

# PUBLIC NOTICE

US Army Corps  
of Engineers  
New York District  
Jacob K. Javits Federal Building  
New York, N.Y. 10278-0090  
ATTN: Regulatory Branch

**In replying refer to:**

Public Notice Number: NAN-2017-00296-ESW  
Issue Date: October 12, 2018  
Expiration Date: November 11, 2018

To Whom It May Concern:

The New York District, Corps of Engineers has received an application for a Department of the Army permit pursuant to Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), and Section 404 of the Clean Water Act (33 U.S.C. 1344).

**APPLICANT:** Governor's Office of Storm Recovery  
25 Beaver Street, 5<sup>th</sup> Floor  
New York, New York 10004

**ACTIVITY:** Discharge of fill into, and the placement of structures within, waters of the United States to facilitate the construction and installation of a system of off-shore engineered breakwaters and restoration activities through the placement of sand along the shoreline

**WATERWAY:** Raritan Bay

**LOCATION:** Borough of Staten Island, Tottenville, Richmond County, New York.

A detailed description and plans of the applicant's activity are enclosed to assist in your review.

The decision whether to issue a permit will be based on an evaluation of the probable impact including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably may be expected to accrue from the proposal must be balanced against its reasonably foreseeable detriments. All factors which may be relevant to the proposal will be considered including the cumulative effects thereof; among those are conservation, economics, aesthetics, general environmental concerns, wetlands, historic properties, fish and wildlife values, flood hazards, floodplain values, land use, navigation, shoreline erosion and accretion, recreation, water supply and conservation, water quality, energy needs, safety, food and fiber production, mineral needs, considerations of property ownership and, in general, the needs and welfare of the people.

The Corps of Engineers is soliciting comments from the public; Federal, state, and local agencies and officials; Indian Tribes; and other interested parties in order to consider and evaluate the impacts of this proposed activity. Any comments received will be considered by the Corps of Engineers to determine whether to issue, modify, condition or deny a permit for this proposal. To make this decision, comments are used to assess impacts on endangered species, historic properties, water quality, general environmental effects, and the other public interest factors listed above. Comments are used in preparation of an Environmental Assessment and/or an Environmental Impact Statement pursuant to the National Environmental Policy Act. Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.

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ALL COMMENTS REGARDING THE PERMIT APPLICATION MUST BE PREPARED IN WRITING AND MAILED TO REACH THIS OFFICE BEFORE THE EXPIRATION DATE OF THIS NOTICE, otherwise, it will be presumed that there are no objections to the activity.

Comments submitted in response to this notice will be fully considered during the public interest review for this permit application. Comments provided will become part of the public record for this permit application. All written comments, including contact information, will be made a part of the administrative record, available to the public under the Freedom of Information Act. The Administrative Record, or portions thereof, may also be posted on a Corps of Engineers internet web site. Due to resource limitations, this office will normally not acknowledge the receipt of comments or respond to individual letters of comment.

Any person may request, in writing, before this public notice expires, that a public hearing be held to collect information necessary to consider this application. Requests for public hearings shall state, with particularity, the reasons why a public hearing should be held. It should be noted that information submitted by mail is considered just as carefully in the permit decision process and bears the same weight as that furnished at a public hearing.

The Corps of Engineers participated in a joint public hearing with the New York State Governor's Office for Storm Recovery on April 26, 2017.

The Lead Federal Agency, the United States Department of Housing and Development (HUD), has prepared a Final Environmental Impact Statement (FEIS) and Joint Record of Decision (ROD) for the proposed work. The FEIS and ROD is available for review at: <https://stormrecovery.ny.gov/environmental-docs>.

The Corps of Engineers will consider information in the FEIS and ROD prepared by the New York State Governor's Office of Storm Recovery during the review of the proposed work.

Our preliminary determination is that the activity for which authorization is sought herein is not likely to affect any Federally endangered or threatened species or their critical habitat. However, pursuant to Section 7 of the Endangered Species Act (16 U.S.C. 1531), the District Engineer is consulting with the appropriate Federal agency to determine the presence of and potential impacts to listed species in the project area or their critical habitat.

The Magnuson-Stevens Fishery Conservation and Management Act, as amended by the Sustainable Fisheries Act (Public Law 104-267), requires all Federal agencies to consult with the National Oceanic and Atmospheric Administration Fisheries Service (NOAA/FS) on all actions, or proposed actions, permitted, funded, or undertaken by the agency, that may adversely affect Essential Fish Habitat (EFH). The proposed work, fully described in the attached work description, could cause the disruption of habitat for various life stages of some EFH-designated species. Further consultation with NOAA/FS regarding EFH impacts and conservation recommendations is being conducted and will be concluded prior to the final decision.

Based upon a review of the latest published version of the National Register of Historic Places, there are several known sites eligible for, or included in, the Register within the permit area. These sites include the Conference House/Christopher Billopp House, the Henry Hogg Biddle House, the Sam and Hannah Wood House, the James M. Rutan House, and the Rutan-Beckett House. Presently unknown archeological, scientific, prehistorical, or historical data may be lost by work accomplished under the required permit.

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Reviews of activities pursuant to Section 404 of the Clean Water Act will include application of the guidelines promulgated by the Administrator, U.S. Environmental Protection Agency, under authority of Section 404 (b) of the Clean Water Act and the applicant will obtain a water quality certificate or waiver from the appropriate state agency in accordance with Section 401 of the Clean Water Act prior to a permit decision.

Pursuant to Section 307 (c) of the Coastal Zone Management Act of 1972 as amended [16 U.S.C. 1456 (c)], for activities under consideration that are located within the coastal zone of a state which has a federally approved coastal zone management program, the applicant has certified in the permit application that the activity complies with, and will be conducted in a manner that is consistent with, the approved state coastal zone management program. By this public notice, we are requesting the state's concurrence with, objection to, or waiver of the applicant's certification. No permit decision will be made until one of these actions occur. For activities within the coastal zone of New York State, the applicant's certification and accompanying information is available from the Consistency Coordinator, New York State Department of State, Division of Coastal Resources and Waterfront Revitalization, Coastal Zone Management Program, One Commerce Plaza, 99 Washington Avenue, Albany, New York 12231, Telephone (518) 474-6000. Comments regarding the applicant's certification, and copies of any letters to this office commenting upon this proposal, should be so addressed.

In addition to any required water quality certificate and coastal zone management program concurrence, the applicant has obtained or requested the following governmental authorization for the activity under consideration:

U.S. Department of Housing and Urban Development  
U.S. Environmental Protection Agency;  
U.S. Department of Commerce, National Marine Fisheries Service;  
U.S. Fish and Wildlife Service; and  
U.S. Coast Guard.

It is requested that you communicate the foregoing information concerning the activity to any persons known by you to be interested and who did not receive a copy of this notice. If you have any questions concerning this application, you may contact this office at (917) 790-8618 and ask for Amanda Regan.

For more information on New York District Corps of Engineers programs, visit our website at <http://www.nan.usace.army.mil>.



Stephan A. Ryba  
Chief, Regulatory Branch

Enclosures

### WORK DESCRIPTION

The permit applicant, the Governor's Office of Storm Recovery, has requested Department of the Army authorization to discharge fill into and place structures within navigable and other waters of the United States to facilitate work to increase coastal resiliency along the Tottenville shoreline and enhance ecosystem and shoreline access use. The project site is located in the Borough of Staten Island (Tottenville), Richmond County, New York.

The applicant has stated that the proposed project would consist of two components, the Living Breakwaters Project, and the Tottenville Shoreline Project and would consist of the following:

**The Living Breakwaters:** To reduce wave energy at the shoreline, prevent or reverse shoreline erosion and create a hard/structured marine habitat, approximately 151,780 cubic yards of material (rock, bio-enhancing concrete units, and geotextile) would be discharged into approximately 11.4 acres of waters of the United States to facilitate the construction and installation of nine (9) offshore breakwater structures. Three (3) types of breakwater structures are proposed (Type A, B, and C) and would be placed between 790 and 1,170 feet offshore, in depths of water ranging from -2 to -10 feet below the plane of Mean Low Water, North American Vertical Datum, 1988 (NAVD, 88), with a total length of approximately 3,200 linear feet. The Type B and C breakwater structures would consist of a flat main breakwater crest, and the Type A breakwater structures would have crenelated crests. Seven (7) of the breakwaters would incorporate rocky protrusions (reef ridges) and narrow spaces between them (reef streets) on the ocean facing side to increase the diversity of available habitats within the intertidal and subtidal zones of the breakwater structures.

Construction of the breakwaters would generally consist of placing bedding stone atop geotextile fabric, followed by core stone, riprap stone, and stone and bio-enhancing concrete armor units. The proposed breakwaters would include: two (2) 51-foot-wide by 450-foot-long (including 64-foot-long reef ridges) "Type A" breakwaters, with a breakwater crest elevation of +5 (NAVD, 88); five (5) 95- to 159-foot-wide by 300-foot-long (including 64-foot-long reef ridges on four of the segments) "Type B" breakwaters with a breakwater crest elevation of +14 (NAVD, 88); and two (2) 103- to 180-foot-wide by 350-foot-long to 450-foot-long (including 65-foot-long reef ridges on one segment) "Type C" breakwaters, with a breakwater crest elevation of +14 (NAVD, 88). The distance of the breakwaters from the New York and New Jersey Federal Channel (Ward Point Bend, East) within Raritan Bay would range from approximately 736 feet to 1,736 feet.

**Tottenville Shoreline:** Shoreline activities would include the discharge of approximately 17,404 cubic yards of sand along approximately 806 linear feet of shoreline beach area (approximately 3.1 acres), 12,341 cubic yards and 2.7 acres of which would be below the plane of Spring High Water (SHW) elevation +2.42 feet (NAVD, 88). The sand placement would restore the beach to a +5 foot elevation.

The shoreline activities would also include the discharge of approximately 1,220 cubic yards of fill material into 0.14 acres of vegetated wetlands to facilitate the construction and installation of a 630 square foot portion of a 70 to 90 foot wide hybrid dune/revetment and a 5,640 square foot portion of a 46 foot wide eco-revetment. The applicant would remove a 595-square-foot sand bridge (90 cubic yards) from the wetland that was previously discharged without permit authorization.

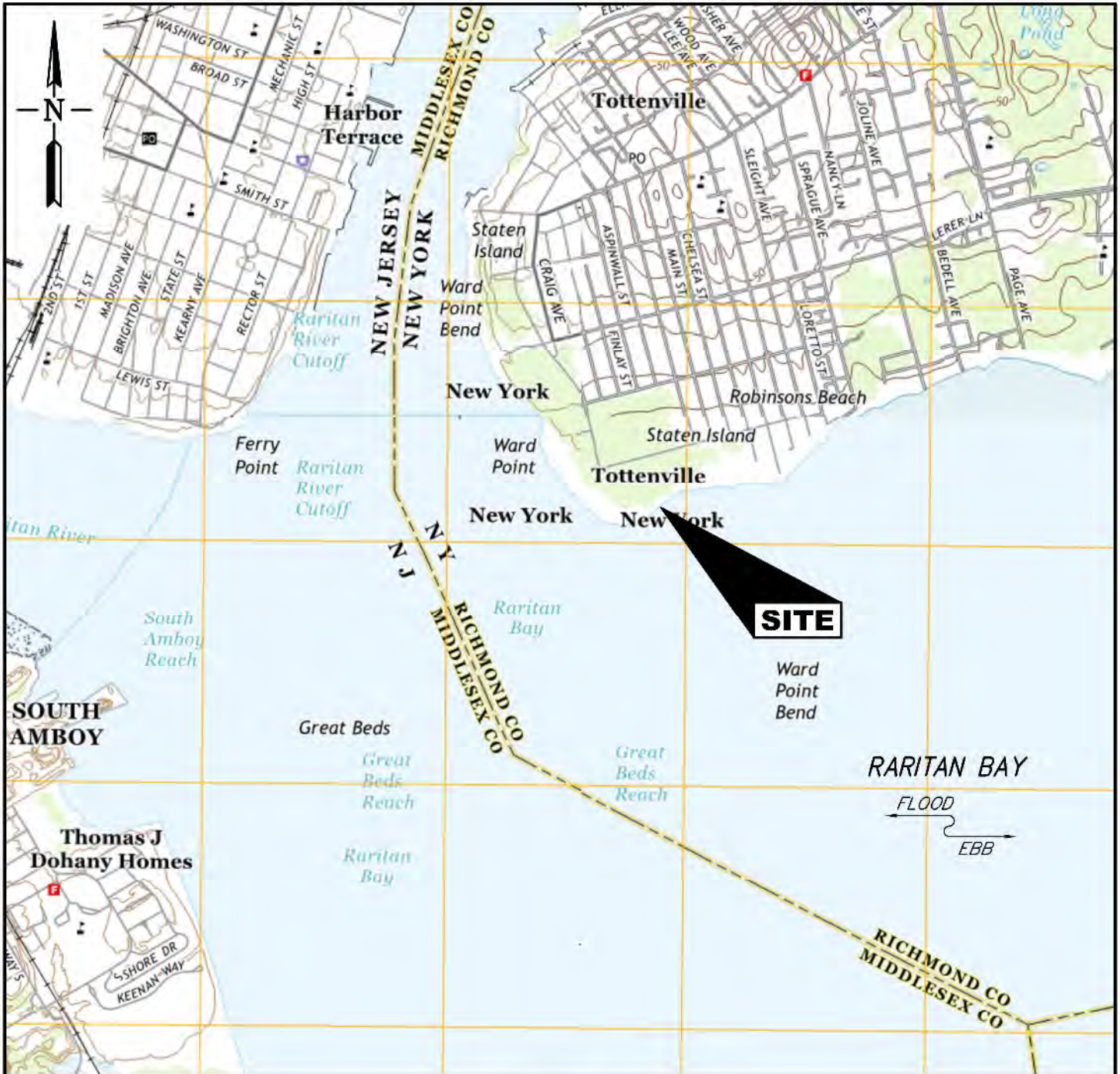
The estimated duration of the proposed work would be 17 months with estimated completion by late 2020.

The applicant has stated that they have avoided, minimized and mitigated for impacts to waters of the United States, and wetlands associated with the shoreline restoration activities through enhancement of the 0.8-acre delineated tidal wetland and purchase of mitigation credits from the

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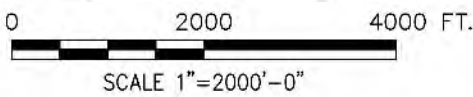
Saw Mill Creek Mitigation Bank as necessary for the 0.14 acres of impacts to the tidal wetland; and the purchase of mitigation credits from the Saw Mill Creek Mitigation Bank at a 1:1 mitigation ratio for impacts to 3.6 acres of waters of the United States and associated habitat that would no longer be available to aquatic organisms due to the portion of the breakwater structures above MHW. The portion of the breakwaters below MHW within the 11.4-acre footprint will result in the conversion of sand/gravel bottom habitat and approximately 115,990 cubic yards of open water habitat to complex hard structured habitat. By design, the breakwater system will incorporate ecological enhancements expected to benefit the target species groups identified for the project. The high-relief rocky habitat provided by the breakwaters will be designed to attract and retain habitat-creating benthic invertebrates and shellfish, including bivalves. The 3.1-acre area of sand placement along the shoreline will restore the historic shoreline.

The applicant stated purpose of this project is to increase coastal resiliency along the Tottenville shoreline by providing coastal protection and ecological enhancement to reduce wave action and coastal erosion.



TAKEN FROM MULTIPLE USGS MAPS:  
 ARTHUR KILL, PERTH AMBOY, SOUTH  
 AMBOY, & KEYPORT QUADRANGLE  
 NEW JERSEY-NEW YORK  
 7.5 MINUTE SERIES

**VICINITY MAP**

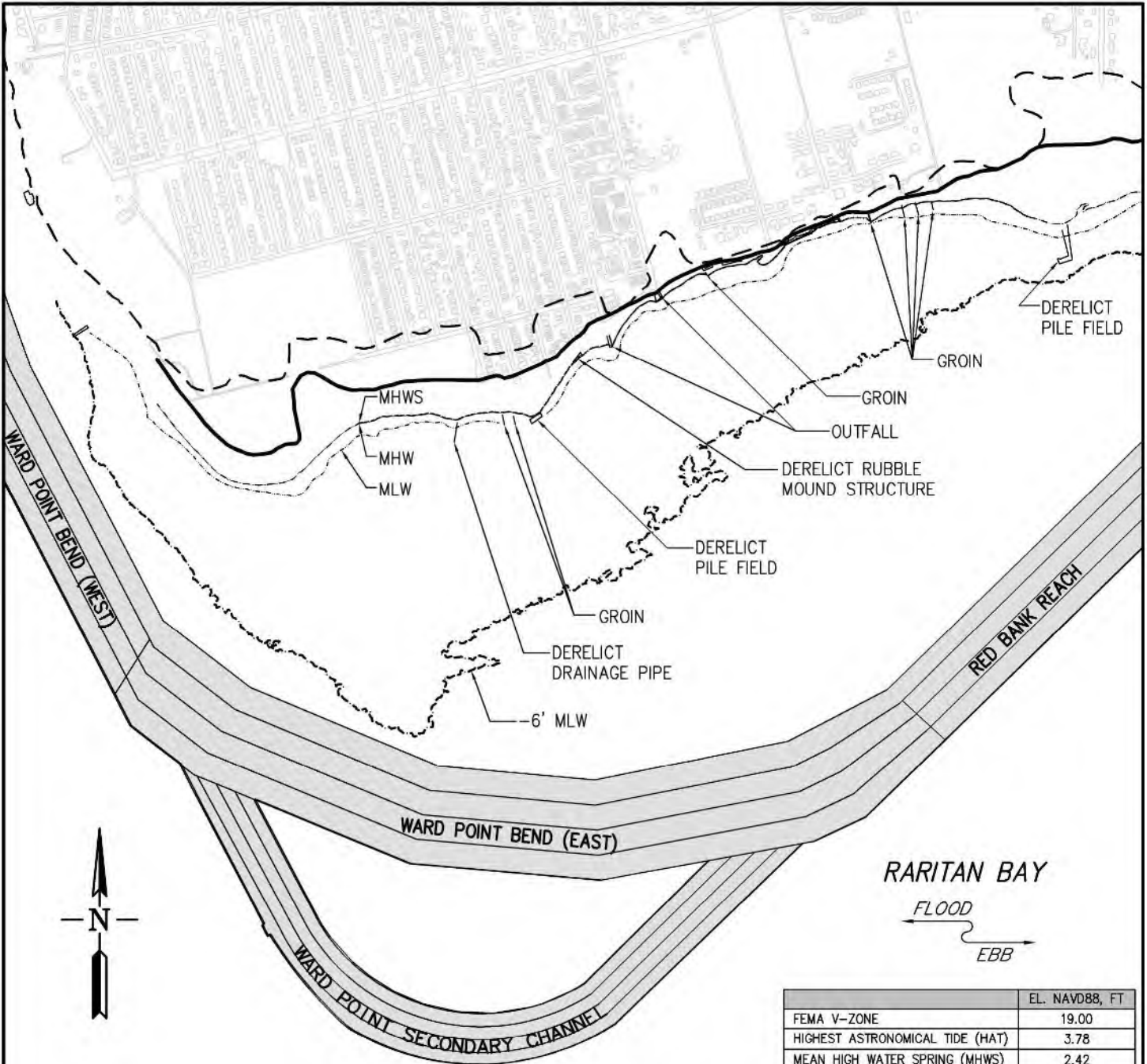


FOR PERMIT USE ONLY  
 NOT FOR CONSTRUCTION

DATUM: N.A.V.D. 88  
 APPLICATION BY: GOVERNOR'S  
 OFFICE OF STORM RECOVERY  
 APPLICATION NO.:  
 AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
 WARD POINT BEND, RARITAN BAY  
 TOTTEVILLE, STATEN ISLAND  
 COUNTY OF RICHMOND  
 STATE OF NEW YORK  
 DATE: 10/30/2017 SHEET 1 OF 25

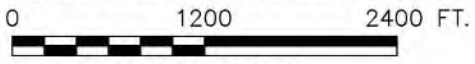




**EXISTING OVERALL SITE PLAN**

**LEGEND**

- MEAN HIGH WATER SPRING
- MEAN HIGH WATER
- MEAN LOW WATER
- LiMWA
- -6' MLW (NAVD88 EL. -8.62)
- FEMA V-ZONE
- FEDERAL NAVIGATION CHANNEL



SCALE 1"=1200'-0"

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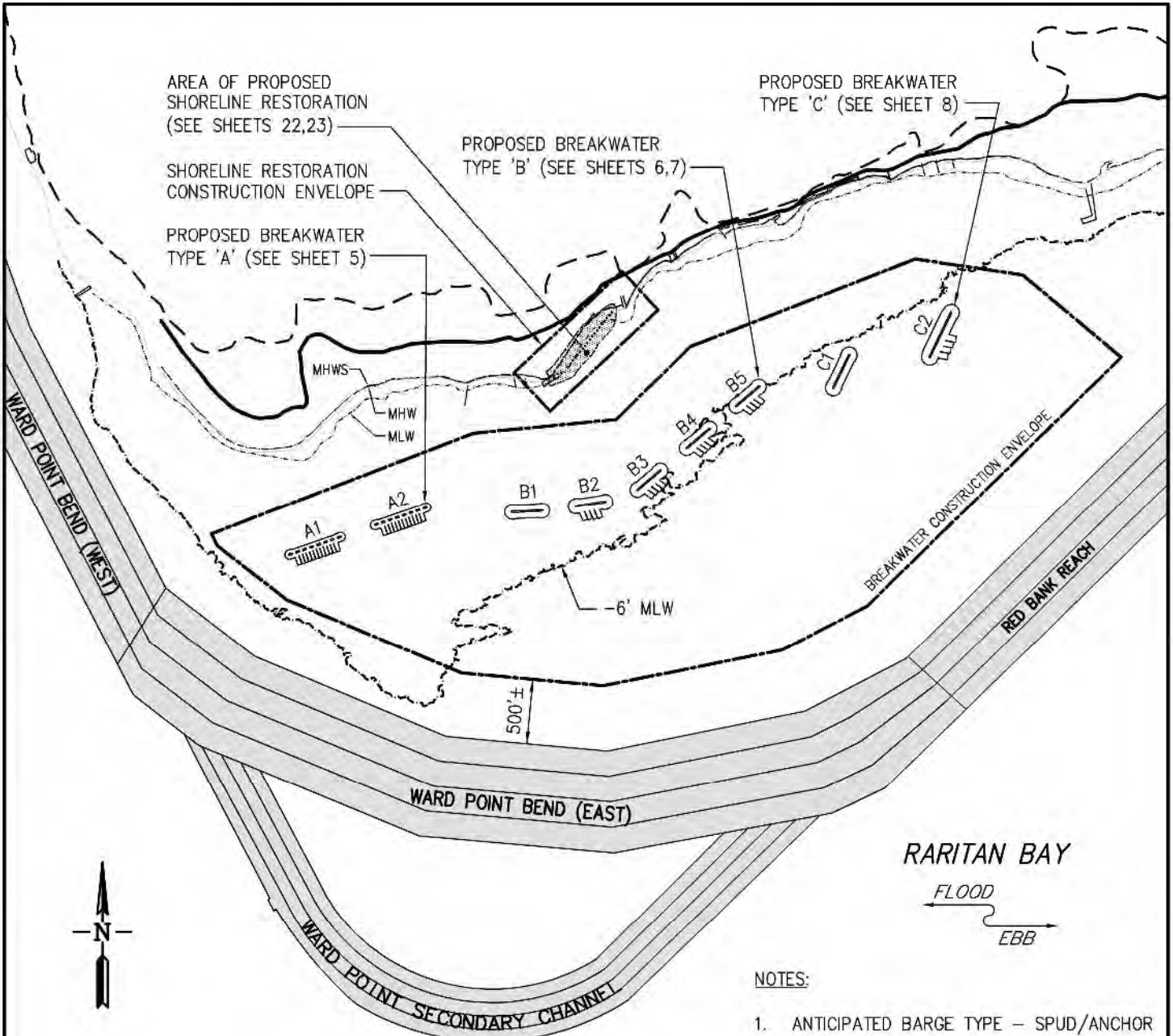
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 APPLICATION NO.:  
 AGENT: COM

**PROPOSED CONSTRUCTION OF LIVING BREAKWATERS**

WARD POINT BEND, RARITAN BAY  
 TOTTEVILLE, STATEN ISLAND  
 COUNTY OF RICHMOND  
 STATE OF NEW YORK

DATE: 10/30/2017

SHEET 2 OF 25



**PROPOSED OVERALL SITE PLAN**

**LEGEND**

- MEAN HIGH WATER SPRING
- \_\_\_\_\_ MEAN HIGH WATER
- NAVD88 EL. 0.0'
- \_\_\_\_\_ MEAN LOW WATER
- -6' MLW (NAVD88 EL. -8.62)
- \_\_\_\_\_ BREAKWATER CONSTRUCTION ENVELOPE
- LIMWA
- \_\_\_\_\_ FEMA V-ZONE
- 0 1200 2400 FT.
- SCALE 1"=1200'-0"
- \_\_\_\_\_ FEDERAL NAVIGATION CHANNEL
- \_\_\_\_\_ PROPOSED SHORELINE RESTORATION
- CONSTRUCTION ENVELOPE

**NOTES:**

1. ANTICIPATED BARGE TYPE – SPUD/ANCHOR BARGE.
2. ANTICIPATED NUMBER OF OPERATING BARGES – 4 WORK AND 4 MATERIAL BARGES.
3. MINIMUM UNDERKEEL CLEARANCE AT MLW – 2FT.
4. ANTICIPATED MAX. BARGE STATIONARY TIME – 1 WEEK.
5. MINIMUM DISTANCE FROM BREAKWATER CONSTRUCTION ENVELOPE TO FEDERAL NAVIGATION CHANNEL IS APPROXIMATELY 500 FEET.

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WARD POINT BEND, RARITAN BAY  
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BREAKWATER	TOTAL LENGTH AT EL. 0 NAVD88 (FT)	TOTAL FOOTPRINT (FT <sup>2</sup> )	TOTAL FOOTPRINT (ACRES)	FOOTPRINT SHALLOWER THAN -6' MLW (FT <sup>2</sup> )	FOOTPRINT SHALLOWER THAN -6' MLW (ACRES)	TOTAL VOLUME (FT <sup>3</sup> )	TOTAL VOLUME BELOW MHW (FT <sup>3</sup> )	TOTAL VOLUME BELOW MHWS (FT <sup>3</sup> )	TOTAL VOLUME BELOW MHW (YD <sup>3</sup> )	TOTAL VOLUME BELOW MHWS (YD <sup>3</sup> )	TOTAL VOLUME BELOW MHWS (YD <sup>3</sup> )
A.1	450	59,600	1.4	59,600	1.4	269,000	256,700	254,200	9,420	9,970	9,510
A.2	450	59,600	1.4	59,600	1.4	269,000	256,700	254,200	9,420	9,970	9,510
B.1	300	39,000	0.9	39,000	0.9	395,000	280,200	274,100	10,160	14,630	10,380
B.2	300	51,500	1.2	51,500	1.2	440,400	325,500	319,500	11,840	16,310	12,060
B.3	300	51,500	1.2	48,900	1.1	440,400	325,500	319,500	11,840	16,310	12,060
B.4	300	51,500	1.2	34,000	0.8	440,400	325,500	319,500	11,840	16,310	12,060
B.5	300	51,500	1.2	16,500	0.4	440,400	325,500	319,500	11,840	16,310	12,060
C.1	350	49,000	1.1	0	0.0	546,000	409,400	402,300	14,900	20,230	15,170
C.2	450	82,700	1.9	0	0.0	856,900	676,800	667,500	24,730	31,740	25,070
TOTAL	3,200	495,900	11.4	309,100	7.1	4,097,500	3,181,800	3,130,300	115,990	151,780	117,880

**BREAKWATER TYPES AND QUANTITIES**

**NOTES:**

1. PROPOSED SHORELINE RESTORATION QUANTITIES ARE BASED ON CONSTRUCTION SHORELINE RESTORATION PROFILE.
2. ALL VALUES INCLUDE AN ADDITIONAL 10% TO ACCOUNT FOR UNCERTAINTY.
3. SHORELINE RESTORATION AREAS ARE EXISTING AREAS IMPACTED BY THE CONSTRUCTION ACTIVITY.

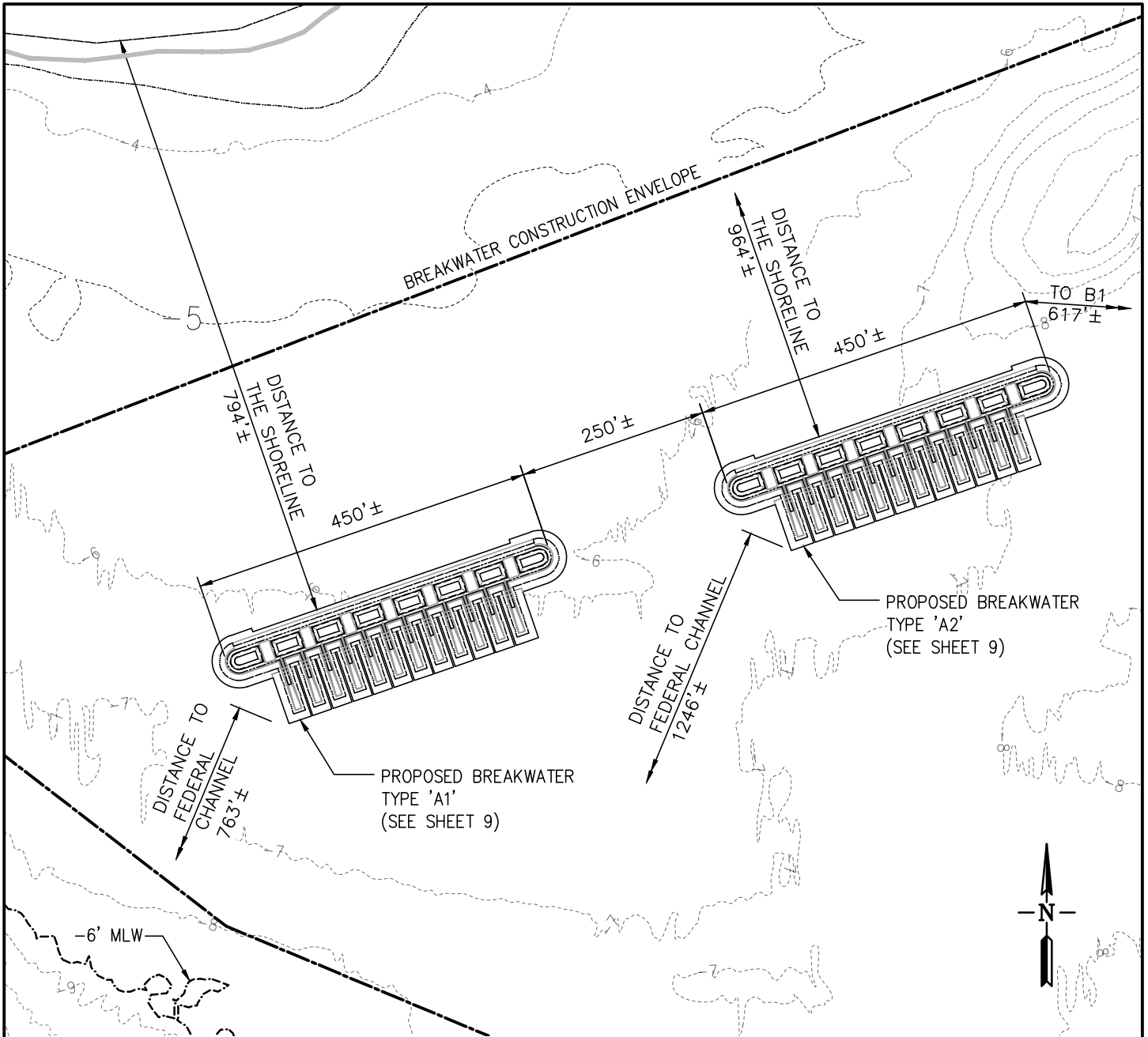
	AVERAGE CROSS SECTIONAL AREA (FT <sup>2</sup> /FT)	PLAN AREA (FT <sup>2</sup> )	LENGTH (FT)	VOLUME (FT <sup>3</sup> )	VOLUME (YD <sup>3</sup> )
TOTAL SHORELINE RESTORATION CONSIDERED	169	136,100	806	469,900	17,404
TOTAL SHORELINE RESTORATION BELOW MHW	142	114,500	806	314,200	11,637
TOTAL SHORELINE RESTORATION BELOW MHWS	146	117,700	806	333,200	12,341

**PROPOSED SHORELINE RESTORATION QUANTITIES**

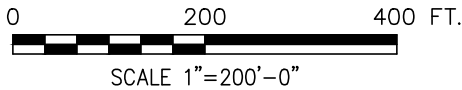
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APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK  
DATE: 10/30/2017 SHEET 4 OF 25



**PROPOSED PARTIAL SITE PLAN**



**LEGEND**

- MEAN HIGH WATER SPRING
- MEAN HIGH WATER
- NAVD88 EL. 0.0'
- MEAN LOW WATER
- -6' MLW (NAVD88 EL. -8.62)
- BREAKWATER CONSTRUCTION ENVELOPE

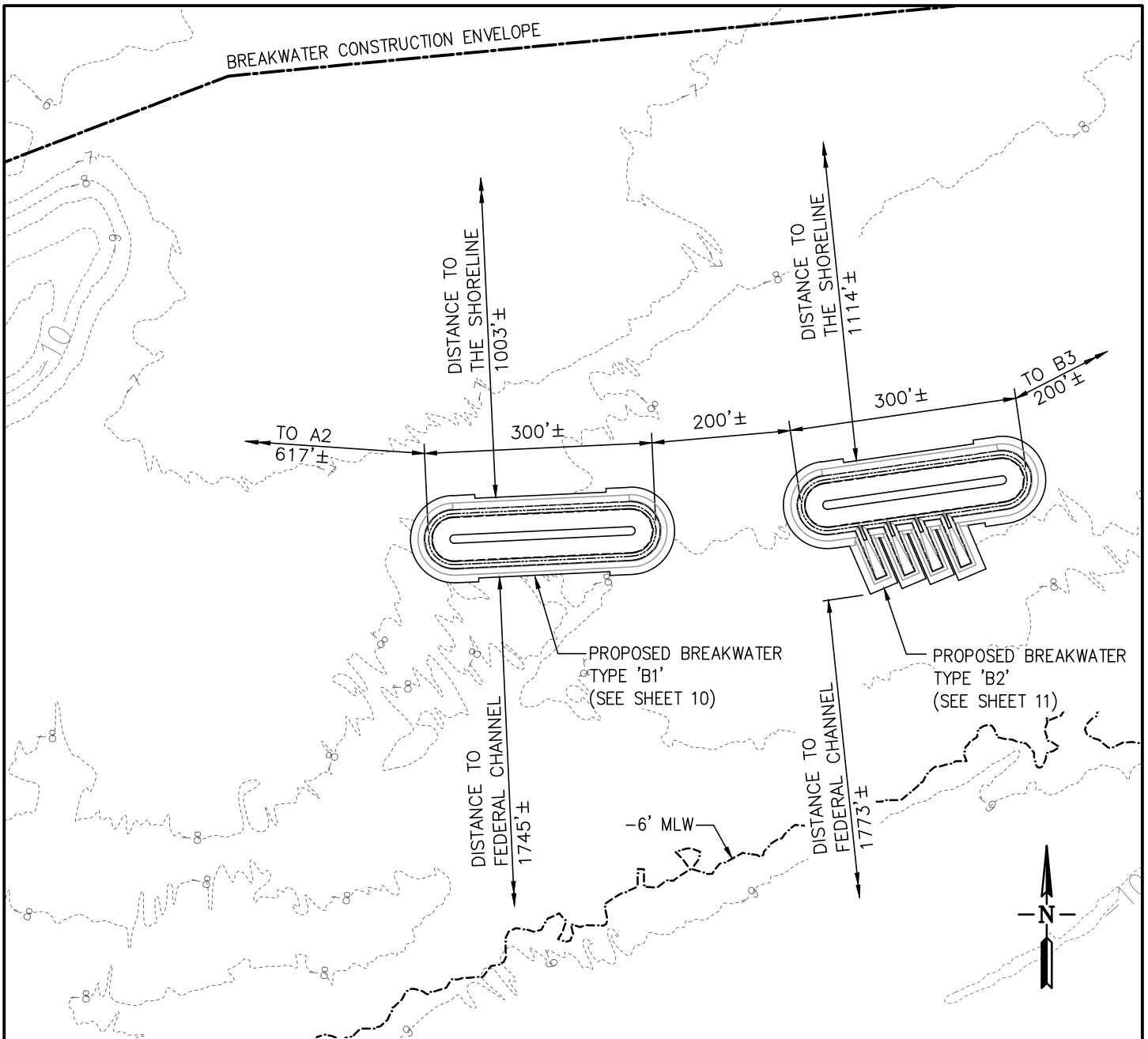
**NOTES:**

1. MINIMUM DISTANCE FROM BREAKWATER CONSTRUCTION ENVELOPE TO FEDERAL NAVIGATION CHANNEL IS APPROXIMATELY 500 FEET.
2. SHORELINE DISTANCE IS MEASURE TO MHW.

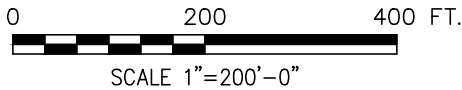
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**PROPOSED PARTIAL SITE PLAN**



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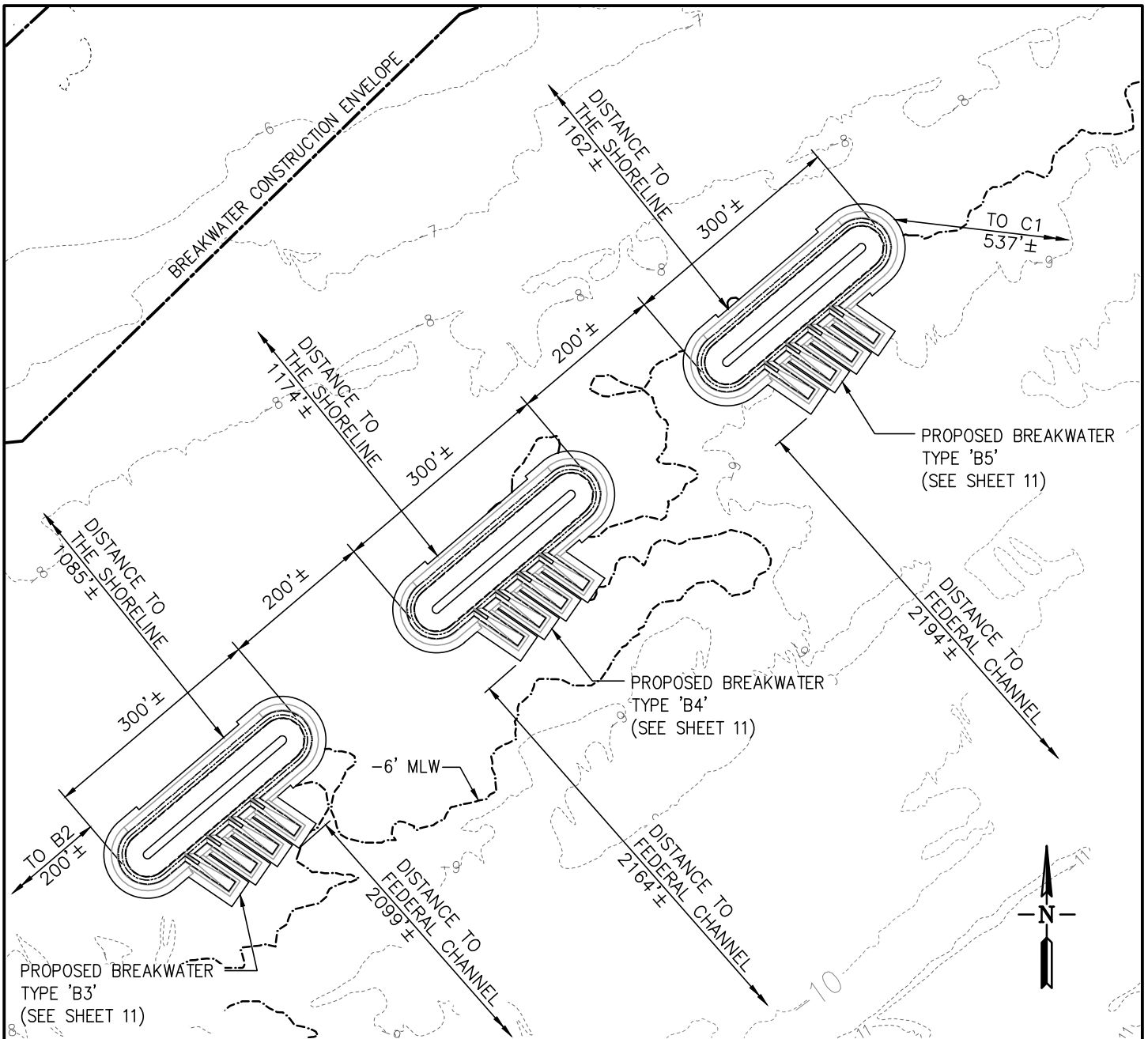
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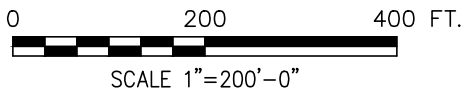
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**PROPOSED PARTIAL SITE PLAN**



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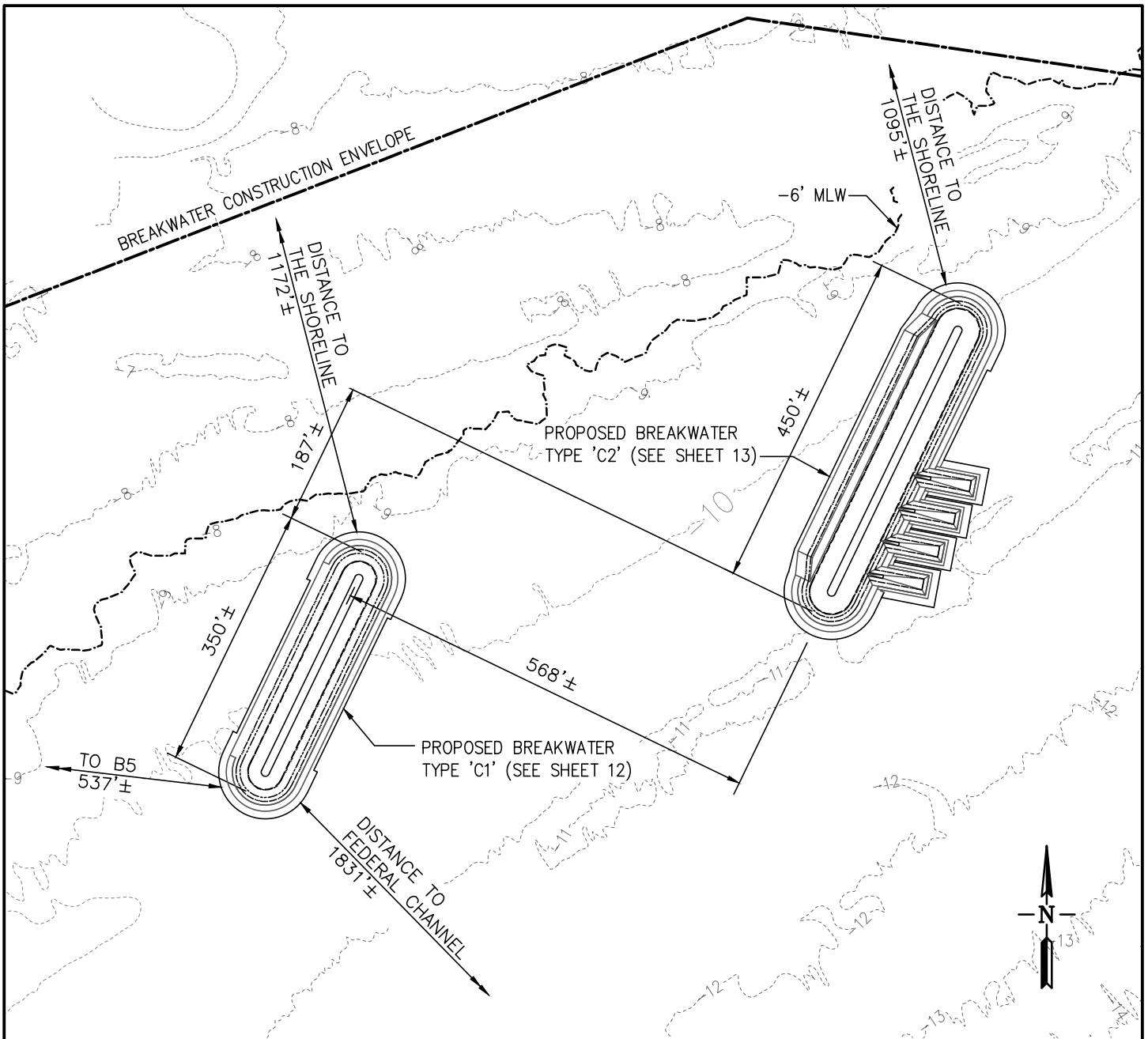
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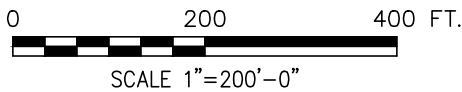
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**PROPOSED PARTIAL SITE PLAN**



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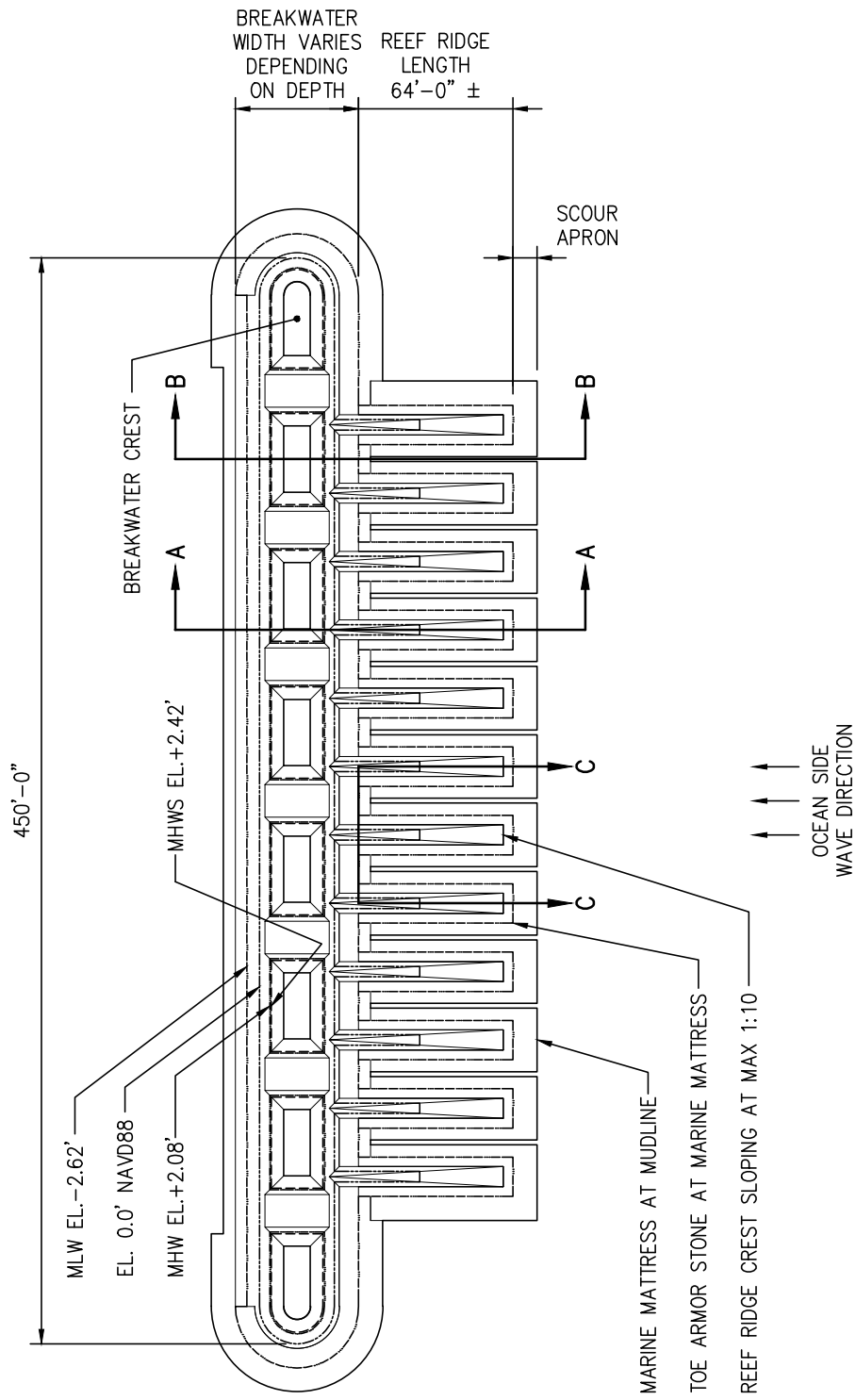
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 STATE OF NEW YORK  
 DATE: 10/30/2017 SHEET 8 OF 25





**PROPOSED BREAKWATER PLAN -- TYPE 'A1-A2'**

SCALE: N.T.S.

**LEGEND**

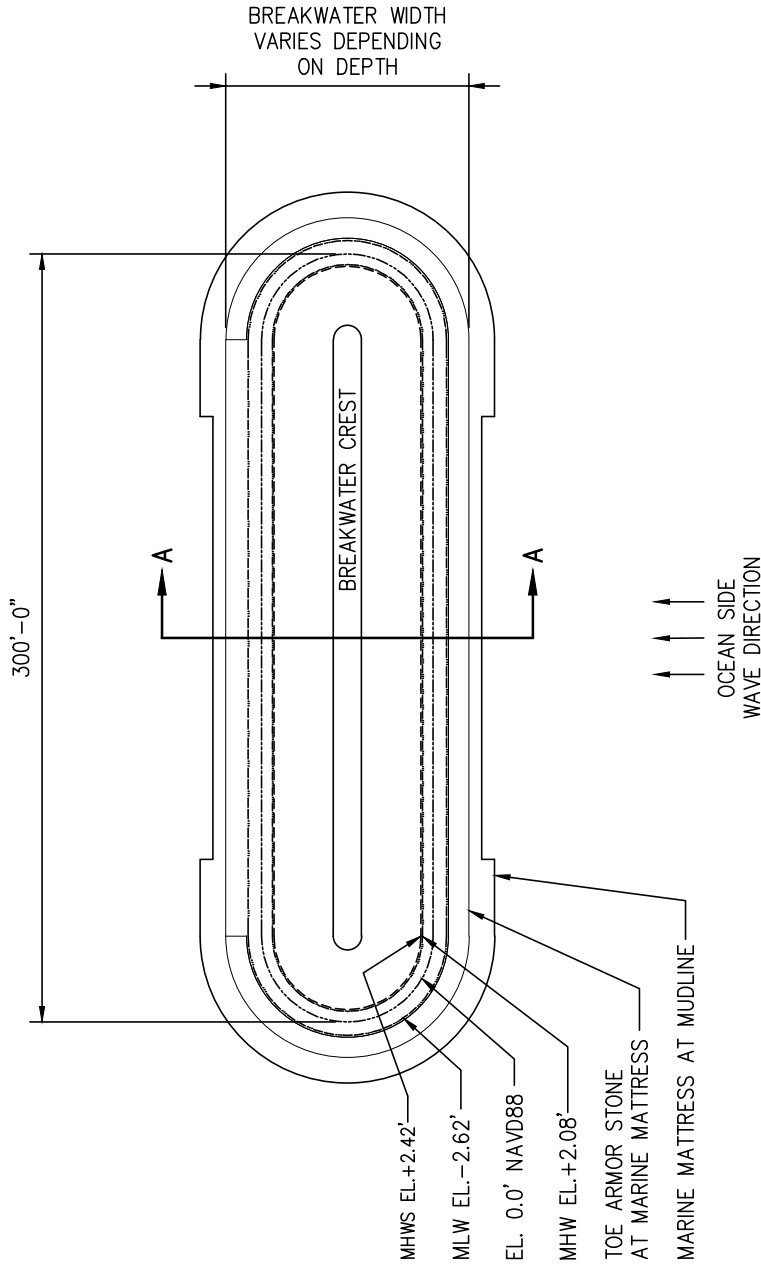
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PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK

DATE: 10/30/2017 SHEET 9 OF 25



**PROPOSED BREAKWATER PLAN -- TYPE 'B1'**

SCALE: N.T.S.

**LEGEND**

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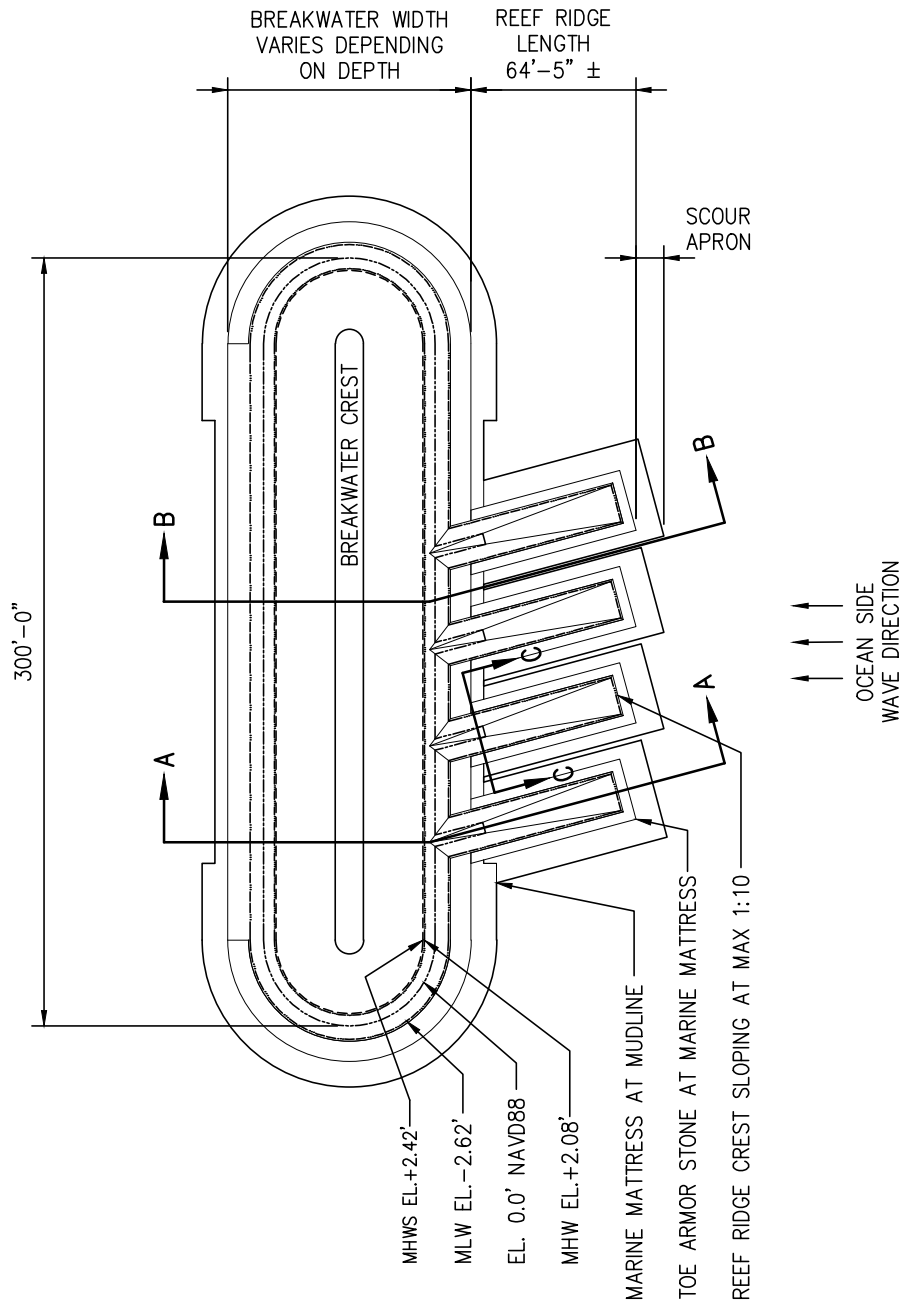
DATUM: N.A.V.D. 88  
 APPLICATION BY: GOVERNOR'S  
 OFFICE OF STORM RECOVERY  
 APPLICATION NO.:  
 AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS

WARD POINT BEND, RARITAN BAY  
 TOTTEVILLE, STATEN ISLAND  
 COUNTY OF RICHMOND  
 STATE OF NEW YORK

DATE: 10/30/2017

SHEET 10 OF 25



**PROPOSED BREAKWATER PLAN -- TYPE 'B2-B5'**

SCALE: N.T.S.

**LEGEND**

- MEAN HIGH WATER SPRING
- MEAN HIGH WATER
- NAVD88 EL. 0.0'
- MEAN LOW WATER

FOR PERMIT USE ONLY  
NOT FOR CONSTRUCTION

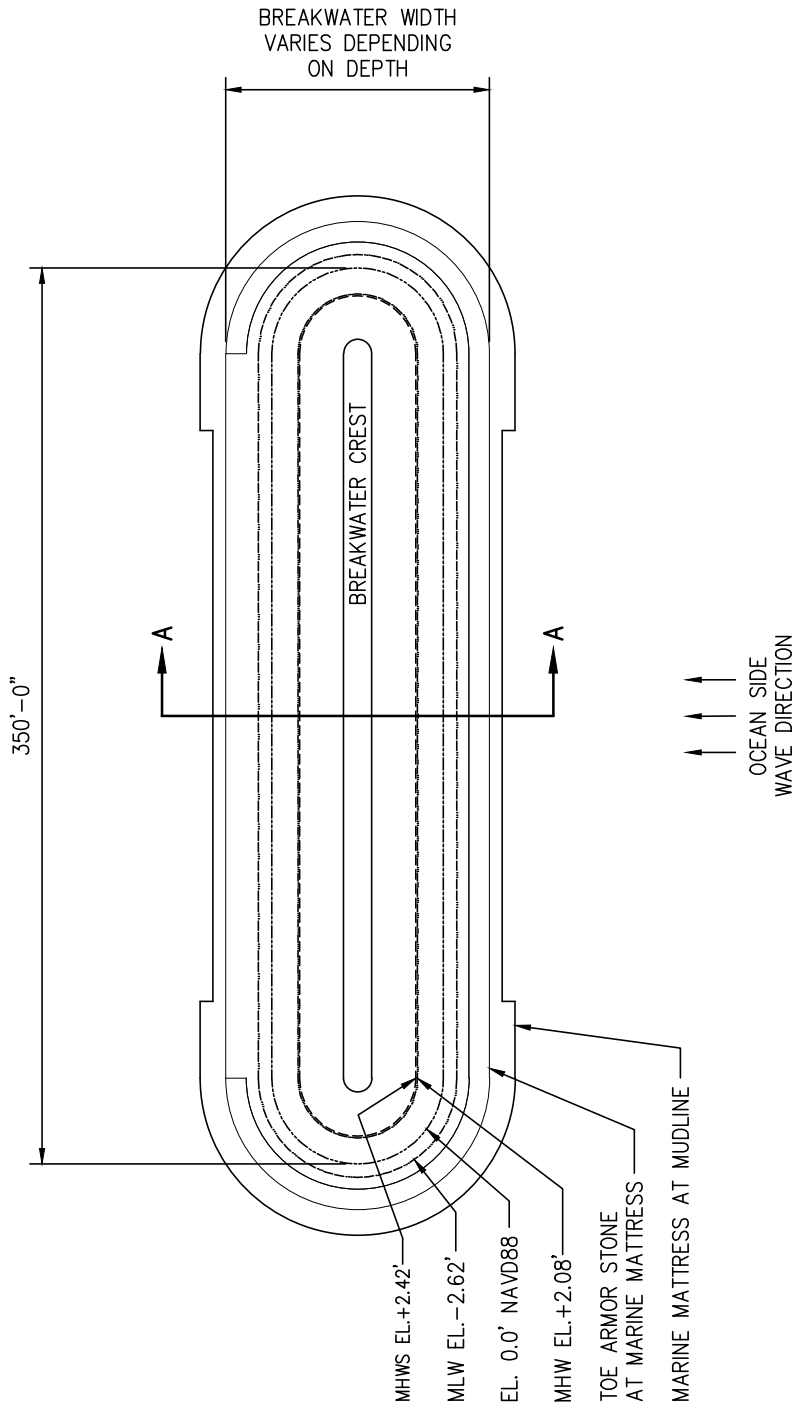
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APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS

WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK

DATE: 10/30/2017

SHEET 11 OF 25



**PROPOSED BREAKWATER PLAN - TYPE 'C1'**

SCALE: N.T.S.

**LEGEND**

- MEAN HIGH WATER SPRING
- MEAN HIGH WATER
- NAVD88 EL. 0.0'
- MEAN LOW WATER

FOR PERMIT USE ONLY  
NOT FOR CONSTRUCTION

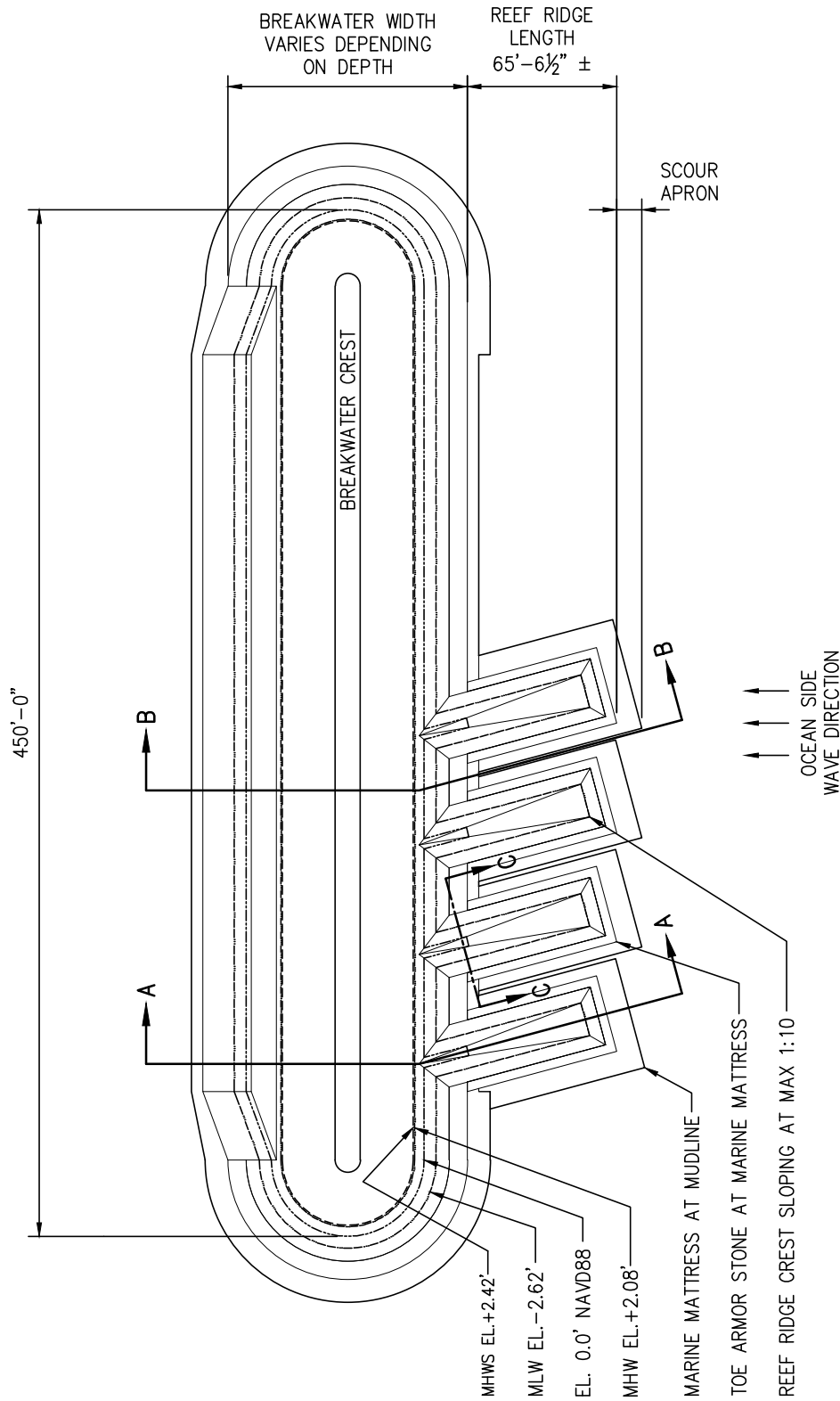
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APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS

WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK

DATE: 10/30/2017

SHEET 12 OF 25



**PROPOSED BREAKWATER PLAN -- TYPE 'C2'**  
SCALE: N.T.S.

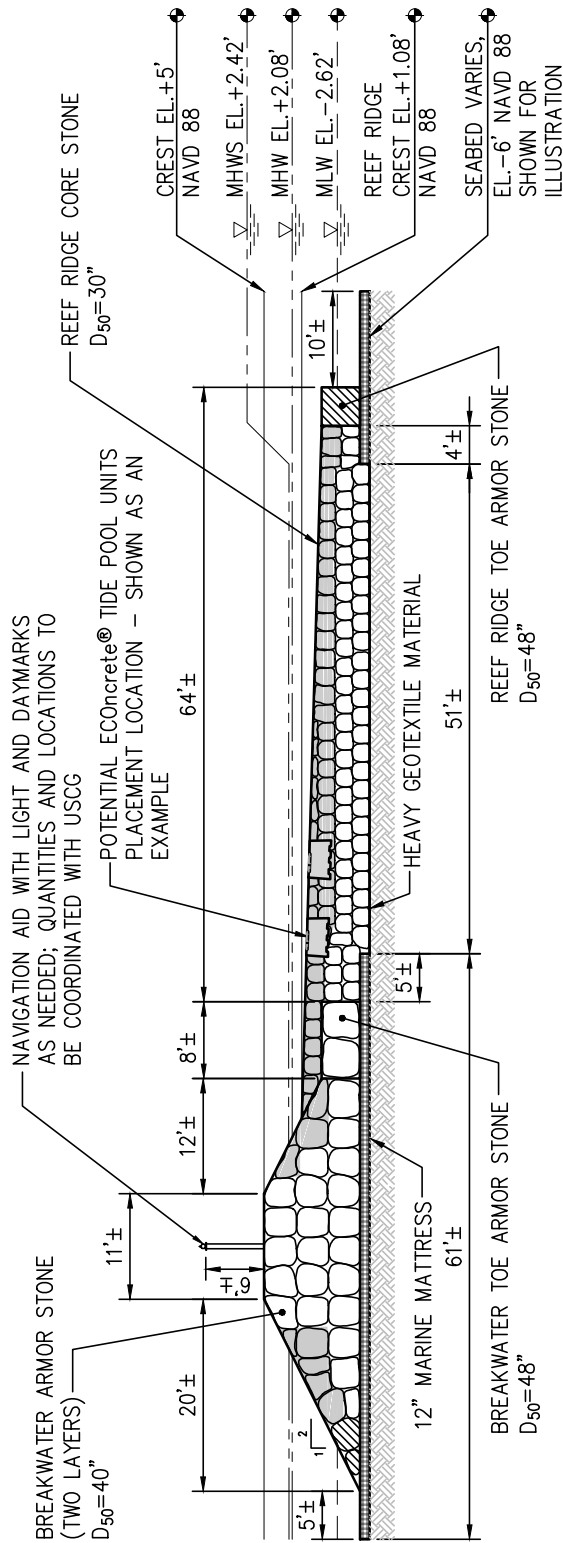
- LEGEND**
- MEAN HIGH WATER SPRING
  - MEAN HIGH WATER
  - NAVD88 EL. 0.0'
  - MEAN LOW WATER

FOR PERMIT USE ONLY  
NOT FOR CONSTRUCTION

DATUM: N.A.V.D. 88  
APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK  
DATE: 10/30/2017 SHEET 13 OF 25





**BREAKWATER TYPE 'A1-A2' PROPOSED SECTION A-A**

LEGEND	
	POTENTIAL LOCATION FOR EConcrete® ARMOR UNITS
	POTENTIAL LOCATION FOR EConcrete® TIDE POOL UNITS

**NOTES:**

- WHERE POTENTIAL EConcrete® ARMOR UNITS ARE INDICATED, ARMOR STONE WILL BE REPLACED WITH EConcrete® ARMOR UNITS AT A RATE OF 30% IN ALL OTHER LOCATIONS, ARMOR AND TOE UNITS WILL BE STONE OF THE SIZE INDICATED.
- REFER TO SHEET 8 FOR BREAKWATER VOLUME SUMMARY.
- ALL VALUES INCLUDE AN ADDITIONAL 10% TO ACCOUNT FOR UNCERTAINTY.

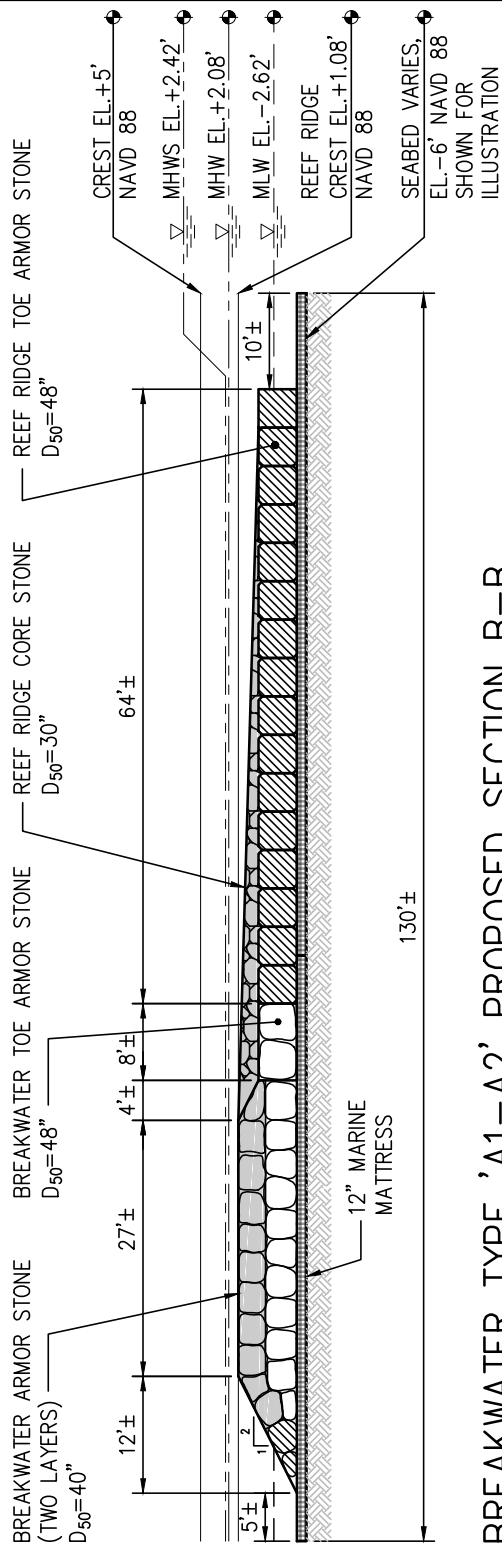


FOR PERMIT USE ONLY  
NOT FOR CONSTRUCTION

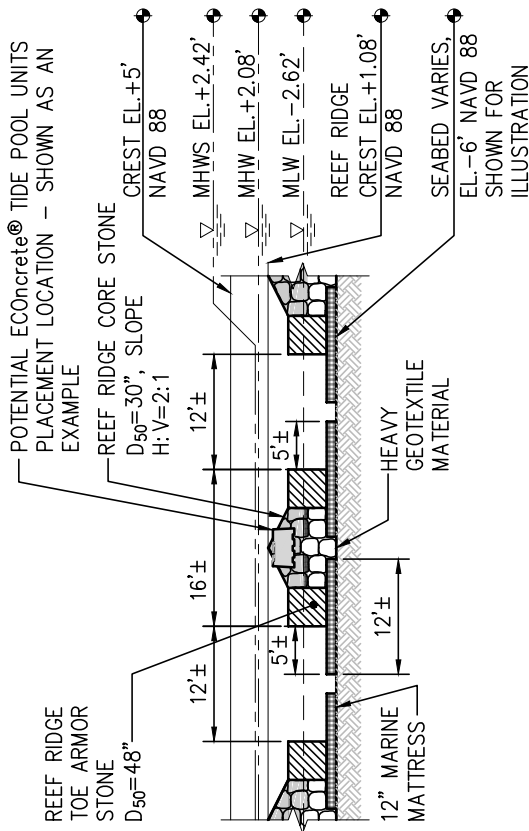
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APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK

DATE: 10/30/2017 SHEET 14 OF 25



**BREAKWATER TYPE 'A1-A2' PROPOSED SECTION B-B**

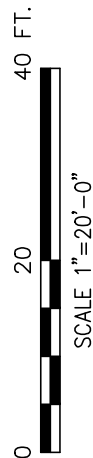


**BREAKWATER TYPE 'A1-A2' PROPOSED SECTION C-C**

LEGEND	
	POTENTIAL LOCATION FOR EConcrete® ARMOR UNITS
	POTENTIAL LOCATION FOR EConcrete® TIDE POOL UNITS

**NOTES:**

- WHERE POTENTIAL EConcrete® ARMOR UNITS ARE INDICATED, ARMOR STONE WILL BE REPLACED WITH EConcrete® ARMOR UNITS AT A RATE OF 30% IN ALL OTHER LOCATIONS, ARMOR AND TOE UNITS WILL BE STONE OF THE SIZE INDICATED.
- REFER TO SHEET 8 FOR BREAKWATER VOLUME SUMMARY.



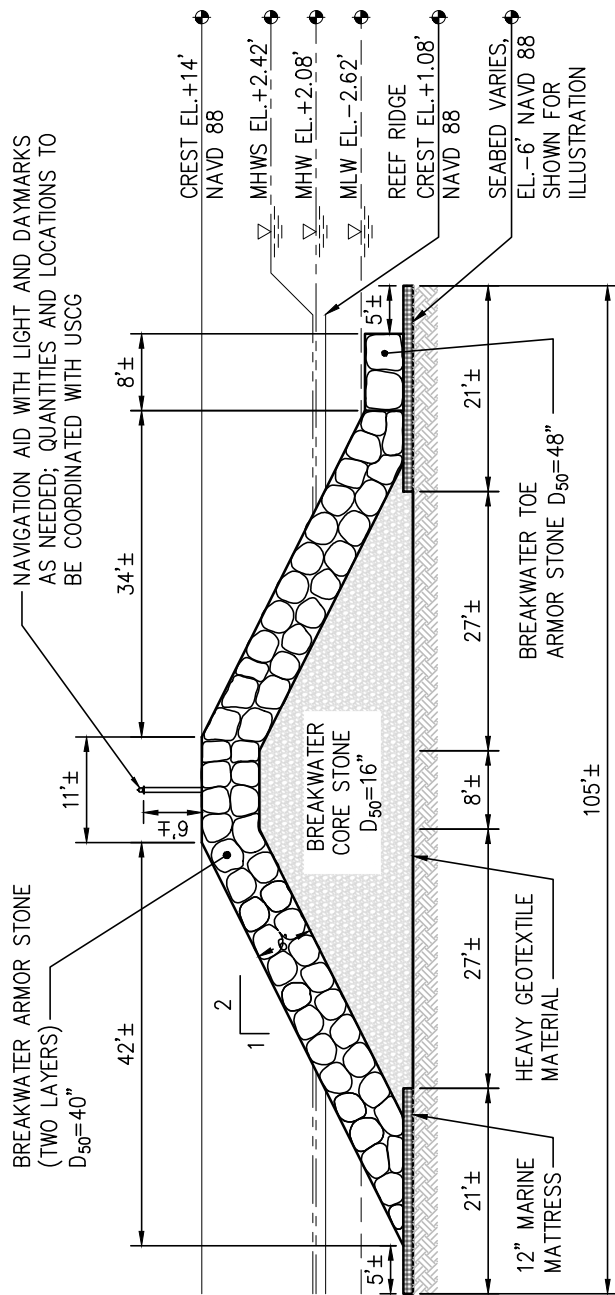
**FOR PERMIT USE ONLY  
NOT FOR CONSTRUCTION**

DATUM: N.A.V.D. 88  
 APPLICATION BY: GOVERNOR'S  
 OFFICE OF STORM RECOVERY  
 APPLICATION NO.:  
 AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
 WARD POINT BEND, RARITAN BAY  
 TOTTENVILLE, STATEN ISLAND  
 COUNTY OF RICHMOND  
 STATE OF NEW YORK

DATE: 10/30/2017

SHEET 15 OF 25



**BREAKWATER TYPE 'B1' PROPOSED SECTION A-A**

**NOTES:**

1. WHERE POTENTIAL EConcrete® ARMOR UNITS ARE INDICATED, ARMOR STONE WILL BE REPLACED WITH EConcrete® ARMOR UNITS AT A RATE OF 30%. IN ALL OTHER LOCATIONS, ARMOR AND TOE UNITS WILL BE STONE OF THE SIZE INDICATED.
2. REFER TO SHEET 8 FOR BREAKWATER VOLUME SUMMARY.
3. ALL VALUES INCLUDE AN ADDITIONAL 10% TO ACCOUNT FOR UNCERTAINTY.



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NOT FOR CONSTRUCTION

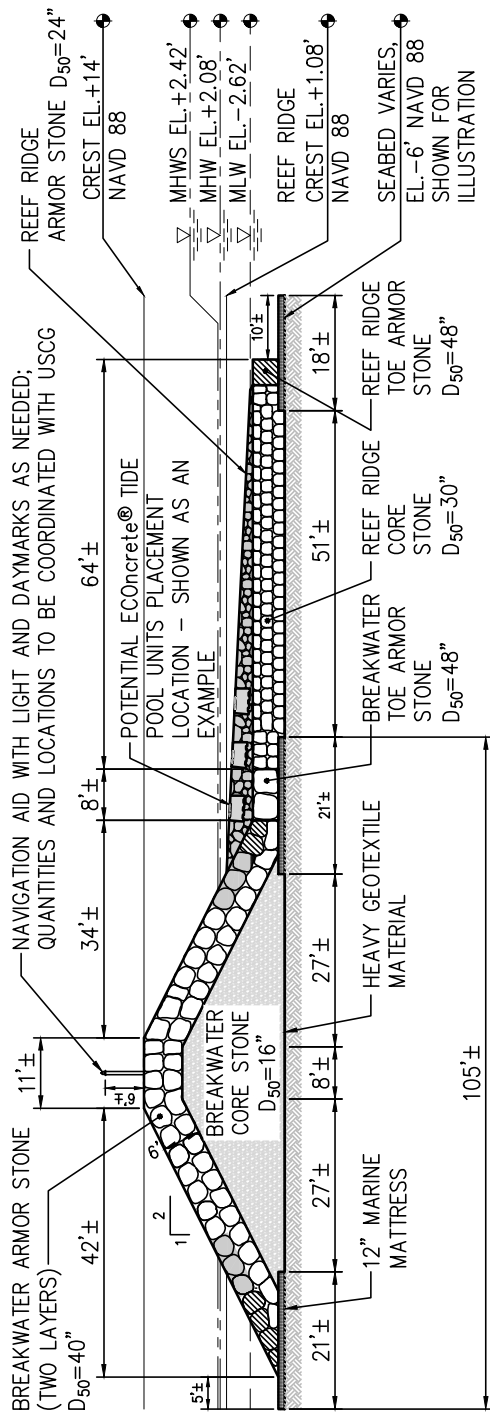
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APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS

WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK

DATE: 10/30/2017

SHEET 16 OF 25



**BREAKWATER TYPE 'B2-B5' PROPOSED SECTION A-A**

LEGEND	
	POTENTIAL LOCATION FOR EConcrete® ARMOR UNITS
	POTENTIAL LOCATION FOR EConcrete® TIDE POOL UNITS

- NOTES:**
- WHERE POTENTIAL EConcrete® ARMOR UNITS ARE INDICATED, ARMOR STONE WILL BE REPLACED WITH EConcrete® ARMOR UNITS AT A RATE OF 30% IN ALL OTHER LOCATIONS, ARMOR AND TOE UNITS WILL BE STONE OF THE SIZE INDICATED.
  - REFER TO SHEET 8 FOR BREAKWATER VOLUME SUMMARY.
  - ALL VALUES INCLUDE AN ADDITIONAL 10% TO ACCOUNT FOR UNCERTAINTY.

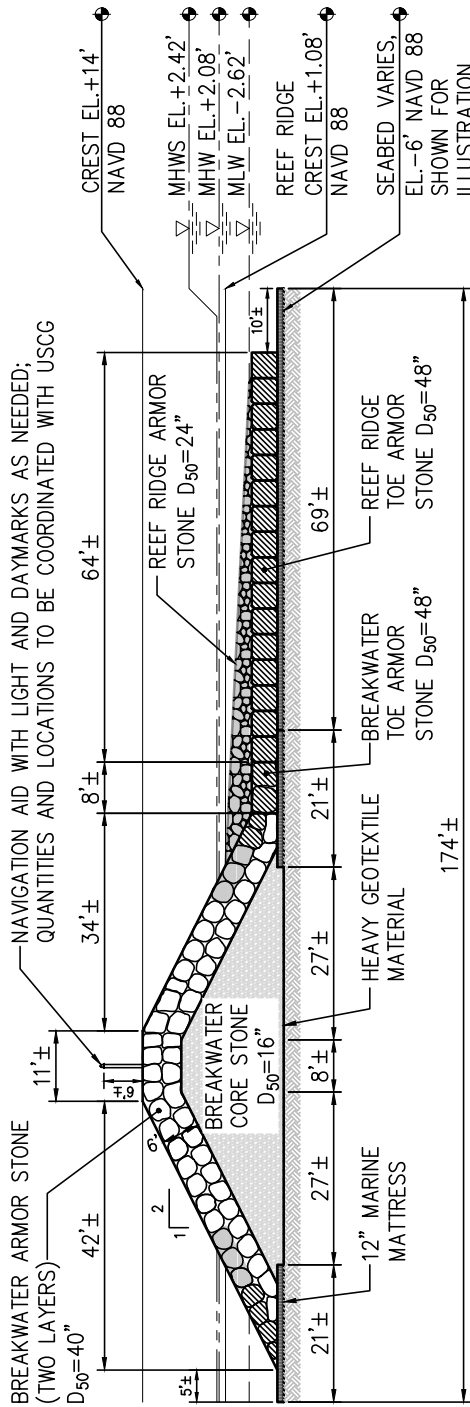


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NOT FOR CONSTRUCTION

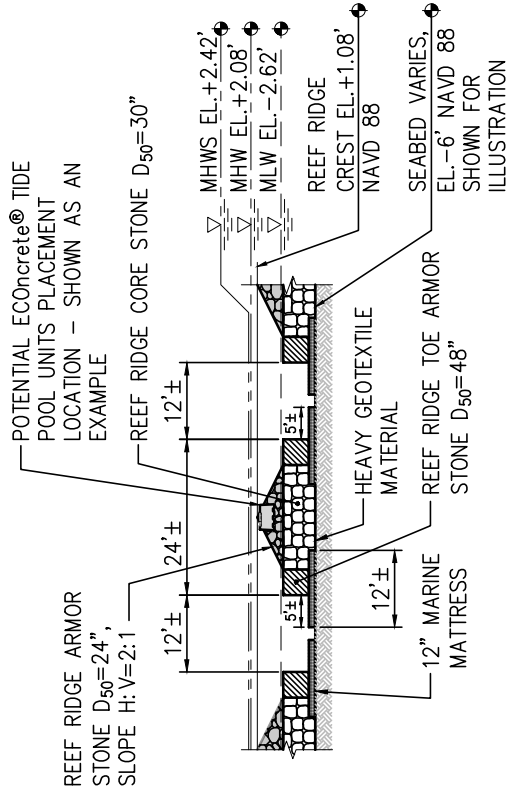
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 APPLICATION BY: GOVERNOR'S  
 OFFICE OF STORM RECOVERY  
 APPLICATION NO.:  
 AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
 WARD POINT BEND, RARITAN BAY  
 TOTTEVILLE, STATEN ISLAND  
 COUNTY OF RICHMOND  
 STATE OF NEW YORK

DATE: 10/30/2017 SHEET 17 OF 25



**BREAKWATER TYPE 'B2-B5' PROPOSED SECTION B-B**



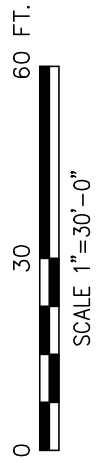
**BREAKWATER TYPE 'B2-B5' PROPOSED SECTION C-C**

LEGEND

[Hatched Box]	POTENTIAL LOCATION FOR EConcrete® ARMOR UNITS
[Solid Box]	POTENTIAL LOCATION FOR EConcrete® TIDE POOL UNITS

**NOTES:**

- WHERE POTENTIAL EConcrete® ARMOR UNITS ARE INDICATED, ARMOR STONE WILL BE REPLACED WITH EConcrete® ARMOR UNITS AT A RATE OF 30% IN ALL OTHER LOCATIONS, ARMOR AND TOE UNITS WILL BE STONE OF THE SIZE INDICATE
- REFER TO SHEET 8 FOR BREAKWATER VOLUME SUMMARY.
- ALL VALUES INCLUDE AN ADDITIONAL 10% TO ACCOUNT FOR UNCERTAINTY.

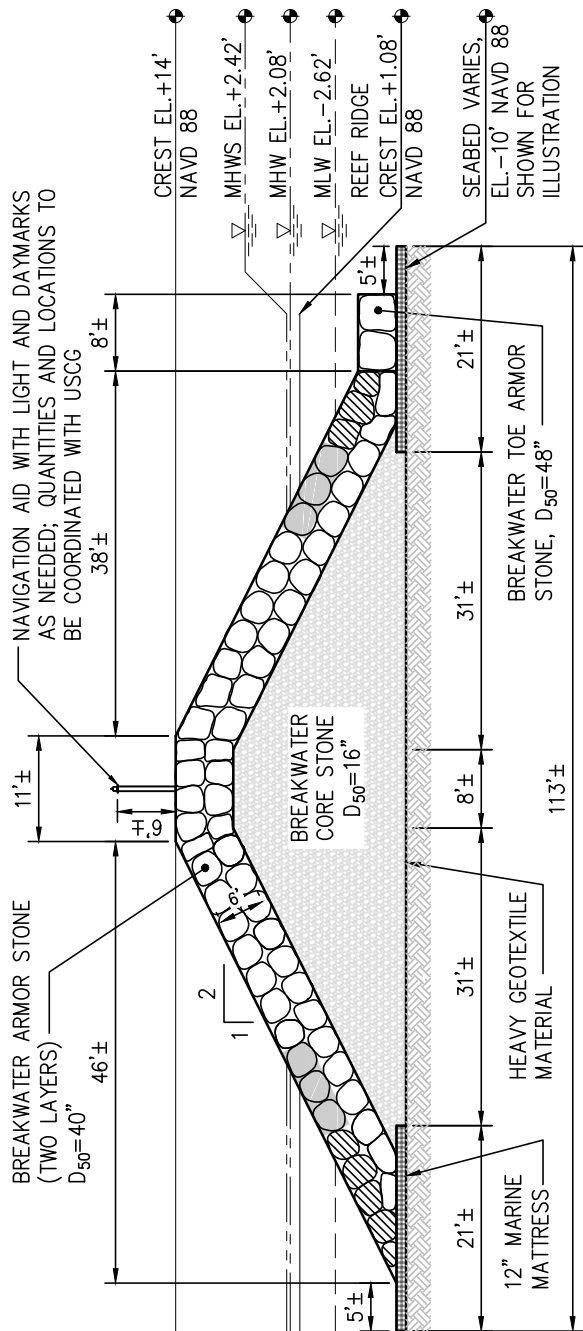


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DATUM: N.A.V.D. 88  
APPLICATION BY: GOVERNOR'S OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK  
DATE: 10/30/2017 SHEET 18 OF 25





**BREAKWATER TYPE 'C1' PROPOSED SECTION A-A**

LEGEND	
	POTENTIAL LOCATION FOR EConcrete® ARMOR UNITS
	POTENTIAL LOCATION FOR EConcrete® TIDE POOL UNITS

**NOTES:**

- WHERE POTENTIAL EConcrete® ARMOR UNITS ARE INDICATED, ARMOR STONE WILL BE REPLACED WITH EConcrete® ARMOR UNITS AT A RATE OF 30% IN ALL OTHER LOCATIONS, ARMOR AND TOE UNITS WILL BE STONE OF THE SIZE INDICATED.
- REFER TO SHEET 8 FOR BREAKWATER VOLUME SUMMARY.
- ALL VALUES INCLUDE AN ADDITIONAL 10% TO ACCOUNT FOR UNCERTAINTY.

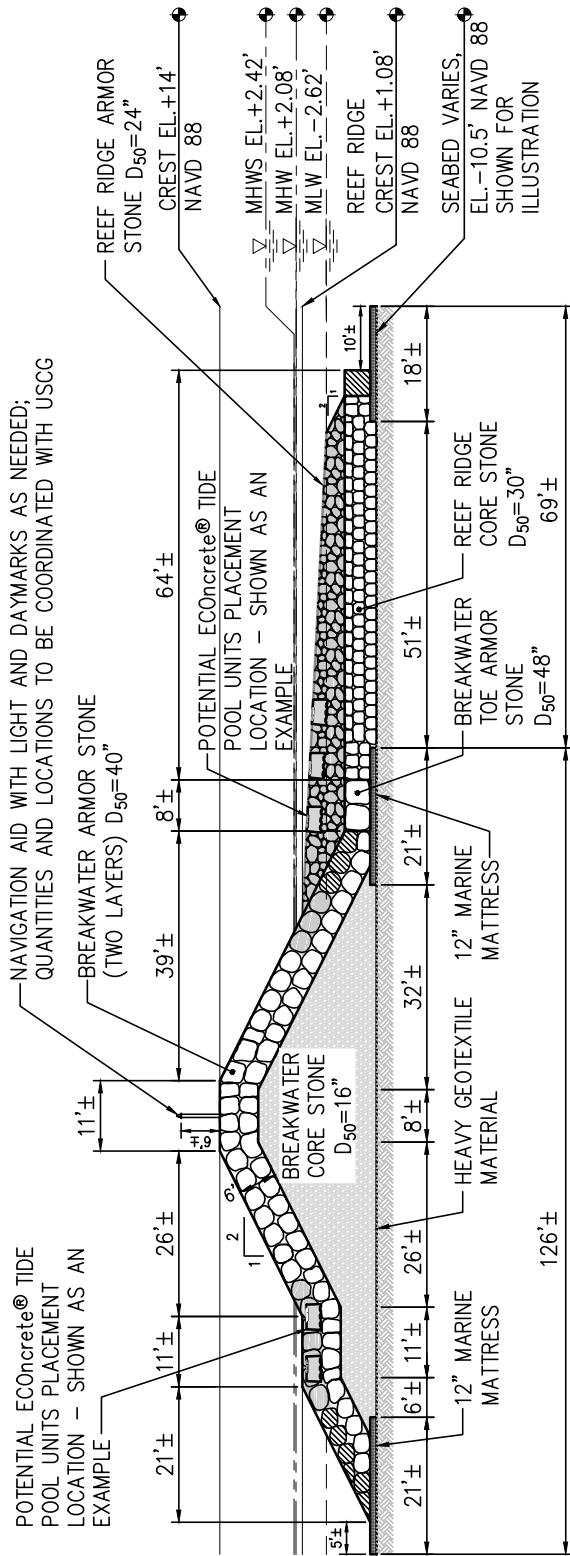


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DATUM: N.A.V.D. 88  
APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK

DATE: 10/30/2017 SHEET 19 OF 25

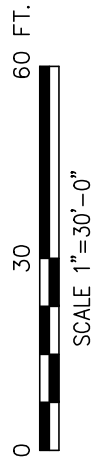


BREAKWATER TYPE 'C2' PROPOSED SECTION A-A

LEGEND	
	POTENTIAL LOCATION FOR ECoConcrete® ARMOR UNITS
	POTENTIAL LOCATION FOR ECoConcrete® TIDE POOL UNITS

NOTES:

- WHERE POTENTIAL ECoConcrete® ARMOR UNITS ARE INDICATED, ARMOR STONE WILL BE REPLACED WITH ECoConcrete® ARMOR UNITS AT A RATE OF 30% IN ALL OTHER LOCATIONS, ARMOR AND TOE UNITS WILL BE STONE OF THE SIZE INDICATED.
- REFER TO SHEET 8 FOR BREAKWATER VOLUME SUMMARY.
- ALL VALUES INCLUDE AN ADDITIONAL 10% TO ACCOUNT FOR UNCERTAINTY.



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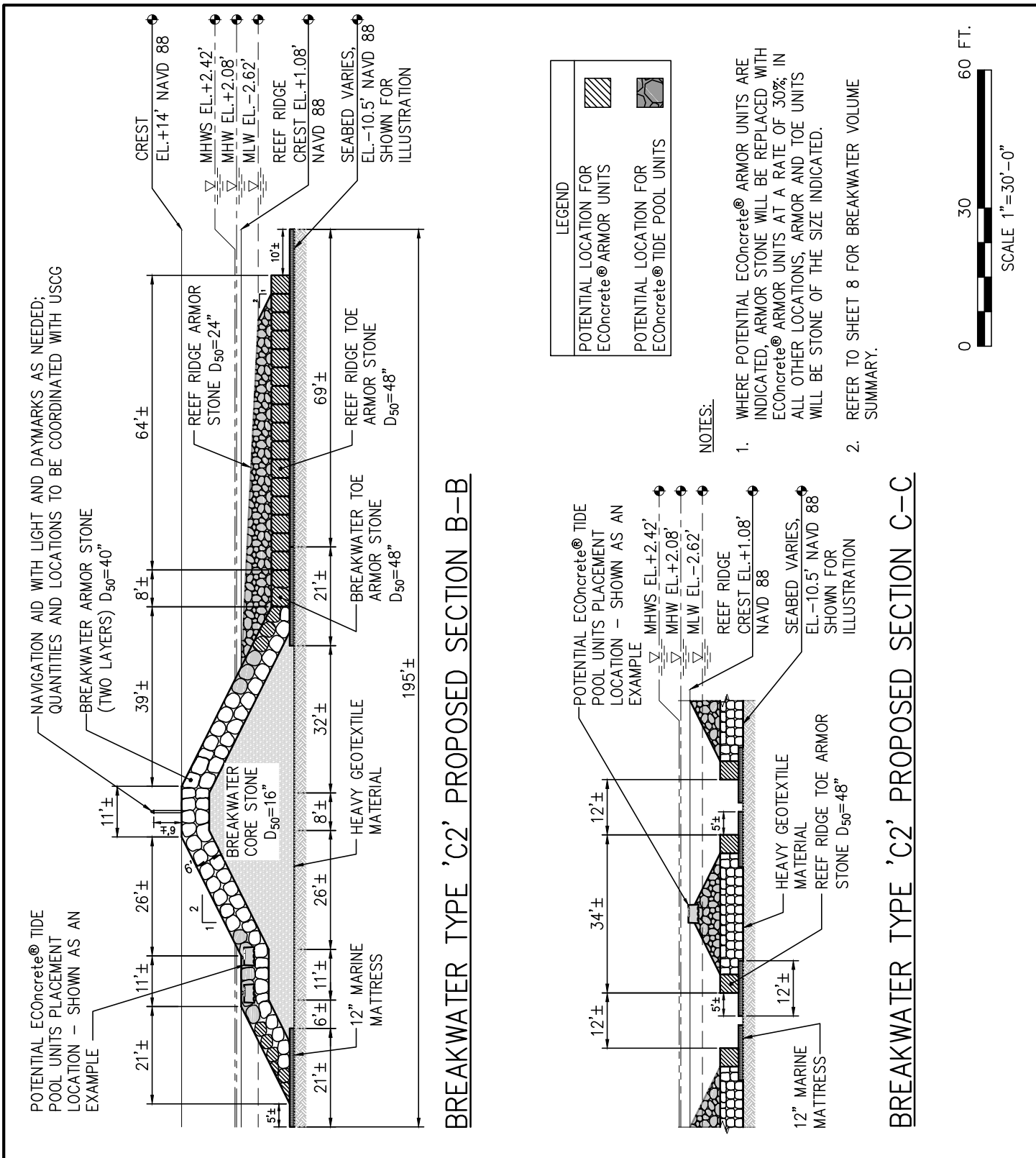
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APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS

WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK

DATE: 10/30/2017

SHEET 20 OF 25



BREAKWATER TYPE 'C2' PROPOSED SECTION B-B

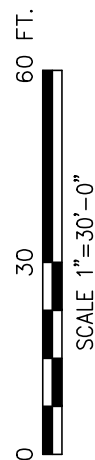
BREAKWATER TYPE 'C2' PROPOSED SECTION C-C

LEGEND

	POTENTIAL LOCATION FOR EConcrete® ARMOR UNITS
	POTENTIAL LOCATION FOR EConcrete® TIDE POOL UNITS

NOTES:

- WHERE POTENTIAL EConcrete® ARMOR UNITS ARE INDICATED, ARMOR STONE WILL BE REPLACED WITH EConcrete® ARMOR UNITS AT A RATE OF 30% IN ALL OTHER LOCATIONS, ARMOR AND TOE UNITS WILL BE STONE OF THE SIZE INDICATED.
- REFER TO SHEET 8 FOR BREAKWATER VOLUME SUMMARY.



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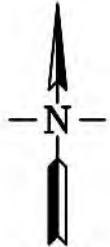
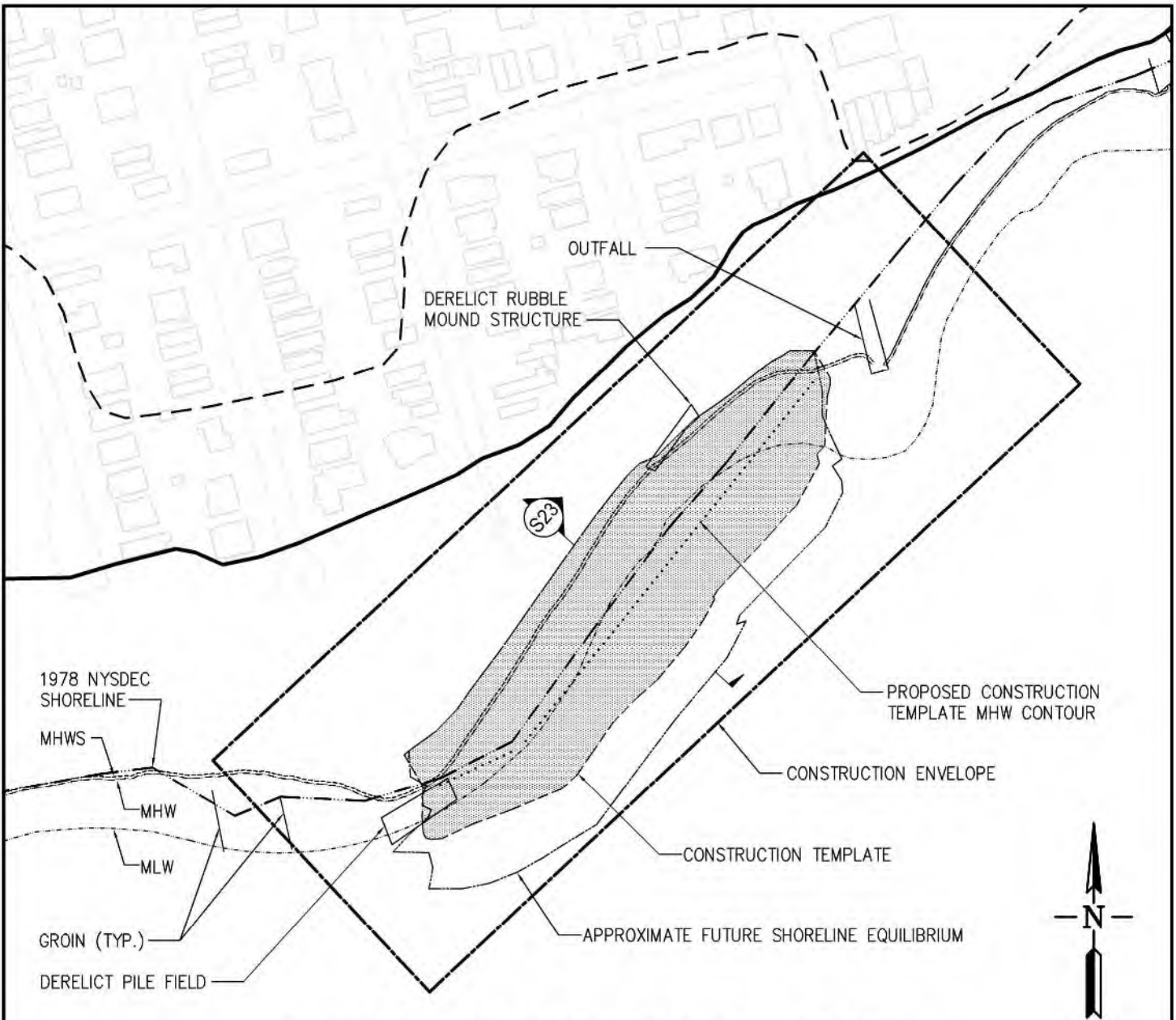
DATUM: N.A.V.D. 88  
APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS

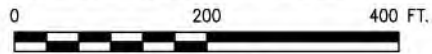
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK

DATE: 10/30/2017

SHEET 21 OF 25



### PROPOSED SHORELINE RESTORATION PLAN



SCALE 1"=200'-0"

**LEGEND**

- |                              |                                                       |
|------------------------------|-------------------------------------------------------|
| ----- MEAN HIGH WATER SPRING | ----- CONSTRUCTION ENVELOPE                           |
| ----- MEAN HIGH WATER        | ----- PROPOSED SHORELINE RESTORATION (AS CONSTRUCTED) |
| ----- FEMA V-ZONE            | ----- CONSTRUCTION TEMPLATE                           |
| ----- MEAN LOW WATER         | ----- EQUILIBRIUM SHORELINE RESTORATION OUTLINE       |
| ----- LIMWA                  | ----- PROPOSED CONSTRUCTION TEMPLATE MHW CONTOUR      |
| ----- 1978 NYSDEC SHORELINE  |                                                       |

**NOTES**

1. CONSTRUCTION TEMPLATE OUTLINE REPRESENTS THE FOOTPRINT OF PLACED SAND.
2. EQUILIBRIUM SHORELINE RESTORATION OUTLINE REPRESENTS THE PROJECTED SPREAD OF THE CONSTRUCTION TEMPLATE.

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NOT FOR CONSTRUCTION

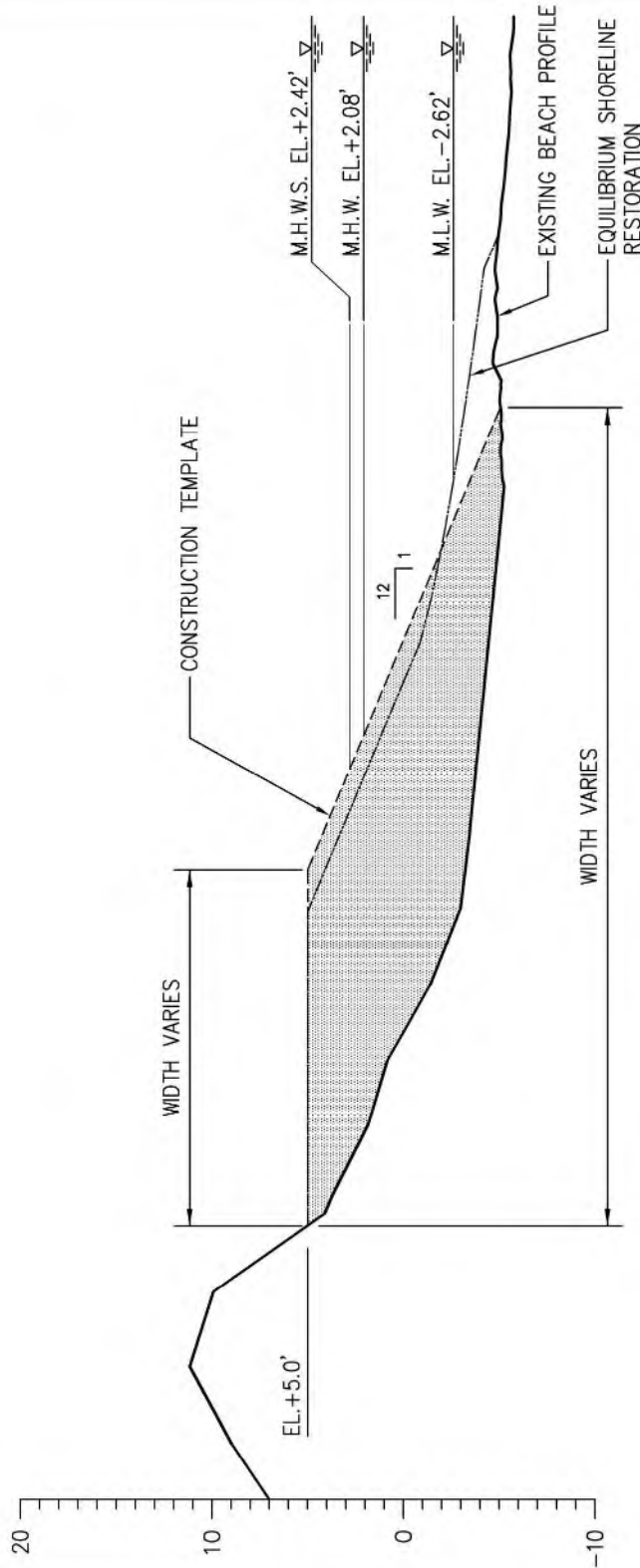
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 APPLICATION BY: GOVERNOR'S  
 OFFICE OF STORM RECOVERY  
 APPLICATION NO.:  
 AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS

WARD POINT BEND, RARITAN BAY  
 TOTTEVILLE, STATEN ISLAND  
 COUNTY OF RICHMOND  
 STATE OF NEW YORK

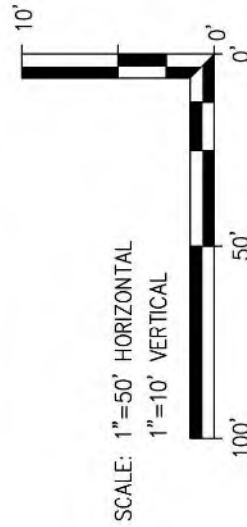
DATE: 10/30/2017

SHEET 22 OF 25



**PROPOSED SHORELINE RESTORATION SECTION (TYPICAL)**

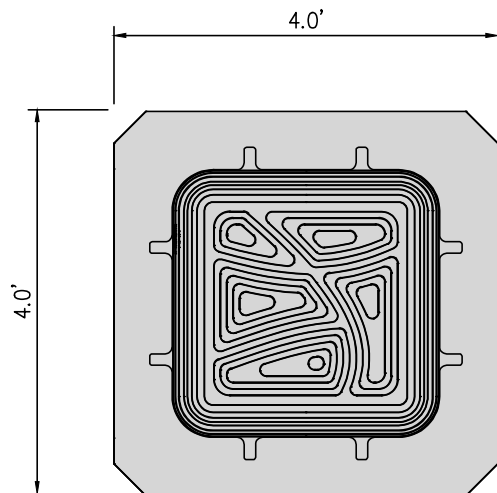
- NOTES:**
1. SHORELINE RESTORATION FILL MATERIAL IS SAND WITH D50=0.3MM
  2. CONSTRUCTION TEMPLATE OUTLINE REPRESENTS THE FOOTPRINT OF PLACED SAND.
  3. EQUILIBRIUM SHORELINE RESTORATION OUTLINE REPRESENTS THE PROJECTED SPREAD OF THE CONSTRUCTION TEMPLATE.



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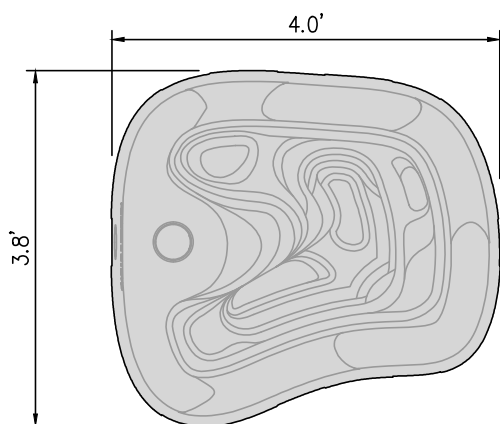
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APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
  
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK  
  
DATE: 10/30/2017 SHEET 23 OF 25

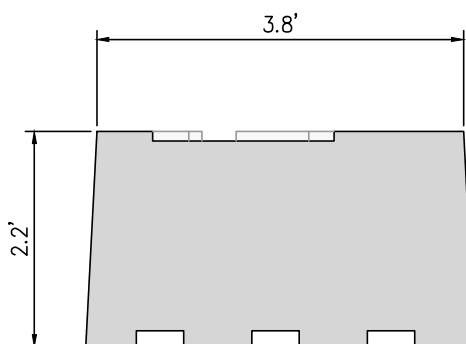


ELEVATION (FIVE SIDE, SIX SIDE FACING SEABED IS FLAT)

EOncrete® ARMOR UNIT

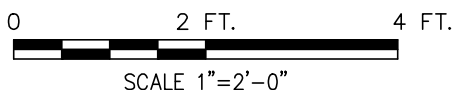


TOP VIEW



SIDE VIEW

EOncrete® BIO-ACTIVE TIDE POOL



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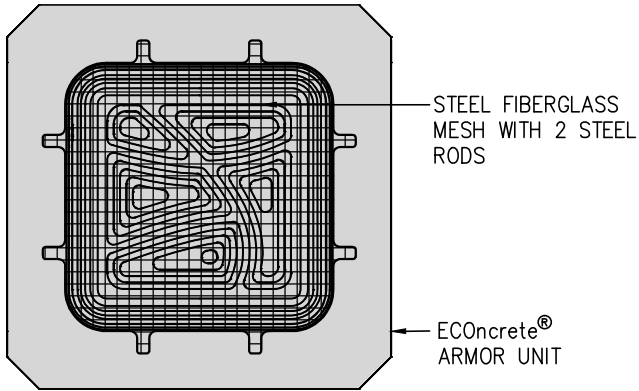
DATUM: N.A.V.D. 88  
APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS

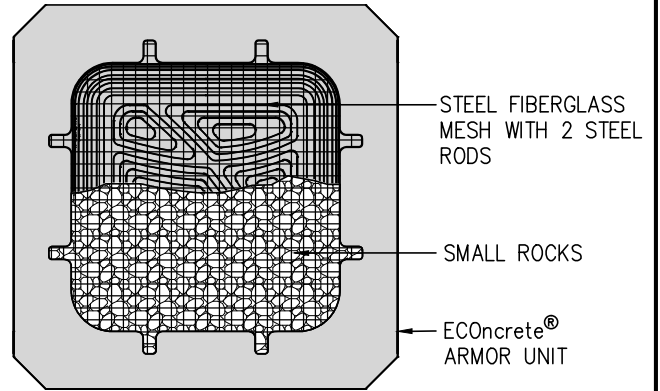
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK

DATE: 10/30/2017

SHEET 24 OF 25

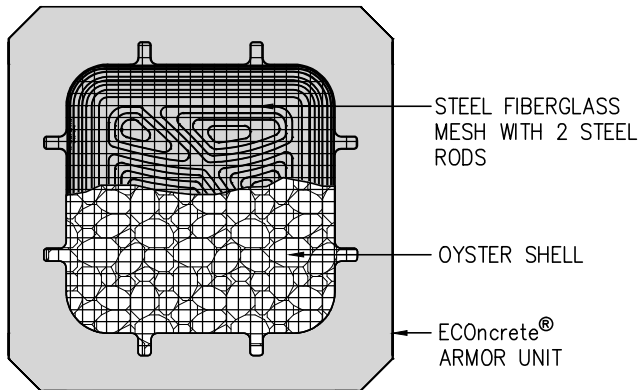


TREATMENT 1  
MESH ONLY

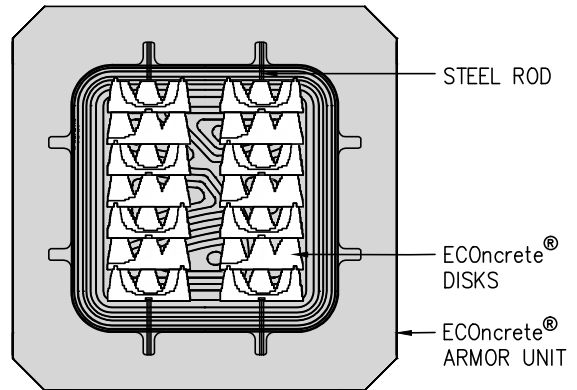


TREATMENT 2  
MESH WITH SMALL ROCK

ECONcrete® TREATMENTS 1 & 2

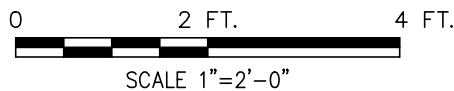


TREATMENT 3  
MESH WITH SHELL



TREATMENT 4  
ECONcrete DISKS

ECONcrete® TREATMENTS 3 & 4

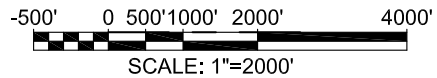
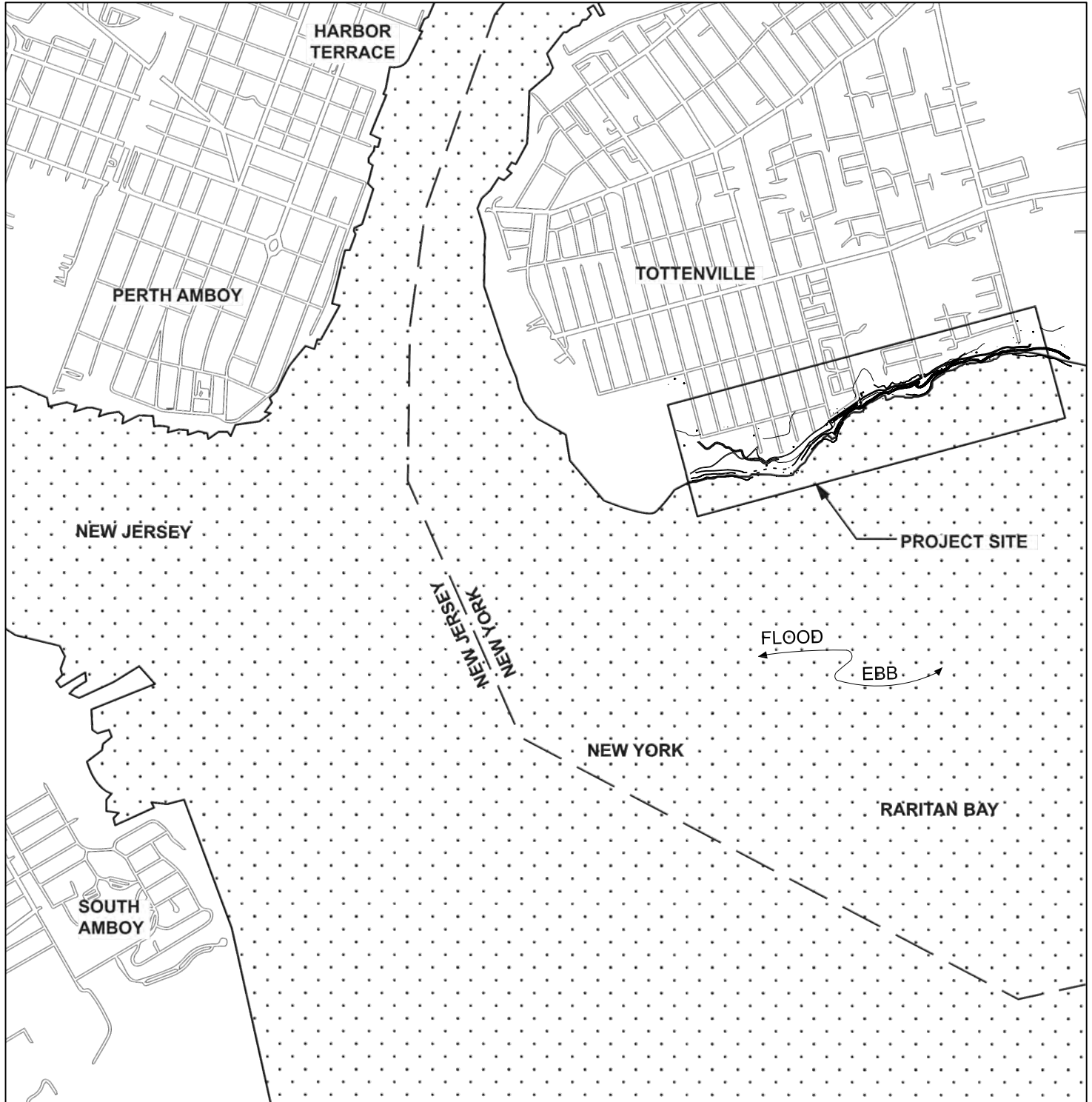


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DATUM: N.A.V.D. 88  
APPLICATION BY: GOVERNOR'S  
OFFICE OF STORM RECOVERY  
APPLICATION NO.:  
AGENT: COWI

PROPOSED CONSTRUCTION OF LIVING BREAKWATERS  
  
WARD POINT BEND, RARITAN BAY  
TOTTENVILLE, STATEN ISLAND  
COUNTY OF RICHMOND  
STATE OF NEW YORK  
  
DATE: 10/30/2017 SHEET 25 OF 25





FILE:

DRAWING TITLE: VICINITY MAP

PROPOSED PROJECT:  
TOTTENVILLE SHORELINE PROTECTION PROJECT

APPLICATION BY:  
GOVERNOR'S OFFICE OF STORM RECOVERY

DATUM: NAVD88

AGENT: STANTEC

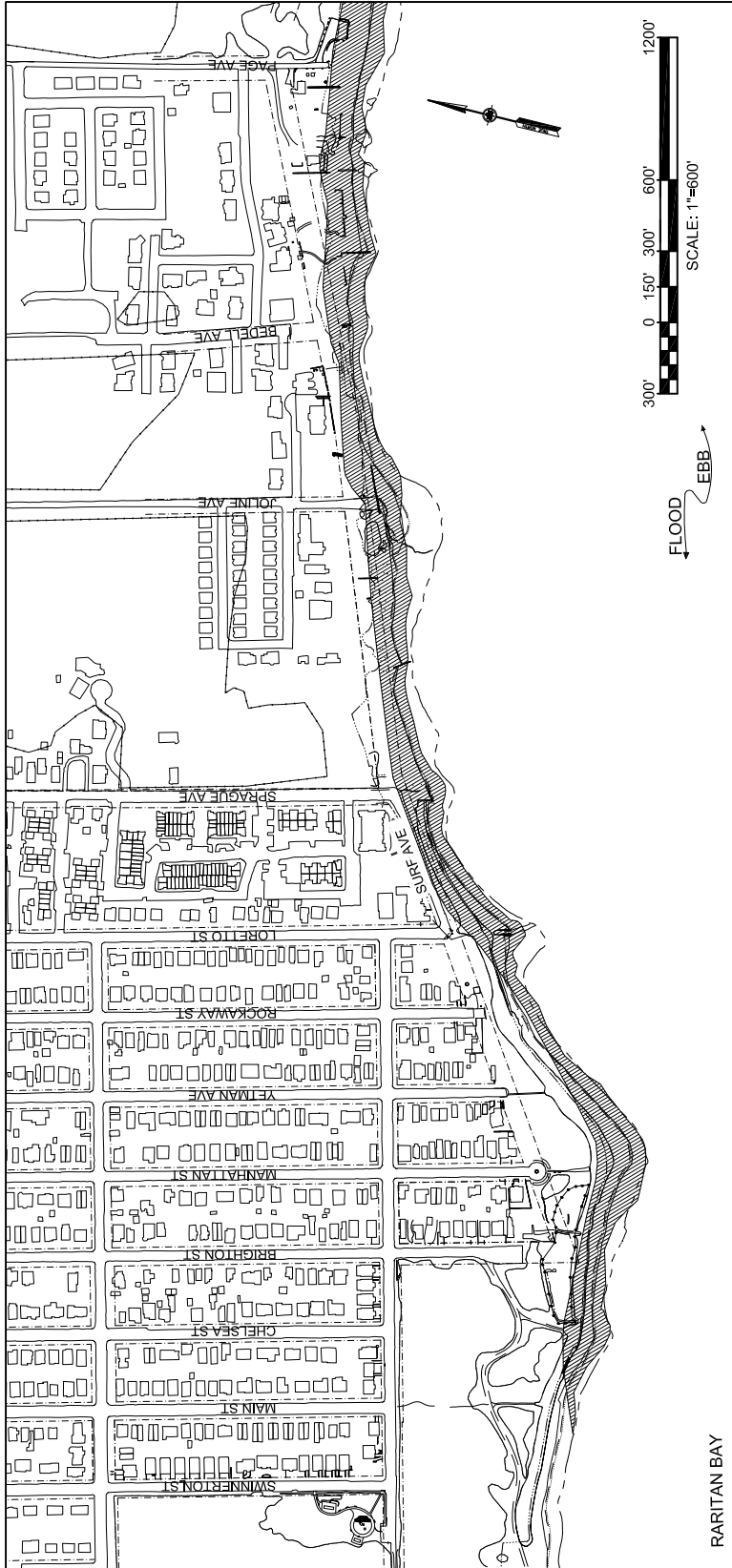
IN: TOTTENVILLE STATEN ISLAND  
NEAR/AT: RARITAN BAY  
COUNTY: RICHMOND COUNTY  
STATE: NEW YORK

DRAWING NO.: L-01

PAGE 1 OF 11

DATE 2/28/18

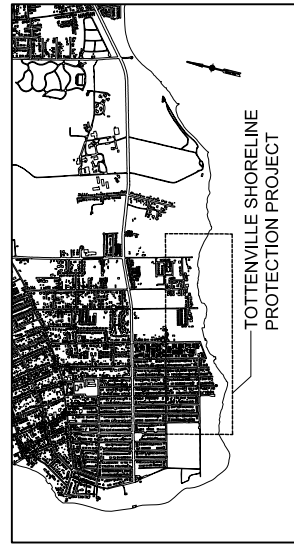
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FOR CONSTRUCTION



PROJECT SITE ENLARGEMENT PLAN  
EXISTING CONDITIONS

- MEAN HIGH WATER SPRING EL. +2.42 NAVD88
- MEAN HIGH WATER EL. +2.08 NAVD88
- MEAN LOW WATER EL. -2.62 NAVD88
- NYSDCE TIDAL WETLANDS ADJACENT AREA (TWAA)
- FRESH WATER WETLAND
- DELINEATED WETLAND BOUNDARY
- DOT RIGHT-OF-WAY
- COASTAL EROSION HAZARD AREA (CEHA)

NOTE: ALL TIDAL DATA ARE BASED ON NOAA STATION NO. 8531680, SANDY HOOK, N.J.



KEYMAP

FILE:

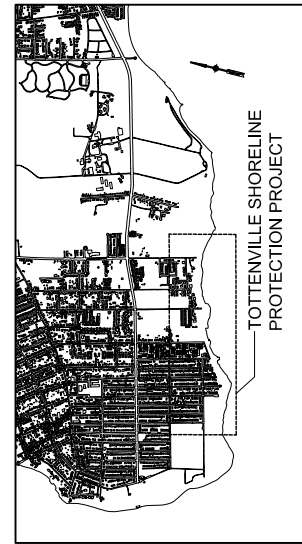
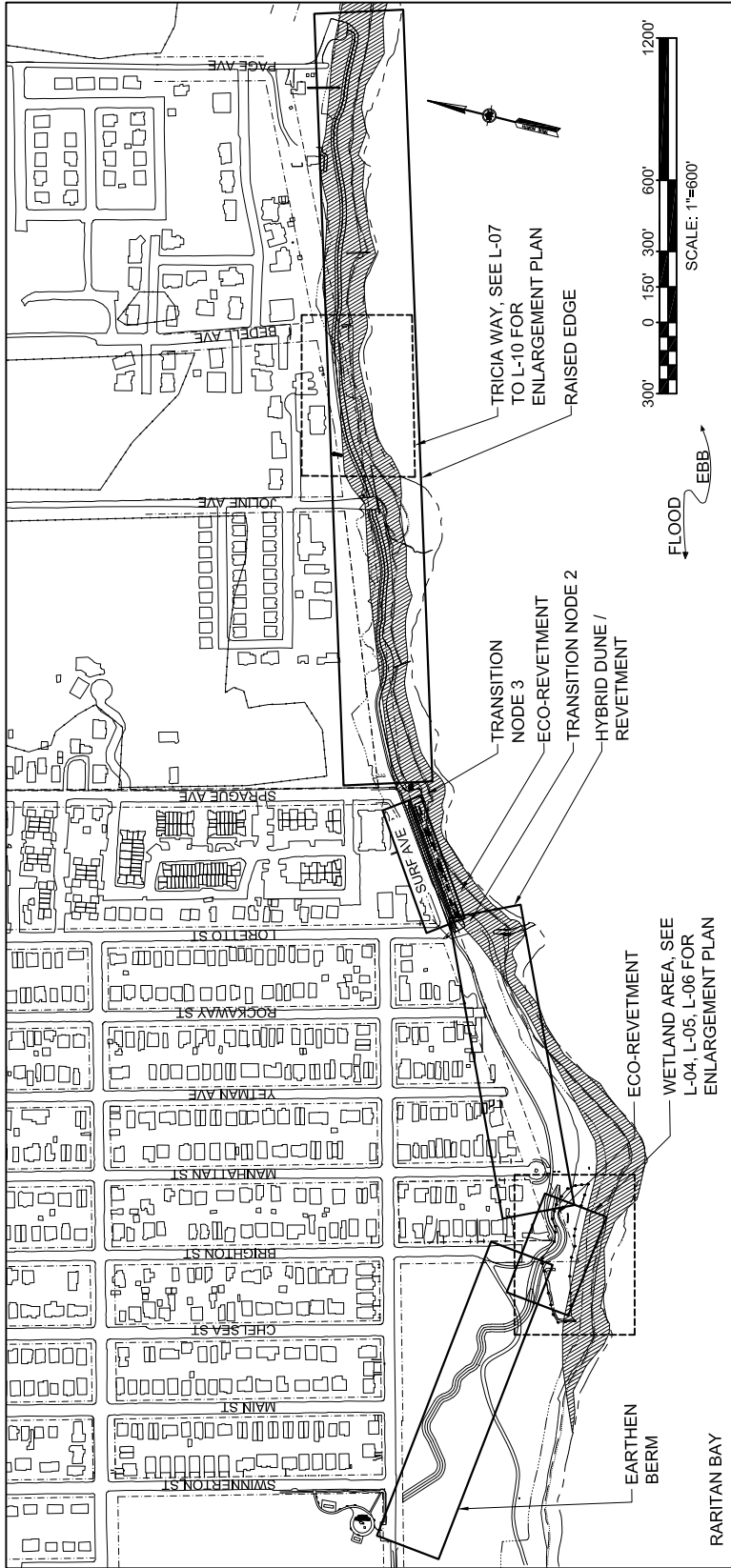
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EXISTING CONDITIONS  
APPLICATION BY:  
GOVERNOR'S OFFICE OF STORM RECOVERY  
DATUM: NAVD88  
AGENT: STANTEC  
DRAWING NO.: L-02  
PAGE 2 OF 11

PROPOSED PROJECT:  
TOTTENVILLE SHORELINE PROTECTION PROJECT

IN: TOTTENVILLE STATEN ISLAND  
NEAR/AT: RARITAN BAY  
COUNTY: RICHMOND COUNTY  
STATE: NEW YORK

FOR PERMIT USE ONLY NOT FOR CONSTRUCTION

DATE 2/28/18



- MEAN HIGH WATER SPRING EL. +2.42 NAVD88
- MEAN HIGH WATER EL. +2.08 NAVD88
- MEAN LOW WATER EL. -2.62 NAVD88
- NYSDEC TIDAL WETLANDS ADJACENT AREA (TWAA)
- FRESH WATER WETLAND
- DELINEATED WETLAND BOUNDARY
- DOT RIGHT-OF-WAY
- COASTAL EROSION HAZARD AREA (CEHA)

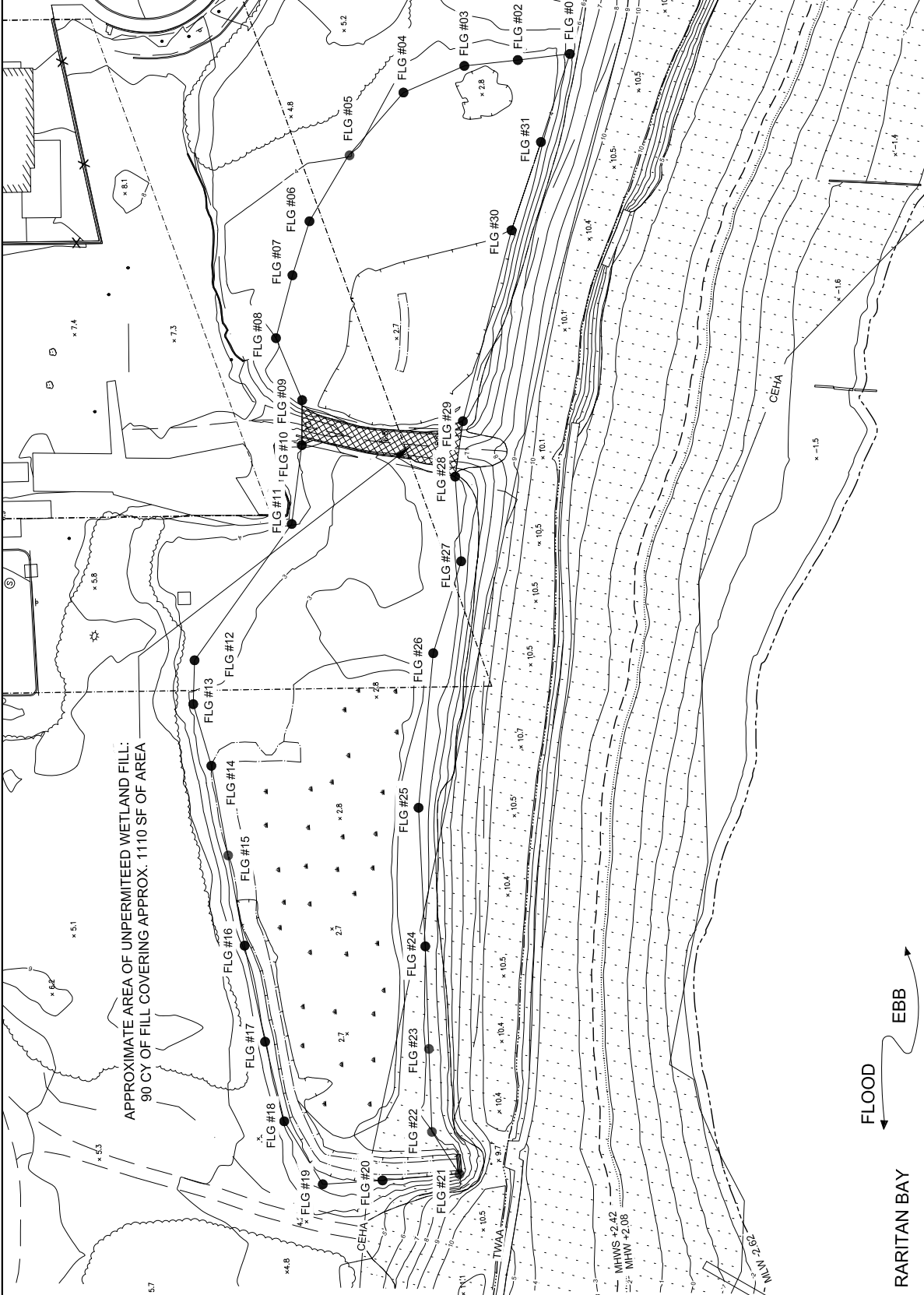
NOTE: ALL TIDAL DATA ARE BASED ON NOAA STATION NO. 8531680, SANDY HOOK, NJ.

PROJECT SITE ENLARGEMENT PLAN  
PROPOSED DESIGNS

FILE:  
  
**FOR PERMIT USE ONLY NOT FOR CONSTRUCTION**

DRAWING TITLE: INDEX MAP  
PROPOSED DESIGN  
APPLICATION BY:  
GOVERNOR'S OFFICE OF STORM RECOVERY  
DATUM: NAVD88  
AGENT: STANTEC  
DRAWING NO.: L-03  
PAGE 3 OF 11      DATE 2/28/18

PROPOSED PROJECT:  
TOTTENVILLE SHORELINE PROTECTION PROJECT  
  
IN: TOTTENVILLE STATEN ISLAND  
NEAR/AT: RARITAN BAY  
COUNTY: RICHMOND COUNTY  
STATE: NEW YORK



MEAN HIGH WATER SPRING EL. +2.42 NAVD88  
 MEAN HIGH WATER EL. +2.08 NAVD88  
 MEAN LOW WATER EL. -2.62 NAVD88  
 NY/DEC TIDAL WETLANDS ADJACENT AREA (TWAA)  
 DELINEATED WETLAND BOUNDARY  
 DOT RIGHT-OF-WAY  
 COASTAL EROSION HAZARD AREA (CEHA)  
 UNPERMITTED FILL

NOTE: ALL TIDAL DATA ARE BASED ON NOAA STATION NO. 8531680, SANDY HOOK, NJ.

FILE:

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DRAWING TITLE: TOPOGRAPHIC SURVEY WETLAND AREA

APPLICATION BY: GOVERNOR'S OFFICE OF STORM RECOVERY

DATUM: NAVD88

AGENT: STANTEC

DRAWING NO.: L-04

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DATE 2/28/18

PROPOSED PROJECT: TOTTENVILLE SHORELINE PROTECTION PROJECT

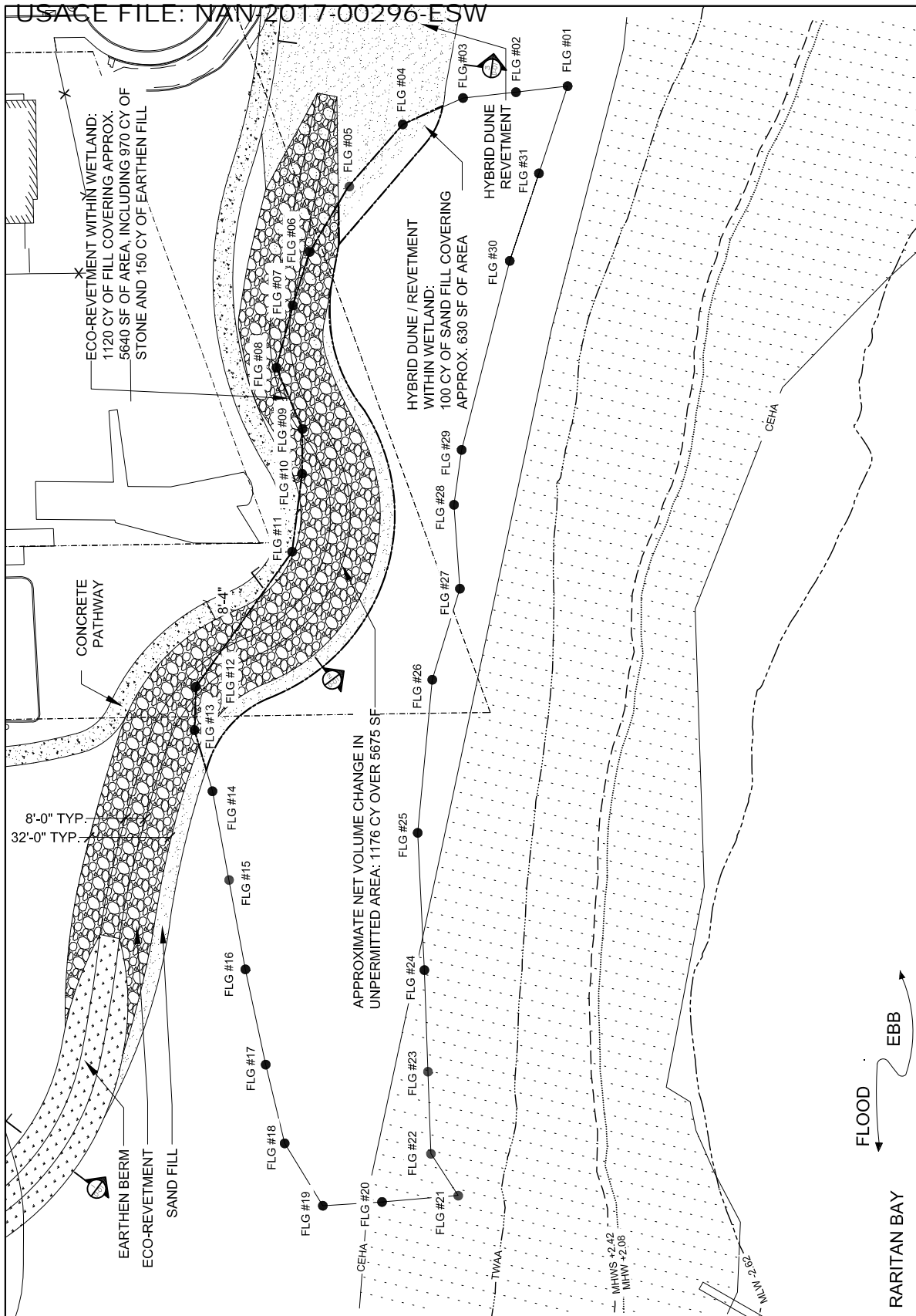
IN: TOTTENVILLE STATEN ISLAND

NEAR/AT: RARITAN BAY

COUNTY: RICHMOND COUNTY

STATE: NEW YORK





<p>--- MEAN HIGH WATER SPRING EL. +2.42 NAVD88</p> <p>--- MEAN HIGH WATER EL. +2.08 NAVD88</p> <p>--- MEAN LOW WATER EL. -2.62 NAVD88</p> <p>--- NYSDEC TIDAL WETLANDS ADJACENT AREA (TWAA)</p> <p>--- DELINEATED WETLAND BOUNDARY</p> <p>--- PROJECT ELEMENTS WITHIN WETLAND</p> <p>--- DOT RIGHT-OF-WAY</p> <p>NOTE: ALL TIDAL DATA ARE BASED ON NOAA STATION NO. 8531680, SANDY HOOK, NJ.</p>	<p>COASTAL EROSION HAZARD AREA (CEHA)</p> <p>EARTHEN BERM</p> <p>ARMOR STONE</p> <p>CONCRETE PAVEMENT</p> <p>SAND FILL</p>
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FILE:

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DRAWING TITLE: MATERIALS PLAN WETLAND AREA

APPLICATION BY: GOVERNOR'S OFFICE OF STORM RECOVERY

DATUM: NAVD88

AGENT: STANTEC

DRAWING NO.: L-06

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DATE 2/28/18

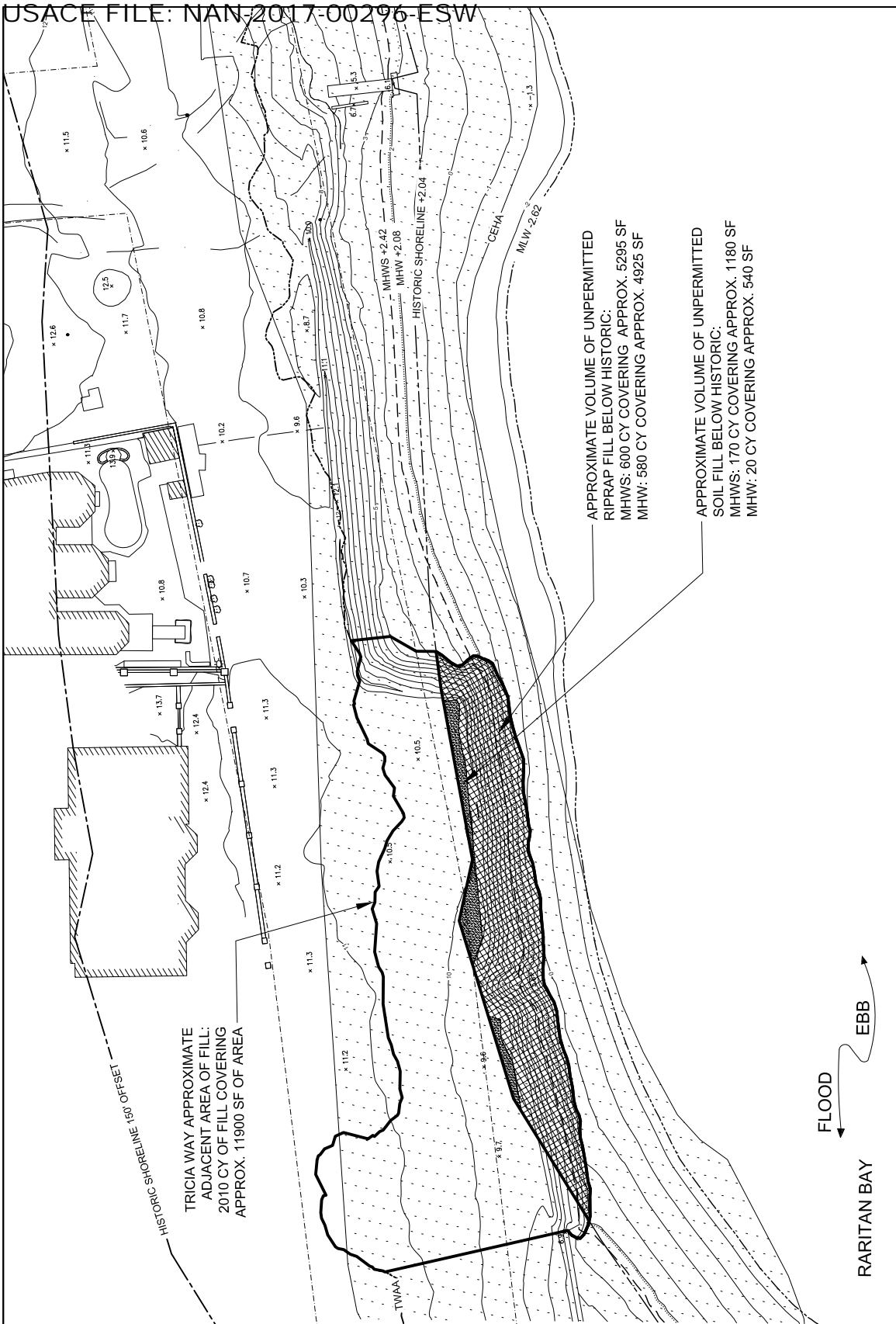
PROPOSED PROJECT: TOTENVILLE SHORELINE PROTECTION PROJECT

IN: TOTENVILLE STATEN ISLAND

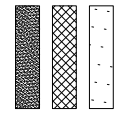
NEAR/AT: RARITAN BAY

COUNTY: RICHMOND COUNTY

STATE: NEW YORK

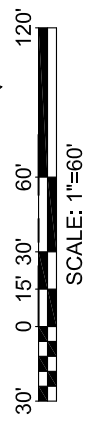


UNPERMITTED SOIL FILL BELOW MHW OF HISTORIC SHORELINE  
 UNPERMITTED RIP RAP BELOW MHW OF HISTORIC SHORELINE  
 COASTAL EROSION HAZARD AREA (CEHA)



HISTORIC SHORELINE EL. +2.04 NAVD88  
 MEAN HIGH WATER SPRING EL. +2.42 NAVD88  
 MEAN HIGH WATER EL. +2.08 NAVD88  
 MEAN LOW WATER EL. -2.62 NAVD88  
 HISTORIC SHORELINE 150' OFFSET  
 NYSDEC TIDAL WETLANDS ADJACENT AREA  
 2010 (TWAA)  
 DOT RIGHT-OF-WAY

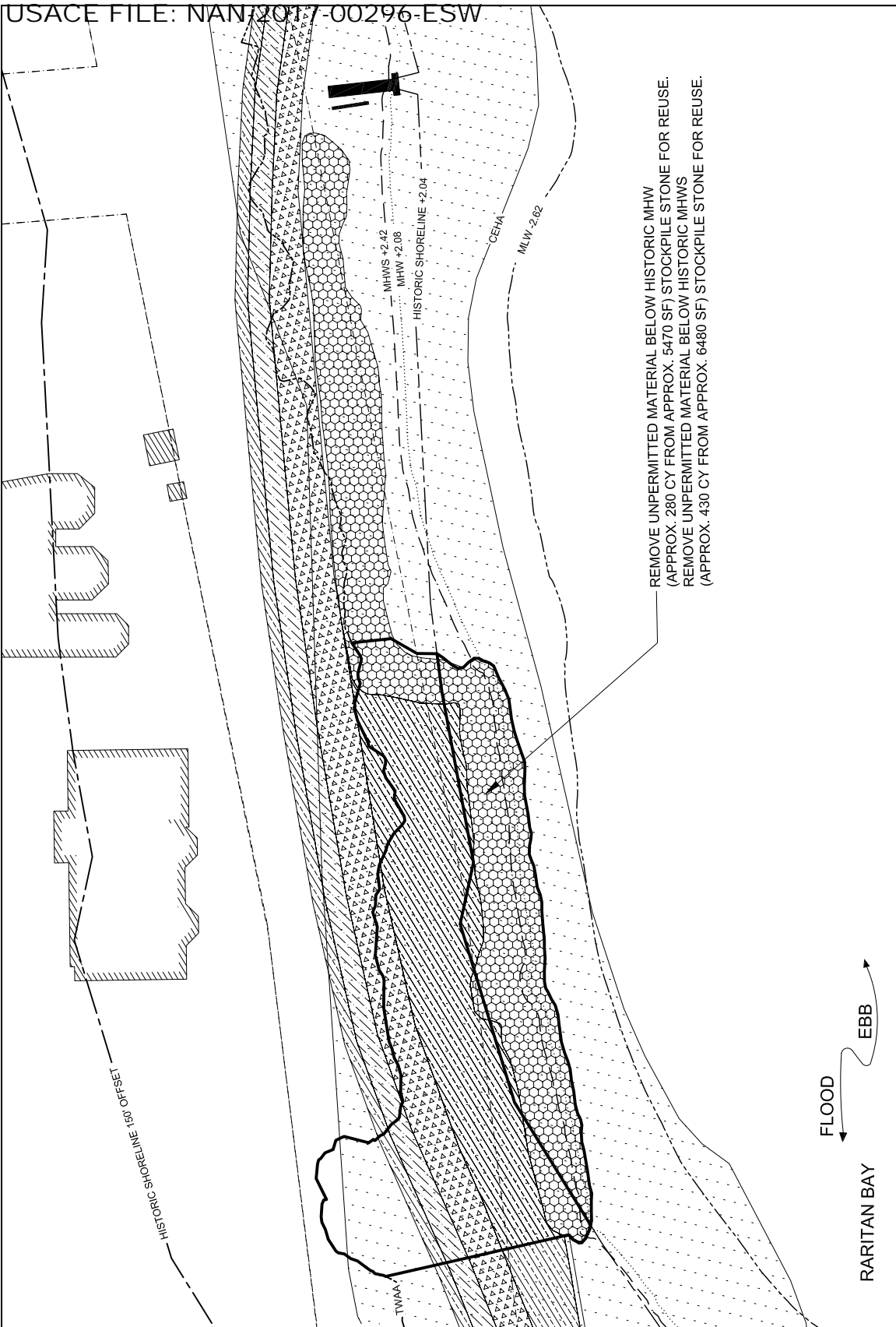
NOTE: ALL TIDAL DATA ARE BASED ON NOAA STATION NO. 8531680, SANDY HOOK, NJ.



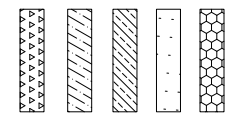
FILE:  
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DRAWING TITLE: TOPOGRAPHIC SURVEY  
 TRICIA WAY  
 APPLICATION BY:  
 GOVERNOR'S OFFICE OF STORM RECOVERY  
 DATUM: NAVD88  
 AGENT: STANTEC  
 DRAWING NO.: L-07  
 PAGE 7 OF 11  
 DATE 2/28/18

PROPOSED PROJECT:  
 TOTTENVILLE SHORELINE PROTECTION PROJECT  
 IN: TOTTENVILLE STATEN ISLAND  
 NEAR/AT: RARITAN BAY  
 COUNTY: RICHMOND COUNTY  
 STATE: NEW YORK



- REMOVE MATERIAL / EXCAVATE FOR PROPOSED RIP RAP / REVETMENT AT RAISED EDGE
- CLEAR AND GRUB / REMOVE MATERIAL FOR PROPOSED PATH
- CLEAR AND GRUB / REMOVE MATERIALS FOR BEACH OR LANDSCAPE IMPROVEMENT
- COASTAL EROSION HAZARD AREA (CEHA)
- REMOVE EXISTING RIP RAP (STOCKPILE FOR REUSE)



- HISTORIC SHORELINE EL. +2.04 NAVD88
- MEAN HIGH WATER SPRING EL. +2.42 NAVD88
- MEAN HIGH WATER EL. +2.08 NAVD88
- MEAN LOW WATER EL. -2.62 NAVD88
- HISTORIC SHORELINE 150' OFFSET
- NYSDEC TIDAL WETLANDS ADJACENT AREA 2010 (TWAA)
- DOT RIGHT-OF-WAY

NOTE: ALL TIDAL DATA ARE BASED ON NOAA STATION NO. 8531680, SANDY HOOK, NJ.

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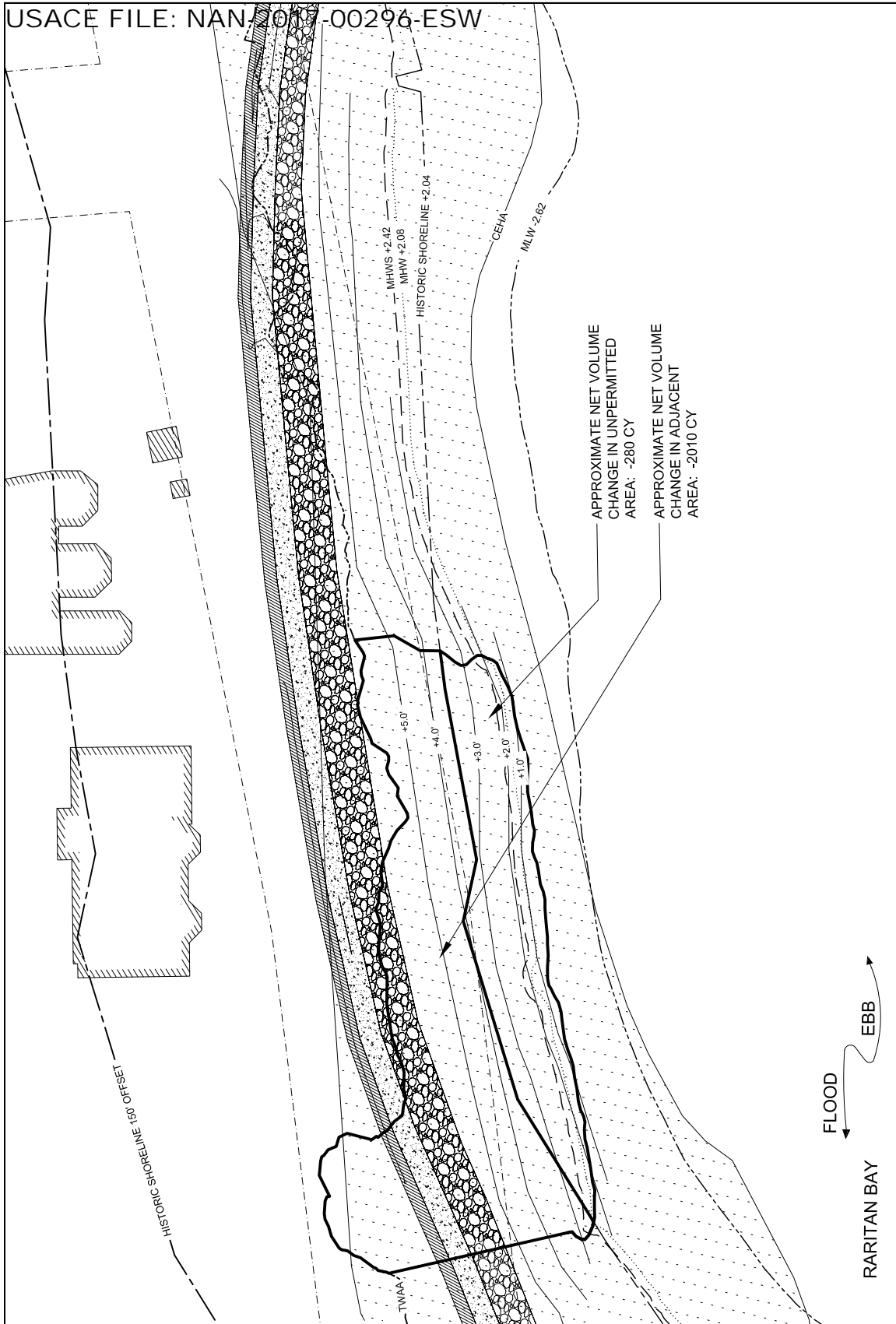
FOR PERMIT USE ONLY NOT FOR CONSTRUCTION

DRAWING TITLE: REMOVAL PLAN  
TRICIA WAY  
APPLICATION BY:  
GOVERNOR'S OFFICE OF STORM RECOVERY  
DATUM: NAVD88  
AGENT: STANTEC  
DRAWING NO.: L-08  
PAGE 8 OF 11      DATE 2/28/18

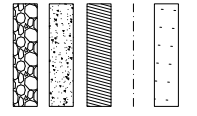
PROPOSED PROJECT:  
TOTTENVILLE SHORELINE PROTECTION PROJECT

IN: TOTTENVILLE STATEN ISLAND  
NEAR/AT: RARITAN BAY  
COUNTY: RICHMOND COUNTY  
STATE: NEW YORK





- ARMOR STONE
- RAISED EDGE
- BIOSWALE
- DOT RIGHT-OF-WAY
- COASTAL EROSION HAZARD AREA (CEHA)



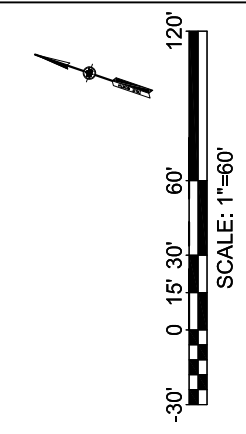
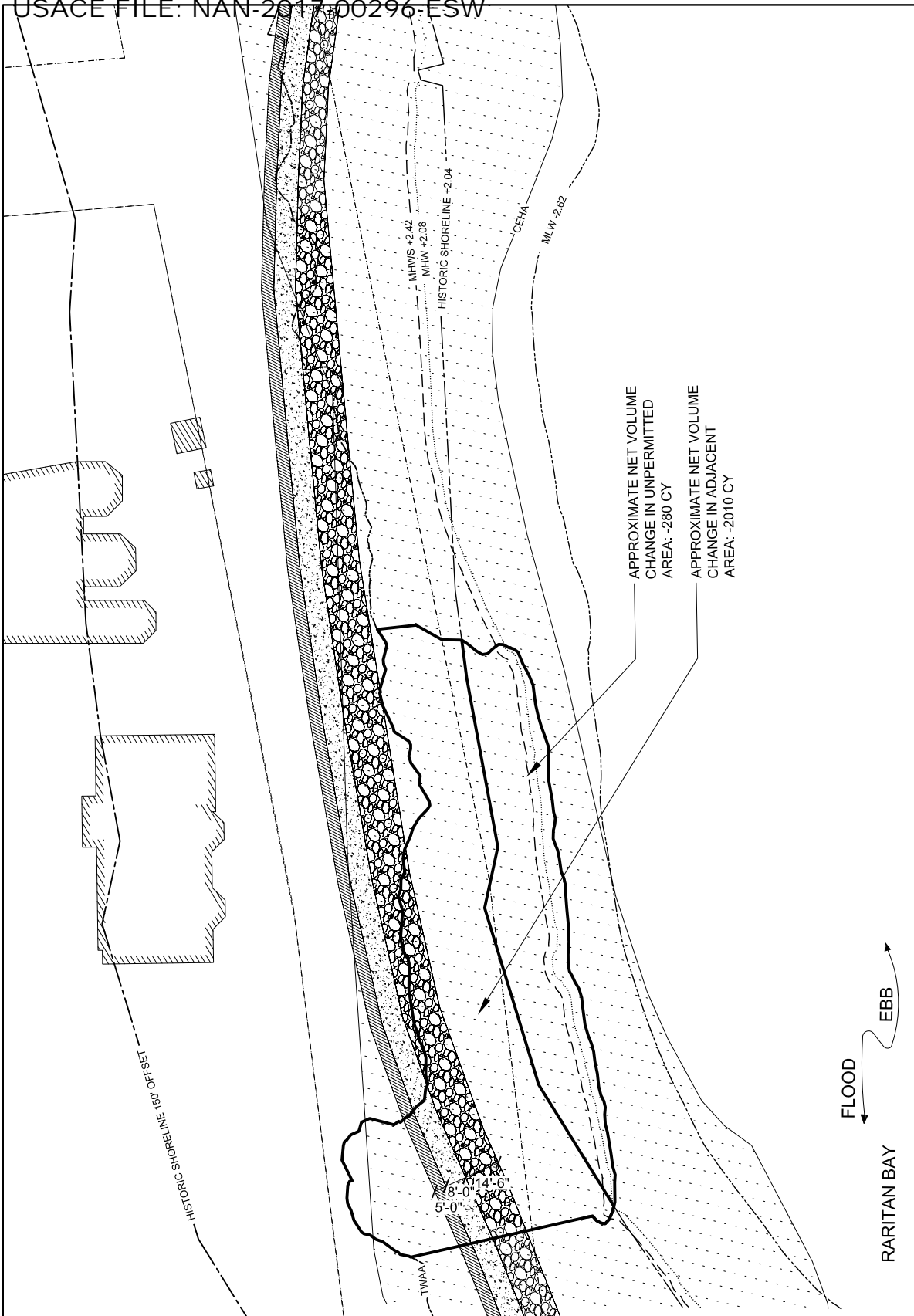
- HISTORIC SHORELINE EL. +2.04 NAVD88
- MEAN HIGH WATER SPRING EL. +2.42 NAVD88
- MEAN HIGH WATER EL. +2.08 NAVD88
- MEAN LOW WATER EL. -2.62 NAVD88
- HISTORIC SHORELINE 150' OFFSET
- NYSDEC TIDAL WETLANDS ADJACENT AREA 2010 (TWA)
- DOT RIGHT-OF-WAY

NOTE: ALL TIDAL DATA ARE BASED ON NOAA STATION NO. 8531680, SANDY HOOK, NJ.

FILE:  
  
FOR PERMIT USE ONLY NOT FOR CONSTRUCTION

DRAWING TITLE: GRADING PLAN  
TRICIA WAY  
APPLICATION BY:  
GOVERNOR'S OFFICE OF STORM RECOVERY  
DATUM: NAVD88  
AGENT: STANTEC  
DRAWING NO.: L-09  
PAGE 9 OF 11 DATE 2/28/18

PROPOSED PROJECT:  
TOTTENVILLE SHORELINE PROTECTION PROJECT  
  
IN: TOTTENVILLE STATEN ISLAND  
NEAR/AT: RARITAN BAY  
COUNTY: RICHMOND COUNTY  
STATE: NEW YORK



- ARMOR STONE
  - CONCRETE PAVEMENT
  - BIOSWALE PLANTING
  - COASTAL EROSION HAZARD AREA (CEHA)
- 
- HISTORIC SHORELINE EL. +2.04 NAVD88
  - MEAN HIGH WATER SPRING EL. +2.42 NAVD88
  - MEAN HIGH WATER EL. +2.08 NAVD88
  - MEAN LOW WATER EL. -2.62 NAVD88
  - HISTORIC SHORELINE 150' OFFSET
  - NYSDEC TIDAL WETLANDS ADJACENT AREA 2010 (TWAA)
  - DOT RIGHT-OF-WAY

NOTE: ALL TIDAL DATA ARE BASED ON NOAA STATION NO. 8531680, SANDY HOOK, NJ.

FILE:

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DRAWING TITLE: MATERIALS PLAN  
TRICIA WAY

APPLICATION BY:  
GOVERNOR'S OFFICE OF STORM RECOVERY

DATUM: NAVD88

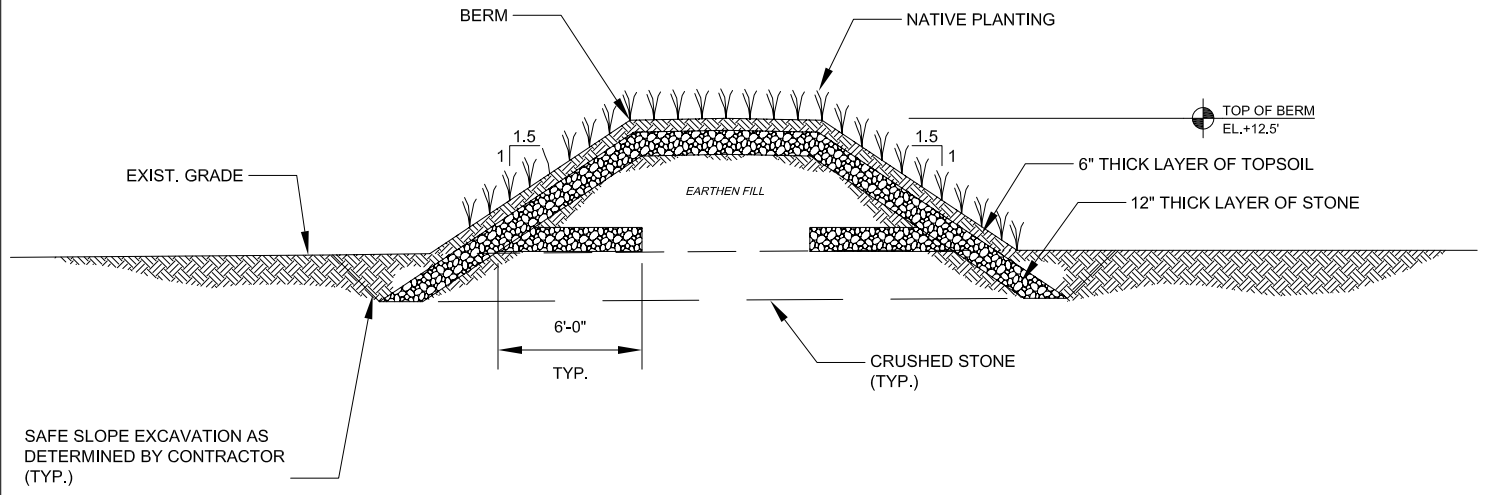
AGENT: STANTEC

DRAWING NO.: L-10  
PAGE 10 OF 11

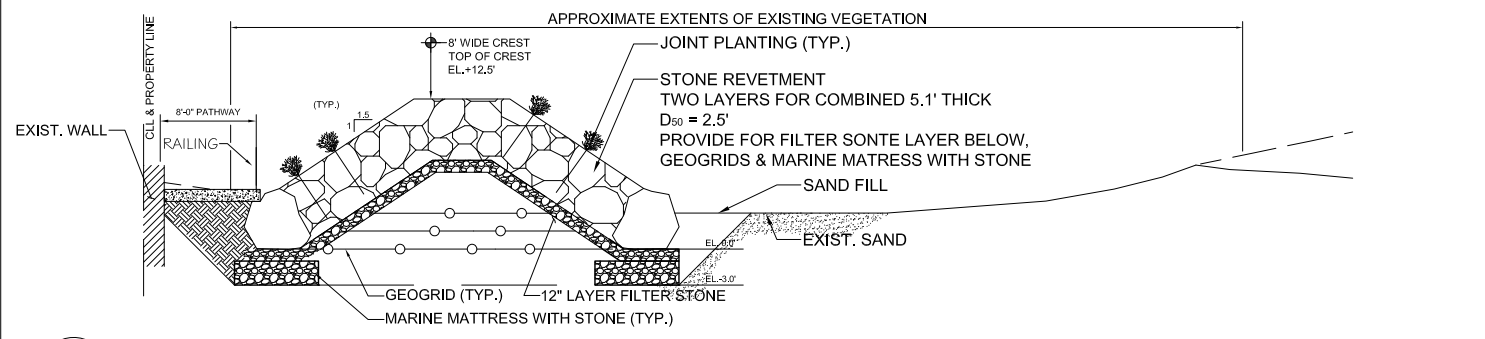
DATE 2/28/18

PROPOSED PROJECT:  
TOTENVILLE SHORELINE PROTECTION PROJECT

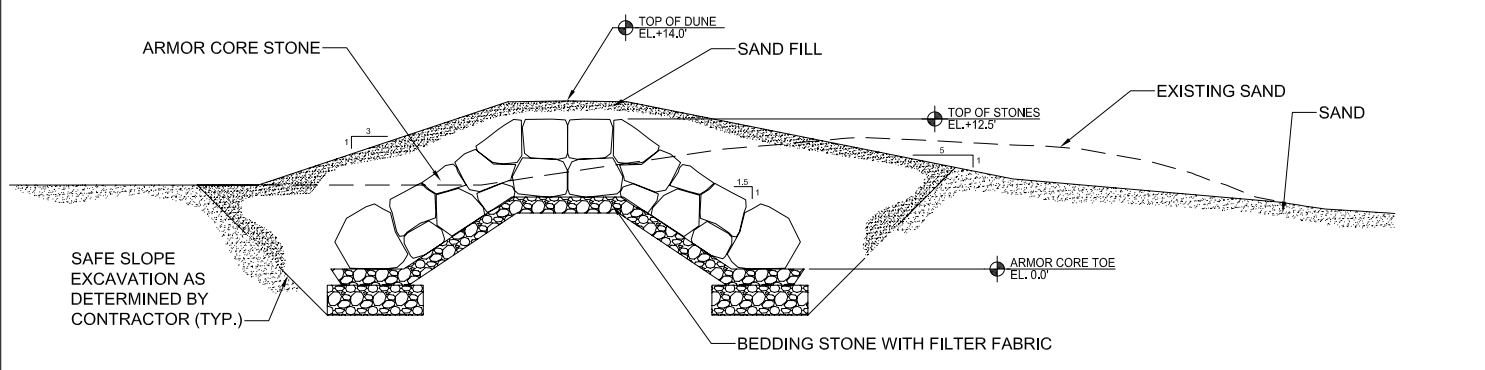
IN: TOTENVILLE STATEN ISLAND  
NEAR/AT: RARITAN BAY  
COUNTY: RICHMOND COUNTY  
STATE: NEW YORK



**1 EARTHEN BERM**  
 D-01 SCALE: 1/8"=1'-0" SCALE IN FEET



**2 WETLAND AREA ECO-REVETMENT**  
 D-01 SCALE: 1/16"=1'-0" SCALE IN FEET



**3 HYBRID DUNE / REVETMENT**  
 D-01 SCALE: 1/16"=1'-0" SCALE IN FEET

FILE:

FOR PERMIT USE ONLY NOT FOR CONSTRUCTION

DRAWING TITLE: DETAILS

APPLICATION BY:  
 GOVERNOR'S OFFICE OF STORM RECOVERY

DATUM: NAVD88

AGENT: STANTEC

DRAWING NO.: D-01

PAGE 11 OF 11 DATE 2/28/18

PROPOSED PROJECT:  
 TOTTEVILLE SHORELINE PROTECTION PROJECT

IN: TOTTEVILLE STATEN ISLAND

NEAR/AT: RARITAN BAY

COUNTY: RICHMOND COUNTY

STATE: NEW YORK