

Appendix E

Sediment Sampling Report



American Littoral Society

Thompsons Beach Marsh Restoration and Enhancement Project

March 2017

Sediment Collection Report

The Coastal Research Center

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Port Republic, NJ 08241

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NEW JERSEY'S DISTINCTIVE PUBLIC UNIVERSITY

Captain Alek Modjeski
American Littoral Society
18 Hartshorne Drive
Highlands, NJ 07732

Captain Al:

On September 20, 21, and 22, 2016 the Stockton University Coastal Research Center (CRC) undertook the collection of sediment information as prescribed in the Sediment Sampling and Analysis Plan; dated June 12, 2016 by the New Jersey Department of Environmental Protection (NJDEP) Office of Sediment and Dredging Technology (OST). This work was part of the effort required to perform maintenance dredging of approximately 22,100 cubic yards (CY) of sediment from the "Eastern" and "Western" creeks adjacent to and behind Thompson's Beach (Maurice River Township, NJ), and the beneficial use of the dredged material for marsh restoration at two proposed placement areas (the "Eastern Area" and the "Southern Area"). The objective was to collect 11 sediment cores from the two creeks to a project depth of -5.5 feet (NAVD 88), using 2.0 inch diameter, 10 foot-length lexan tubes to have sufficient sediment from the creek bottom to conduct physical and chemical sediment analyses as required by NJDEP (OST). In addition, 15 surface grab samples were obtained from the Eastern and Southern placement areas for required testing.

The CRC field crew collected core samples BZ-1 through BZ-11, and PA-11 through PA-15 using the 12-foot flat bottom outboard skiff RV Willet. The remaining sediment samples PA-1 through PA-10 were obtained by foot with access directly from the adjacent gravel road. The sampling conditions were ideal from a weather standpoint, clear, wind (calm) and creek conditions (no waves/high tide) for late-September. The sampling schedule for this project was as follows:

September 20, 2016 – Thompsons Creeks (Western/Eastern) Core Sites BZ-4, BZ-5, BZ-6, BZ-7, BZ-8, BZ-9, BZ-10, BZ-11

- (16/32oz. Clear Glass Jars) 2 per site for Grain Size Analysis
- (8/4oz. Clear Glass Jars) 1 per site for TOC's, TS

September 21, 2016 – Thompsons Creek/Placement Area (Eastern) Core Sites BZ-1, BZ-2, BZ-3, PA-11, PA-12, PA-13, PA-14, PA-15

- (16/32oz. Clear Glass Jars) 2 per site for Grain Size Analysis
- (8/4oz. Clear Glass Jars) 1 per site for TOC's, TS

x:\data\small-jobs\delaware bay restoration\thompsons beach\geotech_creeks\2016_sampling\final report thompsons marsh restoration.docx

September 22, 2016 – Thompsons Creek/Placement Area (Southern) Core Sites PA-1, PA-2, PA-3, PA-4, PA-5, PA-6, PA-7, PA-8, PA-9, PA-10

- (20/32oz. Clear Glass Jars) 2 per site for Grain Size Analysis
- (10/4oz. Clear Glass Jars) 1 per site for TOC's, TS

The compositing of the designated individual core samples is to be conducted by ALS Environmental Laboratories post-collection according to the pre-determined schedule. RTK-GPS data points were recorded on the top of each 10-foot core tube to get the position and elevation/penetration depth reached by the coring effort. Core penetration depths ranged from -5.3 feet to -6.2 feet (NAVD 88). The cores were then extracted and the contents measured for recovery and any distinctive sedimentary layers present. Following completion of the sampling effort, the sediment containers and custody documentation were relinquished on site to Mr. Paul Collier from ALS, for delivery to the laboratory.

The material recovered at every core location with the exception of one (PA-2), contained a gray to black organic silt consistent with lower energy creek environments, marsh areas, and mud flats. Sample PA-2 contained an existing salt marsh component at the surface with a fine tan sand present 0.2 feet below the marsh surface. Attached to this report are the maps depicting the proposed vs. actual core locations, an excel data table displaying the sample coordinates and depths of penetrations obtained, and stratigraphic core logs, detailing the stratigraphy found at each core site.

We at the Coastal Research Center appreciate the opportunity to conduct this kind of research for the American Littoral Society and look forward to aiding your sampling and analysis needs in the future. If you have any questions regarding the information contained in this report please contact the Coastal Center at (609) 652-4245.

Sincerely,



Crist Robine, MA, CFM
Chief Sedimentologist
Coastal Research Center

**STOCKTON UNIVERSITY
COASTAL RESEARCH CENTER**

Restoration area delineations provided by Dr. Joseph Smith.

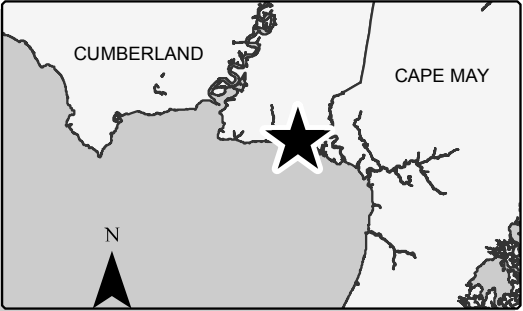
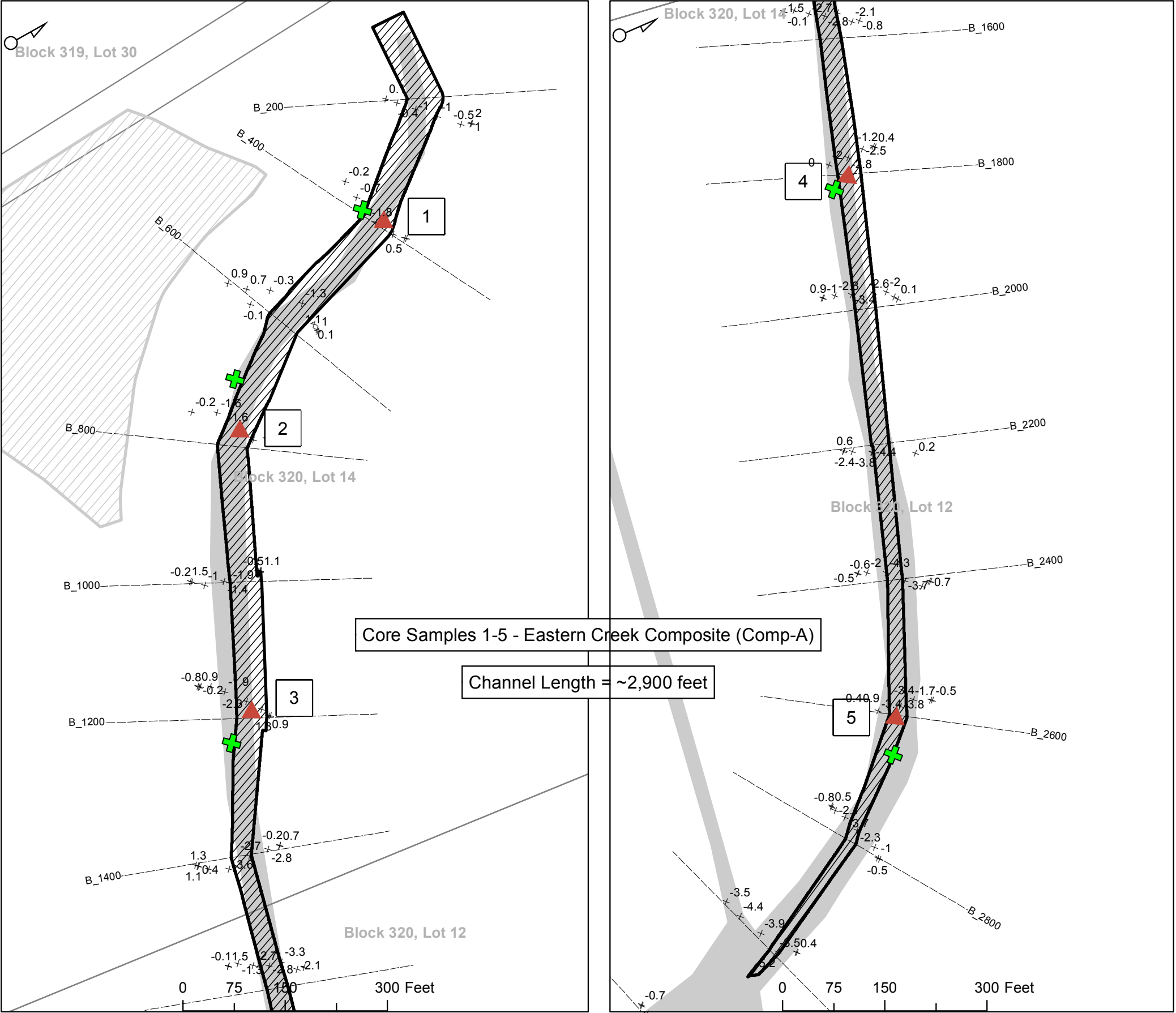
Spring 2015 survey lines and elevation points provided by the Coastal Research Center. Volume calculations were determined by using a Geographic Information System to compare Digital Elevation Models of the Spring 2015 survey by the CRC and of the proposed fill elevations.

Parcel delineations were provided by the New Jersey Geographic Information Network.

Conversion from NAVD88 to MLW and MHW were determined using V Datum, created by the NOAA.

Cores samples were collected September 20, 21 and 22, 2016. Core samples were collected using a piston core.

Core ID	Easting	Northing
BZ1	352599.946	134779.802
BZ2	352724.369	134495.502
BZ3	353187.676	134228.948
BZ4	353739.003	134027.335
BZ5	354533.664	133773.486



This map shows the Eastern Creek tidal channel way. The dredge cut design shown, and the estimated volume calculations are based on an approximate 50ft wide cut with 4:1 sloped sides. Each side has a beginning elevation of -0.5ft and an ending elevation at approximately -5.5ft NAVD88. A 10ft wide middle section at elevation -5.5ft completes the 50ft wide hopper cut. The dark shaded areas show the location of available material that are within the cut design.

The Eastern Creek has an estimated 7,429 cubic yards, of a total of 22,103 cubic yards of material available for dredging. The length of the Eastern Creek to be dredged is approximately 3,000 feet. The total volume needed to meet the placement estimates are 20,295 cubic yards.

Elevation survey conducted by the Coastal Research Center.

Legend

- Actual Core Locations
- Proposed Core Locations
- GPS Elevation Points
- Available Material

Eastern Creek Tidal Channel

THOMPSONS BEACH MARSH RESTORATION PROJECT

STOCKTON UNIVERSITY
COASTAL RESEARCH CENTER

Restoration area delineations provided by Dr. Joseph Smith.

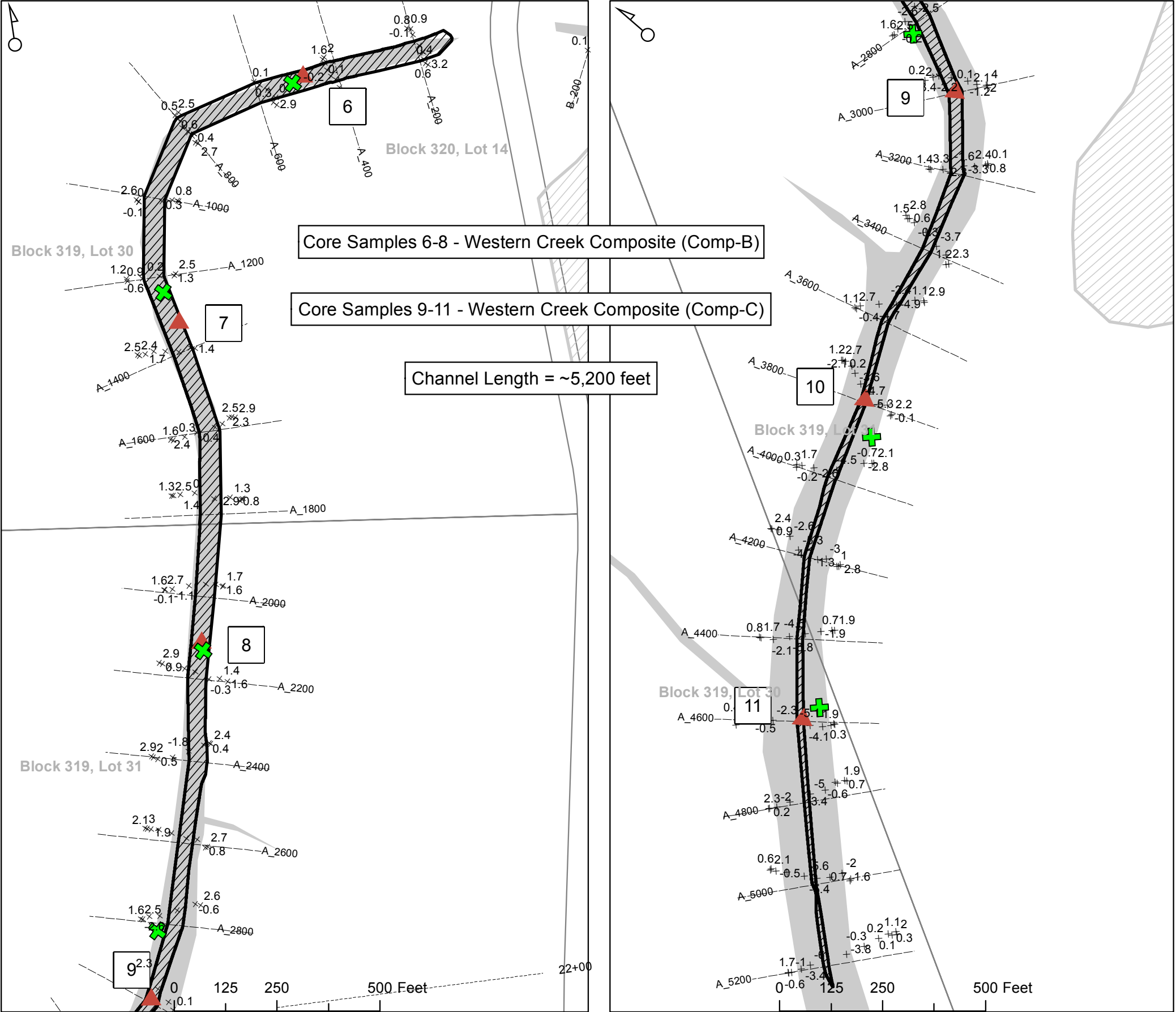
Spring 2015 survey lines and elevation points provided by the Coastal Research Center. Volume calculations were determined by using a Geographic Information System to compare Digital Elevation Models of the Spring 2015 survey by the CRC and of the proposed fill elevations.

Parcel delineations were provided by the New Jersey Geographic Information Network.

Conversion from NAVD88 to MLW and MHW were determined using V Datum, created by the NOAA.

Cores samples were collected September 20, 21 and 22, 2016. Core samples were collected using a piston core.

Core ID	Easting	Northing
BZ6	351753.942	134915.366
BZ7	351369.555	134458.902
BZ8	351336.491	133585.028
BZ9	351127.624	132928.706
BZ10	350321.879	132365.799
BZ11	349742.022	132032.761



CUMBERLAND CAPE MAY

This map shows the Western Creek tidal channel way. The dredge cut design shown, and the estimated volume calculations are based on an approximate 50ft wide cut with 4:1 sloped sides. Each side has a beginning elevation of -0.5ft and an ending elevation at approximately -5.5ft NAVD88. A 10ft wide middle section at elevation -5.5ft completes the 50ft wide hopper cut. The dark shaded areas show the location of available material that are within the cut design.

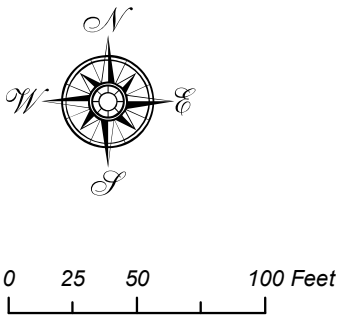
The Western Creek has an estimated 14,674 cubic yards, of a total of 22,103 cubic yards of material available for dredging. The total volume needed to meet the placement estimates are 20,295 cubic yards.

Elevation survey conducted by the Coastal Research Center.

Legend

- Actual Core Locations
- Proposed Core Locations
- GPS Elevation Points
- Available Material

Western Creek Tidal Channel



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Restoration area delineations provided by Dr. Joseph Smith.

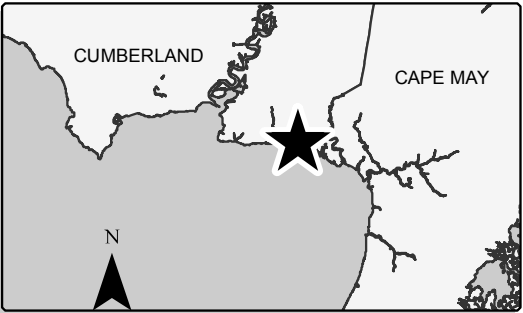
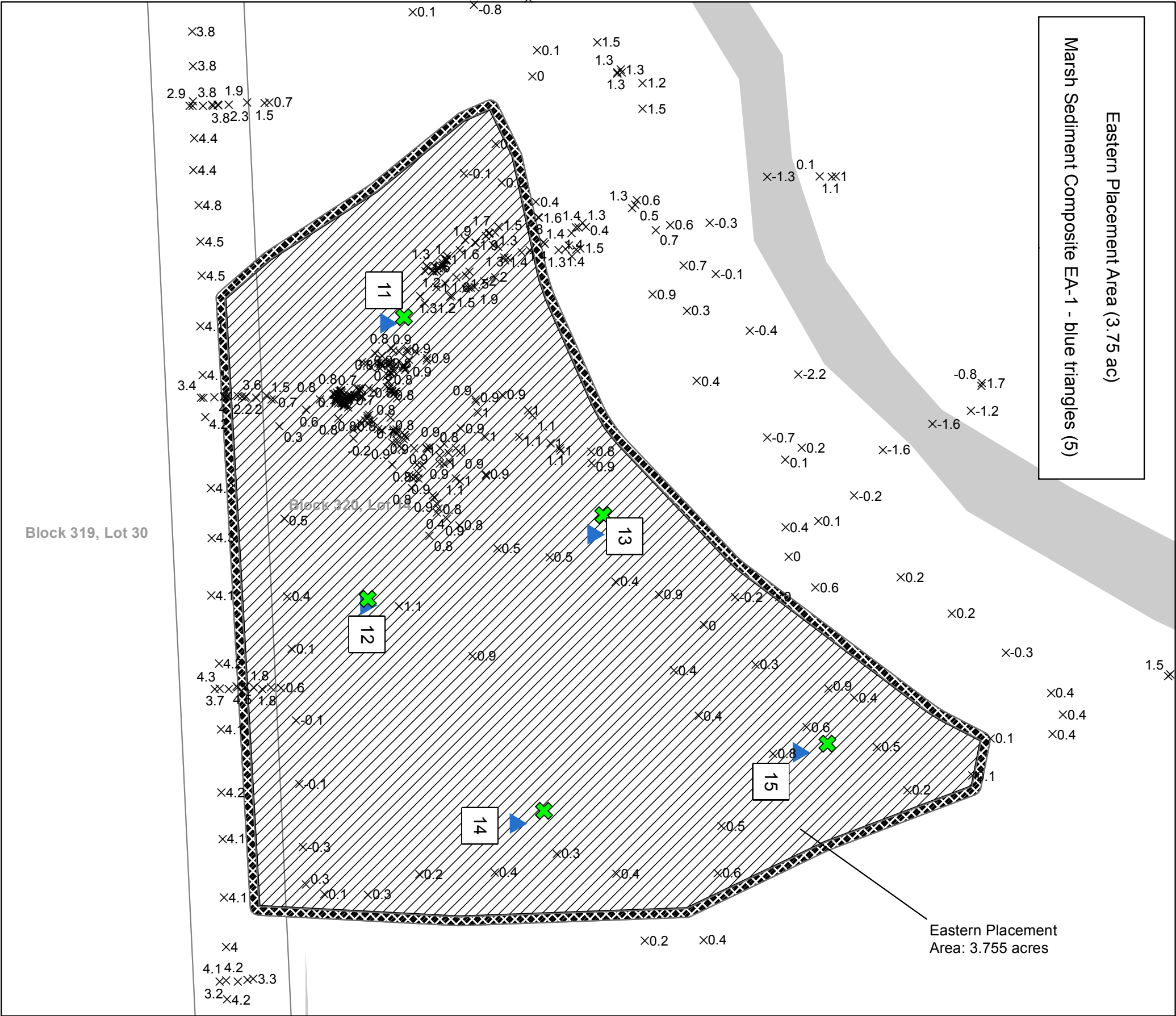
Spring 2015 survey lines and elevation points provided by the Coastal Research Center. Volume calculations were determined by using a Geographic Information System to compare Digital Elevation Models of the Spring 2015 survey by the CRC and of the proposed fill elevations.

Parcel delineations were provided by the New Jersey Geographic Information Network.

Conversion from NAVD88 to MLW and MHW were determined using V Datum, created by the NOAA.

Cores samples were collected September 20, 21 and 22, 2016. Core samples were collected using a piston core.

Core ID	Easting	Northing
PA11	352426.219	134538.960
PA12	352401.285	134345.323
PA13	352563.106	134402.965
PA14	352522.322	134199.884
PA15	352717.163	134245.910

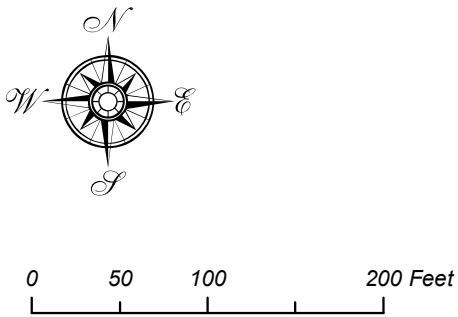


This map shows the Eastern Area. This is a mudflat area to be raised to an elevation of 2.5 feet with dredge slurry.

An estimated 11,135 cubic yards of material are need to reach 2.5 feet in elevation.

Coir Logs will be located allong the perimeter of the placement area. (Barrier features on map are not to scale.)

Eastern Area



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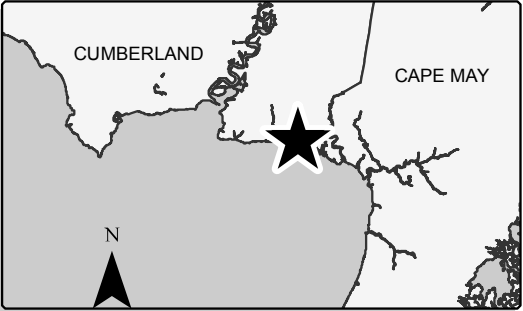
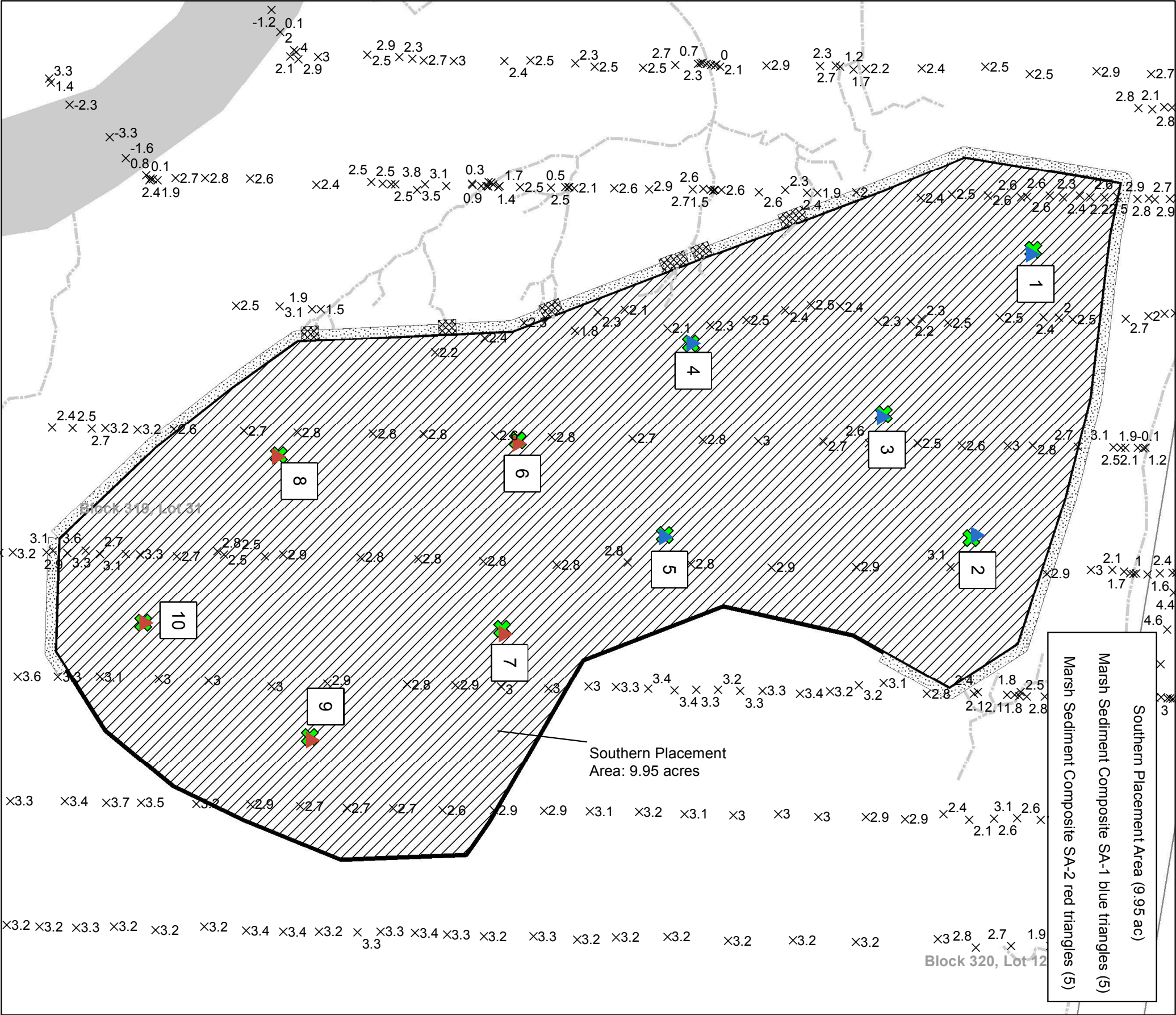
Spring 2015 survey lines and elevation points provided by the Coastal Research Center. Volume calculations were determined by using a Geographic Information System to compare Digital Elevation Models of the Spring 2015 survey by the CRC and of the proposed fill elevations.

Parcel delineations were provided by the New Jersey Geographic Information Network.

Conversion from NAVD88 to MLW and MHW were determined using V Datum, created by the NOAA.

Cores samples were collected September 20, 21 and 22, 2016. Core samples were collected using a piston core.

Core ID	Easting	Northing
PA1	351891.892	132513.492
PA2	351829.968	132224.523
PA3	351742.129	132348.498
PA4	351548.810	132419.304
PA5	351522.674	132227.658
PA6	351375.515	132322.479
PA7	351359.984	132133.559
PA8	351135.984	132307.404
PA9	351167.271	132025.547
PA10	351000.434	132139.785



This map shows the Southern Area. This area shall receive a thin layer application of a maximum thickness of 8" of dredge material, not to exceed 3.4 feet in elevation. Placement will be in the shaded areas, which are determined to be the most deficient.

An estimated 9,160 cubic yards of material are needed to apply the 8" thin layer, not exceeding 3.4 feet, in the placement area.

A slit fence will be located along the perimeter of the placement area. Based on slope analysis, Hay bales will be placed in designated areas as a silt barrier. Coir logs will also be added to areas where streams are running out of the placement area. (Barrier features on map are not to scale.)

Legend

Proposed Core Locations

- 1 - 5
- 6 - 10
- Actual Core Locations
- Coir Logs
- Hay Bales
- Minor Streams
- Placement Area/Silt Fence

Southern Area

Thompsons Marsh Restoration Project: Core Sample Positions/Elevations

Sample ID	Easting	Northing	Penetration El. (ft) NAVD 88	Sediment El. (ft) NAVD 88
BZ1	352599.9	134779.802	-5.3	
BZ10	350321.9	132365.799	-5.7	
BZ11	349742	132032.761	-5.9	
BZ2	352724.4	134495.502	-5.4	
BZ3	353187.7	134228.948	-5.5	
BZ4	353739	134027.335	-5.7	
BZ5	354533.7	133773.486	-6.2	
BZ6	351753.9	134915.366	-6.1	
BZ7	351369.6	134458.902	-5.7	
BZ8	351336.5	133585.028	-5.5	
BZ9	351127.6	132928.706	-5.9	
PA1	351891.9	132513.492		2.4 sediment surface
PA10	351000.4	132139.785		2.6 sediment surface
PA2	351830	132224.523		2.3 sediment surface
PA3	351742.1	132348.498		2.3 sediment surface
PA4	351548.8	132419.304		2.2 sediment surface
PA5	351522.7	132227.658		2.6 sediment surface
PA6	351375.5	132322.479		2.2 sediment surface
PA7	351360	132133.559		2.6 sediment surface
PA8	351136	132307.404		2.6 sediment surface
PA9	351167.3	132025.547		2.6 sediment surface
PA11	352426.2	134538.96		0.5 sediment surface
PA12	352401.3	134345.323		0.1 sediment surface
PA13	352563.1	134402.965		0.9 sediment surface
PA14	352522.3	134199.884		0.6 sediment surface
PA15	352717.2	134245.91		0.7 sediment surface

THOMPSONS MARSH RESTORATION

CORE# = BZ1

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/21/16

TIME = 11:40

**PENETRATING DEPTH =
-5.3ft NAVD 88**

CORE (RECOVERY) = 4.2ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ2

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/21/16

TIME = 11:15

**PENETRATING DEPTH =
-5.4ft NAVD 88**

CORE (RECOVERY) = 4.3ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ3

NOTE: MEASUREMENTS GIVEN IN FEET

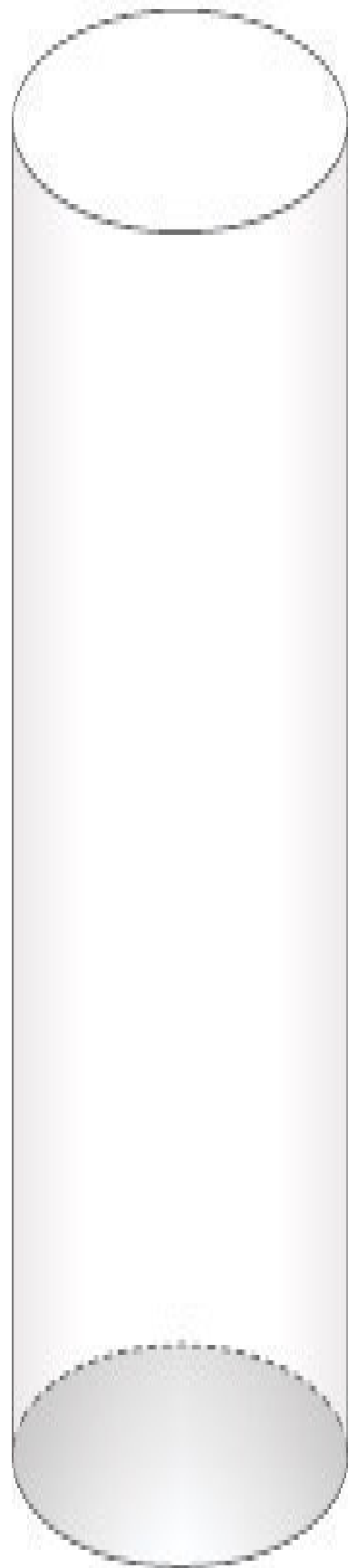
DATE = 9/21/16

TIME = 11:00

**PENETRATING DEPTH =
-5.5ft NAVD 88**

CORE (RECOVERY) = 3.8ft

STRATIGRAPHY NOTES:



Top

Bottom

NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ4

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/20/15

TIME = 14:25

**PENETRATING DEPTH =
-5.7ft NAVD 88**

CORE (RECOVERY) = 4.8ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ5

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/20/15

TIME = 14:10

**PENETRATING DEPTH =
-6.2ft NAVD 88**

CORE (RECOVERY) = 3.4ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ6

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/20/15

TIME = 11:15

**PENETRATING DEPTH =
-6.1ft NAVD 88**

CORE (RECOVERY) = 5.2ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ7

NOTE: MEASUREMENTS GIVEN IN FEET

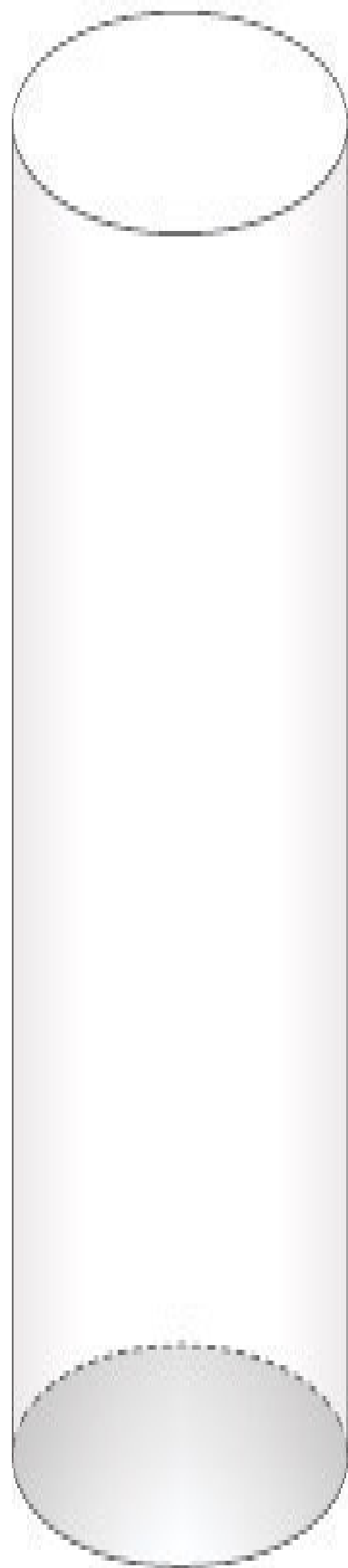
DATE = 9/20/15

TIME = 12:00

**PENETRATING DEPTH =
-5.7ft NAVD 88**

CORE (RECOVERY) = 4.5ft

STRATIGRAPHY NOTES:



Top

Bottom

NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ8

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/20/15

TIME = 12:15

PENETRATING DEPTH =
-5.5ft NAVD 88

CORE (RECOVERY) = 4.2ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ9

NOTE: MEASUREMENTS GIVEN IN FEET

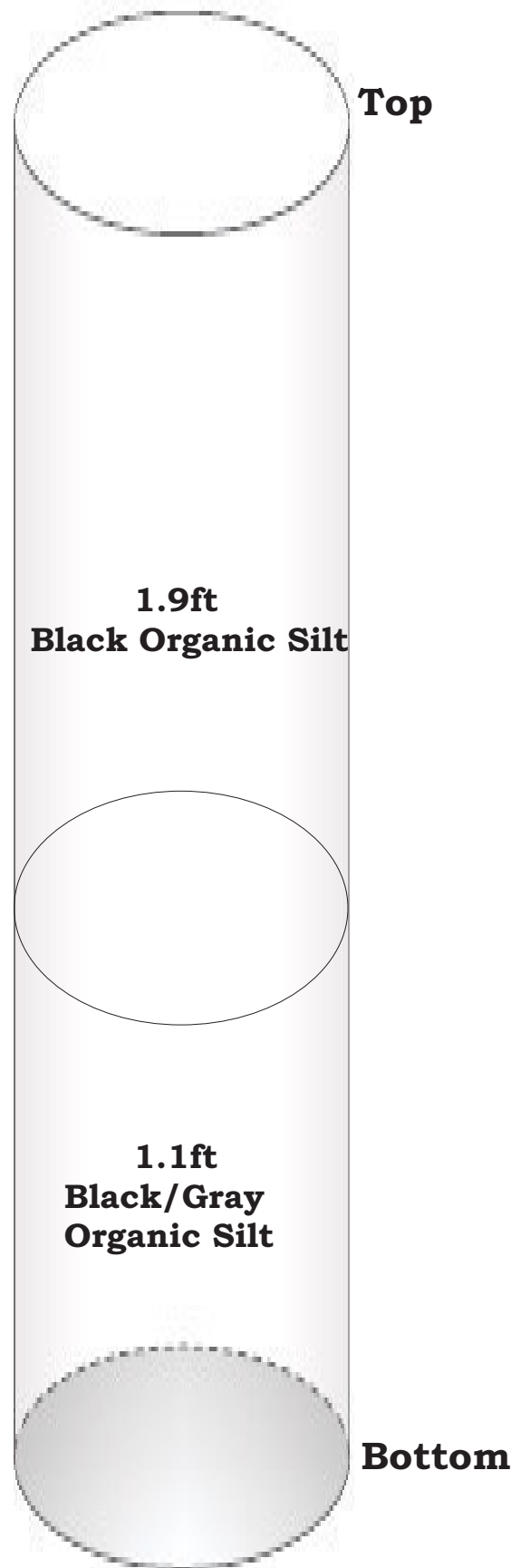
DATE = 9/20/15

TIME = 12:45

**PENETRATING DEPTH =
-5.9ft NAVD 88**

CORE (RECOVERY) = 3.0ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ10

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/20/15

TIME = 13:15

**PENETRATING DEPTH =
-5.7ft NAVD 88**

CORE (RECOVERY) = 1.1ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = BZ11

NOTE: MEASUREMENTS GIVEN IN FEET

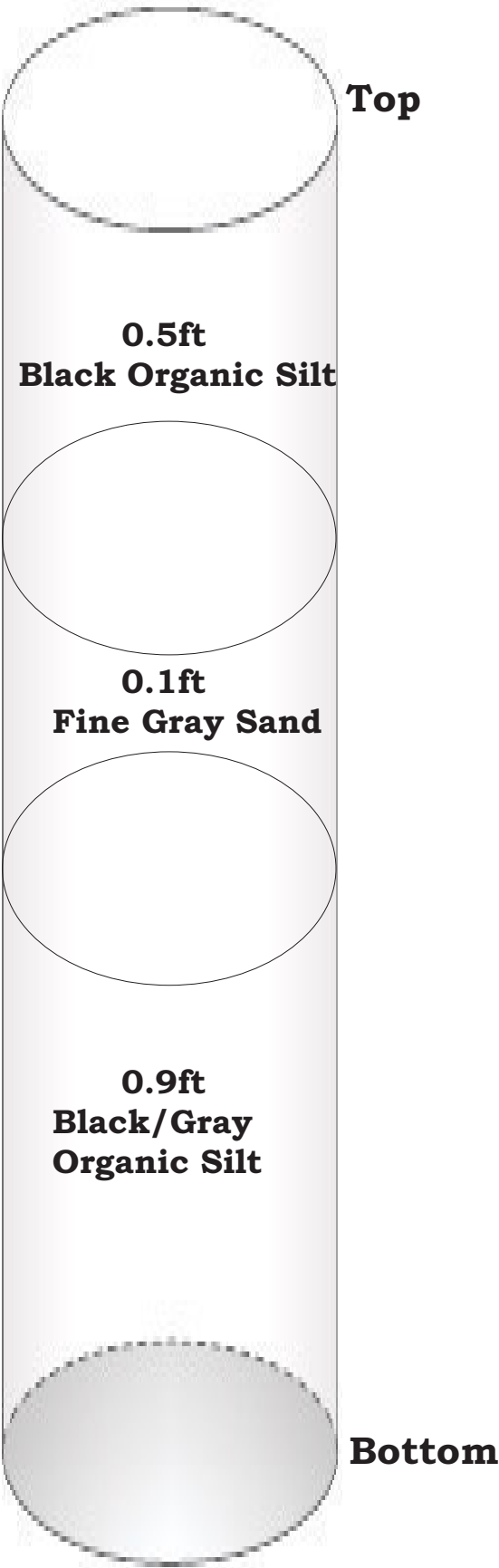
DATE = 9/20/15

TIME = 13:45

PENETRATING DEPTH =
-5.9ft NAVD 88

CORE (RECOVERY) = 1.5ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA1

NOTE: MEASUREMENTS GIVEN IN FEET

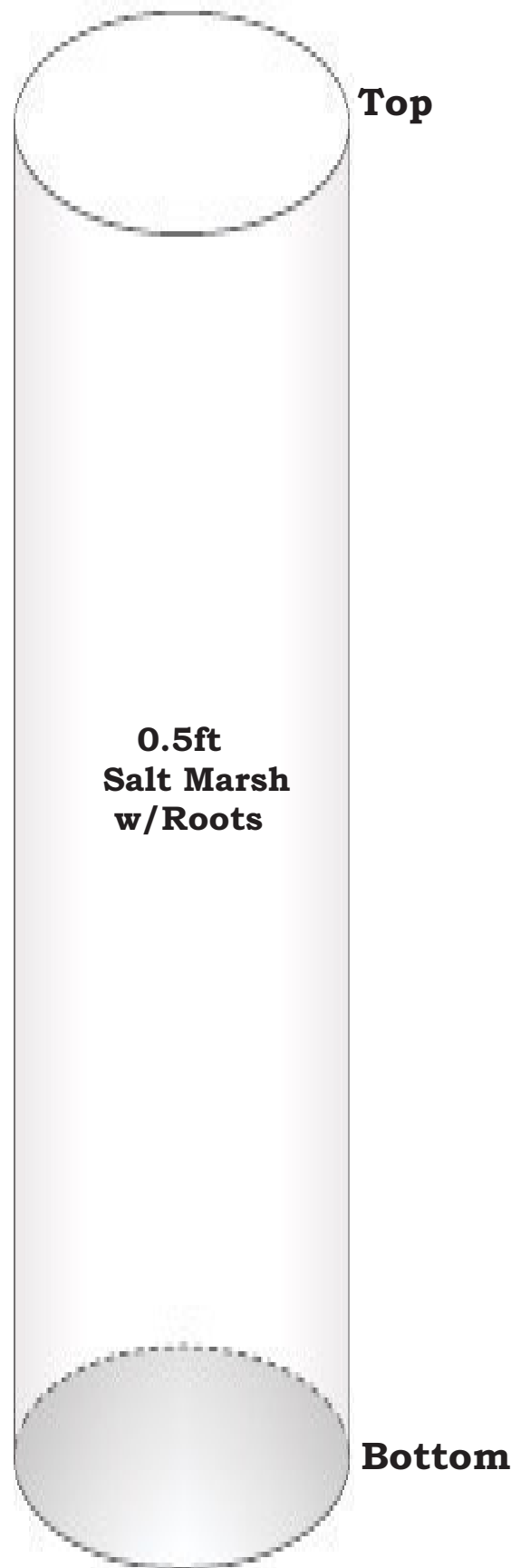
DATE = 9/22/16

TIME = 10:00

**SEDIMENT ELEVATION =
2.4ft NAVD 88**

CORE (RECOVERY) = 0.5ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA2

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/22/16

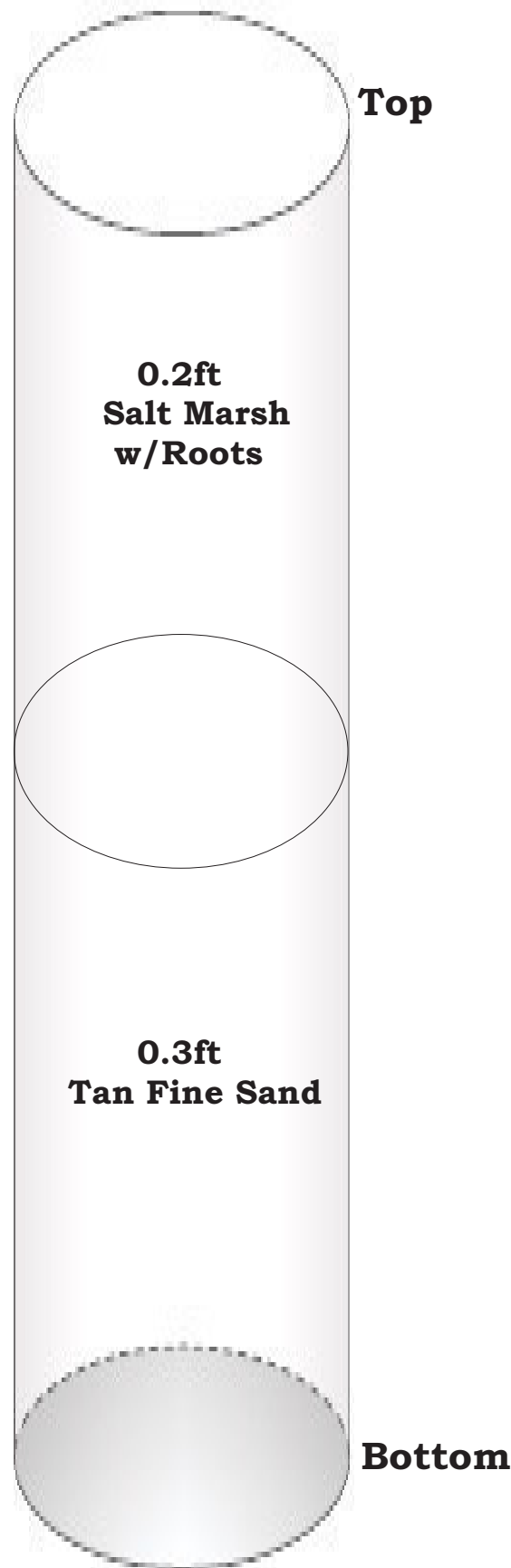
TIME = 10:30

**SEDIMENT ELEVATION =
2.3ft NAVD 88**

CORE (RECOVERY) = 0.5ft

STRATIGRAPHY NOTES:

**Fine sand underlying
newly grown salt marsh.**



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA3

NOTE: MEASUREMENTS GIVEN IN FEET

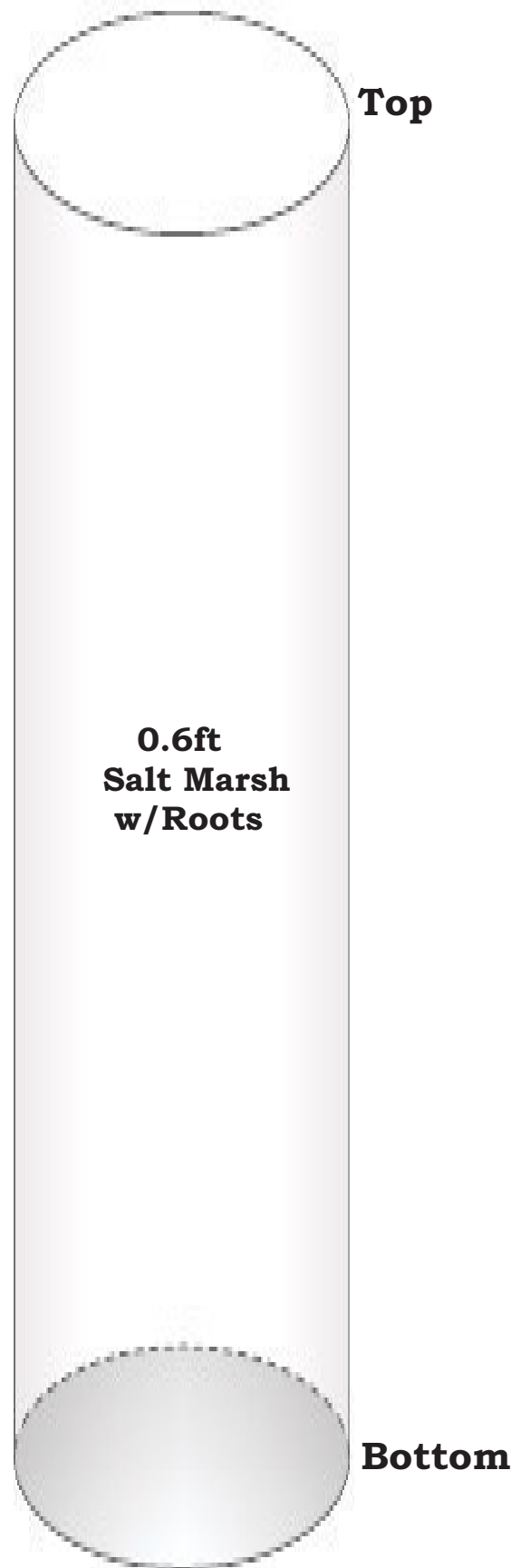
DATE = 9/22/16

TIME = 11:00

**SEDIMENT ELEVATION =
2.3ft NAVD 88**

CORE (RECOVERY) = 0.6ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA4

NOTE: MEASUREMENTS GIVEN IN FEET

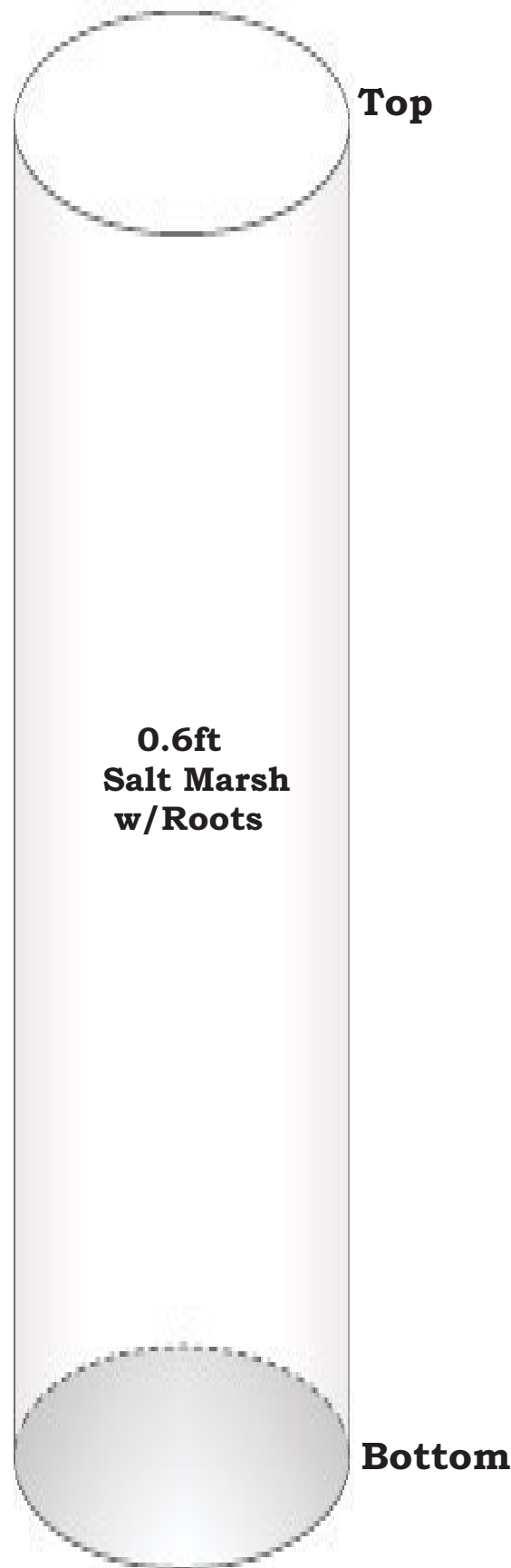
DATE = 9/22/16

TIME = 11:15

**SEDIMENT ELEVATION =
2.2ft NAVD 88**

CORE (RECOVERY) = 0.6ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA5

NOTE: MEASUREMENTS GIVEN IN FEET

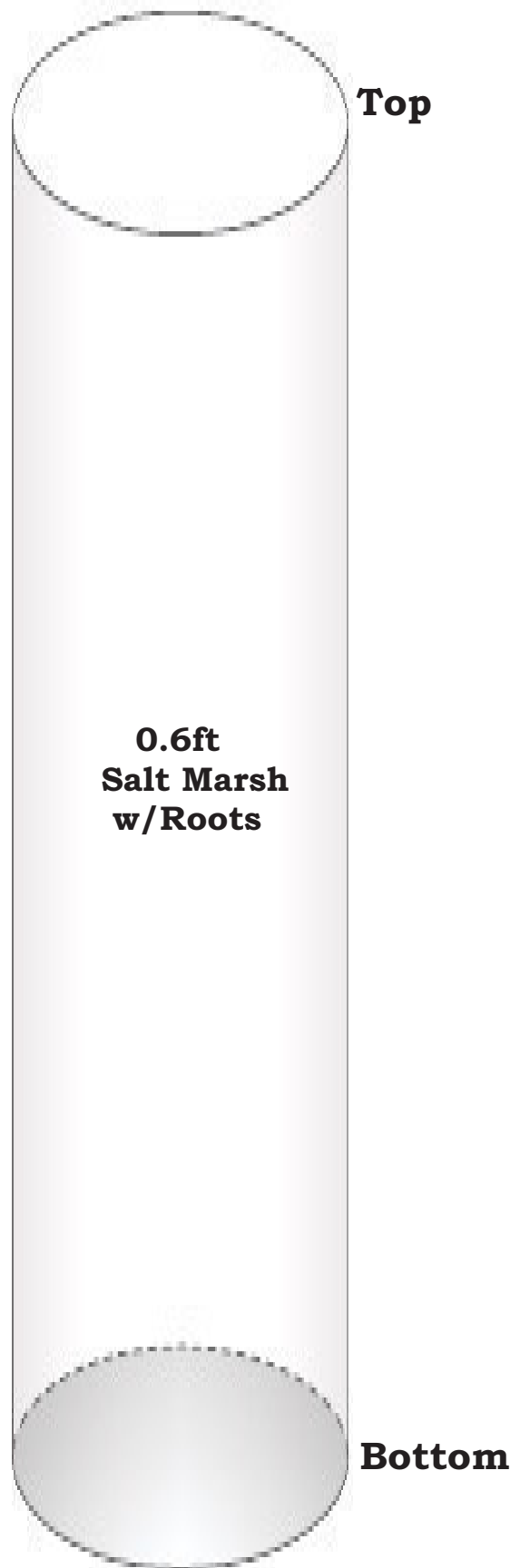
DATE = 9/22/16

TIME = 11:35

**SEDIMENT ELEVATION =
2.6ft NAVD 88**

CORE (RECOVERY) = 0.6ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA6

NOTE: MEASUREMENTS GIVEN IN FEET

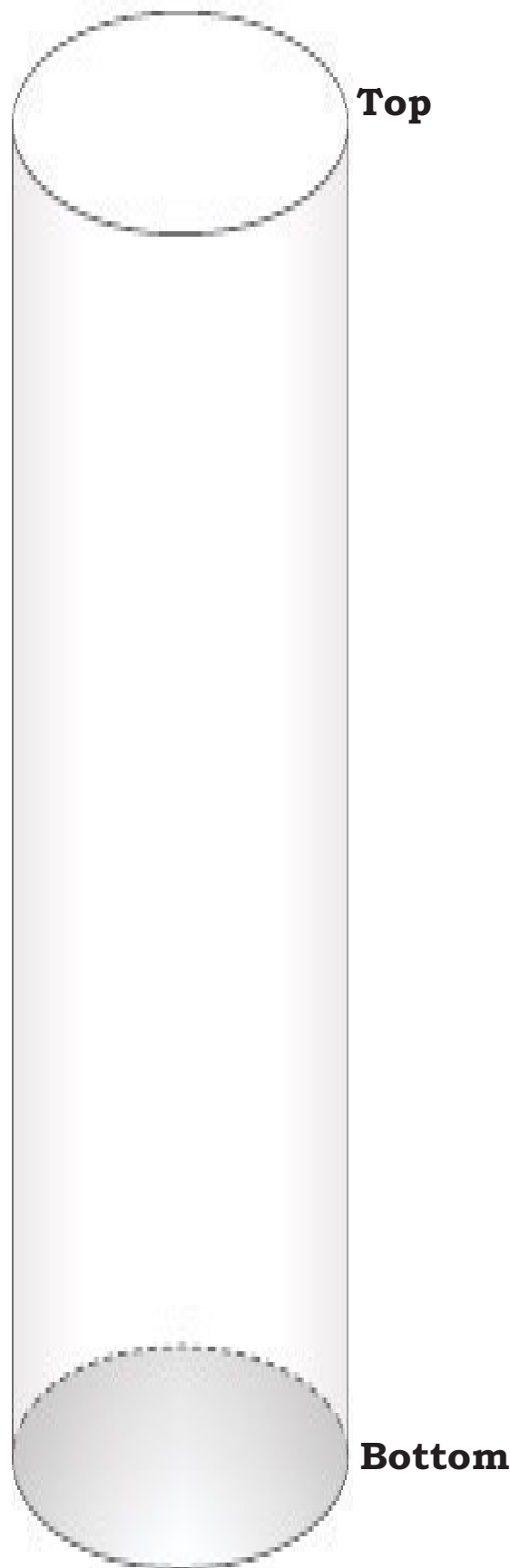
DATE = 9/22/16

TIME = 11:45

**SEDIMENT ELEVATION =
2.6ft NAVD 88**

CORE (RECOVERY) = 0.6ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA7

NOTE: MEASUREMENTS GIVEN IN FEET

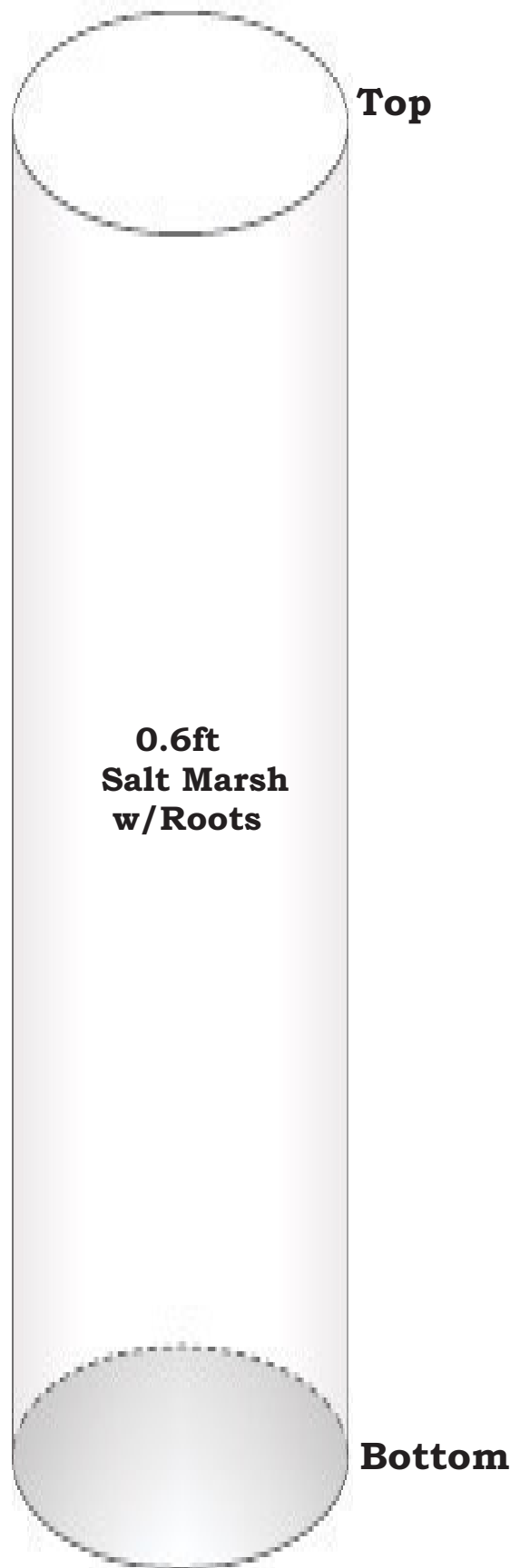
DATE = 9/22/16

TIME = 11:50

**SEDIMENT ELEVATION =
2.6ft NAVD 88**

CORE (RECOVERY) = 0.6ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA8

NOTE: MEASUREMENTS GIVEN IN FEET

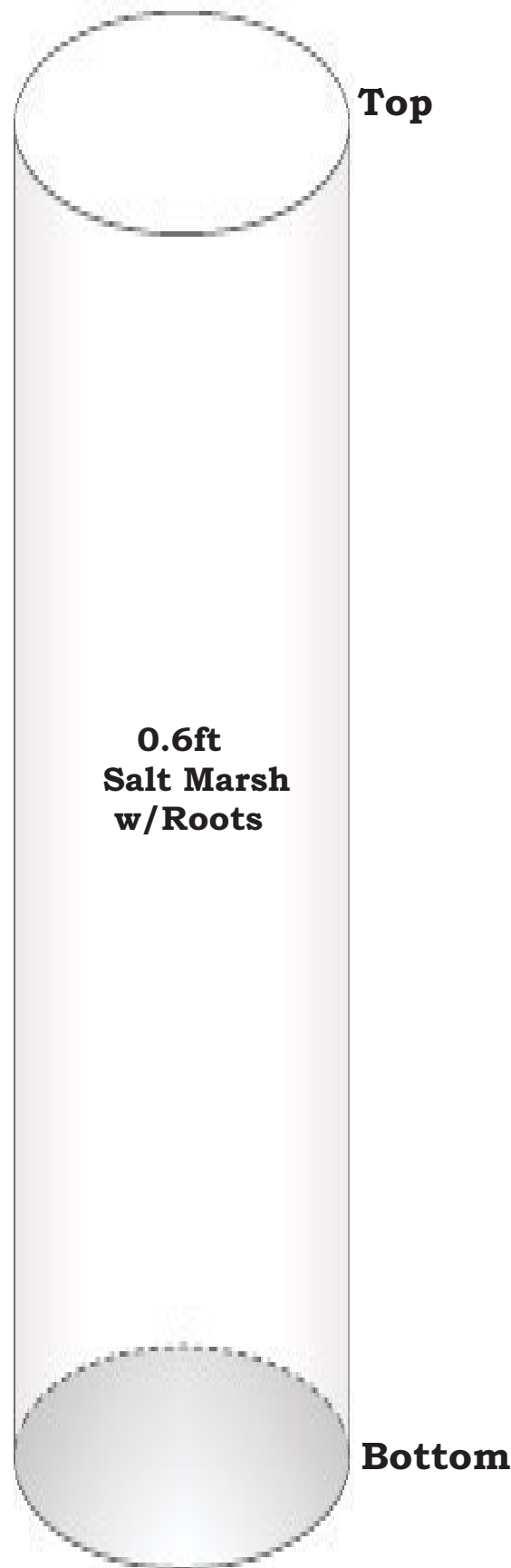
DATE = 9/22/16

TIME = 12:25

**SEDIMENT ELEVATION =
2.6ft NAVD 88**

CORE (RECOVERY) = 0.6ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA9

NOTE: MEASUREMENTS GIVEN IN FEET

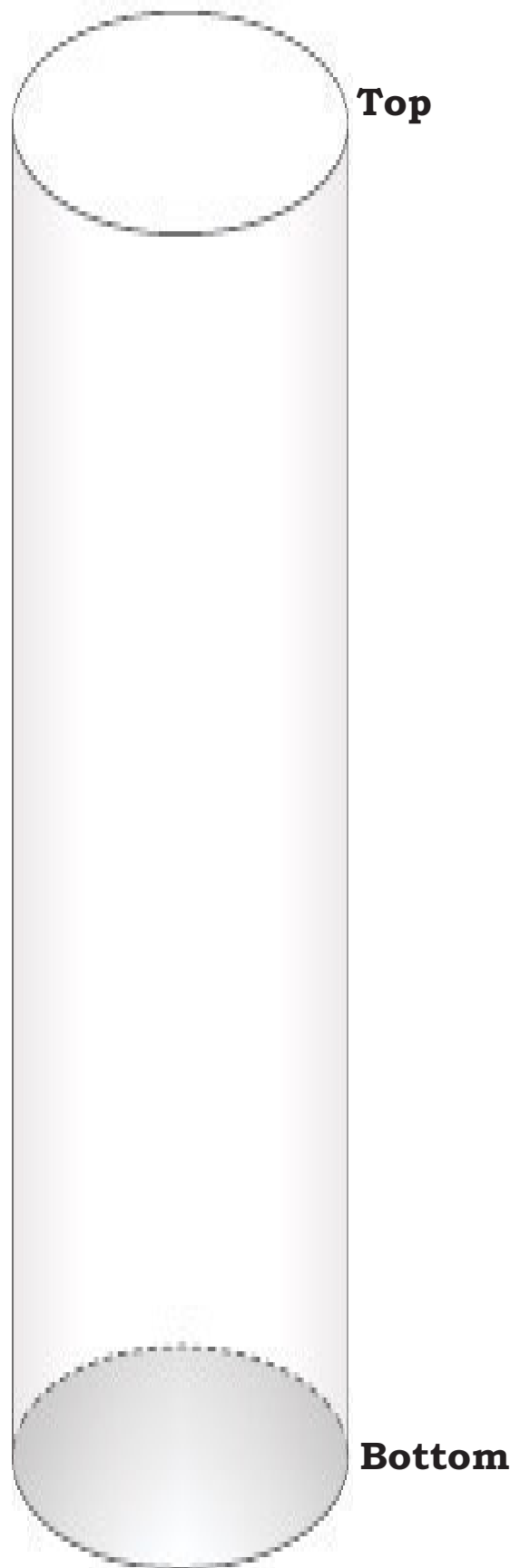
DATE = 9/22/16

TIME = 12:05

**SEDIMENT ELEVATION =
2.6ft NAVD 88**

CORE (RECOVERY) = 0.6ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA10

NOTE: MEASUREMENTS GIVEN IN FEET

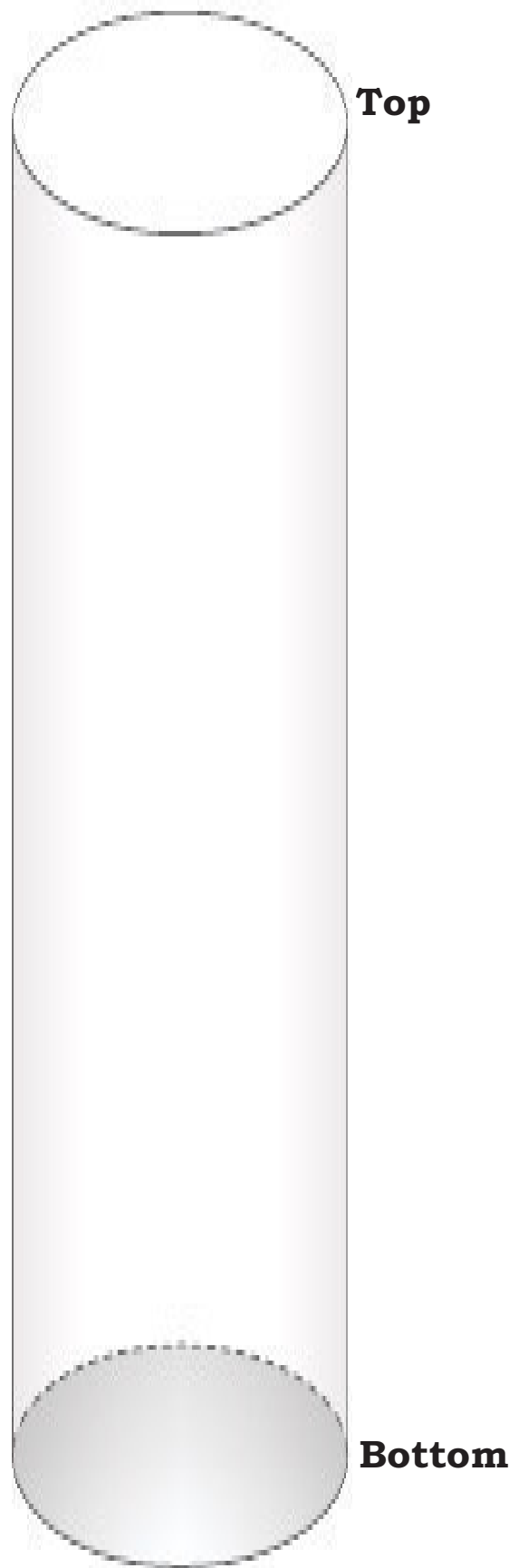
DATE = 9/22/16

TIME = 12:15

**SEDIMENT ELEVATION =
2.6ft NAVD 88**

CORE (RECOVERY) = 0.6ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA11

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/21/16

TIME = 13:30

**SEDIMENT ELEVATION =
0.5ft NAVD 88**

CORE (RECOVERY) = 0.5ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA12

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/21/16

TIME = 13:15

**SEDIMENT ELEVATION =
0.1ft NAVD 88**

CORE (RECOVERY) = 0.6ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA13

NOTE: MEASUREMENTS GIVEN IN FEET

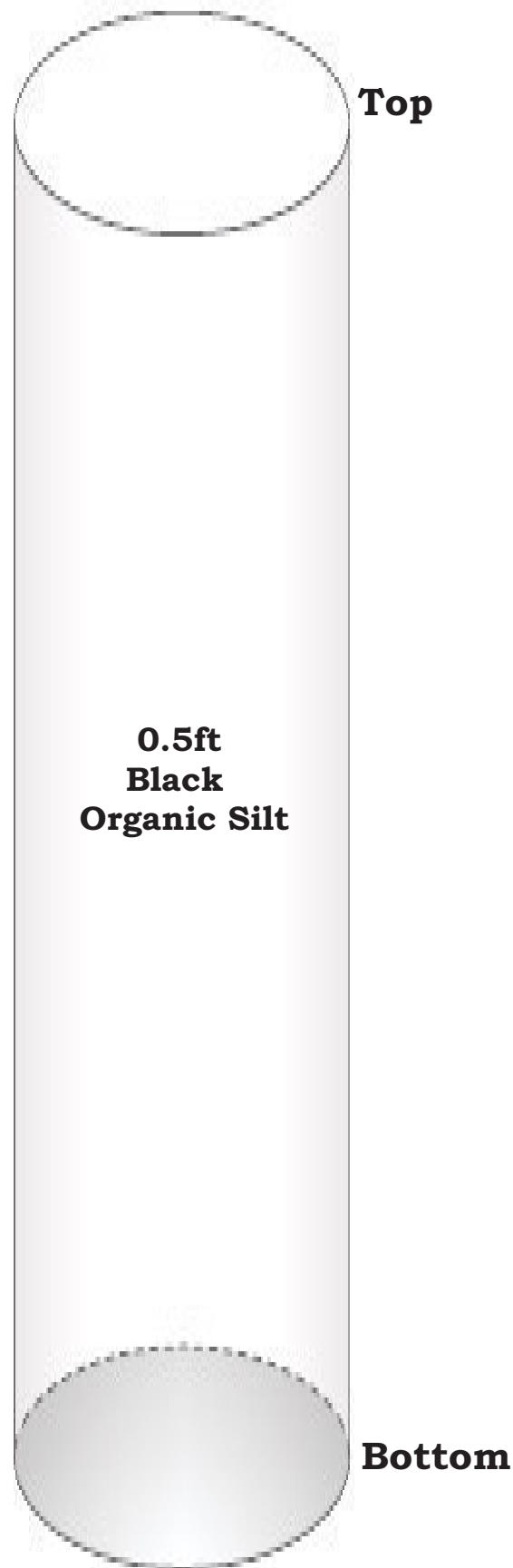
DATE = 9/21/16

TIME = 12:30

**SEDIMENT ELEVATION =
0.9ft NAVD 88**

CORE (RECOVERY) = 0.5ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA14

NOTE: MEASUREMENTS GIVEN IN FEET

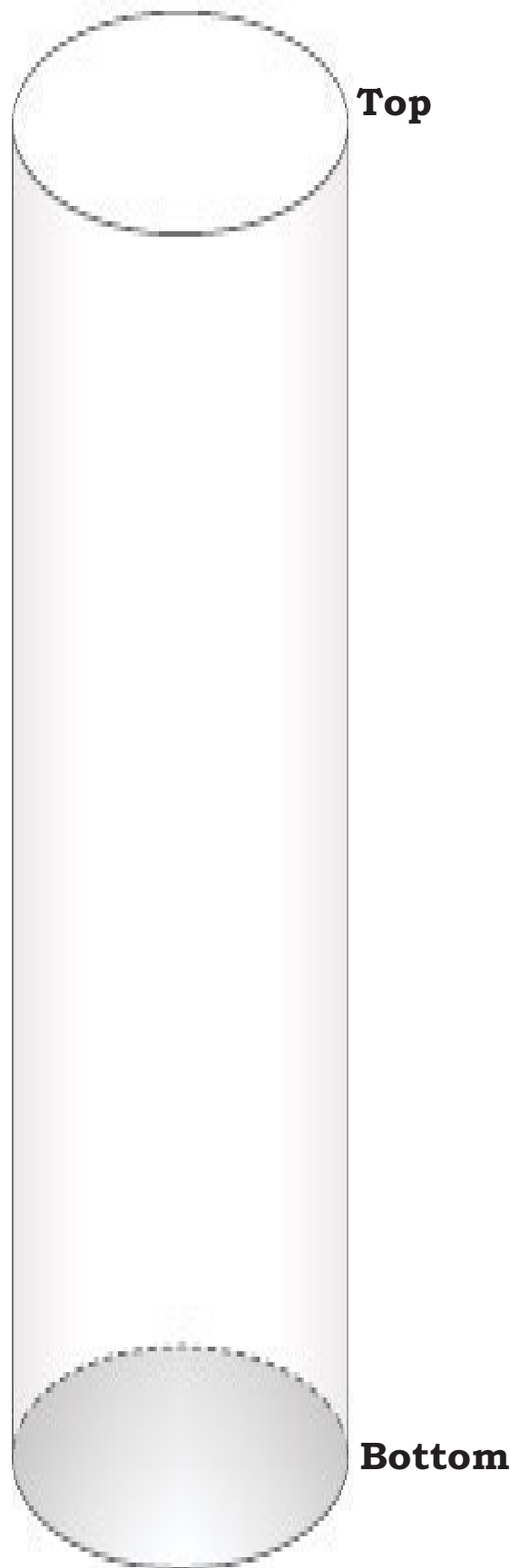
DATE = 9/21/16

TIME = 13:00

**SEDIMENT ELEVATION =
0.6ft NAVD 88**

CORE (RECOVERY) = 0.5ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE

THOMPSONS MARSH RESTORATION

CORE# = PA15

NOTE: MEASUREMENTS GIVEN IN FEET

DATE = 9/21/16

TIME = 12:45

**SEDIMENT ELEVATION =
0.7ft NAVD 88**

CORE (RECOVERY) = 0.5ft

STRATIGRAPHY NOTES:



NOTE: NOT TO SCALE