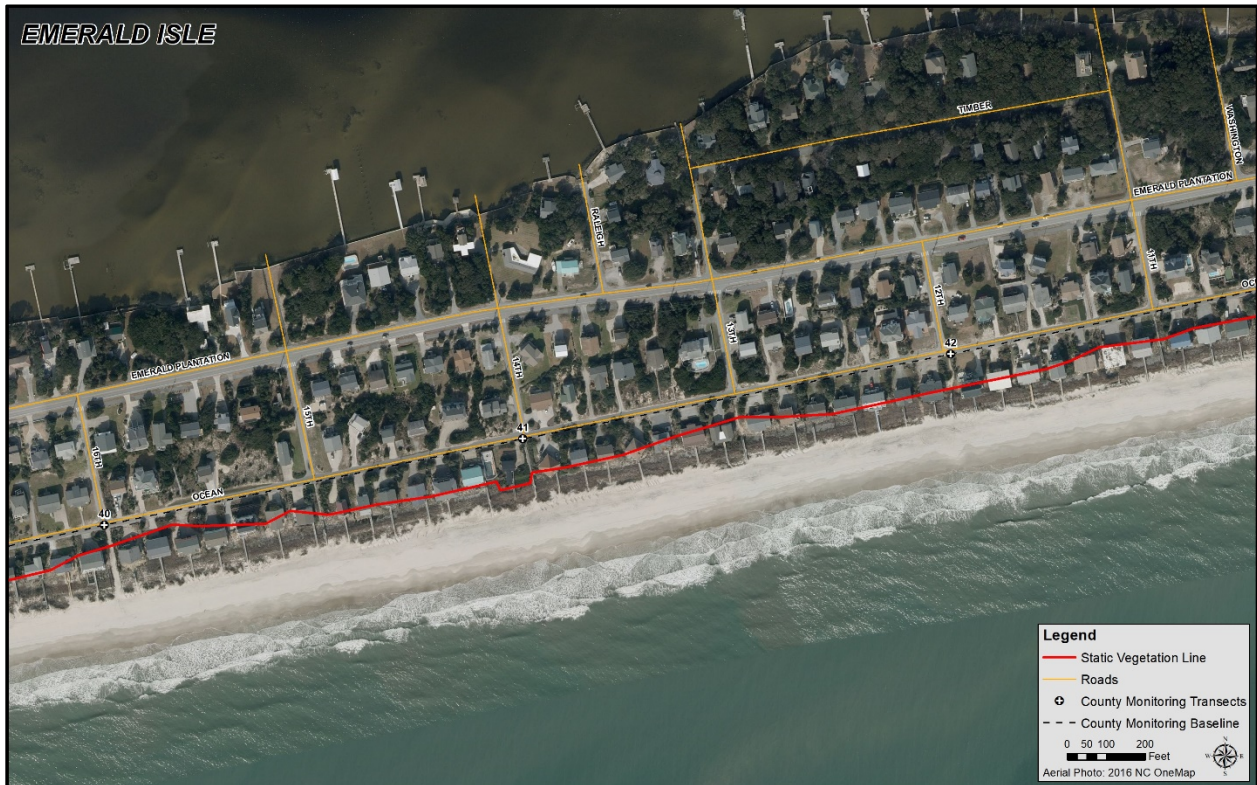


TOWN OF EMERALD ISLE, NC STATIC LINE EXCEPTION 5 YEAR REVIEW / REAUTHORIZATION

October 30, 2020



Prepared by: Moffatt & Nichol



moffatt & nichol

Prepared For: Town of Emerald Isle, NC

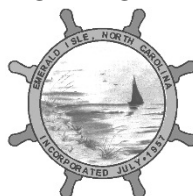


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1.0 PURPOSE

The Town of Emerald Isle initially applied for and received an exception from the static line, which covers Eastern Emerald Isle (site of the 2003 Bogue Banks Restoration Project Phase II), 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 the eastern 5.9 miles of the town's approximate 11 mile oceanfront shoreline as a result of a large scale beach nourishment project constructed in 2003 that exceeded the original 250,000 cy and 50 cy/ft criteria for triggering a static line. The static vegetation line together with the rule establishing graduated setback requirements based on building size (15A NCAC 07h .0306) rendered 171 ocean front properties non-conforming, 160 of which are occupied with structures ranging in size from less than 1,000 square feet to over 4,000 square feet. Twenty-three (23) of the 160 non-conforming structures have heated floor spaces greater than 2,500 square feet. Note that the number of structures does not include the Ocean Reef and Pier Point Condominiums which would have ten (10) and five (5) buildings, respectively, rendered non-conforming.

Recently, in February through April 2020, a portion of the Post-*Florence* Renourishment Project – Phase II (Reach 2) was constructed in Western Emerald Isle, triggering a new static line based on updated criteria defining the requirement for all projects over 300,000 cy. It should be noted that this portion of Western Emerald Isle was originally included in Phase III of the Bogue Banks Restoration Project, constructed in 2005, but did not trigger a static line requirement at the time based on the original criteria of 250,000 cy and 50 cy/ft. The portion of Western Emerald Isle for which the new static line was triggered also received material in 2007 as part of the post-*Ophelia* restoration and in 2013 as part of the post-*Irene* restoration but did not meet the original criteria triggering a static line in either of those events. Therefore, due to the updated criteria and placement volume of over 300,000 cy of material in Reach 2 during the Post-*Florence* Renourishment Project – Phase II in spring 2020, the Town is applying for an exception from the static line in a portion of Western Emerald Isle in accordance with procedures outlines in 15A NCAC 07J.1201 from the North Carolina Coastal Resources Commission. The portion of Western Emerald Isle for which the new static line was triggered covers approximately 1.76 miles of shoreline. The static vegetation line together with the rule establishing graduated setback requirements based on building size (15A NCAC 07h .0306) renders 39 ocean front properties non-conforming, 33 of which are occupied with structures ranging in size from approximately 1,200 square feet to over 4,000 square feet. Six (6) of the 39 non-conforming structures have heated floor spaces greater than 5,000 square feet. Note that the number of structures does not include buildings at the Sound of the Sea Condos (1 building), the Islander Hotel (1 building), Queens Court Condos (1 building), or Pebble Beach Condos (2 buildings) that would be rendered non-conforming.

This document has been created for submittal to the NC Coastal Resources Commission for the review of conditions as it relates to:

- 1) the Town's static line exception reauthorization in 2020 for Eastern Emerald Isle (site of the Bogue Banks Restoration Project Phase II)**

- 2) the Town's initial static line exception authorization in 2020 for a portion of Western Emerald Isle (site of Reach 2 of the Post-Florence Renourishment Project - Phase II).

2.0 SUMMARY OF FILL PROJECTS

2.1 Bogue Banks Restoration Project Phase II (2003)

2.1.1 Project Construction

The Bogue Banks Restoration Project (or County Project) 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 II (Eastern Emerald Isle) covering the extents of the initial Emerald Isle static line exception.

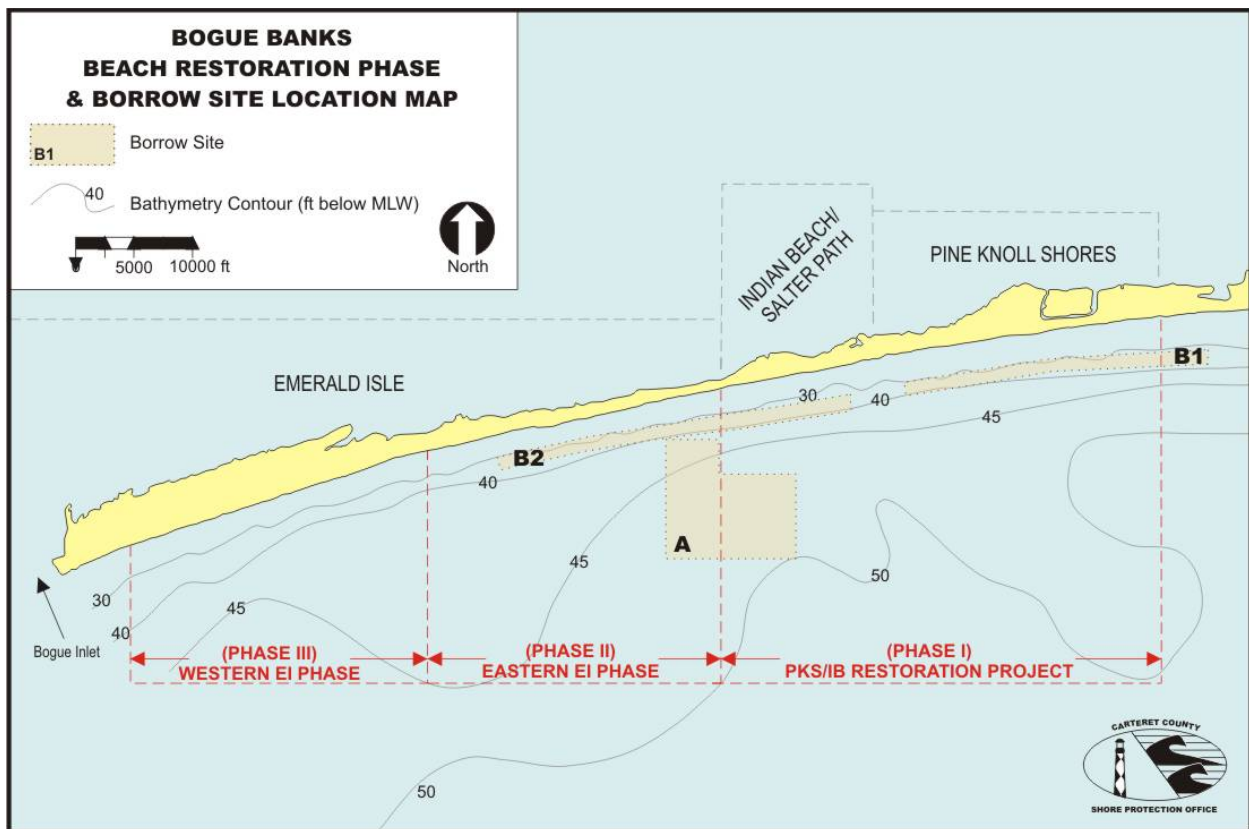


Figure 2-1. Bogue Banks Restoration Project (Carteret County Shore Protection Office)

Phase II of the Bogue Banks Restoration Project (Eastern Emerald Isle), a focus of this static line exception review, was constructed in 2003 and covered the eastern 5.9 miles of Emerald Isle, from the Indian Beach/Emerald Isle (IB/EI) town boundary to Pinta Dr, a point approximately 1.5 miles east of the Bogue Inlet Fishing Pier (Figure 2-2). This stretch of beach encompasses County monitoring transects 24 through 48 of the Bogue Banks Beach and Nearshore Mapping Program (BBNMP) which essentially cover the Emerald Isle – Central (Transects 26 – 35) and Emerald Isle – East (Transects 36 – 48) monitoring reaches. Material for Phase II of the Bogue Banks Restoration Project was obtained from borrow areas B2 and A. The total volume placed on the

5.9 mile shoreline segment was 1,867,726 cubic yards which is equivalent to 60.0 cy/ft. Of this total volume, 123,938 cubic yards were used for construction of the dune and 85,282 cubic yards were placed in the two taper sections with the balance of 1,658,506 cubic yards used to construct the new beach seaward of the dune. Phase II of the Bogue Banks Restoration Project was divided into Eastern, Middle, and Western Zones as shown in Figure 2-2 with design volumes of 82 cy/ft, 58 cy/ft, and 35 cy/ft, respectively. Based on after dredging beach profile surveys, the actual volume of material placed in each of the three zones shown in Figure 2-2 was: 1,001,300 cubic yards or 78.8 cy/ft in the Eastern Zone; 212,500 cubic yards or 54.2 cy/ft in the Middle Zone; and 444,800 cubic yards or 34.5 cy/ft in the Western Zone.

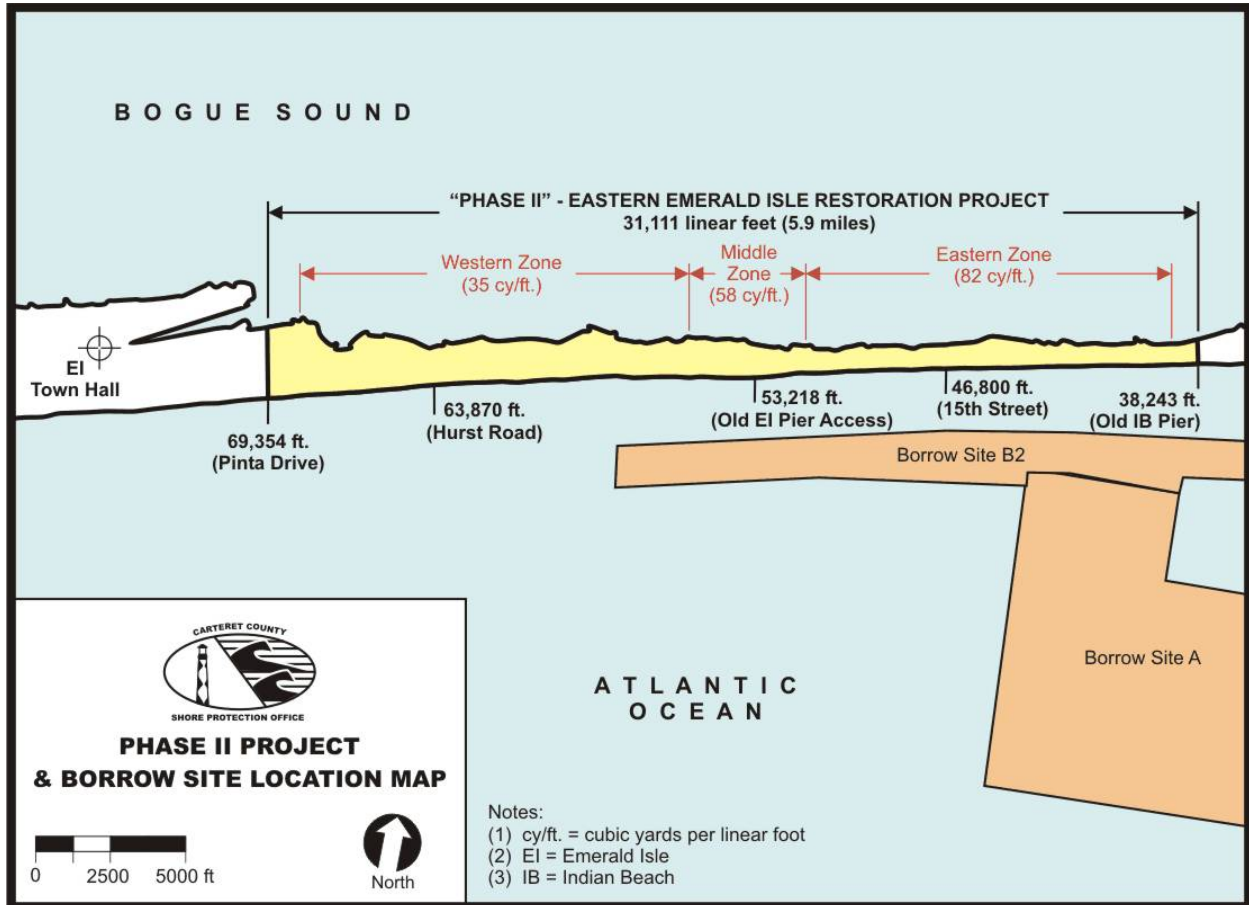


Figure 2-2. Phase II Restoration Project – Eastern Emerald Isle (Carteret County Shore Protection Office)

2.1.2 Establishment of Initial Static Vegetation Line

Phase II of the Bogue Banks Restoration Project (Eastern Emerald Isle), a focus of this static line exception review, was constructed in 2003, with completion of all three phases occurring in 2005, 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 initially 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 Phase II of the Bogue Banks Restoration 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. Although the placement rate in the Western Zone was less than 50 cy/ft, the Phase II project was treated as one project, and since the average placement rate over the 5.9 miles was 60.0 cy/ft, the entire project area was deemed subject to the static line requirement by the Division of Coastal Management (DCM). The existing static vegetation line along Eastern Emerald Isle is shown in Figure 2-3 to Figure 2-12 overlain on 2016 aerials. The line was developed by the Division of Coastal Management using pre-project aerial photography from November 26, 2002.

The static line in Eastern Emerald Isle extends approximately 5.9 miles from just west of County Transect 25, between Periwinkle Dr and Scotch Bonnet Dr to County Transect 48 just east of 1st St. 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 Eastern Emerald Isle which falls under the static line exception was determined to be 2.0. There are currently 366 oceanfront lots within the static line extents of which 9 are currently vacant.



Figure 2-3. Eastern Emerald Isle Static Vegetation Line (1 of 10)



Figure 2-4. Eastern Emerald Isle Static Vegetation Line (2 of 10)



Figure 2-5. Eastern Emerald Isle Static Vegetation Line (3 of 10)



Figure 2-6. Eastern Emerald Isle Static Vegetation Line (4 of 10)



Figure 2-7. Eastern Emerald Isle Static Vegetation Line (5 of 10)



Figure 2-8. Eastern Emerald Isle Static Vegetation Line (6 of 10)

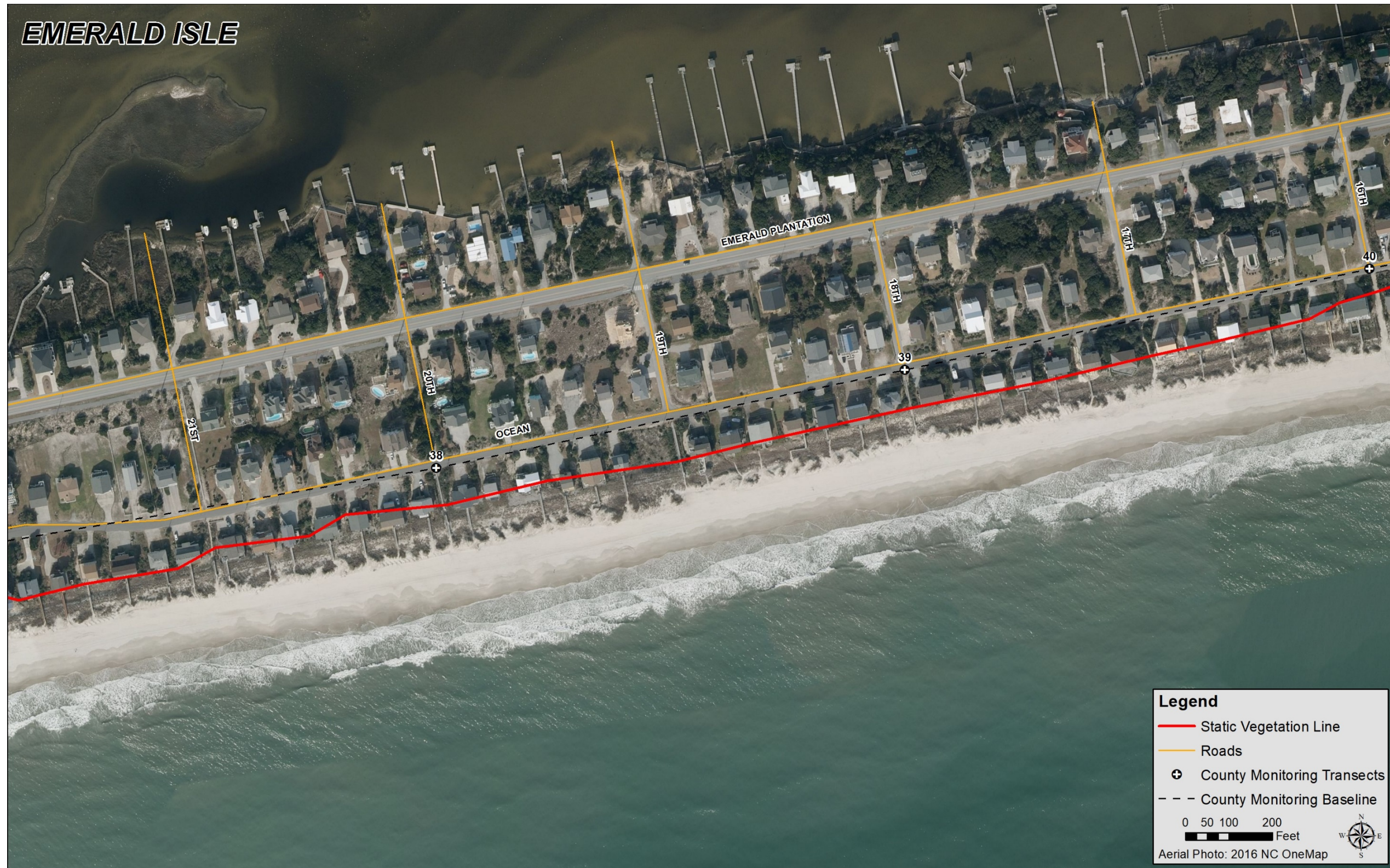


Figure 2-9. Eastern Emerald Isle Static Vegetation Line (7 of 10)

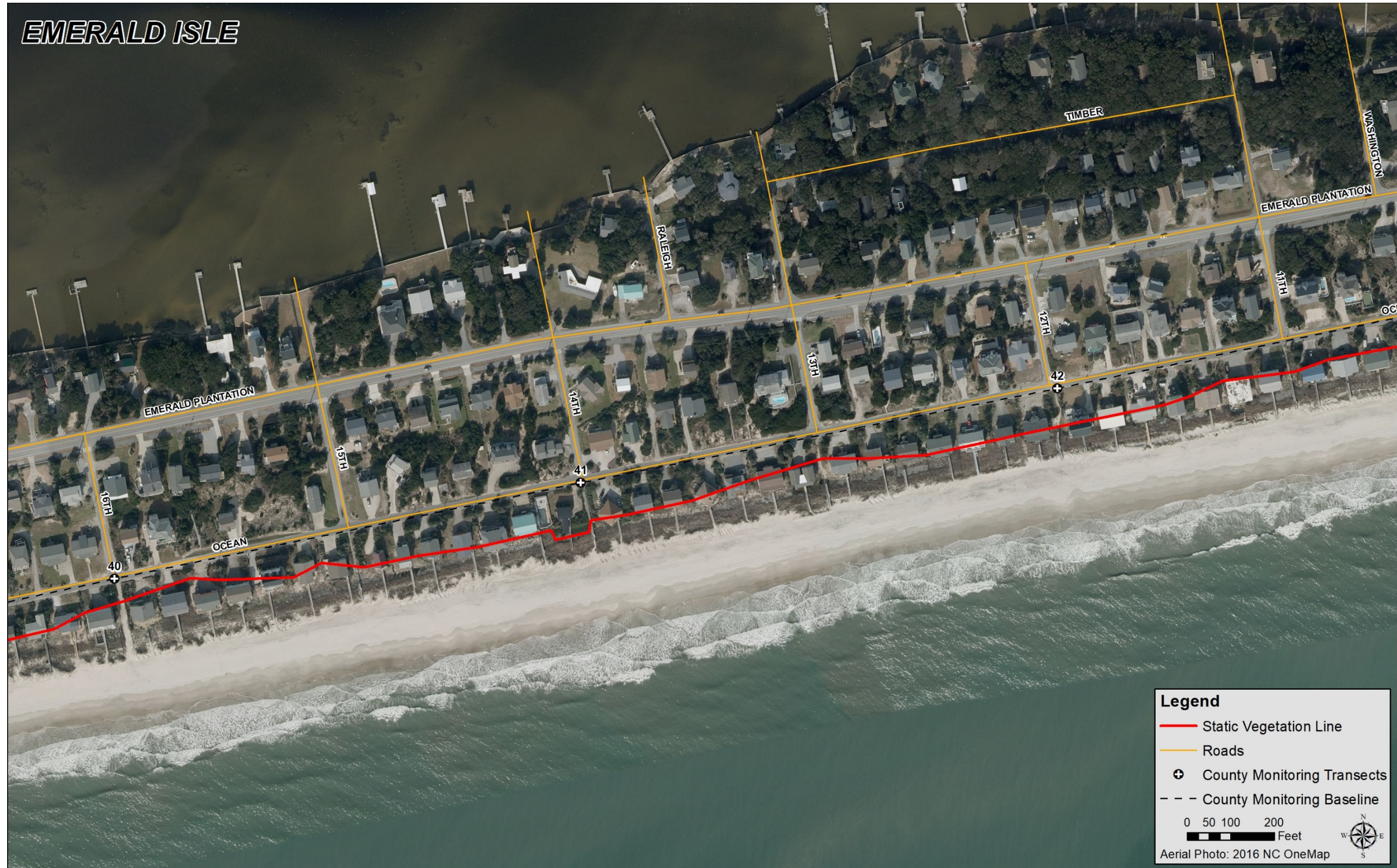


Figure 2-10. Eastern Emerald Isle Static Vegetation Line (8 of 10)

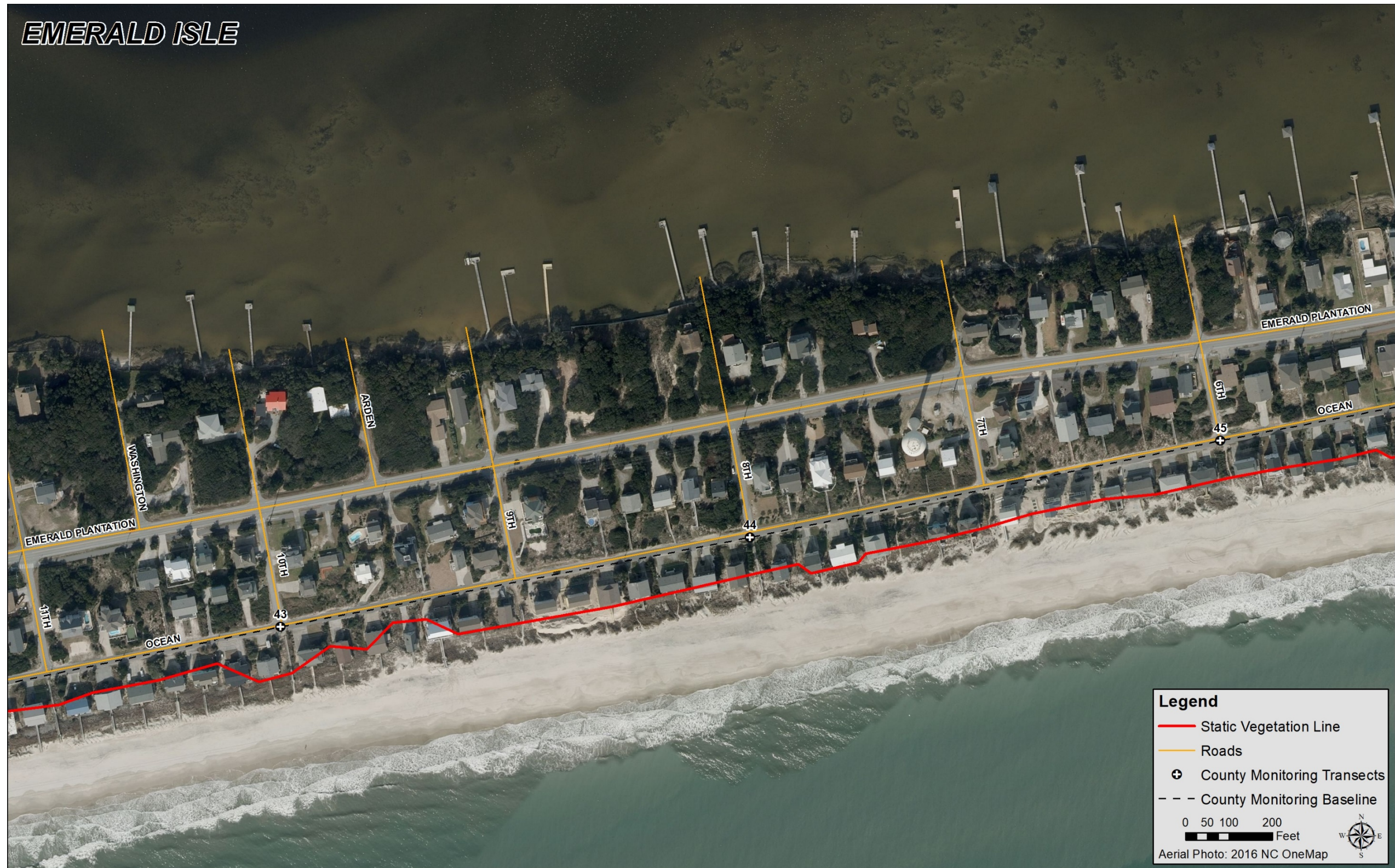


Figure 2-11. Eastern Emerald Isle Static Vegetation Line (9 of 10)



Figure 2-12. Eastern Emerald Isle Static Vegetation Line (10 of 10)

2.1.3 Establishment of Initial Nourishment Triggers

For Phase II of the Bogue Banks Restoration Project (Eastern Emerald Isle), the original periodic nourishment plan adopted by the Town of Emerald Isle dictated 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. This periodic nourishment trigger excluded the volume of material placed in the dune and the volume placed in the two taper sections. Therefore, Eastern Emerald Isle originally intended to schedule maintenance of the Phase II shoreline when 829,253 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 superior condition of Atlantic Beach, which had historically been nourished by the federal UASCE project, 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 enabled 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.

2.1.4 Renourishment Summary (2004 - 2020)

The Phase II portion of the Bogue Banks Restoration Project (Eastern Emerald Isle) has been nourished on four occasions following initial construction, with all four instances resulting from volume losses associated with declared natural disasters. The first event was Hurricane *Isabel* which impacted the Bogue Banks area in September 2003, only 5 months after initial construction of Phase II. The second was Hurricane *Ophelia* which passed through the area in September 2005. The third was Hurricane *Irene* which impacted the area in August 2011. The fourth was Hurricane *Florence* which impacted the area in September 2018. In each case, the Town applied to the Federal Emergency Management Agency (FEMA) for funds to restore the material lost during the storms 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, suitable borrow areas, a maintenance plan, and pre- and post storm beach profile surveys.

Post-*Isabel* Renourishment Project (2004)

Following the advent of Hurricane *Isabel*, the Town of Emerald Isle was able to demonstrate it met all of the FEMA Public Assistance Program requirements including an engineered beach, a nourishment plan, and monitoring program and was subsequently approved to receive funds to restore the beach to the pre-storm condition. Based on profiles of the beach taken before and after Hurricane *Isabel*, the Town of Emerald Isle was able to substantiate the loss of 121,000 cubic yards of material from two sections of the Phase II project, one located between County Transects 30

and 36 and the other between County Transects 38 and 43 (Figure 2-13). Emerald Isle obtained modifications to its original Bogue Banks Restoration Project permits from both the Corps of Engineers and the Division of Coastal Management and completed the restoration of the project during March and April 2004. The final volume of material actually placed along the eroded sections totaled 156,000 cubic yards. One hundred percent (100%) of the approximately \$1.8 million cost of the restoration project was paid for by FEMA. In addition to obtaining a permit to restore the eroded material, the permit modification included the use of material from the northern sections of the Morehead City Harbor Offshore Dredged Material Disposal Site (ODMDS) located seaward of the Beaufort Inlet ocean bar.

Post-Ophelia Renourishment Project (2007)

The post-Hurricane *Ophelia* restoration in Emerald Isle, which was also funded by FEMA, included restoration of the fill between County Transects 33 and 45 (Figure 2-14), located within the Phase II project limits, and between County Transects 10 and 20 (not originally included in the static line exception process) located in the Phase III segment of the Bogue Banks Restoration Project (Western Emerald Isle). The project also placed material in Indian Beach/Salter Path and Pine Knoll Shores. As was the case for the Hurricane *Isabel* restoration, 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 1,229,836 cubic yards deposited along various sections of Bogue Banks, 344,410 cubic yards of which was placed between County Transects 33 and 45 within the limits of the Phase II project and Eastern Emerald Isle static line extents. The total cost of the restoration was \$13,773,800, all of which was provided by FEMA. Of this total restoration cost, \$3,857,000 can be allocated to the portion of the project within the Phase II (Eastern Emerald Isle) project limits and Emerald Isle static line extents 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*. Note that the total cost for the *Ophelia* restoration allocated to the Town of Emerald Isle was \$6,569,000 which also included restoration in the Western Emerald Isle (Phase III) portion.

Post-Irene Renourishment Project (2013)

The post-Hurricane *Irene* restoration in Emerald Isle, which was partially funded by FEMA (mob/demob and a portion of the beach fill), included fill between County Transects 35 and 45 (Figure 2-15), located within the Phase II project limits and between County Transects 10 and 16 (not originally included in the static line exception process) located in the Phase III segment of the Bogue Banks Restoration Project (Western Emerald Isle). The project also placed material in Pine Knoll Shores. As was the case for the Hurricane *Isabel* and *Ophelia* restorations, 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, 451,600 cubic yards of which was placed between County Transects 35 and 46 within the limits of the Phase II project and Eastern Emerald Isle static line extents. This equated to an average of 36.1 cy/ft. The total cost of the restoration was \$14,951,965, \$7,076,155 of which was provided by FEMA and the rest (\$7,875,810) by the County (\$5,920,405) and Towns of Emerald Isle and Pine Knoll Shores. The total FEMA reimbursement for beach fill (not including mob/demob) allocated to the Town of Emerald Isle was \$1,967,473, which included restoration of the Western Emerald Isle (Phase III) portion. The total local cost for the *Irene* restoration allocated to the Town

of Emerald Isle was \$1,443,607 which included restoration of the Western Emerald Isle (Phase III) portion.

Post-Florence Renourishment Project – Phase I (2019)

The post-Hurricane *Florence* restoration, 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. In Eastern Emerald Isle, the 2019 Post-*Florence* Renourishment Project - Phase I included fill between County Transects 34 and 48 (Figure 2-16), located within the Bogue Banks Restoration Project Phase II limits and Eastern Emerald Isle static line extents. The Post-*Florence* Renourishment Project - Phase I also placed material in Indian Beach/Salter Path. As was the case for the Hurricane *Isabel*, *Ophelia*, and *Irene* restorations, the post-*Florence* Phase I restoration used material from the ODMDS which was transported to the beach via hopper dredges. The post-*Florence* Phase I restoration placed a total of 975,647 cubic yards of material along various sections of Bogue Banks, 624,945 cubic yards of which was placed between County Transects 34 and 48 within the limits of Bogue Banks Restoration Project Phase II and Eastern Emerald Isle static line extents. This equated to an average of 38.0 cy/ft. The total cost of the post-*Florence* Phase I restoration was \$20,277,943, of which \$5,000,000 was provided by the State (CSDM funds) and the rest by the County and Towns of Emerald Isle and Indian Beach. The total local cost for the post-*Florence* Phase I restoration allocated to the Town of Emerald Isle was \$9,788,975 (\$7,341,731 County reserve and \$2,447,244 Town of Emerald Isle). Note that Emerald Isle and Indian Beach had applied for FEMA funding as a result of damages from Hurricane *Florence* but were still awaiting award during the construction of Phase I, with plans for County and Town reimbursement if funding was approved. After completion of construction, FEMA funding was awarded, allowing for reimbursement to the County and Towns for all material lost during Hurricane *Florence*. Appendix A contains the plans for the 2019 Post-*Florence* Renourishment Project - Phase I, the only project to occur within the last 5 years, covering the portion of Eastern Emerald Isle included in the static line exception. It should be noted that Phase III of the Post-*Florence* Renourishment Project is scheduled to occur during the upcoming winter 2020/2021 dredging window and will cover Transects 1 – 7 (not currently included in the static line exception process) and Transects 14 – 48 in Emerald Isle, of which Transect 25 – 48 are included in the Eastern Emerald Isle static line exception extents and Transects 14 – 24 are not. In Emerald Isle, current plans call for approximately 2,012,850 cy of material to be placed along Transects 1 – 7 and Transects 14 – 48, with approximately 1,137,750 cy being placed along Transects 25 – 48 within the Eastern Emerald Isle static line exception area.

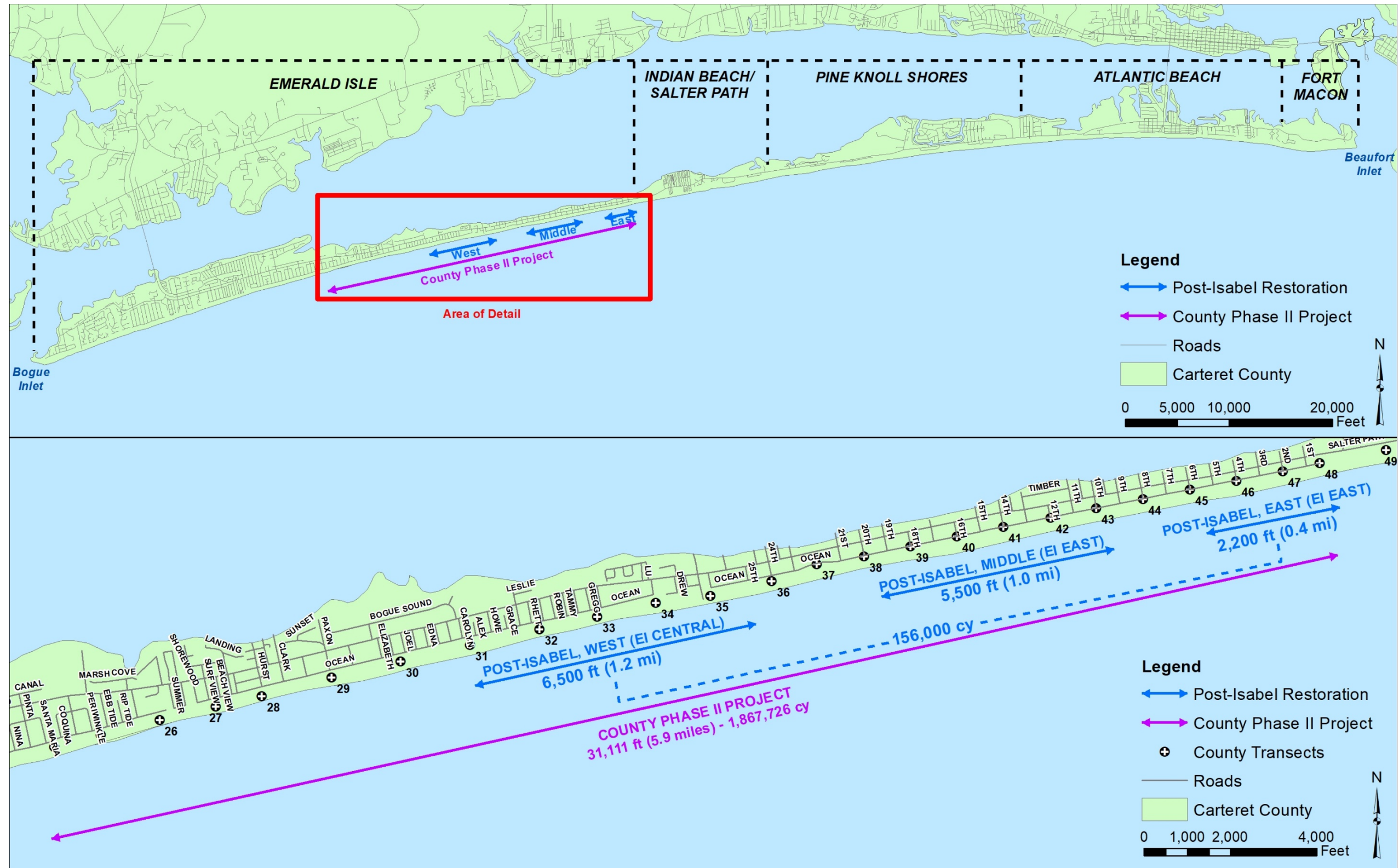


Figure 2-13. Post-Isabel Restoration Project (2004)

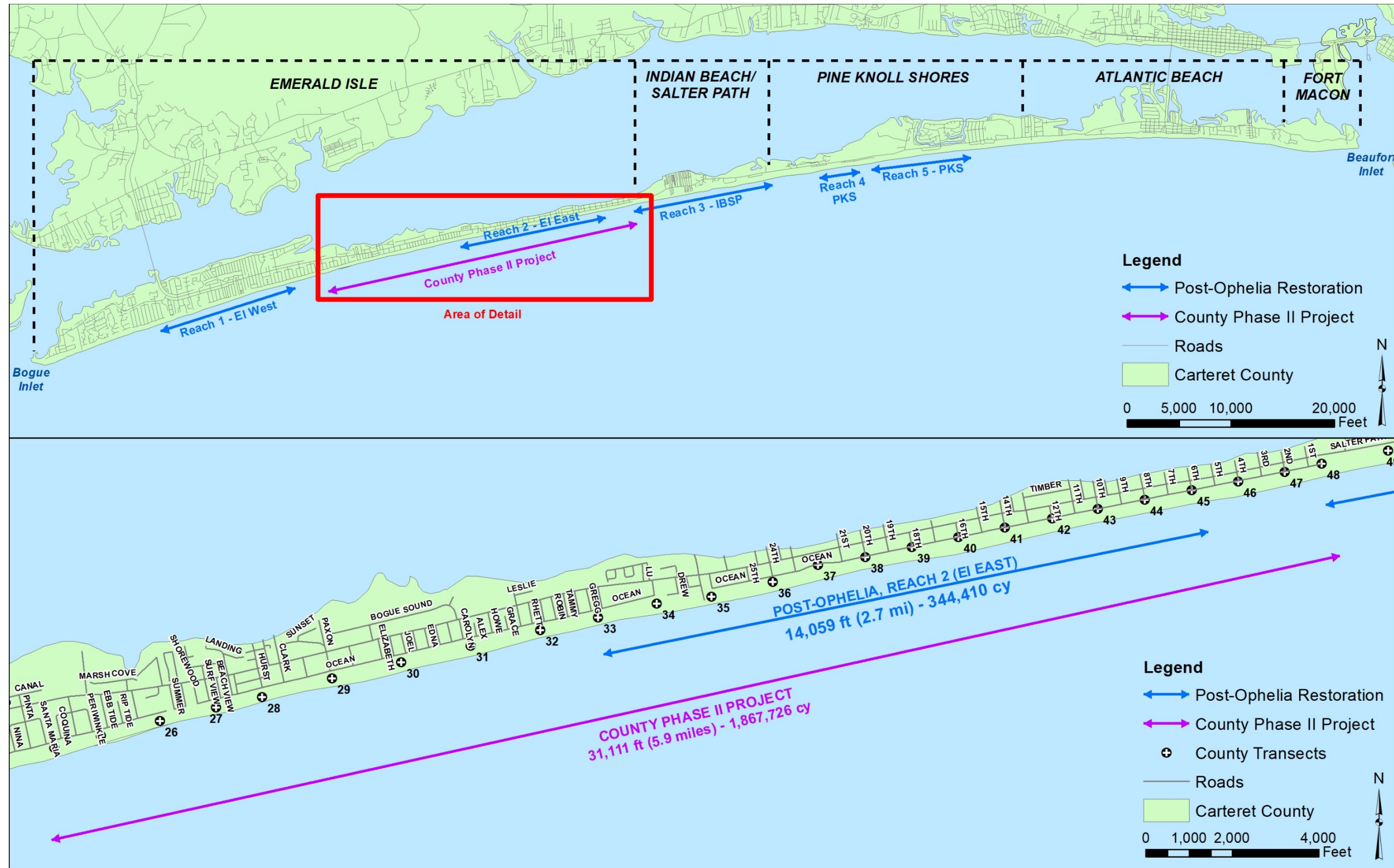


Figure 2-14. Post-Ophelia Restoration Project (2007)

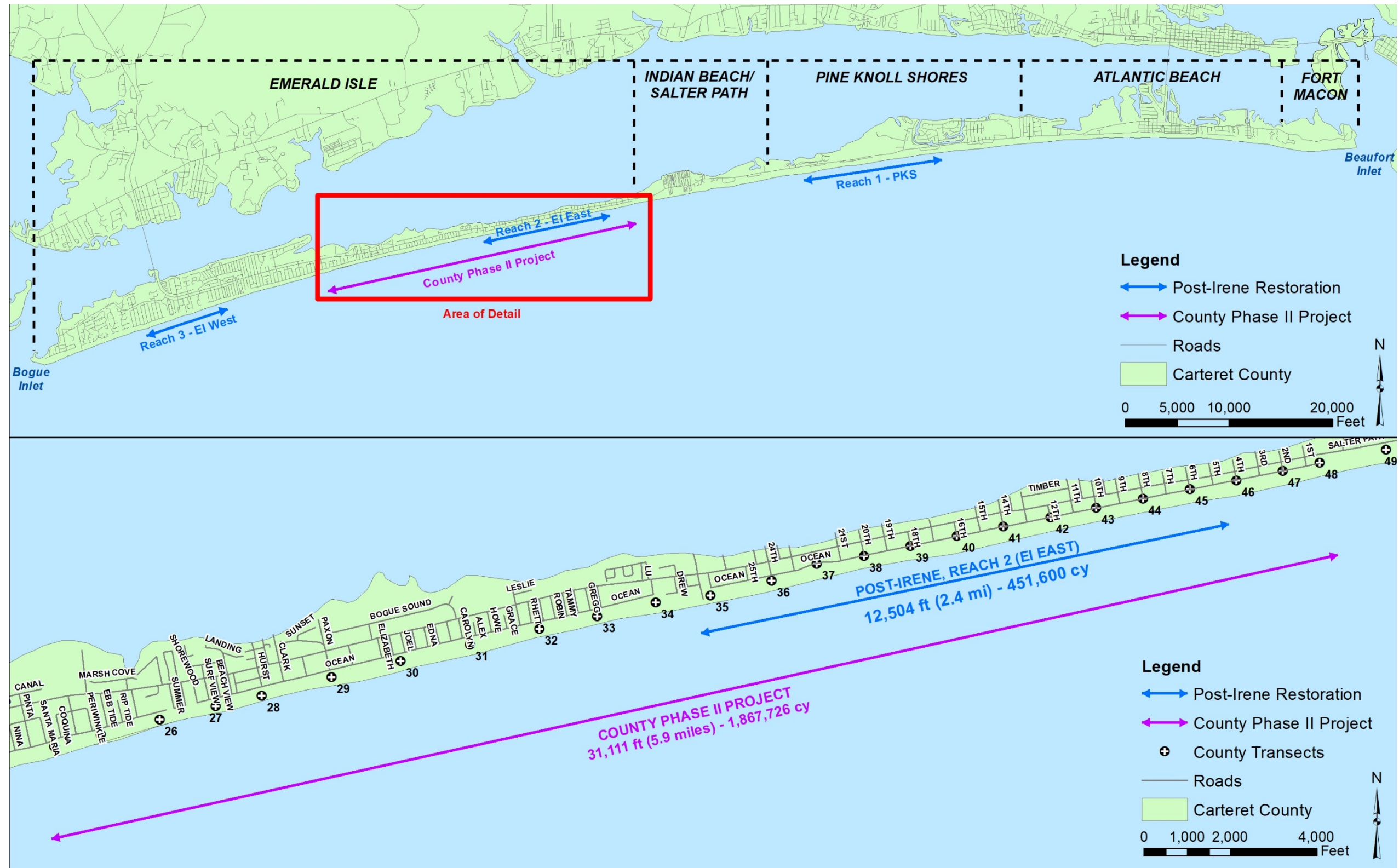


Figure 2-15. Post-Irene Restoration Project (2013)

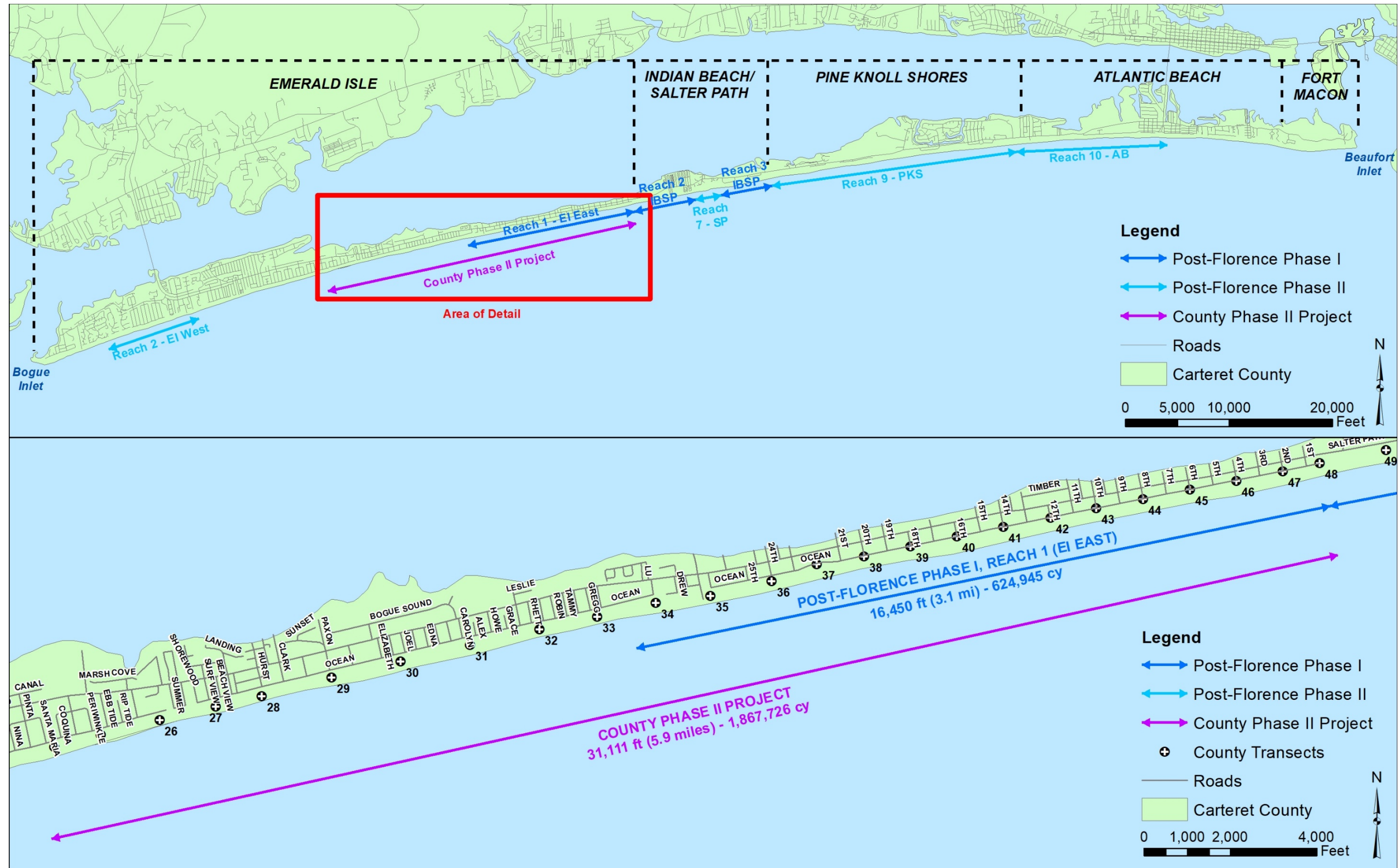


Figure 2-16. Post-Florence Phase I Restoration Project (2019)

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

2.2.1 Project Construction

As mentioned previously, the post-Hurricane *Florence* restoration, 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. The Post-Florence Renourishment Project – Phase II placed sand in four reaches along Bogue Banks, including nourishment efforts in a portion of Western Emerald Isle (Reach 2) where fill was placed between County Transects 7 and 14. This area was not originally included in the static line exception process. Phase II of the Post-Florence Renourishment Project also placed material in Indian Beach/Salter Path, Pine Knoll Shores, and Atlantic Beach (see Figure 2-17). As was the case for the Hurricane *Isabel*, *Ophelia*, and *Irene* restorations, as well as the Post-Florence Phase I restoration, the post-Florence Phase II restoration used material from the ODMDS which was transported to the beach via hopper dredges. The post-Florence Phase II restoration placed a total of 2,022,807 cubic yards of material along four reaches of the Bogue Banks, 355,335 cy of which was placed along 9,300 feet between County Transects 7 and 14 in Western Emerald Isle (see Figure 2-18). 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 Emerald Isle was \$2,501,557 (County reserve). Appendix A contains the plans for the 2020 Post-Florence Renourishment Project - Phase II.

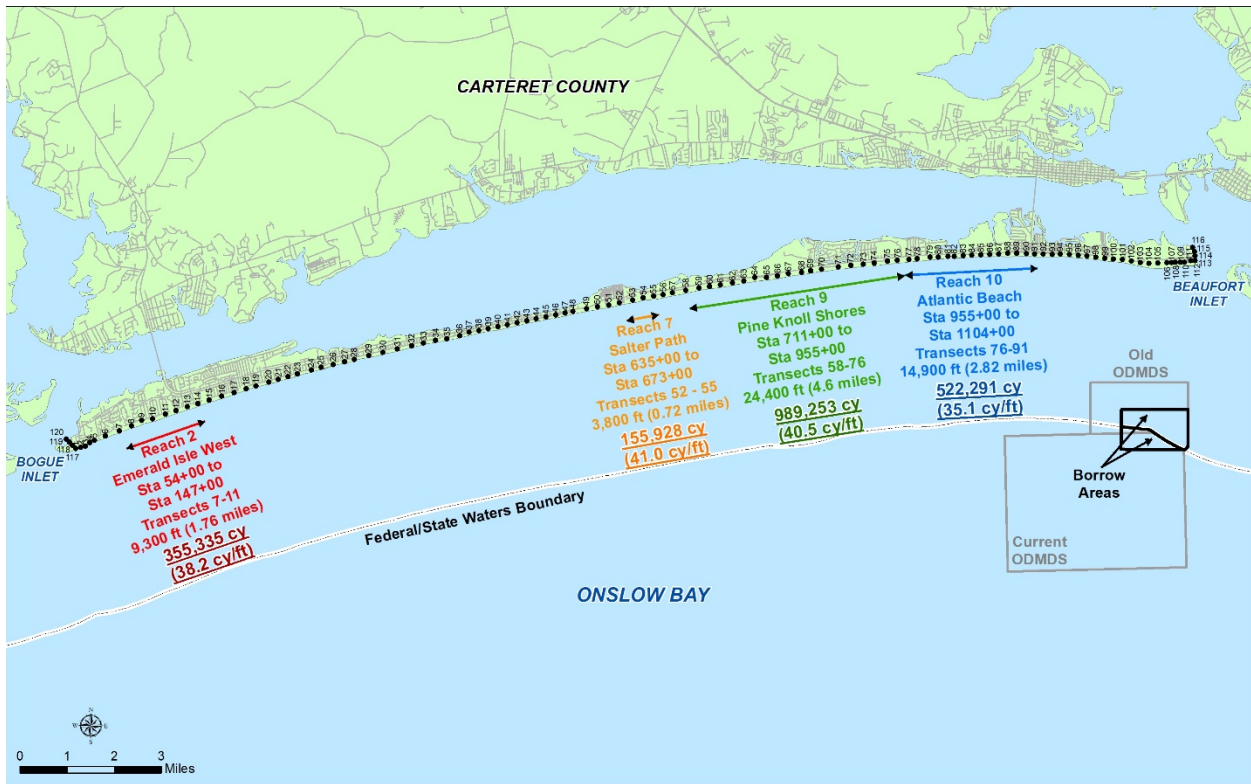


Figure 2-17. Post-Florence Renourishment Project – Phase II (2020)

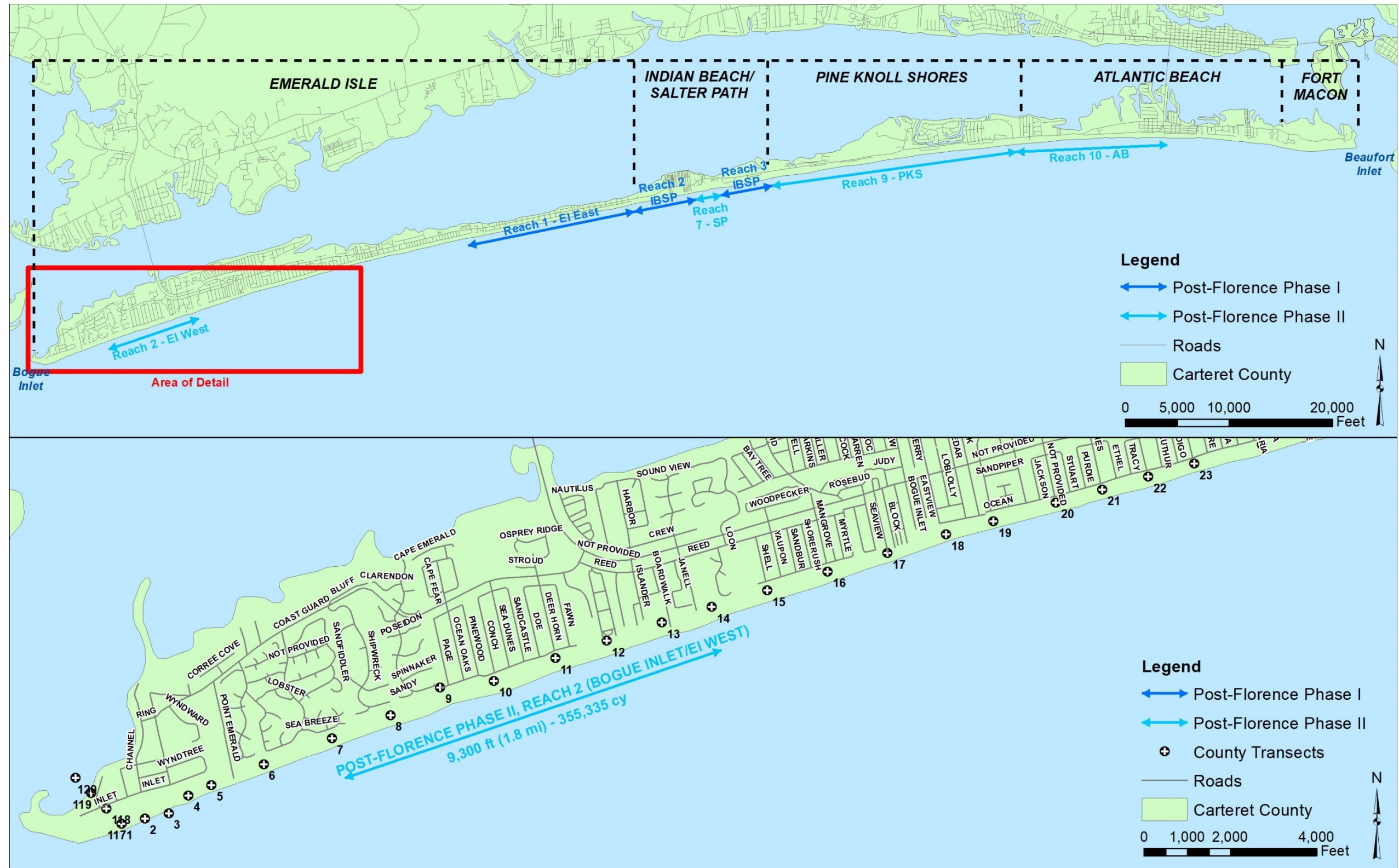


Figure 2-18. Post-Florence Renourishment Project - Phase II, Reach 2 (2020)

2.2.2 Establishment of New Static Vegetation Line

With construction of Phase II of the Post-*Florence* Renourishment Project, a static line requirement was triggered between Transects 7 and 14 in Western Emerald Isle. It should be noted that this area was originally included in Phase III of the Bogue Banks Restoration Project which was constructed in 2005. However, the project did not trigger a static line based on the initial criteria established (250,000 cy and 50 cy/ft) because it did not meet the fill density of 50 cy/ft. The area also received nourishment material in 2007 during the post-*Ophelia* restoration and 2013 during the post-*Irene* restoration. Neither event met the criteria to trigger a static line. Therefore, this area has been absent from any static line exception authorization. However, updated criteria consist of beach fill projects larger than 300,000 cy, triggering a static line in this portion of Western Emerald Isle upon construction of Phase II of the Post-*Florence* Renourishment Project. Therefore, the vegetation line was established prior to construction of the Post-*Florence* Restoration Project – Phase II using post-Dorian survey data and aerial imagery from September 2019. The resulting static vegetation line in the portion of Western Emerald Isle nourished during Phase II of the Post-*Florence* Renourishment Project is presented in Figure 2-19 through Figure 2-21 overlain on 2016 aerials.

The static line in the above referenced portion of Western Emerald Isle extends approximately 1.76 miles from County Transect 7, at Whitecap Circle, to County Transect 14, at Sound of the Sea. This area spans a portion of two County monitoring reaches: Bogue Inlet (Transects 1 – 11) and Emerald Isle - West (Transects 12 – 25). The current erosion rate setback factor (developed by the Division of Coastal Management and approved/adopted by the Coastal Resources Commission in 2019) for this portion of Western Emerald Isle which falls under the new static line extents was determined to be 2.0. There are currently 113 oceanfront lots within these static line extents of which 3 are currently vacant.



Figure 2-19. Western Emerald Isle Static Vegetation Line (1 of 3)



Figure 2-20. Western Emerald Isle Static Vegetation Line (2 of 3)



Figure 2-21. Western Emerald Isle Static Vegetation Line (3 of 3)

2.2.3 Establishment of Nourishment Triggers

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, nourishment triggers have been revised and nourishment operations and timing reformulated from the original methodology which included nourishment triggers of 50% of the initial fill volume and 225 cy/ft above -12 ft NAVD88. This newly triggered static line in a portion of Western Emerald Isle will be monitored and maintained going forward in accordance with the Master Beach Nourishment Plan. Details of the future nourishment plans encompassed by the Bogue Banks Master Beach Nourishment Plan are presented in Section 2.3.

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 original Bogue Banks Restoration Project Phase II project area (and Eastern Emerald Isle static line exemption extents) was determined to be 211 cy/ft for the western portion (Emerald Isle - Central monitoring reach, County Transects 26 - 36) and 221 cy/ft for the eastern portion (Emerald Isle - East monitoring reach, County Transects 37 - 48). The profile volume triggers for the portion of Western Emerald Isle included in the new static line extents triggered by Phase II of the *Post-Florence* Renourishment Project are 235 cy/ft for the western portion (Bogue Inlet monitoring reach, County Transects 1 – 11) and 266 cy/ft for the eastern portion (Emerald Isle - West monitoring reach, County Transects 12 – 25). 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 II project and 225 cy/ft above -12 ft NAVD88). Therefore, the Town of Emerald Isle will initiate nourishment actions in the Phase II Project area (and Eastern Emerald Isle static line exemption extents) and newly added area in Western Emerald Isle (spanning a portion of the Bogue Inlet and Emerald Isle - West monitoring reaches), as these triggers are approached.

Table 2-1. Master Plan Nourishment Triggers

Reach (Transects)	-12 ft Trigger	
Bogue Inlet (1-11)	235	<--Post-Florence Phase II Project
Emerald Isle West (12-25)	266	(Western Emerald Isle)
Emerald Isle Central (26-36)	211	<--Bogue Banks Phase II Project
Emerald Isle East (37-48)	221	(Eastern Emerald Isle)
Indian Beach/Salter Path (49-58)	224	
Pine Knoll Shores (59-76)	211	
Atlantic Beach (77-102)	254	
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 monitoring 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 gauge 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 2-22 shows the future nourishment plan for Bogue Banks, including the Bogue Banks Restoration Project Phase II (Eastern Emerald Isle) area and original static line exception limits along with the portion of Western Emerald Isle that has been newly added to the static line exception process by virtue of material placement in Reach 2 of the Post-Florence Phase II project, for non-storm losses. In Eastern Emerald Isle, it is estimated that the western portion of the Bogue Banks Restoration Project Phase II area (Emerald Isle - Central monitoring reach) would require approximately 224,847 cy of nourishment every 9 years while the eastern portion of the Bogue Banks restoration Project Phase II area (Emerald Isle - East monitoring reach) would require approximately 192,232 cy every 3 years if typical background erosion patterns were the only forces experienced. In Western Emerald Isle, it is estimated that the eastern portion of Reach 2 of the Post-Florence Phase II project area (Emerald Isle – West monitoring reach) would require approximately 57,006 cy of material every 9 years while the western portion of Reach 2 of the Post-Florence Phase II project area (Bogue Inlet monitoring reach) would require 269,112 cy every 6 years if typical background erosion patterns were to occur. 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).

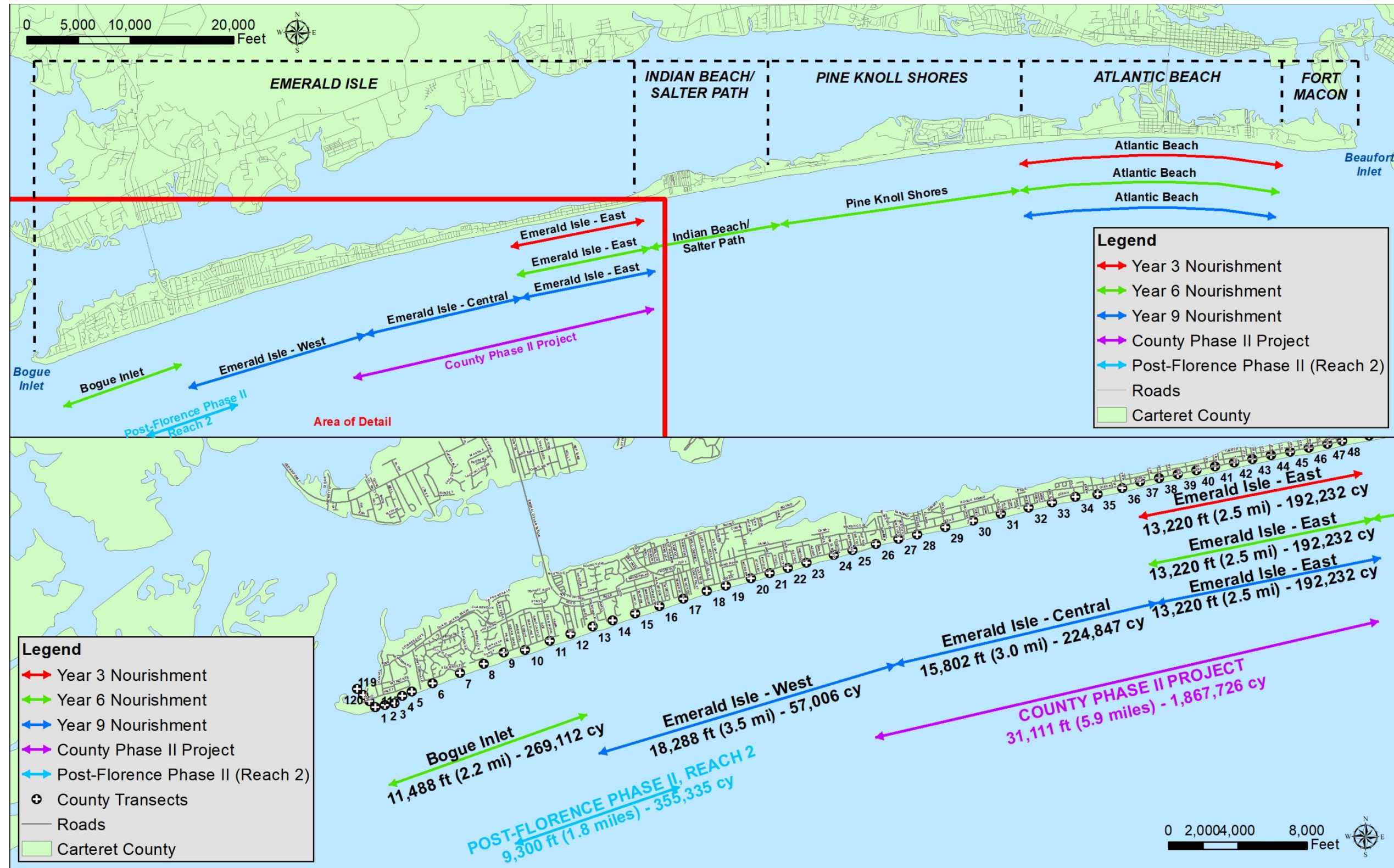


Figure 2-22. Bogue Banks Master Beach Nourishment Plan

3.0 PROJECT DESIGN AND PERFORMANCE

3.1 Bogue Banks Restoration Project – Phase II Template

The Bogue Banks Restoration Phase II (Eastern Emerald Isle) Project was divided into an Eastern, Middle, and Western Zone (see Figure 2-2) with different design volumes in each zone 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 Restoration 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 final design volume for each zone is also shown in Figure 2-2. The Phase II (Eastern Emerald Isle) portion of the project included a dune with a 10 foot wide crest at elevation +14 feet NAVD along the easternmost 2.2 miles of Emerald Isle within the eastern zone. The new dune was only provided in areas where the existing dune was deemed inadequate to provide the desired level of protection. A 959 foot transition or taper section was provided on the east end of the fill and a 531 foot taper on the west end to help control losses of material off the ends of the fill. The beach fill was designed as a variable width horizontal berm at elevation +6.0 feet NAVD. Figure 3-1 shows the plan view of the Phase II (Eastern Emerald Isle) beach fill project while Figure 3-2 shows some typical design cross-sections from each of the three zones. Figure 3-3 and Figure 3-4 display some example pre- and post-nourishment profiles from the Phase II project.

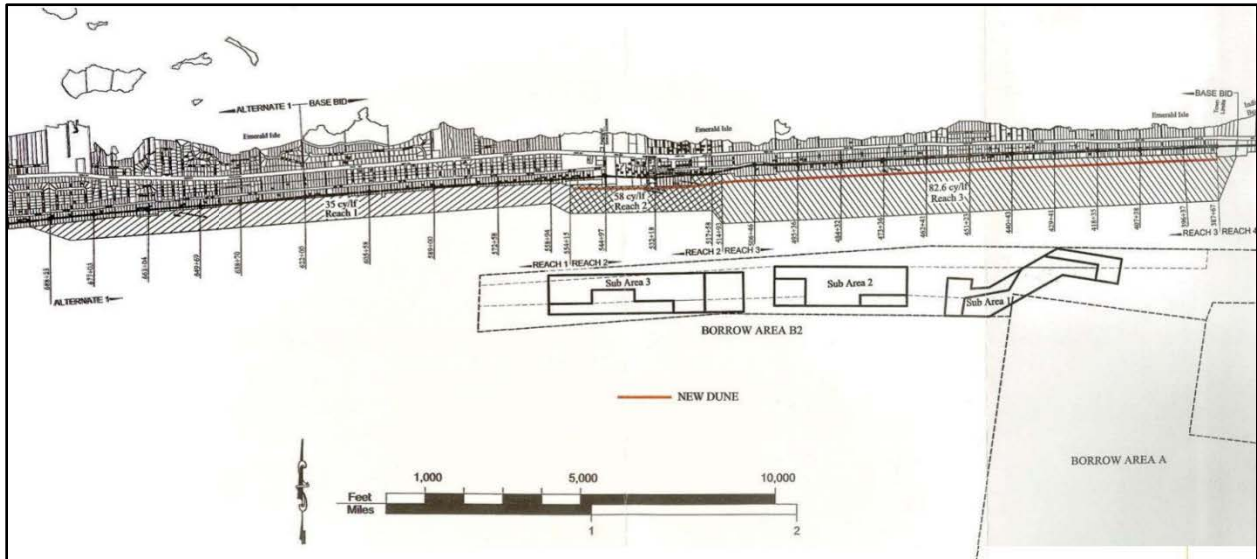


Figure 3-1. Phase II Plan View (CPE 2010 Static Line Report)

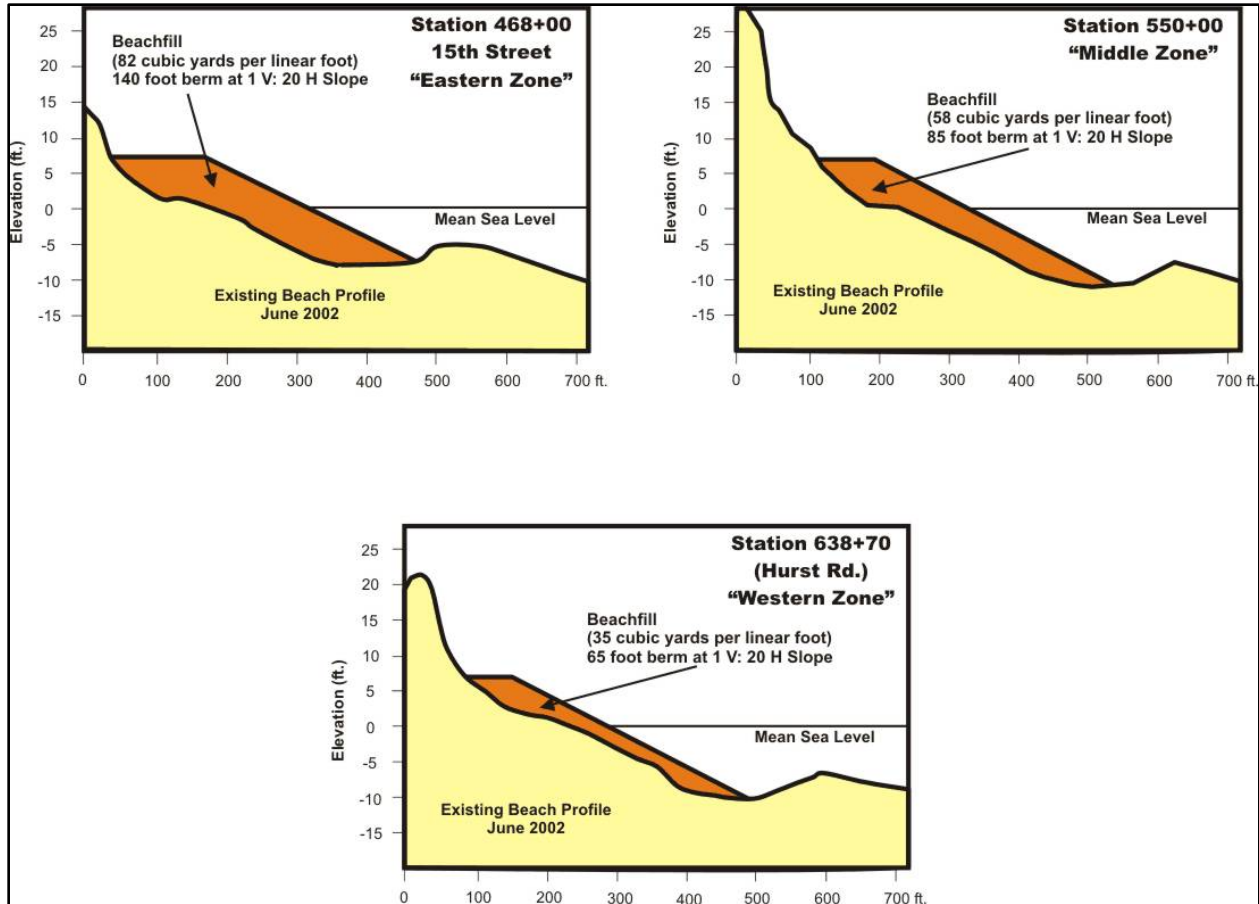


Figure 3-2. Phase II Example Design Cross-Section Graphic (Carteret County Shore Protection Office)

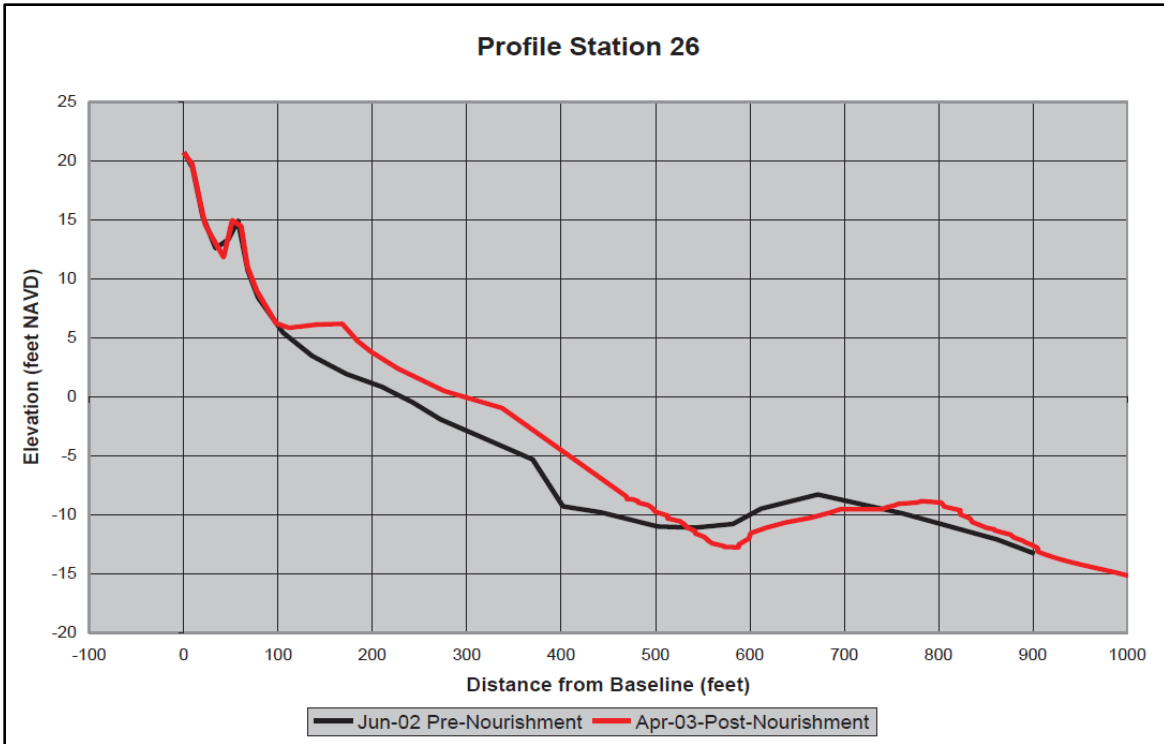


Figure 3-3. Profile Station 26 Pre- and Post-Nourishment Example (CPE 2010 Static Line Report)

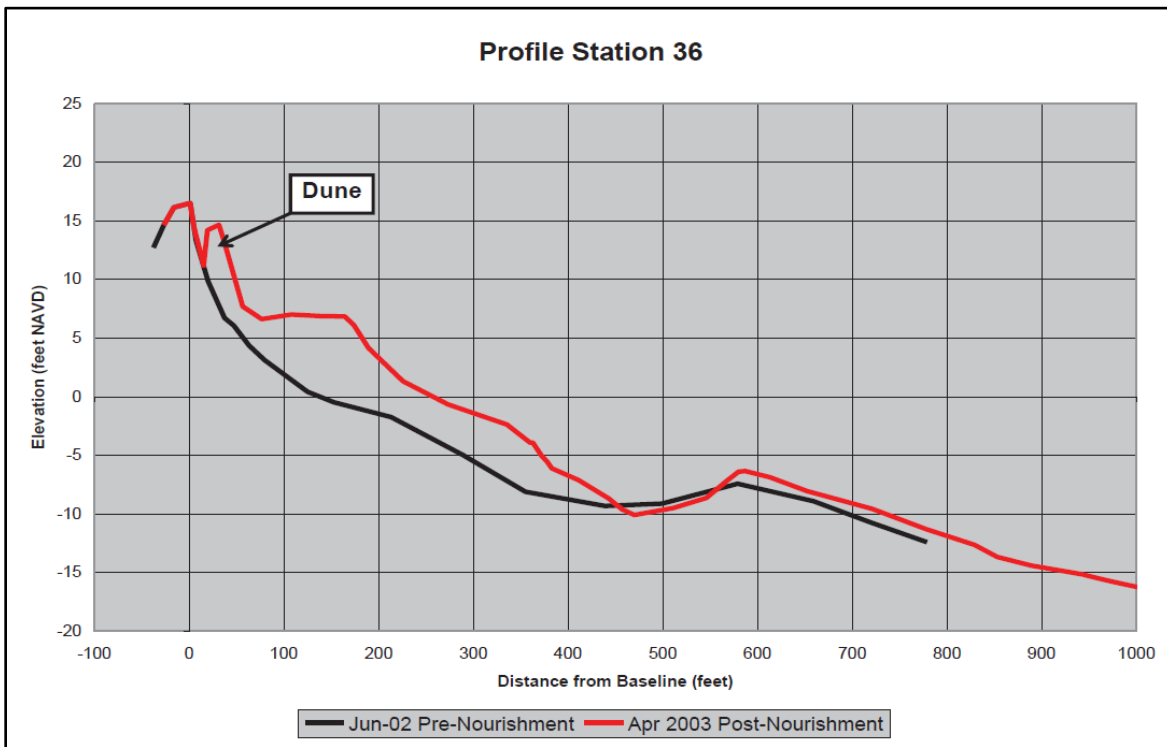


Figure 3-4. Profile Station 36 Pre- and Post-Nourishment Example (CPE 2010 Static Line Report)

3.2 Post-Florence Renourishment Project - Phase II Template

The Post-Florence Renourishment Project – Phase II was divided into four reaches of which Reach 2 was located in Western Emerald Isle between County Transects 7 and 14. The project was designed to replace material that was lost during hurricane *Florence*, restoring the beach back to pre-*Florence* conditions which had been established in Phase III of the Bogue Banks Restoration Project in 2005 and maintained with post-storm restoration in 2007 (*Ophelia*) and 2013 (*Irene*). The project template consisted of a dune of variable width ranging from +10 ft NAVD88 to +13 ft NAVD88 with a 1:5 slope down to a berm of variable width ranging from +6 ft NAVD88 to +6.5 ft NAVD88 and then a flatter slope of 1:20 out to the existing ground, landward of the prominent offshore bar. Figure 3-5 shows an example of the plan view in Reach 2 of the project while Figure 3-6 and Figure 3-7 present typical cross sections for the project template. Where possible, a direct tie-in to the primary dune at grade was preferred (Figure 3-6). However, in cases where this would result in covering existing vegetation, a small dune backslope at 1:5 was constructed down to the existing ground (Figure 3-7). Figure 3-8 and Figure 3-9 display some example pre- and post-nourishment profiles from the Post-Florence Renourishment Project Phase II area, specifically in Reach 2.

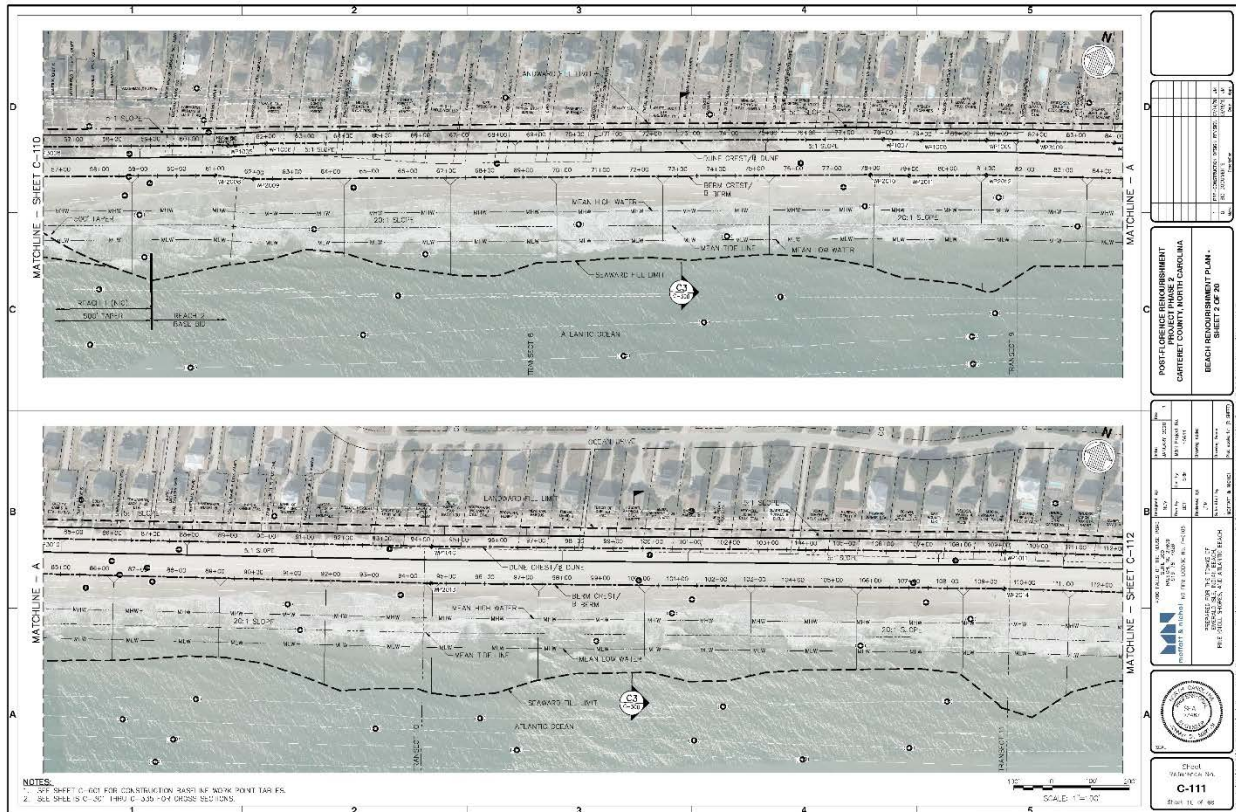


Figure 3-5. Example Plan View – Post-Florence Renourishment Project Phase II, Reach 2

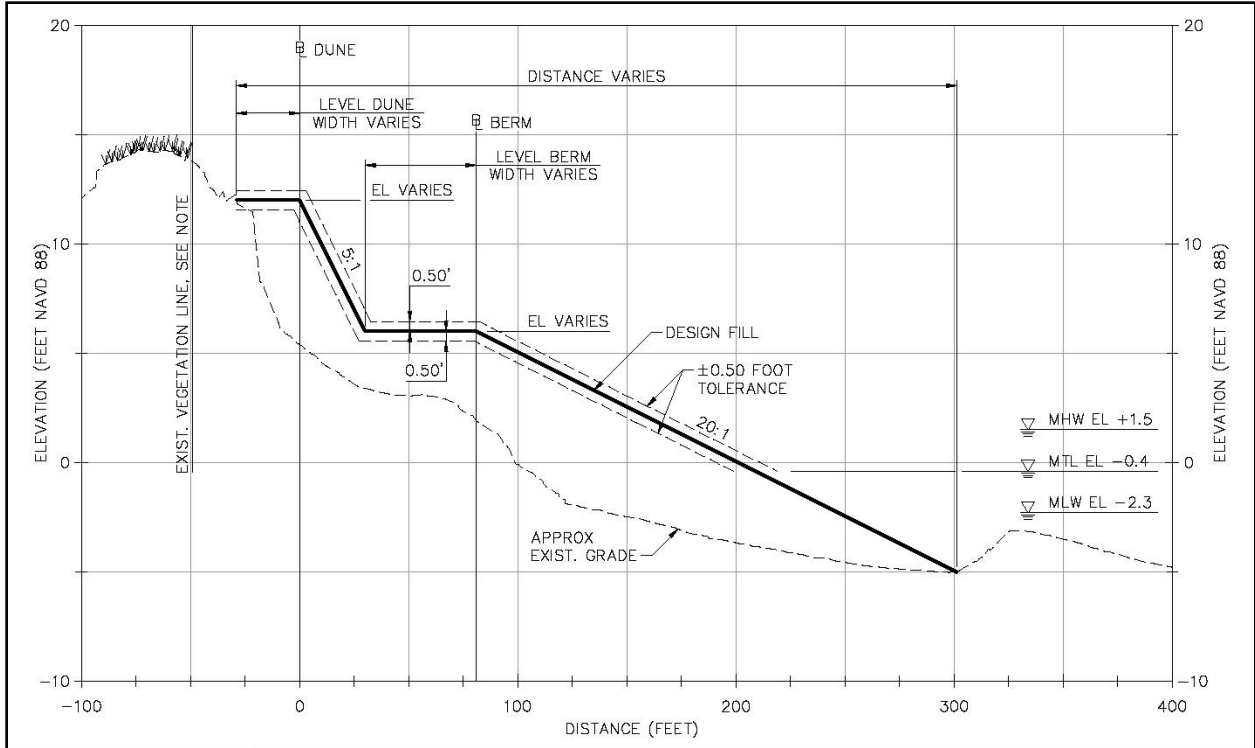


Figure 3-6. Beach Renourishment Typical Cross Section – Direct Tie-In

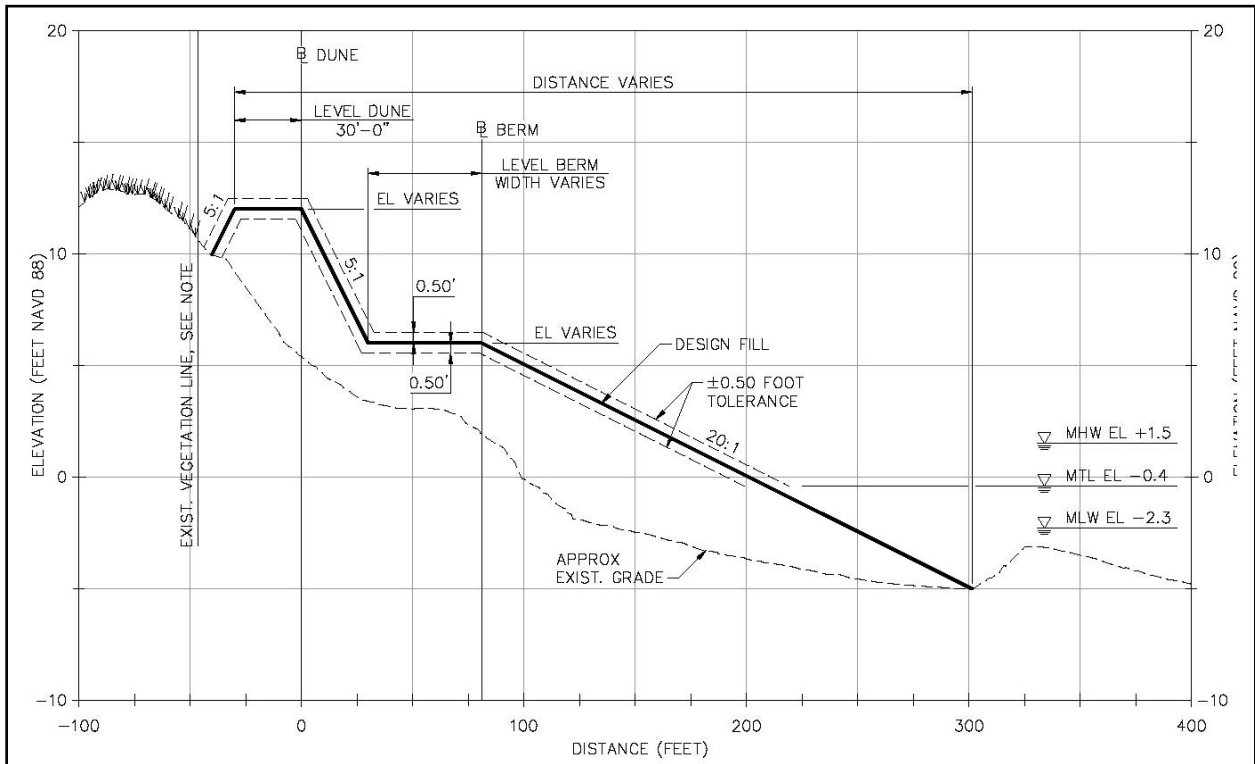


Figure 3-7. Beach Renourishment Typical Cross Section – Backslope Tie-In

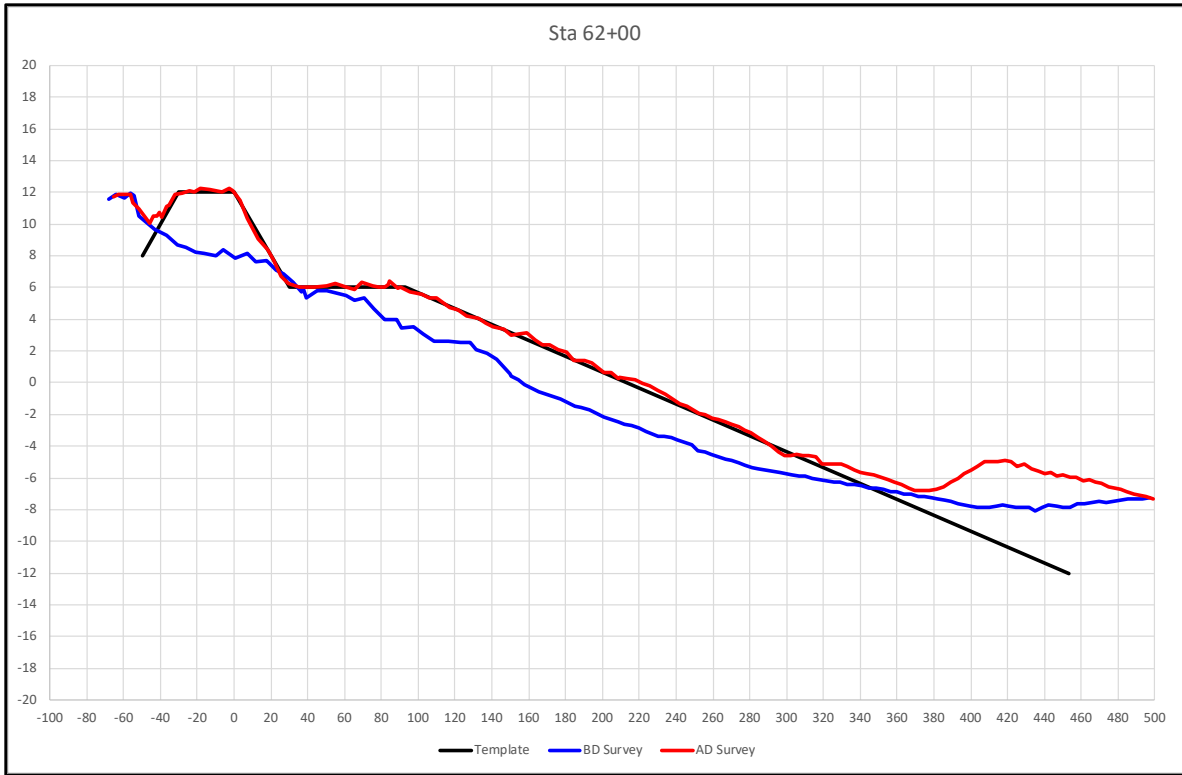


Figure 3-8. Profile Station 62 Pre- and Post-Nourishment Example

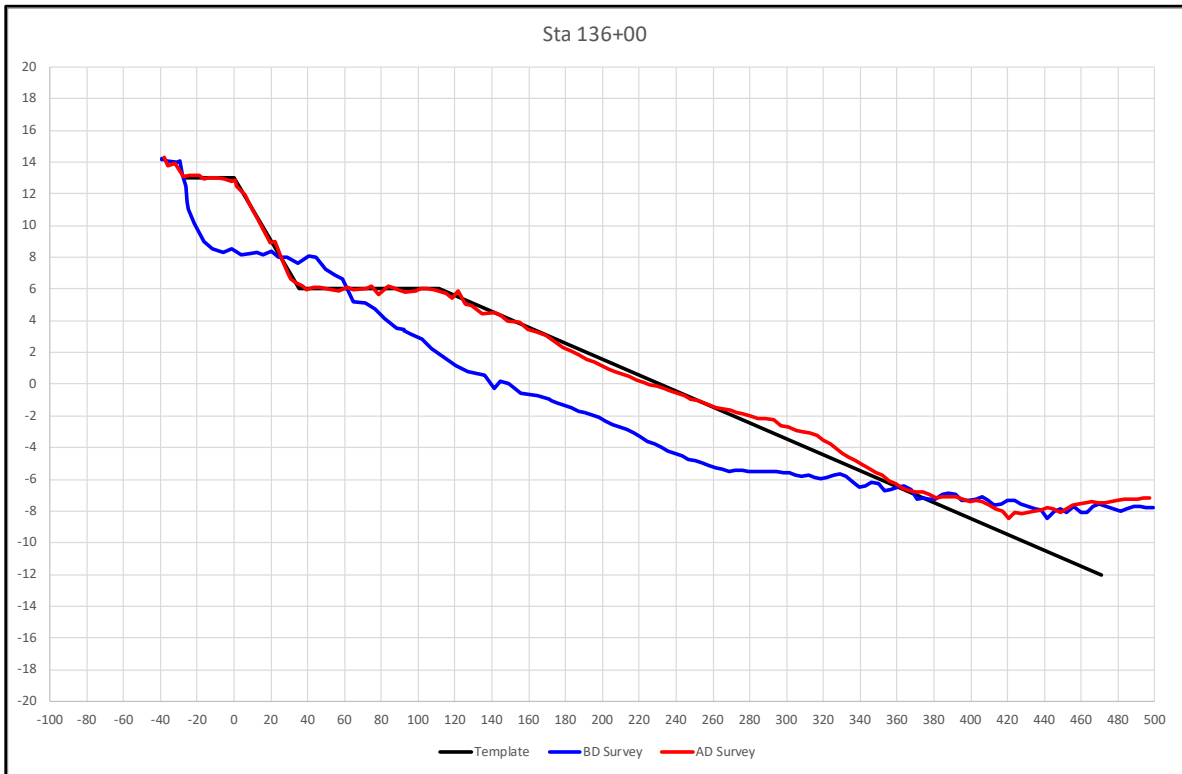


Figure 3-9. Profile Station 136 Pre- and Post-Nourishment Example

3.3 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 Bogue Banks Restoration Project Phase II project area each year of the monitoring from 2004 - 2014. As can be seen, through the efforts of the three post-storm nourishment projects that took place during this time period, there was more sand in the western portion of the Phase II project (Emerald Isle - Central monitoring reach) in 2014 than there was after the project was constructed. The eastern portion of the Phase II project (Emerald Isle - East monitoring reach) contained slightly less material in 2014 than was originally placed but was well above the nourishment trigger of 50% remaining. This portion of Emerald Isle has proven to be a hotspot in the past and is carefully monitored each year.

Table 3-1. Percent Fill Remaining From Initial Construction: 2004 – 2014 (Bogue Banks Restoration Project Phase II – Eastern Emerald Isle)

Reach	Percent Fill Remaining										
	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Emerald Isle Central	98.3	98.5	63.5	75.0	178.0	161.6	147.3	148.8	135.1	165.3	165.0
Emerald Isle East	85.1	85.0	62.8	79.0	84.8	60.9	48.0	50.4	35.1	83.6	89.1
Emerald Isle-Phase II	92.0	92.1	63.2	76.9	133.5	113.5	99.9	101.8	87.3	126.3	128.8

Figure 3-10 shows the average profile volume calculated above -12 ft NAVD88 for the Emerald Isle - Central and Emerald Isle - East reaches during each year of monitoring from 2004 -2014. As can be seen from this figure, the profile volumes were maintained well above the historic trigger of 225 cy/ft.

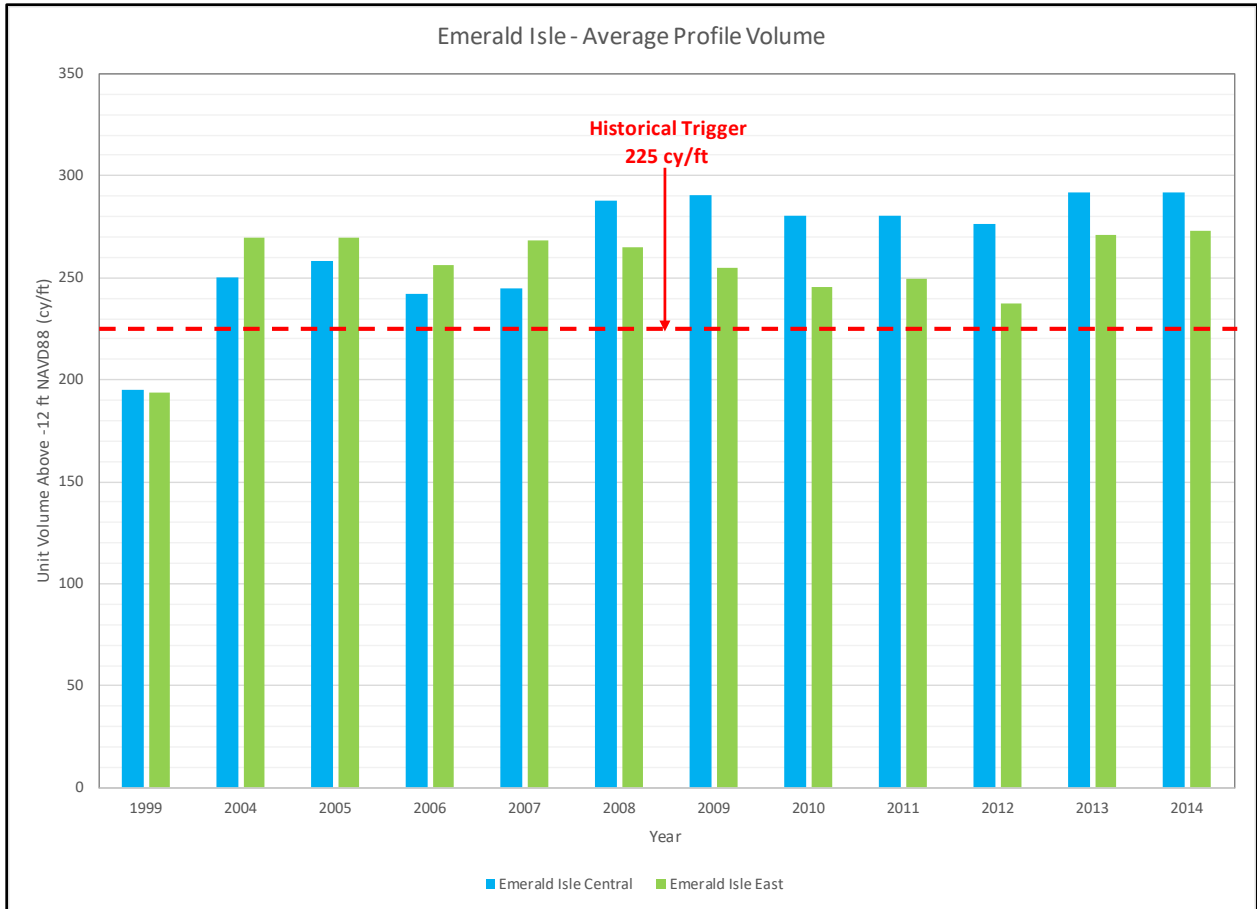


Figure 3-10. Average Profile Volume Above -12 ft NAVD88: 2004 – 2014 (Bogue Banks Restoration Project Phase II – Eastern Emerald Isle)

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 3-11 shows the average profile volume calculated above -12 ft NAVD88 for the Emerald Isle - Central and Emerald Isle - East monitoring reaches during each year of monitoring from 2015 - 2020. As can be seen from this figure, the profile volumes have been maintained above the Master Beach Nourishment Plan triggers of 211 cy/ft for Emerald Isle – Central and 221 cy/ft for Emerald Isle – East.

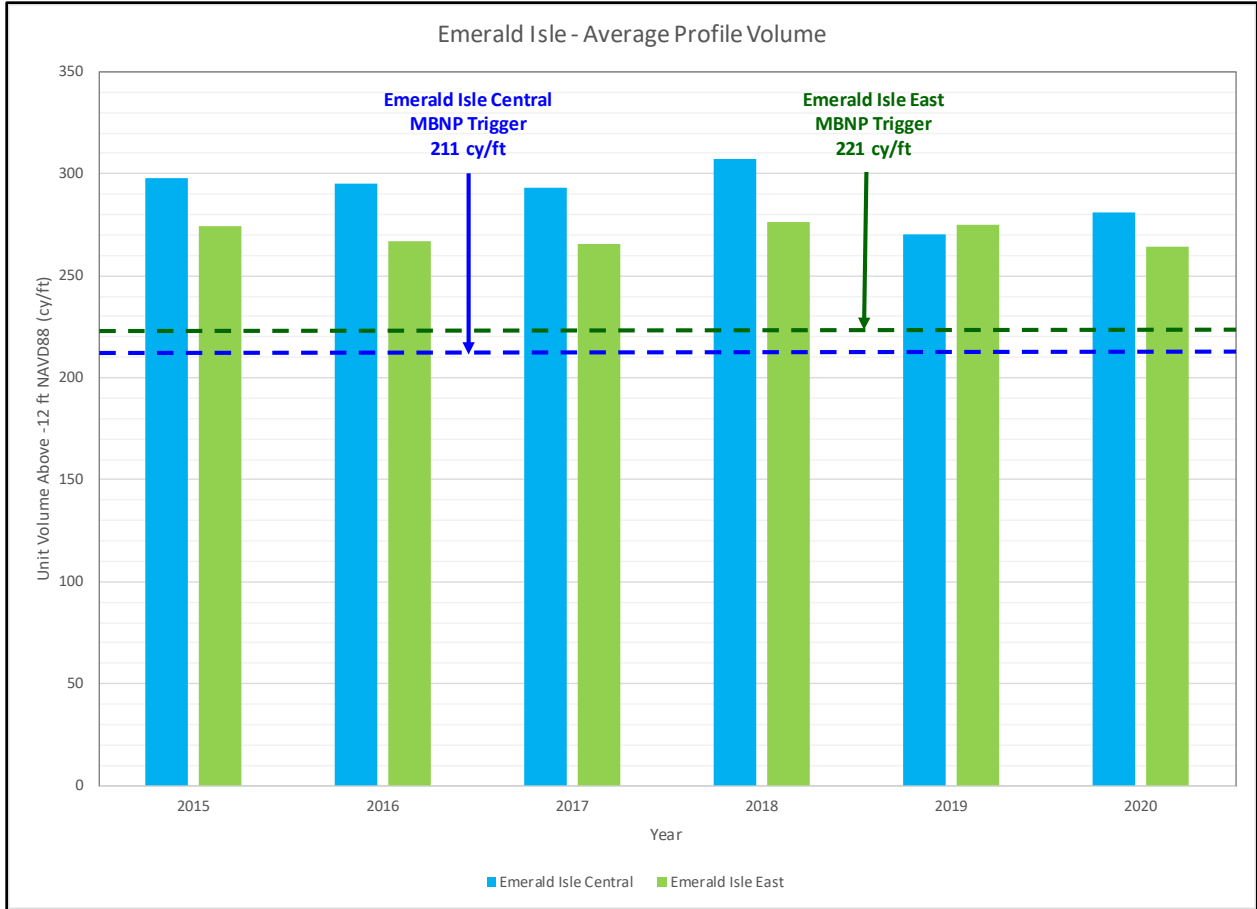


Figure 3-11. Average Profile Volume Above -12 ft NAVD88: 2015 - 2020 (Bogue Banks Restoration Project Phase II – Eastern Emerald Isle)

With the addition of a portion of Western Emerald Isle to the static line exception process in 2020, triggered by placement in Reach 2 of the *Post-Florence* Renourishment Project - Phase II, the Bogue Inlet (Transects 1 – 11) and Emerald Isle – West (Transects 12 – 25) monitoring reaches will be monitored under the Master Beach Nourishment Plan as has been done since 2015 for the Bogue Banks Restoration Project Phase II area, comprised of the Emerald Isle – Central and Emerald Isle – East monitoring reaches. The 2020 annual survey, performed after the *Post-Florence* Phase II nourishment was completed, currently indicates that the average profile volume above -12 ft NAVD88 is 347 cy/ft in the Bogue Inlet monitoring reach and 288 cy/ft in the Emerald Isle - West monitoring reach. This is well above the Master Beach Nourishment Plan Triggers of 235 cy/ft in Bogue Inlet and 266 cy/ft in Emerald Isle – West.

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 Emerald Isle 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.

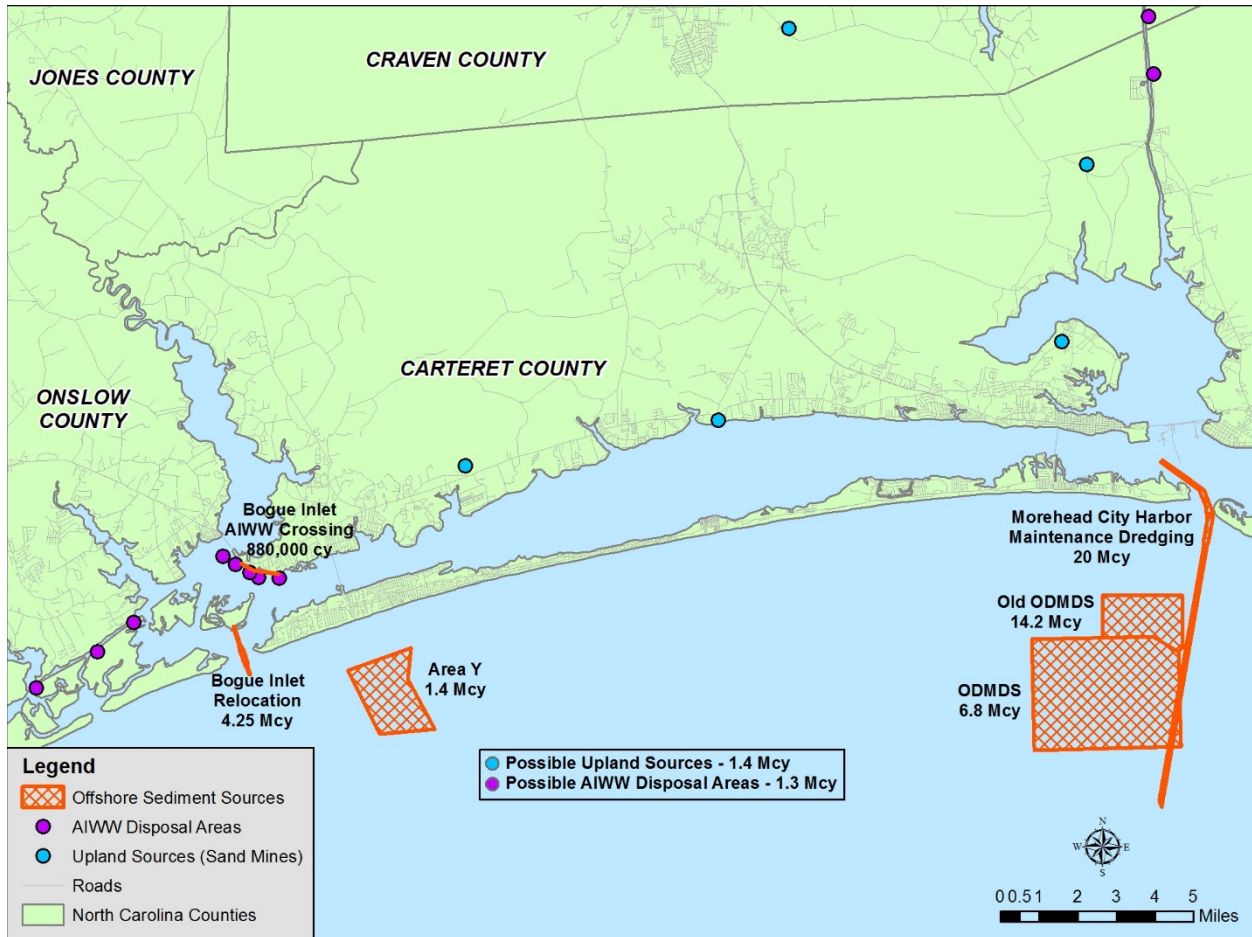


Figure 4-1. Master Beach Nourishment Plan Potential Sediment Sources

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.

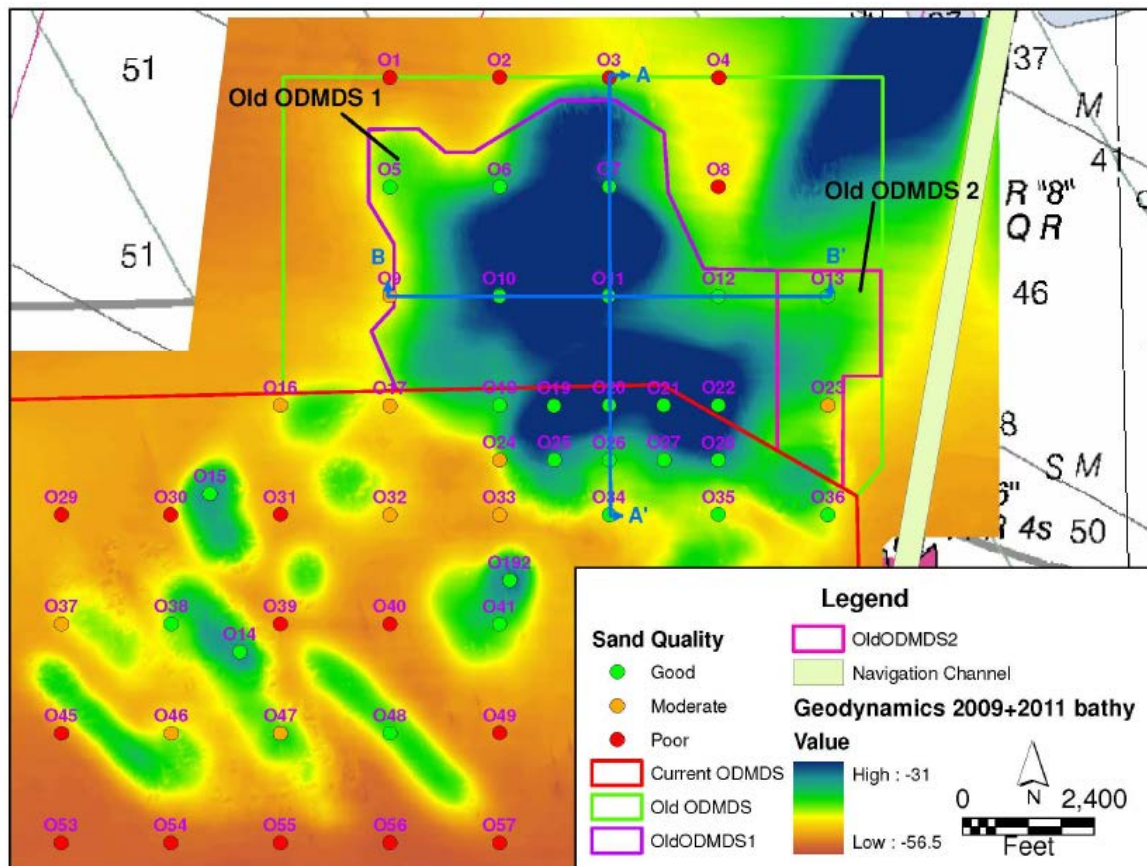


Figure 4-2. Old ODMDS Site and Vibracore Locations (Coastal Tech, 2013)

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 granulometric 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.

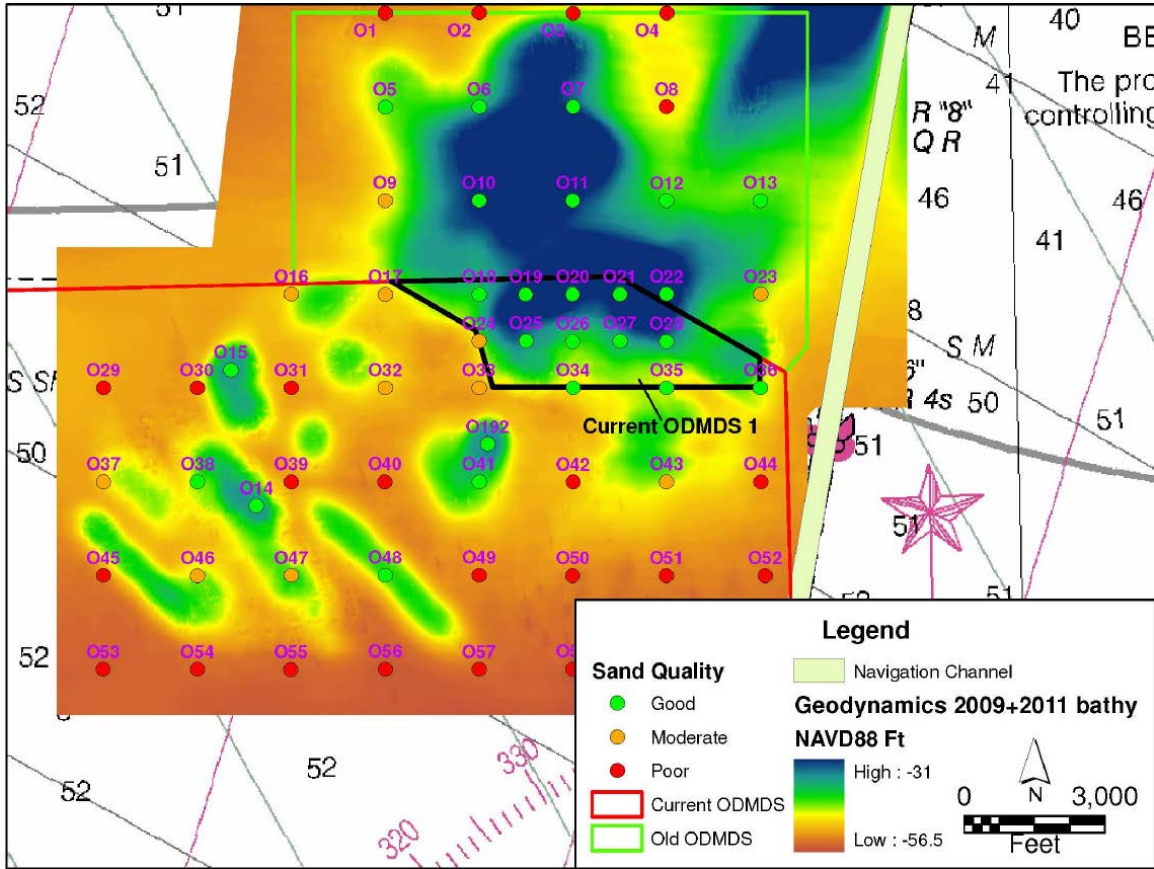


Figure 4-3. Current ODMDS 1 Site and Vibracore Locations (Coastal Tech, 2013)

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.

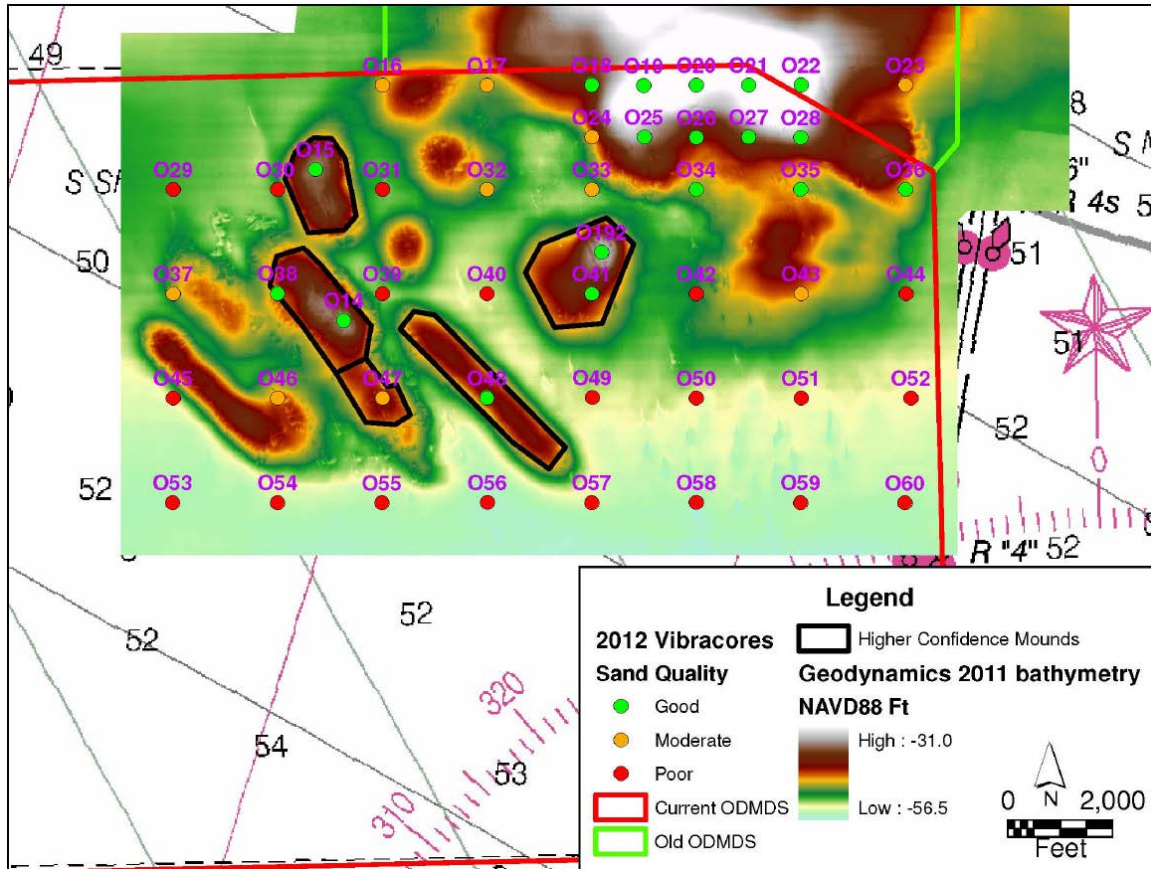


Figure 4-4. Higher Confidence Mound Sites and Vibracore Locations (Coastal Tech, 2013)

Mound O-15

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.

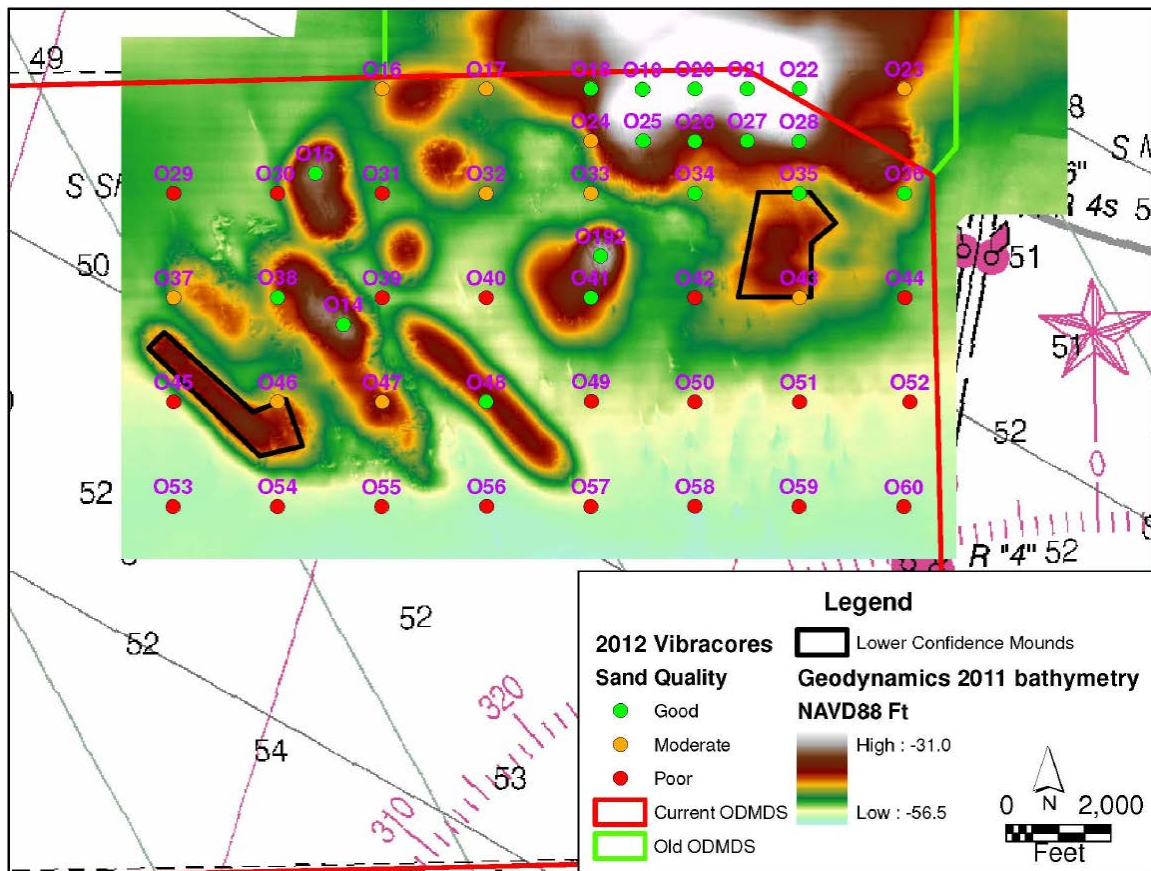


Figure 4-5. Lower Confidence Mound Sites and Vibracore Locations (Coastal Tech, 2013)

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.

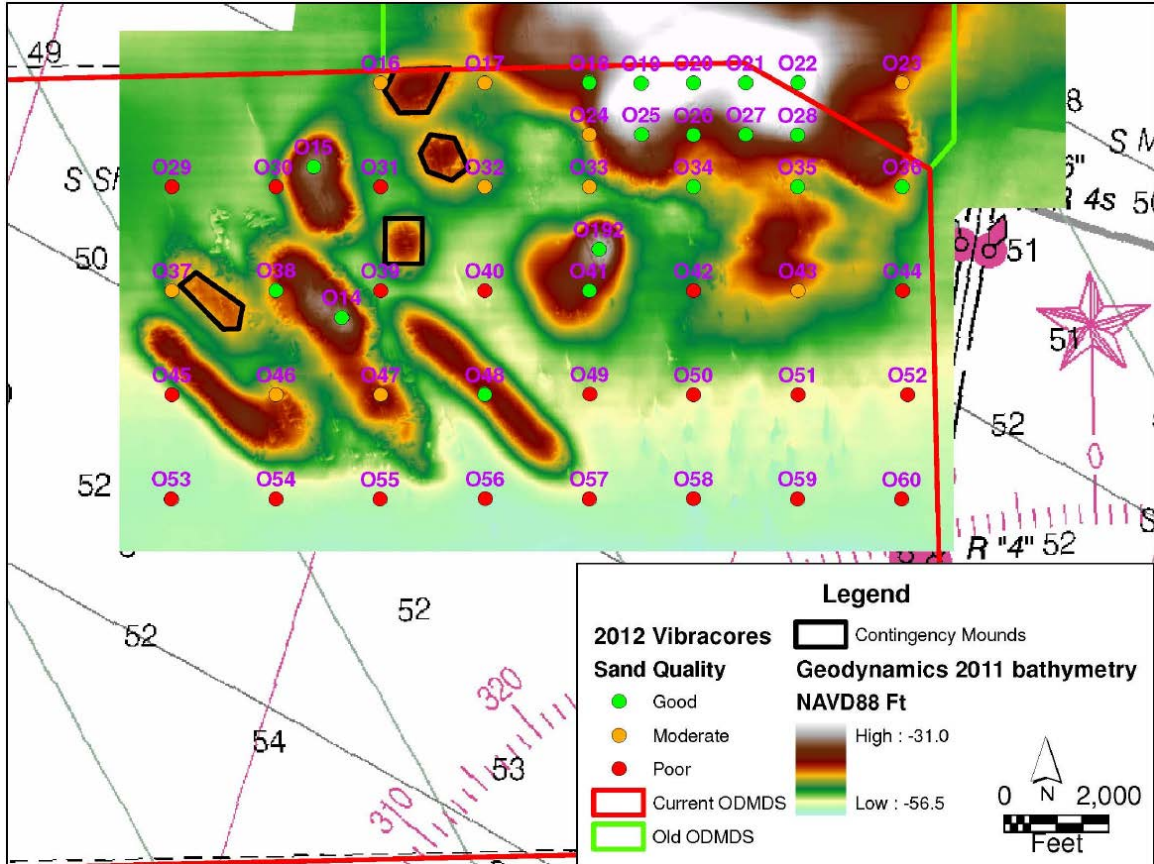


Figure 4-6. Contingency Mound Sites and Vibracores (Coastal Tech, 2013)

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.

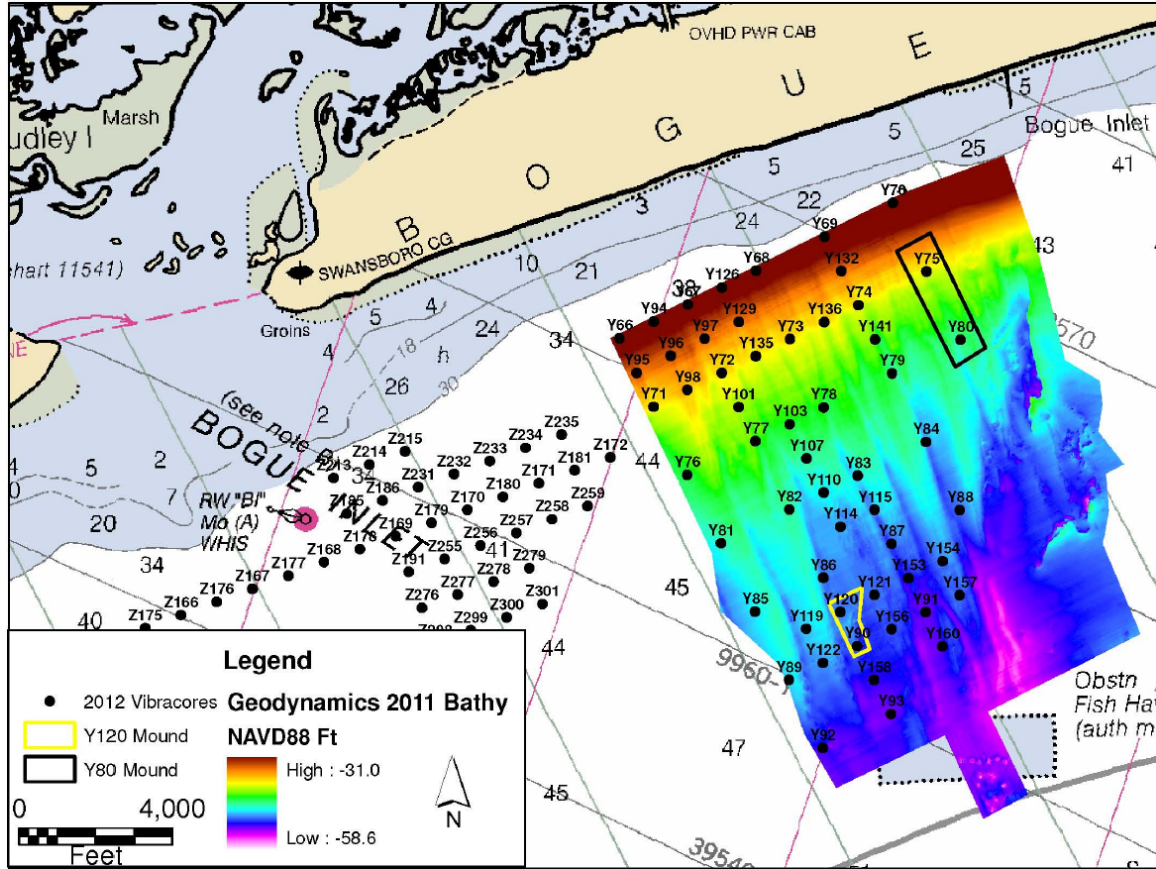


Figure 4-7. Area Y Site and Vibracore Locations (Coastal Tech, 2013)

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.

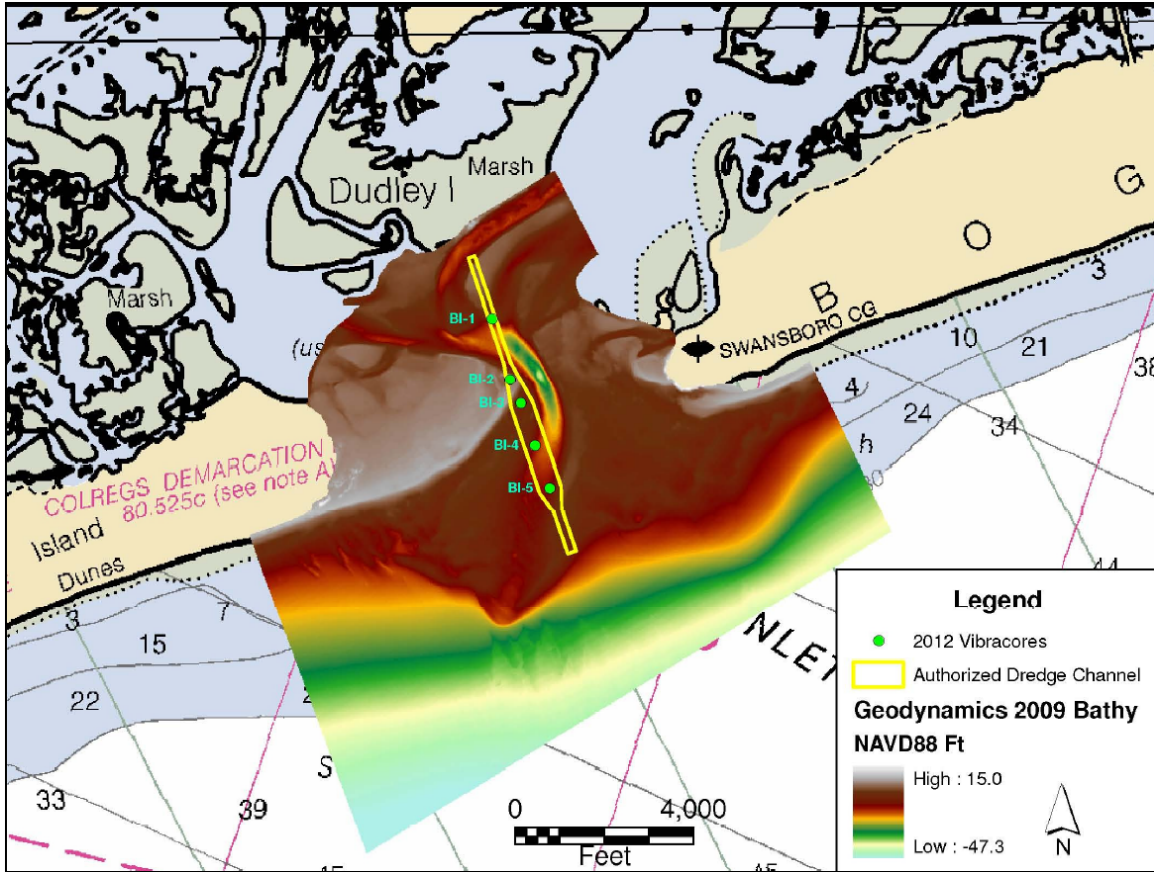


Figure 4-8. Bogue Inlet Channel Site, Vibracores, and Authorized Channel Location (Coastal Tech, 2013)

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 Mey 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.

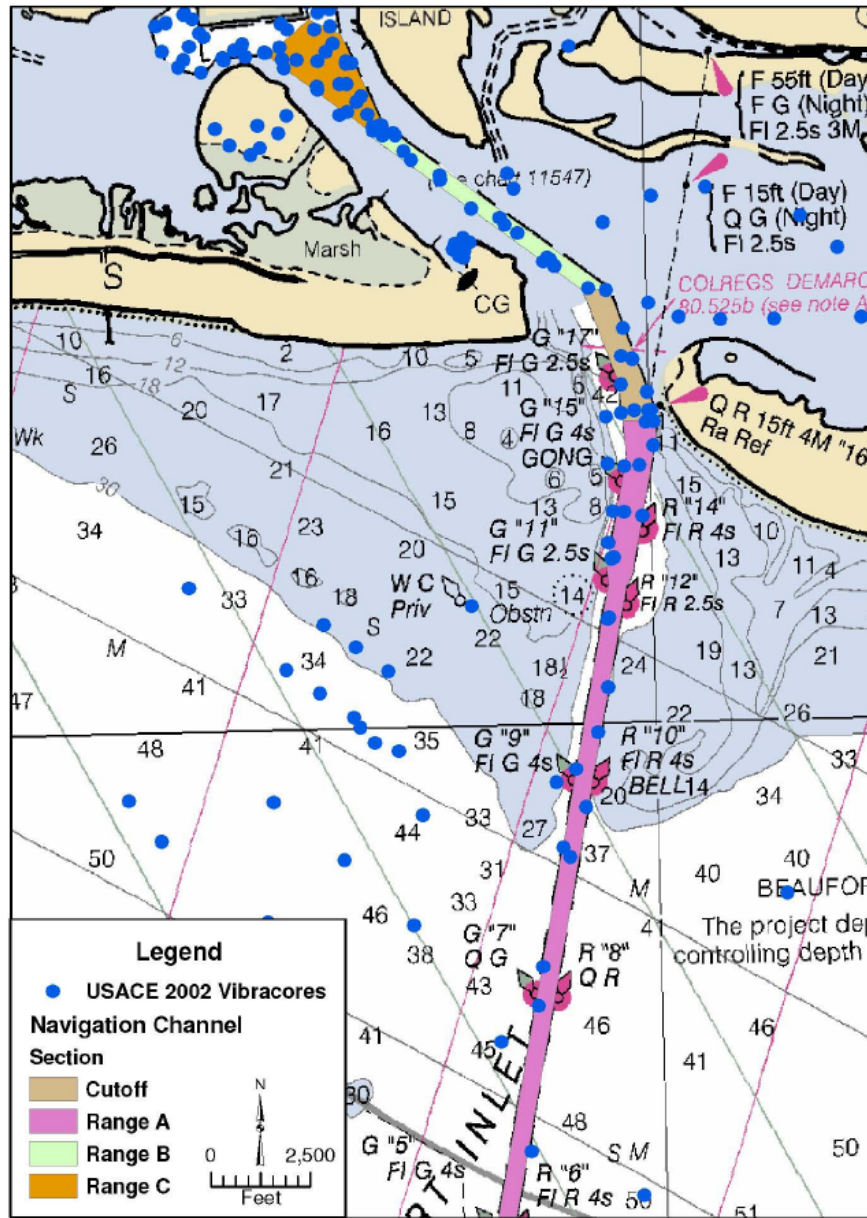


Figure 4-9. Morehead City Channel Vibracore and Reach Locations (Coastal Tech, 2013)

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.**

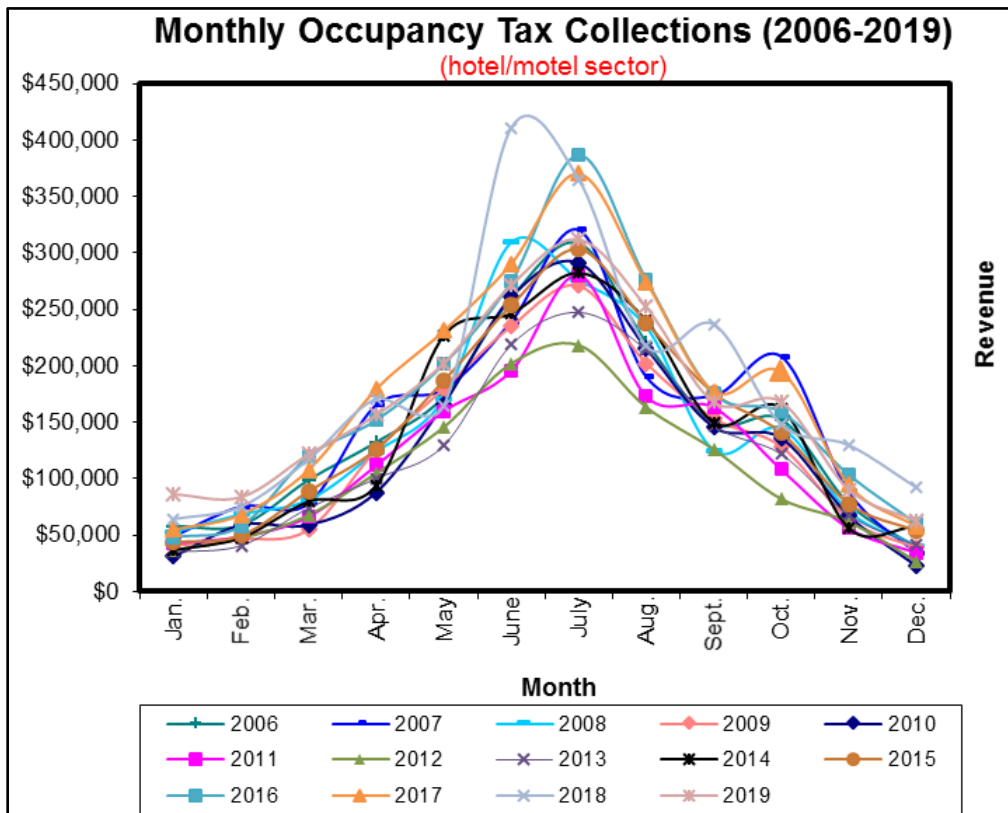


Figure 5-1. Monthly Occupancy Tax – Hotel/Motel

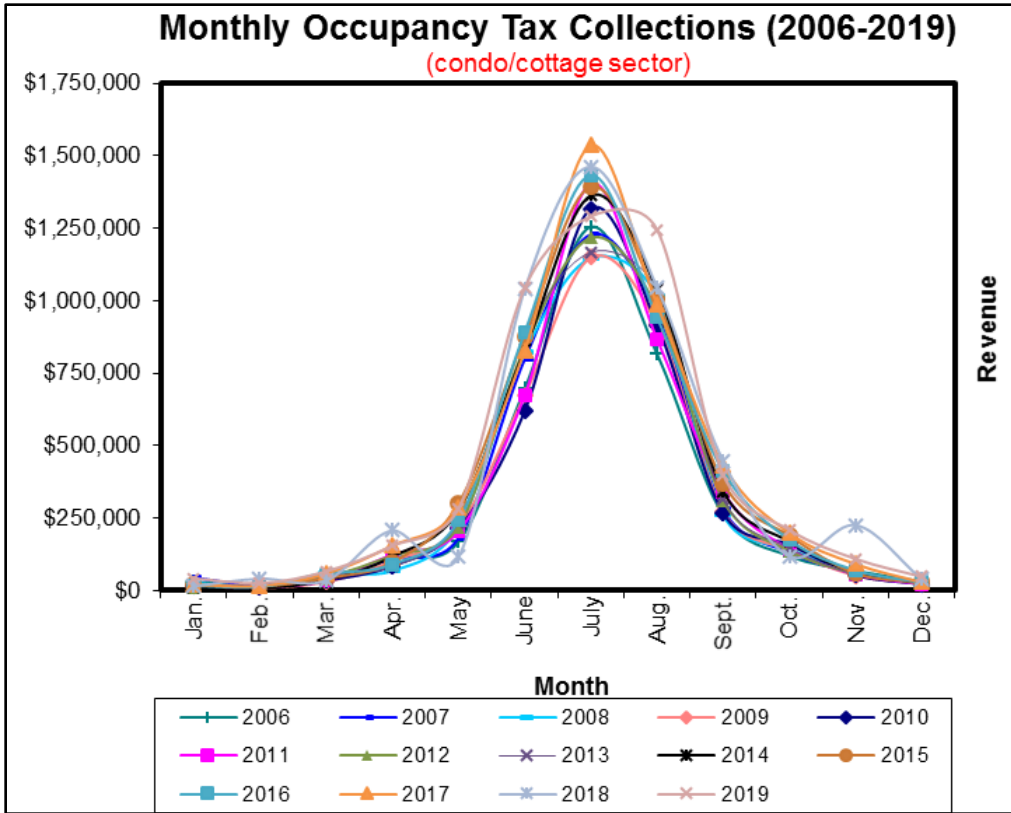


Figure 5-2. Monthly Occupancy Tax – Condo/Cottage

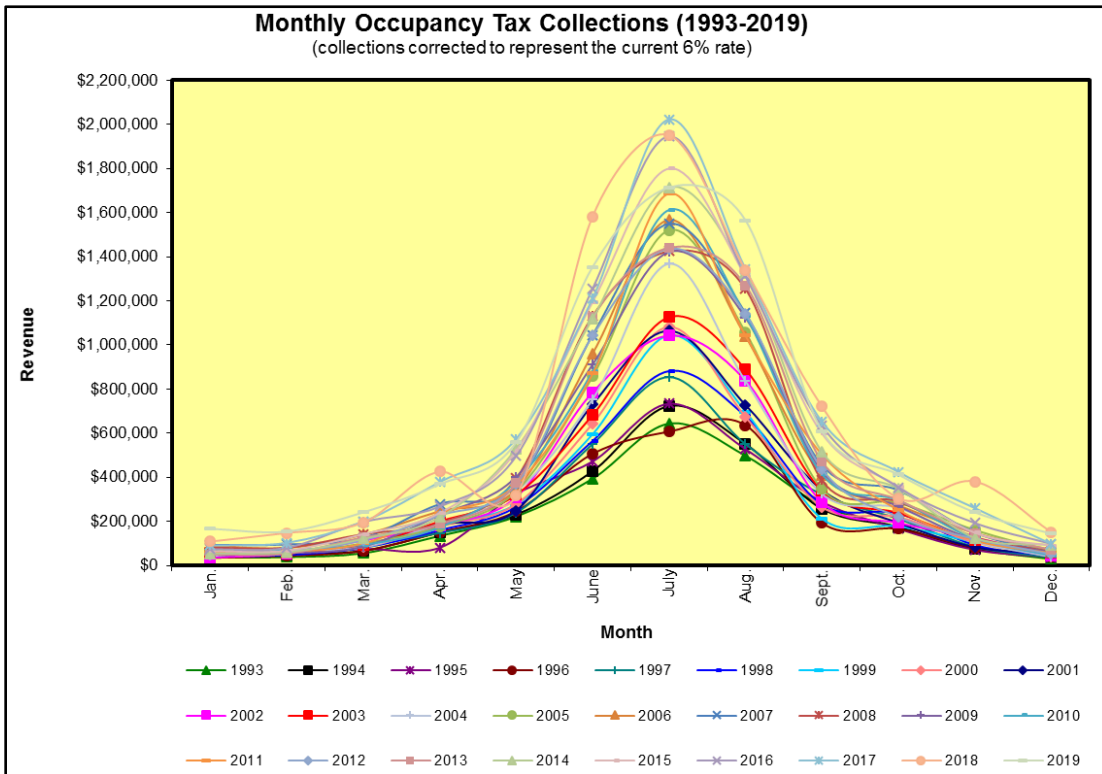


Figure 5-3. Total Monthly Occupancy Tax (1993-2019)

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.

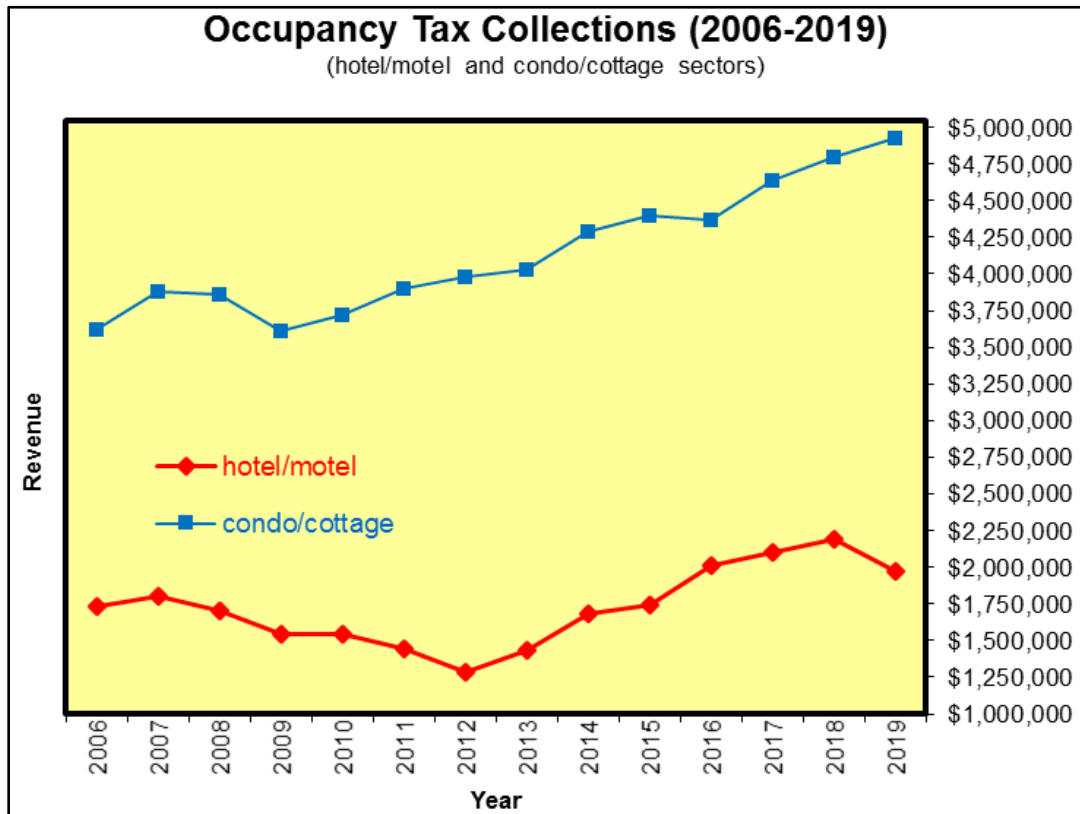


Figure 5-4. Yearly Occupancy Tax – Hotel/Motel & Condo/Cottage

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.

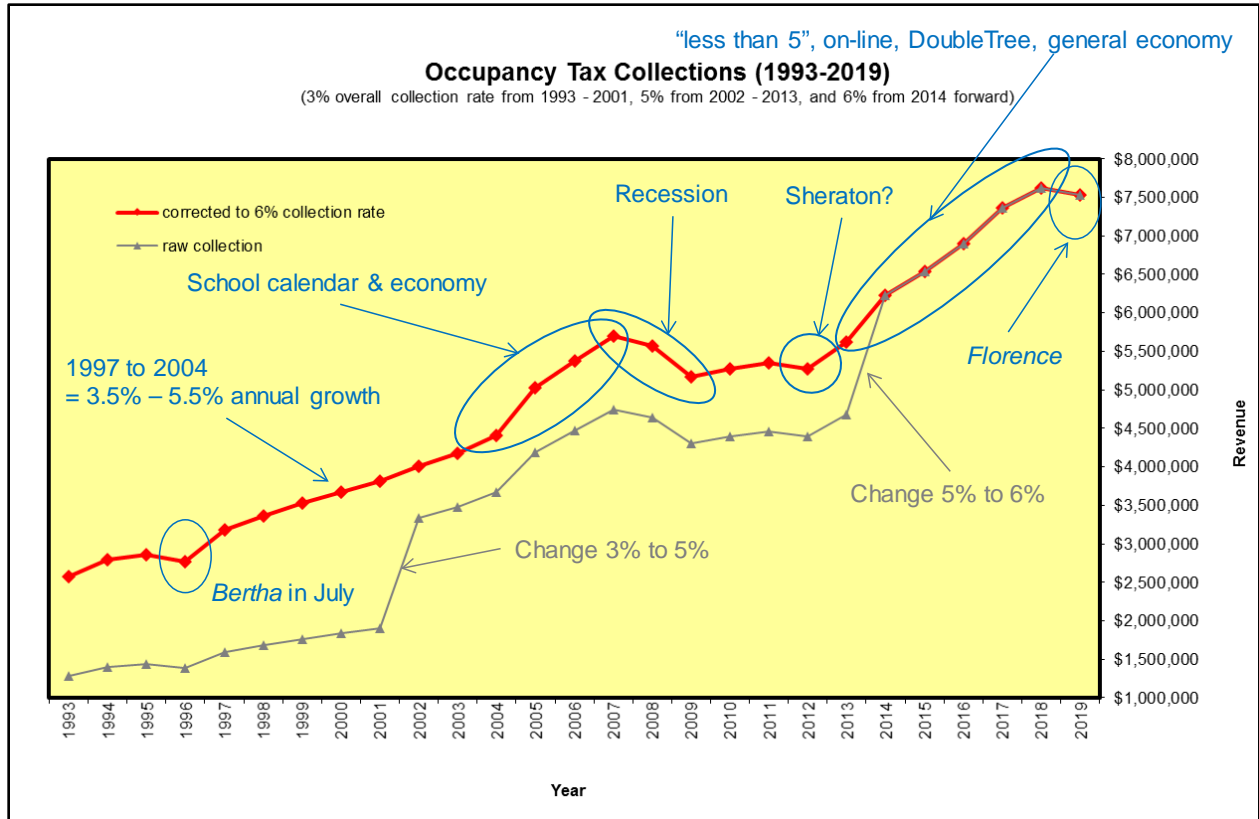


Figure 5-5. Total Yearly Occupancy Tax (1993-2019)

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
<u>Emerald Isle</u>	<u>\$0.0400</u>	<u>\$0.0000</u>	<u>\$400,000</u>	<u>\$674,922</u>
<i>Average or Total</i>	\$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

Town	Annual Volume Loss (cy)	% of Total Annual Volume Loss	Avg. Placement Unit Cost Per Town	25% Town/75% County Cost Share			33% Town/67% County Cost Share		
				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 Emerald Isle 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 existing static line exception extents in Eastern Emerald Isle and newly triggered static line extents in a portion of Western Emerald Isle, including the recently constructed Phase I and Phase II of the Post-*Florence* Renourishment Project. Initial project design of the Phase II Bogue Banks Restoration Project (Eastern Emerald Isle) and performance to date is presented, documenting that the project has been maintained above original design conditions and in accordance with established nourishment triggers. Design of the Post-*Florence* Renourishment Project – Phase II, of which the Reach 2 placement triggered the new static line in Western Emerald Isle, is also documented and will be monitored and maintained going forward, in a similar fashion to Eastern Emerald Isle, under the guidance of the Bogue Banks Master Beach Nourishment Plan which has established nourishment triggers developed to protect Bogue Banks from a 25-yr storm event.

It is important to note that the current condition of the beach in the Bogue Banks Restoration Project Phase II project area (281 cy/ft in Emerald Isle - Central and 264 cy/ft in Emerald Isle East), which covers Eastern Emerald Isle, is similar to or better than it was upon inception of the BBNMP in 2004 (and immediately after the project was constructed in 2003) and in 2010 when the static line exception was originally approved (see Table 6-1). The current condition of the beach is just slightly less than it was in 2015 when the second static line exception was approved (see Table 6-1). However, the beach is still undergoing restoration from the tremendous damage caused by Hurricane *Florence* and the Phase II project area (Emerald Isle – Central and Emerald Isle – East) will be nourished during the upcoming 2020/2021 Post-*Florence* Renourishment

Project – Phase III. Current plans call for approximately 44 cy/ft of placement in Emerald Isle – Central and 37 cy/ft of placement in Emerald Isle – East which will increase the volumes in these areas well over previous conditions.

Table 6-1. Historical Beach Condition Summary (Bogue Banks Restoration Project Phase II – Eastern Emerald Isle)

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)
Emerald Isle Central (26-36)	195	250	280	298	281
Emerald Isle East (37-48)	194	270	245	274	264

It is also important to note that the current beach condition in Eastern Emerald Isle (281 cy/ft in Emerald Isle – Central and 264 cy/ft Emerald Isle – East) and the newly added Western Emerald Isle (347 cy/ft in Bogue Inlet and 288 cy/ft in Emerald Isle – West), is well above the nourishment triggers set by the Master Beach Nourishment Plan of 235 cy/ft in Bogue Inlet, 266 cy/ft in Emerald Isle – West, 211 cy/ft in Emerald Isle – Central, and 221 cy/ft in Emerald Isle - East, as shown in Table 6-2.

Table 6-2. Current Nourishment Trigger Summary (Eastern Emerald Isle & Western Emerald Isle)

Reach (Transects)	Avg 2020 Profile Volume (cy/ft)	MBNP Trigger (cy/ft)
Bogue Inlet (1-11)	347	235
Emerald Isle West (12-25)	288	266
Emerald Isle Central (26-36)	281	211
Emerald Isle East (37-48)	264	221

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

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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 I & Phase II Plans

POST-FLORENCE RENOURISHMENT PROJECT PHASE 1

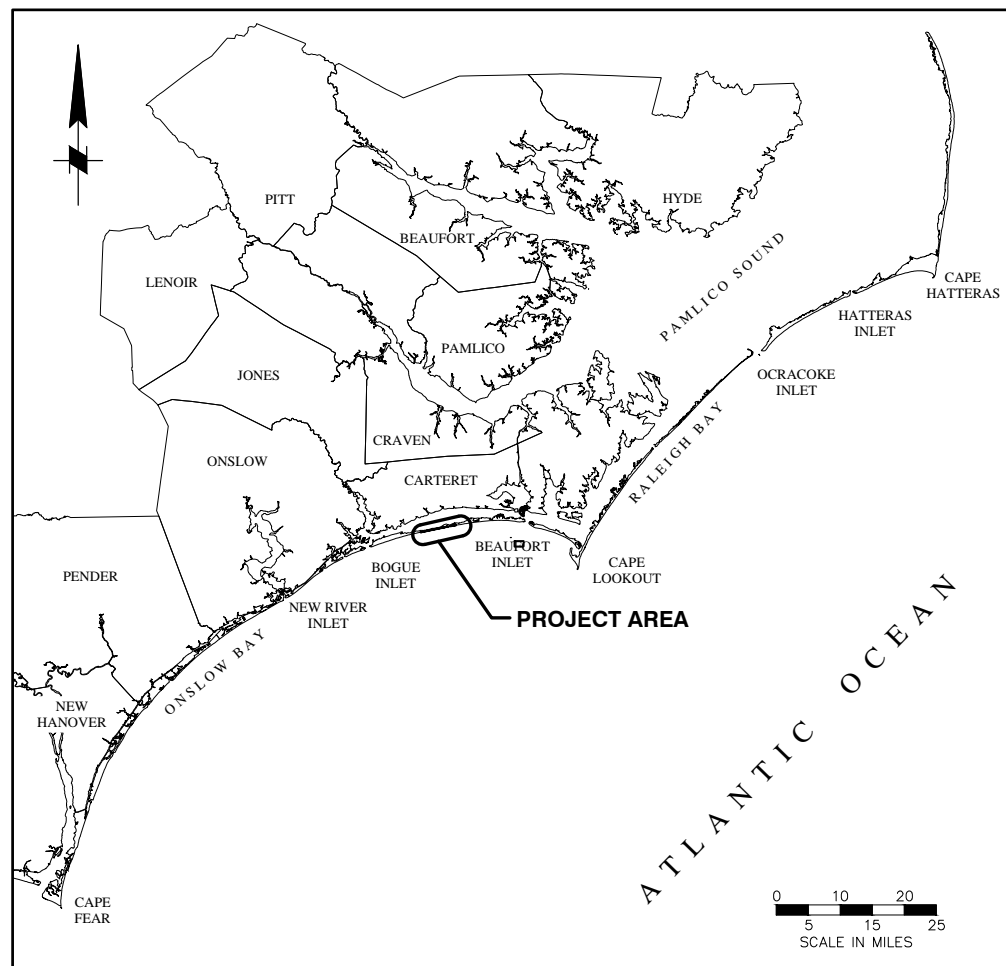
CARTERET COUNTY, NORTH CAROLINA



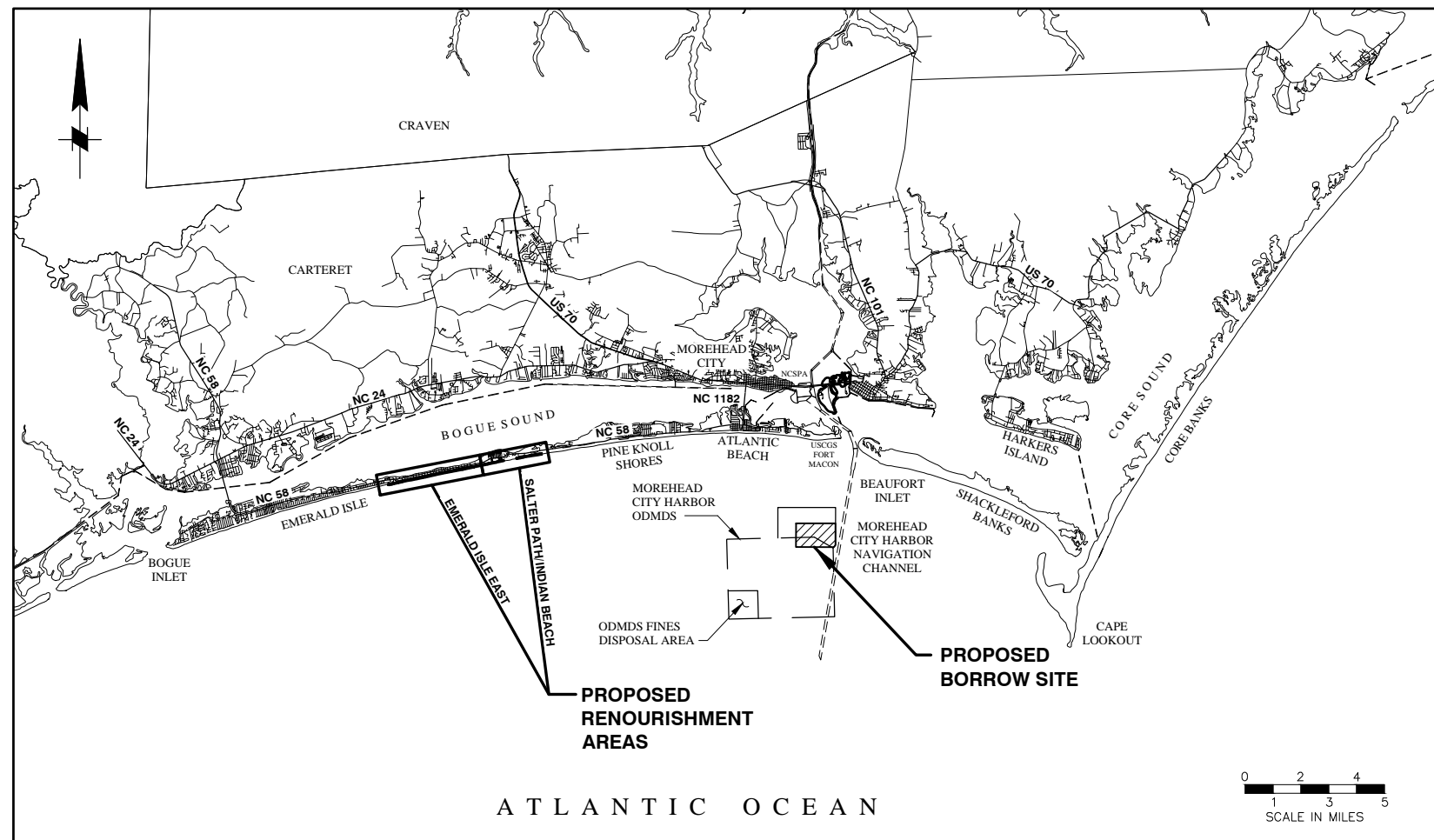
**TOWN OF EMERALD ISLE
7500 EMERALD DRIVE
EMERALD ISLE, NC 28594**



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



VICINITY MAP



LOCATION MAP



Mark	Description	Date	Appr.
0	ISSUED FOR CONSTRUCTION	02/12/19	JM
	BID DOCUMENTS	10/19/18	JM

**POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA**

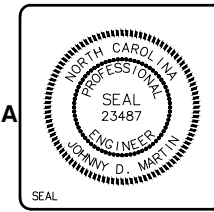
COVER SHEET

Date:	FEB 2019	Rev.	-
Designed by:	JM	M&N Project No.:	
Dwn by:	BDF	Drawing code:	
Reviewed by:	SM	Drawing Scale:	
Submitted by:	MOFFATT & NICHOL	Plot scale: 1:1 (0 SHEET)	

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4226

moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
G-001
Sheet 1 of 33

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C-101	PROJECT STAGING, ACCESS AND SURVEY CONTROL PLANS
C-102	ODMDS BORROW SITE DREDGE PLAN
C-103	ODMDS BORROW SITE VIBRACORE SUMMARY TABLE
C-104	ODMDS BORROW SITE DREDGE SECTIONS
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C-316	RENOURISHMENT SECTIONS - SHEET 16 OF 18
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C-318	RENOURISHMENT SECTIONS - SHEET 18 OF 18
C-601	CONSTRUCTION BASELINE WORK POINT TABLES

GENERAL NOTES:

- ALL BEACH FILL, PLANTING AND DREDGING WORK SHALL CONFORM TO THE REQUIREMENTS OF THESE PLANS AND SPECIFICATIONS.
- 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.
- CONTRACTOR SHALL VERIFY ALL DIMENSIONS AND EXISTING CONDITIONS BEFORE STARTING WORK. NOTIFY OWNER OF DISCREPANCIES.
- ALL SAFETY REGULATIONS ARE TO BE STRICTLY FOLLOWED. METHODS OF CONSTRUCTION AND ERECTION OF STRUCTURAL MATERIAL ARE THE CONTRACTORS RESPONSIBILITY.
- 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.
- 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.
- THE STAGING AND ACCESS AREAS SHOWN ON C-101 ARE OWNED BY THE TOWNS OF EMERALD ISLE AND INDIAN BEACH. COORDINATION WITH THE TOWN MANAGERS SHALL BE REQUIRED BEFORE USE. FOR THE STAGING AND ACCESS AREAS WITHIN REACH 1, THE POINT OF CONTACT IS MR. FRANK RUSH. FOR REACHES 2 & 3, THE POINT OF CONTACT IS MR. TIM WHITE.

MR. RANDY MARTIN TOWN MANAGER TOWN OF EMERALD ISLE 7500 EMERALD DRIVE EMERALD ISLE, NC 28594 (252) 354-3424 rmartin@emeraldisle-nc.org	MR. TIM WHITE TOWN MANAGER TOWN OF INDIAN BEACH 1400 SALTER PATH RD INDIAN BEACH, NC 28512 (252) 247-3344 admin@indianbeach.org
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SEE THE TECHNICAL SPECIFICATIONS FOR A DESCRIPTION AND PHOTOS OF STAGING AND ACCESS AREAS.
- 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 OWNER BEFORE INSTALLATION.
- 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.
- 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

- 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.
- 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

- THE FOLLOWING ESTIMATE OF SAND QUANTITIES REQUIRED FOR THE PROJECT IS:
TOTAL PROJECT FILL 956,000 CY
- THE FOLLOWING ESTIMATE OF PLANTING QUANTITIES REQUIRED FOR THE PROJECT IS:
TOTAL PROJECT PLANTING 179,400 SY

DREDGING

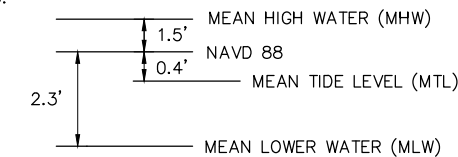
- NO DREDGING WHATSOEVER SHALL OCCUR BELOW AN ELEVATION OF -52 FT NAVD 88.
- ALL DREDGING SHALL BE PERFORMED WITHIN THE LIMITS OF THE PERMITTED DREDGING AREA AS SHOWN IN THE DRAWINGS.
- PIPELINE CORRIDOR SHALL BE DELINEATED WITH BUOYS BY THE CONTRACTOR IN THE PRESENCE OF THE OWNER BEFORE PLACEMENT.

DREDGING

- 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).
- ALL ELEVATIONS SHOWN ON THE DREDGING DRAWINGS ARE REFERENCED TO NORTH AMERICAN VERTICAL DATUM 1988 (NAVD 88).
- THE BATHYMETRY PRESENTED ON THE DREDGING PLANS IS BASED ON A SURVEY COMPLETED IN MARCH 2018 BY GEODYNAMICS AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THAT TIME.
- 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

- 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.
- 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-318.
- 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 FROM EAST TO WEST.
- 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.
- CONTRACTOR SHALL TAKE CARE TO GRADE THE DUNE AND BERM SO THAT PONDING LANDWARD OF THE CRESTS IS MINIMIZED.
- 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.
- 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).
- ALL ELEVATIONS SHOWN ON THE BEACH FILL DRAWINGS ARE REFERENCED TO THE NORTH AMERICAN VERTICAL DATUM (NAVD 88).
- THE BATHYMETRY/TOPOGRAPHY PRESENTED ON THE BEACH FILL PLANS AND SECTIONS IS BASED ON A SURVEY COMPLETED IN JANUARY 2019 BY GEODYNAMICS AND CAN ONLY BE CONSIDERED AS INDICATING THE CONDITIONS AT THAT TIME.
- 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.



- HORIZONTAL AND VERTICAL CONTROL FOR THE BEACH FILL SURVEY WAS BASED ON NUMEROUS RANGE MONUMENTS AS FOUND BY GEODYNAMICS.
- CONTOURS FOR THE BEACH FILL PLANS ARE SHOWN AT 1 FT INTERVALS.
- 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.
- BEACH FILL SLOPES CALLED OUT ON PLANS ARE HORIZONTAL : VERTICAL.
- SEE TECHNICAL SPECIFICATION FOR ADDITIONAL PLACEMENT REQUIREMENTS.
- 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.

LEGEND

EXISTING		PROPOSED
---	MEAN HIGH WATER LINE	---
---	MEAN LOW WATER LINE	---
---	MEAN TIDE LEVEL LINE	---
---	PROPERTY LINE	---
---	MAJOR CONTOUR	---
---	MINOR CONTOUR	---
---	FILL SLOPE LIMIT	---
---	FILL SLOPE BREAK	---
⊗	CONSTRUCTION BASELINE WORK POINT	⊗ WP-##
⊗	NGS STATION	⊗
⊗	NAME	

ABBREVIATIONS

CY	CUBIC YARDS	No.	NUMBER
FT	FEET OR FOOT	ODMDS	OFFSHORE DREDGE MATERIAL DISPOSAL SITE
MHW	MEAN HIGH WATER	TYP	TYPICAL
MLW	MEAN LOW WATER	WP	WORK POINT
MTL	MEAN TIDE LEVEL	Ⓡ	BASELINE
NAD	NORTH AMERICAN DATUM	Ⓢ	AT
NAVD	NORTH AMERICAN VERTICAL DATUM	~	APPROXIMATELY
NGS	NATIONAL GEODETIC SURVEY		
NOAA	NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION		

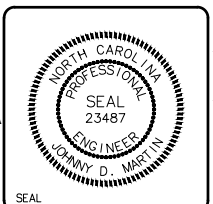


Date	Issued For	Revision
02/12/19	ISSUED FOR CONSTRUCTION	0
10/19/18	BID DOCUMENTS	

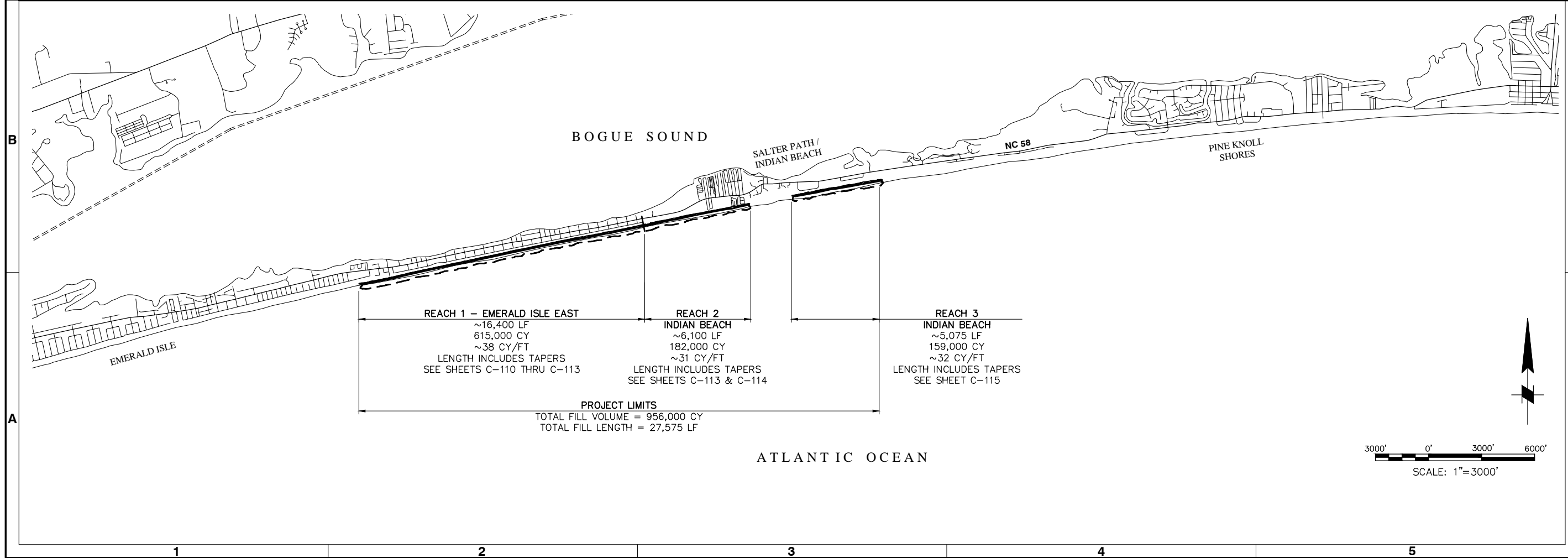
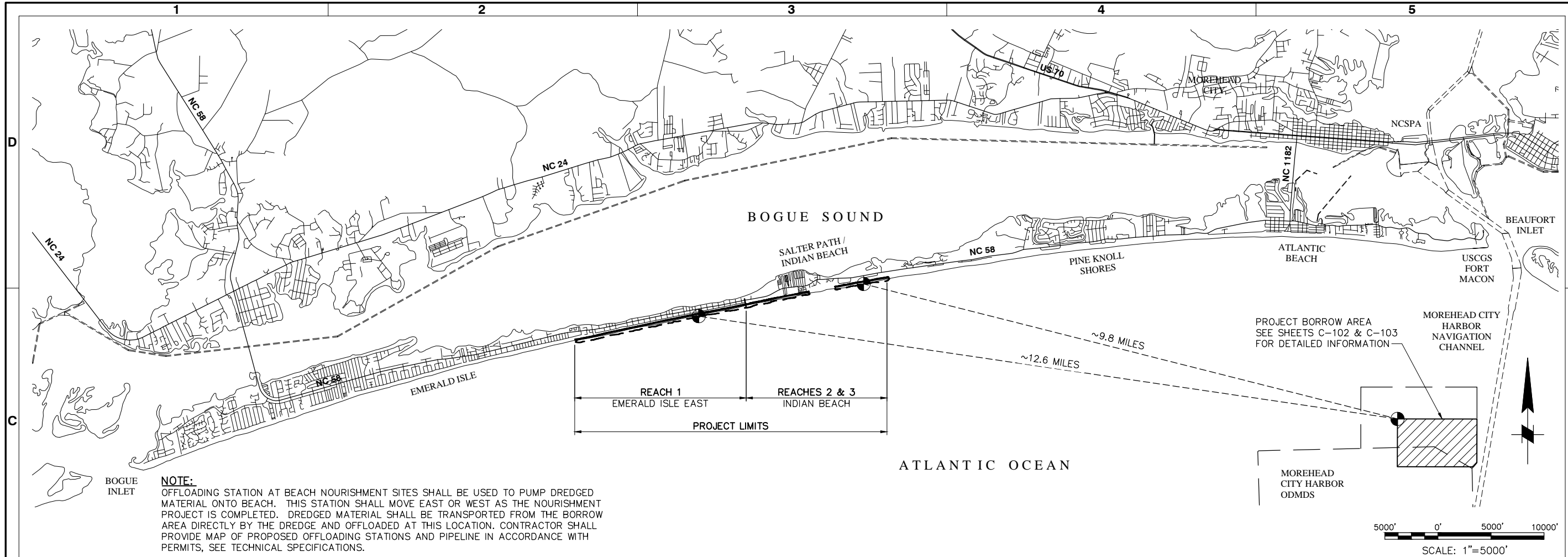
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
INDEX OF DRAWINGS, LEGEND, ABBREVIATIONS, AND GENERAL NOTES

Designed by:	SM	Checked by:	SM	Reviewed by:	SM	Submitted by:	MOFFATT & NICHOL
Date:	FEB 2019	M&N Project No.:		Drawing code:		Drawing Scale:	As shown (1:1 (0 SHEET))

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4428
moffatt & nichol
NC FIRM LICENSE No. F-0105
PREPARED FOR THE TOWNS OF EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
G-002
Sheet 2 of 33

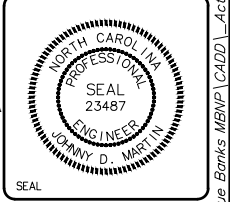


Mark	Description	Date	Appr.
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0	BID DOCUMENTS	10/19/18	JM

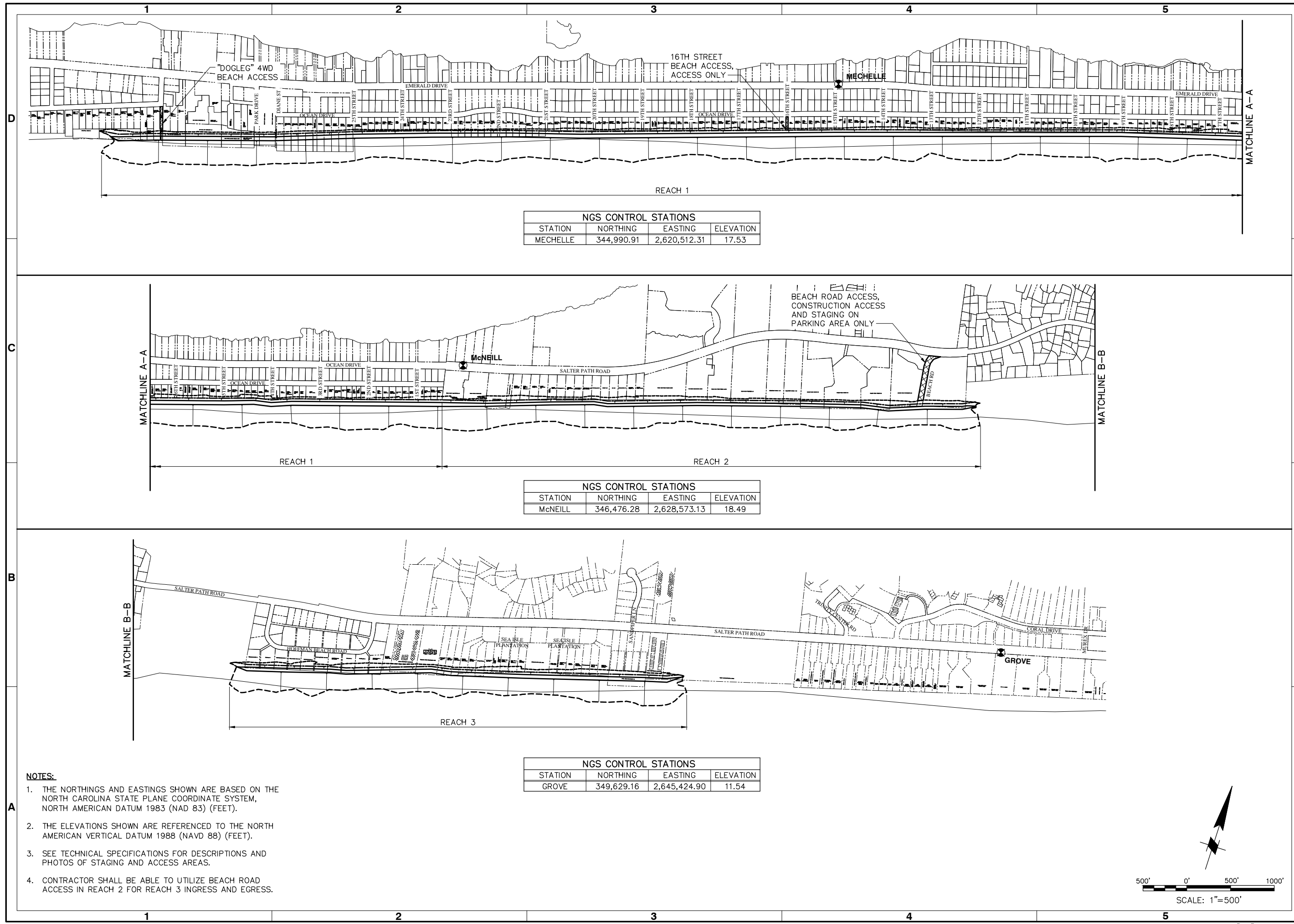
**POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA**

PROJECT MAP AND KEY PLAN

4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4268	NC FIRM LICENSE No. F-0105	MEFFATT & NICHOL
Prepared for the Towns of EMERALD ISLE AND INDIAN BEACH		



Sheet Reference No.
C-100
Sheet 3 of 33



NGS CONTROL STATIONS			
STATION	NORTHING	EASTING	ELEVATION
MECHELLE	344,990.91	2,620,512.31	17.53

NGS CONTROL STATIONS			
STATION	NORTHING	EASTING	ELEVATION
McNEILL	346,476.28	2,628,573.13	18.49

NGS CONTROL STATIONS			
STATION	NORTHING	EASTING	ELEVATION
GROVE	349,629.16	2,645,424.90	11.54

- 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).
 3. SEE TECHNICAL SPECIFICATIONS FOR DESCRIPTIONS AND PHOTOS OF STAGING AND ACCESS AREAS.
 4. CONTRACTOR SHALL BE ABLE TO UTILIZE BEACH ROAD ACCESS IN REACH 2 FOR REACH 3 INGRESS AND EGRESS.



Rev.	Date	Description
0	02/12/19	ISSUED FOR CONSTRUCTION
	10/19/18	BID DOCUMENTS

**POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA**

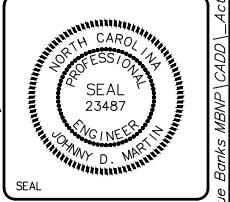
**PROJECT STAGING, ACCESS AND
SURVEY CONTROL PLANS**

Date:	FEB 2019	Rev.:	-
Designed by:	JM	M&N Project No.:	
Dwn by:	BDF	Drawn by:	SM
Reviewed by:	SM	Submitted by:	MOFFATT & NICHOL
		Drawing code:	
		Drawing Scale:	Plot scale: 1" = 10' (SHEET)

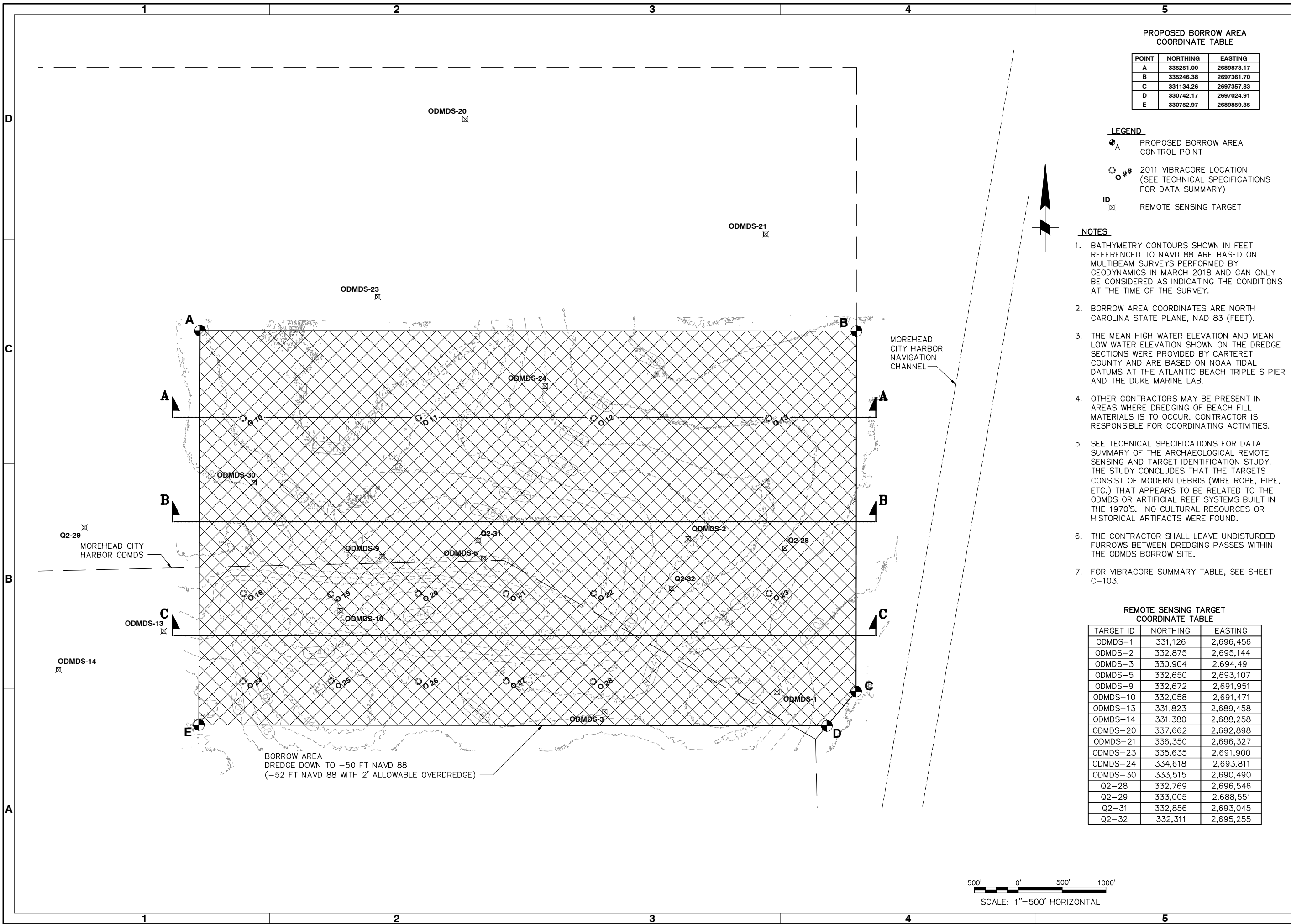
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4226

moffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-101
Sheet 4 of 33



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

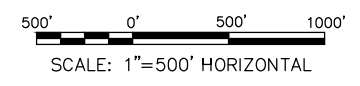
- ⓐ PROPOSED BORROW AREA CONTROL POINT
- ## 2011 VIBRACORE LOCATION (SEE TECHNICAL SPECIFICATIONS FOR DATA SUMMARY)
- ⓧ REMOTE SENSING TARGET

NOTES

1. BATHYMETRY CONTOURS SHOWN IN FEET REFERENCED TO NAVD 88 ARE BASED ON MULTIBEAM SURVEYS PERFORMED BY GEODYNAMICS IN MARCH 2018 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 VIBRACORE SUMMARY TABLE, SEE SHEET C-103.

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



Date	Description	Mark
02/12/19 JM	ISSUED FOR CONSTRUCTION	0
10/19/18 JM	BID DOCUMENTS	0

POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
ODMDS BORROW SITE DREDGE PLAN

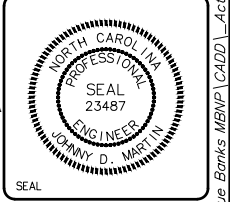
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH

Designed by: J.M.
Dwn by: BDF
Ckd by: SM
Reviewed by: SM
Submitted by: MOFFATT & NICHOL

Date: FEB 2019
M&N Project No.:
Drawing code:
Drawing Scale:
Plot scale: 1:1 (0 SHEET)



Sheet Reference No.
C-102
Sheet 5 of 33

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%
Percent 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

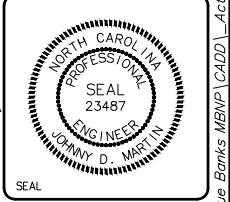


Rev.	Date	Description
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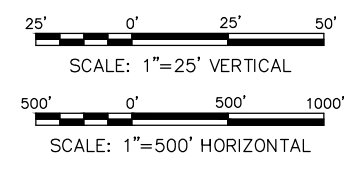
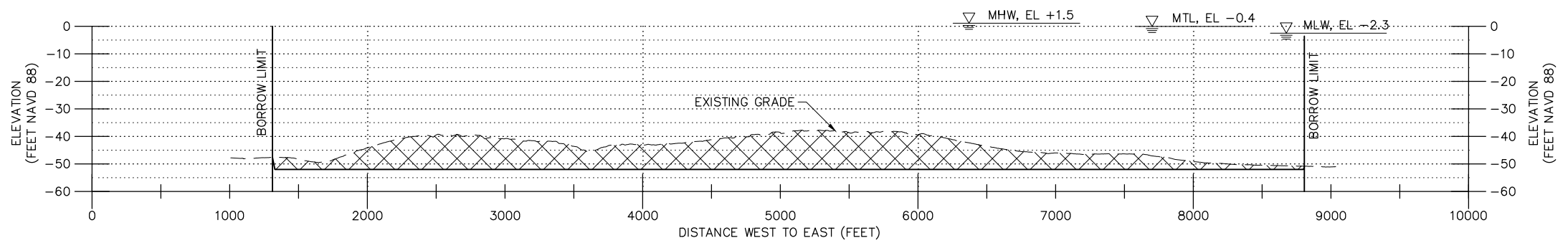
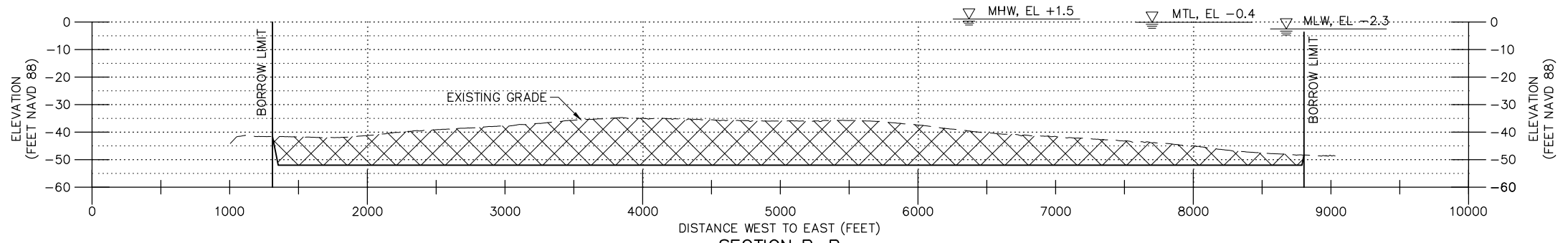
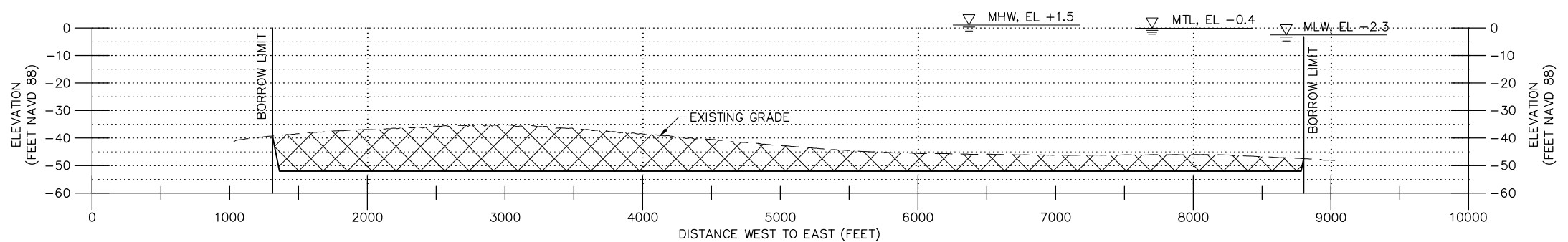
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
ODMDS BORROW SITE
VIBRACORE SUMMARY TABLE

4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4626 meffatt & nichol NC FIRM LICENSE No. F-0105	Prepared for the Towns of EMERALD ISLE AND INDIAN BEACH
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4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626
meffatt & nichol
NC FIRM LICENSE No. F-0105



Sheet Reference No.
C-103
Sheet 6 of 33



Mark	Description	Date	Appr.
0	BID DOCUMENTS	10/19/18	JM
	ISSUED FOR CONSTRUCTION	02/12/19	JM

POST-FLORENCE RENOURISHMENT PROJECT
 PHASE 1
 CARTERET COUNTY, NORTH CAROLINA

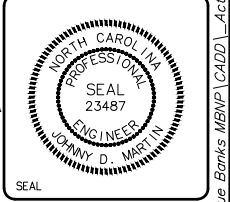
ODMDS BORROW SITE DREDGE
 SECTIONS

Designed by:	JM	Checked by:	SM	Reviewed by:	SM	Submitted by:	MOFFATT & NICHOL
Date:	FEB 2019	M&N Project No.:		Drawing code:		Drawing Scale:	Plot scale: 1:1 (0 SHEET)

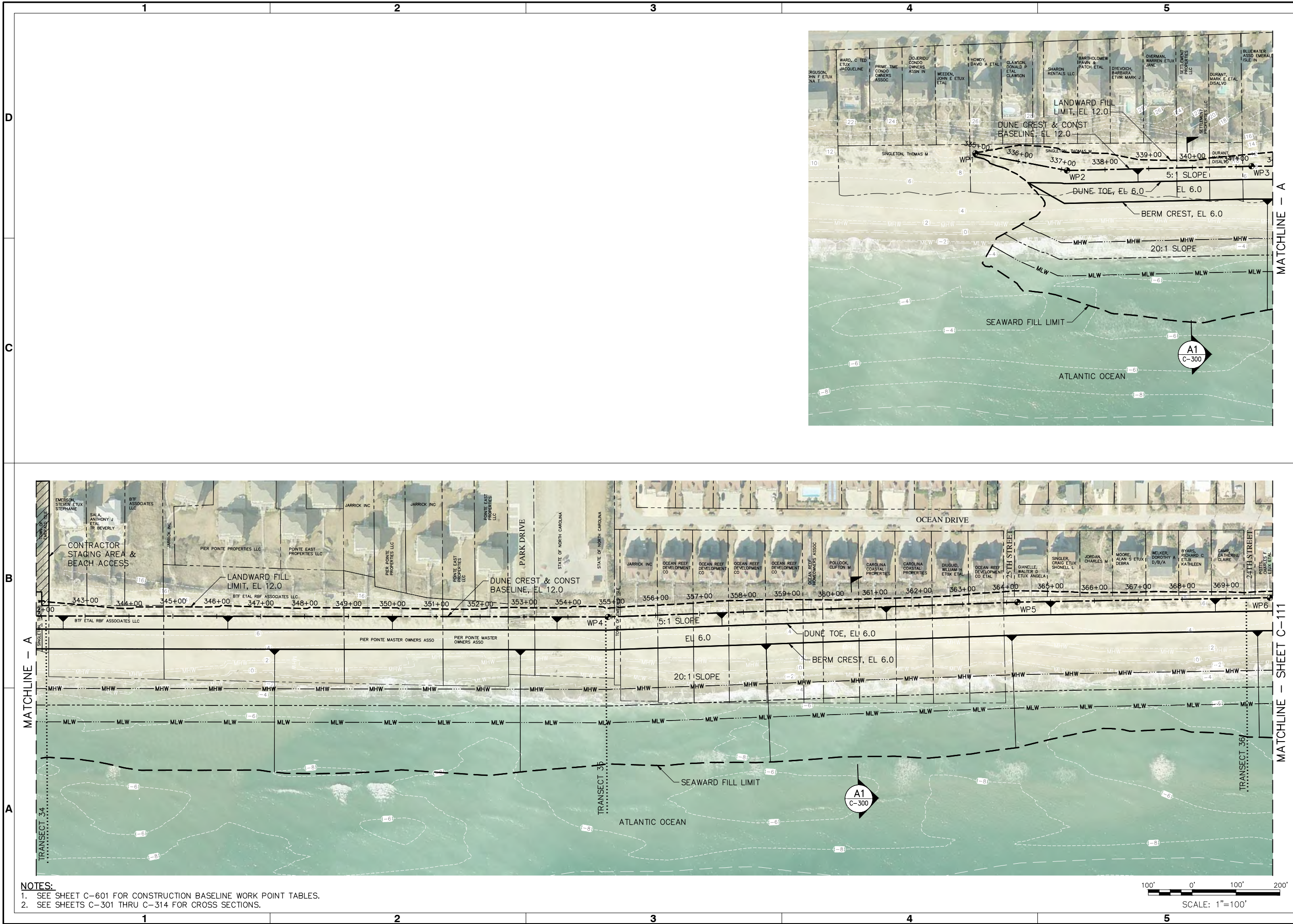
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4228

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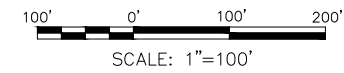
PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-104
 Sheet 7 of 33



- NOTES:**
1. SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
 2. SEE SHEETS C-301 THRU C-314 FOR CROSS SECTIONS.



Rev.	Date	Description
0	10/19/18 JM	BID DOCUMENTS
1	02/12/19 JM	ISSUED FOR CONSTRUCTION

POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA

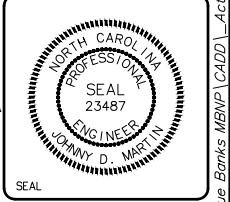
REACHES 1 AND 2 - SHEET 1 OF 5

Designed by:	JM	Checked by:	SM
Date:	FEB 2019	M&N Project No.:	
Drawn by:	BDF	Drawing code:	
Reviewed by:	SM	Drawing Scale:	As Shown
Submitted by:	MOFFATT & NICHOL	Plot scale: 1" = 100'	

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 RALEIGH, NC 27609
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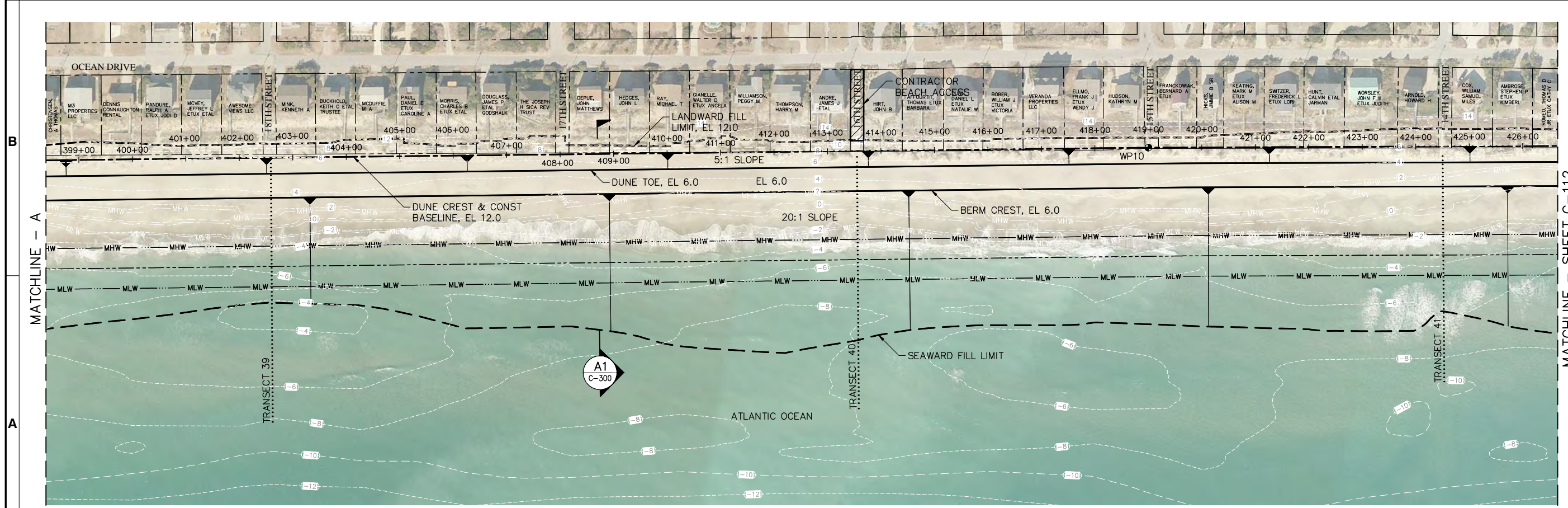
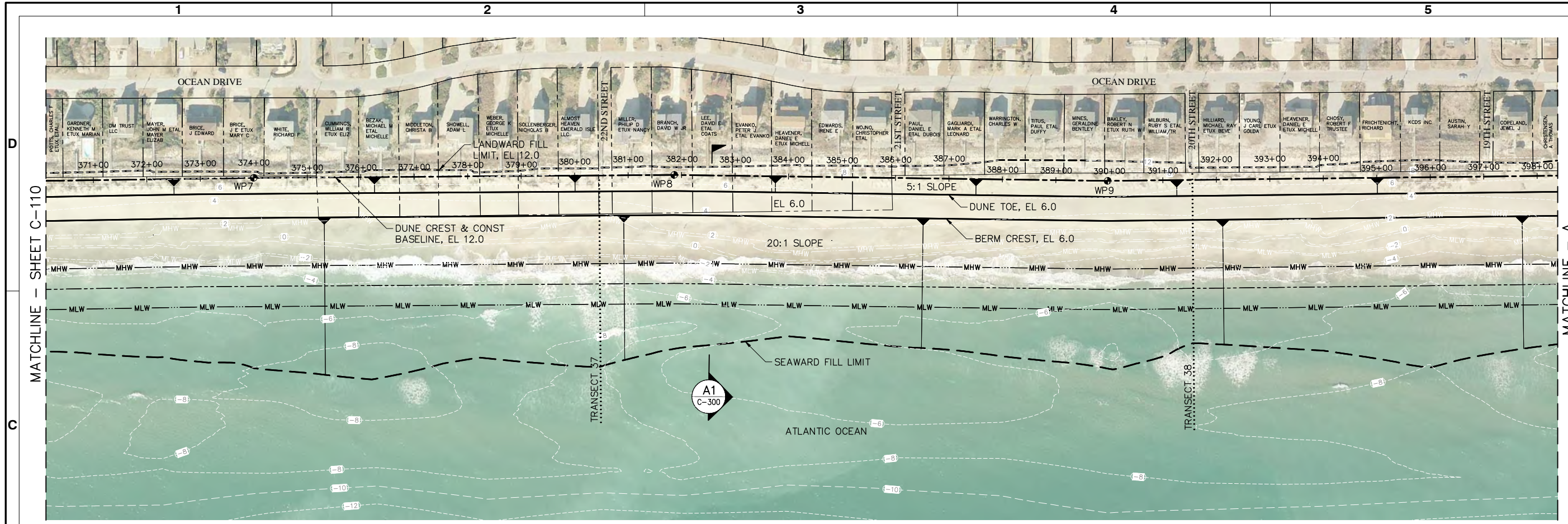
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 EMERALD ISLE AND INDIAN BEACH

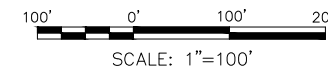


Sheet Reference No.
C-110
 Sheet 8 of 33

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NOTES:
 1. SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
 2. SEE SHEETS C-301 THRU C-314 FOR CROSS SECTIONS.



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PHASE 1
CARTERET COUNTY, NORTH CAROLINA

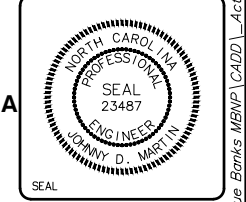
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Reviewed by:	SM	Drawing code:	
Submitted by:	MOFFATT & NICHOL	Drawing Scale:	As Shown

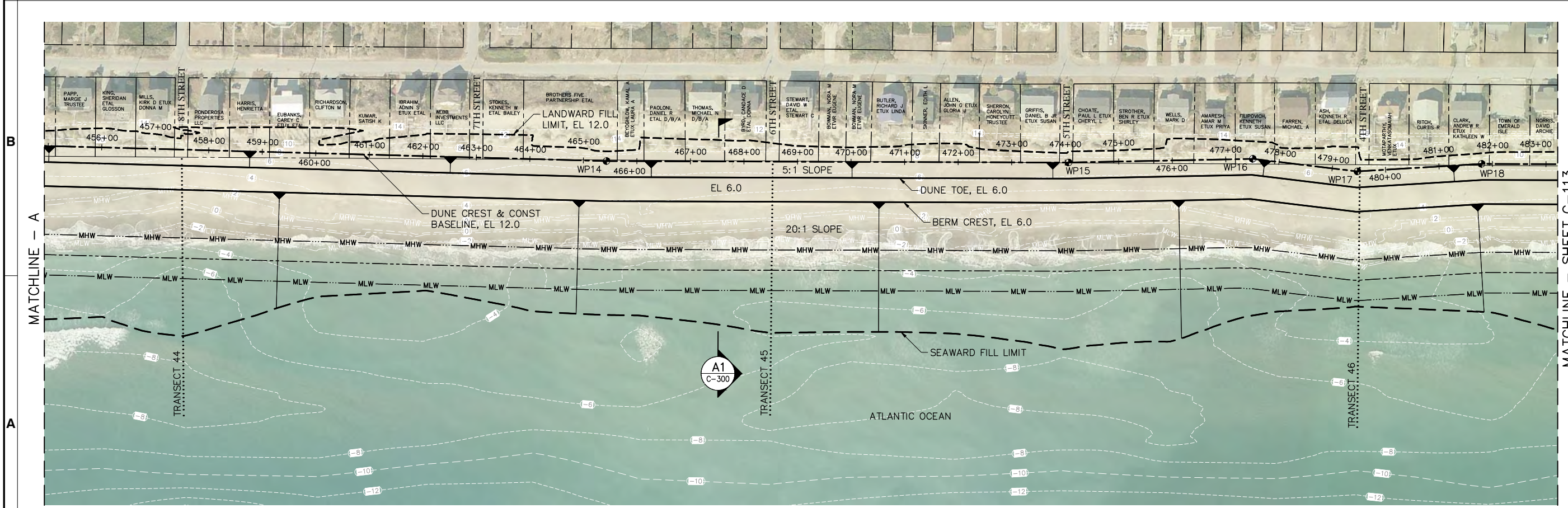
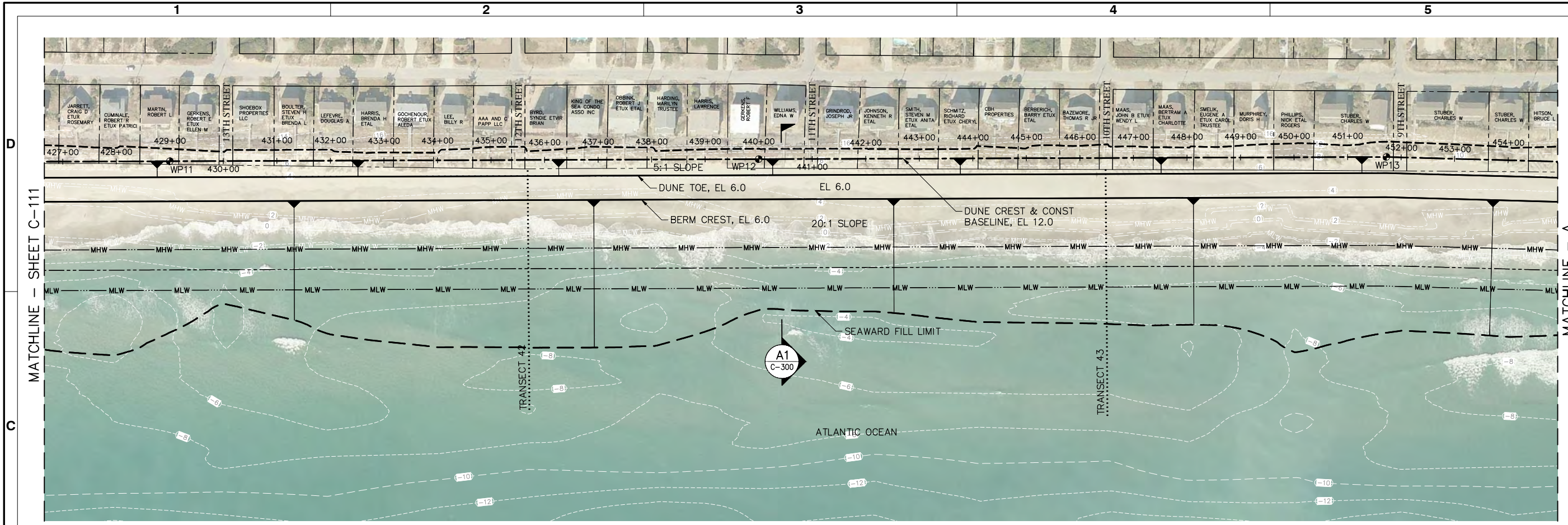
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4226

meffatt & nichol NC FIRM LICENSE No. F-0105

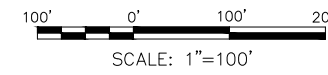
PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-111
 Sheet 9 of 33



- NOTES:**
- SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
 - SEE SHEETS C-301 THRU C-314 FOR CROSS SECTIONS.



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0	02/12/19	ISSUED FOR CONSTRUCTION
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POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA

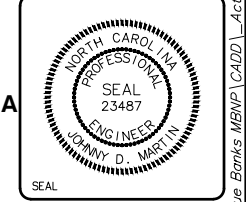
REACHES 1 AND 2 - SHEET 3 OF 5

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Date:	FEB 2019	M&N Project No.:		Drawing code:		Drawing Scale:	As Shown

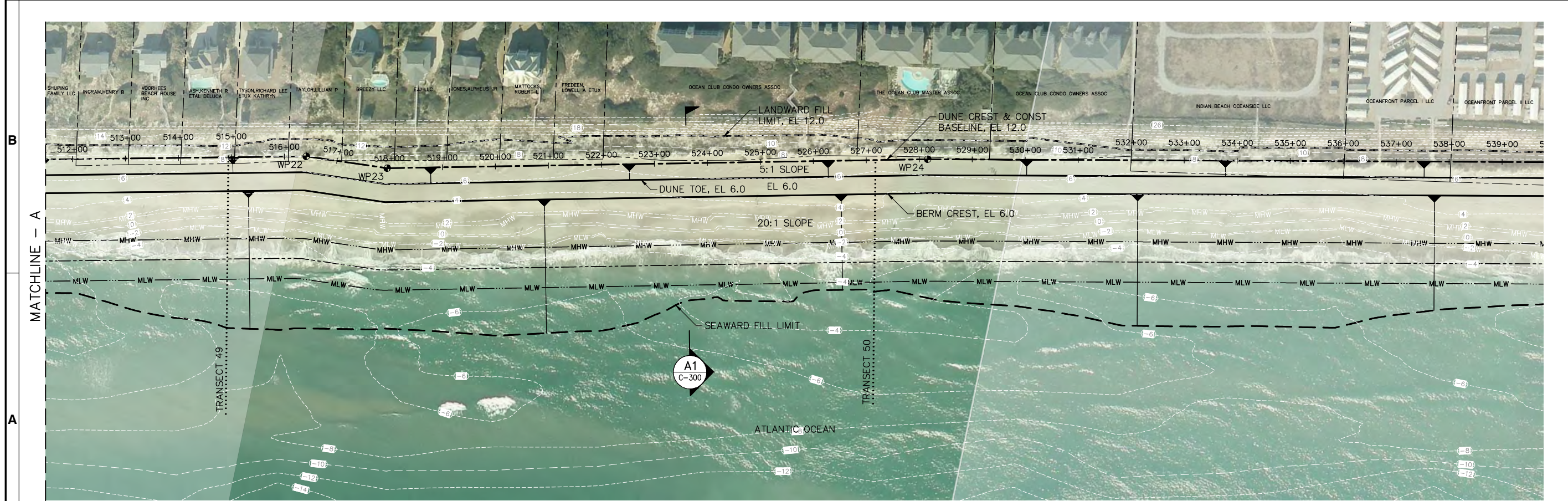
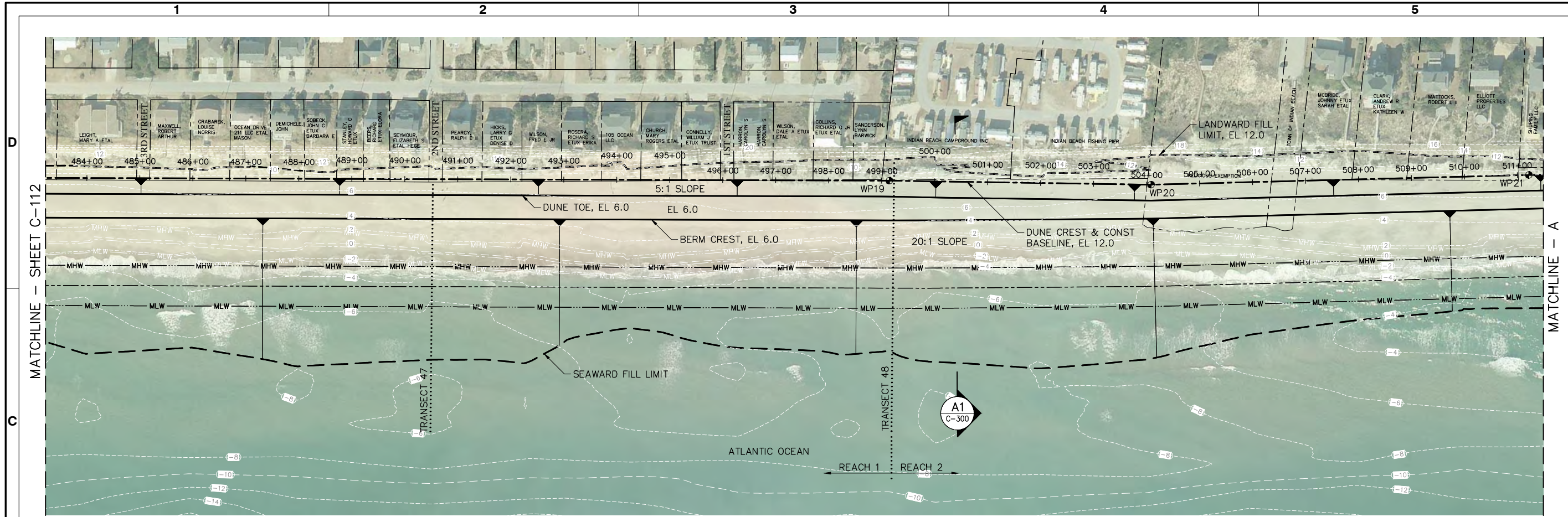
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4228

meffatt & nichol NC FIRM LICENSE No. F-0105

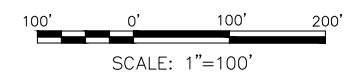
PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-112
 Sheet 10 of 33



- NOTES:**
- SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
 - SEE SHEETS C-301 THRU C-314 FOR CROSS SECTIONS.



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0	02/12/19	ISSUED FOR CONSTRUCTION
0	10/19/18	BID DOCUMENTS
		Mark

POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA

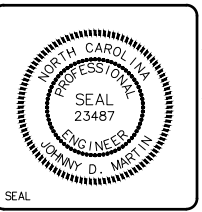
REACHES 1 AND 2 - SHEET 4 OF 5

Designed by:	JM	Checked by:	SM	Date:	FEB 2019
Dwn by:	BDF	Reviewed by:	SM	M&N Project No.:	
Submitted by:	MOFFATT & NICHOI	Drawing code:		Drawing Scale:	As Shown (1" = 100')

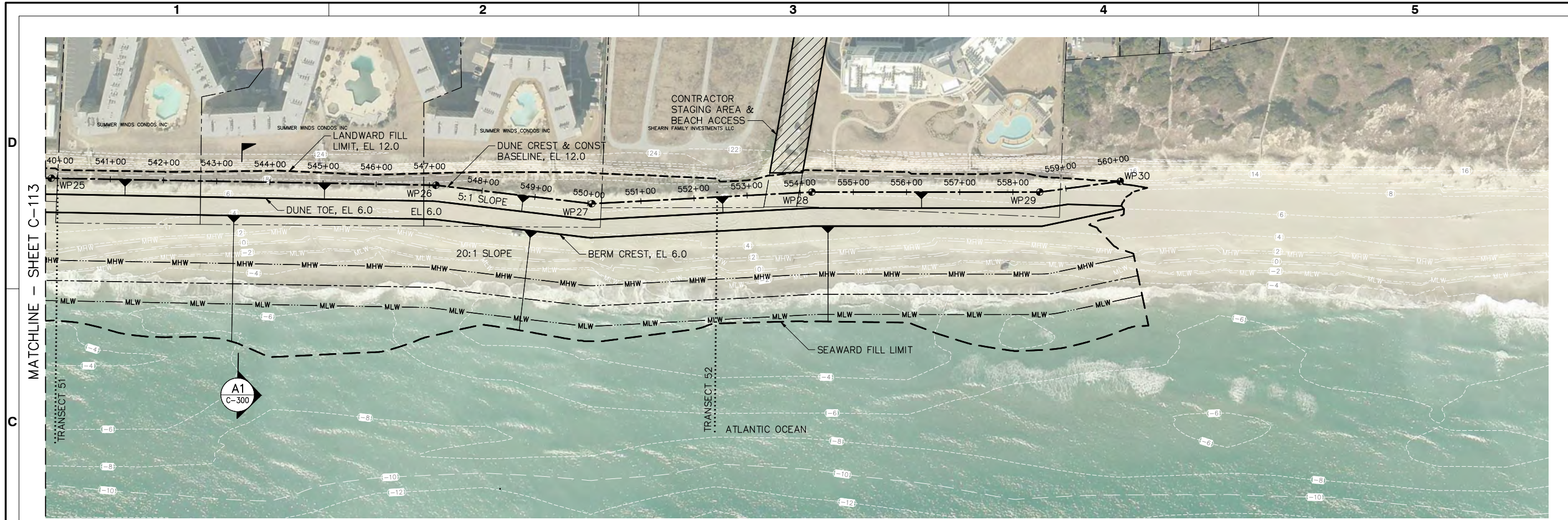
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4226

meffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH

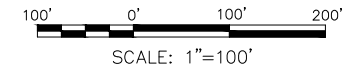


Sheet Reference No.
C-113
 Sheet 11 of 33



MATCHLINE - SHEET C-113

- NOTES:**
- SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
 - SEE SHEETS C-301 THRU C-314 FOR CROSS SECTIONS.



Mark	Description	Date	Appr.
0	BID DOCUMENTS	10/19/18	JM
	ISSUED FOR CONSTRUCTION	02/12/19	JM

POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA

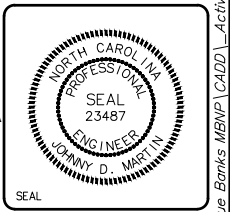
REACHES 1 AND 2 - SHEET 5 OF 5

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4228
meffatt & nichol NC FIRM LICENSE No. F-0105

DESIGNED BY: JM
 DWN BY: BDF
 CHECKED BY: SM
 REVIEWED BY: SM
 SUBMITTED BY: MOFFATT & NICHOL

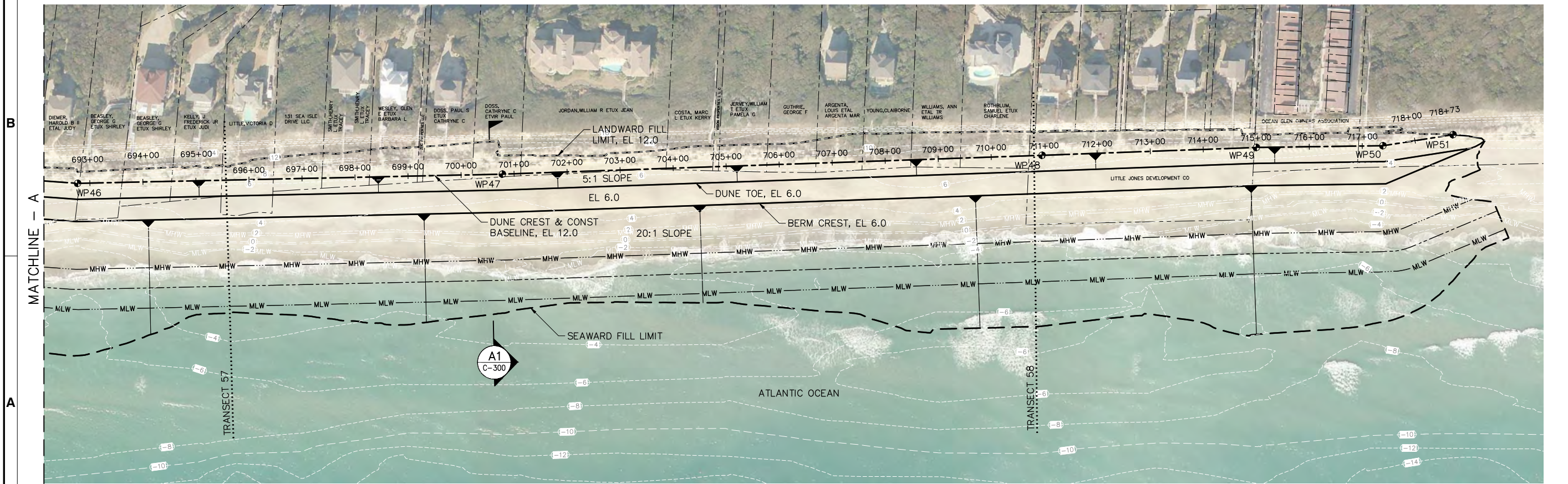
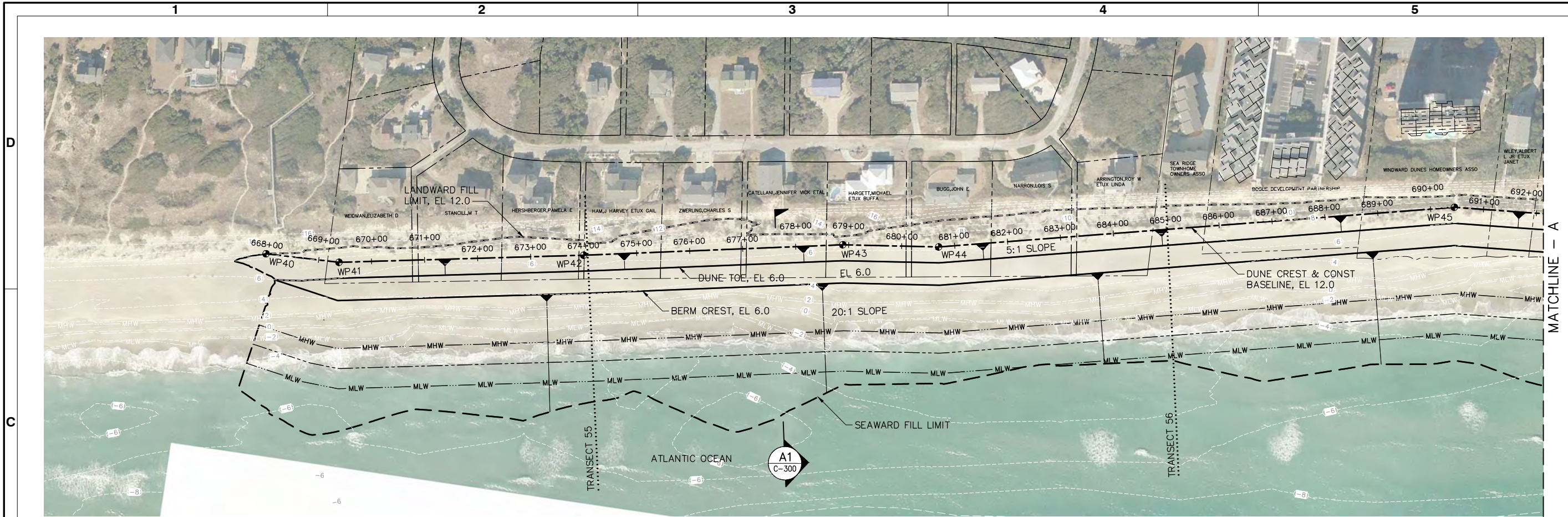
DATE: FEB 2019
 M&N PROJECT No.
 DRAWING CODE:
 DRAWING SCALE:
 PLOT SCALE: 1:1 (0 SHEET)

PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH

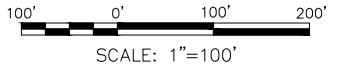


Sheet Reference No.
C-114
 Sheet 12 of 33

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- NOTES:**
- SEE SHEET C-601 FOR CONSTRUCTION BASELINE WORK POINT TABLES.
 - SEE SHEETS C-315 THRU C-318 FOR CROSS SECTIONS.



Rev.	Date	Description
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1	02/12/19	BID DOCUMENTS

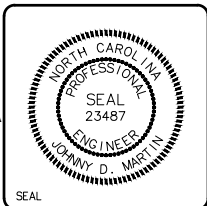
**POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA**

REACH 3 - SHEET 1 OF 1

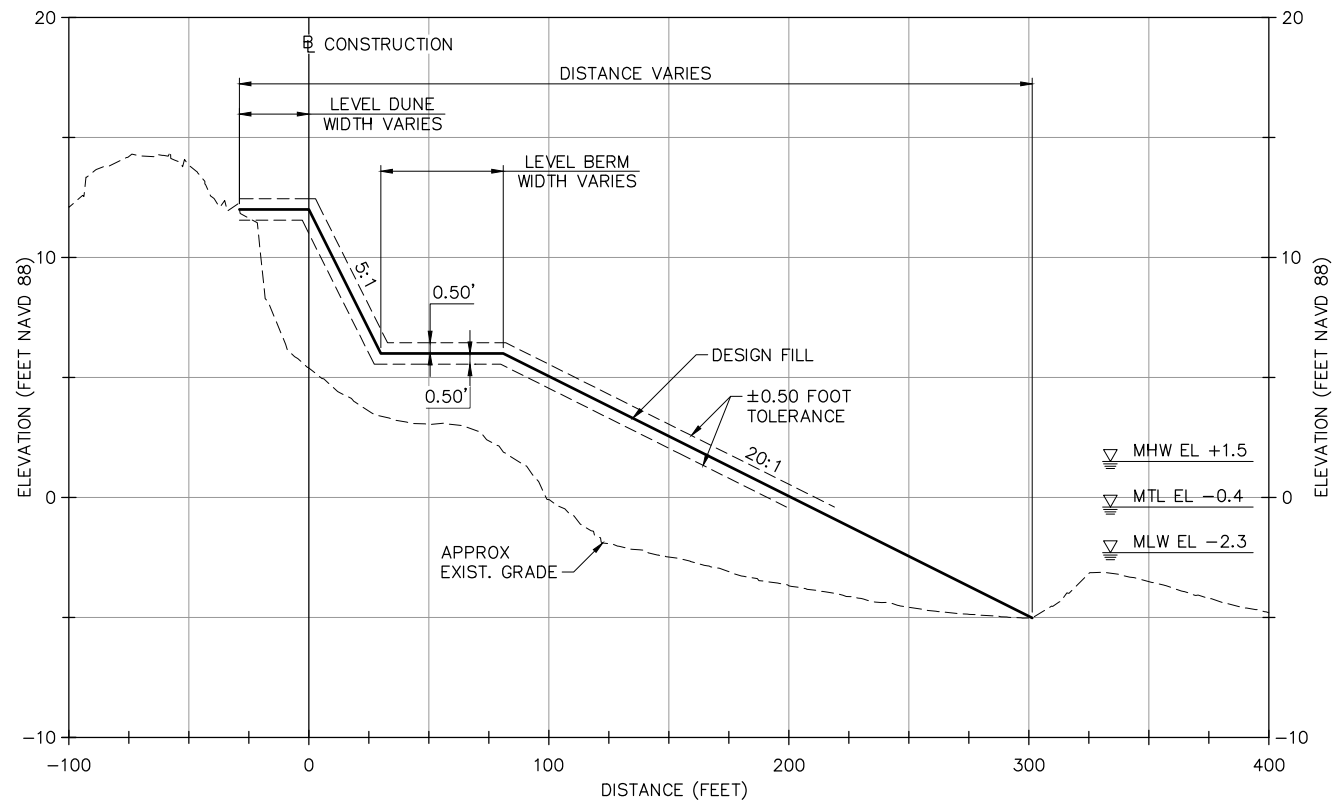
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4226	Designed by: JM	Drawn by: BDF	Reviewed by: SM	Submitted by: MOTTAT & NICHOL
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4226	Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: As Shown

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH

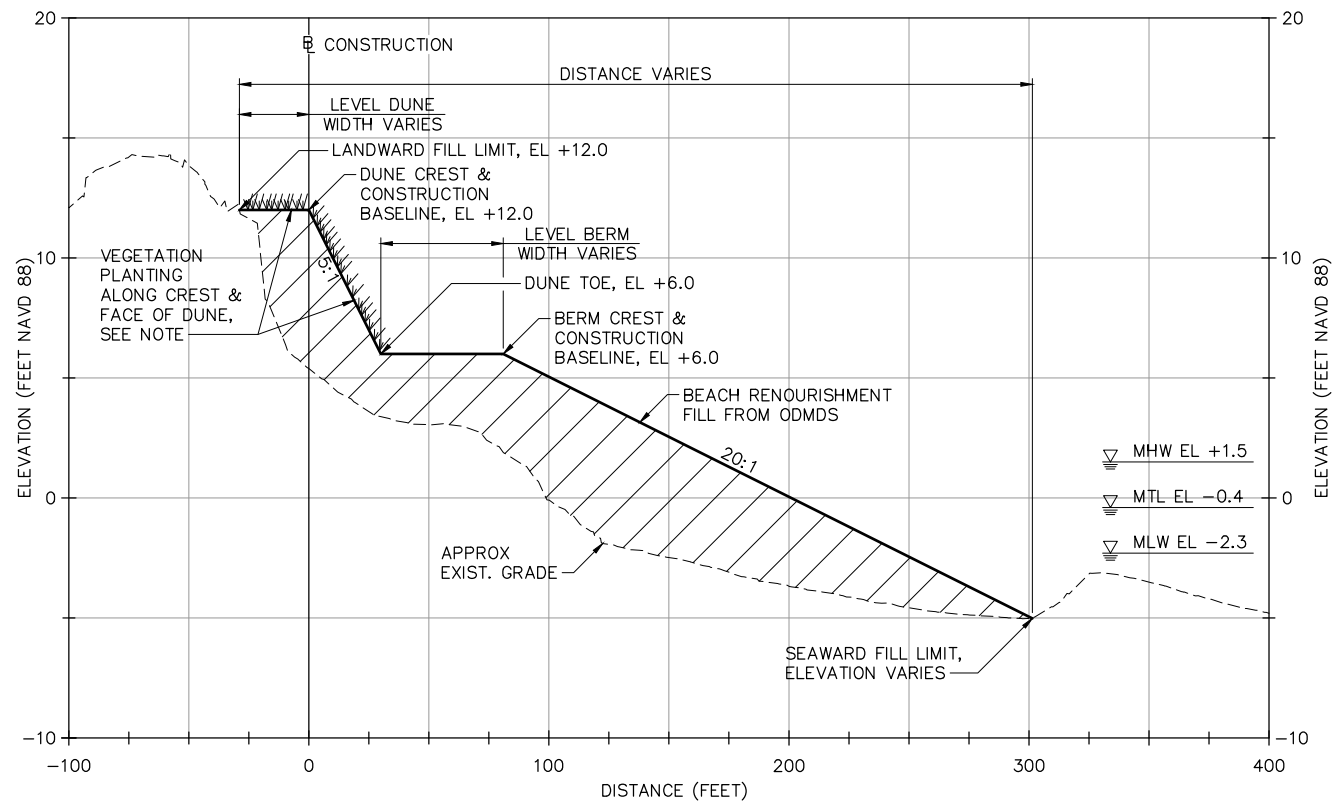
moffatt & nichol



Sheet Reference No.
C-115
Sheet 13 of 33

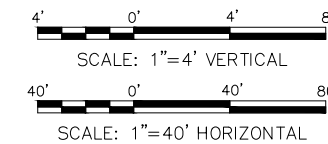


C1 BEACH NOURISHMENT FILL TOLERANCE TYPICAL SECTION
 G-002 SCALE: AS SHOWN



A1 BEACH NOURISHMENT TYPICAL SECTION
 C-110 THRU C-115 SCALE: AS SHOWN

NOTE:
 SEE TECHNICAL SPECIFICATIONS FOR PLANTING,
 FERTILIZING AND WATERING REQUIREMENTS.



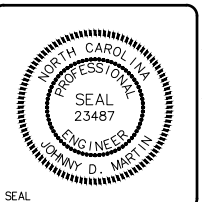
Mark	Description	Date	Appr.
0	BID DOCUMENTS	10/19/18	JM
	ISSUED FOR CONSTRUCTION	02/12/19	JM

POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
BEACH RENOURISHMENT TYPICAL SECTIONS

Designed by:	DM	Checked by:	SM	Date:	FEB 2019
Dwn by:	BDF	Rev. by:	SM	M&N Project No.:	
Submitted by:	MOFFATT & NICHOL	Drawing code:		Drawing Scale:	Plot scale: 1:1 (0 SHEET)

4700 FALLS OF THE NEUSE ROAD
 SUITE 300 #209
 RALEIGH, NC 27609
 919-781-4228
moftatt & nichol
 NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-300
 Sheet 14 of 33



Rev.	Date	Description
0	02/12/19 JM	ISSUED FOR CONSTRUCTION
1	10/19/18 JM	BID DOCUMENTS

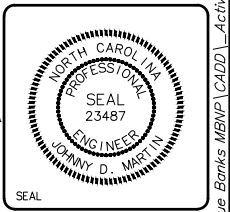
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 1 OF 18

4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4268	NC FIRM LICENSE No. F-0105	Prepared for the Towns of EMERALD ISLE and INDIAN BEACH
--------------------------------------------------------------------------------	----------------------------	------------------------------------------------------------

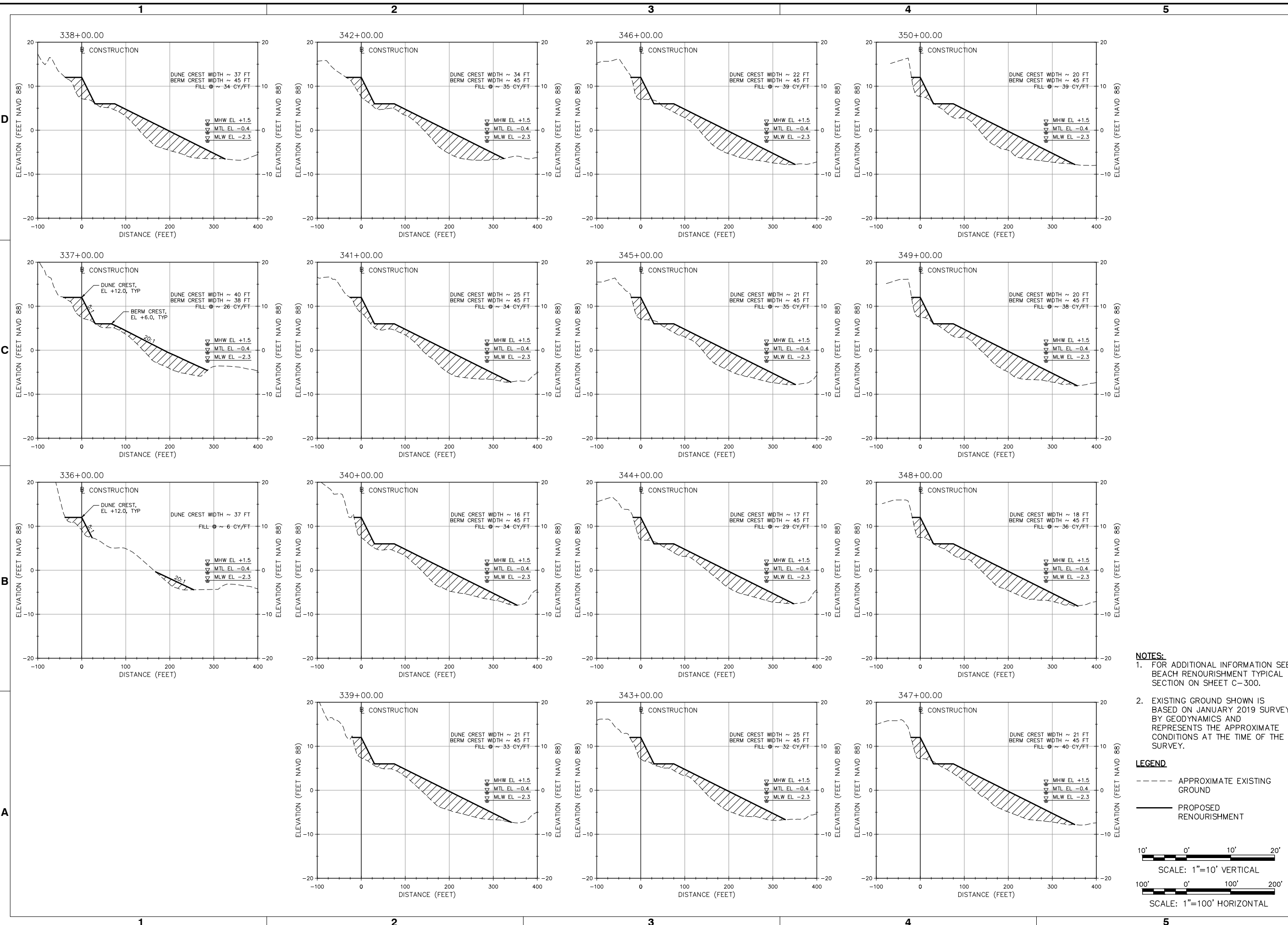
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4268

NC FIRM LICENSE No. F-0105

Prepared for the Towns of
EMERALD ISLE and INDIAN BEACH



Sheet Reference No.
C-301
 Sheet 15 of 33



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

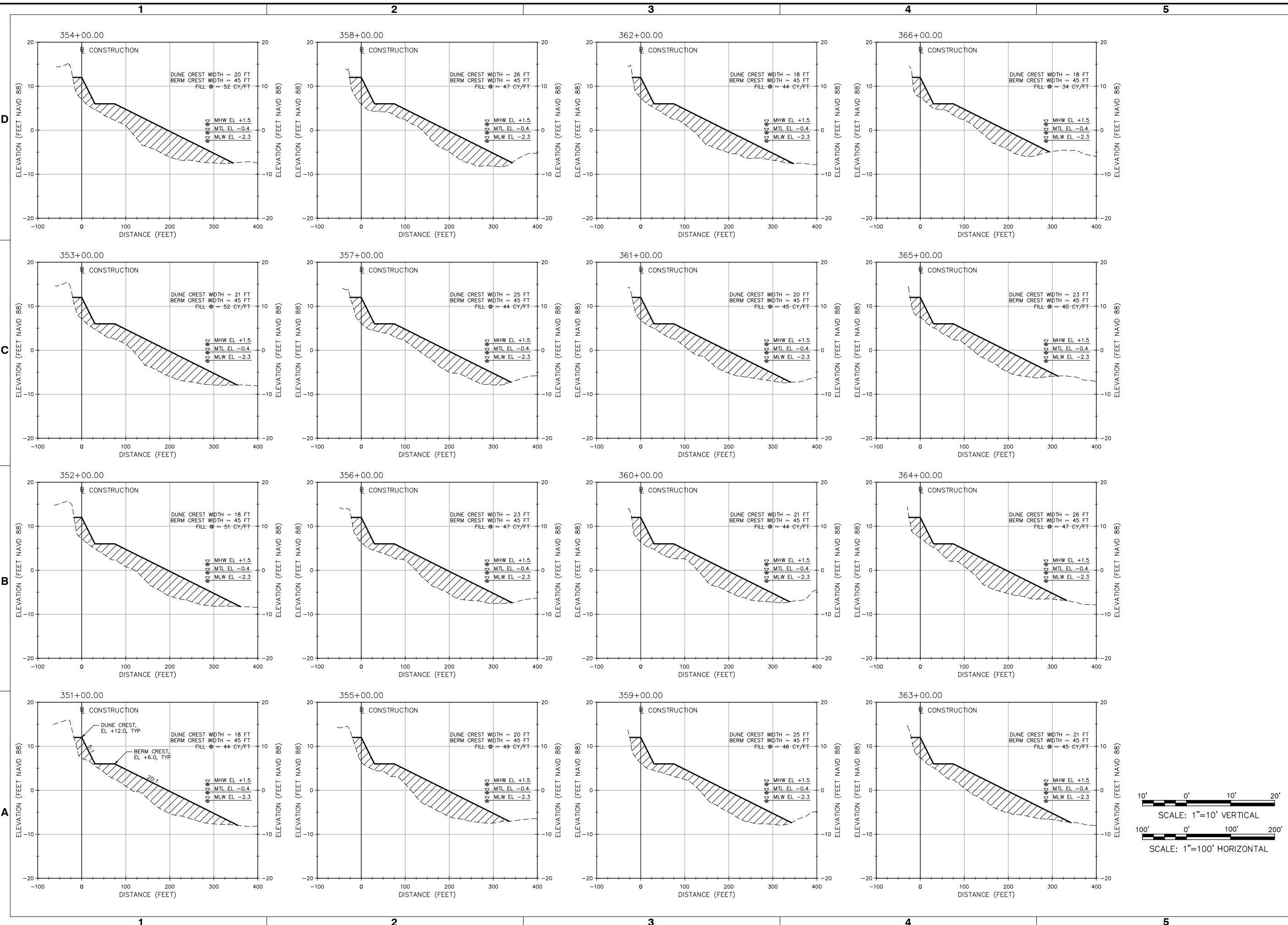
LEGEND

--- APPROXIMATE EXISTING GROUND

— PROPOSED RENOURISHMENT

1" = 10' VERTICAL

1" = 100' HORIZONTAL



Rev.	Date	Description
0	02/12/19	ISSUED FOR CONSTRUCTION
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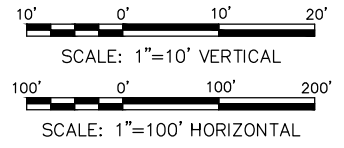
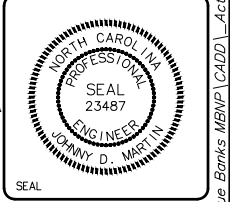
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 2 OF 18

Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

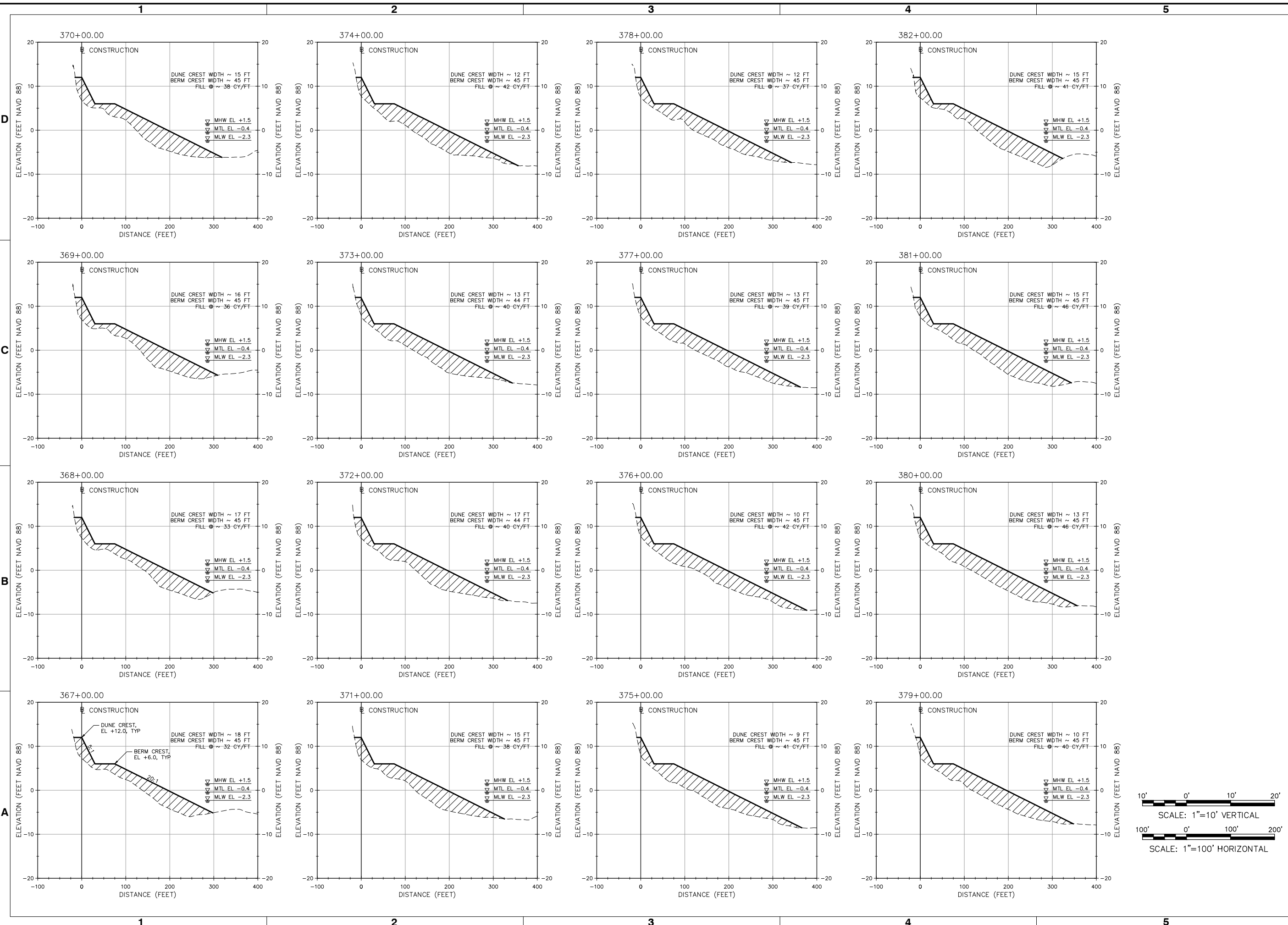
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4268
 NC FIRM LICENSE No. F-0105

moftatt & nichol

PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-302
 Sheet 16 of 33



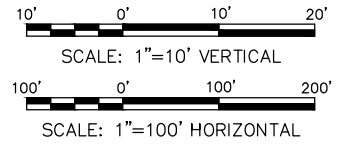
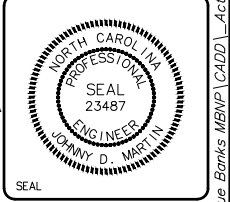
Rev.	Date	Description
0	02/12/19	ISSUED FOR CONSTRUCTION
1	10/19/18	BID DOCUMENTS
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POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 3 OF 18

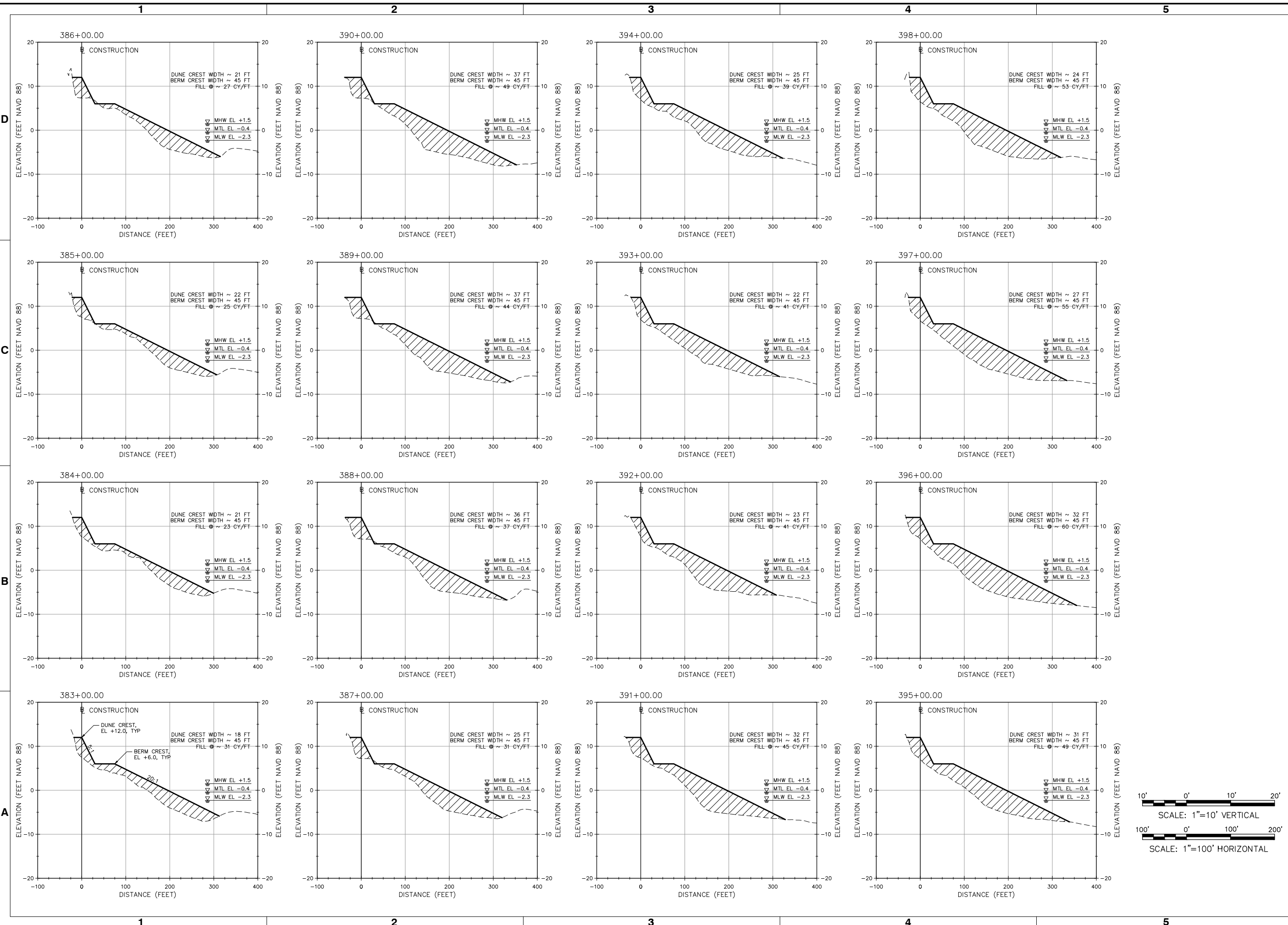
Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: Plot scale: 1" = 10' (SEE IT)

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4268
mofoffatt & nichol
 NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-303
 Sheet 17 of 33



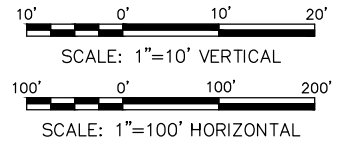
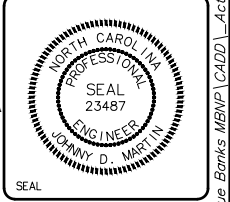
Rev.	Date	Description
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1	10/19/18	BID DOCUMENTS

POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 4 OF 18

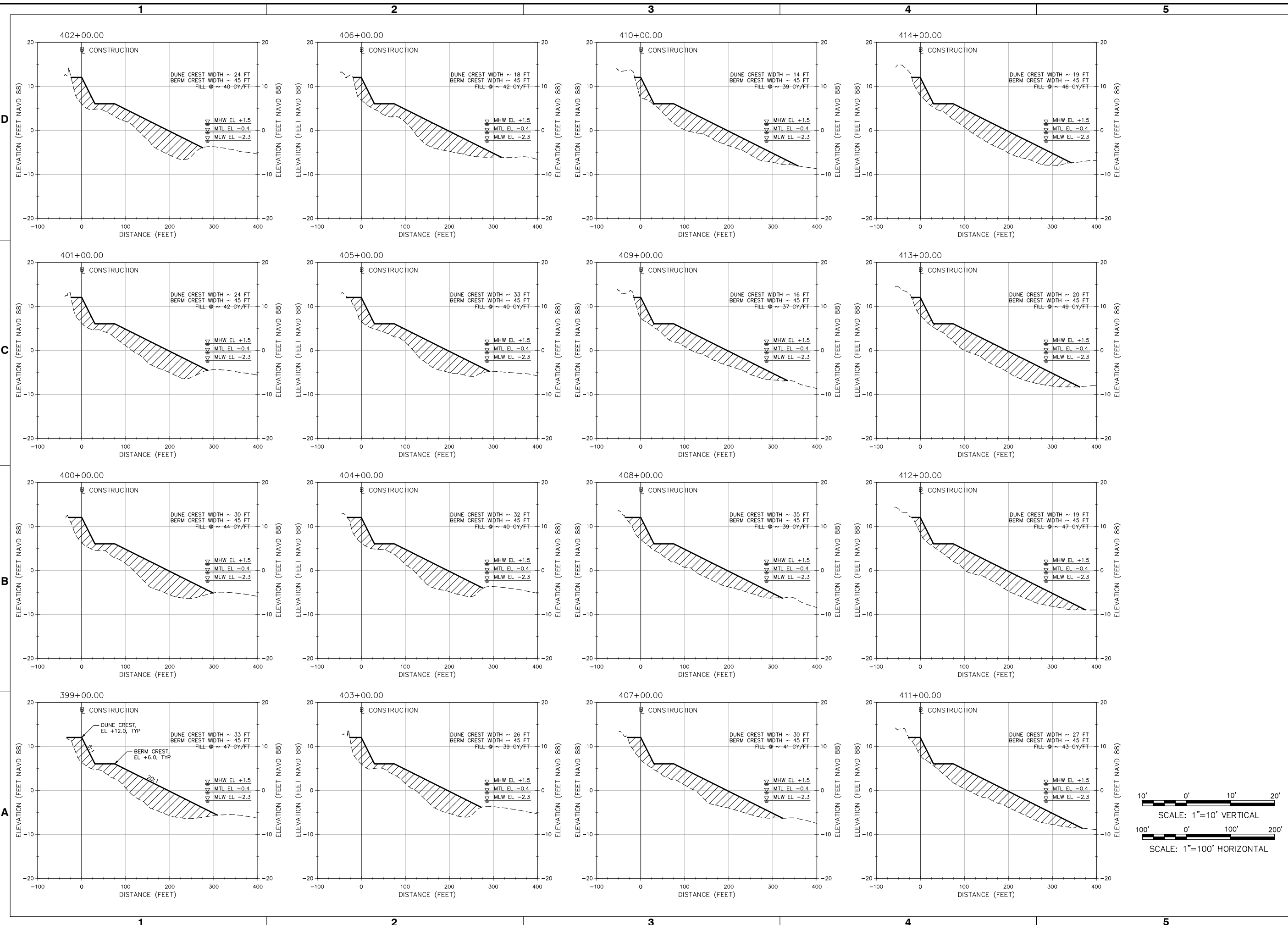
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4268 NC FIRM LICENSE No. F-0105	Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOI
	Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: Plot scale: 1" = 10' (SEE IT)

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4268
NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-304
 Sheet 18 of 33



Rev.	Date	Description
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1	10/19/18	BID DOCUMENTS

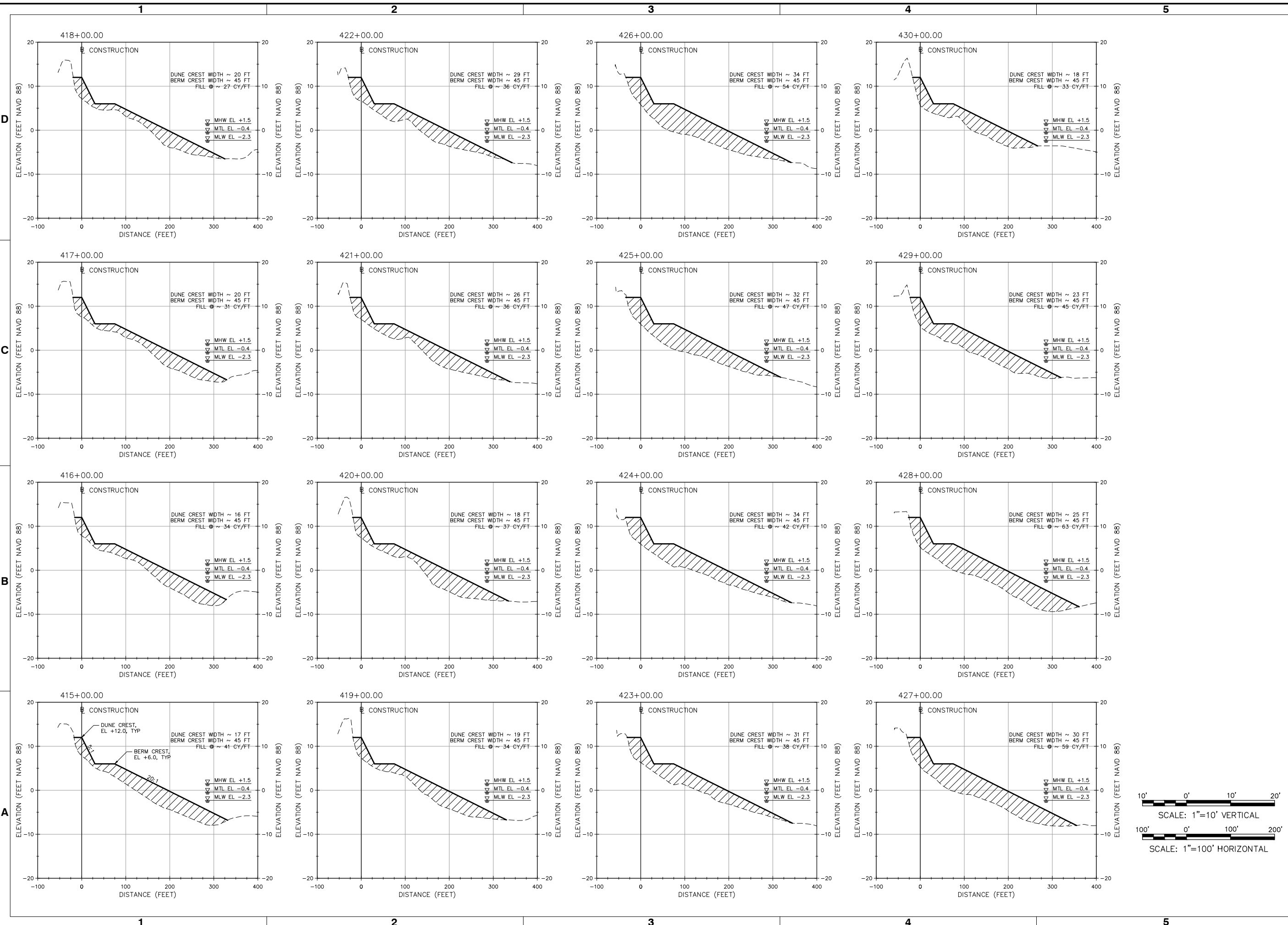
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 5 OF 18

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
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meffatt & nichol
 NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH

Sheet Reference No.
C-305
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Scale: 1"=10' VERTICAL
 Scale: 1"=100' HORIZONTAL

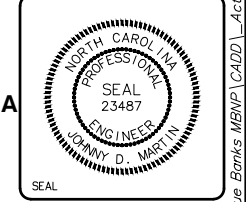


Rev.	Date	Description
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2		

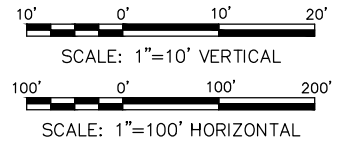
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 6 OF 18

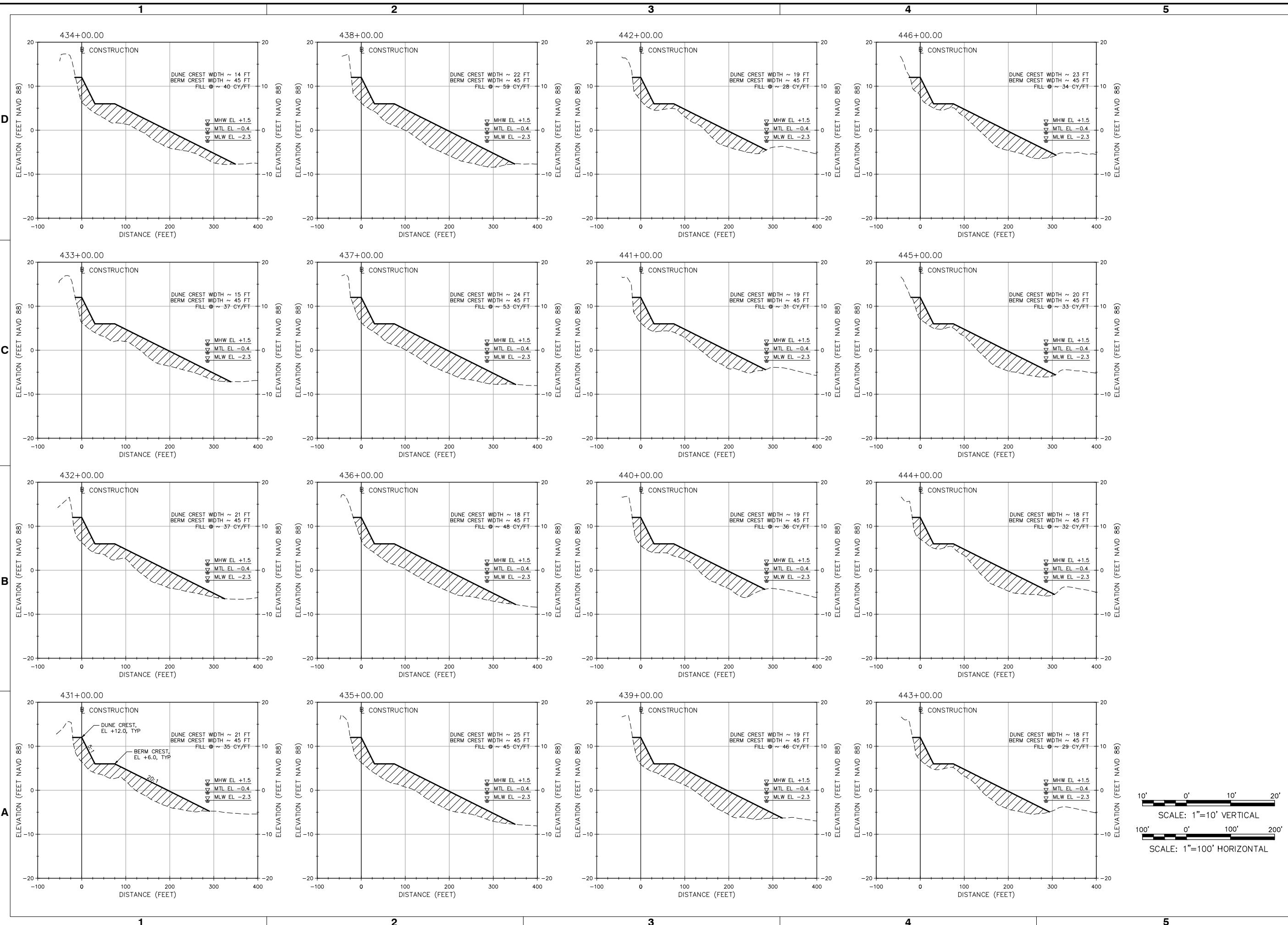
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4268 NC FIRM LICENSE No. F-0105	Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
	Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-306
Sheet 20 of 33





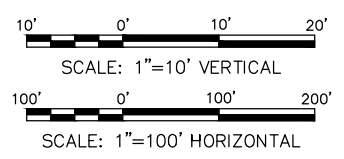
Rev.	Date	Description
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1	10/19/18 JM	BID DOCUMENTS

POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 7 OF 18

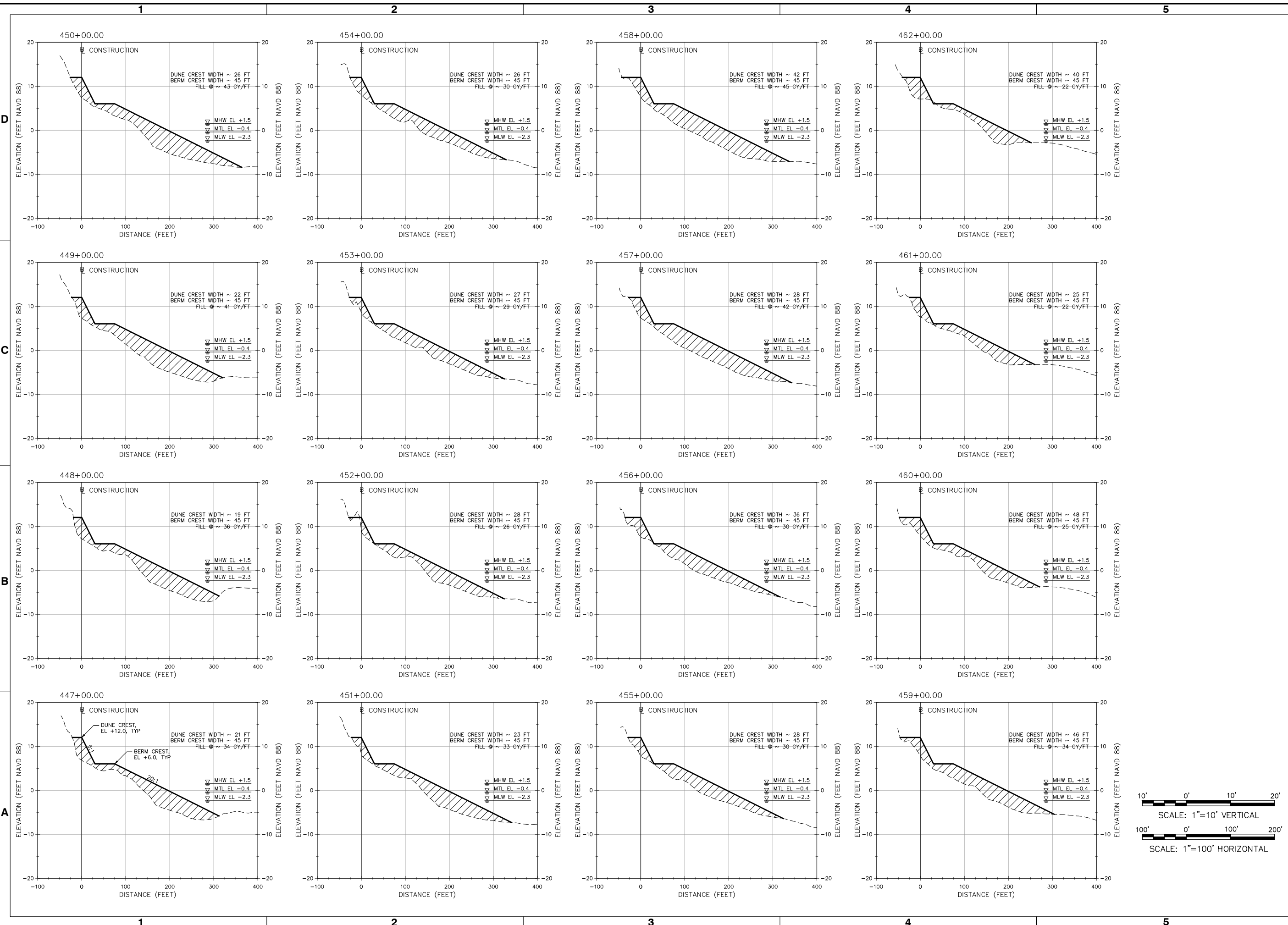
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4268 NC FIRM LICENSE No. F-0105	Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale:	Plot scale: 1" = 10' (SHEET)

PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH

moftatt & nichol



Sheet Reference No.
C-307
 Sheet 21 of 33

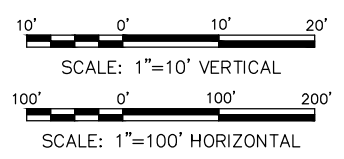


Rev.	Date	Description
0	02/12/19 JM	ISSUED FOR CONSTRUCTION
1	10/19/18 JM	BID DOCUMENTS

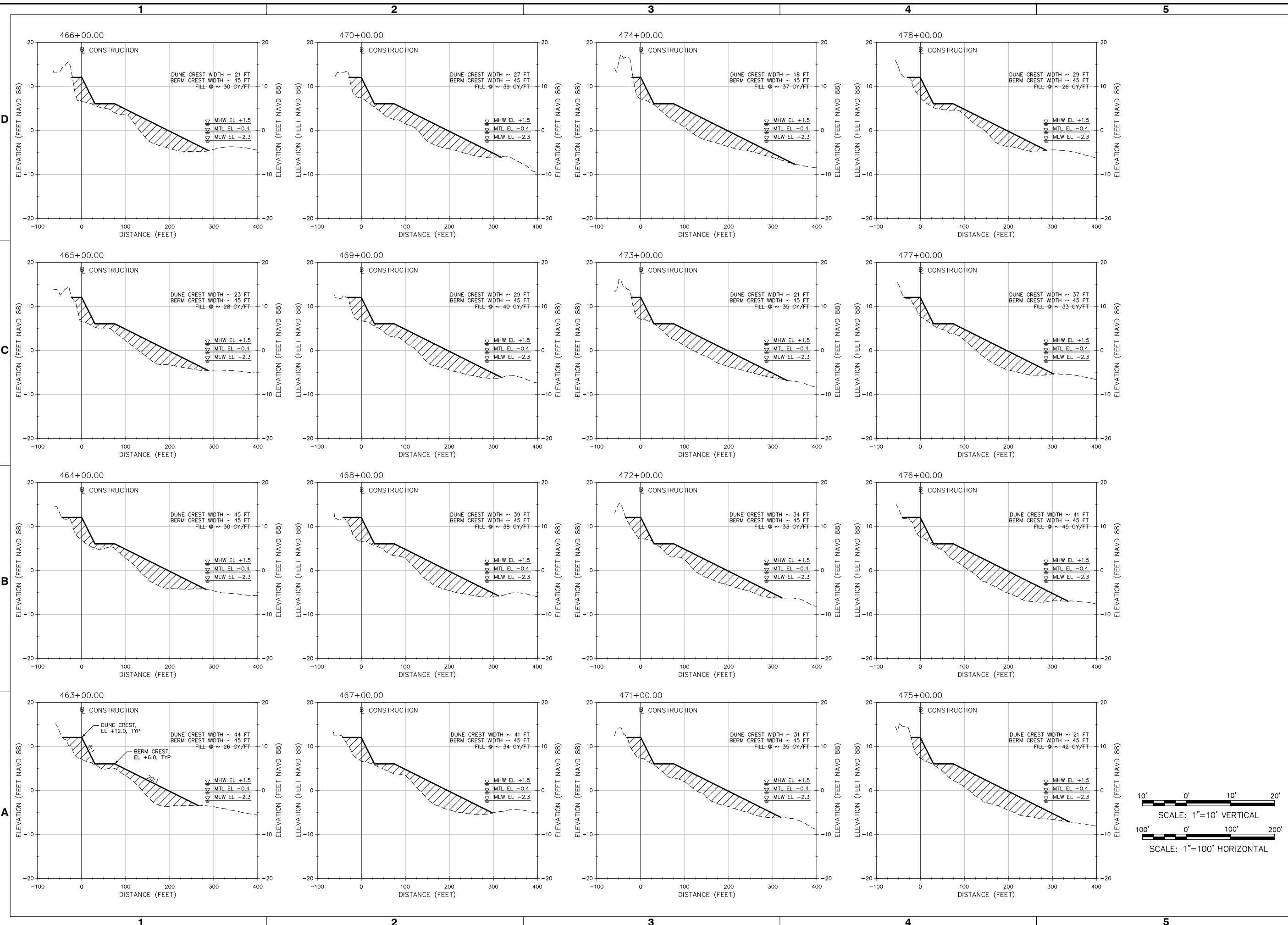
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 8 OF 18

4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4268 NC FIRM LICENSE No. F-0105	Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale:	Plot scale: 1:1 (0 SHEET)

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



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C-308
Sheet 22 of 33

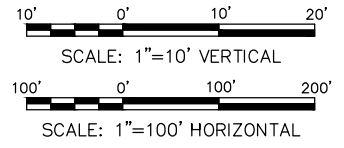
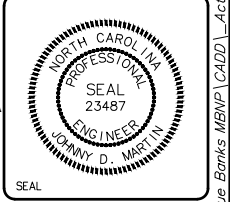


Rev.	Date	Description
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1	10/19/18	BID DOCUMENTS

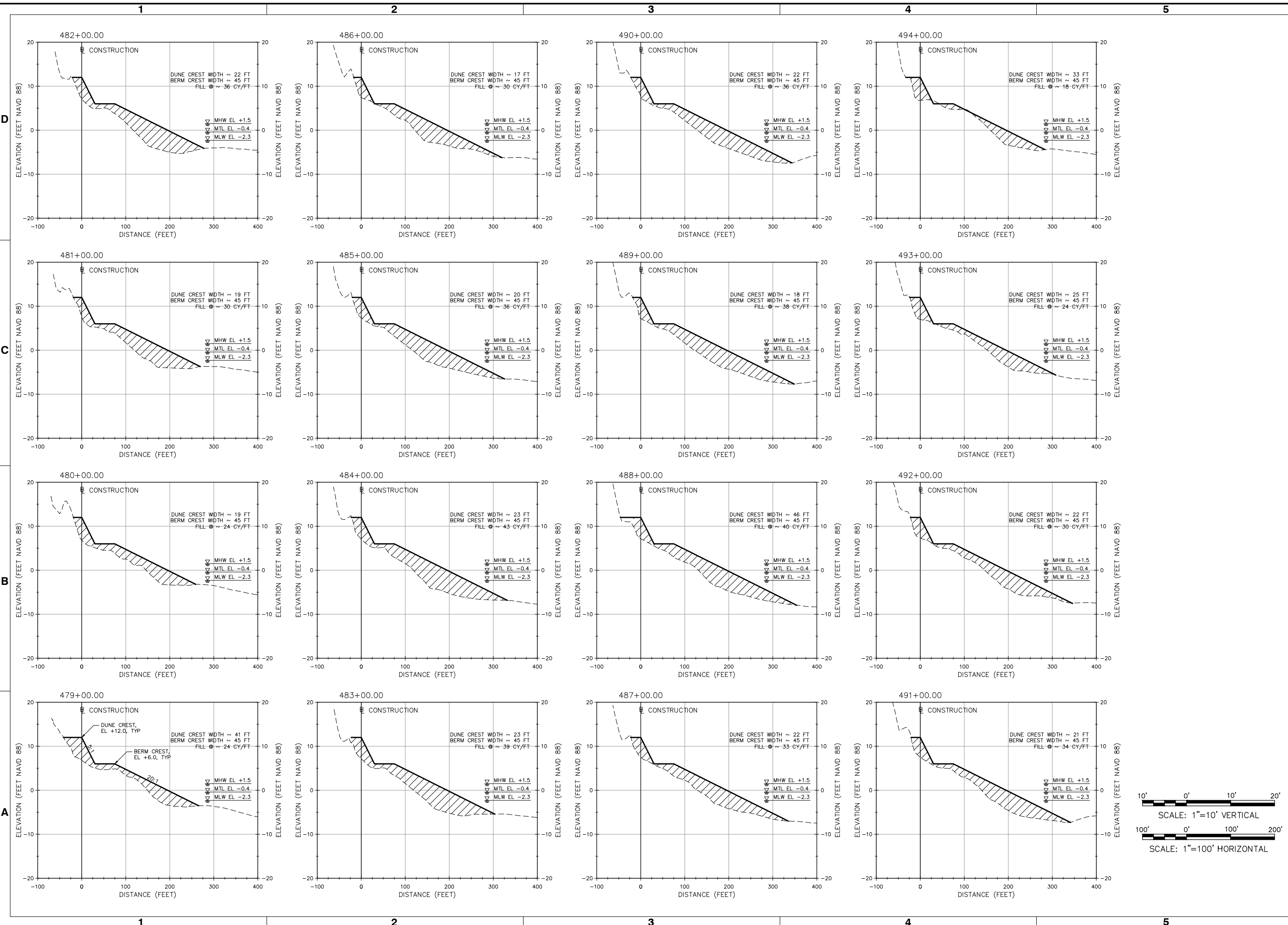
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 9 OF 18

Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4268
moffatt & nichol
 NC FIRM LICENSE No. F-0105
 PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



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C-309
 Sheet 23 of 33

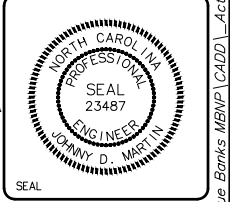


Rev.	Date	Description
0	02/12/19 JM	ISSUED FOR CONSTRUCTION
	10/19/18 JM	BID DOCUMENTS

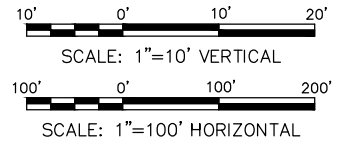
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 10 OF 18

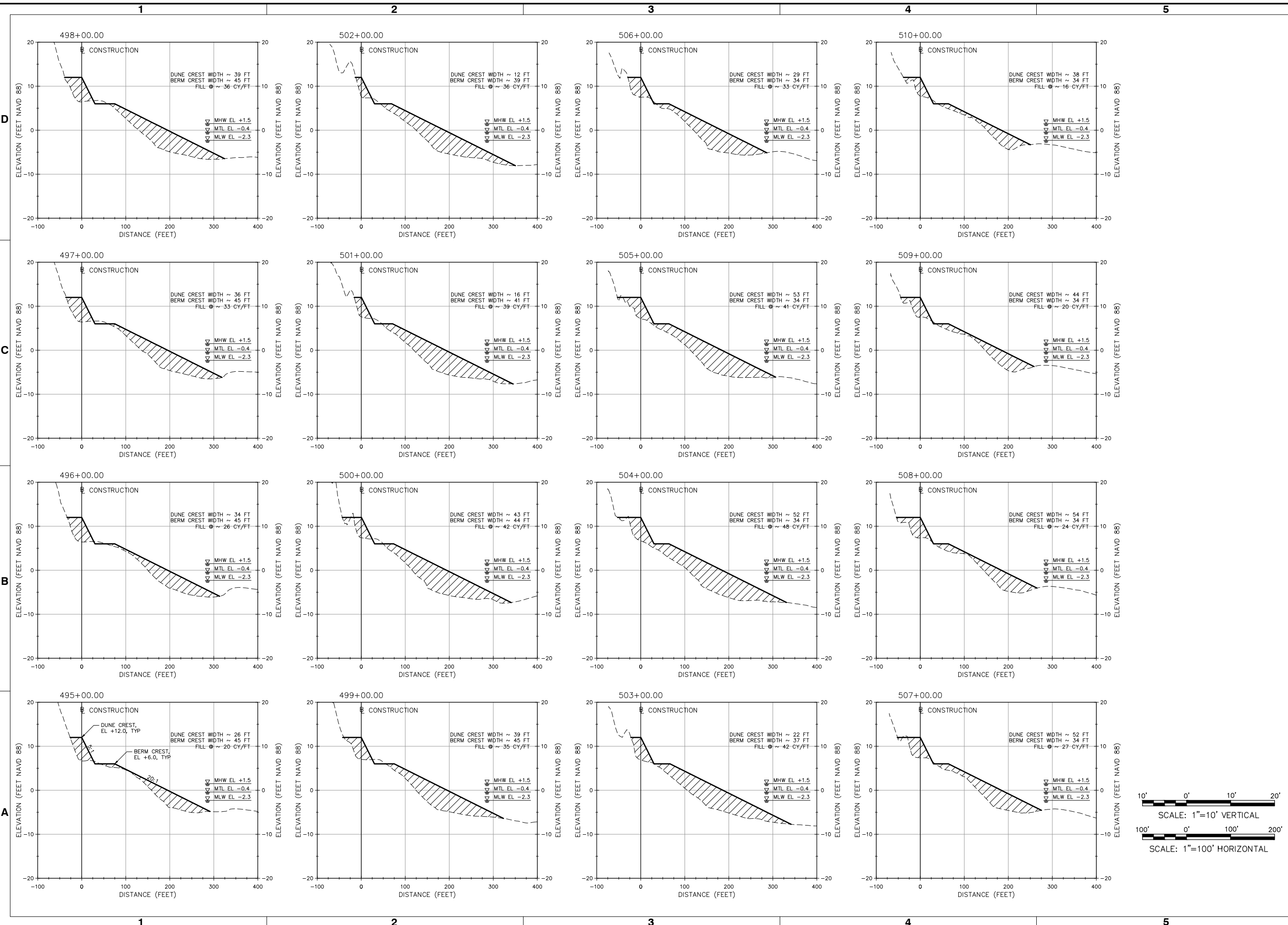
Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4268
meffatt & nichol
 NC FIRM LICENSE No. F-0105
 PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



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C-310
 Sheet 24 of 33



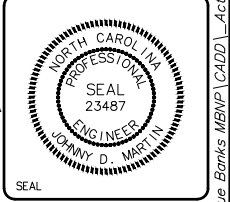


Rev.	Date	Description
0	02/12/19	ISSUED FOR CONSTRUCTION
1	10/19/18	BID DOCUMENTS

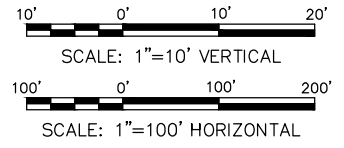
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 11 OF 18

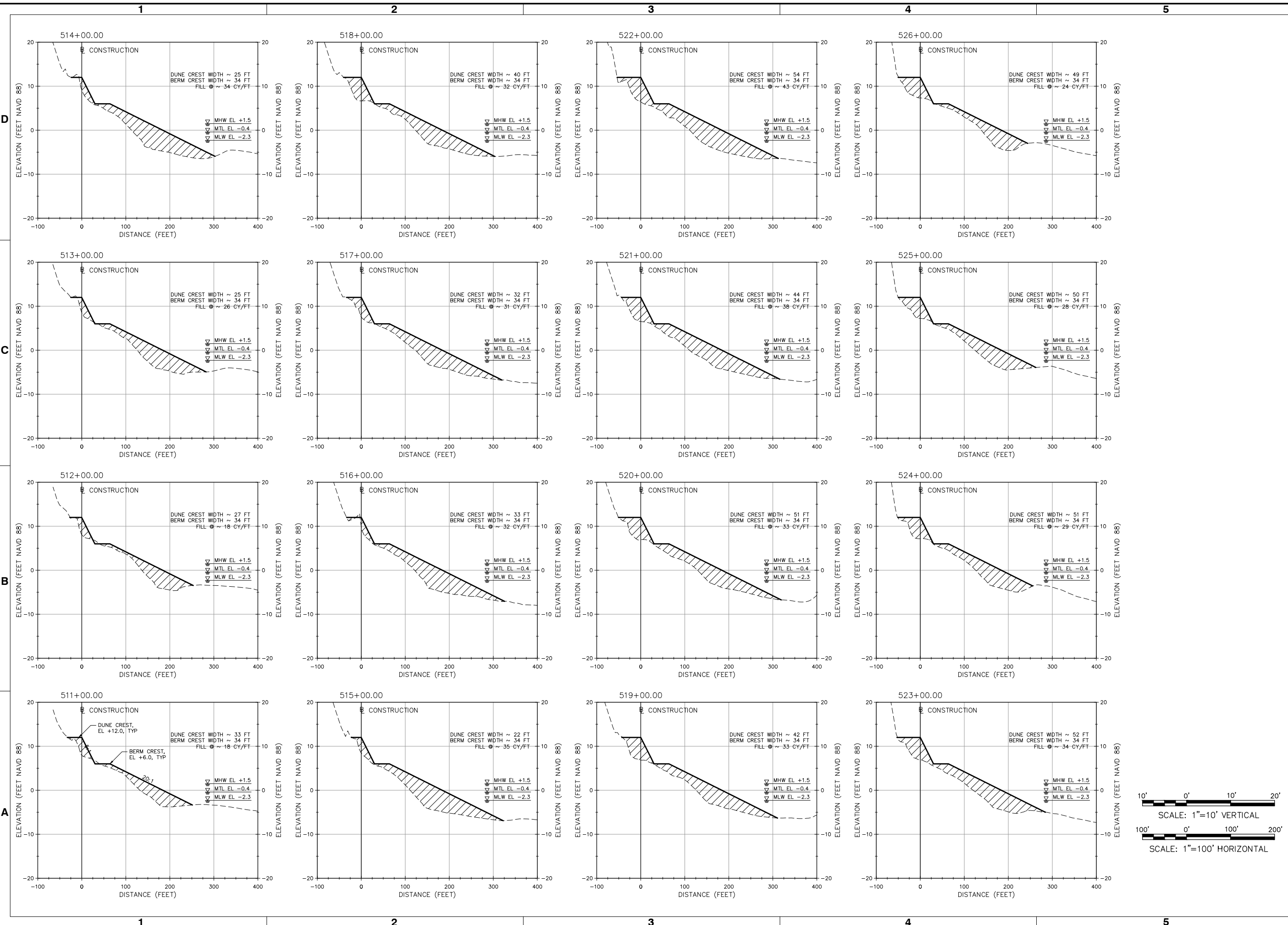
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4268 NC FIRM LICENSE No. F-0105	Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
	Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



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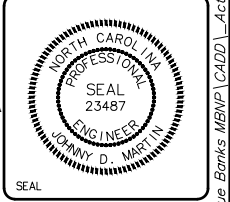


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1	10/19/18 JM	BID DOCUMENTS

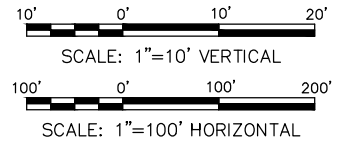
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 12 OF 18

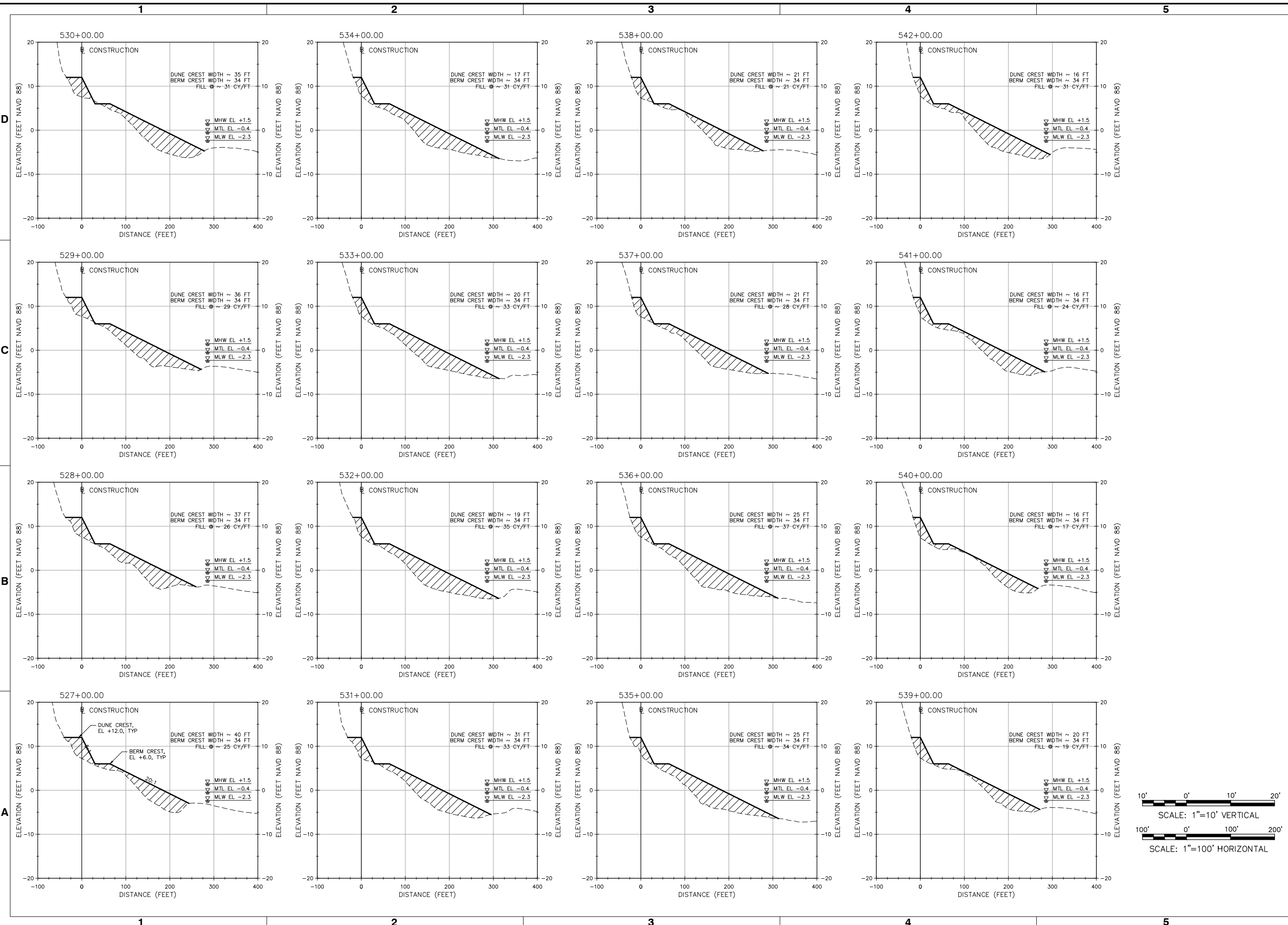
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4268 NC FIRM LICENSE No. F-0105	Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale:	Plot scale: 1:1 (0 SHEET)

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



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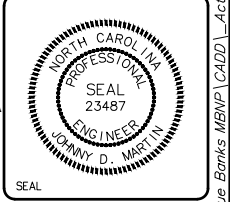


Rev.	Date	Description
0	02/12/19 JM	ISSUED FOR CONSTRUCTION
	10/19/18 JM	BID DOCUMENTS

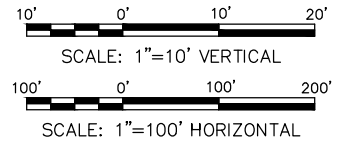
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 13 OF 18

Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL
Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

4700 FALLS OF THE NEUSE ROAD
 SUITE 300 #209
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 919-781-4268
moftatt & nichol
 NC FIRM LICENSE No. F-0105
 PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-313
 Sheet 27 of 33





Rev.	Date	Description
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1	10/19/18 JM	BID DOCUMENTS

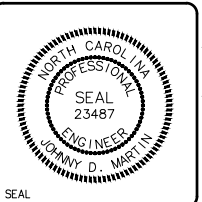
**POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA**

**RENOURISHMENT SECTIONS -
SHEET 14 OF 18**

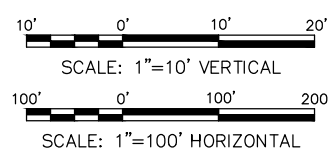
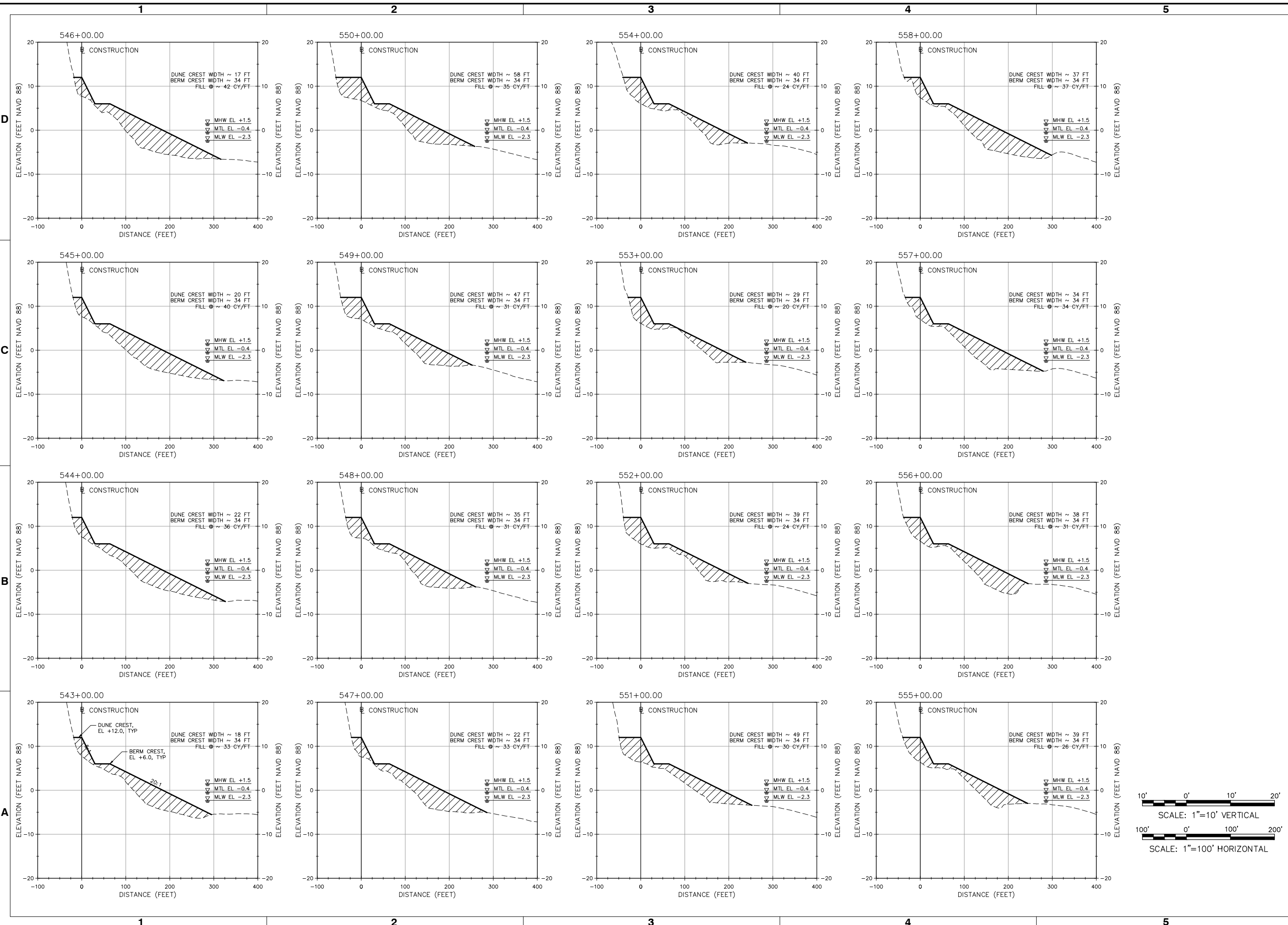
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Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale:	Plot scale: 1" = 10' (SEE IT)

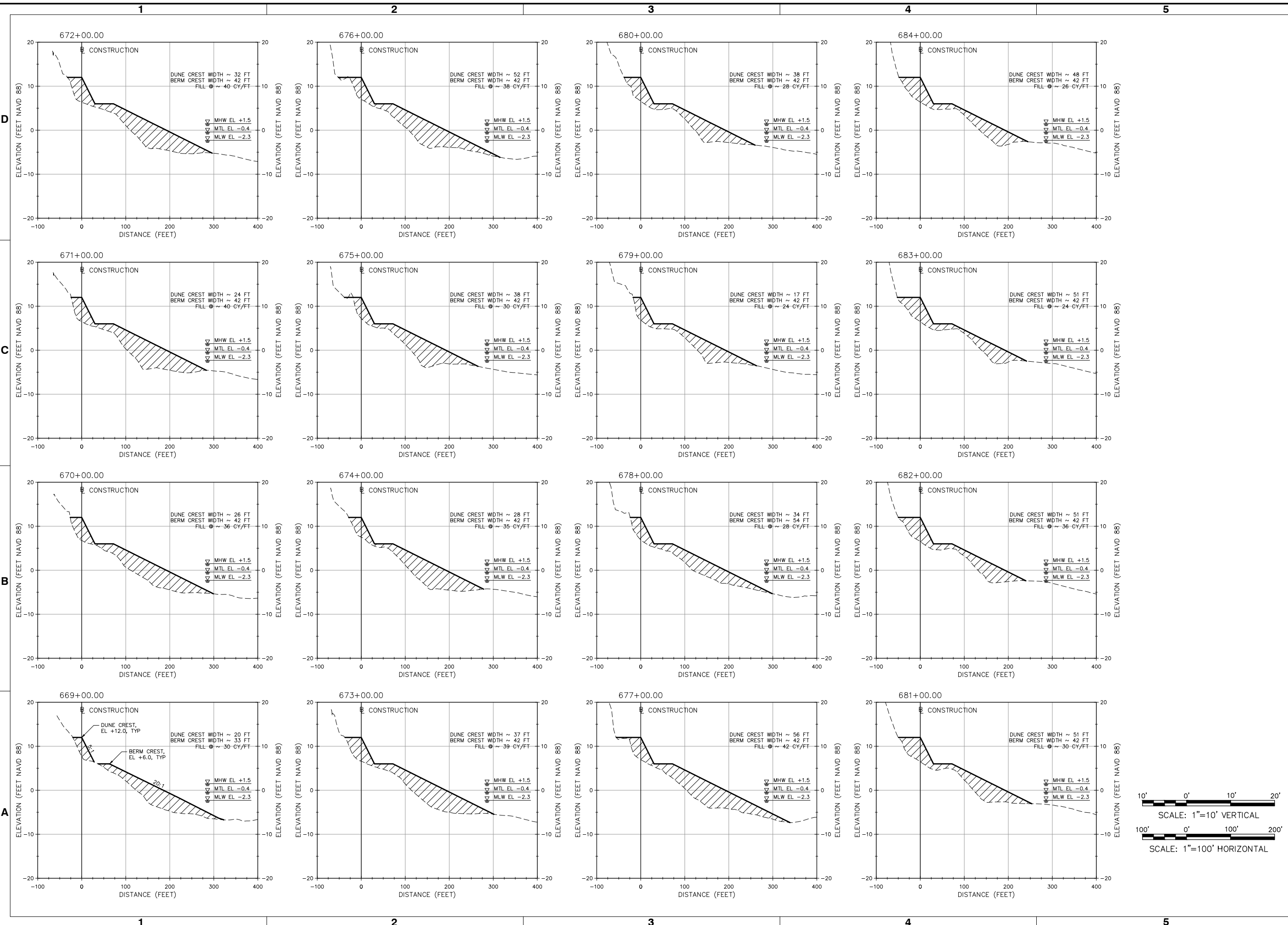
PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH

moftatt & nichol



Sheet Reference No.
C-314
Sheet 28 of 33





Rev.	Date	Description
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1	10/19/18 JM	BID DOCUMENTS

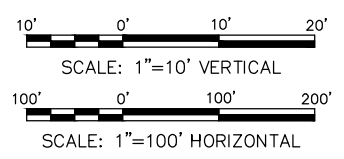
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PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 15 OF 18

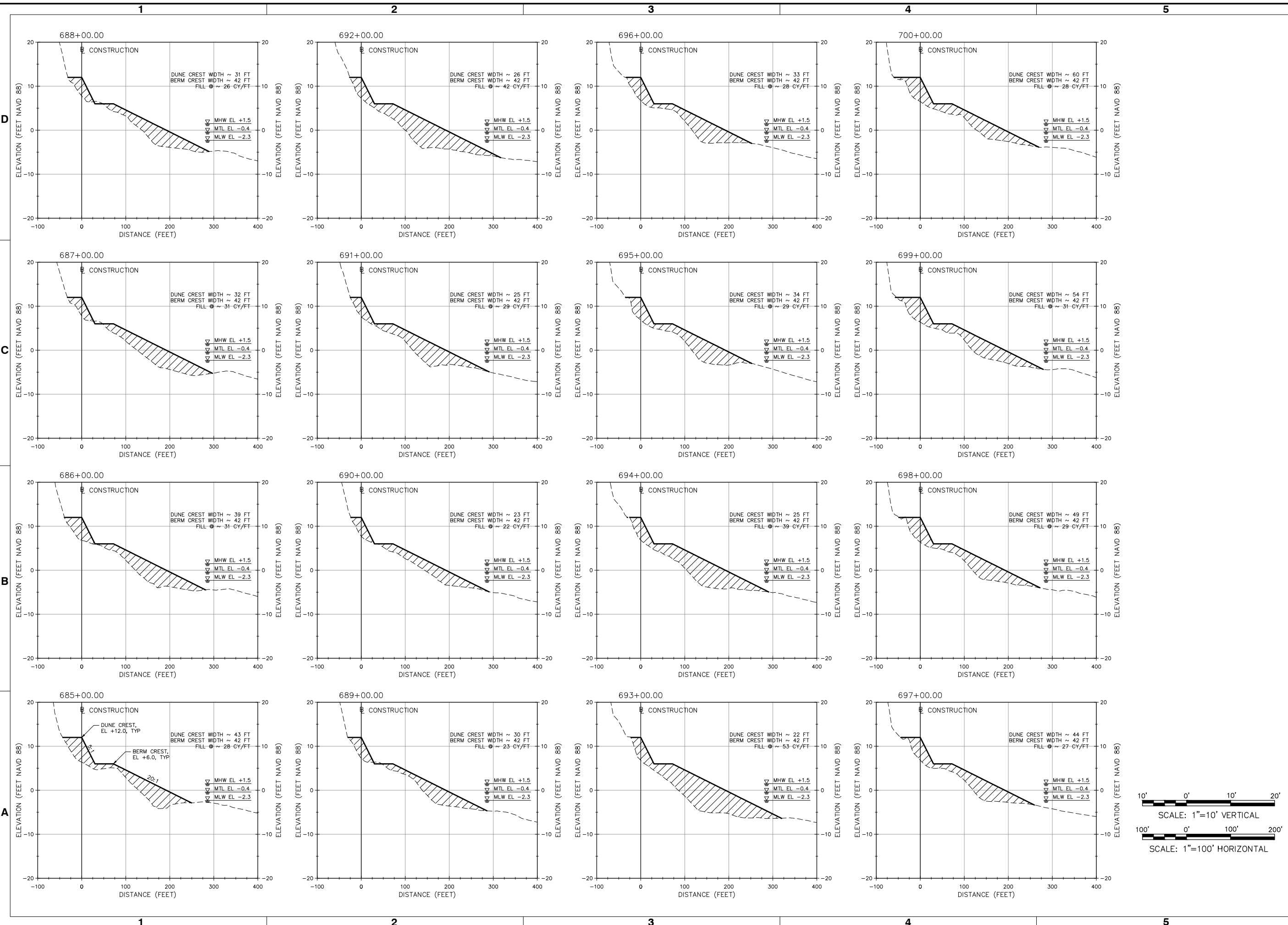
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	Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

PREPARED FOR THE TOWNS OF
 EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-315
 Sheet 29 of 33



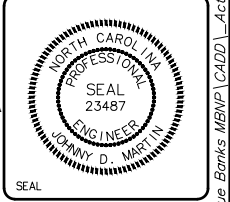


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1	10/19/18	BID DOCUMENTS

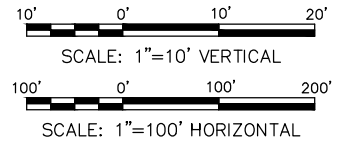
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 16 OF 18

4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4268 NC FIRM LICENSE No. F-0105	Designed by: JM	Checked by: BDF	Reviewed by: SM	Submitted by: MOFFATT & NICHOL	Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale:	Plot scale: 1:1 (0 SHEET)
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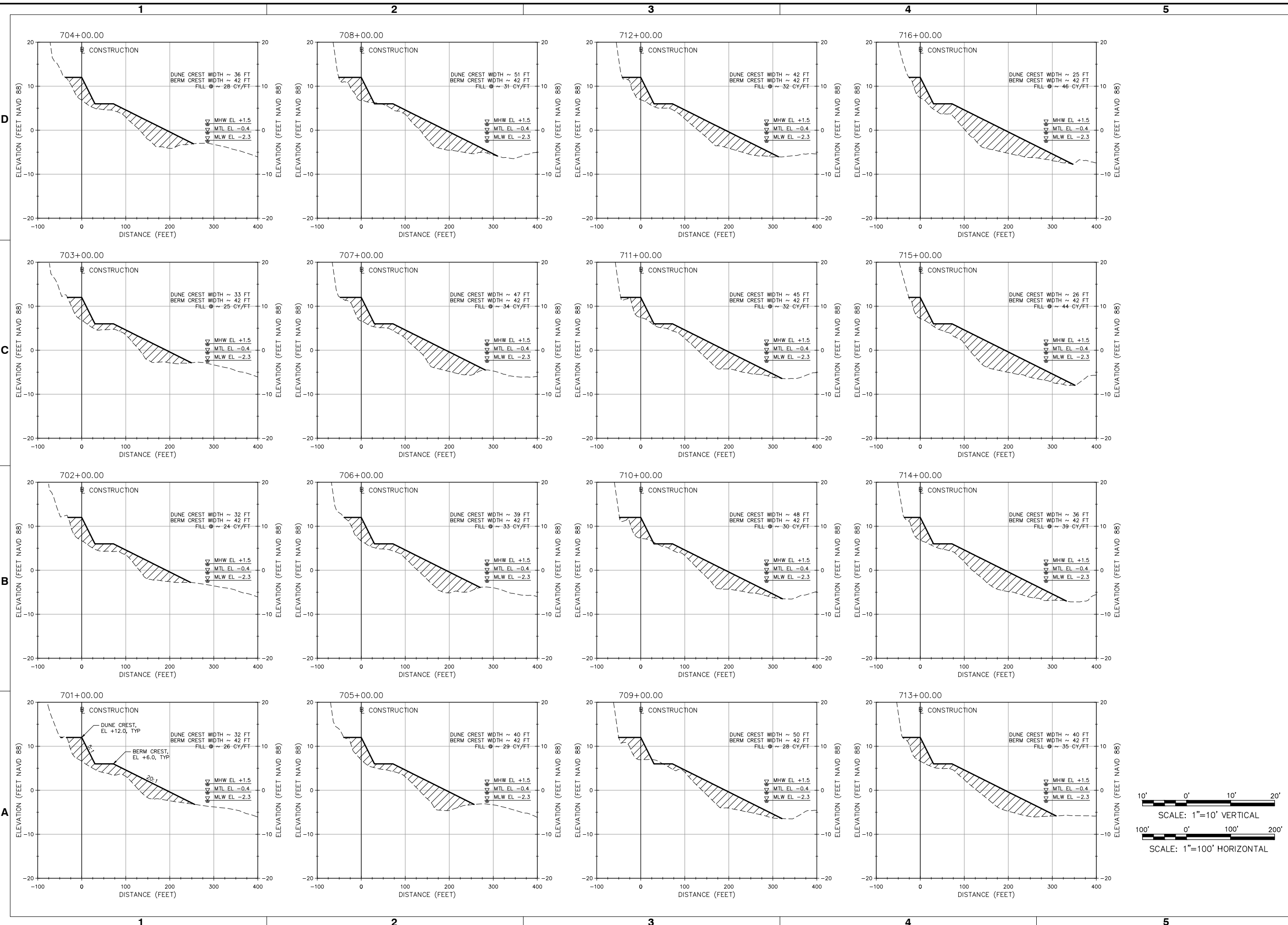
PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-316
Sheet 30 of 33



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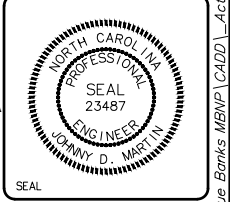


Rev.	Date	Description
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1	10/19/18	BID DOCUMENTS

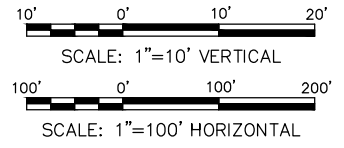
POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA
RENOURISHMENT SECTIONS -
SHEET 17 OF 18

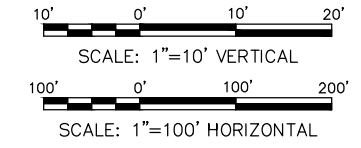
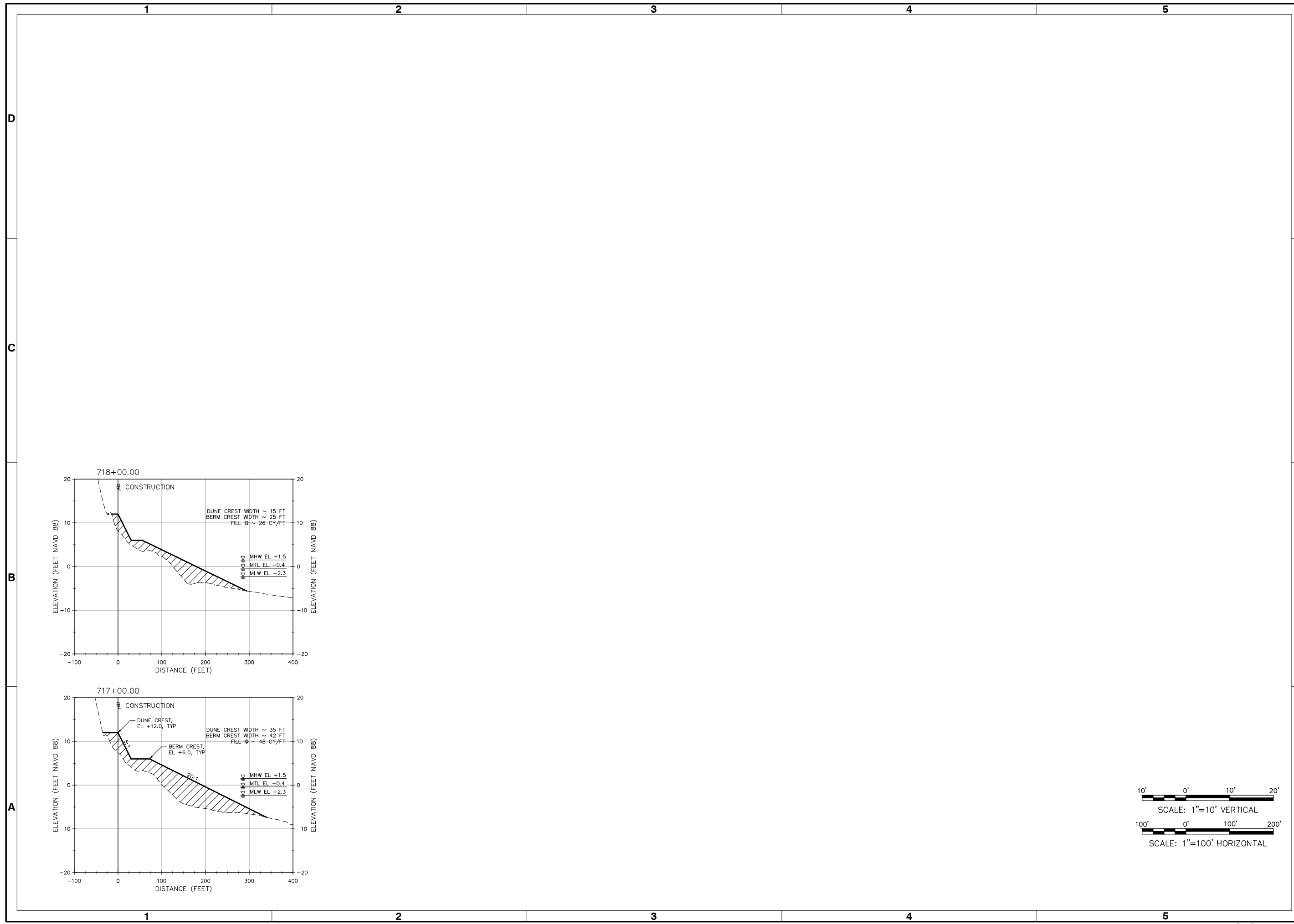
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PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-317
Sheet 31 of 33





Mark	Description	Date	Appr.
0	BID DOCUMENTS	10/19/18	JM
	ISSUED FOR CONSTRUCTION	02/12/19	JM

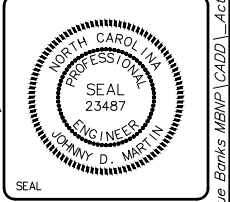
**POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA**

**RENOURISHMENT SECTIONS -
SHEET 18 OF 18**

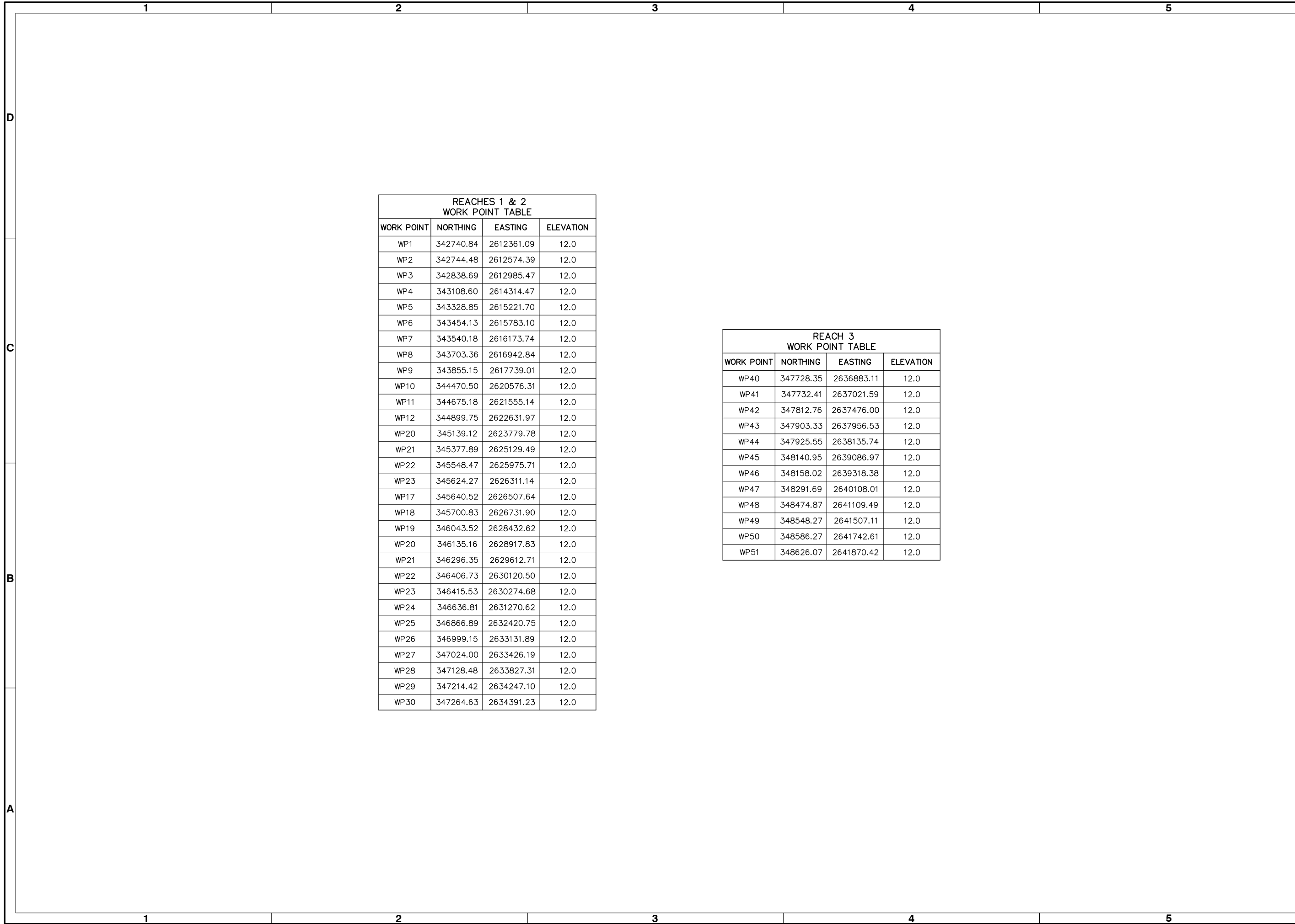
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4226 NC FIRM LICENSE No. F-0105	Designed by: JM	Checked by: SM	Reviewed by: SM	Submitted by: MOFFATT & NICHOL	Date: FEB 2019	M&N Project No.:	Drawing code:	Drawing Scale:	Plot scale: 1:1 (0 SHEET)
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moffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-318
Sheet 32 of 33

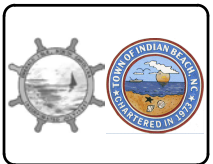


**REACHES 1 & 2
WORK POINT TABLE**

WORK POINT	NORTHING	EASTING	ELEVATION
WP1	342740.84	2612361.09	12.0
WP2	342744.48	2612574.39	12.0
WP3	342838.69	2612985.47	12.0
WP4	343108.60	2614314.47	12.0
WP5	343328.85	2615221.70	12.0
WP6	343454.13	2615783.10	12.0
WP7	343540.18	2616173.74	12.0
WP8	343703.36	2616942.84	12.0
WP9	343855.15	2617739.01	12.0
WP10	344470.50	2620576.31	12.0
WP11	344675.18	2621555.14	12.0
WP12	344899.75	2622631.97	12.0
WP20	345139.12	2623779.78	12.0
WP21	345377.89	2625129.49	12.0
WP22	345548.47	2625975.71	12.0
WP23	345624.27	2626311.14	12.0
WP17	345640.52	2626507.64	12.0
WP18	345700.83	2626731.90	12.0
WP19	346043.52	2628432.62	12.0
WP20	346135.16	2628917.83	12.0
WP21	346296.35	2629612.71	12.0
WP22	346406.73	2630120.50	12.0
WP23	346415.53	2630274.68	12.0
WP24	346636.81	2631270.62	12.0
WP25	346866.89	2632420.75	12.0
WP26	346999.15	2633131.89	12.0
WP27	347024.00	2633426.19	12.0
WP28	347128.48	2633827.31	12.0
WP29	347214.42	2634247.10	12.0
WP30	347264.63	2634391.23	12.0

**REACH 3
WORK POINT TABLE**

WORK POINT	NORTHING	EASTING	ELEVATION
WP40	347728.35	2636883.11	12.0
WP41	347732.41	2637021.59	12.0
WP42	347812.76	2637476.00	12.0
WP43	347903.33	2637956.53	12.0
WP44	347925.55	2638135.74	12.0
WP45	348140.95	2639086.97	12.0
WP46	348158.02	2639318.38	12.0
WP47	348291.69	2640108.01	12.0
WP48	348474.87	2641109.49	12.0
WP49	348548.27	2641507.11	12.0
WP50	348586.27	2641742.61	12.0
WP51	348626.07	2641870.42	12.0



Mark	Description	Date	Appr.
0	ISSUED FOR CONSTRUCTION	02/12/19	JM
	BID DOCUMENTS	10/19/18	JM

**POST-FLORENCE RENOURISHMENT PROJECT
PHASE 1
CARTERET COUNTY, NORTH CAROLINA**

**CONSTRUCTION BASELINE
WORK POINT TABLES**

Designed by:	JM	Checked by:	SM	Reviewed by:	SM	Submitted by:	MOFFATT & NICHOL
Date:	FEB 2019	M&N Project No.:		Drawing code:		Drawing Scale:	Plot scale: 1:1 (0 SHEET)

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4228
NC FIRM LICENSE No. F-0105

meffatt & nichol

PREPARED FOR THE TOWNS OF
EMERALD ISLE AND INDIAN BEACH



Sheet Reference No.
C-601
Sheet 33 of 33

File: G:\RA\Bogue Banks MBNP\CADD\Active\Sheets\MBNP-C601; Plotted: 2/11/2019 5:21 PM by FORD, BRIAN; Saved: 2/8/2019 8:07 AM by BFORD

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2

CARTERET COUNTY, NORTH CAROLINA



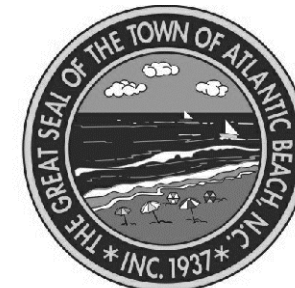
TOWN OF EMERALD ISLE
7500 EMERALD DRIVE
EMERALD ISLE, NC 28594



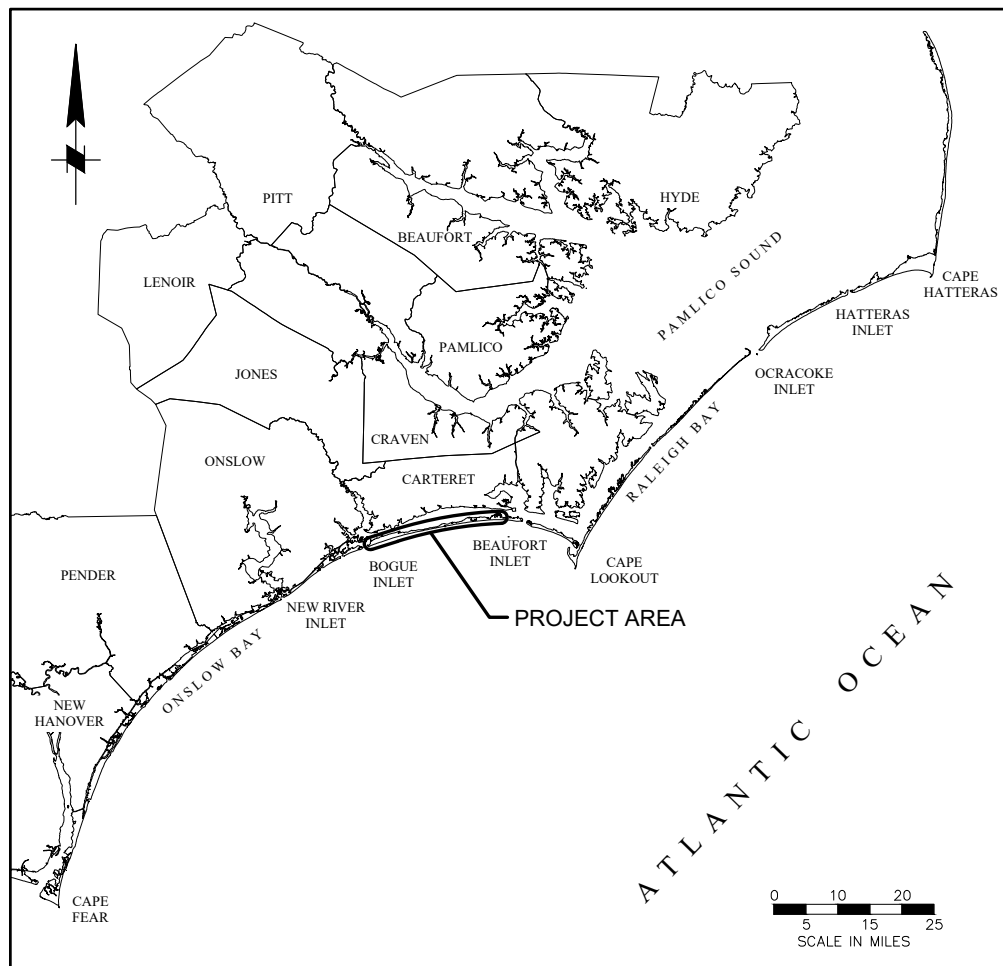
TOWN OF INDIAN BEACH
1400 SALTER PATH ROAD
INDIAN BEACH, NC 28512



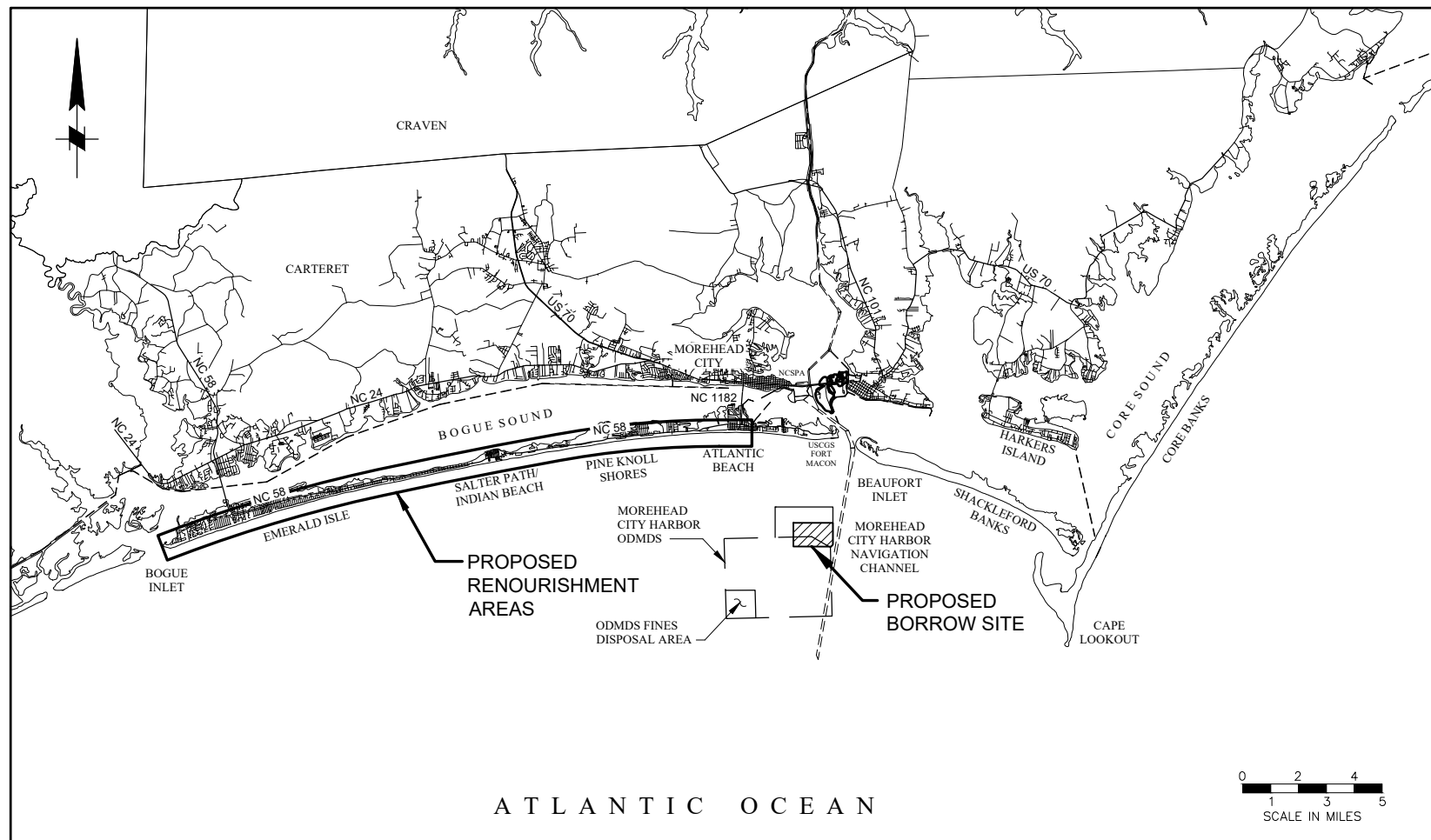
TOWN OF PINE KNOLL SHORES
100 MUNICIPAL CIRCLE
PINE KNOLL SHORES, NC 28512



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

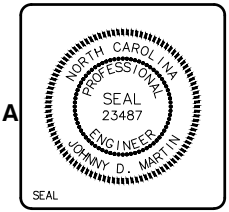
COVER SHEET

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

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-761-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



Sheet Reference No.
G-001
Sheet 1 of 66

INDEX OF DRAWINGS table with columns SHEET NO. and SHEET TITLE. Lists sheets from G-001 to C-601 including cover sheets, project maps, survey control plans, staging and access plans, borrow site dredge plans, and various beach nourishment plans.

ABBREVIATIONS

Table of abbreviations: CY (Cubic Yards), FT (Feet or Foot), MHW (Mean High Water), MLW (Mean Low Water), MTL (Mean Tide Level), NAD (North American Datum), NAVD (North American Vertical Datum), NGS (National Geodetic Survey), NOAA (National Oceanic and Atmospheric Administration).

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 CIRCL PINE KNOLL SHORES, NC 28512 (252) 247-4353 manager@townofpkcs.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

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

TOTAL PROJECT PLANTING 230,500 SY

DREDGING

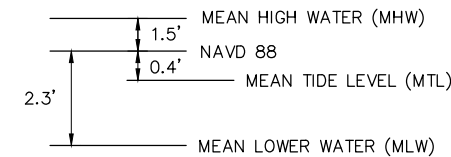
- 1. NO DREDGING WHATSOEVER SHALL OCCUR BELOW AN ELEVATION OF -52 FT NAVD 88.
2. ALL DREDGING SHALL BE PERFORMED WITHIN THE LIMITS OF THE PERMITTED DREDGING AREA AS SHOWN IN THE DRAWINGS.
3. PIPELINE CORRIDOR SHALL BE DELINEATED WITH BUOYS BY THE CONTRACTOR IN THE PRESENCE OF THE ENGINEER/OWNER BEFORE 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.

Small table with columns for Date and Description.

Table with columns for Date and Description, containing entries for ADDENDUM 1 and BID DOCUMENTS.

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2 CARTERET COUNTY, NORTH CAROLINA INDEX OF DRAWINGS, ABBREVIATIONS, AND GENERAL NOTES

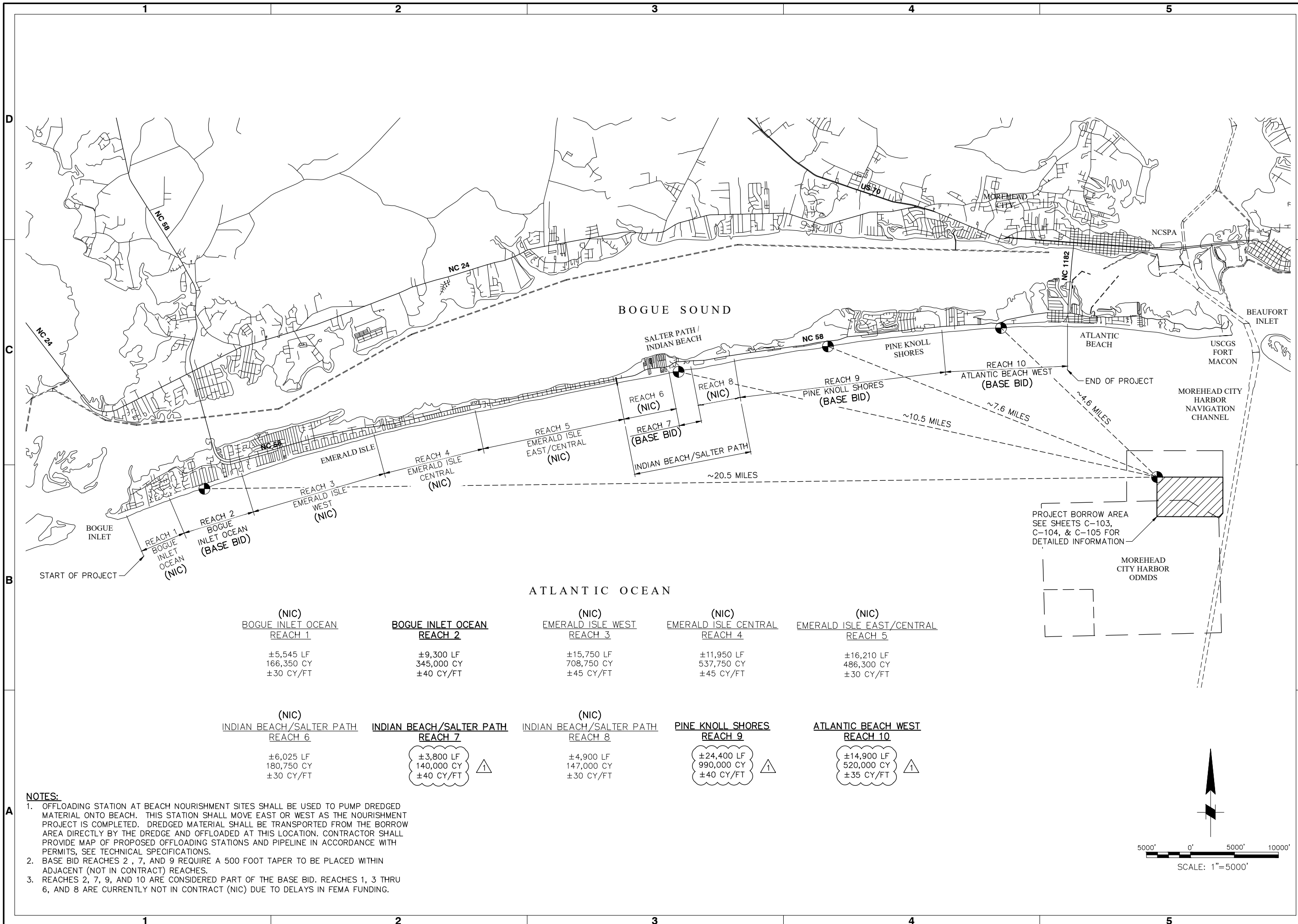
Designated by: NCY; Date: AUGUST 2019; M&N Project No: 10611; Drawing code: ; Drawing Scale: ; Plot scale: 1:1 (D SHEET)

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

Professional Engineer Seal for JOHNNY D. MARTIN, License No. 23487, State of North Carolina.

Sheet Reference No. G-002 Sheet 2 of 66

File: G:\RA\10611\10500_CAD\Active-10611\Bouge Banks 2020\1061100G-002; Plotted: 2/14/2020 10:24 AM by FORD, BRIAN; Saved: 8/27/2019 1:46 PM by BFORD



- NOTES:**
- 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.
 - BASE BID REACHES 2, 7, AND 9 REQUIRE A 500 FOOT TAPER TO BE PLACED WITHIN ADJACENT (NOT IN CONTRACT) REACHES.
 - 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.

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**

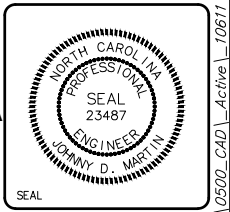
PROJECT MAP AND KEY PLAN

Designed by:	NCY	Drawn by:	BDF	Reviewed by:	JDM	Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019	MAN Project No.:	10611	Drawing code:		Drawing Scale:	Plot scale: 1:1 (D SHEET)

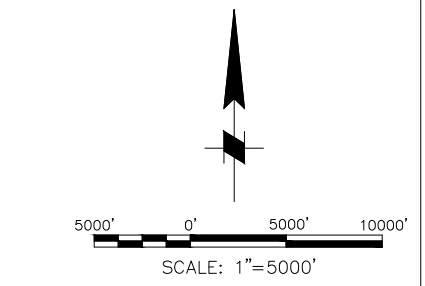
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-761-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

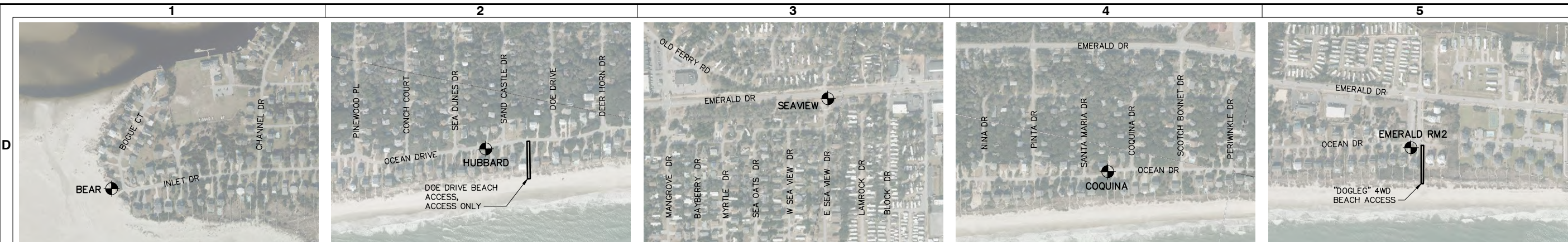
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH



Sheet Reference No.
C-100
Sheet 3 of 66



File: G:\RA\10611\0500-CAD-Active\10611 Bogue Banks 2020\1061100C-100-Plotted: 2/14/2020 10:24 AM by FORD, BRIAN; Saved: 8/27/2019 1:46 PM by BFORD



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



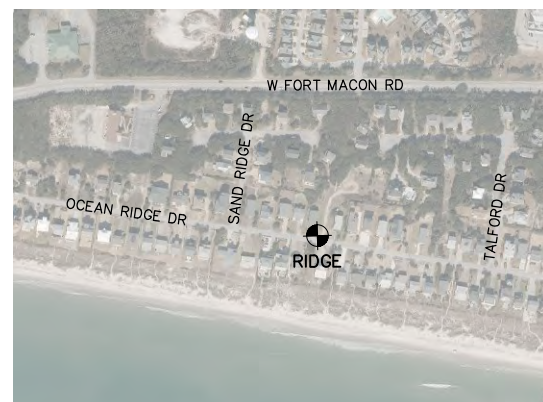
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STATION	NORTHING	EASTING	ELEVATION
VERRAZZANO	351254.18	2654624.71	10.71



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).



Rev.	Date	Description
0	08/19/19	JM

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

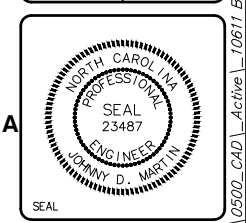
**PROJECT SURVEY CONTROL
PLANS**

Designed by:	NCV	Checked by:	SRM
Dwn by:	BDF	Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1:1 (D SHEET)

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



Sheet Reference No.
C-101
Sheet 4 of 66

File: G:\1RA\10611\10500_CAD\Active\10611\10611_10500_CAD - Active - 10611 Bouge Banks 2020\1061100C-101; Plotted: 2/14/2020 10:25 AM by FORD, BRIAN; Saved: 8/19/2019 1:37 PM by BFRD

1



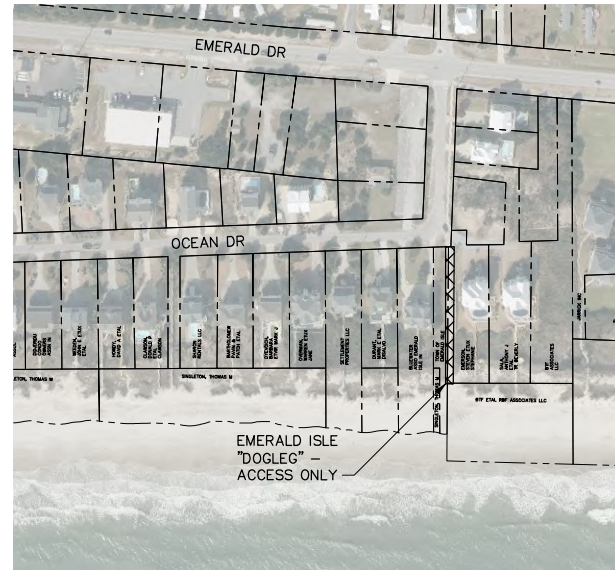
STAGING & ACCESS SITE 1
NOT TO SCALE

2



STAGING & ACCESS SITE 2
NOT TO SCALE

3



STAGING & ACCESS SITE 3
NOT TO SCALE

4

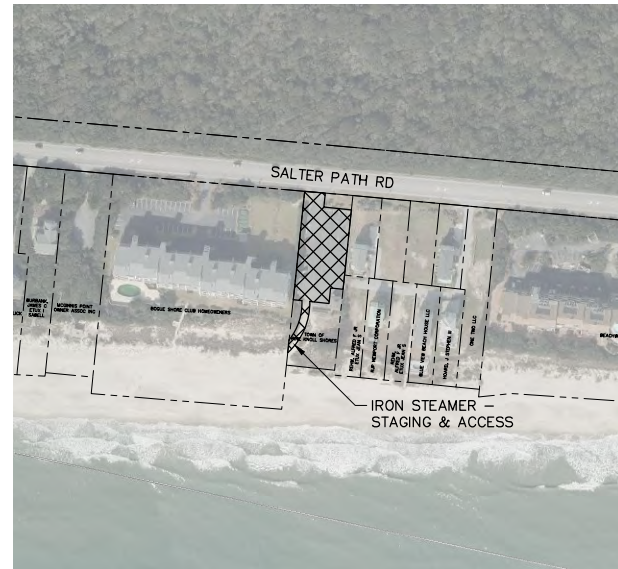


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NOT TO SCALE

5



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.



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:	Rev.
Dwn by:	AUGUST 2019	
Chk by:	MAN Project No.	
Reviewed by:	10611	
Submitted by:	Drawing code:	
MOFFATT & NICHOI	Drawing Scale:	
	Plot scale: 1:1 (D SHEET)	

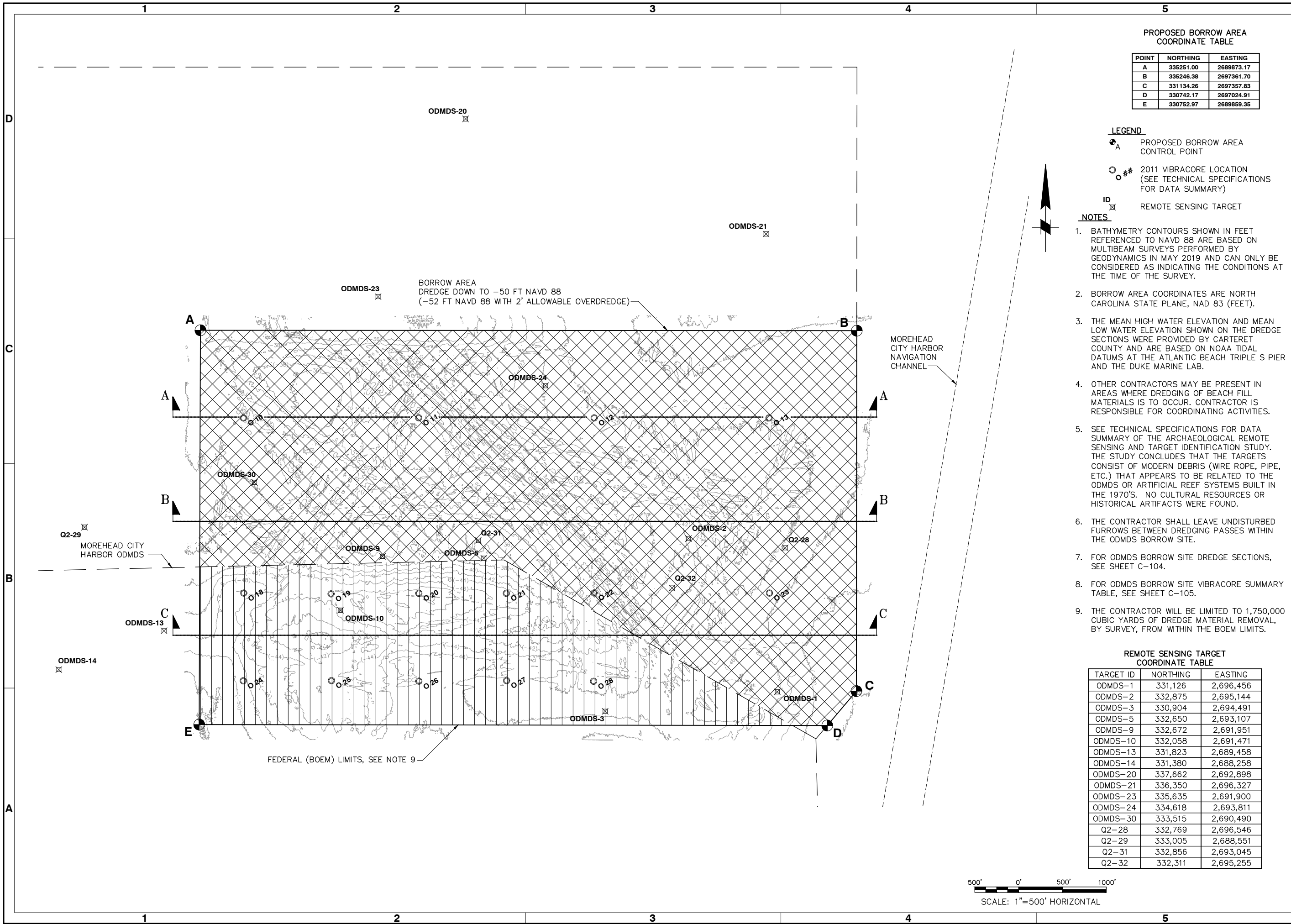
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626
NC FIRM LICENSE No. F-0105

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



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DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



BORROW AREA
DREDGE DOWN TO -50 FT NAVD 88
(-52 FT NAVD 88 WITH 2' ALLOWABLE OVERDREDGE)

MOREHEAD CITY HARBOR
NAVIGATION
CHANNEL

FEDERAL (BOEM) LIMITS, SEE NOTE 9

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

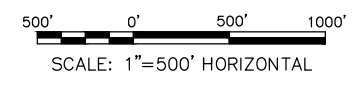
- A PROPOSED BORROW AREA CONTROL POINT
- ## 2011 VIBRACORE LOCATION (SEE TECHNICAL SPECIFICATIONS FOR DATA SUMMARY)
- ⊗ ID REMOTE SENSING TARGET

NOTES

- 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.
- BORROW AREA COORDINATES ARE NORTH CAROLINA STATE PLANE, NAD 83 (FEET).
- 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.
- OTHER CONTRACTORS MAY BE PRESENT IN AREAS WHERE DREDGING OF BEACH FILL MATERIALS IS TO OCCUR. CONTRACTOR IS RESPONSIBLE FOR COORDINATING ACTIVITIES.
- 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.
- THE CONTRACTOR SHALL LEAVE UNDISTURBED FURROWS BETWEEN DREDGING PASSES WITHIN THE ODMDS BORROW SITE.
- FOR ODMDS BORROW SITE DREDGE SECTIONS, SEE SHEET C-104.
- FOR ODMDS BORROW SITE VIBRACORE SUMMARY TABLE, SEE SHEET C-105.
- 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



Mark	Date	J.M.	Appr.
0			

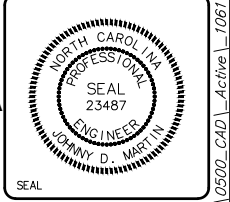
POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA

 ODMDS BORROW SITE DREDGE
PLAN

Designed by:	NCV	Clk 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)

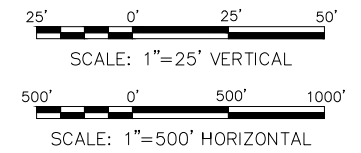
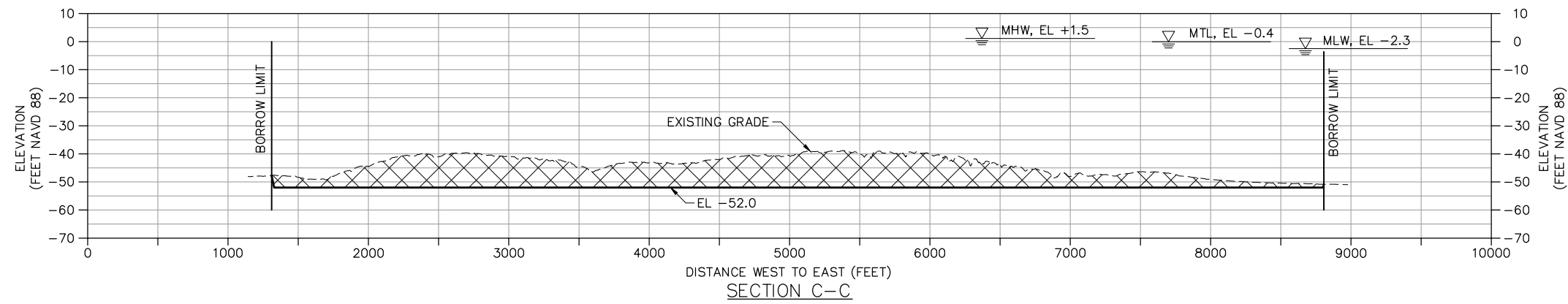
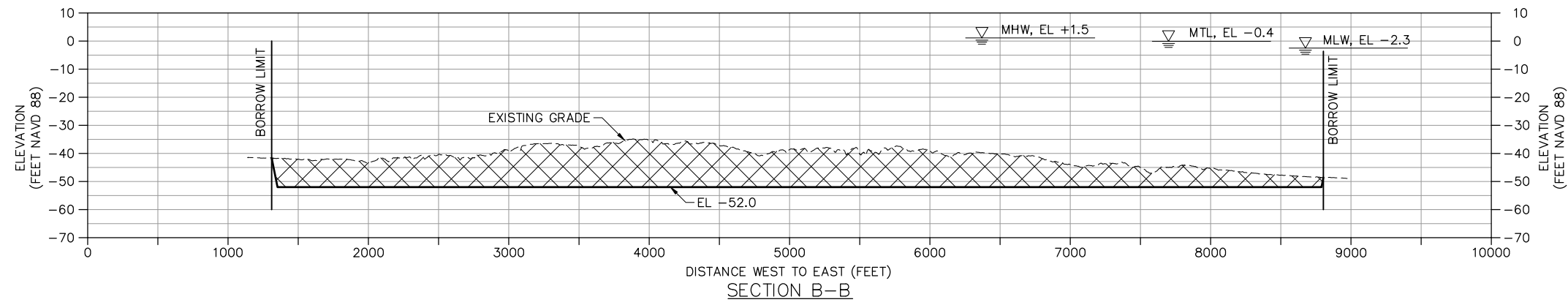
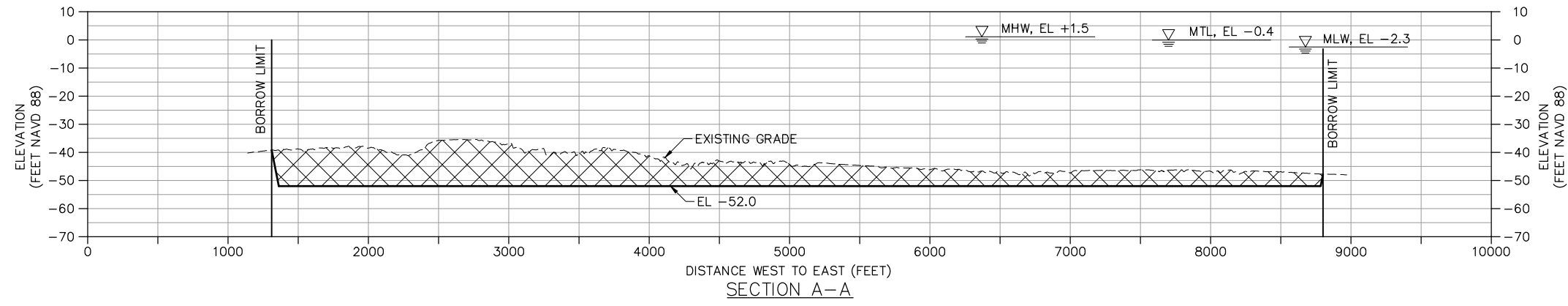
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

NC FIRM LICENSE No. F-0105
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH



Sheet Reference No.
C-103
Sheet 6 of 66

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0	BID DOCUMENTS	08/19/19	JM

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

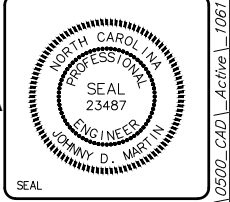
**ODMDS BORROW SITE DREDGE
SECTIONS**

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

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
PHONE: 919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



Sheet Reference No.
C-104
Sheet 7 of 66

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%
Percent 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	0.68	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	1.98	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.	Date	Description
0	08/19/19	BID DOCUMENTS

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

ODMDS BORROW SITE
VIBRACORE SUMMARY TABLE

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

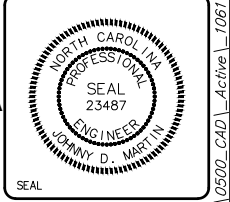
meffatt & nichol

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

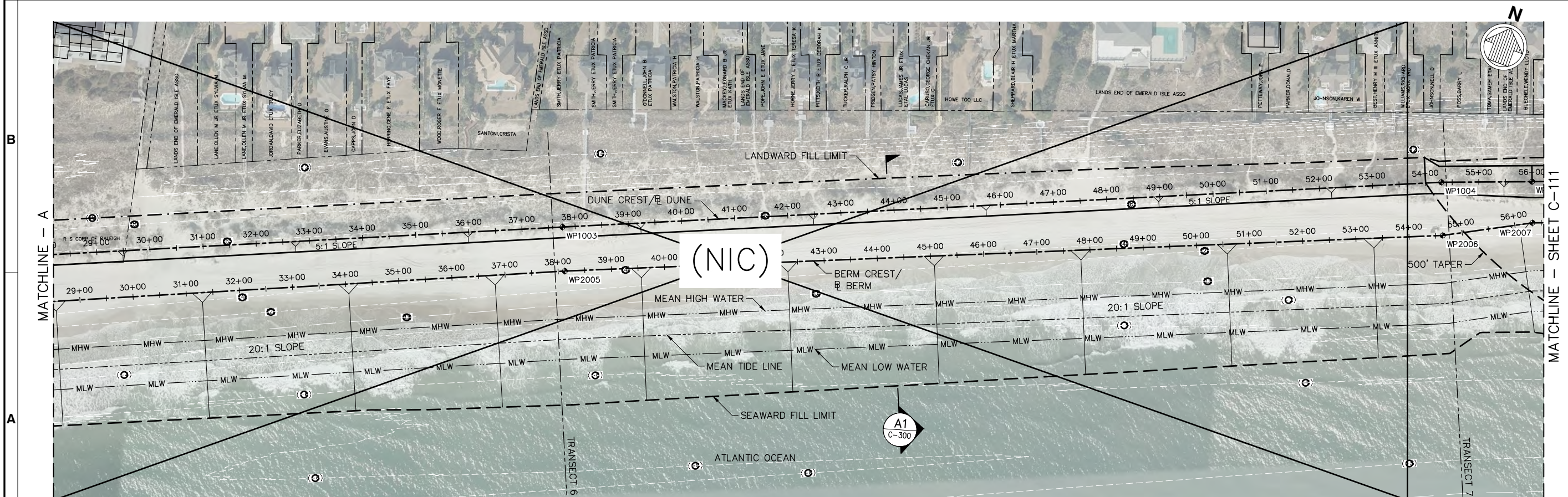
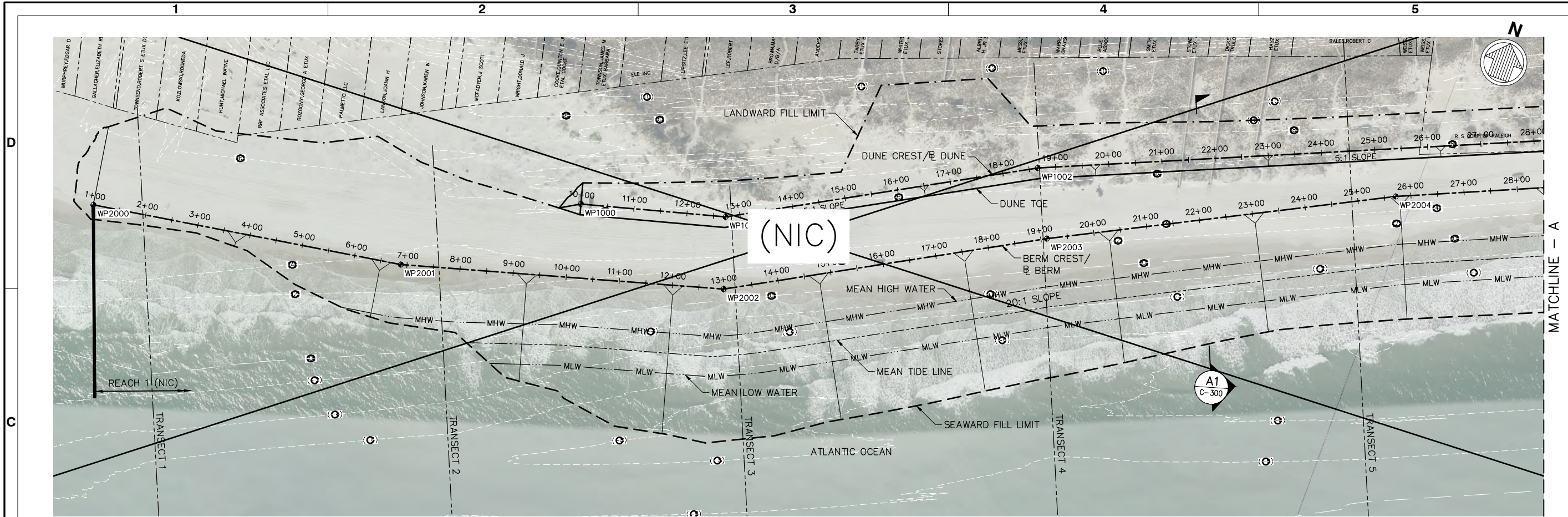
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
PHONE: 919-781-4626
NC FIRM LICENSE No. F-0105

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

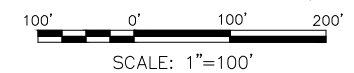
Date: AUGUST 2019
MAN Project No: 10611
Drawing code:
Drawing Scale:
Plot scale: 1:1 (D SHEET)



Sheet Reference No.
C-105
Sheet 8 of 66



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



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

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

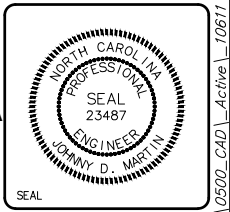
**BEACH RENOURISHMENT PLAN -
SHEET 1 OF 20**

Designed by: NCY	Date: JANUARY 2020	Rev.
Dwn by: BDF	MAN Project No. 10611	
Reviewed by: JDM	Drawing code:	
Submitted by: MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1" (D SHEET)

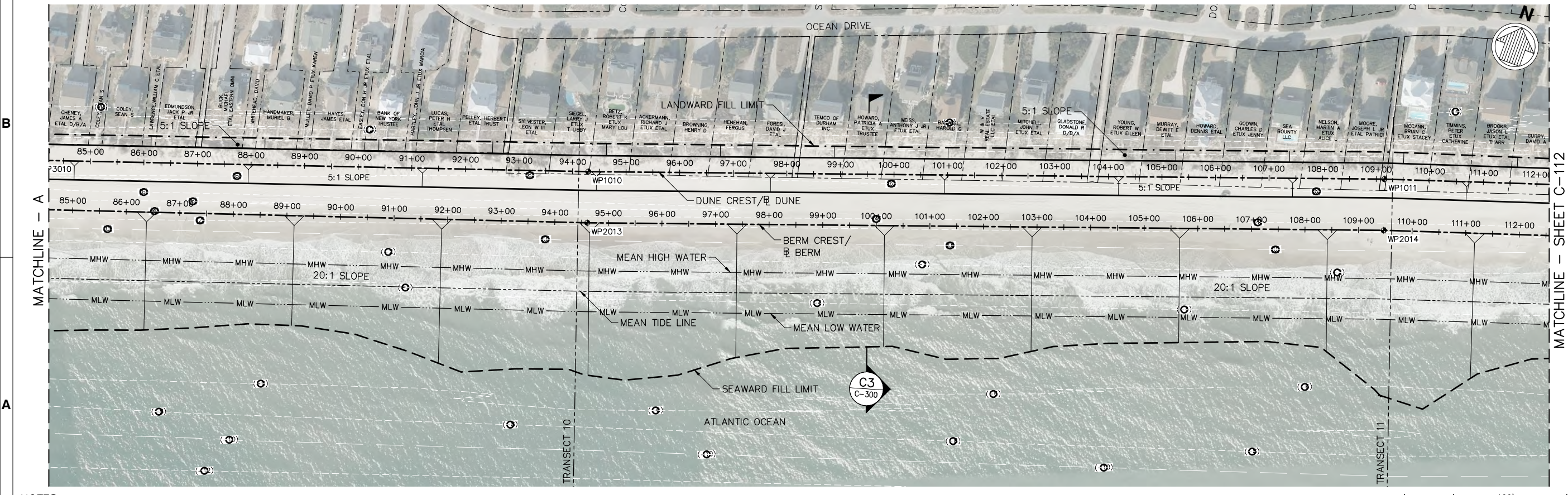
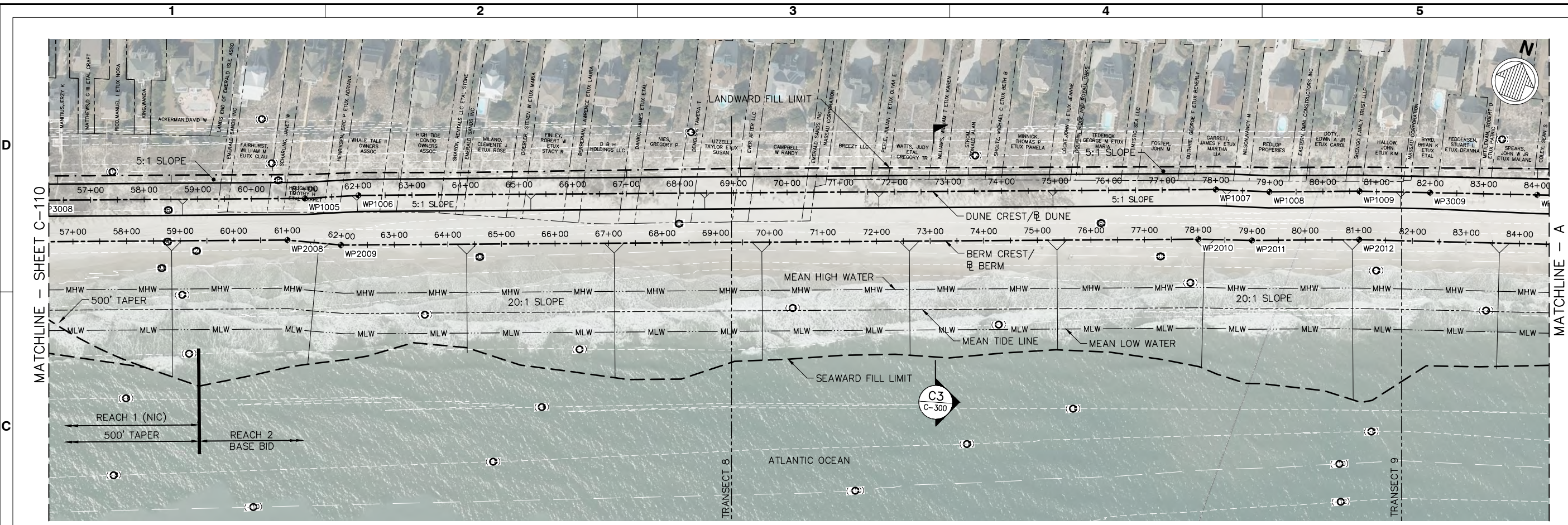
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

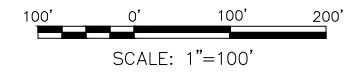
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH



Sheet Reference No.
C-110
Sheet 9 of 66



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



Rev.	Date	Description
1	JANUARY 2020	1

1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM
			Apr

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

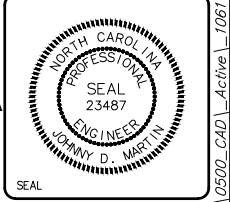
**BEACH RENOURISHMENT PLAN -
 SHEET 2 OF 20**

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

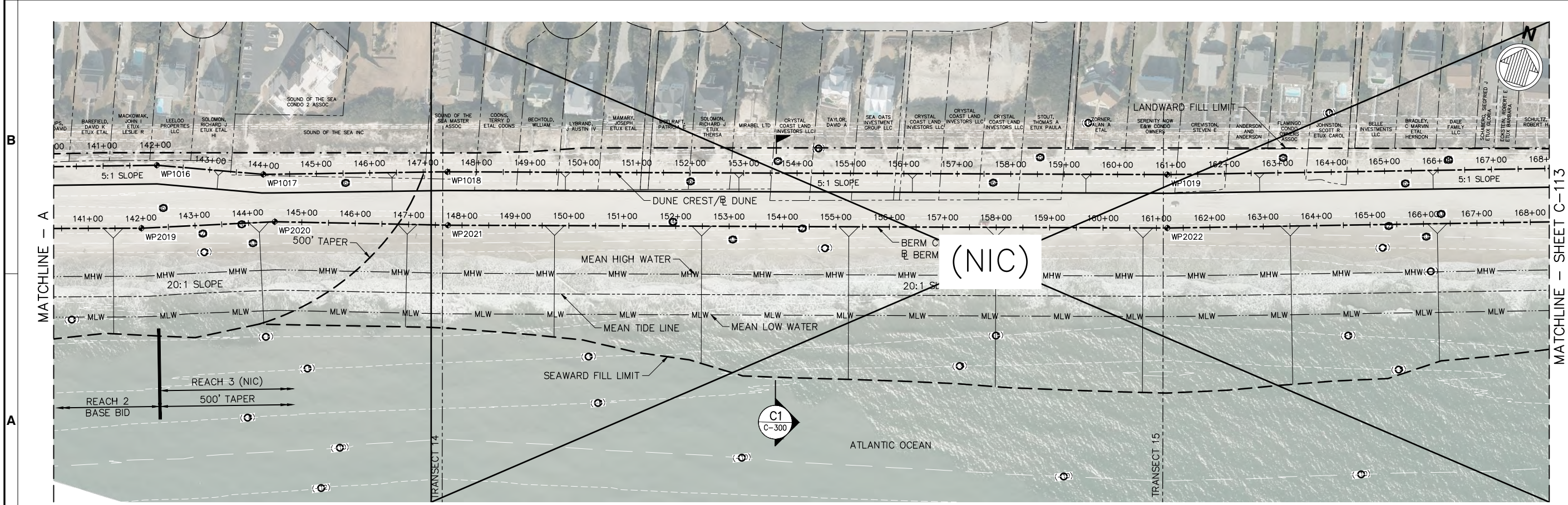
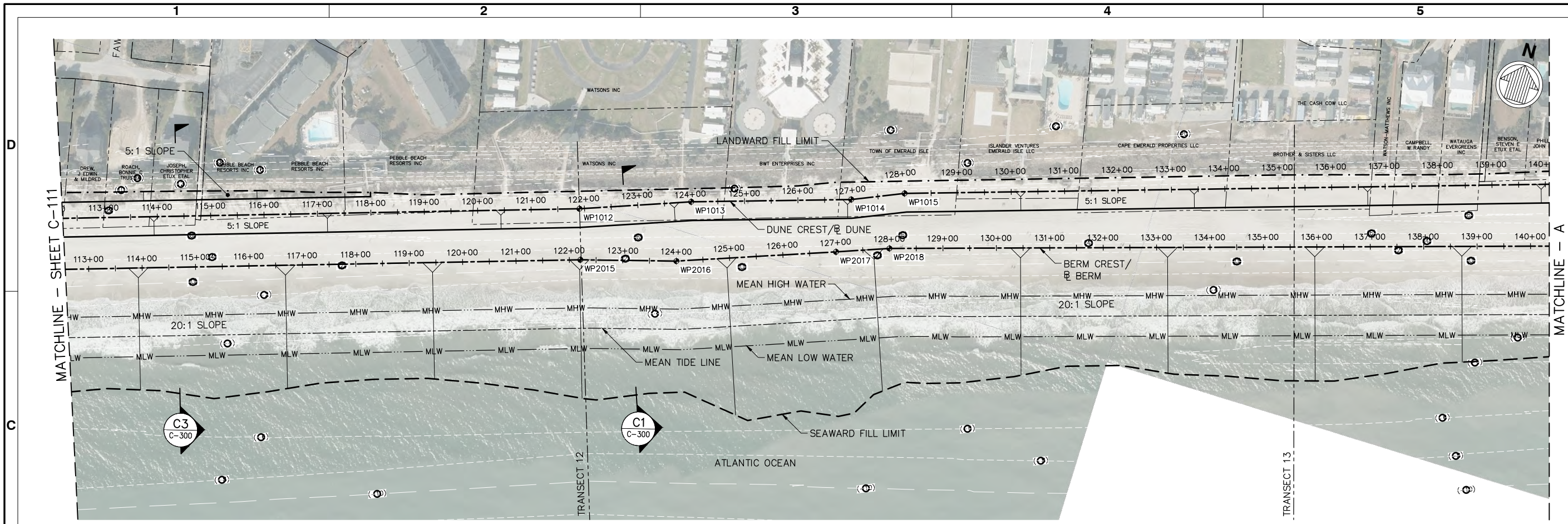
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

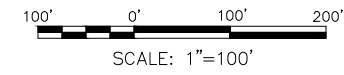
PREPARED FOR THE TOWNS OF
 EMERALD ISLE, INDIAN BEACH,
 PINE KNOLL SHORES, AND ATLANTIC BEACH



Sheet Reference No.
C-111
 Sheet 10 of 66



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



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

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

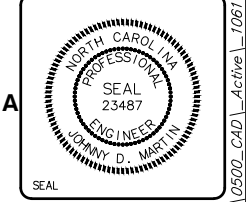
**BEACH RENOURISHMENT PLAN -
 SHEET 3 OF 20**

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

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

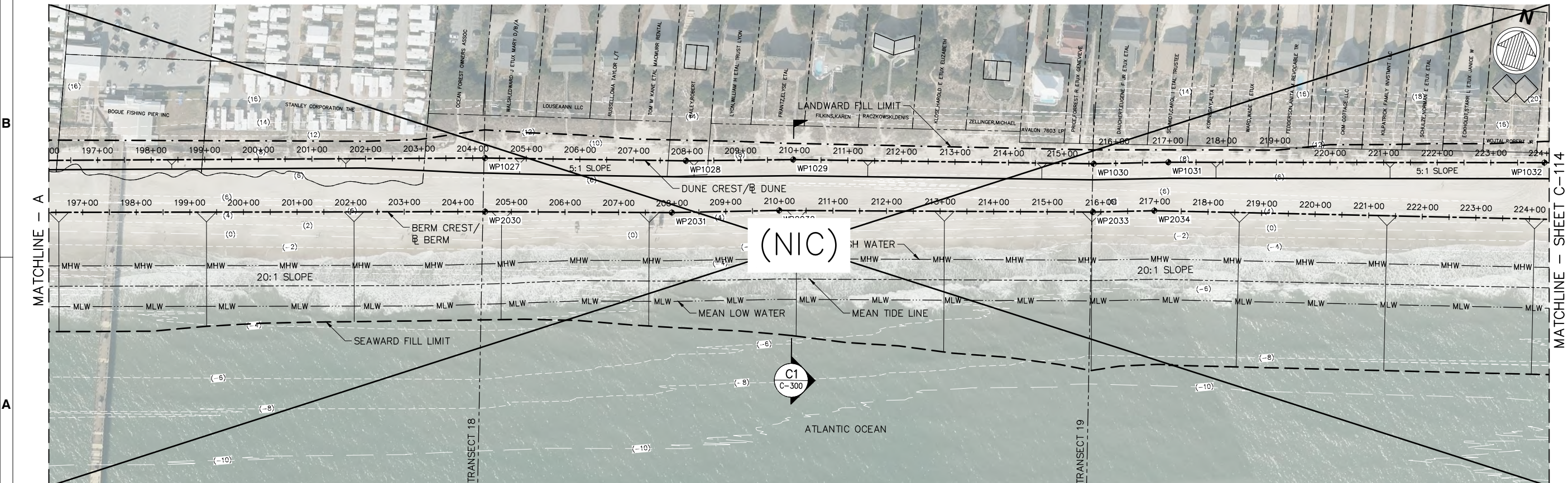
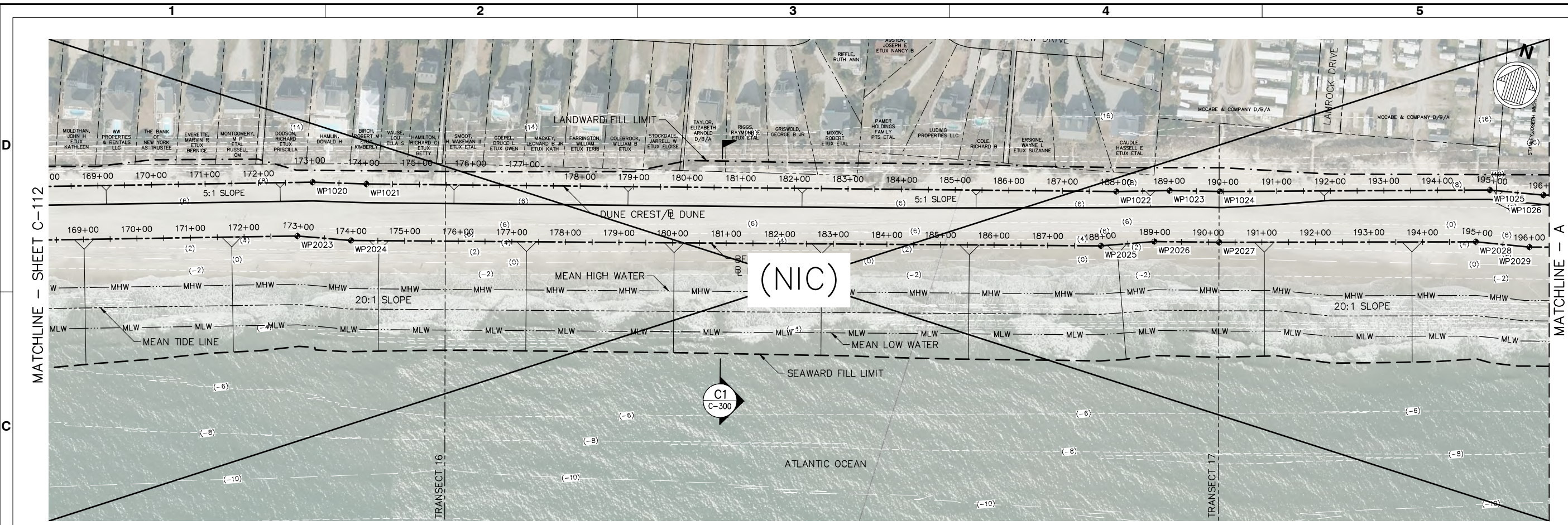
NC FIRM LICENSE No. F-0105

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

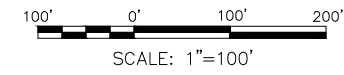


Sheet Reference No.
C-112
 Sheet 11 of 66

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



Rev.	Date	Description
0	08/19/19	JM

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

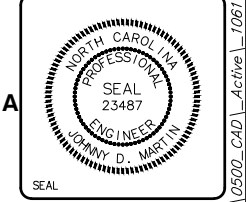
**BEACH RENOURISHMENT PLAN -
 SHEET 4 OF 20**

Designed by:	NCV	Date:	AUGUST 2019
Drawn by:	BDF	MAN Project No.:	10611
Reviewed by:	JDM	Drawing code:	
Submitted by:	MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1" = 100'

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

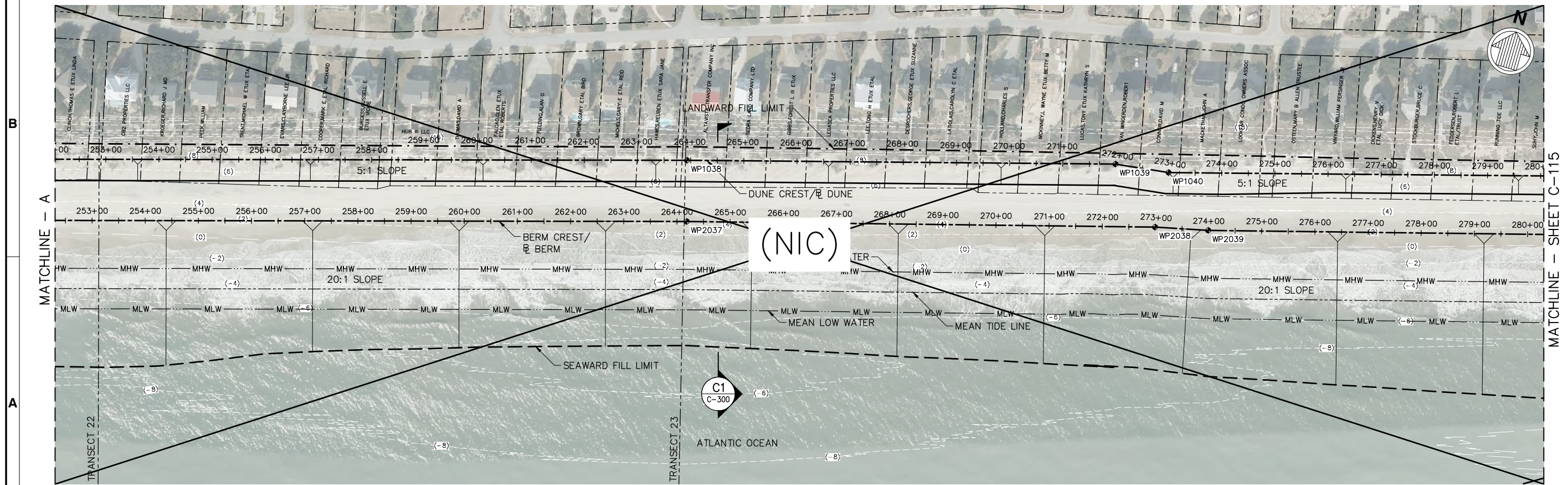
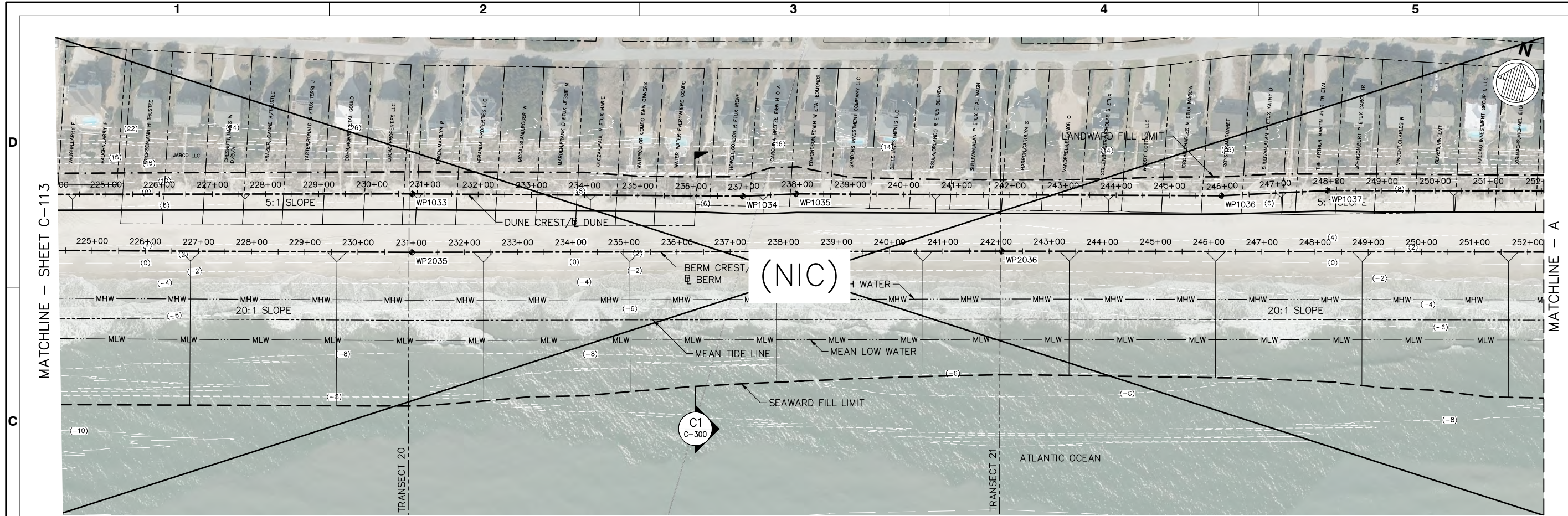
meffatt & nichol NC FIRM LICENSE No. F-0105

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

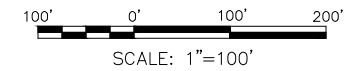


Sheet Reference No.
C-113
 Sheet 12 of 66

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



Rev.	Date	Description
0	08/19/19	JM

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

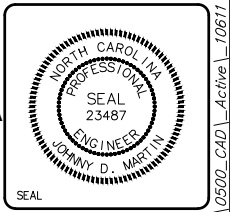
**BEACH RENOURISHMENT PLAN -
SHEET 5 OF 20**

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

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

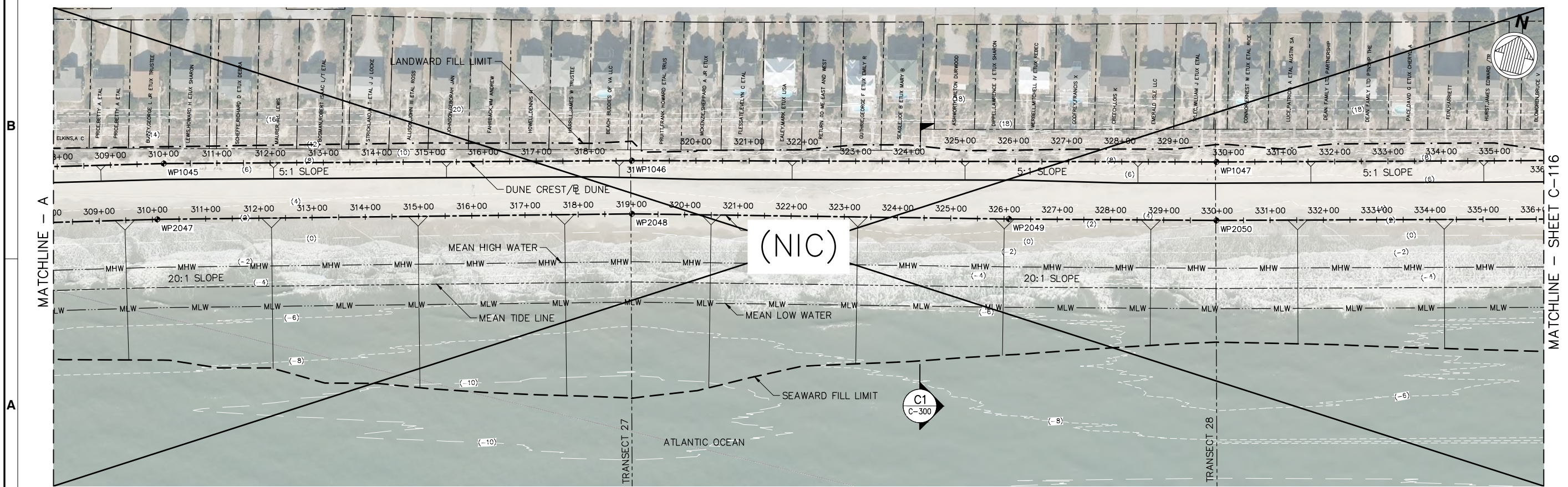
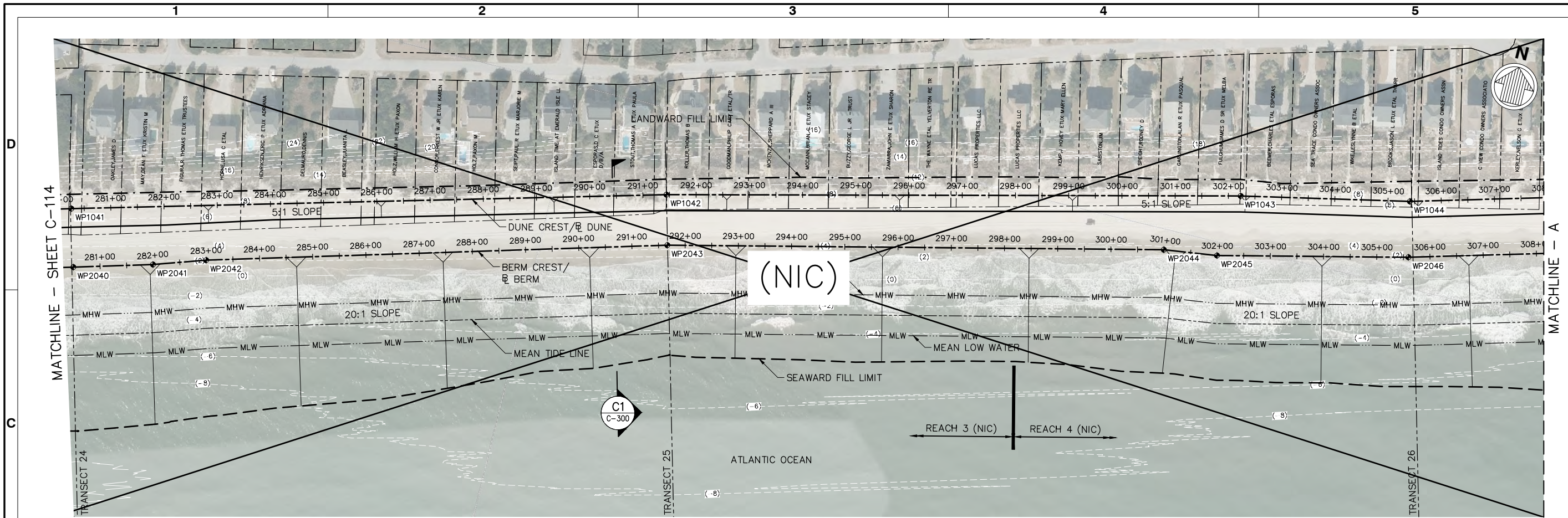
meffatt & nichol NC FIRM LICENSE No. F-0105

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

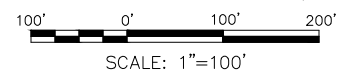


Sheet Reference No.
C-114
Sheet 13 of 66

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



Rev.	Date	Description
0	08/19/19	JM

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

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

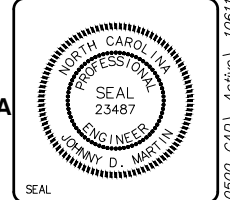
**BEACH RENOURISHMENT PLAN -
 SHEET 6 OF 20**

Designed by: NCY	Date: AUGUST 2019	Rev.
Dwn by: BDF	MAN Project No. 10611	
Reviewed by: JDM	Drawing code:	
Submitted by: MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1" = 10'

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

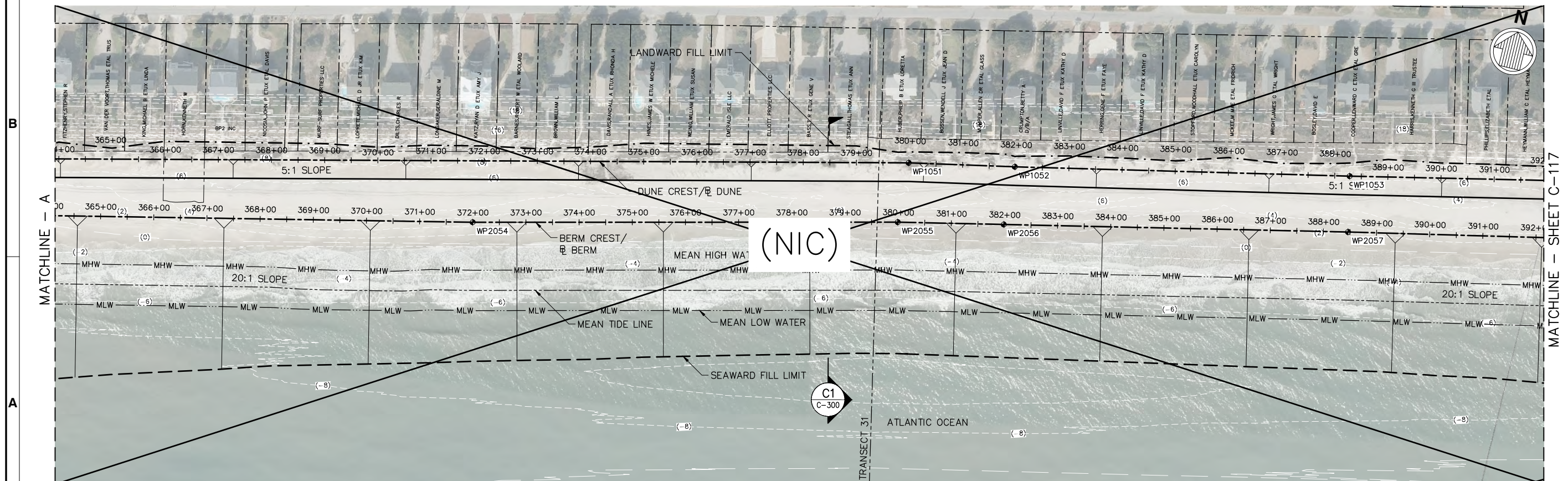
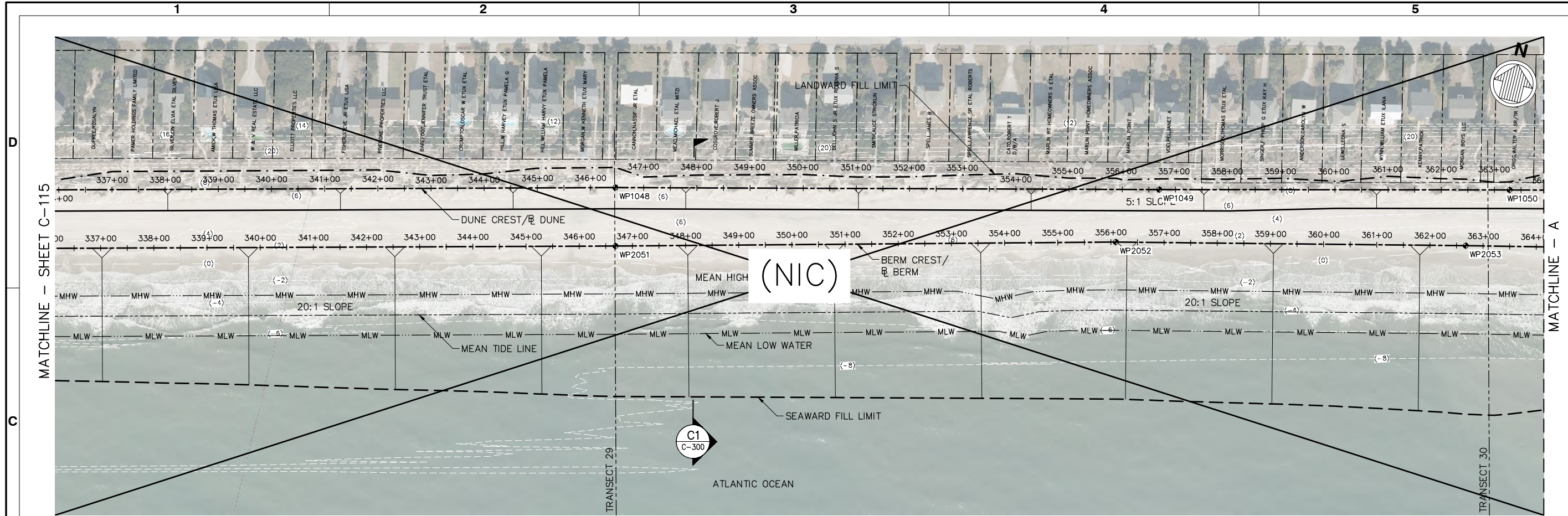
meffatt & nichol NC FIRM LICENSE No. F-0105

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

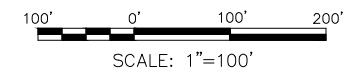


Sheet
 Reference No.
C-115
 Sheet 14 of 66

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



Rev.	Date	Description
0	08/19/19	JM

Mark	Description	Date	Appr.

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

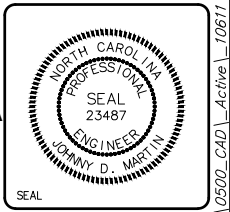
**BEACH RENOURISHMENT PLAN -
SHEET 7 OF 20**

Designed by: NCY	Date: AUGUST 2019	Rev.
Dwn by: BDF	MAN Project No. 10611	
Reviewed by: JDM	Drawing code:	
Submitted by: MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1" = 10'

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

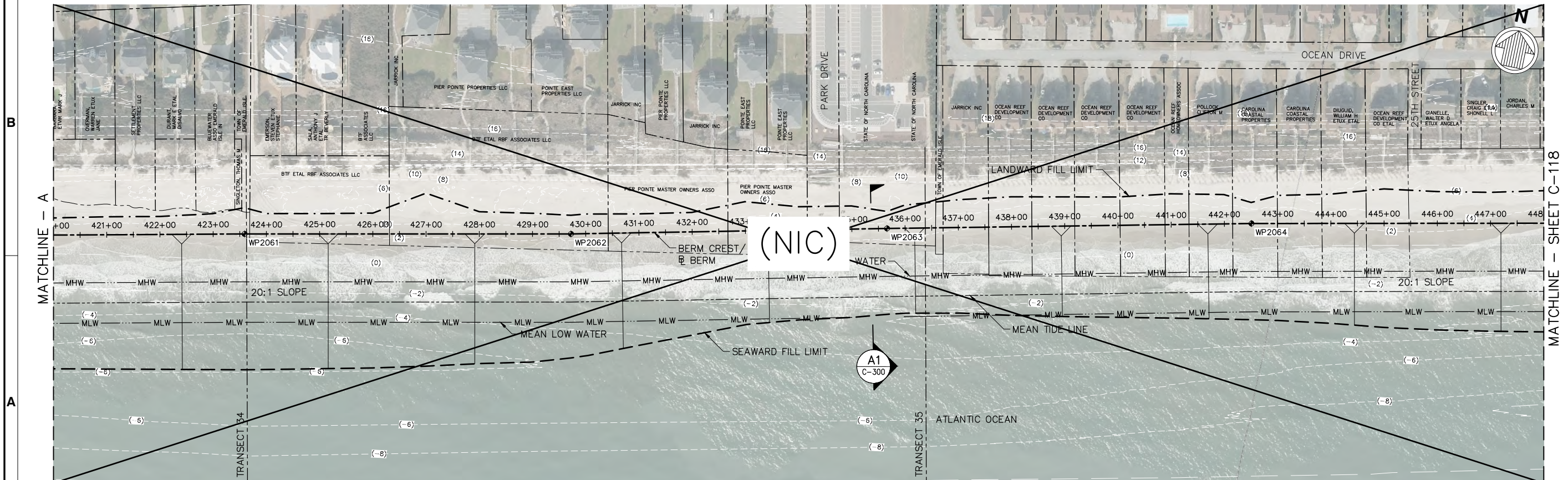
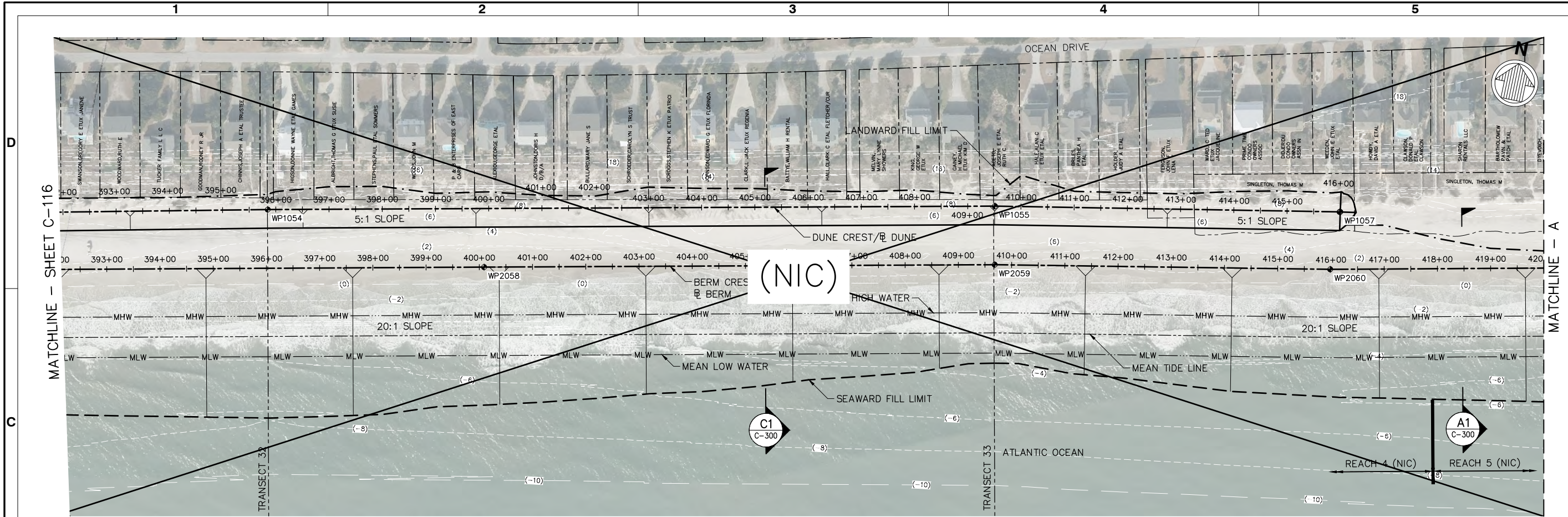
meffatt & nichol NC FIRM LICENSE No. F-0105

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

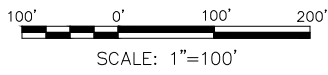


Sheet Reference No.
C-116
Sheet 15 of 66

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



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

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

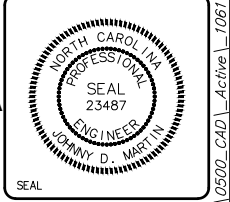
**BEACH RENOURISHMENT PLAN -
SHEET 8 OF 20**

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

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

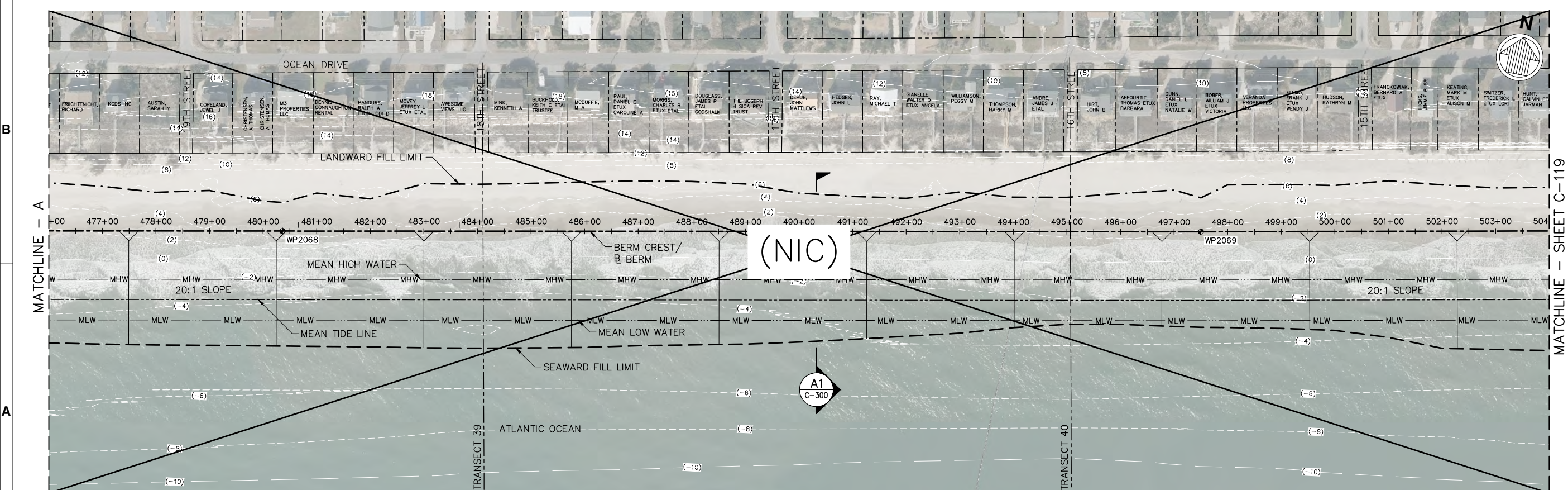
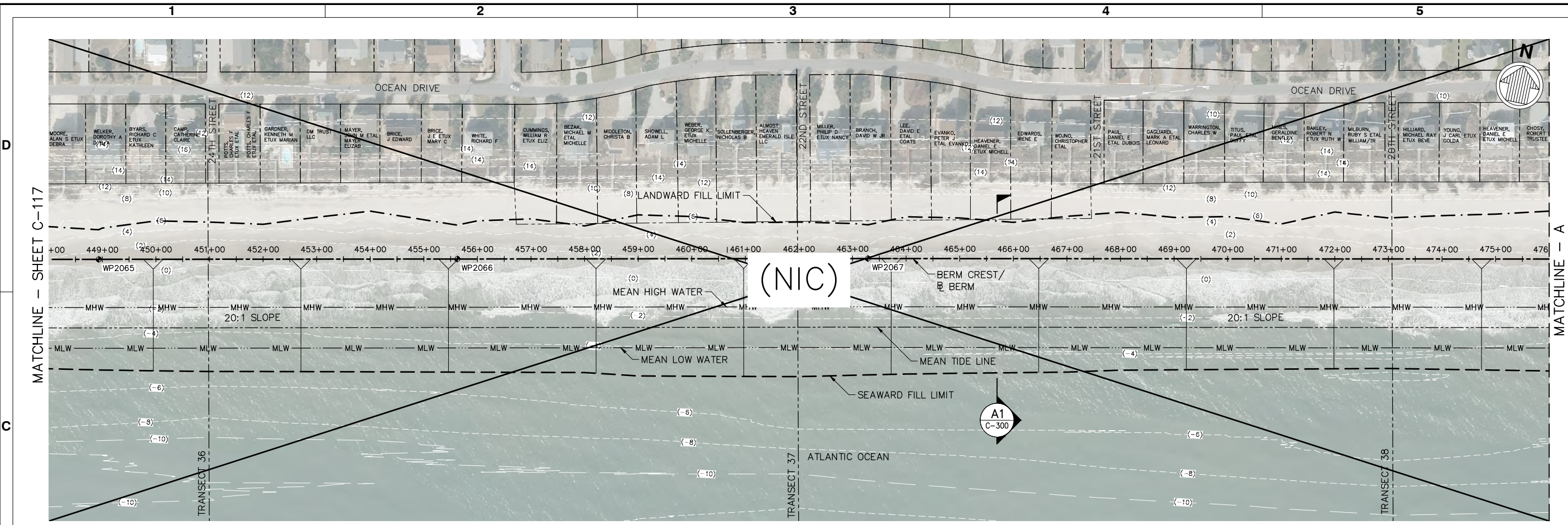
meffatt & nichol NC FIRM LICENSE No. F-0105

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

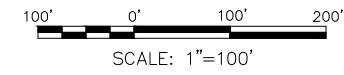


Sheet Reference No.
C-117
Sheet 16 of 66

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



Rev.	Date	Description
0	08/19/19	JM

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

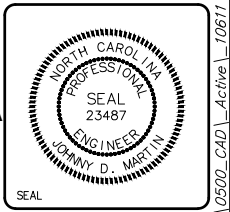
**BEACH RENOURISHMENT PLAN -
 SHEET 9 OF 20**

Designed by:	NCV	Date:	AUGUST 2019
Drawn by:	BDF	MAN Project No.:	10611
Reviewed by:	JDM	Drawing code:	
Submitted by:	MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1" = 100'

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

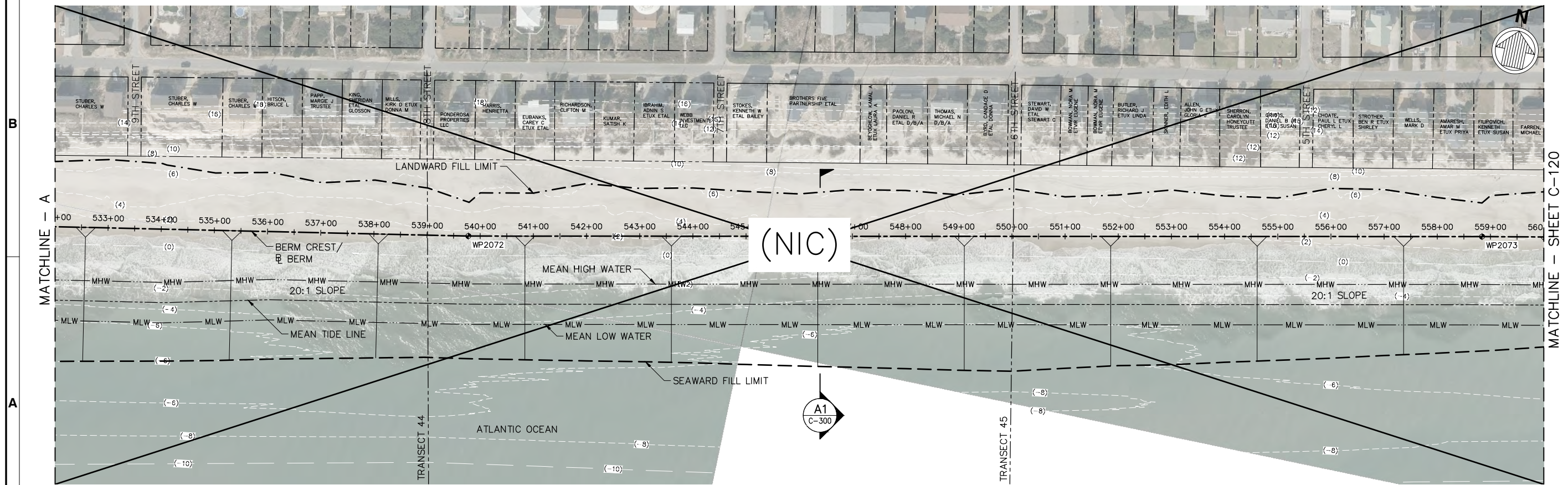
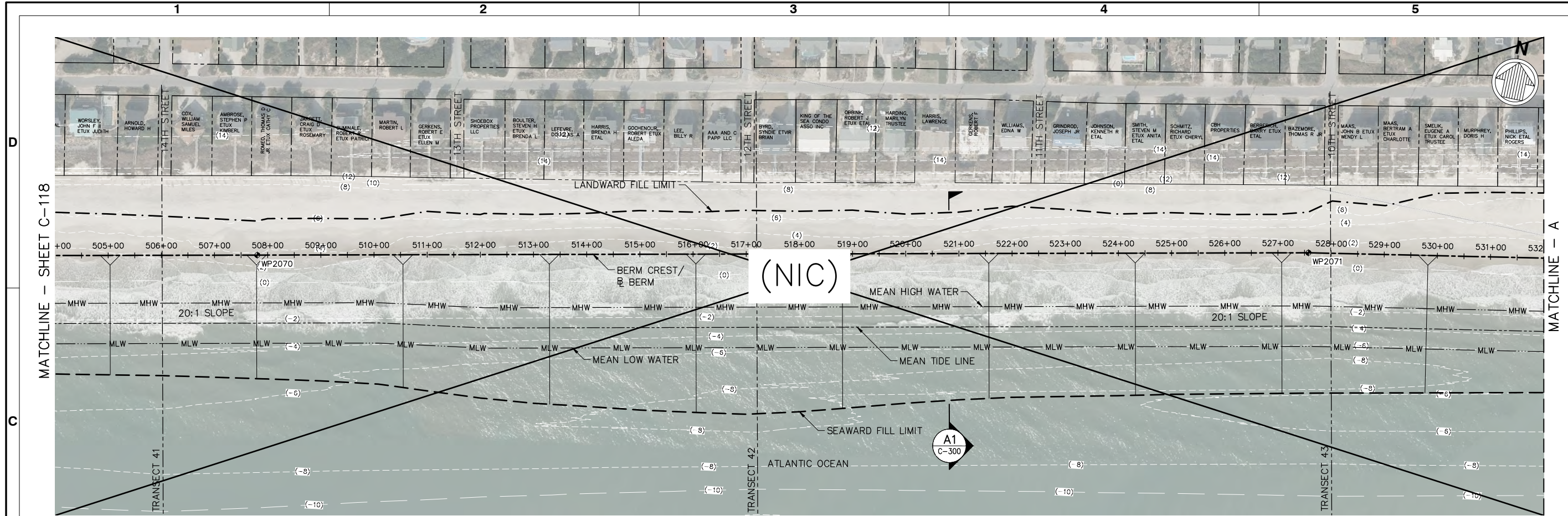
meffatt & nichol NC FIRM LICENSE No. F-0105

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

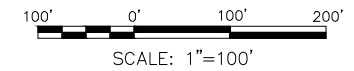


Sheet Reference No.
C-118
 Sheet 17 of 66

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



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

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

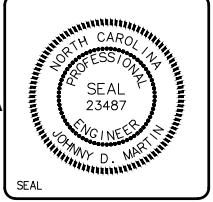
**BEACH RENOURISHMENT PLAN -
 SHEET 10 OF 20**

Designed by:	NCY	Checked by:	SRM	Reviewed by:	JDM	Submitted by:	MOFFATT & NICHOL
Date:	AUGUST 2019	MAN Project No.:	10611	Drawing code:		Drawing Scale:	Plot scale: 1" (D SHEET)

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

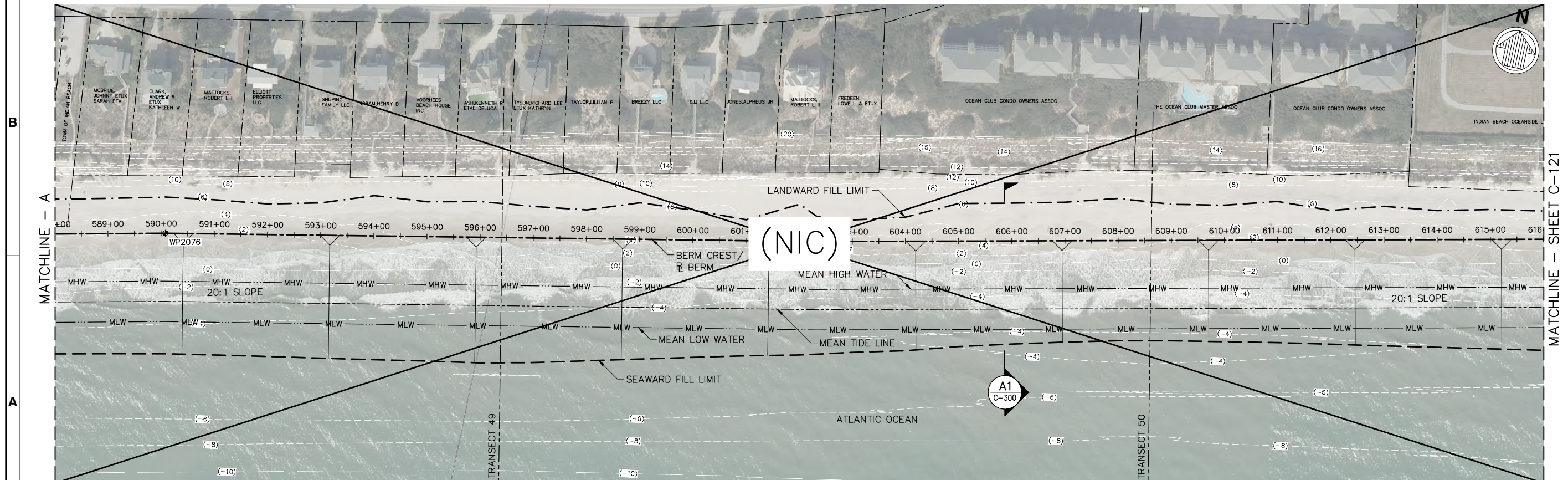
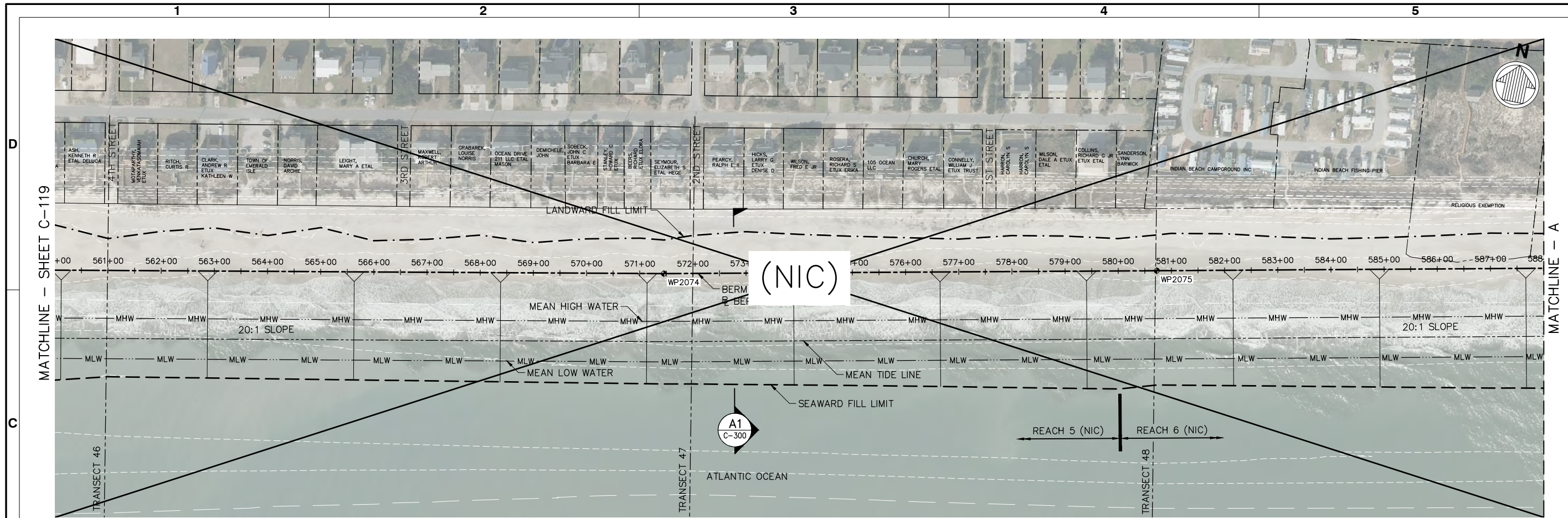
meffatt & nichol NC FIRM LICENSE No. F-0105

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

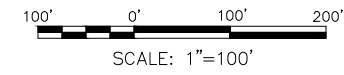


Sheet Reference No.
C-119
 Sheet 18 of 66

File: Q:\1RA\10611\0500_CAD\Active\10611 Bouge Banks 2020\1061100C-119; Plotted: 2/14/2020 10:29 AM by FORD, BRIAN; Saved: 8/16/2019 5:43 PM by BFCORP



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



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

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

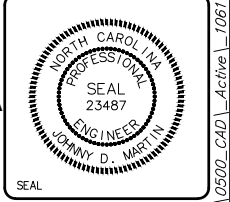
**BEACH RENOURISHMENT PLAN -
SHEET 11 OF 20**

Designed by:	NCY	Date:	AUGUST 2019
Drawn by:	BDF	MAN Project No.:	10611
Reviewed by:	JDM	Drawing code:	
Submitted by:	MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1" (0 SHEET)

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

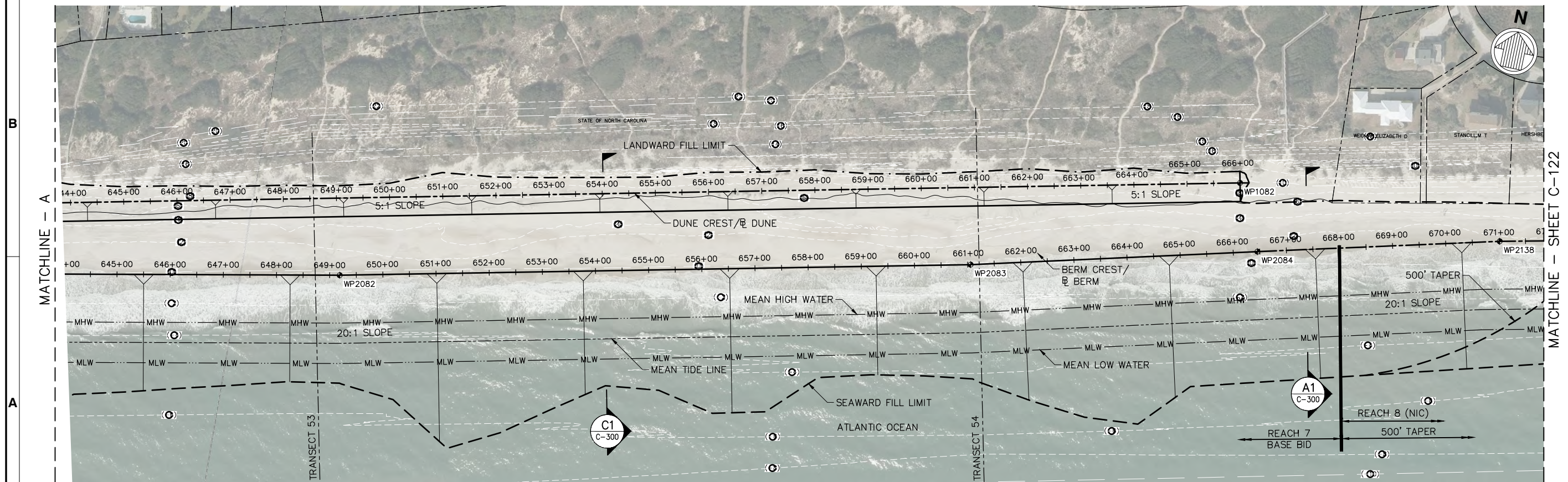
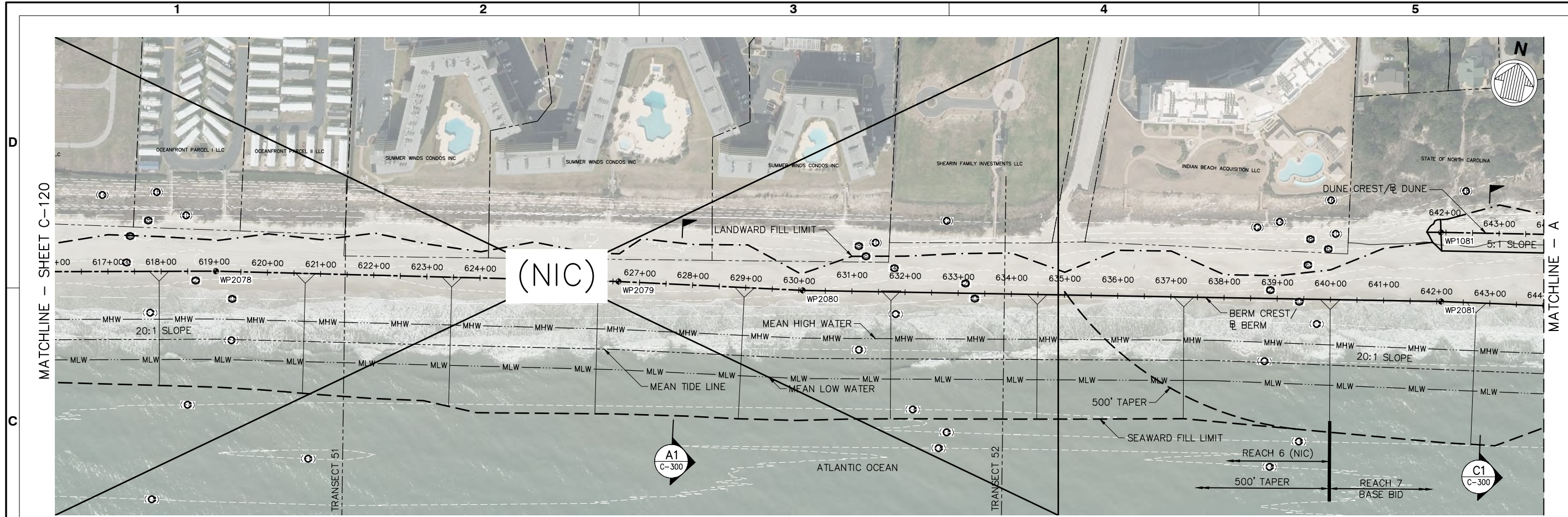
meffatt & nichol NC FIRM LICENSE No. F-0105

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

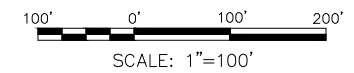


Sheet Reference No.
C-120
Sheet 19 of 66

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



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

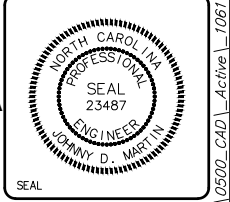
**POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA**

**BEACH RENOURISHMENT PLAN -
SHEET 12 OF 20**

Designed by: NCY	Drawn by: BDF	Checked by: SRM	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Date: JANUARY 2020	Rev. 1
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4626			NC FIRM LICENSE No. F-0105		M&N Project No. 10611	
Prepared for the Towns of EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH				Drawing code: 		
				Drawing Scale: 		
				Plot scale: 1" (0 SHEET)		

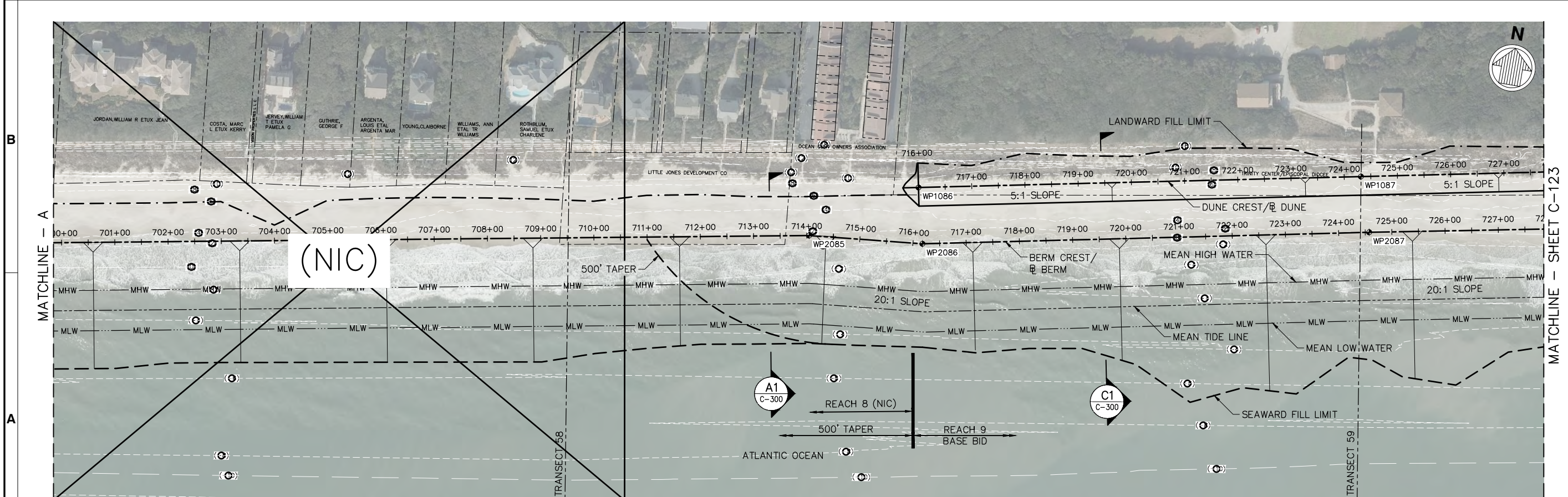
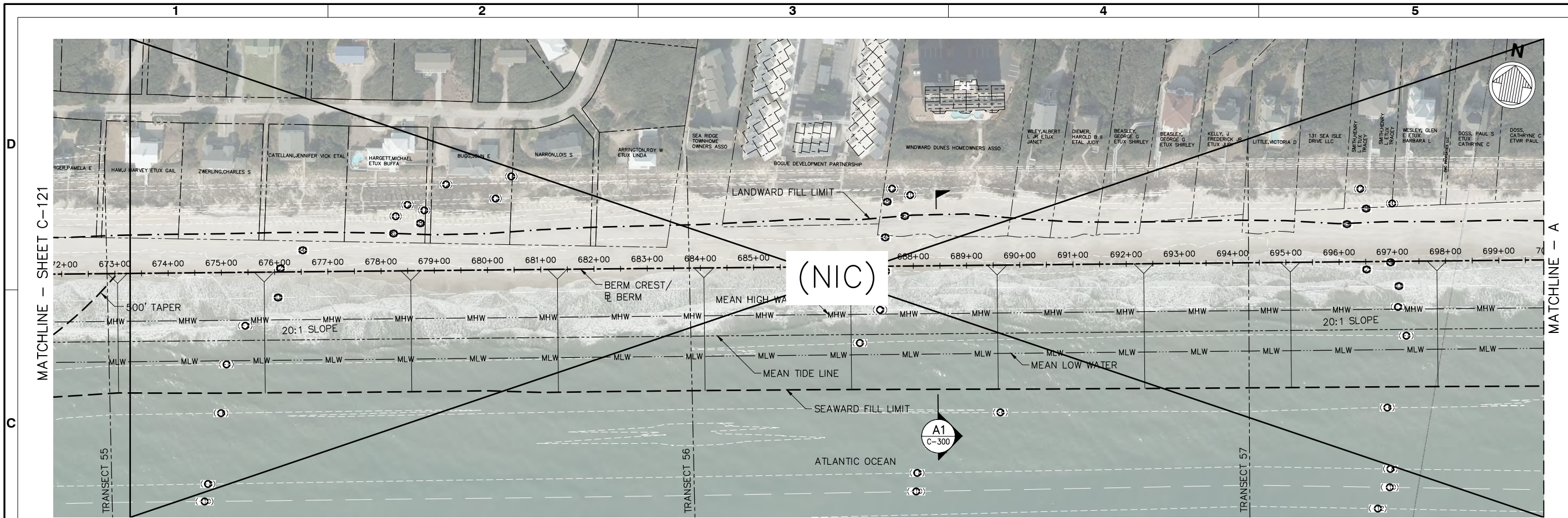
meffatt & nichol

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



Sheet Reference No.
C-121
Sheet 20 of 66

File: G:\RA\10611\0500_CAD\Active\10611 Bouge Banks 2020\1061100C-121; Plotted: 2/14/2020 10:29 AM by FORD, BRIAN; Saved: 2/14/2020 10:20 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.

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

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

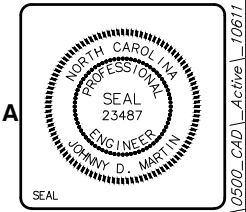
**BEACH RENOURISHMENT PLAN -
 SHEET 13 OF 20**

Designed by: NCV	Checked by: BDF	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL
Date: JANUARY 2020	MAN Project No. 10611	Drawing code:	Drawing Scale: Plot scale: 1" = 100'

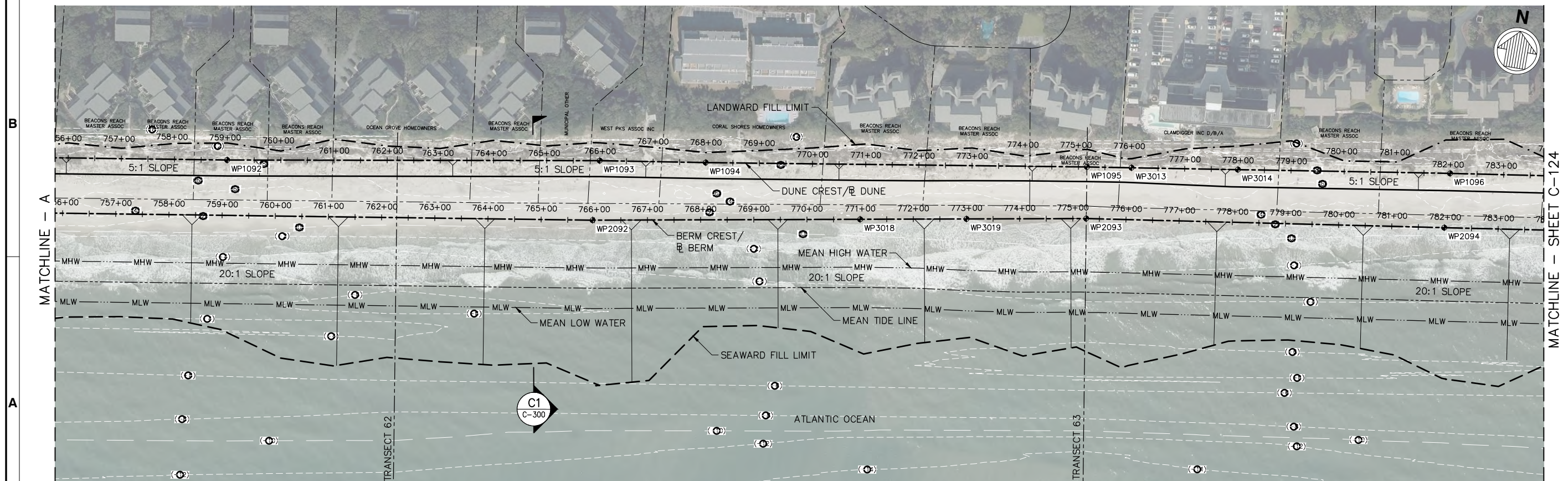
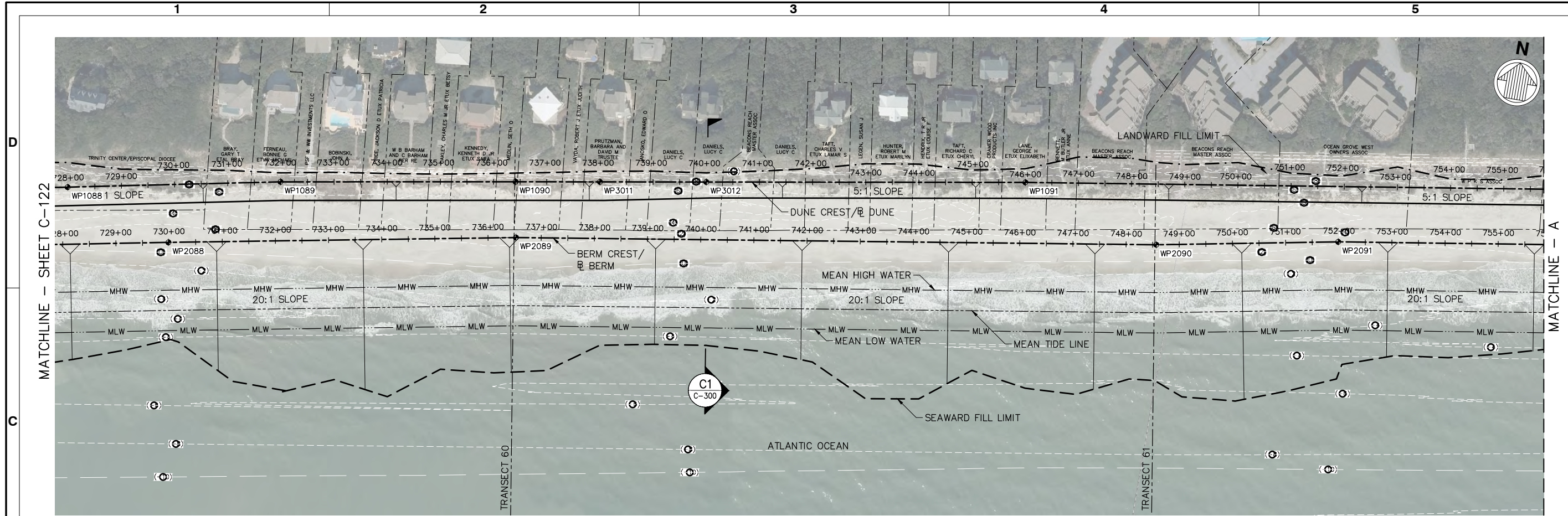
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

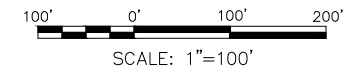
PREPARED FOR THE TOWNS OF
 EMERALD ISLE, INDIAN BEACH,
 PINE KNOLL SHORES, AND ATLANTIC BEACH



Sheet Reference No.
C-122
 Sheet 21 of 66



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



Rev.	Date	Description
1	02/14/20	JM
0	08/19/19	JM
0		

1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM
0			

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

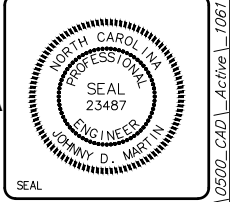
**BEACH RENOURISHMENT PLAN -
SHEET 14 OF 20**

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

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

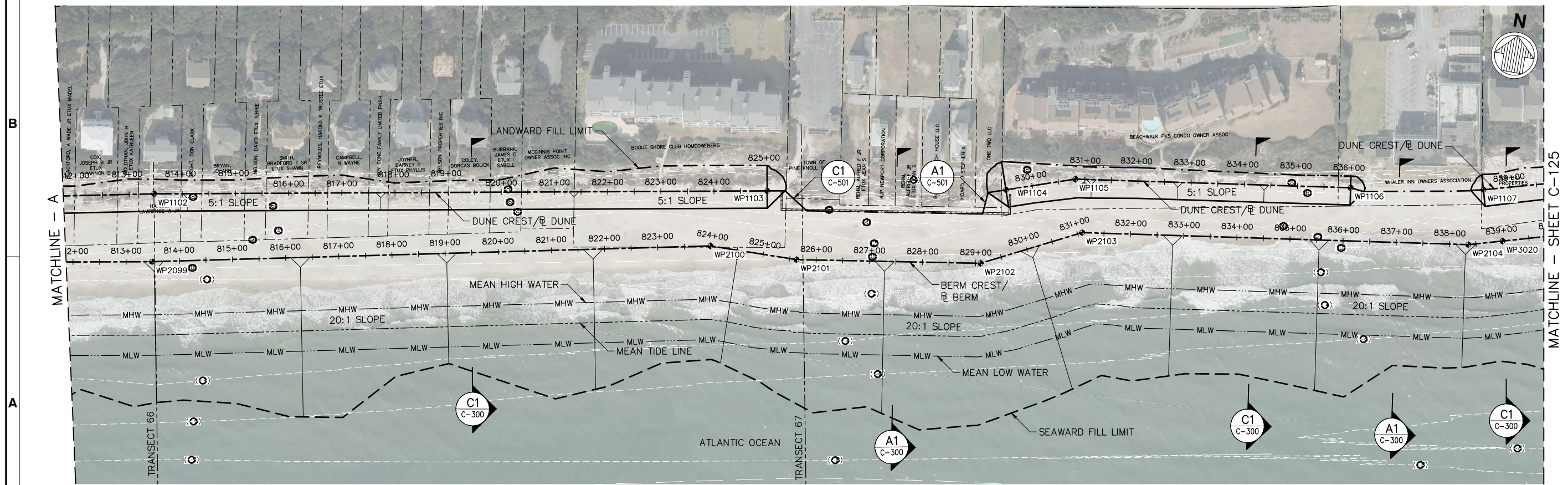
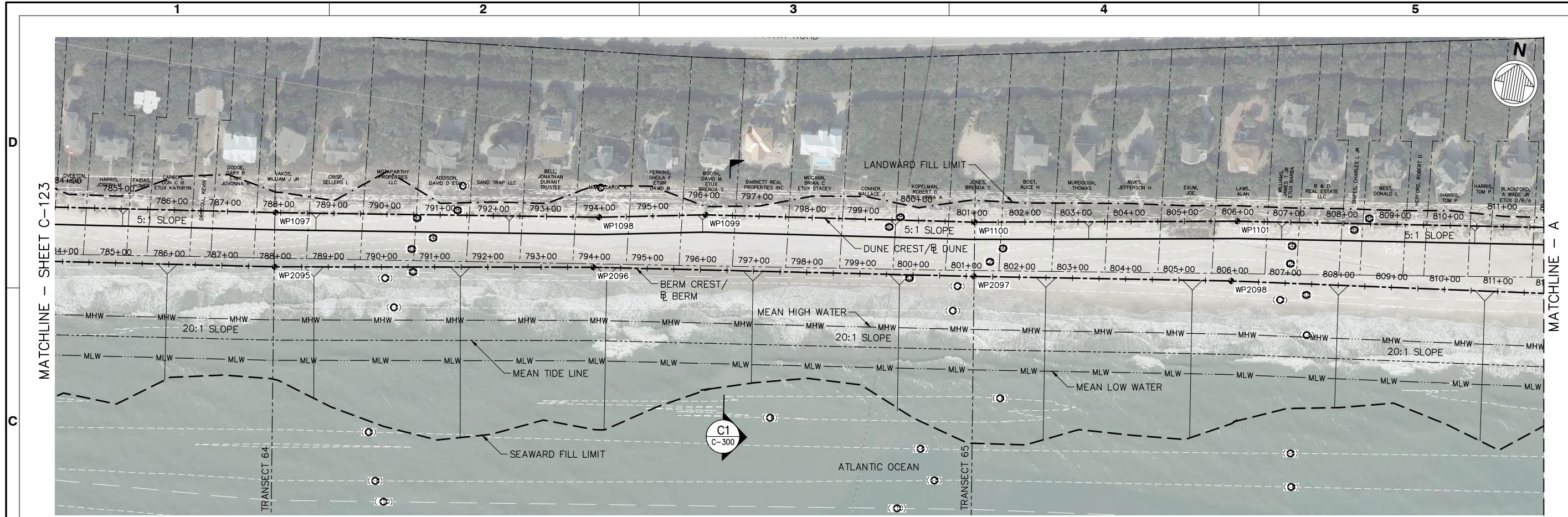
meffatt & nichol NC FIRM LICENSE No. F-0105

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

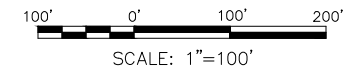


Sheet Reference No.
C-123
Sheet 22 of 66

File: Q:\RA\10611\0500_CAD\Active\10611\061100C-123; Plotted: 2/14/2020 10:30 AM by FORD, BRIAN; Saved: 2/14/2020 10:18 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.



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

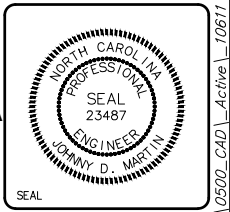
BEACH RENOURISHMENT PLAN -
 SHEET 15 OF 20

Designed by:	NCV	Date:	JANUARY 2020
Drawn by:	BDF	MAN Project No.:	10611
Reviewed by:	JDM	Drawing code:	
Submitted by:	MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1" = 100'

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

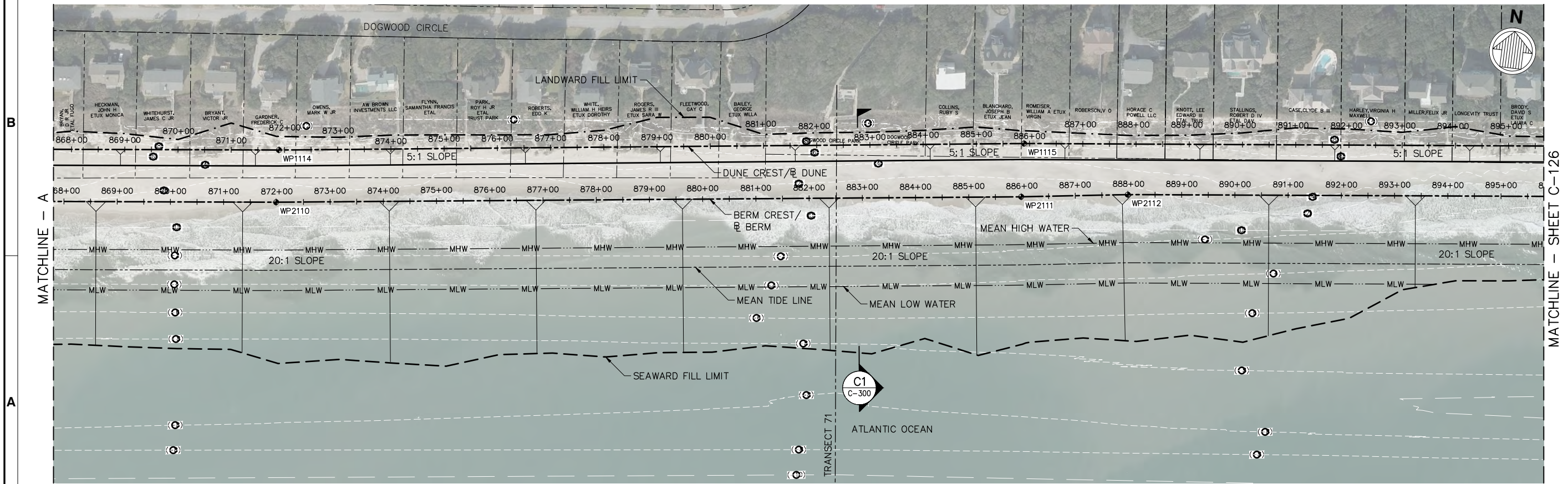
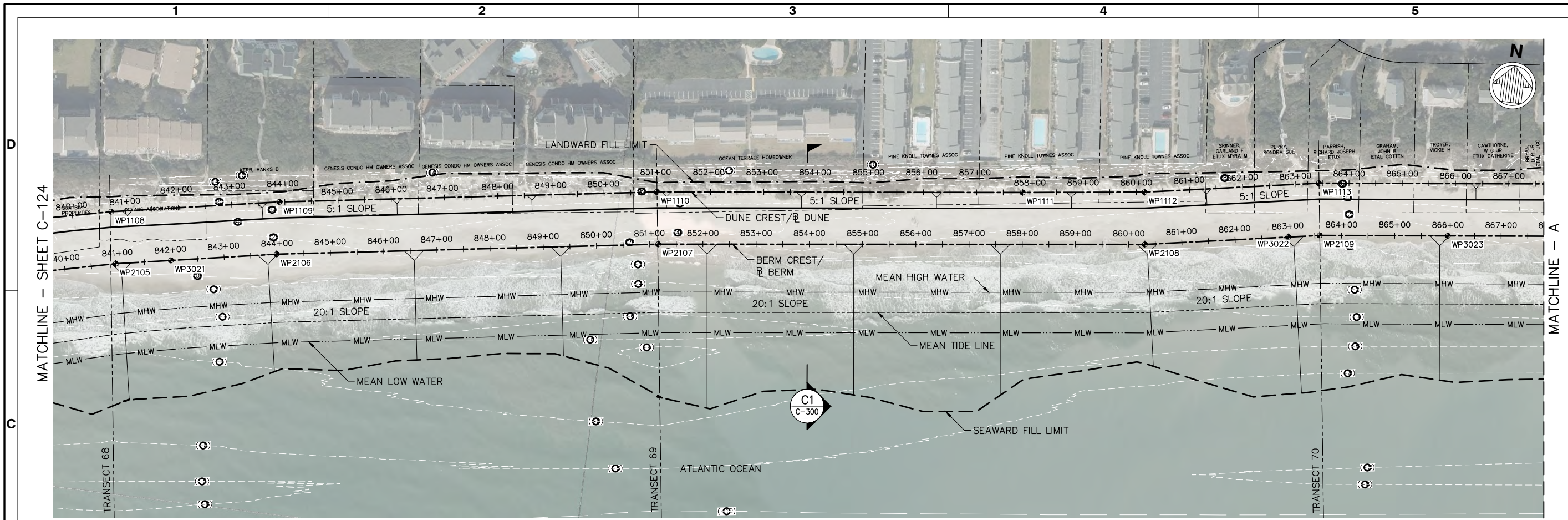
meffatt & nichol

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

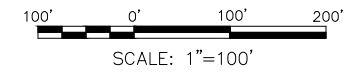


Sheet Reference No.
C-124
 Sheet 23 of 66

File: Q:\RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-124; Plotted: 2/14/2020 10:31 AM by FORD, BRIAN; Saved: 2/14/2020 10:17 AM by BFOR



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



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

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

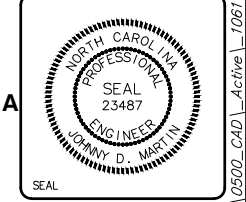
**BEACH RENOURISHMENT PLAN -
SHEET 16 OF 20**

Designed by:	NCV	Date:	JANUARY 2020	Rev.	1
Drawn by:	BDF	MAN Project No.:	10611		
Reviewed by:	JDM	Drawing code:			
Submitted by:	MOFFATT & NICHOL	Drawing Scale:			
		Plot scale: 1" = 100'			

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

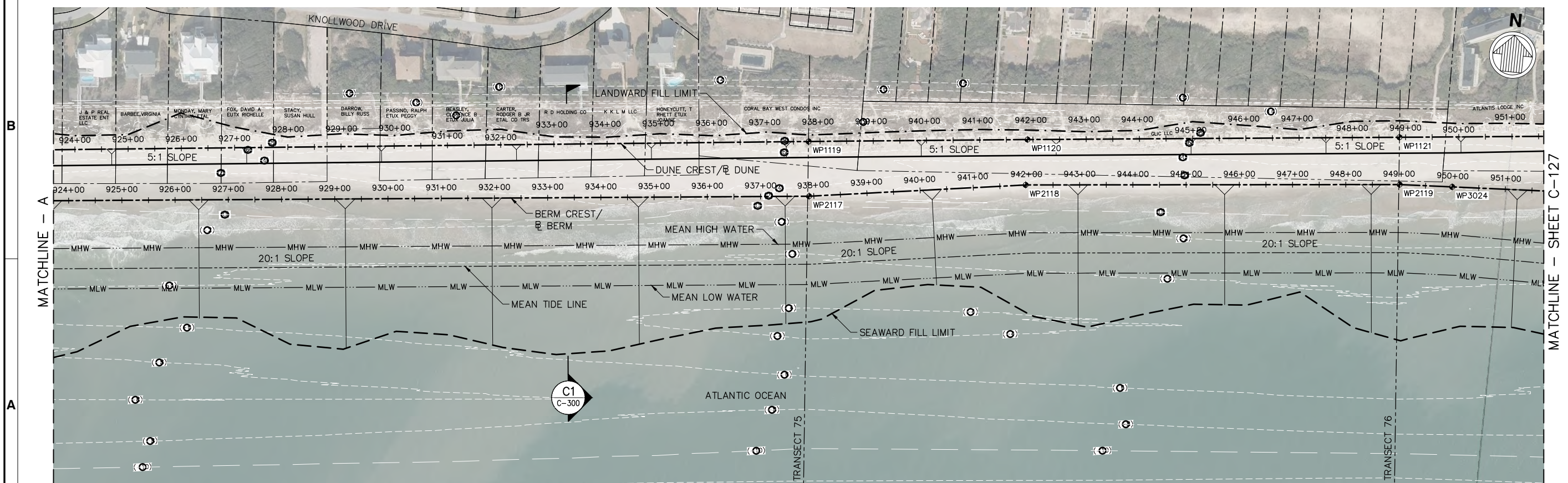
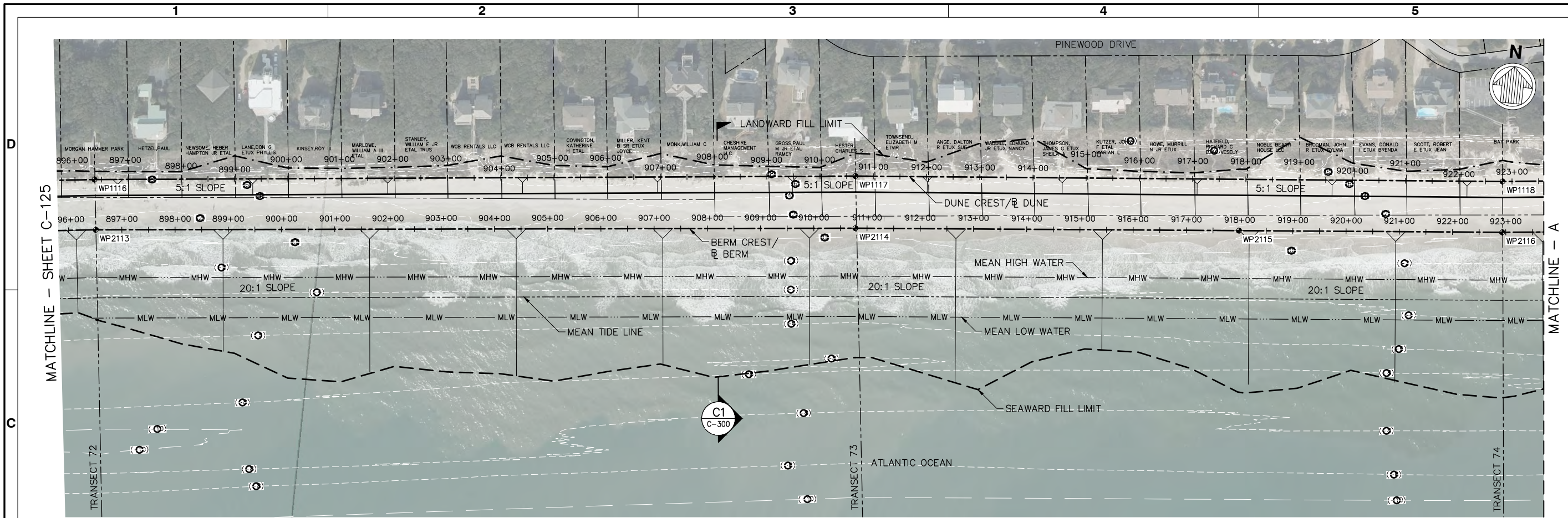
NC FIRM LICENSE No. F-0105

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

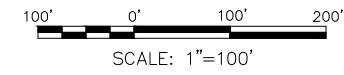


Sheet Reference No.
C-125
Sheet 24 of 66

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



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

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

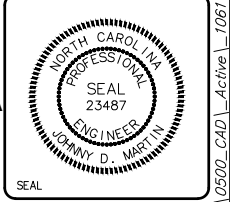
**BEACH RENOURISHMENT PLAN -
SHEET 17 OF 20**

Designed by: NCY	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: As Shown	Plot scale: 1" = 100'

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

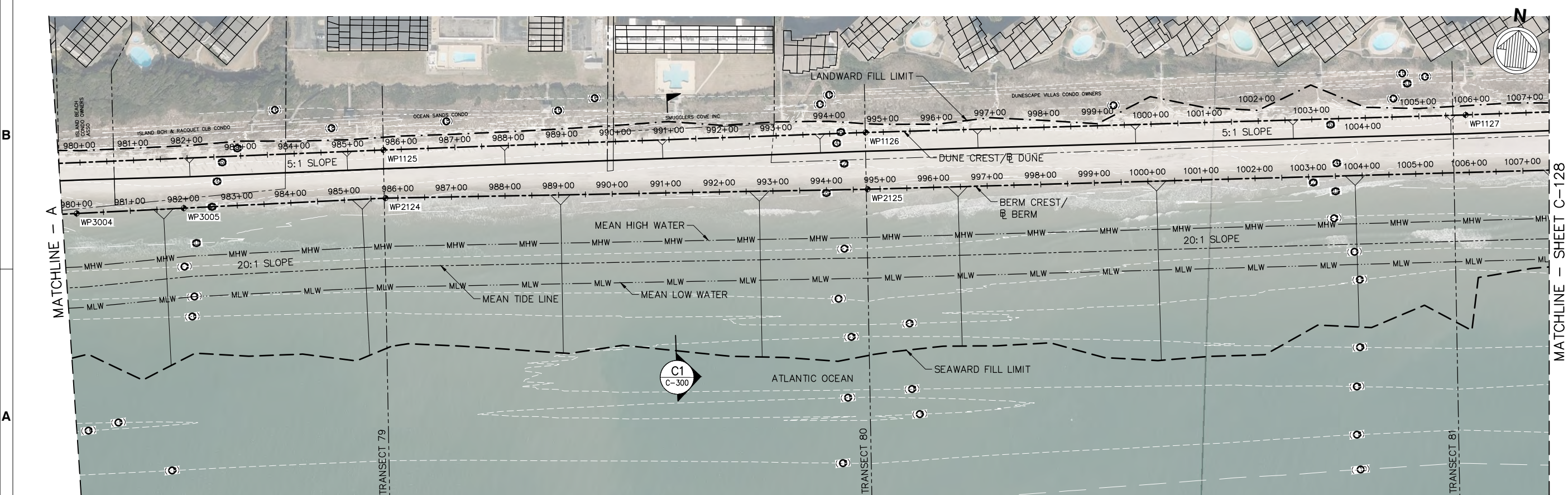
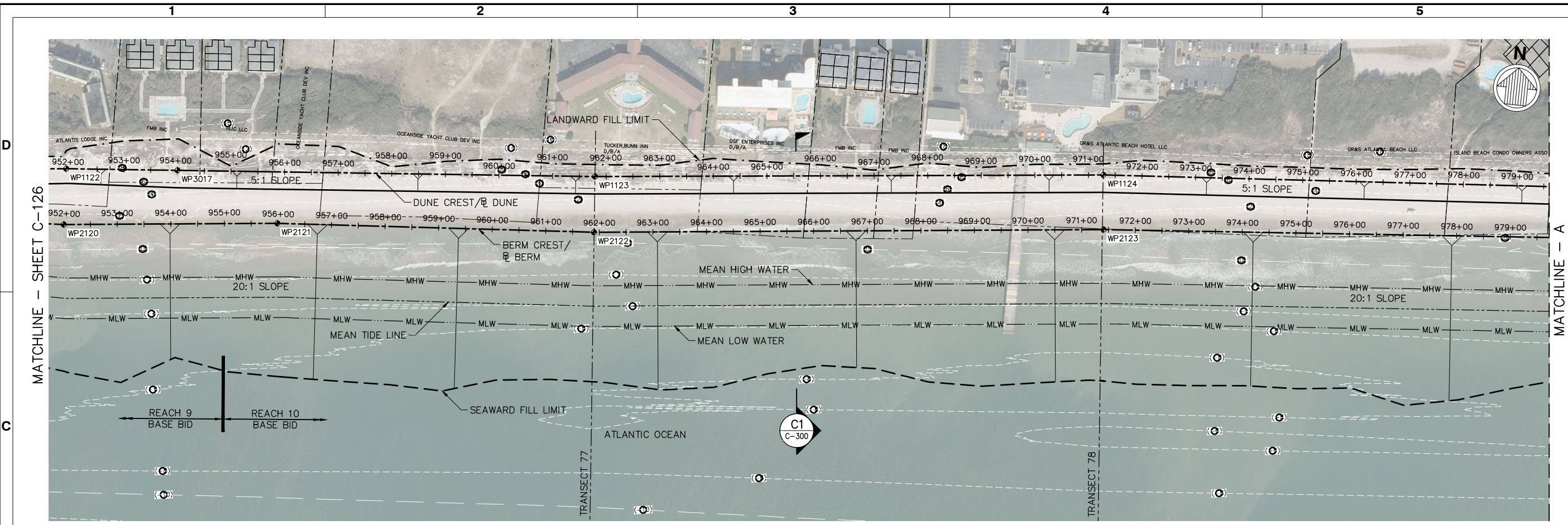
meffatt & nichol NC FIRM LICENSE No. F-0105

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

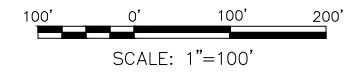


Sheet Reference No.
C-126
Sheet 25 of 66

File: G:\1\RA\10611\10500_CAD_Active\10611 Bouge Banks 2020\1061100C-126; Plotted: 2/14/2020 10:31 AM by FORD, BRIAN; Saved: 2/14/2020 10:13 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.



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

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

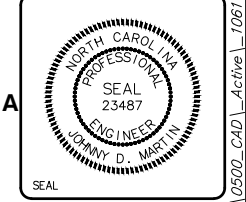
**BEACH RENOURISHMENT PLAN -
 SHEET 18 OF 20**

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

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

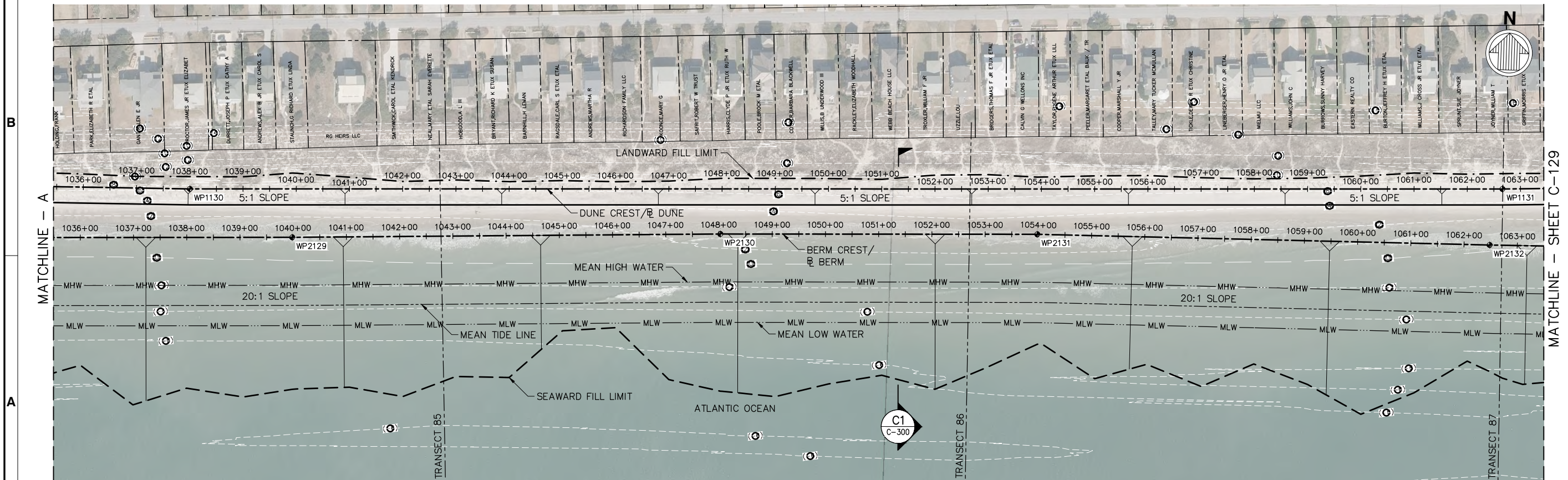
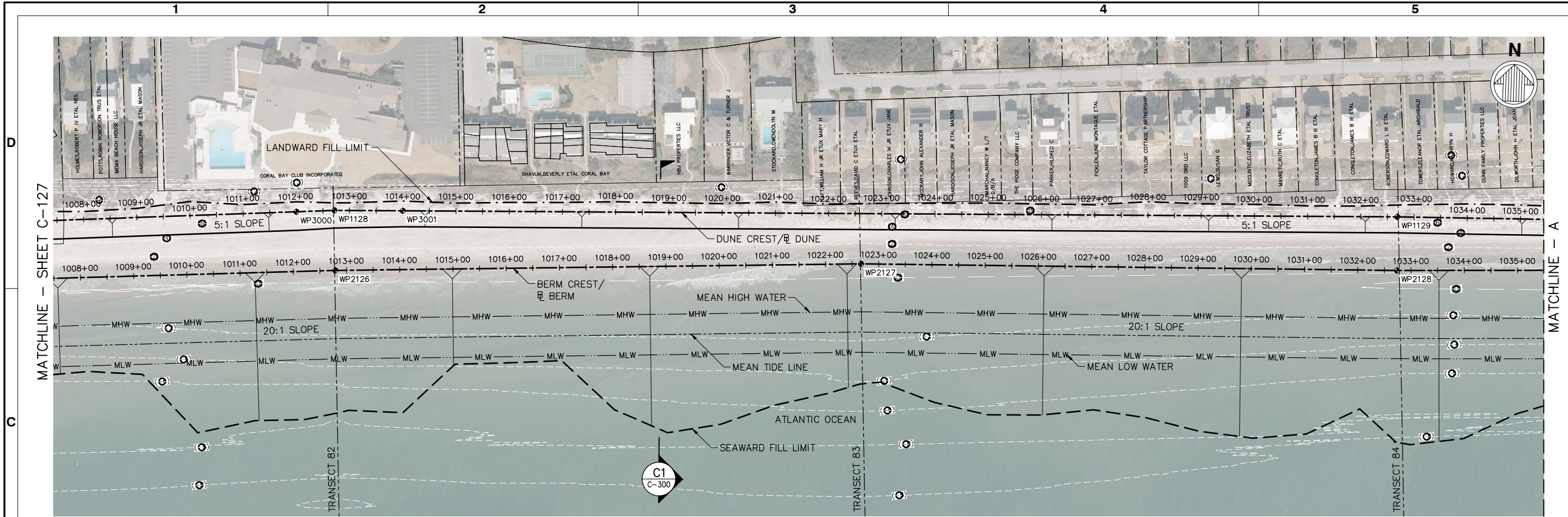
moffatt & nichol NC FIRM LICENSE No. F-0105

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

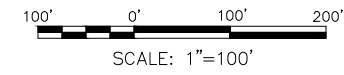


Sheet Reference No.
C-127
 Sheet 26 of 66

File: G:\1RA\10611\10500_CAD_Active\10611 Bouge Banks 2020\1061100C-127; Plotted: 2/14/2020 10:32 AM by FORD, BRIAN; Saved: 2/11/2020 5:51 PM by BFORO



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



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

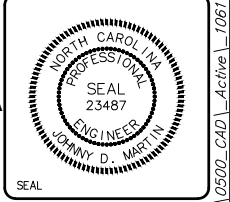
**BEACH RENOURISHMENT PLAN -
SHEET 19 OF 20**

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

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

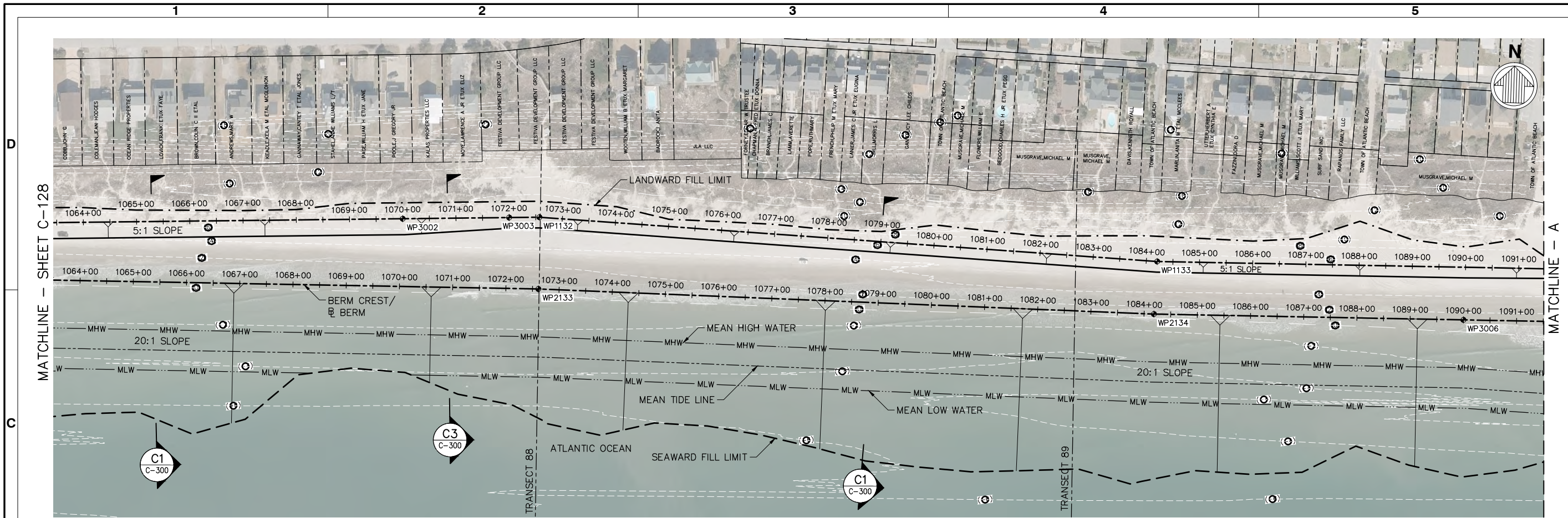
meffatt & nichol NC FIRM LICENSE No. F-0105

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

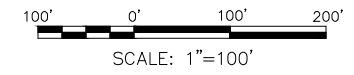


Sheet Reference No.
C-128
Sheet 27 of 66

File: G:\1RA\10611\10500_CAD_Active\10611 Bouge Banks 2020\1061100C-128; Plotted: 2/14/2020 10:32 AM by FORD, BRIAN; Saved: 2/11/2020 5:50 PM by BFFORD



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



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

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

**BEACH RENOURISHMENT PLAN -
SHEET 28 OF 20**

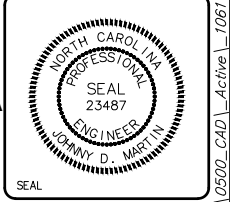
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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

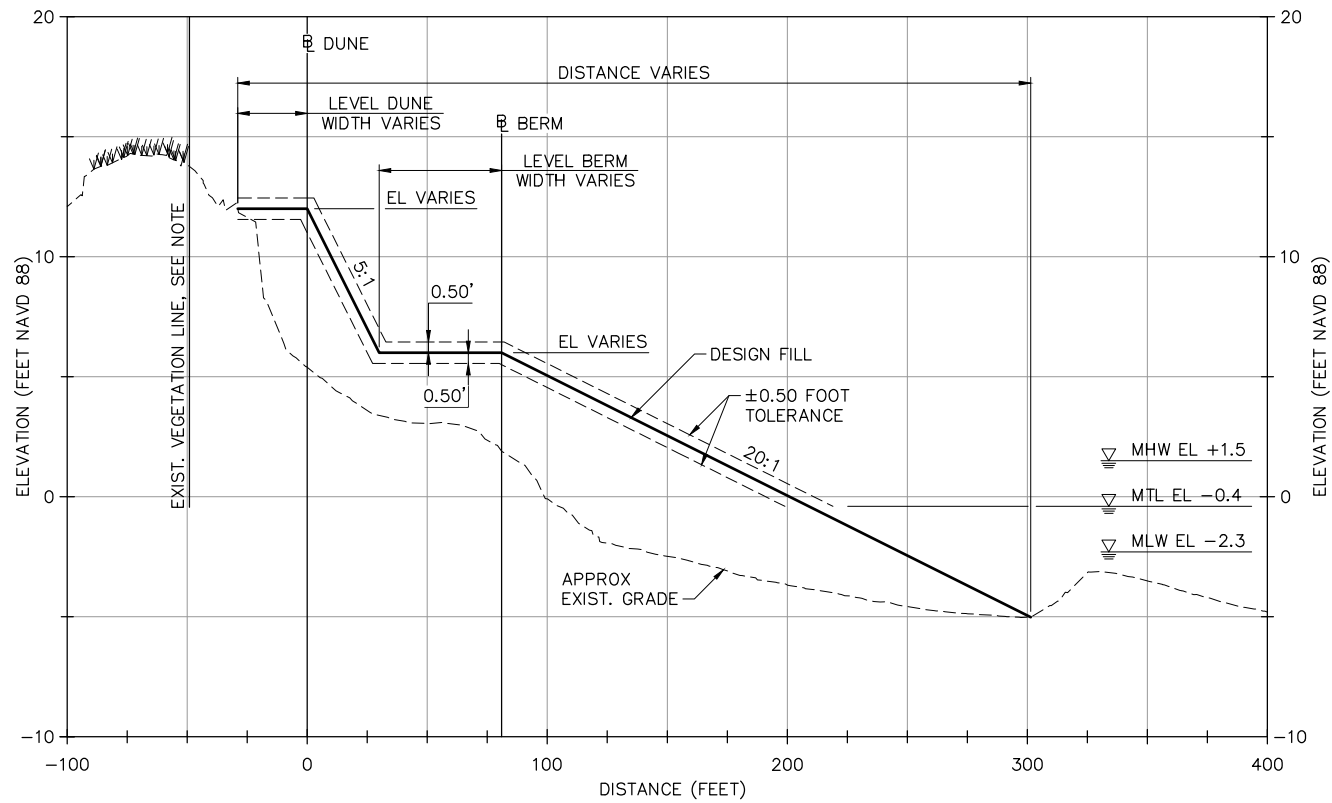
Designed by: NCV
Dwn by: BDF
Ckd by: SRM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL

Date: JANUARY, 2020
MAN Project No. 10611
Drawing code:
Drawing Scale:
Plot scale: 1" (D SHEET)



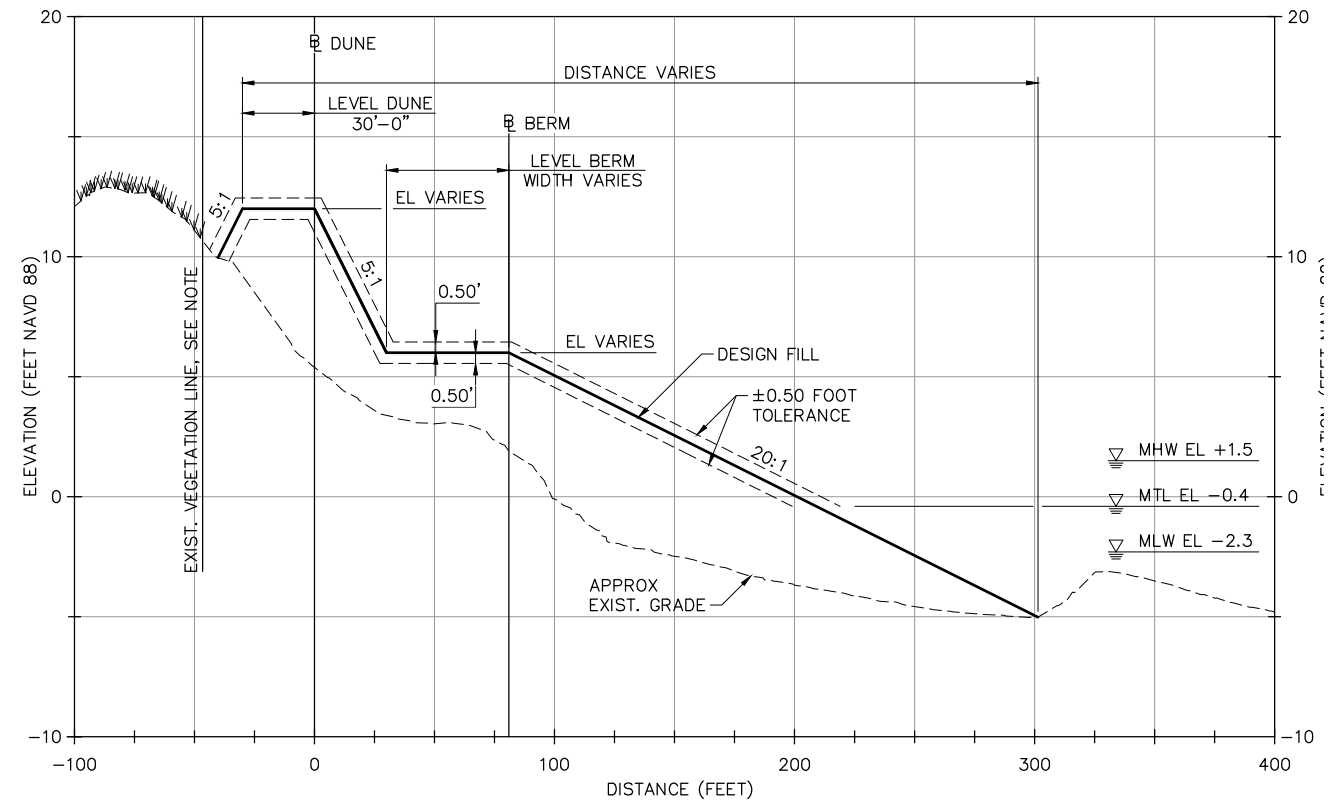
Sheet Reference No.
C-129
Sheet 28 of 66

File: G:\1RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-129; Plotted: 2/14/2020 10:32 AM by FORD, BRIAN; Saved: 2/11/2020 5:50 PM by BFFORD



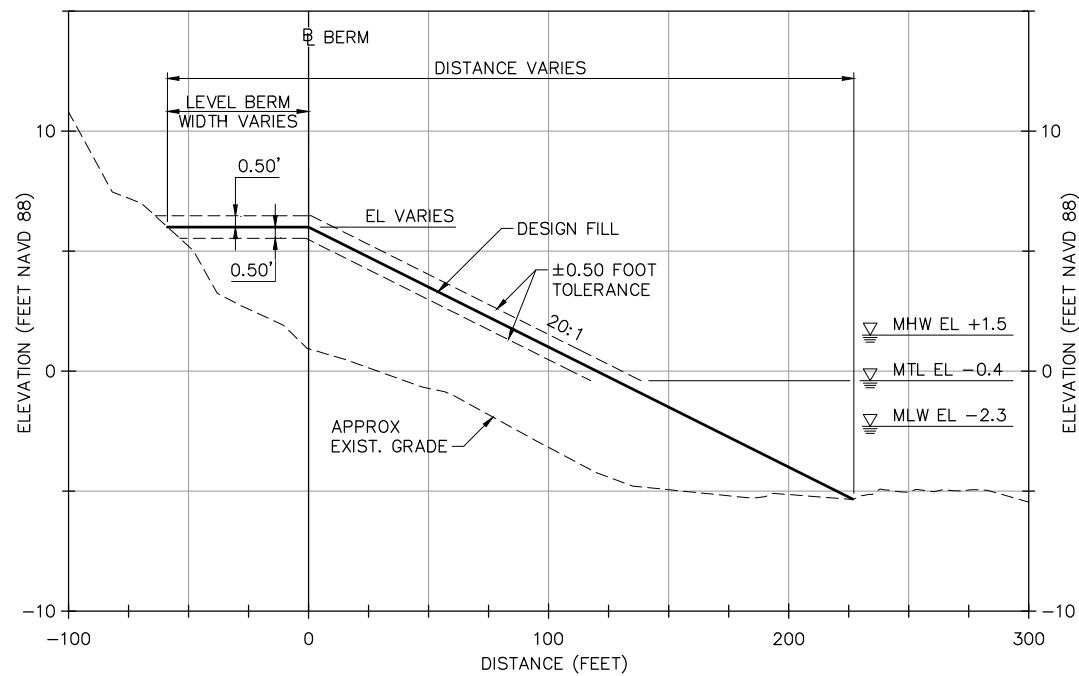
NOTE:
FIELD FIT THE LANDWARD DUNE CREST TIE IN, IF ELEVATION OF THE EXISTING VEGETATION LINE IS HIGHER THAN THE FINAL ELEVATION OF THE DUNE CREST DESIGN, THE DUNE CREST WILL BE CONSTRUCTED TO TIE IN AT THE ELEVATION OF THE CONSTRUCTED DUNE CREST. IF ELEVATION OF THE EXISTING VEGETATION LINE IS LOWER 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 LEVEL DUNE BEACH NOURISHMENT FILL TOLERANCE SECTION
C-300 SCALE: 1"=40'

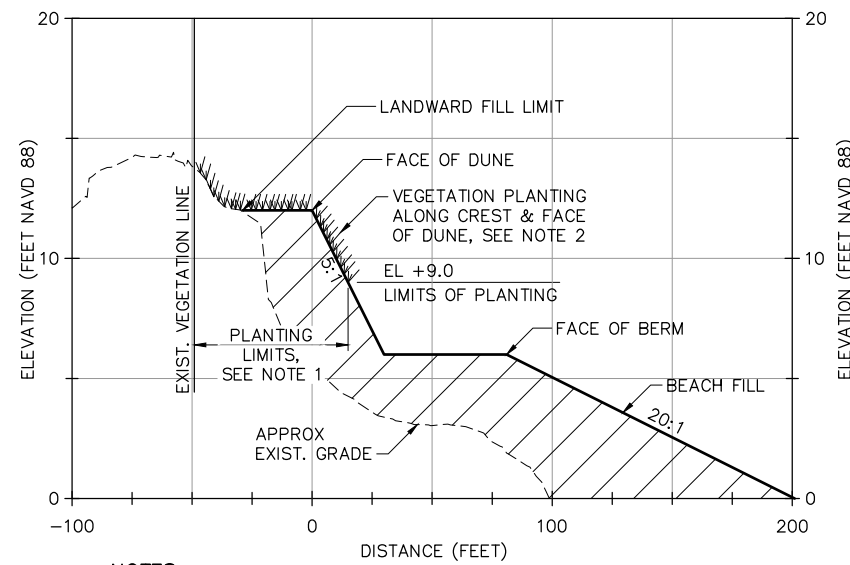


NOTE:
FIELD FIT THE LANDWARD DUNE CREST TIE IN, IF ELEVATION OF THE EXISTING VEGETATION LINE IS HIGHER THAN THE FINAL ELEVATION OF THE DUNE CREST DESIGN, THE DUNE CREST WILL BE CONSTRUCTED TO TIE IN AT THE ELEVATION OF THE CONSTRUCTED DUNE CREST. IF ELEVATION OF THE EXISTING VEGETATION LINE IS LOWER 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 LEVEL DUNE WITH BACK SLOPE NOURISHMENT FILL TOLERANCE SECTION
C-300 SCALE: 1"=40'

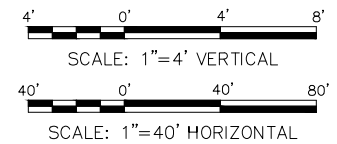


A1 BERM BEACH NOURISHMENT FILL TOLERANCE SECTION
C-300 SCALE: 1"=40'



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



Rev.	Date	Description
0	08/19/19	JM

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

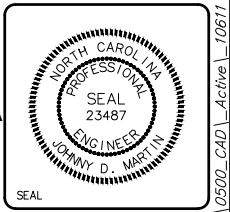
BEACH NOURISHMENT TYPICAL
SECTIONS

Designed by:	NCV	Checked by:	SRM
Dwn by:	BDF	Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1:1 (D SHEET)

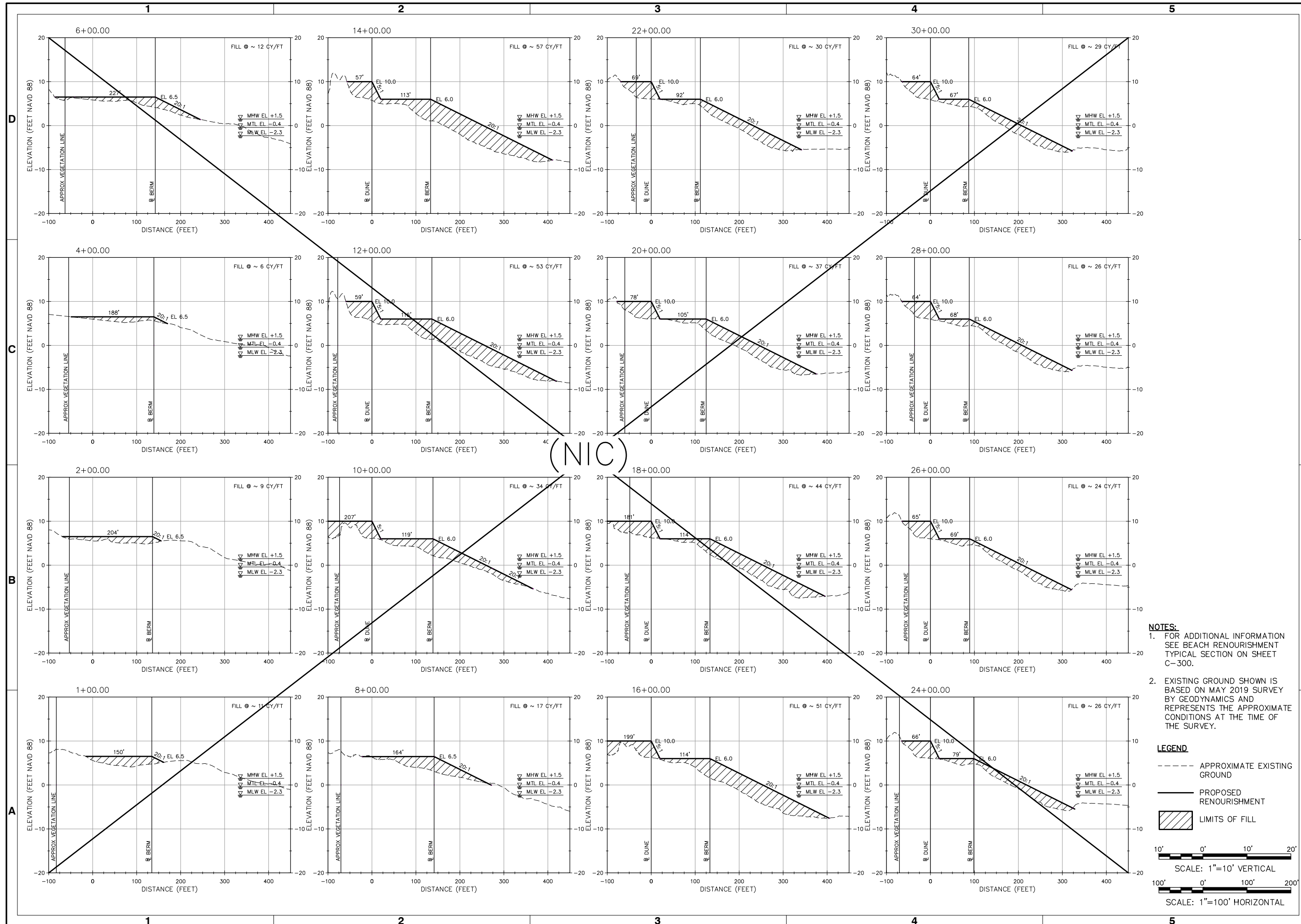
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



Sheet Reference No.
C-300
Sheet 29 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

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

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

Rev.	Date	Description
0	08/19/19	JM

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

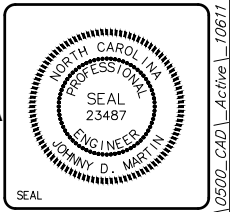
**RENOURISHMENT SECTIONS
 SHEET 1 OF 35**

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

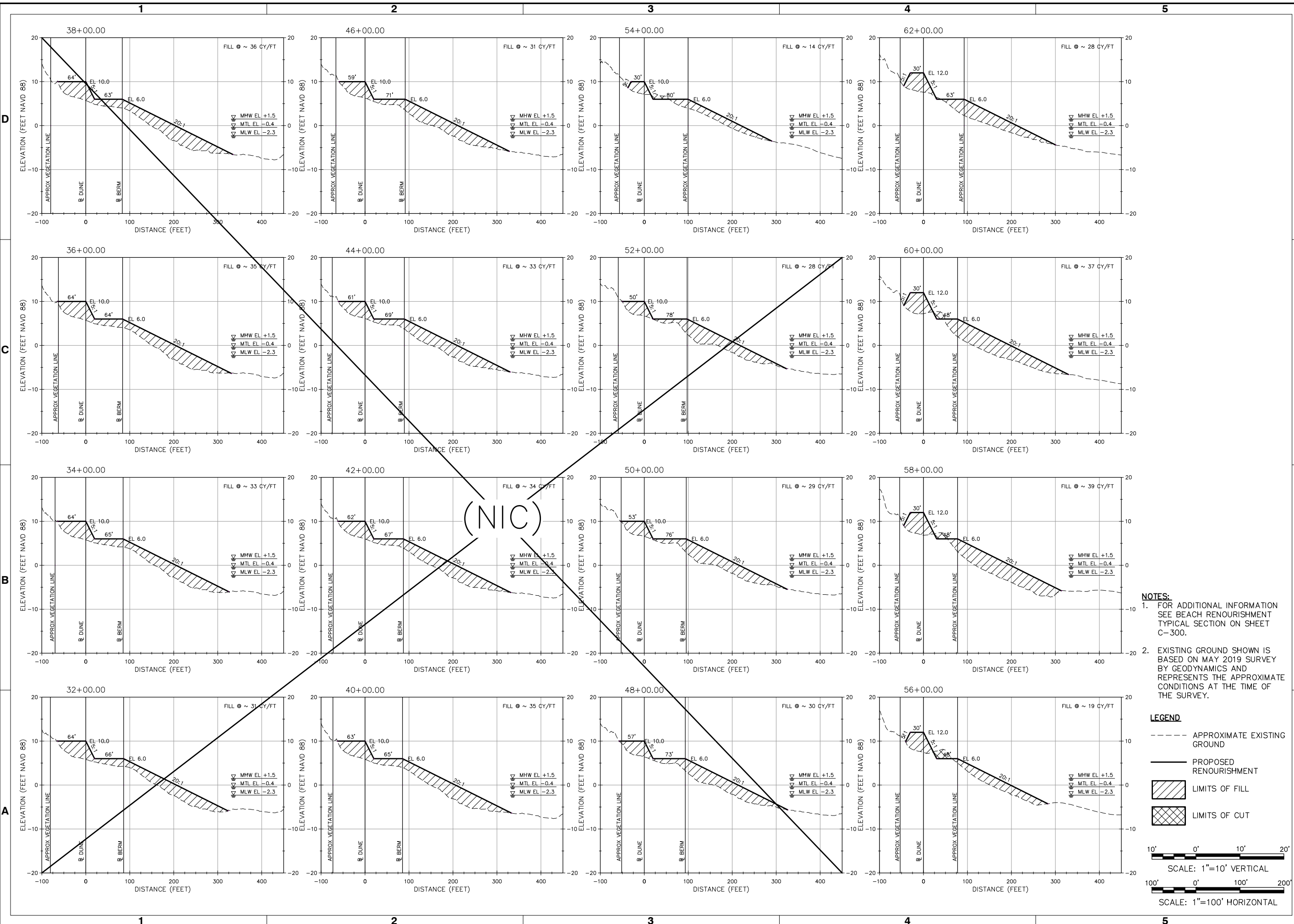
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1RA\10611\10500_CAD_Active\10611 Bouge Banks 2020\1061100C-301; Plotted: 2/14/2020 10:32 AM by FORD, BRIAN; Saved: 8/16/2019 5:50 PM by BRFORD



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

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

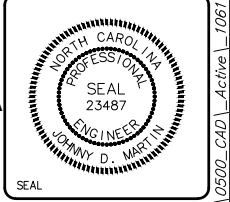
**RENOURISHMENT SECTIONS
SHEET 2 OF 35**

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

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



NOTES:

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

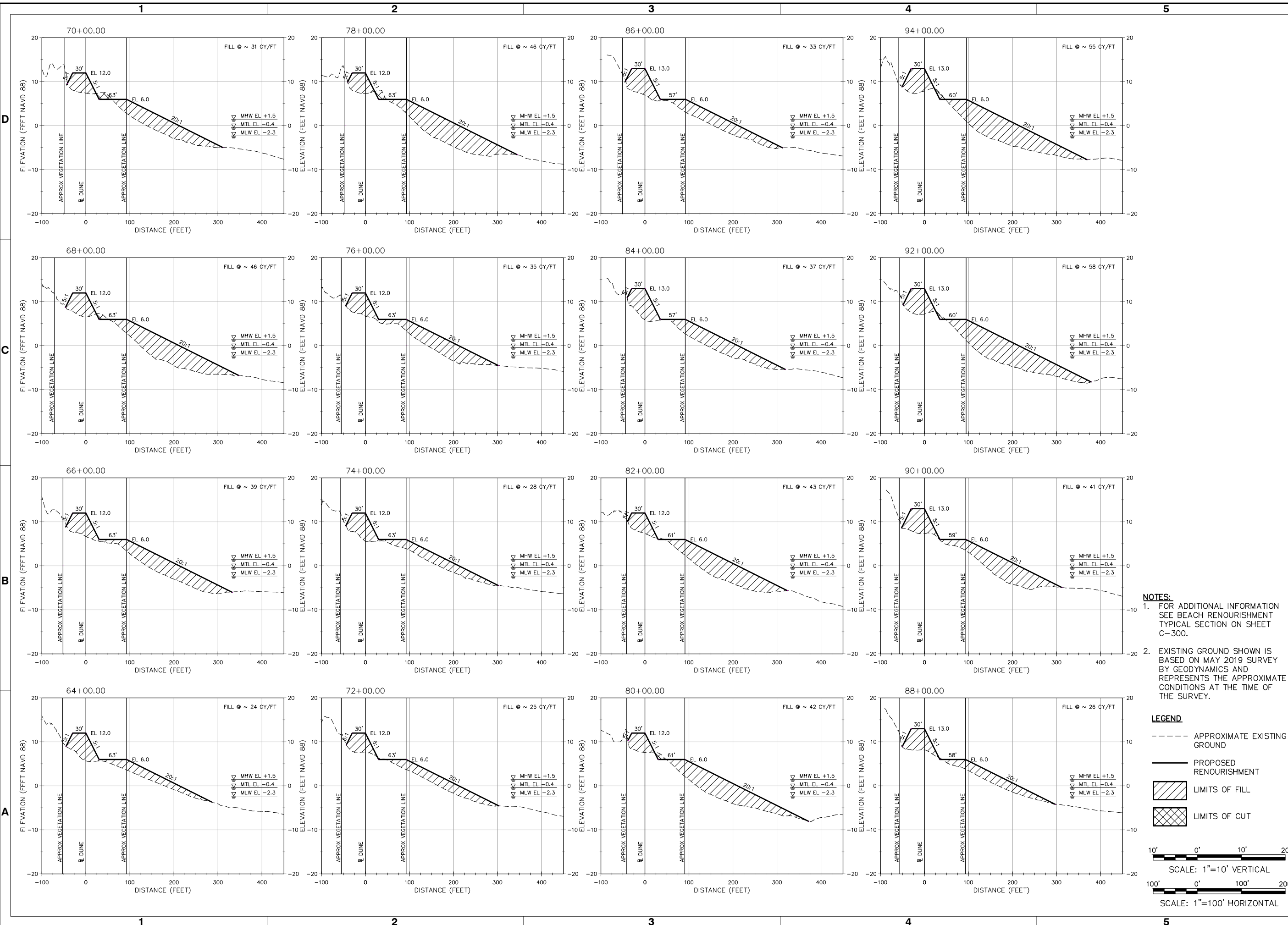
LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- [Hatched Box] LIMITS OF FILL
- [Cross-hatched Box] LIMITS OF CUT

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

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

File: G:\1RA\10611\10500_CAD_Active\10611 Bouge Banks 2020\1061100C-302; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 2/14/2020 9:48 AM by BFOR



NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

1" = 10' VERTICAL
1" = 100' HORIZONTAL

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

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

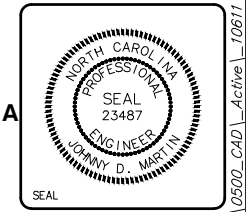
**RENOURISHMENT SECTIONS
SHEET 3 OF 35**

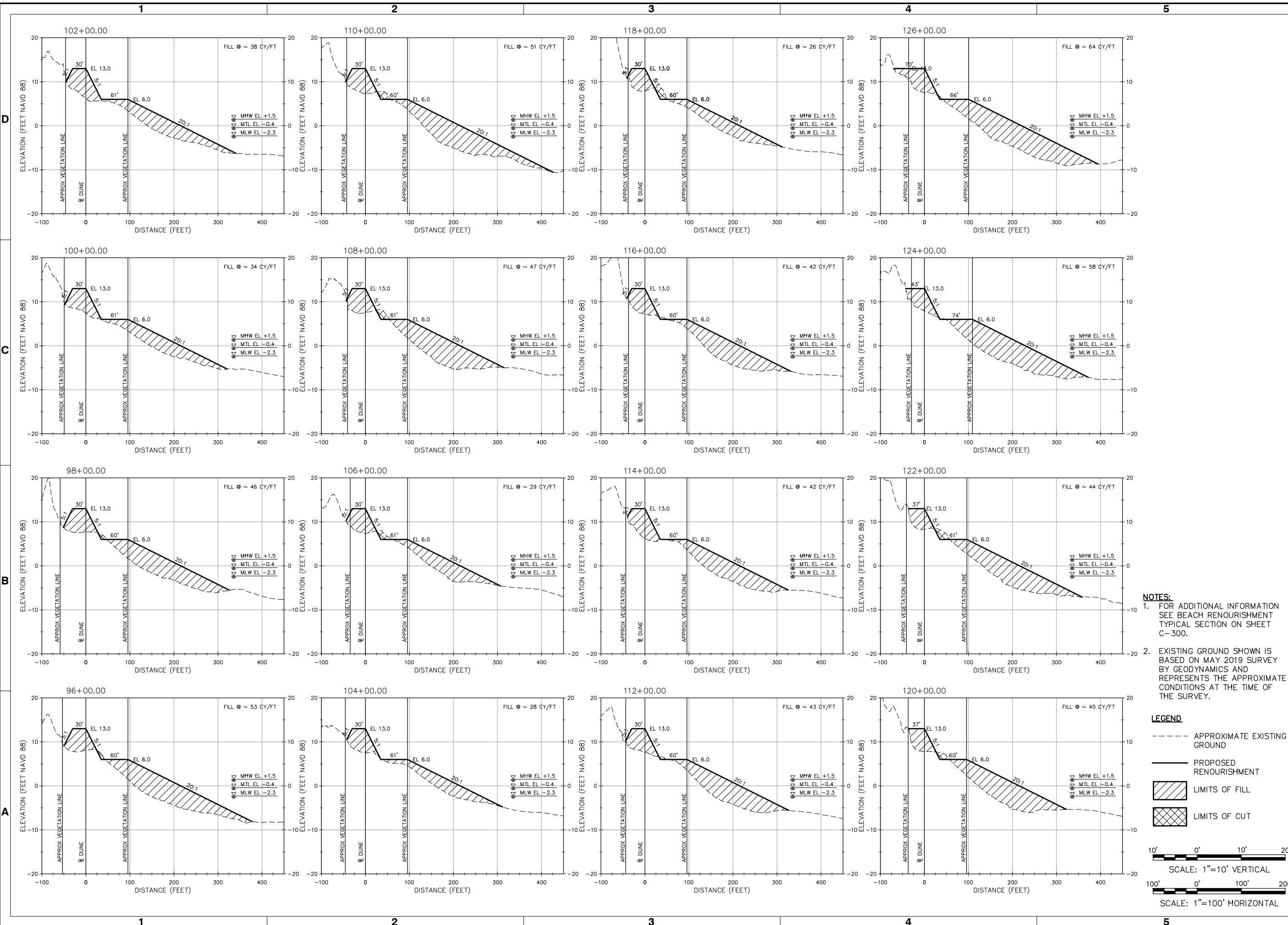
Designed by: NCY	Checked by: BDF	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019	M&N Project No. 10611	Drawing code: SRM	Drawing Scale: As Shown
Plot scale: 1" = 10' (SEE SHEET)			

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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





NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

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

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

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

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

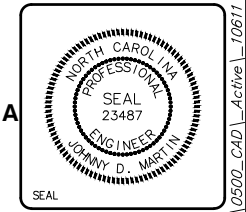
**RENOURISHMENT SECTIONS
SHEET 4 OF 35**

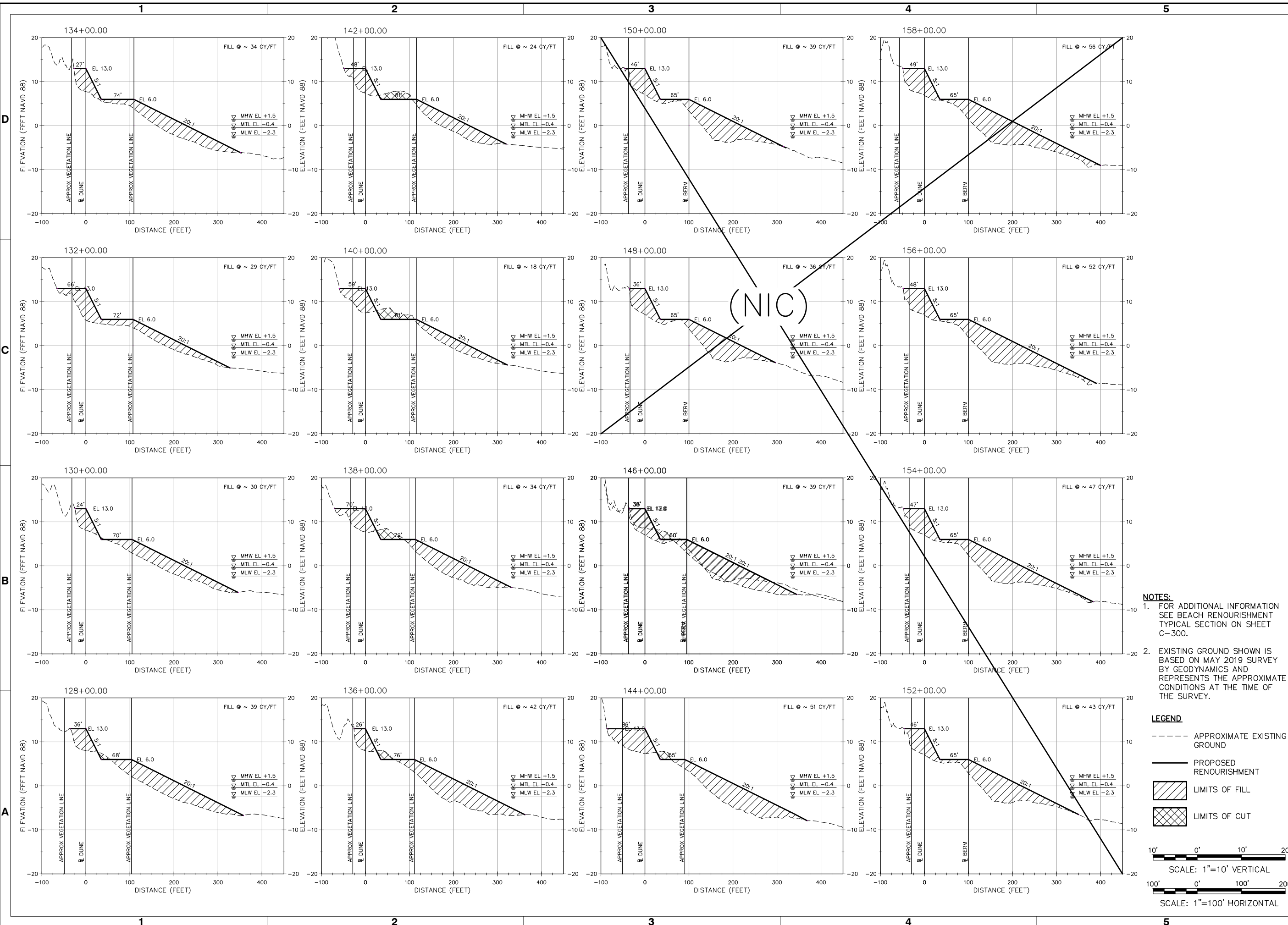
Designed by: NCY	Drawn by: BDF	Checked by: SRM	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Plot scale: 1:1 (D SHEET)
Date: AUGUST 2019	M&N Project No. 10611	Drawing code:	Drawing Scale:		

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

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





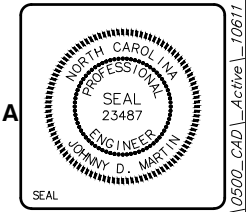
Rev.	1	Date	AUGUST 2019
Design by:	NCY	Drawn by:	BDF
Checked by:	SRM	Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL	Plot scale:	1:1 (D SHEET)
M&N Project No.	10611	Drawing code:	

**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	NC FIRM LICENSE No. F-0105
--------------------------------------------------------------------------------	----------------------------

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



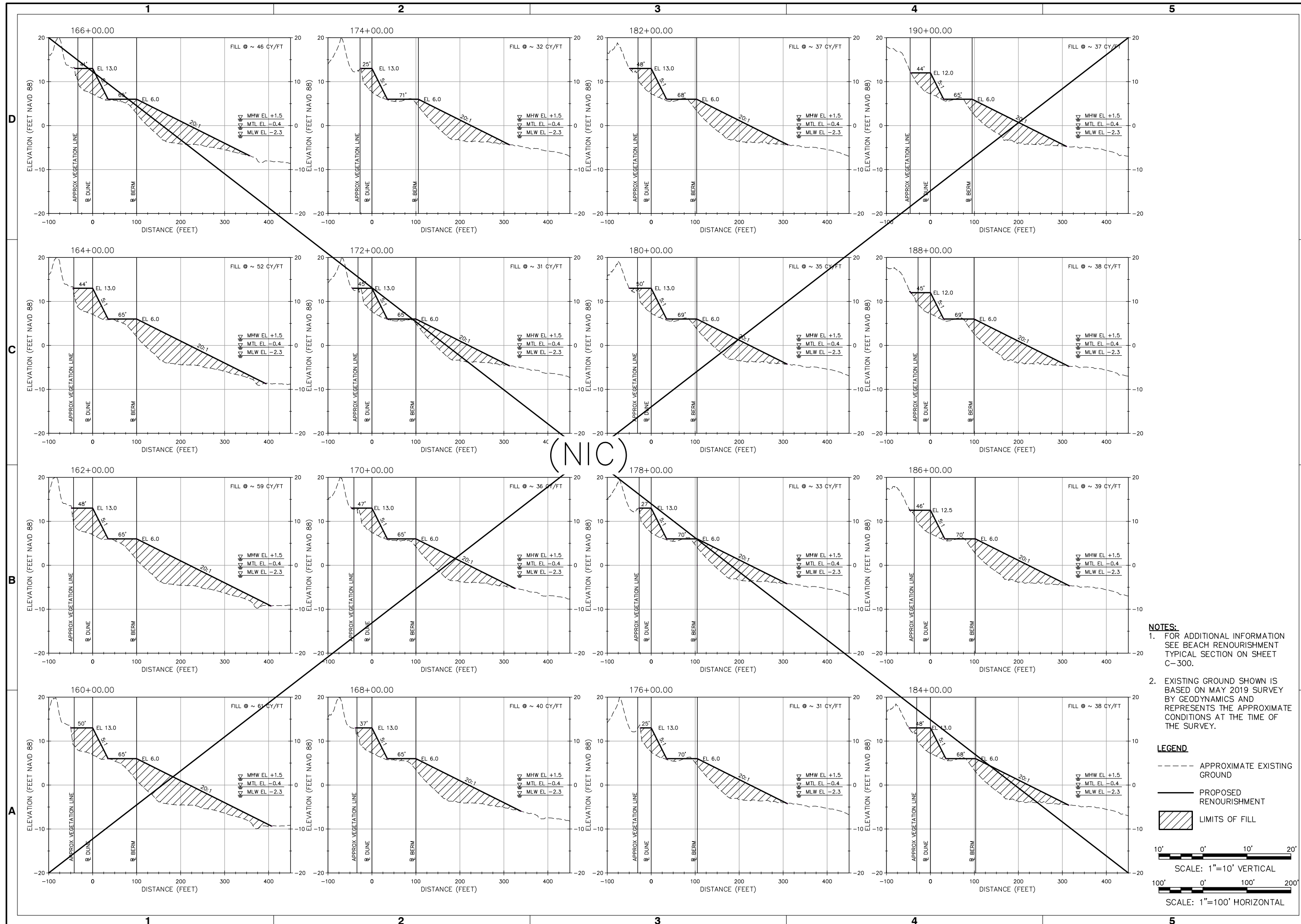
Sheet Reference No.
C-305
Sheet 34 of 66

- NOTES:**
- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
 - 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
- [Diagonal Hatching] LIMITS OF FILL
- [Cross-hatching] LIMITS OF CUT

1"=10' VERTICAL
1"=100' HORIZONTAL



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

Rev.	Date	Description
0	08/19/19	JM

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

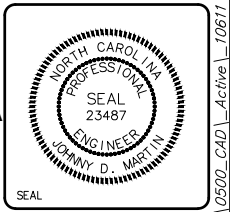
**RENOURISHMENT SECTIONS
 SHEET 6 OF 35**

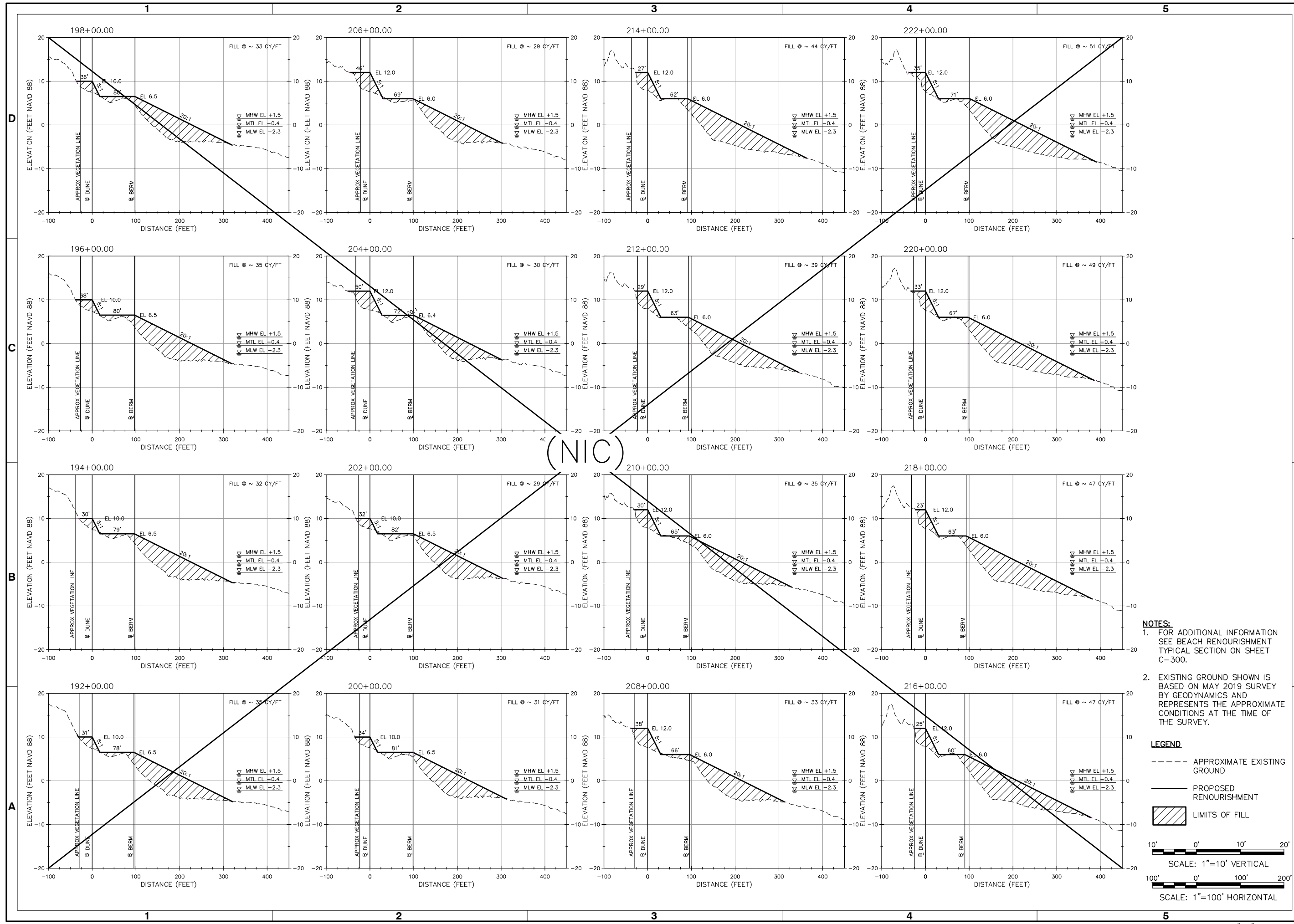
Designed by: NCY	Date: AUGUST 2019	MAN Project No. 10611	Drawing code:	Drawing Scale: As Shown	Plot scale: 1:1 (D SHEET)
Dwn by: BDF	Chk by: SRM	Submitted by: JDM	Submitted by: MOFFATT & NICHOIL		

4700 FALLS OF THE NEUSE ROAD
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moffatt & nichol NC FIRM LICENSE No. F-0105

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





(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
 [Hatched Box] LIMITS OF FILL

1" = 10' VERTICAL
 1" = 100' HORIZONTAL

Rev.	Date	Description
0	08/19/19	JM

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

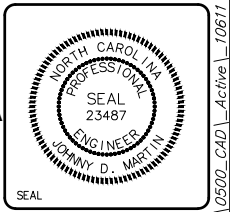
**RENOURISHMENT SECTIONS
 SHEET 7 OF 35**

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

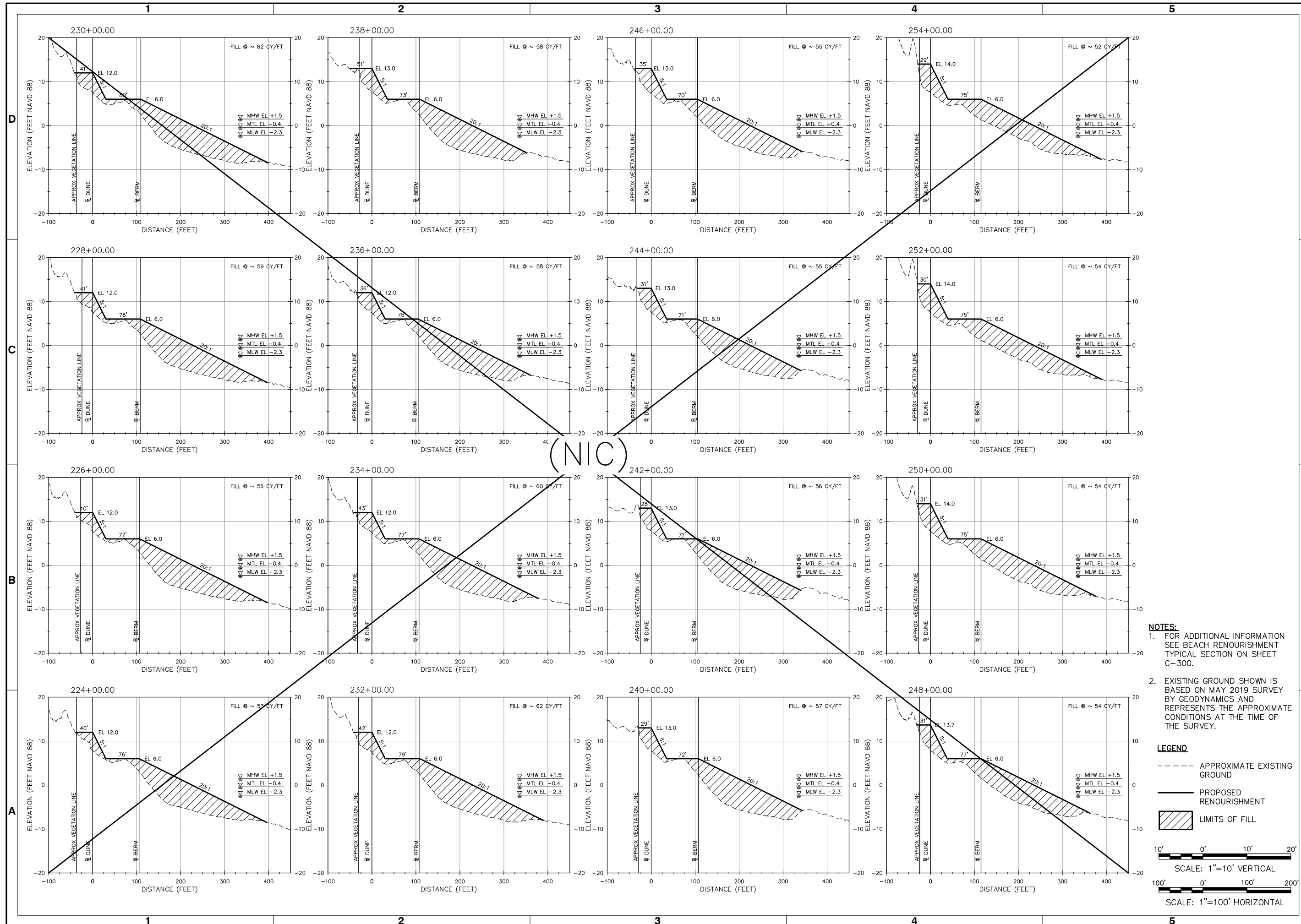
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



Sheet Reference No.
C-307
 Sheet 36 of 66



NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

Rev.	Date	Description
0	08/19/19	JM

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

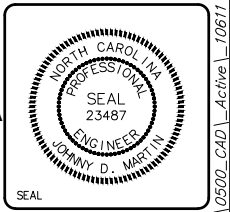
**RENOURISHMENT SECTIONS
SHEET 8 OF 35**

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

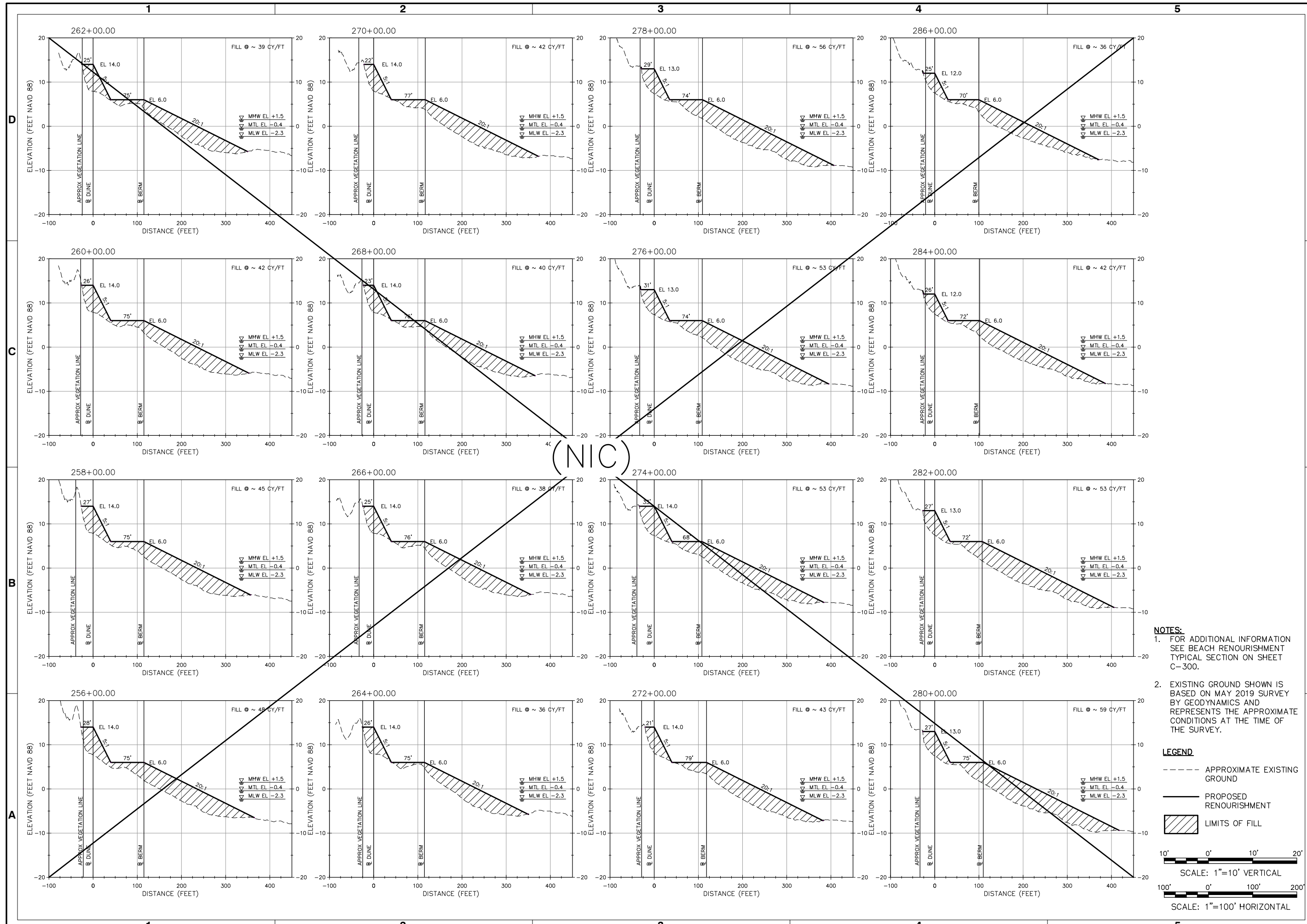
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1RA\10611\10500_CAD_Active\10611 Bouge Banks 2020\1061100C-308; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 8/16/2019 5:58 PM by BFOR



NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

1" = 10' VERTICAL
1" = 100' HORIZONTAL

Rev.	Date	Description
0	08/19/19	JM

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

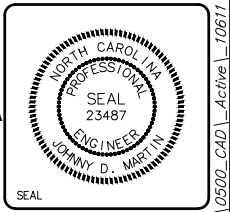
**RENOURISHMENT SECTIONS
SHEET 9 OF 35**

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

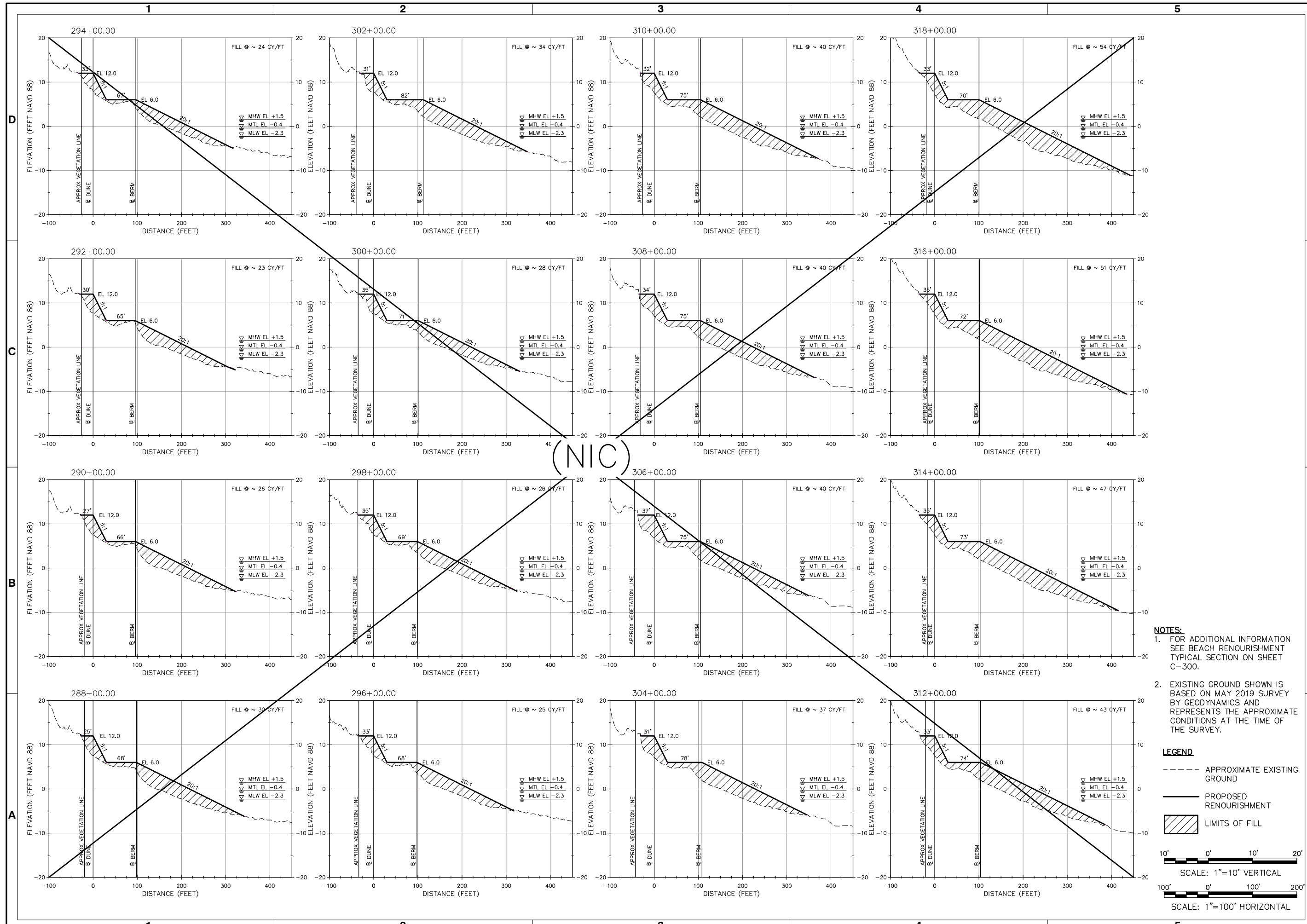
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE NO. F-0105

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



File: G:\1\RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-309; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 8/16/2019 5:58 PM by BORD



NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

1" = 10' VERTICAL
1" = 100' HORIZONTAL

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

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

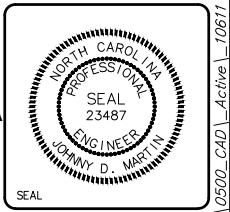
**RENOURISHMENT SECTIONS
SHEET 10 OF 35**

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

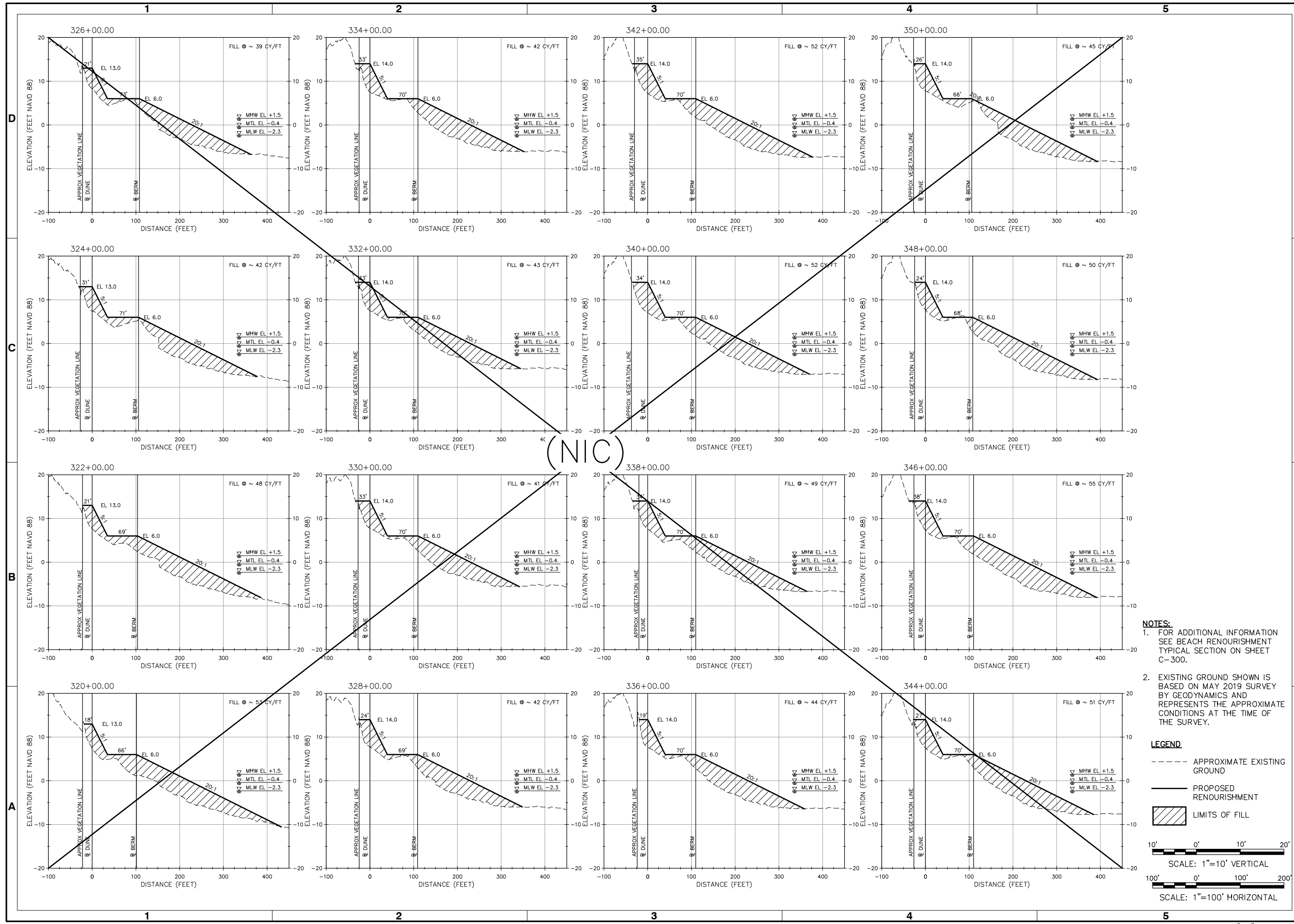
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



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NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

Rev.	Date	Description
0	08/19/19	JM

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

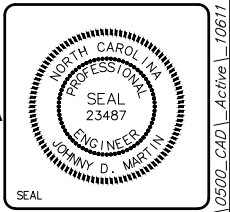
**RENOURISHMENT SECTIONS
SHEET 11 OF 35**

Designed by: NCY	Date: AUGUST 2019	MAN Project No. 10611
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Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Drawing Scale: Plot scale: 1:1 (D SHEET)

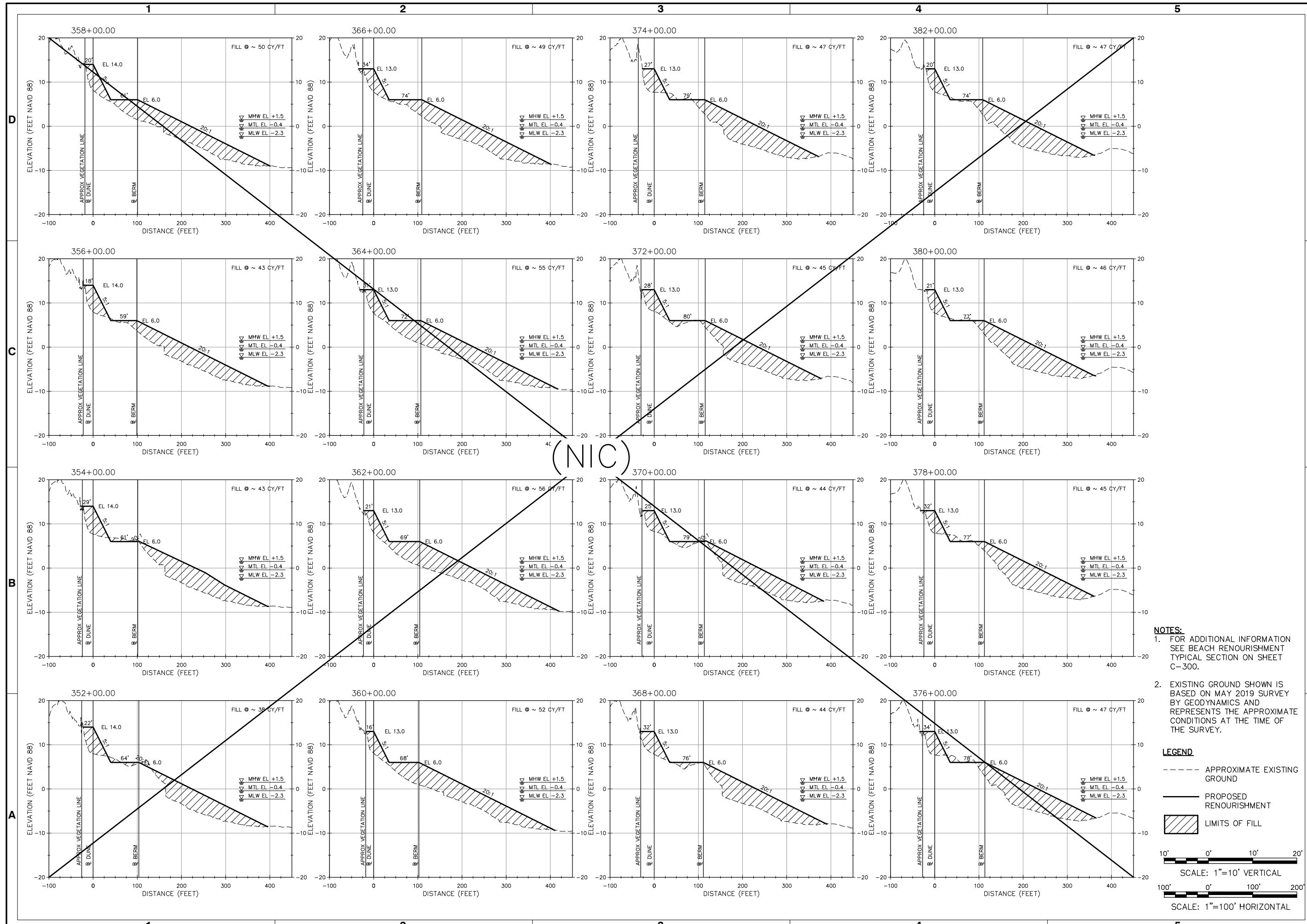
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1RA\10611\0500_CAD\Active\10611 Bouge Banks 2020\1061100C-311; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 8/16/2019 5:58 PM by BCFORD



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

Rev.	Date	Description
0	08/19/19	JM

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

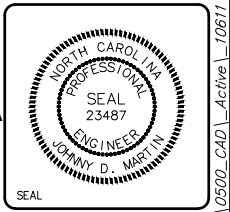
**RENOURISHMENT SECTIONS
 SHEET 12 OF 35**

Designed by: NCY	Date: AUGUST 2019
Drawn by: BDF	MAN Project No. 10611
Reviewed by: JDM	Drawing code: SRM
Submitted by: MOFFATT & NICHOL	Drawing Scale: As Shown
Plot scale: 1" (D SHEET)	

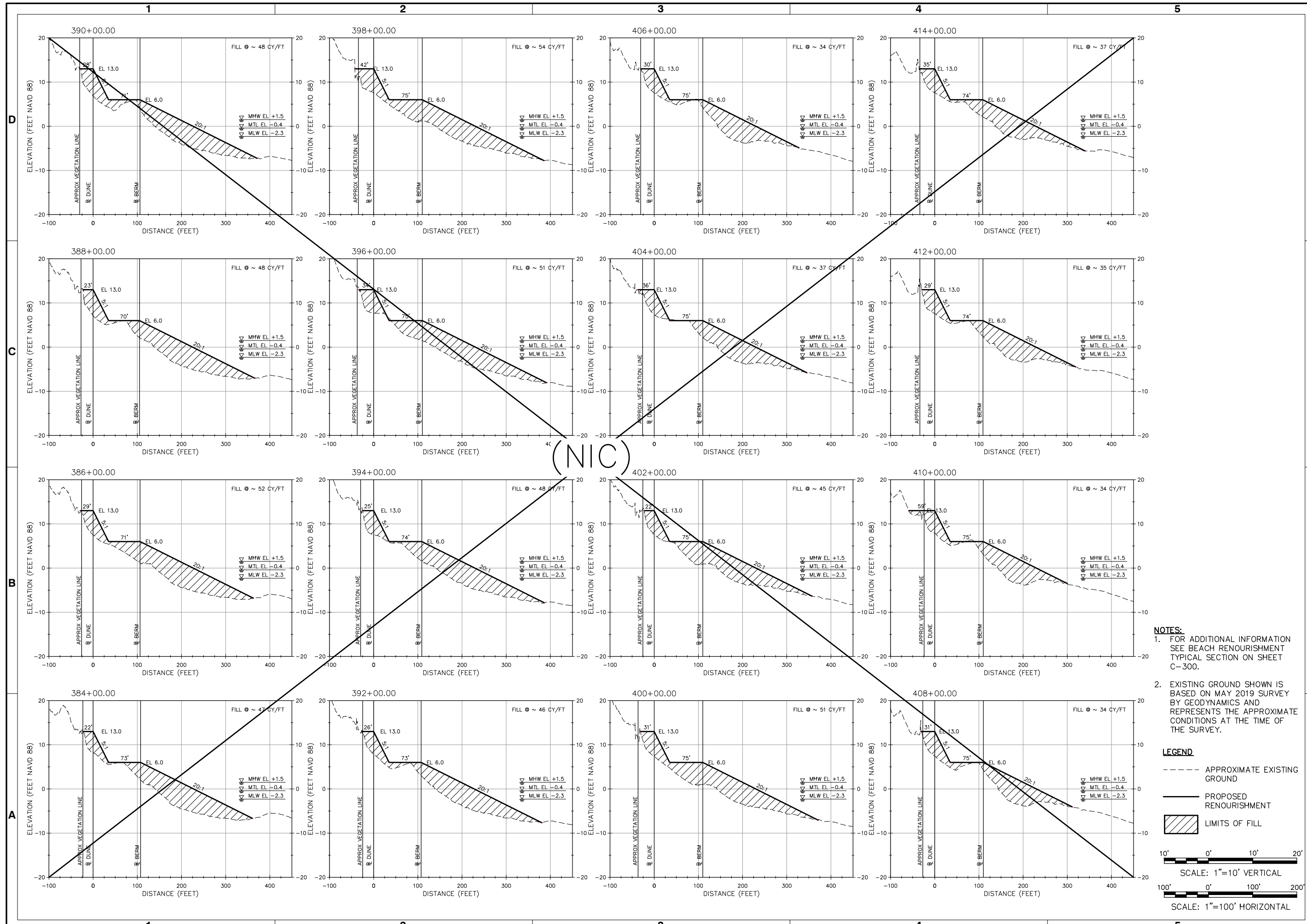
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-312; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFFORD



NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

1" = 10' VERTICAL
1" = 100' HORIZONTAL

Rev.	Date	By	Appr.
0	08/19/19	JM	

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

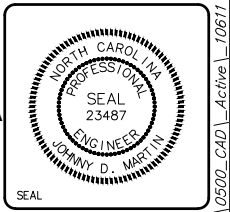
**RENOURISHMENT SECTIONS
SHEET 13 OF 35**

Designed by: NCY	Date: AUGUST 2019	MAN Project No. 10611	Drawing code:	Drawing Scale: As Shown
Dwn by: BDF	Chk by: SRM	Submitted by: JDM	Submitted by: MOFFATT & NICHOL	Plot scale: 1:1 (D SHEET)

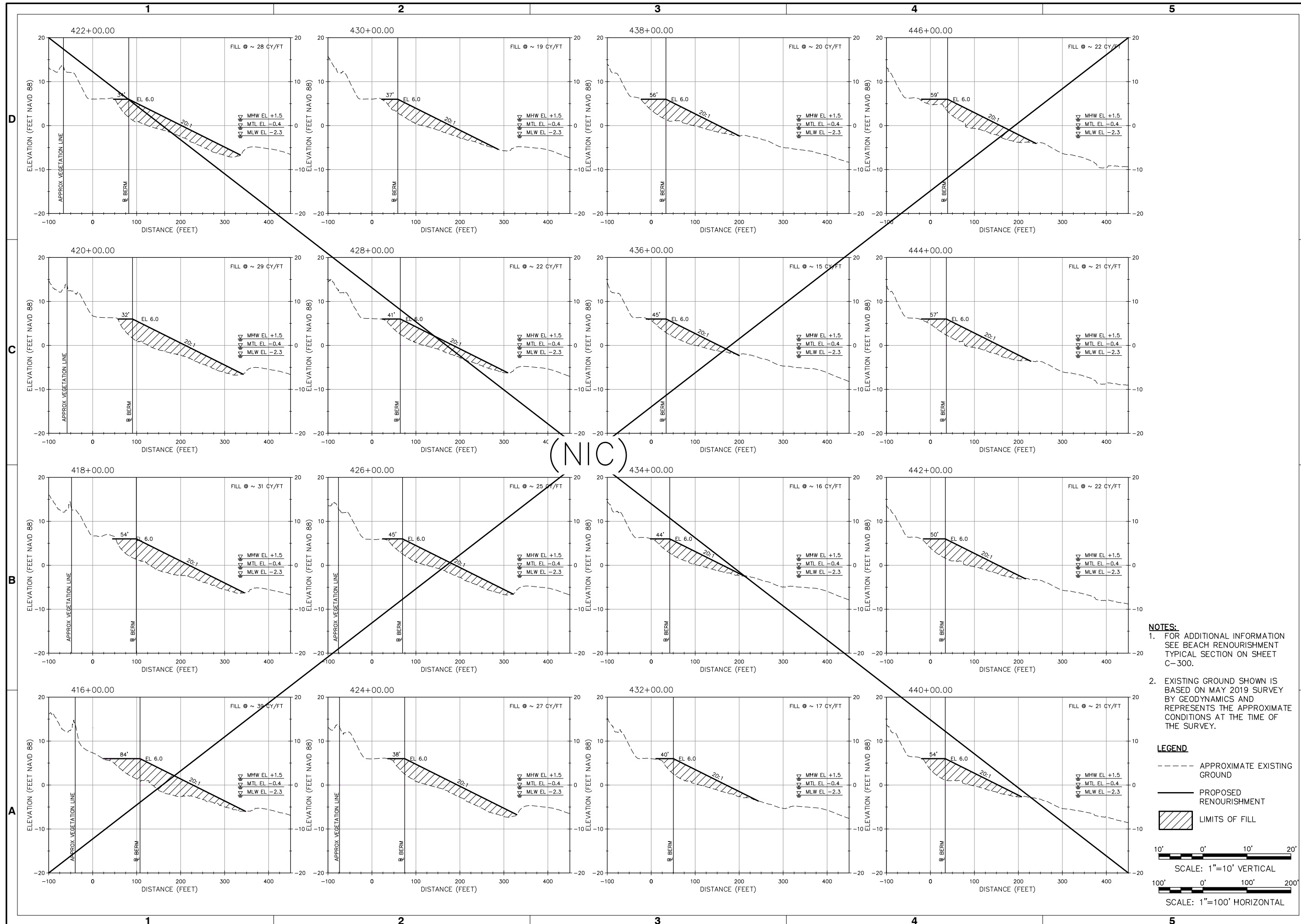
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1RA\10611\0500_CAD\Active\10611 Bouge Banks 2020\1061100C-313; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BRFORD



NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

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

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

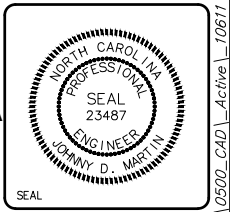
**RENOURISHMENT SECTIONS
SHEET 14 OF 35**

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

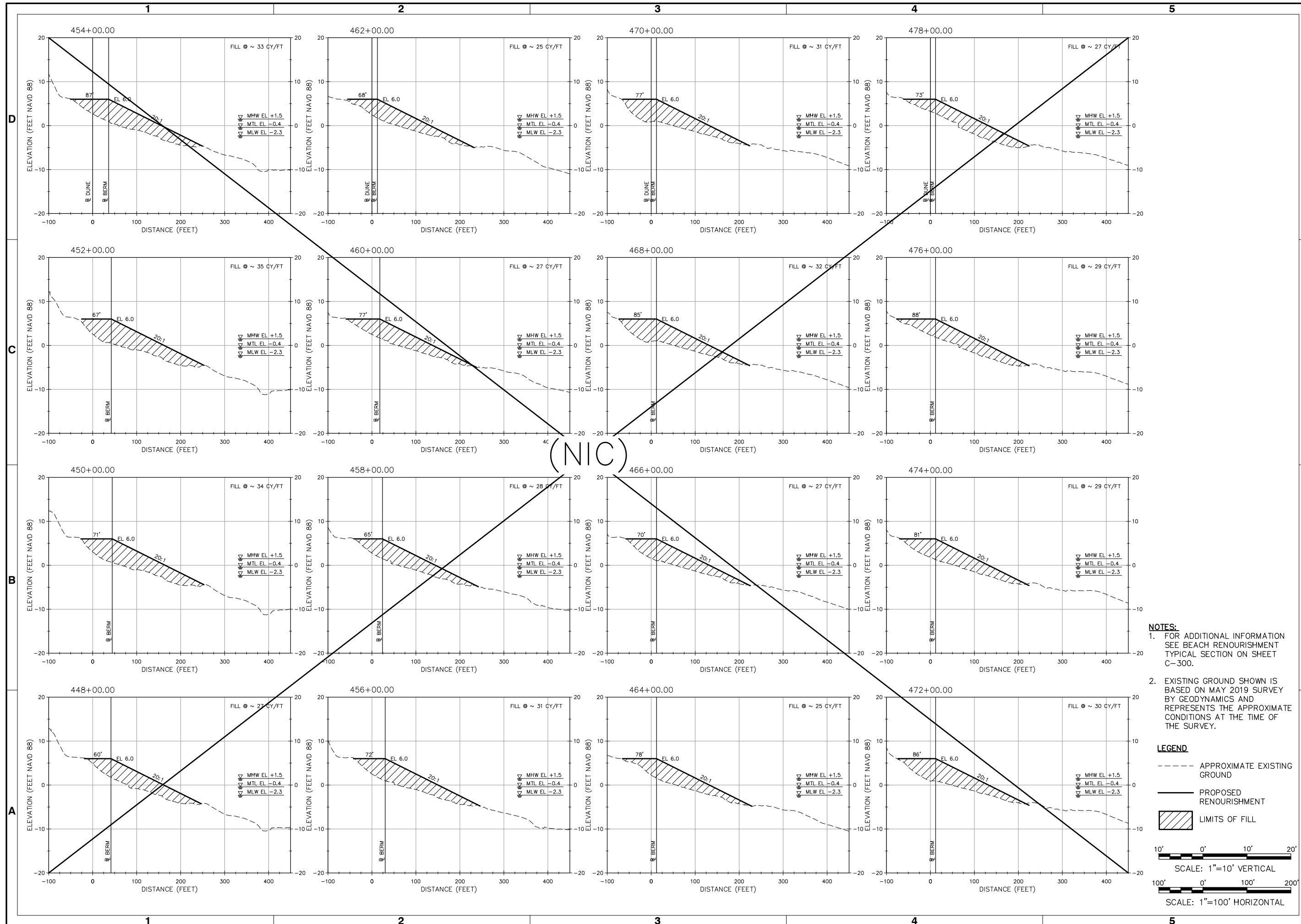
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-314; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD



(NIC)

- NOTES:**
- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
 - 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

1" = 10' VERTICAL
1" = 100' HORIZONTAL

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

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

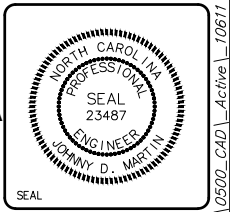
**RENOURISHMENT SECTIONS
SHEET 15 OF 35**

Designed by: NCY	Checked by: BDF	Submitted by: JDM
Date: AUGUST 2019	M&N Project No. 10611	Drawing Scale: As Shown
Submitted to: MOFFATT & NICHOL		

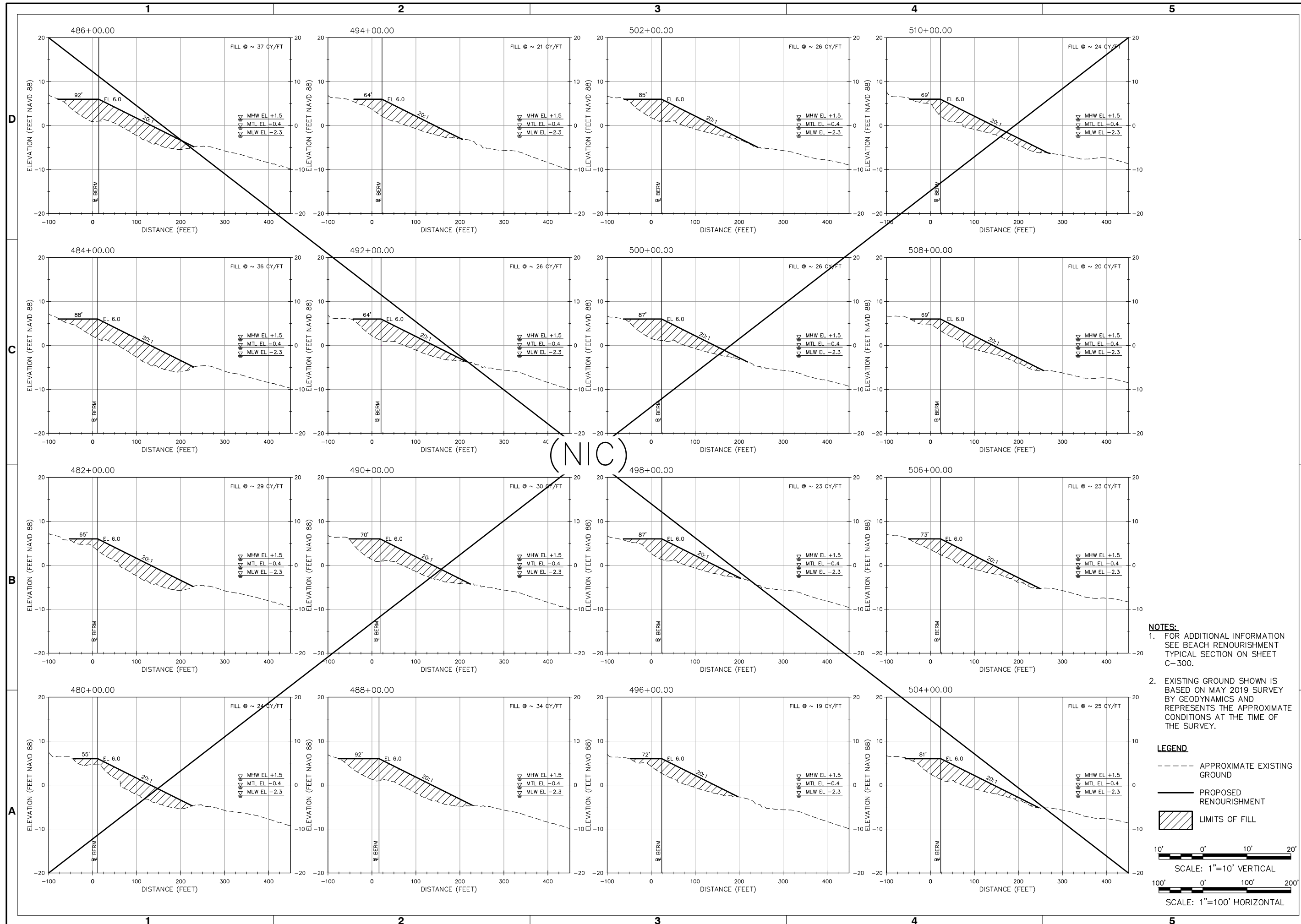
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-761-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



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(NIC)

- NOTES:**
- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
 - 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

1" = 10' VERTICAL
1" = 100' HORIZONTAL

Rev.	Date	Description
0	08/19/19	JM

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

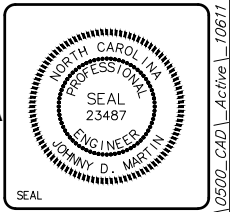
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SHEET 16 OF 35**

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

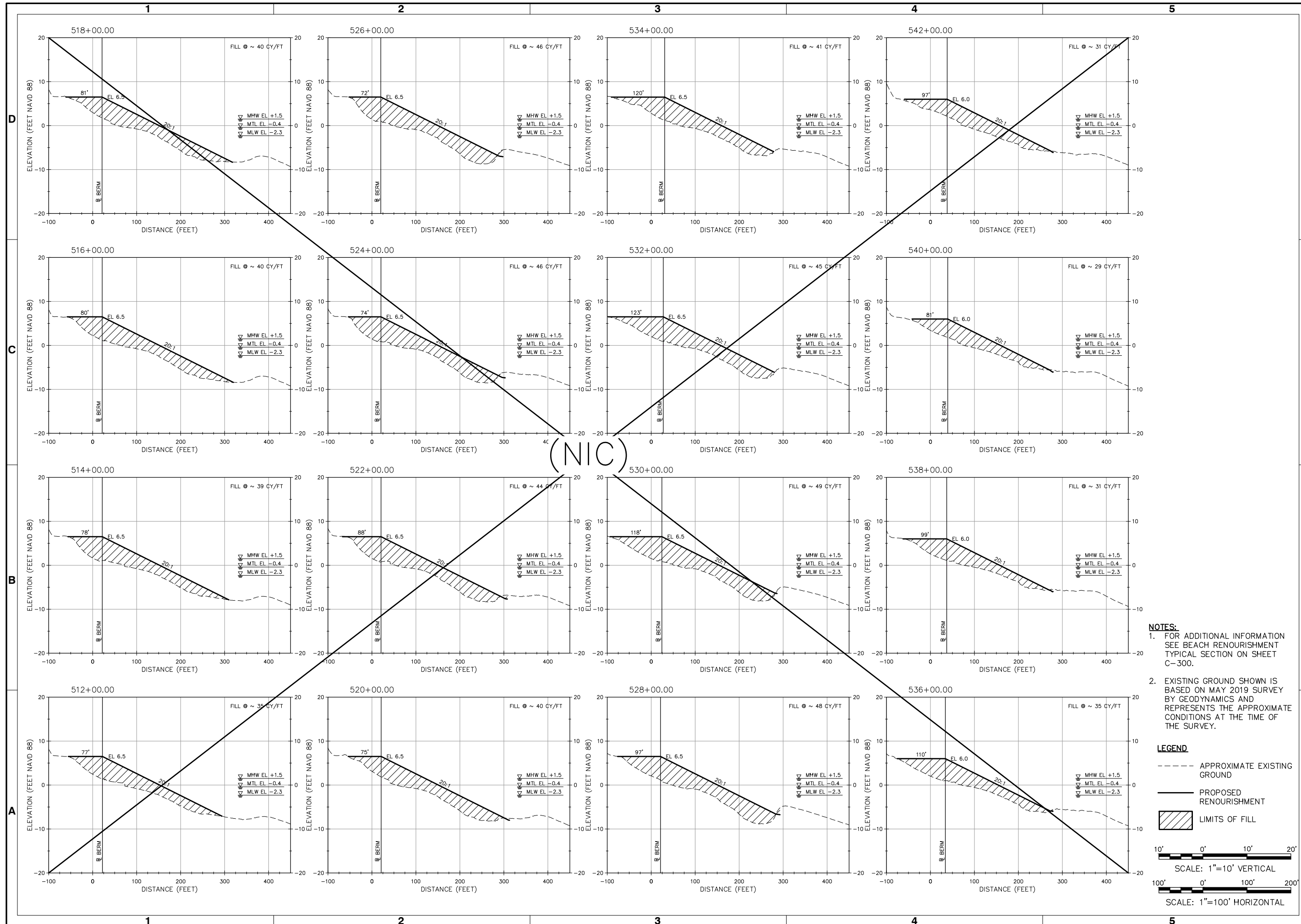
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-761-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



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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

1" = 10' VERTICAL
 1" = 100' HORIZONTAL

Rev.	Date	Description
0	08/19/19	JM

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

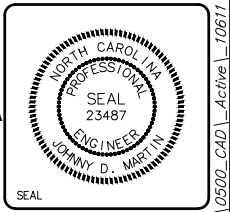
**RENOURISHMENT SECTIONS
 SHEET 17 OF 35**

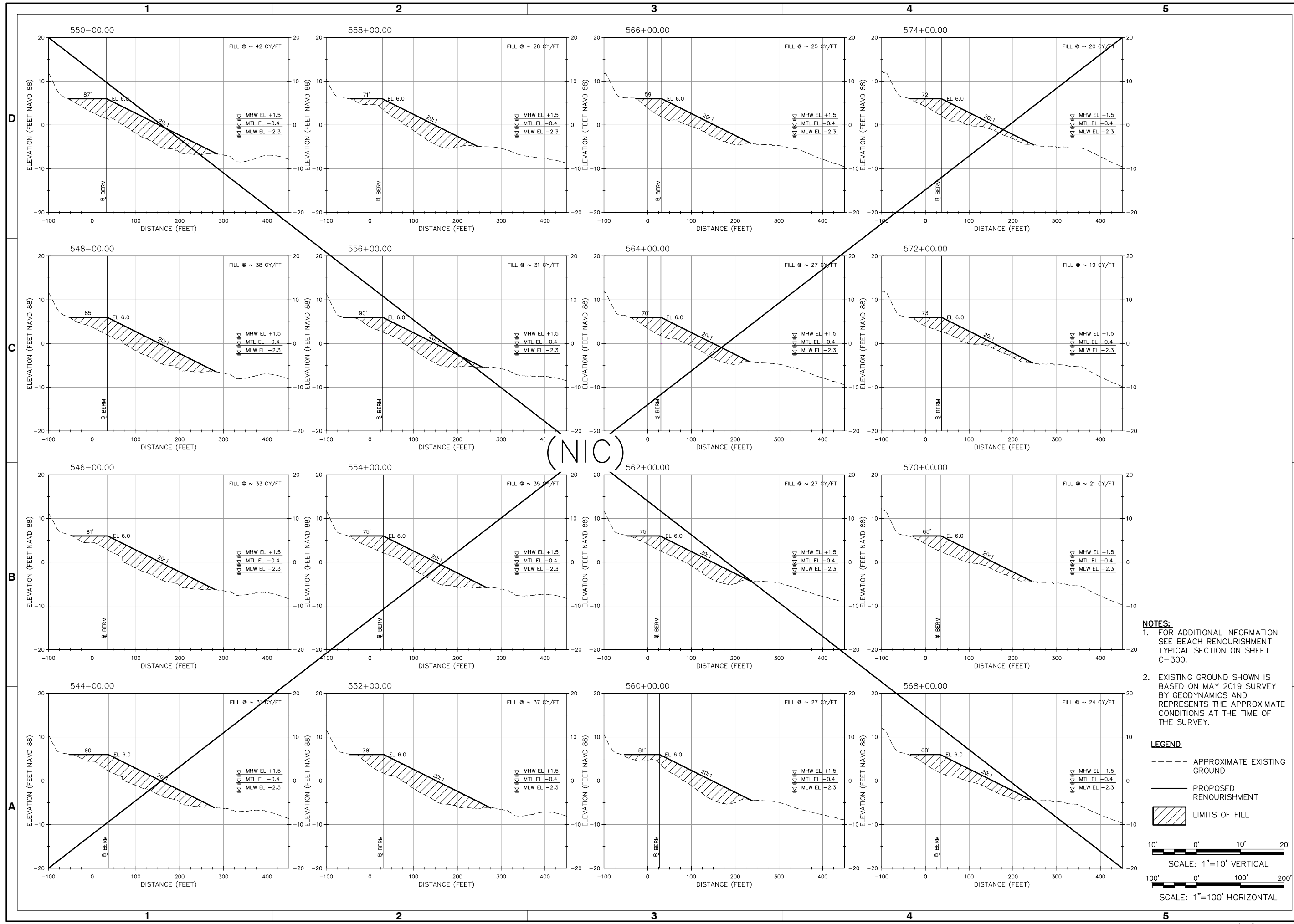
Designed by: NCY	Checked by: SRM	Submitted by: JDM	Reviewed by: JDM	Date: AUGUST 2019	M&N Project No. 10611	Drawing Code: SRM	Drawing Scale: As Shown	Plot Scale: 1:1 (D SHEET)
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4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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





NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

1" = 10' VERTICAL
1" = 100' HORIZONTAL

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

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

**RENOURISHMENT SECTIONS
SHEET 18 OF 35**

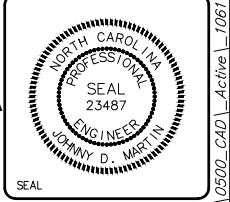
Designed by: NCY	Checked by: BDF	Submitted by: JDM
Date: AUGUST 2019	M&N Project No. 10611	Drawing Scale: As Shown

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

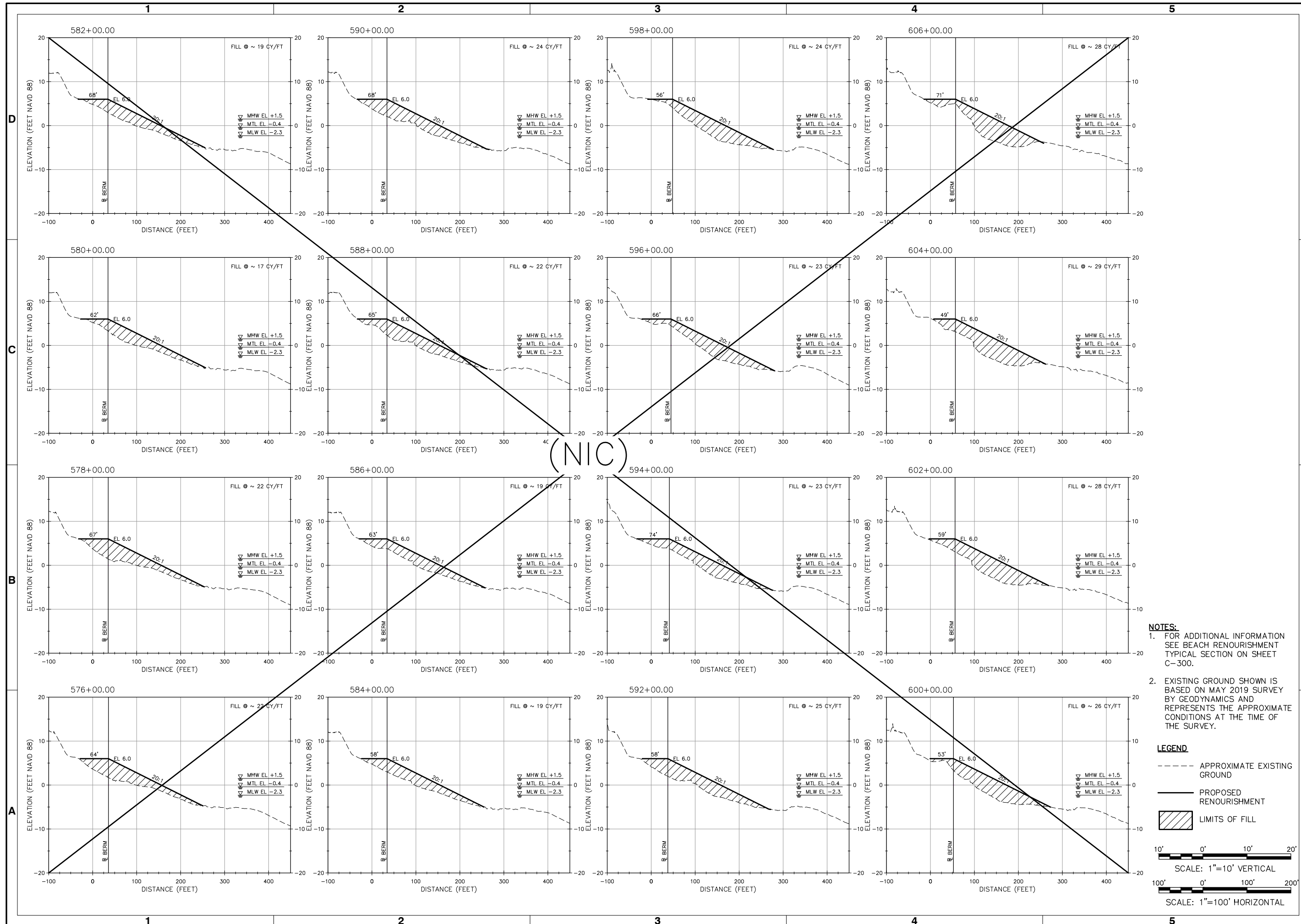
meffatt & nichol NC FIRM LICENSE No. F-0105

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

Submitted by:
MOFFATT & NICHOL



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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

1" = 10' VERTICAL
 1" = 100' HORIZONTAL

Rev.	Date	Description
0	08/19/19	JM

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

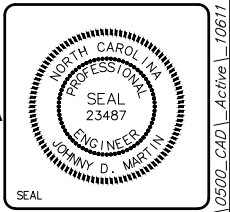
**RENOURISHMENT SECTIONS
 SHEET 19 OF 35**

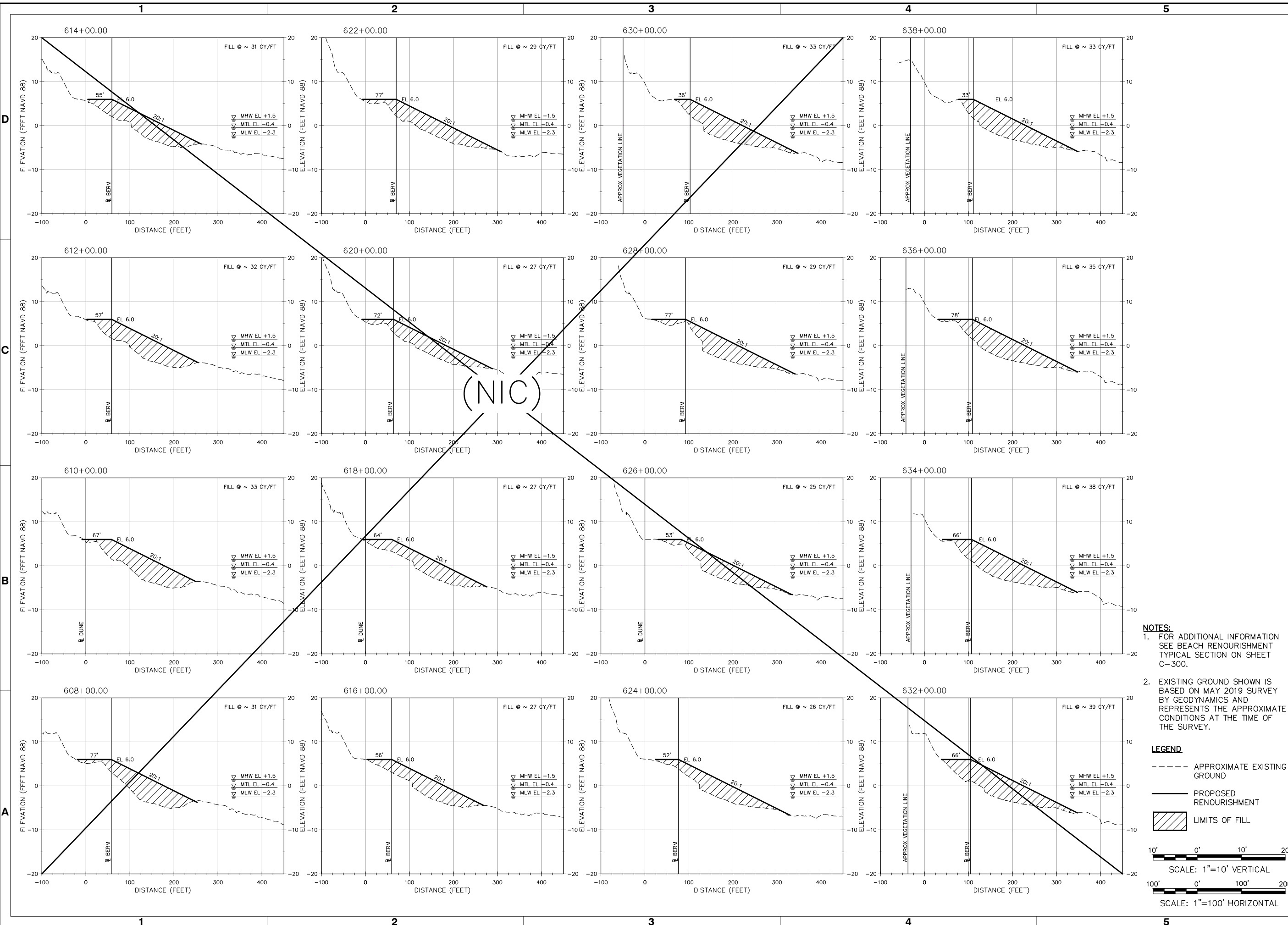
Designed by: NCY	Checked by: BDF	Submitted by: JDM	Reviewed by: MOFFATT & NICHOL
Date: AUGUST 2019	MAN Project No. 10611	Drawing code:	Drawing Scale: Plot scale: 1:1 (D SHEET)

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 319-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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





NOTES:

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- 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

1" = 10' VERTICAL
1" = 100' HORIZONTAL

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

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

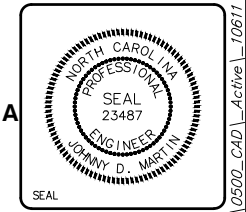
**RENOURISHMENT SECTIONS
SHEET 20 OF 35**

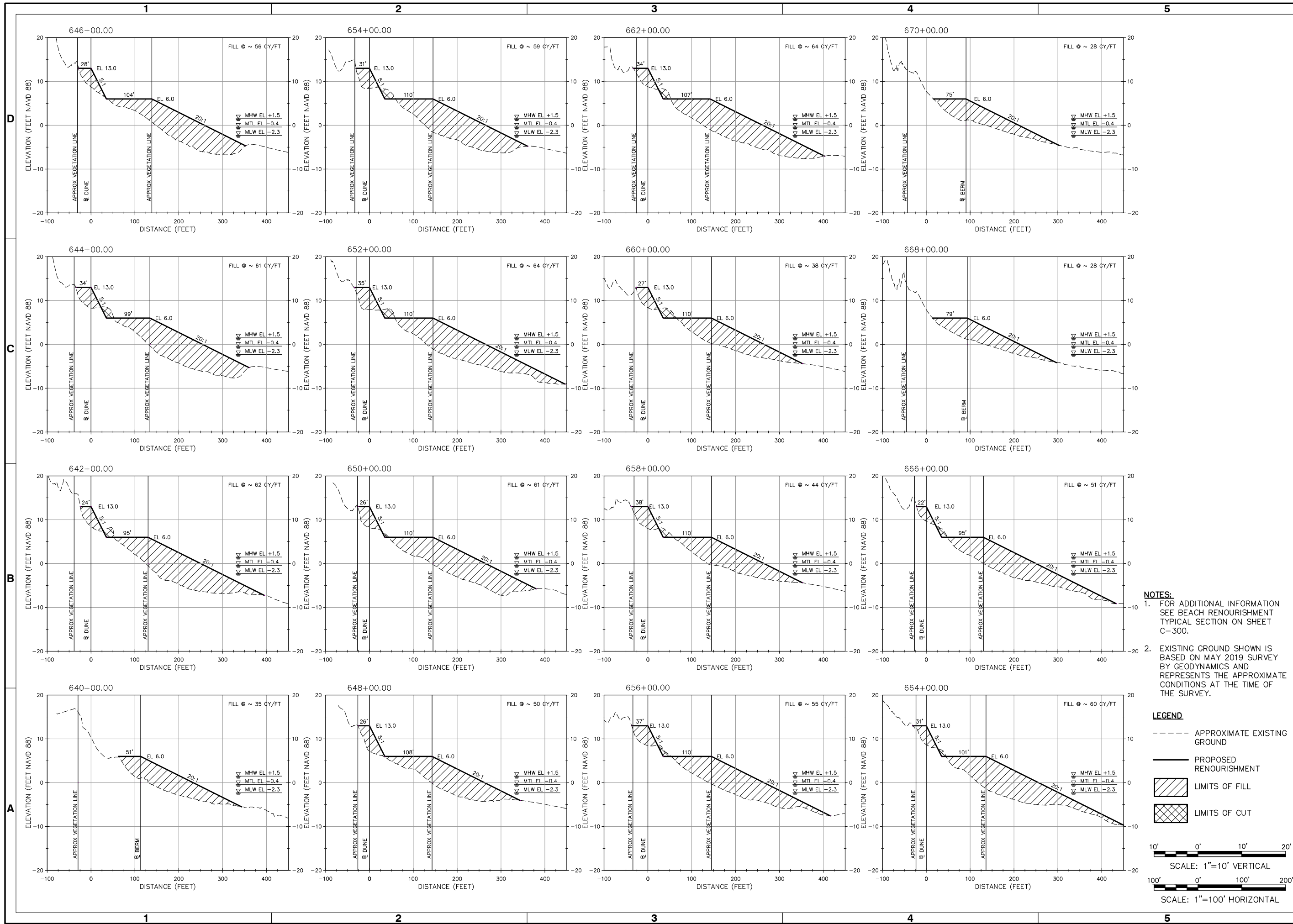
Designed by: NCY	Date: AUGUST 2019	M&N Project No. 10611	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)
Drawn by: BDF	Checked by: SRM	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	

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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





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

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

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

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

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

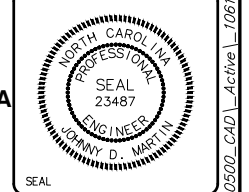
**RENOURISHMENT SECTIONS
 SHEET 21 OF 35**

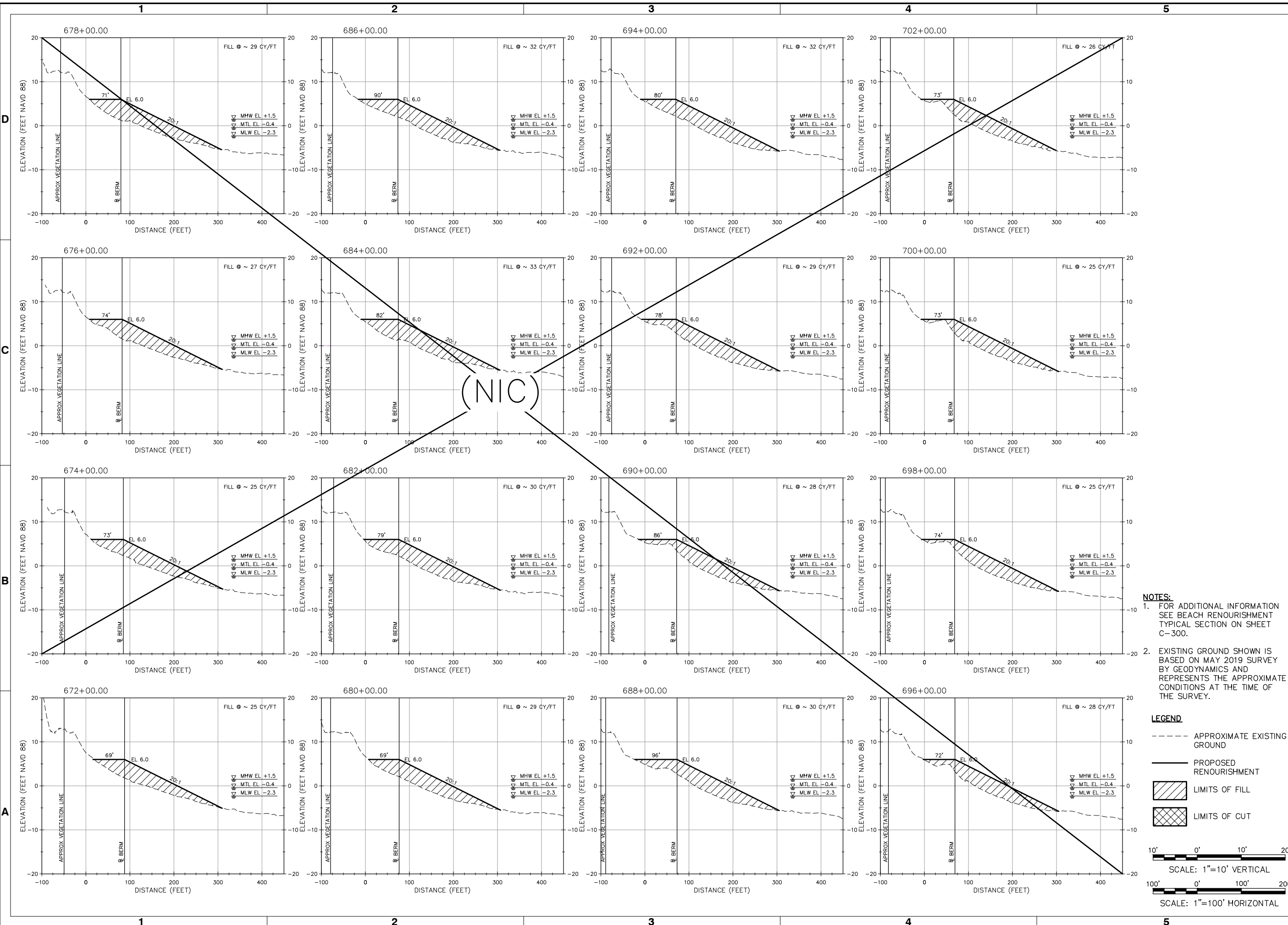
Designed by:	NCV	Date:	AUGUST 2019	Rev.	1
Drawn by:	BDF	MAN Project No.:	10611		
Checked by:	SRM	Drawn code:			
Reviewed by:	JDM	Submitted by:	MOFFATT & NICHOIL	Plot scale:	1:1 (D SHEET)

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

meffatt & nichoil NC FIRM LICENSE No. F-0105

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





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

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

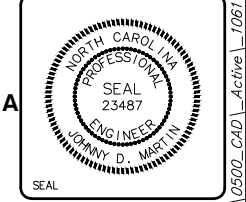
**RENOURISHMENT SECTIONS
SHEET 22 OF 35**

Designed by: NCY	Checked by: BDF	Submitted by: JDM
Date: AUGUST 2019	Drawn by: SRM	Reviewed by: MOFFATT & NICHOL
M&N Project No. 10611	Drawn by: SRM	Submitted by: MOFFATT & NICHOL
Drawn 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



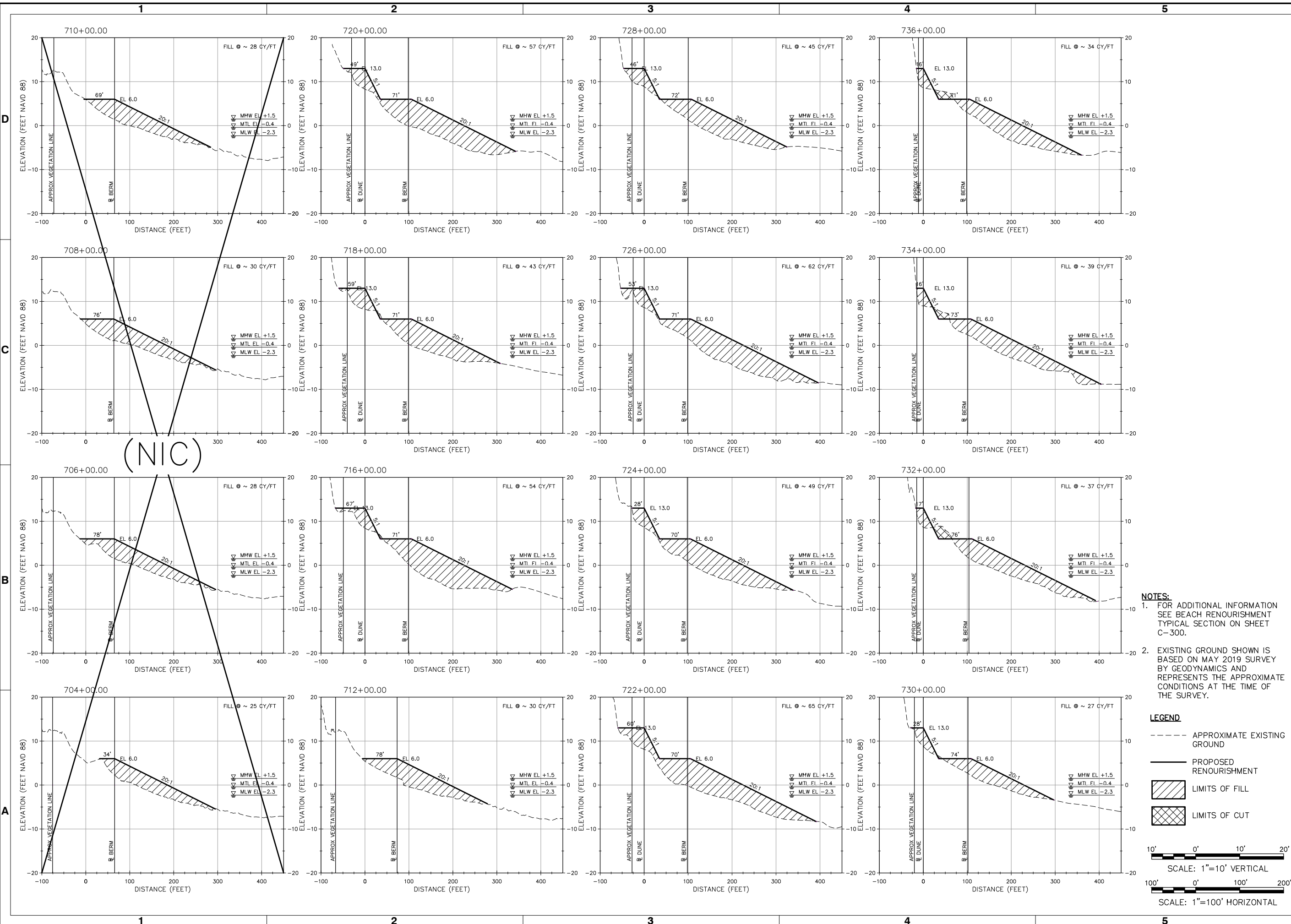
Sheet Reference No.
C-322
Sheet 51 of 66

- NOTES:**
- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
 - 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
- [Hatched] LIMITS OF FILL
- [Cross-hatched] LIMITS OF CUT

1"=10' VERTICAL
1"=100' HORIZONTAL



(NIC)

- NOTES:**
- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
 - 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
- [Hatched Box] LIMITS OF FILL
- [Cross-hatched Box] LIMITS OF CUT

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

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

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

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

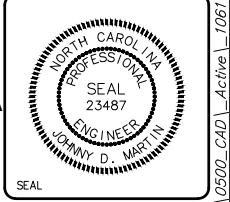
RENOURISHMENT SECTIONS
SHEET 23 OF 35

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

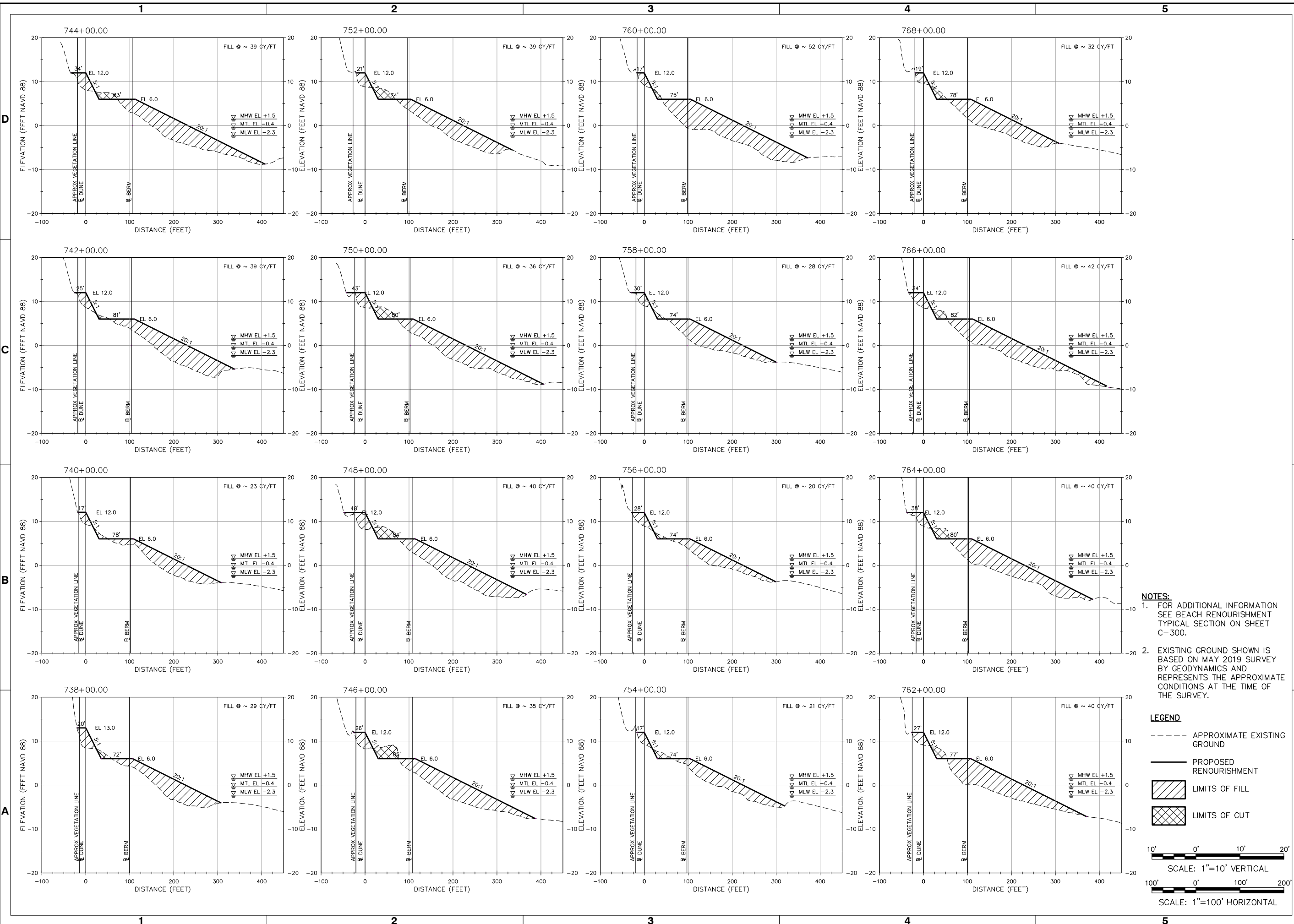
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1RA\10611\10500_CAD\Active\10611 Bouge Banks 2020\1061100C-323; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:46 AM by BIFORD



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

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

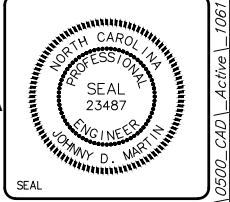
**RENOURISHMENT SECTIONS
SHEET 24 OF 35**

Designed by: NCY	Checked by: BDF	Reviewed by: JDM	Submitted by: MOFFATT & NICHOIL
Date: AUGUST 2019	MAN Project No. 10611	Drawing code:	Drawing Scale: Plot scale: 1:1 (D SHEET)

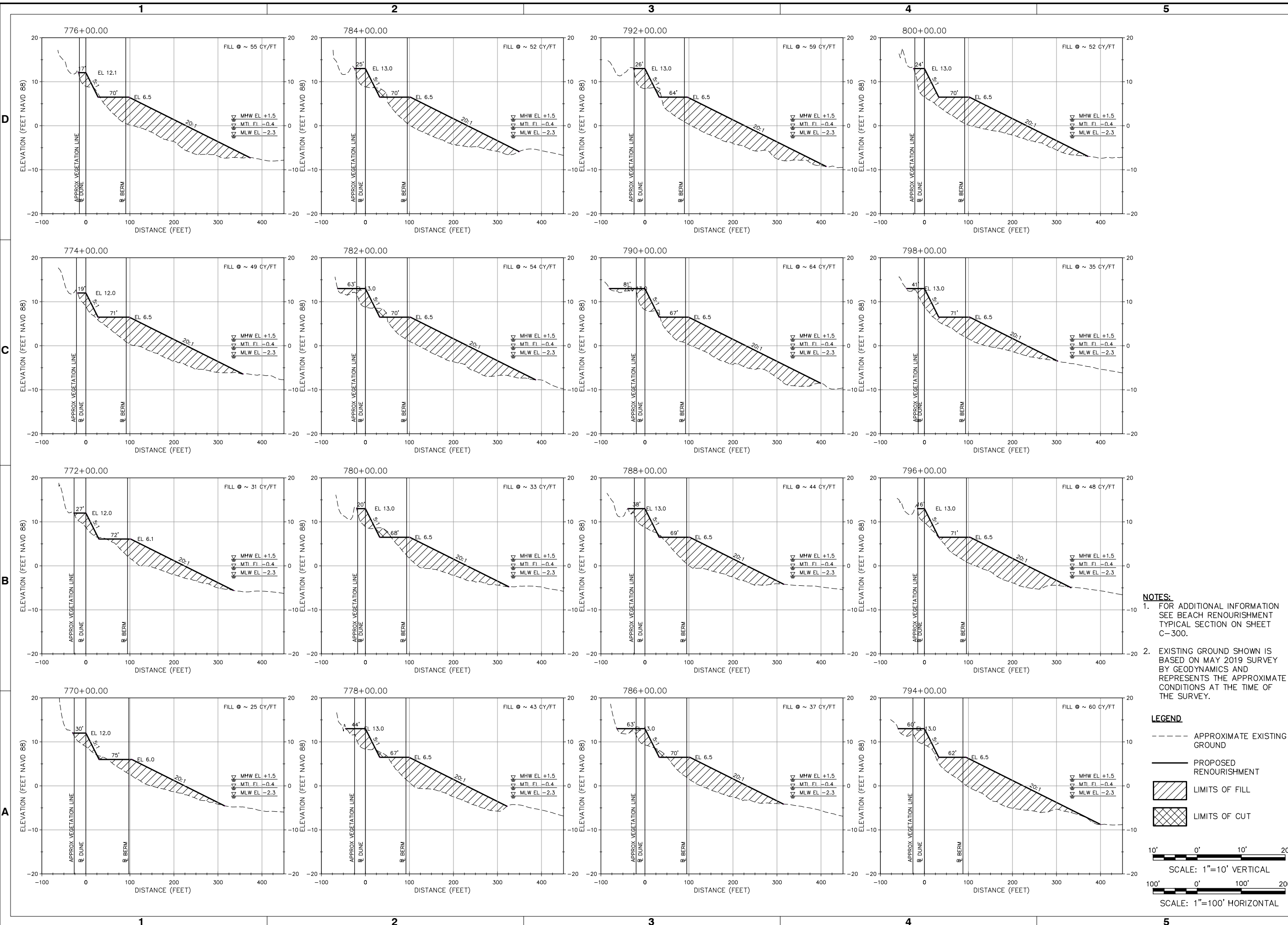
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichoil NC FIRM LICENSE NO. F-0105

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



DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING



NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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

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

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

Rev.	1	Date	AUGUST 2019
Designed by:	NCY	Checked by:	BDF
Dwn by:	BDF	Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL	Drawing Scale:	Plot scale: 1:1 (D SHEET)
Project No.:	10611	Project Name:	POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
Project Location:	CARTERET COUNTY, NORTH CAROLINA	Revision:	02/14/20
Revision:	0	Date:	08/19/19
Mark:		Description:	PRE-CONSTRUCTION DESIGN REVISION

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

**RENOURISHMENT SECTIONS
SHEET 25 OF 35**

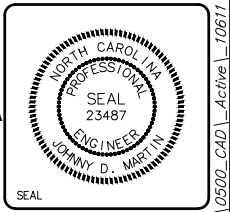
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4626	NC FIRM LICENSE No. F-0105
meffatt & nichol	PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

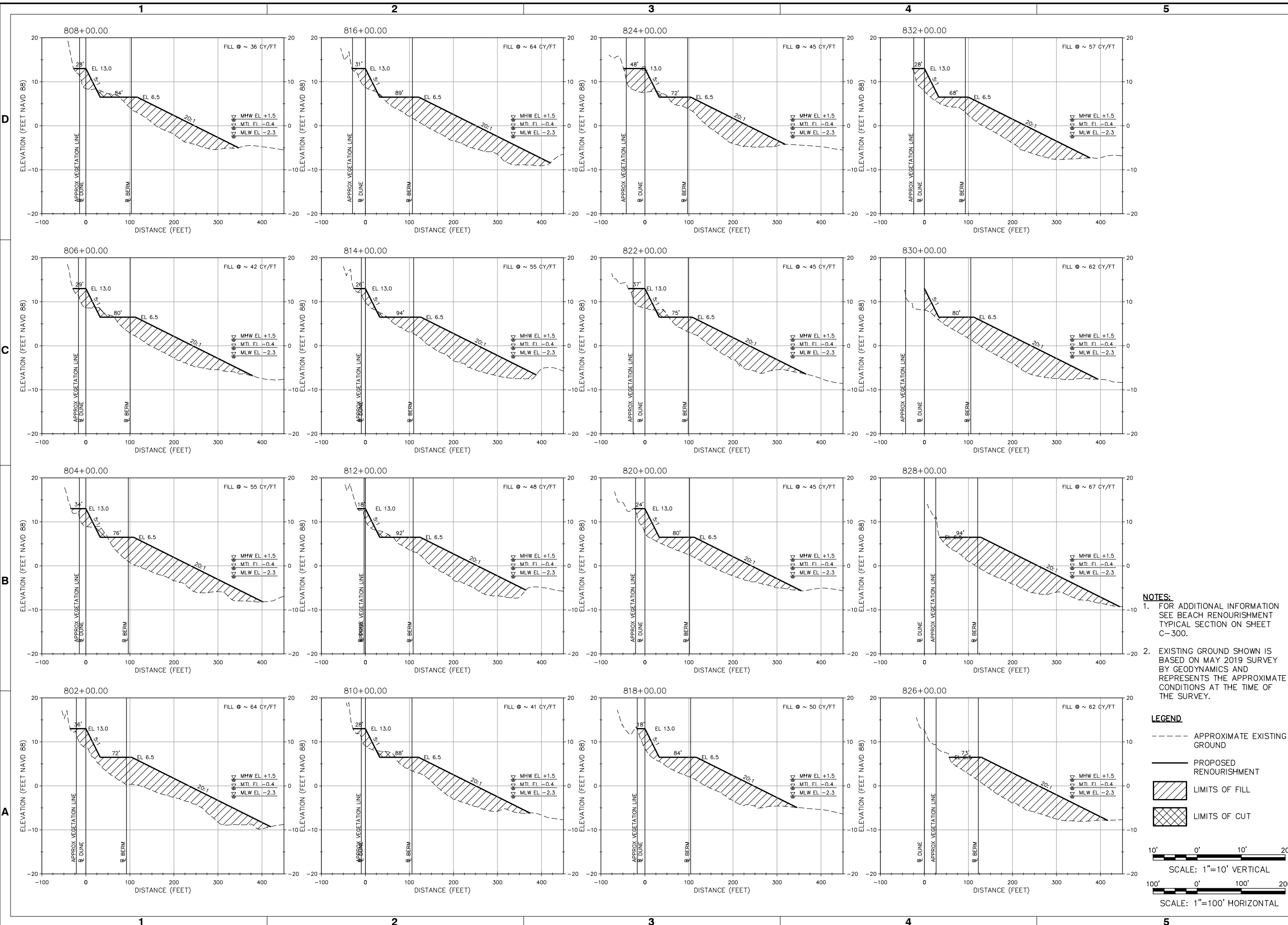
4700 FALLS OF THE NEUSE ROAD
SUITE 300
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919-781-4626

NC FIRM LICENSE No. F-0105

meffatt & nichol

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





Rev.	1	Date	AUGUST 2019
Designed by:	NCY	Checked by:	BDF
Drawn by:	BDF	Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL	Project No.:	10611
Project Name:	POST-FLORENCE RENOURISHMENT PROJECT PHASE 2		
Location:	CARTERET COUNTY, NORTH CAROLINA		
Sheet Title:	RENOURISHMENT SECTIONS SHEET 26 OF 35		
Revision Description	Date	By	Appr.
1 PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM	
0 BID DOCUMENTS	08/19/19	JM	

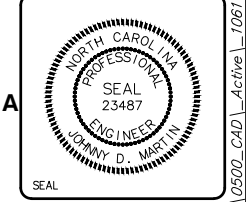
**POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA**

**RENOURISHMENT SECTIONS
SHEET 26 OF 35**

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
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meffatt & nichol

PROFESSIONAL ENGINEER
JOHNNY D. MARTIN
SEAL 23487



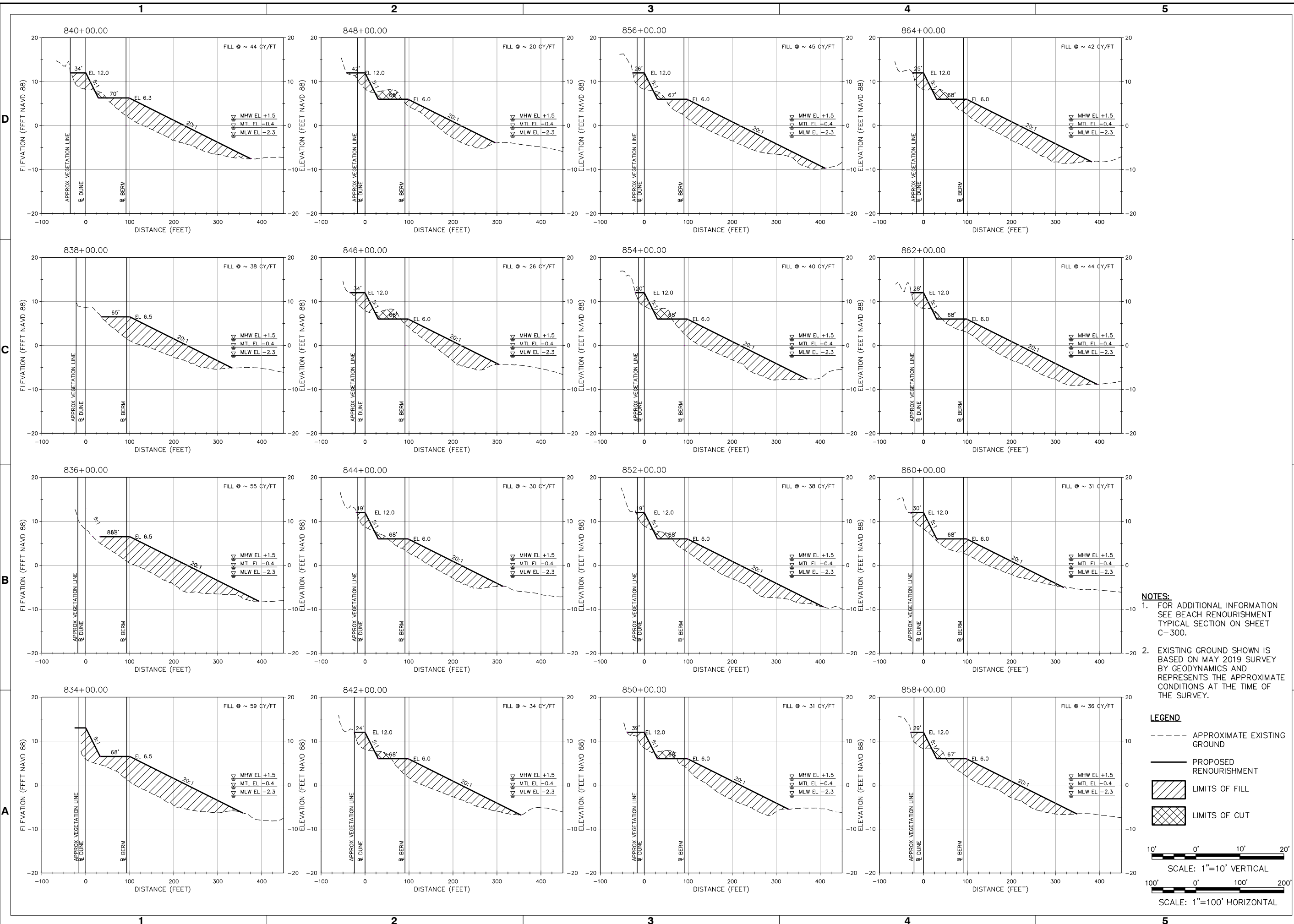
NOTES:

- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- 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
- [Diagonal Hatching] LIMITS OF FILL
- [Cross-Hatching] LIMITS OF CUT

1"=10' VERTICAL
1"=100' HORIZONTAL



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

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

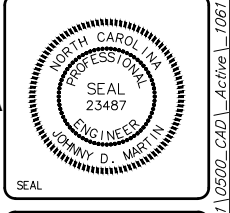
**RENOURISHMENT SECTIONS
SHEET 27 OF 35**

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

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SUITE 300
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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

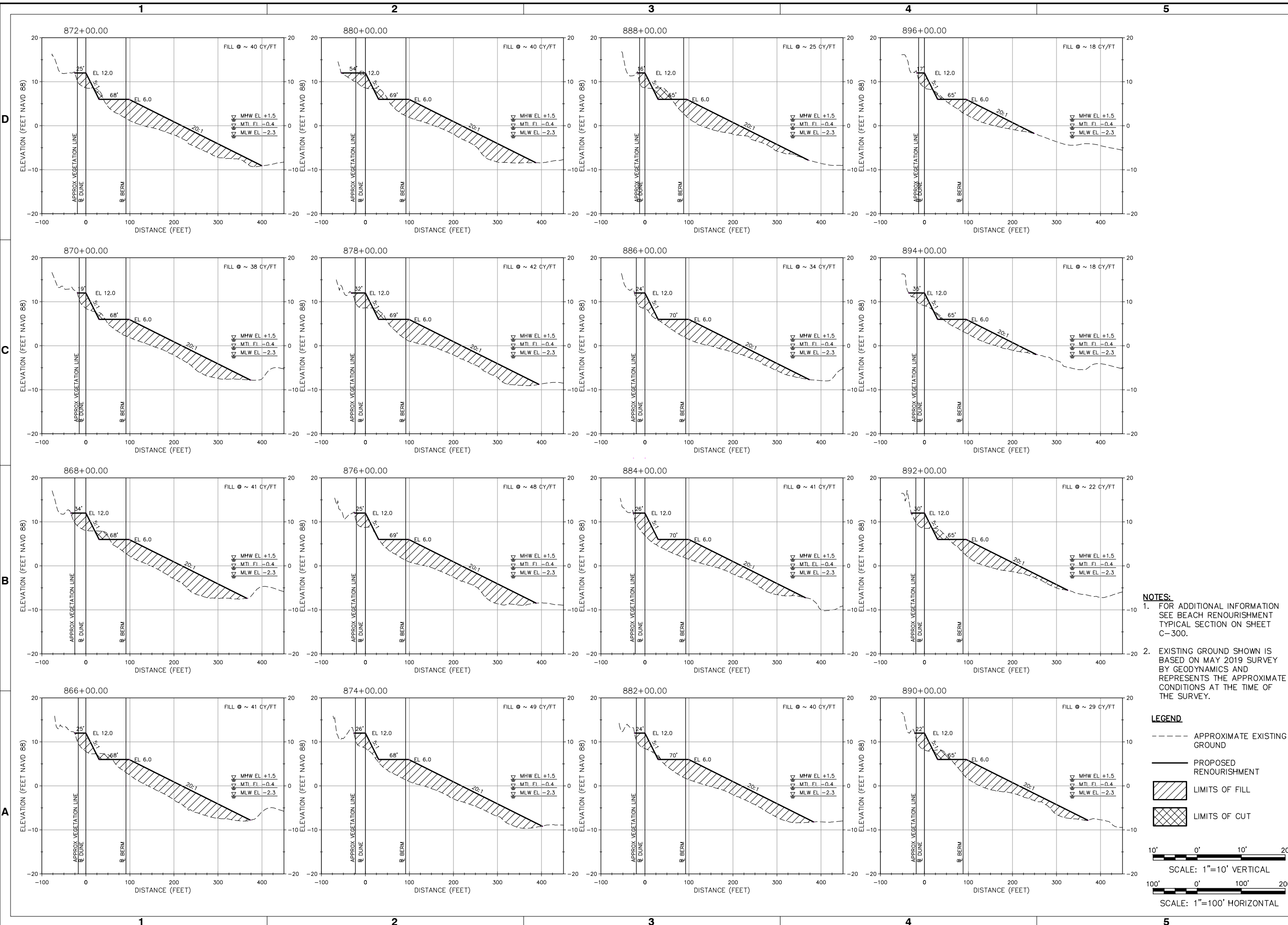


NOTES:
1. FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
2. EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- [Hatched Box] LIMITS OF FILL
- [Cross-hatched Box] LIMITS OF CUT

1"=10' VERTICAL
1"=100' HORIZONTAL



NOTES:
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 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

Rev.	1
Date:	AUGUST 2019
Designed by:	NCY
Drawn by:	BDF
Checked by:	SRM
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Plot scale:	1:1 (D SHEET)

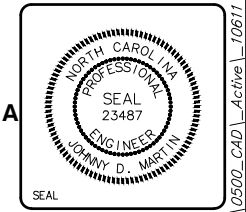
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 PROJECT PHASE 2
 CARTERET COUNTY, NORTH CAROLINA**

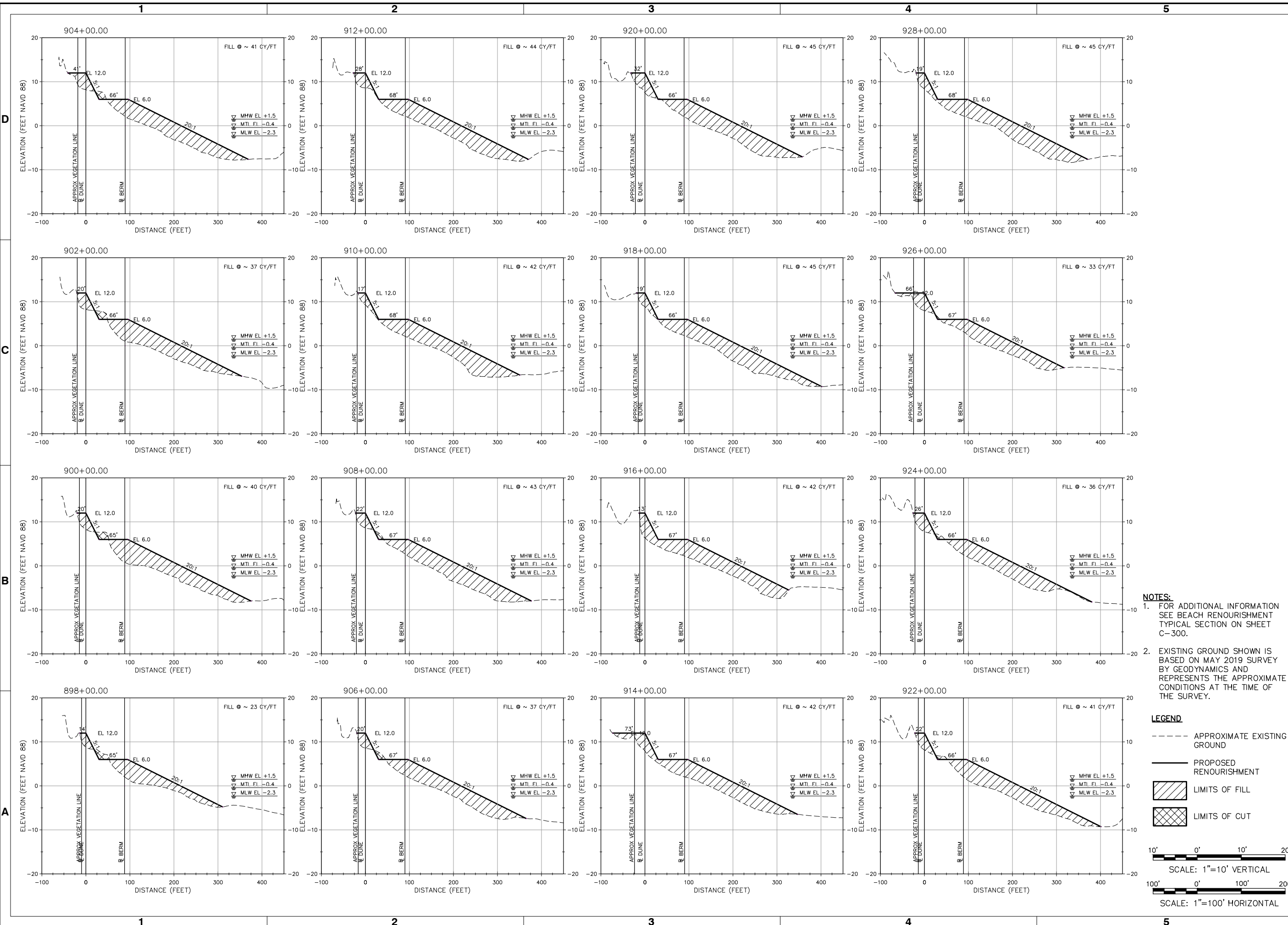
**RENOURISHMENT SECTIONS
 SHEET 28 OF 35**

4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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





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- PROPOSED RENOURISHMENT
- ▨ LIMITS OF FILL
- ▩ LIMITS OF CUT

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

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

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

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

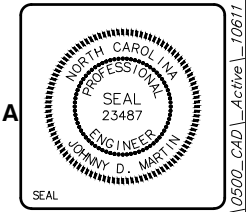
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SHEET 29 OF 35**

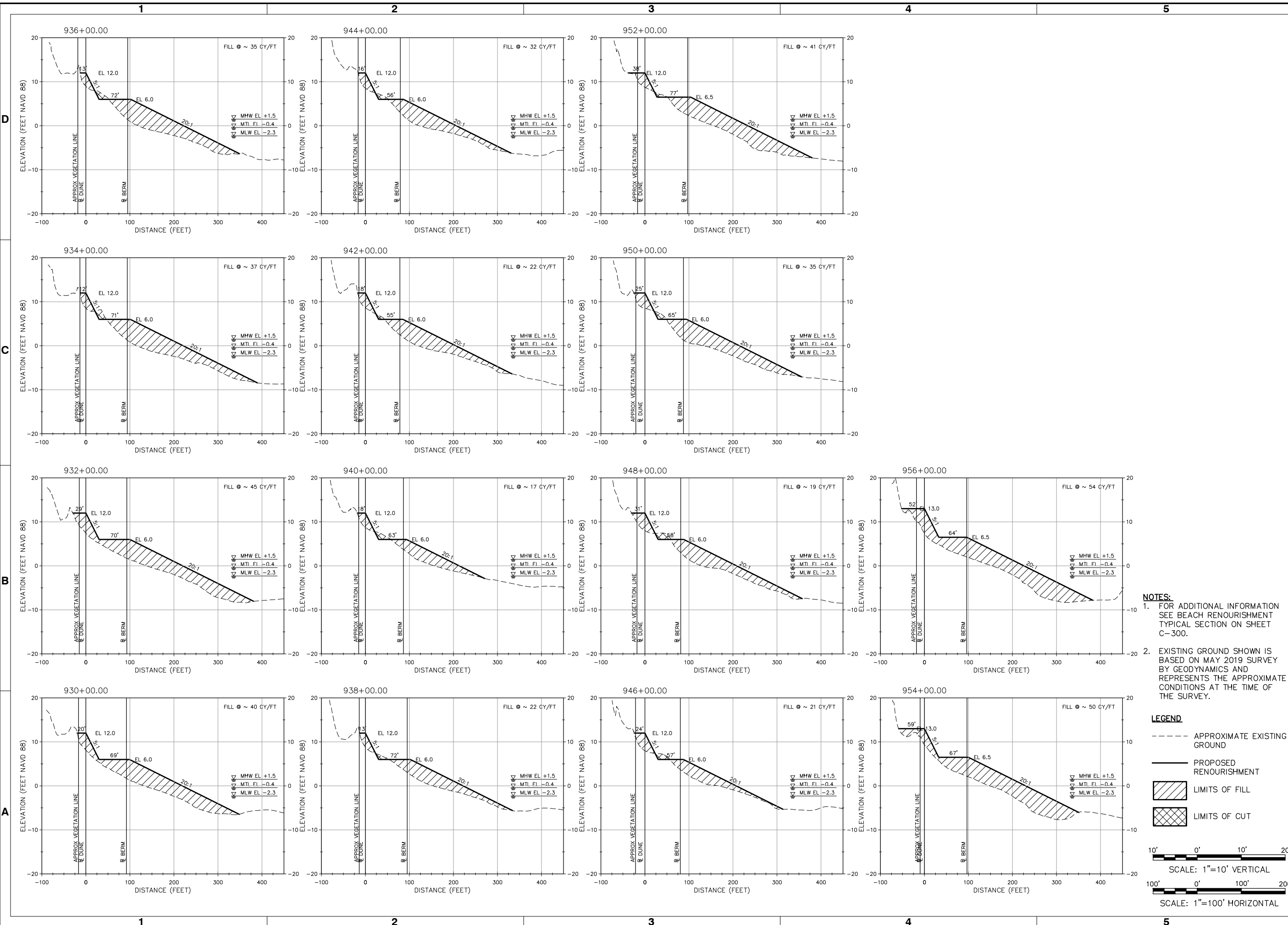
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Date: AUGUST 2019	MAN Project No: 10611	Drawing code:	Drawing Scale:		

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
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- ▨ LIMITS OF FILL
- ▩ LIMITS OF CUT

1" = 10' VERTICAL
1" = 100' HORIZONTAL

Rev.	1	Date	JANUARY 2020
Design	NCV	Drawn	BDF
Checked	SRM	Reviewed	JDM
Submitted	MOFFATT & NICHOL	Plot Scale	1:1 (D SHEET)
Project No.	10611	Project Name	POST-FLORENCE RENOURISHMENT PROJECT PHASE 2
Revision	02/14/20	Revision Description	PRE-CONSTRUCTION DESIGN REVISION
Author	JM	Drawn	JM
Checker	JM	Reviewed	JM
Submitter	JM	Plot	JM

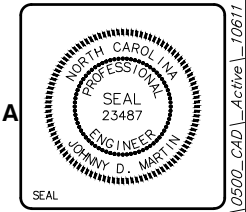
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PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA**

**RENOURISHMENT SECTIONS
SHEET 30 OF 35**

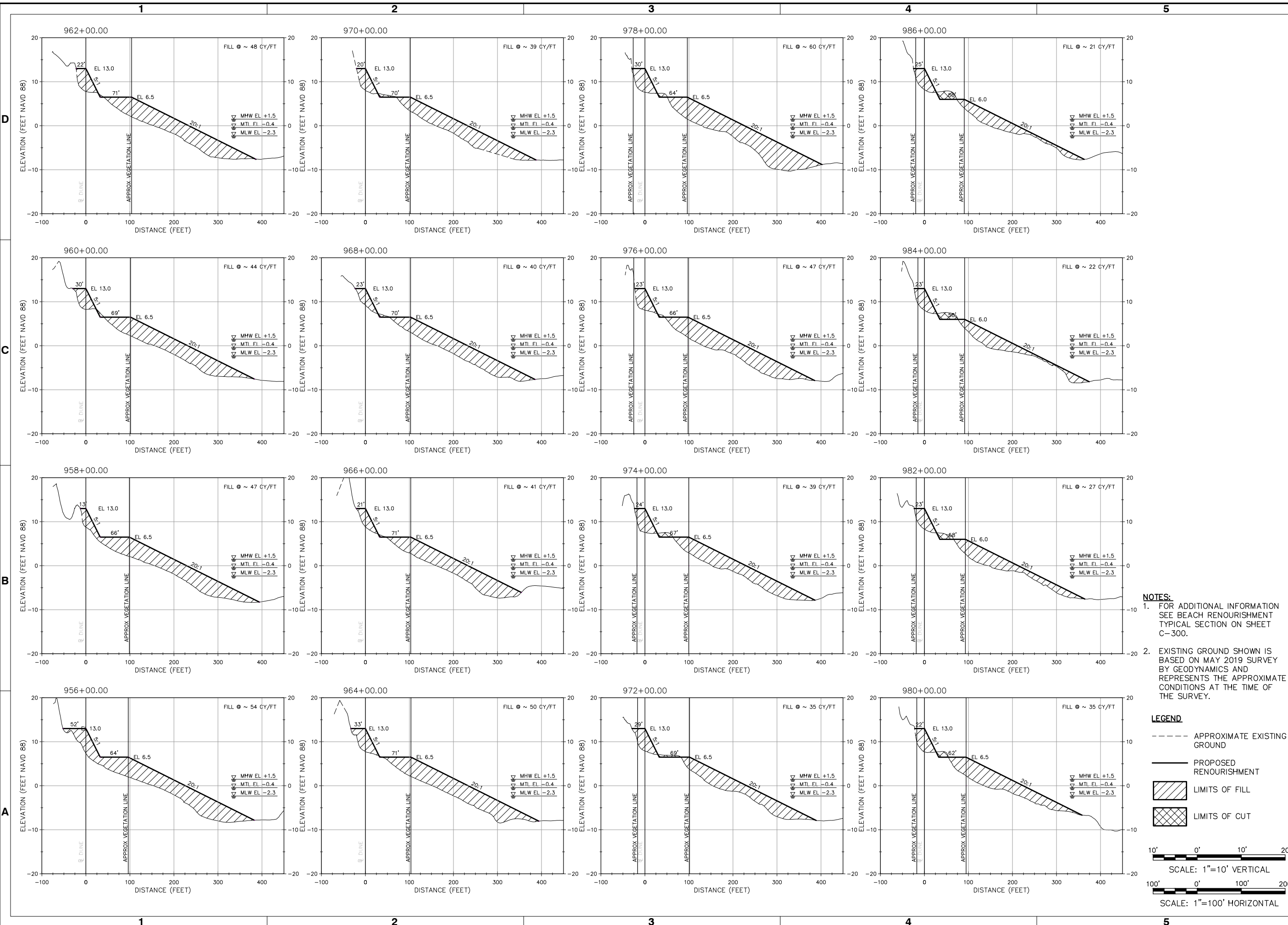
4700 FALLS OF THE NEUSE ROAD
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RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



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

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

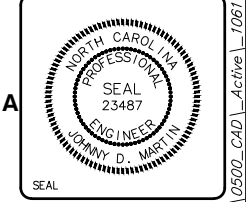
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Date: JANUARY 2020	MAN Project No. 10611	Drawing code:	Drawing Scale: Plot scale: 1:1 (0 SHEET)

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



Sheet Reference No.
C-331
Sheet 60 of 66

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

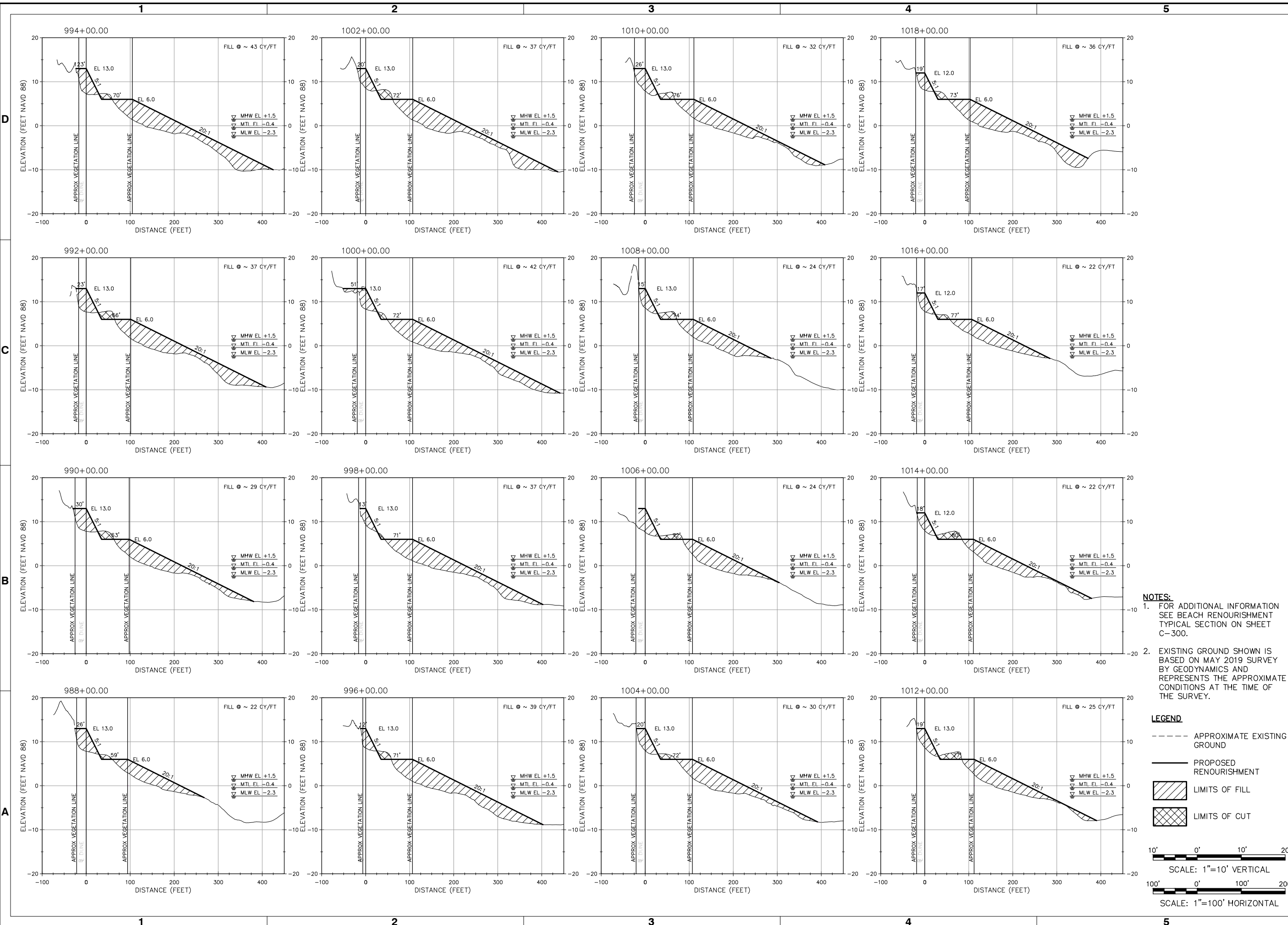
LEGEND

- APPROXIMATE EXISTING GROUND
- PROPOSED RENOURISHMENT
- [Diagonal Hatching] LIMITS OF FILL
- [Cross-hatching] LIMITS OF CUT

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

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

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NOTES:

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- PROPOSED RENOURISHMENT
- ▨ LIMITS OF FILL
- ▩ LIMITS OF CUT

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0	08/19/19	BID DOCUMENTS

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

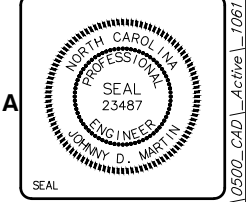
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SHEET 32 OF 35**

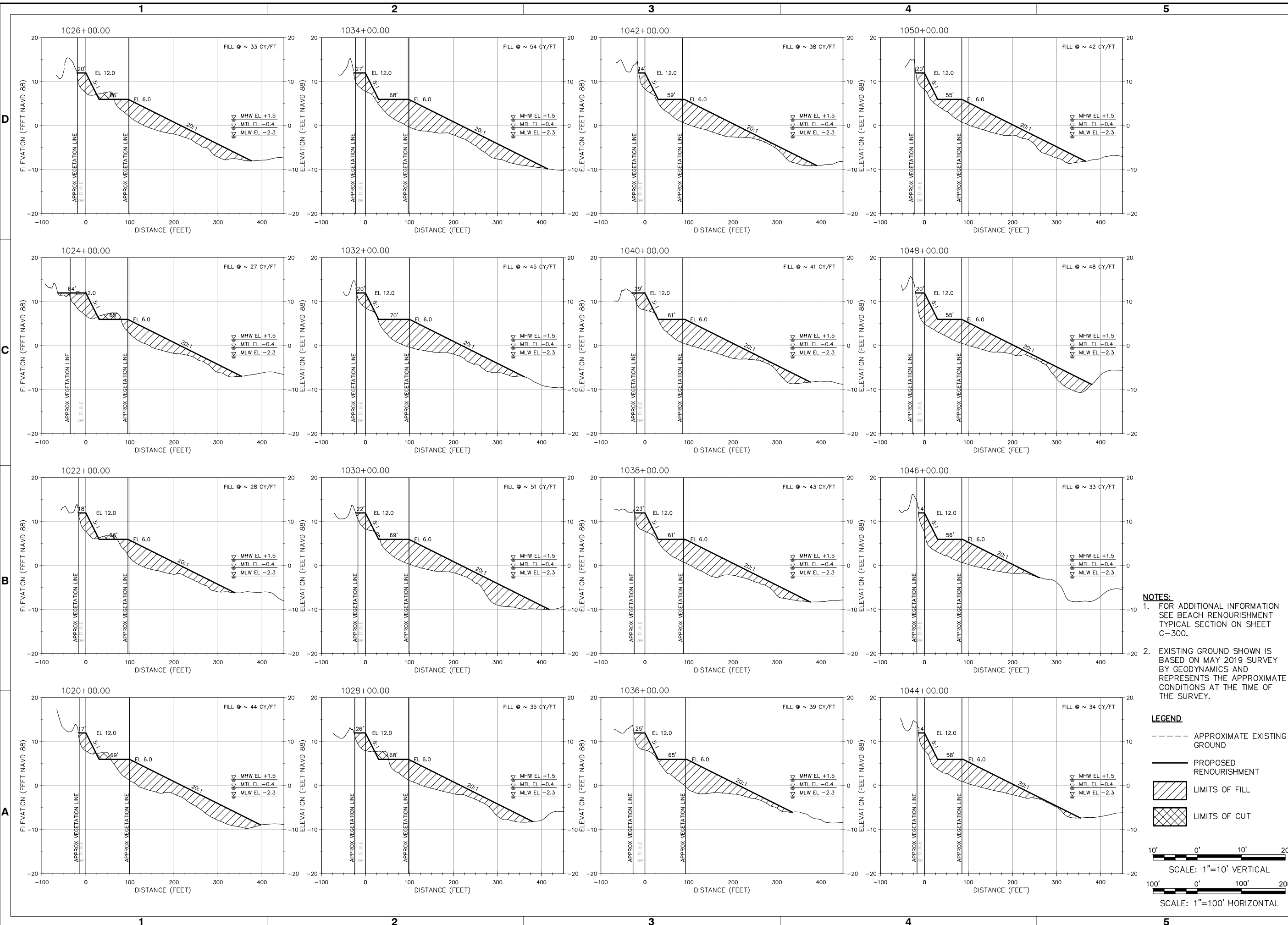
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Date: JANUARY 2020	Project No.: 10611	Drawing code: SRM	Drawing Scale: As Shown

4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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





NOTES:

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SCALE: 1"=10' VERTICAL

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

Rev.	1	Date	JANUARY 2020
Design	NCV	Drawn	BDF
Checked	JDM	Reviewed	JDM
Submitted	MOFFATT & NICHOL	Project No.	10611
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Drawn	BDF	Drawn Code	SRM
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Reviewed	JDM	Drawn Code	
Submitted	MOFFATT & NICHOL	Drawn Code	
Project	MAN	Project No.	10611
Drawn	BDF	Drawn Code	SRM
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Project	MAN	Project No.	10611
Drawn	BDF	Drawn Code	SRM
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**POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA**

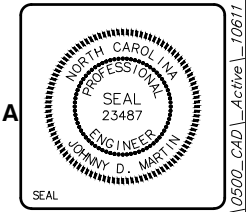
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SHEET 33 OF 35**

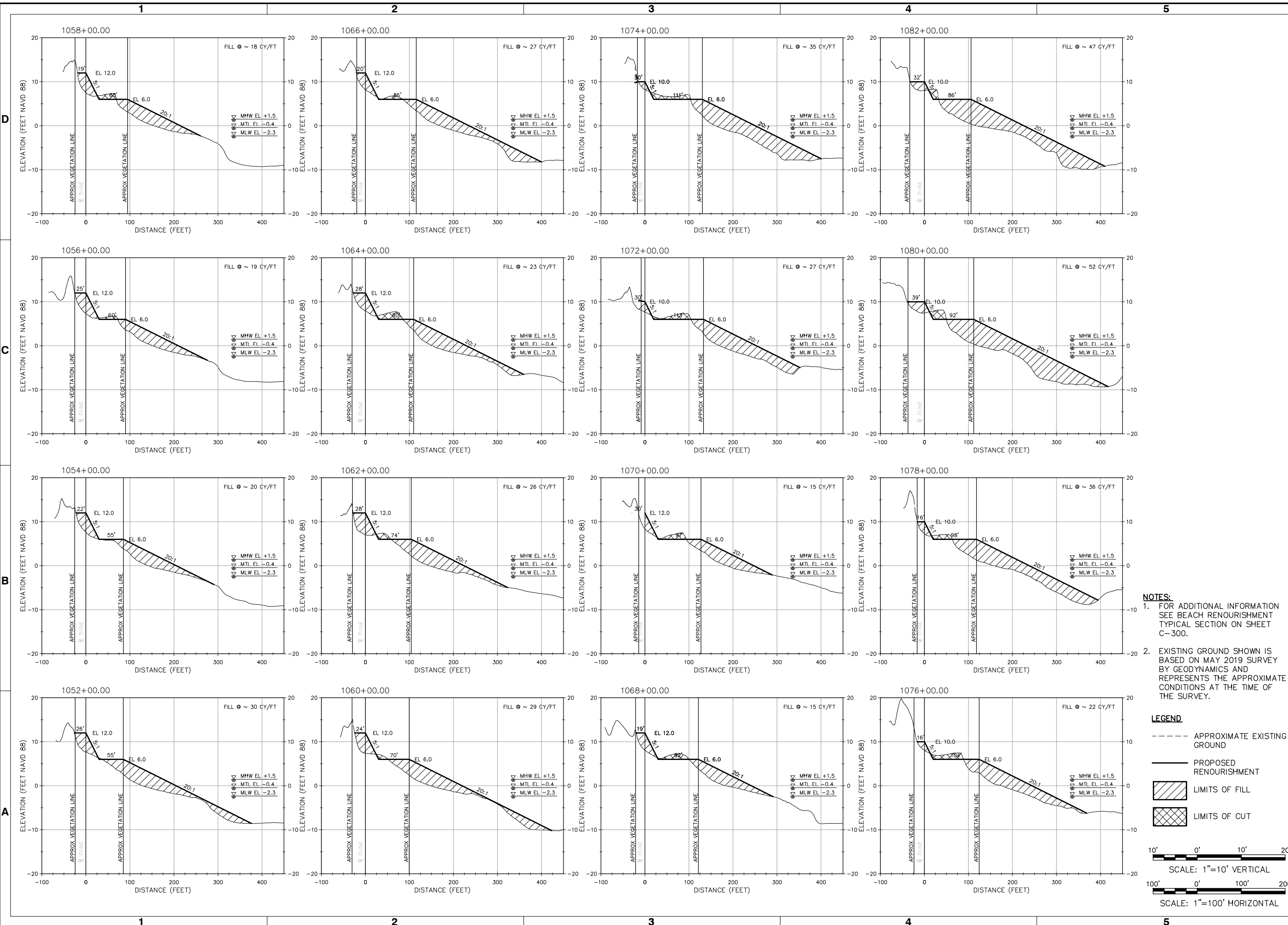
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SUITE 300
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919-781-4626

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PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
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Date: JANUARY 2020
Drawn by: BDF
Checked by: JDM
Reviewed by: JDM
Submitted by: MOFFATT & NICHOL
Project No.: 10611
Drawing Code: SRM
Drawing Scale: 1"=10' (D SHEET)
Plot Scale: 1"=100'





NOTES:

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1" = 10' VERTICAL
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Rev.	1	Date	JANUARY 2020
Design	NCV	Drawn	BDF
Checked	JDM	Reviewed	JDM
Submitted	MOFFATT & NICHOIL	Project No.	10611
Project	MAN	Project No.	10611
Drawn	BDF	Drawn Code	SRM
Checked	JDM	Drawn Scale	As Shown
Reviewed	MOFFATT & NICHOIL	Project Scale	As Shown
Submitted	MOFFATT & NICHOIL	Project Scale	As Shown

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

**RENOURISHMENT SECTIONS
SHEET 34 OF 35**

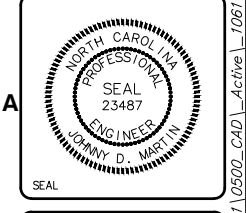
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4626	NC FIRM LICENSE No. F-0105
meffatt & nichoil	PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH

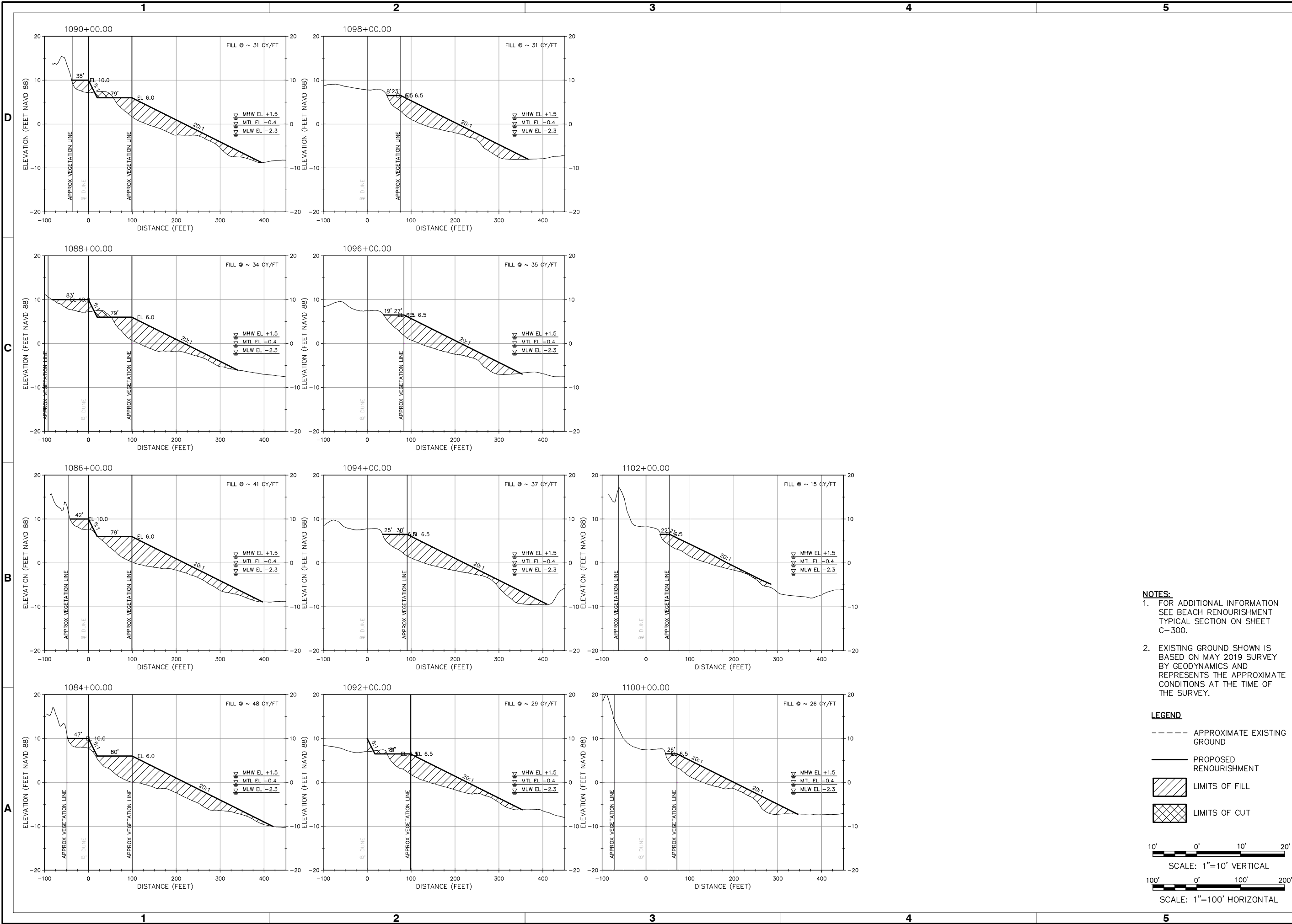
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919-781-4626

NC FIRM LICENSE No. F-0105

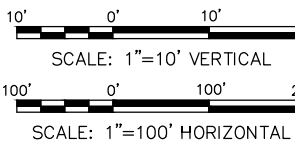
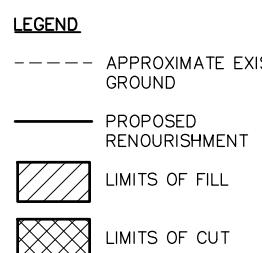
meffatt & nichoil

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





- NOTES:**
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Mark	Date	Description
1	02/14/20	PRE-CONSTRUCTION DESIGN REVISION
0	08/19/19	BID DOCUMENTS

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

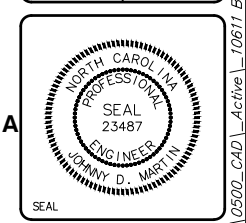
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Drawn by: BDF	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Drawing code:	Drawing Scale:	

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 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

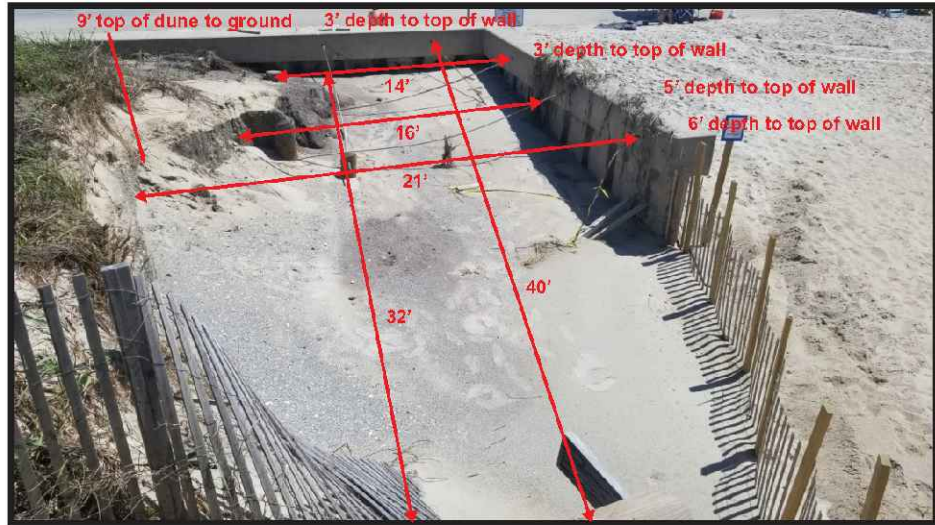
meffatt & nichol NC FIRM LICENSE No. F-0105

PREPARED FOR THE TOWNS OF
 EMERALD ISLE, INDIAN BEACH,
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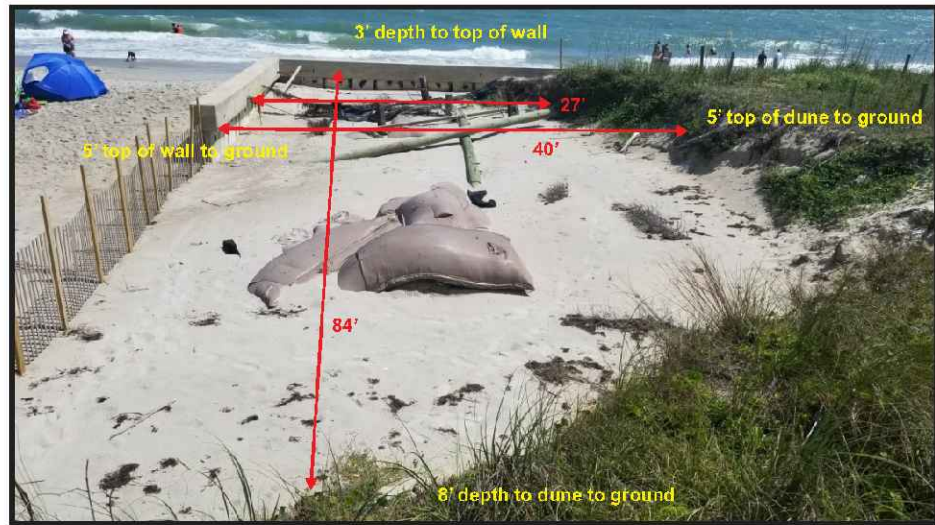
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C-335
 Sheet 64 of 66

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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 IRON STEAMER WEST FILL
C-124 NOT TO SCALE



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 IRON STEAMER EAST FILL
C-124 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

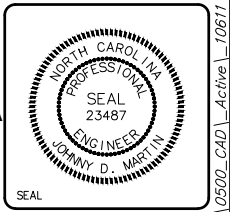
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4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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

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Sheet Reference No.
C-501
Sheet 65 of 66

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: *D. W. Hain*
Chairman of the Board

Attest:

Jennette Reese
County Clerk

TOWN OF ATLANTIC BEACH

By: *A. B. H. [unclear]*
Mayor

Attest:

Kelly J. Cypress
Town Clerk

TOWN OF PINE KNOLL SHORES

By: *[unclear]*
Mayor

Attest:

Janet H. Thomas
Town Clerk

TOWN OF INDIAN BEACH

By: *Frederic V. Vickel*
Mayor

Attest:

Ronda Lambert
Town Clerk

TOWN OF EMERALD ISLE

By: *Arthur B. Schoebf*
Mayor

Attest:

[unclear]
Town Clerk