

TO: Mary Crosby - DEP, Burt Holt – Ackenheil, File

FROM: Doug Beitko, PE, - Garvin Boward Beitko Engineering, Inc. (GBBE)

RE: Post-Report Supplemental Soil “Mix Design” Testing Program Narrative & Summary
GBBE Project 16123A

DATE: June 12, 2026

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The intent of this portion of this supplemental post-report laboratory testing was to prepare compacted samples of on-site soils, and mixtures of on-site soils to help determine appropriate design values for friction angle and cohesion. The two extremes generally consist of sand that has weathered from the sandstone “cap” that tops the ridge and clay that has weathered from the Pittsburgh Red Bed claystone unit that daylights below the sandstone cap. The samples were named based on the nearest original test boring location as the bulk samples were obtained in the immediate vicinity of those original test boring locations. For example, Sample # TP-SB-8-1 through TP-SB-8-4 were excavated in the immediate vicinity of the as-staked location of Test Boring SB-8.

Sand Fraction Testing

The initial testing of the sand-filled buckets revealed the sand material sampled is generally consistent relative to in-situ moisture content, percent sand, percent gravel, and percent silt. These four buckets, designated as TP-SB8-1, TP-SB8-2, TP-SB8-3, and TP-SB8-4, were mixed into one composite sample and tested, in the mixed condition, in general accordance with ASTM D 1557 (laboratory compaction test with modified effort a.k.a. Modified Proctor) and then for direct shear at a density near 95% for a maximum embankment height of 150 feet. A second grain size analysis (GSA) was completed on the post-Proctor material in general accordance with ASTM D 6913/D 7928. The post-Proctor GSA results indicated that some of the tested material broke down into finer-grained soils (silt and clay-sized particles) during the mechanical compaction effort applied during the test. The fines increased from about 22% to 33% during the Modified Proctor test.

A second Modified Proctor on the composite sand sample was completed after the sand was laboratory-washed to less than 10% silt or clay-sized particles. This material will be used to construct the reinforced slopes and be used within the reinforced zones of the mechanically-stabilized earth (MSE) retaining walls that surround the planned school building. The “washed” sample was tested in general accordance with ASTM D 1557 (laboratory compaction test with modified effort a.k.a. Modified Proctor) and then for direct shear at a density near 95% for a maximum embankment height of 150 feet. A second grain size analysis (GSA) was completed on the post-Proctor material in general accordance with ASTM D 6913/D 7928. The post-Proctor GSA results indicated that some of the tested material broke down into finer-grained

soils (silt and clay-sized particles) during the mechanical compaction effort applied during the test. The fines increased from about 4% to 31% during the Modified Proctor test. Based on this increase, we asked the laboratory to run the series of tests again in an attempt to determine whether or not this observed change was an anomaly. The second series of tests indicated the fines increased from approximately 8% to 30%. As such, the designs of the MSE walls and the RSS slope were changed to account for this observed and documented soil behavior.

Redbed-Derived Clay Fraction Testing

We obtained 4 buckets of reddish-brown to gray-brown clay in test pits located near test borings B-10, B-9A, B-39, and B-100 from 1-4 feet. Each bucket was tested for natural moisture content (NMC), GSA with 200 wash (no hydrometer), and Atterberg limits. Based on those initial test results, the clay sampled at TP-B39, appears to have the lowest shear strength as it is almost 95% pure clay with high plasticity. Hence, the clay from that test pit was tested for shear strength following the same methodologies/procedures outlined above, except the test pressures were set to model a maximum 50-foot slope design height as opposed to a 150-foot slope design height.

Composite Sample Testing

Once the shear strength testing program was completed on the two sand samples, and the one clay sample, two additional composite samples were prepared and tested utilizing the same methodologies outlined above. For these mixtures, the loading was set to simulate a maximum embankment height of 100 feet. The first mixture was visually targeted via estimating mixed volumes to better simulate field mixing procedures with a target of approximately 60% clay and 40% sand. The as-mixed composite tested out reasonably close at approximately 62% clay and 38% sand. The second mixture was visually targeted via estimating mixed volumes to better simulate field mixing procedures with a target of approximately 40% clay and 60% sand. The as-mixed composite tested out at approximately 47% clay and 53% sand. As anticipated, the shear strength increased with the increasing sand content.

SAMPLE AREA	APPROXIMATE SAMPLE DEPTH (FT)	DESCRIPTION	AS-TESTED				
			USCS SYMBOL	PASSING #200 (%)	DRY DENSITY @ 95% (PCF)	FRICTION ANGLE (DEGREES)	COHESION (PSF)
SB-8	0-2	AS-EXCAVATED	SM	18-23	124	35.3	1231
SB-8	0-2	FINES WASHED OUT	SP TO SM	4-31	118	34.7	1312
B-39	0-4	AS-EXCAVATED	CL/CH	95	113	23.1	1149
SB-8/B-39 60/40*	0-4	60% CLAY 40% SAND*	CL	62	119	20.9	720
SB-8/B-39 40/60*	0-4	40% CLAY 60% SAND*	SM	47	118	21.8	1408

*SAMPLE TARGETS WERE MIXED BY ESTIMATED VISUAL VOLUME AS WOULD LIKELY BE COMPLETED DURING FIELD MIXING.

UP-FRONT SAND CHARACTERIZATION TESTING



June 12, 2025

Project No. 2025-353-002

Doug Beitko
Garvin Boward Beitko Engineering, Inc.
180 Bilmar Drive, Suite IV
Pittsburgh, PA 15205

Transmittal
Laboratory Test Results
QVSD HS GBBE #16123A

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was transmitted to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens that were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectfully submitted,
Geotechnics, Inc.

Nathan Melaro
Director of Operations

***We understand that you have a choice in your laboratory services
and we thank you for choosing Geotechnics.***

MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-002

Lab ID:	001	002	003	004
Boring No.:	TP-SB8-1	TP-SB8-2	TP-SB8-3	TP-SB8-4
Depth (ft):	0.0-2.0'	0.0-2.0'	0.0-2.0'	0.0-2.0'
Sample No.:	TP-SB8-1	TP-SB8-2	TP-SB8-3	TP-SB8-4
Tare Number	3238	3288	3092	3198
Wt. of Tare & Wet Sample (g)	266.04	234.44	270.46	273.30
Wt. of Tare & Dry Sample (g)	244.51	215.05	244.46	249.04
Weight of Tare (g)	7.09	7.17	7.20	7.12
Weight of Water (g)	21.53	19.39	26.00	24.26
Weight of Dry Sample (g)	237.42	207.88	237.26	241.92
Water Content (%)	9.1	9.3	11.0	10.0

Notes :

Tested By JW Date 6/5/25 Checked By EG Date 6/6/25

page 1 of 1 DCN: CT-S1 DATE: 3/18/13 REVISION: 4

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-002	Sample No.:	TP-SB8-1
Lab ID:	2025-353-002-001	Soil Color:	Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	12.59
#4 to #200	Sand	64.74
Finer than #200	Silt & Clay	22.66

USCS Symbol:
SM, TESTED

D50 = 0.25

USCS Classification:
SILTY SAND
(NON-PLASTIC FINES)

Tested By	DF	Date	6/9/25	Checked By	EG	Date	6/12/25
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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-002	Sample No.:	TP-SB8-1
Lab ID:	2025-353-002-001	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	2991	Tare No.:	3184				
Wt. of Tare & Wet Sample (g):	248.11	Weight of Tare & Wet Sample (g):	268.01				
Wt. of Tare & Dry Sample (g):	227.83	Weight of Tare & Dry Sample (g):	258.12				
Weight of Tare (g):	7.04	Weight of Tare (g):	7.11				
Weight of Water (g):	20.28	Weight of Water (g):	9.89				
Weight of Dry Soil (g):	220.79	Weight of Dry Soil (g):	251.01				
Moisture Content (%):	9.2	Moisture Content (%):	3.9				
Wet Weight of -3/4" Sample (g):	19178.00	Total Dry Weight of Sample (g):	17815.76				
Tare No. -3/4" Sub-Specimen (g):	2045	Wet Weight of +3/4" Sample (g):	261.00				
Wt. of Tare & Wet -3/4" Sub-Specimen (g):	1392.76	Dry Weight of + 3/4" Sample (g):	251.11				
Weight of Tare (g):	144.11	Dry Weight of - 3/4" Sample (g):	17564.65				
Sub-Specimen 3/4" Wet Weight (g):	1248.65	Dry Weight -3/4" +3/8" Sample (g):	1163.75				
Tare No. (-3/8" Sub-Specimen):	410	Dry Weight of -3/8" Sample (g):	16400.90				
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	397.37	J - Factor (% Finer than 3/4"):	98.6%				
Weight of Tare (g):	97.97	J - Factor (% Finer than 3/8"):	92.1%				
Sub-Specimen -3/8" Wet Weight (g):	299.40						

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	158.00	0.85	0.85	99.15	99
1"	25	0.00	0.00	0.85	99.15	99
3/4"	19	103.00	0.56	1.41	98.59	99
1/2"	12.5	31.93	(**)	2.79	97.21	96
3/8"	9.5	43.84	3.83	6.63	93.37	92
#4	4.75	13.86	5.05	5.05	94.95	87
#10	2	23.03	8.40	13.45	86.55	80
#20	0.85	22.88	(**)	21.80	78.20	72
#40	0.425	30.63	11.17	32.97	67.03	62
#60	0.25	33.36	12.17	45.13	54.87	51
#100	0.15	44.77	16.33	61.46	38.54	35
#140	0.106	24.78	9.04	70.50	29.50	27
#200	0.075	13.40	4.89	75.38	24.62	23
Pan	-	67.50	24.62	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	6/9/25	Checked By	EG	Date	6/12/25
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ATTERBERG LIMITS

ASTM D 4318-17

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-002
Lab ID: 2025-353-002-001

Boring No.: TP-SB8-1
Depth (ft): 0.0-2.0'
Sample No.: TP-SB8-1
Color: Brown
(Minus No. 40 sieve material)

As Received Water Content

Tare Number	3238
Wt. of Tare & Wet Sample (g)	266.04
Wt. of Tare & Dry Sample (g)	244.51
Weight of Tare (g)	7.09
Weight of Water (g)	21.53
Weight of Dry Sample (g)	237.42

Water Content (%) **9.1**

NON - PLASTIC MATERIAL

Tested By *FS* *Date* *6/11/25* *Checked By* *EG* *Date* *6/12/25*

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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-2
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-002	Sample No.:	TP-SB8-2
Lab ID:	2025-353-002-002	Soil Color:	Brown



Sieve Size	Percentage (%)
Greater than #4	10.62
#4 to #200	66.38
Finer than #200	22.99

USCS Symbol:
SM, TESTED

D50 = 0.23

USCS Classification:
SILTY SAND
(NON-PLASTIC FINES)

Tested By DF	Date 6/9/25	Checked By EG	Date 6/12/25
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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-2
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-002	Sample No.:	TP-SB8-2
Lab ID:	2025-353-002-002	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1450	Tare No.:	NA	Tare No.:	1450	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	831.72	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	831.72	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	773.20	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	773.20	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.38	Weight of Tare (g):	NA	Weight of Tare (g):	144.38	Weight of Tare (g):	NA
Weight of Water (g):	58.52	Weight of Water (g):	NA	Weight of Water (g):	58.52	Weight of Water (g):	NA
Weight of Dry Soil (g):	628.82	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	628.82	Weight of Dry Soil (g):	NA
Moisture Content (%):	9.3	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	628.82	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	628.82
Tare No. (Sub-Specimen)	1450	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1450	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	831.72	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	831.72	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.38	Dry Weight of - 3/4" Sample (g):	628.82	Weight of Tare (g):	144.38	Dry Weight of - 3/4" Sample (g):	628.82
Sub-Specimen Wet Weight (g):	687.34	Dry Weight -3/4" +3/8" Sample (g):	36.54	Sub-Specimen Wet Weight (g):	687.34	Dry Weight -3/4" +3/8" Sample (g):	36.54
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	592.28	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	592.28
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	14.71	(**)	2.34	97.66	98
3/8"	9.5	21.83	3.47	5.81	94.19	94
#4	4.75	30.27	4.81	10.62	89.38	89
#10	2	27.45	4.37	14.99	85.01	85
#20	0.85	25.73	(**)	19.08	80.92	81
#40	0.425	71.07	11.30	30.38	69.62	70
#60	0.25	101.30	16.11	46.49	53.51	54
#100	0.15	111.15	17.68	64.17	35.83	36
#140	0.106	51.83	8.24	72.41	27.59	28
#200	0.075	28.91	4.60	77.01	22.99	23
Pan	-	144.57	22.99	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	6/9/25	Checked By	EG	Date	6/12/25
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ATTERBERG LIMITS

ASTM D 4318-17

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-002
Lab ID: 2025-353-002-002

Boring No.: TP-SB8-2
Depth (ft): 0.0-2.0'
Sample No.: TP-SB8-2
Color: Brown
(Minus No. 40 sieve material)

As Received Water Content

Tare Number	3288
Wt. of Tare & Wet Sample (g)	234.44
Wt. of Tare & Dry Sample (g)	215.05
Weight of Tare (g)	7.17
Weight of Water (g)	19.39
Weight of Dry Sample (g)	207.88

Water Content (%) **9.3**

NON - PLASTIC MATERIAL

Tested By *FS* *Date* *6/11/25* *Checked By* *EG* *Date* *6/12/25*

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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-3
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-002	Sample No.:	TP-SB8-3
Lab ID:	2025-353-002-003	Soil Color:	Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	20.96
#4 to #200	Sand	58.80
Finer than #200	Silt & Clay	20.24

USCS Symbol:
SM, TESTED

D50 = 0.34

USCS Classification:
SILTY SAND WITH GRAVEL
(NON-PLASTIC FINES)

Tested By	DF	Date	6/9/25	Checked By	EG	Date	6/12/25
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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-3
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-002	Sample No.:	TP-SB8-3
Lab ID:	2025-353-002-003	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	3230	Tare No.:	3517				
Wt. of Tare & Wet Sample (g):	233.77	Weight of Tare & Wet Sample (g):	538.50				
Wt. of Tare & Dry Sample (g):	212.17	Weight of Tare & Dry Sample (g):	500.71				
Weight of Tare (g):	7.09	Weight of Tare (g):	7.11				
Weight of Water (g):	21.60	Weight of Water (g):	37.79				
Weight of Dry Soil (g):	205.08	Weight of Dry Soil (g):	493.60				
Moisture Content (%):	10.5	Moisture Content (%):	7.7				
Wet Weight of -3/4" Sample (g):	19877.00	Total Dry Weight of Sample (g):	18479.90				
Tare No. -3/4" Sub-Specimen (g):	1545	Wet Weight of +3/4" Sample (g):	535.00				
Wt. of Tare & Wet -3/4" Sub-Specimen (g):	1458.24	Dry Weight of + 3/4" Sample (g):	496.95				
Weight of Tare (g):	177.72	Dry Weight of - 3/4" Sample (g):	17982.95				
Sub-Specimen 3/4" Wet Weight (g):	1280.52	Dry Weight -3/4" +3/8" Sample (g):	2265.37				
Tare No. (-3/8" Sub-Specimen):	451	Dry Weight of -3/8" Sample (g):	15717.58				
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	412.64	J - Factor (% Finer than 3/4"):	97.3%				
Weight of Tare (g):	92.04	J - Factor (% Finer than 3/8"):	85.1%				
Sub-Specimen -3/8" Wet Weight (g):	320.60						

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*) 0.00	0.00	100.00	100
1 1/2"	37.5	247.00	1.24	1.24	98.76	99
1"	25	269.00	1.35	2.59	97.41	97
3/4"	19	19.00	0.10	2.69	97.31	97
1/2"	12.5	51.47	(**) 4.44	4.44	95.56	93
3/8"	9.5	94.47	8.15	12.60	87.40	85
#4	4.75	20.51	7.07	7.07	92.93	79
#10	2	27.97	9.64	16.71	83.29	71
#20	0.85	24.86	(**) 8.57	25.29	74.71	64
#40	0.425	31.44	10.84	36.12	63.88	54
#60	0.25	33.22	11.45	47.58	52.42	45
#100	0.15	44.33	15.28	62.86	37.14	32
#140	0.106	25.30	8.72	71.58	28.42	24
#200	0.075	13.40	4.62	76.20	23.80	20
Pan	-	69.02	23.80	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	6/9/25	Checked By	EG	Date	6/12/25
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ATTERBERG LIMITS

ASTM D 4318-17

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-002
Lab ID: 2025-353-002-003

Boring No.: TP-SB8-3
Depth (ft): 0.0-2.0'
Sample No.: TP-SB8-3
Color: Brown
(Minus No. 40 sieve material)

As Received Water Content

Tare Number	3092
Wt. of Tare & Wet Sample (g)	270.46
Wt. of Tare & Dry Sample (g)	244.46
Weight of Tare (g)	7.20
Weight of Water (g)	26.00
Weight of Dry Sample (g)	237.26

Water Content (%) **11.0**

NON - PLASTIC MATERIAL

Tested By *FS* *Date* *6/11/25* *Checked By* *EG* *Date* *6/12/25*

page 1 of 1 DCN: CT-S4C, DATE: 4/27/17, REVISION : 4e

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-002	Sample No.:	TP-SB8-4
Lab ID:	2025-353-002-004	Soil Color:	Brown



Sieve Size	Percentage (%)
Greater than #4	24.56
#4 to #200	57.34
Finer than #200	18.11

USCS Symbol:
SM, TESTED

D50 = 0.43

USCS Classification:
SILTY SAND WITH GRAVEL
(NON-PLASTIC FINES)

Tested By DF	Date 6/9/25	Checked By EG	Date 6/12/25
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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-002	Sample No.:	TP-SB8-4
Lab ID:	2025-353-002-004	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	3510			Tare No.:	3393		
Wt. of Tare & Wet Sample (g):	244.45			Weight of Tare & Wet Sample (g):	384.78		
Wt. of Tare & Dry Sample (g):	222.55			Weight of Tare & Dry Sample (g):	359.77		
Weight of Tare (g):	7.16			Weight of Tare (g):	7.13		
Weight of Water (g):	21.90			Weight of Water (g):	25.01		
Weight of Dry Soil (g):	215.39			Weight of Dry Soil (g):	352.64		
Moisture Content (%):	10.2			Moisture Content (%):	7.1		
Wet Weight of -3/4" Sample (g):	20451.00			Total Dry Weight of Sample (g):	18916.50		
Tare No. -3/4" Sub-Specimen (g):	1487			Wet Weight of +3/4" Sample (g):	378.00		
Wt. of Tare & Wet -3/4" Sub-Specimen (g):	1491.10			Dry Weight of + 3/4" Sample (g):	352.97		
Weight of Tare (g):	146.64			Dry Weight of - 3/4" Sample (g):	18563.53		
Sub-Specimen 3/4" Wet Weight (g):	1344.46			Dry Weight -3/4" +3/8" Sample (g):	3081.66		
Tare No. (-3/8" Sub-Specimen):	449			Dry Weight of -3/8" Sample (g):	15481.87		
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	421.87			J - Factor (% Finer than 3/4"):	98.1%		
Weight of Tare (g):	98.02			J - Factor (% Finer than 3/8"):	81.8%		
Sub-Specimen -3/8" Wet Weight (g):	323.85						

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	67.00	0.33	0.33	99.67	100
1"	25	231.00	1.14	1.47	98.53	99
3/4"	19	80.00	0.39	1.87	98.13	98
1/2"	12.5	86.99	(**)	7.13	92.87	91
3/8"	9.5	115.60	9.47	16.60	83.40	82
#4	4.75	22.99	7.82	7.82	92.18	75
#10	2	29.89	10.17	17.99	82.01	67
#20	0.85	27.81	(**)	27.45	72.55	59
#40	0.425	34.69	11.80	39.25	60.75	50
#60	0.25	33.56	11.42	50.67	49.33	40
#100	0.15	44.12	15.01	65.68	34.32	28
#140	0.106	22.79	7.75	73.43	26.57	22
#200	0.075	13.08	4.45	77.88	22.12	18
Pan	-	65.03	22.12	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	6/9/25	Checked By	EG	Date	6/12/25
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ATTERBERG LIMITS

ASTM D 4318-17

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-002
Lab ID: 2025-353-002-004

Boring No.: TP-SB8-4
Depth (ft): 0.0-2.0'
Sample No.: TP-SB8-4
Color: Brown
(Minus No. 40 sieve material)

As Received Water Content

Tare Number	3198
Wt. of Tare & Wet Sample (g)	273.30
Wt. of Tare & Dry Sample (g)	249.04
Weight of Tare (g)	7.12
Weight of Water (g)	24.26
Weight of Dry Sample (g)	241.92

Water Content (%)	10.0
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NON - PLASTIC MATERIAL

Tested By FS Date 6/11/25 Checked By EG Date 6/12/25

page 1 of 1 DCN: CT-S4C, DATE: 4/27/17, REVISION : 4e

UP-FRONT CLAY CHARACTERIZATION TESTING



June 11, 2025

Project No. 2024-353-001

Doug Beitko
Garvin Boward Beitko Engineering, Inc.
180 Bilmar Drive, Suite IV
Pittsburgh, PA 15205

Transmittal
Laboratory Test Results
QVSD HS GBBE #16123A

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was transmitted to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens that were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectfully submitted,
Geotechnics, Inc.

Nathan Melaro
Director of Operations

***We understand that you have a choice in your laboratory services
and we thank you for choosing Geotechnics.***

MOISTURE CONTENT

ASTM D 2216-19

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-001

Lab ID:	001	002	003	004
Boring No.:	TP-10	TP-9A	TP-39	TP-100
Depth (ft):	0.0-4.0'	0.0-4.0'	0.0-4.0'	0.0-4.0'
Sample No.:	TP-10	TP-9A	TP-39	TP-100
Tare Number	3167	3274	4035	3379
Wt. of Tare & Wet Sample (g)	288.93	295.00	279.01	277.61
Wt. of Tare & Dry Sample (g)	239.38	255.54	216.42	222.00
Weight of Tare (g)	7.33	8.07	7.18	7.19
Weight of Water (g)	49.55	39.46	62.59	55.61
Weight of Dry Sample (g)	232.05	247.47	209.24	214.81
Water Content (%)	21.4	15.9	29.9	25.9

Notes :

Tested By	JW	Date	6/3/25	Checked By	EG	Date	6/4/25
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page 1 of 1 DCN: CT-S1 DATE: 3/18/13 REVISION: 4

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-10
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-001	Sample No.:	TP-10
Lab ID:	2025-353-001-001	Soil Color:	Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	9.05
#4 to #200	Sand	20.43
Finer than #200	Silt & Clay	70.53

USCS Symbol:
CL, TESTED

USCS Classification:
LEAN CLAY WITH SAND

Tested By	DF	Date	6/6/25	Checked By	EG	Date	6/11/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-10
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-001	Sample No.:	TP-10
Lab ID:	2025-353-001-001	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1465	Tare No.:	NA	Tare No.:	1465	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	878.68	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	878.68	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	830.55	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	830.55	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	145.63	Weight of Tare (g):	NA	Weight of Tare (g):	145.63	Weight of Tare (g):	NA
Weight of Water (g):	48.13	Weight of Water (g):	NA	Weight of Water (g):	48.13	Weight of Water (g):	NA
Weight of Dry Soil (g):	684.92	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	684.92	Weight of Dry Soil (g):	NA
Moisture Content (%):	7.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	684.92	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	684.92
Tare No. (Sub-Specimen)	1465	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1465	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	878.68	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	878.68	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	145.63	Dry Weight of - 3/4" Sample (g):	684.92	Weight of Tare (g):	145.63	Dry Weight of - 3/4" Sample (g):	684.92
Sub-Specimen Wet Weight (g):	733.05	Dry Weight -3/4" +3/8" Sample (g):	31.71	Sub-Specimen Wet Weight (g):	733.05	Dry Weight -3/4" +3/8" Sample (g):	31.71
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	653.21	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	653.21
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	14.36	(**)	2.10	97.90	98
3/8"	9.5	17.35	2.53	4.63	95.37	95
#4	4.75	30.25	4.42	9.05	90.95	91
#10	2	34.11	4.98	14.03	85.97	86
#20	0.85	23.58	(**)	17.47	82.53	83
#40	0.425	17.58	2.57	20.04	79.96	80
#60	0.25	28.28	4.13	24.16	75.84	76
#100	0.15	19.91	2.91	27.07	72.93	73
#140	0.106	8.23	1.20	28.27	71.73	72
#200	0.075	8.23	1.20	29.47	70.53	71
Pan	-	483.04	70.53	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	6/6/25	Checked By	EG	Date	6/11/25
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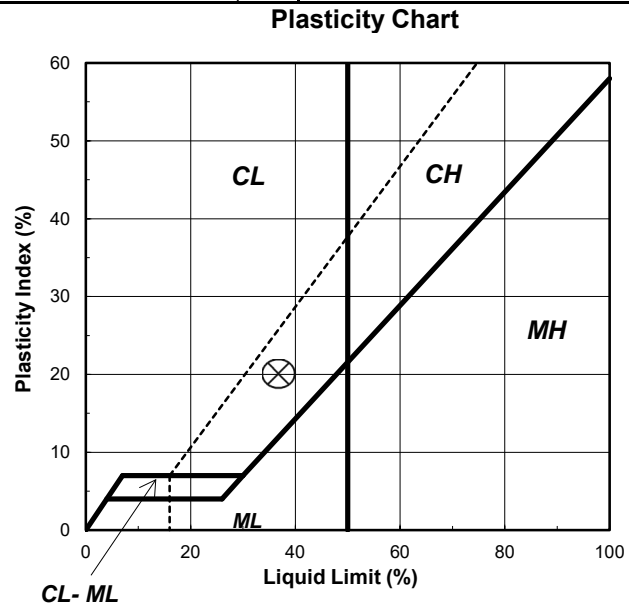
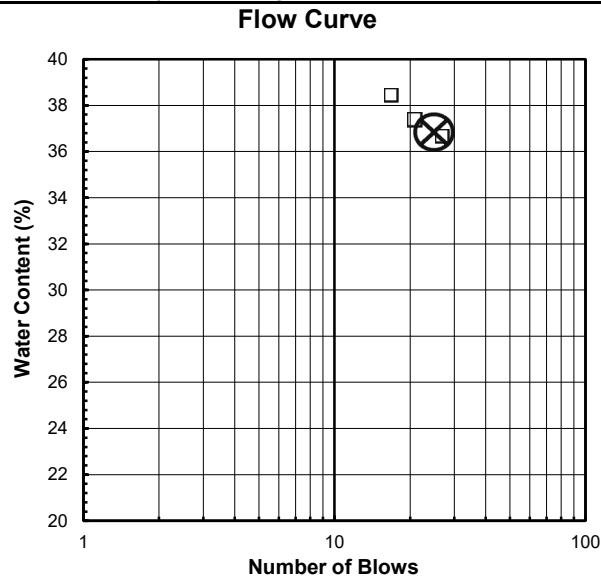
ATTERBERG LIMITS

ASTM D 4318-17

Client: Garvin Boward Beitko Engineering, Inc. Boring No.: TP-10
 Client Reference: QVSD HS GBBE #16123A Depth (ft): 0.0-4.0'
 Project No.: 2025-353-001 Sample No.: TP-10
 Lab ID: 2025-353-001-001 Soil Description: BROWN LEAN CLAY
Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus #40 sieve material, Air dried)
sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

As Received Moisture Content ASTM D2216-19		Liquid Limit Test			
		1	2	3	M
Tare Number:	3167	217	235	166	U
Wt. of Tare & Wet Sample (g):	288.93	41.33	41.21	42.21	L
Wt. of Tare & Dry Sample (g):	239.38	35.25	35.10	35.87	T
Weight of Tare (g):	7.33	18.65	18.74	19.36	I
Weight of Water (g):	49.6	6.1	6.1	6.3	P
Weight of Dry Sample (g):	232.1	16.6	16.4	16.5	O
Was As Received MC Preserved:	Yes				I
Moisture Content (%):	21.4	36.6	37.3	38.4	N
Number of Blows:		27	21	17	T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	612	234		Liquid Limit (%): 37
Wt. of Tare & Wet Sample (g):	26.46	26.10		Plastic Limit (%): 17
Wt. of Tare & Dry Sample (g):	25.47	25.17		Plasticity Index (%): 20
Weight of Tare (g):	19.79	19.87		USCS Symbol: CL
Weight of Water (g):	1.0	0.9		
Weight of Dry Sample (g):	5.7	5.3		
Moisture Content (%):	17.4	17.5	-0.1	
<i>Note: The acceptable range of the two Moisture Contents is $\pm$ 1.12</i>				



Tested By TO Date 6/7/25 Checked By EG Date 6/11/25

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-9A
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-001	Sample No.:	TP-9A
Lab ID:	2025-353-001-002	Soil Color:	Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	15.32
#4 to #200	Sand	35.91
Finer than #200	Silt & Clay	48.78

USCS Symbol:
SC, TESTED

D50 = 0.09

USCS Classification:
CLAYEY SAND WITH GRAVEL

Tested By	DF	Date	6/6/25	Checked By	EG	Date	6/10/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-9A
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-001	Sample No.:	TP-9A
Lab ID:	2025-353-001-002	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	3188			Tare No.:	3208		
Wt. of Tare & Wet Sample (g):	267.71			Weight of Tare & Wet Sample (g):	298.40		
Wt. of Tare & Dry Sample (g):	251.29			Weight of Tare & Dry Sample (g):	290.54		
Weight of Tare (g):	8.24			Weight of Tare (g):	7.30		
Weight of Water (g):	16.42			Weight of Water (g):	7.86		
Weight of Dry Soil (g):	243.05			Weight of Dry Soil (g):	283.24		
Moisture Content (%):	6.8			Moisture Content (%):	2.8		
Wet Weight of -3/4" Sample (g):	16062.00			Total Dry Weight of Sample (g):	15593.35		
Tare No. -3/4" Sub-Specimen (g):	1408			Wet Weight of +3/4" Sample (g):	563.00		
Wt. of Tare & Wet -3/4" Sub-Specimen (g):	1306.24			Dry Weight of + 3/4" Sample (g):	547.80		
Weight of Tare (g):	174.87			Dry Weight of - 3/4" Sample (g):	15045.55		
Sub-Specimen 3/4" Wet Weight (g):	1131.37			Dry Weight -3/4" +3/8" Sample (g):	754.85		
Tare No. (-3/8" Sub-Specimen):	456			Dry Weight of -3/8" Sample (g):	14290.70		
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	408.20			J - Factor (% Finer than 3/4"):	96.5%		
Weight of Tare (g):	91.41			J - Factor (% Finer than 3/8"):	91.6%		
Sub-Specimen -3/8" Wet Weight (g):	316.79						

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	63.00	0.39	0.39	99.61	100
1"	25	219.00	1.37	1.76	98.24	98
3/4"	19	281.00	1.75	3.51	96.49	96
1/2"	12.5	40.23	(**)	3.80	96.20	93
3/8"	9.5	12.94	1.22	5.02	94.98	92
#4	4.75	22.55	7.60	7.60	92.40	85
#10	2	24.00	8.09	15.69	84.31	77
#20	0.85	15.19	(**)	20.81	79.19	73
#40	0.425	13.18	4.44	25.25	74.75	69
#60	0.25	23.59	7.95	33.20	66.80	61
#100	0.15	25.59	8.62	41.82	58.18	53
#140	0.106	8.65	2.91	44.74	55.26	51
#200	0.075	6.06	2.04	46.78	53.22	49
Pan	-	157.93	53.22	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	6/6/25	Checked By	EG	Date	6/10/25
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ATTERBERG LIMITS

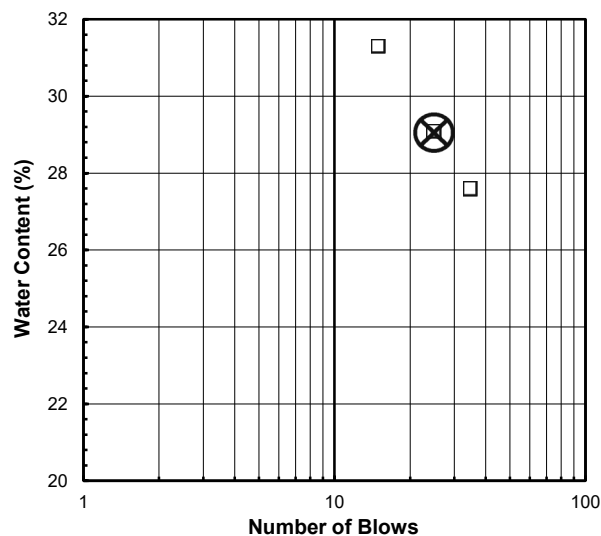
ASTM D 4318-17

Client: Garvin Boward Beitko Engineering, Inc. Boring No.: TP-9A
 Client Reference: QVSD HS GBBE #16123A Depth (ft): 0.0-4.0'
 Project No.: 2025-353-001 Sample No.: TP-9A
 Lab ID: 2025-353-001-002 Soil Description: BROWN LEAN CLAY
Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus #40 sieve material, Air dried)
sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

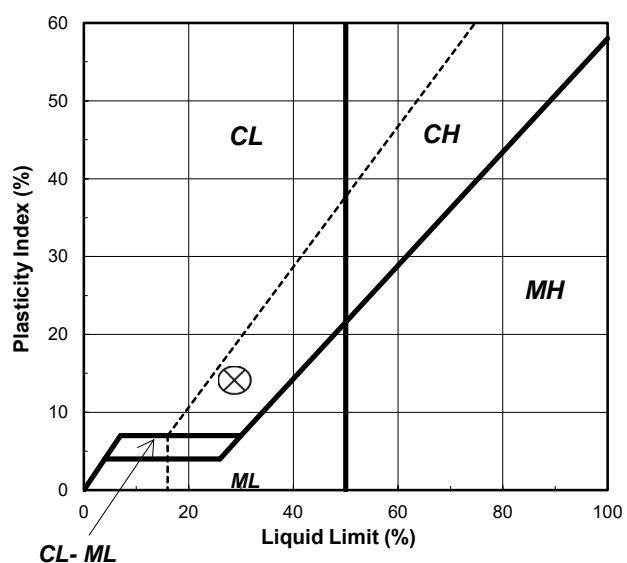
As Received Moisture Content ASTM D2216-19		Liquid Limit Test			
Tare Number:	3274	1	2	3	M
Wt. of Tare & Wet Sample (g):	295.00	642	177	317	U
Wt. of Tare & Dry Sample (g):	255.54	41.89	41.98	41.79	L
Weight of Tare (g):	8.07	37.15	37.07	36.67	T
Weight of Water (g):	39.5	19.96	20.18	20.30	I
Weight of Dry Sample (g):	247.5	4.7	4.9	5.1	P
Was As Received MC Preserved:	Yes	17.2	16.9	16.4	O
Moisture Content (%):	15.9	27.6	29.1	31.3	N
Number of Blows:		35	25	15	T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	2234	631		Liquid Limit (%): 29
Wt. of Tare & Wet Sample (g):	22.08	25.03		Plastic Limit (%): 15
Wt. of Tare & Dry Sample (g):	21.29	24.21		Plasticity Index (%): 14
Weight of Tare (g):	16.08	18.83		USCS Symbol: CL
Weight of Water (g):	0.8	0.8		
Weight of Dry Sample (g):	5.2	5.4		
Moisture Content (%):	15.2	15.2	-0.1	
Note: The acceptable range of the two Moisture Contents is $\pm$ 1.12				

Flow Curve



Plasticity Chart

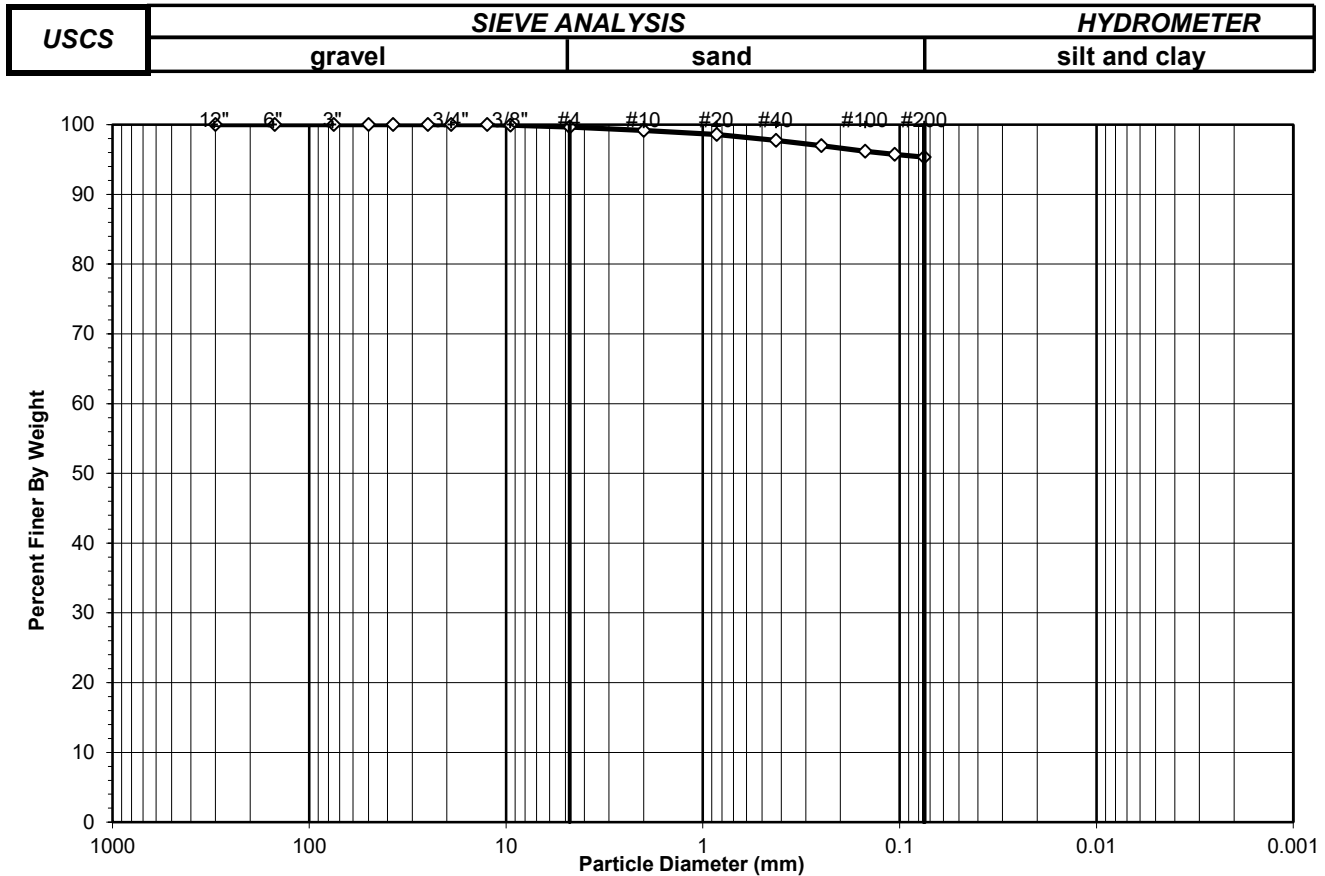


Tested By DDA Date 6/9/25 Checked By EG Date 6/10/25

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-253-001	Sample No.:	TP-39
Lab ID:	2025-353-001-003	Soil Color:	Reddish Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	0.35
#4 to #200	Sand	4.31
Finer than #200	Silt & Clay	95.34

USCS Symbol:
CH, TESTED

USCS Classification:
FAT CLAY

Tested By	DF	Date	6/6/25	Checked By	EG	Date	6/9/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-253-001	Sample No.:	TP-39
Lab ID:	2025-353-001-003	Soil Color:	Reddish Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1482	Tare No.:	NA	Tare No.:	1482	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	869.62	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	869.62	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	797.68	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	797.68	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	175.25	Weight of Tare (g):	NA	Weight of Tare (g):	175.25	Weight of Tare (g):	NA
Weight of Water (g):	71.94	Weight of Water (g):	NA	Weight of Water (g):	71.94	Weight of Water (g):	NA
Weight of Dry Soil (g):	622.43	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	622.43	Weight of Dry Soil (g):	NA
Moisture Content (%):	11.6	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	622.43	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	622.43
Tare No. (Sub-Specimen)	1482	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1482	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	869.62	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	869.62	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	175.25	Dry Weight of - 3/4" Sample (g):	622.43	Weight of Tare (g):	175.25	Dry Weight of - 3/4" Sample (g):	622.43
Sub-Specimen Wet Weight (g):	694.37	Dry Weight -3/4" +3/8" Sample (g):	0.40	Sub-Specimen Wet Weight (g):	694.37	Dry Weight -3/4" +3/8" Sample (g):	0.40
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	622.03	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	622.03
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100.0
6"	150	0.00	0.00	0.00	100.00	100.0
3"	75	0.00	0.00	0.00	100.00	100.0
2"	50	0.00	(*)	0.00	100.00	100.0
1 1/2"	37.5	0.00	0.00	0.00	100.00	100.0
1"	25	0.00	0.00	0.00	100.00	100.0
3/4"	19	0.00	0.00	0.00	100.00	100.0
1/2"	12.5	0.00	(**)	0.00	100.00	100.0
3/8"	9.5	0.40	0.06	0.06	99.94	99.9
#4	4.75	1.76	0.28	0.35	99.65	99.7
#10	2	3.05	0.49	0.84	99.16	99.2
#20	0.85	3.69	(**)	1.43	98.57	98.6
#40	0.425	5.09	0.82	2.25	97.75	97.8
#60	0.25	4.88	0.78	3.03	96.97	97.0
#100	0.15	4.86	0.78	3.81	96.19	96.2
#140	0.106	2.69	0.43	4.24	95.76	95.8
#200	0.075	2.59	0.42	4.66	95.34	95.3
Pan	-	593.42	95.34	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	6/6/25	Checked By	EG	Date	6/9/25
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ATTERBERG LIMITS

ASTM D 4318-17

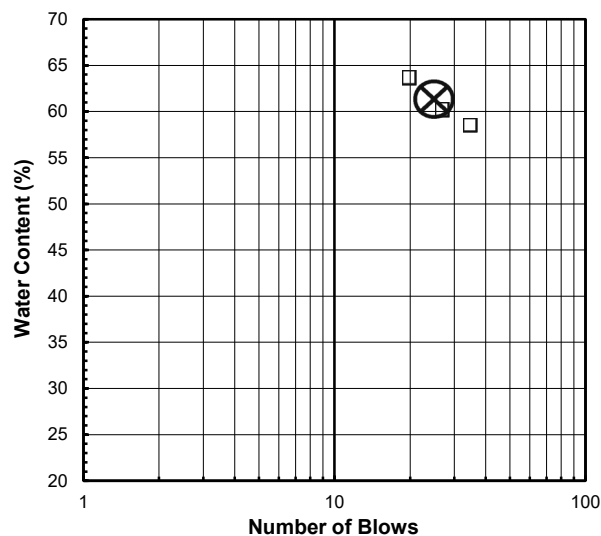
Client: Garvin Boward Beitko Engineering, Inc. Boring No.: TP-39
 Client Reference: QVSD HS GBBE #16123A Depth (ft): 0.0-4.0'
 Project No.: 2025-353-001 Sample No.: TP-39
 Lab ID: 2025-353-001-003 Soil Description: REDDISH BROWN FAT CLAY

Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus #40 sieve material, Air dried)
sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

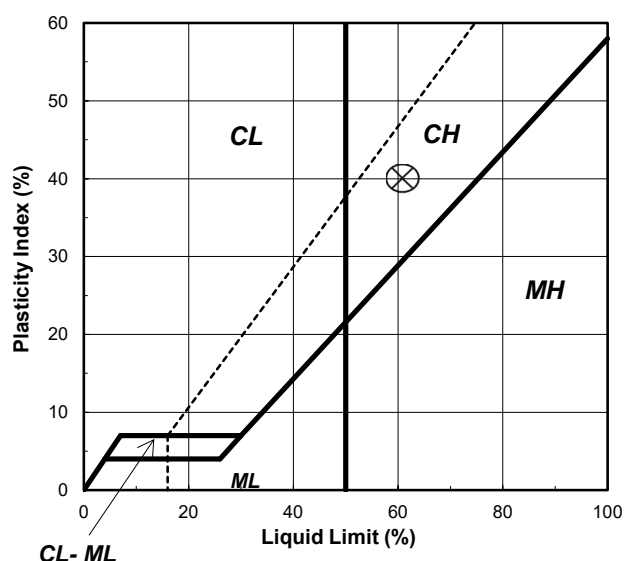
As Received Moisture Content ASTM D2216-19		Liquid Limit Test			
		1	2	3	M
Tare Number:	4035	268	333	327	U
Wt. of Tare & Wet Sample (g):	279.01	38.81	41.46	42.80	L
Wt. of Tare & Dry Sample (g):	216.42	31.04	33.20	33.70	T
Weight of Tare (g):	7.18	17.75	19.46	19.39	I
Weight of Water (g):	62.6	7.8	8.3	9.1	P
Weight of Dry Sample (g):	209.2	13.3	13.7	14.3	O
Was As Received MC Preserved:	Yes				I
Moisture Content (%):	29.9	58.5	60.1	63.6	N
Number of Blows:		35	27	20	T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	626	278		Liquid Limit (%): 61
Wt. of Tare & Wet Sample (g):	24.76	23.42		Plastic Limit (%): 21
Wt. of Tare & Dry Sample (g):	23.73	22.37		Plasticity Index (%): 40
Weight of Tare (g):	18.72	17.34		USCS Symbol: CH
Weight of Water (g):	1.0	1.1		
Weight of Dry Sample (g):	5.0	5.0		
Moisture Content (%):	20.6	20.9	-0.3	
Note: The acceptable range of the two Moisture Contents is $\pm$ 1.4				

Flow Curve



Plasticity Chart



Tested By TO Date 6/7/25 Checked By EG Date 6/9/25

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-100
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-001	Sample No.:	TP-100
Lab ID:	2025-353-001-004	Soil Color:	Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	12.67
#4 to #200	Sand	22.58
Finer than #200	Silt & Clay	64.74

USCS Symbol:
CL, TESTED

USCS Classification:
SANDY LEAN CLAY

Tested By	DF	Date	6/9/25	Checked By	EG	Date	6/11/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-100
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-001	Sample No.:	TP-100
Lab ID:	2025-353-001-004	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	3198			Tare No.:	3379		
Wt. of Tare & Wet Sample (g):	289.15			Weight of Tare & Wet Sample (g):	356.26		
Wt. of Tare & Dry Sample (g):	271.80			Weight of Tare & Dry Sample (g):	352.77		
Weight of Tare (g):	8.47			Weight of Tare (g):	7.20		
Weight of Water (g):	17.35			Weight of Water (g):	3.49		
Weight of Dry Soil (g):	263.33			Weight of Dry Soil (g):	345.57		
Moisture Content (%):	6.6			Moisture Content (%):	1.0		
Wet Weight of -3/4" Sample (g):	17861.00			Total Dry Weight of Sample (g):	17904.35		
Tare No. -3/4" Sub-Specimen (g):	1415			Wet Weight of +3/4" Sample (g):	1159.00		
Wt. of Tare & Wet -3/4" Sub-Specimen (g):	1156.06			Dry Weight of + 3/4" Sample (g):	1147.41		
Weight of Tare (g):	143.43			Dry Weight of - 3/4" Sample (g):	16756.94		
Sub-Specimen 3/4" Wet Weight (g):	1012.63			Dry Weight -3/4" +3/8" Sample (g):	612.58		
Tare No. (-3/8" Sub-Specimen):	480			Dry Weight of -3/8" Sample (g):	16144.36		
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	370.63			J - Factor (% Finer than 3/4"):	93.6%		
Weight of Tare (g):	97.22			J - Factor (% Finer than 3/8"):	90.2%		
Sub-Specimen -3/8" Wet Weight (g):	273.41						

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	145.00	(*) 0.80	0.80	99.20	99
1 1/2"	37.5	320.00	1.77	2.57	97.43	97
1"	25	396.00	2.19	4.76	95.24	95
3/4"	19	298.00	1.65	6.41	93.59	94
1/2"	12.5	11.73	(**) 1.23	1.23	98.77	92
3/8"	9.5	23.00	2.42	3.66	96.34	90
#4	4.75	8.09	3.15	3.15	96.85	87
#10	2	15.96	6.22	9.38	90.62	82
#20	0.85	12.03	(**) 4.69	14.07	85.93	77
#40	0.425	10.20	3.98	18.04	81.96	74
#60	0.25	8.90	3.47	21.51	78.49	71
#100	0.15	9.26	3.61	25.12	74.88	68
#140	0.106	4.20	1.64	26.76	73.24	66
#200	0.075	3.69	1.44	28.20	71.80	65
Pan	-	184.18	71.80	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	6/9/25	Checked By	EG	Date	6/11/25
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ATTERBERG LIMITS

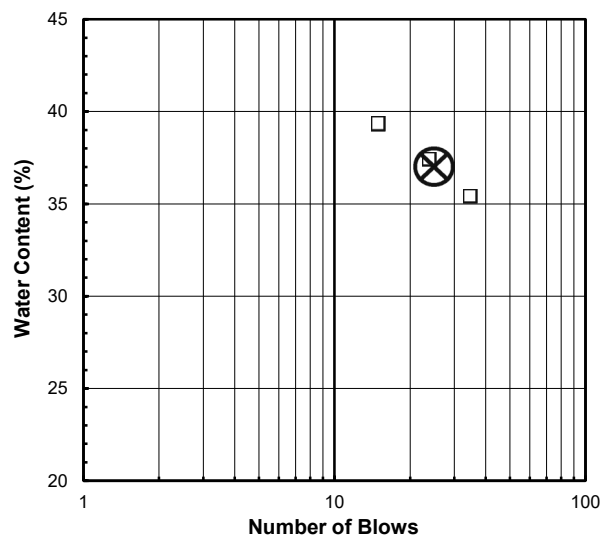
ASTM D 4318-17

Client: Garvin Boward Beitko Engineering, Inc. Boring No.: TP-100
 Client Reference: QVSD HS GBBE #16123A Depth (ft): 0.0-4.0'
 Project No.: 2025-353-001 Sample No.: TP-100
 Lab ID: 2025-353-001-004 Soil Description: BROWN LEAN CLAY
Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus #40 sieve material, Air dried)
sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

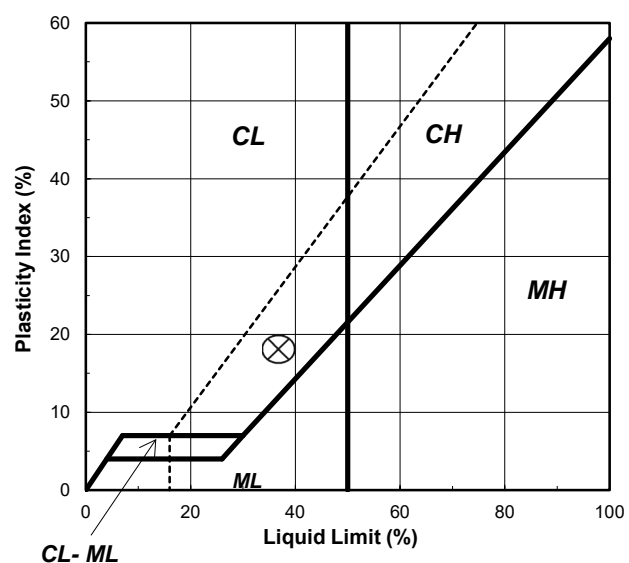
As Received Moisture Content ASTM D2216-19		Liquid Limit Test			
		1	2	3	M
Tare Number:	3379	670	672	652	U
Wt. of Tare & Wet Sample (g):	277.61	46.46	44.66	47.85	L
Wt. of Tare & Dry Sample (g):	222.00	40.52	39.21	41.31	T
Weight of Tare (g):	7.19	23.72	24.63	24.67	I
Weight of Water (g):	55.6	5.9	5.5	6.5	P
Weight of Dry Sample (g):	214.8	16.8	14.6	16.6	O
Was As Received MC Preserved:	Yes				I
Moisture Content (%):	25.9	35.4	37.4	39.3	N
Number of Blows:		35	24	15	T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	679	687		Liquid Limit (%): 37
Wt. of Tare & Wet Sample (g):	28.29	27.04		Plastic Limit (%): 19
Wt. of Tare & Dry Sample (g):	27.18	25.97		Plasticity Index (%): 18
Weight of Tare (g):	21.50	20.47		USCS Symbol: CL
Weight of Water (g):	1.1	1.1		
Weight of Dry Sample (g):	5.7	5.5		
Moisture Content (%):	19.5	19.5	0.1	
Note: The acceptable range of the two Moisture Contents is $\pm$ 1.12				

Flow Curve



Plasticity Chart



Tested By DDA Date 6/10/25 Checked By EG Date 6/11/25

SAND SHEAR STRENGTH TESTING



August 27, 2025

Project No. 2025-353-003

Doug Beitko
Garvin Boward Beitko Engineering, Inc.
180 Bilmar Drive, Suite IV
Pittsburgh, PA 15205

Transmittal
Laboratory Test Results
QVSD HS GBBE #16123A

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was transmitted to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens that were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectfully submitted,
Geotechnics, Inc.

Nathan Melaro
Director of Operations

***We understand that you have a choice in your laboratory services
and we thank you for choosing Geotechnics.***

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-003	Sample No.:	Unwashed Sand
Lab ID:	2025-353-003-001	Soil Color:	Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	15.25
#4 to #200	Sand	62.66
Finer than #200	Silt & Clay	22.09

USCS Symbol:
sm, ASSUMED

D50 = 0.25

USCS Classification:
SILTY SAND WITH GRAVEL

Tested By	DF	Date	7/23/25	Checked By	EG	Date	7/23/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-003	Sample No.:	Unwashed Sand
Lab ID:	2025-353-003-001	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1412	Tare No.:	NA	Tare No.:	1412	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	922.84	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	922.84	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	855.96	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	855.96	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	176.29	Weight of Tare (g):	NA	Weight of Tare (g):	176.29	Weight of Tare (g):	NA
Weight of Water (g):	66.88	Weight of Water (g):	NA	Weight of Water (g):	66.88	Weight of Water (g):	NA
Weight of Dry Soil (g):	679.67	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	679.67	Weight of Dry Soil (g):	NA
Moisture Content (%):	9.8	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	679.67	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	679.67
Tare No. (Sub-Specimen)	1412	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1412	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	922.84	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	922.84	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	176.29	Dry Weight of - 3/4" Sample (g):	679.67	Weight of Tare (g):	176.29	Dry Weight of - 3/4" Sample (g):	679.67
Sub-Specimen Wet Weight (g):	746.55	Dry Weight -3/4" +3/8" Sample (g):	48.82	Sub-Specimen Wet Weight (g):	746.55	Dry Weight -3/4" +3/8" Sample (g):	48.82
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	630.85	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	630.85
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	23.69	(**)	3.49	96.51	97
3/8"	9.5	25.13	3.70	7.18	92.82	93
#4	4.75	54.82	8.07	15.25	84.75	85
#10	2	41.35	6.08	21.33	78.67	79
#20	0.85	37.50	(**)	26.85	73.15	73
#40	0.425	73.47	10.81	37.66	62.34	62
#60	0.25	86.00	12.65	50.31	49.69	50
#100	0.15	104.97	15.44	65.76	34.24	34
#140	0.106	53.43	7.86	73.62	26.38	26
#200	0.075	29.14	4.29	77.91	22.09	22
Pan	-	150.17	22.09	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	7/23/25	Checked By	EG	Date	7/23/25
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MOISTURE - DENSITY RELATIONSHIP

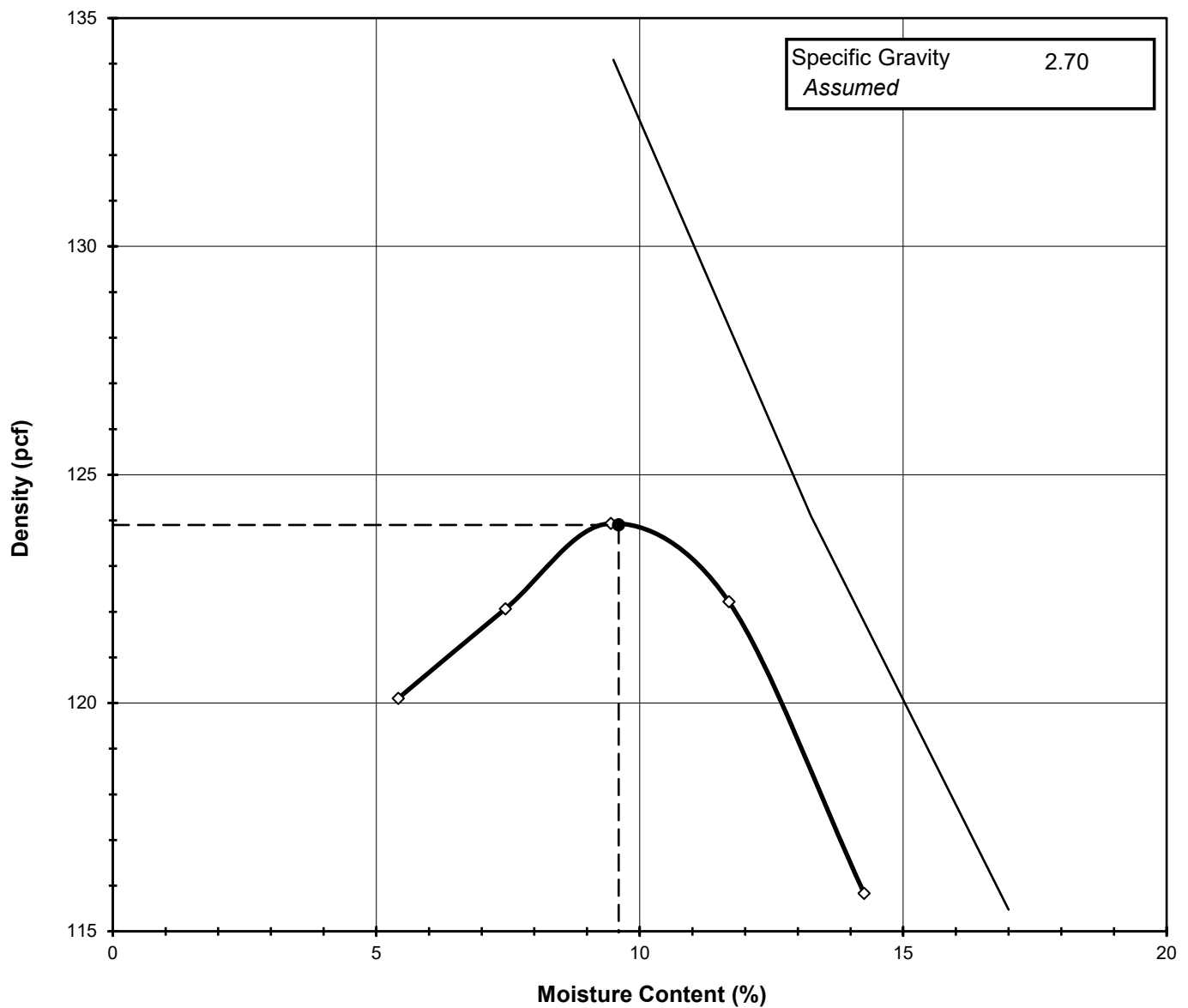
ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-001

Boring No.: TP-SB8-1,2,3,4
 Depth (ft): 0.0-2.0'
 Sample No.: Unwashed Sand
 Test Method: **MODIFIED**

Visual Description: Brown Sand & Sandstone

Optimum Moisture Content (%): 9.6
Maximum Dry Density (pcf): 123.9



Tested By AB Date 7/23/2025 Checked By JLK Date 7/24/25

page 1 of 2 DCN:CT-S12 DATE: 4/21/23 REVISION: 17

MOISTURE - DENSITY RELATIONSHIP

ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-001

Boring No.: TP-SB8-1,2,3,4
Depth (ft): 0.0-2.0'
Sample No.: Unwashed Sand

Visual Description: Brown Sand & Sandstone

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	MODIFIED
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G1916
Mold ID:	G3291
Mold diameter:	4"
Weight of the Mold (g):	4102
Volume of the Mold (cm ³):	946

Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	6021	6090	6158	6171	6108
Weight of Mold (g):	4102	4102	4102	4102	4102
Weight of Wet Sample (g):	1919	1988	2056	2069	2006
Mold Volume (cm ³):	946	946	946	946	946

Moisture Content / Density

Tare Number:	489	454	472	475	481
Weight of Tare & Wet Sample (g):	491.98	490.81	500.50	499.20	488.39
Weight of Tare & Dry Sample (g):	471.39	463.03	465.84	457.25	438.31
Weight of Tare (g):	91.30	90.26	99.17	98.43	87.07
Weight of Water (g):	20.59	27.78	34.66	41.95	50.08
Weight of Dry Sample (g):	380.09	372.77	366.67	358.82	351.24

Wet Density (g/cm ³):	2.03	2.10	2.17	2.19	2.12
Wet Density (pcf):	126.6	131.2	135.6	136.5	132.4
Moisture Content (%):	5.4	7.5	9.5	11.7	14.3
Dry Density (pcf):	120.1	122.1	123.9	122.2	115.8

Zero Air Voids

Moisture Content (%):	9.5	13.3	17.0
Dry Unit Weight (pcf):	134.1	124.1	115.5

Tested By AB Date 7/23/25 Checked By JLK Date 7/24/25

DIRECT SHEAR

ASTM D 3080-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0
Project No.:	2025-353-003	Sample No.:	Unwashed Sand
Lab ID:	2025-353-003-001	Visual Description:	Brown Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Maximum Shear Stress (psi)		Normal Stress (psi)
41.75	(1)	46.9
75.13	(2)	93.8
141.29	(3)	187.5

Overall Regression Analysis

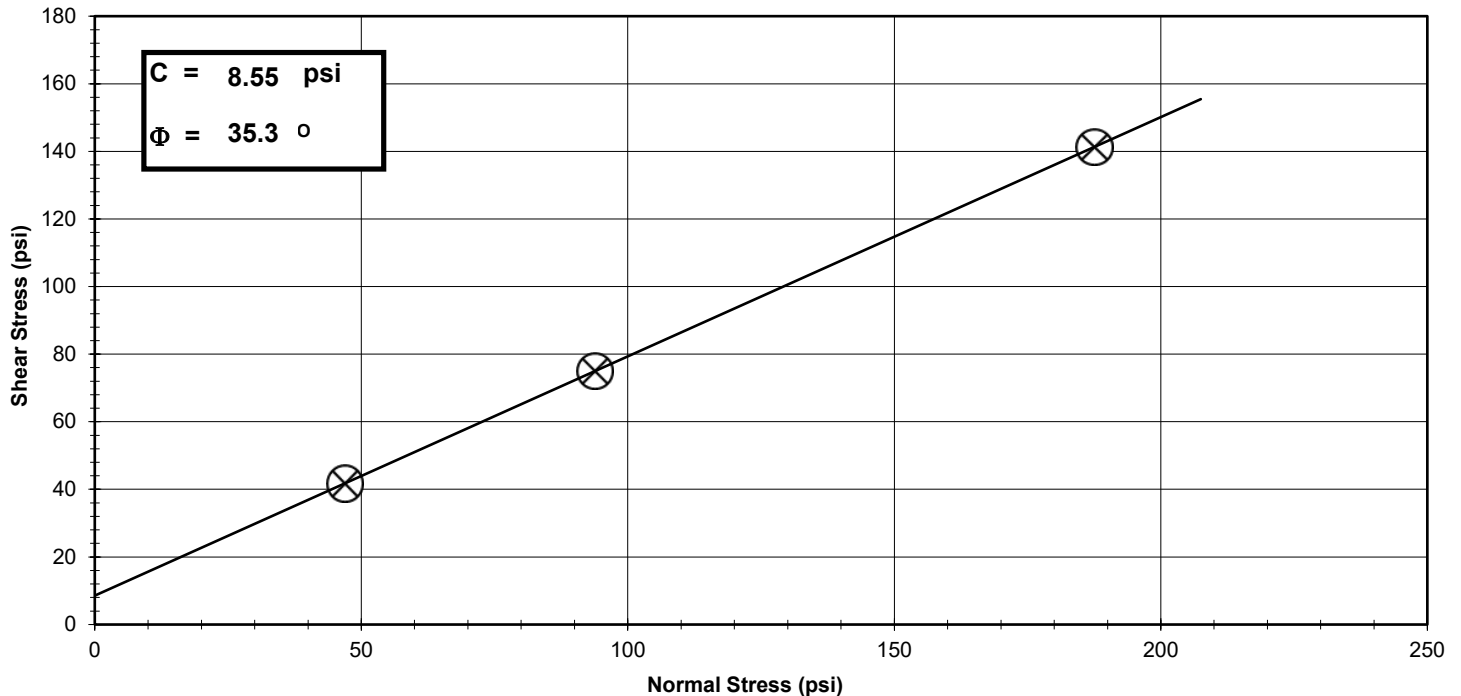
Slope = 0.71
C = 8.64 psi
Φ = 35.3 degrees

Selected Points	Shear Stress (psi)	Normal Stress (psi)
1	41.75	46.9
3	141.29	187.5

Selected Points Regression

Slope = 0.71
C = 8.55 psi
Φ = 35.3 degrees

SHEAR STRESS vs. NORMAL STRESS



Note: Graph not to scale

Tested By RPE Date 8/14/25 Approved By NJM Date 8/14/25

DIRECT SHEAR

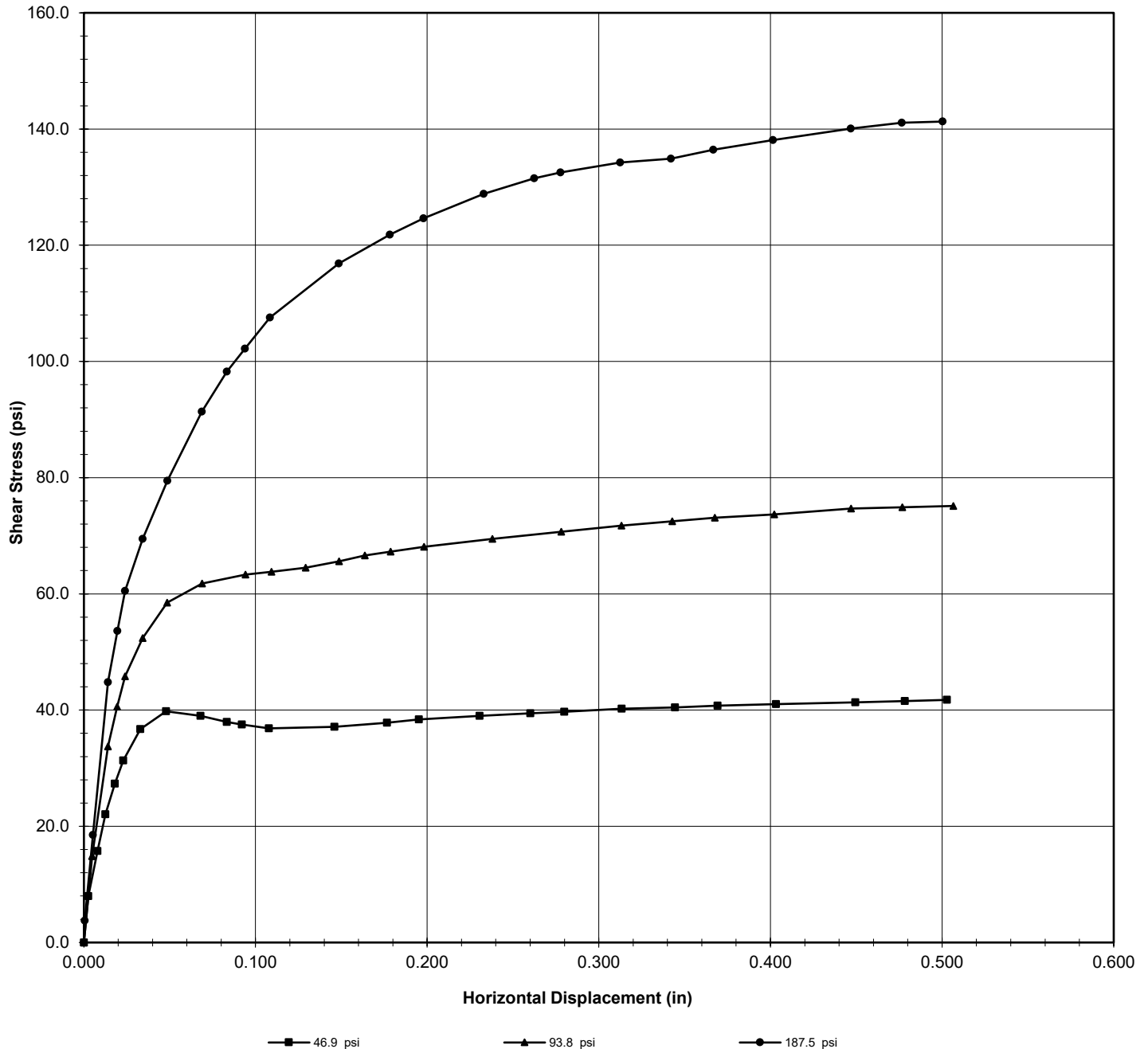
ASTM D 3080-11

Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-001

Boring No.: TP-SB8-1,2,3,4
 Depth (ft): 0.0-2.0
 Sample No.: Unwashed Sand
 Visual Description: Brown Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

SHEAR STRESS vs. HORIZONTAL DISPLACEMENT



Tested By RPE Date 8/14/25 Approved By NJM Date 8/14/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-001

Boring No.: TP-SB8-1,2,3,4
 Depth (ft): 0.0-2.0
 Sample No.: Unwashed Sand
 Visual Description: Brown Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3156 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	174.02	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	0	Volume of Solids (cm ³)	58.7
Weight of Wet Specimen (g)	174.02	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0260
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0125
Wet Density (pcf)	135.1	Void Ratio Before Consolidation	0.369
Dry Density (pcf)	123.1	Void Ratio After Consolidation	0.352

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	3516	2947	Normal Stress (psi)	46.9
Weight of Wet Soil & Tare (g)	131.29	189.19		
Weight of Dry Soil & Tare (g)	120.29	165.26	Strain Rate (in/min)	0.00144
Weight of Tare (g)	7.04	8.19		
Weight of Water (g)	11	23.93	Machine Deflection (in)	0.0135
Weight of Dry Soil (g)	113.25	157.07		
Moisture Content (%)	9.7	15.2		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr,(-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.003	39.1	7.96	0.0000	0.0000	0.17
0.008	77.4	15.76	0.0001	-0.0001	0.34
0.013	108.3	22.05	0.0001	-0.0001	0.47
0.018	134.2	27.34	-0.0004	0.0004	0.58
0.023	153.8	31.32	-0.0010	0.0010	0.67
0.033	180.4	36.74	-0.0026	0.0026	0.78
0.048	195.4	39.81	-0.0055	0.0055	0.85
0.068	191.5	39.01	-0.0097	0.0097	0.83
0.083	186.3	37.95	-0.0117	0.0117	0.81
0.092	184.1	37.50	-0.0124	0.0124	0.80
0.108	180.8	36.84	-0.0132	0.0132	0.79
0.146	182.2	37.11	-0.0140	0.0140	0.79
0.177	185.7	37.84	-0.0144	0.0144	0.81
0.195	188.4	38.38	-0.0145	0.0145	0.82
0.231	191.4	38.99	-0.0146	0.0146	0.83
0.260	193.7	39.47	-0.0145	0.0145	0.84
0.280	195.0	39.72	-0.0144	0.0144	0.85
0.313	197.6	40.26	-0.0139	0.0139	0.86
0.344	198.6	40.46	-0.0135	0.0135	0.86
0.369	200.1	40.76	-0.0133	0.0133	0.87
0.403	201.4	41.04	-0.0129	0.0129	0.87
0.450	202.8	41.31	-0.0119	0.0119	0.88
0.478	204.0	41.57	-0.0108	0.0108	0.89
0.503	205.0	41.75	-0.0103	0.0103	0.89

Tested By RPE *Date* 8/8/25 *Input Checked By* NJM *Date* 8/14/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-001

Boring No.: TP-SB8-1,2,3,4
 Depth (ft): 0.0-2.0
 Sample No.: Unwashed Sand
 Visual Description: Brown Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3155 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	173.99	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	0	Volume of Solids (cm ³)	58.7
Weight of Wet Specimen (g)	173.99	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0378
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0230
Wet Density (pcf)	135.0	Void Ratio Before Consolidation	0.370
Dry Density (pcf)	123.1	Void Ratio After Consolidation	0.338

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	3516	3527		
Weight of Wet Soil & Tare (g)	131.29	188.31	Normal Stress (psi)	93.8
Weight of Dry Soil & Tare (g)	120.29	165.33		
Weight of Tare (g)	7.04	8.02	Strain Rate (in/min)	0.00144
Weight of Water (g)	11	22.98		
Weight of Dry Soil (g)	113.25	157.31	Machine Deflection (in)	0.0147
Moisture Content (%)	9.7	14.6		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.005	72.9	14.85	0.0000	0.0000	0.16
0.005	72.9	14.85	0.0000	0.0000	0.16
0.014	165.6	33.74	0.0001	-0.0001	0.36
0.019	199.2	40.57	0.0000	0.0000	0.43
0.024	224.9	45.81	0.0000	0.0000	0.49
0.034	257.2	52.39	-0.0002	0.0002	0.56
0.049	287.1	58.48	-0.0011	0.0011	0.62
0.069	303.3	61.79	-0.0023	0.0023	0.66
0.094	310.8	63.32	-0.0031	0.0031	0.68
0.109	313.1	63.79	-0.0033	0.0033	0.68
0.129	316.6	64.49	-0.0034	0.0034	0.69
0.149	322.1	65.62	-0.0033	0.0033	0.70
0.164	326.9	66.60	-0.0031	0.0031	0.71
0.179	330.1	67.25	-0.0029	0.0029	0.72
0.198	334.3	68.10	-0.0026	0.0026	0.73
0.238	341.0	69.46	-0.0013	0.0013	0.74
0.278	347.0	70.69	0.0003	-0.0003	0.75
0.313	352.2	71.74	0.0011	-0.0011	0.76
0.343	355.8	72.48	0.0024	-0.0024	0.77
0.368	358.9	73.11	0.0034	-0.0034	0.78
0.402	361.8	73.70	0.0043	-0.0043	0.79
0.447	366.7	74.70	0.0056	-0.0056	0.80
0.477	367.6	74.89	0.0064	-0.0064	0.80
0.506	368.8	75.13	0.0072	-0.0072	0.80

Tested By RPE Date 8/8/25 Input Checked By NJM Date 8/14/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-001

Boring No.: TP-SB8-1,2,3,4
 Depth (ft): 0.0-2.0
 Sample No.: Unwashed Sand
 Visual Description: Brown Sand

Sample Conditions: Remolded, Inundated and Double Drained

(-#4 Material)

Machine ID # G3155 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	174.01	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	0	Volume of Solids (cm ³)	58.7
Weight of Wet Specimen (g)	174.01	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0514
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0312
Wet Density (pcf)	135.0	Void Ratio Before Consolidation	0.369
Dry Density (pcf)	123.1	Void Ratio After Consolidation	0.327

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	3516	3023		
Weight of Wet Soil & Tare (g)	131.29	188.26	Normal Stress (psi)	187.5
Weight of Dry Soil & Tare (g)	120.29	165.51		
Weight of Tare (g)	7.04	8.09	Strain Rate (in/min)	0.00144
Weight of Water (g)	11	22.75		
Weight of Dry Soil (g)	113.25	157.42	Machine Deflection (in)	0.0202
Moisture Content (%)	9.7	14.5		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.001	18.5	3.77	0.0000	0.0000	0.02
0.005	90.8	18.50	0.0000	0.0000	0.10
0.014	220.0	44.81	0.0008	-0.0008	0.24
0.019	263.2	53.63	0.0010	-0.0010	0.29
0.024	297.0	60.50	0.0016	-0.0016	0.32
0.034	341.0	69.46	0.0033	-0.0033	0.37
0.049	390.0	79.46	0.0049	-0.0049	0.42
0.069	448.4	91.35	0.0078	-0.0078	0.49
0.083	482.3	98.25	0.0091	-0.0091	0.52
0.094	501.6	102.19	0.0100	-0.0100	0.55
0.108	528.0	107.57	0.0107	-0.0107	0.57
0.149	573.7	116.87	0.0139	-0.0139	0.62
0.178	597.9	121.80	0.0158	-0.0158	0.65
0.198	611.9	124.65	0.0165	-0.0165	0.66
0.233	632.5	128.86	0.0178	-0.0178	0.69
0.262	645.6	131.51	0.0196	-0.0196	0.70
0.278	650.6	132.53	0.0202	-0.0202	0.71
0.312	658.9	134.24	0.0214	-0.0214	0.72
0.342	662.2	134.90	0.0224	-0.0224	0.72
0.367	669.6	136.41	0.0239	-0.0239	0.73
0.402	678.0	138.12	0.0251	-0.0251	0.74
0.447	687.5	140.06	0.0277	-0.0277	0.75
0.476	692.5	141.07	0.0284	-0.0284	0.75
0.500	693.5	141.29	0.0293	-0.0293	0.75

Tested By RPE Date 8/12/25 Input Checked By NJM Date 8/14/25

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-003	Sample No.:	Unwashed Sand (Post-Proct
Lab ID:	2025-353-003-001	Soil Color:	Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	4.53
#4 to #200	Sand	62.17
Finer than #200	Silt & Clay	33.30

USCS Symbol:
sm, ASSUMED

D50 = 0.15

USCS Classification:
SILTY SAND

Tested By	DF	Date	7/28/25	Checked By	EG	Date	7/28/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-003	Sample No.:	Unwashed Sand (Post-Proct)
Lab ID:	2025-353-003-001	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1432	Tare No.:	NA	Tare No.:	1432	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	631.79	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	631.79	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	572.49	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	572.49	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.23	Weight of Tare (g):	NA	Weight of Tare (g):	144.23	Weight of Tare (g):	NA
Weight of Water (g):	59.30	Weight of Water (g):	NA	Weight of Water (g):	59.30	Weight of Water (g):	NA
Weight of Dry Soil (g):	428.26	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	428.26	Weight of Dry Soil (g):	NA
Moisture Content (%):	13.8	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	428.26	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	428.26
Tare No. (Sub-Specimen)	1432	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1432	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	631.79	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	631.79	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.23	Dry Weight of - 3/4" Sample (g):	428.26	Weight of Tare (g):	144.23	Dry Weight of - 3/4" Sample (g):	428.26
Sub-Specimen Wet Weight (g):	487.56	Dry Weight -3/4" +3/8" Sample (g):	0.00	Sub-Specimen Wet Weight (g):	487.56	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	428.26	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	428.26
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	0.00	(**)	0.00	100.00	100
3/8"	9.5	0.00	0.00	0.00	100.00	100
#4	4.75	19.39	4.53	4.53	95.47	95
#10	2	20.75	4.85	9.37	90.63	91
#20	0.85	19.61	(**)	13.95	86.05	86
#40	0.425	31.21	7.29	21.24	78.76	79
#60	0.25	44.69	10.44	31.67	68.33	68
#100	0.15	81.93	19.13	50.81	49.19	49
#140	0.106	44.46	10.38	61.19	38.81	39
#200	0.075	23.59	5.51	66.70	33.30	33
Pan	-	142.63	33.30	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	7/28/25	Checked By	EG	Date	7/28/25
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SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-003	Sample No.:	Washed Sand
Lab ID:	2025-353-003-002	Soil Color:	Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	14.15
#4 to #200	Sand	81.70
Finer than #200	Silt & Clay	4.15

USCS Symbol:
sp, ASSUMED

D60 = 0.48 D50 = 0.33

D30 = 0.19 CU = 4.52

USCS Classification:
POORLY GRADED SAND

D10 = 0.107

Tested By	DF	Date	8/7/25	Checked By	EG	Date	8/8/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-003	Sample No.:	Washed Sand
Lab ID:	2025-353-003-002	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1420	Tare No.:	NA	Tare No.:	1420	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	812.04	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	812.04	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	747.26	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	747.26	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.50	Weight of Tare (g):	NA	Weight of Tare (g):	144.50	Weight of Tare (g):	NA
Weight of Water (g):	64.78	Weight of Water (g):	NA	Weight of Water (g):	64.78	Weight of Water (g):	NA
Weight of Dry Soil (g):	602.76	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	602.76	Weight of Dry Soil (g):	NA
Moisture Content (%):	10.7	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	602.76	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	602.76
Tare No. (Sub-Specimen)	1420	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1420	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	812.04	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	812.04	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.50	Dry Weight of - 3/4" Sample (g):	602.76	Weight of Tare (g):	144.50	Dry Weight of - 3/4" Sample (g):	602.76
Sub-Specimen Wet Weight (g):	667.54	Dry Weight -3/4" +3/8" Sample (g):	28.64	Sub-Specimen Wet Weight (g):	667.54	Dry Weight -3/4" +3/8" Sample (g):	28.64
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	574.12	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	574.12
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	7.65	(**)	1.27	98.73	99
3/8"	9.5	20.99	3.48	4.75	95.25	95
#4	4.75	56.65	9.40	14.15	85.85	86
#10	2	56.53	9.38	23.53	76.47	76
#20	0.85	38.81	(**)	29.97	70.03	70
#40	0.425	74.00	12.28	42.24	57.76	58
#60	0.25	95.13	15.78	58.03	41.97	42
#100	0.15	128.19	21.27	79.29	20.71	21
#140	0.106	66.00	10.95	90.24	9.76	10
#200	0.075	33.78	5.60	95.85	4.15	4
Pan	-	25.03	4.15	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	8/7/25	Checked By	EG	Date	8/8/25
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MOISTURE - DENSITY RELATIONSHIP

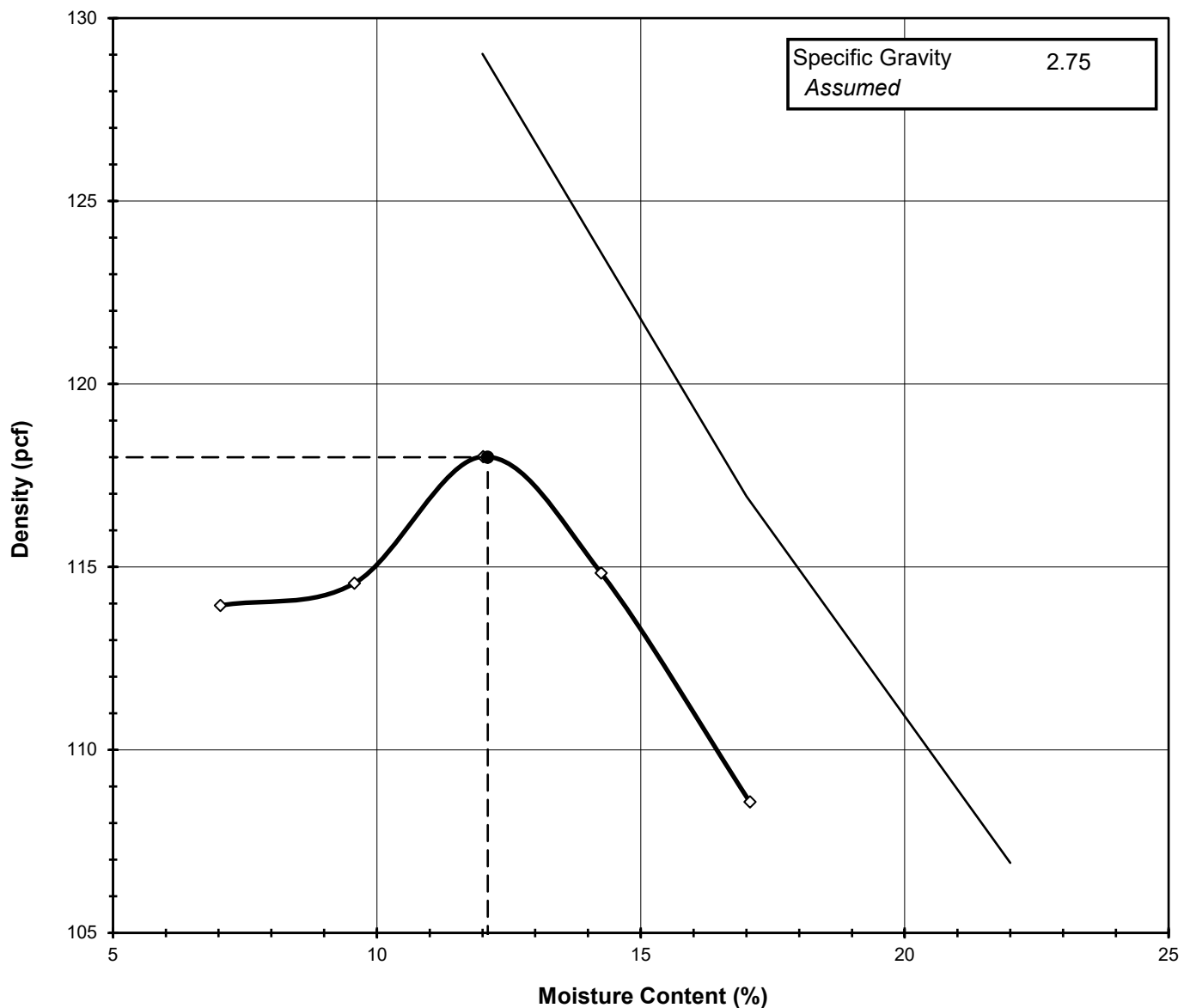
ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-002

Boring No.: TP-SB8-1,2,3,4
Depth (ft): 0.0-2.0'
Sample No.: Washed Sand
Test Method: **MODIFIED**

Visual Description: Brown Washed Sand

Optimum Moisture Content (%): 12.1
Maximum Dry Density (pcf): 118.0



Tested By MLF Date 8/6/2025 Checked By KC Date 8/8/25

page 1 of 2 DCN:CT-S12 DATE: 4/21/23 REVISION: 17

MOISTURE - DENSITY RELATIONSHIP

ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-002

Boring No.: TP-SB8-1,2,3,4
Depth (ft): 0.0-2.0'
Sample No.: Washed Sand

Visual Description: Brown Washed Sand

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	MODIFIED
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G1916
Mold ID:	G3292
Mold diameter:	4"
Weight of the Mold (g):	4108
Volume of the Mold (cm ³):	946

Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5957	6011	6112	6097	6035
Weight of Mold (g):	4108	4108	4108	4108	4108
Weight of Wet Sample (g):	1849	1903	2004	1989	1927
Mold Volume (cm ³):	946	946	946	946	946

Moisture Content / Density

Tare Number:	417	465	455	404	444
Weight of Tare & Wet Sample (g):	407.76	405.85	405.67	404.94	404.91
Weight of Tare & Dry Sample (g):	387.41	378.34	372.00	366.81	359.22
Weight of Tare (g):	98.07	90.99	91.65	99.16	91.50
Weight of Water (g):	20.35	27.51	33.67	38.13	45.69
Weight of Dry Sample (g):	289.34	287.35	280.35	267.65	267.72

Wet Density (g/cm ³):	1.95	2.01	2.12	2.10	2.04
Wet Density (pcf):	122.0	125.5	132.2	131.2	127.1
Moisture Content (%):	7.0	9.6	12.0	14.2	17.1
Dry Density (pcf):	113.9	114.6	118.0	114.8	108.6

Zero Air Voids

Moisture Content (%):	12.0	17.0	22.0
Dry Unit Weight (pcf):	129.0	116.9	106.9

Tested By MLF Date 8/6/25 Checked By KC Date 8/8/25

DIRECT SHEAR

ASTM D 3080-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0
Project No.:	2025-353-003	Sample No.:	Washed Sand
Lab ID:	2025-353-003-002	Visual Description:	Brown Washed Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Maximum Shear Stress (psi)		Normal Stress (psi)
70.76	(1)	89.1
132.35	(2)	178.1
258.18	(3)	356.3

Overall Regression Analysis

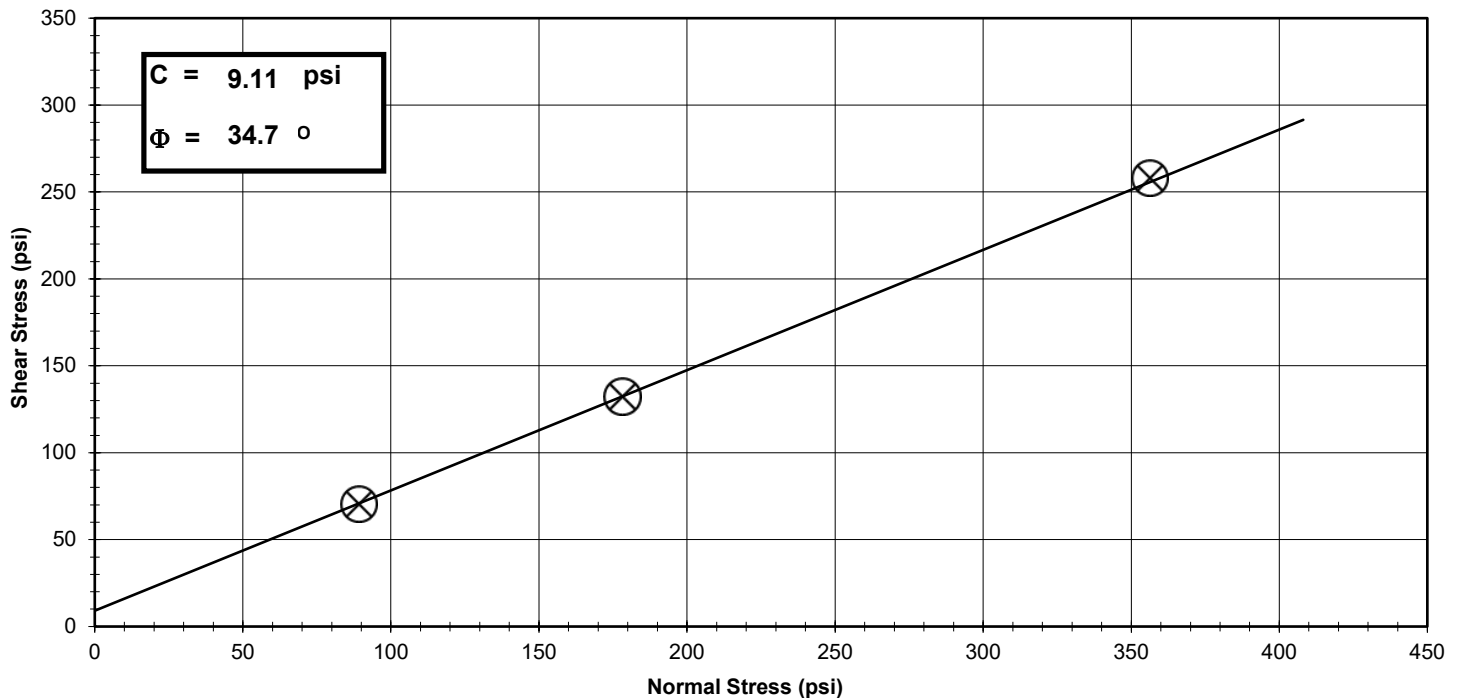
Slope = 0.70
C = 7.85 psi
Φ = 35.1 degrees

Selected Points	Shear Stress (psi)	Normal Stress (psi)
1	70.76	89.1
2	132.35	178.1

Selected Points Regression

Slope = 0.69
C = 9.11 psi
Φ = 34.7 degrees

SHEAR STRESS vs. NORMAL STRESS



Note: Graph not to scale

Tested By RPE Date 8/19/25 Approved By NJM Date 8/19/25

DIRECT SHEAR
ASTM D 3080-11

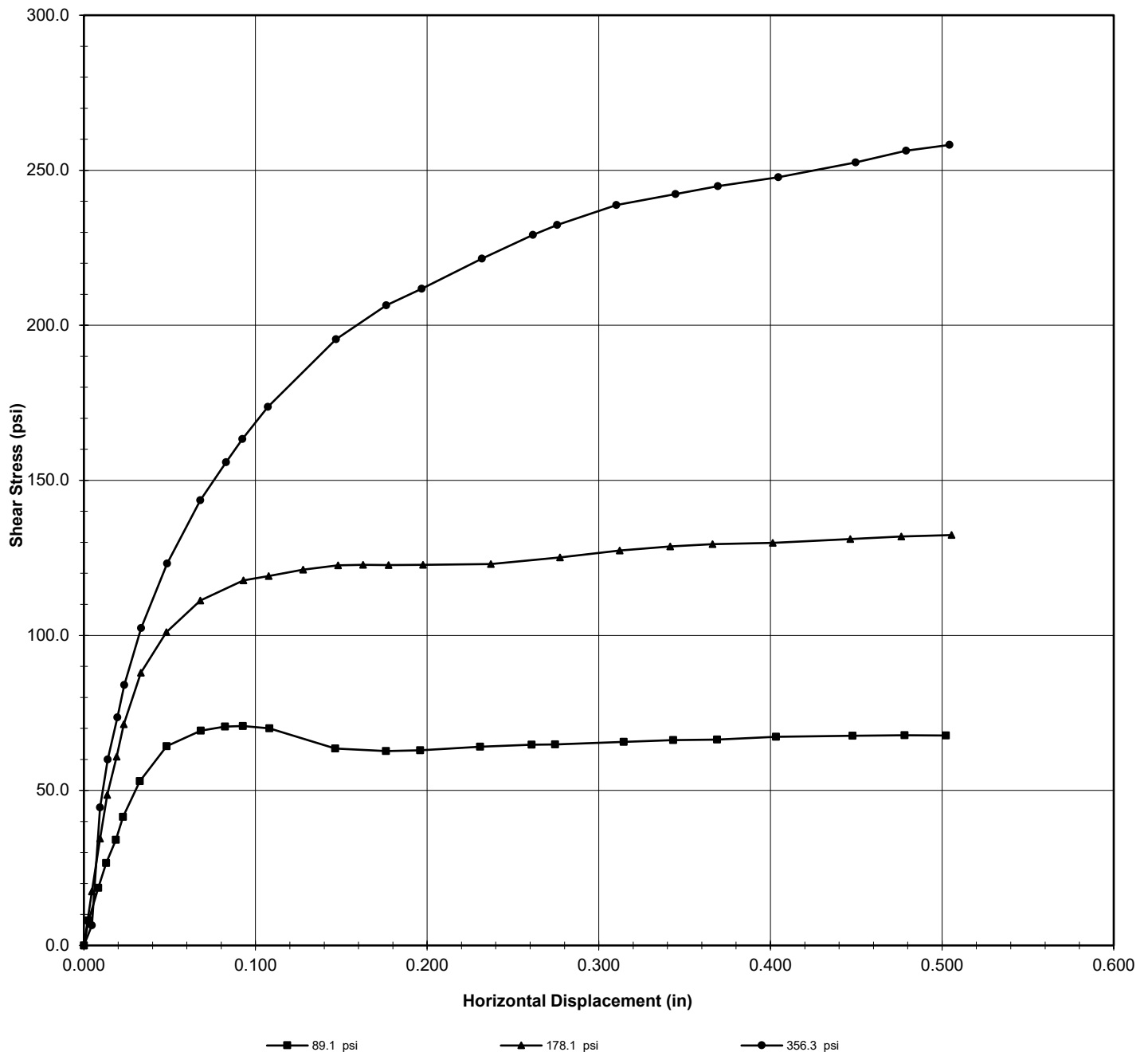


Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-002

Boring No.: TP-SB8-1,2,3,4
Depth (ft): 0.0-2.0
Sample No.: Washed Sand
Visual Description: Brown Washed Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

SHEAR STRESS vs. HORIZONTAL DISPLACEMENT



Tested By RPE Date 8/19/25 Approved By NJM Date 8/19/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-002

Boring No.: TP-SB8-1,2,3,4
 Depth (ft): 0.0-2.0
 Sample No.: Washed Sand
 Visual Description: Brown Washed Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3156 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	174.02	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	0	Volume of Solids (cm ³)	57.3
Weight of Wet Specimen (g)	174.02	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0369
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0193
Wet Density (pcf)	135.1	Void Ratio Before Consolidation	0.403
Dry Density (pcf)	120.2	Void Ratio After Consolidation	0.376

Moisture Content	Before Test	After Test	Testing Parameters
Tare ID	3175	2800	
Weight of Wet Soil & Tare (g)	107.94	187.86	Normal Stress (psi) 89.1
Weight of Dry Soil & Tare (g)	96.82	159.12	
Weight of Tare (g)	7.14	7.24	Strain Rate (in/min) 0.00144
Weight of Water (g)	11.12	28.74	
Weight of Dry Soil (g)	89.68	151.88	Machine Deflection (in) 0.0176
Moisture Content (%)	12.4	18.9	

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr,(-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.003	39.3	8.00	0.0000	0.0000	0.09
0.008	91.2	18.57	0.0000	0.0000	0.21
0.013	130.5	26.58	0.0000	0.0000	0.30
0.019	167.1	34.04	0.0000	0.0000	0.38
0.023	203.6	41.48	0.0000	0.0000	0.47
0.033	260.2	53.01	-0.0004	0.0004	0.59
0.048	315.2	64.21	-0.0020	0.0020	0.72
0.068	340.1	69.28	-0.0048	0.0048	0.78
0.082	346.6	70.61	-0.0070	0.0070	0.79
0.093	347.4	70.76	-0.0085	0.0085	0.79
0.108	343.6	70.01	-0.0095	0.0095	0.79
0.146	311.7	63.50	-0.0110	0.0110	0.71
0.176	307.7	62.69	-0.0103	0.0103	0.70
0.196	309.0	62.95	-0.0095	0.0095	0.71
0.231	314.4	64.05	-0.0086	0.0086	0.72
0.261	317.7	64.73	-0.0076	0.0076	0.73
0.275	318.4	64.86	-0.0069	0.0069	0.73
0.315	322.4	65.68	-0.0057	0.0057	0.74
0.343	325.1	66.24	-0.0047	0.0047	0.74
0.369	325.9	66.39	-0.0039	0.0039	0.75
0.403	330.5	67.32	-0.0029	0.0029	0.76
0.448	331.9	67.62	-0.0021	0.0021	0.76
0.478	332.8	67.79	-0.0015	0.0015	0.76
0.502	332.3	67.69	-0.0007	0.0007	0.76

Tested By RPE Date 8/14/25 Input Checked By NJM Date 8/19/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-002

Boring No.: TP-SB8-1,2,3,4
 Depth (ft): 0.0-2.0
 Sample No.: Washed Sand
 Visual Description: Brown Washed Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3155 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	174.03	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	0	Volume of Solids (cm ³)	57.3
Weight of Wet Specimen (g)	174.03	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0602
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0404
Wet Density (pcf)	135.1	Void Ratio Before Consolidation	0.403
Dry Density (pcf)	120.2	Void Ratio After Consolidation	0.346

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	3175	3196		
Weight of Wet Soil & Tare (g)	107.94	188.29	Normal Stress (psi)	178.1
Weight of Dry Soil & Tare (g)	96.82	160.61		
Weight of Tare (g)	7.14	8.07	Strain Rate (in/min)	0.00144
Weight of Water (g)	11.12	27.68		
Weight of Dry Soil (g)	89.68	152.54	Machine Deflection (in)	0.0197
Moisture Content (%)	12.4	18.1		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.005	85.7	17.45	-0.0001	0.0001	0.10
0.009	169.1	34.45	-0.0002	0.0002	0.19
0.014	238.2	48.52	0.0004	-0.0004	0.27
0.019	298.9	60.90	0.0008	-0.0008	0.34
0.023	350.2	71.33	0.0010	-0.0010	0.40
0.033	431.5	87.91	0.0015	-0.0015	0.49
0.048	496.0	101.04	0.0018	-0.0018	0.57
0.068	546.1	111.25	0.0025	-0.0025	0.62
0.093	577.9	117.72	0.0031	-0.0031	0.66
0.108	584.7	119.12	0.0038	-0.0038	0.67
0.128	594.7	121.16	0.0044	-0.0044	0.68
0.148	602.0	122.63	0.0053	-0.0053	0.69
0.163	602.5	122.73	0.0058	-0.0058	0.69
0.178	602.0	122.64	0.0065	-0.0065	0.69
0.198	602.5	122.74	0.0074	-0.0074	0.69
0.237	603.6	122.97	0.0091	-0.0091	0.69
0.277	614.3	125.15	0.0109	-0.0109	0.70
0.312	625.3	127.38	0.0124	-0.0124	0.72
0.342	631.5	128.66	0.0136	-0.0136	0.72
0.366	635.2	129.41	0.0144	-0.0144	0.73
0.401	637.3	129.83	0.0157	-0.0157	0.73
0.446	643.4	131.07	0.0168	-0.0168	0.74
0.476	647.3	131.87	0.0181	-0.0181	0.74
0.506	649.7	132.35	0.0189	-0.0189	0.74

Tested By RPE Date 8/26/25 Input Checked By NJM Date 8/19/25

DIRECT SHEAR
ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-002

Boring No.: TP-SB8-1,2,3,4
Depth (ft): 0.0-2.0
Sample No.: Washed Sand
Visual Description: Brown Washed Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3155 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	174.01	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	0	Volume of Solids (cm ³)	57.3
Weight of Wet Specimen (g)	174.01	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0787
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0519
Wet Density (pcf)	135.0	Void Ratio Before Consolidation	0.403
Dry Density (pcf)	120.1	Void Ratio After Consolidation	0.330

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	3175	3103		
Weight of Wet Soil & Tare (g)	107.94	179.40	Normal Stress (psi)	356.3
Weight of Dry Soil & Tare (g)	96.82	156.49		
Weight of Tare (g)	7.14	7.12	Strain Rate (in/min)	0.00144
Weight of Water (g)	11.12	22.91		
Weight of Dry Soil (g)	89.68	149.37	Machine Deflection (in)	0.0268
Moisture Content (%)	12.4	15.3		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.005	31.9	6.50	0.0000	0.0000	0.02
0.009	218.2	44.46	0.0006	-0.0006	0.12
0.014	294.5	59.99	0.0013	-0.0013	0.17
0.019	361.1	73.57	0.0021	-0.0021	0.21
0.024	412.4	84.01	0.0028	-0.0028	0.24
0.033	502.2	102.31	0.0047	-0.0047	0.29
0.049	604.5	123.14	0.0078	-0.0078	0.35
0.068	704.8	143.59	0.0125	-0.0125	0.40
0.083	764.9	155.82	0.0148	-0.0148	0.44
0.092	801.9	163.36	0.0169	-0.0169	0.46
0.107	852.7	173.70	0.0194	-0.0194	0.49
0.147	959.6	195.49	0.0254	-0.0254	0.55
0.176	1013.4	206.44	0.0295	-0.0295	0.58
0.197	1039.7	211.80	0.0317	-0.0317	0.59
0.232	1087.2	221.49	0.0358	-0.0358	0.62
0.262	1125.0	229.18	0.0393	-0.0393	0.64
0.276	1140.6	232.37	0.0410	-0.0410	0.65
0.310	1172.1	238.77	0.0441	-0.0441	0.67
0.345	1189.5	242.32	0.0471	-0.0471	0.68
0.369	1201.9	244.85	0.0489	-0.0489	0.69
0.405	1216.3	247.79	0.0515	-0.0515	0.70
0.450	1239.6	252.53	0.0544	-0.0544	0.71
0.479	1258.2	256.31	0.0561	-0.0561	0.72
0.504	1267.3	258.18	0.0571	-0.0571	0.72

Tested By RPE *Date* 8/15/25 *Input Checked By* NJM *Date* 8/19/25

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-003	Sample No.:	Washed Sand
Lab ID:	2025-353-003-002	Soil Color:	Brown Post-Proctor



Sieve Size		Percentage (%)
Greater than #4	Gravel	2.78
#4 to #200	Sand	66.66
Finer than #200	Silt & Clay	30.56

USCS Symbol:
sm, ASSUMED

D50 = 0.14

USCS Classification:
SILTY SAND

Tested By	DF	Date	8/12/25	Checked By	EG	Date	8/13/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-003	Sample No.:	Washed Sand
Lab ID:	2025-353-003-002	Soil Color:	Brown Post-Proctor

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1620	Tare No.:	NA	Tare No.:	1620	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	965.63	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	965.63	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	845.55	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	845.55	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.88	Weight of Tare (g):	NA	Weight of Tare (g):	144.88	Weight of Tare (g):	NA
Weight of Water (g):	120.08	Weight of Water (g):	NA	Weight of Water (g):	120.08	Weight of Water (g):	NA
Weight of Dry Soil (g):	700.67	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	700.67	Weight of Dry Soil (g):	NA
Moisture Content (%):	17.1	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	700.67	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	700.67
Tare No. (Sub-Specimen)	1620	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1620	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	965.63	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	965.63	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.88	Dry Weight of - 3/4" Sample (g):	700.67	Weight of Tare (g):	144.88	Dry Weight of - 3/4" Sample (g):	700.67
Sub-Specimen Wet Weight (g):	820.75	Dry Weight -3/4" +3/8" Sample (g):	0.00	Sub-Specimen Wet Weight (g):	820.75	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	700.67	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	700.67
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	0.00	(**)	0.00	100.00	100
3/8"	9.5	0.00	0.00	0.00	100.00	100
#4	4.75	19.47	2.78	2.78	97.22	97
#10	2	20.86	2.98	5.76	94.24	94
#20	0.85	14.53	(**)	7.83	92.17	92
#40	0.425	23.27	3.32	11.15	88.85	89
#60	0.25	63.30	9.03	20.18	79.82	80
#100	0.15	189.75	27.08	47.27	52.73	53
#140	0.106	104.48	14.91	62.18	37.82	38
#200	0.075	50.89	7.26	69.44	30.56	31
Pan	-	214.12	30.56	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	8/12/25	Checked By	EG	Date	8/13/25
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CLAY SHEAR STRENGTH TESTING

MOISTURE - DENSITY RELATIONSHIP

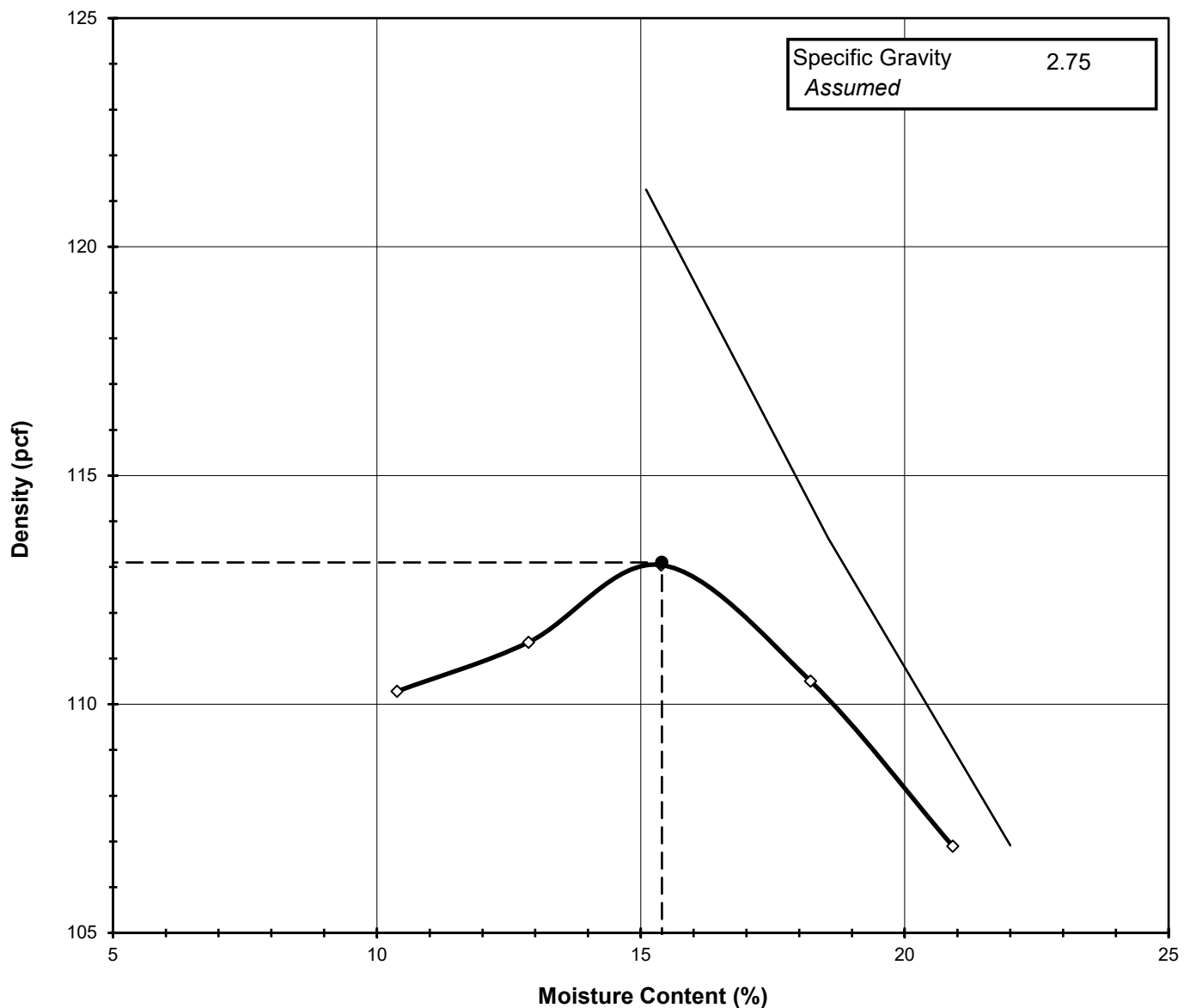
ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-003

Boring No.: TP-39
Depth (ft): 0.0-4.0'
Sample No.: Clay
Test Method: **MODIFIED**

Visual Description: Reddish Brown Clay

Optimum Moisture Content (%): 15.4
Maximum Dry Density (pcf): 113.1



Tested By AB Date 7/24/2025 Checked By JLK Date 7/25/25

page 1 of 2 DCN:CT-S12 DATE: 4/21/23 REVISION: 17

MOISTURE - DENSITY RELATIONSHIP

ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-003

Boring No.: TP-39
 Depth (ft): 0.0-4.0'
 Sample No.: Clay

Visual Description: Reddish Brown Clay

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.75
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	MODIFIED
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G1916
Mold ID:	G3291
Mold diameter:	4"
Weight of the Mold (g):	4103
Volume of the Mold (cm ³):	946

Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5948	6008	6080	6083	6062
Weight of Mold (g):	4103	4103	4103	4103	4103
Weight of Wet Sample (g):	1845	1905	1977	1980	1959
Mold Volume (cm ³):	946	946	946	946	946

Moisture Content / Density

Tare Number:	440	444	457	491	481
Weight of Tare & Wet Sample (g):	500.60	491.46	491.04	493.12	490.14
Weight of Tare & Dry Sample (g):	462.71	445.80	437.65	431.28	420.43
Weight of Tare (g):	97.67	91.05	90.66	91.82	87.06
Weight of Water (g):	37.89	45.66	53.39	61.84	69.71
Weight of Dry Sample (g):	365.04	354.75	346.99	339.46	333.37

Wet Density (g/cm ³):	1.95	2.01	2.09	2.09	2.07
Wet Density (pcf):	121.7	125.7	130.4	130.6	129.2
Moisture Content (%):	10.4	12.9	15.4	18.2	20.9
Dry Density (pcf):	110.3	111.4	113.0	110.5	106.9

Zero Air Voids

Moisture Content (%):	15.1	18.6	22.0
Dry Unit Weight (pcf):	121.3	113.6	106.9

Tested By AB Date 7/24/25 Checked By JLK Date 7/25/25

DIRECT SHEAR

ASTM D 3080-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0
Project No.:	2025-353-003	Sample No.:	Clay
Lab ID:	2025-353-003-003	Visual Description:	Reddish-Brown Clay

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

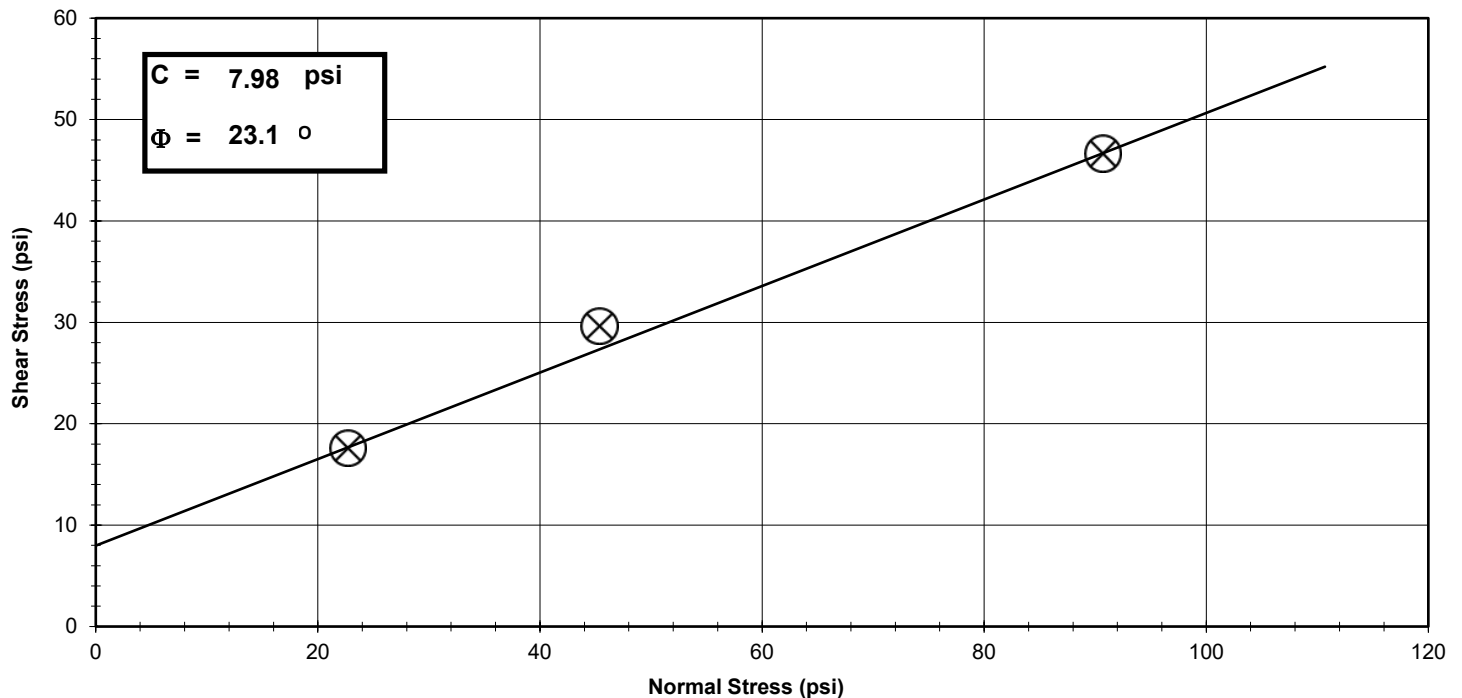
Maximum Shear Stress (psi)		Normal Stress (psi)
17.65	(1)	22.67
29.65	(2)	45.35
46.68	(3)	90.69

Overall Regression Analysis			
Slope =	0.42		
C =	9.14	psi	
Φ =	22.8	degrees	

Selected Points	Shear Stress (psi)	Normal Stress (psi)
1	17.65	22.67
3	46.68	90.69

Selected Points Regression			
Slope =	0.43		
C =	7.98	psi	
Φ =	23.1	degrees	

SHEAR STRESS vs. NORMAL STRESS



Note: Graph not to scale

Tested By RPE Date 8/15/25 Approved By NJM Date 8/15/25

DIRECT SHEAR
ASTM D 3080-11

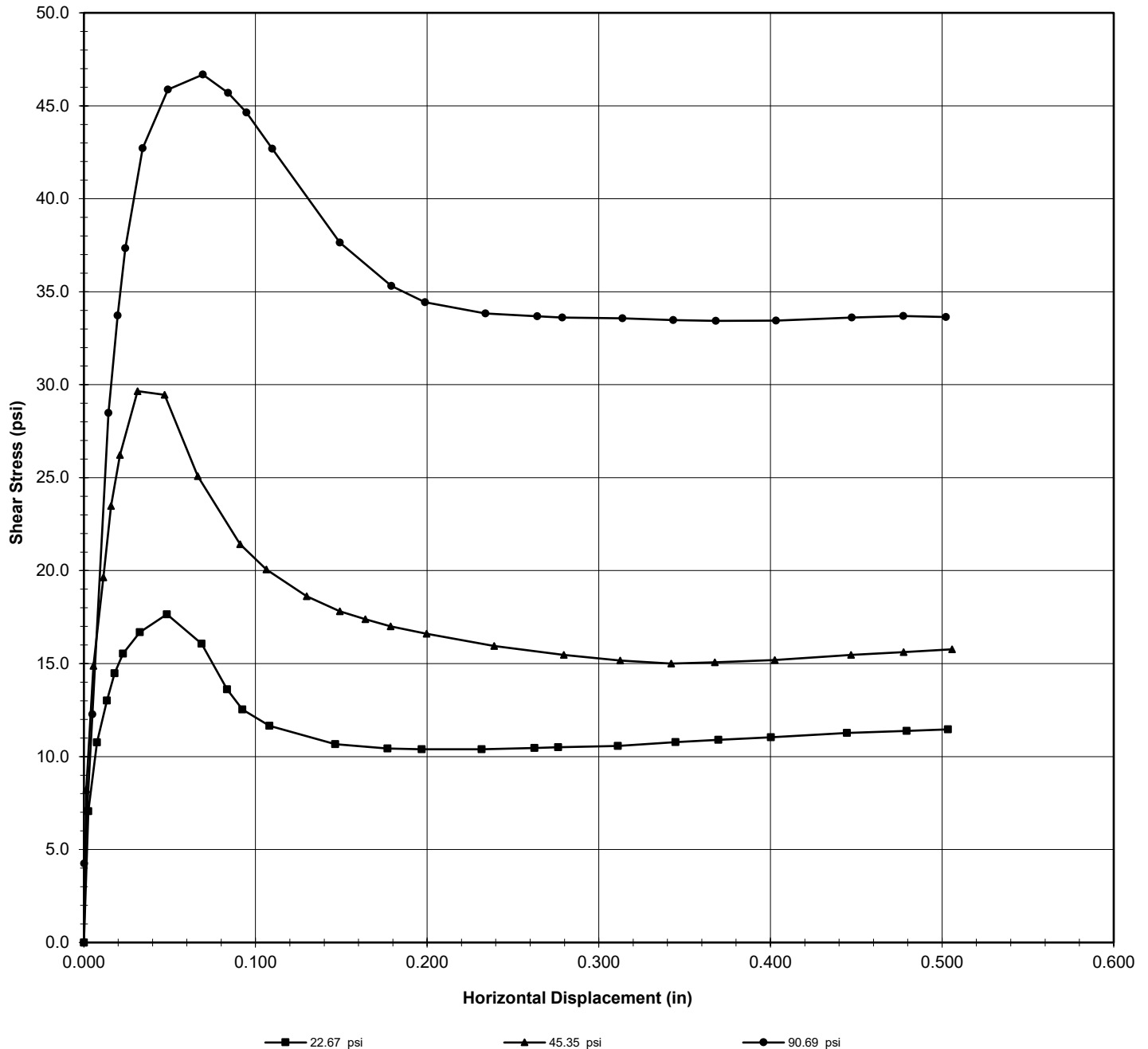


Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-003

Boring No.: TP-39
Depth (ft): 0.0-4.0
Sample No.: Clay
Visual Description: Reddish-Brown Clay

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

SHEAR STRESS vs. HORIZONTAL DISPLACEMENT



Tested By RPE Date 8/15/25 Approved By NJM Date 8/15/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-003

Boring No.: TP-39
 Depth (ft): 0.0-4.0
 Sample No.: Clay
 Visual Description: Reddish-Brown Clay

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3156 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	381.79	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	213.86	Volume of Solids (cm ³)	53.7
Weight of Wet Specimen (g)	167.93	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	-0.0175
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	-0.0272
Wet Density (pcf)	130.3	Void Ratio Before Consolidation	0.497
Dry Density (pcf)	112.6	Void Ratio After Consolidation	0.537

Moisture Content	Before Test	After Test	Testing Parameters	
Tare ID	3393	3523		
Weight of Wet Soil & Tare (g)	156.91	184.40	Normal Stress (psi)	22.67
Weight of Dry Soil & Tare (g)	136.56	149.92		
Weight of Tare (g)	7.09	7.25	Strain Rate (in/min)	0.00144
Weight of Water (g)	20.35	34.48		
Weight of Dry Soil (g)	129.47	142.67	Machine Deflection (in)	0.0097
Moisture Content (%)	15.7	24.2		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr.(-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.003	34.7	7.06	-0.0012	0.0012	0.31
0.008	52.8	10.76	-0.0014	0.0014	0.47
0.013	63.8	13.01	-0.0018	0.0018	0.57
0.018	71.1	14.48	-0.0022	0.0022	0.64
0.023	76.3	15.53	-0.0027	0.0027	0.69
0.033	81.9	16.69	-0.0035	0.0035	0.74
0.048	86.7	17.65	-0.0050	0.0050	0.78
0.069	78.9	16.07	-0.0069	0.0069	0.71
0.083	66.8	13.61	-0.0074	0.0074	0.60
0.092	61.5	12.53	-0.0076	0.0076	0.55
0.108	57.2	11.65	-0.0079	0.0079	0.51
0.146	52.3	10.66	-0.0088	0.0088	0.47
0.177	51.2	10.43	-0.0091	0.0091	0.46
0.197	51.0	10.39	-0.0091	0.0091	0.46
0.232	51.0	10.40	-0.0093	0.0093	0.46
0.262	51.4	10.47	-0.0093	0.0093	0.46
0.276	51.5	10.50	-0.0093	0.0093	0.46
0.311	51.9	10.57	-0.0094	0.0094	0.47
0.345	52.9	10.77	-0.0094	0.0094	0.48
0.370	53.5	10.90	-0.0093	0.0093	0.48
0.400	54.2	11.04	-0.0092	0.0092	0.49
0.445	55.3	11.26	-0.0090	0.0090	0.50
0.479	55.9	11.39	-0.0088	0.0088	0.50
0.503	56.3	11.47	-0.0085	0.0085	0.51

Tested By RPE Date 8/12/25 Input Checked By NJM Date 8/15/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-003

Boring No.: TP-39
 Depth (ft): 0.0-4.0
 Sample No.: Clay
 Visual Description: Reddish-Brown Clay

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3156 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	382.81	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	214.77	Volume of Solids (cm ³)	53.8
Weight of Wet Specimen (g)	168.04	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0145
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0011
Wet Density (pcf)	130.4	Void Ratio Before Consolidation	0.496
Dry Density (pcf)	112.7	Void Ratio After Consolidation	0.494

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	3393	3396		
Weight of Wet Soil & Tare (g)	156.91	183.51	Normal Stress (psi)	45.35
Weight of Dry Soil & Tare (g)	136.56	151.22		
Weight of Tare (g)	7.09	8.02	Strain Rate (in/min)	0.00144
Weight of Water (g)	20.35	32.29		
Weight of Dry Soil (g)	129.47	143.2	Machine Deflection (in)	0.0134
Moisture Content (%)	15.7	22.5		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.001	40.5	8.24	-0.0006	0.0006	0.18
0.006	73.0	14.87	-0.0007	0.0007	0.33
0.011	96.4	19.64	-0.0010	0.0010	0.43
0.016	115.2	23.48	-0.0014	0.0014	0.52
0.021	128.7	26.22	-0.0019	0.0019	0.58
0.031	145.6	29.65	-0.0024	0.0024	0.65
0.047	144.6	29.46	-0.0035	0.0035	0.65
0.066	123.1	25.08	-0.0048	0.0048	0.55
0.091	105.1	21.41	-0.0057	0.0057	0.47
0.106	98.5	20.06	-0.0059	0.0059	0.44
0.130	91.4	18.62	-0.0065	0.0065	0.41
0.149	87.5	17.82	-0.0070	0.0070	0.39
0.164	85.3	17.38	-0.0077	0.0077	0.38
0.179	83.5	17.01	-0.0081	0.0081	0.38
0.200	81.5	16.61	-0.0083	0.0083	0.37
0.239	78.3	15.95	-0.0088	0.0088	0.35
0.280	75.9	15.47	-0.0091	0.0091	0.34
0.313	74.4	15.16	-0.0092	0.0092	0.33
0.342	73.6	15.00	-0.0092	0.0092	0.33
0.368	74.0	15.07	-0.0091	0.0091	0.33
0.402	74.6	15.19	-0.0091	0.0091	0.33
0.447	75.9	15.47	-0.0088	0.0088	0.34
0.478	76.7	15.62	-0.0086	0.0086	0.34
0.506	77.4	15.77	-0.0082	0.0082	0.35

Tested By RPE Date 8/13/25 Input Checked By NJM Date 8/15/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-003

Boring No.: TP-39
 Depth (ft): 0.0-4.0
 Sample No.: Clay
 Visual Description: Reddish-Brown Clay

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3155 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	382.19	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	214.04	Volume of Solids (cm ³)	53.8
Weight of Wet Specimen (g)	168.15	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0419
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0274
Wet Density (pcf)	130.5	Void Ratio Before Consolidation	0.495
Dry Density (pcf)	112.8	Void Ratio After Consolidation	0.454

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	3393	2972		
Weight of Wet Soil & Tare (g)	156.91	181.75	Normal Stress (psi)	90.69
Weight of Dry Soil & Tare (g)	136.56	151.56		
Weight of Tare (g)	7.09	8.01	Strain Rate (in/min)	0.00144
Weight of Water (g)	20.35	30.19		
Weight of Dry Soil (g)	129.47	143.55	Machine Deflection (in)	0.0145
Moisture Content (%)	15.7	21.0		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.000	20.9	4.25	-0.0004	0.0004	0.05
0.005	60.2	12.27	-0.0007	0.0007	0.14
0.014	139.8	28.48	-0.0012	0.0012	0.31
0.020	165.5	33.72	-0.0012	0.0012	0.37
0.024	183.3	37.34	-0.0014	0.0014	0.41
0.034	209.7	42.71	-0.0014	0.0014	0.47
0.049	225.2	45.87	-0.0013	0.0013	0.51
0.069	229.1	46.68	-0.0005	0.0005	0.51
0.084	224.3	45.70	0.0001	-0.0001	0.50
0.095	219.1	44.64	0.0003	-0.0003	0.49
0.110	209.6	42.69	0.0006	-0.0006	0.47
0.149	184.8	37.64	0.0012	-0.0012	0.42
0.179	173.3	35.31	0.0015	-0.0015	0.39
0.199	169.0	34.43	0.0020	-0.0020	0.38
0.234	166.0	33.83	0.0028	-0.0028	0.37
0.264	165.3	33.68	0.0036	-0.0036	0.37
0.279	165.0	33.60	0.0040	-0.0040	0.37
0.314	164.8	33.57	0.0047	-0.0047	0.37
0.343	164.3	33.47	0.0051	-0.0051	0.37
0.368	164.1	33.43	0.0056	-0.0056	0.37
0.403	164.2	33.44	0.0059	-0.0059	0.37
0.447	165.0	33.61	0.0064	-0.0064	0.37
0.477	165.4	33.69	0.0068	-0.0068	0.37
0.502	165.2	33.64	0.0075	-0.0075	0.37

Tested By RPE *Date* 8/13/25 *Input Checked By* NJM *Date* 8/15/25

SAND/CLAY MIXTURES - SHEAR STRENGTH TESTING

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1to4 & TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-003	Sample No.:	60% Clay/40% Washed San
Lab ID:	2025-353-003-004	Soil Color:	Brown



Sieve Size		Percentage (%)
Greater than #4	Gravel	2.12
#4 to #200	Sand	36.33
Finer than #200	Silt & Clay	61.55

USCS Symbol:
CL, TESTED

USCS Classification:
SANDY LEAN CLAY

Tested By	DF	Date	8/14/25	Checked By	EG	Date	8/18/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1to4 & TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-003	Sample No.:	60% Clay/40% Washed San
Lab ID:	2025-353-003-004	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	2026	Tare No.:	NA	Tare No.:	2026	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	680.36	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	680.36	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	633.46	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	633.46	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	148.08	Weight of Tare (g):	NA	Weight of Tare (g):	148.08	Weight of Tare (g):	NA
Weight of Water (g):	46.90	Weight of Water (g):	NA	Weight of Water (g):	46.90	Weight of Water (g):	NA
Weight of Dry Soil (g):	485.38	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	485.38	Weight of Dry Soil (g):	NA
Moisture Content (%):	9.7	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	485.38	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	485.38
Tare No. (Sub-Specimen)	2026	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	2026	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	680.36	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	680.36	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	148.08	Dry Weight of - 3/4" Sample (g):	485.38	Weight of Tare (g):	148.08	Dry Weight of - 3/4" Sample (g):	485.38
Sub-Specimen Wet Weight (g):	532.28	Dry Weight -3/4" +3/8" Sample (g):	0.00	Sub-Specimen Wet Weight (g):	532.28	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	485.38	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	485.38
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	0.00	(**)	0.00	100.00	100
3/8"	9.5	0.00	0.00	0.00	100.00	100
#4	4.75	10.28	2.12	2.12	97.88	98
#10	2	15.32	3.16	5.27	94.73	95
#20	0.85	11.54	(**)	7.65	92.35	92
#40	0.425	20.21	4.16	11.82	88.18	88
#60	0.25	30.91	6.37	18.18	81.82	82
#100	0.15	54.32	11.19	29.37	70.63	71
#140	0.106	29.63	6.10	35.48	64.52	65
#200	0.075	14.41	2.97	38.45	61.55	62
Pan	-	298.76	61.55	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	8/14/25	Checked By	EG	Date	8/18/25
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ATTERBERG LIMITS

ASTM D 4318-17

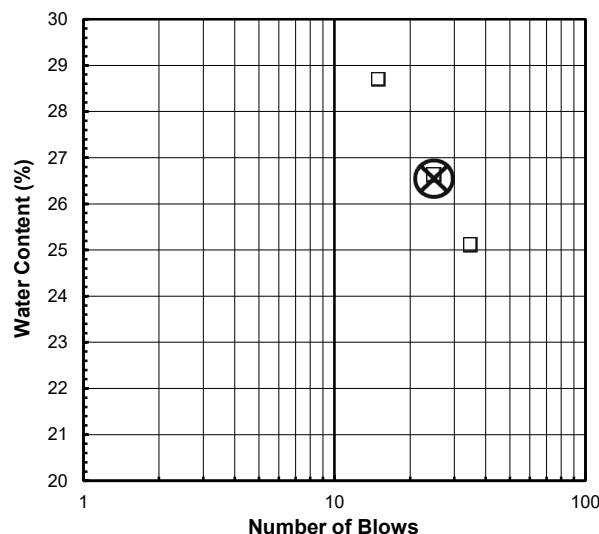
Client: Garvin Boward Beitko Engineering, Inc. Boring No.: TP-SB8-1to4 & TP-39
 Client Reference: QVSD HS GBBE #16123A Depth (ft): 0.0-4.0'
 Project No.: 2025-353-003 Sample No.: 60% Clay/40% Washed Sand
 Lab ID: 2025-353-003-004 Soil Description: BROWN LEAN CLAY

Note: The USCS symbol used with this test refers only to the minus No. 40 (Minus #40 sieve material, Air dried)
sieve material. See the "Sieve and Hydrometer Analysis" graph page for the complete material description.

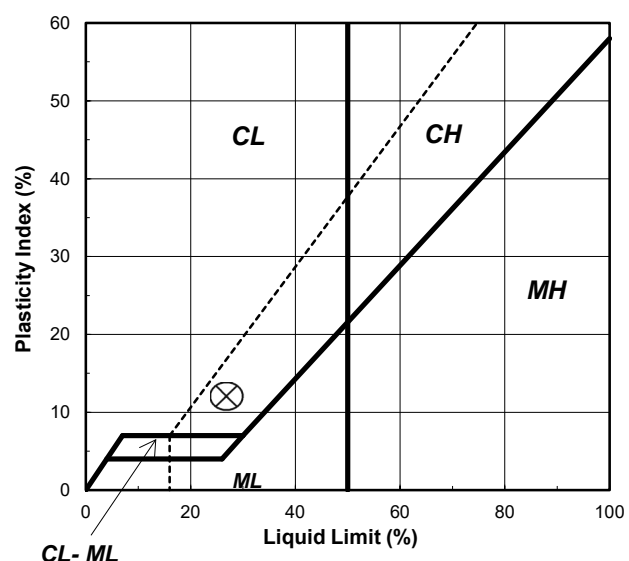
As Received Moisture Content ASTM D2216-19		Liquid Limit Test			
		1	2	3	M
Tare Number:	3031	317	525	636	U
Wt. of Tare & Wet Sample (g):	208.27	43.48	41.50	39.44	L
Wt. of Tare & Dry Sample (g):	186.98	38.83	37.05	34.98	T
Weight of Tare (g):	7.16	20.30	20.33	19.43	I
Weight of Water (g):	21.3	4.7	4.5	4.5	P
Weight of Dry Sample (g):	179.8	18.5	16.7	15.6	O
Was As Received MC Preserved:	Yes				I
Moisture Content (%):	11.8	25.1	26.6	28.7	N
Number of Blows:		35	25	15	T

Plastic Limit Test	1	2	Range	Test Results
Tare Number:	573	1101		Liquid Limit (%): 27
Wt. of Tare & Wet Sample (g):	26.17	25.22		Plastic Limit (%): 15
Wt. of Tare & Dry Sample (g):	25.28	24.33		Plasticity Index (%): 12
Weight of Tare (g):	19.33	18.19		USCS Symbol: CL
Weight of Water (g):	0.9	0.9		
Weight of Dry Sample (g):	6.0	6.1		
Moisture Content (%):	15.0	14.5	0.5	
Note: The acceptable range of the two Moisture Contents is $\pm$ 1.12				

Flow Curve



Plasticity Chart



Tested By DDA Date 8/14/25 Checked By EG Date 8/18/25

MOISTURE - DENSITY RELATIONSHIP

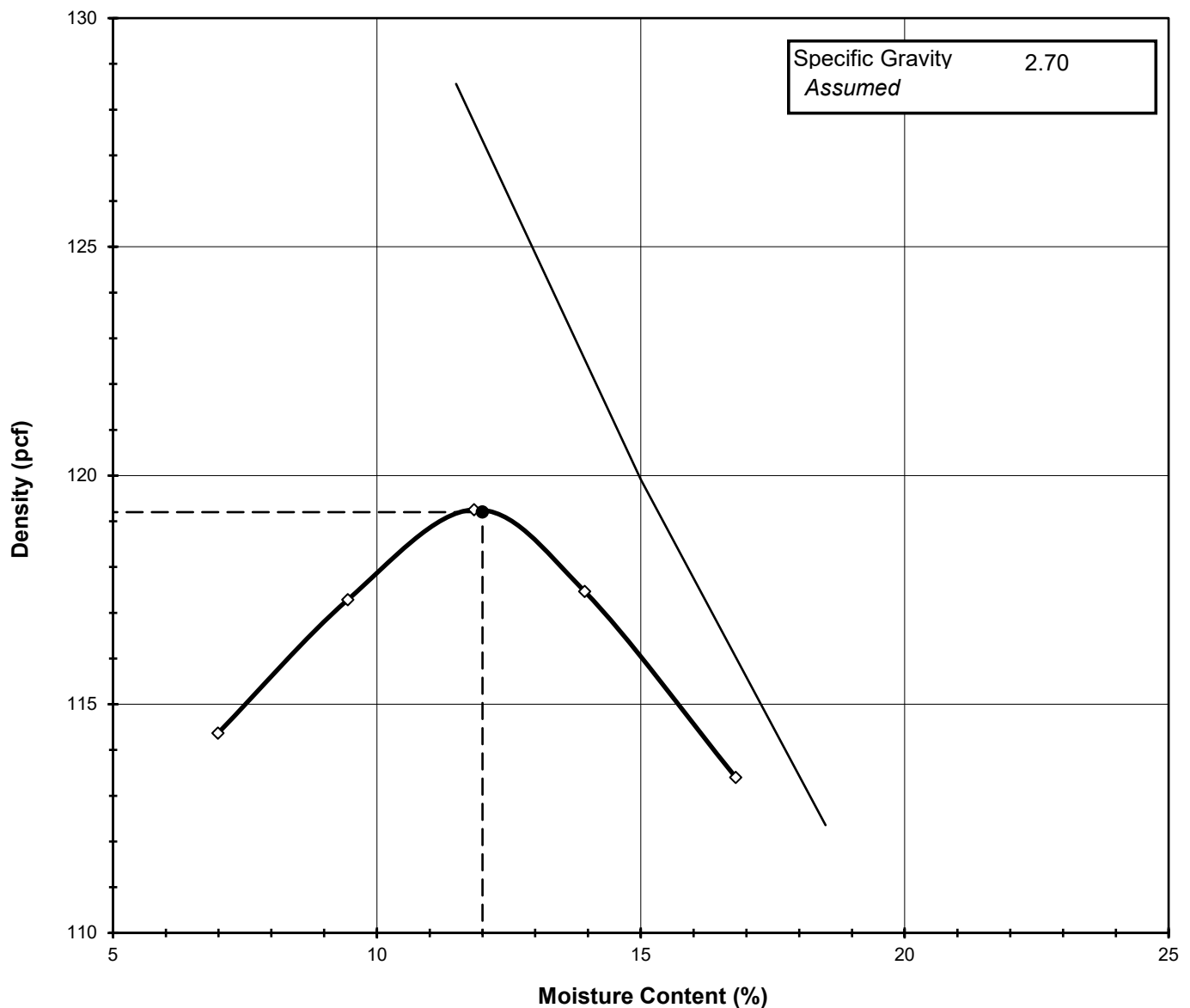
ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-004

Boring No.: TP-SB8-1to4 & TP-39
Depth (ft): 0.0-4.0'
Sample No.: 60% Clay / 40% Washed S
Test Method **MODIFIED**

Visual Description: Brown Clay / Brown Sand

Optimum Moisture Content (%): 12.0
Maximum Dry Density (pcf): 119.2



Tested By MLF Date 8/12/2025 Checked By JLK Date 8/13/25
page 1 of 2 DCN:CT-S12 DATE: 4/21/23 REVISION: 17

MOISTURE - DENSITY RELATIONSHIP

ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-004

Boring No.: TP-SB8-1to4 & TP-39
Depth (ft): 0.0-4.0'
Sample No.: 60% Clay / 40% Washed S

Visual Description: Brown Clay / Brown Sand

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	MODIFIED
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G1916
Mold ID:	G3292
Mold diameter:	4"
Weight of the Mold (g):	4108
Volume of the Mold (cm ³):	946

Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5963	6054	6130	6137	6116
Weight of Mold (g):	4108	4108	4108	4108	4108
Weight of Wet Sample (g):	1855	1946	2022	2029	2008
Mold Volume (cm ³):	946	946	946	946	946

Moisture Content / Density

Tare Number:	495	460	401	492	420
Weight of Tare & Wet Sample (g):	405.79	400.51	401.59	402.22	400.85
Weight of Tare & Dry Sample (g):	385.10	374.38	369.48	364.22	355.95
Weight of Tare (g):	89.02	97.75	98.30	91.57	88.69
Weight of Water (g):	20.69	26.13	32.11	38.00	44.90
Weight of Dry Sample (g):	296.08	276.63	271.18	272.65	267.26

Wet Density (g/cm ³):	1.96	2.06	2.14	2.14	2.12
Wet Density (pcf):	122.4	128.4	133.4	133.8	132.5
Moisture Content (%):	7.0	9.4	11.8	13.9	16.8
Dry Density (pcf):	114.4	117.3	119.3	117.5	113.4

Zero Air Voids

Moisture Content (%):	11.5	15.0	18.5
Dry Unit Weight (pcf):	128.6	119.9	112.4

Tested By MLF Date 8/12/25 Checked By JLK Date 8/13/25

DIRECT SHEAR

ASTM D 3080-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1to4, TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0
Project No.:	2025-353-003	Sample No.:	60%Clay/40%Washed Sand
Lab ID:	2025-353-003-004	Visual Description:	Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

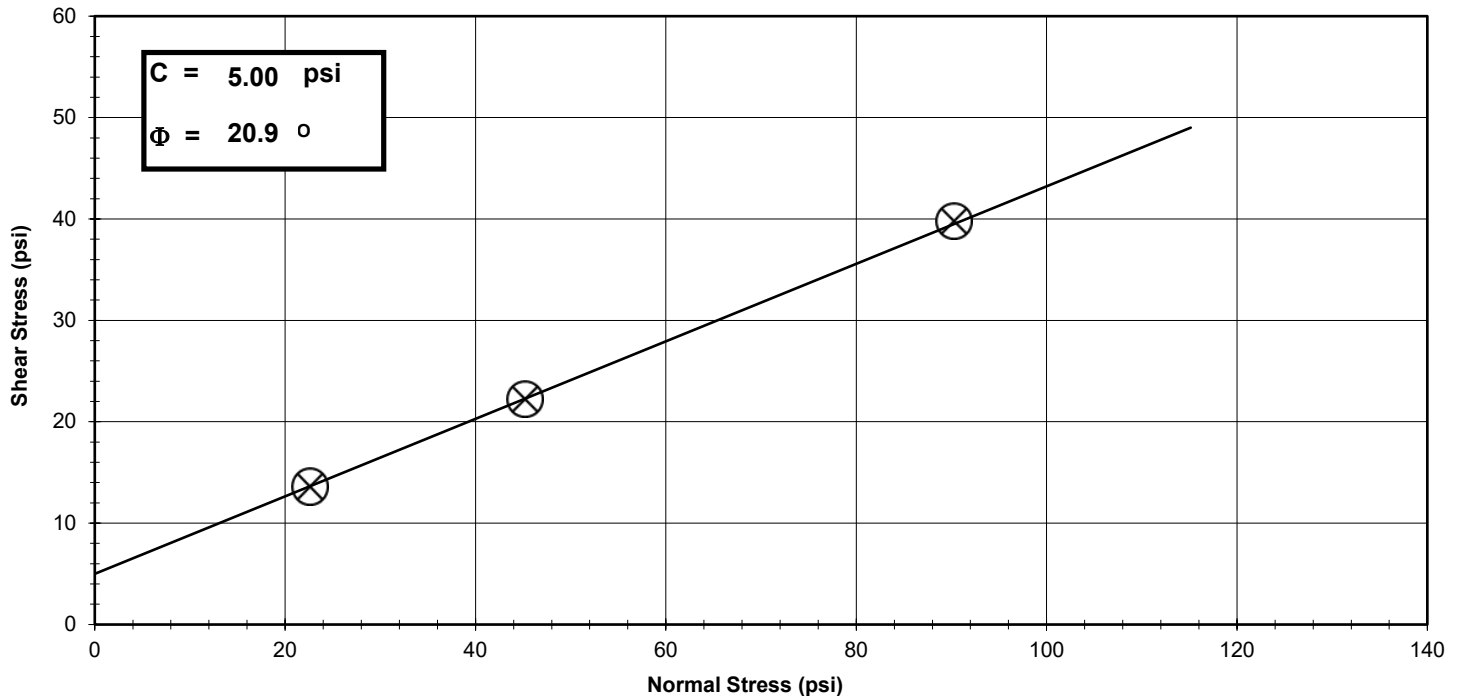
Maximum Shear Stress (psi)		Normal Stress (psi)
13.62	(1)	22.57
22.25	(2)	45.14
39.84	(3)	90.28

Overall Regression Analysis			
Slope =	0.39		
C =	4.83	psi	
Φ =	21.2	degrees	

Selected Points	Shear Stress (psi)	Normal Stress (psi)
1	13.62	22.57
2	22.25	45.14

Selected Points Regression			
Slope =	0.38		
C =	5.00	psi	
Φ =	20.9	degrees	

SHEAR STRESS vs. NORMAL STRESS



Note: Graph not to scale

Tested By RPE Date 8/22/25 Approved By NJM Date 8/22/25

DIRECT SHEAR
ASTM D 3080-11

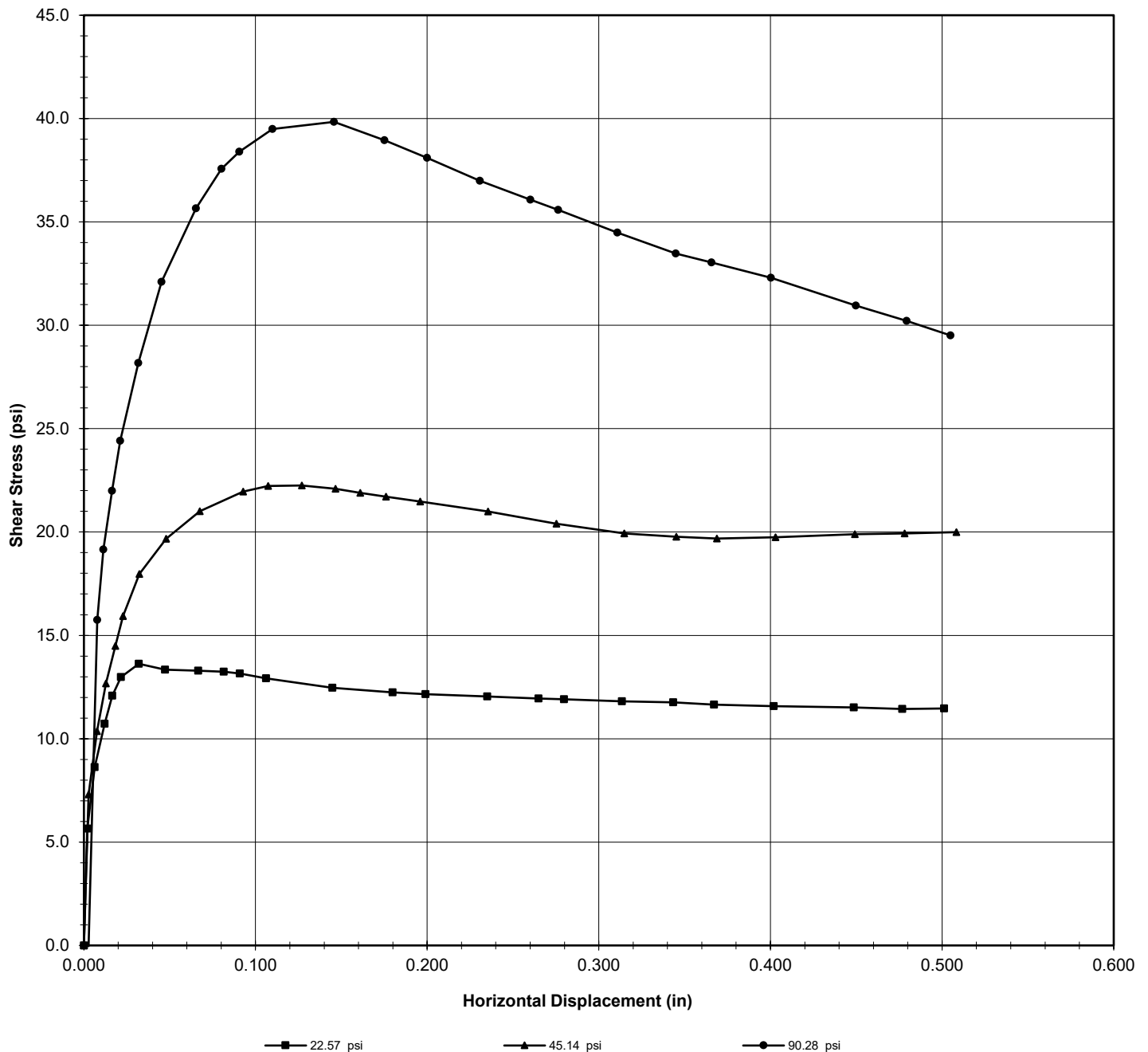


Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-004

Boring No.: TP-SB8-1to4, TP-39
Depth (ft): 0.0-4.0
Sample No.: 60%Clay/40%Washed Sand
Visual Description: Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

SHEAR STRESS vs. HORIZONTAL DISPLACEMENT



Tested By RPE Date 8/22/25 Approved By NJM Date 8/22/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-004

Boring No.: TP-SB8-1to4, TP-39
 Depth (ft): 0.0-4.0
 Sample No.: 60%Clay/40%Washed Sand
 Visual Description: Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3156 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	384.08	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	216.82	Volume of Solids (cm ³)	55.4
Weight of Wet Specimen (g)	167.26	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0103
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0007
Wet Density (pcf)	129.8	Void Ratio Before Consolidation	0.452
Dry Density (pcf)	116.1	Void Ratio After Consolidation	0.451

Moisture Content	Before Test	After Test	Testing Parameters	
Tare ID	3031	3188		
Weight of Wet Soil & Tare (g)	208.27	181.36	Normal Stress (psi)	22.57
Weight of Dry Soil & Tare (g)	186.98	154.34		
Weight of Tare (g)	7.16	8.20	Strain Rate (in/min)	0.00144
Weight of Water (g)	21.29	27.02		
Weight of Dry Soil (g)	179.82	146.14	Machine Deflection (in)	0.0096
Moisture Content (%)	11.8	18.5		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr.(-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.002	27.7	5.65	-0.0006	0.0006	0.25
0.006	42.3	8.62	-0.0012	0.0012	0.38
0.012	52.6	10.72	-0.0024	0.0024	0.47
0.017	59.3	12.08	-0.0031	0.0031	0.54
0.022	63.7	12.98	-0.0038	0.0038	0.58
0.032	66.9	13.62	-0.0048	0.0048	0.60
0.047	65.5	13.34	-0.0056	0.0056	0.59
0.067	65.2	13.29	-0.0065	0.0065	0.59
0.082	65.0	13.24	-0.0068	0.0068	0.59
0.091	64.6	13.15	-0.0072	0.0072	0.58
0.106	63.4	12.92	-0.0078	0.0078	0.57
0.145	61.2	12.47	-0.0084	0.0084	0.55
0.180	60.1	12.24	-0.0088	0.0088	0.54
0.199	59.7	12.15	-0.0088	0.0088	0.54
0.235	59.2	12.05	-0.0088	0.0088	0.53
0.265	58.6	11.95	-0.0088	0.0088	0.53
0.280	58.5	11.91	-0.0088	0.0088	0.53
0.313	57.9	11.80	-0.0090	0.0090	0.52
0.343	57.7	11.76	-0.0090	0.0090	0.52
0.367	57.2	11.65	-0.0090	0.0090	0.52
0.402	56.8	11.57	-0.0092	0.0092	0.51
0.449	56.5	11.52	-0.0092	0.0092	0.51
0.477	56.2	11.44	-0.0092	0.0092	0.51
0.501	56.3	11.47	-0.0092	0.0092	0.51

Tested By RPE Date 8/20/25 Input Checked By NJM Date 8/22/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-004

Boring No.: TP-SB8-1to4, TP-39
 Depth (ft): 0.0-4.0
 Sample No.: 60%Clay/40%Washed Sand
 Visual Description: Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G1645 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	383.38	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	216.13	Volume of Solids (cm ³)	55.4
Weight of Wet Specimen (g)	167.25	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0322
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0236
Wet Density (pcf)	129.8	Void Ratio Before Consolidation	0.452
Dry Density (pcf)	116.1	Void Ratio After Consolidation	0.418

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	3031	4008		
Weight of Wet Soil & Tare (g)	208.27	179.19	Normal Stress (psi)	45.14
Weight of Dry Soil & Tare (g)	186.98	152.95		
Weight of Tare (g)	7.16	7.22	Strain Rate (in/min)	0.00144
Weight of Water (g)	21.29	26.24		
Weight of Dry Soil (g)	179.82	145.73	Machine Deflection (in)	0.0085
Moisture Content (%)	11.8	18.0		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.003	35.8	7.30	0.0000	0.0000	0.16
0.008	50.9	10.37	0.0001	-0.0001	0.23
0.013	62.2	12.68	0.0002	-0.0002	0.28
0.018	71.1	14.49	0.0003	-0.0003	0.32
0.023	78.2	15.93	0.0003	-0.0003	0.35
0.032	88.2	17.97	0.0005	-0.0005	0.40
0.048	96.6	19.68	0.0009	-0.0009	0.44
0.068	103.1	21.01	0.0019	-0.0019	0.47
0.093	107.7	21.95	0.0023	-0.0023	0.49
0.107	109.1	22.23	0.0024	-0.0024	0.49
0.127	109.2	22.25	0.0024	-0.0024	0.49
0.147	108.4	22.09	0.0024	-0.0024	0.49
0.161	107.5	21.89	0.0023	-0.0023	0.49
0.176	106.6	21.71	0.0023	-0.0023	0.48
0.196	105.4	21.47	0.0024	-0.0024	0.48
0.235	103.1	21.00	0.0029	-0.0029	0.47
0.275	100.2	20.41	0.0035	-0.0035	0.45
0.315	97.9	19.93	0.0040	-0.0040	0.44
0.345	97.0	19.77	0.0042	-0.0042	0.44
0.369	96.7	19.69	0.0044	-0.0044	0.44
0.403	96.9	19.74	0.0046	-0.0046	0.44
0.449	97.6	19.89	0.0049	-0.0049	0.44
0.478	97.8	19.93	0.0056	-0.0056	0.44
0.508	98.2	20.00	0.0066	-0.0066	0.44

Tested By RPE Date 8/20/25 Input Checked By NJM Date 8/22/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-004

Boring No.: TP-SB8-1to4, TP-39
 Depth (ft): 0.0-4.0
 Sample No.: 60%Clay/40%Washed Sanc
 Visual Description: Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G1285 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	384.39	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	217.15	Volume of Solids (cm ³)	55.4
Weight of Wet Specimen (g)	167.24	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0566
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0220
Wet Density (pcf)	129.8	Void Ratio Before Consolidation	0.452
Dry Density (pcf)	116.1	Void Ratio After Consolidation	0.420

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	3031	2803		
Weight of Wet Soil & Tare (g)	208.27	181.61	Normal Stress (psi)	90.28
Weight of Dry Soil & Tare (g)	186.98	156.00		
Weight of Tare (g)	7.16	8.18	Strain Rate (in/min)	0.00144
Weight of Water (g)	21.29	25.61		
Weight of Dry Soil (g)	179.82	147.82	Machine Deflection (in)	0.0346
Moisture Content (%)	11.8	17.3		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.003	-0.1	-0.03	0.0000	0.0000	0.00
0.008	77.3	15.74	0.0002	-0.0002	0.17
0.011	94.0	19.15	0.0009	-0.0009	0.21
0.016	108.0	21.99	0.0017	-0.0017	0.24
0.021	119.9	24.42	0.0021	-0.0021	0.27
0.032	138.3	28.18	0.0026	-0.0026	0.31
0.045	157.6	32.11	0.0033	-0.0033	0.36
0.065	175.0	35.66	0.0041	-0.0041	0.39
0.080	184.4	37.56	0.0053	-0.0053	0.42
0.091	188.5	38.40	0.0057	-0.0057	0.43
0.110	193.9	39.50	0.0063	-0.0063	0.44
0.146	195.6	39.84	0.0079	-0.0079	0.44
0.175	191.2	38.95	0.0082	-0.0082	0.43
0.200	187.0	38.10	0.0084	-0.0084	0.42
0.231	181.6	36.99	0.0085	-0.0085	0.41
0.260	177.1	36.08	0.0088	-0.0088	0.40
0.276	174.7	35.59	0.0089	-0.0089	0.39
0.311	169.3	34.49	0.0091	-0.0091	0.38
0.345	164.3	33.47	0.0095	-0.0095	0.37
0.366	162.2	33.04	0.0097	-0.0097	0.37
0.400	158.5	32.29	0.0099	-0.0099	0.36
0.450	152.0	30.96	0.0104	-0.0104	0.34
0.479	148.3	30.21	0.0106	-0.0106	0.33
0.505	144.9	29.52	0.0109	-0.0109	0.33

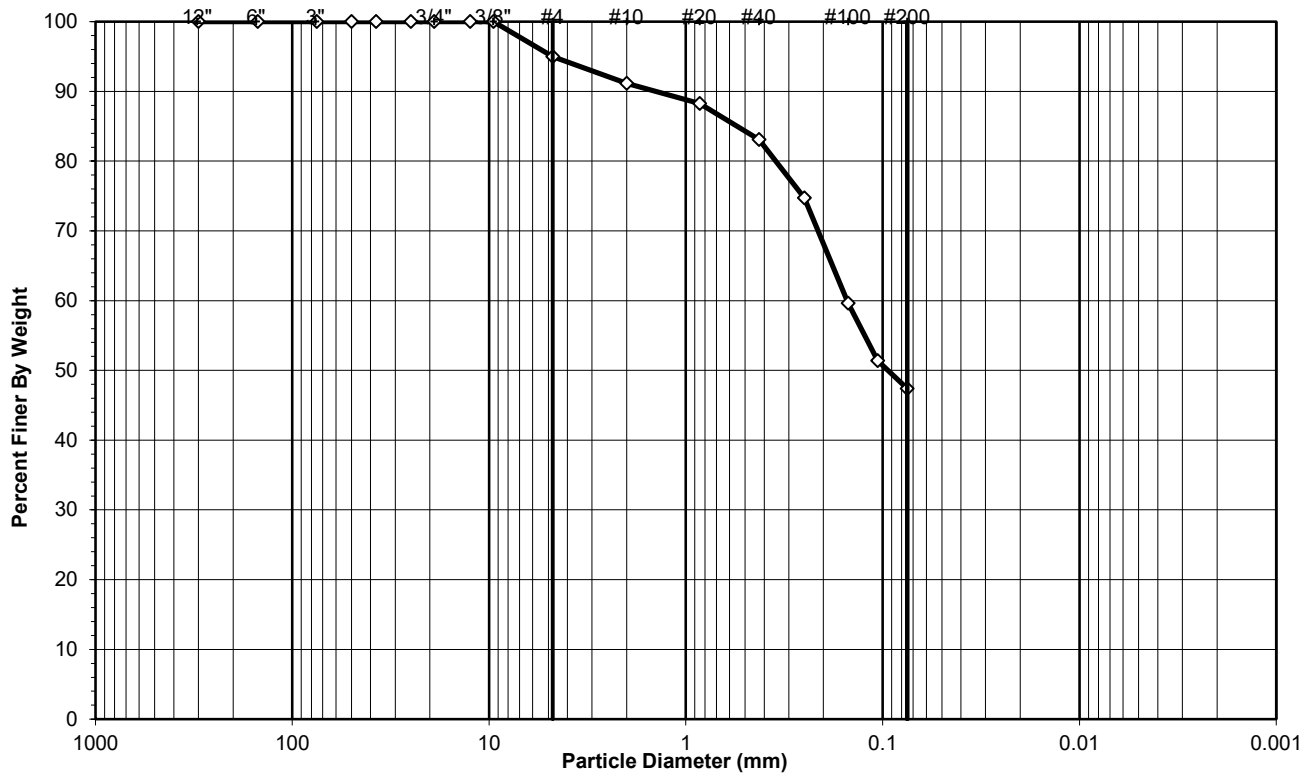
Tested By RPE *Date* 8/20/25 *Input Checked By* NJM *Date* 8/22/25

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1to4 & TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-003	Sample No.:	40% Clay/60% Washed San
Lab ID:	2025-353-003-005	Soil Color:	Brown

USCS	SIEVE ANALYSIS		HYDROMETER
	gravel	sand	silt and clay



Sieve Size		Percentage (%)
Greater than #4	Gravel	5.00
#4 to #200	Sand	47.61
Finer than #200	Silt & Clay	47.39

USCS Symbol:
SM, TESTED

D50 = 0.09

USCS Classification:
SILTY SAND
(NON-PLASTIC FINES)

Tested By	DF	Date	8/14/25	Checked By	EG	Date	8/18/25
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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1to4 & TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-003	Sample No.:	40% Clay/60% Washed San
Lab ID:	2025-353-003-005	Soil Color:	Brown

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1493	Tare No.:	NA	Tare No.:	1493	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	680.20	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	680.20	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	637.15	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	637.15	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	147.63	Weight of Tare (g):	NA	Weight of Tare (g):	147.63	Weight of Tare (g):	NA
Weight of Water (g):	43.05	Weight of Water (g):	NA	Weight of Water (g):	43.05	Weight of Water (g):	NA
Weight of Dry Soil (g):	489.52	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	489.52	Weight of Dry Soil (g):	NA
Moisture Content (%):	8.8	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	489.52	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	489.52
Tare No. (Sub-Specimen)	1493	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1493	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	680.20	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	680.20	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	147.63	Dry Weight of - 3/4" Sample (g):	489.52	Weight of Tare (g):	147.63	Dry Weight of - 3/4" Sample (g):	489.52
Sub-Specimen Wet Weight (g):	532.57	Dry Weight -3/4" +3/8" Sample (g):	0.00	Sub-Specimen Wet Weight (g):	532.57	Dry Weight -3/4" +3/8" Sample (g):	0.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	489.52	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	489.52
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	0.00	(**)	0.00	100.00	100
3/8"	9.5	0.00	0.00	0.00	100.00	100
#4	4.75	24.48	5.00	5.00	95.00	95
#10	2	18.86	3.85	8.85	91.15	91
#20	0.85	14.05	(**)	11.72	88.28	88
#40	0.425	25.44	5.20	16.92	83.08	83
#60	0.25	40.85	8.34	25.27	74.73	75
#100	0.15	73.86	15.09	40.35	59.65	60
#140	0.106	40.45	8.26	48.62	51.38	51
#200	0.075	19.53	3.99	52.61	47.39	47
Pan	-	232.00	47.39	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	8/14/25	Checked By	EG	Date	8/18/25
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ATTERBERG LIMITS

ASTM D 4318-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1to4 & TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0'
Project No.:	2025-353-003	Sample No.:	40% Clay / 60% Washed Sand
Lab ID:	2025-353-003-005	Color:	Brown
			(Minus No. 40 sieve material)

As Received Water Content

Tare Number	2991
Wt. of Tare & Wet Sample (g)	160.87
Wt. of Tare & Dry Sample (g)	146.05
Weight of Tare (g)	7.95
Weight of Water (g)	14.82
Weight of Dry Sample (g)	138.10

Water Content (%)	10.7
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NON - PLASTIC MATERIAL

<i>Tested By</i>	<i>DDA</i>	<i>Date</i>	<i>8/14/25</i>	<i>Checked By</i>	<i>EG</i>	<i>Date</i>	<i>8/18/25</i>
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page 1 of 1 DCN: CT-S4C, DATE: 4/27/17, REVISION : 4e

MOISTURE - DENSITY RELATIONSHIP

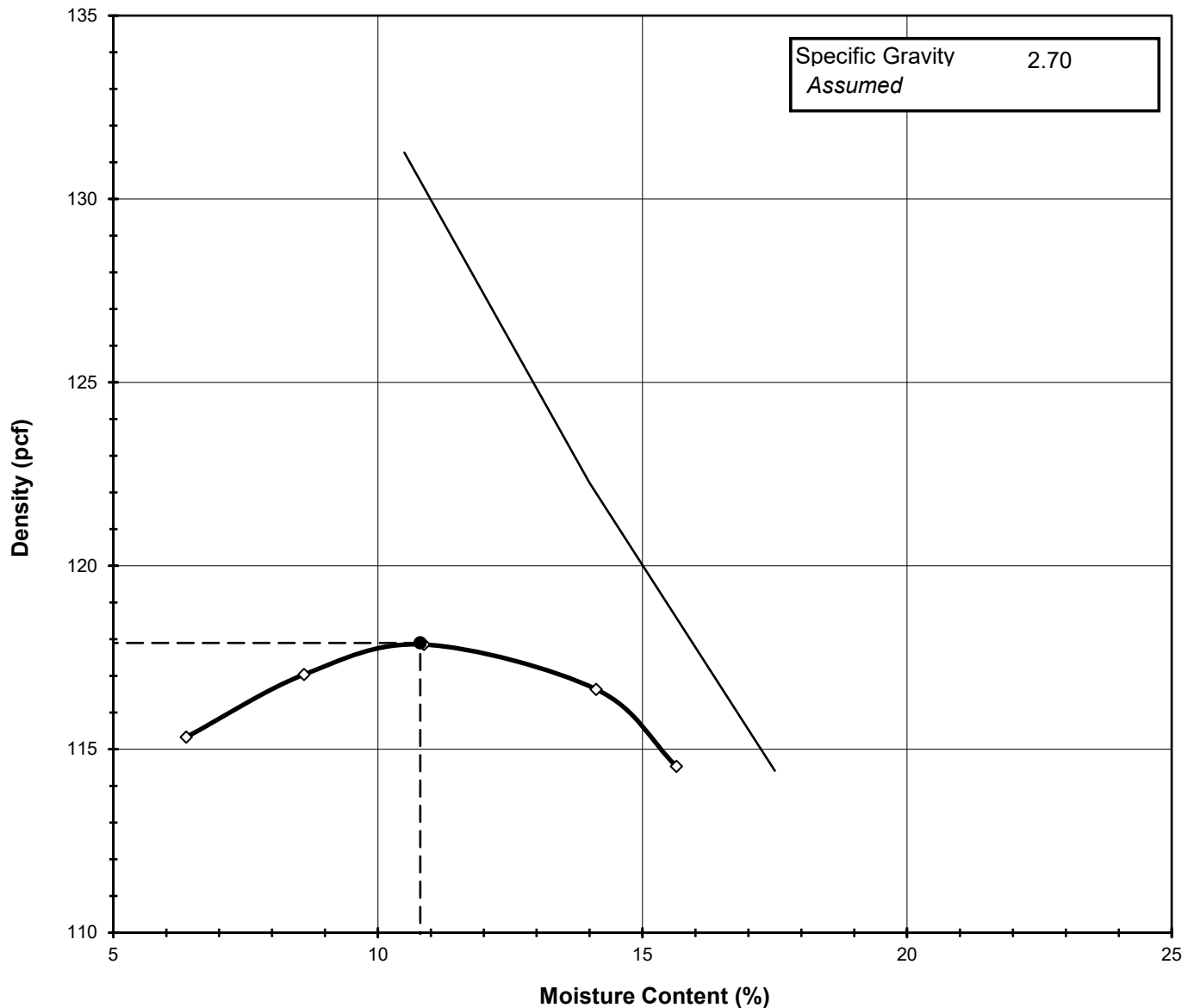
ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-005

Boring No.: TP-SB8-1to4 & TP-39
Depth (ft): 0.0-4.0'
Sample No.: 40% Clay / 60% Washed S
Test Method **MODIFIED**

Visual Description: Brown Clay / Brown Sand

Optimum Moisture Content (%): 10.8
Maximum Dry Density (pcf): 117.9



Tested By MLF Date 8/12/2025 Checked By JLK Date 8/13/25

page 1 of 2 DCN:CT-S12 DATE: 4/21/23 REVISION: 17

MOISTURE - DENSITY RELATIONSHIP

ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-005

Boring No.: TP-SB8-1to4 & TP-39
 Depth (ft): 0.0-4.0'
 Sample No.: 40% Clay / 60% Washed S

Visual Description: Brown Clay / Brown Sand

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.70
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	B

Test Type:	MODIFIED
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G1916
Mold ID:	G3292
Mold diameter:	4"
Weight of the Mold (g):	4108
Volume of the Mold (cm ³):	946

Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	5968	6035	6089	6126	6116
Weight of Mold (g):	4108	4108	4108	4108	4108
Weight of Wet Sample (g):	1860	1927	1981	2018	2008
Mold Volume (cm ³):	946	946	946	946	946

Moisture Content / Density

Tare Number:	416	446	478	410	428
Weight of Tare & Wet Sample (g):	406.54	406.34	408.13	400.18	408.14
Weight of Tare & Dry Sample (g):	388.06	381.38	377.74	362.78	364.64
Weight of Tare (g):	98.31	91.28	98.24	97.99	86.53
Weight of Water (g):	18.48	24.96	30.39	37.40	43.50
Weight of Dry Sample (g):	289.75	290.10	279.50	264.79	278.11

Wet Density (g/cm ³):	1.97	2.04	2.09	2.13	2.12
Wet Density (pcf):	122.7	127.1	130.7	133.1	132.5
Moisture Content (%):	6.4	8.6	10.9	14.1	15.6
Dry Density (pcf):	115.3	117.0	117.9	116.6	114.5

Zero Air Voids

Moisture Content (%):	10.5	14.0	17.5
Dry Unit Weight (pcf):	131.3	122.3	114.4

Tested By MLF Date 8/12/25 Checked By JLK Date 8/13/25

DIRECT SHEAR

ASTM D 3080-11

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1to4 & TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0
Project No.:	2025-353-003	Sample No.:	40%Clay/60%Washed Sand
Lab ID:	2025-353-003-005	Visual Description:	Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

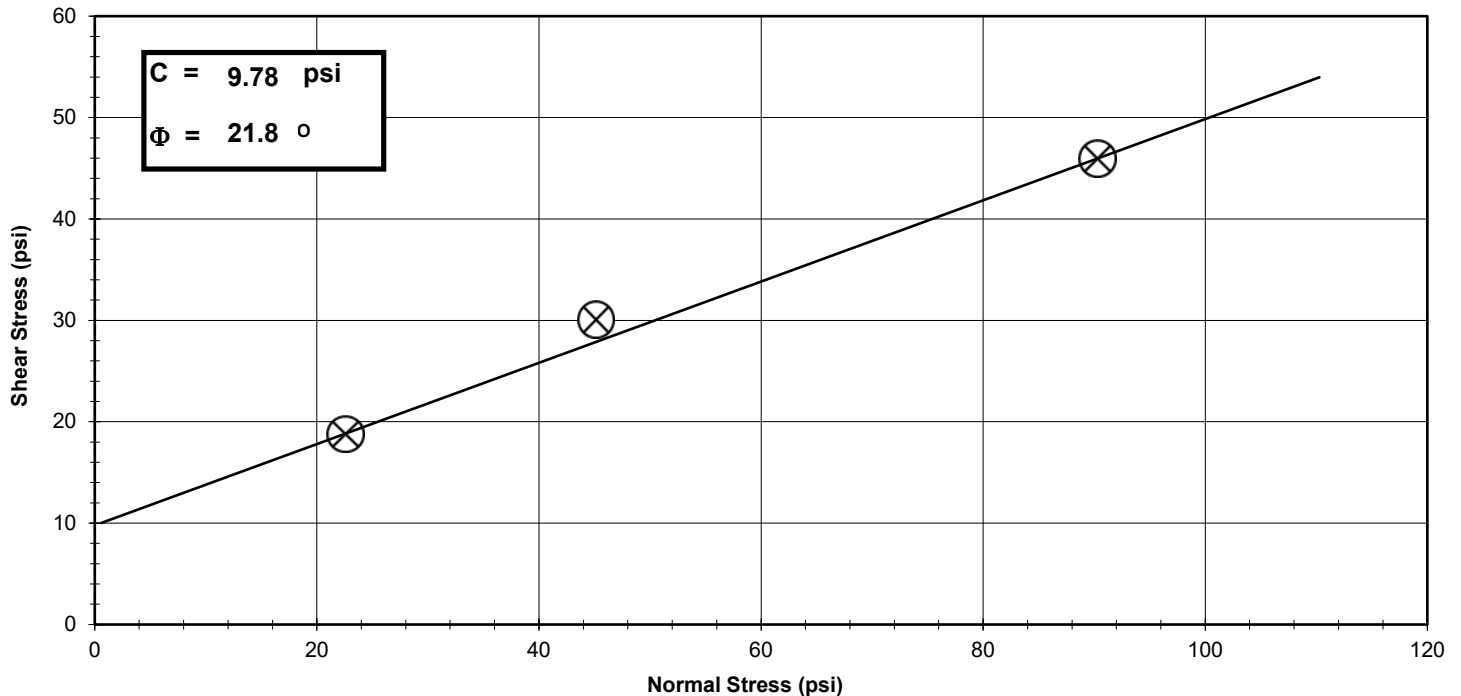
Maximum Shear Stress (psi)		Normal Stress (psi)
18.83	(1)	22.57
30.13	(2)	45.14
45.96	(3)	90.28

Overall Regression Analysis			
Slope =	0.39		
C =	10.91	psi	
Φ =	21.5	degrees	

Selected Points	Shear Stress (psi)	Normal Stress (psi)
1	18.83	22.57
3	45.96	90.28

Selected Points Regression			
Slope =	0.40		
C =	9.78	psi	
Φ =	21.8	degrees	

SHEAR STRESS vs. NORMAL STRESS



Note: Graph not to scale

Tested By RPE Date 8/26/25 Approved By NJM Date 8/26/25

DIRECT SHEAR
ASTM D 3080-11

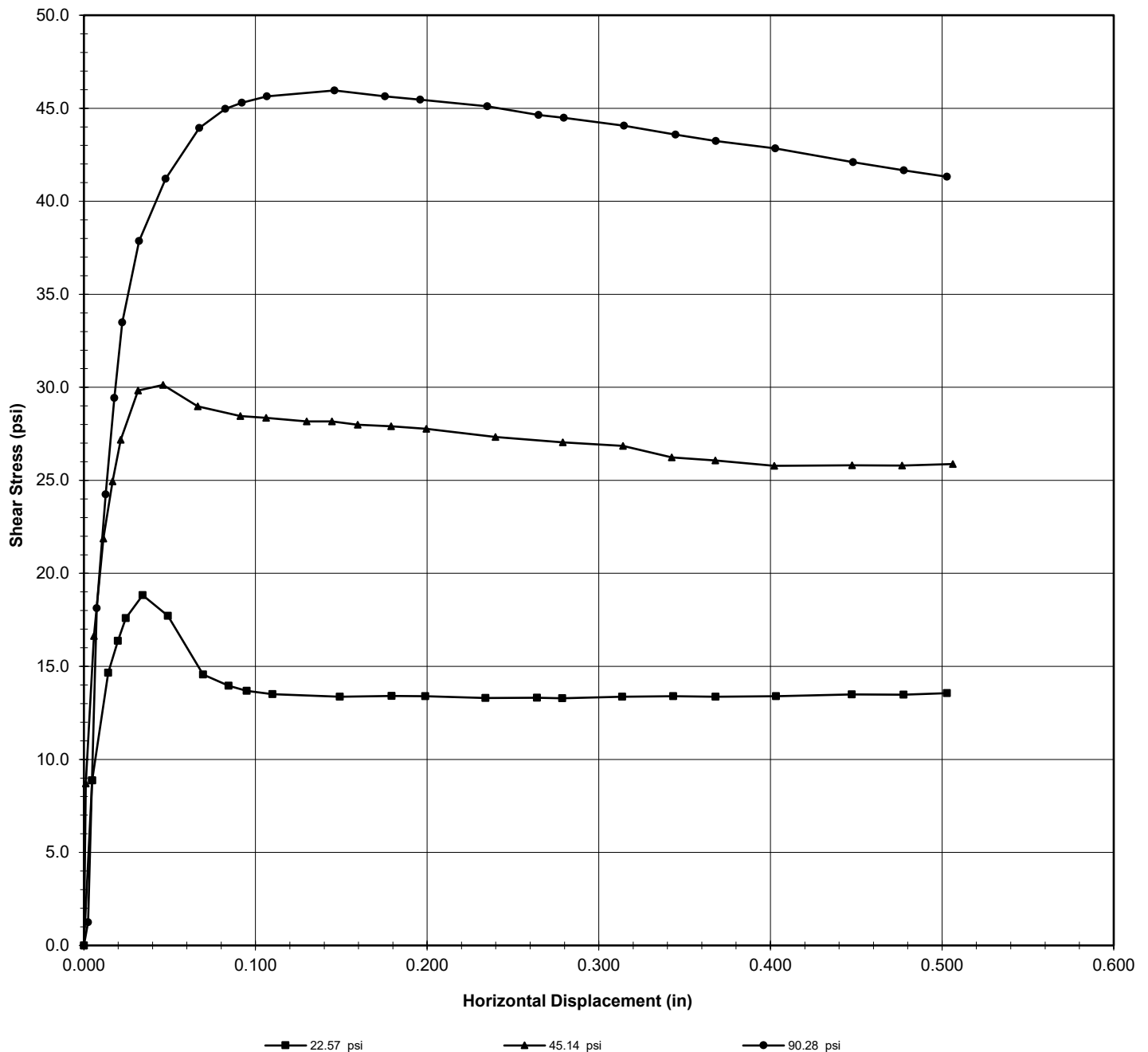


Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-003
Lab ID: 2025-353-003-005

Boring No.: TP-SB8-1to4 & TP-39
Depth (ft): 0.0-4.0
Sample No.: 40%Clay/60%Washed Sand
Visual Description: Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

SHEAR STRESS vs. HORIZONTAL DISPLACEMENT



Tested By RPE Date 8/26/25 Approved By NJM Date 8/26/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-005

Boring No.: TP-SB8-1to4 & TP-39
 Depth (ft): 0.0-4.0
 Sample No.: 40%Clay/60%Washed Sand
 Visual Description: Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3155 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	381.45	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	214.27	Volume of Solids (cm ³)	55.9
Weight of Wet Specimen (g)	167.18	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0288
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0218
Wet Density (pcf)	129.7	Void Ratio Before Consolidation	0.439
Dry Density (pcf)	117.2	Void Ratio After Consolidation	0.407

Moisture Content	Before Test	After Test	Testing Parameters	
Tare ID	2991	3149		
Weight of Wet Soil & Tare (g)	160.87	180.89	Normal Stress (psi)	22.57
Weight of Dry Soil & Tare (g)	146.05	155.98		
Weight of Tare (g)	7.95	7.22	Strain Rate (in/min)	0.00144
Weight of Water (g)	14.82	24.91		
Weight of Dry Soil (g)	138.1	148.76	Machine Deflection (in)	0.0070
Moisture Content (%)	10.7	16.7		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr,(-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.005	43.5	8.87	-0.0001	0.0001	0.39
0.005	43.5	8.87	-0.0001	0.0001	0.39
0.014	72.0	14.66	-0.0004	0.0004	0.65
0.020	80.4	16.38	-0.0008	0.0008	0.73
0.024	86.3	17.59	-0.0012	0.0012	0.78
0.034	92.4	18.83	-0.0024	0.0024	0.83
0.049	87.0	17.72	-0.0042	0.0042	0.78
0.069	71.5	14.57	-0.0065	0.0065	0.65
0.084	68.5	13.96	-0.0070	0.0070	0.62
0.095	67.2	13.69	-0.0074	0.0074	0.61
0.110	66.3	13.51	-0.0075	0.0075	0.60
0.149	65.6	13.37	-0.0076	0.0076	0.59
0.179	65.8	13.41	-0.0077	0.0077	0.59
0.199	65.7	13.39	-0.0078	0.0078	0.59
0.234	65.3	13.29	-0.0078	0.0078	0.59
0.264	65.4	13.31	-0.0078	0.0078	0.59
0.279	65.2	13.29	-0.0077	0.0077	0.59
0.314	65.6	13.36	-0.0077	0.0077	0.59
0.343	65.8	13.40	-0.0077	0.0077	0.59
0.368	65.6	13.36	-0.0076	0.0076	0.59
0.403	65.8	13.40	-0.0075	0.0075	0.59
0.447	66.2	13.49	-0.0074	0.0074	0.60
0.478	66.2	13.48	-0.0073	0.0073	0.60
0.503	66.5	13.56	-0.0072	0.0072	0.60

Tested By RPE Date 8/20/25 Input Checked By NJM Date 8/26/25

DIRECT SHEAR

ASTM D 3080-11



Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-003
 Lab ID: 2025-353-003-005

Boring No.: TP-SB8-1to4 & TP-39
 Depth (ft): 0.0-4.0
 Sample No.: 40%Clay/60%Washed Sand
 Visual Description: Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G3156 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	382.48	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	215.27	Volume of Solids (cm ³)	55.9
Weight of Wet Specimen (g)	167.21	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0318
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0184
Wet Density (pcf)	129.8	Void Ratio Before Consolidation	0.438
Dry Density (pcf)	117.2	Void Ratio After Consolidation	0.412

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	2991	3323		
Weight of Wet Soil & Tare (g)	160.87	180.39	Normal Stress (psi)	45.14
Weight of Dry Soil & Tare (g)	146.05	156.61		
Weight of Tare (g)	7.95	7.22	Strain Rate (in/min)	0.00144
Weight of Water (g)	14.82	23.78		
Weight of Dry Soil (g)	138.1	149.39	Machine Deflection (in)	0.0134
Moisture Content (%)	10.7	15.9		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.001	42.7	8.70	0.0000	0.0000	0.19
0.006	81.6	16.63	0.0000	0.0000	0.37
0.011	107.4	21.87	-0.0003	0.0003	0.48
0.017	122.4	24.94	-0.0007	0.0007	0.55
0.022	133.4	27.18	-0.0012	0.0012	0.60
0.032	146.4	29.82	-0.0020	0.0020	0.66
0.046	147.9	30.13	-0.0037	0.0037	0.67
0.066	142.2	28.97	-0.0045	0.0045	0.64
0.091	139.7	28.46	-0.0050	0.0050	0.63
0.106	139.2	28.35	-0.0050	0.0050	0.63
0.130	138.2	28.16	-0.0051	0.0051	0.62
0.145	138.3	28.17	-0.0051	0.0051	0.62
0.160	137.4	27.99	-0.0051	0.0051	0.62
0.179	137.0	27.91	-0.0051	0.0051	0.62
0.199	136.3	27.76	-0.0050	0.0050	0.62
0.240	134.2	27.34	-0.0050	0.0050	0.61
0.279	132.7	27.04	-0.0050	0.0050	0.60
0.314	131.8	26.86	-0.0049	0.0049	0.59
0.342	128.8	26.24	-0.0047	0.0047	0.58
0.368	128.0	26.07	-0.0046	0.0046	0.58
0.402	126.6	25.78	-0.0044	0.0044	0.57
0.448	126.7	25.81	-0.0039	0.0039	0.57
0.477	126.6	25.80	-0.0038	0.0038	0.57
0.506	127.0	25.87	-0.0035	0.0035	0.57

Tested By RPE Date 8/22/25 Input Checked By NJM Date 8/26/25

DIRECT SHEAR
ASTM D 3080-11



Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1to4 & TP-39
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-4.0
Project No.:	2025-353-003	Sample No.:	40%Clay/60%Washed Sanc
Lab ID:	2025-353-003-005	Visual Description:	Brown Clay and Sand

Sample Conditions: Remolded, Inundated and Double Drained (-#4 Material)

Machine ID # G1645 SHEAR BOX DATA

Weight of Wet Specimen & Ring (g)	382.99	Specific Gravity (Assumed)	2.70
Weight of Ring (g)	215.81	Volume of Solids (cm ³)	55.9
Weight of Wet Specimen (g)	167.18	Initial Consolidation Dial Reading (in)	0.0
Initial Specimen Height (in)	1.0	Final Consolidation Dial Reading (in)	0.0379
Specimen Diameter (in)	2.5	Corrected Final Consolidation Reading (in)	0.0257
Wet Density (pcf)	129.7	Void Ratio Before Consolidation	0.439
Dry Density (pcf)	117.2	Void Ratio After Consolidation	0.401

Moisture Content	<i>Before Test</i>	<i>After Test</i>	<i>Testing Parameters</i>	
Tare ID	2991	2998		
Weight of Wet Soil & Tare (g)	160.87	178.21	Normal Stress (psi)	90.28
Weight of Dry Soil & Tare (g)	146.05	155.75		
Weight of Tare (g)	7.95	8.05	Strain Rate (in/min)	0.00144
Weight of Water (g)	14.82	22.46		
Weight of Dry Soil (g)	138.1	147.7	Machine Deflection (in)	0.0122
Moisture Content (%)	10.7	15.2		

Horizontal Displacement (in)	Shear Force (lb)	Shear Stress (psi)	Vertical Dial Reading (in)	Vertical Displacement (+)incr, (-)decr (in)	Shear To Normal Ratio
0.000	0.0	0.00	0.0000	0.0000	0.00
0.002	6.1	1.24	0.0000	0.0000	0.01
0.007	89.0	18.13	0.0000	0.0000	0.20
0.013	119.0	24.24	0.0000	0.0000	0.27
0.018	144.4	29.42	0.0002	-0.0002	0.33
0.022	164.4	33.49	0.0004	-0.0004	0.37
0.032	185.9	37.87	0.0004	-0.0004	0.42
0.048	202.3	41.21	0.0008	-0.0008	0.46
0.067	215.7	43.94	0.0011	-0.0011	0.49
0.082	220.7	44.96	0.0014	-0.0014	0.50
0.092	222.3	45.29	0.0015	-0.0015	0.50
0.107	224.0	45.64	0.0016	-0.0016	0.51
0.146	225.6	45.96	0.0021	-0.0021	0.51
0.175	224.1	45.65	0.0023	-0.0023	0.51
0.196	223.1	45.45	0.0027	-0.0027	0.50
0.235	221.4	45.10	0.0031	-0.0031	0.50
0.265	219.1	44.63	0.0033	-0.0033	0.49
0.280	218.3	44.48	0.0033	-0.0033	0.49
0.315	216.3	44.07	0.0034	-0.0034	0.49
0.345	213.9	43.59	0.0035	-0.0035	0.48
0.368	212.3	43.24	0.0035	-0.0035	0.48
0.403	210.3	42.85	0.0038	-0.0038	0.47
0.448	206.6	42.10	0.0040	-0.0040	0.47
0.478	204.5	41.66	0.0043	-0.0043	0.46
0.503	202.8	41.31	0.0045	-0.0045	0.46

Tested By RPE *Date* 8/22/25 *Input Checked By* NJM *Date* 8/26/25



September 12, 2025

Project No. 2025-353-004

Doug Beitko
Garvin Boward Beitko Engineering, Inc.
180 Bilmar Drive, Suite IV
Pittsburgh, PA 15205

Transmittal
Laboratory Test Results
QVSD HS GBBE #16123A

Please find attached the laboratory test results for the above referenced project. The tests were outlined on the Project Verification Form that was transmitted to your firm prior to the testing. The testing was performed in general accordance with the methods listed on the enclosed data sheets. The test results are believed to be representative of the samples that were submitted for testing and are indicative only of the specimens that were evaluated. We have no direct knowledge of the origin of the samples and imply no position with regard to the nature of the test results, i.e. pass/fail and no claims as to the suitability of the material for its intended use.

The test data and all associated project information provided shall be held in strict confidence and disclosed to other parties only with authorization by our Client. The test data submitted herein is considered integral with this report and is not to be reproduced except in whole and only with the authorization of the Client and Geotechnics. The remaining sample materials for this project will be retained for a minimum of 90 days as directed by the Geotechnics' Quality Program.

We are pleased to provide these testing services. Should you have any questions or if we may be of further assistance, please contact our office.

Respectfully submitted,
Geotechnics, Inc.

Nathan Melaro
Director of Operations

***We understand that you have a choice in your laboratory services
and we thank you for choosing Geotechnics.***

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-004	Sample No.:	Washed Sand
Lab ID:	2025-353-004-001	Soil Color:	Brown Pre-Proctor



Sieve Size	Percentage (%)
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Greater than #4	<i>Gravel</i>	8.39
#4 to #200	<i>Sand</i>	83.79
Finer than #200	<i>Silt & Clay</i>	7.82

USCS Symbol:
sp-sm, ASSUMED

D60 = 0.35 D50 = 0.24

D30 = 0.16 CU = 4.12

USCS Classification:
POORLY GRADED SAND WITH SILT

D10 = 0.084

Tested By	DF	Date	9/11/25	Checked By	EG	Date	9/12/25
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WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-004	Sample No.:	Washed Sand
Lab ID:	2025-353-004-001	Soil Color:	Brown Pre-Proctor

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1555	Tare No.:	NA	Tare No.:	1555	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	677.67	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	677.67	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	675.42	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	675.42	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	145.84	Weight of Tare (g):	NA	Weight of Tare (g):	145.84	Weight of Tare (g):	NA
Weight of Water (g):	2.25	Weight of Water (g):	NA	Weight of Water (g):	2.25	Weight of Water (g):	NA
Weight of Dry Soil (g):	529.58	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	529.58	Weight of Dry Soil (g):	NA
Moisture Content (%):	0.4	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	529.58	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	529.58
Tare No. (Sub-Specimen)	1555	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1555	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	677.67	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	677.67	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	145.84	Dry Weight of - 3/4" Sample (g):	529.58	Weight of Tare (g):	145.84	Dry Weight of - 3/4" Sample (g):	529.58
Sub-Specimen Wet Weight (g):	531.83	Dry Weight -3/4" +3/8" Sample (g):	7.00	Sub-Specimen Wet Weight (g):	531.83	Dry Weight -3/4" +3/8" Sample (g):	7.00
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	522.58	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	522.58
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	0.00	(**)	0.00	100.00	100
3/8"	9.5	7.00	1.32	1.32	98.68	99
#4	4.75	37.44	7.07	8.39	91.61	92
#10	2	45.63	8.62	17.01	82.99	83
#20	0.85	36.90	(**)	23.98	76.02	76
#40	0.425	55.72	10.52	34.50	65.50	66
#60	0.25	76.26	14.40	48.90	51.10	51
#100	0.15	127.60	24.09	72.99	27.01	27
#140	0.106	67.44	12.73	85.73	14.27	14
#200	0.075	34.20	6.46	92.18	7.82	8
Pan	-	41.39	7.82	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	9/11/25	Checked By	EG	Date	9/12/25
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MOISTURE - DENSITY RELATIONSHIP

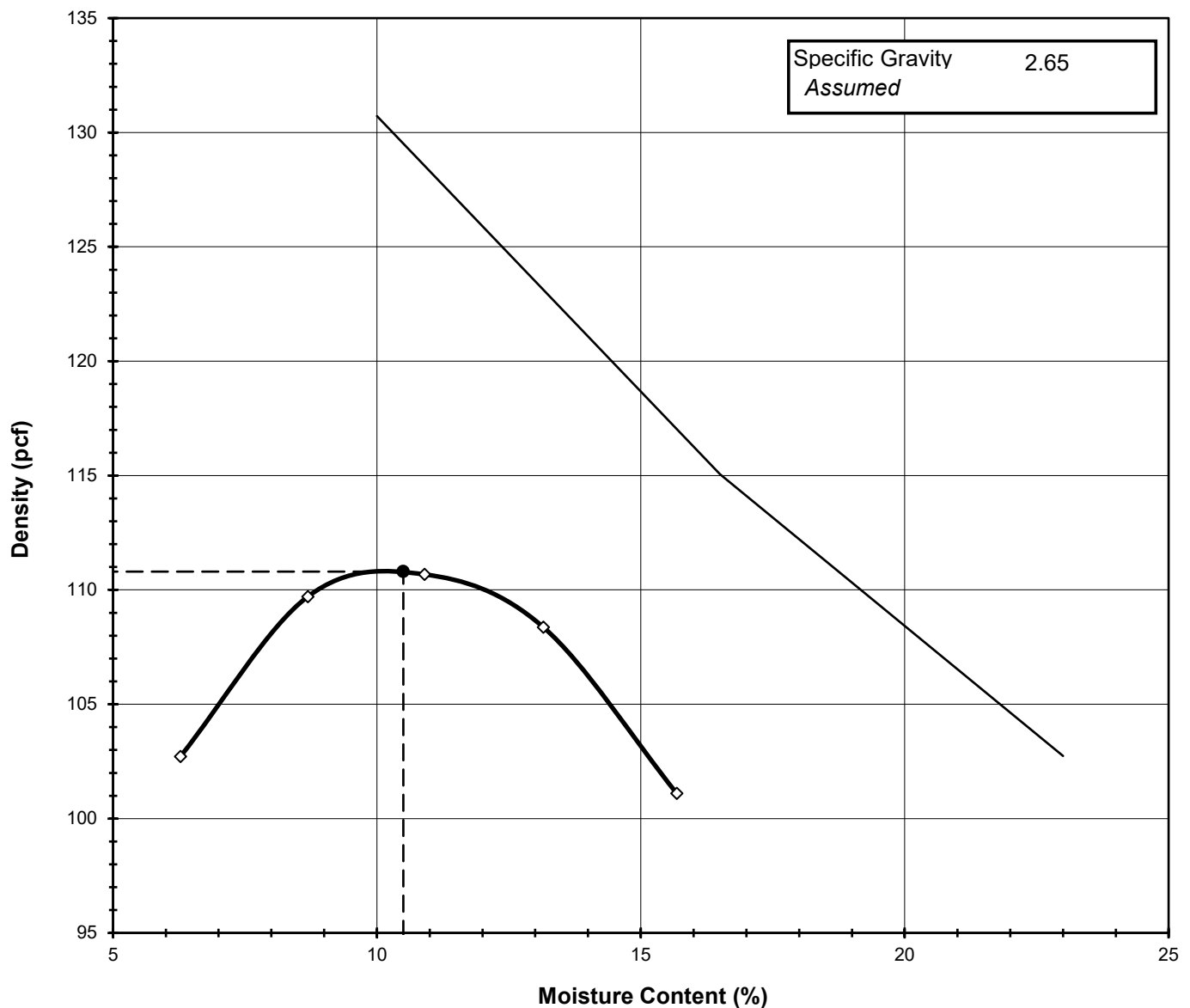
ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
 Client Reference: QVSD HS GBBE #16123A
 Project No.: 2025-353-004
 Lab ID: 2025-353-004-001

Boring No.: TP-SB8-1,2,3,4
 Depth (ft): 0.0-2.0'
 Sample No.: Washed Sand
 Test Method: **MODIFIED**

Visual Description: Brown Sand

Optimum Moisture Content (%): 10.5
Maximum Dry Density (pcf): 110.8



Tested By AB Date 9/9/2025 Checked By JLK Date 9/10/25

page 1 of 2 DCN:CT-S12 DATE: 4/21/23 REVISION: 17

MOISTURE - DENSITY RELATIONSHIP

ASTM D1557-12

Client: Garvin Boward Beitko Engineering, Inc.
Client Reference: QVSD HS GBBE #16123A
Project No.: 2025-353-004
Lab ID: 2025-353-004-001

Boring No.: TP-SB8-1,2,3,4
Depth (ft): 0.0-2.0'
Sample No.: Washed Sand

Visual Description: Brown Sand

Total Weight of the Sample (g):	NA
As Received Water Content (%):	NA
Assumed Specific Gravity:	2.65
Percent Retained on 3/4":	NA
Percent Retained on 3/8":	NA
Percent Retained on #4:	NA
Oversize Material:	Not included
Procedure Used:	C

Test Type:	MODIFIED
Rammer Weight (lb):	10.0
Rammer Drop (in):	18
Rammer Type:	MECHANICAL
Machine ID:	G1916
Mold ID:	G3347
Mold diameter:	6"
Weight of the Mold (g):	5996
Volume of the Mold (cm ³):	2123

Mold / Specimen

Point No.	1	2	3	4	5
Weight of Mold & Wet Sample (g):	9710	10053	10172	10168	9975
Weight of Mold (g):	5996	5996	5996	5996	5996
Weight of Wet Sample (g):	3714	4057	4176	4172	3979
Mold Volume (cm ³):	2123	2123	2123	2123	2123

Moisture Content / Density

Tare Number:	432	464	465	474	458
Weight of Tare & Wet Sample (g):	502.07	500.22	499.46	500.29	591.80
Weight of Tare & Dry Sample (g):	477.73	467.51	459.27	453.62	523.99
Weight of Tare (g):	89.92	91.16	90.60	98.77	91.57
Weight of Water (g):	24.34	32.71	40.19	46.67	67.81
Weight of Dry Sample (g):	387.81	376.35	368.67	354.85	432.42

Wet Density (g/cm ³):	1.75	1.91	1.97	1.97	1.87
Wet Density (pcf):	109.2	119.2	122.7	122.6	117.0
Moisture Content (%) :	6.3	8.7	10.9	13.2	15.7
Dry Density (pcf) :	102.7	109.7	110.7	108.4	101.1

Zero Air Voids

Moisture Content (%) :	10.0	16.5	23.0
Dry Unit Weight (pcf) :	130.7	115.1	102.7

Tested By AB Date 9/9/25 Checked By JLK Date 9/10/25

SIEVE AND HYDROMETER ANALYSIS

ASTM D6913 / D7928

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-004	Sample No.:	Washed Sand
Lab ID:	2025-353-004-001	Soil Color:	Brown Post-Proctor



Sieve Size		Percentage (%)
Greater than #4	Gravel	1.53
#4 to #200	Sand	68.90
Finer than #200	Silt & Clay	29.57

USCS Symbol:
sm, ASSUMED

D50 = 0.14

USCS Classification:
SILTY SAND

Tested By	DF	Date	9/11/25	Checked By	EG	Date	9/12/25
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page 1 of 2 DCN: CT-S73T, DATE 2/25/22, REV. 1

WASH SIEVE ANALYSIS

ASTM D6913-17

Client:	Garvin Boward Beitko Engineering, Inc.	Boring No.:	TP-SB8-1,2,3,4
Client Reference:	QVSD HS GBBE #16123A	Depth (ft):	0.0-2.0'
Project No.:	2025-353-004	Sample No.:	Washed Sand
Lab ID:	2025-353-004-001	Soil Color:	Brown Post-Proctor

Moisture Content of Passing 3/4" Material				Moisture Content of Retained 3/4" Material			
Tare No.:	1548	Tare No.:	NA	Tare No.:	1548	Tare No.:	NA
Wt. of Tare & Wet Sample (g):	762.64	Weight of Tare & Wet Sample (g):	NA	Wt. of Tare & Wet Sample (g):	762.64	Weight of Tare & Wet Sample (g):	NA
Wt. of Tare & Dry Sample (g):	677.61	Weight of Tare & Dry Sample (g):	NA	Wt. of Tare & Dry Sample (g):	677.61	Weight of Tare & Dry Sample (g):	NA
Weight of Tare (g):	144.56	Weight of Tare (g):	NA	Weight of Tare (g):	144.56	Weight of Tare (g):	NA
Weight of Water (g):	85.03	Weight of Water (g):	NA	Weight of Water (g):	85.03	Weight of Water (g):	NA
Weight of Dry Soil (g):	533.05	Weight of Dry Soil (g):	NA	Weight of Dry Soil (g):	533.05	Weight of Dry Soil (g):	NA
Moisture Content (%):	16.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0	Moisture Content (%):	0.0
Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	533.05	Dry Weight of Sample (g):	NA	Total Dry Weight of Sample (g):	533.05
Tare No. (Sub-Specimen)	1548	Wet Weight of +3/4" Sample (g):	0.00	Tare No. (Sub-Specimen)	1548	Wet Weight of +3/4" Sample (g):	0.00
Wt. of Tare & Wet Sub-Specimen (g):	762.64	Dry Weight of + 3/4" Sample (g):	0.00	Wt. of Tare & Wet Sub-Specimen (g):	762.64	Dry Weight of + 3/4" Sample (g):	0.00
Weight of Tare (g):	144.56	Dry Weight of - 3/4" Sample (g):	533.05	Weight of Tare (g):	144.56	Dry Weight of - 3/4" Sample (g):	533.05
Sub-Specimen Wet Weight (g):	618.08	Dry Weight -3/4" +3/8" Sample (g):	1.43	Sub-Specimen Wet Weight (g):	618.08	Dry Weight -3/4" +3/8" Sample (g):	1.43
Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	531.62	Tare No. (-3/8" Sub-Specimen):	NA	Dry Weight of -3/8" Sample (g):	531.62
Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA	Wt. of Tare & Wet -3/8" Sub-Specimen (g):	NA	J - Factor (% Finer than 3/4"):	NA
Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA	Weight of Tare (g):	NA	J - Factor (% Finer than 3/8"):	NA
Sub-Specimen -3/8" Wet Weight (g):	NA			Sub-Specimen -3/8" Wet Weight (g):	NA		

Sieve Size	Sieve Opening (mm)	Weight of Soil Retained (g)	Percent Retained (%)	Accumulated Percent Retained (%)	Percent Finer (%)	Accumulated Percent Finer (%)
12"	300	0.00	0.00	0.00	100.00	100
6"	150	0.00	0.00	0.00	100.00	100
3"	75	0.00	0.00	0.00	100.00	100
2"	50	0.00	(*)	0.00	100.00	100
1 1/2"	37.5	0.00	0.00	0.00	100.00	100
1"	25	0.00	0.00	0.00	100.00	100
3/4"	19	0.00	0.00	0.00	100.00	100
1/2"	12.5	0.00	(**)	0.00	100.00	100
3/8"	9.5	1.43	0.27	0.27	99.73	100
#4	4.75	6.75	1.27	1.53	98.47	98
#10	2	14.91	2.80	4.33	95.67	96
#20	0.85	11.80	(**)	6.55	93.45	93
#40	0.425	18.75	3.52	10.06	89.94	90
#60	0.25	47.90	8.99	19.05	80.95	81
#100	0.15	147.33	27.64	46.69	53.31	53
#140	0.106	83.98	15.75	62.44	37.56	38
#200	0.075	42.59	7.99	70.43	29.57	30
Pan	-	157.61	29.57	100.00	-	-

Notes : (*) The + 3/4" sieve analysis is based on the Total Dry Weight of the Sample
 (**) The - 3/4" and - 3/8" sieve analysis is based on the Weight of the Dry Specimen

Tested By	DF	Date	9/11/25	Checked By	EG	Date	9/12/25
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