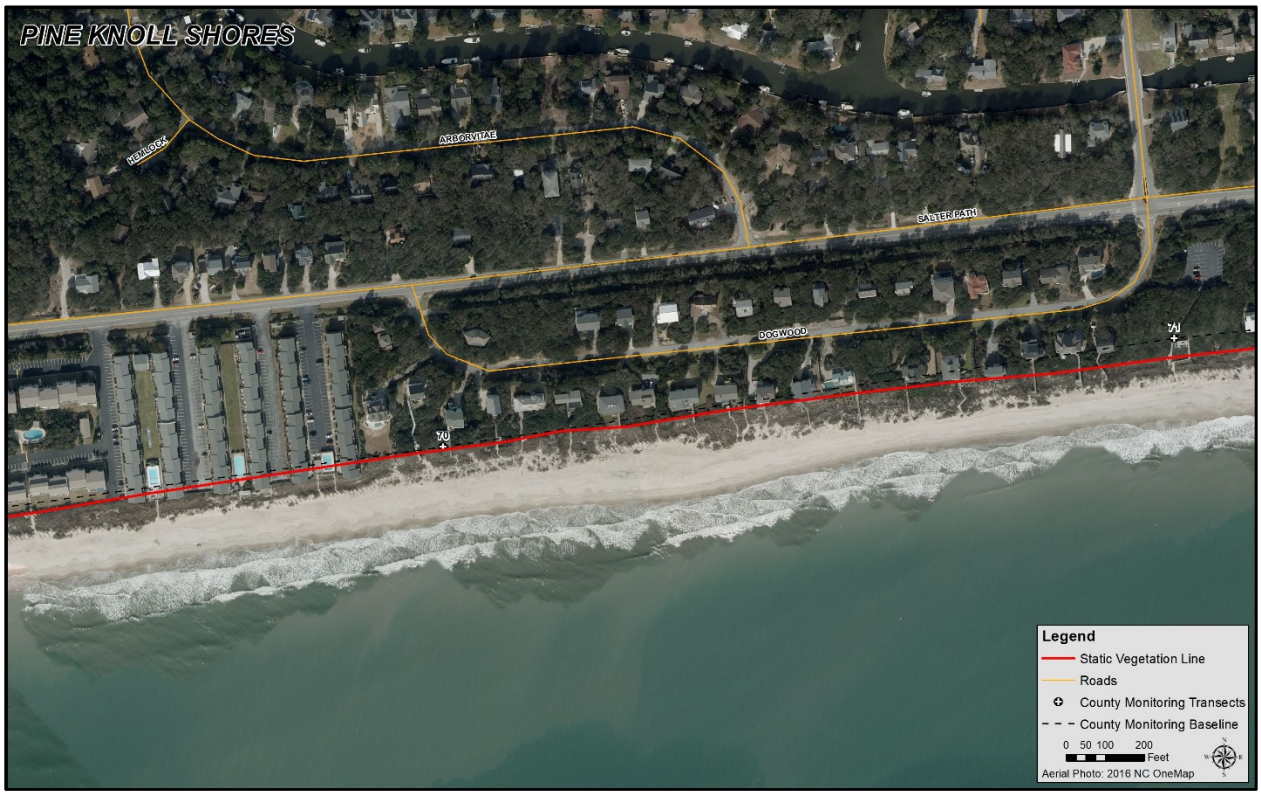
TOWN OF PINE KNOLL SHORES, NC
STATIC LINE EXCEPTION 5 YEAR REVIEW / REAUTHORIZATION

October 30, 2020



Prepared by: Moffatt & Nichol

moffatt & nichol

Prepared For: Town of Pine Knoll Shores, NC

Table of Contents

List of Figures

List of Tables

1.0 PURPOSE

The Town of Pine Knoll Shores initially applied for and received an exception from the static line in accordance with procedures outlined in 15A NCAC 07J.1201 from the North Carolina Coastal Resources Commission on March 24, 2010. A second exception from the static line was subsequently applied for and approved five years later on April 29, 2015. A static vegetation line was established along 4.5 miles of shoreline fronting the Town of Pine Knoll Shores as a result of a large scale beach nourishment project constructed in 2001-2002. The static vegetation line together with the recently adopted rule establishing graduated setback requirements based on building size (15A NCAC 07h .0306) has rendered 22 ocean front condominiums and 72 ocean front single family dwellings non-conforming.

This document has been created for submittal to the NC Coastal Resources Commission for the review of conditions as it relates to the Town's static line exception reauthorization in 2020.

2.0 SUMMARY OF FILL PROJECTS

2.1 Initial Construction (Phase I – 2001-2002)

The Bogue Banks Restoration Plan covers approximately 16.8 miles of the 25 mile long island and extends from the Atlantic Beach/Pine Knoll Shores (AB/PKS) town boundary west to approximately one mile east of Bogue Inlet (Figure 2-1). The Island-wide project was implemented in three phases, as shown in Figure 2-1, with Phase I (Indian Beach/Salter Path and Pine Knoll Shores) covering the extents of the Indian Beach and Pine Knoll Shores static line exceptions.

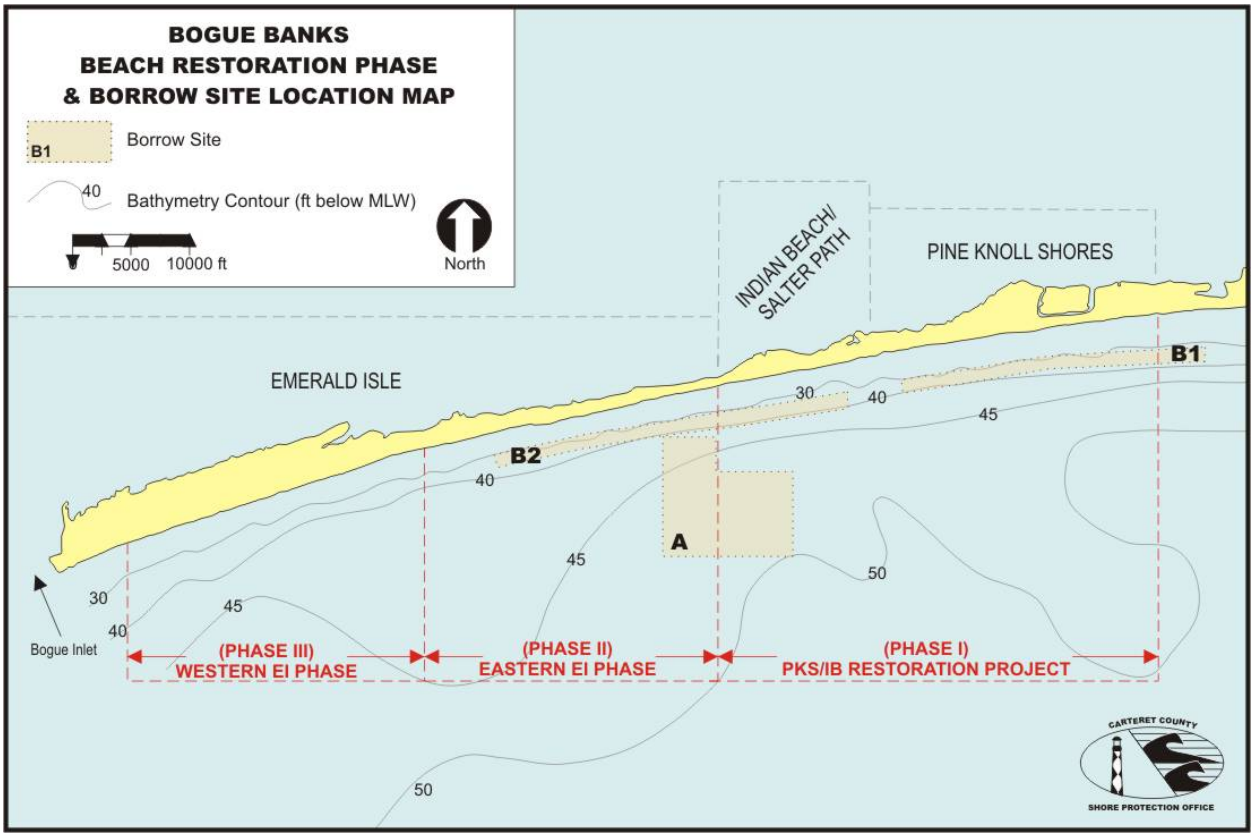


Figure 2-1. Bogue Banks Restoration Project (Carteret County Shore Protection Office)

Phase I of the Bogue Banks Restoration Project was constructed between 2001 and 2002 and covered the 2.4 miles of ocean shoreline fronting the Town of Indian Beach and the Village of Salter Path and 4.5 miles along the shoreline segment that includes the Town of Pine Knoll Shores (the focus of this static line exception report) (Figure 2-2). This stretch of beach encompasses County monitoring transects 49 through 76 of the Bogue Banks Beach and Nearshore Mapping Program (BBBNMP) which essentially cover the Indian Beach/Salter Path (Transects 49 – 58) and Pine Knoll Shores (Transects 59 – 768) monitoring reaches. Material to construct Phase I was obtained primarily from the offshore borrow areas designated as B1 and B2. Construction of Phase I was halted prior to the April 30 permit deadline due to turtle takes, resulting in a reduction in the volume of material placed along both Indian Beach/Salter Path and Pine Knoll Shores. Based on after construction profile surveys, the amount surveyed in place along the Indian Beach/Salter Path shorelines totaled 456,994 cubic yards or about 41% less than the contract amount. The Town of Pine Knoll Shores received 1,276,586 cubic yards or about 9% less than the original contract amount.

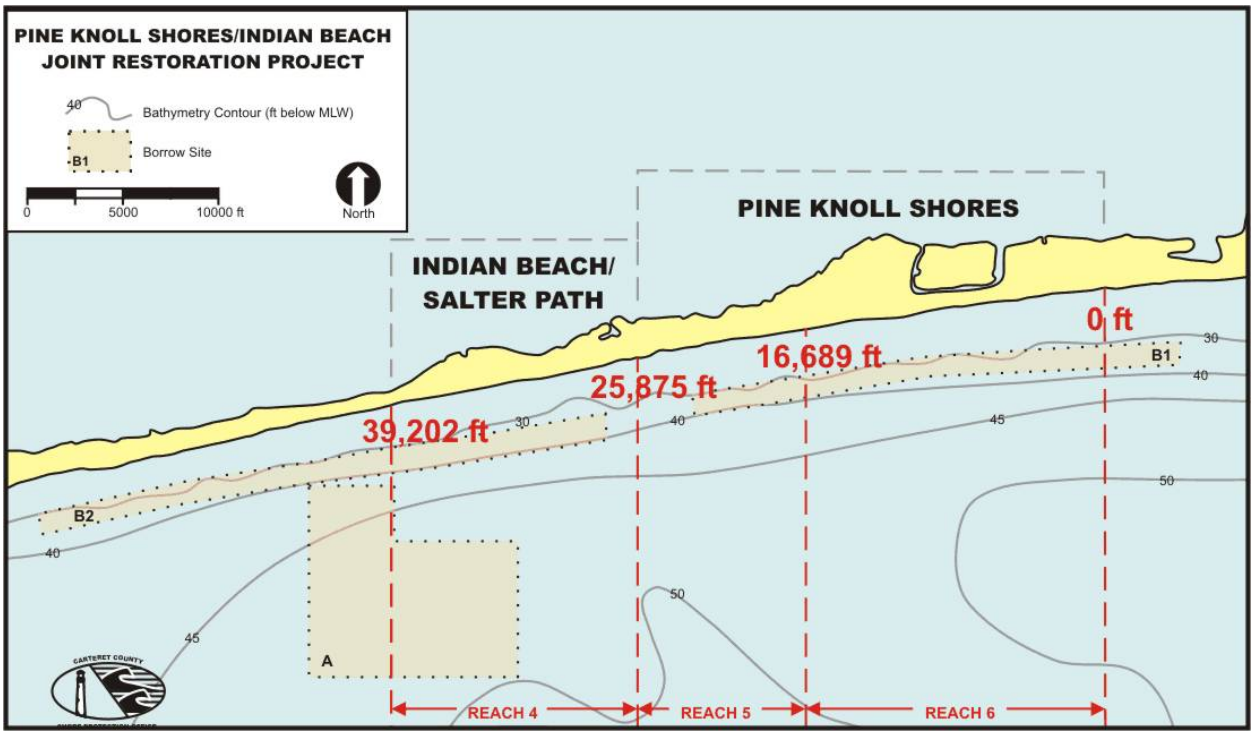


Figure 2-2. Phase I Restoration Project – Indian Beach/Salter Path and Pine Knoll Shores (Carteret County Shore Protection Office)

2.1.1 Establishment of Static Vegetation Line

The Pine Knoll Shores portion of the Bogue Banks Restoration Project was constructed between November 2001 and April 2002 as part of Phase I and included design specifications that triggered a static line and therefore satisfied a requirement of 15A NCAC 07J .1201 whereby an exception request could be made after 5 years. This request was approved and adopted on March 24, 2010. It was then followed, five years later, by a second exception request which was approved and adopted on April 29, 2015.

The static line rule in effect at the time the Indian Beach/Salter Path and Pine Knoll Shores joint Restoration Project (Phase I) project was constructed required a static line be established for beach fills exceeding 250,000 cubic yards and a placement rate greater than 50 cy/ft. Even with a reduction in the contracted placement, the placement rate at Indian Beach/Salter Path was approximately 50 cy/ft and 54 cy/ft at Pine Knoll Shores. Therefore, the Phase I project placement rate of 53 cy/ft deemed the entire project area be subject to the static line requirement by the Division of Coastal Management (DCM). The existing static vegetation line along Pine Knoll Shores is shown in Figure 2-3 to Figure 2-11 overlain on 2016 aerials. The line was developed by the Division of Coastal Management using aerial photography from November 13, 2001.

The static line in Pine Knoll Shores extends the entire 4.5 mile oceanfront from County Transect 58, at Ocean Glen Condominiums, to County Transect 77, just west of the pier at the PKS/AB border. The current erosion rate setback factor (developed by the Division of Coastal Management and approved/adopted by the Coastal Resources Commission in 2019) for the entire area of Pine Knoll Shores which falls under the static line exception was determined to be 2.0. There are currently 211 oceanfront lots within the static line extents of which 33 are currently vacant.

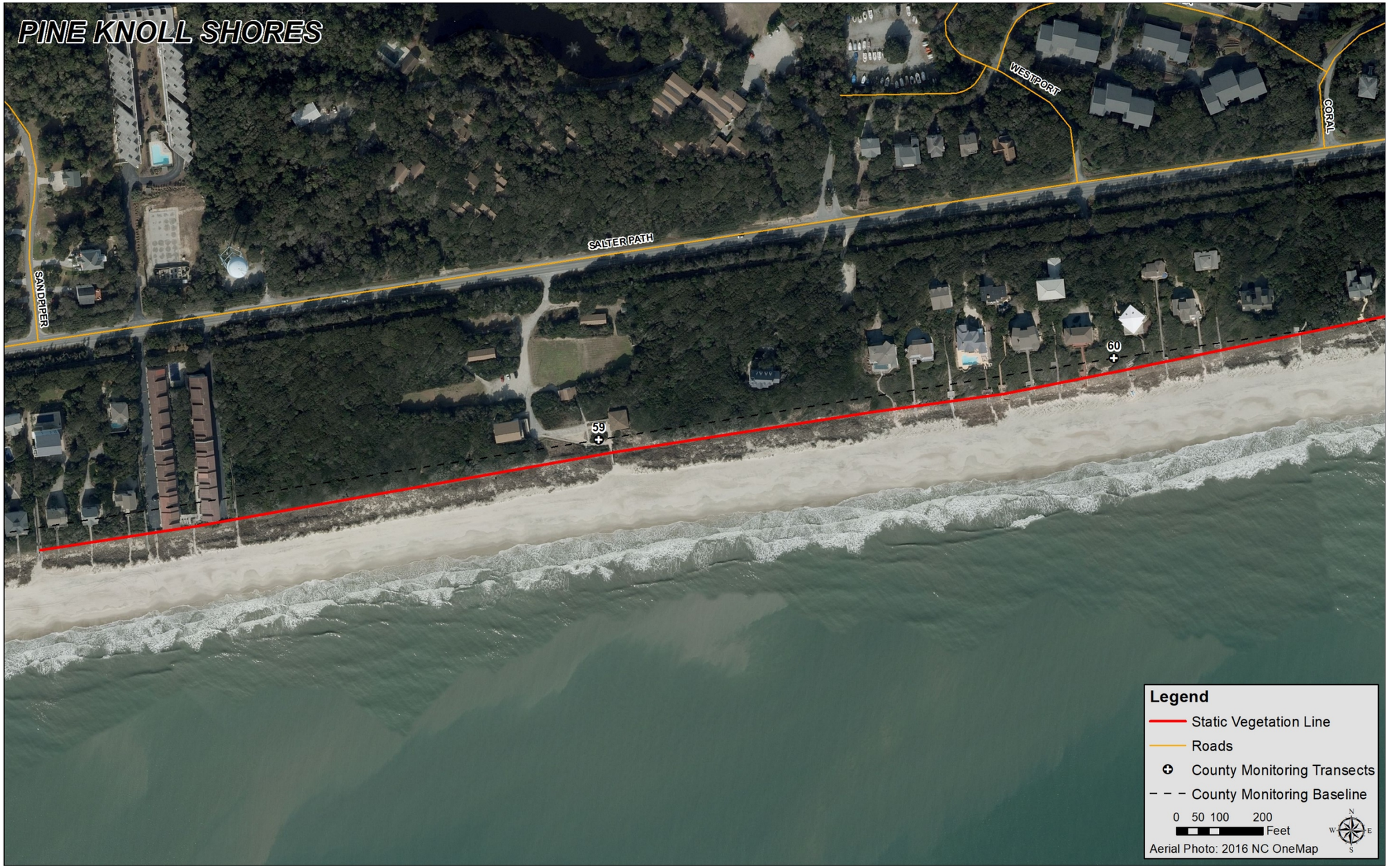


Figure 2-3. Pine Knoll Shores Static Vegetation Line (1 of 9)

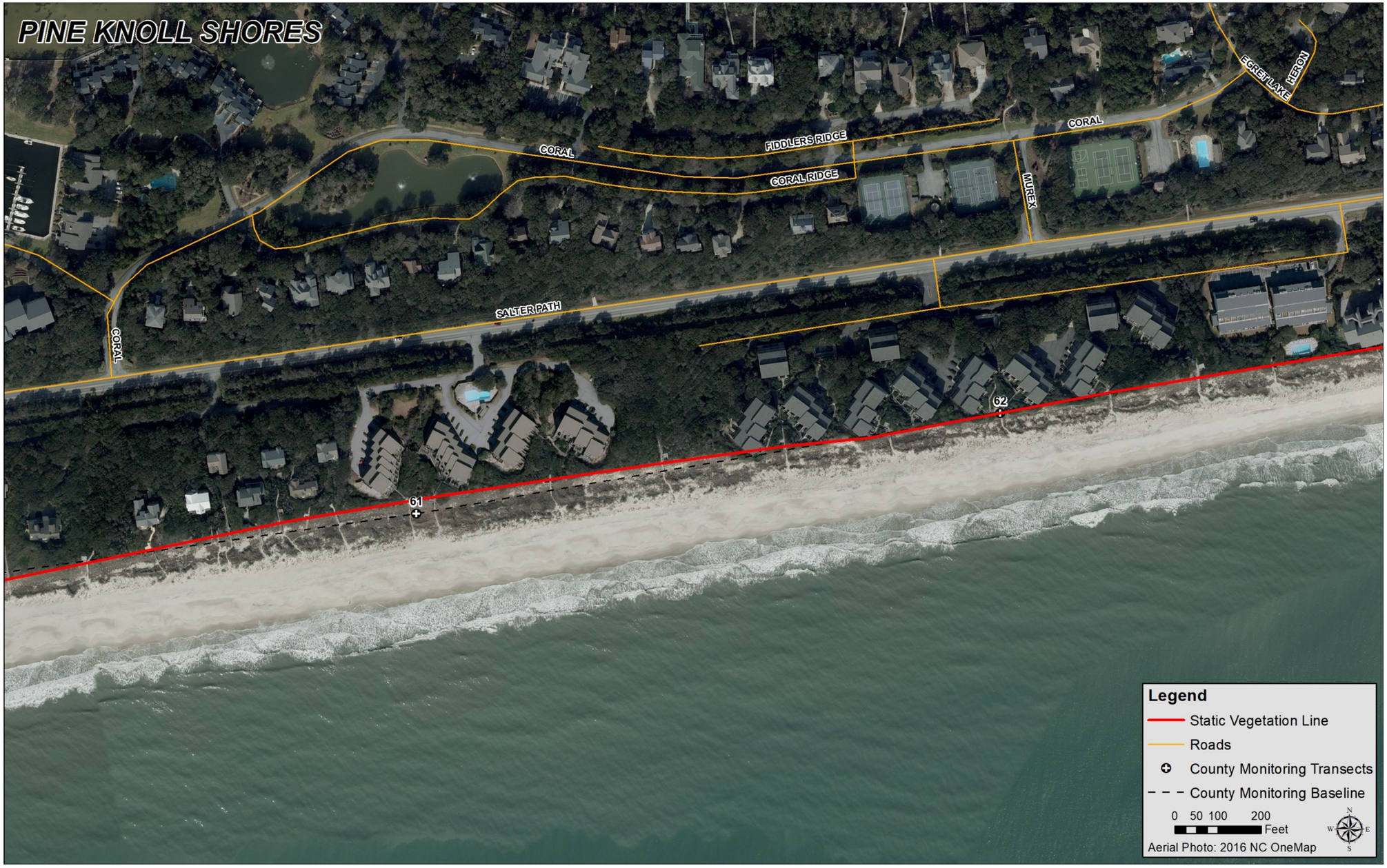


Figure 2-4. Pine Knoll Shores Static Vegetation Line (2 of 9)

Figure 2-5. Pine Knoll Shores Static Vegetation Line (3 of 9)

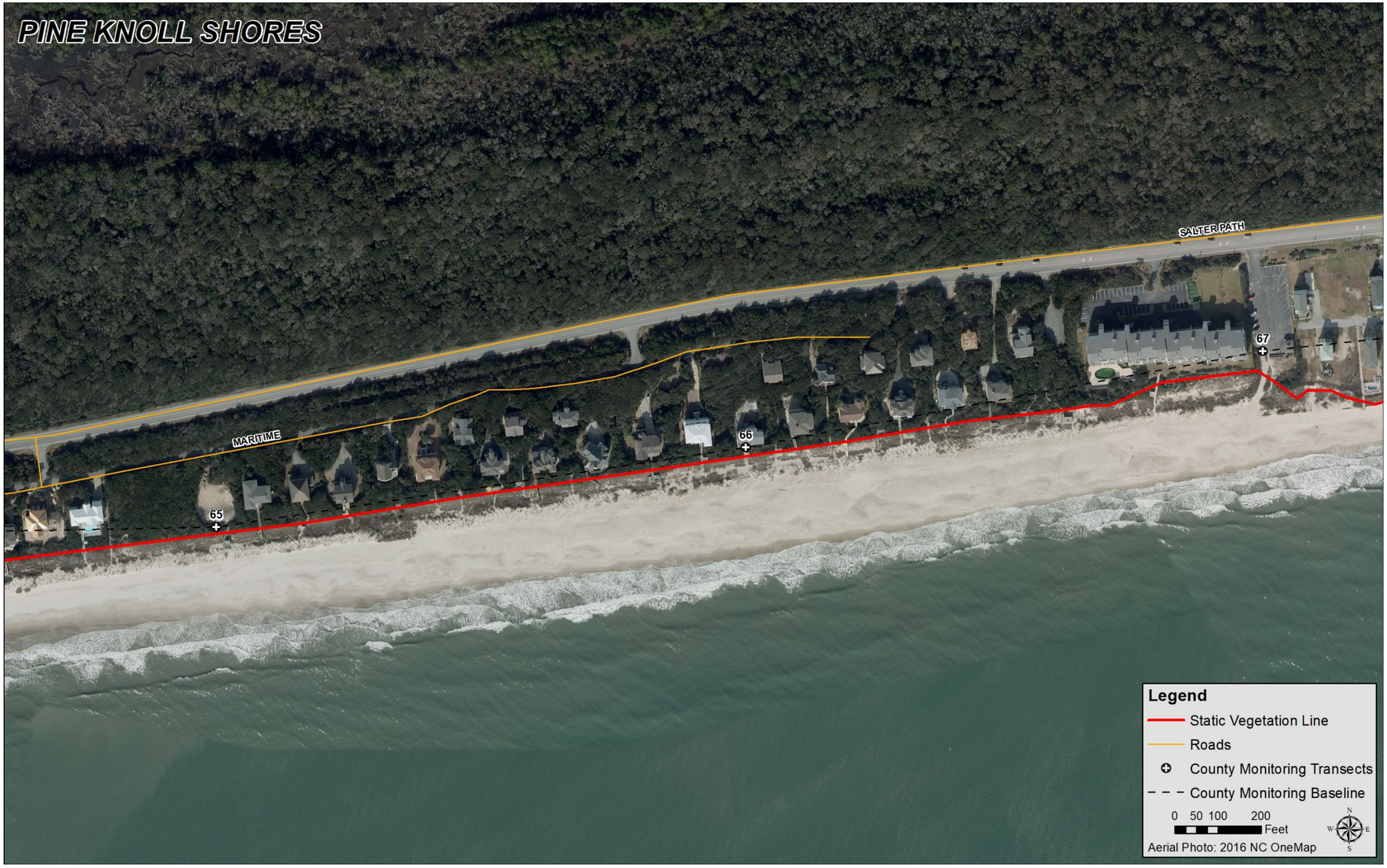


Figure 2-6. Pine Knoll Shores Static Vegetation Line (4 of 9)

Figure 2-7. Pine Knoll Shores Static Vegetation Line (5 of 9)

Figure 2-8. Pine Knoll Shores Static Vegetation Line (6 of 9)

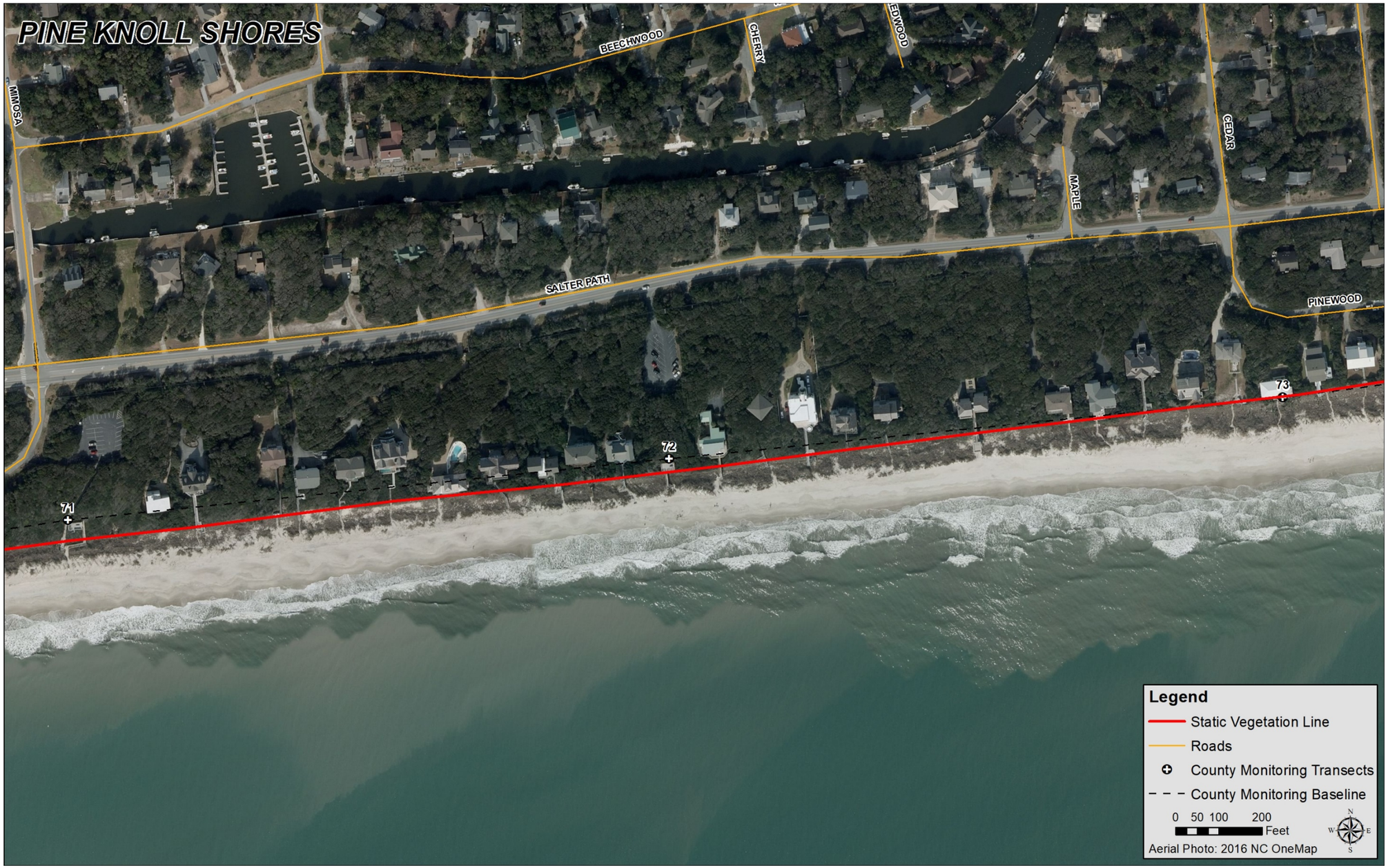


Figure 2-9. Pine Knoll Shores Static Vegetation Line (7 of 9)

Figure 2-10. Pine Knoll Shores Static Vegetation Line (8 of 9)

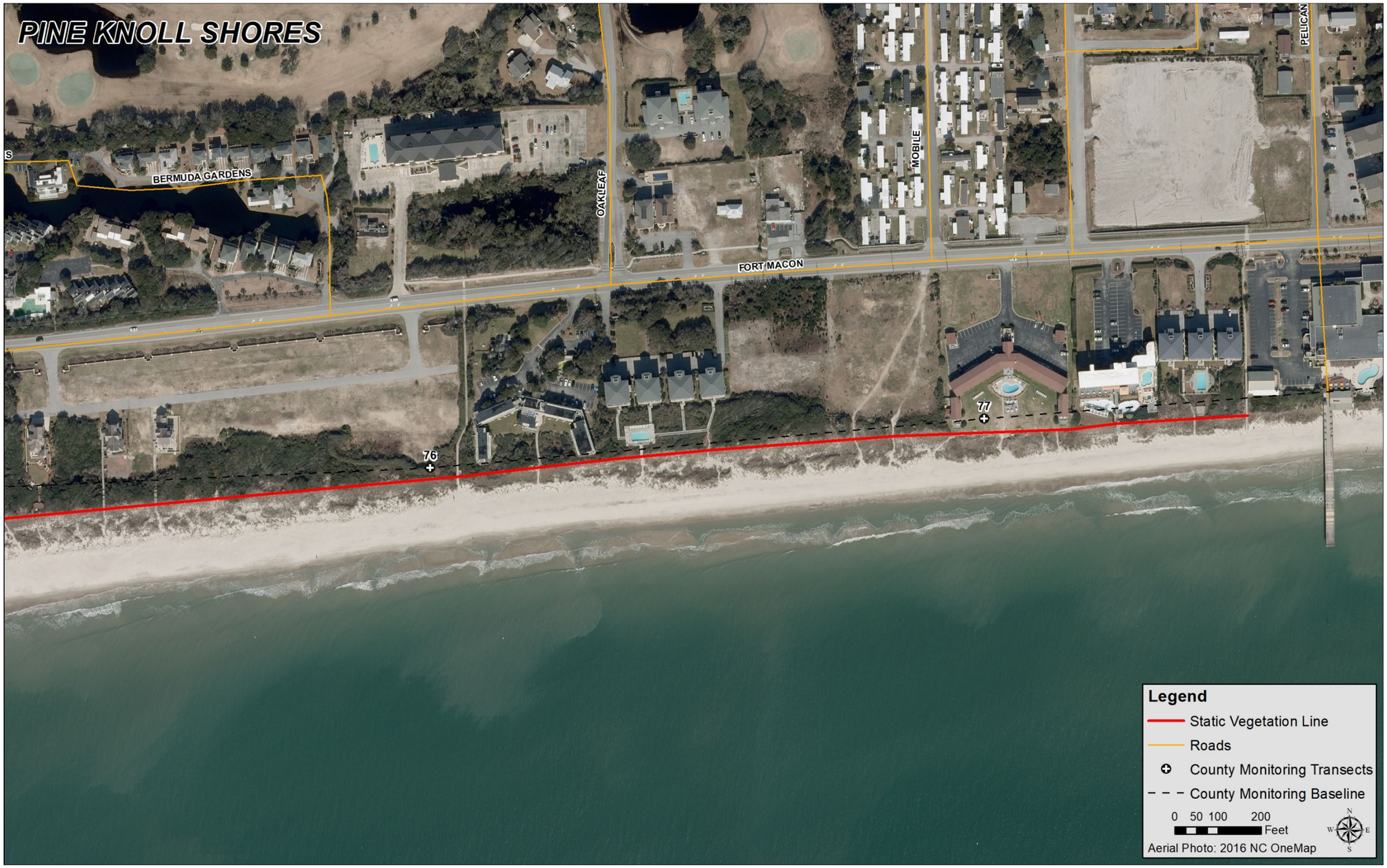


Figure 2-11. Pine Knoll Shores Static Vegetation Line (9 of 9)

2.1.2 Establishment of Initial Nourishment Triggers

For the Indian Beach/Salter Path and Pine Knoll Shores joint Restoration Project (Phase I), the periodic nourishment plan adopted by the Town of Pine Knoll Shores dictates nourishment would be performed under two conditions. First, when one-half of the initial fill volume was lost to erosion, this would prompt a nourishment event. Therefore, Pine Knoll Shores originally intended to schedule maintenance of the Phase I shoreline when 638,293 cubic yards was lost from the initial fill. Second, a target minimum volume for each profile from the foredune (landward most crest of the primary dune) to the outer bar (above -12 ft NAVD88) was established at 225 cy/ft during the formulation of the Bogue Banks Restoration Project. This was determined to be an adequate amount of material to protect from storms based on the condition of Atlantic Beach after the hurricanes of the 1990s. Therefore, if profiles in a monitoring reach, on average, fell below the 225 cy/ft above -12 ft NAVD88, it would prompt a nourishment event. These periodic nourishment strategies were represented in the Town's original FEMA Monitoring & Maintenance Plan that enables the Town to remain eligible for the cost reimbursement of replacing the volume of sand lost during a federally-declared disaster.

With the recent development of the Bogue Banks Master Beach Nourishment Plan, of which the engineering analysis was completed in 2014 and the permit obtained in fall 2018, these triggers were revised and nourishment operations and timing reformulated. Details of the recent (Post-Florence) and future nourishment plans encompassed by the Bogue Banks Master Beach Nourishment Plan are presented in Section 2.3.

2.2 Renourishment Summary (2003-2020)

The Pine Knoll Shores portion of the Phase I Bogue Banks Restoration Project has been renourished on five occasions since initial construction. The first renourishment was a small portion of the USACE Section 933 Phase I project in 2004, of which the majority of the nourishment was located in Indian Beach/Salter Path. The second and third renourishments occurred concurrently as part of the USACE Section 933 Phase II project and the FEMA post-Hurricane *Ophelia* project in 2007. The fourth project occurred in 2013 as part of the post-Hurricane *Irene* Restoration project. The fifth project was recently completed in 2020 as part of the post-Hurricane *Florence* Renourishment Project – Phase II.

USACE Section 933 – Phase I (2004)

The first renourishment occurred between February and March 2004 as part of Phase I of the Section 933 project associated with the USACE maintenance of the Morehead City Harbor federal navigation project. Section 933 of the Water Resources Development Act of 1986 allows the State and local sponsors to cost share with the federal government in the added cost of depositing material in areas other than the least cost disposal site. Under normal operating conditions, the material removed from the Beaufort Inlet bar channel would be deposited offshore in the Offshore Dredged Material Disposal Site (ODMDS) or in a near shore disposal mound situated immediately west of the inlet's ebb tide delta. For the Section 933 project, Weeks Marine, the firm contracted by USACE to perform the work, used hopper dredges (*BE Lindholm* and the *RN Weeks*) to haul the material to mooring sites located immediately offshore of Indian Beach/Salter Path and Pine Knoll Shores. From the mooring sites the material was pumped to the beach via a submerged pipeline. Phase I included a relatively short segment on the west end of Pine Knoll Shores (Figure

2-12). Phase I of the Section 933 project placed 630,094 cubic yards of material along the entire shoreline of Indian Beach/Salter Path and 69,189 cubic yards on the western 2,500 feet of Pine Knoll Shores.

USACE Section 933 – Phase II (2007)

The second renourishment occurred between January and March 2007 as part of Phase II of the Section 933 project associated with the USACE maintenance of the Morehead City Harbor federal navigation project. The work was also contracted to Weeks Marine by the USACE. All of the material removed from the bar channel during Phase II of the Section 933 project was deposited on the beach in two locations within the town limits of Pine Knoll Shores. The locations of the two beach nourishment areas are shown in Figure 2-12. Approximately 507,939 cy of material was placed in these two reaches.

Post-Ophelia Renourishment Project (2007)

A third renourishment operation also occurred between January and March 2007 and was carried out to replace material lost during Hurricane *Ophelia* which struck the area in September 2005. Following the advent of Hurricane *Ophelia* in September 2005, the Town of Pine Knoll Shores, along with the other island communities applied to FEMA for funds to restore the material lost during *Ophelia* under Category G of FEMA's Public Assistance Program. Specifically, the Public Assistance Program allows FEMA to provide funds to restore an "improved" or engineered beach providing the applicant can demonstrate the beach fill project had a designed template and grain size, a maintenance plan, and pre- and post-storm beach profile surveys. In its application, Pine Knoll Shores as well as the other towns along the island included in the Bogue Banks Restoration project were able to demonstrate they met all of the FEMA requirements including an engineered beach, a nourishment plan, and monitoring program and was subsequently approved to receive reimbursement funds to restore the beach to the pre-storm condition. The post-Hurricane *Ophelia* restoration in Pine Knoll Shores included restoration of the fill along two reaches (Reach 4 and Reach 5) between County Transects 62-65 and 66-74 (Figure 2-13), respectively, located within the Bogue Banks Restoration Project Phase I limits. The Hurricane *Ophelia* restoration used material from the ODMDS which was transported to the beach via hopper dredges. The post-Hurricane *Ophelia* restoration was accomplished between January and March 2007 with a total of 1,229,800 cubic yards deposited along various sections of the Bogue Banks, 262,276 cubic yards of which was placed between County Transects 62 and 74 in Pine Knoll Shores, within the Bogue Banks Restoration Project Phase I limits and Pine Knoll Shores static line extents. 73,387 cubic yards was placed in Reach 4 and 188,879 cubic yards was placed in Reach 5. The total cost of the restoration was $13,773,800 all of which was provided by FEMA. Of this total restoration cost, $3,311,582 was allocated to the Pine Knoll Shores project based on the volume of material placed within this reach compared to the total volume placed on Bogue Banks to replace the material lost to Hurricane *Ophelia.*

Post-*Irene* Renourishment Project (2013)

In 2013, the post-Hurricane *Irene* restoration in Pine Knoll Shores, which was partially funded by FEMA, included fill between County Transects 62 and 71 (Figure 2-14), located within the Phase I project limits of the Bogue Banks Restoration Project. As was the case for the Hurricane *Ophelia* restoration, the Hurricane *Irene* restoration used material from the ODMDS which was transported to the beach via hopper dredges. The post-Hurricane *Irene* restoration was accomplished between

January and March 2013 with a total of 965,011 cubic yards deposited along various sections of the Bogue Banks, 315,221 cubic yards of which was placed between County Transects 62 and 71 in Pine Knoll Shores, within the Bogue Banks Restoration Project Phase I limits and Pine Knoll Shores static line extents. This equated to an average of placement density of 24.4 cy/ft. The total cost of the restoration was $14,951,965, $7,076,155 of which was provided by FEMA and the rest by the County and Towns of Emerald Isle and Pine Knoll Shores. Note that the total local cost for the *Irene* restoration allocated to the Town of Pine Knoll Shores was $511,798, while the County paid $5,920,405 of the total project cost which included material in both Emerald Isle and Pine Knoll Shores.

Post-*Florence* Renourishment Project – Phase II (2020)

The post-Hurricane *Florence* Renourishment Project, which was partially funded by FEMA, was divided into three phases with Phase I occurring March through April 2019, Phase II occurring in February through April 2020, and Phase III expected to occur during the upcoming 2020/2021 dredging window. Pine Knoll Shores was not included in the Post-*Florence* Phase I project which placed material in Emerald Isle and Indian Beach/Salter Path but the Post-*Florence* Phase II project placed material between County Transects 59 and 76 (Figure 2-15), located within the Bogue Banks Restoration Project Phase I limits and static line exception extents. The Post-*Florence* Phase II project also placed material in Emerald Isle, Salter Path, and Atlantic Beach. As was the case for the Hurricane *Ophelia* and *Irene* restorations, the post-*Florence* restoration used material from the ODMDS which was transported to the beach via hopper dredges. The post-*Florence* Phase II restoration (2020) placed a total of 2,022,807 cubic yards of material along various sections of the Bogue Banks, of which 989,253 cubic yards was placed between County Transects 59 and 76 within the limits of original Bogue Banks Restoration Project Phase I and Pine Knoll Shores static line extents. As a note, approximately 155,928 cubic yards was placed between County Transects 53 and 54 in Salter Path, also within the original Bogue Banks Restoration Project Phase I limits. The total cost of the post-*Florence* Phase II restoration was $28,068,085, of which FEMA (Category G) and State CSDM funds ($11,105,767) were used in combination with funds from the County and Towns of Emerald Isle, Pine Knoll Shores, and Atlantic Beach. The total local cost for the post-*Florence* Phase II restoration allocated to the Town of Pine Knoll Shores was $3,818,623 (County reserve). Appendix A contains the plans for the 2020 Post-*Florence* Renourishment Project - Phase II, the only projects to occur within the last 5 years, covering the full extents of Pine Knoll Shores included in the static line exception.

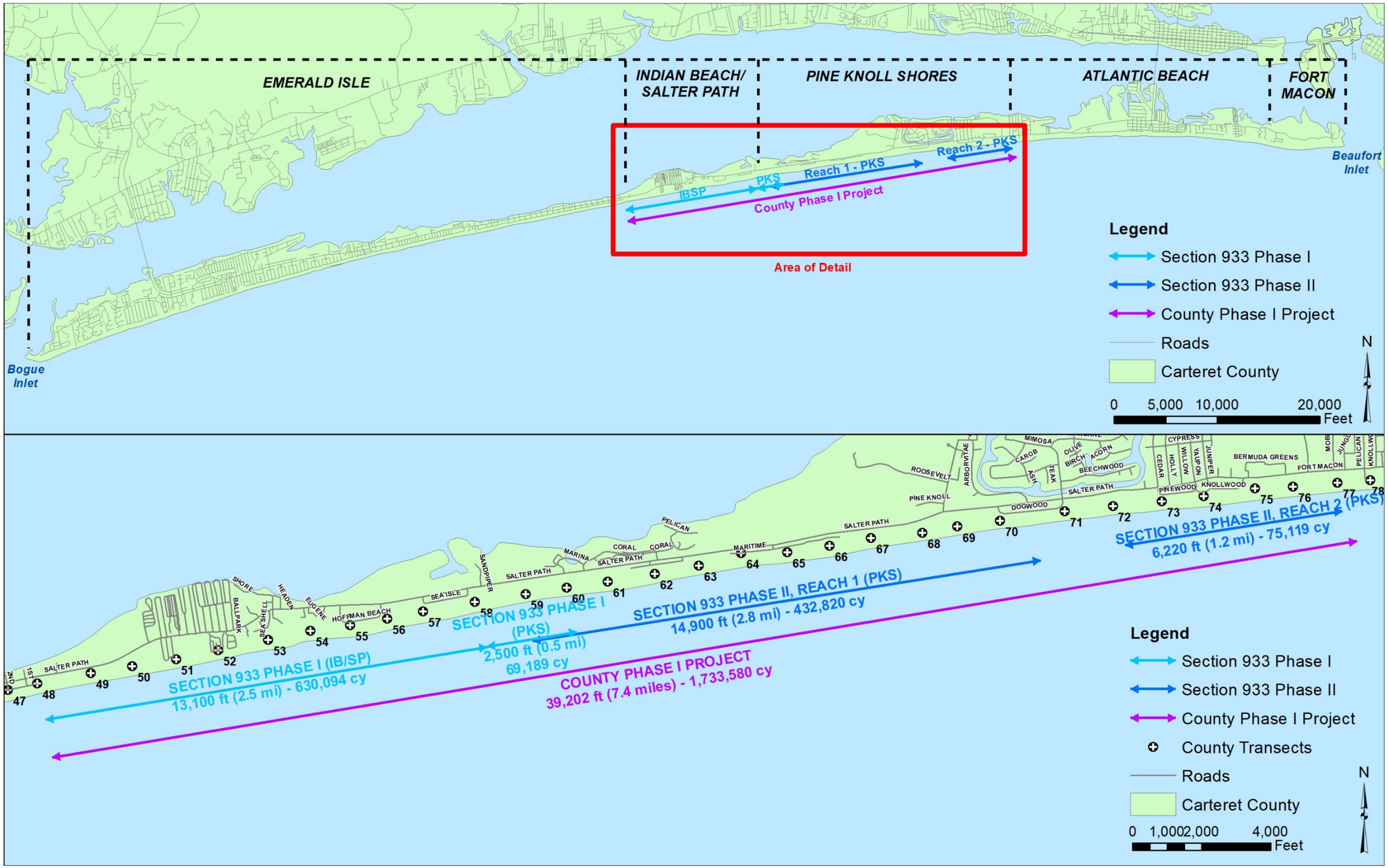


Figure 2-12. USACE Section 933 Project Phase I and Phase II (2004, 2007)

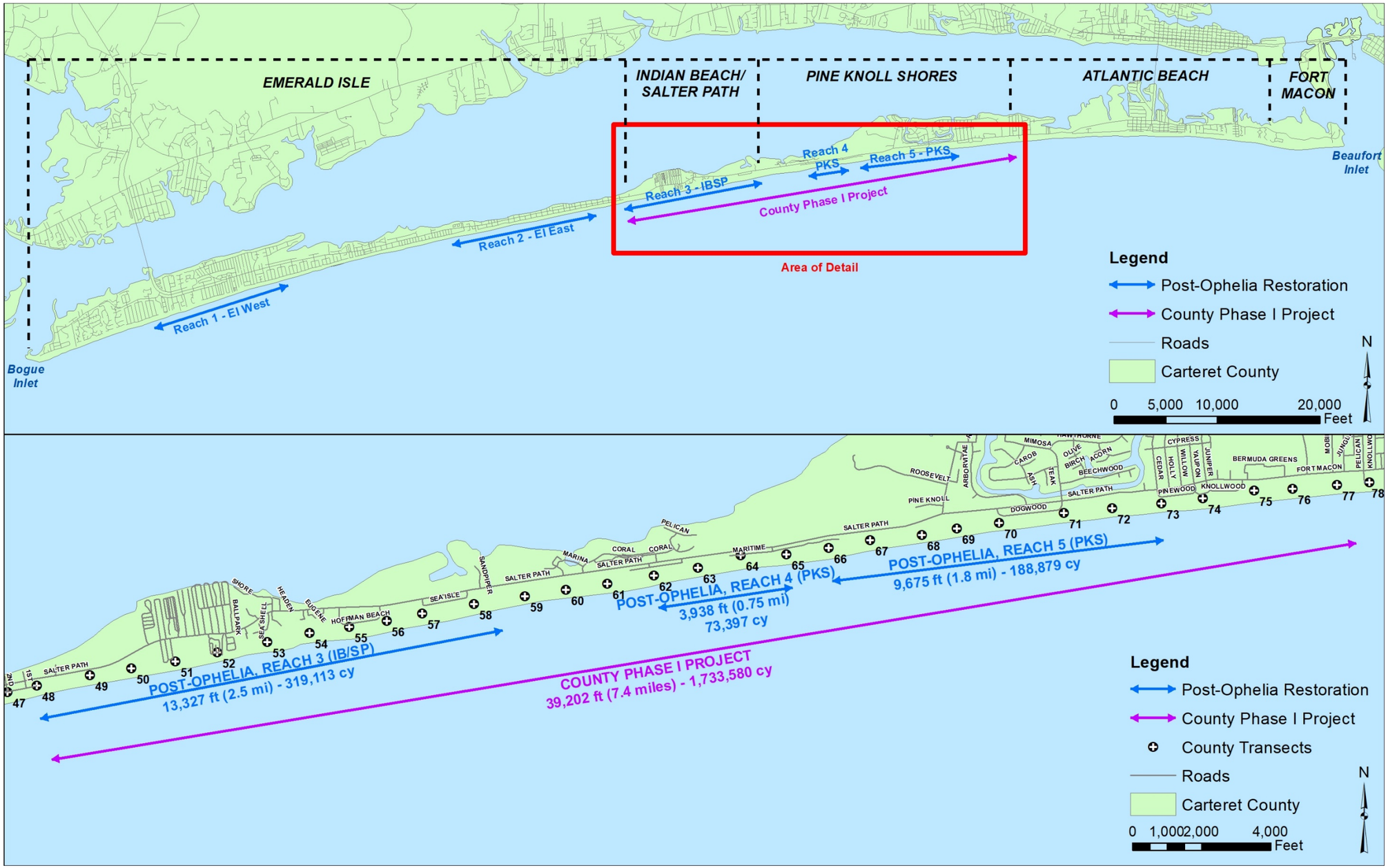


Figure 2-13. Post-Ophelia Restoration Project (2007)

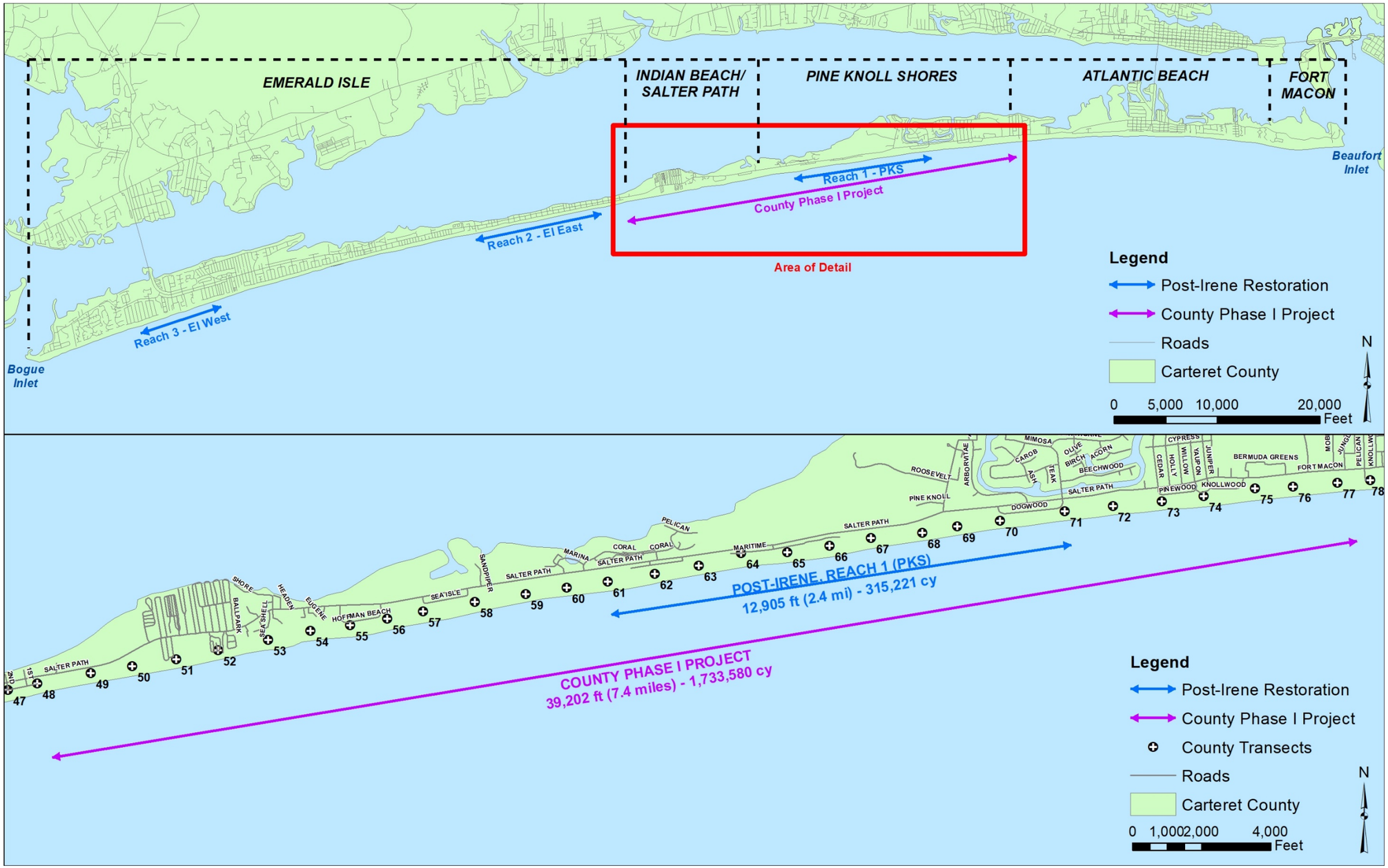


Figure 2-14. Post-Irene Restoration Project (2013)

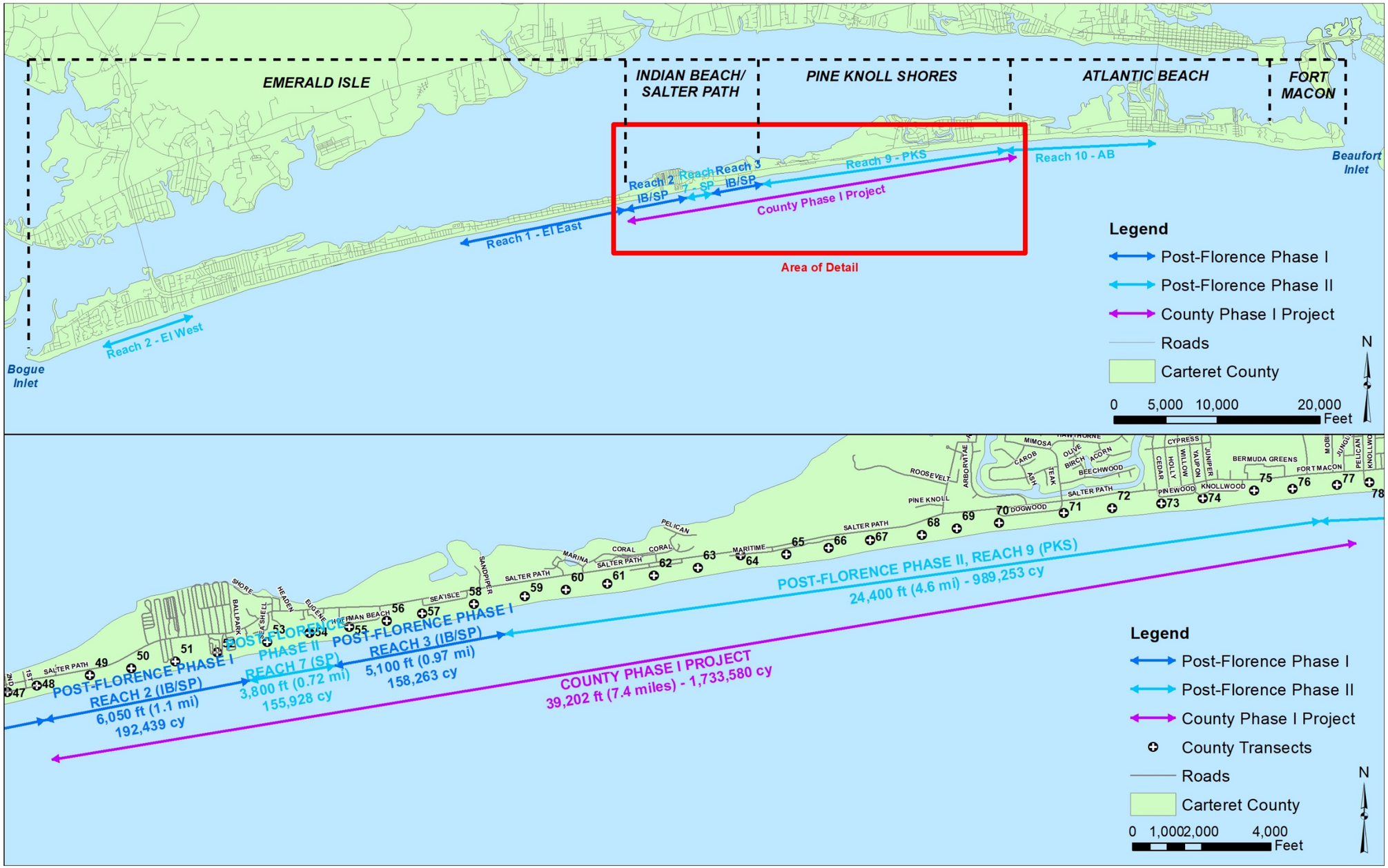


Figure 2-15. Post-Florence Phase I and Phase II Restoration Project (2019, 2020)

2.3 Master Beach Nourishment Plan

The Bogue Banks Master Beach Nourishment Plan was developed to provide long-term shoreline stabilization and equivalent level of protection along Bogue Banks 25 mile oceanfront. Development of a 50-year programmatic EIS was completed and a 50-year USACE permit was issued on November 8, 2018, which covers Phases I, II, and III of the Post-*Florence* Renourishment Project and will apply to nourishment operations through 2068 (50 years). As part of the EIS, an engineering report was completed in 2014 to provide insight into the future sand needs and availability. A combination of analytical analysis and cross-shore and longshore modeling was used to determine historical loss rates (both background erosion and storm erosion), volumetric requirements to provide equal protection to all portions of the island, and future nourishment quantities and timing cycles.

Through SBEACH modeling, it was determined that a 25-year return period storm level of protection (LoP) for the entire island was feasible, both from a construction/sand availability standpoint and financial position. Therefore, the island was divided into various reaches based on similar profiles characteristics and historical erosion rates were used to determine the volume of material required to protect infrastructure in each reach from the 25-year storm event. This volume differed slightly across the oceanfront based on existing dune configurations. Table 2-1 shows the calculated 25-year triggers for the LoP for the various monitoring reaches of Bogue Banks. The profile volume trigger for the Pine Knoll Shores portion of the original Bogue Banks Restoration Project Phase I project area (and static line exemption extents) was determined to be 211 cy/ft. The new triggers developed for the Master Beach Nourishment Plan have replaced the previous methods of determining the need for nourishment (i.e. 50% erosion of the original Phase I project and 225 cy/ft above -12 ft NAVD88). Therefore, the Town of Pine Knoll Shores will initiate nourishment actions in the Phase I Project area (and static line exception extents) as this trigger is approached.

Table 2-1. Master Plan Nourishment Triggers

Reach	-12 ft Trigger	
Bogue Inlet (1-11)	235	
Emerald Isle West (12-25)	266	
Emerald Isle Central (26-36)	211	
Emerald Isle East (37-48)	221	
Indian Beach/Salter Path (49-58)	224	
Pine Knoll Shores (59-76)	211	<--Phase I
Atlantic Beach (77-102)	254	Project Area
Fort Macon (103-112)	N/A	
Weighted Average	233	

Since erosion rates across the island differ drastically, an analytical analysis was performed to determine the expected quantity and timing of future nourishments to maintain the 25-year level of protection in each reach for the next 50 years. Based on the analytical analysis of historical profile volume change performed using the Crystal Ball software (a Microsoft Excel Add-in program), it was determined that the overall annual loss along Bogue Banks was roughly 450,000

cy with a 50 year nourishment need of 22.6 Mcy just to keep up with historical erosion patterns. This value was based on the 50% probability results, as Crystal Ball reports results for various probabilities of exceedance. Table 2-2 shows the volume loss based on 50% exceedance for various sub-reaches of Bogue Banks.

Table 2-2. Crystal Ball Analysis For Annual Volume Change and 50 Year Need

Sub-Reach (Transects)	Reach Length (ft)	-12 ft Annual Loss 50% Exceedance (cy)	-12 ft Annual Loss Density 50% Exceedance (cy/ft)
Bogue Inlet (1-8)	7,432	39,468	-5.3
Emerald Isle West - West (9-11)	4,056	5,384	-1.3
Emerald Isle West - Central (12-22)	14,283	4,768	-0.3
Emerald Isle West - East (23-25)	4,005	1,566	-0.4
Emerald Isle Central - West (26-32)	10,428	14,093	-1.4
Emerald Isle Central - East (33-36)	5,374	10,890	-2.0
Emerald Isle East - West (37-44)	8,814	40,472	-4.6
Emerald Isle East - East (45-48)	4,406	23,272	-5.3
Indian Beach/Salter Path - West (49-52)	5,275	54,380	-10.3
Indian Beach/Salter Path - East (53-58)	7,575	8,187	-1.1
Pine Knoll Shores West (59-65)	9,063	13,726	-1.5
Pine Knoll Shores East-West (66-70)	6,564	24,709	-3.8
Pine Knoll Shores East-East (71-76)	8,251	46,360	-5.6
Atlantic Beach - West (77-81)	5,388	5,881	-1.1
Atlantic Beach - Central (82-89, 91-96)	13,771	96,718	-7.0
Atlantic Beach - Circle (90)	1,006	12,948	-12.9
Atlantic Beach - East (97-102)	6,011	49,398	-8.2
Total Annual Volume Change		**452,220**	**-3.7**
50-yr Nourishment Need		**22,611,000**	

A separate Crystal Ball analysis of individual storm impacts was performed to gage the amount of erosion that could occur from storm activity in addition to the historical background losses. Based on the results, it is expected that the losses for a given storm may range between 1.4 – 1.7 Mcy. Table 2-3 shows the results for storm induced losses above -12 ft NAVD88 and -16 ft NAVD88. Given that storms have occurred once every three years or so, the storm need over 50 years may range between 22.4 – 27.2 Mcy. Therefore, the overall background and storm sediment need over the 50 year planning horizon based on the analytical/empirical analysis is between 45.0 and 49.8 Mcy.

Table 2-3. Crystal Ball Estimate of Individual Storm Volume Loss

Probability	Storm Loss Above -12 ft NAVD88 (cy)	Storm Loss Above -16 ft NAVD88 (cy)
85%	1,644,909	1,847,667
84%	1,636,034	1,839,681
80%	1,602,871	1,809,816
75%	1,567,196	1,776,197
70%	1,534,995	1,747,197
65%	1,506,039	1,719,307
60%	1,477,667	1,693,397
55%	1,450,894	1,668,206
50%	1,424,153	1,644,355

Taking into account possible sea level change, SBEACH was used to determine the impact on beach profiles based on a rise in water level. The intermediate rate of sea level change determined by the USACE indicates a rise of 1.01 ft over the next 50 years. Based on this, SBEACH results showed an additional 1.8 Mcy of loss could be expected due to sea level rise. **This brings the overall total 50 year need to 46.8 – 51.6 Mcy.**

Figure 2-16 shows the future nourishment plan for Bogue Banks, including the Bogue Banks Restoration Project Phase I (Indian Beach/Salter Path and Pine Knoll Shores) area and static line exception limits, for non-storm losses. It is estimated that the Pine Knoll Shores portion of the Phase I project area will require 508,770 cy of nourishment every 6 years if typical background erosion patters were the only forces experienced. However, the annual monitoring efforts will decide the exact timing and extents of future nourishment projects by tracking the average profile volume in each management reach as compared to nourishment triggers that define the minimum profile volumes required to provide an equal level of protection along the Bogue Banks shoreline for a 25-yr storm event. These are likely to vary from the 3, 6, and 9 year nourishment intervals used for planning due to storm events, atypical annual erosion, the status of funding streams, and dredging market forces (i.e. dredge availability and price).

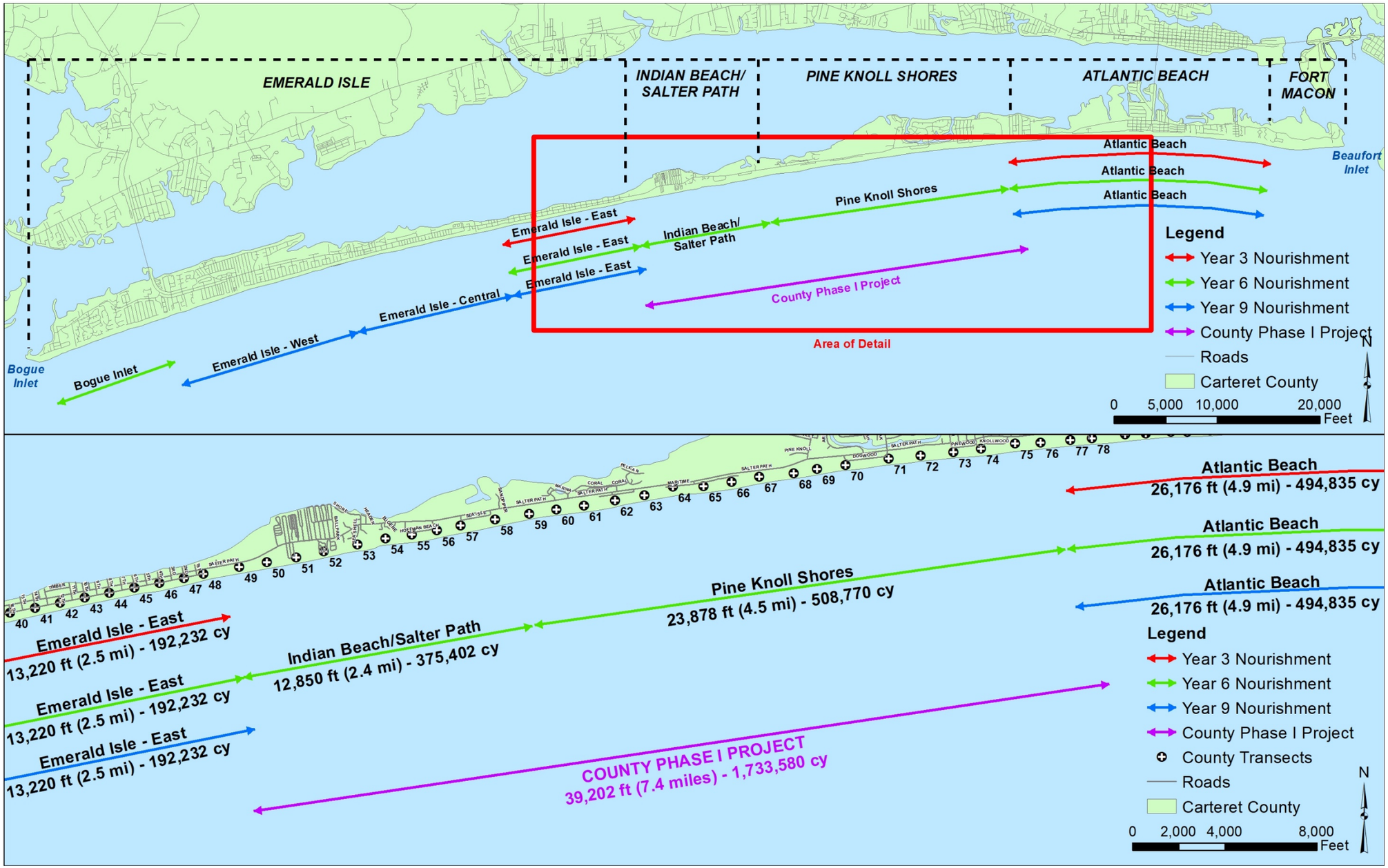


Figure 2-16. Bogue Banks Master Beach Nourishment Plan

3.0 PROJECT DESIGN AND PERFORMANCE

3.1 Initial Project Template

CSE divided Phase I of the Bogue Banks Restoration Project (Indian Beach/Salter Path and Pine Knoll Shores) into three reaches (see Figure 2-2) with different design volumes in each reach based on the volume from the toe of the dune out to -12 ft NAVD88 needed to reach the design volume of 175 cy/ft and an advanced nourishment volume equal to expected volume losses in that zone over the next 10 years. The design profile volume for the Bogue Banks project was subsequently increased to 225 cy/ft to account for the volume of material from the landward toe of the dune up to the peak of the dune. The Pine Knoll Shores portion of the project was divided into two reaches (Reach 5 and 6). A 1,000-foot transition or taper section was provided on the east end of the fill. A taper section was not required on the west end of the fill as the project was constructed as a continuous fill through Indian Beach/Salter Path. The beach fill was designed as a variable width horizontal berm at elevation +6.0 feet NAVD with an average fill volume of 54.8 cy/ft in Reach 5 and 58.7 cy/ft in Reach 6. Figure 3-1 and Figure 3-2 show the plan view of the Pine Knoll Shores portion (reaches 5 and 6) of the Phase I beach fill project while typical design templates for Reach 5 (west) and 6 (east) are provided in Figure 3-3 and Figure 3-4, respectively. Figure 3-5 and Figure 3-6 display some example pre- and post-nourishment profiles from the Phase I project.

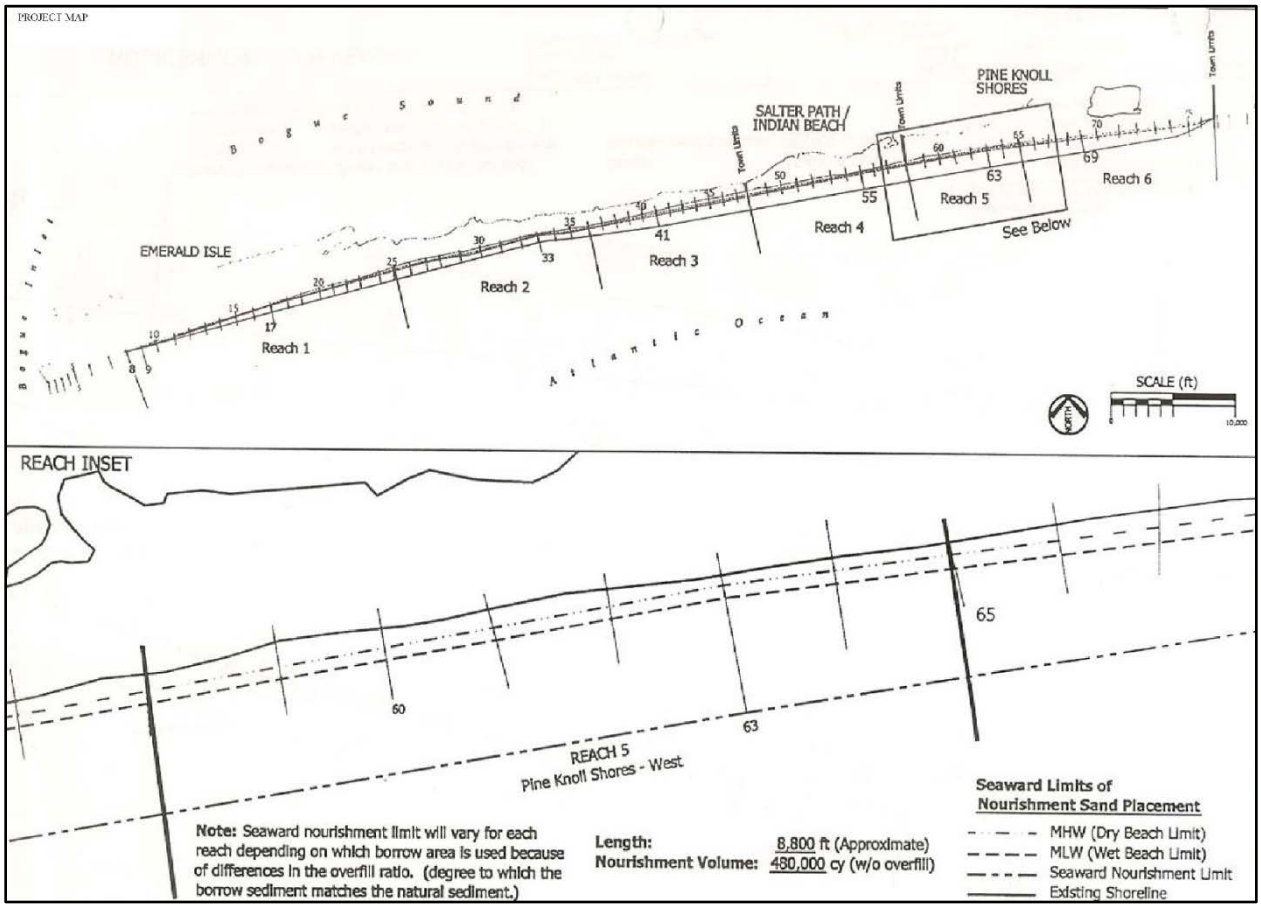


Figure 3-1. Phase I Plan View – Pine Knoll Shores Reach 5 (CPE 2010 Static Line Report)

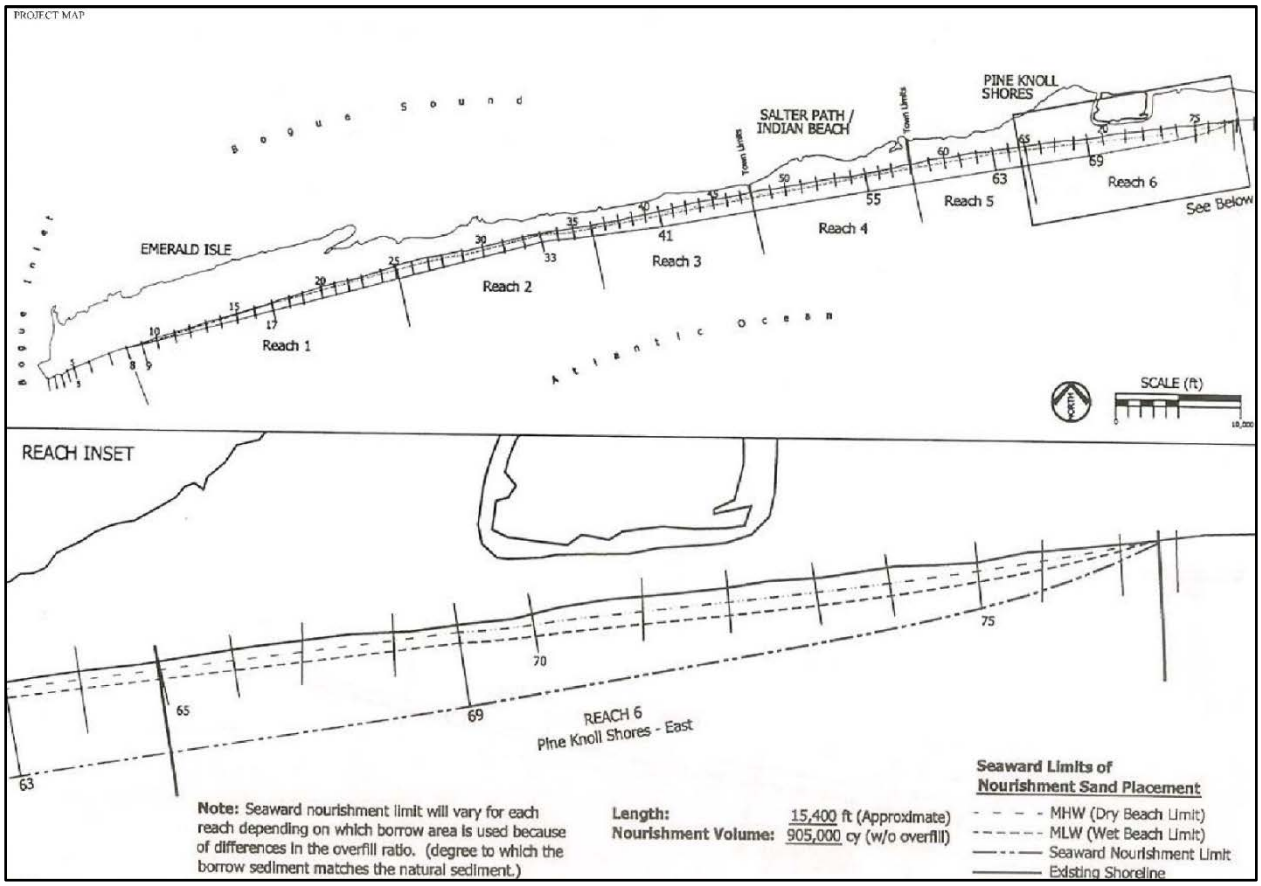


Figure 3-2. Phase I Plan View – Pine Knoll Shores Reach 6 (CPE 2010 Static Line Report)

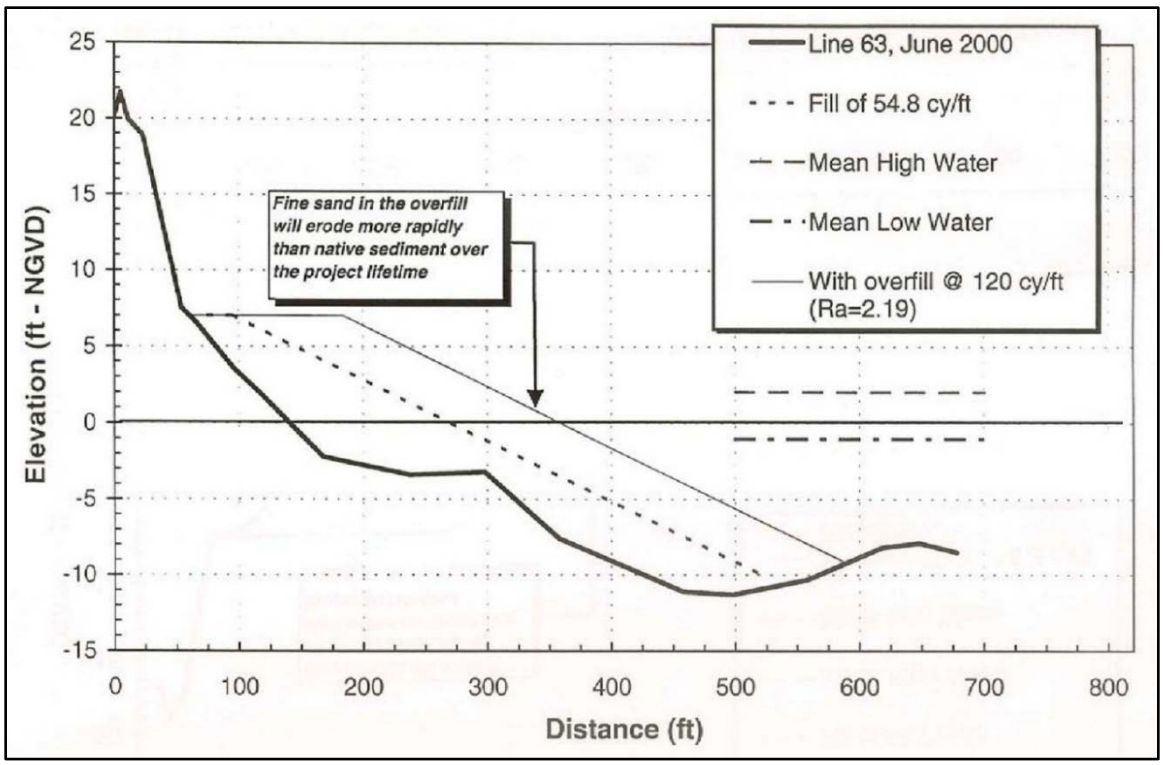


Figure 3-3. Pine Knoll Shores Phase I Example Cross-Section - Reach 5 (CPE 2010 Static Line Report)

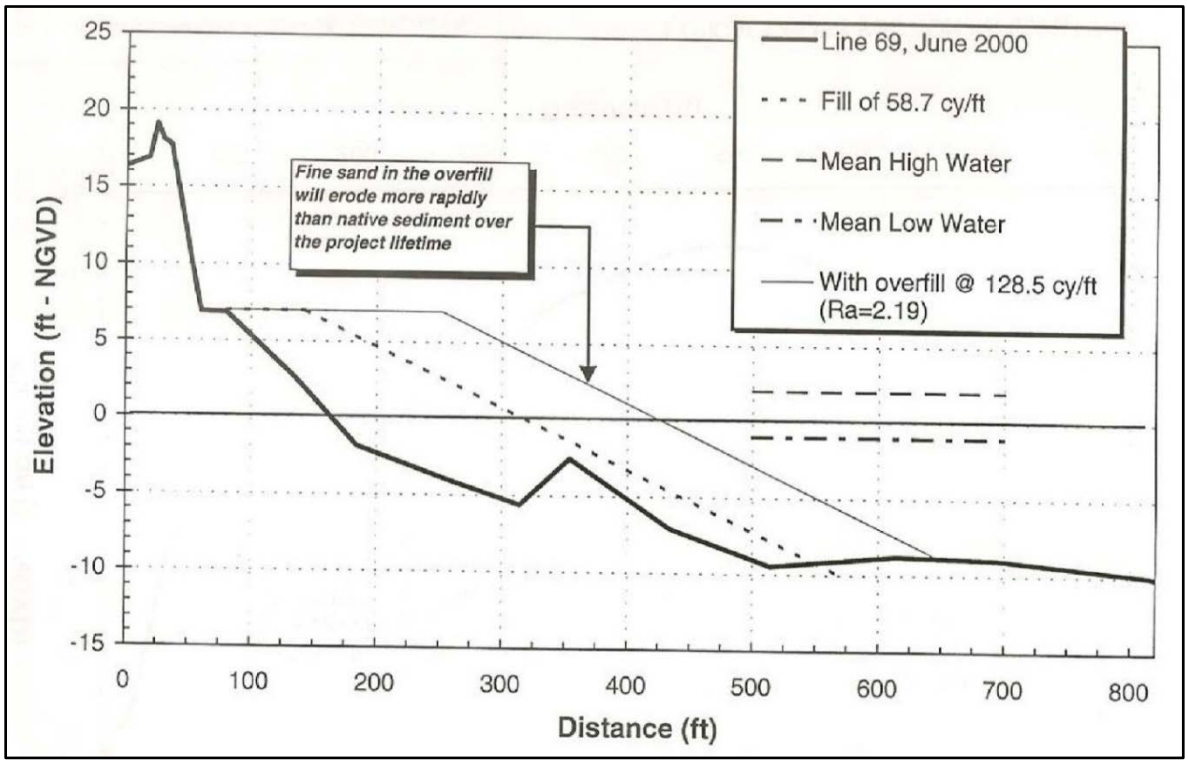


Figure 3-4. Pine Knoll Shores Phase I Example Cross-Section - Reach 6 (CPE 2010 Static Line Report)

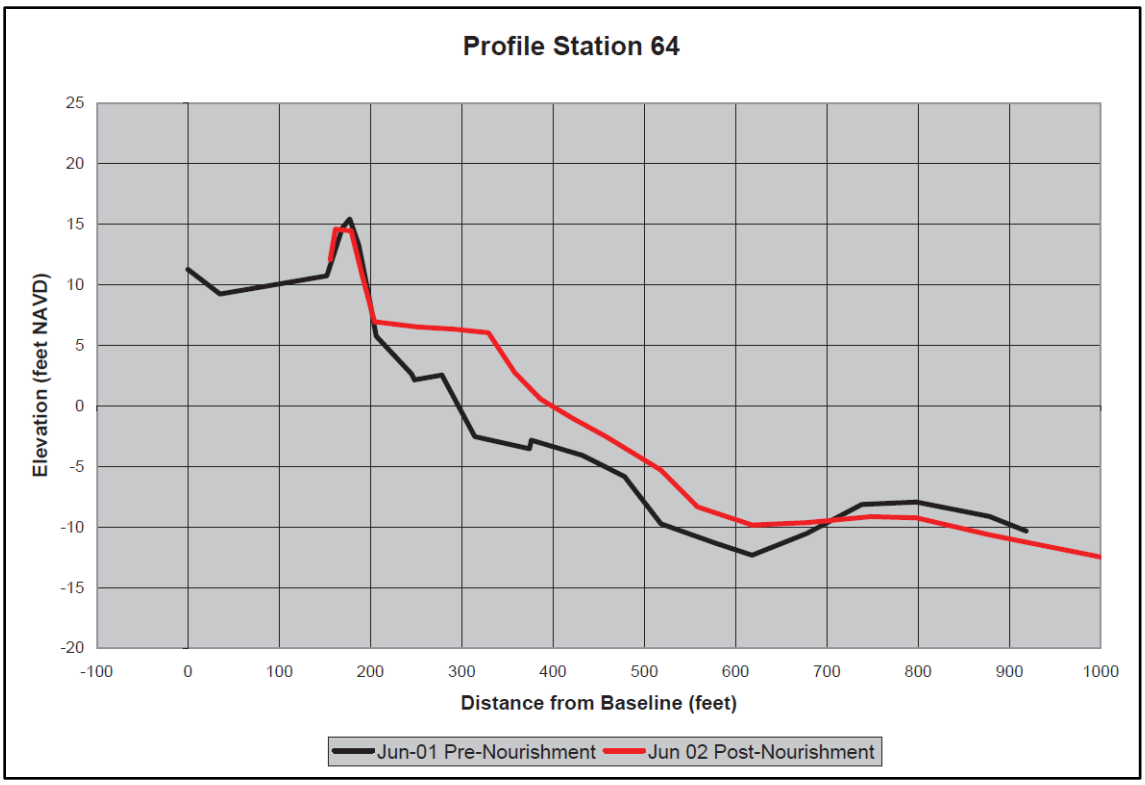


Figure 3-5. Profile Station 64 Pre- and Post-Nourishment Example (CPE 2010 Static Line Report)

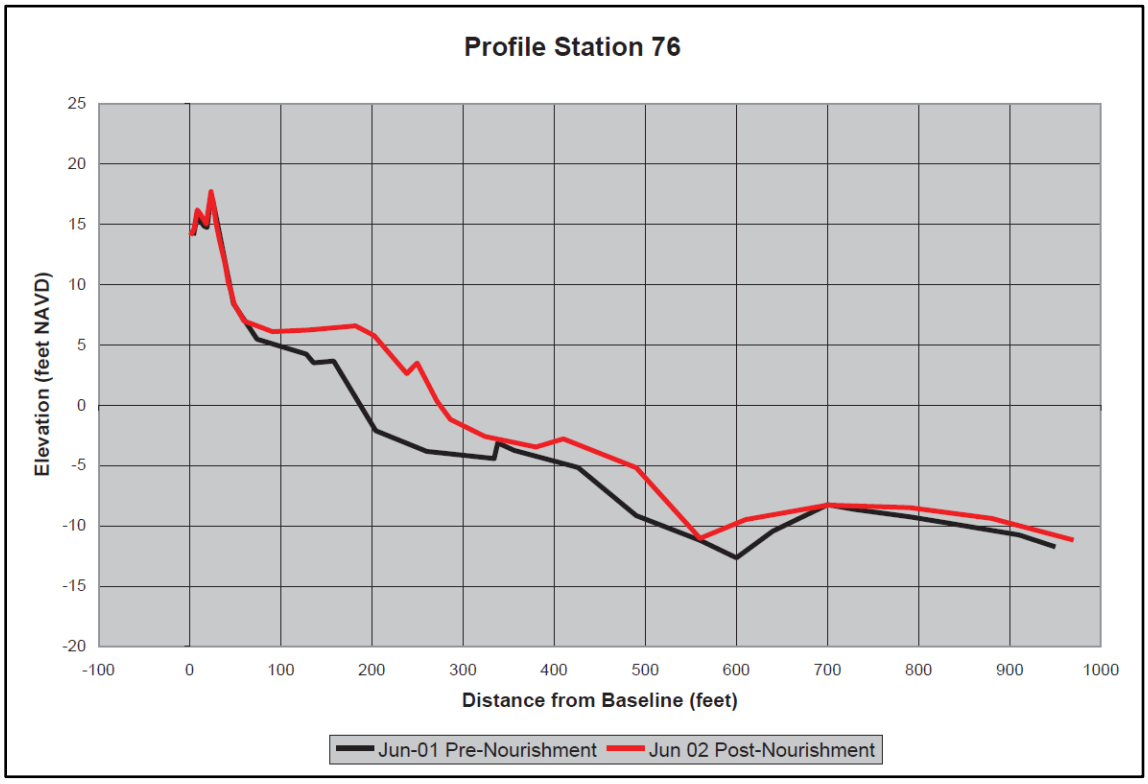


Figure 3-6. Profile Station 76 Pre- and Post-Nourishment Example (CPE 2010 Static Line Report)

3.2 Monitoring Project Performance & Status of the Beach

The Bogue Banks Beach and Nearshore Mapping Program, established in 2004, monitors the entire island on an annual basis. Each year, profiles are analyzed to determine gains and losses in material to the system as well as assessment of current beach conditions as compared to nourishment triggers. Through 2014, two nourishment triggers were analyzed: 1) 50% of original fill volume from the initial restoration project remaining, and 2) volume from the peak of the dune to the outer bar at -12 ft NAVD88 above 225 cy/ft. Table 3-1 shows the amount of fill, by percent of original placement, that existed in the Pine Knoll Shores portion of the Bogue Banks Restoration Project Phase I area each year of the monitoring from 2004 - 2014. As can be seen, through the efforts of the Section 933 and post-storm nourishment projects, there was more sand in the Pine Knoll Shores portion of the Phase I project overall in 2014 than there was only 2 years after the project was constructed (see 2004 results in Table 3-1). While the eastern portion of the Phase I project (Pine Knoll Shores East reach) contained slightly less material in 2014 than was originally placed, it is well above the nourishment trigger of 50% remaining.

Table 3-1. Percent Fill Remaining From Initial Construction (Pine Knoll Shores Phase I)

	Percent Fill Remaining										
Reach	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Pine Knoll Shores-West	92.5	122.4	91.7	157.8	168.8	165.0	150.0	145.2	128.5	136.0	137.6
Pine Knoll Shores-East	65.8	59.4	34.4	119.8	125.7	107.7	99.7	94.5	64.7	103.8	95.8
Pine Knoll Shores-Phase I	76.0	83.5	56.4	134.4	142.2	129.7	119.0	113.9	89.1	116.1	111.8

Figure 3-7 shows the average profile volume calculated above -12 ft NAVD88 for the Pine Knoll Shores West and Pine Knoll Shores East reaches during each year of monitoring from 2004 - 2014. As can be seen from this figure, the profile volumes have been maintained above the historic trigger of 225 cy/ft.

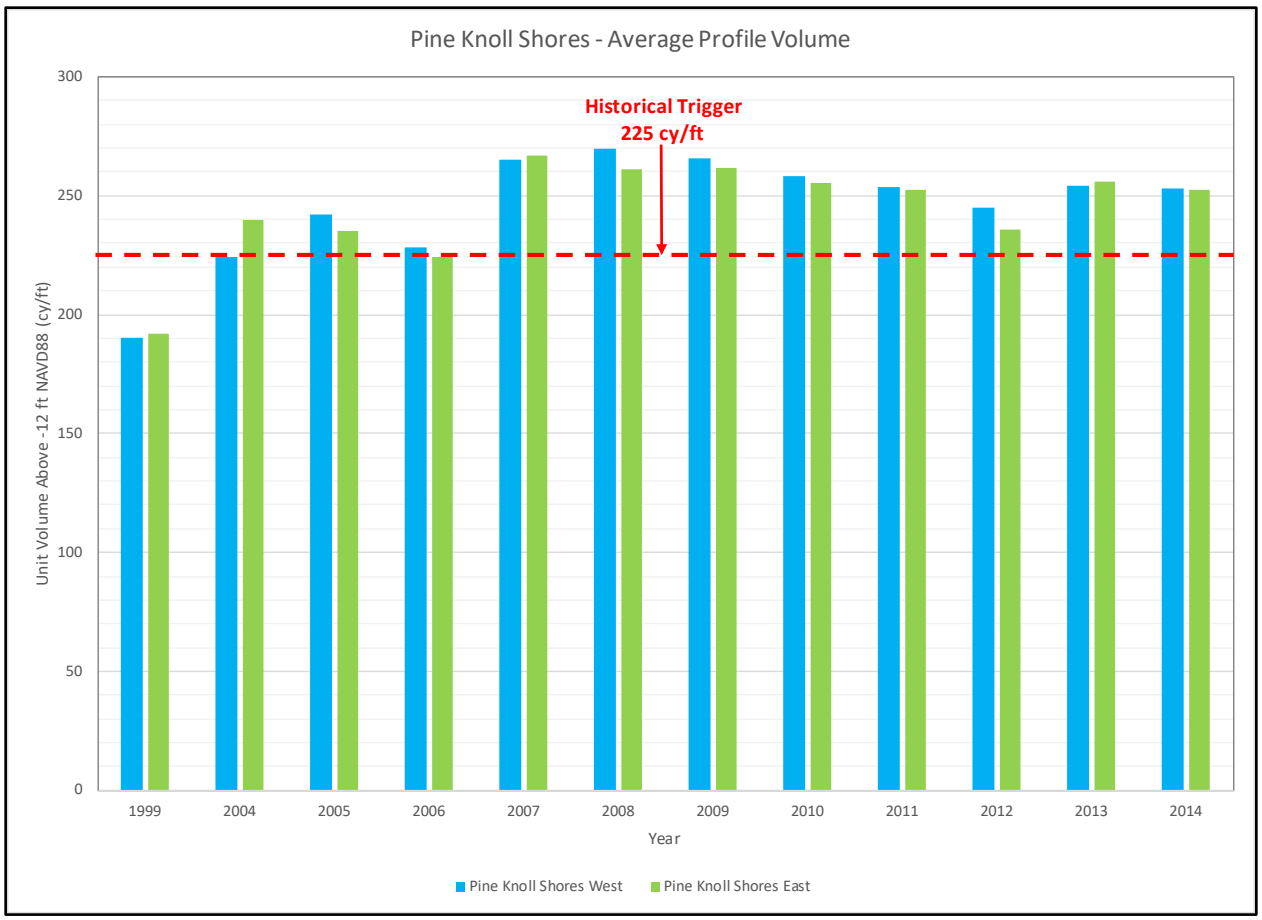


Figure 3-7. Average Profile Volume Above -12 ft NAVD88: 2004 - 2014 (Pine Knoll Shores - Phase I)

Following completion of the engineering report in 2014, which was developed to provide insight into the future sand needs and availability for the programmatic EIS upon which the USACE 50-yr permit was based, the Bogue Banks Beach and Nearshore Mapping Program shifted to the new methodology in 2015 for tracking project performance and determining the status of the beach as stated in the Master Beach Nourishment Plan which solely uses 25-year Level of Protection nourishment triggers (see Table 2-1) to determine the need for nourishment. Figure 3-8 shows the average profile volume calculated above -12 ft NAVD88 for the Pine Knoll Shores monitoring reach during each year of monitoring from 2015 - 2020. As can be seen from this figure, the average profile volumes have been maintained above the Master Beach Nourishment Plan trigger of 211 cy/ft for the Pine Knoll Shores monitoring reach within the Bogue Banks Restoration Project Phase I area and Pine Knoll Shores static line exception extents.

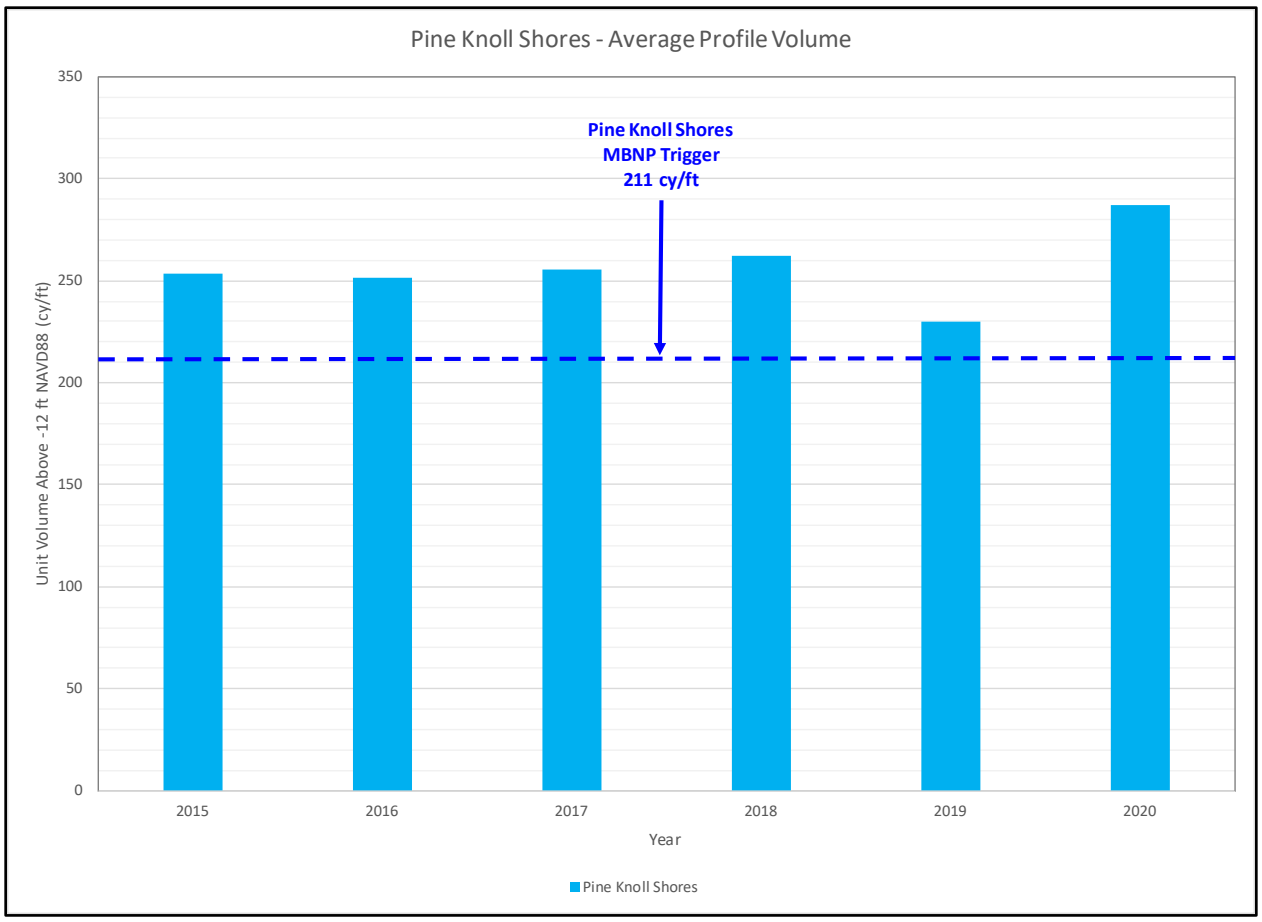


Figure 3-8. Average Profile Volume Above -12 ft NAVD88: 2015 - 2020 (Pine Knoll Shores - Phase I)

4.0 COMPATIBLE SEDIMENT

The material from borrow areas B2 and A used for initial construction of the Bogue Banks Restoration Project had a composite mean grain size of 0.44 mm which was much coarser than the native sand mean grain size of 0.30 mm. In that regard, the borrow material seemed ideal for beach nourishment purposes as material coarser than the native is known to provide a more stable beach fill. However, the coarseness of the material in these two borrow areas was primarily due to relatively high shell or CaCO3 content which averaged 44% based on post-placement samples of the material. In order to avoid placing additional large amounts of shell or CaCO3 along the town's shoreline, the Town of Pine Knoll Shores opted to use the ODMDS for the subsequent FEMA nourishment events. The ODMDS is expected to have compatible material as most of the sediment in the disposal site was derived from maintenance of the Beaufort Inlet ocean bar channel; particularly the landward portions of the channel which is known to accumulate littoral material directly off the adjacent shorelines of Bogue and Shackleford Banks. Limited sampling was performed in accordance with post-*Isabel* and post-*Ophelia* restoration projects confirming the quality of the material, with an average grain size of approximately 0.31 mm.

As part of the Bogue Banks Master Beach Nourishment Plan, an extensive sediment sampling program was implemented in 2012, just prior to the 2013 post-*Irene* project, to verify the compatibility and quantity of existing sediment sources in the ODMDS, which had been used

previously during the post-*Isabel* and post-*Ophelia* restoration projects, as well as possibly locate some new sources for use in the 50 year plan. This was part of the permitting requirements to show the quantity and quality of potential sediment sources for the next 50 years. The 2014 engineering report identified and quantified the amount of material in upland sources (sand mines), AIWW disposal areas, offshore sources (ODMDS and Area Y), and inlets (Beaufort and Bogue). The findings indicate that possible upland sources exist in the amount of 1.4 Mcy while AIWW disposal areas possibly contain up to 1.3 Mcy. Offshore sources consist of the new and old ODMDS as well as some small pockets of material off of Emerald Isle, known as Area Y. Together, they contain approximately 22.4 Mcy of compatible material. In addition, both Beaufort Inlet and Bogue Inlet could provide a steady supply of nourishment material from dredging operations over the next fifty years. The periodic dredging of Morehead City Harbor by the USACE could provide approximately 20 Mcy over the next 50 years. The dredging/relocation of Bogue Inlet (approximately every 10 years) and dredging of the AIWW crossing could provide approximately 5.1 Mcy over the next 50 yrs. Therefore, approximately 50.2 Mcy of material has been identified which is considered enough material to meet the 50 year need of 46.8-51.6 Mcy determined in the Bogue Banks Master Beach Nourishment Plan. Figure 4-1 shows a summary of the potential sediment sources identified for use over the next 50 years.

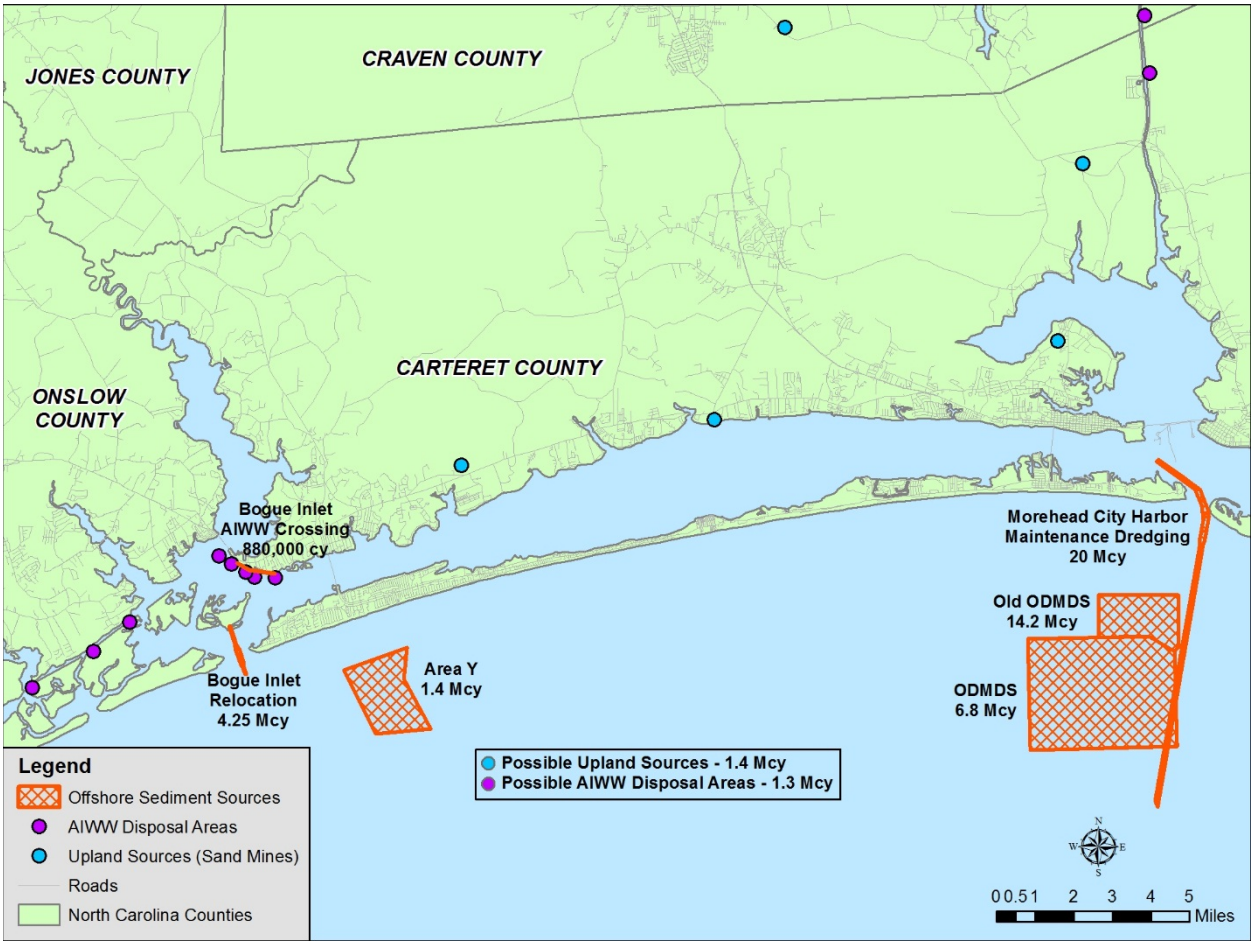


Figure 4-1. Master Beach Nourishment Plan Potential Sediment Sources

While more analysis will need to be done on the potential upland sources and AIWW disposal areas before being utilized, the majority of material will be coming from offshore sources and inlets. A detailed analysis of these areas from the 2012 sampling effort, in comparison to the native beach, is provided in the following sections. The vibracoring was performed by Alpine Ocean Seismic Survey, Inc (Alpine) while the sediment analysis was performed by Coastal Technology Corporation (Coastal Tech).

4.1 Native Beach

Before the series of nourishment projects which took place along Bogue Banks in the 2000's, native beach data was collected by the USACE as well as CSE. These data indicate a native grain size ranging from 0.2 mm to 0.3 mm. For the Bogue Banks Master Beach Nourishment Plan, a median grain size of 0.3 mm was selected as the best representation of the native beach based upon the 64 samples analyzed by CSE in 2001.

The native beach characteristics and parameters identified by the North Carolina Administrative Code "Technical Standards for Beach Fill Projects" (15A NCAC 07H .0312) are presented in Table 4-1.

Table 4-1. Native Beach Characteristics and Rule Parameters

Characteristic	2001 Native	NCAC Requirements	Required Borrow Site Parameters
Fines (<#230)	Reported: 0%, Assumed: <1%	<1% +5%	≤ 6%
Sand (>#230 & <#10)	Reported at 98.68%	-	-
Granular (>#10 & <#4)	Reported combined at 1.32%, Assumed 0.7% each	0.7% + 10%	≤ 11%
Gravel (>#4)		0.7% + 5%	≤ 6%
Calcium Carbonate	Reported at 15-20%	20% + 15%	≤ 35%

The material in the proposed borrow areas must meet the characteristics prescribed by North Carolina Administrative Code (NCAC) "Technical Standards for Beach Fill Projects" (15A NCAC 07H .0312).

4.2 Old ODMDS

This site is located directly north of the Current ODMDS in State waters. The Old ODMDS was split into two sections; designated Old ODMDS 1 and Old ODMDS 2, to maximize the potential borrow area volume as shown in Figure 4-2.

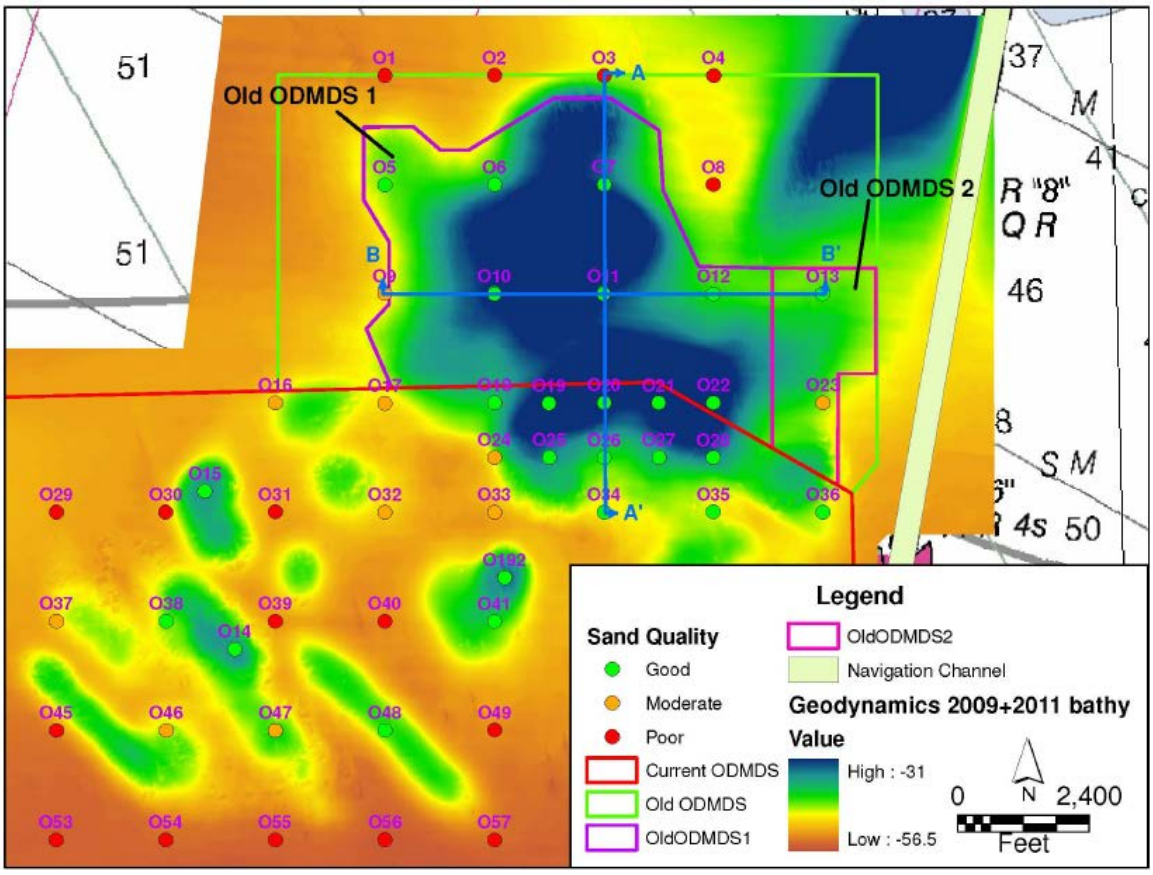


Figure 4-2. Old ODMDS Site and Vibracore Locations (Coastal Tech, 2013)

4.2.1 Old ODMDS 1

Old ODMDS 1 borrow area is location on the boarder of Current ODMDS. This area consists of fine grained, poorly sorted quartz sand with a mean grain size of 0.30 millimeters (mm) and an overfill factor of 1.30. This area is estimated to contain 13.1 Million cubic yards (Mcy) of beach compatible sand. The characteristics of this material are compliant with the parameters defined by the NCAC as shown in Table 4-2.

Table 4-2. Old ODMDS 1 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Old ODMDS 1
Fines (<#230)	≤ 6%	**0.53%**
Sand (>#230 & <#10)	-	**96.00%**
Granular (>#10 & <#4)	≤ 11%	**2.14%**
Gravel (>#4)	≤ 6%	**1.33%**
Calcium Carbonate	≤ 35%	**13.55%**

4.2.2 Old ODMDS 2

Old ODMDS 2 borrow area is similar to Old ODMDS 1 with a slightly larger mean grain size of 0.32 mm and an overfill factor of 1.25. This area is estimated to contain 1.1 Mcy of beach compatible sand that meet the NCAC criteria as listed in Table 4-3.

Table 4-3. Old ODMDS 2 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Old ODMDS 2
Fines (<#230)	≤ 6%	**0.20%**
Sand (>#230 & <#10)	-	**96.30%**
Granular (>#10 & <#4)	≤ 11%	**2.49%**
Gravel (>#4)	≤ 6%	**1.01%**
Calcium Carbonate	≤ 35%	**13.57%**

4.3 Current ODMDS

The Current ODMDS is located south of the Old ODMDS just outside of the 3-mile jurisdictional line in Federal waters. This area was divided into eight potential borrow areas consisting of one large mound and seven smaller disposal mounds within this location. The seven small disposal mounds were then grouped according to the level of confidence in the granularmetric data.

4.3.1 Current ODMDS 1

Current ODMDS 1 is an extension of the large mound located in Old ODMDS 1 as shown in Figure 4-3; therefore, they have very similar sediment properties. The mean grain size is 0.30 mm and an overfill factor of 1.25 and meet all of the NCAC compatibility requirements as listed in Table 4-4. This site contains approximately 3.27 Mcy of beach compatible material.

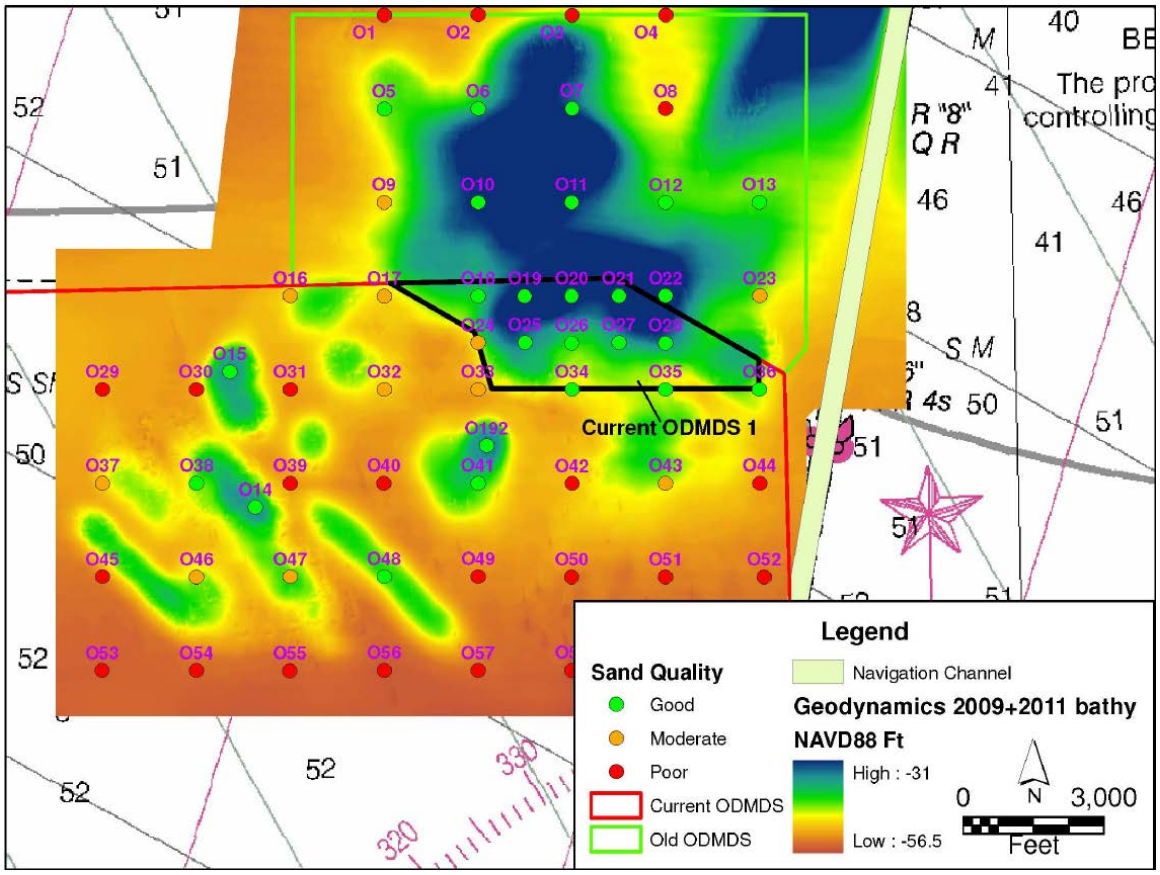


Figure 4-3. Current ODMDS 1 Site and Vibracore Locations (Coastal Tech, 2013)

Table 4-4. Current ODMDS 1 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Current ODMDS 1
Fines (<#230)	≤ 6%	**0.52%**
Sand (>#230 & <#10)	-	**96.06%**
Granular (>#10 & <#4)	≤ 11%	**2.06%**
Gravel (>#4)	≤ 6%	**1.36%**
Calcium Carbonate	≤ 35%	**13.29%**

4.3.2 Higher Confidence Mounds

The higher confidence mounds include mounds where at least one vibracore penetrates the thickest portion of the mound. This allows for more accurate representation of the stratigraphy to be defined. The higher confidence mounds include Mounds O-15, O-192, O-48, O14, and O-47, which are shown in Figure 4-4.

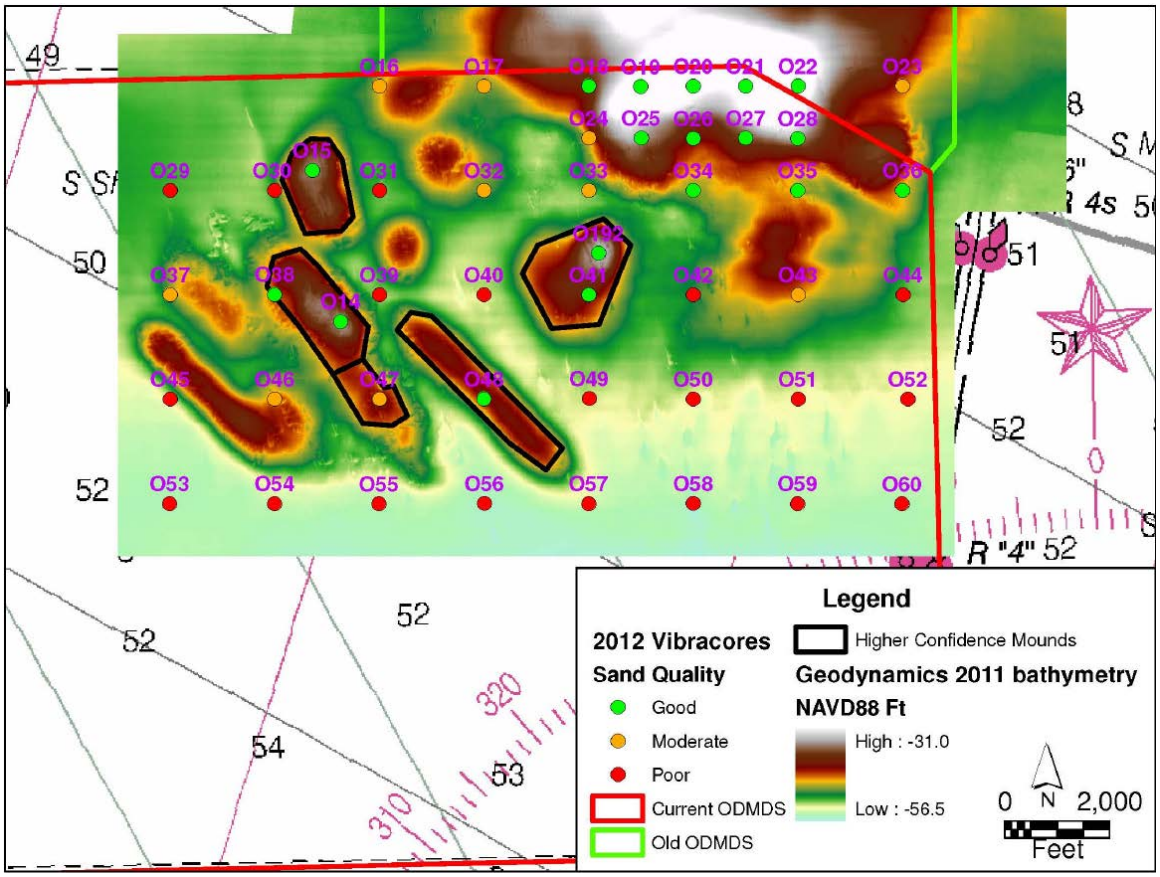


Figure 4-4. Higher Confidence Mound Sites and Vibracore Locations (Coastal Tech, 2013)

<u>Mound O-15</u>

Mound O-15 is located west of Current ODMDS 1 and has vibracore O-15 passing directly through the thickest section of the mound. This potential borrow area consists of fine grained, moderately sorted quartz sand and has a mean grain size of 0.24 mm, which is smaller than the native mean grain size. This results in a larger overfill factor of 1.60. All parameters defined by NCAC were

met, as shown in Table 4-5; therefore, the material is considered beach compatible. The total amount of beach compatible material in this mound is approximately 356,000 cubic yards (cy).

Table 4-5. Mound O-15 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Mound O-15
Fines (<#230)	≤ 6%	**0.07%**
Sand (>#230 & <#10)	-	**99.23%**
Granular (>#10 & <#4)	≤ 11%	**0.54%**
Gravel (>#4)	≤ 6%	**0.16%**
Calcium Carbonate	≤ 35%	**10.10%**

Mound O-192

Mound O-192 is located southwest of Current ODMDS 1 and has vibracore O-192 and O-41 passing through this mound with O-192 passing through the thickest section of the mound. This potential borrow area consists of fine grained, poorly sorted quartz sand and has a mean grain size of 0.36 mm, which is coarser than the previous mound. This results in a smaller overfill factor of 1.25. All parameters defined by NCAC were met, as shown in Table 4-6; therefore, the material is considered beach compatible. The total amount of beach compatible material in this mound is approximately 785,270 cy.

Table 4-6. Mound O-192 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Mound O-192
Fines (<#230)	≤ 6%	**0.13%**
Sand (>#230 & <#10)	-	**93.07%**
Granular (>#10 & <#4)	≤ 11%	**3.43%**
Gravel (>#4)	≤ 6%	**3.37%**
Calcium Carbonate	≤ 35%	**19.59%**

Mound O-48

Mound O-48 is located southwest of Current ODMDS 1 and has vibracore O-48 passing through the middle of the mound. This potential borrow area consists of fine grained, moderately sorted quartz sand and has a mean grain size of 0.2 mm, which is significantly finer than the native sediment. This results in a larger overfill factor of 2.25. All parameters defined by NCAC were met, as shown in Table 4-7; therefore, the material is considered beach compatible. The total amount of beach compatible material in this mound is approximately 468,740 cy.

Table 4-7. Mound O-48 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Mound O-48
Fines (<#230)	≤ 6%	**5.91%**
Sand (>#230 & <#10)	-	**92.83%**
Granular (>#10 & <#4)	≤ 11%	**1.11%**
Gravel (>#4)	≤ 6%	**0.15%**
Calcium Carbonate	≤ 35%	**7.76%**

Mound O-14/O-47

Mound O-14/O-47 is located west of Mound O-48 and has vibracore O-14, O-47, and O-38 passing through the mound. This mound was split because it was assigned two different cut depths to maximize beach quality material being removed. Even though this area was split, the sediment properties were analyzed and recorded as one site. This potential borrow area consists of fine grained, poorly sorted quartz sand and has a mean grain size of 0.38 mm, which is coarser than the native sediment. This results in a smaller overfill factor of 1.20. All parameters defined by NCAC were met, as shown in Table 4-8; therefore, the material is considered beach compatible. The total amount of beach compatible material in this mound is approximately 566,028 cy.

Table 4-8. Mound O-14/O-47 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Mound O-14 / O-47
Fines (<#230)	≤ 6%	**0.23%**
Sand (>#230 & <#10)	-	**93.43%**
Granular (>#10 & <#4)	≤ 11%	**4.71%**
Gravel (>#4)	≤ 6%	**1.63%**
Calcium Carbonate	≤ 35%	**19.80%**

4.3.3 Lower Confidence Mounds

The lower confidence mounds include mounds where the vibracore is located along the edge and none that penetrate the thickest portion of the mound. This prevents an accurate representation of the stratigraphy to be defined. The lower confidence mounds include Mounds O-35 and O-46, which are shown in Figure 4-5.

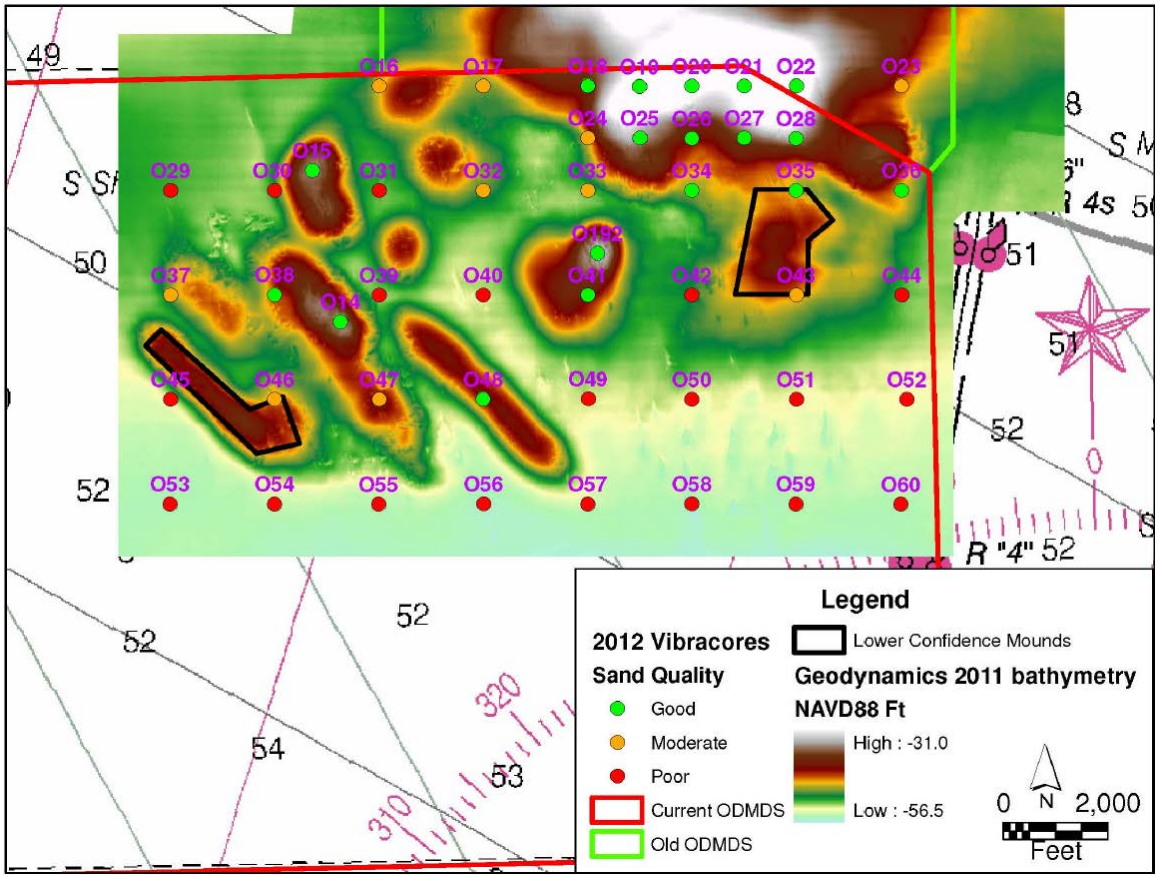


Figure 4-5. Lower Confidence Mound Sites and Vibracore Locations (Coastal Tech, 2013)

Mound O-35

Mound O-35 is located south of Current ODMDS 1 and shares data from vibracore O-35 which was used in the analysis of Current ODMDS 1. Vibracore O-43 passes through the southern edge of this mound. These vibracores were weighted equally when the mound composite was created. This potential borrow area consists of fine grained, poorly sorted quartz sand. An overfill factor of 1.3 was calculated. All parameters defined by NCAC were met, as shown in Table 4-9; therefore, the material is considered beach compatible. The total amount of beach compatible material in this mound is approximately 499,500 cy.

Table 4-9. Mound O-35 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Mound O-35
Fines (<#230)	≤ 6%	**0.31%**
Sand (>#230 & <#10)	-	**96.08%**
Granular (>#10 & <#4)	≤ 11%	**2.65%**
Gravel (>#4)	≤ 6%	**0.96%**
Calcium Carbonate	≤ 35%	**15.20%**

Mound O-46

Mound O-46 is located southwest of Current ODMDS 1 and only has vibracore O-46 passing through the edge of the mound. This potential borrow area consists of fine grained, poorly sorted quartz sand and has a mean grain size of 0.4 mm, which is coarser than the native sediment. An overfill factor of 1.25 was calculated. All parameters defined by NCAC were met, as shown in Table 4-10, therefore, the material is considered beach compatible. The total amount of potential beach compatible material in this mound is approximately 493,564 cy.

Table 4-10. Mound O-46 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Mound O-35
Fines (<#230)	≤ 6%	**0.37%**
Sand (>#230 & <#10)	-	**90.60%**
Granular (>#10 & <#4)	≤ 11%	**6.27%**
Gravel (>#4)	≤ 6%	**2.76%**
Calcium Carbonate	≤ 35%	**18.17%**

4.3.4 Contingency Mounds

The remaining mounds in the Current ODMDS lack a vibracore within the boundary of the mound, as shown in Figure 4-6. Conceptual cut depths were assumed from the surrounding vibracores and potential volumes were calculated. These mounds do not have sediment characteristics defined. The potential volumes these mounds contain are shown in Table 4-11 with a total volume of approximately 320,000 cy.

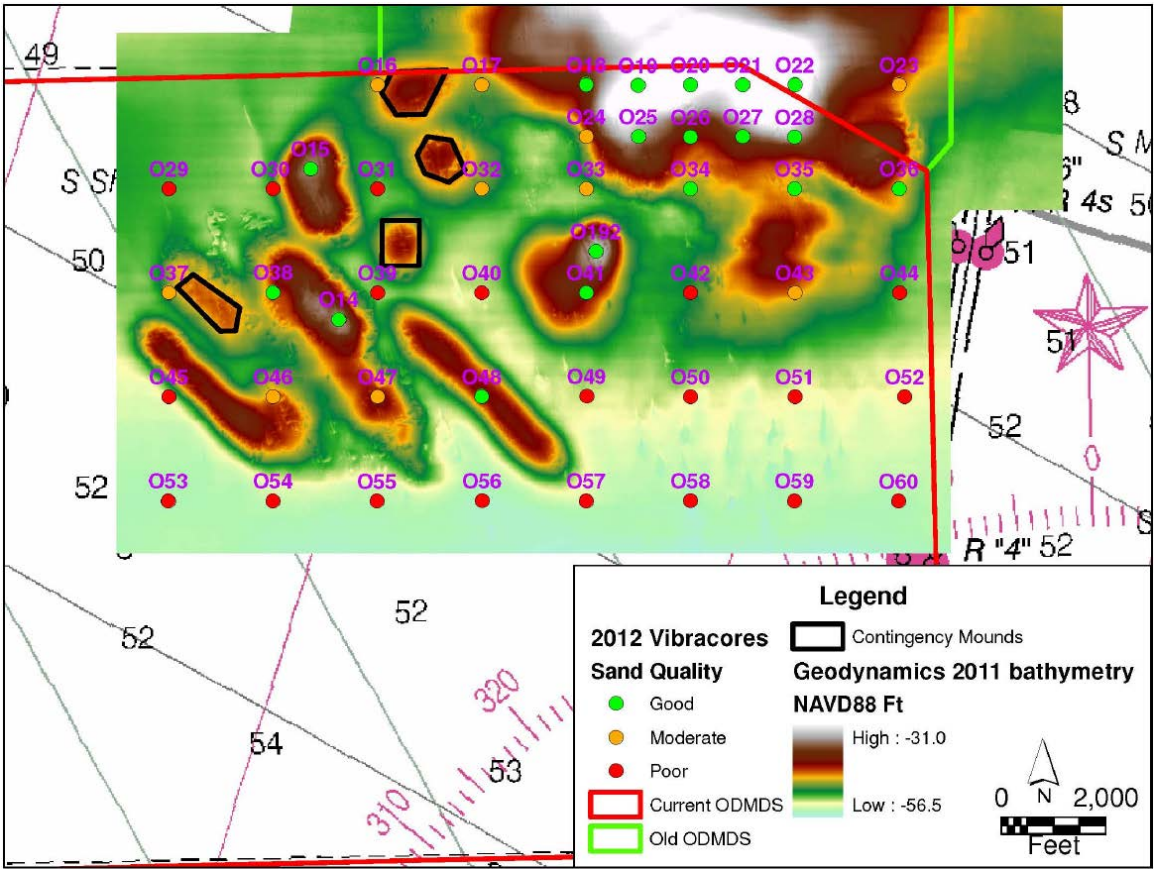


Figure 4-6. Contingency Mound Sites and Vibracores (Coastal Teach, 2013)

Table 4-11. Contingency Mound Potential Volumes (Coastal Tech, 2013)

Mound	Cut Elevation NAVD88	Volume (cy)
O-16	-50 ft	95,326
O-39	-52 ft	94.352
O-37/O-38	-51 ft	71.233
O-32	-50 ft	58,543
	Total	**319,454**

4.4 Area Y

Area Y is located off of Emerald Isle within State waters where fifty-five vibracores were taken. Vibracores were initially taken on a 1000 foot by 1000 foot grid; however, a significant amount of fines were found in the surficial layer. The spacing was then increased to a 2000 foot grid spacing and two areas were identified as potential sites as shown in Figure 4-7.

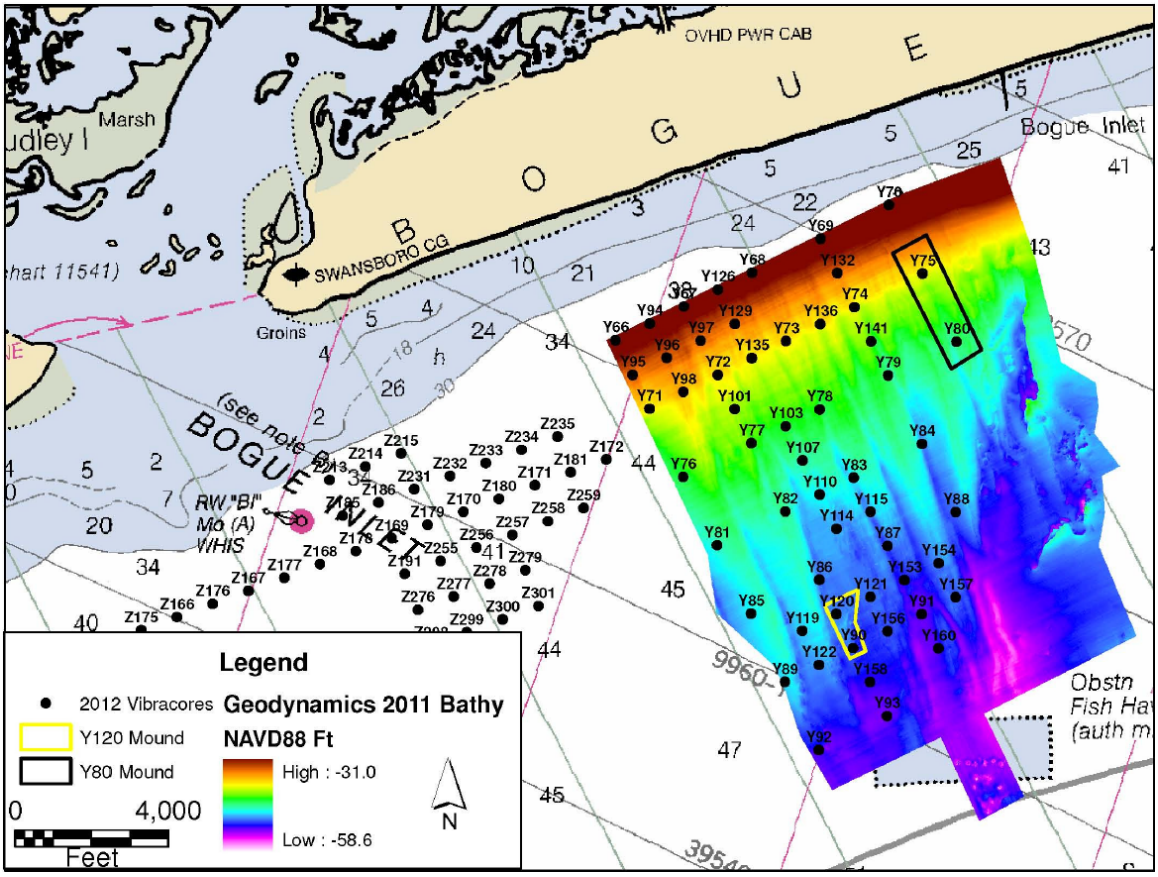


Figure 4-7. Area Y Site and Vibracore Locations (Coastal Tech, 2013)

Vibracores Y-80/Y-75

Vibracores Y-80 and Y-75 are 2000 feet apart and, due to the hardbottom buffer to the east, no vibracores were taken on that side. The vibracores taken to the west of Y-80 and Y-75 are not beach compatible. This potential borrow area consists of fine grained, moderately well sorted quartz sand and has a mean grain size of 0.23 mm, which is finer than the native sediment. All parameters defined by NCAC were met as shown below in Table 4-12. Although the parameters are met, the area should be considered a low priority due to insufficient vibracores to designate a reliable borrow area and poor quality of sediment. The potential volume is estimated at 1.08 Mcy; however, the rectangular area defined is purely conceptual and not based on the vibracores.

Table 4-12. Vibracores Y-80 & Y-75 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Vibracores Y-80 / Y-75
Fines (<#230)	≤ 6%	**2.37%**
Sand (>#230 & <#10)	-	**97.55%**
Granular (>#10 & <#4)	≤ 11%	**0.08%**
Gravel (>#4)	≤ 6%	**0.00%**
Calcium Carbonate	≤ 35%	**1.85%**

Vibracores Y-120/Y-90

Vibracores Y-120 and Y-90 are 1000 feet apart and are located along a ridge; however, the sediment color is dark in color. This potential borrow area also exceeds the requirement set by NCAC for Gravel as shown in Table 4-13; therefore, would not be considered beach compatible. The total amount of material in this mound is approximately 379,675 cy.

Table 4-13. Vibracores Y-120 & Y-90 Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Vibracores Y-120 / Y-90
Fines (<#230)	≤ 6%	**2.04%**
Sand (>#230 & <#10)	-	**86.60%**
Granular (>#10 & <#4)	≤ 11%	**3.43%**
Gravel (>#4)	≤ 6%	**7.93%**
Calcium Carbonate	≤ 35%	**1.50%**

4.5 Bogue Inlet Channel

Five vibracores were taken within the template of the 2005 Bogue Inlet relocation project shown in Figure 4-8. This area is fed by the surrounding beaches. The mean grain size is 0.33 mm and an overfill factor of 1.15 and meet all of the NCAC compatibility requirements as listed in Table 4-14. This site contains approximately 850,000 cy to 1 Mcy of beach compatible material and is expected to provide this volume each time the inlet is relocated.

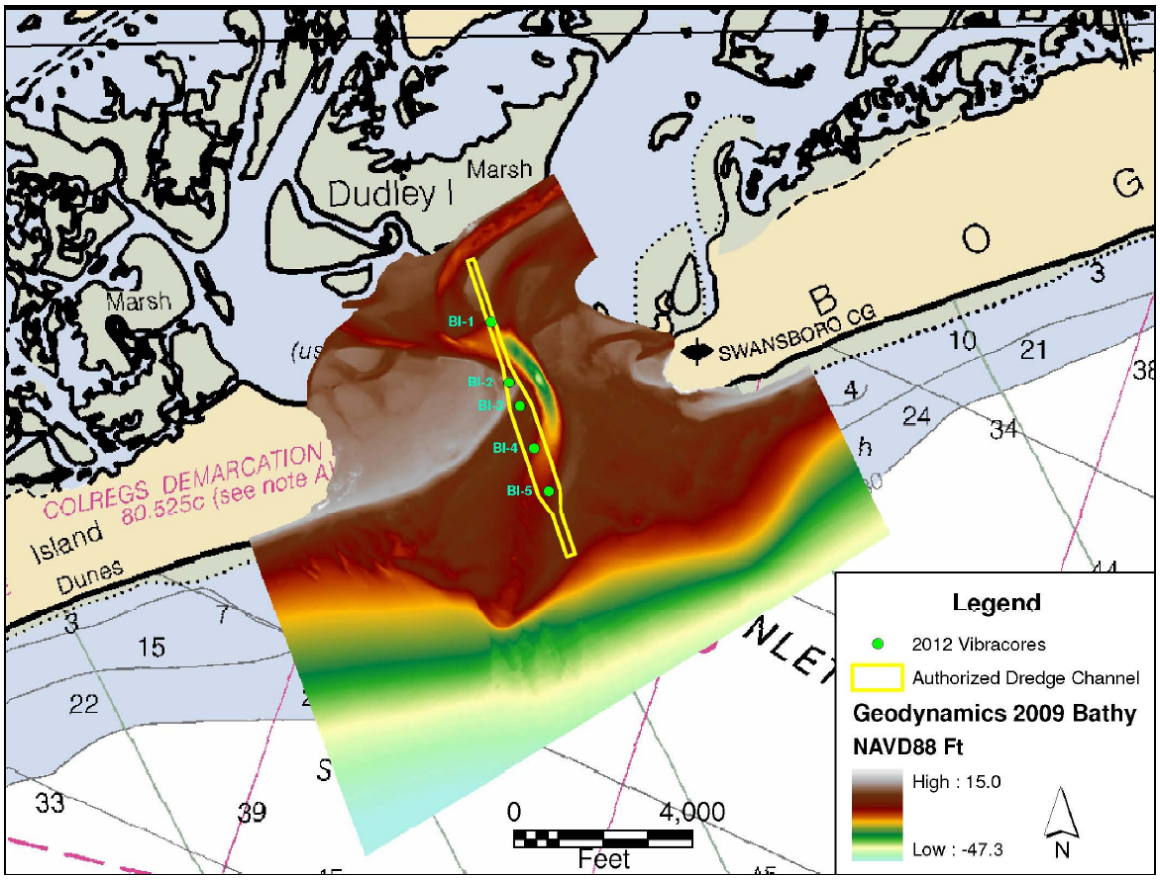


Figure 4-8. Bogue Inlet Channel Site, Vibracores, and Authorized Channel Location (Coastal Tech, 2013)

Table 4-14. Bogue Inlet Channel Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Vibracore Z-174
Fines (<#230)	≤ 6%	**0.15%**
Sand (>#230 & <#10)	-	**96.61%**
Granular (>#10 & <#4)	≤ 11%	**2.40%**
Gravel (>#4)	≤ 6%	**0.84%**
Calcium Carbonate	≤ 35%	**14.96%**

4.6 Morehead City Harbor

The Outer Harbor consists of the Cutoff and Range A out to Station 110+00 as shown in Figure 4-9. Since this is a federal navigation project, the requirements for beach compatibility only limit the silt content to less than 10%. The characteristics of the sediment in this area meet that requirement and are listed in Table 4-15. The USACE Morehead City Harbor draft Dredged Material Management Plan (DMMP) estimates that the Outer Harbor is shoaling at a rate of 1.2 Mcy per year (2012). Depending on the final DMMP, there could be between 228,000-635,000 cy of sand available for beach placement annually. A mid-range amount of 400,000 cy/yr is assumed to be available from this source.

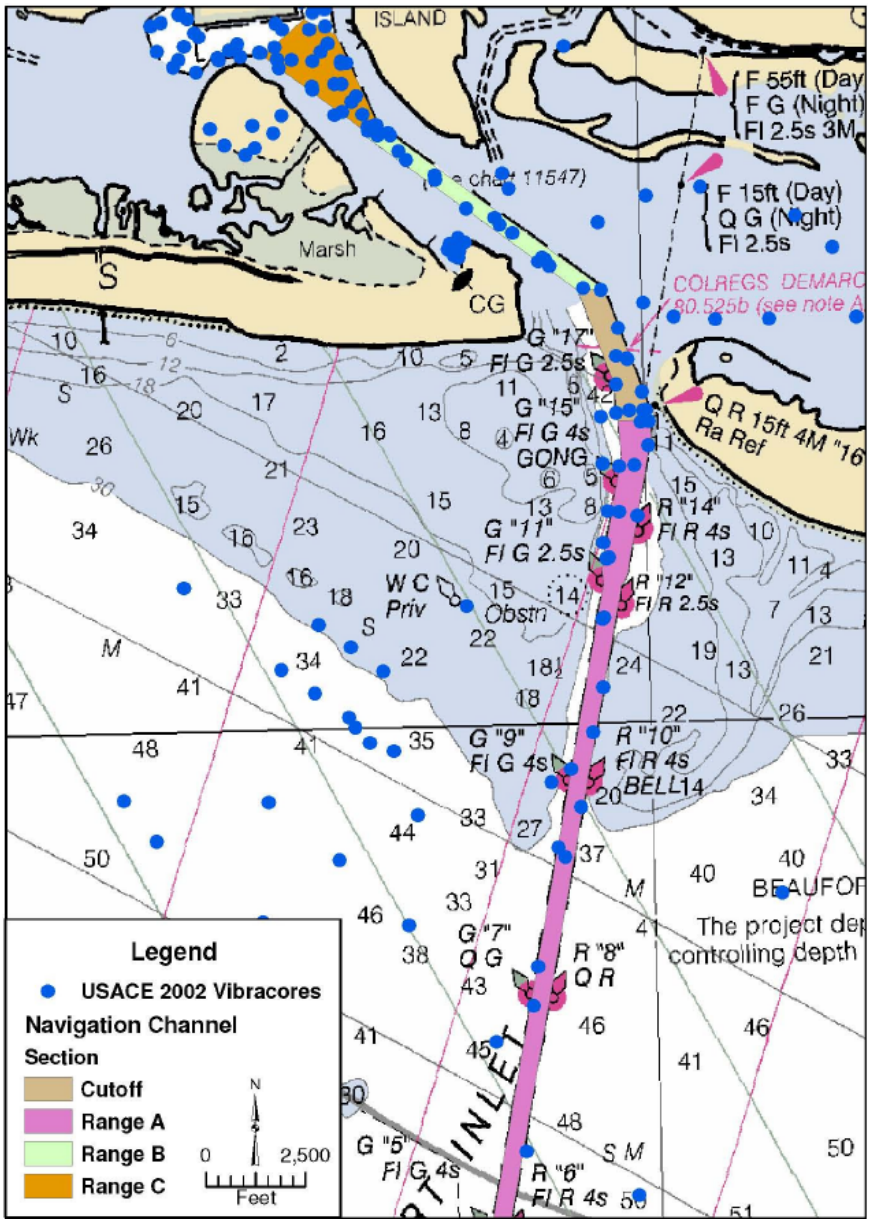


Figure 4-9. Morehead City Channel Vibracore and Reach Locations (Coastal Tech, 2013)

Table 4-15. Morehead City Outer Harbor Characteristics and NCAC Parameters (Coastal Tech, 2013)

Characteristic	Required Borrow Site Parameters	Morehead City Outer Harbor
Fines (<#230)	≤ 6%	**<1%**
Sand (>#230 & <#10)	-	**Not Reported**
Granular (>#10 & <#4)	≤ 11%	**Not Reported**
Gravel (>#4)	≤ 6%	**6.40%**
Calcium Carbonate	≤ 35%	**15.70%**

4.7 Summary of Potential Borrow Areas

The total volume available when the upland sources (sand mines), AIWW disposal areas, and the offshore sources are combined is presented in Table 4-16. The total non-renewable volume available from these sources is 25,123,057 cy.

Table 4-16. Summary of Non-renewable Potential Borrow Areas (Coastal Tech, 2013)

Area	Total Volume (cy)
Sand Mines	1,380,700
AIWW Disposal Areas	1,288,800
Offshore Sources	22,453,557
TOTAL	**25,123,057**

In addition to the upland, AIWW, and offshore borrow sources, Bogue and Beaufort Inlets could also provide material on a cyclical basis as they regularly shoal and have to be dredged for navigation purposes. These renewable borrow areas could potentially provide approximately 25,130,000 cy over 50 years, as shown in Table 4-17.

Table 4-17. Volume of Renewable Potential Borrow Areas (Coastal Tech, 2013)

Area	Section	Volume	Dredging Frequency	50 yr Total
MHC Outer Harbor	Cutoff+Range A to STA 110	400,000 cy (assumed)	1 years	20,000,000
Bogue Inlet	Inlet Relocation	850,000 cy	10 years	4,250,000
	AIWW Crossing	44,000 cy	2.5 years	880,000
			Totals:	**25,130,000**

Therefore, if all mentioned sources are incorporated (upland, AIWW, offshore, and inlets) approximately 50,253,057 cy of material would be available and would meet, or come very close to meeting, the 50-year sediment need of 46.8 to 51.6 Mcy which includes background erosion, storm erosion, and potential sea level change. The total volume available when the renewable and non-renewable sources are combined is tabulated in Table 4-18.

Table 4-18. Total Volume Available

Source	50-Yr Total Volume (cy)
Renewable	25,130,000
Non-Renewable	25,123,057
TOTAL	**50,253,057**

4.8 Current Status of Potential Borrow Areas

Since the sediment analysis for the Bogue Banks Master Beach Nourishment Plan was completed in 2012, the Post-*Irene* (2013) and Post-*Florence* Phase I (2019) & Phase II (2020) projects have occurred which used the new and old ODMDS as sediment sources. Therefore, given a post-*Irene* placement volume of 965,011 cy, a post-*Florence* Phase I placement volume of 975,647 cy and a post-*Florence* Phase II placement volume of 2,022,807 cy, it is estimated that approximately 18,490,092 cy of the original 22,453,557 cy of offshore material remains available for future projects, with a total volume availability of 46,289,592 cy amongst all potential sediment sources.

5.0 FINANCIAL RESOURCES

The purpose of this section is to document the history and distribution of the Carteret County occupancy tax as it relates to the Bogue Banks municipalities along with an explanation of Local municipal taxes and how these funds (both County and Local) are to be used for the Bogue Banks Master Beach Nourishment Plan to maintain the project.

5.1 County Occupancy Tax

5.1.1 Occupancy Tax History

The Shore Protection Office is funded 100% by the portion of the County's occupancy tax legislatively mandated for beach nourishment, which was instituted in 2001 via SL 2001-381 and after several changes related to a proposed convention center (SL 2005-120, SL 2007-112), is now codified as SL 2013-223. The remaining fund balance at the conclusion of each fiscal year is permitted to accrue in a reserve account, commonly referred as the "Beach Fund" in an effort to finance some of the large-scale shore protection projects and efforts. The County's occupancy tax rate was established at 5% overall rate via the enacting legislation (SL 2001-381) and the revenues were previously split 50-50 between beach nourishment and the Tourism Development Authority (TDA), representing a 2.5% overall collection rate for both the TDA and beach nourishment. Beginning in FY 2010-11 as stipulated in SL 2007-112, the TDA begun receiving 3% of the 5% collection and the beach nourishment fund received 2%, which effectively changed the cost share from 50%-50% to 60%-40%. Several years later, new changes in the occupancy tax law were codified in SL 2013-223, which amended SL 2007-112 to allow the collection of an additional 1% (6% total) with the total proceeds being split 50-50 again between the TDA and beach nourishment (or 3% a piece). This law also raised the cap of the beach nourishment fund from $15 M to $30 M. The effective date of this change was January 1, 2014. The following series of graphs and tables were prepared to identify trends in the occupancy tax collection. The collection rate was 3% prior to SL 2001-381 and where applicable all data were normalized to the current 6% collection rate to provide for a common baseline. A summary of the important legislation and occupancy tax rate changes is shown in Table 5-1.

Table 5-1. Summary of Occupancy Tax Collection Rate Changes

Legislation	Collection Rate (TDA - Beach)	Effective Date
S.L. 2013-223	6% (3% - 3%) or (50/50)	1-Jan-14
S.L. 2007-112	5% (3% - 2%) or (40/60)	1-Jul-10
S.L. 2007-112	5% (2.5% - 2.5%) or (50/50)	1-Jul-07
S.L. 2001-381	5% (2.5% - 2.5%) or (50/50)	1-Jan-02

5.1.2 Occupancy Tax Distribution

The following sections show the monthly and yearly breakdowns of the occupancy tax as whole, as well as the distribution of how those funds are collected from the individual municipalities of Bogue Banks.

Monthly Distribution

The occupancy tax collection is reported in two predominant categories - hotel/motel stays and condo/cottage rentals. Condo and cottage rentals dominate the market on Bogue Banks and both sets of curves show peak collections during the summer months, which is expected. Figure 5-1 and Figure 5-2 show plots of the occupancy tax generated by month from 2006-2019 for the hotel/motel and condo/cottage sectors, respectively. Figure 5-3 shows the combined occupancy tax (hotel/motel and condo/cottage), generated each month, from 1993-2019. **Please note that all of the data and figures below were provided by the Carteret County Shore Protection Office.**

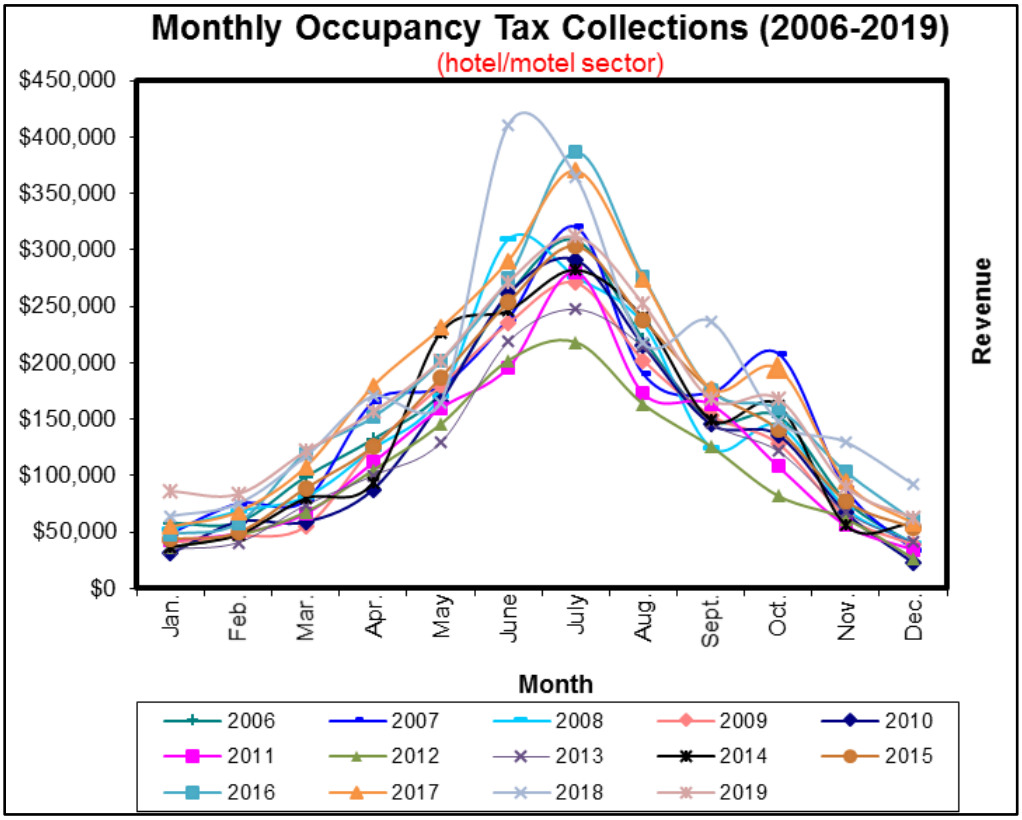


Figure 5-1. Monthly Occupancy Tax – Hotel/Motel

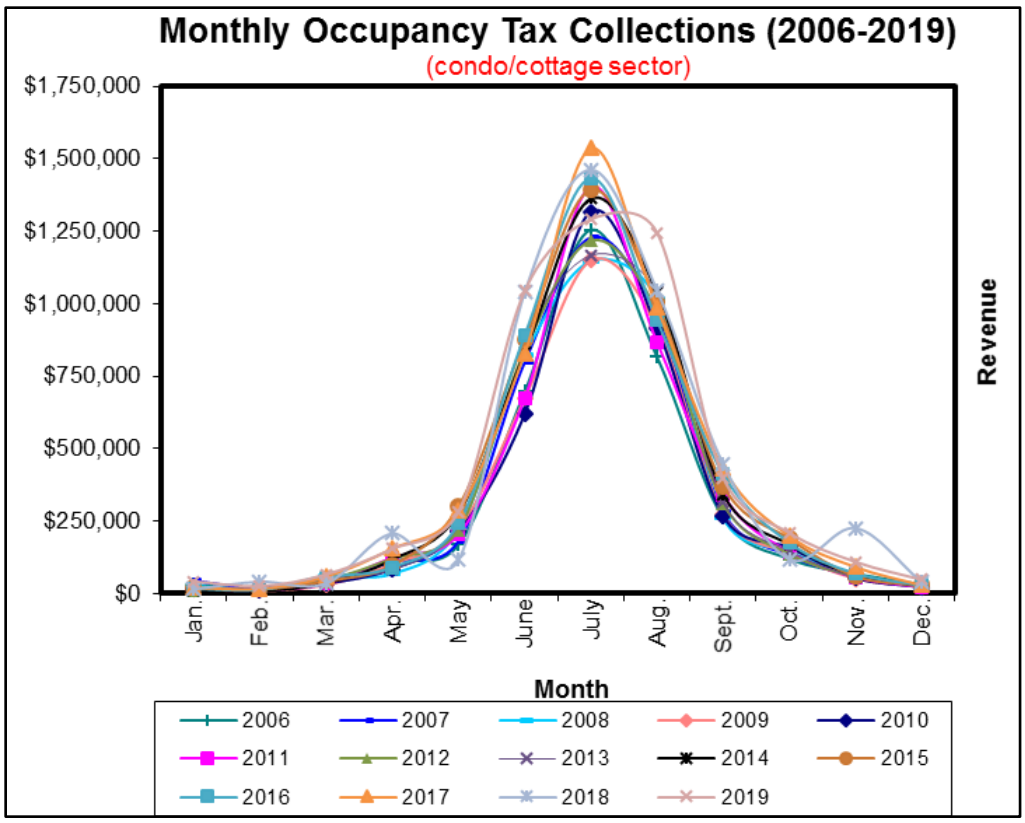


Figure 5-2. Monthly Occupancy Tax – Condo/Cottage

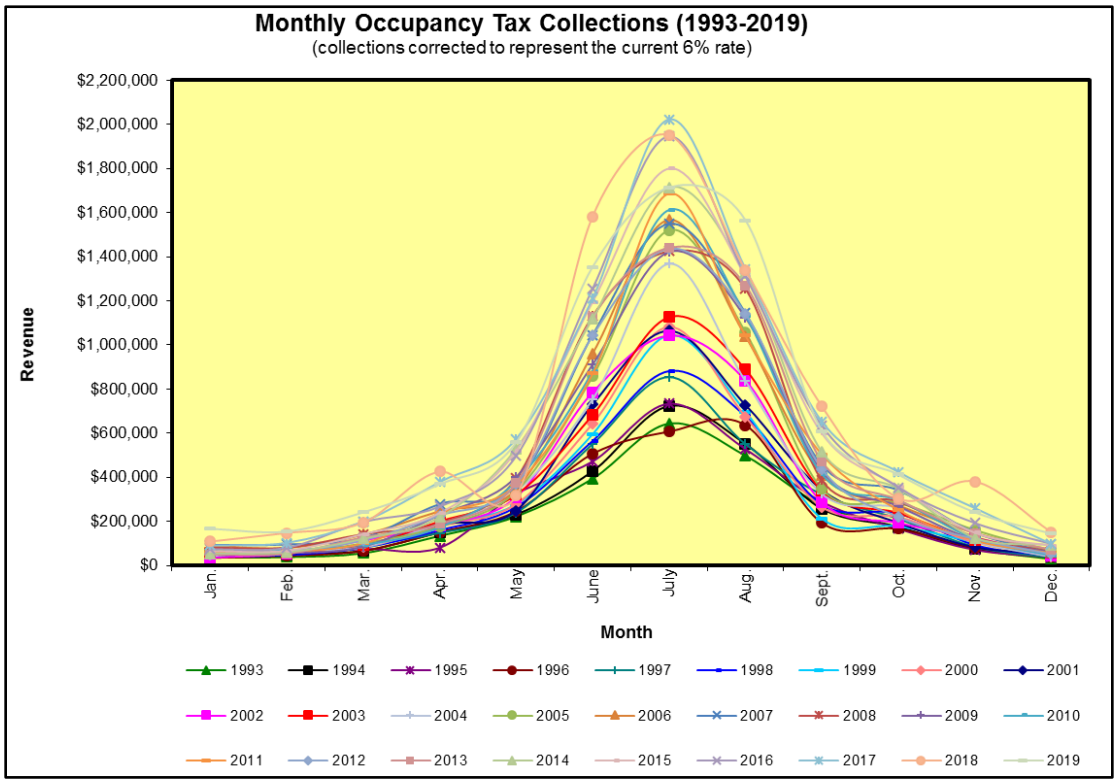


Figure 5-3. Total Monthly Occupancy Tax (1993-2019)

Yearly Totals

As mentioned previously, condo/cottage rentals dominate the market on Bogue Banks, currently generating almost $5.0 million per year while the hotel/motel sector generates, on average, $1.75 million per year. Figure 5-4 shows the yearly occupancy tax collections from the hotel/motel and condo/cottage sectors from 2006-2019.

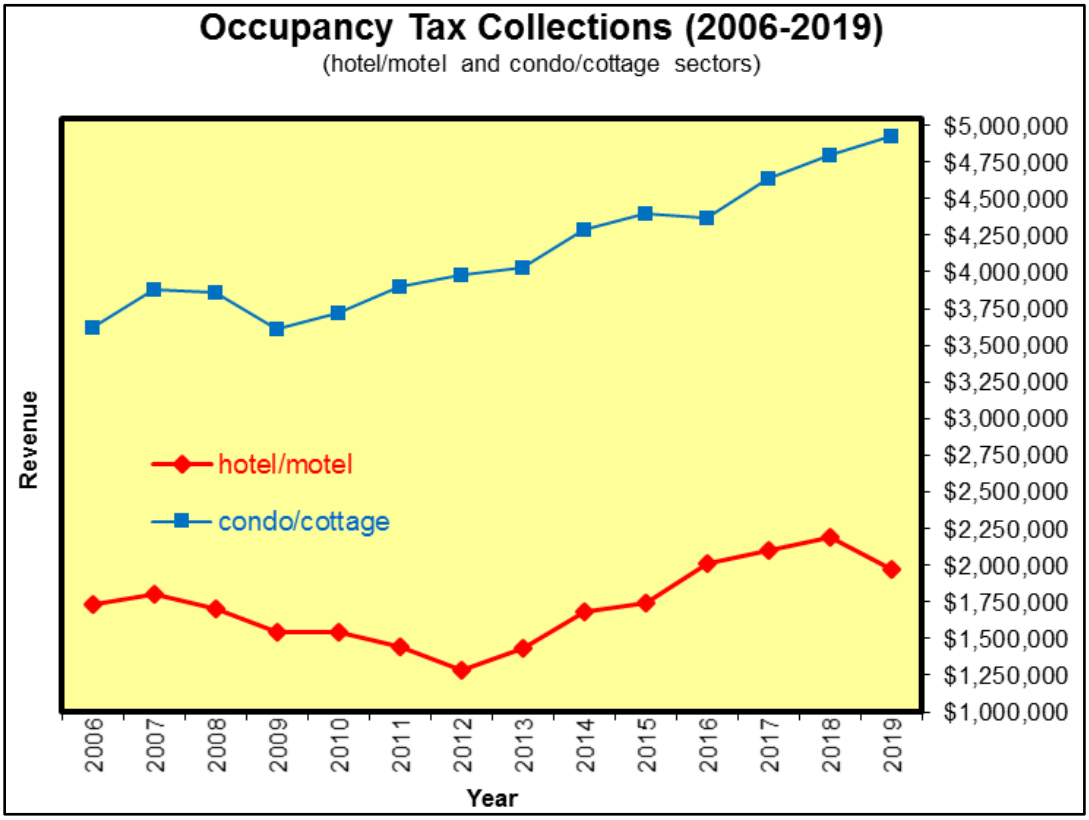


Figure 5-4. Yearly Occupancy Tax – Hotel/Motel & Condo/Cottage

Figure 5-5 shows the combined occupancy tax (hotel/motel and condo/cottage), generated each year, from 1993-2019. Of course, when reviewing the data, one can see the effects of the economic downturn of 2008-2009, recent economic growth (2013 – 2018), the Save our Summers efforts, the effect of the closing of the Sheraton for an extended period of time after Hurricane Irene in 2011, and the effect of closures in 2019 due to Hurricane Florence. Nonetheless, it does appear that the trends should continue to rise into the future.

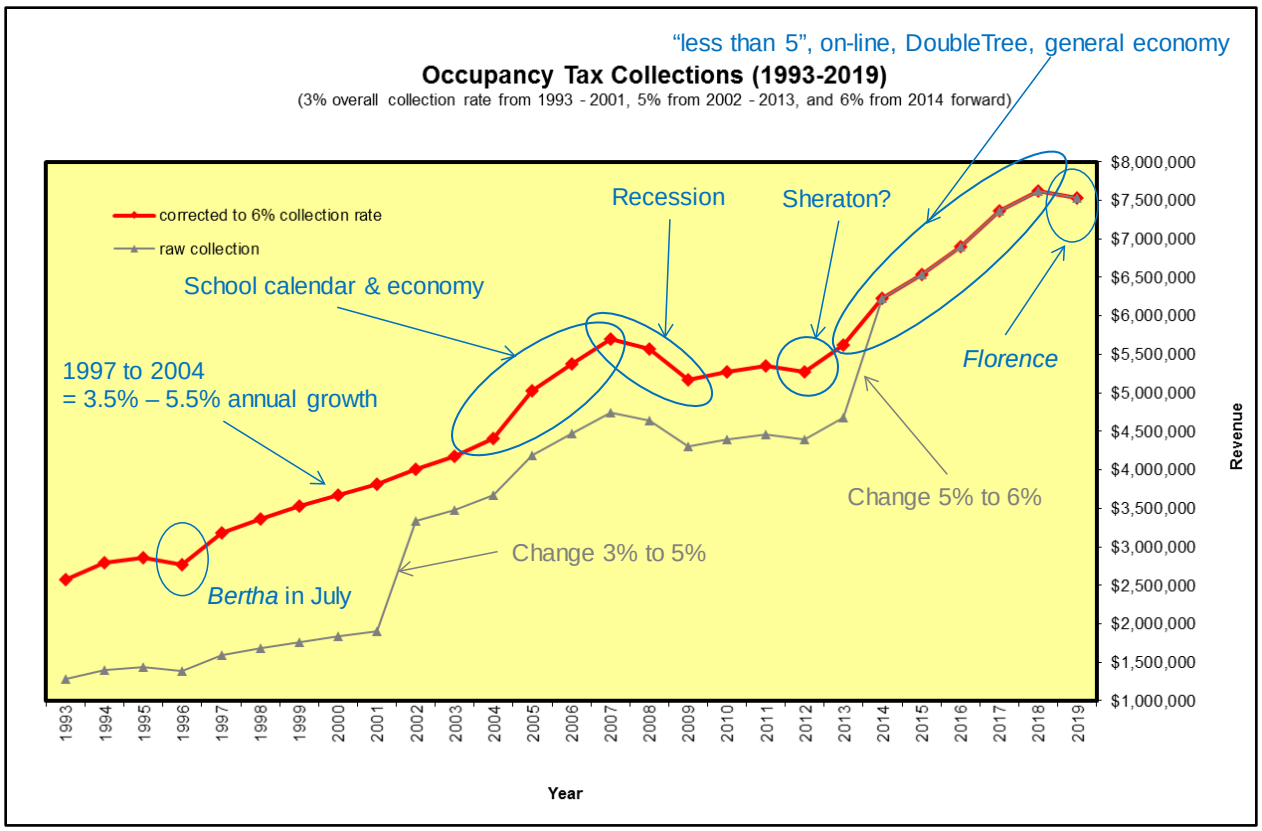


Figure 5-5. Total Yearly Occupancy Tax (1993-2019)

5.2 Local Municipal Taxes For Beach Nourishment Projects

While the Shore Protection Office generates 100% of its funds for beach nourishment from the County Occupancy Tax ("County"), the local municipalities generate revenue from which they contribute to beach nourishment through their local property taxes ("Local"). Property taxes are divided into two sectors; oceanfront and non-oceanfront properties with the non-oceanfront properties paying less tax. Table 5-2 shows the current distribution of property tax rates and the associated revenue for the fiscal year 2020-2021.

Table 5-2. Local Property Tax Rates (FY 2020-2021)

FY 2020-21				
Municipality	**Oceanfront rate** (per $100 valuation)	**Non-oceanfront rate** (per $100 valuation)	**Transfers from General Fund/Other**	**Estimated total revenue**
Atlantic Beach	$0.0000	$0.0000	$0	$0
Pine Knoll Shores	$0.0550	$0.0150	$93,000	$465,000
Indian Beach	$0.0300	$0.0100	$0	$87,870
Salter Path (county)	$0.0550	NA	$0	$4,907
Emerald Isle	$0.0400	$0.0000	$400,000	$674,922
Average or Total	$0.04	$0.01	$493,000	$1,232,699

5.3 Use Of Funds (County & Local) For Master Plan Projects

With the individual Towns and County funding streams, various scenarios were investigated to determine the long-term financial sustainability of the Master Beach Nourishment Plan. First, dredging/placement unit costs were developed from past projects (rates include mob/demob).

- Emerald Isle – Combination of Pipeline and Hopper - $12 - $18/ cy – Avg. = $15/cy
- Indian Beach /Salter Path – All Hopper - $13/cy
- Pine Knoll Shores – All Hopper - $12.25/cy
- Atlantic Beach – Combination of Hopper and Pipeline - $11.50 cy – USACE Project Good To Circle – 60% - Prorated Unit Rate for Entire Volume = $4/cy

Utilizing the annualized volume needs estimated as part of the preferred option from the Master Beach Nourishment Plan (see Table 2-2) and the above unit rates, an annualized estimate of funding need was developed. Two scenarios were analyzed for the Town/County cost share: 1) 25% Town and 75% County and 2) 33% Town and 67% County. Table 5-3 presents the results for both funding scenarios. Given the current annually generated local taxes for beach nourishment are equivalent to $1,232,699 (see Table 5-2) and the estimate annual County tax generated is $3,750,000 (50% of total occupancy tax collections, see Figure 5-5), it seems as though the 25% Town and 75% County cost share would be most reasonable at this point in time to ensure the ability of Town contributions to remain sustainable long-term. It should be noted that the County currently has $27M in reserve, putting them ahead of "schedule" in terms of revenue. It should also be noted that Atlantic Beach does not currently have a dedicated funding source. However, at this time, the eastern portion of Atlantic Beach will continue to be served by the USACE DMMP, leaving only the western portion (from The Circle to the AB/PKS town boundary) as a new addition to the engineered beach courtesy of the Post-*Florence* Phase II project (spring 2020). A dedicated funding source from Atlantic Beach would increase the total available annual revenue from the Towns. The interlocal agreement signed by all the Towns and County also requires them to meet the funding needs even if new taxes or one-time loans are required. The interlocal agreement can be seen in Appendix B.

Table 5-3. Annualized Estimate of Funding

				25% Town/75% County Cost Share			33% Town/67% County Cost Share		
Town	Annual Volume Loss (cy)	% of Total Annual Volume Loss	Avg. Placement Unit Cost Per Town	Annual Town Cost ($)	Annual County Cost ($)	% of Total Annual County Cost	Annual Town Cost ($)	Annual County Cost ($)	% of Total Annual County Cost
Emerald Isle	139,913	31%	$15.00	$524,674	$1,574,021	46%	$692,569	$1,406,126	46%
Indian Beach/Salter Path	62,567	14%	$13.00	$203,343	$610,028	18%	$268,412	$544,959	18%
Pine Knoll Shores	84,795	19%	$12.25	$259,685	$779,054	23%	$342,784	$695,955	23%
Atlantic Beach	164,945	36%	$4.00	$164,945	$494,835	14%	$217,727	$442,053	14%
TOTAL	452,220	-	-	$1,152,646	$3,457,939	-	$1,521,493	$3,089,092	-

If the above results were then just multiplied out over the next 50 years, the preferred plan needs are currently slightly less than the estimated revenue. The current funding levels at the 25% Town/75% County split are summarized below:

- Annual Total Cost = $4.61 M/yr * 50 yr = $230.5 M
- Annual Total Revenue = $4.98 M/yr * 50 yr = $249.0 M

Thus, there is some flexibility for the escalation of dredging/placement costs above and beyond tax revenue and/or some small decreases in tax revenue, as have been seen in the past, due to the state of the economy, natural disasters, etc. In addition, post-storm restoration of the beach may require funding above and beyond what is reimbursable by FEMA so additional anticipated County/Town revenue is important.

Even though the preferred plan currently appears sustainable, County and Local officials will continue to track expenditures over next 5-10 years and adjust as needed. **Finally, it should be noted that all the above analyses does not include any State or Federal funding above that which is expected for the Morehead City Harbor Project. Any additional funds from these sources would extend the long-term sustainability of the project. Again, the interlocal agreement signed by all the Towns and County (see Appendix B) also requires them to meet the funding needs even if new taxes or one-time loans are required.**

6.0 SUMMARY

By virtue of this report, the Town of Pine Knoll Shores has provided information satisfying the requirements for review of the static line exception stipulated in 15A NCAC 07J .1201. This report documents the fill projects (initial construction and renourishment) within the static line exception extents in Pine Knoll Shores. Initial project design of the Phase I Bogue Banks Restoration Project and performance to date is presented, documenting that the project has been maintained above original design conditions and in accordance with established nourishment triggers.

It is important to note that the current condition of the beach in the Pine Knoll Shores portion of the Bogue Banks Restoration Project Phase I area (287 cy/ft) is better than it was upon inception of the BBBNMP in 2004 (2 years after the project was constructed in 2001-2002) and in 2010 and 2015 when the previous static line exceptions were approved, **as shown in Table 6-1.**

Table 6-1. Beach Condition Summary

Reach (Transects)	Avg 1999 Profile Volume (cy/ft)	Avg 2004 Profile Volume (cy/ft)	Avg 2010 Profile Volume (cy/ft)	Avg 2015 Profile Volume (cy/ft)	Avg 2020 Profile Volume (cy/ft)
Pine Knoll Shores (59 - 76)	191	234	256	253	287

It is also important to note that the current beach condition (287 cy/ft) is well above nourishment trigger set by the Master Beach Nourishment Plan of 211 cy/ft, as shown in Table 6-2.

Table 6-2. Nourishment Trigger Summery

Reach (Transects)	Avg 2020 Profile Volume (cy/ft)	MBNP Trigger (cy/ft)
Pine Knoll Shores (59 - 76)	287	211

Compatible sediment sources and financial resources for the future that exhibit long-term sustainability for the project were also identified**. In fact, it is expected that the sediment need for the next 50 years of 46.8 – 51.6 Mcy can be met with identified sediment sources totaling 50.2 Mcy. Using current funding practices, it is expected that the project will be fully funded for the next 50 years with the interlocal agreement requiring action in the form of new taxes or one time loans if funds were to ever fall short.**

7.0 REFERENCES

Carteret County Shore Protection Office Preservation Plan. Retrieved from http://www.carteretcountync.gov/313/Preservation-Plan.

Coastal Tech 2013, Carteret County, North Carolina Sand Search Investigation, Prepared for Moffatt & Nichol by Coastal Technology Corporation, Melbourne, Florida.

CSE 2004, Survey Report 2004, Bogue Banks, North Carolina, Prepared for Carteret County Shore Protection Office by Coastal Science & Engineering, Columbia, South Carolina.

CSE 2005, Survey Report 2005, Bogue Banks, North Carolina, Prepared for Carteret County Shore Protection Office by Coastal Science & Engineering, Columbia, South Carolina.

CSE 2006, Survey Report 2006, Bogue Banks, North Carolina, Prepared for Carteret County Shore Protection Office by Coastal Science & Engineering, Columbia, South Carolina.

CSE 2007, Survey Report 2007, Bogue Banks, North Carolina, Prepared for Carteret County Shore Protection Office by Coastal Science & Engineering, Columbia, South Carolina.

CPE 2010, Pine Knoll Shores, NC Static Line Exception Application Report, Prepared for the Town of Pine Knoll Shores by Coastal Planning & Engineering, Wilmington, North Carolina.

M&N 2008, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2009, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2010, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2011, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2012, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2013, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2013, Post-Irene Renourishment Project Final Report, Prepared for Town of Emerald Isle and Town of Pine Knoll Shores by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2014, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2014, Bogue Banks Master Beach Nourishment Plan, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2015, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2015, Town of Pine Knoll Shores, NC Static Line Exception 5 Year Review/Reauthorization, Prepared for the Town of Pine Knoll Shores by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2016, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2017, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2018, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2019, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2019, Post-Florence Renourishment Project – Phase I Report, Prepared for Town of Emerald Isle and Town of Indian Beach by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2020, Bogue Banks Beach and Nearshore Mapping Program Periodic Survey Evaluation, Prepared for Carteret County Shore Protection Office by Moffatt & Nichol, Raleigh, North Carolina.

M&N 2020, Post-Florence Renourishment Project – Phase II Report, Prepared for Town of Emerald Isle, Town of Pine Knoll Shores, and Town of Atlantic Beach by Moffatt & Nichol, Raleigh, North Carolina.

APPENDIX A

Post-Florence Renourishment Project Phase II Plans

POST-FLORENCE RENOURISHMENT PROJECT
PHASE 2

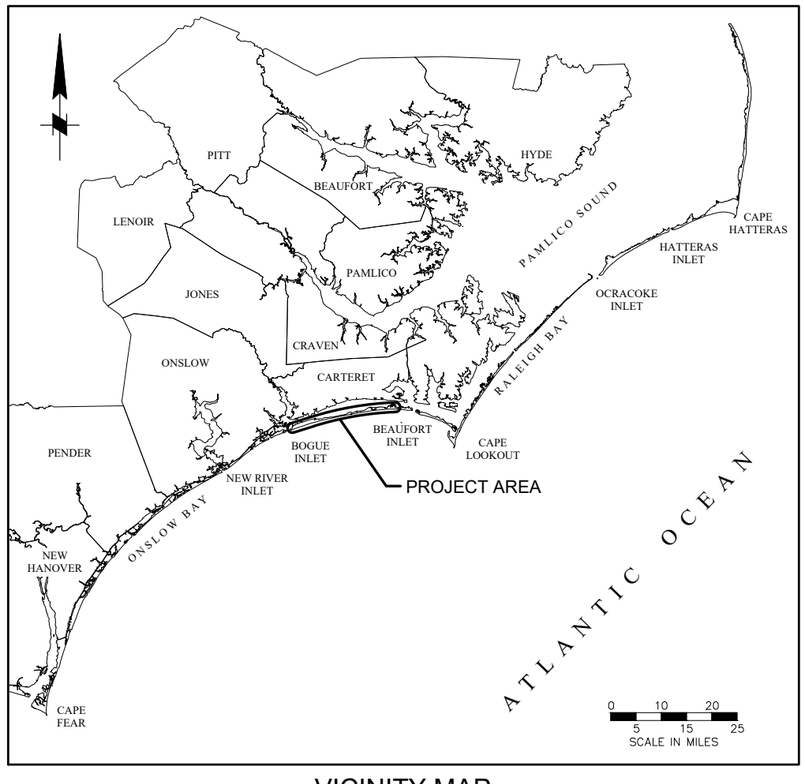
CARTERET COUNTY, NORTH CAROLINA

TOWN OF EMERALD ISLE
7500 EMERALD DRIVE
EMERALD ISLE, NC 28594

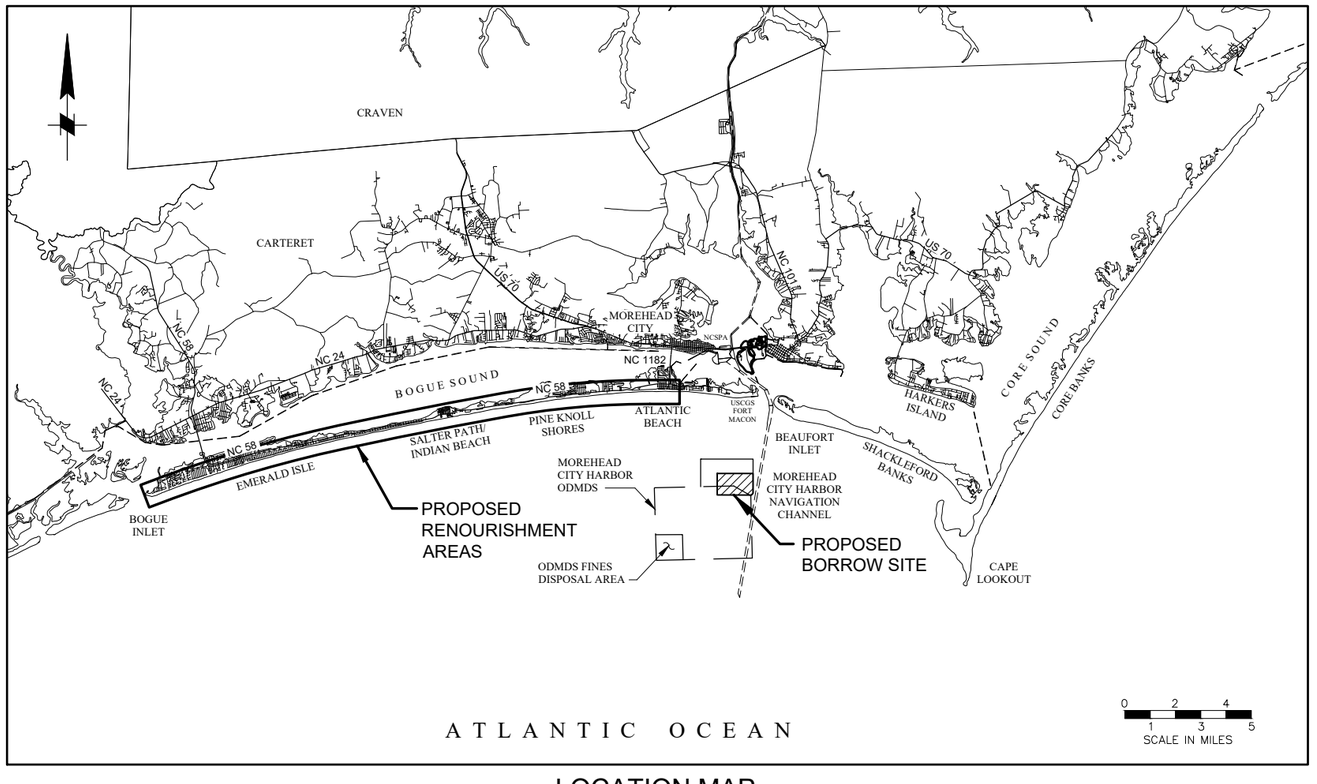
TOWN OF INDIAN BEACH
1400 SALTER PATH ROAD
INDIAN BEACH, NC 28512

TOWN OF PINE KNOLL SHORES
100 MUNICIPAL CIRCLE
PINE KNOLL SHORES, NC 28512

TOWN OF ATLANTIC BEACH
125 WEST FORT MACON ROAD
ATLANTIC BEACH, NC 28512



VICINITY MAP



LOCATION MAP

REVISION 1
FEBRUARY 14, 2020

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

COVER SHEET

Designed by: NCV
Drawn by: BDF
Checked by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

Date: AUGUST 2019
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (D SHEET)

Rev. 1

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
G-001
Sheet 1 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-001; Plotted: 2/14/2020 10:24 AM by FORD, BRIAN; Saved: 2/12/2020 2:42 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

INDEX OF DRAWINGS

SHEET NO.	SHEET TITLE
G-001	COVER SHEET
G-002	INDEX OF DRAWINGS, ABBREVIATIONS, AND GENERAL NOTES
C-100	PROJECT MAP AND KEY PLAN
C-101	PROJECT SURVEY CONTROL PLANS
C-102	PROJECT STAGING AND ACCESS PLANS
C-103	ODMDS BORROW SITE DREDGE PLAN
C-104	ODMDS BORROW SITE DREDGE SECTIONS
C-105	ODMDS BORROW SITE VIBRACORE SUMMARY TABLE
C-110	BEACH RENOURISHMENT PLAN – SHEET 1 OF 20
C-111	BEACH RENOURISHMENT PLAN – SHEET 2 OF 20
C-112	BEACH RENOURISHMENT PLAN – SHEET 3 OF 20
C-113	BEACH RENOURISHMENT PLAN – SHEET 4 OF 20
C-114	BEACH RENOURISHMENT PLAN – SHEET 5 OF 20
C-115	BEACH RENOURISHMENT PLAN – SHEET 6 OF 20
C-116	BEACH RENOURISHMENT PLAN – SHEET 7 OF 20
C-117	BEACH RENOURISHMENT PLAN – SHEET 8 OF 20
C-118	BEACH RENOURISHMENT PLAN – SHEET 9 OF 20
C-119	BEACH RENOURISHMENT PLAN – SHEET 10 OF 20
C-120	BEACH RENOURISHMENT PLAN – SHEET 11 OF 20
C-121	BEACH RENOURISHMENT PLAN – SHEET 12 OF 20
C-122	BEACH RENOURISHMENT PLAN – SHEET 13 OF 20
C-123	BEACH RENOURISHMENT PLAN – SHEET 14 OF 20
C-124	BEACH RENOURISHMENT PLAN – SHEET 15 OF 20
C-125	BEACH RENOURISHMENT PLAN – SHEET 16 OF 20
C-126	BEACH RENOURISHMENT PLAN – SHEET 17 OF 20
C-127	BEACH RENOURISHMENT PLAN – SHEET 18 OF 20
C-128	BEACH RENOURISHMENT PLAN – SHEET 19 OF 20
C-129	BEACH RENOURISHMENT PLAN – SHEET 20 OF 20
C-300	BEACH NOURISHMENT TYPICAL SECTIONS
C-301	RENOURISHMENT SECTIONS SHEET 1 OF 35
C-302	RENOURISHMENT SECTIONS SHEET 2 OF 35
C-303	RENOURISHMENT SECTIONS SHEET 3 OF 35
C-304	RENOURISHMENT SECTIONS SHEET 4 OF 35
C-305	RENOURISHMENT SECTIONS SHEET 5 OF 35
C-306	RENOURISHMENT SECTIONS SHEET 6 OF 35
C-307	RENOURISHMENT SECTIONS SHEET 7 OF 35
C-308	RENOURISHMENT SECTIONS SHEET 8 OF 35
C-309	RENOURISHMENT SECTIONS SHEET 9 OF 35
C-310	RENOURISHMENT SECTIONS SHEET 10 OF 35
C-311	RENOURISHMENT SECTIONS SHEET 11 OF 35
C-312	RENOURISHMENT SECTIONS SHEET 12 OF 35
C-313	RENOURISHMENT SECTIONS SHEET 13 OF 35
C-314	RENOURISHMENT SECTIONS SHEET 14 OF 35
C-315	RENOURISHMENT SECTIONS SHEET 15 OF 35
C-316	RENOURISHMENT SECTIONS SHEET 16 OF 35
C-317	RENOURISHMENT SECTIONS SHEET 17 OF 35
C-318	RENOURISHMENT SECTIONS SHEET 18 OF 35
C-319	RENOURISHMENT SECTIONS SHEET 19 OF 35
C-320	RENOURISHMENT SECTIONS SHEET 20 OF 35
C-321	RENOURISHMENT SECTIONS SHEET 21 OF 35
C-322	RENOURISHMENT SECTIONS SHEET 22 OF 35
C-323	RENOURISHMENT SECTIONS SHEET 23 OF 35
C-324	RENOURISHMENT SECTIONS SHEET 24 OF 35
C-325	RENOURISHMENT SECTIONS SHEET 25 OF 35
C-326	RENOURISHMENT SECTIONS SHEET 26 OF 35
C-327	RENOURISHMENT SECTIONS SHEET 27 OF 35
C-328	RENOURISHMENT SECTIONS SHEET 28 OF 35
C-329	RENOURISHMENT SECTIONS SHEET 29 OF 35
C-330	RENOURISHMENT SECTIONS SHEET 30 OF 35
C-331	RENOURISHMENT SECTIONS SHEET 31 OF 35
C-332	RENOURISHMENT SECTIONS SHEET 32 OF 35
C-333	RENOURISHMENT SECTIONS SHEET 33 OF 35
C-334	RENOURISHMENT SECTIONS SHEET 34 OF 35
C-335	RENOURISHMENT SECTIONS SHEET 35 OF 35
C-501	MISCELLANEOUS DETAILS
C-601	CONSTRUCTION BASELINE WORK POINT TABLES

ABBREVIATIONS

CY	CUBIC YARDS	No.	NUMBER
FT	FEET OR FOOT	ODMDS	OFFSHORE DREDGE MATERIAL DISPOSAL SITE
MHW	MEAN HIGH WATER		
MLW	MEAN LOW WATER	TYP	TYPICAL
MTL	MEAN TIDE LEVEL	WP	WORK POINT
NAD	NORTH AMERICAN DATUM	℄	BASELINE
NAVD	NORTH AMERICAN VERTICAL DATUM	@	AT
NGS	NATIONAL GEODETIC SURVEY	~	APPROXIMATELY
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION	NIC	NOT IN CONTRACT

GENERAL NOTES:

1. ALL BEACH FILL, PLANTING AND DREDGING WORK SHALL CONFORM TO THE REQUIREMENTS OF THESE PLANS AND SPECIFICATIONS.

2. THE CONTRACTOR SHALL PLACE THE PERMIT PLACARDS ON THE JOB SITE AND SHALL COMPLY WITH ALL TERMS OF THE PERMITS PERTAINING TO THE PERFORMANCE OF THE WORK. SEE THE TECHNICAL SPECIFICATIONS.

GENERAL NOTES:

3. CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS BEFORE STARTING WORK. NOTIFY OWNER OF DISCREPANCIES.

4. ALL SAFETY REGULATIONS ARE TO BE STRICTLY FOLLOWED. METHODS OF CONSTRUCTION AND ERECTION OF STRUCTURAL MATERIAL ARE THE CONTRACTORS RESPONSIBILITY.

5. THE CONTRACTOR SHALL, ON A DAILY BASIS, REMOVE FROM THE SITE ANY UNSUITABLE EXCAVATED MATERIAL OR DEBRIS. DISPOSAL OF THE MATERIALS IS THE RESPONSIBILITY OF THE CONTRACTOR. ALL DEBRIS SHALL BE DISPOSED OF IN A PERMITTED LANDFILL.

6. THESE PLANS ARE INCOMPLETE WITHOUT THE PROJECT TECHNICAL SPECIFICATIONS. IF THERE ARE CONFLICTS BETWEEN THE PLANS AND SPECIFICATIONS, THE CONTRACTOR SHALL ALERT THE OWNER AND ENGINEER. THE TECHNICAL SPECIFICATIONS SHALL TAKE PRECEDENCE.

7. THE STAGING AND ACCESS AREAS SHOWN ON C-102 ARE OWNED BY THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH. COORDINATION WITH THE TOWN MANAGERS SHALL BE REQUIRED BEFORE USE. FOR THE STAGING AND ACCESS AREAS WITHIN REACHES THE POINTS OF CONTACT ARE AS FOLLOWS.

REACHES 1-5
MR. MATT ZAPP
TOWN MANAGER
TOWN OF EMERALD ISLE
7500 EMERALD DRIVE
EMERALD ISLE, NC 28594
(252) 354-3424
mzapp@emeraldisle-nc.org

REACHES 6-8
MR. TIM WHITE
TOWN MANAGER
TOWN OF INDIAN BEACH
1400 SALTER PATH RD
INDIAN BEACH, NC 28512
(252) 247-3344
admin@indianbeach.org

REACH 9
MR. BRIAN KRAMER
TOWN MANAGER
TOWN OF PINE KNOLL SHORES
100 MUNICIPAL CIRCLE
PINE KNOLL SHORES, NC 28512
(252) 247-4353
manager@townofpks.com

REACH 10
MR. DAVID WALKER
TOWN MANAGER
TOWN OF ATLANTIC BEACH
125 WEST FORT MACON RD
ATLANTIC BEACH, NC 28512
(252) 726-212
townmanager@atlanticbeach-nc.com

SEE THE TECHNICAL SPECIFICATIONS FOR A DESCRIPTION AND PHOTOS OF STAGING AND ACCESS AREAS.

8. STAGING AREAS SHALL BE MAINTAINED BY THE CONTRACTOR. STAGING AREAS SHALL BE CLEARED OF DEBRIS AND CONTRACTOR INSTALLED AMENITIES AT THE COMPLETION AND ACCEPTANCE OF WORK IN THE AREA. THE CONTRACTOR SHALL RESTORE THE ACCESS AREAS TO THEIR ORIGINAL CONDITION AFTER WORK IN THE AREA IS COMPLETE. THIS WORK INCLUDES, BUT NOT LIMITED TO, REPLACEMENT OF FENCING, SIGNS, SAND FENCE, BEACH VEGETATION, WALKWAYS, DUNES, DUNE VEGETATION, PARKING FACILITIES, PAVED AREAS AND OTHER MISCELLANEOUS ITEMS. ALL REPLACEMENT MATERIALS SHALL BE APPROVED BY THE ENGINEER/OWNER BEFORE INSTALLATION.

9. UNLESS OTHERWISE APPROVED BY THE OWNER, EXCESS EQUIPMENT MAY ONLY BE STORED IN APPROVED STORAGE/STAGING AREAS OR TEMPORARY AREAS IN THE IMMEDIATE VICINITY OF THE BEACHFILL PLACEMENT SITE. THE OWNER RESERVES THE RIGHT TO LIMIT SUCH AREAS AS DEEMED NECESSARY. OPERATION OF GRADING AND OTHER CONSTRUCTION EQUIPMENT WILL NOT BE PERMITTED OUTSIDE THE WORK AREA LIMITS EXCEPT FOR INGRESS AND EGRESS OF THE SITE AT APPROVED LOCATIONS. THE STACKING OF DISCHARGE PIPES IN LAYERS EXCEEDING TWO PIPES HIGH SHALL BE PROHIBITED IN ANY OF THE STORAGE OR STAGING AREAS INCLUDING THE TEMPORARY AREAS.

10. ANY EXISTING SIGNS, FENCES, OR OTHER STRUCTURES WITHIN THE WORK LIMITS SHALL BE PROTECTED AND/OR REMOVED AND LATER REPLACED BY THE CONTRACTOR AS DIRECTED.

PERMITS

1. IT IS THE INTENT OF THESE PLANS TO BE IN ACCORDANCE WITH APPLICABLE CODES AND AUTHORITIES HAVING JURISDICTION. ANY DISCREPANCIES BETWEEN THESE PLANS AND APPLICABLE CODES SHALL BE IMMEDIATELY BROUGHT TO THE ATTENTION OF THE OWNER. THE APPLICABLE CODES SHALL TAKE PRECEDENCE.

2. IT IS THE INTENT OF THESE PLANS, AND THE RESPONSIBILITY OF THE CONTRACTOR, TO COMPLY WITH THE ENVIRONMENTAL PERMITS ISSUED FOR THIS PROJECT. THE PERMITS ARE HEREBY MADE PART OF THE CONTRACT DOCUMENTS. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FAMILIARIZE AND GOVERN HIMSELF BY ALL PROVISIONS OF THESE PERMITS. SEE THE TECHNICAL SPECIFICATIONS.

BID QUANTITIES

1. THE FOLLOWING ESTIMATE OF SAND QUANTITIES REQUIRED FOR THE PROJECT IS:

   TOTAL PROJECT FILL . . . . . 1,995,000 CY (1)

2. THE FOLLOWING ESTIMATE OF PLANTING QUANTITIES REQUIRED FOR THE PROJECT IS:

   TOTAL PROJECT PLANTING . . . . . 230,500 SY

DREDGING

1. NO DREDGING WHATSOEVER SHALL OCCUR BELOW AN ELEVATION OF -52 FT NAVD 88.

2. ALL DREDGING SHALL BE PERFORMED WITHIN THE LIMITS OF THE PERMITTED DREDGING AREA AS SHOWN IN THE DRAWINGS.

3. PIPELINE CORRIDOR SHALL BE DELINEATED WITH BUOYS BY THE CONTRACTOR IN THE PRESENCE OF THE ENGINEER/OWNER BEFORE PLACEMENT.

DREDGING

4. THE PLANE COORDINATES AND BEARINGS SHOWN FOR THE DREDGING SURVEYS ARE BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM 83 (NAD 83).

5. ALL ELEVATIONS SHOWN ON THE DREDGING DRAWINGS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).

6. THE BATHYMETRY PRESENTED ON THE DREDGING PLANS IS BASED ON A SURVEY COMPLETED IN MAY 2019 BY GEODYNAMICS AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THAT TIME.

7. A POST-DREDGE SURVEY OF THE BORROW AREA SHALL BE COMPLETED BY AN INDEPENDENT REGISTERED/CERTIFIED SURVEYOR COORDINATED AND PAID FOR BY THE CONTRACTOR TO STANDARDS OUTLINED IN THE TECHNICAL SPECIFICATIONS.

BEACH FILL

1. ALL SAND EXCAVATED FROM THE BORROW AREAS SHALL BE TRANSPORTED TO, AND DEPOSITED ON, THE BEACH BETWEEN THE LINES, GRADES, AND CROSS-SECTIONS SHOWN ON THE DRAWINGS OR AS ADJUSTED BY THE ENGINEER.

2. AFTER NOTIFICATION BY THE CONTRACTOR OF THEIR INTENT TO COMMENCE DREDGING AND SAND PLACEMENT, A CURRENT BEACH SURVEY WILL BE PERFORMED BY THE OWNER. THE CONTRACTOR SHALL NOTIFY THE OWNER AT LEAST 4 WEEKS PRIOR TO THE COMMENCEMENT OF BEACH FILL PLACEMENT. THE UPDATED BEACH SURVEY WILL BE USED TO ADJUST THE LIMITS AND GRADE LINES TO MEET THE FILL DENSITIES PROVIDED WITH THE SECTIONS ON SHEETS C-301 THRU C-335.

3. SAND SHALL BE PLACED WITHIN THESE LIMITS AND GRADE LINES AS PRACTICALLY AS POSSIBLE. TOLERANCE SHALL BE WITHIN ±0.5 FOOT FOR BERM ELEVATION AND WIDTHS OUT TO THE MEAN TIDE LEVEL (MTL) AS SHOWN ON SHEET C-300. PAYMENT WILL BE MADE FOR THE CY/FT SHOWN ON THE PLANS WITH A TOLERANCE OF ±10%. EVERY ATTEMPT WILL BE MADE BY THE CONTRACTOR TO FILL WITHIN THE PRESCRIBED TEMPLATE. SEE TECHNICAL SPECIFICATIONS. THE BEACH FILL SHALL BE PLACED BY REACH GENERALLY FROM EAST TO WEST.

4. THE OWNER MAY MAKE ALTERATIONS IN THE PLAN DIMENSIONS, GRADE OF SLOPES, OR VOLUME OF FILL PER FOOT OF BEACH IN ORDER TO ACCOUNT FOR CHANGED CONDITIONS SINCE THE TIME OF THE EXISTING CONDITIONS SURVEY. THE CONTRACTOR SHALL WORK CLOSELY WITH THE OWNER TO ENSURE THAT THE TOTAL QUANTITY OF SAND ALLOWED UNDER THE CONTRACT IS PLACED AS EFFECTIVELY AS POSSIBLE.

5. CONTRACTOR SHALL TAKE CARE TO GRADE THE DUNE AND BERM SO THAT PONDING LANDWARD OF THE CRESTS IS MINIMIZED.

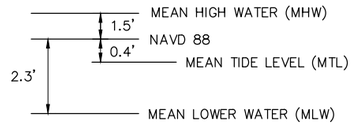
6. EXISTING WALKWAYS SHALL REMAIN AND NOT BE DAMAGED BEYOND CURRENT CONDITIONS. ANY ADDITIONAL DAMAGE WILL BE REPAIRED OR REPLACED AT THE CONTRACTORS COST AS DIRECTED BY THE OWNER OR THE ENGINEER. FILL SHALL BE PLACED COMPLETELY UNDERNEATH AND/OR AROUND STRUCTURES.

7. THE PLANE COORDINATES AND BEARINGS SHOWN FOR THE BEACH FILL SURVEYS ARE BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM 83 (NAD 83).

8. ALL ELEVATIONS SHOWN ON THE BEACH FILL DRAWINGS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM (NAVD 88).

9. THE BATHYMETRY/TOPOGRAPHY PRESENTED ON THE BEACH FILL PLANS AND SECTIONS IS BASED ON A SURVEY COMPLETED IN MAY 2019 BY GEODYNAMICS AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THAT TIME.

10. THE MEAN HIGH WATER ELEVATION AND MEAN LOW WATER ELEVATION SHOWN ON THE BEACH FILL DRAWINGS AND BELOW WERE PROVIDED BY CARTERET COUNTY AND ARE BASED ON NOAA TIDAL DATUMS AT THE ATLANTIC BEACH TRIPLE S PIER AND THE DUKE MARINE LAB.



11. HORIZONTAL AND VERTICAL CONTROL FOR THE BEACH FILL SURVEY WAS BASED ON NUMEROUS RANGE MONUMENTS AS FOUND BY GEODYNAMICS.

12. CONTOURS FOR THE BEACH FILL PLANS ARE SHOWN AT 1 FT INTERVALS.

13. PRE- AND POST-CONSTRUCTION SURVEYS OF THE BEACH AREA SHALL BE COMPLETED BY AN INDEPENDENT REGISTERED/CERTIFIED SURVEYOR COORDINATED AND PAID FOR BY THE CONTRACTOR. TRANSECTS SHALL BE AT 100-FOOT INTERVALS. ADDITIONAL ELEVATIONS SHALL BE TAKEN AS NECESSARY TO ACCURATELY REPRESENT TOPOGRAPHY OF THE BEACH AREA.

14. BEACH FILL SLOPES CALLED OUT ON PLANS ARE HORIZONTAL : VERTICAL.

15. SEE TECHNICAL SPECIFICATION FOR ADDITIONAL PLACEMENT REQUIREMENTS.

16. THE CONTRACTOR SHALL PROVIDE TEMPORARY SAND RAMPS OVER THE PIPELINE FOR PEDESTRIAN AND EMERGENCY VEHICLE ACCESS ALONG THE BEACH. THE MAXIMUM DISTANCE BETWEEN THESE TEMPORARY SAND RAMPS SHALL BE 500 FEET. THESE TEMPORARY SAND RAMPS SHALL BE LEVELED ONCE THE PIPELINE HAS BEEN MOVED. THE CONTRACTOR SHALL ALSO CONSTRUCT A BARRIER TO KEEP THE PUBLIC AT LEAST 250 FEET FROM THE DISCHARGE PIPE IN BOTH DIRECTIONS UP AND DOWN THE BEACH. SEE THE TECHNICAL SPECIFICATIONS.

Mark	Description	Date	Appr.
1	ADDENDUM 1	08/27/19	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

INDEX OF DRAWINGS, ABBREVIATIONS, AND GENERAL NOTES

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

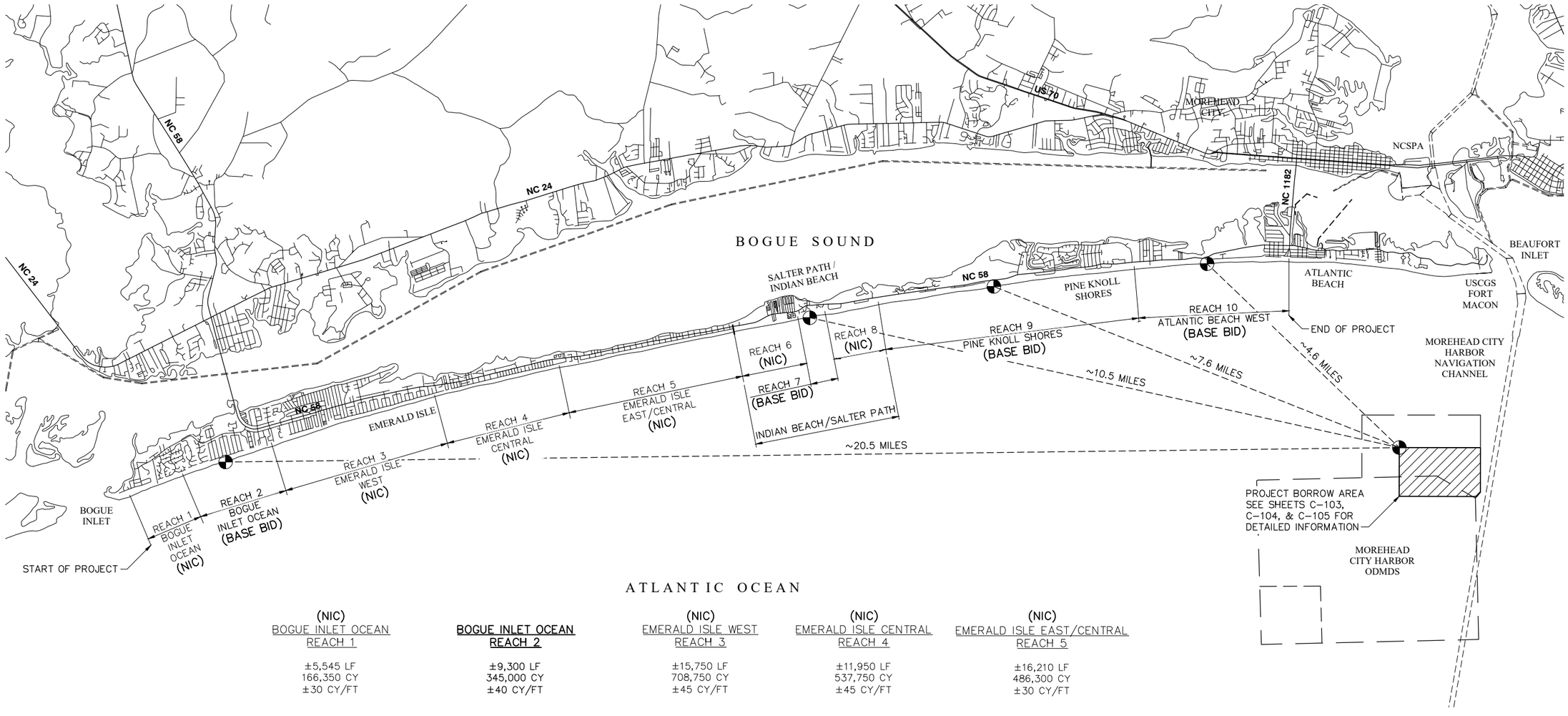
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Designed by:	NCV
Drawn by:	BDF
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
Qad by:	SRM
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
M&N Project No.	10611
Rev.	

Sheet Reference No.
G-002
Sheet 2 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 20220\10611000-002; Plotted: 2/14/2020 10:24 AM by: FORD, BRIAN; Saved: 8/27/2019 1:46 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



(NIC) BOGUE INLET OCEAN REACH 1	BOGUE INLET OCEAN REACH 2	(NIC) EMERALD ISLE WEST REACH 3	(NIC) EMERALD ISLE CENTRAL REACH 4	(NIC) EMERALD ISLE EAST/CENTRAL REACH 5
±5,545 LF 166,350 CY ±30 CY/FT	±9,300 LF 345,000 CY ±40 CY/FT	±15,750 LF 708,750 CY ±45 CY/FT	±11,950 LF 537,750 CY ±45 CY/FT	±16,210 LF 486,300 CY ±30 CY/FT

(NIC) INDIAN BEACH/SALTER PATH REACH 6	INDIAN BEACH/SALTER PATH REACH 7	(NIC) INDIAN BEACH/SALTER PATH REACH 8	PINE KNOLL SHORES REACH 9	ATLANTIC BEACH WEST REACH 10
±6,025 LF 180,750 CY ±30 CY/FT	±3,800 LF 140,000 CY ±40 CY/FT (1)	±4,900 LF 147,000 CY ±30 CY/FT	±24,400 LF 990,000 CY ±40 CY/FT (1)	±14,900 LF 520,000 CY ±35 CY/FT (1)

NOTES:
1. OFFLOADING STATION AT BEACH NOURISHMENT SITES SHALL BE USED TO PUMP DREDGED MATERIAL ONTO BEACH. THIS STATION SHALL MOVE EAST OR WEST AS THE NOURISHMENT PROJECT IS COMPLETED. DREDGED MATERIAL SHALL BE TRANSPORTED FROM THE BORROW AREA DIRECTLY BY THE DREDGE AND OFFLOADED AT THIS LOCATION. CONTRACTOR SHALL PROVIDE MAP OF PROPOSED OFFLOADING STATIONS AND PIPELINE IN ACCORDANCE WITH PERMITS, SEE TECHNICAL SPECIFICATIONS.
2. BASE BID REACHES 2 , 7, AND 9 REQUIRE A 500 FOOT TAPER TO BE PLACED WITHIN ADJACENT (NOT IN CONTRACT) REACHES.
3. REACHES 2, 7, 9, AND 10 ARE CONSIDERED PART OF THE BASE BID. REACHES 1, 3 THRU 6, AND 8 ARE CURRENTLY NOT IN CONTRACT (NIC) DUE TO DELAYS IN FEMA FUNDING.

5000' 0' 5000' 10000'
SCALE: 1"=5000'

Mark	Description	Date	Appr.
1	ADDENDUM 1	08/27/19	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

PROJECT MAP AND KEY PLAN

Date: AUGUST 2019
Designed by: NCV
Drawn by: BDF
Ckd by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL
M&N Project No. 10611
Drawing code:
Drawing Scale:
Plot scale: 1:1 (0 SHEET)
Rev.

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

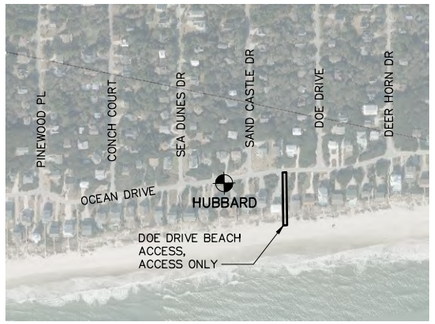
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-100
Sheet 3 of 66

File: C:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000C-100; Plotted: 2/14/2020 10:24 AM by FORD, BRIAN; Saved: 8/27/2019 1:46 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
BEAR	331243.42	2572100.58	16.08

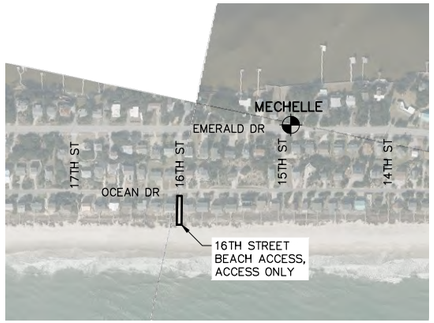


NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
HUBBARD	334559.51	2581884.14	14.99

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
SEAVIEW	338492.52	2589895.22	15.43

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
COQUINA	339814.76	2599077.46	17.82

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
EMERALD RM2	343122.52	2612927.40	16.79



NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
MECHELLE	344990.91	2620512.31	17.51

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
McNEILL	346476.28	2628573.13	18.47

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
SALTER	348063.64	2637673.57	25.21

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
GROVE	349629.16	2645424.90	11.53

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
VERRANZZANO	351254.18	2654624.71	10.71

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
WEEPING	351818.98	2659539.89	18.66

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
SHERATON	352583.33	2667932.37	9.81

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
RIDGE	352747.25	2673936.72	13.31

NGS CONTROL STATION			
STATION	NORTHING	EASTING	ELEVATION
POLICE RM5	354033.16	2679512.54	5.26

NOTES:

1. THE NORTHINGS AND EASTINGS SHOWN ARE BASED ON THE NORTH CAROLINA STATE PLANE COORDINATE SYSTEM, NORTH AMERICAN DATUM 1983 (NAD 83) (FEET).
2. THE ELEVATIONS SHOWN ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88) (FEET).

0	BID DOCUMENTS	08/19/19	JM
Mark	Description	Date	Appr.

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

PROJECT SURVEY CONTROL PLANS

Rev.
Date: AUGUST 2019
Designed by: NCV
Dwn by: BDF
Ckd by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL
M&N Project No. 10611
Drawing code:
Drawing Scale:
Plot scale: 1:1 (0 SHEET)

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

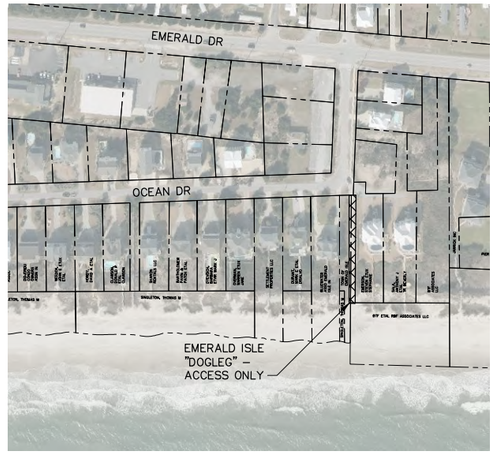
Sheet Reference No.
C-101
Sheet 4 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10610100C-101; Plotted: 2/14/2020 10:25 AM by FORD, BRIAN; Saved: 8/19/2019 1:37 PM by BFORD

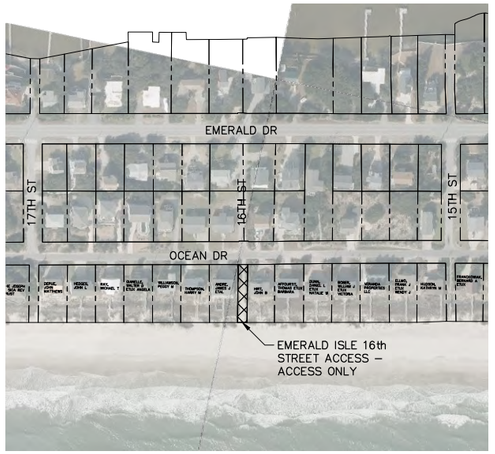
DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

STAGING & ACCESS SITE 1
NOT TO SCALE

STAGING & ACCESS SITE 2
NOT TO SCALE

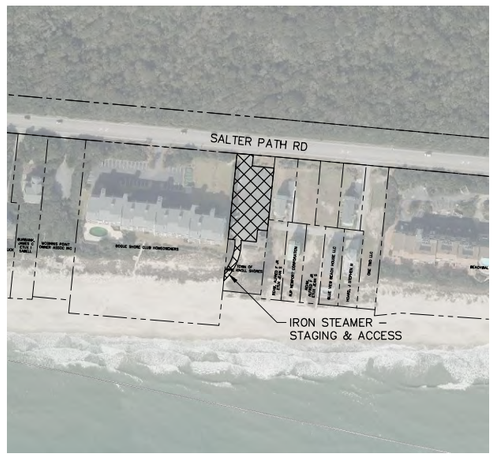


STAGING & ACCESS SITE 3
NOT TO SCALE



STAGING & ACCESS SITE 4
NOT TO SCALE

STAGING & ACCESS SITE 5
NOT TO SCALE



STAGING & ACCESS SITE 6
NOT TO SCALE

STAGING & ACCESS SITE 7
NOT TO SCALE

STAGING & ACCESS SITE 8
NOT TO SCALE

NOTES:

1. SEE TECHNICAL SPECIFICATIONS FOR ADDITIONAL INFORMATION.
2. SEE TECHNICAL SPECIFICATIONS FOR DESCRIPTIONS AND PHOTOS OF STAGING AND ACCESS AREAS.

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

No.	Mark	Description	Date	Appr.
0	BID	DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

PROJECT STAGING AND ACCESS PLANS

Designed by: .	Date: AUGUST 2019	Rev.	
Drawn by: BDF	Cad by: .	M&N Project No. 10611	
Reviewed by: .	Drawing code:		
Submitted by: MOFFATT & NICHOL	Drawing Scale: Plot scale: 1:1 (0 SHEET)		

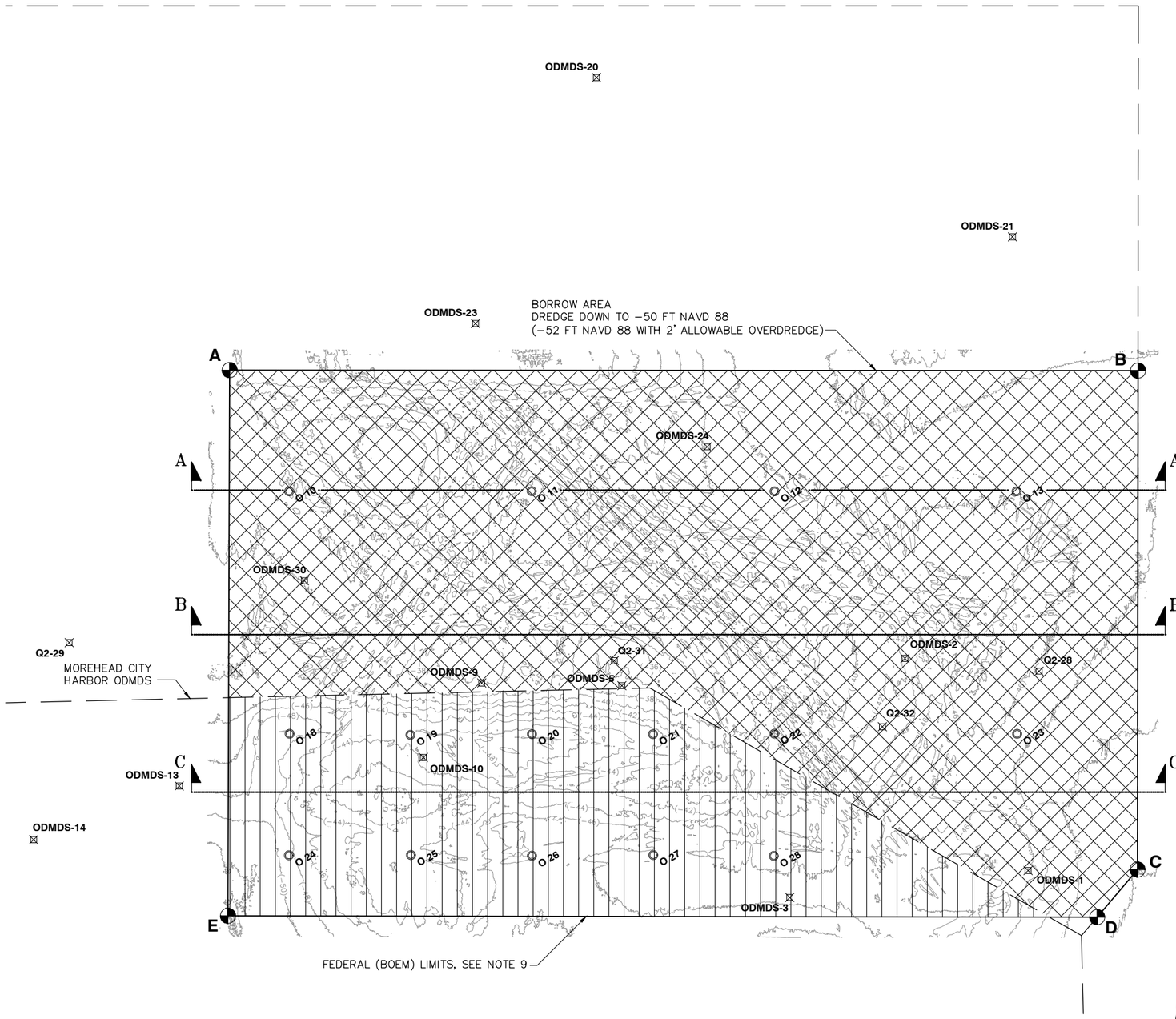
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-102
Sheet 5 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-102; Plotted: 2/14/2020 10:25 AM by FORD, BRIAN; Saved: 8/19/2019 1:17 PM by BFORD



PROPOSED BORROW AREA
COORDINATE TABLE

POINT	NORTHING	EASTING
A	335251.00	2689873.17
B	335246.38	2697361.70
C	331134.26	2697357.83
D	330742.17	2697024.91
E	330752.97	2689859.35

LEGEND

A — PROPOSED BORROW AREA CONTROL POINT

O## — 2011 VIBRACORE LOCATION (SEE TECHNICAL SPECIFICATIONS FOR DATA SUMMARY)

ID — REMOTE SENSING TARGET

NOTES

1. BATHYMETRY CONTOURS SHOWN IN FEET REFERENCED TO NAVD 88 ARE BASED ON MULTIBEAM SURVEYS PERFORMED BY GEODYNAMICS IN MAY 2019 AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THE TIME OF THE SURVEY.
2. BORROW AREA COORDINATES ARE NORTH CAROLINA STATE PLANE, NAD 83 (FEET).
3. THE MEAN HIGH WATER ELEVATION AND MEAN LOW WATER ELEVATION SHOWN ON THE DREDGE SECTIONS WERE PROVIDED BY CARTERET COUNTY AND ARE BASED ON NOAA TIDAL DATUMS AT THE ATLANTIC BEACH TRIPLE S PIER AND THE DUKE MARINE LAB.
4. OTHER CONTRACTORS MAY BE PRESENT IN AREAS WHERE DREDGING OF BEACH FILL MATERIALS IS TO OCCUR. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ACTIVITIES.
5. SEE TECHNICAL SPECIFICATIONS FOR DATA SUMMARY OF THE ARCHAEOLOGICAL REMOTE SENSING AND TARGET IDENTIFICATION STUDY. THE STUDY CONCLUDES THAT THE TARGETS CONSIST OF MODERN DEBRIS (WIRE ROPE, PIPE, ETC.) THAT APPEARS TO BE RELATED TO THE ODMDS OR ARTIFICIAL REEF SYSTEMS BUILT IN THE 1970'S. NO CULTURAL RESOURCES OR HISTORICAL ARTIFACTS WERE FOUND.
6. THE CONTRACTOR SHALL LEAVE UNDISTURBED FURROWS BETWEEN DREDGING PASSES WITHIN THE ODMDS BORROW SITE.
7. FOR ODMDS BORROW SITE DREDGE SECTIONS, SEE SHEET C−104.
8. FOR ODMDS BORROW SITE VIBRACORE SUMMARY TABLE, SEE SHEET C−105.
9. THE CONTRACTOR WILL BE LIMITED TO 1,750,000 CUBIC YARDS OF DREDGE MATERIAL REMOVAL, BY SURVEY, FROM WITHIN THE BOEM LIMITS.

REMOTE SENSING TARGET
COORDINATE TABLE

TARGET ID	NORTHING	EASTING
ODMDS−1	331,126	2,696,456
ODMDS−2	332,875	2,695,144
ODMDS−3	330,904	2,694,491
ODMDS−5	332,650	2,693,107
ODMDS−9	332,672	2,691,951
ODMDS−10	332,058	2,691,471
ODMDS−13	331,823	2,689,458
ODMDS−14	331,380	2,688,258
ODMDS−20	337,662	2,692,898
ODMDS−21	336,350	2,696,327
ODMDS−23	335,635	2,691,900
ODMDS−24	334,618	2,693,811
ODMDS−30	333,515	2,690,490
Q2−28	332,769	2,696,546
Q2−29	333,005	2,688,551
Q2−31	332,856	2,693,045
Q2−32	332,311	2,695,255

500' 0' 500' 1000'
SCALE: 1"=500' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

No.	Mark	BID DOCUMENTS Description	Date	Appr.
0			08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

ODMDS BORROW SITE DREDGE
PLAN

Rev.	
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	
Plot scale: 1:1 (0 SHEET)	
Designed by:	NCV
Drn by:	BDF
Chkd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL

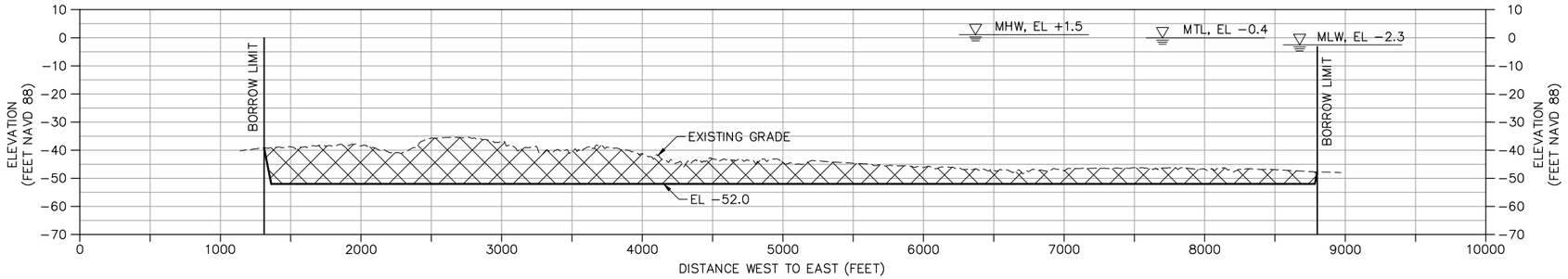
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919−781−4626
moffatt & nichol NC FIRM LICENSE No. F−0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

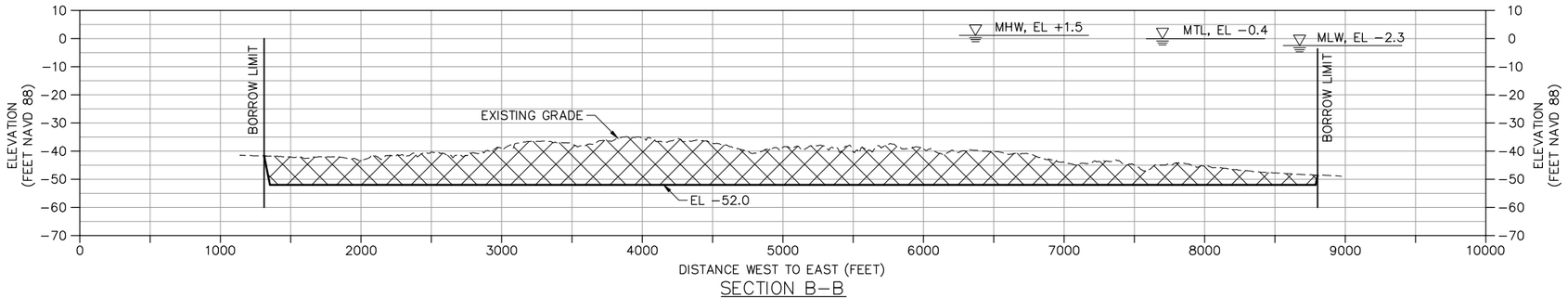
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet
Reference No.
C-103
Sheet 6 of 66

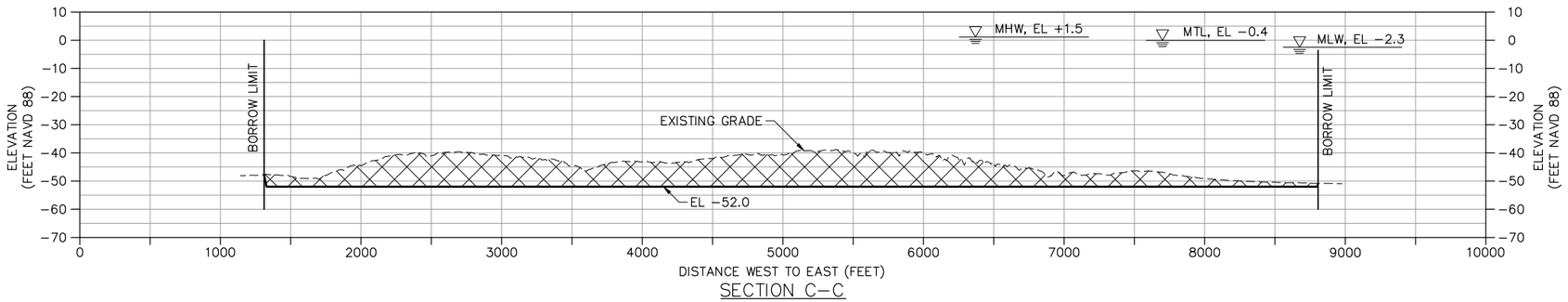
File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000−103; Plotted: 2/14/2020 10:25 AM by FORD, BRIAN; Saved: 8/19/2019 1:28 PM by BFORD



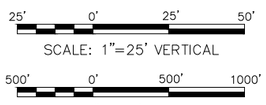
SECTION A–A



SECTION B–B



SECTION C–C



Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

ODMDS BORROW SITE DREDGE SECTIONS

Date: AUGUST 2019 | Rev.
Designed by: NCV | Dwn by: BDF | Ckd by: SRM
Reviewed by: JDM | Submitted by: JDM
M&N Project No. 10611
Drawing code:
Drawing Scale:
Plot scale: 1:1 (0 SHEET)

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-104
Sheet 7 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10610C-104; Plotted: 2/14/2020 10:25 AM by FORD, BRIAN; Saved: 8/16/2019 11:56 AM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Bogue Banks Sediment Compatibility

Native Sediment Characteristics

Reference - (CSE, 2001 - EA for Phases 1 & 2 and CAMA Permit #124-01)

Mean	1.76 phi	0.30 mm
Standard Deviation	0.77 phi	0.59 mm

Borrow Area Sediment Characteristics ODMDS

Reference - (Alpine, February 2012)

Mean	1.71	phi	0.31	mm
Standard Deviation	1.10	phi	0.81	mm

Percent Fines 0.5%

Percent Sand 98.0%

Precent Gravel 1.5%

Overfill Factor

Mean Difference	Sorting Ratio
-0.07	1.42

Summary of ODMDS Borrow Area Sediment Characteristics

Vibracore	Sample Number	Depth (ft)	Bed Elevation (ft NAVD)	Sample Elevation (ft NAVD)			Sample Depth (ft)	Gravel	Sand	<#200	<#230	Carbonate	Mean (mm)	Mean (phi)
O10	1	0-5	-38.2	-38.2	-	-43.2	5.0	1.18	98.64	0.18	0.12	11.8	0.27	1.89
O10	2	5-10	-38.2	-43.2	-	-48.2	5.0	0.22	99.43	0.35	0.29	12.9	0.28	1.84
O10	3	10-15	-38.2	-48.2	-	-53.2	5.0	0.18	99.50	0.32	0.25	10.0	0.26	1.94
O11	1	0-2	-37.6	-37.6	-	-39.6	2.0	2.7	96.48	0.82	0.63	15.5	0.34	1.56
O11	2	2-5	-37.6	-39.6	-	-42.6	3.0	0.43	99.28	0.29	0.27	13.7	0.33	1.60
O11	3	5-10	-37.6	-42.6	-	-47.6	5.0	0.07	99.66	0.27	0.26	13.8	0.26	1.94
O11	4	10-15	-37.6	-47.6	-	-52.6	5.0	1.93	97.92	0.15	0.12	14.1	0.29	1.79
O12	1	0-5	-46.6	-46.6	-	-51.6	5.0	4.59	95.09	0.32	0.26	23.3	0.45	1.15
O12	2	5-9	-46.6	-51.6	-	-55.6	4.0	1.32	98.39	0.29	0.21	14.2	0.32	1.64
O13	1	0-6	-47.3	-47.3	-	-53.3	6.0	0.08	99.53	0.39	0.28	11.5	.29	1.79
O18	1	0-6	-44.1	-44.1	-	-50.1	6.0	1.22	98.07	0.71	0.53	12.1	0.28	1.84
O18	2	6-12	-44.1	-50.1	-	-56.1	6.0	0.21	99.39	0.4	0.29	12.6	0.28	1.84
O19	1	0-6	-36.1	-36.1	-	-42.1	6.0	0	99.82	0.18	0.08	10.6	0.25	2.00
O19	2	6-12	-36.1	-42.1	-	-48.1	6.0	1.69	98.27	0.04	0	13.5	0.29	1.79
O19	3	12-17	-36.1	-48.1	-	-53.1	5.0	1.63	98.19	0.18	0.12	12.8	0.32	1.64
O19	4	17-19.3	-36.1	-53.1	-	-55.4	2.3	0	99.3	0.7	0.49	9.5	0.24	2.06
O20	1	0-5	-36.4	-36.4	-	-41.4	5.0	2.55	97.31	0.14	0.12	17.8	0.35	1.51
O20	2	5-10	-36.4	-41.4	-	-46.4	5.0	1.28	97.83	0.89	0.72	21.2	0.31	1.69
O20	3	10-13.9	-36.4	-46.4	-	-50.3	3.9	2.31	97.24	0.45	0.39	9.3	0.3	1.74
O21	1	0-5	-37	-37.0	-	-42.0	5.0	0.36	99.34	0.3	0.28	16.2	0.3	1.74
O21	2	5-10	-37	-42.0	-	-47.0	5.0	1.77	97.72	0.51	0.46	11.7	0.36	1.47
O21	3	10-15	-37	-47.0	-	-52.0	5.0	1.66	98.11	0.23	0.16	12.3	0.31	1.69
O22	1	0-5	-32.7	-32.7	-	-37.7	5.0	2.14	97.72	0.14	0.13	16.2	0.34	1.56
O22	2	5-10	-32.7	-37.7	-	-42.7	5.0	2.12	97.68	0.2	0.14	12.3	0.31	1.69
O22	3	10-15	-32.7	-42.7	-	-47.7	5.0	1.58	98.04	0.38	0.37	11.7	0.29	1.79
O22	4	15-20	-32.7	-47.7	-	-52.7	5.0	1.06	98.53	0.41	0.4	14.7	0.34	1.56
O23	1	0-6	-47.8	-47.8	-	-53.8	6.0	1.88	97.98	0.14	0.11	13.3	0.36	1.47
O24	1	0-4.9	-49.3	-49.3	-	-54.2	4.9	4.78	90.03	5.19	4.81	13	0.24	2.06
O24	2	4.9-6.8	-49.3	-54.2	-	-56.1	1.9	0.32	99.38	0.3	0.2	10.4	0.26	1.94
O25	1	0-6	-42	-42.0	-	-48.0	6.0	0.9	98.65	0.45	0.36	13.6	0.33	1.60
O25	2	6-12	-42	-48.0	-	-54.0	6.0	2.05	96.99	0.96	0.83	18	0.33	1.60
O25	3	12-17.9	-42	-54.0	-	-59.9	5.9	1.79	98.06	0.15	0.12	19.2	0.32	1.64
O26	1	0-5	-45.7	-45.7	-	-50.7	5.0	5.01	94.52	0.47	0.37	12.7	0.36	1.47
O26	2	5-9.3	-45.7	-50.7	-	-55.0	4.3	0.97	98.79	0.24	0.21	11.9	0.3	1.74
O27	1	0-4	-43.6	-43.6	-	-47.6	4.0	0.56	99.24	0.2	0.2	16.7	0.4	1.32
O27	2	4-8	-43.6	-47.6	-	-51.6	4.0	0.67	98.95	0.38	0.35	12	0.32	1.64
O27	3	8-12.9	-43.6	-51.6	-	-56.5	4.9	0.16	99.35	0.49	0.41	11.8	0.29	1.79
O28	1	0-6	-42.7	-42.7	-	-48.7	6.0	0.59	99.29	0.12	0.09	12.8	0.28	1.84
O28	2	6-11.6	-42.7	-48.7	-	-54.3	5.6	0.41	99.34	0.25	0.16	13.4	0.3	1.74
							average	1.44	98.04	0.52	0.44	13.56	0.31	1.71
							median	1.28	98.19	0.30	0.28	12.80	0.31	1.74

Rev.	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

ODMDS BORROW SITE
VIBRACORE SUMMARY TABLE

Designed by: NCV
Dwn by: BDF
Ckd by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019
M&N Project No. 10611
Drawing code:
Drawing Scale:
Plot scale: 1:1 (D SHEET)

4700 FALLS OF THE NEUSE ROAD SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

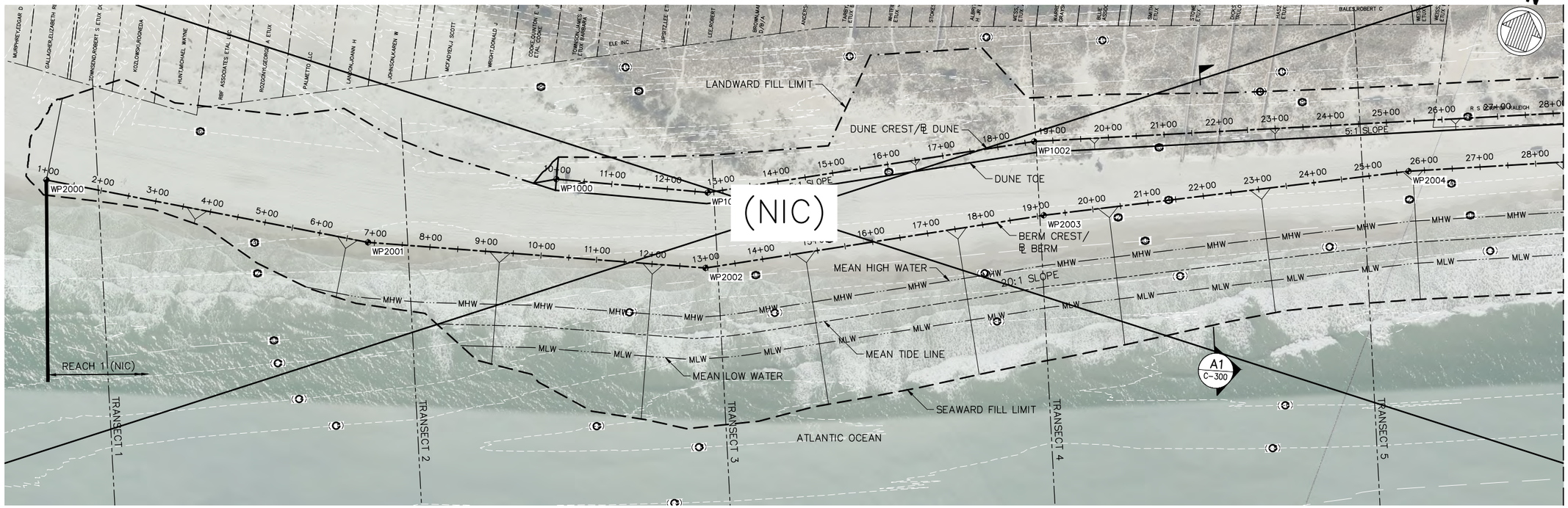
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

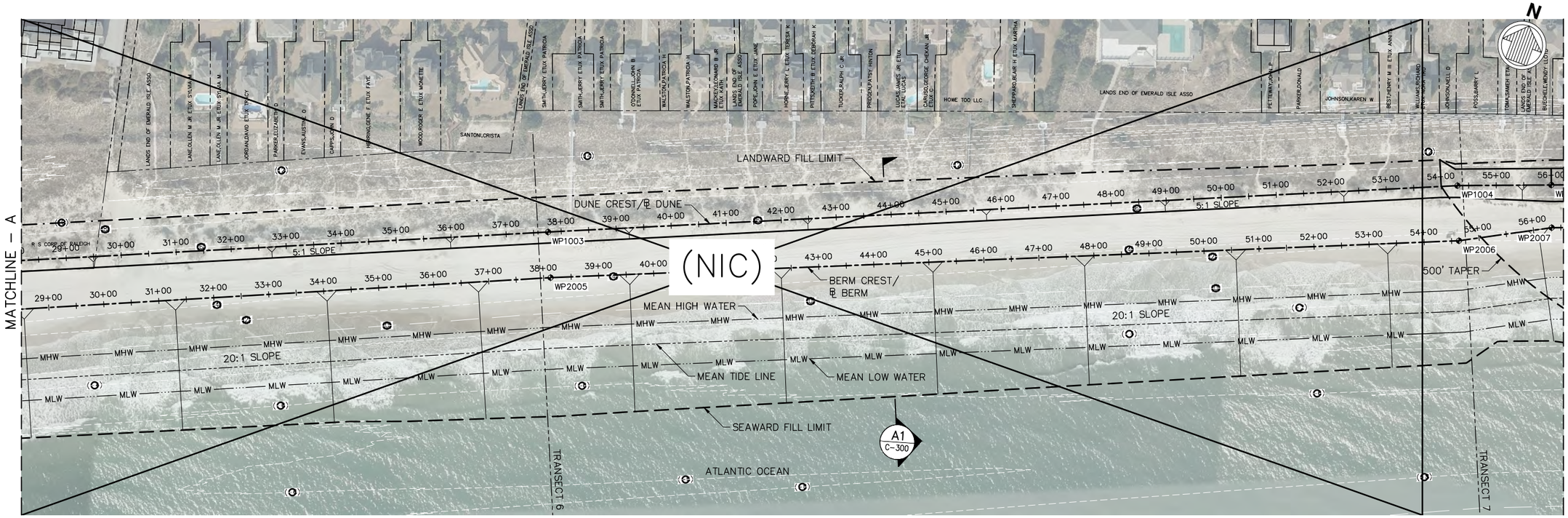
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-105
Sheet 8 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611100C-105; Plotted: 2/14/2020 10:25 AM by FORD, BRIAN; Saved: 8/16/2019 11:56 AM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C-301 THRU C-335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 1 OF 20

Rev.	
Date:	JANUARY 2020
Designed by:	NCV
Dwn by:	BDF
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
M&N Project No.	10611
Cad by:	SRM
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (D SHEET)

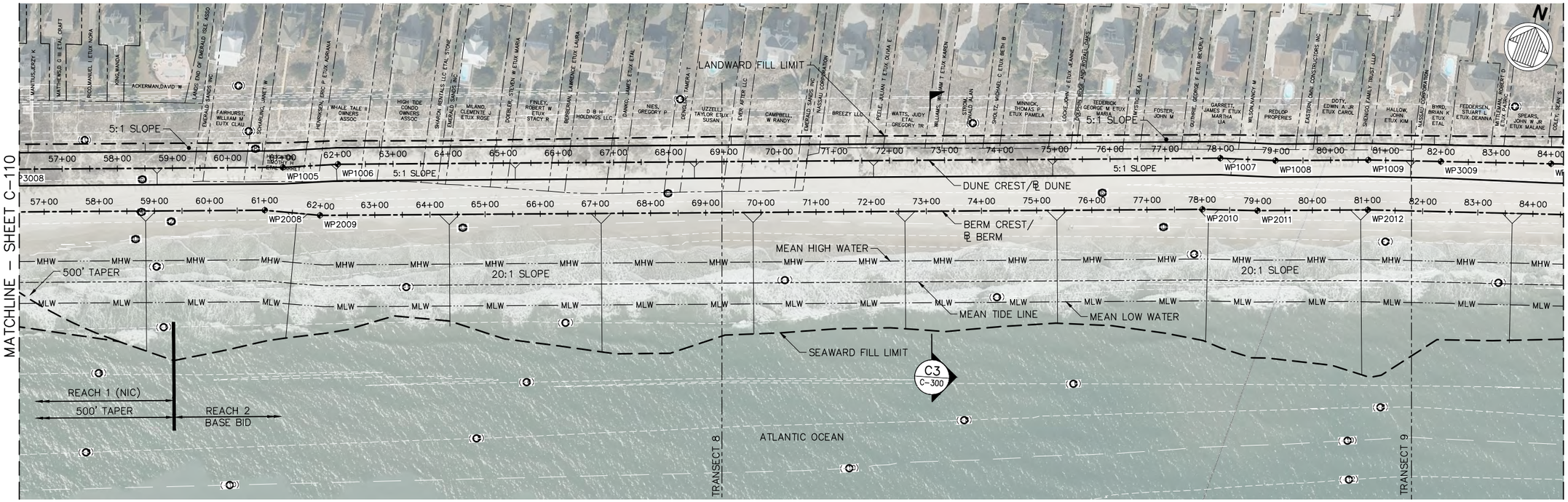
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

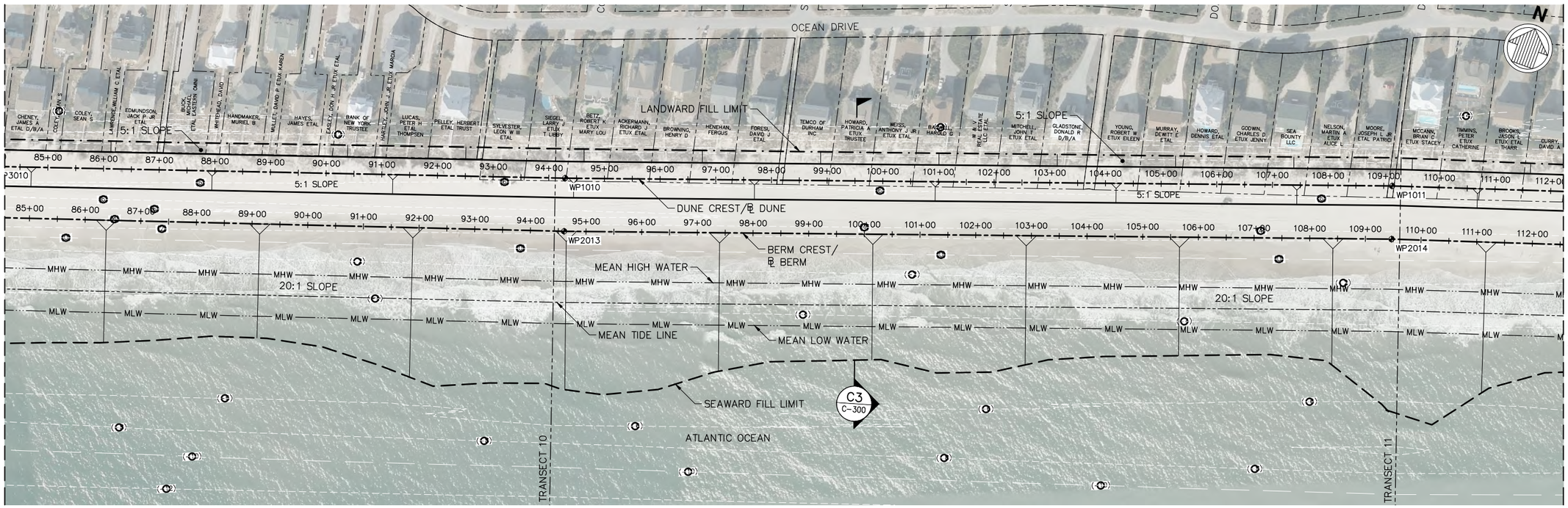
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-110
Sheet 9 of 66

File: C:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00C-110; Plotted: 2/14/2020 10:25 AM by FORD, BRIAN; Saved: 2/14/2020 10:23 AM by BFORD





NOTES:
1. SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C-301 THRU C-335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

No.	Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 2 OF 20

Rev.	Date:	Designed by:	Dwn by:	Reviewed by:	Submitted by:	Drawing code:	Drawing Scale:
1	JANUARY 2020	NCV	BDF	JDM	MOFFATT & NICHOL	M&N Project No. 10611	Plot scale: 1:1 (0 SHEET)

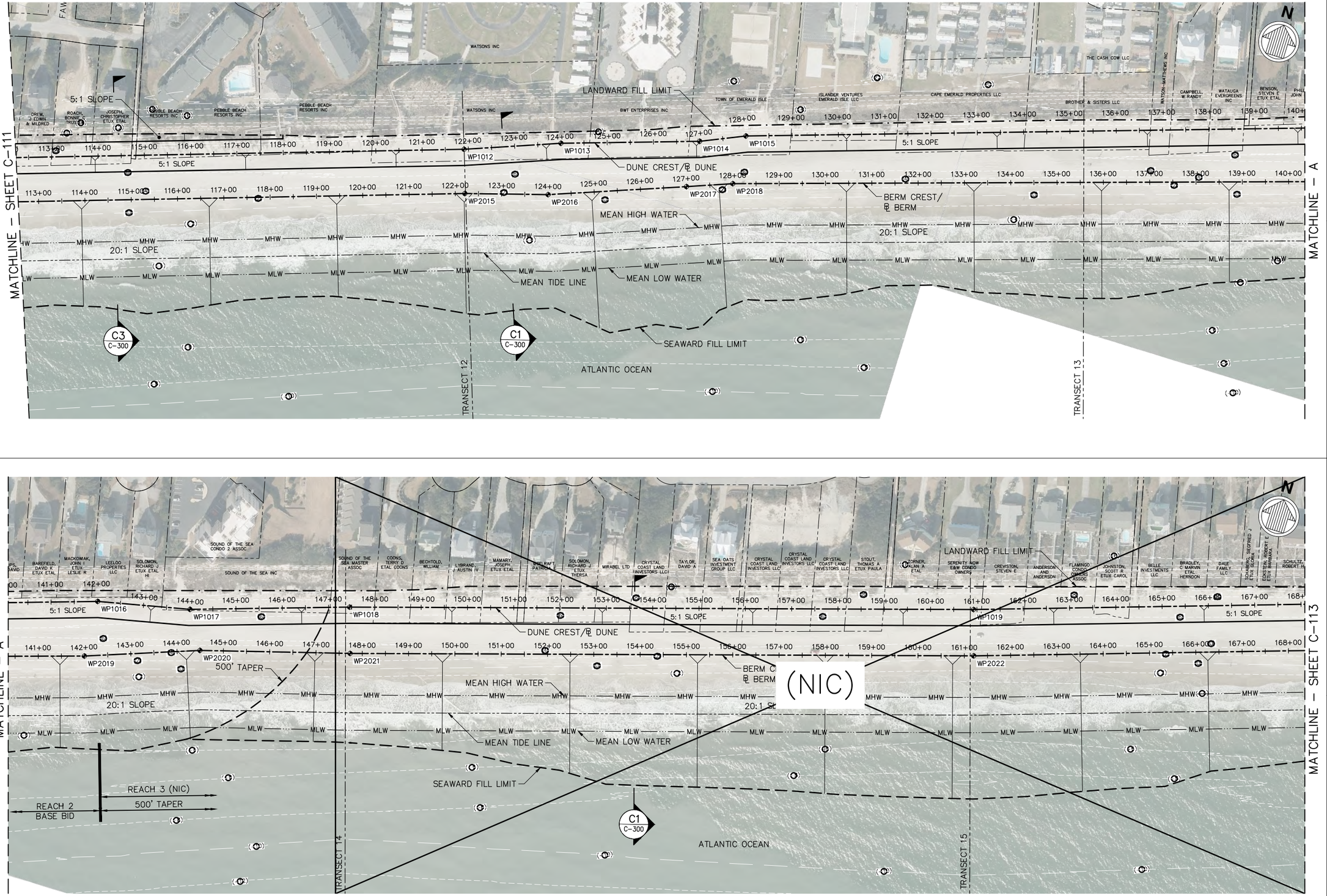
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-111
Sheet 10 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00C-111; Plotted: 2/14/2020 10:26 AM by FORD, BRIAN; Saved: 2/14/2020 10:23 AM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
1	PRE–CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 3 OF 20

Rev.: 1
Date: JANUARY 2020
M&N Project No.: 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (0 SHEET)
Designed by: NCV
Dwn by: BDF
Chd by: SRM
Reviewed by:
Submitted by: JDM
MOFFATT & NICHOL

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

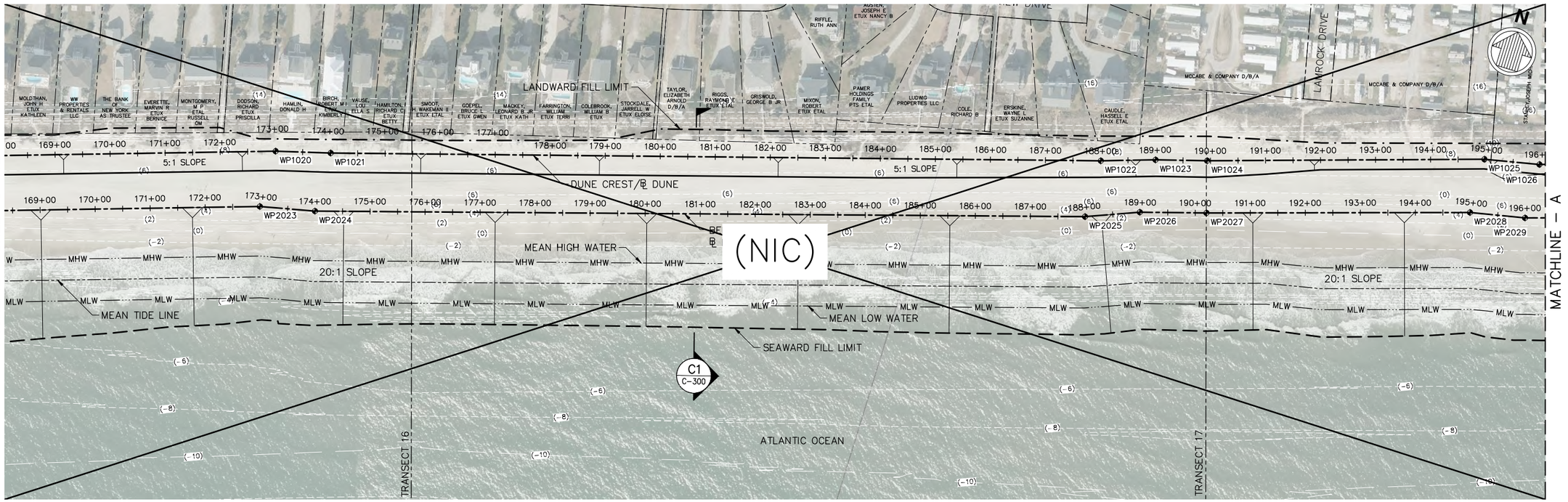
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

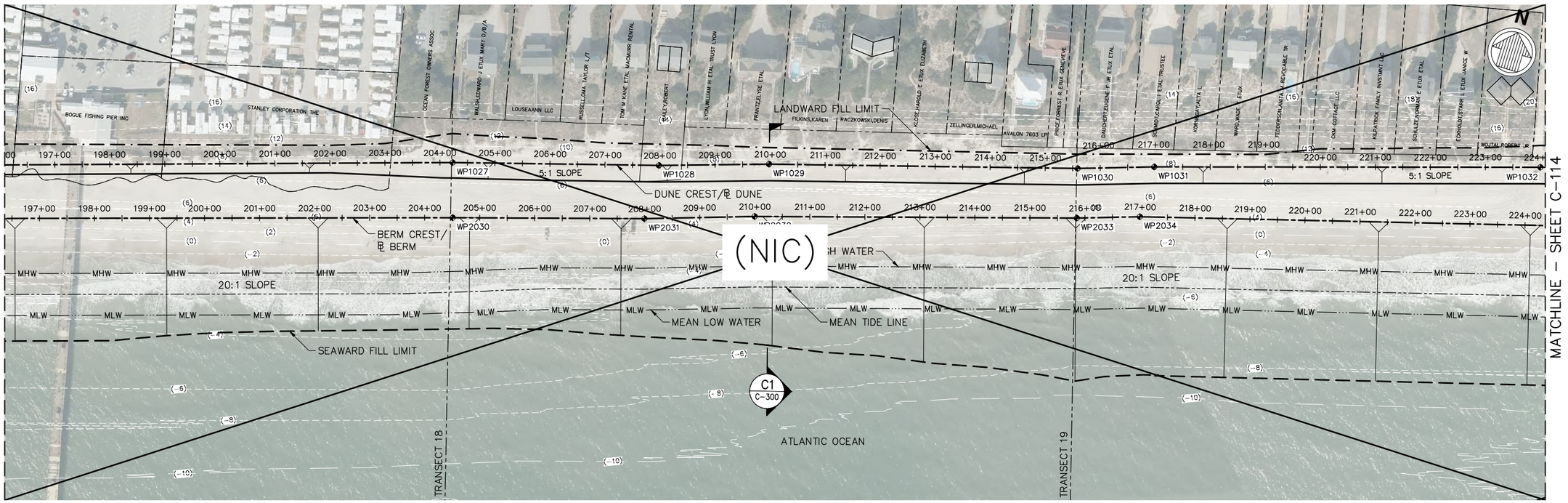
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-112
Sheet 11 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000–112; Plotted: 2/14/2020 10:26 AM by FORD, BRIAN; Saved: 2/14/2020 10:22 AM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 4 OF 20

Rev.	Date: AUGUST 2019	Designed by: NCV	Dwn by: BDF	Chkd by: SRM	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	M&N Project No. 10611	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

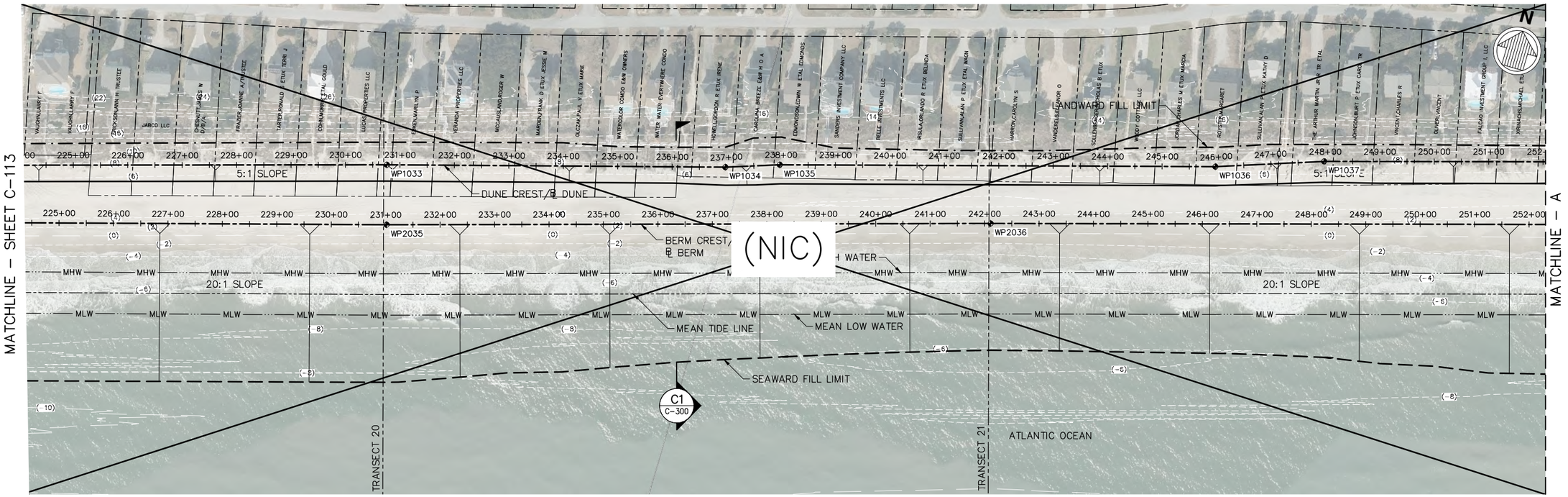
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

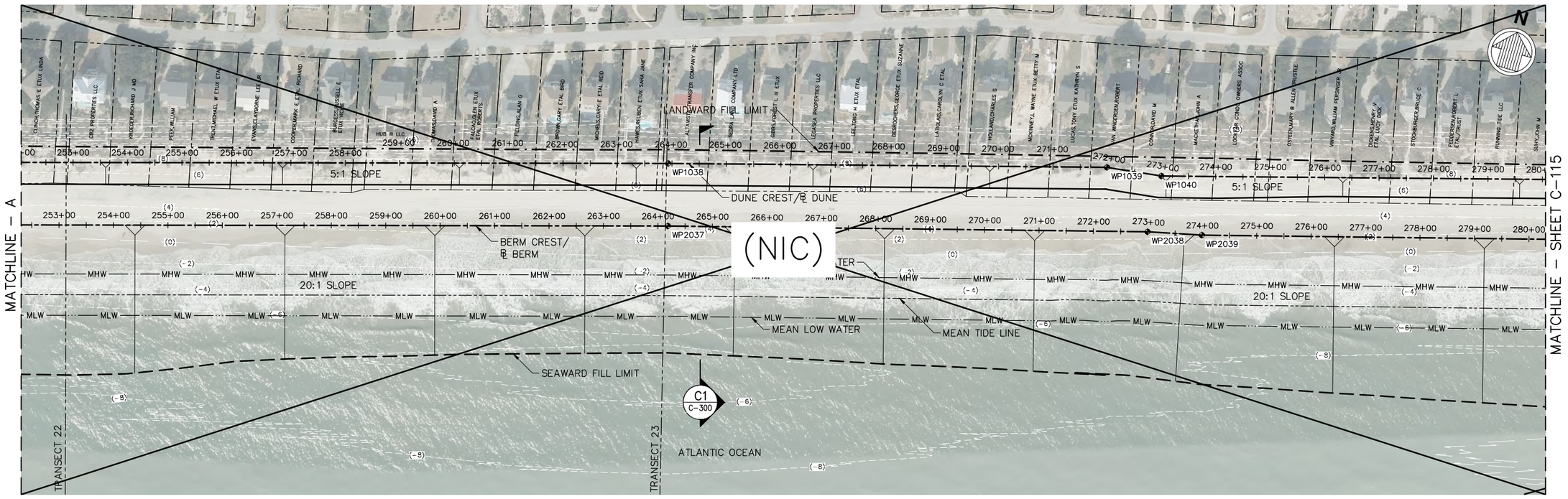
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-113
Sheet 12 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2022\10611002C-113; Plotted: 2/14/2020 10-27 AM by FORD, BRIAN; Saved: 8/16/2019 5:46 PM by: BFORD





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 5 OF 20

Rev.			
Date:	AUGUST 2019	M&N Project No.	10611
Designed by:	NCV	Drawn by:	BDF
Checked by:	SRM	Drawing code:	
Reviewed by:	JDM	Drawing Scale:	
Submitted by:	MOFFATT & NICHOL	Plot scale: 1:1 (0 SHEET)	

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

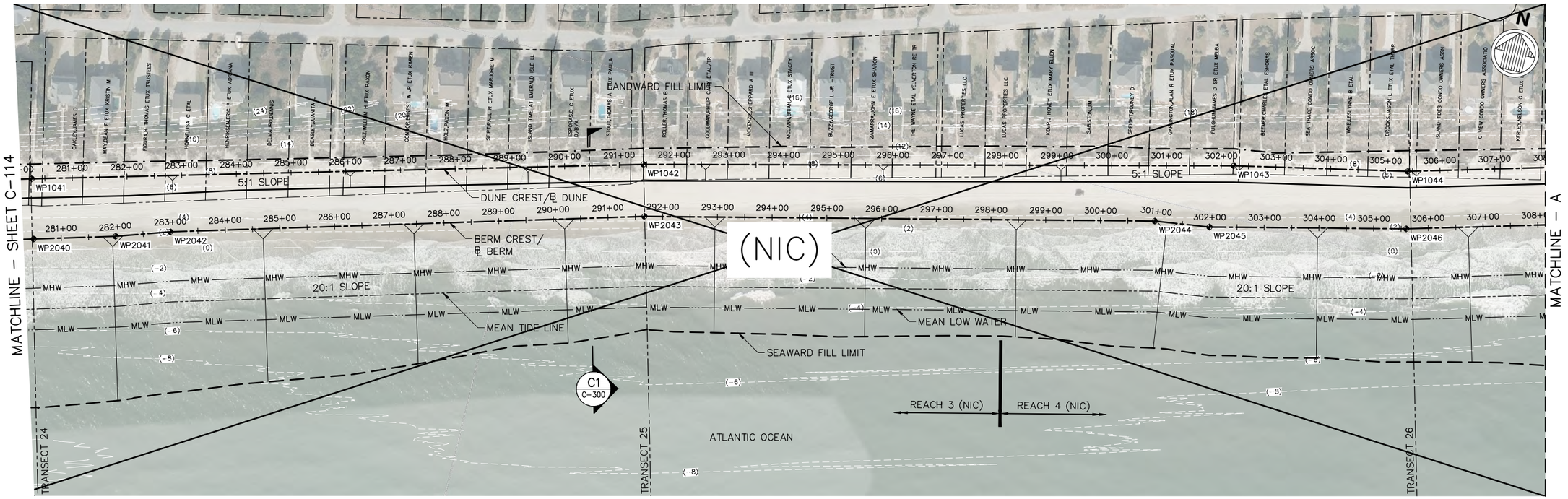
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

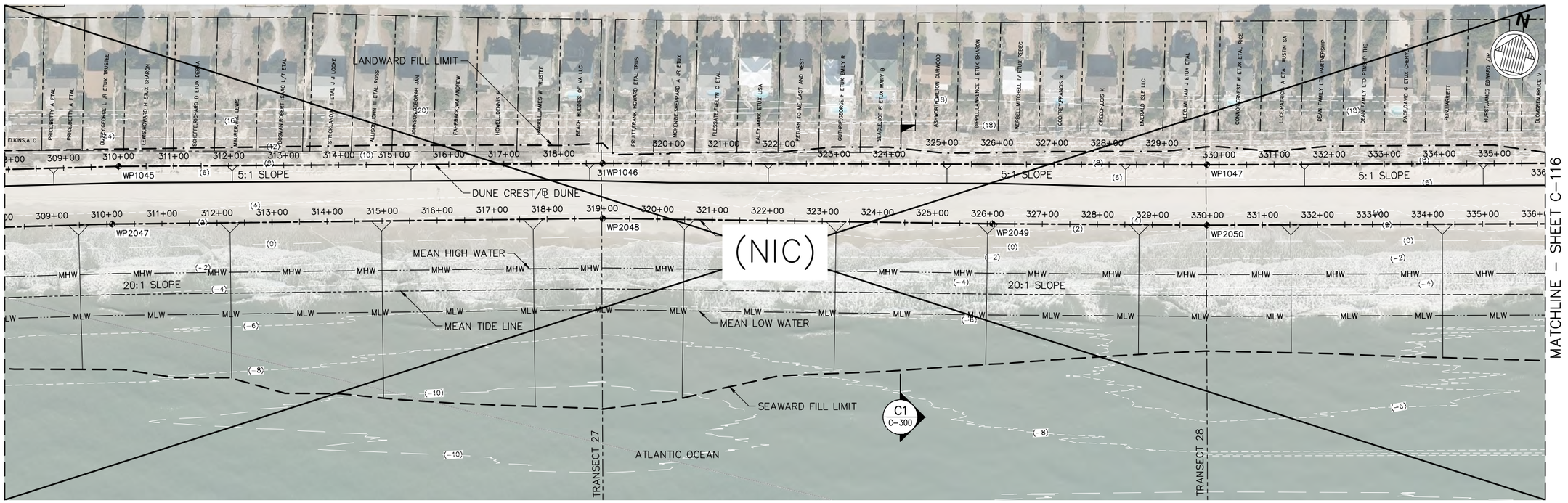
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-114
Sheet 13 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00C–114; Plotted: 2/14/2020 10:27 AM by FORD, BRIAN; Saved: 8/16/2019 5:45 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2 CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 6 OF 20

Rev.	
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Designed by:	NCV
Dwn by:	BDF
Ckd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

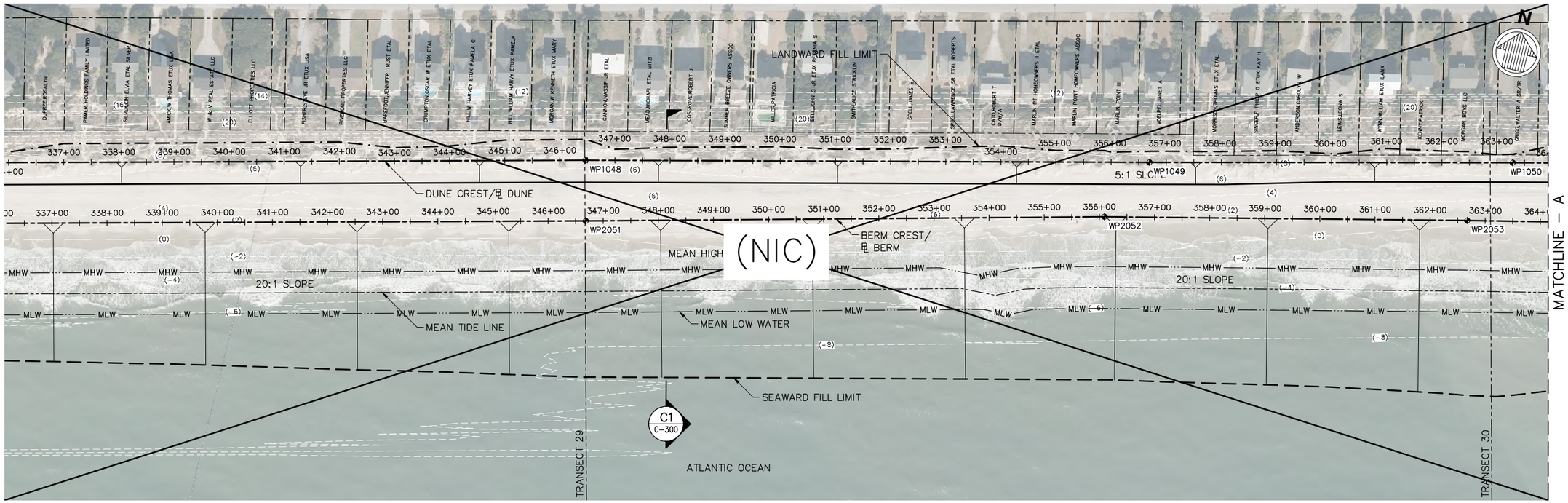
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

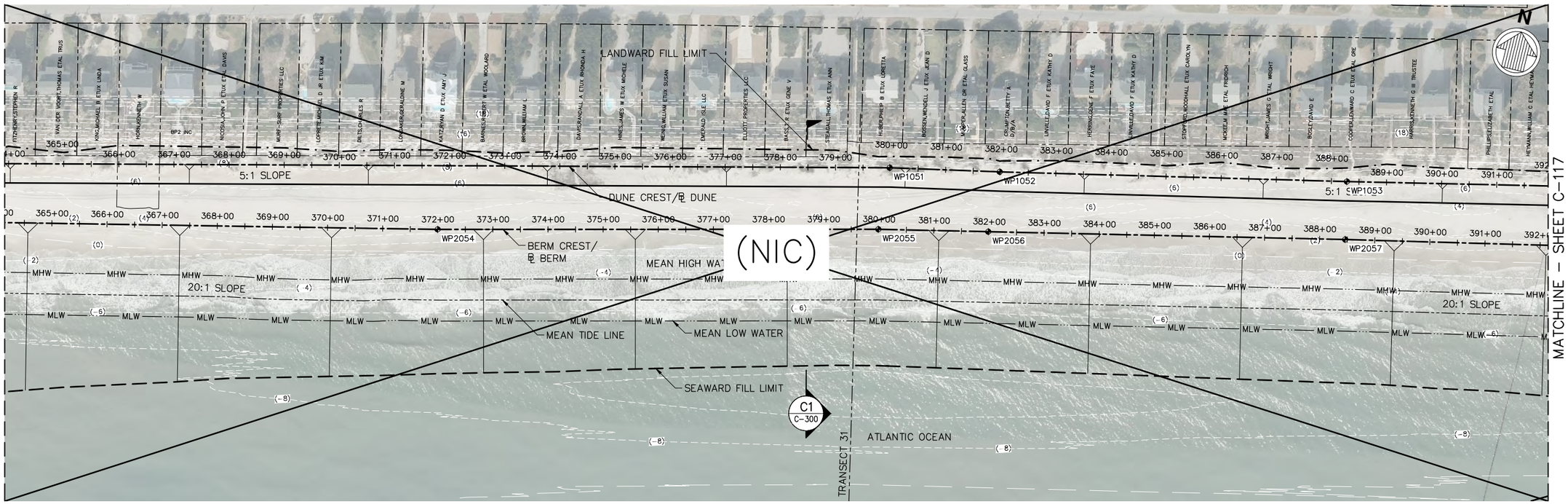
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-115
Sheet 14 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2022\10611C00C–115; Plotted: 2/14/2020 10:27 AM by FORD, BRIAN; Saved: 8/16/2019 5:45 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 7 OF 20

Rev.	
Date:	AUGUST 2019
Designed by:	NCV
Dwn by:	BDF
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
M&N Project No.	10611
Cad by:	SRM
Drawing code:	
Drawing Scale:	
Plot scale: 1:1 (0 SHEET)	

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

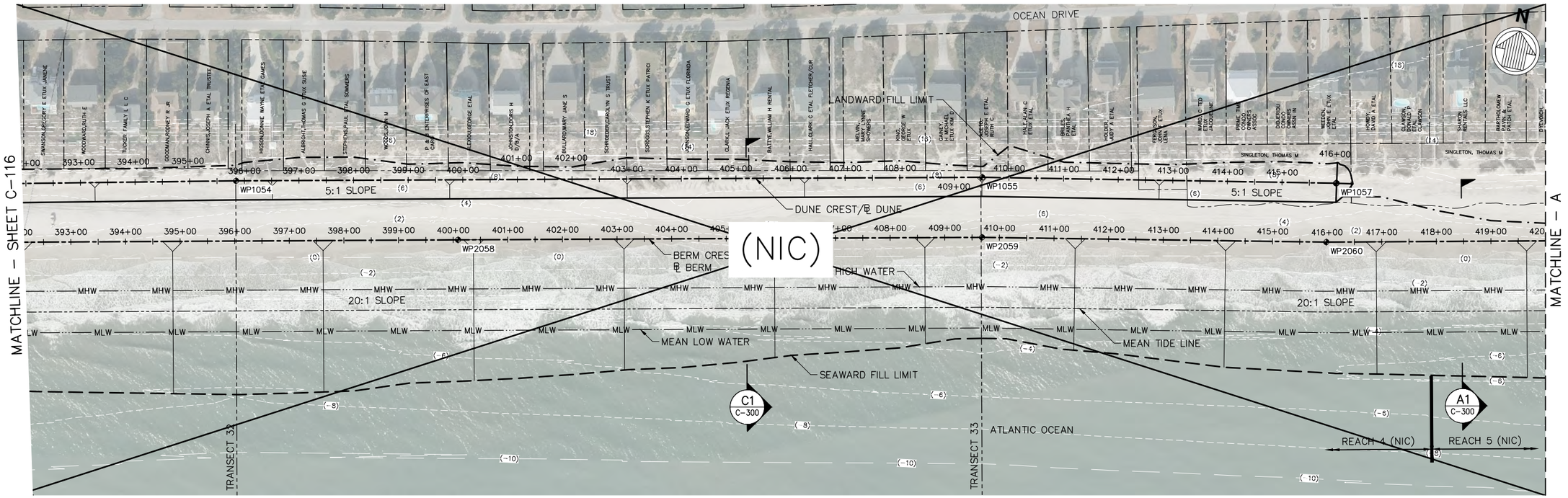
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-116
Sheet 15 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2022\10611C00C–116; Plotted: 2/14/2020 10:28 AM by FORD, BRIAN; Saved: 8/16/2019 5:45 PM by: BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 8 OF 20

Rev.	
Date:	AUGUST 2019
Designed by:	NCV
Dwn by:	BDF
Chd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)

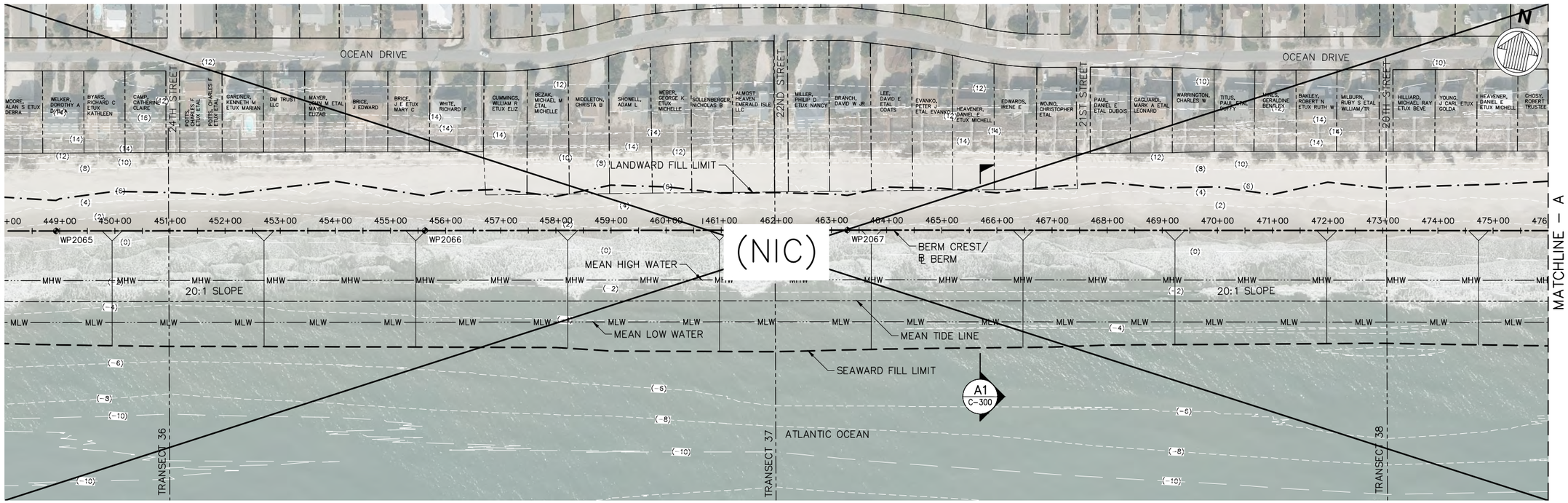
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

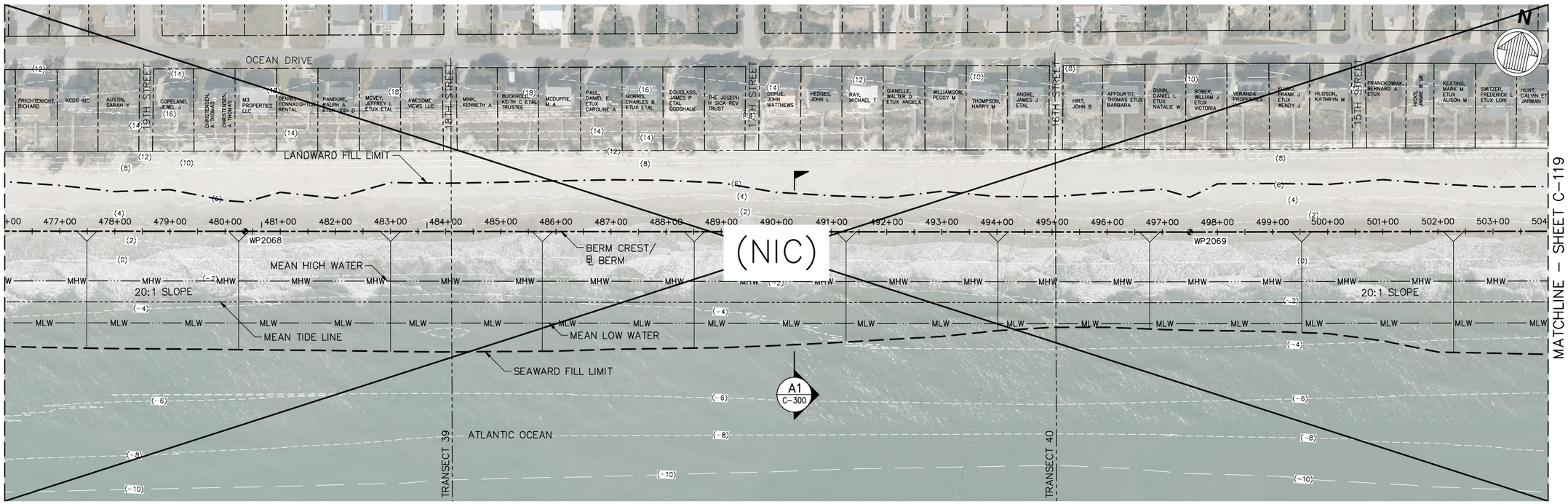
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-117
Sheet 16 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00C–117; Plotted: 2/14/2020 10:28 AM by FORD, BRIAN; Saved: 8/16/2019 5:44 PM by BFORD





NOTES:
1. SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C-301 THRU C-335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 9 OF 20

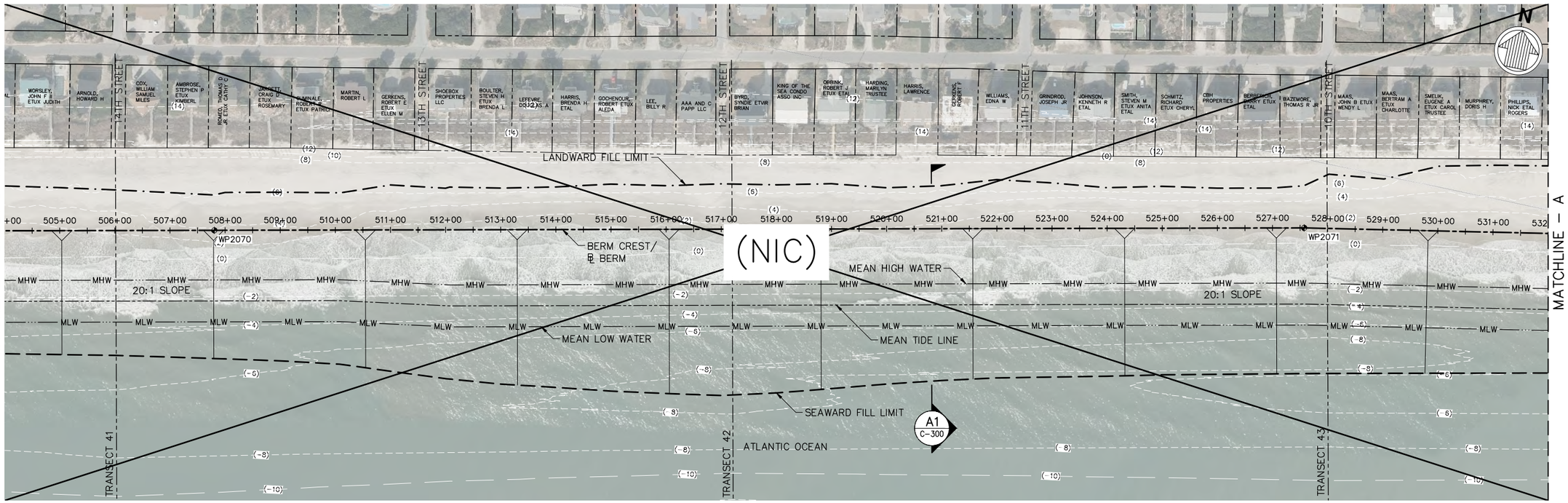
Rev.		
Date:	AUGUST 2019	
Designed by:	NCV	
Dwn by:	BDF	
Reviewed by:	JDM	
Submitted by:	MOFFATT & NICHOL	
M&N Project No.	10611	
Drawing code:		
Drawing Scale:	Plot scale: 1:1 (0 SHEET)	

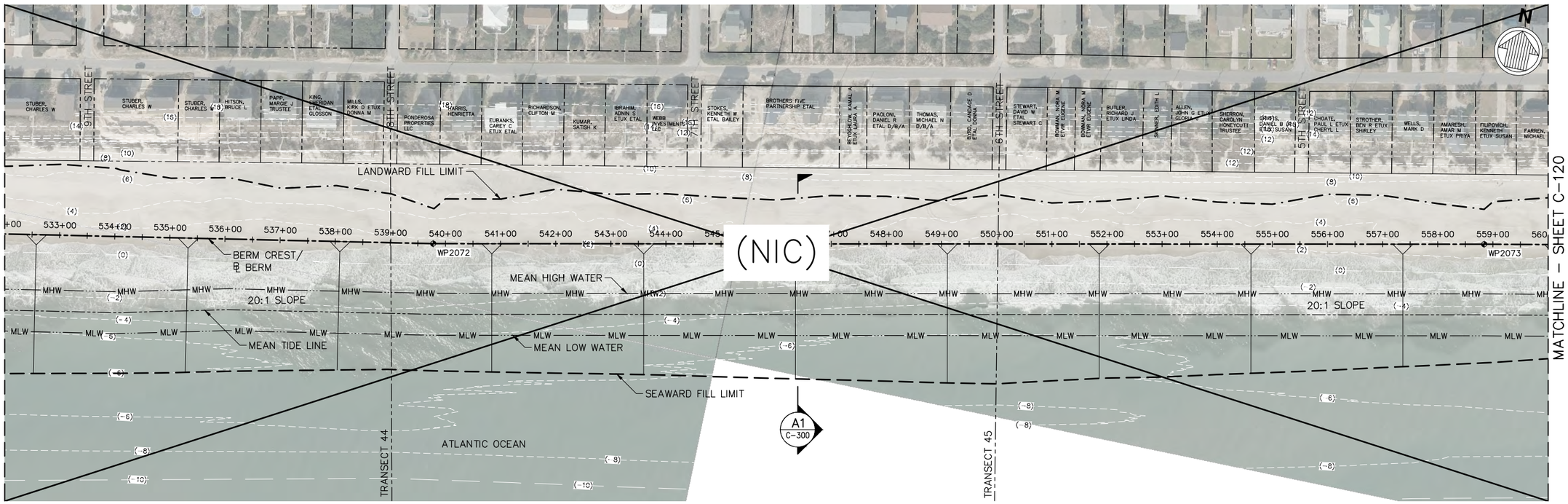
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-118
Sheet 17 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-118; Plotted: 2/14/2020 10:28 AM by FORD, BRIAN; Saved: 8/16/2019 5:43 PM by: BFORD





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 10 OF 20

Rev.	Date: AUGUST 2019	Designed by: NCV	Dwn by: BDF	Chd by: SRM	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)
							M&N Project No. 10611	

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

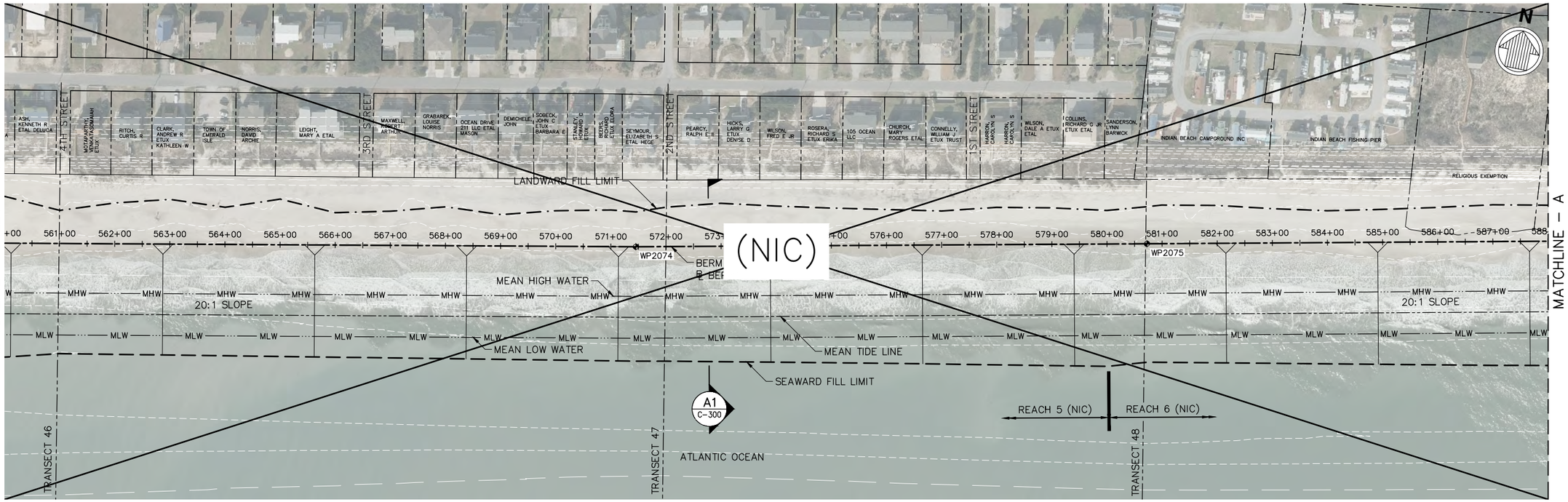
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

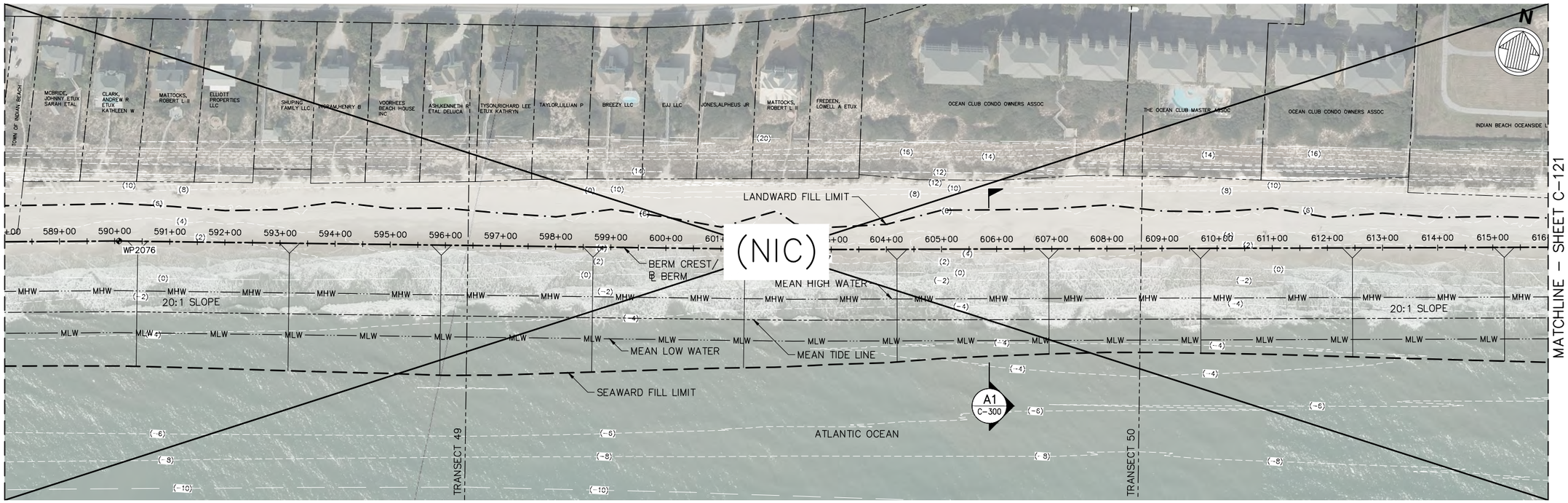
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-119
Sheet 18 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2022\10611000-119; Plotted: 2/14/2020 10:29 AM by FORD, BRIAN; Saved: 8/16/2019 5:43 PM by: BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 11 OF 20

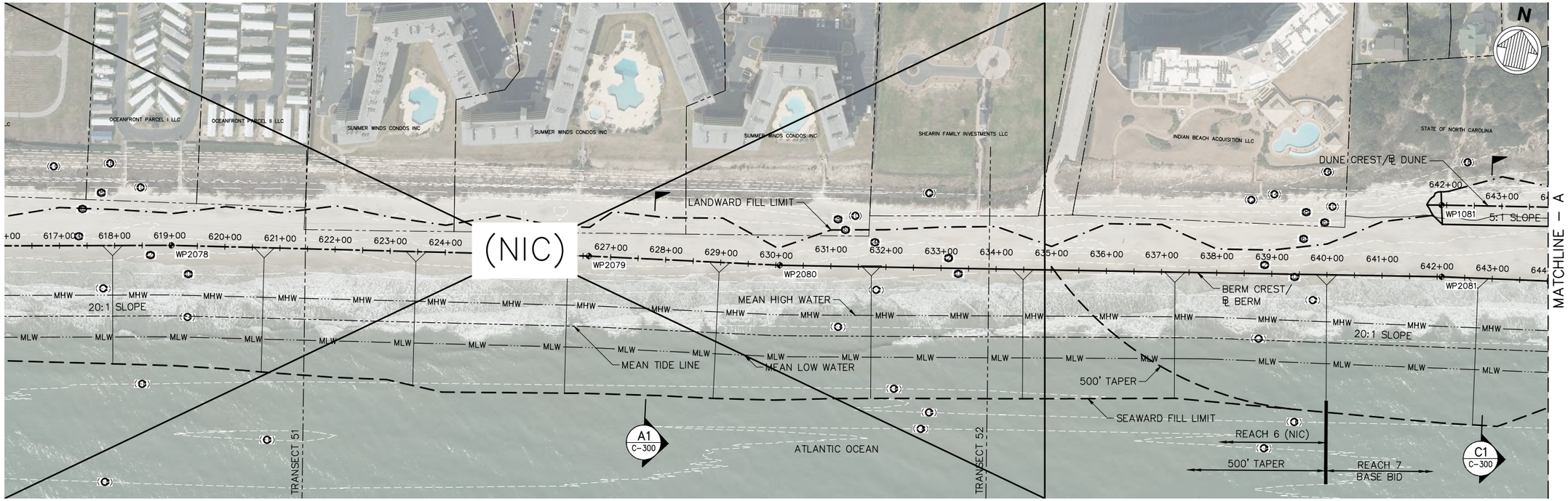
Designed by:	Date:	Rev.
NCV	AUGUST 2019	
Dwn by: BDF	Ckd by: SRM	M&N Project No. 10611
Reviewed by: JDM	Drawing code:	
Submitted by: MOFFATT & NICHOL	Drawing Scale: Plot scale: 1:1 (0 SHEET)	

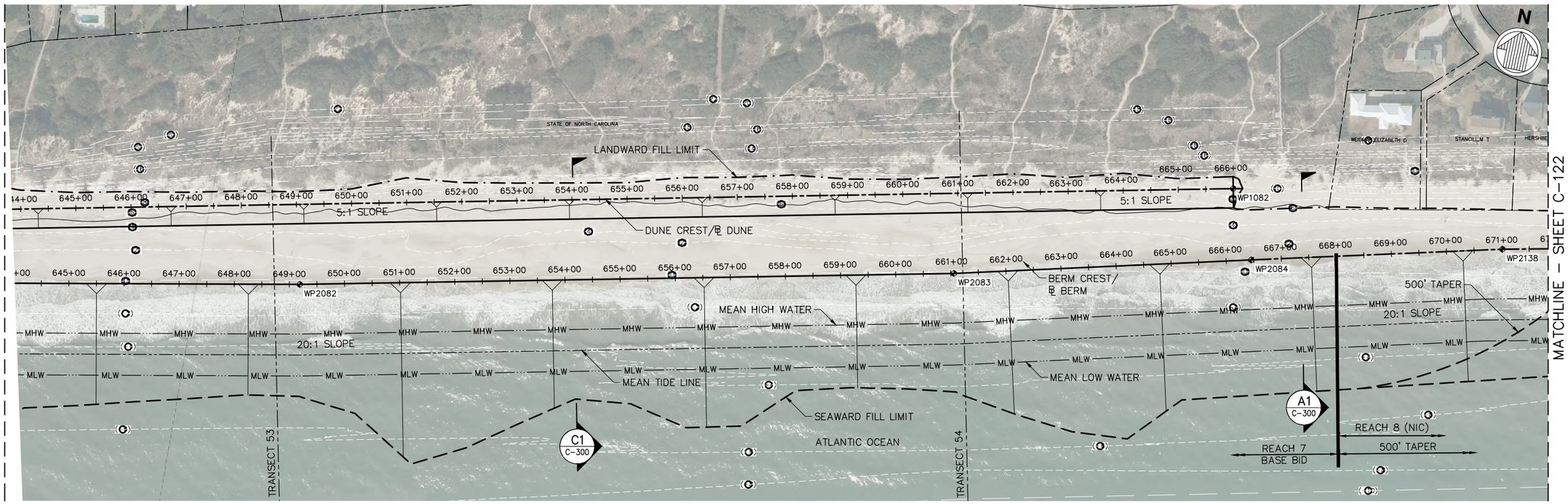
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-120
Sheet 19 of 66

File: c:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00-120; Plotted: 2/14/2020 10:29 AM by FORD, BRIAN; Saved: 8/16/2019 5:42 PM by BFORD





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
1	PRE–CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 12 OF 20

Rev.	1
Date:	JANUARY 2020
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Designed by:	NCV
Dwn by:	BDF
Chd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

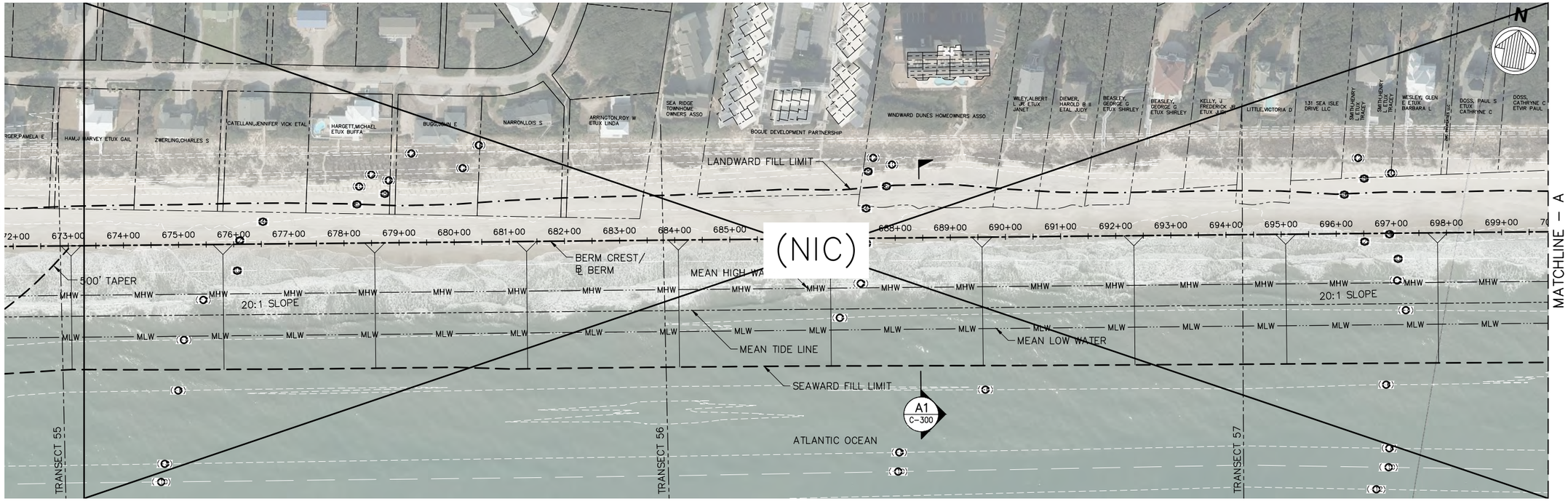
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

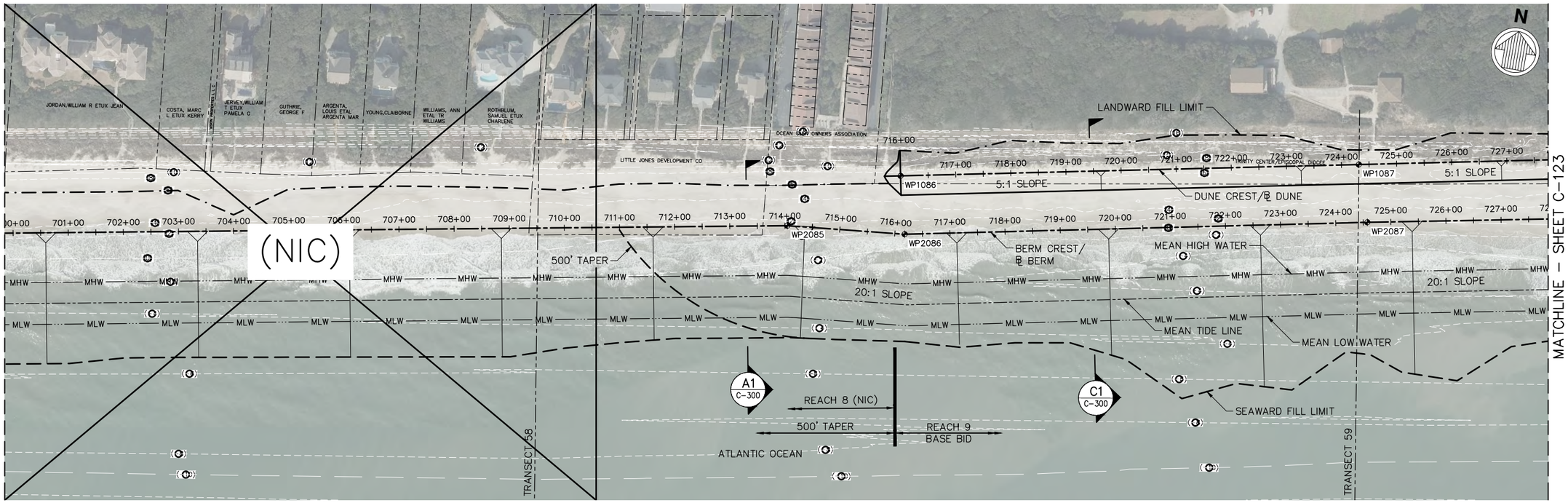
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-121
Sheet 20 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00C–121; Plotted: 2/14/2020 10:29 AM by FORD, BRIAN; Saved: 2/14/2020 10:20 AM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
1	PRE–CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 13 OF 20

Rev. 1
Date: JANUARY 2020
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (0 SHEET)
Designed by: NCV
Cad by: SRM
Dwn by: BDF
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

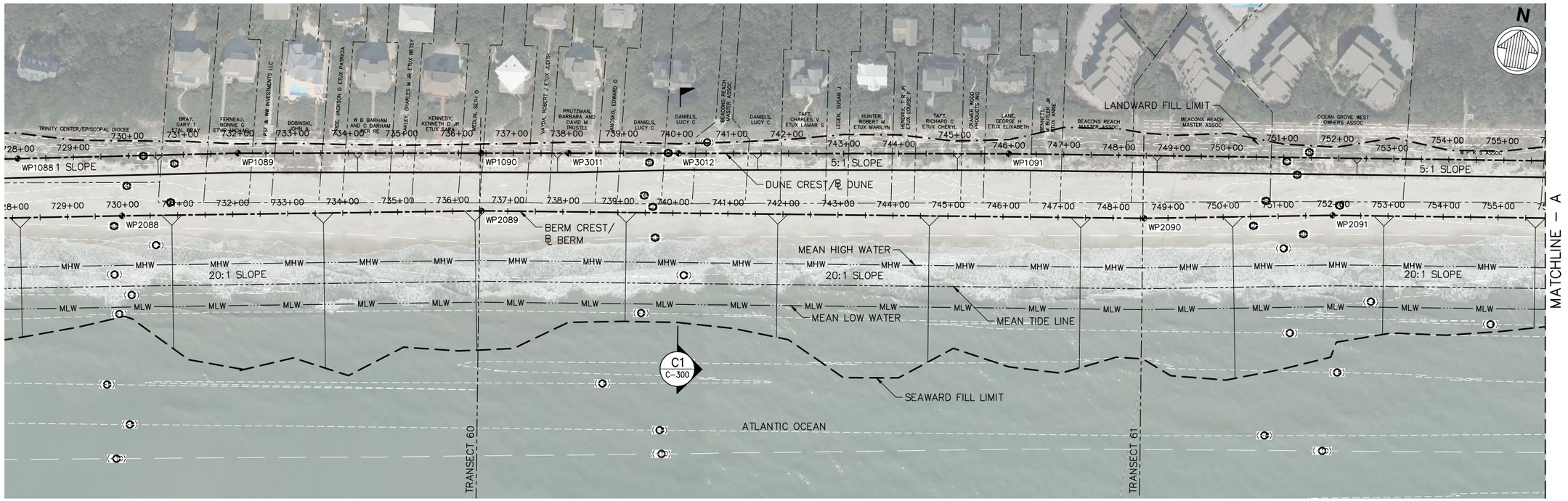
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

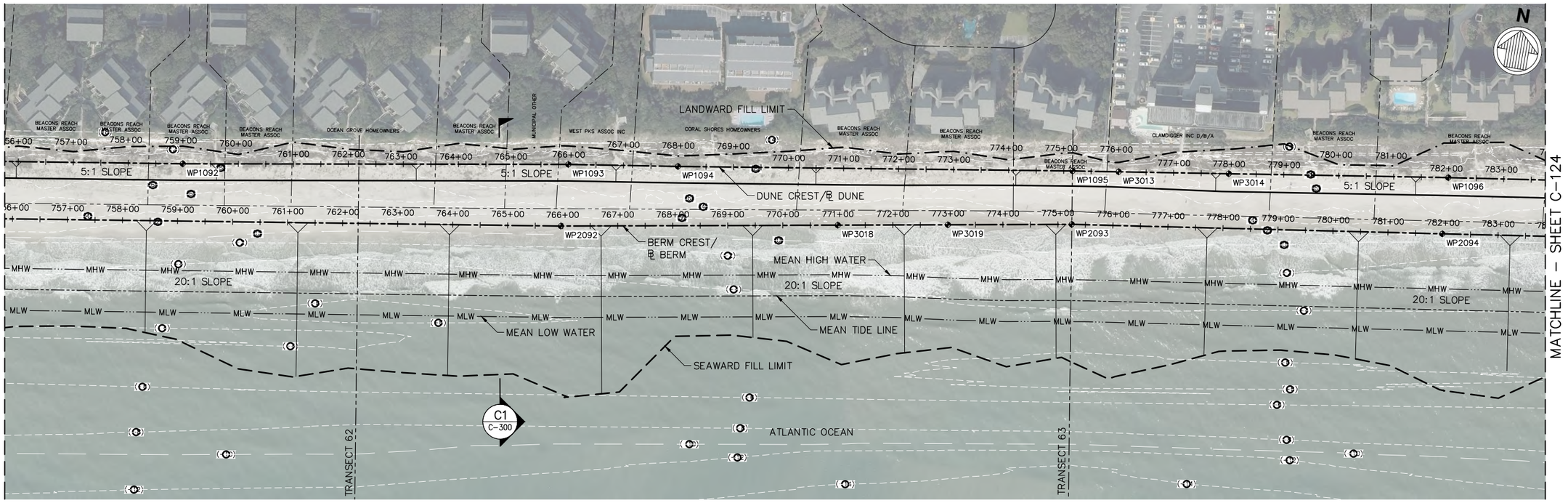
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-122
Sheet 21 of 66

File: c:\RA1\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611D0C–122; Plotted: 2/14/2020 10:30 AM by FORD, BRIAN; Saved: 2/14/2020 10:19 AM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
1	PRE–CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 14 OF 20

Rev.	1
Date:	JANUARY 2020
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Designed by:	NCV
Dwn by:	BDF
Chd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL

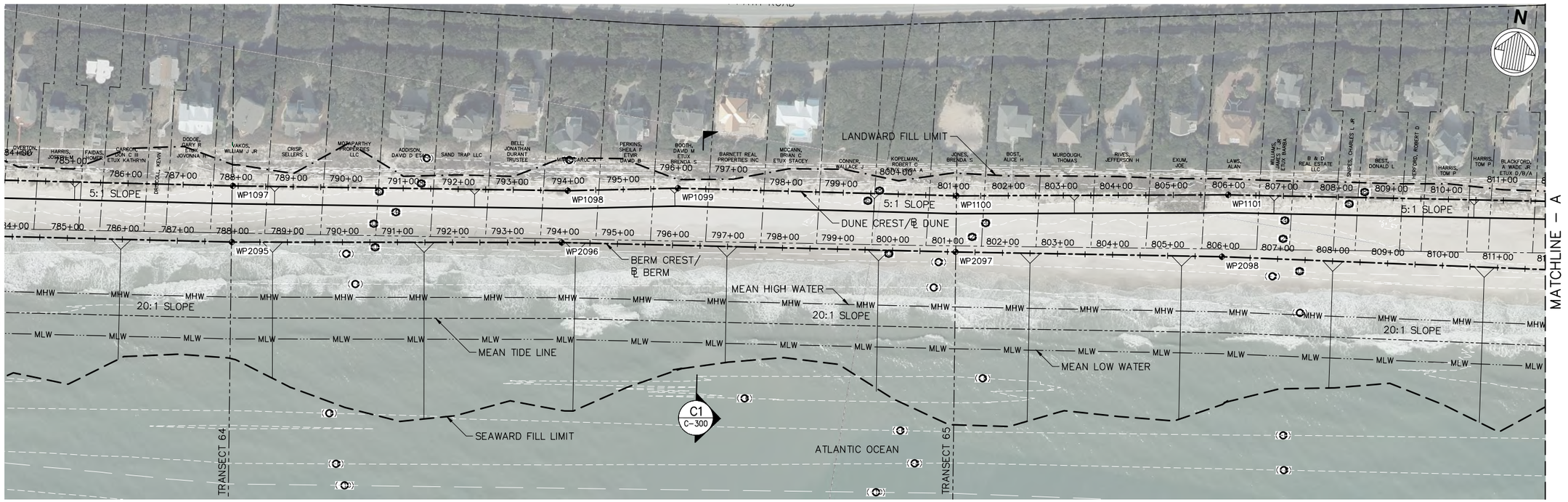
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

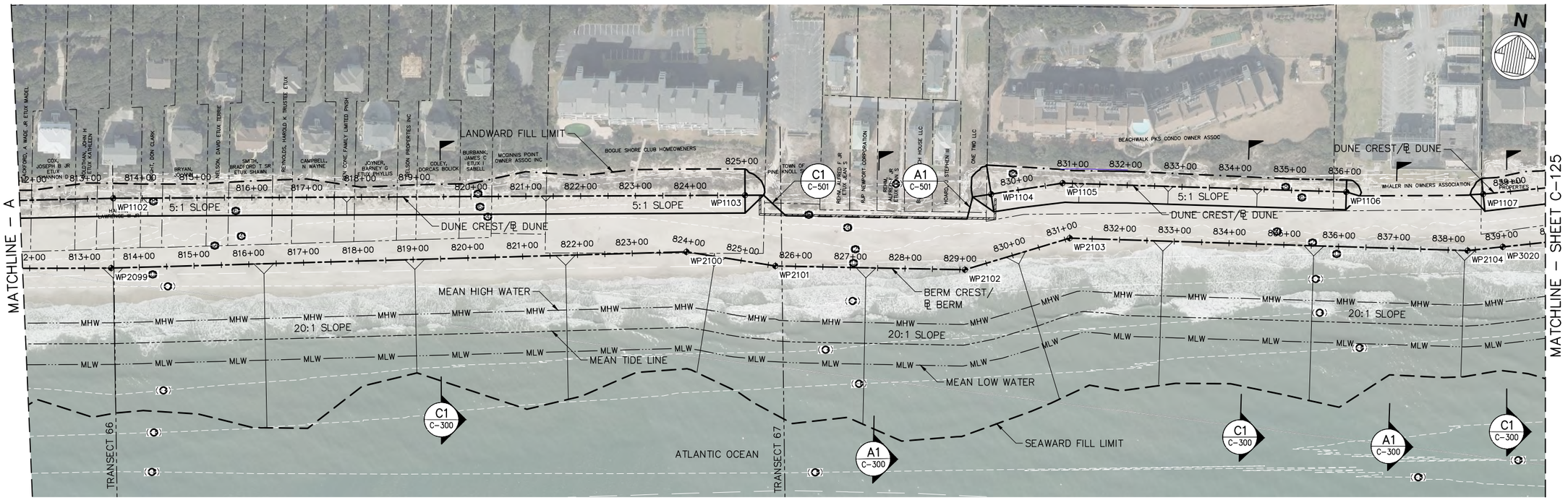
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-123
Sheet 22 of 66

File: c:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00-123; Plotted: 2/14/2020 10:30 AM by FORD, BRIAN; Saved: 2/14/2020 10:18 AM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
1	PRE–CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 15 OF 20

Rev.	1
Date:	JANUARY 2020
Designed by:	NCV
Dwn by:	BDF
Reviewed by:	JDM
Submitted by:	
M&N Project No.	10611
Chd by:	SRM
Drawing code:	
Drawing Scale:	
Plot scale: 1:1 (0 SHEET)	

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

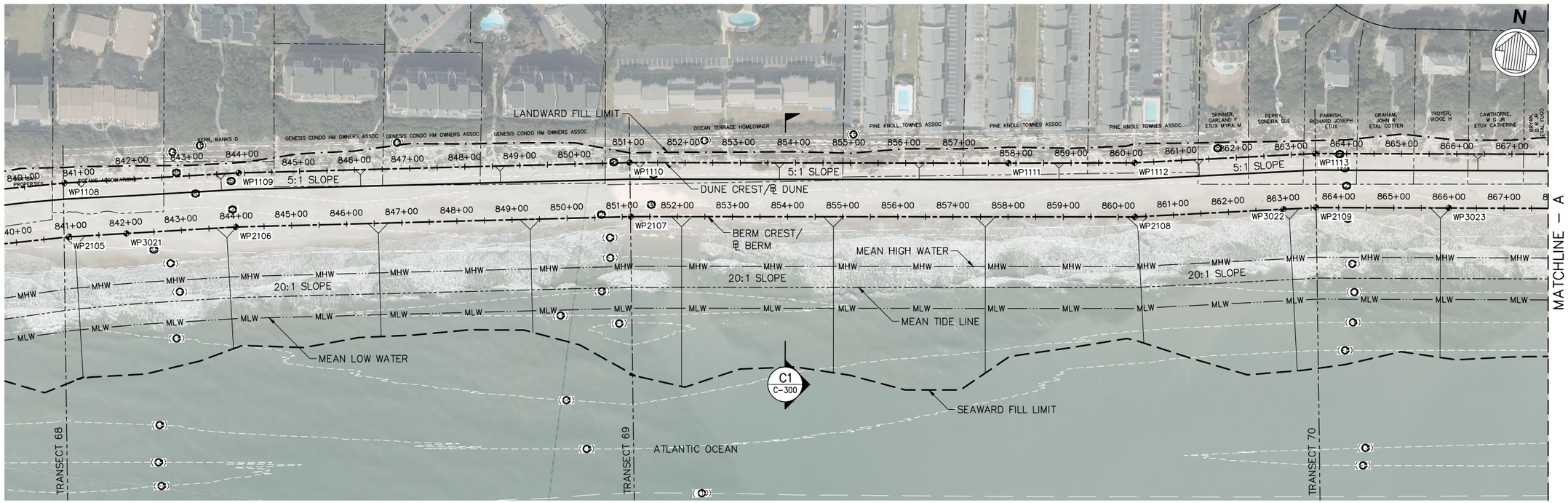
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

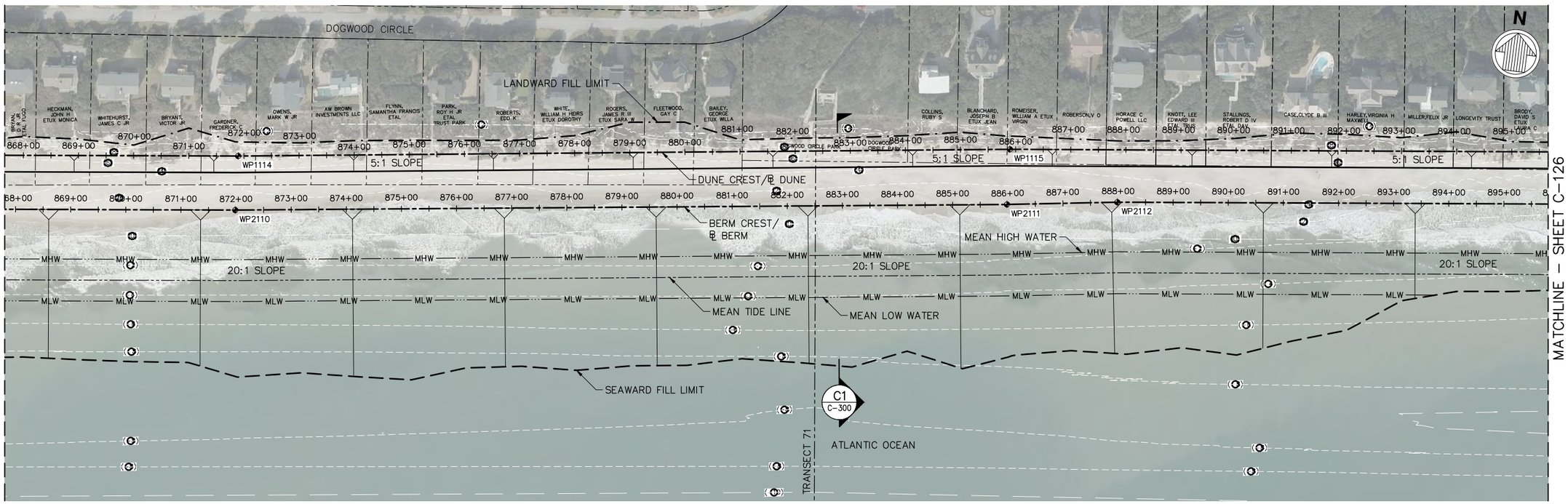
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-124
Sheet 23 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000–124; Plotted: 2/14/2020 10:31 AM by FORD, BRIAN; Saved: 2/14/2020 10:17 AM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C-301 THRU C-335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

No.	Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION		02/14/20	JM
0	BID DOCUMENTS		08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 16 OF 20

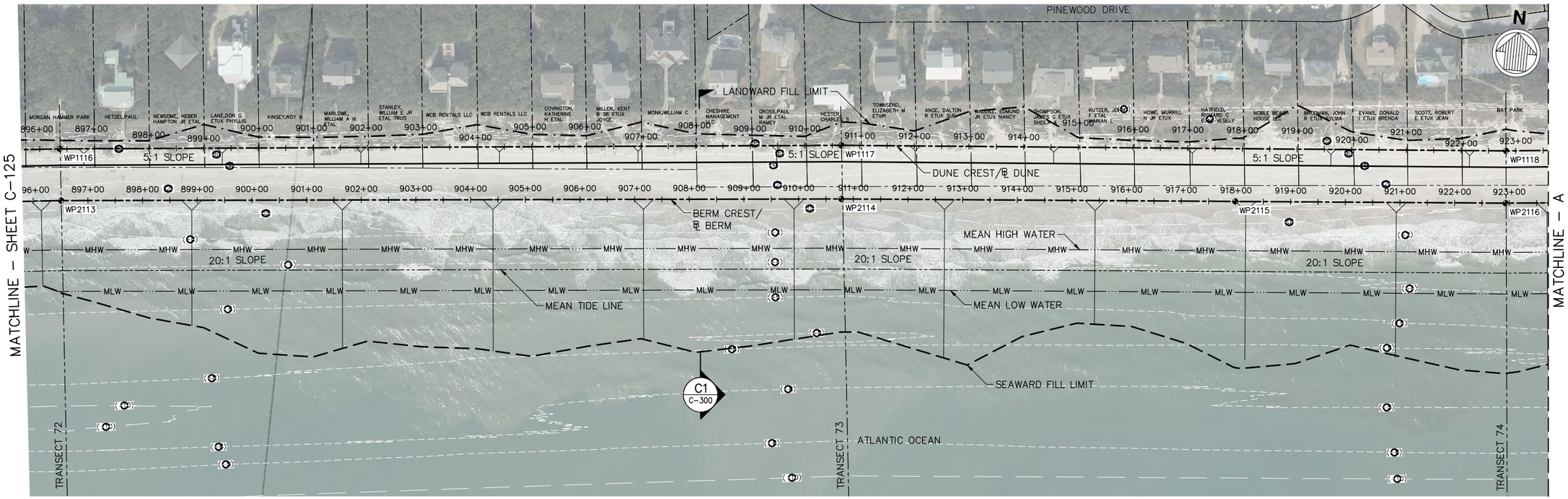
Rev.	1
Date:	JANUARY 2020
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Designed by:	NCV
Dwn by:	BDF
Chd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL

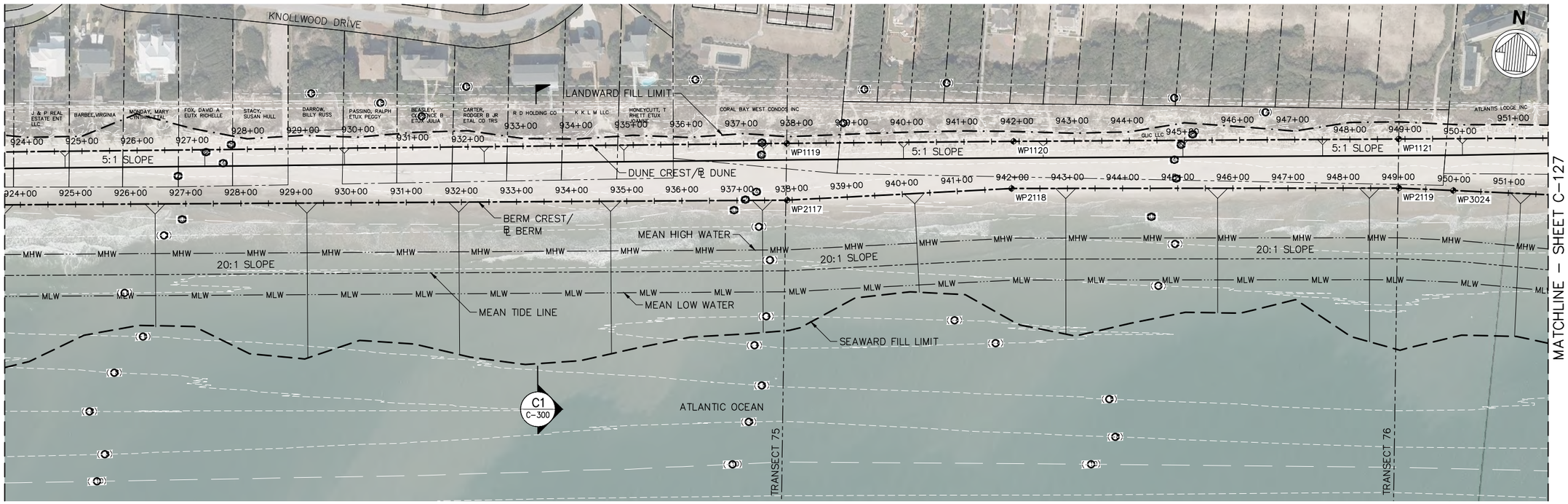
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-125
Sheet 24 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2022\10611002C-125; Plotted: 2/14/2020 10:31 AM by FORD, BRIAN; Saved: 2/14/2020 10:16 AM by BFORD





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
1	PRE–CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 17 OF 20

Rev.	1
Date:	JANUARY 2020
M&N Project No.	10611
Drawing code:	
Designed by:	NCV
Dwn by:	BDF
Chd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Drawing Scale:	Plot scale: 1:1 (0 SHEET)

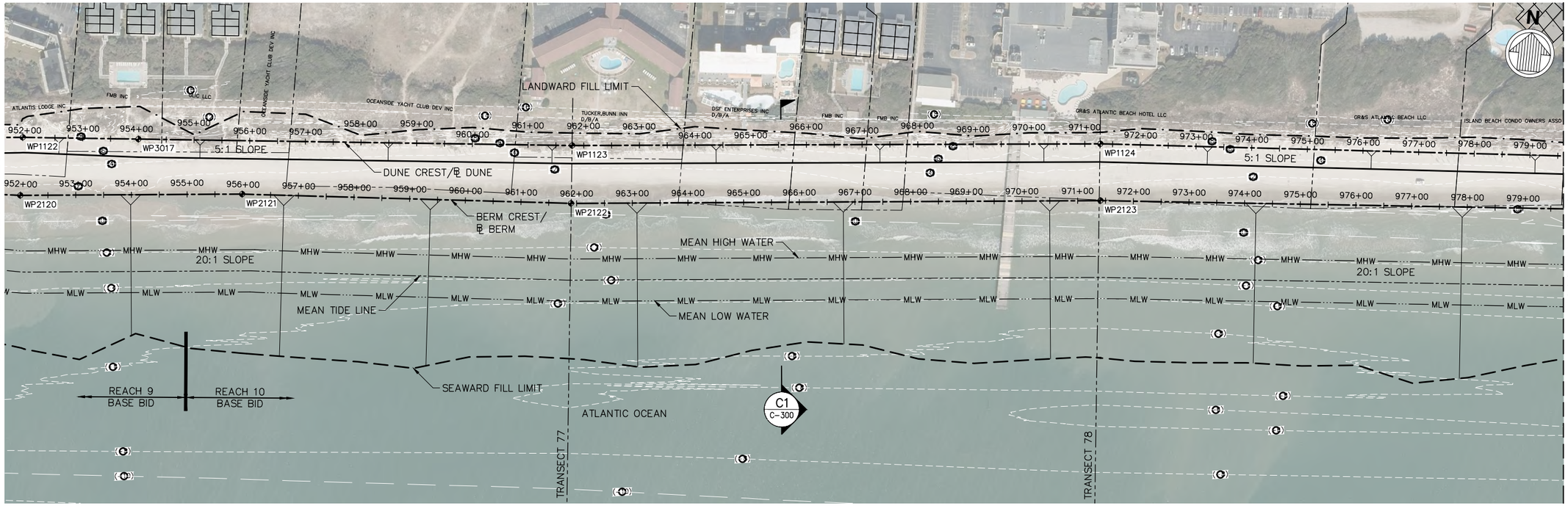
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919–781–4626
moffatt & nichol NC FIRM LICENSE No. F–0105
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

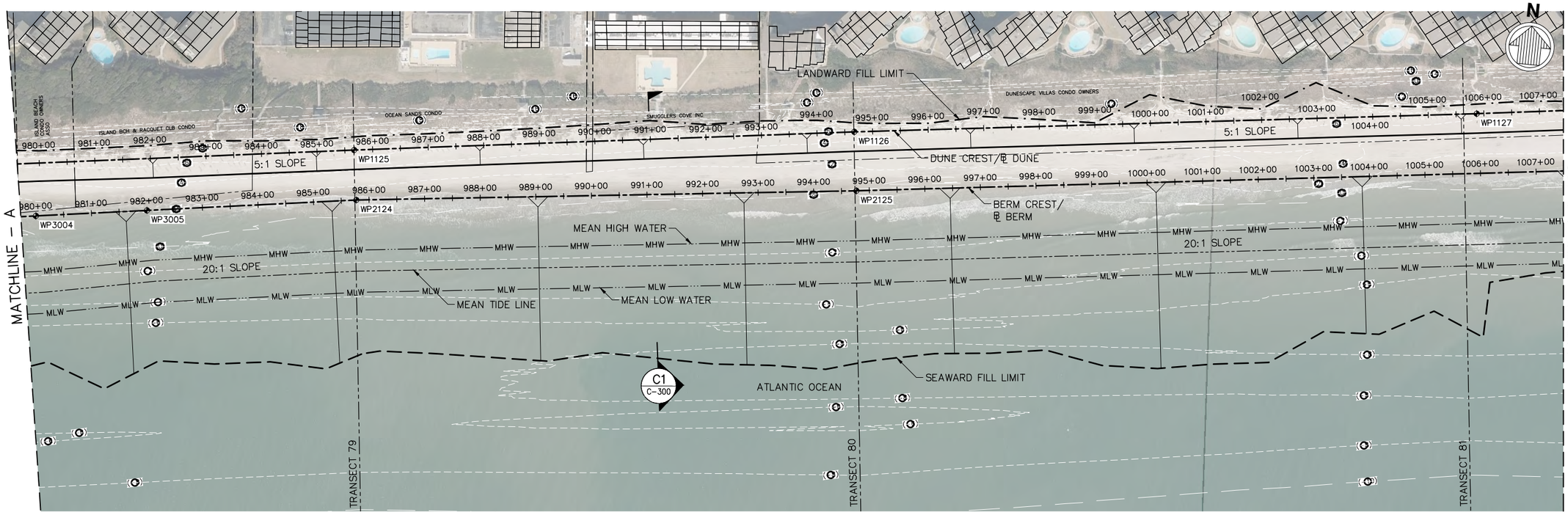
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-126
Sheet 25 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00-126; Plotted: 2/14/2020 10:31 AM by FORD, BRIAN; Saved: 2/14/2020 10:13 AM by FORD, BRIAN

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
1	PRE–CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 18 OF 20

Rev. 1
Date: JANUARY 2020
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (0 SHEET)
Designed by: NCV
Drawn by: BDF
Checked by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

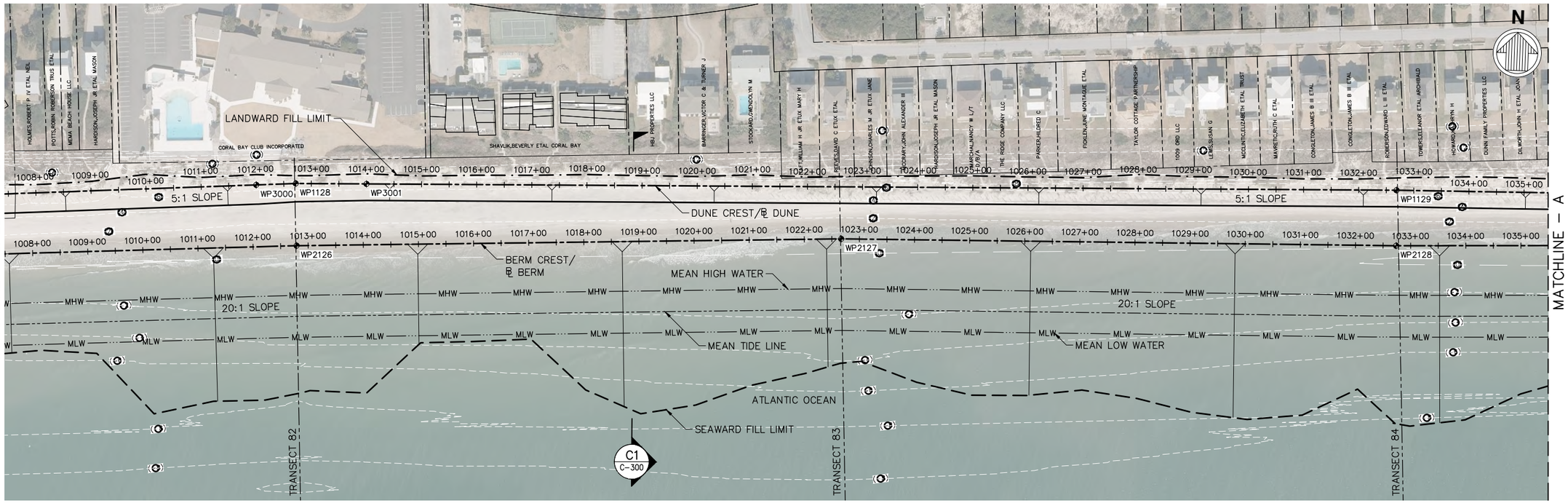
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

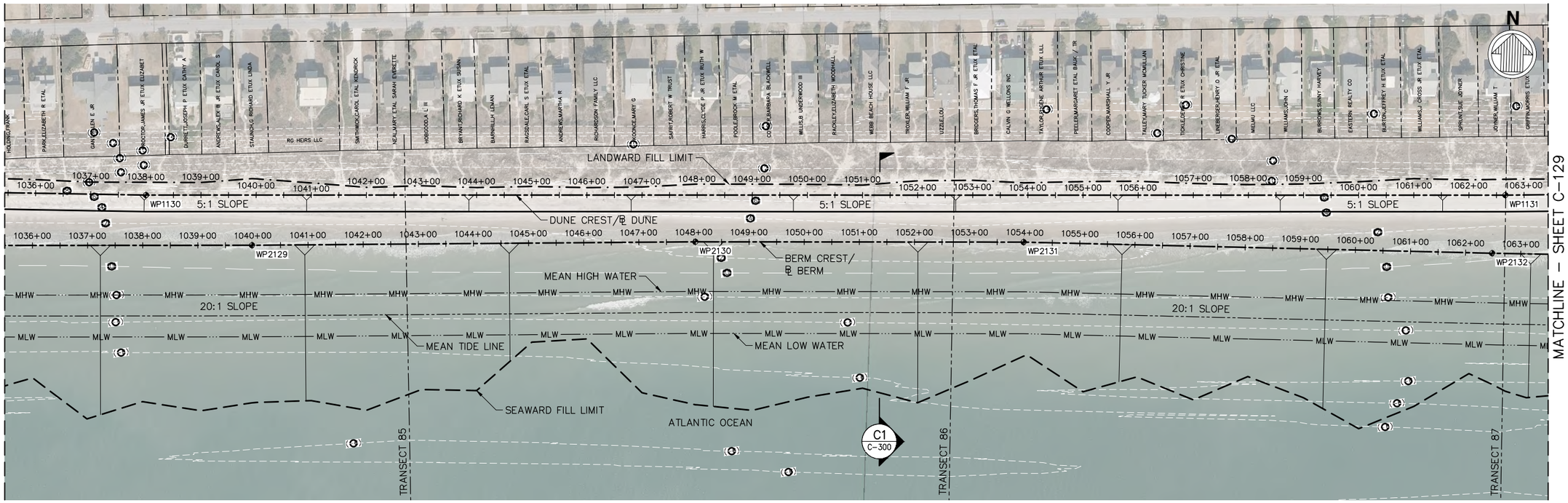
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-127
Sheet 26 of 66

File: C:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00C–127; Plotted: 2/14/2020 10:32 AM by FORD, BRIAN; Saved: 2/11/2020 5:51 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE–CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 19 OF 20

Rev.	Date:	M&N Project No.	Drawing code:	Drawing Scale:
1	JANUARY 2020	10611		Plot scale: 1:1 (0 SHEET)

Designed by:	Cad by:	Reviewed by:	Submitted by:
NCV	SRM	JDM	MOFFATT & NICHOL

Dwn by:
BDF

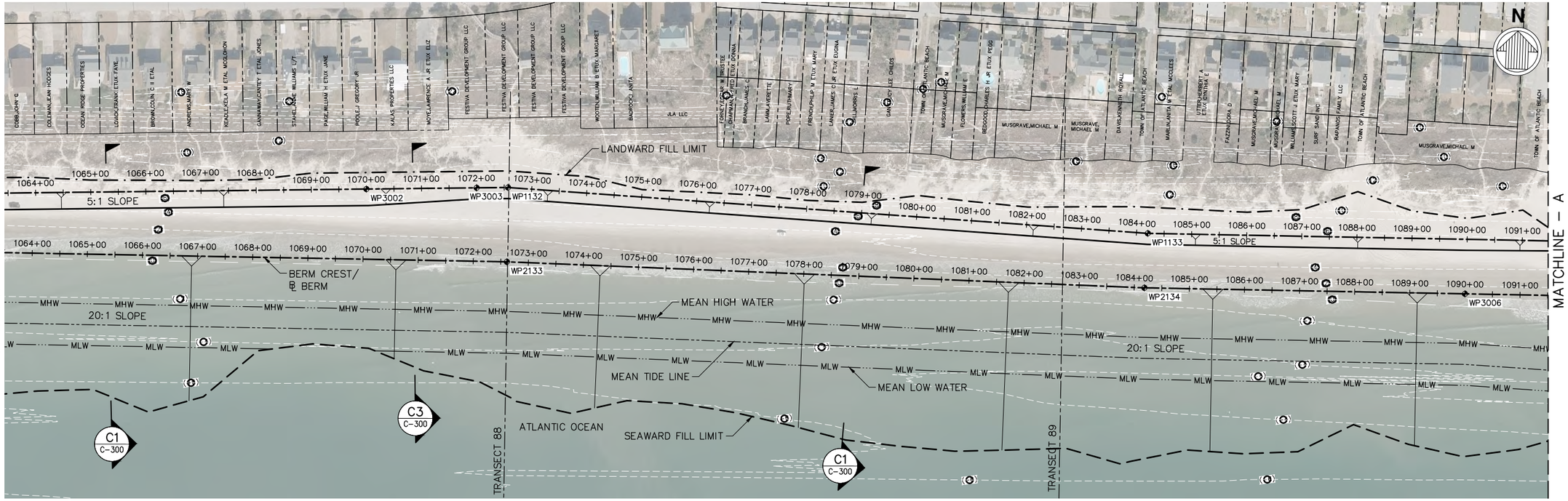
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

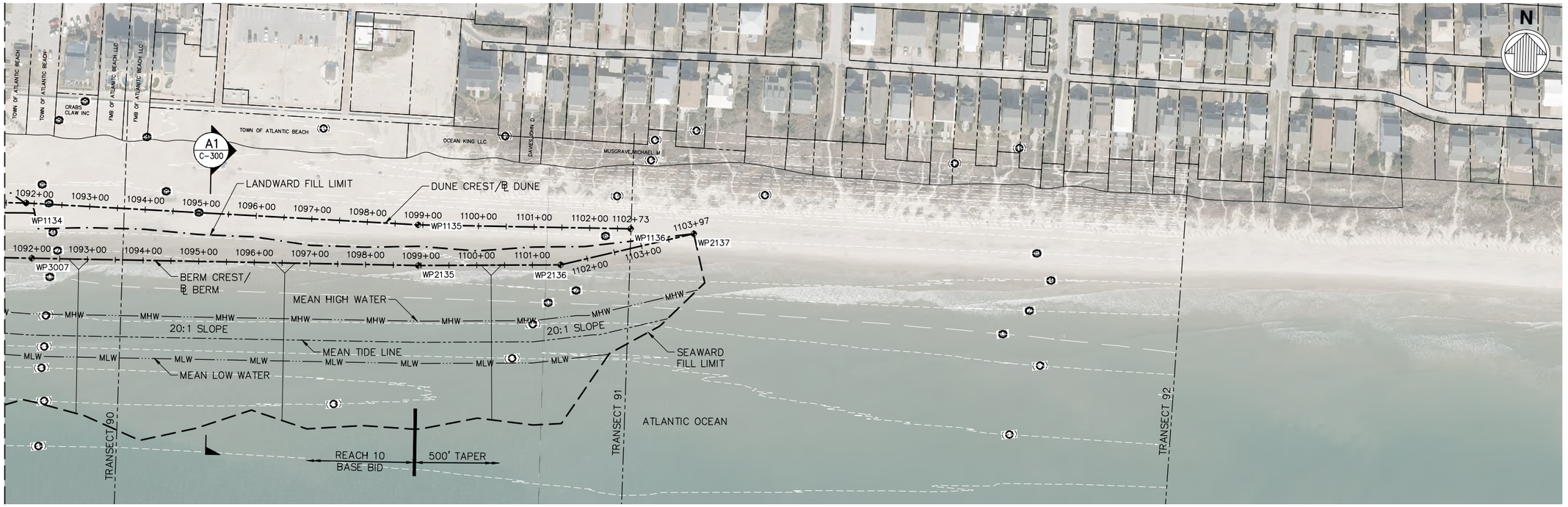
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-128
Sheet 27 of 66

File: c:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00-128; Plotted: 2/14/2020 10:32 AM by FORD, BRIAN; Saved: 2/11/2020 5:50 PM by BFORD





NOTES:
1. SEE SHEET C–601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
2. SEE SHEETS C–301 THRU C–335 FOR CROSS SECTIONS.

100' 0' 100' 200'
SCALE: 1"=100'

Mark	Description	Date	Appr.
1	PRE–CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH RENOURISHMENT PLAN - SHEET 20 OF 20

Designed by: NCV	Date: JANUARY 2020
Dwn by: BDF	Ckd by: SRM
Reviewed by: JDM	M&N Project No. 10611
Submitted by: MOFFATT & NICHOL	Drawing code:
	Drawing Scale: Plot scale: 1:1 (0 SHEET)
	Rev. 1

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

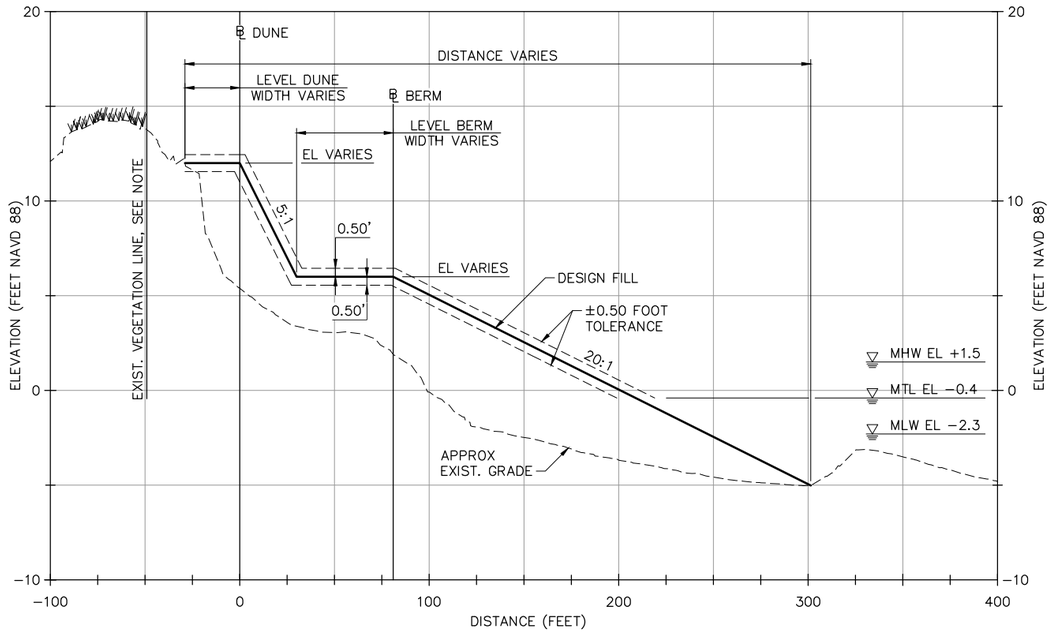
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-129
Sheet 28 of 66

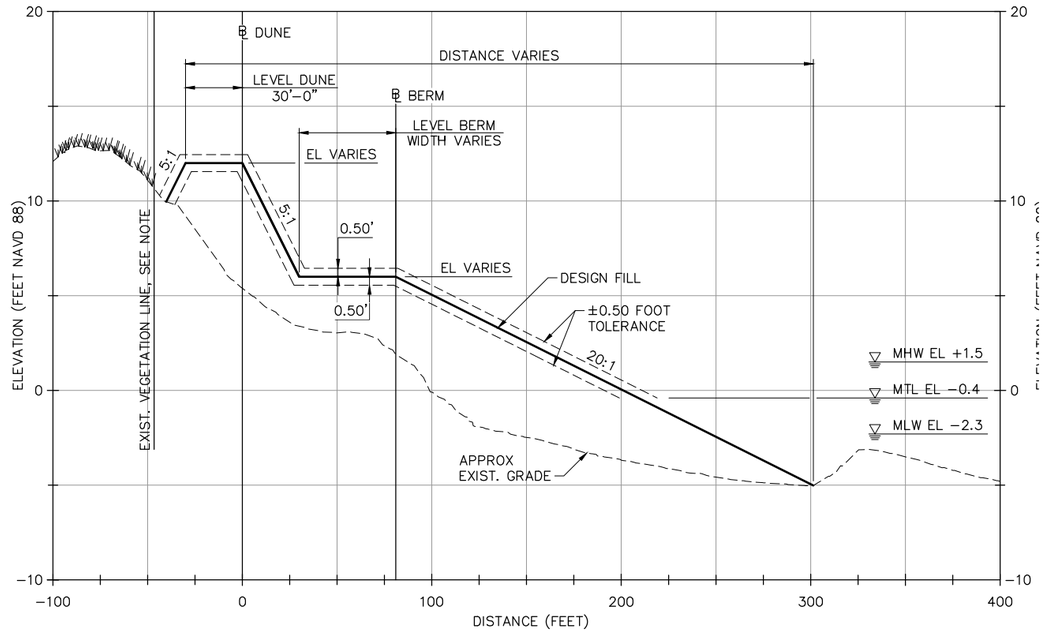
File: c:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00C–129; Plotted: 2/14/2020 10:32 AM by FORD, BRIAN; Saved: 2/11/2020 5:50 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



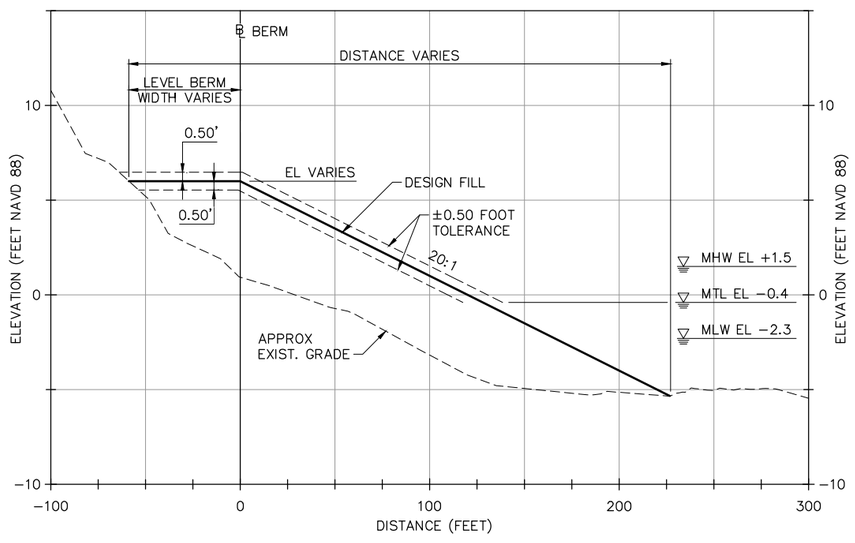
NOTE:
FIELD FIT THE LANDWARD DUNE CREST TIE IN, IF ELEVATION OF THE EXISTING VEGETATION LINE IS HIGHER THAN THE FINAL ELEVATION OF THE DUNE CREST DESIGN, THE DUNE CREST WILL BE CONSTRUCTED TO TIE IN AT THE ELEVATION OF THE CONSTRUCTED DUNE CREST. IF ELEVATION OF THE EXISTING VEGETATION LINE IS LOWER THAN THE FINAL ELEVATION OF THE DUNE CREST DESIGN, THE DUNE WILL BE CONSTRUCTED TO TIE INTO THE VEGETATION LINE WITH A 1:5 BACK SLOPE UP TO THE FINAL ELEVATION OF THE CONSTRUCTED DUNE.

C1 C-300 LEVEL DUNE BEACH NOURISHMENT FILL TOLERANCE SECTION
SCALE: 1"=40'

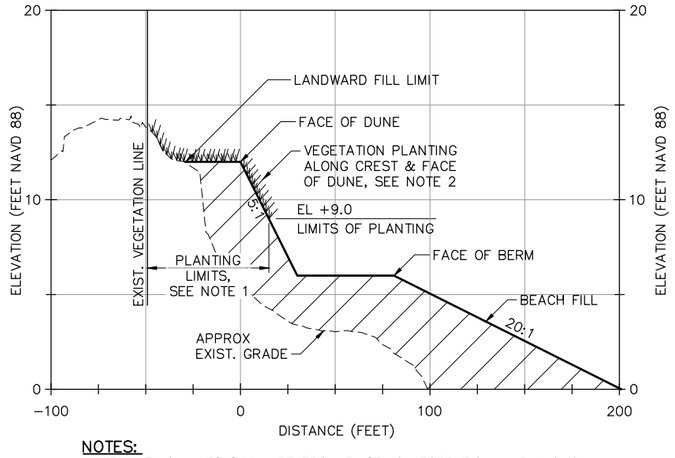


NOTE:
FIELD FIT THE LANDWARD DUNE CREST TIE IN, IF ELEVATION OF THE EXISTING VEGETATION LINE IS HIGHER THAN THE FINAL ELEVATION OF THE DUNE CREST DESIGN, THE DUNE CREST WILL BE CONSTRUCTED TO TIE IN AT THE ELEVATION OF THE CONSTRUCTED DUNE CREST. IF ELEVATION OF THE EXISTING VEGETATION LINE IS LOWER THAN THE FINAL ELEVATION OF THE DUNE CREST DESIGN, THE DUNE WILL BE CONSTRUCTED TO TIE INTO THE VEGETATION LINE WITH A 1:5 BACK SLOPE UP TO THE FINAL ELEVATION OF THE CONSTRUCTED DUNE.

C3 C-300 LEVEL DUNE WITH BACK SLOPE NOURISHMENT FILL TOLERANCE SECTION
SCALE: 1"=40'



A1 C-300 BERM BEACH NOURISHMENT FILL TOLERANCE SECTION
SCALE: 1"=40'



NOTES:
1. PLANTING LIMITS SHALL BE FROM EXISTING VEGETATION LINE ALONG EXISTING GRADE TO ELEVATION +9.0 ON FACE OF DUNE.
2. LEVEL DUNE SHOWN, PLANTING FOR DUNE WITH 5:1 BACK SLOPE SIMILAR.
3. SEE TECHNICAL SPECIFICATIONS FOR PLANTING, FERTILIZING AND WATERING REQUIREMENTS.

A3 C-300 BEACH NOURISHMENT FILL PLANTING SECTION
SCALE: 1"=40'

4' 0' 4' 8'
SCALE: 1"=4' VERTICAL

40' 0' 40' 80'
SCALE: 1"=40' HORIZONTAL

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

BEACH NOURISHMENT TYPICAL SECTIONS

Rev.
Date: AUGUST 2019
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (0 SHEET)
Designed by: NCV
Dwn by: BDF
Chd by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

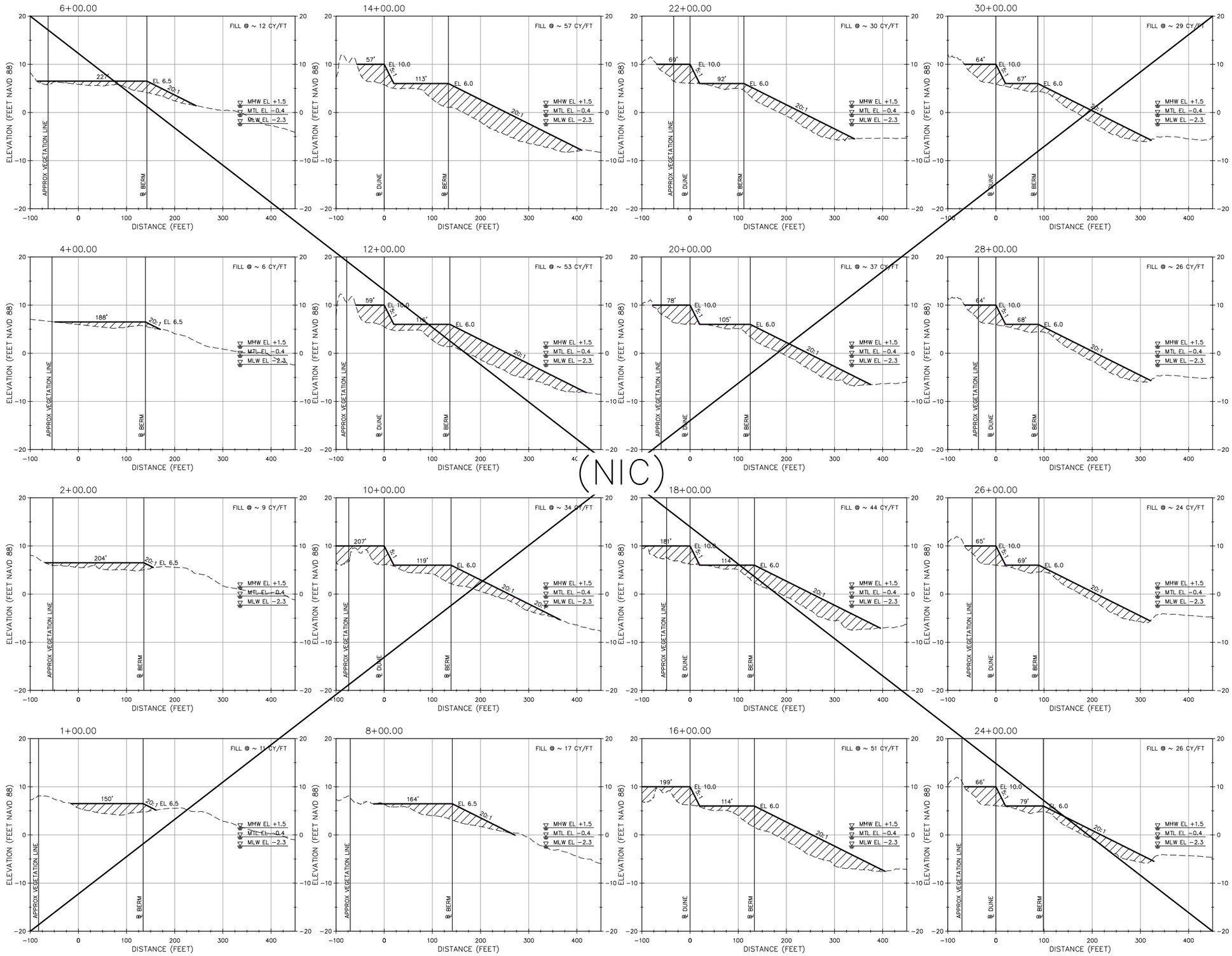
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-300
Sheet 29 of 66

File: G:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2022\10611000C-300; Plotted: 2/14/2020 10:32 AM by FORD, BRIAN; Saved: 8/16/2019 5:49 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 1 OF 35

Designed by:	NCV
Drawn by:	BDF
Checked by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Rev.	

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

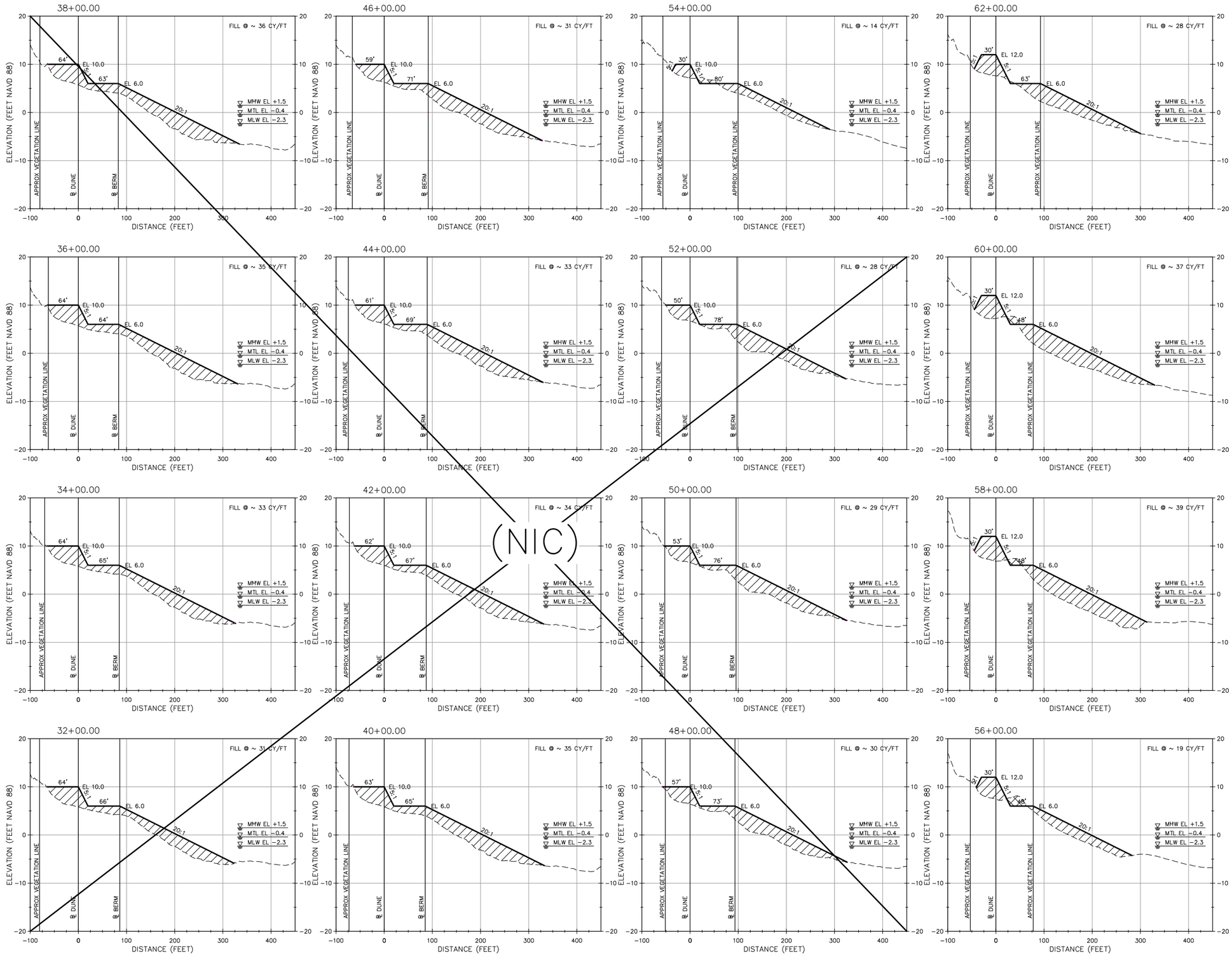
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN

SEAL

Sheet Reference No.
C-301
Sheet 30 of 66

File: Q:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-301; Plotted: 2/14/2020 10:32 AM by FORD, BRIAN; Saved: 8/16/2019 5:50 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 2 OF 35

Date:	AUGUST 2019
Designed by:	NCV
Dwn by:	BDF
Ckd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Rev.	1

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

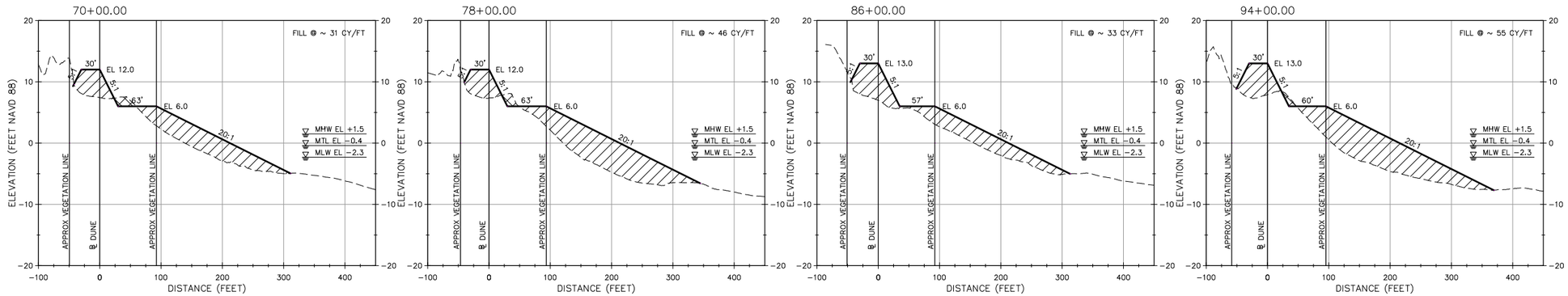
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-302
Sheet 31 of 66

File: Q:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000−302; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 2/14/2020 9:48 AM by FORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2 CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 3 OF 35

Designed by: NCV	Date: AUGUST 2019
Dwn by: BDF	Chd by: SRM
Reviewed by: JDM	M&N Project No. 10611
Submitted by: MOFFATT & NICHOL	Drawing code:
	Drawing Scale: Plot scale: 1:1 (D SHEET)
	Rev. 1

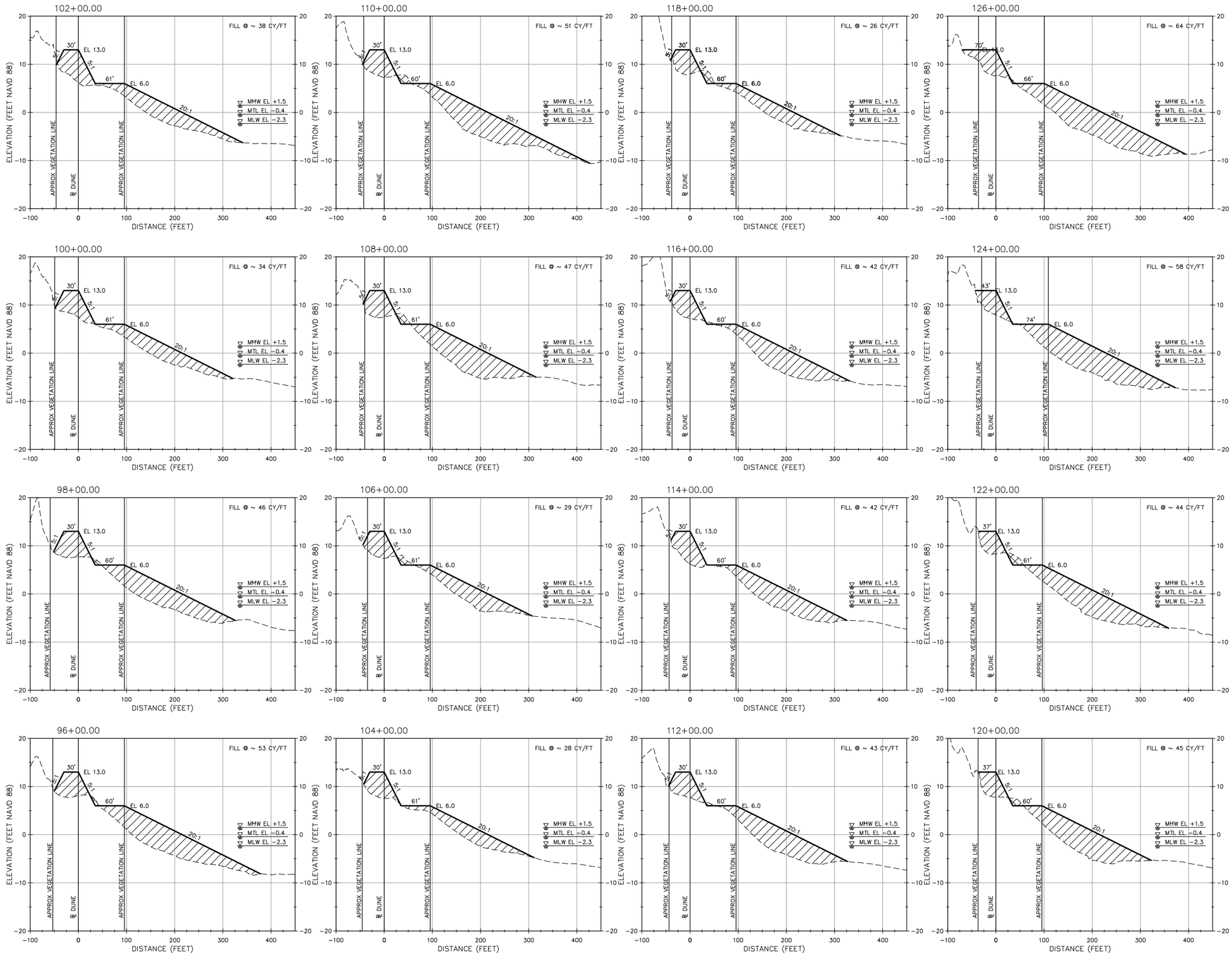
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-303
Sheet 32 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-303; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 2/14/2020 9:48 AM by FORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 4 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

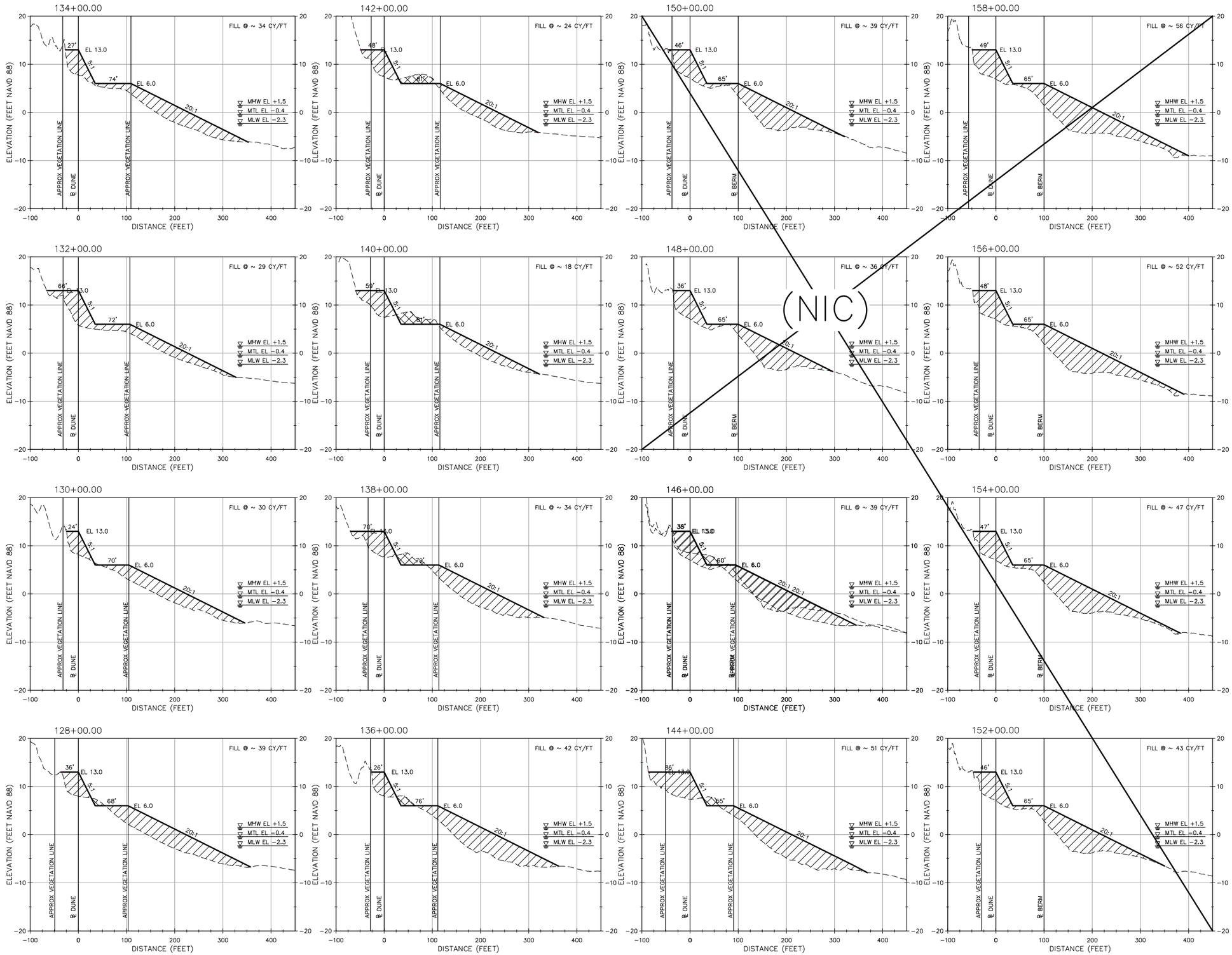
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

Designed by:	NCV
Dwn by:	BDF
Ckd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	
Plot scale: 1:1 (D SHEET)	
Rev.	1

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-304
Sheet 33 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-304; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 2/14/2020 9:48 AM by FORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2 CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 5 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

Rev.	1
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (D SHEET)
Designed by:	NCV
Dwn by:	BDF
Chd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN

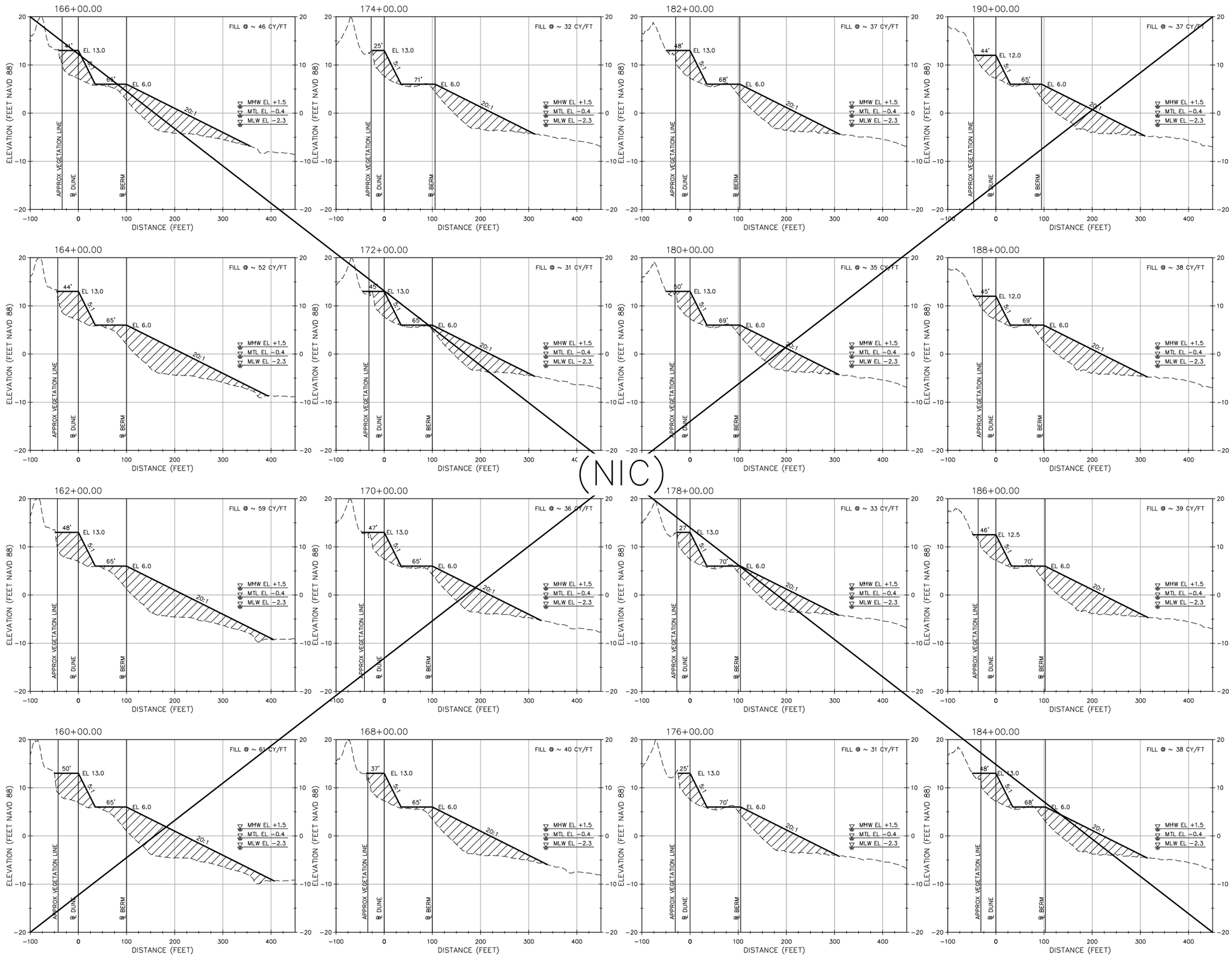
SEAL

Sheet Reference No.

C-305

Sheet 34 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-305; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 2/14/2020 9:48 AM by FORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C–300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 6 OF 35

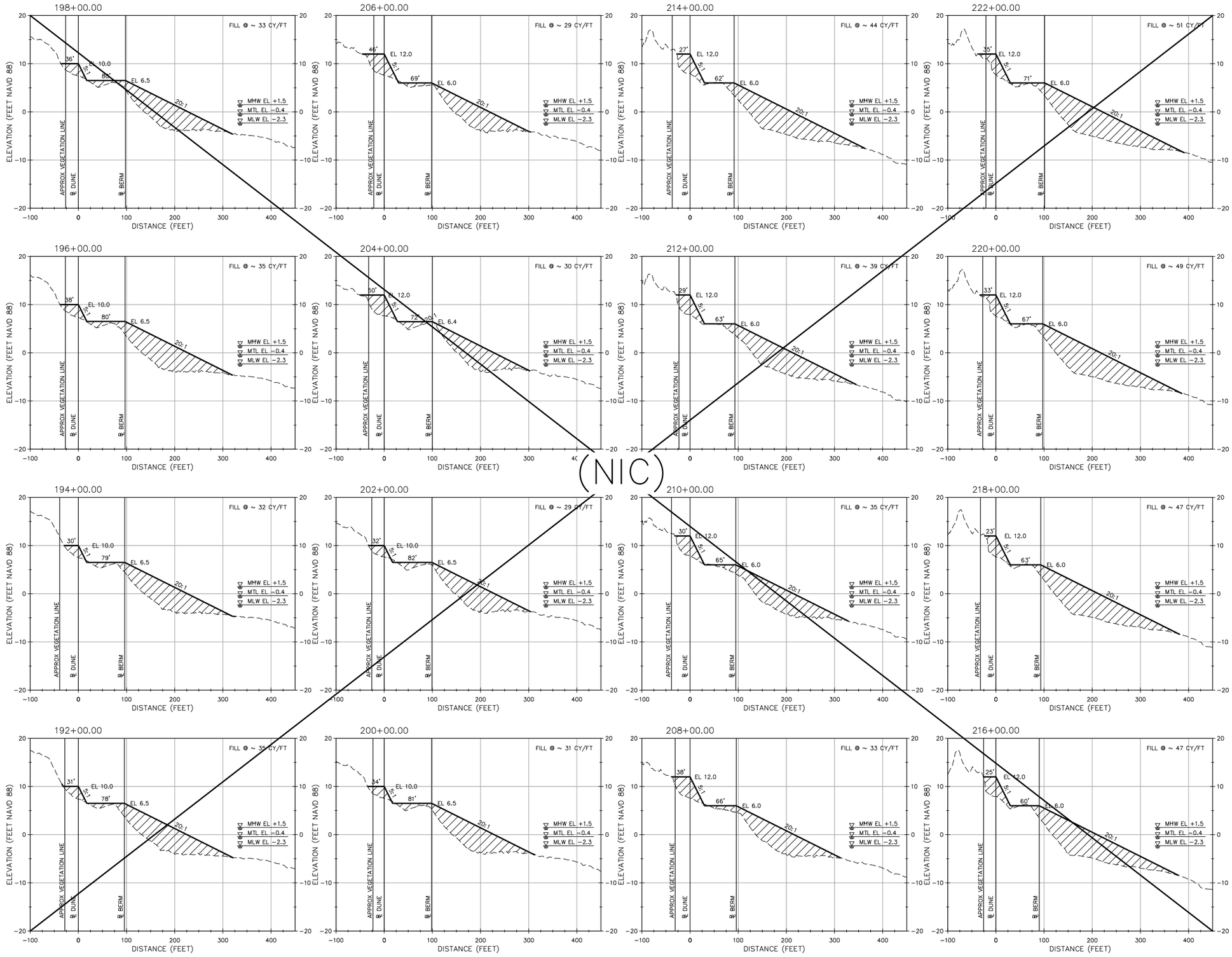
Designed by:	NCV
Drawn by:	BDF
Checked by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Rev.	

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-306
Sheet 35 of 66



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 7 OF 35

Designed by:	NCV
Drawn by:	BDF
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
Cad by:	SRM
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)

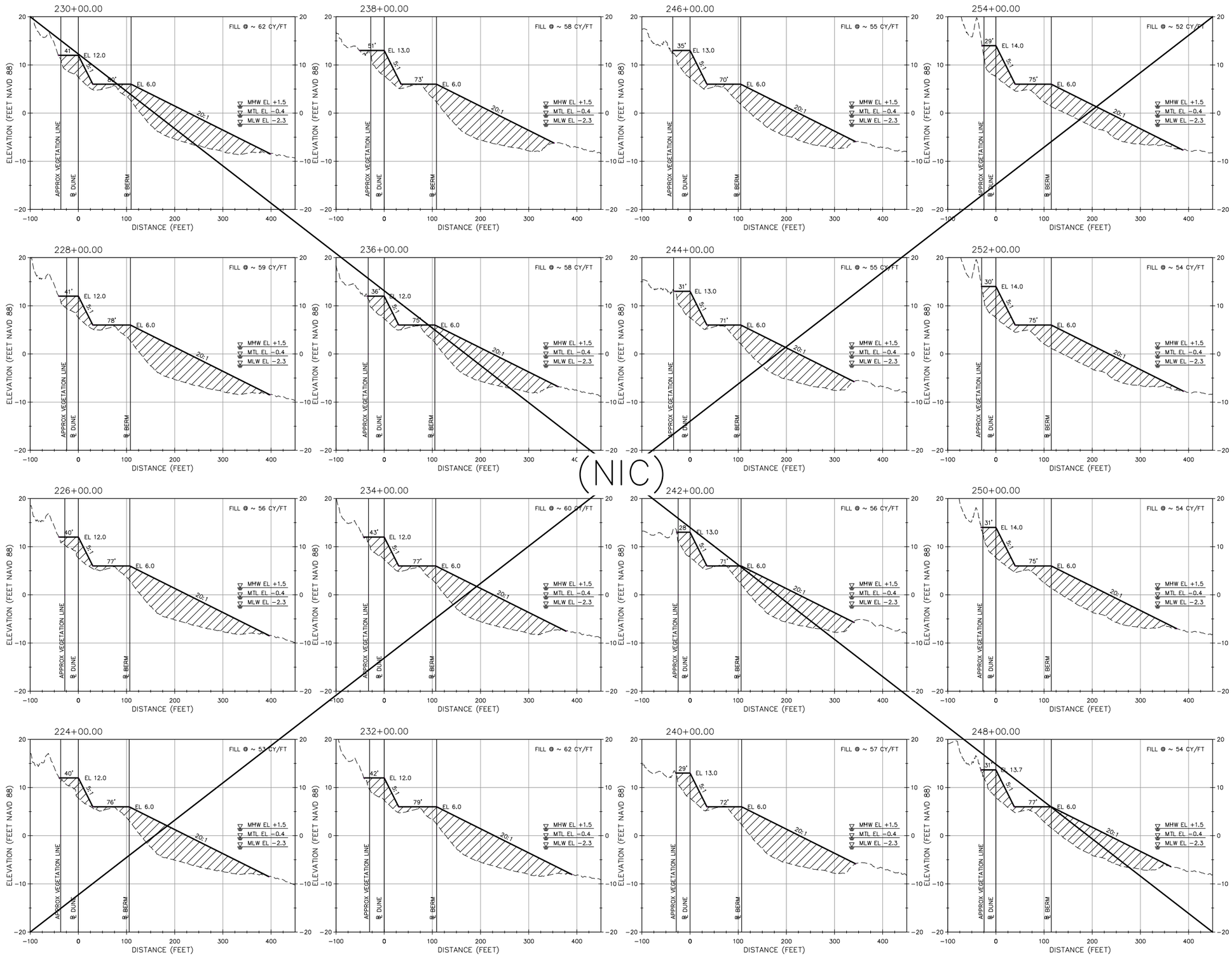
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919−781−4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-307
Sheet 36 of 66

File: Q:\PA\10611\0500_CAD_Active_10611 Bouge Banks 20220\10611000−307; Plotted: 2/14/2020 10:33 AM by FORD, BRYAN; Saved: 8/16/2019 5:58 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 8 OF 35

Date:	AUGUST 2019
Rev.	
Designed by:	NCV
Drawn by:	BDF
Cked by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)

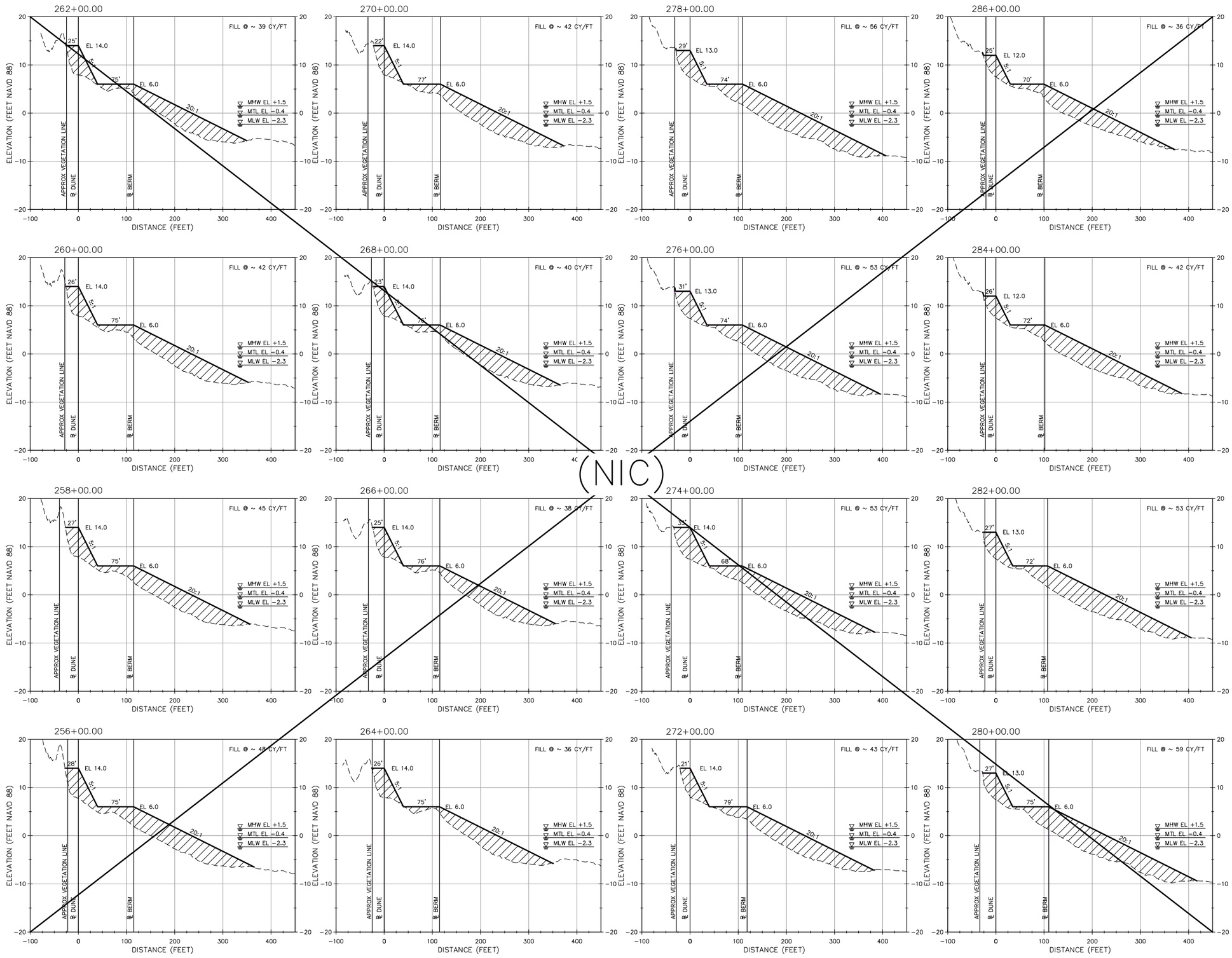
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-308
Sheet 37 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 20201\0611000-308; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 8/16/2019 5:58 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 9 OF 35

Date: AUGUST 2019
Rev.
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (0 SHEET)
Designed by: NCV
Dwn by: BDF
Ckd by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

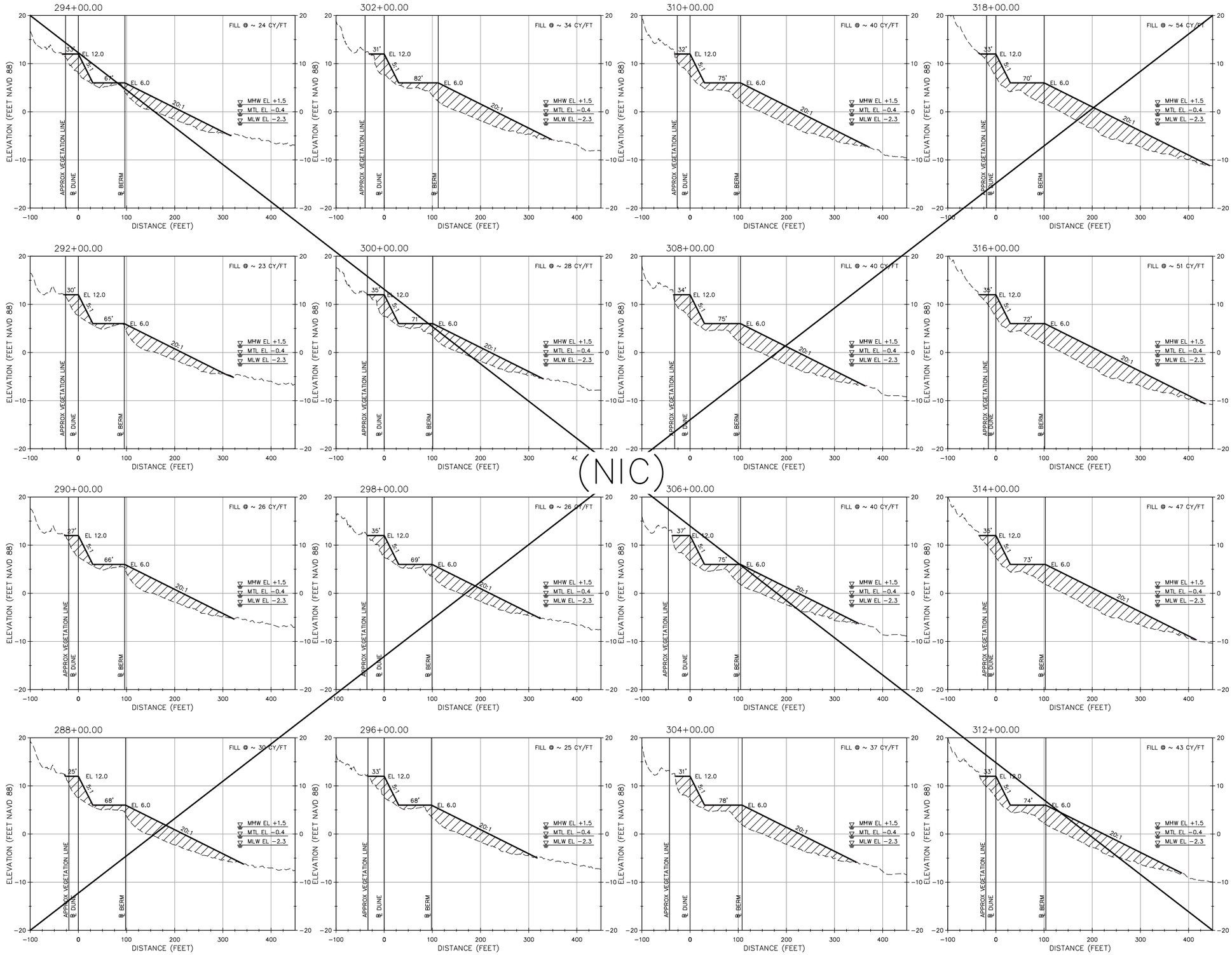
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919−781−4626
NC FIRM LICENSE No. F−0105
moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-309
Sheet 38 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 20201\061100C−309; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 8/16/2019 5:58 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

No.	Mark	Description	Date	Appr.
0	BID	DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 10 OF 35

Date: AUGUST 2019
Rev.
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (0 SHEET)
Designed by: NCV
Cad by: SRM
Dwn by: BDF
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

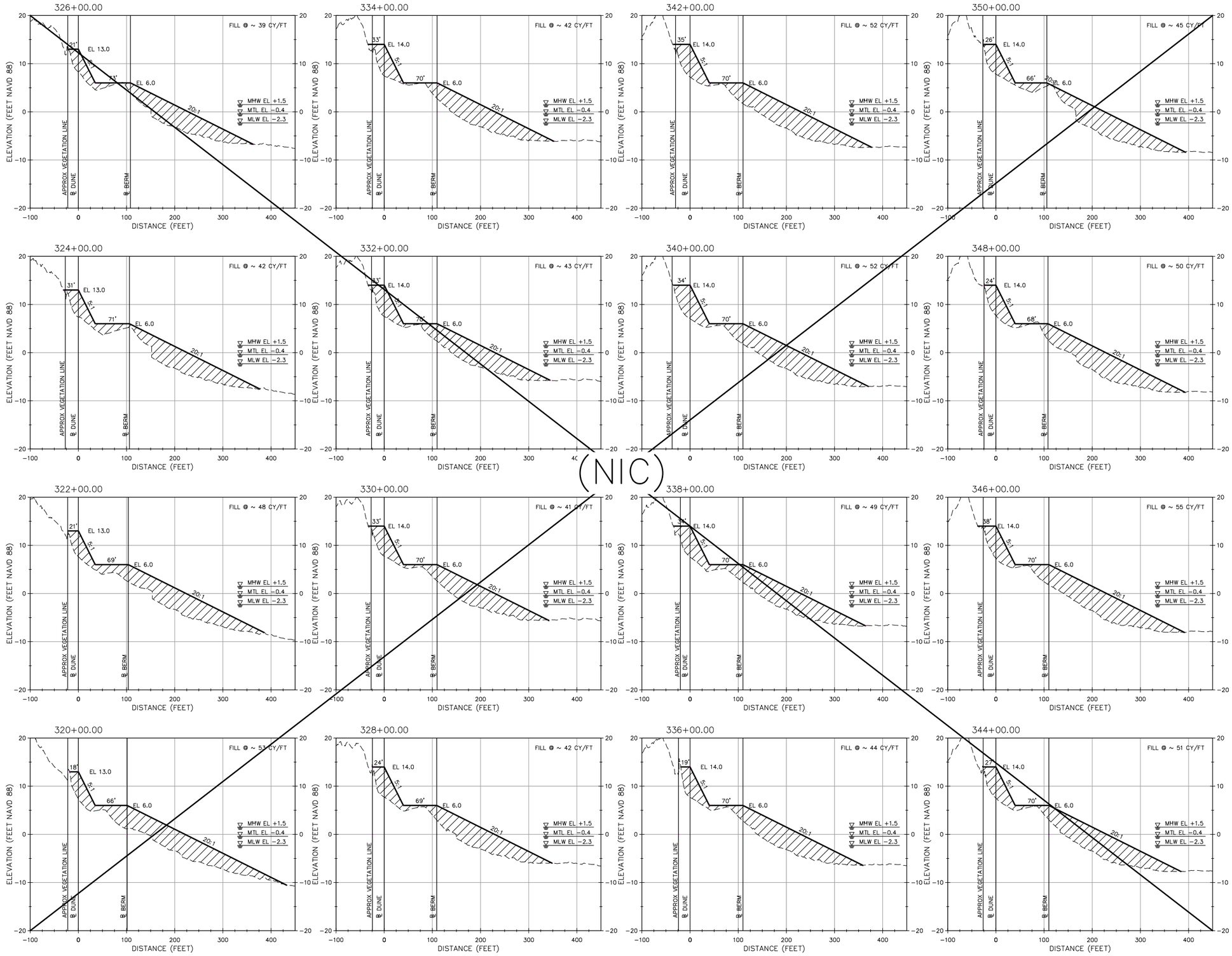
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-310
Sheet 39 of 66

File: Q:\PA\10611\0500_CAD_Active_10611 Bouge Banks 20220\10611000-310; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 8/16/2019 5:58 PM by BFORD



(NIC)

NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 11 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

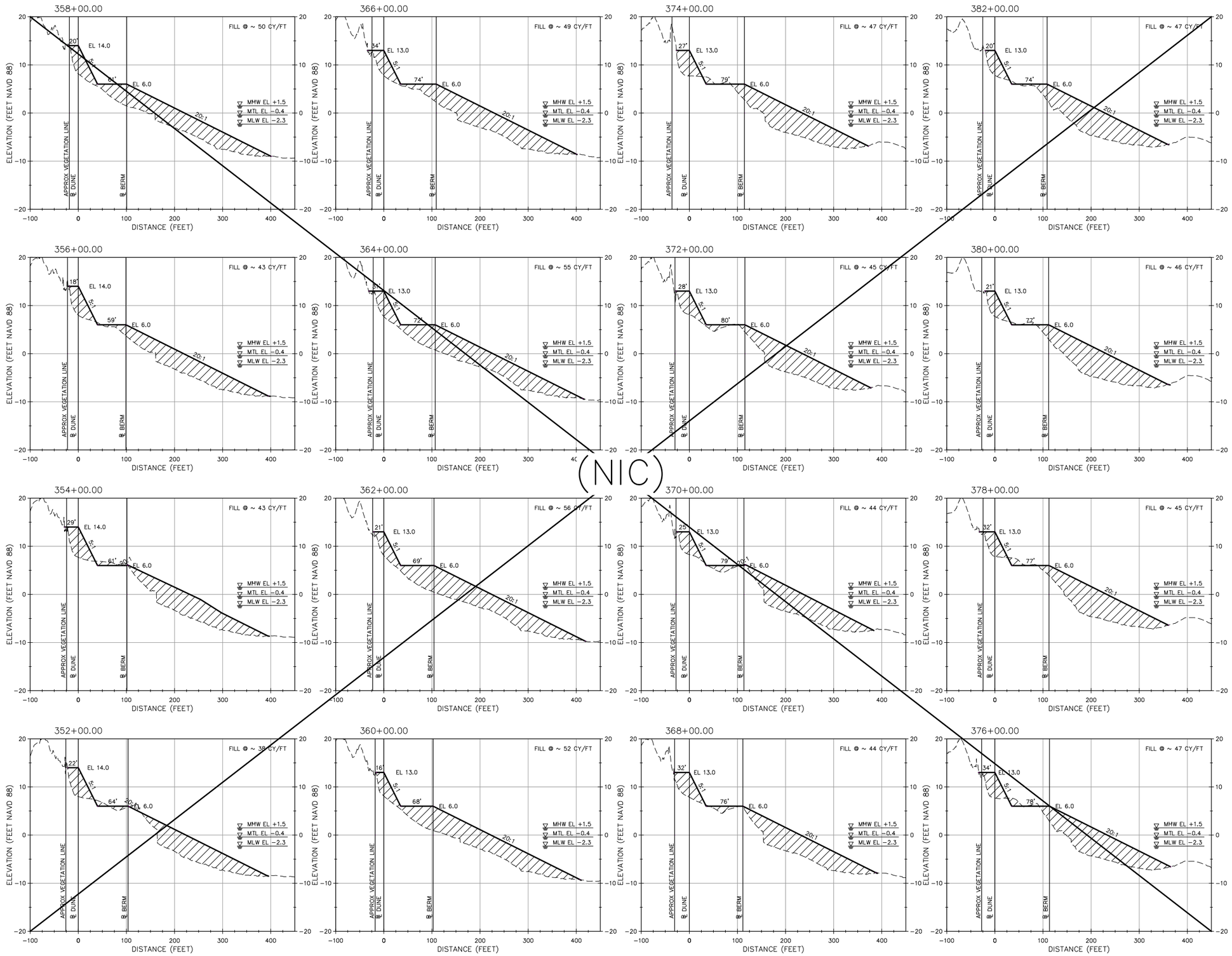
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Rev.		
Date:	AUGUST 2019	
Designed by:	NCV	
Cad by:	SRM	
Dwn by:	BDF	
Reviewed by:	JDM	
Submitted by:	MOFFATT & NICHOL	
M&N Project No.	10611	
Drawing code:		
Drawing Scale:		
Plot scale: 1:1 (0 SHEET)		

Sheet Reference No.
C-311
Sheet 40 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 20201\0611000-311; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 8/16/2019 5:58 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 12 OF 35

Designed by: NCV	Drawn by: BDF	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019	Cad by: SRM	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)
Rev.	M&N Project No. 10611		

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919−781−4626
NC FIRM LICENSE No. F−0105
moffatt & nichol

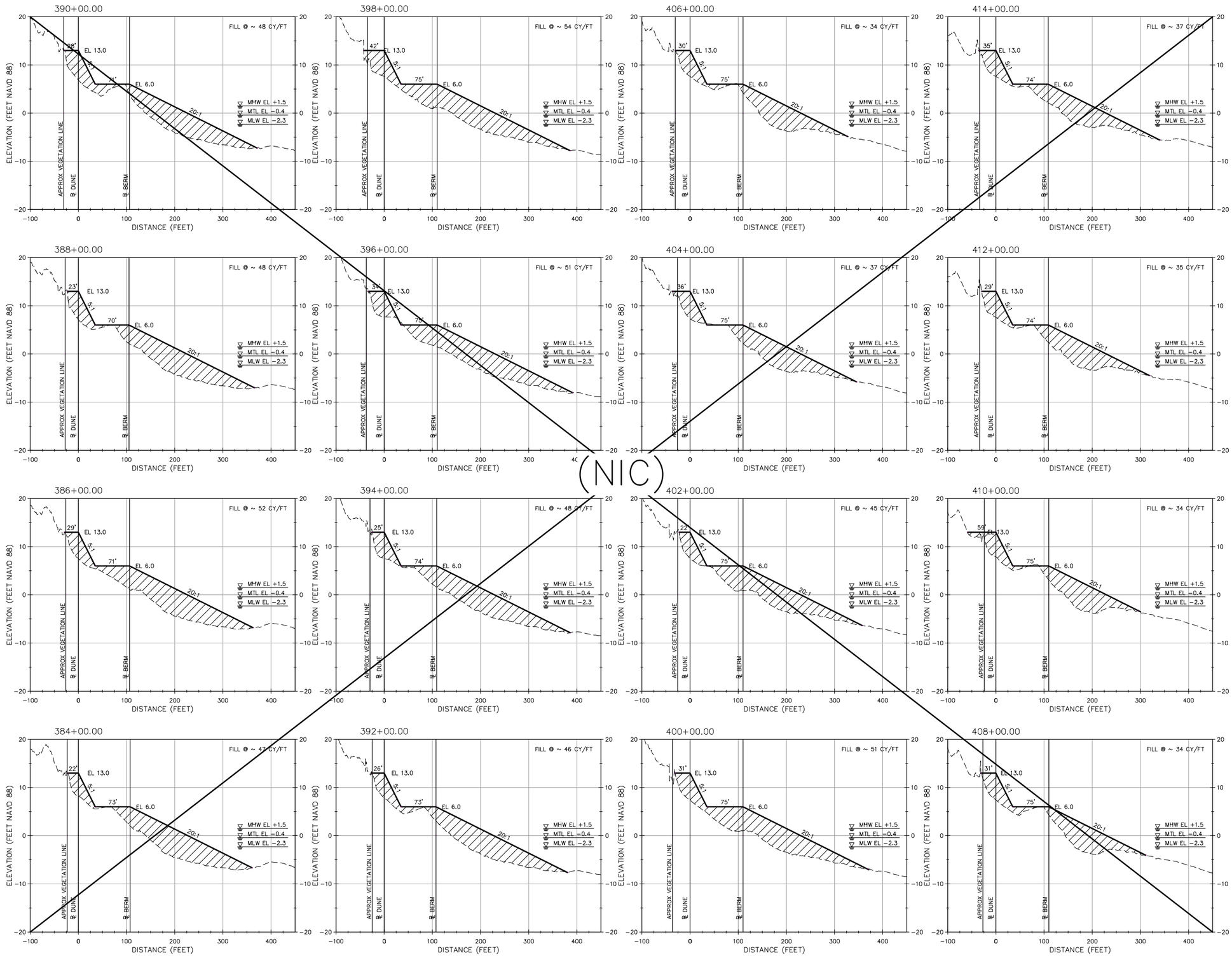
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN

SEAL

Sheet Reference No.
C-312
Sheet 41 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 20220\10611000−312; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

No.	Mark	Description	Date	Appr.
0	BID DOCUMENTS		08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 13 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

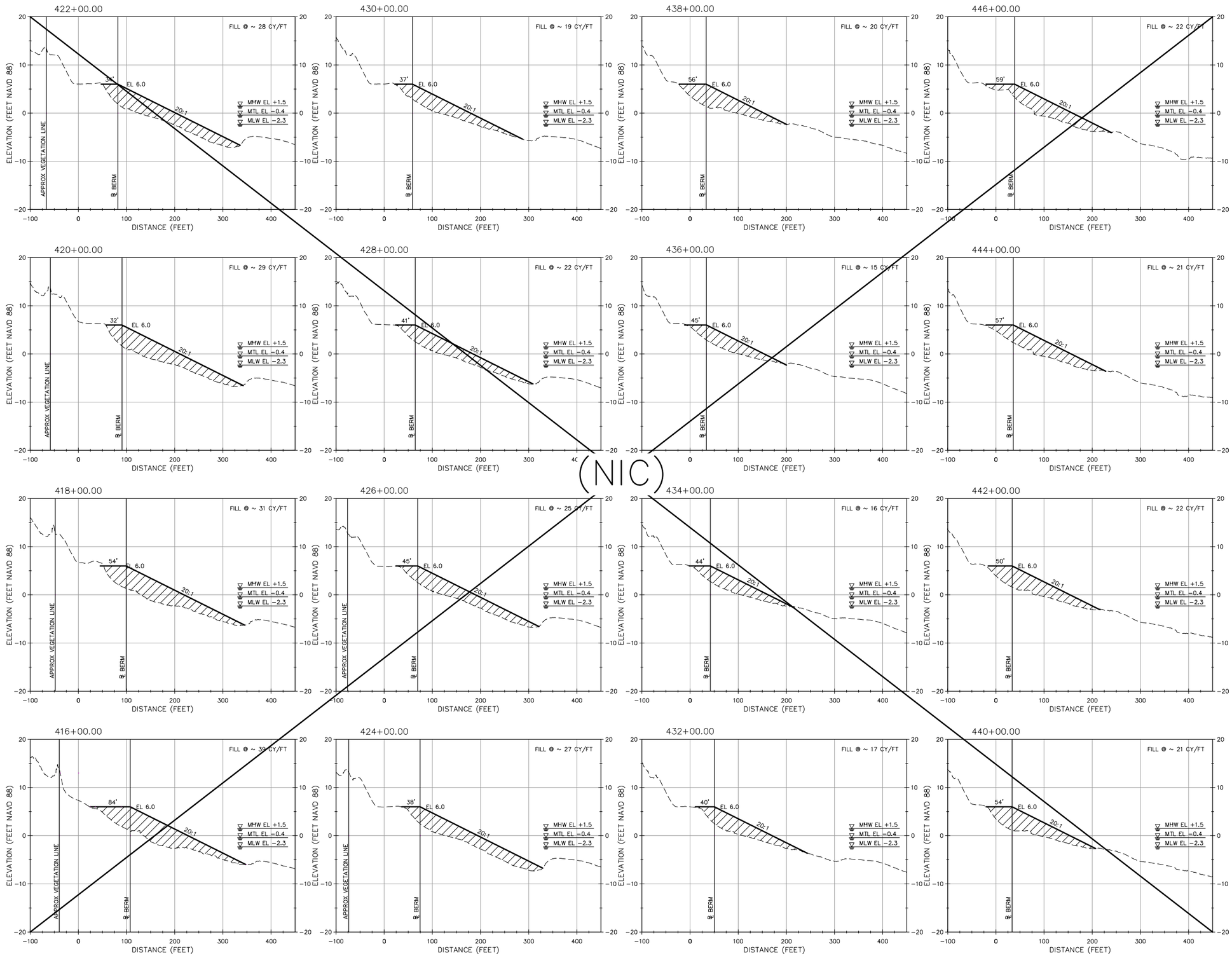
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Rev.	Date: AUGUST 2019	Designed by: NCV	Drawn by: BDF	Checked by: SRM	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)
	M&N Project No. 10611							

Sheet Reference No.
C-313
Sheet 42 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 20201\0611000-313; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD



(NIC)

NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

No.	Mark	BID DOCUMENTS Description	Date	Appr.
0			08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 14 OF 35

Rev.
Date: AUGUST 2019
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (0 SHEET)
Designed by: NCV
Dwn by: BDF
Ckd by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919−781−4626
NC FIRM LICENSE No. F−0105
moffatt & nichol

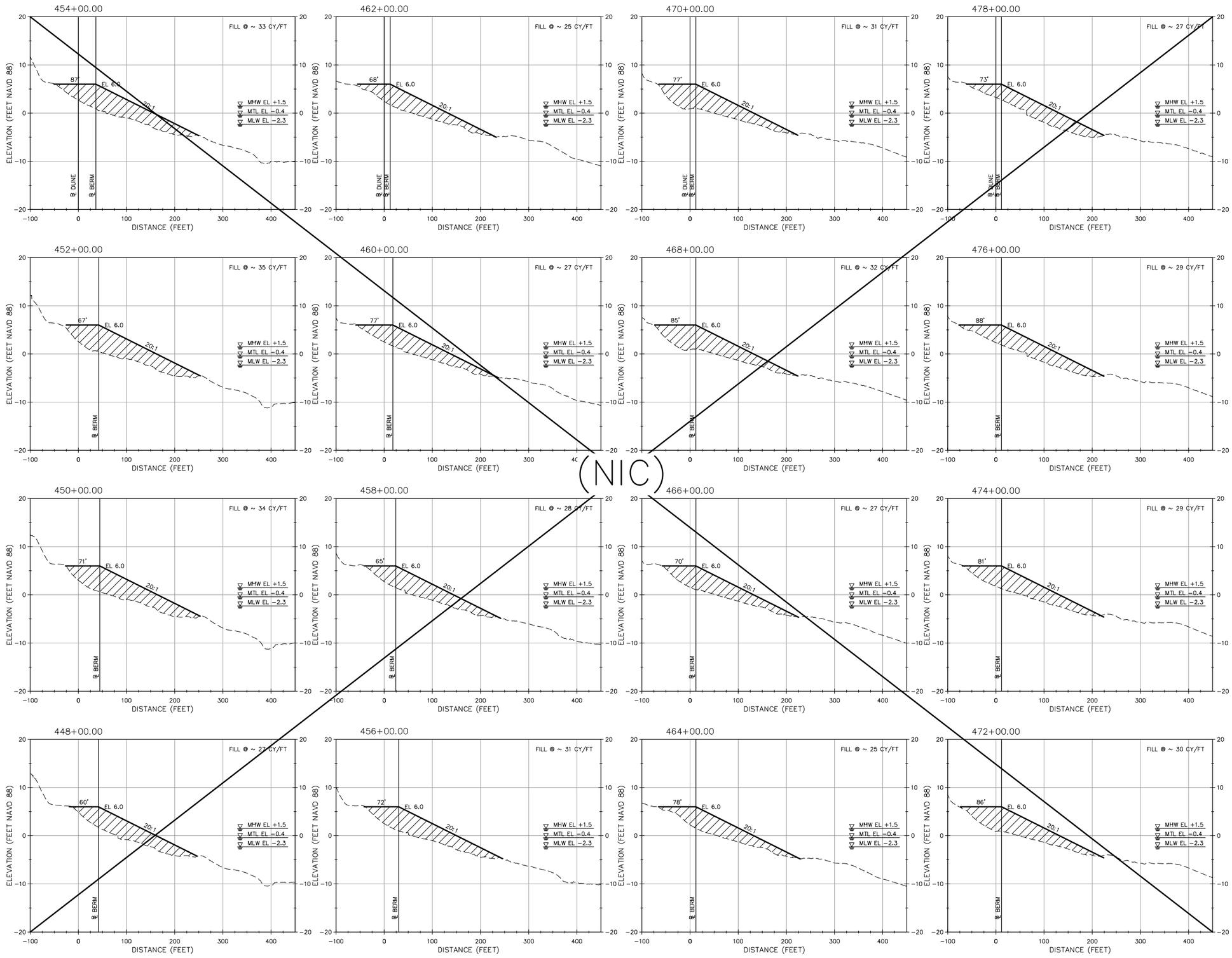
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-314
Sheet 43 of 66

File: Q:\PA\10611\0500_CAD_Active_10611 Bouge Banks 20220\10611000−314; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



(NIC)

NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

No.	Mark	Description	Date	Appr.
0	BID	DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 15 OF 35

Designed by:	NCV
Drawn by:	BDF
Checked by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)

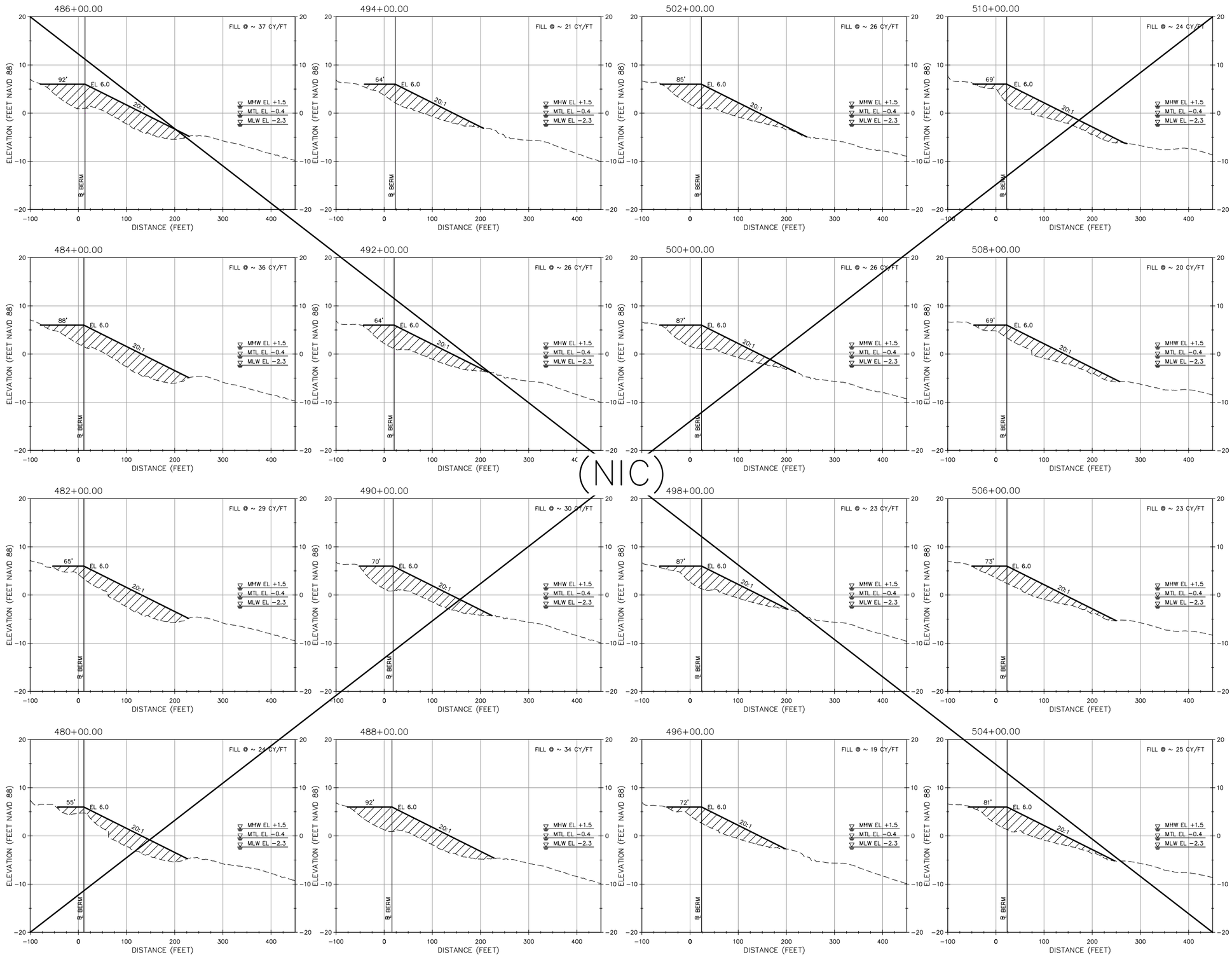
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-315
Sheet 44 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 20220\10611000-315; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD



(NIC)

NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

No.	Mark	Description	Date	Appr.
0	BID	DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2 CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 16 OF 35

Designed by: NCV
Drawn by: BDF
Checked by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (0 SHEET)
Rev.

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

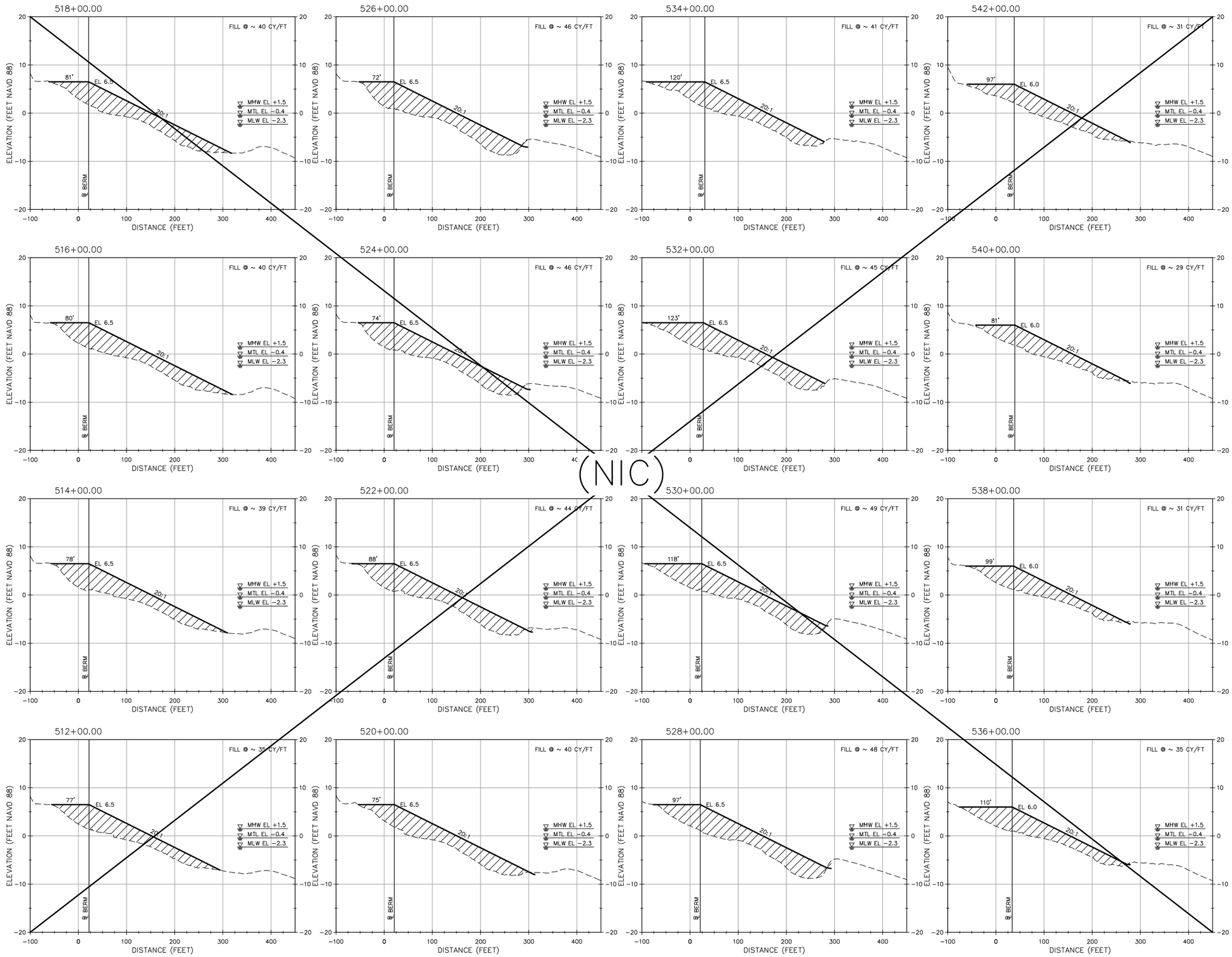
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-316
Sheet 45 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 20220\10611000-316; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

No.	Mark	Description	Date	Appr.
0	BID	DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2 CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 17 OF 35

Designed by: NCV	Drawn by: BDF	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019	Qual by: SRM	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)
Rev.	M&N Project No. 10611		

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN

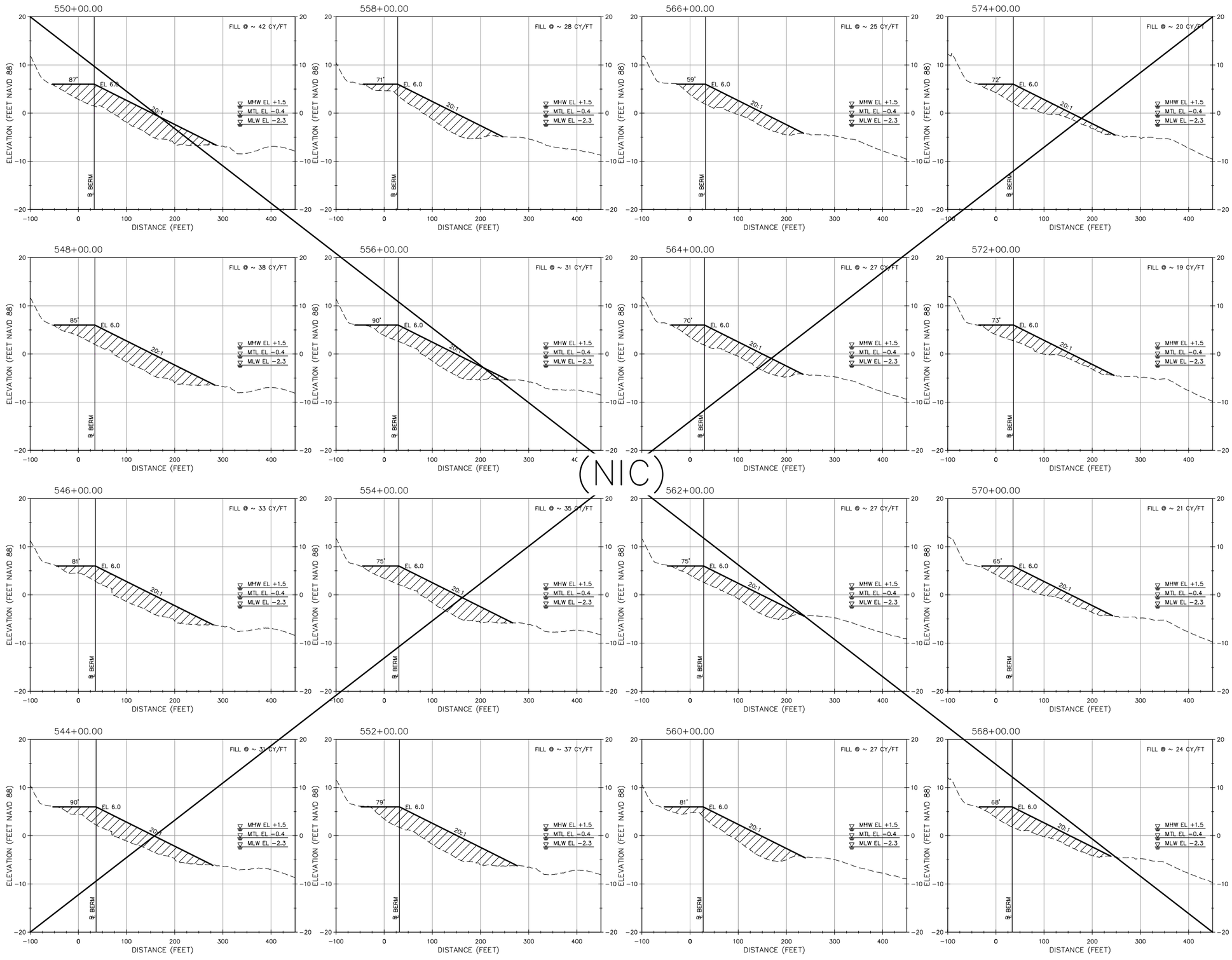
SEAL

Sheet Reference No.

C-317

Sheet 46 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 20220\10611000-317; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD



(NIC)

NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2 CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 18 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

Designed by:	Date:	Rev.
NCV	AUGUST 2019	
Dwn by: BDF	Ckd by: SRM	M&N Project No. 10611
Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Drawing code:
		Drawing Scale: Plot scale: 1:1 (0 SHEET)

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN

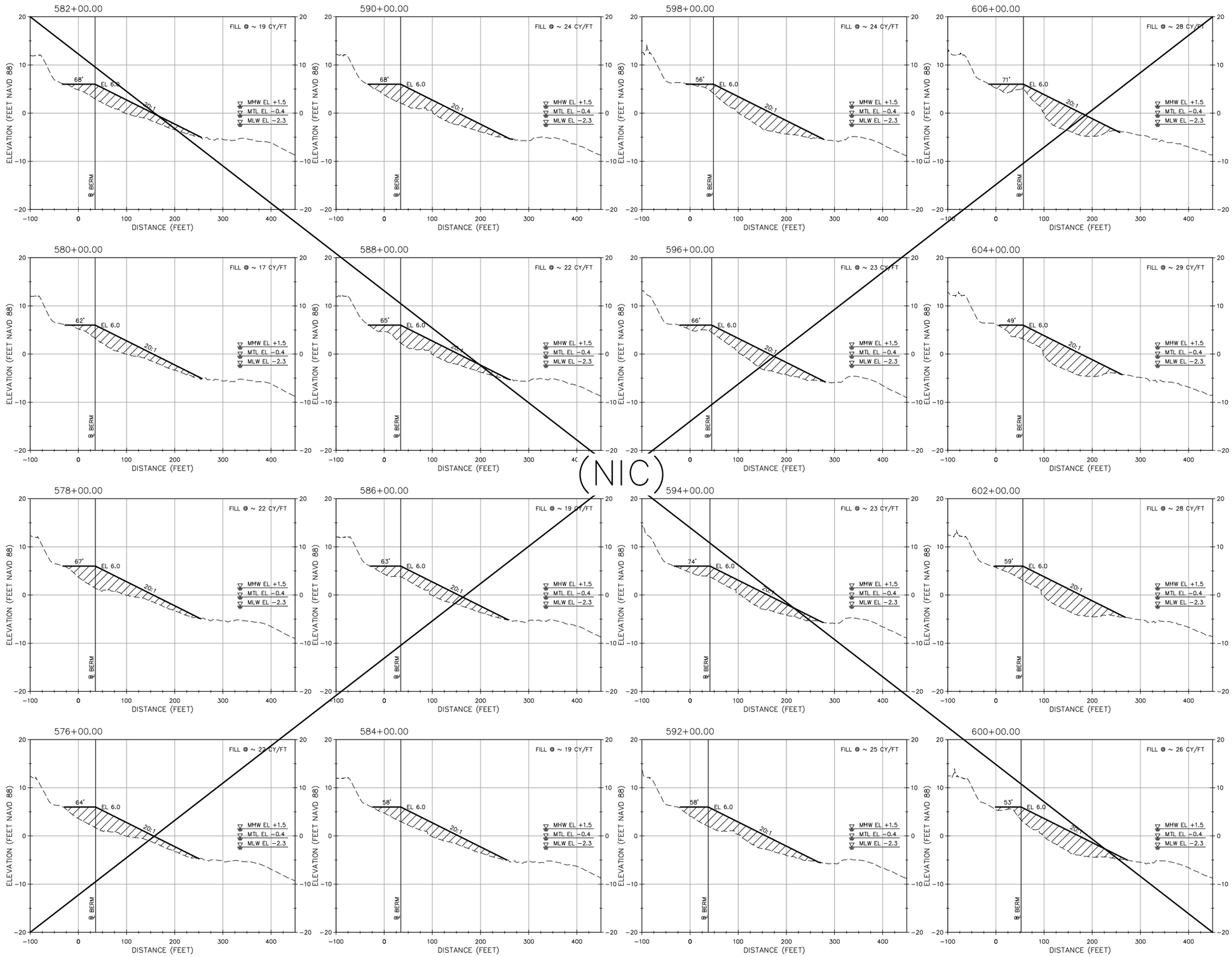
SEAL

Sheet Reference No.

C-318

Sheet 47 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-318; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD



(NIC)

NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

No.	Mark	BID DOCUMENTS	Date	Appr.
0			08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 19 OF 35

Designed by:	NCV
Drawn by:	BDF
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
Cad by:	SRM
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Rev.	

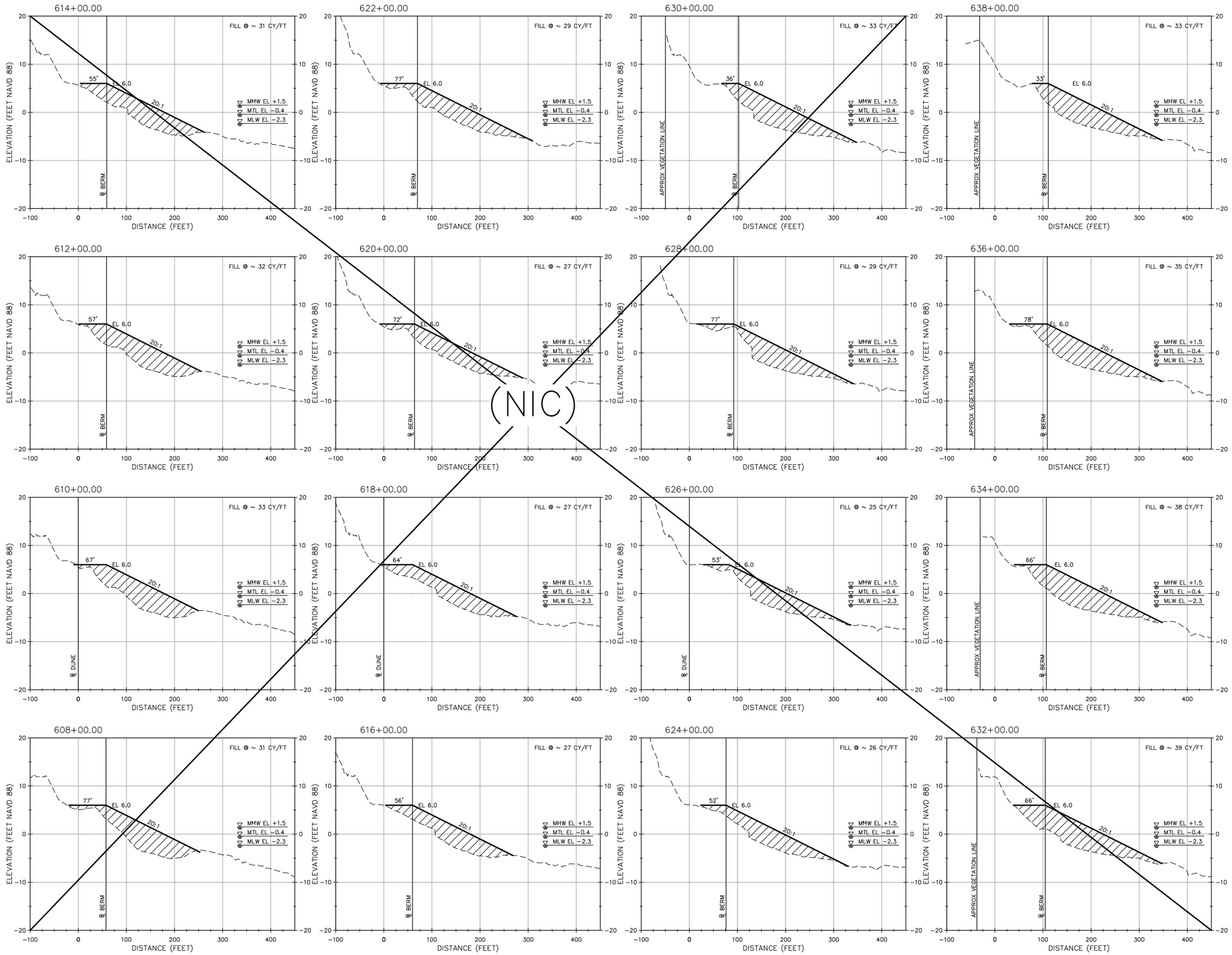
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919−781−4626
NC FIRM LICENSE No. F−0105
moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-319
Sheet 48 of 66

File: Q:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000−319; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:56 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 20 OF 35

Designed by: NCV	Dwn by: BDF	Reviewed by: JDM	Date: AUGUST 2019
	Ckd by: SRM		M&N Project No. 10611
		Drawing code:	
Submitted by: MOFFATT & NICHOL		Drawing Scale: Plot scale: 1:1 (0 SHEET)	Rev.

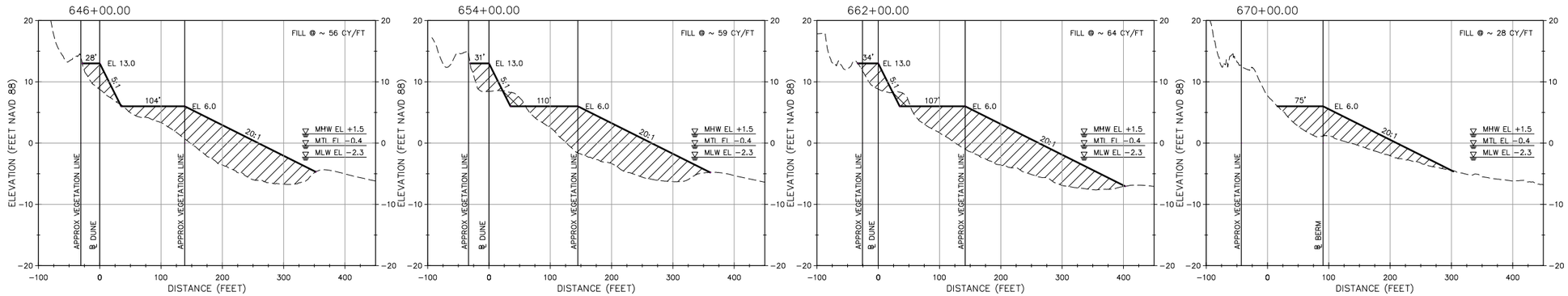
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-320
Sheet 49 of 66

File: Q:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-320; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 2/14/2020 9:46 AM by FORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

Mark	Description	Date	Appr.
1	PRE−CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 21 OF 35

Designed by: NCV | Drawn by: BDF | Checked by: SRM | Reviewed by: JDM | Submitted by: MOFFATT & NICHOL | Date: AUGUST 2019 | M&N Project No. 10611 | Drawing code: | Drawing Scale: Plot scale: 1:1 (D SHEET) | Rev. 1

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919−781−4626
moffatt & nichol NC FIRM LICENSE No. F−0105

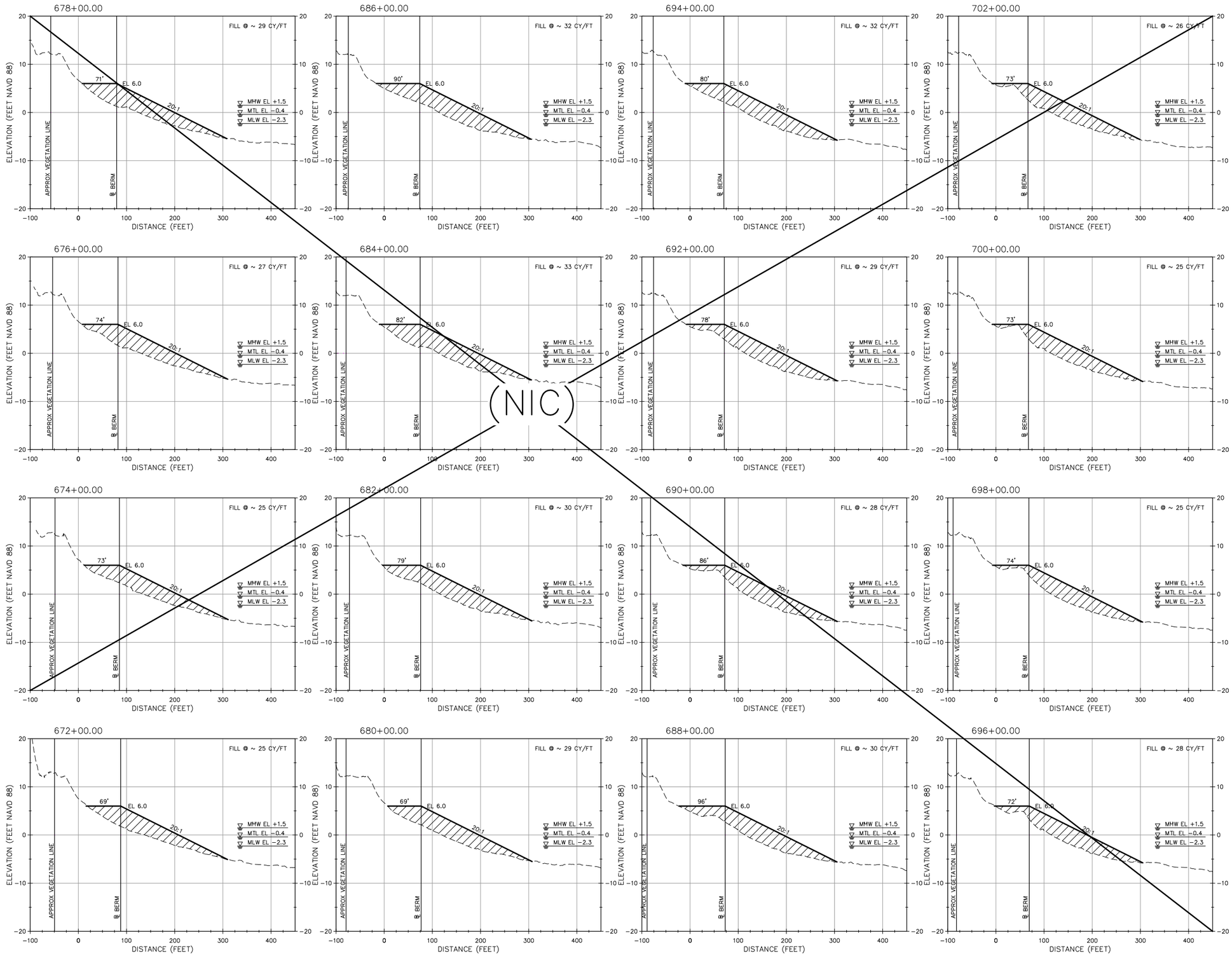
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-321
Sheet 50 of 66

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611D0C−321; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 2/14/2020 9:46 AM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 22 OF 35

Designed by:	NCV
Drawn by:	BDF
Checked by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Rev.	1

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

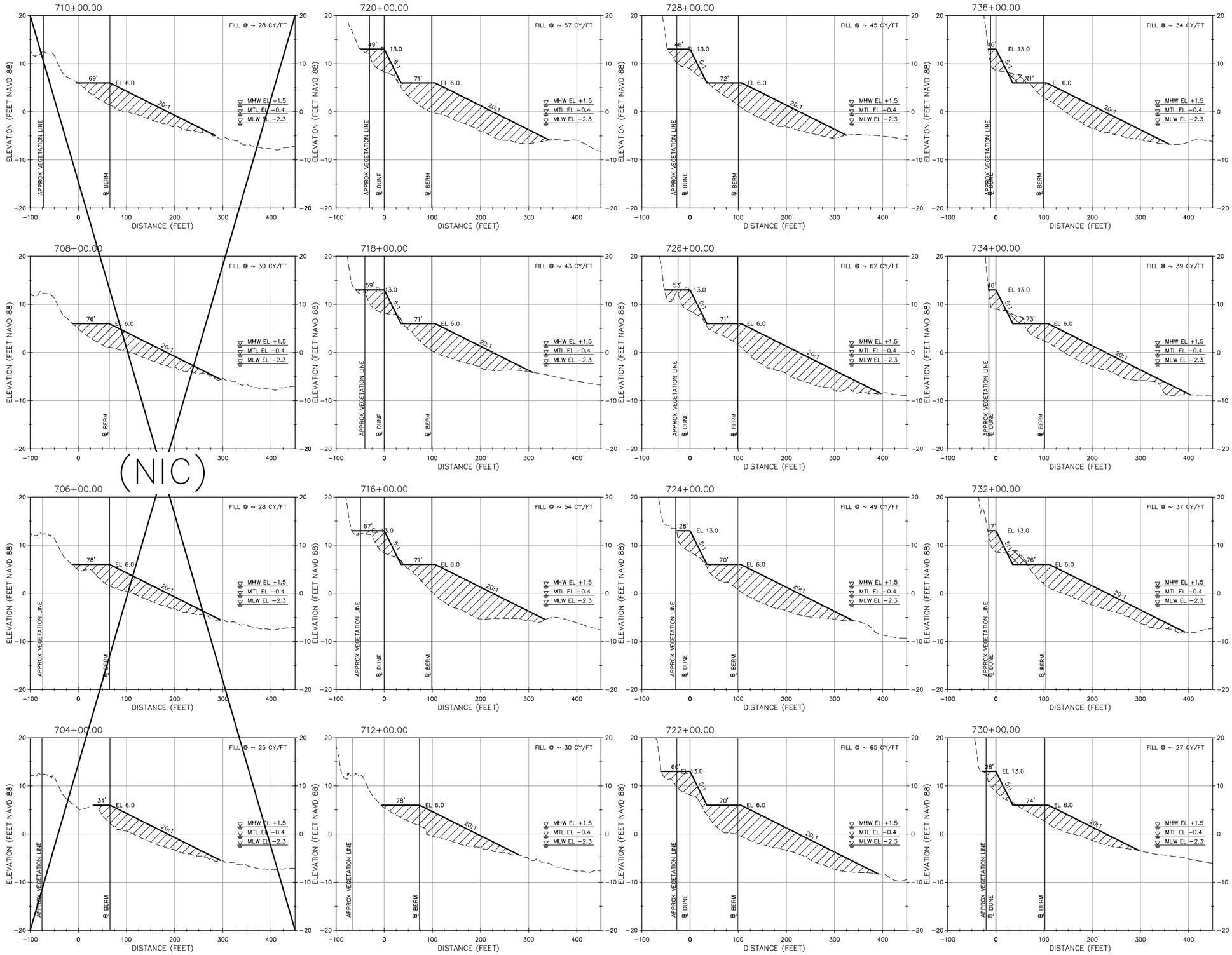
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN

SEAL

Sheet Reference No.

C-322

Sheet 51 of 66



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C–300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 23 OF 35

Designed by: NCV
Drawn by: BDF
Checked by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (0 SHEET)
Rev. 1

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

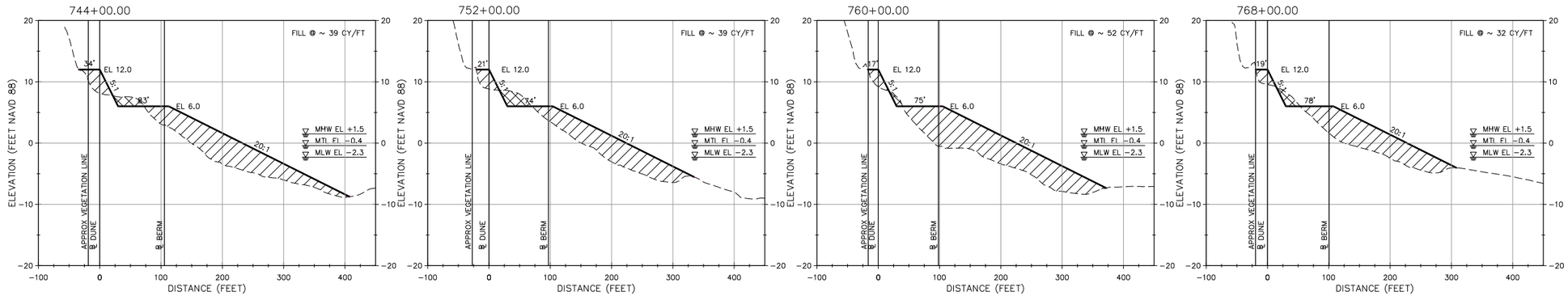
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-323
Sheet 52 of 66

File: Q:\PA\10611\0500_CAD_Active_10611 Bouge Banks 20220\10611000–323; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:46 AM by FORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 24 OF 35

Rev. 1
Date: AUGUST 2019
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (D SHEET)
Designed by: NCV
Dwn by: BDF
Ckd by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

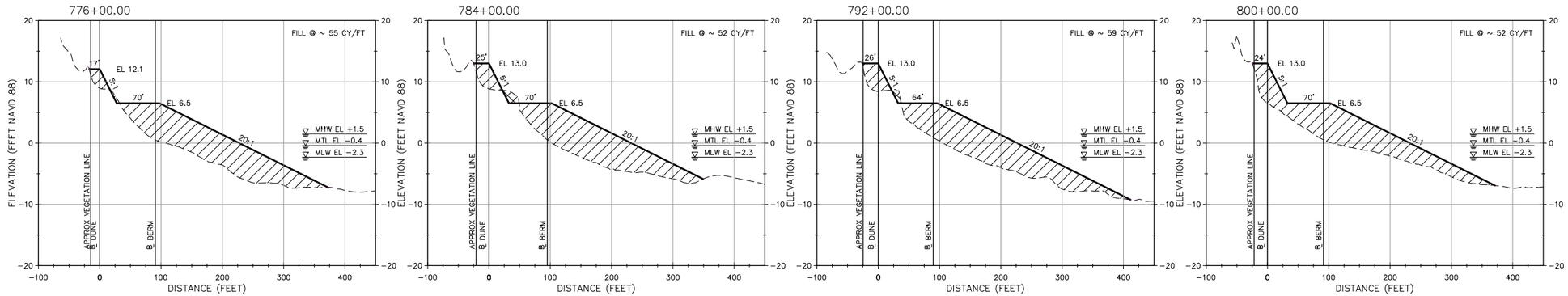
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

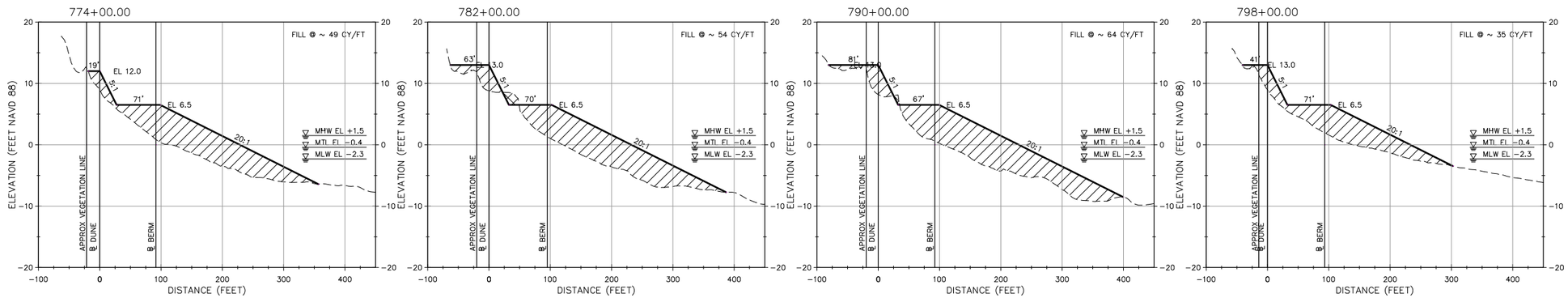
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

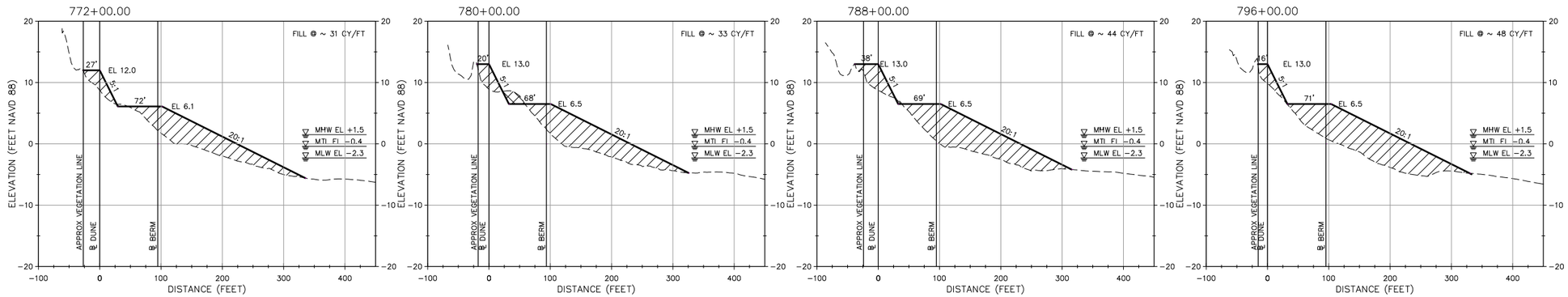
Sheet Reference No.
C-324
Sheet 53 of 66

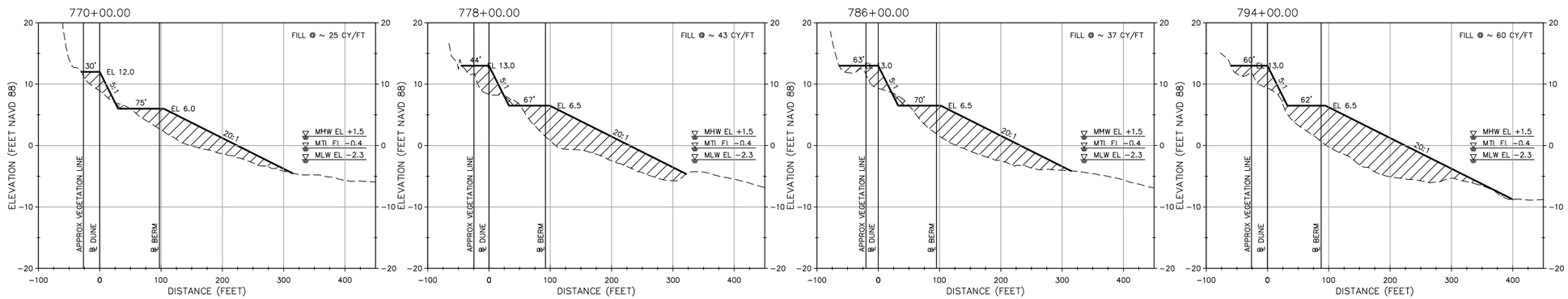
File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-324; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:45 AM by FORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING









NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 25 OF 35

Designed by: NCV
Drawn by: BDF
Checked by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (D SHEET)
Rev. 1

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

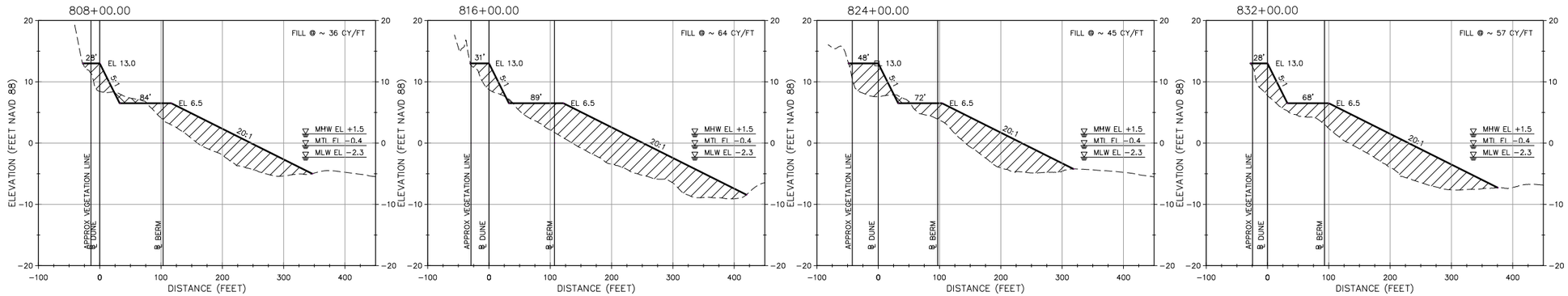
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-325
Sheet 54 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-325; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:45 AM by FORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 26 OF 35

Designed by:	NCV
Dwn by:	BDF
Ckd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (D SHEET)
Rev.	1

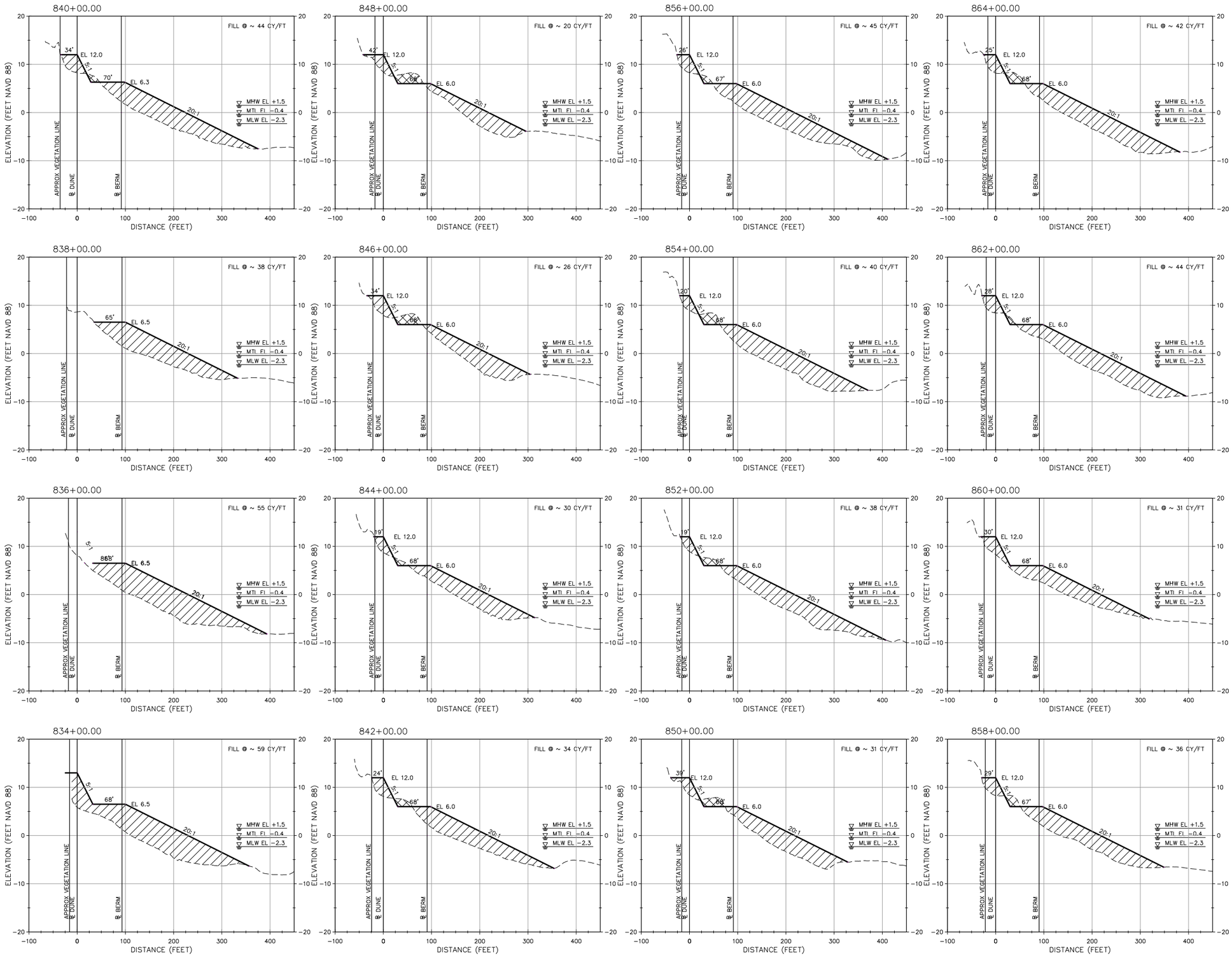
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-326
Sheet 55 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-326; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:44 AM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2 CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 27 OF 35

Designed by:	NCV
Drawn by:	BDF
Checked by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Rev.	1

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN

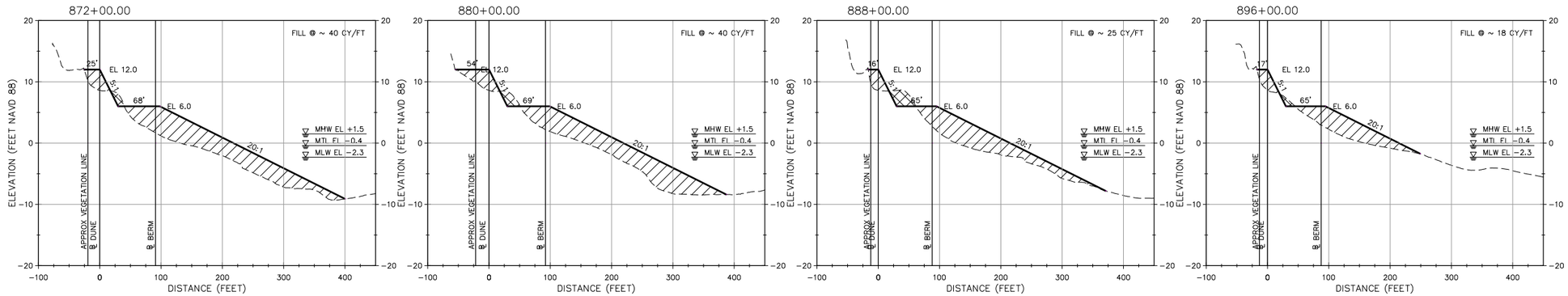
SEAL

Sheet Reference No.

C-327

Sheet 56 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-327; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:44 AM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 28 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN

SEAL

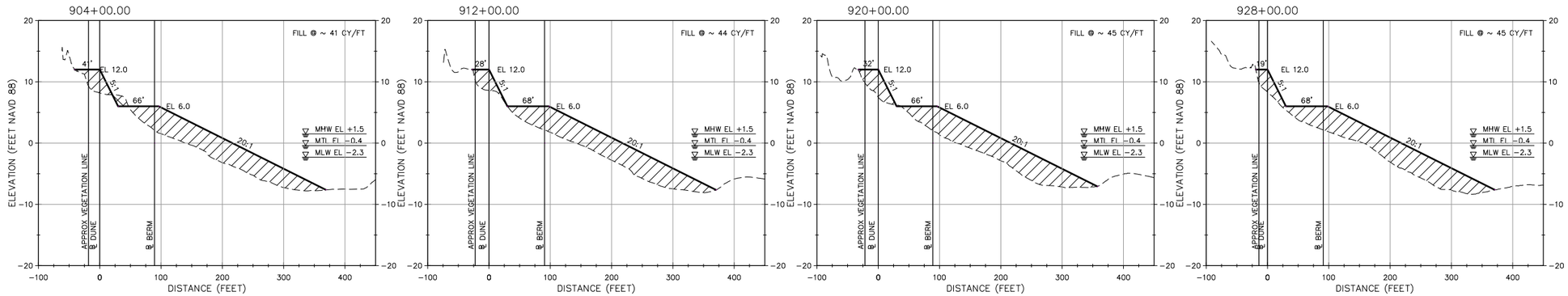
Designed by:	NCV
Drawn by:	BDF
Checked by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Rev.	1

Sheet Reference No.

C-328

Sheet 57 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-328; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:44 AM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 29 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

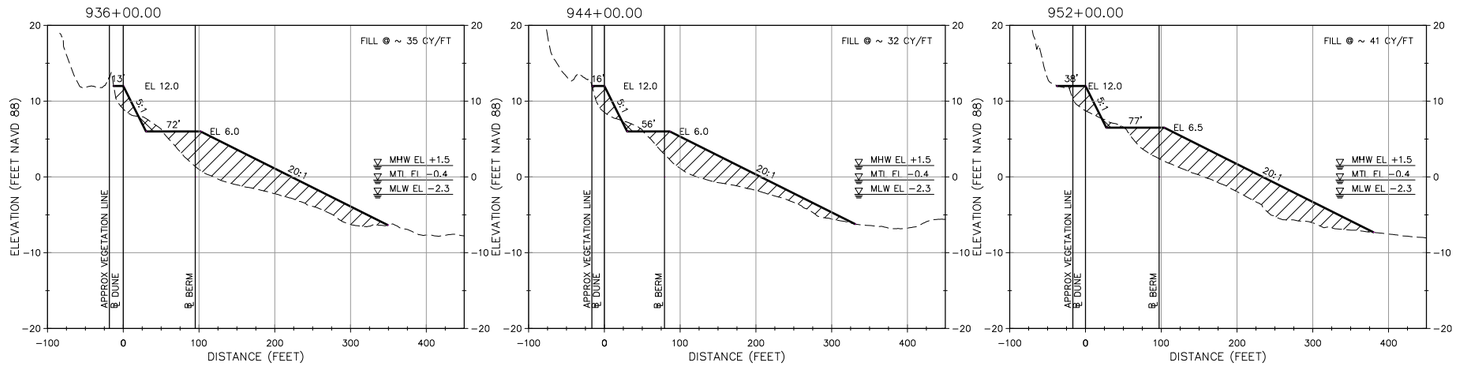
Designed by:	Drawn by:	Checked by:	Reviewed by:	Submitted by:
NCV	BDF	SRM	JDM	MOFFATT & NICHOL

Date: AUGUST 2019
M&N Project No. 10611
Drawing code:
Drawing Scale: Plot scale: 1:1 (D SHEET)
Rev. 1

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-329
Sheet 58 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-329; Plotted: 2/14/2020 9:44 AM by BFORD
File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-329; Saved: 2/14/2020 10:35 AM by FORD, BRIAN



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 30 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

Designed by:	Drawn by:	Reviewed by:	Submitted by:
NCV	BDF	JDM	MOFFATT & NICHOL

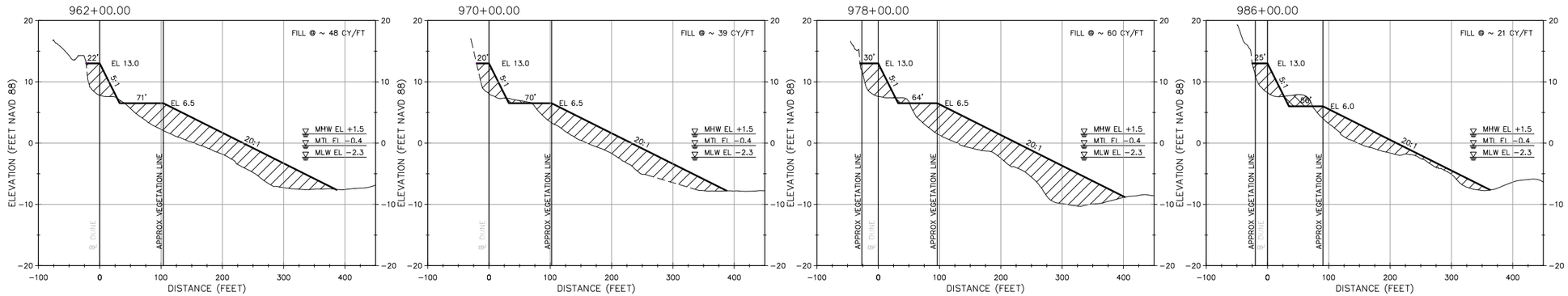
Date: JANUARY 2020 | Chkd by: SRM | Drawing code: | Drawing Scale: Plot scale: 1:1 (D SHEET) | Rev. 1

M&N Project No. 10611

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-330
Sheet 59 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-330; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/11/2020 3:56 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 31 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

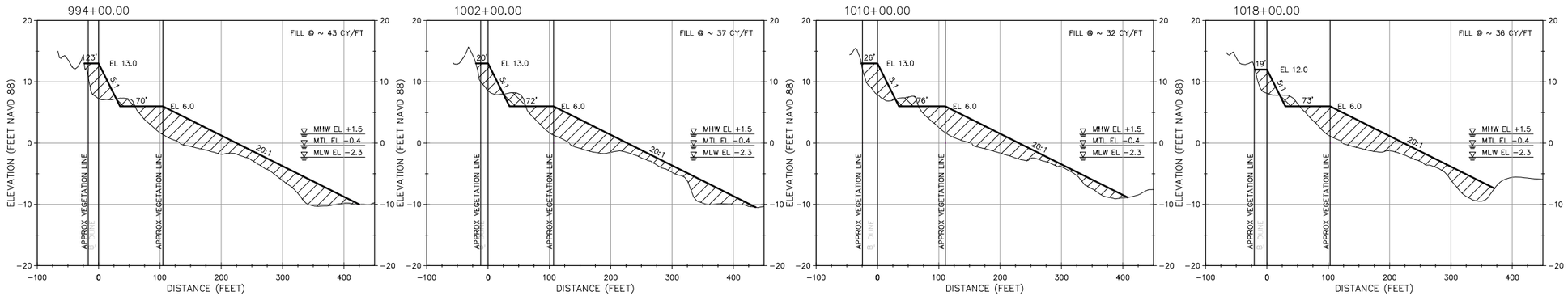
Designed by:	Drawn by:	Reviewed by:	Submitted by:
NCV	BDF	JDM	MOFFATT & NICHOL

Date: JANUARY 2020
Checked by: SRM
Drawing code:
Drawing Scale: Plot scale: 1:1 (D SHEET)
M&N Project No. 10611
Rev. 1

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-331
Sheet 60 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000−331; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/11/2020 3:56 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE−CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 32 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919−781−4626
moffatt & nichol NC FIRM LICENSE No. F−0105

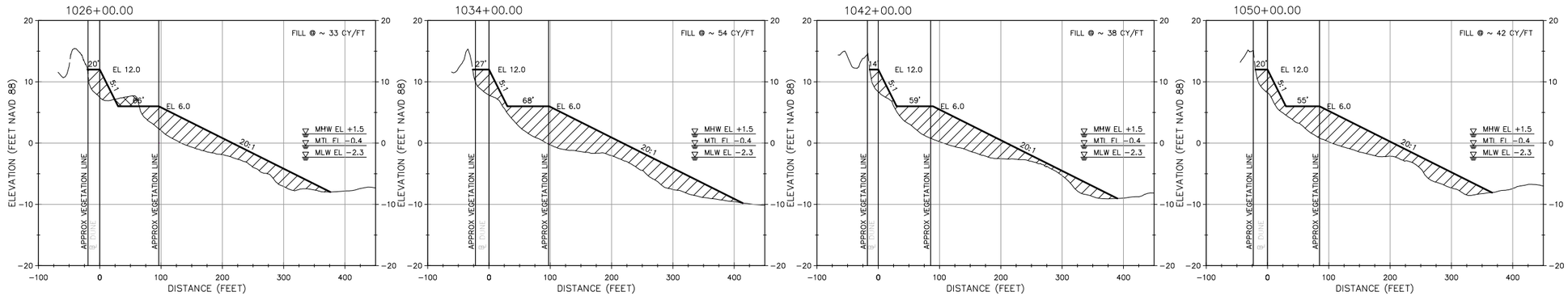
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

Rev.	1
Date:	JANUARY 2020
M&N Project No.	10611
Drawing code:	
Drawing Scale:	
Plot scale: 1:1 (D SHEET)	
Designed by:	NCV
Dwn by:	BDF
Ckd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-332
Sheet 61 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611D0C−332; Plotted: 2/14/2020 10:36 AM by FORD, BRIAN; Saved: 2/11/2020 3:57 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

SCALE: 1"=10' VERTICAL

SCALE: 1"=100' HORIZONTAL

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 33 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN

SEAL

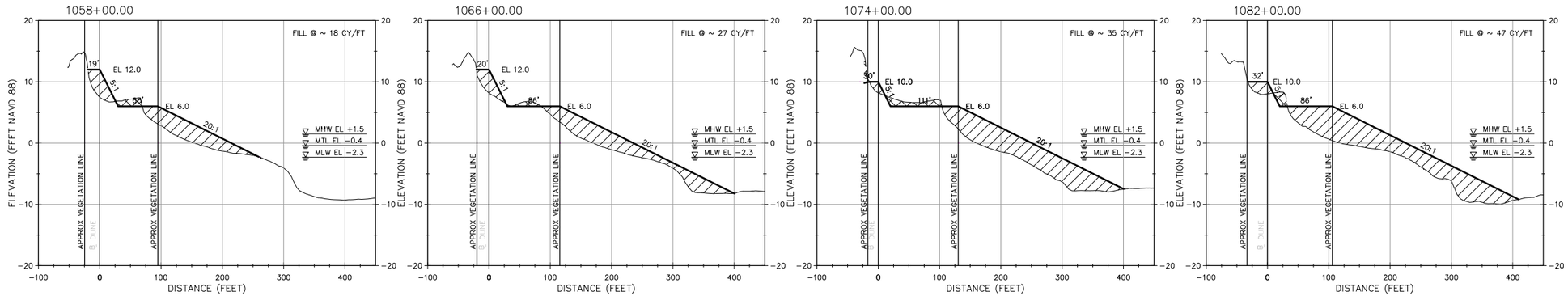
Rev.	1
Date:	JANUARY 2020
M&N Project No.	10611
Designed by:	NCV
Dwn by:	BDF
Chkd by:	SRM
Reviewed by:	JDM
Drawing code:	
Submitted by:	MOFFATT & NICHOL
Drawing Scale:	Plot scale: 1:1 (D SHEET)

Sheet Reference No.

C-333

Sheet 62 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-333; Plotted: 2/14/2020 10:36 AM by FORD, BRIAN; Saved: 2/11/2020 3:57 PM by BFORD



NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C−300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

10' 0' 10' 20'
SCALE: 1"=10' VERTICAL

100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS
SHEET 34 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

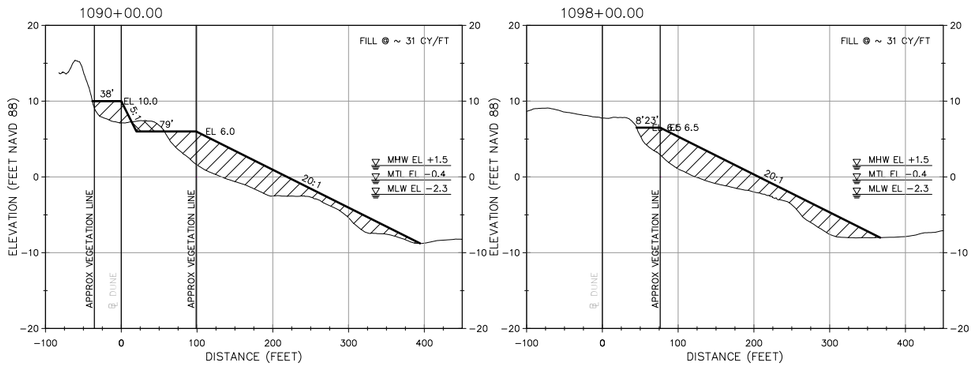
Designed by:	Drawn by:	Reviewed by:	Submitted by:
NCV	BDF	JDM	MOFFATT & NICHOL

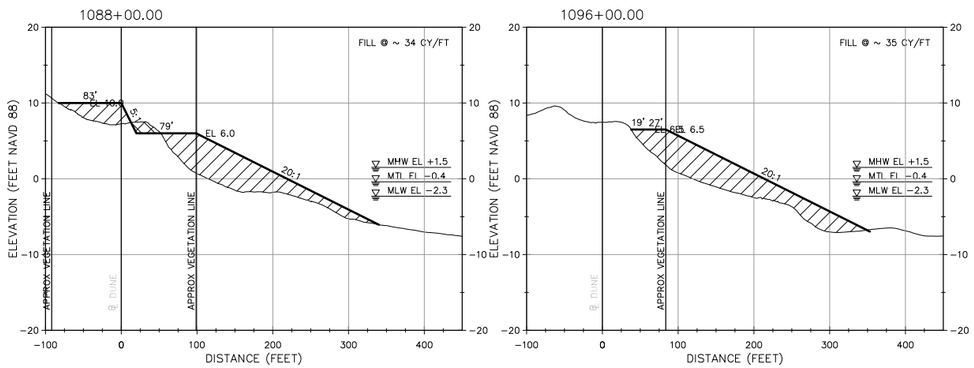
Date: JANUARY 2020
Chkd by: SRM
Drawing code:
M&N Project No. 10611
Drawing Scale:
Plot scale: 1:1 (D SHEET)
Rev. 1

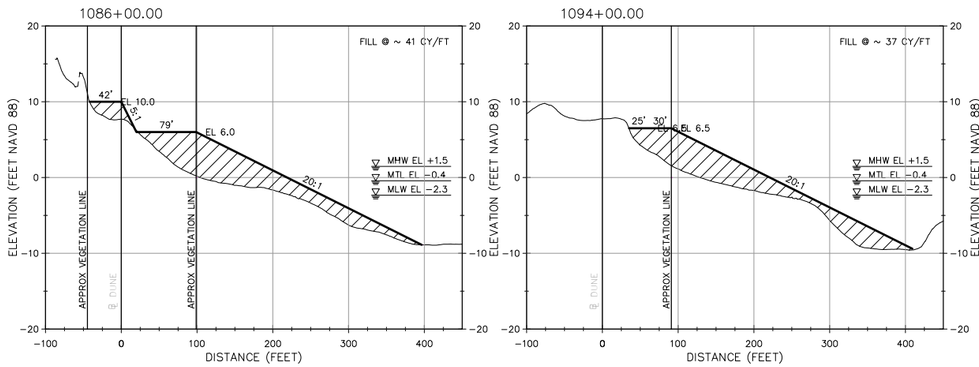
Sheet Reference No.
C-334
Sheet 63 of 66

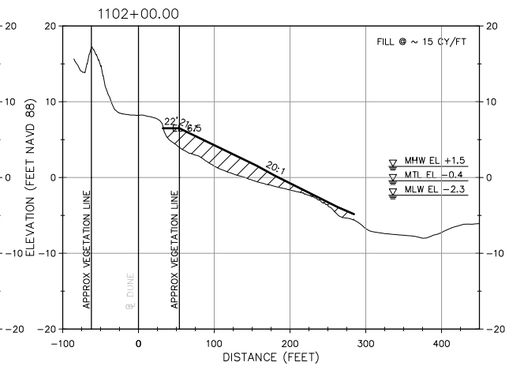
File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-334; Plotted: 2/14/2020 10:36 AM by FORD, BRIAN; Saved: 2/11/2020 3:57 PM by BFORD

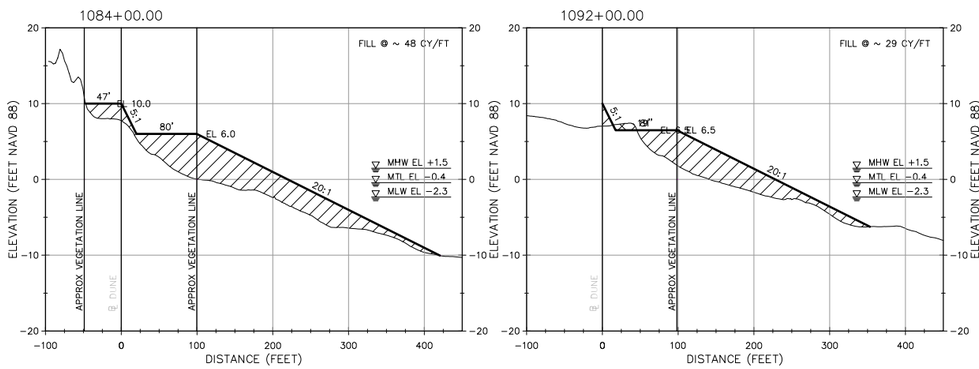
DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

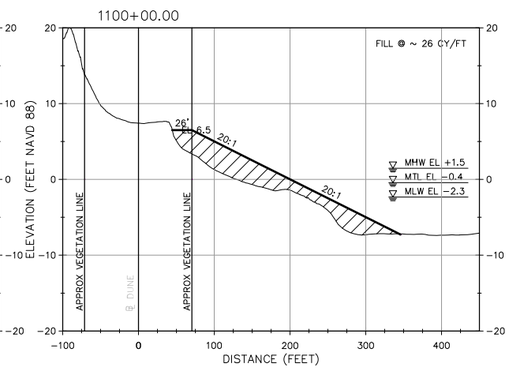












NOTES:

1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- LIMITS OF FILL
- LIMITS OF CUT

10' 0' 10' 20'

SCALE: 1"=10' VERTICAL

100' 0' 100' 200'

SCALE: 1"=100' HORIZONTAL

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

RENOURISHMENT SECTIONS SHEET 35 OF 35

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
NC FIRM LICENSE No. F-0105
moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

Designed by: NCV
Drawn by: BDF
Checked by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL
Date: JANUARY 2020
M&N Project No. 10611
Drawing code:
Drawing Scale:
Plot scale: 1:1 (0 SHEET)
Rev. 1

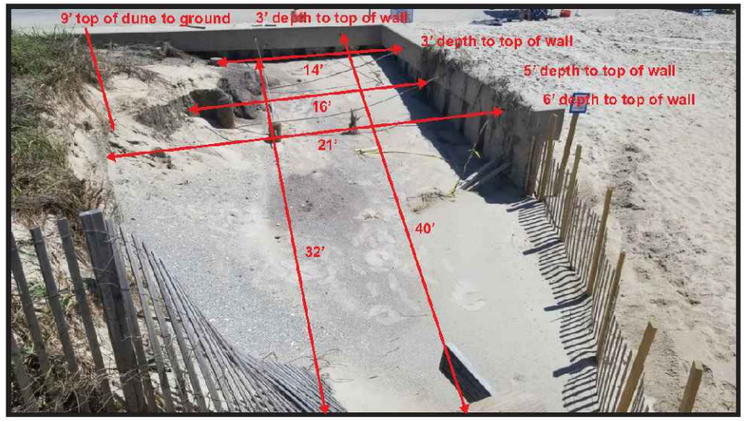
NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-335
Sheet 64 of 66

File: Q:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611000-335; Plotted: 2/14/2020 10:36 AM by FORD, BRIAN; Saved: 2/11/2020 4:04 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

SOUTH



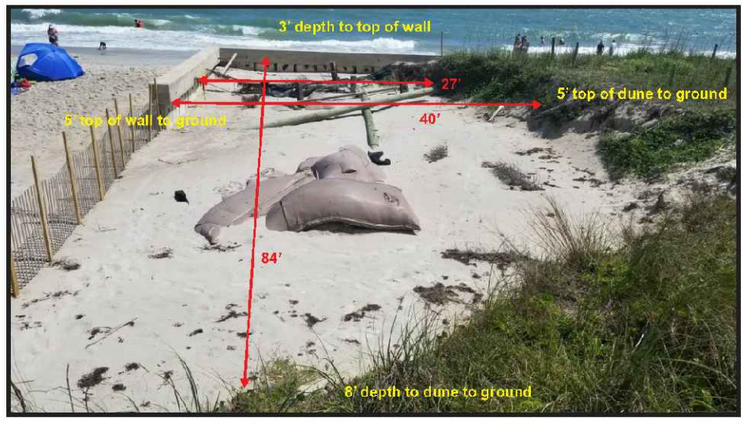
EAST WEST

NORTH

NOTE:
CONTRACTOR TO FILL AND PLANT THIS AREA BEHIND EXISTING RETAINING WALL TO MATCH THE PROPOSED DUNE DESIGN WITH APPROXIMATELY 75 CY TO 100 CY OF FILL.

C1 / C-124 IRON STEAMER WEST FILL
NOT TO SCALE

SOUTH



EAST WEST

NORTH

NOTE:
CONTRACTOR TO FILL AND PLANT THIS AREA BEHIND EXISTING RETAINING WALL TO MATCH THE PROPOSED DUNE DESIGN WITH APPROXIMATELY 75 CY TO 100 CY OF FILL.

A1 / C-124 IRON STEAMER EAST FILL
NOT TO SCALE

Mark	Description	Date	Appr.
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

MISCELLANEOUS DETAILS

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
maffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

Designed by:	NCV
Dwn by:	BDF
Ckd by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019
M&N Project No.	10611
Drawing code:	
Drawing Scale:	Plot scale: 1:1 (0 SHEET)
Rev.	

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-501
Sheet 65 of 66

File: c:\PA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611C00C-501; Plotted: 2/14/2020 10:36 AM by FORD, BRIAN; Saved: 8/19/2019 1:28 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

DUNE WORK POINT TABLE			
WORK POINT	ELEVATION	NORTHING	EASTING
1000	10.00	330983.25	2573534.68
1001	10.00	331053.53	2573798.25
1002	10.00	331340.29	2574317.86
1003	10.00	332089.35	2576074.81
1004	10.30	332733.11	2577597.52
1005	12.00	332966.74	2578226.07
1006	12.00	333006.27	2578318.06
1007	12.00	333563.73	2579817.81
1008	12.00	333593.89	2579913.29
1009	12.00	333652.43	2580070.79
1010	13.00	334091.47	2581359.14
1011	13.00	334586.38	2582759.90
1012	13.00	334984.24	2583971.83
1013	13.00	335058.22	2584168.02
1014	13.00	335150.41	2584452.98
1015	13.00	335190.70	2584545.04
1016	13.00	335621.78	2585877.55
1017	13.00	335664.00	2586073.04
1018	13.00	335770.13	2586401.08
1019	13.00	336161.48	2587690.30
1020	13.00	336535.35	2588838.90
1021	13.00	336561.59	2588935.66
1022	12.00	336959.92	2590277.34
1023	12.00	336990.85	2590371.96
1024	12.00	337016.86	2590462.06
1025	10.00	337167.68	2590942.82
1026	10.00	337188.08	2591041.22
1027	12.00	337434.96	2591828.16
1028	12.00	337540.27	2592187.94
1029	12.00	337601.32	2592378.65
1030	12.00	337758.89	2592916.91
1031	12.00	337802.59	2593049.10
1032	12.00	338008.39	2593720.13
1033	12.00	338197.33	2594369.03
1034	12.64	338366.27	2594967.36
1035	13.00	338398.25	2595062.22
1036	13.00	338617.74	2595831.49
1037	13.65	338682.65	2596020.66
1038	14.00	339124.32	2597553.58
1039	14.00	339341.84	2598329.64
1040	14.00	339354.39	2598429.97
1041	13.00	339550.25	2599128.76
1042	12.00	339841.01	2600208.59
1043	12.00	340094.59	2601257.31
1044	12.00	340160.03	2601568.59
1045	12.00	340281.34	2602011.27
1046	12.38	340495.22	2602864.25
1047	14.00	340753.48	2603931.95
1048	14.00	341155.97	2605551.25
1049	14.00	341394.98	2606545.84
1050	13.00	341550.66	2607186.23
1051	13.00	341939.26	2608810.20
1052	13.00	341979.38	2609005.92
1053	13.00	342111.68	2609621.80
1054	13.00	342275.23	2610360.65
1055	13.00	342560.17	2611696.79
1056	13.00	342681.64	2612332.99
1057	13.00	342681.87	2612334.31
1081	13.00	347250.63	2634456.26
1082	13.00	347696.53	2636823.80
1086	13.00	348560.07	2641745.32
1087	13.00	348720.42	2642561.11
1088	13.00	348791.34	2642921.58
1089	13.00	348868.64	2643314.52
1090	13.00	348943.29	2643750.13
1091	12.00	349103.68	2644695.54
1092	12.00	349305.76	2645978.60

DUNE WORK POINT TABLE			
WORK POINT	ELEVATION	NORTHING	EASTING
1093	12.00	349422.70	2646669.41
1094	12.00	349452.68	2646866.48
1095	12.00	349565.44	2647574.68
1096	13.00	349668.69	2648249.83
1097	13.00	349753.80	2648835.06
1098	13.00	349847.79	2649436.32
1099	13.00	349886.00	2649632.92
1100	13.00	349957.68	2650134.14
1101	13.00	350042.62	2650620.66
1102	13.00	350153.70	2651359.83
1103	13.00	350304.42	2652502.93
1104	13.00	350362.87	2652948.23
1105	13.00	350399.29	2653075.04
1106	13.00	350448.44	2653590.76
1107	12.00	350476.09	2653839.00
1108	12.00	350525.82	2654056.57
1109	12.00	350583.78	2654367.63
1110	12.00	350691.64	2655068.95
1111	12.00	350777.13	2655750.85
1112	12.00	350806.61	2655977.95
1113	12.00	350864.55	2656300.61
1114	12.00	350968.46	2657140.54
1115	12.00	351156.87	2658527.79
1116	12.00	351283.65	2659567.23
1117	12.00	351435.14	2660988.61
1118	12.00	351548.38	2662199.26
1119	12.00	351716.51	2663686.25
1120	12.00	351761.80	2664094.96
1121	12.00	351836.92	2664789.70
1122	12.00	351869.73	2665091.52
1123	13.00	351955.28	2666074.75
1124	13.00	352054.52	2667018.35
1125	13.00	352162.96	2668453.10
1126	13.00	352226.33	2669351.11
1127	13.00	352297.35	2670468.96
1128	12.65	352345.34	2671151.67
1129	12.00	352401.32	2673147.78
1130	12.00	352410.54	2673679.31
1131	12.00	352494.64	2676143.74
1132	10.00	352539.55	2677133.51
1133	10.00	352495.95	2678296.44
1134	10.00	352507.81	2679061.46
1135	N/A	352492.74	2679767.02
1136	N/A	352498.67	2680149.10

BERM WORK POINT TABLE			
WORK POINT	ELEVATION	NORTHING	EASTING
2000	6.50	330668.51	2572674.42
2001	6.50	330760.76	2573255.49
2002	5.92	330924.73	2573840.95
2003	6.00	331221.53	2574379.32
2004	6.00	331520.16	2574968.25
2005	6.00	332013.13	2576107.28
2006	6.00	332640.14	2577634.37
2007	6.00	332719.89	2577784.40
2008	6.00	332882.51	2578221.89
2009	6.00	332907.98	2578319.11
2010	6.00	333465.44	2579818.86
2011	6.00	333497.47	2579913.64
2012	6.00	333567.18	2580101.20
2013	6.00	334001.09	2581389.99
2014	6.00	334496.27	2582791.58
2015	6.00	334893.46	2584001.49
2016	6.00	334944.04	2584174.07
2017	6.00	335048.45	2584454.56
2018	6.00	335084.00	2584548.22
2019	6.00	335500.55	2585884.57
2020	6.00	335585.58	2586119.56
2021	6.00	335674.84	2586431.43
2022	6.00	336065.98	2587719.97
2023	6.00	336430.90	2588841.08
2024	6.00	336452.34	2588939.27
2025	6.00	336854.50	2590279.83
2026	6.00	336891.50	2590372.57
2027	6.00	336925.84	2590488.76
2028	6.50	337067.51	2590946.24
2029	6.50	337087.53	2591044.72
2030	6.39	337339.31	2591857.78
2031	6.00	337440.15	2592191.37
2032	6.00	337502.91	2592381.63
2033	6.00	337672.34	2592942.05
2034	6.00	337708.43	2593050.77
2035	6.00	338091.56	2594399.25
2036	6.00	338402.62	2595464.11
2037	6.00	339013.76	2597585.22
2038	6.00	339248.87	2598434.14
2039	6.00	339270.74	2598531.84
2040	6.00	339444.30	2599158.51
2041	6.00	339484.53	2599302.76
2042	6.00	339516.22	2599397.74
2043	6.00	339749.15	2600232.84
2044	6.00	339962.15	2601140.96
2045	6.00	339975.25	2601240.60
2046	6.00	340057.39	2601590.79
2047	6.00	340176.43	2602024.52
2048	6.00	340398.13	2602888.19
2049	6.00	340556.69	2603578.53
2050	6.00	340646.65	2603957.88
2051	6.00	341049.22	2605577.79
2052	6.00	341279.72	2606490.03
2053	6.00	341429.30	2607130.96
2054	6.00	341636.15	2608040.18
2055	6.00	341826.07	2608816.68
2056	6.00	341869.15	2609011.43
2057	6.00	342008.99	2609643.70
2058	6.00	342252.32	2610780.63
2059	6.00	342452.43	2611718.96
2060	6.00	342572.47	2612337.75
2061	6.00	342731.99	2613081.29
2062	6.00	342857.07	2613681.54
2063	6.00	342988.18	2614260.79
2064	6.00	343136.98	2614929.14
2065	6.00	343268.57	2615557.96
2066	6.00	343405.68	2616212.91
2067	6.00	343562.79	2616962.84
2068	6.00	343909.80	2618634.69
2069	6.00	344258.14	2620312.92

BERM WORK POINT TABLE			
WORK POINT	ELEVATION	NORTHING	EASTING
2070	6.00	344470.47	2621321.05
2071	6.50	344877.99	2623255.65
2072	6.00	345099.73	2624455.63
2073	6.00	345487.58	2626322.16
2074	6.00	345737.82	2627558.33
2075	6.00	345932.20	2628464.86
2076	6.00	346128.84	2629379.39
2077	6.00	346363.43	2630581.85
2078	6.00	346709.22	2632215.81
2079	6.00	346844.56	2632960.95
2080	6.00	346898.86	2633303.52
2081	0.00	347123.25	2634483.09
2082	6.00	347240.14	2635184.02
2083	6.00	347459.79	2636350.24
2084	6.00	347574.83	2636877.76
2085	6.00	348436.45	2641557.90
2086	6.00	348456.98	2641770.39
2087	6.00	348619.75	2642593.98
2088	6.00	348720.83	2643125.94
2089	6.00	348839.93	2643768.61
2090	6.00	349029.53	2644957.92
2091	6.00	349092.64	2645294.32
2092	6.00	349310.14	2646675.05
2093	6.50	349469.61	2647589.69
2094	6.50	349566.25	2648256.18
2095	6.50	349652.96	2648850.44
2096	6.50	349753.09	2649441.46
2097	6.50	349856.90	2650149.85
2098	6.50	349929.94	2650628.41
2099	6.50	350026.74	2651372.04
2100	6.50	350188.39	2652409.90
2101	6.50	350183.22	2652574.10
2102	6.50	350220.00	2652918.25
2103	6.44	350301.28	2653100.65
2104	6.50	350370.21	2653823.86
2105	6.18	350429.98	2654077.09
2106	6.00	350485.87	2654374.98
2107	6.00	350594.76	2655083.76
2108	6.00	350709.44	2655990.73
2109	6.00	350767.56	2656314.68
2110	6.00	350870.52	2657147.59
2111	6.00	351056.85	2658535.11
2112	6.00	351086.16	2658733.08
2113	6.00	351189.90	2659579.22
2114	6.00	351337.64	2660998.49
2115	6.00	351406.24	2661715.92
2116	6.00	351453.31	2662208.25
2117	6.00	351614.11	2663697.41
2118	6.00	351676.50	2664100.00
2119	6.00	351748.54	2664799.09
2120	6.48	351765.61	2665097.71
2121	6.50	351808.26	2665493.78
2122	6.50	351851.62	2666083.20
2123	6.50	351953.05	2667028.91
2124	6.00	352073.28	2668459.86
2125	6.00	352120.60	2669358.54
2126	6.00	352232.67	2671157.14
2127	6.00	352278.76	2672144.04
2128	6.00	352300.79	2673150.60
2129	6.00	352326.18	2673874.57
2130	6.00	352359.94	2674678.23
2131	6.00	352379.69	2675273.32
2132	6.00	352388.60	2676123.31
2133	6.00	352404.65	2677136.17
2134	6.00	352397.00	2678293.65
2135	6.50	352419.80	2679769.69
2136	6.50	352429.67	2680025.71
2137	6.50	352493.71	2680262.93
2138	6.00	347670.71	2637323.69

MISCELLANEOUS WORK POINT TABLE			
WORK POINT	ELEVATION	NORTHING	EASTING
3000	13.00	352340.32	2671080.25
3001	12.00	352348.94	2671280.03
3002	12.00	352527.91	2676877.02
3003	10.00	352536.98	2677076.82
3004	6.50	352024.97	2667884.92
3005	6.00	352041.72	2668084.22
3006	6.00	352405.98	2678875.10
3007	6.50	352409.07	2679075.07
3008	12.00	332792.54	2577757.40
3009	12.00	333694.92	2580195.47
3010	13.00	333759.43	2580384.78
3011	13.00	348969.85	2643906.68
3012	12.00	349003.30	2644103.86
3013	12.00	349578.12	2647657.61
3014	13.00	349608.36	2647855.31
3015	NOT USED		
3016	NOT USED		
3017	13.00	351887.74	2665298.48
3018	6.00	349396.58	2647170.82
3019	6.50	349430.93	2647367.85
3020	6.50	350385.01	2653886.59
3021	6.00	350449.21	2654179.56
3022	6.00	350757.10	2656256.38
3023	6.00	350797.10	2656553.63
3024	6.00	351754.17	2664897.65

MISCELLANEOUS WORK POINT TABLE IS PROVIDED FOR ADDITIONAL REFERENCE POINTS ASSOCIATED WITH A CHANGE IN DUNE OR BERM ELEVATION.

Mark	Description	Date	Appr.
1	PRE-CONSTRUCTION DESIGN REVISION	01/24/20	JM
0	BID DOCUMENTS	08/19/19	JM

POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

CONSTRUCTION BASELINE
WORK POINT TABLES

Rev. 1
Date: JANUARY 2020
M&N Project No. 10611
Drawing scale:
Drawing Scale:
Plot scale: 1:1 (0 SHEET)
Designed by: NCV
Cad by: SRM
Dwn by: BDF
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH

NORTH CAROLINA PROFESSIONAL SEAL 23487 ENGINEER JOHNNY D. MARTIN
SEAL

Sheet Reference No.
C-601
Sheet 66 of 66

File: O:\RA\10611\0500_CAD_Active_10611 Bouge Banks 2020\10611100C-601. Plotted: 2/14/2020 10:36 AM by FORD, BRIAN; Saved: 2/12/2020 1:54 PM by BFORD

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

APPENDIX B

Interlocal Agreement

INTERLOCAL AGREEMENT REGARDING LONG TERM BEACH NOURISHMENT BETWEEN CARTERET COUNTY, NORTH CAROLINA, AND THE MUNICIPALITIES OF ATLANTIC BEACH, PINE KNOLL SHORES, INDIAN BEACH, AND EMERALD ISLE

This Interlocal Agreement is made for purposes of reference MARCH 15, 2010 by and between the County of Carteret, North Carolina, a body corporate and politic (hereinafter referred to as the "County"), and the Municipalities of Atlantic Beach, Pine Knoll Shores, Indian Beach, and Emerald Isle, bodies politic and corporate (hereinafter referred to as the "Towns").

PURPOSE

Whereas, County and Towns are jointly seeking approval by State and Federal Agencies of a 30-year Nourishment Plan for the Bogue Banks Beaches, and the State in anticipation of such a plan is prepared to complete/review one Environmental Impact Study, and State and Federal Agencies involved in the funding have indicated that they strongly prefer and require that Bogue Banks units of local government work on and submit one mutual plan for beach nourishment without individual towns seeking separate funding or individual beach nourishment projects except in emergencies approved in accordance with this Agreement;

Whereas, it is within the contemplation of the Parties hereto and State agencies involved in the approval process that the U.S. Army Corps of Engineers and other federal

approval agencies will issue one permit for the Bogue Banks beaches valid for 30 years and it is anticipated the permit will be constantly updated and amended based upon numerous factors including hurricanes, severe erosion, availability of funding, etc;

Whereas, County and Towns now desire to enter into an agreement that provides a planning mechanism, plan, and compact among the parties for a multi-decadal beach nourishment program for Bogue Banks (hereinafter referred to as the "Master Nourishment Plan", "Master Plan", or "Plan"), which utilizes available funds from the County's occupancy tax administered and collected under S.L. 2007-112, or future modifications to this law, and any State and Federal funding secured for the Master Nourishment Plan;

Whereas, under this Agreement it is contemplated the County as the lead sponsor, with the assistance of its Shore Protection Office, the Carteret County Beach Commission, and consultants hired by the County, in consultation with the Towns, will prepare the Master Nourishment Plan for approval by the Towns which upon approval will then be implemented under this Agreement with the County being the designated permittee for beach nourishment on Bogue Banks under the auspices of the County Beach Commission and Shore Protection Office.

NOW THEREFORE, County and Towns pursuant to NCGS 153A-13, NCGS 160A-17 and NCGS 160A-460, hereby contract and agree as follows:

1. Purpose. County and Towns enter into this Agreement in order to approve, carry out and complete under a common plan, one permit and a common source of tax funding and revenues for the Master Beach Nourishment Plan in accordance with the terms and conditions set forth herein.

2. Participation of the Town of Atlantic Beach. It is contemplated the Town of Atlantic Beach will remain eligible for and continue to receive satisfactory sand for its beaches based upon past years from the dredging of the Morehead City Harbor Federal Navigation Project, and will therefore only be involved in the Master Beach Nourishment Plan if the availability of dredged sand is terminated or cut off. The plan will provide for the contingency of providing beach nourishment to the ocean beaches of the Town of Atlantic Beach under the Master Plan and using available revenue sources if the dredged sand currently provided by the US Army Corps becomes unavailable or are restricted or terminated. The Master Plan will provide alternatives if the provision of sand becomes unavailable or insufficient to provide for the needs of the entire ocean shoreline of Atlantic Beach.

3. Development of Master Beach Nourishment Plan. The County, using available occupancy tax revenues will over the next 18 to 36 months develop the Master Plan in consultation with State and Federal Agencies, the Towns, consulting engineers, the Shore Protection Office and the County Beach Commission, and submit the same to the Towns for consideration and approval. Concurrently the County will submit for a State and Federal permit to carry out and complete the plan.

The final approved plan will contain the following principles and encompass and cover the following subjects, goals and objectives:

a. Beneficiaries. The Towns of Emerald Isle, Indian Beach, and Pine Knoll Shores understand they are the primary beneficiaries of the Master Beach Nourishment Plan and that the Town of Atlantic Beach will be a contingent beneficiary should sand from the Morehead City Harbor Federal Navigation Project and other past sources become unavailable or insufficient to provide for the needs of the entire ocean shoreline of Atlantic Beach.

b. Easements and Rights-of-Way. Each Town shall be responsible for providing the staging areas, sites or necessary lands, easements, and rights-of-way required for the development, construction, and maintenance of those elements of the Master Beach

Nourishment Plan to be implemented within the Town. No Town will be obligated to provide sites, staging areas or facilities for nourishment that will take place in another party's jurisdiction. However, the plan will provide that Towns may cooperate in providing staging areas and access to the beach for beach construction equipment regardless of where the beach construction activity is taking place when joint nourishment projects are undertaken.

c. Public Beach Access and Parking. The Towns shall be responsible for securing, constructing, and maintaining any and all access/parking facilities stipulated as a condition of receiving State or Federal funding. All public beach accesses and parking facilities must be secured prior to issuing a notice to proceed for each construction event.

d. Funding Contingency. Each party's participation in a nourishment project associated with the Master Beach Nourishment Plan will be contingent on such party being able, in its sole discretion, to fund its portion of the project. Each Town is required to anticipate the need for the local funding share and to either budget for the same over a period of years, provide for and conduct elections in approval of bonds or borrowing under LGC approvals,

or put in place tax districts or similar means of funding the local share. Failure to meet local funding needs by one or more Towns could result in the Beach Commission passing over a project of a Town due to lack of funding.

e. Inventory of Present Beaches. The Master Plan will inventory, map, survey, describe, and highlight in detail data regarding the Bogue Banks Beaches' ocean shoreline, the heights and elevations of the public trust areas, the elevations of dunes, the location of first lines of vegetation, low areas, "hot spots", and the like.

f. Sand Resources. The Master Plan will provide a survey of the location, quality, quantity, and usefulness of sand resources which may be selected.

g. Time Frame and Budget Estimates. The Master Plan will estimate the cost of dredging and the placement of sand within each Town which will be constantly updated, and further provide a time frame and schedule for dredging and the placement of sand on the oceanfront beaches of the participating units of local government over the 30-year plan which may be reasonably relied upon by the Towns so that each Town will be able to fund its local share.

h. Triggers. The Master Plan will provide a method for the immediate dredging and placement of sand when sand along the oceanfront beaches falls below specified minimum levels or parameters (herein "triggers"). The plan will also provide a mechanism for emergency dredging and placement of spoils when the need arises as a result of hurricanes, natural disasters, and similar acts of God so that hot spots or specified areas of need receive immediate and emergency nourishment to prevent loss of human life, property, structures, and the like.

i. Methods of Nourishment. The Master Plan will specify the method of nourishment for the beaches within each Town, the probable sources of sand, estimated schedule, estimated cost, and similar details.

j. Environmental Impact Statement. The Master Plan will include the completion of the Environmental Impact Statements required by State and Federal permitting agencies as a condition of issuing the long term beach nourishment permit covering the 30 year plan.

k. Construction Administration. The County or a Town may serve in the role as lead administrator for any nourishment event associated with the Master Beach

Nourishment Plan, and accordingly prior to the construction of any nourishment event, the County and Town(s) involved with the project will determine which entity or entities will serve in this capacity (lead administrator). All State and/or Federal funding secured for each nourishment event will be distributed to the lead administrator.

1. Project Cost-Sharing. Cost sharing for the Master Plan as approved and adopted will be implemented generally along the following principles:

   (1) By the Town or Towns receiving sand within its or their city limit(s), and the County for unincorporated areas of Bogue Banks receiving sand, on a prorata basis, and the plan will set out the recommended basis for establishing the formula to be used.

   (2) If only one Town, or the County alone, is scheduled to receive sand in a project, that Town or the County will bear all costs of the same.

   (3) If two or more parties are scheduled to receive sand in a joint project, then it is anticipated that a separate interlocal agreement would be coordinated and executed among the parties involved detailing how

project costs (unit and fixed) would be allocated, sequencing of nourishment, payment responsibilities, etc.

(4) The Master Plan will provide that project costs to be included in any specific nourishment project will include but not being limited to planning, permitting, engineering, environmental, legal, accounting, administration, construction, mobilization and demobilization. While project costs may include financing costs, each Town, and the County for projects in the un-incorporated areas of Bogue Banks, will bear its own financing costs and any costs relating thereto.

4. Indemnity. The Towns agree to indemnify and save the County harmless from any claim, suit, administrative proceeding, judgment or penalty, including attorneys' fees and other costs incurred in defending the same, of whatsoever nature or kind arising out of or in any way relating to the Master Beach Nourishment Plan, or this Interlocal Agreement including but not being limited to contract claims relating to the Master Beach Nourishment Plan, tort claims from third parties, damages arising from violation of laws protecting endangered species, and contamination claims. This indemnity provision is

applicable to all phases of the Master Beach Nourishment Plan and regardless of which entity serves as lead administrator for individual construction events. Excluded from the indemnity will be claims relating to any of the above arising out of a nourishment project occurring in the un-incorporated areas of Bogue Banks over which the County has exclusive jurisdiction.

5. Withdrawal from Compact. The commitment of each Town to provide public beach access, parking, any other lands or rights-of-way, or any rules or regulations with respect to use of the same, as a party to this agreement, is expressly conditioned on Federal and State laws, regulations, or interpretations thereof, as of the date of approval of this agreement by the signatories herewith, and if there are amendments, changes or interpretations to Federal or State law, regulations, which are more stringent provisions than are currently in effect, after this Agreement is approved, any party that chooses not to meet the requirements shall have a right to withdraw from the same at any time.

6. "Least Cost Method of Disposing of Dredge Spoils." Each party is free to either defend or seek amendments to the policy or practice of the U.S. Army Corps of Engineers in using the "least cost" method of disposing of dredge spoils as such practice impacts the depositing of sand on the beaches of any of the parties to the Plan.

7. Role of the Carteret County Beach Commission. The Parties hereto recognize that the Carteret County Beach Commission is representative of each Town and County. The Commission is directly involved in the promotion of a stable beach shoreline, has oversight in the spending of tax revenues from the occupancy tax on beach nourishment, and has the resources to assist with the formulation and administration of the Plan.

The Parties agree that the Beach Commission shall be the final authority on the scheduling and timing of beach nourishment events for each Town under the following circumstances:

A. In those circumstances where there are hot spots due to severe erosion, hurricanes, coastal storms, and the like, and there is an immediate need for the placement of spoils and action, the Commission shall have the authority to delay scheduled nourishment under the Plan's approved 30 year plan and schedule for one or more Towns, and to move up and approve beach nourishment for the hot spots or areas in immediate need. In such an event the Commission shall confer with all necessary parties, and have the authority to revise the Plan's schedule.

B. In the event a Town lacks the necessary local funding for its nourishment event, the Commission

after consultation with the Town, may revise the Plan's schedule and move up one or more Towns in the approved schedule.

C. When circumstances, the availability of funding, unanticipated spoils, timing or similar factors affecting the overall protection and soundness of Bogue Banks oceanfront beaches, arise, which in the opinion of the Beach Commission justify and require a change in the schedule and timing of the Plan's nourishment events and projects, then the Commission following consultation with the Towns and County, may revise the Plan's schedule, and approve alternate nourishment events.

8. Arbitration. In those circumstances where one or more Towns are dissatisfied with decisions made by an event's lead administrator or the Beach Commission, the Town may request arbitration by notifying the County in writing, specifying the reason and requesting a review or arbitration of the decision. Upon such a request, the Town and County shall each appoint one disinterested representative with an extensive education, background, and experience in ocean sciences and engineering, ocean studies, and related fields. The Town and County will subsequently agree upon a third arbitrator. The Town and County shall then present the factors and circumstances leading to the decision in dispute to the panel, and the

majority decision reached by the panel shall be binding on the parties. The County shall have the authority as the lead agency to establish the time frame, to set the meetings, establish the format and rules, and determine the qualifications of each representative.

9. Withdrawal, Termination, Modifications, Amendments, and Binding Effect. Until the Plan has been carried out and completed as modified and amended from time to time, this Agreement will remain in effect and be binding on the Parties regardless of changes in the composition of boards of the respective units of local government that are parties hereto. This Agreement is a continuing contract until the purposes herein have been completed. No party may withdraw except that a Town upon 12 months written notice to the County following adoption of its own plan providing for its own funding sources may withdraw. Upon such withdrawal the Town shall have the responsibility on its own to provide all sources of funding for beach nourishment by procuring the same from State and Federal agencies and providing the local match other than from County occupancy tax revenues and receipts.

Any amendment or modification to this Agreement shall require the written consent of all Parties.

IN WITNESS WHEREOF, the parties have executed this Agreement.

COUNTY OF CARTERET

By: _____
Chairman of the Board

Attest:

_____
County Clerk

TOWN OF ATLANTIC BEACH

By: _____
Mayor

Attest:

_____
Town Clerk

TOWN OF PINE KNOLL SHORES

By: _____
Mayor

Attest:

_____
Town Clerk

TOWN OF INDIAN BEACH

By: _____
Mayor

Attest:

_____
Town Clerk

TOWN OF EMERALD ISLE

By: _____
Mayor

Attest:

_____
Town Clerk