Section M

Dredge Sediment Grain Size & Chemistry Data

Section M

Phase 2 Core Logs & Lab Data from Sampling on 12/10/2015

Phase 2 Sediment Sampling - 12/10/2015

Sediment Core Descriptions

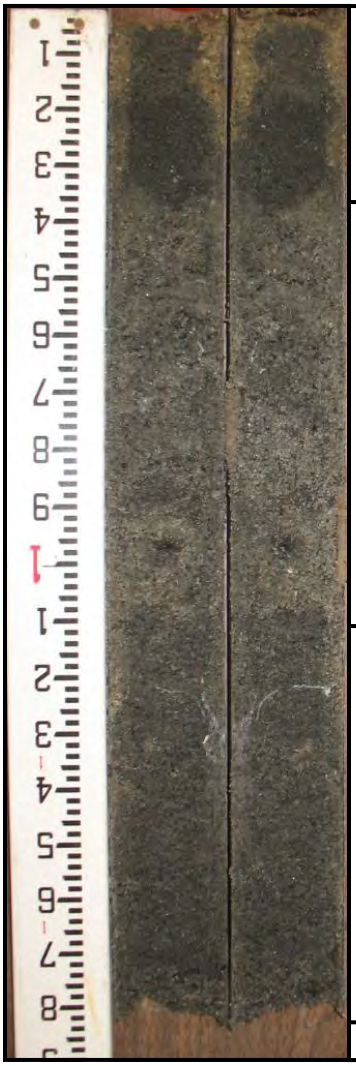
N-1

0.0-0.2’	Black sandy silt. Well sorted. **SAMPLE N-1(0-0.2)**
0.2-1.2’	Fine sand. Moderately-well to well-sorted. Color modeled brown to gray.
1.2-2.7’	**SAMPLE N-1 (0.2-2.3)** Medium to fine sand. Moderately well-sorted. Gray.
2.7-2.9’	Fine sand. Moderately to well sorted.

N-2

0.0-0.4’	Medium to fine sand. Silty clay clast. Slipper snail shell on surface. Variable color. Modeled brown to black.
0.4-0.86’	Fine sand. Occasional shell fragments. Well-sorted. Color is gray/light gray.
0.86-0.88’	Silt. Gray to dark gray. Crushed shell hash on top layer then silt.
0.88-1.08’	Fine to medium sand. Light brown to gray color. Moderately well sorted
1.08-1.16’	Sandy silt. Gray to dark gray. Well sorted.
1.16-2.78’	**SAMPLE N-2 (0-2.6)** Sand. Grain-size coarsens with depth. Medium grained with occasional pockets of coarser sand. Organic material at 2.32’. Crushed shell hash at 2.6-2.62’. Silt content at 2.06-2.22’. Light gray to gray color.

N-3



0.0-0.36’	Medium to fine sand. Moderately sorted. Dark gray to dark olive gray.
0.36-1.1’	Sand. Poorly sorted. Fine to coarse sand. Small percentage gravel. Small to coarse gravel size. Organic content includes charcoal, woody debris and shell hash. Color variable light brown to gray.
1.1-1.86’	SAMPLE N-3 (0-1.8) Medium to fine sand. Moderately sorted. Gray to dark gray.

N-4

0.0-1.2’	Sand. Poorly sorted. Medium grained matrix with gravel. Light brown color.
1.2-1.6’	Top predominately quartz. Slightly coarser grained. Minerology is different. High content of darker sand grains.
1.6-1.98’	SAMPLE N-4 (0-3.3) Gray to dark gray. Moderately well sorted.
1.98-2.2’	Well sorted. Fine sand. Very dark gray. Shell fragments. Occasional large gravel.
2.2-2.56’	Bimodal sand. Dark gray.
2.56-3.3’	Medium to coarse grained with gravel. Salt and pepper color. Predominately quartz. Medium to poorly sorted.

N-5

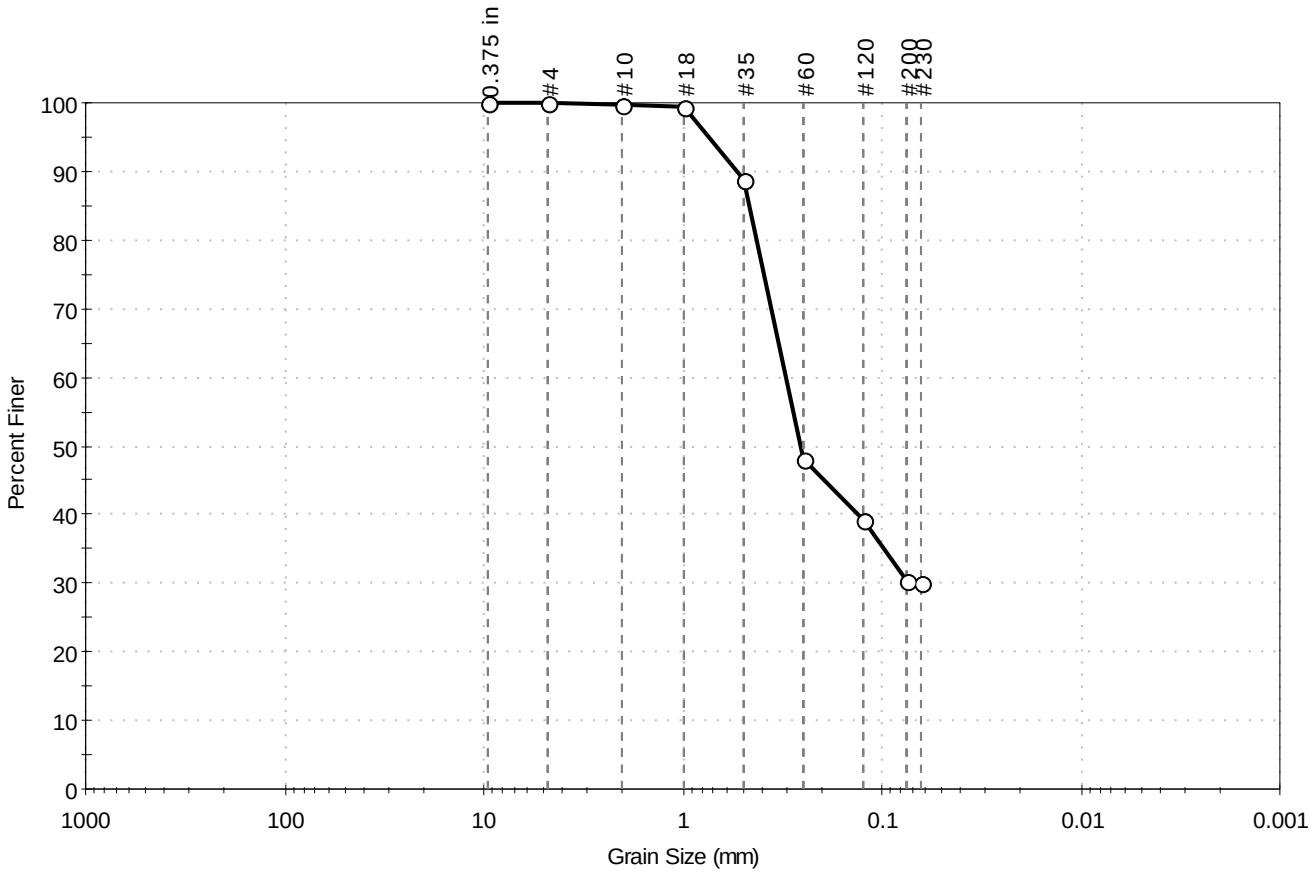
0.0-1.26’	Medium grained sand. Moderately sorted. Shell fragments. Low percentage gravel. Brown to light browns.
1.26-2.84’	Well sorted medium sand. Color variable light gray to dark gray. SAMPLE N-5 (0-4.5)
2.84-3.52’	Well sorted medium sand. Color variable light gray to dark gray.
3.52-4.56’	Moderately sorted. Medium grained sand matrix. Occasional gravel. Color gray to dark gray. SAMPLE N-5(4.5-4.8)
4.56-4.84’	Poorly sorted sand with low percentage silt and gravel. High percentage organic material with shell hash. Gravel > 1 cm well rounded. Black color.

N-6

0.0-0.2’	Fine to medium sand with gravel. Light brown.
0.2-0.9’	SAMPLE N-6 (0.2-0.6) Uniform texture. Fine sand and silt content. Bottom on transition zone on an angle. Sand content increases with depth. Dark olive gray to black.
0.9-1.3’	Moderate medium grained sand. Low percentage gravel fragments. Color light grayish to brown.
1.3-2.6’	SAMPLE N-6 (0.9-3.2) Fine to medium grained sand. Well rounded gravel. Gray to dark gray. Well sorted.
2.6-3.24’	Medium grained. Slightly coarser than above. Moderately sorted. Gray.

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-1	Test Date:	01/04/16	Checked By:	emm
Depth :	0-0.2 ft	Test Id:	359153		
Test Comment:	---				
Visual Description:	Moist, olive silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.1	69.5	30.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#18	1.00	99		
#35	0.50	89		
#60	0.25	48		
#120	0.12	39		
#200	0.075	30		
#230	0.063	30		

Coefficients

D_{85} = 0.4690 mm D_{30} = N/A

D_{60} = 0.3059 mm D_{15} = N/A

D_{50} = 0.2579 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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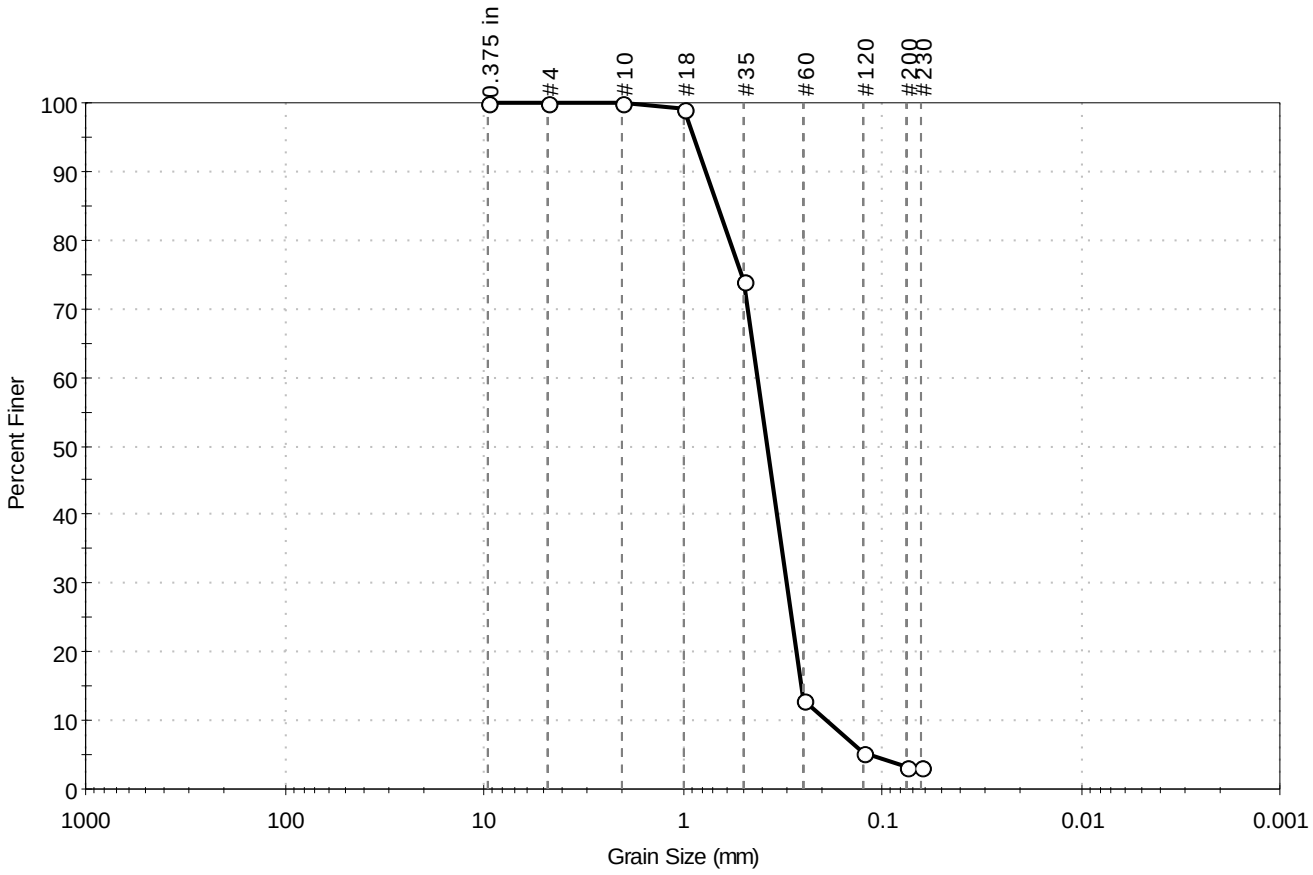
Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-1	Test Date:	01/04/16	Checked By:	emm
Depth :	0.2-2.3 ft	Test Id:	359154		
Test Comment:	---				
Visual Description:	Moist, gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	96.8	3.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#18	1.00	99		
#35	0.50	74		
#60	0.25	13		
#120	0.12	5		
#200	0.075	3.2		
#230	0.063	3		

Coefficients

D_{85} = 0.6765 mm	D_{30} = 0.3031 mm
D_{60} = 0.4262 mm	D_{15} = 0.2556 mm
D_{50} = 0.3804 mm	D_{10} = 0.1901 mm
C_u = 2.242	C_c = 1.134

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

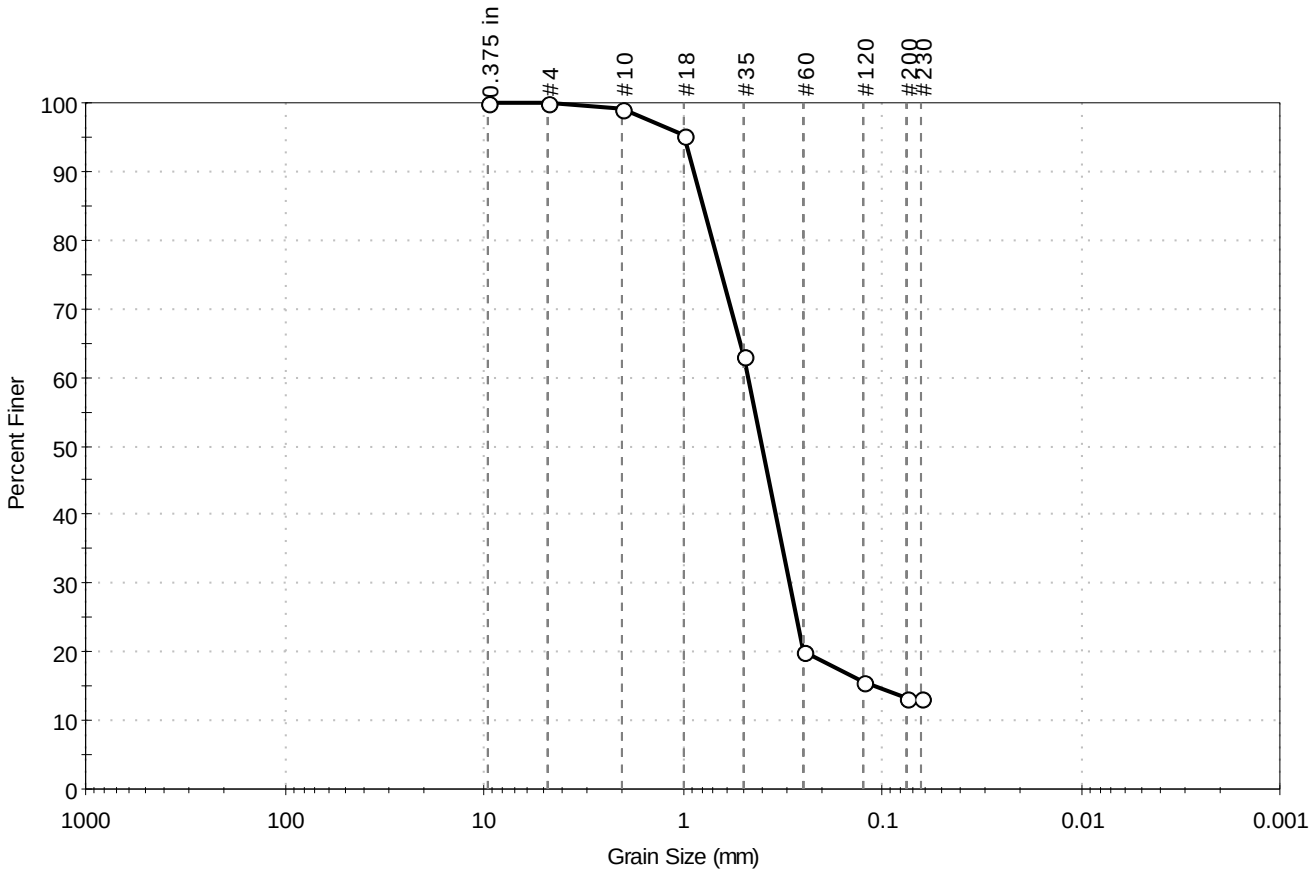
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-2	Test Date:	12/31/15	Checked By:	emm
Depth :	0-2.6 ft	Test Id:	359155		
Test Comment:	---				
Visual Description:	Moist, olive silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	86.7	13.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#18	1.00	95		
#35	0.50	63		
#60	0.25	20		
#120	0.12	16		
#200	0.075	13		
#230	0.063	13		

Coefficients

D_{85} = 0.8010 mm
D_{30} = 0.2935 mm
D_{60} = 0.4765 mm
D_{15} = 0.1095 mm
D_{50} = 0.4054 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

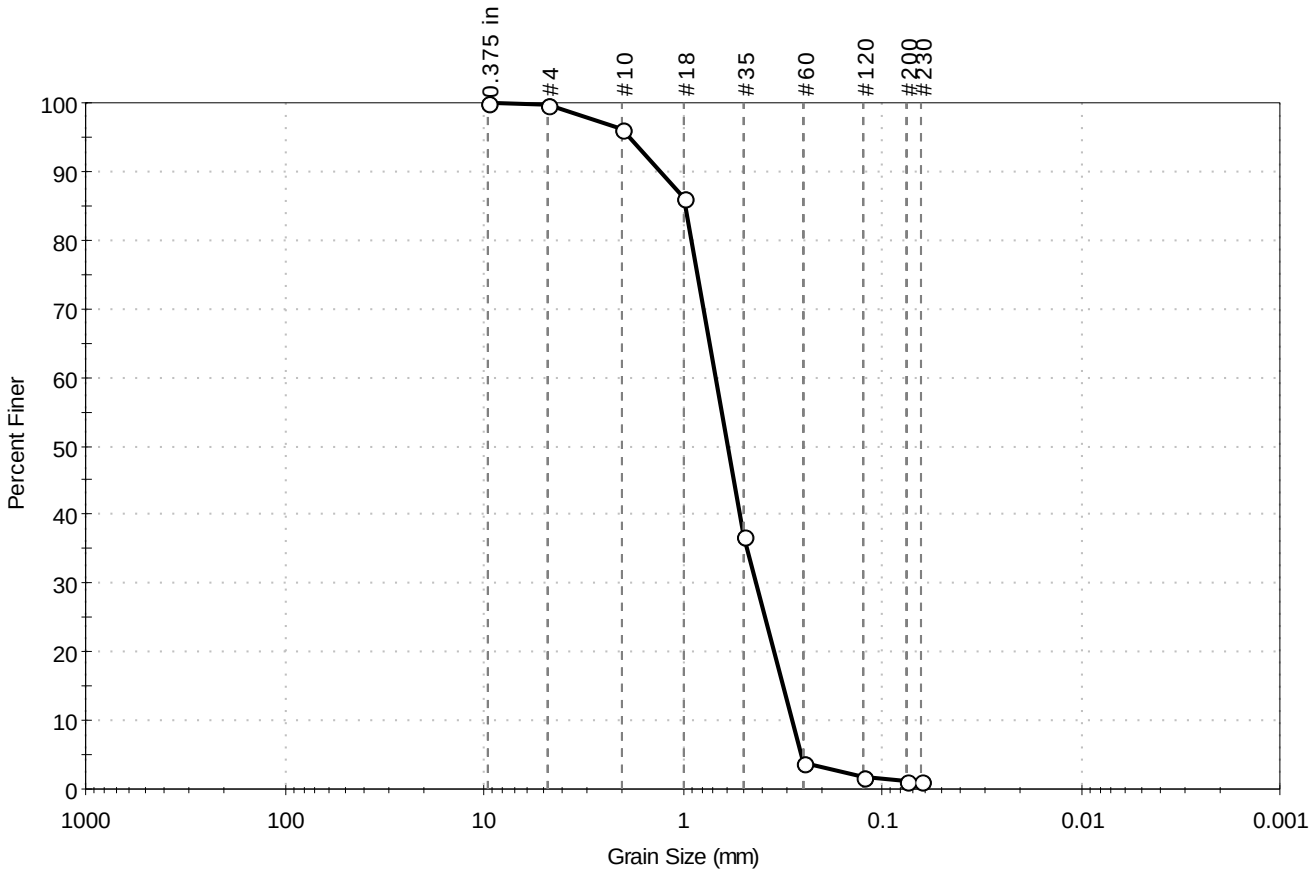
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-3	Test Date:	12/31/15	Checked By:	emm
Depth :	0-1.8 ft	Test Id:	359156		
Test Comment:	---				
Visual Description:	Moist, pale brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.4	98.3	1.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	96		
#18	1.00	86		
#35	0.50	37		
#60	0.25	4		
#120	0.12	2		
#200	0.075	1.3		
#230	0.063	1		

Coefficients

D_{85} = 0.9840 mm D_{30} = 0.4324 mm

D_{60} = 0.6918 mm D_{15} = 0.3163 mm

D_{50} = 0.6009 mm D_{10} = 0.2850 mm

C_u = 2.427 C_c = 0.948

Classification

ASTM Poorly graded sand (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

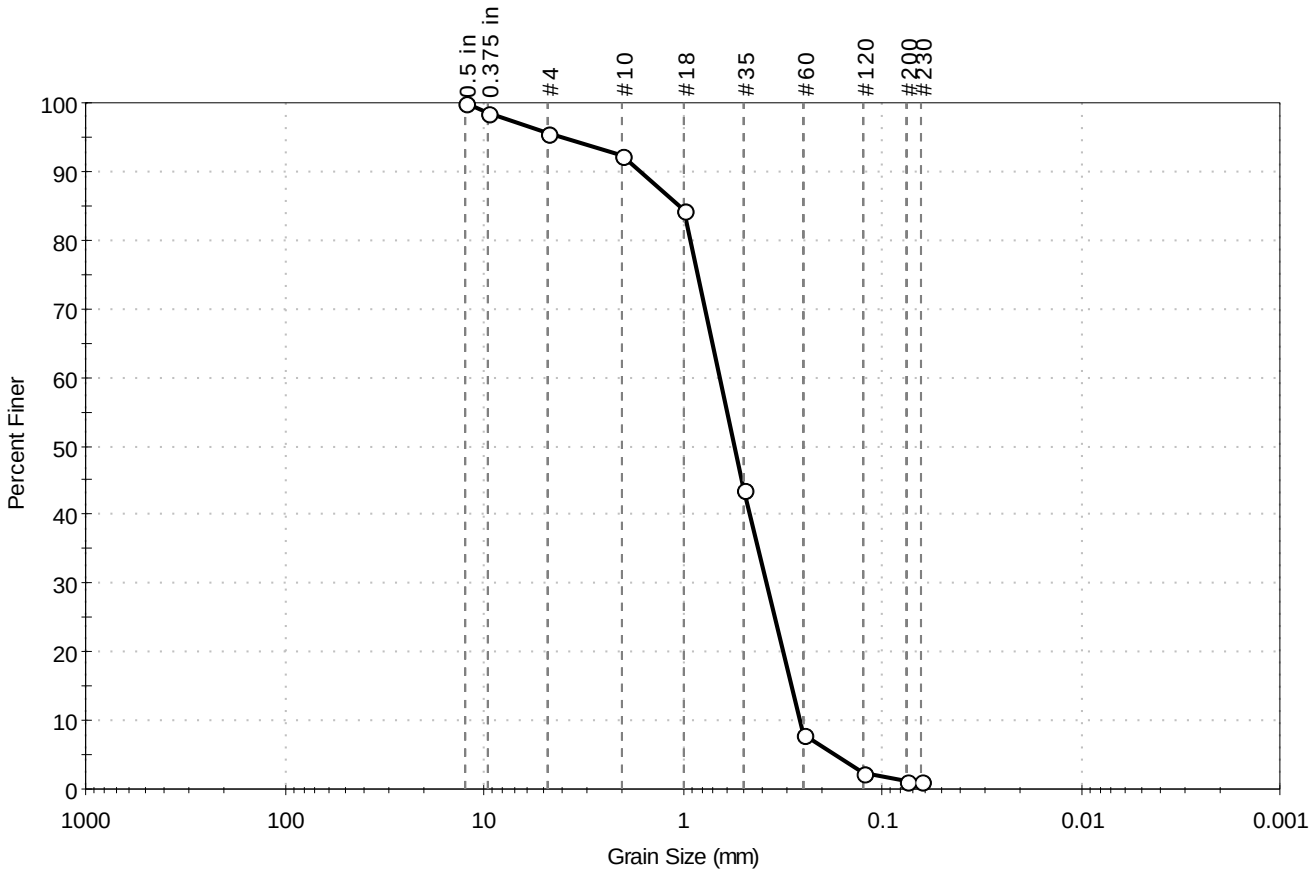
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-4	Test Date:	01/04/16	Checked By:	emm
Depth :	0-3.3 ft	Test Id:	359157		
Test Comment:	---				
Visual Description:	Moist, pale brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	4.5	94.2	1.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	99		
#4	4.75	95		
#10	2.00	92		
#18	1.00	84		
#35	0.50	44		
#60	0.25	8		
#120	0.12	2		
#200	0.075	1.3		
#230	0.063	1		

Coefficients

D_{85} = 1.0677 mm	D_{30} = 0.3837 mm
D_{60} = 0.6607 mm	D_{15} = 0.2872 mm
D_{50} = 0.5568 mm	D_{10} = 0.2607 mm
C_u = 2.534	C_c = 0.855

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

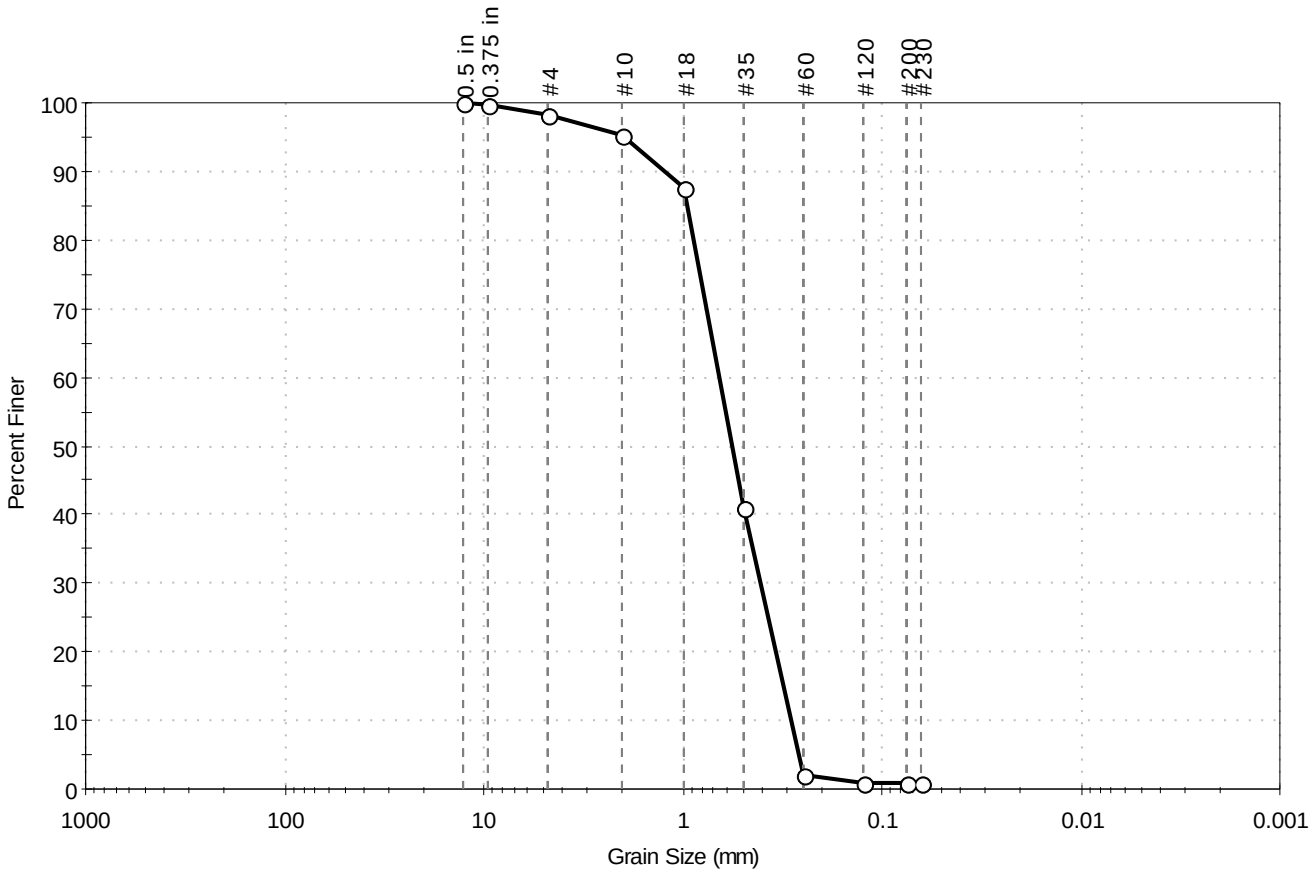
Sample / Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-5	Test Date:	12/31/15	Checked By:	emm
Depth :	0-4.5 ft	Test Id:	359158		
Test Comment:	---				
Visual Description:	Moist, pale brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	1.9	97.3	0.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.70	100		
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	95		
#18	1.00	88		
#35	0.50	41		
#60	0.25	2		
#120	0.12	1		
#200	0.075	0.8		
#230	0.063	1		

Coefficients

D_{85} = 0.9623 mm	D_{30} = 0.4121 mm
D_{60} = 0.6642 mm	D_{15} = 0.3155 mm
D_{50} = 0.5726 mm	D_{10} = 0.2886 mm
C_u = 2.301	C_c = 0.886

Classification

ASTM — Poorly graded sand (SP)

AASHTO — Stone Fragments, Gravel and Sand (A-1-b (1))

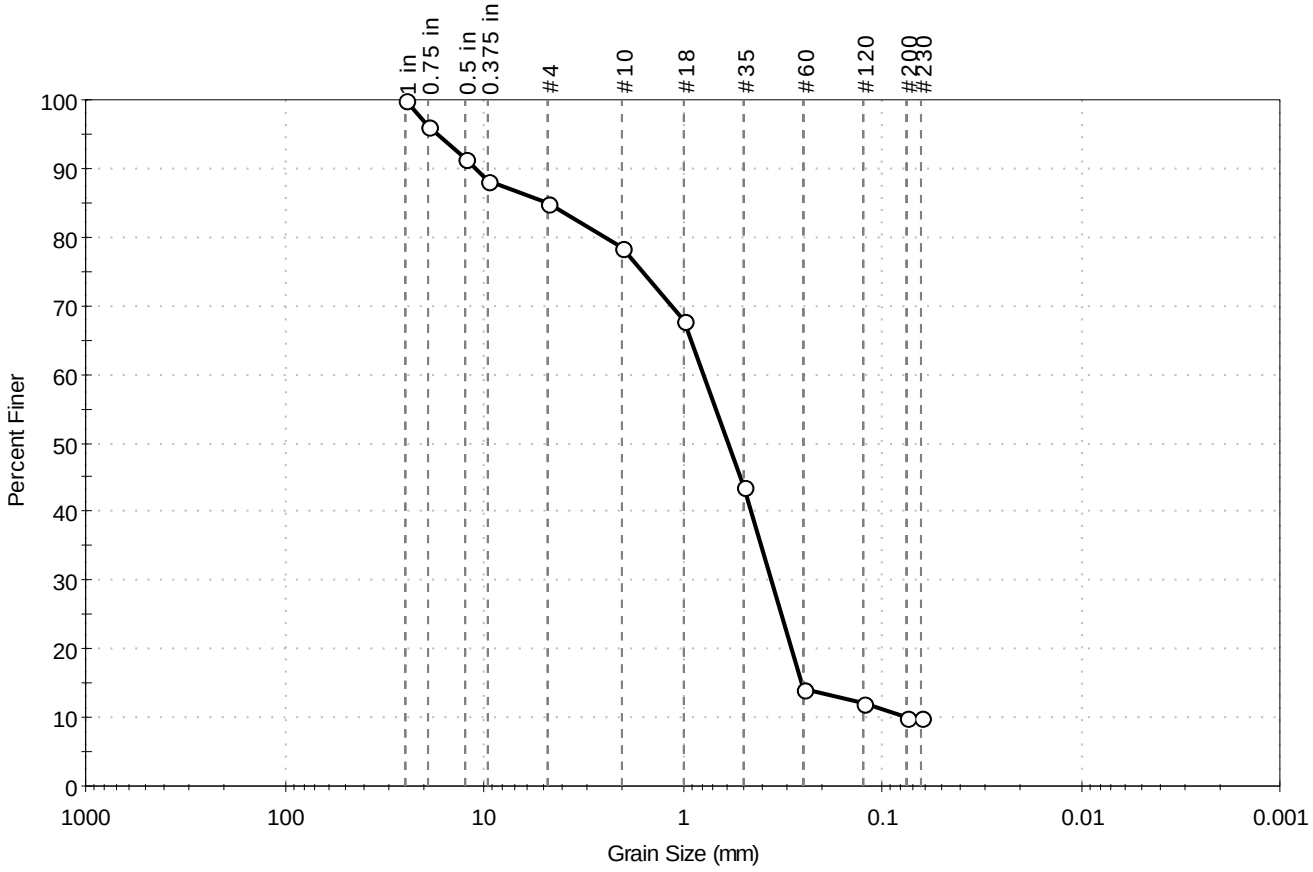
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-5	Test Date:	01/04/16	Checked By:	emm
Depth :	4.56-4.84 ft	Test Id:	359159		
Test Comment:	---				
Visual Description:	Moist, brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	15.0	74.9	10.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	96		
0.5 in	12.50	91		
0.375 in	9.50	88		
#4	4.75	85		
#10	2.00	78		
#18	1.00	68		
#35	0.50	44		
#60	0.25	14		
#120	0.12	12		
#200	0.075	10		
#230	0.063	10		

Coefficients

D_{85} = 4.7159 mm
D_{30} = 0.3619 mm
D_{60} = 0.7966 mm
D_{15} = 0.2543 mm
D_{50} = 0.5982 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

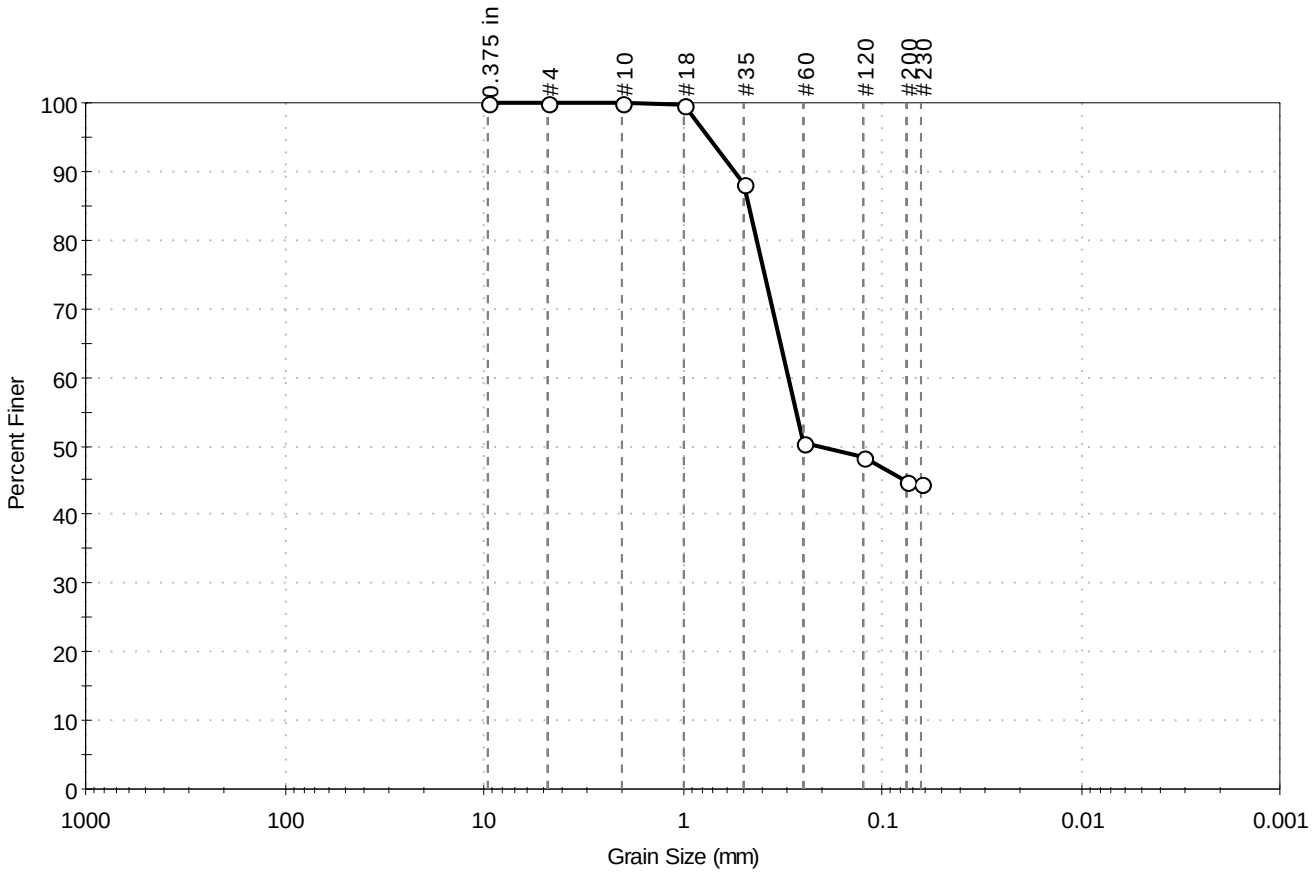
Sample / Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-6	Test Date:	01/04/16	Checked By:	emm
Depth :	0.2-0.6 ft	Test Id:	359161		
Test Comment:	---				
Visual Description:	Moist, olive silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	55.3	44.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#18	1.00	100		
#35	0.50	88		
#60	0.25	51		
#120	0.12	48		
#200	0.075	45		
#230	0.063	44		

Coefficients

D_{85} = 0.4722 mm D_{30} = N/A

D_{60} = 0.2978 mm D_{15} = N/A

D_{50} = 0.2097 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

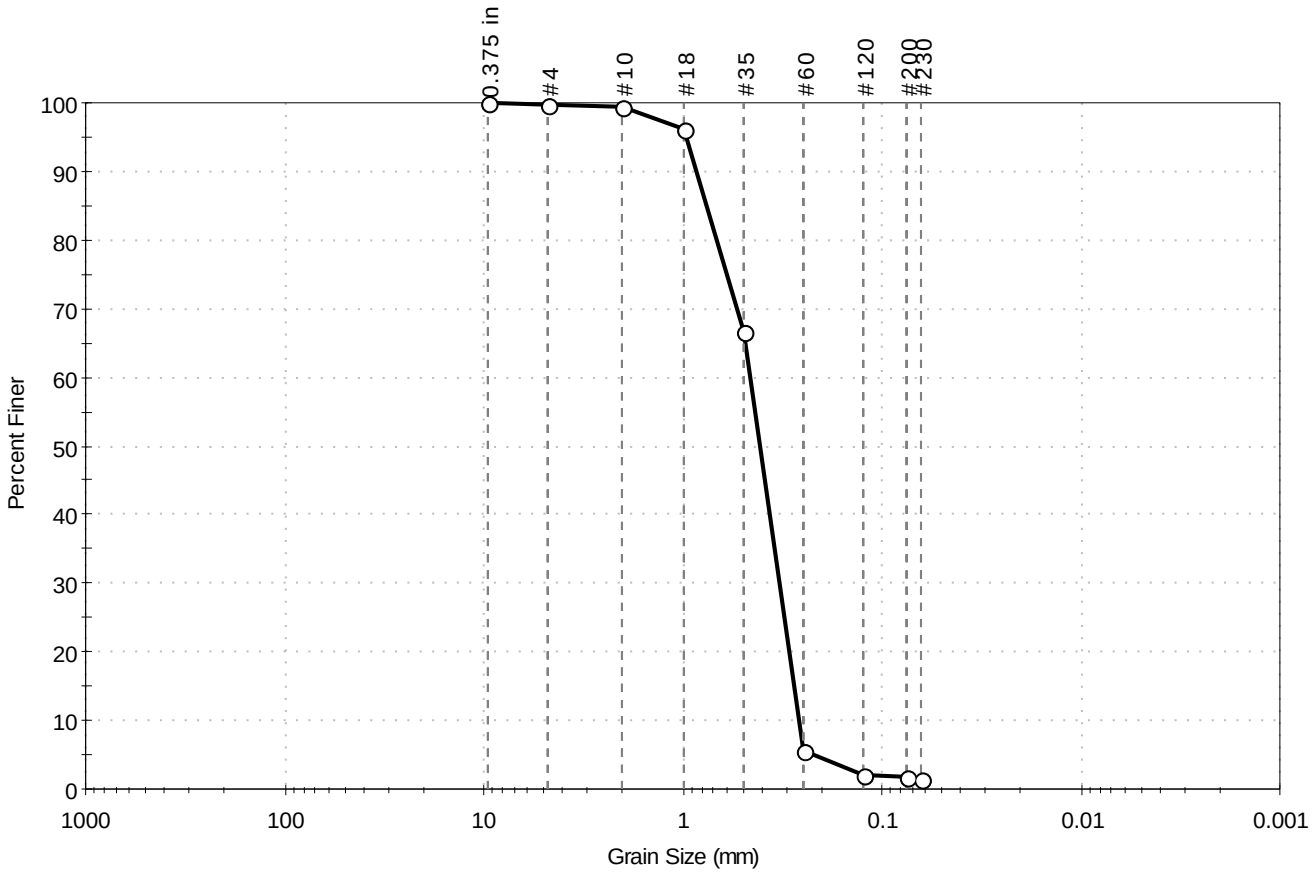
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-6	Test Date:	01/04/16	Checked By:	emm
Depth :	0.9-3.24 ft	Test Id:	359160		
Test Comment:	---				
Visual Description:	Moist, gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.2	98.2	1.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#18	1.00	96		
#35	0.50	67		
#60	0.25	6		
#120	0.12	2		
#200	0.075	1.6		
#230	0.063	2		

Coefficients

D_{85} = 0.7699 mm	D_{30} = 0.3297 mm
D_{60} = 0.4637 mm	D_{15} = 0.2780 mm
D_{50} = 0.4139 mm	D_{10} = 0.2627 mm
C_u = 1.765	C_c = 0.892

Classification

ASTM Poorly graded sand (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

GeoTesting EXPRESS

SOIL CHAIN OF CUSTODY & TEST REQUEST

CLIENT		INVOICE (complete if different from Client)	
Company: Woods Hole Group		Company:	
Address: 81 Technology Park Drive		Address:	
City, State, Zip: East Falmouth, MA 02536		City, State, Zip:	
Contact: Kyle Olejniczak	Phone: 5084956272	Contact:	Phone:
E-mail: kolejniczak@whgrp.com	Cell: 2673775490	E-mail:	Cell:

PROJECT		
Project Name: Orleans Nauset Estuary	Client Project #:	Purchase Order#:
Project Location: Nauset Inlet, MA	GTX Sales Order #:	Requested Turnaround: Normal (5-10) days
On-site Contact: Kyle Olejniczak	E-mail: kolejniczak@whgrp.com	Phone: 5084956272

GeoTesting Express, Inc.
125 Nagog Park
Acton, MA 01720
800 434 1062 Toll Free
978 635 0266 Fax

2358 Perimeter Park Drive, Suite 320
Atlanta, GA 30341
770 645 6575 Tel
770 645 6570 Fax

www.geotesting.com

SOIL			Atterberg Limits (ASTM D 4318)	USCS – Classification (ASTM D 2487)	Grain Size: ASTM D 422 ☑ Sieve Only ☑ Sieve & Hydrometer ☐	Density: ASTM D 2937 ☐ ASTM D 7263 ☐	Moisture Content (ASTM D 2216)	Organic Content (ASTM D 2974)	pH (ASTM D 4972)	Specific Gravity (ASTM D 854)	Electrical Resistivity (ASTM G 57)	Proctor Compaction: Standard – ASTM D 698 ☐ Modified – ASTM D 1557 ☐	California Bearing Ratio * (ASTM D 1883)	Direct Shear* (ASTM D 3080)	Triaxial Shear* : UU – ASTM D 2850 ☐ CU – ASTM D 4767 ☐ CD – ASTM D7181 ☐	Incremental Consolidation* (ASTM D 2435)	Permeability/ Hydraulic Conductivity* : Fixed Wall – ASTM D 2434 ☐ Flexible Wall – ASTM D 5084 ☐	Unconfined Compression (ASTM D 2166)	Other:_____	Other:_____
Boring ID	Sample ID	Depth																			
	2015-0121; N-1; 0-0.2'																				
	2015-0121; N-1; 0.2-2.3'																				
	2015-0121; N-2; 0-2.6'																				
	2015-0121; N-3; 0-1.8'																				
	2015-0121; N-4; 0-3.3'																				
	2015-0121; N-5; 0-4.5'																				
	2015-0121; N-5; 4.56-4.84'																				
	2015-0121; N-6; 0.9-3.24'																				
	2015-0121; N-6; 0.2-0.6'																				

*Specify Test Conditions (Undisturbed or Remolded, Density and moisture, Test Normal Loads, Test Confining Stresses, etc.):

Need sieve measurements at sieve name: 0.375 in, #4, #10, #18, #35, #60, #120 and #230. Also need a digital copy sent.

AUTHORIZE BY SIGNING AND DATING:

SIGNATURE: Kyle Olejniczak PRINT NAME: Kyle Olejniczak DATE: 12/16/15

For GTX Use Only
Incoming Sample Inspection Performed ☐
Adverse conditions:

Relinquished By:	DATE:	Received By:	DATE:
	TIME:		TIME:
Relinquished By:	DATE:	Received By:	DATE:
	TIME:		TIME:

Section M

Request for Approval of SAP to ACOE & DEP - 6/7/2017

Woods Hole Group 81 Technology Park Drive E. Falmouth, MA 02536 USA TELEPHONE: 508.540.8080 FAX: 508.540.1001 www.woodsholegroup.com

June 7, 2017 Job No. 2015-0121

Barbara Newman, Chief
US ACOE – Regulatory Department
696 Virginia Road
Concord, MA 01742-2751

&

Ken Chin
Mass. DEP/Waterways Program
One Winter Street
Boston, MA 02108

Re: **Town of Orleans – Sediment Sampling & Analysis Plan for Review & Approval**
Proposed Nauset Estuary Dredging & Beneficial Re-Use of Dredged Material
Town of Orleans, Proponent
Orleans and Eastham, MA

Dear Ms. Newman & Mr. Chin:

On behalf of our client, the Town of Orleans, we are submitting the attached Sediment Sampling and Analysis Plan for your review and approval regarding the above referenced project. The following items are included in the plan:

- Project Narrative for Proposed Sediment Sampling and Analysis Plan
- Grain Size Data for Previously Sampled Cores from the Dredge Area (Appendix A)
- Grain Size Data for Potential Beach/Dune Restoration Locations (Appendix B)

We are interested in receiving your comments on the additional sampling/analyses so that supplemental field investigations can be planned for this summer. If you have any questions or require additional information, please give me a call at 508-495-6225. Thank you.

Sincerely,

Leslie Fields

Leslie Fields
Coastal Geologist/Project Manager

MLF/beg

Enclosures: as stated

cc: John Kelly, Orleans Town Administrator
Tom Daley, Orleans Director of Public Works & Natural Resources
Nate Sears, Orleans Natural Resources Manager

Nauset Estuary Dredging Project Narrative
for Proposed Sediment Sampling and Analysis Plan

On behalf of our client, the Town of Orleans, the Woods Hole Group would like to request the USACE-NAE and MA DEP Waterways provide a review of the proposed Sediment Sampling and Analysis Plan for a project that involves dredging in Nauset Estuary with beneficial reuse for enhanced resiliency on nearby dunes and beaches. The Town of Orleans performed a feasibility study in 2015 to determine if dredging a navigation channel in Nauset Estuary would benefit the Town's commercial and recreational interests without ecological detriment. The channel design evaluated during the feasibility study is shown in Figure 1.

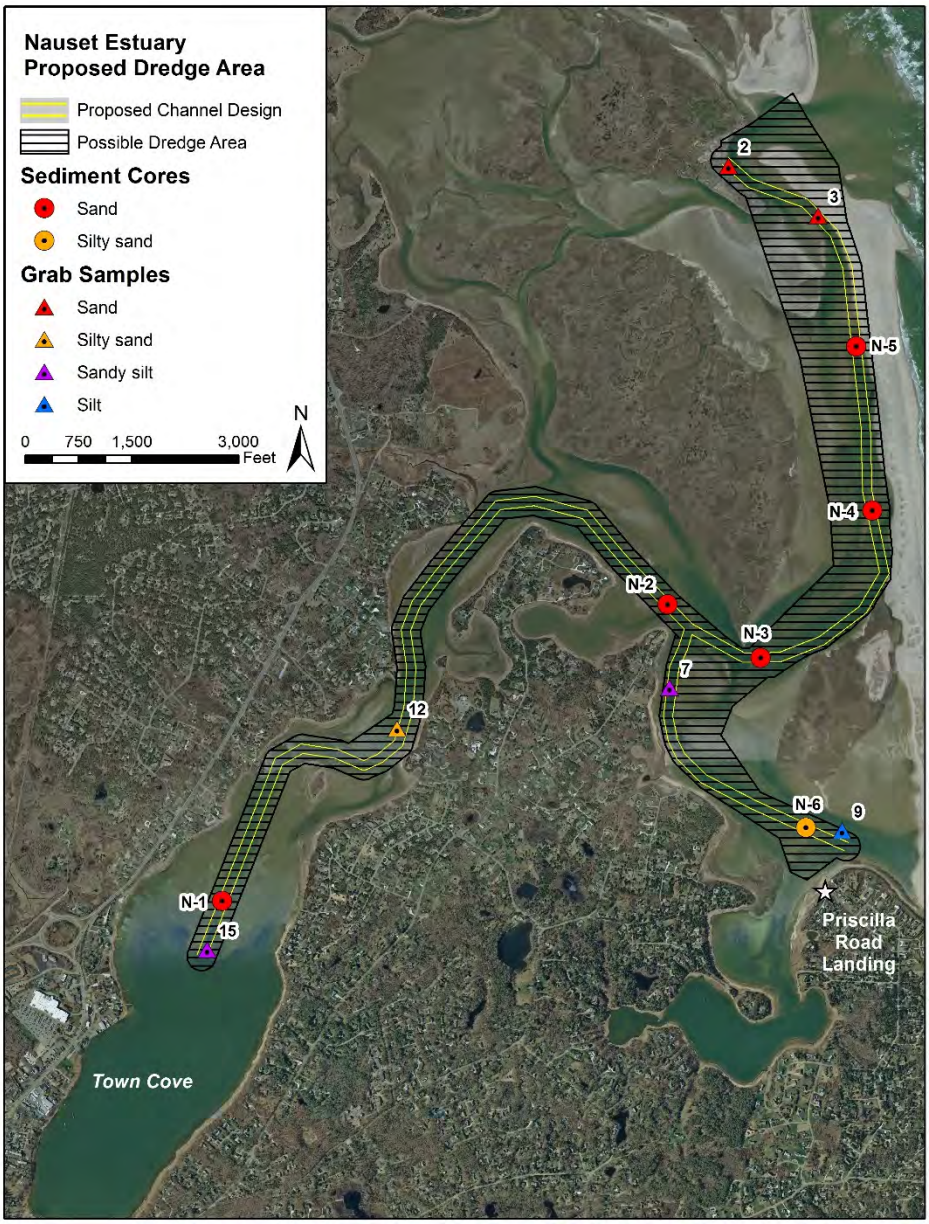


Figure 1. Map of proposed dredge area and channel design at Nauset Estuary. Location and results of previous sediment analyses are indicated.

To accommodate local boating needs the channel was designed to be 100 feet wide at the base, with 1V:3H side slopes, and a dredge depth of -5 ft MLLW. The main stem of the channel would extend just over 4 miles from Nauset Inlet to Town Cove. A secondary channel, approximately 4,500 feet long would extend south from the main channel towards Robert's Cove, to provide access to Tonset Road, Snow Shore Road and Priscilla Road Landings. Given the bathymetry surveyed in 2015 (Figure 2), an estimated volume of 80,600 cubic yards of material would need to be dredged to create the channel design.

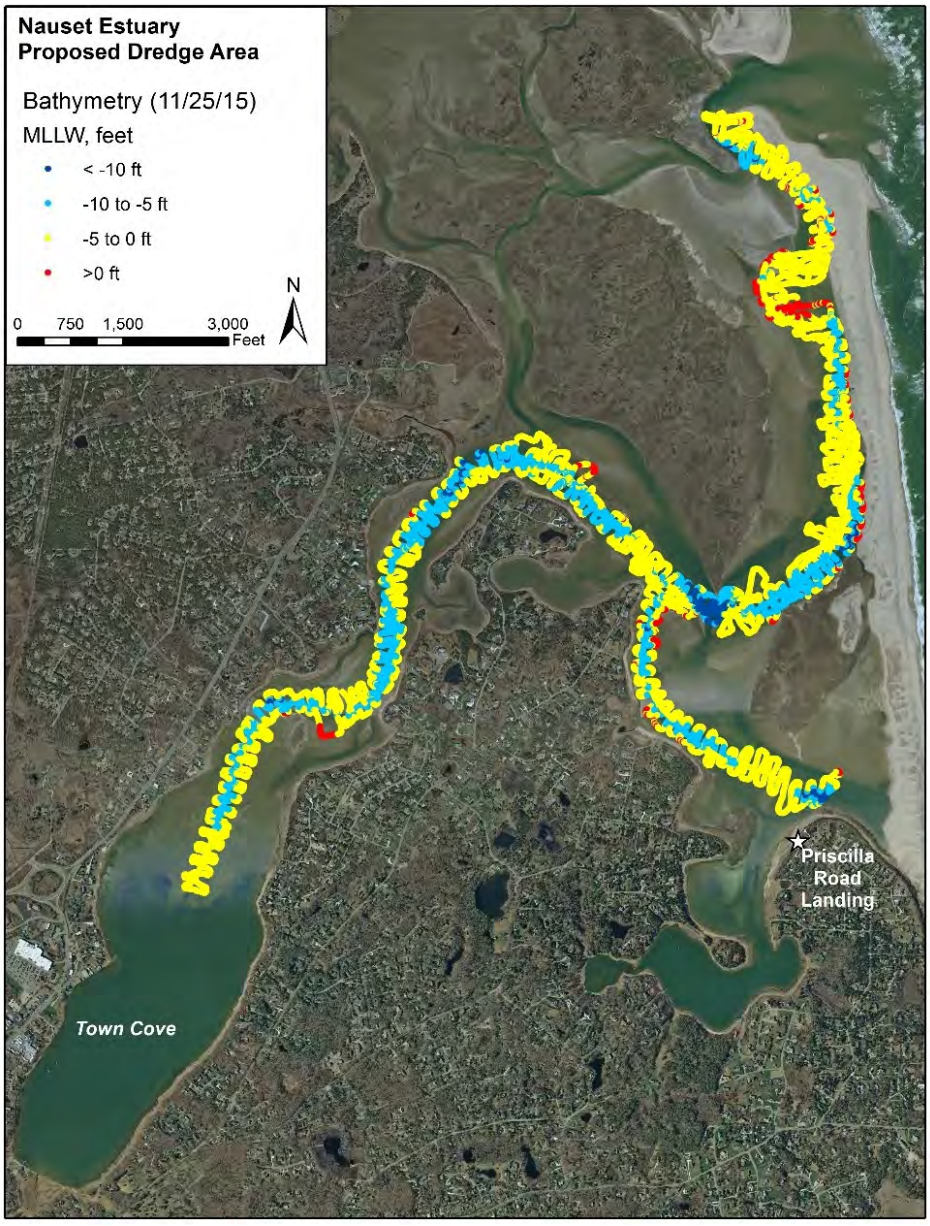


Figure 2. Channel bathymetry collected in 2015 for the feasibility study.

Due to the dynamic nature of the estuary, an adaptive management approach is being proposed that would permit a larger dredge zone, rather than a specific channel. This zone is wider than the specific channel layout, and allows flexibility in the future for choosing the optimum dredge

route along the deepest part of the natural channel to minimize the volume of dredge material. The dredge zone is shown as the black hatched area in Figure1.

During the feasibility study six (6) grab samples and six (6) vibracores were collected in the proposed dredge channel to ascertain the sediment characteristics of the site. The locations of these samples are shown in Figure 1. Initially, six grab samples were collected with a Van Veen sampler and the material was described qualitatively by a trained geologist. Based on these grab sample observations and the bathymetric survey data, vibracores were then collected at key locations throughout the project area. The vibracores were described and sub-samples were analyzed for grain-size using the ATSM D422 methodology. Sample information and qualitative data on sediment characteristics for the grab samples and vibracores is provided in Table 1. Laboratory data for grain size distributions from the vibracores is provided in Appendix A. Bulk chemistry analyses were not performed due to the low percentages of fines observed in the grab and vibracore samples.

Table 1. Previous sediment samples taken from the dredge area. Grain size analyses of subsamples of sediment cores and core logs are attached as Appendix A.

Sample ID	Sample Type	X (MA State Plane Ft)	Y (MA State Plane Ft)	Qualitative Sediment Determination
2	Grab Sample	1078908.4	2766180.0	sand
3	Grab Sample	1080170.6	2765480.2	sand
9	Grab Sample	1080509.8	2756848.7	silt
7	Grab Sample	1078082.7	2758857.7	sandy silt
12	Grab Sample	1074248.3	2758284.2	silty sand
15	Grab Sample	1071577.0	2755175.0	sandy silt
N-1	Core	1071787.4	2755865.1	sand
N-2	Core	1078052.3	2760029.5	sand
N-3	Core	1079361.2	2759275.7	sand
N-4	Core	1080932.2	2761345.3	sand
N-5	Core	1080708.3	2763649.5	sand
N-6	Core	1079999.9	2756894.1	silty sand

Results of these analyses indicate that sediments within the main channel are mostly sand and silty sand. Grab samples taken most proximally to Town Cove and Priscilla Road Landing contained slightly finer material, being described as silty sand or silt (Samples 15 and 9 respectively). Laboratory analyses of the cores taken closest to these grab samples (Cores N-1 and N-6) showed a thin surface layer (0.2 to 0.6 ft thick) containing in excess of 30% fines, underlain by 3.0 ft of medium to fine grained sand.

Based on results from the previous sampling, a total of sixteen (16) additional cores (Cores NE-1 through NE-16) are proposed at key locations throughout the proposed dredge zone. The additional data will help to develop a more comprehensive characterization of sediments expected for dredging. The proposed core locations are summarized in Table 2 and illustrated in Figure 3.

The sampling locations were chosen to best represent the dredge zone, with special attention paid both, to areas where finer grained sediments might be present (in Town Cove, Near Pricilla Road Landing, and on the western side of the northern section of the channel near the inlet), as well as in areas where the bathymetry indicates that significant dredging will be needed to alleviate shoaling. The cores will be collected down to an elevation of -6.0 ft MLLW and will be collected using a vibracore or push core system. The cores will be split, photographed, and described by a trained sedimentologist. Sub-samples will be collected from the cores to capture changes in sediment stratification. Areas of homogeneity within adjacent cores will be composited into a single sample. All samples will be sent to the laboratory for grain size analysis.

Table 2. Summary of Proposed Cores within Nauset Estuary.

Core ID	X (MA State Plane Ft)	Y (MA State Plane Ft)	Estimated Bottom Elevation (MLLW ft)	Estimated Core Penetration* (ft)
NE-1	1071686.7	2755469.6	-4.5	1.5
NE-2	1072398.2	2757145.2	-3.5	2.5
NE-3	1073867.3	2758132.2	-2.4	3.6
NE-4	1074556.6	2759630.7	-2.9	3.1
NE-5	1075657.7	2761231.0	-4.5	1.5
NE-6	1077269.8	2761192.8	-0.1	5.9
NE-7	1078549.9	2759417.7	-2.3	3.7
NE-8	1078618.8	2758683.1	N/A	TBD
NE-9	1078321.6	2758107.1	-1.4	4.6
NE-10	1075657.7	2761231.0	-4.4	1.6
NE-11	1079514.0	2757053.4	-3.3	2.7
NE-12	1080110.8	2756525.4	-2	4
NE-13	1080592.8	2760404.7	-1.8	4.2
NE-14	1080271.5	2762401.7	N/A	TBD
NE-15	1080019.0	2763733.0	-0.7	5.3
NE-16	1079825.7	2764946.3	N/A	TBD

***** Actual core penetration depth will be determined in the field.

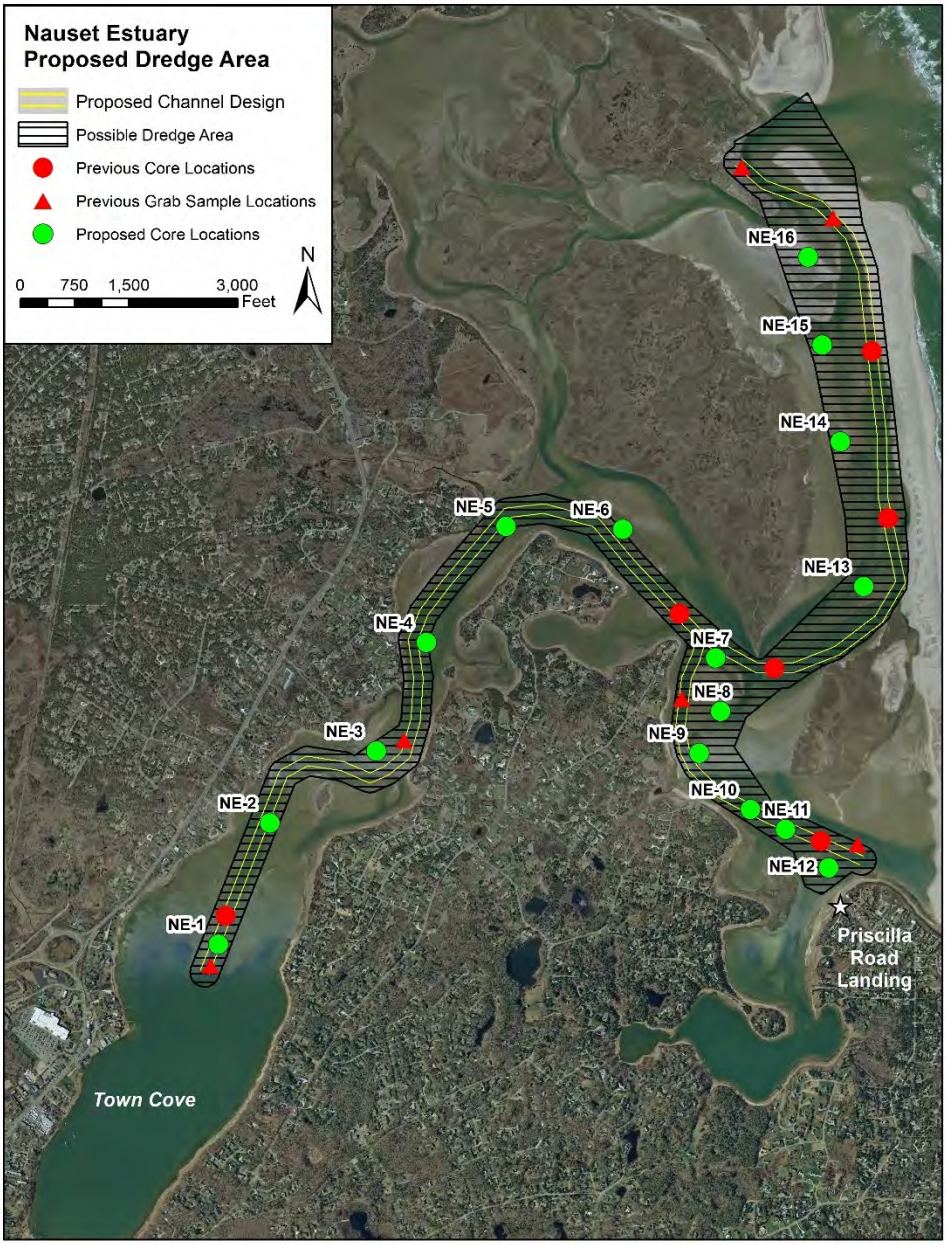


Figure 3. Map of proposed and previously collected sediment samples.

Potential beneficial re-use areas have been identified for the proposed dredged material, both at Skaket Beach and Nauset Beach in Orleans, MA (Figure 4). Sand dredged from the Nauset Estuary channel is planned for use at Nauset Beach as part of a dune enhancement project. The Town is implementing a plan of phased retreat from Nauset Beach and intends to use a portion of the dredged material for dune enhancement along the landward edge of the existing dune. At Skaket Beach, the dredged material is planned for use in on-going annual beach nourishment where the Town currently has permits to maintain the beach. Sediments at both Skaket Beach and on the back side of the dunes at Nauset Beach have been characterized previously. The locations and Sample ID's of the sediment samples taken as part of those characterization efforts are listed in Table 3, and the results of the grain size analyses are included in Appendix B. Based on the

available data, sediments planned for dredging from Nauset Estuary are compatible with both of the identified beneficial reuse sites. Grain size data from the additional coring collected as part of this plan will allow for further comparison.

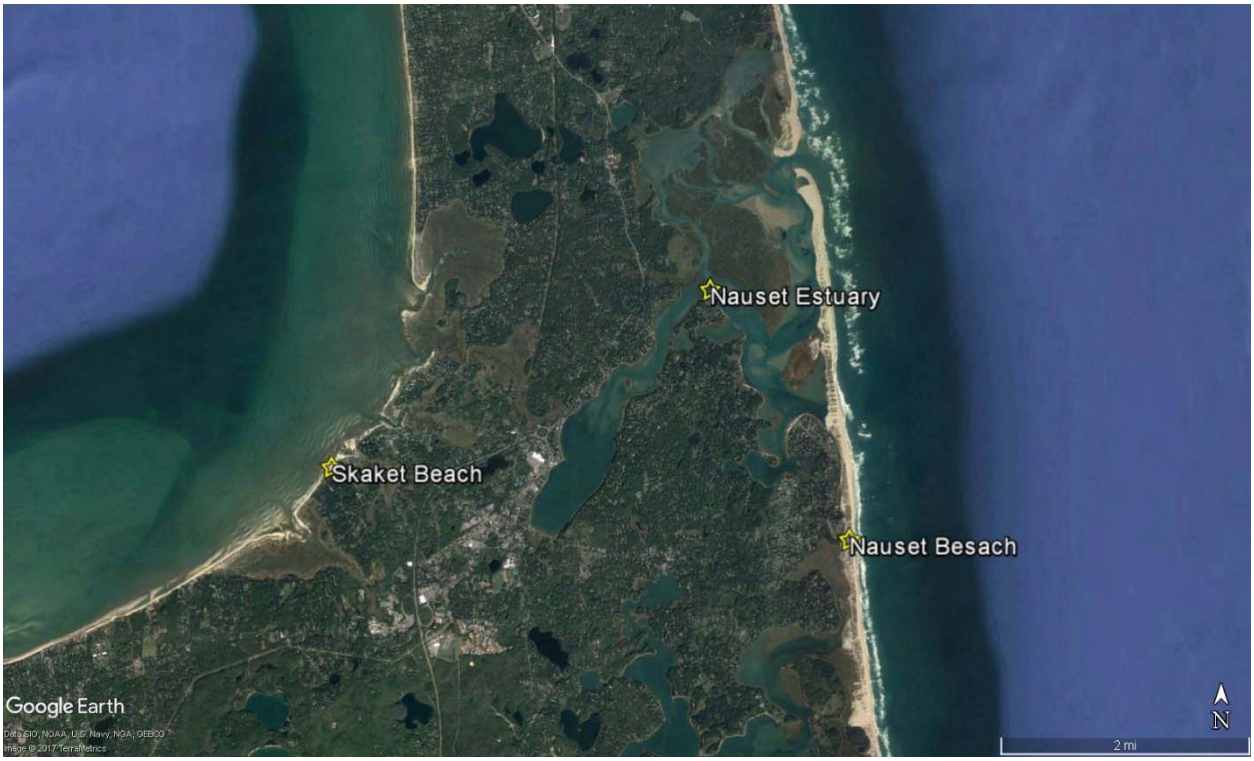


Figure 4. Aerial photo showing location of Nauset Estuary and the potential beneficial reuse sites at Nauset Beach and Skaket Beach.

Table 3. Skaket Beach and Nauset Beach Sample ID's and Locations.

Sample ID	Site	X (MA State Plane Ft)	Y (MA State Plane Ft)
Skaket 3	Skaket Beach	1060536.0	2753699.9
Skaket 2	Skaket Beach	1060651.0	2753899.2
NB 1	Nauset Beach	1082628.1	2751816.1
NB 4	Nauset Beach	1082629.4	2750810.5
NB 3	Nauset Beach	1082620.3	2751128.9
NB 2	Nauset Beach	1082630.0	2751548.7

Appendix A

Grain Size Data for Nauset Estuary Core Samples

Sediment Core Descriptions

N-1

0.0-0.2’	Black sandy silt. Well sorted.
0.2-1.2’	Fine sand. Moderately-well to well-sorted. Color modeled brown to gray.
1.2-2.7’	Medium to fine sand. Moderately well-sorted. Gray.
2.7-2.9’	Fine sand. Moderately to well sorted.

N-2

0.0-0.4’	Medium to fine sand. Silty clay clast. Slipper snail shell on surface. Variable color. Modeled brown to black.
0.4-0.86’	Fine sand. Occasional shell fragments. Well-sorted. Color is gray/light gray.
0.86-0.88’	Silt. Gray to dark gray. Crushed shell hash on top layer then silt.
0.88-1.08’	Fine to medium sand. Light brown to gray color. Moderately well sorted
1.08-1.16’	Sandy silt. Gray to dark gray. Well sorted.
1.16-2.78’	Sand. Grain-size coarsens with depth. Medium grained with occasional pockets of coarser sand. Organic material at 2.32’. Crushed shell hash at 2.6-2.62’. Silt content at 2.06-2.22’. Light gray to gray color.

N-3

	0.0-0.36’	Medium to fine sand. Moderately sorted. Dark gray to dark olive gray.
	0.36-1.1’	Sand. Poorly sorted. Fine to coarse sand. Small percentage gravel. Small to coarse gravel size. Organic content includes charcoal, woody debris and shell hash. Color variable light brown to gray.
	1.1-1.86’	Medium to fine sand. Moderately sorted. Gray to dark gray.

N-4

0.0-1.2’	Sand. Poorly sorted. Medium grained matrix with gravel. Light brown color.
1.2-1.6’	Top predominately quartz. Slightly coarser grained. Minerology is different. High content of darker sand grains.
1.6-1.98’	Gray to dark gray. Moderately well sorted.
1.98-2.2’	Well sorted. Fine sand. Very dark gray. Shell fragments. Occasional large gravel.
2.2-2.56’	Bimodal sand. Dark gray.
2.56-3.3’	Medium to coarse grained with gravel. Salt and pepper color. Predominately quartz. Medium to poorly sorted.

N-5

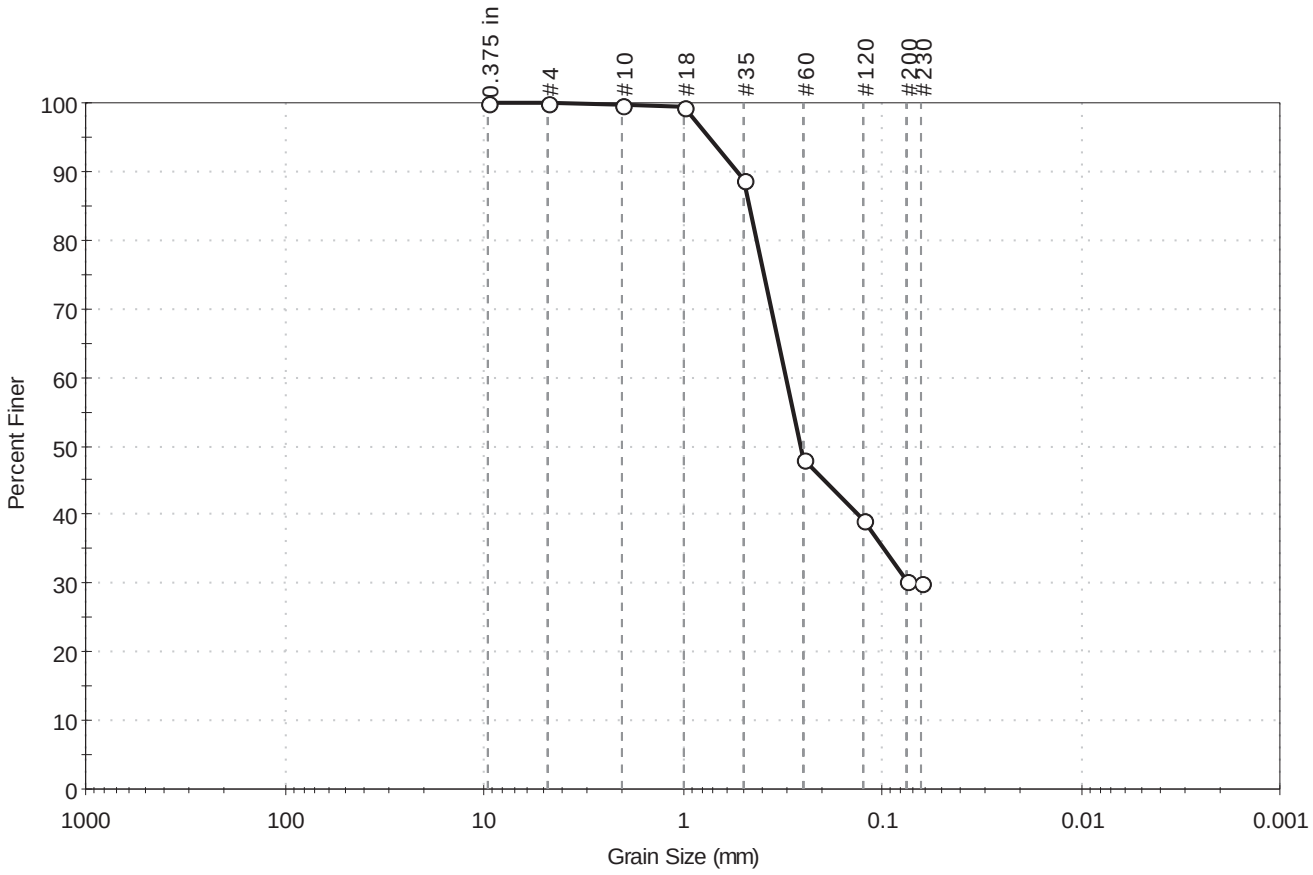
0.0-1.26’	Medium grained sand. Moderately sorted. Shell fragments. Low percentage gravel. Brown to light browns.
1.26-2.84’	Well sorted medium sand. Color variable light gray to dark gray.
2.84-3.52’	Well sorted medium sand. Color variable light gray to dark gray.
3.52-4.56’	Moderately sorted. Medium grained sand matrix. Occasional gravel. Color gray to dark gray.
4.56-4.84’	Poorly sorted sand with low percentage silt and gravel. High percentage organic material with shell hash. Gravel > 1 cm well rounded. Black color.

N-6

0.0-0.2’	Fine to medium sand with gravel. Light brown.
0.2-0.9’	Uniform texture. Fine sand and silt content. Bottom on transition zone on an angle. Sand content increases with depth. Dark olive gray to black.
0.9-1.3’	Moderate medium grained sand. Low percentage gravel fragments. Color light grayish to brown.
1.3-2.6’	Fine to medium grained sand. Well rounded gravel. Gray to dark gray. Well sorted.
2.6-3.24’	Medium grained. Slightly coarser than above. Moderately sorted. Gray.

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-1	Test Date:	01/04/16	Checked By:	emm
Depth :	0-0.2 ft	Test Id:	359153		
Test Comment:	---				
Visual Description:	Moist, olive silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.1	69.5	30.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#18	1.00	99		
#35	0.50	89		
#60	0.25	48		
#120	0.12	39		
#200	0.075	30		
#230	0.063	30		

Coefficients

D_{85} = 0.4690 mm D_{30} = N/A

D_{60} = 0.3059 mm D_{15} = N/A

D_{50} = 0.2579 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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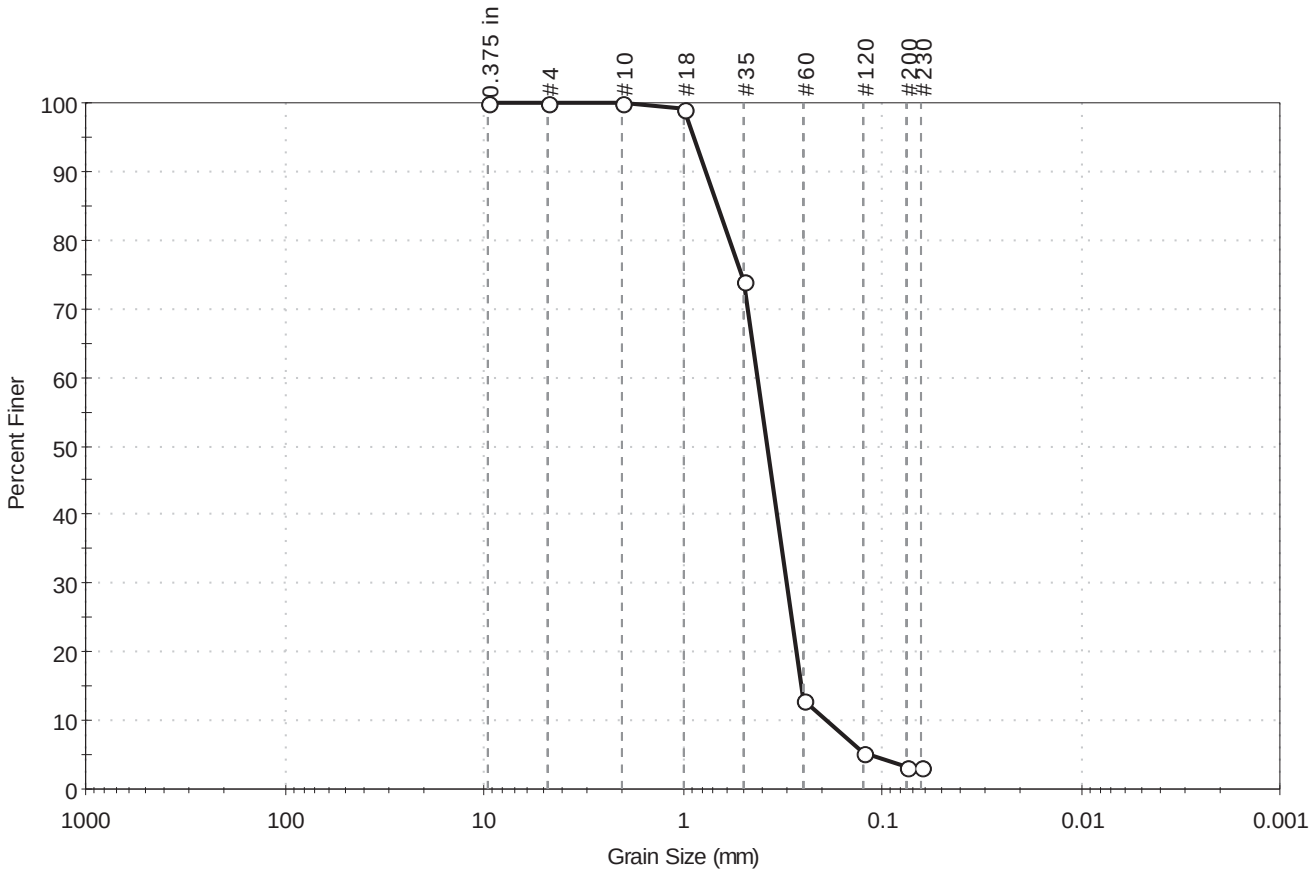
Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-1	Test Date:	01/04/16	Checked By:	emm
Depth :	0.2-2.3 ft	Test Id:	359154		
Test Comment:	---				
Visual Description:	Moist, gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	96.8	3.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#18	1.00	99		
#35	0.50	74		
#60	0.25	13		
#120	0.12	5		
#200	0.075	3.2		
#230	0.063	3		

Coefficients

D_{85} = 0.6765 mm D_{30} = 0.3031 mm

D_{60} = 0.4262 mm D_{15} = 0.2556 mm

D_{50} = 0.3804 mm D_{10} = 0.1901 mm

C_u = 2.242 C_c = 1.134

Classification

ASTM Poorly graded sand (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

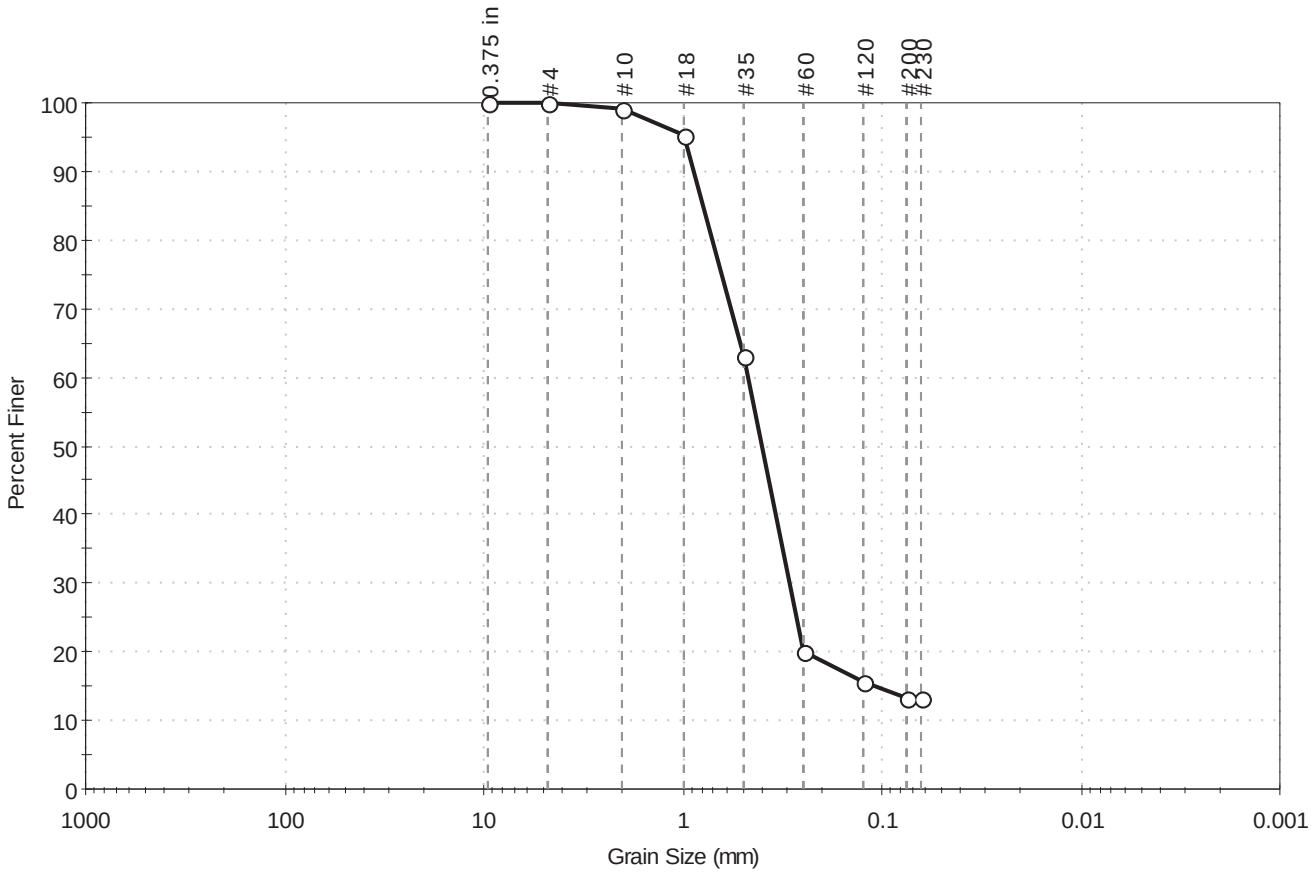
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-2	Test Date:	12/31/15	Checked By:	emm
Depth :	0-2.6 ft	Test Id:	359155		
Test Comment:	---				
Visual Description:	Moist, olive silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	86.7	13.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#18	1.00	95		
#35	0.50	63		
#60	0.25	20		
#120	0.12	16		
#200	0.075	13		
#230	0.063	13		

Coefficients

D_{85} = 0.8010 mm	D_{30} = 0.2935 mm
D_{60} = 0.4765 mm	D_{15} = 0.1095 mm
D_{50} = 0.4054 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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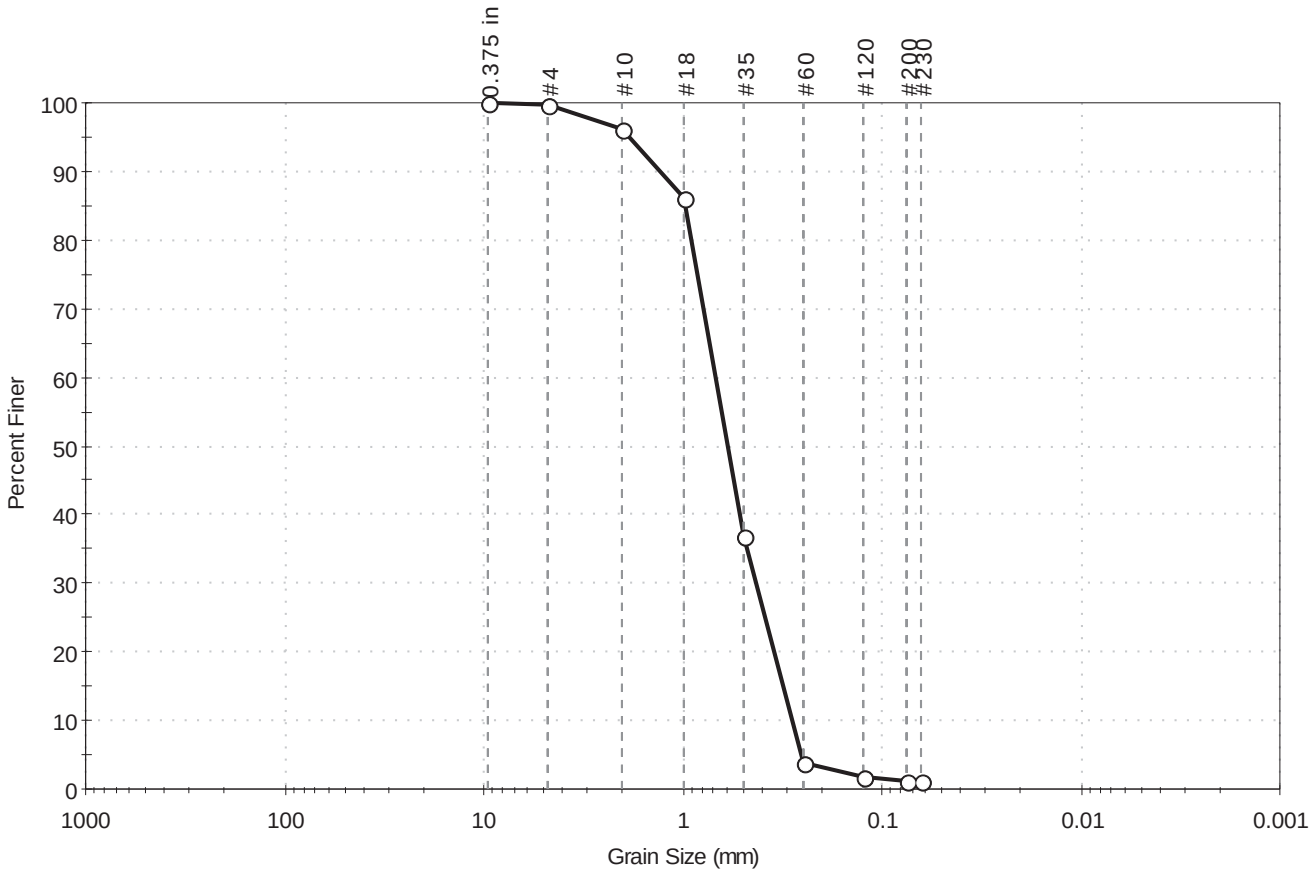
Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-3	Test Date:	12/31/15	Checked By:	emm
Depth :	0-1.8 ft	Test Id:	359156		
Test Comment:	---				
Visual Description:	Moist, pale brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.4	98.3	1.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	96		
#18	1.00	86		
#35	0.50	37		
#60	0.25	4		
#120	0.12	2		
#200	0.075	1.3		
#230	0.063	1		

Coefficients

D_{85} = 0.9840 mm	D_{30} = 0.4324 mm
D_{60} = 0.6918 mm	D_{15} = 0.3163 mm
D_{50} = 0.6009 mm	D_{10} = 0.2850 mm
C_u = 2.427	C_c = 0.948

Classification

ASTM Poorly graded sand (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

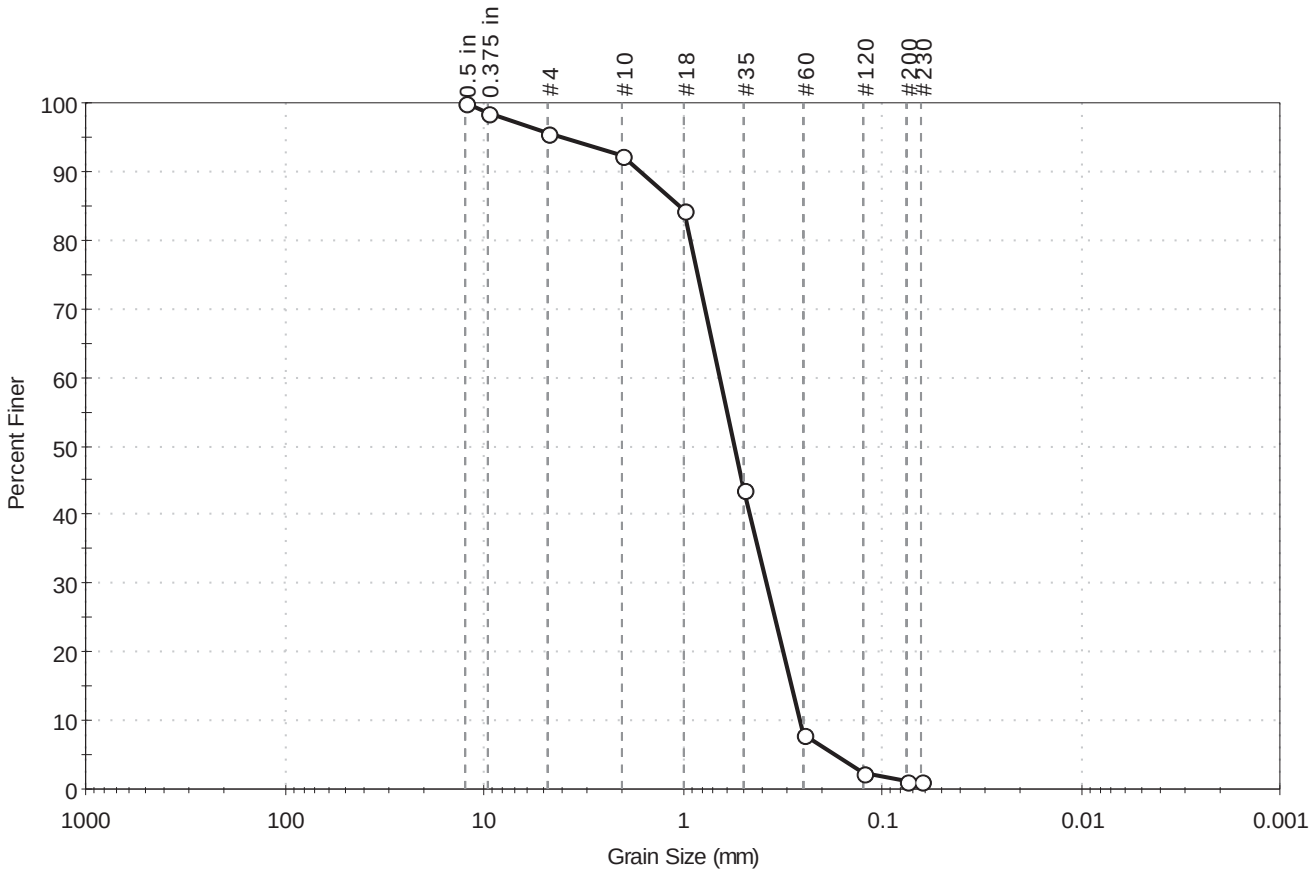
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-4	Test Date:	01/04/16	Checked By:	emm
Depth :	0-3.3 ft	Test Id:	359157		
Test Comment:	---				
Visual Description:	Moist, pale brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	4.5	94.2	1.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	99		
#4	4.75	95		
#10	2.00	92		
#18	1.00	84		
#35	0.50	44		
#60	0.25	8		
#120	0.12	2		
#200	0.075	1.3		
#230	0.063	1		

Coefficients

D_{85} = 1.0677 mm	D_{30} = 0.3837 mm
D_{60} = 0.6607 mm	D_{15} = 0.2872 mm
D_{50} = 0.5568 mm	D_{10} = 0.2607 mm
C_u = 2.534	C_c = 0.855

Classification

ASTM — Poorly graded sand (SP)

AASHTO — Stone Fragments, Gravel and Sand (A-1-b (1))

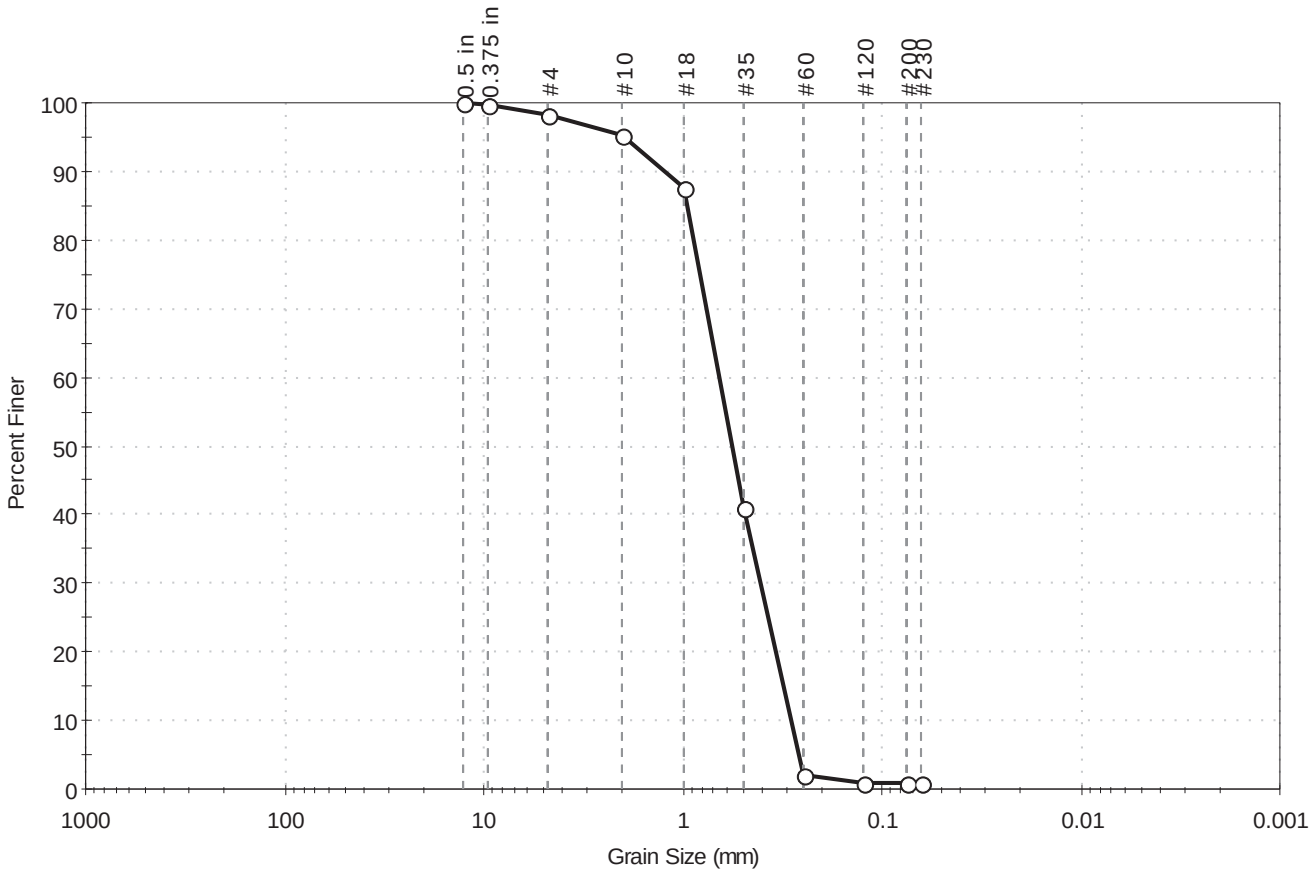
Sample / Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-5	Test Date:	12/31/15	Checked By:	emm
Depth :	0-4.5 ft	Test Id:	359158		
Test Comment:	---				
Visual Description:	Moist, pale brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	1.9	97.3	0.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.70	100		
0.375 in	9.50	100		
#4	4.75	98		
#10	2.00	95		
#18	1.00	88		
#35	0.50	41		
#60	0.25	2		
#120	0.12	1		
#200	0.075	0.8		
#230	0.063	1		

Coefficients

D_{85} = 0.9623 mm	D_{30} = 0.4121 mm
D_{60} = 0.6642 mm	D_{15} = 0.3155 mm
D_{50} = 0.5726 mm	D_{10} = 0.2886 mm
C_u = 2.301	C_c = 0.886

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

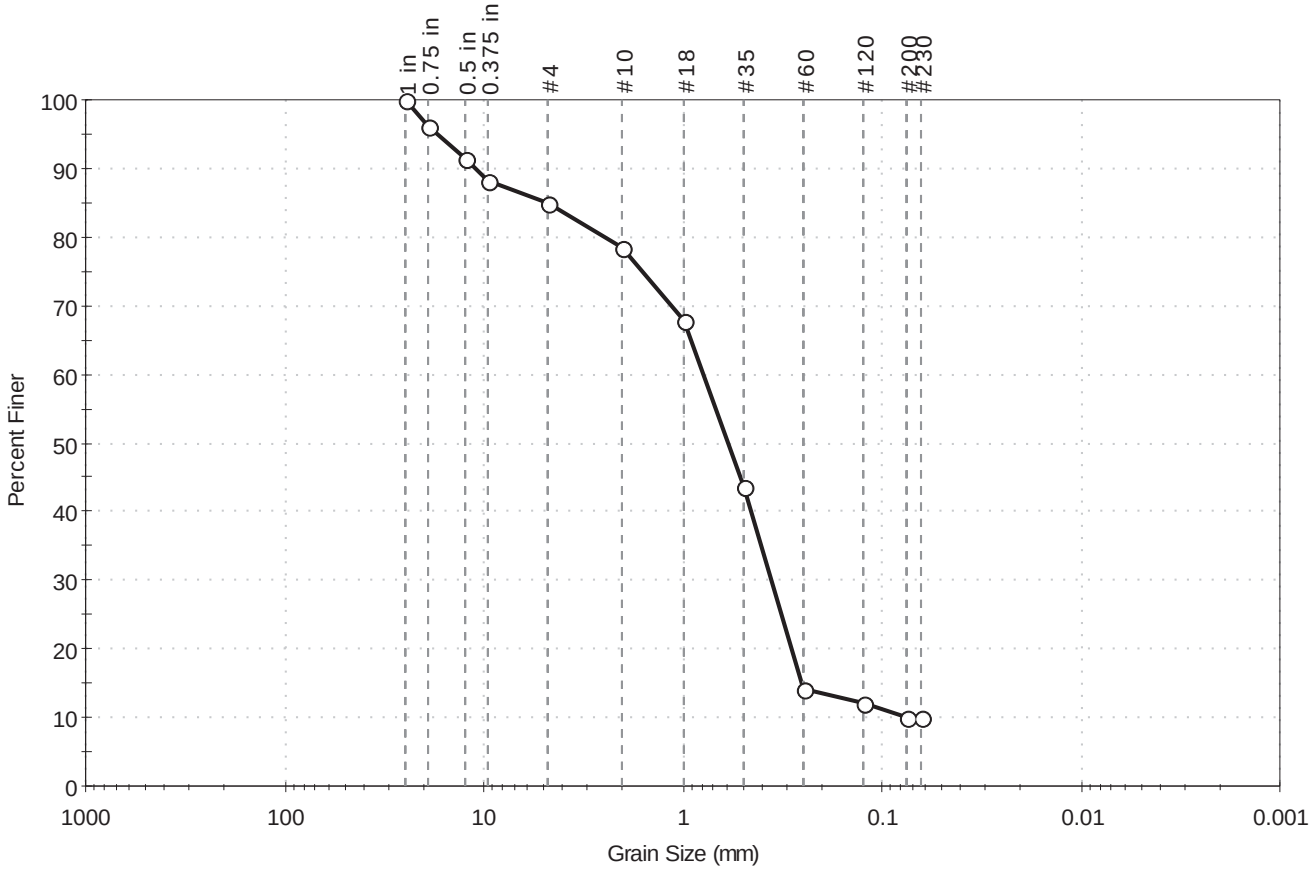
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-5	Test Date:	01/04/16	Checked By:	emm
Depth :	4.56-4.84 ft	Test Id:	359159		
Test Comment:	---				
Visual Description:	Moist, brown sand with silt and gravel				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	15.0	74.9	10.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	96		
0.5 in	12.50	91		
0.375 in	9.50	88		
#4	4.75	85		
#10	2.00	78		
#18	1.00	68		
#35	0.50	44		
#60	0.25	14		
#120	0.12	12		
#200	0.075	10		
#230	0.063	10		

Coefficients

D_{85} = 4.7159 mm	D_{30} = 0.3619 mm
D_{60} = 0.7966 mm	D_{15} = 0.2543 mm
D_{50} = 0.5982 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

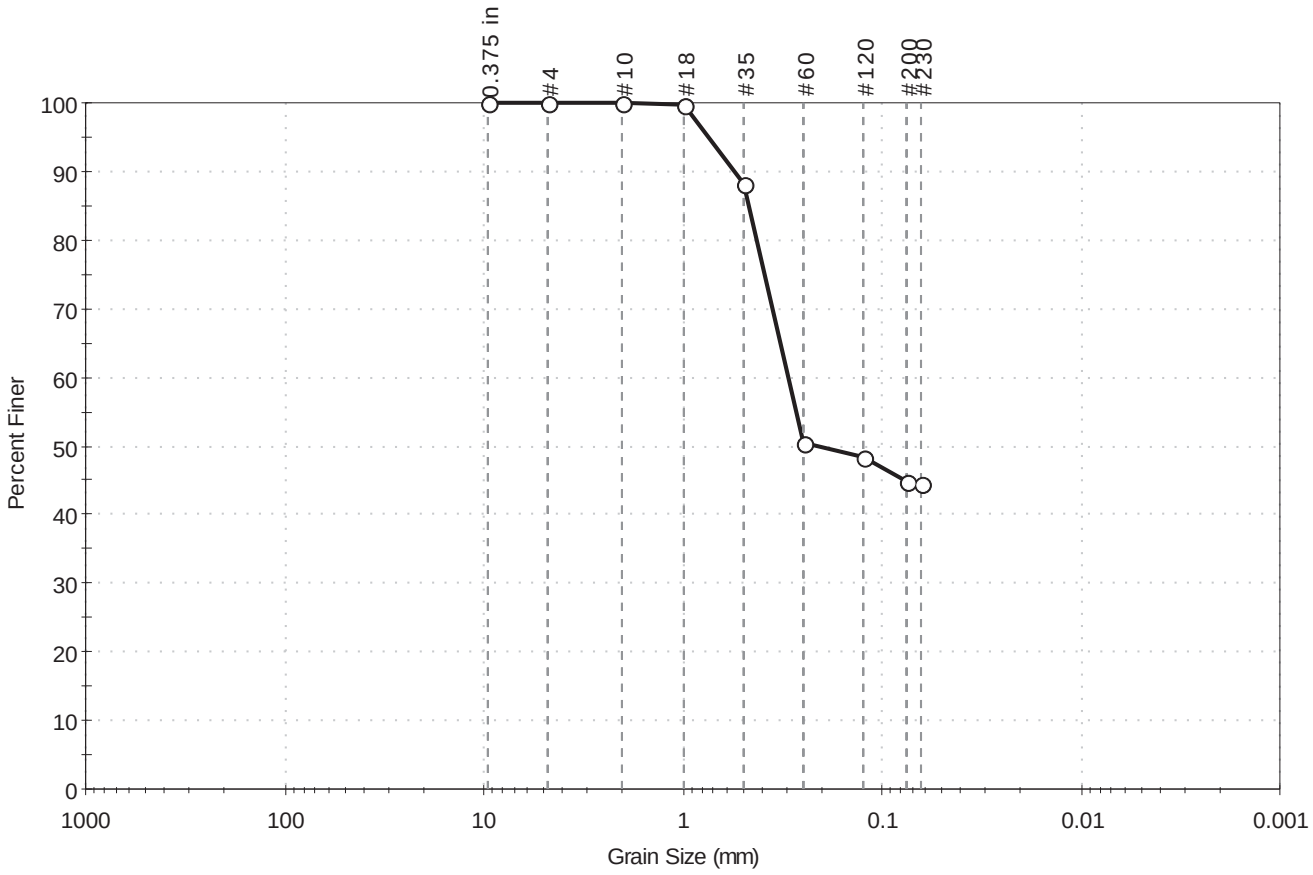
Sample / Test Description

Sand/Gravel Particle Shape : ROUNDED

Sand/Gravel Hardness : HARD

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-6	Test Date:	01/04/16	Checked By:	emm
Depth :	0.2-0.6 ft	Test Id:	359161		
Test Comment:	---				
Visual Description:	Moist, olive silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	55.3	44.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#18	1.00	100		
#35	0.50	88		
#60	0.25	51		
#120	0.12	48		
#200	0.075	45		
#230	0.063	44		

Coefficients

D_{85} = 0.4722 mm D_{30} = N/A

D_{60} = 0.2978 mm D_{15} = N/A

D_{50} = 0.2097 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample / Test Description

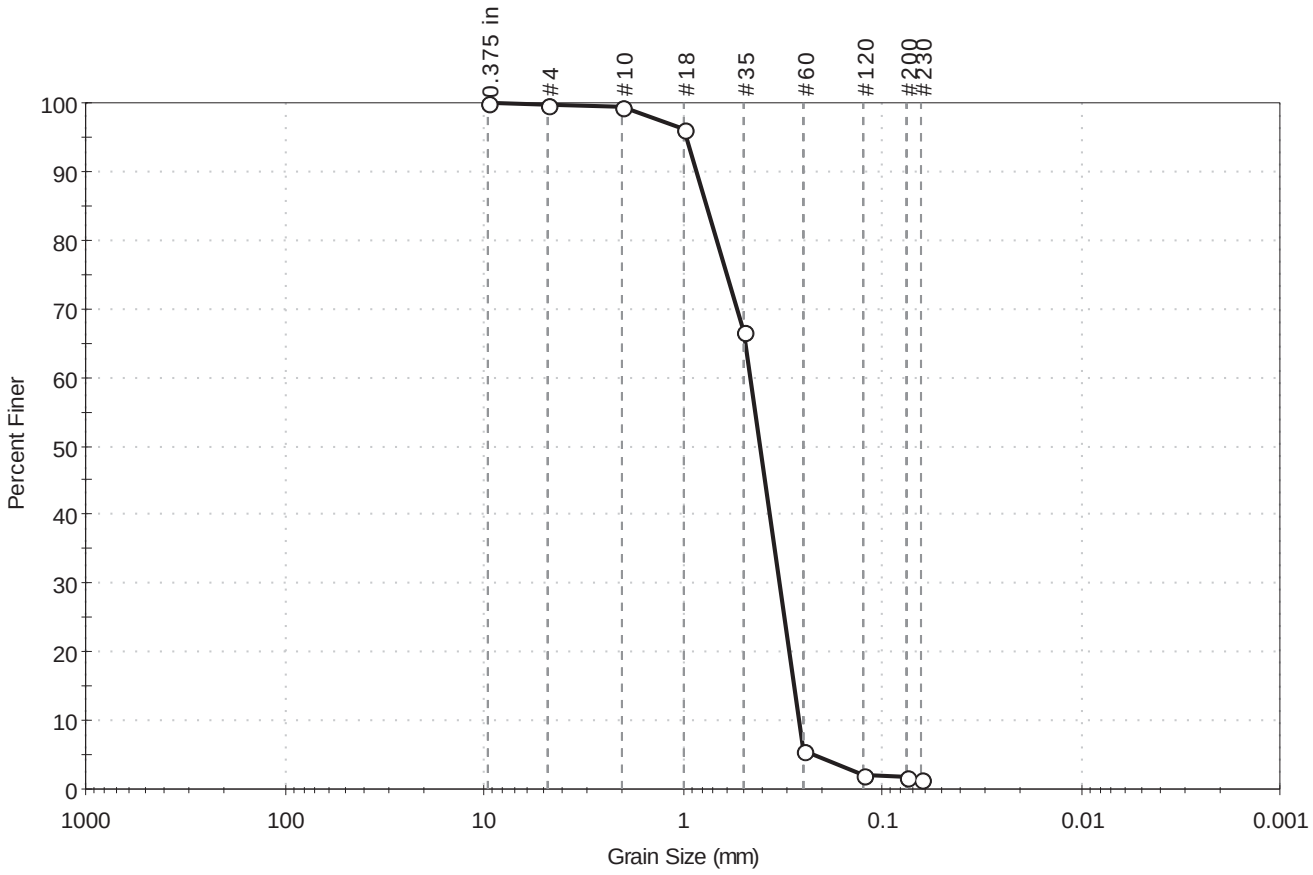
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

printed 1/4/2016 5:41:35 PM

Client:	Woods Hole Group				
Project:	Orleans Nauset Estuary				
Location:	Nauset Inlet, MA			Project No:	GTX-304172
Boring ID:	2015-0121	Sample Type:	bag	Tested By:	jbr
Sample ID:	N-6	Test Date:	01/04/16	Checked By:	emm
Depth :	0.9-3.24 ft	Test Id:	359160		
Test Comment:	---				
Visual Description:	Moist, gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.2	98.2	1.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#18	1.00	96		
#35	0.50	67		
#60	0.25	6		
#120	0.12	2		
#200	0.075	1.6		
#230	0.063	2		

Coefficients

D_{85} = 0.7699 mm	D_{30} = 0.3297 mm
D_{60} = 0.4637 mm	D_{15} = 0.2780 mm
D_{50} = 0.4139 mm	D_{10} = 0.2627 mm
C_u = 1.765	C_c = 0.892

Classification

ASTM Poorly graded sand (SP)

AASHTO Stone Fragments, Gravel and Sand (A-1-b (1))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

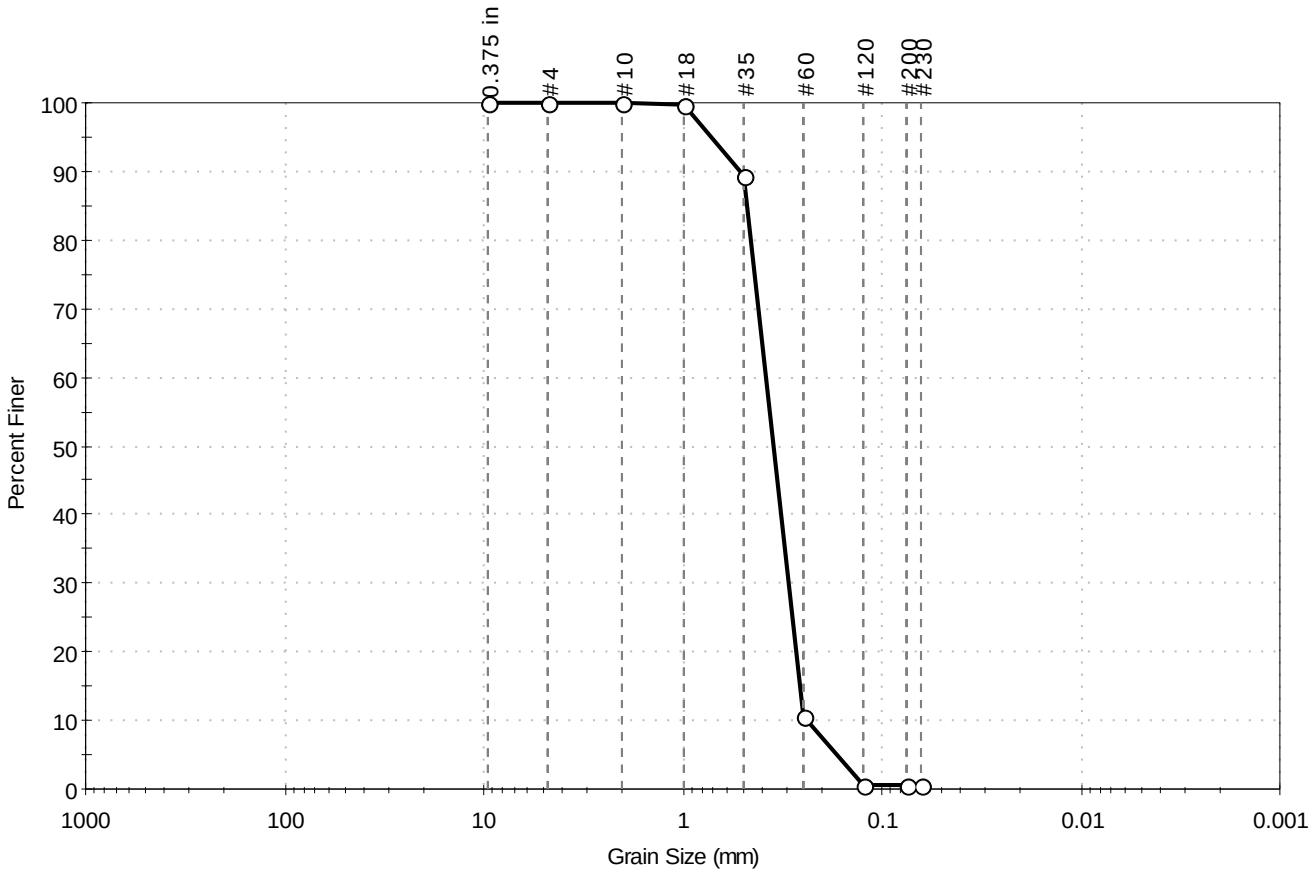
Appendix B

Grain Size Data for Nauset Beach & Skaket Beach

Client:	Woods Hole Group				
Project:	Skaket Beach				
Location:	2003_0094			Project No:	GTX-304142
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	Skaket #2	Test Date:	12/22/15	Checked By:	emm
Depth :	---	Test Id:	358353		

Test Comment: ---
Visual Description: Moist, pale brown sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	99.4	0.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#18	1.00	100		
#35	0.50	89		
#60	0.25	11		
#120	0.12	1		
#200	0.075	0.6		
#230	0.063	1		

Coefficients

D_{85} = 0.4806 mm	D_{30} = 0.2961 mm
D_{60} = 0.3857 mm	D_{15} = 0.2595 mm
D_{50} = 0.3532 mm	D_{10} = 0.2373 mm
C_u = 1.625	C_c = 0.958

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

Sample / Test Description

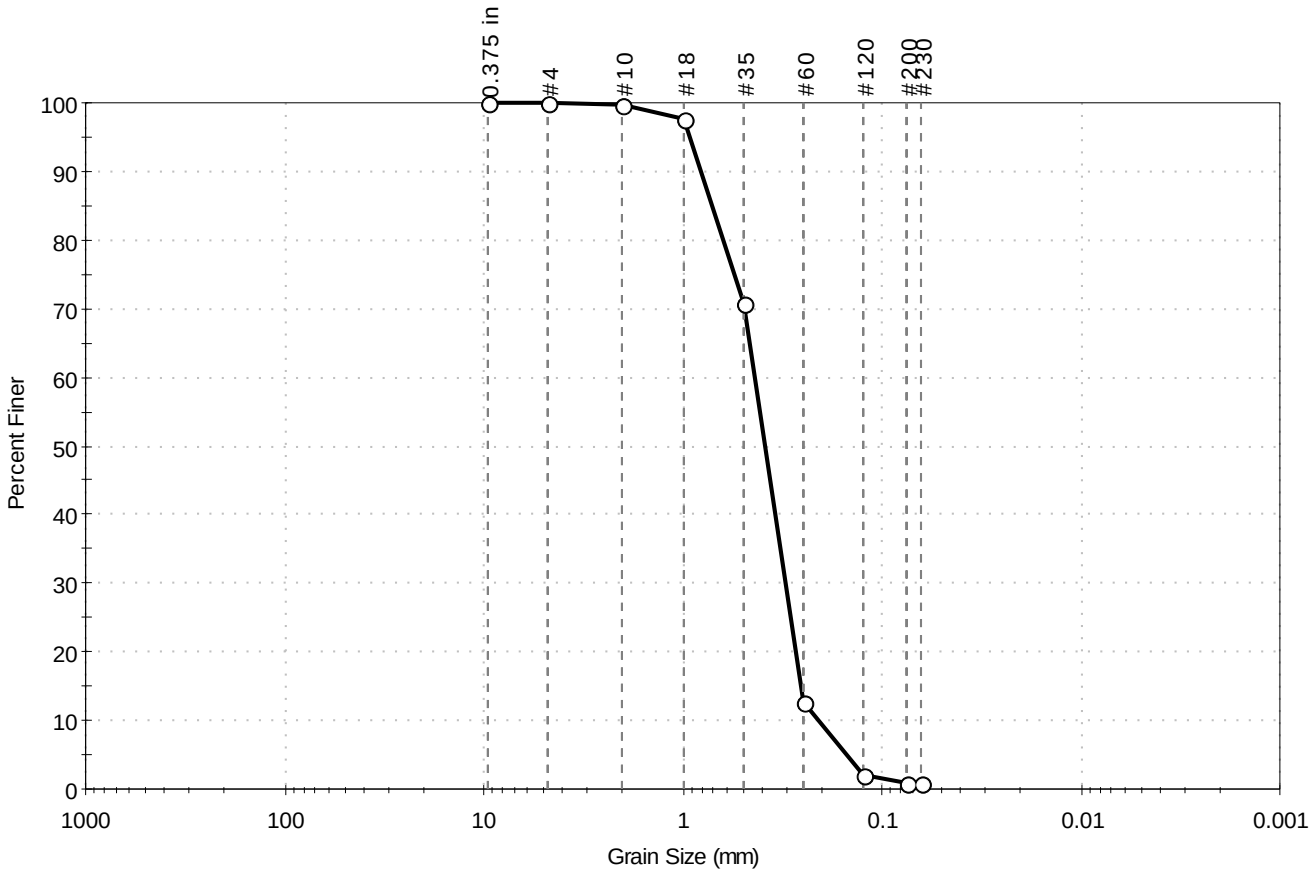
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Skaket Beach				
Location:	2003_0094			Project No:	GTX-304142
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	Skaket #3	Test Date:	12/22/15	Checked By:	emm
Depth :	---	Test Id:	358354		

Test Comment: ---
Visual Description: Moist, brown sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.0	99.0	1.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#18	1.00	97		
#35	0.50	71		
#60	0.25	13		
#120	0.12	2		
#200	0.075	1.0		
#230	0.063	1		

Coefficients

D_{85} = 0.7226 mm
D_{30} = 0.3075 mm
D_{60} = 0.4395 mm
D_{15} = 0.2572 mm
D_{50} = 0.3901 mm
D_{10} = 0.2107 mm
C_u = 2.086
C_c = 1.021

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

Sample / Test Description

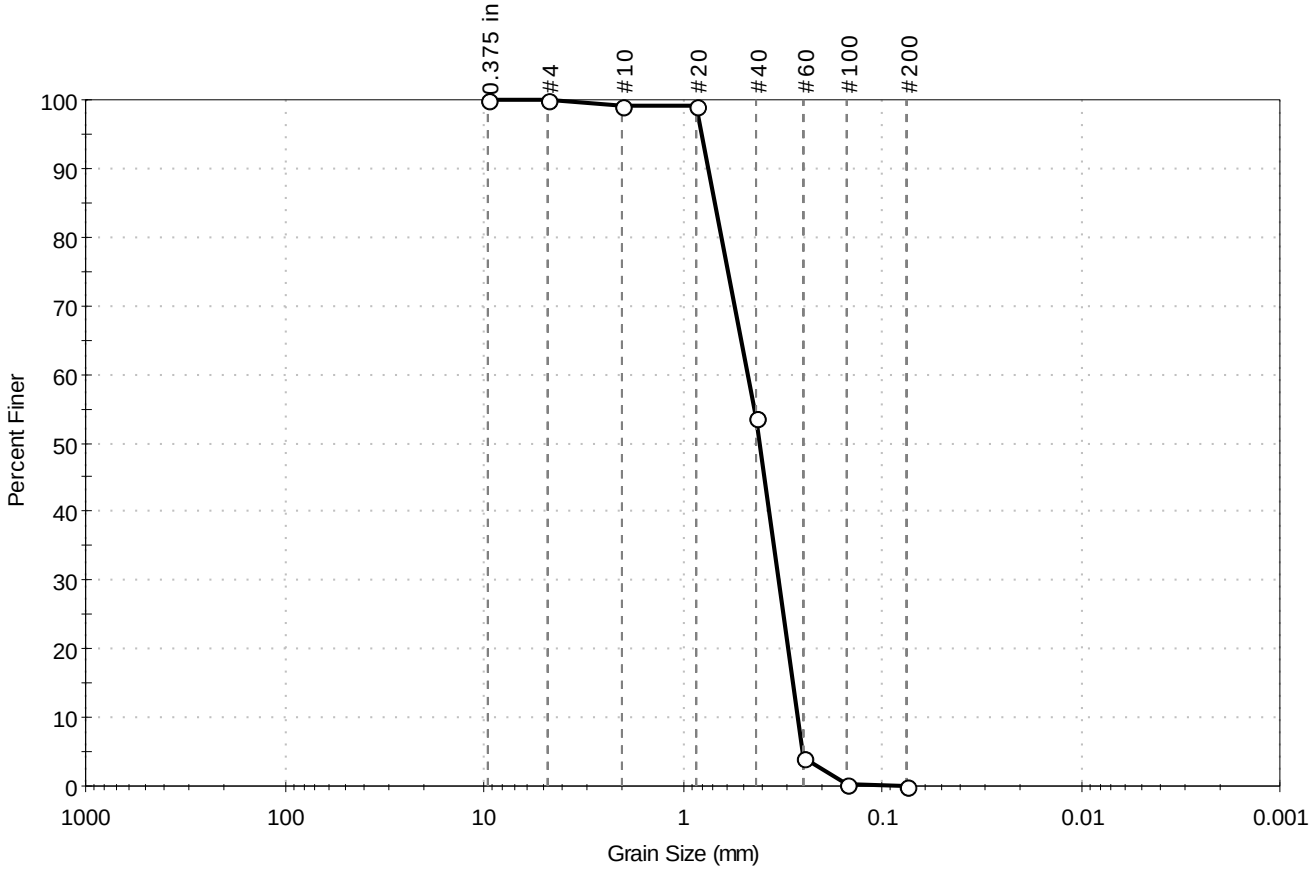
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	2016-0077				
Location:	---			Project No:	GTX-306090
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NB 1	Test Date:	03/07/17	Checked By:	emm
Depth :	---	Test Id:	405717		

Test Comment: ---
Visual Description: Moist, light yellow sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.1	99.8	0.1

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	99		
#40	0.42	54		
#60	0.25	4		
#100	0.15	0		
#200	0.075	0.1		

Coefficients

D_{85} = 0.6846 mm D_{30} = 0.3298 mm
D_{60} = 0.4680 mm D_{15} = 0.2808 mm
D_{50} = 0.4086 mm D_{10} = 0.2662 mm
C_u = 1.758 C_c = 0.873

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

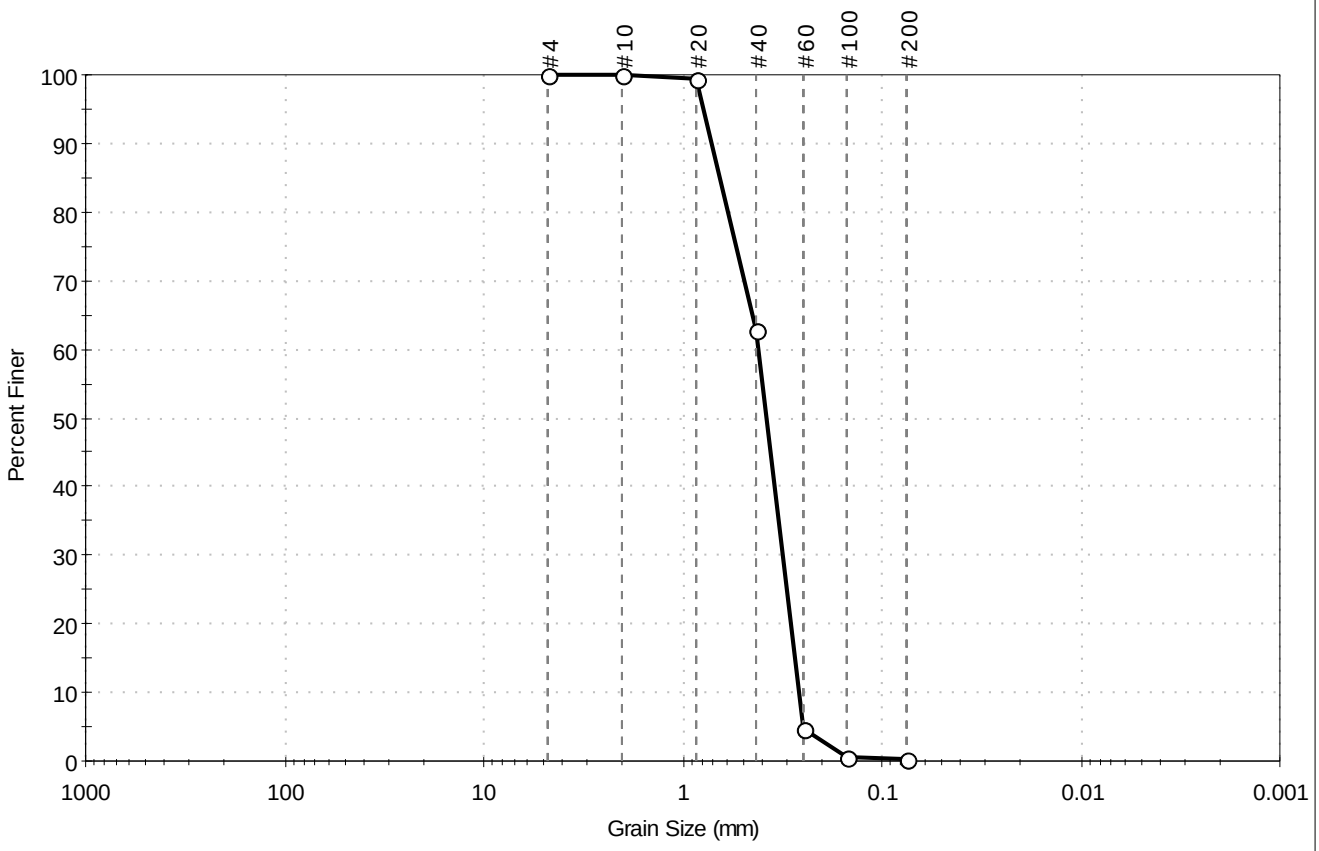
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	2016-0077				
Location:	---			Project No:	GTX-306090
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NB 2	Test Date:	03/07/17	Checked By:	emm
Depth :	---	Test Id:	405718		
Test Comment:	---				
Visual Description:	Moist, light yellow sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	99.8	0.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	63		
#60	0.25	5		
#100	0.15	1		
#200	0.075	0.2		

Coefficients

D_{85} = 0.6478 mm	D_{30} = 0.3148 mm
D_{60} = 0.4140 mm	D_{15} = 0.2745 mm
D_{50} = 0.3779 mm	D_{10} = 0.2623 mm
C_u = 1.578	C_c = 0.913

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

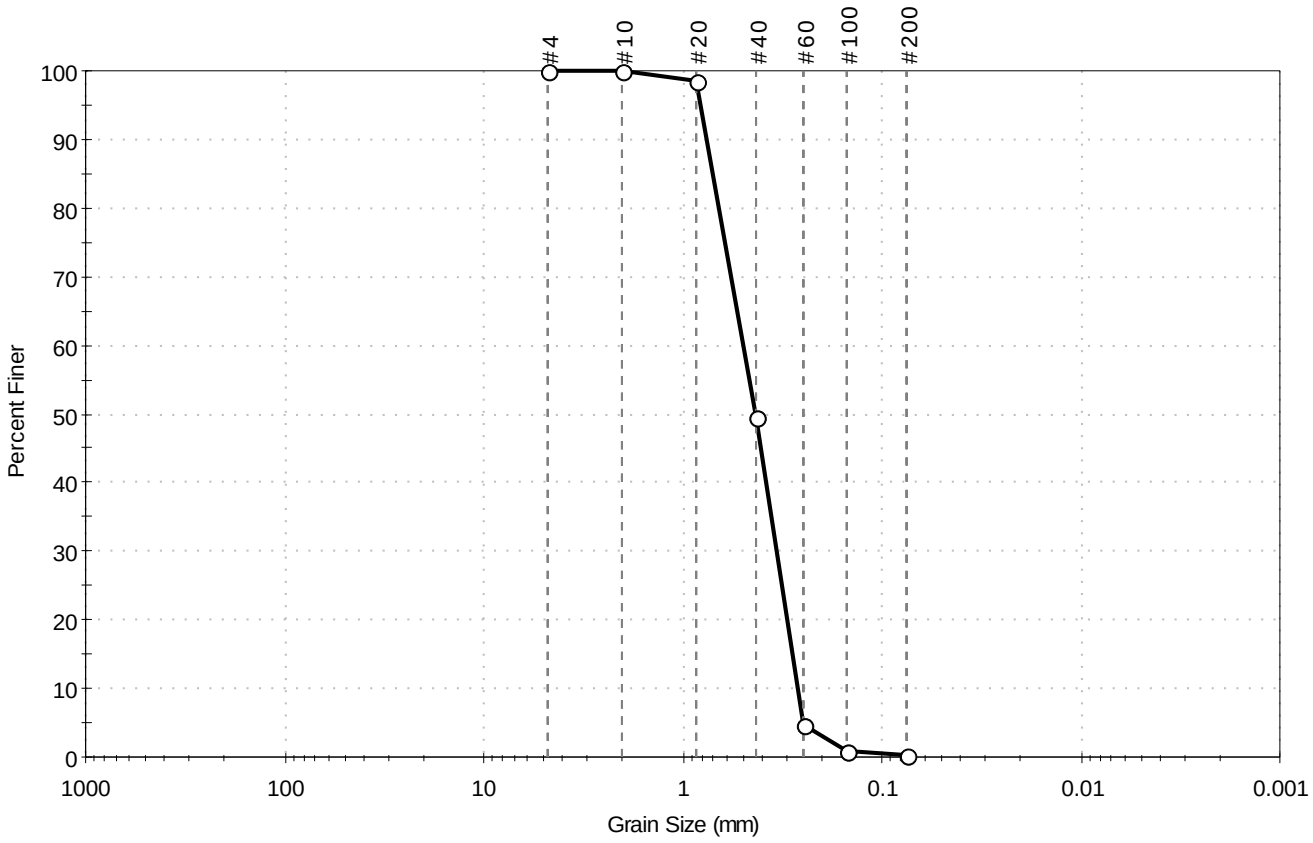
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	2016-0077				
Location:	---			Project No:	GTX-306090
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NB 3	Test Date:	03/07/17	Checked By:	emm
Depth :	---	Test Id:	405719		
Test Comment:	---				
Visual Description:	Moist, light yellow sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	99.7	0.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	50		
#60	0.25	5		
#100	0.15	1		
#200	0.075	0.3		

Coefficients

D_{85} = 0.7018 mm	D_{30} = 0.3374 mm
D_{60} = 0.4929 mm	D_{15} = 0.2826 mm
D_{50} = 0.4280 mm	D_{10} = 0.2663 mm
C_u = 1.851	C_c = 0.867

Classification

ASTM — Poorly graded sand (SP)

AASHTO — Stone Fragments, Gravel and Sand (A-1-b (1))

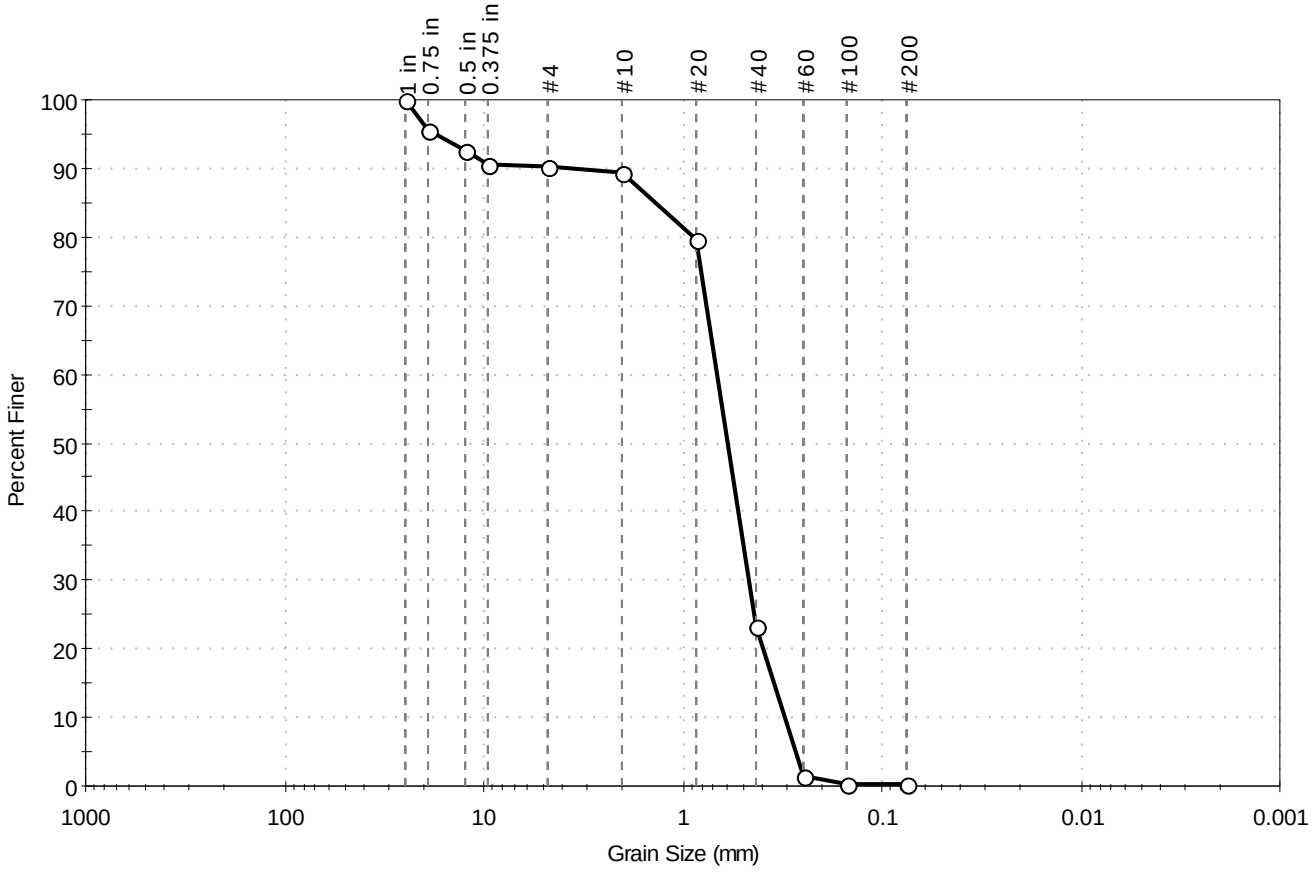
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	2016-0077				
Location:	---			Project No:	GTX-306090
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NB 4	Test Date:	03/07/17	Checked By:	emm
Depth :	---	Test Id:	405720		
Test Comment:	---				
Visual Description:	Moist, light brownish yellow sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	9.8	90.0	0.2

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
1 in	25.00	100		
0.75 in	19.00	96		
0.5 in	12.50	93		
0.375 in	9.50	90		
#4	4.75	90		
#10	2.00	89		
#20	0.85	80		
#40	0.42	23		
#60	0.25	1		
#100	0.15	0		
#200	0.075	0.2		

Coefficients

D_{85} = 1.3580 mm
D_{30} = 0.4614 mm
D_{60} = 0.6678 mm
D_{15} = 0.3472 mm
D_{50} = 0.5904 mm
D_{10} = 0.3076 mm
C_u = 2.171
C_c = 1.036

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

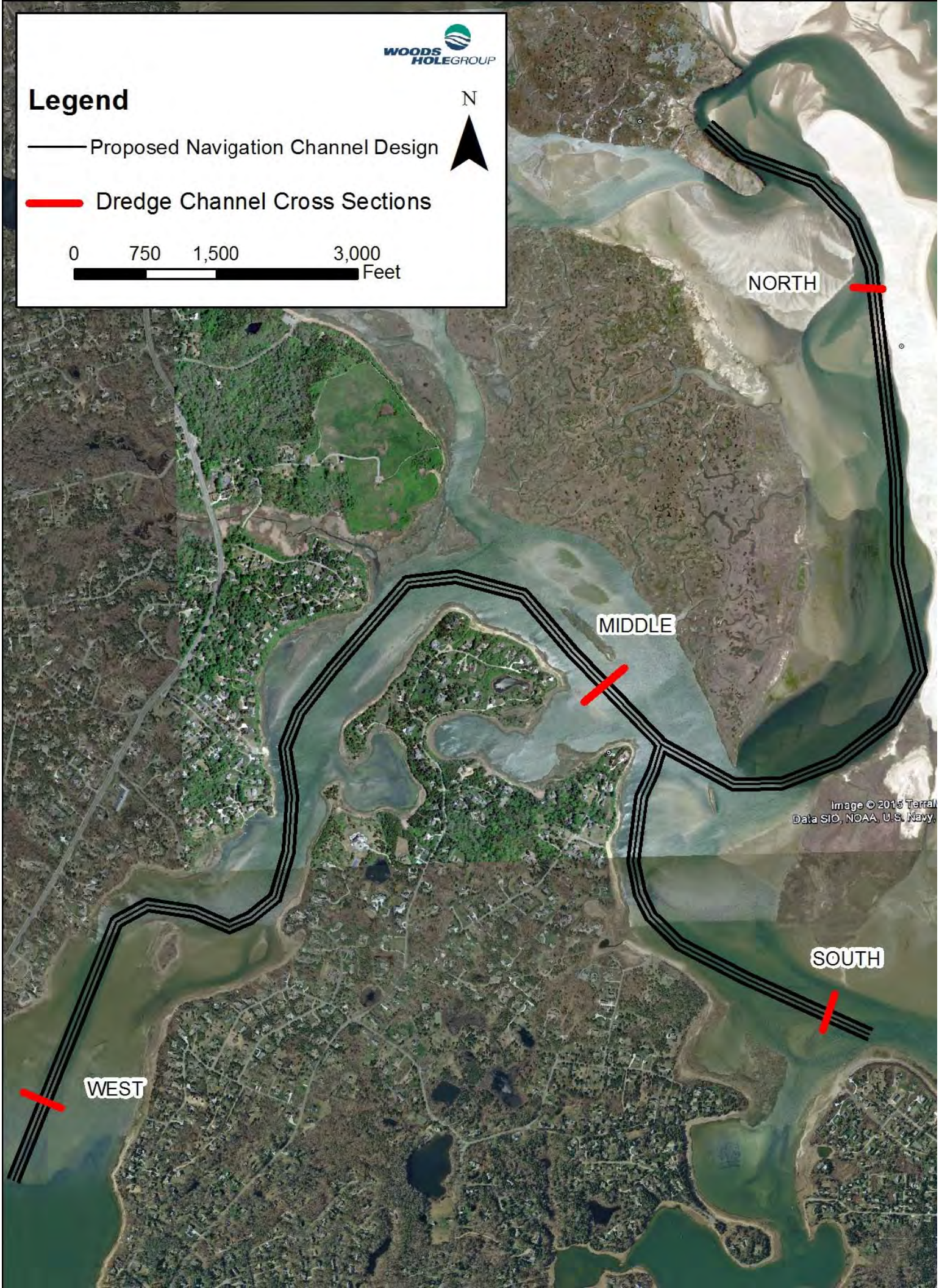
Sample / Test Description

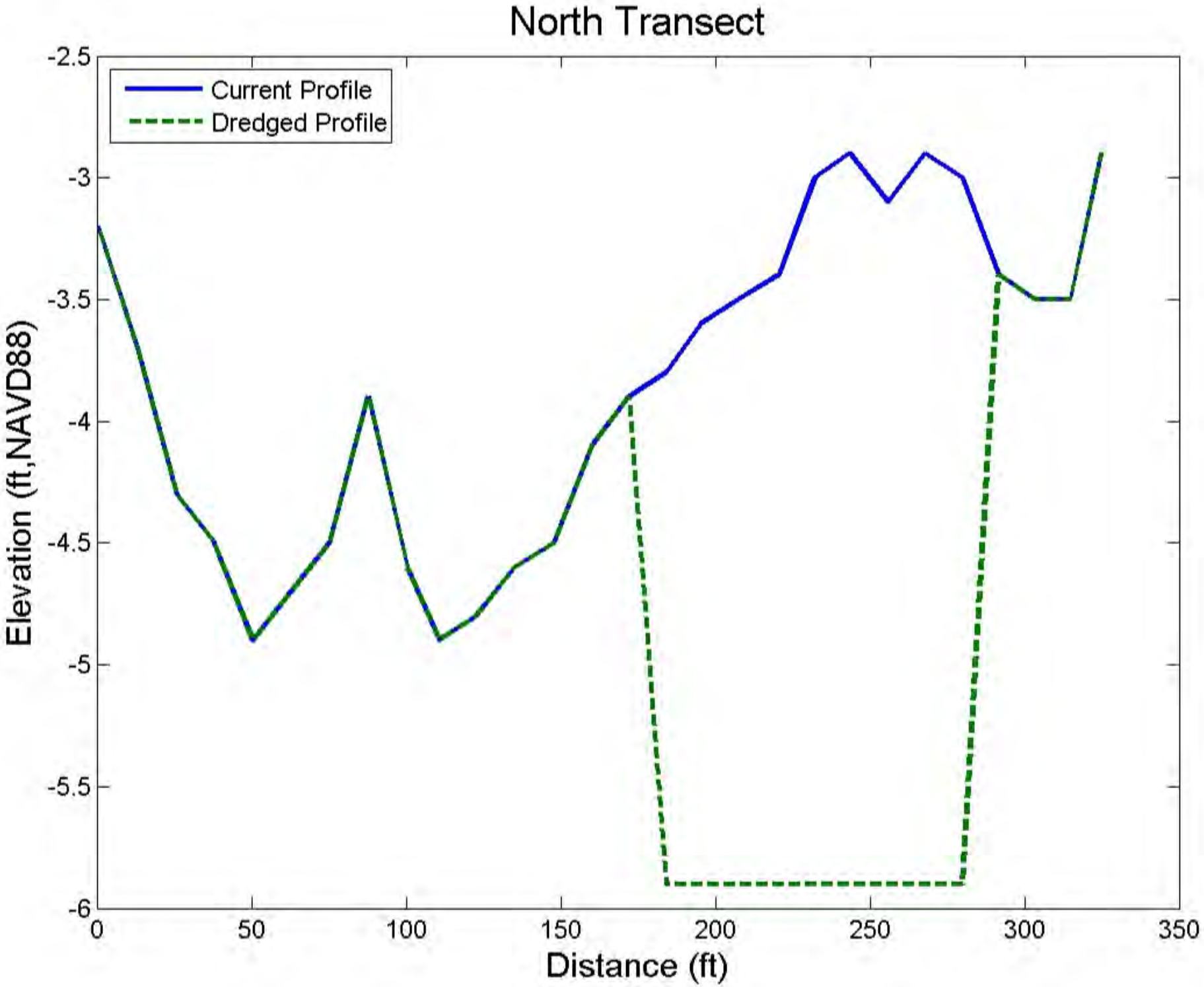
Sand/Gravel Particle Shape : ANGULAR

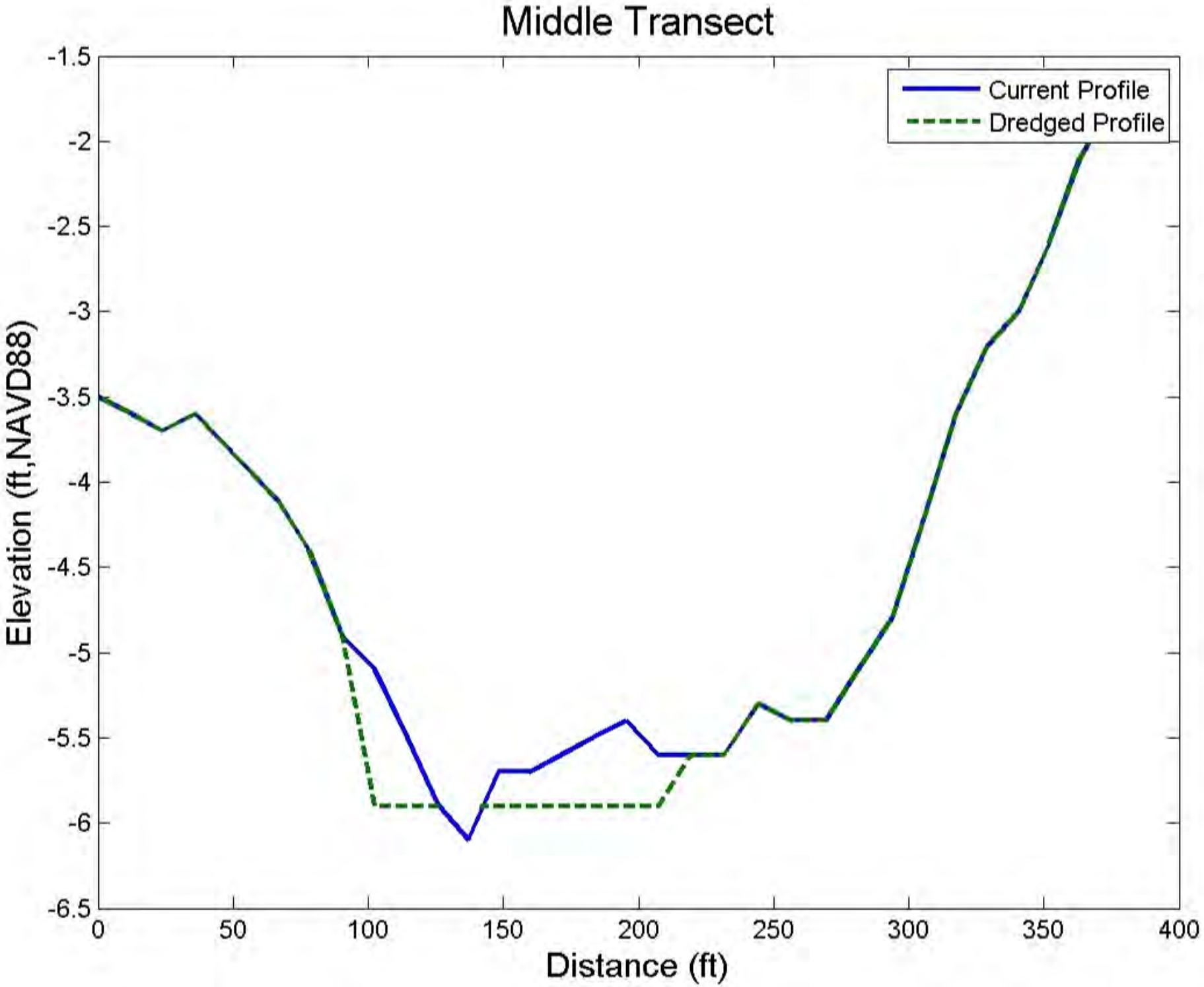
Sand/Gravel Hardness : HARD

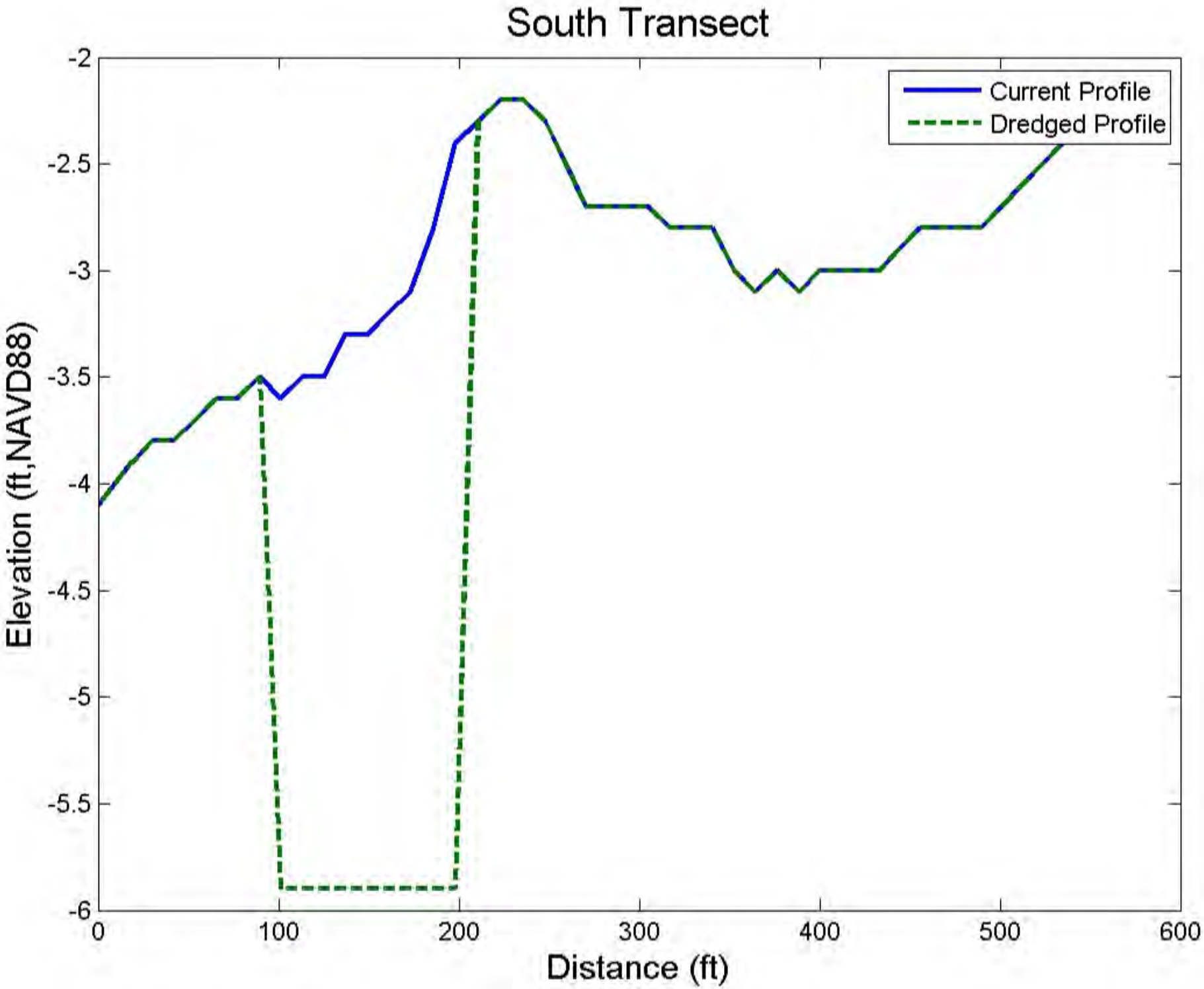
Section M

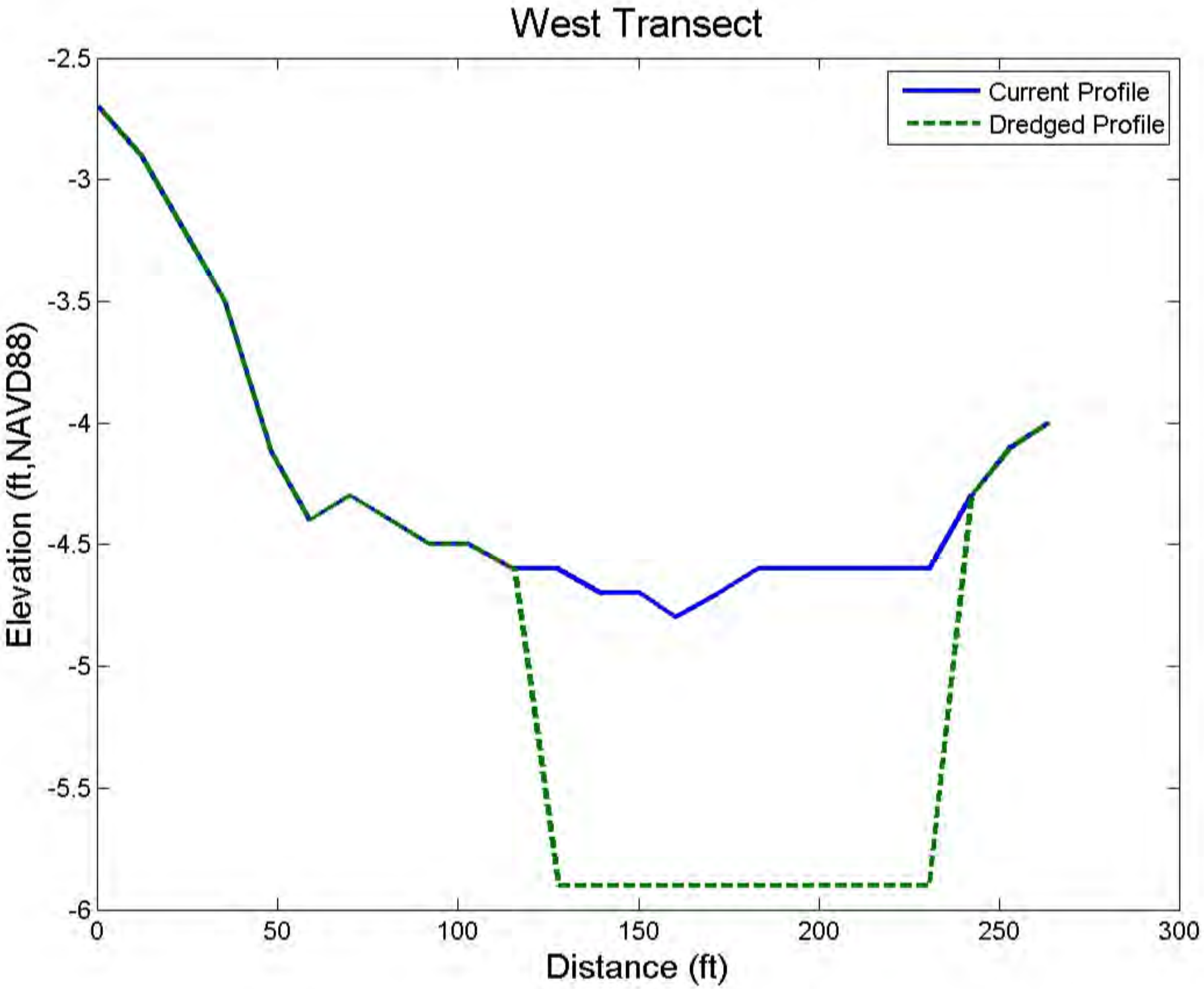
SAP Supplemental Information to ACOE – 7/27/2017


WOODS HOLE GROUP
Legend
N
Proposed Navigation Channel Design
Dredge Channel Cross Sections
0 750 1,500 3,000
Feet
NORTH
MIDDLE
SOUTH
WEST
Image © 2015 Terra
Data SIO, NOAA, U.S. Navy,


North Transect
Current Profile
Dredged Profile
Elevation (ft,NAVD88)
Distance (ft)
-2.5
-3
-3.5
-4
-4.5
-5
-5.5
-6
0
50
100
150
200
250
300
350


Middle Transect
Current Profile
Dredged Profile
Elevation (ft,NAVD88)
Distance (ft)
-1.5
-2
-2.5
-3
-3.5
-4
-4.5
-5
-5.5
-6
-6.5
0
50
100
150
200
250
300
350
400


South Transect
Current Profile
Dredged Profile
Elevation (ft,NAVD88)
Distance (ft)
-2
-2.5
-3
-3.5
-4
-4.5
-5
-5.5
-6
0
100
200
300
400
500
600


West Transect
Current Profile
Dredged Profile
Elevation (ft,NAVD88)
-2.5
-3
-3.5
-4
-4.5
-5
-5.5
-6
0
50
100
150
200
250
300
Distance (ft)


Nauset Beach
NB 1
NB 2
NB 3
NB 4
0
75
150
300 Feet
N

SITE PLAN

1"= 50'

LOCATION MAP

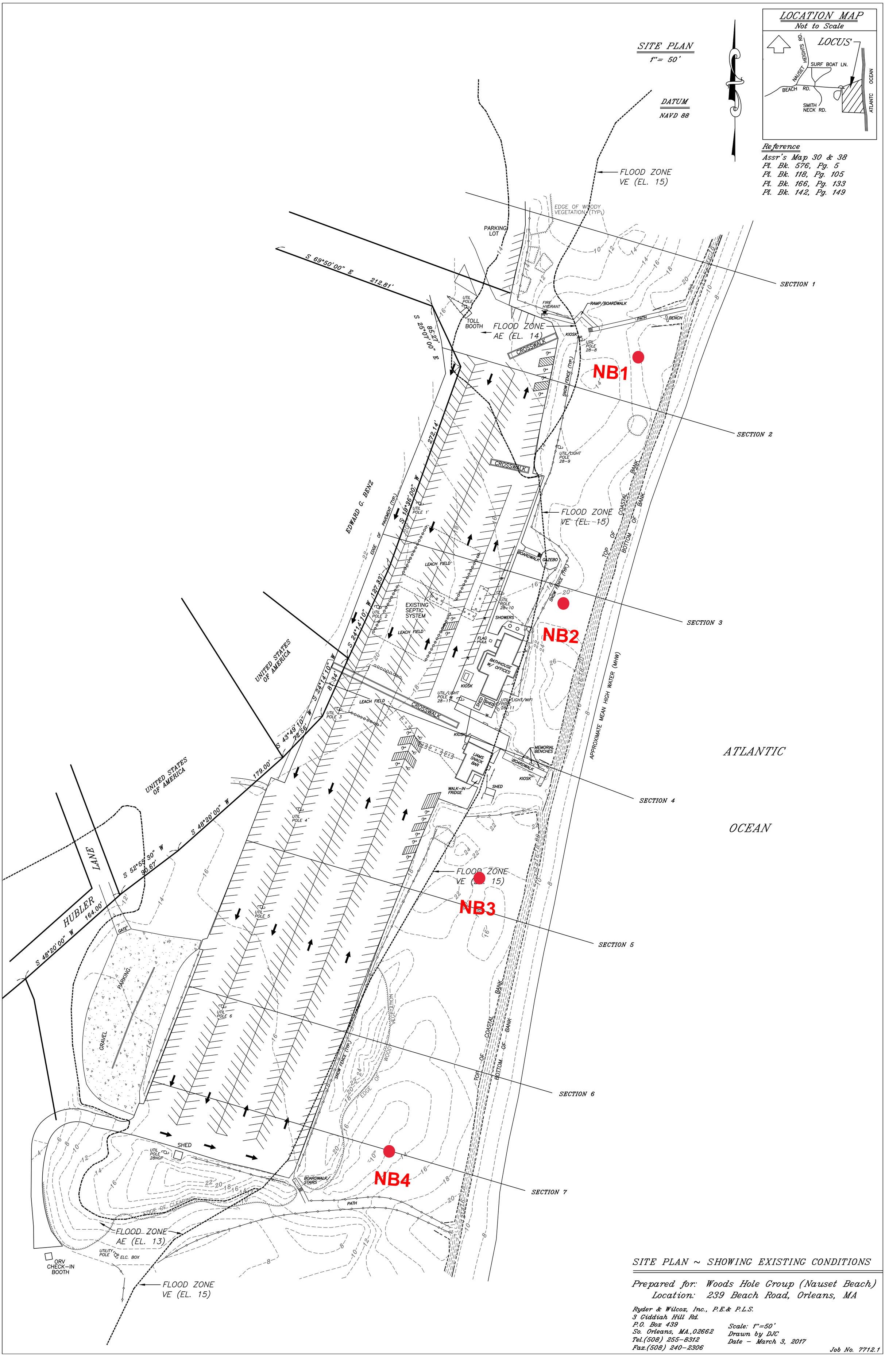
Not to Scale

DATUM

NAVD 88

Reference

Assr's Map 30 & 38
Pl. Bk. 576, Pg. 5
Pl. Bk. 118, Pg. 105
Pl. Bk. 166, Pg. 133
Pl. Bk. 142, Pg. 149



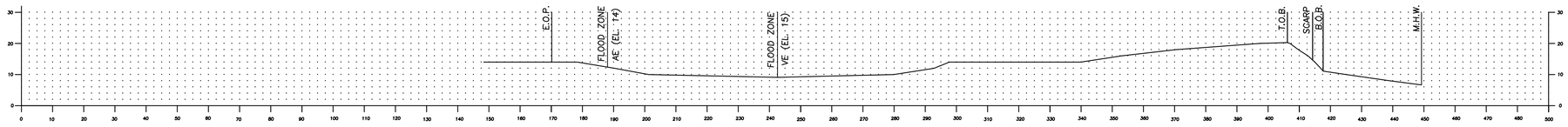
SITE PLAN ~ SHOWING EXISTING CONDITIONS

Prepared for: Woods Hole Group (Nauset Beach)
Location: 239 Beach Road, Orleans, MA

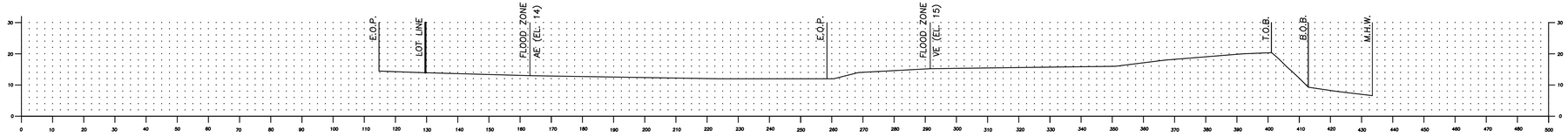
Ryder & Wilcox, Inc., P.E.& P.L.S.
3 Giddiah Hill Rd.
P.O. Box 439
So. Orleans, MA.,02662
Tel.(508) 255-8312
Fax.(508) 240-2306

Scale: 1"=50'
Drawn by DJC
Date - March 3, 2017

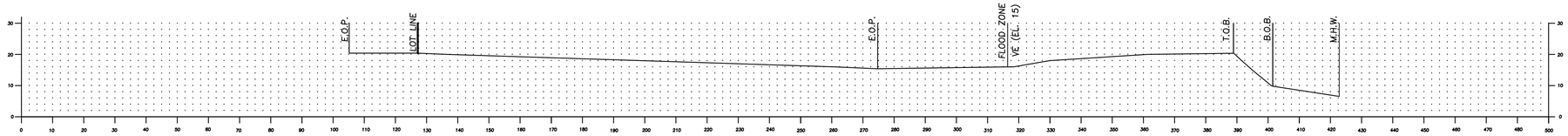
Job No. 7712.1



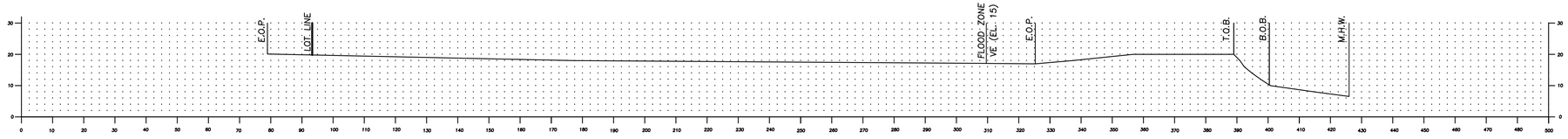
SECTION 1



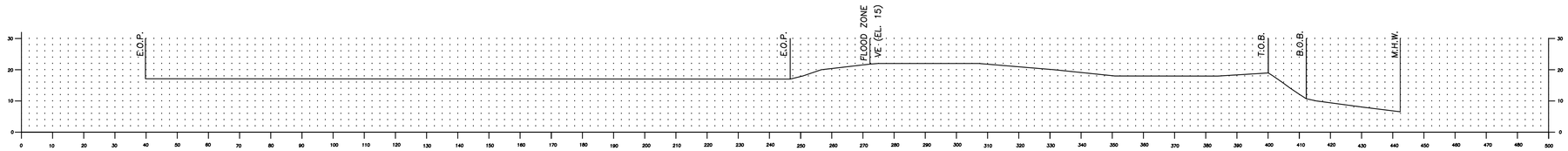
SECTION 2



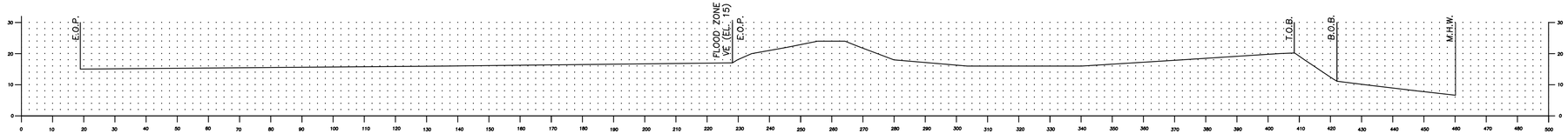
SECTION 3



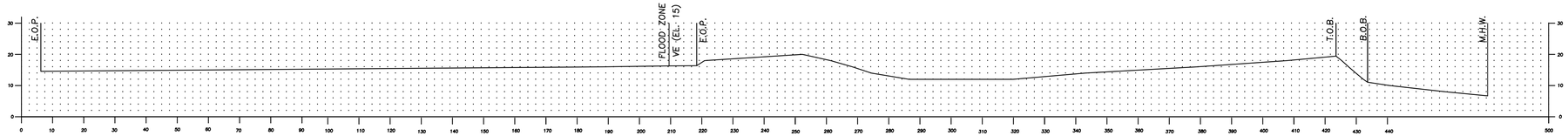
SECTION 4



SECTION 5



SECTION 6



SECTION 7

PROFILE SCALE

1"= 20' HORIZONTAL
1"= 20' VERTICAL

SITE PLAN ~ TRANSECTS

Prepared for: Woods Hole Croup (Naruset Beach)
Location: 239 Beach Road, Orleans, MA

Ryder & Wilcox, Inc., P.E.& P.L.S.
3 Ciddiah Hill Rd.
P.O. Box 439
So. Orleans, MA.,02662
Tel.(508) 255-8312
Fax.(508) 240-2306

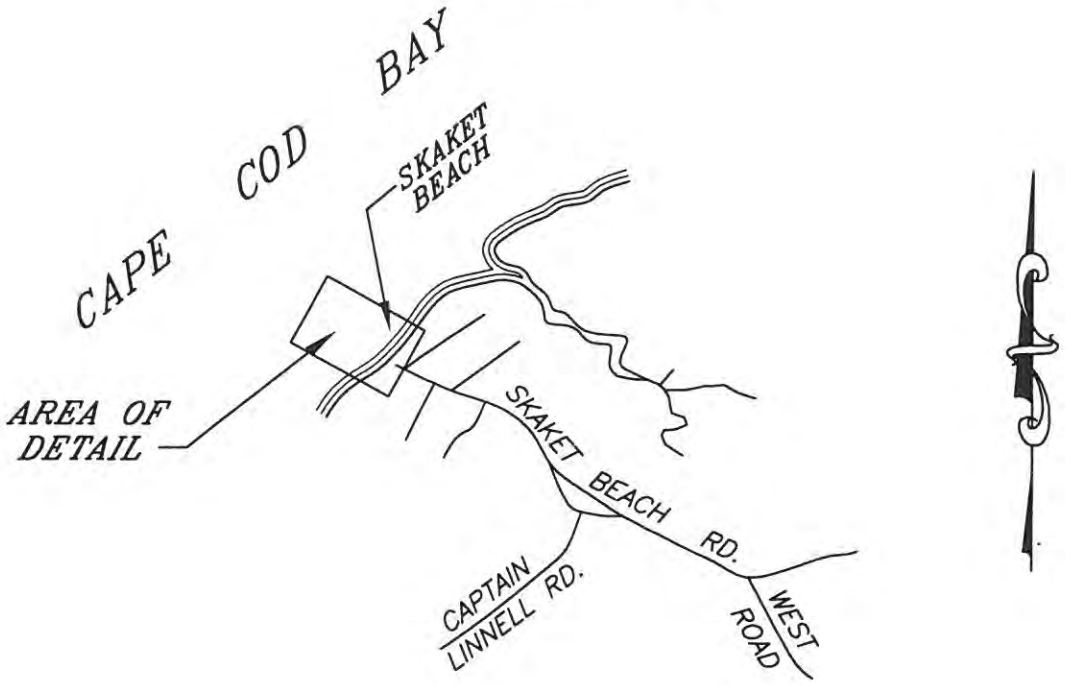
Scale: 1"=20'
Drawn by DJC
Date - March 13, 2017

Job No. 7712.1


Skaket Beach
Skaket 2
Skaket 3
0 50 100 200 Feet
N

LOCATION MAP

Not to Scale



PLAN & PROFILES

of

PROPOSED BEACH NOURISHMENT

at

SKAKET BEACH ORLEANS, MA

prepared for

TOWN of ORLEANS

Ryder & Wilcox, Inc. *P.E. & P.L.S*
P.O. Box 439 South Orleans, MA 02662

Scale: As Noted *Date: February 22, 2016*

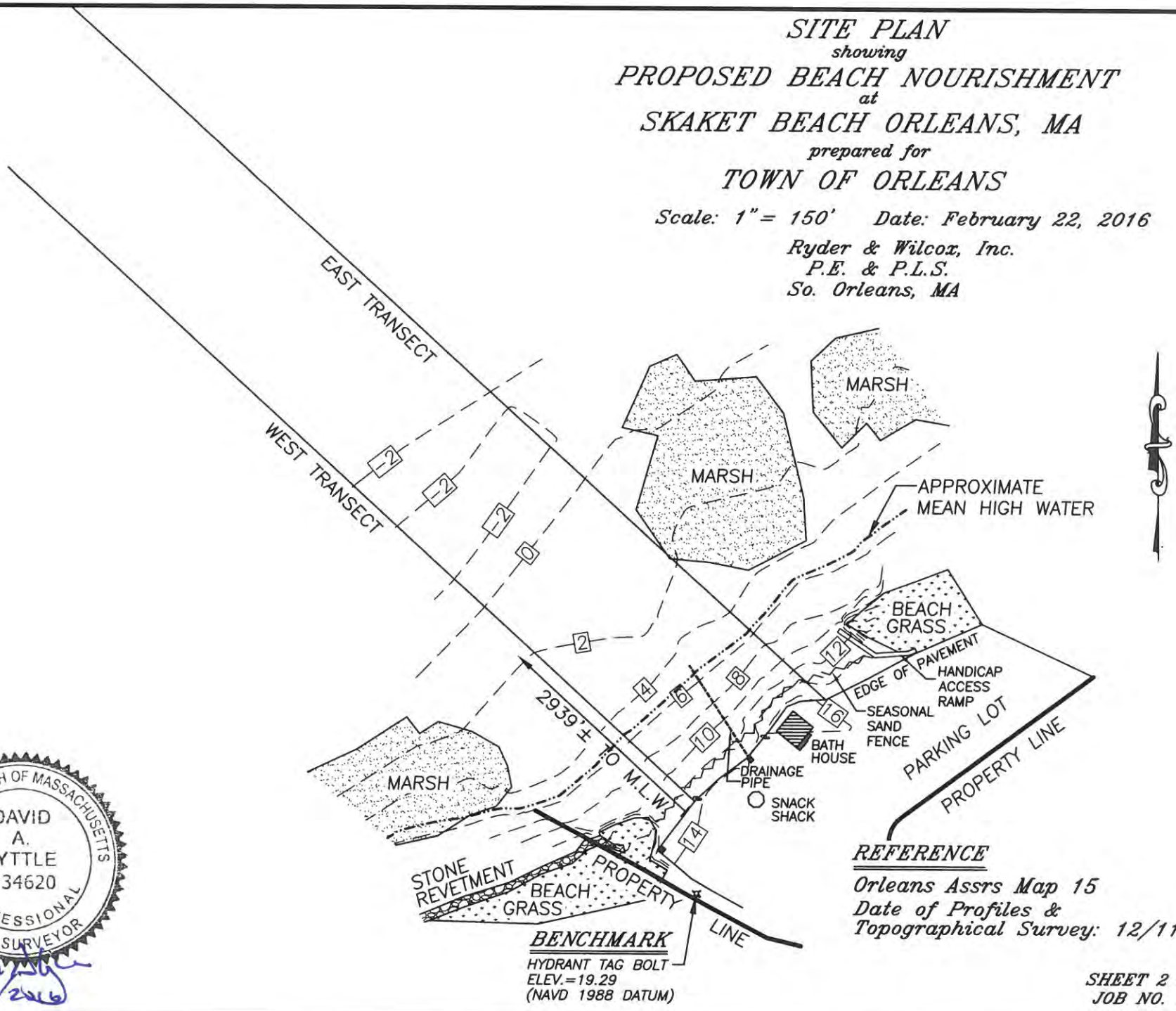
COMMONWEALTH OF MASSACHUSETTS
DAVID A. LYTTLE #34620
PROFESSIONAL LAND SURVEYOR

3/16/2016

SITE PLAN
showing
PROPOSED BEACH NOURISHMENT
at
SKAKET BEACH ORLEANS, MA
prepared for
TOWN OF ORLEANS

Scale: 1" = 150' Date: February 22, 2016

Ryder & Wilcox, Inc.
P.E. & P.L.S.
So. Orleans, MA



COMMONWEALTH OF MASSACHUSETTS
DAVID A. LYTTLE #34620
PROFESSIONAL LAND SURVEYOR

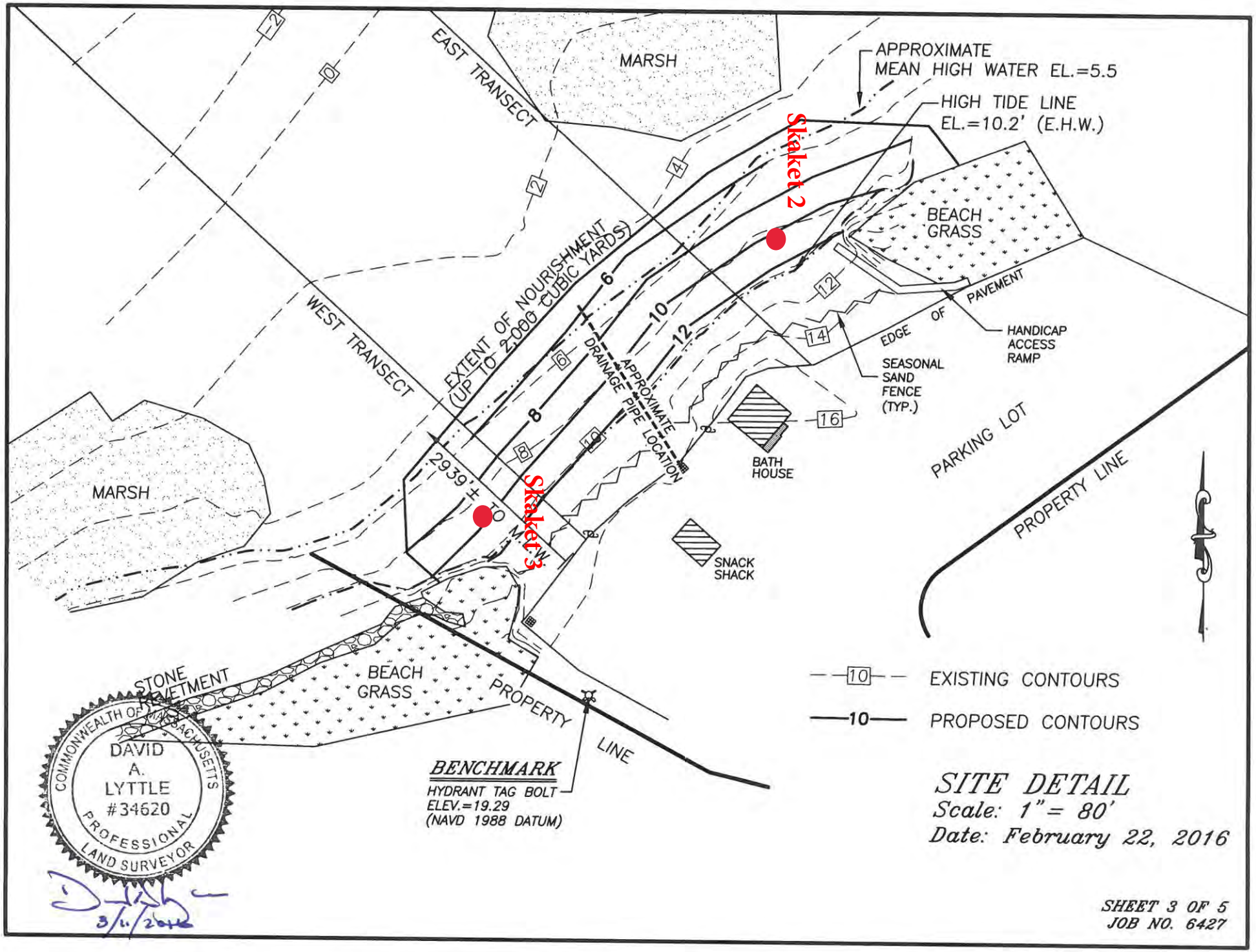
3/4/2016

REFERENCE

Orleans Assrs Map 15
Date of Profiles & Topographical Survey: 12/11/15

BENCHMARK

HYDRANT TAG BOLT
ELEV.=19.29
(NAVD 1988 DATUM)



SITE DETAIL

Scale: 1" = 80'

Date: February 22, 2016

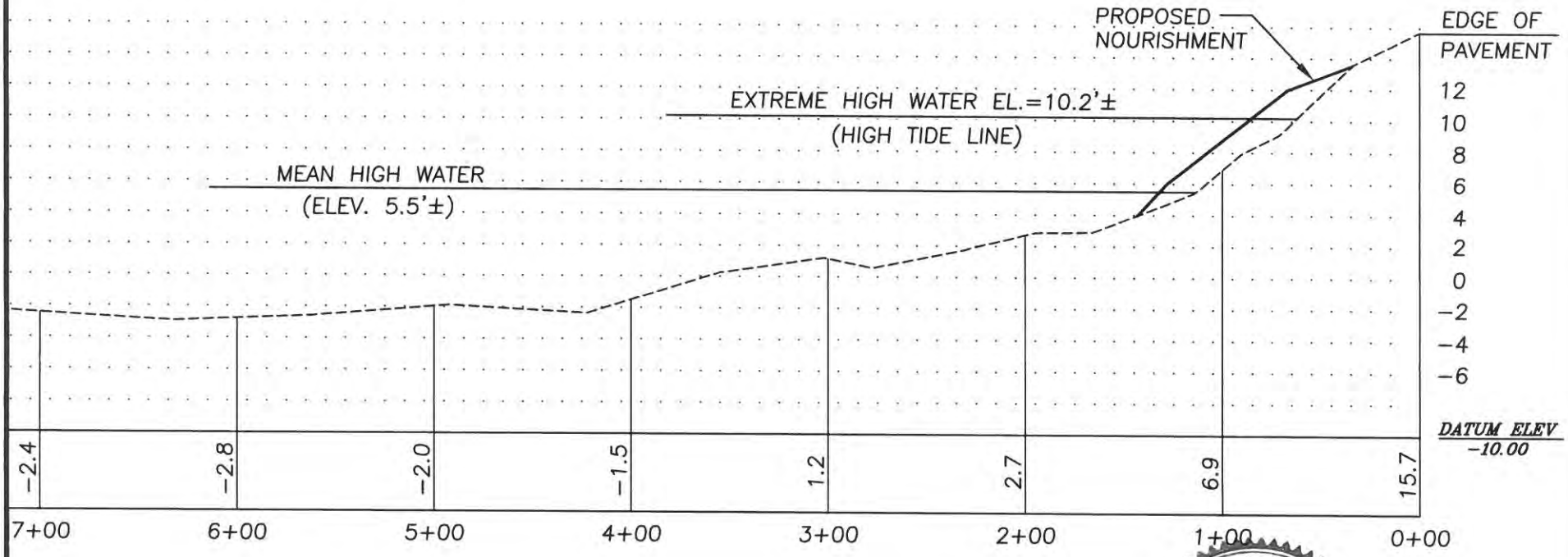
SHEET 3 OF 5
JOB NO. 6427

SITE PLAN
showing
PROPOSED BEACH NOURISHMENT
at
SKAKET BEACH ORLEANS, MA
prepared for
TOWN OF ORLEANS

Scale: 1"= 80' Horizontal 1" = 10' Vertical
Date: February 22, 2016

Ryder & Wilcox, Inc.
P.E. & P.L.S.
So. Orleans, MA

EAST TRANSECT



COMMONWEALTH OF MASSACHUSETTS
DAVID A. LYTTLE #34620
PROFESSIONAL LAND SURVEYOR

3/15/2016

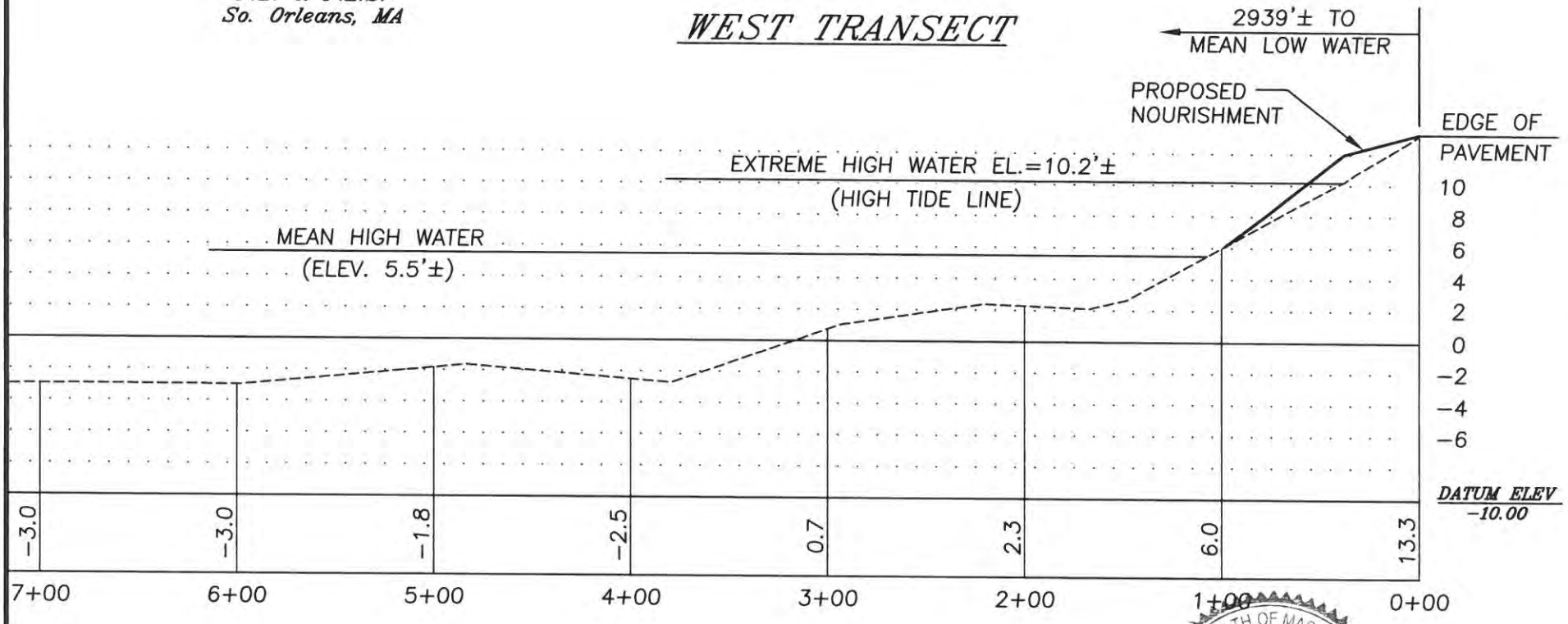
SHEET 4 OF 5
JOB NO. 6427

SITE PLAN
showing
PROPOSED BEACH NOURISHMENT
at
SKAKET BEACH ORLEANS, MA
prepared for
TOWN OF ORLEANS

Scale: 1"= 80' Horizontal 1" = 10' Vertical
Date: February 22, 2016

Ryder & Wilcox, Inc.
P.E. & P.L.S.
So. Orleans, MA

WEST TRANSECT



COMMONWEALTH OF MASSACHUSETTS
DAVID
A.
LYTTLE
#34620
PROFESSIONAL
LAND SURVEYOR

3/10/2016

SHEET 5 OF 5
JOB NO. 6427

Section M

Approved SAP from ACOE – 8/18/2017

CENAE-RDP 18 August 2017

MEMORANDUM FOR: Phillip Nimeskern, Project Manager, CENAE-RDA

SUBJECT: Sampling and Analysis Plan for the Nauset Estuary Channel, Nauset Harbor and Town Cove, Orleans, MA, Application Number NAE-2017-01476.

1. In response to your request of 17 July 2017, Olga Guza, US EPA, and I have developed a sampling plan for the above project. The Town of Orleans is proposing to dredge an area of approximately 2,657,160 sq.ft. in the Nauset Harbor and Town Cove to a depth of -5' MLLW. Approximately 139,930 cu. yds. of material will be removed and disposed of at Nauset Beach and Skaket Beach. The Town of Orleans is proposing to hydraulically and mechanically dredge this material. This area was has not been previously dredged.

2. Please note that the "Regional Implementation Manual for the Evaluation of Dredged Material Proposed for Disposal in New England Waters" (RIM) is now final and took effect on May 6, 2004. The RIM, as well as requirements for electronic submission of data, may be downloaded from the website http://www.nae.usace.army.mil/Missions/Regulatory/DredgedMaterialProgram/RegionalImplementationManual.aspx.

3. There are no known spills or outfalls in the vicinity of the project according to the information provided by the Town of Orleans.

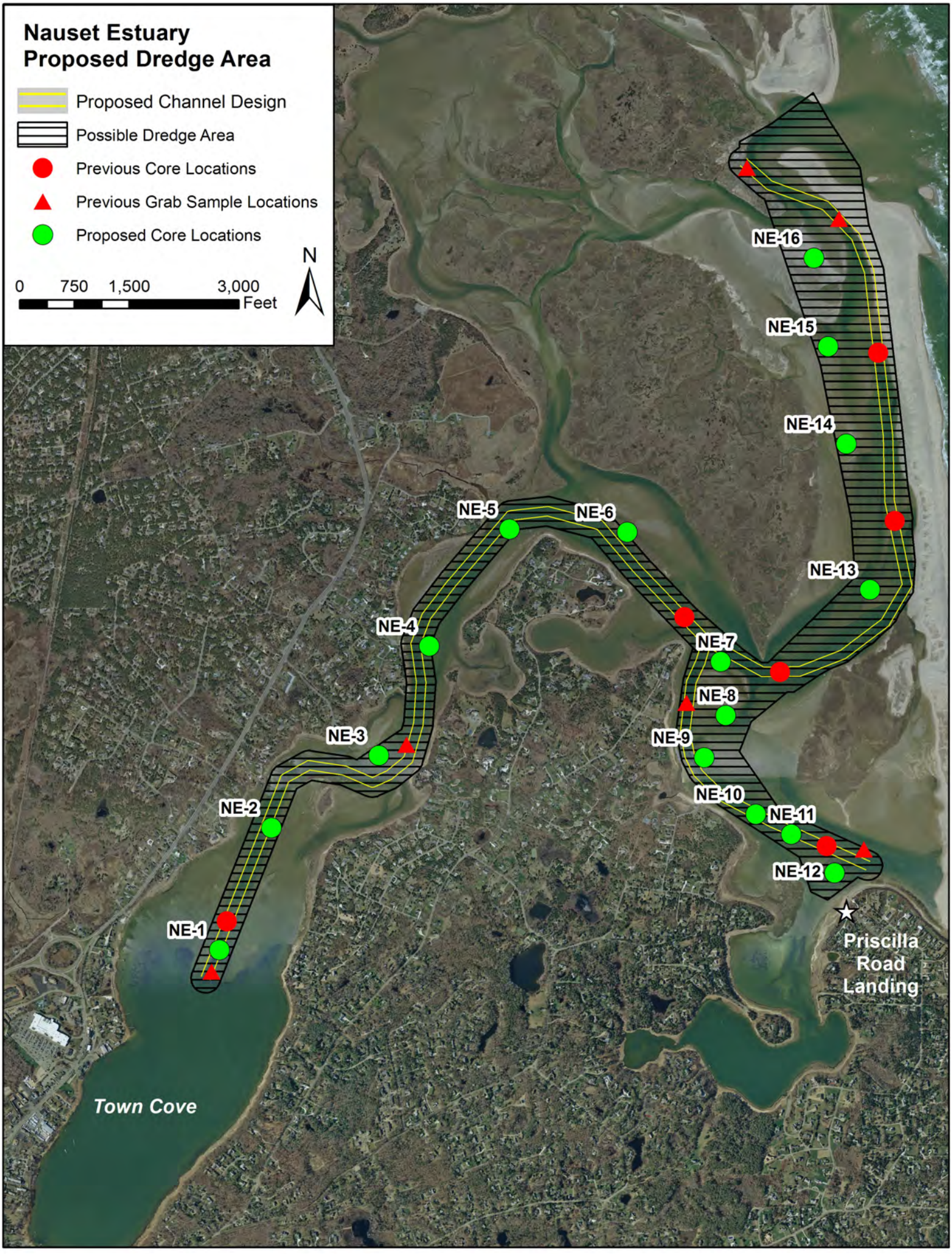
4. 16 cores (NE-1 through NE-16) should be taken from the area to be dredged according to the attached plan. Core samples should be taken to the proposed dredge depth. The cores should be inspected in the field for stratification. If the cores show significant stratification, in the opinion of the sampling crew, subsamples should be made of each layer. All sediments being held for testing should be stored in accordance with the requirements of Table 8-2 in Evaluation of Dredged Material Proposed for Ocean Disposal, Testing Manual, 1991.

5. Each core or core layer should be individually analyzed for sediment grain size and the results reported to me with a copy of the boring log. The grain size analysis should use the Wet Sieve method and use sieve sizes #4, 10, 40, and 200.

6. Copies of this sampling and analysis plan were sent to the USEPA and the MADEP. The USEPA concurred with the sampling and analysis plan as proposed. The MADEP did not respond within the ten business day review period and their concurrence is assumed.

7. If you, the applicant or the testing laboratory have any questions, feel free to reach me at 978-318-8495 or christopher.l.veinotte@usace.army.mil.

CHRISTOPHER L. VEINOTTE
Project Manager
Marine Analysis Section


Nauset Estuary
Proposed Dredge Area
Proposed Channel Design
Possible Dredge Area
Previous Core Locations
Previous Grab Sample Locations
Proposed Core Locations
N
0 750 1,500 3,000
Feet
NE-16
NE-15
NE-14
NE-5
NE-6
NE-13
NE-4
NE-7
NE-8
NE-3
NE-9
NE-10
NE-2
NE-11
NE-12
NE-1
Priscilla
Road
Landing
Town Cove

Section M

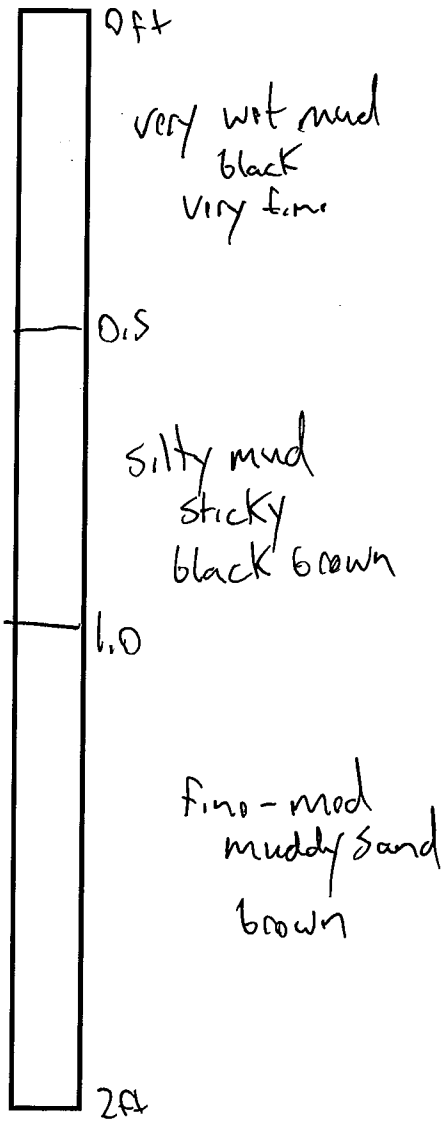
Phase 3 Core Logs & Lab Data from Sampling on 10/3/2017

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S. + Dave W + TGB
COLLECTION DATE: 10/3/17 COLLECTION TIME: 8:00
SEA STATE: Calm WEATHER: Clear
SAMPLE ID: NE-1 LOCATION METHO: DGPS
COORDINATES: W 69° 58.5619' N 41° 47.9366'
WATER DEPTH: 5.3ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 2.7ft RECOVERY LENGTH: 2.2ft
CORE LENGTH: 2.0ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



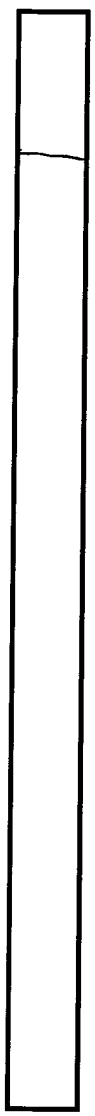
All core → 1 sample

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TGB
COLLECTION DATE: 10/3/17 COLLECTION TIME: 15:52
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-2 LOCATION METHO: DGPS
COORDINATES: N: 41° 48.2101' W: 69° 58.3987'
WATER DEPTH: 5.5 ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 3.7 ft RECOVERY LENGTH: 3.35 ft
CORE LENGTH: 3.05 ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



muddy fine grained sand
Black/brown

fine-med grained sand
some small shell fragments
grey

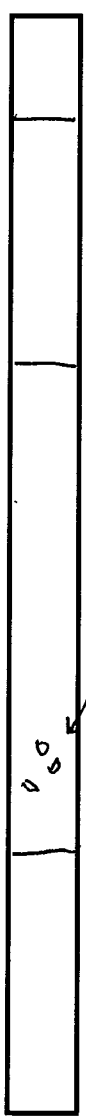
All core -> 1 sample

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TG+B
COLLECTION DATE: 10/3/17 COLLECTION TIME: 15:31
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-3 LOCATION METHO: DGPS
COORDINATES: N: 41° 48.3649' W: 69° 58.0703'
WATER DEPTH: 4.4 ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 4.7ft RECOVERY LENGTH: 4.65ft
CORE LENGTH: 4.65 NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



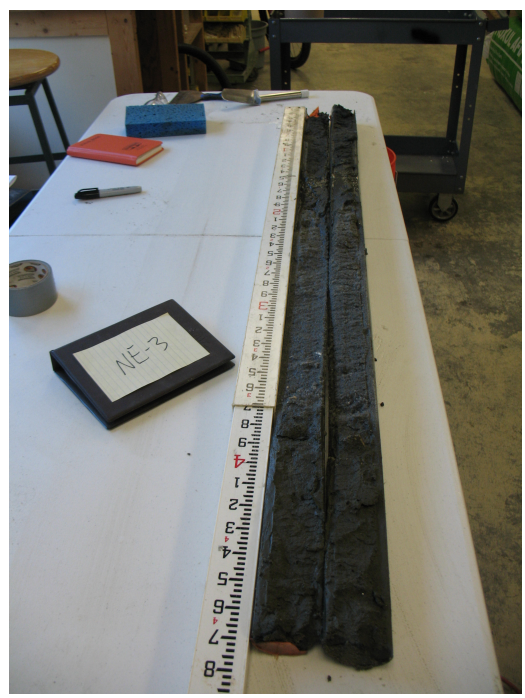
0ft — muddy med. grained sand, black/brown — 5Y 2.5/1

0.4 — fine grained mud, some med sand, sticky + wet, dark grey/brown — 5Y 3/1

1.7 — med-coarse sand, some shell hash, grey/brown — 5Y 4/1

3.7 — silty mud, brown, sticky — 5Y 3/2

4.65ft



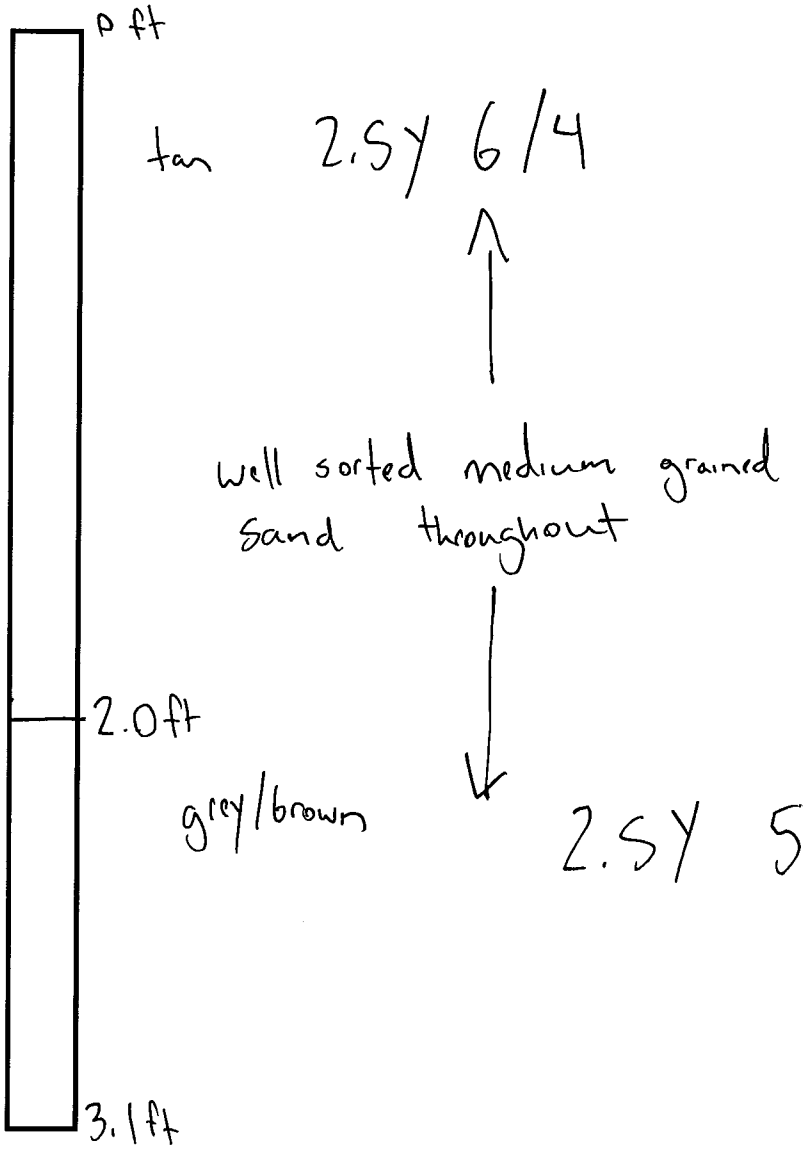
Sample NE3 (0.2-0.3, 0.5-0.6, 0.9-1, 1.3-1.4, 1.6-1.7, 2.1-2.2, 2.5-2.6, 2.9-3, 3.2-3.3, 3.6-3.7)

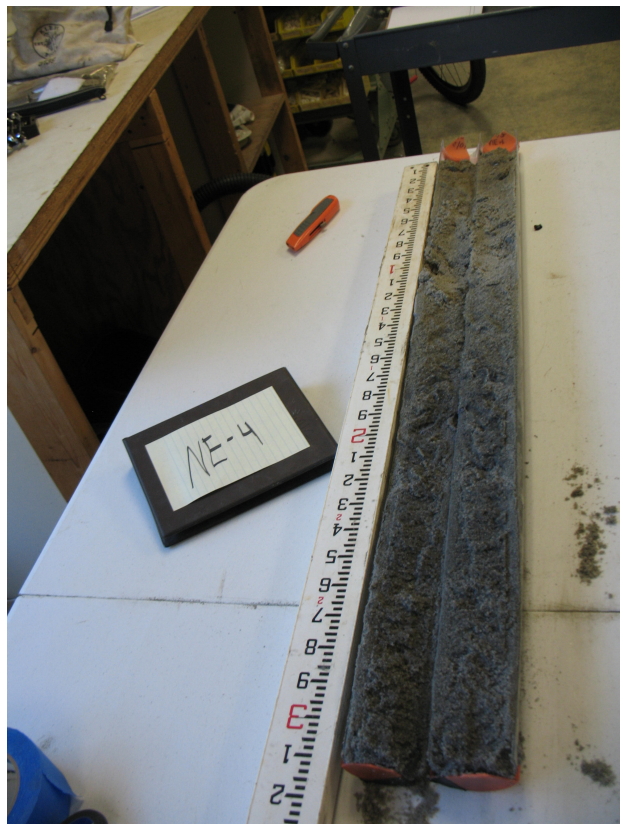
v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TG+B
COLLECTION DATE: 10/3/17 COLLECTION TIME: 15:02
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-4 LOCATION METHO: DGPS
COORDINATES: N: 41° 48.6138' W: 69° 57.9138'
WATER DEPTH: 5.6ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 3.7ft RECOVERY LENGTH: 3.2ft
CORE LENGTH: 3.1ft NO. ATTEMPTS: 2
CORE DESCRIPTION:

TOP





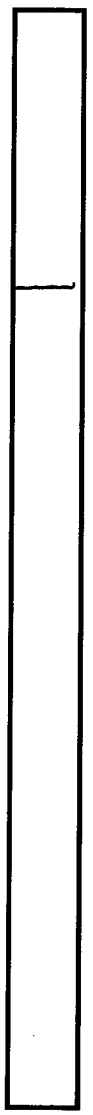
All core → 1 sample

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TGB
COLLECTION DATE: 10/3/17 COLLECTION TIME: 14:33
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-5 LOCATION METHO: DGPS
COORDINATES: N: 41°48.8733' W: 69° 57.611'
WATER DEPTH: 6.35ft TIDE LEVEL:
COLLECTION METHOD: Pushcore
DEPTH OF PENETRATION: 2.75 ft RECOVERY LENGTH: 2.25ft
CORE LENGTH: 2.1ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



tan sand

Homogeneous medium sand well sorted

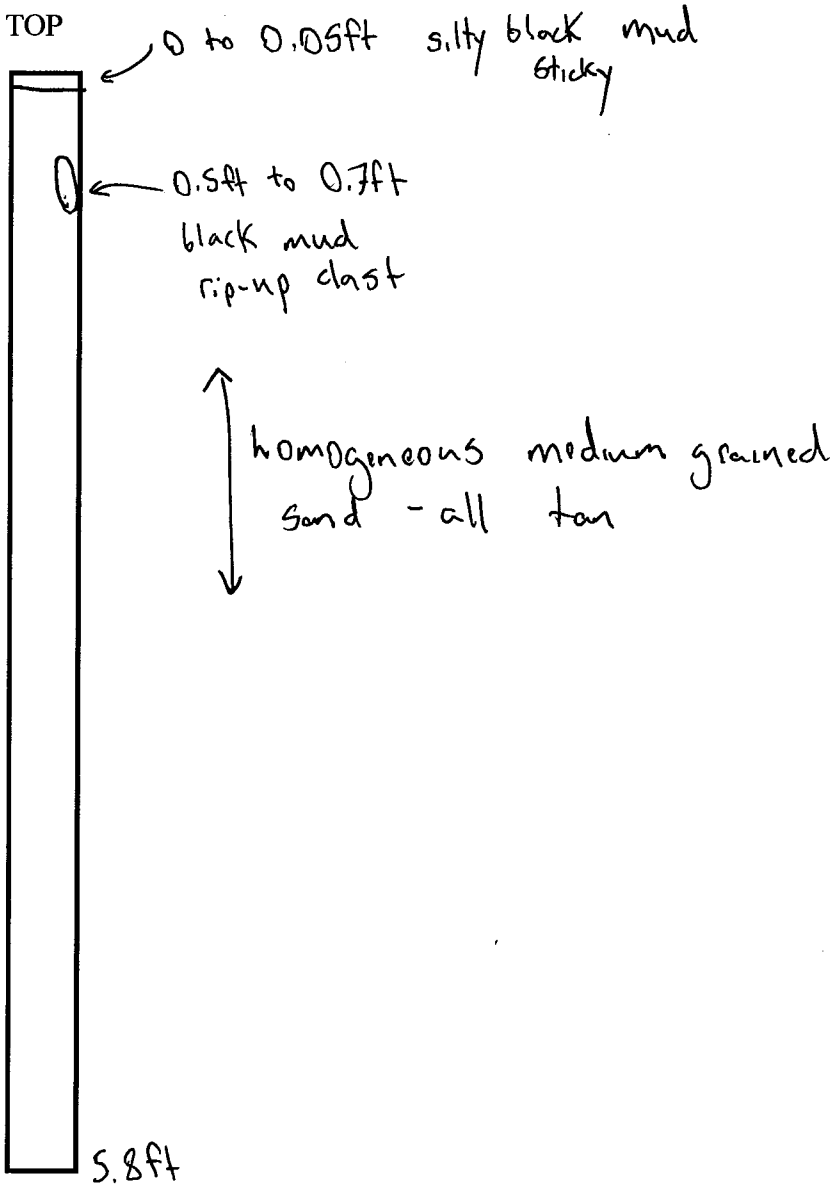
black/brown sand w/ layers of tan sand w/ burrowing

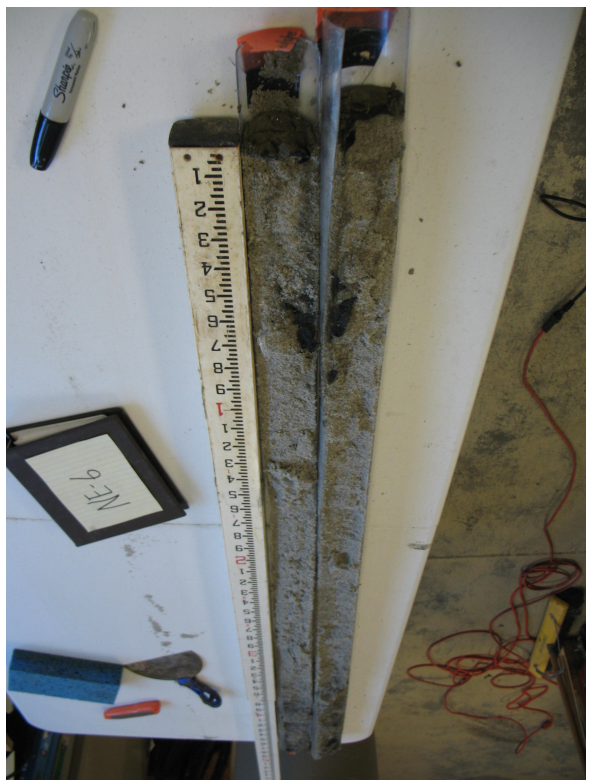
All core → 1 sample

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach Sr Dave W * T&B
COLLECTION DATE: 10/3/17 COLLECTION TIME: 14:08
SEA STATE: Calm WEATHER: clear
SAMPLE ID: NE-6 LOCATION METHO: DGPS
COORDINATES: N: 41° 48.8717' W: 69° 57.3544'
WATER DEPTH: 3.7 ft TIDE LEVEL:
COLLECTION METHOD: Pushcore
DEPTH OF PENETRATION: 6.6ft RECOVERY LENGTH: 5.8ft
CORE LENGTH: 5.8ft NO. ATTEMPTS:
CORE DESCRIPTION:





All core → 1 sample

v.20160720

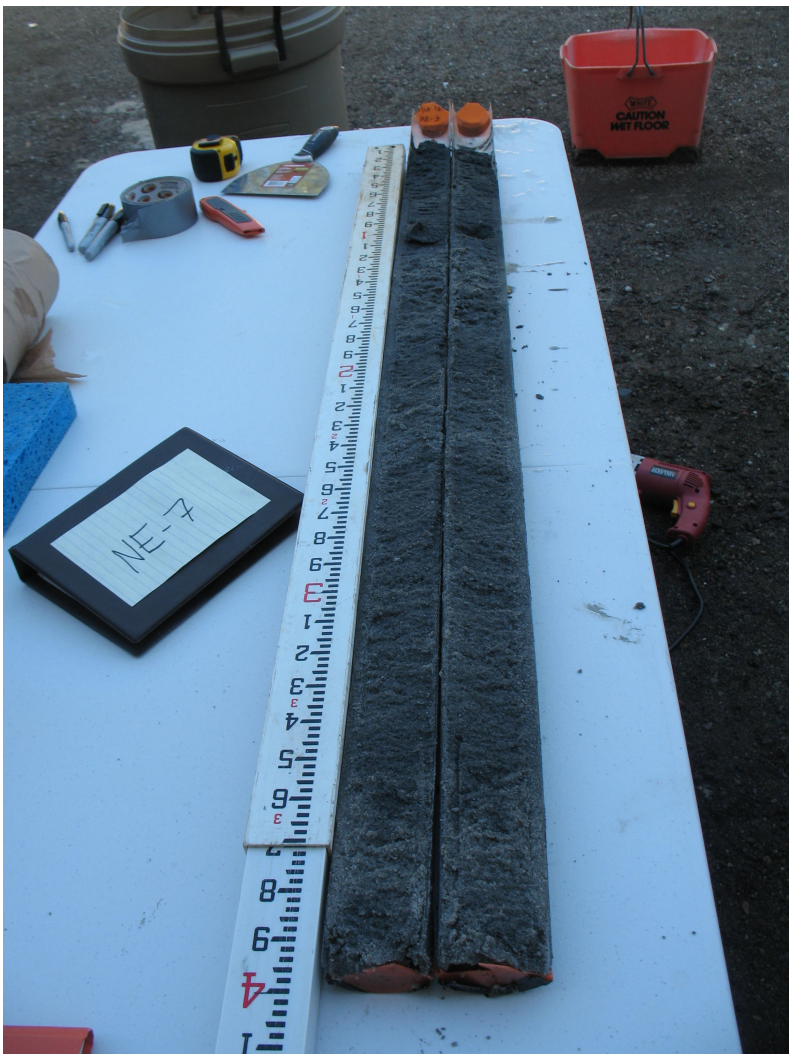
Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nausit
SAMPLING PERSONNEL: Zach S + Dave W + TG+B
COLLECTION DATE: 10/3/17 COLLECTION TIME: 13:42
SEA STATE: calm WEATHER: clear
SAMPLE ID: ~~NE-7~~ NE-7 LOCATION METHO: DGPS
COORDINATES: N: 41° 48.5672' W: 69° 57.0377'
WATER DEPTH: 5.45ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 4.8ft RECOVERY LENGTH: 4.3ft
CORE LENGTH: 3.95ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP

med sand
slightly darker

med-coarse sand
grey/brown
~~WAS~~ fairly well sorted



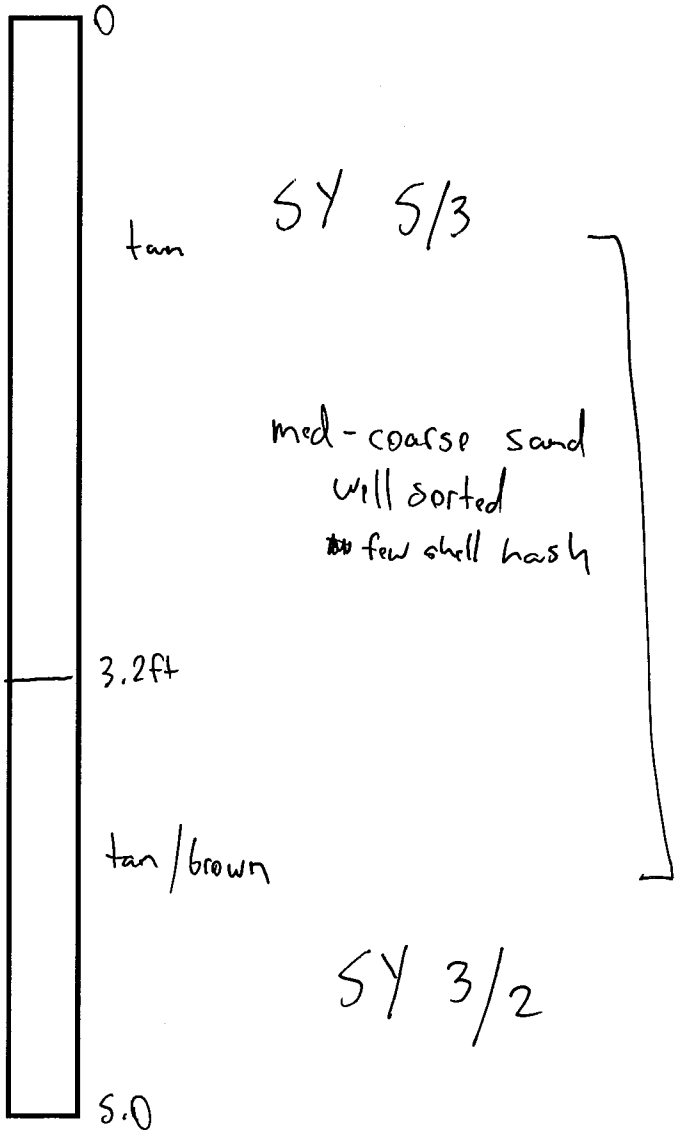
All core → 1 sample

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S. + Dave W + TAB
COLLECTION DATE: 10/3/17 COLLECTION TIME: 13:20
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-8 LOCATION METHO: RTK (StatePlane ft) MA
COORDINATES: N: 2758699.233 E: 1078976.749
WATER DEPTH: 4.2ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 5.65ft RECOVERY LENGTH: 5.2ft
CORE LENGTH: 5.0ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



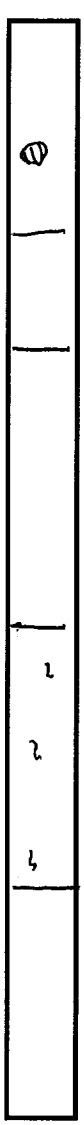
All core → 1 sample

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TG+B
COLLECTION DATE: 10/3/17 COLLECTION TIME: 12:52
SEA STATE: Calm WEATHER: clear
SAMPLE ID: NE-9 LOCATION METHO: DGPS
COORDINATES: N: 41° 48.3639' W: 69° 57.0927
WATER DEPTH: 2.95ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 5.5ft RECOVERY LENGTH: 5.4ft
CORE LENGTH: 5.4ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



0ft
med sand
some shell hash
dark grey/brown

0.9ft
med sand
light grey/brown

1.3ft
med sand
dark grey/brown

2.6ft
silt - fine/med sand
some rootlets
dark brown

4.3ft
med-coarse sand
well sorted
grey

5.4ft

Gley1 4/10Y

NE9A (0.3-0.4, 0.6-0.7, 1.2-1.3, 1.6-1.7, 2.1-2.2, 2.5-2.6, 3.1-3.2, 3.4-3.5, 3.7-3.8, 4.1-4.2, 4.6-4.7, 4.9-5, 5.3-5.4)
NE9B (0-0.1, 0.4-0.5, 0.8-0.9, 1.2-1.3, 1.6-1.7, 2-2.1, 2.3-2.4)

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S+ Dave V+ TG+B
COLLECTION DATE: 10/3/17 COLLECTION TIME: 12:31
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-10 LOCATION METHO: DGPS
COORDINATES: N: 41° 48. 2223' W: 69.° 56. 9410'
WATER DEPTH: 10.9ft TIDE LEVEL: '
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 2.7ft RECOVERY LENGTH: 2.4ft
CORE LENGTH: 2.3ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP

very wet mud
sticky
brown/black
some silt, almost no sand

silty mud
black/grey
rootlets
some med grained sand
(<20%)

med-coarse sand
muddy @ top and bottom
Gley2 3/10B

black/grey
sticky mud
shell fragments
Gley2 2.5/10B

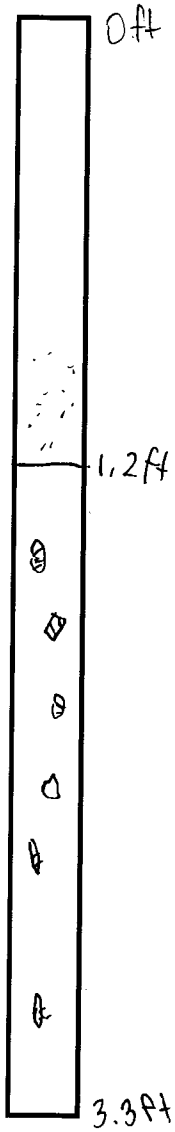
10B (0-0.1, 0.5-0.6, 0.9-1, 1.2-1.3, 1.5-1.6, 1.8-1.9)
10A (0-0.1, 0.5-0.6, 0.8-0.9, 1.1-1.2, 1.4-1.5, 1.8-1.9, 2.1-2.2)

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W - TGtB
COLLECTION DATE: 10/3/17 COLLECTION TIME: 12:07
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-11 LOCATION METHO: DGPS
COORDINATES: N: 41° 48.1747' W: 69° 56.8325'
WATER DEPTH: 7.3ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 3.7 ft RECOVERY LENGTH: 3.7ft
CORE LENGTH: 3.3 ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



silty mud
grey/brown
some med-coarse sand towards bottom (<20%)

grey/brown
coarse sand
many shell fragments

SY

NE11 (0-0.1, 0.4-0.5, 0.8-0.9, 1.2-1.3, 1.5-1.6, 1.9-2, 2.3-2.4, 2.6-2.7, 2.9-3, 3.2-3.3)

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TGB
COLLECTION DATE: 10/3/17 COLLECTION TIME: 11:32
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-12 LOCATION METHO: DGPS
COORDINATES: N: 41° 48.0836' W: 69° 56.7032'
WATER DEPTH: 5.4 ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 4.7ft RECOVERY LENGTH: ~~4.65~~ 3.7ft
CORE LENGTH: 3.6 ft NO. ATTEMPTS: 2
CORE DESCRIPTION:

TOP

0ft

Silty med. grained sand
black/brown

0.7ft

med-coarse sand
Well sorted
grey/brown

3.6 ft

From 3.7-4.65 washed out of core
—All sand—

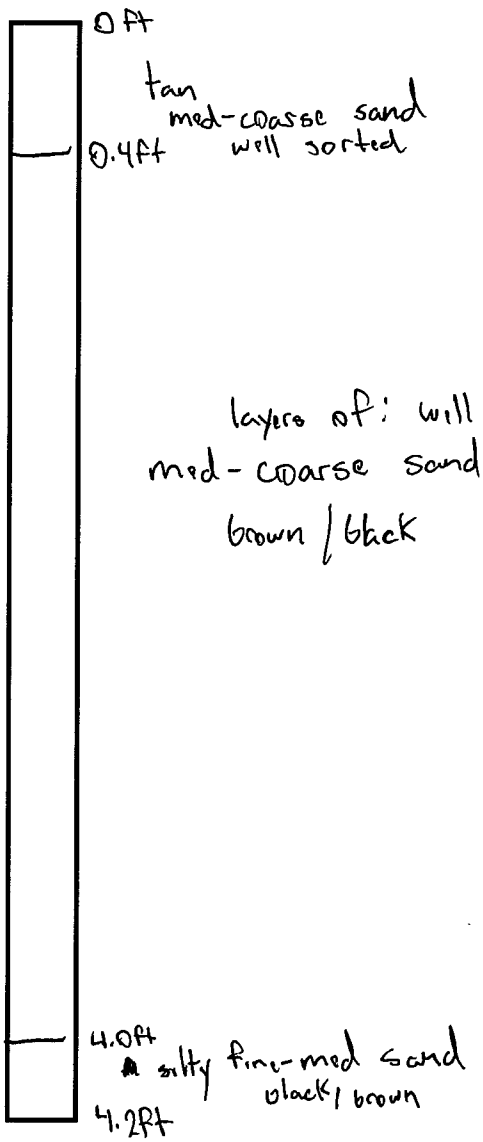
All core → 1 sample

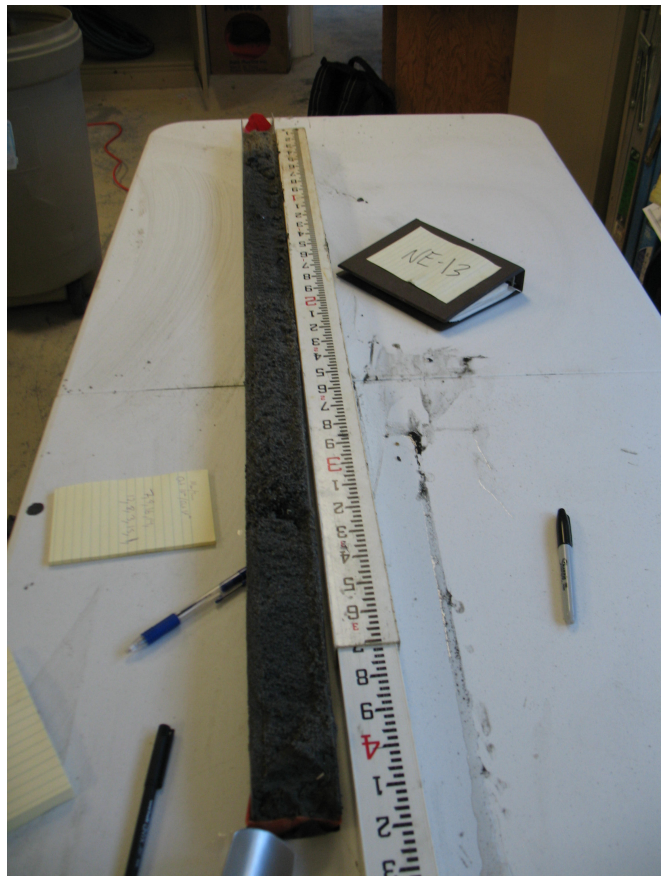
v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TGrB
COLLECTION DATE: 10/3/17 COLLECTION TIME: 11:00
SEA STATE: Calm WEATHER: clear
SAMPLE ID: NE-13 LOCATION METHO: DGPS
COORDINATES: N: 41° 48.7207' W: 69° 56.5299'
WATER DEPTH: 4.2ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: ~~4.2ft~~ 4.4ft RECOVERY LENGTH: 4.2ft
CORE LENGTH: 4.2ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP





5Y 2.5/1

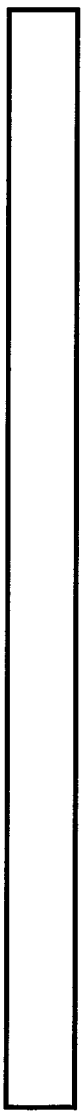
All core → 1 sample

v.20160720

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TG+B
COLLECTION DATE: 10/3/17 COLLECTION TIME: 10:40
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-14 LOCATION METHO: RTK (MA StatePlane ft)
COORDINATES: N: 2762426.163 E W: 1080346.749
WATER DEPTH: 1.6ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 6.5ft RECOVERY LENGTH: 5.95ft
CORE LENGTH: 5.8ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



medium - coarse sand
Color → layers of brown and tan throughout

+2 inches of sand washed out

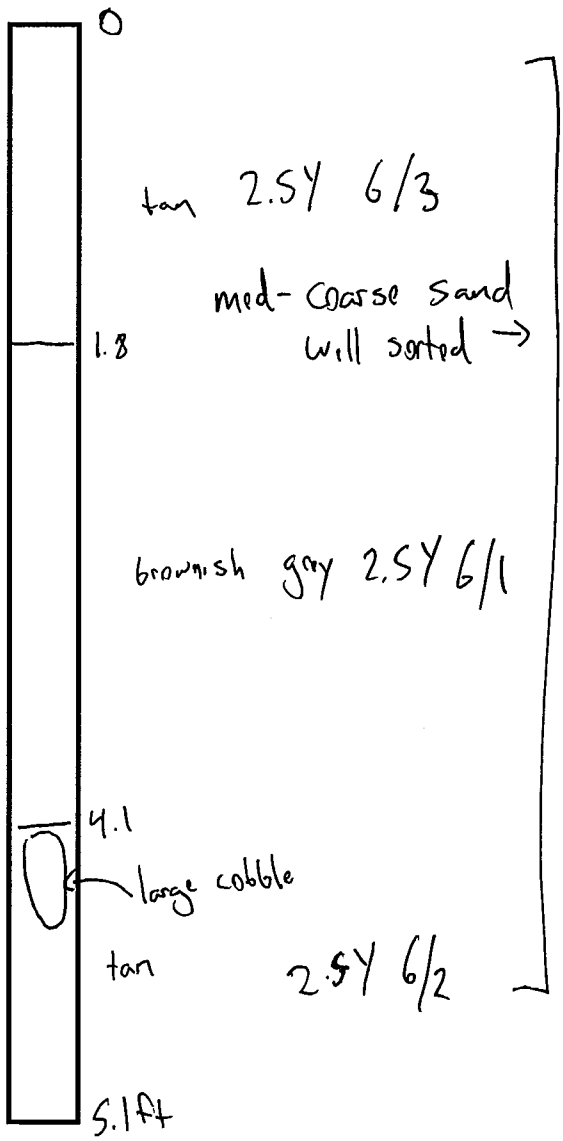
All core → 1 sample

v.20160720

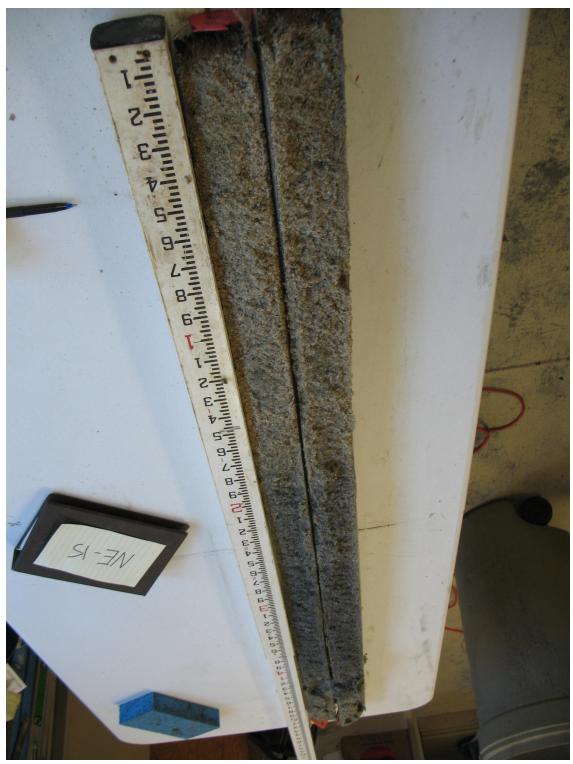
Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TG-B
COLLECTION DATE: 10/3/17 COLLECTION TIME: 9:38
SEA STATE: calm WEATHER: clear
SAMPLE ID: NE-15 LOCATION METHO: DGPS
COORDINATES: N: 41° 49.2716' W: 69° 56.7021'
WATER DEPTH: 4.1ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: ~~6.0 ft~~ RECOVERY LENGTH: ~~5.1 ft~~
CORE LENGTH: 5.1ft NO. ATTEMPTS: 2
CORE DESCRIPTION:

TOP



Homogeneous throughout



bottom of barrel cracked
~1.0 ft of sand washed out

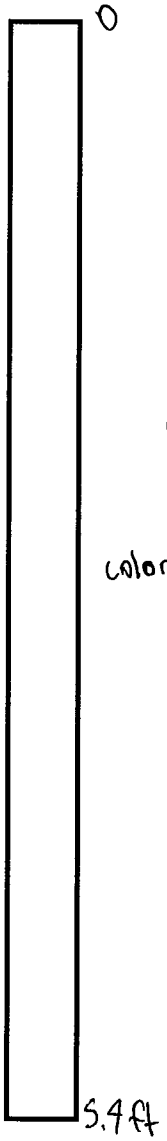
All core → 1 sample

v.20160720

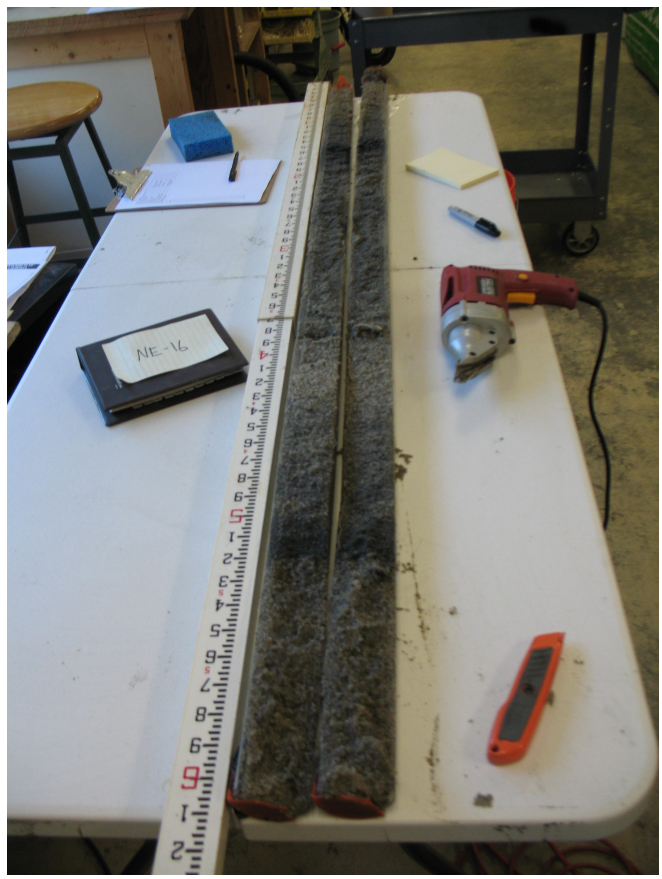
Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT NUMBER: 2015-0121
PROJECT DESCRIPTION/LOCATION: Nauset
SAMPLING PERSONNEL: Zach S + Dave W + TG/B
COLLECTION DATE: 10/3/17 COLLECTION TIME: 9:40
SEA STATE: Calm WEATHER: clear
SAMPLE ID: NE-16 LOCATION METHO: RTK (MA StatePlane ft)
COORDINATES: N: 2764322.041 E/W: 1080076.81
WATER DEPTH: 3.1ft TIDE LEVEL:
COLLECTION METHOD: Push Core
DEPTH OF PENETRATION: 7.0ft RECOVERY LENGTH: 6.0ft
CORE LENGTH: ~~6.0ft~~ 5.9ft NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



medium - coarse Sand
Very few shell fragments
color → layers of tan/brown
some darker layers



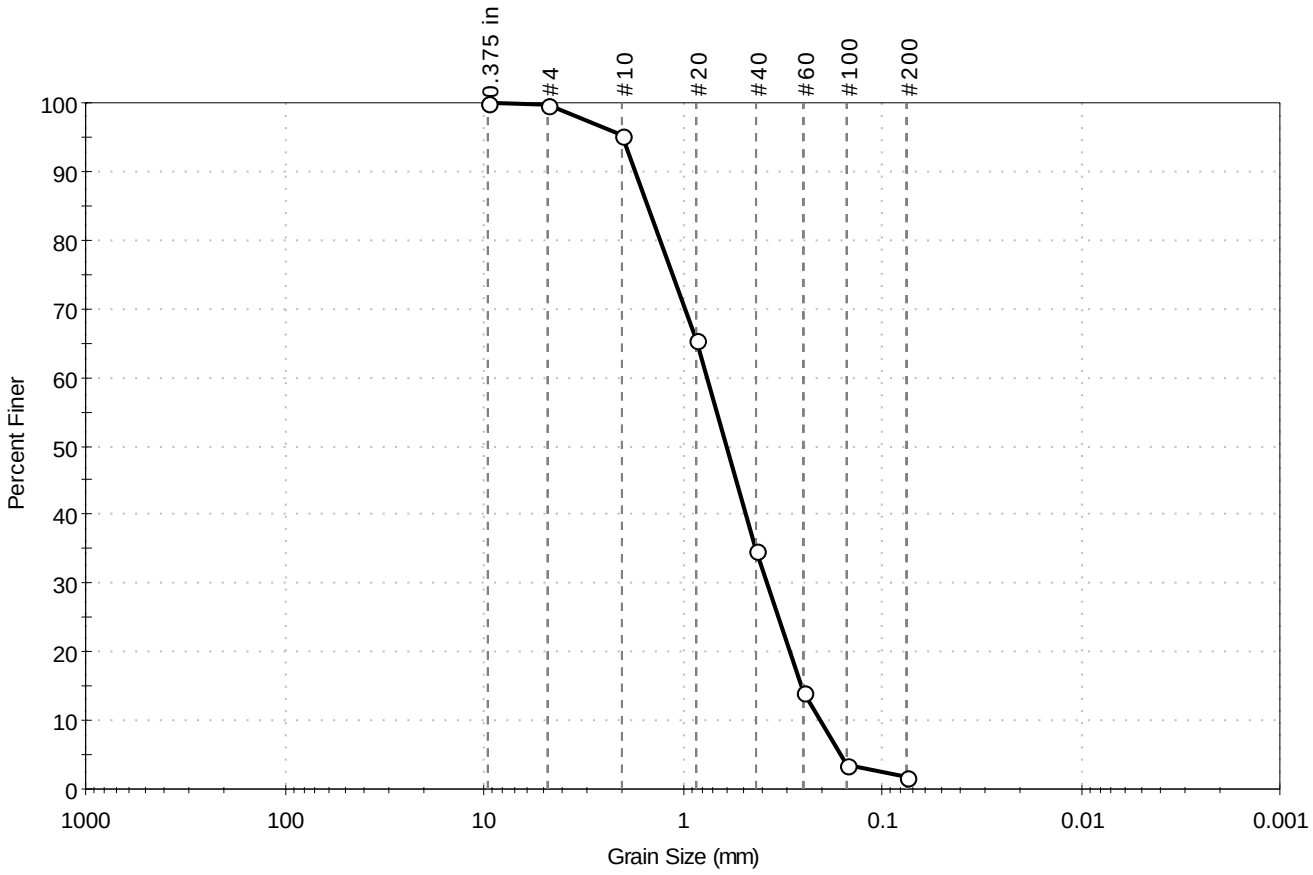
+ ~3 inches of sand washout

All Core → 1 Sample

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	HR-CNR	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428170		

Test Comment: ---
Visual Description: Moist, dark brown sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.2	98.0	1.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	95		
#20	0.85	65		
#40	0.42	35		
#60	0.25	14		
#100	0.15	3		
#200	0.075	1.8		

Coefficients

D_{85} = 1.4848 mm
D_{30} = 0.3746 mm
D_{60} = 0.7504 mm
D_{15} = 0.2552 mm
D_{50} = 0.5982 mm
D_{10} = 0.2047 mm
C_u = 3.666
C_c = 0.914

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

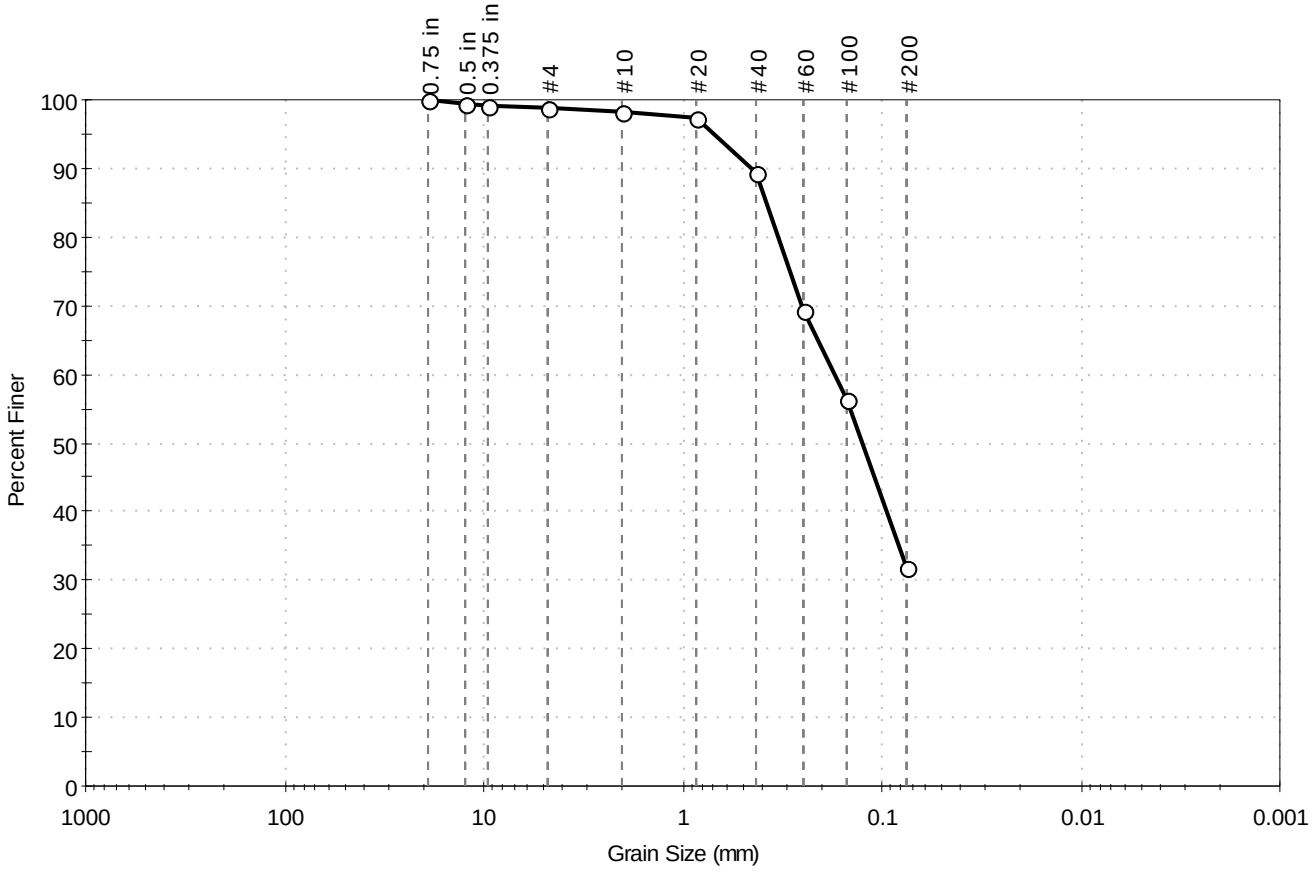
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-1	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428154		
Test Comment:	---				
Visual Description:	Moist, dark gray silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	1.3	66.7	32.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	100		
0.375 in	9.50	99		
#4	4.75	99		
#10	2.00	98		
#20	0.85	97		
#40	0.42	89		
#60	0.25	69		
#100	0.15	56		
#200	0.075	32		

Coefficients

D_{85} = 0.3777 mm D_{30} = N/A

D_{60} = 0.1730 mm D_{15} = N/A

D_{50} = 0.1251 mm D_{10} = N/A

C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

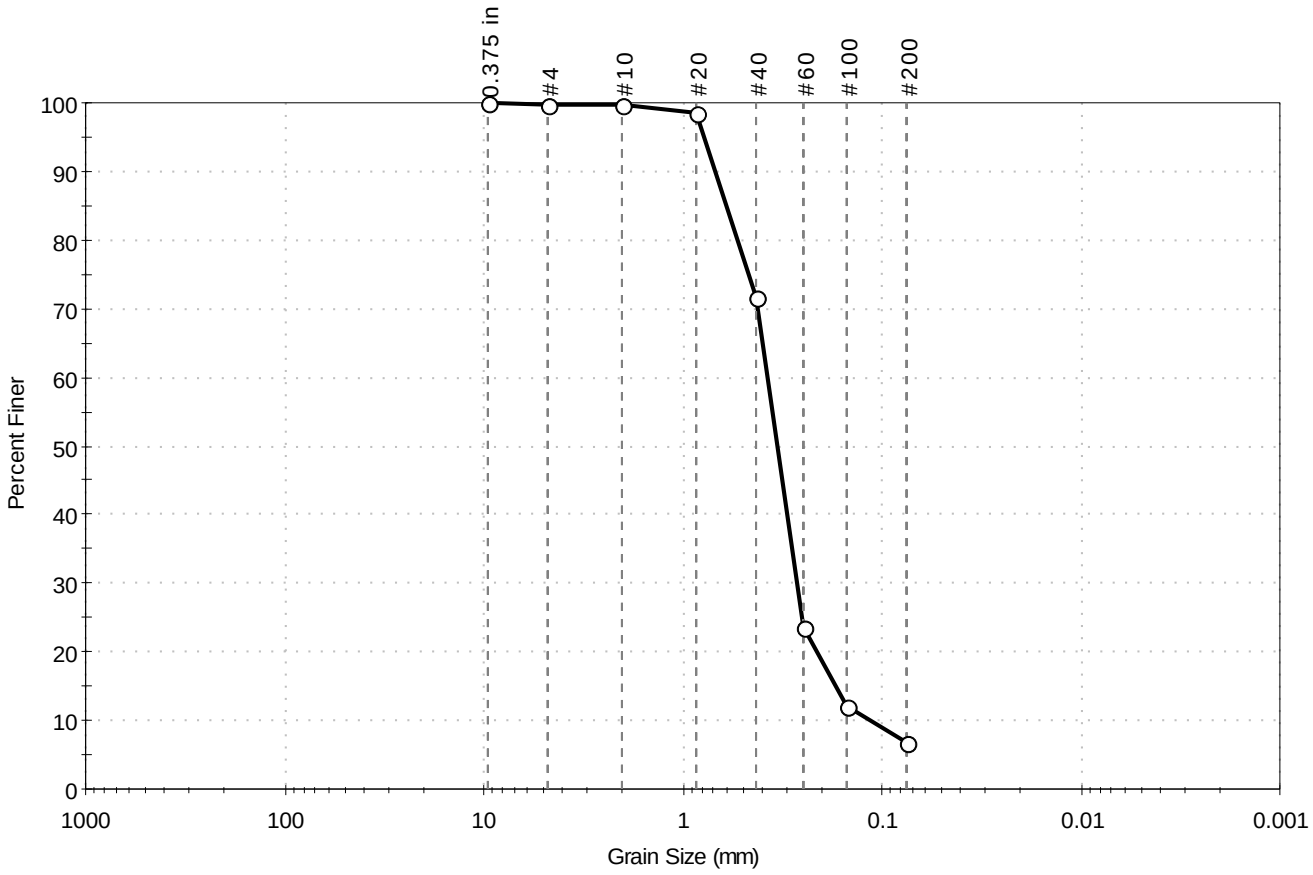
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-2	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428155		
Test Comment:	---				
Visual Description:	Moist, gray sand with silt				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	0.2	93.1	6.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	72		
#60	0.25	24		
#100	0.15	12		
#200	0.075	6.7		

Coefficients

D_{85} = 0.6002 mm
D_{30} = 0.2681 mm
D_{60} = 0.3734 mm
D_{15} = 0.1708 mm
D_{50} = 0.3343 mm
D_{10} = 0.1151 mm
C_u = 3.244
C_c = 1.672

Classification

ASTM N/A

AASHTO Fine Sand (A-3 (1))

Sample / Test Description

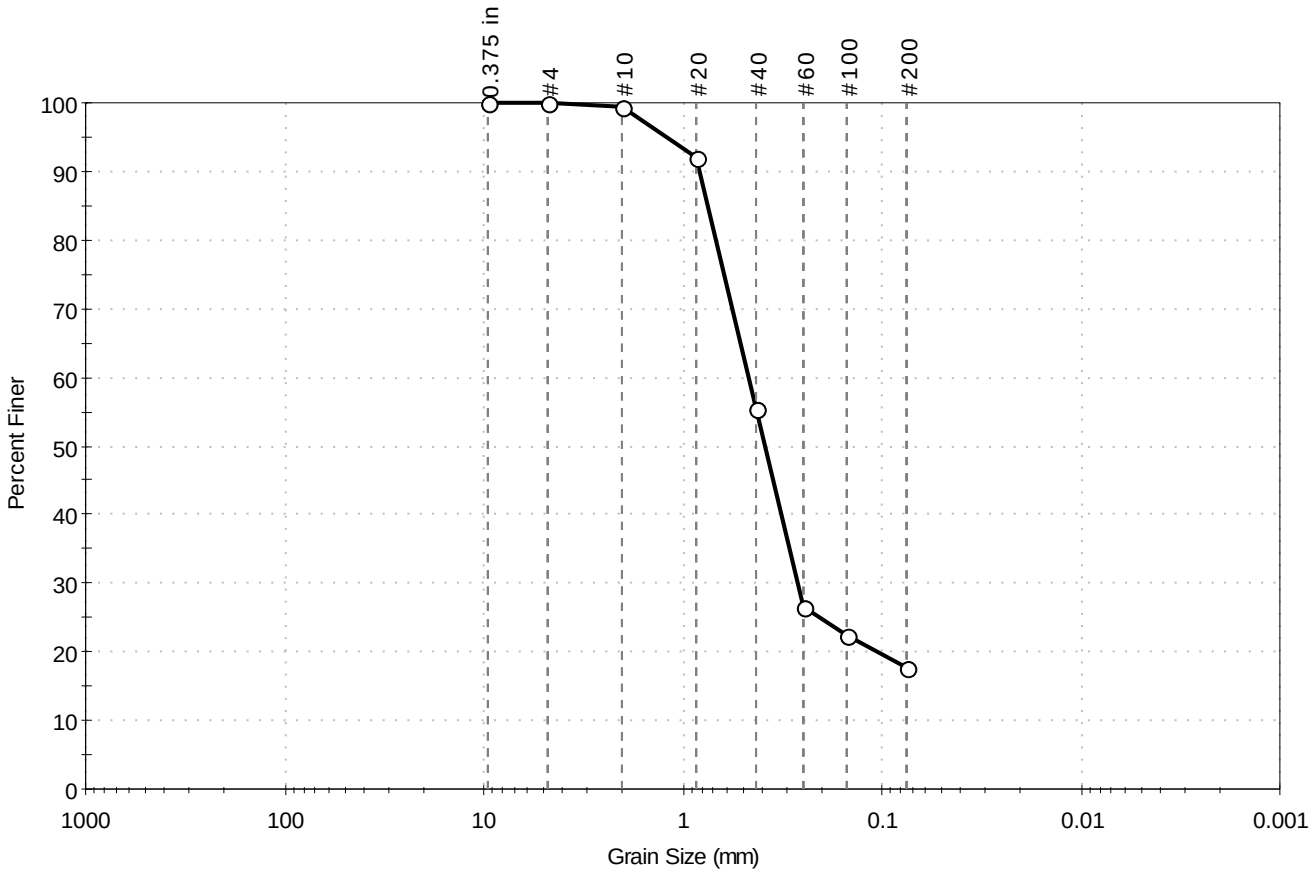
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-3	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428156		

Test Comment: ---
Visual Description: Moist, dark gray silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.1	82.1	17.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	99		
#20	0.85	92		
#40	0.42	55		
#60	0.25	26		
#100	0.15	22		
#200	0.075	18		

Coefficients

D_{85} = 0.7430 mm
D_{30} = 0.2667 mm
D_{60} = 0.4630 mm
D_{15} = N/A
D_{50} = 0.3845 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

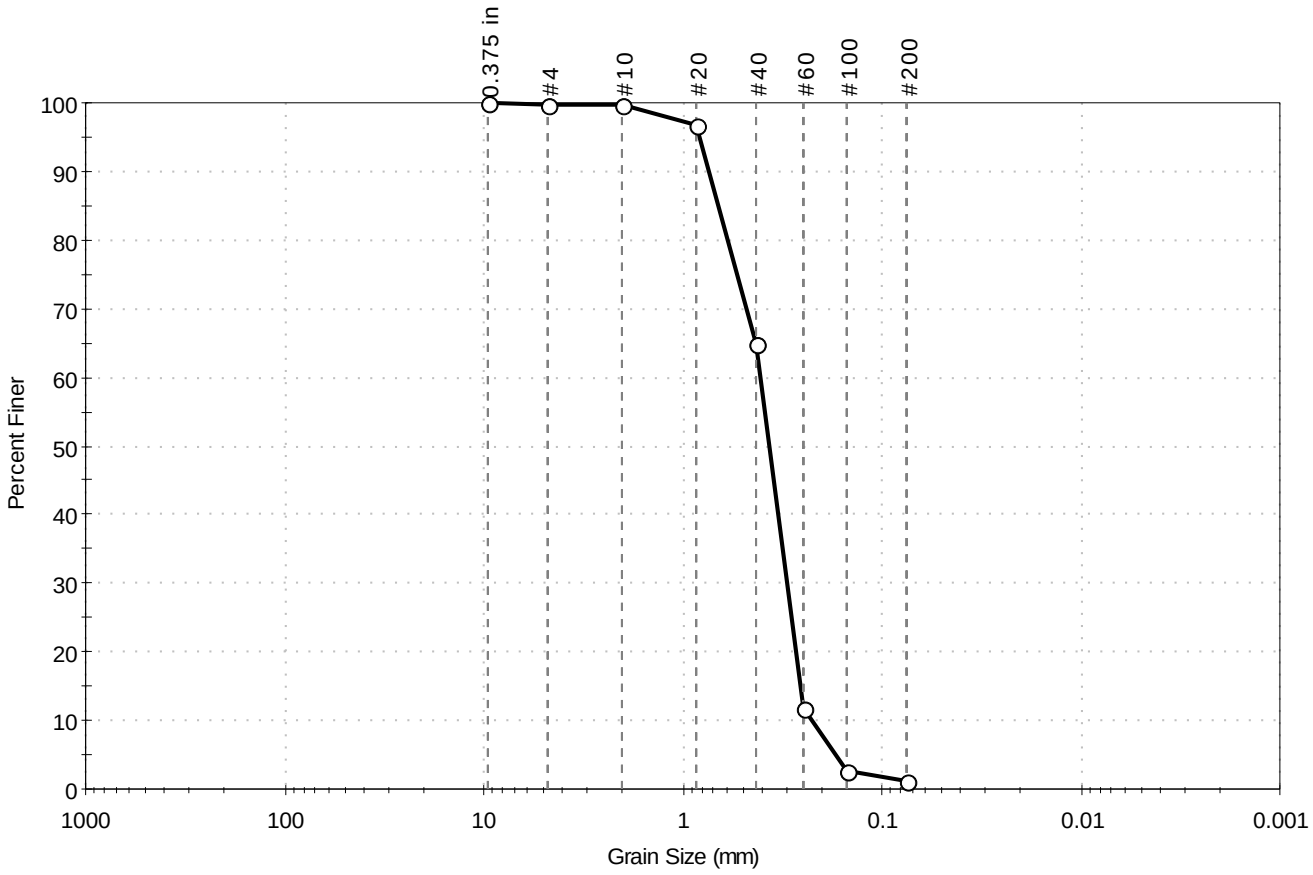
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-4	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428157		
Test Comment:	---				
Visual Description:	Moist, light gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.2	98.5	1.3

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	97		
#40	0.42	65		
#60	0.25	12		
#100	0.15	3		
#200	0.075	1.3		

Coefficients

D_{85} = 0.6569 mm	D_{30} = 0.3000 mm
D_{60} = 0.4044 mm	D_{15} = 0.2584 mm
D_{50} = 0.3661 mm	D_{10} = 0.2274 mm
C_u = 1.778	C_c = 0.979

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

Sample/Test Description

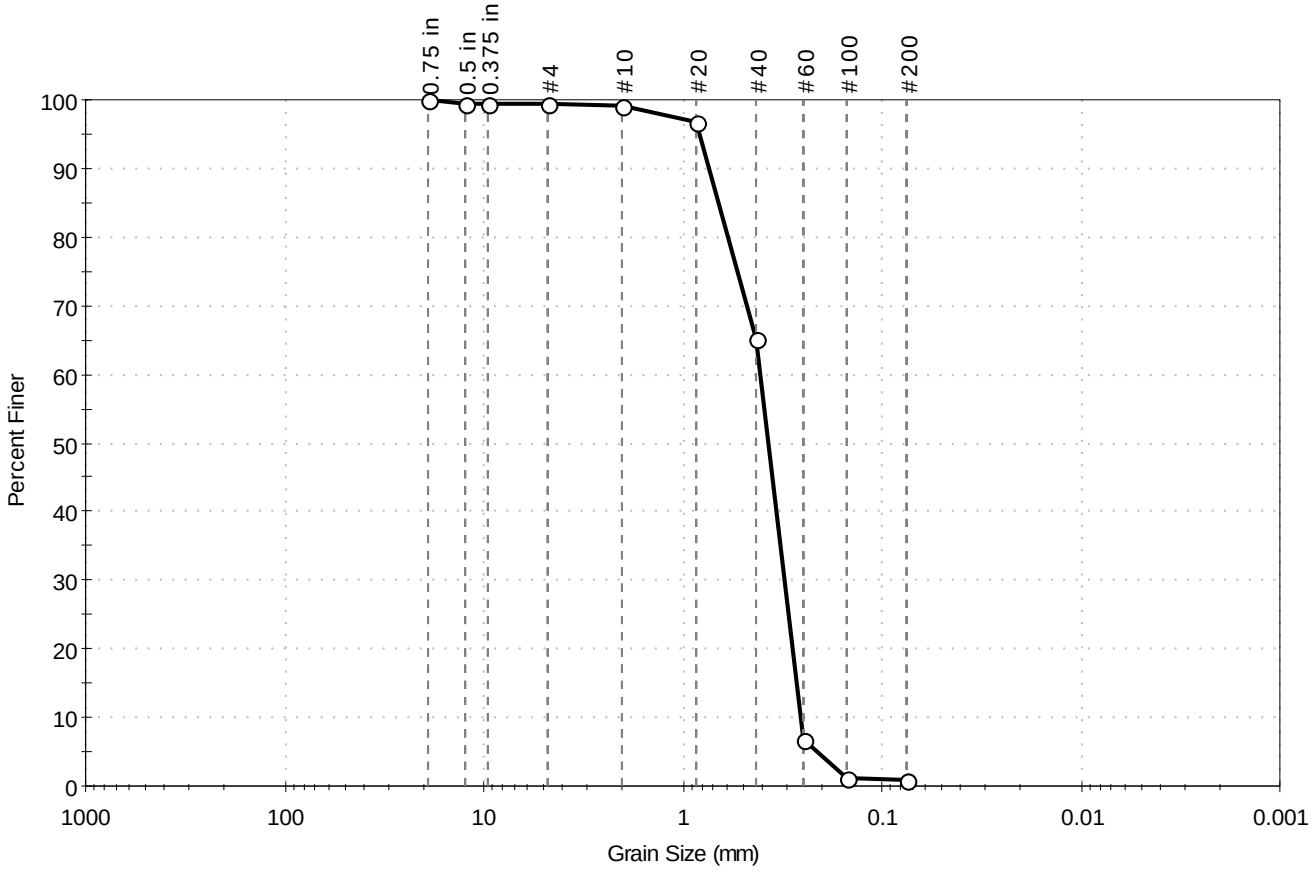
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-5	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428158		

Test Comment: ---
Visual Description: Moist, gray sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.5	98.6	0.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	100		
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	99		
#20	0.85	97		
#40	0.42	65		
#60	0.25	7		
#100	0.15	1		
#200	0.075	0.9		

Coefficients

D_{85} = 0.6564 mm
D_{30} = 0.3085 mm
D_{60} = 0.4050 mm
D_{15} = 0.2693 mm
D_{50} = 0.3699 mm
D_{10} = 0.2573 mm
C_u = 1.574
C_c = 0.913

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

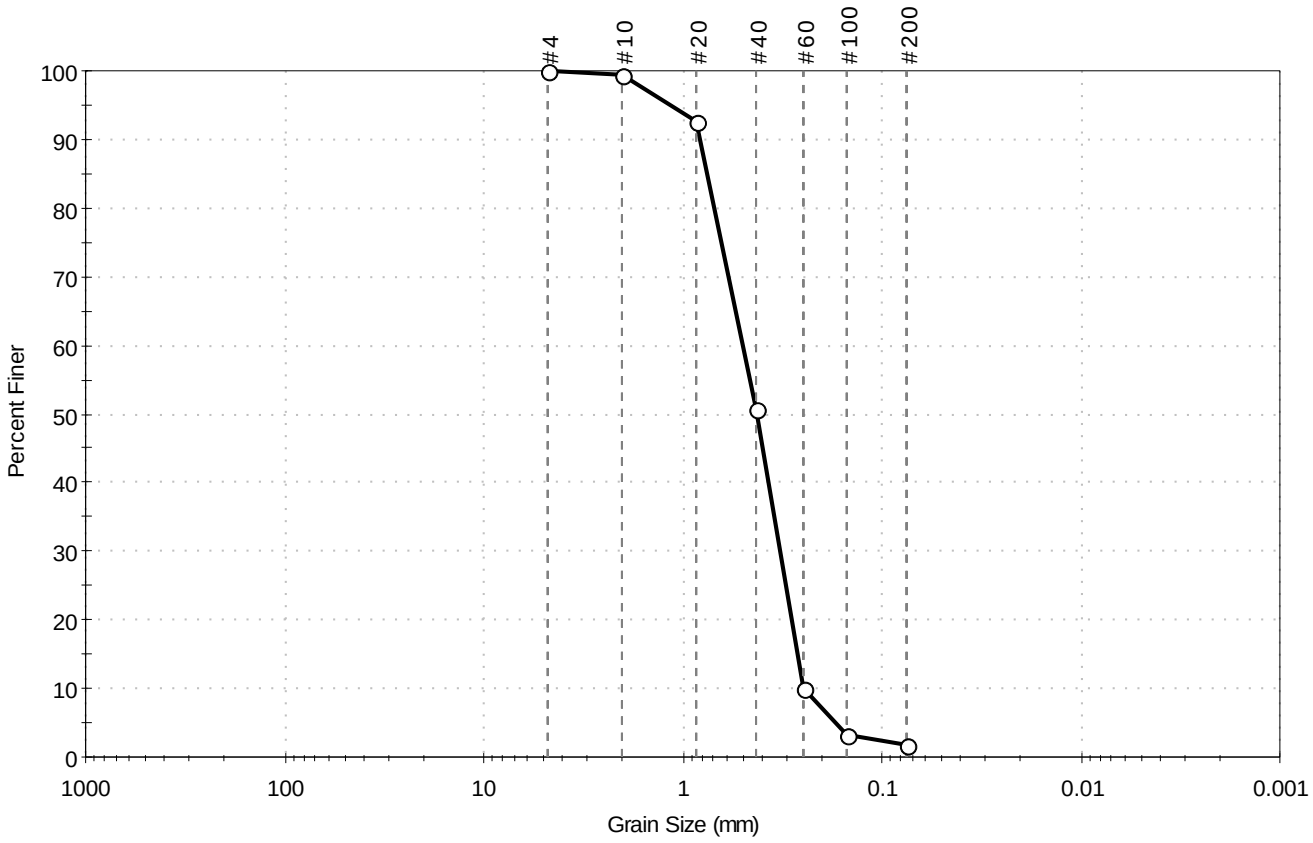
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-6	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428159		
Test Comment:	---				
Visual Description:	Moist, light gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	98.1	1.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
#4	4.75	100		
#10	2.00	99		
#20	0.85	93		
#40	0.42	51		
#60	0.25	10		
#100	0.15	3		
#200	0.075	1.9		

Coefficients

D_{85} = 0.7503 mm	D_{30} = 0.3242 mm
D_{60} = 0.4960 mm	D_{15} = 0.2664 mm
D_{50} = 0.4213 mm	D_{10} = 0.2473 mm
C_u = 2.006	C_c = 0.857

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

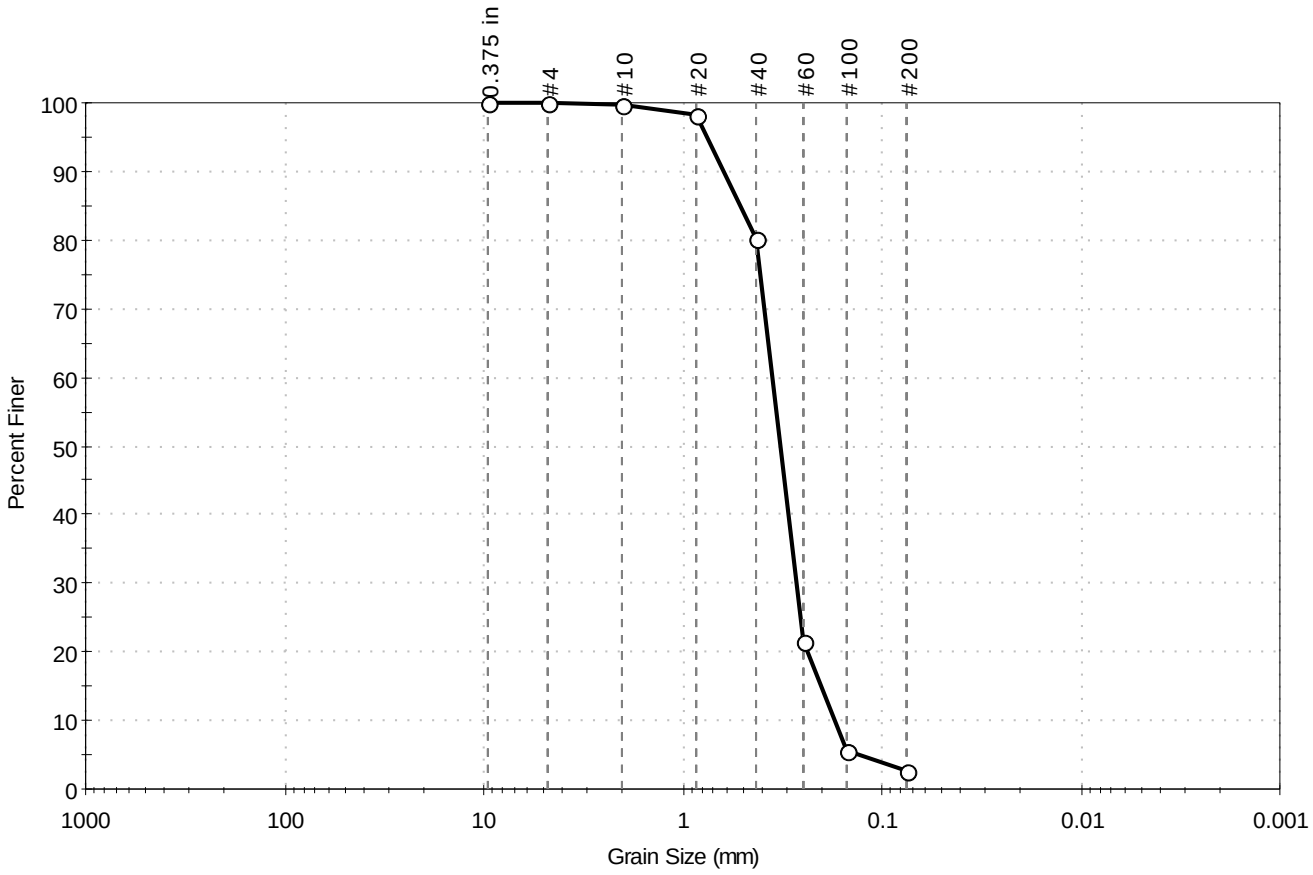
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-7	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428160		
Test Comment:	---				
Visual Description:	Moist, light gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.0	97.4	2.6

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	98		
#40	0.42	80		
#60	0.25	22		
#100	0.15	6		
#200	0.075	2.6		

Coefficients

D_{85} = 0.5095 mm	D_{30} = 0.2698 mm
D_{60} = 0.3537 mm	D_{15} = 0.2027 mm
D_{50} = 0.3232 mm	D_{10} = 0.1728 mm
C_u = 2.047	C_c = 1.191

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

Sample / Test Description

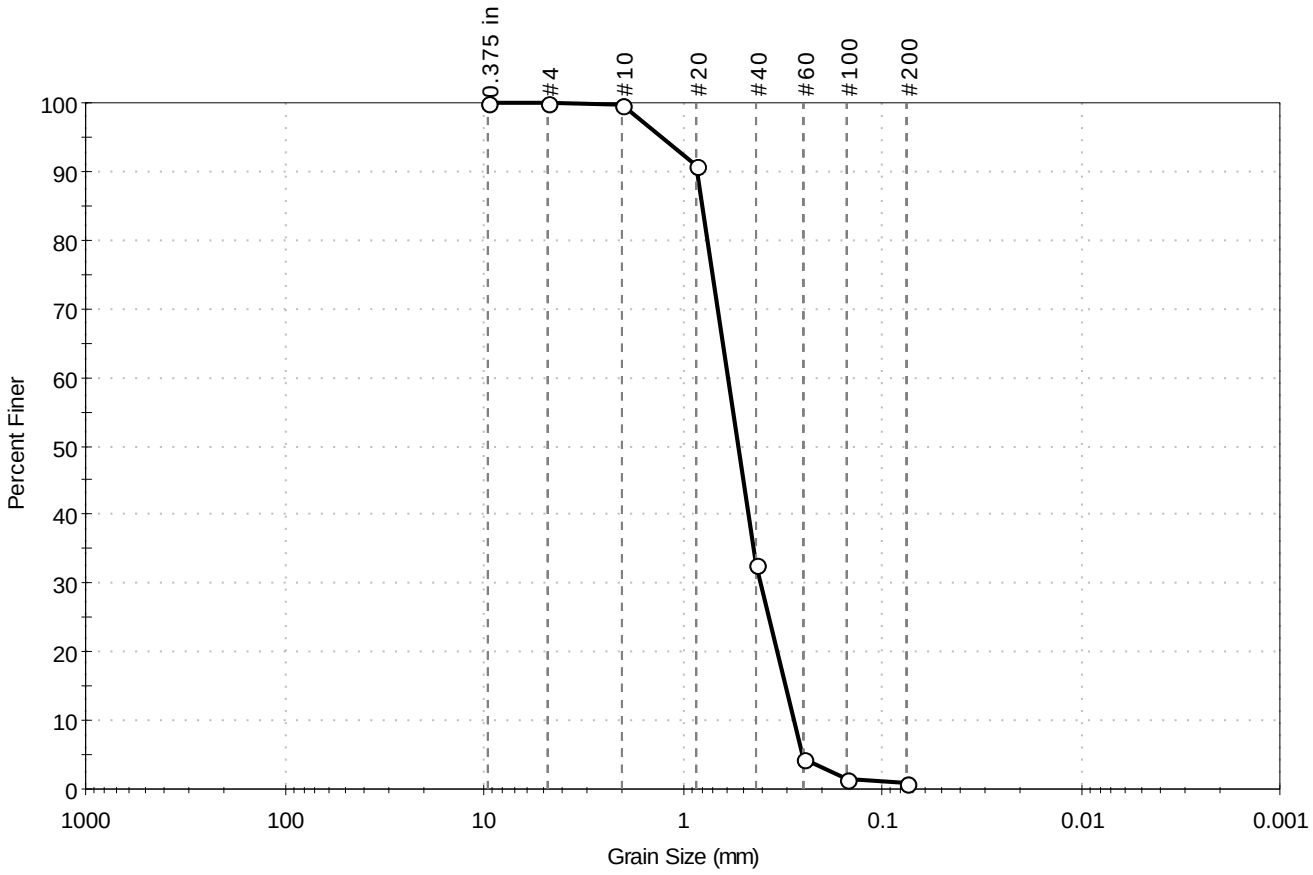
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-8	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428161		

Test Comment: ---
Visual Description: Moist, light gray sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.1	98.9	1.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	91		
#40	0.42	33		
#60	0.25	4		
#100	0.15	1		
#200	0.075	1.0		

Coefficients

D_{85} = 0.7939 mm
D_{60} = 0.5890 mm
D_{50} = 0.5227 mm
C_u = 2.122
D_{30} = 0.4042 mm
D_{15} = 0.3049 mm
D_{10} = 0.2776 mm
C_c = 0.999

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

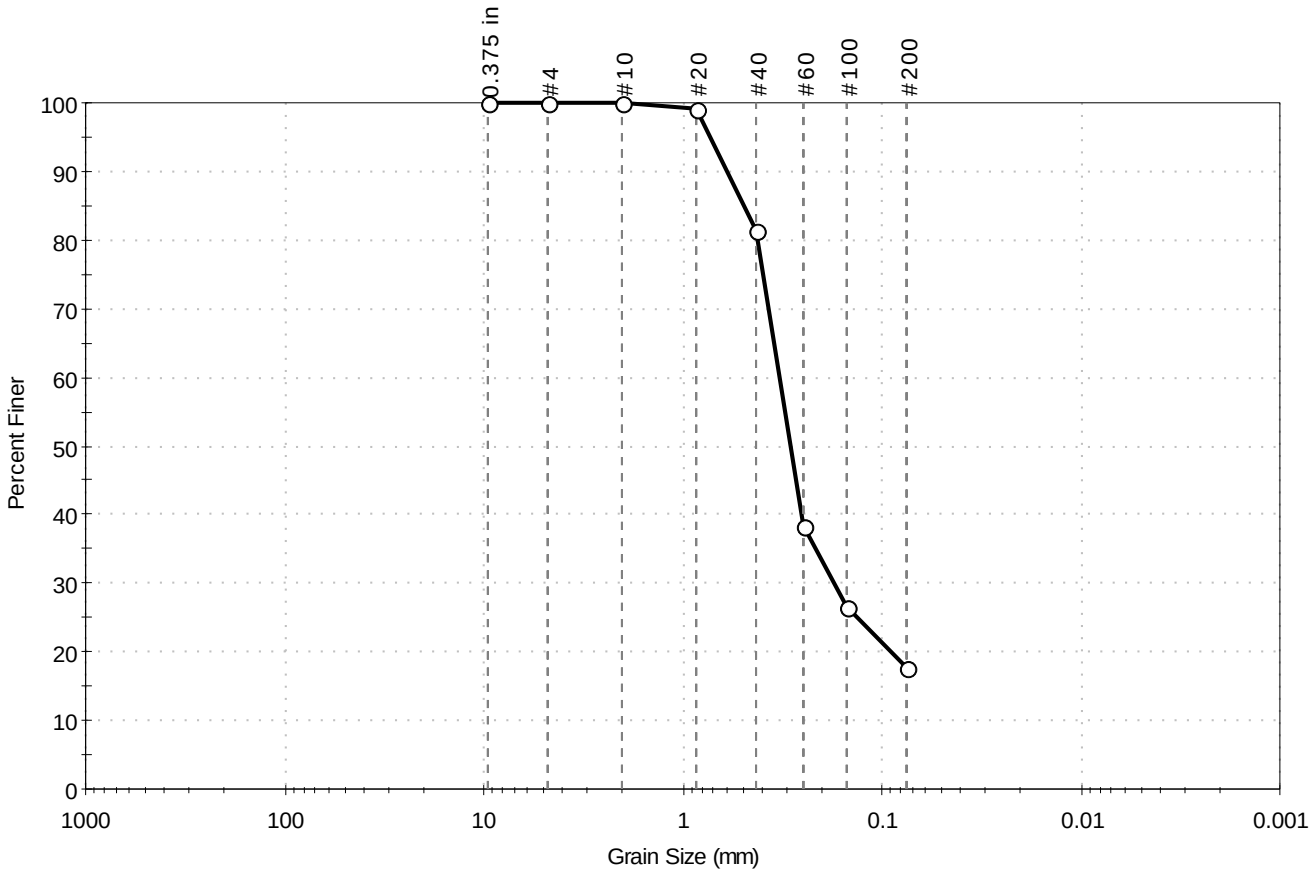
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-9A	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428162		
Test Comment:	---				
Visual Description:	Moist, dark gray silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.1	82.1	17.8

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	100		
#20	0.85	99		
#40	0.42	82		
#60	0.25	38		
#100	0.15	26		
#200	0.075	18		

Coefficients

D_{85} = 0.4876 mm	D_{30} = 0.1748 mm
D_{60} = 0.3264 mm	D_{15} = N/A
D_{50} = 0.2887 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Silty Gravel and Sand (A-2-4 (0))

Sample / Test Description

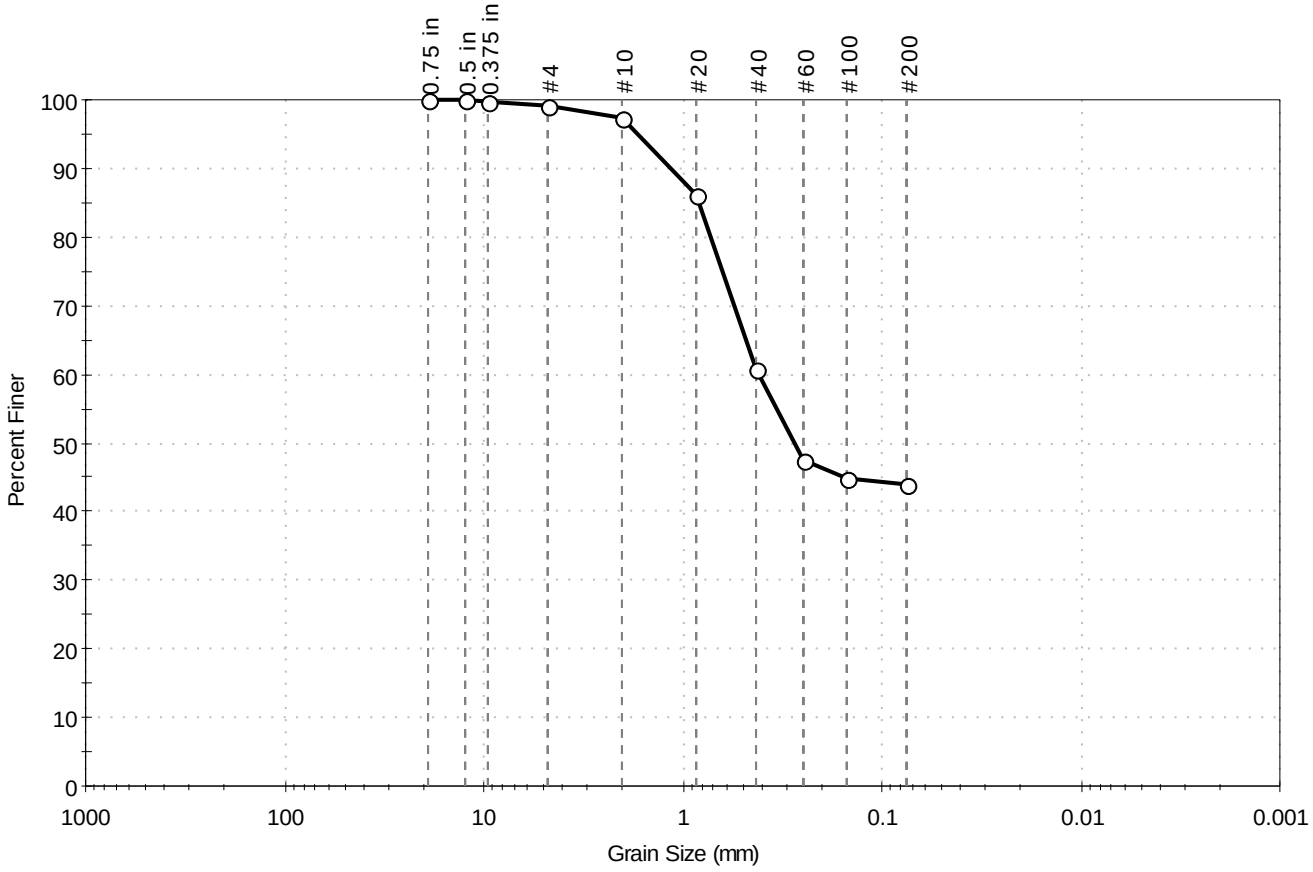
Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-10A	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428163		

Test Comment: ---
Visual Description: Moist, dark brown silty sand
Sample Comment: Sample Contains Shells

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	1.0	55.0	44.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	100		
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	97		
#20	0.85	86		
#40	0.42	61		
#60	0.25	48		
#100	0.15	45		
#200	0.075	44		

Coefficients

D_{85} = 0.8220 mm D_{30} = N/A
D_{60} = 0.4141 mm D_{15} = N/A
D_{50} = 0.2754 mm D_{10} = N/A
C_u = N/A C_c = N/A

Classification

ASTM N/A

AASHTO Silty Soils (A-4 (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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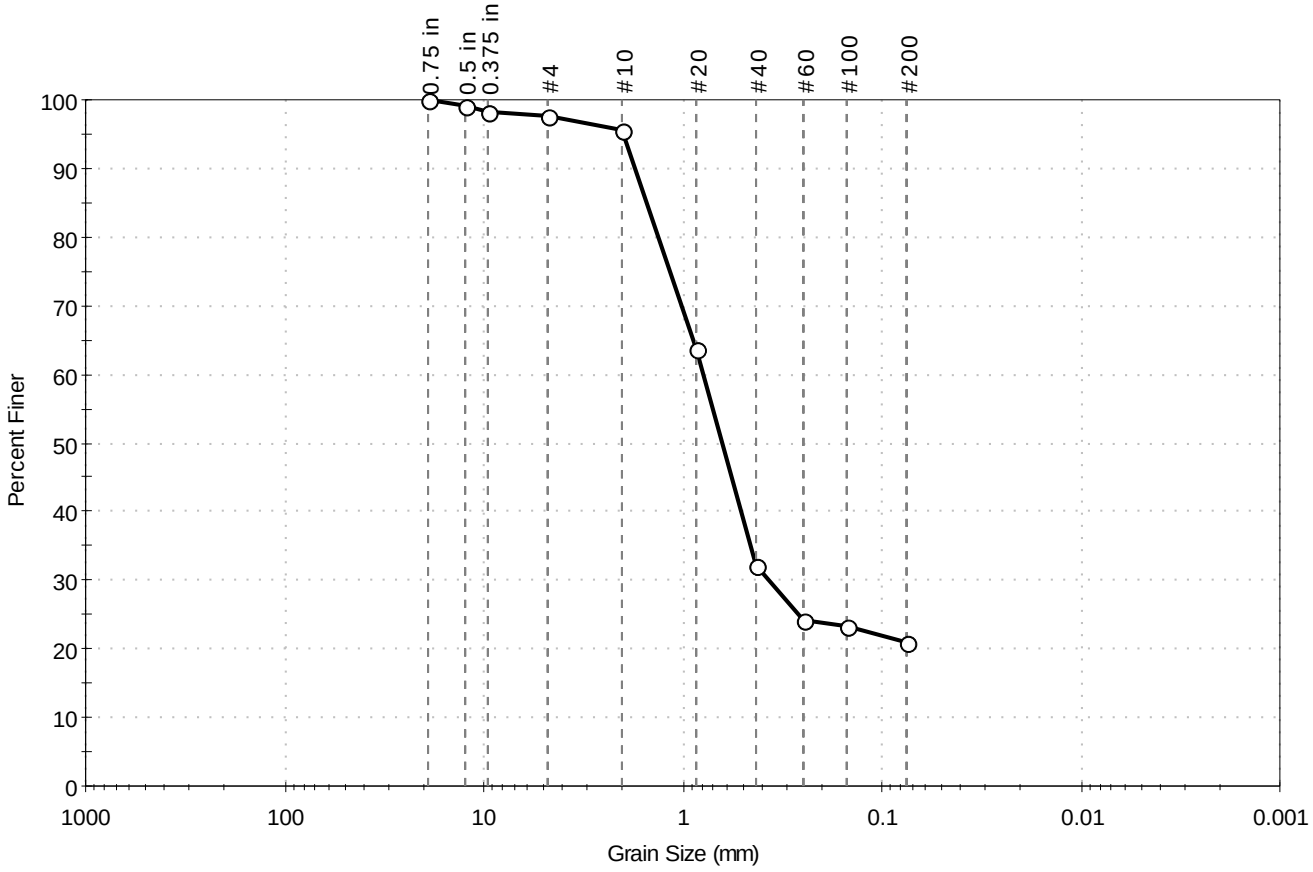
Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-11	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428164		

Test Comment: ---
Visual Description: Moist, dark gray silty sand
Sample Comment: ---

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	2.4	76.7	20.9

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	99		
0.375 in	9.50	98		
#4	4.75	98		
#10	2.00	96		
#20	0.85	64		
#40	0.42	32		
#60	0.25	24		
#100	0.15	23		
#200	0.075	21		

Coefficients

D_{85} = 1.5031 mm
D_{30} = 0.3653 mm
D_{60} = 0.7813 mm
D_{15} = N/A
D_{50} = 0.6272 mm
D_{10} = N/A
C_u = N/A
C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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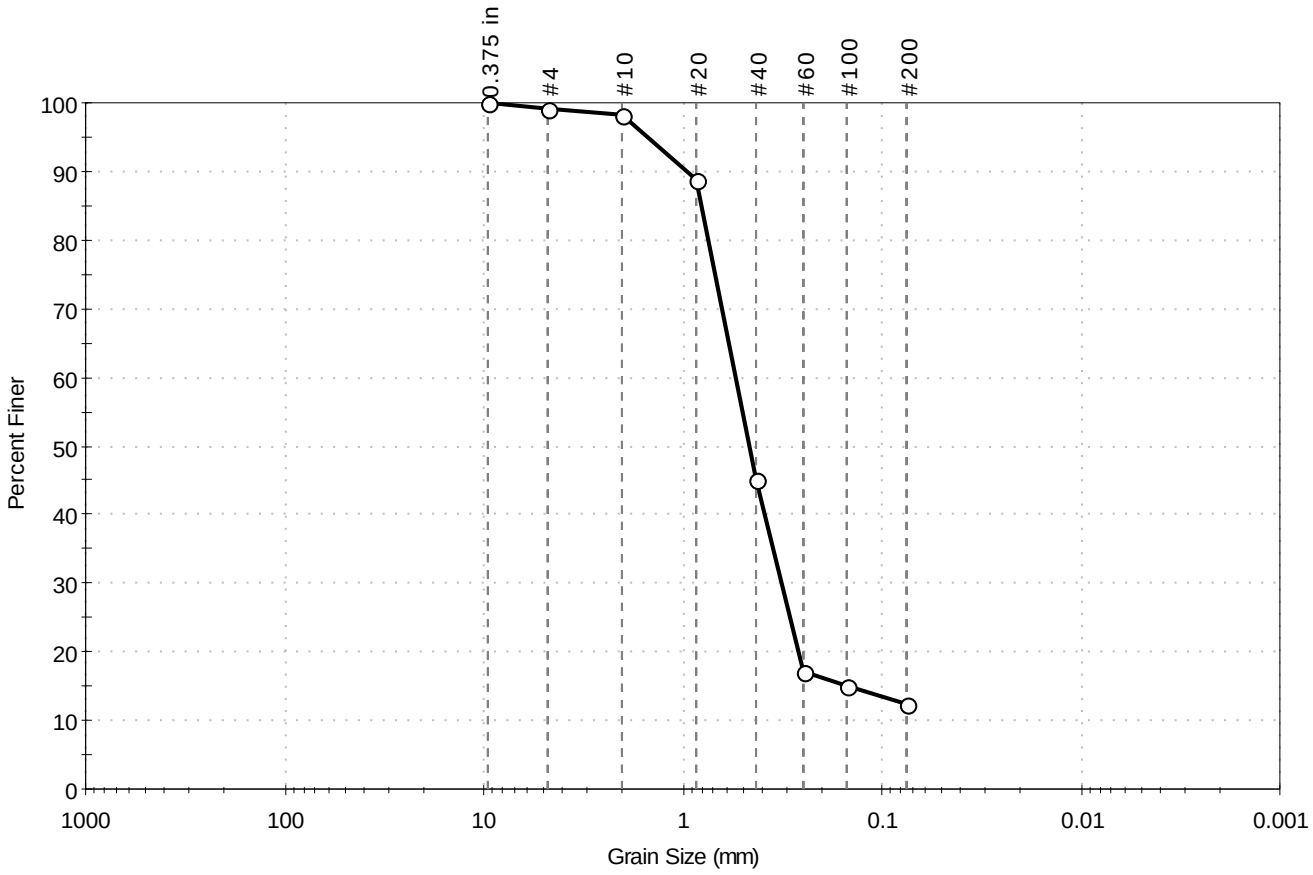
Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-12	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428165		
Test Comment:	---				
Visual Description:	Moist, light gray silty sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.9	86.7	12.4

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	99		
#10	2.00	98		
#20	0.85	89		
#40	0.42	45		
#60	0.25	17		
#100	0.15	15		
#200	0.075	12		

Coefficients

D_{85} = 0.8014 mm	D_{30} = 0.3192 mm
D_{60} = 0.5391 mm	D_{15} = 0.1487 mm
D_{50} = 0.4600 mm	D_{10} = N/A
C_u = N/A	C_c = N/A

Classification

ASTM N/A

AASHTO Stone Fragments, Gravel and Sand (A-1-b (0))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

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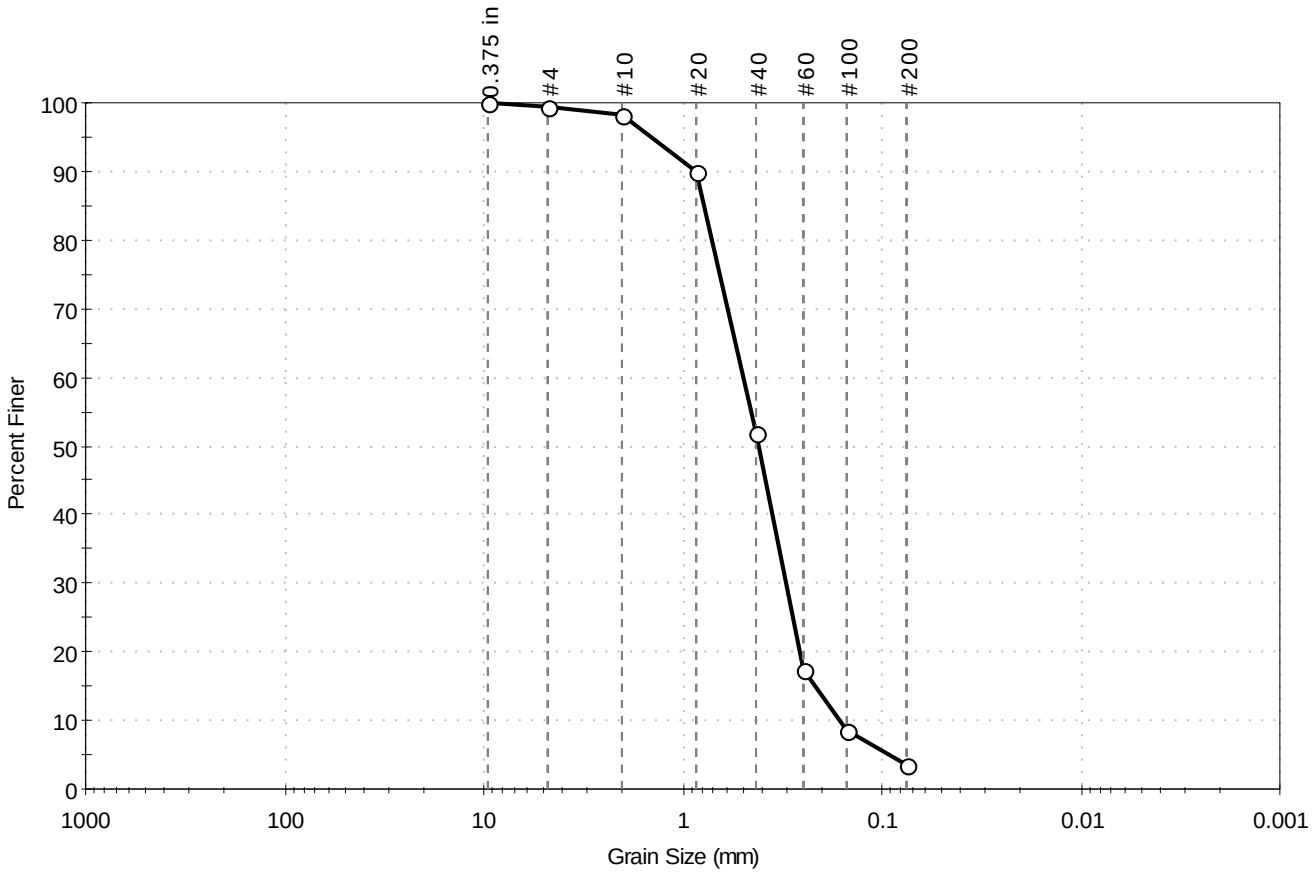
Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-13	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428166		
Test Comment:	---				
Visual Description:	Moist, dark gray sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	0.5	95.8	3.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.375 in	9.50	100		
#4	4.75	100		
#10	2.00	98		
#20	0.85	90		
#40	0.42	52		
#60	0.25	17		
#100	0.15	9		
#200	0.075	3.7		

Coefficients

D_{85} = 0.7767 mm	D_{30} = 0.3038 mm
D_{60} = 0.4924 mm	D_{15} = 0.2189 mm
D_{50} = 0.4127 mm	D_{10} = 0.1632 mm
C_u = 3.017	C_c = 1.149

Classification

ASTM Poorly graded sand (SP)

AASHTO Fine Sand (A-3 (1))

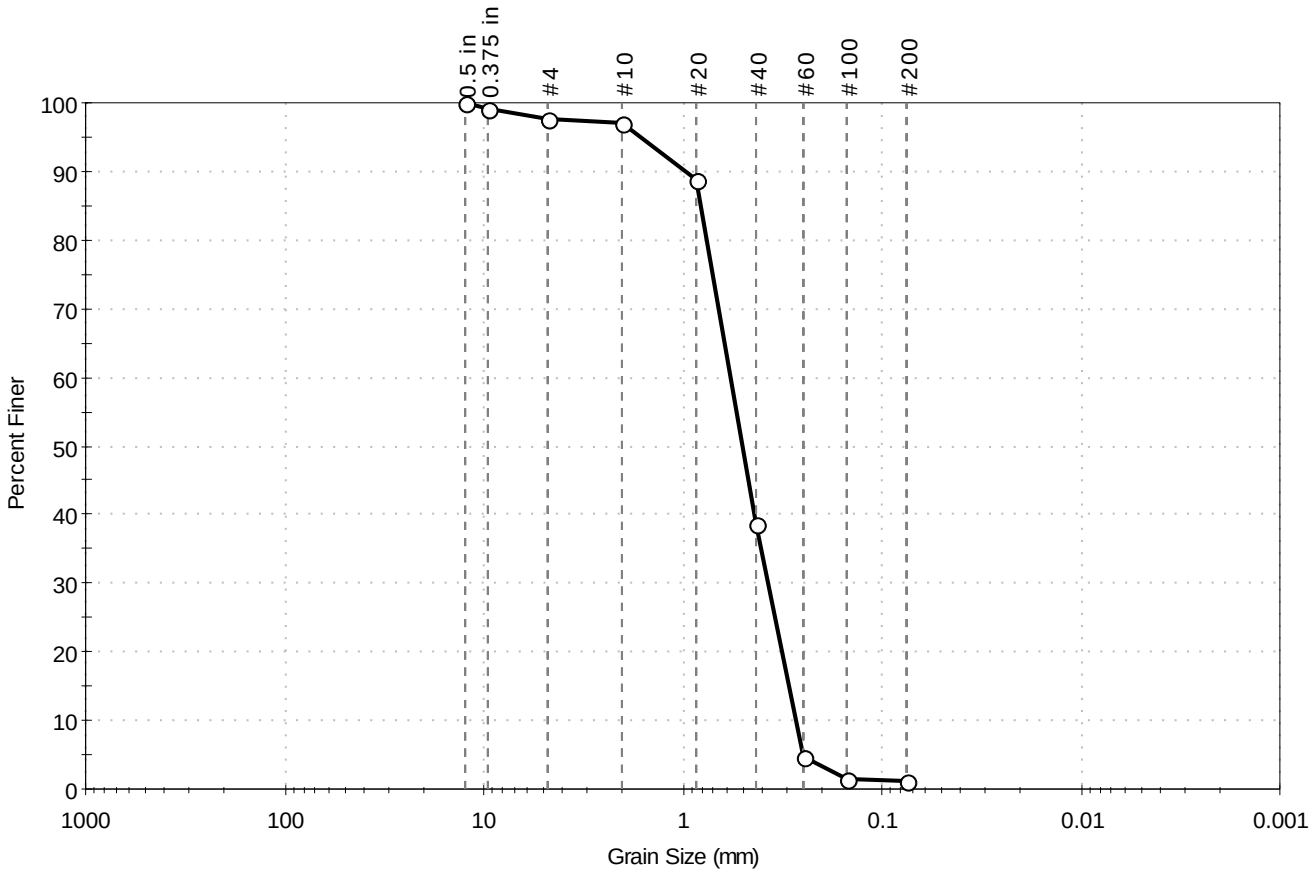
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-14	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428167		
Test Comment:	---				
Visual Description:	Moist, pale brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	2.3	96.7	1.0

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	99		
#4	4.75	98		
#10	2.00	97		
#20	0.85	89		
#40	0.42	39		
#60	0.25	5		
#100	0.15	2		
#200	0.075	1.0		

Coefficients

D_{85} = 0.8063 mm	D_{30} = 0.3710 mm
D_{60} = 0.5704 mm	D_{15} = 0.2939 mm
D_{50} = 0.4966 mm	D_{10} = 0.2720 mm
C_u = 2.097	C_c = 0.887

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

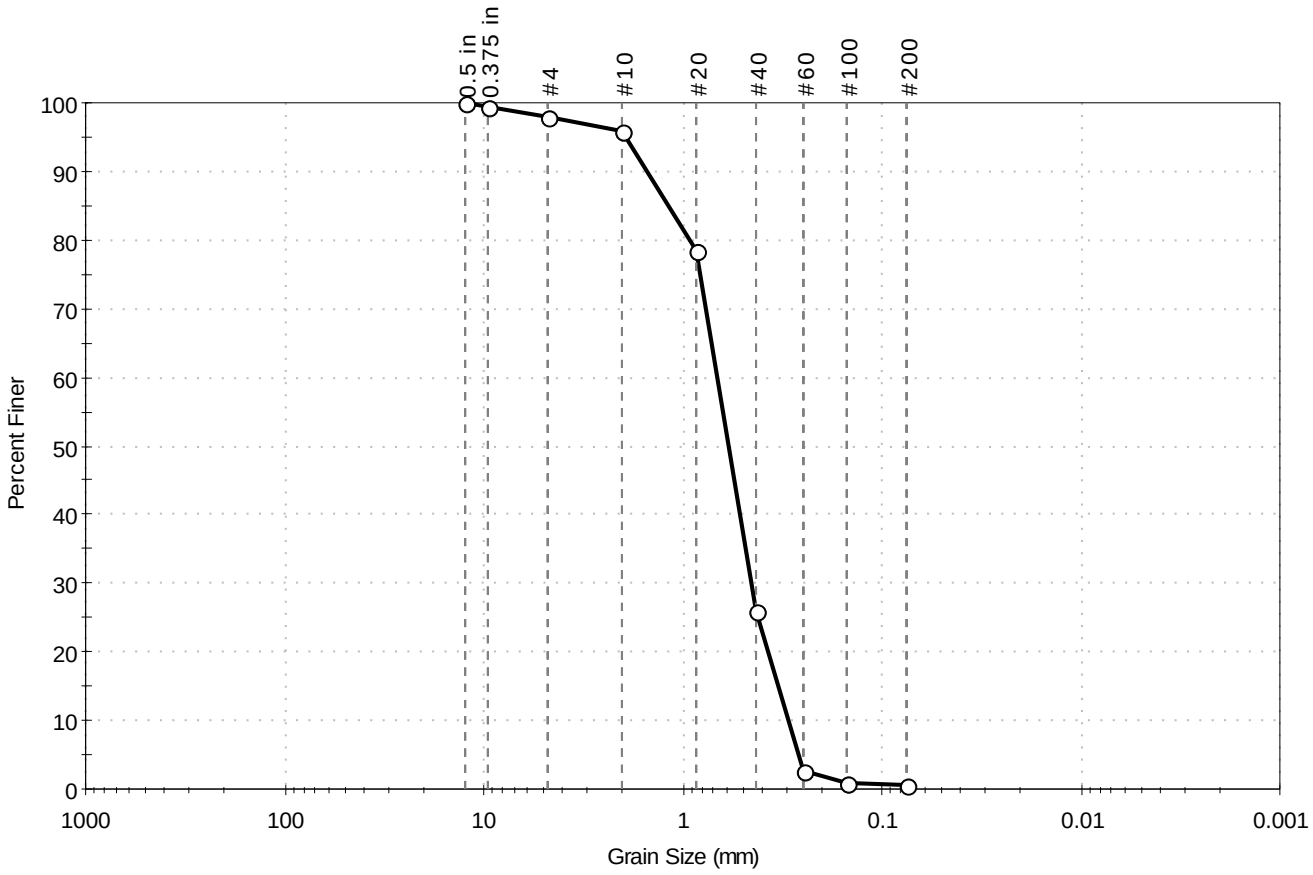
Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-15	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428168		
Test Comment:	---				
Visual Description:	Moist, pale brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



%Cobble	%Gravel	%Sand	%Silt & Clay Size
---	2.2	97.1	0.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.5 in	12.50	100		
0.375 in	9.50	99		
#4	4.75	98		
#10	2.00	96		
#20	0.85	78		
#40	0.42	26		
#60	0.25	3		
#100	0.15	1		
#200	0.075	0.7		

Coefficients

D_{85} = 1.1742 mm	D_{30} = 0.4478 mm
D_{60} = 0.6664 mm	D_{15} = 0.3305 mm
D_{50} = 0.5837 mm	D_{10} = 0.2950 mm
C_u = 2.259	C_c = 1.020

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

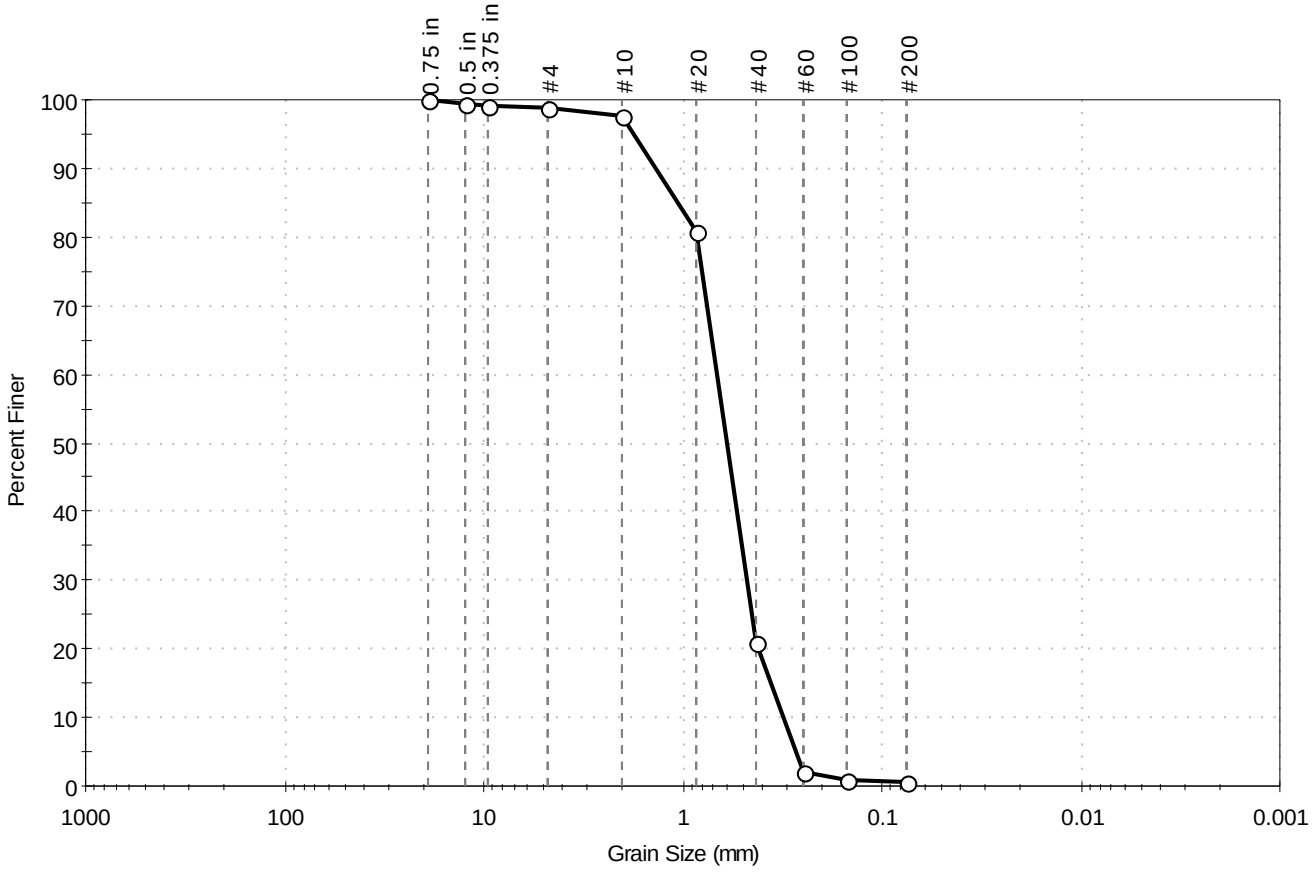
Sample/Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

Client:	Woods Hole Group				
Project:	Nauset Estuary				
Location:	Orleans, MA			Project No:	GTX-307151
Boring ID:	---	Sample Type:	bag	Tested By:	jbr
Sample ID:	NE-16	Test Date:	10/19/17	Checked By:	emm
Depth :	---	Test Id:	428169		
Test Comment:	---				
Visual Description:	Moist, pale brown sand				
Sample Comment:	---				

Particle Size Analysis - ASTM D422



% Cobble	% Gravel	% Sand	% Silt & Clay Size
---	1.3	98.0	0.7

Sieve Name	Sieve Size, mm	Percent Finer	Spec. Percent	Complies
0.75 in	19.00	100		
0.5 in	12.50	99		
0.375 in	9.50	99		
#4	4.75	99		
#10	2.00	98		
#20	0.85	81		
#40	0.42	21		
#60	0.25	2		
#100	0.15	1		
#200	0.075	0.7		

Coefficients

D_{85} = 1.0580 mm	D_{30} = 0.4724 mm
D_{60} = 0.6688 mm	D_{15} = 0.3601 mm
D_{50} = 0.5956 mm	D_{10} = 0.3126 mm
C_u = 2.139	C_c = 1.067

Classification

ASTM: Poorly graded sand (SP)

AASHTO: Stone Fragments, Gravel and Sand (A-1-b (1))

Sample / Test Description

Sand/Gravel Particle Shape : ---

Sand/Gravel Hardness : ---

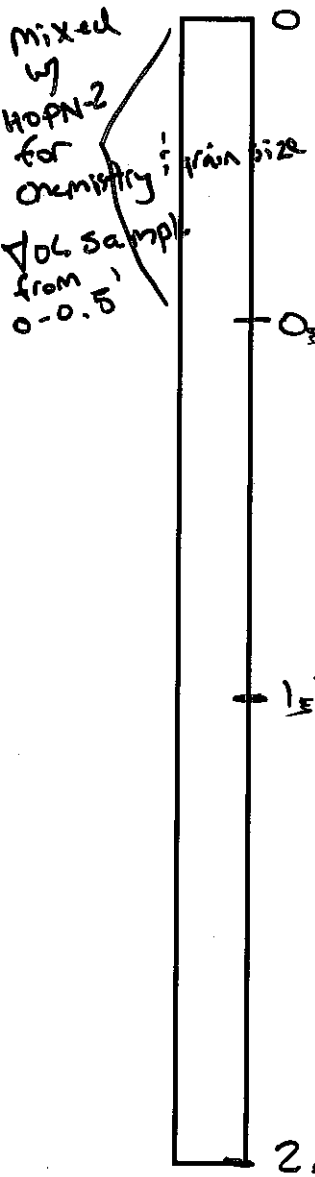
Section M

Phase 4 Core Logs & Lab Data from Sampling on 7/29/2019

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT: Nauset Estuary
SAMPLING PERSONNEL: TG & B, A. Finkl (Boat), L. Fields (sub-sampling)
DATE: 7-29-19 TIME: 8'.10 (core collected); sampled 11:15 - 11:30
SEA STATE: WEATHER:
SAMPLE ID: HopN-1 LOCATION METHOD:
COORDINATES: N: W:
WATER DEPTH: 5.4' TIDE LEVEL:
DEPTH OF PENETRATION: 3.7' RECOVERY LENGTH: 2.8'
CORE LENGTH: 2.8' NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



Sandy silt
small shell fragments
organics
dark colored

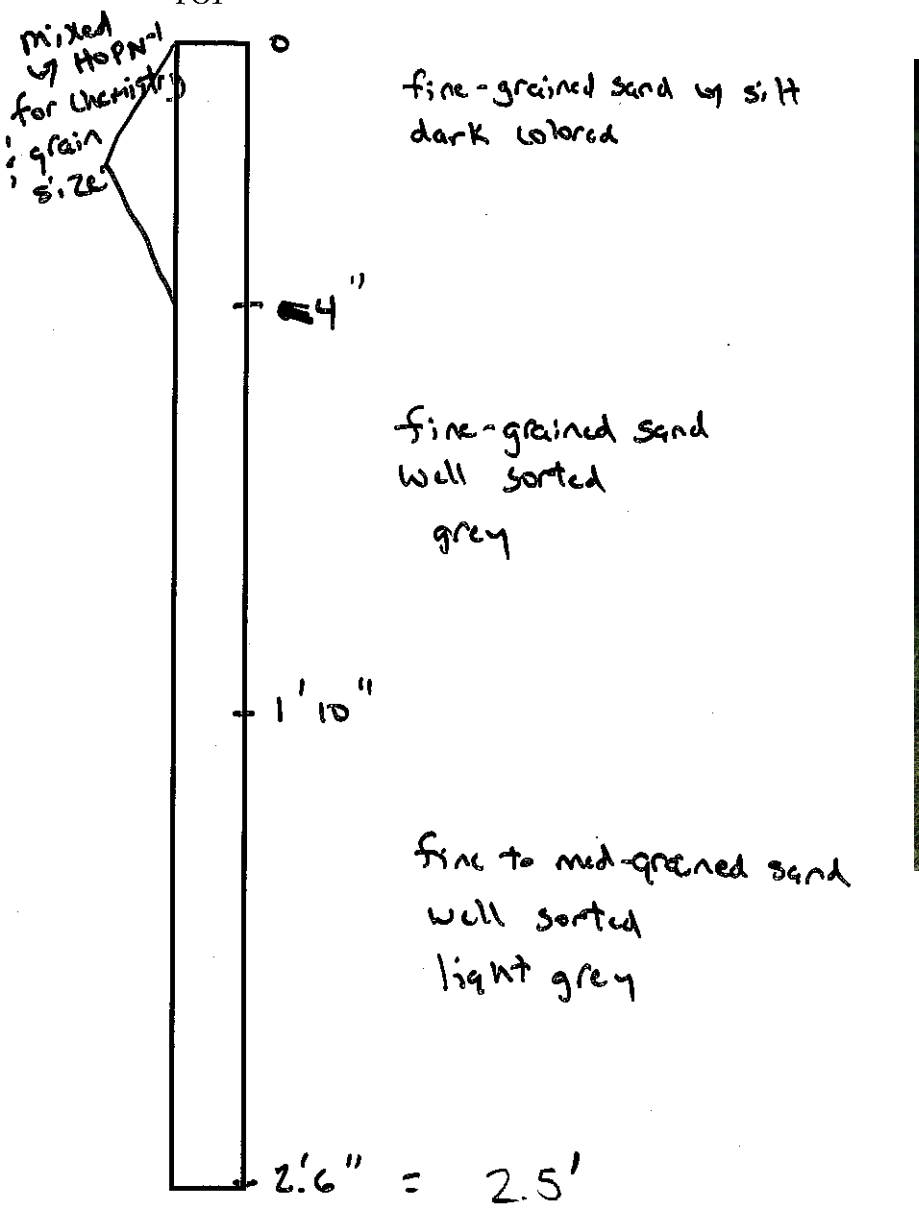
Med-grained sand
mottled grey/black
well sorted

Med-grained sand
light grey
well sorted
1.5" pebble at bottom of core

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT: Nauset Estuary
SAMPLING PERSONNEL: TG & B, A Finkle (boat), L. Fields (sub-sampling)
DATE: 7-29-19 TIME: (core collected); sampled 11:30 - 11:45
SEA STATE: WEATHER:
SAMPLE ID: HopN-2 LOCATION METHOD:
COORDINATES: N: W:
WATER DEPTH: 7.0' TIDE LEVEL:
DEPTH OF PENETRATION: 2.8 RECOVERY LENGTH: 2.6
CORE LENGTH: 2.6 NO. ATTEMPTS:
CORE DESCRIPTION:

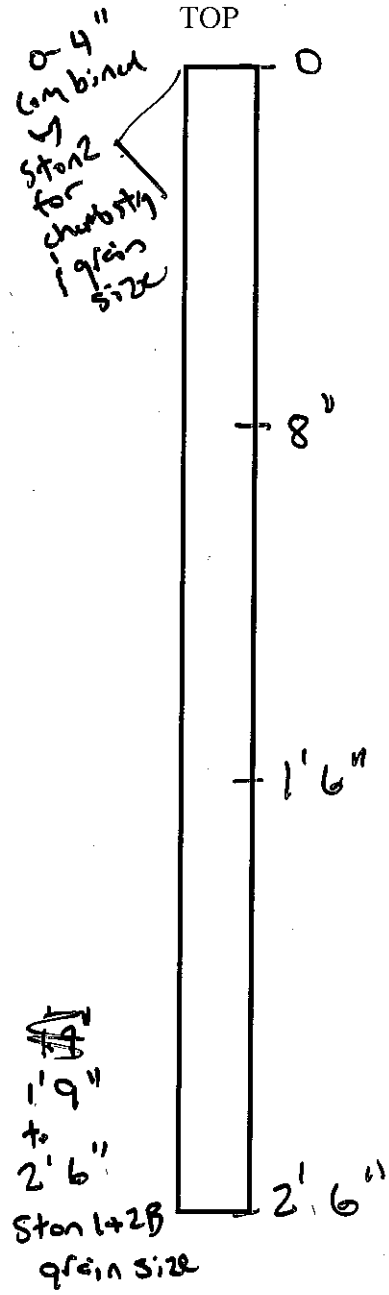
TOP



5Y 5/1

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

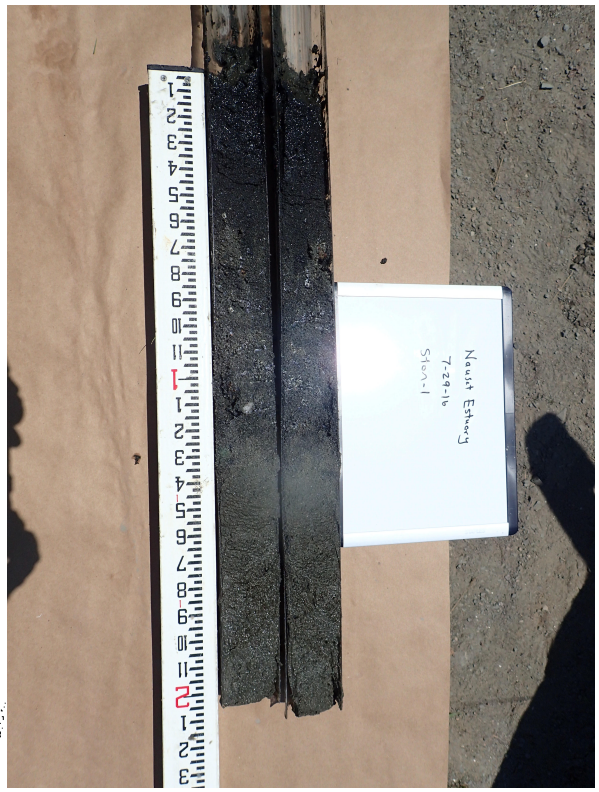
PROJECT: Nauset Estuary
SAMPLING PERSONNEL: TG&B, A. Finkle (boat), L. Fields (Sub-Sampling)
DATE: 7-29-19 TIME: 10:20 (core collected); sampled ~~12:55~~ 12:53
SEA STATE: WEATHER:
SAMPLE ID: Ston-1 LOCATION METHOD:
COORDINATES: N: W:
WATER DEPTH: 6.9 TIDE LEVEL:
DEPTH OF PENETRATION: 2.6 RECOVERY LENGTH: 2.0
CORE LENGTH: NO. ATTEMPTS:
CORE DESCRIPTION:



Sandy silt, mostly silt
dark colored

Coarse to med-grained sand
some shell hash
lighter gray colored
well sorted

Sandy silt
fine-grained sand w/ silt
compact
dark gray colored



Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT: Nauset Estuary
SAMPLING PERSONNEL: TG+B, A. Finkle (boat), L. Fiddy (sub-sampling)
DATE: 7-29-19 TIME: 10:50 (core collected), sampled 12:53
SEA STATE: WEATHER:
SAMPLE ID: Ston-2 LOCATION METHOD:
COORDINATES: N: W:
WATER DEPTH: 7.1 TIDE LEVEL:
DEPTH OF PENETRATION: 3.3 RECOVERY LENGTH: 2.9
CORE LENGTH: NO. ATTEMPTS:
CORE DESCRIPTION:

TOP

combined w/ Ston-1 for chemistry & grain size

0 — clay/silt, brown in color, cohesive

1" — silty sand, black in color, well sorted

6" — coarse to med-grained sand, moderatly sorted, light gray, some shell fragments

1' 1" — coarse to med-grained sand w/ moderately sorted, dark gray in color

1' 7" — coarse to med-grained sand, some shell hash, moderately sorted, light gray in color

10 YR 7/1

2' 5" — silty sand, dark colored, well sorted, compacted, dark brown in color

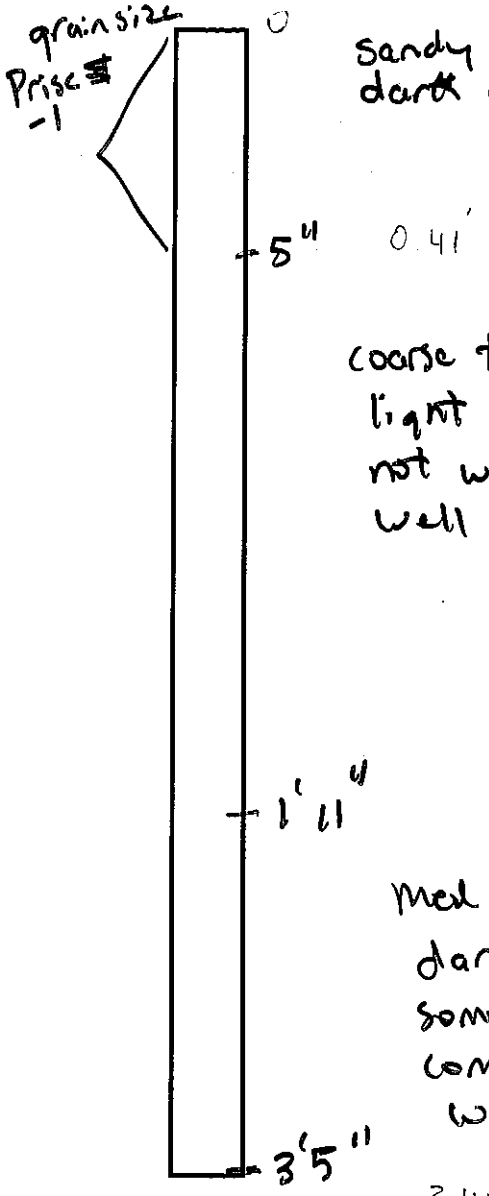
10 YR 3/2

2' 9" — 2' 7" to 2' 9" Ston 42B grain size

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT: Nauset Estuary
SAMPLING PERSONNEL: TGtB, A. Finkl-Choat), L. Fields (sub-sampling)
DATE: 7-29-19 TIME: 11:15 (core collected; sub-sampled
SEA STATE: WEATHER:
SAMPLE ID: Prisc-1 LOCATION METHOD:
COORDINATES: N: W:
WATER DEPTH: 5.5 TIDE LEVEL:
DEPTH OF PENETRATION: 4.0 RECOVERY LENGTH: 3.5
CORE LENGTH: NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



Sandy silt
dark colored

0.41'

coarse to med-grained sand
light gray
not well compacted
well sorted

med to coarse-grained sand
dark gray
some shell fragments
compacted
well sorted

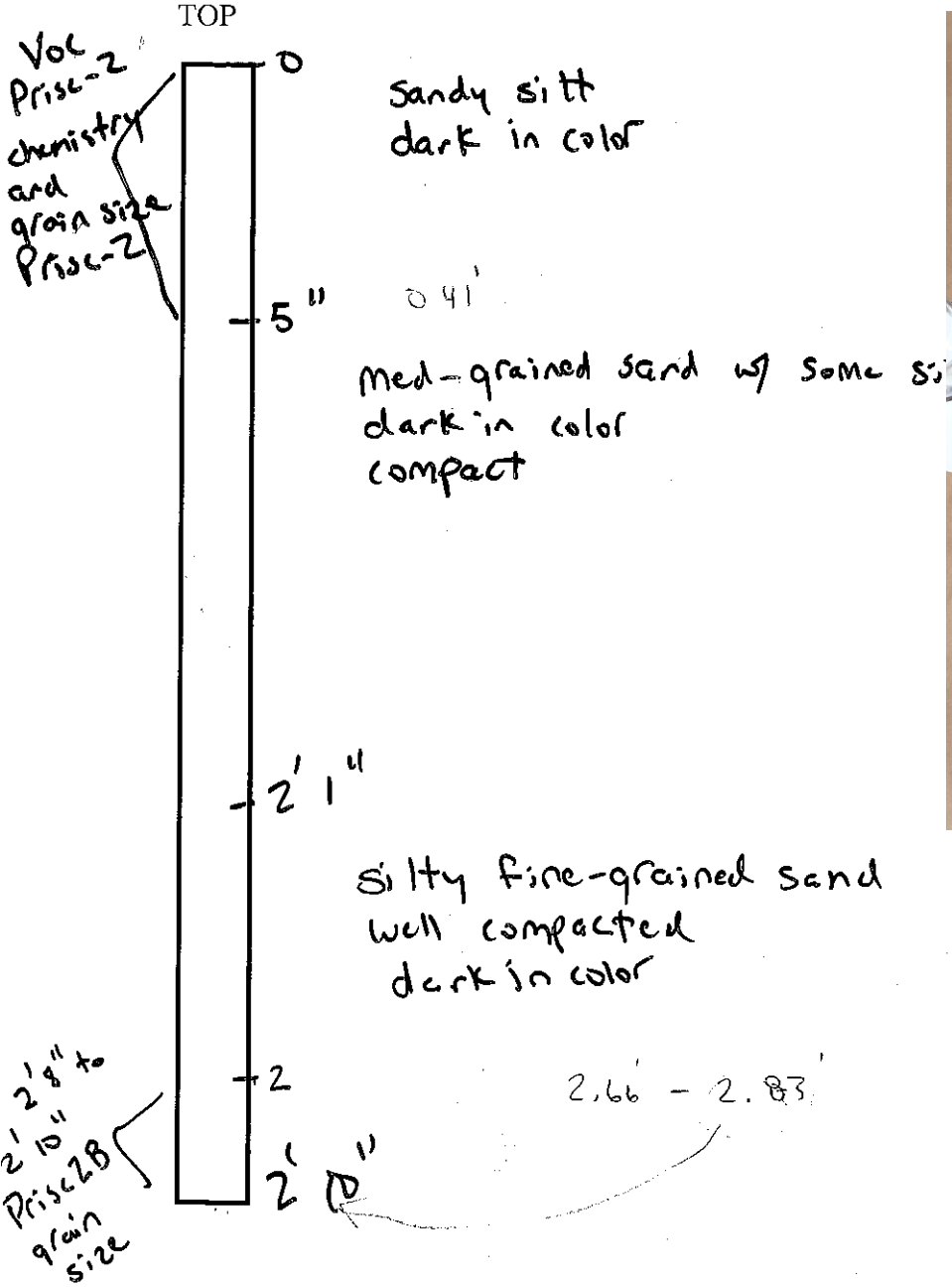
3.41'

7.5YR 3/1

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT: Nauset Estuary
SAMPLING PERSONNEL: TG+B, A. Finkle (boat), L. Fields (sub-sampling) 2:20
DATE: 7-29-19 TIME: 11:35 (core collected); sub-sampled
SEA STATE: WEATHER:
SAMPLE ID: Prisc-2 LOCATION METHOD:
COORDINATES: N: W:
WATER DEPTH: 5.5 TIDE LEVEL:
DEPTH OF PENETRATION: 3.8 RECOVERY LENGTH: ~~2'~~ 2' 10"
CORE LENGTH: NO. ATTEMPTS:
CORE DESCRIPTION:

TOP

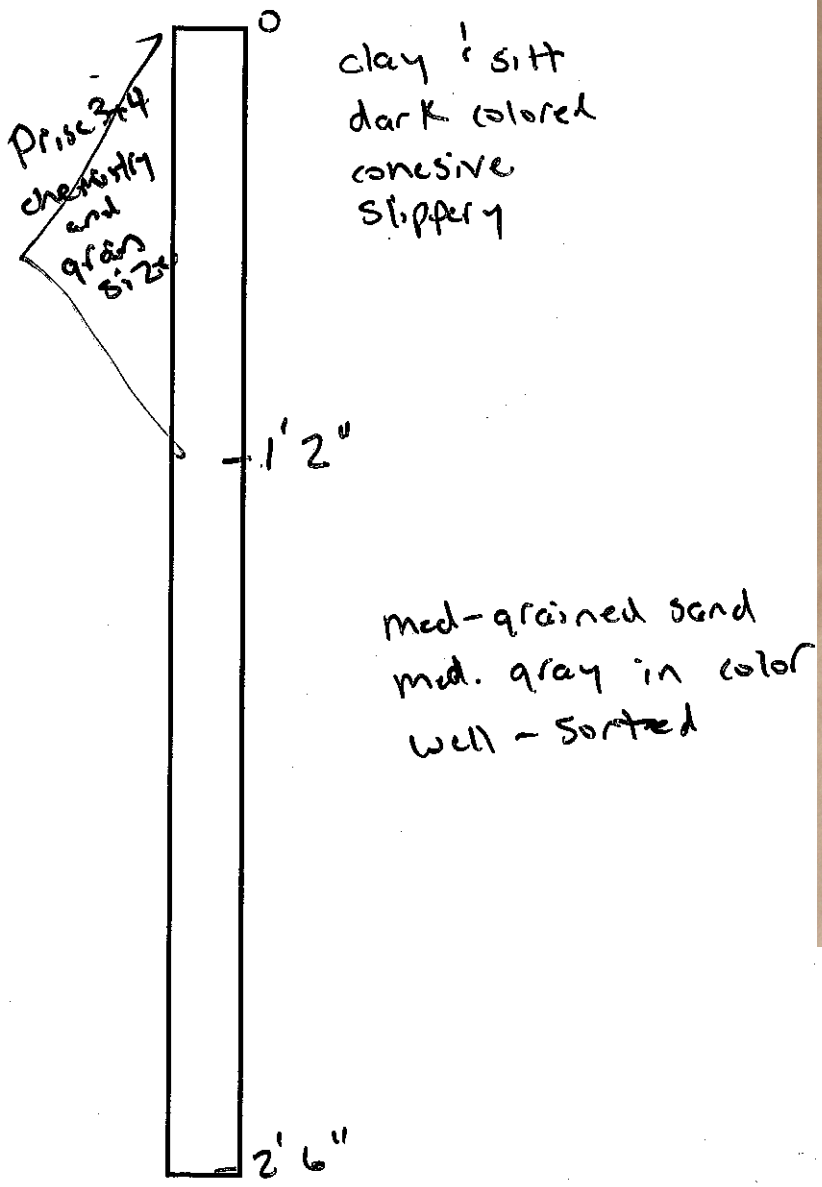


5 YR 2.5/1

Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT: Nauset Estuary
SAMPLING PERSONNEL: TG&B, A. Finkle (boat), L. Fields (Sub-sampling)
DATE: 7-29-19 TIME: 12:10 (core collected) sub-sampled 3:01
SEA STATE: WEATHER:
SAMPLE ID: Prisc-3 LOCATION METHOD:
COORDINATES: N: W:
WATER DEPTH: 6.8 TIDE LEVEL:
DEPTH OF PENETRATION: 2.6 RECOVERY LENGTH: 2' 6"
CORE LENGTH: NO. ATTEMPTS:
CORE DESCRIPTION:

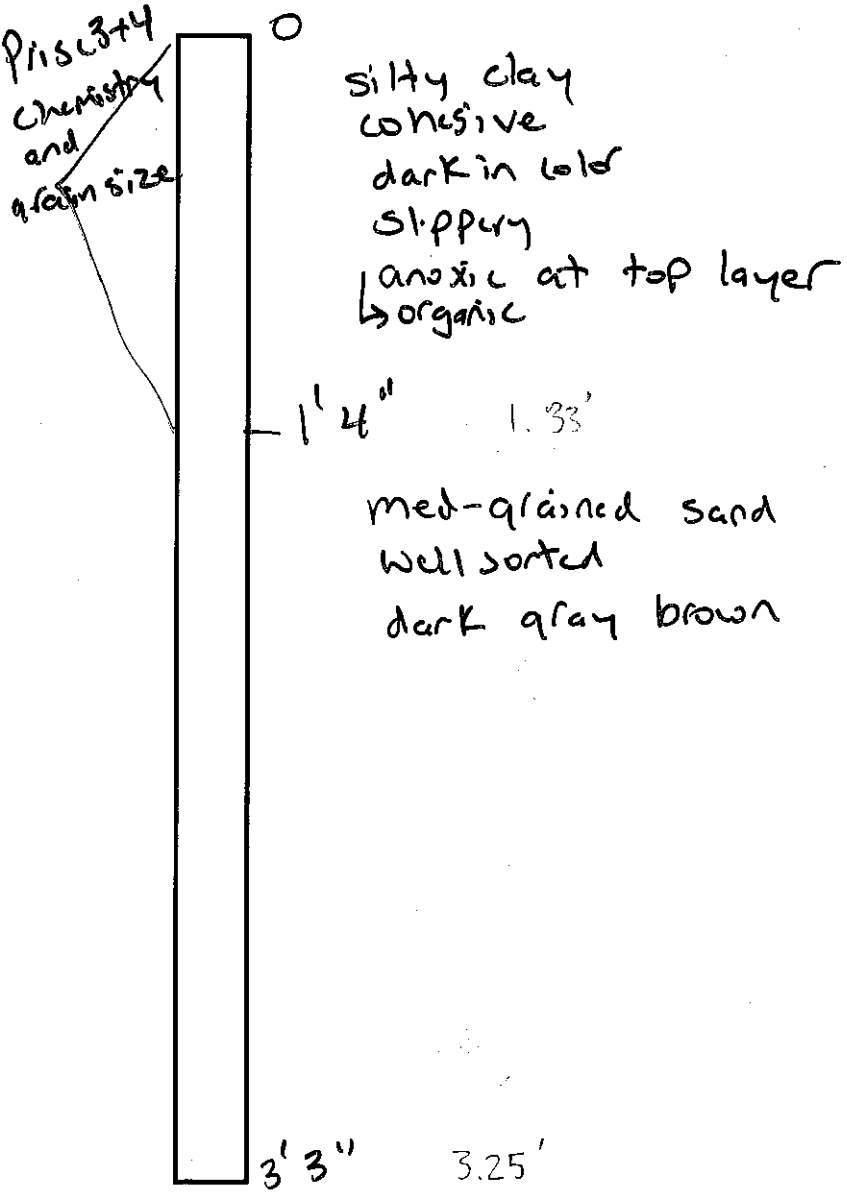
TOP



Woods Hole Group
ENVIRONMENTAL SAMPLING LOG

PROJECT: Nauset Estuary
SAMPLING PERSONNEL: T Gebo, A. Finkle (boat), L. Fields (sub-sampling)
DATE: 7-29-19 TIME: 12:35 (core collected) sub-sampled
SEA STATE: WEATHER:
SAMPLE ID: Prisc-4 LOCATION METHOD:
COORDINATES: N: W:
WATER DEPTH: 5.7 TIDE LEVEL:
DEPTH OF PENETRATION: 4.5 RECOVERY LENGTH: ~~3'~~ 3"
CORE LENGTH: NO. ATTEMPTS:
CORE DESCRIPTION:

TOP



ANALYTICAL REPORT

Lab Number:	L1933910
Client:	Woods Hole Group 107 Waterhouse Road Bourne, MA 02532
ATTN:	Leslie Fields
Phone:	(508) 540-8080
Project Name:	NAUSET ESTUARY
Project Number:	2015-0121-03
Report Date:	08/14/19

Certifications & Approvals: MA (M-MA030), NH NELAP (2062), CT (PH-0141), DoD (L2474), FL (E87814), IL (200081), LA (85084), ME (MA00030), MD (350), NJ (MA015), NY (11627), NC (685), OH (CL106), PA (68-02089), RI (LAO00299), TX (T104704419), VT (VT-0015), VA (460194), WA (C954), US Army Corps of Engineers, USDA (Permit #P330-17-00150), USFWS (Permit #206964).

Eight Walkup Drive, Westborough, MA 01581-1019
508-898-9220 (Fax) 508-898-9193 800-624-9220 - www.alphalab.com

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Alpha Sample ID	Client ID	Matrix	Sample Location	Collection Date/Time	Receive Date
L1933910-01	HOPN1	SEDIMENT	ORLEANS, MA	07/29/19 11:15	07/30/19
L1933910-02	HOPN1+2	SEDIMENT	ORLEANS, MA	07/29/19 11:45	07/30/19
L1933910-03	STON1+2	SEDIMENT	ORLEANS, MA	07/29/19 12:53	07/30/19
L1933910-04	STON1+2B	SEDIMENT	ORLEANS, MA	07/29/19 13:24	07/30/19
L1933910-05	PRISC-1	SEDIMENT	ORLEANS, MA	07/29/19 13:54	07/30/19
L1933910-06	PRISC-2	SEDIMENT	ORLEANS, MA	07/29/19 14:24	07/30/19
L1933910-07	PRISC-2B	SEDIMENT	ORLEANS, MA	07/29/19 14:33	07/30/19
L1933910-08	PRISC-3+4	SEDIMENT	ORLEANS, MA	07/29/19 15:27	07/30/19

Project Name:	NAUSET ESTUARY	**Lab Number:**	L1933910
Project Number:	2015-0121-03	**Report Date:**	08/14/19

Case Narrative

The samples were received in accordance with the Chain of Custody and no significant deviations were encountered during the preparation or analysis unless otherwise noted. Sample Receipt, Container Information, and the Chain of Custody are located at the back of the report.

Results contained within this report relate only to the samples submitted under this Alpha Lab Number and meet NELAP requirements for all NELAP accredited parameters unless otherwise noted in the following narrative. The data presented in this report is organized by parameter (i.e. VOC, SVOC, etc.). Sample specific Quality Control data (i.e. Surrogate Spike Recovery) is reported at the end of the target analyte list for each individual sample, followed by the Laboratory Batch Quality Control at the end of each parameter. Tentatively Identified Compounds (TICs), if requested, are reported for compounds identified to be present and are not part of the method/program Target Compound List, even if only a subset of the TCL are being reported. If a sample was re-analyzed or re-extracted due to a required quality control corrective action and if both sets of data are reported, the Laboratory ID of the re-analysis or re-extraction is designated with an "R" or "RE", respectively.

When multiple Batch Quality Control elements are reported (e.g. more than one LCS), the associated samples for each element are noted in the grey shaded header line of each data table. Any Laboratory Batch, Sample Specific % recovery or RPD value that is outside the listed Acceptance Criteria is bolded in the report. In reference to questions H (CAM) or 4 (RCP) when "NO" is checked, the performance criteria for CAM and RCP methods allow for some quality control failures to occur and still be within method compliance. In these instances, the specific failure is not narrated but noted in the associated QC Outlier Summary Report, located directly after the Case Narrative. QC information is also incorporated in the Data Usability Assessment table (Format 11) of our Data Merger tool, where it can be reviewed in conjunction with the sample result, associated regulatory criteria and any associated data usability implications.

Soil/sediments, solids and tissues are reported on a dry weight basis unless otherwise noted. Definitions of all data qualifiers and acronyms used in this report are provided in the Glossary located at the back of the report.

HOLD POLICY - For samples submitted on hold, Alpha's policy is to hold samples (with the exception of Air canisters) free of charge for 21 calendar days from the date the project is completed. After 21 calendar days, we will dispose of all samples submitted including those put on hold unless you have contacted your Alpha Project Manager and made arrangements for Alpha to continue to hold the samples. Air canisters will be disposed after 3 business days from the date the project is completed.

Please contact Project Management at 800-624-9220 with any questions.

Project Name:	NAUSET ESTUARY	**Lab Number:**	L1933910
Project Number:	2015-0121-03	**Report Date:**	08/14/19

Case Narrative (continued)

Report Submission

All non-detect (ND) or estimated concentrations (J-qualified) have been quantitated to the limit noted in the MDL column.

EPH

The WG1270948-3 LCS/LCSD RPD(s), associated with L1933910-03 and -08, are above the acceptance criteria for c9-c18 aliphatics (26%), c11-c22 aromatics (26%), naphthalene (35%), 2-methylnaphthalene (32%), acenaphthylene (30%), acenaphthene (31%), fluorene (31%), phenanthrene (30%), anthracene (30%), fluoranthene (29%), benzo(b)fluoranthene (28%), benzo(a)pyrene (27%), indeno(1,2,3-cd)pyrene (28%), benzo(ghi)perylene (26%), nonane (c9) (33%), decane (c10) (29%), dodecane (c12) (26%), hexadecane (c16) (27%), octadecane (c18) (27%), nonadecane (c19) (27%), eicosane (c20) (26%), docosane (c22) (26%), tetracosane (c24) (26%), hexacosane (c26) (26%), octacosane (c28) (26%) and triacontane (c30) (26%).

Total Organic Carbon

The WG1266970-3 Laboratory Duplicate RPD for total organic carbon (rep1) (39%), performed on L1933910-02, is outside the acceptance criteria. The elevated RPD has been attributed to the non-homogeneous nature of the native sample.

Grain Size Analysis

The WG1270041-1 Laboratory Duplicate RPD for % fine gravel (86%), performed on L1933910-03, is outside the acceptance criteria. The elevated RPD has been attributed to the non-homogeneous nature of the native sample.

I, the undersigned, attest under the pains and penalties of perjury that, to the best of my knowledge and belief and based upon my personal inquiry of those responsible for providing the information contained in this analytical report, such information is accurate and complete. This certificate of analysis is not complete unless this page accompanies any and all pages of this report.

Authorized Signature: Susan E O'Neil Susan O' Neil

Title: Technical Director/Representative Date: 08/14/19

ORGANICS

VOLATILES

Project Name: NAUSET ESTUARY
Lab Number: L1933910
Project Number: 2015-0121-03
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-01
Client ID: HOPN1
Sample Location: ORLEANS, MA
Date Collected: 07/29/19 11:15
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 1,8260C
Analytical Date: 08/10/19 11:30
Analyst: MV
Percent Solids: Results reported on an 'AS RECEIVED' basis.

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by EPA 5035 Low - Westborough Lab						
Methylene chloride	ND		ug/kg	9.3	4.3	1
1,1-Dichloroethane	ND		ug/kg	1.9	0.27	1
Chloroform	ND		ug/kg	2.8	0.26	1
Carbon tetrachloride	ND		ug/kg	1.9	0.43	1
1,2-Dichloropropane	ND		ug/kg	1.9	0.23	1
Dibromochloromethane	ND		ug/kg	1.9	0.26	1
1,1,2-Trichloroethane	ND		ug/kg	1.9	0.50	1
Tetrachloroethene	ND		ug/kg	0.93	0.36	1
Chlorobenzene	ND		ug/kg	0.93	0.24	1
Trichlorofluoromethane	ND		ug/kg	7.5	1.3	1
1,2-Dichloroethane	ND		ug/kg	1.9	0.48	1
1,1,1-Trichloroethane	ND		ug/kg	0.93	0.31	1
Bromodichloromethane	ND		ug/kg	0.93	0.20	1
trans-1,3-Dichloropropene	ND		ug/kg	1.9	0.51	1
cis-1,3-Dichloropropene	ND		ug/kg	0.93	0.29	1
1,3-Dichloropropene, Total	ND		ug/kg	0.93	0.29	1
1,1-Dichloropropene	ND		ug/kg	0.93	0.30	1
Bromoform	ND		ug/kg	7.5	0.46	1
1,1,2,2-Tetrachloroethane	ND		ug/kg	0.93	0.31	1
Benzene	ND		ug/kg	0.93	0.31	1
Toluene	ND		ug/kg	1.9	1.0	1
Ethylbenzene	ND		ug/kg	1.9	0.26	1
Chloromethane	ND		ug/kg	7.5	1.7	1
Bromomethane	ND		ug/kg	3.7	1.1	1
Vinyl chloride	ND		ug/kg	1.9	0.62	1
Chloroethane	ND		ug/kg	3.7	0.84	1
1,1-Dichloroethene	ND		ug/kg	1.9	0.44	1
trans-1,2-Dichloroethene	ND		ug/kg	2.8	0.26	1

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-01 Date Collected: 07/29/19 11:15

Client ID: HOPN1 Date Received: 07/30/19

Sample Location: ORLEANS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by EPA 5035 Low - Westborough Lab						
Trichloroethene	ND		ug/kg	0.93	0.26	1
1,2-Dichlorobenzene	ND		ug/kg	3.7	0.27	1
1,3-Dichlorobenzene	ND		ug/kg	3.7	0.28	1
1,4-Dichlorobenzene	ND		ug/kg	3.7	0.32	1
Methyl tert butyl ether	ND		ug/kg	3.7	0.38	1
p/m-Xylene	ND		ug/kg	3.7	1.0	1
o-Xylene	ND		ug/kg	1.9	0.54	1
Xylenes, Total	ND		ug/kg	1.9	0.54	1
cis-1,2-Dichloroethene	ND		ug/kg	1.9	0.33	1
1,2-Dichloroethene, Total	ND		ug/kg	1.9	0.26	1
Dibromomethane	ND		ug/kg	3.7	0.44	1
1,4-Dichlorobutane	ND		ug/kg	19	0.42	1
1,2,3-Trichloropropane	ND		ug/kg	3.7	0.24	1
Styrene	ND		ug/kg	1.9	0.36	1
Dichlorodifluoromethane	ND		ug/kg	19	1.7	1
Acetone	71		ug/kg	19	9.0	1
Carbon disulfide	ND		ug/kg	19	8.5	1
2-Butanone	ND		ug/kg	19	4.1	1
Vinyl acetate	ND		ug/kg	19	4.0	1
4-Methyl-2-pentanone	ND		ug/kg	19	2.4	1
2-Hexanone	ND		ug/kg	19	2.2	1
Ethyl methacrylate	ND		ug/kg	19	2.9	1
Acrylonitrile	ND		ug/kg	7.5	2.1	1
Bromochloromethane	ND		ug/kg	3.7	0.38	1
Tetrahydrofuran	ND		ug/kg	7.5	3.0	1
2,2-Dichloropropane	ND		ug/kg	3.7	0.38	1
1,2-Dibromoethane	ND		ug/kg	1.9	0.52	1
1,3-Dichloropropane	ND		ug/kg	3.7	0.31	1
1,1,1,2-Tetrachloroethane	ND		ug/kg	0.93	0.25	1
Bromobenzene	ND		ug/kg	3.7	0.27	1
n-Butylbenzene	ND		ug/kg	1.9	0.31	1
sec-Butylbenzene	ND		ug/kg	1.9	0.27	1
tert-Butylbenzene	ND		ug/kg	3.7	0.22	1
o-Chlorotoluene	ND		ug/kg	3.7	0.36	1
p-Chlorotoluene	ND		ug/kg	3.7	0.20	1
1,2-Dibromo-3-chloropropane	ND		ug/kg	5.6	1.9	1
Hexachlorobutadiene	ND		ug/kg	7.5	0.32	1

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-01 Date Collected: 07/29/19 11:15

Client ID: HOPN1 Date Received: 07/30/19

Sample Location: ORLEANS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by EPA 5035 Low - Westborough Lab						
Isopropylbenzene	ND		ug/kg	1.9	0.20	1
p-Isopropyltoluene	ND		ug/kg	1.9	0.20	1
Naphthalene	ND		ug/kg	7.5	1.2	1
n-Propylbenzene	ND		ug/kg	1.9	0.32	1
1,2,3-Trichlorobenzene	ND		ug/kg	3.7	0.60	1
1,2,4-Trichlorobenzene	ND		ug/kg	3.7	0.51	1
1,3,5-Trimethylbenzene	ND		ug/kg	3.7	0.36	1
1,2,4-Trimethylbenzene	ND		ug/kg	3.7	0.62	1
trans-1,4-Dichloro-2-butene	ND		ug/kg	9.3	2.6	1
Ethyl ether	ND		ug/kg	3.7	0.64	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	112		70-130
Toluene-d8	118		70-130
4-Bromofluorobenzene	110		70-130
Dibromofluoromethane	98		70-130

Project Name: NAUSET ESTUARY
Lab Number: L1933910
Project Number: 2015-0121-03
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-06
Client ID: PRISC-2
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 14:24
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 1,8260C
Analytical Date: 08/10/19 11:58
Analyst: MV
Percent Solids: 82%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by EPA 5035 Low - Westborough Lab						
Methylene chloride	ND		ug/kg	5.5	2.5	1
1,1-Dichloroethane	ND		ug/kg	1.1	0.16	1
Chloroform	ND		ug/kg	1.6	0.15	1
Carbon tetrachloride	ND		ug/kg	1.1	0.25	1
1,2-Dichloropropane	ND		ug/kg	1.1	0.14	1
Dibromochloromethane	ND		ug/kg	1.1	0.15	1
1,1,2-Trichloroethane	ND		ug/kg	1.1	0.29	1
Tetrachloroethene	ND		ug/kg	0.55	0.22	1
Chlorobenzene	ND		ug/kg	0.55	0.14	1
Trichlorofluoromethane	ND		ug/kg	4.4	0.76	1
1,2-Dichloroethane	ND		ug/kg	1.1	0.28	1
1,1,1-Trichloroethane	ND		ug/kg	0.55	0.18	1
Bromodichloromethane	ND		ug/kg	0.55	0.12	1
trans-1,3-Dichloropropene	ND		ug/kg	1.1	0.30	1
cis-1,3-Dichloropropene	ND		ug/kg	0.55	0.17	1
1,3-Dichloropropene, Total	ND		ug/kg	0.55	0.17	1
1,1-Dichloropropene	ND		ug/kg	0.55	0.17	1
Bromoform	ND		ug/kg	4.4	0.27	1
1,1,2,2-Tetrachloroethane	ND		ug/kg	0.55	0.18	1
Benzene	ND		ug/kg	0.55	0.18	1
Toluene	ND		ug/kg	1.1	0.60	1
Ethylbenzene	ND		ug/kg	1.1	0.15	1
Chloromethane	ND		ug/kg	4.4	1.0	1
Bromomethane	ND		ug/kg	2.2	0.64	1
Vinyl chloride	ND		ug/kg	1.1	0.37	1
Chloroethane	ND		ug/kg	2.2	0.50	1
1,1-Dichloroethene	ND		ug/kg	1.1	0.26	1
trans-1,2-Dichloroethene	ND		ug/kg	1.6	0.15	1

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-06 Date Collected: 07/29/19 14:24

Client ID: PRISC-2 Date Received: 07/30/19

Sample Location: ORLEANS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by EPA 5035 Low - Westborough Lab						
Trichloroethene	ND		ug/kg	0.55	0.15	1
1,2-Dichlorobenzene	ND		ug/kg	2.2	0.16	1
1,3-Dichlorobenzene	ND		ug/kg	2.2	0.16	1
1,4-Dichlorobenzene	ND		ug/kg	2.2	0.19	1
Methyl tert butyl ether	ND		ug/kg	2.2	0.22	1
p/m-Xylene	ND		ug/kg	2.2	0.61	1
o-Xylene	ND		ug/kg	1.1	0.32	1
Xylenes, Total	ND		ug/kg	1.1	0.32	1
cis-1,2-Dichloroethene	ND		ug/kg	1.1	0.19	1
1,2-Dichloroethene, Total	ND		ug/kg	1.1	0.15	1
Dibromomethane	ND		ug/kg	2.2	0.26	1
1,4-Dichlorobutane	ND		ug/kg	11	0.25	1
1,2,3-Trichloropropane	ND		ug/kg	2.2	0.14	1
Styrene	ND		ug/kg	1.1	0.22	1
Dichlorodifluoromethane	ND		ug/kg	11	1.0	1
Acetone	83		ug/kg	11	5.3	1
Carbon disulfide	ND		ug/kg	11	5.0	1
2-Butanone	10	J	ug/kg	11	2.4	1
Vinyl acetate	ND		ug/kg	11	2.4	1
4-Methyl-2-pentanone	ND		ug/kg	11	1.4	1
2-Hexanone	ND		ug/kg	11	1.3	1
Ethyl methacrylate	ND		ug/kg	11	1.7	1
Acrylonitrile	ND		ug/kg	4.4	1.3	1
Bromochloromethane	ND		ug/kg	2.2	0.22	1
Tetrahydrofuran	ND		ug/kg	4.4	1.7	1
2,2-Dichloropropane	ND		ug/kg	2.2	0.22	1
1,2-Dibromoethane	ND		ug/kg	1.1	0.31	1
1,3-Dichloropropane	ND		ug/kg	2.2	0.18	1
1,1,1,2-Tetrachloroethane	ND		ug/kg	0.55	0.14	1
Bromobenzene	ND		ug/kg	2.2	0.16	1
n-Butylbenzene	ND		ug/kg	1.1	0.18	1
sec-Butylbenzene	ND		ug/kg	1.1	0.16	1
tert-Butylbenzene	ND		ug/kg	2.2	0.13	1
o-Chlorotoluene	ND		ug/kg	2.2	0.21	1
p-Chlorotoluene	ND		ug/kg	2.2	0.12	1
1,2-Dibromo-3-chloropropane	ND		ug/kg	3.3	1.1	1
Hexachlorobutadiene	ND		ug/kg	4.4	0.18	1

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-06 Date Collected: 07/29/19 14:24

Client ID: PRISC-2 Date Received: 07/30/19

Sample Location: ORLEANS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Volatile Organics by EPA 5035 Low - Westborough Lab						
Isopropylbenzene	ND		ug/kg	1.1	0.12	1
p-Isopropyltoluene	ND		ug/kg	1.1	0.12	1
Naphthalene	ND		ug/kg	4.4	0.71	1
n-Propylbenzene	ND		ug/kg	1.1	0.19	1
1,2,3-Trichlorobenzene	ND		ug/kg	2.2	0.35	1
1,2,4-Trichlorobenzene	ND		ug/kg	2.2	0.30	1
1,3,5-Trimethylbenzene	ND		ug/kg	2.2	0.21	1
1,2,4-Trimethylbenzene	ND		ug/kg	2.2	0.37	1
trans-1,4-Dichloro-2-butene	ND		ug/kg	5.5	1.6	1
Ethyl ether	ND		ug/kg	2.2	0.37	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	110		70-130
Toluene-d8	119		70-130
4-Bromofluorobenzene	111		70-130
Dibromofluoromethane	101		70-130

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 08/10/19 05:35
Analyst: MKS

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01,06 Batch: WG1271319-5					
Methylene chloride	ND		ug/kg	5.0	2.3
1,1-Dichloroethane	ND		ug/kg	1.0	0.14
Chloroform	ND		ug/kg	1.5	0.14
Carbon tetrachloride	ND		ug/kg	1.0	0.23
1,2-Dichloropropane	ND		ug/kg	1.0	0.12
Dibromochloromethane	ND		ug/kg	1.0	0.14
1,1,2-Trichloroethane	ND		ug/kg	1.0	0.27
2-Chloroethylvinyl ether	ND		ug/kg	20	1.6
Tetrachloroethene	ND		ug/kg	0.50	0.20
Chlorobenzene	ND		ug/kg	0.50	0.13
Trichlorofluoromethane	ND		ug/kg	4.0	0.70
1,2-Dichloroethane	ND		ug/kg	1.0	0.26
1,1,1-Trichloroethane	ND		ug/kg	0.50	0.17
Bromodichloromethane	ND		ug/kg	0.50	0.11
trans-1,3-Dichloropropene	ND		ug/kg	1.0	0.27
cis-1,3-Dichloropropene	ND		ug/kg	0.50	0.16
1,3-Dichloropropene, Total	ND		ug/kg	0.50	0.16
1,1-Dichloropropene	ND		ug/kg	0.50	0.16
Bromoform	ND		ug/kg	4.0	0.25
1,1,2,2-Tetrachloroethane	ND		ug/kg	0.50	0.17
Benzene	ND		ug/kg	0.50	0.17
Toluene	ND		ug/kg	1.0	0.54
Ethylbenzene	ND		ug/kg	1.0	0.14
Chloromethane	ND		ug/kg	4.0	0.93
Bromomethane	ND		ug/kg	2.0	0.58
Vinyl chloride	ND		ug/kg	1.0	0.34
Chloroethane	ND		ug/kg	2.0	0.45
1,1-Dichloroethene	ND		ug/kg	1.0	0.24
trans-1,2-Dichloroethene	ND		ug/kg	1.5	0.14

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 08/10/19 05:35
Analyst: MKS

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01,06 Batch: WG1271319-5					
Trichloroethene	ND		ug/kg	0.50	0.14
1,2-Dichlorobenzene	ND		ug/kg	2.0	0.14
1,3-Dichlorobenzene	ND		ug/kg	2.0	0.15
1,4-Dichlorobenzene	ND		ug/kg	2.0	0.17
Methyl tert butyl ether	ND		ug/kg	2.0	0.20
p/m-Xylene	ND		ug/kg	2.0	0.56
o-Xylene	ND		ug/kg	1.0	0.29
Xylenes, Total	ND		ug/kg	1.0	0.29
cis-1,2-Dichloroethene	ND		ug/kg	1.0	0.18
1,2-Dichloroethene, Total	ND		ug/kg	1.0	0.14
Dibromomethane	ND		ug/kg	2.0	0.24
1,4-Dichlorobutane	ND		ug/kg	10	0.23
1,2,3-Trichloropropane	ND		ug/kg	2.0	0.13
Styrene	ND		ug/kg	1.0	0.20
Dichlorodifluoromethane	ND		ug/kg	10	0.92
Acetone	ND		ug/kg	10	4.8
Carbon disulfide	ND		ug/kg	10	4.6
2-Butanone	ND		ug/kg	10	2.2
Vinyl acetate	ND		ug/kg	10	2.2
4-Methyl-2-pentanone	ND		ug/kg	10	1.3
2-Hexanone	ND		ug/kg	10	1.2
Ethyl methacrylate	ND		ug/kg	10	1.6
Acrolein	ND		ug/kg	25	5.6
Acrylonitrile	ND		ug/kg	4.0	1.2
Bromochloromethane	ND		ug/kg	2.0	0.20
Tetrahydrofuran	ND		ug/kg	4.0	1.6
2,2-Dichloropropane	ND		ug/kg	2.0	0.20
1,2-Dibromoethane	ND		ug/kg	1.0	0.28
1,3-Dichloropropane	ND		ug/kg	2.0	0.17

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 08/10/19 05:35
Analyst: MKS

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01,06 Batch: WG1271319-5					
1,1,1,2-Tetrachloroethane	ND		ug/kg	0.50	0.13
Bromobenzene	ND		ug/kg	2.0	0.14
n-Butylbenzene	ND		ug/kg	1.0	0.17
sec-Butylbenzene	ND		ug/kg	1.0	0.15
tert-Butylbenzene	ND		ug/kg	2.0	0.12
1,3,5-Trichlorobenzene	ND		ug/kg	2.0	0.17
o-Chlorotoluene	ND		ug/kg	2.0	0.19
p-Chlorotoluene	ND		ug/kg	2.0	0.11
1,2-Dibromo-3-chloropropane	ND		ug/kg	3.0	1.0
Hexachlorobutadiene	ND		ug/kg	4.0	0.17
Isopropylbenzene	ND		ug/kg	1.0	0.11
p-Isopropyltoluene	ND		ug/kg	1.0	0.11
Naphthalene	ND		ug/kg	4.0	0.65
n-Propylbenzene	ND		ug/kg	1.0	0.17
1,2,3-Trichlorobenzene	ND		ug/kg	2.0	0.32
1,2,4-Trichlorobenzene	ND		ug/kg	2.0	0.27
1,3,5-Trimethylbenzene	ND		ug/kg	2.0	0.19
1,2,4-Trimethylbenzene	ND		ug/kg	2.0	0.33
trans-1,4-Dichloro-2-butene	ND		ug/kg	5.0	1.4
Ethyl ether	ND		ug/kg	2.0	0.34
Methyl Acetate	ND		ug/kg	4.0	0.95
Ethyl Acetate	ND		ug/kg	10	1.2
Isopropyl Ether	ND		ug/kg	2.0	0.21
Cyclohexane	ND		ug/kg	10	0.54
Tert-Butyl Alcohol	ND		ug/kg	20	5.1
Ethyl-Tert-Butyl-Ether	ND		ug/kg	2.0	0.13
Tertiary-Amyl Methyl Ether	ND		ug/kg	2.0	0.18
1,4-Dioxane	ND		ug/kg	80	35.
Methyl cyclohexane	ND		ug/kg	4.0	0.60

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 1,8260C
Analytical Date: 08/10/19 05:35
Analyst: MKS

Parameter	Result	Qualifier	Units	RL	MDL
Volatile Organics by EPA 5035 Low - Westborough Lab for sample(s): 01,06 Batch: WG1271319-5					
1,1,2-Trichloro-1,2,2-Trifluoroethane	ND		ug/kg	4.0	0.69

Surrogate	%Recovery	Qualifier	Acceptance Criteria
1,2-Dichloroethane-d4	106		70-130
Toluene-d8	118		70-130
4-Bromofluorobenzene	110		70-130
Dibromofluoromethane	97		70-130

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01,06 Batch: WG1271319-3 WG1271319-4								
Methylene chloride	86		87		70-130	1		30
1,1-Dichloroethane	90		92		70-130	2		30
Chloroform	87		89		70-130	2		30
Carbon tetrachloride	90		91		70-130	1		30
1,2-Dichloropropane	90		91		70-130	1		30
Dibromochloromethane	109		109		70-130	0		30
1,1,2-Trichloroethane	115		115		70-130	0		30
2-Chloroethylvinyl ether	80		82		70-130	2		30
Tetrachloroethene	107		109		70-130	2		30
Chlorobenzene	106		108		70-130	2		30
Trichlorofluoromethane	97		96		70-139	1		30
1,2-Dichloroethane	93		94		70-130	1		30
1,1,1-Trichloroethane	91		93		70-130	2		30
Bromodichloromethane	94		96		70-130	2		30
trans-1,3-Dichloropropene	117		118		70-130	1		30
cis-1,3-Dichloropropene	98		97		70-130	1		30
1,1-Dichloropropene	94		95		70-130	1		30
Bromoform	112		118		70-130	5		30
1,1,2,2-Tetrachloroethane	114		117		70-130	3		30
Benzene	90		92		70-130	2		30
Toluene	111		112		70-130	1		30
Ethylbenzene	113		113		70-130	0		30
Chloromethane	88		88		52-130	0		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01,06 Batch: WG1271319-3 WG1271319-4								
Bromomethane	100		99		57-147	1		30
Vinyl chloride	95		95		67-130	0		30
Chloroethane	96		95		50-151	1		30
1,1-Dichloroethene	130		128		65-135	2		30
trans-1,2-Dichloroethene	87		88		70-130	1		30
Trichloroethene	92		90		70-130	2		30
1,2-Dichlorobenzene	116		117		70-130	1		30
1,3-Dichlorobenzene	114		116		70-130	2		30
1,4-Dichlorobenzene	113		112		70-130	1		30
Methyl tert butyl ether	88		89		66-130	1		30
p/m-Xylene	114		114		70-130	0		30
o-Xylene	114		115		70-130	1		30
cis-1,2-Dichloroethene	91		91		70-130	0		30
Dibromomethane	93		92		70-130	1		30
1,4-Dichlorobutane	113		115		70-130	2		30
1,2,3-Trichloropropane	112		116		68-130	4		30
Styrene	115		114		70-130	1		30
Dichlorodifluoromethane	88		88		30-146	0		30
Acetone	89		88		54-140	1		30
Carbon disulfide	**133**	Q	130		59-130	2		30
2-Butanone	82		84		70-130	2		30
Vinyl acetate	88		90		70-130	2		30
4-Methyl-2-pentanone	104		102		70-130	2		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01,06 Batch: WG1271319-3 WG1271319-4								
2-Hexanone	96		98		70-130	2		30
Ethyl methacrylate	97		99		70-130	2		30
Acrolein	88		90		70-130	2		30
Acrylonitrile	88		87		70-130	1		30
Bromochloromethane	90		91		70-130	1		30
Tetrahydrofuran	90		90		66-130	0		30
2,2-Dichloropropane	93		93		70-130	0		30
1,2-Dibromoethane	111		111		70-130	0		30
1,3-Dichloropropane	112		113		69-130	1		30
1,1,1,2-Tetrachloroethane	111		113		70-130	2		30
Bromobenzene	111		112		70-130	1		30
n-Butylbenzene	120		120		70-130	0		30
sec-Butylbenzene	118		120		70-130	2		30
tert-Butylbenzene	117		119		70-130	2		30
1,3,5-Trichlorobenzene	114		115		70-139	1		30
o-Chlorotoluene	126		130		70-130	3		30
p-Chlorotoluene	115		118		70-130	3		30
1,2-Dibromo-3-chloropropane	97		104		68-130	7		30
Hexachlorobutadiene	106		107		67-130	1		30
Isopropylbenzene	118		119		70-130	1		30
p-Isopropyltoluene	120		121		70-130	1		30
Naphthalene	118		118		70-130	0		30
n-Propylbenzene	117		119		70-130	2		30

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Volatile Organics by EPA 5035 Low - Westborough Lab Associated sample(s): 01,06 Batch: WG1271319-3 WG1271319-4								
1,2,3-Trichlorobenzene	114		114		70-130	0		30
1,2,4-Trichlorobenzene	115		116		70-130	1		30
1,3,5-Trimethylbenzene	116		118		70-130	2		30
1,2,4-Trimethylbenzene	120		120		70-130	0		30
trans-1,4-Dichloro-2-butene	113		113		70-130	0		30
Ethyl ether	94		93		67-130	1		30
Methyl Acetate	90		87		65-130	3		30
Ethyl Acetate	86		88		70-130	2		30
Isopropyl Ether	89		91		66-130	2		30
Cyclohexane	92		92		70-130	0		30
Tert-Butyl Alcohol	86		87		70-130	1		30
Ethyl-Tert-Butyl-Ether	90		90		70-130	0		30
Tertiary-Amyl Methyl Ether	89		91		70-130	2		30
1,4-Dioxane	76		85		65-136	11		30
Methyl cyclohexane	90		91		70-130	1		30
1,1,2-Trichloro-1,2,2-Trifluoroethane	**135**	Q	129		70-130	5		30

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
1,2-Dichloroethane-d4	101		100		70-130
Toluene-d8	114		116		70-130
4-Bromofluorobenzene	104		104		70-130
Dibromofluoromethane	98		97		70-130

SEMIVOLATILES

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-02
Client ID: HOPN1+2
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 11:45
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 08/09/19 10:06
Analyst: GP
Percent Solids: 84%

Extraction Method: EPA 3570
Extraction Date: 08/01/19 16:03
Cleanup Method: EPA 3630
Cleanup Date: 08/02/19

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Naphthalene	ND		ug/kg	4.58	2.29	1
Acenaphthylene	ND		ug/kg	4.58	2.29	1
Acenaphthene	ND		ug/kg	4.58	2.29	1
Fluorene	ND		ug/kg	4.58	2.29	1
Phenanthrene	ND		ug/kg	4.58	2.29	1
Anthracene	ND		ug/kg	4.58	2.29	1
Fluoranthene	ND		ug/kg	4.58	2.29	1
Pyrene	ND		ug/kg	4.58	2.29	1
Benz(a)anthracene	ND		ug/kg	4.58	2.29	1
Chrysene	ND		ug/kg	4.58	2.29	1
Benzo(b)fluoranthene	ND		ug/kg	4.58	2.29	1
Benzo(k)fluoranthene	ND		ug/kg	4.58	2.29	1
Benzo(a)pyrene	ND		ug/kg	4.58	2.29	1
Indeno(1,2,3-cd)Pyrene	ND		ug/kg	4.58	2.29	1
Dibenz(a,h)anthracene	ND		ug/kg	4.58	2.29	1
Benzo(ghi)perylene	ND		ug/kg	4.58	2.29	1
Cl2-BZ#8	ND		ug/kg	0.458	0.229	1
Cl3-BZ#18	ND		ug/kg	0.458	0.229	1
Cl3-BZ#28	ND		ug/kg	0.458	0.229	1
Cl4-BZ#44	ND		ug/kg	0.458	0.229	1
Cl4-BZ#49	ND		ug/kg	0.458	0.229	1
Cl4-BZ#52	ND		ug/kg	0.458	0.229	1
Cl4-BZ#66	ND		ug/kg	0.458	0.229	1
Cl5-BZ#87	ND		ug/kg	0.458	0.229	1
Cl5-BZ#101	ND		ug/kg	0.458	0.229	1
Cl5-BZ#105	ND		ug/kg	0.458	0.229	1
Cl5-BZ#118	ND		ug/kg	0.458	0.229	1
Cl6-BZ#128	ND		ug/kg	0.458	0.229	1

Project Name: NAUSET ESTUARY
Lab Number: L1933910
Project Number: 2015-0121-03
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-02
Client ID: HOPN1+2
Sample Location: ORLEANS, MA
Date Collected: 07/29/19 11:45
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Cl6-BZ#138	ND		ug/kg	0.458	0.229	1
Cl6-BZ#153	ND		ug/kg	0.458	0.229	1
Cl7-BZ#170	ND		ug/kg	0.458	0.229	1
Cl7-BZ#180	ND		ug/kg	0.458	0.229	1
Cl7-BZ#183	ND		ug/kg	0.458	0.229	1
Cl7-BZ#184	ND		ug/kg	0.458	0.229	1
Cl7-BZ#187	ND		ug/kg	0.458	0.229	1
Cl8-BZ#195	ND		ug/kg	0.458	0.229	1
Cl9-BZ#206	ND		ug/kg	0.458	0.229	1
Cl10-BZ#209	ND		ug/kg	0.458	0.229	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Methylnaphthalene-d10	87		30-150
Pyrene-d10	127		30-150
Benzo(b)fluoranthene-d12	121		30-150
DBOB	85		50-125
BZ 198	84		50-125

Project Name: NAUSET ESTUARY
Lab Number: L1933910
Project Number: 2015-0121-03
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-03
Client ID: STON1+2
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 12:53
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 08/09/19 10:41
Analyst: GP
Percent Solids: 77%

Extraction Method: EPA 3570
Extraction Date: 08/01/19 16:03
Cleanup Method: EPA 3630
Cleanup Date: 08/02/19

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Naphthalene	ND		ug/kg	5.13	2.57	1
Acenaphthylene	ND		ug/kg	5.13	2.57	1
Acenaphthene	ND		ug/kg	5.13	2.57	1
Fluorene	ND		ug/kg	5.13	2.57	1
Phenanthrene	4.93	J	ug/kg	5.13	2.57	1
Anthracene	ND		ug/kg	5.13	2.57	1
Fluoranthene	9.66		ug/kg	5.13	2.57	1
Pyrene	8.89		ug/kg	5.13	2.57	1
Benz(a)anthracene	3.71	J	ug/kg	5.13	2.57	1
Chrysene	4.81	J	ug/kg	5.13	2.57	1
Benzo(b)fluoranthene	5.30		ug/kg	5.13	2.57	1
Benzo(k)fluoranthene	4.29	J	ug/kg	5.13	2.57	1
Benzo(a)pyrene	4.40	J	ug/kg	5.13	2.57	1
Indeno(1,2,3-cd)Pyrene	4.18	J	ug/kg	5.13	2.57	1
Dibenz(a,h)anthracene	ND		ug/kg	5.13	2.57	1
Benzo(ghi)perylene	4.21	J	ug/kg	5.13	2.57	1
Cl2-BZ#8	ND		ug/kg	0.513	0.257	1
Cl3-BZ#18	ND		ug/kg	0.513	0.257	1
Cl3-BZ#28	ND		ug/kg	0.513	0.257	1
Cl4-BZ#44	ND		ug/kg	0.513	0.257	1
Cl4-BZ#49	ND		ug/kg	0.513	0.257	1
Cl4-BZ#52	ND		ug/kg	0.513	0.257	1
Cl4-BZ#66	ND		ug/kg	0.513	0.257	1
Cl5-BZ#87	ND		ug/kg	0.513	0.257	1
Cl5-BZ#101	ND		ug/kg	0.513	0.257	1
Cl5-BZ#105	ND		ug/kg	0.513	0.257	1
Cl5-BZ#118	ND		ug/kg	0.513	0.257	1
Cl6-BZ#128	ND		ug/kg	0.513	0.257	1

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-03 Date Collected: 07/29/19 12:53

Client ID: STON1+2 Date Received: 07/30/19

Sample Location: ORLEANS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Cl6-BZ#138	ND		ug/kg	0.513	0.257	1
Cl6-BZ#153	ND		ug/kg	0.513	0.257	1
Cl7-BZ#170	ND		ug/kg	0.513	0.257	1
Cl7-BZ#180	ND		ug/kg	0.513	0.257	1
Cl7-BZ#183	ND		ug/kg	0.513	0.257	1
Cl7-BZ#184	ND		ug/kg	0.513	0.257	1
Cl7-BZ#187	ND		ug/kg	0.513	0.257	1
Cl8-BZ#195	ND		ug/kg	0.513	0.257	1
Cl9-BZ#206	ND		ug/kg	0.513	0.257	1
Cl10-BZ#209	ND		ug/kg	0.513	0.257	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Methylnaphthalene-d10	79		30-150
Pyrene-d10	126		30-150
Benzo(b)fluoranthene-d12	119		30-150
DBOB	81		50-125
BZ 198	82		50-125

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-08
Client ID: PRISC-3+4
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 15:27
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 08/09/19 11:16
Analyst: GP
Percent Solids: 61%

Extraction Method: EPA 3570
Extraction Date: 08/01/19 16:03
Cleanup Method: EPA 3630
Cleanup Date: 08/02/19

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Naphthalene	ND		ug/kg	6.42	3.21	1
Acenaphthylene	ND		ug/kg	6.42	3.21	1
Acenaphthene	ND		ug/kg	6.42	3.21	1
Fluorene	ND		ug/kg	6.42	3.21	1
Phenanthrene	14.2		ug/kg	6.42	3.21	1
Anthracene	ND		ug/kg	6.42	3.21	1
Fluoranthene	28.6		ug/kg	6.42	3.21	1
Pyrene	25.9		ug/kg	6.42	3.21	1
Benz(a)anthracene	10.7		ug/kg	6.42	3.21	1
Chrysene	14.5		ug/kg	6.42	3.21	1
Benzo(b)fluoranthene	19.1		ug/kg	6.42	3.21	1
Benzo(k)fluoranthene	12.8		ug/kg	6.42	3.21	1
Benzo(a)pyrene	13.1		ug/kg	6.42	3.21	1
Indeno(1,2,3-cd)Pyrene	11.8		ug/kg	6.42	3.21	1
Dibenz(a,h)anthracene	ND		ug/kg	6.42	3.21	1
Benzo(ghi)perylene	12.1		ug/kg	6.42	3.21	1
Cl2-BZ#8	ND		ug/kg	0.642	0.321	1
Cl3-BZ#18	ND		ug/kg	0.642	0.321	1
Cl3-BZ#28	ND		ug/kg	0.642	0.321	1
Cl4-BZ#44	ND		ug/kg	0.642	0.321	1
Cl4-BZ#49	ND		ug/kg	0.642	0.321	1
Cl4-BZ#52	ND		ug/kg	0.642	0.321	1
Cl4-BZ#66	ND		ug/kg	0.642	0.321	1
Cl5-BZ#87	ND		ug/kg	0.642	0.321	1
Cl5-BZ#101	ND		ug/kg	0.642	0.321	1
Cl5-BZ#105	ND		ug/kg	0.642	0.321	1
Cl5-BZ#118	ND		ug/kg	0.642	0.321	1
Cl6-BZ#128	ND		ug/kg	0.642	0.321	1

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-08 Date Collected: 07/29/19 15:27

Client ID: PRISC-3+4 Date Received: 07/30/19

Sample Location: ORLEANS, MA Field Prep: Not Specified

Sample Depth:

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
PAHs/PCB Congeners by GC/MS - Mansfield Lab						
Cl6-BZ#138	ND		ug/kg	0.642	0.321	1
Cl6-BZ#153	ND		ug/kg	0.642	0.321	1
Cl7-BZ#170	ND		ug/kg	0.642	0.321	1
Cl7-BZ#180	ND		ug/kg	0.642	0.321	1
Cl7-BZ#183	ND		ug/kg	0.642	0.321	1
Cl7-BZ#184	ND		ug/kg	0.642	0.321	1
Cl7-BZ#187	ND		ug/kg	0.642	0.321	1
Cl8-BZ#195	ND		ug/kg	0.642	0.321	1
Cl9-BZ#206	ND		ug/kg	0.642	0.321	1
Cl10-BZ#209	ND		ug/kg	0.642	0.321	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
2-Methylnaphthalene-d10	83		30-150
Pyrene-d10	121		30-150
Benzo(b)fluoranthene-d12	119		30-150
DBOB	84		50-125
BZ 198	80		50-125

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 08/09/19 08:23
Analyst: GP

Extraction Method: EPA 3570
Extraction Date: 08/01/19 16:03
Cleanup Method: EPA 3630
Cleanup Date: 08/02/19

Parameter	Result	Qualifier	Units	RL	MDL
PAHs/PCB Congeners by GC/MS - Mansfield Lab for sample(s): 02-03,08 Batch: WG1267514-1					
Naphthalene	ND		ug/kg	4.00	2.00
Acenaphthylene	ND		ug/kg	4.00	2.00
Acenaphthene	ND		ug/kg	4.00	2.00
Fluorene	ND		ug/kg	4.00	2.00
Phenanthrene	ND		ug/kg	4.00	2.00
Anthracene	ND		ug/kg	4.00	2.00
Fluoranthene	ND		ug/kg	4.00	2.00
Pyrene	ND		ug/kg	4.00	2.00
Benz(a)anthracene	ND		ug/kg	4.00	2.00
Chrysene	ND		ug/kg	4.00	2.00
Benzo(b)fluoranthene	ND		ug/kg	4.00	2.00
Benzo(k)fluoranthene	ND		ug/kg	4.00	2.00
Benzo(a)pyrene	ND		ug/kg	4.00	2.00
Indeno(1,2,3-cd)Pyrene	ND		ug/kg	4.00	2.00
Dibenz(a,h)anthracene	ND		ug/kg	4.00	2.00
Benzo(ghi)perylene	ND		ug/kg	4.00	2.00
Cl2-BZ#8	ND		ug/kg	0.400	0.200
Cl3-BZ#18	ND		ug/kg	0.400	0.200
Cl3-BZ#28	ND		ug/kg	0.400	0.200
Cl4-BZ#44	ND		ug/kg	0.400	0.200
Cl4-BZ#49	ND		ug/kg	0.400	0.200
Cl4-BZ#52	ND		ug/kg	0.400	0.200
Cl4-BZ#66	ND		ug/kg	0.400	0.200
Cl5-BZ#87	ND		ug/kg	0.400	0.200
Cl5-BZ#101	ND		ug/kg	0.400	0.200
Cl5-BZ#105	ND		ug/kg	0.400	0.200
Cl5-BZ#118	ND		ug/kg	0.400	0.200
Cl6-BZ#128	ND		ug/kg	0.400	0.200
Cl6-BZ#138	ND		ug/kg	0.400	0.200

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 105,8270D-SIM/680(M)
Analytical Date: 08/09/19 08:23
Analyst: GP

Extraction Method: EPA 3570
Extraction Date: 08/01/19 16:03
Cleanup Method: EPA 3630
Cleanup Date: 08/02/19

Parameter	Result	Qualifier	Units	RL	MDL
PAHs/PCB Congeners by GC/MS - Mansfield Lab for sample(s): 02-03,08 Batch: WG1267514-1					
Cl6-BZ#153	ND		ug/kg	0.400	0.200
Cl7-BZ#170	ND		ug/kg	0.400	0.200
Cl7-BZ#180	ND		ug/kg	0.400	0.200
Cl7-BZ#183	ND		ug/kg	0.400	0.200
Cl7-BZ#184	ND		ug/kg	0.400	0.200
Cl7-BZ#187	ND		ug/kg	0.400	0.200
Cl8-BZ#195	ND		ug/kg	0.400	0.200
Cl9-BZ#206	ND		ug/kg	0.400	0.200
Cl10-BZ#209	ND		ug/kg	0.400	0.200

Surrogate	%Recovery	Qualifier	Acceptance Criteria
2-Methylnaphthalene-d10	74		30-150
Pyrene-d10	118		30-150
Benzo(b)fluoranthene-d12	127		30-150
DBOB	76		50-125
BZ 198	83		50-125

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PAHs/PCB Congeners by GC/MS - Mansfield Lab Associated sample(s): 02-03,08 Batch: WG1267514-2 WG1267514-3								
Naphthalene	46		49		40-140	6		30
Acenaphthylene	59		60		40-140	2		30
Acenaphthene	62		63		40-140	2		30
Fluorene	69		70		40-140	1		30
Phenanthrene	82		85		40-140	4		30
Anthracene	75		75		40-140	0		30
Fluoranthene	84		84		40-140	0		30
Pyrene	82		85		40-140	4		30
Benz(a)anthracene	94		96		40-140	2		30
Chrysene	87		89		40-140	2		30
Benzo(b)fluoranthene	92		95		40-140	3		30
Benzo(k)fluoranthene	84		82		40-140	2		30
Benzo(a)pyrene	87		90		40-140	3		30
Indeno(1,2,3-cd)Pyrene	90		92		40-140	2		30
Dibenz(a,h)anthracene	87		87		40-140	0		30
Benzo(ghi)perylene	88		88		40-140	0		30
Cl2-BZ#8	74		77		40-140	4		50
Cl3-BZ#18	74		79		40-140	7		50
Cl3-BZ#28	76		81		40-140	6		50
Cl4-BZ#44	85		89		40-140	5		50
Cl4-BZ#49	82		85		40-140	4		50
Cl4-BZ#52	83		89		40-140	7		50
Cl4-BZ#66	84		88		40-140	5		50

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
PAHs/PCB Congeners by GC/MS - Mansfield Lab Associated sample(s): 02-03,08 Batch: WG1267514-2 WG1267514-3								
Cl5-BZ#87	85		87		40-140	2		50
Cl5-BZ#101	84		88		40-140	5		50
Cl5-BZ#105	81		84		40-140	4		50
Cl5-BZ#118	82		85		40-140	4		50
Cl6-BZ#128	86		89		40-140	3		50
Cl6-BZ#138	83		86		40-140	4		50
Cl6-BZ#153	83		85		40-140	2		50
Cl7-BZ#170	84		87		40-140	4		50
Cl7-BZ#180	85		89		40-140	5		50
Cl7-BZ#183	81		84		40-140	4		50
Cl7-BZ#184	78		81		40-140	4		50
Cl7-BZ#187	84		87		40-140	4		50
Cl8-BZ#195	83		87		40-140	5		50
Cl9-BZ#206	83		85		40-140	2		50
Cl10-BZ#209	83		86		40-140	4		50

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
2-Methylnaphthalene-d10	75		72		30-150
Pyrene-d10	124		126		30-150
Benzo(b)fluoranthene-d12	127		126		30-150
DBOB	83		81		50-125
BZ 198	84		85		50-125

PETROLEUM HYDROCARBONS

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID:	L1933910-02	Date Collected:	07/29/19 11:45
Client ID:	HOPN1+2	Date Received:	07/30/19
Sample Location:	ORLEANS, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Sediment	Extraction Method:	EPA 3546
Analytical Method:	98,EPH-04-1.1	Extraction Date:	08/12/19 09:40
Analytical Date:	08/13/19 02:23	Cleanup Method1:	EPH-04-1
Analyst:	MEO	Cleanup Date1:	08/12/19
Percent Solids:	84%		

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	7.64	7.64	1
C19-C36 Aliphatics	ND		mg/kg	7.64	7.64	1
C11-C22 Aromatics	ND		mg/kg	7.64	7.64	1
C11-C22 Aromatics, Adjusted	ND		mg/kg	7.64	7.64	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	53		40-140
o-Terphenyl	71		40-140
2-Fluorobiphenyl	85		40-140
2-Bromonaphthalene	84		40-140

Project Name: NAUSET ESTUARY
Lab Number: L1933910
Project Number: 2015-0121-03
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID:	L1933910-03	Date Collected:	07/29/19 12:53
Client ID:	STON1+2	Date Received:	07/30/19
Sample Location:	ORLEANS, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Sediment	Extraction Method:	EPA 3546
Analytical Method:	98,EPH-04-1.1	Extraction Date:	08/10/19 10:20
Analytical Date:	08/11/19 18:09	Cleanup Method1:	EPH-04-1
Analyst:	MEO	Cleanup Date1:	08/10/19
Percent Solids:	77%		

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	8.32	8.32	1
C19-C36 Aliphatics	ND		mg/kg	8.32	8.32	1
C11-C22 Aromatics	ND		mg/kg	8.32	8.32	1
C11-C22 Aromatics, Adjusted	ND		mg/kg	8.32	8.32	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	46		40-140
o-Terphenyl	52		40-140
2-Fluorobiphenyl	73		40-140
2-Bromonaphthalene	73		40-140

Project Name: NAUSET ESTUARY
Lab Number: L1933910
Project Number: 2015-0121-03
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID:	L1933910-08	Date Collected:	07/29/19 15:27
Client ID:	PRISC-3+4	Date Received:	07/30/19
Sample Location:	ORLEANS, MA	Field Prep:	Not Specified
Sample Depth:			
Matrix:	Sediment	Extraction Method:	EPA 3546
Analytical Method:	98,EPH-04-1.1	Extraction Date:	08/10/19 10:20
Analytical Date:	08/11/19 18:48	Cleanup Method1:	EPH-04-1
Analyst:	MEO	Cleanup Date1:	08/10/19
Percent Solids:	61%		

Quality Control Information

Condition of sample received:	Satisfactory
Sample Temperature upon receipt:	Received on Ice
Sample Extraction method:	Extracted Per the Method

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor
Extractable Petroleum Hydrocarbons - Westborough Lab						
C9-C18 Aliphatics	ND		mg/kg	10.8	10.8	1
C19-C36 Aliphatics	ND		mg/kg	10.8	10.8	1
C11-C22 Aromatics	ND		mg/kg	10.8	10.8	1
C11-C22 Aromatics, Adjusted	ND		mg/kg	10.8	10.8	1

Surrogate	% Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	52		40-140
o-Terphenyl	64		40-140
2-Fluorobiphenyl	84		40-140
2-Bromonaphthalene	84		40-140

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 98,EPH-04-1.1
Analytical Date: 08/12/19 10:50
Analyst: LL

Extraction Method: EPA 3546
Extraction Date: 08/10/19 10:20
Cleanup Method: EPH-04-1
Cleanup Date: 08/10/19

Parameter	Result	Qualifier	Units	RL	MDL
Extractable Petroleum Hydrocarbons - Westborough Lab for sample(s): 03,08 Batch: WG1270948-1					
C9-C18 Aliphatics	ND		mg/kg	6.31	6.31
C19-C36 Aliphatics	ND		mg/kg	6.31	6.31
C11-C22 Aromatics	ND		mg/kg	6.31	6.31
C11-C22 Aromatics, Adjusted	ND		mg/kg	6.31	6.31

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	46		40-140
o-Terphenyl	56		40-140
2-Fluorobiphenyl	81		40-140
2-Bromonaphthalene	82		40-140

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

Method Blank Analysis
Batch Quality Control

Analytical Method: 98,EPH-04-1.1
Analytical Date: 08/13/19 01:44
Analyst: MEO

Extraction Method: EPA 3546
Extraction Date: 08/12/19 09:28
Cleanup Method: EPH-04-1
Cleanup Date: 08/12/19

Parameter	Result	Qualifier	Units	RL	MDL
Extractable Petroleum Hydrocarbons - Westborough Lab for sample(s): 02 Batch: WG1271279-1					
C9-C18 Aliphatics	ND		mg/kg	6.39	6.39
C19-C36 Aliphatics	ND		mg/kg	6.39	6.39
C11-C22 Aromatics	ND		mg/kg	6.39	6.39
C11-C22 Aromatics, Adjusted	ND		mg/kg	6.39	6.39

Surrogate	%Recovery	Qualifier	Acceptance Criteria
Chloro-Octadecane	46		40-140
o-Terphenyl	61		40-140
2-Fluorobiphenyl	82		40-140
2-Bromonaphthalene	81		40-140

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 03,08 Batch: WG1270948-2 WG1270948-3								
C9-C18 Aliphatics	58		75		40-140	**26**	Q	25
C19-C36 Aliphatics	63		81		40-140	25		25
C11-C22 Aromatics	69		90		40-140	**26**	Q	25
Naphthalene	52		74		40-140	**35**	Q	25
2-Methylnaphthalene	53		73		40-140	**32**	Q	25
Acenaphthylene	59		80		40-140	**30**	Q	25
Acenaphthene	60		82		40-140	**31**	Q	25
Fluorene	62		85		40-140	**31**	Q	25
Phenanthrene	66		89		40-140	**30**	Q	25
Anthracene	68		92		40-140	**30**	Q	25
Fluoranthene	69		92		40-140	**29**	Q	25
Pyrene	74		92		40-140	22		25
Benzo(a)anthracene	70		90		40-140	25		25
Chrysene	70		88		40-140	23		25
Benzo(b)fluoranthene	71		94		40-140	**28**	Q	25
Benzo(k)fluoranthene	70		89		40-140	24		25
Benzo(a)pyrene	68		89		40-140	**27**	Q	25
Indeno(1,2,3-cd)Pyrene	68		90		40-140	**28**	Q	25
Dibenzo(a,h)anthracene	69		88		40-140	24		25
Benzo(ghi)perylene	63		82		40-140	**26**	Q	25
Nonane (C9)	46		64		30-140	**33**	Q	25
Decane (C10)	51		68		40-140	**29**	Q	25
Dodecane (C12)	51		66		40-140	**26**	Q	25

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 03,08 Batch: WG1270948-2 WG1270948-3								
Tetradecane (C14)	52		67		40-140	25		25
Hexadecane (C16)	54		71		40-140	**27**	Q	25
Octadecane (C18)	58		76		40-140	**27**	Q	25
Nonadecane (C19)	58		76		40-140	**27**	Q	25
Eicosane (C20)	60		78		40-140	**26**	Q	25
Docosane (C22)	61		79		40-140	**26**	Q	25
Tetracosane (C24)	60		78		40-140	**26**	Q	25
Hexacosane (C26)	60		78		40-140	**26**	Q	25
Octacosane (C28)	60		78		40-140	**26**	Q	25
Triacontane (C30)	60		78		40-140	**26**	Q	25
Hexatriacontane (C36)	62		80		40-140	25		25

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Chloro-Octadecane	50		64		40-140
o-Terphenyl	60		81		40-140
2-Fluorobiphenyl	82		90		40-140
2-Bromonaphthalene	83		90		40-140
% Naphthalene Breakthrough	0		0		
% 2-Methylnaphthalene Breakthrough	0		0		

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 02 Batch: WG1271279-2 WG1271279-3								
C9-C18 Aliphatics	57		63		40-140	10		25
C19-C36 Aliphatics	59		68		40-140	14		25
C11-C22 Aromatics	68		74		40-140	8		25
Naphthalene	58		60		40-140	3		25
2-Methylnaphthalene	59		62		40-140	5		25
Acenaphthylene	64		68		40-140	6		25
Acenaphthene	69		74		40-140	7		25
Fluorene	65		70		40-140	7		25
Phenanthrene	67		72		40-140	7		25
Anthracene	67		72		40-140	7		25
Fluoranthene	65		71		40-140	9		25
Pyrene	67		74		40-140	10		25
Benzo(a)anthracene	65		71		40-140	9		25
Chrysene	67		74		40-140	10		25
Benzo(b)fluoranthene	64		71		40-140	10		25
Benzo(k)fluoranthene	65		71		40-140	9		25
Benzo(a)pyrene	63		70		40-140	11		25
Indeno(1,2,3-cd)Pyrene	62		70		40-140	12		25
Dibenzo(a,h)anthracene	65		74		40-140	13		25
Benzo(ghi)perylene	62		70		40-140	12		25
Nonane (C9)	50		53		30-140	6		25
Decane (C10)	53		58		40-140	9		25
Dodecane (C12)	53		58		40-140	9		25

Lab Control Sample Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Extractable Petroleum Hydrocarbons - Westborough Lab Associated sample(s): 02 Batch: WG1271279-2 WG1271279-3								
Tetradecane (C14)	53		58		40-140	9		25
Hexadecane (C16)	52		58		40-140	11		25
Octadecane (C18)	52		60		40-140	14		25
Nonadecane (C19)	52		60		40-140	14		25
Eicosane (C20)	53		62		40-140	16		25
Docosane (C22)	54		63		40-140	15		25
Tetracosane (C24)	56		65		40-140	15		25
Hexacosane (C26)	58		68		40-140	16		25
Octacosane (C28)	60		69		40-140	14		25
Triacontane (C30)	61		71		40-140	15		25
Hexatriacontane (C36)	63		74		40-140	16		25

Surrogate	LCS %Recovery	Qual	LCSD %Recovery	Qual	Acceptance Criteria
Chloro-Octadecane	42		49		40-140
o-Terphenyl	56		61		40-140
2-Fluorobiphenyl	85		79		40-140
2-Bromonaphthalene	86		79		40-140
% Naphthalene Breakthrough	0		0		
% 2-Methylnaphthalene Breakthrough	0		0		

METALS

Project Name: NAUSET ESTUARY
Lab Number: L1933910
Project Number: 2015-0121-03
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-02
Client ID: HOPN1+2
Sample Location: ORLEANS, MA
Date Collected: 07/29/19 11:45
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Percent Solids: 84%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	982		mg/kg	114	16.9	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Antimony, Total	ND		mg/kg	1.82	0.154	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Arsenic, Total	1.67		mg/kg	0.570	0.075	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Barium, Total	2.77	J	mg/kg	3.42	0.241	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Beryllium, Total	ND		mg/kg	0.342	0.099	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Cadmium, Total	0.070	J	mg/kg	0.228	0.030	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Calcium, Total	341	J	mg/kg	570	69.3	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Chromium, Total	3.53		mg/kg	2.28	0.533	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Cobalt, Total	0.709		mg/kg	0.570	0.061	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Copper, Total	1.65	J	mg/kg	2.28	0.221	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Iron, Total	2570		mg/kg	228	23.5	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Lead, Total	1.80		mg/kg	0.684	0.166	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Magnesium, Total	759		mg/kg	114	14.0	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Manganese, Total	22.1		mg/kg	2.28	0.506	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Mercury, Total	0.006	J	mg/kg	0.016	0.002	5	08/08/19 13:16	08/13/19 11:34	EPA 7474	1,7474	BV
Nickel, Total	2.18		mg/kg	1.14	0.304	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Potassium, Total	321		mg/kg	114	18.1	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Selenium, Total	ND		mg/kg	2.28	0.861	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Silver, Total	ND		mg/kg	0.570	0.056	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Sodium, Total	1710		mg/kg	171	13.4	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Thallium, Total	0.067	J	mg/kg	0.228	0.059	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Vanadium, Total	3.59		mg/kg	1.14	0.432	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG
Zinc, Total	7.37	J	mg/kg	11.4	2.96	10	08/08/19 13:05	08/08/19 20:37	EPA 3050B	1,6020B	MG

Project Name: NAUSET ESTUARY
Lab Number: L1933910
Project Number: 2015-0121-03
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-03
Client ID: STON1+2
Sample Location: ORLEANS, MA
Date Collected: 07/29/19 12:53
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Percent Solids: 77%

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Total Metals - Mansfield Lab											
Aluminum, Total	2710		mg/kg	121	18.0	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Antimony, Total	ND		mg/kg	1.94	0.164	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Arsenic, Total	3.54		mg/kg	0.606	0.080	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Barium, Total	7.53		mg/kg	3.64	0.256	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Beryllium, Total	0.199	J	mg/kg	0.364	0.106	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Cadmium, Total	0.077	J	mg/kg	0.242	0.032	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Calcium, Total	1360		mg/kg	606	73.7	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Chromium, Total	9.00		mg/kg	2.42	0.568	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Cobalt, Total	1.97		mg/kg	0.606	0.065	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Copper, Total	4.41		mg/kg	2.42	0.235	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Iron, Total	6610		mg/kg	242	25.0	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Lead, Total	4.79		mg/kg	0.728	0.177	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Magnesium, Total	1860		mg/kg	121	14.9	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Manganese, Total	56.0		mg/kg	2.42	0.538	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Mercury, Total	0.011	J	mg/kg	0.020	0.003	5	08/08/19 13:16	08/13/19 11:36	EPA 7474	1,7474	BV
Nickel, Total	5.31		mg/kg	1.21	0.324	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Potassium, Total	895		mg/kg	121	19.3	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Selenium, Total	1.24	J	mg/kg	2.42	0.917	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Silver, Total	ND		mg/kg	0.606	0.059	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Sodium, Total	3220		mg/kg	182	14.2	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Thallium, Total	0.097	J	mg/kg	0.242	0.063	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Vanadium, Total	11.1		mg/kg	1.21	0.460	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG
Zinc, Total	17.0		mg/kg	12.1	3.15	10	08/08/19 13:05	08/08/19 20:42	EPA 3050B	1,6020B	MG

Project Name: NAUSET ESTUARY
Lab Number: L1933910
Project Number: 2015-0121-03
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-08
Client ID: PRISC-3+4
Sample Location: ORLEANS, MA
Date Collected: 07/29/19 15:27
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment
Percent Solids: 61%

Total Metals - Mansfield Lab

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Prep Method	Analytical Method	Analyst
Aluminum, Total	6020		mg/kg	156	23.1	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Antimony, Total	ND		mg/kg	2.50	0.211	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Arsenic, Total	5.84		mg/kg	0.781	0.103	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Barium, Total	16.6		mg/kg	4.69	0.330	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Beryllium, Total	0.383	J	mg/kg	0.469	0.136	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Cadmium, Total	0.243	J	mg/kg	0.312	0.041	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Calcium, Total	1590		mg/kg	781	95.0	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Chromium, Total	19.0		mg/kg	3.12	0.731	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Cobalt, Total	4.40		mg/kg	0.781	0.083	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Copper, Total	10.9		mg/kg	3.12	0.303	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Iron, Total	14200		mg/kg	312	32.2	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Lead, Total	11.4		mg/kg	0.938	0.228	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Magnesium, Total	4060		mg/kg	156	19.2	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Manganese, Total	122		mg/kg	3.12	0.694	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Mercury, Total	0.023		mg/kg	0.022	0.003	5	08/08/19 13:16	08/13/19 11:39	EPA 7474	1,7474	BV
Nickel, Total	11.8		mg/kg	1.56	0.418	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Potassium, Total	1850		mg/kg	156	24.8	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Selenium, Total	2.30	J	mg/kg	3.12	1.18	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Silver, Total	0.081	J	mg/kg	0.781	0.076	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Sodium, Total	6980		mg/kg	234	18.3	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Thallium, Total	0.216	J	mg/kg	0.312	0.081	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Vanadium, Total	24.6		mg/kg	1.56	0.592	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG
Zinc, Total	38.3		mg/kg	15.6	4.06	10	08/08/19 13:05	08/08/19 20:46	EPA 3050B	1,6020B	MG

Project Name: NAUSET ESTUARY **Lab Number:** L1933910

Project Number: 2015-0121-03 **Report Date:** 08/14/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 02-03,08 Batch: WG1270121-1										
Aluminum, Total	ND		mg/kg	100	14.8	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Antimony, Total	ND		mg/kg	1.60	0.135	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Arsenic, Total	ND		mg/kg	0.500	0.066	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Barium, Total	ND		mg/kg	3.00	0.211	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Beryllium, Total	ND		mg/kg	0.300	0.087	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Cadmium, Total	ND		mg/kg	0.200	0.026	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Calcium, Total	ND		mg/kg	500	60.8	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Chromium, Total	ND		mg/kg	2.00	0.468	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Cobalt, Total	ND		mg/kg	0.500	0.053	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Copper, Total	ND		mg/kg	2.00	0.194	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Iron, Total	ND		mg/kg	200	20.6	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Lead, Total	ND		mg/kg	0.600	0.146	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Magnesium, Total	ND		mg/kg	100	12.3	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Manganese, Total	ND		mg/kg	2.00	0.444	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Nickel, Total	ND		mg/kg	1.00	0.267	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Potassium, Total	ND		mg/kg	100	15.9	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Selenium, Total	ND		mg/kg	2.00	0.756	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Silver, Total	ND		mg/kg	0.500	0.049	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Sodium, Total	ND		mg/kg	150	11.7	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Thallium, Total	ND		mg/kg	0.200	0.052	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Vanadium, Total	ND		mg/kg	1.00	0.379	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG
Zinc, Total	ND		mg/kg	10.0	2.60	10	08/08/19 13:05	08/08/19 19:15	1,6020B	MG

Prep Information

Digestion Method: EPA 3050B

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Metals - Mansfield Lab for sample(s): 02-03,08 Batch: WG1270125-1										
Mercury, Total	ND		mg/kg	0.013	0.002	5	08/08/19 13:16	08/13/19 10:45	1,7474	BV

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

Method Blank Analysis
Batch Quality Control

Prep Information

Digestion Method: EPA 7474

Lab Control Sample Analysis

Batch Quality Control

Project Name: NAUSET ESTUARY

Project Number: 2015-0121-03

Lab Number: L1933910

Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 02-03,08 Batch: WG1270121-2 SRM Lot Number: D105-540								
Aluminum, Total	69		-		51-149	-		20
Antimony, Total	163		-		19-249	-		20
Arsenic, Total	102		-		70-130	-		20
Barium, Total	104		-		75-125	-		20
Beryllium, Total	103		-		75-125	-		20
Cadmium, Total	105		-		75-125	-		20
Calcium, Total	100		-		73-127	-		20
Chromium, Total	98		-		70-130	-		20
Cobalt, Total	98		-		75-125	-		20
Copper, Total	100		-		75-125	-		20
Iron, Total	95		-		38-162	-		20
Lead, Total	102		-		71-128	-		20
Magnesium, Total	92		-		63-137	-		20
Manganese, Total	97		-		76-124	-		20
Nickel, Total	101		-		70-131	-		20
Potassium, Total	85		-		60-140	-		20
Selenium, Total	108		-		63-137	-		20
Silver, Total	103		-		69-131	-		20
Sodium, Total	110		-		37-162	-		20
Thallium, Total	104		-		68-132	-		20
Vanadium, Total	97		-		65-135	-		20

Lab Control Sample Analysis

Batch Quality Control

Project Name: NAUSET ESTUARY

Project Number: 2015-0121-03

Lab Number: L1933910

Report Date: 08/14/19

Parameter	LCS %Recovery	LCSD %Recovery	%Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 02-03,08 Batch: WG1270121-2 SRM Lot Number: D105-540					
Zinc, Total	101	-	70-130	-	20
Total Metals - Mansfield Lab Associated sample(s): 02-03,08 Batch: WG1270125-2 SRM Lot Number: D105-540					
Mercury, Total	94	-	60-141	-	20

Matrix Spike Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 02-03,08 QC Batch ID: WG1270121-3 WG1270121-4 QC Sample: L1932855-14 Client ID: MS Sample												
Aluminum, Total	13200	370	15200	**541**	Q	17300	**1140**	Q	75-125	13		20
Antimony, Total	0.965J	92.4	95.9	104		88.6	99		75-125	8		20
Arsenic, Total	14.1	22.2	37.8	107		37.7	110		75-125	0		20
Barium, Total	95.6	370	517	114		512	116		75-125	1		20
Beryllium, Total	0.889	9.24	9.85	97		9.81	100		75-125	0		20
Cadmium, Total	0.761	9.43	10.8	106		10.4	106		75-125	4		20
Calcium, Total	8960	1850	11600	**143**	Q	12900	**220**	Q	75-125	11		20
Chromium, Total	75.9	37	118	114		131	**154**	Q	75-125	10		20
Cobalt, Total	11.8	92.4	104	100		100	98		75-125	4		20
Copper, Total	92.4	46.2	139	101		154	**138**	Q	75-125	10		20
Iron, Total	35300	185	37300	**1080**	Q	44600	**5190**	Q	75-125	18		20
Lead, Total	106	94.3	216	117		234	**140**	Q	75-125	8		20
Magnesium, Total	9640	1850	12200	**138**	Q	13600	**221**	Q	75-125	11		20
Manganese, Total	718	92.4	860	**154**	Q	976	**288**	Q	75-125	13		20
Nickel, Total	38.9	92.4	131	100		136	108		75-125	4		20
Potassium, Total	3010	1850	5220	120		5460	**137**	Q	75-125	4		20
Selenium, Total	5.54	22.2	27.8	100		26.5	98		75-125	5		20
Silver, Total	1.55	55.4	60.0	105		57.1	103		75-125	5		20
Sodium, Total	10700	1850	12900	119		11600	**50**	Q	75-125	11		20
Thallium, Total	0.414J	22.2	24.3	110		22.6	105		75-125	7		20
Vanadium, Total	38.2	92.4	133	102		134	107		75-125	1		20

Matrix Spike Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery		MSD Found	MSD %Recovery		Recovery Limits	RPD	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 02-03,08 QC Batch ID: WG1270121-3 WG1270121-4 QC Sample: L1932855-14 Client ID: MS Sample											
Zinc, Total	221	92.4	320	107		357	**152**	Q	75-125	11	20
Total Metals - Mansfield Lab Associated sample(s): 02-03,08 QC Batch ID: WG1270125-3 WG1270125-4 QC Sample: L1932855-14 Client ID: MS Sample											
Mercury, Total	1.24	1.84	3.01	96		2.89	113		80-120	4	20

Lab Duplicate Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Metals - Mansfield Lab Associated sample(s): 02-03,08 QC Batch ID: WG1270121-5 QC Sample: L1932855-14 Client ID: DUP Sample						
Arsenic, Total	14.1	13.8	mg/kg	2		20
Barium, Total	95.6	92.0	mg/kg	4		20
Beryllium, Total	0.889	0.852	mg/kg	4		20
Cadmium, Total	0.761	0.666	mg/kg	13		20
Chromium, Total	75.9	74.3	mg/kg	2		20
Copper, Total	92.4	90.4	mg/kg	2		20
Lead, Total	106	104	mg/kg	2		20
Manganese, Total	718	693	mg/kg	4		20
Nickel, Total	38.9	39.3	mg/kg	1		20
Selenium, Total	5.54	5.42	mg/kg	2		20
Silver, Total	1.55	1.46	mg/kg	6		20
Zinc, Total	221	211	mg/kg	5		20
Total Metals - Mansfield Lab Associated sample(s): 02-03,08 QC Batch ID: WG1270125-5 QC Sample: L1932855-14 Client ID: DUP Sample						
Mercury, Total	1.24	1.20	mg/kg	3		20

INORGANICS
&
MISCELLANEOUS

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-02
Client ID: HOPN1+2
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 11:45
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon (Rep1)	0.231		%	0.010	0.010	1	-	08/13/19 16:24	1,9060A	SP
Total Organic Carbon (Rep2)	0.202		%	0.010	0.010	1	-	08/13/19 16:24	1,9060A	SP
Total Organic Carbon (Average)	0.216		%	0.010	0.010	1	-	08/13/19 16:24	1,9060A	SP
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Gravel	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Gravel	0.300		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Sand	0.100		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Medium Sand	22.7		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Sand	68.0		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Total Fines	8.90		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
General Chemistry - Mansfield Lab										
Solids, Total	84.0		%	0.100	0.100	1	-	08/01/19 04:38	121,2540G	CC

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-03
Client ID: STON1+2
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 12:53
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon (Rep1)	0.635		%	0.010	0.010	1	-	08/13/19 17:34	1,9060A	SP
Total Organic Carbon (Rep2)	0.570		%	0.010	0.010	1	-	08/13/19 17:34	1,9060A	SP
Total Organic Carbon (Average)	0.602		%	0.010	0.010	1	-	08/13/19 17:34	1,9060A	SP
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Gravel	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Gravel	0.500		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Sand	2.90		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Medium Sand	25.0		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Sand	49.2		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Total Fines	22.4		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
General Chemistry - Mansfield Lab										
Solids, Total	77.2		%	0.100	0.100	1	-	08/01/19 04:38	121,2540G	CC

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-04
Client ID: STON1+2B
Sample Location: ORLEANS, MA
Sample Depth:
Matrix: Sediment

Date Collected: 07/29/19 13:24
Date Received: 07/30/19
Field Prep: Not Specified

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Gravel	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Gravel	1.00		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Sand	0.900		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Medium Sand	27.2		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Sand	58.4		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Total Fines	12.5		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-05
Client ID: PRISC-1
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 13:54
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Gravel	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Gravel	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Sand	0.500		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Medium Sand	48.1		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Sand	38.6		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Total Fines	12.8		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-06
Client ID: PRISC-2
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 14:24
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Gravel	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Gravel	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Sand	0.100		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Medium Sand	24.7		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Sand	59.7		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Total Fines	15.5		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
General Chemistry - Mansfield Lab										
Solids, Total	82.1		%	0.100	0.100	1	-	08/02/19 04:06	121,2540G	CC

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-07
Client ID: PRISC-2B
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 14:33
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Gravel	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Gravel	0.300		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Sand	0.400		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Medium Sand	25.0		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Sand	57.8		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Total Fines	16.5		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

SAMPLE RESULTS

Lab ID: L1933910-08
Client ID: PRISC-3+4
Sample Location: ORLEANS, MA

Date Collected: 07/29/19 15:27
Date Received: 07/30/19
Field Prep: Not Specified

Sample Depth:
Matrix: Sediment

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab										
Total Organic Carbon (Rep1)	0.912		%	0.010	0.010	1	-	08/13/19 17:10	1,9060A	SP
Total Organic Carbon (Rep2)	0.925		%	0.010	0.010	1	-	08/13/19 17:10	1,9060A	SP
Total Organic Carbon (Average)	0.918		%	0.010	0.010	1	-	08/13/19 17:10	1,9060A	SP
Grain Size Analysis - Mansfield Lab										
Cobbles	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Gravel	ND		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Gravel	2.70		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Coarse Sand	4.80		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Medium Sand	24.3		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Fine Sand	22.6		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
% Total Fines	45.6		%	0.100	NA	1	-	08/08/19 09:16	12,D6913/D7928	SM
General Chemistry - Mansfield Lab										
Solids, Total	61.3		%	0.100	0.100	1	-	08/01/19 04:38	121,2540G	CC

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03
Lab Number: L1933910
Report Date: 08/14/19

Method Blank Analysis
Batch Quality Control

Parameter	Result	Qualifier	Units	RL	MDL	Dilution Factor	Date Prepared	Date Analyzed	Analytical Method	Analyst
Total Organic Carbon - Mansfield Lab for sample(s): 02-03,08 Batch: WG1266970-1										
Total Organic Carbon (Rep1)	ND		%	0.010	0.010	1	-	08/13/19 09:40	1,9060A	SP
Total Organic Carbon (Rep2)	ND		%	0.010	0.010	1	-	08/13/19 09:40	1,9060A	SP
Total Organic Carbon (Average)	ND		%	0.010	0.010	1	-	08/13/19 09:40	1,9060A	SP

Lab Control Sample Analysis

Batch Quality Control

Project Name: NAUSET ESTUARY

Project Number: 2015-0121-03

Lab Number: L1933910

Report Date: 08/14/19

Parameter	LCS %Recovery	Qual	LCSD %Recovery	Qual	%Recovery Limits	RPD	Qual	RPD Limits
Total Organic Carbon - Mansfield Lab Associated sample(s): 02-03,08 Batch: WG1266970-2								
Total Organic Carbon (Rep1)	96		-		75-125	-		25
Total Organic Carbon (Rep2)	90		-		75-125	-		25
Total Organic Carbon (Average)	93		-		75-125	-		25

Matrix Spike Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	Native Sample	MS Added	MS Found	MS %Recovery	Qual	MSD Found	MSD %Recovery	Qual	Recovery Limits	RPD	Qual	RPD Limits
Total Organic Carbon - Mansfield Lab Associated sample(s): 02-03,08 QC Batch ID: WG1266970-4 QC Sample: L1933910-02 Client ID: HOPN1+2												
Total Organic Carbon (Rep1)	0.231	1.08	1.31	100		-	-		75-125	-		25
Total Organic Carbon (Rep2)	0.202	1.05	1.26	101		-	-		75-125	-		25

Lab Duplicate Analysis
Batch Quality Control

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Parameter	Native Sample	Duplicate Sample	Units	RPD	Qual	RPD Limits
Total Organic Carbon - Mansfield Lab Associated sample(s): 02-03,08 QC Batch ID: WG1266970-3 QC Sample: L1933910-02 Client ID: HOPN1+2						
Total Organic Carbon (Rep1)	0.231	0.155	%	**39**	Q	25
Total Organic Carbon (Rep2)	0.202	0.173	%	15		25
Total Organic Carbon (Average)	0.216	0.164	%	**27**	Q	25
General Chemistry - Mansfield Lab Associated sample(s): 02-03,08 QC Batch ID: WG1267142-1 QC Sample: L1931102-07 Client ID: DUP Sample						
Solids, Total	31.2	30.1	%	4		10
Grain Size Analysis - Mansfield Lab Associated sample(s): 02-08 QC Batch ID: WG1270041-1 QC Sample: L1933910-03 Client ID: STON1+2						
Cobbles	ND	ND	%	NC		20
% Coarse Gravel	ND	ND	%	NC		20
% Fine Gravel	0.500	0.200	%	**86**	Q	20
% Coarse Sand	2.90	2.40	%	19		20
% Medium Sand	25.0	24.6	%	2		20
% Fine Sand	49.2	50.1	%	2		20
% Total Fines	22.4	22.7	%	1		20

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Sample Receipt and Container Information

Were project specific reporting limits specified? YES

Cooler Information

Cooler	Custody Seal
A	Absent

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1933910-01A	Vial MeOH preserved	A	NA		2.3	Y	Absent		8260HLW(14)
L1933910-01B	Vial water preserved	A	NA		2.3	Y	Absent	31-JUL-19 01:53	8260HLW(14)
L1933910-01C	Vial water preserved	A	NA		2.3	Y	Absent	31-JUL-19 01:53	8260HLW(14)
L1933910-02A	Glass 60mL/2oz unpreserved	A	NA		2.3	Y	Absent		A2-TS(7)
L1933910-02B	Glass 120ml/4oz unpreserved	A	NA		2.3	Y	Absent		A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-TOC-9060-2REPS(28),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PAH/PCBCONG(14),A2-PREP-3050:1T(180)
L1933910-02C	Plastic 8oz unpreserved for Grain Size	A	NA		2.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-CGRAVEL(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L1933910-02D	Glass 250ml/8oz unpreserved	A	NA		2.3	Y	Absent		EPH-10(14)
L1933910-03B	Glass 120ml/4oz unpreserved	A	NA		2.3	Y	Absent		A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-TS(7),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-TOC-9060-2REPS(28),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PAH/PCBCONG(14),A2-PREP-3050:1T(180)

*Values in parentheses indicate holding time in days

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1933910-03C	Plastic 8oz unpreserved for Grain Size	A	NA		2.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-CGRAVEL(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L1933910-03D	Glass 250ml/8oz unpreserved	A	NA		2.3	Y	Absent		EPH-10(14)
L1933910-04C	Plastic 8oz unpreserved for Grain Size	A	NA		2.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-CGRAVEL(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L1933910-05C	Plastic 8oz unpreserved for Grain Size	A	NA		2.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-CGRAVEL(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L1933910-06A	Vial MeOH preserved	A	NA		2.3	Y	Absent		8260HLW(14)
L1933910-06B	Vial water preserved	A	NA		2.3	Y	Absent	31-JUL-19 01:53	8260HLW(14)
L1933910-06C	Vial water preserved	A	NA		2.3	Y	Absent	31-JUL-19 01:53	8260HLW(14)
L1933910-06E	Glass 120ml/4oz unpreserved	A	NA		2.3	Y	Absent		A2-TS(7),HOLD-METAL(180)
L1933910-06F	Plastic 8oz unpreserved for Grain Size	A	NA		2.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-CGRAVEL(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L1933910-06G	Glass 250ml/8oz unpreserved	A	NA		2.3	Y	Absent		HOLD-EPH(14),HOLD-8270(14),HOLD-8082(14)
L1933910-06L	Plastic 2oz unpreserved for TS	A	NA		2.3	Y	Absent		HOLD-WETCHEM()
L1933910-07C	Plastic 8oz unpreserved for Grain Size	A	NA		2.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-CGRAVEL(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L1933910-08B	Glass 120ml/4oz unpreserved	A	NA		2.3	Y	Absent		A2-FE-6020T(180),A2-PB-6020T(180),A2-BA-6020T(180),A2-NI-6020T(180),A2-SB-6020T(180),A2-ZN-6020T(180),A2-HG-7474T(28),A2-K-6020T(180),A2-CR-6020T(180),A2-TL-6020T(180),A2-TS(7),A2-AS-6020T(180),A2-CO-6020T(180),A2-MN-6020T(180),A2-BE-6020T(180),A2-CD-6020T(180),A2-HGPREP-AF(28),A2-V-6020T(180),A2-MG-6020T(180),A2-PREP-3050:2T(180),A2-SE-6020T(180),A2-TOC-9060-2REPS(28),A2-AG-6020T(180),A2-AL-6020T(180),A2-CA-6020T(180),A2-CU-6020T(180),A2-NA-6020T(180),A2-PAH/PCBCONG(14),A2-PREP-3050:1T(180)

*Values in parentheses indicate holding time in days

Project Name: NAUSET ESTUARY
Project Number: 2015-0121-03

Lab Number: L1933910
Report Date: 08/14/19

Container Information

Container ID	Container Type	Cooler	Initial pH	Final pH	Temp deg C	Pres	Seal	Frozen Date/Time	Analysis(*)
L1933910-08C	Plastic 8oz unpreserved for Grain Size	A	NA		2.3	Y	Absent		A2-HYDRO-TFINE(),A2-HYDRO-CGRAVEL(),A2-HYDRO-FSAND(),A2-HYDRO-MSAND(),A2-HYDRO-CSAND(),A2-HYDRO-COBBLES(),A2-HYDRO-FGRAVEL()
L1933910-08D	Glass 250ml/8oz unpreserved	A	NA		2.3	Y	Absent		EPH-10(14)

*Values in parentheses indicate holding time in days

Project Name:	NAUSET ESTUARY	**Lab Number:**	L1933910
Project Number:	2015-0121-03	**Report Date:**	08/14/19

GLOSSARY

Acronyms

DL - Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the limit of quantitation (LOQ). The DL includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

EDL - Estimated Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The EDL includes any adjustments from dilutions, concentrations or moisture content, where applicable. The use of EDLs is specific to the analysis of PAHs using Solid-Phase Microextraction (SPME).

EMPC - Estimated Maximum Possible Concentration: The concentration that results from the signal present at the retention time of an analyte when the ions meet all of the identification criteria except the ion abundance ratio criteria. An EMPC is a worst-case estimate of the concentration.

EPA - Environmental Protection Agency.

LCS - Laboratory Control Sample: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LCSD - Laboratory Control Sample Duplicate: Refer to LCS.

LFB - Laboratory Fortified Blank: A sample matrix, free from the analytes of interest, spiked with verified known amounts of analytes or a material containing known and verified amounts of analytes.

LOD - Limit of Detection: This value represents the level to which a target analyte can reliably be detected for a specific analyte in a specific matrix by a specific method. The LOD includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

LOQ - Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

Limit of Quantitation: The value at which an instrument can accurately measure an analyte at a specific concentration. The LOQ includes any adjustments from dilutions, concentrations or moisture content, where applicable. (DoD report formats only.)

MDL - Method Detection Limit: This value represents the level to which target analyte concentrations are reported as estimated values, when those target analyte concentrations are quantified below the reporting limit (RL). The MDL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

MS - Matrix Spike Sample: A sample prepared by adding a known mass of target analyte to a specified amount of matrix sample for which an independent estimate of target analyte concentration is available. For Method 332.0, the spike recovery is calculated using the native concentration, including estimated values.

MSD - Matrix Spike Sample Duplicate: Refer to MS.

NA - Not Applicable.

NC - Not Calculated: Term is utilized when one or more of the results utilized in the calculation are non-detect at the parameter's reporting unit.

NDPA/DPA - N-Nitrosodiphenylamine/Diphenylamine.

NI - Not Ignitable.

NP - Non-Plastic: Term is utilized for the analysis of Atterberg Limits in soil.

RL - Reporting Limit: The value at which an instrument can accurately measure an analyte at a specific concentration. The RL includes any adjustments from dilutions, concentrations or moisture content, where applicable.

RPD - Relative Percent Difference: The results from matrix and/or matrix spike duplicates are primarily designed to assess the precision of analytical results in a given matrix and are expressed as relative percent difference (RPD). Values which are less than five times the reporting limit for any individual parameter are evaluated by utilizing the absolute difference between the values; although the RPD value will be provided in the report.

SRM - Standard Reference Material: A reference sample of a known or certified value that is of the same or similar matrix as the associated field samples.

STLP - Semi-dynamic Tank Leaching Procedure per EPA Method 1315.

TEF - Toxic Equivalency Factors: The values assigned to each dioxin and furan to evaluate their toxicity relative to 2,3,7,8-TCDD.

TEQ - Toxic Equivalent: The measure of a sample's toxicity derived by multiplying each dioxin and furan by its corresponding TEF and then summing the resulting values.

TIC - Tentatively Identified Compound: A compound that has been identified to be present and is not part of the target compound list (TCL) for the method and/or program. All TICs are qualitatively identified and reported as estimated concentrations.

Footnotes

Report Format: DU Report with 'J' Qualifiers

Project Name:	NAUSET ESTUARY	**Lab Number:**	L1933910
Project Number:	2015-0121-03	**Report Date:**	08/14/19

1 - The reference for this analyte should be considered modified since this analyte is absent from the target analyte list of the original method.

Terms

Analytical Method: Both the document from which the method originates and the analytical reference method. (Example: EPA 8260B is shown as 1,8260B.) The codes for the reference method documents are provided in the References section of the Addendum.

Difference: With respect to Total Oxidizable Precursor (TOP) Assay analysis, the difference is defined as the Post-Treatment value minus the Pre-Treatment value.

Final pH: As it pertains to Sample Receipt & Container Information section of the report, Final pH reflects pH of container determined after adjustment at the laboratory, if applicable. If no adjustment required, value reflects Initial pH.

Frozen Date/Time: With respect to Volatile Organics in soil, Frozen Date/Time reflects the date/time at which associated Reagent Water-preserved vials were initially frozen. Note: If frozen date/time is beyond 48 hours from sample collection, value will be reflected in 'bold'.

Initial pH: As it pertains to Sample Receipt & Container Information section of the report, Initial pH reflects pH of container determined upon receipt, if applicable.

PFAS Total: With respect to PFAS analyses, the 'PFAS, Total (5)' result is defined as the summation of results for: PFHpA, PFHxS, PFOA, PFNA and PFOS. If a 'Total' result is requested, the results of its individual components will also be reported.

Total: With respect to Organic analyses, a 'Total' result is defined as the summation of results for individual isomers or Aroclors. If a 'Total' result is requested, the results of its individual components will also be reported. This is applicable to 'Total' results for methods 8260, 8081 and 8082.

Data Qualifiers

A - Spectra identified as "Aldol Condensation Product".

B - The analyte was detected above the reporting limit in the associated method blank. Flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For MCP-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank. For DOD-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte at less than ten times (10x) the concentration found in the blank AND the analyte was detected above one-half the reporting limit (or above the reporting limit for common lab contaminants) in the associated method blank. For NJ-Air-related projects, flag only applies to associated field samples that have detectable concentrations of the analyte above the reporting limit. For NJ-related projects (excluding Air), flag only applies to associated field samples that have detectable concentrations of the analyte, which was detected above the reporting limit in the associated method blank or above five times the reporting limit for common lab contaminants (Phthalates, Acetone, Methylene Chloride, 2-Butanone).

C - Co-elution: The target analyte co-elutes with a known lab standard (i.e. surrogate, internal standards, etc.) for co-extracted analyses.

D - Concentration of analyte was quantified from diluted analysis. Flag only applies to field samples that have detectable concentrations of the analyte.

E - Concentration of analyte exceeds the range of the calibration curve and/or linear range of the instrument.

G - The concentration may be biased high due to matrix interferences (i.e, co-elution) with non-target compound(s). The result should be considered estimated.

H - The analysis of pH was performed beyond the regulatory-required holding time of 15 minutes from the time of sample collection.

I - The lower value for the two columns has been reported due to obvious interference.

J - Estimated value. The Target analyte concentration is below the quantitation limit (RL), but above the Method Detection Limit (MDL) or Estimated Detection Limit (EDL) for SPME-related analyses. This represents an estimated concentration for Tentatively Identified Compounds (TICs).

M - Reporting Limit (RL) exceeds the MCP CAM Reporting Limit for this analyte.

ND - Not detected at the method detection limit (MDL) for the sample, or estimated detection limit (EDL) for SPME-related analyses.

NJ - Presumptive evidence of compound. This represents an estimated concentration for Tentatively Identified Compounds (TICs), where the identification is based on a mass spectral library search.

P - The RPD between the results for the two columns exceeds the method-specified criteria.

Q - The quality control sample exceeds the associated acceptance criteria. For DOD-related projects, LCS and/or Continuing Calibration Standard exceedences are also qualified on all associated sample results. Note: This flag is not applicable for matrix spike recoveries when the sample concentration is greater than 4x the spike added or for batch duplicate RPD when the sample concentrations are less than 5x the RL. (Metals only.)

R - Analytical results are from sample re-analysis.

RE - Analytical results are from sample re-extraction.

S - Analytical results are from modified screening analysis.

Report Format: DU Report with 'J' Qualifiers

REFERENCES

1 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IV, 2007.

12 Annual Book of ASTM Standards. (American Society for Testing and Materials) ASTM International.

98 Method for the Determination of Extractable Petroleum Hydrocarbons (EPH), MassDEP, May 2004, Revision 1.1 with QC Requirements & Performance Standards for the Analysis of EPH under the Massachusetts Contingency Plan, WSC-CAM-IVB, July 2010.

105 Test Methods for Evaluating Solid Waste: Physical/Chemical Methods. EPA SW-846. Third Edition. Updates I - IIIA, 1997 in conjunction with NOAA Technical Memorandum NMFS-NWFSC-59: Extraction, Cleanup and GC/MS Analysis of Sediments and Tissues for Organic Contaminants, March 2004 and the Determination of Pesticides and PCBs in Water and Oil/Sediment by GC/MS: Method 680, EPA 01A0005295, November 1985.

121 Standard Methods for the Examination of Water and Wastewater. APHA-AWWA-WEF. Standard Methods Online.

LIMITATION OF LIABILITIES

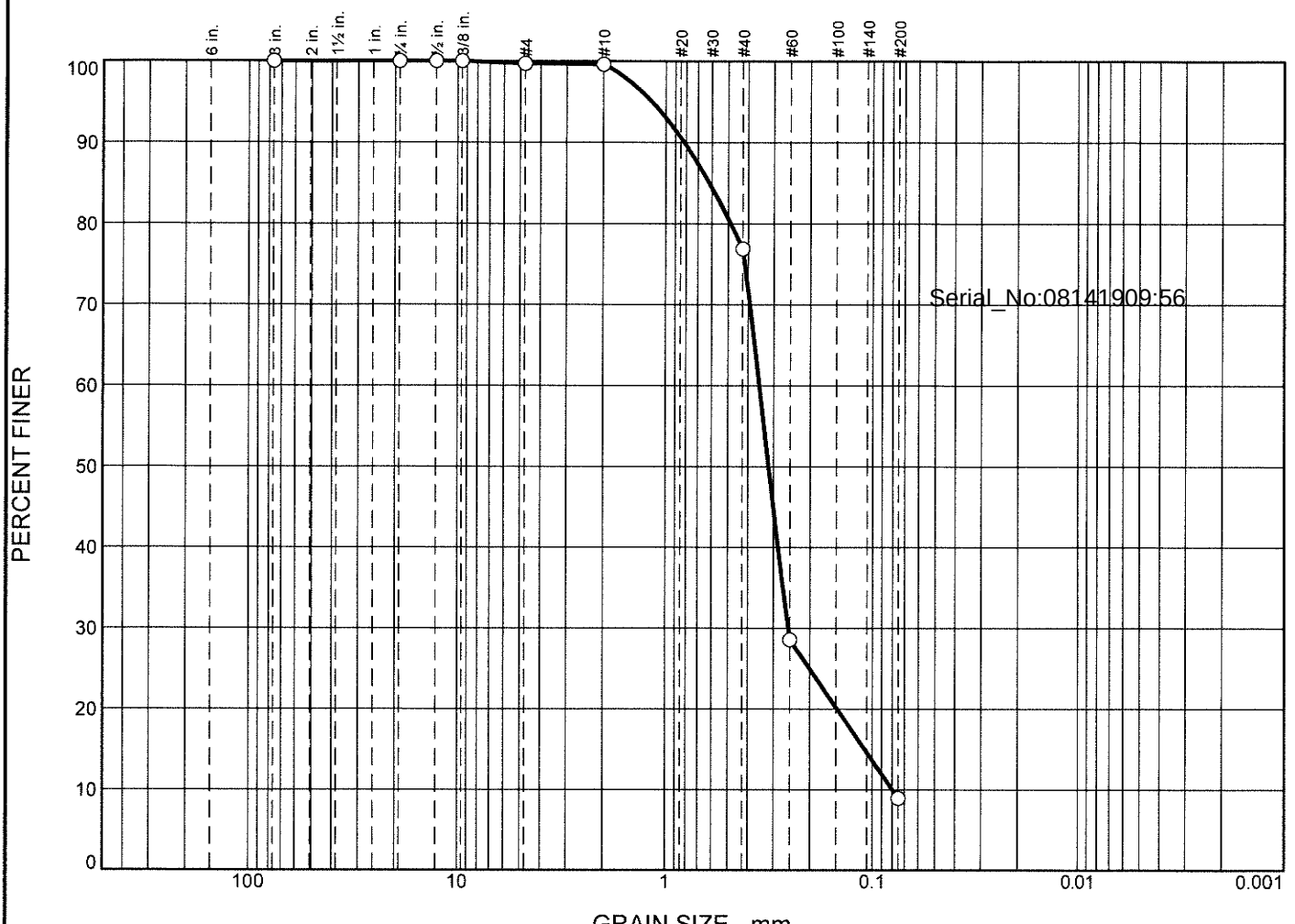
Alpha Analytical performs services with reasonable care and diligence normal to the analytical testing laboratory industry. In the event of an error, the sole and exclusive responsibility of Alpha Analytical shall be to re-perform the work at it's own expense. In no event shall Alpha Analytical be held liable for any incidental, consequential or special damages, including but not limited to, damages in any way connected with the use of, interpretation of, information or analysis provided by Alpha Analytical.

We strongly urge our clients to comply with EPA protocol regarding sample volume, preservation, cooling, containers, sampling procedures, holding time and splitting of samples in the field.

ASTM D6913/D7928

GRAIN SIZE ANALYSIS

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.3	0.1	22.7	68.0	8.9	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.6172	0.3520	0.3176	0.2546	0.1088	0.0801	2.30	4.40

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** HOPN1+2 **Sample Number:** L1933910-02

Date: ○

Alpha Analytical

Mansfield, MA

Remarks:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

8/13/2019

Location: HOPN1+2

Sample Number: L1933910-02

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 92.10
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
92.10	0.00	3"	0.00	0.00	100.0
		0.75"	0.00	0.00	100.0
		0.50"	0.00	0.00	100.0
		0.375"	0.00	0.00	100.0
		#4	0.25	0.00	99.7
		#10	0.11	0.00	99.6
		#40	20.93	0.00	76.9
		#60	44.49	0.00	28.6
		#200	18.09	0.00	8.9

Serial_No:08141909:56

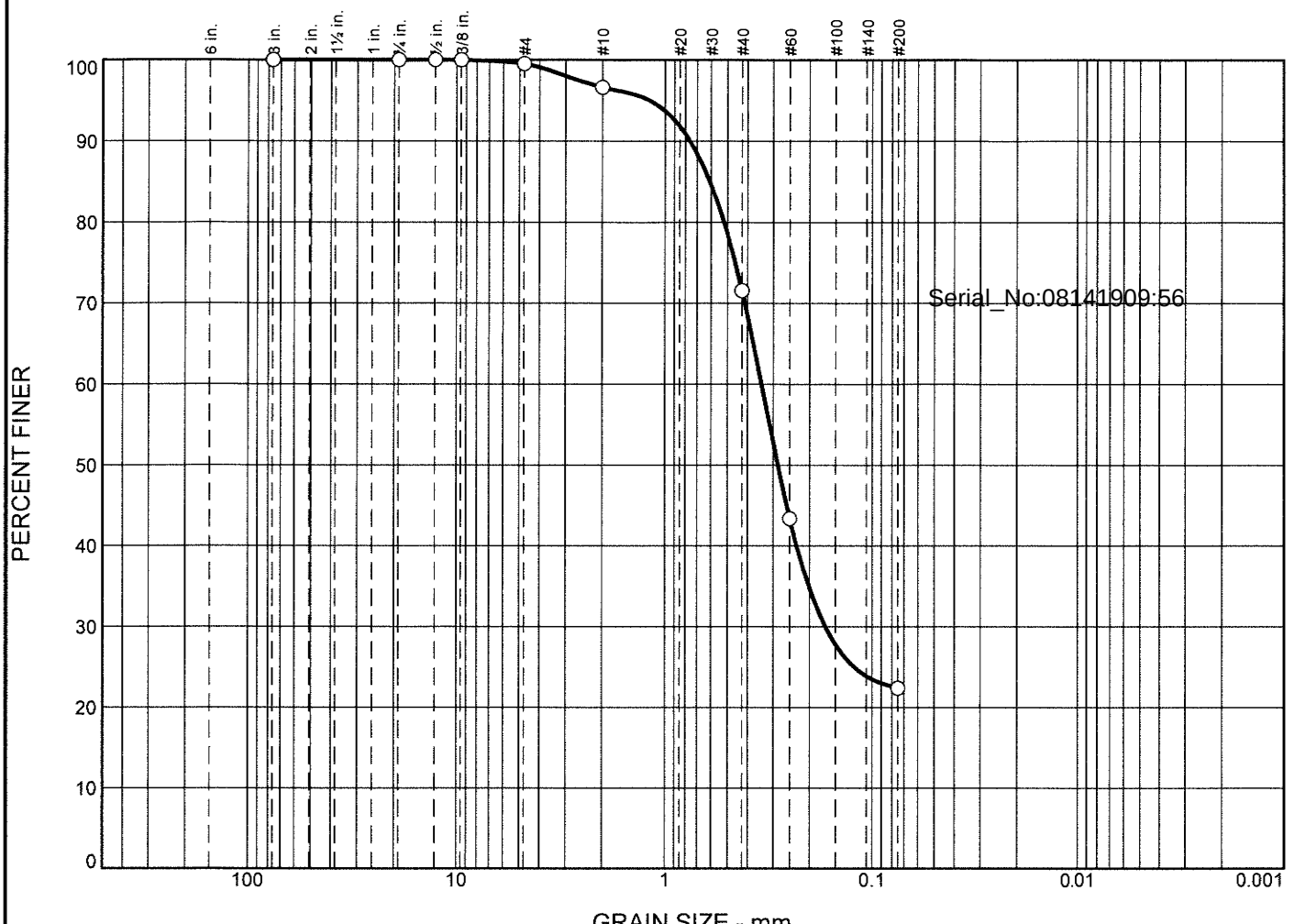
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.3	0.3	0.1	22.7	68.0	90.8			8.9

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
	0.0801	0.1088	0.1478	0.2546	0.2859	0.3176	0.3520	0.4861	0.6172	0.8172	1.1688

Fineness Modulus	C_u	C_c
1.56	4.40	2.30

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.5	2.9	25.0	49.2	22.4	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.6084	0.3417	0.2853	0.1676				

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** STON1+2 **Sample Number:** L1933910-03

Date: ○

Alpha Analytical

Mansfield, MA

Remarks:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

8/13/2019

Location: STON1+2

Sample Number: L1933910-03

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 80.37
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
80.37	0.00	3"	0.00	0.00	100.0
		0.75"	0.00	0.00	100.0
		0.50"	0.00	0.00	100.0
		0.375"	0.00	0.00	100.0
		#4	0.37	0.00	99.5
		#10	2.34	0.00	96.6
		#40	20.13	0.00	71.6
		#60	22.67	0.00	43.4
		#200	16.86	0.00	22.4

Serial_No:08141909:56

Fractional Components

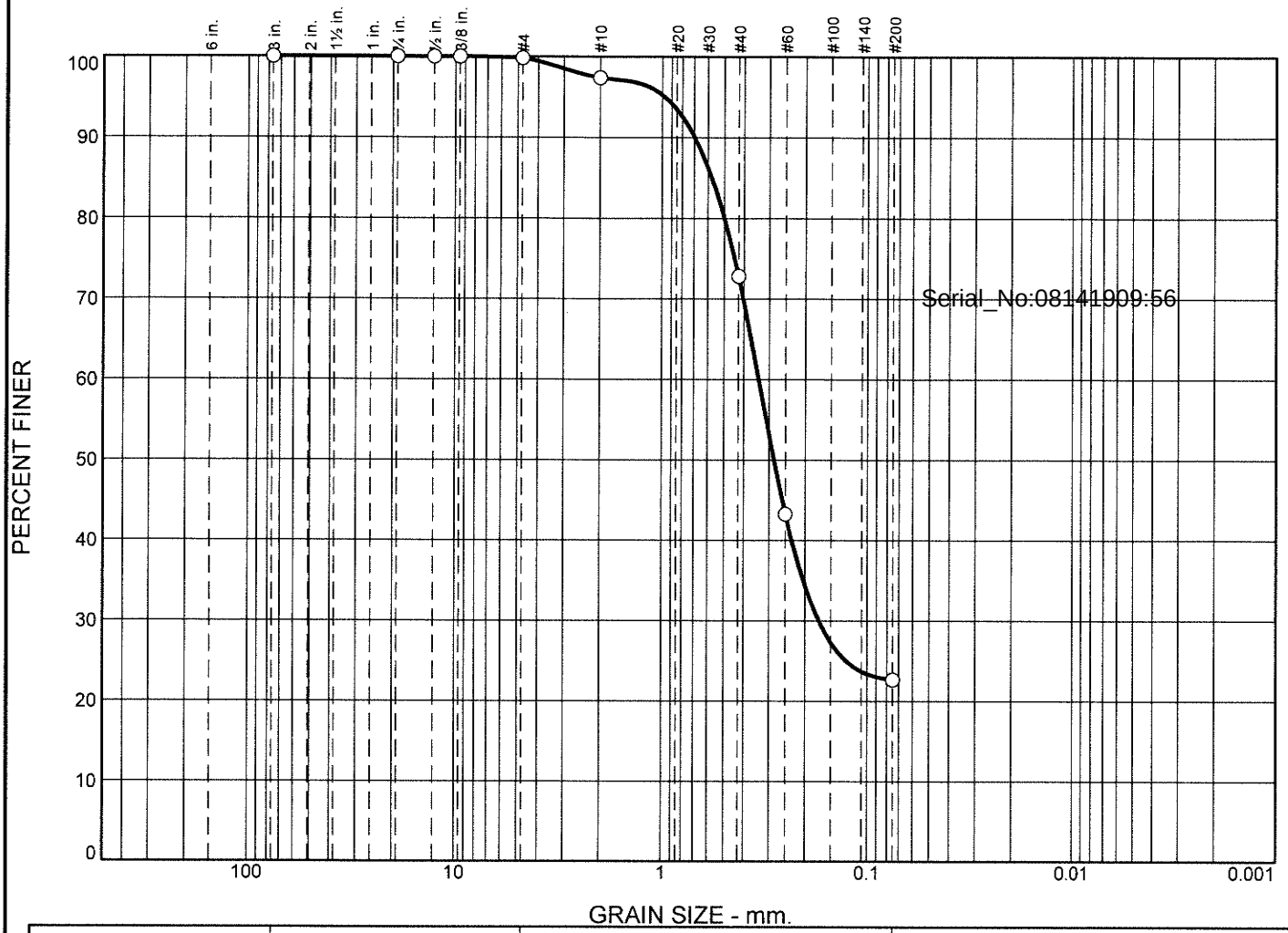
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.5	0.5	2.9	25.0	49.2	77.1			22.4

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1676	0.2313	0.2853	0.3417	0.5198	0.6084	0.7576	1.1835

Fineness Modulus
1.43

Alpha Analytical

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.2	2.4	24.6	50.1	22.7	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.5750	0.3377	0.2842	0.1712				

	Material Description	USCS	AASHTO
○			

Project No. **Client:**

Project:

○ **Source of Sample:** STON1+2 **Sample Number:** WG1270041-1

Date: ○

Alpha Analytical

Mansfield, MA

Remarks:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

8/13/2019

Location: STON1+2

Sample Number: WG1270041-1

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare** = 78.59
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
78.59	0.00	3"	0.00	0.00	100.0
		0.75"	0.00	0.00	100.0
		0.50"	0.00	0.00	100.0
		0.375"	0.00	0.00	100.0
		#4	0.14	0.00	99.8
		#10	1.90	0.00	97.4
		#40	19.32	0.00	72.8
		#60	23.22	0.00	43.3
		#200	16.19	0.00	22.7

Serial_No:08141909:56

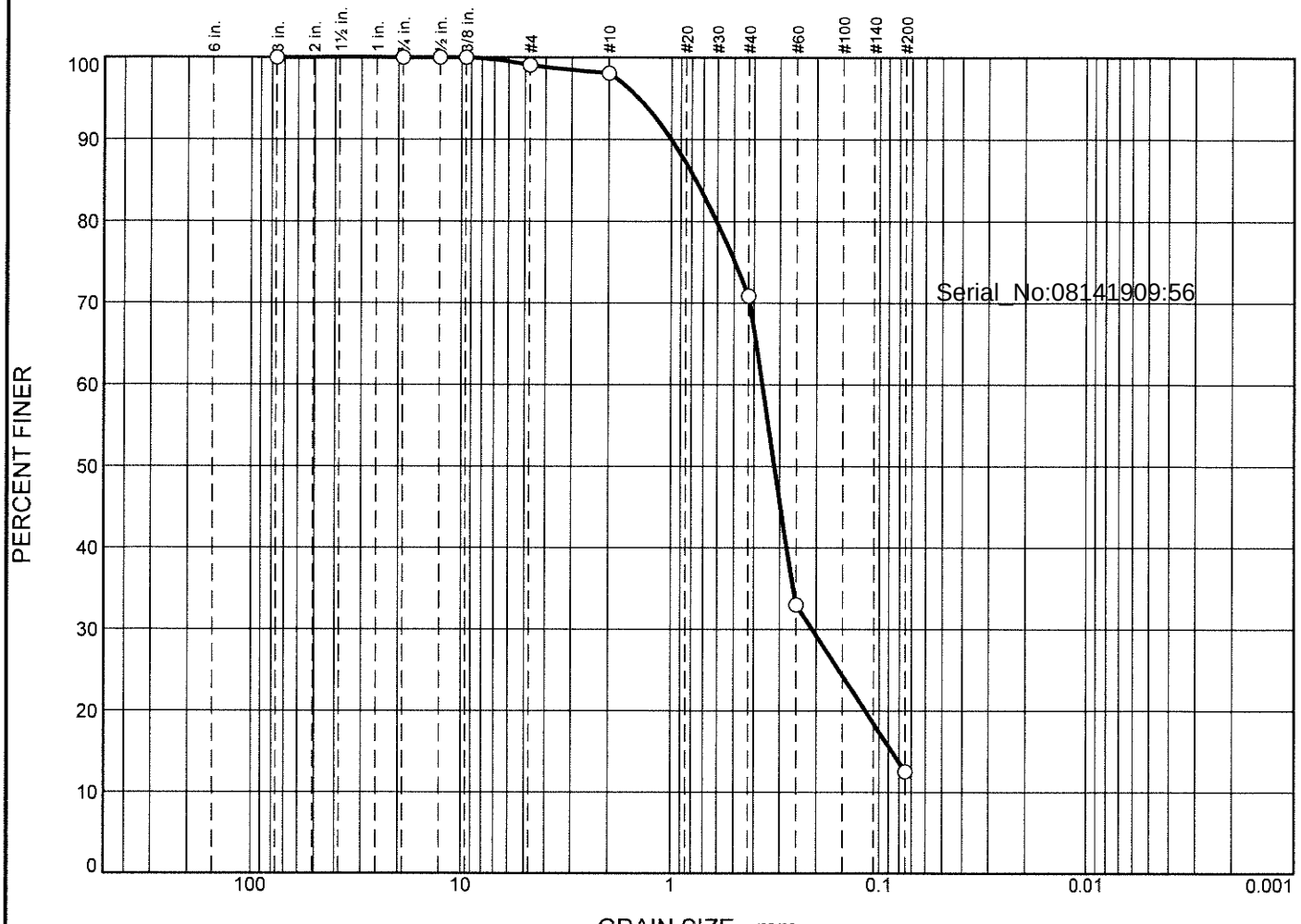
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.2	0.2	2.4	24.6	50.1	77.1			22.7

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
				0.1712	0.2326	0.2842	0.3377	0.4990	0.5750	0.6954	0.9696

Fineness Modulus
1.39

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	1.0	0.9	27.2	58.4	12.5	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.7630	0.3638	0.3186	0.2093	0.0867			

	Material Description	USCS	AASHTO
○			

Project No. **Client:**

Project:

○ **Source of Sample:** STON1+2B **Sample Number:** L1933910-04

Date: ○

Alpha Analytical

Mansfield, MA

Remarks:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

8/13/2019

Location: STON1+2B

Sample Number: L1933910-04

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 82.00
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
82.00	0.00	3"	0.00	0.00	100.0
		0.75"	0.00	0.00	100.0
		0.50"	0.00	0.00	100.0
		0.375"	0.00	0.00	100.0
		#4	0.78	0.00	99.0
		#10	0.79	0.00	98.1
		#40	22.31	0.00	70.9
		#60	31.04	0.00	33.0
		#200	16.81	0.00	12.5

Serial_No:08141909:56

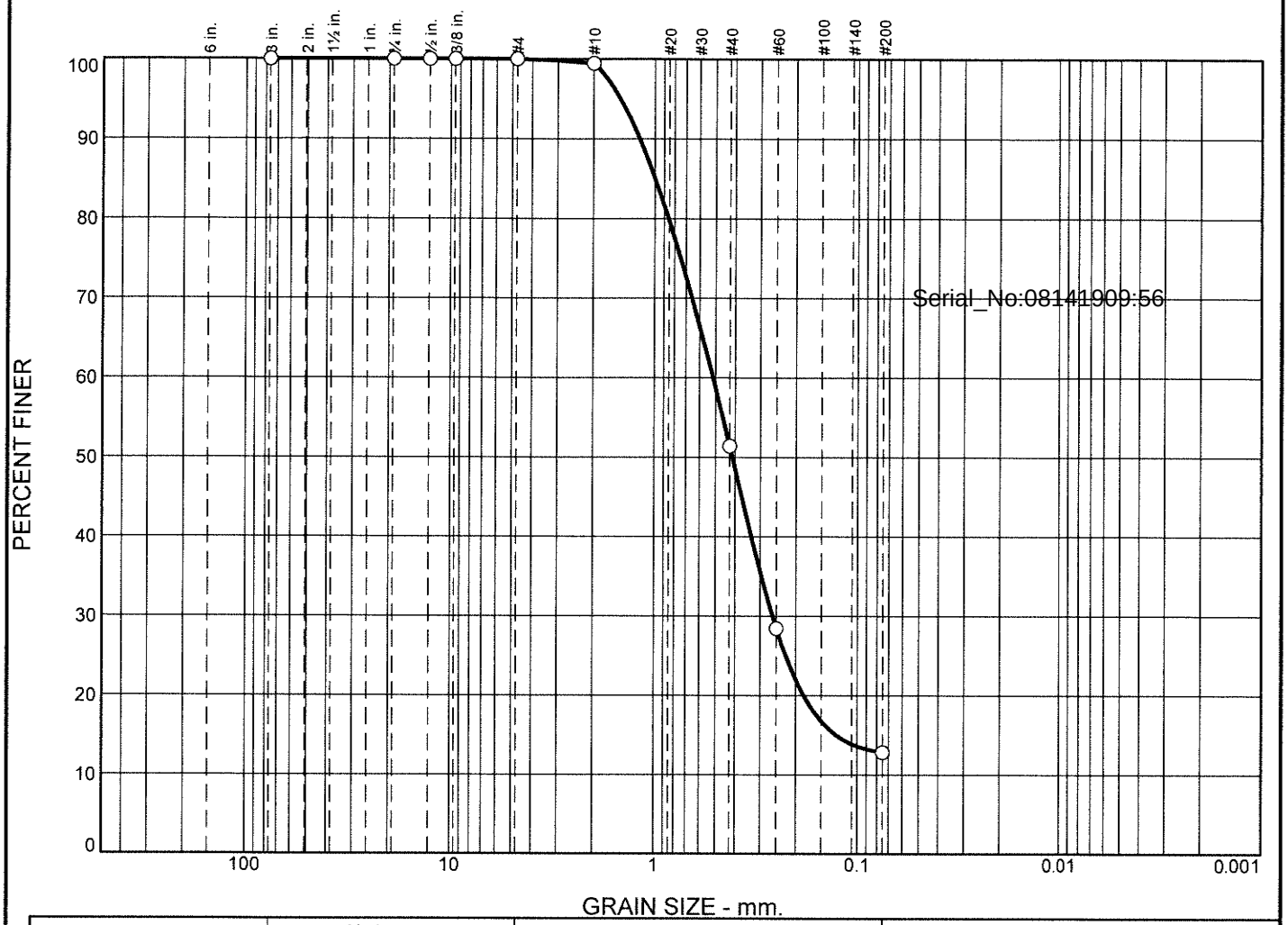
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	1.0	1.0	0.9	27.2	58.4	86.5			12.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.0867	0.1163	0.2093	0.2780	0.3186	0.3638	0.6061	0.7630	1.0029	1.4341

Fineness Modulus
1.61

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.5	48.1	38.6	12.8	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.9980	0.5148	0.4124	0.2612	0.1268			

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** PRISC-1 **Sample Number:** L1933910-05

Date: ○

Alpha Analytical

Mansfield, MA

Remarks:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

8/13/2019

Location: PRISC-1

Sample Number: L1933910-05

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 87.68
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
87.68	0.00	3"	0.00	0.00	100.0
		0.75"	0.00	0.00	100.0
		0.50"	0.00	0.00	100.0
		0.375"	0.00	0.00	100.0
		#4	0.00	0.00	100.0
		#10	0.47	0.00	99.5
		#40	42.15	0.00	51.4
		#60	20.13	0.00	28.4
		#200	13.71	0.00	12.8

Serial_No:08141909:56

Fractional Components

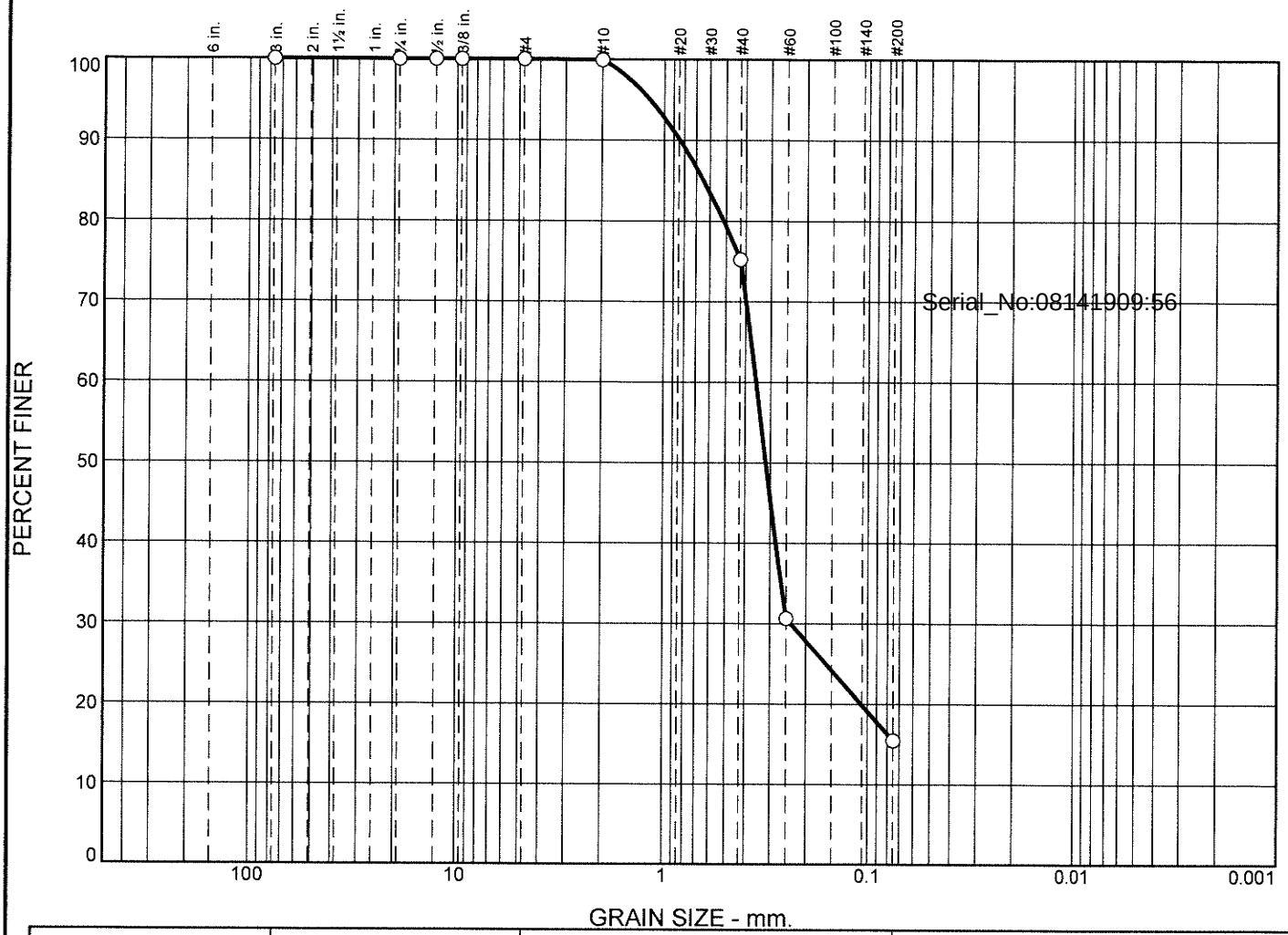
Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.5	48.1	38.6	87.2			12.8

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
		0.1268	0.1829	0.2612	0.3321	0.4124	0.5148	0.8559	0.9980	1.1897	1.4788

Fineness Modulus
1.92

Alpha Analytical

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.0	0.1	24.7	59.7	15.5	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.6452	0.3539	0.3165	0.2370				

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** PRISC-2 **Sample Number:** L1933910-06

Date: ○

Alpha Analytical

Mansfield, MA

Remarks:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

8/13/2019

Location: PRISC-2

Sample Number: L1933910-06

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 86.59
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
86.59	0.00	3"	0.00	0.00	100.0
		0.75"	0.00	0.00	100.0
		0.50"	0.00	0.00	100.0
		0.375"	0.00	0.00	100.0
		#4	0.00	0.00	100.0
		#10	0.05	0.00	99.9
		#40	21.40	0.00	75.2
		#60	38.58	0.00	30.7
		#200	13.16	0.00	15.5

Serial_No:08141909:56

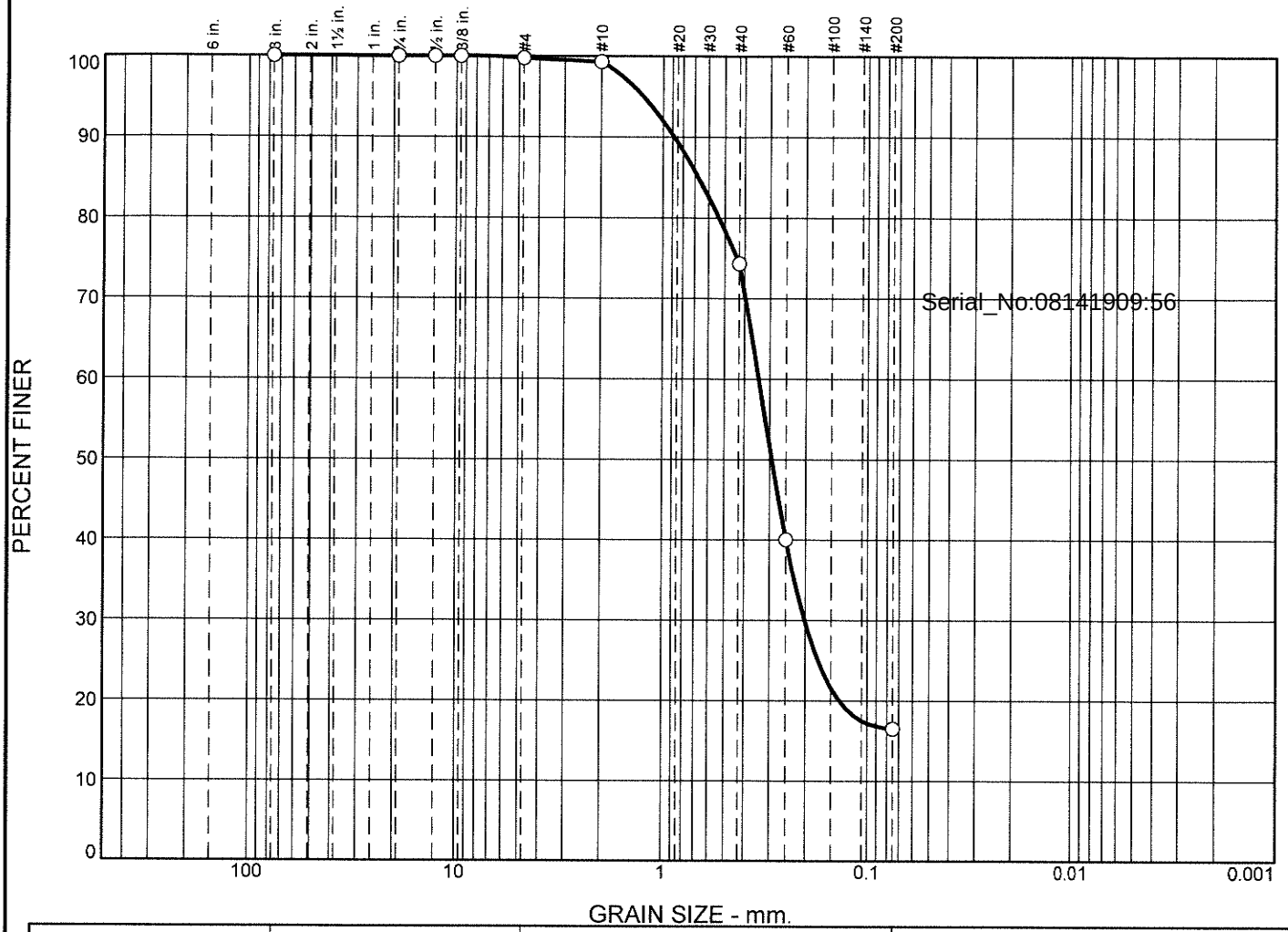
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.0	0.0	0.1	24.7	59.7	84.5			15.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.1073	0.2370	0.2821	0.3165	0.3539	0.5148	0.6452	0.8405	1.1735

Fineness Modulus
1.52

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	0.3	0.4	25.0	57.8	16.5	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				0.6734	0.3402	0.2936	0.2018				

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** PRISC-2B **Sample Number:** L1933910-07

Date: ○

Alpha Analytical

Mansfield, MA

Remarks:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

8/13/2019

Location: PRISC-2B

Sample Number: L1933910-07

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 85.51
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
85.51	0.00	3"	0.00	0.00	100.0
		0.75"	0.00	0.00	100.0
		0.50"	0.00	0.00	100.0
		0.375"	0.00	0.00	100.0
		#4	0.23	0.00	99.7
		#10	0.36	0.00	99.3
		#40	21.36	0.00	74.3
		#60	29.32	0.00	40.0
		#200	20.13	0.00	16.5

Serial_No:08141909:56

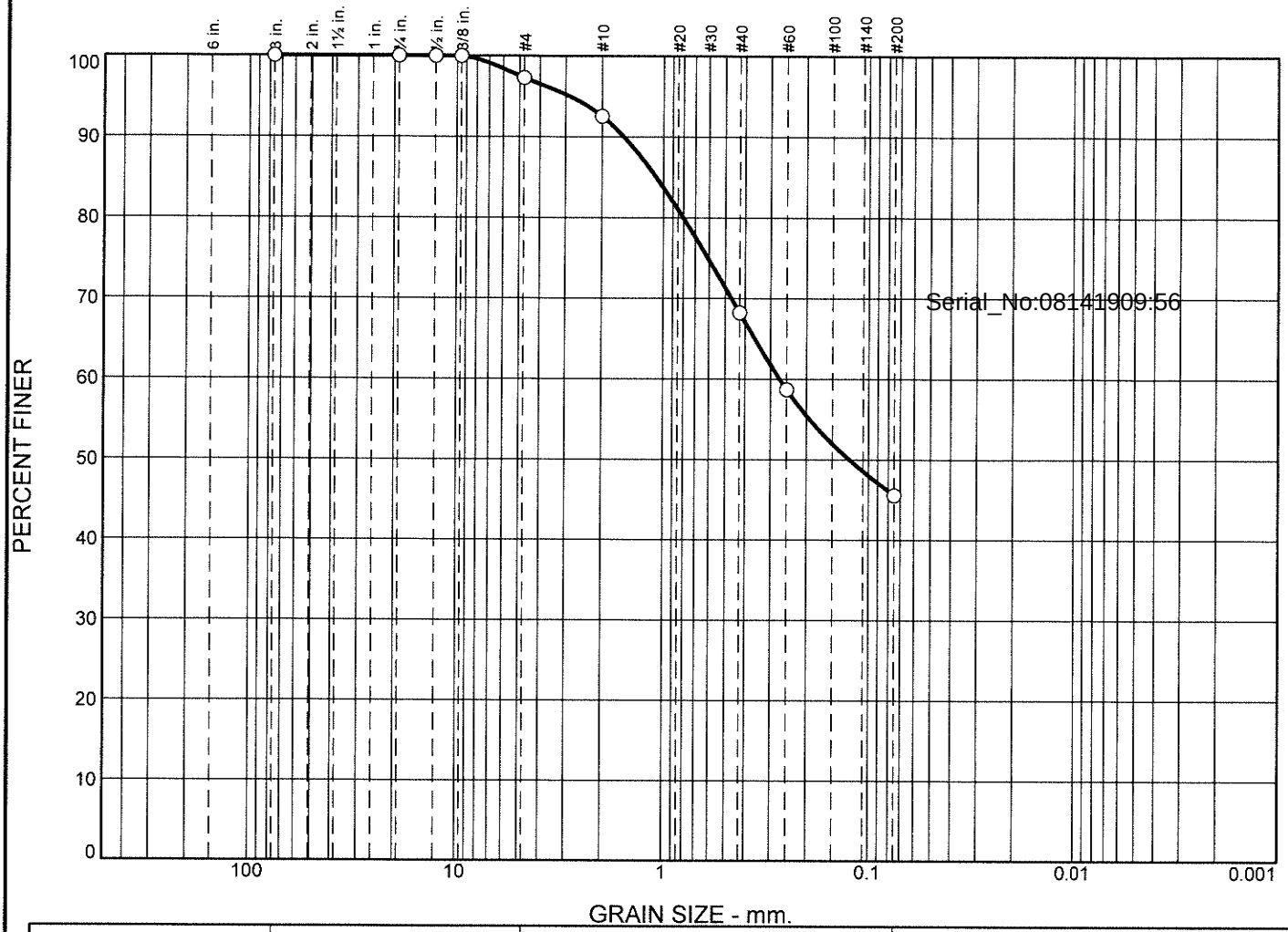
Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	0.3	0.3	0.4	25.0	57.8	83.2			16.5

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
			0.1366	0.2018	0.2498	0.2936	0.3402	0.5348	0.6734	0.8831	1.2484

Fineness Modulus
1.51

Particle Size Distribution Report



	% +3"	% Gravel		% Sand			% Fines	
		Coarse	Fine	Coarse	Medium	Fine	Silt	Clay
○	0.0	0.0	2.7	4.8	24.3	22.6	45.6	

	Colloids	LL	PL	D_{85}	D_{60}	D_{50}	D_{30}	D_{15}	D_{10}	C_c	C_u
○				1.0860	0.2709	0.1237					

Material Description	USCS	AASHTO
○		

Project No. **Client:**

Project:

○ **Source of Sample:** PRISC-3+4 **Sample Number:** L1933910-08

Date: ○

Alpha Analytical

Mansfield, MA

Remarks:

Figure

GRAIN SIZE DISTRIBUTION TEST DATA

8/13/2019

Location: PRISC-3+4

Sample Number: L1933910-08

Sieve Test Data

Post #200 Wash Test Weights (grams): **Dry Sample and Tare =** 64.08
Tare Wt. = 0.00
Minus #200 from wash = 0.0%

Dry Sample and Tare (grams)	Tare (grams)	Sieve Opening Size	Weight Retained (grams)	Sieve Weight (grams)	Percent Finer
64.08	0.00	3"	0.00	0.00	100.0
		0.75"	0.00	0.00	100.0
		0.50"	0.00	0.00	100.0
		0.375"	0.00	0.00	100.0
		#4	1.74	0.00	97.3
		#10	3.04	0.00	92.5
		#40	15.57	0.00	68.2
		#60	6.12	0.00	58.7
		#200	8.41	0.00	45.6

Serial_No:08141909:56

Fractional Components

Cobbles	Gravel			Sand				Fines		
	Coarse	Fine	Total	Coarse	Medium	Fine	Total	Silt	Clay	Total
0.0	0.0	2.7	2.7	4.8	24.3	22.6	51.7			45.6

D_5	D_{10}	D_{15}	D_{20}	D_{30}	D_{40}	D_{50}	D_{60}	D_{80}	D_{85}	D_{90}	D_{95}
						0.1237	0.2709	0.8013	1.0860	1.5650	2.8679

Fineness Modulus
1.34

Alpha Analytical

Certification Information

The following analytes are not included in our Primary NELAP Scope of Accreditation:

Westborough Facility
EPA 624/624.1: m/p-xylene, o-xylene
EPA 8260C: NPW: 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene, Azobenzene; SCM: Iodomethane (methyl iodide), 1,2,4,5-Tetramethylbenzene; 4-Ethyltoluene.
EPA 8270D: NPW: Dimethylnaphthalene,1,4-Diphenylhydrazine; SCM: Dimethylnaphthalene,1,4-Diphenylhydrazine.
SM4500: NPW: Amenable Cyanide; SCM: Total Phosphorus, TKN, NO2, NO3.

Mansfield Facility
SM 2540D: TSS
EPA 8082A: NPW: PCB: 1, 5, 31, 87,101, 110, 141, 151, 153, 180, 183, 187.
EPA TO-15: Halothane, 2,4,4-Trimethyl-2-pentene, 2,4,4-Trimethyl-1-pentene, Thiophene, 2-Methylthiophene, 3-Methylthiophene, 2-Ethylthiophene, 1,2,3-Trimethylbenzene, Indan, Indene, 1,2,4,5-Tetramethylbenzene, Benzothiophene, 1-Methylnaphthalene.
Biological Tissue Matrix: EPA 3050B

The following analytes are included in our Massachusetts DEP Scope of Accreditation

Westborough Facility:

Drinking Water
EPA 300.0: Chloride, Nitrate-N, Fluoride, Sulfate; **EPA 353.2**: Nitrate-N, Nitrite-N; **SM4500NO3-F**: Nitrate-N, Nitrite-N; **SM4500F-C, SM4500CN-CE, EPA 180.1, SM2130B, SM4500Cl-D, SM2320B, SM2540C, SM4500H-B, SM4500NO2-B**
EPA 332: Perchlorate; **EPA 524.2:** THMs and VOCs; **EPA 504.1:** EDB, DBCP.
Microbiology: **SM9215B; SM9223-P/A, SM9223B-Colilert-QT,SM9222D**.

Non-Potable Water
SM4500H,B, EPA 120.1, SM2510B, SM2540C, SM2320B, SM4500CL-E, SM4500F-BC, SM4500NH3-BH: Ammonia-N and Kjeldahl-N, **EPA 350.1**: Ammonia-N, **LACHAT 10-107-06-1-B**: Ammonia-N, **EPA 351.1, SM4500NO3-F, EPA 353.2**: Nitrate-N**, SM4500P-E, SM4500P-B, E, SM4500SO4-E, SM5220D, EPA 410.4, SM5210B, SM5310C, SM4500CL-D, EPA 1664, EPA 420.1, SM4500-CN-CE, SM2540D, EPA 300: Chloride, Sulfate, Nitrate.**
EPA 624.1: Volatile Halocarbons & Aromatics,
EPA 608.3: Chlordane, Toxaphene, Aldrin, alpha-BHC, beta-BHC, gamma-BHC, delta-BHC, Dieldrin, DDD, DDE, DDT, Endosulfan I, Endosulfan II, Endosulfan sulfate, Endrin, Endrin Aldehyde, Heptachlor, Heptachlor Epoxide, PCBs
EPA 625.1: SVOC (Acid/Base/Neutral Extractables), **EPA 600/4-81-045**: PCB-Oil.
Microbiology: **SM9223B-Colilert-QT; Enterolert-QT, SM9221E, EPA 1600, EPA 1603.**

Mansfield Facility:

Drinking Water
EPA 200.7: Al, Ba, Cd, Cr, Cu, Fe, Mn, Ni, Na, Ag, Ca, Zn. **EPA 200.8:** Al, Sb, As, Ba, Be, Cd, Cr, Cu, Pb, Mn, Ni, Se, Ag, TL, Zn. **EPA 245.1** Hg.
EPA 522.

Non-Potable Water
EPA 200.7: Al, Sb, As, Be, Cd, Ca, Cr, Co, Cu, Fe, Pb, Mg, Mn, Mo, Ni, K, Se, Ag, Na, Sr, TL, Ti, V, Zn.
EPA 200.8: Al, As, Be, Cd, Cr, Cu, Fe, Pb, Mn, Ni, K, Se, Ag, Na, TL, Zn.
EPA 245.1 Hg.
SM2340B

For a complete listing of analytes and methods, please contact your Alpha Project Manager.

CHAIN OF COUSTODY

PAGE ____ OF ____

Date Rec'd in Lab: 7/30/19

ALPHA Job #: L1933910

ALPHA ANALYTICAL

8 Walkup Drive, Westboro, MA 01581, Tel: 508-898-9220

320 Forbes Blvd, Mansfield, MA 02048, Tel: 508-822-9300

Project Information

Project Name: Nauset Estuary

Project Location: Nauset Estuary, Orleans MA

Project #: 2015-0121-03

Project Manager: L. Fields

ALPHA Quote #: N/A

Report Information - Data Deliverables

☐ ADEx ☒ EMAIL

Billing Information

☒ Same as Client info

PO #:

Client Information

Client: Woods Hole Group

Address: 107 Waterhouse Rd. Bourne, MA 02532

Phone: (508) 495-6225

Email: lfields@whgrp.com

Regulatory Requirements & Project Information Requirements

☒ Yes ☐ No MA MCP Analytical Methods

☐ Yes ☒ No CT RCP Analytical Methods

☐ Yes ☐ No Matrix Spike Required on this SDG? (Required for MCP Inorganics) ?

☐ Yes ☐ No GW1 Standards (Info Required for Metals & EPH with Targets) ?

☐ Yes ☒ No NPDES RGP

☐ Other State /Fed Program ____ Criteria ____

Turn-Around Time

☐ Standard ☐ RUSH (only confirmed if pre-approved!)

Date Due:

Additional Project Information:

PRISC-2 Analyze grain size first; if > 10% passing #200 sieve then proceed w/ remaining chemistry testing; if < 10% passing #200 sieve no further testing

ANALYSIS

Columns: (1) VOC: ☐ 8260 ☐ 624 ☐ 524.2 8260/5035; (2) SVOC: ☐ ABN ☐ PAH; (3) METALS: ☐ MCP 13 ☐ MCP 14 ☐ RCP 15; (4) METALS: ☐ RCRA5 ☐ RCRA8 ☐ PP13; (5) EPH: ☐ Ranges & Targets ☐ Ranges Only; (6) VPH: ☐ Ranges & Targets ☐ Ranges Only; (7) ☐ PCB ☐ PEST; (8) TPH: ☐ Quant Only ☐ Fingerprint; (9) Total Metals PAH/PCB/Eng TS; (10) Total Solids; (11) Grain Size - MA401 (TOC)

SAMPLE INFO — Filtration: ☐ Field ☐ Lab to do; Preservation: ☐ Lab to do

ALPHA Lab ID (Lab Use Only)	Sample ID	Collection Date	Collection Time	Sample Matrix	Sampler Initials	VOC	SVOC	Metals	Metals	EPH	VPH	PCB/PEST	TPH	Total Metals	Total Solids	Grain Size				Sample Comments	Total # Bottles
33910-01	HOPN1	7-29-19	11:15	SE	MLF	3														TS Sample not collected	3
02	HOPN1+2	7-29-19	~~11:45~~ 11:45 to 11:15	SE	MLF			1						1	1	1				~~Sub-sample collection time 11:15~~ Sub-sample collection times 12:53 to 1:19	~~3~~ 4
03	STON1+2	7-29-19	12:53	SE	MLF			1						1		1					~~2~~ 3
04	STON1+2B	7-29-19	1:24	SE	MLF											1					1
05	PRISC-1	7-29-19	1:54	SE	MLF											1					1
06	PRISC-2	7-29-19	2:24 to 2:18	SE	MLF	3		1						1	1	1			←	Grain size 1st; if > 10% passes #200 then remaining chemistry	~~8~~ 7
07	PRISC-2B	7-29-19	2:33	SE	MLF											1					1
08	PRISC 3+4	7-29-19	3:27	SE	MLF			1						1		1					3
	Trip Blank																				1

	VOC	SVOC	Metals	Metals	EPH	VPH	PCB/PEST	TPH	Total Metals	Total Solids	Grain Size
Container Type	A		A						A	P	P
Preservative	F/G		A						A	A	A

Container Type
P= Plastic
A= Amber glass
V= Vial
G= Glass
B= Bacteria cup
C= Cube
O= Other
E= Encore
D= BOD Bottle

Preservative
A= None
B= HCl
C= HNO_3
D= H_2SO_4
E= NaOH
F= MeOH
G= $NaHSO_4$
H= $Na_2S_2O_3$
I= Ascorbic Acid
J= NH_4Cl
K= Zn Acetate
O= Other

Relinquished By:	Date/Time	Received By:	Date/Time
Leslie Fields	7-30-19 9:55	MCM AAL	7/30/19 955
MCM	7/30/19 1720	[signature]	7/30/19 1320

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