

# Appendix B

## Geotechnical Investigations

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### Attachments

Attachment B-1	Geotechnical Sample Location Details and Laboratory Test Results
Attachment B-2	Boring and Vane Shear Testing Logs
Attachment B-3	Cone Penetrometer Testing Reports
Attachment B-4	Geotechnical Laboratory Reports

## 1 Introduction

The results of the Lower Duwamish Waterway (LDW) middle reach Phase II geotechnical investigation are included as attachments to this appendix. Phase I of the Pre-Design Investigation (PDI) was completed between December 2022 and May 2023, and the geotechnical data collected during this phase are shown on Map 2-5. Phase II was completed between June and October 2024. The various components of this appendix are as follows:

- *Attachment B-1: Geotechnical Sample Location Details and Laboratory Test Results*
  - This attachment includes two sets of tables. Table B-1a includes geotechnical sample location details for borings, cone penetrometer tests, full-flow penetrometers, and vane shear test (VST) locations. Table B-1b summarizes the results of the geotechnical index property test results (i.e., sieve analysis, moisture content, hydrometer analysis, specific gravity, and organic content) and which geotechnical boring sample intervals were designated for more advanced consolidation and strength testing.
- *Attachment B-2: Boring and Vane Shear Testing Logs*
  - This attachment includes the digitized versions of the field logs for borings and VST locations. VST logs are in Section B-2a and boring logs are in Section B-2b.
- *Attachment B-3: Cone Penetrometer Testing Reports*
  - This attachment includes the results of the cone penetrometer tests performed, provided in a summary report by ConeTec.
- *Attachment B-4: Geotechnical Laboratory Reports*
  - This attachment is separated into two sections. Section B-4a contains laboratory consolidation and strength testing results performed by Cooper Testing Laboratory. These results include those for Consolidation (American Society for Testing and Materials [ASTM] D2435), Unconsolidated Undrained Triaxial (ASTM D2850), Consolidated Undrained Triaxial Compression (ASTM D4767), and Consolidated Drained Direct Shear (ASTM D3080) testing. Section B-4b contains index property testing results for tests performed by Materials Testing and Consulting, Inc.

## 2 References

Anchor QEA, Windward. 2024. Pre-Design Investigation Quality Assurance Project Plan Addendum No. 1 for the Lower Duwamish Waterway Middle Reach - Phase II Sampling. Final. Anchor QEA and Windward Environmental LLC, Seattle, WA.

# Attachment B-1

## Geotechnical Sample Location Details and Laboratory Test Results

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**Table B-1a-1**  
**Geotechnical Sample Location Details: Borings**

Station ID	Collection Date	Location	Actual Coordinates NAD83 (ft)		Mudline/Ground Surface Elevation (ft MLLW)	Depth of Investigation (ft)
			Easting (X)	Northing (Y)		
LDW23-GT02-GT*	6/17/2024	Adjacent to FNC	1269199.02	201742.90	-18.1	26.5
LDW23-GT04-GT	8/2/2024	Upland	1269401.67	202046.12	16.6**	0.5
LDW23-GT04b-GT*	10/29/2024	Upland	1269411.66	202021.91	16.6**	35
LDW23-GT08-GT	8/2/2024	Upland	1269524.12	201889.93	14.8**	8
LDW23-GT08b-GT*	10/30/2024	Upland	1269533.43	201895.68	14.8**	41.5
LDW23-GT09-GT*	6/18/2024	Adjacent to FNC	1269846.44	201144.98	-18.4	16.5
LDW23-GT10-GT*	6/18/2024	Adjacent to FNC	1269969.30	201327.13	-19.7	16.5
LDW23-GT11-GT	8/1/2024	Upland	1269907.48	200727.14	15.2**	41.5
LDW23-GT13-GT*	8/1/2024	Upland	1270094.75	200524.15	19.9**	41.5
LDW23-GT32-GT*	7/30/2024	Upland	1270112.12	200429.41	19.4**	41.5
LDW23-GT33-GT*	7/29/2024	Upland	1269966.43	200383.30	19.0**	6
LDW23-GT33b-GT*	7/30/2024	Upland	1269974.41	200384.88	19.2**	41.5
LDW23-GT34-GT*	7/29/2024	Upland	1269815.30	200414.57	20.0**	41.5
LDW23-GT35-GT	8/5/2024	Upland	1270118.91	200289.17	14.7**	8
LDW23-GT35b-GT*	10/28/2024	Upland	1270098.35	200284.28	15.0**	35
LDW23-GT17-GT*	6/22/2024	Adjacent to FNC	1271528.53	199385.24	-17.1	26.5
LDW23-GT18-GT*	6/19/2024	Subtidal/ Intertidal	1271222.23	200303.38	-5.1	31.5
LDW23-GT19-GT*	6/19/2024	Subtidal/ Intertidal	1271609.77	199617.57	-9.5	31.5
LDW23-GT21-GT	8/5/2024	Upland	1271776.13	199546.89	16.9**	41.5
LDW23-GT22-GT*	6/22/2024	Subtidal/ Intertidal	1271763.93	199427.25	-7.3	26.5
LDW23-GT26-GT*	6/24/2024	Adjacent to FNC	1271955.17	199159.81	-11.2	21.5
LDW23-GT30-GT*	6/20/2024	Subtidal/ Intertidal	1272451.43	198841.00	-1.0	26.5

Notes:

- \* Coordinates approximated using field notes indicating distance/direction from target position.
- \*\* Elevation based on 2024 bathymetry survey and King County 2021 Light Detection and Ranging.
- Station ID with "b" indicate stations that were reattempted after initial refusal before reaching target depth
- ft: foot
- FNC: Federal Navigation Channel
- MLLW: mean lower low water
- NAD83: North American Datum of 1983

**Table B-1a-1**  
**Geotechnical Sample Location Details: Borings**

Station ID	Collection Date	Channel Location	Actual Coordinates NAD83 (ft)		Mudline Elevation (ft MLLW)	Depth of Investigation (ft)
			Easting (X)	Northing (Y)		
LDW23-GT01-GT	7/12/2024	Adjacent to FNC	1268978.47	202035.48	-20.2	42.32
LDW23-GT03-GT	7/12/2024	Adjacent to FNC	1269532.21	201422.69	-19.2	43.39
LDW23-GT05-GT	7/13/2024	Adjacent to FNC	1269365.71	201878.34	-14.5	43.39
LDW23-GT07-GT	7/13/2024	Adjacent to FNC	1269426.23	201815.13	-12.1	41.26
LDW23-GT12-GT	7/8/2024	Subtidal/intertidal	1270065.37	200766.54	-13.8	41.83
LDW23-GT14-GT	7/8/2024	Subtidal/intertidal	1270281.68	200583.55	-12.2	42.16
LDW23-GT15-GT	7/13/2024	Subtidal/intertidal	1270636.06	200259.25	-17.2	42.32
LDW23-GT16-GT	7/11/2024	Subtidal/intertidal	1270786.39	199986.35	-6.2	40.76
LDW23-GT20-GT	7/11/2024	Subtidal/intertidal	1271698.50	199501.64	-10.9	41.67
LDW23-GT23-GT	7/10/2024	Adjacent to FNC	1271719.58	199059.79	-12.9	16.4
LDW23-GT23B-GT	7/10/2024	Adjacent to FNC	1271725.29	199099.81	-12.9	41.67
LDW23-GT24-GT	7/9/2024	Subtidal/intertidal	1272114.58	198661.76	-10.4	41.42
LDW23-GT25-GT	7/9/2024	Subtidal/intertidal	1272335.80	198475.05	-8.2	41.42
LDW23-GT27-GT	7/10/2024	Adjacent to FNC	1272212.88	198889.70	-12.9	41.42
LDW23-GT28-GT	7/14/2024	Adjacent to FNC	1272377.72	198725.98	-13.3	34.37
LDW23-GT29-GT	7/12/2024	Subtidal/intertidal	1272420.48	198765.28	-6.7	40.52

Notes:

Station ID with "b" indicate stations that were reattempted after initial refusal before reaching target depth

ft: foot

FNC: Federal Navigation Channel

MLLW: mean lower low water

NAD83: North American Datum of 1983

**Table B-1a-1**  
**Geotechnical Sample Location Details: Borings**

Station ID	Collection Date	Channel Location	Actual Coordinates NAD83 (ft)		Mudline Elevation (ft MLLW)	Depth of Investigation (ft)
			Easting (X)	Northing (Y)		
LDW23-GT05-GT	7/13/2024	Adjacent to FNC	1269365.71	201878.34	-14.5	20.01
LDW23-GT07-GT	7/13/2024	Adjacent to FNC	1269426.23	201815.13	-12.1	4.35
LDW23-GT12-GT	7/8/2024	Subtidal/intertidal	1270065.37	200766.54	-13.8	4.76
LDW23-GT14-GT	7/8/2024	Subtidal/intertidal	1270281.68	200583.55	-12.2	4.59
LDW23-GT28-GT	7/14/2024	Adjacent to FNC	1272377.72	198725.98	-13.3	6.4
LDW23-GT29-GT	7/12/2024	Subtidal/intertidal	1272420.48	198765.28	-6.7	0.98

Notes:

ft: foot

FNC: Federal Navigation Channel

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**Table B-1a-1**  
**Geotechnical Sample Location Details: Borings**

Station ID	Collection Date	Channel Location	Actual Coordinates NAD83 (ft)		Mudline Elevation (ft MLLW)	Depth of Investigation (ft)
			Easting (X)	Northing (Y)		
LDW23-GT06-GT-1a	8/30/2024	Subtidal/intertidal	1269396.93	201945.02	-4.6	7.4
LDW23-GT06-GT-1b	8/30/2024	Subtidal/intertidal	1269434.63	201907.80	-4.6	7
LDW23-GT06-GT-1c	8/30/2024	Subtidal/intertidal	1269484.32	201852.10	-3.8	6.8

Notes:

ft: foot

MLLW: mean lower low water

NAD83: North American Datum of 1983

**Appendix B-1b**  
**Assigned Laboratory Tests**

Sample ID	Sample Interval	Date	Matrix	Moisture Content, % (ASTM D2216)	Specific Gravity (ASTM D854)	Organic Content, % (ASTM D2974)	Atterberg Limits (ASTM D4318)			Grain Size, Sieve Only (ASTM D6913)		
							LL	PL	PI	%Gravel	%Sand	%Fines
LDW23-GT32-GT-0.5-2-20240730	0.5-2	7/30/2024	SE	13.0								
LDW23-GT32-GT-5-6.4-20240730	5-6.4	7/30/2024	SE	19.3								
LDW23-GT32-GT-6.4-6.5-20240730	6.4-6.5	7/30/2024	SE	32.6			53.6	40.5	13.0			
LDW23-GT32-GT-10-11.5-20240730	10-11.5	7/30/2024	SE	24.1								
LDW23-GT32-GT-15-16.5-20240730	15-16.5	7/30/2024	SE	34.1		1.39				0.4	78.4	21.1
LDW23-GT32-GT-25-25.7-20240730	25-25.7	7/30/2024	SE	8.8								
LDW23-GT32-GT-25.7-26.5-20240730	25.7-26.5	7/30/2024	SE	64.4			NP	NP	NP			
LDW23-GT32-GT-26.5-29-20240730	26.5-29	7/30/2024	SE									
LDW23-GT32-GT-35-36.5-20240730	35-36.5	7/30/2024	SE	26.8								
LDW23-GT32-GT-40-41.5-20240730	40-41.5	7/30/2024	SE	25.1						0	94.2	5.8
LDW23-GT33-GT-0.5-2-20240730	0.5-2	7/30/2024	SE	32.0								
LDW23-GT33B-GT-0.5-2-20240730	0.5-2	7/30/2024	SE	16.1								
LDW23-GT33B-GT-5-6.5-20240730	5-6.5	7/30/2024	SE	34.4						0.1	38.4	61.5
LDW23-GT33B-GT-10-11-20240730	10-11	7/30/2024	SE	14.1						30.4	66.9	2.6
LDW23-GT33B-GT-11-11.5-20240730	11-11.5	7/30/2024	SE	24.7								
LDW23-GT33B-GT-15-16.5-20240730	15-16.5	7/30/2024	SE	32.1								
LDW23-GT33B-GT-20-21.5-20240730	20-21.5	7/30/2024	SE	58.9			40	31	9			
LDW23-GT33B-GT-21.5-24-20240730	21.5-24	7/30/2024	SE									
LDW23-GT33B-GT-21.5-24-20240730	21.5-24	7/30/2024	SE									
LDW23-GT33B-GT-25-26.5-20240730	25-26.5	7/30/2024	SE	28.8								
LDW23-GT33B-GT-30-31.5-20240730	30-31.5	7/30/2024	SE	26.0	2.649							
LDW23-GT33B-GT-35-36.5-20240730	35-36.5	7/30/2024	SE	24.7								
LDW23-GT33B-GT-40-41.5-20240730	40-41.5	7/30/2024	SE	23.0								
LDW23-GT34-GT-5-6.5-20240729	5-6.5	7/29/2024	SE	17.0								
LDW23-GT34-GT-10-11.5-20240729	10-11.5	7/29/2024	SE	25.7								
LDW23-GT34-GT-10.5-14-20240729	10.5-14	7/29/2024	SE									
LDW23-GT34-GT-15.3-16.1-20240729	15.3-16.1	7/29/2024	SE	40.2								
LDW23-GT34-GT-20-21.5-20240729	20-21.5	7/29/2024	SE	55.9								
LDW23-GT34-GT-25-26.5-20240729	25-26.5	7/29/2024	SE	62.0	2.571		48.2	34.6	13.6			
LDW23-GT34-GT-26.5-29-20240729	26.5-29	7/29/2024	SE									
LDW23-GT34-GT-30-31.5-20240729	30-31.5	7/29/2024	SE	29.2								
LDW23-GT34-GT-35-36.5-20240729	35-36.5	7/29/2024	SE									
LDW23-GT34-GT-35.5-36.5-20240729	35.5-36.5	7/29/2024	SE	33.1						0.3	70.5	29.2
LDW23-GT34-GT-40-41.5-20240729	40-41.5	7/29/2024	SE	28.7								
LDW23-GT30-GT-0-1.5-20240620	0-1.5	6/20/2024	SE	50.7								

**Appendix B-1b**  
**Assigned Laboratory Tests**

*Appendix B*  
*Geotechnical Investigations*

Sample ID	Sample Interval	Date	Matrix	Moisture Content, % (ASTM D2216)	Specific Gravity (ASTM D854)	Organic Content, % (ASTM D2974)	Atterberg Limits (ASTM D4318)			Grain Size, Sieve Only (ASTM D6913)		
							LL	PL	PI	%Gravel	%Sand	%Fines
LDW23-GT30-GT-5-6.5-20240620	5-6.5	6/20/2024	SE	90.8								
LDW23-GT30-GT-10-11.5-20240620	10-11.5	6/20/2024	SE	68.9	2.588		51	35.3	15.7			
LDW23-GT30-GT-15-15.3-20240620	15-15.3	6/20/2024	SE	58.0								
LDW23-GT30-GT-15.3-15.5-20240620	15.3-15.5	6/20/2024	SE	19.9								
LDW23-GT30-GT-20-21.5-20240620	20-21.5	6/20/2024	SE	19.0						0	67.9	32.1
LDW23-GT30-GT-25-26.5-20240620	25-26.5	6/20/2024	SE	28.3								
LDW23-GT18-GT-0-1.5-20240619	0-1.5	6/19/2024	SE	107.3								
LDW23-GT18-GT-5-6.5-20240619	5-6.5	6/19/2024	SE	102.5								
LDW23-GT18-GT-10-11.5-20240619	10-11.5	6/19/2024	SE	99.4			62.8	42.4	20.4			
LDW23-GT18-GT-15-16.5-20240619	15-16.5	6/19/2024	SE	69.8	2.529		54.9	41	13.9			
LDW23-GT18-GT-25-26.5-20240619	25-26.5	6/19/2024	SE	28.9						0.1	90	9.9
LDW23-GT18-GT-30-31.5-20240619	30-31.5	6/19/2024	SE	31.6								
LDW23-GT02-GT-0-1.5-20240617	0-1.5	6/17/2024	SE			5.46						
LDW23-GT02-GT-5-6-20240617	5-6	6/17/2024	SE	82.6			54.4	37.8	16.6			
LDW23-GT02-GT-6-6.5-20240617	6-6.5	6/17/2024	SE	28.2								
LDW23-GT02-GT-10-10.8-20240617	10-10.8	6/17/2024	SE	26.7								
LDW23-GT02-GT-10.8-11.5-20240617	10.8-11.5	6/17/2024	SE	52.8			45.1	34.2	10.9			
LDW23-GT02-GT-12-14.5-20240617	12-14.5	6/17/2024	SE									
LDW23-GT02-GT-15-15.5-20240617	15-15.5	6/17/2024	SE	52.6								
LDW23-GT02-GT-15.5-16.5-20240617	15.5-16.5	6/17/2024	SE	31.3						0	31.9	68.1
LDW23-GT02-GT-20-21.5-20240617	20-21.5	6/17/2024	SE	31.8	2.727							
LDW23-GT02-GT-25-25.9-20240617	25-25.9	6/17/2024	SE	35.0								
LDW23-GT02-GT-25.9-26.5-20240617	25.9-26.5	6/17/2024	SE	28.5								
LDW23-GT10-GT-0-1.5-20240618	0-1.5	6/18/2024	SE	74.0		4.42						
LDW23-GT10-GT-5-6.5-20240618	5-6.5	6/18/2024	SE	77.0			60.5	39.1	21.4			
LDW23-GT10-GT-7-9-20240618	7-9	6/18/2024	SE									
LDW23-GT10-GT-10-11.5-20240618	10-11.5	6/18/2024	SE	64.7	2.642							
LDW23-GT10-GT-15-15.5-20240618	15-15.5	6/18/2024	SE	72.7								
LDW23-GT10-GT-15.5-16.5-20240618	15.5-16.5	6/18/2024	SE	38.0						0	33.6	66.4
LDW23-GT09-GT-0-1.5-20240618	0-1.5	6/18/2024	SE	84.7		5.6	55.7	41	14.7			
LDW23-GT09-GT-5-6.2-20240618	5-6.2	6/18/2024	SE	72.1	2.699		52.7	38.5	14.2			
LDW23-GT09-GT-6.2-6.5-20240618	6.2-6.5	6/18/2024	SE	69.6								
LDW23-GT09-GT-10-11.5-20240618	10-11.5	6/18/2024	SE	48.9						0	39.8	60.2
LDW23-GT09-GT-15-16.5-20240618	15-16.5	6/18/2024	SE	57.0			49	38.3	10.7			
LDW23-GT19-GT-0-1.5-20240619	0-1.5	6/19/2024	SE	83.3		7.12						

**Appendix B-1b**  
**Assigned Laboratory Tests**

Sample ID	Sample Interval	Date	Matrix	Moisture Content, % (ASTM D2216)	Specific Gravity (ASTM D854)	Organic Content, % (ASTM D2974)	Atterberg Limits (ASTM D4318)			Grain Size, Sieve Only (ASTM D6913)		
							LL	PL	PI	%Gravel	%Sand	%Fines
LDW23-GT19-GT-5-6.5-20240619	5-6.5	6/19/2024	SE	66.9			56	40.8	15.2			
LDW23-GT19-GT-10-11.5-20240619	10-11.5	6/19/2024	SE	27.0						2.7	91.8	5.6
LDW23-GT19-GT-15-16.5-20240619	15-16.5	6/19/2024	SE	28.7								
LDW23-GT19-GT-20-20.8-20240619	20-20.8	6/19/2024	SE	25.0								
LDW23-GT19-GT-20.8-21.5-20240619	20.8-21.5	6/19/2024	SE	33.3								
LDW23-GT19-GT-25-26.5-20240619	25-26.5	6/19/2024	SE		2.797							
LDW23-GT19-GT-30-31.5-20240619	30-31.5	6/19/2024	SE	29.7								
LDW23-GT11-GT-0.5-1.3-20240801	0.5-1.3	8/1/2024	SE	12.2								
LDW23-GT11-GT-1.3-2-20240801	1.3-2	8/1/2024	SE	8.8								
LDW23-GT11-GT-5-6.5-20240801	5-6.5	8/1/2024	SE	39.7						0.1	35.7	64.3
LDW23-GT11-GT-10-10.8-20240801	10-10.8	8/1/2024	SE	42.0			NP	NP	NP			
LDW23-GT11-GT-10.8-11.5-20240801	10.8-11.5	8/1/2024	SE	54.8								
LDW23-GT11-GT-15-16.5-20240801	15-16.5	8/1/2024	SE	43.6	2.649							
LDW23-GT11-GT-20-21.3-20240801	20-21.3	8/1/2024	SE	41.7								
LDW23-GT11-GT-21.3-21.5-20240801	21.3-21.5	8/1/2024	SE	55.8								
LDW23-GT11-GT-25-26.5-20240801	25-26.5	8/1/2024	SE	63.7			55.7	40.1	15.6			
LDW23-GT11-GT-30-31.5-20240801	30-31.5	8/1/2024	SE	56.8								
LDW23-GT11-GT-35-36.5-20240801	35-36.5	8/1/2024	SE	55.9								
LDW23-GT11-GT-40-41.5-20240801	40-41.5	8/1/2024	SE	33.2								
LDW23-GT13-GT-0.5-2-20240801	0.5-2	8/1/2024	SE	25.4								
LDW23-GT13-GT-5-6.5-20240801	5-6.5	8/1/2024	SE	87.4						34.1	34.5	31.4
LDW23-GT13-GT-10-11-20240801	10-11	8/1/2024	SE	9.4						83	10.1	6.9
LDW23-GT13-GT-11-11.5-20240801	11-11.5	8/1/2024	SE	35.2								
LDW23-GT13-GT-15-16.5-20240801	15-16.5	8/1/2024	SE	16.6						24.5	67.5	7.9
LDW23-GT13-GT-20-21.5-20240801	20-21.5	8/1/2024	SE	34.7	2.587							
LDW23-GT13-GT-25-26.5-20240801	25-26.5	8/1/2024	SE	55.0								
LDW23-GT13-GT-26.5-29-20240801	26.5-29	8/1/2024	SE									
LDW23-GT13-GT-30-31.5-20240801	30-31.5	8/1/2024	SE	69.1			61.5	39.5	22.1			
LDW23-GT13-GT-35-36.5-20240801	35-36.5	8/1/2024	SE	64.0								
LDW23-GT13-GT-40-41.5-20240801	40-41.5	8/1/2024	SE	59.4		5.82						
LDW23-GT04-GT-0-1.5-20240802	0-1.5	8/2/2024	SE	10.6								
LDW23-GT21-GT-0.5-2-20240805	0.5-2	8/5/2024	SE	18.7								
LDW23-GT21-GT-5-6.5-20240805	5-6.5	8/5/2024	SE	15.5								
LDW23-GT21-GT-10-11.5-20240805	10-11.5	8/5/2024	SE	14.5						45.6	46.7	7.7
LDW23-GT21-GT-15-16.5-20240805	15-16.5	8/5/2024	SE	16.3	2.821							

**Appendix B-1b**  
**Assigned Laboratory Tests**

Sample ID	Sample Interval	Date	Matrix	Moisture Content, % (ASTM D2216)	Specific Gravity (ASTM D854)	Organic Content, % (ASTM D2974)	Atterberg Limits (ASTM D4318)			Grain Size, Sieve Only (ASTM D6913)		
							LL	PL	PI	%Gravel	%Sand	%Fines
LDW23-GT21-GT-20-21.3-20240805	20-21.3	8/5/2024	SE	6.9								
LDW23-GT21-GT-21.3-21.5-20240805	21.3-21.5	8/5/2024	SE	23.2								
LDW23-GT21-GT-25-26.5-20240805	25-26.5	8/5/2024	SE	27.0								
LDW23-GT21-GT-30-31.5-20240805	30-31.5	8/5/2024	SE	25.6								
LDW23-GT21-GT-35-36.5-20240805	35-36.5	8/5/2024	SE	23.6								
LDW23-GT21-GT-40-41.1-20240805	40-41.1	8/5/2024	SE	30.1								
LDW23-GT21-GT-41.1-41.5-20240805	41.1-41.5	8/5/2024	SE	29.5					0	31.4	68.6	
LDW23-GT35-GT-0.5-1.6-20240805	0.5-1.6	8/5/2024	SE	11.3					53.8	39.3	6.9	
LDW23-GT35-GT-1.6-2-20240805	1.6-2	8/5/2024	SE	18.4								
LDW23-GT35-GT-5-6.5-20240805	5-6.5	8/5/2024	SE	49.3		4.8						
LDW23-GT26-GT-0-1.5-20240624	0-1.5	6/24/2024	SE	27.1					0.3	97.1	2.7	
LDW23-GT26-GT-5-6.5-20240624	5-6.5	6/24/2024	SE	28.0								
LDW23-GT26-GT-10-10.8-20240624	10-10.8	6/24/2024	SE	20.4					8.4	85.9	5.7	
LDW23-GT26-GT-10.8-11.5-20240624	10.8-11.5	6/24/2024	SE	8.6								
LDW23-GT26-GT-15-16.1-20240624	15-16.1	6/24/2024	SE	26.8					0.3	84.3	15.4	
LDW23-GT26-GT-16.1-16.5-20240624	16.1-16.5	6/24/2024	SE	32.0								
LDW23-GT26-GT-20-21.5-20240624	20-21.5	6/24/2024	SE	38.2	2.714							
LDW23-GT22-GT-0-1.5-20240622	0-1.5	6/22/2024	SE	59.8								
LDW23-GT22-GT-5-6.5-20240622	5-6.5	6/22/2024	SE	58.4								
LDW23-GT22-GT-10-11.5-20240622	10-11.5	6/22/2024	SE	27.3					0.1	89.1	10.8	
LDW23-GT22-GT-15-16.5-20240622	15-16.5	6/22/2024	SE	20.9	2.611							
LDW23-GT22-GT-20-21.5-20240622	20-21.5	6/22/2024	SE	32.9								
LDW23-GT22-GT-25-26.5-20240622	25-26.5	6/22/2024	SE	29.2					0	68.5	31.5	
LDW23-GT17-GT-0-1.5-20240622	0-1.5	6/22/2024	SE	73.9								
LDW23-GT17-GT-2.5-5-20240622	2.5-5	6/22/2024	SE									
LDW23-GT17-GT-5-6.5-20240622	5-6.5	6/22/2024	SE	58.3			58.7	38.3	20.3			
LDW23-GT17-GT-10-11.5-20240622	10-11.5	6/22/2024	SE	64.0	2.559							
LDW23-GT17-GT-15-16.5-20240622	15-16.5	6/22/2024	SE	60.1		6.42	48.7	39.2	9.5			
LDW23-GT17-GT-20-21.5-20240622	20-21.5	6/22/2024	SE	31.7						0	55.9	44.1
LDW23-GT17-GT-25-26.5-20240622	25-26.5	6/22/2024	SE	25.0								
LDW23-GT08B-GT-5-6.5-20241030	5-6.5	10/30/2024	SE	56.0						20.7	54.8	24.4
LDW23-GT08B-GT-10-11.5-20241030	10-11.5	10/30/2024	SE	38.0								
LDW23-GT08B-GT-15-16.5-20241030	15-16.5	10/30/2024	SE	174.0								
LDW23-GT08B-GT-20-21.5-20241030	20-21.5	10/30/2024	SE	29.2	2.735	1.42						
LDW23-GT08B-GT-25-26.1-20241030	25-26.1	10/30/2024	SE	26.2								

**Appendix B-1b**  
**Assigned Laboratory Tests**

Sample ID	Sample Interval	Date	Matrix	Moisture Content, % (ASTM D2216)	Specific Gravity (ASTM D854)	Organic Content, % (ASTM D2974)	Atterberg Limits (ASTM D4318)			Grain Size, Sieve Only (ASTM D6913)		
							LL	PL	PI	%Gravel	%Sand	%Fines
LDW23-GT08B-GT-26.1-26.5-20241030	26.1-26.5	10/30/2024	SE	32.3								
LDW23-GT08B-GT-30-31.5-20241030	30-31.5	10/30/2024	SE	24.9								
LDW23-GT08B-GT-35-36.5-20241030	35-36.5	10/30/2024	SE	28.0						0.1	86.2	13.7
LDW23-GT08B-GT-40-41.5-20241030	40-41.5	10/30/2024	SE	27.6								
LDW23-GT04B-GT-5-6.5-20241029	5-6.5	10/29/2024	SE	22.5						6.5	80.5	12.9
LDW23-GT04B-GT-8.7-10-20241029	8.7-10	10/29/2024	SE	28.2		1.96						
LDW23-GT04B-GT-12.7-14.2-20241029	12.7-14.2	10/29/2024	SE	44.5	2.637		51.6	36.9	14.7			
LDW23-GT04B-GT-15-16.5-20241029	15-16.5	10/29/2024	SE	28.0								
LDW23-GT04B-GT-20-21.5-20241029	20-21.5	10/29/2024	SE	24.9								
LDW23-GT04B-GT-30-31.5-20241029	30-31.5	10/29/2024	SE	26.4						0	94.4	5.6
LDW23-GT35B-GT-5-6.5-20241028	5-6.5	10/28/2024	SE	5.4		3.96						
LDW23-GT35B-GT-10-11.2-20241028	10-11.2	10/28/2024	SE	18.9						28	52.5	19.5
LDW23-GT35B-GT-11.2-11.5-20241028	11.2-11.5	10/28/2024	SE	25.2								
LDW23-GT35B-GT-15-16.5-20241028	15-16.5	10/28/2024	SE	35.3								
LDW23-GT35B-GT-20-21.5-20241028	20-21.5	10/28/2024	SE	24.4	2.721							
LDW23-GT35B-GT-25-26.5-20241028	25-26.5	10/28/2024	SE	25.2						0	96.4	3.6

Notes:

ft: foot

LL: liquid limit

NP: sample is nonplastic

PI: plasticity index

PL: plastic limit

X: Engineering test results are provided in laboratory report format in Attachment B-4

**Appendix B-1b**  
**Assigned Laboratory Tests**

Sample ID	Grain Size, Sieve & Hydrometer (ASTM D6913 & D7928)				1D Consolidaton (ASTM D2435)	Unit Weight of Soils (ASTM D7263b)	Direct Shear (ASTM D3080)	UU Triaxial Test (ASTM D2850)	CU Triaxial Test (ASTM D4767)
	%Gravel	%Sand	%Silt	%Clay					
LDW23-GT32-GT-0.5-2-20240730									
LDW23-GT32-GT-5-6.4-20240730									
LDW23-GT32-GT-6.4-6.5-20240730									
LDW23-GT32-GT-10-11.5-20240730	0.1	91.9	6.9	1					
LDW23-GT32-GT-15-16.5-20240730									
LDW23-GT32-GT-25-25.7-20240730									
LDW23-GT32-GT-25.7-26.5-20240730									
LDW23-GT32-GT-26.5-29-20240730									X
LDW23-GT32-GT-35-36.5-20240730	0.2	96	2.6	1.2					
LDW23-GT32-GT-40-41.5-20240730									
LDW23-GT33-GT-0.5-2-20240730									
LDW23-GT33B-GT-0.5-2-20240730									
LDW23-GT33B-GT-5-6.5-20240730									
LDW23-GT33B-GT-10-11-20240730									
LDW23-GT33B-GT-11-11.5-20240730									
LDW23-GT33B-GT-15-16.5-20240730	0.6	77.1	19.1	3.2					
LDW23-GT33B-GT-20-21.5-20240730									
LDW23-GT33B-GT-21.5-24-20240730					X	X		X	
LDW23-GT33B-GT-21.5-24-20240730						X	X		
LDW23-GT33B-GT-25-26.5-20240730									
LDW23-GT33B-GT-30-31.5-20240730									
LDW23-GT33B-GT-35-36.5-20240730									
LDW23-GT33B-GT-40-41.5-20240730									
LDW23-GT34-GT-5-6.5-20240729	27.7	53.6	13.9	4.7					
LDW23-GT34-GT-10-11.5-20240729									
LDW23-GT34-GT-10.5-14-20240729						X	X		
LDW23-GT34-GT-15.3-16.1-20240729	0	49	46.1	4.9					
LDW23-GT34-GT-20-21.5-20240729									
LDW23-GT34-GT-25-26.5-20240729									
LDW23-GT34-GT-26.5-29-20240729						X			X
LDW23-GT34-GT-30-31.5-20240729									
LDW23-GT34-GT-35-36.5-20240729									
LDW23-GT34-GT-35.5-36.5-20240729									
LDW23-GT34-GT-40-41.5-20240729									
LDW23-GT30-GT-0-1.5-20240620									

**Appendix B-1b**  
**Assigned Laboratory Tests**

Sample ID	Grain Size, Sieve & Hydrometer (ASTM D6913 & D7928)				1D Consolidaton (ASTM D2435)	Unit Weight of Soils (ASTM D7263b)	Direct Shear (ASTM D3080)	UU Triaxial Test (ASTM D2850)	CU Triaxial Test (ASTM D4767)
	%Gravel	%Sand	%Silt	%Clay					
LDW23-GT30-GT-5-6.5-20240620	2.8	15.5	59.3	22.4					
LDW23-GT30-GT-10-11.5-20240620									
LDW23-GT30-GT-15-15.3-20240620									
LDW23-GT30-GT-15.3-15.5-20240620									
LDW23-GT30-GT-20-21.5-20240620									
LDW23-GT30-GT-25-26.5-20240620									
LDW23-GT18-GT-0-1.5-20240619									
LDW23-GT18-GT-5-6.5-20240619	0.3	6.4	72.7	20.6					
LDW23-GT18-GT-10-11.5-20240619									
LDW23-GT18-GT-15-16.5-20240619									
LDW23-GT18-GT-25-26.5-20240619									
LDW23-GT18-GT-30-31.5-20240619									
LDW23-GT02-GT-0-1.5-20240617									
LDW23-GT02-GT-5-6-20240617									
LDW23-GT02-GT-6-6.5-20240617									
LDW23-GT02-GT-10-10.8-20240617									
LDW23-GT02-GT-10.8-11.5-20240617	0	31.9	51.7	16.4					
LDW23-GT02-GT-12-14.5-20240617					X	X	X		
LDW23-GT02-GT-15-15.5-20240617									
LDW23-GT02-GT-15.5-16.5-20240617									
LDW23-GT02-GT-20-21.5-20240617									
LDW23-GT02-GT-25-25.9-20240617									
LDW23-GT02-GT-25.9-26.5-20240617									
LDW23-GT10-GT-0-1.5-20240618									
LDW23-GT10-GT-5-6.5-20240618									
LDW23-GT10-GT-7-9-20240618					X			X	
LDW23-GT10-GT-10-11.5-20240618	0	7.5	68.8	23.7					
LDW23-GT10-GT-15-15.5-20240618									
LDW23-GT10-GT-15.5-16.5-20240618									
LDW23-GT09-GT-0-1.5-20240618									
LDW23-GT09-GT-5-6.2-20240618									
LDW23-GT09-GT-6.2-6.5-20240618									
LDW23-GT09-GT-10-11.5-20240618									
LDW23-GT09-GT-15-16.5-20240618	0	19.6	63.3	17.1					
LDW23-GT19-GT-0-1.5-20240619									

**Appendix B-1b**  
**Assigned Laboratory Tests**

Sample ID	Grain Size, Sieve & Hydrometer (ASTM D6913 & D7928)				1D Consolidaton (ASTM D2435)	Unit Weight of Soils (ASTM D7263b)	Direct Shear (ASTM D3080)	UU Triaxial Test (ASTM D2850)	CU Triaxial Test (ASTM D4767)
	%Gravel	%Sand	%Silt	%Clay					
LDW23-GT19-GT-5-6.5-20240619									
LDW23-GT19-GT-10-11.5-20240619									
LDW23-GT19-GT-15-16.5-20240619									
LDW23-GT19-GT-20-20.8-20240619									
LDW23-GT19-GT-20.8-21.5-20240619									
LDW23-GT19-GT-25-26.5-20240619	0	81.3	16.6	2					
LDW23-GT19-GT-30-31.5-20240619									
LDW23-GT11-GT-0.5-1.3-20240801									
LDW23-GT11-GT-1.3-2-20240801	15.3	54.9	21.1	8.7					
LDW23-GT11-GT-5-6.5-20240801									
LDW23-GT11-GT-10-10.8-20240801									
LDW23-GT11-GT-10.8-11.5-20240801									
LDW23-GT11-GT-15-16.5-20240801									
LDW23-GT11-GT-20-21.3-20240801	0	64.2	31	4.8					
LDW23-GT11-GT-21.3-21.5-20240801									
LDW23-GT11-GT-25-26.5-20240801									
LDW23-GT11-GT-30-31.5-20240801									
LDW23-GT11-GT-35-36.5-20240801									
LDW23-GT11-GT-40-41.5-20240801									
LDW23-GT13-GT-0.5-2-20240801									
LDW23-GT13-GT-5-6.5-20240801									
LDW23-GT13-GT-10-11-20240801									
LDW23-GT13-GT-11-11.5-20240801	0	40.9	50.8	8.3					
LDW23-GT13-GT-15-16.5-20240801									
LDW23-GT13-GT-20-21.5-20240801									
LDW23-GT13-GT-25-26.5-20240801									
LDW23-GT13-GT-26.5-29-20240801					X	X			X
LDW23-GT13-GT-30-31.5-20240801									
LDW23-GT13-GT-35-36.5-20240801									
LDW23-GT13-GT-40-41.5-20240801									
LDW23-GT04-GT-0-1.5-20240802									
LDW23-GT21-GT-0.5-2-20240805									
LDW23-GT21-GT-5-6.5-20240805	40.9	39.9	14	5.2					
LDW23-GT21-GT-10-11.5-20240805									
LDW23-GT21-GT-15-16.5-20240805									

**Appendix B-1b**  
**Assigned Laboratory Tests**

Sample ID	Grain Size, Sieve & Hydrometer (ASTM D6913 & D7928)				1D Consolidation (ASTM D2435)	Unit Weight of Soils (ASTM D7263b)	Direct Shear (ASTM D3080)	UU Triaxial Test (ASTM D2850)	CU Triaxial Test (ASTM D4767)
	%Gravel	%Sand	%Silt	%Clay					
LDW23-GT21-GT-20-21.3-20240805	82.1	15	1.8	1.1					
LDW23-GT21-GT-21.3-21.5-20240805									
LDW23-GT21-GT-25-26.5-20240805									
LDW23-GT21-GT-30-31.5-20240805									
LDW23-GT21-GT-35-36.5-20240805									
LDW23-GT21-GT-40-41.1-20240805									
LDW23-GT21-GT-41.1-41.5-20240805									
LDW23-GT35-GT-0.5-1.6-20240805									
LDW23-GT35-GT-1.6-2-20240805	12.9	38.6	37.4	11					
LDW23-GT35-GT-5-6.5-20240805									
LDW23-GT26-GT-0-1.5-20240624									
LDW23-GT26-GT-5-6.5-20240624									
LDW23-GT26-GT-10-10.8-20240624									
LDW23-GT26-GT-10.8-11.5-20240624									
LDW23-GT26-GT-15-16.1-20240624									
LDW23-GT26-GT-16.1-16.5-20240624									
LDW23-GT26-GT-20-21.5-20240624									
LDW23-GT22-GT-0-1.5-20240622									
LDW23-GT22-GT-5-6.5-20240622	0	41.6	47.2	11.2					
LDW23-GT22-GT-10-11.5-20240622									
LDW23-GT22-GT-15-16.5-20240622									
LDW23-GT22-GT-20-21.5-20240622									
LDW23-GT22-GT-25-26.5-20240622									
LDW23-GT17-GT-0-1.5-20240622									
LDW23-GT17-GT-2.5-5-20240622					X	X			X
LDW23-GT17-GT-5-6.5-20240622									
LDW23-GT17-GT-10-11.5-20240622									
LDW23-GT17-GT-15-16.5-20240622									
LDW23-GT17-GT-20-21.5-20240622									
LDW23-GT17-GT-25-26.5-20240622									
LDW23-GT08B-GT-5-6.5-20241030									
LDW23-GT08B-GT-10-11.5-20241030	0.1	20.6	59.1	20.1					
LDW23-GT08B-GT-15-16.5-20241030									
LDW23-GT08B-GT-20-21.5-20241030									
LDW23-GT08B-GT-25-26.1-20241030									

**Appendix B-1b**  
**Assigned Laboratory Tests**

Sample ID	Grain Size, Sieve & Hydrometer (ASTM D6913 & D7928)				1D Consolidation (ASTM D2435)	Unit Weight of Soils (ASTM D7263b)	Direct Shear (ASTM D3080)	UU Triaxial Test (ASTM D2850)	CU Triaxial Test (ASTM D4767)
	%Gravel	%Sand	%Silt	%Clay					
LDW23-GT08B-GT-26.1-26.5-20241030	0	30.7	56.5	12.8					
LDW23-GT08B-GT-30-31.5-20241030	0	87.5	9.1	3.5					
LDW23-GT08B-GT-35-36.5-20241030									
LDW23-GT08B-GT-40-41.5-20241030									
LDW23-GT04B-GT-5-6.5-20241029									
LDW23-GT04B-GT-8.7-10-20241029	2.6	85.3	5.3	6.8					
LDW23-GT04B-GT-12.7-14.2-20241029	0	4.4	57.4	38.1					
LDW23-GT04B-GT-15-16.5-20241029									
LDW23-GT04B-GT-20-21.5-20241029									
LDW23-GT04B-GT-30-31.5-20241029									
LDW23-GT35B-GT-5-6.5-20241028									
LDW23-GT35B-GT-10-11.2-20241028									
LDW23-GT35B-GT-11.2-11.5-20241028									
LDW23-GT35B-GT-15-16.5-20241028	4.3	59.6	30.3	5.8					
LDW23-GT35B-GT-20-21.5-20241028									
LDW23-GT35B-GT-25-26.5-20241028									

Notes:  
 ft: foot  
 LL: liquid limit  
 NP: sample is nonplastic  
 PI: plasticity index  
 PL: plastic limit  
 X: Engineering test results are provided in labor

FINAL

## Attachment B-2

### Boring and Vane Shear Testing Logs

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**Field Vane Shear Log**

Project: LDW Middle Reach

Location: Duwamish Marine Center

Technician: S. Giannakos, A. Riolo

Date: 8/30/2024

ROCTEST H-60 / Humboldt H-4227 Vane Tester	
Vane Diameter	Vane constant ( $\alpha$ )
16mm (0.63")	1.95
20mm (0.79")	1.00
25.4mm (1")	0.49
32mm (1.25")	0.24
50.8mm (2")	0.06
65mm (2.56")	0.03

$S_u = \alpha \times \text{Scale}$



Test Location ID	Coordinates		Test Time	Water Depth in feet	Test Depth below Mudline in feet	Dummy Vane Scale Reading (kPa)	Vane Diameter in mm	Vane Constant	Peak Undrained Shear Strength			Remolded Shear Strength			Sample Description
	Easting	Northing							Vane Scale Reading in kPa	kPa	lbs/ft <sup>2</sup>	Vane Scale Reading in kPa	kPa	lbs/ft <sup>2</sup>	
VST-1a	1269396.930	201945.017	9:15	3.7	1	0.1	25.4	0.49	6.0	2.9	60	6.0	2.9	60	Granular material/debris suspected
VST-1a	1269396.930	201945.017	9:22	3.7	2	0.1	25.4	0.49	28.0	13.6	284	3.0	1.4	30	
VST-1a	1269396.930	201945.017	9:30	3.7	3	0.1	25.4	0.49	22.0	10.7	223	3.0	1.4	30	
VST-1a	1269396.930	201945.017	9:40	3.7	4	0.1	25.4	0.49	23.0	11.2	233	8.0	3.9	81	organic debris felt at 3.5 feet
VST-1a	1269396.930	201945.017	9:45	3.7	5	0.1	25.4	0.49	28.0	13.6	284	9.0	4.3	91	
VST-1a	1269396.930	201945.017	9:50	3.7	6	0.1	25.4	0.49	23.0	11.2	233	13.0	6.3	132	
VST-1a	1269396.930	201945.017	--	--	7.4	--	--	--	--	--	--	--	--	--	Refusal noted on sand
VST-1b	1269434.630	201907.797	10:00	4.2	1	0	25.4	0.49	8.0	3.9	82	3.0	1.5	31	
VST-1b	1269434.630	201907.797	10:10	4.2	2	0.1	25.4	0.49	20.0	9.7	203	5.0	2.4	50	
VST-1b	1269434.630	201907.797	10:13	4.2	3	0.1	25.4	0.49	12.0	5.8	121	7.0	3.4	70	
VST-1b	1269434.630	201907.797	10:16	4.2	4	0.1	25.4	0.49	21.0	10.2	213	8.0	3.9	81	
VST-1b	1269434.630	201907.797	10:19	4.2	5	0.1	25.4	0.49	45.0	21.9	458	10.0	4.8	101	Strong resistance, debris suspected
VST-1b	1269434.630	201907.797	--	--	7	--	--	--	--	--	--	--	--	--	Refusal noted on sand
VST-1c	1269484.321	201852.102	10:30	4	1	0	25.4	0.49	0.0	0.0	0	0.0	0.0	0	
VST-1c	1269484.321	201852.102	10:35	4	2	0	25.4	0.49	12.0	5.9	122	1.0	0.5	10	Sand lens ~2.5-2.8 ft
VST-1c	1269484.321	201852.102	10:40	4	3	0.3	25.4	0.49	18.0	8.6	180	3.0	1.3	28	
VST-1c	1269484.321	201852.102	10:46	4	4.3	0.3	25.4	0.49	33.0	16.0	333	10.0	4.7	99	Pushed through sand lense to 4.3 ft
VST-1c	1269484.321	201852.102	10:50	4	5	0.3	25.4	0.49	38.0	18.4	384	15.0	7.2	150	
VST-1c	1269484.321	201852.102	--	--	6.8	--	--	--	--	--	--	--	--	--	Refusal noted on sand

Note: If used, dummy vane reading is subtracted from peak and remolded vane reading when calculating strength

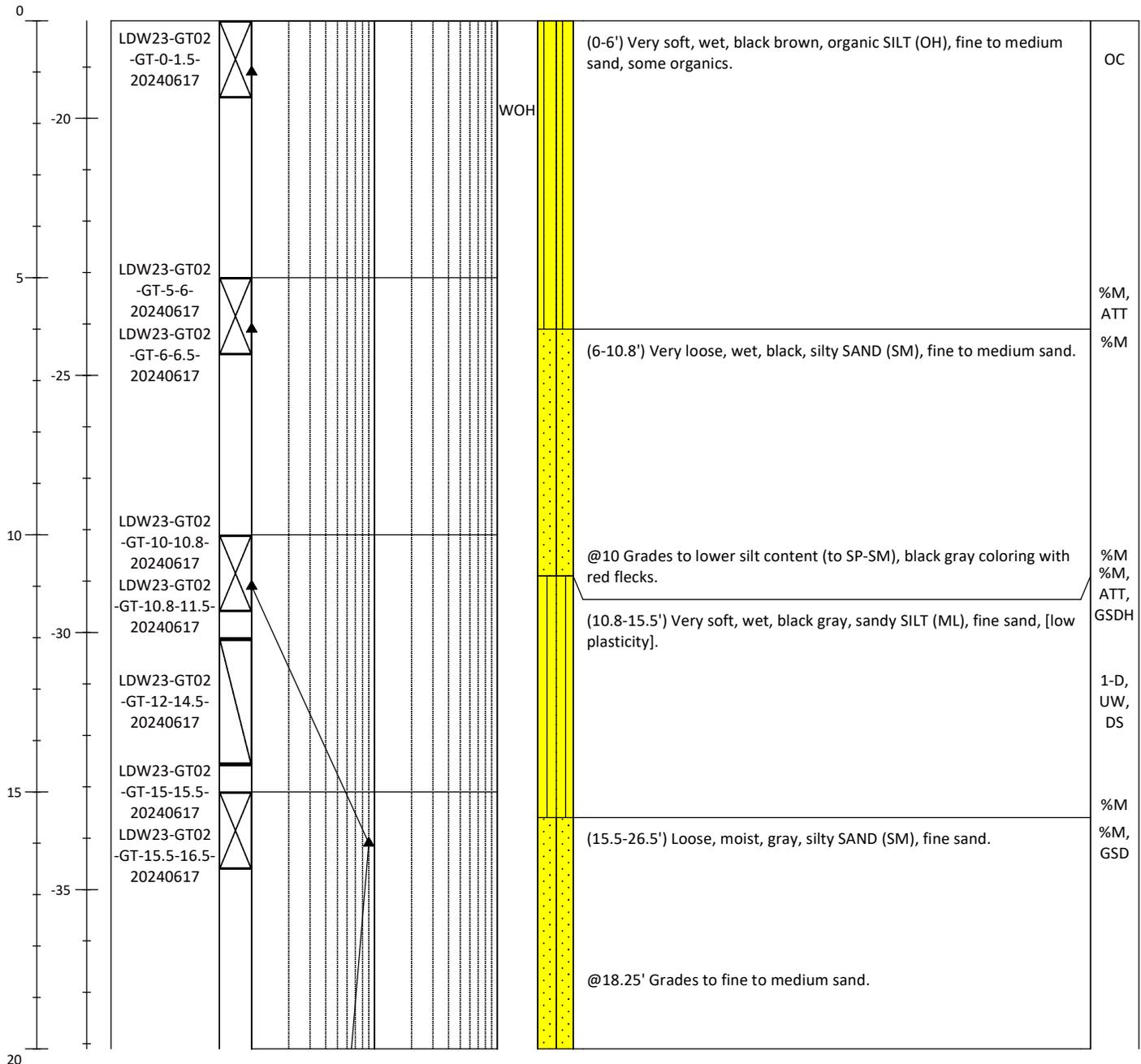
# Soil Boring Log

## LDW23-GT02-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>201742.90</b> E/LONG: <b>1269199.02</b>	Total Depth (ft): <b>26.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-18.1</b>
Collection Date: <b>6/17/24</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

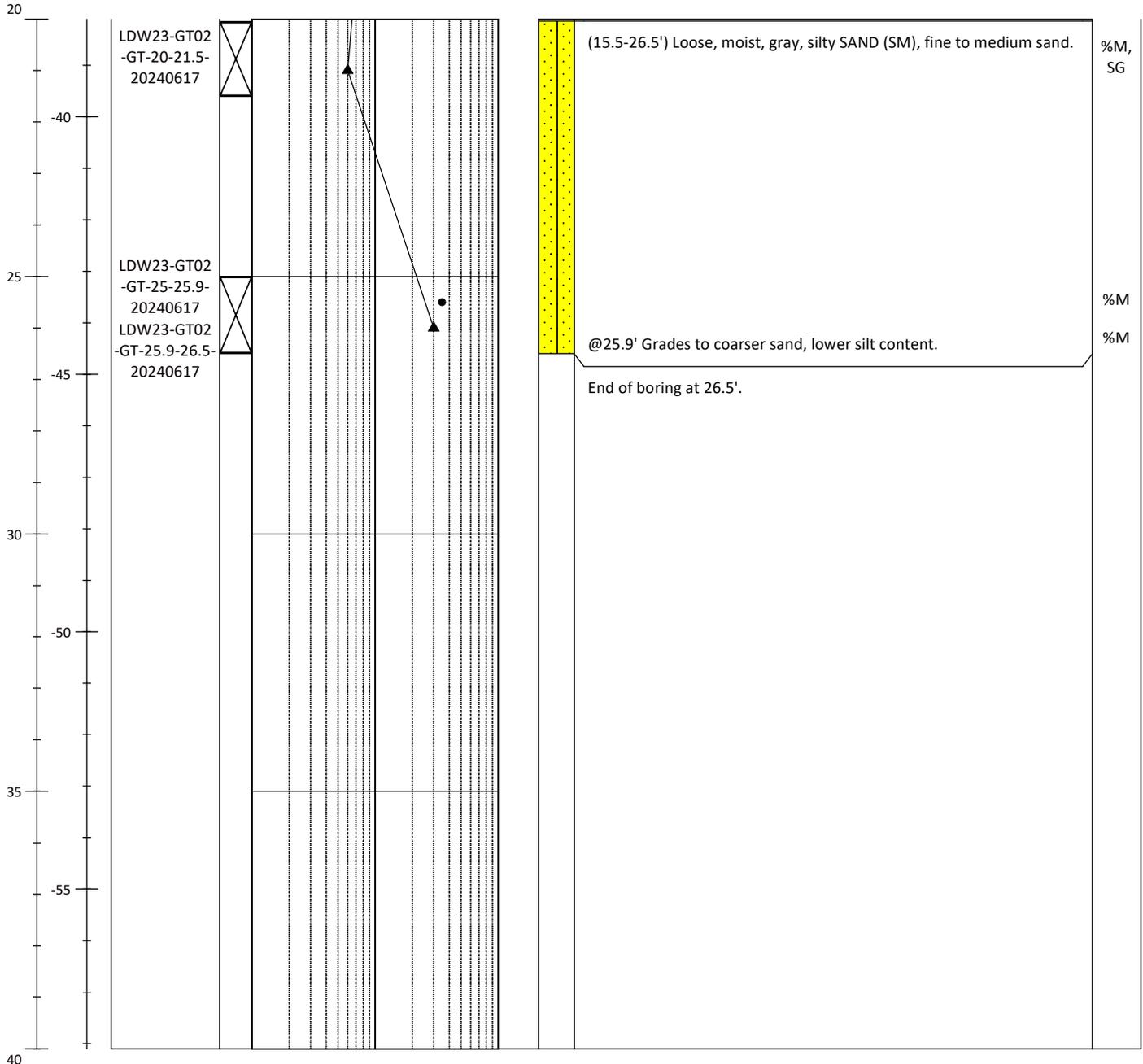
# Soil Boring Log

## LDW23-GT02-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>201742.90</b> E/LONG: <b>1269199.02</b>	Total Depth (ft): <b>26.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-18.1</b>
Collection Date: <b>6/17/24</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

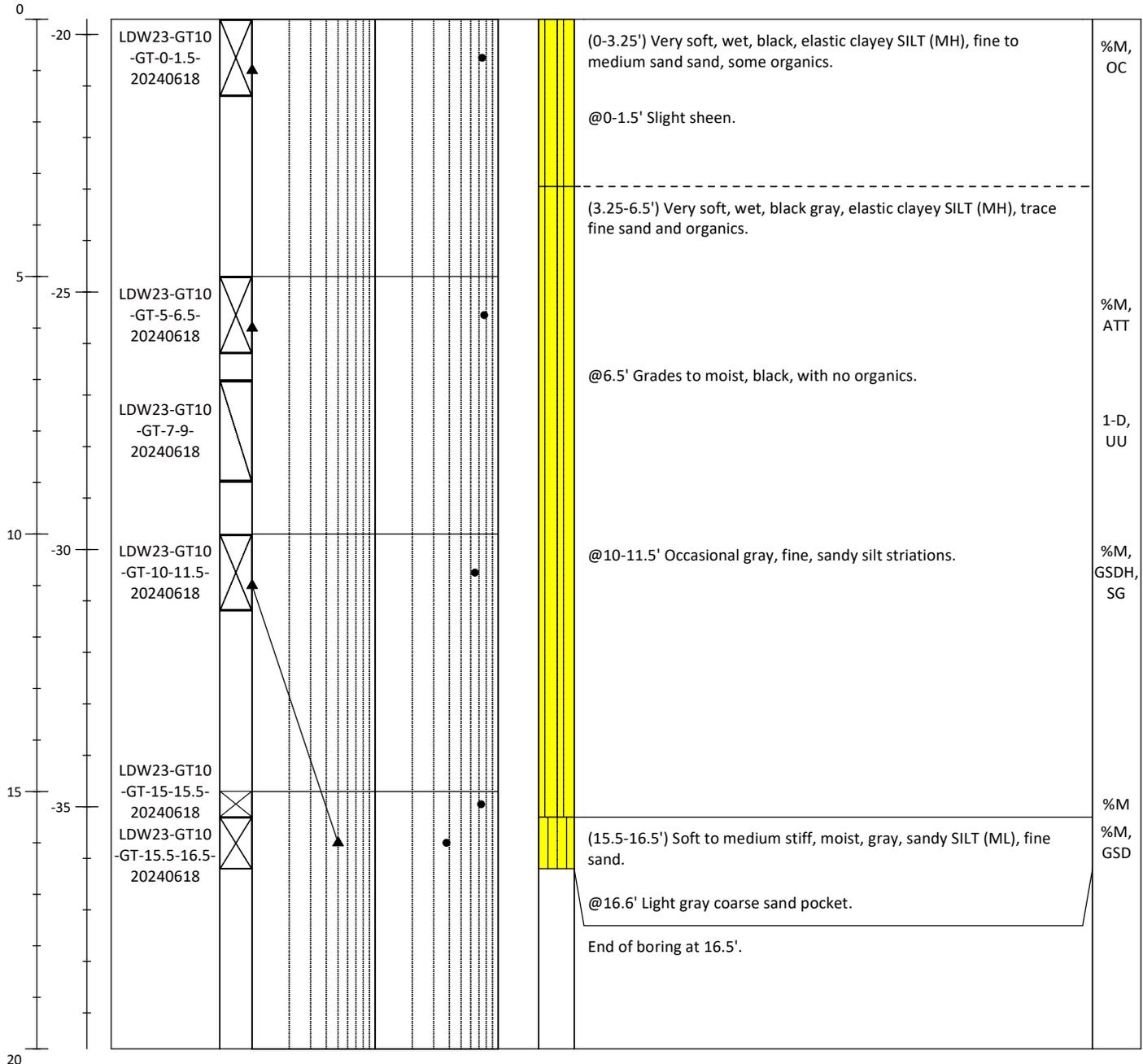
# Soil Boring Log

## LDW23-GT10-GT

Sheet 1 of 1

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>201327.13</b> E/LONG: <b>1269969.3</b>	Total Depth (ft): <b>16.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-19.7</b>
Collection Date: <b>6/18/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

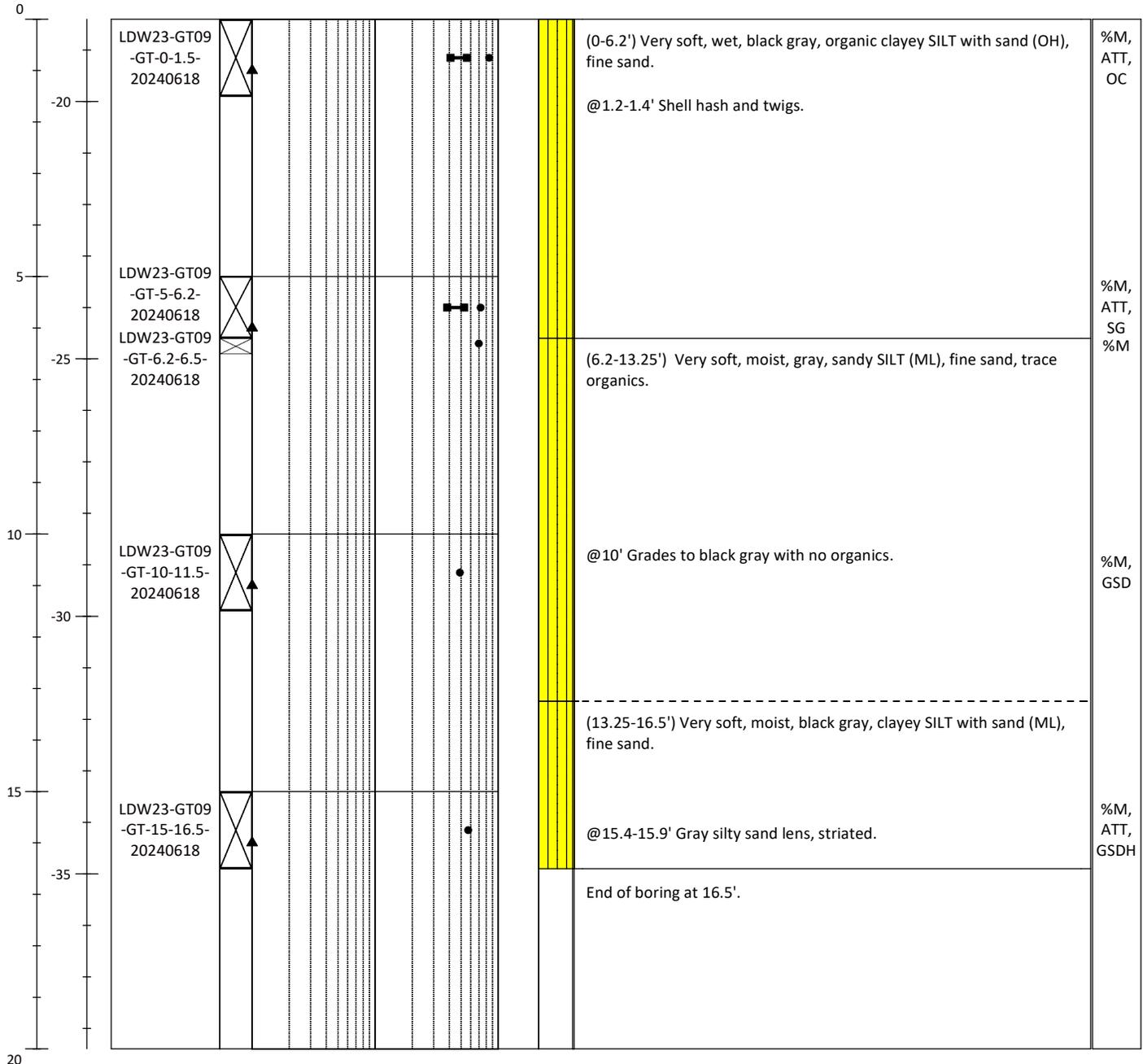
# Soil Boring Log

## LDW-23-GT09-GT

Sheet 1 of 1

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>201144.98</b> E/LONG: <b>1269846.44</b>	Total Depth (ft): <b>16.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-18.4</b>
Collection Date: <b>6/18/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

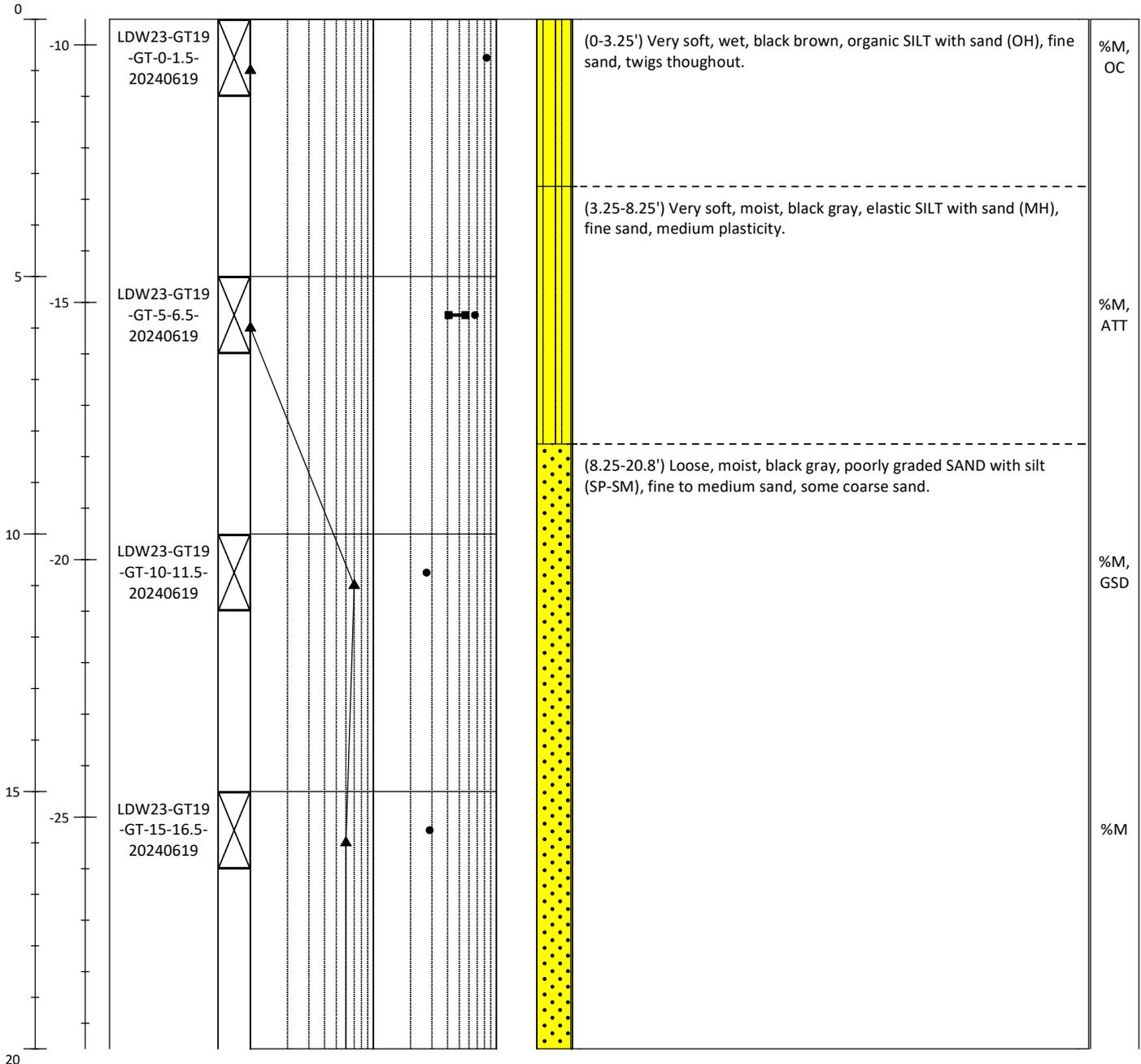
# Soil Boring Log

## LDW23-GT19-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>199617.57</b> E/LONG: <b>1271609.77</b>	Total Depth (ft): <b>31.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-9.5</b>
Collection Date: <b>6/19/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

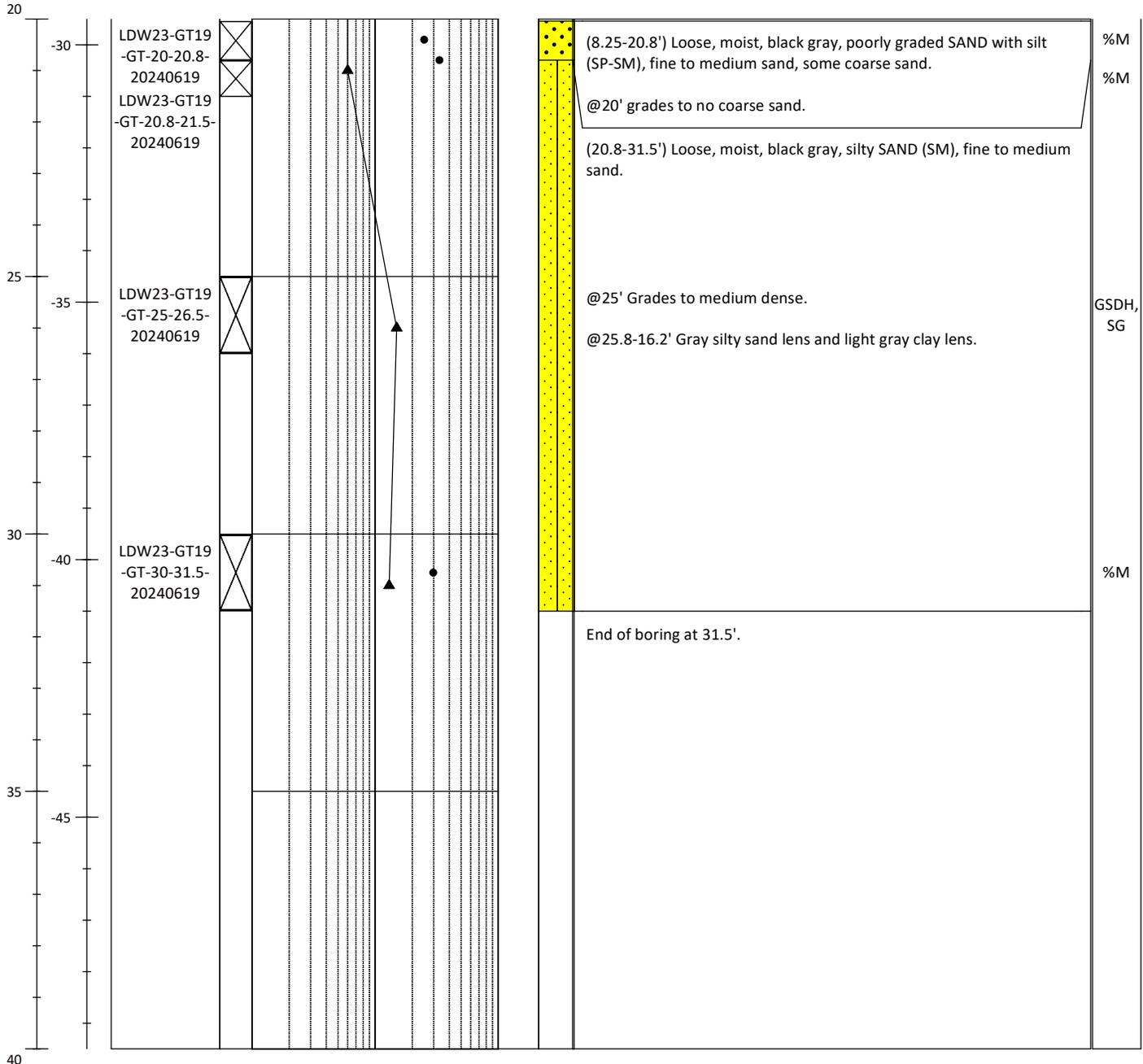
# Soil Boring Log

## LDW23-GT19-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>199617.57</b> E/LONG: <b>1271609.77</b>	Total Depth (ft): <b>31.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-9.5</b>
Collection Date: <b>6/19/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**

%M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
Mudline elevations determined from leadline measurements and Site tide gage levels.



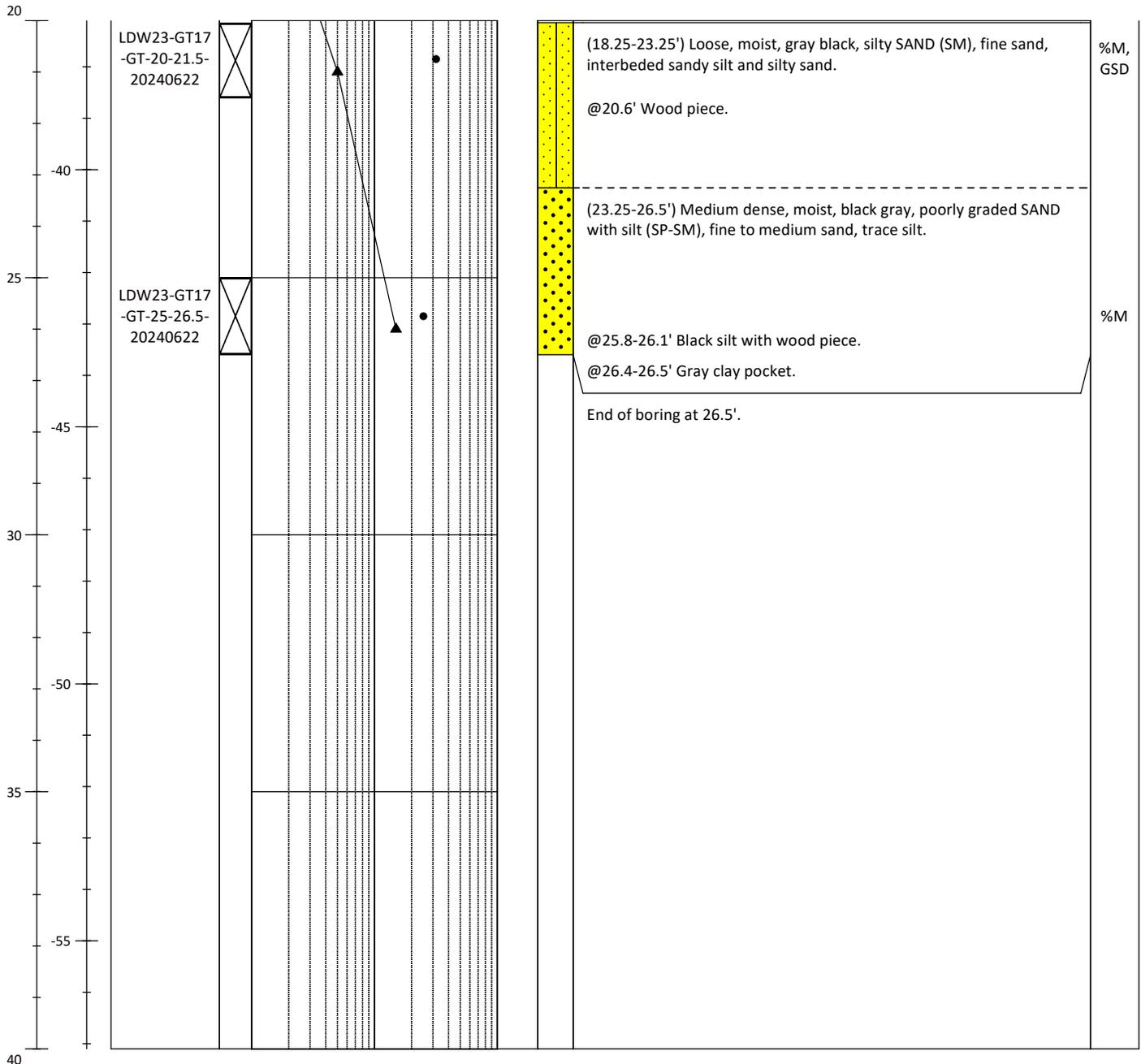
# Soil Boring Log

## LDW23-GT17-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>199385.24</b> E/LONG: <b>1271528.53</b>	Total Depth (ft): <b>26.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-17.1</b>
Collection Date: <b>6/22/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



<p>1201 Third Avenue Suite 2600 Seattle, WA 98101</p>	<ul style="list-style-type: none"> <li>▲ SPT N-Value</li> <li>● Moisture Content (%)</li> <li>■ Atterberg Limits</li> <li>▣ Shelby Tube</li> <li>⊠ Split Spoon/Grab</li> </ul>	<p><b>Notes:</b>          %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution,          GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight,          CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear,          WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic          Mudline elevations determined from leadline measurements and Site tide gage levels.</p>
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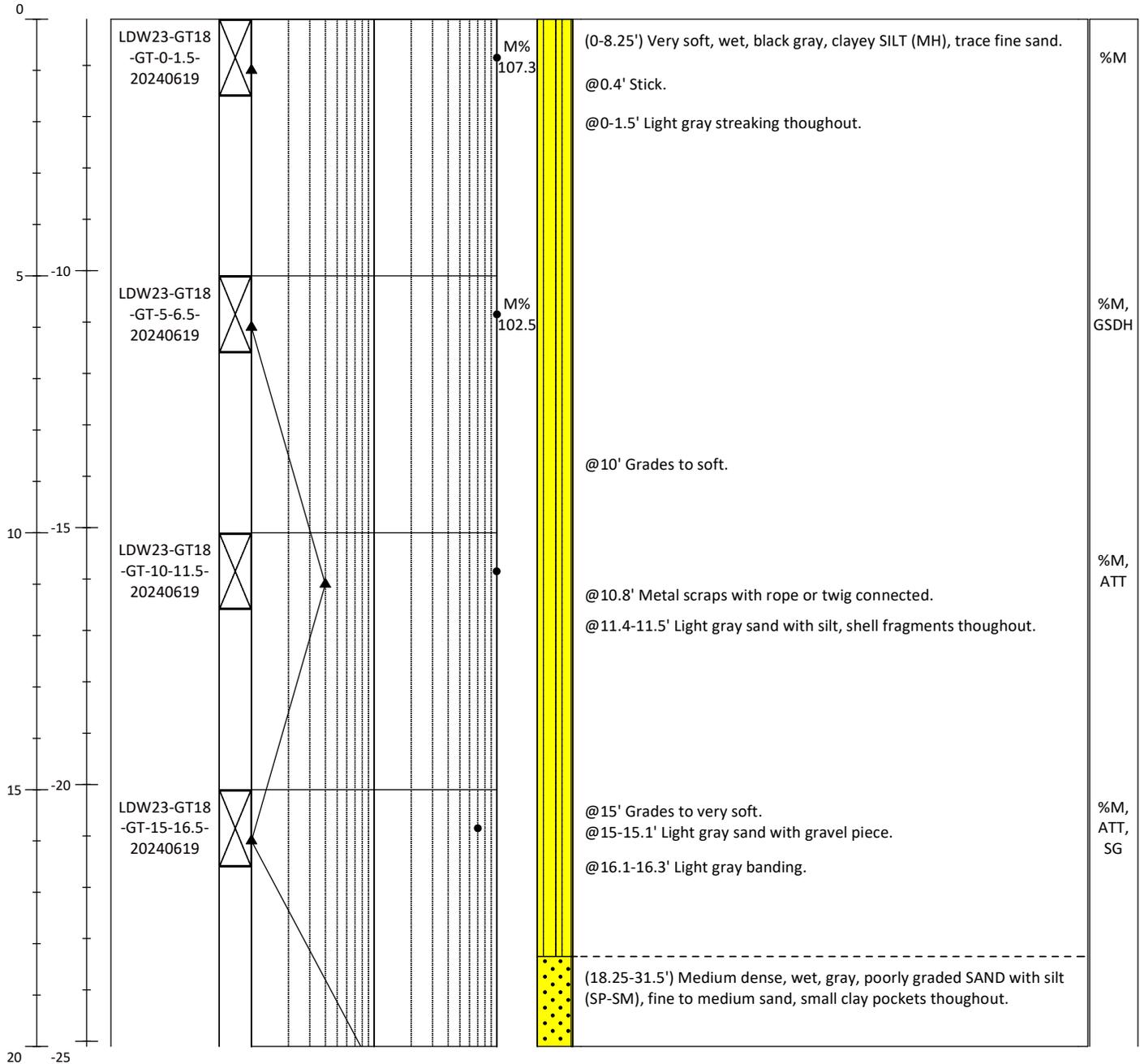
# Soil Boring Log

## LDW23-GT18-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200303.38</b> E/LONG: <b>1271222.23</b>	Total Depth (ft): <b>31.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-5.1</b>
Collection Date: <b>6/19/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

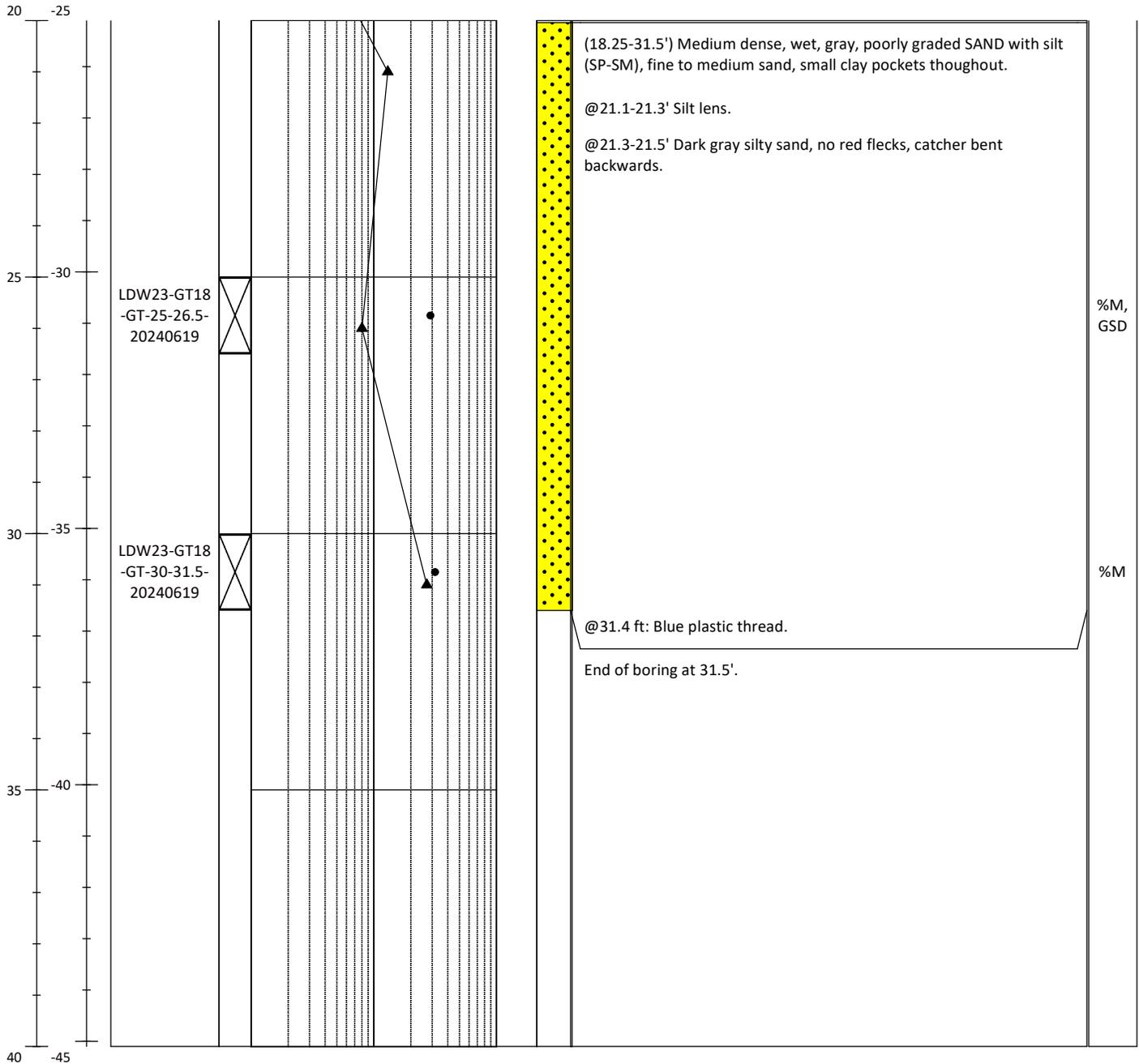
# Soil Boring Log

## LDW23-GT18-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200303.38</b> E/LONG: <b>1271222.23</b>	Total Depth (ft): <b>31.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-5.1</b>
Collection Date: <b>6/19/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ☒ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

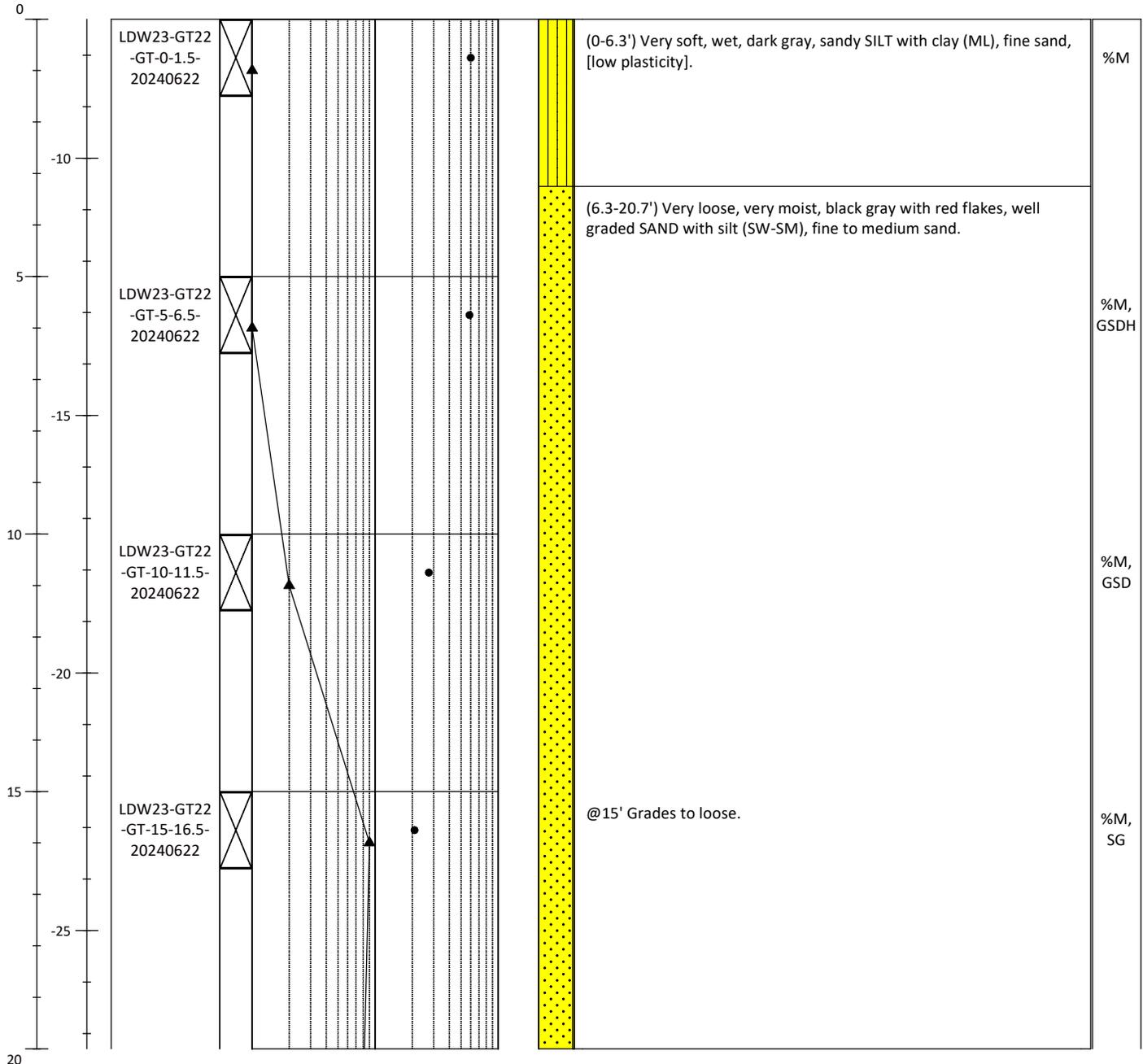
# Soil Boring Log

## LDW23-GT22-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>199427.25</b> E/LONG: <b>1271763.93</b>	Total Depth (ft): <b>26.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-7.3</b>
Collection Date: <b>6/22/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
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 Mudline elevations determined from leadline measurements and Site tide gage levels.

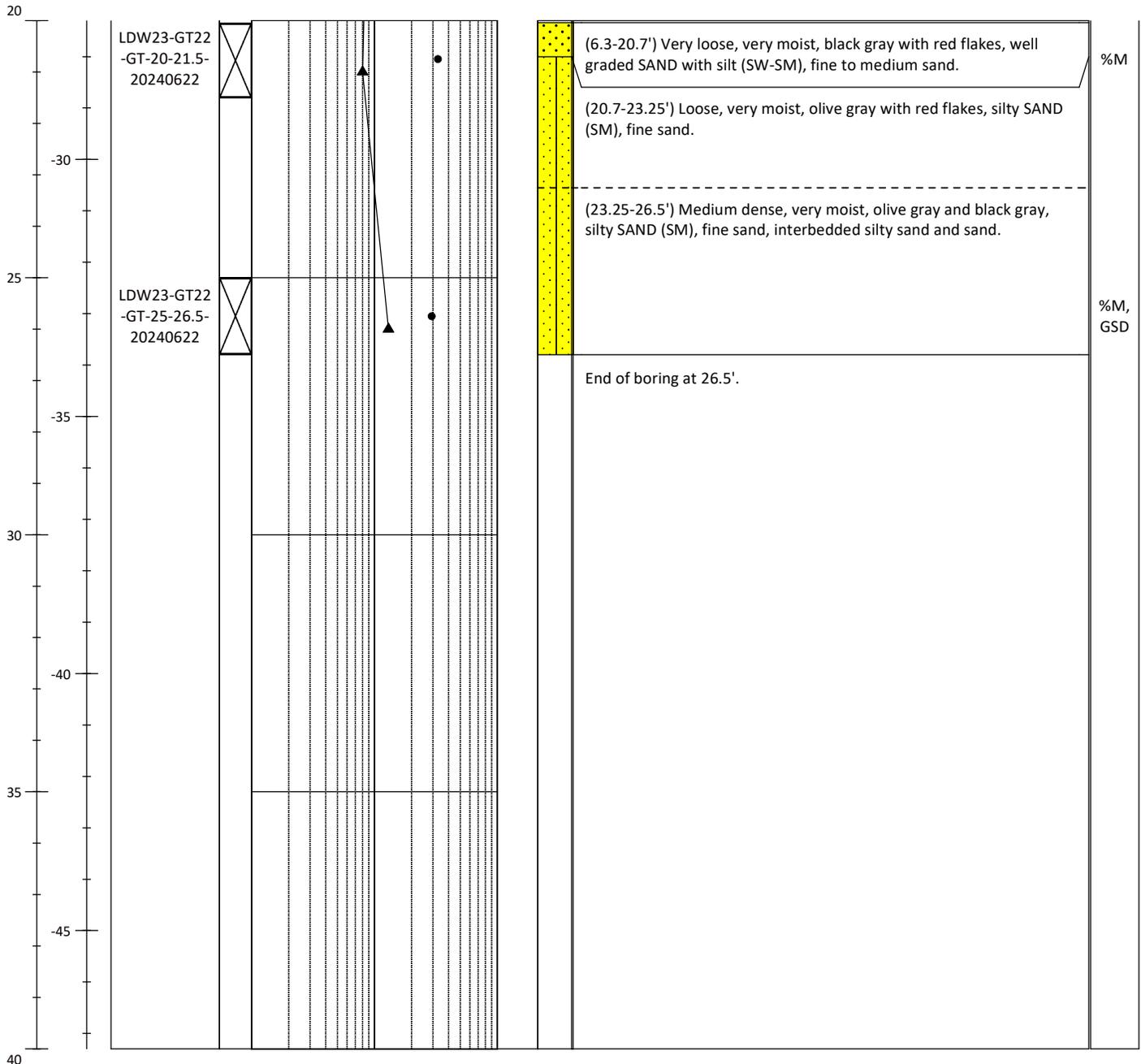
# Soil Boring Log

## LDW23-GT22-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>199427.25</b> E/LONG: <b>1271763.93</b>	Total Depth (ft): <b>26.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-7.3</b>
Collection Date: <b>6/22/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

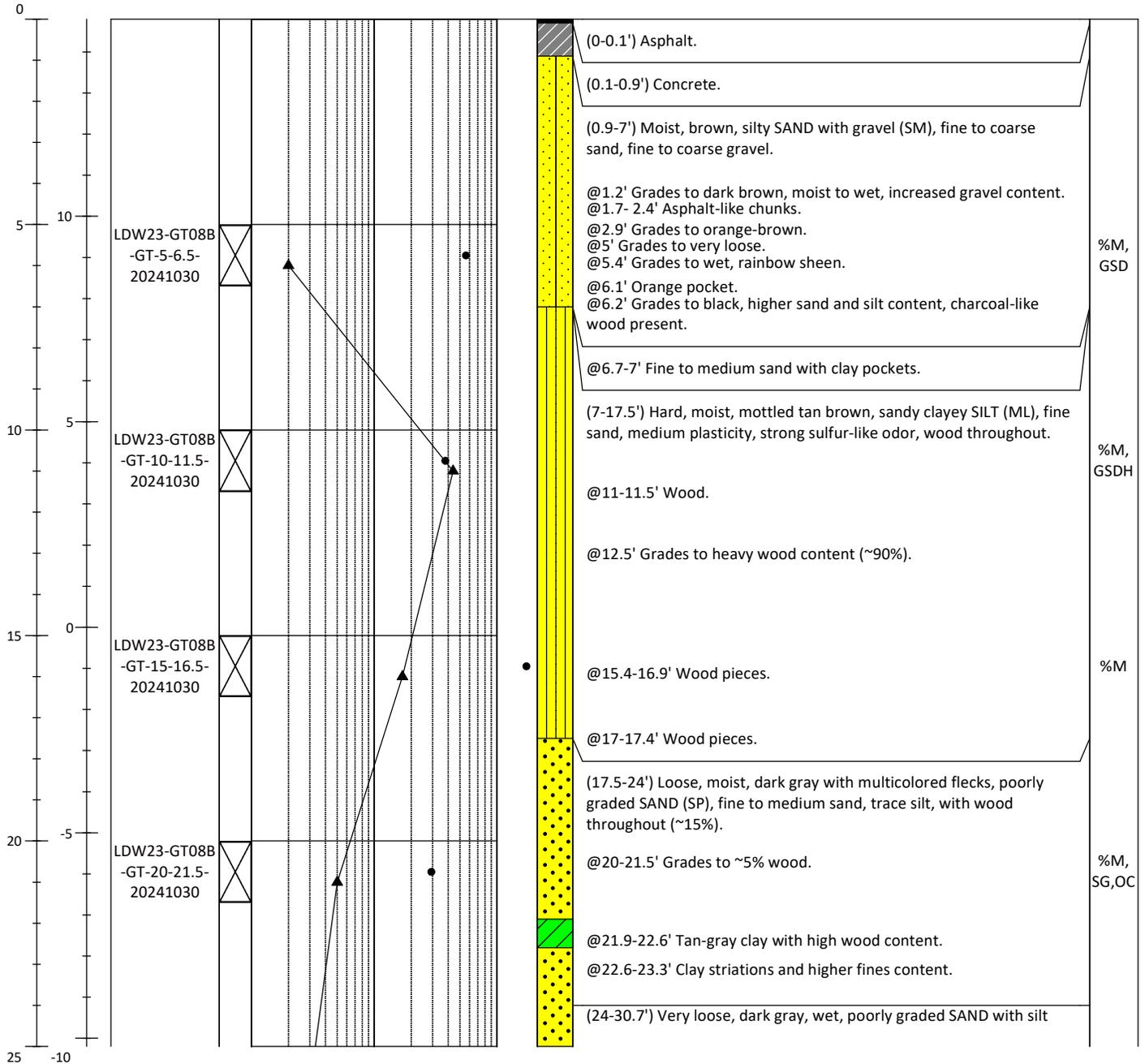
# Soil Boring Log

## LDW23-GT08B-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Rotary Sonic</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>201895.68</b> E/LONG: <b>1269533.43</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>14.8</b>
Collection Date: <b>10/30/24</b>		
Contractor: <b>Holt</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>LD, RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**

%M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

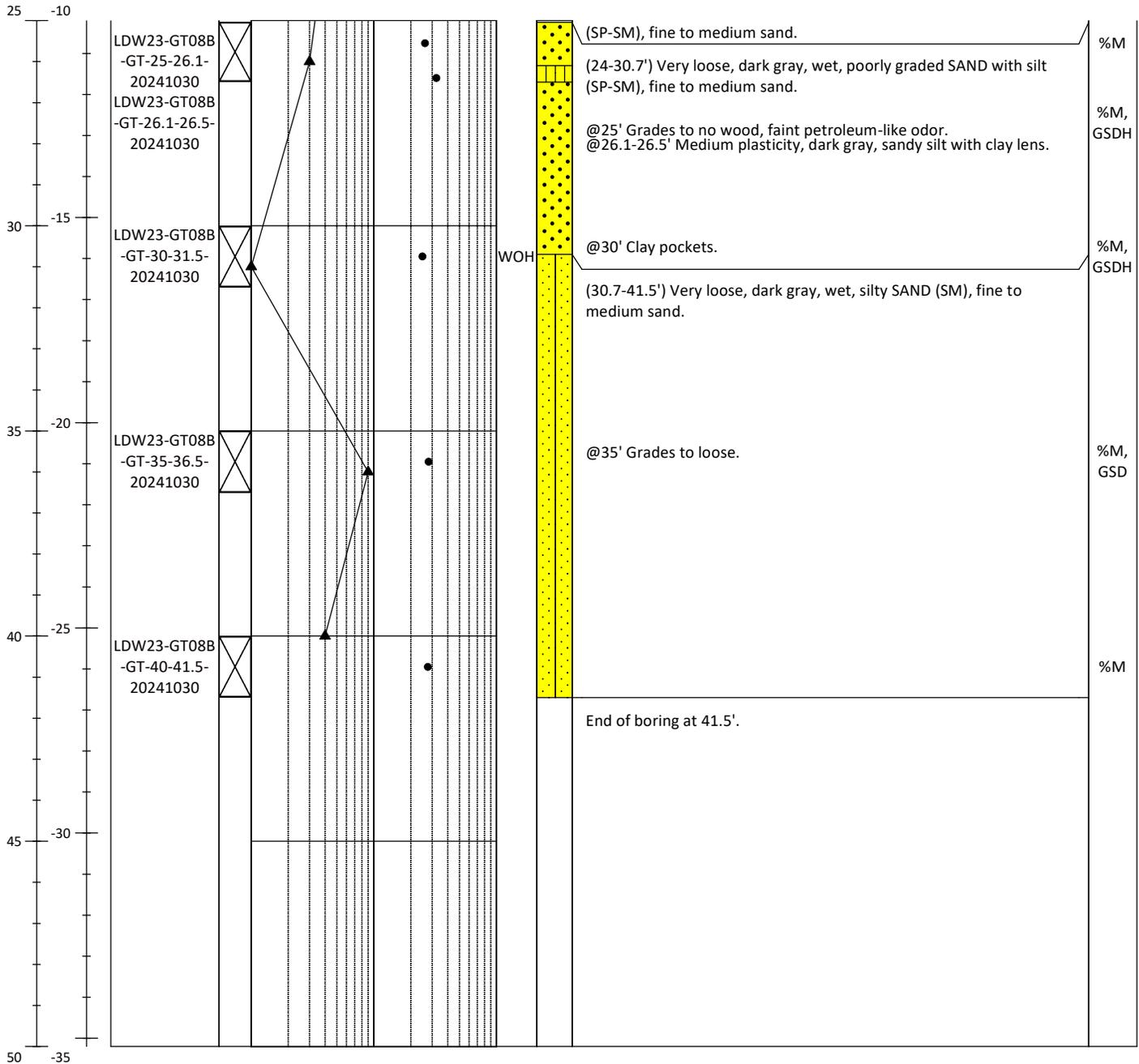
# Soil Boring Log

## LDW23-GT08B-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Rotary Sonic</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>201895.68</b> E/LONG: <b>1269533.43</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>14.8</b>
Collection Date: <b>10/30/24</b>		
Contractor: <b>Holt</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>LD, RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

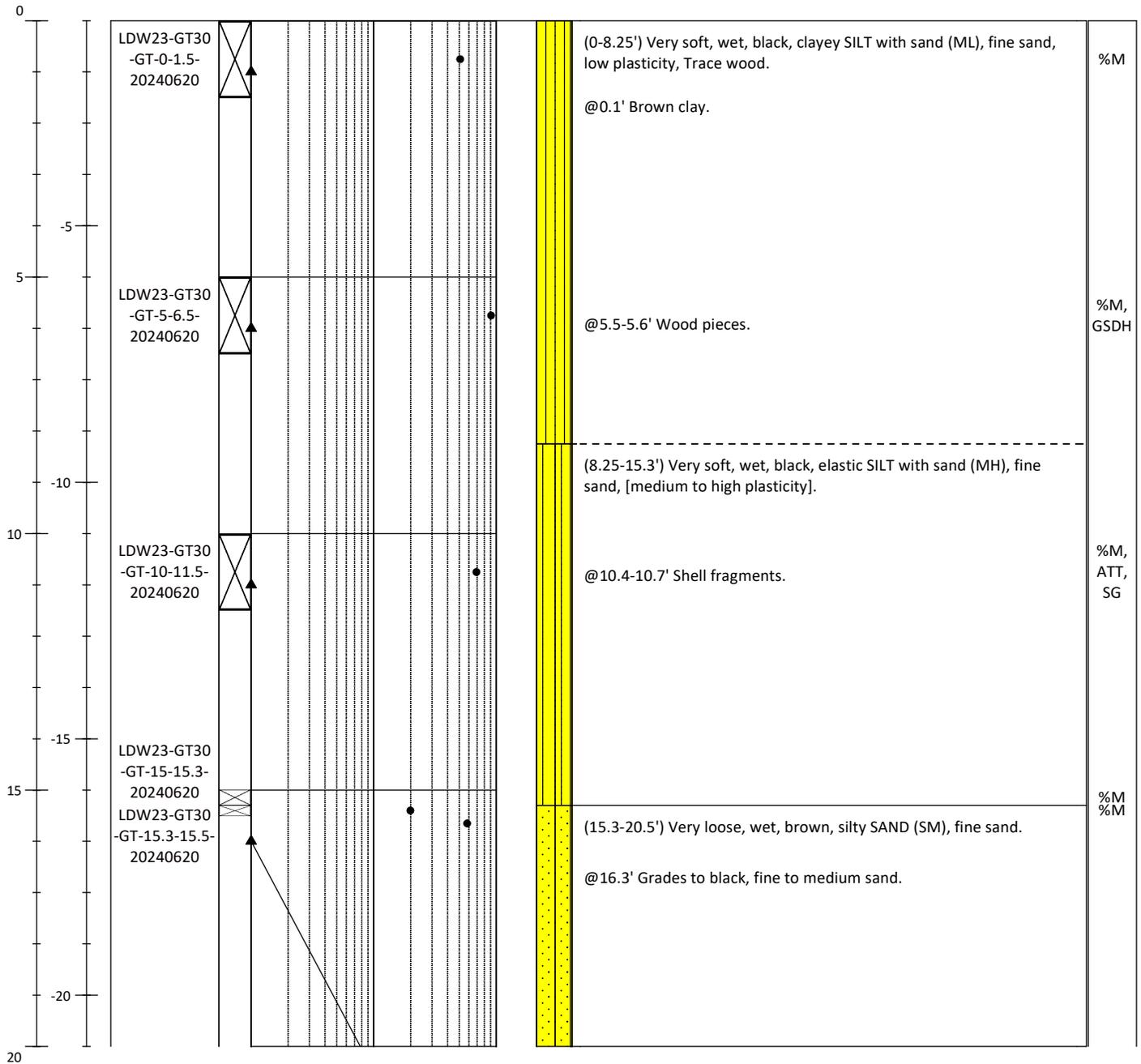
# Soil Boring Log

## LDW23-GT30-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>198841.00</b> E/LONG: <b>1272451.43</b>	Total Depth (ft): <b>26.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-1.0</b>
Collection Date: <b>6/20/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

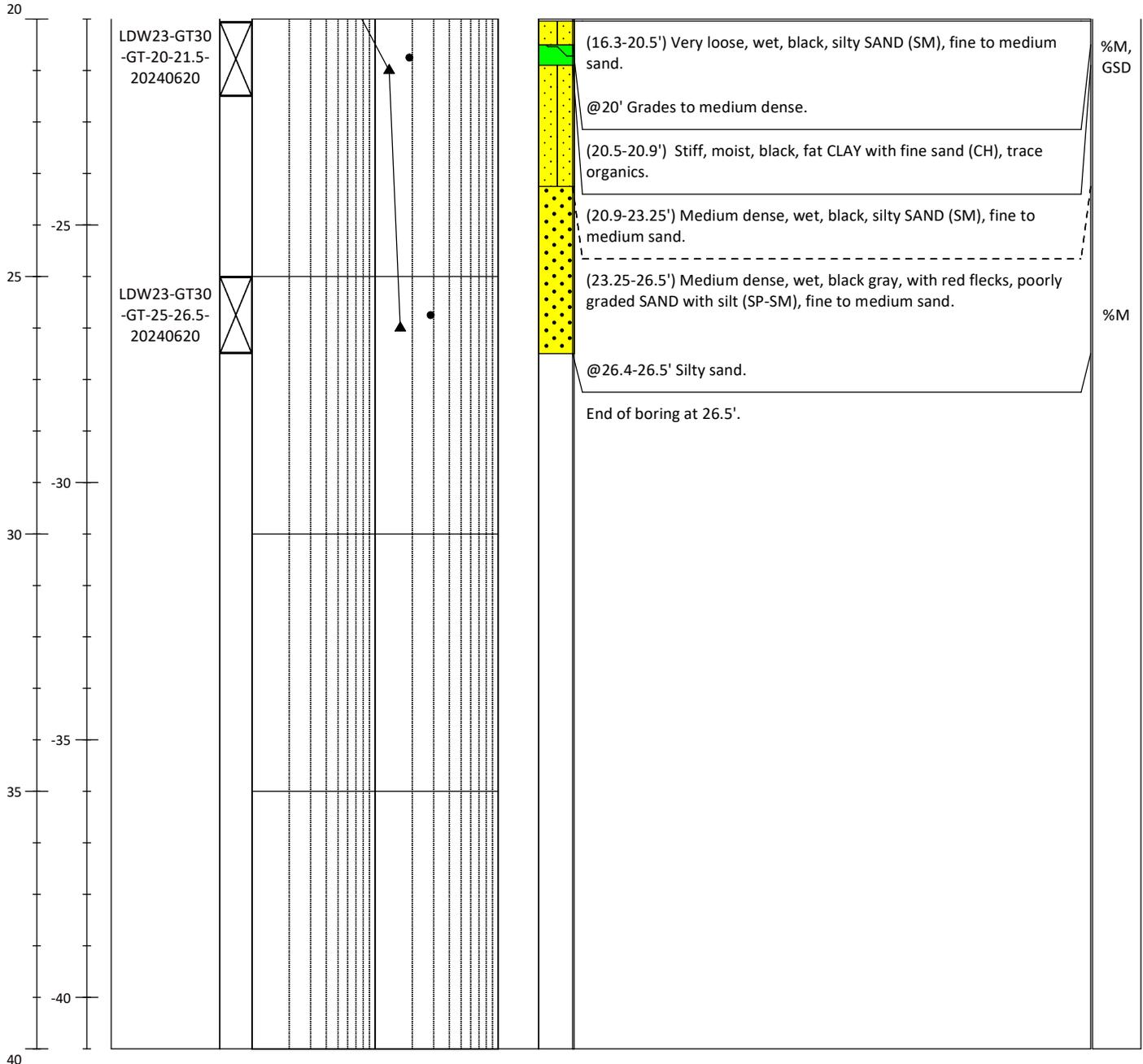
# Soil Boring Log

## LDW23-GT30-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>198841.00</b> E/LONG: <b>1272451.43</b>	Total Depth (ft): <b>26.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-1.0</b>
Collection Date: <b>6/20/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

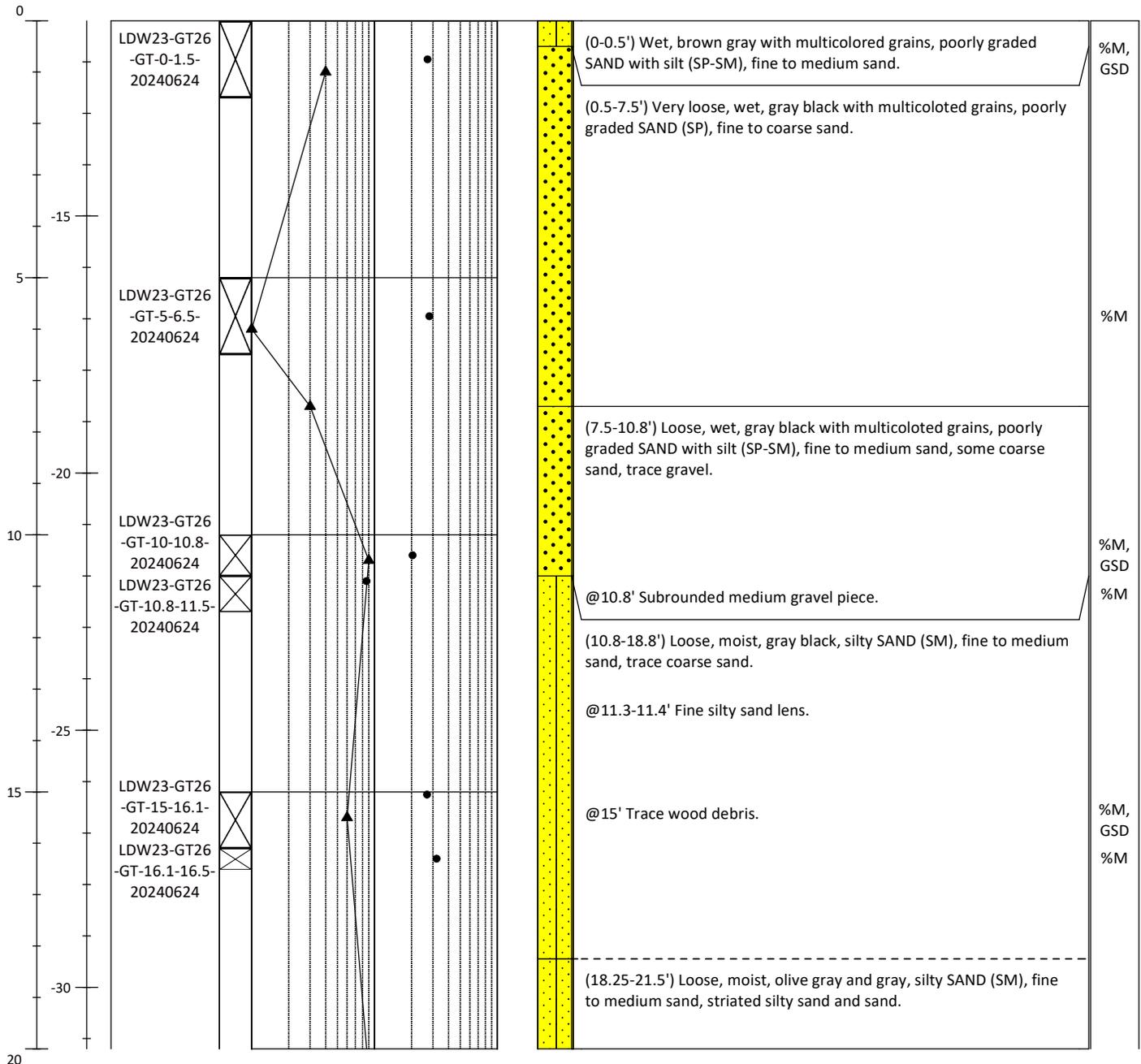
# Soil Boring Log

## LDW23-GT26-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>199159.81</b> E/LONG: <b>1271955.17</b>	Total Depth (ft): <b>21.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-11.2</b>
Collection Date: <b>6/24/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits							Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50	100				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**

%M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

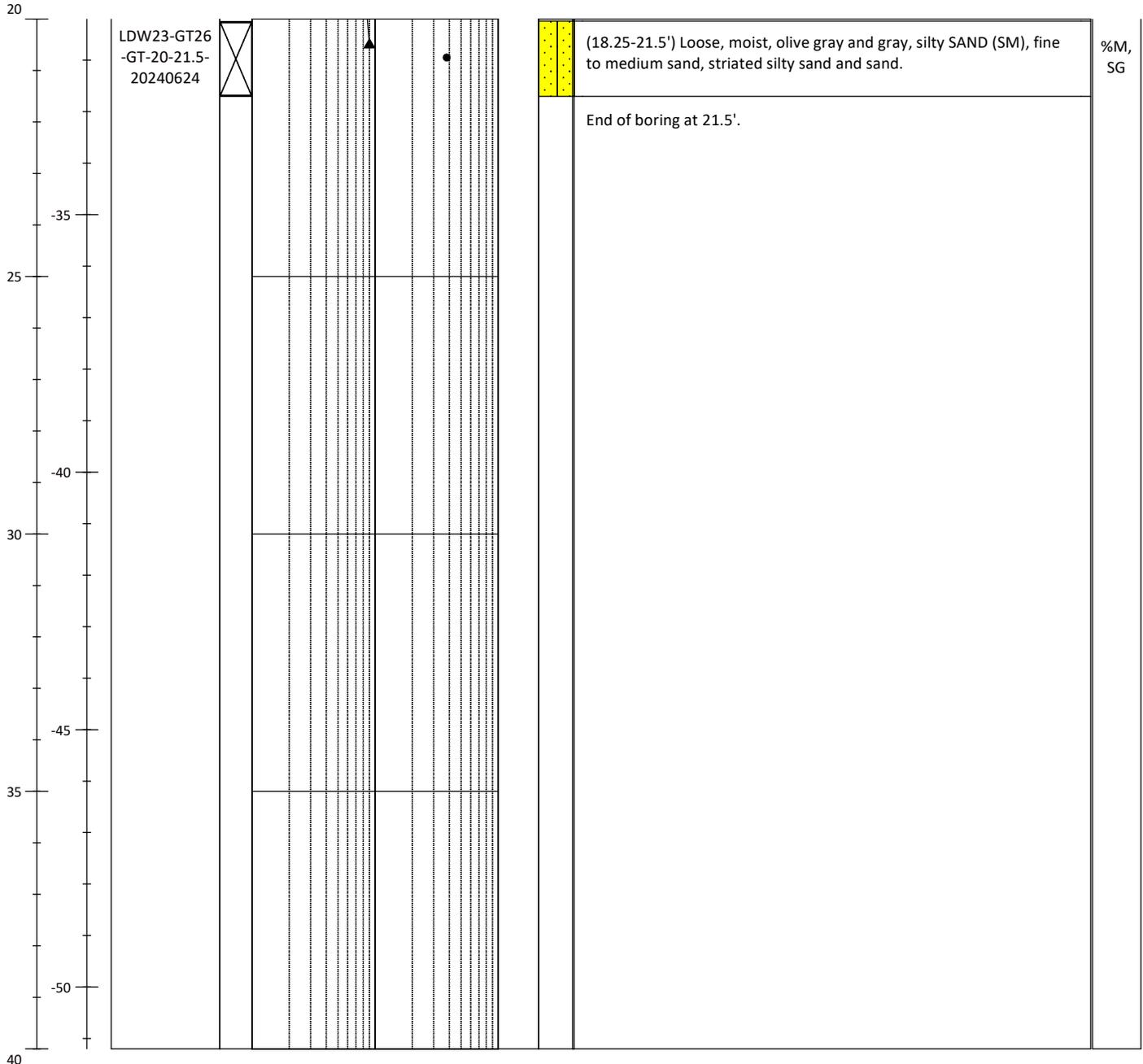
# Soil Boring Log

## LDW23-GT26-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Hollow Stem Auger</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>199159.81</b> E/LONG: <b>1271955.17</b>	Total Depth (ft): <b>21.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Mudline Elevation (ft): <b>-11.2</b>
Collection Date: <b>6/24/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution,  
 GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight,  
 CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear,  
 WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

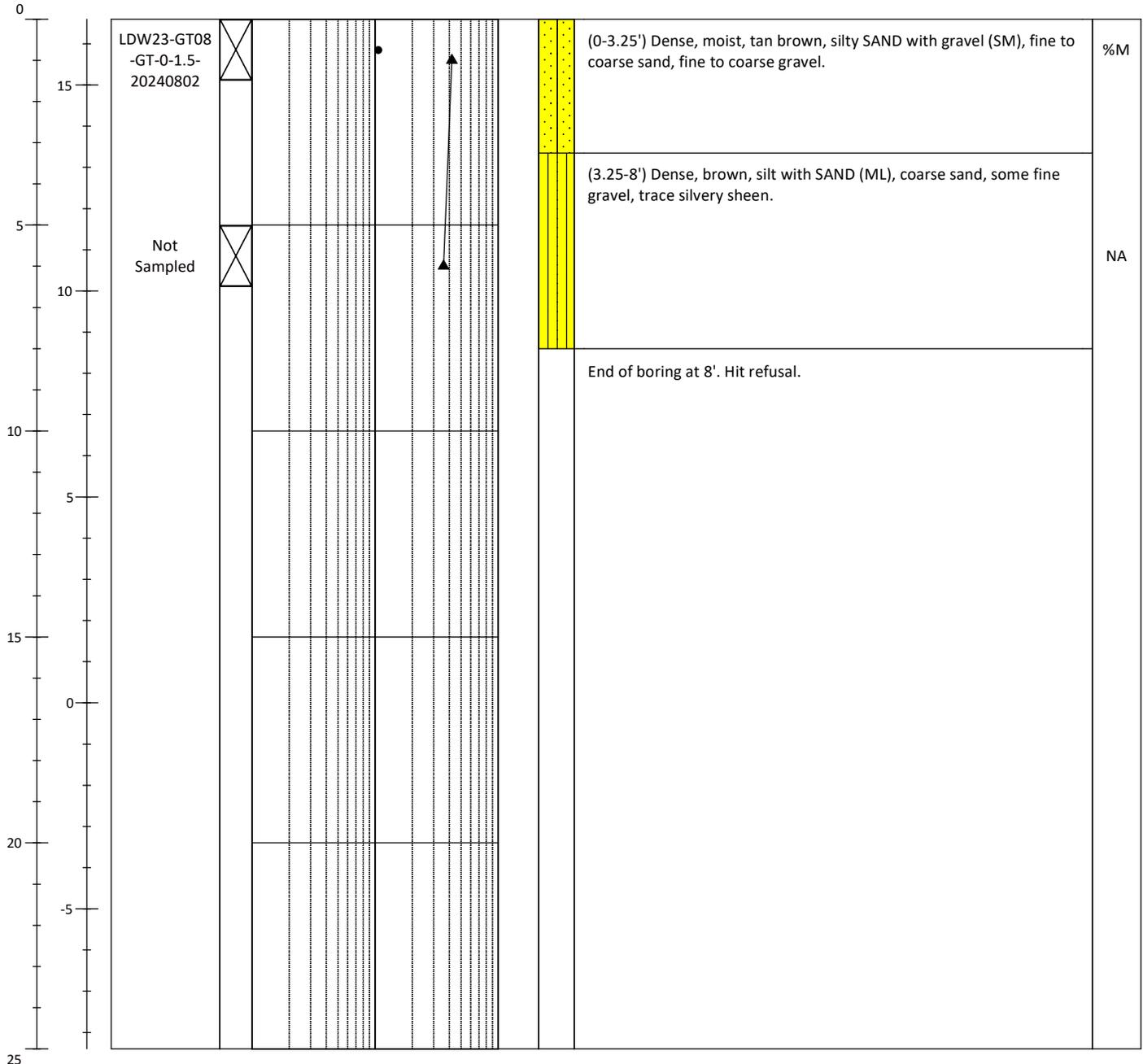
# Soil Boring Log

## LDW23-GT04-GT

Sheet 1 of 1

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>202046.12</b> E/LONG: <b>1269401.67</b>	Total Depth (ft): <b>8</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>16.6</b>
Collection Date: <b>8/02/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

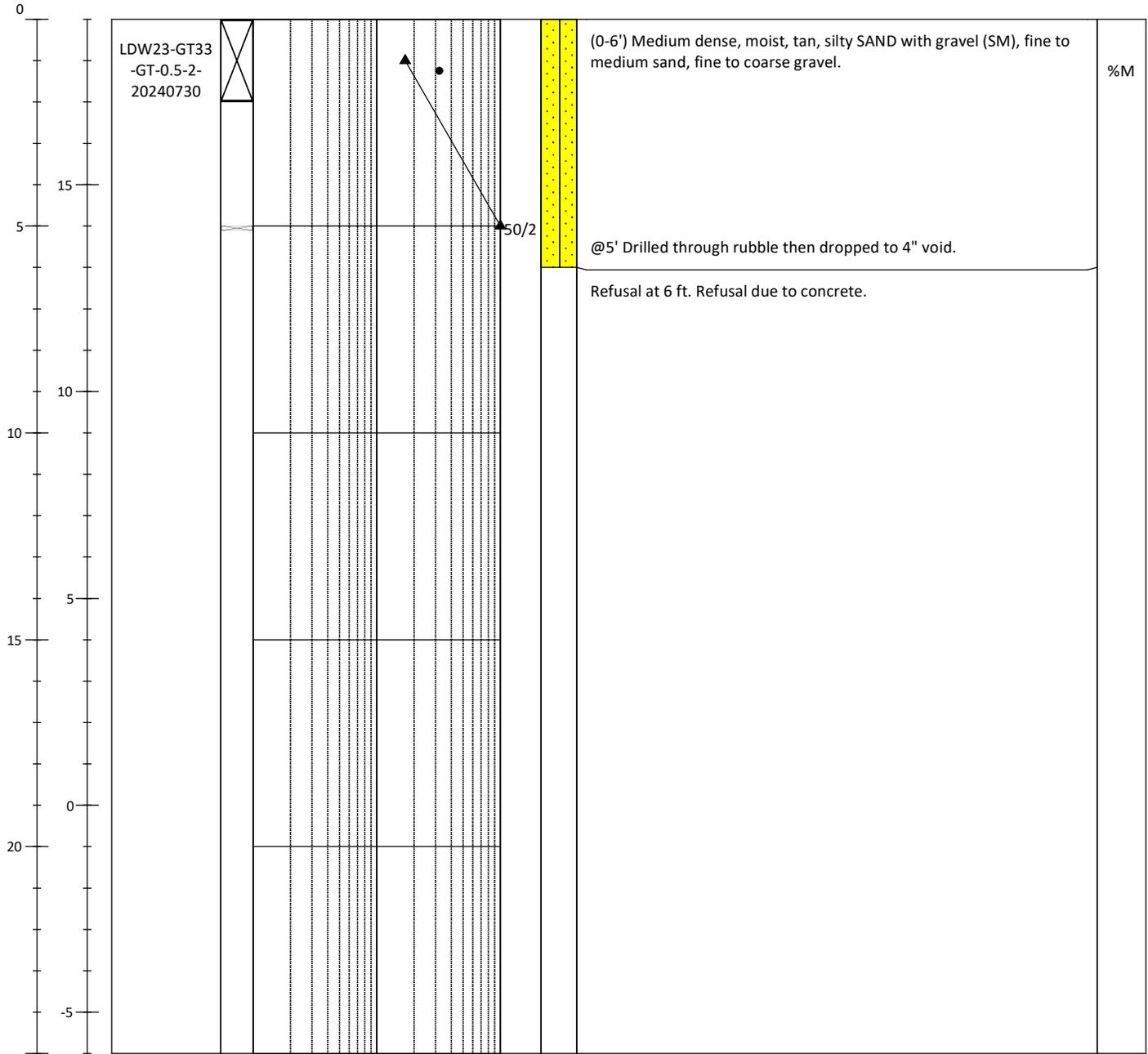
# Soil Boring Log

## LDW23-GT33-GT

Sheet 1 of 1

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200383.3</b> E/LONG: <b>1269966.43</b>	Total Depth (ft): <b>6</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>19</b>
Collection Date: <b>7/30/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

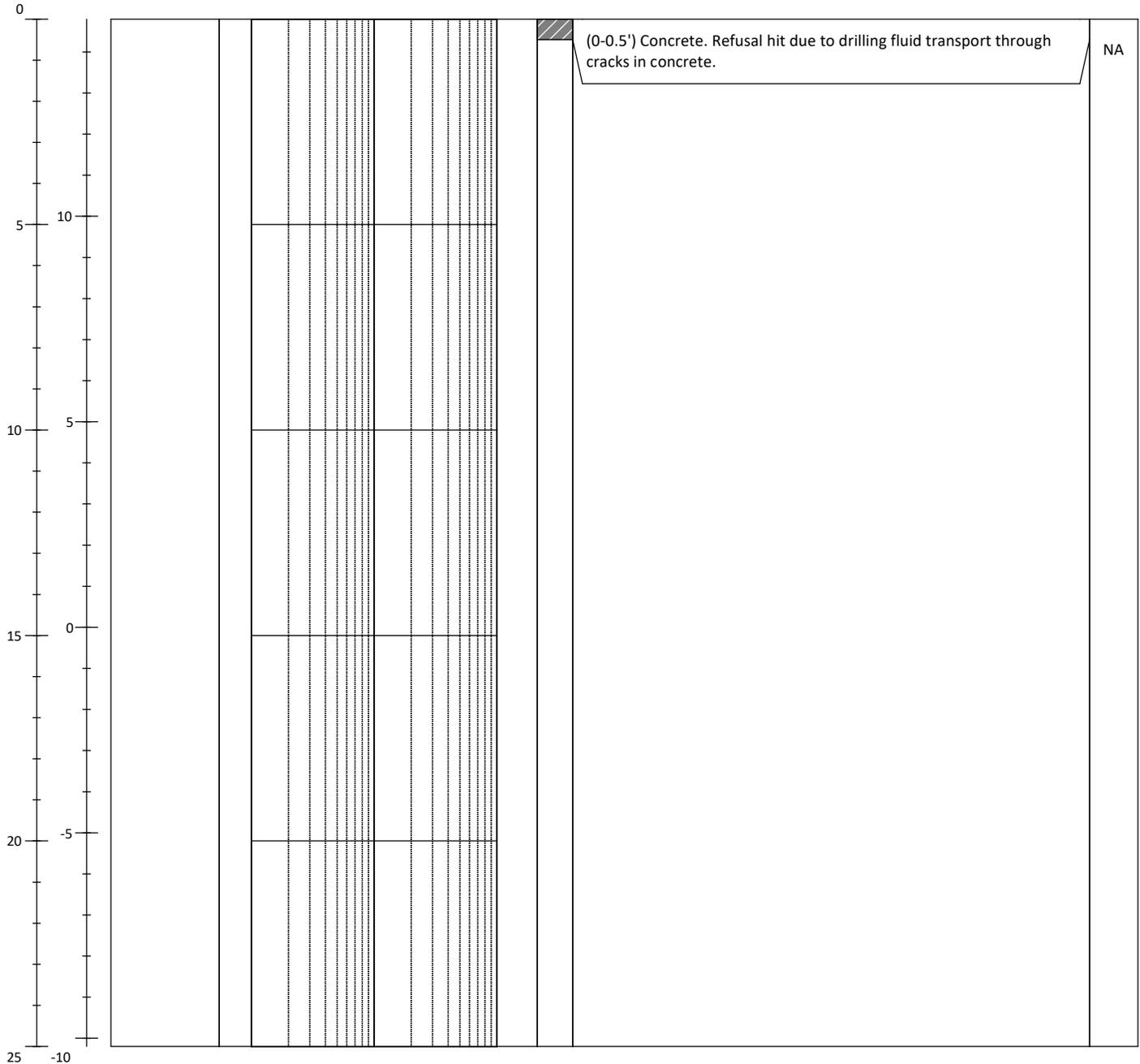
# Soil Boring Log

## LDW23-GT08-GT

Sheet 1 of 1

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>201889.93</b> E/LONG: <b>1269524.12</b>	Total Depth (ft): <b>0.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>14.8</b>
Collection Date: <b>8/02/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ☒ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution,  
 GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight,  
 CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear,  
 WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

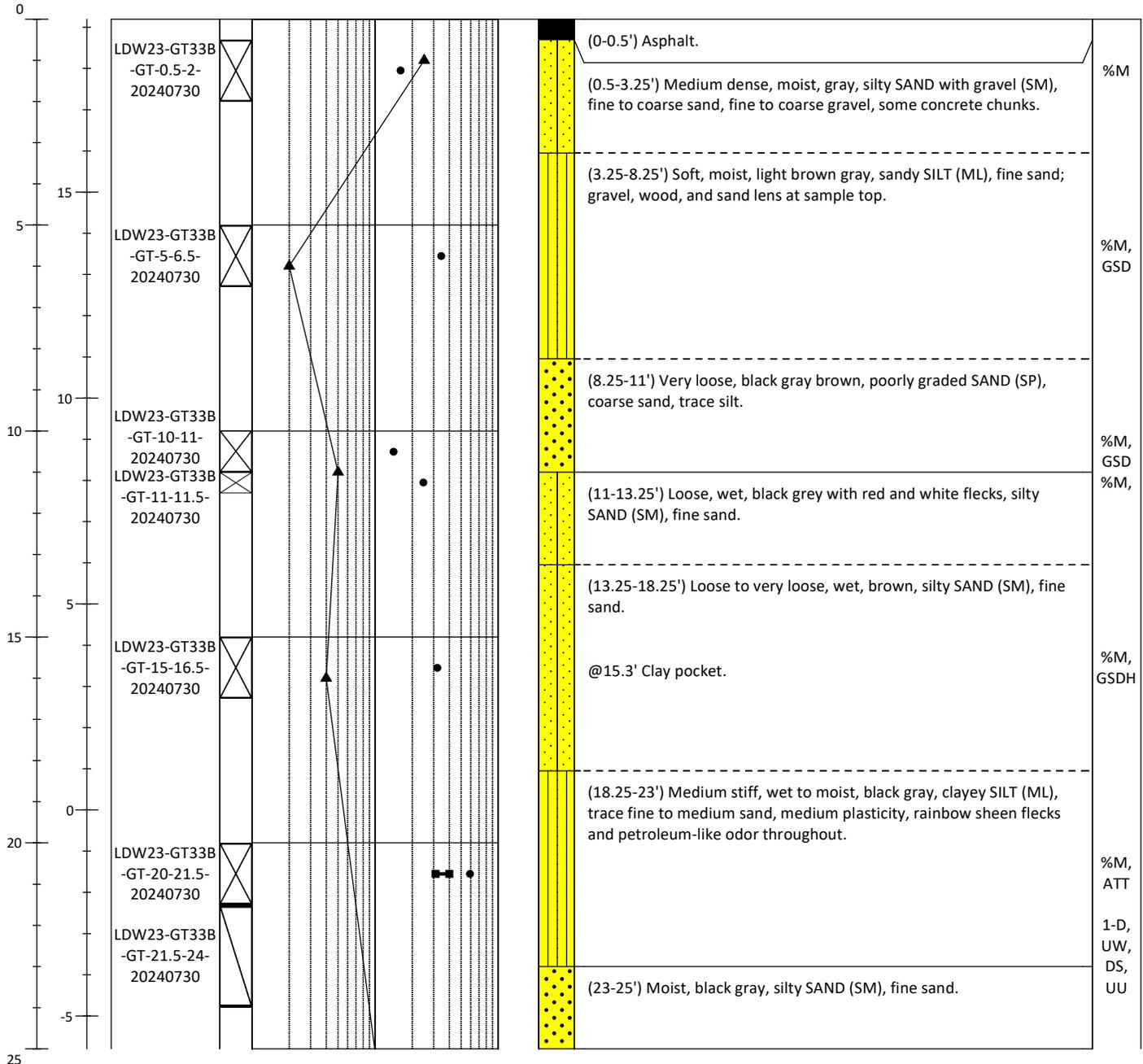
# Soil Boring Log

## LDW23-GT33B-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200384.88</b> E/LONG: <b>1269974.41</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>19.2</b>
Collection Date: <b>7/30/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

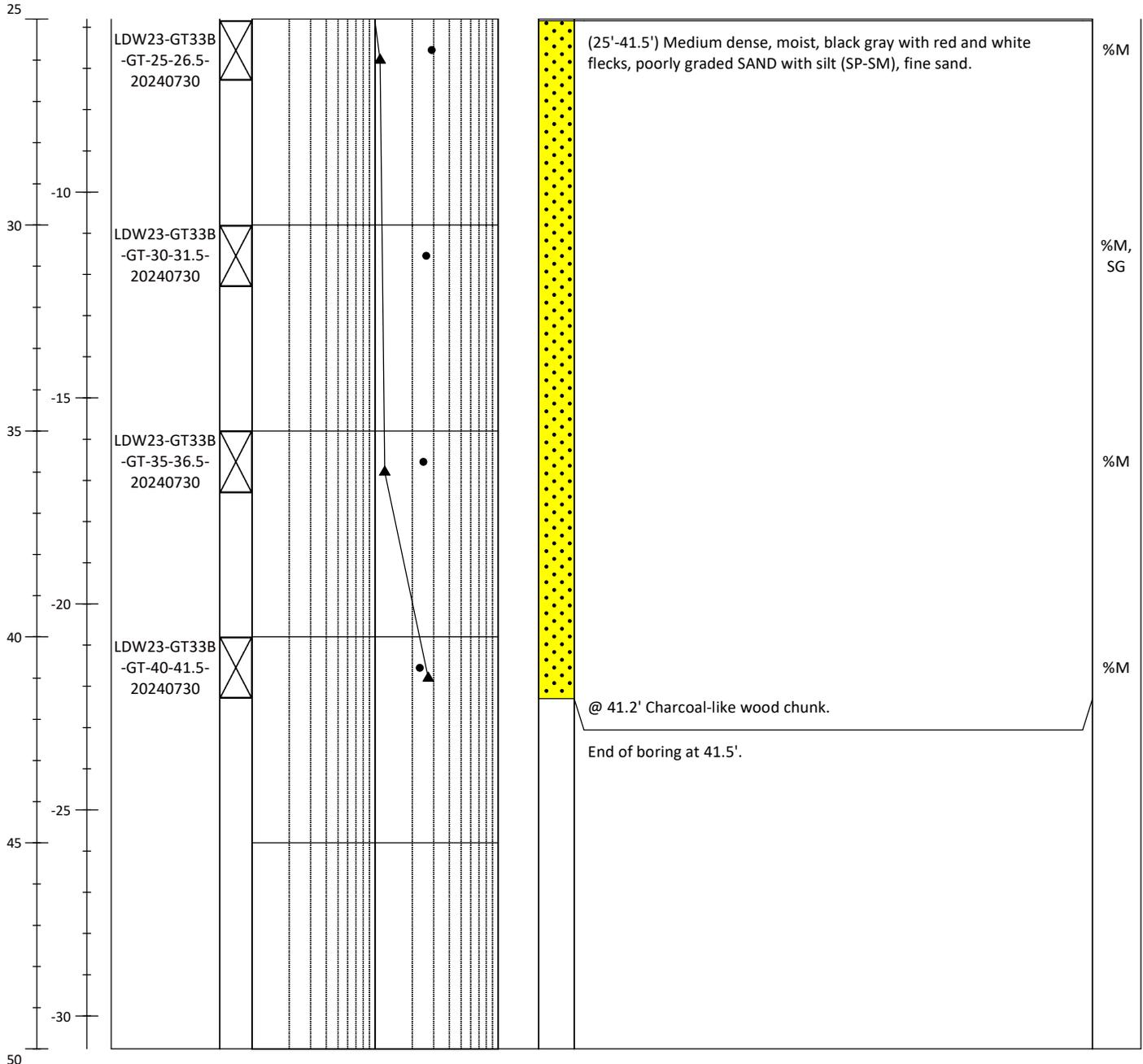
# Soil Boring Log

## LDW23-GT33B-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200384.88</b> E/LONG: <b>1269974.41</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>19.2</b>
Collection Date: <b>7/30/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

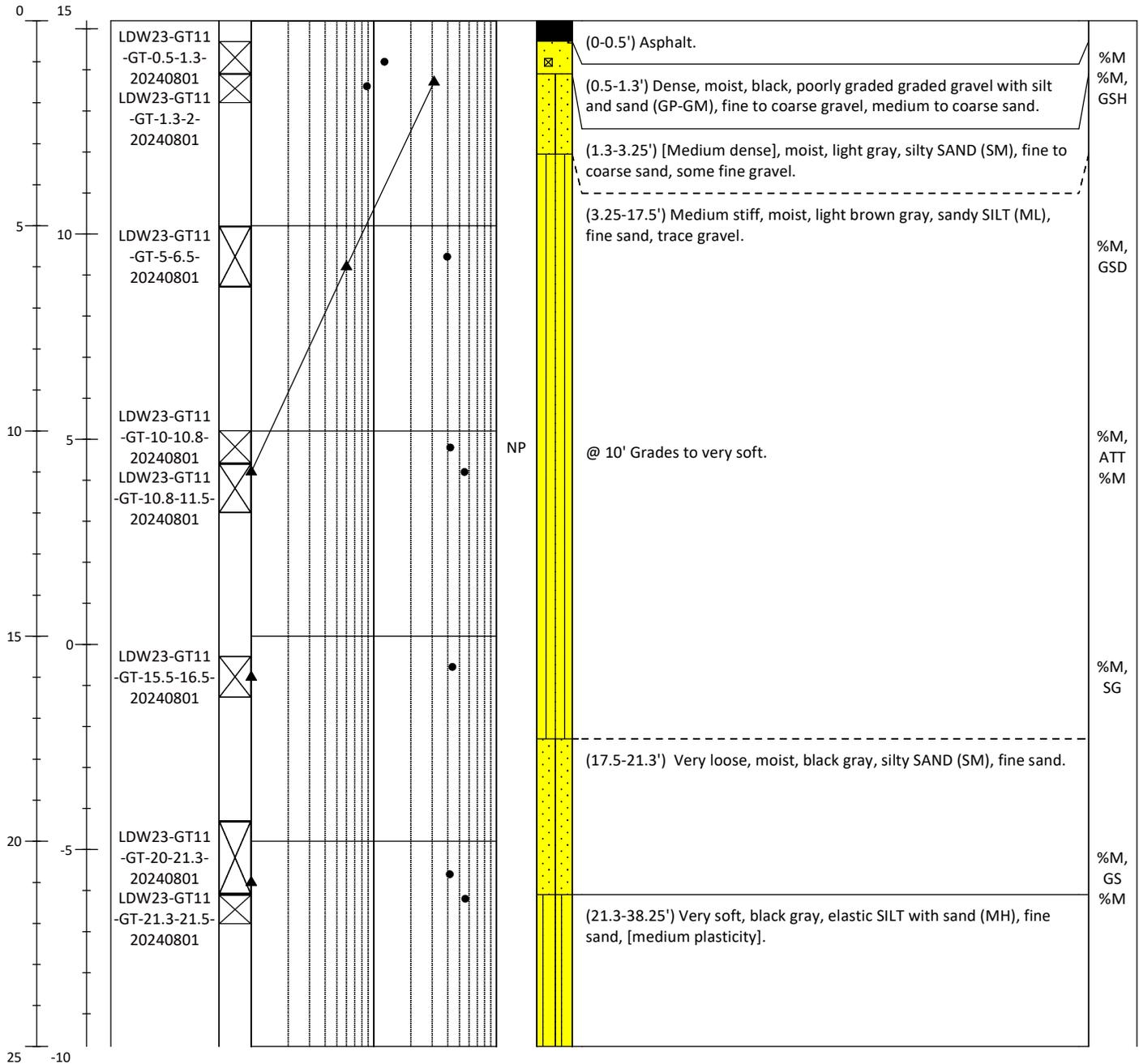
# Soil Boring Log

## LDW23-GT11-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200727.14</b> E/LONG: <b>1269907.48</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>15.2</b>
Collection Date: <b>8/01/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

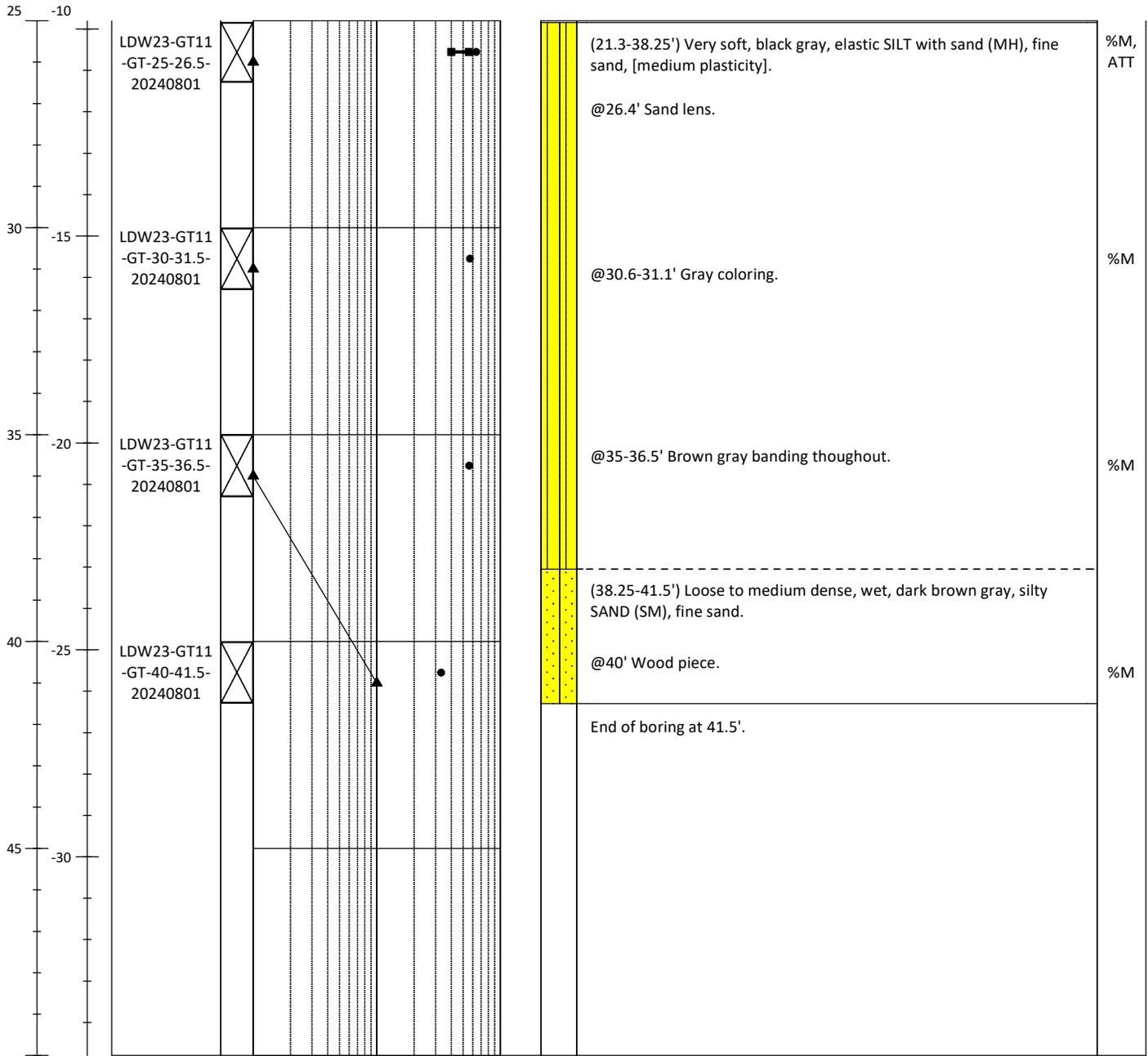
# Soil Boring Log

## LDW23-GT11-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200727.14</b> E/LONG: <b>1269907.48</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>15.2</b>
Collection Date: <b>8/01/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

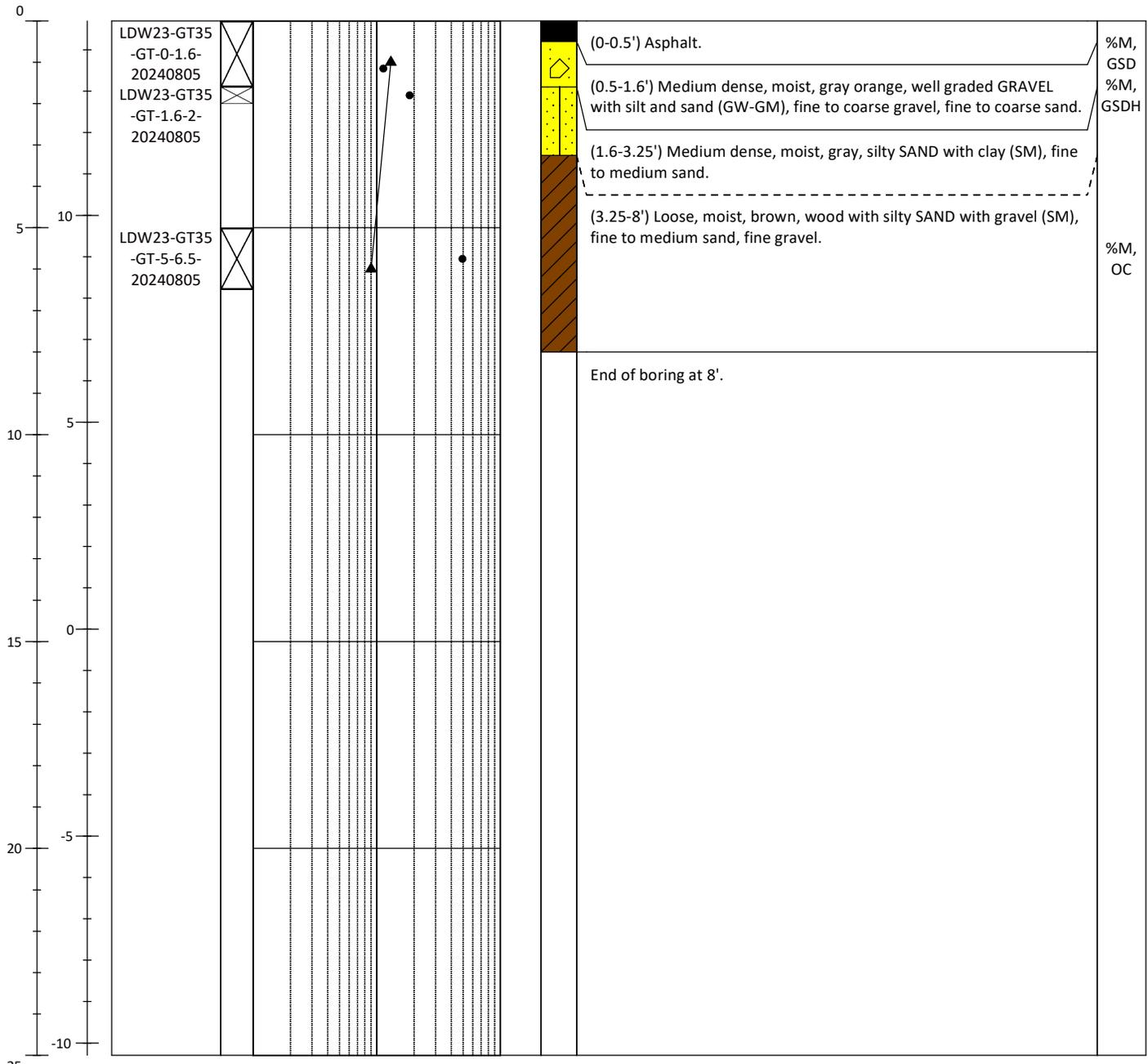
# Soil Boring Log

## LDW23-GT35-GT

Sheet 1 of 1

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200289.17</b> E/LONG: <b>1270118.91</b>	Total Depth (ft): <b>8.0</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>14.7</b>
Collection Date: <b>8/05/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits							Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50	100				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ☒ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

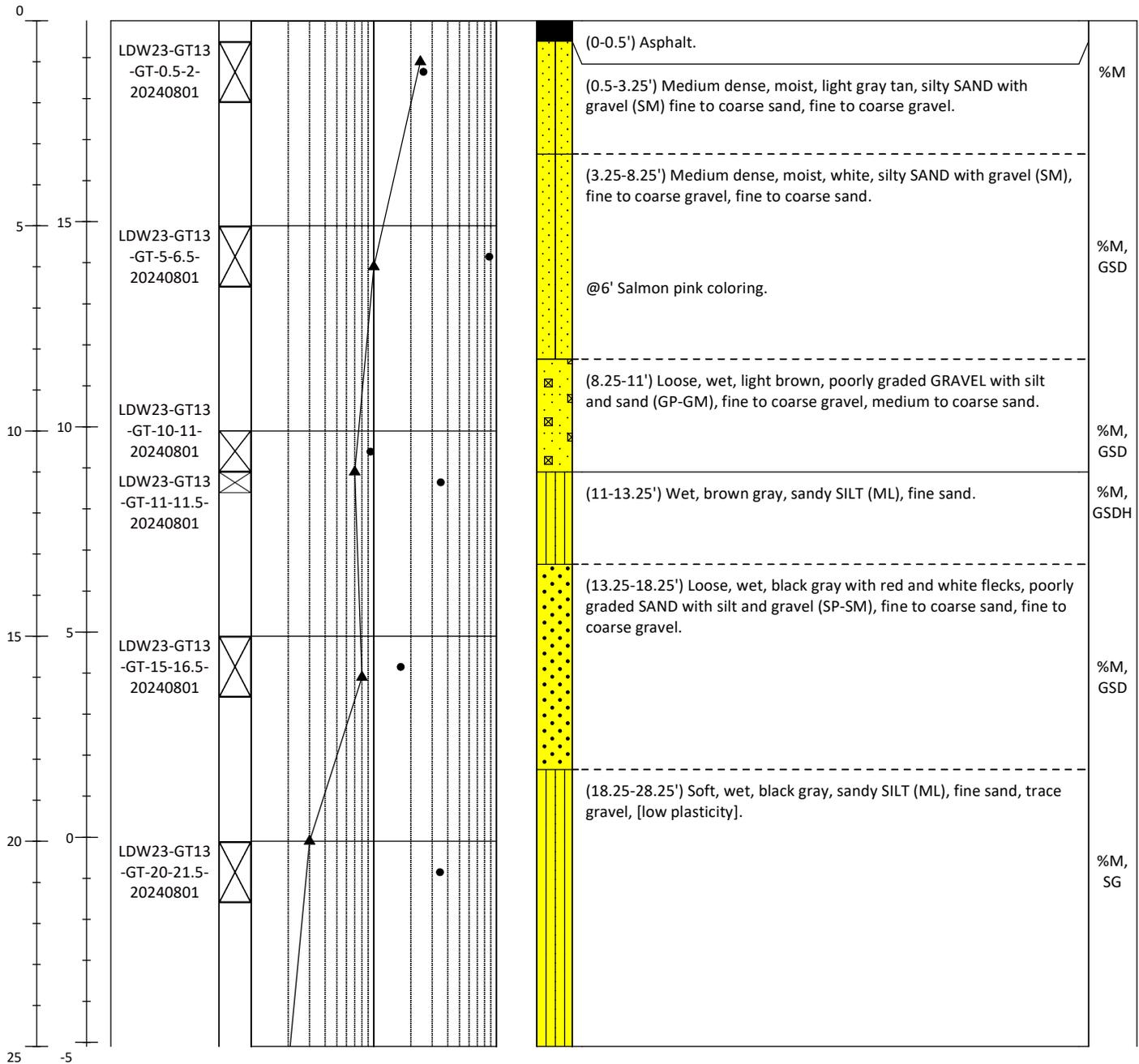
# Soil Boring Log

## LDW23-GT13-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200524.15</b> E/LONG: <b>1270094.75</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>19.9</b>
Collection Date: <b>8/01/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution,  
 GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight,  
 CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear,  
 WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

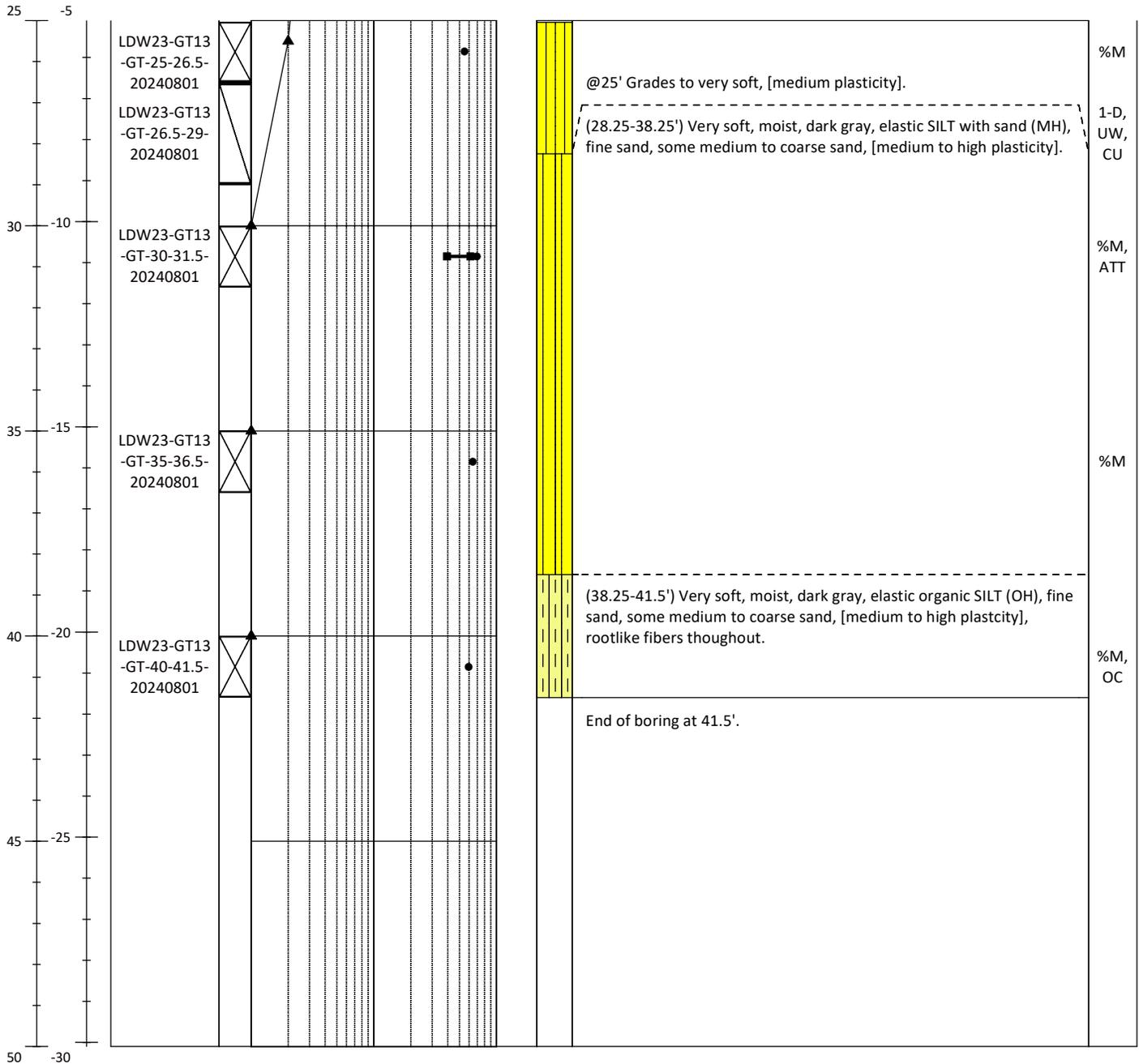
# Soil Boring Log

## LDW23-GT13-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200524.15</b> E/LONG: <b>1270094.75</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>19.9</b>
Collection Date: <b>8/01/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

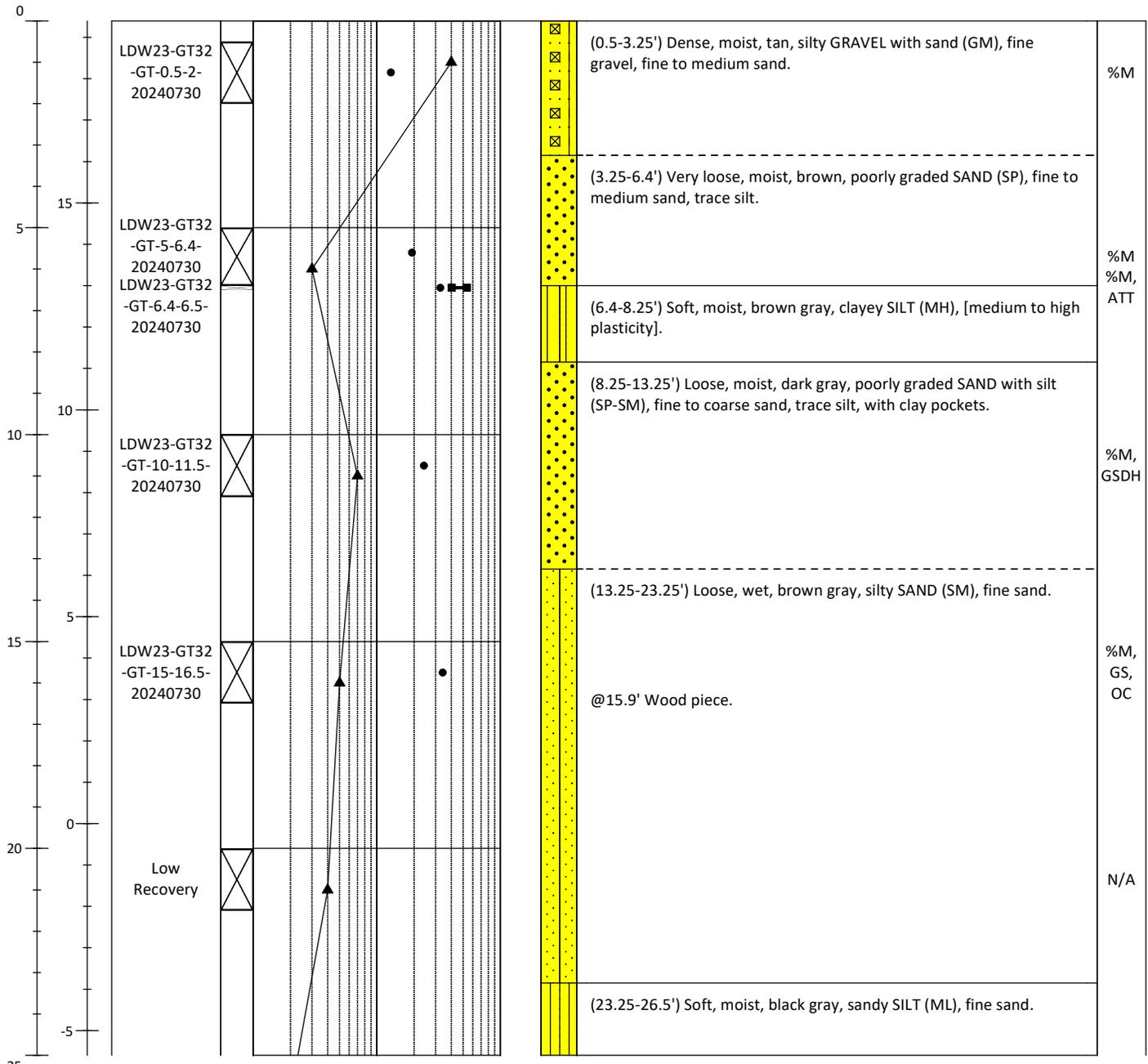
# Soil Boring Log

## LDW23-GT32-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200429.41</b> E/LONG: <b>1270112.12</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>19.4</b>
Collection Date: <b>7/30/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution,  
 GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight,  
 CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear,  
 WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

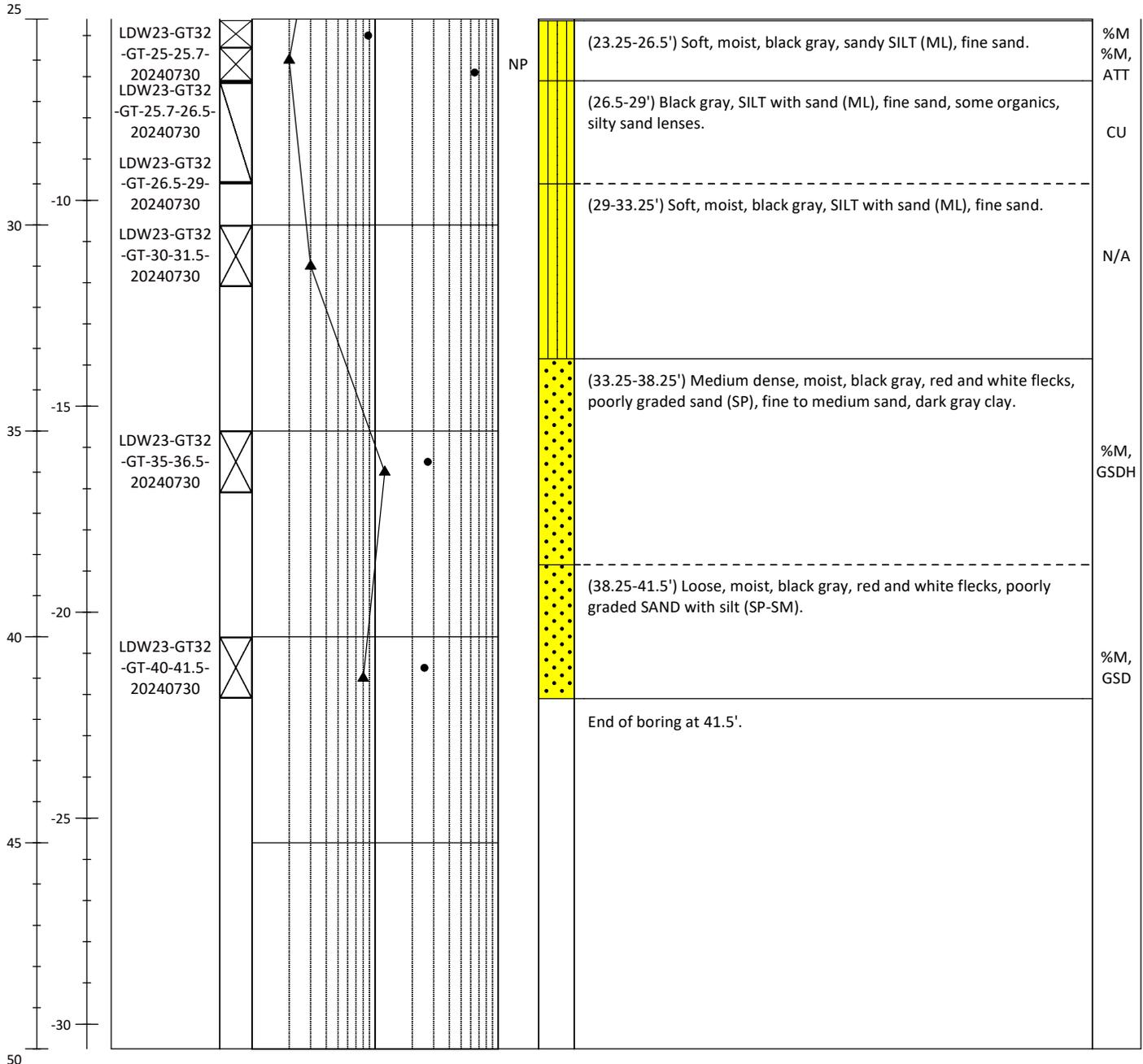
# Soil Boring Log

## LDW23-GT32-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200429.41</b> E/LONG: <b>1270112.12</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>19.4</b>
Collection Date: <b>7/30/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

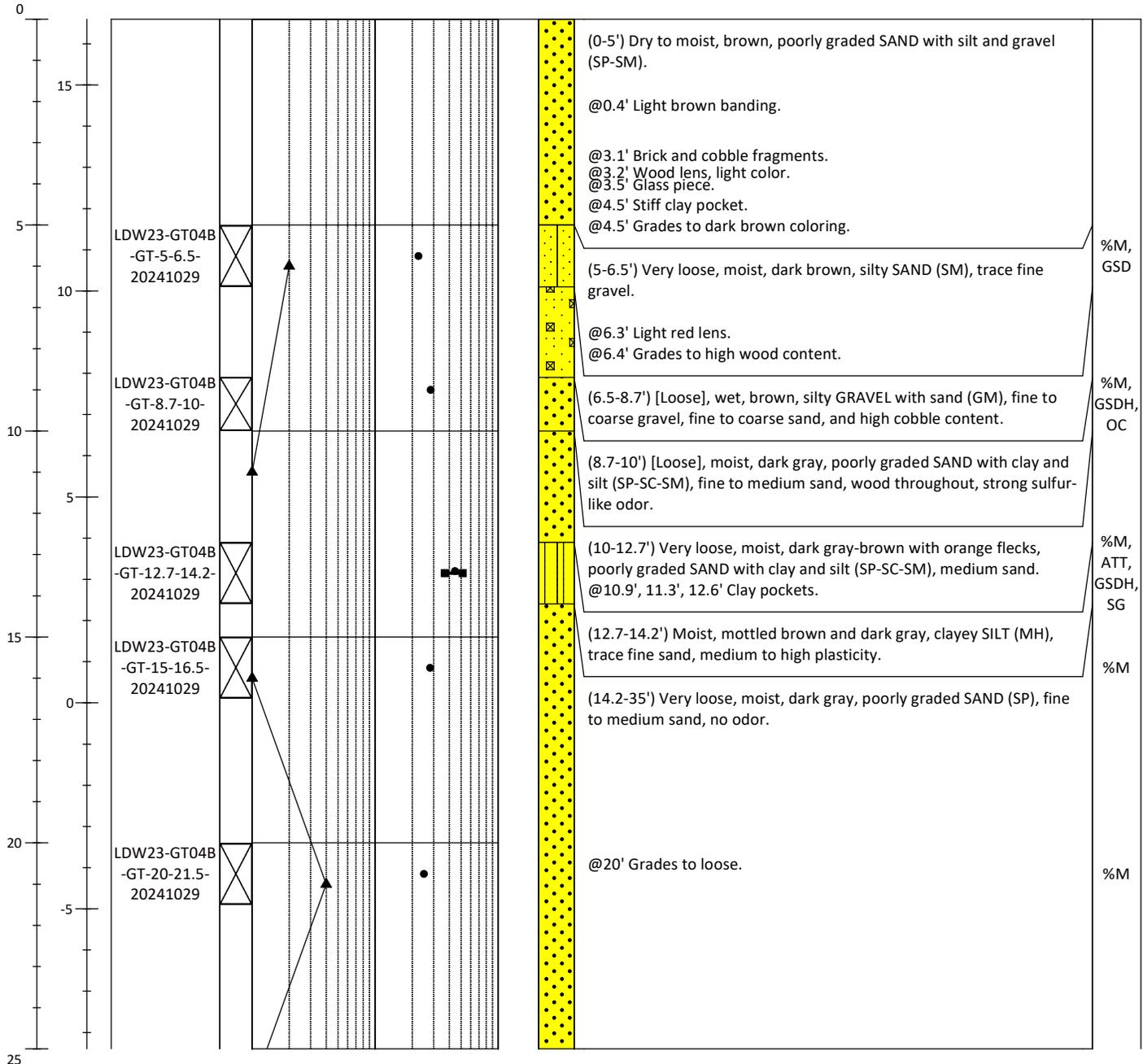
# Soil Boring Log

## LDW23-GT04B-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Rotary Sonic</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>202021.91</b> E/LONG: <b>1269411.66</b>	Total Depth (ft): <b>35</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>16.6</b>
Collection Date: <b>10/29/2024</b>		
Contractor: <b>Holt</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP, LD</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ☒ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution,  
 GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight,  
 CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear,  
 WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

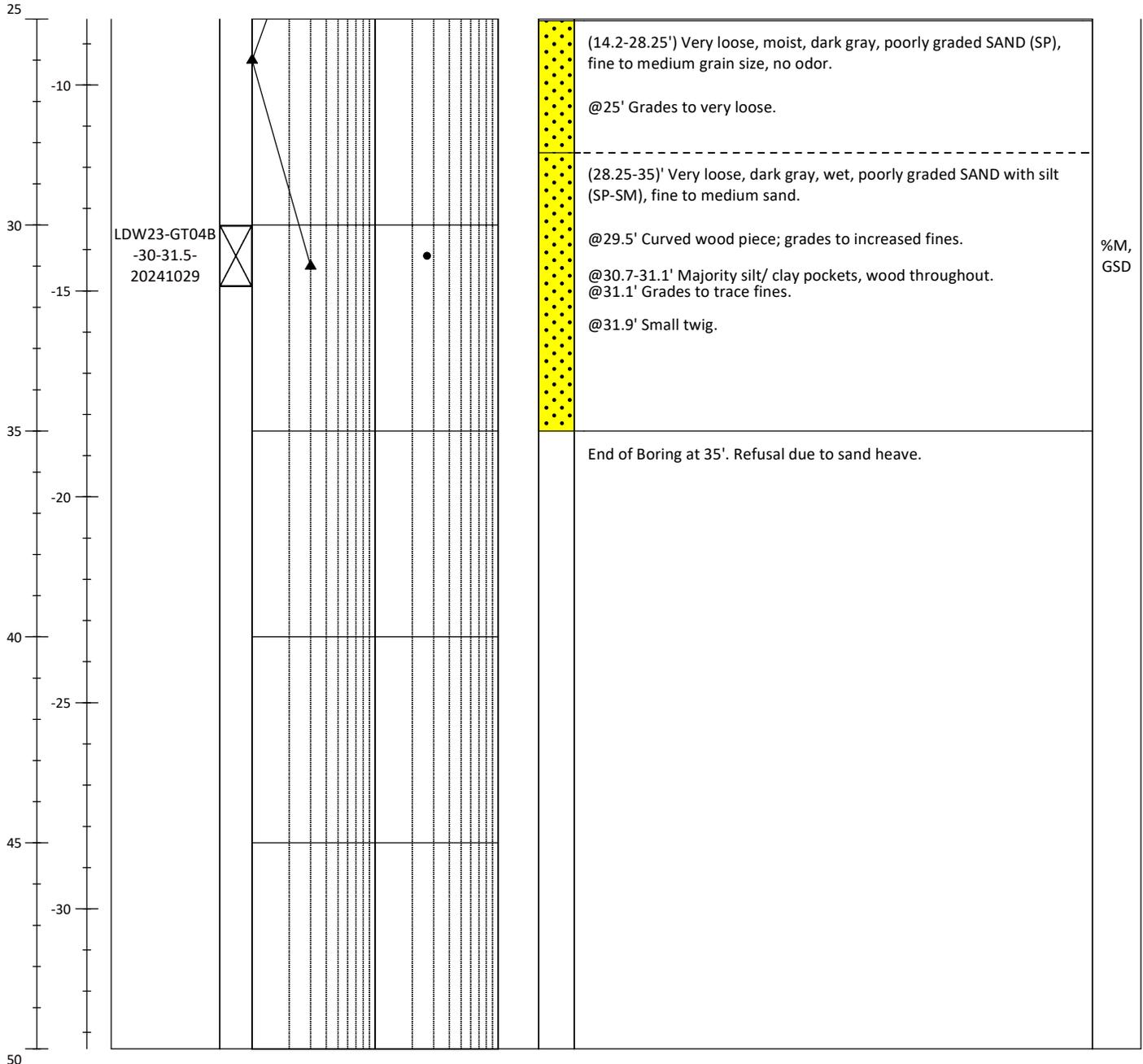
# Soil Boring Log

## LDW23-GT04B-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Rotary Sonic</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>202021.91</b> E/LONG: <b>1269411.66</b>	Total Depth (ft): <b>35</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>16.6</b>
Collection Date: <b>10/29/2024</b>		
Contractor: <b>Holt</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP, LD</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ☒ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

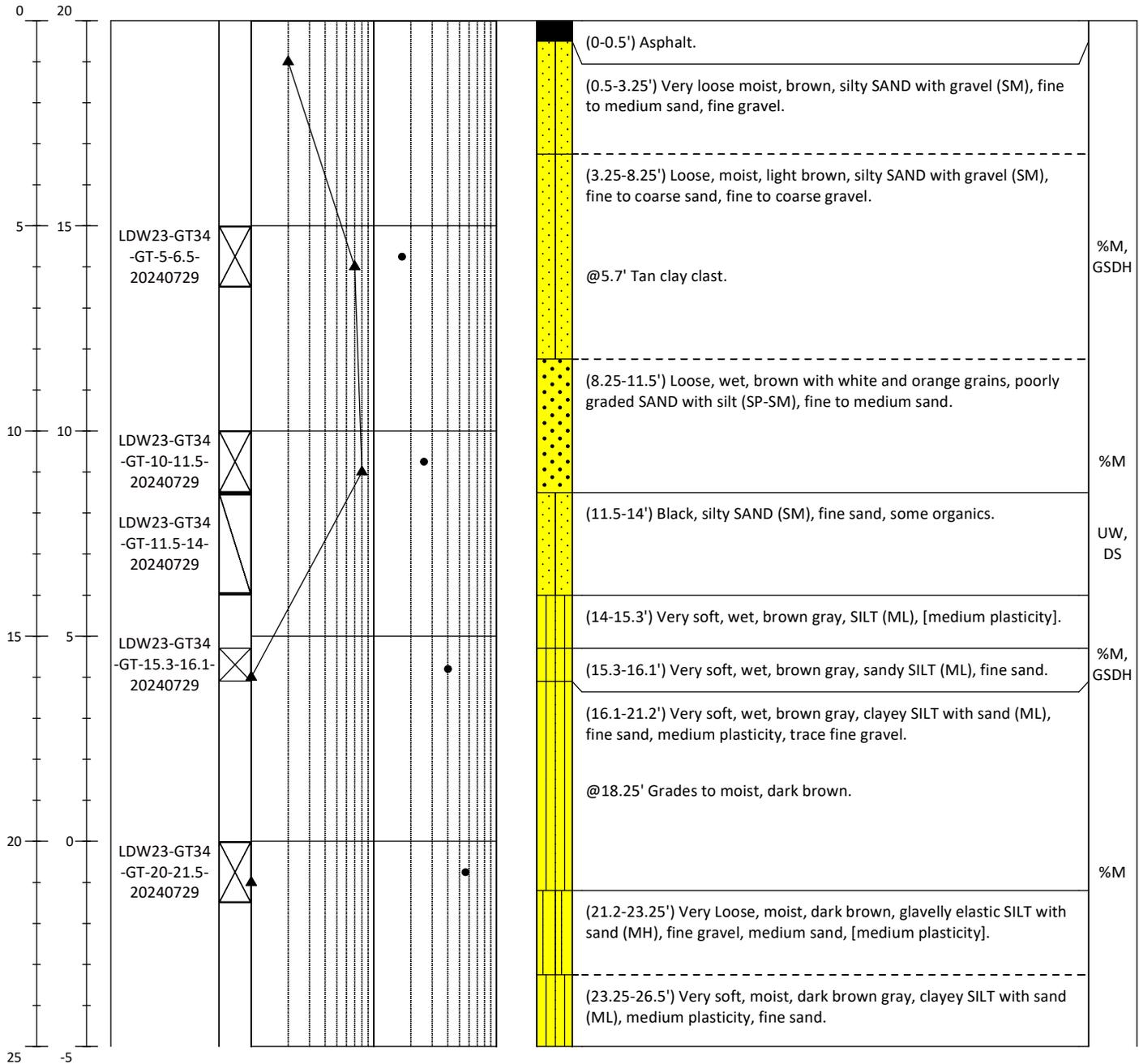
# Soil Boring Log

## LDW23-GT34-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200414.57</b> E/LONG: <b>1269815.3</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>20</b>
Collection Date: <b>7/29/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

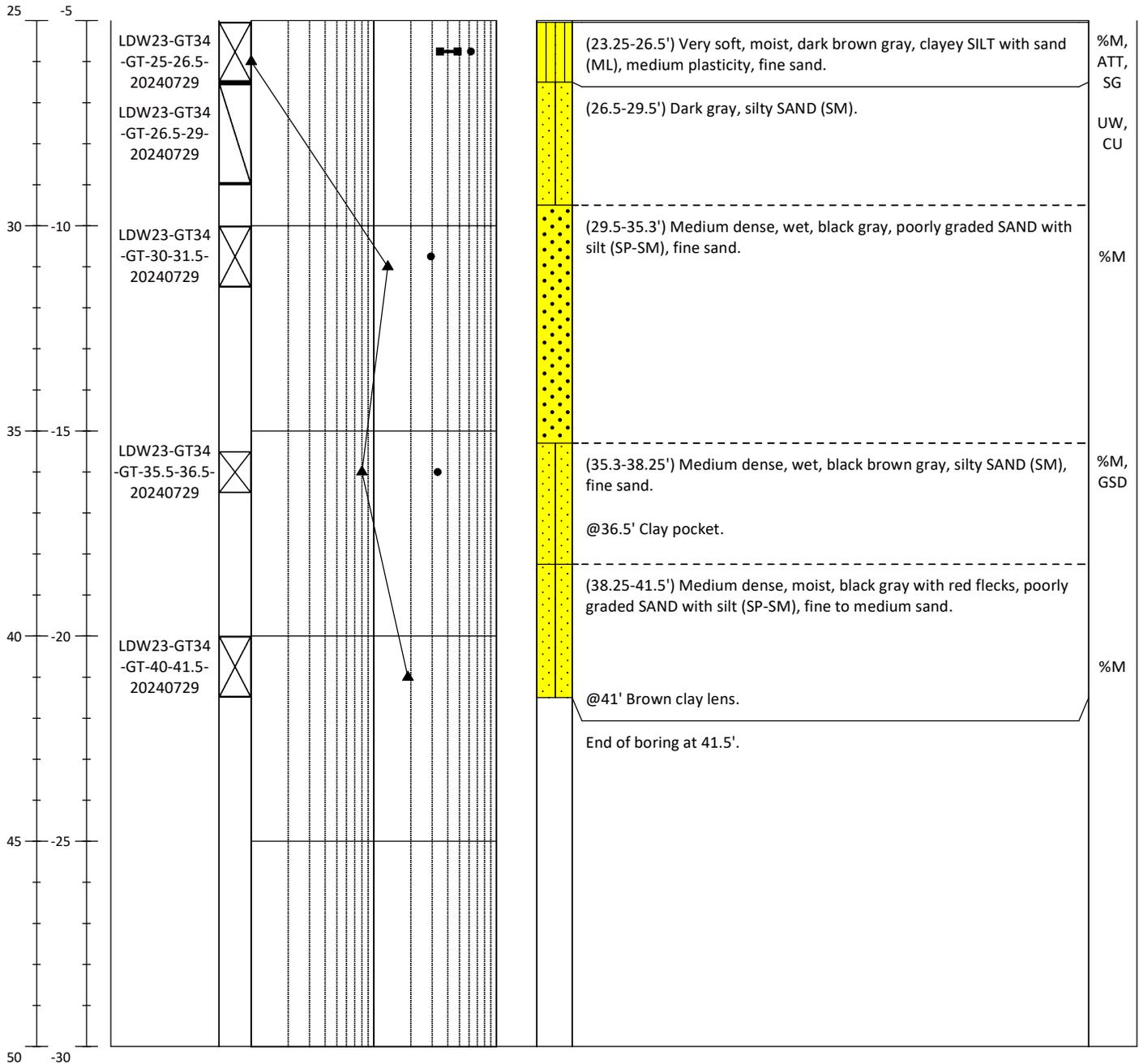
# Soil Boring Log

## LDW23-GT34-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200414.57</b> E/LONG: <b>1269815.3</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>20</b>
Collection Date: <b>7/29/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon &amp; Shelby Tube Sampler</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



<p>1201 Third Avenue Suite 2600 Seattle, WA 98101</p>	<ul style="list-style-type: none"> <li>▲ SPT N-Value</li> <li>● Moisture Content (%)</li> <li>■ Atterberg Limits</li> <li>▣ Shelby Tube</li> <li>⊠ Split Spoon/Grab</li> </ul>	<p><b>Notes:</b>                  %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution,                  GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight,                  CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear,                  WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic                  Mudline elevations determined from leadline measurements and Site tide gage levels.</p>
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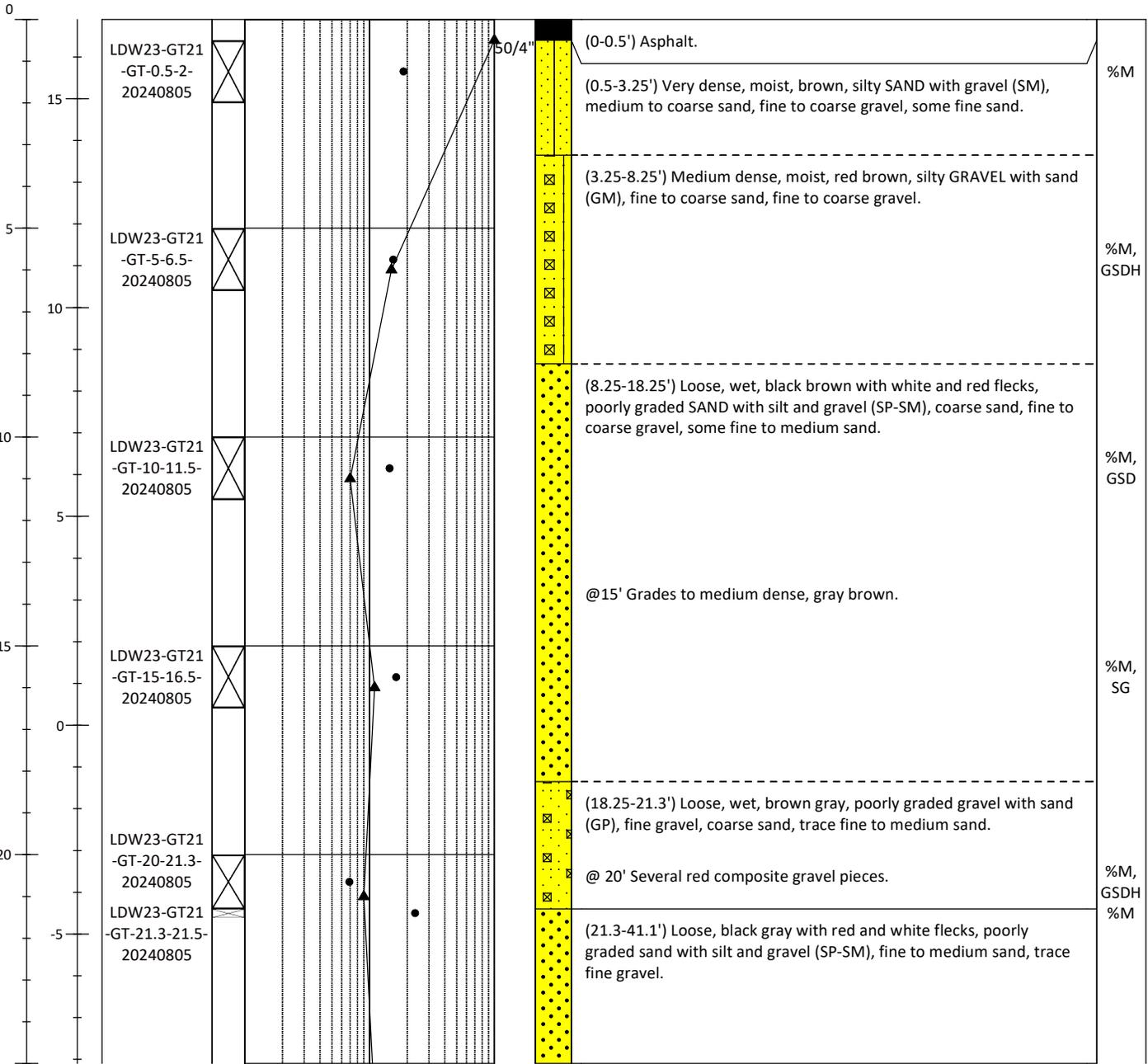
# Soil Boring Log

## LDW23-GT21-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>199546.89</b> E/LONG: <b>1271776.13</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>16.9</b>
Collection Date: <b>8/05/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits							Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50	100				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

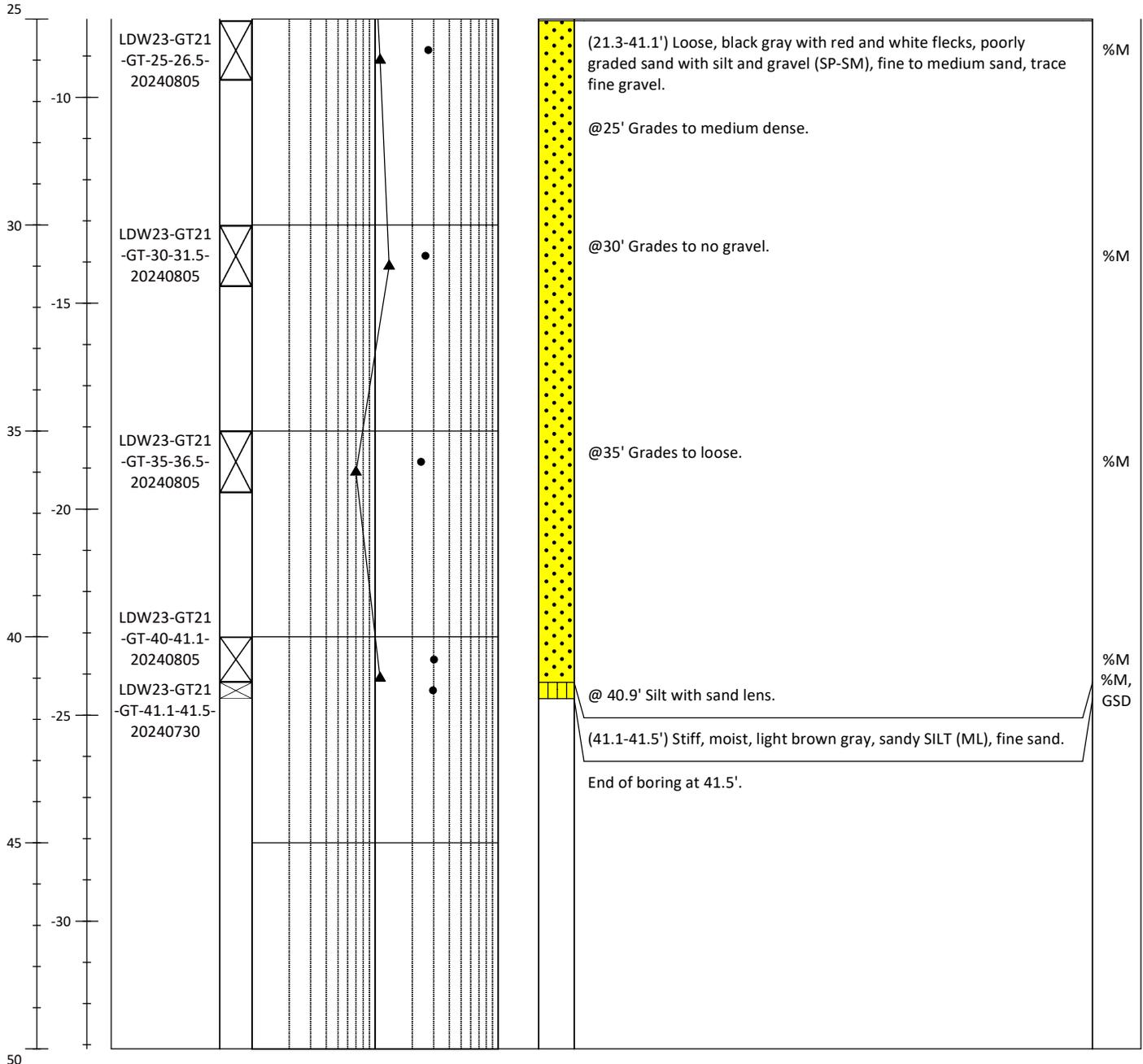
# Soil Boring Log

## LDW23-GT21-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Mud Rotary</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>199546.89</b> E/LONG: <b>1271776.13</b>	Total Depth (ft): <b>41.5</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>16.9</b>
Collection Date: <b>8/05/2024</b>		
Contractor: <b>HOLT</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits							Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50	100				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ☒ Split Spoon/Grab

**Notes:**

%M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

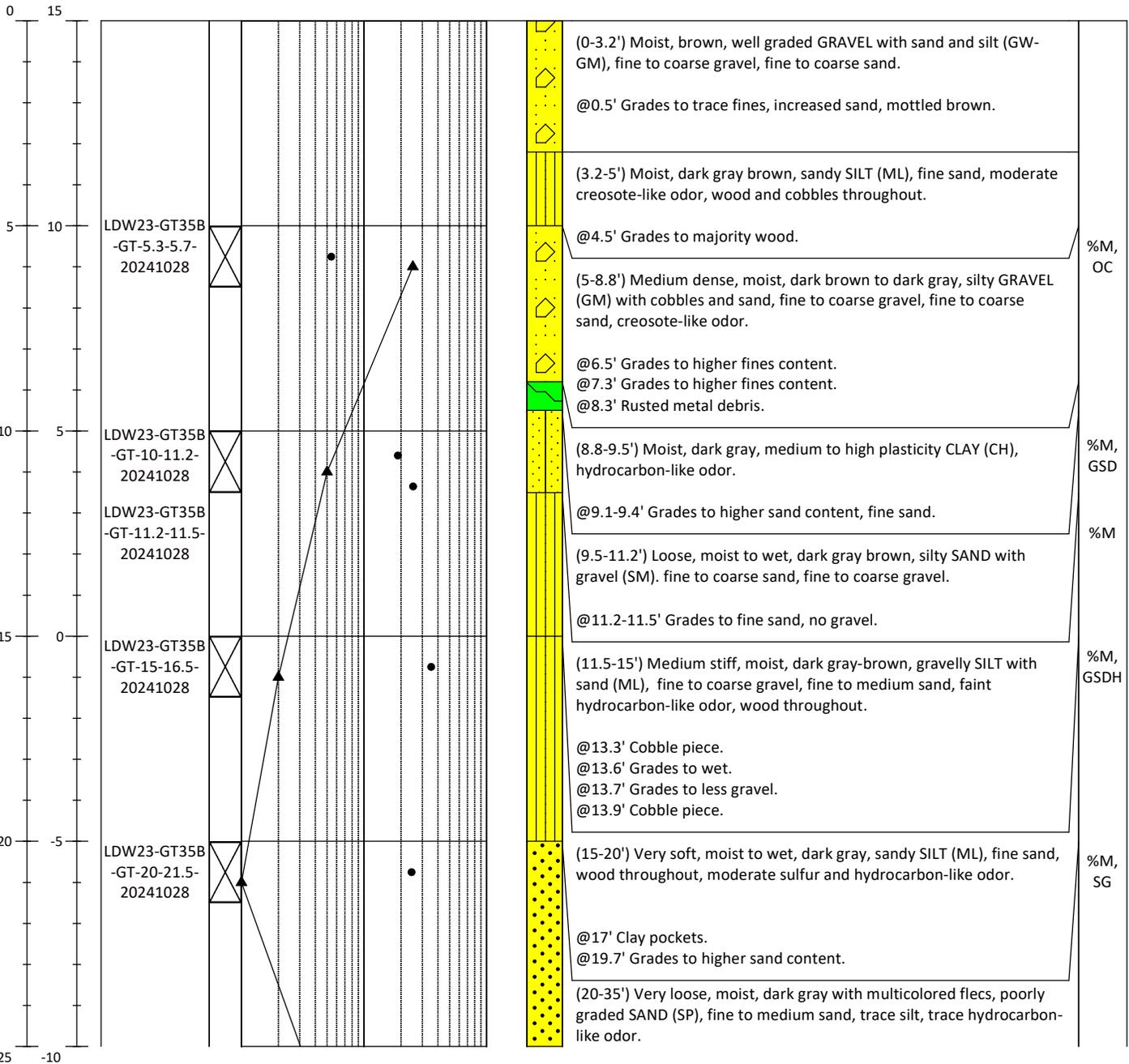
# Soil Boring Log

## LDW23-GT35B-GT

Sheet 1 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Rotary Sonic</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200284.28</b> E/LONG: <b>1270098.35</b>	Total Depth (ft): <b>35</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>15</b>
Collection Date: <b>10/28/24</b>		
Contractor: <b>Holt</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP, LD</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot) Moisture Content (%) and Atterberg Limits						Other Values	Lithology	Soil Description <small>Samples and descriptions are in recovered depths. Classification scheme: USCS</small>	Lab Test
				1	2	5	10	20	50				



- ▲ SPT N-Value
- Moisture Content (%)
- Atterberg Limits
- ▣ Shelby Tube
- ⊠ Split Spoon/Grab

**Notes:**  
 %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution, GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight, CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear, WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic  
 Mudline elevations determined from leadline measurements and Site tide gage levels.

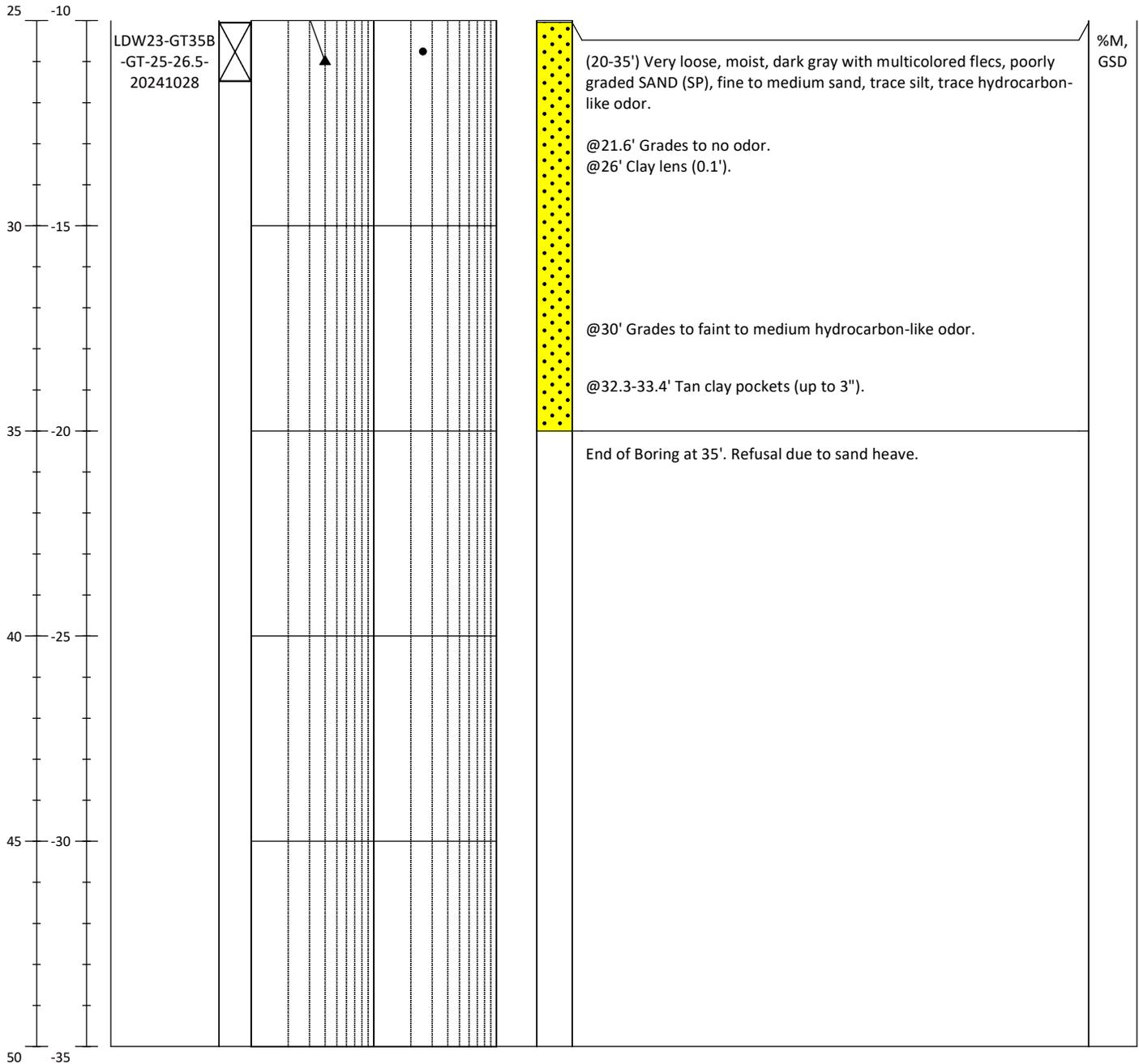
# Soil Boring Log

## LDW23-GT35B-GT

Sheet 2 of 2

Project #: <b>210075-01.03</b>	Project: <b>Middle Reach of Lower Duwamish Waterway</b>	Method: <b>Rotary Sonic</b>
Location: <b>Seattle, WA</b>	N/LAT: <b>200284.28</b> E/LONG: <b>1270098.35</b>	Total Depth (ft): <b>35</b>
Client: <b>City of Seattle</b>	Horiz. Datum: <b>Washington State Plane Coordinate North North American Datum of 1983, U.S. Feet</b>	Ground Surface Elevation (ft): <b>15</b>
Collection Date: <b>10/28/24</b>		
Contractor: <b>Holt</b>	Vert. Datum: <b>MLLW</b>	Hammer: <b>140-lb, 30-in drop, Auto</b>
Logged By: <b>RP, LD</b>	Sampler(s): <b>Split Spoon</b>	

Depth (ft)	Elevation (ft)	Sample ID	Sample Type	Uncorrected Standard Penetration Resistance (blows per foot)						Other Values	Lithology	Soil Description Samples and descriptions are in recovered depths. Classification scheme: USCS	Lab Test
				1	2	5	10	20	50				



<p>1201 Third Avenue Suite 2600 Seattle, WA 98101</p>	<ul style="list-style-type: none"> <li>▲ SPT N-Value</li> <li>● Moisture Content (%)</li> <li>■ Atterberg Limits</li> <li>▣ Shelby Tube</li> <li>☒ Split Spoon/Grab</li> </ul>	<p><b>Notes:</b>          %M = Percent Moisture Content, SG = Specific Gravity, ATT = Atterberg Limits, GSD = Grainsize Distribution,          GSDH = Grainsize Distribution+Hydrometer, 1-D = One-dimensional Consolidation, UW = Unit Weight,          CU = Consolidated Triaxial, UU = Unconsolidated Triaxial, OC = Organic Content, DS = Direct Shear,          WOH = Weight of Hammer, WOR = Weight of Rod, NP = Non-plastic          Mudline elevations determined from leadline measurements and Site tide gage levels.</p>
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FINAL

# Attachment B-3

## Cone Penetrometer Testing Reports

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# PRESENTATION OF SITE INVESTIGATION RESULTS

## Lower Duwamish Waterway Middle Reach

**Prepared for:**

**Anchor QEA**

**ConeTec Job No: 24-59-27874**

Project Start Date: 2024-07-08

Project End Date: 2024-07-14

Release Date: 2024-08-20

**Report Prepared by:**

**ConeTec, Inc.**

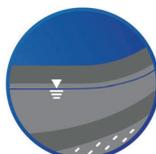
1237 S Director Street, Seattle, WA 98108

Tel: (253) 397-4861

ConeTecWA@conetec.com

www.conetec.com

www.conetecdataservices.com



# ABOUT THIS REPORT

The enclosed report presents the results of the site investigation program conducted by ConeTec, Inc. for Anchor QEA.

Please note that this report, which also includes all accompanying data, are subject to the 3<sup>rd</sup> Party Disclaimer and Client Disclaimer that follow in the 'Limitations' section of this report. Please refer to the list of attached documents following the text of this report. A site map, test summaries, and test plots are all included in the body of the report.

Project	
Client	Anchor QEA
Project	Lower Duwamish Waterway Middle Reach
ConeTec Project Number	24-59-27874
Test Types	CPTu, BCPT
Additional Comments	BCPT Cycling was performed at selected locations and depths.

## Contents

The following listed below are included in the body of this report:

- Site Map
- Limitations and Closure
- Project Information
- Report Appendices
- Supporting Documents and Materials

# SITE MAP



All locations are approximate unless otherwise stated in the body of the report.

**ConeTec Job Number:** 24-59-27874

**Client:** Anchor QEA

**Project:** Lower Duwamish Waterway Middle Reach

**Date:** 2024-08-20

# LIMITATIONS

## 3<sup>rd</sup> Party Disclaimer

The “Report” refers to this report titled: Lower Duwamish Waterway Middle Reach

The Report was prepared by ConeTec for: Anchor QEA

The Report is confidential and may not be distributed to or relied upon by any third parties without the express written consent of ConeTec. Any third parties gaining access to the Report do not acquire any rights as a result of such access. Any use which a third party makes of the Report, or any reliance on or decisions made based on it, are the responsibility of such third parties. ConeTec accepts no responsibility for loss, damage and/or expense, if any, suffered by any third parties as a result of decisions made, or actions taken or not taken, which are in any way based on, or related to, the Report or any portion(s) thereof.

## Client Disclaimer

ConeTec was retained by: Anchor QEA

The “Report” refers to this report titled: Lower Duwamish Waterway Middle Reach

ConeTec was retained to collect and provide the raw data (“Data”) which is included in the Report.

ConeTec has collected and reported the Data in accordance with current industry standards. No other warranty, express or implied, with respect to the Data is made by ConeTec. In order to properly understand the Data included in the Report, reference must be made to the documents accompanying and other sources referenced in the Report in their entirety. Other than the Data, the contents of the Report (including any Interpretations) should not be relied upon in any fashion without independent verification and ConeTec is in no way responsible for any loss, damage or expense resulting from the use of, and/or reliance on, such material by any party.

## Closure

Thank you for the opportunity to work on this project. The equipment used as well the field procedures followed, all complied with current accepted best practice standards.

Report prepared by: Jesse Martinez, Anthony Rasmussen, Jim Grieg

## PROJECT INFORMATION

Rig		
Description	Deployment System	Test Type
C05-026 CPT Track Rig	Twin mounted cylinders	CPTu, BCPT

Coordinates		
Test Type	Collection Method	EPSG Number
CPTu, BCPT	Consumer Grade GPS	4326 (WGS84 / Lat-Long)

Piezocones Used for this Project						
Cone Description	Cone Number	Cross Sectional Area (cm <sup>2</sup> )	Sleeve Area (cm <sup>2</sup> )	Tip Capacity (bar)	Sleeve Capacity (bar)	Pore Pressure Capacity (bar)
EC681:T375F10U35	681	15	225	375	10	35
EC767:T1000F10U35	767	10	150	1000	10	35
EC1007:T1500F15U35	1007	15	225	1500	15	35

The CPTu and BCPT summaries indicate which cone was used for each sounding.

Cone Penetration Test (CPTu)	
<b>Depth reference</b>	Depths are referenced to the existing ground surface at the time of each test.
<b>Tip and sleeve data offset</b>	0.1 Meters. This has been accounted for in the CPT data files.
<b>Unit Weights</b>	Unit weights for water (9.81 kN/m <sup>3</sup> ) and the soil (17.5 kN/m <sup>3</sup> ) were assumed and applied to calculations for specific depth layers, otherwise defined by Q <sub>tn</sub> (SBT Q <sub>tn</sub> ) (Robertson, 2009). An assumed unit weight profile summary is included in the appendices.

## Calculated Geotechnical Parameters

<b>Additional information</b>	<p>The Normalized Soil Behaviour Type Chart based on <math>Q_{tn}</math> (SBT <math>Q_{tn}</math>) (Robertson, 2009) was used to classify the soil for this project. A detailed set of calculated CPTu parameters have been generated and are provided in Excel format files in the release folder. The CPTu parameter calculations are based on values of corrected tip resistance (<math>q_t</math>) sleeve friction (<math>f_s</math>) and pore pressure (<math>u_2</math>).</p> <p>Effective stresses are calculated based on unit weights that have been assigned to the individual soil behaviour type zones and the assumed equilibrium pore pressure profile.</p> <p>Soils were classified as either drained or undrained based on the <math>Q_{tn}</math> Normalized Soil Behaviour Type Chart (Robertson, 2009). Calculations for both drained and undrained parameters were included for materials that classified as silt mixtures (zone 4).</p>
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## Full-Flow Cone Penetrometer Test (BCPT)

<b>Depth reference</b>	Depths are referenced to mudline surface at the time of each test.
<b>Unit Weights</b>	Unit weights for water (9.81 kN/m <sup>3</sup> ) and the soil (17.5 kN/m <sup>3</sup> ) were assumed and applied to calculations for specific depth layers. An assumed unit weight profile summary is included in the appendices.
<b>Additional information</b>	Ball cycling was performed at select locations and specific depths.

# REPORT APPENDICES

The appendices listed below are included in the report:

- **Cone Penetration Test (CPTu) Summary, Unit Weight Summary and CPT Plots**
- **Standard CPTu Plots with Reduced Scales**
- **Advanced CPTu Plots**
- **Soil Behavior Type (SBT) Scatter Plots**
- **Full-Flow Ball Cone Penetration Test (BCPT) Summary, Unit Weight Summary and BCPT Plots**
- **Supplementary Documents and Materials**

**Cone Penetration Test (CPTu) Summary, Unit Weight  
Summary and CPTu Plots**



**Job No:** 24-59-27874  
**Client:** Anchor QEA  
**Project:** Lower Duwamish Waterway Middle Reach  
**Start Date:** 2024-07-08  
**End Date:** 2024-07-14

### CONE PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Cone Area (cm <sup>2</sup> )	Assumed Phreatic Surface <sup>1</sup> (ft)	Final Depth (ft)	Latitude <sup>2</sup>	Longitude <sup>2</sup>	Refer to Notation Number
LDW23-GT01-GT	24-59-27874_CP01	2024-07-12	1007:T1500F15U35	15	-26.7	42.32	47.54392	-122.33734	
LDW23-GT03-GT	24-59-27874_CP03	2024-07-12	1007:T1500F15U35	15	-22.2	43.39	47.54227	-122.33505	
LDW23-GT05-GT	24-59-27874_CP05	2024-07-13	1007:T1500F15U35	15	-19.4	43.39	47.54351	-122.33576	
LDW23-GT07-GT	24-59-27874_CP07	2024-07-13	1007:T1500F15U35	15	-18.5	41.26	47.54334	-122.33551	
LDW23-GT12-GT	24-59-27874_CP12	2024-07-08	1007:T1500F15U35	15	-12.2	41.83	47.54050	-122.33284	
LDW23-GT14-GT	24-59-27874_CP14	2024-07-08	1007:T1500F15U35	15	-20.2	42.16	47.54001	-122.33195	
LDW23-GT15-GT	24-59-27874_CP15	2024-07-13	1007:T1500F15U35	15	-21.9	42.32	47.53914	-122.33049	
LDW23-GT16-GT	24-59-27874_CP16	2024-07-11	681:T375F10U35	15	-9.2	40.76	47.53840	-122.32986	
LDW23-GT20-GT	24-59-27874_CP20	2024-07-11	681:T375F10U35	15	-18.2	41.67	47.53712	-122.32613	
LDW23-GT23-GT	24-59-27874_CP23	2024-07-10	681:T375F10U35	15	-18.7	16.40	47.53591	-122.32601	
LDW23-GT23B-GT	24-59-27874_CP23B	2024-07-10	681:T375F10U35	15	-19.2	41.67	47.53602	-122.32599	
LDW23-GT24-GT	24-59-27874_CP24	2024-07-09	1007:T1500F15U35	15	-13.2	41.42	47.53484	-122.32438	
LDW23-GT25-GT	24-59-27874_CP25	2024-07-09	1007:T1500F15U35	15	-17.6	41.42	47.53434	-122.32347	
LDW23-GT27-GT	24-59-27874_CP27	2024-07-10	681:T375F10U35	15	-13.2	41.42	47.53547	-122.32400	
LDW23-GT28-GT	24-59-27874_CP28	2024-07-14	1007:T1500F15U35	15	-16.2	34.37	47.53503	-122.32332	
LDW23-GT29-GT	24-59-27874_CP29	2024-07-12	681:T375F10U35	15	-12.4	40.52	47.53514	-122.32315	
<b>Total</b>						<b>636.3</b>			

1. All data profiles were began at the mudline surface. Assumed phreatic surface was measured by dip-tape immediately prior to testing and referenced for calculations.

2. The coordinates were collected using consumer grade GPS and have an accuracy of ±30 feet. EPSG number: 4326 (WGS84 / LatLong).

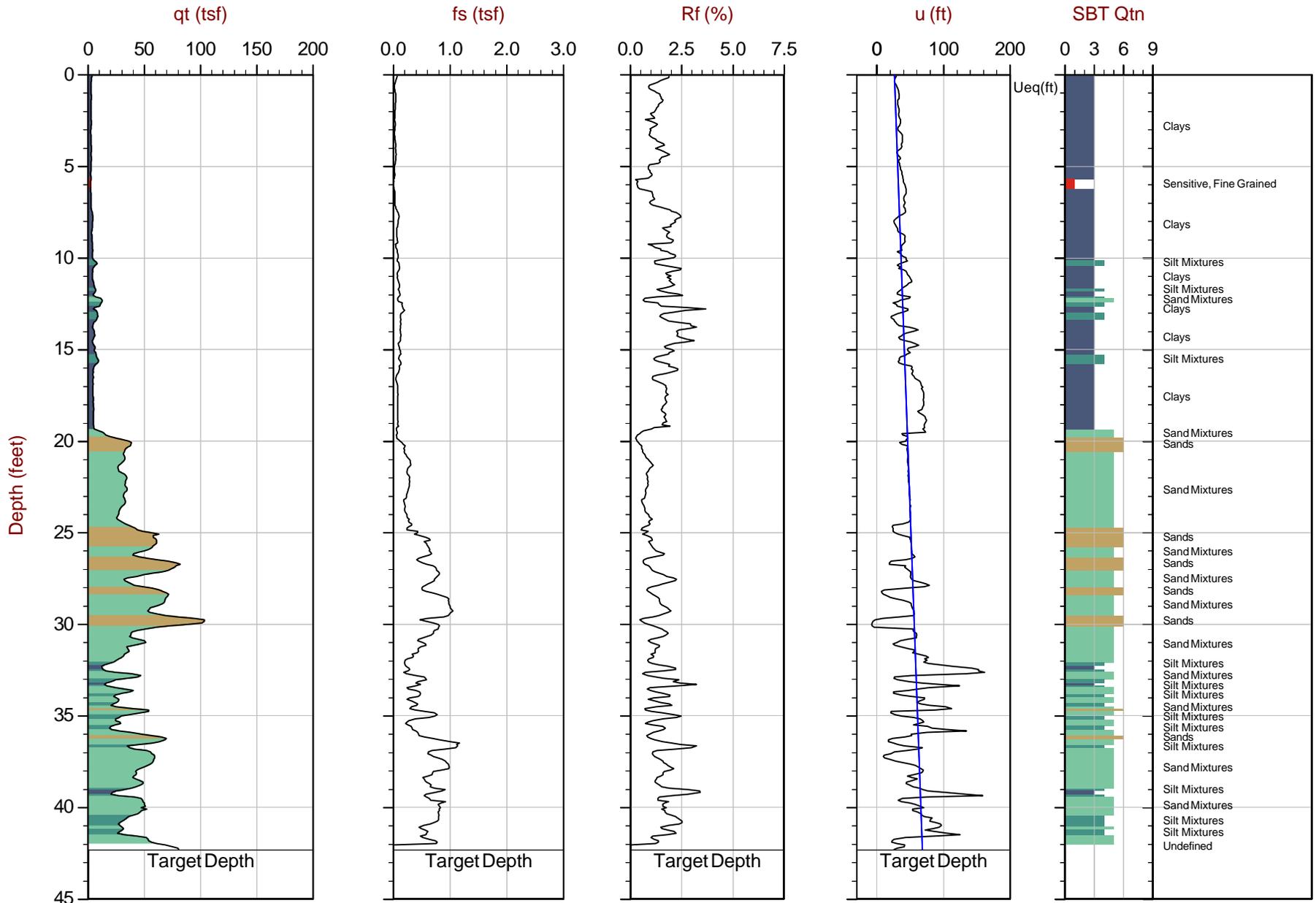


**Job No:** 24-59-27874  
**Client:** Anchor QEA  
**Project:** Lower Duwamish Waterway Middle Reach  
**Start Date:** 2024-07-08  
**End Date:** 2024-07-14

### CPT<sub>u</sub> ASSUMED UNIT WEIGHT SUMMARY

Sounding ID	File Name	Final Depth (ft)	Assumed Unit Weight Start Depth (ft)	Assumed Unit Weight End Depth (ft)	Assumed Unit Weight <sup>1</sup> (kN/m <sup>3</sup> )	Refer to Notation Number
LDW23-GT05-GT	24-59-27874_CP05	43.39	-19.42	0.00	9.81	
LDW23-GT05-GT	24-59-27874_CP05	43.39	0.00	20.01	17.50	
LDW23-GT07-GT	24-59-27874_CP07	41.26	-18.50	0.00	9.81	
LDW23-GT07-GT	24-59-27874_CP07	41.26	0.00	4.35	17.50	
LDW23-GT12-GT	24-59-27874_CP12	41.83	-12.17	0.00	9.81	
LDW23-GT12-GT	24-59-27874_CP12	41.83	0.00	4.76	17.50	
LDW23-GT14-GT	24-59-27874_CP14	42.16	-20.17	0.00	9.81	
LDW23-GT14-GT	24-59-27874_CP14	42.16	0.00	4.59	17.50	
LDW23-GT28-GT	24-59-27874_CP28	34.37	-16.17	0.00	9.81	
LDW23-GT28-GT	24-59-27874_CP28	34.37	0.00	6.40	17.50	
LDW23-GT29-GT	24-59-27874_CP29	40.52	-12.42	0.00	9.81	
LDW23-GT29-GT	24-59-27874_CP29	40.52	0.00	0.98	17.50	

1. A unit weight of 9.81 kN/m<sup>3</sup> was assumed for data above the mudline, within the water layer. A unit weight of 17.50 kN/m<sup>3</sup> was assumed for data below the mudline. For all other depth ranges, unit weights were based on SBT Qtn zones.



Max Depth: 12.900 m / 42.32 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

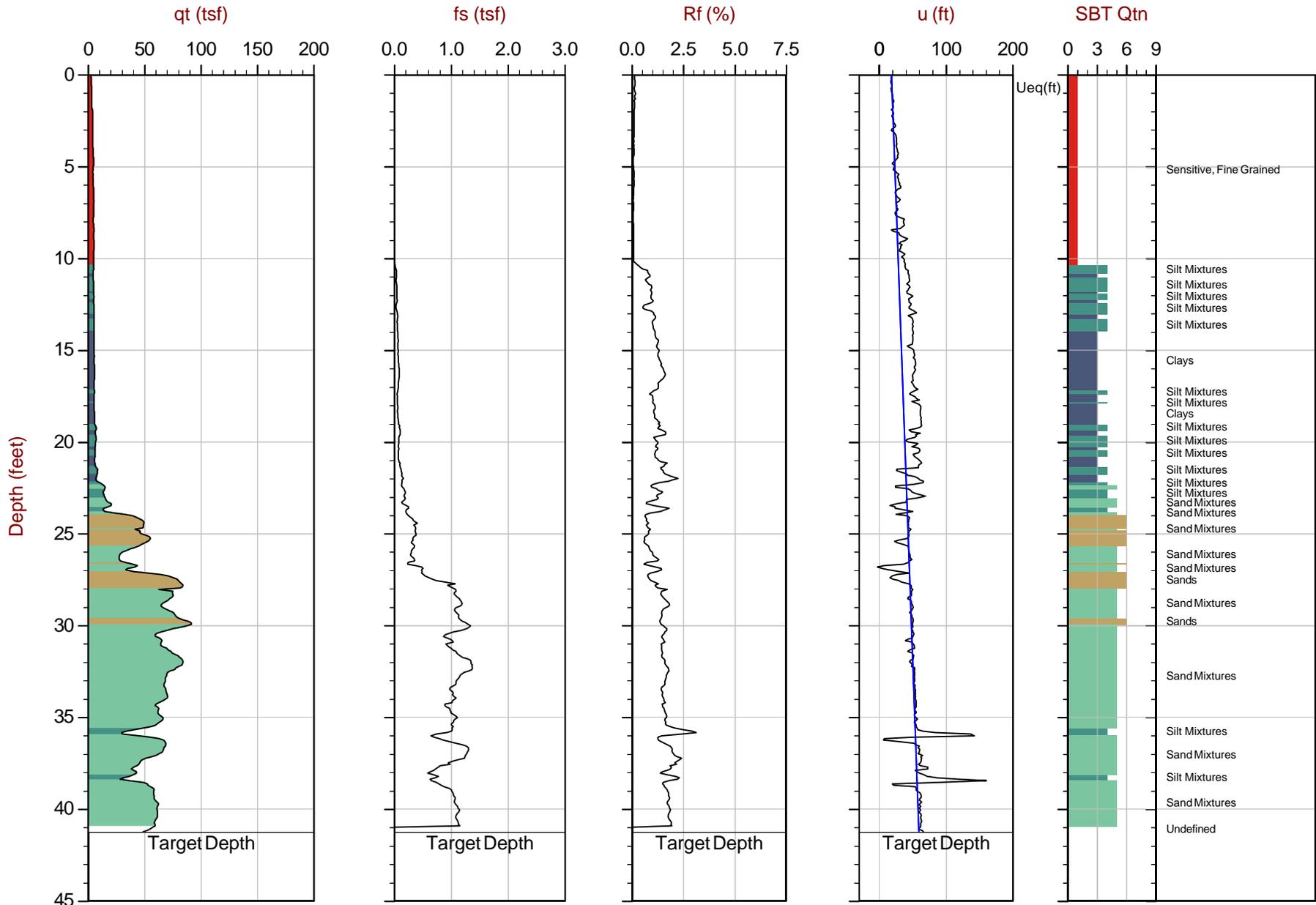
File: 24-59-27874\_CP01.COR  
 Unit Wt: SBTQtn (PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54392 Long: -122.33734

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.







Max Depth: 12.575 m / 41.26 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP07.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54334 Long: -122.33551

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



# Anchor QEA

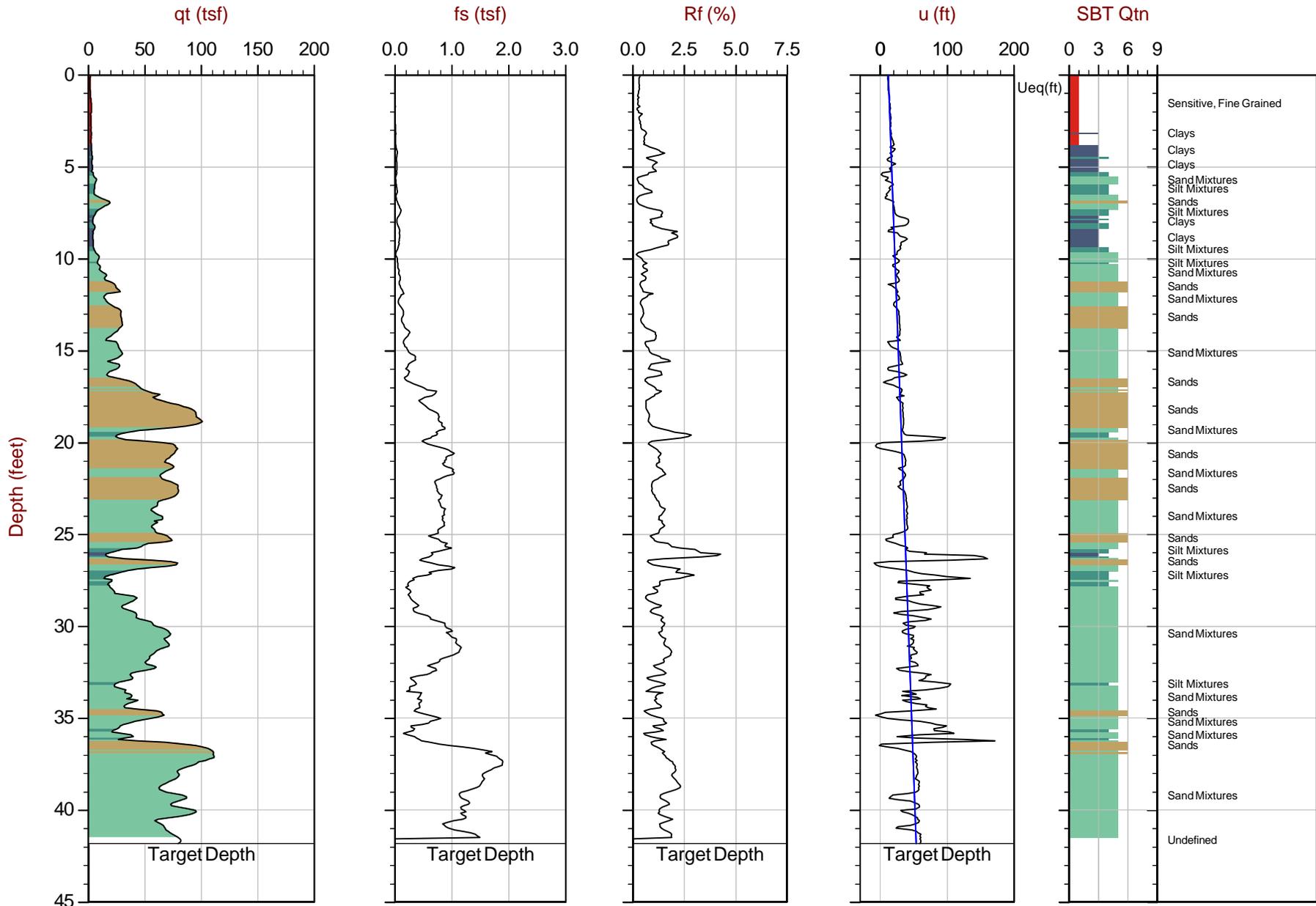
Job No: 24-59-27874

Date: 2024-07-08 13:08

Site: Lower Duwamish Waterway Middle Reach

Sounding: LDW23-GT12-GT

Cone: 1007:T1500F15U35 Area=15 cm<sup>2</sup>

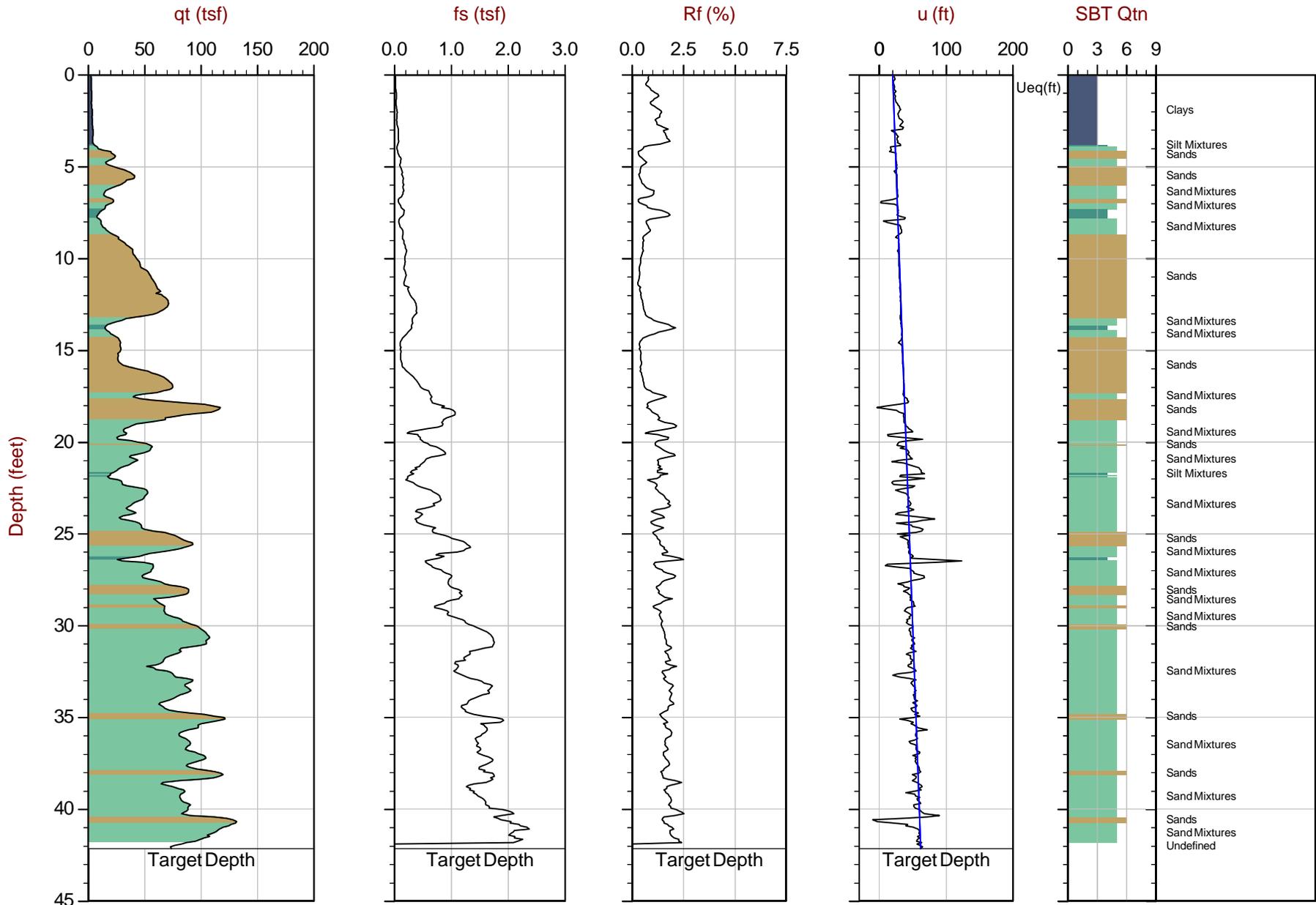


Max Depth: 12.750 m / 41.83 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP12.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54050 Long: -122.33284

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
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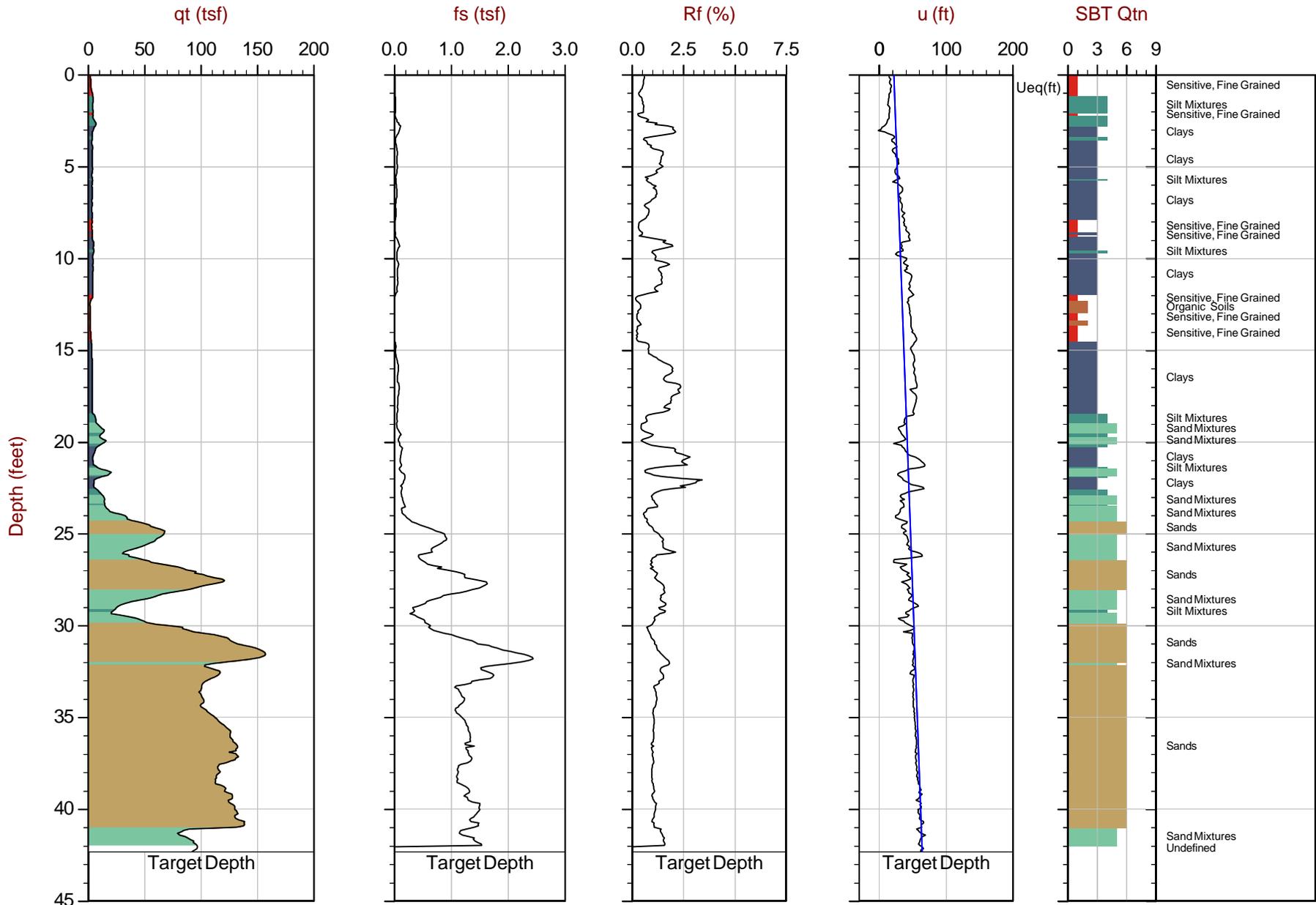


Max Depth: 12.850 m / 42.16 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP14.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54001 Long: -122.33195

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◃ Dissipation, Ueq not achieved   ◅ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

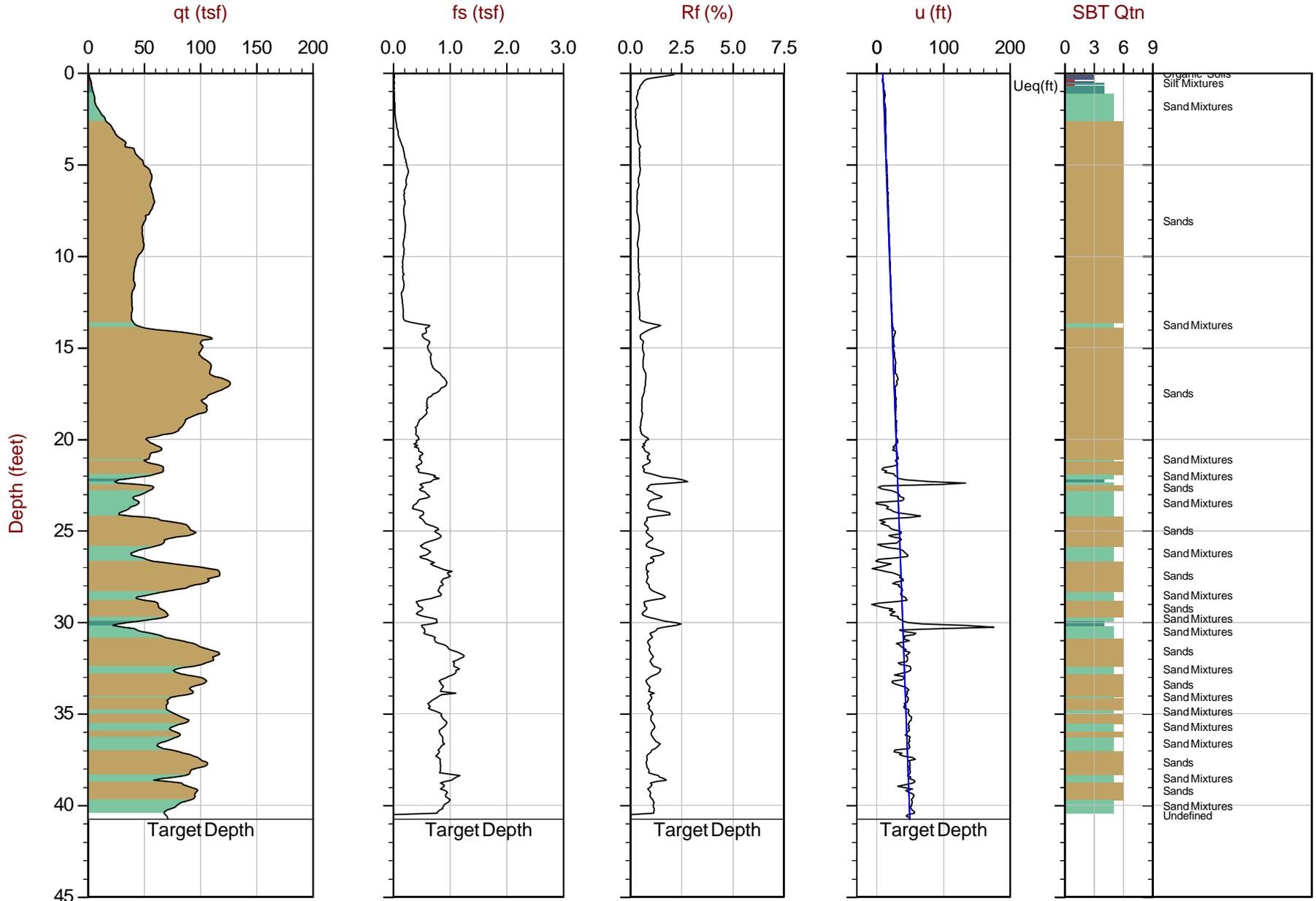


Max Depth: 12.900 m / 42.32 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP15.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53914 Long: -122.33049

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◃ Dissipation, Ueq not achieved   ◂ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

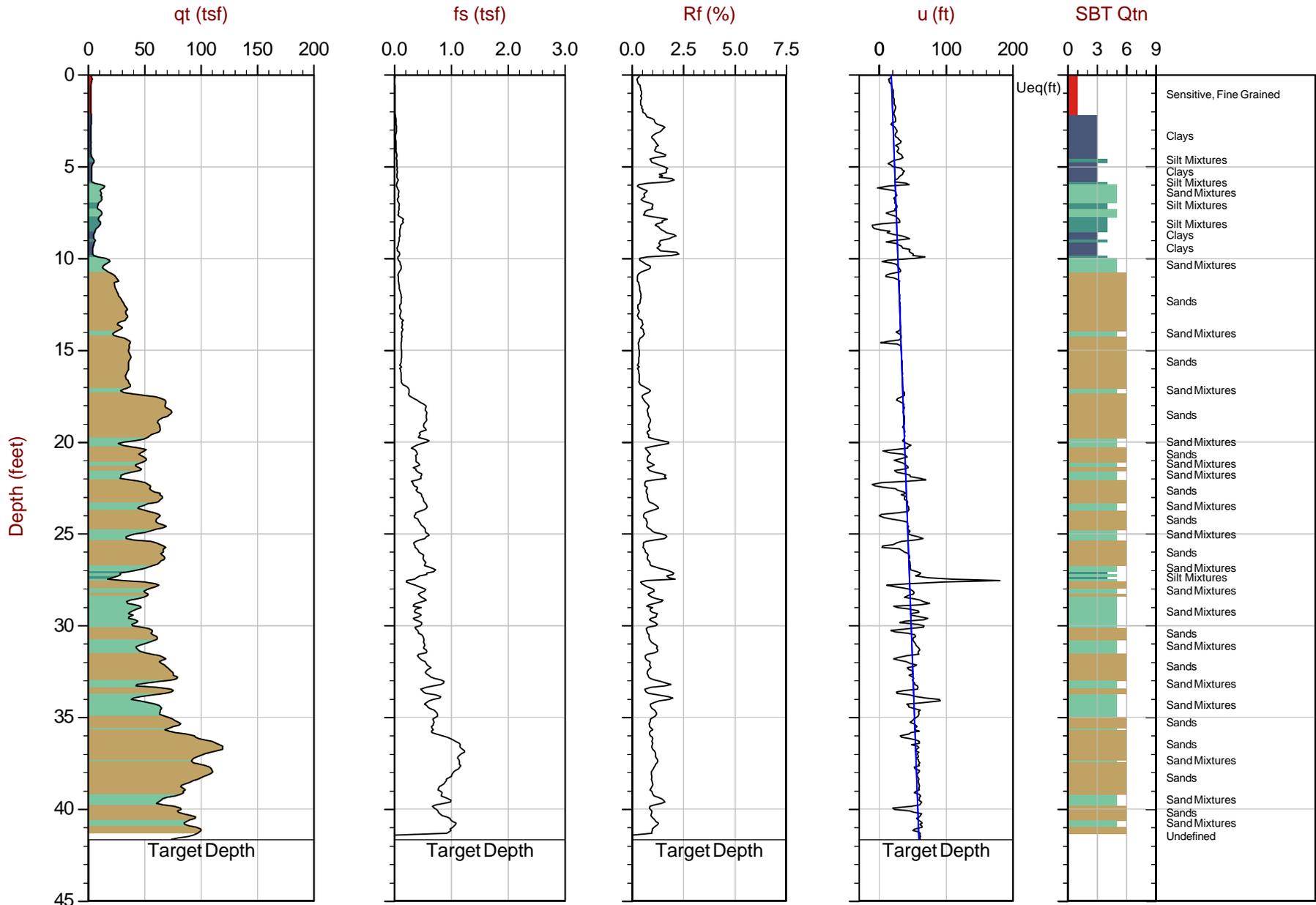


Max Depth: 12.425 m / 40.76 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP16.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53840 Long: -122.32986

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

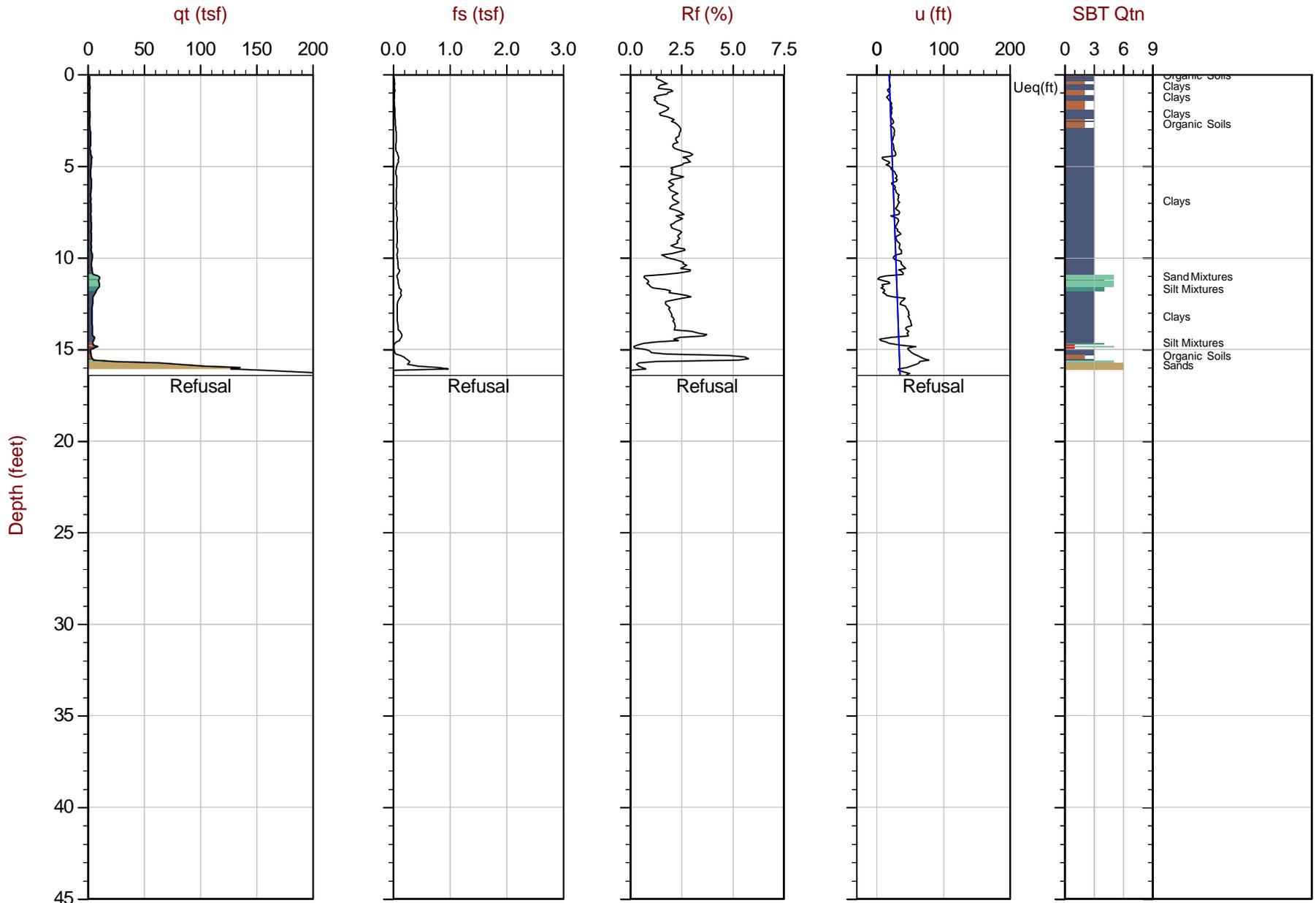


Max Depth: 12.700 m / 41.67 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP20.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53712 Long: -122.32613

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◃ Dissipation, Ueq not achieved   ◂ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

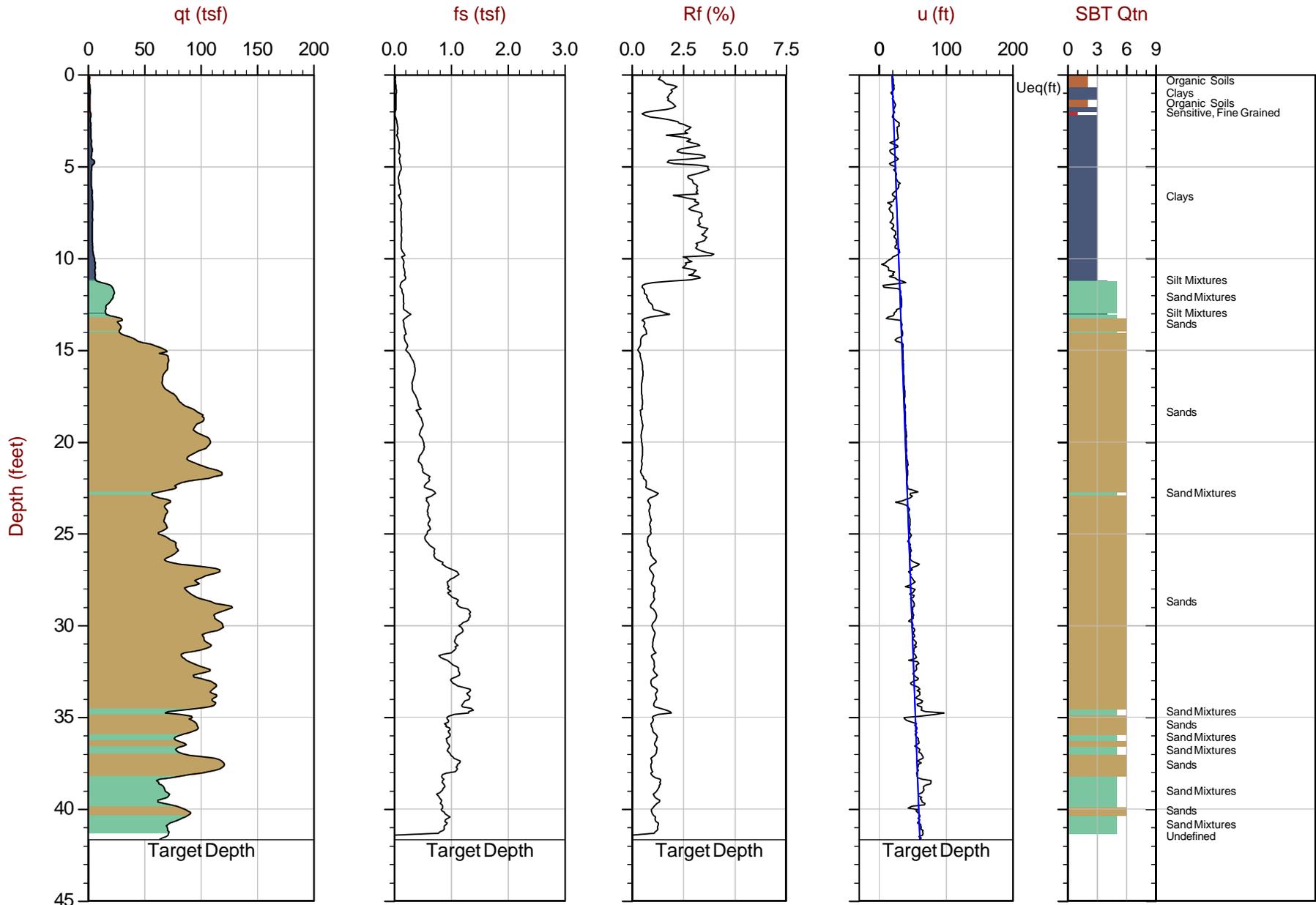


Max Depth: 5.000 m / 16.40 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP23.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53591 Long: -122.32601

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

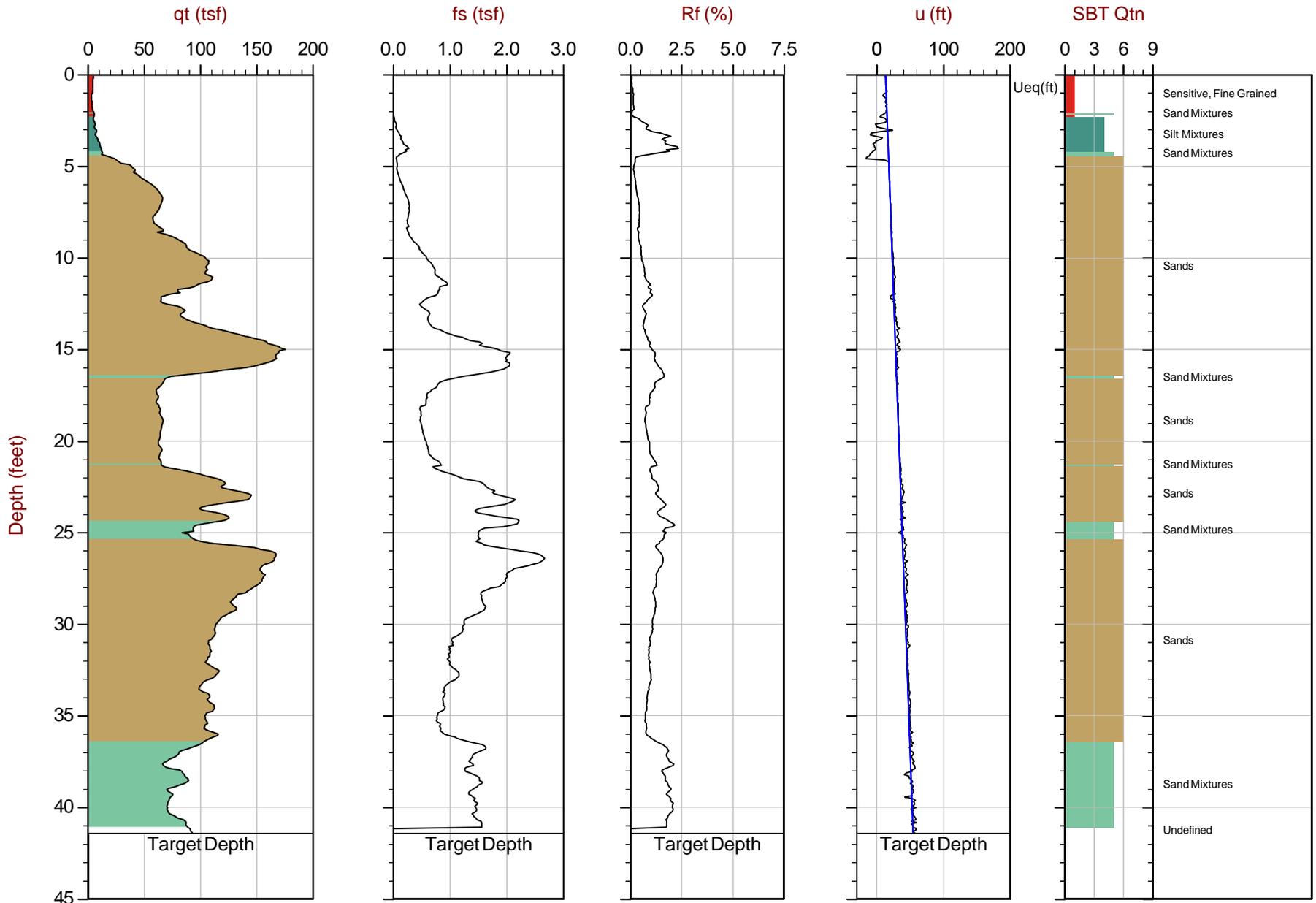


Max Depth: 12.700 m / 41.67 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP23B.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53602 Long: -122.32599

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

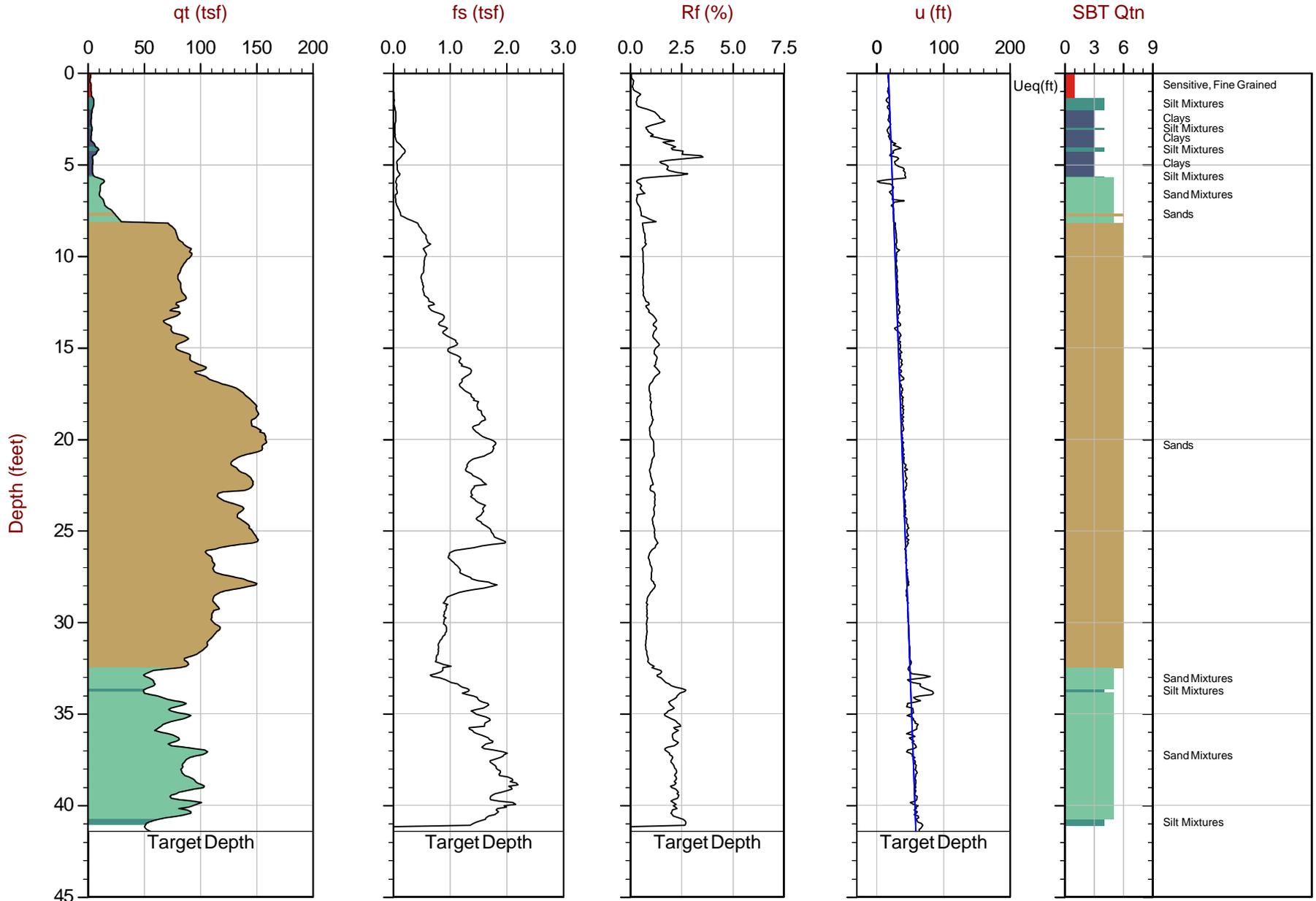


Max Depth: 12.625 m / 41.42 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP24.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53484 Long: -122.32438

Overplot Item: ● Ueq    ● Assumed Ueq    ◁ Dissipation, Ueq achieved    ◁ Dissipation, Ueq not achieved    ◁ Dissipation, Ueq assumed    — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

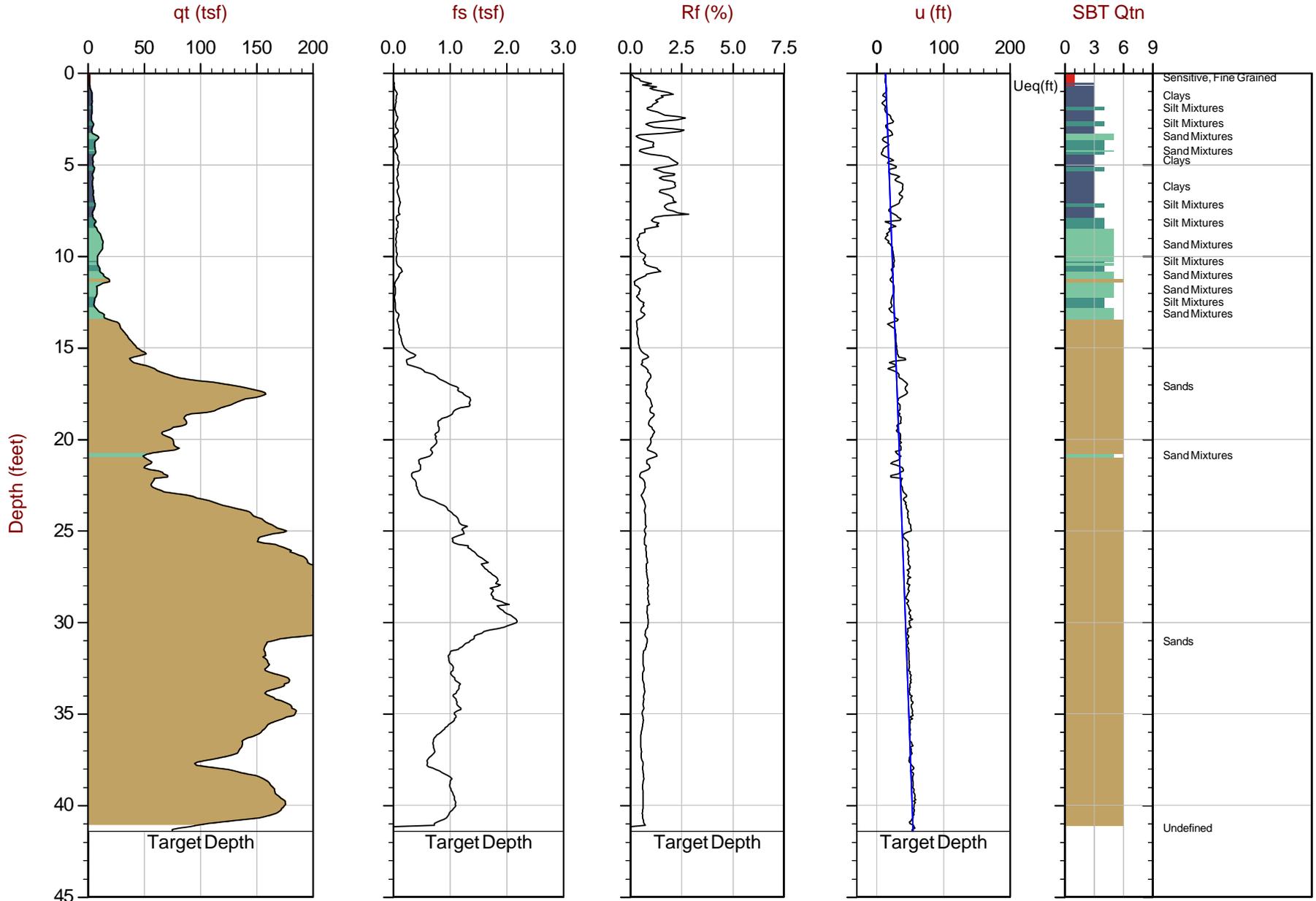


Max Depth: 12.625 m / 41.42 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP25.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53434 Long: -122.32347

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

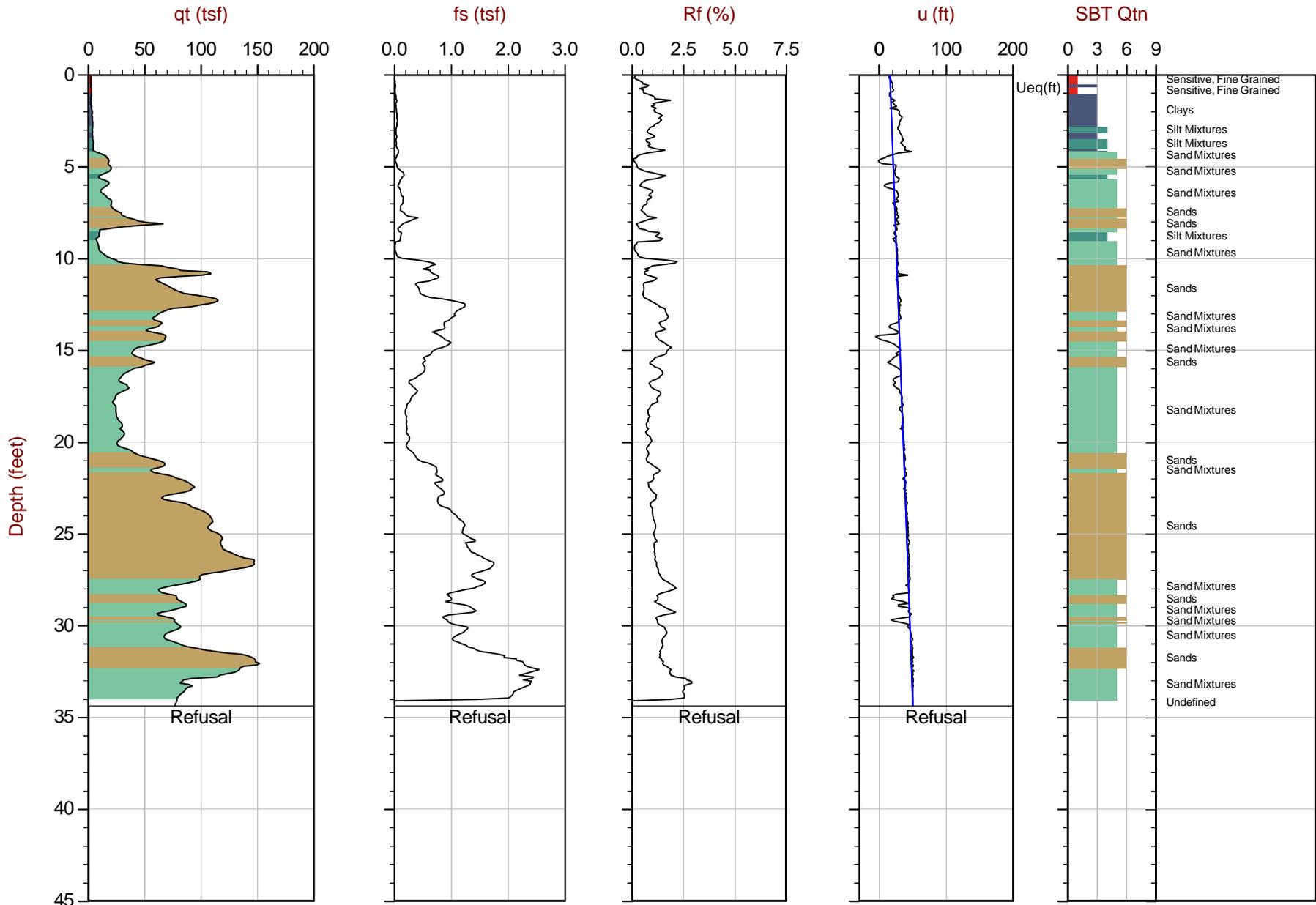


Max Depth: 12.625 m / 41.42 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP27.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53547 Long: -122.32400

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

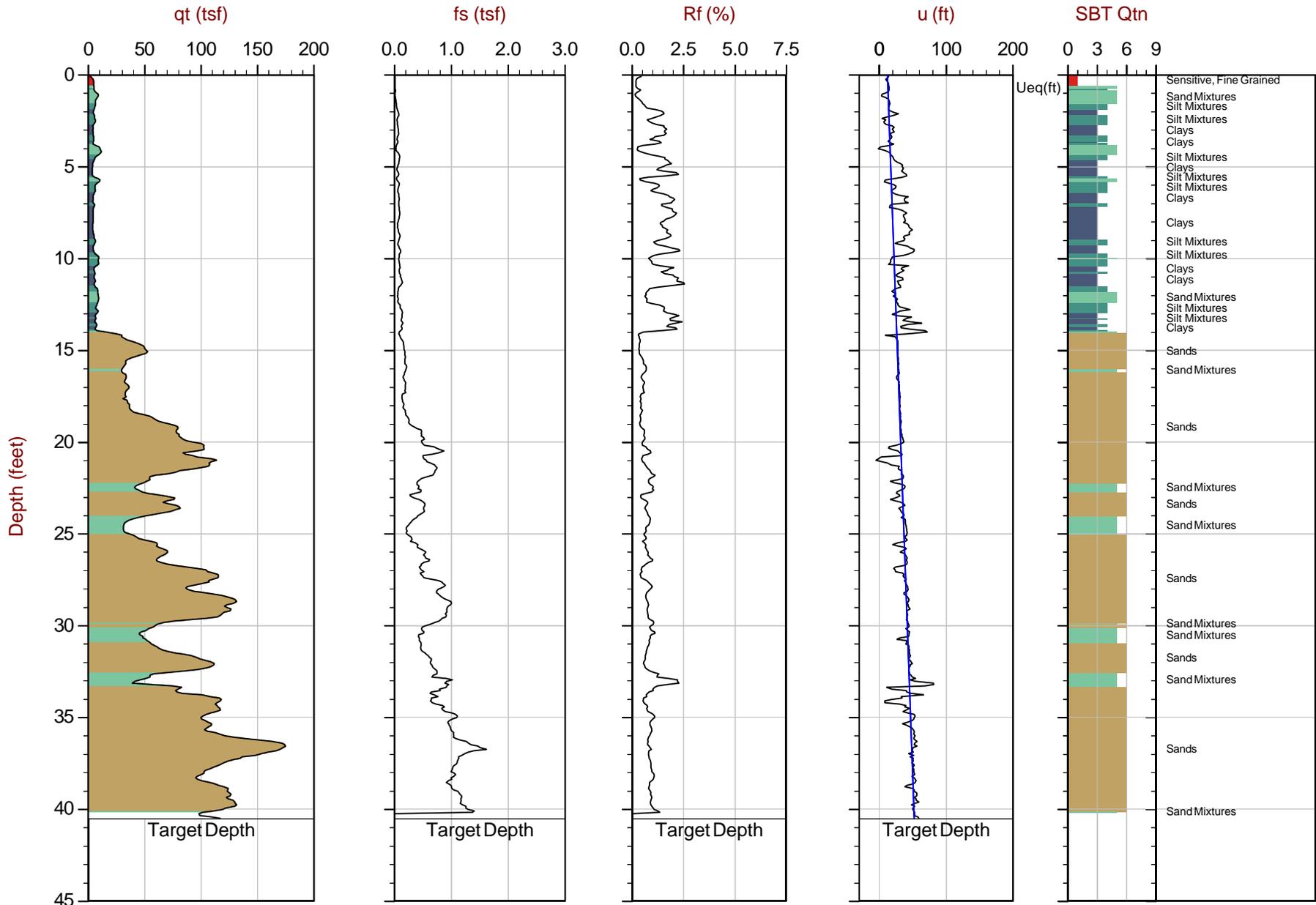


Max Depth: 10.475 m / 34.37 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP28.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53503 Long: -122.32332

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



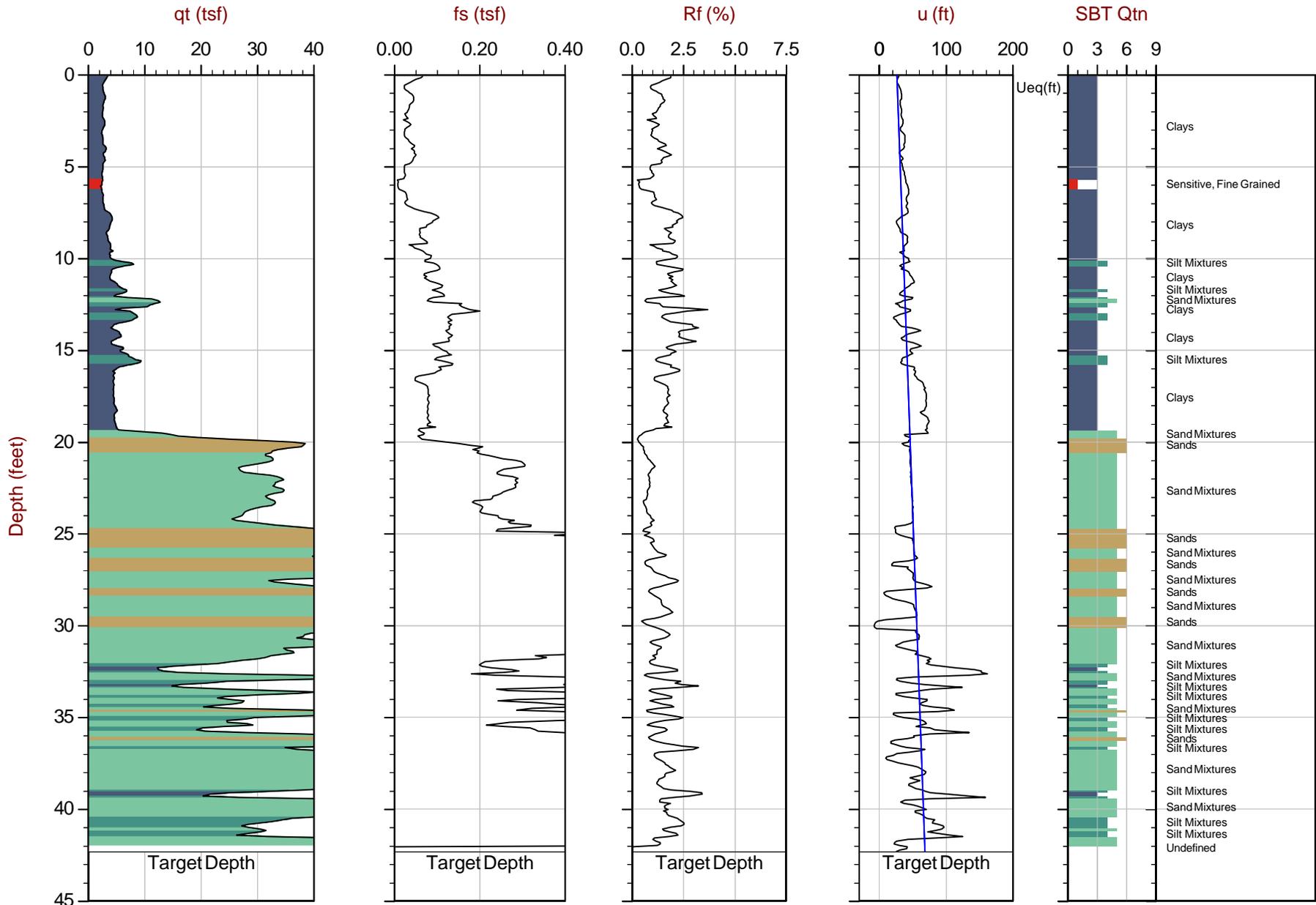
Max Depth: 12.350 m / 40.52 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP29.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53514 Long: -122.32315

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

## **Cone Penetration Test Plots with Reduced Scales**

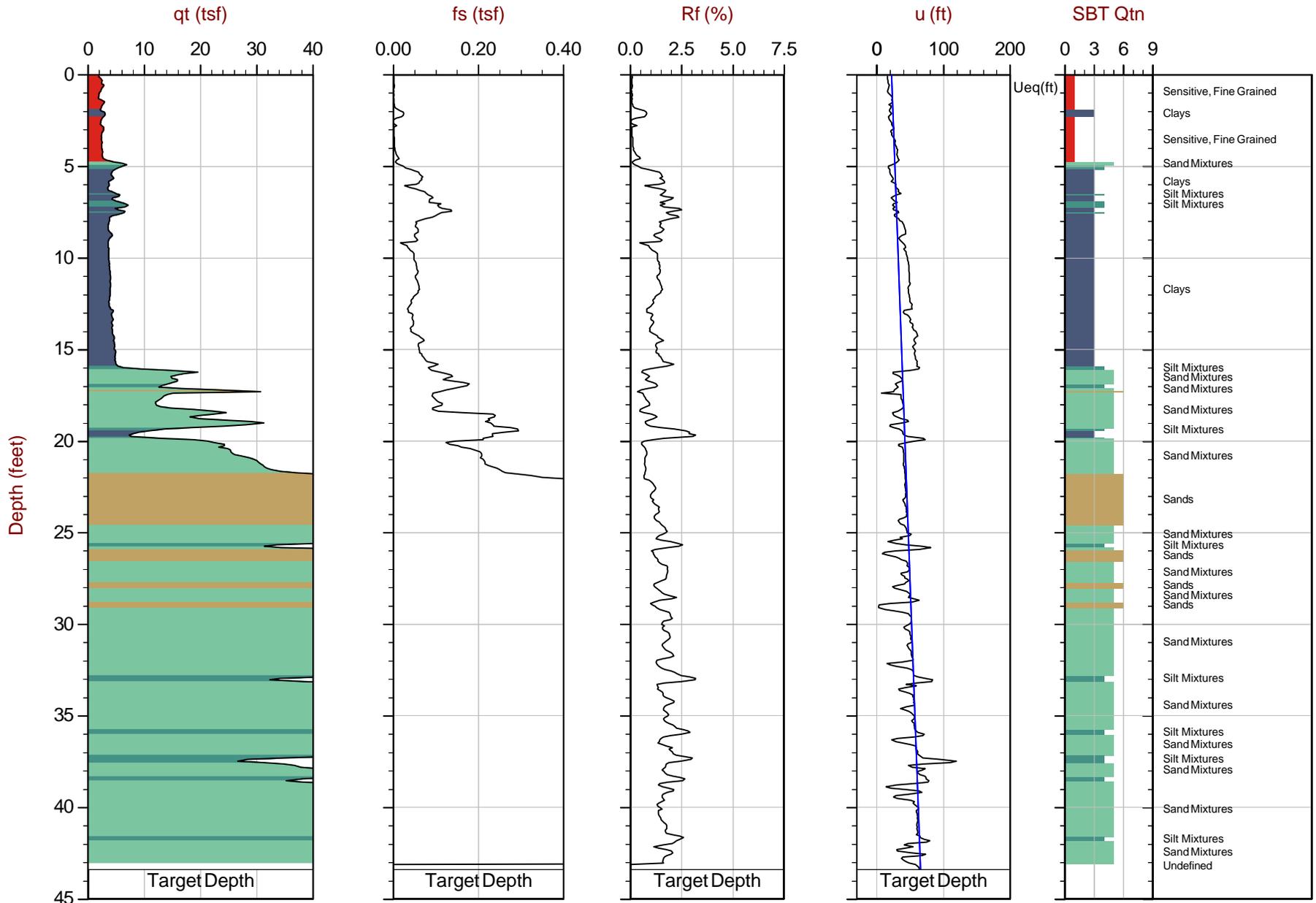


Max Depth: 12.900 m / 42.32 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP01.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54392 Long: -122.33734

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

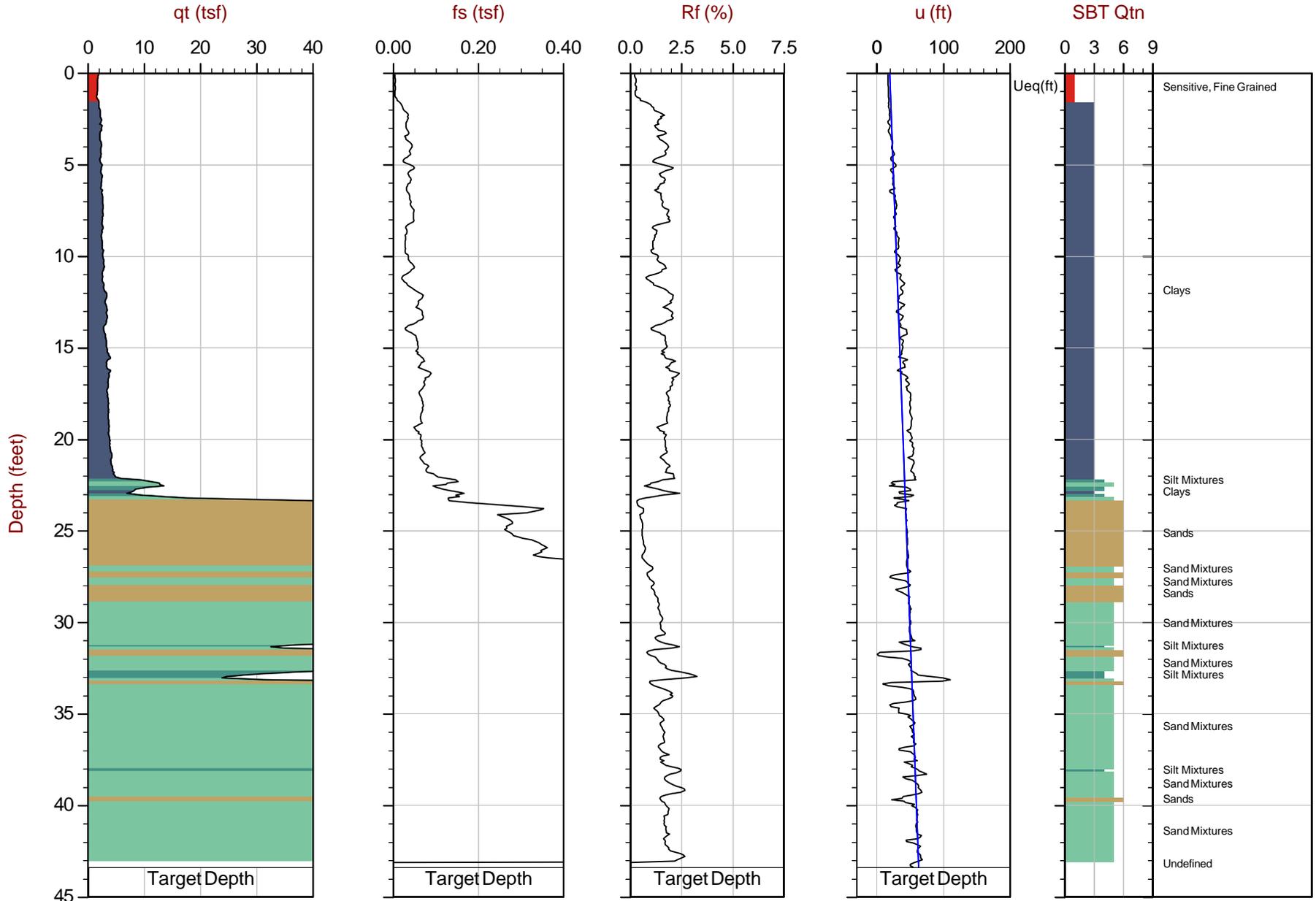


Max Depth: 13.225 m / 43.39 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP03.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54227 Long: -122.33505

Overplot Item: ● Ueq ○ Assumed Ueq ◁ Dissipation, Ueq achieved ▷ Dissipation, Ueq not achieved ◂ Dissipation, Ueq assumed — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

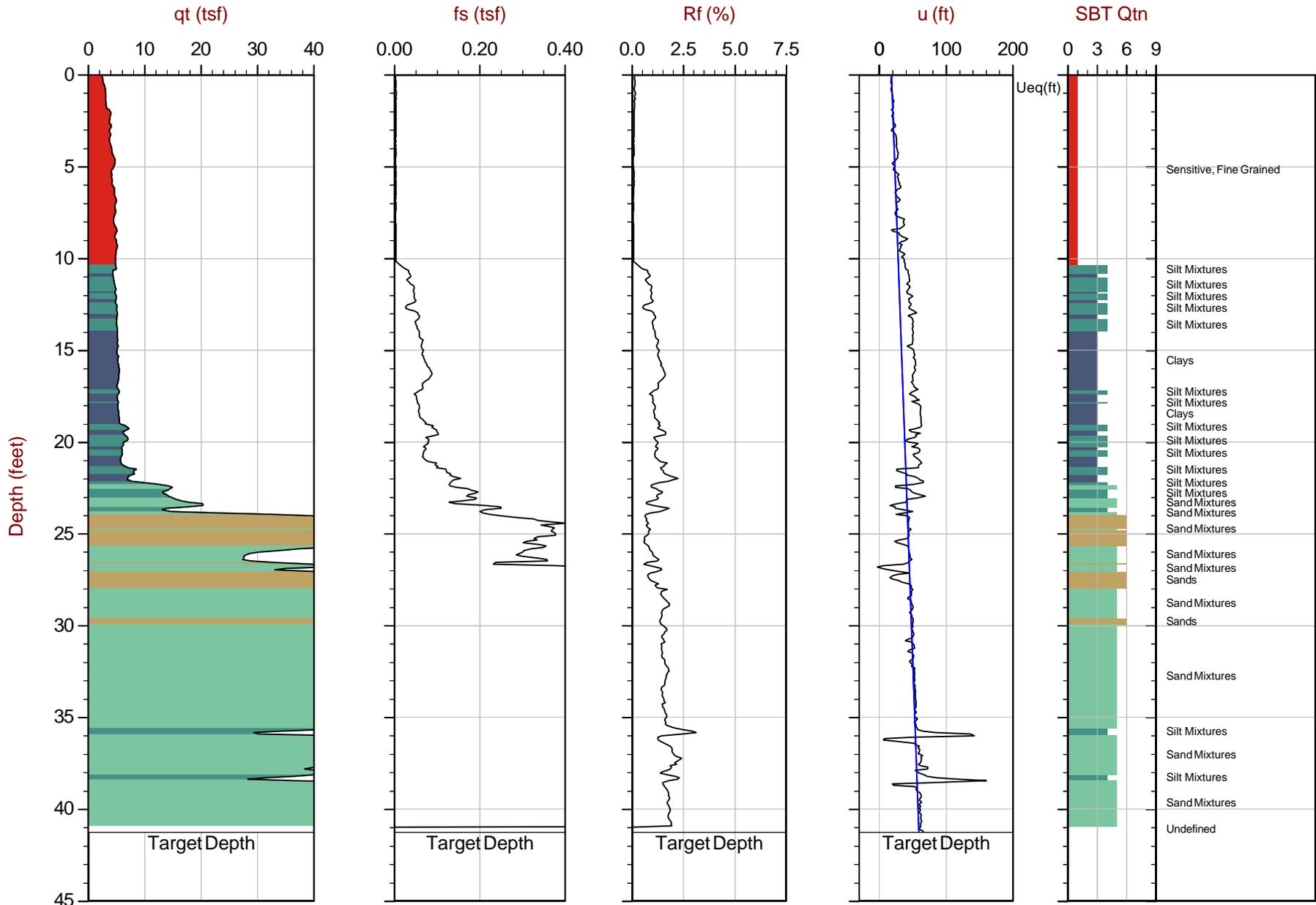


Max Depth: 13.225 m / 43.39 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP05.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54351 Long: -122.33576

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



Max Depth: 12.575 m / 41.26 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP07.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54334 Long: -122.33551

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



# Anchor QEA

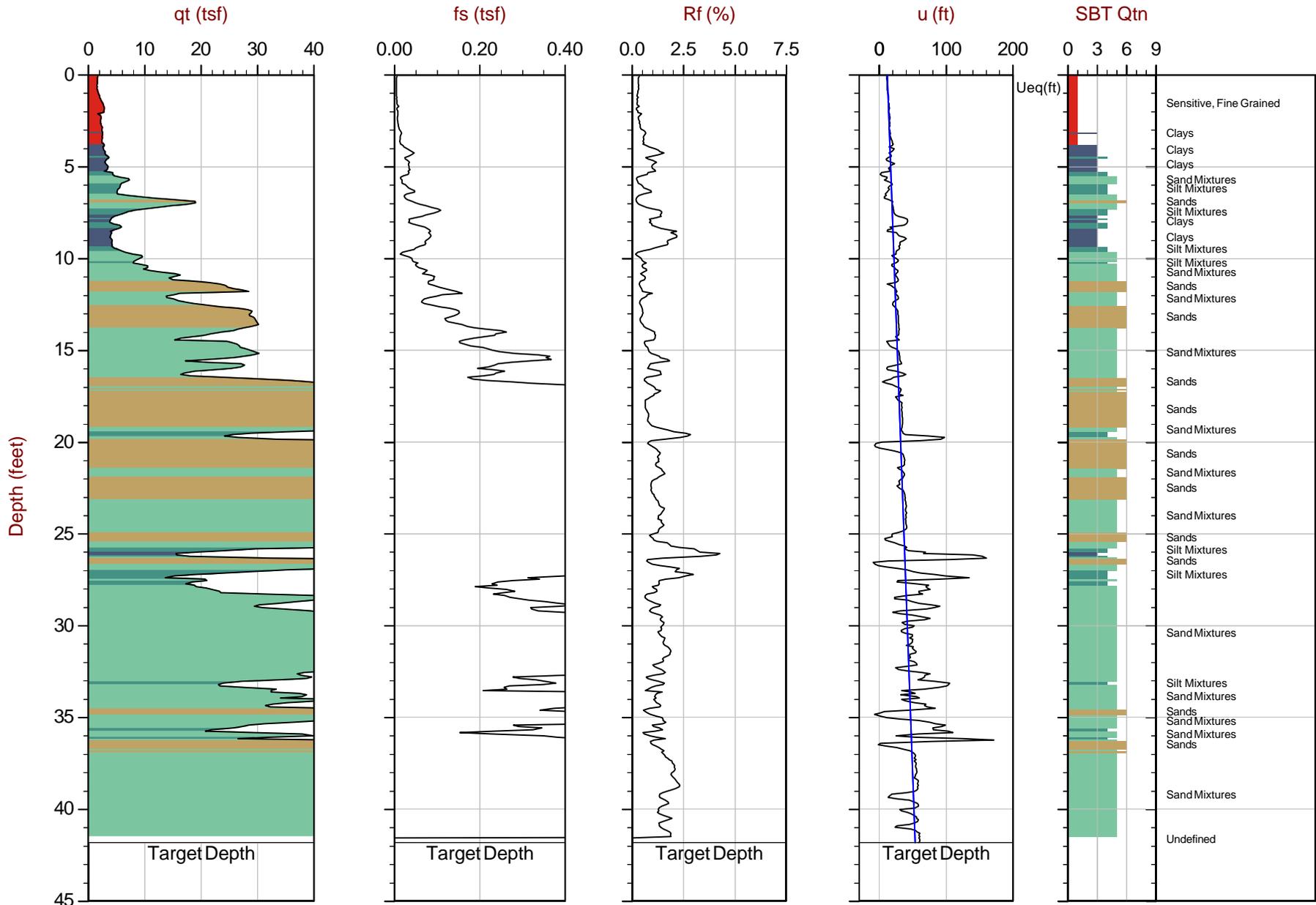
Job No: 24-59-27874

Date: 2024-07-08 13:08

Site: Lower Duwamish Waterway Middle Reach

Sounding: LDW23-GT12-GT

Cone: 1007:T1500F15U35 Area=15 cm<sup>2</sup>

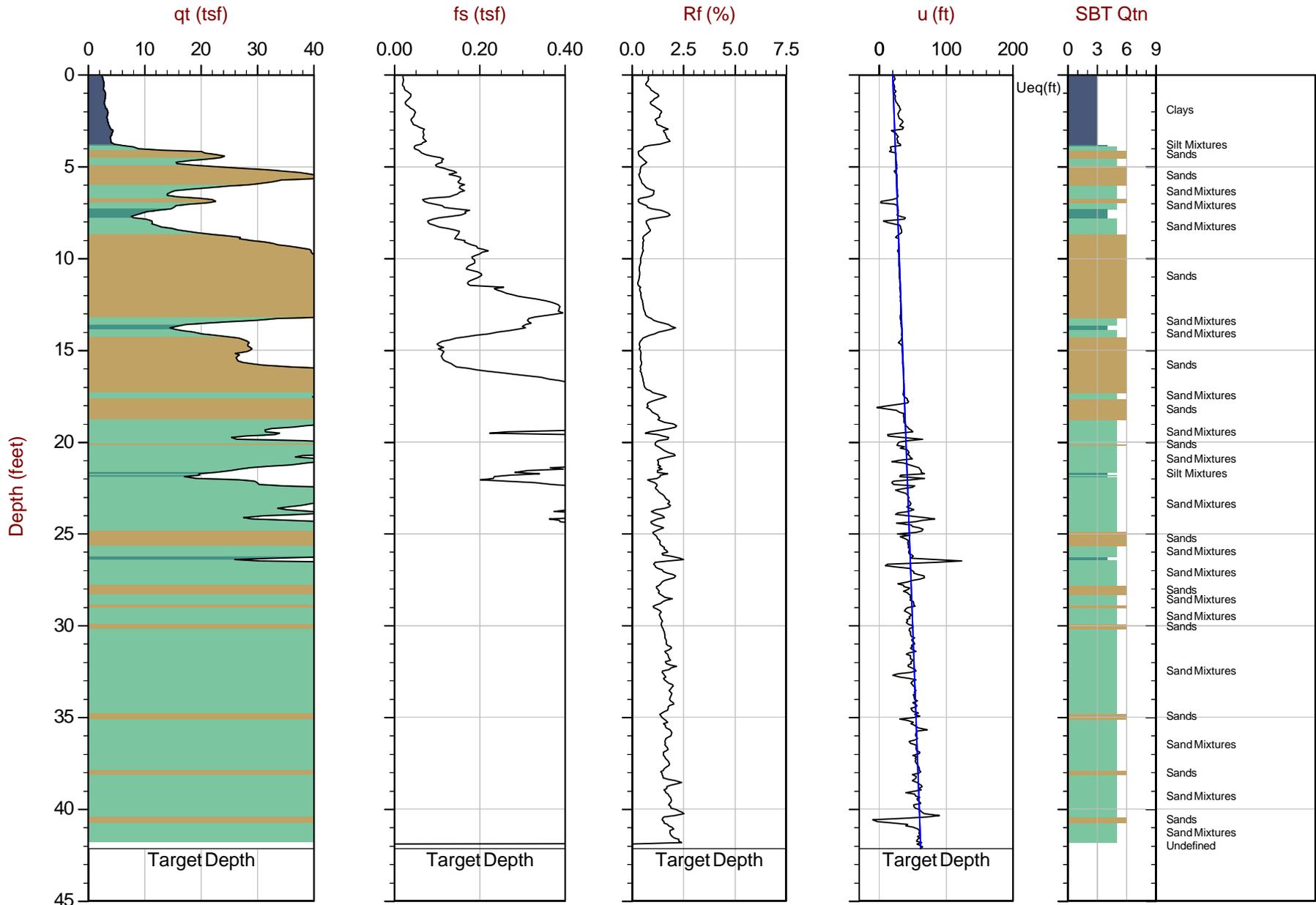


Max Depth: 12.750 m / 41.83 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP12.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54050 Long: -122.33284

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



Max Depth: 12.850 m / 42.16 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP14.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54001 Long: -122.33195

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◃ Dissipation, Ueq not achieved   ◂ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



# Anchor QEA

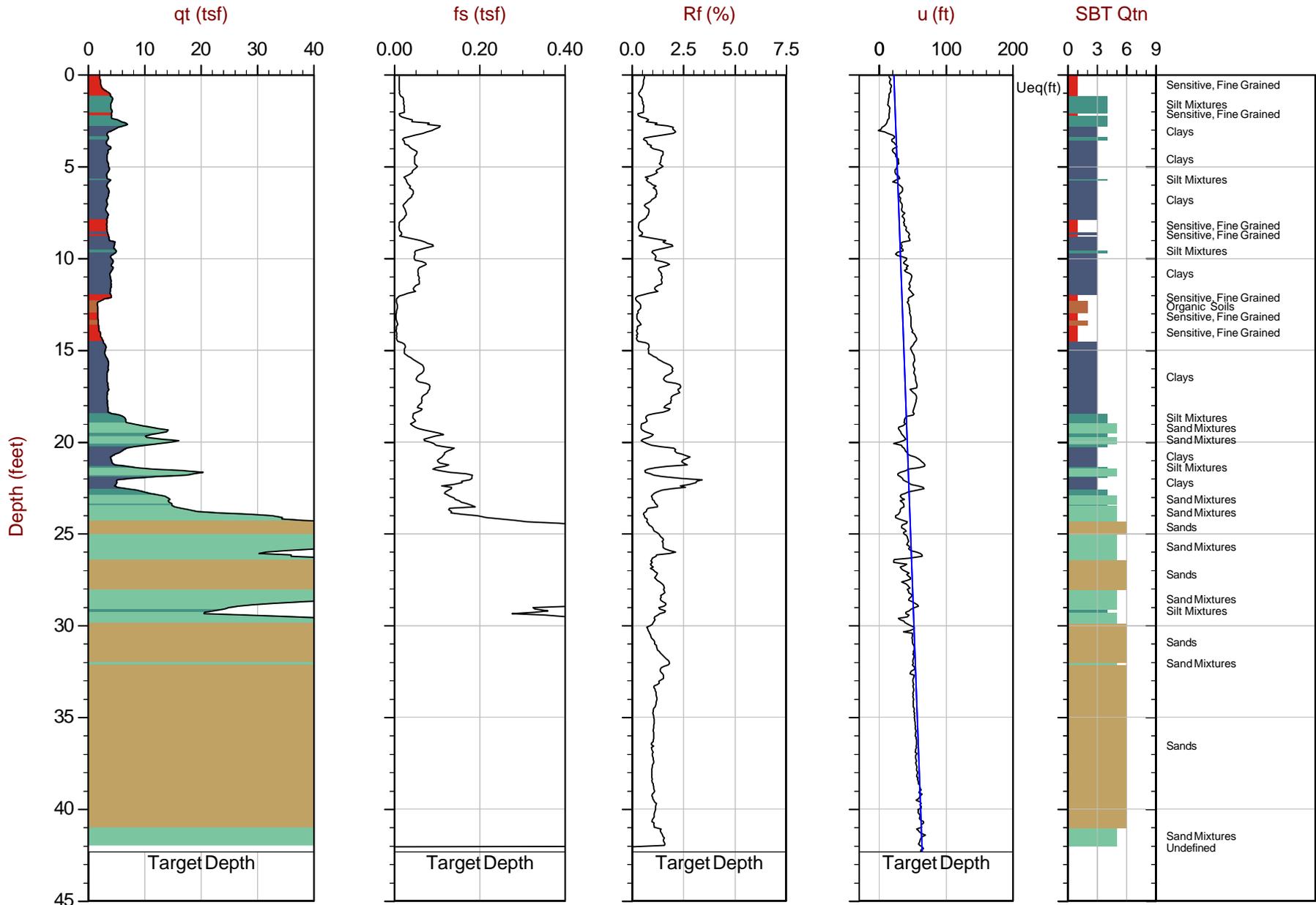
Job No: 24-59-27874

Date: 2024-07-13 16:21

Site: Lower Duwamish Waterway Middle Reach

Sounding: LDW23-GT15-GT

Cone: 1007:T1500F15U35 Area=15 cm<sup>2</sup>



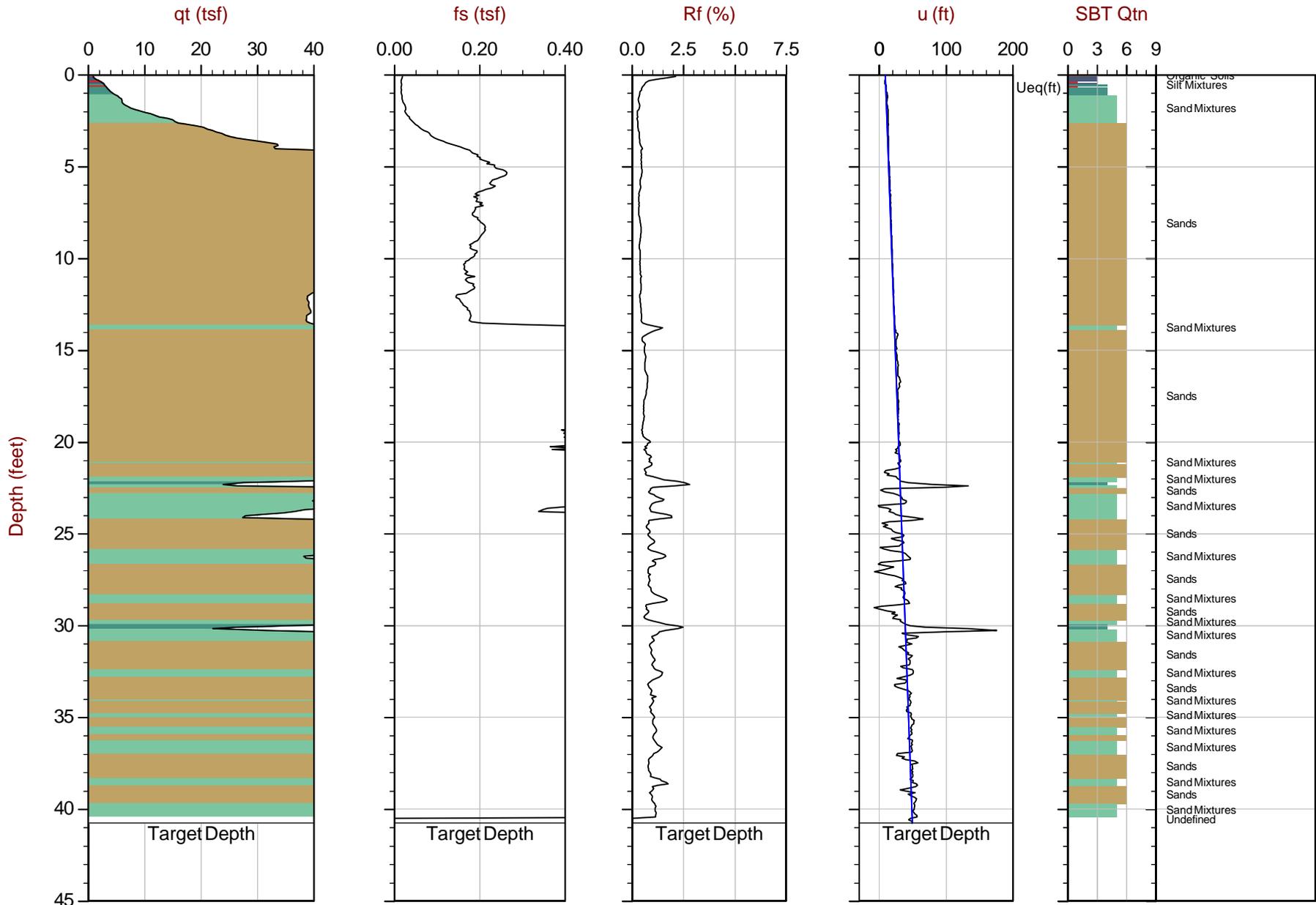
Max Depth: 12.900 m / 42.32 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP15.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53914 Long: -122.33049

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ▷ Dissipation, Ueq not achieved ◂ Dissipation, Ueq assumed — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



Max Depth: 12.425 m / 40.76 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP16.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53840 Long: -122.32986

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



# Anchor QEA

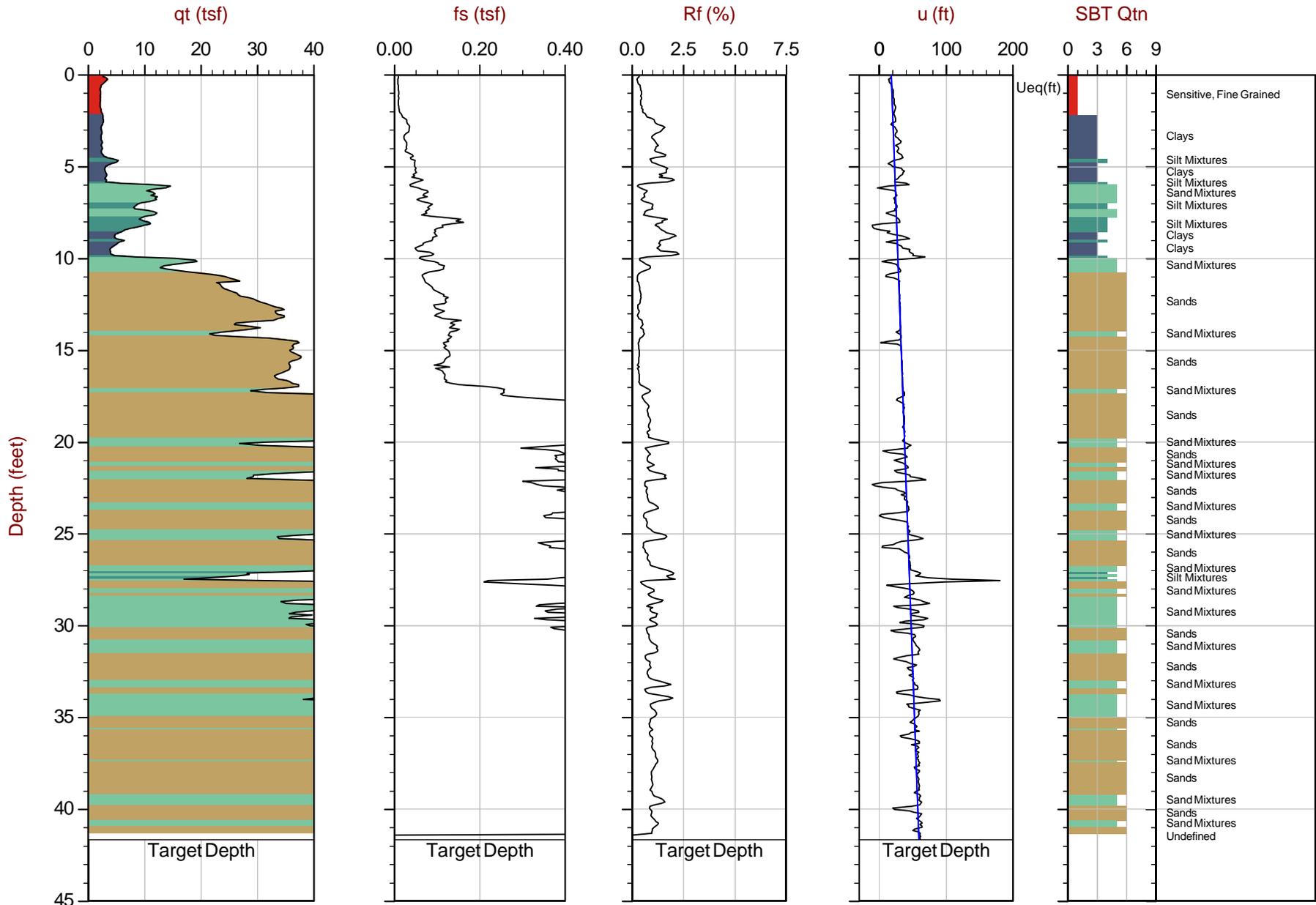
Job No: 24-59-27874

Date: 2024-07-11 10:18

Site: Lower Duwamish Waterway Middle Reach

Sounding: LDW23-GT20-GT

Cone: 681:T375F10U35 Area=15 cm<sup>2</sup>

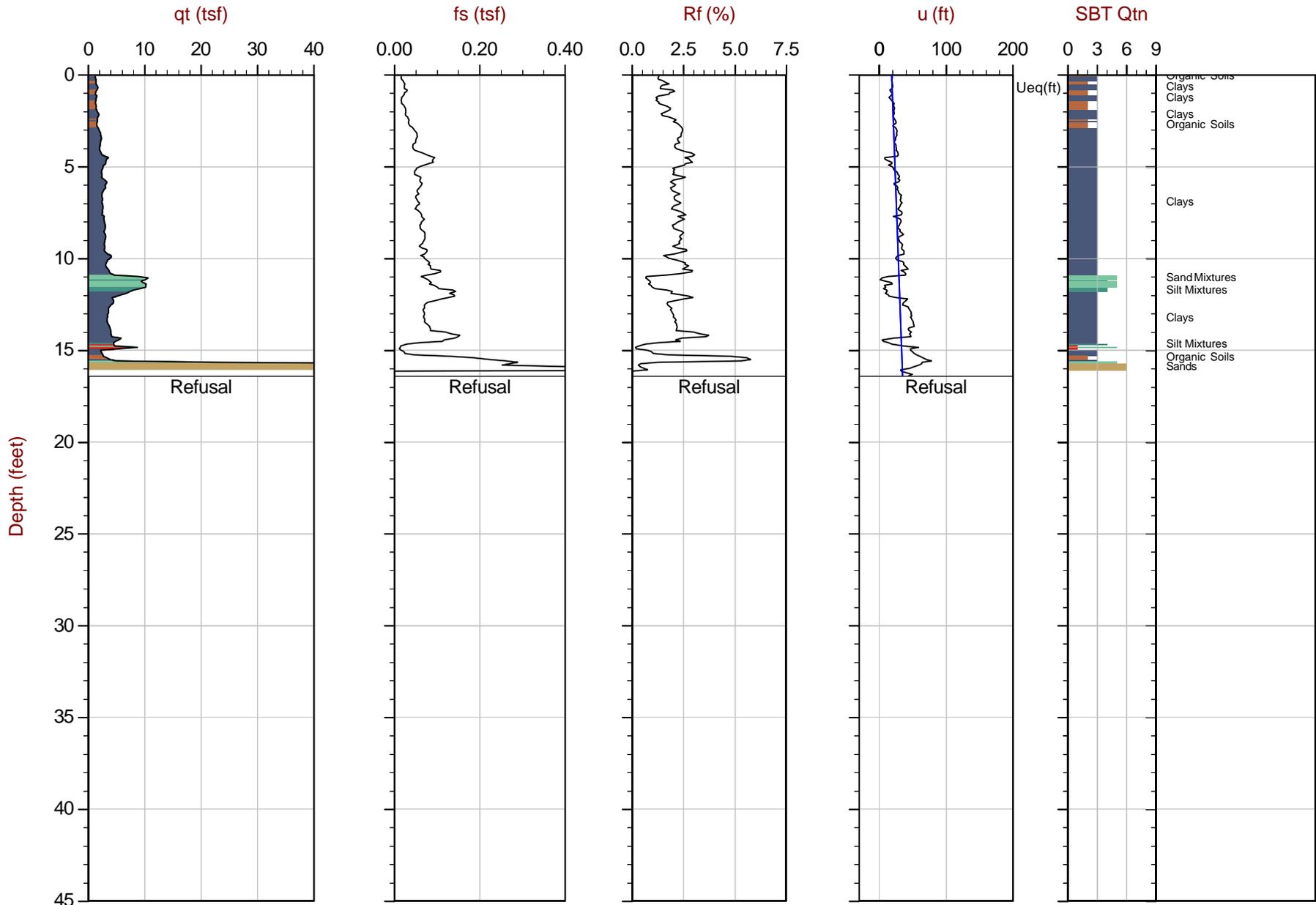


Max Depth: 12.700 m / 41.67 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP20.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53712 Long: -122.32613

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

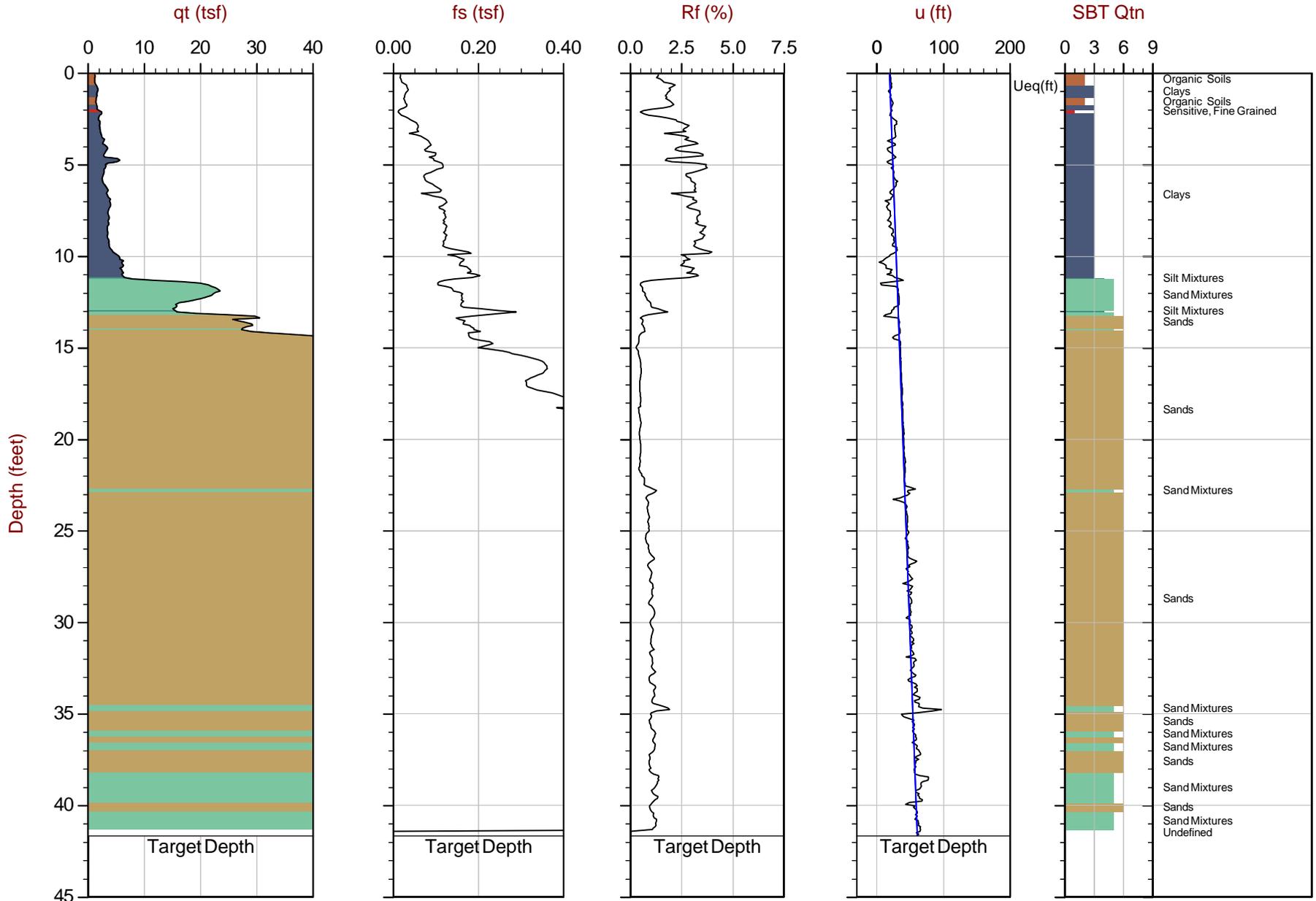


Max Depth: 5.000 m / 16.40 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP23.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53591 Long: -122.32601

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

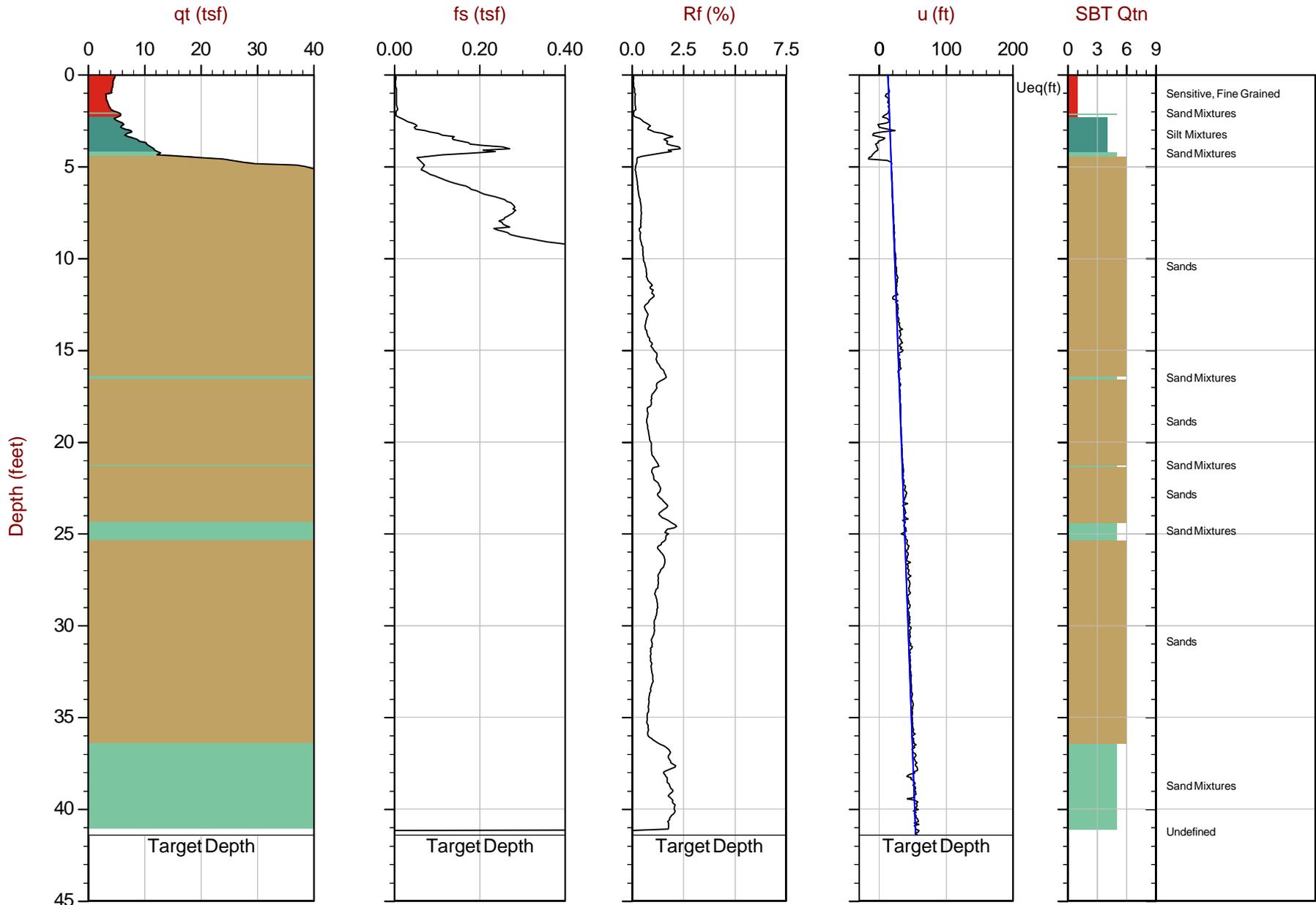


Max Depth: 12.700 m / 41.67 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP23B.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53602 Long: -122.32599

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

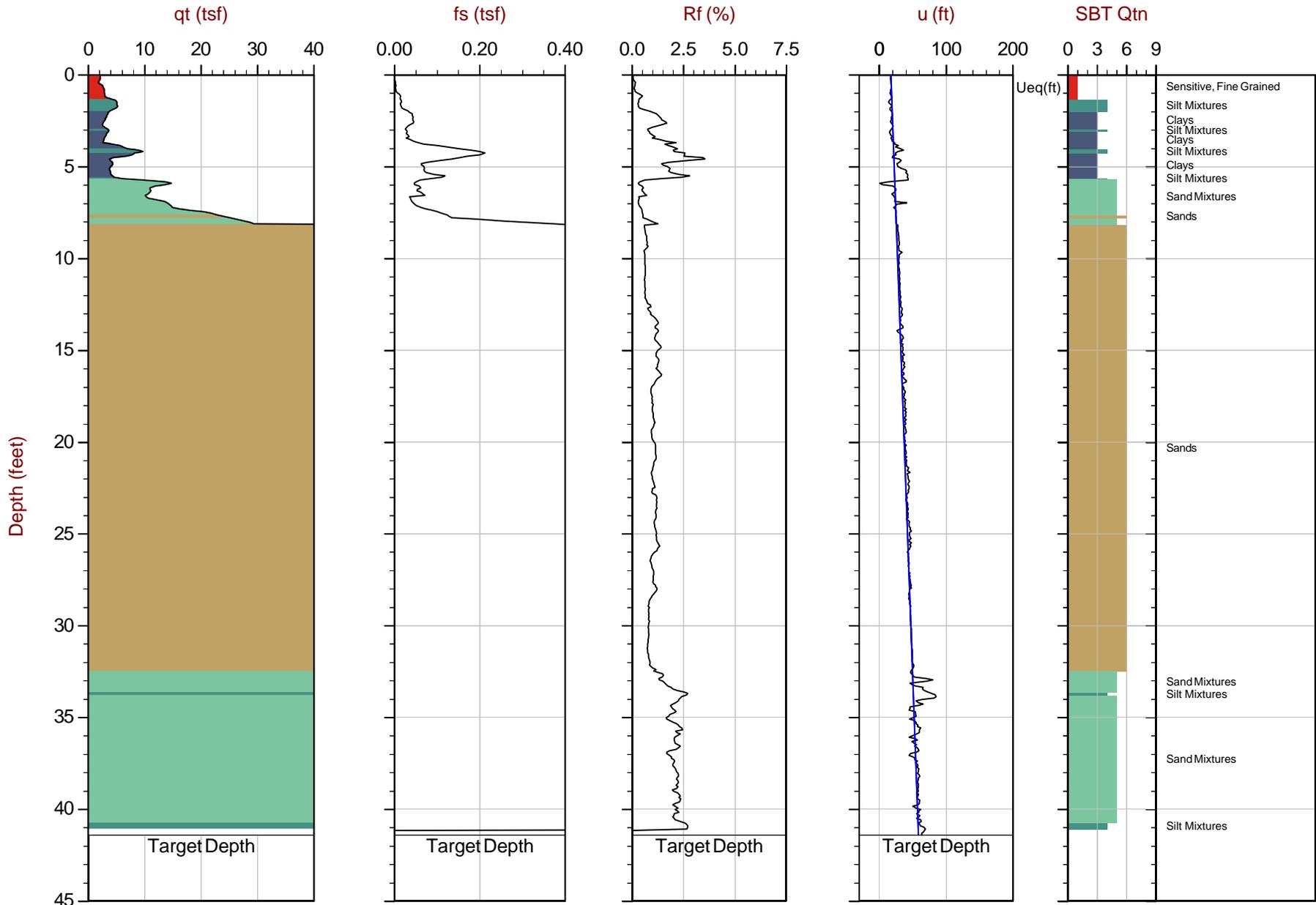


Max Depth: 12.625 m / 41.42 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP24.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53484 Long: -122.32438

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

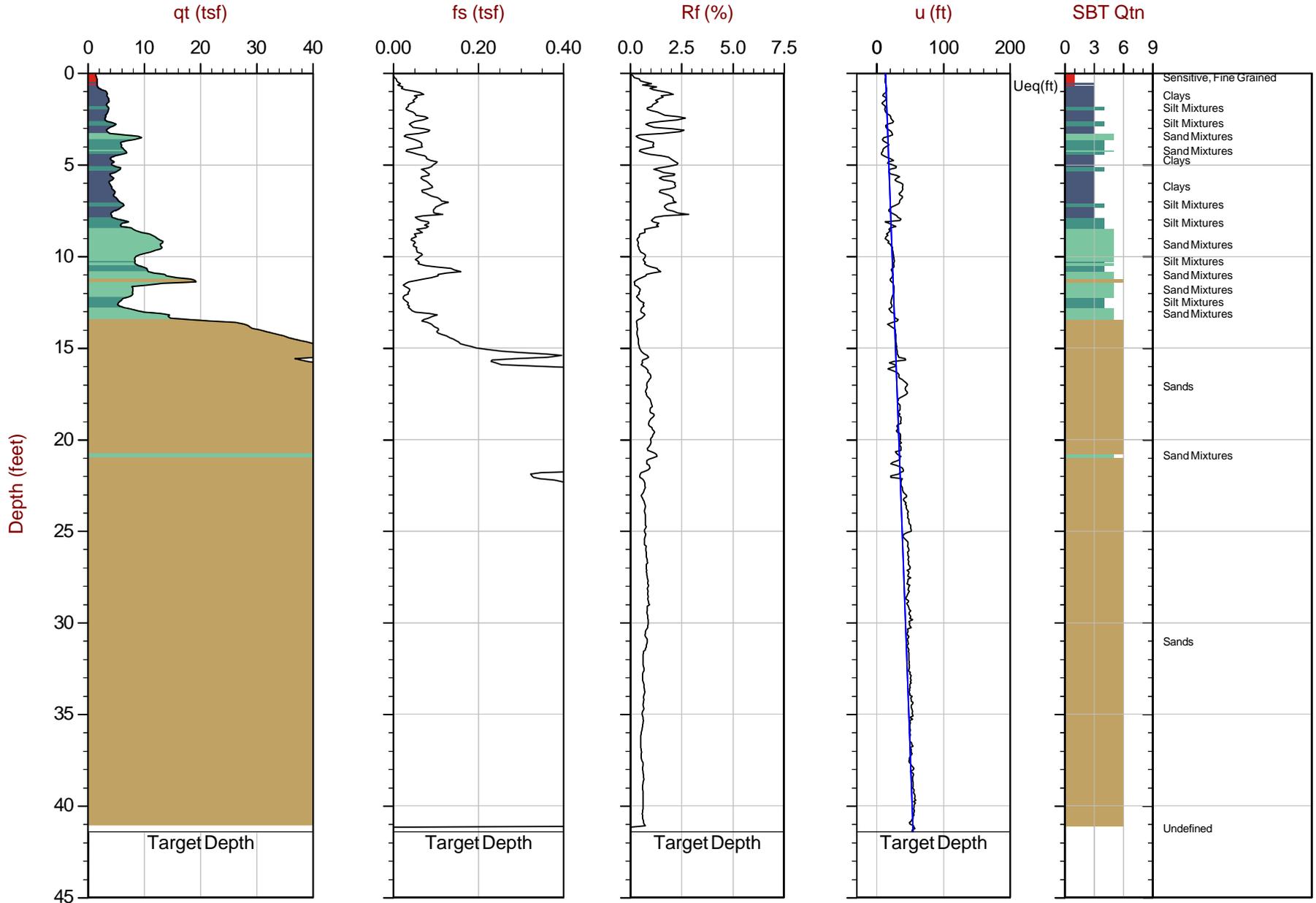


Max Depth: 12.625 m / 41.42 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP25.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53434 Long: -122.32347

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

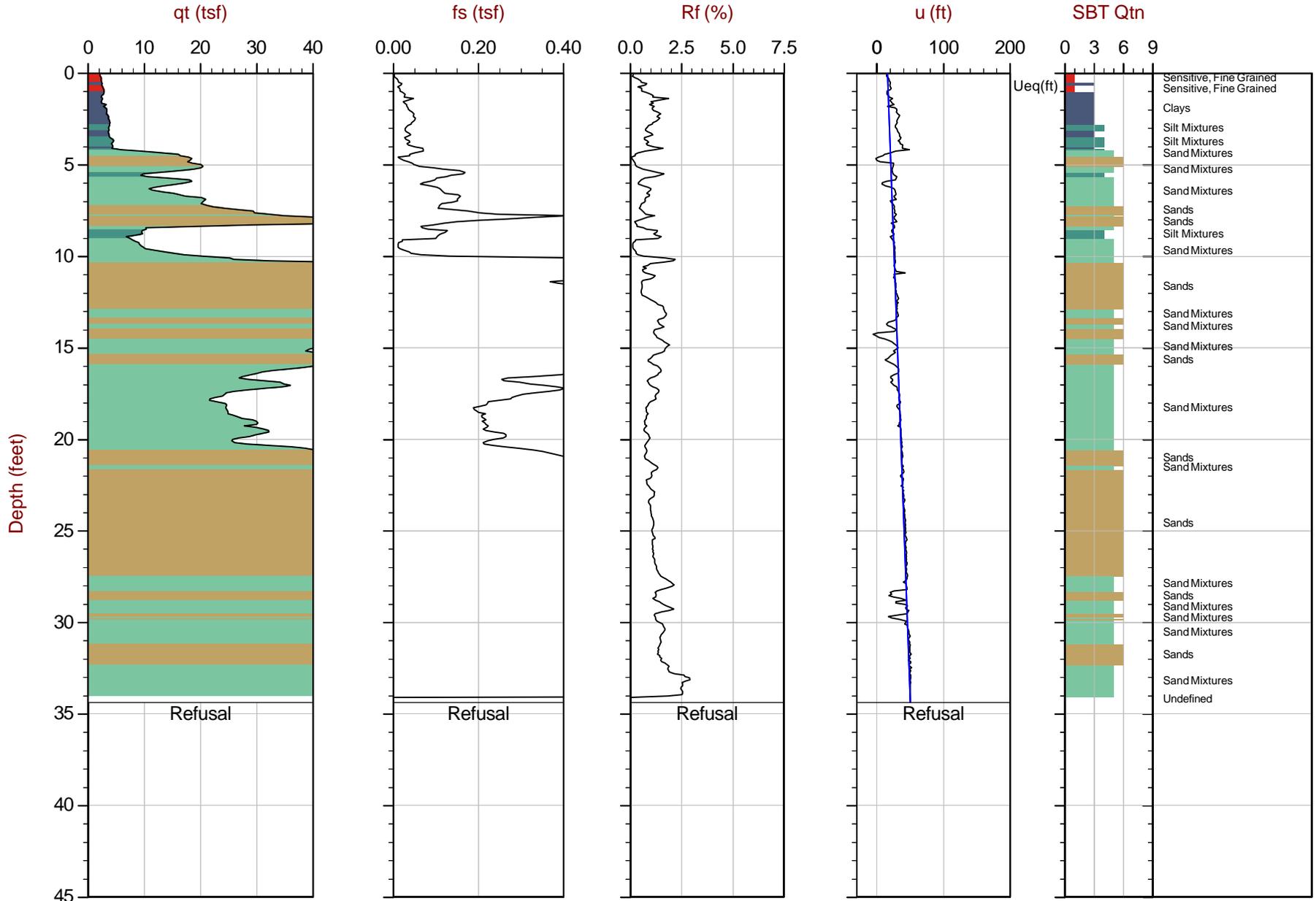


Max Depth: 12.625 m / 41.42 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP27.COR  
 Unit Wt: SBTQtn(PKR2009)

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53547 Long: -122.32400

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

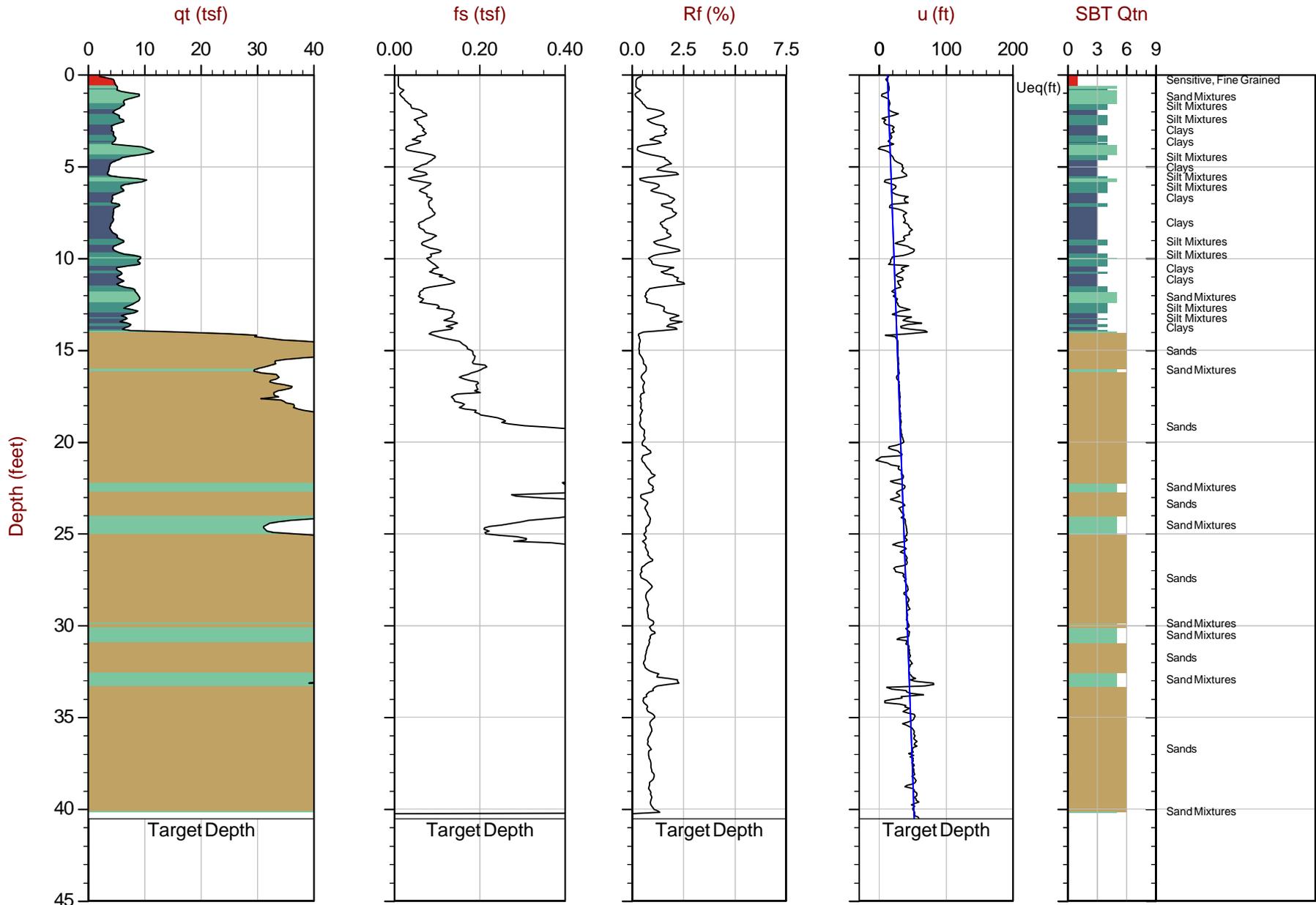


Max Depth: 10.475 m / 34.37 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP28.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53503 Long: -122.32332

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◃ Dissipation, Ueq not achieved   ◅ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



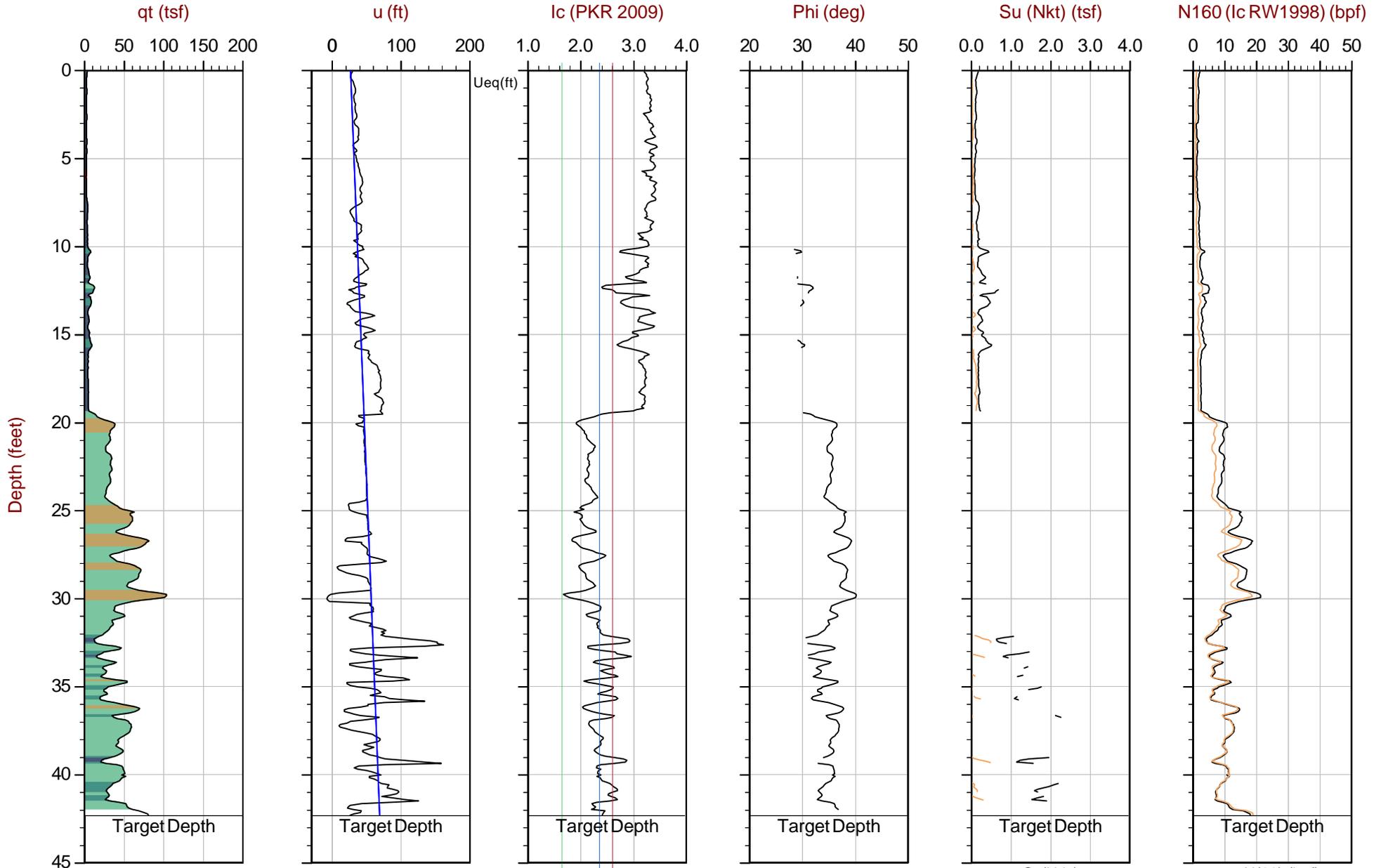
Max Depth: 12.350 m / 40.52 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP29.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53514 Long: -122.32315

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

# **Advanced Cone Penetration Test Plots with $I_c$ , $S_u(N_{kt})$ , $\Phi$ , and $N1(60)I_c$**



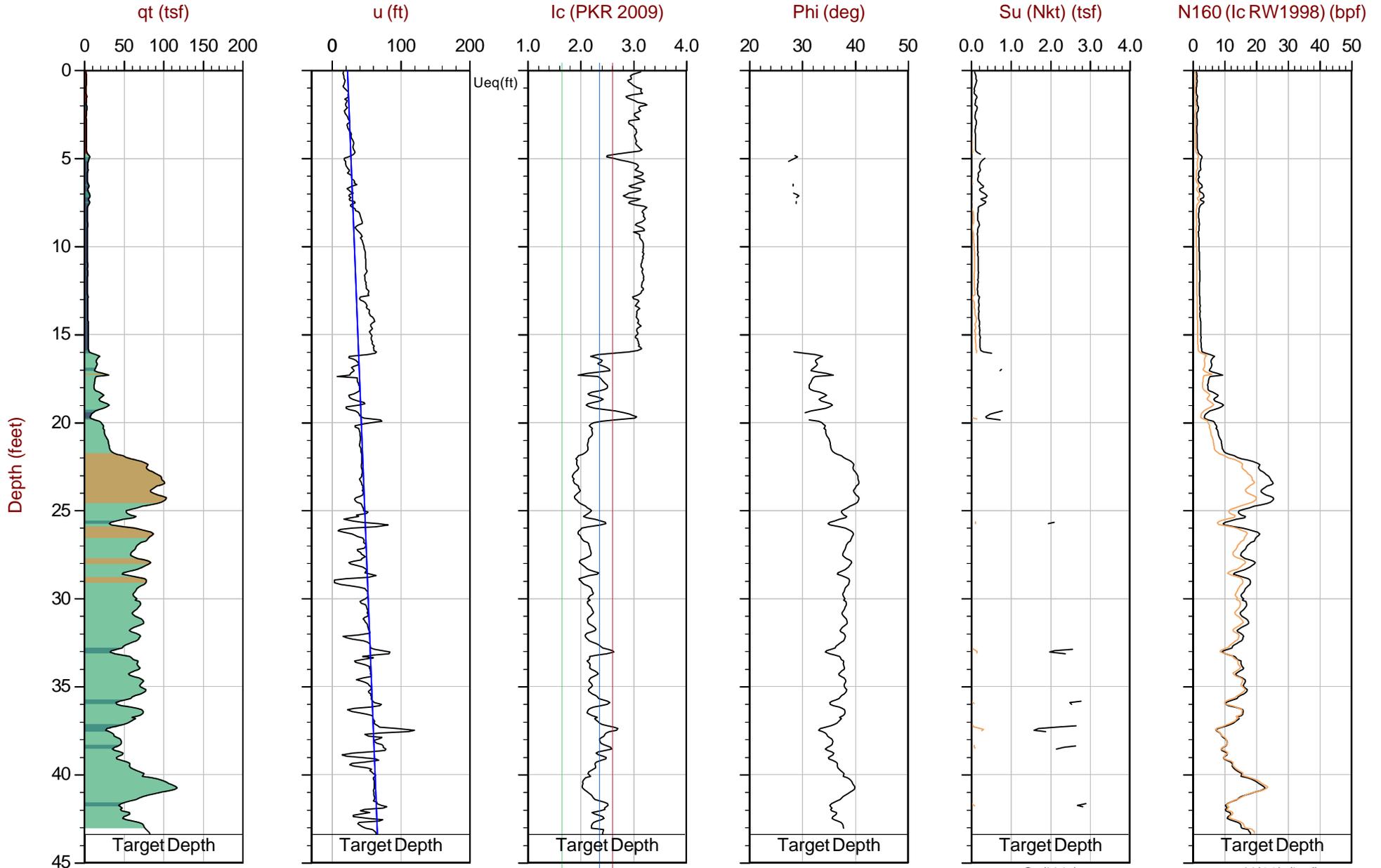
Max Depth: 12.900 m / 42.32 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP01.COR  
 Unit Wt: SBTQtn (PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54392 Long: -122.33734

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



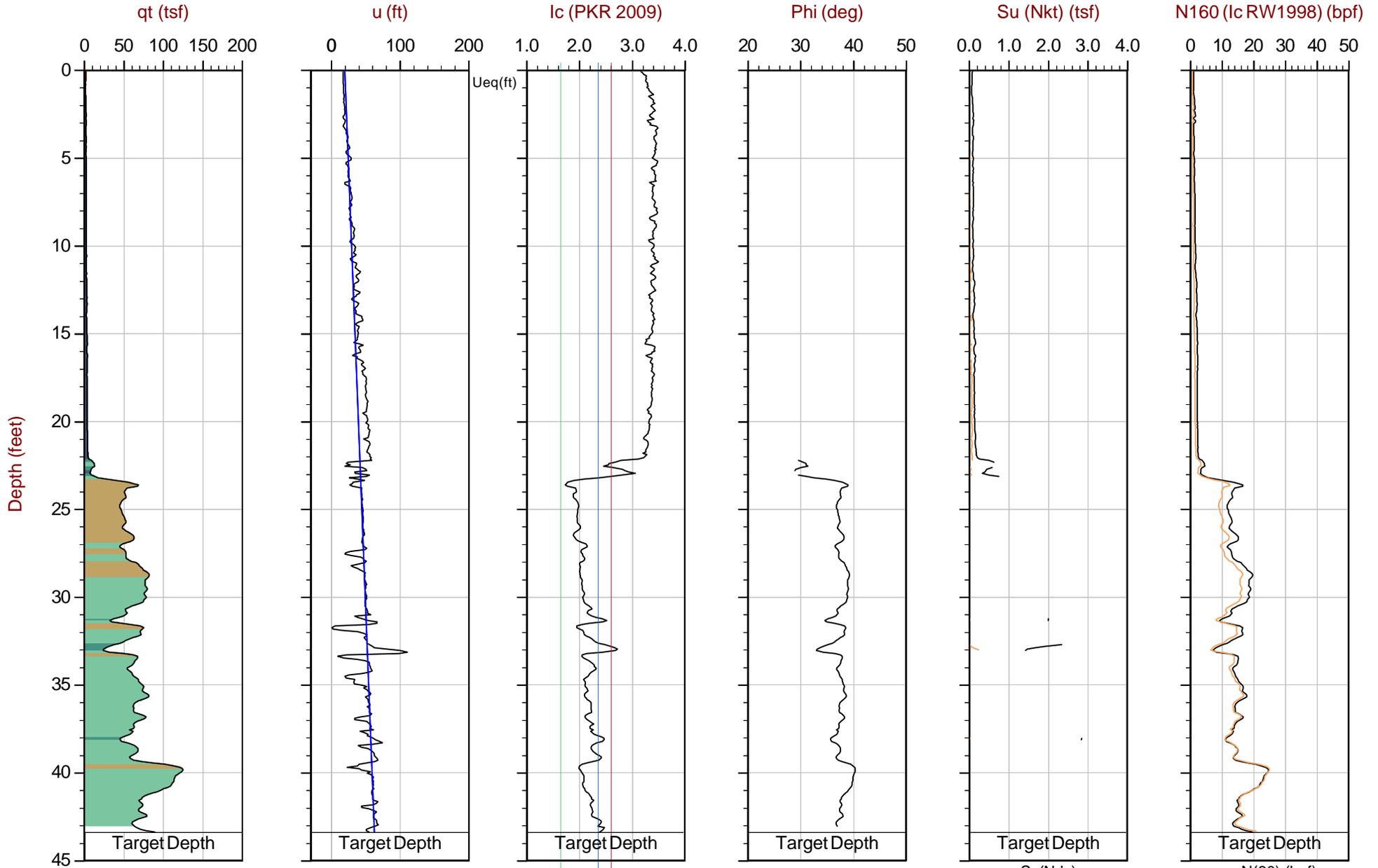
Max Depth: 13.225 m / 43.39 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP03.COR  
 Unit Wt: SBTQtn (PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54227 Long: -122.33505

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



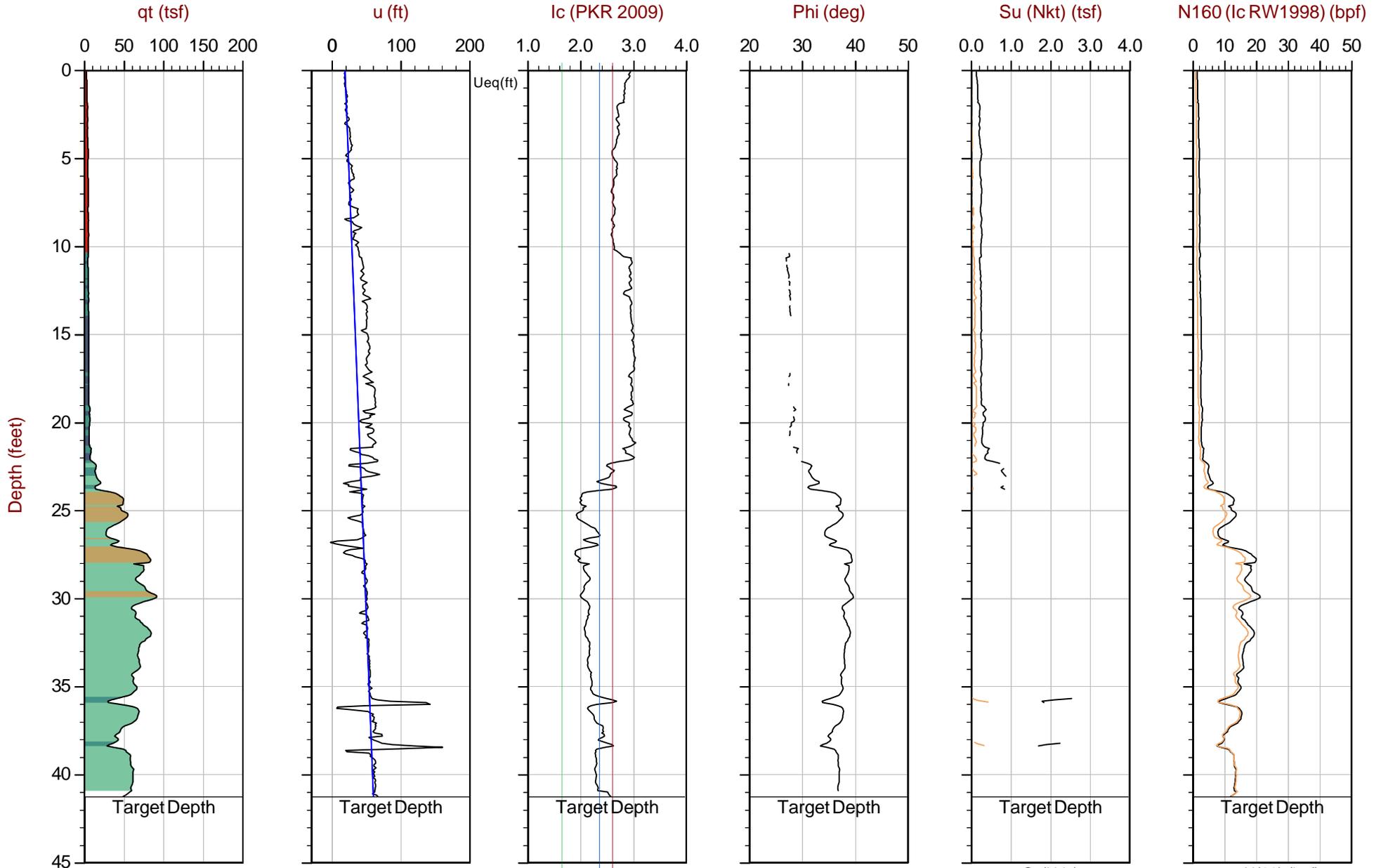
Max Depth: 13.225 m / 43.39 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP05.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54351 Long: -122.33576

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



Max Depth: 12.575 m / 41.26 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP07.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54334 Long: -122.33551

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



# Anchor QEA

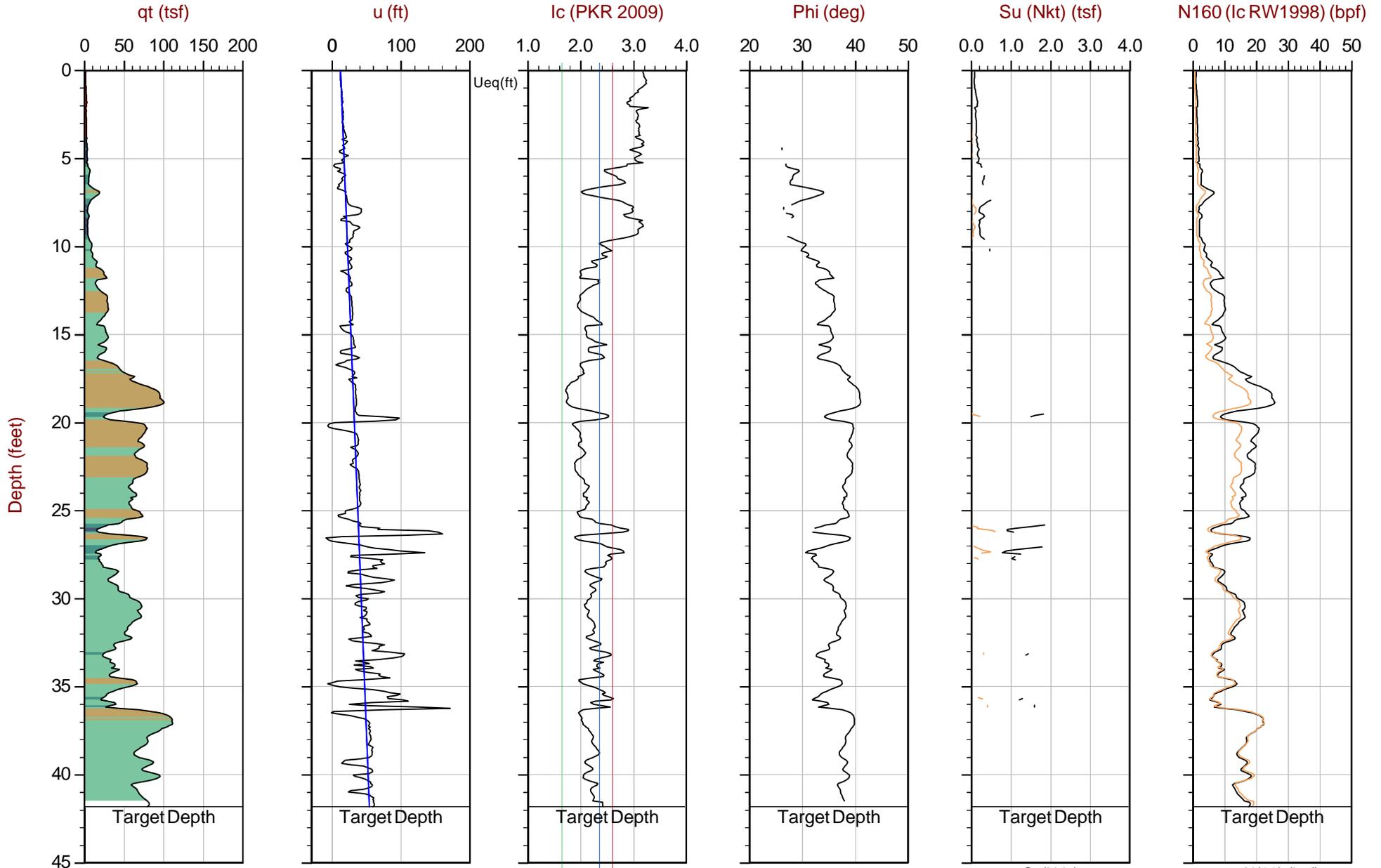
Job No: 24-59-27874

Date: 2024-07-08 13:08

Site: Lower Duwamish Waterway Middle Reach

Sounding: LDW23-GT12-GT

Cone: 1007:T1500F15U35 Area=15 cm<sup>2</sup>



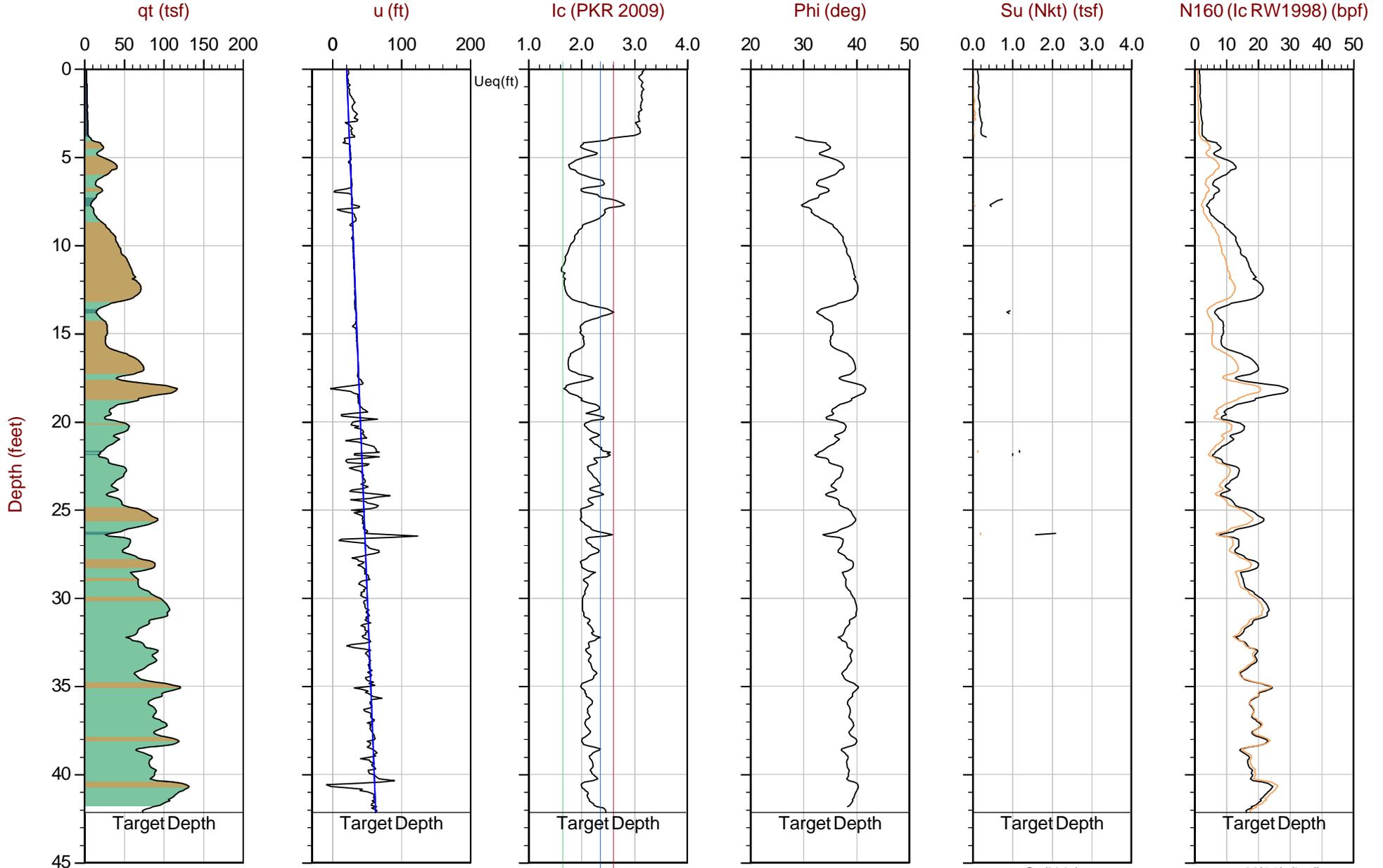
Max Depth: 12.750 m / 41.83 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP12.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54050 Long: -122.33284

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



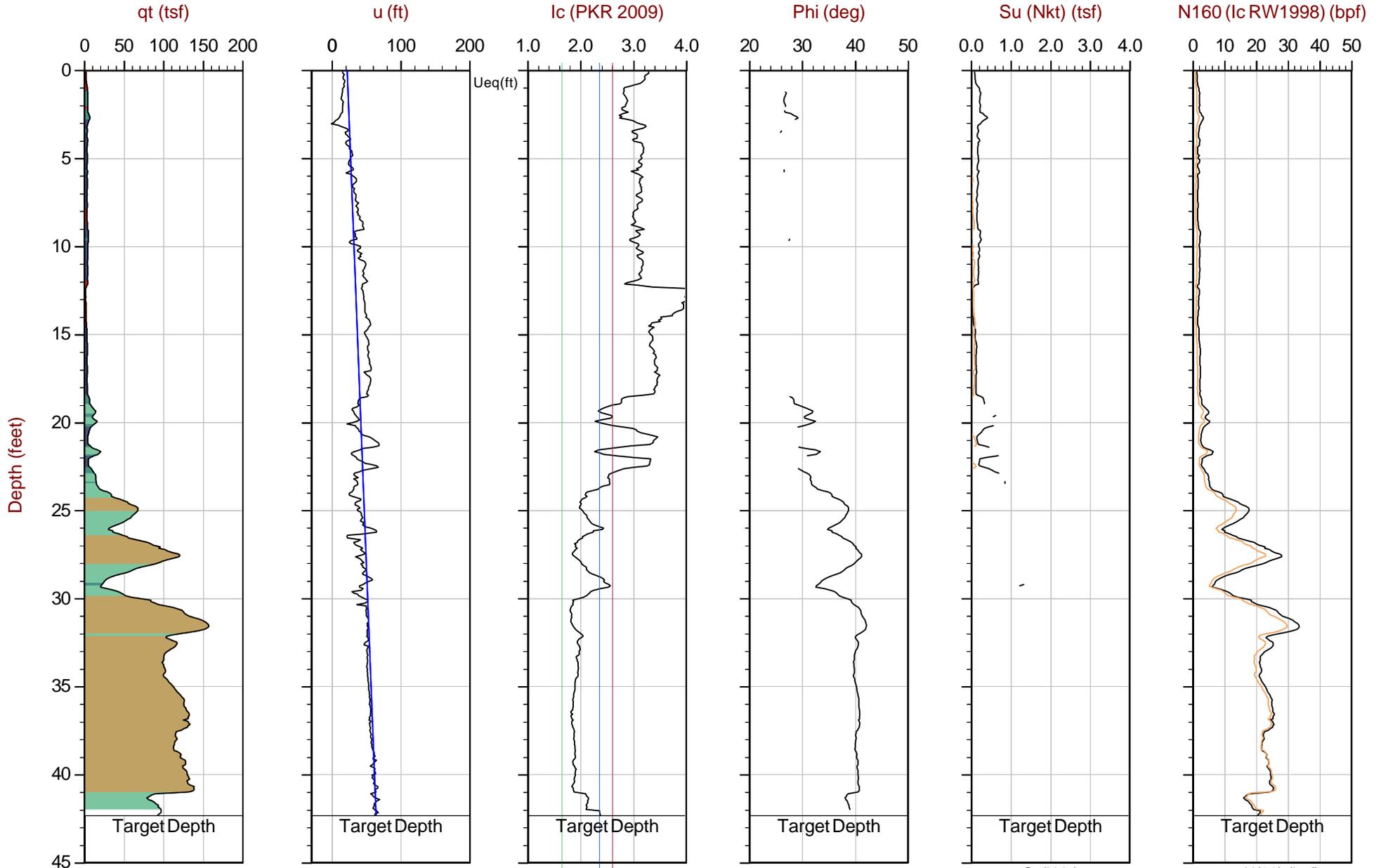
Max Depth: 12.850 m / 42.16 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP14.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.54001 Long: -122.33195

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



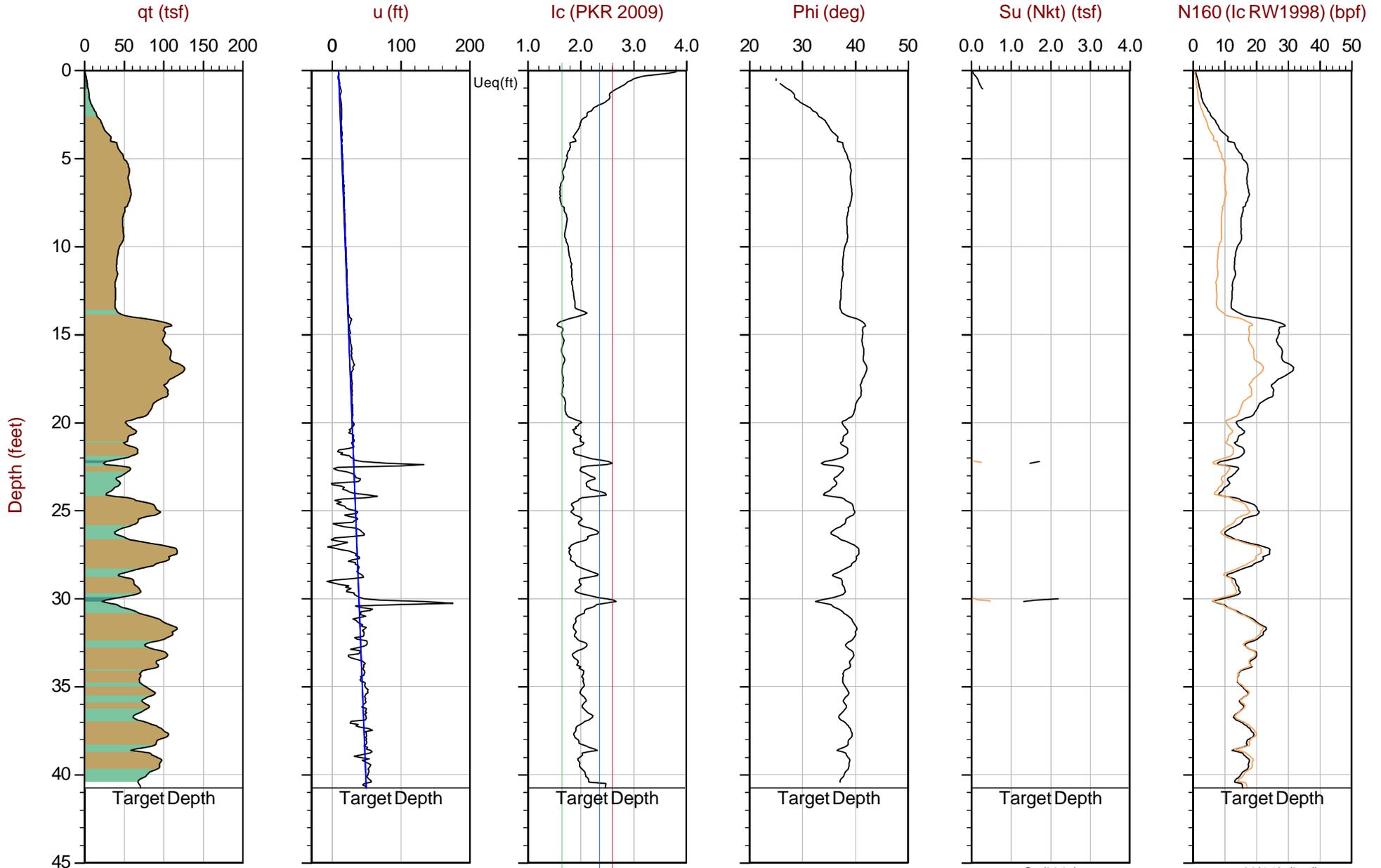
Max Depth: 12.900 m / 42.32 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP15.COR  
 Unit Wt: SBTQtn(PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53914 Long: -122.33049

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◁ Dissipation, Ueq not achieved ◁ Dissipation, Ueq assumed — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

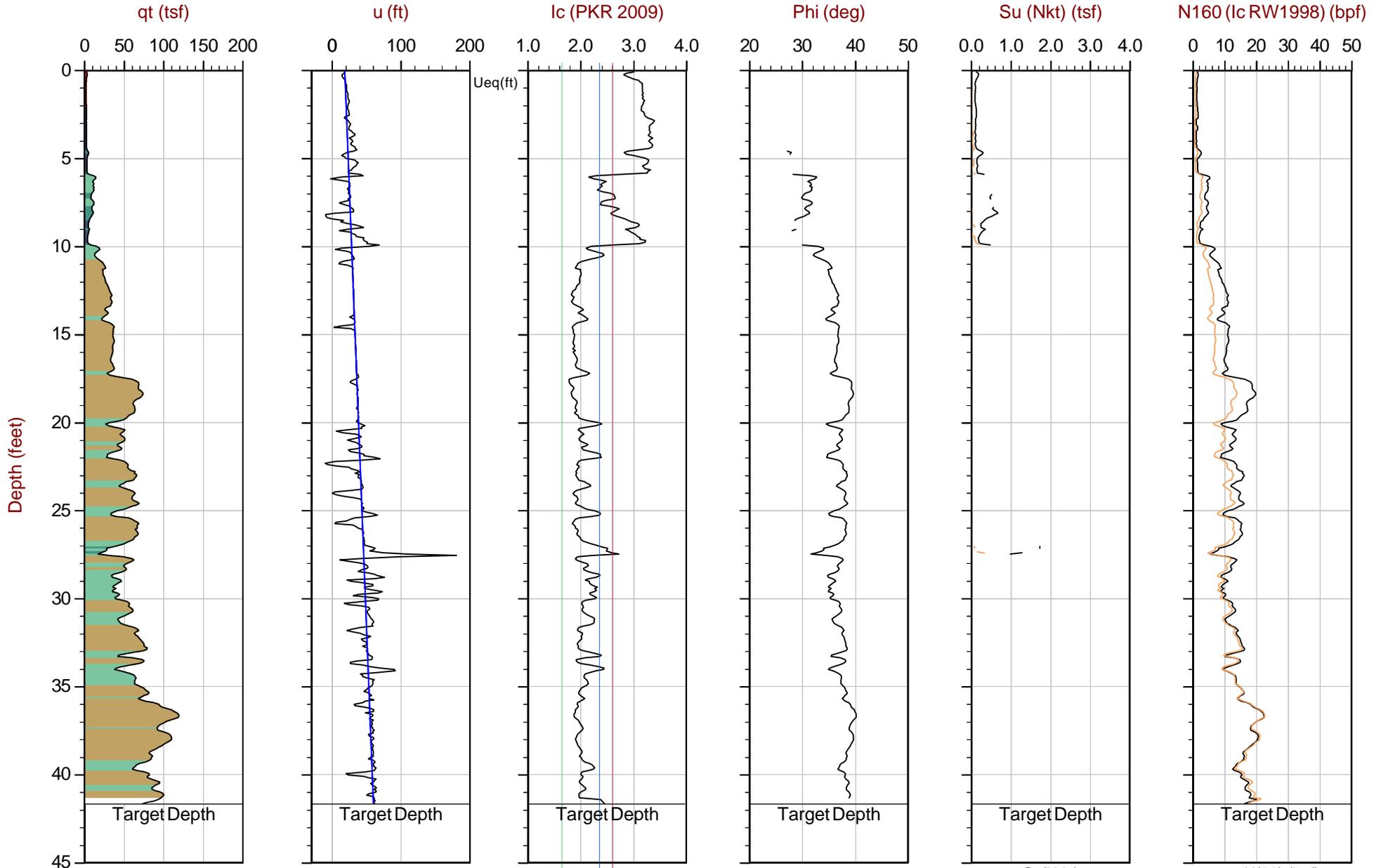


Max Depth: 12.425 m / 40.76 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP16.COR  
 Unit Wt: SBTQtn(PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53840 Long: -122.32986

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line  
 The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



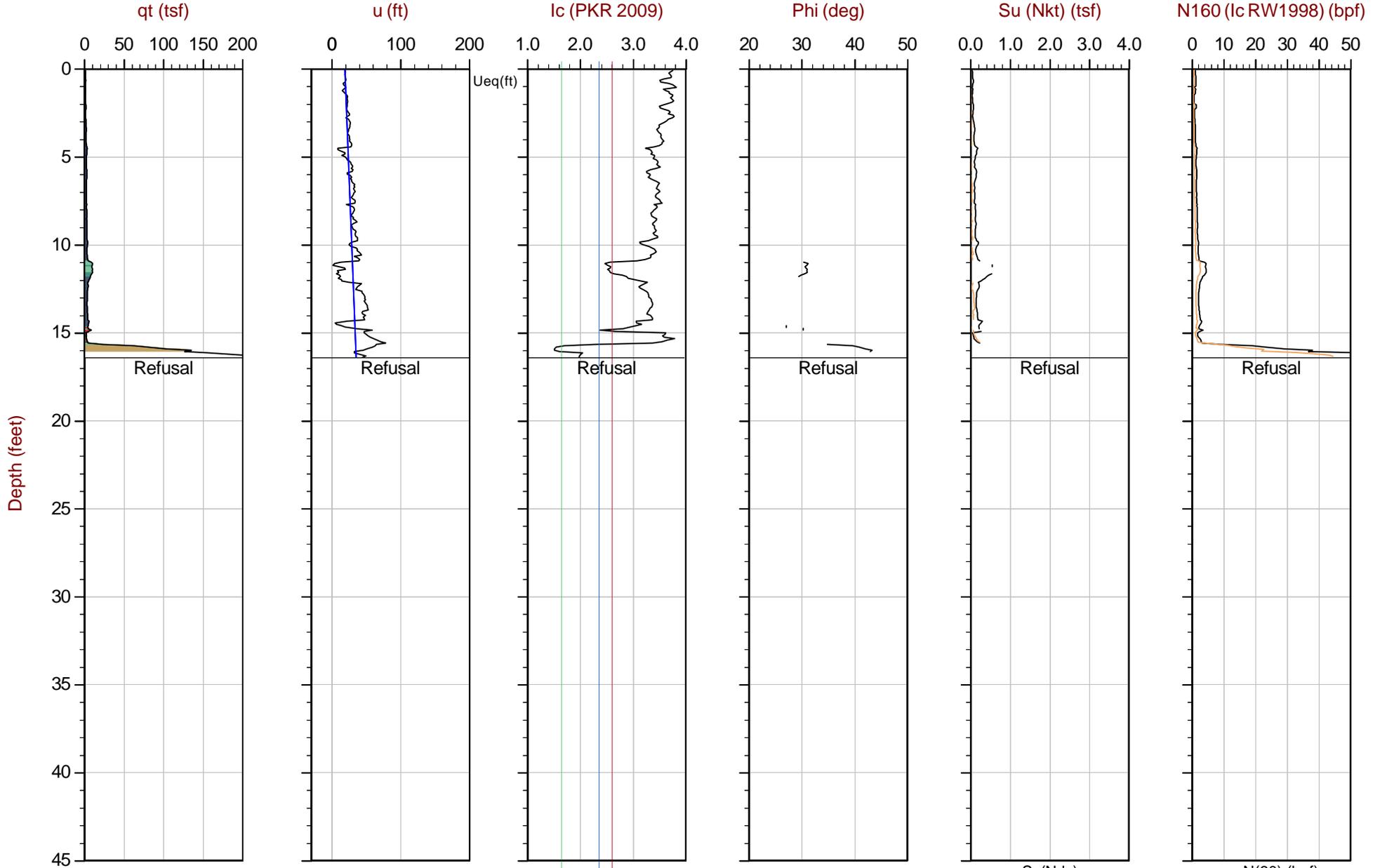
Max Depth: 12.700 m / 41.67 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP20.COR  
 Unit Wt: SBTQtn(PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53712 Long: -122.32613

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



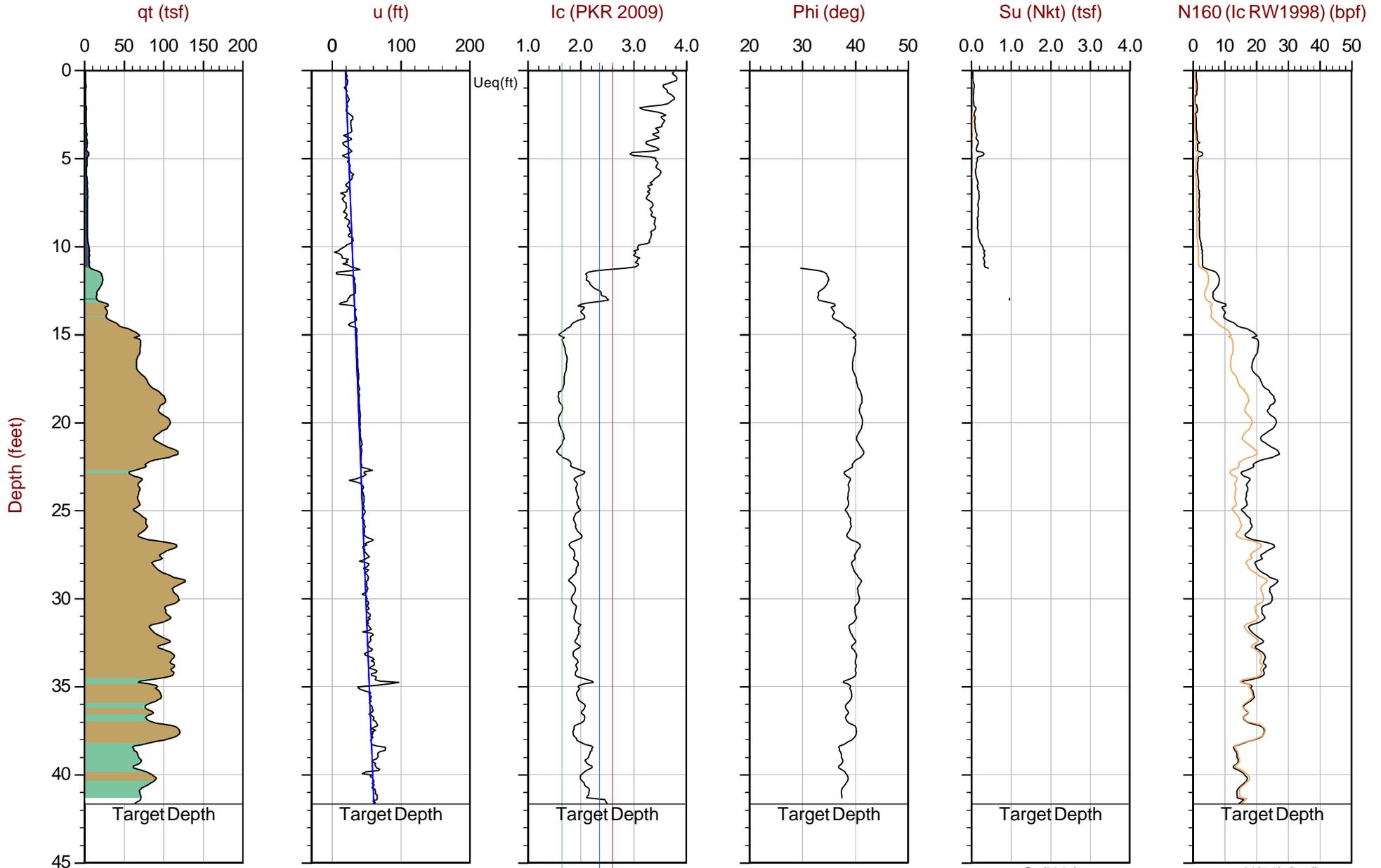
Max Depth: 5.000 m / 16.40 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP23.COR  
 Unit Wt: SBTQtn(PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53591 Long: -122.32601

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



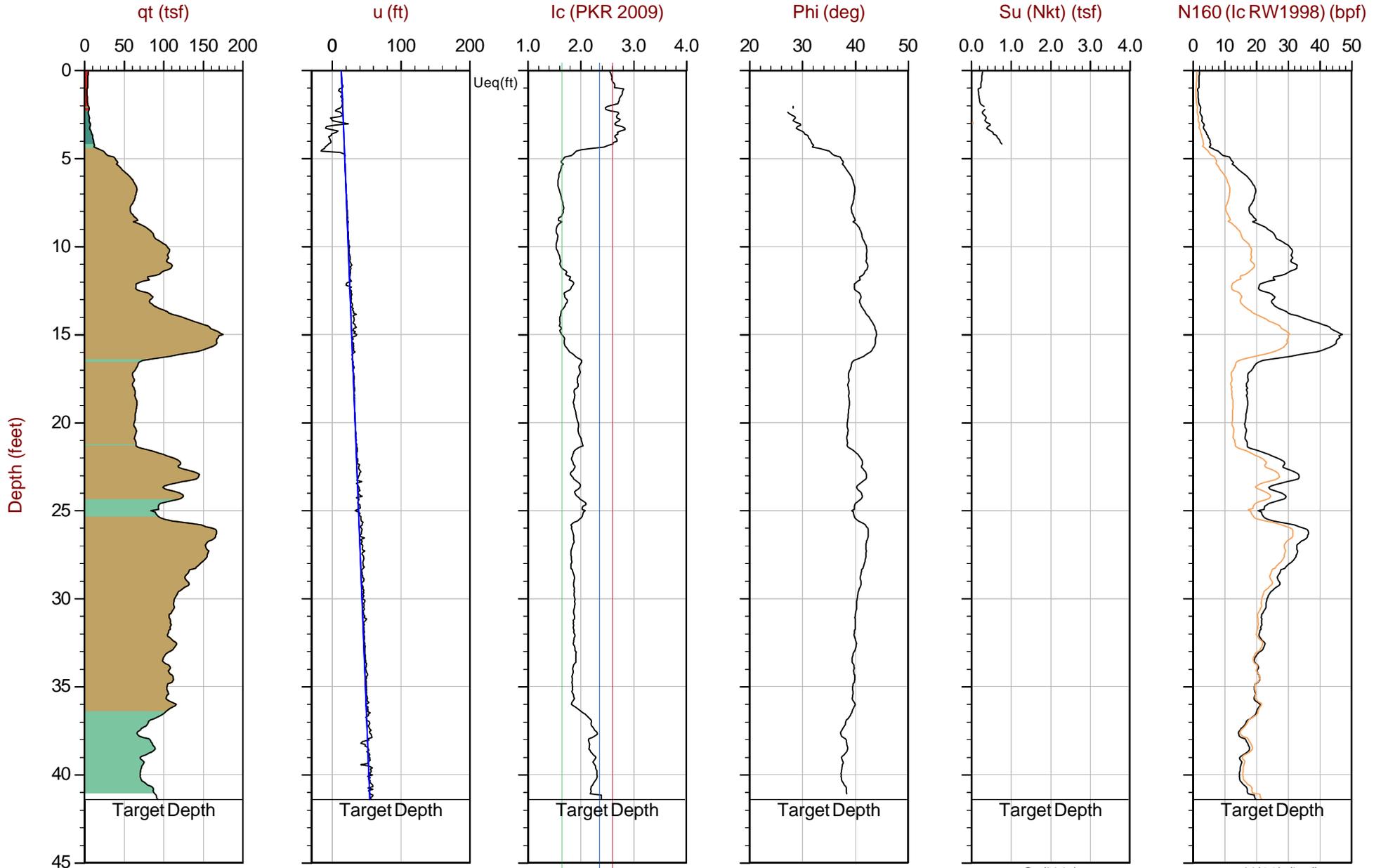
Max Depth: 12.700 m / 41.67 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP23B.COR  
 Unit Wt: SBTQtn(PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53602 Long: -122.32599

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



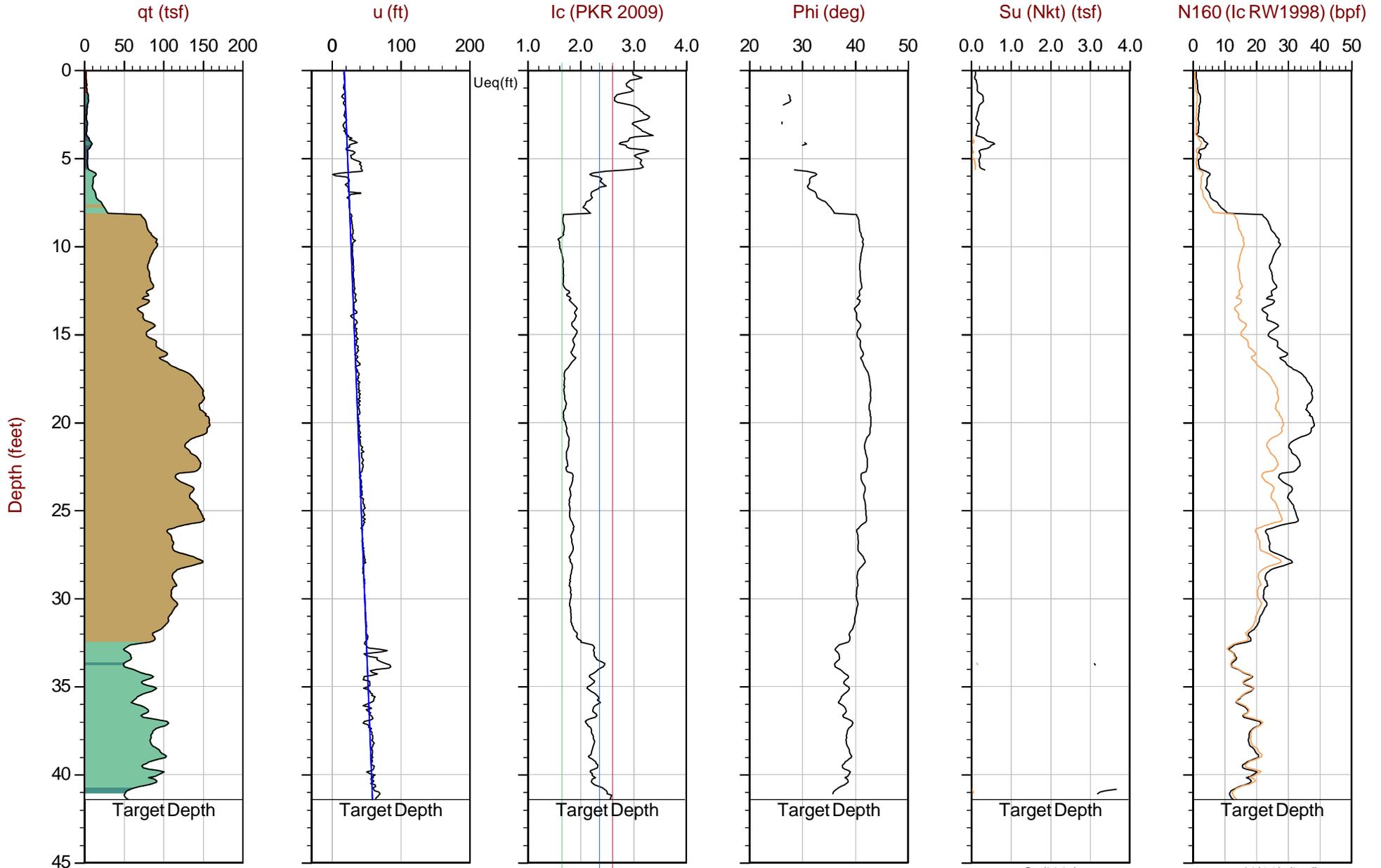
Max Depth: 12.625 m / 41.42 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP24.COR  
 Unit Wt: SBTQtn(PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53484 Long: -122.32438

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



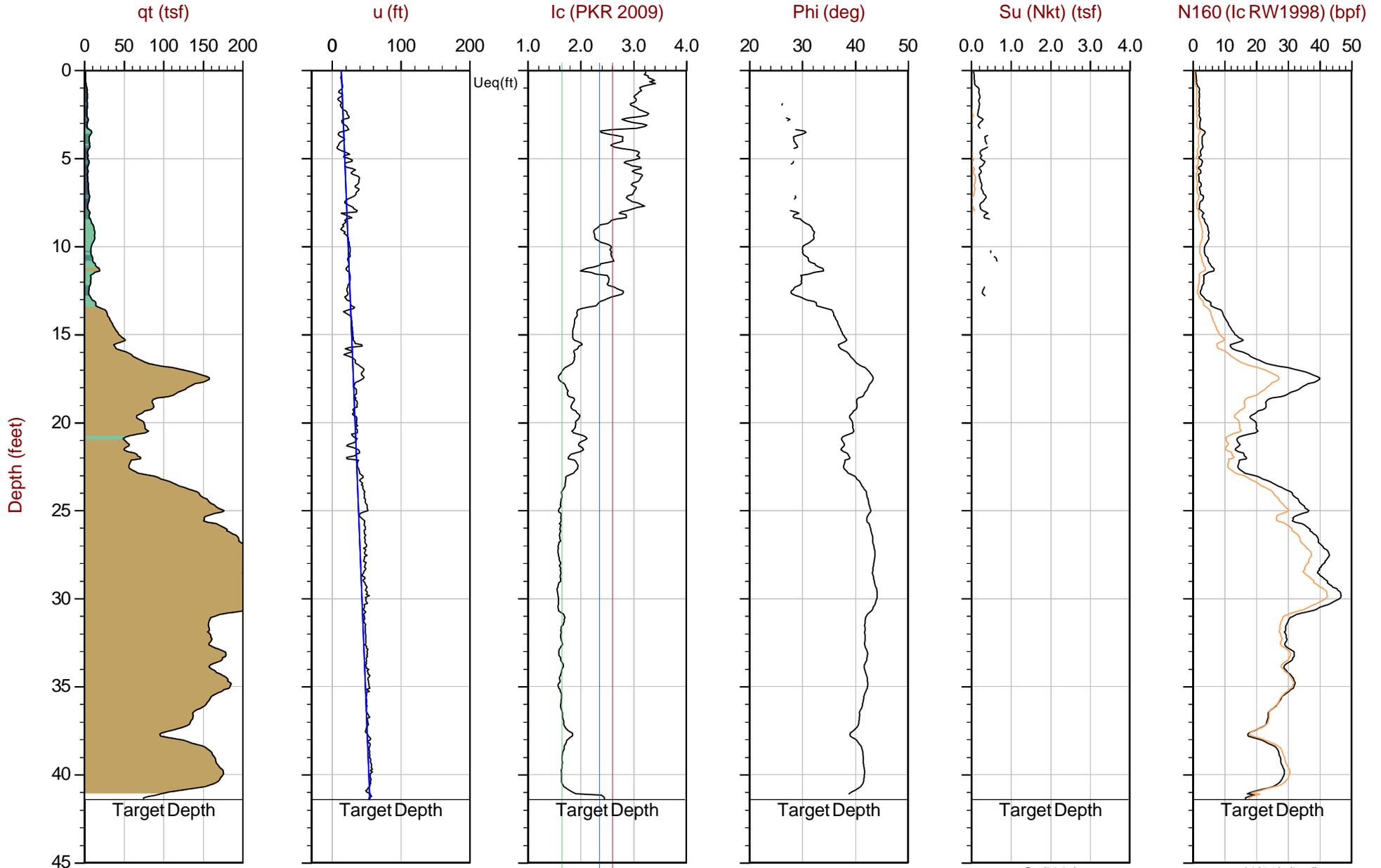
Max Depth: 12.625 m / 41.42 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP25.COR  
 Unit Wt: SBTQtn(PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53434 Long: -122.32347

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



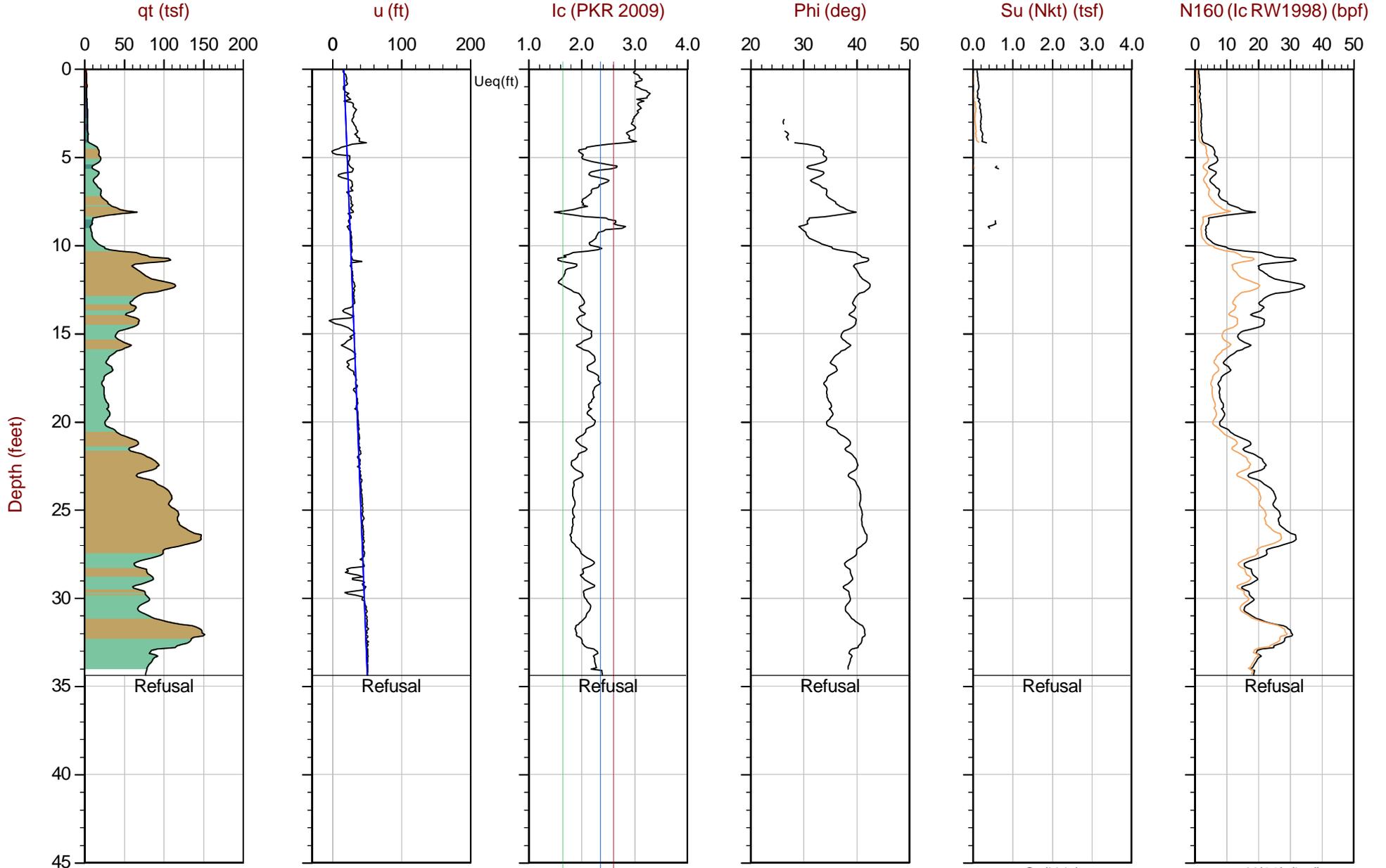
Max Depth: 12.625 m / 41.42 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP27.COR  
 Unit Wt: SBTQtn(PKR2009)  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53547 Long: -122.32400

Overplot Item: ● Ueq ● Assumed Ueq ◁ Dissipation, Ueq achieved ◃ Dissipation, Ueq not achieved ◅ Dissipation, Ueq assumed — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



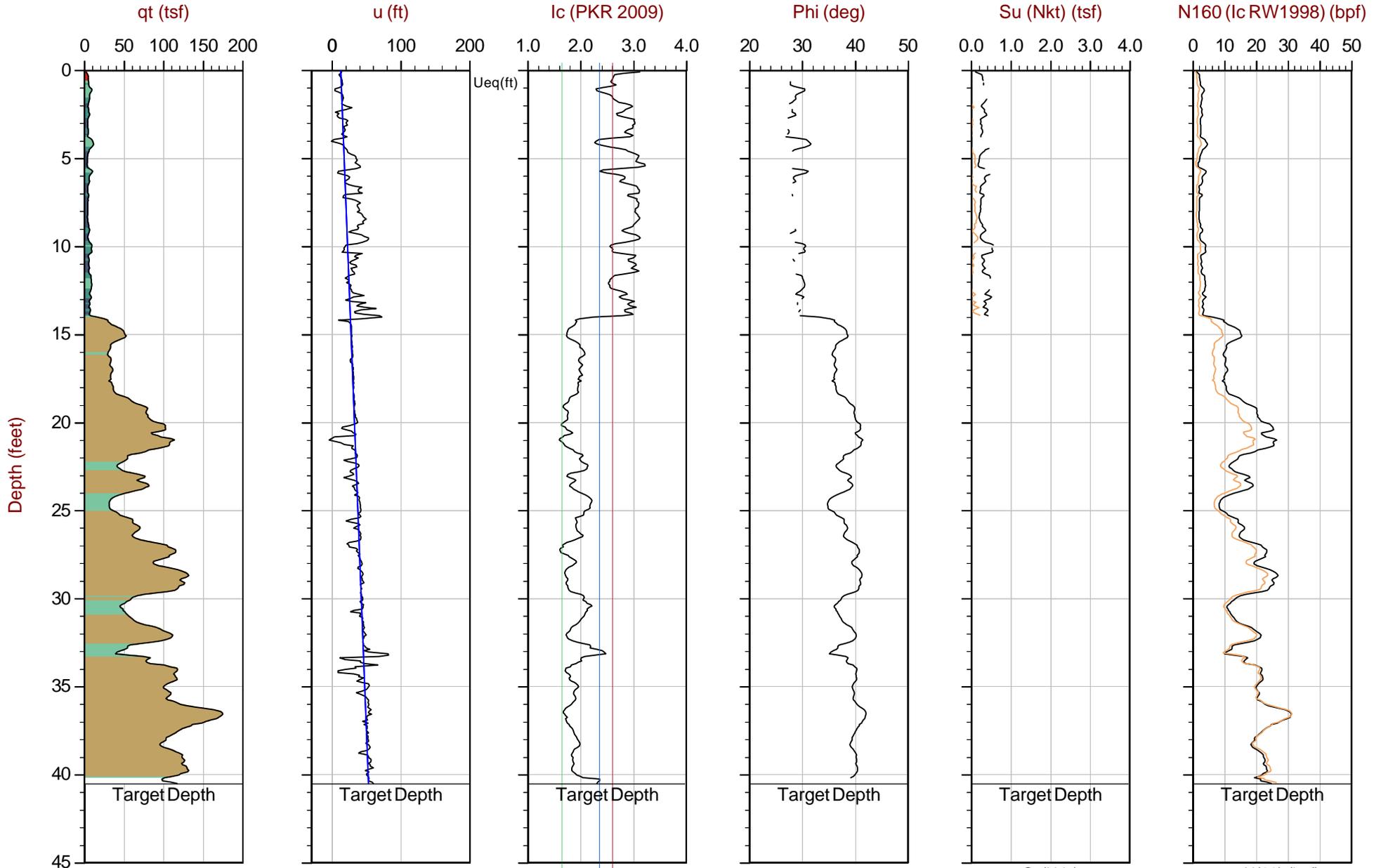
Max Depth: 10.475 m / 34.37 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

File: 24-59-27874\_CP28.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53503 Long: -122.32332

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.



Max Depth: 12.350 m / 40.52 ft  
 Depth Inc: 0.025 m / 0.082 ft  
 Avg Int: Every Point

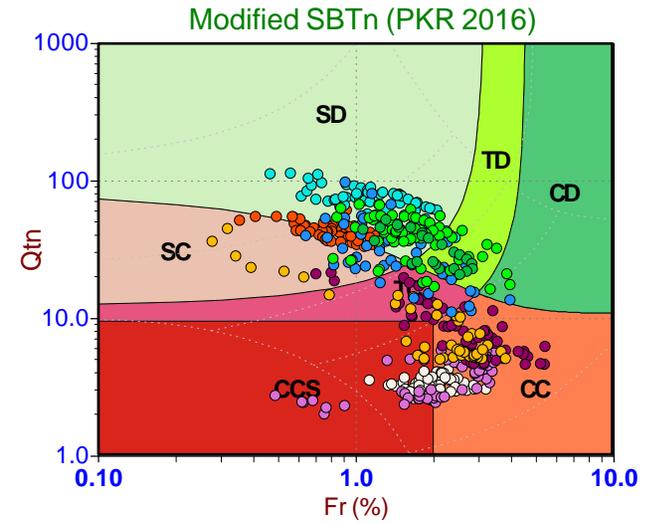
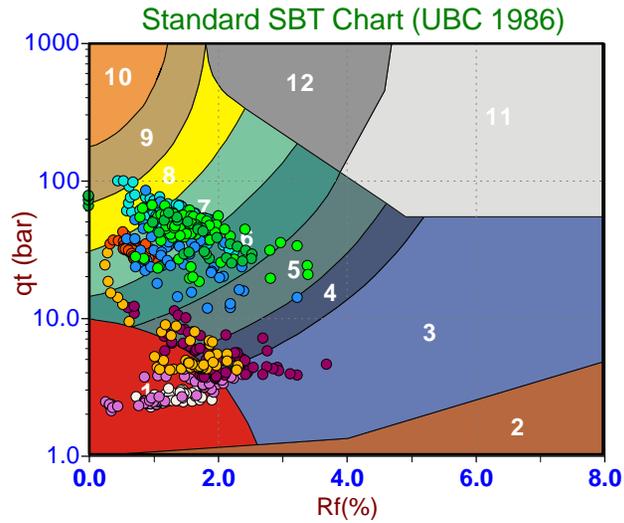
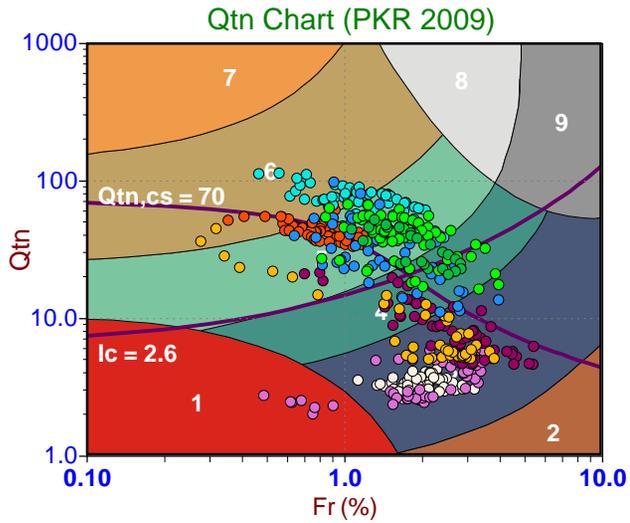
File: 24-59-27874\_CP29.COR  
 Unit Wt: SBTQtn (PKR2009), User Defined Layers  
 Su Nkt/Ndu: 15.0 / 6.0

SBT: Robertson, 2009 and 2010  
 Coords: Lat: 47.53514 Long: -122.32315

Overplot Item: ● Ueq   ● Assumed Ueq   ◁ Dissipation, Ueq achieved   ◁ Dissipation, Ueq not achieved   ◁ Dissipation, Ueq assumed   — Hydrostatic Line

The reported coordinates were acquired from consumer grade GPS equipment and are only approximate locations. The coordinates should not be used for design purposes.

## **Soil Behavior Type (SBT) Scatter Plots**



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

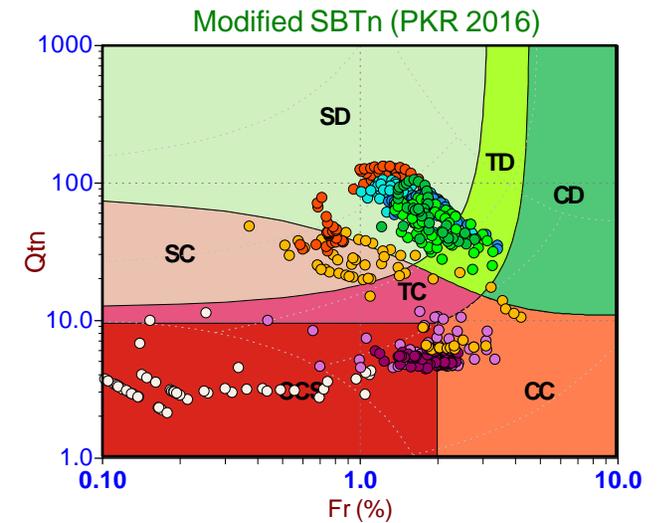
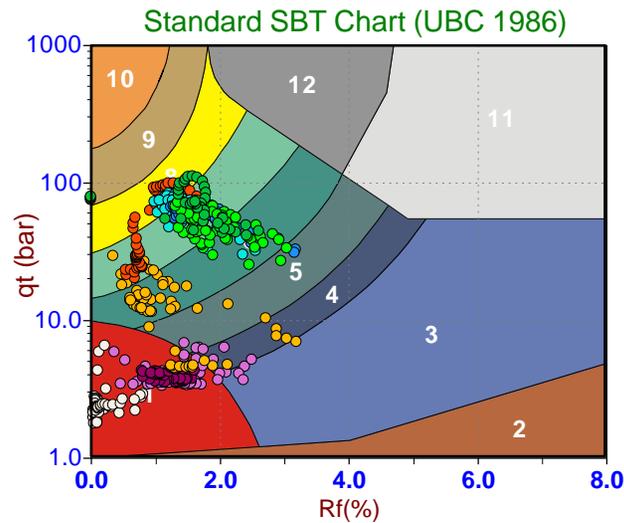
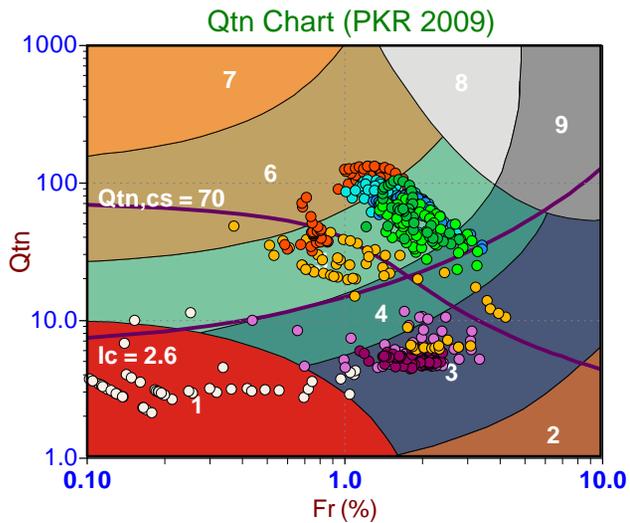
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

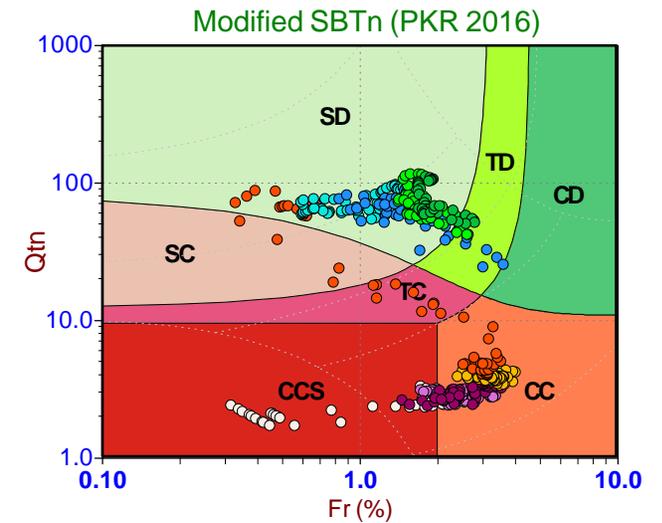
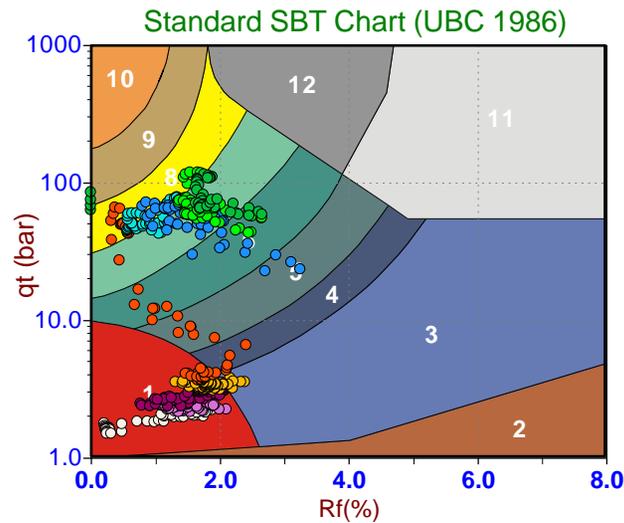
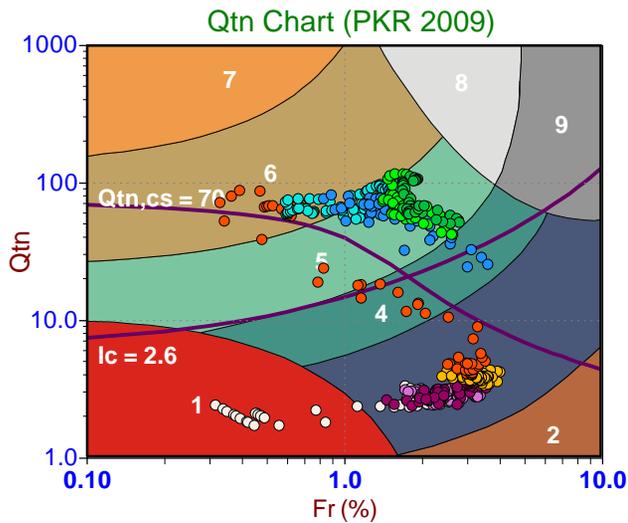
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

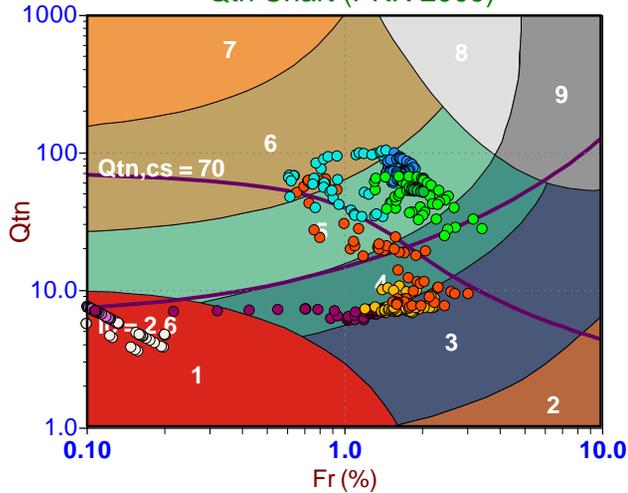
**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

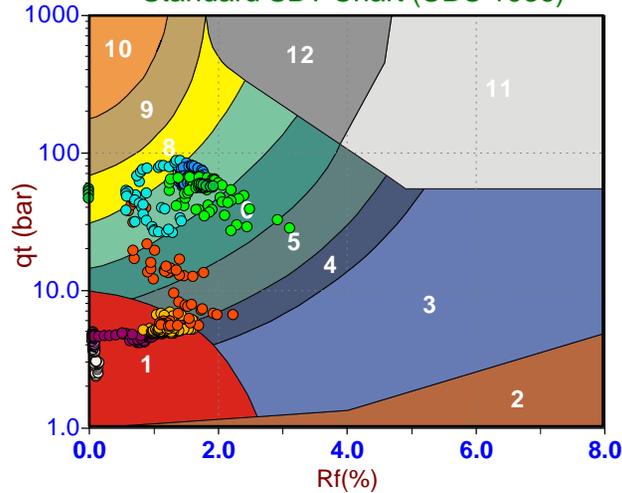
**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)

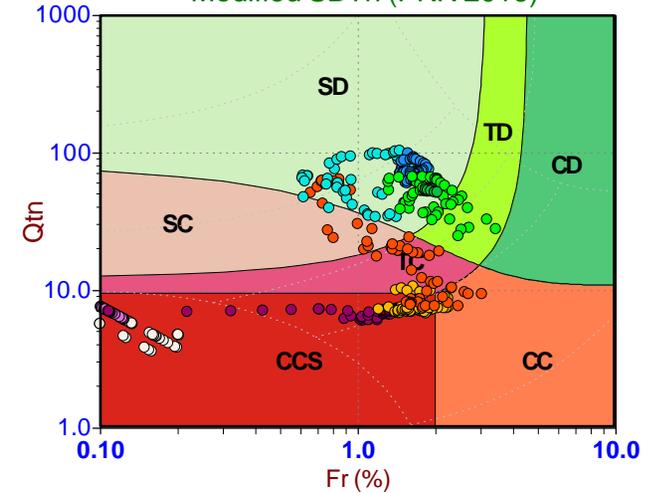
Qtn Chart (PKR 2009)



Standard SBT Chart (UBC 1986)



Modified SBTn (PKR 2016)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

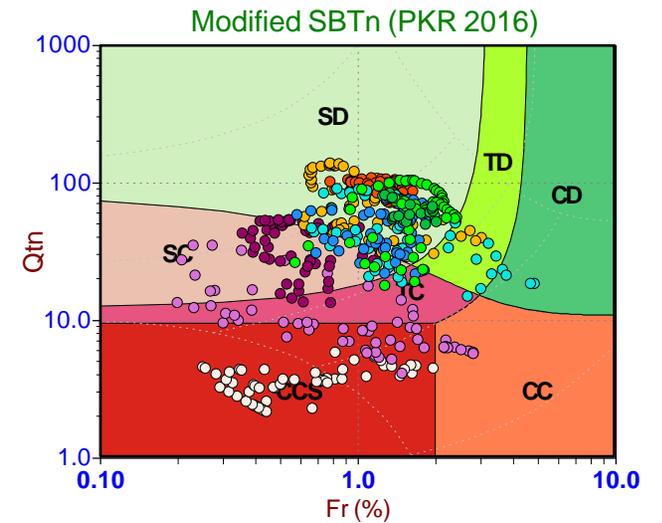
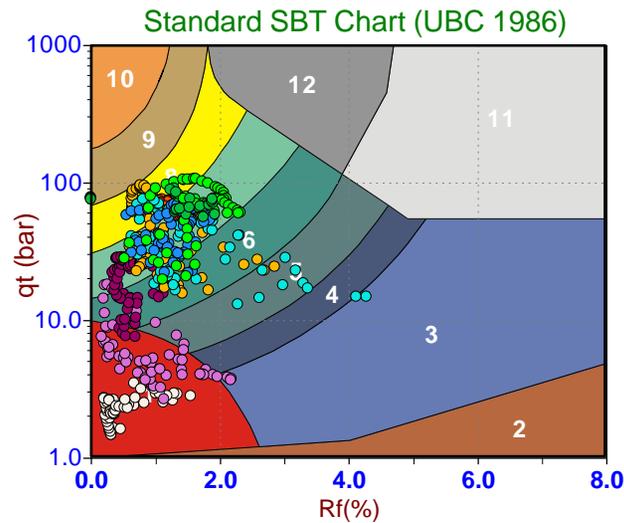
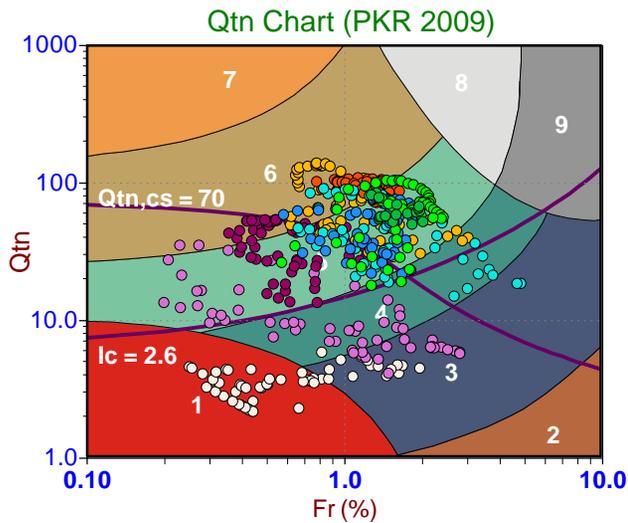
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
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- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

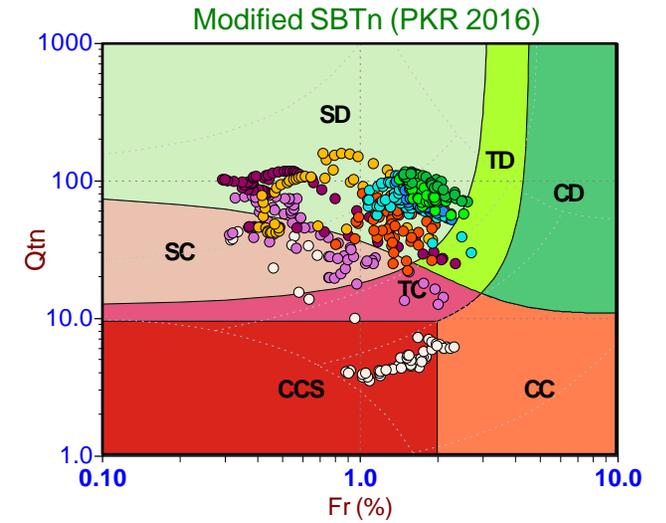
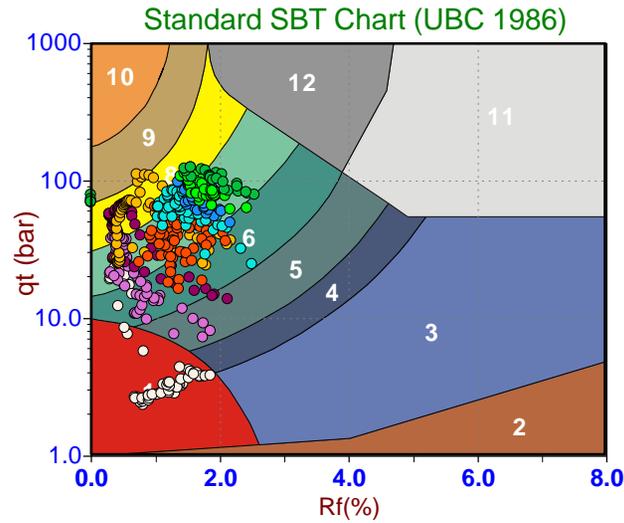
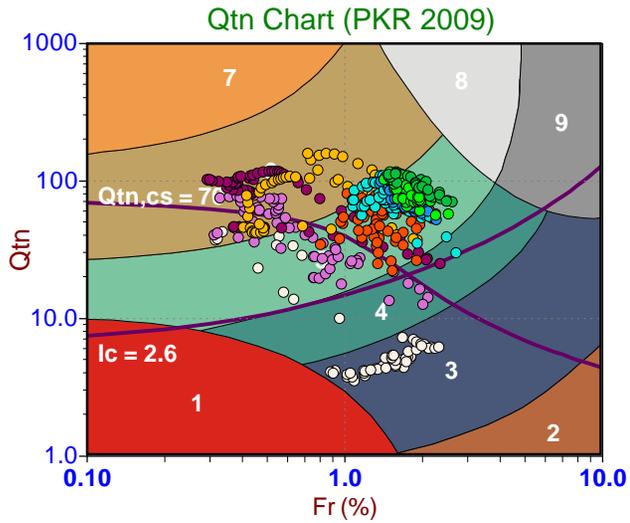
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

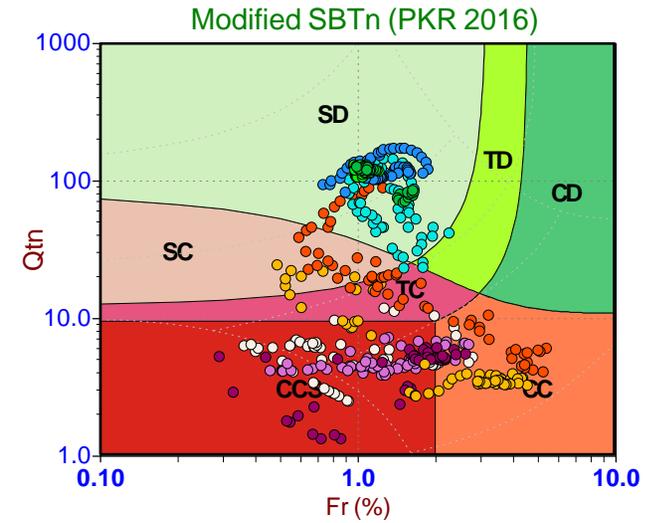
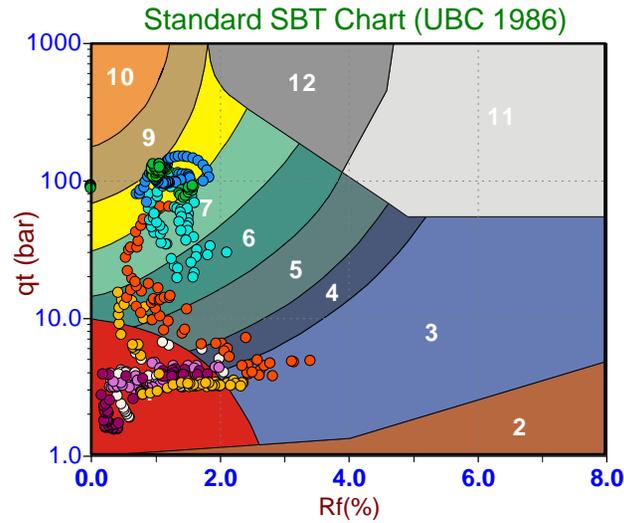
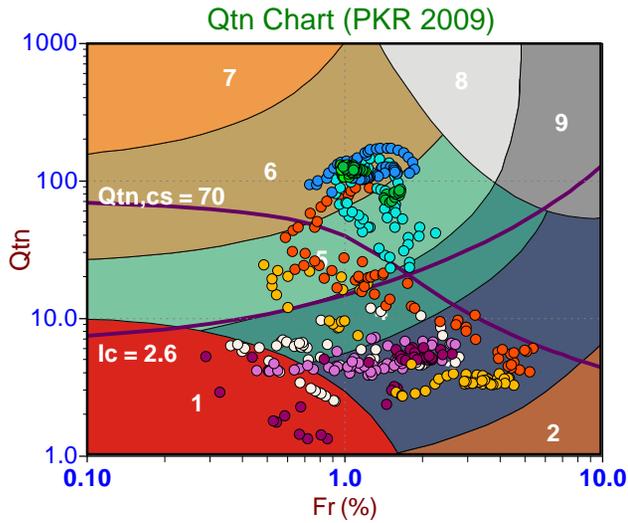
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

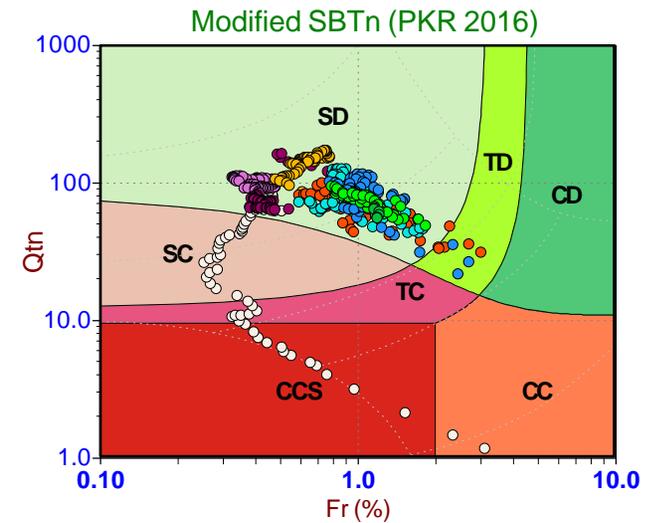
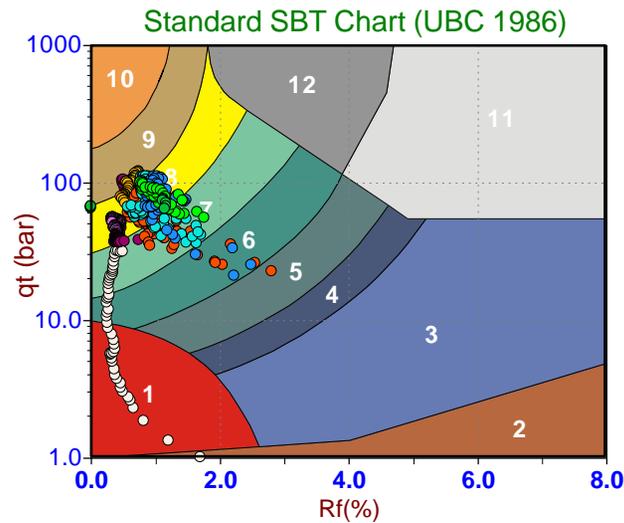
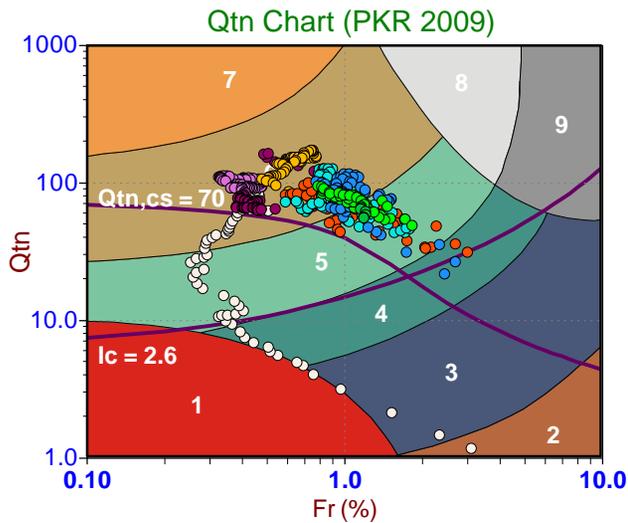
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)



**Depth Ranges**

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

**Legend**

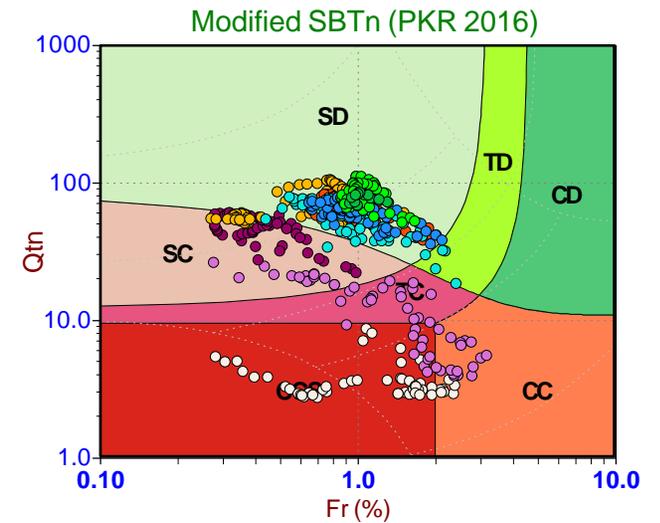
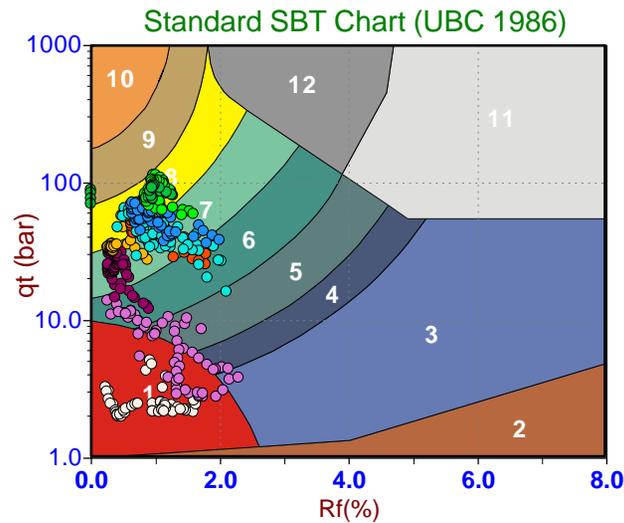
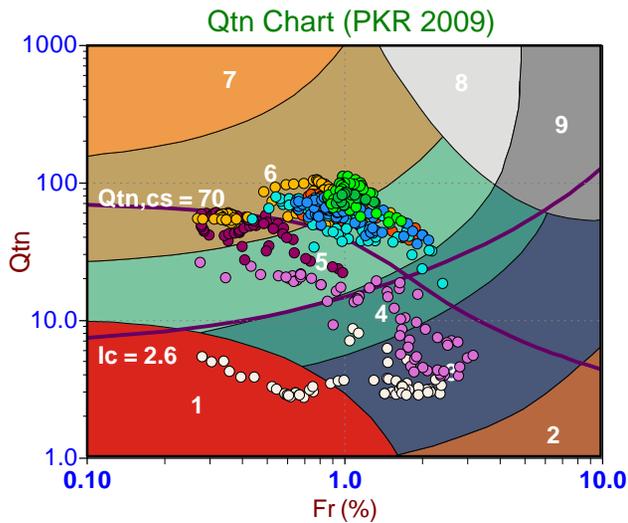
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

**Legend**

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
- Gravelly Sand
- Stiff Fine Grained
- Cemented Sand

**Legend**

- CCS (Cont. sensitive clay like)
- CC (Cont. clay like)
- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

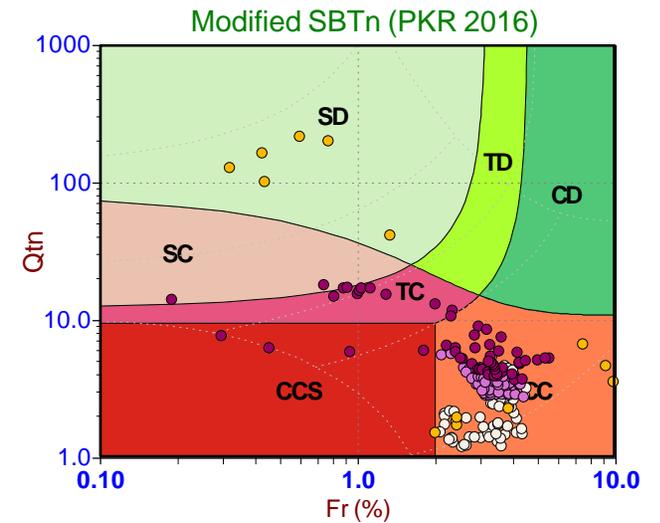
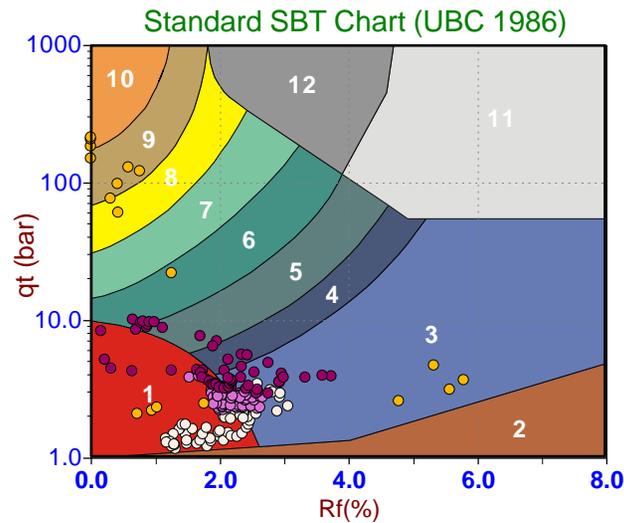
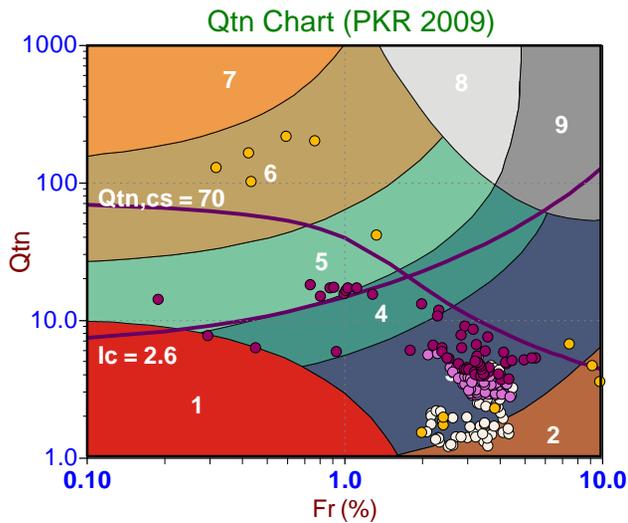
- Sensitive, Fine Grained
- Organic Soils
- Clays
- Silt Mixtures
- Sand Mixtures
- Sands
- Gravelly Sand to Sand
- Stiff Sand to Clayey Sand
- Very Stiff Fine Grained

#### Legend

- Sensitive Fines
- Organic Soil
- Clay
- Silty Clay
- Clayey Silt
- Silt
- Sandy Silt
- Silty Sand/Sand
- Sand
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#### Legend

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- TC (Cont. transitional)
- SC (Cont. sand like)
- CD (Dil. clay like)
- TD (Dil. transitional)
- SD (Dil. sand like)



#### Depth Ranges

- >0.0 to 5.0 ft
- >5.0 to 10.0 ft
- >10.0 to 15.0 ft
- >15.0 to 20.0 ft
- >20.0 to 25.0 ft
- >25.0 to 30.0 ft
- >30.0 to 35.0 ft
- >35.0 to 40.0 ft
- >40.0 to 45.0 ft
- >45.0 to 50.0 ft
- >50.0 ft

#### Legend

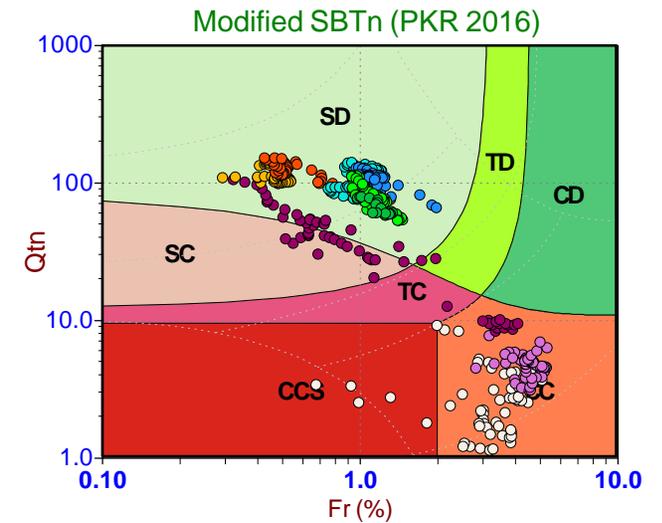
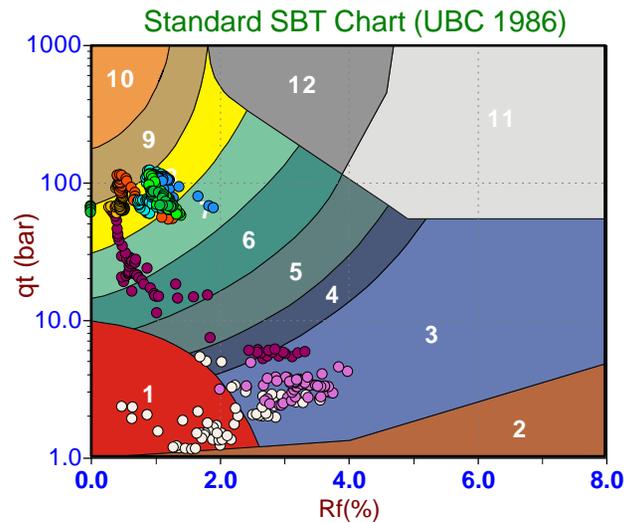
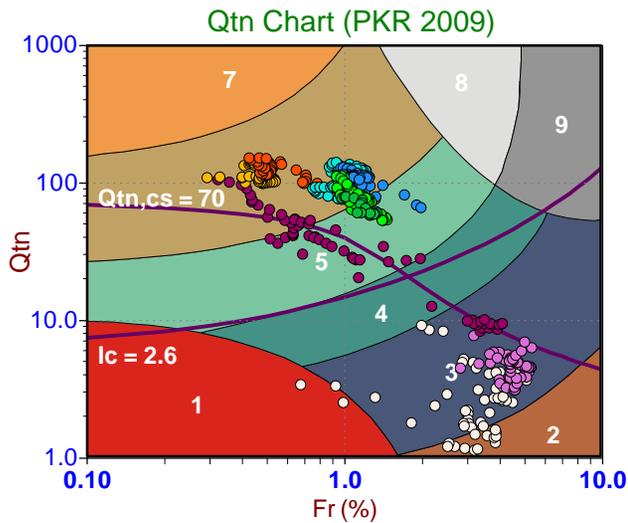
- Sensitive, Fine Grained
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**Legend**

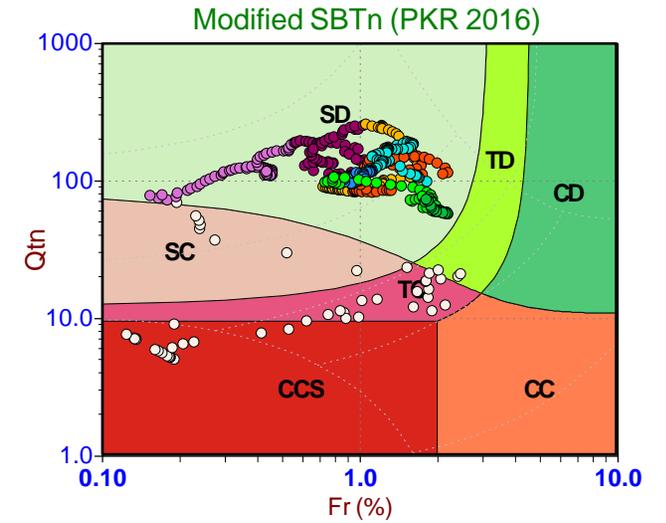
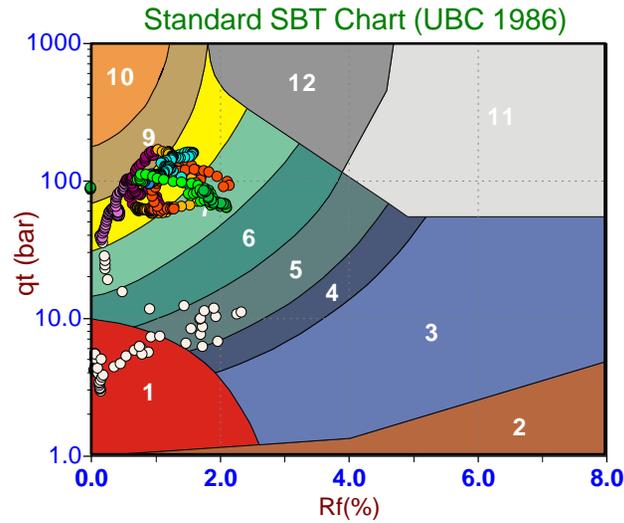
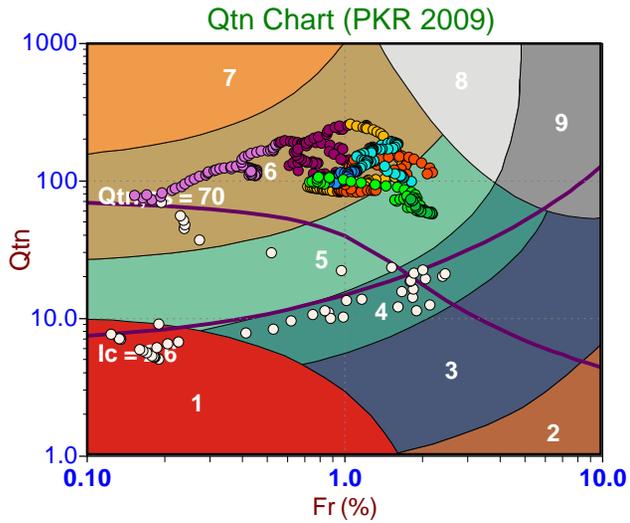
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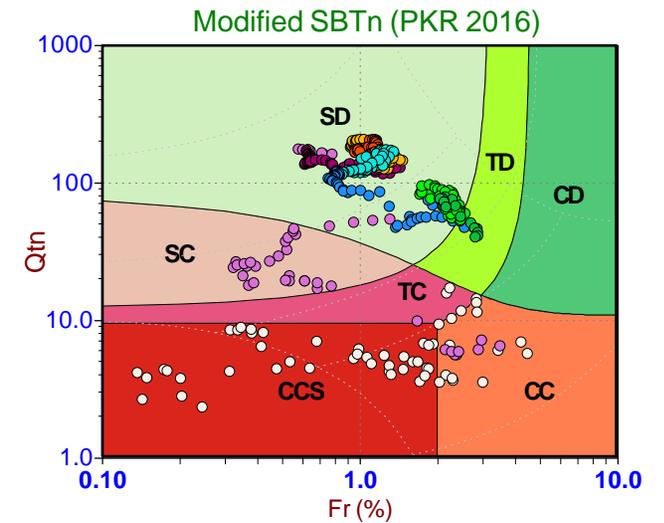
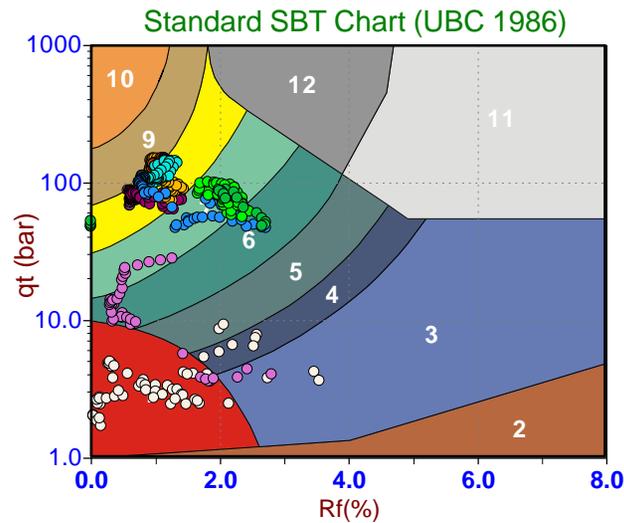
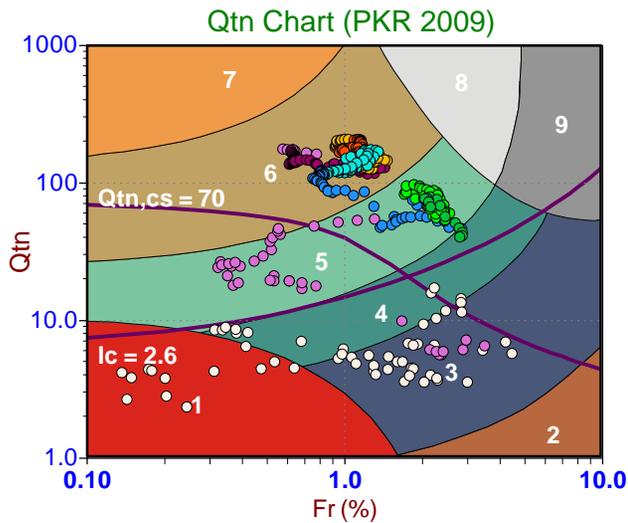
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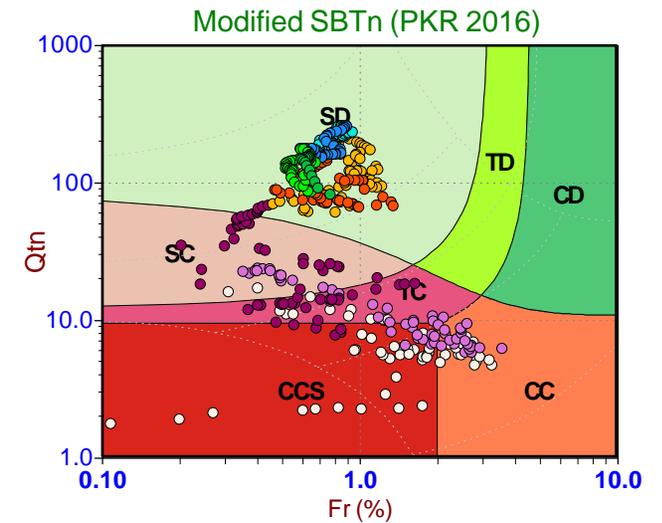
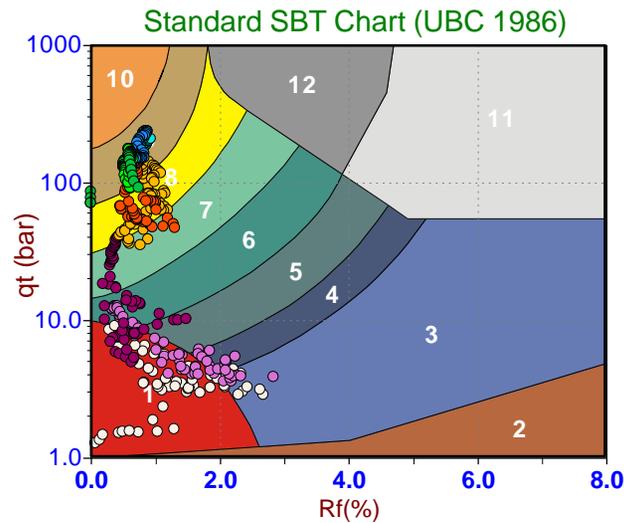
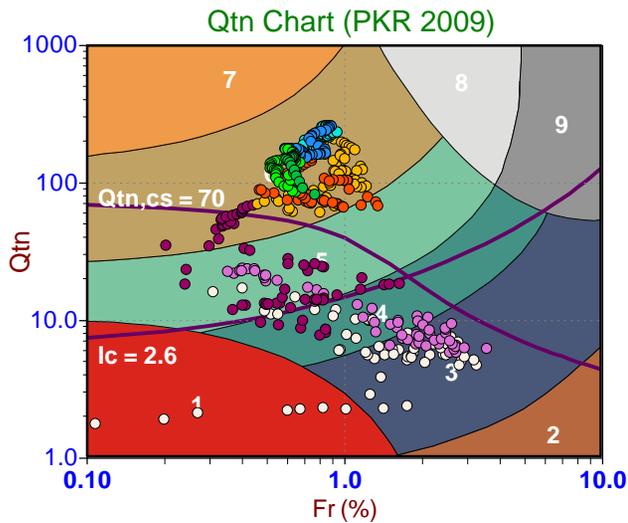
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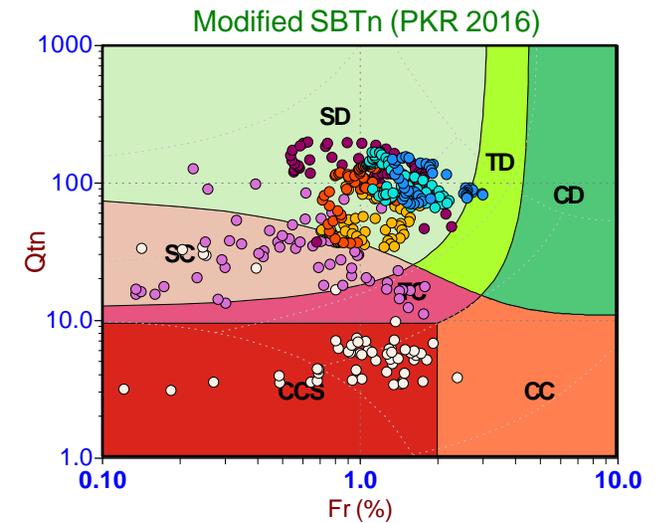
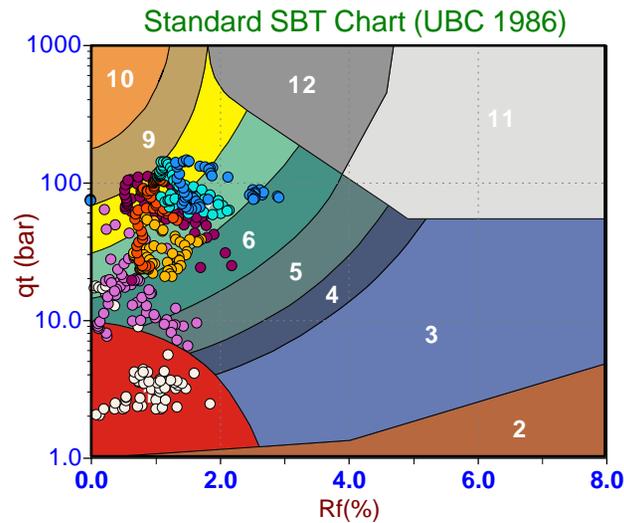
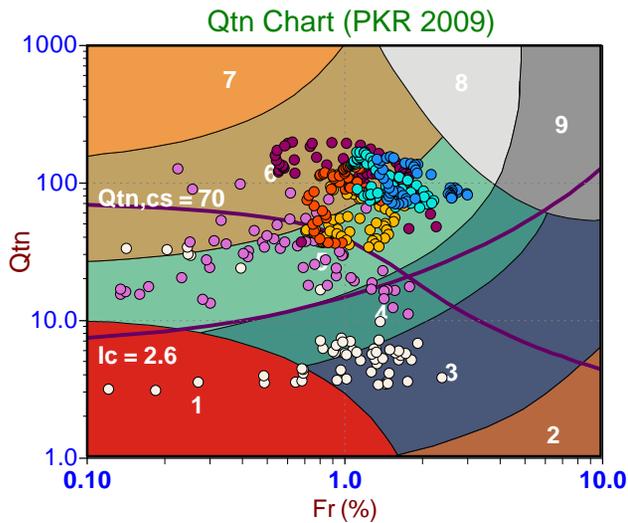
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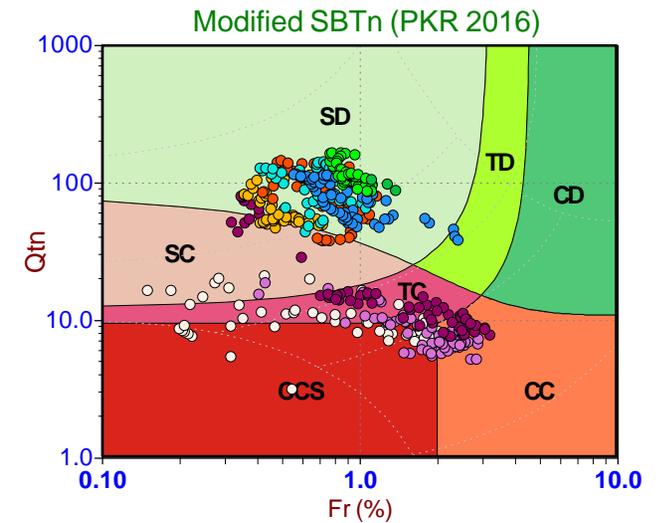
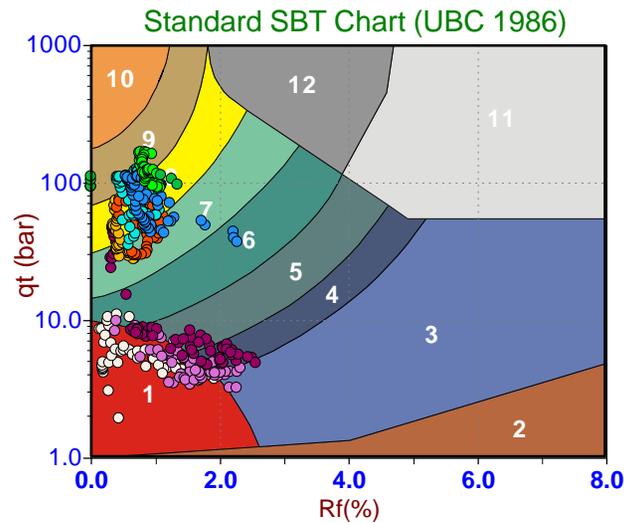
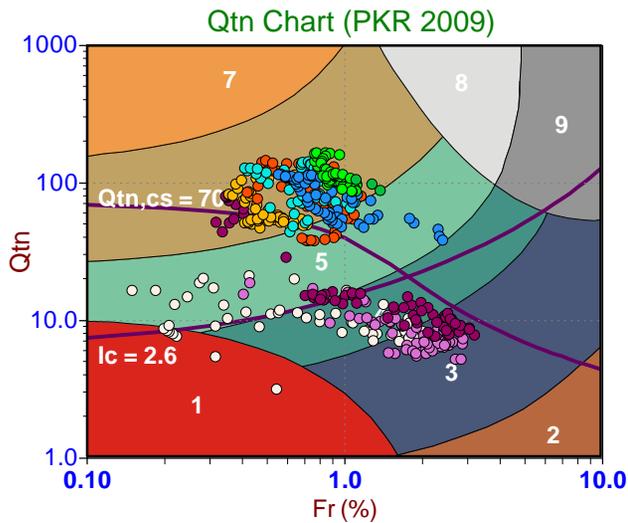
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# **Full-Flow Ball Cone Penetration Test (BCPT) Summary, Unit Weight Summary and BCPT Plots**



**Job No:** 24-59-27874  
**Client:** Anchor QEA  
**Project:** Lower Duwamish Waterway Middle Reach  
**Start Date:** 2024-07-08  
**End Date:** 2024-07-14

### BALL FULL FLOW PENETRATION TEST SUMMARY

Sounding ID	File Name	Date	Cone	Cone Area (cm <sup>2</sup> )	Ball Area (cm <sup>2</sup> )	Assumed Phreatic Surface <sup>1</sup> (ft)	Final Depth <sup>1</sup> (ft)	Cycling Conducted	Latitude <sup>2</sup>	Longitude <sup>2</sup>	Refer to Notation Number
LDW23-GT05-GT-FFP	24-59-27874_BP05	2024-07-13	767:T1000F10U35	10	100	-19.17	20.01	Yes	47.54354	-122.33574	
LDW23-GT07-GT-FFP	24-59-27874_BP07	2024-07-13	767:T1000F10U35	10	100	-18.33	4.35	Yes	47.54334	-122.33543	
LDW23-GT12-GT-FFP	24-59-27874_BP12	2024-07-08	767:T1000F10U35	10	100	-13.67	4.76	Yes	47.54051	-122.33283	
LDW23-GT14-GT-FFP	24-59-27874_BP14	2024-07-08	767:T1000F10U35	10	100	-14.67	4.59	Yes	47.53998	-122.33199	
LDW23-GT28-GT-FFP	24-59-27874_BP28	2024-07-14	767:T1000F10U35	10	100	-19.67	6.40	Yes	47.53506	-122.32329	
LDW23-GT29-GT-FFP	24-59-27874_BP29	2024-07-12	681:T375F10U35	15	150	-12.58	0.98	Yes	47.53513	-122.32312	
<b>Total</b>							<b>41.09 ft</b>				

1. All data profiles were began at the mudline surface. Assumed phreatic surface was measured by dip-tape immediately prior to testing and referenced for calculations.  
2. The coordinates were collected using consumer grade GPS and have an accuracy of ±30 feet. EPSG number: 4326 (WGS84 / LatLong).



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**Project:** Lower Duwamish Waterway Middle Reach  
**Start Date:** 2024-07-08  
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### BCPT<sub>u</sub> ASSUMED UNIT WEIGHT SUMMARY

Sounding ID	File Name	Final Depth (ft)	Assumed Unit Weight Start Depth (ft)	Assumed Unit Weight End Depth (ft)	Assumed Unit Weight <sup>1</sup> (kN/m <sup>3</sup> )	Refer to Notation Number
LDW23-GT05-GT-FFP	24-59-27874_BP05	20.01	-19.17	0.00	9.81	
LDW23-GT05-GT-FFP	24-59-27874_BP05	20.01	0.00	20.01	17.50	
LDW23-GT07-GT-FFP	24-59-27874_BP07	4.35	-18.33	0.00	9.81	
LDW23-GT07-GT-FFP	24-59-27874_BP07	4.35	0.00	4.35	17.50	
LDW23-GT12-GT-FFP	24-59-27874_BP12	4.76	-13.67	0.00	9.81	
LDW23-GT12-GT-FFP	24-59-27874_BP12	4.76	0.00	4.76	17.50	
LDW23-GT14-GT-FFP	24-59-27874_BP14	4.59	-14.67	0.00	9.81	
LDW23-GT14-GT-FFP	24-59-27874_BP14	4.59	0.00	4.59	17.50	
LDW23-GT28-GT-FFP	24-59-27874_BP28	6.40	-19.67	0.00	9.81	
LDW23-GT28-GT-FFP	24-59-27874_BP28	6.40	0.00	6.40	17.50	
LDW23-GT29-GT-FFP	24-59-27874_BP29	0.98	-12.58	0.00	9.81	
LDW23-GT29-GT-FFP	24-59-27874_BP29	0.98	0.00	0.98	17.50	

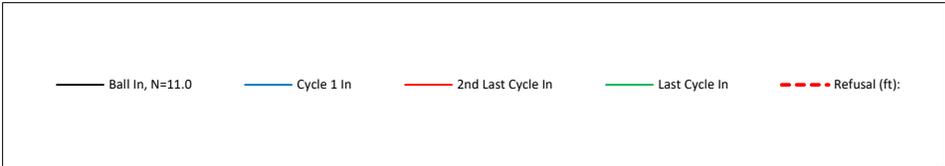
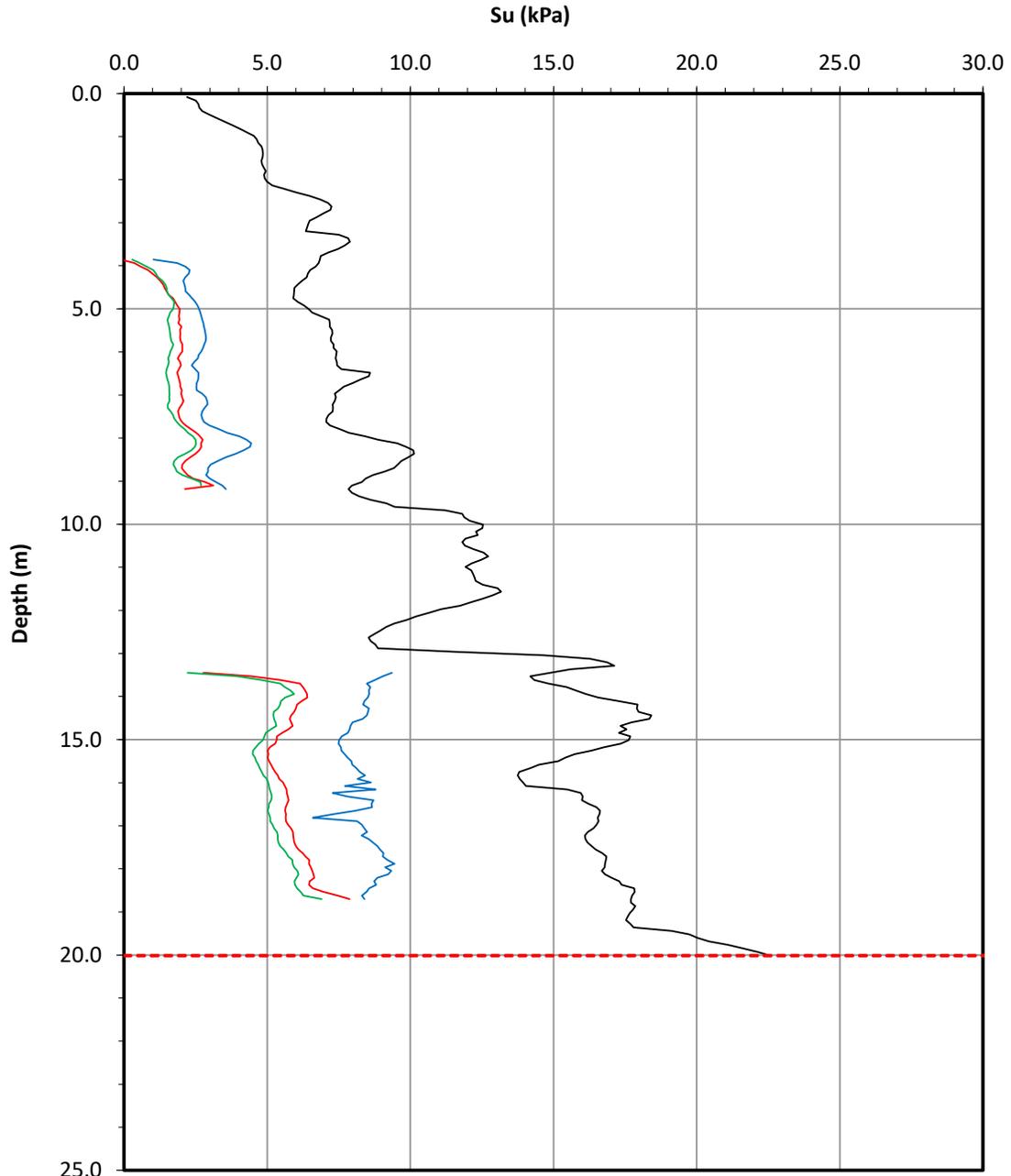
1. A unit weight of 9.81 kN/m<sup>3</sup> was assumed for data above the mudline, within the water layer.  
1. A unit weight of 17.50 kN/m<sup>3</sup> was assumed for data below the mudline.



Job No: 24-59-27874  
Client: Anchor QEA  
Project: Lower Duwamish Waterway Middle Reach  
Sounding ID: LDW23-GT05-GT-FFP  
Sounding Date: 2024-07-13

Coordinate System: WGS84 / Lat-Long  
Latitude (deg): 47.54354  
Longitude (deg): -122.33574

### Flow Penetrometer Undrained Strength

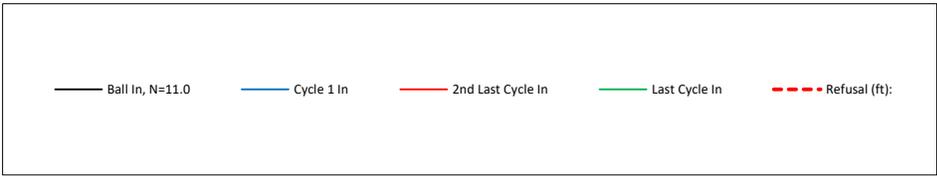
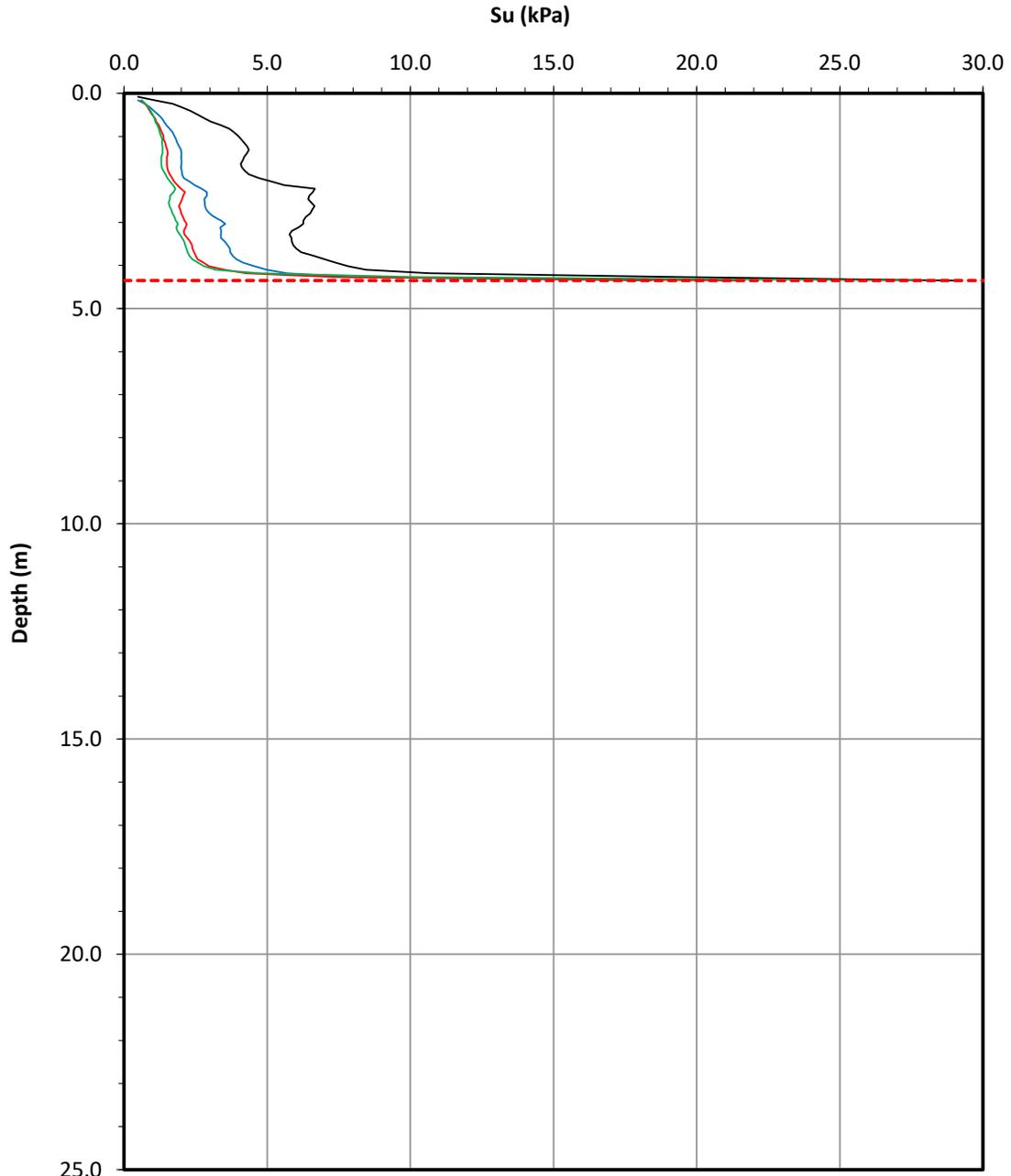




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Project: Lower Duwamish Waterway Middle Reach  
Sounding ID: LDW23-GT07-GT-FFP  
Sounding Date: 2024-07-13

Coordinate System: WGS84 / Lat-Long  
Latitude (deg): 47.54334  
Longitude (deg): -122.33543

### Flow Penetrometer Undrained Strength

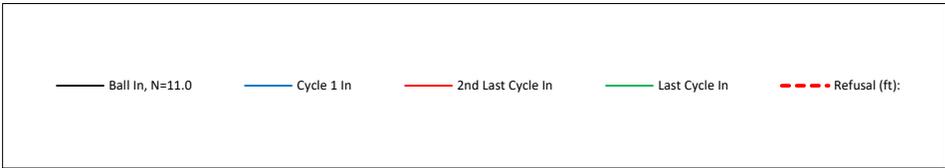
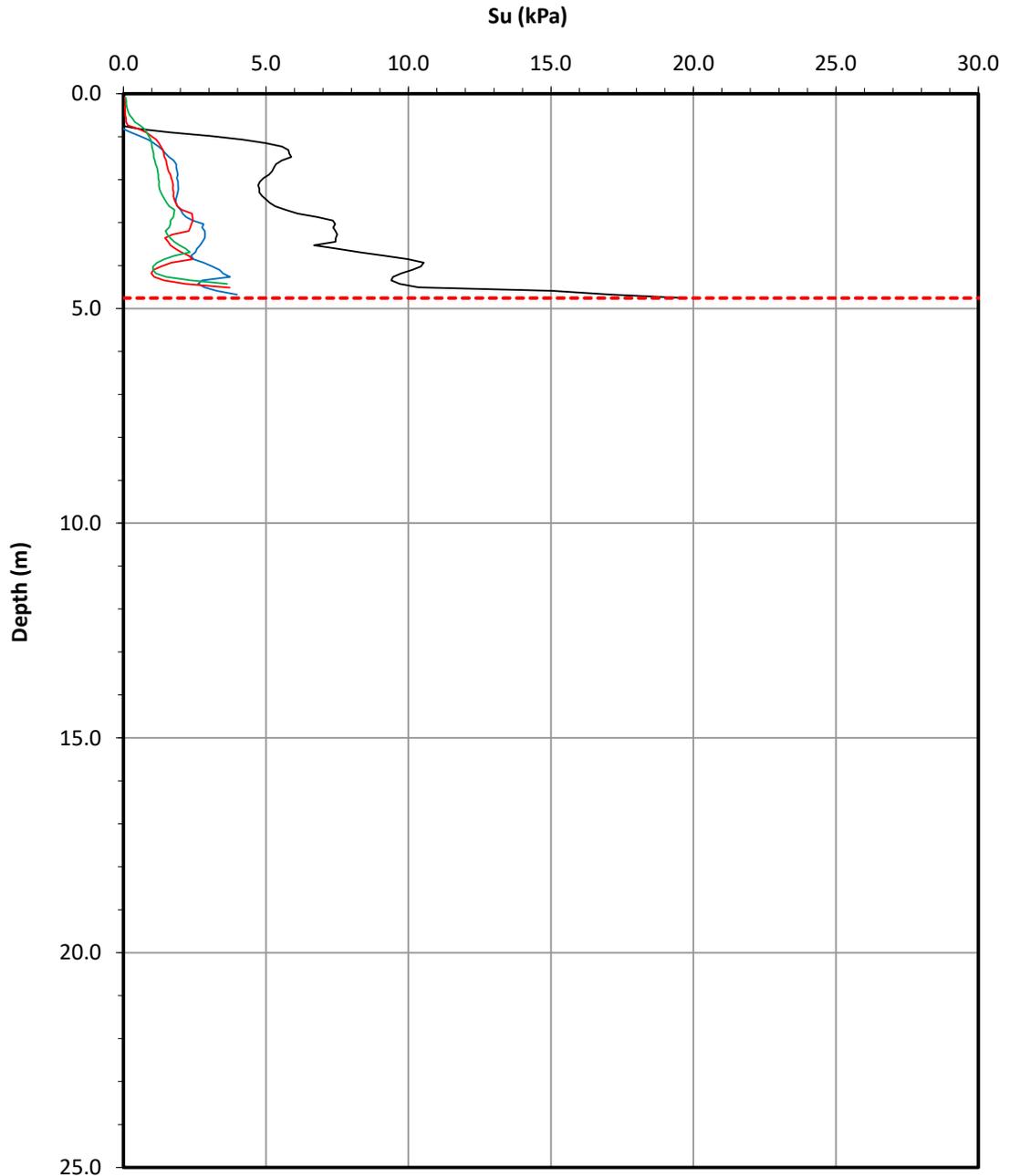




Job No: 24-59-27874  
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Project: Lower Duwamish Waterway Middle Reach  
Sounding ID: LDW23-GT12-GT-FFP  
Sounding Date: 2024-07-13

Coordinate System: WGS84 / Lat-Long  
Latitude (deg): 47.54354  
Longitude (deg): -122.33574

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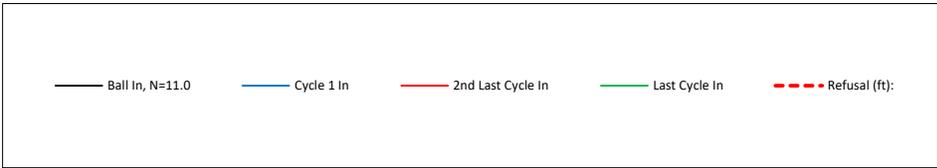
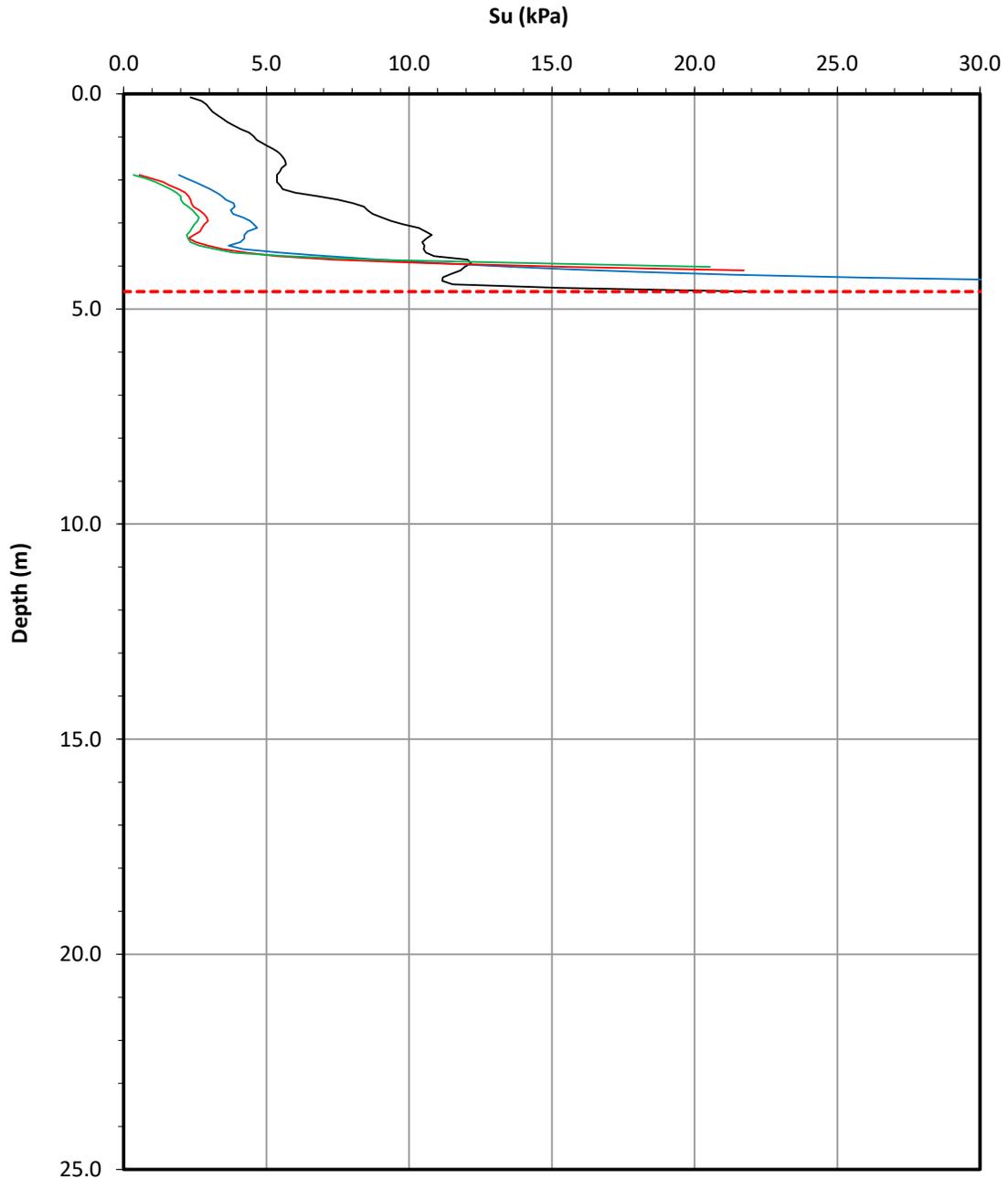




Job No: 24-59-27874  
Client: Anchor QEA  
Project: Lower Duwamish Waterway Middle Reach  
Sounding ID: LDW23-GT14-GT-FFP  
Sounding Date: 2024-07-08

Coordinate System: WGS84 / Lat-Long  
Latitude (deg): 47.53998  
Longitude (deg): -122.33199

### Flow Penetrometer Undrained Strength

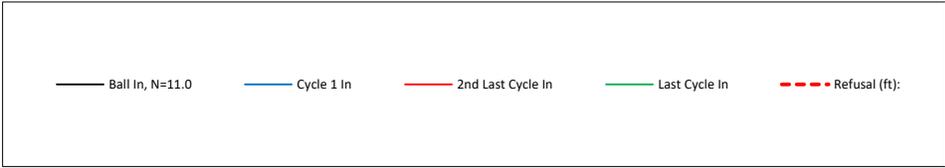
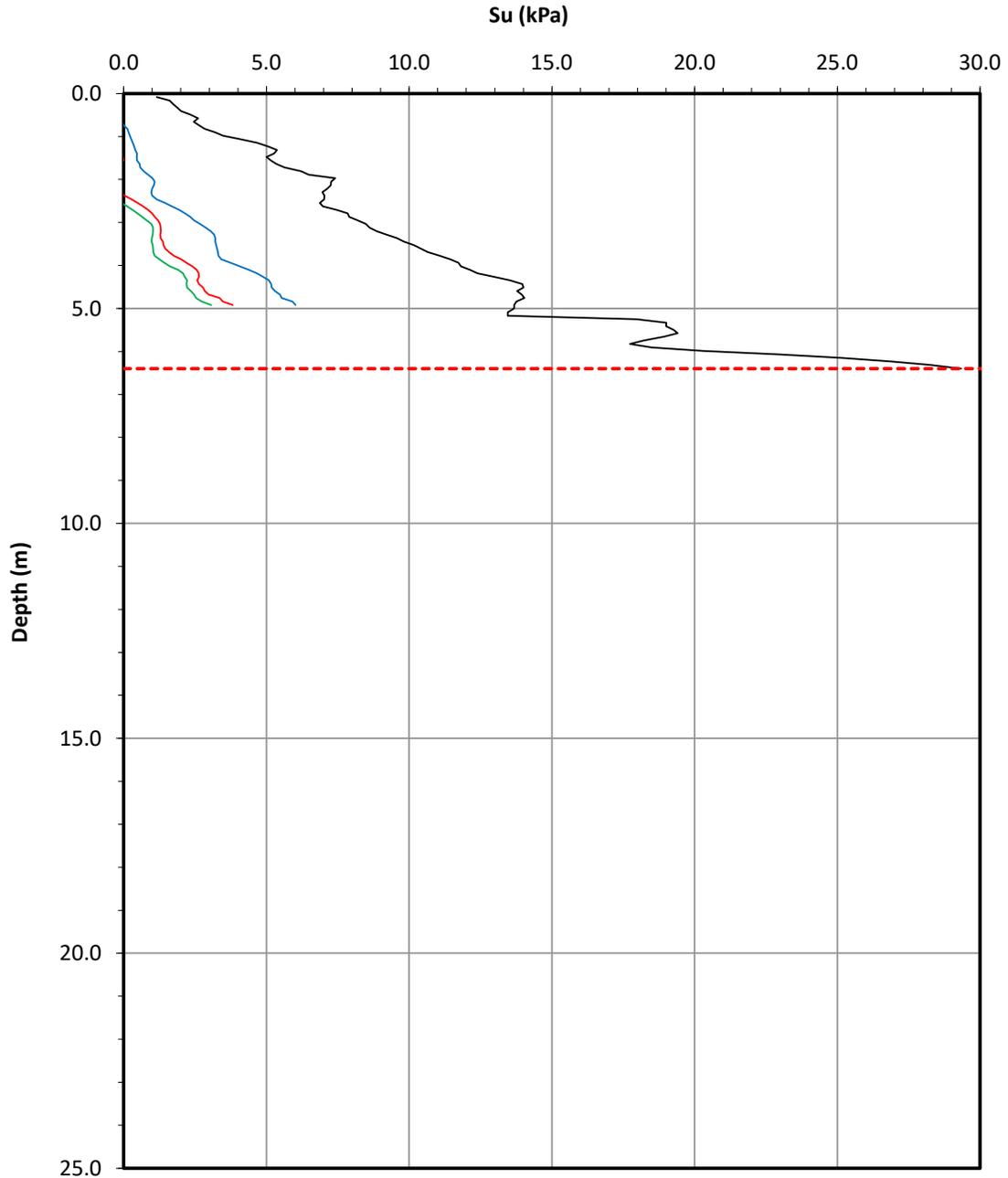




Job No: 24-59-27874  
Client: Anchor QEA  
Project: Lower Duwamish Waterway Middle Reach  
Sounding ID: LDW23-GT28-GT-FFP  
Sounding Date: 2024-07-14

Coordinate System: WGS84 / Lat-Long  
Latitude (deg): 47.53506  
Longitude (deg): -122.32329

### Flow Penetrometer Undrained Strength

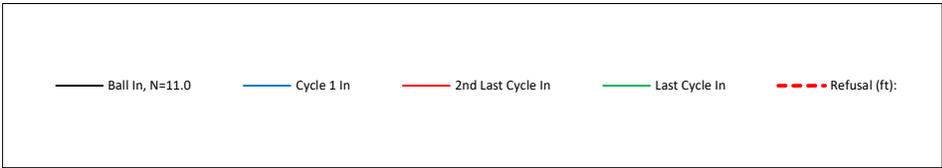
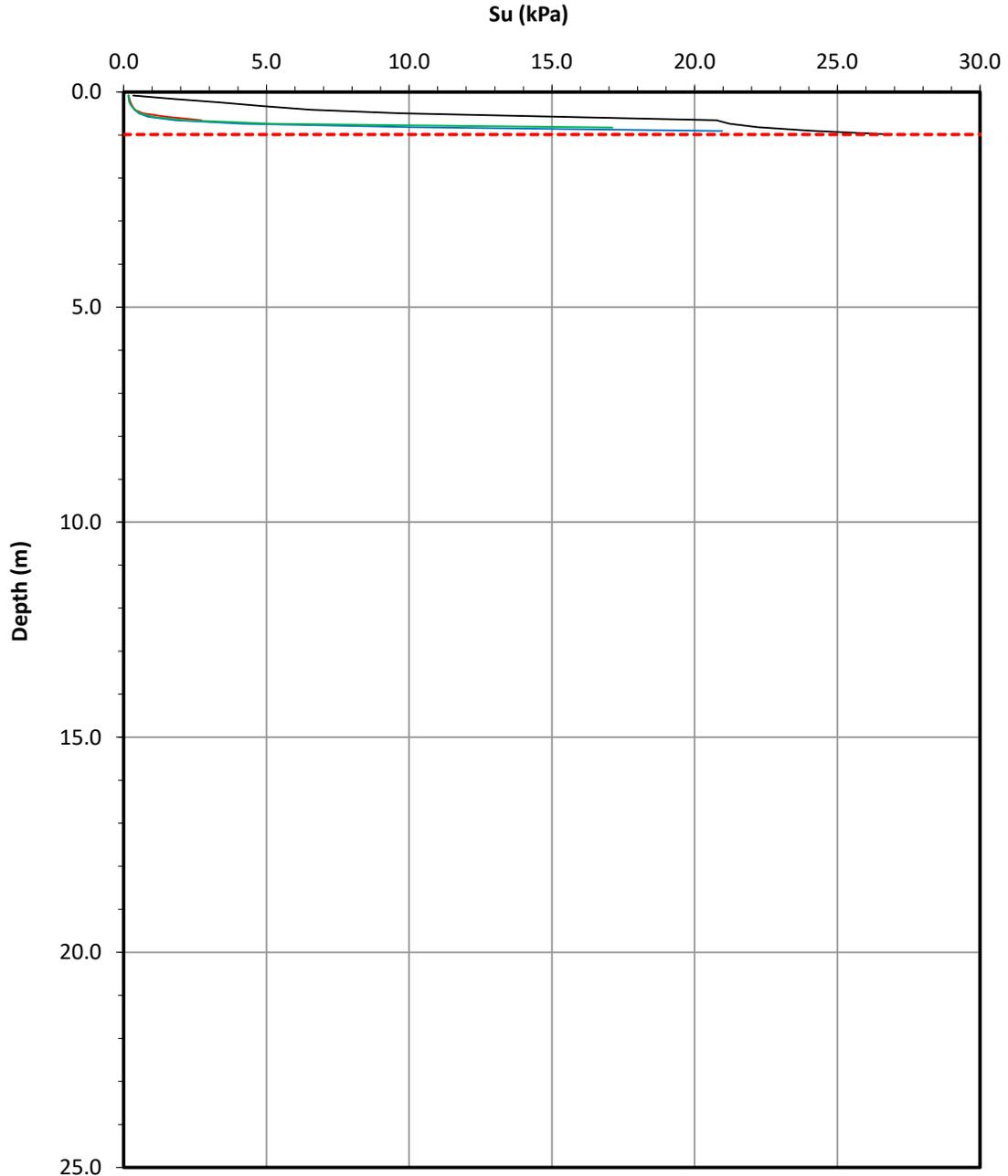




Job No: 24-59-27874  
Client: Anchor QEA  
Project: Lower Duwamish Waterway Middle Reach  
Sounding ID: LDW23-GT29-GT-FFP  
Sounding Date: 2024-07-12

Coordinate System: WGS84 / Lat-Long  
Latitude (deg): 47.53513  
Longitude (deg): -122.32312

### Flow Penetrometer Undrained Strength



# **SUPPORTING DOCUMENTS AND MATERIALS**

The documents and materials listed below are included in the report:

- **Methodology Statements**
- **Cone Penetration Digital File Formats**
- **Description of Methods for Calculated CPTu Geotechnical Parameters**
- **Calibration Records**

## **Methodology Statements**

# METHODOLOGY STATEMENTS



## CONE PENETRATION TEST (CPTu) - eSeries

Cone penetration tests (CPTu) are conducted using an integrated electronic piezocone penetrometer and data acquisition system manufactured by Adara Systems Ltd., a subsidiary of ConeTec.

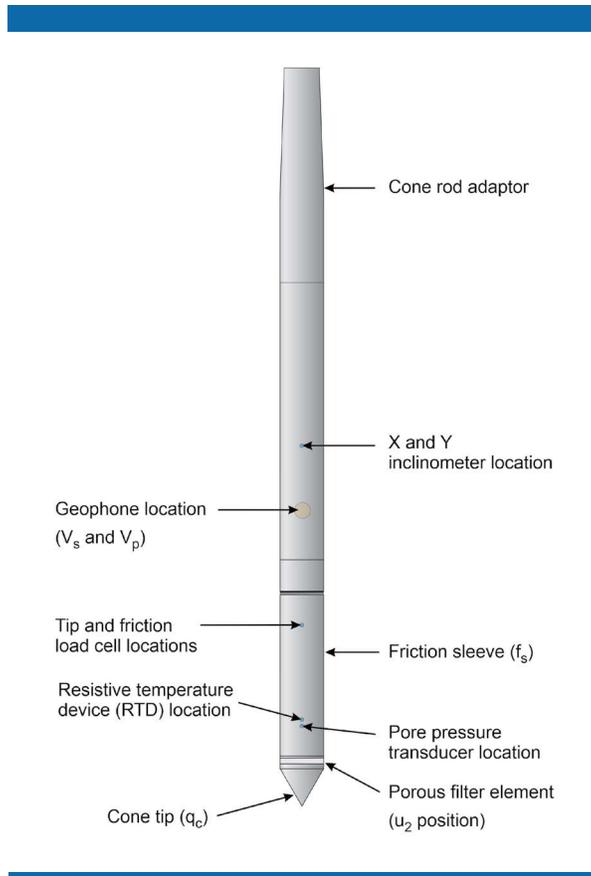
ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and two geophone sensors for recording seismic signals. All signals are amplified and measured with minimum sixteen-bit resolution down hole within the cone body, and the signals are sent to the surface using a high bandwidth, error corrected digital interface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm<sup>2</sup> and 15 cm<sup>2</sup> tip base area configurations in order to maximize signal resolution for various soil conditions. The specific piezocone used for each test is described in the CPT summary table. The 15 cm<sup>2</sup> penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm<sup>2</sup> piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 millimeters diameter over a length of 32 millimeters with tapered leading and trailing edges) located at a distance of 585 millimeters above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

All ConeTec piezocones can record pore pressure at various locations. Unless otherwise noted, the pore pressure filter is located directly behind the cone tip in the "u<sub>2</sub>" position (ASTM Type 2). The filter is six millimeters thick, made of porous plastic (polyethylene) having an average pore size of 125 microns (90-160 microns). The function of the filter is to allow rapid movements of extremely small volumes of water needed to activate the pressure transducer while preventing soil ingress or blockage.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current [ASTM D5778](#) standard. ConeTec's calibration criteria also meets or exceeds those of the current [ASTM D5778](#) standard. An illustration of the piezocone penetrometer is presented in [Figure CPTu](#).



**Figure CPTu. Piezocone Penetrometer (15 cm<sup>2</sup>)**

The ConeTec data acquisition system consists of a Windows based computer, signal interface box, and power supply. The signal interface combines depth increment signals, seismic trigger signals and the downhole digital data. This combined data is then sent to the Windows based computer for collection and presentation. The data is recorded at fixed depth increments using a depth encoder that is either portable or integrated into the rig. The typical recording interval is 2.5 centimeters; custom recording intervals are possible.

The system displays the CPTu data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected tip resistance ( $q_c$ )
- Sleeve friction ( $f_s$ )
- Dynamic pore pressure ( $u$ )
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

All testing is performed in accordance to ConeTec's CPTu operating procedures which are in general accordance with the current [ASTM D5778](#) standard.

Prior to the start of a CPTu sounding a suitable cone is selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with silicone oil and the baseline readings are recorded with the cone hanging freely in a vertical position.

The CPTu is conducted at a steady rate of two centimeters per second, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches are added to advance the cone to the sounding termination depth. After cone retraction final baselines are recorded.

Additional information pertaining to ConeTec's cone penetration testing procedures:

- Each filter is saturated in silicone oil under vacuum pressure prior to use
- Baseline readings are compared to previous readings
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs, excessive inclination occurs, equipment damage is likely to take place, or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with [ASTM](#) standards

The interpretation of piezocone data for this report is based on the corrected tip resistance ( $q_t$ ), sleeve friction ( $f_s$ ) and pore water pressure ( $u$ ). The interpretation of soil type is based on the correlations developed by [Robertson, P.K., 2010](#). The Soil Behavior Type (SBT) classification chart developed by [Robertson, P.K., 2010](#) is presented in [Figure SBT](#). It should be noted that it is not always possible to accurately identify a soil behavior type based on these parameters. In these situations, experience, judgment and an assessment of other parameters may be used to infer soil behavior type.

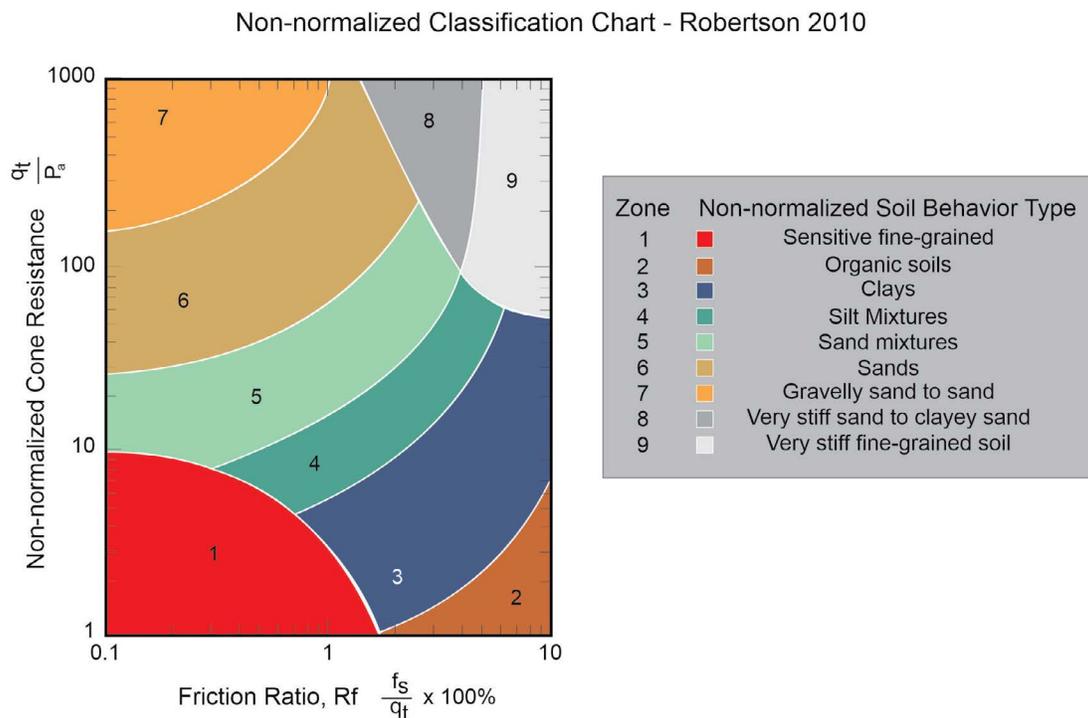


Figure SBT. Non-Normalized Soil Behavior Type Classification Chart (SBT)

The recorded tip resistance ( $q_c$ ) is the total force acting on the piezocone tip divided by its base area. The tip resistance is corrected for pore pressure effects and termed corrected tip resistance ( $q_t$ ) according to the following expression presented in [Robertson et al. \(1986\)](#):

$$q_t = q_c + (1-a) \cdot u_2$$

where:  $q_t$  is the corrected tip resistance

$q_c$  is the recorded tip resistance

$u_2$  is the recorded dynamic pore pressure behind the tip ( $u_2$  position)

$a$  is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

The sleeve friction ( $f_s$ ) is the frictional force on the sleeve divided by its surface area. As all ConeTec piezocones have equal end area friction sleeves, pore pressure corrections to the sleeve data are not required.

The dynamic pore pressure ( $u$ ) is a measure of the pore pressures generated during cone penetration. To record equilibrium pore pressure, the penetration must be stopped to allow the dynamic pore pressures to stabilize. The rate at which this occurs is predominantly a function of the permeability of the soil and the diameter of the cone.

The friction ratio ( $R_f$ ) is a calculated parameter. It is defined as the ratio of sleeve friction to the tip resistance expressed as a percentage. Generally, saturated cohesive soils have low tip resistance, high friction ratios and generate large excess pore water pressures. Cohesionless soils have higher tip resistances, lower friction ratios and do not generate significant excess pore water pressure.

For additional information on CPTu interpretations and calculated geotechnical parameters, refer to [Robertson et al. \(1986\)](#), [Lunne et al. \(1997\)](#), [Robertson \(2009\)](#), [Mayne \(2013, 2014\)](#) and [Mayne and Peuchen \(2012\)](#).

## REFERENCES

ASTM D5778-20, 2020, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils", ASTM International, West Conshohocken, PA. DOI: [10.1520/D5778-20](#).

Lunne, T., Robertson, P.K. and Powell, J. J. M., 1997, "Cone Penetration Testing in Geotechnical Practice", Blackie Academic and Professional.

Mayne, P.W., 2013, "Evaluating yield stress of soils from laboratory consolidation and in-situ cone penetration tests", Sound Geotechnical Research to Practice (Holtz Volume) GSP 230, ASCE, Reston/VA: 406-420. DOI: [10.1061/9780784412770.027](#).

Mayne, P.W. and Peuchen, J., 2012, "Unit weight trends with cone resistance in soft to firm clays", Geotechnical and Geophysical Site Characterization 4, Vol. 1 (Proc. ISC-4, Pernambuco), CRC Press, London: 903-910.

Mayne, P.W., 2014, "Interpretation of geotechnical parameters from seismic piezocone tests", CPT'14 Keynote Address, Las Vegas, NV, May 2014.

Robertson, P.K., Campanella, R.G., Gillespie, D. and Greig, J., 1986, "Use of Piezometer Cone Data", Proceedings of InSitu 86, ASCE Specialty Conference, Blacksburg, Virginia.

Robertson, P.K., 2009, "Interpretation of cone penetration tests – a unified approach", Canadian Geotechnical Journal, Volume 46: 1337-1355. DOI: [10.1139/T09-065](#).

Robertson, P.K., 2010. Soil behavior type from the CPT: an update. 2nd International Symposium on Cone Penetration Testing, CPT'10, Huntington Beach, CA, USA

Full flow penetration testing (BCPTu) is performed in conjunction with a piezocone penetration test using an integrated electronic piezocone with a spherical attachment and a data acquisition system manufactured by Adara Systems Ltd., a subsidiary of ConeTec.

ConeTec's piezocone penetrometers are compression type designs in which the tip and friction sleeve load cells are independent and have separate load capacities. The piezocones use strain gauged load cells for tip and sleeve friction and a strain gauged diaphragm type transducer for recording pore pressure. The piezocones also have a platinum resistive temperature device (RTD) for monitoring the temperature of the sensors, an accelerometer type dual axis inclinometer and two geophone sensors for recording seismic signals. All signals are amplified and measured with minimum sixteen-bit resolution downhole within the cone body, and the signals are sent to the surface using a high bandwidth, error corrected digital interface through a shielded cable.

ConeTec penetrometers are manufactured with various tip, friction and pore pressure capacities in both 10 cm<sup>2</sup> and 15 cm<sup>2</sup> tip base area configurations in order to maximize signal resolution for various soil conditions. The 15 cm<sup>2</sup> penetrometers do not require friction reducers as they have a diameter larger than the deployment rods. The 10 cm<sup>2</sup> piezocones use a friction reducer consisting of a rod adapter extension behind the main cone body with an enlarged cross sectional area (typically 44 millimeters diameter over a length of 32 millimeters with tapered leading and trailing edges) located at a distance of 585 millimeters above the cone tip.

The penetrometers are designed with equal end area friction sleeves, a net end area ratio of 0.8 and cone tips with a 60 degree apex angle.

The piezocone penetrometers are manufactured with dimensions, tolerances and sensor characteristics that are in general accordance with the current [ASTM D5778](#) standard. ConeTec's calibration criteria also meet or exceed those of the current [ASTM D5778](#) standard.

For ball full flow penetration tests, the cone tip is replaced with a spherical attachment that can have projected plan areas of 60 cm<sup>2</sup>, 100 cm<sup>2</sup> or 150 cm<sup>2</sup>. The selection of the size is based on soil strength and deployment limitations. An illustration of the piezocone with a spherical attachment is presented in [Figure BCPTu](#).

The specific piezocone and ball area used for each test is described in the ball full flow penetration test summary presented in the relevant appendix.

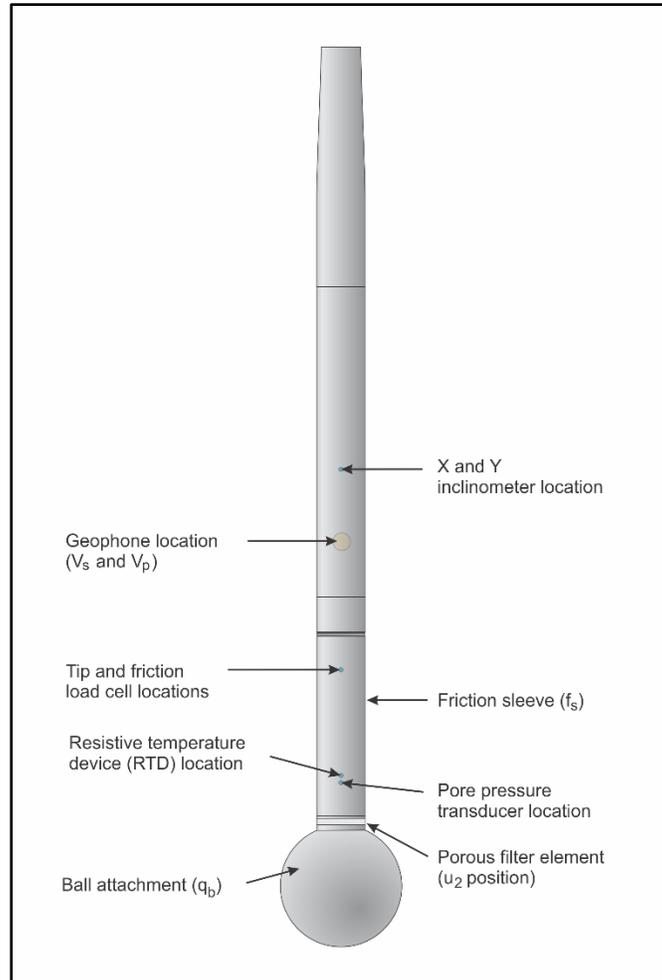


Figure BCPTu. Piezocone penetrometer with a spherical attachment

The ConeTec data acquisition systems consist of a Windows based computer and a signal interface box and power supply. The signal interface combines depth increment signals, seismic trigger signals and the downhole digital data. This combined data is then sent to the Windows based computer for collection and presentation. The data is recorded in fixed depth increments using a depth wheel attached to the push cylinders or by using a spring loaded rubber depth wheel that is held against the cone rods. The typical recording interval is 2.5 centimeters; custom recording intervals are possible.

The system displays the data in real time and records the following parameters to a storage media during penetration:

- Depth
- Uncorrected ball tip resistance ( $q_b$ )
- Sleeve friction ( $f_s$ )
- Dynamic pore pressure ( $u$ ) at the shoulder ( $u_2$ ) or at the equator of the ball
- Additional sensors such as resistivity, passive gamma, ultra violet induced fluorescence, if applicable

Prior to the start of a BCPTu sounding a suitable cone and spherical attachment are selected, the cone and data acquisition system are powered on, the pore pressure system is saturated with silicone oil and the baseline readings are recorded with the ball hanging freely in a vertical position.

The BCPTu is conducted at a steady rate of two centimeters per second, within acceptable tolerances. Typically one meter length rods with an outer diameter of 1.5 inches (38.1 millimeters) are added to advance the ball to the sounding termination depth. The test may be interrupted at selected depths to cycle the probe up and down in order to achieve a completely remolded soil state. Cycling is typically conducted during retraction of the ball and the number of conducted cycles is dependent on reaching a consistent tip value. After ball retraction the final baselines are recorded.

The full flow penetration test can be halted at specific depths to carry out pore pressure dissipation (PPD) tests. For each dissipation test the data acquisition system measures and records the variation of the pore pressure ( $u$ ) with time ( $t$ ). Pore pressure dissipation data can be interpreted to provide estimates of equilibrium pore pressures ( $u_{eq}$ ).

Additional information pertaining to ConeTec's full flow penetration testing procedures:

- Each filter is saturated in silicone oil under vacuum pressure prior to use
- Baseline readings are compared to previous readings verifying compliance with [ASTM](#) standards
- Soundings are terminated at the client's target depth or at a depth where an obstruction is encountered, excessive rod flex occurs or excessive inclination occurs, equipment damage is likely to take place or a dangerous working environment arises
- Differences between initial and final baselines are calculated to ensure zero load offsets have not occurred and to ensure compliance with [ASTM](#) standards

Full flow penetration tests are conducted to assess the undrained shear strength ( $S_u$ ) of low to medium strength soils. During penetration, the soil flows around the penetrometer significantly reducing the influence of overburden stress as compared to the cone penetration test (CPTu). For the test to be valid, the soil must flow around the penetrometer. Cycling is conducted in order to achieve a completely remolded soil state to provide an indication of sensitivity in soft soils.

The recorded ball tip resistance ( $q_b$ ) is the total force acting on the piezocone spherical attachment divided by its base area. The ball tip resistance is corrected for pore pressure effects and termed corrected ball tip resistance ( $q_{bt}$ ) according to the following expression:

$$q_{bt} = q_b + [(1-a)u_2] \frac{A_s}{A_p}$$

where:  $q_{bt}$  is the corrected ball tip resistance

$q_b$  is the recorded ball tip resistance

$u_2$  is the recorded dynamic pore pressure behind the tip ( $u_2$  position)

$a$  is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)

$A_s$  is the shaft area

$A_p$  is the ball plan area

The undrained shear strength ( $S_u$ ) derived from the full flow penetration test is related to the net ball tip resistance ( $q_{bt\text{net}}$ ) and ball factor ( $N_{\text{ball}}$ ) using the following relationship:

$$S_u = \frac{q_{bt\text{net}}}{N_{\text{ball}}}$$

Due to different geometry and the subdued sleeve and pore pressure response, full flow penetration test results are not used for the interpretation of other geotechnical parameters or for soil classification.

A summary of the BCPTu soundings along with test details and individual plots are provided in the appendices. Tabular results generated for each sounding are provided in Excel format in the data release folder. Information regarding the calculated parameters is also included in the data release folder.

For additional information on full flow penetrometer testing, refer to [Weemees et al. \(2006\)](#).

#### References

ASTM D5778-20, 2020, "Standard Test Method for Performing Electronic Friction Cone and Piezocone Penetration Testing of Soils", ASTM International, West Conshohocken, PA. DOI: [10.1520/D5778-20](#).

Weemees, I., Howie, J., Woeller, D.J., Sharp, J.T., Cargill, E., Greig, J., 2006, "Improved Techniques for the In-Situ Determination of Undrained Shear Strength in Soft Clays," Sea to Sky Geotechnics, Proceedings of the 59th Canadian Geotechnical Conference, Vancouver, B.C., 1–4 October. BiTech Publishers Ltd., Richmond, B.C. pp. 89–95.

# **Cone Penetration Digital File Formats**



## CONE PENETRATION DIGITAL FILE FORMATS - eSeries

### CPT Data Files (COR Extension)

ConeTec CPT data files are stored in ASCII text files that are readable by almost any text editor. ConeTec file names start with the job number (which includes the two digit year number) an underscore as a separating character, followed by two letters based on the type of test and the sounding ID. The last character position is reserved for an identifier letter (such as b, c, d etc) used to uniquely distinguish multiple soundings at the same location. The CPT sounding file has the extension COR. As an example, for job number 21-02-00001 the first CPT sounding will have file name 21-02-00001\_CP01.COR

The sounding (COR) file consists of the following components:

1. Two lines of header information
2. Data records
3. End of data marker
4. Units information

#### Header Lines

Line 1: Columns 1-6 may be blank or may indicate the version number of the recording software

Columns 7-21 contain the sounding Date and Time (Date is MM:DD:YY)

Columns 23-38 contain the sounding Operator

Columns 51-100 contain extended Job Location information

Line 2: Columns 1-16 contain the Job Location

Columns 17-32 contain the Cone ID

Columns 33-47 contain the sounding number

Columns 51-100 may contain extended sounding ID information

#### Data Records

The data records contain 4 or more columns of data in floating point format. A comma and spaces separate each data item:

Column 1: Sounding Depth (meters)

Column 2: Tip ( $q_c$ ), recorded in units selected by the operator

Column 3: Sleeve ( $f_s$ ), recorded in units selected by the operator

Column 4: Dynamic pore pressure (u), recorded in units selected by the operator

Column 5: Empty or may contain other requested data such as Gamma, Resistivity or UVIF data

#### End of Data Marker

After the last line of data there is a line containing an ASCII 26 (CTL-Z) character (small rectangular shaped character) followed by a newline (carriage return / line feed). This is used to mark the end of data.

## Units Information

The last section of the file contains information about the units that were selected for the sounding. A separator bar makes up the first line. The second line contains the type of units used for depth,  $q_c$ ,  $f_s$  and  $u$ . The third line contains the conversion values required for ConeTec's software to convert the recorded data to an internal set of base units (bar for  $q_c$ , bar for  $f_s$  and meters for  $u$ ). Additional lines intended for internal ConeTec use may appear following the conversion values.

## CPT Data Files (XLS Extension)

Excel format files of ConeTec CPT data are also generated from corresponding COR files. The XLS files have the same base file name as the COR file with a -BSC suffix. The information in the file is presented in table format and contains additional information about the sounding such as coordinate information, and tip net area ratio.

The BSCI suffix is given to XLS files which are enhanced versions of the BSC files and include the same data records in addition to inclination data collected for each sounding.

## CPT Dissipation Files (XLS Extension)

Pore pressure dissipation files are provided in Excel format and contain each dissipation trace that exceeds a minimum duration (selected during post-processing) formatted column wise within the spreadsheet. The first column (Column A) contains the time in seconds and the second column (Column B) contains the time in minutes. Subsequent columns contain the dissipation trace data. The columns extend to the longest trace of the data set.

Detailed header information is provided at the top of the worksheet. The test depth in meters and feet, the number of points in the trace and the particular units are all presented at the top of each trace column.

CPT Dissipation files have the same naming convention as the CPT sounding files with a “-PPD” suffix.

## Data Records

Each file will contain dissipation traces that exceed a minimum duration (selected during post-processing) in a particular column. The dissipation pore pressure values are typically recorded at varying time intervals throughout the trace; rapidly to start and increasing as the duration of the test lengthens. The test depth in meters and feet, the number of points in the trace and the trace number are identified at the top of each trace column.

## Cone Type Designations

Cone ID	Cone Description	Tip Cross Sect. Area (cm <sup>2</sup> )	Tip Capacity (bar)	Sleeve Area (cm <sup>2</sup> )**	Sleeve Capacity (bar)	Pore Pressure Capacity (bar)
EC###	A15T1500F15U35	15	1500	225	15	35
EC###	A15T375F10U35	15	375	225	10	35
EC###	A10T1000F10U35	10	1000	150	10	35

### refers to the Cone ID number

\*\*Outer Cylindrical Area

# **Description of Methods for Calculated CPT Geotechnical Parameters**

# CALCULATED CPT GEOTECHNICAL PARAMETERS

## A Detailed Description of the Methods Used in ConeTec's CPT Geotechnical Parameter Calculation and Plotting Software



Revision SZW-Rev 18

Revised February 10, 2023

Prepared by Jim Greig, M.A.Sc, P.Eng (BC, AB, ON)



### Limitations

The geotechnical parameter output was prepared specifically for the site and project named in the accompanying report subject to objectives, site conditions and criteria provided to ConeTec by the client. The output may not be relied upon by any other party or for any other site without the express written permission of ConeTec Group (ConeTec) or any of its affiliates. For this project, ConeTec has provided site investigation services, prepared factual data reporting and produced geotechnical parameter calculations consistent with current best practices. No other warranty, expressed or implied, is made.

To understand the calculations that have been performed and to be able to reproduce the calculated parameters the user is directed to the basic descriptions for the methods in this document and the detailed descriptions and their associated limitations and appropriateness in the technical references cited for each parameter.

### ConeTec's Calculated CPT Geotechnical Parameters as of February 10, 2023.

ConeTec's CPT parameter calculation and plotting routine provides a tabular output of geotechnical parameters based on current published CPT correlations and is subject to change to reflect the current state of practice. Due to drainage conditions and the basic assumptions and limitations of the correlations, not all geotechnical parameters provided are considered applicable for all soil types. The results are presented only as a guide for geotechnical use and should be carefully examined for consideration in any geotechnical design. Reference to current literature is strongly recommended. ConeTec does not warranty the correctness or the applicability of any of the geotechnical parameters calculated by the program and does not assume liability for any use of the results in any design or review. For verification purposes we recommend that representative hand calculations be done for any parameter that is critical for design purposes. The end user of the parameter output should also be fully aware of the techniques and the limitations of any method used by the program. The purpose of this document is to inform the user as to which methods were used and to direct the end user to the appropriate technical papers and/or publications for further reference.

The geotechnical parameter output was prepared specifically for the site and project named in the accompanying report subject to objectives, site conditions and criteria provided to ConeTec by the client. The output may not be relied upon by any other party or for any other site without the express written permission of ConeTec Group (ConeTec) or any of its affiliates.

The CPT calculations are based on values of tip resistance, sleeve friction and pore pressures considered at each data point or averaged over a user specified layer thickness (e.g., 0.20 m). Note that  $q_t$  is the tip resistance corrected for pore pressure effects and  $q_c$  is the recorded tip resistance. The corrected tip resistance (corrected using  $u_2$  pore pressure values) is used for all calculations. Since all ConeTec cones have equal end area friction sleeves pore pressure corrections to sleeve friction,  $f_s$ , are not performed.

Corrected tip resistance:  $q_t = q_c + (1-a) \cdot u_2$  (consistent units are required)

where:  $q_t$  is the corrected tip resistance

$q_c$  is the recorded tip resistance

$u_2$  is the recorded dynamic pore pressure from behind the tip ( $u_2$  position)

$a$  is the Net Area Ratio for the cone (typically 0.80 for ConeTec cones)

The total stress calculations are based on soil unit weight values that have been assigned to the Soil Behavior Type (SBT) zones, from a user defined unit weight profile, by using a single uniform value throughout the profile, through unit weight estimation techniques described in various technical papers or from a combination of these methods. The parameter output files indicate the method(s) used.

Effective vertical overburden stresses are calculated using the total stress and equilibrium pore pressure ( $u_{eq}$  or  $u_o$ ) values derived from an assumed hydrostatic distribution of pore pressures below the water table or from a user defined equilibrium pore pressure profile (typically obtained from CPT dissipation tests) or a combination of the two. For over water projects the stress effects of the column of water above the mudline are taken into account as is the appropriate unit weight of water. How this is done depends on where the instruments are zeroed (i.e. on deck or at the mudline). The parameter output files indicate the method(s) used.

A majority of parameter calculations are derived from or driven by results based on material types as determined by the various soil behavior type charts depicted in Figures 1 through 6. The parameter output files indicate the method(s) used.

The Soil Behavior Type classification chart shown in Figure 1 is the classic non-normalized SBT Chart developed at the University of British Columbia and reported in Robertson, Campanella, Gillespie and Greig (1986). Figure 2 shows the original normalized (linear method) SBTn chart developed by Robertson (1990). The Bq classification charts



shown in Figures 3a and 3b incorporate pore pressures into the SBT classification and are based on the methods described in Robertson (1990). Many of these charts have been summarized in Lunne, Robertson and Powell (1997). The Jefferies and Davies SBT chart shown in Figure 3c is based on the techniques discussed in Jefferies and Davies (1993) which introduced the concept of the Soil Behavior Type Index parameter,  $I_c$ . Take note that the  $I_c$  parameter developed by Robertson and Fear (1995) and Robertson and Wride (1998) is similar in concept but uses a slightly different calculation method than that defined by Jefferies and Davies (1993) as the latter incorporates pore pressure in their technique through the use of the  $B_q$  parameter. The normalized  $Q_{tn}$  SBT chart shown in Figure 4 is based on the work by Robertson (2009) utilizing a variable stress ratio exponent,  $n$ , for normalization based on a slightly modified redefinition and iterative approach for  $I_c$ . The boundary curves drawn on the chart are based on the work described in Robertson (2010).

Figure 5 shows a revised 1986 SBT Chart presented to CPT'10 by Robertson (2010b). It is known as the Updated non-normalized Soil Behavior Chart (also referred to as the Rev SBT Chart (PKR2010) in our output files). This chart was produced to be more in line with all post-1986 Robertson charts having the same 9 soil type zones, a  $\log_{10}$  axis for friction ratio,  $R_f$  in this case, and a unitless tip resistance axis.

Figure 6 shows a revised behavior based chart by Robertson (2016) depicting contractive-dilative zones. As the zones represent material behavior rather than soil gradation ConeTec has chosen a set of zone colors that are less likely to be confused with material type colors from previous SBT charts. These colors differ from those used by Dr. Robertson. A green palette was selected for the dilative (desirable) side of the chart and a red palette for the contractive side of the chart.

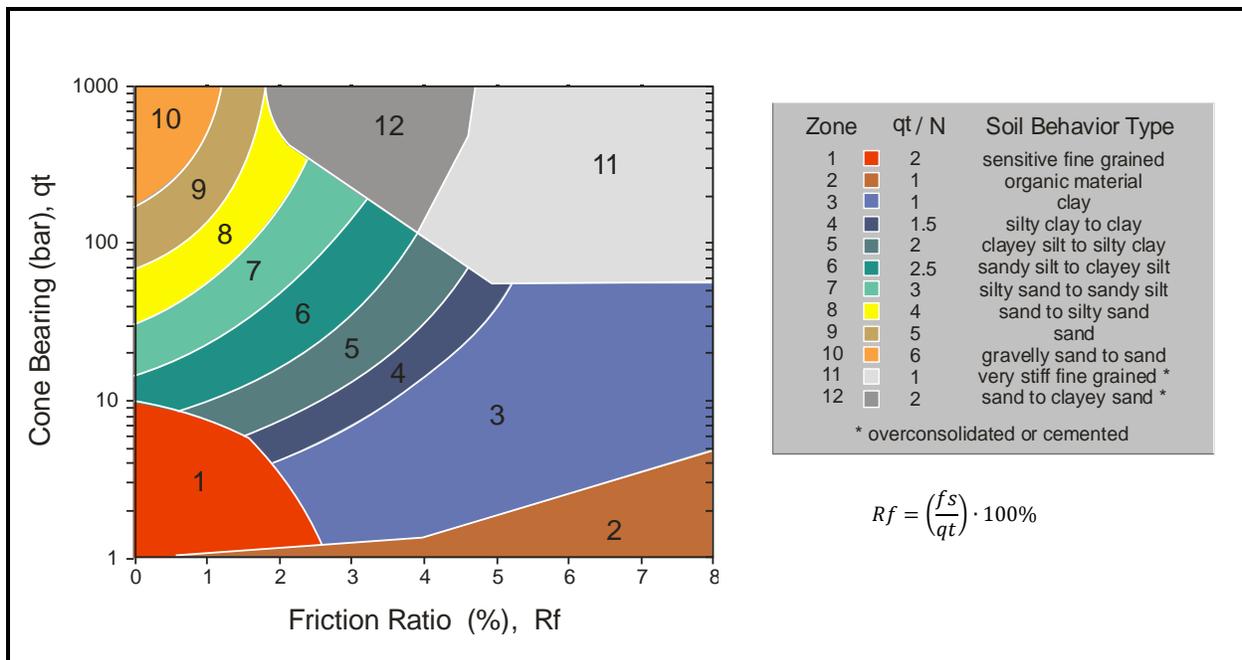


Figure 1. Non-normalized Soil Behavior Type Classification Chart (SBT)

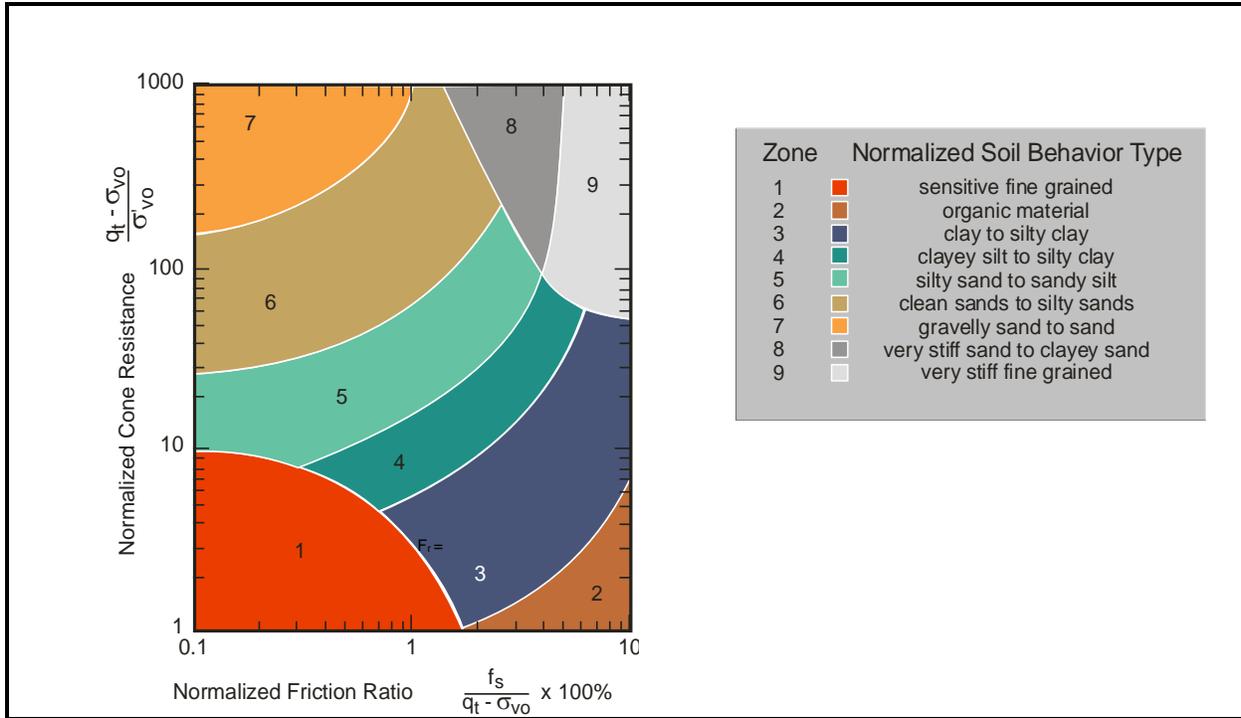


Figure 2. Normalized Soil Behavior Type Classification Chart (SBTn)

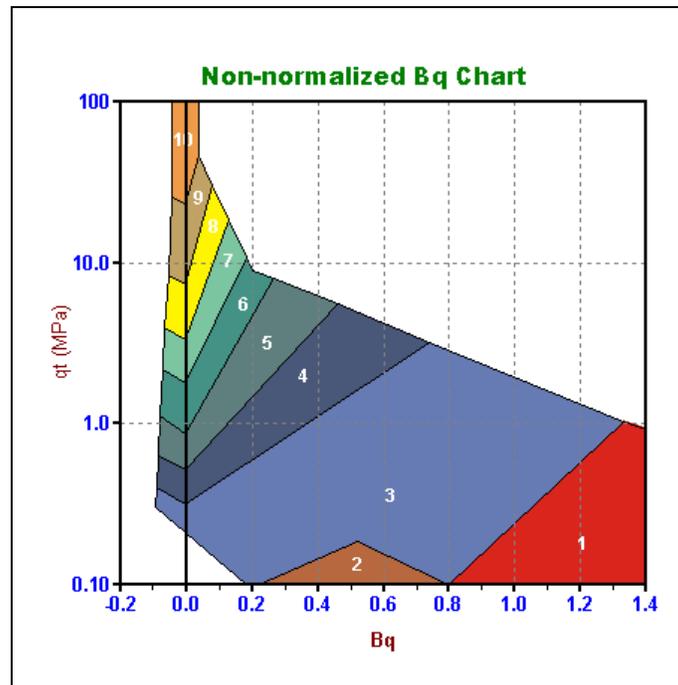


Figure 3a. Alternate Soil Behavior Type Chart (SBT Bq):  $q_t - B_q$

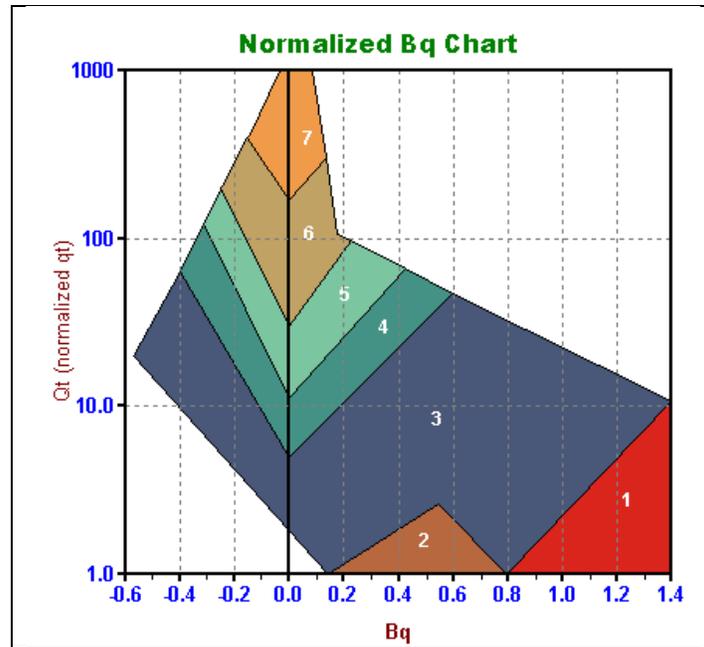


Figure 3b. Alternate Soil Behavior Type Charts (SBT Bqn):  $Q_t$ - $B_q$

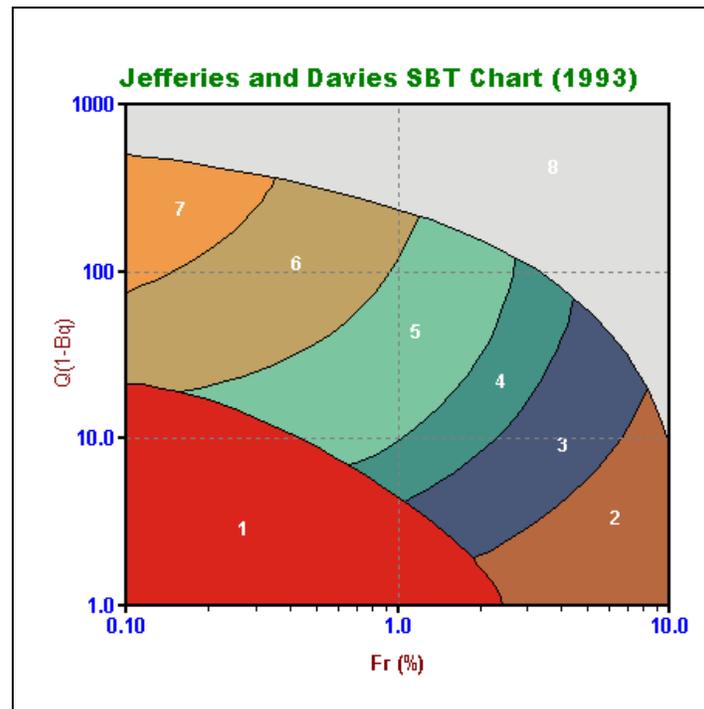


Figure 3c. Alternate Soil Behavior Type Charts:  $Q(1-B_q)$  -  $F_r$

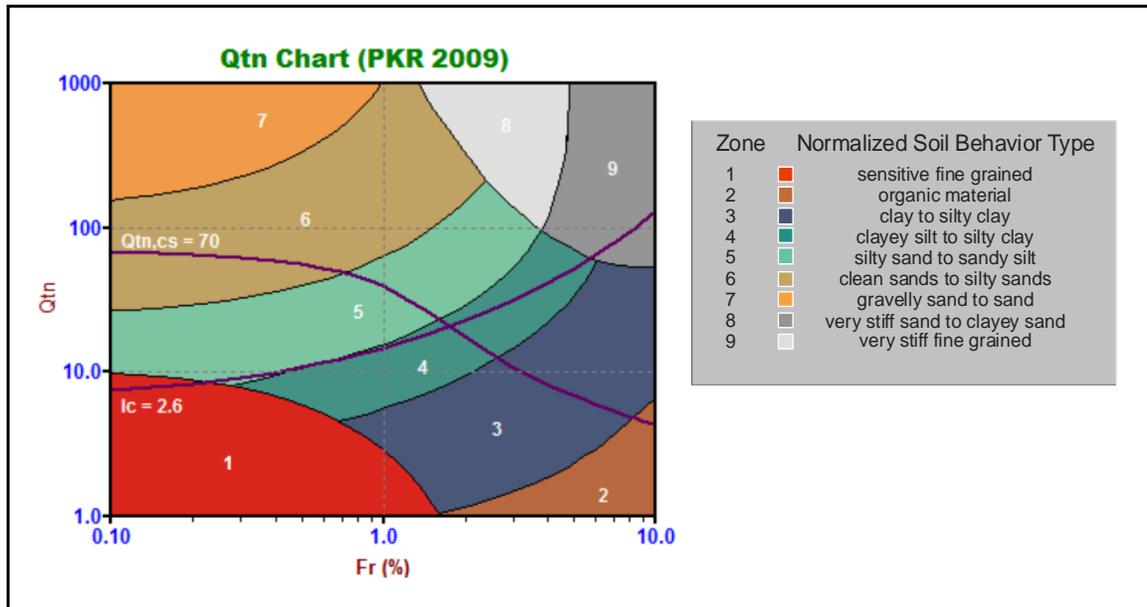


Figure 4. Normalized Soil Behavior Type Chart using  $Q_{tn}$  (SBT  $Q_{tn}$ )

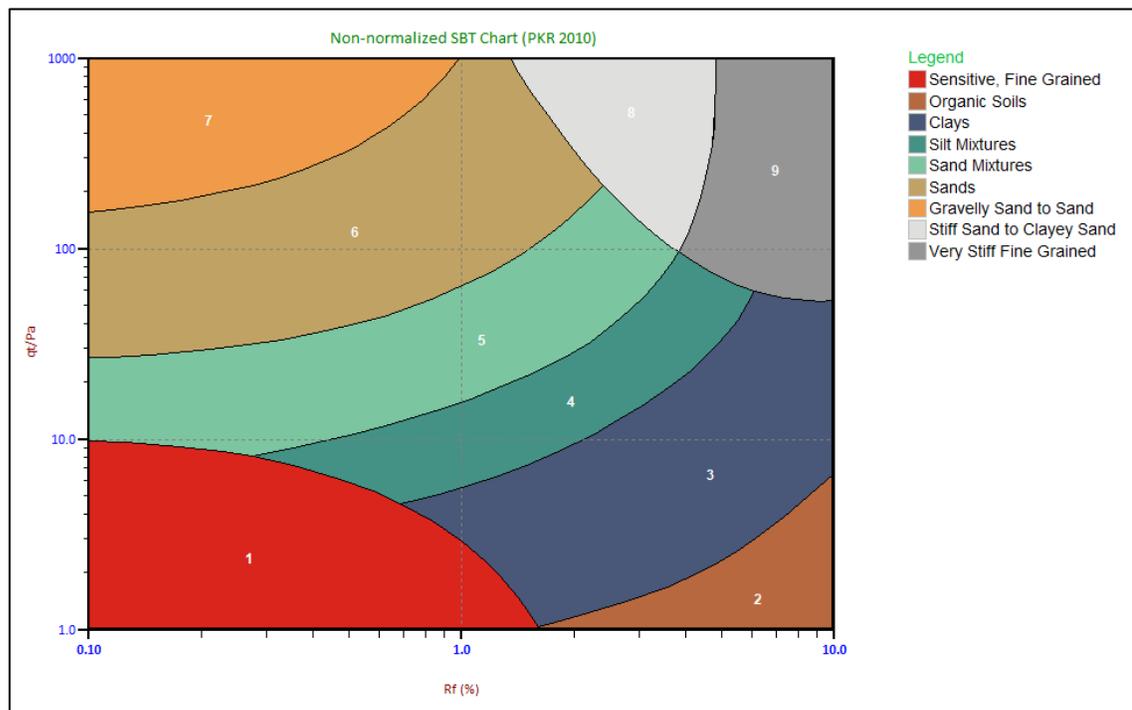


Figure 5. Non-normalized Soil Behavior Type Chart (2010)

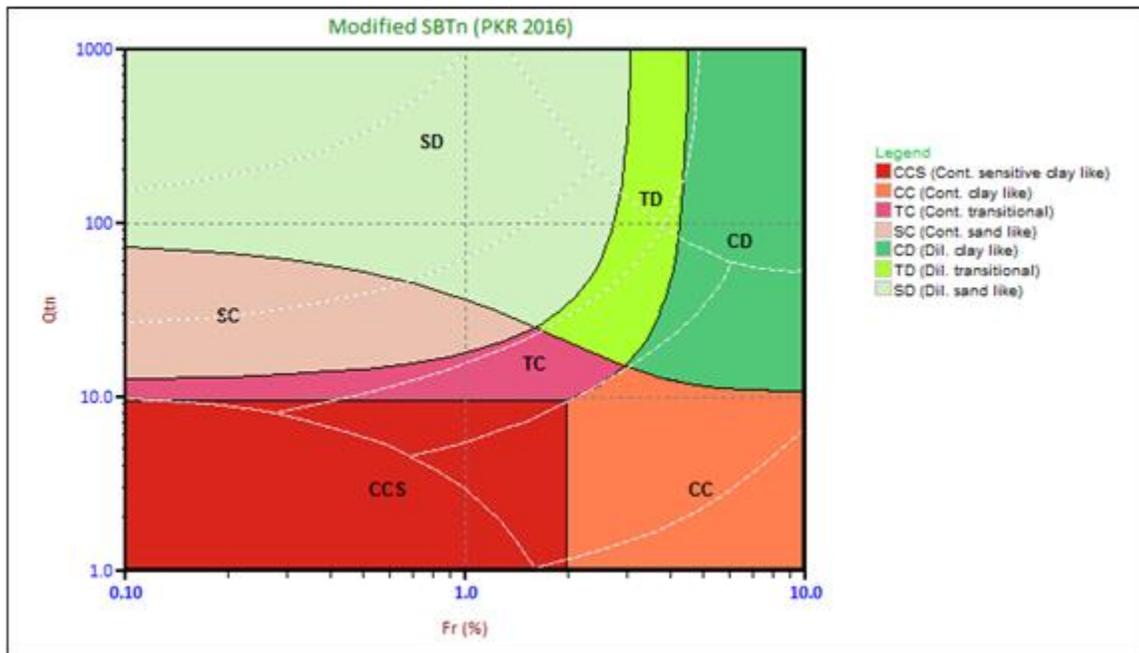


Figure 6. Modified SBTn Behavior Based Chart

Details regarding the geotechnical parameter calculations are provided in Tables 1a and 1b. The appropriate references cited are listed in Table 2. Non-liquefaction specific parameters are detailed in Table 1a and liquefaction specific parameters are detailed in Table 1b.

Where methods are based on charts or techniques that are too complex to describe in this summary, we recommend that the user refer to the cited material. Specific limitations for each method are described in the cited material.

Where the results of a calculation/correlation are deemed *'invalid'* the value will be represented by the text strings *"-9999"*, *"-9999.0"*, the value 0.0 (Zero) or an empty cell. Invalid results will occur because of (and not limited to) one or a combination of:

1. Invalid or undefined CPT data (e.g., drilled out section or data gap).
2. Where the calculation method is inappropriate, for example, drained parameters in a material behaving in an undrained manner (and vice versa).
3. Where input values are beyond the range of the referenced charts or specified limitations of the correlation method.
4. Where pre-requisite or intermediate parameter calculations are invalid.

The parameters selected for output from the program are often specific to a particular project. As such, not all of the calculated parameters listed in Tables 1a and 1b may be included in the output files delivered with this report.

The output files are typically provided in Microsoft Excel XLS, XLSX or CSV format. The ConeTec software has several options for output depending on the number or types of calculated parameters desired or those specifically contracted for by the client. Each output file is named using the original file base name (from the .COR file) followed

by a three or four character indicator of the output set selected (e.g. BSC, TBL, NLI, NL2, IFI, IFI2, IFI3) and possibly followed by an operator selected suffix identifying the characteristics of the particular calculation run.

**Table 1a. CPT Parameter Calculation Methods – Non liquefaction Parameters**

Reference Notes: CK\* - Common Knowledge, U\* - Unpublished

Calculated Parameter	Description	Equation	Ref
Depth	Mid Layer Depth <i>(where calculations are done at each point then Mid Layer Depth = Recorded Depth)</i>	$[Depth (Layer Top) + Depth (Layer Bottom)] / 2.0$	CK*
Elevation	Elevation of Mid Layer is based on the sounding collar elevation supplied by the client or through a site survey  In Sweden a variation of elevation is used where the elevation increases with depth. We refer to this as inverse elevation.	Elevation = Collar Elevation – Depth  InverseElevation = Collar Elevation + Depth	CK*  N/A
Avg qc	Averaged recorded tip value ( $q_c$ )	$Avgqc = \frac{1}{n} \sum_{i=1}^n q_c$ <i>n=1 when calculations are done at each point</i>	CK*
Avg qt	Averaged corrected tip ( $q_t$ ) where: $q_t = q_c + (1 - a) \cdot u_2$  Averaged $q_t$ is not calculated using the average $q_c$ and averaged $u$ values. Averaged $q_t$ is based on the average of the $q_t$ values calculated at each data point.	$Avgqt = \frac{1}{n} \sum_{i=1}^n q_t$ <i>n=1 when calculations are done at each point</i>	1
Avg fs	Averaged sleeve friction ( $f_s$ )  No pore pressure corrections are applied to $f_s$ .	$Avgfs = \frac{1}{n} \sum_{i=1}^n fs$ <i>n=1 when calculations are done at each point</i>	CK*
Avg Rf	Averaged friction ratio ( $R_f$ ) where friction ratio is defined as: $R_f = 100\% \cdot \frac{fs}{qt}$	$AvgRf = 100\% \cdot \frac{Avgfs}{Avgqt}$ <i>not an average of individual <math>R_f</math> values</i>	CK*
Avg u	Averaged dynamic pore pressure ( $u$ )	$Avgu = \frac{1}{n} \sum_{i=1}^n u_i$ <i>n=1 when calculations are done at each point</i>	CK*
Avg Res	Averaged Resistivity (this data is not always available since it is a specialized test requiring an additional module)	$AvgRes = \frac{1}{n} \sum_{i=1}^n Resistivity_i$ <i>n=1 when calculations are done at each point</i>	CK*
Avg UVIF	Averaged UVIF ultra-violet induced fluorescence (this data is not always available since it is a specialized test requiring an additional module)	$AvgUVIF = \frac{1}{n} \sum_{i=1}^n UVIF_i$ <i>n=1 when calculations are done at each point</i>	CK*
Avg Temp	Averaged Temperature (this data is not always available)	$AvgTemp = \frac{1}{n} \sum_{i=1}^n Temperature_i$ <i>n=1 when calculations are done at each point</i>	CK*
Avg Gamma	Averaged Gamma Counts (this data is not always available since it is a specialized test requiring an additional module)	$AvgGamma = \frac{1}{n} \sum_{i=1}^n Gamma_i$ <i>n=1 when calculations are done at each point</i>	CK*
SBT	Soil Behavior Type as defined by Robertson et al 1986 (often referred to as Robertson and Campanella, 1986)	See Figure 1	1, 5
SBTn	Normalized Soil Behavior Type as defined by Robertson 1990 (linear normalization using $Q_t$ , now referred to as $Q_{t1}$ )	See Figure 2	2, 5

Calculated Parameter	Description	Equation	Ref
SBT-Bq	Non-normalized Soil Behavior type based on non-normalized tip resistance and the B <sub>q</sub> parameter	See Figure 3a	1, 2, 5
SBT-Bqn	Normalized Soil Behavior type based on normalized tip resistance (Q <sub>t</sub> , now called Q <sub>t1</sub> ) and the B <sub>q</sub> parameter	See Figure 3b	2, 5
SBT-JandD	Soil Behavior Type as defined by Jeffries and Davies	See Figure 3c	7
SBT Qtn	Soil Behavior Type as defined by Robertson (2009) using a variable stress ratio exponent for normalization based on I <sub>c</sub> (PKR 2009)	See Figure 4	15
Modified Non-normalized SBT Chart SBT (PKR2010)	This is a revised version of the simple 1986 non-normalized SBT chart (presented at CPT '10). The revised version has been reduced from 12 zones to 9 zones to be similar to the normalized Robertson charts. Other updates include a dimensionless tip resistance normalized to atmospheric pressure, q <sub>t</sub> /P <sub>a</sub> , on the vertical axis and a log scale for non-normalized friction ratio, R <sub>f</sub> , along the horizontal axis.	See Figure 5	33
Modified SBTn (contractive /dilative)	Modified SBTn chart as defined by Robertson (2016) indicating zones of contractive/dilative behavior. Note that ConeTec displays the chart with colors different from Robertson. ConeTec's colors were chosen to avoid confusion with soil type descriptions.	See Figure 6	30
Unit Wt.	<p>Unit Weight of soil determined from one of the following user selectable options:</p> <ol style="list-style-type: none"> <li>1) uniform value</li> <li>2) value assigned to each SBT zone</li> <li>3) value assigned to each SBTn zone</li> <li>4) value assigned to SBTn zone as determined from Robertson and Wride (1998) based on q<sub>c1n</sub></li> <li>5) values assigned to SBT Qtn zones</li> <li>6) values based on Robertson updated non-normalized Soil Behavior Type Chart (2010b)</li> <li>6) Mayne f<sub>s</sub> (sleeve friction) method</li> <li>7) Robertson and Cabal 2010 method</li> <li>8) user supplied unit weight profile</li> </ol> <p>The last option may co-exist with any of the other options.</p>	See references	3, 5, 15, 21, 24, 29, 33

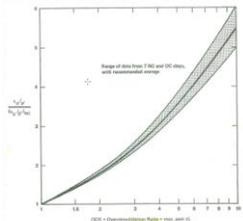


Calculated Parameter	Description	Equation	Ref
TStress  $\sigma_v$	<p>Total vertical overburden stress at Mid Layer Depth</p> <p><i>A layer is defined as the averaging interval specified by the user where depths are reported at their respective mid-layer depth.</i></p> <p>For data calculated at each point layers are defined using the recorded depth as the mid-point of the layer. Thus, a layer starts half-way between the previous depth and the current depth unless this is the first point in which case the layer start is at zero depth. The layer bottom is half-way from the current depth to the next depth unless it is the last data point.</p> <p>Defining layers affects how stresses are calculated since the unit weight attributed to a data point is used throughout the entire layer. This means that to calculate the stresses the total stress at the top and bottom of a layer are required. The stress at mid layer is determined by adding the incremental stress from the layer top to the mid-layer depth. The stress at the layer bottom becomes the stress at the top of the subsequent layer. Stresses are NOT calculated from mid-point to mid-point.</p> <p>For over-water work the total stress due to the column of water above the mud line is taken into account where appropriate.</p>	$TStress = \sum_{i=1}^n \gamma_i h_i$ <p>where <math>\gamma_i</math> is layer unit weight <math>h_i</math> is layer thickness</p>	CK*
EStress $\sigma_v'$	<p>Effective vertical overburden stress at mid-layer depth.</p>	$\sigma_v' = \sigma_v - u_{eq}$	CK*
Equil u $u_{eq}$ or $u_0$	<p>Equilibrium pore pressures are determined from one of the following user selectable options:</p> <ol style="list-style-type: none"> <li>1) hydrostatic below the water table</li> <li>2) user supplied profile</li> <li>3) combination of those above</li> </ol> <p>When a user supplied profile is used/provided a linear interpolation is performed between equilibrium pore pressures defined at specific depths. If the profile values start below the water table then a linear transition from zero pressure at the water table to the first defined pointed is used.</p> <p>Equilibrium pore pressures may come from dissipation tests, adjacent piezometers or other sources. Occasionally, an extra equilibrium point (“assumed value”) will be provided in the profile that does not come from a recorded value to smooth out any abrupt changes or to deal with material interfaces. These “assumed” values will be indicated on our plots and in tabular summaries.</p>	<p>For the hydrostatic option:</p> $u_{eq} = \gamma_w \cdot (D - D_{wt})$ <p>where <math>u_{eq}</math> is equilibrium pore pressure <math>\gamma_w</math> is the unit weight of water <math>D</math> is the current depth <math>D_{wt}</math> is the depth to the water table</p>	CK*
$K_0$	<p>Coefficient of earth pressure at rest, <math>K_0</math>.</p>	$K_0 = (1 - \sin\Phi') OCR^{\sin\Phi'}$	17
$C_n$	<p>Overburden stress correction factor used for <math>(N_1)_{60}</math> and older CPT parameters.</p>	$C_n = (P_a/\sigma_v')^{0.5}$ <p>where <math>0.0 &lt; C_n &lt; 2.0</math> (user adjustable, typically ranging from 1.7 to 2.0) <math>P_a</math> is atmospheric pressure (100 kPa)</p>	4, 12

Calculated Parameter	Description	Equation	Ref
$C_q$	Overburden stress normalizing factor.	$C_q = 1.8 / [0.8 + (\sigma'_v / P_a)]$ where $0.0 < C_q < 2.0$ (user adjustable) $P_a$ is atmospheric pressure (100 kPa)  Robertson and Wride define $C_q$ to be the same as $C_n$ . The Olson definition above is used in the program.	3, 12
$N_{60}$	SPT N value at 60% energy calculated from $q_t/N$ ratios assigned to each SBT zone. This method has abrupt N value changes at zone boundaries.	See Figure 1	5
$(N_1)_{60}$	SPT $N_{60}$ value corrected for overburden pressure.	$(N_1)_{60} = C_n \cdot N_{60}$	4
$N_{60lc}$	SPT $N_{60}$ values based on the $I_c$ parameter, as defined by Robertson and Wride 1998 (3), or by Robertson 2009 (15).	$(q_t/P_a) / N_{60} = 8.5 (1 - I_c/4.6)$ $(q_t/P_a) / N_{60} = 10^{(1.1268 - 0.2817I_c)}$ $P_a$ being atmospheric pressure	3, 5 15, 31
$(N_1)_{60lc}$	SPT $N_{60}$ value corrected for overburden pressure (using $N_{60} I_c$ ). User has 3 options.	1) $(N_1)_{60lc} = C_n \cdot (N_{60} I_c)$ 2) $q_{c1n} / (N_1)_{60lc} = 8.5 (1 - I_c/4.6)$ 3) $(Q_{tn}) / (N_1)_{60lc} = 10^{(1.1268 - 0.2817I_c)}$	4 5 15, 31
$S_u$ or $S_u (N_{kt})$	Undrained shear strength based on $q_t$ $S_u$ factor $N_{kt}$ is user selectable.	$S_u = \frac{q_t - \sigma_v}{N_{kt}}$	1, 5
$S_u$ or $S_u (N_{du})$ or $S_u (N_{\Delta u})$	Undrained shear strength based on pore pressure $S_u$ factor $N_{\Delta u}$ is user selectable.	$S_u = \frac{u_2 - u_{eq}}{N_{\Delta u}}$	1, 5
$D_r$	Relative Density determined from one of the following user selectable options:  1) Ticino Sand 2) Hokksund Sand 3) Schmertmann (1978) 4) Jamiolkowski (1985) - All Sands 5) Jamiolkowski et al (2003) (various compressibilities, $K_o$ )	See reference (methods 1 through 4) Jamiolkowski et al (2003) reference	5 14
PHI $\phi$	Friction Angle determined from one of the following user selectable options (methods 1 through 4 are for sands and method 5 is for silts and clays):  1) Campanella and Robertson 2) Durgunoglu and Mitchel 3) Janbu 4) Kulhawy and Mayne 5) NTH method (clays and silts)	See appropriate reference	5 5 5 11 23
Delta U/ $q_t$ $\Delta u/q_t$ $du/q_t$	Differential pore pressure ratio (older parameter used before $B_q$ was established)	$= \frac{\Delta u}{q_t}$  where: $\Delta u = u - u_{eq}$ and $u =$ dynamic pore pressure $u_{eq} =$ equilibrium pore pressure	39

Calculated Parameter	Description	Equation	Ref
$B_q$	Pore pressure parameter	$B_q = \frac{\Delta u}{q_t - \sigma_v}$ where: $\Delta u = u - u_{eq}$ and $u = \text{dynamic pore pressure}$ $u_{eq} = \text{equilibrium pore pressure}$	1, 2, 5
Net $q_t$ or qtNet	Net tip resistance (used in many subsequent correlations)	$q_t - \sigma_v$	36
$q_e$ or $q_E$ or $q_E$	Effective tip resistance (using the dynamic pore pressure $u_2$ and not equilibrium pore pressure)	$q_t - u_2$	36
qeNorm	Normalized effective tip resistance	$\frac{q_t - u_2}{\sigma_v}$	36
$Q_t$ or Norm: $Q_t$ or $Q_{t1}$	Normalized $q_t$ for Soil Behavior Type classification as defined by Robertson (1990) using a linear stress normalization. Note this is different from $Q_{tn}$ . This parameter was renamed to $Q_{t1}$ in Robertson, 2009. Without normalization limits this parameter calculates to very high unrealistic values at low stresses.	$Q_t = \frac{q_t - \sigma_v}{\sigma_v}$	2, 5, 15
$F_r$ or Norm: $F_r$	Normalized Friction Ratio for Soil Behavior Type classification as defined by Robertson (1990)	$F_r = 100\% \cdot \frac{f_s}{q_t - \sigma_v}$	2, 5
$Q(1-B_q)$ $Q(1-B_q) + 1$	$Q(1-B_q)$ grouping as suggested by Jefferies and Davies for their classification chart and the establishment of their $l_c$ parameter. Later papers added the +1 term to the equation.	$Q \cdot (1 - B_q)$ $Q \cdot (1 - B_q) + 1$ where $B_q$ is defined as above and $Q$ is the same as the normalized tip resistance, $Q_{t1}$ , defined above	6, 7, 34
$q_{c1}$	Normalized tip resistance, $q_{c1}$ , using a fixed stress ratio exponent, $n$ (this method has stress units)	$q_{c1} = q_t \cdot (P_a / \sigma_v')^{0.5}$ where: $P_a = \text{atmospheric pressure}$	21
$q_{c1} (0.5)$	Normalized tip resistance, $q_{c1}$ , using a fixed stress ratio exponent, $n$ (this method is unit-less)	$q_{c1} (0.5) = (q_t / P_a) \cdot (P_a / \sigma_v')^{0.5}$ where: $P_a = \text{atmospheric pressure}$	5
$q_{c1} (C_n)$	Normalized tip resistance, $q_{c1}$ , based on $C_n$ (this method has stress units)	$q_{c1}(C_n) = C_n * q_t$	5, 12
$q_{c1} (C_q)$	Normalized tip resistance, $q_{c1}$ , based on $C_q$ (this method has stress units)	$q_{c1}(C_q) = C_q * q_t$ (some papers use $q_c$ )	5, 12
$q_{c1n}$	normalized tip resistance, $q_{c1n}$ , using a variable stress ratio exponent, $n$ (where $n=0.0, 0.70, \text{ or } 1.0$ ) (this method is unit-less)	$q_{c1n} = (q_t / P_a)(P_a / \sigma_v')^n$ where: $P_a = \text{atm. Pressure}$ and $n$ varies as described below	3



Calculated Parameter	Description	Equation	Ref
$I_B$	Hyperbolic fit defining the boundary between SBT soil types proposed by Schneider as a better fit than the $I_c$ circles. $I_B = 32$ represents the boundary for most sand like soils. $I_B = 22$ represents the upper boundary for most clay like soils. The region between $I_B=22$ and $I_B=32$ is the “transitional soil” zone.	$I_B = 100 (Q_{tn} + 10) / (70 + Q_{tn} F_r)$	30
State Param or State Parameter or $\psi$	The state parameter index, $\psi$ , is defined as the difference between the current void ratio, $e$ , and the critical void ratio, $e_c$ . Positive $\psi$ - contractive soil Negative $\psi$ - dilative soil  This is based on the work by Been and Jefferies (1985) and Plewes, Davies and Jefferies (1992)  This method uses mean normal stresses based on a uniform value of $K_0$ or a calculated $K_0$ using methods described elsewhere in this document	See reference	6, 8
Yield Stress $\sigma_p'$	Yield stress is calculated using the following methods 1) General method  2) 1 <sup>st</sup> order approximation using $q_t$ Net (clays) 3) 1 <sup>st</sup> order approximation using $\Delta u_2$ (clays) 4) 1 <sup>st</sup> order approximation using $q_e$ (clays) 5) Based on $V_s$	All stresses in kPa  1) $\sigma_p' = 0.33 \cdot (q_t - \sigma_v)^{m'} \cdot (\sigma_{atm}/100)^{1-m'}$  where $m' = 1 - \frac{0.28}{1 + (I_c / 2.65)^{25}}$  2) $\sigma_p' = 0.33 \cdot (q_t - \sigma_v)$ 3) $\sigma_p' = 0.54 \cdot (\Delta u_2)$ $\Delta u_2 = u_2 - u_0$ 4) $\sigma_p' = 0.60 \cdot (q_t - u_2)$ 5) $\sigma_p' = (V_s/4.59)^{1.47}$	19  20 20 20 18
OCR OCR(JS1978)  YSR(Mayne2014) YSR (qtNet) YSR (deltaU) YSR (qe) YSR (Vs) OCR (PKR2015)	Over Consolidation Ratio based on  1) Schmertmann (1978) method involving a plot of $S_u/\sigma_v' / (S_u/\sigma_v')_{NC}$ and OCR    2) based on Yield stresses described above 3) approximate version based on qtNet 4) approximate version based on $\Delta u$ 5) approximate version based on effective tip, $q_e$ 6) approximate version based on shear wave velocity, $V_s$ and $\sigma_v'$ 7) based on $Q_t$	1) requires a user defined value for NC $S_u/P_c'$ ratio  2 through 5) based on yield stresses  6) $YSR (Vs) = \sigma_p' (Vs) / \sigma_v'$ 7) $OCR = 0.25 \cdot (Q_t)^{1.25}$	9  19 20 20 20 18 32
$E_s/q_t$	Intermediate parameter for calculating Young’s Modulus, $E$ , in sands. It is the Y axis of the reference chart.  Note that Figure 5.59 from reference 5, Lunne, Robertson and Powell, (LRP) has an error. The X axis values are too high by a factor of 10. The plot is based on Baldi’s (not Bellotti as cited in	Based on Figure 5.59 in the reference	5, 37

Calculated Parameter	Description	Equation	Ref
	<p>LRP) original Figure 3 where the X axis is:  <math>\frac{q_c}{\sqrt{\sigma'_v}}</math> (both in kPa) with a range of 200 to 3000.</p> <p>Figure 5.59 from LRP shows a dimensionless form of the equation, <math>q_{c1}</math>, displaying the same range of values.</p> <p>Figure 5.59's X axis uses <math>q_{c1} = \left(\frac{q_c}{P_a}\right) \left(\frac{P_a}{\sigma'_v}\right)^{0.5}</math></p> <p>The two expressions are not the same: they differ by a factor of <math>\frac{\sqrt{P_a}}{P_a}</math>. With <math>P_a</math> taken to be 100 kPa the factor is 1/10.</p> <p>Substituting typical values of 200 bar (20000 kPa) for <math>q_c</math> and 225 kPa for <math>\sigma'_v</math> one gets: <math>20000 / 15 = 1333.33</math> for Bellotti's axis and <math>(200/1)(100/225)^{0.5} = 200 * (10/15) = 133.3</math> for LRP's axis (noting that <math>P_a = 1</math> bar) showing a factor of 10 difference.</p>		
Es or Es Young's Modulus E	<p>Young's Modulus based on the work done in Italy. There are three types of sands considered in this technique. The user selects the appropriate type for the site from:</p> <ul style="list-style-type: none"> <li>a) OC Sands</li> <li>b) Aged NC Sands</li> <li>c) Recent NC Sands</li> </ul> <p>Each sand type has a family of curves that depend on mean normal stress. The program calculates mean normal stress and linearly interpolates between the two extremes provided in the <math>E_s/q_t</math> chart. <math>E_s</math> is evaluated for an axial strain of 0.1%.</p>	<p>Mean normal stress is evaluated from:</p> $\sigma'_m = \frac{1}{3}(\sigma'_v + \sigma'_h + \sigma'_h)$ <p>where <math>\sigma'_v</math>= vertical effective stress  <math>\sigma'_h</math>= horizontal effective stress</p> <p>and <math>\sigma_h = K_o \cdot \sigma'_v</math> with <math>K_o</math> assumed to be 0.5</p>	5
Delta U/TStress $\Delta u / \sigma_v$	Differential pore pressure ratio with respect to total stress	$= \frac{\Delta u}{\sigma_v}$ where: $\Delta u = u - u_{eq}$	39
Delta U/EStress, P Value, Excess Pore Pressure Ratio $\Delta u/\sigma'_v$	Differential pore pressure ratio with respect to effective stress. Key parameter (P, Normalized Pore Pressure Parameter, Excess Pore Pressure Ratio) in the Winckler et. al. static liquefaction method.	$= \frac{\Delta u}{\sigma'_v}$ where: $\Delta u = u - u_{eq}$	25, 25a
Su/EStress $S_u/\sigma'_v$	Undrained shear strength ratio with respect to vertical effective overburden stress using the $S_u (N_{kt})$ method	$= S_u (N_{kt}) / \sigma'_v$	9, 23
Vs or Vs	Recorded shear wave velocities (not estimated). The shear wave velocities are typically collected over 1 m depth intervals. Each data point over the relevant depth range is assigned the same $V_s$ value.	recorded data	27
Vp or Vp	Recorded compression wave (or P wave) velocities (not estimated). The P wave velocities are typically collected over 1 m depth intervals. Each data point over the relevant depth range is assigned the same $V_p$ value.	recorded data	27



**Table 1b. CPT Parameter Calculation Methods – Liquefaction Parameters**

Calculated Parameter	Description	Equation	Ref
$K_{SPT}$ or $K_s$	Equivalent clean sand factor for $(N_1)_{60}$	$K_{SPT} = 1 + ((0.75/30) \cdot (FC - 5))$	10
$K_{CPT}$ or $K_C$ (RW1998)	Equivalent clean sand correction for $q_{c1N}$	$K_{cpt} = 1.0$ for $l_c \leq 1.64$ $K_{cpt} = f(l_c)$ for $l_c > 1.64$ (see reference) $K_C = -0.403 l_c^4 + 5.581 l_c^3 - 21.63 l_c^2 + 33.75 l_c - 17.88$	3, 10
$K_C$ (PKR 2010)	Clean sand equivalent factor to be applied to $Q_{tn}$	$K_C = 1.0$ for $l_c \leq 1.64$ $K_C = -0.403 l_c^4 + 5.581 l_c^3 - 21.63 l_c^2 + 33.75 l_c - 17.88$ for $l_c > 1.64$	16
$(N_1)_{60cs} l_c$	Clean sand equivalent SPT $(N_1)_{60} l_c$ . User has 3 options.	1) $(N_1)_{60cs} l_c = \alpha + \beta((N_1)_{60} l_c)$ 2) $(N_1)_{60cs} l_c = K_{SPT} * ((N_1)_{60} l_c)$ 3) $(q_{c1ncs}) / (N_1)_{60cs} l_c = 8.5 (1 - l_c / 4.6)$  $FC \leq 5\%: \quad \alpha = 0, \quad \beta = 1.0$ $FC \geq 35\% \quad \alpha = 5.0, \quad \beta = 1.2$ $5\% < FC < 35\% \quad \alpha = \exp[1.76 - (190/FC^2)]$ $\quad \quad \quad \beta = [0.99 + (FC^{1.5}/1000)]$	10 10 5
$q_{c1ncs}$	Clean sand equivalent $q_{c1n}$	$q_{c1ncs} = q_{c1n} \cdot K_{cpt}$	3
$Q_{tn,cs}$ (PKR 2010)	Clean sand equivalent for $Q_{tn}$ described above - $Q_{tn}$ being the normalized tip resistance based on a variable stress exponent as defined by Robertson (2009)	$Q_{tn,cs} = Q_{tn} \cdot K_C$ (PKR 2016)	16
$S_u(Liq)/ES_v$ or $S_u(Liq)/\sigma'_v$	Liquefied shear strength ratio as defined by Olson and Stark	$\frac{S_u(Liq)}{\sigma'_v} = 0.03 + 0.0143(q_{c1})$  Note: $\sigma'_v$ and $s'_v$ are synonymous	13
$S_u(Liq)/ES_v$ or $S_u(Liq)/\sigma'_v$ (PKR 2010)	Liquefied shear strength ratio as defined by Robertson (2010)	$\frac{S_u(Liq)}{\sigma'_v}$ Based on a function involving $Q_{tn,cs}$	16
$S_u(Liq)$ (PKR 2010)	Liquefied shear strength derived from the liquefied shear strength ratio and effective overburden stress	$S_u(Liq) = \sigma'_v \cdot \left( \frac{S_u(Liq)}{\sigma'_v} \right)$	16
Cont/Dilat Tip	Contractive / Dilative $q_{c1}$ Boundary based on $(N_1)_{60}$	$(\sigma'_v)_{boundary} = 9.58 \times 10^{-4} [(N_1)_{60}]^{4.79}$ $q_{c1}$ is calculated from specified $q_t$ (MPa)/N ratio	13
CRR	Cyclic Resistance Ratio (for Magnitude 7.5)	$q_{c1ncs} < 50:$ $CRR_{7.5} = 0.833 [q_{c1ncs}/1000] + 0.05$  $50 \leq q_{c1ncs} < 160:$ $CRR_{7.5} = 93 [q_{c1ncs}/1000]^3 + 0.08$	10
$K_g$ or $K_g$	Small strain Stiffness Ratio Factor, $K_g$	$[G_{max}/q_t]/[q_{c1n}^{-m}]$ m = empirical exponent, typically 0.75	26



Calculated Parameter	Description	Equation	Ref
$K_g^*$	Revised $K_g$ factor extended to fine grained soils (Robertson).	$K_g^* = (G_o / q_n)(Q_{tn})^{0.75}$ where $q_n$ is the net tip resistance = $q_t - \sigma_v$	30
SP Distance	State Parameter Distance, Winckler static liquefaction method	Perpendicular distance on $Q_{tn}$ chart from plotted point to state parameter $\Psi = -0.05$ curve	25
URS NP Fr	Normalized friction ratio point on $\Psi = -0.05$ curve used in SP distance calculation		25
URS NP $Q_{tn}$	Normalized tip resistance ( $Q_{tn}$ ) point on $\Psi = -0.05$ curve used in SP Distance calculation		25

**Table 2. References**

No.	Reference
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No.	Reference
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**ConeTec’s Calculated Flow Penetrometer Geotechnical Parameters as of March 4, 2019 (Rev05).**

Full flow penetration tests are conducted to assess the undrained shear strength ( $S_u$ ) of low to medium strength soils. For the calculations to be valid, the material must flow around the penetrometer. For cases where this condition is not met, the interpreted values may not be valid. Undrained shear strength data from ball CPTu (BCPTu) is presented as a guide for geotechnical use and should be reviewed by personnel having adequate knowledge in the subject matter. The end user should be fully aware of the assumptions made and the techniques used in full flow penetration testing analysis. The purpose of this document is to inform the user as to how undrained strength was determined from full flow penetration data, specifically from ball CPTu (BCPTu).

The recorded ball tip resistance ( $q_b$ ) is the total force acting on the piezocone spherical attachment divided by its base area. The ball tip resistance is corrected for pore pressure effects and termed corrected ball tip resistance ( $q_{bt}$ ) according to the following expression:

$$q_{bt} = q_b + [(1-a)u_2] \frac{A_s}{A_p}$$

- where:
- $q_{bt}$  is the corrected ball tip resistance
  - $q_b$  is the recorded ball tip resistance
  - $u_2$  is the recorded dynamic pore pressure behind the tip ( $u_2$  position)
  - $a$  is the Net Area Ratio for the piezocone (0.8 for ConeTec probes)
  - $A_s$  is the shaft area
  - $A_p$  is the ball plan area

The undrained shear strength derived from the test is related to the net penetration resistance using the following relationship:

$$S_u = \frac{q_{net}}{N}$$

The total vertical stresses used in the  $q_{net}$  calculations are based on assumed unit weights of the material which can be provided by the client or determined from an adjacent CPTu hole, pore pressure dissipation tests conducted in fluid behaving material, laboratory data or historical data. In the analysis for the ball, the influence of the total stress and pore pressure correction are much less than that for the standard CPTu because of the geometry of the ball and how stresses are only unbalanced in the shadow of the cone shaft. This results in the need to only apply adjustments according to the ratio of shaft area ( $A_s$ ) to probe or ball plan area ( $A_p$ ) as detailed in [Table 1](#). A typical value for the ratio ( $A_s/A_p$ ) is  $10 \text{ cm}^2 / 100 \text{ cm}^2$  or 1/10.

**Table 1**  
**BCPTu Parameter Calculation Methods**

Interpreted Parameter	Description	Equation	Ref
$q_{btnet}$	Net ball tip resistance	$q_{btnet} = q_{bt} - \left[ \sigma_{vo} \times \frac{A_s}{A_p} \right]$	
$\gamma$	Soil unit weight	<ul style="list-style-type: none"> <li>• User defined</li> <li>• From pore pressure dissipation data in fluid behaving materials</li> <li>• Lab data</li> <li>• Uniform unit weight (from client, or based on historical data)</li> <li>• From an adjacent CPTu test</li> </ul>	
$S_u$	Undrained shear strength	$S_u = \frac{q_{btnet}}{N_{ball}}$	

## **Calibration Records**



## CERTIFICATE OF CALIBRATION

Calibration Information			
Cone Serial Number	EC681	Model	A15 T375 F10 U35
Date	2023-10-27	Signature	
Technician Performing Calibration	Richard Chen		
Calibration Approved By	Vishrut Khunt	Signature	

Lab Condition	As Found	As Left		
Lab Temperature	N/A	23°C		
Lab Humidity	N/A	26%	Reason for Calibration	Repair

Cone Information				
Tip Stress Limit	375	bar	Tip End Area	15 cm <sup>2</sup>
Friction Stress Limit	10	bar	Friction Surface Area	225 cm <sup>2</sup>
Pressure Limit	35	bar	RTD Location	Pressure Carrier
X-Inclinometer Limit	30	degrees	Geophone	X and Z
Y-Inclinometer Limit	30	degrees	Temperature Range	-20°C to 60°C

### Baseline Summary: (For Reference Only)

Channel	Units	As Found	As Left
Tip	bar	-0.744	-0.050
Sleeve	bar	-0.009	-0.023
Pressure	bar	1.115	1.008
X-Inclinometer	degrees	-0.528	-0.040
Y-Inclinometer	degrees	-0.323	-0.015
Temperature	°C	23.980	22.421

*Classified in accordance with ISO 22476-1:2012 Class 1*

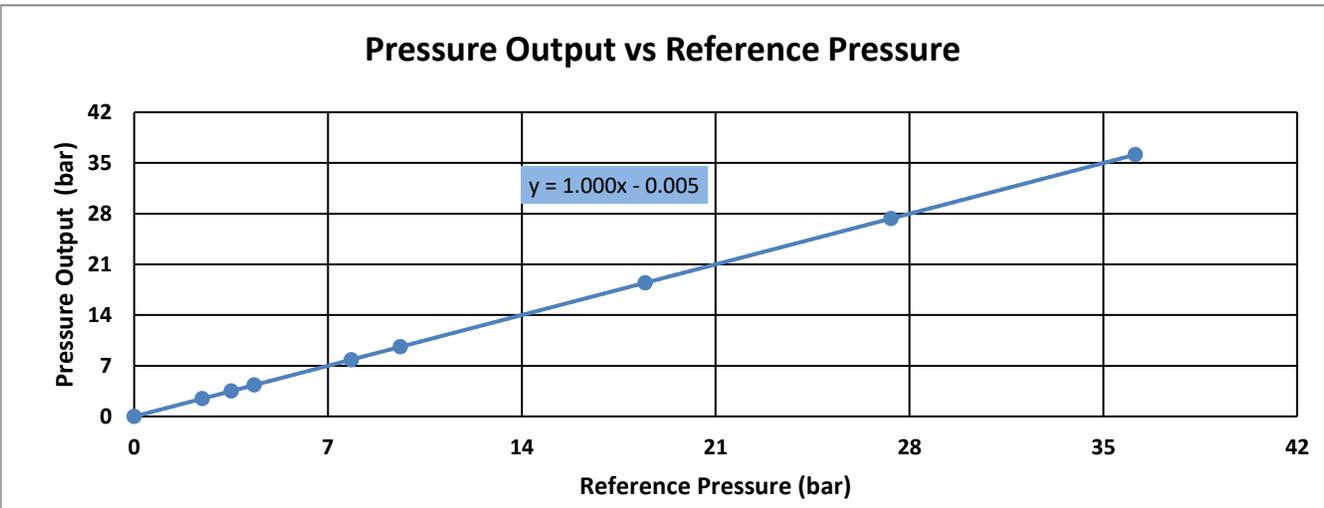
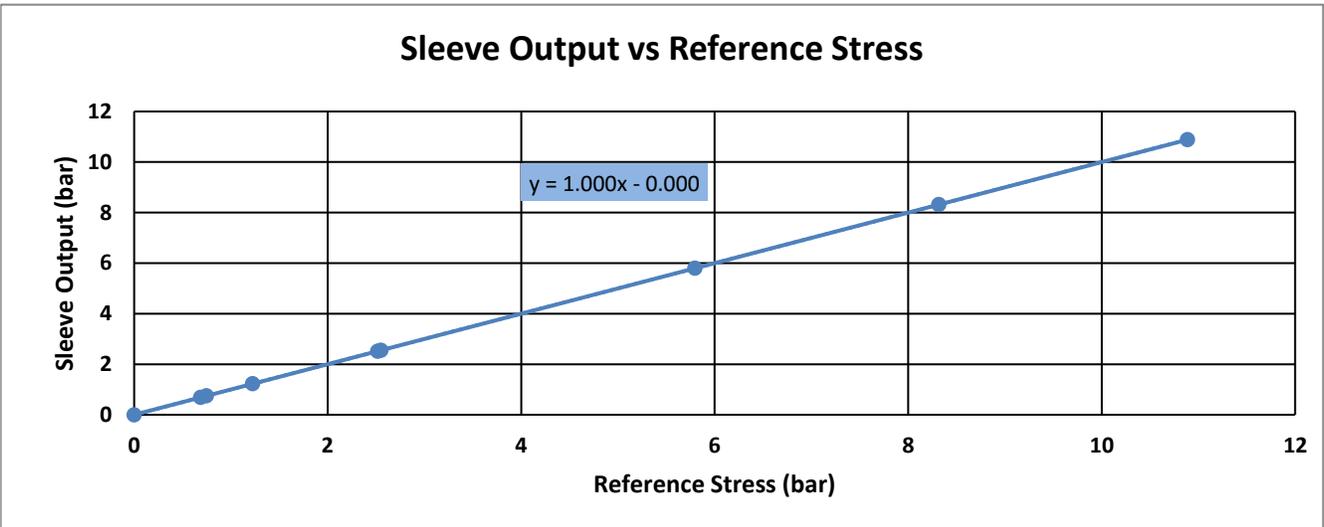
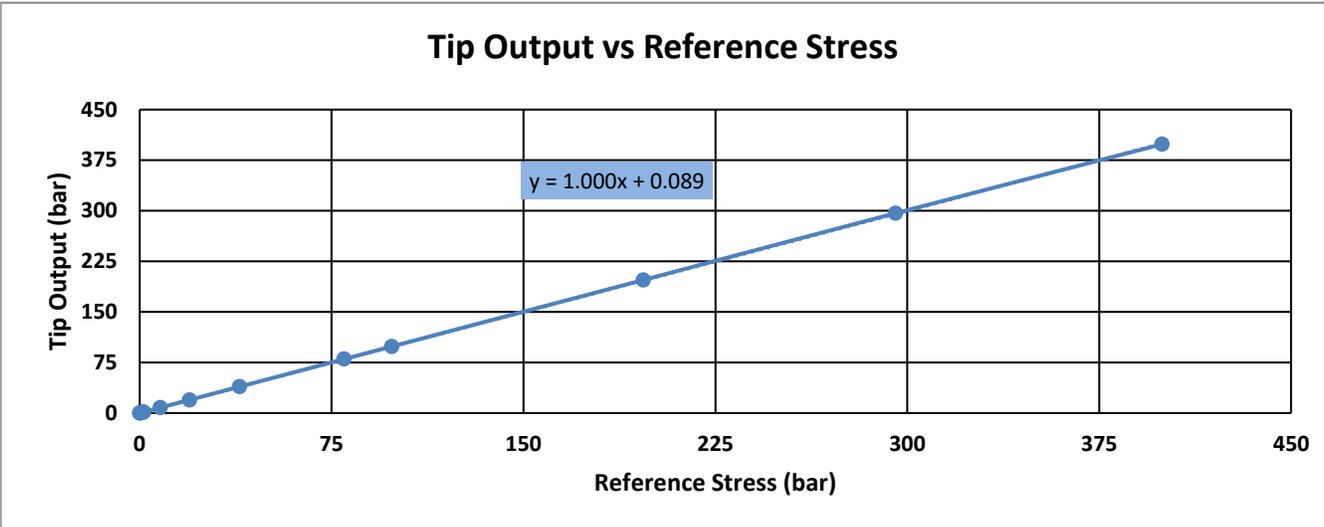
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*Calibrated in general accordance with the ASTM D5778-20 and D7400-08 standards*

*Calibrated with Adara calibration procedure EC\_CPTCAL-2.1*

*Collective uncertainty of the measurement standards conforms to a test uncertainty ratio (TUR) of 3:1 for tip and sleeve measurement and 4:1 for pressure measurement with a confidence level k=2*

**Cone Output vs Reference Stress/Pressure Plots**





**Calibration Results**

<b>Tip Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	0.93%	FAIL	Max. Non Linearity	0.25%	PASS
Calibration Error	0.88%	FAIL	Calibration Error	0.32%	PASS

<b>Sleeve Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	0.53%	FAIL	Max. Non Linearity	0.04%	PASS
Calibration Error	0.49%	PASS	Calibration Error	0.08%	PASS

<b>Pressure Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	0.02%	PASS	Max. Non Linearity	0.05%	PASS
Calibration Error	0.16%	PASS	Calibration Error	0.12%	PASS

<b>X-Inclinometer Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.50%	PASS
Calibration Error	N/A	N/A	Calibration Error	1.00%	PASS

<b>Y-Inclinometer Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.58%	PASS
Calibration Error	N/A	N/A	Calibration Error	1.17%	PASS

<b>Seismic Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Trigger Delay Error	N/A	N/A	Trigger Delay Error	0.01%	PASS

<b>Temperature Calibration</b>					
Full Scale Error	0.10%	PASS			

<b>Channel</b>	<b>Cold</b>	<b>Room</b>	<b>Hot</b>	<b>Units</b>
Ref_Temp	5.9	22.1	42.7	°C
Tip	0.081	-0.051	0.006	bar
Sleeve	-0.026	-0.021	-0.014	bar
Pressure	1.068	1.066	1.061	bar
Temperature	5.832	22.049	42.627	°C

Tip Temperature Coefficient	-0.002 bar/°C	PASS
Sleeve Temperature Coefficient	0.000 bar/°C	PASS
Pressure Temperature Coefficient	0.000 bar/°C	PASS



**Testing Equipment Details**

Testing Machines	Model Number	Serial Number	Calibration Number	Due Date
Tip Load Cell	Precision	P-10289	100490	2025-09-18
Sleeve Load Cell	Precision	P-10868	100579	2025-10-01
Digital Loadcell Indicator	4215	62140	100490	2024-07-18
Fluke Reference Pressure Monitor	RPM4 A10Ms	3061	100214	2024-01-05
Tektronix Function Generator	AFG1022	1820013	100167	2023-11-06
Thermometer	THS-222-555	D23255834	100410	2024-07-11
Thermometer	THS-222-555	D23255829	100410	2024-07-11
Thermometer	THS-222-555	D20345575	100565	2024-07-14

**Adara Error Definitions**

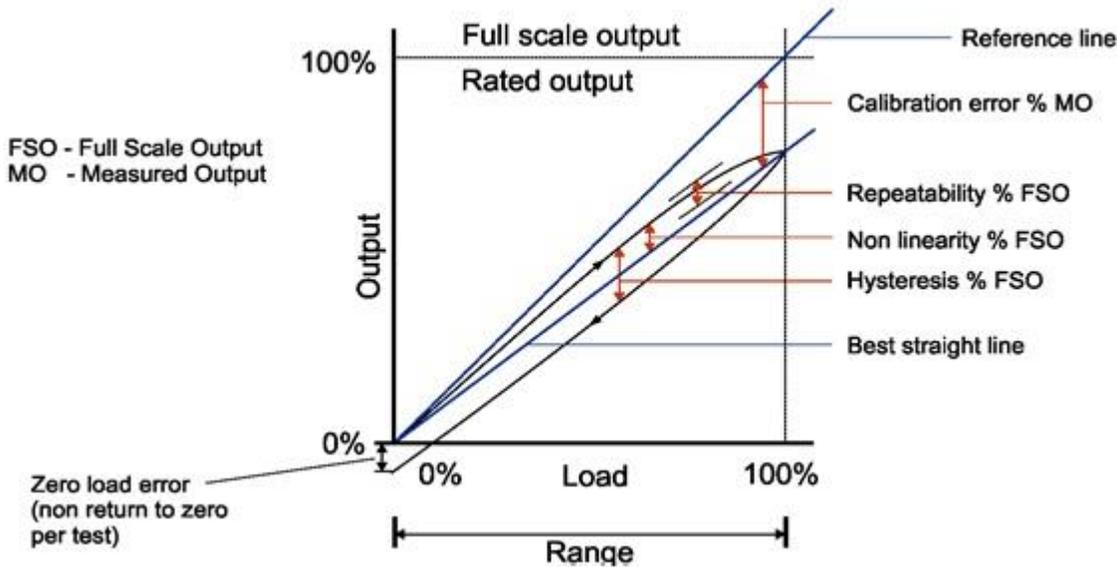


Figure 1: Definition of Calibration Terms for Load Cell and Transducers (Adapted from [1])

Actual Sensitivity	The slope of the best fit line through all data points starting at zero load.
Slope Error	The error in the best fit line compared to the ideal linear calibration in % . Slope Error = (Best Fit Slope - Ideal Slope) / Ideal Slope
Maximum Non Linearity	This value represents the maximum error (absolute value) relative to the best fit line considering each calibration point starting at loads greater than approximately 10% of FSO. The reported errors are a percent error of FSO. Adara's Pass/Fail criteria is 0.5% of FSO (ASTM is 0.5% of FSO at loads > 20% FSO).
Calibration Error	This value represents the maximum error (absolute value) in the recorded load value as compared to the actual load value for each calibration point for loads greater than approximately 10% of FSO. Adara's Pass/Fail criteria for the tip and sleeve is 0.5% of MO and 1.0% of MO for the pore pressure (ASTM for the tip and sleeve is 1.5% and 1.0% of MO respectively at loads greater than 20% of FSO)

**Temperature Check Passing Criteria**

Tip Temperature Coefficient	<0.200 bar/°C
Sleeve Temperature Coefficient	<0.005 bar/°C
Pressure Temperature Coefficient	<0.0196 bar/°C

**ASTM D5778-20 Annex A Summary [1]**

A1.4 Force Transducer Calibration Requirements

A1.4.1 states the following limits:

Non Linearity	Tip	≤ +0.5% of FSO
	Sleeve	≤ +1.0% of FSO
Calibration Error	Tip	≤ +1.5% of MO at loads > 20% FSO
	Sleeve	≤ +1.0% of MO at loads > 20% FSO

A1.5 Pressure Transducer Calibrations

A1.5.1 limits:

Non Linearity	Pore Pressure	≤ +1.0% of FSO
Calibration Error	Pore Pressure	not specified

**ISO 22476 -1:2012 Summary [2]**

Section 5.2 states the following allowable minimum accuracy

Class 1	Cone Resistance	35 kPa or 5%
	Sleeve Friction	5 kPa or 10%
	Pore Pressure	10 kPa or 2%
Class 2	Cone Resistance	100 kPa or 5%
	Sleeve Friction	15 kPa or 15%
	Pore Pressure	25 kPa or 3%

Note: ISO Compliance is based on low end calibration only.

**References**

[1] ASTM D5778-20. "Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils". ASTM, West Conshohocken, PA, USA.

[2] ISO 22476-1:2012. "Geotechnical investigation and testing - Field Testing - Part 1: Electrical cone and piezocone penetration test". ISO, Geneva, Switzerland.

ASTM D7400-08. "Standard Test Methods for Downhole Seismic Testing". ASTM, West Conshohocken, PA, USA.



## CERTIFICATE OF CALIBRATION

Calibration Information			
Cone Serial Number	EC767	Model	A10 T1000 F10 U35
Date	2024-02-13	Signature	
Technician Performing Calibration	Richard Chen		
Calibration Approved By	Vishrut Khunt	Signature	

Lab Condition	As Found	As Left		
Lab Temperature	N/A	23°C		
Lab Humidity	N/A	31%	Reason for Calibration	Repair

Cone Information				
Tip Stress Limit	1000	bar	Tip End Area	10 cm <sup>2</sup>
Friction Stress Limit	10	bar	Friction Surface Area	150 cm <sup>2</sup>
Pressure Limit	35	bar	RTD Location	Pressure Carrier
X-Inclinometer Limit	30	degrees	Geophone	X
Y-Inclinometer Limit	30	degrees	Temperature Range	-20°C to 60°C

### Baseline Summary: (For Reference Only)

Channel	Units	As Found	As Left
Tip	bar	-2.189	0.016
Sleeve	bar	-0.041	-0.018
Pressure	bar	1.033	1.009
X-Inclinometer	degrees	-0.525	0.000
Y-Inclinometer	degrees	-0.325	0.045
Temperature	°C	22.710	22.505

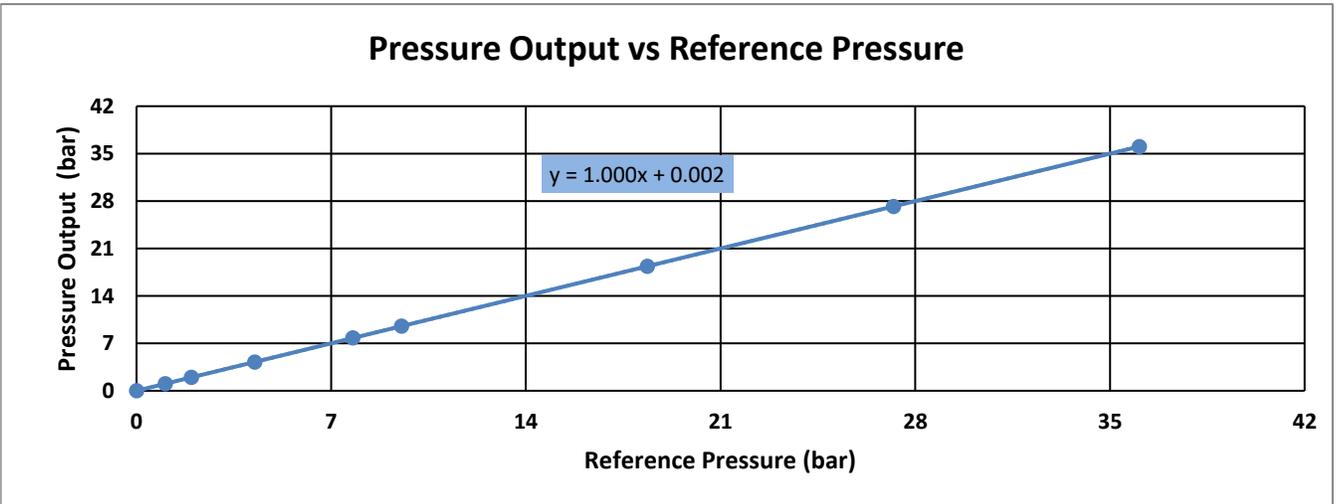
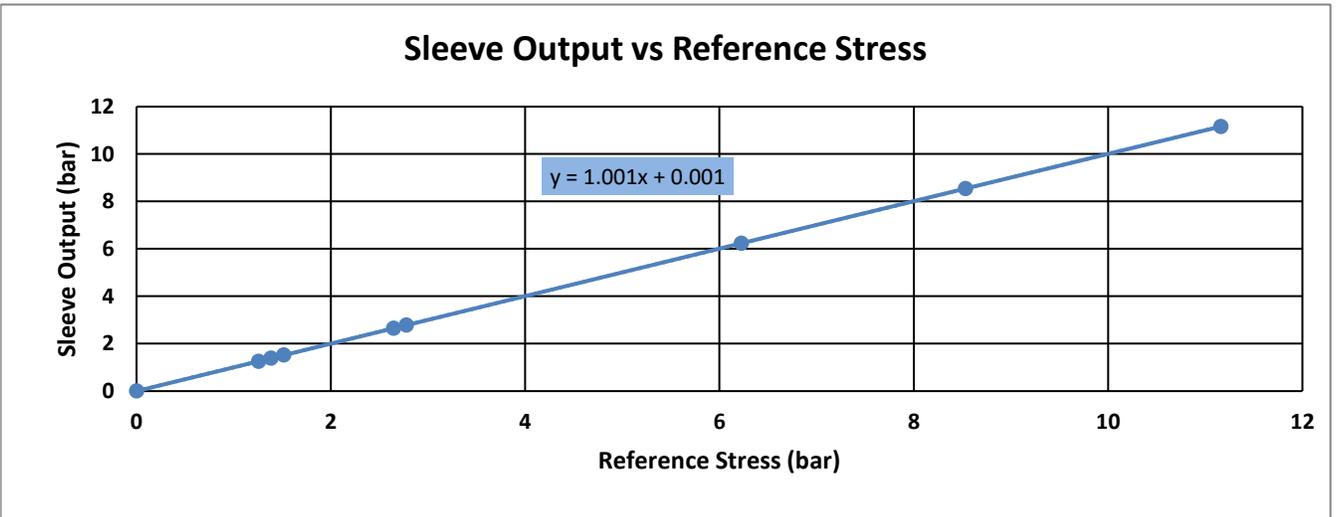
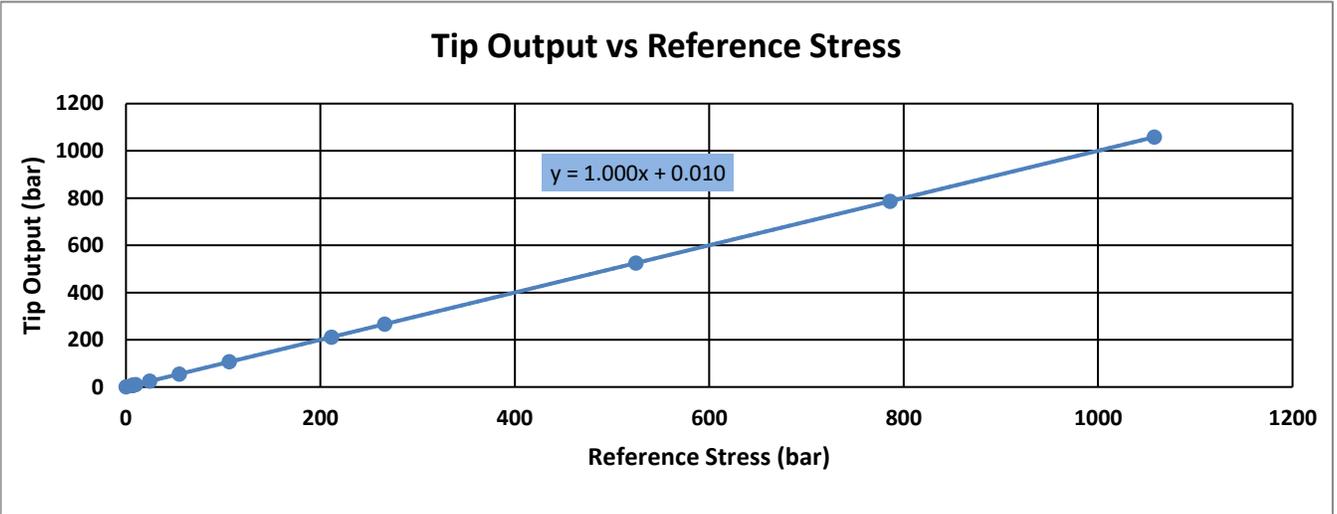
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*Calibrated in general accordance with the ASTM D5778-20 and D7400-08 standards*

*Calibrated with Adara calibration procedure EC\_CPTCAL-2.2*

*Collective uncertainty of the measurement standards conforms to a test uncertainty ratio (TUR) of 3:1 for tip and sleeve measurement and 4:1 for pressure measurement with a confidence level k=2*

**Cone Output vs Reference Stress/Pressure Plots**





**Calibration Results**

<b>Tip Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	0.09%	PASS	Max. Non Linearity	0.04%	PASS
Calibration Error	0.12%	PASS	Calibration Error	0.04%	PASS

<b>Sleeve Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	0.20%	PASS	Max. Non Linearity	0.10%	PASS
Calibration Error	0.69%	FAIL	Calibration Error	0.18%	PASS

<b>Pressure Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	2.97%	FAIL	Max. Non Linearity	0.02%	PASS
Calibration Error	0.17%	PASS	Calibration Error	0.06%	PASS

<b>X-Inclinometer Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.42%	PASS
Calibration Error	N/A	N/A	Calibration Error	0.83%	PASS

<b>Y-Inclinometer Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.79%	PASS
Calibration Error	N/A	N/A	Calibration Error	1.58%	PASS

<b>Seismic Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Trigger Delay Error	N/A	N/A	Trigger Delay Error	0.01%	PASS

<b>Temperature Calibration</b>					
Full Scale Error	0.19%	PASS			

<b>Channel</b>	<b>Cold</b>	<b>Room</b>	<b>Hot</b>	<b>Units</b>
Ref_Temp	2.1	21.5	42.3	°C
Tip	-1.318	-0.145	2.128	bar
Sleeve	-0.026	-0.018	0.022	bar
Pressure	1.007	1.059	1.097	bar
Temperature	2.065	21.318	42.271	°C

Tip Temperature Coefficient	0.086 bar/°C	PASS
Sleeve Temperature Coefficient	0.001 bar/°C	PASS
Pressure Temperature Coefficient	0.002 bar/°C	PASS



**Testing Equipment Details**

Testing Machines	Model Number	Serial Number	Calibration Number	Due Date
Tip Load Cell	Precision	P-10289	100490	2025-09-18
Sleeve Load Cell	Precision	P-10868	100579	2025-10-01
Digital Loadcell Indicator	4215	62140	100490	2024-07-18
Fluke Reference Pressure Monitor	RPM4 A10Ms	3910	100835	2024-12-12
Tektronix Function Generator	AFG3021B	C030955	100751	2024-10-20
Thermometer	THS-222-555	D23255834	100410	2024-07-11
Thermometer	THS-222-555	D23255829	100410	2024-07-11
Thermometer	THS-222-555	D20345575	100565	2024-07-14

**Adara Error Definitions**

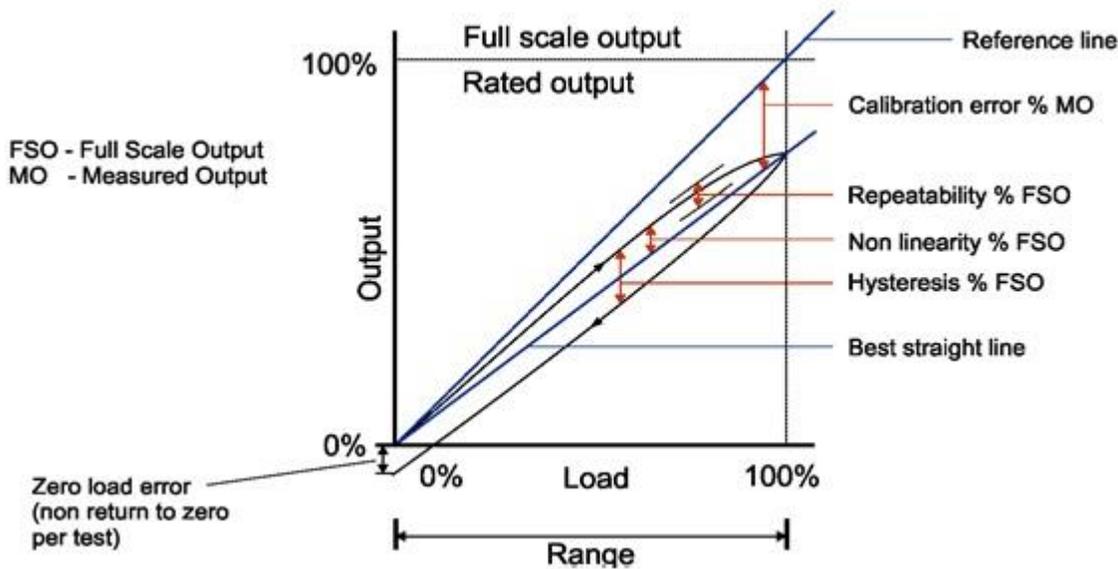


Figure 1: Definition of Calibration Terms for Load Cell and Transducers (Adapted from [1])

Actual Sensitivity	The slope of the best fit line through all data points starting at zero load.
Slope Error	The error in the best fit line compared to the ideal linear calibration in % . Slope Error = (Best Fit Slope - Ideal Slope) / Ideal Slope
Maximum Non Linearity	This value represents the maximum error (absolute value) relative to the best fit line considering each calibration point starting at loads greater than approximately 10% of FSO. The reported errors are a percent error of FSO. Adara's Pass/Fail criteria is 0.5% of FSO (ASTM is 0.5% of FSO at loads > 20% FSO).
Calibration Error	This value represents the maximum error (absolute value) in the recorded load value as compared to the actual load value for each calibration point for loads greater than approximately 10% of FSO. Adara's Pass/Fail criteria for the tip and sleeve is 0.5% of MO and 1.0% of MO for the pore pressure (ASTM for the tip and sleeve is 1.5% and 1.0% of MO respectively at loads greater than 20% of FSO)

**Temperature Check Passing Criteria**

Tip Temperature Coefficient	<0.200 bar/°C
Sleeve Temperature Coefficient	<0.005 bar/°C
Pressure Temperature Coefficient	<0.0196 bar/°C

**ASTM D5778-20 Annex A Summary [1]**

A1.4 Force Transducer Calibration Requirements

A1.4.1 states the following limits:

Non Linearity	Tip	$\leq +0.5\%$ of FSO
	Sleeve	$\leq +1.0\%$ of FSO
Calibration Error	Tip	$\leq +1.5\%$ of MO at loads > 20% FSO
	Sleeve	$\leq +1.0\%$ of MO at loads > 20% FSO

A1.5 Pressure Transducer Calibrations

A1.5.1 limits:

Non Linearity	Pore Pressure	$\leq +1.0\%$ of FSO
Calibration Error	Pore Pressure	not specified

**ISO 22476 -1:2012 Summary [2]**

Section 5.2 states the following allowable minimum accuracy

Class 1	Cone Resistance	35 kPa or 5%
	Sleeve Friction	5 kPa or 10%
	Pore Pressure	10 kPa or 2%
Class 2	Cone Resistance	100 kPa or 5%
	Sleeve Friction	15 kPa or 15%
	Pore Pressure	25 kPa or 3%

Note: ISO Compliance is based on low end calibration only.

**References**

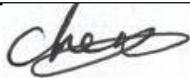
[1] ASTM D5778-20. "Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils". ASTM, West Conshohocken, PA, USA.

[2] ISO 22476-1:2012. "Geotechnical investigation and testing - Field Testing - Part 1: Electrical cone and piezocone penetration test". ISO, Geneva, Switzerland.

ASTM D7400-08. "Standard Test Methods for Downhole Seismic Testing". ASTM, West Conshohocken, PA, USA.



## CERTIFICATE OF CALIBRATION

Calibration Information			
Cone Serial Number	EC1007	Model	A15 T1500 F15 U35
Date	2023-11-24	Signature	
Technician Performing Calibration	Richard Chen	Signature	
Calibration Approved By	Vishrut Khunt	Signature	

Lab Condition	As Found	As Left		
Lab Temperature	N/A	22°C		
Lab Humidity	N/A	30%	Reason for Calibration	Repair

Cone Information				
Tip Stress Limit	1500	bar	Tip End Area	15 cm <sup>2</sup>
Friction Stress Limit	15	bar	Friction Surface Area	225 cm <sup>2</sup>
Pressure Limit	35	bar	RTD Location	Pressure Carrier
X-Inclinometer Limit	30	degrees	Geophone	X and Z
Y-Inclinometer Limit	30	degrees	Temperature Range	-20°C to 60°C

### Baseline Summary: (For Reference Only)

Channel	Units	As Found	As Left
Tip	bar	17.464	0.164
Sleeve	bar	0.189	-0.014
Pressure	bar	1.080	1.009
X-Inclinometer	degrees	-3.760	0.025
Y-Inclinometer	degrees	0.575	0.000
Temperature	°C	22.381	21.603

*Classified in accordance with ISO 22476-1:2012 Class 1*

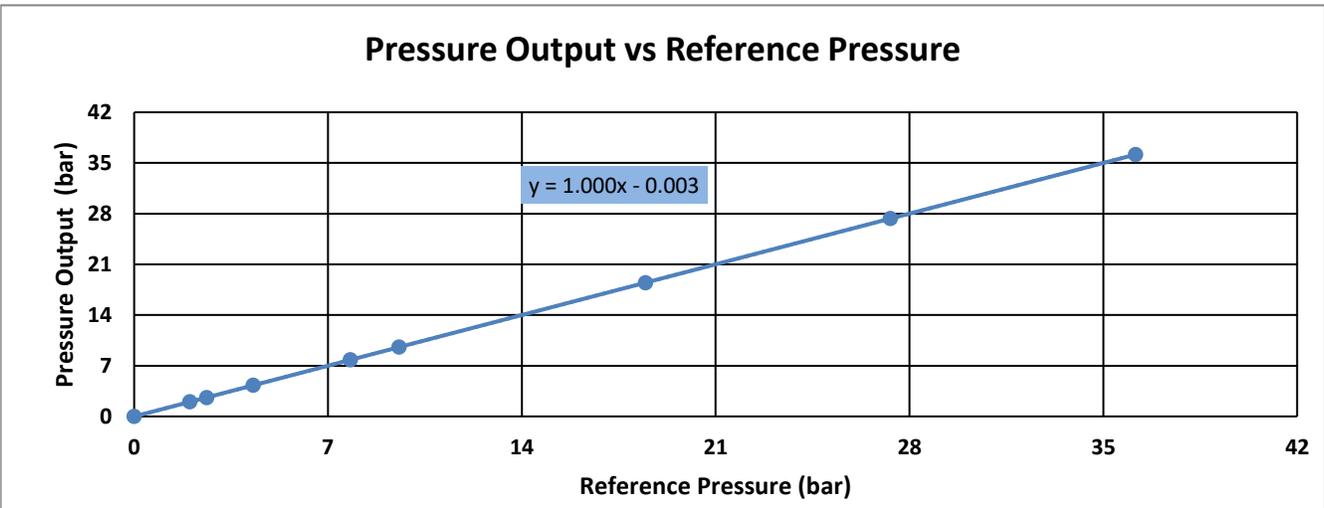
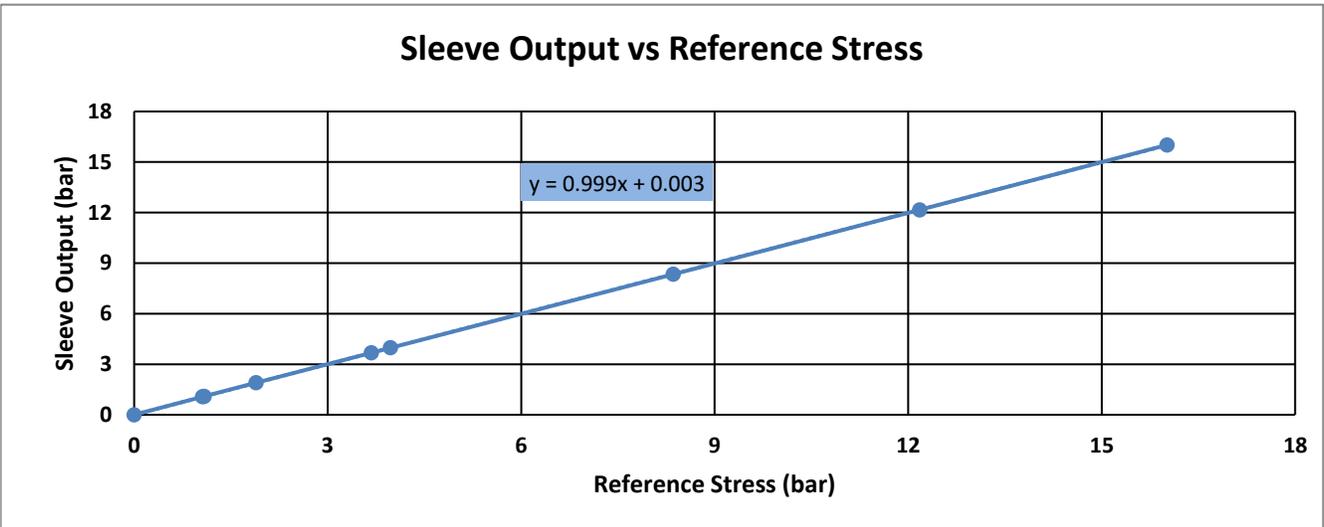
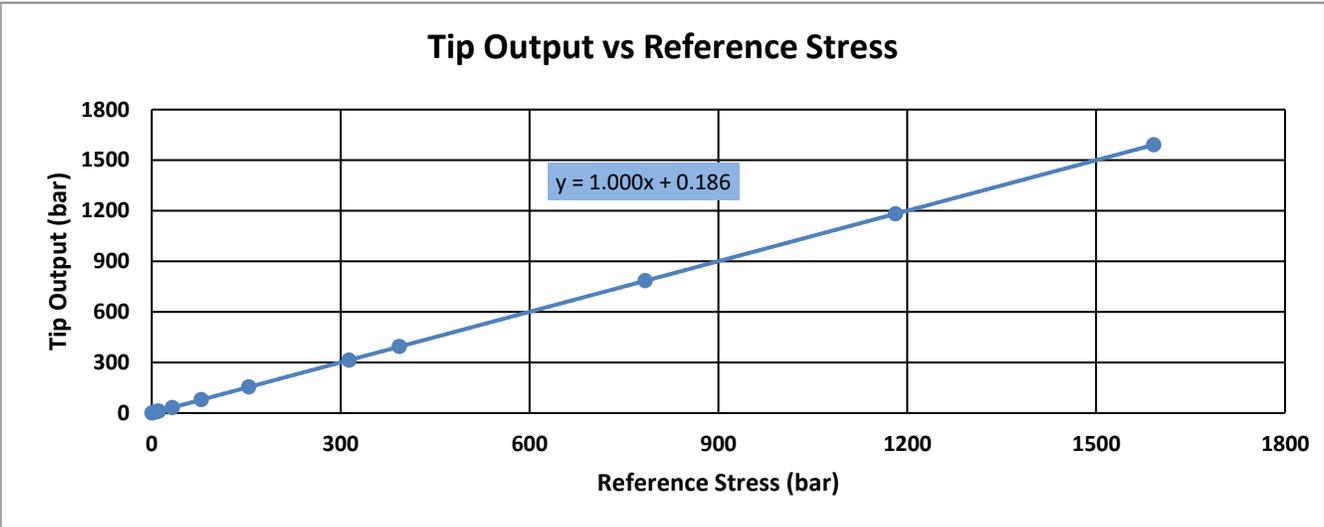
*Classified in accordance with ISO 22476-1:2012 Class 2*

*Calibrated in general accordance with the ASTM D5778-20 and D7400-08 standards*

*Calibrated with Adara calibration procedure EC\_CPTCAL-2.1*

*Collective uncertainty of the measurement standards conforms to a test uncertainty ratio (TUR) of 3:1 for tip and sleeve measurement and 4:1 for pressure measurement with a confidence level k=2*

**Cone Output vs Reference Stress/Pressure Plots**





**Calibration Results**

<b>Tip Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	0.06%	PASS	Max. Non Linearity	0.05%	PASS
Calibration Error	0.12%	PASS	Calibration Error	0.16%	PASS

<b>Sleeve Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	0.09%	PASS	Max. Non Linearity	0.14%	PASS
Calibration Error	0.71%	FAIL	Calibration Error	0.42%	PASS

<b>Pressure Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	0.01%	PASS	Max. Non Linearity	0.03%	PASS
Calibration Error	0.07%	PASS	Calibration Error	0.11%	PASS

<b>X-Inclinometer Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.71%	PASS
Calibration Error	N/A	N/A	Calibration Error	1.42%	PASS

<b>Y-Inclinometer Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Max. Non Linearity	N/A	N/A	Max. Non Linearity	-0.75%	PASS
Calibration Error	N/A	N/A	Calibration Error	1.50%	PASS

<b>Seismic Calibration</b>					
<b>As Found</b>			<b>As Left</b>		
Trigger Delay Error	N/A	N/A	Trigger Delay Error	0.01%	PASS

<b>Temperature Calibration</b>					
Full Scale Error	0.25%	PASS			

<b>Channel</b>	<b>Cold</b>	<b>Room</b>	<b>Hot</b>	<b>Units</b>
Ref_Temp	4.3	22.1	43.4	°C
Tip	-1.703	-0.065	1.990	bar
Sleeve	-0.045	-0.011	0.029	bar
Pressure	1.058	1.068	1.062	bar
Temperature	4.371	21.852	43.356	°C

Tip Temperature Coefficient	0.095 bar/°C	PASS
Sleeve Temperature Coefficient	0.002 bar/°C	PASS
Pressure Temperature Coefficient	0.000 bar/°C	PASS



**Testing Equipment Details**

Testing Machines	Model Number	Serial Number	Calibration Number	Due Date
Tip Load Cell	Precision	P-10289	100490	2025-09-18
Sleeve Load Cell	Precision	P-10868	100579	2025-10-01
Digital Loadcell Indicator	4215	62140	100490	2024-07-18
Fluke Reference Pressure Monitor	RPM4 A10Ms	3061	100214	2024-01-05
Tektronix Function Generator	AFG3021B	C030955	100751	2024-10-20
Thermometer	THS-222-555	D23255834	100410	2024-07-11
Thermometer	THS-222-555	D23255829	100410	2024-07-11
Thermometer	THS-222-555	D20345575	100565	2024-07-14

**Adara Error Definitions**

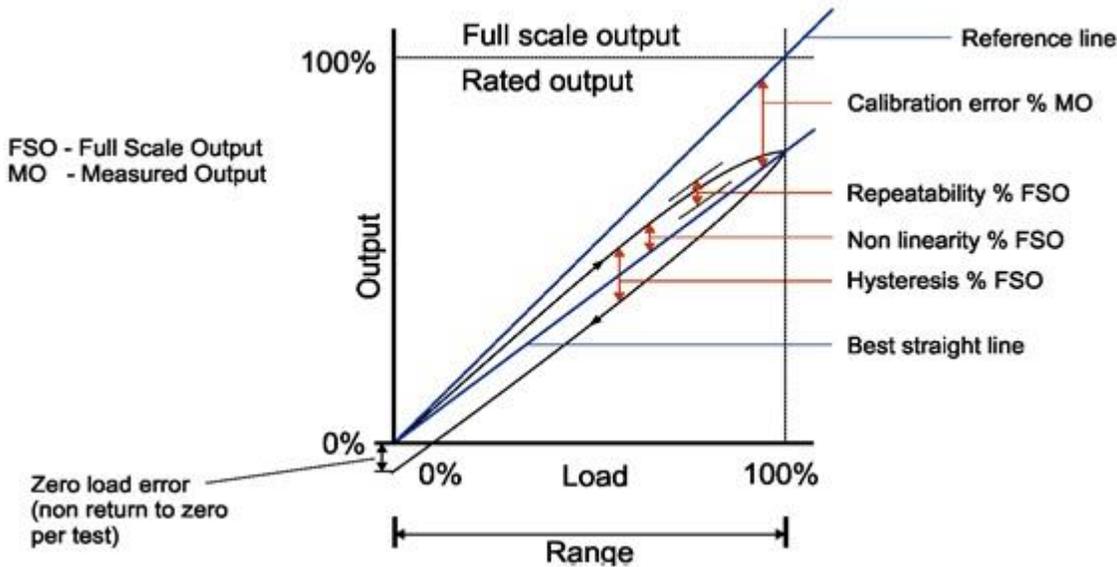


Figure 1: Definition of Calibration Terms for Load Cell and Transducers (Adapted from [1])

Actual Sensitivity	The slope of the best fit line through all data points starting at zero load.
Slope Error	The error in the best fit line compared to the ideal linear calibration in % . Slope Error = (Best Fit Slope - Ideal Slope) / Ideal Slope
Maximum Non Linearity	This value represents the maximum error (absolute value) relative to the best fit line considering each calibration point starting at loads greater than approximately 10% of FSO. The reported errors are a percent error of FSO. Adara's Pass/Fail criteria is 0.5% of FSO (ASTM is 0.5% of FSO at loads > 20% FSO).
Calibration Error	This value represents the maximum error (absolute value) in the recorded load value as compared to the actual load value for each calibration point for loads greater than approximately 10% of FSO. Adara's Pass/Fail criteria for the tip and sleeve is 0.5% of MO and 1.0% of MO for the pore pressure (ASTM for the tip and sleeve is 1.5% and 1.0% of MO respectively at loads greater than 20% of FSO)

**Temperature Check Passing Criteria**

Tip Temperature Coefficient	<0.200 bar/°C
Sleeve Temperature Coefficient	<0.005 bar/°C
Pressure Temperature Coefficient	<0.0196 bar/°C

**ASTM D5778-20 Annex A Summary [1]**

A1.4 Force Transducer Calibration Requirements

A1.4.1 states the following limits:

Non Linearity	Tip	$\leq +0.5\%$ of FSO
	Sleeve	$\leq +1.0\%$ of FSO
Calibration Error	Tip	$\leq +1.5\%$ of MO at loads $> 20\%$ FSO
	Sleeve	$\leq +1.0\%$ of MO at loads $> 20\%$ FSO

A1.5 Pressure Transducer Calibrations

A1.5.1 limits:

Non Linearity	Pore Pressure	$\leq +1.0\%$ of FSO
Calibration Error	Pore Pressure	not specified

**ISO 22476 -1:2012 Summary [2]**

Section 5.2 states the following allowable minimum accuracy

Class 1	Cone Resistance	35 kPa or 5%
	Sleeve Friction	5 kPa or 10%
	Pore Pressure	10 kPa or 2%
Class 2	Cone Resistance	100 kPa or 5%
	Sleeve Friction	15 kPa or 15%
	Pore Pressure	25 kPa or 3%

Note: ISO Compliance is based on low end calibration only.

**References**

[1] ASTM D5778-20. "Standard Test Method for Electronic Friction Cone and Piezocone Penetration Testing of Soils". ASTM, West Conshohocken, PA, USA.

[2] ISO 22476-1:2012. "Geotechnical investigation and testing - Field Testing - Part 1: Electrical cone and piezocone penetration test". ISO, Geneva, Switzerland.

ASTM D7400-08. "Standard Test Methods for Downhole Seismic Testing". ASTM, West Conshohocken, PA, USA.

FINAL

# Attachment B-4

## Geotechnical Laboratory Reports

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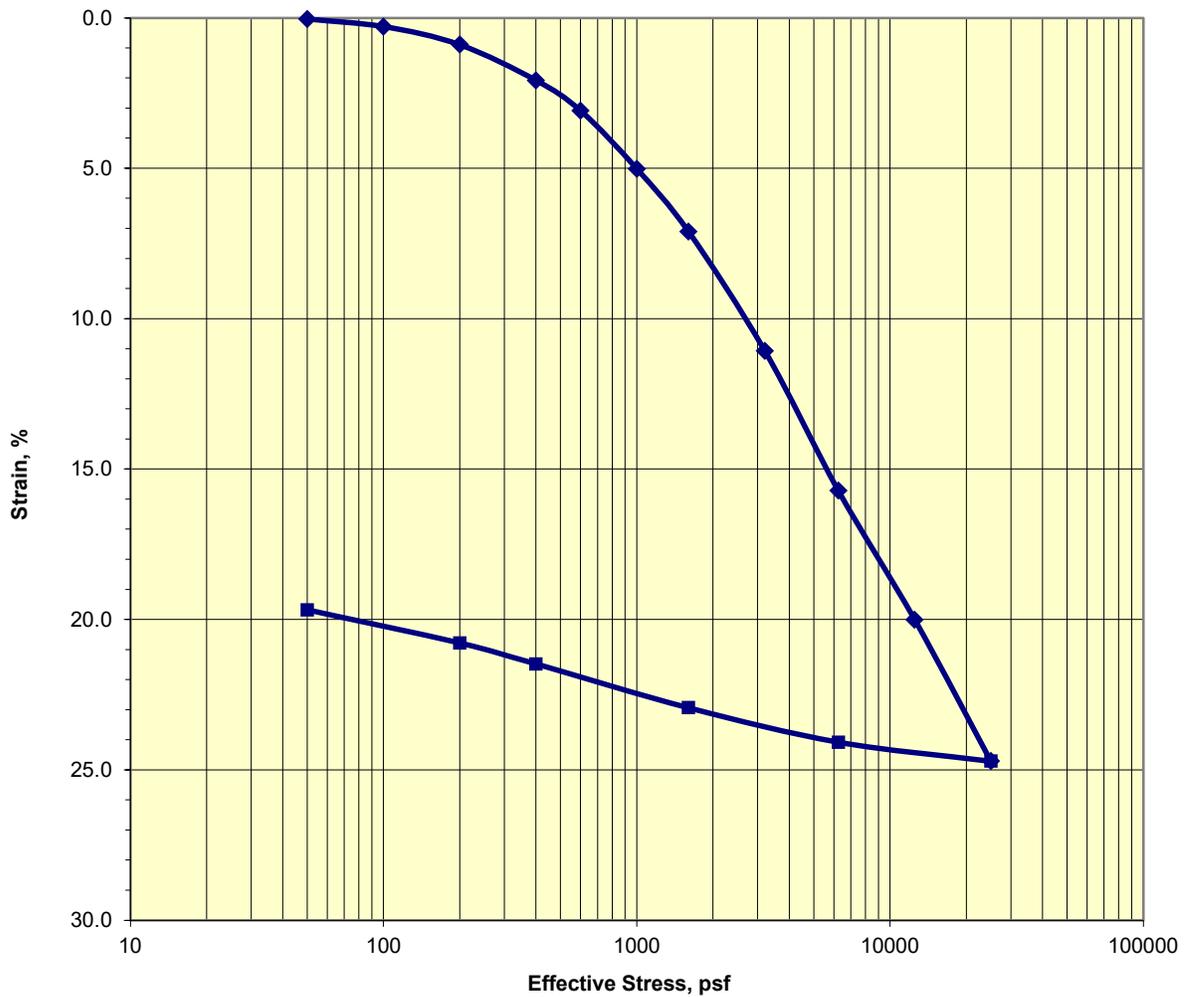


# Consolidation Test

## ASTM D2435

Job No.: 1007-006	Boring: GT-02	Run By: HM
Client: Anchor QEA	Sample:	Reduced: RU
Project: 210075-01.03	Depth, ft.: 12-14.5(Tip-4")	Checked: PJ
Soil Type: Dark Gray CLAY (Bay Mud)		Date: 11/25/2024

### Strain-Log-P Curve



Assumed Gs	2.7	Initial	Final	Remarks:
Moisture %:		52.7	37.8	
Dry Density, pcf:		67.1	83.4	
Void Ratio:		1.513	1.021	
% Saturation:		94.0	100.0	

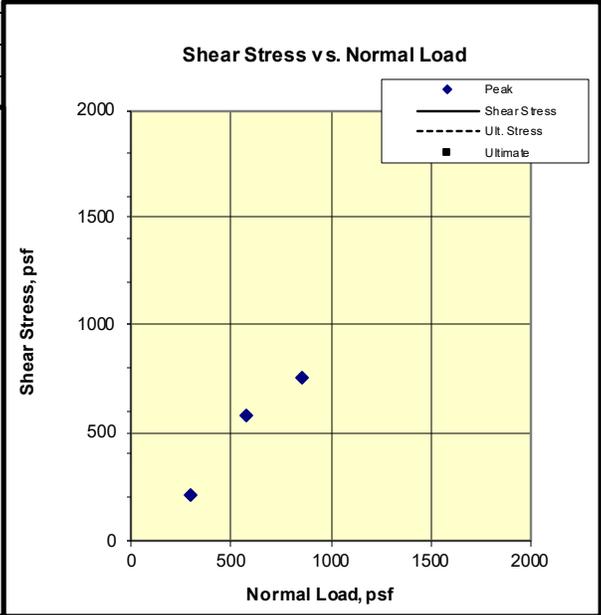
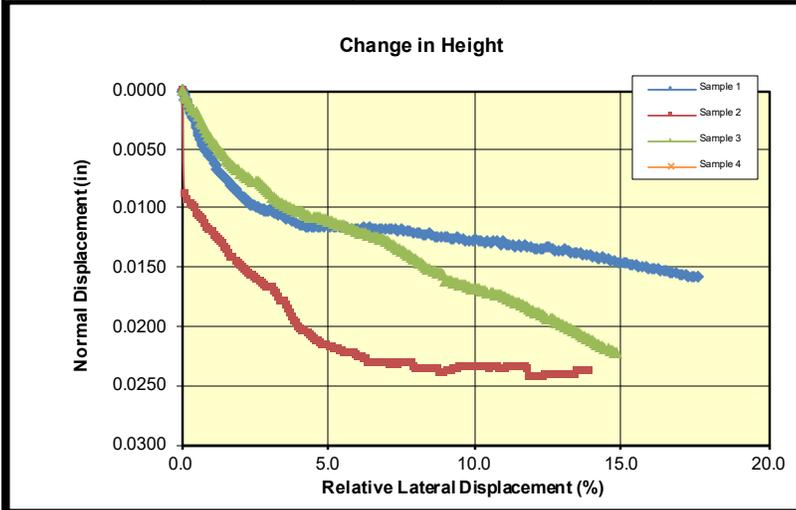
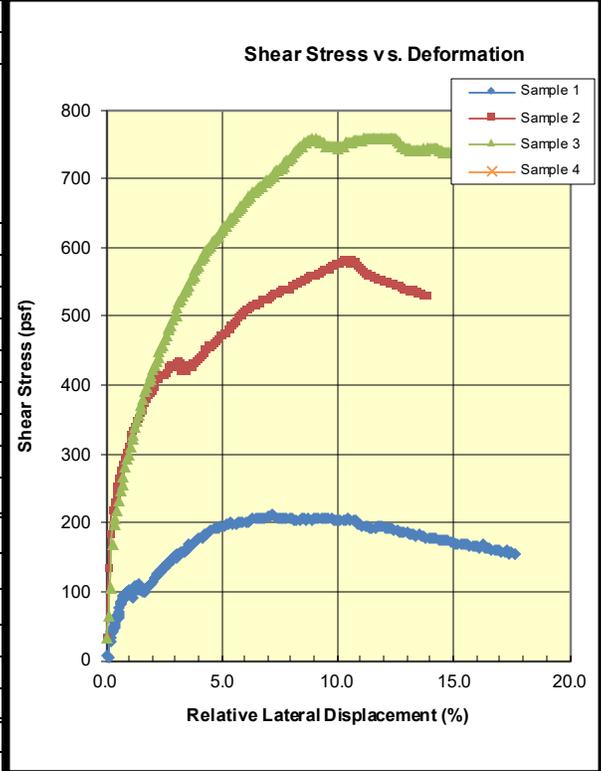


## Consolidated Drained Direct Shear (ASTM D3080)

CTL Job #: 1007-006 Project #: 210075-01-03 By: MD  
 Client: Anchor QEA Date: 2/13/2025 Checked: PJ  
 Project Name: Middle Reach of the Lower Dwamish Waterway Remolding Info: \_\_\_\_\_

Specimen Data			
	1	2	3
Boring:	LDW23-GT02-GT	LDW23-GT02-GT	LDW23-GT02-GT
Sample:			
Depth (ft):	12-14.5	12-14.5	12-14.5
Visual Description:	Dark Olive Gray Sandy SILT	Dark Olive Gray Sandy SILT	Dark Olive Gray Sandy SILT
Normal Load (psf)	290	570	850
Dry Mass of Specimen (g)	115.9	118.6	124.7
Initial Height (in)	1.00	1.00	1.00
Initial Diameter (in)	2.85	2.85	2.85
Initial Void Ratio	1.435	1.380	1.263
Initial Moisture (%)	49.5	50.5	46.0
Initial Wet Density (pcf)	103.5	106.6	108.8
Initial Dry Density (pcf)	69.2	70.8	74.5
Initial Saturation (%)	93.1	98.7	98.4
$\Delta$ Height Consol (in)	0.0234	0.0526	0.0531
At Test Void Ratio	1.378	1.255	1.143
At Test Moisture (%)	49.1	46.4	41.7
At Test Wet Density (pcf)	105.7	109.4	111.5
At Test Dry Density (pcf)	70.9	74.7	78.7
At Test Saturation (%)	96.2	99.8	98.6
Strain Rate (%/min)	0.01	0.01	0.01
Strengths Picked at	Peak	Peak	Peak
Shear Stress (psf)	212	581	759
$\Delta$ Height (in) at Peak	0.0118	0.0233	0.0156
Ultimate Stress (psf)			

Phi (deg)	Ult. Phi (deg)
Cohesion (psf)	Ult. Cohesion (psf)



Remarks: Engineering judgement is required to determine phi and cohesion, no phi or cohesion is reported. To add phi and cohesion to the report go to the "phi" tab and in cells G30, G31, H30, and H31 enter end points for a line through the 3 data points. The points plotted can be changed on the "Eng Values" tab using cells L6, A2,

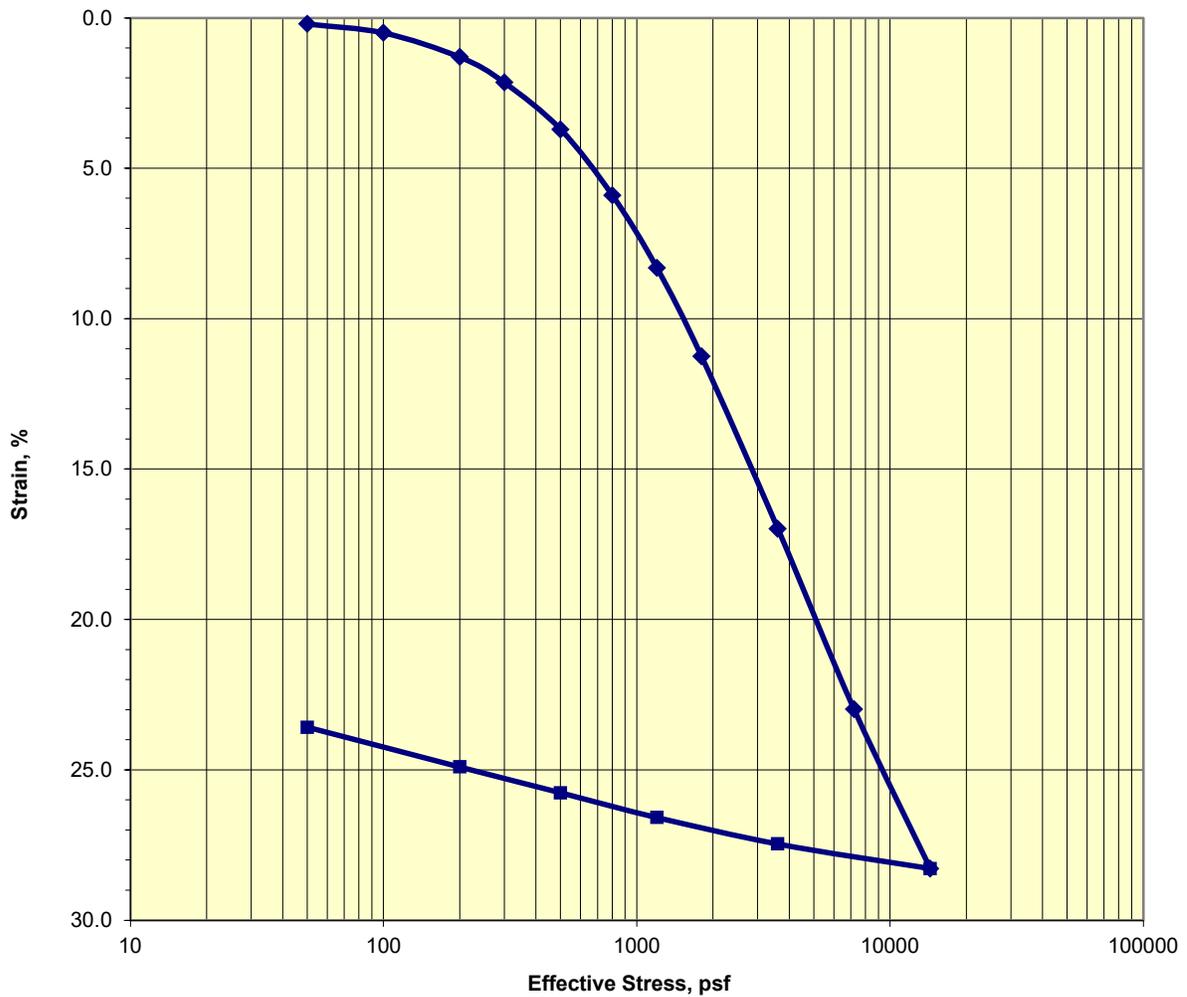


# Consolidation Test

## ASTM D2435

Job No.: 1007-006	Boring: GT-10	Run By: HM
Client: Anchor QEA	Sample:	Reduced: RU
Project: 210075-01.03	Depth, ft.: 7-9(Tip-4")	Checked: PJ
Soil Type: Dark Gray CLAY (Bay Mud)		Date: 11/26/2024

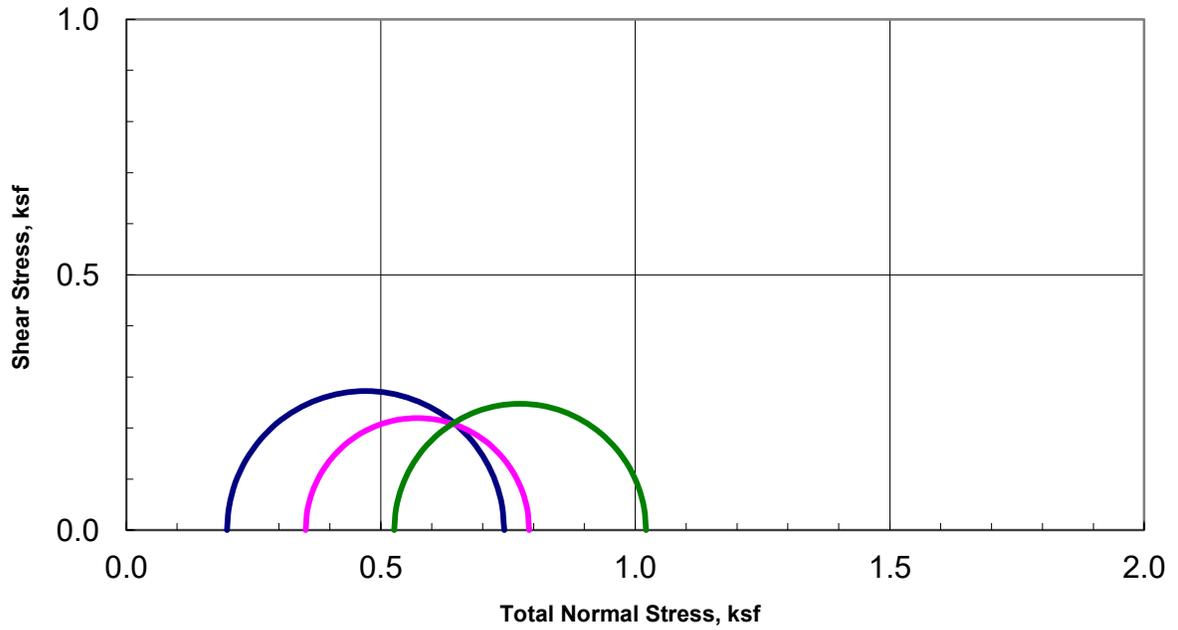
### Strain-Log-P Curve



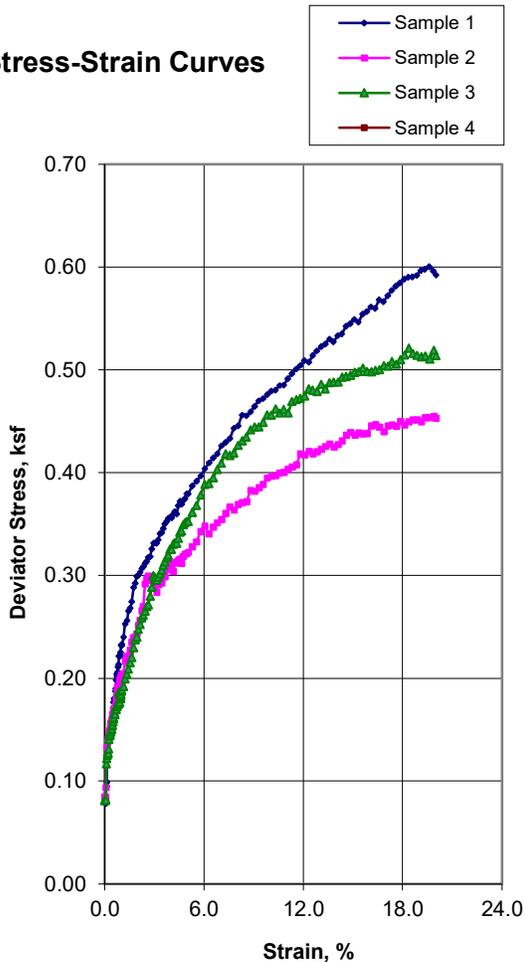
Assumed Gs	2.75	<b>Initial</b>	<b>Final</b>	<b>Remarks:</b>
Moisture %:		62.5	42.4	
Dry Density, pcf:		60.5	79.3	
Void Ratio:		1.839	1.166	
% Saturation:		93.5	100.0	



**Unconsolidated-Undrained Triaxial Test**  
 ASTM D2850



**Stress-Strain Curves**



**Sample Data**

	1	2	3	4
<b>Moisture %</b>	62.6	72.2	70.7	
<b>Dry Den,pcf</b>	60.1	54.7	57.6	
<b>Void Ratio</b>	1.804	2.080	1.928	
<b>Saturation %</b>	93.7	93.7	99.0	
<b>Height in</b>	6.00	6.00	5.60	
<b>Diameter in</b>	2.77	2.67	2.80	
<b>Cell psi</b>	1.4	2.4	3.7	
<b>Strain %</b>	15.00	15.00	15.00	
<b>Deviator, ksf</b>	0.545	0.439	0.495	
<b>Rate %/min</b>	1.00	1.00	1.00	
<b>in/min</b>	0.060	0.060	0.056	
<b>Job No.:</b>	<b>1007-006</b>			
<b>Client:</b>	<b>Anchor QEA</b>			
<b>Project:</b>	<b>210075.01.03</b>			
<b>Boring:</b>	LDW23_GT10_GT7-9	LDW23_GT10_GT7-9	LDW23_GT10_GT7-9	
<b>Sample:</b>				
<b>Depth ft:</b>				

**Visual Soil Description**

Sample #	Description
1	Black CLAY w/ organics
2	Black CLAY
3	Black CLAY w/ organics
4	

Remarks:

Note: Strengths are picked at the peak deviator stress or 15% strain which ever occurs first per ASTM D2850.

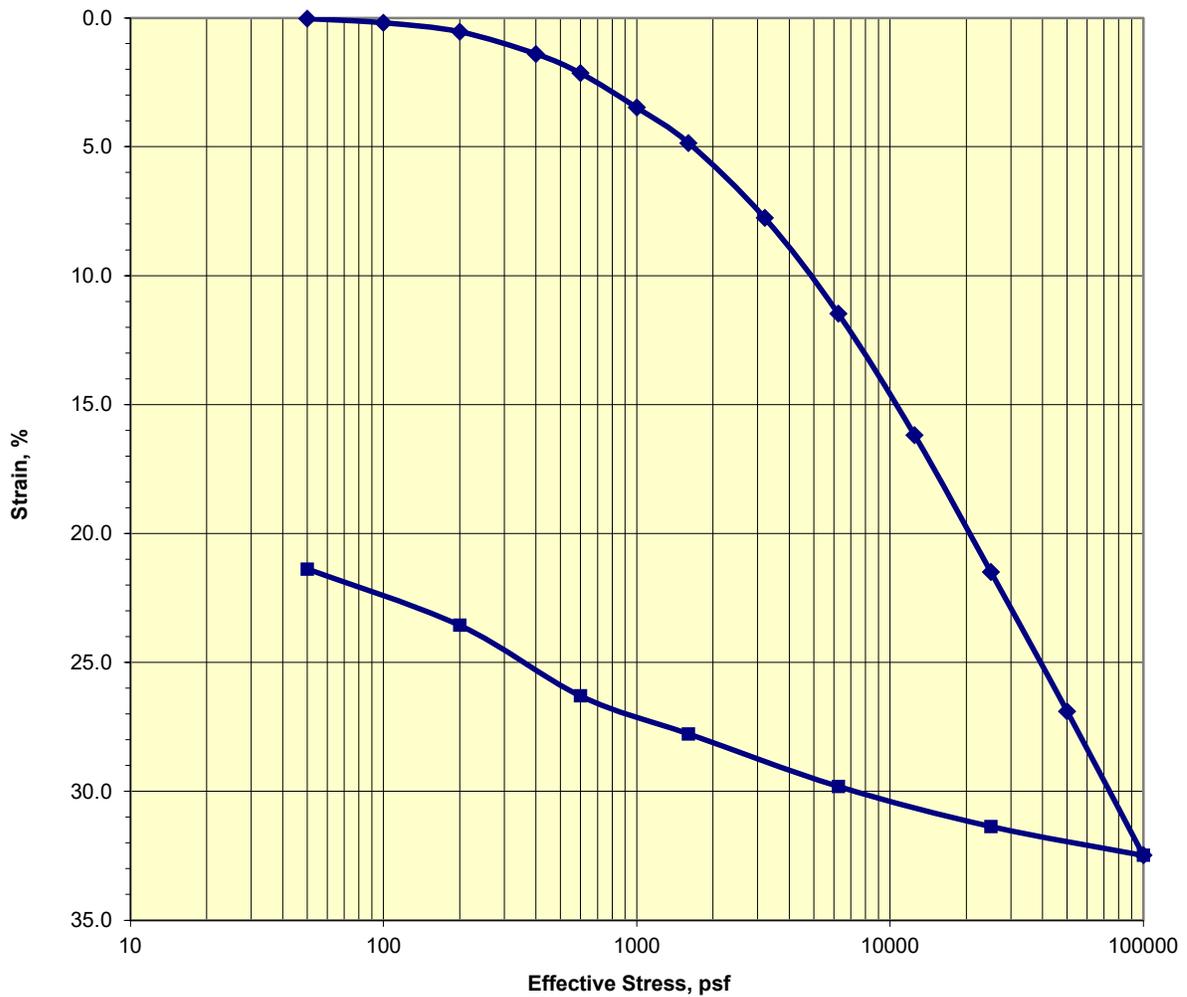


# Consolidation Test

## ASTM D2435

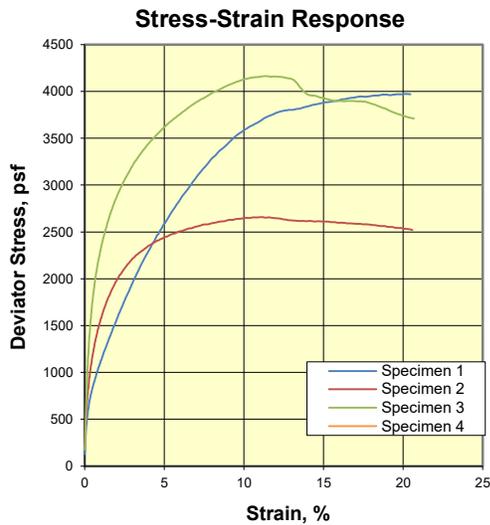
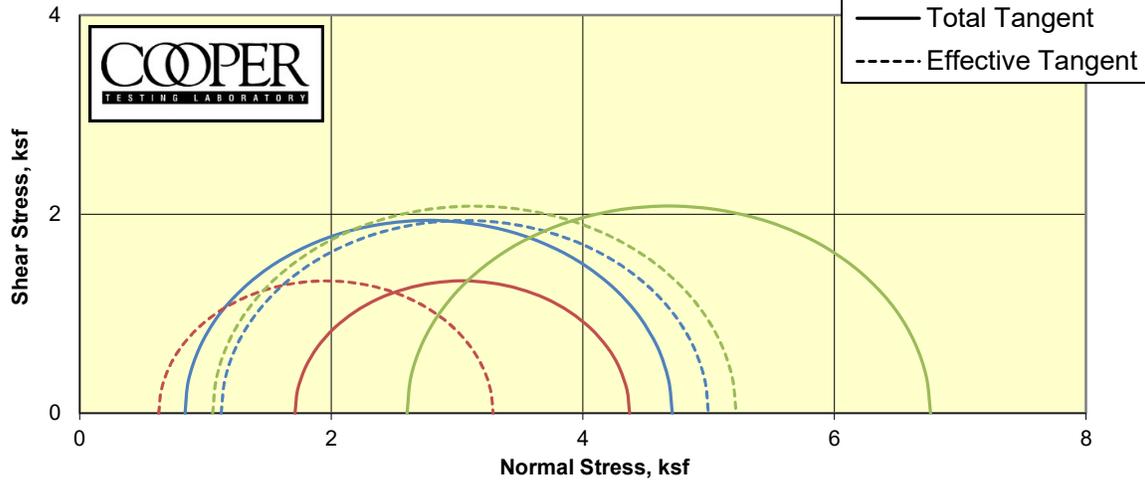
Job No.:	1007-006	Boring:	GT-13	Run By:	HM
Client:	Anchor QEA	Sample:		Reduced:	RU
Project:	210075-01.03	Depth, ft.:	26.5-29(Tip-4")	Checked:	PJ
Soil Type:	Gray CLAY (Bay Mud)	Date:	11/26/2024		

### Strain-Log-P Curve



Assumed Gs	2.65	<b>Initial</b>	<b>Final</b>	<b>Remarks:</b>
Moisture %:		56.6	38.7	
Dry Density, pcf:		64.2	81.7	
Void Ratio:		1.578	1.026	
% Saturation:		95.1	100.0	

**Consolidated Undrained Triaxial Compression with Pore Pressure  
ASTM D4767**



	Specimen 1	Specimen 2	Specimen 3	Specimen 4
<b>Boring</b>	LDW23-GT13-GT-26.5-29-20240801	LDW23-GT13-GT-26.5-29-20240801	LDW23-GT13-GT-26.5-29-20240801	
<b>Sample</b>				
<b>Depth</b>				
<b>Visual Description</b>	Black Silty SAND	Black Silty SAND	Black Silty SAND	
<b>MC (%)</b>	40.8	64.2	51.7	
<b>Dry Density (pcf)</b>	78.1	60.6	68.9	
<b>Saturation (%)</b>	98.4	99.3	99.1	
<b>Void Ratio</b>	1.079	1.680	1.355	
<b>Diameter (in)</b>	2.85	2.85	2.85	
<b>Height (in)</b>	5.81	6.00	6.00	
	<b>Final</b>			
<b>MC (%)</b>	40.2	59.6	47.9	
<b>Dry Density (pcf)</b>	79.4	63.7	72.3	
<b>Saturation (%)</b>	100.0	100.0	100.0	
<b>Void Ratio</b>	1.045	1.550	1.245	
<b>Diameter (in)</b>	2.85	2.82	2.83	
<b>Height (in)</b>	5.67	5.83	5.80	
<b>Cell Pressure (psi)</b>	55.8	61.8	67.7	
<b>Back Pressure (psi)</b>	49.9	49.9	49.7	
	<b>Effective Stresses At:</b>			
<b>Strain (%)</b>	15.0	11.1	11.4	
<b>Deviator (ksf)</b>	3.873	2.659	4.162	
<b>Excess PP (psi)</b>	-2.0	7.5	10.7	
<b>Sigma 1 (ksf)</b>	4.999	3.287	5.219	
<b>Sigma 3 (ksf)</b>	1.125	0.628	1.057	
<b>P (ksf)</b>	3.062	1.958	3.138	
<b>Q (ksf)</b>	1.937	1.329	2.081	
<b>Stress Ratio</b>	4.443	5.231	4.936	
<b>Rate (in/min)</b>	0.0005	0.0005	0.0005	

<b>CTL Number:</b>	1007-006		
<b>Client Name:</b>	Anchor QEA		
<b>Project Name:</b>	Middle Ranch of the Lower Duwamish Waterway		
<b>Project Number:</b>	210075-01.03		
<b>Date:</b>	12/2/2024	<b>By:</b>	MD/DC
<b>Total C</b>	ksf		
<b>Total phi</b>	degrees		
<b>Eff. C</b>	ksf		
<b>Eff. Phi</b>	degrees ©		

Remarks: The significant differences in dry density and moisture content between the points may impact the results. Engineering judgement is required to determine phi and cohesion, no phi or cohesion is reported. To add phi and cohesion to the report go to the "Report" tab and in cells M18 through P19 enter end points for a line through the Mohr's circles. The points plotted can be changed on the "Shear Values" tab using cells B3, F3, and J3.

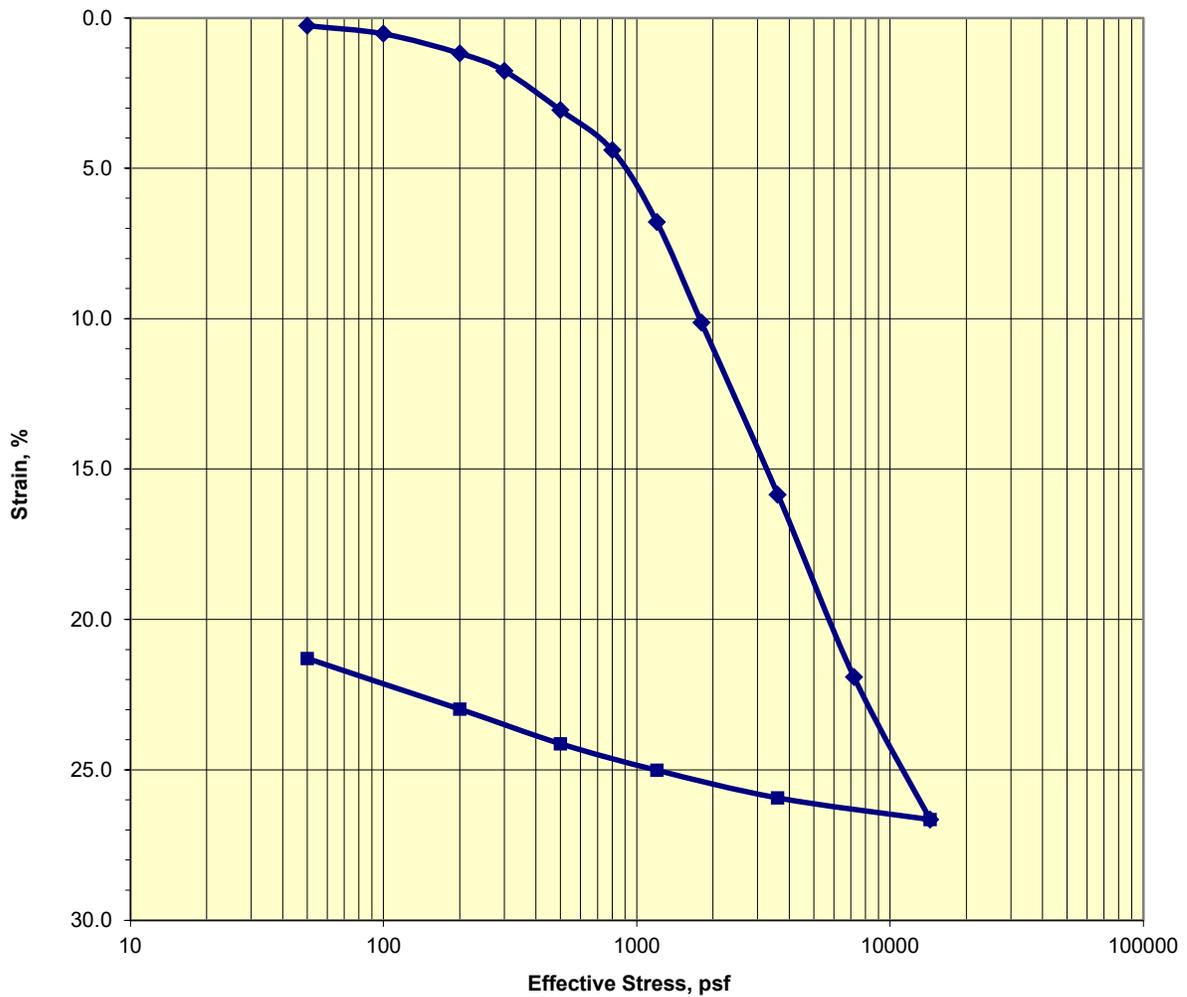


# Consolidation Test

## ASTM D2435

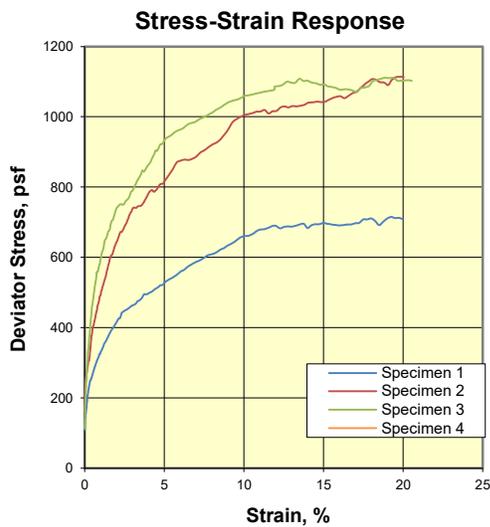
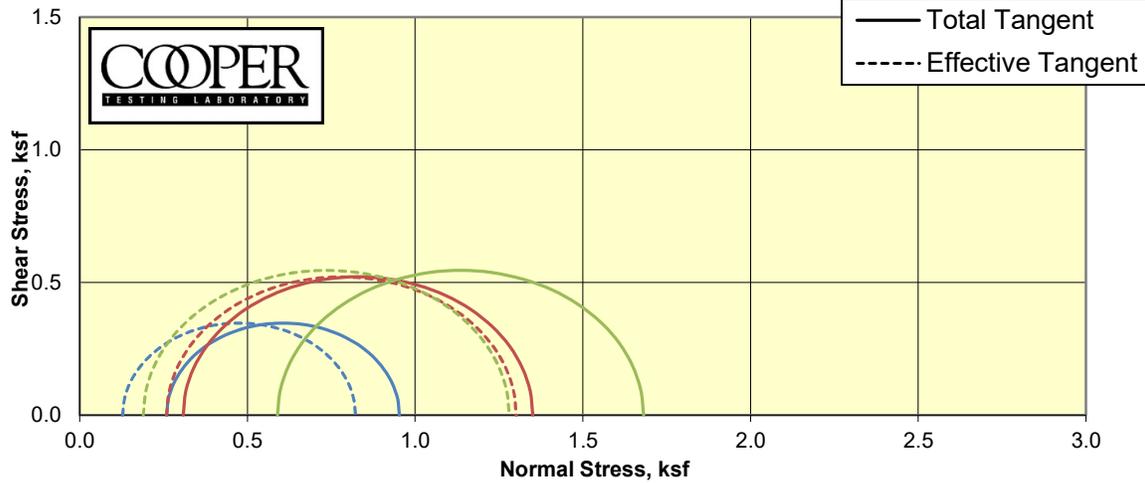
Job No.:	1007-006	Boring:	GT-17	Run By:	HM
Client:	Anchor QEA	Sample:		Reduced:	RU
Project:	210075-01.03	Depth, ft.:	2.5-5(Tip-4")	Checked:	PJ
Soil Type:	Dark Gray CLAY w/ organics (Bay Mud)			Date:	11/25/2024

### Strain-Log-P Curve



Assumed Gs	2.7	<b>Initial</b>	<b>Final</b>	<b>Remarks:</b>
Moisture %:		62.7	43.4	
Dry Density, pcf:		60.8	77.6	
Void Ratio:		1.771	1.173	
% Saturation:		95.5	100.0	

**Consolidated Undrained Triaxial Compression with Pore Pressure  
ASTM D4767**

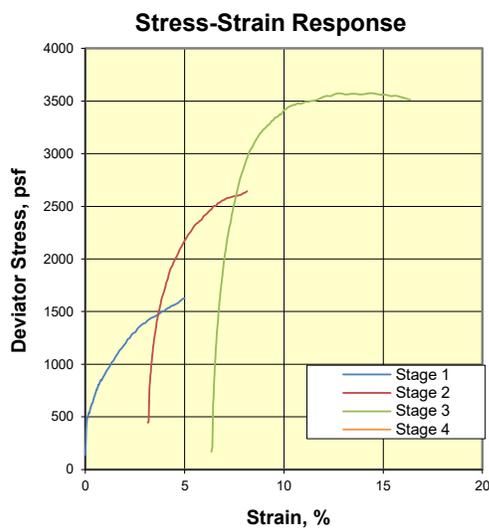
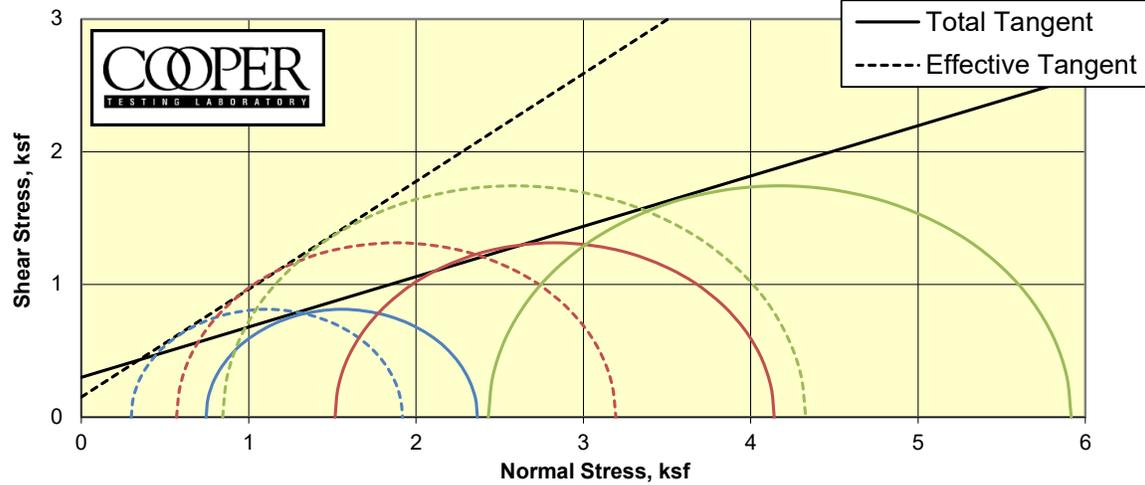


	1	2	3	4
<b>Boring</b>	LDW23-GT17-2.5-5-20240622	LDW23-GT17-2.5-5-20240622	LDW23-GT17-2.5-5-20240622	
<b>Sample</b>				
<b>Depth</b>	2.5-5(Tip-13")	2.5-5(Tip-8")	2.5-5(Tip)	
<b>Visual Description</b>	Dark Olive Brown CLAY w/ Sand	Dark Olive Brown CLAY w/ Sand	Dark Olive Brown CLAY w/ Sand	
<b>MC (%)</b>	69.8	57.4	67.9	
<b>Dry Density (pcf)</b>	57.2	65.5	58.8	
<b>Saturation (%)</b>	96.8	98.4	98.3	
<b>Void Ratio</b>	1.948	1.574	1.865	
<b>Diameter (in)</b>	2.85	2.85	2.85	
<b>Height (in)</b>	6.00	6.00	6.00	
	<b>Final</b>			
<b>MC (%)</b>	65.5	53.7	61.4	
<b>Dry Density (pcf)</b>	60.9	68.8	63.4	
<b>Saturation (%)</b>	100.0	100.0	100.0	
<b>Void Ratio</b>	1.768	1.450	1.658	
<b>Diameter (in)</b>	2.76	2.78	2.78	
<b>Height (in)</b>	6.01	5.99	5.84	
<b>Cell Pressure (psi)</b>	52.4	52.7	54.4	
<b>Back Pressure (psi)</b>	50.6	50.6	50.3	
	<b>Effective Stresses At:</b>			
<b>Strain (%)</b>	15.0	15.0	15.0	
<b>Deviator (ksf)</b>	0.694	1.042	1.091	
<b>Excess PP (psi)</b>	0.9	0.3	2.8	
<b>Sigma 1 (ksf)</b>	0.822	1.302	1.281	
<b>Sigma 3 (ksf)</b>	0.128	0.259	0.190	
<b>P (ksf)</b>	0.475	0.780	0.735	
<b>Q (ksf)</b>	0.347	0.521	0.546	
<b>Stress Ratio</b>	6.421	5.023	6.753	
<b>Rate (in/min)</b>	0.0005	0.0005	0.0005	

<b>CTL Number:</b>	1007-006		
<b>Client Name:</b>	Anchor QEA		
<b>Project Name:</b>	Middle Ranch of the Lower Duwamish Waterway		
<b>Project Number:</b>	210075-01.03		
<b>Date:</b>	12/3/2024	<b>By:</b>	MD/DC
<b>Total C</b>	ksf		
<b>Total phi</b>	degrees		
<b>Eff. C</b>	ksf		
<b>Eff. Phi</b>	degrees ©		

Remarks: The significant differences in dry density and moisture content between the points may impact the results. Engineering judgement is required to determine phi and cohesion, no phi or cohesion is reported. To add phi and cohesion to the report go to the "Report" tab and in cells M18 through P19 enter end points for a line through the Mohr's circles. The points plotted can be changed on the "Shear Values" tab using cells B3, F3, and J3.

**Staged Consolidated Undrained Triaxial Compression with Pore Pressure  
ASTM D4767m**



<b>CTL Number:</b>	1007-006		
<b>Client Name:</b>	Anchor QEA		
<b>Project Name:</b>	Middle Reach of the Lower Dwamish Waterway		
<b>Project Number:</b>	210075-01-03		
<b>Date:</b>	2/13/2025	<b>By:</b>	MD/DC
<b>Total C</b>	<b>0.300</b>	<b>ksf</b>	
<b>Total phi</b>	<b>20.8</b>	<b>degrees</b>	
<b>Eff. C</b>	<b>0.150</b>	<b>ksf</b>	
<b>Eff. Phi</b>	<b>39.1</b>	<b>degrees</b>	©

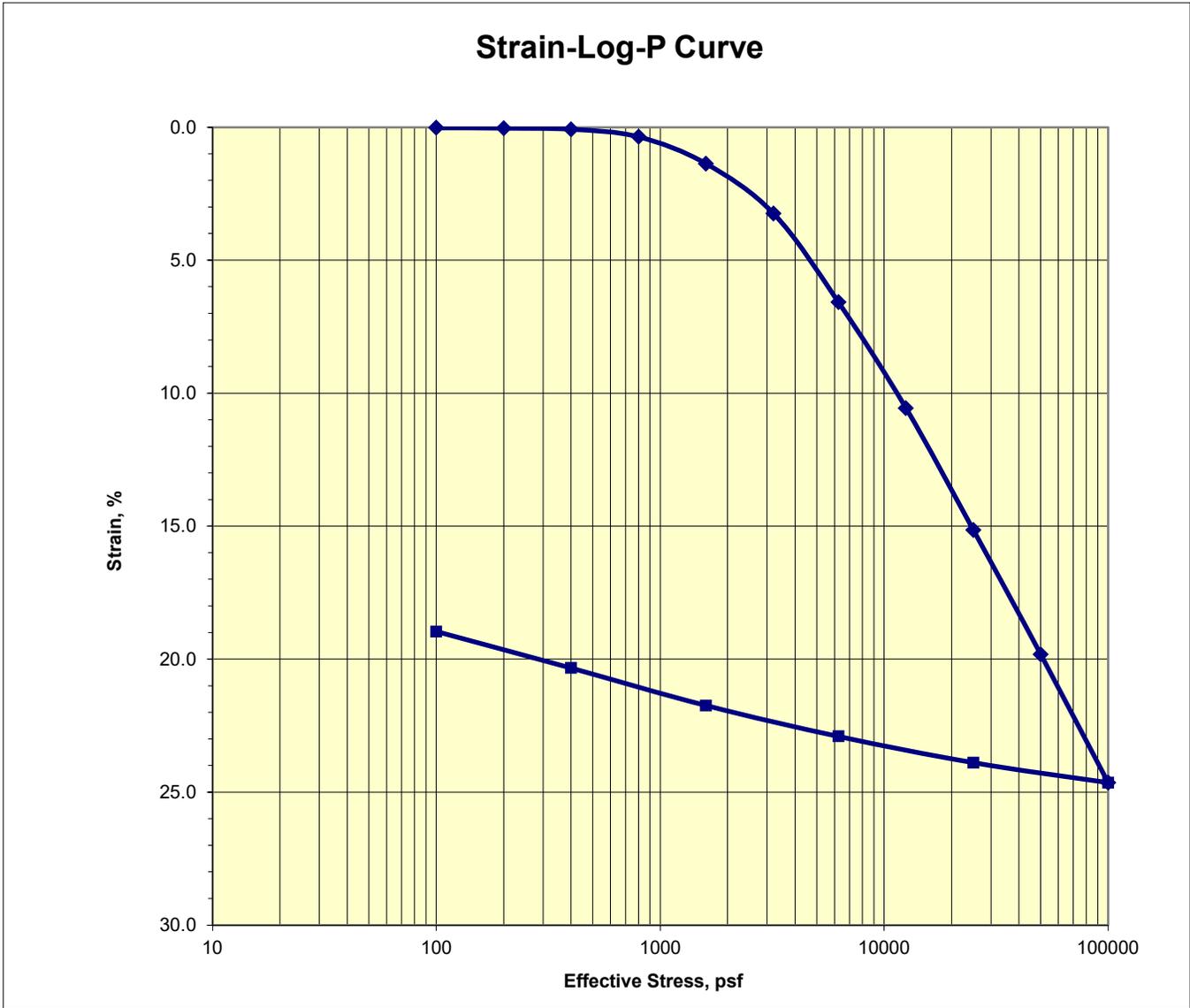
Stage	1	2	3	4
<b>Boring</b>	LDW23-GT32-GT			
<b>Sample</b>				
<b>Depth</b>	26.5-29(Tip-10.5')			
<b>Visual Description</b>	Black CLAY w/ Sand & organics			
<b>MC (%)</b>	58.9			
<b>Dry Density (pcf)</b>	61.7			
<b>Saturation (%)</b>	93.8			
<b>Void Ratio</b>	1.632			
<b>Diameter (in)</b>	2.85			
<b>Height (in)</b>	6.00			
	<b>Final</b>			
<b>MC (%)</b>	57.7	53.9	50.8	
<b>Dry Density (pcf)</b>	64.9	67.6	69.9	
<b>Saturation (%)</b>	100.0	100.0	100.0	
<b>Void Ratio</b>	1.501	1.402	1.321	
<b>Diameter (in)</b>	2.78	2.77	2.77	
<b>Height (in)</b>	6.00	5.81	5.62	
<b>Cell Pressure (psi)</b>	85.3	91.2	97.4	
<b>Back Pressure (psi)</b>	80.1	80.7	80.5	
	<b>Effective Stresses At:</b>			
<b>Strain (%)</b>	5.0	5.0	5.0	
<b>Deviator (ksf)</b>	1.622	2.625	3.484	
<b>Excess PP (psi)</b>	3.1	6.6	11.0	
<b>Sigma 1 (ksf)</b>	1.920	3.195	4.328	
<b>Sigma 3 (ksf)</b>	0.298	0.570	0.845	
<b>P (ksf)</b>	1.109	1.882	2.587	
<b>Q (ksf)</b>	0.811	1.313	1.742	
<b>Stress Ratio</b>	6.443	5.607	5.124	
<b>Rate (in/min)</b>	0.0007	0.0007	0.0007	



# Consolidation Test

## ASTM D2435

<b>Job No.:</b> 1007-006	<b>Boring:</b> LDW23-GT33B-GT-21.5-24-20240730	<b>Run By:</b> HM
<b>Client:</b> Anchor QEA	<b>Sample:</b>	<b>Reduced:</b> RU
<b>Project:</b> 210075.01.03	<b>Depth, ft.:</b>	<b>Checked:</b> PJ
<b>Soil Type:</b> Black Sandy CLAY		<b>Date:</b> 12/20/2024



<b>Assumed Gs</b>	2.6	<b>Initial</b>	<b>Final</b>	<b>Remarks:</b>
<b>Moisture %:</b>		47.9	32.0	
<b>Dry Density, pcf:</b>		69.9	88.6	
<b>Void Ratio:</b>		1.322	0.831	
<b>% Saturation:</b>		94.1	100.0	

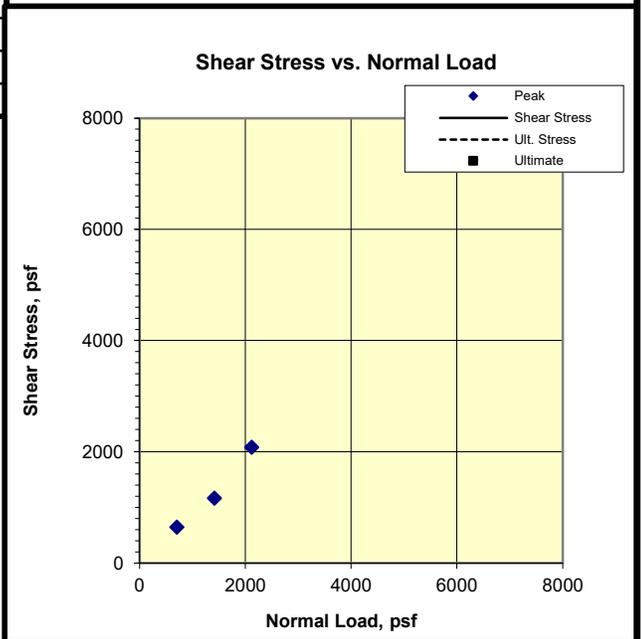
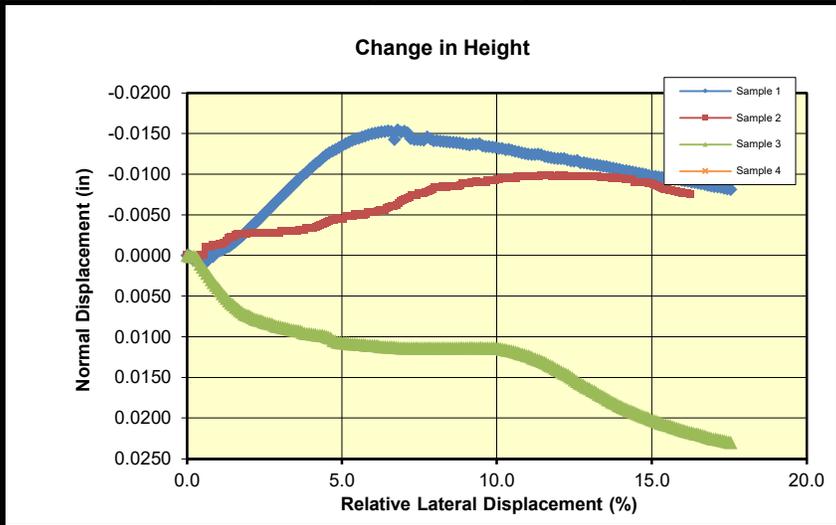
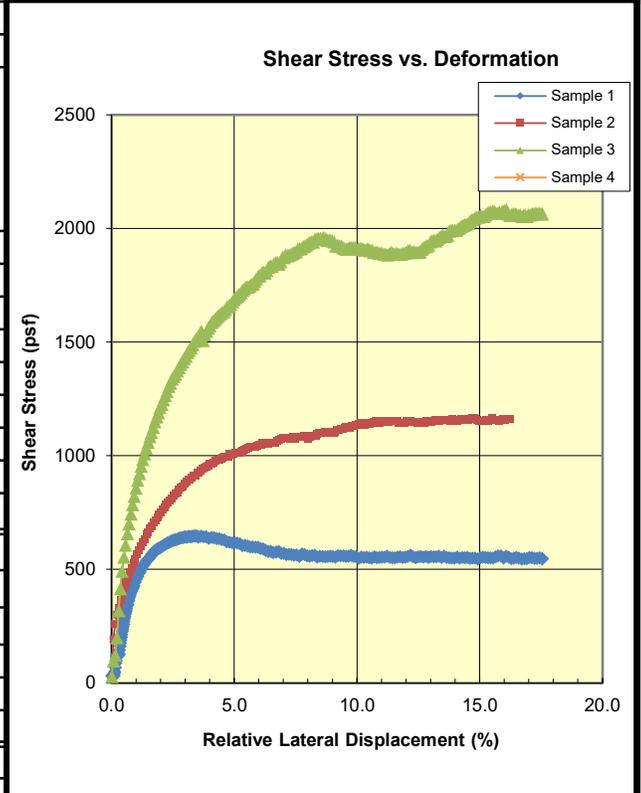


# Consolidated Drained Direct Shear (ASTM D3080)

CTL Job #: 1007-006 Project #: 210075.01.03 By: MD  
 Client: Anchor QEA Date: 3/6/2025 Checked: PJ  
 Project Name: Middle Reach of the Lower Duwamish Waterway Remolding Info:

Specimen Data				
	1	2	3	4
Boring:	LDW23_GT338_GT-21.5-24	LDW23_GT338_GT-21.5-24	LDW23_GT338_GT-21.5-24	
Sample:				
Depth (ft):				
Visual Description:	Dark Gray SAND w/ Silt	Dark Gray SAND w/ Silt	Dark Gray SAND w/ Silt	
Normal Load (psf)	710	1420	2120	
Dry Mass of Specimen (g)	142.3	142.1	139.7	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.85	2.85	2.85	
Initial Void Ratio	0.947	0.949	0.984	
Initial Moisture (%)	18.1	22.3	24.9	
Initial Wet Density (pcf)	100.4	103.8	104.1	
Initial Dry Density (pcf)	85.0	84.9	83.4	
Initial Saturation (%)	50.7	62.2	67.0	
ΔHeight Consol (in)	0.0121	0.0217	0.0389	
At Test Void Ratio	0.923	0.907	0.906	
At Test Moisture (%)	30.8	31.8	31.1	
At Test Wet Density (pcf)	112.5	114.3	113.7	
At Test Dry Density (pcf)	86.0	86.8	86.8	
At Test Saturation (%)	88.4	92.8	90.8	
Strain Rate (%/min)	0.02	0.02	0.02	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	647	1166	2082	
ΔHeight (in) at Peak	-0.0085	-0.0090	0.0216	
Ultimate Stress (psf)				

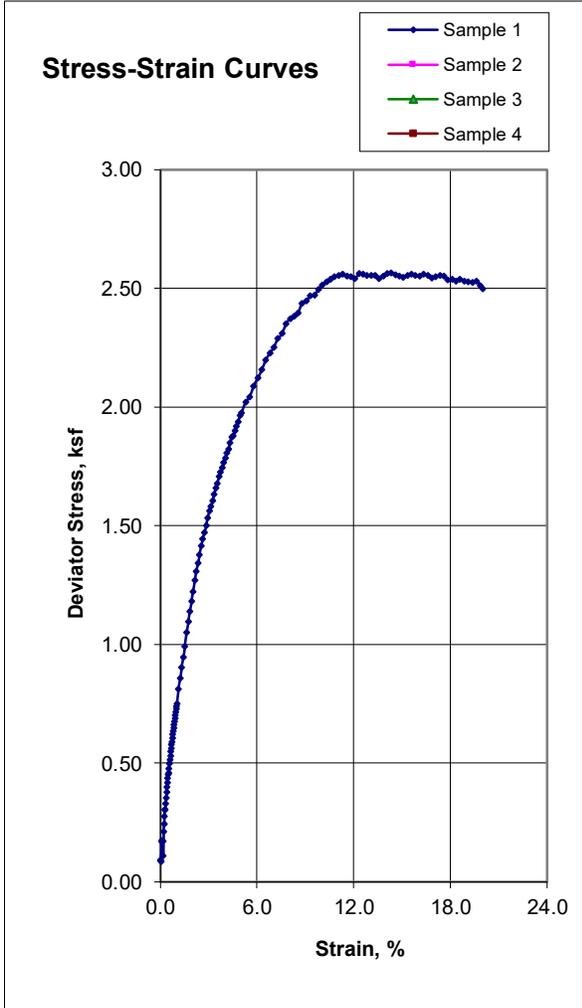
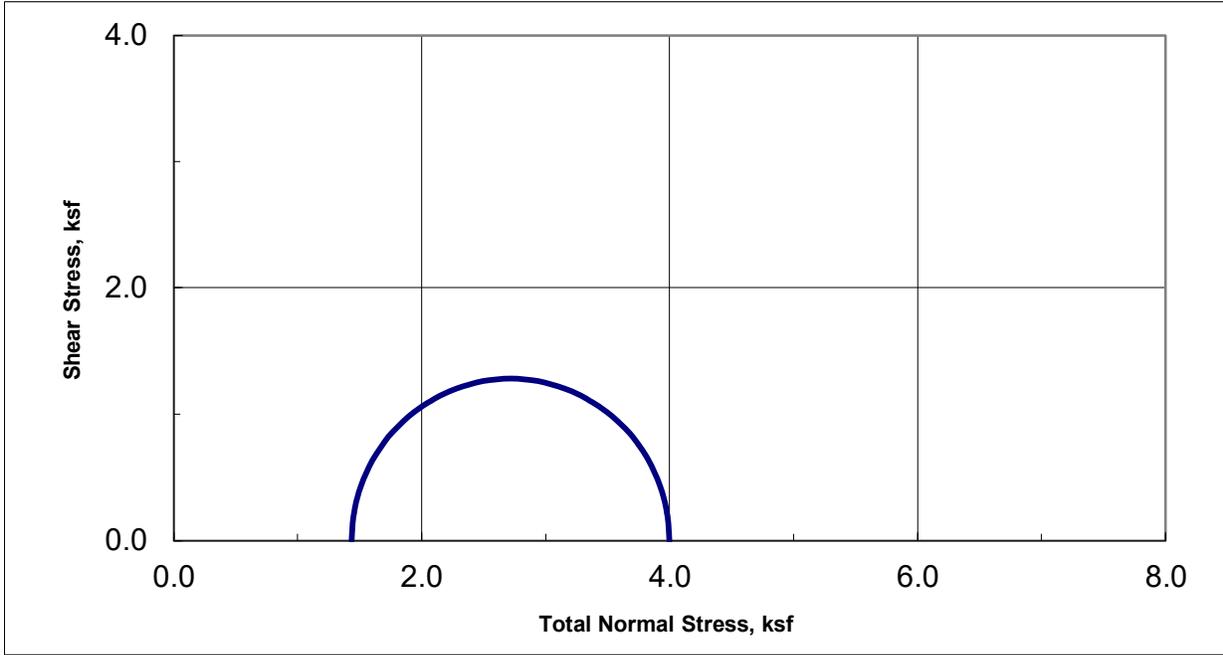
Phi (deg)	Ult. Phi (deg)
Cohesion (psf)	Ult. Cohesion (psf)



Remarks: Engineering judgement is required to determine phi and cohesion, no phi or cohesion is reported. To add phi and cohesion to the report go to the "phi" tab and in cells G30, G31, H30, and H31 enter end points for a line through the 3 data points. The points plotted can be changed on the "Eng Values" tab using cells L6, A2, C2, and E2.



**Unconsolidated-Undrained Triaxial Test**  
 ASTM D2850



Sample Data				
	1	2	3	4
Moisture %	57.1			
Dry Den,pcf	66.0			
Void Ratio	1.553			
Saturation %	99.2			
Height in	5.98			
Diameter in	2.84			
Cell psi	10.0			
Strain %	14.33			
Deviator, ksf	2.564			
Rate %/min	1.00			
in/min	0.060			
Job No.:	1007-006			
Client:	Achor QEA			
Project:	Middle Rach of the Lower Dwamish Waterway - 210075-01-03			
Boring:	LDW23-GT33B-GT			
Sample:				
Depth ft:	21.5-24			
Visual Soil Description				
Sample #	1 Black CLAY w/ organics			
2				
3				
4				
Remarks:				

Note: Strengths are picked at the peak deviator stress or 15% strain which ever occurs first per ASTM D2850.

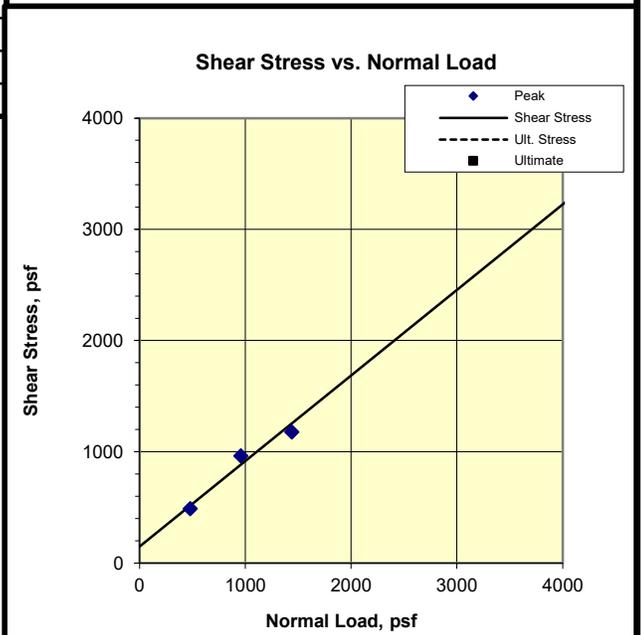
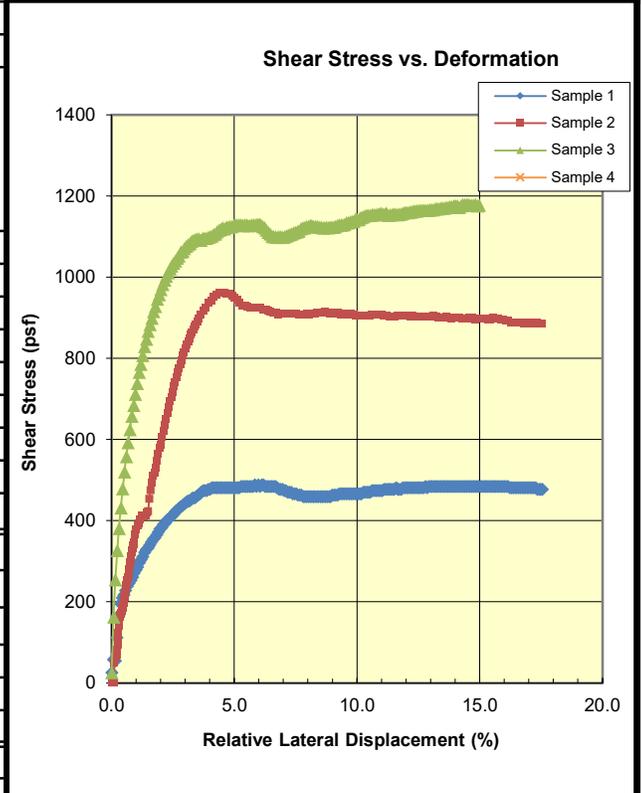


# Consolidated Drained Direct Shear (ASTM D3080)

CTL Job #: 1007-006 Project #: 210075.01.03 By: MD  
 Client: Anchor QEA Date: 3/5/2025 Checked: PJ  
 Project Name: Middle Reach of the Lower Duwamish Waterway Remolding Info:

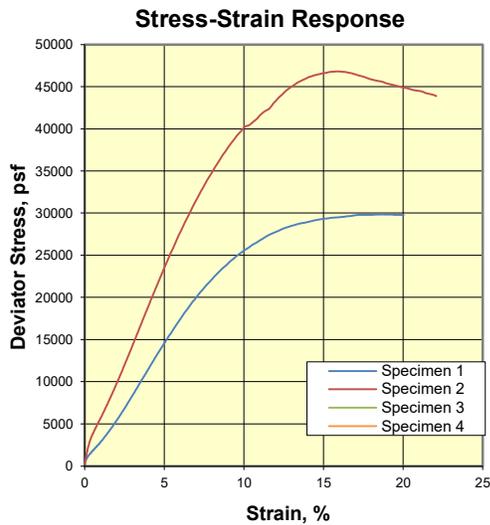
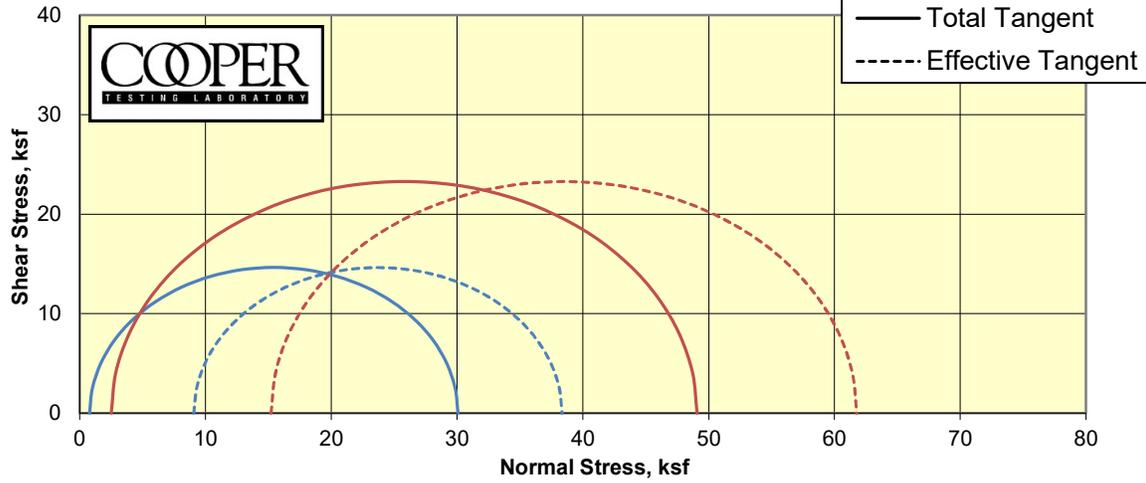
Specimen Data				
	1	2	3	4
Boring:	LDW23_GT34_GT-10.5-14	LDW23_GT34_GT-10.5-14	LDW23_GT34_GT-10.5-14	
Sample:				
Depth (ft):				
Visual Description:	Black Silty SAND w/ organics	Black Silty SAND w/ organics	Black Silty SAND w/ organics	
Normal Load (psf)	480	960	1440	
Dry Mass of Specimen (g)	124.2	101.7	126.0	
Initial Height (in)	1.00	1.00	1.00	
Initial Diameter (in)	2.85	2.85	2.85	
Initial Void Ratio	1.273	1.777	1.240	
Initial Moisture (%)	46.0	59.8	44.3	
Initial Wet Density (pcf)	108.3	97.0	108.6	
Initial Dry Density (pcf)	74.2	60.7	75.3	
Initial Saturation (%)	97.6	90.9	96.5	
ΔHeight Consol (in)	0.0175	0.0295	0.0329	
At Test Void Ratio	1.233	1.695	1.166	
At Test Moisture (%)	45.0	58.1	43.0	
At Test Wet Density (pcf)	109.4	98.9	111.3	
At Test Dry Density (pcf)	75.5	62.5	77.8	
At Test Saturation (%)	98.4	92.5	99.7	
Strain Rate (%/min)	0.02	0.02	0.02	
Strengths Picked at	Peak	Peak	Peak	
Shear Stress (psf)	488	962	1179	
ΔHeight (in) at Peak	-0.0044	-0.0004	0.0007	
Ultimate Stress (psf)				

<b>Phi (deg)</b>	<b>37.6</b>	<b>Ult. Phi (deg)</b>	
<b>Cohesion (psf)</b>	<b>150</b>	<b>Ult. Cohesion (psf)</b>	



Remarks:

**Consolidated Undrained Triaxial Compression with Pore Pressure  
ASTM D4767**



	Specimen 1	Specimen 2	Specimen 3	Specimen 4
<b>Boring</b>	LDW23-GT34-GT-26.5-29-20240729	LDW23-GT34-GT-26.5-29-20240729		
<b>Sample</b>				
<b>Depth</b>				
<b>Visual Description</b>	Dark Gray Silty SAND	Dark Gray Silty SAND		
<b>MC (%)</b>	23.7	26.3		
<b>Dry Density (pcf)</b>	90.4	96.7		
<b>Saturation (%)</b>	73.9	95.6		
<b>Void Ratio</b>	0.864	0.744		
<b>Diameter (in)</b>	2.85	2.85		
<b>Height (in)</b>	6.00	6.00		
	<b>Final</b>			
<b>MC (%)</b>	30.0	27.1		
<b>Dry Density (pcf)</b>	93.1	97.3		
<b>Saturation (%)</b>	100.0	100.0		
<b>Void Ratio</b>	0.810	0.732		
<b>Diameter (in)</b>	2.81	2.85		
<b>Height (in)</b>	5.99	5.98		
<b>Cell Pressure (psi)</b>	105.3	116.9		
<b>Back Pressure (psi)</b>	99.8	99.4		
	<b>Effective Stresses At:</b>			
<b>Strain (%)</b>	15.0	15.0		
<b>Deviator (ksf)</b>	29.268	46.560		
<b>Excess PP (psi)</b>	-57.5	-88.2		
<b>Sigma 1 (ksf)</b>	38.346	61.776		
<b>Sigma 3 (ksf)</b>	9.078	15.217		
<b>P (ksf)</b>	23.712	38.496		
<b>Q (ksf)</b>	14.634	23.280		
<b>Stress Ratio</b>	4.224	4.060		
<b>Rate (in/min)</b>	0.0005	0.0004		

<b>CTL Number:</b>	1007-006		
<b>Client Name:</b>	Anchor QEA		
<b>Project Name:</b>	Middle Ranch of the Lower Duwamish Waterway		
<b>Project Number:</b>	210075-01.03		
<b>Date:</b>	1/21/2025	<b>By:</b>	MD/DC
<b>Total C</b>	_____	<b>ksf</b>	
<b>Total phi</b>	_____	<b>degrees</b>	
<b>Eff. C</b>	_____	<b>ksf</b>	
<b>Eff. Phi</b>	_____	<b>degrees</b>	©



**Client:** Anchor QEA, LLC.  
**Address:** 1201 3rd Avenue, Suite 2600  
Seattle, WA 98101  
**Attn:** Cindy Fields  
**Revised On:** \_\_\_\_\_

**Date:** October 15, 2024  
**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Sample #:** B24-1561 - 1585  
**Date sampled:** July 29 & 30, 2024  
**Control No:** 10152024

As requested and authorized by the Client, MTC has performed the following test(s) on the sample number referenced above. The testing was performed in accordance with current, applicable AASHTO, ASTM, and/or WSDOT standards, which are referenced on the correlating test report pages. The results obtained in our laboratory are as detailed below and/or on the following pages:

	Test(s) Performed:	Test Results	Test(s) Performed:	Test Results
X	Sieve Analysis	See Attached Reports	Sulfate Soundness	
	Proctor		Bulk Density & Voids	
	Sand Equivalent		WSDOT Degradation	
	Fracture Count		LA Abrasion	
X	Moisture Content	See Attached Reports	Cation Exchange Capacity	
	Specific Gravity, Coarse		X Specific Gravity, Soils	See Attached Report
	Specific Gravity, Fine		X Organic Content	See Attached Report
X	Hydrometer Analysis	See Attached Reports		
X	Atterberg Limits	See Attached Reports		

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call the number below and ask to speak with your Project Manager or the Laboratory Manager.

*Alex Eifrig*

\_\_\_\_\_  
 Respectfully Submitted,  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Moisture Content ASTM C-566, ASTM D-2216

**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 9, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 10152024

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1561	LDW23-GT32-GT-0.5-2-20240730	234.7	690.8	638.5	52.3	403.8	13.0%
B24-1562	LDW23-GT32-GT-5-6.4-20240730	233.0	396.5	370.1	26.4	137.1	19.3%
B24-1563	LDW23-GT32-GT-6.4-6.5-20240730	208.5	240.6	232.7	7.9	24.2	32.6%
B24-1564	LDW23-GT32-GT-10-11.5-20240730	215.6	360.3	332.2	28.1	116.6	24.1%
B24-1565	LDW23-GT32-GT-15-16.5-20240730	223.9	374.2	336.0	38.2	112.1	34.1%
B24-1566	LDW23-GT32-GT-25-25.7-20240730	221.7	539.3	513.7	25.6	292.0	8.8%
B24-1567	LDW23-GT32-GT-25.7-26.5-20240730	221.0	343.5	295.5	48.0	74.5	64.4%
B24-1568	LDW23-GT32-GT-35-36.5-20240730	229.4	352.3	326.3	26.0	96.9	26.8%
B24-1569	LDW23-GT32-GT-40-41.5-20240730	217.3	663.9	574.2	89.7	356.9	25.1%
B24-1570	LDW23-GT33B-GT-0.5-2-20240730	223.0	658.2	597.9	60.3	374.9	16.1%
B24-1571	LDW23-GT33B-GT-5-6.5-20240730	260.2	538.5	467.3	71.2	207.1	34.4%
B24-1572	LDW23-GT33B-GT-10-11-20240730	301.0	422.1	407.1	15.0	106.1	14.1%
B24-1573	LDW23-GT33B-GT-11-11.5-20240730	223.1	584.6	513.0	71.6	289.9	24.7%
B24-1574	LDW23-GT33B-GT-15-16.5-20240730	320.5	452.3	420.3	32.0	99.8	32.1%
B24-1575	LDW23-GT33B-GT-20-21.5-20240730	268.8	510.3	420.8	89.5	152.0	58.9%
B24-1576	LDW23-GT33B-GT-25-26.5-20240730	303.3	792.4	682.9	109.5	379.6	28.8%
B24-1577	LDW23-GT33B-GT-30-31.5-20240730	306.5	818.6	712.9	105.7	406.4	26.0%
B24-1578	LDW23-GT33B-GT-40-41.5-20240730	311.1	916.5	803.2	113.3	492.1	23.0%
B24-1579	LDW23-GT34-GT-5-6.5-20240729	270.3	522.3	485.6	36.7	215.3	17.0%
B24-1580	LDW23-GT34-GT-10-11.5-20240729	266.5	703.1	613.8	89.3	347.3	25.7%
B24-1581	LDW23-GT34-GT-15.3-16.1-20240729	419.3	487.7	468.1	19.6	48.8	40.2%
B24-1582	LDW23-GT34-GT-20-21.5-20240729	429.7	1068.7	839.7	229.0	410.0	55.9%
B24-1583	LDW23-GT34-GT-25-26.5-20240729	414.1	615.5	538.4	77.1	124.3	62.0%
B24-1584	LDW23-GT34-GT-30-31.5-20240729	416.2	1053.6	909.6	144.0	493.4	29.2%
B24-1585	LDW23-GT34-GT-35.5-36.5-20240729	380.0	589.4	537.3	52.1	157.3	33.1%

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:**

Reviewed by:

Alex Eifrig  
WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT32-GT-6.4-6.5-20240730 <b>Sample #:</b> B24-1563	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10152024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Silty Clay <b>Sample Color</b> Brown
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### Liquid Limit Determination

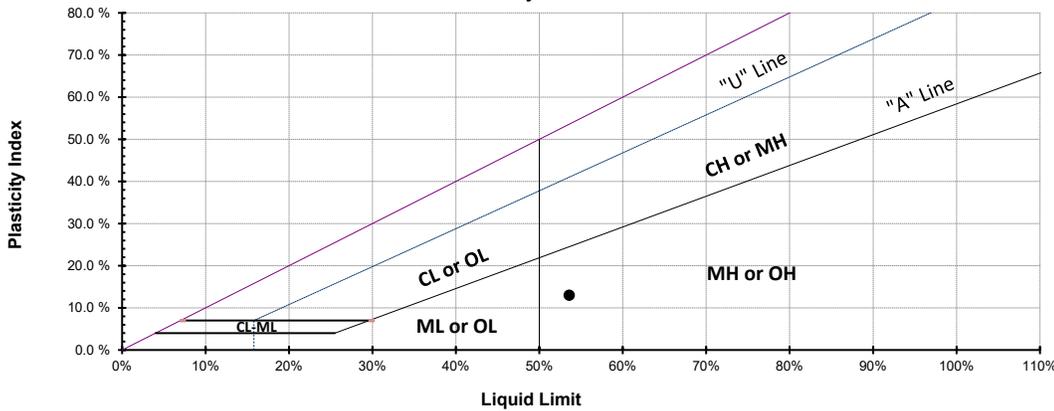
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	27.62	30.41	35.15			
Weight of Dry Soils + Pan:	23.20	26.52	29.54			
Weight of Pan:	14.69	19.44	19.53			
Weight of Dry Soils:	8.51	7.08	10.01			
Weight of Moisture:	4.42	3.89	5.61			
% Moisture:	51.9 %	54.9 %	56.0 %			
Number of Blows:	30	22	15			

**Liquid Limit @ 25 Blows:** 53.6 %  
**Plastic Limit:** 40.5 %  
**Plasticity Index, I<sub>p</sub>:** 13.0 %

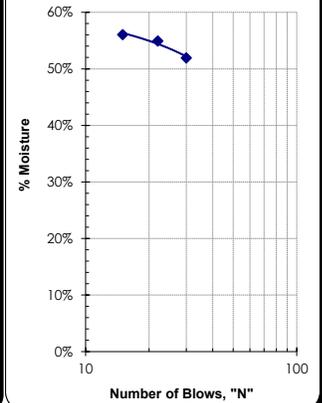
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	20.78	27.60				
Weight of Dry Soils + Pan:	19.00	25.17				
Weight of Pan:	14.60	19.19				
Weight of Dry Soils:	4.40	5.98				
Weight of Moisture:	1.78	2.43				
% Moisture:	40.5 %	40.6 %				

### Plasticity Chart



### Liquid Limit



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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

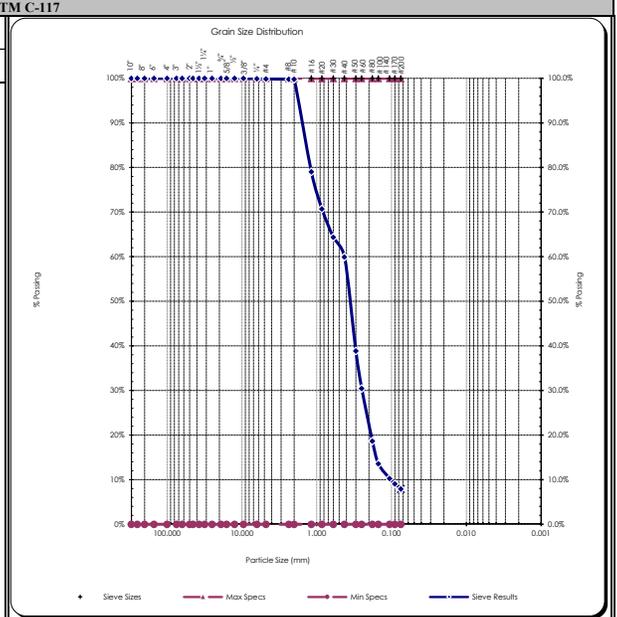
Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT32-GT-10-11.5-20240730 <b>Sample#:</b> B24-1564	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 9-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soil Classification System, ASTM-2487</b> SP-SM, Poorly graded Sand with Silt <b>Sample Color:</b> Brown
<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b>		
<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	D <sub>(6)</sub> = 0.047 mm      % Gravel = 0.1%      Coeff. of Curvature, C <sub>c</sub> = 1.40 D <sub>(10)</sub> = 0.102 mm      % Sand = 91.9%      Coeff. of Uniformity, C <sub>u</sub> = 4.17 D <sub>(15)</sub> = 0.158 mm      % Silt & Clay = 7.9%      Fineness Modulus = 2.05 D <sub>(30)</sub> = 0.247 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.366 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.427 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 1.614 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 9/68      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =	
<b>Method(s) ASTM C-136, ASTM D-6913, ASTM C-117</b>		

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		79%	100.0%	0.0%
#20	0.850		71%	100.0%	0.0%
#30	0.600		64%	100.0%	0.0%
#40	0.425	60%	60%	100.0%	0.0%
#50	0.300		39%	100.0%	0.0%
#60	0.250		30%	100.0%	0.0%
#80	0.180		19%	100.0%	0.0%
#100	0.150	14%	14%	100.0%	0.0%
#140	0.106		10%	100.0%	0.0%
#170	0.090		9%	100.0%	0.0%
#200	0.075	7.9%	7.9%	100.0%	0.0%



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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT32-GT-15-16.5-20240730 <b>Sample#:</b> B24-1565	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soil Classification System, ASTM-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.018 mm      % Gravel = 0.4% D <sub>(10)</sub> = 0.035 mm      % Sand = 78.4% D <sub>(15)</sub> = 0.053 mm      % Silt & Clay = 21.1% D <sub>(50)</sub> = 0.101 mm      Liquid Limit = n/a D <sub>(60)</sub> = 0.174 mm      Plasticity Index = n/a D <sub>(100)</sub> = 0.248 mm      Sand Equivalent = n/a D <sub>(200)</sub> = 1.058 mm      Fracture %, 1 Face = n/a Dust Ratio = 1/4      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.16 Coeff. of Uniformity, C <sub>u</sub> = 7.00 Fineness Modulus = 1.11 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		99%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		91%	100.0%	0.0%
#20	0.850		88%	100.0%	0.0%
#30	0.600		85%	100.0%	0.0%
#40	0.425	84%	84%	100.0%	0.0%
#50	0.300		67%	100.0%	0.0%
#60	0.250		60%	100.0%	0.0%
#80	0.180		51%	100.0%	0.0%
#100	0.150	47%	47%	100.0%	0.0%
#140	0.106		32%	100.0%	0.0%
#170	0.090		26%	100.0%	0.0%
#200	0.075	21.1%	21.1%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 10, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 10152024

**Moisture Content ASTM C-566, ASTM D-2216**

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1565	LDW23-GT32-GT-15-16.5-20240730	223.9	374.2	336.0	38.2	112.1	34.1%

**Organic Content ASTM D-2974**

Sample #	Location	Tare	Soil + Tare, Pre-Ignition	Soil + Tare, Post Ignition	% Organics
B24-1565	LDW23-GT32-GT-15-16.5-20240730	46.75	98.65	97.93	1.39%

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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



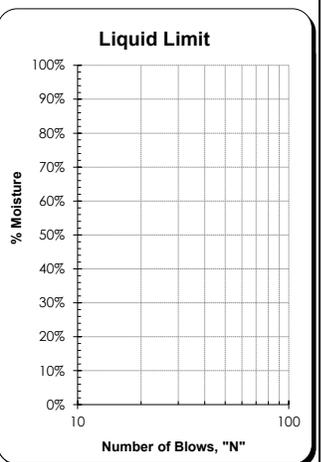
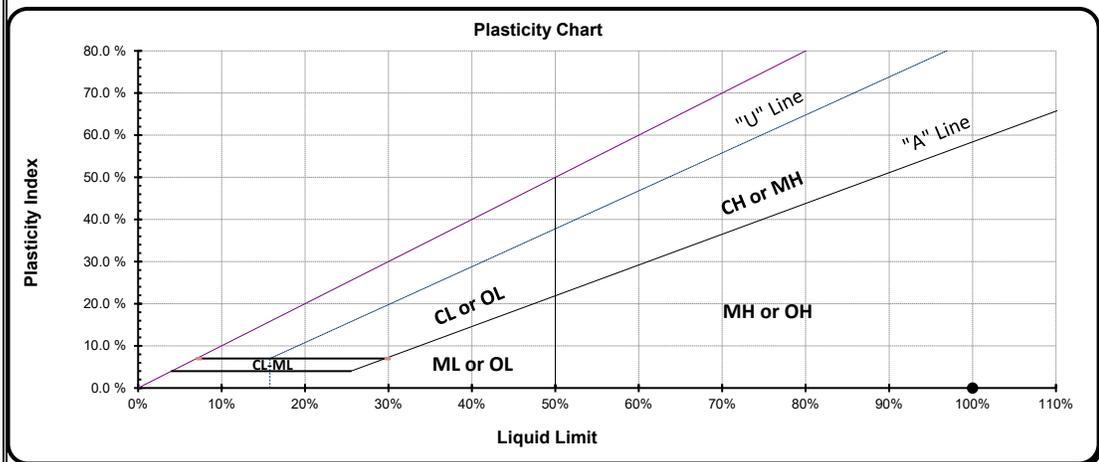
## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT32-GT-25.7-26.5-20240730 <b>Sample #:</b> B24-1567	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10152024	<b>Visual Soils Classification</b> Sandy Silt <b>Sample Color</b> Brown
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Liquid Limit Determination						
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:	Unable to Establish					
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

**Liquid Limit @ 25 Blows:** N/A  
**Plastic Limit:** N/A  
**Plasticity Index, I<sub>p</sub>:** N/A

Plastic Limit Determination						
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:	Non-Plastic					
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						



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**Comments:** Unable to establish the liquid limit of this sample due to the material displaying rapid dilation when subjected to any blows in the cup, and also the material not being able to be spread smoothly into the cup. The sample was then deemed non-plastic due to the material not being workable down to 1/8" ribbons/rolls without breaking apart.

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT32-GT-35-36.5-20240730 <b>Sample#:</b> B24-1568	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soil Classification System, ASTM-2487</b> SP, Poorly graded Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.152 mm      % Gravel = 0.2%      Coeff. of Curvature, C <sub>c</sub> = 0.65 D <sub>(10)</sub> = 0.185 mm      % Sand = 96.0%      Coeff. of Uniformity, C <sub>u</sub> = 4.50 D <sub>(15)</sub> = 0.218 mm      % Silt & Clay = 3.8%      Fineness Modulus = 2.45 D <sub>(30)</sub> = 0.317 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.536 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.832 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 1.721 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 1/12      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		99%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		72%	100.0%	0.0%
#20	0.850		61%	100.0%	0.0%
#30	0.600		52%	100.0%	0.0%
#40	0.425	46%	46%	100.0%	0.0%
#50	0.300		27%	100.0%	0.0%
#60	0.250		20%	100.0%	0.0%
#80	0.180		9%	100.0%	0.0%
#100	0.150	5%	5%	100.0%	0.0%
#140	0.106		4%	100.0%	0.0%
#170	0.090		4%	100.0%	0.0%
#200	0.075	3.8%	3.8%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT32-GT-35-36.5-20240730 <b>Sample#:</b> B24-1568	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soil Classification System, ASTM-2487</b> SP, Poorly graded Sand <b>Sample Color</b> Brown																																																																																																					
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																					
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 100.57 grams <b>Hydroscopic Moist.:</b> 0.66% <b>Adj. Sample Wgt :</b> 99.91 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																					
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>2</td><td>3</td><td>3.0%</td><td>0.0384 mm</td></tr> <tr><td>5</td><td>2.5</td><td>2.5%</td><td>0.0244 mm</td></tr> <tr><td>15</td><td>2.5</td><td>2.5%</td><td>0.0141 mm</td></tr> <tr><td>30</td><td>2.5</td><td>2.5%</td><td>0.0100 mm</td></tr> <tr><td>60</td><td>1.5</td><td>1.5%</td><td>0.0071 mm</td></tr> <tr><td>250</td><td>1</td><td>1.0%</td><td>0.0035 mm</td></tr> <tr><td>1440</td><td>1</td><td>1.0%</td><td>0.0014 mm</td></tr> </tbody> </table>	Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	3	3.0%	0.0384 mm	5	2.5	2.5%	0.0244 mm	15	2.5	2.5%	0.0141 mm	30	2.5	2.5%	0.0100 mm	60	1.5	1.5%	0.0071 mm	250	1	1.0%	0.0035 mm	1440	1	1.0%	0.0014 mm	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>100%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>100%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>100%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>100%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>100%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>99%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>61%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>46%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>5%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>3.8%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>3.8%</td><td>0.074 mm</td></tr> <tr><td></td><td>3.3%</td><td>0.050 mm</td></tr> <tr><td></td><td>2.5%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>1.2%</td><td>0.005 mm</td></tr> <tr><td></td><td>1.0%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>0.7%</td><td>0.001 mm</td></tr> </tbody> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	100%	16.000 mm	1/2"	100%	12.500 mm	3/8"	100%	9.500 mm	1/4"	100%	6.300 mm	#4	100%	4.750 mm	#10	99%	2.000 mm	#20	61%	0.850 mm	#40	46%	0.425 mm	#100	5%	0.150 mm	#200	3.8%	0.075 mm	<b>Silts</b>	3.8%	0.074 mm		3.3%	0.050 mm		2.5%	0.020 mm	<b>Clays</b>	1.2%	0.005 mm		1.0%	0.002 mm	<b>Colloids</b>	0.7%	0.001 mm
Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter																																																																																																				
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3/4"	100%	19.000 mm																																																																																																					
5/8"	100%	16.000 mm																																																																																																					
1/2"	100%	12.500 mm																																																																																																					
3/8"	100%	9.500 mm																																																																																																					
1/4"	100%	6.300 mm																																																																																																					
#4	100%	4.750 mm																																																																																																					
#10	99%	2.000 mm																																																																																																					
#20	61%	0.850 mm																																																																																																					
#40	46%	0.425 mm																																																																																																					
#100	5%	0.150 mm																																																																																																					
#200	3.8%	0.075 mm																																																																																																					
<b>Silts</b>	3.8%	0.074 mm																																																																																																					
	3.3%	0.050 mm																																																																																																					
	2.5%	0.020 mm																																																																																																					
<b>Clays</b>	1.2%	0.005 mm																																																																																																					
	1.0%	0.002 mm																																																																																																					
<b>Colloids</b>	0.7%	0.001 mm																																																																																																					
<b>USDA Soil Textural Classification</b>																																																																																																							
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Particle Size</th> </tr> </thead> <tbody> <tr><td>% Sand:</td><td>2.0 - 0.05 mm</td></tr> <tr><td>% Silt:</td><td>0.05 - 0.002 mm</td></tr> <tr><td>% Clay:</td><td>&lt; 0.002 mm</td></tr> </tbody> </table>	Particle Size	% Sand:	2.0 - 0.05 mm	% Silt:	0.05 - 0.002 mm	% Clay:	< 0.002 mm																																																																																															
Particle Size																																																																																																							
% Sand:	2.0 - 0.05 mm																																																																																																						
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**Comments:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT32-GT-40-41.5-20240730 <b>Sample#:</b> B24-1569	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soil Classification System, ASTM-2487</b> SP-SM, Poorly graded Sand with Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.065 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>c</sub> = 0.76 D <sub>(10)</sub> = 0.162 mm      % Sand = 94.2%      Coeff. of Uniformity, C <sub>u</sub> = 6.03 D <sub>(15)</sub> = 0.209 mm      % Silt & Clay = 5.8%      Fineness Modulus = 2.54 D <sub>(30)</sub> = 0.347 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.723 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.980 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 1.750 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 8/53      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		68%	100.0%	0.0%
#20	0.850		55%	100.0%	0.0%
#30	0.600		45%	100.0%	0.0%
#40	0.425	38%	38%	100.0%	0.0%
#50	0.300		25%	100.0%	0.0%
#60	0.250		19%	100.0%	0.0%
#80	0.180		12%	100.0%	0.0%
#100	0.150	9%	9%	100.0%	0.0%
#140	0.106		7%	100.0%	0.0%
#170	0.090		6%	100.0%	0.0%
#200	0.075	5.8%	5.8%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician

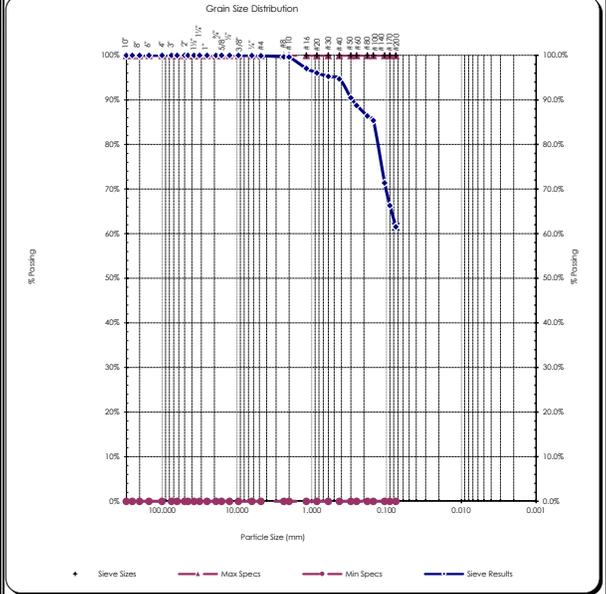


## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT33B-GT-5-6.5-20240730 <b>Sample#:</b> B24-1571	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Visual Soils Classification</b> Silt with Sand <b>Sample Color:</b> Brown
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<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b>			
<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	D <sub>(6)</sub> = 0.006 mm D <sub>(10)</sub> = 0.012 mm D <sub>(15)</sub> = 0.018 mm D <sub>(30)</sub> = 0.037 mm D <sub>(60)</sub> = 0.061 mm D <sub>(90)</sub> = 0.073 mm D <sub>(100)</sub> = 0.286 mm Dust Ratio = 13/20	% Gravel = 0.1% % Sand = 38.4% % Silt & Clay = 61.5% Liquid Limit = n/a Plasticity Index = n/a Sand Equivalent = n/a Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.50 Coeff. of Uniformity, C <sub>u</sub> = 6.00 Fineness Modulus = 0.32 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

<b>Method(s) ASTM C-136, ASTM D-6913, ASTM C-117</b>					
<b>Sieve Size</b>		<b>Actual Cumulative Percent Passing</b>	<b>Interpolated Cumulative Percent Passing</b>	<b>Specs</b>	
<b>US</b>	<b>Metric</b>			<b>Max</b>	<b>Min</b>
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		97%	100.0%	0.0%
#20	0.850		96%	100.0%	0.0%
#30	0.600		95%	100.0%	0.0%
#40	0.425	95%	95%	100.0%	0.0%
#50	0.300		90%	100.0%	0.0%
#60	0.250		89%	100.0%	0.0%
#80	0.180		86%	100.0%	0.0%
#100	0.150	85%	85%	100.0%	0.0%
#140	0.106		71%	100.0%	0.0%
#170	0.090		66%	100.0%	0.0%
#200	0.075	61.5%	61.5%	100.0%	0.0%



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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT33B-GT-10-11-20240730 <b>Sample#:</b> B24-1572	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soils Classification System, ASTM D-2487</b> SP, Poorly graded Sand with Gravel <b>Sample Color:</b> Gray
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.516 mm      % Gravel = 30.4% D <sub>(10)</sub> = 1.710 mm      % Sand = 66.9% D <sub>(15)</sub> = 2.178 mm      % Silt & Clay = 2.6% D <sub>(30)</sub> = 2.885 mm      Liquid Limit = n/a D <sub>(50)</sub> = 3.828 mm      Plasticity Index = n/a D <sub>(60)</sub> = 4.300 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 7.940 mm      Fracture %, 1 Face = n/a Dust Ratio = 4/7      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.13 Coeff. of Uniformity, C <sub>u</sub> = 2.51 Fineness Modulus = 4.91 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00	100%	100%	100.0%	0.0%
10.00"	250.00	100%	100%	100.0%	0.0%
8.00"	200.00	100%	100%	100.0%	0.0%
6.00"	150.00	100%	100%	100.0%	0.0%
4.00"	100.00	100%	100%	100.0%	0.0%
3.00"	75.00	100%	100%	100.0%	0.0%
2.50"	63.00	100%	100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00	100%	100%	100.0%	0.0%
1.50"	37.50	100%	100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00	100%	100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30	100%	79%	100.0%	0.0%
#4	4.75	70%	70%	100.0%	0.0%
#8	2.36	100%	19%	100.0%	0.0%
#10	2.00	11%	11%	100.0%	0.0%
#16	1.18	100%	8%	100.0%	0.0%
#20	0.850	100%	6%	100.0%	0.0%
#30	0.600	100%	5%	100.0%	0.0%
#40	0.425	5%	5%	100.0%	0.0%
#50	0.300	100%	4%	100.0%	0.0%
#60	0.250	100%	4%	100.0%	0.0%
#80	0.180	100%	4%	100.0%	0.0%
#100	0.150	3%	3%	100.0%	0.0%
#140	0.106	100%	3%	100.0%	0.0%
#170	0.090	100%	3%	100.0%	0.0%
#200	0.075	2.6%	2.6%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT33B-GT-15-16.5-20240730 <b>Sample#:</b> B24-1574	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.017 mm      % Gravel = 0.6%      Coeff. of Curvature, C <sub>c</sub> = 1.61 D <sub>(10)</sub> = 0.034 mm      % Sand = 77.1%      Coeff. of Uniformity, C <sub>u</sub> = 4.48 D <sub>(15)</sub> = 0.050 mm      % Silt & Clay = 22.3%      Fineness Modulus = 0.94 D <sub>(50)</sub> = 0.090 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(60)</sub> = 0.130 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(100)</sub> = 0.150 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(200)</sub> = 1.130 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 19/74      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	99%	99%	100.0%	0.0%
#8	2.36		94%	100.0%	0.0%
#10	2.00	94%	94%	100.0%	0.0%
#16	1.18		90%	100.0%	0.0%
#20	0.850		89%	100.0%	0.0%
#30	0.600		88%	100.0%	0.0%
#40	0.425	87%	87%	100.0%	0.0%
#50	0.300		75%	100.0%	0.0%
#60	0.250		70%	100.0%	0.0%
#80	0.180		63%	100.0%	0.0%
#100	0.150	60%	60%	100.0%	0.0%
#140	0.106		38%	100.0%	0.0%
#170	0.090		30%	100.0%	0.0%
#200	0.075	22.3%	22.3%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT33B-GT-15-16.5-20240730 <b>Sample#:</b> B24-1574	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color</b> Brown																																																																																																					
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																					
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 50.45 grams <b>Hydroscopic Moist.:</b> 1.67% <b>Adj. Sample Wgt :</b> 49.62 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																					
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**Comments:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT33B-GT-20-21.5-20240730 <b>Sample #:</b> B24-1575	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10152024	<b>Unified Soils Classification System, ASTM D-2487</b> ML, Clayey Silt <b>Sample Color</b> Brown
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### Liquid Limit Determination

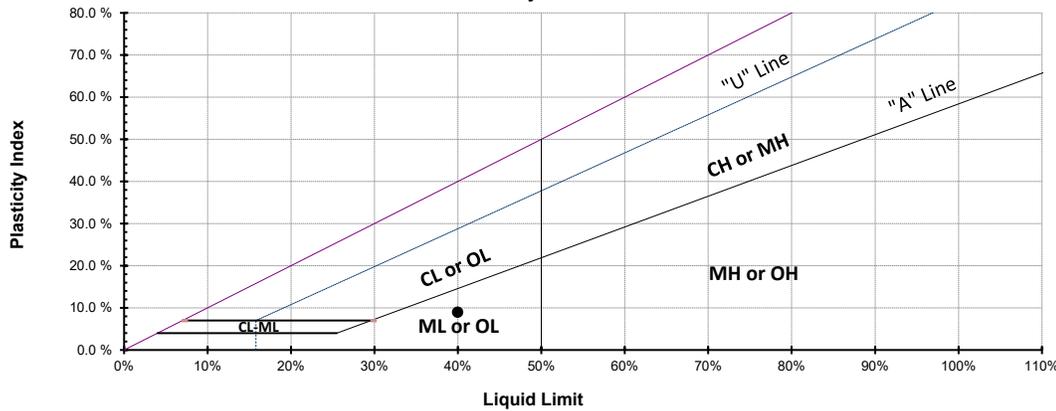
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	32.49	26.28	33.44			
Weight of Dry Soils + Pan:	28.80	22.74	29.68			
Weight of Pan:	19.40	13.98	20.43			
Weight of Dry Soils:	9.40	8.76	9.25			
Weight of Moisture:	3.69	3.54	3.76			
% Moisture:	39.3 %	40.4 %	40.7 %			
Number of Blows:	30	24	17			

**Liquid Limit @ 25 Blows:** 40.0 %  
**Plastic Limit:** 31.0 %  
**Plasticity Index, I<sub>p</sub>:** 9.0 %

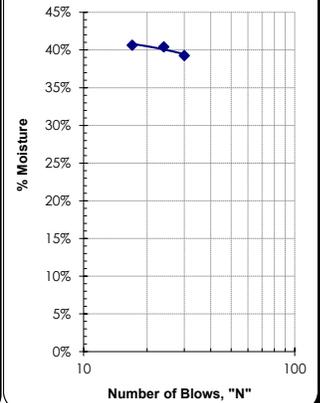
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	28.04	27.01				
Weight of Dry Soils + Pan:	26.33	25.53				
Weight of Pan:	20.70	20.85				
Weight of Dry Soils:	5.63	4.68				
Weight of Moisture:	1.71	1.48				
% Moisture:	30.4 %	31.6 %				

### Plasticity Chart



### Liquid Limit



All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT34-GT-5-6.5-20240729 <b>Sample#:</b> B24-1579	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soil Classification System, ASTM-2487</b> SM, Silty Sand with Gravel <b>Sample Color:</b> Brown
<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b>		
<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	D <sub>(6)</sub> = 0.020 mm D <sub>(10)</sub> = 0.040 mm D <sub>(15)</sub> = 0.060 mm D <sub>(50)</sub> = 0.192 mm D <sub>(60)</sub> = 0.406 mm D <sub>(90)</sub> = 1.237 mm D <sub>(95)</sub> = 13.921 mm Dust Ratio = 31/86	% Gravel = 27.7% % Sand = 53.6% % Silt & Clay = 18.7% Liquid Limit = n/a Plasticity Index = n/a Sand Equivalent = n/a Fracture %, 1 Face = n/a Fracture %, 2+ Faces = n/a  Coeff. of Curvature, C <sub>c</sub> = 0.74 Coeff. of Uniformity, C <sub>u</sub> = 30.79 Fineness Modulus = 3.01 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	96%	96%	100.0%	0.0%
5/8"	16.00		92%	100.0%	0.0%
1/2"	12.50	88%	88%	100.0%	0.0%
3/8"	9.50	84%	84%	100.0%	0.0%
1/4"	6.30		76%	100.0%	0.0%
#4	4.75	72%	72%	100.0%	0.0%
#8	2.36		68%	100.0%	0.0%
#10	2.00	68%	68%	100.0%	0.0%
#16	1.18		59%	100.0%	0.0%
#20	0.850		56%	100.0%	0.0%
#30	0.600		54%	100.0%	0.0%
#40	0.425	52%	52%	100.0%	0.0%
#50	0.300		40%	100.0%	0.0%
#60	0.250		35%	100.0%	0.0%
#80	0.180		29%	100.0%	0.0%
#100	0.150	26%	26%	100.0%	0.0%
#140	0.106		22%	100.0%	0.0%
#170	0.090		20%	100.0%	0.0%
#200	0.075	18.7%	18.7%	100.0%	0.0%

Grain Size Distribution

Particle Size (mm)

% Passing

● Sieve Sizes   
 — Max Specs   
 — Min Specs   
 — Sieve Results

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
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## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT34-GT-5-6.5-20240729 <b>Sample#:</b> B24-1579	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soil Classification System, ASTM-2487</b> SM, Silty Sand with Gravel <b>Sample Color</b> Brown																																																																																																					
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<table style="width: 100%; border-collapse: collapse;"> <tbody> <tr> <td style="width: 50%;"><b>% Sand:</b></td> <td style="width: 50%;">2.0 - 0.05 mm</td> </tr> <tr> <td><b>% Silt:</b></td> <td>0.05 - 0.002 mm</td> </tr> <tr> <td><b>% Clay:</b></td> <td>&lt; 0.002 mm</td> </tr> </tbody> </table> <p style="text-align: center;"><b>USDA Soil Textural Classification</b> Loamy Sand</p>		<b>% Sand:</b>	2.0 - 0.05 mm	<b>% Silt:</b>	0.05 - 0.002 mm	<b>% Clay:</b>	< 0.002 mm																																																																																																
<b>% Sand:</b>	2.0 - 0.05 mm																																																																																																						
<b>% Silt:</b>	0.05 - 0.002 mm																																																																																																						
<b>% Clay:</b>	< 0.002 mm																																																																																																						

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**Reviewed by:**

Alex Eifrig

\_\_\_\_\_  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT34-GT-15.3-16.1-20240729 <b>Sample#:</b> B24-1581	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Visual Soils Classification</b> Sandy Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s)</b> ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281 D <sub>(6)</sub> = 0.007 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.015 mm      % Sand = 49.0% D <sub>(15)</sub> = 0.022 mm      % Silt & Clay = 51.0% D <sub>(30)</sub> = 0.044 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.074 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.092 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.148 mm      Fracture %, 1 Face = n/a Dust Ratio = 17/33      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.44 Coeff. of Uniformity, C <sub>u</sub> = 6.24 Fineness Modulus = 0.15 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
---	--	--

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		99%	100.0%	0.0%
#20	0.850		99%	100.0%	0.0%
#30	0.600		99%	100.0%	0.0%
#40	0.425	99%	99%	100.0%	0.0%
#50	0.300		96%	100.0%	0.0%
#60	0.250		94%	100.0%	0.0%
#80	0.180		92%	100.0%	0.0%
#100	0.150	91%	91%	100.0%	0.0%
#140	0.106		68%	100.0%	0.0%
#170	0.090		59%	100.0%	0.0%
#200	0.075	51.0%	51.0%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT34-GT-25-26.5-20240729 <b>Sample #:</b> B24-1583	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10152024	<b>Unified Soils Classification System, ASTM D-2487</b> ML, Silty Clay <b>Sample Color</b> Brown
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### Liquid Limit Determination

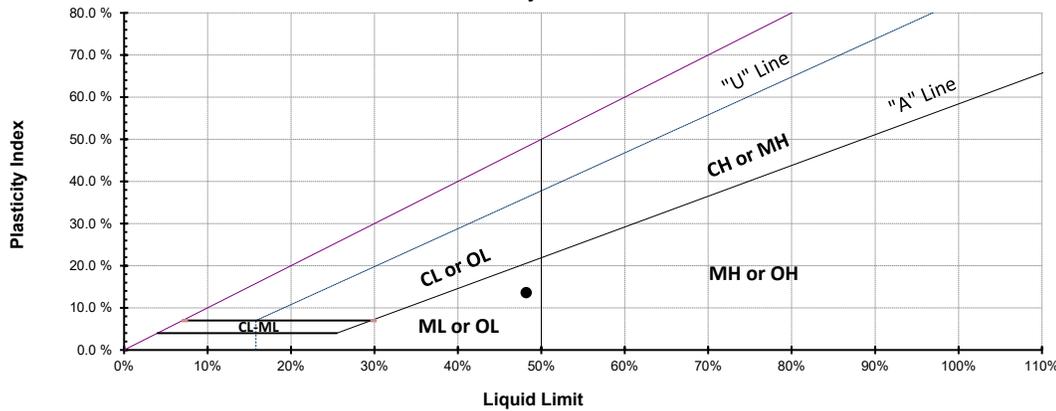
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	29.28	36.63	25.94			
Weight of Dry Soils + Pan:	26.09	31.15	22.01			
Weight of Pan:	19.28	19.84	14.04			
Weight of Dry Soils:	6.81	11.31	7.97			
Weight of Moisture:	3.19	5.48	3.93			
% Moisture:	46.8 %	48.5 %	49.3 %			
Number of Blows:	31	24	20			

**Liquid Limit @ 25 Blows:** 48.2 %  
**Plastic Limit:** 34.6 %  
**Plasticity Index, I<sub>p</sub>:** 13.6 %

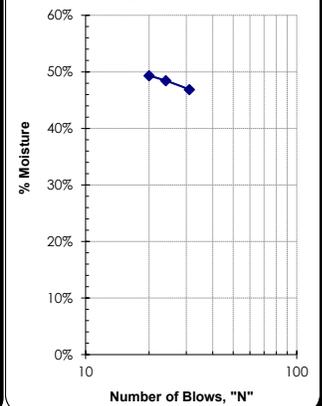
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	24.67	25.72				
Weight of Dry Soils + Pan:	23.09	24.12				
Weight of Pan:	18.44	19.57				
Weight of Dry Soils:	4.65	4.55				
Weight of Moisture:	1.58	1.60				
% Moisture:	34.0 %	35.2 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT34-GT-35.5-36.5-20240729 <b>Sample#:</b> B24-1585	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10152024	<b>Unified Soil Classification System, ASTM-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.013 mm      % Gravel = 0.3% D <sub>(10)</sub> = 0.026 mm      % Sand = 70.5% D <sub>(15)</sub> = 0.039 mm      % Silt & Clay = 29.2% D <sub>(30)</sub> = 0.077 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.120 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.142 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.381 mm      Fracture %, 1 Face = n/a Dust Ratio = 4/13      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.61 Coeff. of Uniformity, C <sub>u</sub> = 5.53 Fineness Modulus = 0.64 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		97%	100.0%	0.0%
#20	0.850		96%	100.0%	0.0%
#30	0.600		95%	100.0%	0.0%
#40	0.425	95%	95%	100.0%	0.0%
#50	0.300		81%	100.0%	0.0%
#60	0.250		75%	100.0%	0.0%
#80	0.180		67%	100.0%	0.0%
#100	0.150	64%	64%	100.0%	0.0%
#140	0.106		43%	100.0%	0.0%
#170	0.090		36%	100.0%	0.0%
#200	0.075	29.2%	29.2%	100.0%	0.0%

Grain Size Distribution

Particle Size (mm)

● Sieve Sizes   
 — Max Specs   
 — Min Specs   
 — Sieve Results

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Client:** Anchor QEA, LLC.  
**Address:** 1201 3rd Avenue, Suite 2600  
Seattle, WA 98101  
**Attn:** Cindy Fields  
**Revised On:** \_\_\_\_\_

**Date:** October 18, 2024  
**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Sample #:** B24-1586 - 1611  
**Date sampled:** June 17 - July 29, 2024  
**Control No:** 10182024

As requested and authorized by the Client, MTC has performed the following test(s) on the sample number referenced above. The testing was performed in accordance with current, applicable AASHTO, ASTM, and/or WSDOT standards, which are referenced on the correlating test report pages. The results obtained in our laboratory are as detailed below and/or on the following pages:

	Test(s) Performed:	Test Results	Test(s) Performed:	Test Results
X	Sieve Analysis	See Attached Reports	Sulfate Soundness	
	Proctor		Bulk Density & Voids	
	Sand Equivalent		WSDOT Degradation	
	Fracture Count		LA Abrasion	
X	Moisture Content	See Attached Reports	Cation Exchange Capacity	
	Specific Gravity, Coarse		X Specific Gravity, Soils	See Attached Report
	Specific Gravity, Fine		X Organic Content	See Attached Report
X	Hydrometer Analysis	See Attached Reports		
X	Atterberg Limits	See Attached Reports		

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call the number below and ask to speak with your Project Manager or the Laboratory Manager.

*Alex Eifrig*

\_\_\_\_\_  
 Respectfully Submitted,  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Moisture Content ASTM C-566, ASTM D-2216

**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 11, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 10182024

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1586	LDW23-GT34-GT-40-41.5-20240729	270.2	848.5	719.5	129.0	449.3	28.7%
B24-1587	LDW23-GT30-GT-5-6.5-20240620	320.0	411.2	367.8	43.4	47.8	90.8%
B24-1588	LDW23-GT30-GT-10-11.5-20240620	266.4	460.5	381.3	79.2	114.9	68.9%
B24-1589	LDW23-GT30-GT-15-15.3-20240620	311.2	443.1	394.7	48.4	83.5	58.0%
B24-1590	LDW23-GT30-GT-15.3-15.5-20240620	303.4	320.3	317.5	2.8	14.1	19.9%
B24-1591	LDW23-GT30-GT-20-21.5-20240620	269.0	683.3	617.1	66.2	348.1	19.0%
B24-1592	LDW23-GT30-GT-25-26.5-20240620	223.9	636.1	545.3	90.8	321.4	28.3%
B24-1593	LDW23-GT18-GT-0-1.5-20240619	215.7	691.6	445.3	246.3	229.6	107.3%
B24-1594	LDW23-GT18-GT-5-6.5-20240619	357.3	525.2	440.2	85.0	82.9	102.5%
B24-1595	LDW23-GT18-GT-10-11.5-20240619	358.2	424.0	391.2	32.8	33.0	99.4%
B24-1596	LDW23-GT18-GT-15-16.5-20240619	360.1	431.4	402.1	29.3	42.0	69.8%
B24-1597	LDW23-GT18-GT-25-26.5-20240619	356.7	794.8	696.6	98.2	339.9	28.9%
B24-1598	LDW23-GT18-GT-30-31.5-20240619	270.2	765.5	646.7	118.8	376.5	31.6%
B24-1600	LDW23-GT02-GT-5-6-20240617	215.5	313.4	269.1	44.3	53.6	82.6%
B24-1601	LDW23-GT02-GT-6-6.5-20240617	223.9	359.5	329.7	29.8	105.8	28.2%
B24-1602	LDW23-GT02-GT-10-10.8-20240617	303.4	599.7	537.2	62.5	233.8	26.7%
B24-1603	LDW23-GT02-GT-10.8-11.5-20240617	311.3	405.1	372.7	32.4	61.4	52.8%
B24-1604	LDW23-GT02-GT-15-15.5-20240617	320.0	572.0	485.1	86.9	165.1	52.6%
B24-1605	LDW23-GT02-GT-15.5-16.5-20240617	360.1	819.8	710.1	109.7	350.0	31.3%
B24-1606	LDW23-GT02-GT-20-21.5-20240617	420.7	889.1	776.1	113.0	355.4	31.8%
B24-1607	LDW23-GT02-GT-25.9-26.5-20240617	229.4	559.5	486.3	73.2	256.9	28.5%
B24-1608	LDW23-GT10-GT-0-1.5-20240618	414.2	1184.1	856.7	327.4	442.5	74.0%
B24-1609	LDW23-GT10-GT-5-6.5-20240618	221.0	392.5	317.9	74.6	96.9	77.0%
B24-1610	LDW23-GT10-GT-10-11.5-20240618	394.0	828.7	657.9	170.8	263.9	64.7%
B24-1611	LDW23-GT10-GT-15-15.5-20240618	221.8	516.0	392.2	123.8	170.4	72.7%

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**Comments:**

Reviewed by:

Alex Eifrig  
WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT30-GT-5-6.5-20240620 <b>Sample#:</b> B24-1587	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Visual Soils Classification</b> Clayey Sandy Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.005 mm      % Gravel = 2.8%      Coeff. of Curvature, C <sub>c</sub> = 1.50 D <sub>(10)</sub> = 0.009 mm      % Sand = 15.5%      Coeff. of Uniformity, C <sub>u</sub> = 6.00 D <sub>(15)</sub> = 0.014 mm      % Silt & Clay = 81.7%      Fineness Modulus = 0.58 D <sub>(30)</sub> = 0.028 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.046 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.055 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.968 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 54/59      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
---	--

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		98%	100.0%	0.0%
#4	4.75	97%	97%	100.0%	0.0%
#8	2.36		92%	100.0%	0.0%
#10	2.00	91%	91%	100.0%	0.0%
#16	1.18		90%	100.0%	0.0%
#20	0.850		90%	100.0%	0.0%
#30	0.600		89%	100.0%	0.0%
#40	0.425	89%	89%	100.0%	0.0%
#50	0.300		88%	100.0%	0.0%
#60	0.250		87%	100.0%	0.0%
#80	0.180		86%	100.0%	0.0%
#100	0.150	86%	86%	100.0%	0.0%
#140	0.106		83%	100.0%	0.0%
#170	0.090		82%	100.0%	0.0%
#200	0.075	81.7%	81.7%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT30-GT-5-6.5-20240620 <b>Sample#:</b> B24-1587	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Visual Soils Classification</b> Clayey Sandy Silt <b>Sample Color</b> Brown																																																																																																																																								
ASTM D-422 HYDROMETER ANALYSIS		ASTM C-136																																																																																																																																								
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**Comments:** \_\_\_\_\_  
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 \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT30-GT-10-11.5-20240620 <b>Sample #:</b> B24-1588	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 16-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Silty Clay <b>Sample Color</b> Brown
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### Liquid Limit Determination

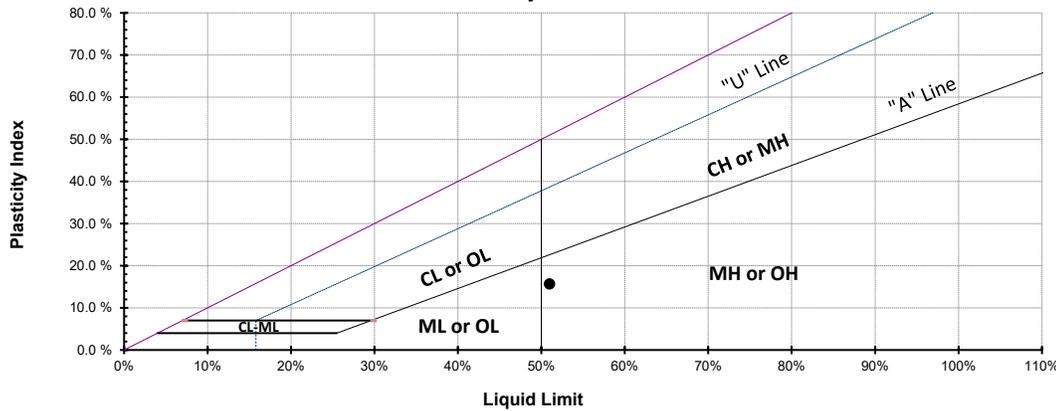
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	33.51	31.03	40.45			
Weight of Dry Soils + Pan:	28.69	27.04	33.03			
Weight of Pan:	18.43	19.29	19.23			
Weight of Dry Soils:	10.26	7.75	13.80			
Weight of Moisture:	4.82	3.99	7.42			
% Moisture:	47.0 %	51.5 %	53.8 %			
Number of Blows:	35	25	17			

**Liquid Limit @ 25 Blows:** 51.0 %  
**Plastic Limit:** 35.3 %  
**Plasticity Index, I<sub>p</sub>:** 15.7 %

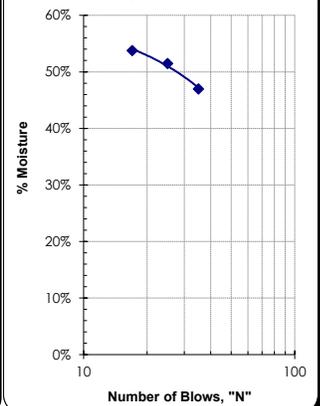
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	26.59	26.39				
Weight of Dry Soils + Pan:	24.76	24.67				
Weight of Pan:	19.47	19.90				
Weight of Dry Soils:	5.29	4.77				
Weight of Moisture:	1.83	1.72				
% Moisture:	34.6 %	36.1 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT30-GT-20-21.5-20240620 <b>Sample#:</b> B24-1591	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10182024	<b>Unified Soil Classification System, ASTM-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.012 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.023 mm      % Sand = 67.9% D <sub>(15)</sub> = 0.035 mm      % Silt & Clay = 32.1% D <sub>(30)</sub> = 0.070 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.187 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.275 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 1.315 mm      Fracture %, 1 Face = n/a Dust Ratio = 5/12      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 0.77 Coeff. of Uniformity, C <sub>u</sub> = 11.75 Fineness Modulus = 1.24 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		88%	100.0%	0.0%
#20	0.850		83%	100.0%	0.0%
#30	0.600		80%	100.0%	0.0%
#40	0.425	77%	77%	100.0%	0.0%
#50	0.300		63%	100.0%	0.0%
#60	0.250		57%	100.0%	0.0%
#80	0.180		49%	100.0%	0.0%
#100	0.150	46%	46%	100.0%	0.0%
#140	0.106		38%	100.0%	0.0%
#170	0.090		35%	100.0%	0.0%
#200	0.075	32.1%	32.1%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

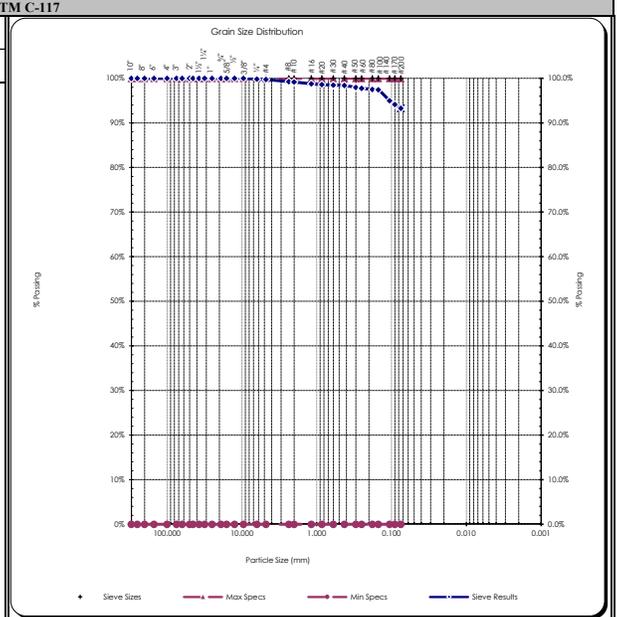
**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT18-GT-5-6.5-20240619 <b>Sample#:</b> B24-1594	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Visual Soils Classification</b> Clayey Silt with Sand <b>Sample Color:</b> Brown
<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b>		
<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	D <sub>(6)</sub> = 0.004 mm      % Gravel = 0.3% D <sub>(10)</sub> = 0.008 mm      % Sand = 6.4% D <sub>(15)</sub> = 0.012 mm      % Silt & Clay = 93.3% D <sub>(30)</sub> = 0.024 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.040 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.048 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.072 mm      Fracture %, 1 Face = n/a Dust Ratio = 55/58      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.50 Coeff. of Uniformity, C <sub>u</sub> = 6.00 Fineness Modulus = 0.08 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
<b>Method(s) ASTM C-136, ASTM D-6913, ASTM C-117</b>		

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
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6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		99%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		99%	100.0%	0.0%
#20	0.850		99%	100.0%	0.0%
#30	0.600		98%	100.0%	0.0%
#40	0.425	98%	98%	100.0%	0.0%
#50	0.300		98%	100.0%	0.0%
#60	0.250		98%	100.0%	0.0%
#80	0.180		98%	100.0%	0.0%
#100	0.150	97%	97%	100.0%	0.0%
#140	0.106		95%	100.0%	0.0%
#170	0.090		94%	100.0%	0.0%
#200	0.075	93.3%	93.3%	100.0%	0.0%



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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT18-GT-5-6.5-20240619 <b>Sample#:</b> B24-1594	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Visual Soils Classification</b> Clayey Silt with Sand <b>Sample Color</b> Brown																																																																																																					
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																					
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 50.57 grams <b>Hydroscopic Moist.:</b> 10.64% <b>Adj. Sample Wgt :</b> 45.71 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																					
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>2</td><td>30</td><td>65.1%</td><td>0.0326 mm</td></tr> <tr><td>5</td><td>23.5</td><td>51.0%</td><td>0.0216 mm</td></tr> <tr><td>15</td><td>19</td><td>41.2%</td><td>0.0128 mm</td></tr> <tr><td>30</td><td>15</td><td>32.5%</td><td>0.0093 mm</td></tr> <tr><td>60</td><td>12</td><td>26.0%</td><td>0.0067 mm</td></tr> <tr><td>250</td><td>7</td><td>15.2%</td><td>0.0034 mm</td></tr> <tr><td>1440</td><td>4</td><td>8.7%</td><td>0.0014 mm</td></tr> </tbody> </table>	Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	30	65.1%	0.0326 mm	5	23.5	51.0%	0.0216 mm	15	19	41.2%	0.0128 mm	30	15	32.5%	0.0093 mm	60	12	26.0%	0.0067 mm	250	7	15.2%	0.0034 mm	1440	4	8.7%	0.0014 mm	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>100%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>100%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>100%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>100%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>100%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>99%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>99%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>98%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>97%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>93.3%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>92.6%</td><td>0.074 mm</td></tr> <tr><td></td><td>76.7%</td><td>0.050 mm</td></tr> <tr><td></td><td>49.2%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>20.6%</td><td>0.005 mm</td></tr> <tr><td></td><td>10.6%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>6.1%</td><td>0.001 mm</td></tr> </tbody> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	100%	16.000 mm	1/2"	100%	12.500 mm	3/8"	100%	9.500 mm	1/4"	100%	6.300 mm	#4	100%	4.750 mm	#10	99%	2.000 mm	#20	99%	0.850 mm	#40	98%	0.425 mm	#100	97%	0.150 mm	#200	93.3%	0.075 mm	<b>Silts</b>	92.6%	0.074 mm		76.7%	0.050 mm		49.2%	0.020 mm	<b>Clays</b>	20.6%	0.005 mm		10.6%	0.002 mm	<b>Colloids</b>	6.1%	0.001 mm
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<b>% Gravel:</b> 0.3% <b>% Sand:</b> 6.4% <b>% Silt:</b> 72.7% <b>% Clay:</b> 20.6%		<b>Liquid Limit:</b> n/a <b>Plastic Limit:</b> n/a <b>Plasticity Index:</b> n/a																																																																																																					
<b>USDA Soil Textural Classification</b>																																																																																																							
<b>% Sand:</b> 2.0 - 0.05 mm <b>% Silt:</b> 0.05 - 0.002 mm <b>% Clay:</b> < 0.002 mm		<b>USDA Soil Textural Classification</b> Silt Loam																																																																																																					

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**Comments:** \_\_\_\_\_

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**Reviewed by:** Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT18-GT-10-11.5-20240619 <b>Sample #:</b> B24-1595	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Silty Clay <b>Sample Color</b> Brown
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### Liquid Limit Determination

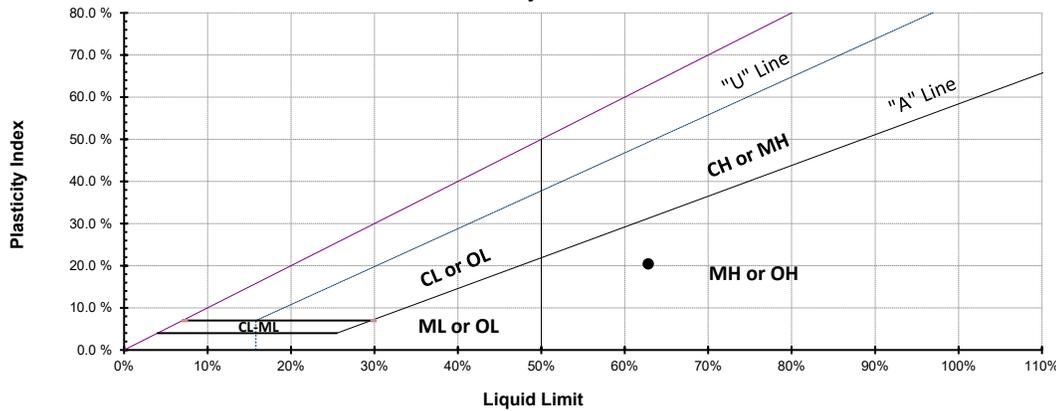
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	29.80	30.36	29.37			
Weight of Dry Soils + Pan:	26.11	26.68	25.91			
Weight of Pan:	20.20	20.83	20.43			
Weight of Dry Soils:	5.91	5.85	5.48			
Weight of Moisture:	3.69	3.68	3.46			
% Moisture:	62.4 %	62.9 %	63.1 %			
Number of Blows:	32	24	19			

**Liquid Limit @ 25 Blows:** 62.8 %  
**Plastic Limit:** 42.4 %  
**Plasticity Index, I<sub>p</sub>:** 20.4 %

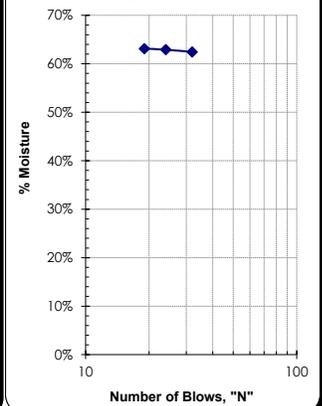
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	26.71	26.72				
Weight of Dry Soils + Pan:	24.88	24.95				
Weight of Pan:	20.65	20.69				
Weight of Dry Soils:	4.23	4.26				
Weight of Moisture:	1.83	1.77				
% Moisture:	43.3 %	41.6 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

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 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT18-GT-15-16.5-20240619 <b>Sample #:</b> B24-1596	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10182024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Clayey Silt <b>Sample Color</b> Brown
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### Liquid Limit Determination

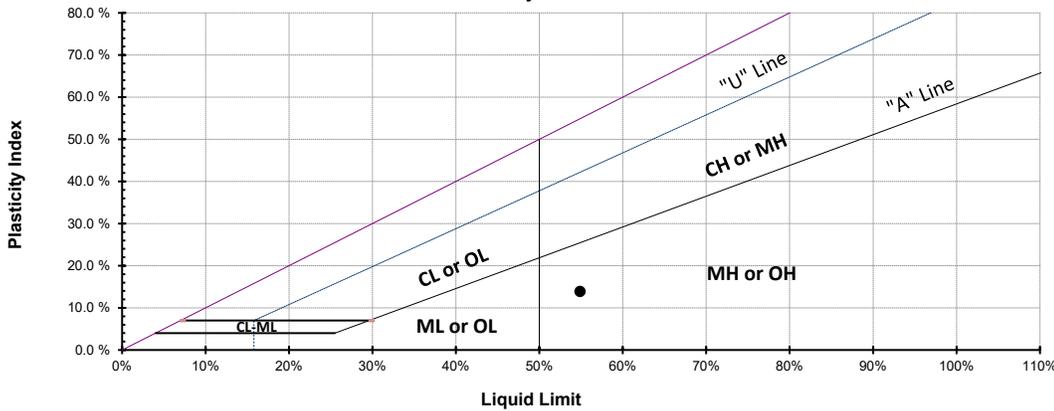
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	27.48	32.85	28.42			
Weight of Dry Soils + Pan:	22.85	28.07	23.19			
Weight of Pan:	14.00	19.39	14.05			
Weight of Dry Soils:	8.85	8.68	9.14			
Weight of Moisture:	4.63	4.78	5.23			
% Moisture:	52.3 %	55.1 %	57.2 %			
Number of Blows:	34	24	17			

**Liquid Limit @ 25 Blows:** 54.9 %  
**Plastic Limit:** 41.0 %  
**Plasticity Index, I<sub>p</sub>:** 13.9 %

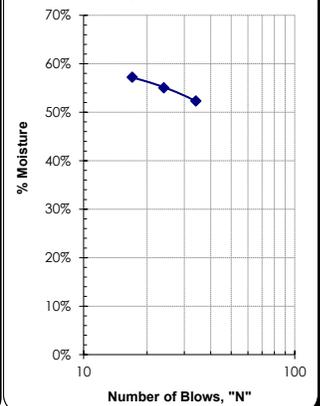
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	25.26	26.28				
Weight of Dry Soils + Pan:	23.48	24.35				
Weight of Pan:	19.19	19.58				
Weight of Dry Soils:	4.29	4.77				
Weight of Moisture:	1.78	1.93				
% Moisture:	41.5 %	40.5 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT18-GT-25-26.5-20240619 <b>Sample#:</b> B24-1597	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10182024	<b>Unified Soil Classification System, ASTM-2487</b> SP-SM, Poorly graded Sand with Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.038 mm      % Gravel = 0.1% D <sub>(10)</sub> = 0.076 mm      % Sand = 90.0% D <sub>(15)</sub> = 0.100 mm      % Silt & Clay = 9.9% D <sub>(30)</sub> = 0.171 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.257 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.300 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.539 mm      Fracture %, 1 Face = n/a Dust Ratio = 1/9      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.29 Coeff. of Uniformity, C <sub>u</sub> = 3.97 Fineness Modulus = 1.30 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		94%	100.0%	0.0%
#20	0.850		92%	100.0%	0.0%
#30	0.600		90%	100.0%	0.0%
#40	0.425	89%	89%	100.0%	0.0%
#50	0.300		60%	100.0%	0.0%
#60	0.250		48%	100.0%	0.0%
#80	0.180		32%	100.0%	0.0%
#100	0.150	25%	25%	100.0%	0.0%
#140	0.106		16%	100.0%	0.0%
#170	0.090		13%	100.0%	0.0%
#200	0.075	9.9%	9.9%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 14, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 10182024

### Moisture Content ASTM C-566, ASTM D-2216

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1599	LDW23-GT02-GT-0-1.5-20240617	423.8	1247.9	888.0	359.9	464.2	77.5%
B24-1608	LDW23-GT10-GT-0-1.5-20240618	414.2	1184.1	856.7	327.4	442.5	74.0%

### Organic Content ASTM D-2974

Sample #	Location	Tare	Soil + Tare, Pre-Ignition	Soil + Tare, Post Ignition	% Organics
B24-1599	LDW23-GT02-0-1.5-20240617	51.49	100.01	97.36	5.46%
B24-1608	LDW23-GT10-0-1.5-20240618	50.2	100.00	97.80	4.42%

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## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT02-GT-5-6-20240617 <b>Sample #:</b> B24-1600	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Clayey Silt <b>Sample Color</b> Brown
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### Liquid Limit Determination

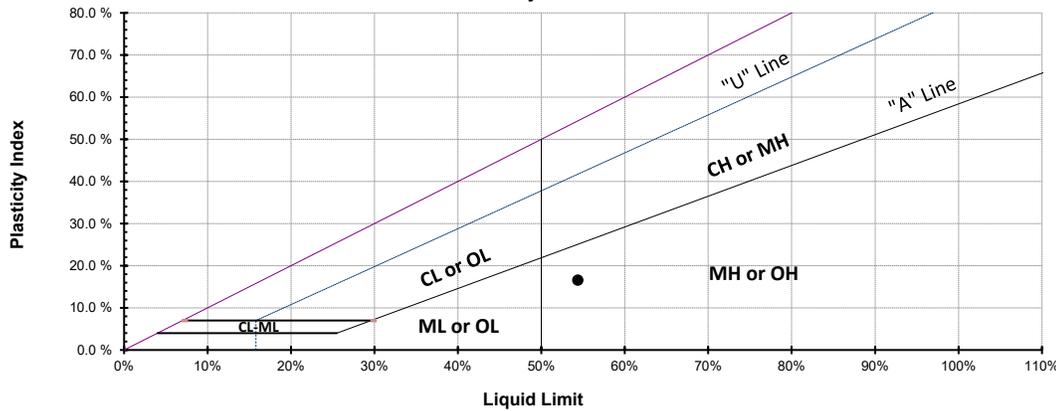
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	29.69	29.47	32.17			
Weight of Dry Soils + Pan:	26.30	25.94	27.59			
Weight of Pan:	19.88	19.47	19.41			
Weight of Dry Soils:	6.42	6.47	8.18			
Weight of Moisture:	3.39	3.53	4.58			
% Moisture:	52.8 %	54.6 %	56.0 %			
Number of Blows:	31	25	18			

**Liquid Limit @ 25 Blows:** 54.4 %  
**Plastic Limit:** 37.8 %  
**Plasticity Index, I<sub>p</sub>:** 16.6 %

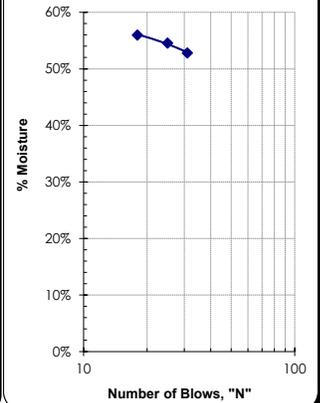
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	25.41	24.92				
Weight of Dry Soils + Pan:	23.69	23.16				
Weight of Pan:	19.19	18.44				
Weight of Dry Soils:	4.50	4.72				
Weight of Moisture:	1.72	1.76				
% Moisture:	38.2 %	37.3 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

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 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT02-GT-10.8-11.5-20240617 <b>Sample#:</b> B24-1603	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Unified Soils Classification System, ASTM D-2487</b> OL, Clayey Silt with Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.006 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.011 mm      % Sand = 31.9% D <sub>(15)</sub> = 0.017 mm      % Silt & Clay = 68.1% D <sub>(30)</sub> = 0.033 mm      Liquid Limit = 45.1% D <sub>(50)</sub> = 0.055 mm      Plasticity Index = 10.9% D <sub>(60)</sub> = 0.066 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.350 mm      Fracture %, 1 Face = n/a Dust Ratio = 44/61      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.50 Coeff. of Uniformity, C <sub>u</sub> = 6.00 Fineness Modulus = 0.43 Plastic Limit = 34.2% Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		97%	100.0%	0.0%
#20	0.850		96%	100.0%	0.0%
#30	0.600		95%	100.0%	0.0%
#40	0.425	94%	94%	100.0%	0.0%
#50	0.300		87%	100.0%	0.0%
#60	0.250		84%	100.0%	0.0%
#80	0.180		80%	100.0%	0.0%
#100	0.150	78%	78%	100.0%	0.0%
#140	0.106		72%	100.0%	0.0%
#170	0.090		70%	100.0%	0.0%
#200	0.075	68.1%	68.1%	100.0%	0.0%

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 All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT02-GT-10.8-11.5-20240617 <b>Sample#:</b> B24-1603	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Unified Soils Classification System, ASTM D-2487</b> OL, Clayey Silt with Sand <b>Sample Color</b> Brown																																																																																																					
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																					
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 50.16 grams <b>Hydroscopic Moist.:</b> 4.16% <b>Adj. Sample Wgt :</b> 48.16 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																					
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>2</td><td>25</td><td>51.9%</td><td>0.0337 mm</td></tr> <tr><td>5</td><td>20</td><td>41.5%</td><td>0.0220 mm</td></tr> <tr><td>15</td><td>15</td><td>31.1%</td><td>0.0131 mm</td></tr> <tr><td>30</td><td>12</td><td>24.9%</td><td>0.0094 mm</td></tr> <tr><td>60</td><td>10</td><td>20.8%</td><td>0.0068 mm</td></tr> <tr><td>250</td><td>6</td><td>12.5%</td><td>0.0034 mm</td></tr> <tr><td>1440</td><td>3.5</td><td>7.3%</td><td>0.0014 mm</td></tr> </tbody> </table>		Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	25	51.9%	0.0337 mm	5	20	41.5%	0.0220 mm	15	15	31.1%	0.0131 mm	30	12	24.9%	0.0094 mm	60	10	20.8%	0.0068 mm	250	6	12.5%	0.0034 mm	1440	3.5	7.3%	0.0014 mm	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>100%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>100%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>100%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>100%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>100%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>100%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>96%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>94%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>78%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>68.1%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>67.7%</td><td>0.074 mm</td></tr> <tr><td></td><td>58.3%</td><td>0.050 mm</td></tr> <tr><td></td><td>39.2%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>16.4%</td><td>0.005 mm</td></tr> <tr><td></td><td>8.8%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>5.1%</td><td>0.001 mm</td></tr> </tbody> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	100%	16.000 mm	1/2"	100%	12.500 mm	3/8"	100%	9.500 mm	1/4"	100%	6.300 mm	#4	100%	4.750 mm	#10	100%	2.000 mm	#20	96%	0.850 mm	#40	94%	0.425 mm	#100	78%	0.150 mm	#200	68.1%	0.075 mm	<b>Silts</b>	67.7%	0.074 mm		58.3%	0.050 mm		39.2%	0.020 mm	<b>Clays</b>	16.4%	0.005 mm		8.8%	0.002 mm	<b>Colloids</b>	5.1%	0.001 mm
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**Comments:** \_\_\_\_\_

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**Reviewed by:**

Alex Eifrig

\_\_\_\_\_  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT02-GT-10.8-11.5-20240617 <b>Sample #:</b> B24-1603	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Unified Soils Classification System, ASTM D-2487</b> OL, Clayey Silt with Sand <b>Sample Color</b> Brown
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### Liquid Limit Determination

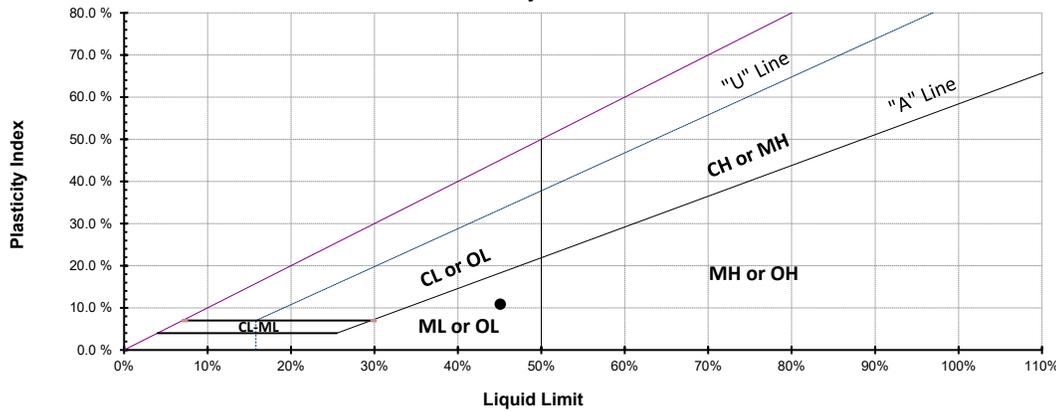
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	23.90	24.08	40.70			
Weight of Dry Soils + Pan:	21.09	21.13	36.71			
Weight of Pan:	14.71	14.56	28.10			
Weight of Dry Soils:	6.38	6.57	8.61			
Weight of Moisture:	2.81	2.95	3.99			
% Moisture:	44.0 %	44.9 %	46.3 %			
Number of Blows:	35	24	16			

**Liquid Limit @ 25 Blows:** 45.1 %  
**Plastic Limit:** 34.2 %  
**Plasticity Index, I<sub>p</sub>:** 10.9 %

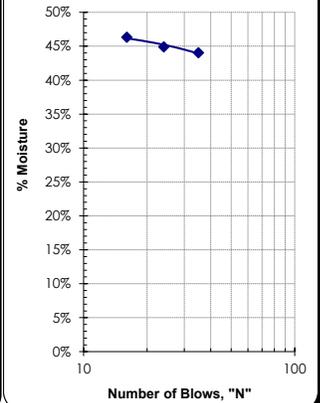
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	26.48	25.66				
Weight of Dry Soils + Pan:	24.72	24.04				
Weight of Pan:	19.58	19.30				
Weight of Dry Soils:	5.14	4.74				
Weight of Moisture:	1.76	1.62				
% Moisture:	34.2 %	34.2 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT02-GT-15.5-16.5-20240617 <b>Sample#:</b> B24-1605	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10182024	<b>Visual Soils Classification</b> Silt with Clay and Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.006 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.011 mm      % Sand = 31.9% D <sub>(15)</sub> = 0.017 mm      % Silt & Clay = 68.1% D <sub>(30)</sub> = 0.033 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.055 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.066 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.139 mm      Fracture %, 1 Face = n/a Dust Ratio = 28/41      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.50 Coeff. of Uniformity, C <sub>u</sub> = 6.00 Fineness Modulus = 0.10 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		100%	100.0%	0.0%
#20	0.850		100%	100.0%	0.0%
#30	0.600		100%	100.0%	0.0%
#40	0.425	100%	100%	100.0%	0.0%
#50	0.300		97%	100.0%	0.0%
#60	0.250		96%	100.0%	0.0%
#80	0.180		94%	100.0%	0.0%
#100	0.150	94%	94%	100.0%	0.0%
#140	0.106		79%	100.0%	0.0%
#170	0.090		73%	100.0%	0.0%
#200	0.075	68.1%	68.1%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT10-GT-5-6.5-20240618 <b>Sample #:</b> B24-1609	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10182024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Silty Clay with Sand <b>Sample Color</b> Brown
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### Liquid Limit Determination

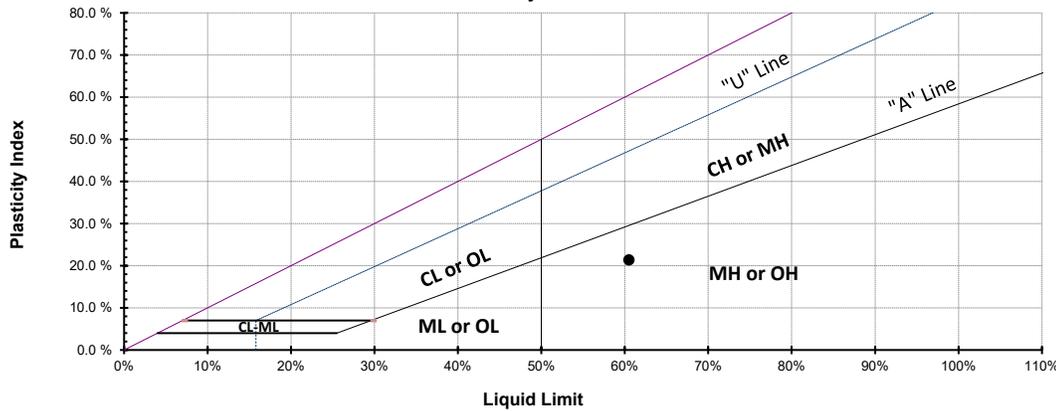
	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	31.45	24.69	25.03			
<b>Weight of Dry Soils + Pan:</b>	26.93	20.65	20.85			
<b>Weight of Pan:</b>	19.29	14.02	14.08			
<b>Weight of Dry Soils:</b>	7.64	6.63	6.77			
<b>Weight of Moisture:</b>	4.52	4.04	4.18			
<b>% Moisture:</b>	59.2 %	60.9 %	61.7 %			
<b>Number of Blows:</b>	33	24	16			

**Liquid Limit @ 25 Blows:** 60.5 %  
**Plastic Limit:** 39.1 %  
**Plasticity Index, I<sub>p</sub>:** 21.4 %

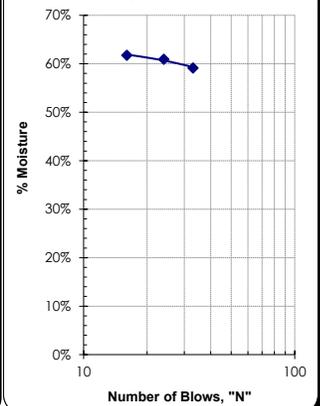
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	25.56	26.88				
<b>Weight of Dry Soils + Pan:</b>	23.87	25.14				
<b>Weight of Pan:</b>	19.56	20.68				
<b>Weight of Dry Soils:</b>	4.31	4.46				
<b>Weight of Moisture:</b>	1.69	1.74				
<b>% Moisture:</b>	39.2 %	39.0 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT10-GT-10-11.5-20240618 <b>Sample#:</b> B24-1610	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Visual Soils Classification</b> Clayey Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.004 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.008 mm      % Sand = 7.5% D <sub>(15)</sub> = 0.012 mm      % Silt & Clay = 92.5% D <sub>(30)</sub> = 0.024 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.041 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.049 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.073 mm      Fracture %, 1 Face = n/a Dust Ratio = 13/14      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.50 Coeff. of Uniformity, C <sub>u</sub> = 6.00 Fineness Modulus = 0.03 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		100%	100.0%	0.0%
#20	0.850		100%	100.0%	0.0%
#30	0.600		100%	100.0%	0.0%
#40	0.425	100%	100%	100.0%	0.0%
#50	0.300		99%	100.0%	0.0%
#60	0.250		99%	100.0%	0.0%
#80	0.180		99%	100.0%	0.0%
#100	0.150	99%	99%	100.0%	0.0%
#140	0.106		95%	100.0%	0.0%
#170	0.090		94%	100.0%	0.0%
#200	0.075	92.5%	92.5%	100.0%	0.0%

Copyright Spens Engineering & Technical Services PS, 1996-98  
 All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT10-GT-10-11.5-20240618 <b>Sample#:</b> B24-1610	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 15-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10182024	<b>Visual Soils Classification</b> Clayey Silt <b>Sample Color</b> Brown																																																																																																					
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																					
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 50.24 grams <b>Hydroscopic Moist.:</b> 7.69% <b>Adj. Sample Wgt :</b> 46.65 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																					
	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>2</td><td>33</td><td>70.6%</td><td>0.0319 mm</td></tr> <tr><td>5</td><td>29</td><td>62.1%</td><td>0.0207 mm</td></tr> <tr><td>15</td><td>23</td><td>49.2%</td><td>0.0125 mm</td></tr> <tr><td>30</td><td>18</td><td>38.5%</td><td>0.0091 mm</td></tr> <tr><td>60</td><td>14</td><td>30.0%</td><td>0.0066 mm</td></tr> <tr><td>250</td><td>8</td><td>17.1%</td><td>0.0033 mm</td></tr> <tr><td>1440</td><td>5</td><td>10.7%</td><td>0.0014 mm</td></tr> </tbody> </table>	Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	33	70.6%	0.0319 mm	5	29	62.1%	0.0207 mm	15	23	49.2%	0.0125 mm	30	18	38.5%	0.0091 mm	60	14	30.0%	0.0066 mm	250	8	17.1%	0.0033 mm	1440	5	10.7%	0.0014 mm	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>100%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>100%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>100%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>100%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>100%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>100%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>100%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>100%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>99%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>92.5%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>92.0%</td><td>0.074 mm</td></tr> <tr><td></td><td>79.8%</td><td>0.050 mm</td></tr> <tr><td></td><td>61.0%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>23.7%</td><td>0.005 mm</td></tr> <tr><td></td><td>12.6%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>7.6%</td><td>0.001 mm</td></tr> </tbody> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	100%	16.000 mm	1/2"	100%	12.500 mm	3/8"	100%	9.500 mm	1/4"	100%	6.300 mm	#4	100%	4.750 mm	#10	100%	2.000 mm	#20	100%	0.850 mm	#40	100%	0.425 mm	#100	99%	0.150 mm	#200	92.5%	0.075 mm	<b>Silts</b>	92.0%	0.074 mm		79.8%	0.050 mm		61.0%	0.020 mm	<b>Clays</b>	23.7%	0.005 mm		12.6%	0.002 mm	<b>Colloids</b>	7.6%	0.001 mm
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Reviewed by:** Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Client:** Anchor QEA, LLC.  
**Address:** 1201 3rd Avenue, Suite 2600  
Seattle, WA 98101  
**Attn:** Cindy Fields  
**Revised On:** \_\_\_\_\_

**Date:** October 23, 2024  
**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Sample #:** B24-1612 - 1637  
**Date sampled:** June 18, 2024 - August 1, 2024  
**Control No:** 10232024

As requested and authorized by the Client, MTC has performed the following test(s) on the sample number referenced above. The testing was performed in accordance with current, applicable AASHTO, ASTM, and/or WSDOT standards, which are referenced on the correlating test report pages. The results obtained in our laboratory are as detailed below and/or on the following pages:

	Test(s) Performed:	Test Results	Test(s) Performed:	Test Results
X	Sieve Analysis	See Attached Reports	Sulfate Soundness	
	Proctor		Bulk Density & Voids	
	Sand Equivalent		WSDOT Degradation	
	Fracture Count		LA Abrasion	
X	Moisture Content	See Attached Reports	Cation Exchange Capacity	
	Specific Gravity, Coarse		X Specific Gravity, Soils	See Attached Report
	Specific Gravity, Fine		X Organic Content	See Attached Report
X	Hydrometer Analysis	See Attached Reports		
X	Atterberg Limits	See Attached Reports		

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call the number below and ask to speak with your Project Manager or the Laboratory Manager.

*Alex Eifrig*

\_\_\_\_\_  
 Respectfully Submitted,  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Moisture Content ASTM C-566, ASTM D-2216

**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 15, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 10232024

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1612	LDW23-GT10-GT-15.5-16.5-20240618	360.2	528.6	482.2	46.4	122.0	38.0%
B24-1613	LDW23-GT09-GT-0-1.5-20240618	301.1	437.4	374.9	62.5	73.8	84.7%
B24-1614	LDW23-GT09-GT-5-6.2-20240618	260.3	365.3	321.3	44.0	61.0	72.1%
B24-1615	LDW23-GT09-GT-6.2-6.5-20240618	223.0	470.0	368.6	101.4	145.6	69.6%
B24-1616	LDW23-GT09-GT-10-11.5-20240618	356.8	746.8	618.8	128.0	262.0	48.9%
B24-1617	LDW23-GT09-GT-15-16.5-20240618	222.5	339.3	296.9	42.4	74.4	57.0%
B24-1618	LDW23-GT19-GT-0-1.5-20240619	225.7	670.9	468.6	202.3	242.9	83.3%
B24-1619	LDW23-GT19-GT-5-6.5-20240619	208.7	342.9	289.1	53.8	80.4	66.9%
B24-1620	LDW23-GT19-GT-10-11.5-20240619	358.3	669.4	603.2	66.2	244.9	27.0%
B24-1621	LDW23-GT19-GT-15-16.5-20240619	233.1	969.8	805.5	164.3	572.4	28.7%
B24-1622	LDW23-GT19-GT-20-20.8-20240619	234.8	708.3	613.7	94.6	378.9	25.0%
B24-1623	LDW23-GT19-GT-20.8-21.5-20240619	357.9	868.0	740.5	127.5	382.6	33.3%
B24-1625	LDW23-GT19-GT-30-31.5-20240619	584.1	1572.3	1345.9	226.4	761.8	29.7%
B24-1626	LDW23-GT11-GT-1.3-2-20240801	221.8	334.6	325.5	9.1	103.7	8.8%
B24-1627	LDW23-GT11-GT-5-6.5-20240801	584.1	1095.7	950.4	145.3	366.3	39.7%
B24-1628	LDW23-GT11-GT-10-10.8-20240801	221.7	242.0	236.0	6.0	14.3	42.0%
B24-1629	LDW23-GT11-GT-10.8-11.5-20240801	221.0	601.4	466.7	134.7	245.7	54.8%
B24-1630	LDW23-GT11-GT-15-16.5-20240801	357.3	932.8	758.1	174.7	400.8	43.6%
B24-1631	LDW23-GT11-GT-20-21.3-20240801	229.4	290.6	272.6	18.0	43.2	41.7%
B24-1632	LDW23-GT11-GT-21.3-21.5-20240801	215.5	395.8	331.2	64.6	115.7	55.8%
B24-1633	LDW23-GT11-GT-25-26.5-20240801	234.5	365.0	314.2	50.8	79.7	63.7%
B24-1634	LDW23-GT11-GT-30-31.5-20240801	429.7	1234.4	942.8	291.6	513.1	56.8%
B24-1635	LDW23-GT11-GT-35-36.5-20240801	380.0	1158.4	879.4	279.0	499.4	55.9%
B24-1636	LDW23-GT11-GT-40-41.5-20240801	414.0	799.2	703.2	96.0	289.2	33.2%
B24-1637	LDW23-GT13-GT-0.5-2-20240801	510.0	1437.5	1249.5	188.0	739.5	25.4%

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:**

Reviewed by:

Alex Eifrig  
WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT10-GT-15.5-16.5-20240618 <b>Sample#:</b> B24-1612	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10232024	<b>Visual Soils Classification</b> Clayey Silt with Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.006 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>c</sub> = 1.50 D <sub>(10)</sub> = 0.011 mm      % Sand = 33.6%      Coeff. of Uniformity, C <sub>u</sub> = 6.00 D <sub>(15)</sub> = 0.017 mm      % Silt & Clay = 66.4%      Fineness Modulus = 0.09 D <sub>(30)</sub> = 0.034 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.056 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.068 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.138 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 2/3      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		100%	100.0%	0.0%
#20	0.850		99%	100.0%	0.0%
#30	0.600		99%	100.0%	0.0%
#40	0.425	99%	99%	100.0%	0.0%
#50	0.300		97%	100.0%	0.0%
#60	0.250		96%	100.0%	0.0%
#80	0.180		95%	100.0%	0.0%
#100	0.150	95%	95%	100.0%	0.0%
#140	0.106		78%	100.0%	0.0%
#170	0.090		72%	100.0%	0.0%
#200	0.075	66.4%	66.4%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT09-GT-0-1.5-20240618 <b>Sample #:</b> B24-1613	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 18-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Clayey Silt <b>Sample Color</b> Brown
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### Liquid Limit Determination

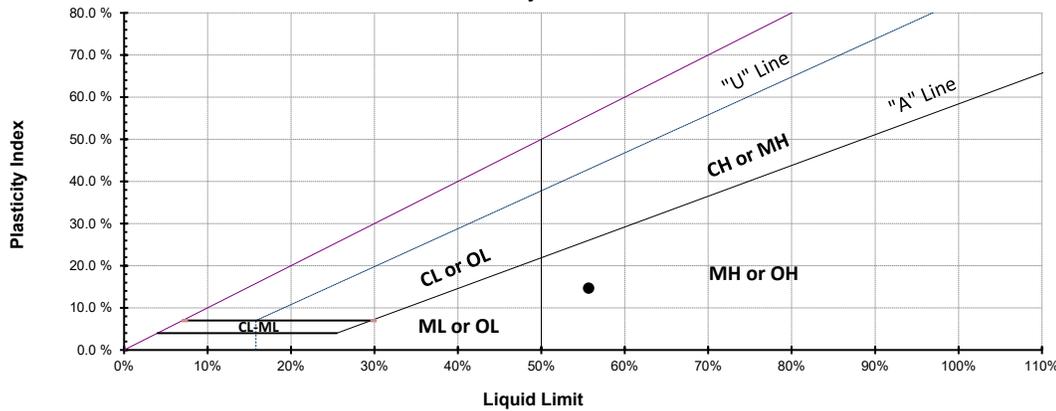
	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	26.16	32.56	31.06			
<b>Weight of Dry Soils + Pan:</b>	22.20	27.89	26.80			
<b>Weight of Pan:</b>	14.58	19.33	19.56			
<b>Weight of Dry Soils:</b>	7.62	8.56	7.24			
<b>Weight of Moisture:</b>	3.96	4.67	4.26			
<b>% Moisture:</b>	52.0 %	54.6 %	58.8 %			
<b>Number of Blows:</b>	35	30	15			

**Liquid Limit @ 25 Blows:** 55.7 %  
**Plastic Limit:** 41.0 %  
**Plasticity Index, I<sub>p</sub>:** 14.7 %

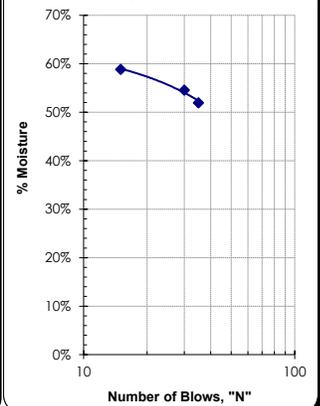
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	20.18	26.72				
<b>Weight of Dry Soils + Pan:</b>	18.39	24.99				
<b>Weight of Pan:</b>	14.10	20.69				
<b>Weight of Dry Soils:</b>	4.29	4.30				
<b>Weight of Moisture:</b>	1.79	1.73				
<b>% Moisture:</b>	41.7 %	40.2 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 17, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 10232024

**Moisture Content ASTM C-566, ASTM D-2216**

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1613	LDW23-GT09-GT-0-1.5-20240618	301.1	437.4	374.9	62.5	73.8	84.7%
B24-1618	LDW23-GT19-GT-0-1.5-20240619	225.7	670.9	468.6	202.3	242.9	83.3%

**Organic Content ASTM D-2974**

Sample #	Location	Tare	Soil + Tare, Pre-Ignition	Soil + Tare, Post Ignition	% Organics
B24-1613	LDW23-GT09-GT-0-1.5-20240618	49.20	93.45	90.97	5.60%
B24-1618	LDW23-GT19-GT-0-1.5-20240619	52.65	101.42	97.95	7.12%

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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT09-GT-5-6.2-20240618 <b>Sample #:</b> B24-1614	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 18-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Clayey Silt with Sand <b>Sample Color</b> Brown
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### Liquid Limit Determination

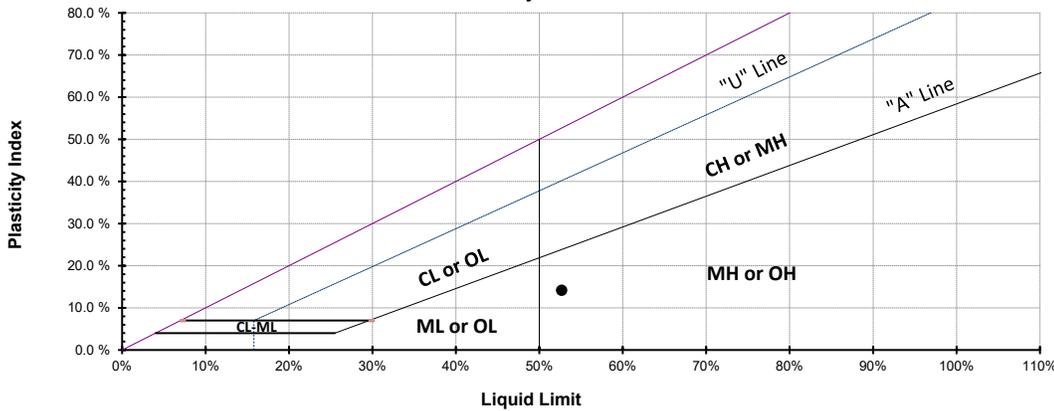
	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	29.34	25.79	37.45			
<b>Weight of Dry Soils + Pan:</b>	26.02	23.63	34.21			
<b>Weight of Pan:</b>	19.55	19.48	28.17			
<b>Weight of Dry Soils:</b>	6.47	4.15	6.04			
<b>Weight of Moisture:</b>	3.32	2.16	3.24			
<b>% Moisture:</b>	51.3 %	52.1 %	53.6 %			
<b>Number of Blows:</b>	35	27	20			

**Liquid Limit @ 25 Blows:** 52.7 %  
**Plastic Limit:** 38.5 %  
**Plasticity Index, I<sub>p</sub>:** 14.2 %

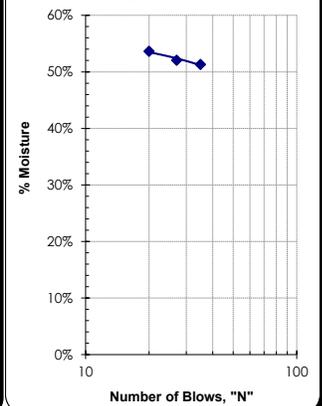
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	20.25	20.93				
<b>Weight of Dry Soils + Pan:</b>	18.56	19.17				
<b>Weight of Pan:</b>	14.06	14.71				
<b>Weight of Dry Soils:</b>	4.50	4.46				
<b>Weight of Moisture:</b>	1.69	1.76				
<b>% Moisture:</b>	37.6 %	39.5 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT09-GT-10-11.5-20240618 <b>Sample#:</b> B24-1616	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10232024	<b>Visual Soils Classification</b> Clayey Silt with Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.006 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.012 mm      % Sand = 39.8% D <sub>(15)</sub> = 0.019 mm      % Silt & Clay = 60.2% D <sub>(30)</sub> = 0.037 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.062 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.075 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.165 mm      Fracture %, 1 Face = n/a Dust Ratio = 8/13      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.50 Coeff. of Uniformity, C <sub>u</sub> = 6.00 Fineness Modulus = 0.19 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		99%	100.0%	0.0%
#20	0.850		98%	100.0%	0.0%
#30	0.600		98%	100.0%	0.0%
#40	0.425	98%	98%	100.0%	0.0%
#50	0.300		94%	100.0%	0.0%
#60	0.250		93%	100.0%	0.0%
#80	0.180		90%	100.0%	0.0%
#100	0.150	90%	90%	100.0%	0.0%
#140	0.106		72%	100.0%	0.0%
#170	0.090		66%	100.0%	0.0%
#200	0.075	60.2%	60.2%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT09-GT-15-16.5-20240618 <b>Sample#:</b> B24-1617	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10232024	<b>Visual Soils Classification</b> Clayey Silt with Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.005 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>c</sub> = 1.50 D <sub>(10)</sub> = 0.009 mm      % Sand = 19.6%      Coeff. of Uniformity, C <sub>u</sub> = 6.00 D <sub>(15)</sub> = 0.014 mm      % Silt & Clay = 80.4%      Fineness Modulus = 0.05 D <sub>(30)</sub> = 0.028 mm      Liquid Limit = 49.0%      Plastic Limit = 38.3% D <sub>(50)</sub> = 0.047 mm      Plasticity Index = 10.7%      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.056 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.118 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 80/99      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		100%	100.0%	0.0%
#20	0.850		100%	100.0%	0.0%
#30	0.600		99%	100.0%	0.0%
#40	0.425	99%	99%	100.0%	0.0%
#50	0.300		98%	100.0%	0.0%
#60	0.250		98%	100.0%	0.0%
#80	0.180		98%	100.0%	0.0%
#100	0.150	97%	97%	100.0%	0.0%
#140	0.106		87%	100.0%	0.0%
#170	0.090		84%	100.0%	0.0%
#200	0.075	80.4%	80.4%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT09-GT-15-16.5-20240618 <b>Sample#:</b> B24-1617	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10232024	<b>Visual Soils Classification</b> Clayey Silt with Sand <b>Sample Color</b> Brown																																																																																																					
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																					
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 50.15 grams <b>Hydroscopic Moist.:</b> 5.58% <b>Adj. Sample Wgt :</b> 47.50 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																					
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>2</td><td>22.5</td><td>47.2%</td><td>0.0344 mm</td></tr> <tr><td>5</td><td>19</td><td>39.9%</td><td>0.0222 mm</td></tr> <tr><td>15</td><td>15</td><td>31.5%</td><td>0.0131 mm</td></tr> <tr><td>30</td><td>12</td><td>25.2%</td><td>0.0094 mm</td></tr> <tr><td>60</td><td>10.5</td><td>22.0%</td><td>0.0068 mm</td></tr> <tr><td>250</td><td>6</td><td>12.6%</td><td>0.0034 mm</td></tr> <tr><td>1440</td><td>3.5</td><td>7.3%</td><td>0.0014 mm</td></tr> </tbody> </table>	Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	22.5	47.2%	0.0344 mm	5	19	39.9%	0.0222 mm	15	15	31.5%	0.0131 mm	30	12	25.2%	0.0094 mm	60	10.5	22.0%	0.0068 mm	250	6	12.6%	0.0034 mm	1440	3.5	7.3%	0.0014 mm	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>100%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>100%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>100%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>100%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>100%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>100%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>100%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>99%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>97%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>80.4%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>79.6%</td><td>0.074 mm</td></tr> <tr><td></td><td>60.0%</td><td>0.050 mm</td></tr> <tr><td></td><td>37.9%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>17.1%</td><td>0.005 mm</td></tr> <tr><td></td><td>8.9%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>5.1%</td><td>0.001 mm</td></tr> </tbody> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	100%	16.000 mm	1/2"	100%	12.500 mm	3/8"	100%	9.500 mm	1/4"	100%	6.300 mm	#4	100%	4.750 mm	#10	100%	2.000 mm	#20	100%	0.850 mm	#40	99%	0.425 mm	#100	97%	0.150 mm	#200	80.4%	0.075 mm	<b>Silts</b>	79.6%	0.074 mm		60.0%	0.050 mm		37.9%	0.020 mm	<b>Clays</b>	17.1%	0.005 mm		8.9%	0.002 mm	<b>Colloids</b>	5.1%	0.001 mm
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**Comments:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT09-GT-15-16.5-20240618 <b>Sample #:</b> B24-1617	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 18-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> OL, Clayey Silt <b>Sample Color</b> Brown
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### Liquid Limit Determination

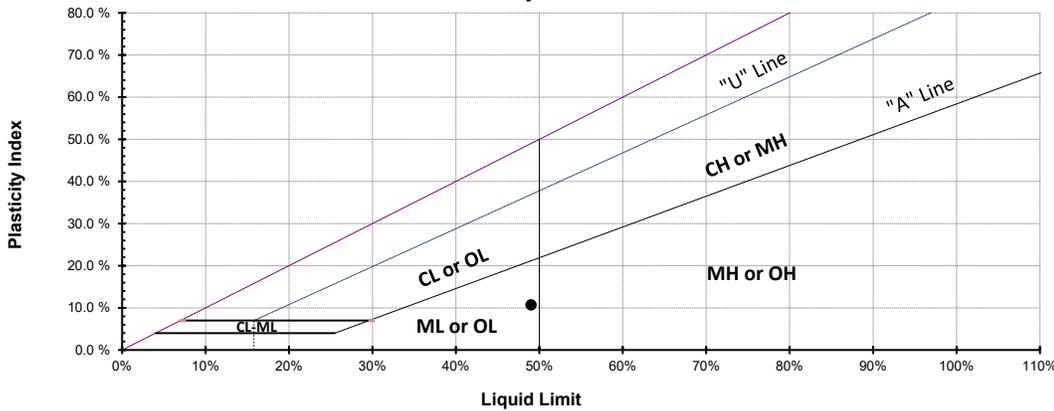
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	34.50	34.57	29.10			
Weight of Dry Soils + Pan:	29.31	29.75	25.88			
Weight of Pan:	18.46	19.93	19.59			
Weight of Dry Soils:	10.85	9.82	6.29			
Weight of Moisture:	5.19	4.82	3.22			
% Moisture:	47.8 %	49.1 %	51.2 %			
Number of Blows:	31	23	16			

**Liquid Limit @ 25 Blows:** 49.0 %  
**Plastic Limit:** 38.3 %  
**Plasticity Index, I<sub>p</sub>:** 10.7 %

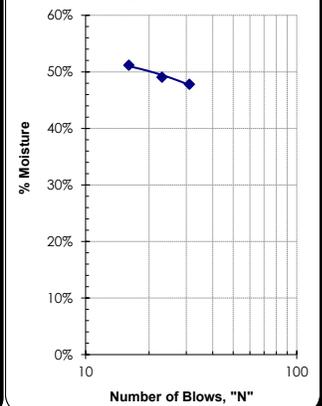
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	25.56	25.31				
Weight of Dry Soils + Pan:	23.80	23.66				
Weight of Pan:	19.33	19.22				
Weight of Dry Soils:	4.47	4.44				
Weight of Moisture:	1.76	1.65				
% Moisture:	39.4 %	37.2 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT19-GT-5-6.5-20240619 <b>Sample #:</b> B24-1619	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Silty Clay <b>Sample Color</b> Brown
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### Liquid Limit Determination

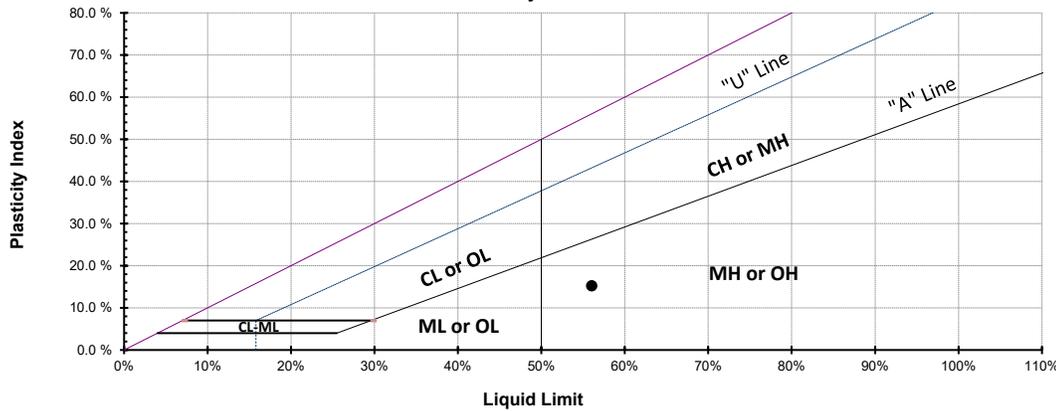
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	33.48	31.11	30.04			
Weight of Dry Soils + Pan:	28.88	27.21	26.62			
Weight of Pan:	20.47	20.21	20.80			
Weight of Dry Soils:	8.41	7.00	5.82			
Weight of Moisture:	4.60	3.90	3.42			
% Moisture:	54.7 %	55.7 %	58.8 %			
Number of Blows:	31	25	15			

**Liquid Limit @ 25 Blows:** 56.0 %  
**Plastic Limit:** 40.8 %  
**Plasticity Index, I<sub>p</sub>:** 15.2 %

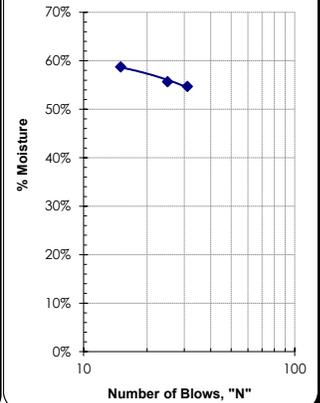
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	27.42	28.69				
Weight of Dry Soils + Pan:	25.57	26.44				
Weight of Pan:	21.08	20.87				
Weight of Dry Soils:	4.49	5.57				
Weight of Moisture:	1.85	2.25				
% Moisture:	41.2 %	40.4 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT19-GT-10-11.5-20240619 <b>Sample#:</b> B24-1620	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> SP-SM, Poorly graded Sand with Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.067 mm      % Gravel = 2.7% D <sub>(10)</sub> = 0.111 mm      % Sand = 91.8% D <sub>(15)</sub> = 0.151 mm      % Silt & Clay = 5.6% D <sub>(30)</sub> = 0.217 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.306 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.350 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 1.476 mm      Fracture %, 1 Face = n/a Dust Ratio = 4/55      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.22 Coeff. of Uniformity, C <sub>u</sub> = 3.16 Fineness Modulus = 1.77 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		98%	100.0%	0.0%
#4	4.75	97%	97%	100.0%	0.0%
#8	2.36		97%	100.0%	0.0%
#10	2.00	96%	96%	100.0%	0.0%
#16	1.18		86%	100.0%	0.0%
#20	0.850		82%	100.0%	0.0%
#30	0.600		79%	100.0%	0.0%
#40	0.425	77%	77%	100.0%	0.0%
#50	0.300		49%	100.0%	0.0%
#60	0.250		37%	100.0%	0.0%
#80	0.180		22%	100.0%	0.0%
#100	0.150	15%	15%	100.0%	0.0%
#140	0.106		9%	100.0%	0.0%
#170	0.090		7%	100.0%	0.0%
#200	0.075	5.6%	5.6%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT19-GT-25-26.5-20240619 <b>Sample#:</b> B24-1624	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.020 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.040 mm      % Sand = 81.3% D <sub>(15)</sub> = 0.060 mm      % Silt & Clay = 18.7% D <sub>(30)</sub> = 0.108 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.180 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.236 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.403 mm      Fracture %, 1 Face = n/a Dust Ratio = 1/5      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.23 Coeff. of Uniformity, C <sub>u</sub> = 5.87 Fineness Modulus = 0.92 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		97%	100.0%	0.0%
#20	0.850		96%	100.0%	0.0%
#30	0.600		95%	100.0%	0.0%
#40	0.425	94%	94%	100.0%	0.0%
#50	0.300		72%	100.0%	0.0%
#60	0.250		63%	100.0%	0.0%
#80	0.180		50%	100.0%	0.0%
#100	0.150	45%	45%	100.0%	0.0%
#140	0.106		29%	100.0%	0.0%
#170	0.090		24%	100.0%	0.0%
#200	0.075	18.7%	18.7%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT19-GT-25-26.5-20240619 <b>Sample#:</b> B24-1624	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color</b> Brown																																																																																																					
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																					
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 100.07 grams <b>Hydroscopic Moist.:</b> 1.36% <b>Adj. Sample Wgt :</b> 98.73 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																					
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>2</td><td>8</td><td>8.1%</td><td>0.0374 mm</td></tr> <tr><td>5</td><td>6</td><td>6.1%</td><td>0.0239 mm</td></tr> <tr><td>15</td><td>4.5</td><td>4.6%</td><td>0.0139 mm</td></tr> <tr><td>30</td><td>4</td><td>4.1%</td><td>0.0098 mm</td></tr> <tr><td>60</td><td>2</td><td>2.0%</td><td>0.0070 mm</td></tr> <tr><td>250</td><td>2</td><td>2.0%</td><td>0.0035 mm</td></tr> <tr><td>1440</td><td>1</td><td>1.0%</td><td>0.0014 mm</td></tr> </tbody> </table>	Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	8	8.1%	0.0374 mm	5	6	6.1%	0.0239 mm	15	4.5	4.6%	0.0139 mm	30	4	4.1%	0.0098 mm	60	2	2.0%	0.0070 mm	250	2	2.0%	0.0035 mm	1440	1	1.0%	0.0014 mm	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>100%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>100%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>100%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>100%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>100%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>100%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>96%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>94%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>45%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>18.7%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>18.4%</td><td>0.074 mm</td></tr> <tr><td></td><td>11.6%</td><td>0.050 mm</td></tr> <tr><td></td><td>5.5%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>2.0%</td><td>0.005 mm</td></tr> <tr><td></td><td>1.3%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>0.7%</td><td>0.001 mm</td></tr> </tbody> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	100%	16.000 mm	1/2"	100%	12.500 mm	3/8"	100%	9.500 mm	1/4"	100%	6.300 mm	#4	100%	4.750 mm	#10	100%	2.000 mm	#20	96%	0.850 mm	#40	94%	0.425 mm	#100	45%	0.150 mm	#200	18.7%	0.075 mm	<b>Silts</b>	18.4%	0.074 mm		11.6%	0.050 mm		5.5%	0.020 mm	<b>Clays</b>	2.0%	0.005 mm		1.3%	0.002 mm	<b>Colloids</b>	0.7%	0.001 mm
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT11-GT-1.3-2-20240801 <b>Sample#:</b> B24-1626	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand with Gravel <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.013 mm      % Gravel = 15.3% D <sub>(10)</sub> = 0.025 mm      % Sand = 54.9% D <sub>(15)</sub> = 0.038 mm      % Silt & Clay = 29.9% D <sub>(30)</sub> = 0.076 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.394 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.968 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 8.869 mm      Fracture %, 1 Face = n/a Dust Ratio = 11/19      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 0.24 Coeff. of Uniformity, C <sub>u</sub> = 38.53 Fineness Modulus = 2.47 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00	100%	100%	100.0%	0.0%
10.00"	250.00	100%	100%	100.0%	0.0%
8.00"	200.00	100%	100%	100.0%	0.0%
6.00"	150.00	100%	100%	100.0%	0.0%
4.00"	100.00	100%	100%	100.0%	0.0%
3.00"	75.00	100%	100%	100.0%	0.0%
2.50"	63.00	100%	100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00	100%	100%	100.0%	0.0%
1.50"	37.50	100%	100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00	99%	100%	100.0%	0.0%
1/2"	12.50	97%	97%	100.0%	0.0%
3/8"	9.50	91%	91%	100.0%	0.0%
1/4"	6.30	87%	87%	100.0%	0.0%
#4	4.75	85%	85%	100.0%	0.0%
#8	2.36	77%	77%	100.0%	0.0%
#10	2.00	76%	76%	100.0%	0.0%
#16	1.18	63%	63%	100.0%	0.0%
#20	0.850	58%	58%	100.0%	0.0%
#30	0.600	54%	54%	100.0%	0.0%
#40	0.425	52%	52%	100.0%	0.0%
#50	0.300	45%	45%	100.0%	0.0%
#60	0.250	43%	43%	100.0%	0.0%
#80	0.180	39%	39%	100.0%	0.0%
#100	0.150	38%	38%	100.0%	0.0%
#140	0.106	33%	33%	100.0%	0.0%
#170	0.090	31%	31%	100.0%	0.0%
#200	0.075	29.9%	29.9%	100.0%	0.0%

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 All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT11-GT-1.3-2-20240801 <b>Sample#:</b> B24-1626	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand with Gravel <b>Sample Color</b> Brown																																																																																																					
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																					
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 100.29 grams <b>Hydroscopic Moist.:</b> 4.79% <b>Adj. Sample Wgt :</b> 95.71 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																					
<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>2</td><td>27</td><td>21.5%</td><td>0.0333 mm</td></tr> <tr><td>5</td><td>21</td><td>16.7%</td><td>0.0219 mm</td></tr> <tr><td>15</td><td>19</td><td>15.1%</td><td>0.0128 mm</td></tr> <tr><td>30</td><td>15</td><td>11.9%</td><td>0.0093 mm</td></tr> <tr><td>60</td><td>12</td><td>9.5%</td><td>0.0067 mm</td></tr> <tr><td>250</td><td>10</td><td>7.9%</td><td>0.0033 mm</td></tr> <tr><td>1440</td><td>7.5</td><td>6.0%</td><td>0.0014 mm</td></tr> </tbody> </table>		Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	27	21.5%	0.0333 mm	5	21	16.7%	0.0219 mm	15	19	15.1%	0.0128 mm	30	15	11.9%	0.0093 mm	60	12	9.5%	0.0067 mm	250	10	7.9%	0.0033 mm	1440	7.5	6.0%	0.0014 mm	<table style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>99%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>97%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>91%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>87%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>85%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>76%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>58%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>52%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>38%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>29.9%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>29.7%</td><td>0.074 mm</td></tr> <tr><td></td><td>24.8%</td><td>0.050 mm</td></tr> <tr><td></td><td>16.4%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>8.7%</td><td>0.005 mm</td></tr> <tr><td></td><td>6.6%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>4.2%</td><td>0.001 mm</td></tr> </tbody> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	99%	16.000 mm	1/2"	97%	12.500 mm	3/8"	91%	9.500 mm	1/4"	87%	6.300 mm	#4	85%	4.750 mm	#10	76%	2.000 mm	#20	58%	0.850 mm	#40	52%	0.425 mm	#100	38%	0.150 mm	#200	29.9%	0.075 mm	<b>Silts</b>	29.7%	0.074 mm		24.8%	0.050 mm		16.4%	0.020 mm	<b>Clays</b>	8.7%	0.005 mm		6.6%	0.002 mm	<b>Colloids</b>	4.2%	0.001 mm
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

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\_\_\_\_\_

**Reviewed by:**

Alex Eifrig

\_\_\_\_\_  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT11-GT-5-6.5-20240801 <b>Sample#:</b> B24-1627	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10232024	<b>Visual Soils Classification</b> Clayey, Silt with Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s)</b> ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281 D <sub>(6)</sub> = 0.006 mm      % Gravel = 0.1% D <sub>(10)</sub> = 0.012 mm      % Sand = 35.7% D <sub>(15)</sub> = 0.017 mm      % Silt & Clay = 64.3% D <sub>(30)</sub> = 0.035 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.058 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.070 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.141 mm      Fracture %, 1 Face = n/a Dust Ratio = 17/26      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.50 Coeff. of Uniformity, C <sub>u</sub> = 6.00 Fineness Modulus = 0.13 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		99%	100.0%	0.0%
#20	0.850		99%	100.0%	0.0%
#30	0.600		98%	100.0%	0.0%
#40	0.425	98%	98%	100.0%	0.0%
#50	0.300		96%	100.0%	0.0%
#60	0.250		95%	100.0%	0.0%
#80	0.180		94%	100.0%	0.0%
#100	0.150	93%	93%	100.0%	0.0%
#140	0.106		76%	100.0%	0.0%
#170	0.090		70%	100.0%	0.0%
#200	0.075	64.3%	64.3%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT11-GT-10-10.8-20240801 <b>Sample #:</b> B24-1628	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10232024	<b>Visual Soils Classification</b> Silty Sand <b>Sample Color</b> Brown
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### Liquid Limit Determination

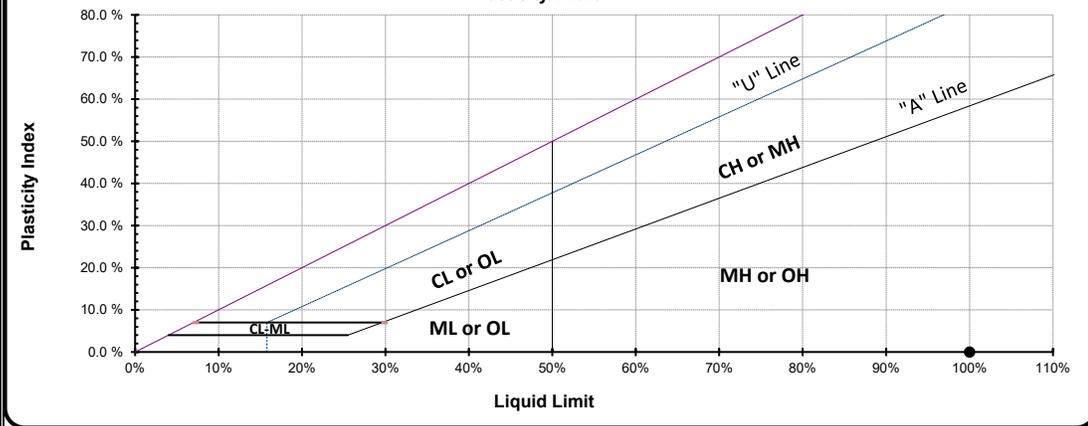
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:	Unable to Establish					
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						
Number of Blows:						

**Liquid Limit @ 25 Blows:** N/A  
**Plastic Limit:** N/A  
**Plasticity Index, I<sub>p</sub>:** N/A

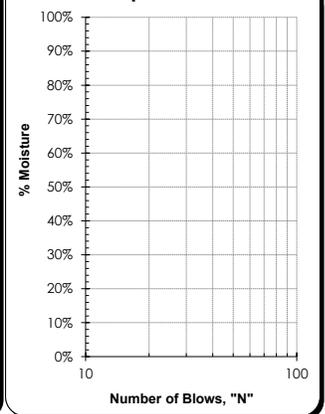
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:						
Weight of Dry Soils + Pan:	Non-Plastic					
Weight of Pan:						
Weight of Dry Soils:						
Weight of Moisture:						
% Moisture:						

### Plasticity Chart



### Liquid Limit



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**Comments:** Unable to establish the liquid limit of this sample due to the material displaying rapid dilation when subjected to any blows in the cup, and also the material not being able to be spread smoothly into the cup. The sample was then deemed non-plastic due to the material not being workable down to 1/8" ribbons/rolls without breaking apart.

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT11-GT-20-21.3-20240801 <b>Sample#:</b> B24-1631	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.010 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>c</sub> = 1.60 D <sub>(10)</sub> = 0.021 mm      % Sand = 64.2%      Coeff. of Uniformity, C <sub>u</sub> = 5.64 D <sub>(15)</sub> = 0.031 mm      % Silt & Clay = 35.8%      Fineness Modulus = 0.40 D <sub>(50)</sub> = 0.063 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(100)</sub> = 0.100 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.118 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.334 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 22/59      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		98%	100.0%	0.0%
#20	0.850		97%	100.0%	0.0%
#30	0.600		96%	100.0%	0.0%
#40	0.425	96%	96%	100.0%	0.0%
#50	0.300		88%	100.0%	0.0%
#60	0.250		84%	100.0%	0.0%
#80	0.180		80%	100.0%	0.0%
#100	0.150	78%	78%	100.0%	0.0%
#140	0.106		53%	100.0%	0.0%
#170	0.090		44%	100.0%	0.0%
#200	0.075	35.8%	35.8%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT11-GT-25-26.5-20240801 <b>Sample #:</b> B24-1633	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 21-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10232024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Silty Clay with Sand <b>Sample Color</b> Brown
--	--	---

### Liquid Limit Determination

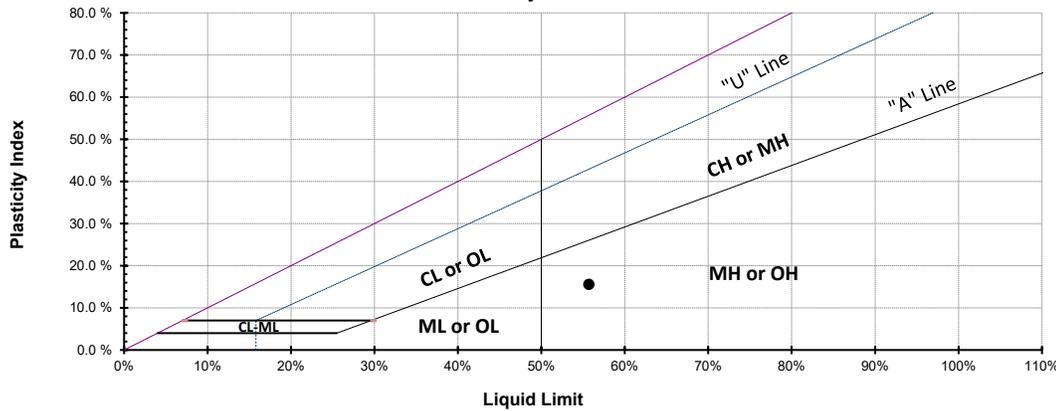
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	34.72	24.48	30.00			
Weight of Dry Soils + Pan:	29.35	20.88	26.34			
Weight of Pan:	19.34	14.34	19.95			
Weight of Dry Soils:	10.01	6.54	6.39			
Weight of Moisture:	5.37	3.60	3.66			
% Moisture:	53.7 %	55.1 %	57.3 %			
Number of Blows:	35	25	20			

**Liquid Limit @ 25 Blows:** 55.7 %  
**Plastic Limit:** 40.1 %  
**Plasticity Index, I<sub>p</sub>:** 15.6 %

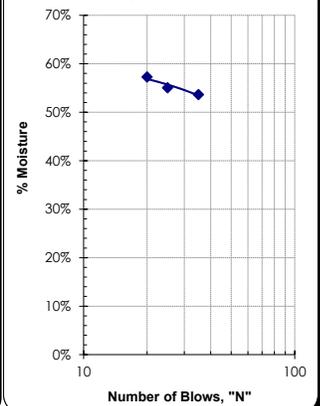
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	26.18	21.45				
Weight of Dry Soils + Pan:	24.19	19.51				
Weight of Pan:	19.22	14.69				
Weight of Dry Soils:	4.97	4.82				
Weight of Moisture:	1.99	1.94				
% Moisture:	40.0 %	40.3 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Client:** Anchor QEA, LLC.  
**Address:** 1201 3rd Avenue, Suite 2600  
Seattle, WA 98101  
**Attn:** Cindy Fields  
**Revised On:** \_\_\_\_\_

**Date:** October 25, 2024  
**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Sample #:** B24-1638 - 1662  
**Date sampled:** June 24, 2024 - August 5, 2024  
**Control No:** 10252024

As requested and authorized by the Client, MTC has performed the following test(s) on the sample number referenced above. The testing was performed in accordance with current, applicable AASHTO, ASTM, and/or WSDOT standards, which are referenced on the correlating test report pages. The results obtained in our laboratory are as detailed below and/or on the following pages:

	Test(s) Performed:	Test Results	Test(s) Performed:	Test Results
X	Sieve Analysis	See Attached Reports	Sulfate Soundness	
	Proctor		Bulk Density & Voids	
	Sand Equivalent		WSDOT Degradation	
	Fracture Count		LA Abrasion	
X	Moisture Content	See Attached Reports	Cation Exchange Capacity	
	Specific Gravity, Coarse		X Specific Gravity, Soils	See Attached Report
	Specific Gravity, Fine		X Organic Content	See Attached Report
X	Hydrometer Analysis	See Attached Reports		
X	Atterberg Limits	See Attached Reports		

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call the number below and ask to speak with your Project Manager or the Laboratory Manager.

*Alex Eifrig*

\_\_\_\_\_  
 Respectfully Submitted,  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Moisture Content ASTM C-566, ASTM D-2216

**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 18, 2021

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 10252024

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1638	LDW23-GT13-GT-5-6.5-20240801	500.5	976.0	754.2	221.8	253.7	87.4%
B24-1639	LDW23-GT13-GT-10-11-20240801	497.5	655.6	642.0	13.6	144.5	9.4%
B24-1640	LDW23-GT13-GT-11-11.5-20240801	223.8	281.0	266.1	14.9	42.3	35.2%
B24-1641	LDW23-GT13-GT-15-16.5-20240801	510.0	974.4	908.4	66.0	398.4	16.6%
B24-1642	LDW23-GT13-GT-20-21.5-20240801	601.5	773.0	728.8	44.2	127.3	34.7%
B24-1643	LDW23-GT13-GT-25-26.5-20240801	357.4	1150.9	869.4	281.5	512.0	55.0%
B24-1644	LDW23-GT13-GT-30-31.5-20240801	268.7	300.5	287.5	13.0	18.8	69.1%
B24-1645	LDW23-GT13-GT-35-36.5-20240801	223.9	373.6	315.2	58.4	91.3	64.0%
B24-1646	LDW23-GT13-GT-40-41.5-20240801	411.6	1194.2	902.6	291.6	491.0	59.4%
B24-1647	LDW23-GT21-GT-0.5-2-20240805	229.4	474.6	435.9	38.7	206.5	18.7%
B24-1648	LDW23-GT21-GT-5-6.5-20240805	232.9	313.2	302.4	10.8	69.5	15.5%
B24-1649	LDW23-GT21-GT-10-11.5-20240805	358.2	803.9	747.6	56.3	389.4	14.5%
B24-1650	LDW23-GT21-GT-15-16.5-20240805	379.8	874.8	805.4	69.4	425.6	16.3%
B24-1651	LDW23-GT21-GT-20-21.3-20240805	208.6	234.9	233.2	1.7	24.6	6.9%
B24-1652	LDW23-GT21-GT-21.3-21.5-20240805	222.9	367.7	340.4	27.3	117.5	23.2%
B24-1653	LDW23-GT21-GT-25-26.5-20240805	319.8	613.7	551.2	62.5	231.4	27.0%
B24-1654	LDW23-GT21-GT-30-31.5-20240805	509.7	937.2	850.1	87.1	340.4	25.6%
B24-1655	LDW23-GT21-GT-35-36.5-20240805	493.1	968.4	877.5	90.9	384.4	23.6%
B24-1656	LDW23-GT21-GT-40-41.1-20240805	310.8	552.4	496.5	55.9	185.7	30.1%
B24-1657	LDW23-GT21-GT-41.1-41.5-20240805	360.1	559.5	514.1	45.4	154.0	29.5%
B24-1658	LDW23-GT35-GT-0.5-1.6-20240805	356.7	630.6	602.7	27.9	246.0	11.3%
B24-1659	LDW23-GT35-GT-1.6-2-20240805	222.4	245.6	242.0	3.6	19.6	18.4%
B24-1660	LDW23-GT35-GT-5-6.5-20240805	394.7	778.1	651.5	126.6	256.8	49.3%
B24-1661	LDW23-GT26-GT-0-1.5-20240624	420.7	968.7	851.8	116.9	431.1	27.1%
B24-1662	LDW23-GT26-GT-5-6.5-20240624	303.3	444.9	413.9	31.0	110.6	28.0%

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:**

Reviewed by:

Alex Eifrig  
WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT13-GT-5-6.5-20240801 <b>Sample#:</b> B24-1638	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand with Gravel <b>Sample Color:</b> Gray
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.012 mm      % Gravel = 34.1%      Coeff. of Curvature, C <sub>c</sub> = 0.07 D <sub>(10)</sub> = 0.024 mm      % Sand = 34.5%      Coeff. of Uniformity, C <sub>u</sub> = 123.63 D <sub>(15)</sub> = 0.036 mm      % Silt & Clay = 31.4%      Fineness Modulus = 3.30 D <sub>(50)</sub> = 0.072 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(60)</sub> = 1.036 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(100)</sub> = 2.955 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(200)</sub> = 17.059 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 11/16      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
--	--

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	93%	93%	100.0%	0.0%
5/8"	16.00	89%	89%	100.0%	0.0%
1/2"	12.50	84%	84%	100.0%	0.0%
3/8"	9.50	79%	79%	100.0%	0.0%
1/4"	6.30	70%	70%	100.0%	0.0%
#4	4.75	66%	66%	100.0%	0.0%
#8	2.36	58%	58%	100.0%	0.0%
#10	2.00	57%	57%	100.0%	0.0%
#16	1.18	51%	51%	100.0%	0.0%
#20	0.850	49%	49%	100.0%	0.0%
#30	0.600	47%	47%	100.0%	0.0%
#40	0.425	46%	46%	100.0%	0.0%
#50	0.300	41%	41%	100.0%	0.0%
#60	0.250	39%	39%	100.0%	0.0%
#80	0.180	37%	37%	100.0%	0.0%
#100	0.150	36%	36%	100.0%	0.0%
#140	0.106	33%	33%	100.0%	0.0%
#170	0.090	32%	32%	100.0%	0.0%
#200	0.075	31.4%	31.4%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT13-GT-10-11-20240801 <b>Sample#:</b> B24-1639	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> GP-GM, Poorly graded Gravel with Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.055 mm      % Gravel = 83.0% D <sub>(10)</sub> = 0.155 mm      % Sand = 10.1% D <sub>(15)</sub> = 2.855 mm      % Silt & Clay = 6.9% D <sub>(30)</sub> = 7.323 mm      Liquid Limit = n/a D <sub>(50)</sub> = 13.440 mm      Plasticity Index = n/a D <sub>(60)</sub> = 16.795 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 23.205 mm      Fracture %, 1 Face = n/a Dust Ratio = 33/58      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 20.66 Coeff. of Uniformity, C <sub>u</sub> = 108.64 Fineness Modulus = 6.15 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
--	---	---

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00	100%	100%	100.0%	0.0%
10.00"	250.00	100%	100%	100.0%	0.0%
8.00"	200.00	100%	100%	100.0%	0.0%
6.00"	150.00	100%	100%	100.0%	0.0%
4.00"	100.00	100%	100%	100.0%	0.0%
3.00"	75.00	100%	100%	100.0%	0.0%
2.50"	63.00	100%	100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00	100%	100%	100.0%	0.0%
1.50"	37.50	100%	100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	67%	67%	100.0%	0.0%
5/8"	16.00	58%	58%	100.0%	0.0%
1/2"	12.50	47%	47%	100.0%	0.0%
3/8"	9.50	41%	41%	100.0%	0.0%
1/4"	6.30	25%	25%	100.0%	0.0%
#4	4.75	17%	17%	100.0%	0.0%
#8	2.36	14%	14%	100.0%	0.0%
#10	2.00	14%	14%	100.0%	0.0%
#16	1.18	13%	13%	100.0%	0.0%
#20	0.850	12%	12%	100.0%	0.0%
#30	0.600	12%	12%	100.0%	0.0%
#40	0.425	12%	12%	100.0%	0.0%
#50	0.300	11%	11%	100.0%	0.0%
#60	0.250	11%	11%	100.0%	0.0%
#80	0.180	10%	10%	100.0%	0.0%
#100	0.150	10%	10%	100.0%	0.0%
#140	0.106	8%	8%	100.0%	0.0%
#170	0.090	7%	7%	100.0%	0.0%
#200	0.075	6.9%	6.9%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

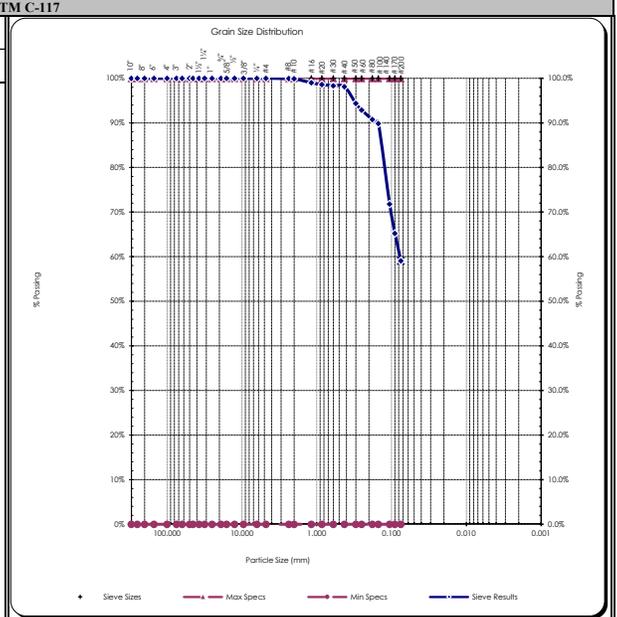
Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT13-GT-11-11.5-20240801 <b>Sample#:</b> B24-1640	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10252024	<b>Visual Soils Classification</b> Clayey, Silty Sand <b>Sample Color:</b> Brown
<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b>		
<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	D <sub>(6)</sub> = 0.006 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.013 mm      % Sand = 40.9% D <sub>(15)</sub> = 0.019 mm      % Silt & Clay = 59.1% D <sub>(30)</sub> = 0.038 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.063 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.077 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.155 mm      Fracture %, 1 Face = n/a Dust Ratio = 56/93      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.48 Coeff. of Uniformity, C <sub>u</sub> = 6.08 Fineness Modulus = 0.19 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
<b>Method(s) ASTM C-136, ASTM D-6913, ASTM C-117</b>		

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		99%	100.0%	0.0%
#20	0.850		99%	100.0%	0.0%
#30	0.600		98%	100.0%	0.0%
#40	0.425	98%	98%	100.0%	0.0%
#50	0.300		94%	100.0%	0.0%
#60	0.250		93%	100.0%	0.0%
#80	0.180		91%	100.0%	0.0%
#100	0.150	90%	90%	100.0%	0.0%
#140	0.106		72%	100.0%	0.0%
#170	0.090		65%	100.0%	0.0%
#200	0.075	59.1%	59.1%	100.0%	0.0%



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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT13-GT-11-11.5-20240801 <b>Sample#:</b> B24-1640	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10252024	<b>Visual Soils Classification</b> Clayey, Silty Sand <b>Sample Color</b> Brown																																																																																																				
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																				
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 100.01 grams <b>Hydroscopic Moist.:</b> 1.88% <b>Adj. Sample Wgt :</b> 98.16 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																				
<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> <tr> <td>2</td> <td>28.5</td> <td>29.0%</td> <td>0.0330 mm</td> </tr> <tr> <td>5</td> <td>21</td> <td>21.4%</td> <td>0.0219 mm</td> </tr> <tr> <td>15</td> <td>15</td> <td>15.3%</td> <td>0.0131 mm</td> </tr> <tr> <td>30</td> <td>12.5</td> <td>12.7%</td> <td>0.0094 mm</td> </tr> <tr> <td>60</td> <td>10.5</td> <td>10.7%</td> <td>0.0068 mm</td> </tr> <tr> <td>250</td> <td>6</td> <td>6.1%</td> <td>0.0034 mm</td> </tr> <tr> <td>1440</td> <td>3.5</td> <td>3.6%</td> <td>0.0014 mm</td> </tr> </table>	Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	28.5	29.0%	0.0330 mm	5	21	21.4%	0.0219 mm	15	15	15.3%	0.0131 mm	30	12.5	12.7%	0.0094 mm	60	10.5	10.7%	0.0068 mm	250	6	6.1%	0.0034 mm	1440	3.5	3.6%	0.0014 mm	<table border="0" style="width: 100%;"> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>100%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>100%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>100%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>100%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>100%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>100%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>99%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>98%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>90%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>59.1%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>58.4%</td><td>0.074 mm</td></tr> <tr><td></td><td>41.2%</td><td>0.050 mm</td></tr> <tr><td></td><td>20.0%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>8.3%</td><td>0.005 mm</td></tr> <tr><td></td><td>4.3%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>2.5%</td><td>0.001 mm</td></tr> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	100%	16.000 mm	1/2"	100%	12.500 mm	3/8"	100%	9.500 mm	1/4"	100%	6.300 mm	#4	100%	4.750 mm	#10	100%	2.000 mm	#20	99%	0.850 mm	#40	98%	0.425 mm	#100	90%	0.150 mm	#200	59.1%	0.075 mm	<b>Silts</b>	58.4%	0.074 mm		41.2%	0.050 mm		20.0%	0.020 mm	<b>Clays</b>	8.3%	0.005 mm		4.3%	0.002 mm	<b>Colloids</b>	2.5%	0.001 mm
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<b>% Sand:</b> <b>% Silt:</b> <b>% Clay:</b>	<b>Particle Size</b> 2.0 - 0.05 mm 0.05 - 0.002 mm < 0.002 mm																																																																																																					
<b>USDA Soil Textural Classification</b> Sandy Loam																																																																																																						

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**Comments:** \_\_\_\_\_  
 \_\_\_\_\_  
 \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT13-GT-15-16.5-20240801 <b>Sample#:</b> B24-1641	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> SP-SM, Poorly graded Sand with Silt and Gravel <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.047 mm      % Gravel = 24.5%      Coeff. of Curvature, C <sub>c</sub> = 0.77 D <sub>(10)</sub> = 0.107 mm      % Sand = 67.5%      Coeff. of Uniformity, C <sub>u</sub> = 13.50 D <sub>(15)</sub> = 0.176 mm      % Silt & Clay = 7.9%      Fineness Modulus = 3.50 D <sub>(30)</sub> = 0.346 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 1.006 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 1.450 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 22.508 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 3/14      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		98%	100.0%	0.0%
1.50"	37.50		96%	100.0%	0.0%
1.25"	31.50		94%	100.0%	0.0%
1.00"	25.00	92%	92%	100.0%	0.0%
3/4"	19.00	87%	87%	100.0%	0.0%
5/8"	16.00		85%	100.0%	0.0%
1/2"	12.50	83%	83%	100.0%	0.0%
3/8"	9.50	81%	81%	100.0%	0.0%
1/4"	6.30		77%	100.0%	0.0%
#4	4.75	75%	75%	100.0%	0.0%
#8	2.36		73%	100.0%	0.0%
#10	2.00	72%	72%	100.0%	0.0%
#16	1.18		54%	100.0%	0.0%
#20	0.850		46%	100.0%	0.0%
#30	0.600		41%	100.0%	0.0%
#40	0.425	37%	37%	100.0%	0.0%
#50	0.300		26%	100.0%	0.0%
#60	0.250		22%	100.0%	0.0%
#80	0.180		15%	100.0%	0.0%
#100	0.150	13%	13%	100.0%	0.0%
#140	0.106		10%	100.0%	0.0%
#170	0.090		9%	100.0%	0.0%
#200	0.075	7.9%	7.9%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT13-GT-30-31.5-20240801 <b>Sample #:</b> B24-1644	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 23-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Silty Clay <b>Sample Color</b> Brown
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### Liquid Limit Determination

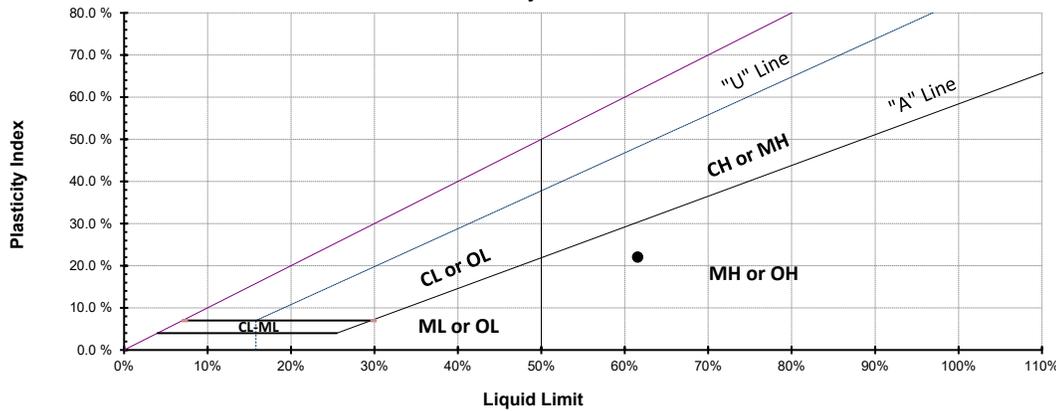
	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	29.17	27.75	31.92			
<b>Weight of Dry Soils + Pan:</b>	23.48	24.24	27.31			
<b>Weight of Pan:</b>	14.15	18.54	19.94			
<b>Weight of Dry Soils:</b>	9.33	5.70	7.37			
<b>Weight of Moisture:</b>	5.69	3.51	4.61			
<b>% Moisture:</b>	61.0 %	61.6 %	62.6 %			
<b>Number of Blows:</b>	30	24	17			

**Liquid Limit @ 25 Blows:** 61.5 %  
**Plastic Limit:** 39.5 %  
**Plasticity Index, I<sub>p</sub>:** 22.1 %

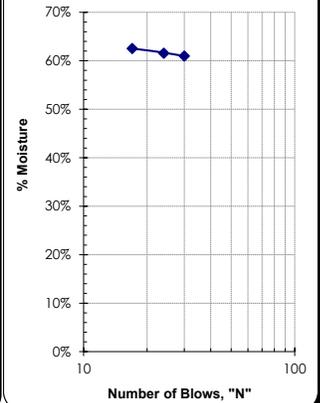
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	25.31	20.52				
<b>Weight of Dry Soils + Pan:</b>	23.60	18.78				
<b>Weight of Pan:</b>	19.28	14.36				
<b>Weight of Dry Soils:</b>	4.32	4.42				
<b>Weight of Moisture:</b>	1.71	1.74				
<b>% Moisture:</b>	39.6 %	39.4 %				

### Plasticity Chart



### Liquid Limit



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**Comments:** \_\_\_\_\_

Reviewed by: Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 21, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 10252024

**Moisture Content ASTM C-566, ASTM D-2216**

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1646	LDW23-GT13-GT-40-41.5-20240801	411.6	1194.2	902.6	291.6	491.0	59.4%
B24-1660	LDW23-GT35-GT-5-6.5-20240805	394.7	778.1	651.5	126.6	256.8	49.3%

**Organic Content ASTM D-2974**

Sample #	Location	Tare	Soil + Tare, Pre-Ignition	Soil + Tare, Post Ignition	% Organics
B24-1646	LDW23-GT13-GT-40-41.5-20240801	50.18	100.00	97.10	5.82%
B24-1660	LDW23-GT35-GT-5-6.5-20240805	51.50	100.00	97.67	4.80%

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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 \_\_\_\_\_  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT21-GT-5-6.5-20240805 <b>Sample#:</b> B24-1648	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> GM, Silty Gravel with Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.019 mm      % Gravel = 40.9% D <sub>(10)</sub> = 0.039 mm      % Sand = 39.9% D <sub>(15)</sub> = 0.058 mm      % Silt & Clay = 19.3% D <sub>(50)</sub> = 0.682 mm      Liquid Limit = n/a D <sub>(60)</sub> = 3.559 mm      Plasticity Index = n/a D <sub>(100)</sub> = 5.022 mm      Sand Equivalent = n/a D <sub>(200)</sub> = 15.190 mm      Fracture %, 1 Face = n/a Dust Ratio = 21/31      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 2.38 Coeff. of Uniformity, C <sub>u</sub> = 128.95 Fineness Modulus = 4.14 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00	100%	100%	100.0%	0.0%
10.00"	250.00	100%	100%	100.0%	0.0%
8.00"	200.00	100%	100%	100.0%	0.0%
6.00"	150.00	100%	100%	100.0%	0.0%
4.00"	100.00	100%	100%	100.0%	0.0%
3.00"	75.00	100%	100%	100.0%	0.0%
2.50"	63.00	100%	100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00	100%	100%	100.0%	0.0%
1.50"	37.50	100%	100%	100.0%	0.0%
1.25"	31.50	100%	100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00	92%	100%	100.0%	0.0%
1/2"	12.50	83%	83%	100.0%	0.0%
3/8"	9.50	74%	74%	100.0%	0.0%
1/4"	6.30	64%	64%	100.0%	0.0%
#4	4.75	59%	59%	100.0%	0.0%
#8	2.36	41%	41%	100.0%	0.0%
#10	2.00	38%	38%	100.0%	0.0%
#16	1.18	33%	31%	100.0%	0.0%
#20	0.850	31%	29%	100.0%	0.0%
#30	0.600	29%	26%	100.0%	0.0%
#40	0.425	28%	25%	100.0%	0.0%
#50	0.300	26%	24%	100.0%	0.0%
#60	0.250	25%	23%	100.0%	0.0%
#80	0.180	24%	21%	100.0%	0.0%
#100	0.150	23%	20%	100.0%	0.0%
#140	0.106	21%	19.3%	100.0%	0.0%
#170	0.090	20%		100.0%	0.0%
#200	0.075	19.3%		100.0%	0.0%

Grain Size Distribution

Particle Size (mm)

● Sieve Sizes   
 — Max Specs   
 — Min Specs   
 — Sieve Results

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT21-GT-5-6.5-20240805 <b>Sample#:</b> B24-1648	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> GM, Silty Gravel with Sand <b>Sample Color</b> Brown																																																																																																				
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																				
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 50.01 grams <b>Hydroscopic Moist.:</b> 3.06% <b>Adj. Sample Wgt :</b> 48.53 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																				
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**Comments:** \_\_\_\_\_  
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**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT21-GT-10-11.5-20240805 <b>Sample#:</b> B24-1649	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> SP-SM, Poorly graded Sand with Silt and Gravel <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.049 mm      % Gravel = 45.6% D <sub>(10)</sub> = 0.140 mm      % Sand = 46.7% D <sub>(15)</sub> = 0.427 mm      % Silt & Clay = 7.7% D <sub>(30)</sub> = 1.723 mm      Liquid Limit = n/a D <sub>(50)</sub> = 4.180 mm      Plasticity Index = n/a D <sub>(60)</sub> = 5.928 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 19.437 mm      Fracture %, 1 Face = n/a Dust Ratio = 23/45      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 3.59 Coeff. of Uniformity, C <sub>u</sub> = 42.44 Fineness Modulus = 4.79 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	89%	89%	100.0%	0.0%
5/8"	16.00		85%	100.0%	0.0%
1/2"	12.50	81%	81%	100.0%	0.0%
3/8"	9.50	77%	77%	100.0%	0.0%
1/4"	6.30		62%	100.0%	0.0%
#4	4.75	54%	54%	100.0%	0.0%
#8	2.36		36%	100.0%	0.0%
#10	2.00	33%	33%	100.0%	0.0%
#16	1.18		24%	100.0%	0.0%
#20	0.850		20%	100.0%	0.0%
#30	0.600		17%	100.0%	0.0%
#40	0.425	15%	15%	100.0%	0.0%
#50	0.300		13%	100.0%	0.0%
#60	0.250		12%	100.0%	0.0%
#80	0.180		11%	100.0%	0.0%
#100	0.150	10%	10%	100.0%	0.0%
#140	0.106		9%	100.0%	0.0%
#170	0.090		8%	100.0%	0.0%
#200	0.075	7.7%	7.7%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT21-GT-20-21.3-20240805 <b>Sample#:</b> B24-1651	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> GP, Poorly graded Gravel with Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.250 mm      % Gravel = 82.1%      Coeff. of Curvature, C <sub>c</sub> = 3.47 D <sub>(10)</sub> = 1.157 mm      % Sand = 15.0%      Coeff. of Uniformity, C <sub>u</sub> = 7.10 D <sub>(15)</sub> = 2.984 mm      % Silt & Clay = 2.9%      Fineness Modulus = 5.65 D <sub>(50)</sub> = 5.743 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(60)</sub> = 7.387 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 8.208 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 12.815 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 15/37      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		95%	100.0%	0.0%
1/2"	12.50	89%	89%	100.0%	0.0%
3/8"	9.50	76%	76%	100.0%	0.0%
1/4"	6.30		37%	100.0%	0.0%
#4	4.75	18%	18%	100.0%	0.0%
#8	2.36		14%	100.0%	0.0%
#10	2.00	13%	13%	100.0%	0.0%
#16	1.18		10%	100.0%	0.0%
#20	0.850		9%	100.0%	0.0%
#30	0.600		8%	100.0%	0.0%
#40	0.425	7%	7%	100.0%	0.0%
#50	0.300		6%	100.0%	0.0%
#60	0.250		5%	100.0%	0.0%
#80	0.180		4%	100.0%	0.0%
#100	0.150	4%	4%	100.0%	0.0%
#140	0.106		3%	100.0%	0.0%
#170	0.090		3%	100.0%	0.0%
#200	0.075	2.9%	2.9%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT21-GT-20-21.3-20240805 <b>Sample#:</b> B24-1651	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> GP, Poorly graded Gravel with Sand <b>Sample Color</b> Brown																																																																																																					
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1.25"	100%	31.500 mm																																																																																																					
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3/4"	100%	19.000 mm																																																																																																					
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<b>Colloids</b>	0.7%	0.001 mm																																																																																																					
<b>% Gravel:</b> 82.1% <b>% Sand:</b> 15.0% <b>% Silt:</b> 1.8% <b>% Clay:</b> 1.1%		<b>Liquid Limit:</b> n/a <b>Plastic Limit:</b> n/a <b>Plasticity Index:</b> n/a																																																																																																					
<b>USDA Soil Textural Classification</b>																																																																																																							
<b>% Sand:</b> 2.0 - 0.05 mm <b>% Silt:</b> 0.05 - 0.002 mm <b>% Clay:</b> < 0.002 mm																																																																																																							
<b>USDA Soil Textural Classification</b> Loamy Sand																																																																																																							

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**Comments:** Insufficient material resulted in hydrometer sample weight being undersized.

**Reviewed by:** Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT21-GT-41.1-41.5-20240805 <b>Sample#:</b> B24-1657	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10252024	<b>Visual Soils Classification</b> Sandy Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.005 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.011 mm      % Sand = 31.4% D <sub>(15)</sub> = 0.016 mm      % Silt & Clay = 68.6% D <sub>(30)</sub> = 0.033 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.055 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.066 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.236 mm      Fracture %, 1 Face = n/a Dust Ratio = 16/23      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.50 Coeff. of Uniformity, C <sub>u</sub> = 6.00 Fineness Modulus = 0.23 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		99%	100.0%	0.0%
#20	0.850		99%	100.0%	0.0%
#30	0.600		99%	100.0%	0.0%
#40	0.425	99%	99%	100.0%	0.0%
#50	0.300		93%	100.0%	0.0%
#60	0.250		91%	100.0%	0.0%
#80	0.180		87%	100.0%	0.0%
#100	0.150	86%	86%	100.0%	0.0%
#140	0.106		76%	100.0%	0.0%
#170	0.090		72%	100.0%	0.0%
#200	0.075	68.6%	68.6%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT35-GT-0.5-1.6-20240805 <b>Sample#:</b> B24-1658	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> GW-GM, Well-graded Gravel with Silt and Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.055 mm      % Gravel = 53.8%      Coeff. of Curvature, C <sub>c</sub> = 1.71 D <sub>(10)</sub> = 0.140 mm      % Sand = 39.3%      Coeff. of Uniformity, C <sub>u</sub> = 52.64 D <sub>(15)</sub> = 0.261 mm      % Silt & Clay = 6.9%      Fineness Modulus = 4.74 D <sub>(30)</sub> = 1.327 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 5.472 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 7.363 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 17.903 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 13/41      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	92%	92%	100.0%	0.0%
5/8"	16.00		86%	100.0%	0.0%
1/2"	12.50	80%	80%	100.0%	0.0%
3/8"	9.50	71%	71%	100.0%	0.0%
1/4"	6.30		54%	100.0%	0.0%
#4	4.75	46%	46%	100.0%	0.0%
#8	2.36		38%	100.0%	0.0%
#10	2.00	36%	36%	100.0%	0.0%
#16	1.18		29%	100.0%	0.0%
#20	0.850		26%	100.0%	0.0%
#30	0.600		23%	100.0%	0.0%
#40	0.425	22%	22%	100.0%	0.0%
#50	0.300		17%	100.0%	0.0%
#60	0.250		15%	100.0%	0.0%
#80	0.180		12%	100.0%	0.0%
#100	0.150	10%	10%	100.0%	0.0%
#140	0.106		8%	100.0%	0.0%
#170	0.090		8%	100.0%	0.0%
#200	0.075	6.9%	6.9%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT35-GT-1.6-2-20240805 <b>Sample#:</b> B24-1659	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.008 mm      % Gravel = 12.9%      Coeff. of Curvature, C <sub>c</sub> = 0.65 D <sub>(10)</sub> = 0.015 mm      % Sand = 38.6%      Coeff. of Uniformity, C <sub>u</sub> = 13.86 D <sub>(15)</sub> = 0.023 mm      % Silt & Clay = 48.4%      Fineness Modulus = 1.52 D <sub>(30)</sub> = 0.046 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.094 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.215 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 6.421 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 49/78      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	95%	95%	100.0%	0.0%
1/4"	6.30		90%	100.0%	0.0%
#4	4.75	87%	87%	100.0%	0.0%
#8	2.36		85%	100.0%	0.0%
#10	2.00	85%	85%	100.0%	0.0%
#16	1.18		81%	100.0%	0.0%
#20	0.850		79%	100.0%	0.0%
#30	0.600		78%	100.0%	0.0%
#40	0.425	77%	77%	100.0%	0.0%
#50	0.300		67%	100.0%	0.0%
#60	0.250		63%	100.0%	0.0%
#80	0.180		57%	100.0%	0.0%
#100	0.150	55%	55%	100.0%	0.0%
#140	0.106		51%	100.0%	0.0%
#170	0.090		50%	100.0%	0.0%
#200	0.075	48.4%	48.4%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT35-GT-1.6-2-20240805 <b>Sample#:</b> B24-1659	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color</b> Brown																																																																																																					
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																					
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 100.04 grams <b>Hydroscopic Moist.:</b> 1.34% <b>Adj. Sample Wgt :</b> 98.72 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																					
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>2</td><td>37.5</td><td>32.1%</td><td>0.0308 mm</td></tr> <tr><td>5</td><td>31.5</td><td>27.0%</td><td>0.0204 mm</td></tr> <tr><td>15</td><td>24.5</td><td>21.0%</td><td>0.0124 mm</td></tr> <tr><td>30</td><td>18.5</td><td>15.9%</td><td>0.0091 mm</td></tr> <tr><td>60</td><td>15.5</td><td>13.3%</td><td>0.0065 mm</td></tr> <tr><td>250</td><td>10</td><td>8.6%</td><td>0.0033 mm</td></tr> <tr><td>1440</td><td>6.5</td><td>5.6%</td><td>0.0014 mm</td></tr> </tbody> </table>	Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	37.5	32.1%	0.0308 mm	5	31.5	27.0%	0.0204 mm	15	24.5	21.0%	0.0124 mm	30	18.5	15.9%	0.0091 mm	60	15.5	13.3%	0.0065 mm	250	10	8.6%	0.0033 mm	1440	6.5	5.6%	0.0014 mm	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>100%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>100%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>95%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>90%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>87%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>85%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>79%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>77%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>55%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>48.4%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>48.1%</td><td>0.074 mm</td></tr> <tr><td></td><td>39.2%</td><td>0.050 mm</td></tr> <tr><td></td><td>26.7%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>11.0%</td><td>0.005 mm</td></tr> <tr><td></td><td>6.5%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>4.0%</td><td>0.001 mm</td></tr> </tbody> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	100%	16.000 mm	1/2"	100%	12.500 mm	3/8"	95%	9.500 mm	1/4"	90%	6.300 mm	#4	87%	4.750 mm	#10	85%	2.000 mm	#20	79%	0.850 mm	#40	77%	0.425 mm	#100	55%	0.150 mm	#200	48.4%	0.075 mm	<b>Silts</b>	48.1%	0.074 mm		39.2%	0.050 mm		26.7%	0.020 mm	<b>Clays</b>	11.0%	0.005 mm		6.5%	0.002 mm	<b>Colloids</b>	4.0%	0.001 mm
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<b>Colloids</b>	4.0%	0.001 mm																																																																																																					
<b>USDA Soil Textural Classification</b>																																																																																																							
	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="text-align: left;">Particle Size</th> </tr> </thead> <tbody> <tr><td>% Sand:</td><td>2.0 - 0.05 mm</td></tr> <tr><td>% Silt:</td><td>0.05 - 0.002 mm</td></tr> <tr><td>% Clay:</td><td>&lt; 0.002 mm</td></tr> </tbody> </table>	Particle Size	% Sand:	2.0 - 0.05 mm	% Silt:	0.05 - 0.002 mm	% Clay:	< 0.002 mm																																																																																															
Particle Size																																																																																																							
% Sand:	2.0 - 0.05 mm																																																																																																						
% Silt:	0.05 - 0.002 mm																																																																																																						
% Clay:	< 0.002 mm																																																																																																						
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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

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\_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT26-GT-0-1.5-20240805 <b>Sample#:</b> B24-1661	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 22-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10252024	<b>Unified Soils Classification System, ASTM D-2487</b> SP, Poorly graded Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.153 mm      % Gravel = 0.3% D <sub>(10)</sub> = 0.179 mm      % Sand = 97.1% D <sub>(15)</sub> = 0.206 mm      % Silt & Clay = 2.7% D <sub>(30)</sub> = 0.286 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.392 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.561 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 1.655 mm      Fracture %, 1 Face = n/a Dust Ratio = 1/21      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 0.81 Coeff. of Uniformity, C <sub>u</sub> = 3.13 Fineness Modulus = 2.25 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
--	--	--

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		77%	100.0%	0.0%
#20	0.850		68%	100.0%	0.0%
#30	0.600		61%	100.0%	0.0%
#40	0.425	56%	56%	100.0%	0.0%
#50	0.300		33%	100.0%	0.0%
#60	0.250		23%	100.0%	0.0%
#80	0.180		10%	100.0%	0.0%
#100	0.150	4%	4%	100.0%	0.0%
#140	0.106		3%	100.0%	0.0%
#170	0.090		3%	100.0%	0.0%
#200	0.075	2.7%	2.7%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Client:** Anchor QEA, LLC.  
**Address:** 1201 3rd Avenue, Suite 2600  
Seattle, WA 98101  
**Attn:** Cindy Fields  
**Revised On:** \_\_\_\_\_

**Date:** October 29, 2024  
**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Sample #:** B24-1663 - 1685  
**Date sampled:** June 17, 2024 - August 2, 2024  
**Control No:** 10292024

As requested and authorized by the Client, MTC has performed the following test(s) on the sample number referenced above. The testing was performed in accordance with current, applicable AASHTO, ASTM, and/or WSDOT standards, which are referenced on the correlating test report pages. The results obtained in our laboratory are as detailed below and/or on the following pages:

	Test(s) Performed:	Test Results	Test(s) Performed:	Test Results
X	Sieve Analysis	See Attached Reports	Sulfate Soundness	
	Proctor		Bulk Density & Voids	
	Sand Equivalent		WSDOT Degradation	
	Fracture Count		LA Abrasion	
X	Moisture Content	See Attached Reports	Cation Exchange Capacity	
	Specific Gravity, Coarse		X Specific Gravity, Soils	See Attached Report
	Specific Gravity, Fine		X Organic Content	See Attached Report
X	Hydrometer Analysis	See Attached Reports		
X	Atterberg Limits	See Attached Reports		

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call the number below and ask to speak with your Project Manager or the Laboratory Manager.

*Alex Eifrig*

\_\_\_\_\_  
 Respectfully Submitted,  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



### Moisture Content ASTM C-566, ASTM D-2216

**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 23, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 10292024

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1663	LDW23-GT26-GT-10-10.8-20240624	356.7	656.4	605.7	50.7	249.0	20.4%
B24-1664	LDW23-GT26-GT-10.8-11.5-20240624	501.0	880.4	850.3	30.1	349.3	8.6%
B24-1665	LDW23-GT26-GT-15-16.1-20240624	360.1	558.2	516.3	41.9	156.2	26.8%
B24-1666	LDW23-GT26-GT-16.1-16.5-20240624	268.8	611.4	528.4	83.0	259.6	32.0%
B24-1667	LDW23-GT26-GT-20-21.5-20240624	420.7	1498.2	1200.1	298.1	779.4	38.2%
B24-1668	LDW23-GT22-GT-0-1.5-20240622	270.1	630.9	495.9	135.0	225.8	59.8%
B24-1669	LDW23-GT22-GT-5-6.5-20240622	222.9	330.9	291.1	39.8	68.2	58.4%
B24-1670	LDW23-GT22-GT-10-11.5-20240622	358.2	608.2	554.6	53.6	196.4	27.3%
B24-1671	LDW23-GT22-GT-15-16.5-20240622	420.5	931.2	843.0	88.2	422.5	20.9%
B24-1672	LDW23-GT22-GT-20-21.5-20240622	601.3	1157.2	1019.6	137.6	418.3	32.9%
B24-1673	LDW23-GT22-GT-25-26.5-20240622	414.2	976.5	849.4	127.1	435.2	29.2%
B24-1674	LDW23-GT17-GT-0-1.5-20240622	600.1	1461.4	1095.5	365.9	495.4	73.9%
B24-1675	LDW23-GT17-GT-5-6.5-20240622	234.6	287.3	267.9	19.4	33.3	58.3%
B24-1676	LDW23-GT17-GT-10-11.5-20240622	417.5	824.4	665.6	158.8	248.1	64.0%
B24-1677	LDW23-GT17-GT-15-16.5-20240622	303.4	464.9	404.3	60.6	100.9	60.1%
B24-1678	LDW23-GT17-GT-20-21.5-20240622	584.0	957.5	867.7	89.8	283.7	31.7%
B24-1679	LDW23-GT17-GT-25-26.5-20240622	234.5	533.6	473.7	59.9	239.2	25.0%
B24-1680	LDW23-GT33-GT-0.5-2-20240730	260.2	889.1	736.7	152.4	476.5	32.0%
B24-1681	LDW23-GT30-GT-0-1.5-20240620	266.6	666.6	532.1	134.5	265.5	50.7%
B24-1682	LDW23-GT02-GT-25-25.9-20240617	268.7	653.0	553.4	99.6	284.7	35.0%
B24-1683	LDW23-GT11-GT-0.5-1.3-20240801	310.8	470.4	453.0	17.4	142.2	12.2%
B24-1684	LDW23-GT04-GT-0-1.5-20240802	319.7	965.8	904.1	61.7	584.4	10.6%
B24-1685	LDW23-GT33B-GT-35-36.5-20240730	270.0	810.4	703.5	106.9	433.5	24.7%
					0.0	0.0	#DIV/0!
					0.0	0.0	#DIV/0!

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

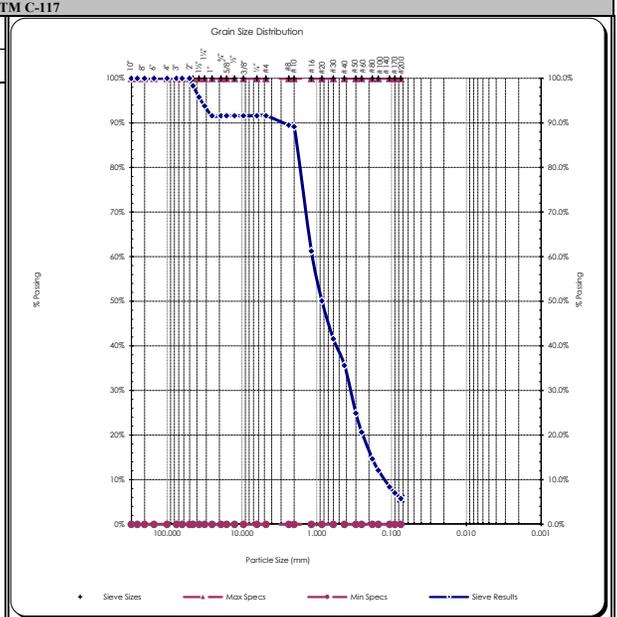
Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT26-GT-10-10.8-20240624 <b>Sample#:</b> B24-1663	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 25-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10292024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand with Gravel <b>Sample Color:</b> Brown
<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b>		
<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	D <sub>(6)</sub> = 0.065 mm      % Gravel = 8.4%      Coeff. of Curvature, C <sub>c</sub> = 0.90 D <sub>(10)</sub> = 0.125 mm      % Sand = 85.9%      Coeff. of Uniformity, C <sub>u</sub> = 9.11 D <sub>(15)</sub> = 0.184 mm      % Silt & Clay = 5.7%      Fineness Modulus = 2.96 D <sub>(30)</sub> = 0.359 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.848 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 1.142 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 2.947 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 5/31      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =	
<b>Method(s) ASTM C-136, ASTM D-6913, ASTM C-117</b>		

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		98%	100.0%	0.0%
1.50"	37.50		96%	100.0%	0.0%
1.25"	31.50		94%	100.0%	0.0%
1.00"	25.00	92%	92%	100.0%	0.0%
3/4"	19.00	92%	92%	100.0%	0.0%
5/8"	16.00		92%	100.0%	0.0%
1/2"	12.50	92%	92%	100.0%	0.0%
3/8"	9.50	92%	92%	100.0%	0.0%
1/4"	6.30		92%	100.0%	0.0%
#4	4.75	92%	92%	100.0%	0.0%
#8	2.36		89%	100.0%	0.0%
#10	2.00	89%	89%	100.0%	0.0%
#16	1.18		61%	100.0%	0.0%
#20	0.850		50%	100.0%	0.0%
#30	0.600		42%	100.0%	0.0%
#40	0.425	36%	36%	100.0%	0.0%
#50	0.300		25%	100.0%	0.0%
#60	0.250		21%	100.0%	0.0%
#80	0.180		15%	100.0%	0.0%
#100	0.150	12%	12%	100.0%	0.0%
#140	0.106		8%	100.0%	0.0%
#170	0.090		7%	100.0%	0.0%
#200	0.075	5.7%	5.7%	100.0%	0.0%



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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT26-GT-15-16.1-20240624 <b>Sample#:</b> B24-1665	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 25-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10292024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.024 mm      % Gravel = 0.3%      Coeff. of Curvature, C <sub>c</sub> = 1.23 D <sub>(10)</sub> = 0.049 mm      % Sand = 84.3%      Coeff. of Uniformity, C <sub>u</sub> = 6.11 D <sub>(15)</sub> = 0.073 mm      % Silt & Clay = 15.4%      Fineness Modulus = 1.31 D <sub>(30)</sub> = 0.133 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.240 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.297 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 1.135 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 3/16      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
---	---

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		99%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		90%	100.0%	0.0%
#20	0.850		87%	100.0%	0.0%
#30	0.600		84%	100.0%	0.0%
#40	0.425	83%	83%	100.0%	0.0%
#50	0.300		61%	100.0%	0.0%
#60	0.250		52%	100.0%	0.0%
#80	0.180		39%	100.0%	0.0%
#100	0.150	34%	34%	100.0%	0.0%
#140	0.106		23%	100.0%	0.0%
#170	0.090		19%	100.0%	0.0%
#200	0.075	15.4%	15.4%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT22-GT-5-6.5-20240622 <b>Sample#:</b> B24-1669	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 25-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10292024	<b>Visual Soils Classification</b> Clayey, Sandy Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s)</b> ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281 D <sub>(6)</sub> = 0.006 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.013 mm      % Sand = 41.6% D <sub>(15)</sub> = 0.019 mm      % Silt & Clay = 58.4% D <sub>(30)</sub> = 0.039 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.064 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.082 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.384 mm      Fracture %, 1 Face = n/a Dust Ratio = 17/27      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.40 Coeff. of Uniformity, C <sub>u</sub> = 6.42 Fineness Modulus = 0.52 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		96%	100.0%	0.0%
#20	0.850		95%	100.0%	0.0%
#30	0.600		93%	100.0%	0.0%
#40	0.425	93%	93%	100.0%	0.0%
#50	0.300		84%	100.0%	0.0%
#60	0.250		81%	100.0%	0.0%
#80	0.180		76%	100.0%	0.0%
#100	0.150	74%	74%	100.0%	0.0%
#140	0.106		65%	100.0%	0.0%
#170	0.090		62%	100.0%	0.0%
#200	0.075	58.4%	58.4%	100.0%	0.0%

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All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT22-GT-5-6.5-20240622 <b>Sample#:</b> B24-1669	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 25-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10292024	<b>Visual Soils Classification</b> Clayey, Sandy Silt <b>Sample Color</b> Brown																																																																																																				
<b>ASTM D-422 HYDROMETER ANALYSIS</b>		<b>ASTM C-136</b>																																																																																																				
<b>Assumed Sp Gr :</b> 2.65 <b>Sample Weight:</b> 50.27 grams <b>Hydroscopic Moist.:</b> 5.08% <b>Adj. Sample Wgt :</b> 47.84 grams		<b>Sieve Analysis</b> <b>Grain Size Distribution</b>																																																																																																				
<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;">Hydrometer Reading</th> <th style="text-align: left;">Corrected Reading</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>2</td><td>22</td><td>45.8%</td><td>0.0344 mm</td></tr> <tr><td>5</td><td>16</td><td>33.3%</td><td>0.0226 mm</td></tr> <tr><td>15</td><td>12.5</td><td>26.0%</td><td>0.0133 mm</td></tr> <tr><td>30</td><td>9</td><td>18.8%</td><td>0.0096 mm</td></tr> <tr><td>60</td><td>7</td><td>14.6%</td><td>0.0069 mm</td></tr> <tr><td>250</td><td>4</td><td>8.3%</td><td>0.0034 mm</td></tr> <tr><td>1440</td><td>2</td><td>4.2%</td><td>0.0014 mm</td></tr> </tbody> </table>	Hydrometer Reading	Corrected Reading	Percent Passing	Soils Particle Diameter	2	22	45.8%	0.0344 mm	5	16	33.3%	0.0226 mm	15	12.5	26.0%	0.0133 mm	30	9	18.8%	0.0096 mm	60	7	14.6%	0.0069 mm	250	4	8.3%	0.0034 mm	1440	2	4.2%	0.0014 mm	<table border="0" style="width: 100%;"> <thead> <tr> <th style="text-align: left;">Sieve Size</th> <th style="text-align: left;">Percent Passing</th> <th style="text-align: left;">Soils Particle Diameter</th> </tr> </thead> <tbody> <tr><td>3.0"</td><td>100%</td><td>75.000 mm</td></tr> <tr><td>2.0"</td><td>100%</td><td>50.000 mm</td></tr> <tr><td>1.5"</td><td>100%</td><td>37.500 mm</td></tr> <tr><td>1.25"</td><td>100%</td><td>31.500 mm</td></tr> <tr><td>1.0"</td><td>100%</td><td>25.000 mm</td></tr> <tr><td>3/4"</td><td>100%</td><td>19.000 mm</td></tr> <tr><td>5/8"</td><td>100%</td><td>16.000 mm</td></tr> <tr><td>1/2"</td><td>100%</td><td>12.500 mm</td></tr> <tr><td>3/8"</td><td>100%</td><td>9.500 mm</td></tr> <tr><td>1/4"</td><td>100%</td><td>6.300 mm</td></tr> <tr><td>#4</td><td>100%</td><td>4.750 mm</td></tr> <tr><td>#10</td><td>100%</td><td>2.000 mm</td></tr> <tr><td>#20</td><td>95%</td><td>0.850 mm</td></tr> <tr><td>#40</td><td>93%</td><td>0.425 mm</td></tr> <tr><td>#100</td><td>74%</td><td>0.150 mm</td></tr> <tr><td>#200</td><td>58.4%</td><td>0.075 mm</td></tr> <tr><td><b>Silts</b></td><td>58.1%</td><td>0.074 mm</td></tr> <tr><td></td><td>50.7%</td><td>0.050 mm</td></tr> <tr><td></td><td>31.3%</td><td>0.020 mm</td></tr> <tr><td><b>Clays</b></td><td>11.2%</td><td>0.005 mm</td></tr> <tr><td></td><td>5.4%</td><td>0.002 mm</td></tr> <tr><td><b>Colloids</b></td><td>2.9%</td><td>0.001 mm</td></tr> </tbody> </table>	Sieve Size	Percent Passing	Soils Particle Diameter	3.0"	100%	75.000 mm	2.0"	100%	50.000 mm	1.5"	100%	37.500 mm	1.25"	100%	31.500 mm	1.0"	100%	25.000 mm	3/4"	100%	19.000 mm	5/8"	100%	16.000 mm	1/2"	100%	12.500 mm	3/8"	100%	9.500 mm	1/4"	100%	6.300 mm	#4	100%	4.750 mm	#10	100%	2.000 mm	#20	95%	0.850 mm	#40	93%	0.425 mm	#100	74%	0.150 mm	#200	58.4%	0.075 mm	<b>Silts</b>	58.1%	0.074 mm		50.7%	0.050 mm		31.3%	0.020 mm	<b>Clays</b>	11.2%	0.005 mm		5.4%	0.002 mm	<b>Colloids</b>	2.9%	0.001 mm
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<b>% Gravel:</b> 0.0% <b>% Sand:</b> 41.6% <b>% Silt:</b> 47.2% <b>% Clay:</b> 11.2%		<b>Liquid Limit:</b> n/a <b>Plastic Limit:</b> n/a <b>Plasticity Index:</b> n/a																																																																																																				
<b>USDA Soil Textural Classification</b>																																																																																																						
<b>% Sand:</b> 41.6% <b>% Silt:</b> 47.2% <b>% Clay:</b> 11.2%		<b>Particle Size</b> 2.0 - 0.05 mm 0.05 - 0.002 mm < 0.002 mm  <b>USDA Soil Textural Classification</b> Sandy Loam																																																																																																				

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**Comments:** \_\_\_\_\_

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**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT22-GT-10-11.5-20240622 <b>Sample#:</b> B24-1670	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 25-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10292024	<b>Unified Soils Classification System, ASTM D-2487</b> SW-SM, Well-graded Sand with Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(6)</sub> = 0.035 mm      % Gravel = 0.1%      Coeff. of Curvature, C <sub>c</sub> = 1.36 D <sub>(10)</sub> = 0.069 mm      % Sand = 89.1%      Coeff. of Uniformity, C <sub>u</sub> = 10.12 D <sub>(15)</sub> = 0.132 mm      % Silt & Clay = 10.8%      Fineness Modulus = 2.17 D <sub>(30)</sub> = 0.257 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.413 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.700 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 1.679 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 4/19      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		75%	100.0%	0.0%
#20	0.850		65%	100.0%	0.0%
#30	0.600		57%	100.0%	0.0%
#40	0.425	52%	52%	100.0%	0.0%
#50	0.300		36%	100.0%	0.0%
#60	0.250		29%	100.0%	0.0%
#80	0.180		20%	100.0%	0.0%
#100	0.150	16%	16%	100.0%	0.0%
#140	0.106		13%	100.0%	0.0%
#170	0.090		12%	100.0%	0.0%
#200	0.075	10.8%	10.8%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

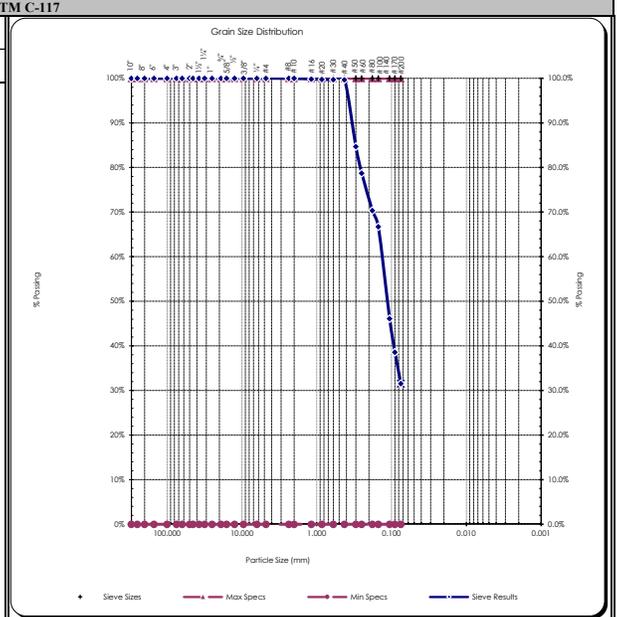
**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT22-GT-25-26.5-20240622 <b>Sample#:</b> B24-1673	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 25-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10292024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b>		
<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	D <sub>(6)</sub> = 0.012 mm      % Gravel = 0.0% D <sub>(10)</sub> = 0.024 mm      % Sand = 68.5% D <sub>(15)</sub> = 0.036 mm      % Silt & Clay = 31.5% D <sub>(30)</sub> = 0.071 mm      Liquid Limit = n/a D <sub>(50)</sub> = 0.114 mm      Plasticity Index = n/a D <sub>(60)</sub> = 0.136 mm      Sand Equivalent = n/a D <sub>(90)</sub> = 0.344 mm      Fracture %, 1 Face = n/a Dust Ratio = 19/60      Fracture %, 2+ Faces = n/a	Coeff. of Curvature, C <sub>c</sub> = 1.58 Coeff. of Uniformity, C <sub>u</sub> = 5.71 Fineness Modulus = 0.49 Plastic Limit = n/a Moisture %, as sampled = n/a Req'd Sand Equivalent = Req'd Fracture %, 1 Face = Req'd Fracture %, 2+ Faces =
<b>Method(s) ASTM C-136, ASTM D-6913, ASTM C-117</b>		

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		100%	100.0%	0.0%
#20	0.850		100%	100.0%	0.0%
#30	0.600		100%	100.0%	0.0%
#40	0.425	99.7%	100%	100.0%	0.0%
#50	0.300		85%	100.0%	0.0%
#60	0.250		79%	100.0%	0.0%
#80	0.180		70%	100.0%	0.0%
#100	0.150	66.7%	67%	100.0%	0.0%
#140	0.106		46%	100.0%	0.0%
#170	0.090		39%	100.0%	0.0%
#200	0.075	31.5%	31.5%	100.0%	0.0%



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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT17-GT-5-6-5-20240622 <b>Sample #:</b> B24-1675	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 25-Oct-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 10292024	<b>Unified Soils Classification System, ASTM D-2487</b> OH, Organic Silty Clay <b>Sample Color</b> Brown
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### Liquid Limit Determination

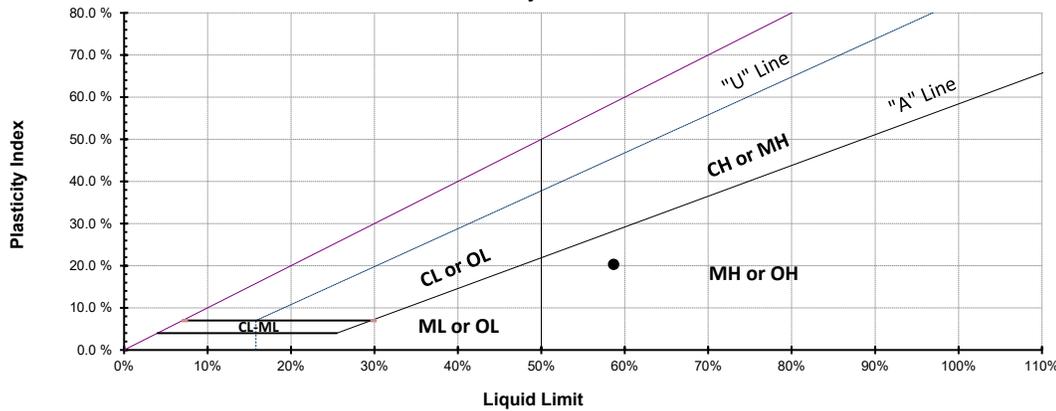
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	32.95	30.08	33.23			
Weight of Dry Soils + Pan:	28.05	26.15	28.00			
Weight of Pan:	19.39	19.59	19.56			
Weight of Dry Soils:	8.66	6.56	8.44			
Weight of Moisture:	4.90	3.93	5.23			
% Moisture:	56.6 %	59.9 %	62.0 %			
Number of Blows:	31	21	16			

**Liquid Limit @ 25 Blows:** 58.7 %  
**Plastic Limit:** 38.3 %  
**Plasticity Index, I<sub>p</sub>:** 20.3 %

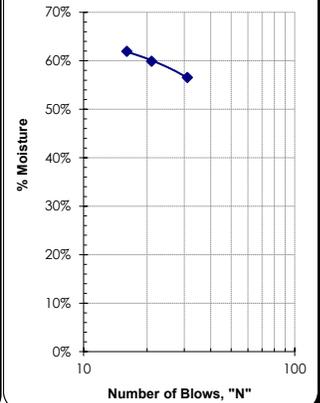
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	25.87	20.71				
Weight of Dry Soils + Pan:	24.14	18.92				
Weight of Pan:	19.65	14.22				
Weight of Dry Soils:	4.49	4.70				
Weight of Moisture:	1.73	1.79				
% Moisture:	38.5 %	38.1 %				

### Plasticity Chart



### Liquid Limit



All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

Reviewed by: Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



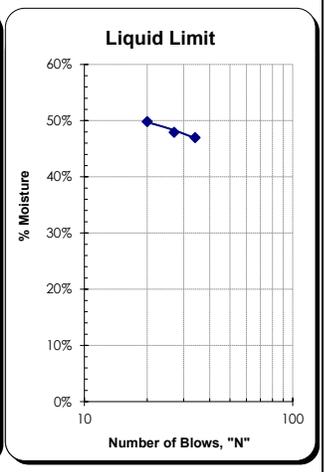
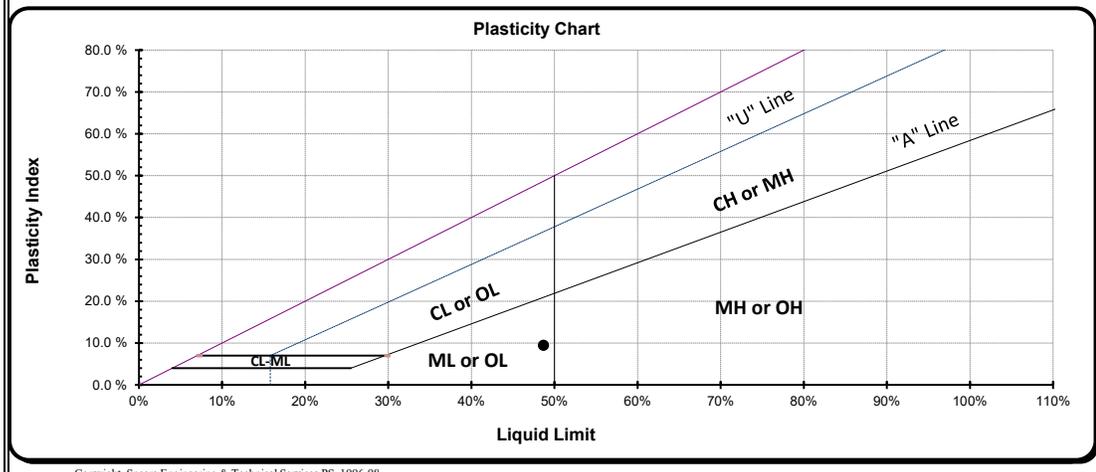
## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT17-GT-15-16.5-20240622 <b>Sample #:</b> B24-1677	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 25-Oct-24 <b>Tested By:</b> S. Boesenberg <b>Control No.:</b> 10292024	<b>Unified Soils Classification System, ASTM D-2487</b> ML, Clayey Silt <b>Sample Color</b> Brown
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Liquid Limit Determination						
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	26.70	32.31	31.25			
Weight of Dry Soils + Pan:	22.77	28.33	27.27			
Weight of Pan:	14.41	20.03	19.29			
Weight of Dry Soils:	8.36	8.30	7.98			
Weight of Moisture:	3.93	3.98	3.98			
% Moisture:	47.0 %	48.0 %	49.9 %			
Number of Blows:	34	27	20			

**Liquid Limit @ 25 Blows:** 48.7 %  
**Plastic Limit:** 39.2 %  
**Plasticity Index, I<sub>p</sub>:** 9.5 %

Plastic Limit Determination						
	#1	#2	#3	#4	#5	#6
Weight of Wet Soils + Pan:	24.88	20.75				
Weight of Dry Soils + Pan:	23.11	19.04				
Weight of Pan:	18.56	14.71				
Weight of Dry Soils:	4.55	4.33				
Weight of Moisture:	1.77	1.71				
% Moisture:	38.9 %	39.5 %				



All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** September 23, 2024  
**Date Tested:** October 24, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** R. Bohler  
**Control No.:** 10292024

### Moisture Content ASTM C-566, ASTM D-2216

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1677	LDW23-GT17-GT-15-16.5-20240622	303.4	464.9	404.3	60.6	100.9	60.1%
					0.0	0.0	#DIV/0!

### Organic Content ASTM D-2974

Sample #	Location	Tare	Soil + Tare, Pre-Ignition	Soil + Tare, Post Ignition	% Organics
B24-1677	LDW23-GT17-GT-15-16.5-20240622	50.17	99.54	96.37	6.42%
					#DIV/0!

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23-GT17-GT-20-21.5-20240622 <b>Sample#:</b> B24-1678	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 25-Oct-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 10292024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b>		
<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	D <sub>(6)</sub> = 0.009 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>c</sub> = 1.46 D <sub>(10)</sub> = 0.017 mm      % Sand = 55.9%      Coeff. of Uniformity, C <sub>u</sub> = 6.17 D <sub>(15)</sub> = 0.026 mm      % Silt & Clay = 44.1%      Fineness Modulus = 0.25 D <sub>(30)</sub> = 0.051 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.086 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.105 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.259 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 4/9      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =	

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		100%	100.0%	0.0%
#20	0.850		99%	100.0%	0.0%
#30	0.600		99%	100.0%	0.0%
#40	0.425	99.3%	99%	100.0%	0.0%
#50	0.300		92%	100.0%	0.0%
#60	0.250		89%	100.0%	0.0%
#80	0.180		86%	100.0%	0.0%
#100	0.150	83.9%	84%	100.0%	0.0%
#140	0.106		61%	100.0%	0.0%
#170	0.090		52%	100.0%	0.0%
#200	0.075	44.1%	44.1%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



**Client:** Anchor QEA, LLC.  
**Address:** 1201 3rd Avenue, Suite 2600  
Seattle, WA 98101  
**Attn:** Cindy Fields  
**Revised On:** \_\_\_\_\_

**Date:** December 13, 2024  
**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Sample #:** B24-1898 - 1918  
**Date sampled:** October 28, 29, & 30, 2024  
**Control No:** 12132024

As requested and authorized by the Client, MTC has performed the following test(s) on the sample number referenced above. The testing was performed in accordance with current, applicable AASHTO, ASTM, and/or WSDOT standards, which are referenced on the correlating test report pages. The results obtained in our laboratory are as detailed below and/or on the following pages:

	Test(s) Performed:	Test Results	Test(s) Performed:	Test Results
X	Sieve Analysis	See Attached Reports	Sulfate Soundness	
	Proctor		Bulk Density & Voids	
	Sand Equivalent		WSDOT Degradation	
	Fracture Count		LA Abrasion	
X	Moisture Content	See Attached Report	Cation Exchange Capacity	
	Specific Gravity, Coarse		X Specific Gravity, Soils	See Attached Report
	Specific Gravity, Fine		X Organic Content	See Attached Report
X	Hydrometer Analysis	See Attached Reports		
X	Atterberg Limits	See Attached Reports		

If you have any questions concerning the test results, the procedures used, or if we can be of any further assistance please call the number below and ask to speak with your Project Manager or the Laboratory Manager.

*Alex Eifrig*

\_\_\_\_\_  
 Respectfully Submitted,  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Moisture Content ASTM C-566, ASTM D-2216

**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** November 22, 2024  
**Date Tested:** December 6, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** Z. Romney  
**Control No.:** 12132024

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1898	LDW23 - GT08B - GT - 5 - 6.5 - 20241030	601.5	896.4	790.5	105.9	189.0	56.0%
B24-1899	LDW23 - GT08B - GT - 10 - 11.5 - 20241030	266.4	361.5	335.3	26.2	68.9	38.0%
B24-1900	LDW23 - GT08B - GT - 15 - 16.5 - 20241030	260.2	486.5	342.8	143.7	82.6	174.0%
B24-1901	LDW23 - GT08B - GT - 20 - 21.5 - 20241030	380.0	778.8	688.6	90.2	308.6	29.2%
B24-1902	LDW23 - GT08B - GT - 25 - 26.1 - 20241030	268.8	723.0	628.8	94.2	360.0	26.2%
B24-1903	LDW23 - GT08B - GT - 26.1 - 26.5 - 20241030	306.4	397.3	375.1	22.2	68.7	32.3%
B24-1904	LDW23 - GT08B - GT - 30 - 31.5 - 20241030	303.8	408.6	387.7	20.9	83.9	24.9%
B24-1905	LDW23 - GT08B - GT - 35 - 36.5 - 20241030	584.0	929.7	854.1	75.6	270.1	28.0%
B24-1906	LDW23 - GT08B - GT - 40 - 41.5 - 20241030	310.9	1000.5	851.5	149.0	540.6	27.6%
B24-1907	LDW23 - GT04B - GT - 5 - 6.5 - 20241029	493.2	673.9	640.7	33.2	147.5	22.5%
B24-1908	LDW23 - GT04B - GT - 8.7 - 10 - 20241029	429.6	670.4	617.4	53.0	187.8	28.2%
B24-1909	LDW23 - GT04B - GT - 12.7 - 14.2 - 20241029	415.3	1006.2	824.2	182.0	408.9	44.5%
B24-1910	LDW23 - GT04B - GT - 15 - 16.5 - 20241029	303.2	483.6	444.1	39.5	140.9	28.0%
B24-1911	LDW23 - GT04B - GT - 20 - 21.5 - 20241029	301.0	1063.8	911.7	152.1	610.7	24.9%
B24-1912	LDW23 - GT04B - GT - 30 - 31.5 - 20241029	510.0	1090.1	968.8	121.3	458.8	26.4%
B24-1913	LDW23 - GT35B - GT - 5 - 6.5 - 20241028	414.1	533.8	527.7	6.1	113.6	5.4%
B24-1914	LDW23 - GT35B - GT - 10 - 11.2 - 20241028	500.5	813.2	763.4	49.8	262.9	18.9%
B24-1915	LDW23 - GT35B - GT - 11.2 - 11.5 - 20241028	301.0	460.7	428.6	32.1	127.6	25.2%
B24-1916	LDW23 - GT35B - GT - 15 - 16.5 - 20241028	319.8	460.5	423.8	36.7	104.0	35.3%
B24-1917	LDW23 - GT35B - GT - 20 - 21.5 - 20241028	423.4	902.3	808.5	93.8	385.1	24.4%
B24-1918	LDW23 - GT35B - GT - 25 - 26.5 - 20241028	600.1	1256.0	1123.8	132.2	523.7	25.2%
					0.0	0.0	#DIV/0!
					0.0	0.0	#DIV/0!

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**Comments:**

Reviewed by:

*Alex Eifrig*

Alex Eifrig  
WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT08B - GT - 5 - 6.5 - 20241030 <b>Sample#:</b> B24-1898	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand with Gravel <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(5)</sub> = 0.015 mm      % Gravel = 20.7%      Coeff. of Curvature, C <sub>c</sub> = 0.38 D <sub>(10)</sub> = 0.031 mm      % Sand = 54.8%      Coeff. of Uniformity, C <sub>u</sub> = 47.36 D <sub>(15)</sub> = 0.046 mm      % Silt & Clay = 24.4%      Fineness Modulus = 3.01 D <sub>(30)</sub> = 0.130 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.799 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 1.453 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 18.010 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 16/29      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Method(s) ASTM C-136, ASTM D-6913, ASTM C-117					
Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	91%	91%	100.0%	0.0%
5/8"	16.00		88%	100.0%	0.0%
1/2"	12.50	85%	85%	100.0%	0.0%
3/8"	9.50	85%	85%	100.0%	0.0%
1/4"	6.30		81%	100.0%	0.0%
#4	4.75	79%	79%	100.0%	0.0%
#8	2.36		70%	100.0%	0.0%
#10	2.00	68%	68%	100.0%	0.0%
#16	1.18		56%	100.0%	0.0%
#20	0.850		51%	100.0%	0.0%
#30	0.600		47%	100.0%	0.0%
#40	0.425	44%	44%	100.0%	0.0%
#50	0.300		39%	100.0%	0.0%
#60	0.250		36%	100.0%	0.0%
#80	0.180		33%	100.0%	0.0%
#100	0.150	32%	32%	100.0%	0.0%
#140	0.106		28%	100.0%	0.0%
#170	0.090		26%	100.0%	0.0%
#200	0.075	24.4%	24.4%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





**Project:** Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER  
**Project #:** 24B105  
**Date Received:** November 22, 2024  
**Date Tested:** December 9, 2024

**Client:** Anchor QEA, LLC.  
**Sampled by:** Client  
**Tested by:** S. Boesenberg  
**Control No.:** 12132024

**Moisture Content ASTM C-566, ASTM D-2216**

Sample #	Location	Tare	Wet + Tare	Dry + Tare	Wgt. Of Moisture	Wgt. Of Soil	% Moisture
B24-1901	LDW23 - GT08B - GT - 20 - 21.5 - 20241030	380.0	778.8	688.6	90.2	308.6	29.2%
B24-1908	LDW23 - GT04B - GT - 8.7 - 10 - 20241029	429.6	670.4	617.4	53.0	187.8	28.2%
B24-1913	LDW23 - GT35B - GT - 5 - 6.5 - 20241028	414.1	533.8	527.7	6.1	113.6	5.4%

**Organic Content ASTM D-2974**

Sample #	Location	Tare	Soil + Tare, Pre-Ignition	Soil + Tare, Post Ignition	% Organics
B24-1901	LDW23 - GT08B - GT - 20 - 21.5 - 20241030	49.93	92.93	92.32	1.42%
B24-1908	LDW23 - GT04B - GT - 8.7 - 10 - 20241029	51.82	97.65	96.75	1.96%
B24-1913	LDW23 - GT35B - GT - 5 - 6.5 - 20241028	46.73	90.16	88.44	3.96%

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**Comments:** \_\_\_\_\_

Reviewed by: *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician

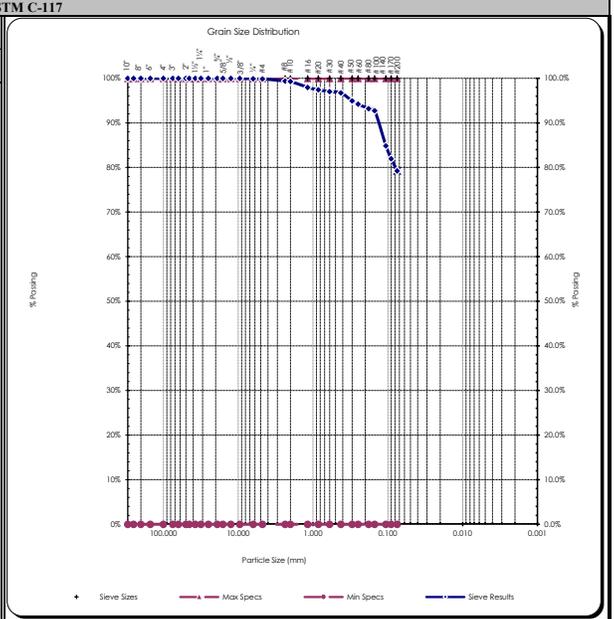


## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT08B - GT - 10 - 11.5 - 20241030 <b>Sample#:</b> B24-1899	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Visual Soils Classification</b> Clayey Silt with Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s)</b> ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281 D <sub>(5)</sub> = 0.005 mm      % Gravel = 0.1%      Coeff. of Curvature, C <sub>c</sub> = 1.50 D <sub>(10)</sub> = 0.009 mm      % Sand = 20.6%      Coeff. of Uniformity, C <sub>u</sub> = 6.00 D <sub>(15)</sub> = 0.014 mm      % Silt & Clay = 79.3%      Fineness Modulus = 0.18 D <sub>(30)</sub> = 0.028 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.047 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.057 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.135 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 59/72      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		99%	100.0%	0.0%
#10	2.00	99%	99%	100.0%	0.0%
#16	1.18		98%	100.0%	0.0%
#20	0.850	97%	97%	100.0%	0.0%
#30	0.600		97%	100.0%	0.0%
#40	0.425	97%	97%	100.0%	0.0%
#50	0.300		95%	100.0%	0.0%
#60	0.250		94%	100.0%	0.0%
#80	0.180		93%	100.0%	0.0%
#100	0.150	93%	93%	100.0%	0.0%
#140	0.106		85%	100.0%	0.0%
#170	0.090		82%	100.0%	0.0%
#200	0.075	79.3%	79.3%	100.0%	0.0%



All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT08B - GT - 10 - 11.5 - 20241030 <b>Sample#:</b> B24-1899	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 11-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Visual Soils Classification</b> Clayey Silt with Sand <b>Sample Color</b> Brown																																																																																																																																														
ASTM D-422 HYDROMETER ANALYSIS		ASTM C-136																																																																																																																																														
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**Comments:** \_\_\_\_\_  
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 \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT08B - GT - 26.1 - 26.5 - 20241030 <b>Sample#:</b> B24-1903	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Visual Soils Classification</b> Silt with Clayey Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  Sample Meets Specs ? <i>N/A</i>	<b>Method(s)</b> ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281 D <sub>(5)</sub> = 0.005 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>u</sub> = 1.50 D <sub>(10)</sub> = 0.011 mm      % Sand = 30.7%      Coeff. of Uniformity, C <sub>u</sub> = 6.00 D <sub>(15)</sub> = 0.016 mm      % Silt & Clay = 69.3%      Fineness Modulus = 0.15 D <sub>(30)</sub> = 0.032 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.054 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.065 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.146 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 68/97      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		99%	100.0%	0.0%
#20	0.850	99%	99%	100.0%	0.0%
#30	0.600		99%	100.0%	0.0%
#40	0.425	99%	99%	100.0%	0.0%
#50	0.300		95%	100.0%	0.0%
#60	0.250		94%	100.0%	0.0%
#80	0.180		92%	100.0%	0.0%
#100	0.150	91%	91%	100.0%	0.0%
#140	0.106		78%	100.0%	0.0%
#170	0.090		74%	100.0%	0.0%
#200	0.075	69.3%	69.3%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Hydrometer Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT08B - GT - 26.1 - 26.5 - 20241030 <b>Sample#:</b> B24-1903		<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 11-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024		<b>Visual Soils Classification</b> Silt with Clayey Sand <b>Sample Color</b> Brown
ASTM D-422 HYDROMETER ANALYSIS				
Assumed Sp Gr : 2.65 Sample Weight: 50.07 grams Hydrosopic Moist.: 4.39% Adj. Sample Wgt : 47.96 grams				
Hydrometer Reading Minutes	Corrected Reading	Percent Passing	Soils Particle Diameter	
2	23	47.9%	0.0341 mm	
5	17	35.4%	0.0224 mm	
15	12	25.0%	0.0133 mm	
30	10	20.8%	0.0096 mm	
60	7.5	15.6%	0.0069 mm	
250	5	10.4%	0.0034 mm	
1440	4	8.3%	0.0014 mm	
% Gravel: 0.0% % Sand: 30.7% % Silt: 56.5% % Clay: 12.8%		Liquid Limit: n/a Plastic Limit: n/a Plasticity Index: n/a		
ASTM C-136				
Sieve Analysis				
Grain Size Distribution				
Sieve Size	Percent Passing	Soils Particle Diameter		
3.0"	100%	75.000 mm		
2.0"	100%	50.000 mm		
1.5"	100%	37.500 mm		
1.25"	100%	31.500 mm		
1.0"	100%	25.000 mm		
3/4"	100%	19.000 mm		
5/8"	100%	16.000 mm		
1/2"	100%	12.500 mm		
3/8"	100%	9.500 mm		
1/4"	100%	6.300 mm		
#4	100%	4.750 mm		
#10	100%	2.000 mm		
#20	99%	0.850 mm		
#40	99%	0.425 mm		
#100	91%	0.150 mm		
#200	69.3%	0.075 mm		
<b>Silts</b>		68.8%	0.074 mm	
		56.2%	0.050 mm	
		32.6%	0.020 mm	
<b>Clays</b>		12.8%	0.005 mm	
		8.9%	0.002 mm	
<b>Colloids</b>		5.9%	0.001 mm	
USDA Soil Textural Classification				
% Sand: 43.7% % Silt: 47.3% % Clay: 9.0%		Particle Size 2.0 - 0.05 mm 0.05 - 0.002 mm < 0.002 mm		
USDA Soil Textural Classification				
Loam				

All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_  
 \_\_\_\_\_  
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**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT08B - GT - 30 - 31.5 - 20241030 <b>Sample#:</b> B24-1904	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(5)</sub> = 0.030 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>c</sub> = 1.82 D <sub>(10)</sub> = 0.060 mm      % Sand = 87.5%      Coeff. of Uniformity, C <sub>u</sub> = 5.00 D <sub>(15)</sub> = 0.094 mm      % Silt & Clay = 12.5%      Fineness Modulus = 1.29 D <sub>(30)</sub> = 0.180 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.259 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.299 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.417 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 3/22      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		96%	100.0%	0.0%
#20	0.850		94%	100.0%	0.0%
#30	0.600		93%	100.0%	0.0%
#40	0.425	92%	92%	100.0%	0.0%
#50	0.300		60%	100.0%	0.0%
#60	0.250		48%	100.0%	0.0%
#80	0.180		30%	100.0%	0.0%
#100	0.150	22%	22%	100.0%	0.0%
#140	0.106		17%	100.0%	0.0%
#170	0.090		14%	100.0%	0.0%
#200	0.075	12.5%	12.5%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



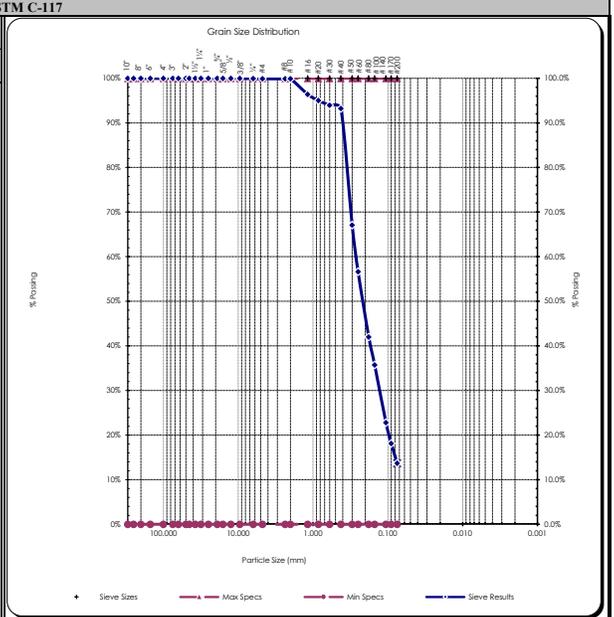


## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT08B - GT - 35 - 36.5 - 20241030 <b>Sample#:</b> B24-1905	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(5)</sub> = 0.027 mm      % Gravel = 0.1%      Coeff. of Curvature, C <sub>c</sub> = 1.17 D <sub>(10)</sub> = 0.055 mm      % Sand = 86.2%      Coeff. of Uniformity, C <sub>u</sub> = 4.86 D <sub>(15)</sub> = 0.079 mm      % Silt & Clay = 13.7%      Fineness Modulus = 1.07 D <sub>(30)</sub> = 0.131 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.218 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.266 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.410 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 5/34      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
---	---

Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		96%	100.0%	0.0%
#20	0.850		95%	100.0%	0.0%
#30	0.600		94%	100.0%	0.0%
#40	0.425	93%	93%	100.0%	0.0%
#50	0.300		67%	100.0%	0.0%
#60	0.250		57%	100.0%	0.0%
#80	0.180		42%	100.0%	0.0%
#100	0.150	36%	36%	100.0%	0.0%
#140	0.106		23%	100.0%	0.0%
#170	0.090		18%	100.0%	0.0%
#200	0.075	13.7%	13.7%	100.0%	0.0%



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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT04B - GT - 5 - 6.5 - 20241029 <b>Sample#:</b> B24-1907	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs	Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281  Sample Meets Specs ? <i>N/A</i>	D <sub>(5)</sub> = 0.029 mm      % Gravel = 6.5%      Coeff. of Curvature, C <sub>c</sub> = 1.05 D <sub>(10)</sub> = 0.058 mm      % Sand = 80.5%      Coeff. of Uniformity, C <sub>u</sub> = 6.28 D <sub>(15)</sub> = 0.084 mm      % Silt & Clay = 12.9%      Fineness Modulus = 1.87 D <sub>(30)</sub> = 0.148 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.291 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.363 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 2.604 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 17/90      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Method(s) ASTM C-136, ASTM D-6913, ASTM C-117					
Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	99%	100%	100.0%	0.0%
1/4"	6.30		95%	100.0%	0.0%
#4	4.75	93%	93%	100.0%	0.0%
#8	2.36		90%	100.0%	0.0%
#10	2.00	89%	89%	100.0%	0.0%
#16	1.18		78%	100.0%	0.0%
#20	0.850		74%	100.0%	0.0%
#30	0.600		71%	100.0%	0.0%
#40	0.425	69%	69%	100.0%	0.0%
#50	0.300		51%	100.0%	0.0%
#60	0.250		44%	100.0%	0.0%
#80	0.180		35%	100.0%	0.0%
#100	0.150	30%	30%	100.0%	0.0%
#140	0.106		20%	100.0%	0.0%
#170	0.090		16%	100.0%	0.0%
#200	0.075	12.9%	12.9%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT04B - GT - 8.7 - 10 - 20241029 <b>Sample#:</b> B24-1908	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(5)</sub> = 0.031 mm      % Gravel = 2.6%      Coeff. of Curvature, C <sub>c</sub> = 1.99 D <sub>(10)</sub> = 0.062 mm      % Sand = 85.3%      Coeff. of Uniformity, C <sub>u</sub> = 6.09 D <sub>(15)</sub> = 0.113 mm      % Silt & Clay = 12.1%      Fineness Modulus = 1.91 D <sub>(30)</sub> = 0.215 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.323 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.377 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 1.667 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 16/91      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Method(s) ASTM C-136, ASTM D-6913, ASTM C-117					
Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	99%	100%	100.0%	0.0%
1/4"	6.30		98%	100.0%	0.0%
#4	4.75	97%	97%	100.0%	0.0%
#8	2.36		96%	100.0%	0.0%
#10	2.00	96%	96%	100.0%	0.0%
#16	1.18		82%	100.0%	0.0%
#20	0.850		76%	100.0%	0.0%
#30	0.600		72%	100.0%	0.0%
#40	0.425	69%	69%	100.0%	0.0%
#50	0.300		46%	100.0%	0.0%
#60	0.250		36%	100.0%	0.0%
#80	0.180		23%	100.0%	0.0%
#100	0.150	18%	18%	100.0%	0.0%
#140	0.106		14%	100.0%	0.0%
#170	0.090		13%	100.0%	0.0%
#200	0.075	12.1%	12.1%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT04B - GT - 12.7 - 14.2 - 20241029 <b>Sample#:</b> B24-1909	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Visual Soils Classification</b> Clayey Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s)</b> ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281 D <sub>(5)</sub> = 0.004 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>c</sub> = 1.50 D <sub>(10)</sub> = 0.008 mm      % Sand = 4.4%      Coeff. of Uniformity, C <sub>u</sub> = 6.00 D <sub>(15)</sub> = 0.012 mm      % Silt & Clay = 95.6%      Fineness Modulus = 0.06 D <sub>(30)</sub> = 0.024 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.039 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.047 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.071 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 30/31      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Method(s) ASTM C-136, ASTM D-6913, ASTM C-117					
Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		99%	100.0%	0.0%
#20	0.850	99%	99%	100.0%	0.0%
#30	0.600		99%	100.0%	0.0%
#40	0.425	99%	99%	100.0%	0.0%
#50	0.300		98%	100.0%	0.0%
#60	0.250		98%	100.0%	0.0%
#80	0.180		98%	100.0%	0.0%
#100	0.150	98%	98%	100.0%	0.0%
#140	0.106		97%	100.0%	0.0%
#170	0.090		96%	100.0%	0.0%
#200	0.075	95.6%	95.6%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## ASTM D-4318 Liquid Limit, Plastic Limit & Plasticity Index of Soils

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT04B - GT - 12.7 - 14 - 20241029 <b>Sample #:</b> B24-1909	<b>Date Received:</b> 23-Sep-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 11-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> MH, Clayey Silt with Sand <b>Sample Color</b> Brown
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### Liquid Limit Determination

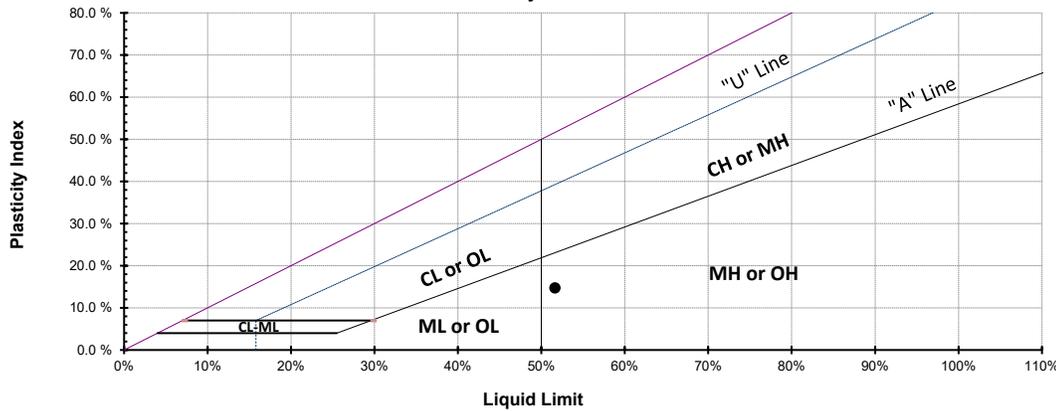
	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	31.03	30.70	23.64			
<b>Weight of Dry Soils + Pan:</b>	26.91	26.70	20.32			
<b>Weight of Pan:</b>	18.95	19.06	14.15			
<b>Weight of Dry Soils:</b>	7.96	7.64	6.17			
<b>Weight of Moisture:</b>	4.12	4.00	3.32			
<b>% Moisture:</b>	51.8 %	52.4 %	53.8 %			
<b>Number of Blows:</b>	25	20	14			

**Liquid Limit @ 25 Blows:** 51.6 %  
**Plastic Limit:** 36.9 %  
**Plasticity Index, I<sub>p</sub>:** 14.7 %

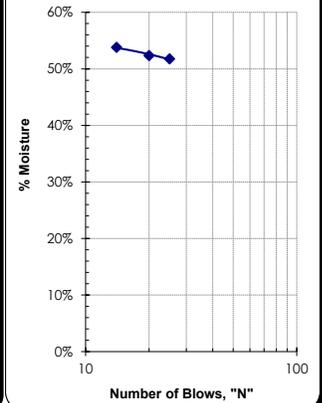
### Plastic Limit Determination

	#1	#2	#3	#4	#5	#6
<b>Weight of Wet Soils + Pan:</b>	25.87	26.54				
<b>Weight of Dry Soils + Pan:</b>	23.99	24.36				
<b>Weight of Pan:</b>	18.97	18.37				
<b>Weight of Dry Soils:</b>	5.02	5.99				
<b>Weight of Moisture:</b>	1.88	2.18				
<b>% Moisture:</b>	37.5 %	36.4 %				

### Plasticity Chart



### Liquid Limit



All results apply only to actual locations and materials tested. As a mutual protection to clients, the public and ourselves, all reports are submitted as the confidential property of clients, and authorization for publication of statements, conclusions or extracts from or regarding our reports is reserved pending our written approval.

**Comments:** \_\_\_\_\_

Reviewed by: Alex Eifrig  
 Alex Eifrig  
 WABO Supervising Laboratory Technician

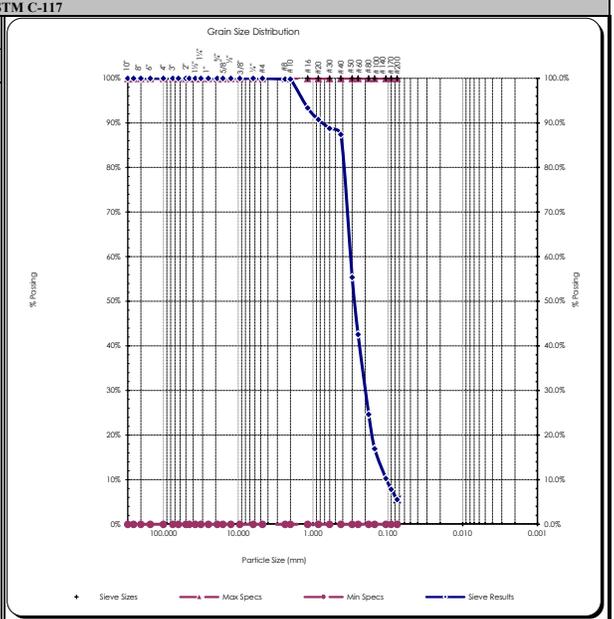


## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT04B - GT - 30 - 31.5 - 20241029 <b>Sample#:</b> B24-1912	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 11-Dec-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> SP-SM, Poorly graded Sand with Silt <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(5)</sub> = 0.067 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>c</sub> = 1.22 D <sub>(10)</sub> = 0.104 mm      % Sand = 94.4%      Coeff. of Uniformity, C <sub>u</sub> = 3.05 D <sub>(15)</sub> = 0.137 mm      % Silt & Clay = 5.6%      Fineness Modulus = 1.46 D <sub>(30)</sub> = 0.201 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.279 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.318 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.755 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 4/63      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		93%	100.0%	0.0%
#20	0.850		91%	100.0%	0.0%
#30	0.600		89%	100.0%	0.0%
#40	0.425	87%	87%	100.0%	0.0%
#50	0.300		55%	100.0%	0.0%
#60	0.250		43%	100.0%	0.0%
#80	0.180		25%	100.0%	0.0%
#100	0.150	17%	17%	100.0%	0.0%
#140	0.106		10%	100.0%	0.0%
#170	0.090		8%	100.0%	0.0%
#200	0.075	5.6%	5.6%	100.0%	0.0%



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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician

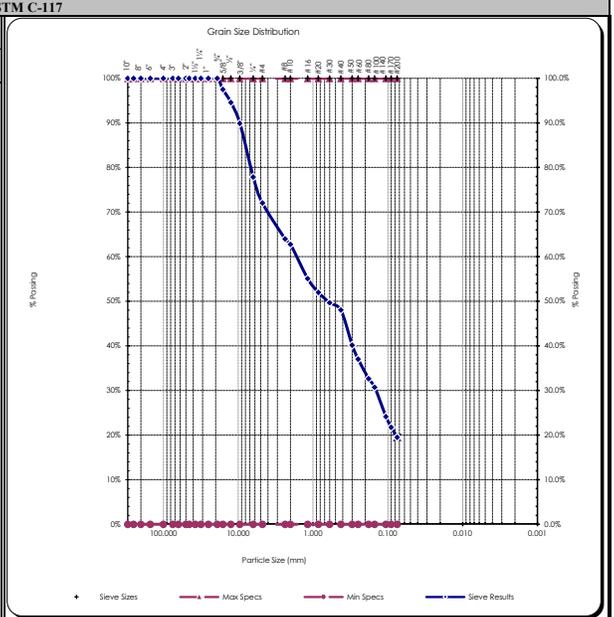


## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT35B - GT - 10 - 11.2 - 20241028 <b>Sample#:</b> B24-1914	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 11-Dec-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand with Gravel <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(5)</sub> = 0.019 mm      % Gravel = 28.0%      Coeff. of Curvature, C <sub>c</sub> = 0.32 D <sub>(10)</sub> = 0.038 mm      % Sand = 52.5%      Coeff. of Uniformity, C <sub>u</sub> = 44.35 D <sub>(15)</sub> = 0.058 mm      % Silt & Clay = 19.5%      Fineness Modulus = 2.98 D <sub>(30)</sub> = 0.145 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.635 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 1.705 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 9.552 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 13/32      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		97%	100.0%	0.0%
1/2"	12.50	95%	95%	100.0%	0.0%
3/8"	9.50	90%	90%	100.0%	0.0%
1/4"	6.30		78%	100.0%	0.0%
#4	4.75	72%	72%	100.0%	0.0%
#8	2.36		64%	100.0%	0.0%
#10	2.00	63%	63%	100.0%	0.0%
#16	1.18		55%	100.0%	0.0%
#20	0.850		52%	100.0%	0.0%
#30	0.600		50%	100.0%	0.0%
#40	0.425	48%	48%	100.0%	0.0%
#50	0.300		40%	100.0%	0.0%
#60	0.250		37%	100.0%	0.0%
#80	0.180		33%	100.0%	0.0%
#100	0.150	31%	31%	100.0%	0.0%
#140	0.106		24%	100.0%	0.0%
#170	0.090		22%	100.0%	0.0%
#200	0.075	19.5%	19.5%	100.0%	0.0%



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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician



## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT35B - GT - 15 - 16.5 - 20241028 <b>Sample#:</b> B24-1916	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 10-Dec-24 <b>Tested By:</b> R. Bohler <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> SM, Silty Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(5)</sub> = 0.010 mm      % Gravel = 4.3%      Coeff. of Curvature, C <sub>c</sub> = 1.30 D <sub>(10)</sub> = 0.021 mm      % Sand = 59.6%      Coeff. of Uniformity, C <sub>u</sub> = 6.90 D <sub>(15)</sub> = 0.031 mm      % Silt & Clay = 36.1%      Fineness Modulus = 0.89 D <sub>(30)</sub> = 0.062 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.115 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.143 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 0.601 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 21/52      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		97%	100.0%	0.0%
#4	4.75	96%	96%	100.0%	0.0%
#8	2.36		94%	100.0%	0.0%
#10	2.00	94%	94%	100.0%	0.0%
#16	1.18		92%	100.0%	0.0%
#20	0.850		91%	100.0%	0.0%
#30	0.600		90%	100.0%	0.0%
#40	0.425	89%	89%	100.0%	0.0%
#50	0.300		77%	100.0%	0.0%
#60	0.250		72%	100.0%	0.0%
#80	0.180		65%	100.0%	0.0%
#100	0.150	62%	62%	100.0%	0.0%
#140	0.106		47%	100.0%	0.0%
#170	0.090		41%	100.0%	0.0%
#200	0.075	36.1%	36.1%	100.0%	0.0%

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
 Alex Eifrig  
 WABO Supervising Laboratory Technician





## Sieve Report

<b>Project:</b> Q.C. - LDW Middle Reach Design 210075 - 01.03, Task 7.3 - Ph II DER <b>Project #:</b> 24B105 <b>Client:</b> Anchor QEA, LLC. <b>Source:</b> LDW23 - GT35B - GT - 25 - 26.5 - 20241028 <b>Sample#:</b> B24-1918	<b>Date Received:</b> 22-Nov-24 <b>Sampled By:</b> Client <b>Date Tested:</b> 11-Dec-24 <b>Tested By:</b> Z. Romney <b>Control No.:</b> 12132024	<b>Unified Soils Classification System, ASTM D-2487</b> SP, Poorly graded Sand <b>Sample Color:</b> Brown
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<b>Specifications</b> No Specs  <p style="text-align: center;">Sample Meets Specs ? <i>N/A</i></p>	<b>Method(s) ASTM D-2216, ASTM D-2419, ASTM D4318, ASTM D-5281</b> D <sub>(5)</sub> = 0.090 mm      % Gravel = 0.0%      Coeff. of Curvature, C <sub>c</sub> = 0.90 D <sub>(10)</sub> = 0.145 mm      % Sand = 96.4%      Coeff. of Uniformity, C <sub>u</sub> = 3.76 D <sub>(15)</sub> = 0.177 mm      % Silt & Clay = 3.6%      Fineness Modulus = 2.15 D <sub>(30)</sub> = 0.266 mm      Liquid Limit = n/a      Plastic Limit = n/a D <sub>(50)</sub> = 0.385 mm      Plasticity Index = n/a      Moisture %, as sampled = n/a D <sub>(60)</sub> = 0.545 mm      Sand Equivalent = n/a      Req'd Sand Equivalent = D <sub>(90)</sub> = 1.638 mm      Fracture %, 1 Face = n/a      Req'd Fracture %, 1 Face = Dust Ratio = 3/47      Fracture %, 2+ Faces = n/a      Req'd Fracture %, 2+ Faces =
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Method(s) ASTM C-136, ASTM D-6913, ASTM C-117					
Sieve Size		Actual Cumulative Percent Passing	Interpolated Cumulative Percent Passing	Specs	
US	Metric			Max	Min
12.00"	300.00		100%	100.0%	0.0%
10.00"	250.00		100%	100.0%	0.0%
8.00"	200.00		100%	100.0%	0.0%
6.00"	150.00		100%	100.0%	0.0%
4.00"	100.00		100%	100.0%	0.0%
3.00"	75.00		100%	100.0%	0.0%
2.50"	63.00		100%	100.0%	0.0%
2.00"	50.00	100%	100%	100.0%	0.0%
1.75"	45.00		100%	100.0%	0.0%
1.50"	37.50		100%	100.0%	0.0%
1.25"	31.50		100%	100.0%	0.0%
1.00"	25.00	100%	100%	100.0%	0.0%
3/4"	19.00	100%	100%	100.0%	0.0%
5/8"	16.00		100%	100.0%	0.0%
1/2"	12.50	100%	100%	100.0%	0.0%
3/8"	9.50	100%	100%	100.0%	0.0%
1/4"	6.30		100%	100.0%	0.0%
#4	4.75	100%	100%	100.0%	0.0%
#8	2.36		100%	100.0%	0.0%
#10	2.00	100%	100%	100.0%	0.0%
#16	1.18		77%	100.0%	0.0%
#20	0.850		68%	100.0%	0.0%
#30	0.600		62%	100.0%	0.0%
#40	0.425	57%	57%	100.0%	0.0%
#50	0.300		36%	100.0%	0.0%
#60	0.250		27%	100.0%	0.0%
#80	0.180		16%	100.0%	0.0%
#100	0.150	10%	10%	100.0%	0.0%
#140	0.106		6%	100.0%	0.0%
#170	0.090		5%	100.0%	0.0%
#200	0.075	3.6%	3.6%	100.0%	0.0%

Grain Size Distribution

+ Sieve Sizes    — Max Specs    — Min Specs    — Sieve Results

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**Comments:** \_\_\_\_\_

**Reviewed by:** *Alex Eifrig*  
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 WABO Supervising Laboratory Technician