



US Army Corps
Of Engineers
Wilmington District

PUBLIC NOTICE

Issue Date: October 16, 2017
Comment Deadline: November 16, 2017
Corps Action ID Number: SAW-2017-02098

The Wilmington District, Corps of Engineers (Corps) received an application from the Town of Nags Head seeking Department of the Army authorization to dredge 4 million cubic yards of beach-quality sediments from two offshore borrow sources, and deposit the material along a 10-mile section of oceanfront shoreline, in the Town Nags Head, Dare County, North Carolina.

Specific plans and location information are described below and shown on the attached plans. This Public Notice and all attached plans are also available on the Wilmington District Web Site at

<http://www.saw.usace.army.mil/Missions/RegulatoryPermitProgram.aspx>

Applicant: Town of Nags Head
Attn: Mr. Cliff Ogburn
5401 S. Croatan Hwy
Nags Head, North Carolina 27959

AGENT (if applicable): Mrs. Haiqing Kaczkowski
Coastal Science & Engineering
160 Gills Creek Parkway
Columbia, South Carolina 29209

Authority

The Corps evaluates this application and decides whether to issue, conditionally issue, or deny the proposed work pursuant to applicable procedures of the following Statutory Authorities:

- ☒ Section 404 of the Clean Water Act (33 U.S.C. 1344)
- ☒ Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403)
- ☐ Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413)

Location



Directions to Site: The project begins with the north terminus at the Bonnet Street Beach Access and continues ten miles south to E. McCall Ct, adjacent to the Atlantic Ocean, in the Town of Nags Head, Dare County, North Carolina.

Project Area (acres): 800 acres Nearest Town: Town of Nags Head
Nearest Waterway: Atlantic Ocean River Basin: Atlantic Ocean
Latitude and Longitude: 35.957453 N, -75.622742 W

Existing Site Conditions

The Town of Nags Head encompasses approximately 11 miles of ocean shoreline on a barrier island located at the northern end of North Carolina's Outer Banks. Variations in beach sediment grain size vary in the near shore zone, with the majority ranging between 0.17 millimeters (mm) to 0.23 mm. Sediments become coarser proceeding seaward in

water depths greater than 30 feet about 1-3 miles offshore. These sediments are thought to be associated with relic deposits from former inlets and barrier ridges from earlier sea-level stands. The near shore zone is highly dynamic with exchanges of sand between the bar and the beach, resulting in a predominance of finer type sand.

The width of the berm of the island's dune system varies considerably with location along the town's beach and with the season. A previous beach nourishment action was completed in 2011 which deposited more than 4.6 million cubic yards of sediment on the beach front. Since the activity, three major storms have impacted the area resulting in a loss of 1.43 million cubic yards of material. Erosion losses vary significantly from north to south throughout the project area.

Beach and terrestrial communities are considered sparsely populated due to the harsh conditions, including salt spray, wind, shifting sands, and soils with low water retention. Extensive coastal development is another factor that could limit species diversity and abundance. Vegetation along the uppermost portions of the dry beach includes beach spurge, sea rocket, and pennywort. The upper dune areas are more stabilized with vegetation consisting of American beach grass, panic grass, sea oats, broom straw, and salt meadow hay.

Organisms in the high-energy sandy inter-tidal zones include mole crabs, coquina clams, amphipods, isopods, and polychaetes. These species are not commercially important, but serve as an important food source for surf-feeding fish and shore birds. According to data collected from the project area, the invertebrate community of the inter-tidal beaches is strongly seasonal.

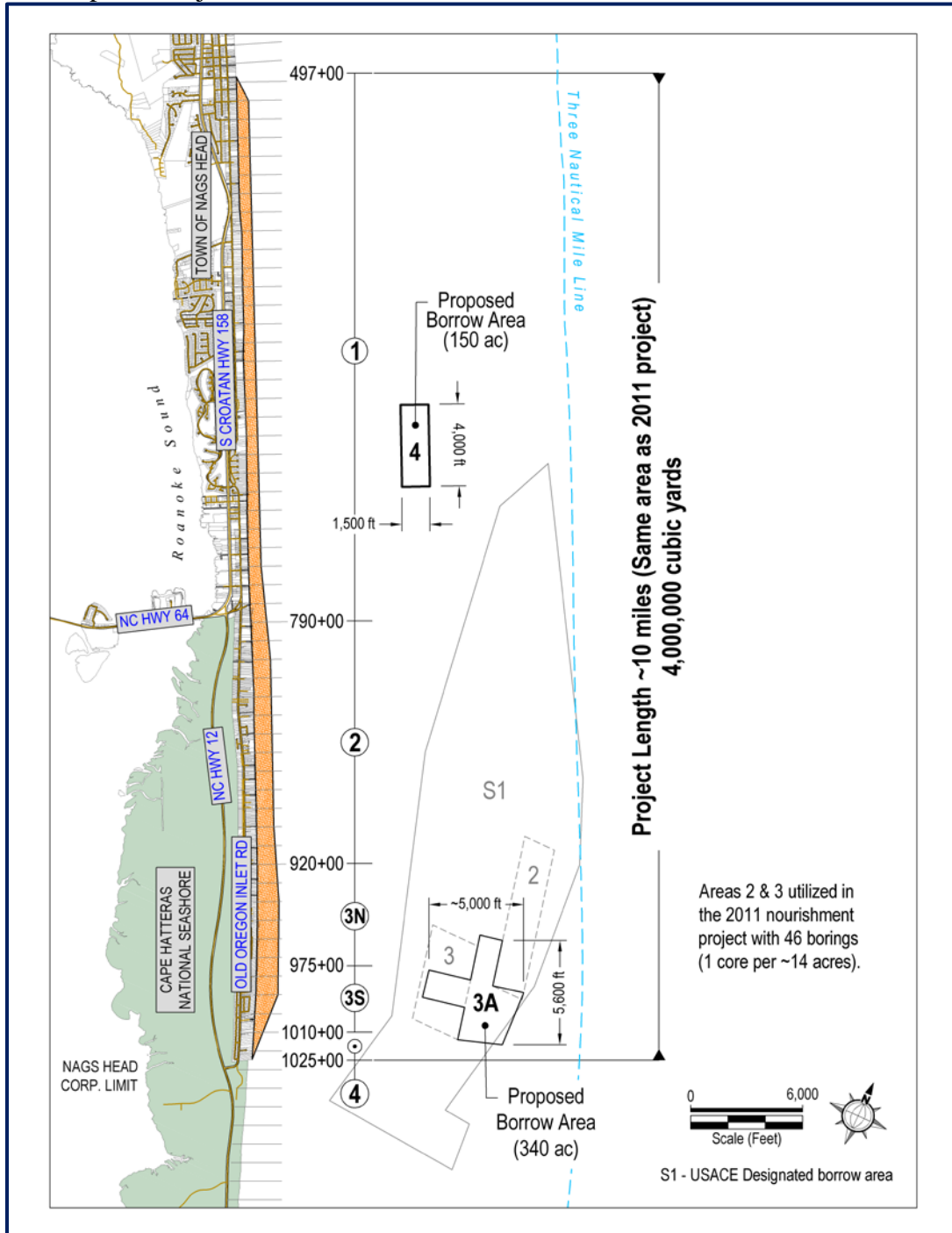
Applicant's Stated Purpose

The purpose of the proposed action is to facilitate a long-term shoreline management program to sustain the eroding beach and provide support to a significant portion of the local economy and maintain local and regional tax bases. In order to accomplish this goal, the Town is proposing to maintain its oceanfront beach and dune system to a configuration that will: (1) restore sand losses due to chronic erosion and recent storms; (2) provide a higher level of storm protection (3) provide a wider recreational beach and create habitats for wildlife, (4) address high erosion rates at the south end of Nags Head. (5) integrate a dune management plan into the renourishment design and (6) maintain Nags Head's eligibility for future FEMA community assistance funds.

Project Description

The proposed action will include sand placement along a 10-mile section of the Town's oceanfront shoreline. Beach quality sand would be dredged using a self-contained ocean-certified hopper dredge and/or a hydraulic pipeline dredge. Material will be obtained from two borrow areas located 1.0-2.5 miles offshore of Nags Head. Borrow Areas 3A

and 4 encompass 490 acres and contain over 6 million cubic yards of sand. Placement onto the beach would be accomplished via submerged pipeline with direct pump-out. Once discharged, the sand will be shaped and graded according to the design template using earth-moving equipment such as bulldozers and excavators. The average fill density (volume of nourishment per linear foot of beach) is 75 cubic yards per linear foot of shoreline, which is equivalent to an average beach width of approximately 60 feet after natural profile adjustment.



Avoidance and Minimization

An extensive alternatives analysis was performed for this permit as well as the 2011 permit action. This included the evaluation of a no action alternative; a winter dredging alternative, a retreat and relocate alternative; and the preferred alternative. Many alternatives were identified and evaluated through the scoping and pre-application process, and further detailed descriptions of all alternatives may be reviewed in the application and associated applicant prepared Environmental Assessment.

Essential Fish Habitat

Pursuant to the Magnuson-Stevens Fishery Conservation and Management Act, this Public Notice initiates the Essential Fish Habitat (EFH) consultation requirements. The Corps' initial determination is that the proposed project may affect, but not likely to adversely affect EFH or associated fisheries managed by the South Atlantic or Mid Atlantic Fishery Management Councils or the National Marine Fisheries Service. As part of the pre-application and scoping process, the applicant submitted an EFH assessment to The Nation Marine Fisheries Service for review.

Cultural Resources

Pursuant to Section 106 of the National Historic Preservation Act of 1966, Appendix C of 33 CFR Part 325, and the 2005 Revised Interim Guidance for Implementing Appendix C, the District Engineer consulted district files and records and the latest published version of the National Register of Historic Places and initially determines that:

- ☐ Should historic properties, or properties eligible for inclusion in the National Register, be present within the Corps' permit area; the proposed activity requiring the DA permit (the undertaking) is a type of activity that will have no potential to cause an effect to an historic properties.
- ☒ No historic properties, nor properties eligible for inclusion in the National Register, are present within the Corps' permit area; therefore, there will be no historic properties affected. The Corps subsequently requests concurrence from the SHPO (or THPO).
- ☐ Properties ineligible for inclusion in the National Register are present within the Corps' permit area; there will be no historic properties affected by the proposed work. The Corps subsequently requests concurrence from the SHPO (or THPO).
- ☐ Historic properties, or properties eligible for inclusion in the National Register, are present within the Corps' permit area; however, the undertaking will have no adverse effect on these historic properties. The Corps subsequently requests concurrence from the SHPO (or THPO).

- ☐ Historic properties, or properties eligible for inclusion in the National Register, are present within the Corps' permit area; moreover, the undertaking may have an adverse effect on these historic properties. The Corps subsequently initiates consultation with the SHPO (or THPO).
- ☐ The proposed work takes place in an area known to have the potential for the presence of prehistoric and historic cultural resources; however, the area has not been formally surveyed for the presence of cultural resources. No sites eligible for inclusion in the National Register of Historic Places are known to be present in the vicinity of the proposed work. Additional work may be necessary to identify and assess any historic or prehistoric resources that may be present.

The District Engineer's final eligibility and effect determination will be based upon coordination with the SHPO and/or THPO, as appropriate and required, and with full consideration given to the proposed undertaking's potential direct and indirect effects on historic properties within the Corps-identified permit area.

Endangered Species

Pursuant to the Endangered Species Act of 1973, the Corps reviewed the project area, examined all information provided by the applicant and consulted the latest North Carolina Natural Heritage Database. Based on available information:

- ☐ The Corps determines that the proposed project would not affect federally listed endangered or threatened species or their formally designated critical habitat.
- ☒ The Corps determines that the proposed project may affect, not likely to adversely affect federally listed endangered or threatened species or their formally designated critical habitat. The Corps initiates consultation under Section 7 of the ESA and will not make a permit decision until the consultation process is complete.
- ☐ The Corps is not aware of the presence of species listed as threatened or endangered or their critical habitat formally designated pursuant to the Endangered Species Act of 1973 (ESA) within the project area. The Corps will make a final determination on the effects of the proposed project upon additional review of the project and completion of any necessary biological assessment and/or consultation with the U.S. Fish and Wildlife Service and/or National Marine Fisheries Service.

Other Required Authorizations

The Corps forwards this notice and all applicable application materials to the appropriate State agencies for review.

North Carolina Division of Water Resources (NCDWR): The Corps will generally not make a final permit decision until the NCDWR issues, denies, or waives the state Certification as required by Section 401 of the Clean Water Act (PL 92-500). The receipt of the application and this public notice, combined with the appropriate application fee, at the NCDWR Central Office in Raleigh constitutes initial receipt of an application for a 401 Certification. A waiver will be deemed to occur if the NCDWR fails to act on this request for certification within sixty days of receipt of a complete application. Additional information regarding the 401 Certification may be reviewed at the NCDWR Central Office, 401 and Buffer Permitting Unit, 512 North Salisbury Street, Raleigh, North Carolina 27604-2260. All persons desiring to make comments regarding the application for a 401 Certification should do so, in writing, by November 7, 2017 to:

NCDWR Central Office
Attention: Ms. Karen Higgins, 401 and Buffer Permitting Unit
(USPS mailing address): 1617 Mail Service Center, Raleigh, NC 27699-1617

Or,

(physical address): 512 North Salisbury Street, Raleigh, North Carolina 27604

North Carolina Division of Coastal Management (NCDCM):

- ☒ The application did not include a certification that the proposed work complies with and would be conducted in a manner that is consistent with the approved North Carolina Coastal Zone Management Program. Pursuant to 33 CFR 325.2 (b)(2) the Corps cannot issue a Department of Army (DA) permit for the proposed work until the applicant submits such a certification to the Corps and the NCDCM, and the NCDCM notifies the Corps that it concurs with the applicant's consistency certification. As the application did not include the consistency certification, the Corps will request, upon receipt, concurrence or objection from the NCDCM.
- ☐ Based upon all available information, the Corps determines that this application for a Department of Army (DA) permit does not involve an activity which would affect the coastal zone, which is defined by the Coastal Zone Management (CZM) Act (16 U.S.C. § 1453).

Evaluation

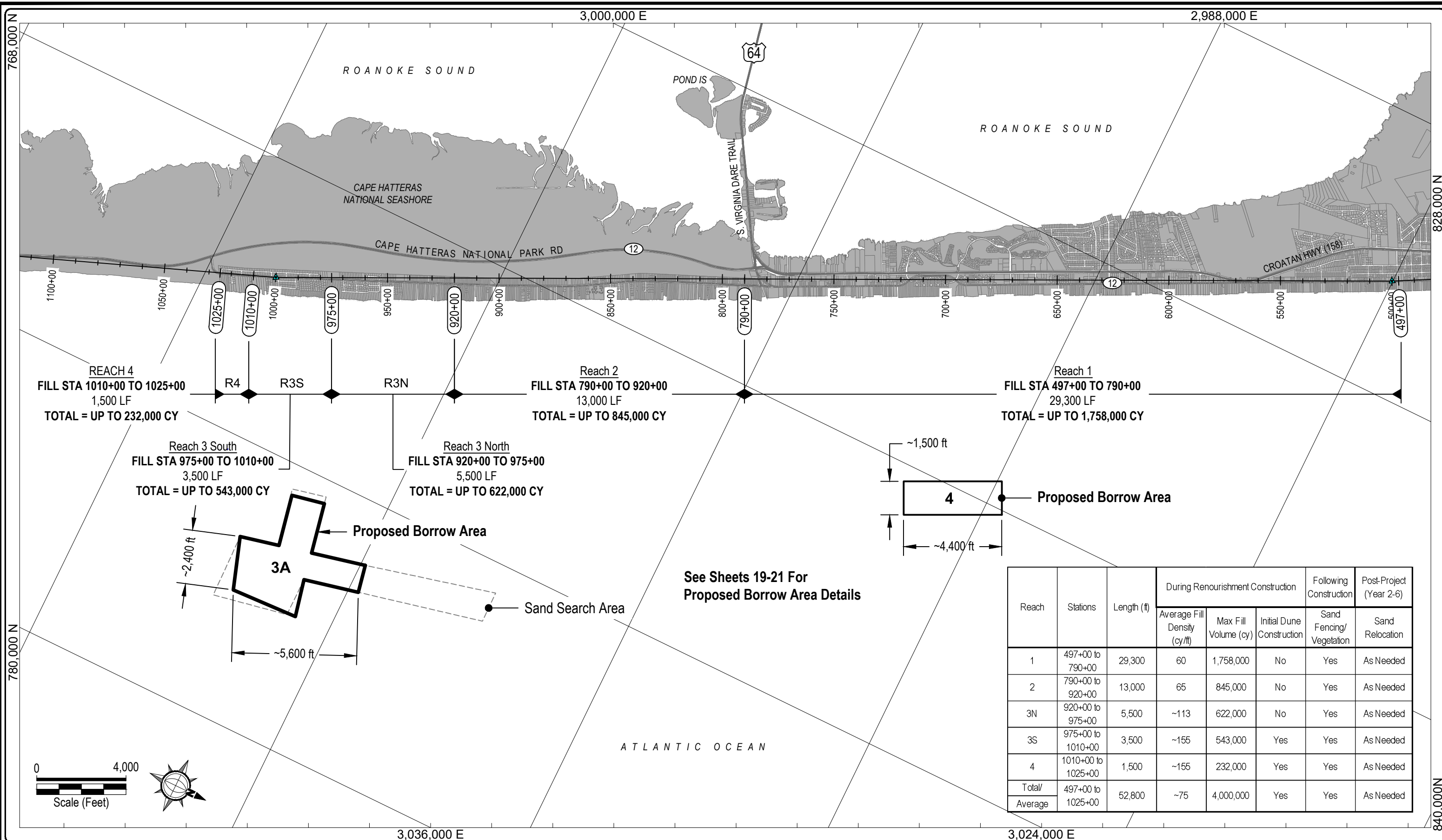
The decision whether to issue a permit will be based on an evaluation of the probable impacts including cumulative impacts of the proposed activity on the public interest. That decision will reflect the national concern for both protection and utilization of important resources. The benefit which reasonably 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, flood plain values (in accordance with Executive Order 11988), 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. For activities involving the discharge of dredged or fill materials in waters of the United States, the evaluation of the impact of the activity on the public interest will include application of the Environmental Protection Agency's 404(b)(1) guidelines.

Commenting Information

The Corps of Engineers is soliciting comments from the public; Federal, State and local agencies and officials, including any consolidated State Viewpoint or written position of the Governor; 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 the preparation of an Environmental Assessment (EA) and/or an Environmental Impact Statement (EIS) pursuant to the National Environmental Policy Act (NEPA). Comments are also used to determine the need for a public hearing and to determine the overall public interest of the proposed activity.


Any person may request, in writing, within the comment period specified in this notice, that a public hearing be held to consider the application. Requests for public hearings shall state, with particularity, the reasons for holding a public hearing. Requests for a public hearing shall be granted, unless the District Engineer determines that the issues raised are insubstantial or there is otherwise no valid interest to be served by a hearing.

The Corps of Engineers, Wilmington District will receive written comments pertinent to the proposed work, as outlined above, until 5pm November 12, 2017. Comments should be submitted to Josh Pelletier, Washington Regulatory Field Office,, 2407 West Fifth Street , Washington, North Carolina 27889, at (910) 251-4605.



Reach	Stations	Length (ft)	During Renourishment Construction			Following Construction	Post-Project (Year 2-6)
			Average Fill Density (cy/ft)	Max Fill Volume (cy)	Initial Dune Construction	Sand Fencing/Vegetation	Sand Relocation
1	497+00 to 790+00	29,300	60	1,758,000	No	Yes	As Needed
2	790+00 to 920+00	13,000	65	845,000	No	Yes	As Needed
3N	920+00 to 975+00	5,500	~113	622,000	No	Yes	As Needed
3S	975+00 to 1010+00	3,500	~155	543,000	Yes	Yes	As Needed
4	1010+00 to 1025+00	1,500	~155	232,000	Yes	Yes	As Needed
Total/Average	497+00 to 1025+00	52,800	~75	4,000,000	Yes	Yes	As Needed

NOTES:
DATUM:
HORIZONTAL: SPCS NAD '83 (FEET) NC ZONE 3200



Coastal Science & Engineering

PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH
RENOURISHMENT

DRAWING TITLE:
OVERALL PROJECT PLAN

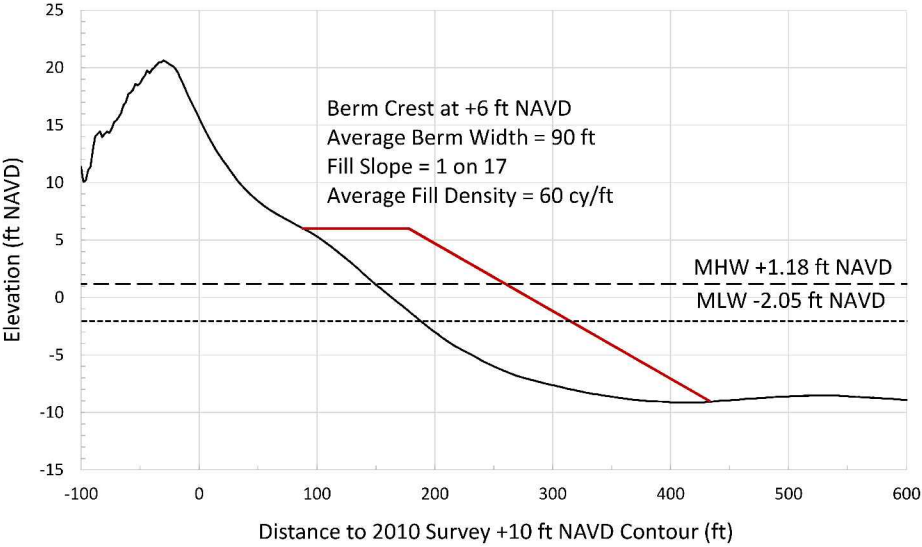


North Carolina
Professional Engineer
37281
T. Hair
09/15/2017
XIAOQIANG LIU KACZKOWSKI

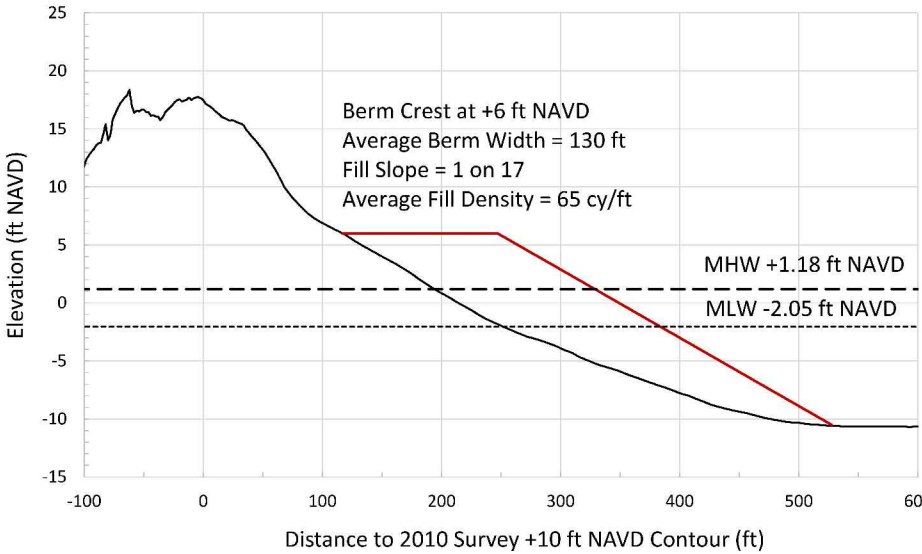
SCALE: AS SHOWN
DATE: 15 Sep 2017
DRAWN BY: T. Hair
APPROVED BY: HLK
PROJECT #: 2450

FIGURE #
02

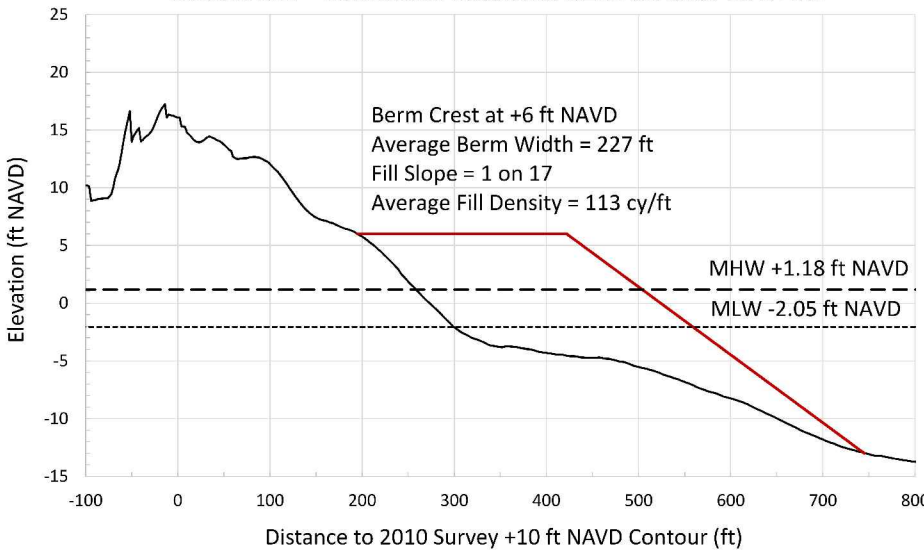
Reach 1 – Between Stations 497+00 and 790+00



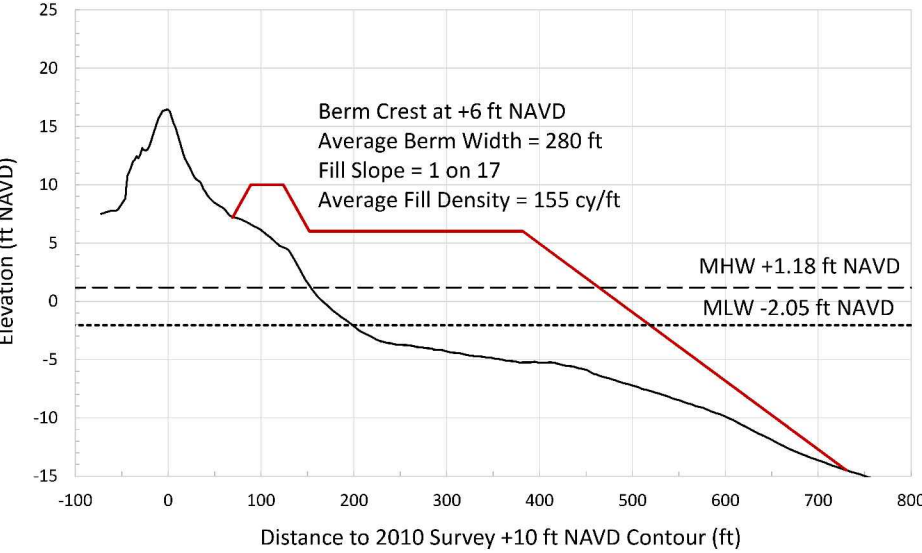
Reach 2 – Between Stations 790+00 and 920+00



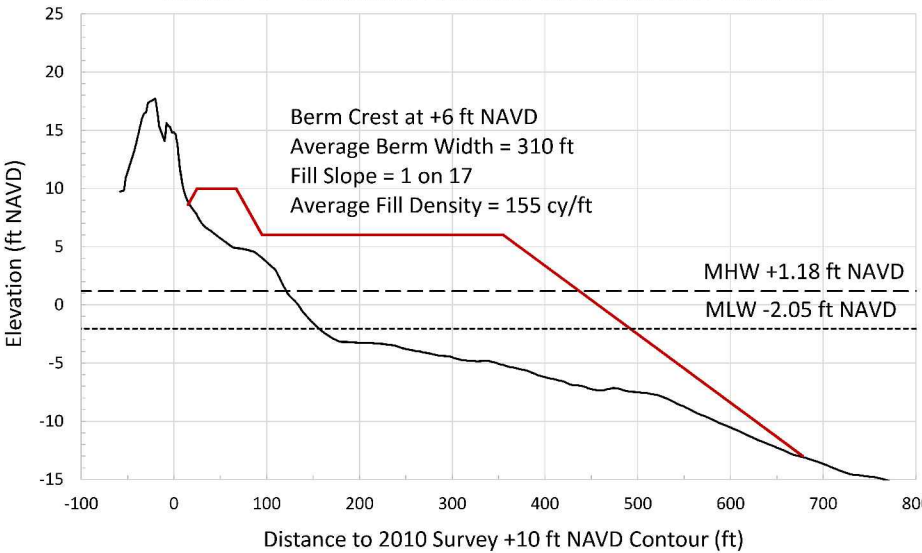
Reach 3N – Between Stations 920+00 and 975+00



Reach 3S – Between Stations 975+00 and 1010+00



Reach 4 – Between Stations 1010+00 and 1025+00



FILL Design:

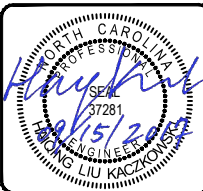
- (1) Profiles shown on this sheet are the averaged profiles of each reach in June 2016 to represent the typical beach conditions at the time of preliminary design and permit application.
- (2) Typical berm elevation is designed to be +6 ft NAVD with the possible maximum berm elevation to be +7 ft NAVD along some sections of north Nags Head where the natural dry-sand beach elevation is higher than south Nags Head.
- (3) Initial protective dunes will be constructed along all or a portion of Reaches 3N, 3S, and 4. The maximum elevation of the protective dune will be +12 feet (ft) above NAVD and the average dune elevation will be +10 ft NAVD. The typical crest width of the protective dune will be 20-50 ft. The typical slope of the protective dune will be ~1 on 5 (vertical versus horizontal), and the maximum slope will be ~1 on 3. The final design of the initial dune will be determined based on the beach condition and oceanfront structure location at the time of construction.
- (4) Fill template at each section of the project area will be adjusted based on the beach condition and available funds at the time of final design and construction, but the total fill quantity of each reach will not exceed the maximum volume listed in the table on Sheet 02.



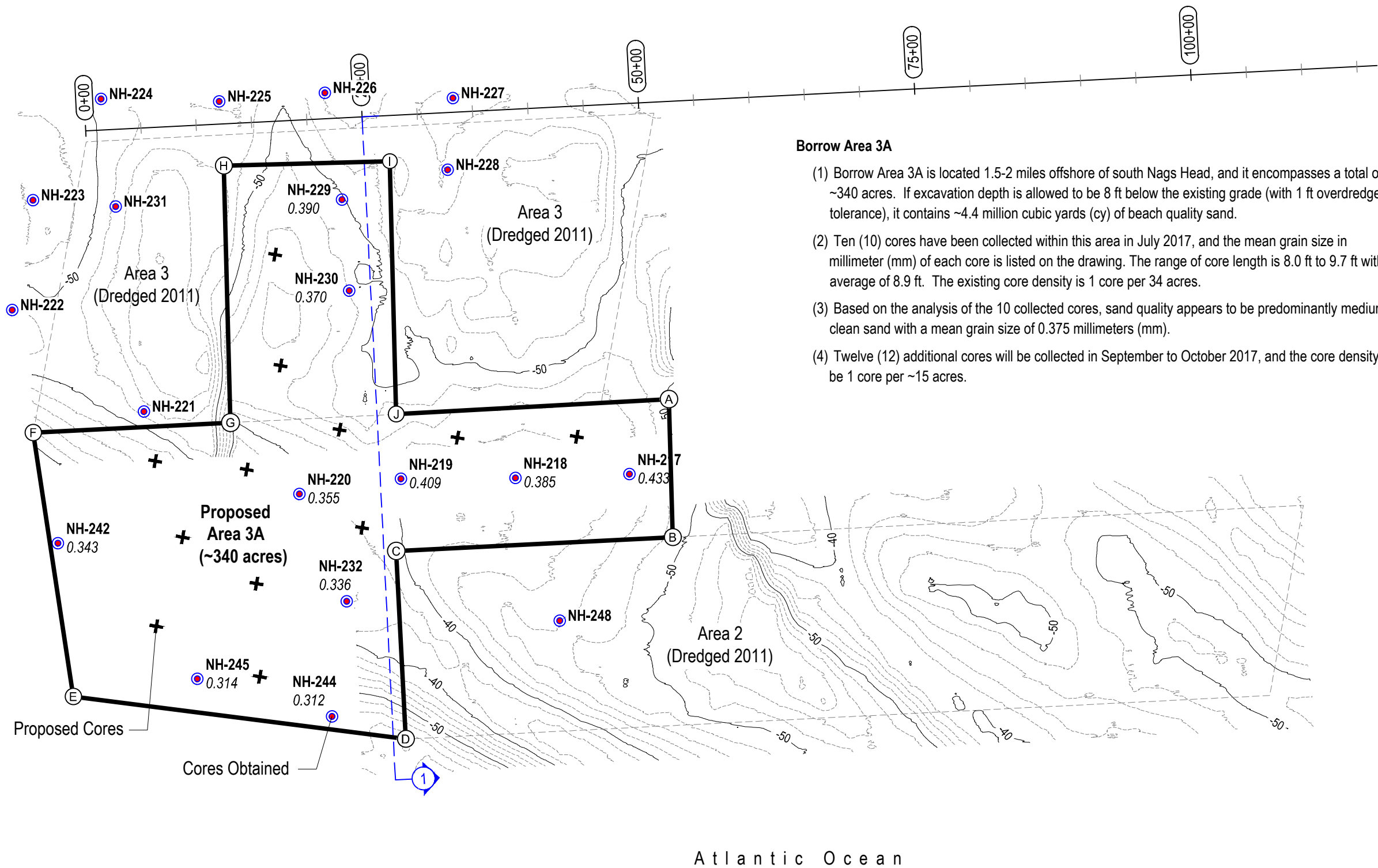
PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROPOSED FILL PROFILES



SCALE: AS SHOWN
DATE: 15 Sep 2017
DRAWN BY: T. Hair
APPROVED BY: HLK
PROJECT #: 2458



- Borrow Area 3A**
- (1) Borrow Area 3A is located 1.5-2 miles offshore of south Nags Head, and it encompasses a total of ~340 acres. If excavation depth is allowed to be 8 ft below the existing grade (with 1 ft overdredge tolerance), it contains ~4.4 million cubic yards (cy) of beach quality sand.
 - (2) Ten (10) cores have been collected within this area in July 2017, and the mean grain size in millimeter (mm) of each core is listed on the drawing. The range of core length is 8.0 ft to 9.7 ft with an average of 8.9 ft. The existing core density is 1 core per 34 acres.
 - (3) Based on the analysis of the 10 collected cores, sand quality appears to be predominantly medium, clean sand with a mean grain size of 0.375 millimeters (mm).
 - (4) Twelve (12) additional cores will be collected in September to October 2017, and the core density will be 1 core per ~15 acres.

Borrow Area 3A Coordinates		
Easting	Northing	Point
3,026,712.08	792,204.05	A
3,027,933.66	792,454.57	B
3,028,491.56	790,016.30	C
3,030,148.73	790,395.49	D
3,030,292.73	787,370.81	E
3,028,006.11	786,600.67	F
3,027,608.50	788,338.37	G
3,025,332.35	787,876.35	H
3,025,033.95	789,346.37	I
3,027,273.83	789,801.03	J

VERTICAL: NAVD '88 (FEET)
 HORIZONTAL: SPCS NAD '83 (FEET)
 NC ZONE 3200
 Bathymetry Shown Collected 24 June 2016

0 1,000
 Scale (Feet)



PREPARED FOR:
 TOWN OF NAGS HEAD
 5401 SOUTH CROATAN HWY
 NAGS HEAD NC 27959

PROJECT:
 NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
 PROPOSED BORROW
 AREA 3A
 (mean grain size shown)

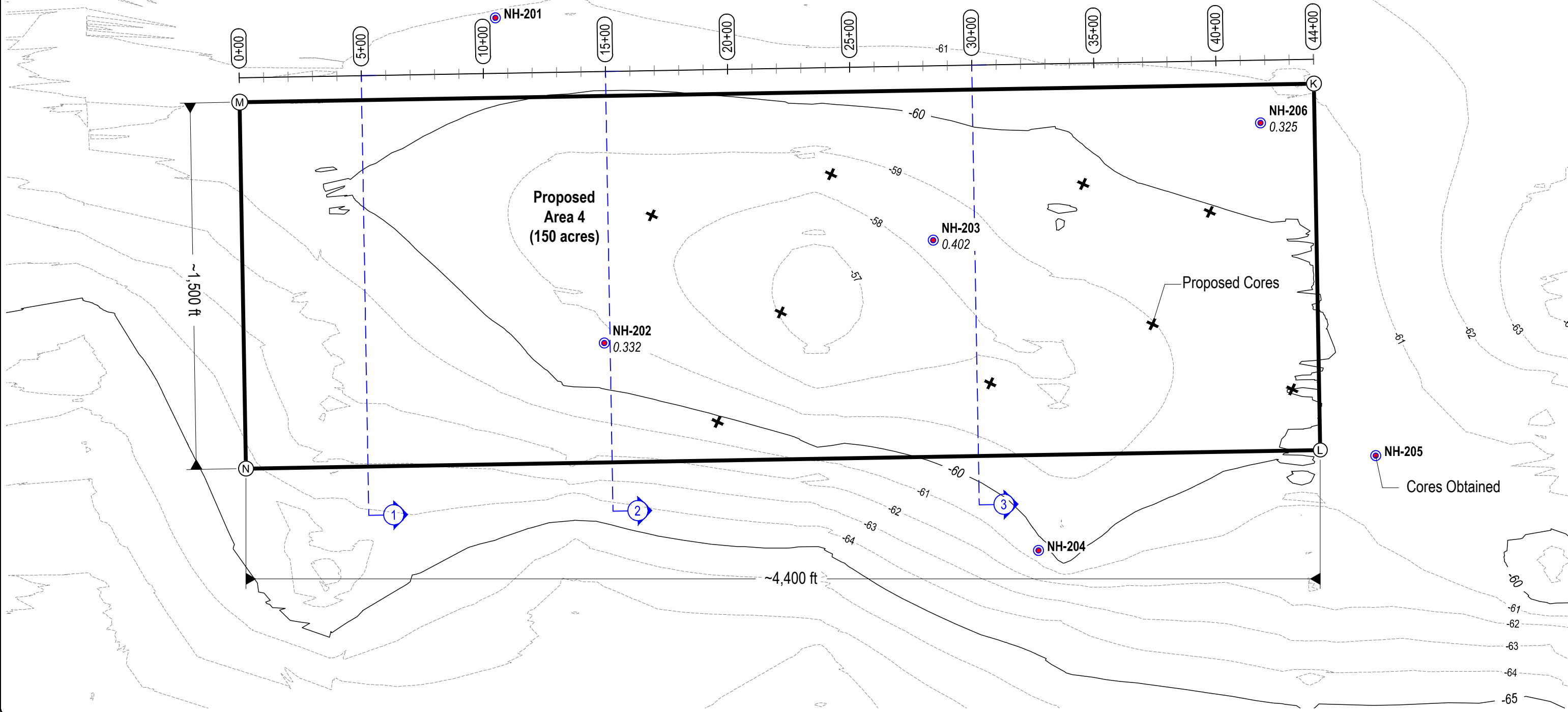


SCALE: AS SHOWN
 DATE: 15 Sep 2017
 DRAWN BY: T. Hair
 APPROVED BY: HLK
 PROJECT #: 2458

Borrow Area 4

- (1) Borrow Area 4 is located ~1 mile offshore of north Nags Head, and it encompasses a total of ~150 acres. If excavation depth is allowed to be 8 ft below the existing grade (with 1 ft overdredge tolerance), it contains ~2 million cubic yards (cy) of beach quality sand which should be sufficient for Reach 1 if the maximum permitted volume of 1.758 million cy is awarded at the time of construction.
- (2) Three (3) cores have been collected within this area in July 2017, and the range of core length is 6.0 ft to 9.1 ft with an average of 7.5 ft. The existing core density is 1 core per 50 acres.
- (3) Based on the analysis of the 3 collected cores, sand quality appears to be predominantly medium, clean sand with a mean grain size of 0.353 millimeters (mm).
- (4) Ten (10) additional cores will be collected in September to October 2017, and the core density will be 1 core per ~15 acres.

Borrow Area 4 Coordinates		
Easting	Northing	Point
3,010,828.13	816,183.00	K
3,012,176.47	816,840.26	L
3,012,756.08	812,227.88	M
3,014,104.42	812,885.13	N



VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET)
NC ZONE 3200
Bathymetry Shown Collected 24 June 2016

0 400
Scale (Feet)

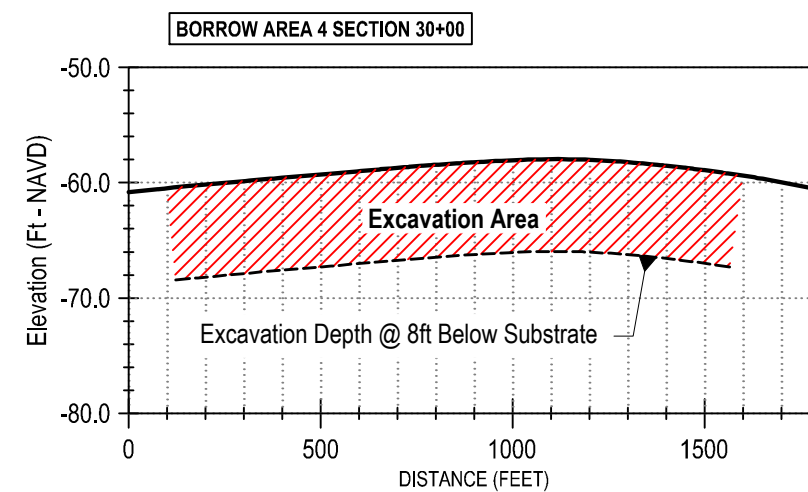
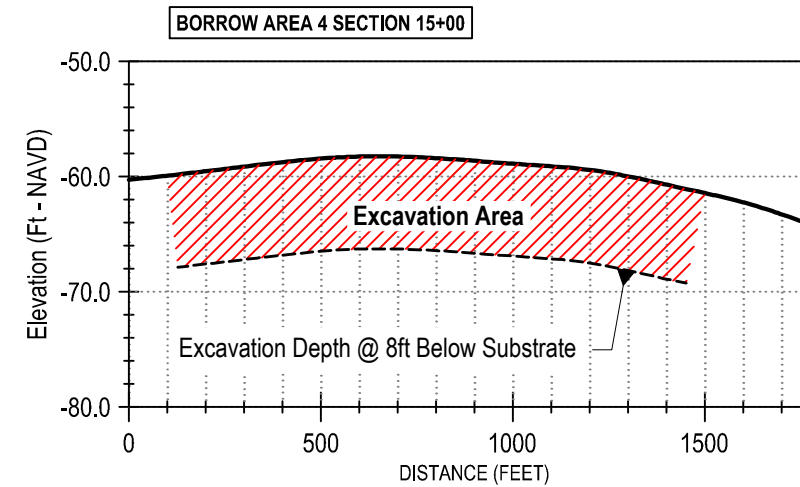
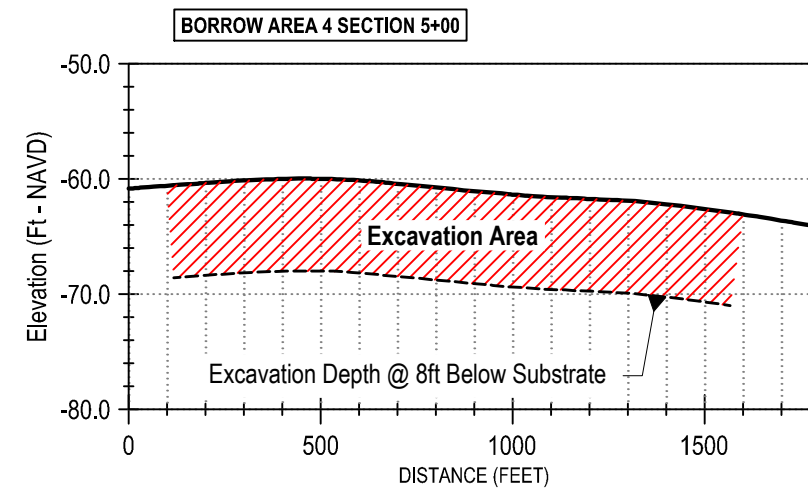
PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROPOSED BORROW
AREA 4
(mean grain size shown)

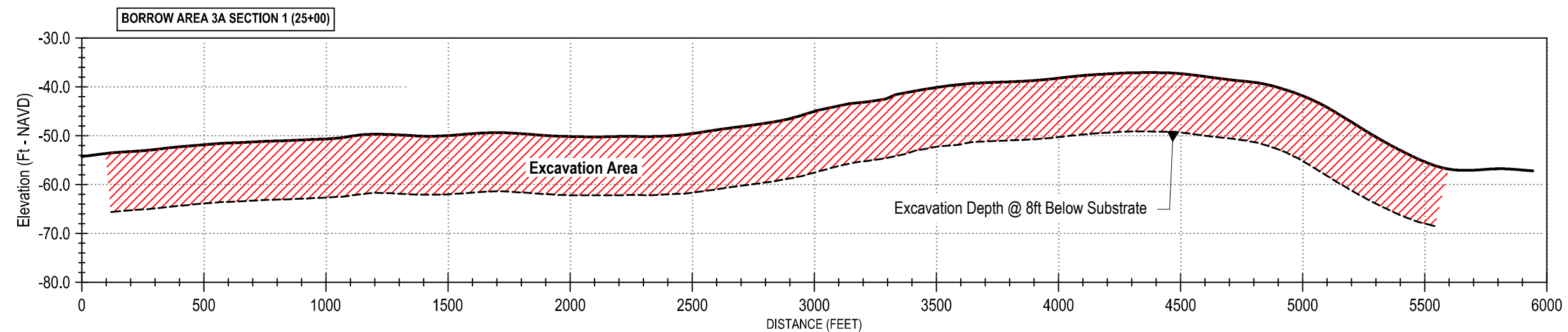
SCALE: AS SHOWN
DATE: 15 Sep 2017
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APPROVED BY: HLK
PROJECT #: 2458

SHEET #
20



EXCAVATION DEPTH

- (1) The Town of Nags Head proposes to have an excavation depth of 8 feet below the existing grade with 1 foot overdredge tolerance based on the coring analysis in the borrow areas. This excavation depth was permitted and used in the initial 2011 project.
- (2) Bathymetric data in Borrow Areas 3A and 4 were collected in June 2016.
- (3) Additional bathymetric data will be collected in Borrow Area 3A in September to October 2017 to provide the full coverage of the area.



VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) NC ZONE 3200
Bathymetry Shown Collected 24 June 2016



PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

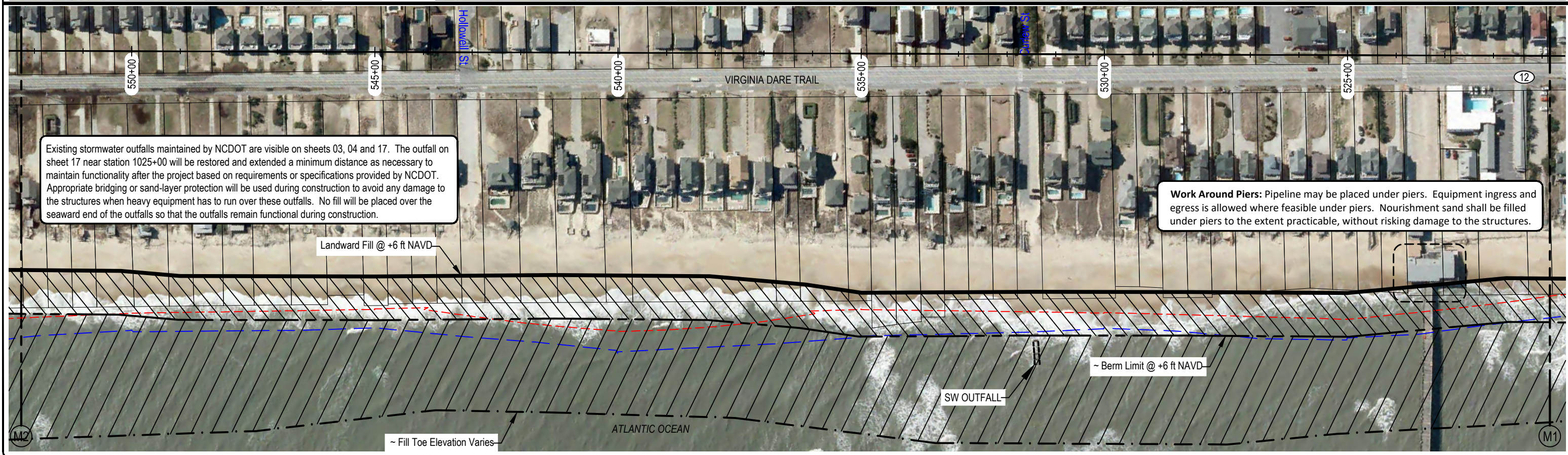
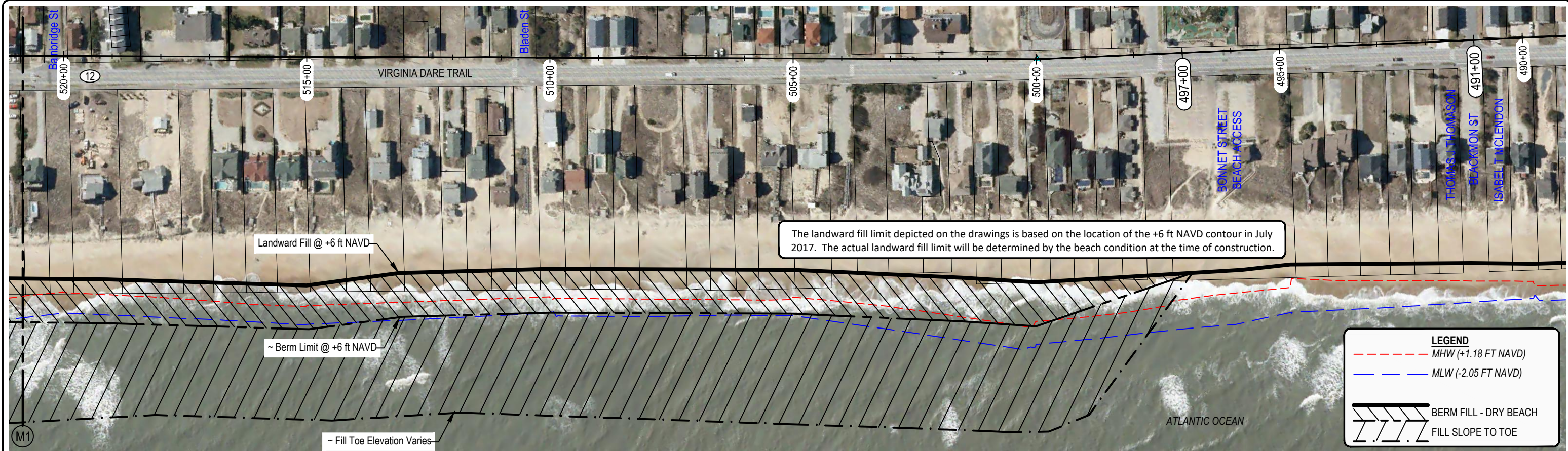
PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROPOSED BORROW
EXCAVATION SECTIONS



SCALE: AS SHOWN
DATE: 15 Sep 2017
DRAWN BY: T. Hair
APPROVED BY: HLK
PROJECT #: 2458

21



NOTES:
 VERTICAL: NAVD '88 (FEET)
 HORIZONTAL: SPCS NAD '83 (FEET)
 NC ZONE 3200
 MHW = MEAN HIGH WATER
 MLW = MEAN LOW WATER
 PHOTO SOURCE: DARE CTY GIS (2016)

0 200
 Scale (Feet)



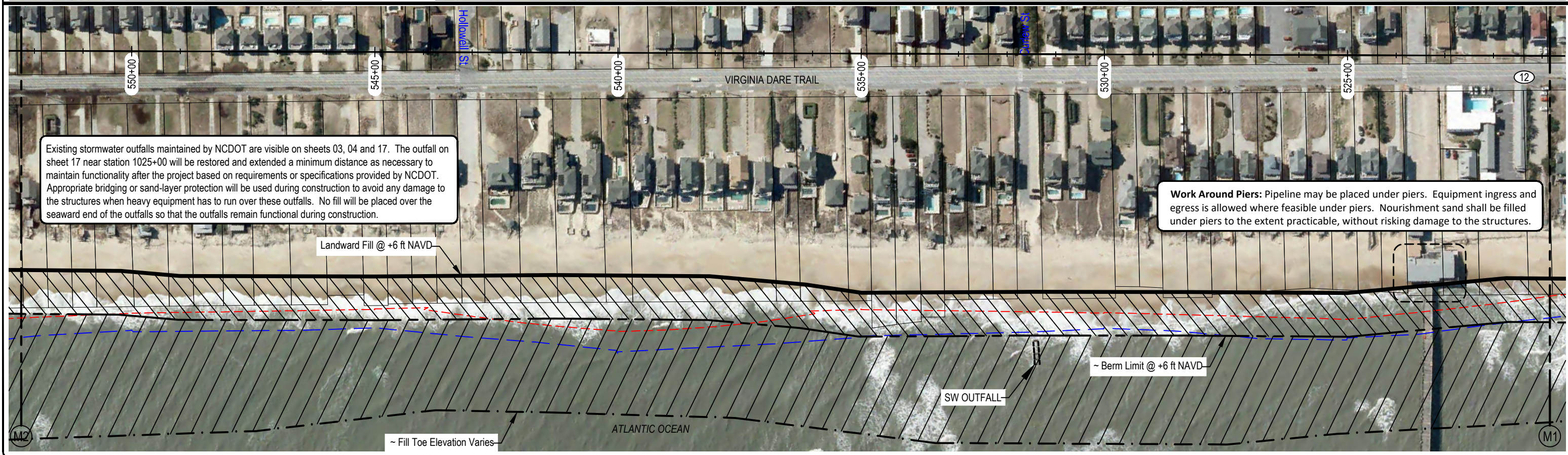
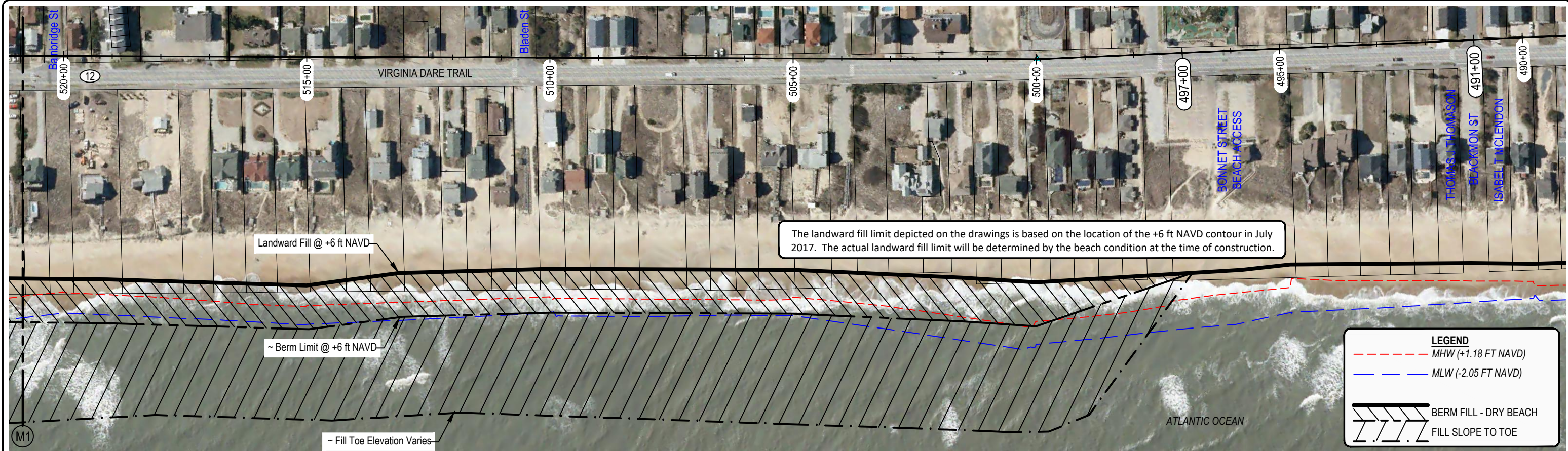
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 5401 SOUTH CROATAN HWY
 NAGS HEAD NC 27959

PROJECT:
 NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
 PROJECT PLAN
 REACH 01
 STA 490+00 TO 552+00



SCALE:	AS SHOWN	SHEET #
DATE:	15 Sep 2017	03
DRAWN BY:	T. Hair	
APPROVED BY:	HLK	
PROJECT #:	2458	



NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET)
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

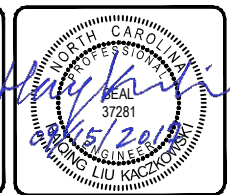
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Scale (Feet)



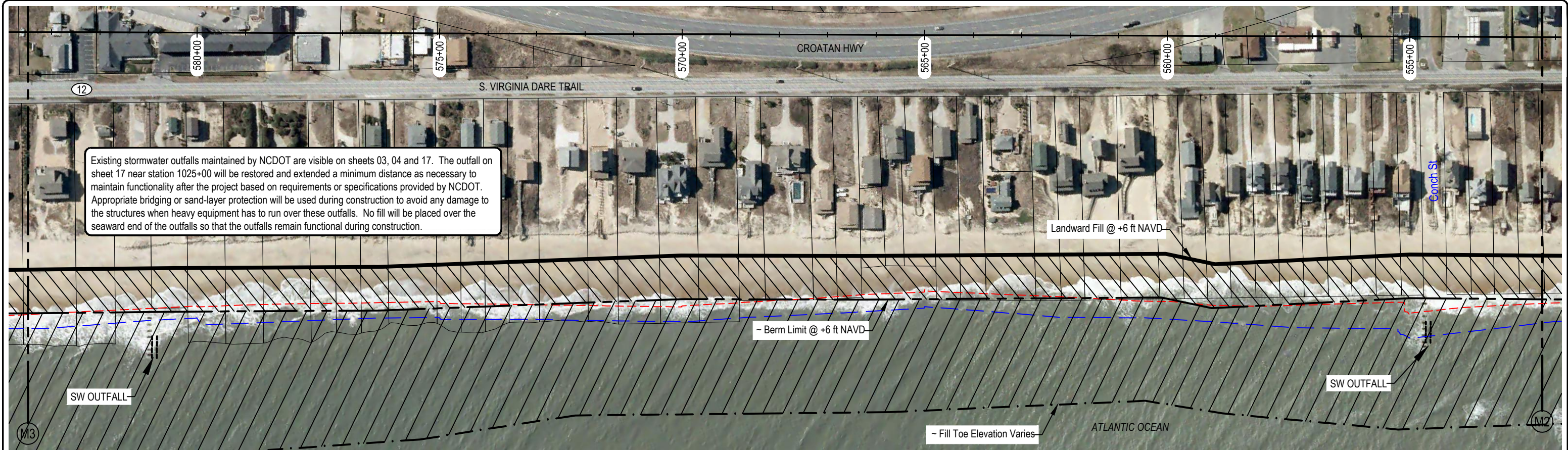
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NAGS HEAD BEACH RENOURISHMENT


DRAWING TITLE:
PROJECT PLAN
REACH 01
STA 490+00 TO 552+00



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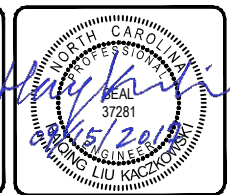
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VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)



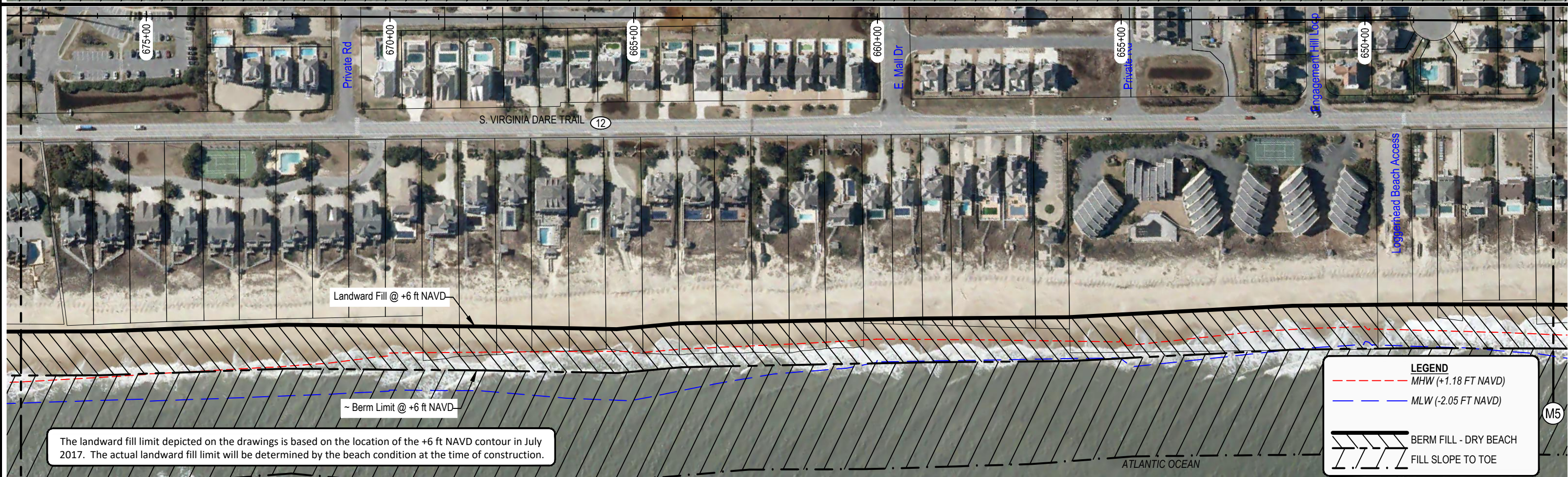
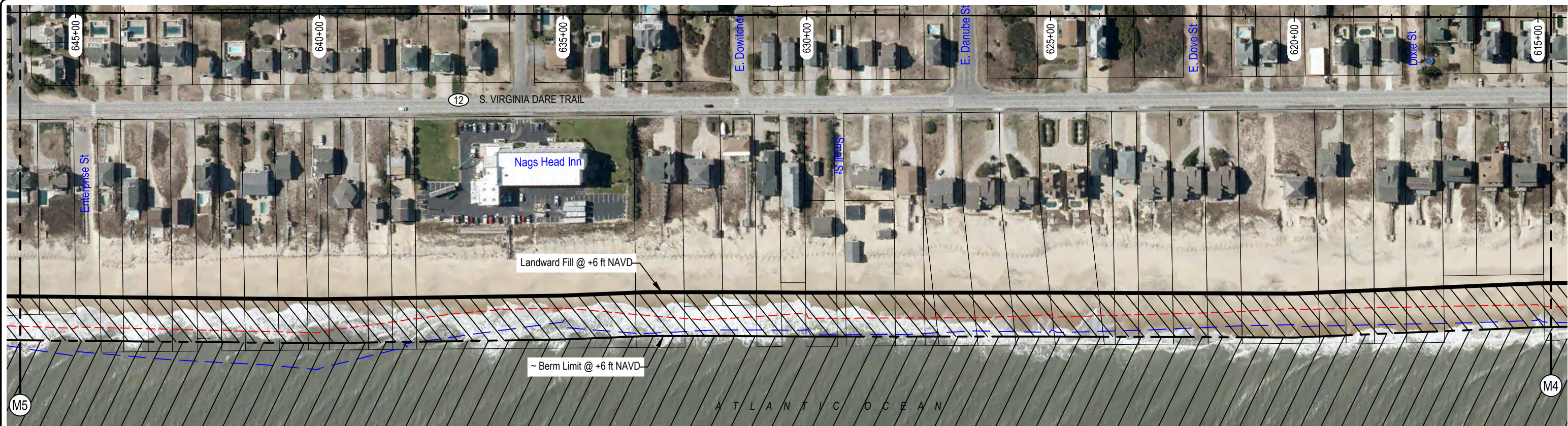
PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
REACH 01
STA 552+00 TO 615+00



SCALE: AS SHOWN	SHEET #
DATE: 15 Sep 2017	04
DRAWN BY: T. Hair	
APPROVED BY: HLK	
PROJECT #: 2458	



The landward fill limit depicted on the drawings is based on the location of the +6 ft NAVD contour in July 2017. The actual landward fill limit will be determined by the beach condition at the time of construction.

LEGEND

--- MHW (+1.18 FT NAVD)

--- MLW (-2.05 FT NAVD)

BERM FILL - DRY BEACH

FILL SLOPE TO TOE

NOTES:

VERTICAL: NAVD '88 (FEET)

HORIZONTAL: SPCS NAD '83 (FEET)

NC ZONE 3200

MHW = MEAN HIGH WATER

MLW = MEAN LOW WATER

PHOTO SOURCE: DARE CTY GIS (2016)

0 200

Scale (Feet)

Coastal Science & Engineering

PREPARED FOR:

TOWN OF NAGS HEAD

5401 SOUTH CROATAN HWY

NAGS HEAD NC 27959

PROJECT:

NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:

PROJECT PLAN

STA 615+00 TO 667+00

SCALE: AS SHOWN

DATE: 15 Sep 2017

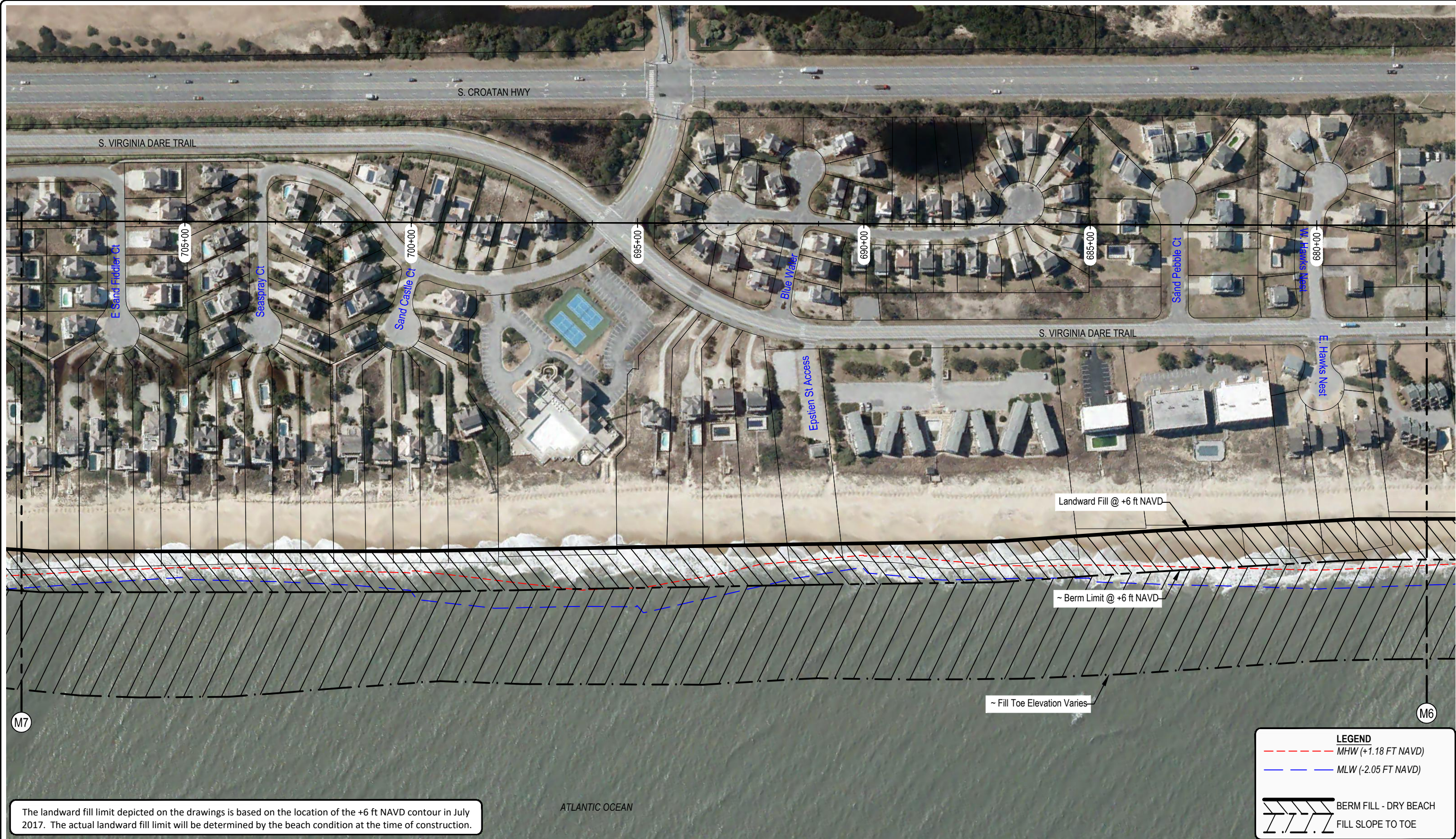
DRAWN BY: T. Hair

APPROVED BY: HLK

PROJECT #: 2458

SHEET #

05



NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

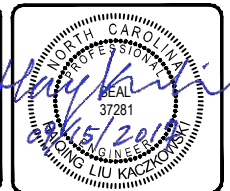
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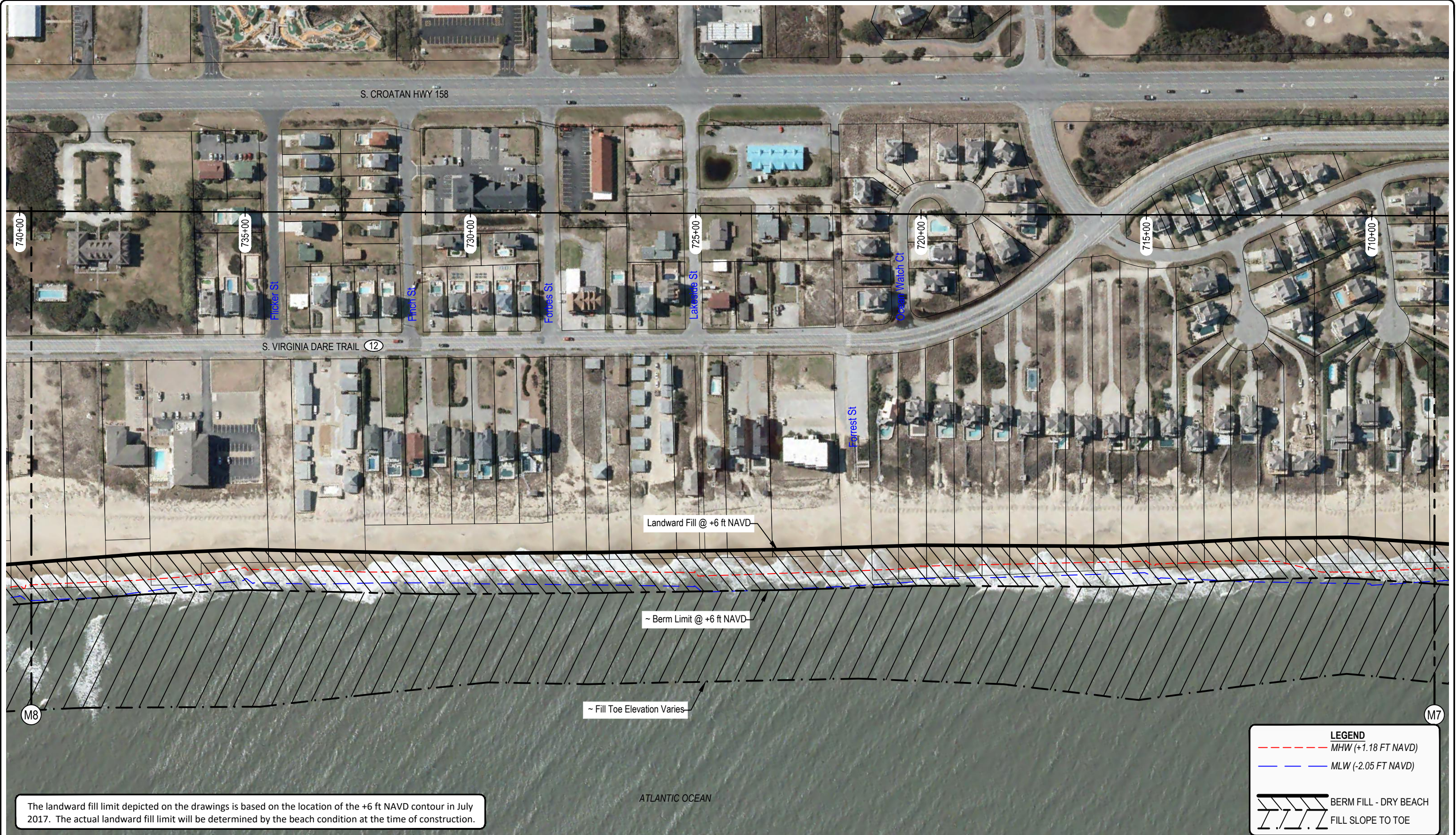
PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
STA 667+00 TO 708+00



SCALE: AS SHOWN	SHEET #
DATE: 15 Sep 2017	06
DRAWN BY: T. Hair	
APPROVED BY: HLK	
PROJECT #: 2458	



NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

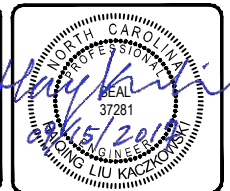
Scale (Feet)



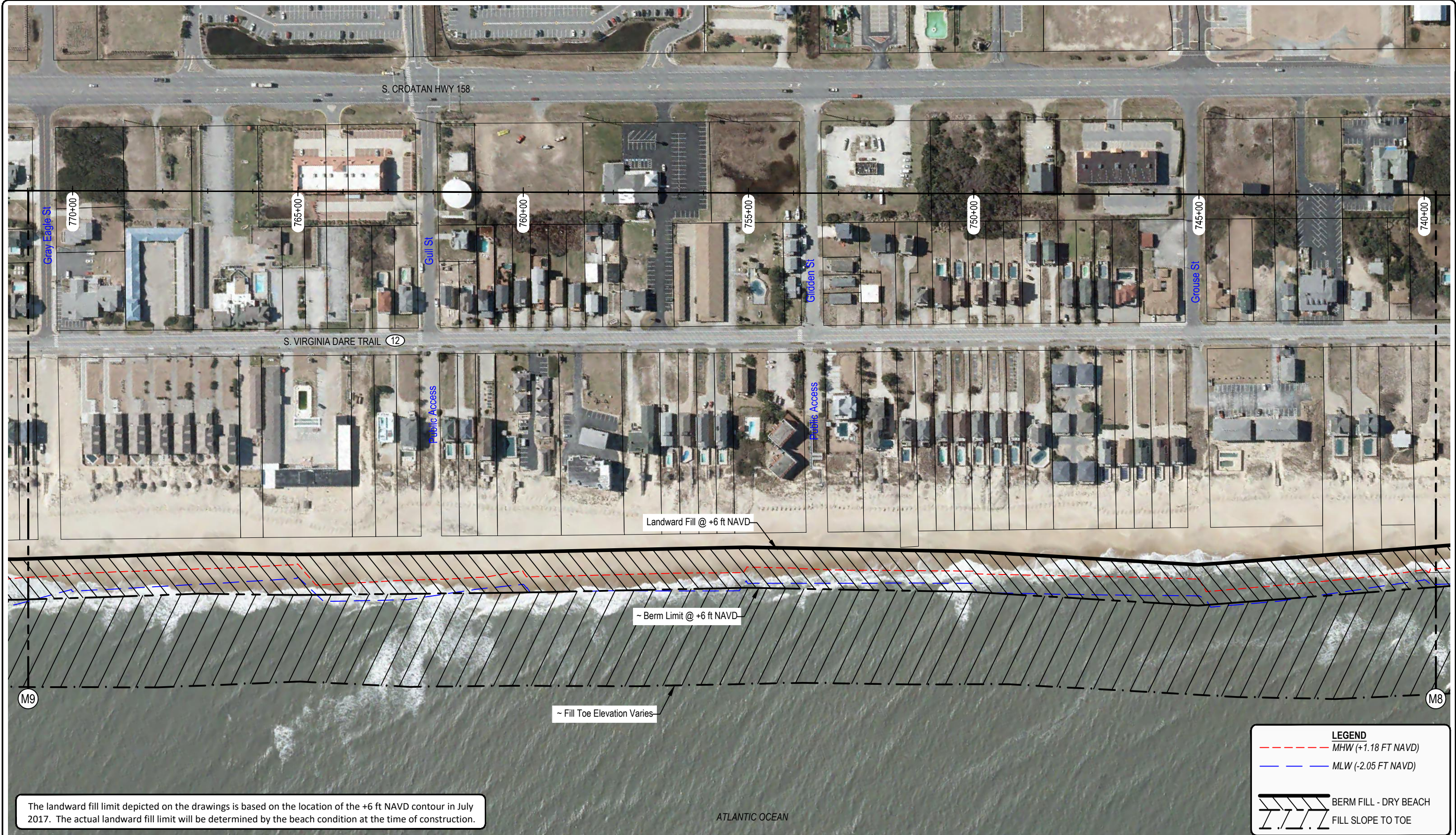
PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
STA 708+00 TO 740+00



SCALE: AS SHOWN	SHEET #
DATE: 15 Sep 2017	07
DRAWN BY: T. Hair	
APPROVED BY: HLK	
PROJECT #: 2458	



NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

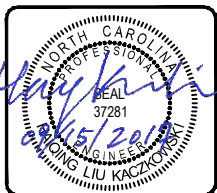
Scale (Feet)



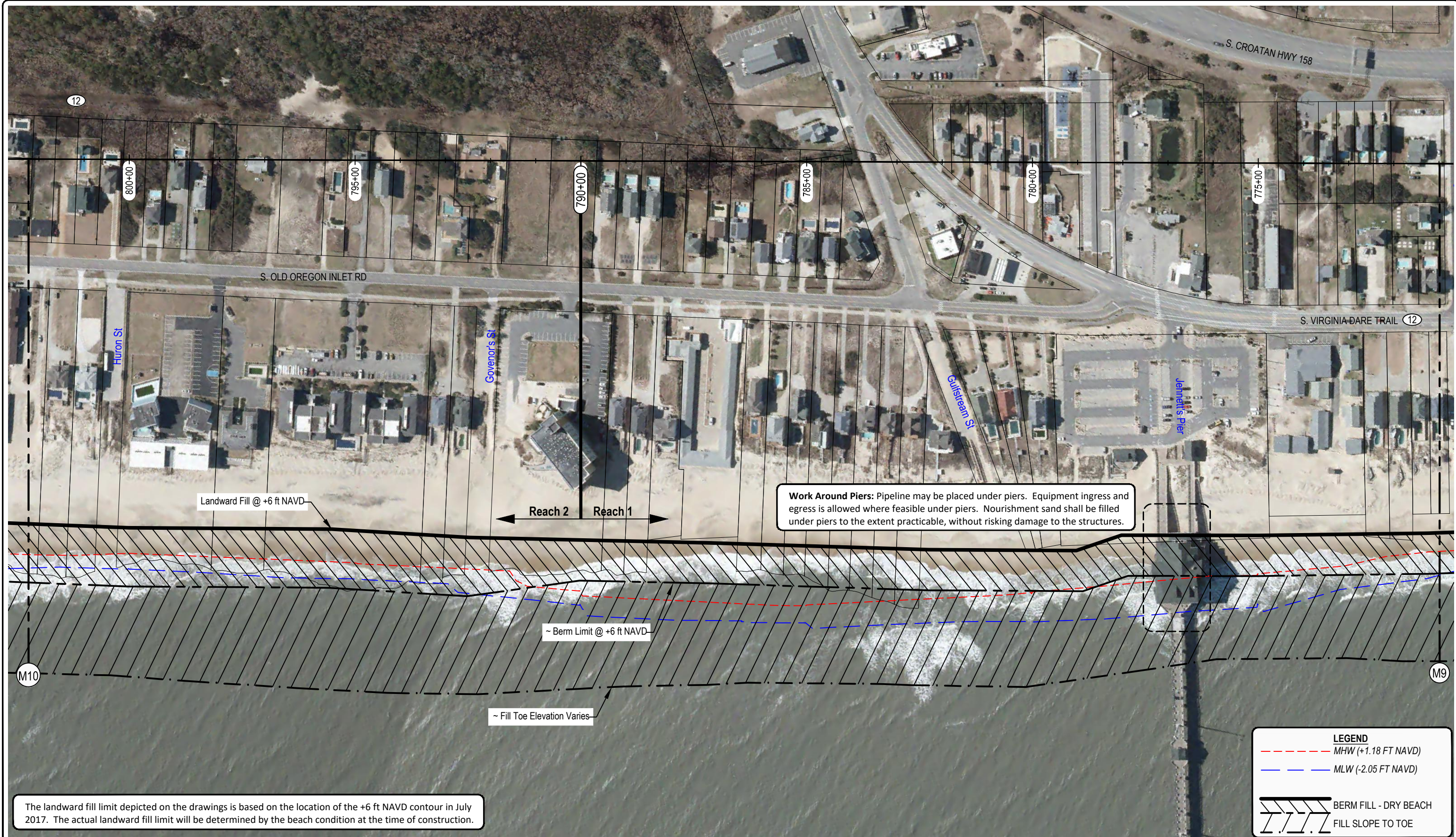
PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
STA 740+00 TO 771+00



SCALE:	AS SHOWN	SHEET #
DATE:	15 Sep 2017	08
DRAWN BY:	T. Hair	
APPROVED BY:	HLK	
PROJECT #:	2458	



Landward Fill @ +6 ft NAVD

Reach 2 Reach 1

Work Around Piers: Pipeline may be placed under piers. Equipment ingress and egress is allowed where feasible under piers. Nourishment sand shall be filled under piers to the extent practicable, without risking damage to the structures.

~ Berm Limit @ +6 ft NAVD

~ Fill Toe Elevation Varies

LEGEND

- MHW (+1.18 FT NAVD)
- MLW (-2.05 FT NAVD)
- BERM FILL - DRY BEACH
- FILL SLOPE TO TOE

The landward fill limit depicted on the drawings is based on the location of the +6 ft NAVD contour in July 2017. The actual landward fill limit will be determined by the beach condition at the time of construction.

NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

Scale (Feet)

PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
STA 771+00 TO 802+00

SCALE: AS SHOWN	SHEET #
DATE: 15 Sep 2017	09
DRAWN BY: T. Hair	
APPROVED BY: HLK	
PROJECT #: 2458	



NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

Scale (Feet)



PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
REACH 02
STA 802+00 TO 833+00



SCALE: AS SHOWN
DATE: 15 Sep 2017
DRAWN BY: T. Hair
APPROVED BY: HLK
PROJECT #: 2458

SHEET #
10



The landward fill limit depicted on the drawings is based on the location of the +6 ft NAVD contour in July 2017. The actual landward fill limit will be determined by the beach condition at the time of construction.

LEGEND

--- MHW (+1.18 FT NAVD)

--- MLW (-2.05 FT NAVD)

BERM FILL - DRY BEACH

FILL SLOPE TO TOE

NOTES:

VERTICAL: NAVD '88 (FEET)

HORIZONTAL: SPCS NAD '83 (FEET)

NC ZONE 3200

MHW = MEAN HIGH WATER

MLW = MEAN LOW WATER

PHOTO SOURCE: DARE CTY GIS (2016)

0 200

Scale (Feet)

PREPARED FOR:

TOWN OF NAGS HEAD

5401 SOUTH CROATAN HWY

NAGS HEAD NC 27959

PROJECT:

NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:

PROJECT PLAN

REACH 02

STA 833+00 TO 865+00

SCALE: AS SHOWN

DATE: 15 Sep 2017

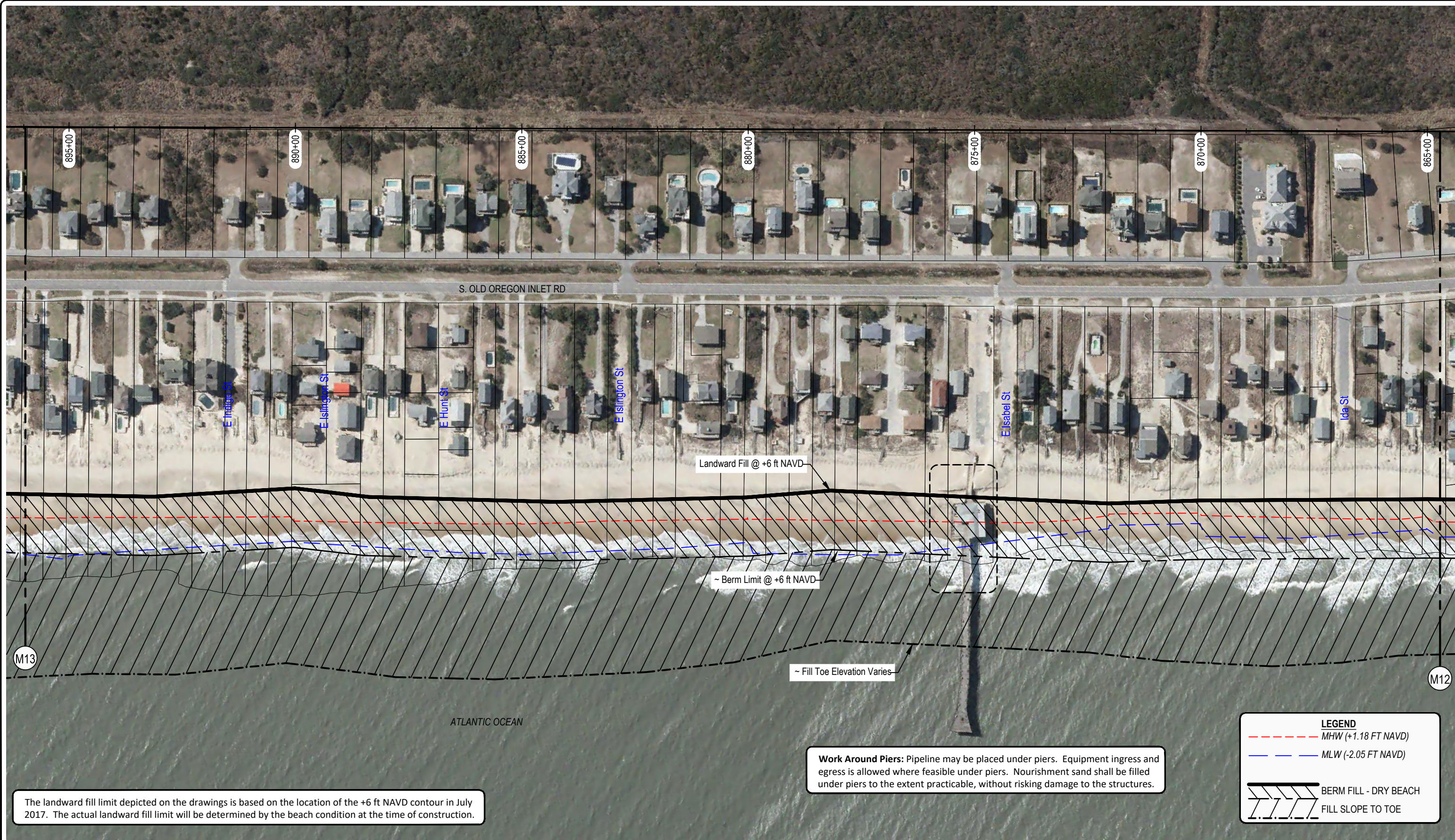
DRAWN BY: T. Hair

APPROVED BY: HLK

PROJECT #: 2458

SHEET #

11



NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

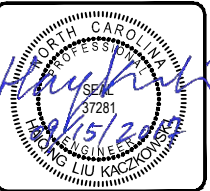
Scale (Feet)



PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
REACH 02
STA 865+00 TO 896+00



SCALE: AS SHOWN
DATE: 15 Sep 2017
DRAWN BY: T. Hair
APPROVED BY: HLK
PROJECT #: 2458

SHEET #
12



NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)



PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
REACH 02 & 03
STA 896+00 TO 927+00



SCALE: AS SHOWN	SHEET #
DATE: 15 Sep 2017	13
DRAWN BY: T. Hair	
APPROVED BY: HLK	
PROJECT #: 2458	





The landward fill limit depicted on the drawings is based on the location of the +6 ft NAVD contour in July 2017. The actual landward fill limit will be determined by the beach condition at the time of construction.

LEGEND

--- MHW (+1.18 FT NAVD)

--- MLW (-2.05 FT NAVD)

 BERM FILL - DRY BEACH

 FILL SLOPE TO TOE

NOTES:

VERTICAL: NAVD '88 (FEET)

HORIZONTAL: SPCS NAD '83 (FEET)

NC ZONE 3200

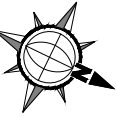
MHW = MEAN HIGH WATER

MLW = MEAN LOW WATER

PHOTO SOURCE: DARE CTY GIS (2016)

0 200

Scale (Feet)



Coastal Science & Engineering

PREPARED FOR:

TOWN OF NAGS HEAD

5401 SOUTH CROATAN HWY

NAGS HEAD NC 27959

PROJECT:

NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:

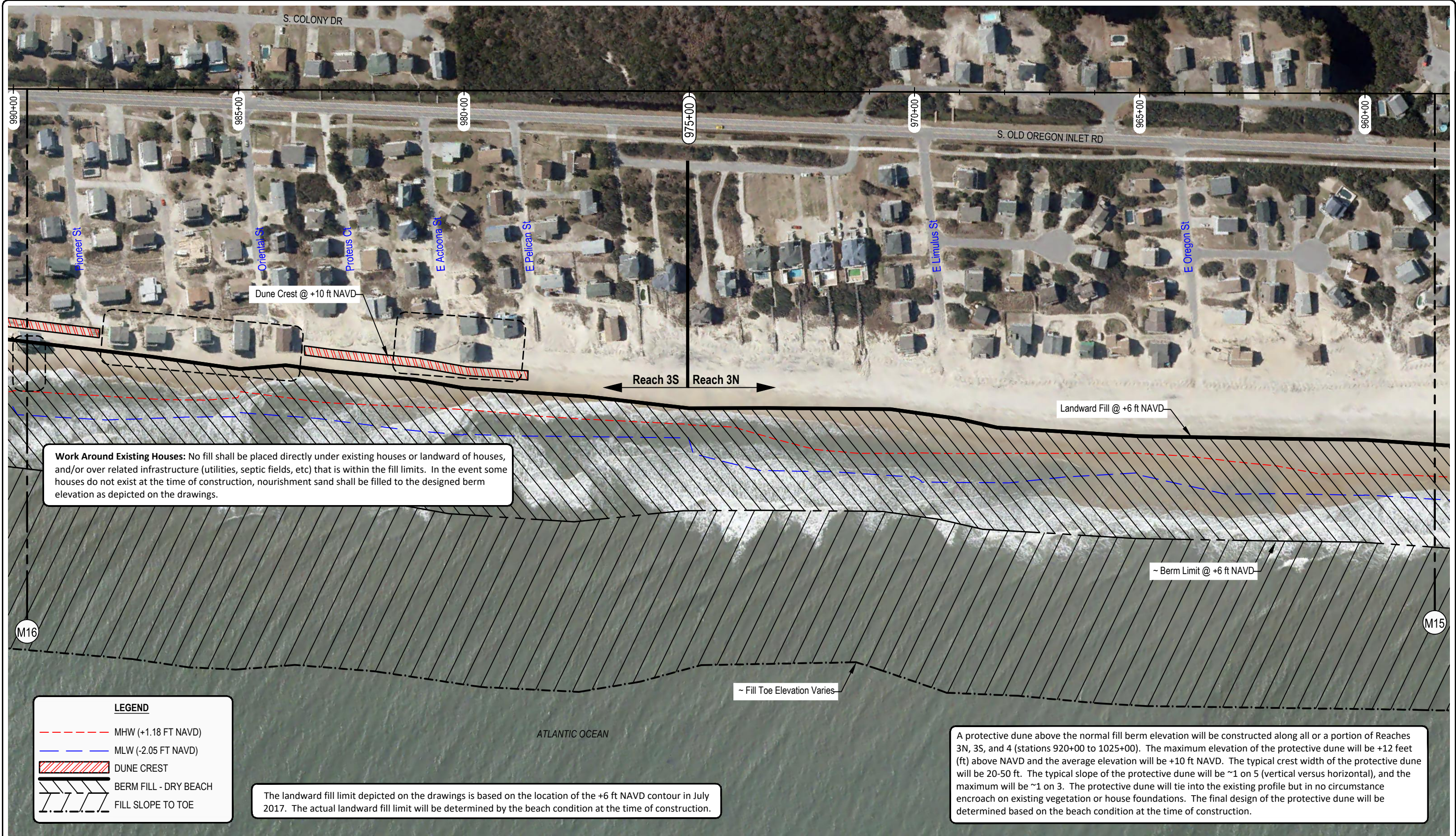
PROJECT PLAN

REACH 03

STA 927+00 TO 958+00



SCALE:	AS SHOWN	SHEET #
DATE:	15 Sep 2017	14
DRAWN BY:	T. Hair	
APPROVED BY:	HLK	
PROJECT #:	2458	



Work Around Existing Houses: No fill shall be placed directly under existing houses or landward of houses, and/or over related infrastructure (utilities, septic fields, etc) that is within the fill limits. In the event some houses do not exist at the time of construction, nourishment sand shall be filled to the designed berm elevation as depicted on the drawings.

LEGEND

- MHW (+1.18 FT NAVD)
- MLW (-2.05 FT NAVD)
- DUNE CREST
- BERM FILL - DRY BEACH
- FILL SLOPE TO TOE

The landward fill limit depicted on the drawings is based on the location of the +6 ft NAVD contour in July 2017. The actual landward fill limit will be determined by the beach condition at the time of construction.

A protective dune above the normal fill berm elevation will be constructed along all or a portion of Reaches 3N, 3S, and 4 (stations 920+00 to 1025+00). The maximum elevation of the protective dune will be +12 feet (ft) above NAVD and the average elevation will be +10 ft NAVD. The typical crest width of the protective dune will be 20-50 ft. The typical slope of the protective dune will be ~1 on 5 (vertical versus horizontal), and the maximum will be ~1 on 3. The protective dune will tie into the existing profile but in no circumstance encroach on existing vegetation or house foundations. The final design of the protective dune will be determined based on the beach condition at the time of construction.

NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

Scale (Feet)

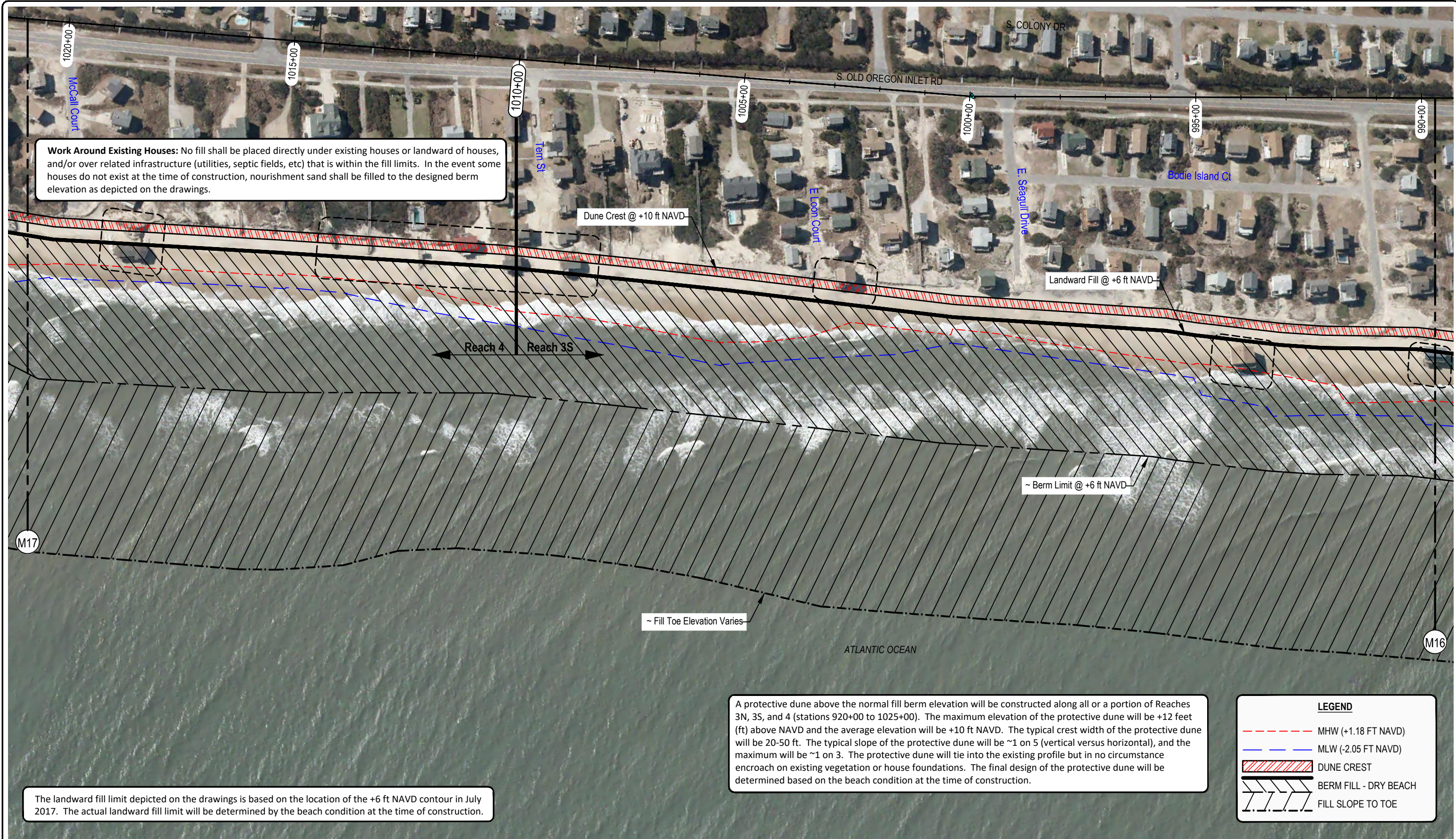
Coastal Science & Engineering

PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
REACH 03
STA 958+00 TO 990+00

SCALE: AS SHOWN	SHEET #
DATE: 15 Sep 2017	15
DRAWN BY: T. Hair	
APPROVED BY: HLK	
PROJECT #: 2458	



A protective dune above the normal fill berm elevation will be constructed along all or a portion of Reaches 3N, 3S, and 4 (stations 920+00 to 1025+00). The maximum elevation of the protective dune will be +12 feet (ft) above NAVD and the average elevation will be +10 ft NAVD. The typical crest width of the protective dune will be 20-50 ft. The typical slope of the protective dune will be ~1 on 5 (vertical versus horizontal), and the maximum will be ~1 on 3. The protective dune will tie into the existing profile but in no circumstance encroach on existing vegetation or house foundations. The final design of the protective dune will be determined based on the beach condition at the time of construction.

LEGEND

- MHW (+1.18 FT NAVD)
- MLW (-2.05 FT NAVD)
- DUNE CREST
- BERM FILL - DRY BEACH
- FILL SLOPE TO TOE

The landward fill limit depicted on the drawings is based on the location of the +6 ft NAVD contour in July 2017. The actual landward fill limit will be determined by the beach condition at the time of construction.

NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET) 0 200
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

Coastal Science & Engineering

PREPARED FOR:
TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:
NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:
PROJECT PLAN
REACH 03
STA 990+00 TO 1021+00

SCALE: AS SHOWN	SHEET #
DATE: 15 Sep 2017	16
DRAWN BY: T. Hair	
APPROVED BY: HLK	
PROJECT #: 2458	



Work Around Existing Houses: No fill shall be placed directly under existing houses or landward of houses, and/or over related infrastructure (utilities, septic fields, etc) that is within the fill limits. In the event some houses do not exist at the time of construction, nourishment sand shall be filled to the designed berm elevation as depicted on the drawings.

The landward fill limit depicted on the drawings is based on the location of the +6 ft NAVD contour in July 2017. The actual landward fill limit will be determined by the beach condition at the time of construction.

A protective dune above the normal fill berm elevation will be constructed along all or a portion of Reaches 3N, 3S, and 4 (stations 920+00 to 1025+00). The maximum elevation of the protective dune will be +12 feet (ft) above NAVD and the average elevation will be +10 ft NAVD. The typical crest width of the protective dune will be 20-50 ft. The typical slope of the protective dune will be ~1 on 5 (vertical versus horizontal), and the maximum will be ~1 on 3. The protective dune will tie into the existing profile but in no circumstance encroach on existing vegetation or house foundations. The final design of the protective dune will be determined based on the beach condition at the time of construction.

Existing stormwater outfalls maintained by NCDOT are visible on sheets 03, 04 and 17. The outfall on sheet 17 near station 1025+00 will be restored and extended a minimum distance as necessary to maintain functionality after the project based on requirements or specifications provided by NCDOT. Appropriate bridging or sand-layer protection will be used during construction to avoid any damage to the structures when heavy equipment has to run over these outfalls. No fill will be placed over the seaward end of the outfalls so that the outfalls remain functional during construction.

LEGEND

MHW (+1.18 FT NAVD)

MLW (-2.05 FT NAVD)

NOTES:
VERTICAL: NAVD '88 (FEET)
HORIZONTAL: SPCS NAD '83 (FEET)
NC ZONE 3200
MHW = MEAN HIGH WATER
MLW = MEAN LOW WATER
PHOTO SOURCE: DARE CTY GIS (2016)

0200

Scale (Feet)

PREPARED FOR:

TOWN OF NAGS HEAD
5401 SOUTH CROATAN HWY
NAGS HEAD NC 27959

PROJECT:

NAGS HEAD BEACH RENOURISHMENT

DRAWING TITLE:

PROJECT PLAN
REACH 04 - PROJECT END
STA 1021+00 TO 1050+00

SCALE: AS SHOWN

DATE: 15 Sep 2017

DRAWN BY: T. Hair

APPROVED BY: HLK

PROJECT #: 2458

SHEET #

17