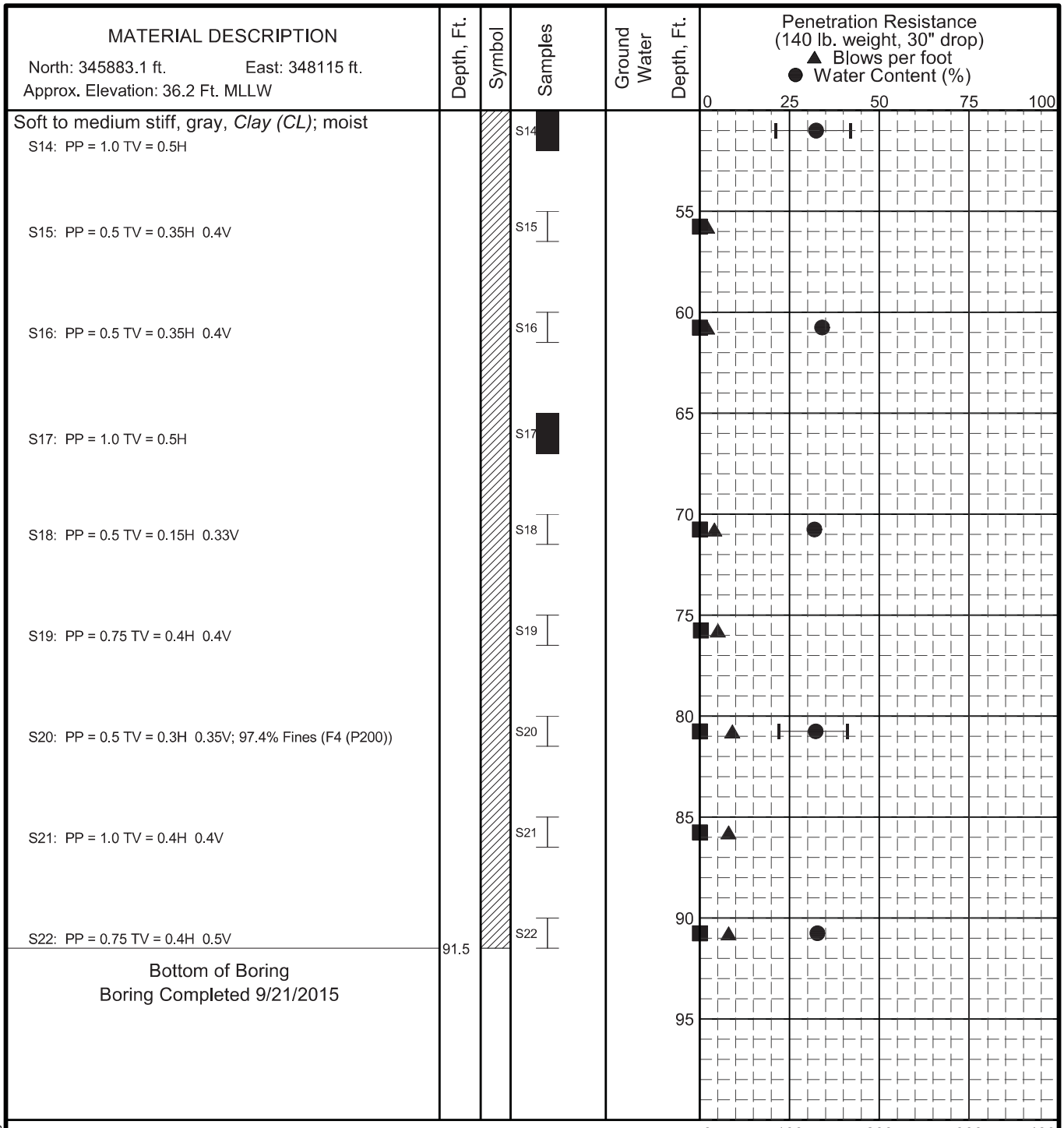
FIG. 5
Sheet 1 of 2

REV 3 - Approved for Submittal

GEOTECHNICAL LOG 02480 LOGS.GPJ S&W GEO1.GDT 2/8/16



LEGEND

* Sample Not Recovered
2" O.D. Split Spoon Sample
Grab Sample
Shelby Tube
Ground Water Level At Time Of Drilling

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. PP (Pocket Penetrometer) tests estimate Unconfined Compressive Strength of Cohesive Soils. TV (Torvane) tests estimate the Undrained Shear Strength of Cohesive Soils. All measurements in tons per square foot.

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

LOG OF BORING LB-1

February 2016 32-1-02480-005

SHANNON & WILSON, INC.
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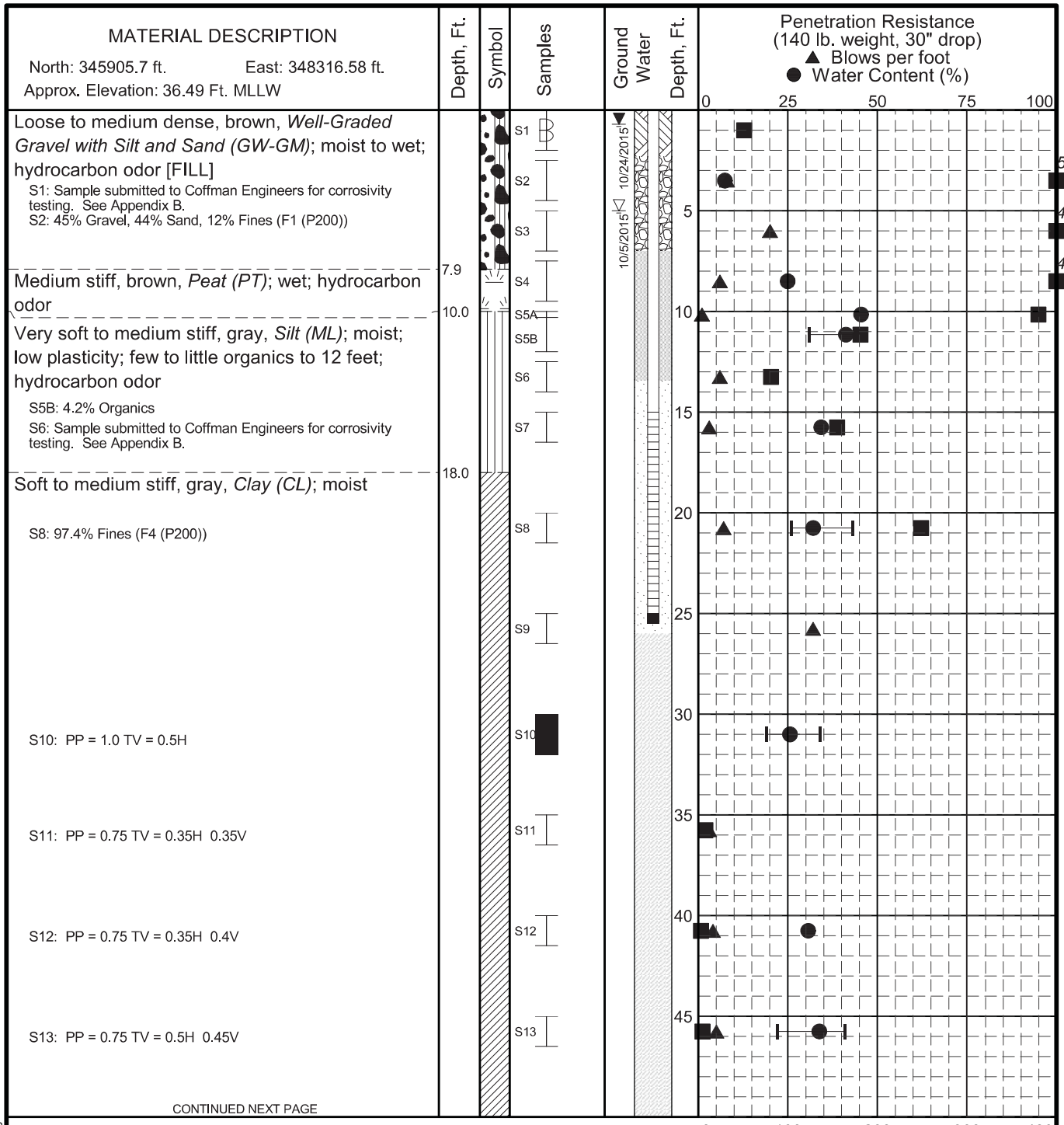
FIG. 5
Sheet 2 of 2

REV 3 - Approved for Submittal

GEOTECHNICAL LOG 02480 LOGS.GPJ S&W GEO1.GDT 2/8/16



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- Grab Sample
- Shelby Tube
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Gravel Backfill
- Blank Casing, Annular Seal
- Slotted Casing, Filter Sand
- Grouted Bottom Seal

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. PP (Pocket Penetrometer) tests estimate Unconfined Compressive Strength of Cohesive Soils. TV (Torvane) tests estimate the Undrained Shear Strength of Cohesive Soils. All measurements in tons per square foot.

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

LOG OF BORING LB-2

February 2016 32-1-02480-005

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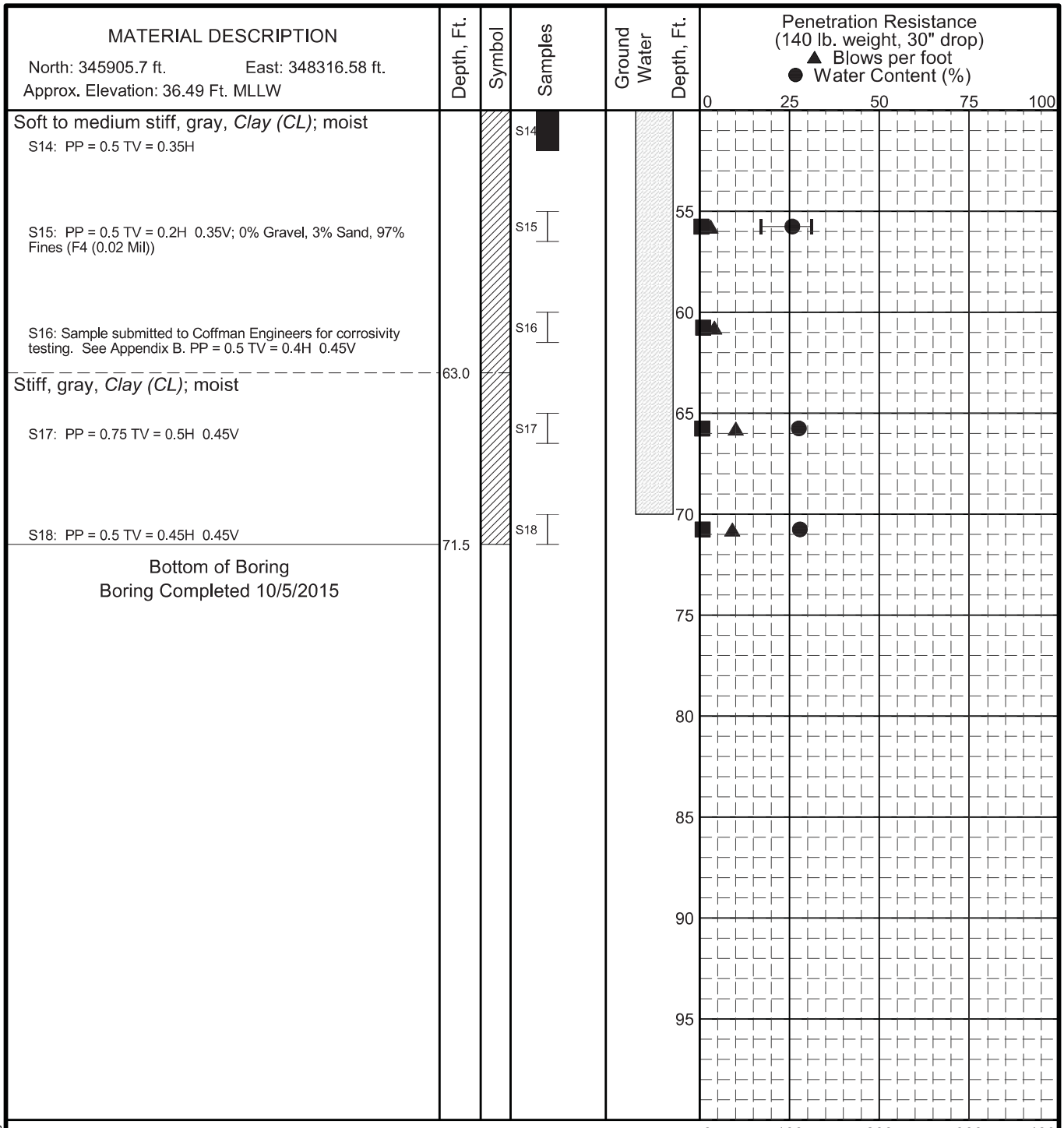
FIG. 6
Sheet 1 of 2

REV 3 - Approved for Submittal

GEOTECHNICAL LOG 02480 LOGS.GPJ S&W GEO1.GDT 2/8/16



LEGEND

- * Sample Not Recovered
- 2" O.D. Split Spoon Sample
- Grab Sample
- Shelby Tube
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Gravel Backfill
- Blank Casing, Annular Seal
- Slotted Casing, Filter Sand
- Grouted Bottom Seal

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.
4. PP (Pocket Penetrometer) tests estimate Unconfined Compressive Strength of Cohesive Soils. TV (Torvane) tests estimate the Undrained Shear Strength of Cohesive Soils. All measurements in tons per square foot.

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

LOG OF BORING LB-2

February 2016 32-1-02480-005

SHANNON & WILSON, INC.
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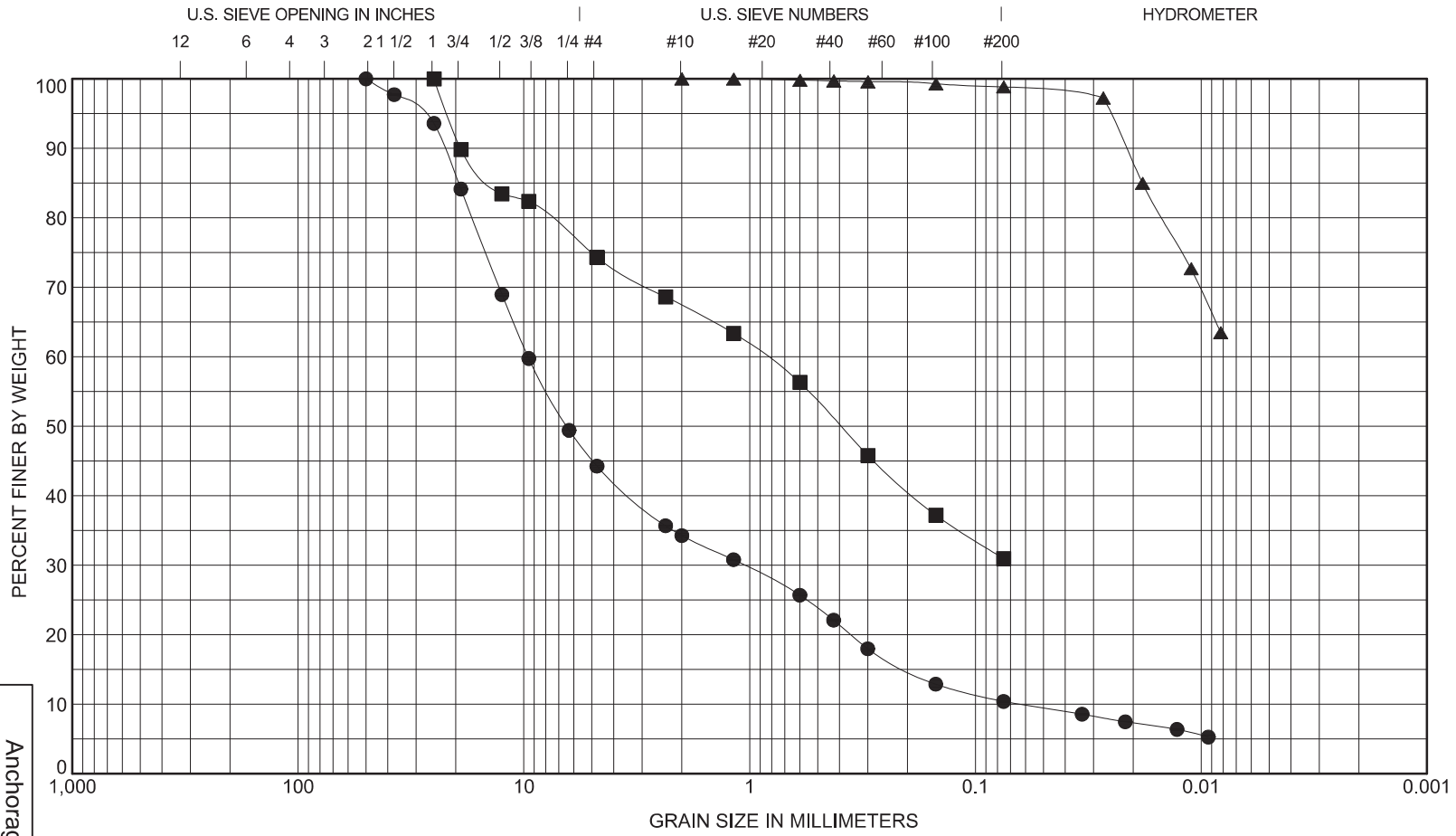
FIG. 6
Sheet 2 of 2

REV 3 - Approved for Submittal

GEOTECHNICAL LOG 02480 LOGS.GPJ S&W GEO1.GDT 2/8/16



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Depth, Ft	Classification	LL	PL	PI	Cc	Cu
●	LB-1 S1	0.0 - 2.0	**Well-Graded Gravel with Silt and Sand (GW-GM)**				**1.9**	**152.3**
■	LB-1 S3	5.0 - 6.5	**Silty Sand with Gravel (SM)**					
▲	LB-1 S6	12.5 - 14.5	**Silt (ML)**					

Sample		Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	LB-1 S1	0.0 - 2.0	**50**	**9.57**	**1.06**	**0.06**	**56**	**34**	**10**	
■	LB-1 S3	5.0 - 6.5	**25**	**0.85**			**26**	**43**	**31**	
▲	LB-1 S6	12.5 - 14.5	**2**				**0**	**1**	**99**	

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

GRAIN SIZE CLASSIFICATION

February 2016

32-1-02480-005

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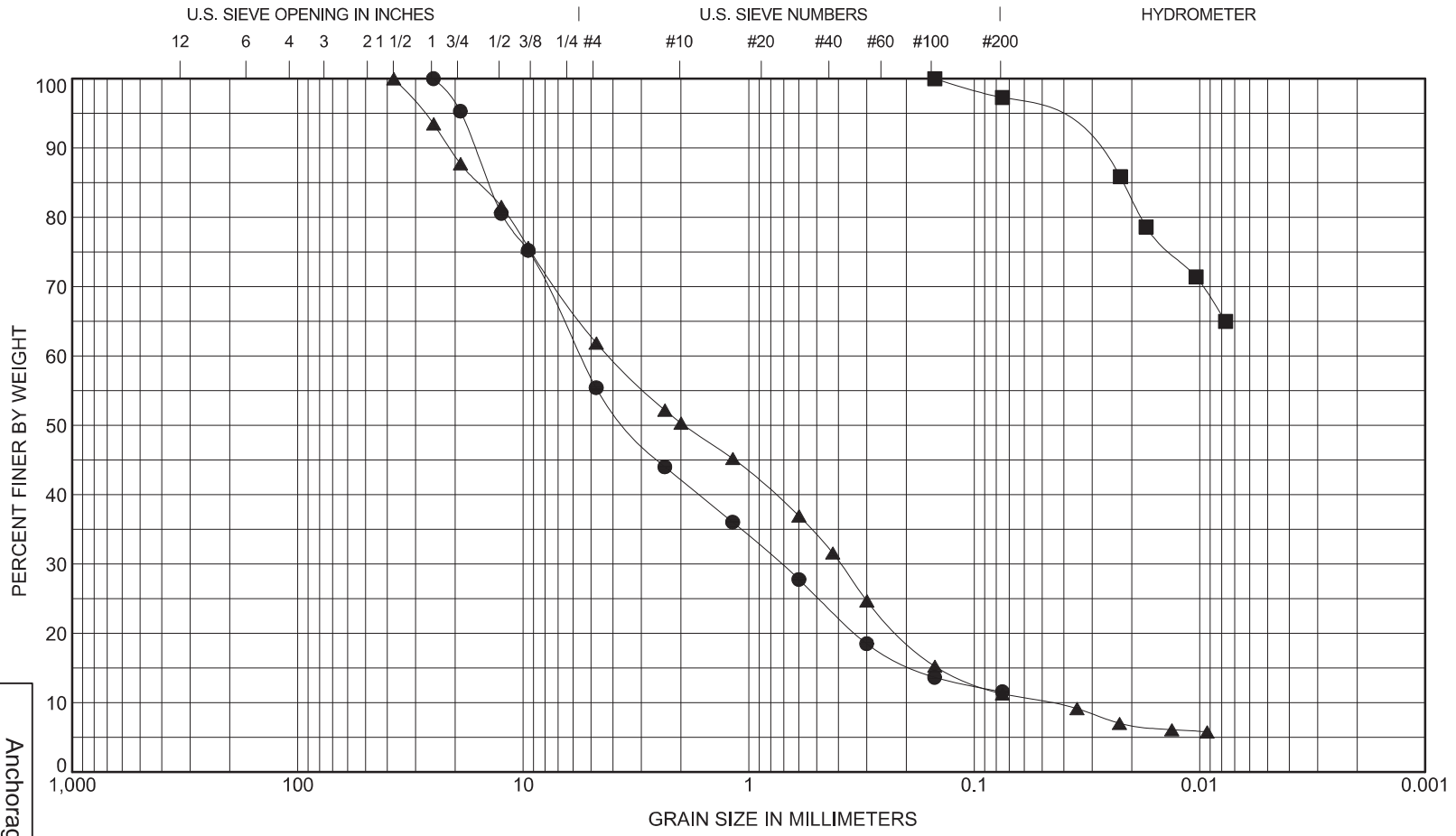
FIG. A-1
Sheet 1 of 3



COBBLES	GRAVEL		SAND			SILT OR CLAY
	coarse	fine	coarse	medium	fine	

Sample		Depth, Ft	Classification	LL	PL	PI	Cc	Cu
●	LB-2 S2	2.5 - 4.0	Well-Graded Gravel with Silt and Sand (GW-GM)				2.1	126.1
■	LB-2 S15	55.0 - 56.5	Clay (CL)	31	17	14		
▲	LB-4 S2	2.5 - 4.5	Poorly Graded Sand with Silt and Gravel (SP-SM)				0.8	87.5

Sample		Depth, Ft	D100	D60	D30	D10	%Gravel	%Sand	%Silt	%Clay
●	LB-2 S2	2.5 - 4.0	25	5.57	0.72		45	44	12	
■	LB-2 S15	55.0 - 56.5	0.15				0	3	97	
▲	LB-4 S2	2.5 - 4.5	37.5	4.15	0.39	0.05	38	51	11	

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

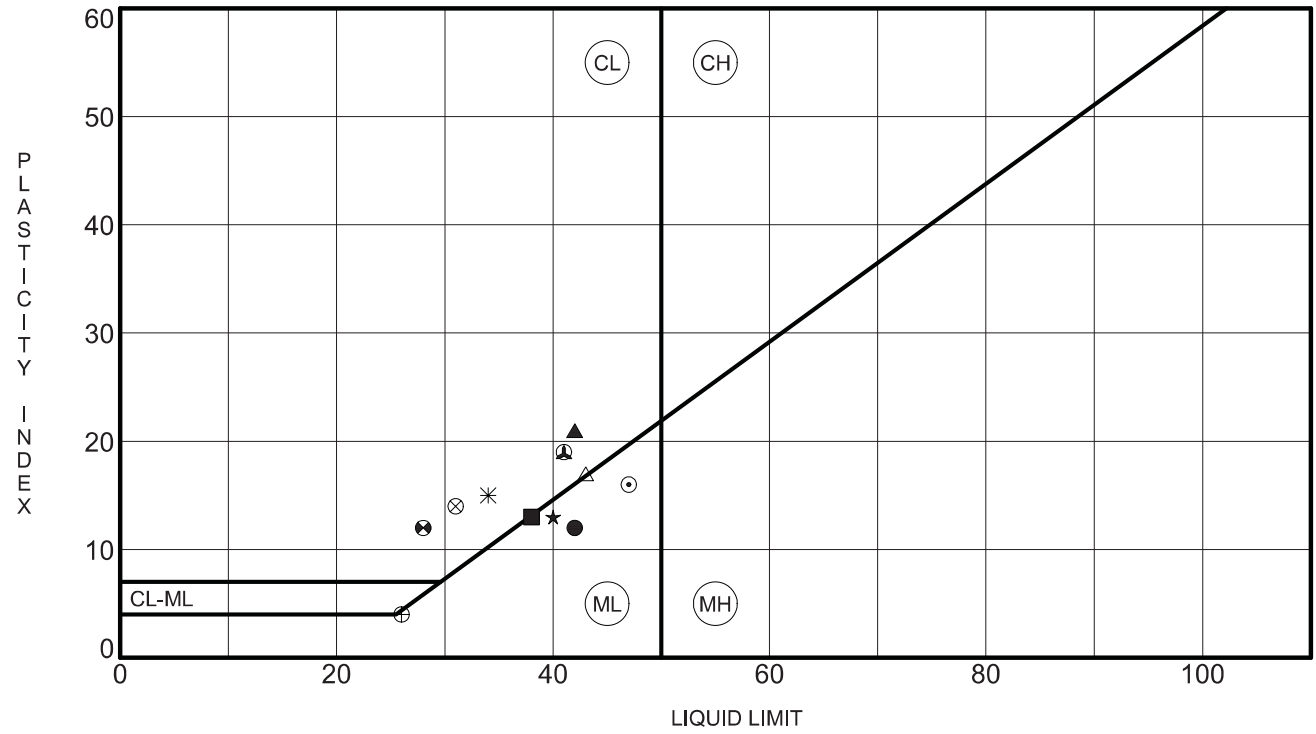
GRAIN SIZE CLASSIFICATION

February 2016

32-1-02480-005

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-1
Sheet 2 of 3



Boring		Depth, Ft	LL	PL	PI	Fines	Classification
●	**LB-1**	**10.0 - 11.5**	**42**	**30**	**12**	**97.2**	**ML**
■	**LB-1**	**20.0 - 21.5**	**38**	**25**	**13**	**99.8**	**ML**
▲	**LB-1**	**50.0 - 51.5**	**42**	**21**	**21**		**CL**
○	**LB-1**	**80.0 - 81.5**	**41**	**22**	**19**	**97.4**	**CL**
⊙	**LB-2**	**10.3 - 11.8**	**47**	**31**	**16**		**ML**
△	**LB-2**	**20.0 - 21.5**	**43**	**26**	**17**	**97.4**	**CL**
✳	**LB-2**	**30.0 - 31.5**	**34**	**19**	**15**		**CL**
⅄	**LB-2**	**45.0 - 46.5**	**41**	**22**	**19**		**CL**
⊗	**LB-2**	**55.0 - 56.5**	**31**	**17**	**14**	**97**	**CL**
★	**LB-4**	**10.0 - 11.5**	**40**	**27**	**13**		**ML**
⊕	**LB-4**	**20.0 - 21.5**	**26**	**22**	**4**	**98.2**	**ML**
⊛	**LB-4**	**70.0 - 71.5**	**28**	**16**	**12**	**93.3**	**CL**

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

ATTERBERG LIMITS RESULTS

February 2016 32-1-02480-005

SHANNON & WILSON, INC.
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FIG. A-2

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

BORING LB-1, SAMPLE S-14, 51.6 ft

Lean Clay; CL; LL = 42; PL = 21; PI = 21; Gs = 2.7 (Assumed); Relatively Undisturbed.

	Pre-Shear	Post-Shear
Height, in	5.953	5.103
Diameter, in	2.845	---
Aspect Ratio	2.09	---
Wet Weight, g	1214.99	1215.86
Water Content	29.7%	29.8%
Wet Density, pcf	122.3	122.4
Dry Density, pcf	94.3	94.3
Void Ratio	0.8	---
Saturation	100%	---

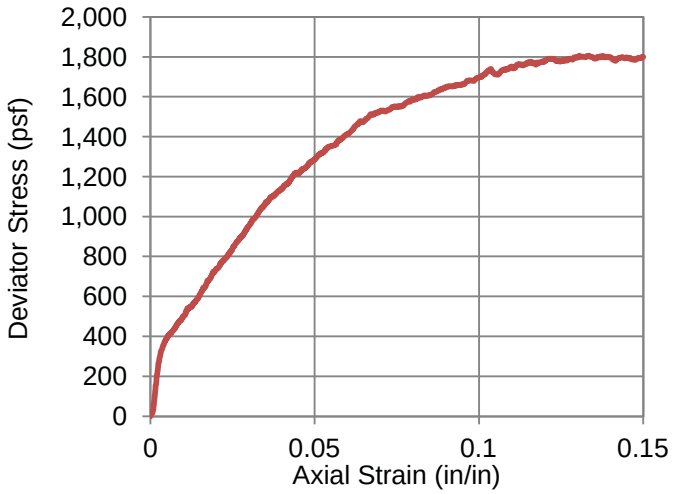
	During Shear
Cell Pressure	1,010 psf
Shear Rate	0.044 in/min 0.74 %/min

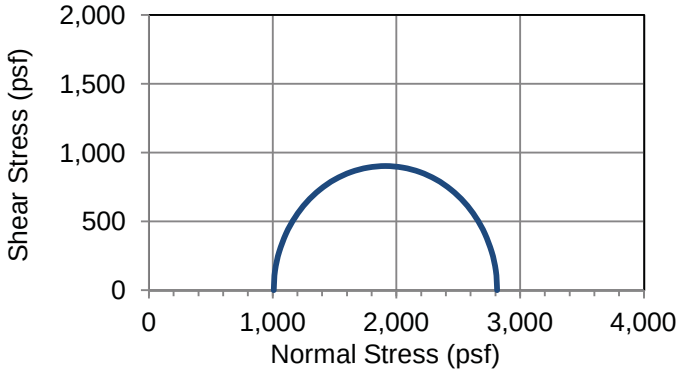
Axial Strain, in/in	Deviator Stress, psf	Major Principal Stress, psf	Minor Principal Stress, psf
0.01	500	1,510	1,010
0.02	740	1,740	1,010
0.03	950	1,960	1,010
0.04	1,140	2,150	1,010
0.05	1,280	2,290	1,010
0.06	1,410	2,420	1,010
0.07	1,530	2,540	1,010
0.08	1,590	2,600	1,010
0.09	1,650	2,650	1,010
0.10	1,690	2,700	1,010
0.11	1,750	2,760	1,010
0.12	1,780	2,790	1,010
0.13	1,800	2,800	1,010
0.14	1,800	2,810	1,010
0.15	1,800	2,810	1,010
At Failure			
0.134	**1,800**	**2,810**	**1,010**

Compressive Strength = 1800 psf

Before Shear

After Shear





NOTES:

1. Abbreviations:
   - ft = feet
   - g = grams
   - in = inch
   - Gs = Specific Gravity
   - LL = Liquid Limit
   - min = minute
   - pcf = pounds per cubic foot
   - PI = Plasticity Index (PI = LL - PL)
   - PL = Plastic Limit
   - psf = pounds per square foot
2. Water content obtained from entire specimen.

Tested By AKV
Finalized By JFL

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

UU TRIAXIAL TEST SUMMARY
BORING LB-1, SAMPLE S-14, 51.6 ft

February 2016 32-1-02480-005

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. A-3

UNCONSOLIDATED UNDRAINED TRIAXIAL COMPRESSION

BORING LB-2, SAMPLE S-10, 30.4 ft

Lean Clay; CL; LL = 34; PL = 19; PI = 15; Gs = 2.7 (Assumed); Relatively Undisturbed.

	Pre-Shear	Post-Shear
Height, in	6.333	5.399
Diameter, in	2.866	---
Aspect Ratio	2.21	---
Wet Weight, g	1331.31	1333.2
Water Content	29.2%	29.3%
Wet Density, pcf	124.1	124.3
Dry Density, pcf	96.1	96.1
Void Ratio	0.8	---
Saturation	100%	---

	During Shear
Cell Pressure	760 psf
Shear Rate	0.044 in/min 0.69 %/min

Axial Strain, in/in	Deviator Stress, psf	Major Principal Stress, psf	Minor Principal Stress, psf
0.01	990	1,740	760
0.02	1,730	2,490	760
0.03	2,290	3,040	760
0.04	2,690	3,440	760
0.05	2,970	3,720	760
0.06	3,110	3,870	760
0.07	3,240	4,000	760
0.08	3,290	4,050	760
0.09	3,290	4,040	760
0.10	3,270	4,020	760
0.11	3,220	3,980	760
0.12	3,180	3,940	760
0.13	3,130	3,890	760
0.14	3,080	3,840	760
0.15	3,050	3,810	760

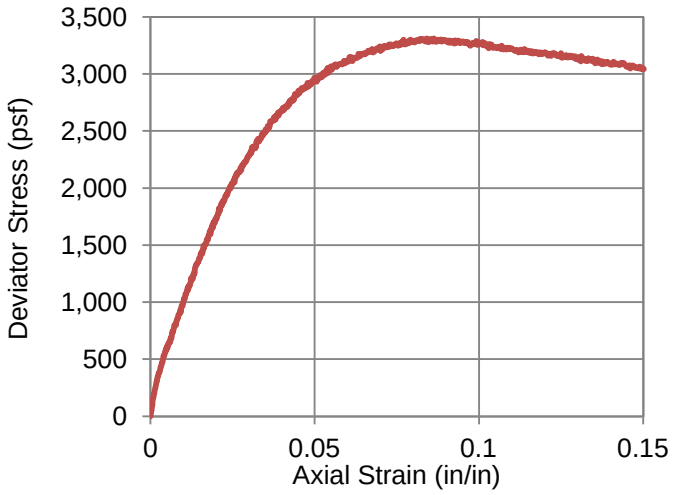
At Failure

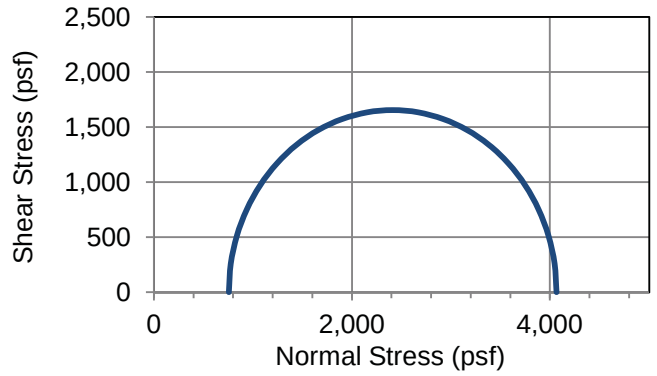
0.084	**3,310**	**4,070**	**760**

Compressive Strength = 3310 psf

Before Shear

After Shear





NOTES:

1. Abbreviations:
   - ft = feet
   - g = grams
   - in = inch
   - Gs = Specific Gravity
   - LL = Liquid Limit
   - min = minute
   - pcf = pounds per cubic foot
   - PI = Plasticity Index (PI = LL - PL)
   - PL = Plastic Limit
   - psf = pounds per square foot
2. Water content obtained from entire specimen.

Tested By AKV
Finalized By JFL

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

UU TRIAXIAL TEST SUMMARY
BORING LB-2, SAMPLE S-10, 30.4 ft

February 2016 32-1-02480-005

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. A-4

ONE DIMENSIONAL CONSOLIDATION TEST

BORING LB-1, SAMPLE S-14, 50.9 ft

SPECIMEN DATA AND TEST RESULTS:

Sample Classification:
Gray, Lean Clay; CL

Specific Gravity (Estimated)	2.7
Liquid Limit	42
Plastic Limit	21
Plasticity Index	21
Initial Seating Load	0.013 tsf
Final Seating Load	0.102 tsf
ASTM Test Method	Method B
Coeff. of Consol. Interpretation	Procedure 1

	Pre-Inundation	Final Load
Height, inches	0.785	0.700
Diameter, inches	2.816	2.816
Sample Volume, cuin	4.890	4.358
Wet Density, pcf	120.1	129.0
Dry Density, pcf	90.3	101.3
Water Content	33%	27%
Void Ratio	0.87	0.66
Saturation	100%	100%

Increm.	Applied Stress, tsf	t_{load}, min	t_{50}, min	ΔH_{load}, in	ΔH at t_{100}, in	$\Delta H / H_o$	Void Ratio	Coeff. of Comp., MPa^{-1}	Coeff. of Consol., cm^2/sec	Coeff. of Perm., cm/sec
1	0.31	1110	2.9	0.007	0.003	0.4%	0.861	0.70	1.13E-03	4.1E-08
2	0.61	1275	2.4	0.015	0.009	1.1%	0.847	0.48	1.37E-03	3.4E-08
3	1.22	175	1.6	0.023	0.016	2.0%	0.830	0.29	1.94E-03	3.0E-08
4	2.44	270	1.3	0.035	0.025	3.2%	0.808	0.19	2.46E-03	2.5E-08
5	4.88	3885	1.4	0.055	0.040	5.1%	0.772	0.15	2.19E-03	1.8E-08
6	9.76	465	1.6	0.084	0.065	8.3%	0.713	0.13	1.81E-03	1.3E-08
7	19.53	945	1.2	0.122	0.100	12.8%	0.629	0.09	2.11E-03	1.1E-08
8	29.29	510	1.2	0.139	0.115	14.7%	0.593	0.04	2.02E-03	4.6E-09
9	43.94	900	0.9	0.168	0.141	18.0%	0.531	0.04	2.51E-03	6.9E-09
10	10.98	480	0.4	0.154	0.138	17.6%	0.539	0.00	6.02E-03	9.0E-10
11	2.75	900	1.8	0.133	0.122	15.5%	0.578	0.05	1.26E-03	3.9E-09
12	0.69	1440	7.5	0.109	0.101	12.9%	0.628	0.25	3.19E-04	5.0E-09
13	0.17	1545	25.8	0.085	0.079	10.1%	0.680	1.05	9.94E-05	6.3E-09

NOTES:

1. Abbreviations:
   - cm = centimeter
   - cm^2 = square centimeter
   - Coeff. = Coefficient
   - Comp. = Compressibility
   - Consol. = Consolidation
   - cu in = cubic inch
   - ft = feet
   - H_o = initial height
   - ΔH = change in height
   - ΔH_{load} = end of increment deformation
   - in. = inch
   - Increm. = Increment
   - min = minute
   - MPa = Mega-Pascal
   - pcf = pounds per cubic foot
   - Perm. = Permeability
   - sec = second
   - t_{load} = Duration of load increment
   - tn = time at n% of primary consolidation
   - tsf = tons per square foot
2. Specimen trimmed using a trimming turntable and indundated with distilled water

Tested by AKV on 10/20/2015
Finalized by JFL

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

ONE DIMENSIONAL CONSOLIDATION TEST SUMMARY
BORING LB-1, SAMPLE S-14, 50.9 ft

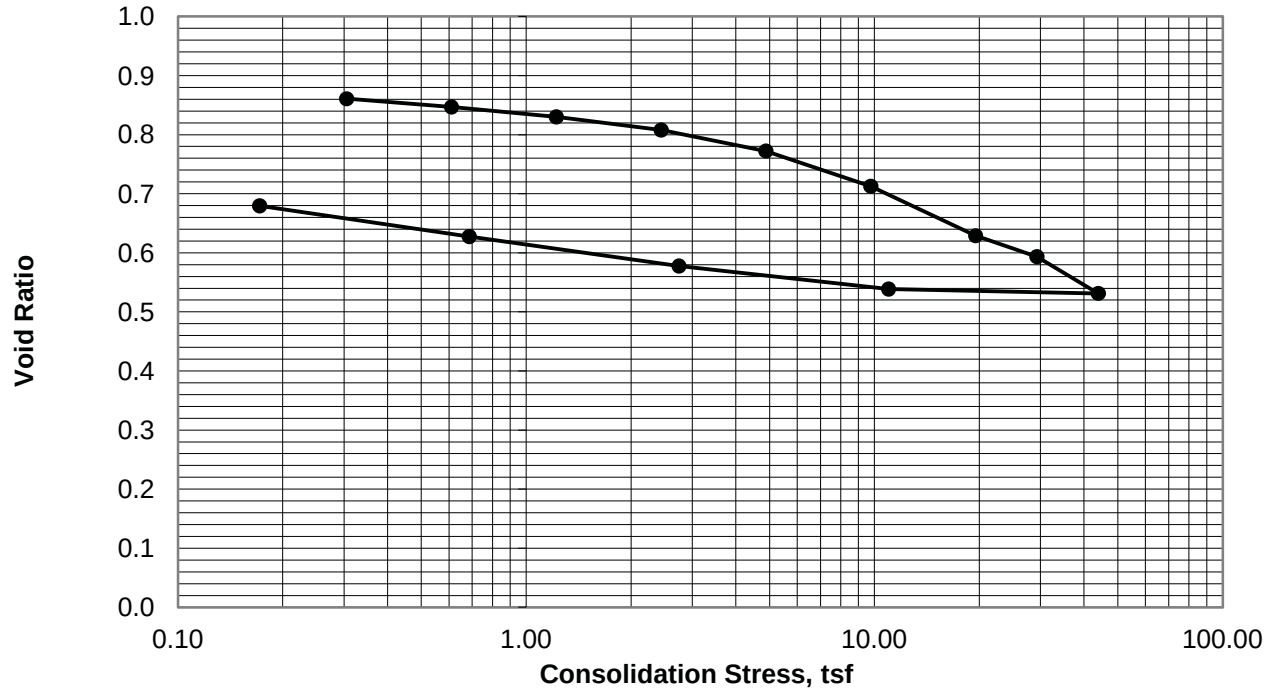
February 2016 32-1-02480-005

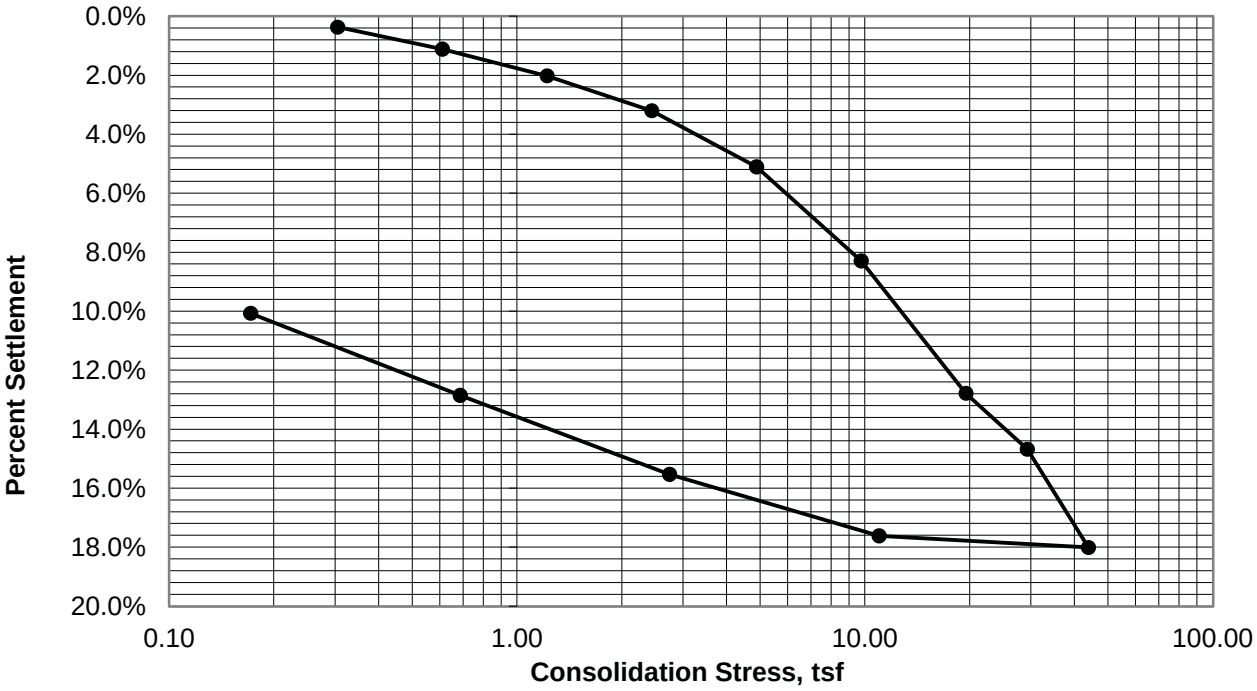
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. A-6

ONE DIMENSIONAL CONSOLIDATION TEST

BORING LB-1, SAMPLE S-14, 50.9 ft





Maximum Load, tsf 43.94

NOTES:
1. Abbreviations:
ft = feet
tsf = tons per square foot

Tested by AKV on 10/20/2015
Finalized by JFL

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

ONE DIMENSIONAL CONSOLIDATION SETTLEMENT PLOTS
BORING LB-1, SAMPLE S-14, 50.9 ft

February 2016 32-1-02480-005

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. A-7

ONE DIMENSIONAL CONSOLIDATION TEST

BORING LB-2, SAMPLE S-10, 31.3 ft

SPECIMEN DATA AND TEST RESULTS:

Sample Classification:
Gray, Lean Clay; CL

Specific Gravity (Estimated)	2.7
Liquid Limit	34
Plastic Limit	19
Plasticity Index	15
Initial Seating Load	0.013 tsf
Final Seating Load	0.14 tsf
ASTM Test Method	Method B
Coeff. of Consol. Interpretation	Procedure 1

	Pre-Inundation	Final Load
Height, inches	0.787	0.722
Diameter, inches	2.816	2.816
Sample Volume, cuin	4.899	4.497
Wet Density, pcf	127.9	135.0
Dry Density, pcf	103.0	112.2
Water Content	24%	20%
Void Ratio	0.64	0.50
Saturation	100%	100%

Increm.	Applied Stress, tsf	t_{load}, min	t_{50}, min	ΔH_{load}, in	ΔH at t_{100}, in	$\Delta H / H_o$	Void Ratio	Coeff. of Comp., MPa^{-1}	Coeff. of Consol., cm^2/sec	Coeff. of Perm., cm/sec
1	0.51	1125	2.7	0.008	0.002	0.3%	0.632	0.35	1.20E-03	2.5E-08
2	1.02	155	2.0	0.016	0.008	1.1%	0.619	0.25	1.60E-03	2.4E-08
3	2.03	144	1.4	0.026	0.016	2.1%	0.603	0.17	2.19E-03	2.3E-08
4	4.07	144	1.4	0.041	0.028	3.6%	0.578	0.13	2.22E-03	1.8E-08
5	8.14	870	1.3	0.064	0.047	6.0%	0.539	0.10	2.23E-03	1.4E-08
6	16.28	108	1.0	0.088	0.069	8.7%	0.494	0.06	2.93E-03	1.1E-08
7	24.42	175	0.9	0.104	0.084	10.6%	0.462	0.04	2.89E-03	7.6E-09
8	36.63	155	0.8	0.121	0.099	12.5%	0.432	0.03	3.16E-03	5.6E-09
9	47.06	128	0.9	0.132	0.109	13.8%	0.411	0.02	2.66E-03	3.8E-09
10	16.28	150	0.1	0.126	0.110	14.0%	0.407	0.00	3.23E-02	2.7E-09
11	4.07	230	0.8	0.114	0.101	12.8%	0.427	0.02	3.06E-03	3.5E-09
12	1.02	1065	4.6	0.098	0.088	11.2%	0.453	0.09	5.52E-04	3.4E-09
13	0.25	4560	17.6	0.080	0.073	9.3%	0.485	0.44	1.50E-04	4.5E-09
14	0.06	1470	55.7	0.065	0.059	7.6%	0.513	1.52	4.94E-05	5.0E-09

NOTES:

1. Abbreviations:
   - cm = centimeter
   - cm^2 = square centimeter
   - Coeff. = Coefficient
   - Comp. = Compressibility
   - Consol. = Consolidation
   - cu in = cubic inch
   - ft = feet
   - H_o = initial height
   - ΔH = change in height
   - ΔH_{load} = end of increment deformation
   - in. = inch
   - Increm. = Increment
   - min = minute
   - MPa = Mega-Pascal
   - pcf = pounds per cubic foot
   - Perm. = Permeability
   - sec = second
   - t_{load} = Duration of load increment
   - tn = time at n% of primary consolidation
   - tsf = tons per square foot
2. Specimen trimmed using a trimming turntable and indundated with distilled water

Tested by AKV on 11/25/2015
Finalized by JFL

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

ONE DIMENSIONAL CONSOLIDATION TEST SUMMARY
BORING LB-2, SAMPLE S-10, 31.3 ft

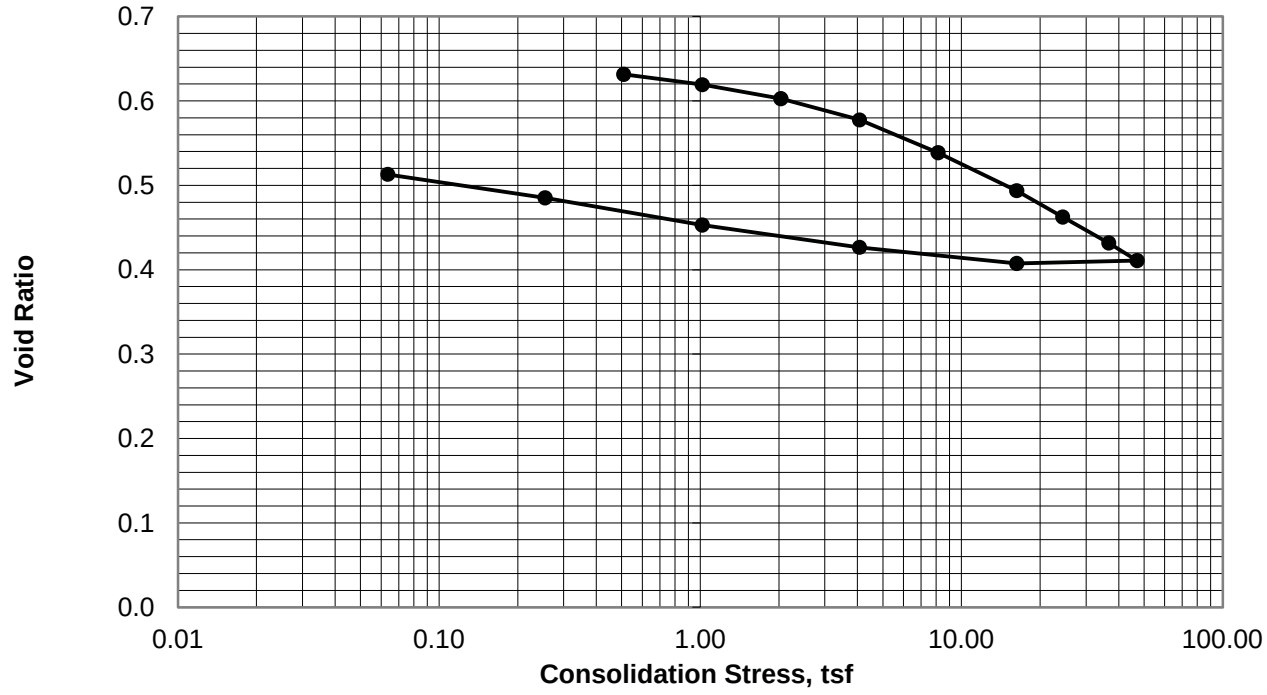
February 2016 32-1-02480-005

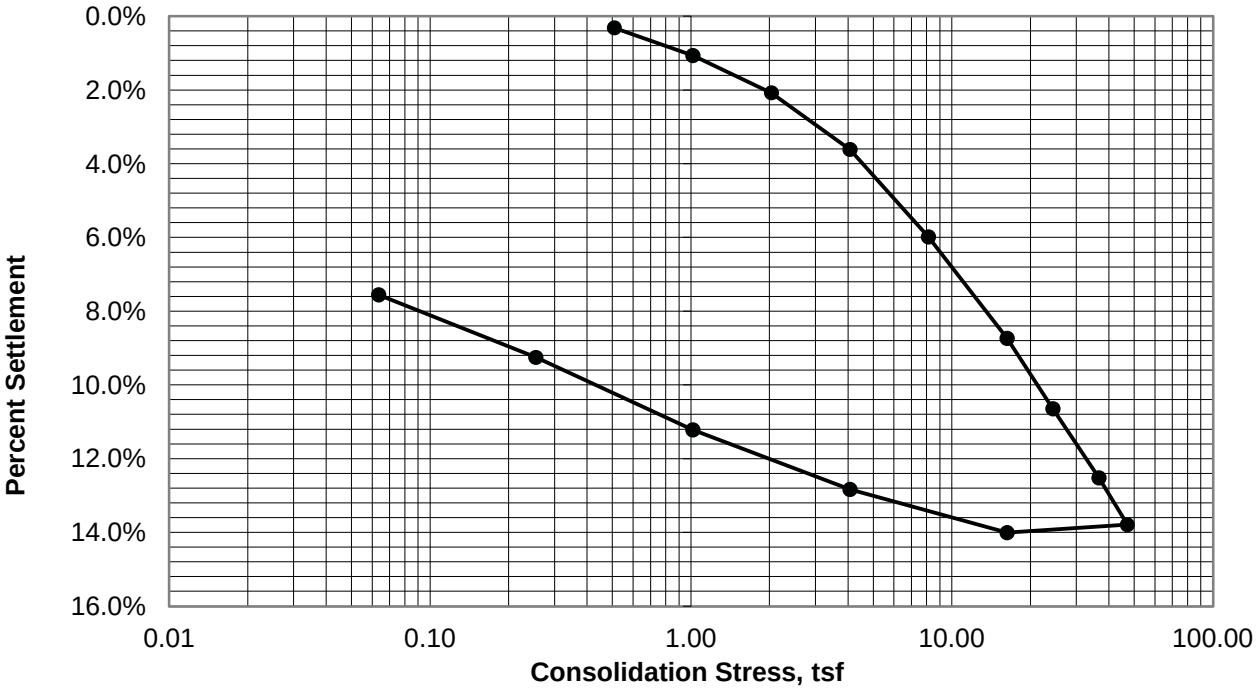
SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

Fig. A-8

ONE DIMENSIONAL CONSOLIDATION TEST

BORING LB-2, SAMPLE S-10, 31.3 ft





Maximum Load, tsf 47.06

NOTES:
1. Abbreviations:
ft = feet
tsf = tons per square foot

Tested by AKV on 11/25/2015
Finalized by JFL

Anchorage Port Modernization Project
Landside Facilities
Port of Anchorage, Alaska

ONE DIMENSIONAL CONSOLIDATION SETTLEMENT PLOTS
BORING LB-2, SAMPLE S-10, 31.3 ft

February 2016 32-1-02480-005

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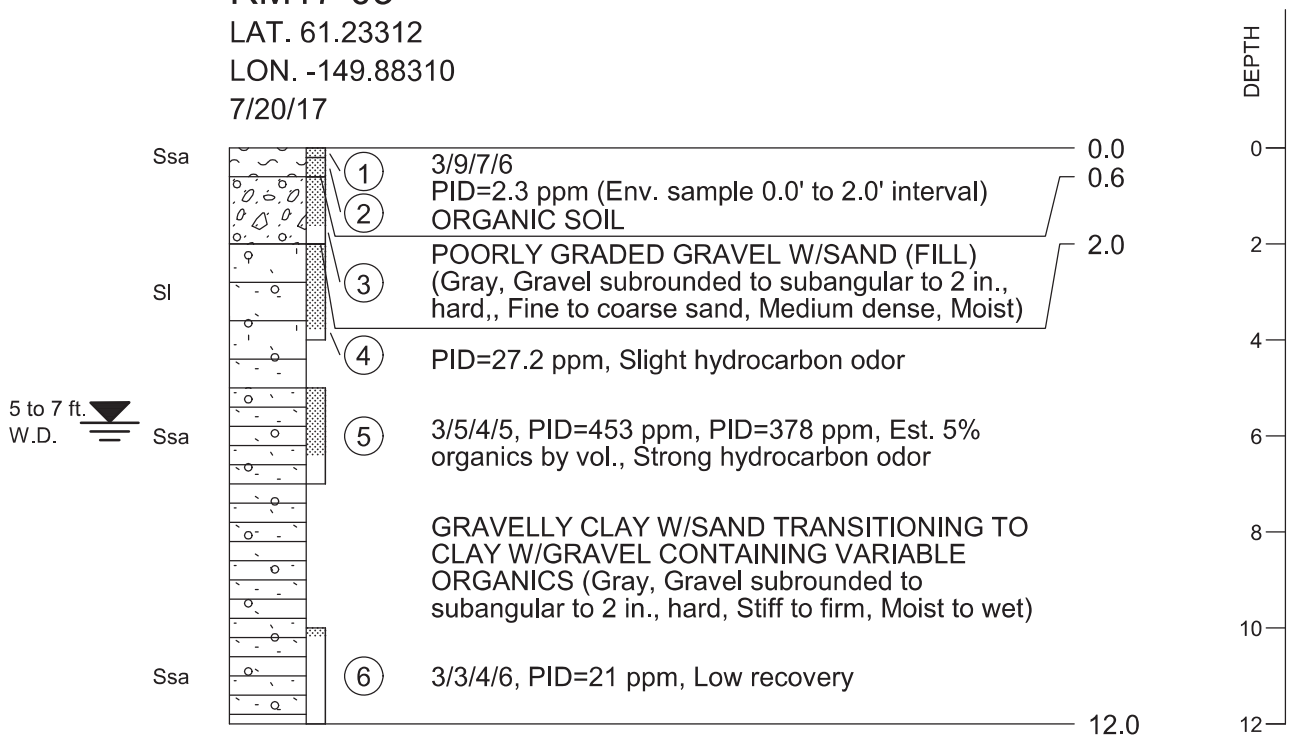
Fig. A-9

RM17-03

LAT. 61.23312
LON. -149.88310
7/20/17



Coordinates are presented in WGS84 and were obtained using a recreational grade GPS unit.

An additional test boring was advanced immediately adjacent to RM17-03 to provide additional sample volume for environmental sample collection. The two holes are treated as a single exploration.

CS: PTF17-TH03-01, 2'-4'
PTF17-TH03-02, 5'-7'
PTF17-TH09-02, 5'-7'

G:\GINT_PROJECTS\2520.01 GNE POA TANK FARM\GNE POA TANK FARM.GPJ

MASTER ONE COL/PAGE GNE POA TANK FARM.GPJ MASTER2.GDT 8/14/17

DWN:	B.M.M.
CKD:	C.H.R.
DATE:	AUG. 17
SCALE:	SHOWN

R&M CONSULTANTS, INC.

PROPOSED JET FUEL TANKAGE
PORT OF ANCHORAGE
LOG OF TEST BORING
RM17-03

FB:	NA
GRID:	1031
PROJ.NO:	2520.01
DWG.NO:	B-08

Shannon & Wilson, Inc. (S&W), uses a soil identification system modified from the Unified Soil Classification System (USCS). Elements of the USCS and other definitions are provided on this and the following pages. Soil descriptions are based on visual-manual procedures (ASTM D2488) and laboratory testing procedures (ASTM D2487), if performed.

S&W INORGANIC SOIL CONSTITUENT DEFINITIONS

CONSTITUENT[2]	FINE-GRAINED SOILS (50% or more fines)[1]	COARSE-GRAINED SOILS (less than 50% fines)[1]
Major	***Silt, Lean Clay, Elastic Silt,*** or ***Fat Clay***[3]	***Sand*** or ***Gravel***[4]
Modifying (Secondary) Precedes major constituent	30% or more coarse-grained: ***Sandy*** or ***Gravelly***[4]	More than 12% fine-grained: ***Silty*** or ***Clayey***[3]
Minor Follows major constituent	15% to 30% coarse-grained: ***with Sand*** or ***with Gravel***[4]	5% to 12% fine-grained: ***with Silt*** or ***with Clay***[3]
	30% or more total coarse-grained *and* lesser coarse-grained constituent is 15% or more: ***with Sand*** or ***with Gravel***[5]	15% or more of a second coarse-grained constituent: ***with Sand*** or ***with Gravel***[5]

[1]All percentages are by weight of total specimen passing a 3-inch sieve.
[2]The order of terms is: *Modifying Major with Minor*.
[3]Determined based on behavior.
[4]Determined based on which constituent comprises a larger percentage.
[5]Whichever is the lesser constituent.

MOISTURE CONTENT TERMS

Dry	Absence of moisture, dusty, dry to the touch
Moist	Damp but no visible water
Wet	Visible free water, from below water table

STANDARD PENETRATION TEST (SPT) SPECIFICATIONS

Hammer:	140 pounds with a 30-inch free fall. Rope on 6- to 10-inch-diam. cathead 2-1/4 rope turns, > 100 rpm NOTE: If automatic hammers are used, blow counts shown on boring logs should be adjusted to account for efficiency of hammer.
Sampler:	10 to 30 inches long Shoe I.D. = 1.375 inches Barrel I.D. = 1.5 inches Barrel O.D. = 2 inches
N-Value:	Sum blow counts for second and third 6-inch increments. Refusal: 50 blows for 6 inches or less; 10 blows for 0 inches.

NOTE: Penetration resistances (N-values) shown on boring logs are as recorded in the field and have not been corrected for hammer efficiency, overburden, or other factors.

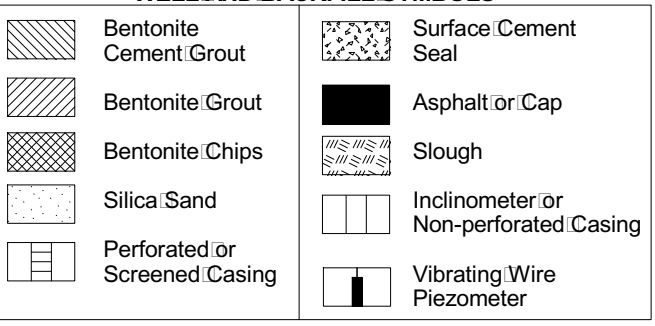
PARTICLE SIZE DEFINITIONS

DESCRIPTION	SIEVE NUMBER AND/OR APPROXIMATE SIZE
FINES	< #200 (0.075 mm = 0.003 in.)
SAND Fine Medium Coarse	 #200 to #40 (0.075 to 0.4 mm; 0.003 to 0.02 in.) #40 to #10 (0.4 to 2 mm; 0.02 to 0.08 in.) #10 to #4 (2 to 4.75 mm; 0.08 to 0.187 in.)
GRAVEL Fine Coarse	 #4 to 3/4 in. (4.75 to 19 mm; 0.187 to 0.75 in.) 3/4 to 3 in. (19 to 76 mm)
COBBLES	3 to 12 in. (76 to 305 mm)
BOULDERS	> 12 in. (305 mm)

RELATIVE DENSITY / CONSISTENCY

COHESIONLESS SOILS		COHESIVE SOILS	
N, SPT, BLOWS/FT.	RELATIVE DENSITY	N, SPT, BLOWS/FT.	RELATIVE CONSISTENCY
< 4	Very loose	< 2	Very soft
4 - 10	Loose	2 - 4	Soft
10 - 30	Medium dense	4 - 8	Medium stiff
30 - 50	Dense	8 - 15	Stiff
> 50	Very dense	15 - 30	Very stiff
		> 30	Hard

WELL AND BACKFILL SYMBOLS



PERCENTAGES TERMS[1, 2]

Trace	< 5%
Few	5 to 10%
Little	15 to 25%
Some	30 to 45%
Mostly	50 to 100%

[1]Gravel, sand, and fines estimated by mass. Other constituents, such as organics, cobbles, and boulders, estimated by volume.

[2]Reprinted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

Rancho Mesa Tank Farm
Anchorage, Alaska

SOIL DESCRIPTION AND LOG KEY

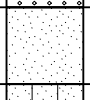
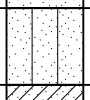
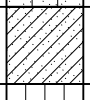
January 2018 32-1-20034-002

SHANNON & WILSON, INC.
Geotechnical and Environmental Consultants

FIG. B-1
Sheet 1 of 3

2013_BORING_CLASS1 20034.GINT.GPJ SWNEW.GDT 1/11/18

UNIFIED SOIL CLASSIFICATION SYSTEM (USCS)
(Modified From USACE Tech Memo 3-357, ASTM D2487, and ASTM D2488)

MAJOR DIVISIONS			GROUP/GRAPHIC SYMBOL		TYPICAL IDENTIFICATIONS
COARSE-GRAINED SOILS *(more than 50% retained on No. 200 sieve)*	Gravels *(more than 50% of coarse fraction retained on No. 4 sieve)*	Gravel *(less than 5% fines)*	GW		Well-Graded Gravel; Well-Graded Gravel with Sand
			GP		Poorly Graded Gravel; Poorly Graded Gravel with Sand
		Silty or Clayey Gravel *(more than 12% fines)*	GM		Silty Gravel; Silty Gravel with Sand
			GC		Clayey Gravel; Clayey Gravel with Sand
	Sands *(50% or more of coarse fraction passes the No. 4 sieve)*	Sand *(less than 5% fines)*	SW		Well-Graded Sand; Well-Graded Sand with Gravel
			SP		Poorly Graded Sand; Poorly Graded Sand with Gravel
		Silty or Clayey Sand *(more than 12% fines)*	SM		Silty Sand; Silty Sand with Gravel
			SC		Clayey Sand; Clayey Sand with Gravel
FINE-GRAINED SOILS *(50% or more passes the No. 200 sieve)*	Silts and Clays *(liquid limit less than 50)*	Inorganic	ML		Silt; Silt with Sand or Gravel; Sandy or Gravelly Silt
			CL		Lean Clay; Lean Clay with Sand or Gravel; Sandy or Gravelly Lean Clay
		Organic	OL		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
	Silts and Clays *(liquid limit 50 or more)*	Inorganic	MH		Elastic Silt; Elastic Silt with Sand or Gravel; Sandy or Gravelly Elastic Silt
			CH		Fat Clay; Fat Clay with Sand or Gravel; Sandy or Gravelly Fat Clay
		Organic	OH		Organic Silt or Clay; Organic Silt or Clay with Sand or Gravel; Sandy or Gravelly Organic Silt or Clay
HIGHLY-ORGANIC SOILS	Primarily organic matter, dark in color, and organic odor		PT		Peat or other highly organic soils (see ASTM D4427)

NOTE: No. 4 size = 4.75 mm = 0.187 in.; No. 200 size = 0.075 mm = 0.003 in.

NOTES

1. Dual symbols *(symbols separated by a hyphen, i.e., SP-SM, Sand with Silt)* are used for soils with between 5% and 12% fines or when the liquid limit and plasticity index values plot in the CL-ML area of the plasticity chart. Graphics shown on the logs for these soil types are a combination of the two graphic symbols (e.g., SP and SM).

2. Borderline symbols *(symbols separated by a slash, i.e., CL/ML, Lean Clay to Silt; SP-SM/SM, Sand with Silt to Silty Sand)* indicate that the soil properties are close to the defining boundary between two groups.

Rancho Mesa Tank Farm
Anchorage, Alaska

SOIL DESCRIPTION AND LOG KEY

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FIG. B-1
Sheet 2 of 3

GRADATION TERMS

Poorly Graded	Narrow range of grain sizes present or, within the range of grain sizes present, one or more sizes are missing (Gap Graded). Meets criteria in ASTM D2487, if tested.
Well-Graded	Full range and even distribution of grain sizes present. Meets criteria in ASTM D2487, if tested.

CEMENTATION TERMS[1]

Weak	Crumbles or breaks with handling or slight finger pressure
Moderate	Crumbles or breaks with considerable finger pressure
Strong	Will not crumble or break with finger pressure

PLASTICITY[2]

DESCRIPTION	VISUAL-MANUAL CRITERIA	APPROX. PLASITICTY INDEX RANGE
Nonplastic	A 1/8-in. thread cannot be rolled at any water content.	< 4
Low	A thread can barely be rolled and a lump cannot be formed when drier than the plastic limit.	4 to 10
Medium	A thread is easy to roll and not much time is required to reach the plastic limit. The thread cannot be rerolled after reaching the plastic limit. A lump crumbles when drier than the plastic limit.	10 to 20
High	It take considerable time rolling and kneading to reach the plastic limit. A thread can be rerolled several times after reaching the plastic limit. A lump can be formed without crumbling when drier than the plastic limit.	> 20

ADDITIONAL TERMS

Mottled	Irregular patches of different colors.
Bioturbated	Soil disturbance or mixing by plants or animals.
Diamict	Nonsorted sediment; sand and gravel in silt and/or clay matrix.
Cuttings	Material brought to surface by drilling.
Slough	Material that caved from sides of borehole.
Sheared	Disturbed texture, mix of strengths.

PARTICLE ANGULARITY AND SHAPE TERMS[1]

Angular	Sharp edges and unpolished planar surfaces.
Subangular	Similar to angular, but with rounded edges.
Subrounded	Nearly planar sides with well-rounded edges.
Rounded	Smoothly curved sides with no edges.
Flat	Width/thickness ratio > 3.
Elongated	Length/width ratio > 3.

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[2]Adapted, with permission, from ASTM D2488 - 09a Standard Practice for Description and Identification of Soils (Visual-Manual Procedure), copyright ASTM International, 100 Barr Harbor Drive, West Conshohocken, PA 19428. A copy of the complete standard may be obtained from ASTM International, www.astm.org.

ACRONYMS AND ABBREVIATIONS

ATD	At Time of Drilling
Diam.	Diameter
Elev.	Elevation
ft.	Feet
FeO	Iron Oxide
gal.	Gallons
Horiz.	Horizontal
HSA	Hollow Stem Auger
I.D.	Inside Diameter
in.	Inches
lbs.	Pounds
MgO	Magnesium Oxide
mm	Millimeter
MnO	Manganese Oxide
NA	Not Applicable or Not Available
NP	Nonplastic
O.D.	Outside Diameter
OW	Observation Well
pcf	Pounds per Cubic Foot
PID	Photo-Ionization Detector
PMT	Pressuremeter Test
ppm	Parts per Million
psi	Pounds per Square Inch
PVC	Polyvinyl Chloride
rpm	Rotations per Minute
SPT	Standard Penetration Test
USCS	Unified Soil Classification System
q_u	Unconfined Compressive Strength
VWP	Vibrating Wire Piezometer
Vert.	Vertical
WOH	Weight of Hammer
WOR	Weight of Rods
Wt.	Weight

STRUCTURE TERMS[1]

Interbedded	Alternating layers of varying material or color with layers at least 1/4-inch thick; singular: bed.
Laminated	Alternating layers of varying material or color with layers less than 1/4-inch thick; singular: lamination.
Fissured	Breaks along definite planes or fractures with little resistance.
Slickensided	Fracture planes appear polished or glossy; sometimes striated.
Blocky	Cohesive soil that can be broken down into small angular lumps that resist further breakdown.
Lensed	Inclusion of small pockets of different soils, such as small lenses of sand scattered through a mass of clay.
Homogeneous	Same color and appearance throughout.

Rancho Mesa Tank Farm
Anchorage, Alaska

SOIL DESCRIPTION AND LOG KEY

January 2018 32-1-20034-002

SHANNON & WILSON, INC.
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FIG. B-1
Sheet 3 of 3

2013_BORING_CLASS3 20034.GINT.GPJ SWNEW.GDT 1/11/18

SHANNON & WILSON, INC.

FROST CLASSIFICATION

(after Municipality of Anchorage 2007)

GROUP		0.02 Mil.	P-200*	USC SYSTEM (based on P-200 results)
NFS	Sandy Soils	0 to 3	0 to 6	SW, SP, SW-SM, SP-SM
	Gravelly Soils	0 to 3	0 to 6	GW, GP, GW-GM, GP-GM
F1	Gravelly Soils	3 to 10	6 to 13	GM, GW-GM, GP-GM
F2	Sandy Soils	3 to 15	6 to 19	SP-SM, SW-SM, SM
	Gravelly Soils	10 to 20	13 to 25	GM
F3	Sands, except very fine silty sands**	Over 15	Over 19	SM, SC
	Gravelly Soils	Over 20	Over 25	GM, GC
	Clays, PI>12			CL, CH
F4	All Silts	Over 15	Over 19	ML, MH
	Very fine silty sands**			SM, SC
	Clays, PI<12			CL, CL-ML
	Varved clays and other fined grained, banded sediments			CL and ML CL, ML, and SM; SL, SH, and ML; CL, CH, ML, and SM

P-200 = Percent passing the number 200 sieve
0.02 Mil. = Percent material below 0.02 millimeter grain size
PI = Plasticity Index

*Approximate P-200 value equivalent for frost classification. Value range based on typical, well-graded soil curves.

** Very fine sand : greater than 50% of sand fraction passing the number 100 sieve

Rancho Mesa Tank Farm
Anchorage, Alaska

FROST CLASSIFICATION LEGEND

January 2018 32-1-20034-002

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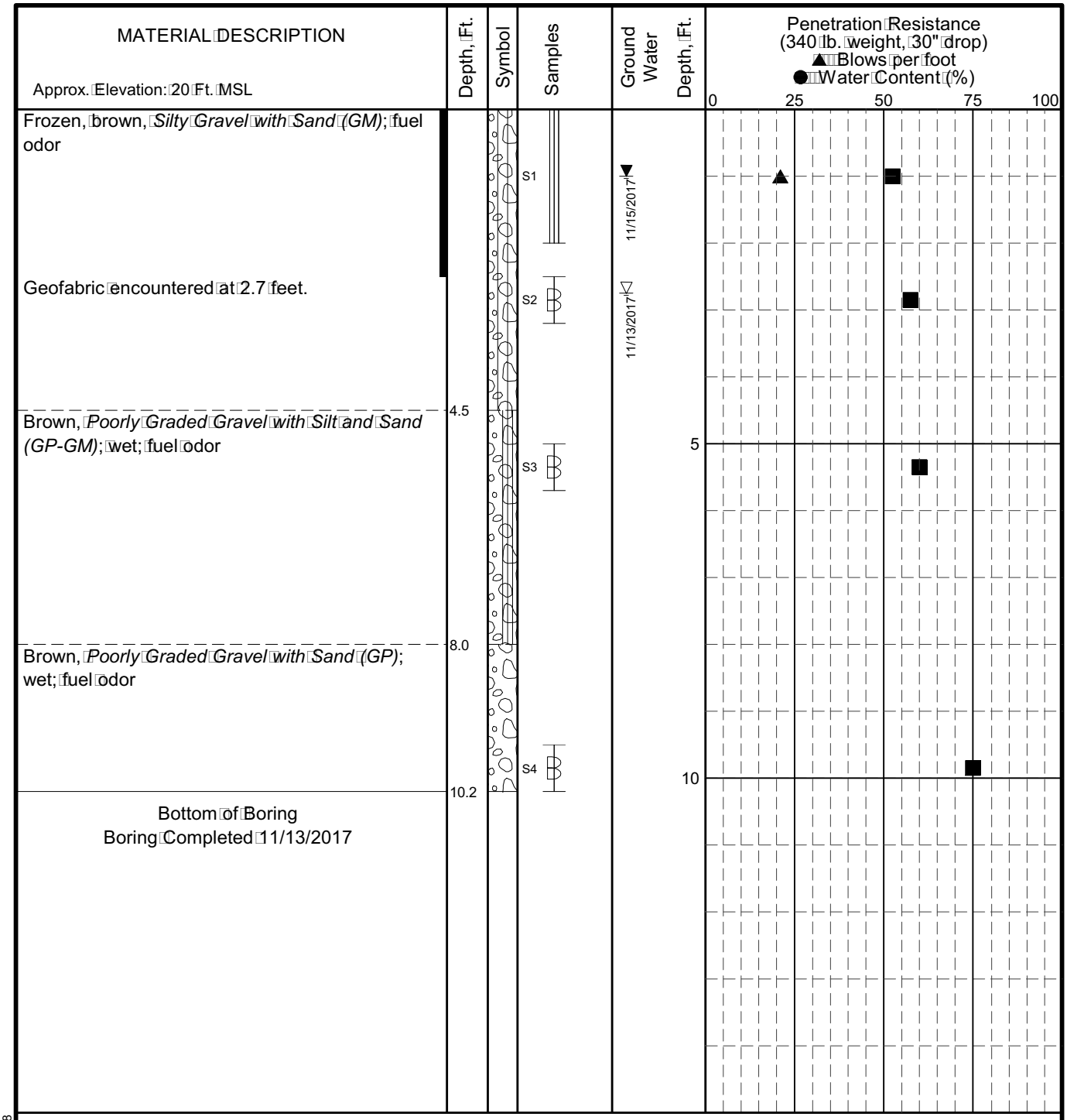
FIG. B-2



LEGEND

* Sample Not Recovered
Grab Sample
3" O.D. Split Spoon Sample
Ground Water Level At Time Of Drilling
Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Rancho Mesa Tank Farm
Anchorage, Alaska

LOG OF BORING SW-1

January 2018 32-1-20034-002

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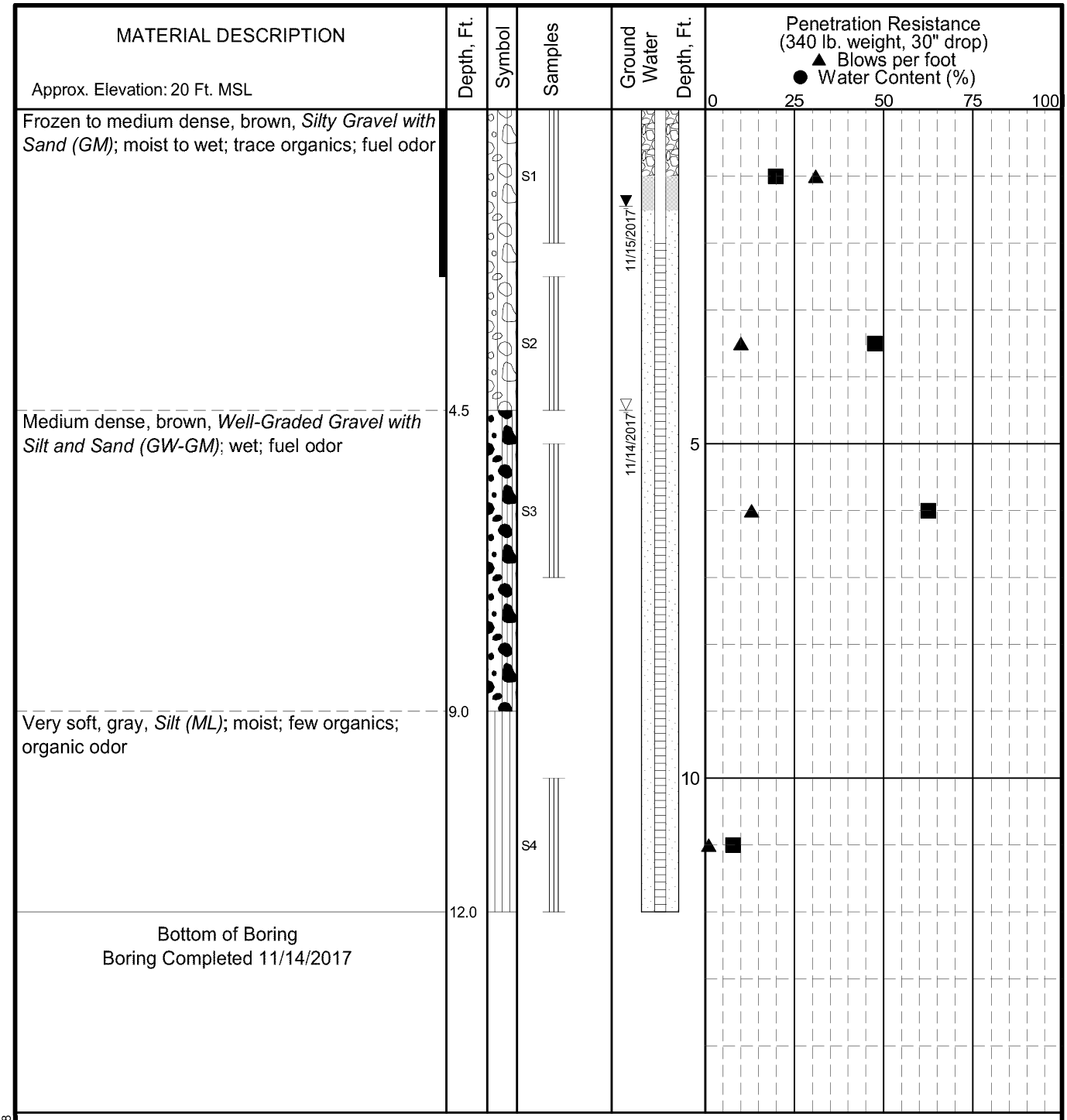
FIG. B-3

REV 3 - Approved for Submittal

GEOTECHNICAL LOG 20034 GINT.GPJ S&W_GEO1.GDT 1/15/18



LEGEND

- * Sample Not Recovered
- Grab Sample
- 3" O.D. Split Spoon Sample
- Frozen
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Cuttings Backfill
- Blank Casing, Annular Seal
- Slotted Casing, Filter Sand
- Grouted Bottom Seal

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Rancho Mesa Tank Farm
Anchorage, Alaska

LOG OF BORING SW-2

January 2018

32-1-20034-002

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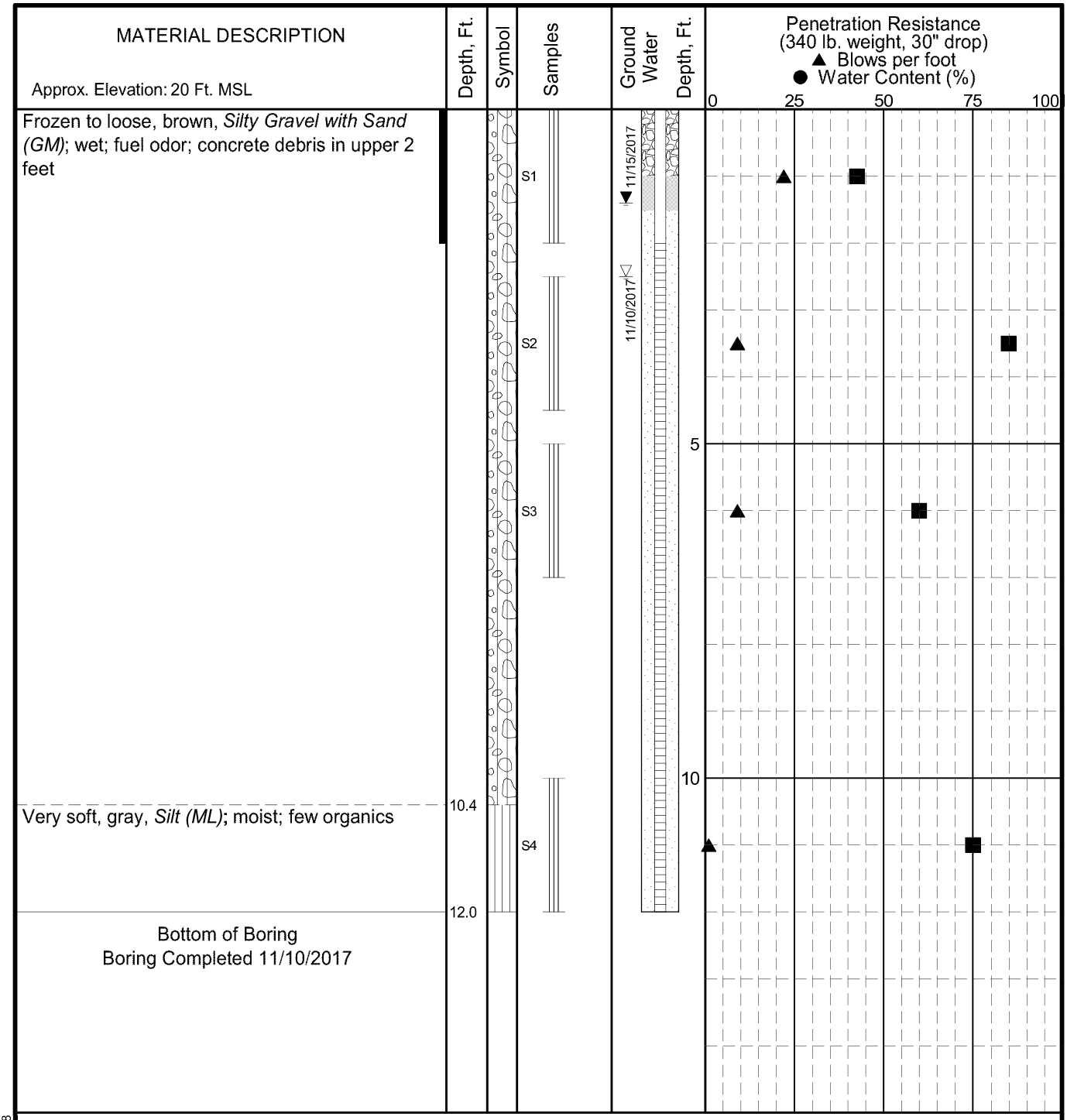
FIG. B-4

REV 3 - Approved for Submittal

GEOTECHNICAL LOG 20034 GINT.GPJ S&W GEO1.GDT 1/15/18



LEGEND

- * Sample Not Recovered
- Grab Sample
- 3" O.D. Split Spoon Sample
- Frozen
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Cuttings Backfill
- Blank Casing, Annular Seal
- Slotted Casing, Filter Sand
- Grouted Bottom Seal

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Rancho Mesa Tank Farm
Anchorage, Alaska

LOG OF BORING SW-3

January 2018

32-1-20034-002

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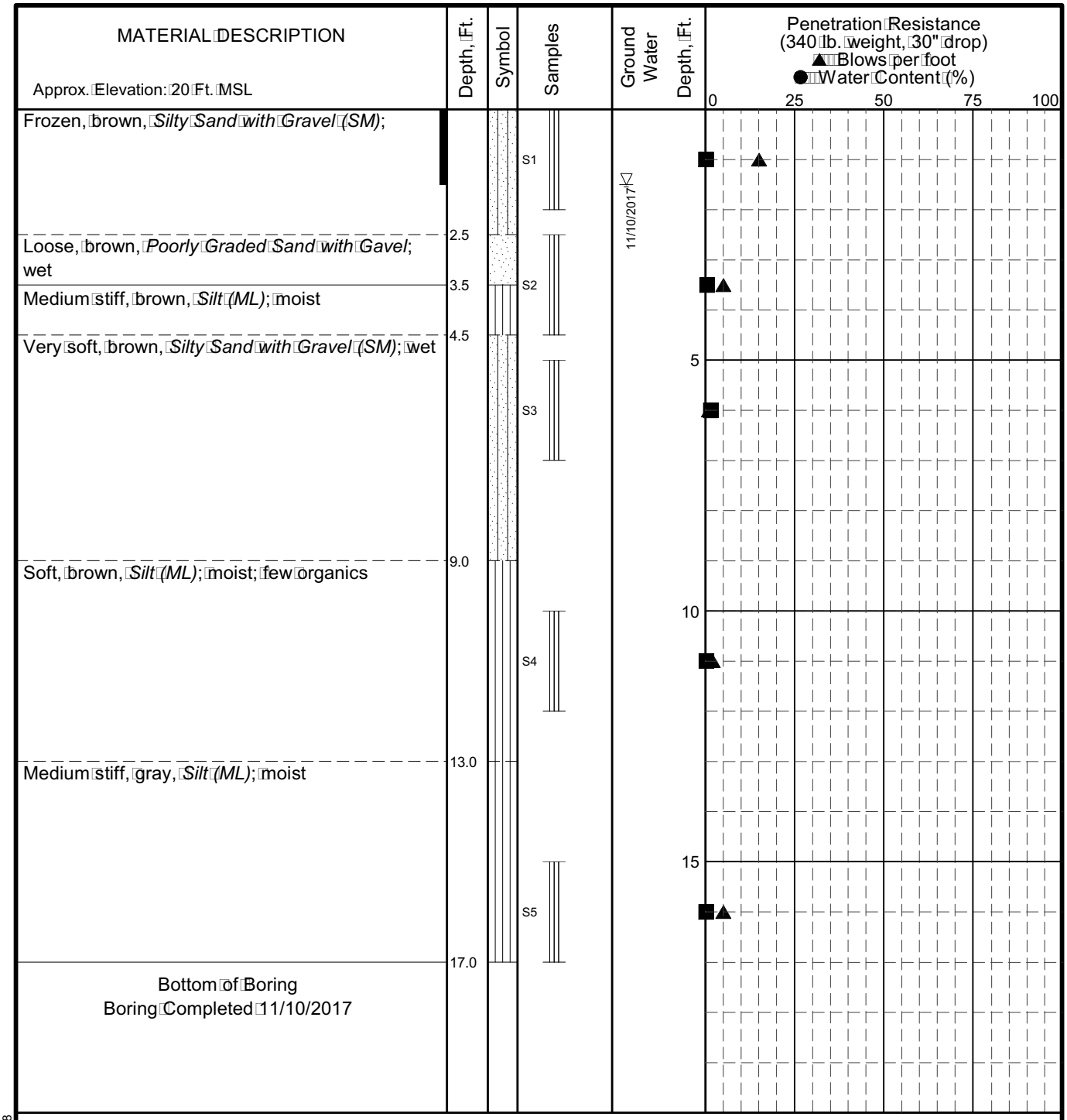
FIG. B-5

REV 3 - Approved for Submittal

GEOTECHNICAL LOG 20034 GINT.GPJ S&W GEO1.GDT 1/15/18



LEGEND

* Sample Not Recovered
Grab Sample
3" O.D. Split Spoon Sample
Ground Water Level At Time Of Drilling
Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Rancho Mesa Tank Farm
Anchorage, Alaska

LOG OF BORING SW-4

January 2018 32-1-20034-002

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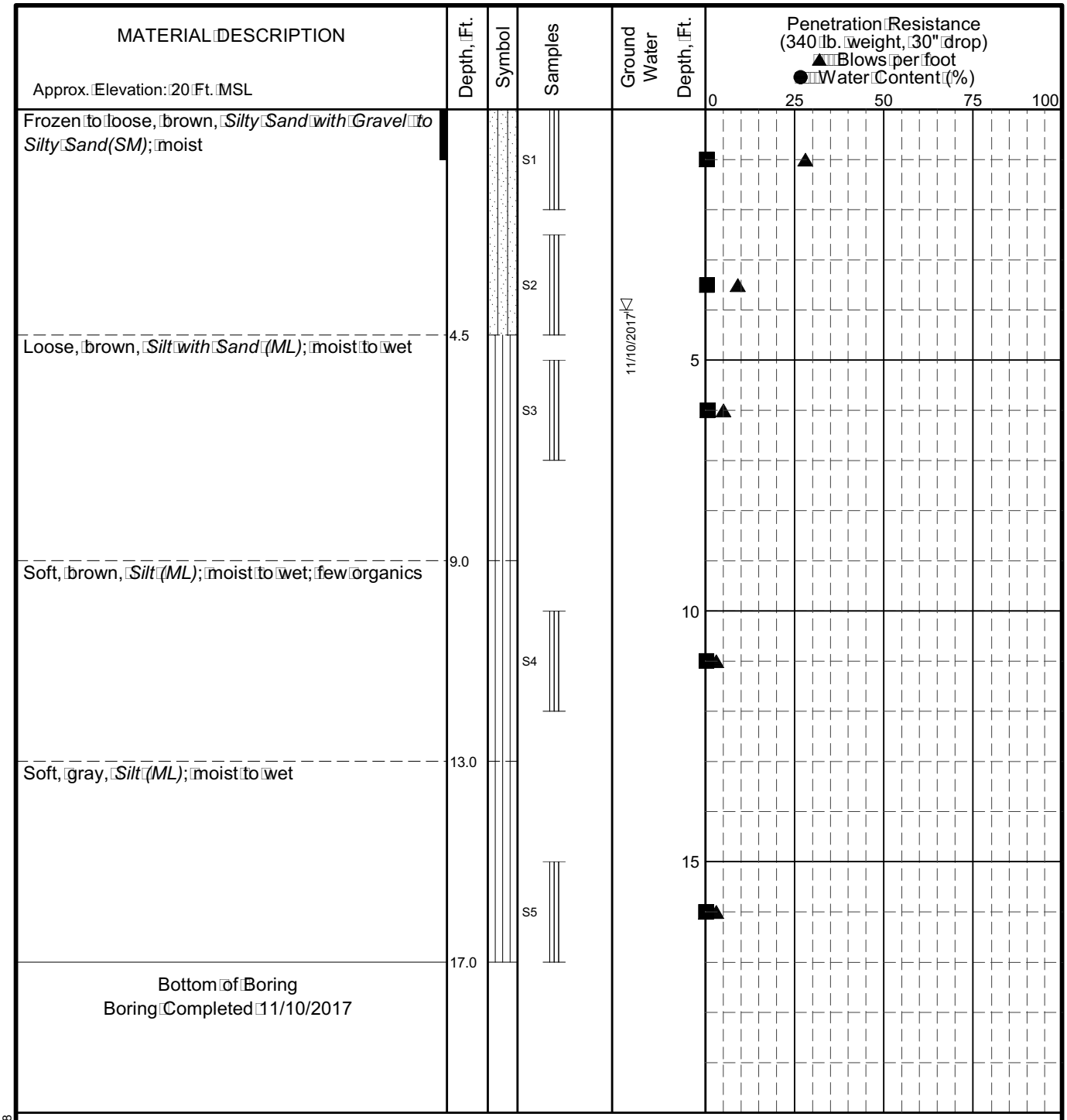
FIG. B-6

REV 3 - Approved for Submittal

GEOTECHNICAL LOG 20034 GINT.GPJ S&W_GEO1.GDT 1/15/18



LEGEND

* Sample Not Recovered
Grab Sample
3" O.D. Split Spoon Sample
Ground Water Level At Time Of Drilling
Frozen

NOTES

1. The stratification lines represent the approximate boundaries between soil types, and the transition may be gradual.
2. The discussion in the text of this report is necessary for a proper understanding of the nature of subsurface materials.
3. Water level, if indicated above, is for the date specified and may vary.

Rancho Mesa Tank Farm
Anchorage, Alaska

LOG OF BORING SW-5

January 2018 32-1-20034-002

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FIG. B-7

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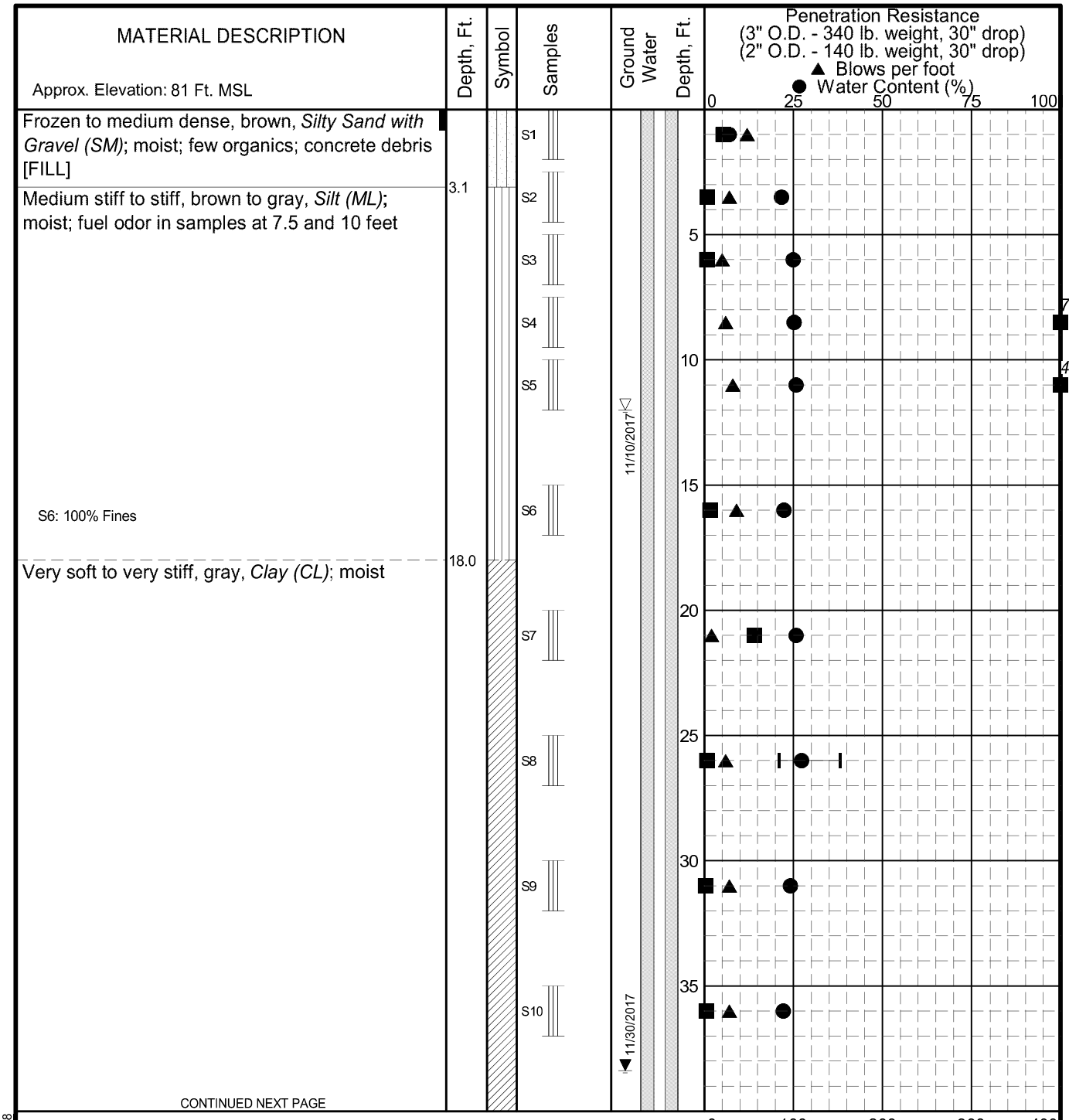
GEOTECHNICAL LOG 20034 GINT.GPJ S&W_GEO1.GDT 1/15/18



LEGEND

- * Sample Not Recovered
- Grab Sample
- 2" O.D. Split Spoon Sample
- 3" O.D. Split Spoon Sample
- Shelby Tube
- Frozen
- Ground Water Level At Time Of Drilling
- Static Water Level
- Blank Section, Cuttings Backfill
- Blank Casing, Annular Seal
- Slotted Casing, Filter Sand
- Grouted Bottom Seal

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Rancho Mesa Tank Farm
Anchorage, Alaska

LOG OF BORING SW-6

January 2018 32-1-20034-002

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FIG. B-8
Sheet 1 of 4

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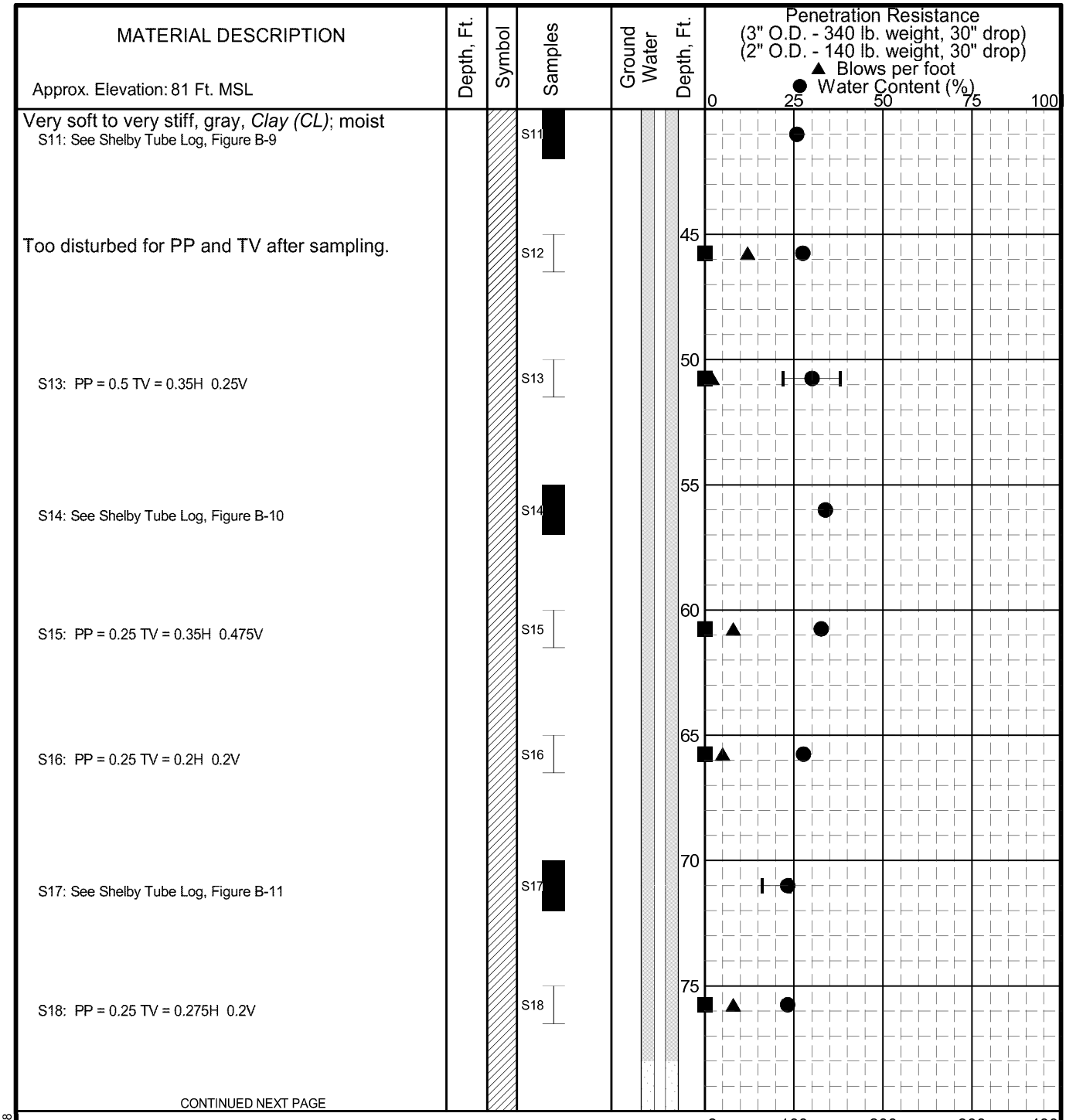

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Rancho Mesa Tank Farm
Anchorage, Alaska

LOG OF BORING SW-6

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32-1-20034-002

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FIG. B-8
Sheet 2 of 4

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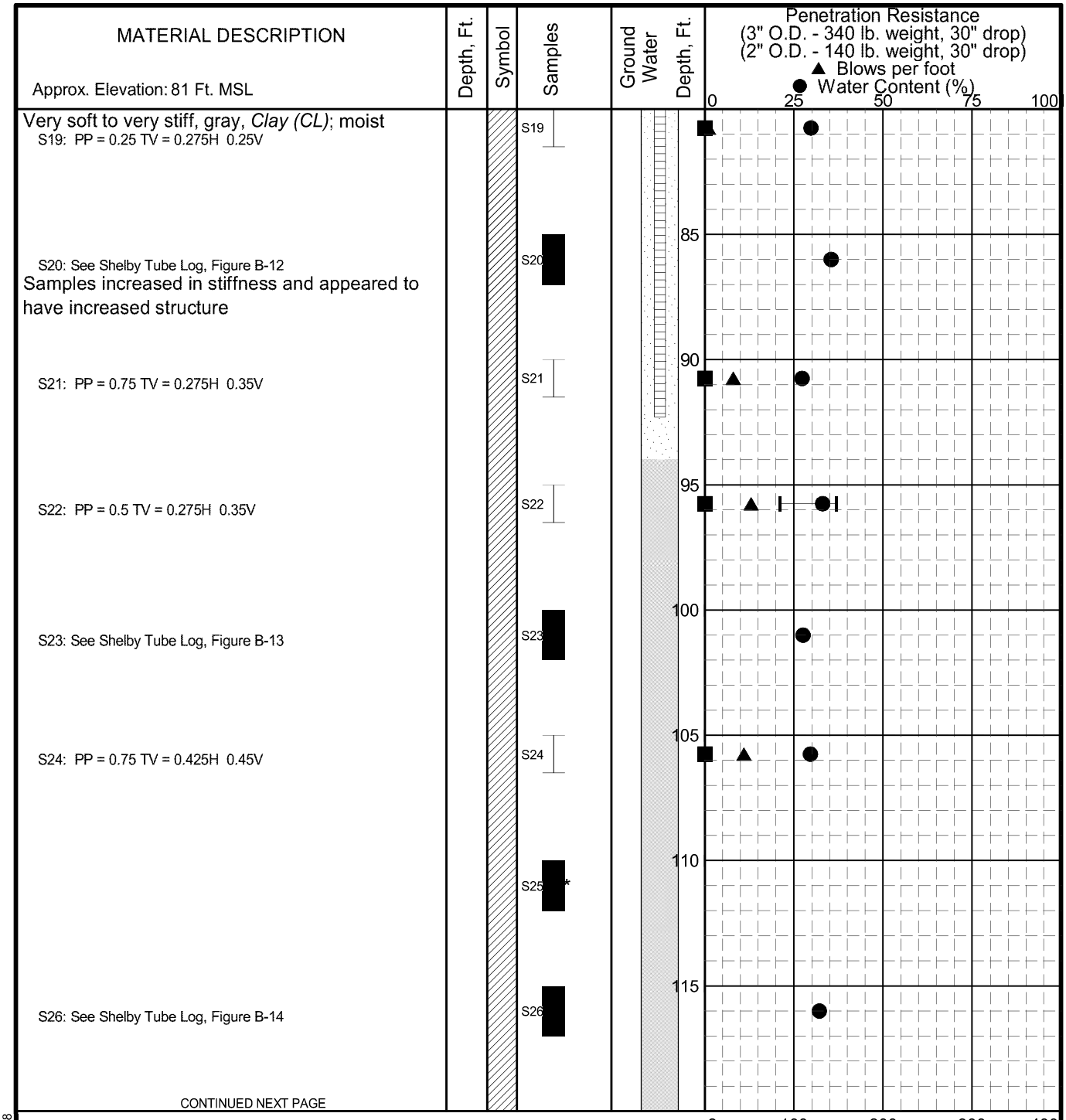

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Rancho Mesa Tank Farm
Anchorage, Alaska

LOG OF BORING SW-6

January 2018

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FIG. B-8
Sheet 3 of 4

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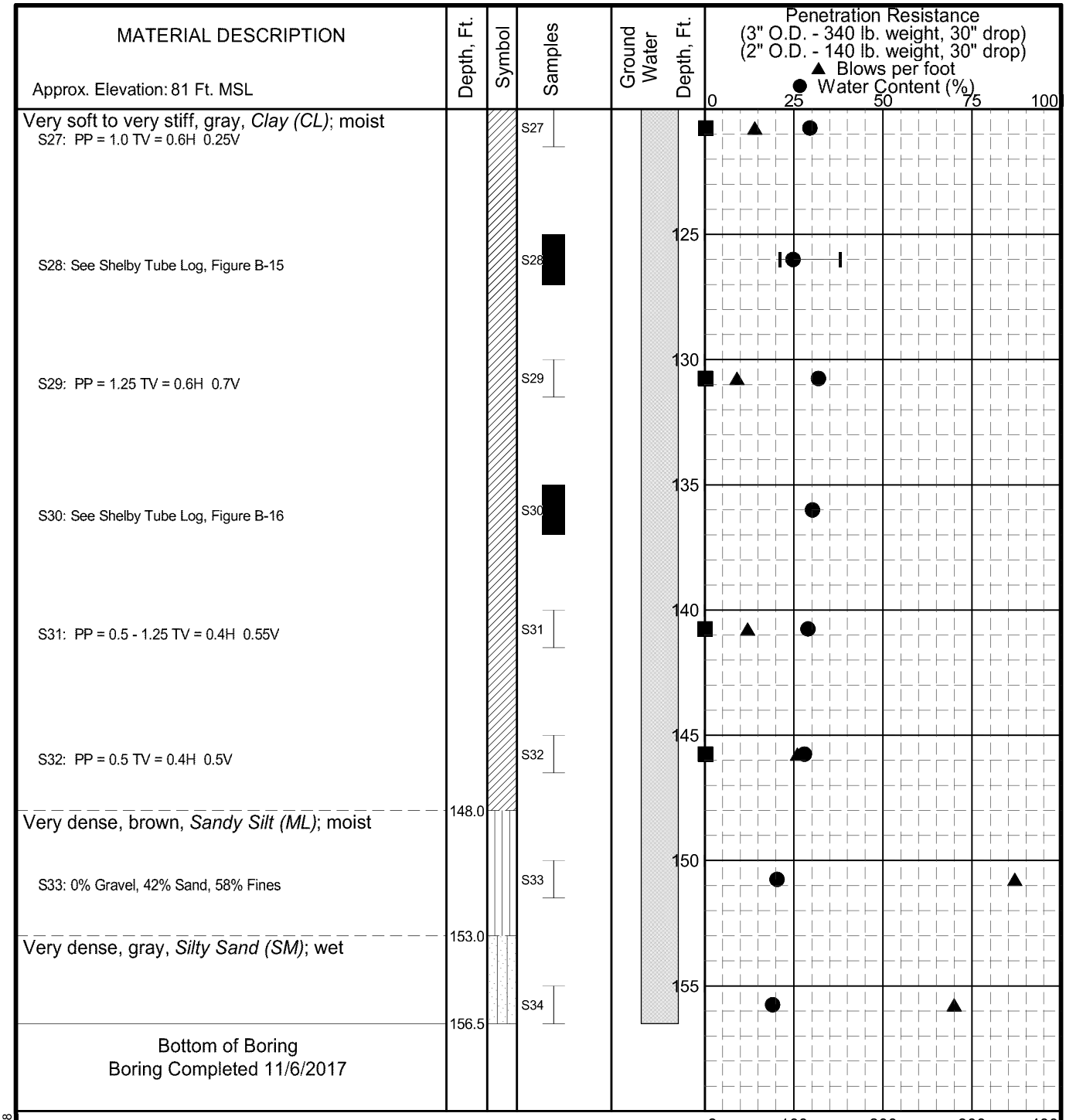
GEOTECHNICAL LOG 20034 GINT.GPJ S&W_GEO1.GDT 1/15/18



LEGEND

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Rancho Mesa Tank Farm
Anchorage, Alaska

LOG OF BORING SW-6

January 2018 32-1-20034-002

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FIG. B-8
Sheet 4 of 4

REV 3 - Approved for Submittal

GEOTECHNICAL LOG 20034 GINT.GPJ S&W_GEO1.GDT 1/15/18

APPENDIX C

RESULTS OF LIMITED ENVIRONMENTAL CHARACTERIZATION

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TABLES

ATTACHMENTS

APPENDIX C

RESULTS OF LIMITED ENVIRONMENTAL CHARACTERIZATION

C.1 INTRODUCTION

Shannon & Wilson conducted limited site characterization activities at the former Defense Fuels Support Point-Anchorage (DFSP-A) in support of the design and construction of the proposed Rancho Mesa Tank Farm at the Port of Anchorage, Alaska. This work was conducted concurrently with geotechnical explorations conducted for the project. The purpose of the site characterization activities was to provide data to supplement existing information and to support earthwork and dewatering design, permitting for construction, and preliminary evaluation of indoor air concerns for occupied structures; which will be conducted in future phases of work and are not included as part of this report.

C.2 BACKGROUND

The lease area for the proposed tank farm project is located within a former truck/rail car loading rack area at the former DFSP-A bulk fuel storage and distribution facility. DFSP-A was in operation from 1942 to 1996. Numerous releases of diesel fuel, turbine fuel, unleaded gasoline, slop fuel, and transformer fluid were documented at the facility between 1960 and 1989. In addition, several fuel releases were documented at neighboring facilities that may have also impacted the former loading rack area. Following cleanup and assessment activities, the DFSP-A site was granted a Cleanup Complete with Institutional Controls (ICs) designation by the ADEC in an April 2003 Record of Decision (ROD). The ROD states that the contaminants of concern (COCs) in soil, groundwater, and surface water for the site are gasoline range organics (GRO), diesel range organics (DRO), benzene, toluene, ethylbenzene, and xylenes (BTEX). The ROD also provides site specific soil and groundwater cleanup levels for these contaminants. However; based on feedback from ADEC during development of our work plan, it is our understanding that the soil cleanup levels for the ROD-listed site COCs are the applicable ADEC Method Two Human Health cleanup levels. The ADEC also specified that the levels for residual range organics (RRO), although not listed in the ROD as a COC for the site, should be compared to the Method Two Human Health criteria. Similarly, the ADEC also specified that groundwater sampling results should be compared to the Table C cleanup level values instead of the cleanup level presented in the ROD, which were 10 times the ADEC groundwater cleanup levels.

C.3 FIELD ACTIVITIES

Field work for this project consisted of advancing and sampling six soil borings; installing, developing, and sampling two groundwater monitoring wells; and managing investigation-derived waste (IDW). The locations of the borings/monitoring wells and general site features are shown on Figure 2 in the report. Field notes are included in Attachment C-1. Monitoring well construction details are included in Attachment C-2. Laboratory results are provided in Attachment C-3. Soil and groundwater conditions at the site are described in detail in Sections 5.1 and 5.2. Boring logs are located in Appendices A and B of this report.

C.3.1 Soil Screening and Sampling

Soil samples were collected using 3-inch outside diameter, split-spoon samplers driven using a 340-pound hammer. In each boring, field screening samples were collected at approximately 2.5-foot intervals until groundwater was encountered and at 5-foot intervals thereafter to the bottom of the boring. Immediately following retrieval and opening of the split-spoons, the analytical samples and field screening samples were collected. The analytical sample jars for volatile analyses were collected first, followed by the non-volatile analytical sample jars, and finally the field screening sample. Each soil sample was visually described and "screened" for volatile organic compounds (VOCs) using a photoionization detector (PID) and ADEC-approved headspace screening techniques. The PID was calibrated before screening activities with 100 parts per million (ppm) isobutylene standard gas. The field screening samples were collected in re-sealable plastic bags, warmed to a common temperature, and tested within 60 minutes of collection.

Two analytical samples were collected from each boring and submitted for analysis. One sample was collected from the interval just above the soil/water interface and the second sample was collected from the sample interval with the highest PID measurement. The analytical soil samples tested for volatile constituents were collected using methanol preservation. In accordance with the method, at least 25 grams of soil were quickly placed into a laboratory supplied 4-ounce jar that had been pre-weighed. Afterward, 25 milliliters of reagent grade methanol was added to submerge the soil. The methanol extracts the hydrocarbons from the soil at the time of sampling, thereby reducing the possible loss of volatile constituents prior to sample analysis. The samples were transferred to the appropriate laboratory-supplied jars using decontaminated stainless steel spoons, and transferred to the laboratory in coolers with ice packs using chain-of-custody procedures. The sample locations and descriptions are summarized in Table C-1 and on the Boring Logs in Appendix B.

C.3.2 Monitoring Well Installation

Borings SW-2 and SW-3 were completed as Monitoring Wells SW-2 and SW-3, respectively. The monitoring wells were constructed of 2-inch nominal inside diameter, schedule 40, polyvinyl chloride (PVC) pipe with threaded connections. The lower sections of the wells were constructed of 10-foot sections of PVC well screen with 0.010-inch slots. A continuous #10 to #20 silica sand pack was used to backfill around the well screens to about 0.5 feet above the screened sections. Bentonite chips were used to backfill above the filter pack to approximately 1 foot bgs. Pea gravel was placed above the bentonite to match the existing ground surface. The monitoring wells were completed with flush mount protective casings that were embedded in the pea gravel. Monitoring well construction details are included in Attachment C-2.

C.3.3 Monitoring Well Development

Shannon & Wilson developed the monitoring wells on November 17 and 20, 2017. Prior to initiating the well development activities, water depth relative to the top of the well casings and the presence of free product was measured with a multi-phase probe. Groundwater levels were 1.4 and 1.45 feet below top of casing and no free product was encountered. The wells were developed using a surge block and a submersible pump with dedicated disposable tubing. Five to 10-minute periods of surging were alternated with periods of purging. During well development, water quality parameters, including pH, specific conductance, temperature, and turbidity were measured with Hanna and Hach water quality instruments. Development of Monitoring Well SW-2 began on November 17, 2017 but was halted after 7 gallons were purged from the well. Development was continued on November 20, 2017 and considered complete after three hours of total development effort had been expended. A total of 52 gallons was removed from the well during development. Development of Monitoring Well SW-3 was considered complete after 55 gallons of water were removed. Water quality parameters did not stabilize to standard acceptance criteria during development in either well. Final water quality parameters are listed in Attachment C-1 in the field notes. Approximately 52 and 55 gallons were removed from Monitoring Wells SW-2 and SW-3, respectively. Development water generated as part of this project was placed in two, labeled 55-gallon drums and stored on site. Well development data are summarized in Table C-2.

C.3.4 Monitoring Well Sampling

Groundwater samples were collected from Monitoring Wells SW-3 and SW-2 on November 17 and 20, 2017, respectively. In accordance with the work plan, the wells were allowed to recharge to 80 percent of the original water volume before collecting groundwater samples. The

wells were sampled using a submersible pump and dedicated tubing. Sampling data are included in Table C-2.

Analytical samples were collected by transferring water directly from the pump tubing into the laboratory supplied containers. The sample jars were filled in decreasing order of volatility.

C.3.5 Investigation-Derived Waste Management

IDW consisted of soil cuttings, development water, and purge water. Drill cuttings and development water from the borings and wells were containerized in labeled 55-gallon drums and are stored on-site at the former DFSP-A area. Shannon and Wilson was coordinating IDW disposal at the time of this report.

C.4 LABORATORY ANALYSES

The soil and groundwater samples were submitted to SGS North America Inc. (SGS) for analytical testing using chain-of-custody procedures. The laboratory reports and completed ADEC Laboratory Data Review Checklists (LDRCs) are provided in Attachment C-3.

Fourteen analytical soil samples, including two duplicates, were submitted and analyzed for GRO by Alaska Method (AK) 101; DRO by AK 102; RRO by AK 103; BTEX by Environmental Protection Agency (EPA) Method 8021B; volatile organic compounds (VOCs) by EPA Method 8260C; and polynuclear aromatic hydrocarbons (PAHs) by EPA Method 8270D SIM. One soil trip blank accompanied the samples and was analyzed for GRO by AK 101 and VOCs by EPA Method 8260C. The analytical soil sample results are summarized in Table C-3.

Three groundwater samples, including one duplicate, were submitted and analyzed for GRO by AK 101, DRO by AK 102, RRO by AK 103, BTEX by EPA Method 8021B, VOCs by EPA Method 8260C, and PAHs by EPA Method 8270D SIM. One water trip blank accompanied the samples and was analyzed for GRO by AK 101 and VOCs by EPA Method 8260C. The analytical groundwater sample results are summarized in Table C-4.

C.5 DISCUSSION OF ANALYTICAL RESULTS

The analytical soil and groundwater results were compared to ADEC cleanup levels presented in the 18 Alaska Administrative Code (AAC) 75 regulations (October 2017) and the water quality standards listed in 18 AAC 70 (February 2017). The applicable soil criteria consist of the most stringent ADEC Method Two cleanup levels or Human Health cleanup levels listed in Tables B1 and B2 of 18 AAC 75.341, for the “under 40-inch (precipitation) zone,” and groundwater

cleanup levels are presented in Table C of 18 AAC 75.345. Human health cleanup levels were used as a comparison for GRO, DRO, RRO, and BTEX, in accordance with ICs for the site.

C.5.1 Soil Sample Analytical Results

1,2,4-trimethylbenzene (2.73 milligrams per kilogram [mg/kg] to 6.84 mg/kg), naphthalene (0.583 mg/kg to 1.9 mg/kg by EPA Method 8260C and 1.09 mg/kg to 1.42 mg/kg by EPA Method 8270D SIM), 1-methylnaphthalene (1.86 mg/kg to 2.25 mg/kg), and 2-methylnaphthalene (2.64 mg/kg to 3 mg/kg) were detected in Samples SW2-S3 and SW3-S2 at concentrations greater than the most stringent ADEC Method Two cleanup levels of 0.16 kg/mg, 0.038 mg/kg, 0.41 mg/kg, and 1.3 mg/kg, respectively. Sample SW3-S2 also contained a concentration of 1,3,5-trimethylbenzene (2.08 mg/kg) at a concentration greater than the most stringent ADEC Method Two cleanup levels of 1.3 mg/kg. The remaining analytes were either not detected or detected below the applicable cleanup levels.

None of the samples tested contained concentrations above the ADEC Method Two Human Health criteria for COCs at the site (GRO, DRO, RRO, and BTEX). It is noted that each of these analytes were detected at concentrations exceeding the ADEC Migration to Groundwater cleanup levels. The maximum COC concentrations detected in the samples tested as part of this study are summarized in the table below for reference.

Compound Tested	Human Health Cleanup Level (mg/kg)	Maximum Concentration (mg/kg) and Sample ID
GRO	1,400	335 J+ (Sample SW3-S20)
DRO	10,250	2,320 (Sample SW3-S20)
RRO	10,000	4,260 (Sample SW1-S1)
Benzene	11	3.51 (Sample SW1-S1)
Toluene	200	23.4 (Sample SW3-S20)
Ethylbenzene	49	5.51 (Sample SW3-S20)
Xylenes	57	44.1 (Sample SW3-S20)

C.5.2 Groundwater Sample Analytical Results

DRO (2,660 micrograms per liter [µg/L] to 4,030 µg/L), benzene (550 µg/L to 2,700 µg/L), ethylbenzene (157 µg/L to 695 µg/L), and xylenes (409 µg/L to 4,880 µg/L) were detected in

each of the groundwater samples at concentrations exceeding the ADEC Table C cleanup levels of 1,500 µg/L, 15 µg/L, and 190 µg/L, respectively. GRO (maximum of 22,300 µg/L) and toluene (maximum of 4,300 µg/L) were detected in duplicate Samples SW-3/SW-30 at concentrations exceeding the ADEC Table C cleanup levels of 2,200 µg/L and 1,100 µg/L, respectively. Sample SW-2 also contained 180 µg/L 1,2,4-trimethylbenzene, 1.97 µg/L 1,2-dichloroethane, 44.7 µg/L naphthalene by EPA Method 8260C, 26.1 µg/L naphthalene by EPA Method 8270D, and 12.7 µg/L dichlorodifluoromethane which exceed the ADEC Table C cleanup levels of 15 µg/L, 1.7 µg/L, 1.7 µg/L, and 11 µg/L, respectively. The remaining tested analytes were either not detected or detected below the ADEC cleanup levels.

Total aromatic hydrocarbon (TAH) and total aqueous hydrocarbon (TAqH) concentrations were calculated based on the total based on the total BTEX and total PAH concentrations. The TAH concentration (1,180 µg/L) and TAqH concentration (1,238 µg/L) were greater than the ADEC water quality standards of 10 µg/L and 15 µg/L, respectively.

C.5.3 Quality Control Samples

The project laboratory follows on-going quality assurance/quality control procedures to evaluate conformance to applicable ADEC data quality objectives (DQOs). Internal laboratory controls to assess data quality for this project include surrogates, method blanks, matrix spike/matrix spike duplicates (MS/MSD), and laboratory control sample/laboratory control sample duplicates (LCS/LCSD) to assess precision, accuracy, and matrix bias. If a DQO was not met, the project laboratory provides a brief narrative concerning the problem in the case narrative of their laboratory reports (see Attachment C-3).

External quality controls included duplicate samples and trip blanks. Three duplicate sets, two soil (SW1-S2/SW1-S20 and SW3-S2/SW3-S20) and one groundwater (SW-3/SW-30), were collected to assess precision of the sampling and analysis processes using the calculated relative percent difference (RPD). The RPDs are within the ADEC recommended DQO of 50 percent for soil and 30 percent for groundwater, with the exception of benzene and toluene in the SW3-S2/SW3-S20 sample set (126% and 70%, respectively) and GRO, ethylbenzene, and xylenes in the groundwater samples (73%, 71%, and 61% respectively). Therefore, these results are flagged “E” on Tables C-3 and C-4 to indicate that the sample results are estimated due to the RPD failures.

Phenanthrene was detected at an estimated concentration in a laboratory method blank for groundwater analysis. The affected project sample contained more than ten times the concentration detected in the method blank, therefore the sample is considered unaffected.

One soil trip blank (Sample STB) and one water trip blank (Sample WTB) accompanied the sample jars and bottles, as appropriate, from the laboratory to the site during sampling activities and back again to SGS. The soil trip blank did not contain any detectable concentrations of GRO and/or VOCs, indicating that the soil samples were not cross contaminated or exposed to contamination during sample handling, storage, or testing. The water trip blank contained bromoform (0.800J µg/L) and dibromochloromethane (0.760 µg/L) at concentrations less than applicable cleanup levels. Bromoform and dibromochloromethane were not detected in the sample, therefore the sample is considered unaffected.

Shannon & Wilson conducted a limited data assessment to review the laboratory's compliance with precision, accuracy, sensitivity, and completeness to the data quality objectives. Shannon & Wilson reviewed the SGS data deliverables and completed the ADEC's LDRCs, which are included in Attachment C-3. No non-conformances that would adversely affect the quality or usability of the data were noted.

C.6 CONCLUSIONS

Based on the analytical results, soil and groundwater contamination, presumed to be associated with the former DFSP-A facility operations, exists within the proposed area of development. Soil analytical results indicate that concentrations of the site COCs (GRO, DRO, RRO, and BTEX) were below the ADEC Method Two Human Health cleanup levels but exceed the ADEC Migration to Groundwater cleanup levels in several samples. Several VOC and PAH compounds were also detected at concentrations exceeding the applicable ADEC Migration to Groundwater cleanup levels.

Groundwater impacted with petroleum hydrocarbons, and several VOC and PAH compounds exceeding the ADEC cleanup levels was documented in the monitoring wells installed and sampled during the project. In addition, the sample collected from Monitoring Well SW-2 contained TAH and TaqH at concentrations exceeding the ADEC water quality standards.

TABLE C-1
SAMPLE LOCATIONS AND DESCRIPTIONS

Sample Number	Date	Sample Location	Depth (feet bgs)	Headspace (ppm) ^
Soil Samples				
Boring SW-1				
* SW1-S1	11/13/2017	Boring SW-1, Sample 1	0-2	210
* SW1-S2	11/13/2017	Boring SW-1, Sample 2	2.5-3.2	230
* SW1-S20	11/13/2017	Duplicate of Sample SW1-S2	2.5-3.2	230
SW1-S3	11/13/2017	Boring SW-1, Sample 3	5-5.7	240
SW1-S4	11/13/2017	Boring SW-1, Sample 4	9.5-10.2	300
Boring SW-2				
* SW2-S1	11/13/2017	Boring SW-2, Sample 1	0-2	79
SW2-S2	11/14/2017	Boring SW-2, Sample 2	2.5-4.5	190
* SW2-S3	11/14/2017	Boring SW-2, Sample 3	5-7	250
SW2-S4	11/14/2017	Boring SW-2, Sample 4	10-12	31
Boring SW-3				
* SW3-S1	11/10/2017	Boring SW-3, Sample 1	0-2	170
* SW3-S2	11/10/2017	Boring SW-3, Sample 2	2.5-4.5	340
* SW3-S20	11/10/2017	Duplicate of Sample SW3-S2	2.5-4.5	340
SW3-S3	11/10/2017	Boring SW-3, Sample 3	5-7	240
SW3-S4	11/10/2017	Boring SW-3, Sample 4	10-12	300
Boring SW-4				
* SW4-S1	11/10/2017	Boring SW-4, Sample 1	0-2	0.5
SW4-S2	11/10/2017	Boring SW-4, Sample 2	2.5-4.5	1.9
* SW4-S3	11/10/2017	Boring SW-4, Sample 3	5-7	6.2
SW4-S4	11/10/2017	Boring SW-4, Sample 4	10-12	1.0
SW4-S5	11/10/2017	Boring SW-4, Sample 5	15-17	0.8

Notes:

* = Sample analyzed by the project laboratory (See Tables C-3 and C-4)

^ = Field screening instrument was a Thermo Environmental Instruments 580B photoionization detector (PID).

\- = Measurement not recorded or not applicable

bgs = below ground surface

ppm = parts per million

TABLE C-1
SAMPLE LOCATIONS AND DESCRIPTIONS

Sample Number	Date	Sample Location	Depth (feet bgs)	Headspace (ppm) ^
Soil Samples Continued				
Boring SW-5				
***** SW5-S1	11/10/2017	Boring SW-5, Sample 1	0-2	1.5
SW5-S2	11/10/2017	Boring SW-5, Sample 2	2.5-4.5	1.7
***** SW5-S3	11/10/2017	Boring SW-5, Sample 3	5-7	2.2
SW5-S4	11/10/2017	Boring SW-5, Sample 4	10-12	1.0
SW5-S5	11/10/2017	Boring SW-5, Sample 5	15-17	0.6
Boring SW-6				
* SW6-S1	11/6/2017	Boring SW-6, Sample 1	0-2	21
SW6-S2	11/6/2017	Boring SW-6, Sample 2	2.5-4.5	3.4
SW6-S3	11/6/2017	Boring SW-6, Sample 3	5-7	2.7
* SW6-S4	11/6/2017	Boring SW-6, Sample 4	7.5-9.5	720
SW6-S5	11/6/2017	Boring SW-6, Sample 5	10-12	460
SW6-S6	11/6/2017	Boring SW-6, Sample 6	15-17	6.5
SW6-S7	11/6/2017	Boring SW-6, Sample 7	20-22	56
SW6-S8	11/6/2017	Boring SW-6, Sample 8	25-27	2.9
SW6-S9	11/6/2017	Boring SW-6, Sample 9	30-32	1.5
SW6-S10	11/6/2017	Boring SW-6, Sample 10	35-37	2.2
Water Samples				
***** SW-2	5/17/2017	Monitoring Well SW-2	1.5	-
***** SW-3	5/17/2017	Monitoring Well SW-3	1.4	-
***** SW-30	5/17/2017	Duplicate of Sample SW-3	1.4	-
Quality Control Samples				
* STB1	5/17/2017	Soil Trip Blank	-	-
* WTB1	5/17/2017	Water Trip Blank	-	-

Notes:

* = Sample analyzed by the project laboratory (See Tables C-3 and C-4)

^ = Field screening instrument was a Thermo Environmental Instruments 580B photoionization detector (PID).

\- = Measurement not recorded or not applicable

bgs = below ground surface

ppm = parts per million

TABLE C-2
MONITORING WELL DEVELOPMENT AND SAMPLING LOG

	Monitoring Well Number	
	SW-2	**SW-3**
Water Level Measurement Data		
Date Water Level Measured	11/17/2017	11/17/2017
Time Water Level Measured	15:32	11:32
Measured Depth to Water (ft below ground surface)^	1.45	1.37
Measured Depth to Water (ft below TOC)^	1.15	0.86
Development Data		
Development Date	11/17/2017	11/17/2017
Total Depth of Well (ft below TOC)	11.90	11.60
Water Column in Well (ft)	10.75	10.74
Gallons per Foot	0.16	0.16
Water Column Volume (gallons)	1.72	1.72
Total Volume Pumped (gallons)	52 (see remarks)	55
Development Method	Surge block/ Submersible pump	Surge block/ Submersible pump
Sampling Data		
Date Sampled	11/20/2017	11/17/2017
Time Sampled	13:07	14:17
Sampling Method	Submersible pump	Submersible pump
Diameter of Well Casing	2-inch	2-inch
Water Quality Data		
Date Measured	11/20/2017	11/17/2017
Temperature (°C)	1.1	0.5
pH (Standard Units)	6.99	7.23
Specific Conductivity (µS/cm)	20	16
Turbidity (NTU)	229	847
Remarks	7 gallons were removed during initial development on 11/17/2017. Development completed on 11/20/2017.	

Notes:

Water quality parameters were measured with Hanna and Hach Instruments

^ = Depth to water measured prior to development

TOC = Top of casing

ft = Feet

°C = Degrees Celsius

µS/cm = Microsiemens per Centimeter

NTU = Nephelometric Turbidity Unit

TABLE C-3
SUMMARY OF SOIL ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level**	Boring ID, Sample Source, ID Number^, and Collection Depth in Feet bgs				
			Boring SW-1			Boring SW-2	
			SW1-S1 0-2	SW1-S2 2.5-3.2	SW1-S20~ 2.5-3.2	SW2-S1 0-2	SW2-S3 5-7
Headspace Reading - ppm	OVM 580B	-	210	230	230	79	250
Gasoline Range Organics (GRO) - mg/kg	AK 101	1,400[(a)]	**47.4**	**91.2 J+**	**61.8 J+**	**140 J+**	**280 J+**
Diesel Range Organics (DRO) - mg/kg	AK 102	10,250[(a)]	**332**	**416**	**411**	**161 J**	**502**
Residual Range Organics (RRO) - mg/kg	AK 103	10,000[(a)]	**4,260**	**586**	**574**	**2,490**	**158**
Volatile Organic Compounds (VOCs)							
Benzene - mg/kg	EPA 8260C	11[(a)]	**3.51**	**2.21**	**2.03**	**0.567**	**0.851**
Toluene - mg/kg	EPA 8260C	200[(a)]	**0.110**	**0.345**	**0.233**	**0.306**	**0.276**
Ethylbenzene - mg/kg	EPA 8260C	49[(a)]	**0.492**	**1.38**	**1.23**	**0.741**	**0.654**
Xylenes (total) - mg/kg	EPA 8260C	57[(a)]	**0.924**	**7.36**	**7.17**	**4.21**	**1.86**
1,2,4-Trimethylbenzene - mg/kg	EPA 8260C	0.16	-	-	-	-	**2.73 J+**
1,3,5-Trimethylbenzene - mg/kg	EPA 8260C	1.3	-	-	-	-	**0.601 J+**
4-Isopropyltoluene - mg/kg	EPA 8260C	-	-	-	-	-	**0.478 J+**
Chloromethane - mg/kg	EPA 8260C	0.61	-	-	-	-	<0.0105
Dichlorodiflouromethane - mg/kg	EPA 8260C	3.9	-	-	-	-	**0.0187 J**
Isopropylbenzene - mg/kg	EPA 8260C	5.6	-	-	-	-	**0.536**
Naphthalene - mg/kg	EPA 8260C	0.038	-	-	-	-	**0.583 J+**
n-Propylbenzene - mg/kg	EPA 8260C	9.1	-	-	-	-	**0.949 J+**
sec-Butylbenzene - mg/kg	EPA 8260C	28	-	-	-	-	**0.409 J+**
tert-Butylbenzene - mg/kg	EPA 8260C	11	-	-	-	-	**0.0227 J+**
Tetrachloroethene - mg/kg	EPA 8260C	0.19	-	-	-	-	<0.00525
Other VOCs - mg/kg	EPA 8260C	varies	-	-	-	-	ND
TCLP Benzene - mg/L	EPA 1311/8260	0.5[(b)]	-	-	-	-	**0.0470**
Polynuclear Aromatic Hydrocarbons (PAHs)							
1-Methylnaphthalene - mg/kg	8270D SIM	0.41	-	-	-	-	**1.86**
2-Methylnaphthalene - mg/kg	8270D SIM	1.3	-	-	-	-	**2.64**
Acenaphthene - mg/kg	8270D SIM	37	-	-	-	-	**0.134**
Acenaphthylene - mg/kg	8270D SIM	18					<0.0141
Anthracene - mg/kg	8270D SIM	390	-	-	-	-	**0.0842**
Benzo(a)Anthracene - mg/kg	8270D SIM	0.28	-	-	-	-	**0.261**
Benzo[a]pyrene - mg/kg	8270D SIM	0.2	-	-	-	-	**0.185**
Benzo[b]Fluoranthene	8270D SIM	2	-	-	-	-	**0.308**
Benzo[g,h,i]perylene - mg/kg	8270D SIM	2,300	-	-	-	-	**0.0693**
Benzo[k]fluoranthene	8270D SIM	27	-	-	-	-	**0.0900**
Chrysene - mg/kg	8270D SIM	82	-	-	-	-	**0.212**
Dibenzo[a,h]anthracene	8270D SIM	0.2	-	-	-	-	**0.0233 J**
Fluoranthene - mg/kg	8270D SIM	590	-	-	-	-	**0.703**
Fluorene - mg/kg	8270D SIM	36	-	-	-	-	**0.105**
Indeno[1,2,3-c,d] pyrene	8270D SIM	2	-	-	-	-	**0.0736**
Naphthalene - mg/kg	8270D SIM	0.038	-	-	-	-	**1.09**
Phenanthrene - mg/kg	8270D SIM	39	-	-	-	-	**0.357**
Pyrene - mg/kg	8270D SIM	87	-	-	-	-	**0.689**
Total Lead - mg/kg	EPA 6020A	400	-	-	-	-	**15.1**

Notes:

*	= See Attachement C-3 for compounds tested, methods, and laboratory reporting limits
**	= Soil cleanup level is the most stringent ADEC Method Two standard listed in Table B1 or B2 18 Alaska Administrative Code (AAC) 75, for the "under 40 inches (precipitation) zone" (October 2017).
(a)	= Soil cleanup level based on the most stringent Human Health cleanup level in Table B1 or B2, 18 AAC 75.
(b)	= TCLP benzene regulatory level is presented in 40 CFR 261.24
^	= sample ID No. preceded by "20034-" on the chain of custody form.
1.86	= reported concentration exceeds the ADEC cleanup level
47.4	= analyte detected
<0.0105	= analyte not detected; laboratory limit of detection of 0.0105 mg/kg
mg/L	= milligrams per liter
ppm	= parts per million
mg/kg	= milligrams per kilogram
bgs	= below ground surface
-	= not applicable or sample not tested for this analyte
ND	= not detected
J	= quantitation is an estimate less than the limit of quantitation (LOQ). See the SGS laboratory report for details.
J+	= Analytical result is potentially biased high due to surrogate failure. See ADEC Laboratory Data Review Checklist (LDRC) in Attachment C-3 for details.

TABLE C-3
SUMMARY OF SOIL ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level**	Boring ID, Sample Source, ID Number^, and Collection Depth in Feet bgs				
			Boring SW-3			Boring SW-4	
			SW3-S1 0-2	SW3-S2 2.5-4.5	SW3-S20~ 2.5-4.5	SW4-S1 0-2	SW4-S3 5-7
Headspace Reading - ppm	OVM 580B	-	170	340	340	0.5	6.2
Gasoline Range Organics (GRO) - mg/kg	AK 101	1,400[(a)]	<1.13	**250 J+**	**335 J+**	<1.21	<1.12
Diesel Range Organics (DRO) - mg/kg	AK 102	10,250[(a)]	**59.0 J**	**1,690**	**2,320**	**41.4 J**	**330**
Residual Range Organics (RRO) - mg/kg	AK 103	10,000[(a)]	**486**	**797**	**1,090**	**178**	**487**
Volatile Organic Compounds (VOCs)							
Benzene - mg/kg	EPA 8260C	11[(a)]	**0.0945**	**0.776 E**	**3.4 E**	**0.00849 J**	**0.0580**
Toluene - mg/kg	EPA 8260C	200[(a)]	<0.0113	**11.3 E**	**23.4 E**	<0.0121	**0.0103 J**
Ethylbenzene - mg/kg	EPA 8260C	49[(a)]	<0.0113	**3.35**	**5.51**	<0.0121	<0.0112
Xylenes (total) - mg/kg	EPA 8260C	57[(a)]	<0.0339	**30**	**44.1**	<0.0364	**0.0289 J**
1,2,4-Trimethylbenzene - mg/kg	EPA 8260C	0.16	-	**6.84 J+**	-	-	-
1,3,5-Trimethylbenzene - mg/kg	EPA 8260C	1.3	-	**2.08 J+**	-	-	-
4-Isopropyltoluene - mg/kg	EPA 8260C	-	-	**0.271 J+**	-	-	-
Chloromethane - mg/kg	EPA 8260C	0.61	-	**0.0448**	-	-	-
Dichlorodiflouromethane - mg/kg	EPA 8260C	3.9	-	**0.0162 J**	-	-	-
Isopropylbenzene - mg/kg	EPA 8260C	5.6	-	**0.432**	-	-	-
Naphthalene - mg/kg	EPA 8260C	0.038	-	**1.9 J+**	-	-	-
n-Propylbenzene - mg/kg	EPA 8260C	9.1	-	**0.706 J+**	-	-	-
sec-Butylbenzene - mg/kg	EPA 8260C	28	-	**0.210 J+**	-	-	-
tert-Butylbenzene - mg/kg	EPA 8260C	11	-	**0.0182 J+**	-	-	-
Tetrachloroethene - mg/kg	EPA 8260C	0.19	-	**0.11**	-	-	-
Other VOCs - mg/kg	EPA 8260C	varies	-	ND	-	-	-
TCLP Benzene - mg/L	EPA 1311/8260	0.5[(b)]	-	**0.0355**	-	-	-
Polynuclear Aromatic Hydrocarbons (PAHs)							
1-Methylnaphthalene - mg/kg	8270D SIM	0.41	-	**2.25 J-**	-	-	-
2-Methylnaphthalene - mg/kg	8270D SIM	1.3	-	**3 J-**	-	-	-
Acenaphthene - mg/kg	8270D SIM	37	-	**0.301 J-**	-	-	-
Acenaphthylene - mg/kg	8270D SIM	18		<0.142 J-			
Anthracene - mg/kg	8270D SIM	390	-	**0.128 J-**	-	-	-
Benzo(a)Anthracene - mg/kg	8270D SIM	0.28	-	**0.203 J-**	-	-	-
Benzo[a]pyrene - mg/kg	8270D SIM	0.2	-	**0.108 J-**	-	-	-
Benzo[b]Fluoranthene	8270D SIM	2	-	**0.193 J-**	-	-	-
Benzo[g,h,i]perylene - mg/kg	8270D SIM	2,300	-	<0.142 J-	-	-	-
Benzo[k]fluoranthene	8270D SIM	27	-	<0.142 J-	-	-	-
Chrysene - mg/kg	8270D SIM	82	-	**0.232 J-**	-	-	-
Dibenzo[a,h]anthracene	8270D SIM	0.2	-	<0.142 J-	-	-	-
Fluoranthene - mg/kg	8270D SIM	590	-	**0.829 J-**	-	-	-
Fluorene - mg/kg	8270D SIM	36	-	**0.293 J-**	-	-	-
Indeno[1,2,3-c,d] pyrene	8270D SIM	2	-	<0.142 J-	-	-	-
Naphthalene - mg/kg	8270D SIM	0.038	-	**1.42 J-**	-	-	-
Phenanthrene - mg/kg	8270D SIM	39	-	**0.690 J-**	-	-	-
Pyrene - mg/kg	8270D SIM	87	-	**0.642 J-**	-	-	-
Total Lead - mg/kg	EPA 6020A	400	-	**17.1**	-	-	-

Notes:

* = See Attachement C-3 for compounds tested, methods, and laboratory reporting limits

** = Soil cleanup level is the most stringent ADEC Method Two standard listed in Table B1 or B2 18 Alaska Administrative Code (AAC) 75, for the "under 40 inches (precipitation) zone" (October 2017).

(a) = Soil cleanup level based on the most stringent Human Health cleanup level in Table B1 or B2, 18 AAC 75.

(b) = TCLP benzene regulatory level is presented in 40 CFR 261.24

^ = sample ID No. preceded by "20034-" on the chain of custody form.

6.84 = reported concentration exceeds the ADEC cleanup level

486 = analyte detected

<1.13 = analyte not detected; laboratory limit of detection of 1.13 mg/kg

E = Result is an estimate due to a primary/field duplicate sample pair relative percent difference (RPD) failure. See ADEC LDRC in Appendix D for details.

mg/L = milligrams per liter

ppm = parts per million

mg/kg = milligrams per kilogram

bgs = below ground surface

\- = not applicable or sample not tested for this analyte

ND = not detected

J = quantitation is an estimate less than the limit of quantitation (LOQ). See the SGS laboratory report for details.

J+ = Analytical result is potentially biased high due to surrogate failure. See ADEC Laboratory Data Review Checklist (LDRC) in Attachment C-3 for details.

J- = Analytical result is potentially biased low due to surrogate failure. See ADEC Laboratory Data Review Checklist (LDRC) in Attachment C-3 for details.

TABLE C-3
SUMMARY OF SOIL ANALYTICAL RESULTS

Parameter Tested	Method*	Cleanup Level**	Boring ID, Sample Source, ID Number^, and Collection Depth in Feet bgs				
			Boring SW-5		Boring SW-6		Trip Blank
			SW5-S1 0-2	SW5-S3 5-7	SW6-S1 0-2	SW6-S4 7.5-9.5	STB -
Headspace Reading - ppm	OVM 580B	-	1.5	2.2	21	720	-
Gasoline Range Organics (GRO) - mg/kg	AK 101	1,400[(a)]	<0.960	**2.66**	<0.945	**34.9 J+**	<1.25
Diesel Range Organics (DRO) - mg/kg	AK 102	10,250[(a)]	**85.8 J**	**345**	**29.9**	**353**	-
Residual Range Organics (RRO) - mg/kg	AK 103	10,000[(a)]	**1,380**	**29.2**	**85.8**	<12.7	-
Volatile Organic Compounds (VOCs)							
Benzene - mg/kg	EPA 8260C	11[(a)]	<0.00480	**0.00451 J**	<0.00472	<0.0115	<0.00630
Toluene - mg/kg	EPA 8260C	200[(a)]	<0.00960	<0.0133	<0.00945	**0.0542**	<0.0126
Ethylbenzene - mg/kg	EPA 8260C	49[(a)]	<0.00960	<0.0133	**0.0251**	**0.0391 J**	<0.0126
Xylenes (total) - mg/kg	EPA 8260C	57[(a)]	<0.0288	**0.0212 J**	**0.0351**	**1.14**	<0.0376
1,2,4-Trimethylbenzene - mg/kg	EPA 8260C	0.16	-	-	-	-	<0.0251
1,3,5-Trimethylbenzene - mg/kg	EPA 8260C	1.3	-	-	-	-	<0.0126
4-Isopropyltoluene - mg/kg	EPA 8260C	-	-	-	-	-	<0.0126
Chloromethane - mg/kg	EPA 8260C	0.61	-	-	-	-	<0.0126
Dichlorodiflouromethane - mg/kg	EPA 8260C	3.9	-	-	-	-	<0.0251
Isopropylbenzene - mg/kg	EPA 8260C	5.6	-	-	-	-	<0.0126
Naphthalene - mg/kg	EPA 8260C	0.038	-	-	-	-	<0.0126
n-Propylbenzene - mg/kg	EPA 8260C	9.1	-	-	-	-	<0.0126
sec-Butylbenzene - mg/kg	EPA 8260C	28	-	-	-	-	<0.0126
tert-Butylbenzene - mg/kg	EPA 8260C	11	-	-	-	-	<0.0126
Tetrachloroethene - mg/kg	EPA 8260C	0.19	-	-	-	-	<0.00630
Other VOCs - mg/kg	EPA 8260C	varies	-	-	-	-	ND
TCLP Benzene - mg/L	EPA 1311/8260	0.5[(b)]	-	-	-	-	-
Polynuclear Aromatic Hydrocarbons (PAHs)							
1-Methylnaphthalene - mg/kg	8270D SIM	0.41	-	-	-	-	-
2-Methylnaphthalene - mg/kg	8270D SIM	1.3	-	-	-	-	-
Acenaphthene - mg/kg	8270D SIM	37	-	-	-	-	-
Acenaphthylene - mg/kg	8270D SIM	18					
Anthracene - mg/kg	8270D SIM	390	-	-	-	-	-
Benzo(a)Anthracene - mg/kg	8270D SIM	0.28	-	-	-	-	-
Benzo[a]pyrene - mg/kg	8270D SIM	0.2	-	-	-	-	-
Benzo[b]Fluoranthene	8270D SIM	2	-	-	-	-	-
Benzo[g,h,i]perylene - mg/kg	8270D SIM	2,300	-	-	-	-	-
Benzo[k]fluoranthene	8270D SIM	27	-	-	-	-	-
Chrysene - mg/kg	8270D SIM	82	-	-	-	-	-
Dibenzo[a,h]anthracene	8270D SIM	0.2	-	-	-	-	-
Fluoranthene - mg/kg	8270D SIM	590	-	-	-	-	-
Fluorene - mg/kg	8270D SIM	36	-	-	-	-	-
Indeno[1,2,3-c,d] pyrene	8270D SIM	2	-	-	-	-	-
Naphthalene - mg/kg	8270D SIM	0.038	-	-	-	-	-
Phenanthrene - mg/kg	8270D SIM	39	-	-	-	-	-
Pyrene - mg/kg	8270D SIM	87	-	-	-	-	-
Total Lead - mg/kg	EPA 6020A	400	-	-	-	-	-

Notes:

*	= See Attachement C-3 for compounds tested, methods, and laboratory reporting limits
**	= Soil cleanup level is the most stringent ADEC Method Two standard listed in Table B1 or B2 18 Alaska Administrative Code (AAC) 75, for the "under 40 inches (precipitation) zone" (October 2017).
(a)	= Soil cleanup level based on the most stringent Human Health cleanup level in Table B1 or B2, 18 AAC 75.
(b)	= TCLP benzene regulatory level is presented in 40 CFR 261.24
^	= sample ID No. preceded by "20034-" on the chain of custody form.
1,380.0	= analyte detected
<0.960	= analyte not detected; laboratory limit of detection of 0.960 mg/kg
mg/L	= milligrams per liter
ppm	= parts per million
mg/kg	= milligrams per kilogram
bgs	= below ground surface
-	= not applicable or sample not tested for this analyte
ND	= not detected
J	= quantitation is an estimate less than the limit of quantitation (LOQ). See the SGS laboratory report for details.
J+	= Analytical result is potentially biased high due to surrogate failure. See ADEC Laboratory Data Review Checklist (LDRC) in Attachment C-3 for details.

TABLE C-4 - SUMMARY OF GROUNDWATER ANALYTICAL RESULTS

Parameter Tested	Method*	Groundwater Cleanup Level**	Sample ID Number^ and Water Depth in Feet bgs			
			Monitoring Wells			Trip Blank
			SW-2 1.5	SW-3 1.4	SW-30~ 1.4	WTB -
Gasoline Range Organics (GRO) -µg/L	AK 101	2,200	**1,870**	**22,300 E**	**10,400 E**	<50.0
Diesel Range Organics (DRO) - µg/L	AK 102	1,500	**2,660**	**4,030**	**3,570**	-
Residual Range Organics (RRO) - µg/L	AK 103	1,100	**789**	**541**	**590**	-
Volatile Organic Compounds (VOCs)						
Benzene - µg/L	EPA 8260C	4.6	**550**	**2,700**	**2,370**	<0.200
Toluene - µg/L	EPA 8260C	1,100	**59.8**	**4,240**	**4,300**	<0.500
Ethylbenzene - µg/L	EPA 8260C	15	**157**	**695 E**	**329 E**	<0.500
Xylenes (total) - µg/L	EPA 8260C	190	**409**	**4,880 E**	**2,567 E**	<1.50
1,2,4-Trimethylbenzene - µg/L	EPA 8260C	15	**180**	-	-	<0.500
1,2-Dichloroethane - µg/L	EPA 8260C	1.7	**1.97**	-	-	<0.250
1,3,5-Trimethylbenzene - µg/L	EPA 8260C	120	**50.2**	-	-	<0.500
4-Isopropyltoluene - µg/L	EPA 8260C	-	**8.79**	-	-	<0.500
Isopropylbenzene (Cumene) - µg/L	EPA 8260C	450	**44.3**	-	-	<0.500
Bromoform - µg/L	EPA 8260C	33	<0.500	-	-	**0.800 J**
Chloroethane - µg/L	EPA 8260C	-	**2.91**	-	-	<0.500
Dibromochloromethane - mg/L	EPA 8260C	8.7	<0.250	-	-	**0.760**
Dichlorodifluoromethane - mg/L	EPA 8260C	200	**22.3**	-	-	<0.500
Naphthalene - µg/L	EPA 8260C	1.7	**44.7**	-	-	<0.500
n-Propylbenzene - µg/L	EPA 8260C	660	**43.9**	-	-	<0.500
sec-Butylbenzene - µg/L	EPA 8260C	2,000	**7.37**	-	-	<0.500
tert-Butylbenzene - µg/L	EPA 8260C	690	**0.690 J**	-	-	<0.500
Trichlorofluoromethane - mg/L	EPA 8260C	5,200	**3.28**	-	-	<0.500
Other VOCs - µg/L	EPA 8260C	varies	ND	-	-	ND
Polynuclear Aromatic Hydrocarbons (PAHs)						
1-Methylnaphthalene - µg/L	EPA 8270D	11	**12.7**	-	-	-
2-Methylnaphthalene - µg/L	EPA 8270D	36	**15.7**	-	-	-
Acenaphthene - µg/L	EPA 8270D	530	**1.10**	-	-	-
Acenaphthylene - µg/L	EPA 8270D	260	<0.0257	-	-	-
Anthracene - µg/L	EPA 8270D	43	**0.129**	-	-	-
Benzo(a)Anthracene - µg/L	EPA 8270D	0.12	**0.0438 J**	-	-	-
Benzo[a]pyrene - µg/L	EPA 8270D	0.034	**0.0183 J**	-	-	-
Benzo[b]Fluoranthene - µg/L	EPA 8270D	0.34	**0.0295 J**	-	-	-
Benzo[g,h,i]perylene - µg/L	EPA 8270D	0.26	<0.0257	-	-	-
Benzo[k]fluoranthene - µg/L	EPA 8270D	0.8	<0.0257	-	-	-
Chrysene - µg/L	EPA 8270D	2.0	**0.0397 J**	-	-	-
Dibenzo[a,h]anthracene - µg/L	EPA 8270D	0.034	<0.0103	-	-	-
Fluoranthene - µg/L	EPA 8270D	260	**0.346**	-	-	-
Fluorene - µg/L	EPA 8270D	290	**0.617**	-	-	-
Indeno[1,2,3-c,d] pyrene - µg/L	EPA 8270D	0.19	<0.0257	-	-	-
Naphthalene - µg/L	EPA 8270D	1.7	**26.1**	-	-	-
Phenanthrene - µg/L	EPA 8270D	170	**0.824**	-	-	-
Pyrene - µg/L	EPA 8270D	120	**0.286**	-	-	-
Total Aromatic Hydrocarbons (TAH)^^ - µg/L	calculated	10	**1,180**	-	-	<2.95
Total Aqueous Hydrocarbons (TAqH)^^^ - µg/L	calculated	15	**1,238**	-	-	-

Notes:

*	= See Attachment C-3 for compounds tested, methods, and laboratory reporting limits
**	= Groundwater cleanup levels are listed in Table C, 18 AAC 75.345 (October 2017)
^	= sample ID No. preceded by "20034" on the chain of custody form
^^	= TAH concentration is the sum of benzene, toluene, ethylbenze, and xylene concentrations.
	concentrations.
^^^	= TAqH concentration is the sum of TAH and PAH compounds.
µg/L	= micrograms per liter
1,870	= analyte detected
550	= reported concentration exceeds the ADEC Table C cleanup level
<0.500	= analyte not detected; laboratory limit of detection 0.500 µg/L
bgs	= below ground surface
-	= not applicable
~	= duplicate of preceding sample
J	= quantitation is an estimate less than the limit of quantitation (LOQ). See the SGS laboratory report for details.
J+	= Analytical result is potentially biased high due to surrogate failure. See ADEC LDRC in Attachment C-3 for details.
J-	= Analytical result is potentially biased low due to surrogate failure. See ADEC LDRC in Attachment C-3 for details.
ND	= analyte not detected
E	= Result is an estimate due to a primary/field duplicate sample pair relative percent difference (RPD)
	failure. See ADEC LDRC in Attachment C-3 for details.