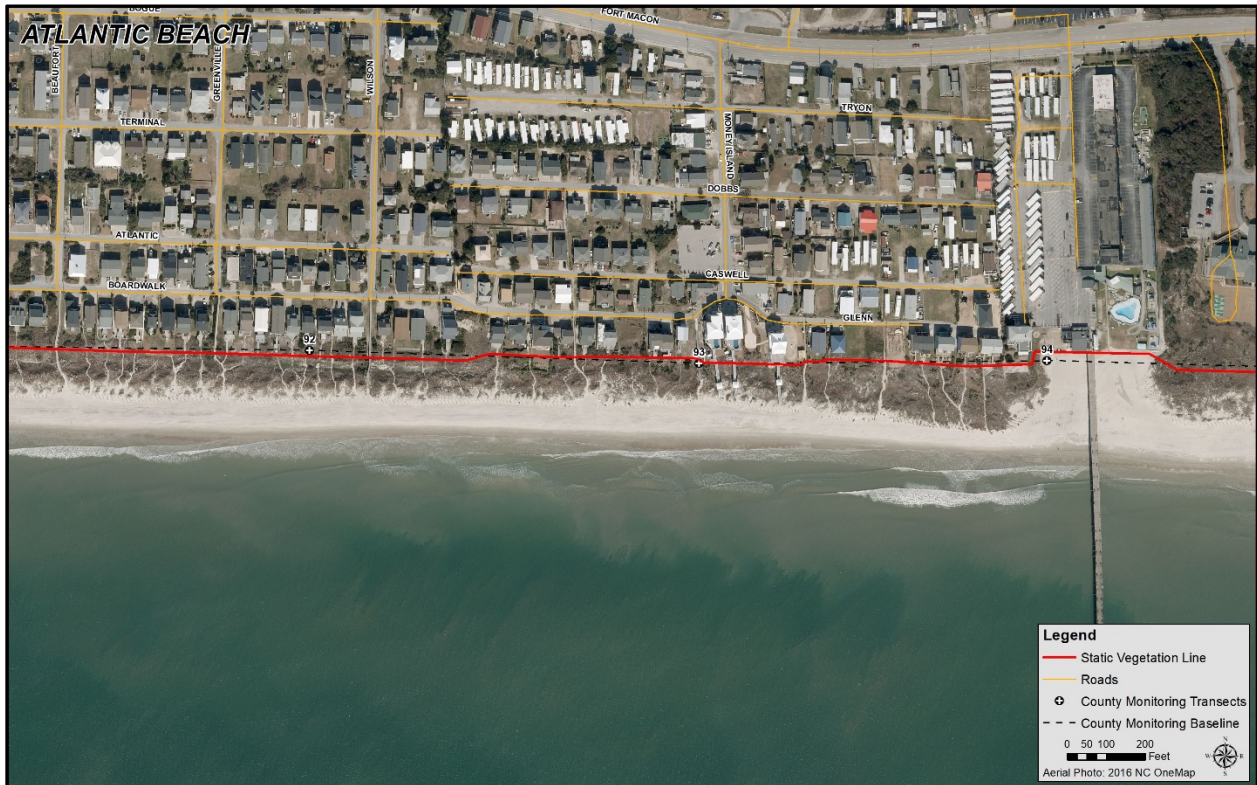


TOWN OF ATLANTIC BEACH, NC STATIC LINE EXCEPTION 5 YEAR REVIEW / REAUTHORIZATION

October 30, 2020



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Prepared For: Town of Atlantic Beach, NC



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1.0 PURPOSE

The Town of Atlantic Beach initially applied for and received an exception from the static line in accordance with procedures outlined in 15A NCAC 07J.1201 from the North Carolina Coastal Resources Commission on March 24, 2010. A second exception from the static line was subsequently applied for and approved five years later on April 29, 2015. A static vegetation line was established along most of the ocean shoreline of Atlantic Beach as a result of two beach disposal operations associated with the maintenance of the Morehead City Harbor federal navigation project (MCH). The first disposal operation occurred in 1986 and covered approximately the eastern half of the town's 4.5 mile shoreline extending west from the Atlantic Beach/Fort Macon State Park boundary (AB/FM). The second disposal operation occurred in 1994 and covered most of the remaining portion of the town's shoreline, ending approximately 2,500 feet east of the town's west boundary with Pine Knoll Shores (AB/PKS). The location of the static line combined with the rule establishing graduated setback requirements based on building size (15A NCAC 07h .0306), rendered at least 60 ocean front structures in Atlantic Beach non-conforming.

Recently, in February through April 2020, a portion of the Post-*Florence* Renourishment Project – Phase II (Reach 10) was constructed in Atlantic Beach, covering the entire western half of the shoreline from the AB/PKS town boundary to just east of The Circle. Therefore, the 2,500 ft of shoreline located in the westernmost portion of Atlantic Beach that was not originally included in the static line exception process, because it hadn't been previously nourished, has now triggered the current static line criteria with a project over 300,000 cy. The new static vegetation line together with the rule establishing graduated setback requirements based on building size (15A NCAC 07h .0306) renders the Double Tree Hotel and Smugglers Cove buildings non-conforming in this area.

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 all but the western 2,500 feet of shoreline (site of multiple USACE projects)**
- 2) the Town's initial static line exception authorization in 2020 for the westernmost 2,500 ft of shoreline (site of a portion of Reach 10 of the Post-*Florence* Renourishment Project – Phase II)**

2.0 SUMMARY OF FILL PROJECTS

Up until 2020, beach fill projects for the Town of Atlantic Beach were totally dependent on material deposited along its shoreline during construction and maintenance of the MCH federal navigation project. The USACE is congressionally mandated to maintain the Nation's navigational thoroughfares and conduct disposal practices "... in the least costly manner, at the least costly and most practicable location, and consistent with engineering and environmental requirements.", as specified in 33 C.F.R. § 335.4. This is often referred to as the "least-cost option" or the "Federal Standard", and has resulted in the partitioning of the MCH project into several reaches - Range A, the Cutoff, Range B, Range C, and the Turning Basin. Historically, the Cutoff and Range A (collectively known as the Outer Harbor) has been maintained by hopper dredging

that collects sediment from the base of the channel and travels to one of two disposal areas located 1 to approximately 6.0 miles offshore to dispose the dredged material. More recently, the material has been placed onto Atlantic Beach and Fort Macon in some instances. Maintenance and construction of Range B, C and the Turning Basin (known as the Inner Harbor) has been conducted utilizing a pipeline dredge that carries sediment from these areas to the confined upland disposal site of Brandt Island, located north of Ft. Macon State Park. This material has also historically been pumped onto Atlantic Beach from Brandt Island in some instances. Most recently, the Town of Atlantic Beach has elected to develop an engineered beach along the western half of the shoreline from The Circle to the Atlantic Beach/Pine Knoll Shores town boundary and participated in Phase II of the Post-*Florence* Renourishment Project in 2020.

2.1 Nourishment History (1978 – 2020)

A description of the nourishment events in Atlantic Beach and Fort Macon resulting from the MCH federal navigation project and, most recently, the locally sponsored Post-*Florence* Renourishment Project – Phase II are presented in the following sections. Figure 2-1, following these sections, displays the location and quantities associated with each event.

2.1.1 1978 USACE Disposal

1,179,600 cy of material from the Turning Basin, Range C, and Range B were placed along the Ft. Macon shoreline during construction of the 40-foot MLW deepening project.

2.1.2 1986 USACE Disposal

The upland recycling facility of Brandt Island was excavated (“pumped-out”) for the first time with 3,918,484 cy placed along Atlantic Beach and Ft. Macon. An additional 250,116 cy of channel and basin material was pumped directly to the beach disposal area resulting in a total of 4,168,600 cy being placed on the beach.

2.1.3 1994 USACE Disposal

A total of 4,664,400 cy of material was placed along the least cost corridor of Atlantic Beach and Ft. Macon, including; the second pump-out of Brandt Island (2,473,700 cy), Inner Harbor deepening material associated with the 45-foot MLW project (1,725,000 cy), and routine Inner Harbor maintenance (465,700 cy).

2.1.4 2002 USACE Disposal

209,348 cy of material maintained from Range B and a portion of Range C were directly placed along the beaches of Ft. Macon.

2.1.5 2005 USACE Disposal

2,390,000 cy and 530,729 cy of material were placed along Atlantic Beach and Ft. Macon, respectively (2,920,729 cy total) in association with the third Brandt Island pump-out and routine Inner Harbor maintenance.

2.1.6 2007 USACE Disposal

184,828 cy of material maintained from Range B and a portion of Range C were directly placed along the beaches of Ft. Macon, discreetly along the bath house region of the State Park shoreline.

2.1.7 2011 USACE Disposal

A total of 1,346,700 cy of material was dredged from Range B, the Cutoff, and Range A and placed along Atlantic Beach and Fort Macon. Fort Macon received 547,196 cy while Atlantic Beach received 799,504 cy, extending from the AB/FMSP boundary west to the Circle.

2.1.8 2014 USACE Disposal

A total of 1,107,585 cy of material was dredged from Range B and Range A and placed along Atlantic Beach and Fort Macon. Fort Macon received 585,067 cy while Atlantic Beach received 522,518 cy, extending from the AB/FMSP boundary west to Freeman Lane.

2.1.9 2015 USACE Disposal

Approximately 150,000 cy of material was dredged from the Cutoff in order to excavate some pipeline previously left on the seafloor. The dredged shoal material was placed along 3,000 ft of shoreline on Fort Macon to the east of the Picnic Park Dr lot.

2.1.10 2017 USACE Disposal

A total of 621,000 cy of material was dredged from the Cutoff and placed along 9,500 ft of the Atlantic Beach shoreline from Seaspray to The Circle.

2.1.11 2020 Post-Florence Phase II

The *Post-Florence* Renourishment Project, which was partially funded by FEMA, was divided into three phases with Phase I occurring in 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. Atlantic Beach was not included in the *Post-Florence* Phase I project which placed material in Emerald Isle and Indian Beach/Salter Path but the *Post-Florence* Phase II project placed material between County Transects 77 and 91 (Figure 2-1). The *Post-Florence* Phase II project also placed material in Emerald Isle, Salter Path, and Pine Knoll Shores. As was the case for previous post-storm restorations along the Bogue Banks shoreline (Hurricane *Isabel*, Hurricane *Ophelia*, and Hurricane *Irene* restorations), the *post-Florence* restoration used material from the ODMDS which was transported to the beach via hopper dredges. The *post-Florence* Phase II restoration placed a total of 2,022,807 cubic yards of material along various sections of Bogue Banks, of which 522,291 cubic yards was placed between monitoring transects 77 and 91, designating the western portion of Atlantic Beach from the Pine Knoll Shores/Atlantic Beach boundary to The Circle. The total cost of the *post-Florence* Phase II restoration was \$28,068,085, of which FEMA (Category G) and State (CSDM) funds were used in combination with funds from the County and Towns of Emerald Isle, Pine Knoll Shores, and Atlantic Beach. Since Atlantic Beach was not previously part of the engineered beach along Bogue Banks, which extends from Emerald Isle through Pine Knoll Shores, it was not eligible for any federal funding from FEMA and was therefore financed with State and local funds only. The total local cost for the *post-Florence* Phase II restoration allocated to the Town of Atlantic Beach was \$3,770,463 (County reserve). Appendix A contains the plans for the 2020 *Post-Florence* Renourishment Project - Phase II, the only locally sponsored project to occur within the last 5 years, covering a portion of Atlantic Beach included in the existing static line exception extents, which begin at Transect 80 and continue east through the end of Fort Macon, and also a portion of Atlantic Beach not previously included in the static line exception process (Transects 77 – 80).

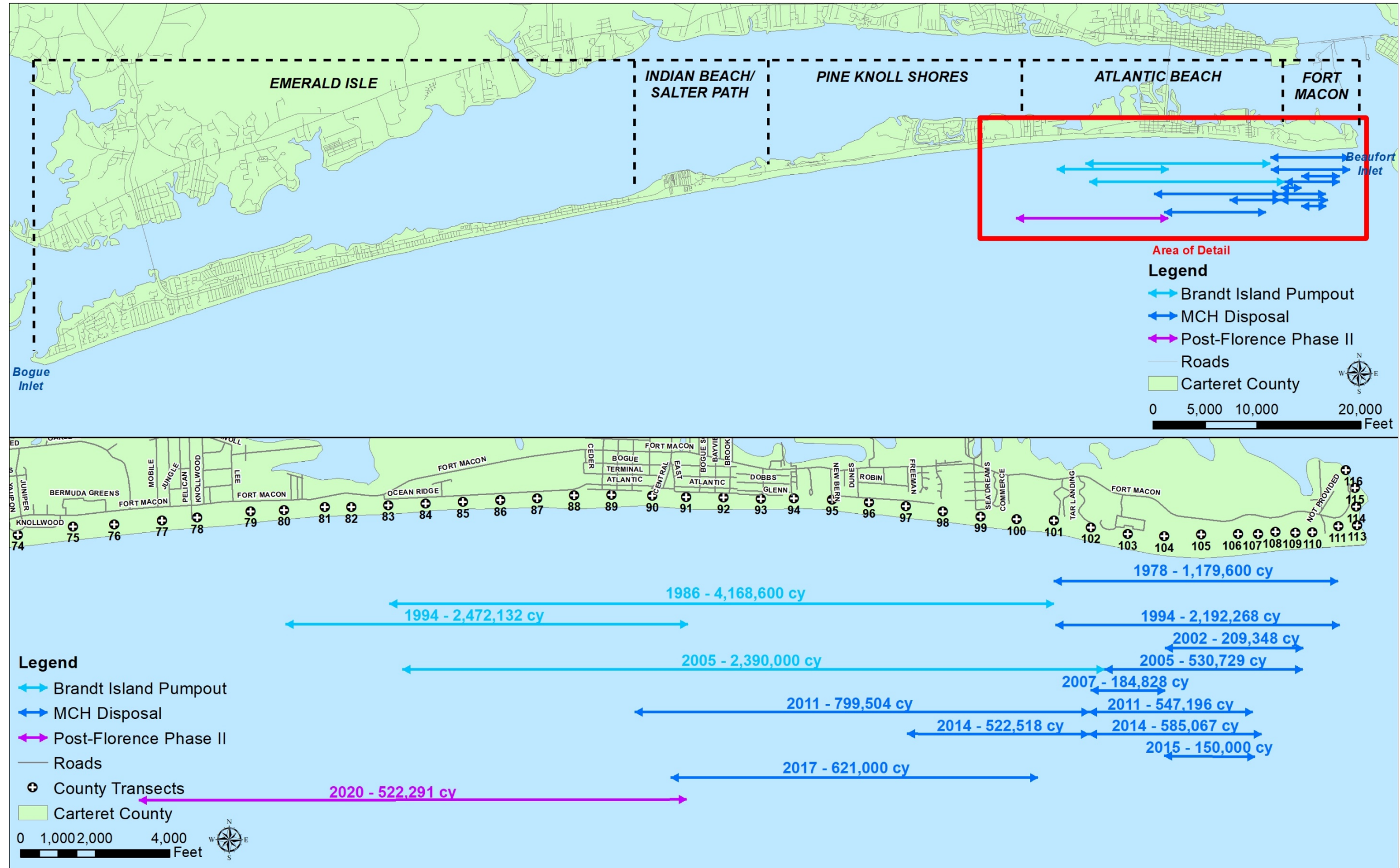


Figure 2-1. Atlantic Beach & Fort Macon Nourishment History

2.2 Establishment of Static Vegetation Line

2.2.1 Initial Static Vegetation Line

Disposal operations on Atlantic Beach in 1986 and 1994 triggered a static line which extended from near the AB/PKS boundary east to the Fort Macon Terminal groin and therefore satisfied a requirement of 15A NCAC 07J .1201 whereby an exception request could be made after 5 years. This request was approved and adopted on March 24, 2010. It was then followed, five years later, by a second exception request which was approved and adopted on April 29, 2015.

The Atlantic Beach project differs from the traditional beach nourishment projects which have taken place along the remainder of Bogue Banks in that the material placed on the beach has mostly been derived from construction and maintenance activities associated with the MCH federal navigation project. As a matter of background, the original rules for the static vegetation line were formulated so as not to require the establishment of a static vegetation line for routine navigation channel maintenance operations that involved disposal of beach quality dredged material on the beach. Generally, these operations involve material quantities less than 200,000 cubic yards and result in minor widening of the beach over relative short lengths of shoreline. However, the beach disposal operations carried out for the MCH project far exceed the norm and result in substantial widening of the beach that can stretch over several miles. Consequently, the original static line rule included a disposal threshold that would have to be exceeded in order to invoke the static vegetation line. This threshold included a total volume equal to or greater than 200,000 cubic yards and a placement rate of 50 cubic yards/lineal foot or greater. While the static vegetation line threshold has now been changed to beach fills equal to or greater than 300,000 cubic yards, the existing rule still does not obviate the MCH disposal operations from the static line rule given that they often exceed 1 million cy. The existing static vegetation line along Atlantic Beach and Fort Macon is shown in Figure 2-2 to Figure 2-11 overlain on 2016 aerials. The line was developed by the Division of Coastal Management using aerial photography from September 7, 1984.

The static line in Atlantic Beach and Fort Macon extends almost the entire length of Atlantic Beach from just west of Lee Drive to the Fort Macon Terminal Groin. 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 Atlantic Beach and Fort Macon which fall under the static line exception was determined to be 2.0. There are currently 289 oceanfront lots within the static line extents of which 15 are currently vacant.



Figure 2-2. Atlantic Beach Static Vegetation Line (1 of 10)

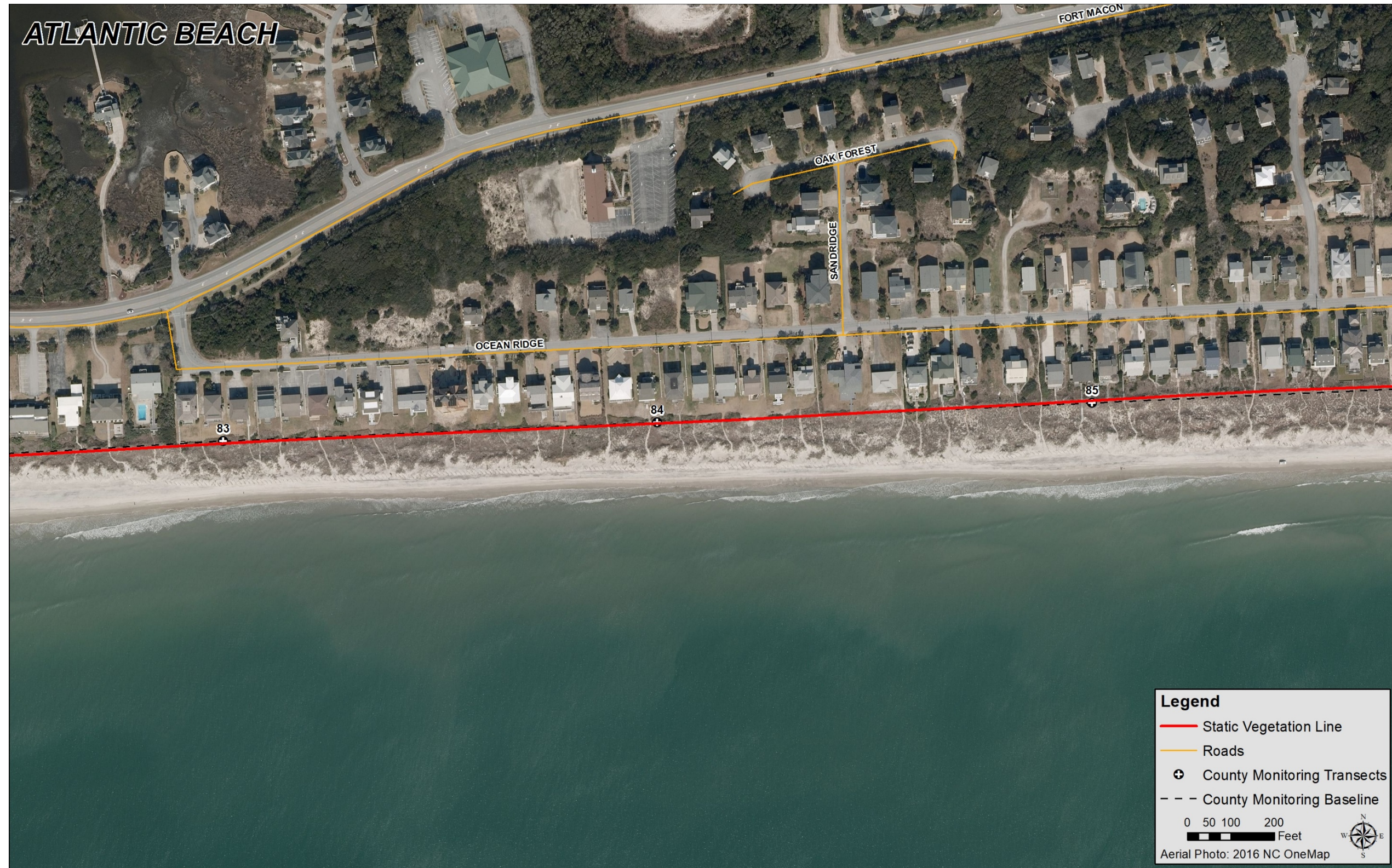


Figure 2-3. Atlantic Beach Static Vegetation Line (2 of 10)

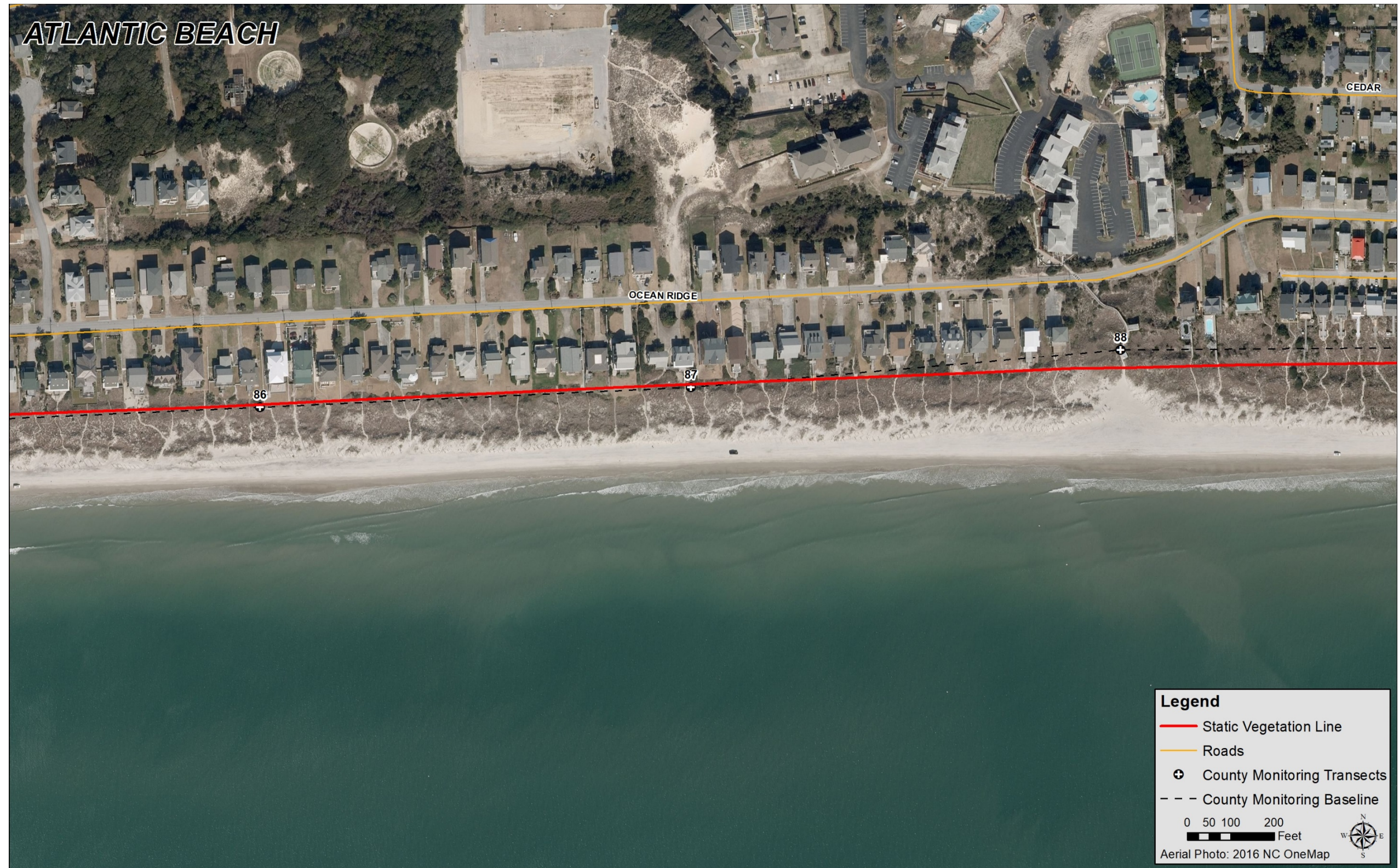


Figure 2-4. Atlantic Beach Static Vegetation Line (3 of 10)



Figure 2-5. Atlantic Beach Static Vegetation Line (4 of 10)

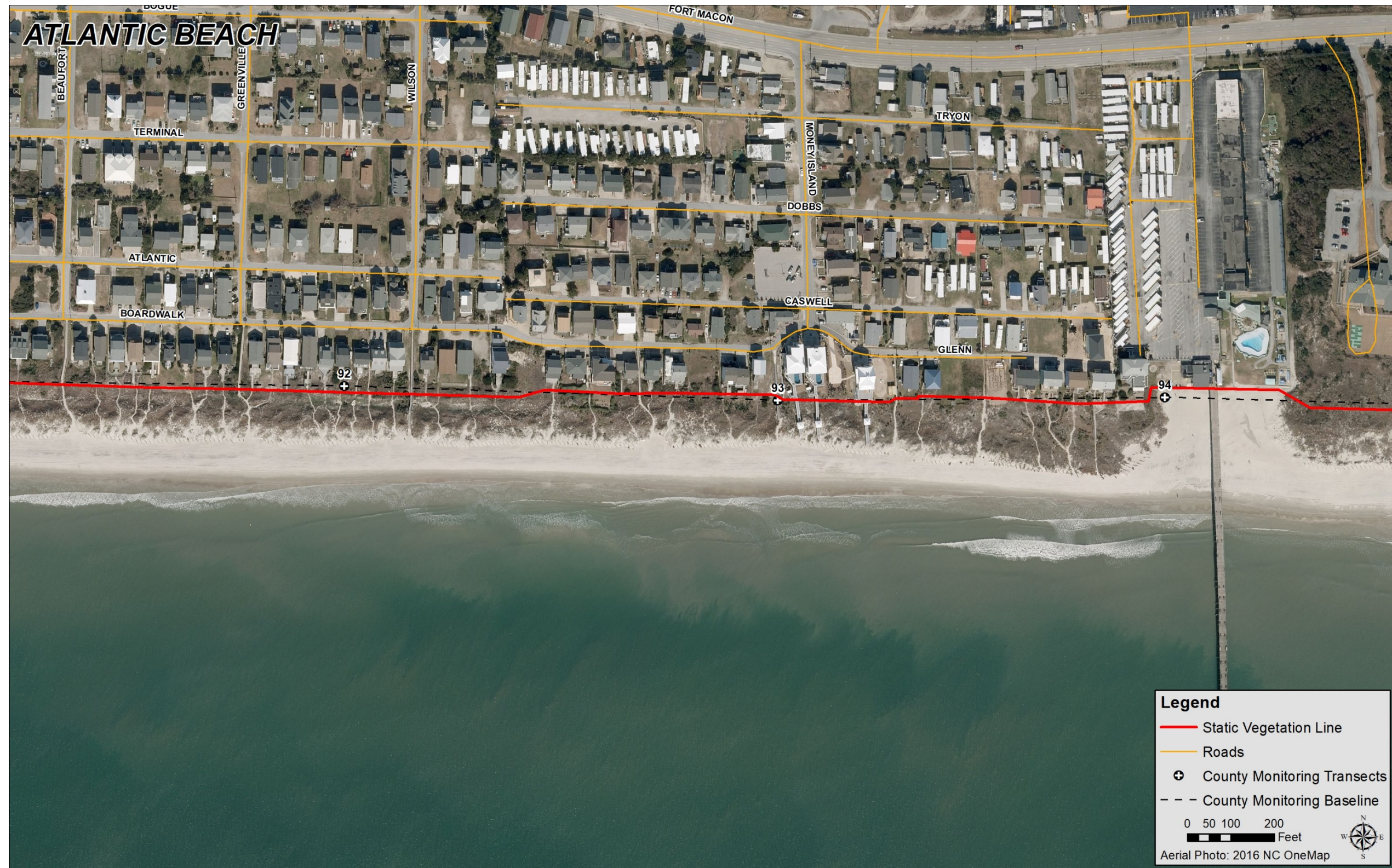


Figure 2-6. Atlantic Beach Static Vegetation Line (5 of 10)



Figure 2-7. Atlantic Beach Static Vegetation Line (6 of 10)



Figure 2-8. Atlantic Beach Static Vegetation Line (7 of 10)

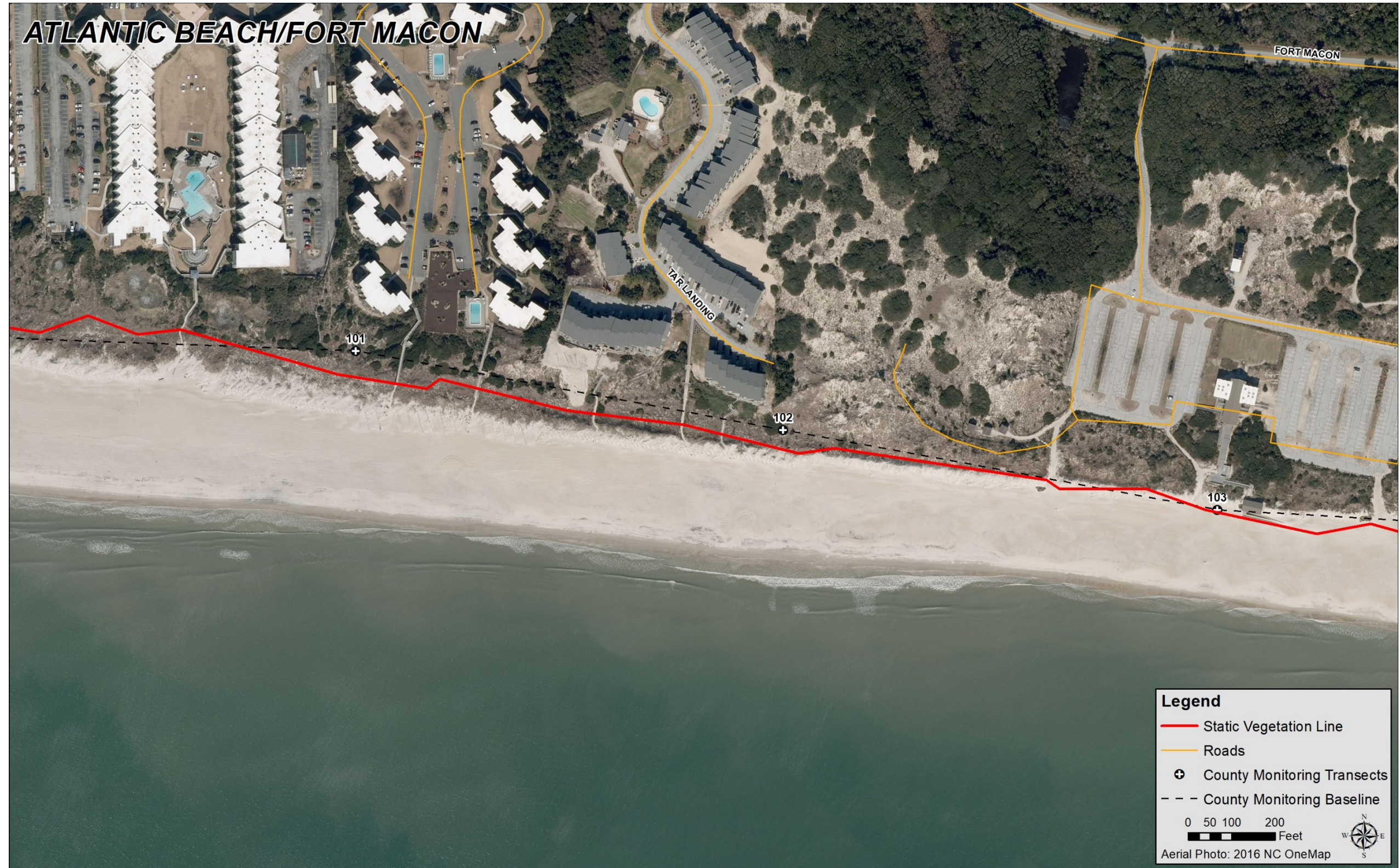


Figure 2-9. Atlantic Beach/Fort Macon Static Vegetation Line (8 of 10)



Figure 2-10. Fort Macon Static Vegetation Line (9 of 10)



Figure 2-11. Fort Macon Static Vegetation Line (10 of 10)

2.2.2 New Static Vegetation Line

With construction of Phase II of the Post-*Florence* Renourishment Project, a static line requirement was triggered between monitoring transects 77 and 80 in western Atlantic Beach. Material had never been placed in this small section of Atlantic Beach, rendering it absent from any static line exception process previously. 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 western Atlantic Beach, which was nourished during Phase II of the Post-*Florence* Renourishment Project, is presented in Figure 2-12, overlain on 2016 aerial photography.

The static line in the above referenced portion of western Atlantic Beach extends approximately 2,500 ft between County Transect 77, at the Double Tree Hotel, to County Transect 80, at Smugglers Cove. This area makes up a small portion of the Atlantic Beach monitoring reach (Transects 77 – 102). 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 Atlantic Beach which falls under the new static line extents was determined to be 2.0. There are currently 9 oceanfront lots within these new static line extents of which 1 is currently vacant.



Figure 2-12. Western Atlantic Beach Static Vegetation Line

2.3 Initial Periodic Nourishment Plan

Historically, during the formulation of the project to deepen the MCH project from 35-foot mean low water (MLW) to 40 feet MLW in the early 1970's, the USACE (USACE 1976) determined the least cost disposal of material removed to maintain the Inner Harbor would involve the temporary storage of material in an upland disposal area known as Brandt Island, and once full, the Brandt Island disposal area would be pumped-out with the material being distributed along the shoreline on the east end of Bogue Banks. The estimated time between pump-out operations was 8 to 10 years. The designated beach disposal area for the MCH project eventually evolved to include approximately 7 miles of shoreline on the east end of Bogue Banks beginning at the Fort Macon terminal groin and extending west into the Town of Pine Knoll Shores. However, given funding and equipment limitations, disposal of the material removed from Brandt Island never extended all the way to the AB/PKS town limit. In addition, direct placement from the Outer Harbor has occurred at varying time intervals in both Fort Macon and Atlantic Beach. The timing of the direct placement was interspersed with years of offshore disposal to the nearshore berm or ODMDS.

The USACE began development of a Dredged Material Management Plan (DMMP) in 2010. For the initial three year period from 2011 to 2013, while the DMMP was being developed, the USACE instituted an Interim Operation Plan (IOP). The IOP included a three-year cycle consisting of maintenance of portions of the Outer Harbor with deposition of the material on Atlantic Beach and Fort Macon during Year 1, spot maintenance of the Outer Harbor with disposal in either the ODMDS or the near shore berm during Year 2, and maintenance of the Inner Harbor with disposal on Brandt Island as well as offshore during Year 3. At the end of the three-year IOP, the USACE had not completed the DMMP but did restart the 3 year cycle by placing Outer Harbor material on Atlantic Beach and Fort Macon in 2014. The DMMP was officially completed in 2016, taking on a similar look to the IOP. Year 1 is the only phase of the DMMP that places sand dredged from the harbor along the beaches of Bogue Banks. Year 2 includes "touch-up" dredging of the outer harbor with nearshore disposal (~250,000 cubic yards), and Year 3 includes a more robust maintenance event for the outer harbor, with an estimated 750,000 cubic yards of sand to be disposed in the nearshore disposal area. Areas of the harbor containing non-beach compatible shoal material will be dredged in Years 2 and 3, and will be disposed in either Brandt Island or dumped in the southwest corner of the Offshore Dredged Material Disposal Site, located roughly 3 miles offshore. Therefore, the 2017 disposal event was the first event under the DMMP with the next event scheduled for the upcoming 2020-2021 dredging window. The updated DMMP did provide the option for placement of material all the way west to the PKS/IBSP boundary with the understanding that local funds would most likely be required to pay the "delta" costs for placing material that far west given likely cost constraints.

2.4 Future Nourishment Plans

2.4.1 DMMP

With the finalized DMMP, Atlantic Beach and Fort Macon can anticipate receiving material about every third year as far west as the Circle (and possibly further subject to federal, state, and local funding). Due to the poor quality of material removed from Brandt Island during the 2005 pump-out operation, the USACE has indicated the revised DMMP will not include the disposal of the Brandt Island material on the east end of Bogue Banks. USACE sampling of the shoal material

throughout the Harbor in preparation of the revised DMMP has identified a portion Range C, all of Range B and the Cutoff, and a portion of Range A to shoal with beach compatible material. Therefore, the material shoaling these sections of the harbor will be targeted for disposal along the Atlantic Beach and Forth Macon shorelines.

Permit authority now exists to place material westward of the Circle in Atlantic Beach, all the way to the eastern edge of and within Pine Knoll Shores. It was also posited that the County and Towns of Atlantic Beach and Pine Knoll Shores would also be able to possibly participate in additional “delta” projects where they would pay the delta costs during either Year 2 or 3 to place additional sand westward of the Circle in Atlantic Beach up to the Pine Knoll Shores and Indian Beach/Salter Path boundary. It was originally anticipated that the DMMP would include a financial MOU agreement with Carteret County on future cost sharing plans to place material further west (the “delta” projects mentioned previously) on Bogue Banks instead of the nearshore disposal area, but this has yet to be finalized. Given the uncertainty of future ability to provide adequate nourishment material west of the Circle in conjunction with the MCH federal navigation project, Carteret County elected to build a locally funded project along the western portion of Atlantic Beach (Post-Florence Phase II), allowing for participation in the Master Beach Nourishment Plan and ability to apply for FEMA funding after storm events (Category G). Even if the MOU is finalized in the future, it is expected that most of the costs for the sand placed by these “delta” projects will be borne by the State and local governments.

2.4.2 Master Beach Nourishment Plan

Due to Federal funding limits and historical patterns of placement being limited to the eastern half of the shoreline in Atlantic Beach, the Town has elected to develop an engineered beach along the western portion of the shoreline, and therefore, partially participate in the Bogue Banks Master Beach Nourishment Plan with the neighboring towns of Emerald Isle, Indian Beach/Salter Path and Pine Knoll Shores. 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 Atlantic Beach project area was determined to be 254 cy/ft. Therefore, the Town of Atlantic Beach will initiate nourishment actions along the western portion

of shoreline (County Transects 77 – 91), which is currently participating in the Master Beach Nourishment Plan, once this trigger is met.

Table 2-1. Master Plan Nourishment Triggers

Reach	-12 ft Trigger
Bogue Inlet (1-11)	235
Emerald Isle West (12-25)	266
Emerald Isle Central (26-36)	211
Emerald Isle East (37-48)	221
Indian Beach/Salter Path (49-58)	224
Pine Knoll Shores (59-76)	211
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 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.**

Again, Atlantic Beach has now committed to maintaining an engineered beach for its shoreline including and west of the Circle. Participation in Phase II of the Post-Florence Renourishment Project has established an initial project from which to monitor the status of the beach. Figure 2-13 shows the future nourishment plan for the Atlantic Beach project area, for non-storm losses, under the Bogue Banks Master Beach Nourishment Plan. It is estimated that Atlantic Beach will require 494,835 cy of nourishment every 3 years to maintain the 25-year level of protection. While the Master Beach Nourishment Plan was developed for all of Atlantic Beach, it is likely that only the western portion will have to participate in the near future due to continued efforts from the USACE DMMP along the eastern portion of the shoreline. Therefore, the volume need along the western portion of shoreline would be less than the 494,835 cy determined for all of Atlantic Beach and nourishment intervals could likely be lengthened due to the more stable nature of the western portion of the shoreline as distance from Beaufort Inlet increases. Therefore, while the DMMP maintenance along the eastern portion of the shoreline typically falls on a 3 year cycle, the Master Beach Nourishment Plan maintenance of the western portion of the shoreline will be based on the nourishment trigger of 254 cy/ft.

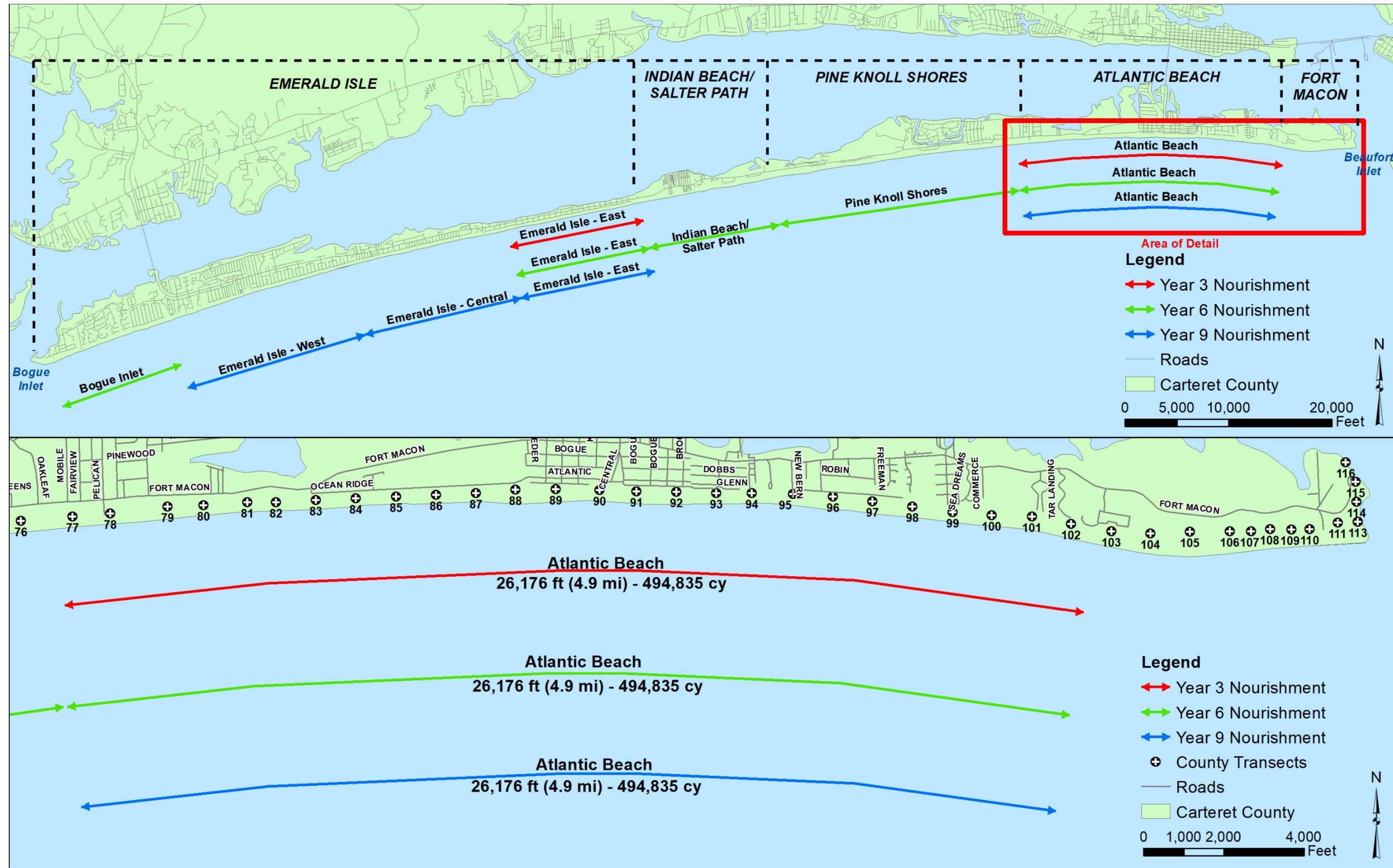


Figure 2-13. Bogue Banks Master Beach Nourishment Plan

3.0 PROJECT DESIGN AND PERFORMANCE

3.1 DMMP Project Template

The design template for the disposal of the 1986 Brandt Island material along Atlantic Beach included a variable width horizontal berm at elevation +10 ft NAVD with the material allow to assume its natural angle of repose seaward of the berm crest. Shortly after placement, vertical scarps became prevalent along the entire beach fill area. The formation of the vertical scarps was attributed to the +10 ft NAVD elevation of the berm with was about 4 feet above the elevation of normal wave run-up. Subsequent nourishment operations carried out lowered the berm elevation to +6 ft NAVD which allow normal wave and tide action to overtop the berm thus preventing the formation of vertical scarps. Note that through the course of a year, tides and wave vary and can produce a natural crest elevation of the berm greater than 6 ft NAVD which in turn can result in the formation of scarps. However, by lowering the design elevation of the berm, the scarps that do form are normally less than a foot high and are short lived. Figure 3-1 shows a comparative plot of typical profiles along eastern Atlantic Beach beginning in September 1981, prior to the first Brandt Island pump-out in 1986, through May 2020. The profile comparisons show that the beach continues to be maintained well seaward of the 1981 (pre-project) shoreline.

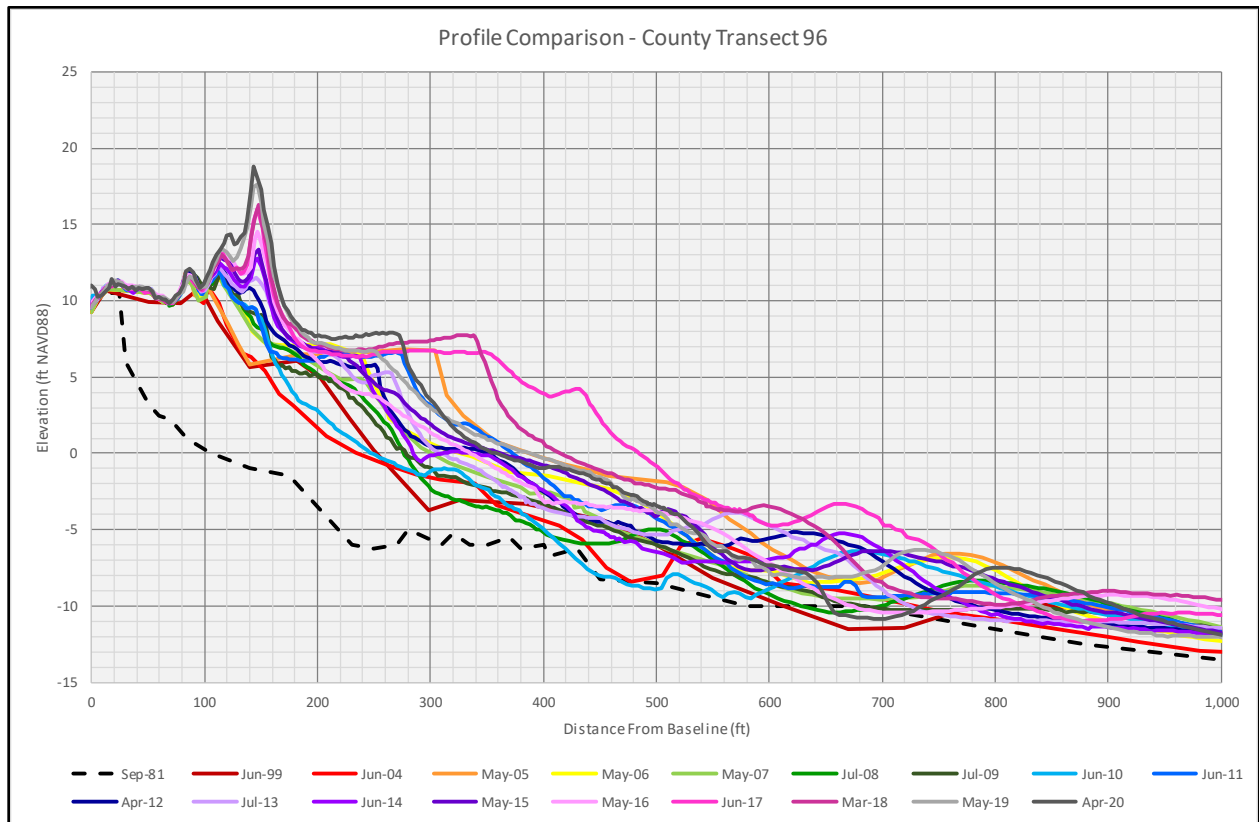


Figure 3-1. Profile Comparisons for County Transect 96

3.2 Post-Florence Phase II Project Template

For the western portion of Atlantic Beach (Transects 77 – 91), the Post-Florence Phase II project established the engineered beach which the Town plans to monitor and maintain in accordance

with Master Beach Nourishment Plan. 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 3-2 presents a typical cross section for the project template. Figure 3-3 present an example section from construction showing the pre- and post-nourishment profile.

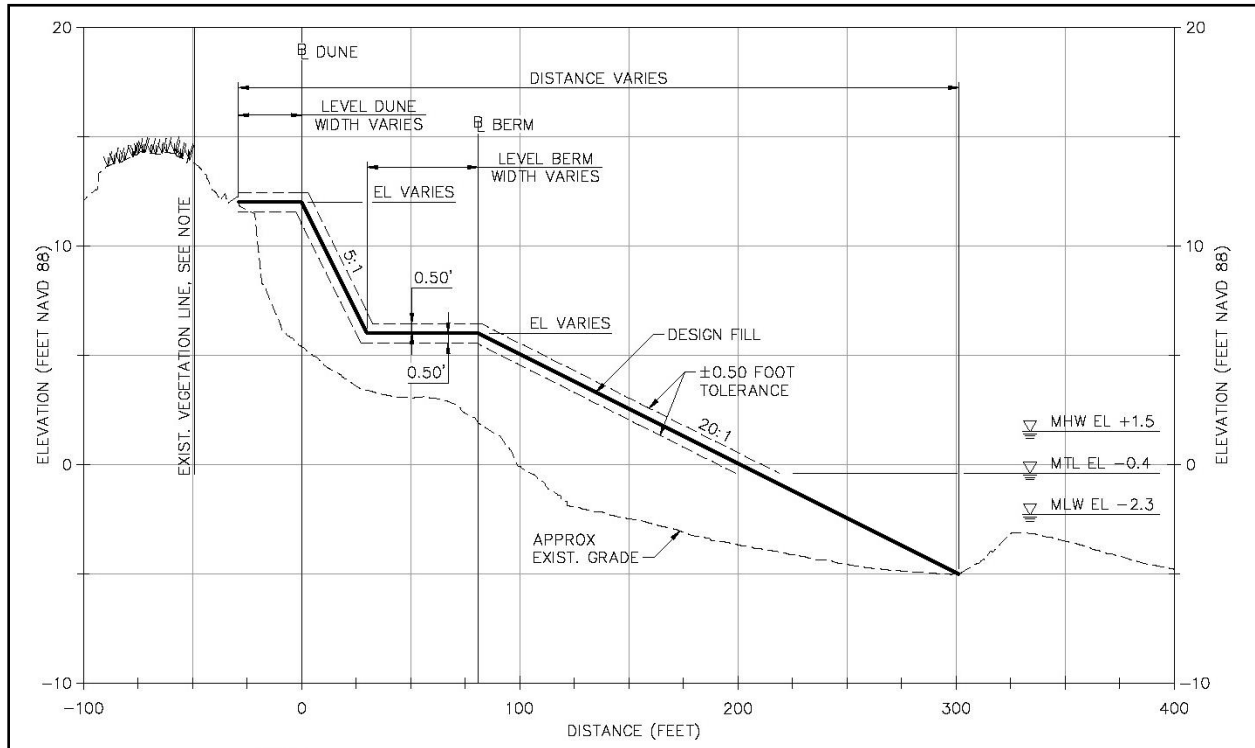


Figure 3-2. Post-Florence Phase II Typical Cross Section

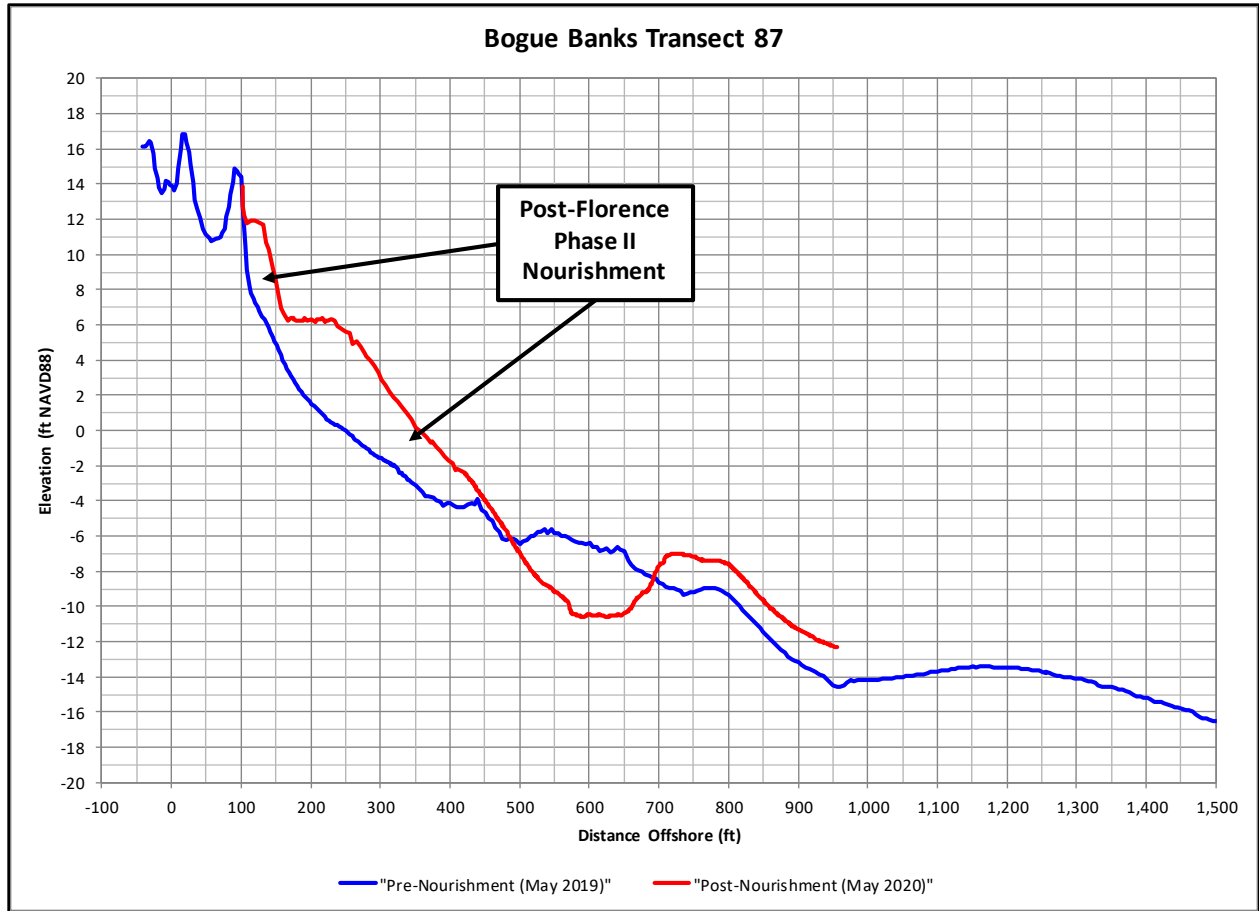


Figure 3-3. Transect 87 Pre- and Post-Nourishment Example

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. Among the items analyzed, is the amount of material on the beach, from the peak of the dune to the outer bar at -12 ft NAVD88. Although Atlantic Beach has historically been maintained through a different process (Federal USACE project) than the remainder of Bogue Banks (Local projects), the initial oceanfront nourishment trigger set up as part of the Bogue Banks Restoration Project (Phases I, II, and III) of 225 cy/ft from the peak of the dune to the outer bar at -12 ft NAVD88 has historically been monitored in Atlantic Beach as well. Figure 3-4 shows the average profile volume from each year of monitoring from 2004 – 2014 in addition to an initial survey which was taken in 1999 to assess the state of the beach after the hurricanes of the 1990's in preparation for planning of the Bogue Banks Restoration Project. As can be seen, through the early efforts of the Morehead City Harbor federal navigation project, Atlantic Beach maintained a significant amount of material, well above the historic island wide trigger of 225 cy/ft.

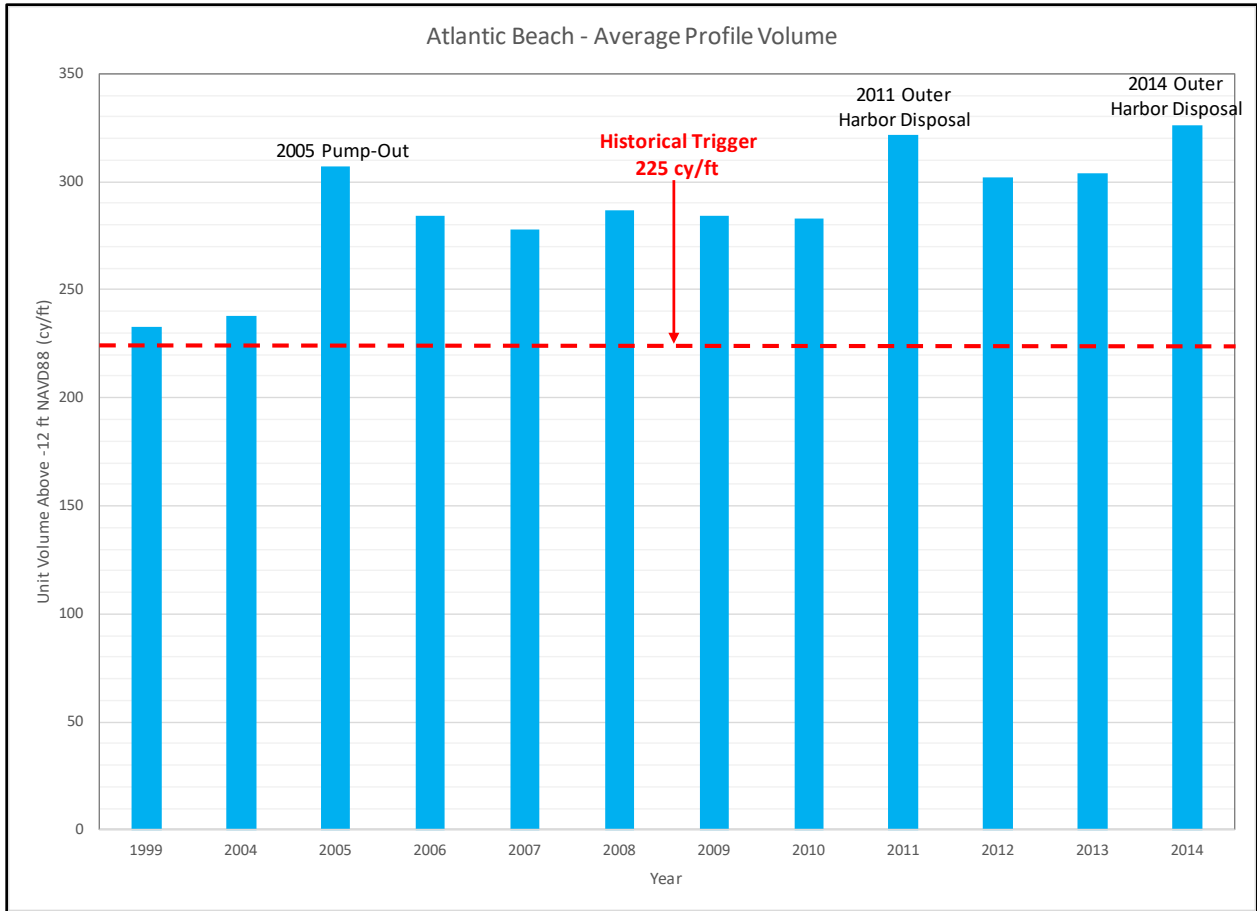


Figure 3-4. Atlantic Beach Average Profile Volume Above -12 ft NAVD88: 2004 – 2014

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. Similar to previous efforts, although Atlantic Beach has historically been maintained through a different process (Federal USACE project) than the remainder of Bogue Banks (Local projects), the new nourishment triggers set up by the Master beach Nourishment Plan have been monitored as well. Figure 3-5 shows the average profile volume calculated above -12 ft NAVD88 for the Atlantic Beach monitoring reach during each year of monitoring from 2015 - 2020. As can be seen from this figure, the average profile volumes have been maintained above the Master Beach Nourishment Plan trigger of 254 cy/ft for the Atlantic Beach monitoring reach.

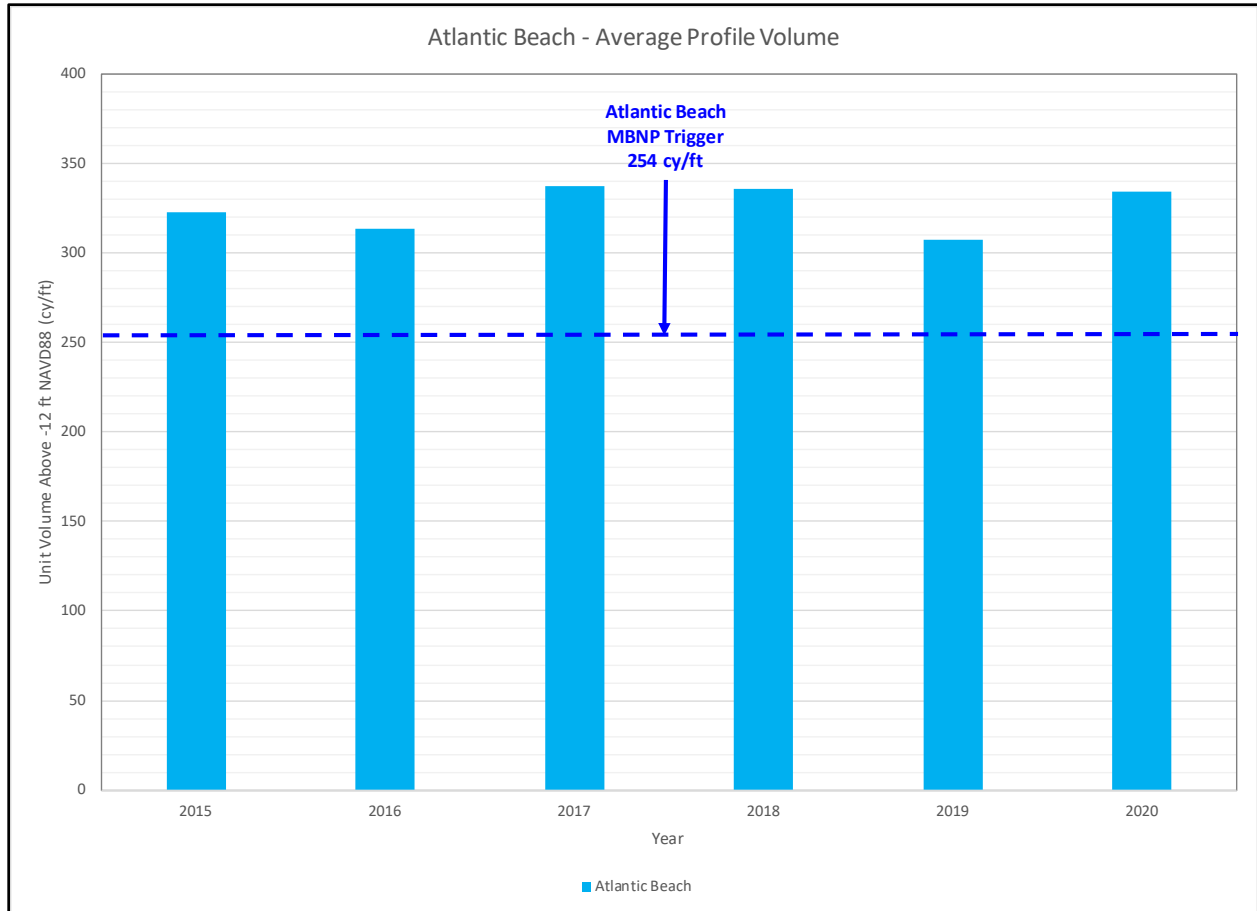


Figure 3-5. Atlantic Beach Average Profile Volume Above -12 ft NAVD88: 2015 – 2020

4.0 COMPATIBLE SEDIMENT

Material removed from navigation channels is considered by the USACE to be compatible with the native material if the silt content (i.e., material with a grain size equal to or less than 0.0625 mm) is less than 10%. This is the same standard adopted by the State for beach nourishment emanating from the maintenance of navigation channels (15A NCAC 07H .0312).

Historically, material from the Inner Harbor (Range B, Range C, and the Turning Basin) has been transferred, stored, and subsequently pumped out of Brandt Island. Based on observations by the local municipalities, the dredged material pumped to Atlantic Beach from Brandt Island has been comprised of sand with a preponderance of mud. These observations are consistent with the provenance of sediments entering the Inner Harbor, which are mostly fine grained. The USACE 2001 Section 111 Report (USACE 2001) estimates that only 69% of Inner Harbor material pumped onto Atlantic Beach and Fort Macon has been beach quality. Material from the Turning Basin and the northern portion of Range C is generally considered not to be of beach quality while material from the southern portion of Range C and Range B is considered to generally be beach compatible. The Outer Harbor (Range A and the Cutoff) tends to have coarser grained material, which is more similar to the native beach. It is estimated that almost 100% of this material beach quality. Figure 4-1 shows the compatible and non-compatible portions of the Morehead City Harbor.

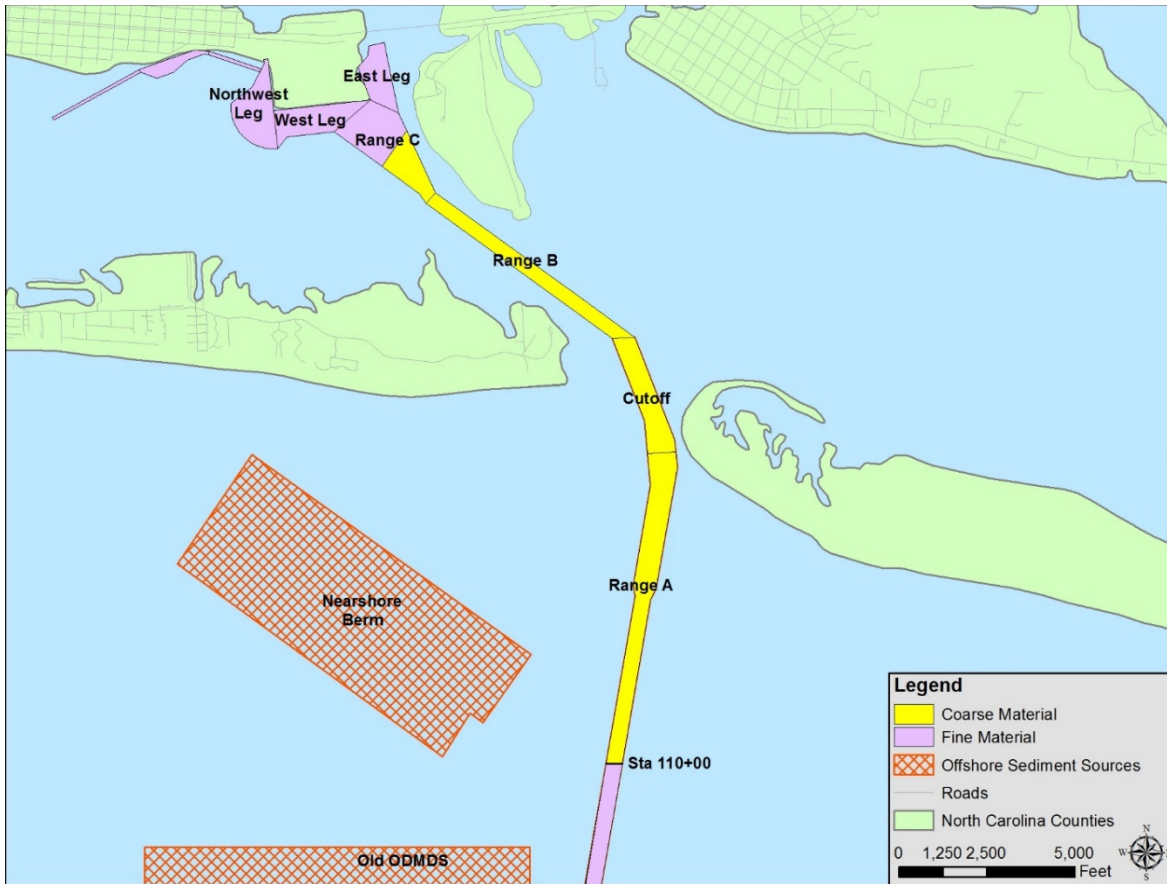


Figure 4-1. Morehead City Harbor Material Compatibility

Recently, the western portion of Atlantic Beach has implemented the design of an engineered beach and elected to participate in the Bogue Banks Master Beach Nourishment Plan. As such, sediment sources developed as part of the Master Beach Nourishment Plan will also be applicable to Atlantic Beach. As part of the 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 yrs. 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 4-2 shows a summary of the potential sediment sources identified for use over the next 50 years.

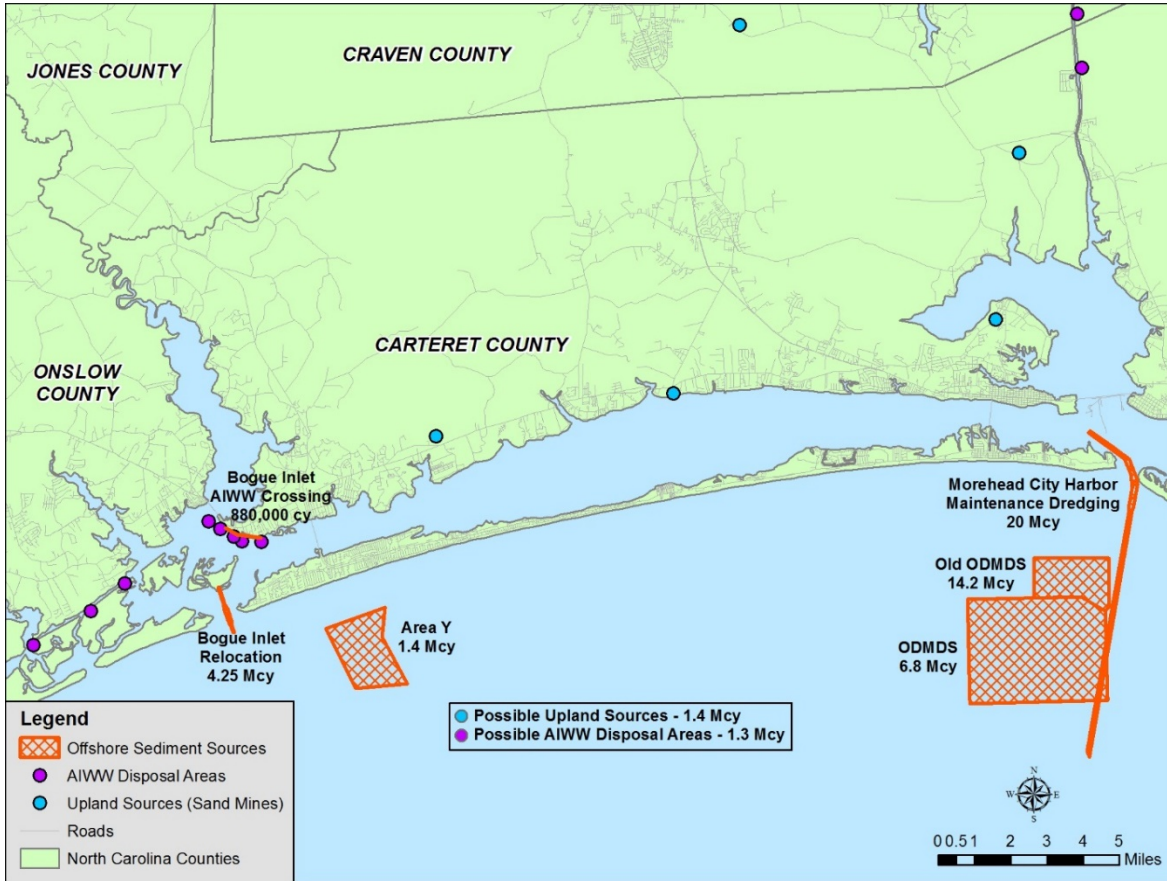


Figure 4-2. Master Beach Nourishment Plan Potential Sediment Sources

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%,	0.7% + 10%	≤ 11%
Gravel (>#4)	Assumed 0.7% each	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 4-3.

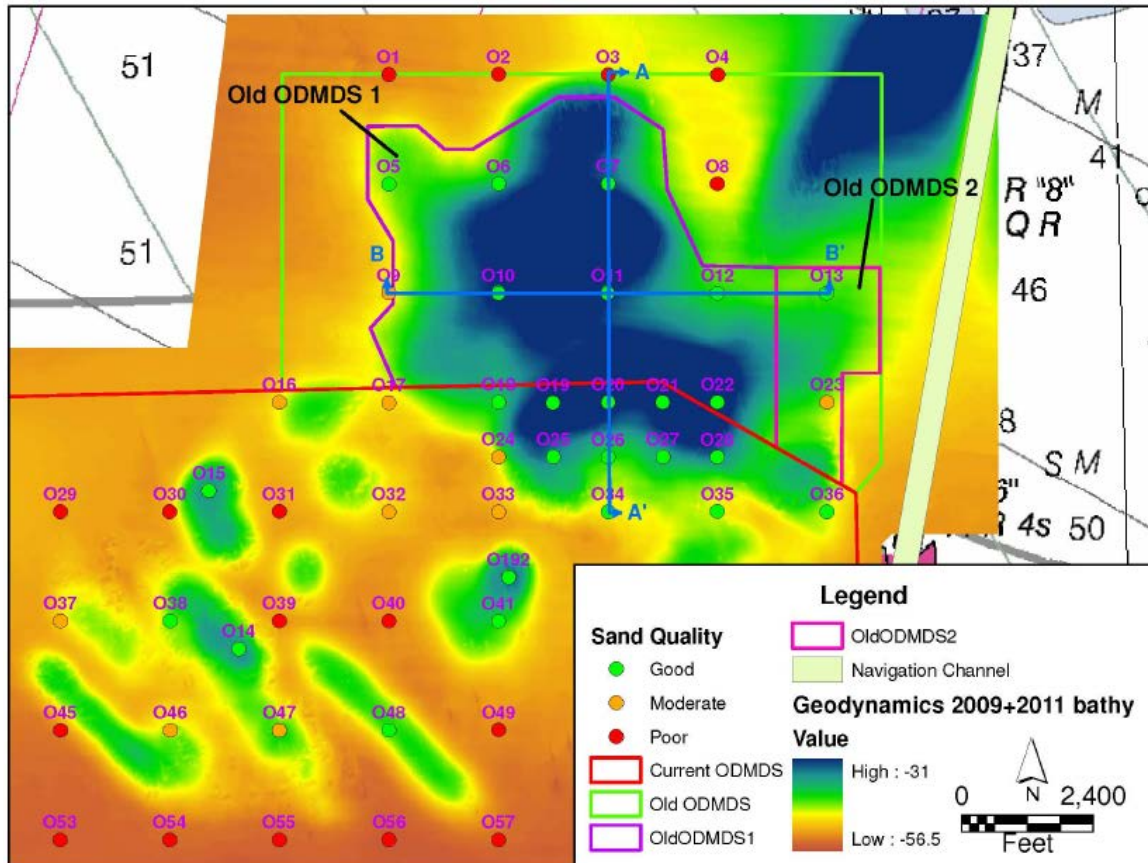


Figure 4-3. Old ODMDS Site and Vibracore Locations (Coastal Tech, 2013)

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 4-4; 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.

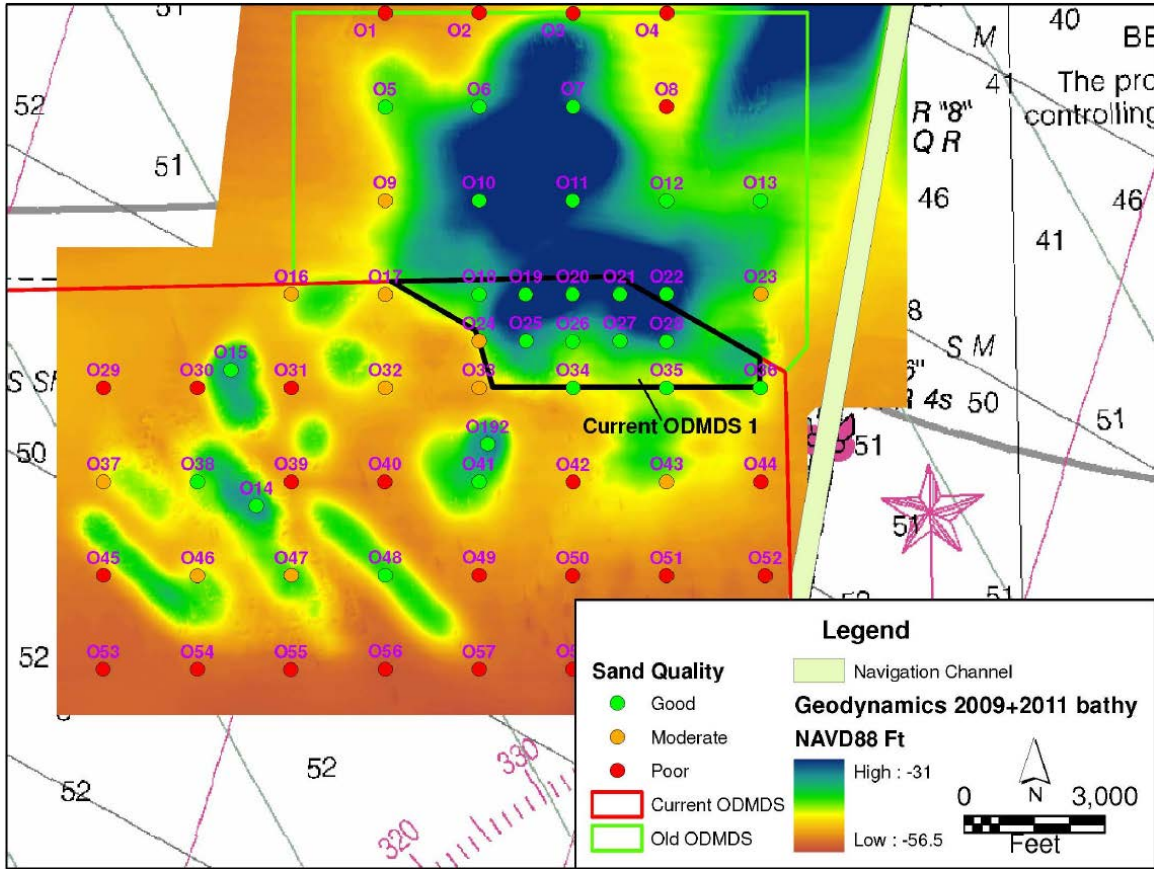


Figure 4-4. Current ODMDS 1 Site and Vibracore Locations (Coastal Tech, 2013)

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 4-5.

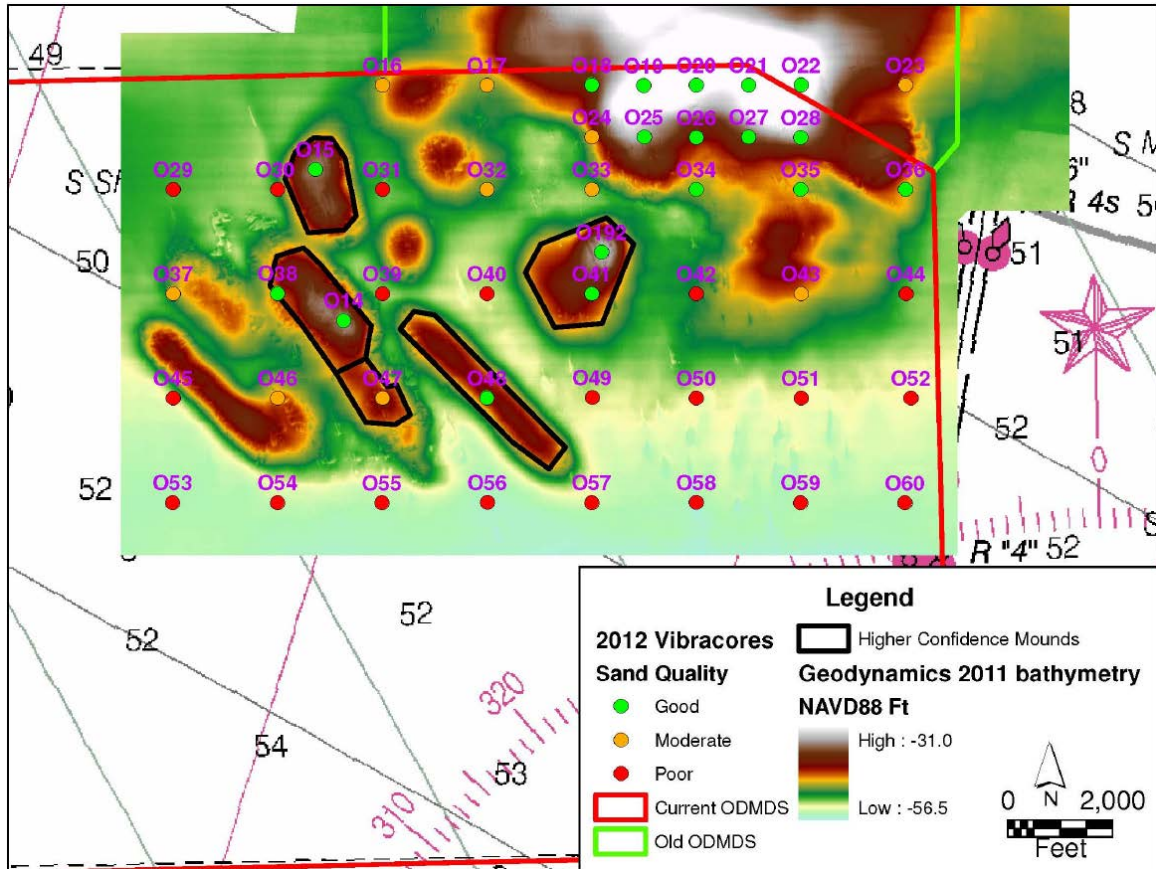


Figure 4-5. Higher Confidence Mound Sites and Vibracore Locations (Coastal Tech, 2013)

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 4-6.

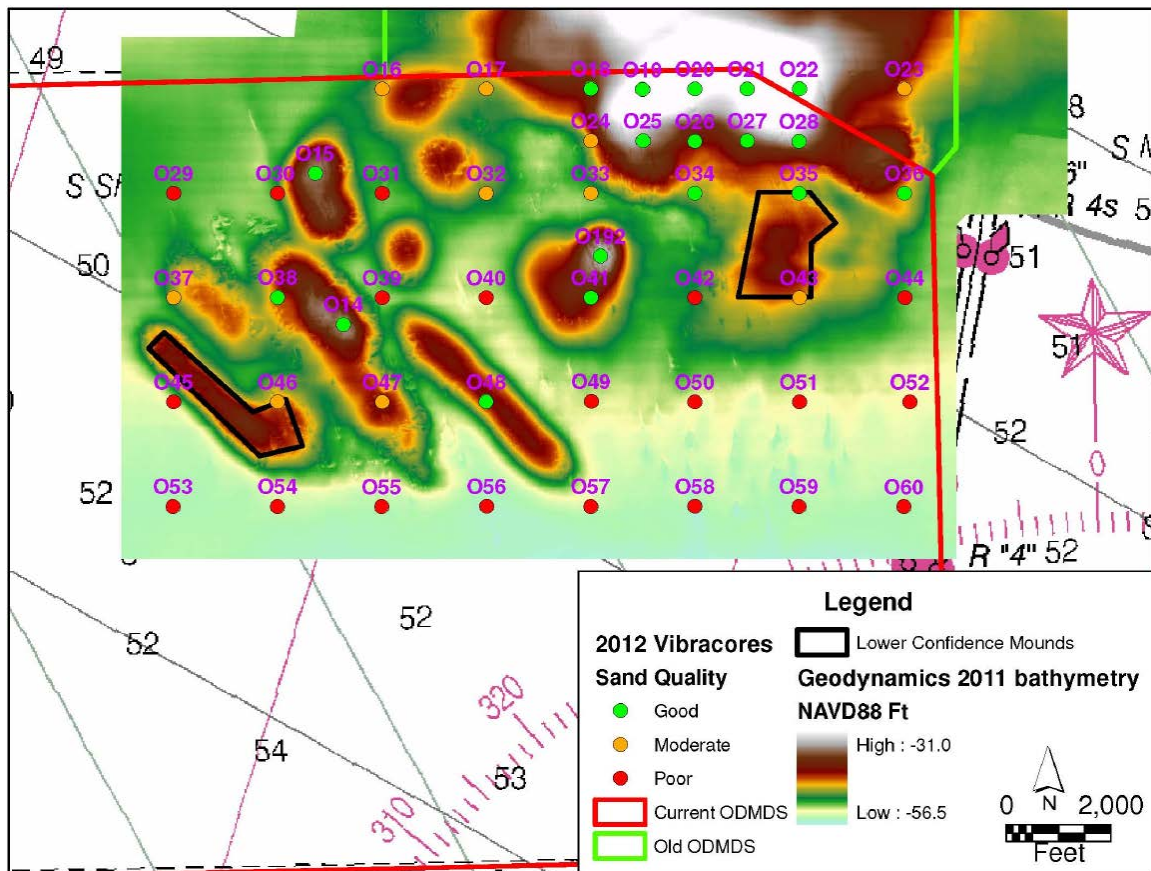


Figure 4-6. Lower Confidence Mound Sites and Vibracore Locations (Coastal Tech, 2013)

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 4-7. 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.

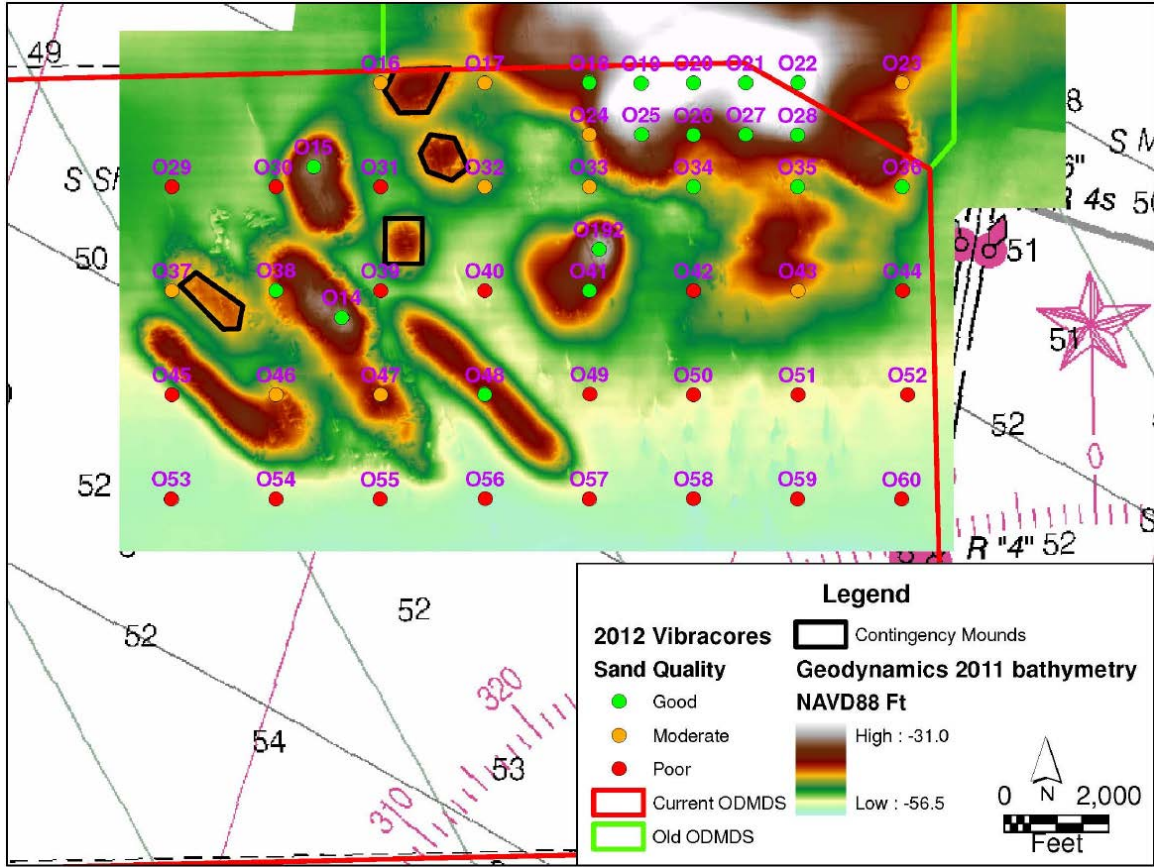


Figure 4-7. Contingency Mound Sites and Vibracores (Coastal Tech, 2013)

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 4-8.

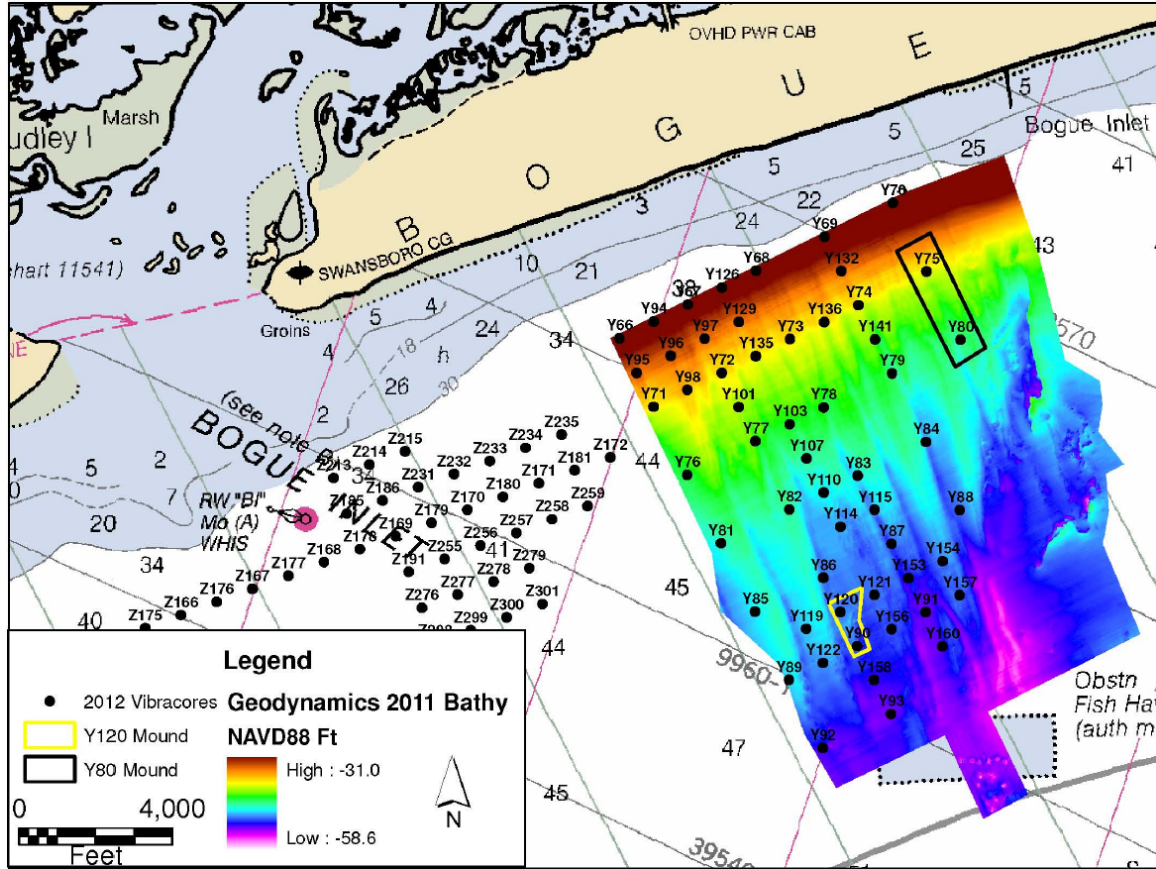


Figure 4-8. Area Y Site and Vibracore Locations (Coastal Tech, 2013)

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 4-9. 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.

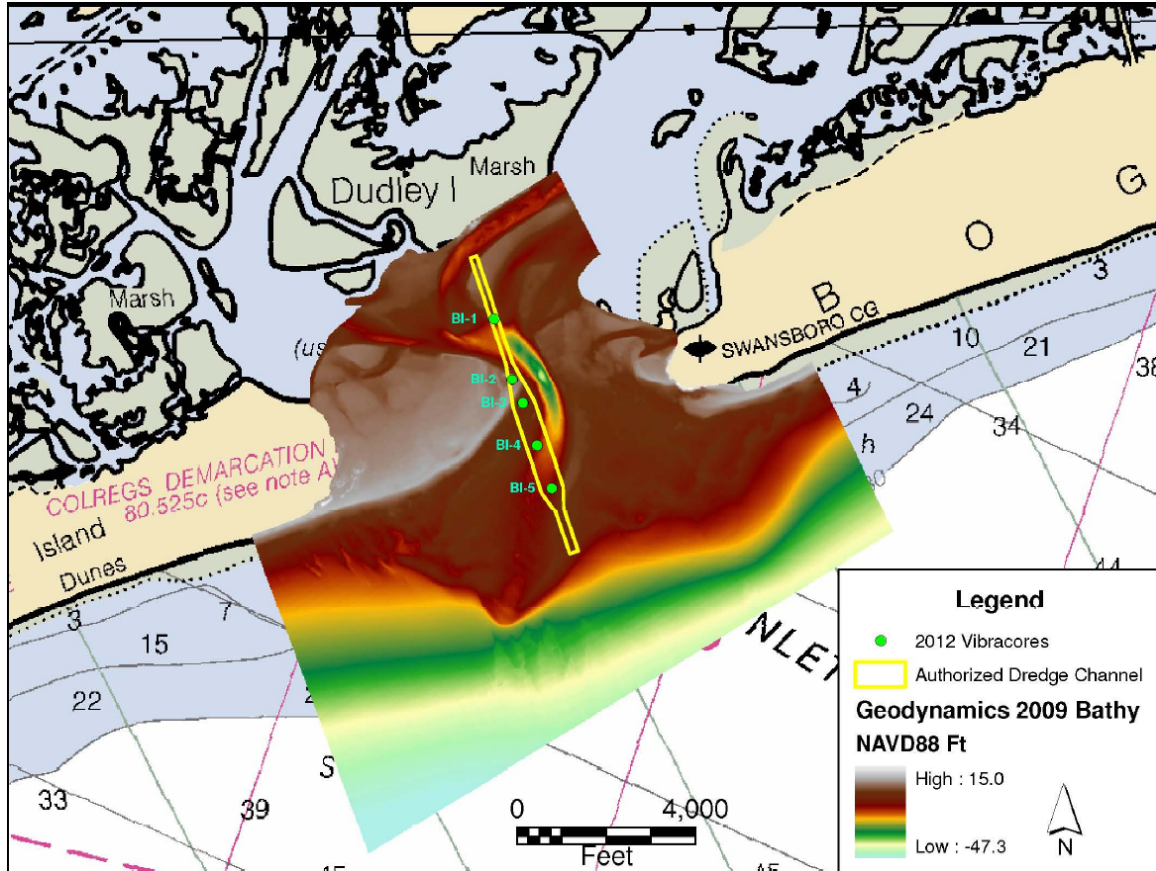


Figure 4-9. Bogue Inlet Channel Site, Vibracores, and Authorized Channel Location (Coastal Tech, 2013)

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

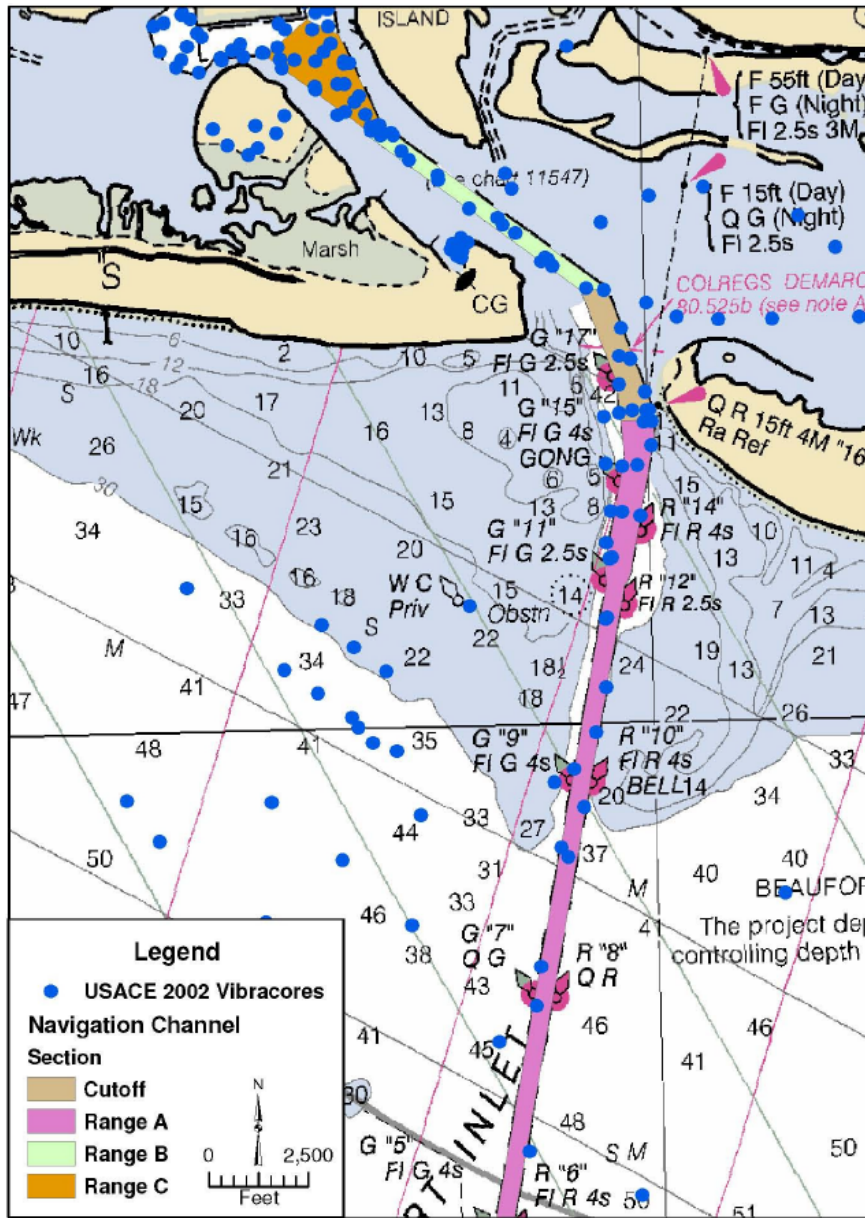


Figure 4-10. Morehead City Channel Vibracore and Reach Locations (Coastal Tech, 2013)

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
	Inlet Relocation	850,000 cy	10 years	4,250,000
Bogue Inlet	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.**

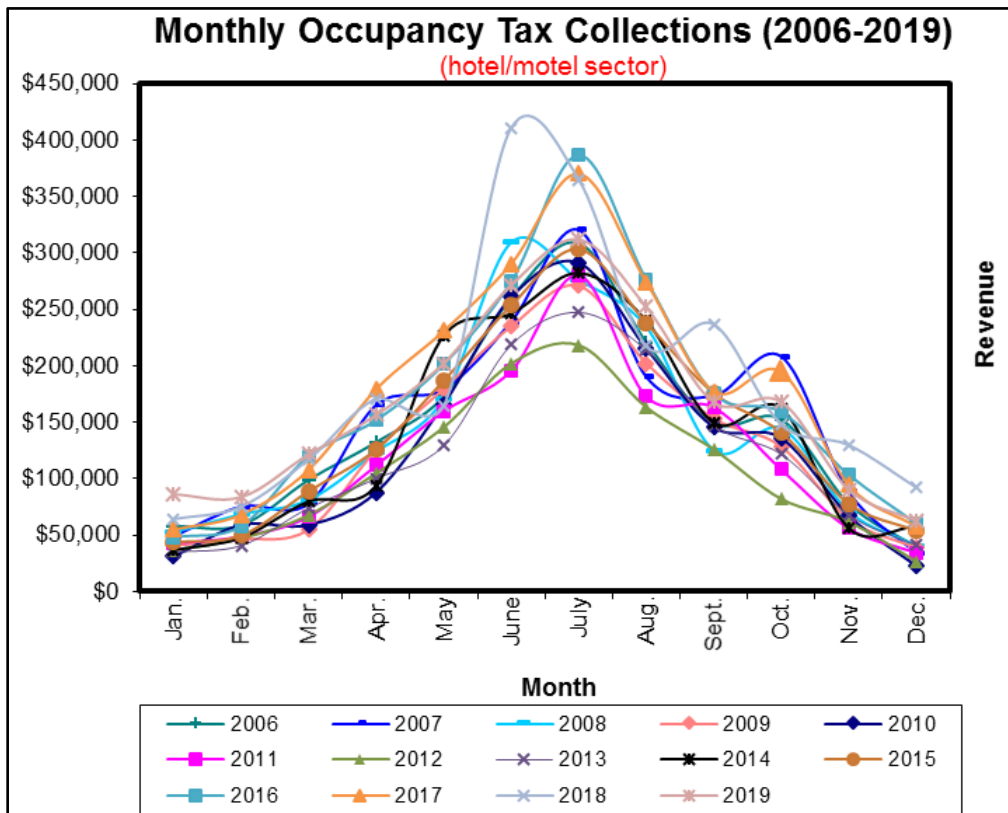


Figure 5-1. Monthly Occupancy Tax – Hotel/Motel

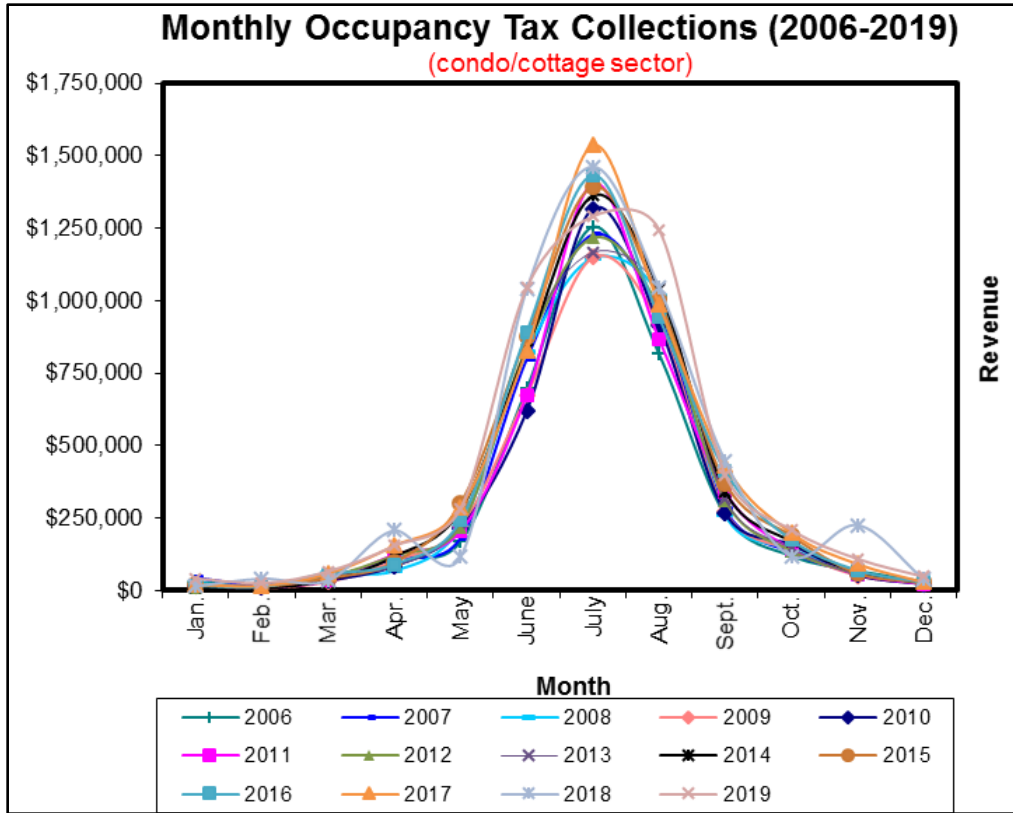


Figure 5-2. Monthly Occupancy Tax – Condo/Cottage

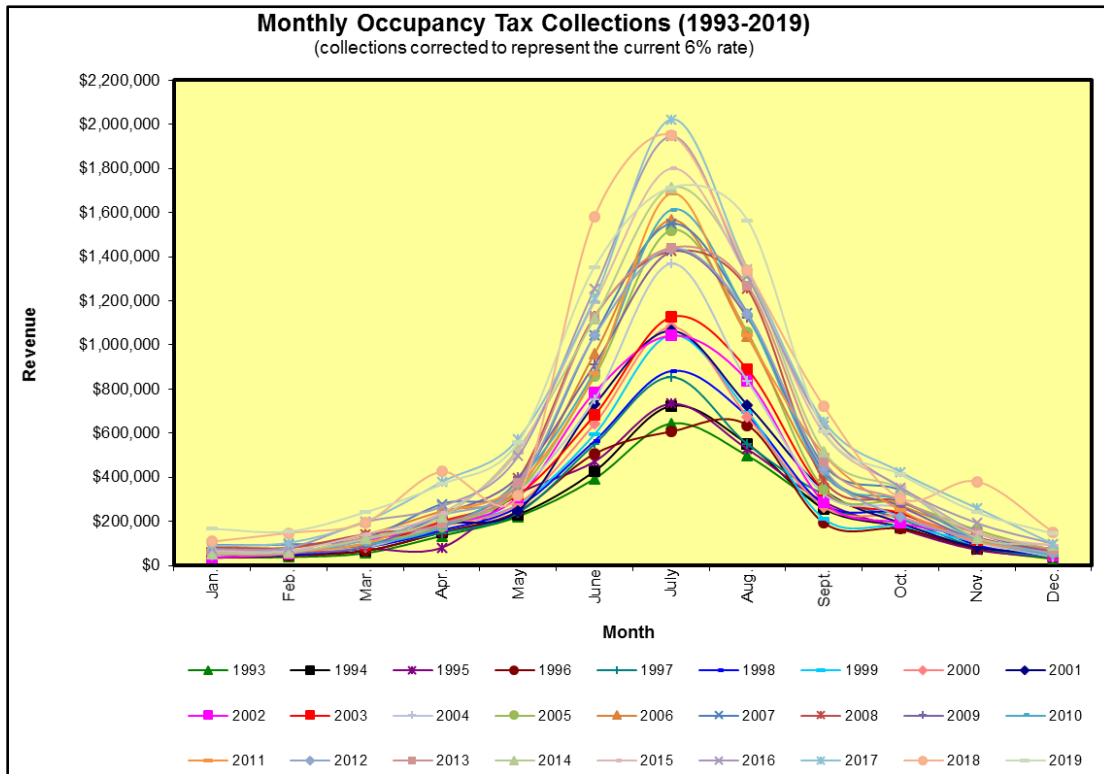


Figure 5-3. Total Monthly Occupancy Tax (1993-2019)

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.

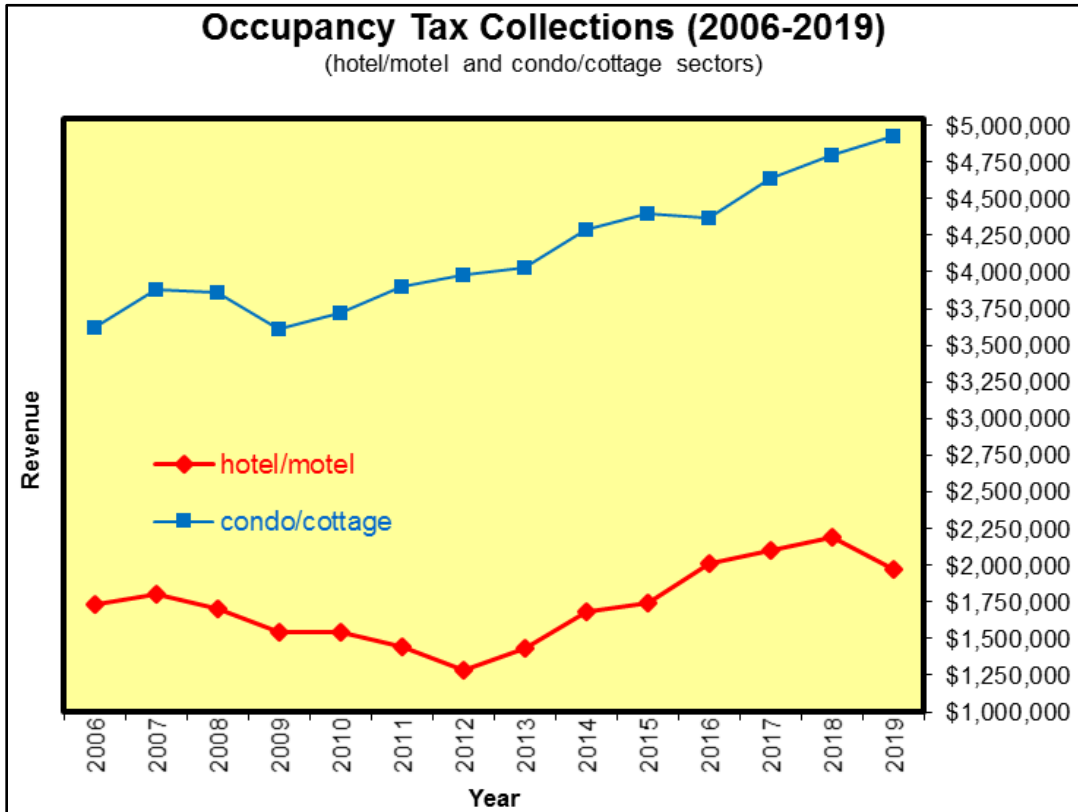


Figure 5-4. Yearly Occupancy Tax – Hotel/Motel & Condo/Cottage

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.

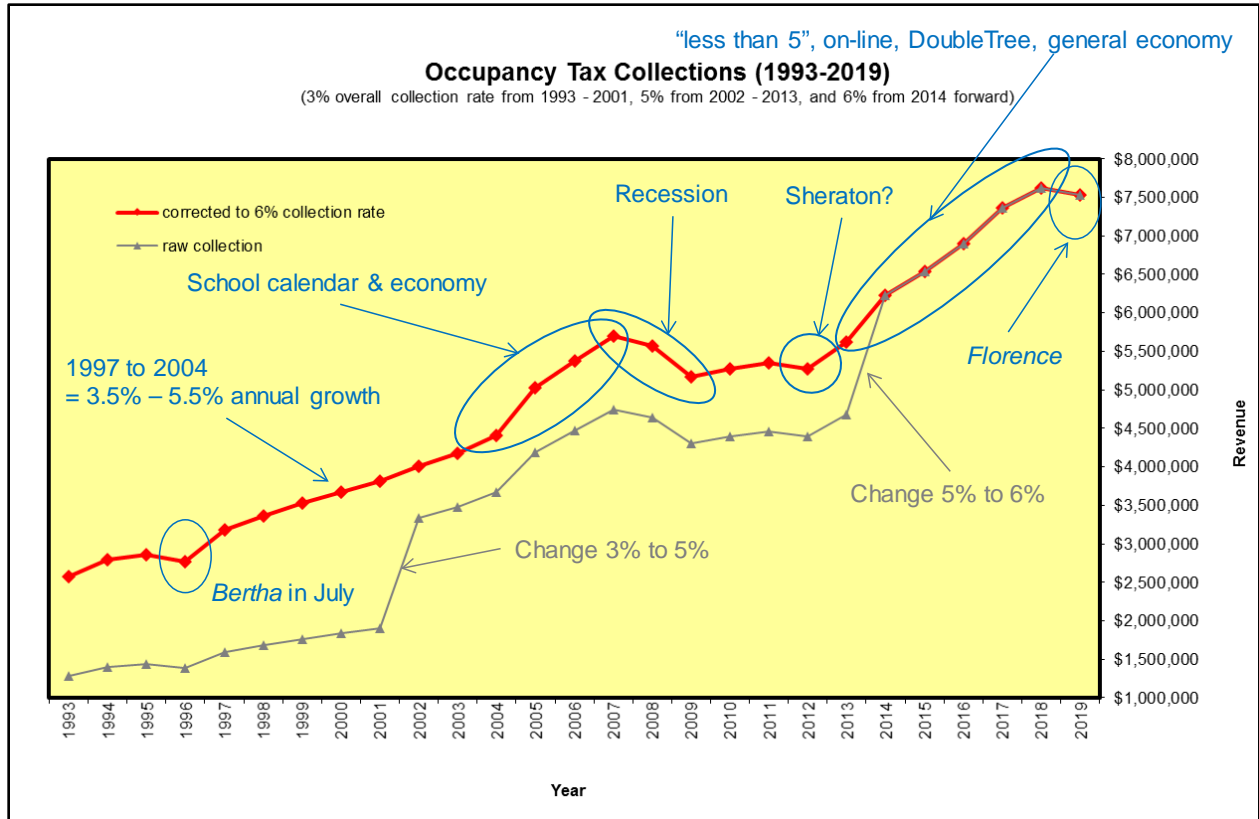


Figure 5-5. Total Yearly Occupancy Tax (1993-2019)

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

It should be noted that Atlantic Beach does not currently have a dedicated funding source. Up until Phase II of the Post-Florence Renourishment project, disposal of the Morehead City Harbor

maintenance and construction material on the east end of Bogue Banks was accomplished at 100% federal cost, i.e., local cost sharing for the disposal operation was not required. As a result, the Town of Atlantic Beach was totally dependent on federal funding for the MCH navigation project to maintain the beach and has not needed a separate funding source in the past. However, planning efforts were made to ensure that funding is available if cost sharing or “delta projects” become a possibility under the UASCE DMMP to place material west of The Circle.

The total contribution needed from the Town of Atlantic Beach to assure dredged material could be distributed along the entire length of its shoreline is estimated to be \$217,727 per year, equal to 33% of the total project cost to cover areas west of the Circle. Of course, this estimate does not include the idea that the Town and County may likely be able to participate in “delta” projects where they would just pay the delta costs to place sand west of the Circle in years 2 or 3 of the DMMP. Given that the DMMP is expected to cover areas up to the Circle, the “delta” projects would at worst need to cover 40% of the total Atlantic Beach need which would equal 65,978 cy/yr. Given this small volume, it is expected that a “delta” project may be required every 9 years. Assuming an additional mobilization cost of \$500,000 to cover an additional booster pump and additional \$2 per cy for lost production, the total delta cost per project is expected to be approximately \$1.7 million. Assuming a 33%/67% split between the Town and County, the Town cost would be approximately \$62,500 per year.

Also, in the initial version of the legislation authorizing the County’s room occupancy tax (S.L. 2001-381), funds were distributed directly to the individual towns on Bogue Banks as opposed to the County’s Beach Fund. Atlantic Beach has maintained their share of these initial distributions in a dedicated Beach Nourishment Fund with a current balance of approximately \$375,784. The fund earns an annual interest rate of 2%. The legislation restricts the use of these funds so that they can only be used for beach nourishment, including “[t]he costs associated with providing enhanced public beach access.” Although Atlantic Beach may use a small portion of this fund to improve existing beach accesses, the Town intends to maintain the majority of this fund, and the interest income generated by the fund, to provide the local funds required to augment the work of the USACE. Given this fund and taxable property value of \$1.7 billion, an annual contribution of \$62,500 is well within the financial capabilities of the Town. In order to generate \$62,500 per year, a minimal tax of less than 1 cent per \$100 property value (\$0.004/\$100) would be required.

If cost sharing or “delta projects” under the USACE DMMP are not a possibility to place material west of The Circle, western Atlantic Beach is now in the position to maintain an engineered beach which would be eligible for FEMA reimbursement for declared disaster events (Category G). The interlocal agreement signed by all the Towns and County (see Appendix B) would require them to meet the funding needs even if new taxes or one-time loans are required.

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. As a reminder, 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 Atlantic Beach 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 Atlantic Beach and Fort Macon and newly triggered static line extents in western Atlantic Beach, including projects which have occurred within the past 5 years (2017 DMMP, Post-Florence Phase II). Initial project design of the beach fill associated with the Morehead City Harbor Federal Navigation Project and performance to date is presented, documenting that the project has been maintained well seaward of the pre-project conditions. Initial project design of the Post-Florence Phase II project, which has established an engineered beach along the western portion of Atlantic Beach from the Circle to the Atlantic Beach/Pine Knoll Shores town boundary, has also been presented and documentation showing the means by which it is to be monitored and maintained under the Master Beach Nourishment Plan have been provided.

It is important to note that the current condition of the beach in Atlantic Beach (334 cy/ft) is better than it was following the hurricanes of the 1990s, inception of the BBBNMP in 2004, and in 2010 and 2015 when the previous static line exceptions were approved, as presented in Table 6-1.

Table 6-1. Beach Condition Summary

Reach (Transects)	Avg 1999 Profile Volume (cy/ft)	Avg 2004 Profile Volume (cy/ft)	Avg 2010 Profile Volume (cy/ft)	Avg 2015 Profile Volume (cy/ft)	Avg 2020 Profile Volume (cy/ft)
Atlantic Beach (77 - 102)	233	238	283	323	334

It is also important to note that the current beach condition (334 cy/ft) is well above nourishment trigger set by the Master Beach Nourishment Plan of 254 cy/ft, as shown in Table 6-2.

Table 6-2. Nourishment Trigger Summary

Reach (Transects)	Avg 2020 Profile Volume (cy/ft)	MBNP Trigger (cy/ft)
Atlantic Beach (77 - 102)	334	254

While Atlantic Beach is able to rely on some federally funded material from the MCH DMMP, compatible sediment sources and financial resources for the future that exhibit long-term sustainability for the Master Beach Nourishment Plan were also identified. **In fact, it is expected that the sediment need for the next 50 years of 46.8 – 51.6 Mcy can be met with identified sediment sources totaling 50.2 Mcy. Using current funding practices, it is expected that the project will be fully funded for the next 50 years with the interlocal agreement requiring action in the form of new taxes or one time loans if funds were to ever fall short.**

7.0 REFERENCES

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

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

APPENDIX A

Post-Florence Renourishment Project Phase II Plans

POST-FLORENCE RENOURISHMENT PROJECT PHASE 2

CARTERET COUNTY, NORTH CAROLINA



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



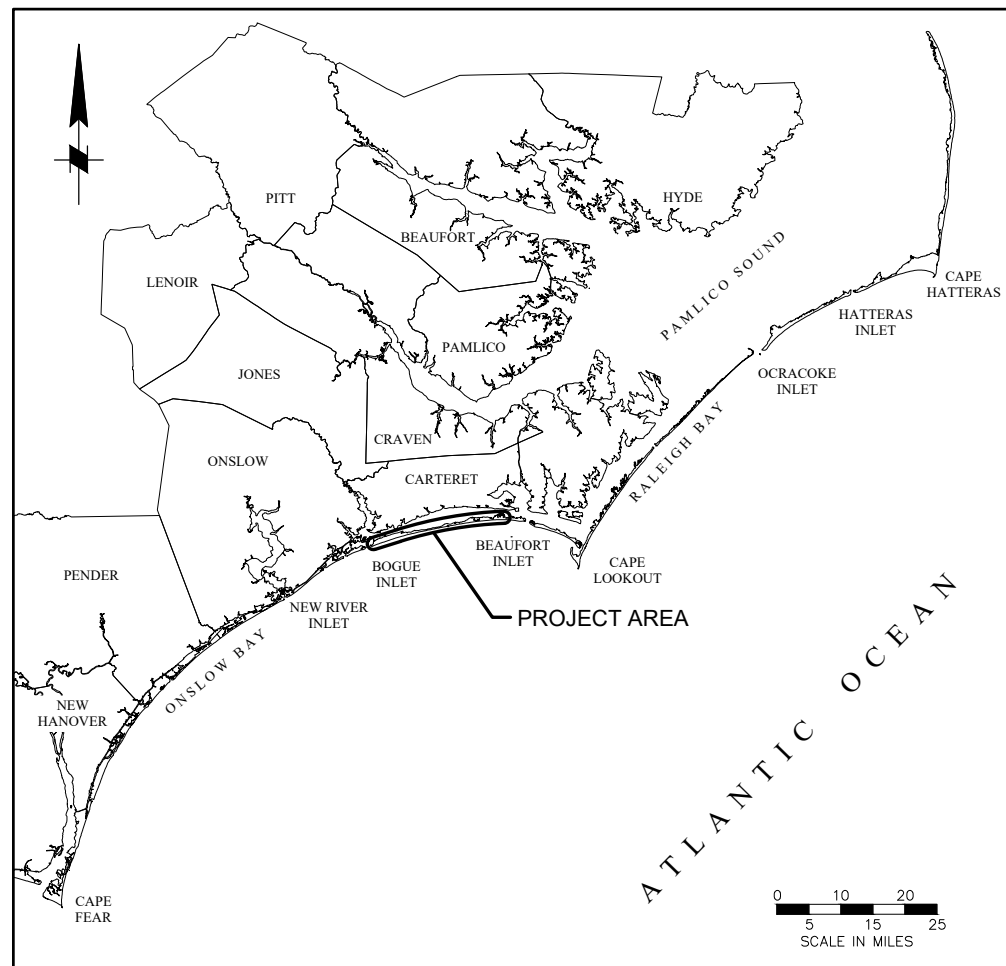
TOWN OF INDIAN BEACH
1400 SALTER PATH ROAD
INDIAN BEACH, NC 28512



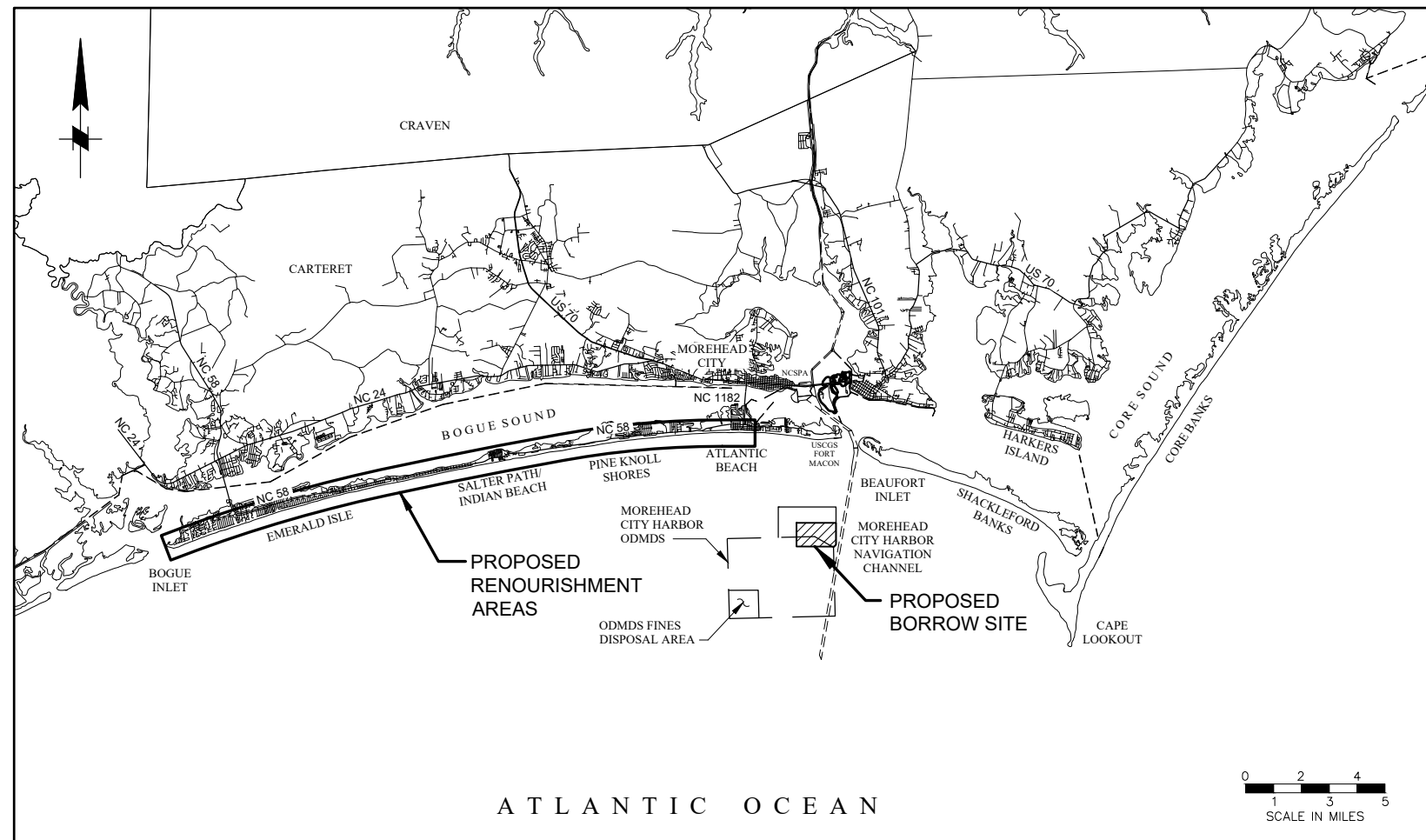
TOWN OF PINE KNOLL SHORES
100 MUNICIPAL CIRCLE
PINE KNOLL SHORES, NC 28512



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



VICINITY MAP



LOCATION MAP

REVISION 1
FEBRUARY 14, 2020

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

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

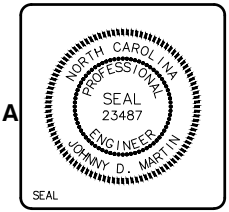
COVER SHEET

Designed by:	NCV	Drawn by:	BDF	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

File: G:\RA\10611\10500_CAD_Active\10611 Bogue Banks 2020\1061100G-001; Plotted: 2/14/2020 10:24 AM by FORD, BRIAN; Saved: 2/12/2020 2:42 PM by BFOR

INDEX OF DRAWINGS table with columns SHEET NO. and SHEET TITLE. Includes entries for COVER SHEET, INDEX OF DRAWINGS, PROJECT MAP, and various BEACH RENOURISHMENT PLANS (SHEETS 1-35).

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.

Table listing REACHES 1-5, 6-8, 9, and 10 with corresponding TOWN MANAGERS and contact information.

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.
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.
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.
2. IT IS THE INTENT OF THESE PLANS, AND THE RESPONSIBILITY OF THE CONTRACTOR, TO COMPLY WITH THE ENVIRONMENTAL PERMITS ISSUED FOR THIS PROJECT.

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

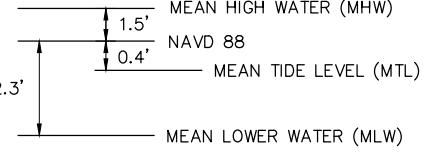
- 1. NO DREDGING WHATSOEVER SHALL OCCUR BELOW AN ELEVATION OF -52 FT NAVD 88.
2. ALL DREDGING SHALL BE PERFORMED WITHIN THE LIMITS OF THE PERMITTED DREDGING AREA AS SHOWN IN THE DRAWINGS.
3. PIPELINE CORRIDOR SHALL BE DELINEATED WITH BUOYS BY THE CONTRACTOR IN THE PRESENCE OF THE ENGINEER/OWNER BEFORE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



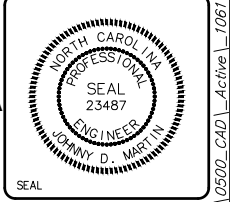
- 11. HORIZONTAL AND VERTICAL CONTROL FOR THE BEACH FILL SURVEY WAS BASED ON NUMEROUS RANGE MONUMENTS AS FOUND BY GEODYNAMICS.
12. CONTOURS FOR THE BEACH FILL PLANS ARE SHOWN AT 1 FT INTERVALS.
13. PRE- AND POST-CONSTRUCTION SURVEYS OF THE BEACH AREA SHALL BE COMPLETED BY AN INDEPENDENT REGISTERED/CERTIFIED SURVEYOR COORDINATED AND PAID FOR BY THE CONTRACTOR.
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.

Revision table with columns: No., Description, Date, Appr. Includes entry for ADDENDUM 1.

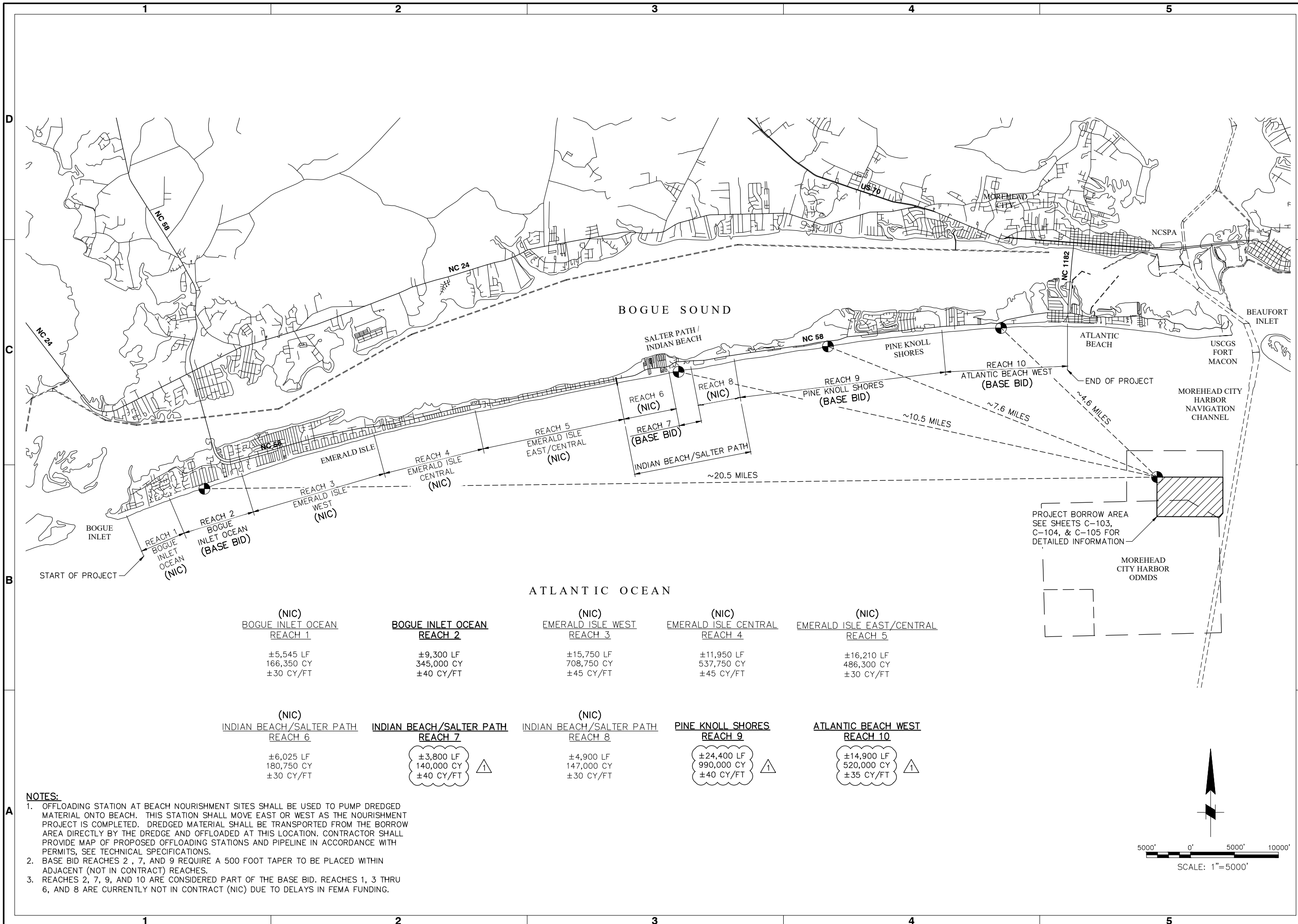
Project information: POST-FLORENCE RENOURISHMENT PROJECT PHASE 2, CARTERET COUNTY, NORTH CAROLINA. INDEX OF DRAWINGS, ABBREVIATIONS, AND GENERAL NOTES.

Design and review information: Date: AUGUST 2019, Project No. 10611, Drawing code: JDM, Submitted by: MOFFATT & NICHOI.

Project address: 4700 FALLS OF THE NEUSE ROAD, SUITE 300, RALEIGH, NC 27609. License No. F-0105. Prepared for the Towns of Emerald Isle, Indian Beach, Pine Knoll Shores, and Atlantic Beach.



Sheet Reference No. G-002, Sheet 2 of 66.



- 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**

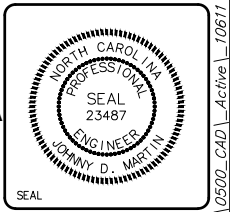
PROJECT MAP AND KEY PLAN

Designed by: NCY	Drawn by: BDF	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)

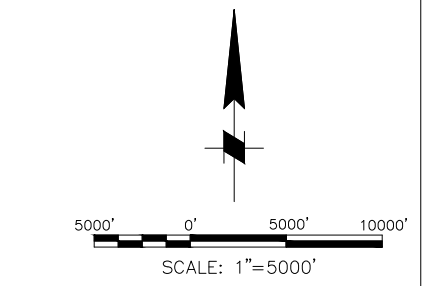
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-761-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

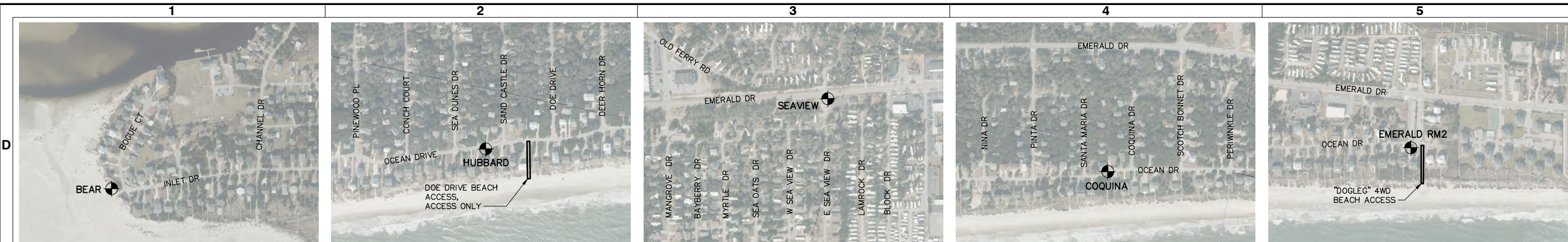
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH



Sheet Reference No.
C-100
Sheet 3 of 66



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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



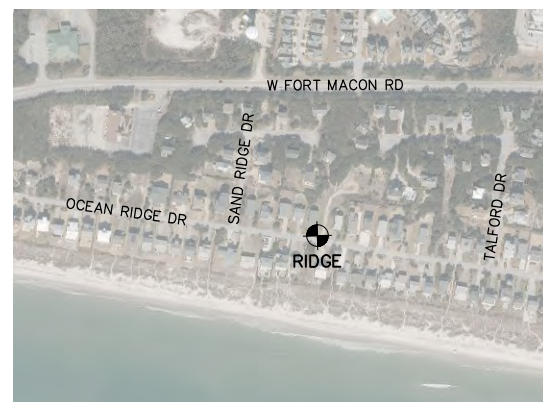
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STATION	NORTHING	EASTING	ELEVATION
VERRAZZANO	351254.18	2654624.71	10.71



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**

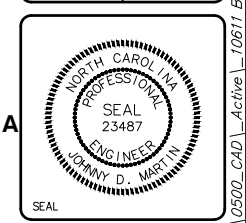
**PROJECT SURVEY CONTROL
PLANS**

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

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1

2

3

4

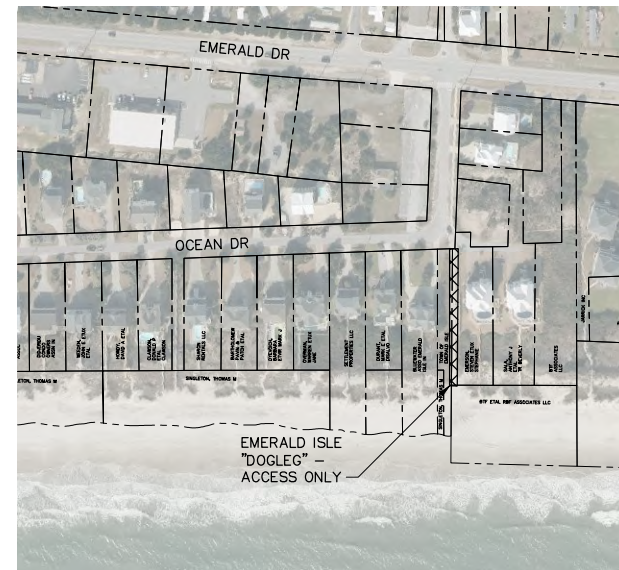
5



STAGING & ACCESS SITE 1
NOT TO SCALE



STAGING & ACCESS SITE 2
NOT TO SCALE



STAGING & ACCESS SITE 3
NOT TO SCALE



STAGING & ACCESS SITE 4
NOT TO SCALE



STAGING & ACCESS SITE 5
NOT TO SCALE



STAGING & ACCESS SITE 6
NOT TO SCALE



STAGING & ACCESS SITE 7
NOT TO SCALE



STAGING & ACCESS SITE 8
NOT TO SCALE

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

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

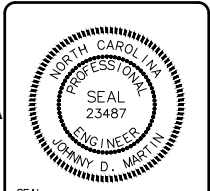
**POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA**

**PROJECT STAGING AND ACCESS
PLANS**

Designed by:	Date:	Rev.
Dwn by:	AUGUST 2019	
Clk by:	M&N Project No.	
BDF	10611	
Reviewed by:	Drawing code:	
Submitted by:	Drawing Scale:	
MOFFATT & NICHOL	PLOT SCALE: 1:1 (D SHEET)	

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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



Sheet
Reference No.
C-102
Sheet 5 of 66



1

2

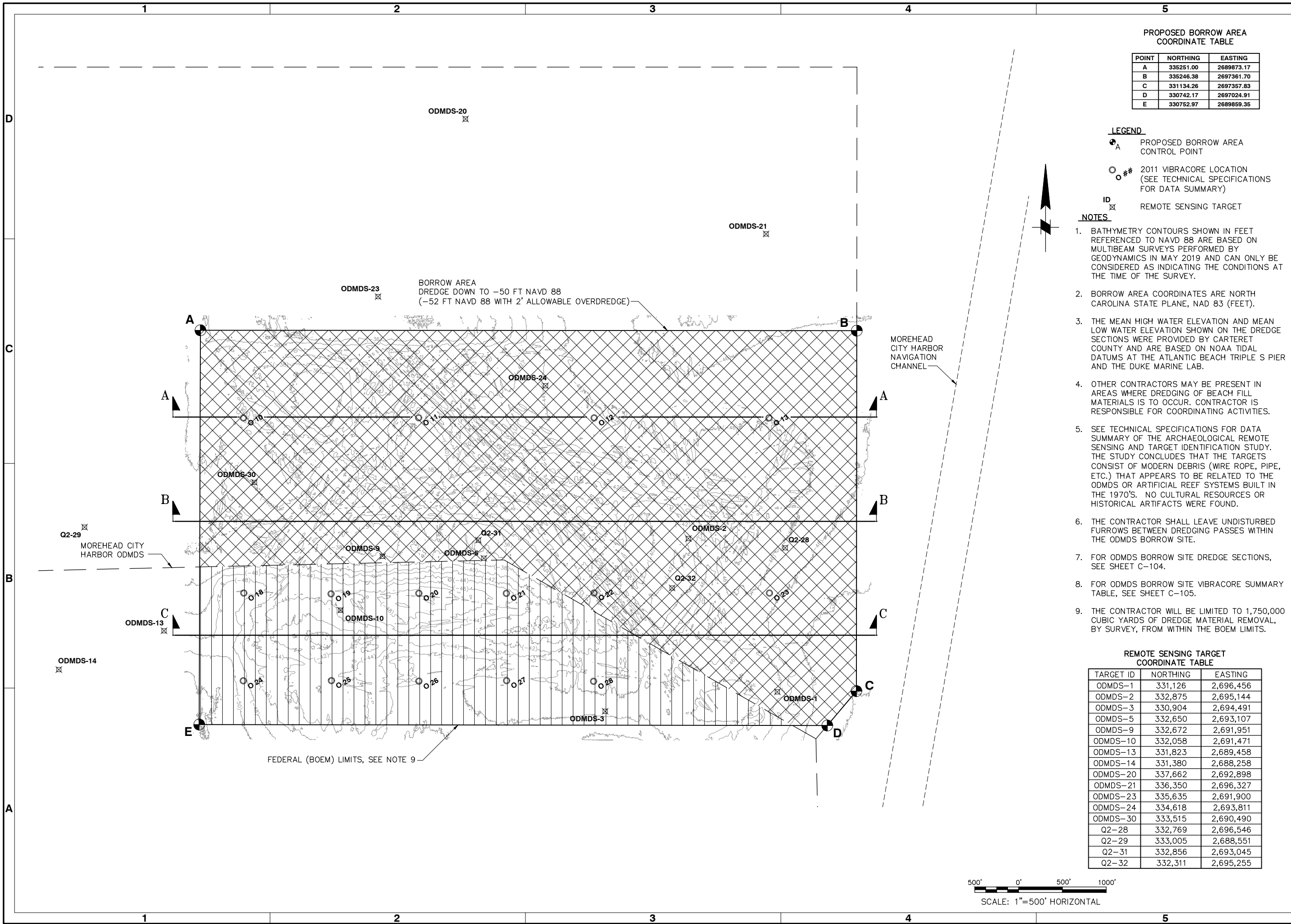
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4

5

DRAWING SCALES SHOWN BASED ON 22"x34" DRAWING

File: C:\RA\10611\0500_CAD\Active\10611 Project Staging and Access Plans.dwg Plotted: 2/14/2020 10:25 AM BY: BFOR, BRIAN; Saved: 8/19/2019 1:17 PM by BFOR



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

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

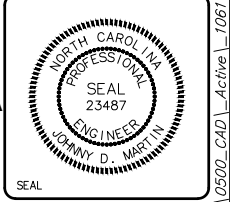
REMOTE SENSING TARGET COORDINATE TABLE

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

POST-FLORENCE RENOURISHMENT
 PROJECT PHASE 2
 CARTERET COUNTY, NORTH CAROLINA
 ODMDS BORROW SITE DREDGE
 PLAN

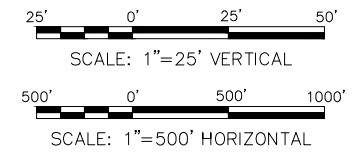
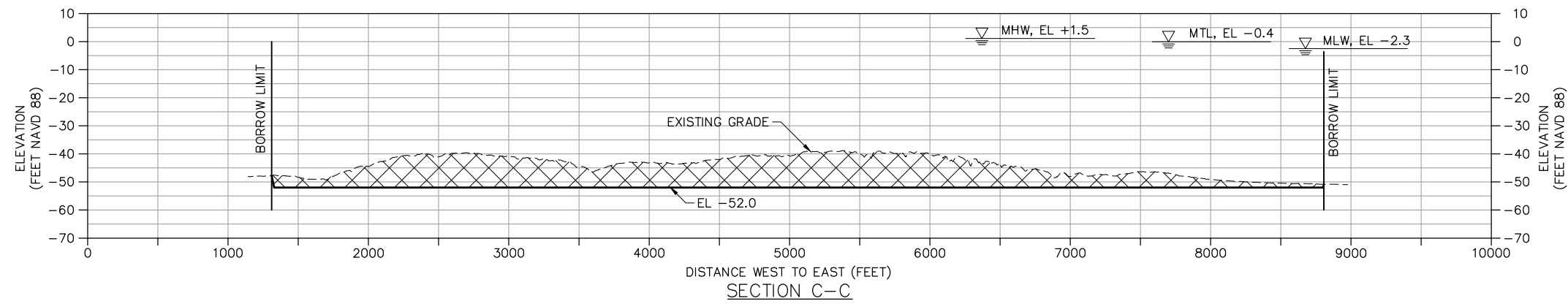
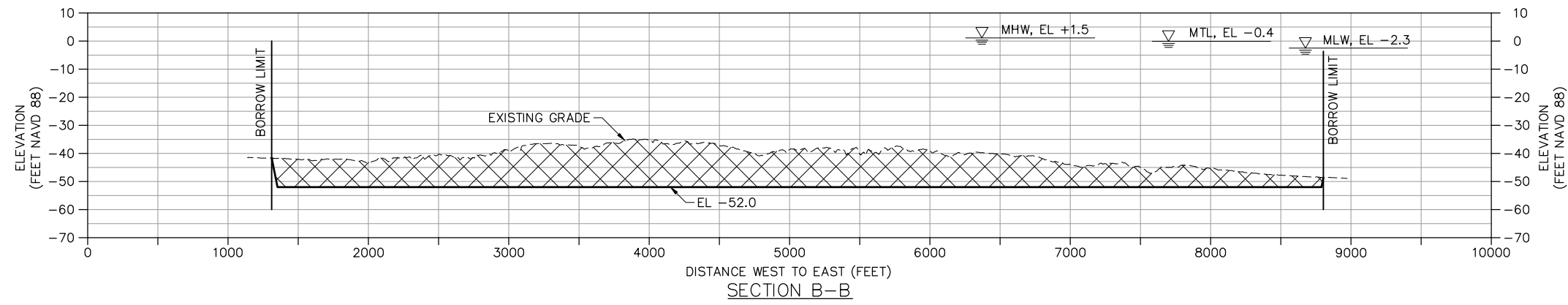
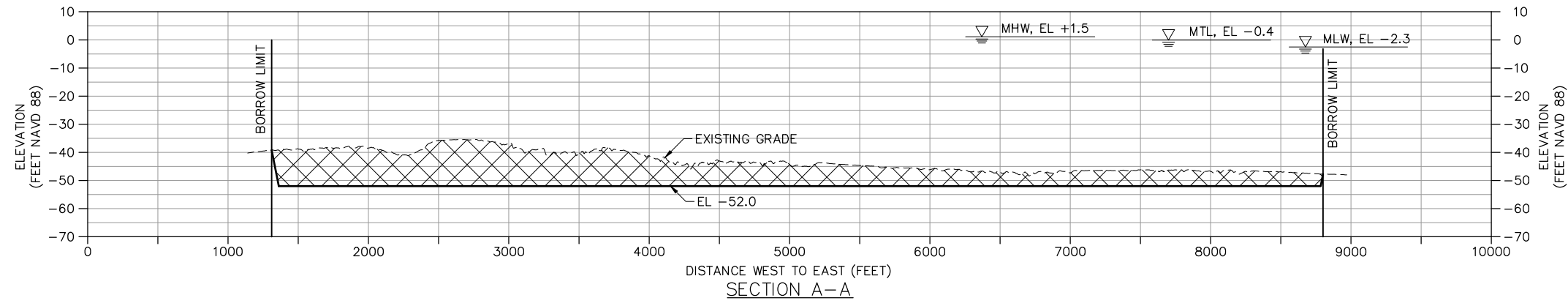
Designed by: NCY	Drawn by: BDF	Checked by: SRM	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019	M&N Project No. 10611	Drawing code:	Drawing Scale:	Plot scale: 1" (D SHEET)

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



Sheet Reference No.
C-103
 Sheet 6 of 66

File: G:\1RA\10611\0500_CAD\Active\10611 Bouge Banks 2020\1061100C-103; Plotted: 2/14/2020 10:25 AM by FORD, BRIAN; Saved: 8/19/2019 1:28 PM by BCFORD



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0	BID DOCUMENTS	08/19/19	JM

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

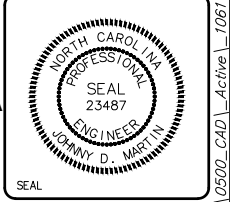
**ODMDS BORROW SITE DREDGE
SECTIONS**

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

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	0.63	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	1.98	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

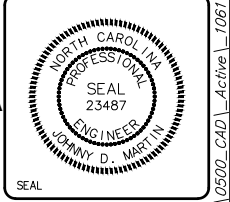
Designed by: NCV
Dwn by: BDF
Rev. by: JDM
Submitted by: MOFFATT & NICHOL

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

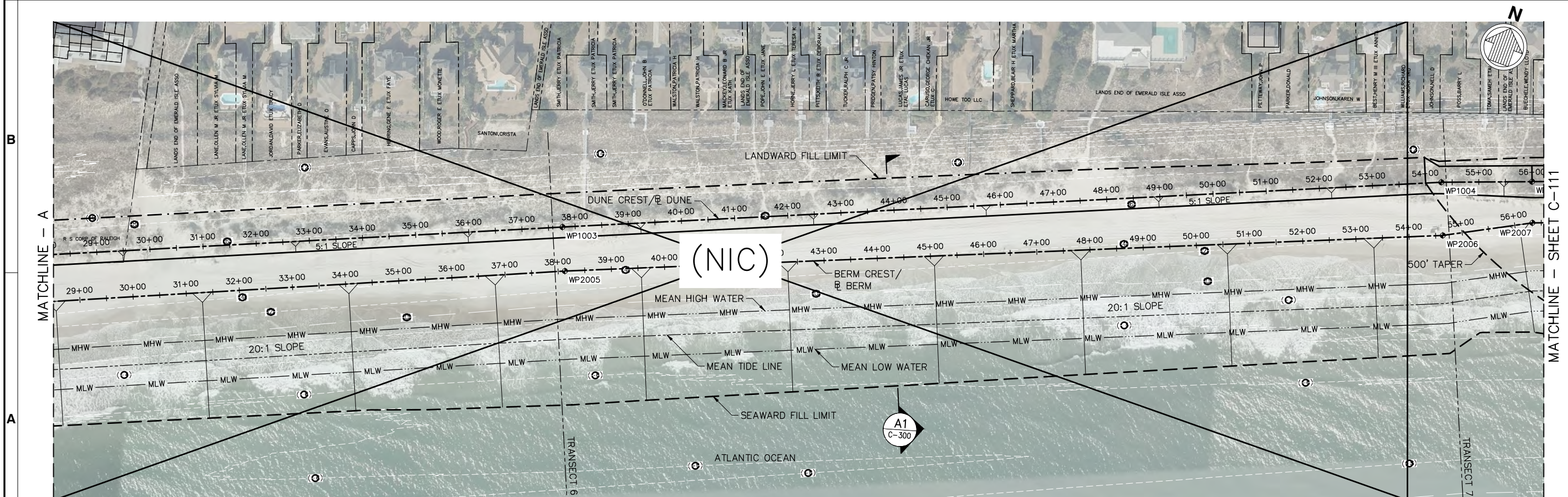
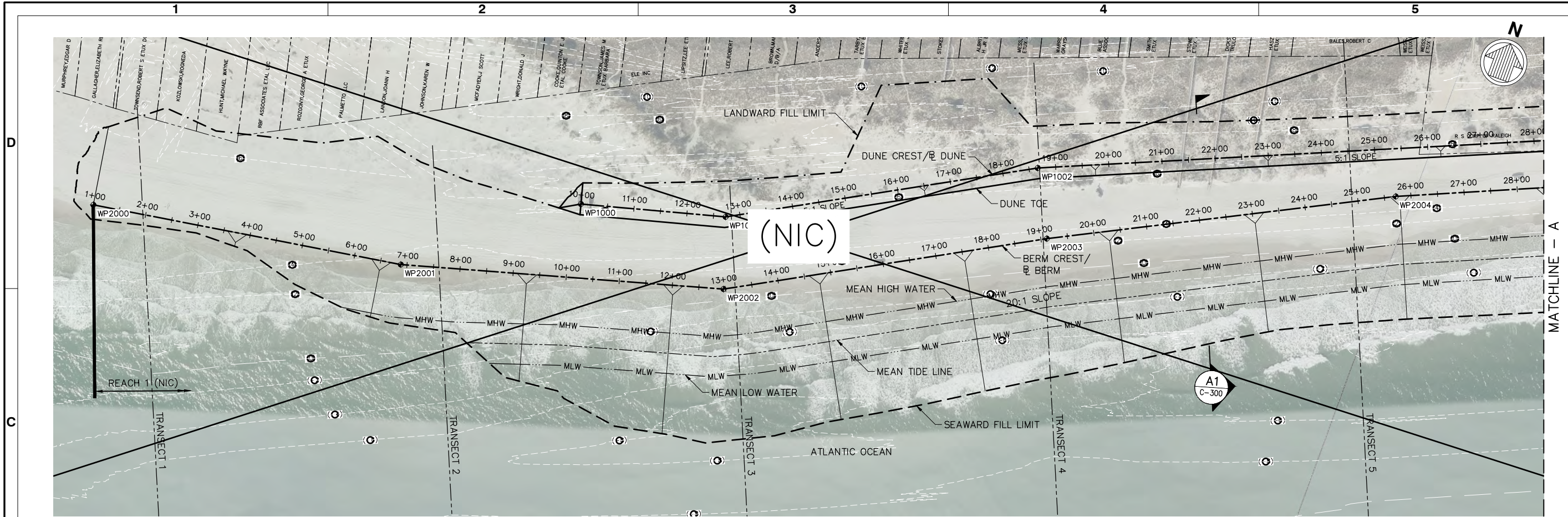
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
PHONE: 919-781-4626
NC FIRM LICENSE No. F-0105

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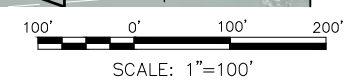
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH



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.



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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**

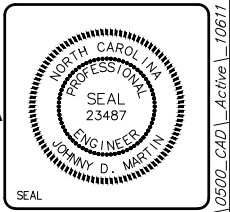
**BEACH RENOURISHMENT PLAN -
SHEET 1 OF 20**

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

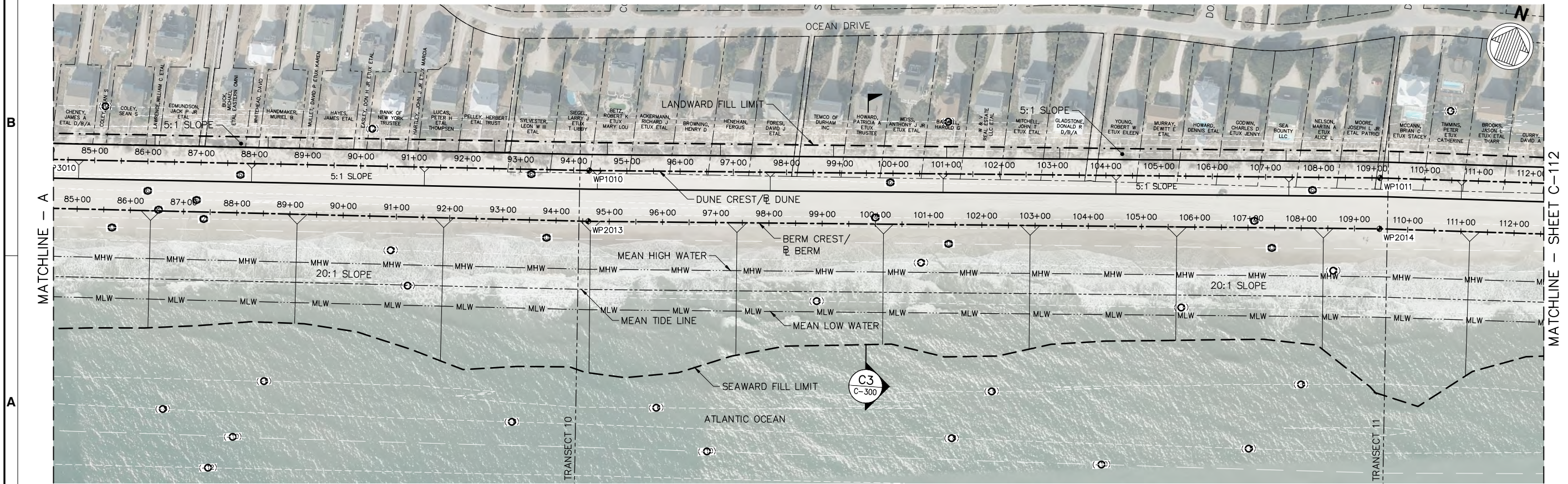
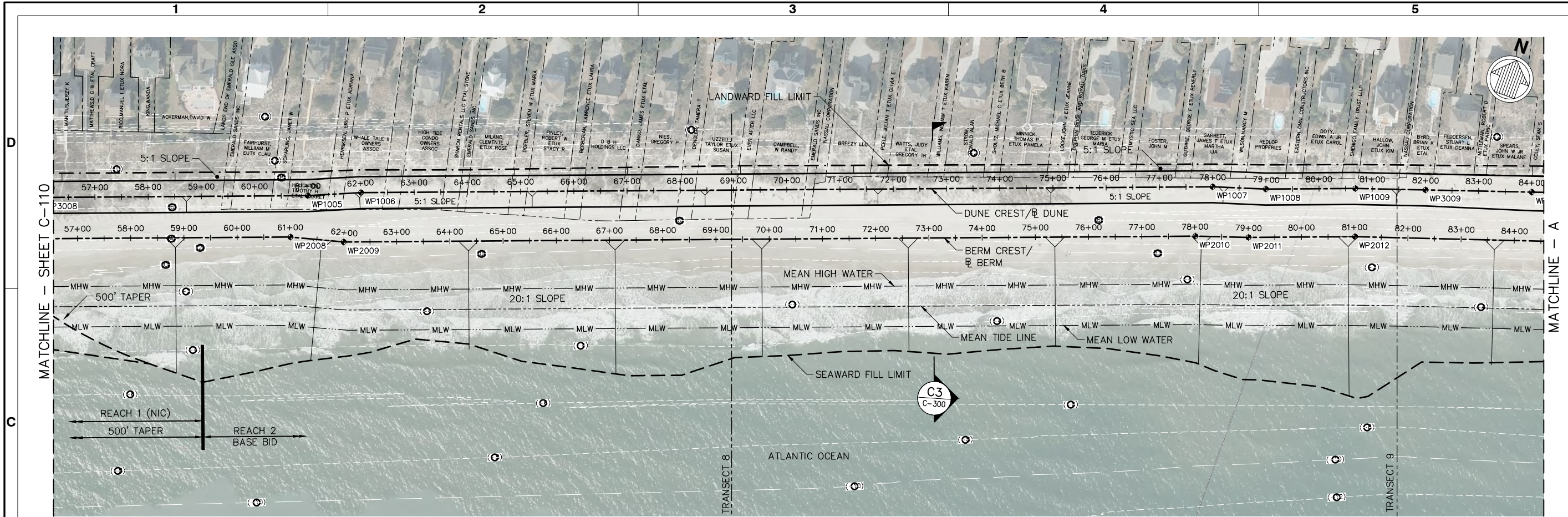
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

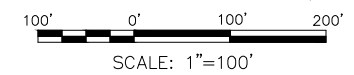
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH



Sheet Reference No.
C-110
Sheet 9 of 66



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



Rev.	1
Date:	JANUARY 2020
Designed by:	NCY
Dwn by:	BDF
Reviewed by:	JDM
Submitted by:	MOFFATT & NICHOL
Plot scale: 1" (D SHEET)	

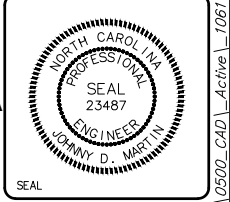
1	PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
0	BID DOCUMENTS	08/19/19	JM
			Apr

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

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

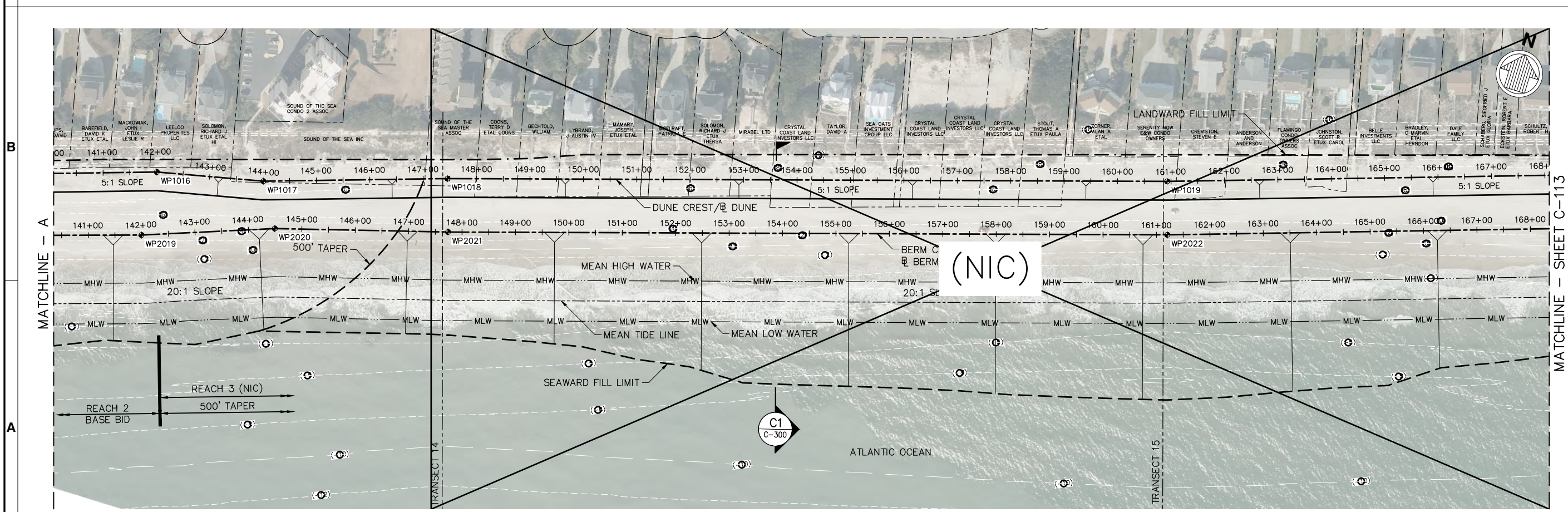
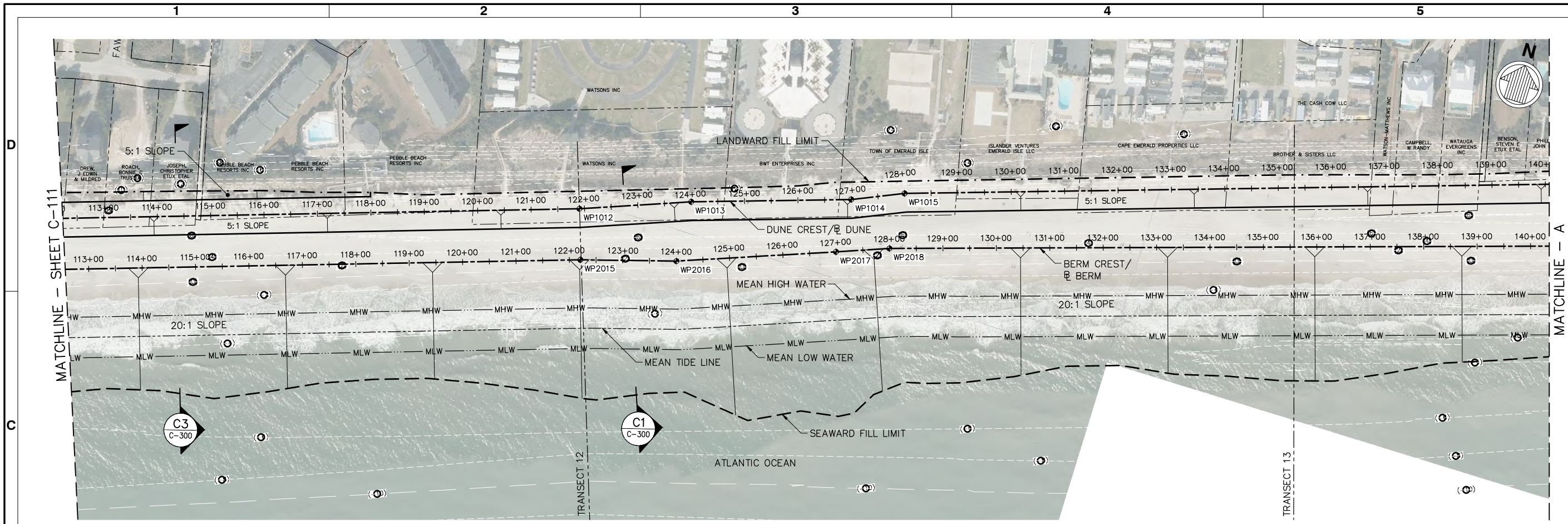
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4626	NCV	BDF	SRM	JDM	MOFFATT & NICHOL
DATE: JANUARY 2020	MAN Project No. 10611	Drawing code:	Drawing Scale:	Plot scale: 1" (D SHEET)	

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

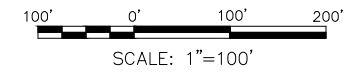


Sheet Reference No.
C-111
Sheet 10 of 66

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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
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**

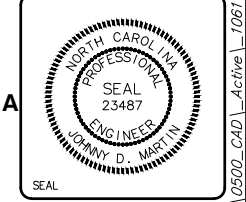
**BEACH RENOURISHMENT PLAN -
 SHEET 3 OF 20**

Designed by:	NCY	Date:	JANUARY 2020	Rev.	1
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

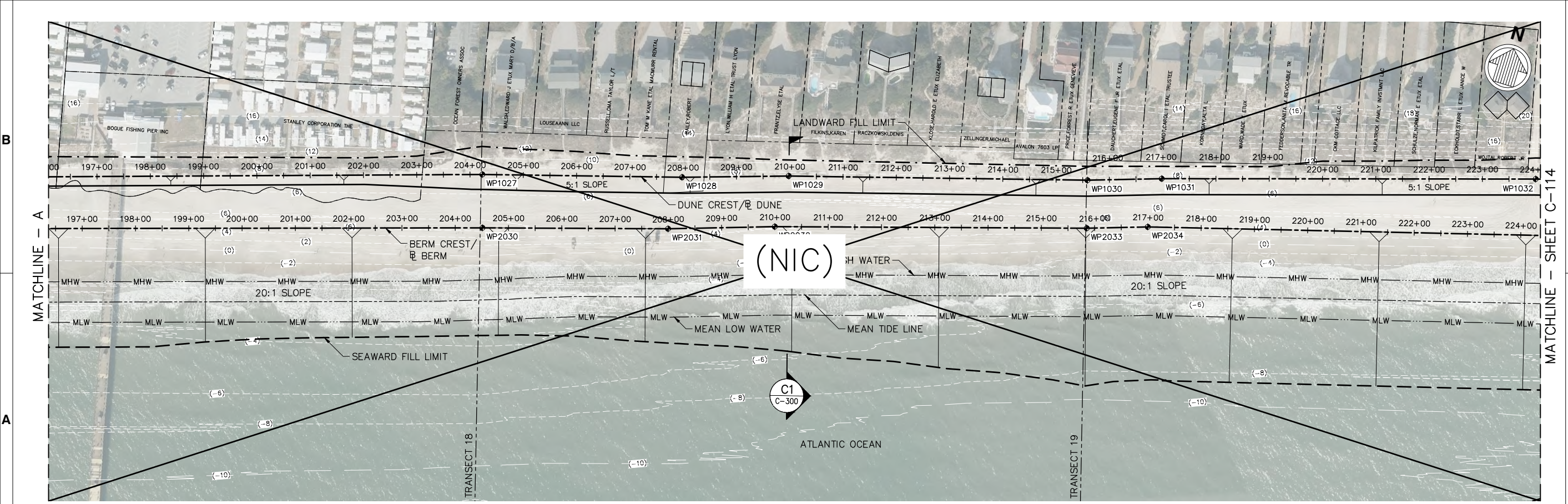
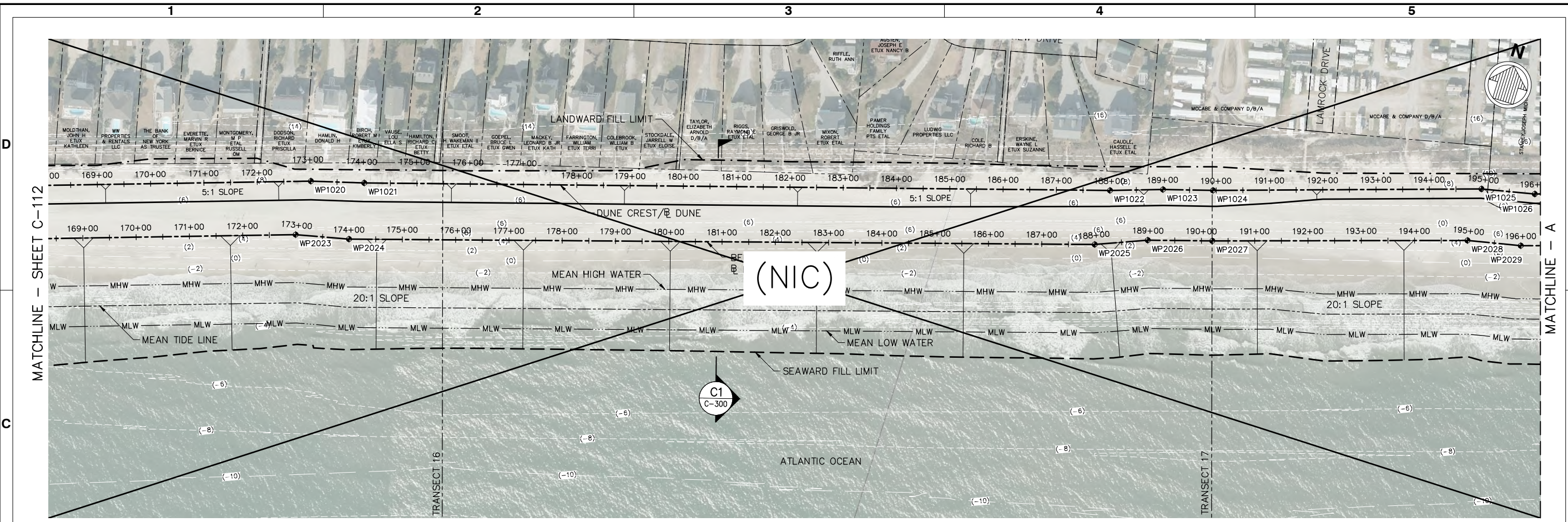
meffatt & nichol NC FIRM LICENSE No. F-0105

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

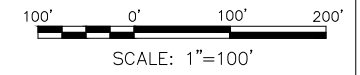


Sheet Reference No.
C-112
 Sheet 11 of 66

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

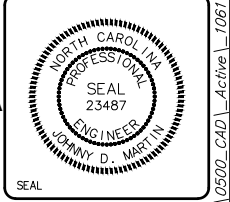
**BEACH RENOURISHMENT PLAN -
 SHEET 4 OF 20**

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: 1:1 (D SHEET)

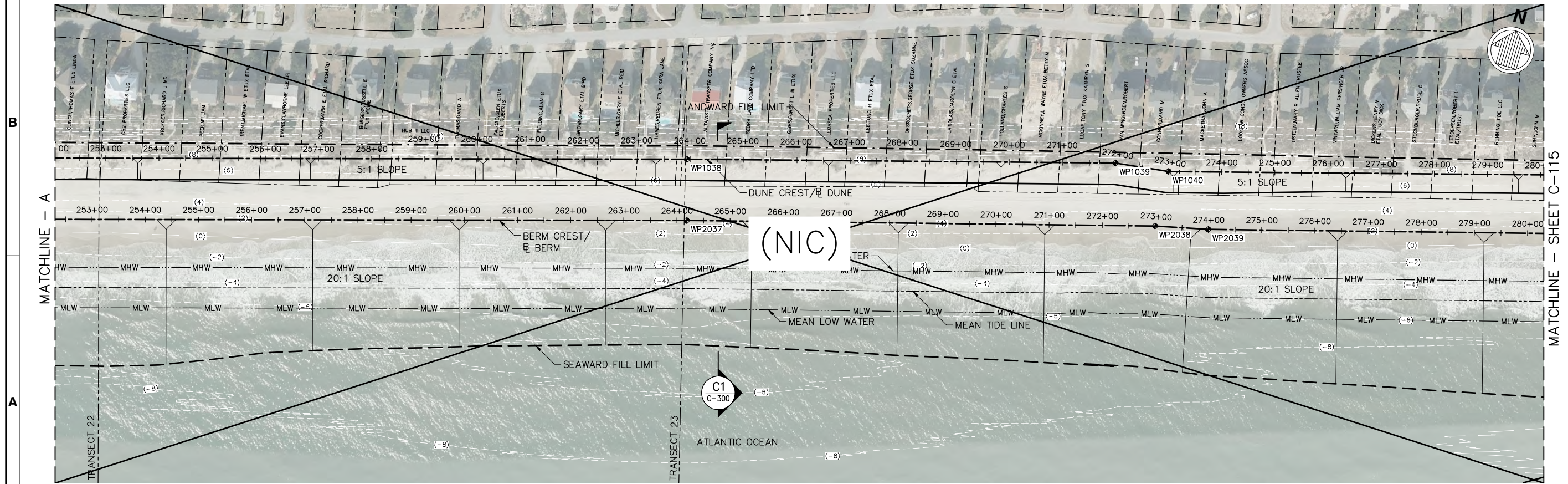
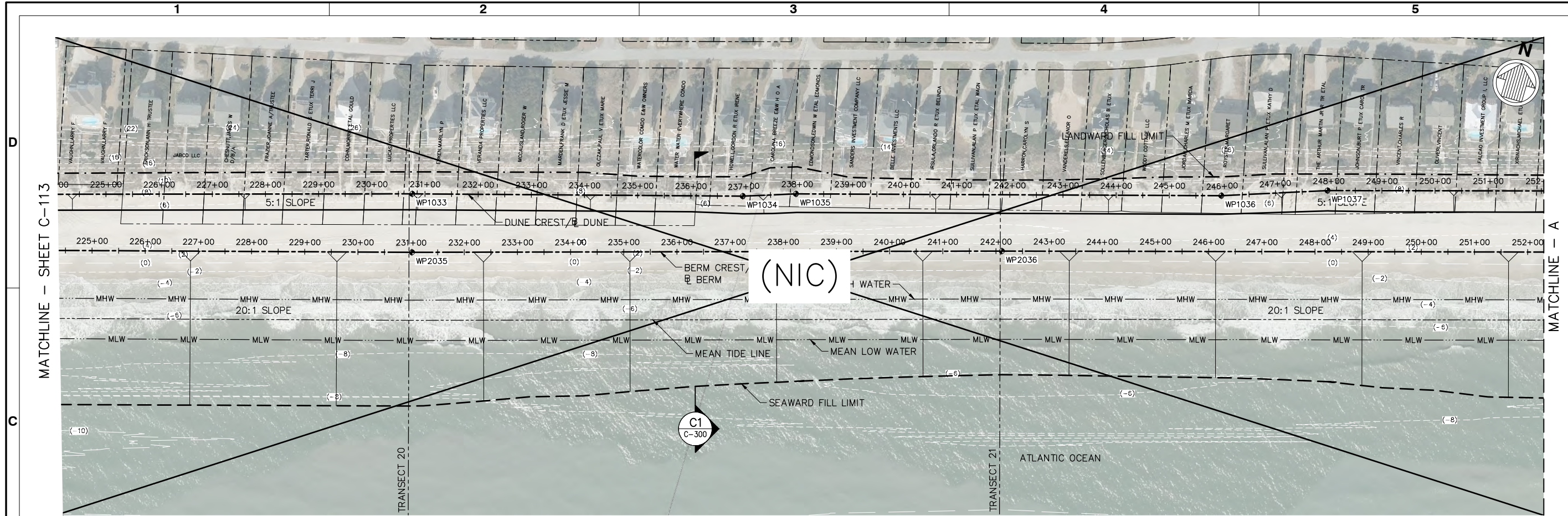
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

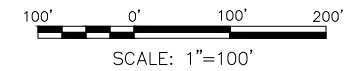
PREPARED FOR THE TOWNS OF
 EMERALD ISLE, INDIAN BEACH,
 PINE KNOLL SHORES, AND ATLANTIC BEACH



Sheet Reference No.
C-113
 Sheet 12 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
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**POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA**

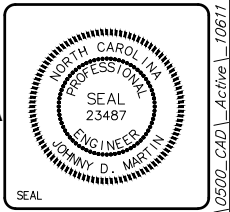
**BEACH RENOURISHMENT PLAN -
SHEET 5 OF 20**

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: 1:1 (D SHEET)

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

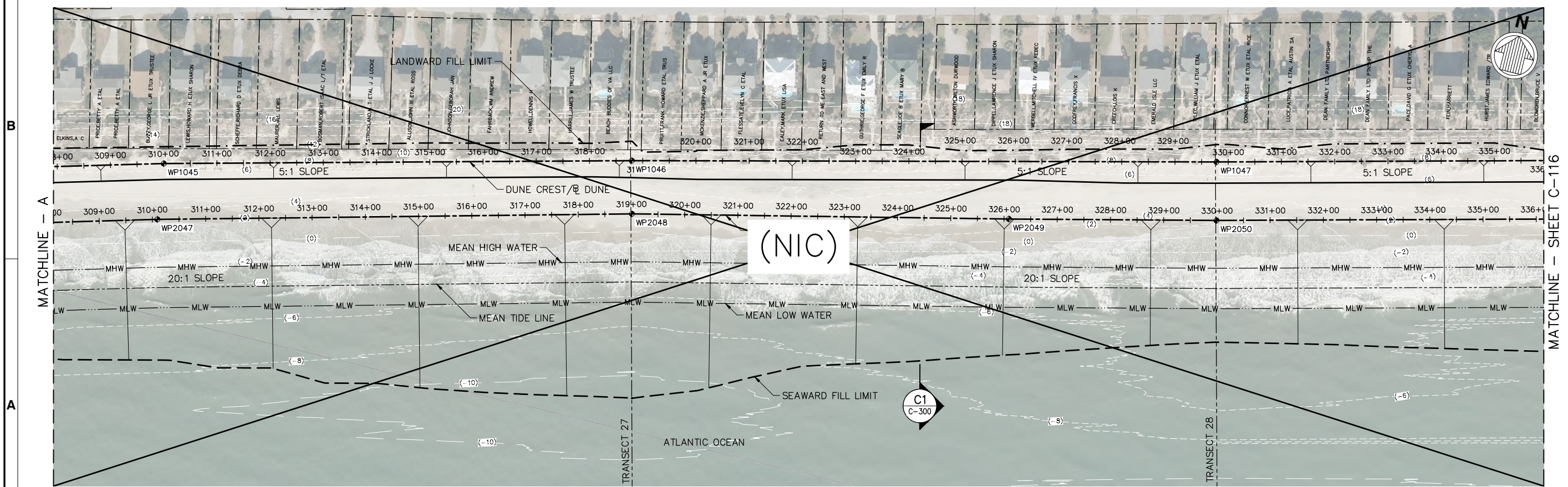
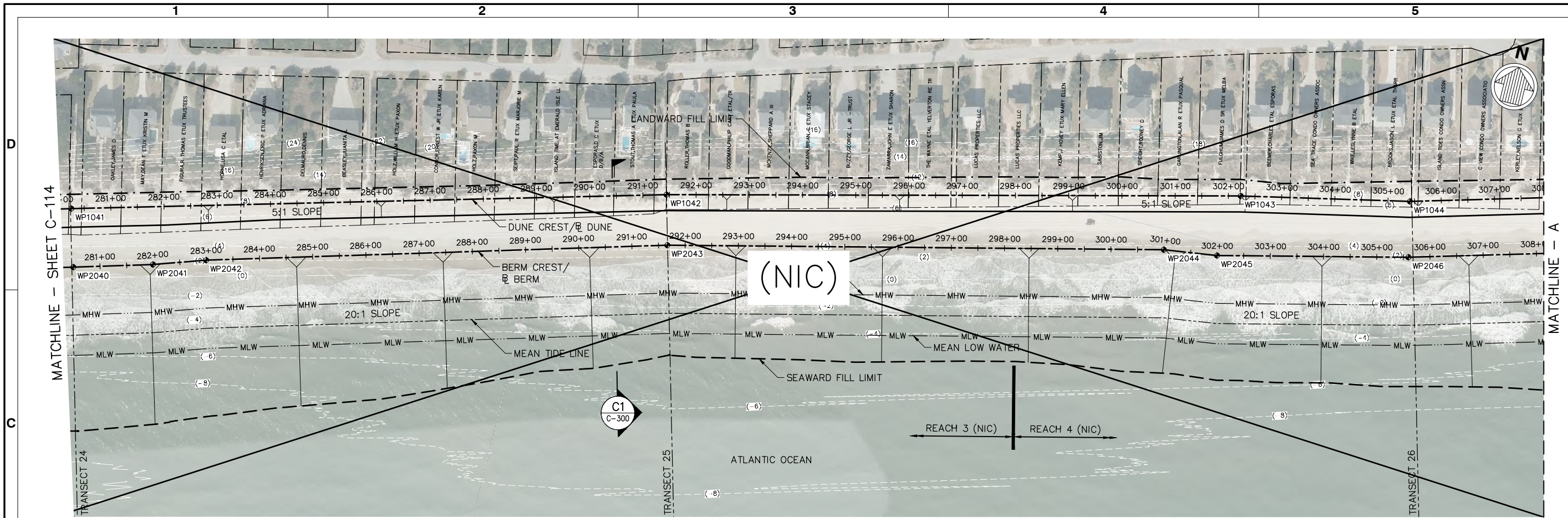
meffatt & nichol NC FIRM LICENSE No. F-0105

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

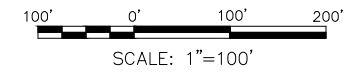


Sheet Reference No.
C-114
Sheet 13 of 66

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- NOTES:**
- 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

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

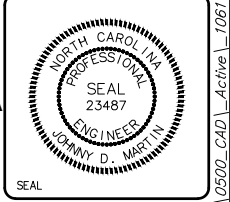
**BEACH RENOURISHMENT PLAN -
SHEET 6 OF 20**

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

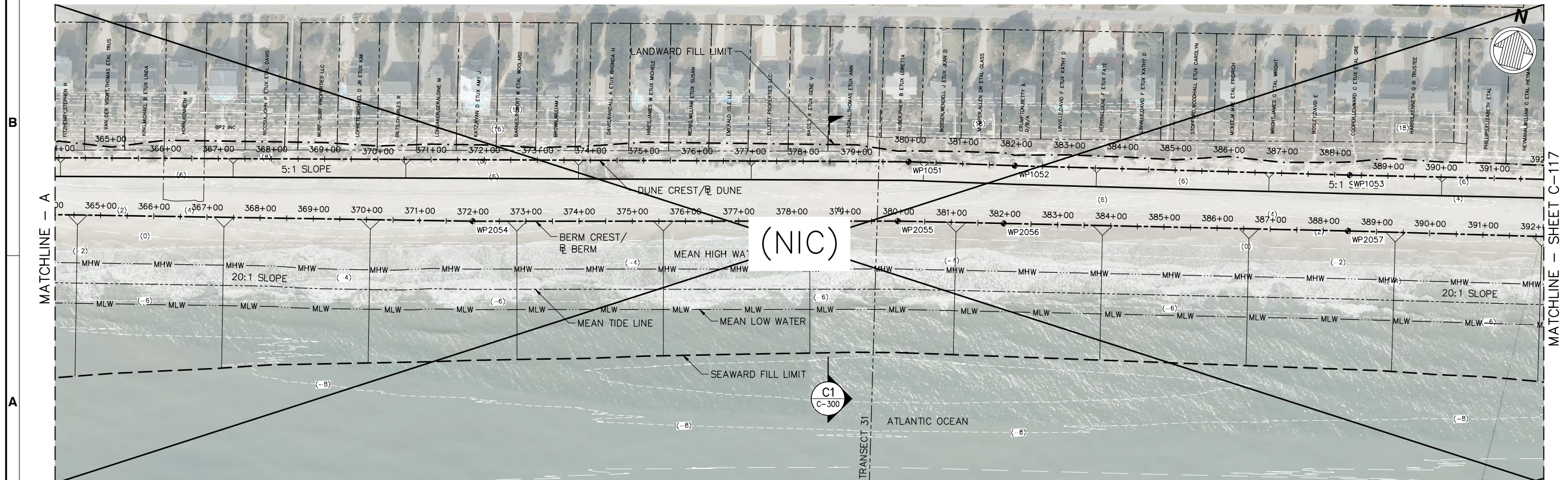
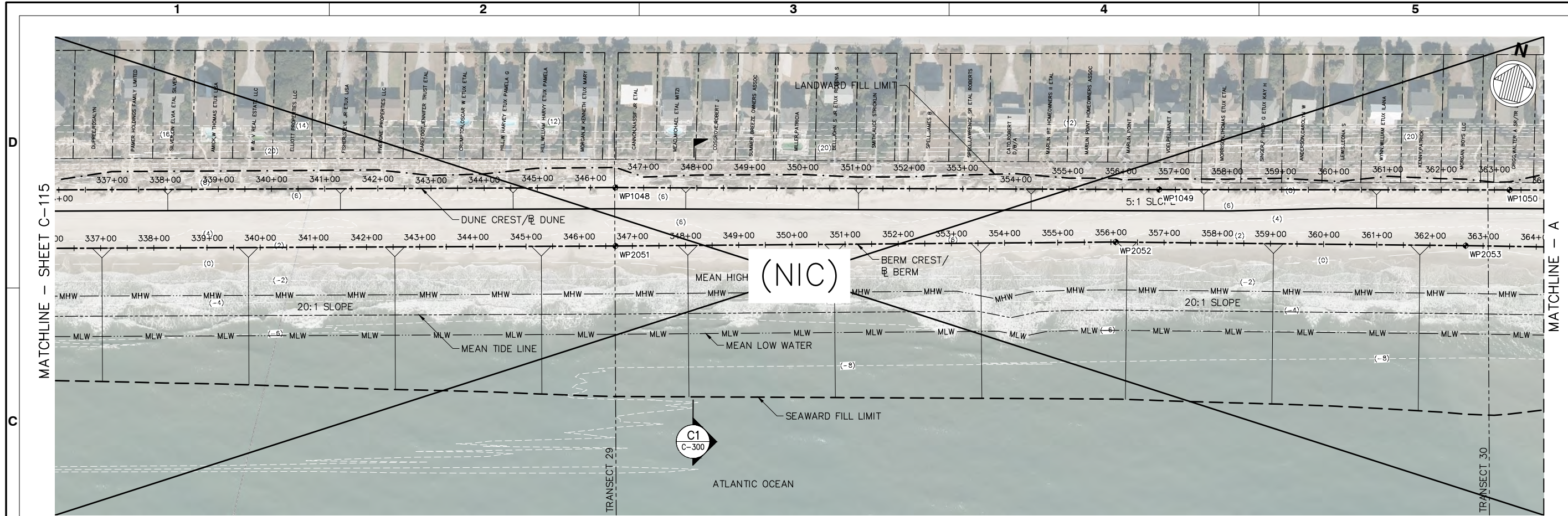
meffatt & nichol NC FIRM LICENSE No. F-0105

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

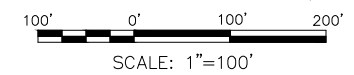


Sheet
Reference No.
C-115
Sheet 14 of 66

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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**

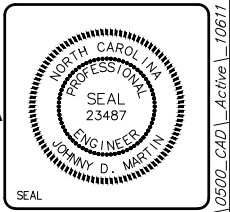
**BEACH RENOURISHMENT PLAN -
SHEET 7 OF 20**

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'

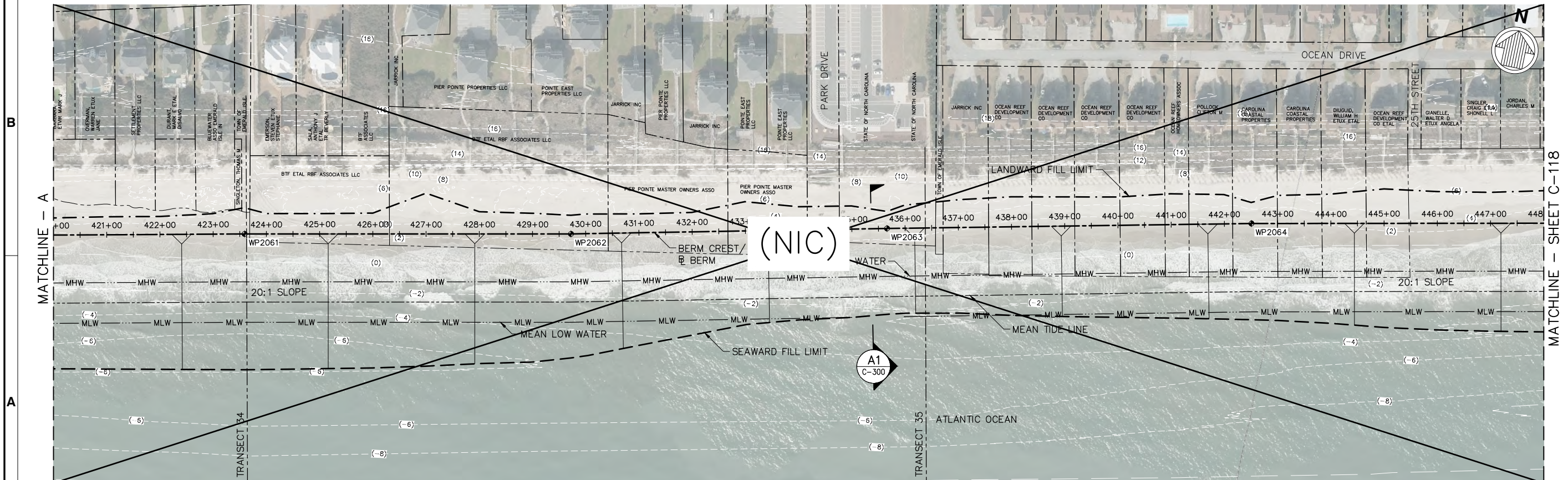
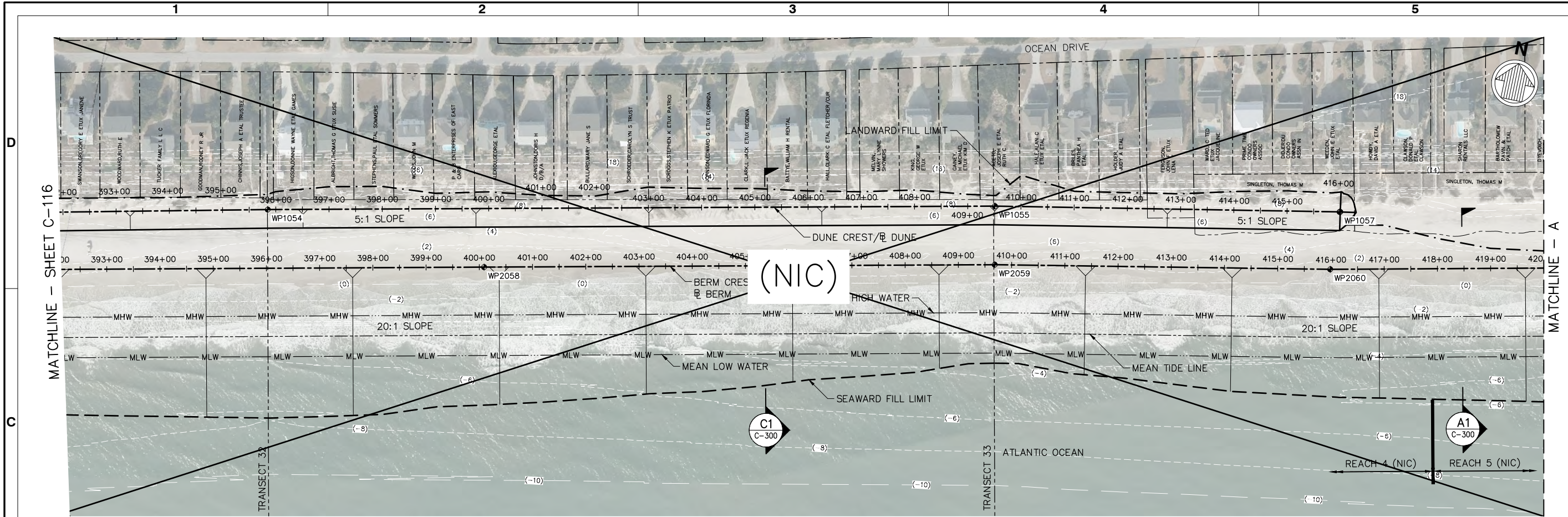
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

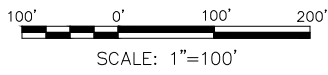
PREPARED FOR THE TOWNS OF
EMERALD ISLE, INDIAN BEACH,
PINE KNOLL SHORES, AND ATLANTIC BEACH



Sheet Reference No.
C-116
Sheet 15 of 66



- 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**

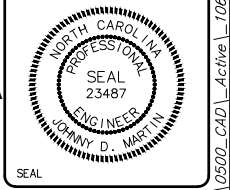
**BEACH RENOURISHMENT PLAN -
SHEET 8 OF 20**

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" (D SHEET)

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

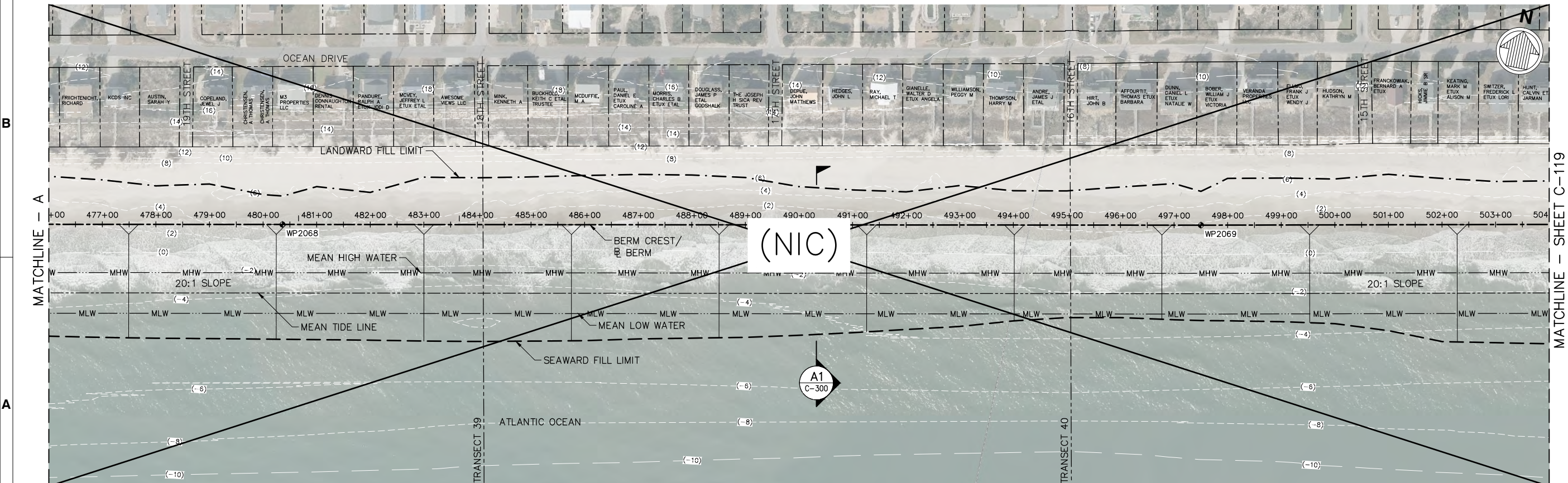
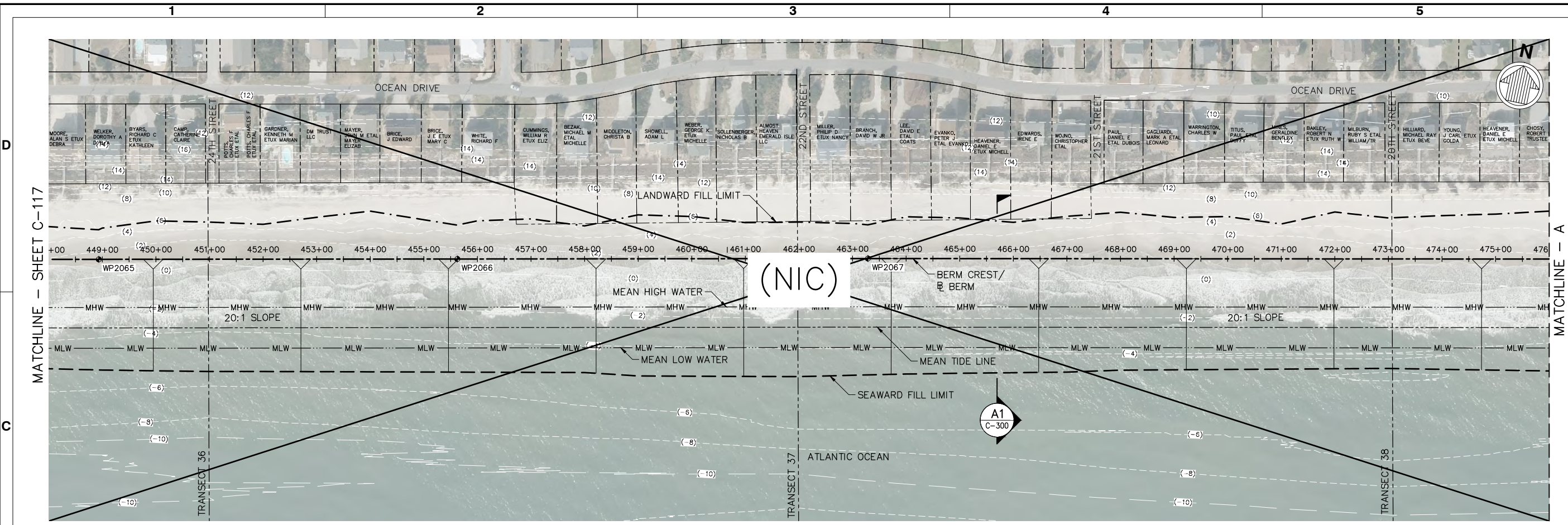
meffatt & nichol NC FIRM LICENSE No. F-0105

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

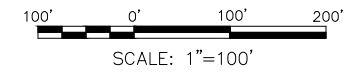


Sheet Reference No.
C-117
Sheet 16 of 66

File: G:\1\RA\10611\0500_CAD_Active\10611\0611000-117_Plot.dwg; Plotted: 2/14/2020 10:29 AM by FORD, BRIAN; Saved: 8/16/2019 5:44 PM by BFOFD



- 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**

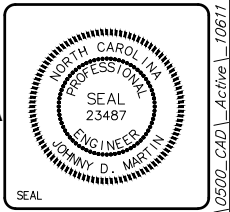
**BEACH RENOURISHMENT PLAN -
SHEET 9 OF 20**

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" (D SHEET)

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

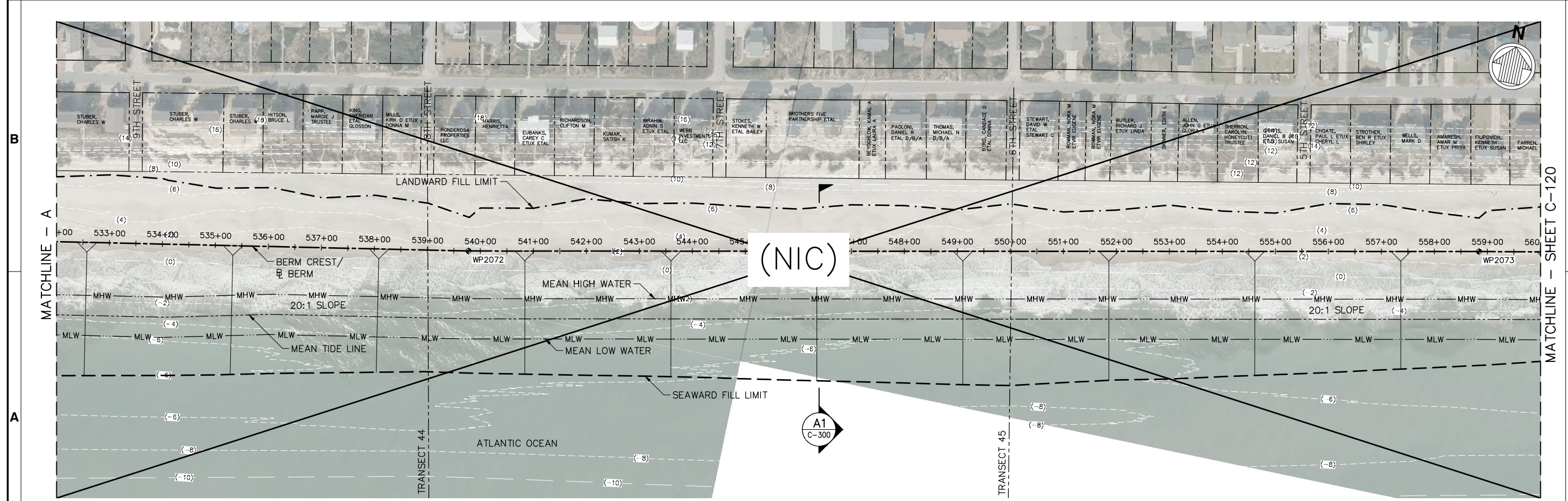
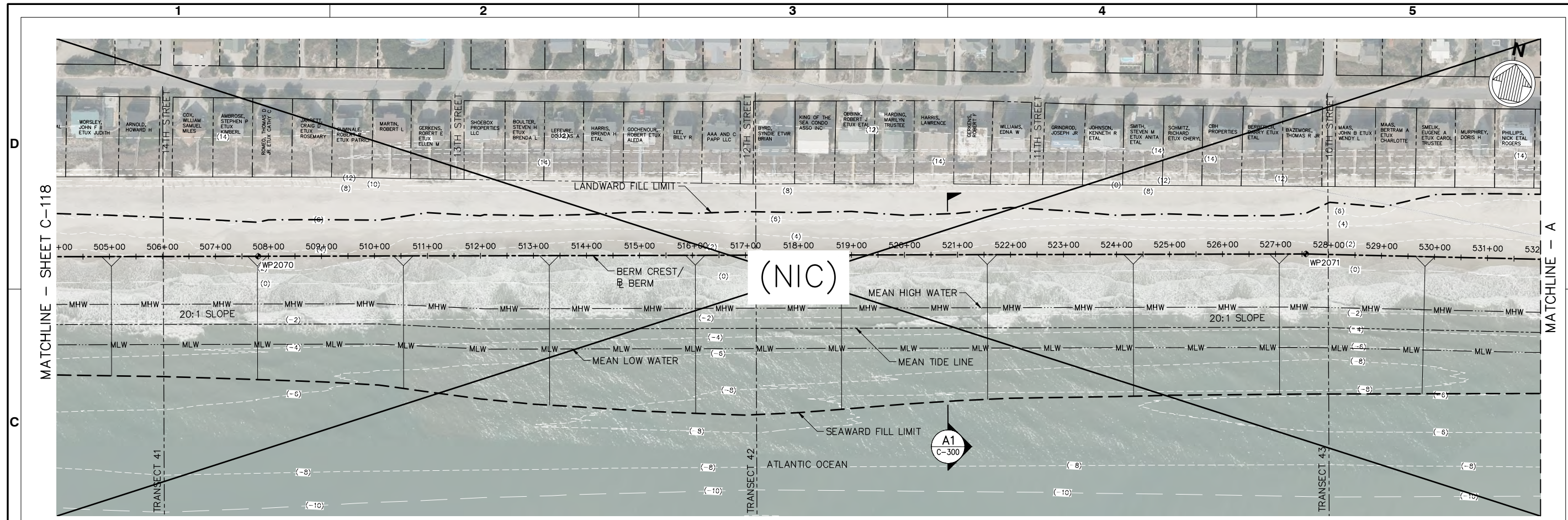
meffatt & nichol NC FIRM LICENSE No. F-0105

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

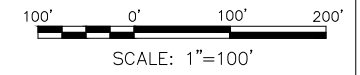


Sheet Reference No.
C-118
Sheet 17 of 66

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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**

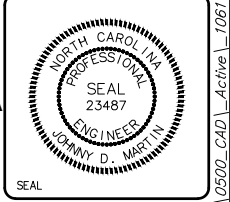
**BEACH RENOURISHMENT PLAN -
 SHEET 10 OF 20**

Designed by:	NCY	Checked by:	SRM	Drawn 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

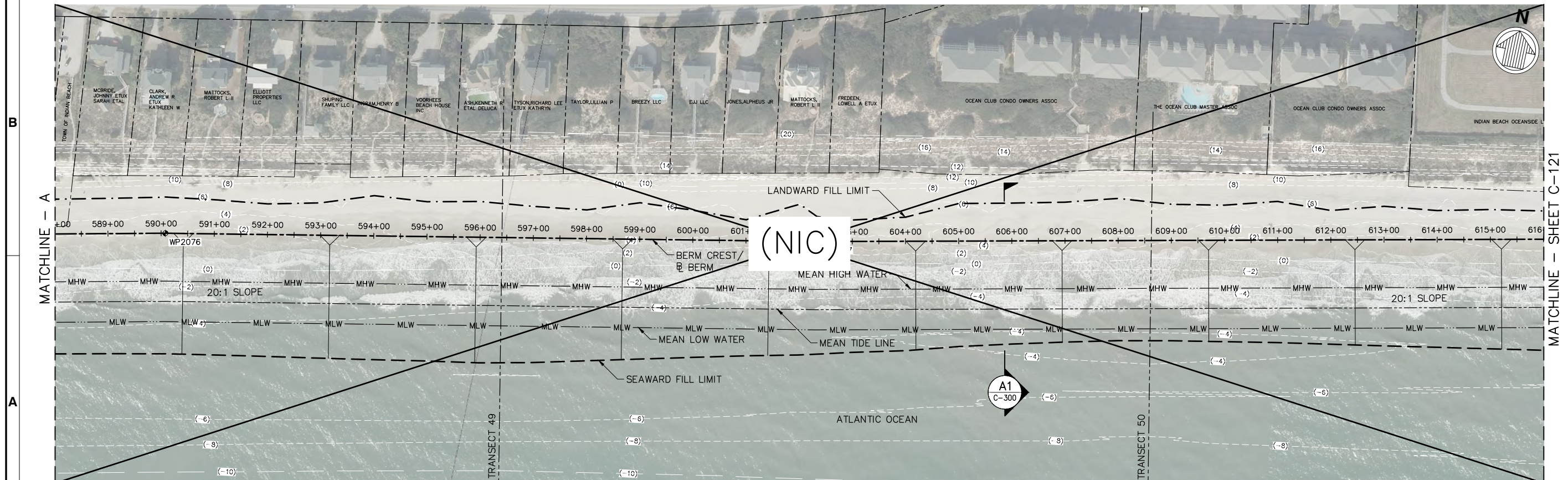
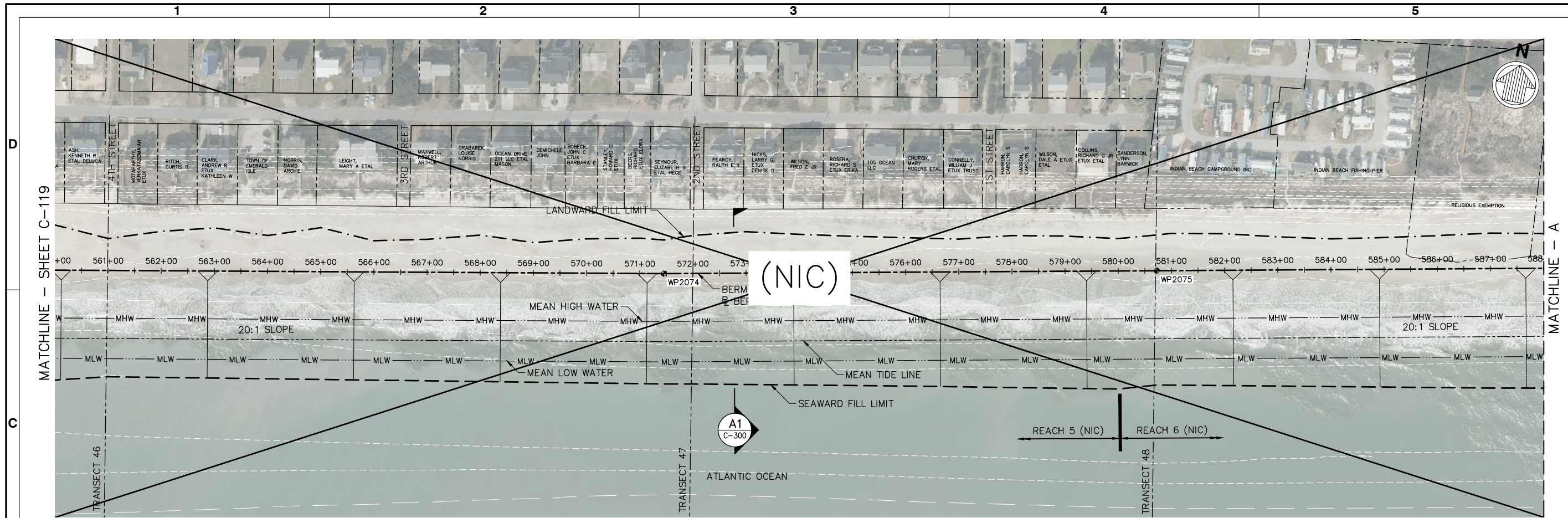
meffatt & nichol NC FIRM LICENSE No. F-0105

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

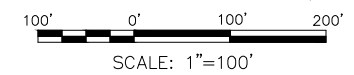


Sheet Reference No.
C-119
 Sheet 18 of 66

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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	BID DOCUMENTS

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

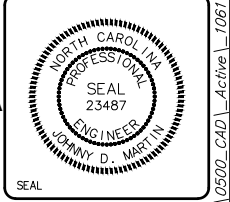
BEACH RENOURISHMENT PLAN -
SHEET 11 OF 20

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

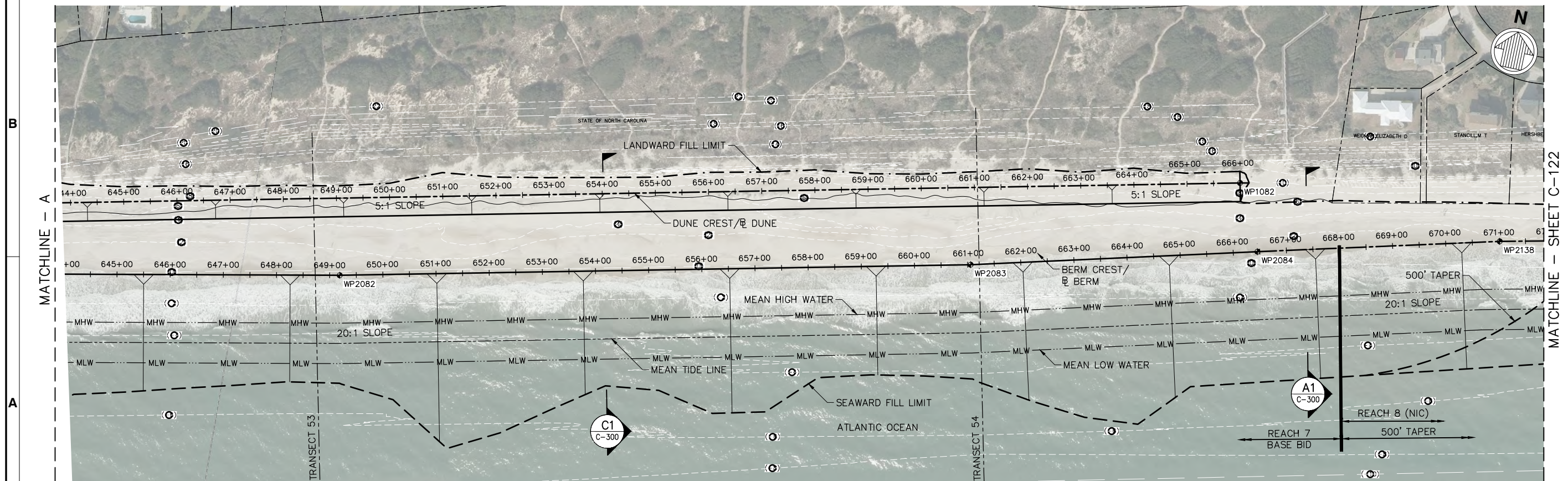
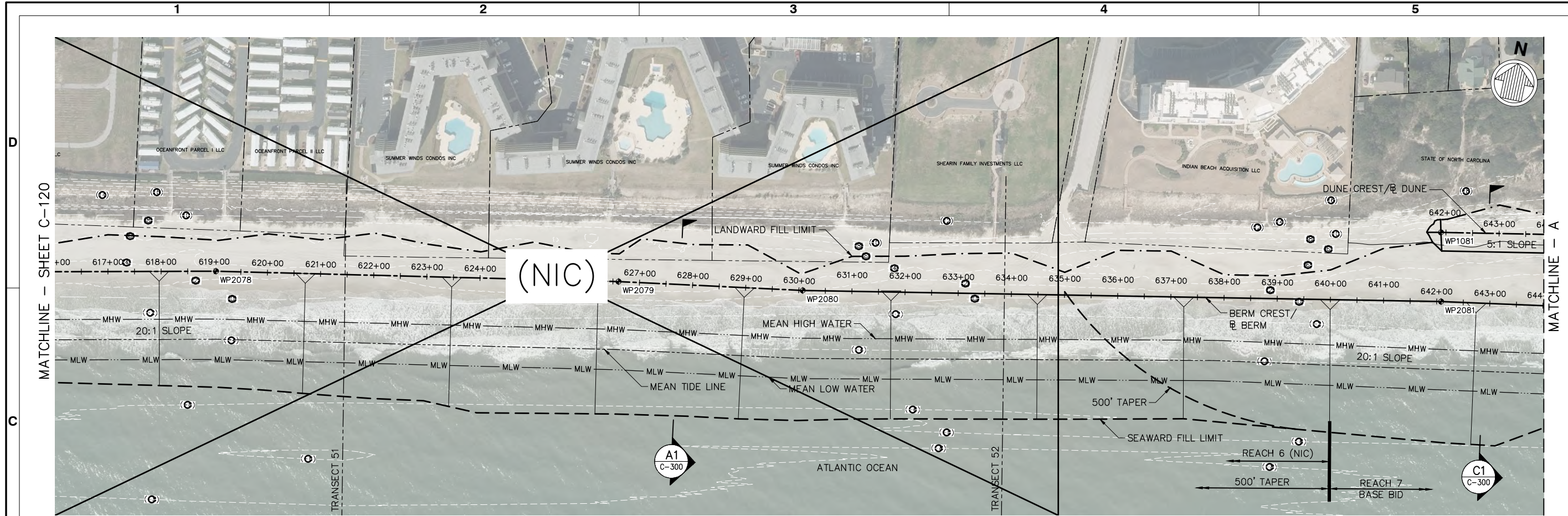
meffatt & nichol NC FIRM LICENSE No. F-0105

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

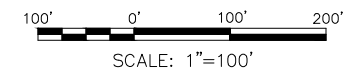


Sheet Reference No.
C-120
Sheet 19 of 66

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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		

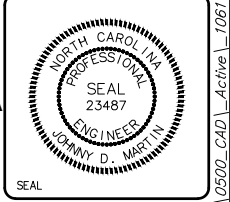
**POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA**

**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		MAN 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)	

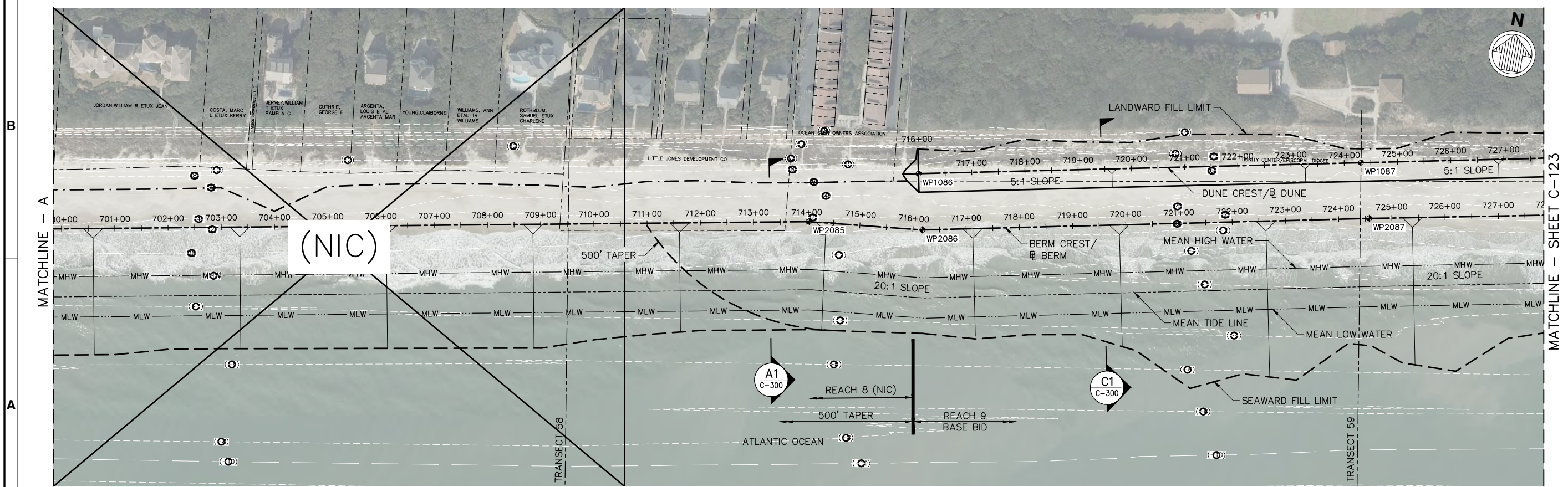
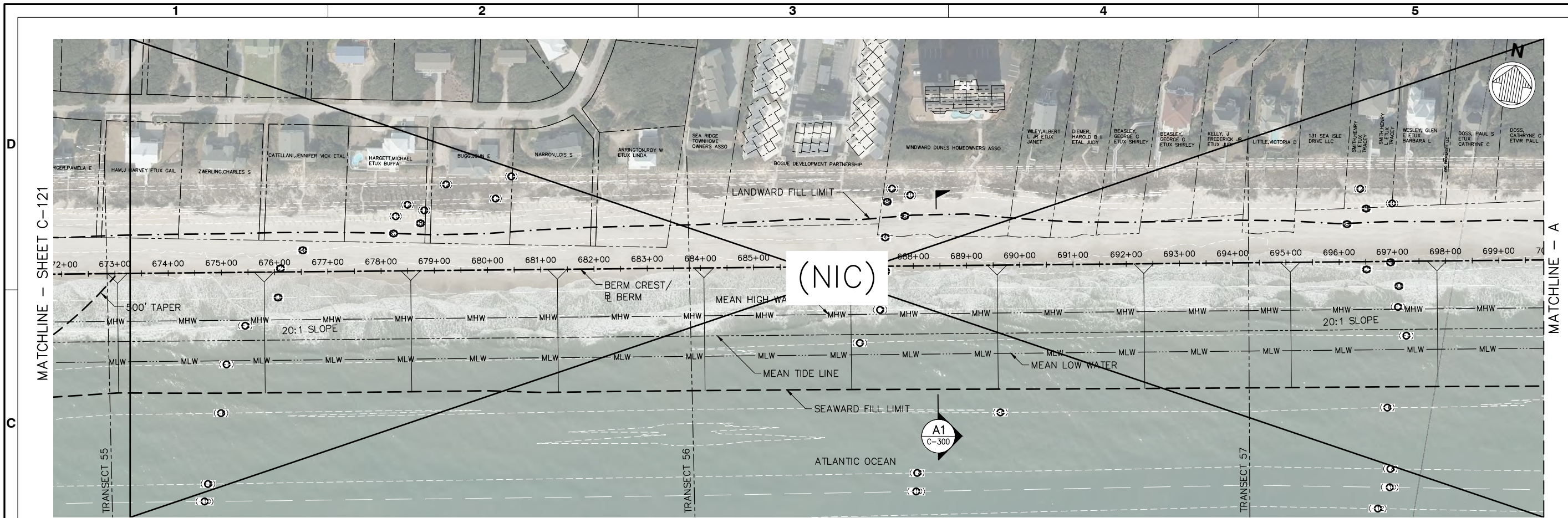
meffatt & nichol

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

Rev.	Date	Description
1	JANUARY 2020	1

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**

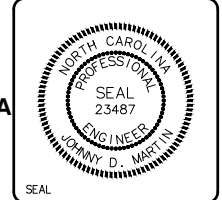
**BEACH RENOURISHMENT PLAN -
SHEET 13 OF 20**

Designed by:	NCV	Checked by:	SRM	Reviewed by:	JDM	Submitted by:	MOFFATT & NICHOL
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
919-781-4626

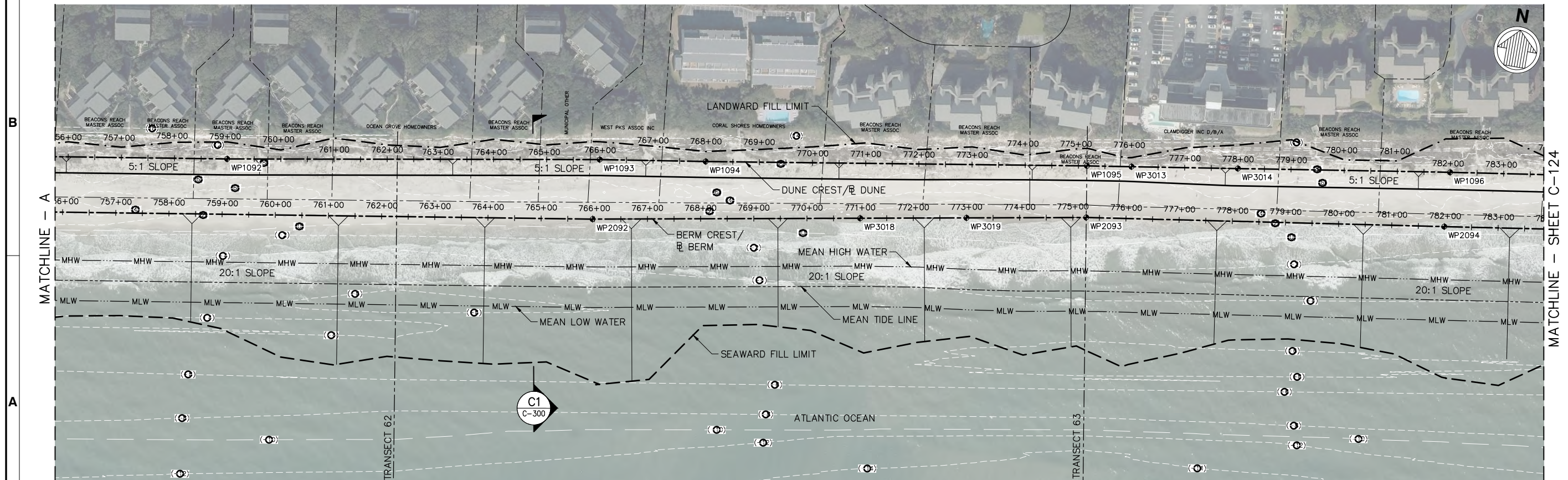
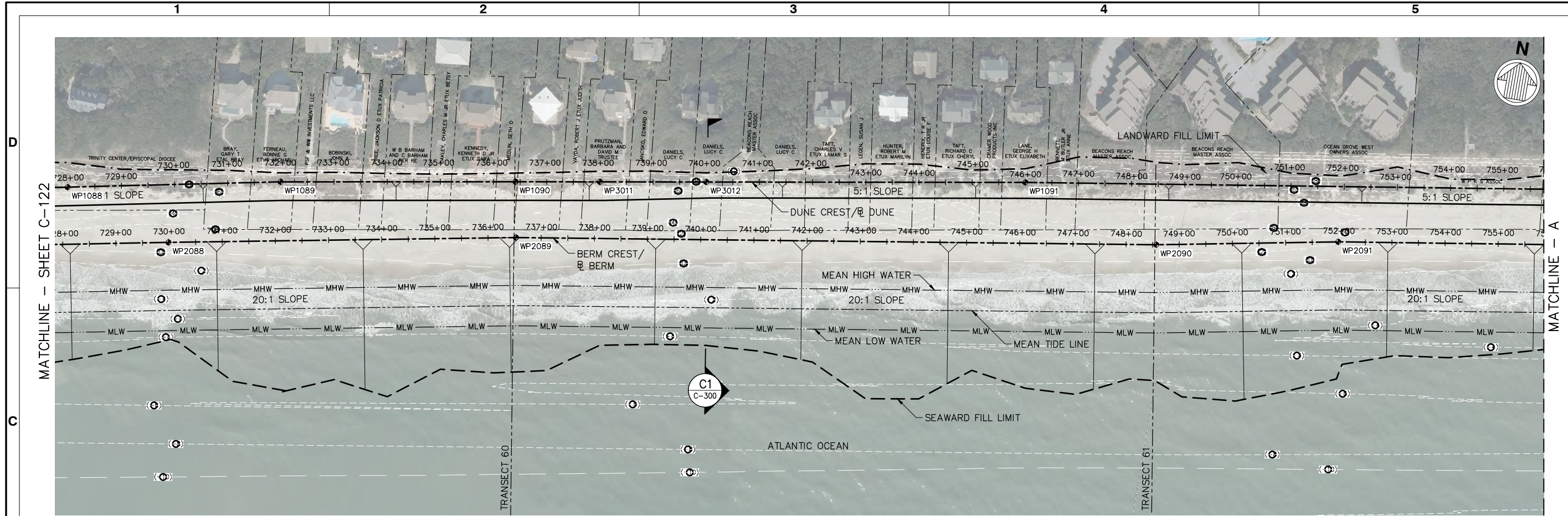
meffatt & nichol NC FIRM LICENSE No. F-0105

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

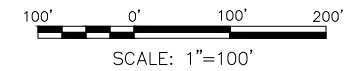


Sheet Reference No.
C-122
Sheet 21 of 66

File: G:\RA\10611\0500_CAD\Active\10611 Bouge Banks 2020\1061100C-122; Plotted: 2/14/2020 10:30 AM by FORD, BRIAN; Saved: 2/14/2020 10:19 AM by BFORD



- 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	JANUARY 2020	1

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**

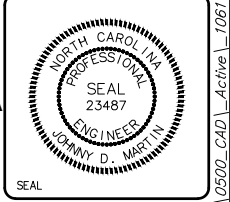
**BEACH RENOURISHMENT PLAN -
SHEET 14 OF 20**

Designed by:	NCV	Date:	JANUARY 2020
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

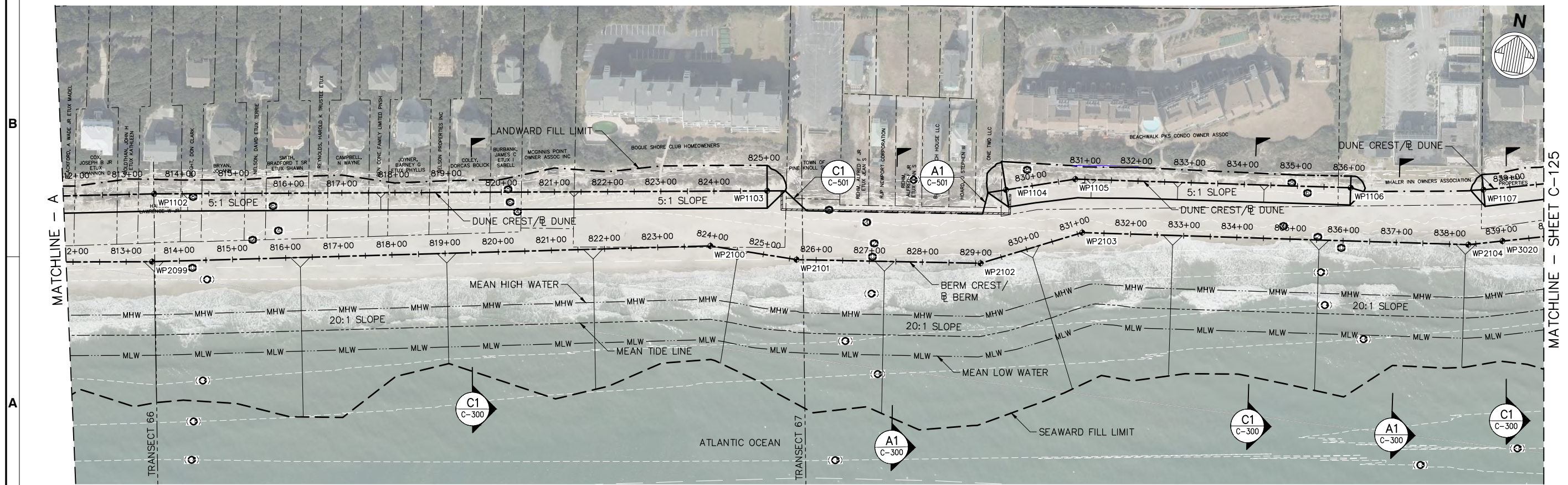
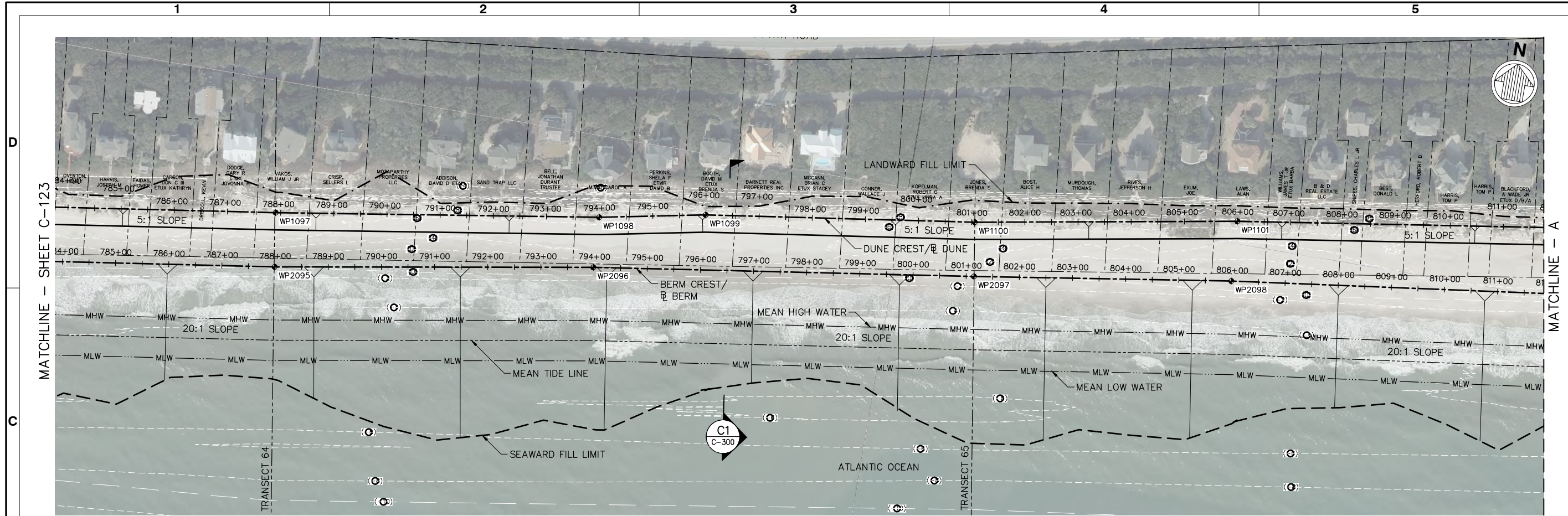
meffatt & nichol NC FIRM LICENSE No. F-0105

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

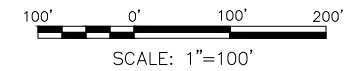


Sheet Reference No.
C-123
Sheet 22 of 66

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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	JANUARY 2020	1

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**

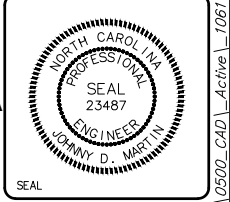
**BEACH RENOURISHMENT PLAN -
SHEET 15 OF 20**

Designed by:	NCV	Drawn by:	BDF	Reviewed by:	JDM	Submitted by:	MOFFATT & NICHOL
Date:	JANUARY 2020	MAN Project No.:	10611	Drawing code:		Drawing Scale:	Plot scale: 1" = 10'

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

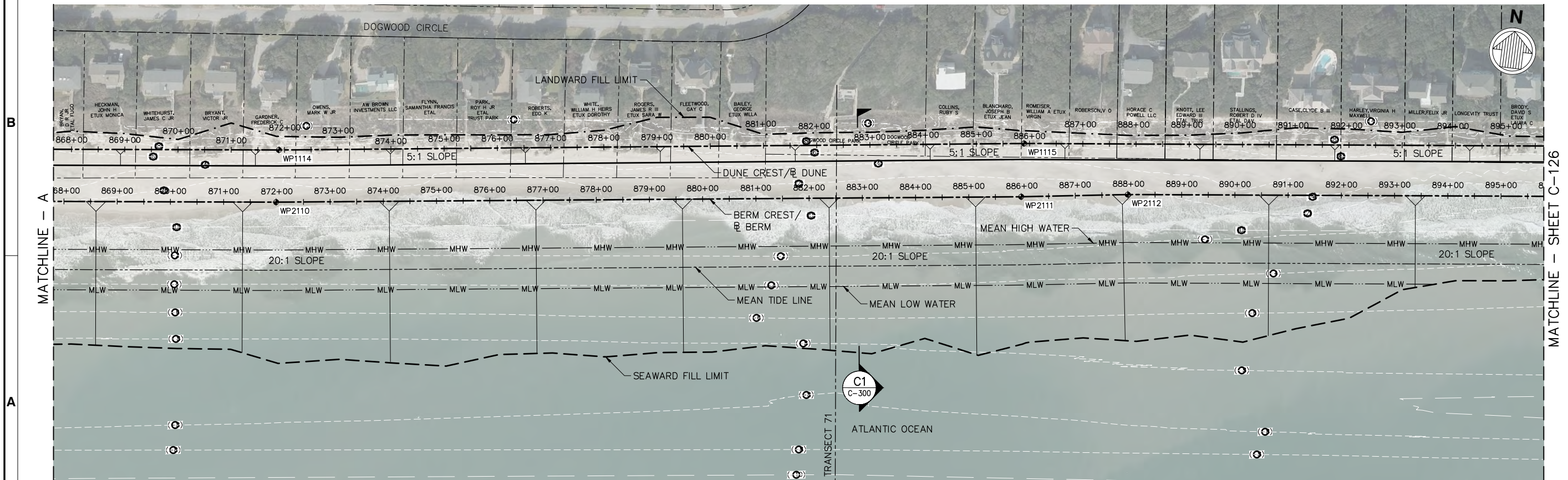
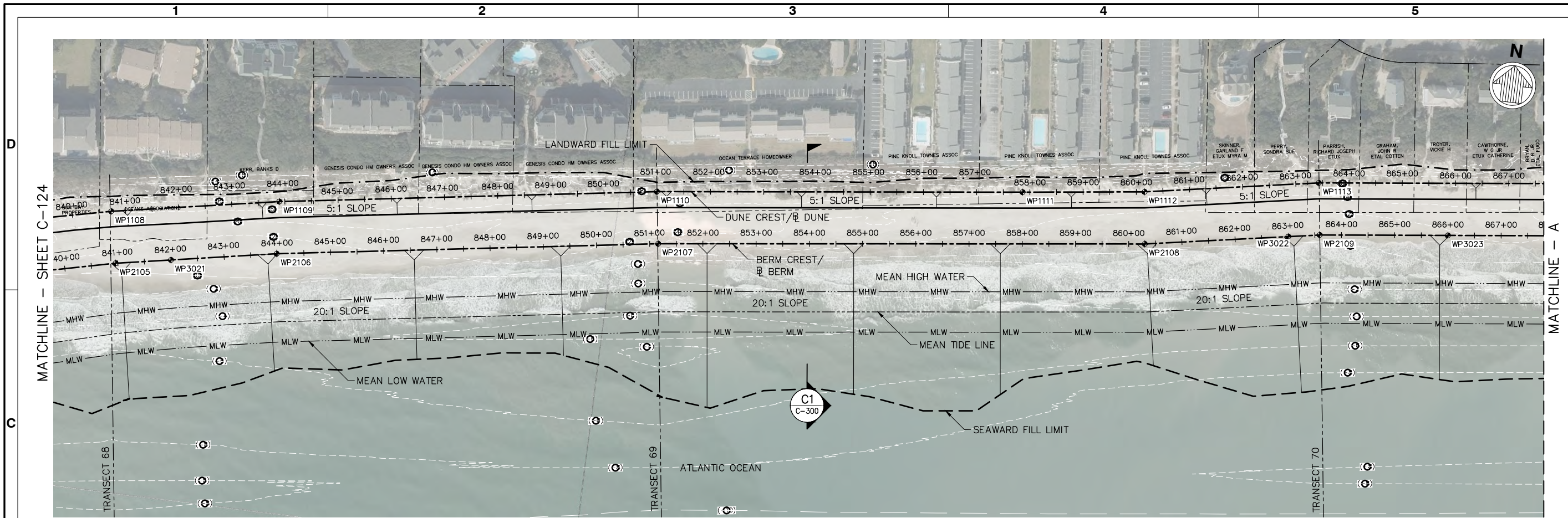
meffatt & nichol NC FIRM LICENSE No. F-0105

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

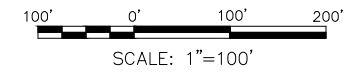


Sheet Reference No.
C-124
Sheet 23 of 66

File: Q:\1\RA\10611\10500_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 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		Mark

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

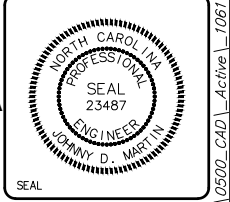
**BEACH RENOURISHMENT PLAN -
 SHEET 16 OF 20**

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

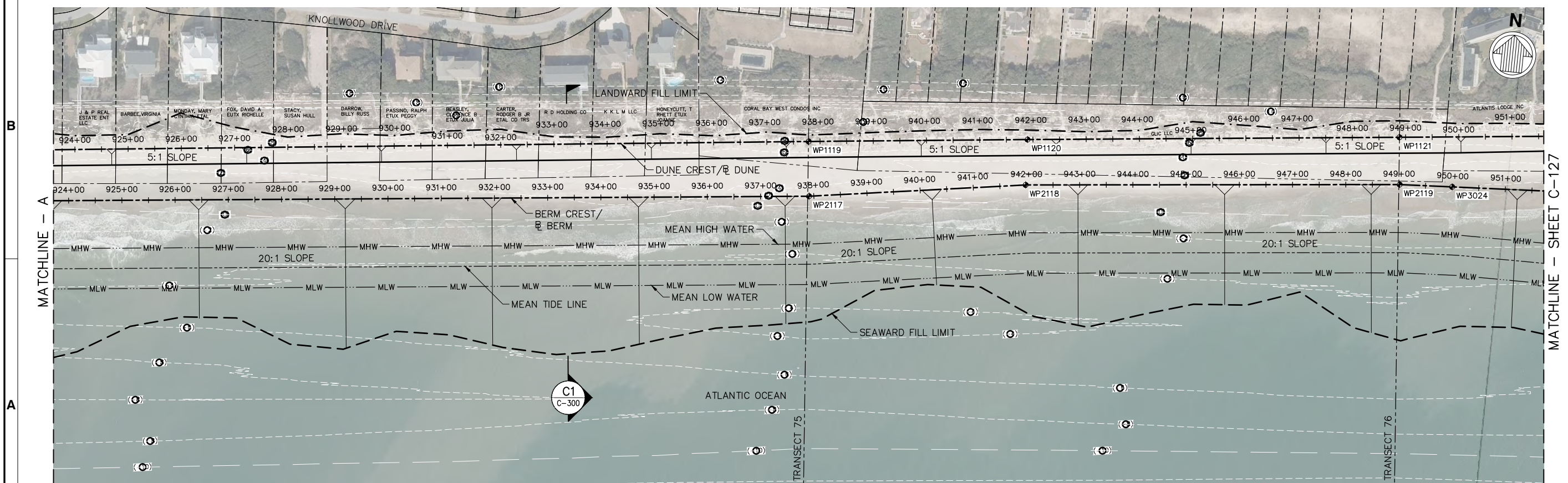
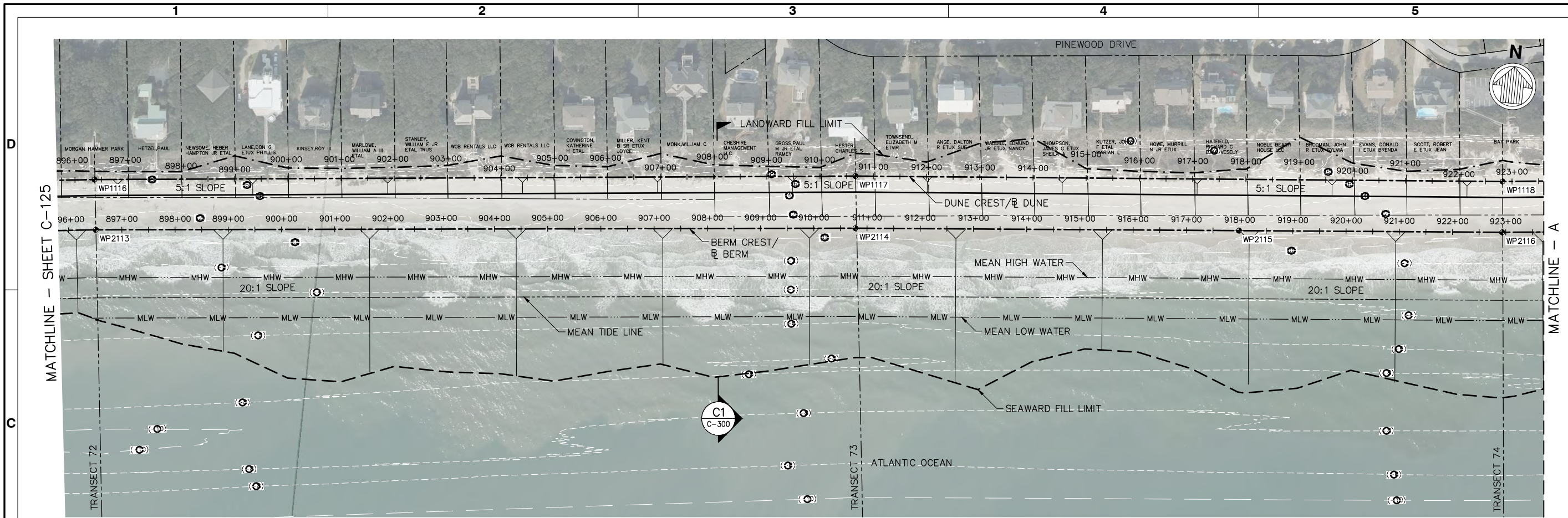
NC FIRM LICENSE No. F-0105

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

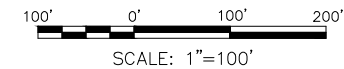


Sheet Reference No.
C-125
 Sheet 24 of 66

File: G:\RA\10611\0500_CAD\Active\10611\061100C-125; Plotted: 2/14/2020 10:31 AM by FORD, BRIAN; Saved: 2/14/2020 10:16 AM by BFORD



- 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
		Mark

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

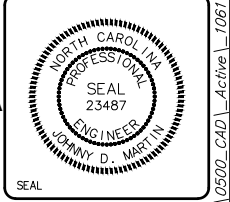
**BEACH RENOURISHMENT PLAN -
SHEET 17 OF 20**

Designed by: NCY	Drawn by: BDF	Checked by: SRM	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Date: JANUARY 2020	Rev. 1
M&N 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

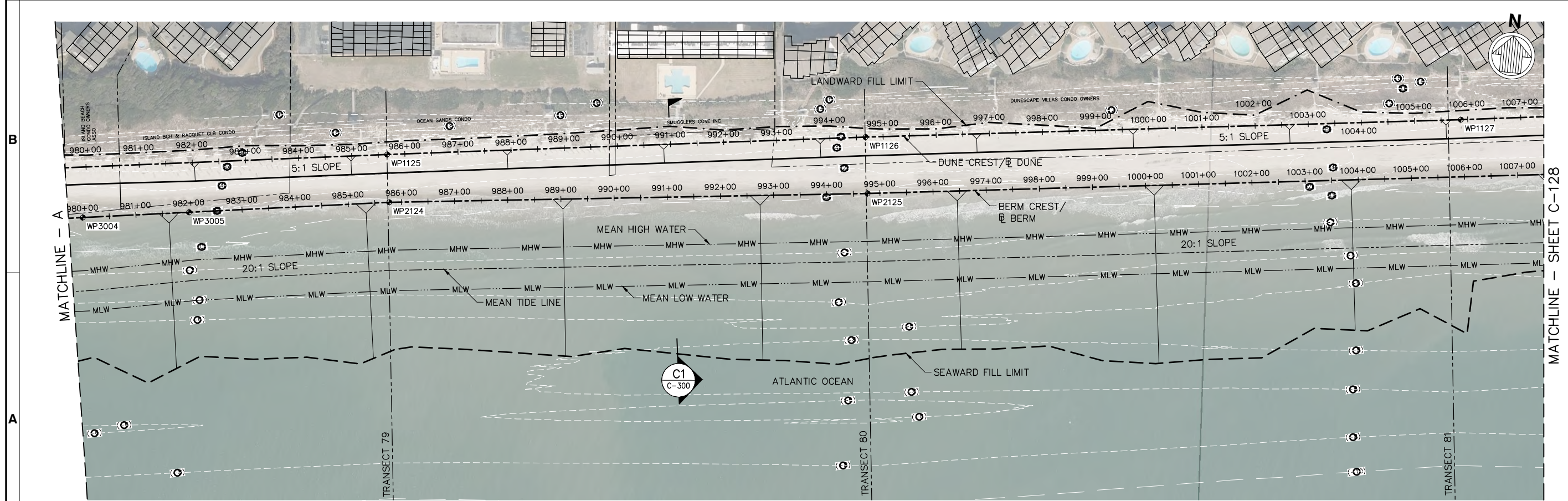
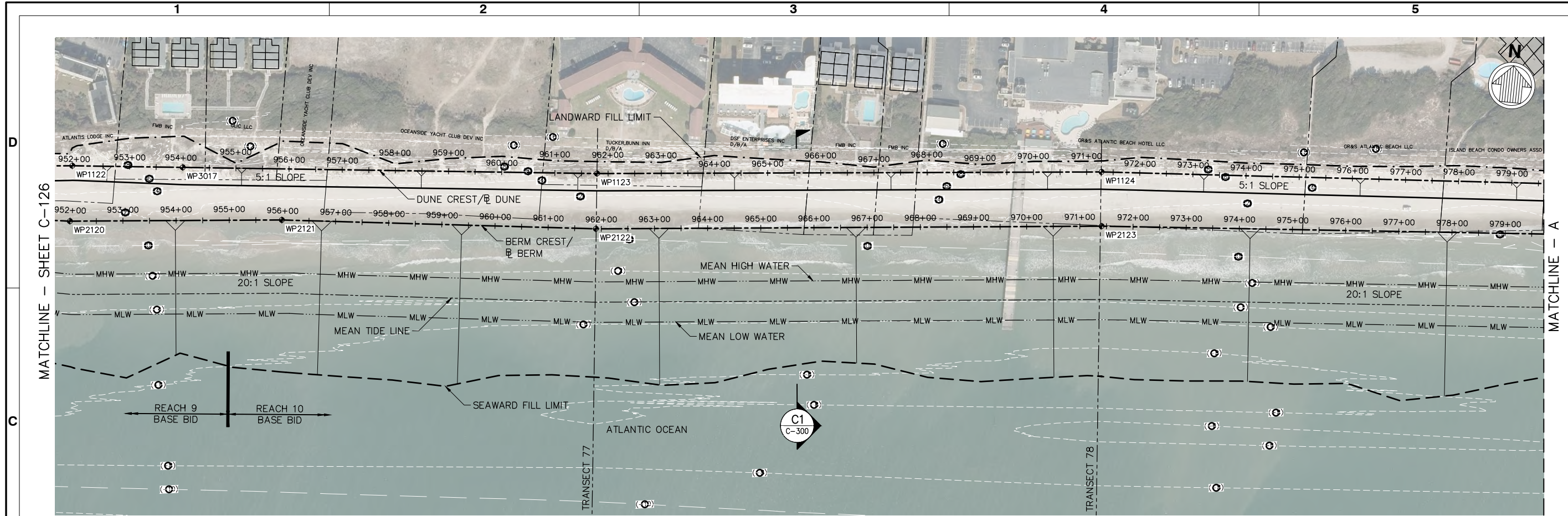
meffatt & nichol NC FIRM LICENSE No. F-0105

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

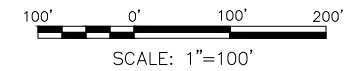


Sheet Reference No.
C-126
Sheet 25 of 66

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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

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

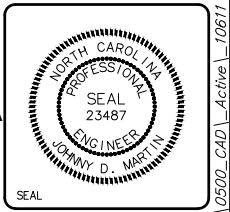
**BEACH RENOURISHMENT PLAN -
SHEET 18 OF 20**

Designed by:	NCV	Date:	JANUARY 2020
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

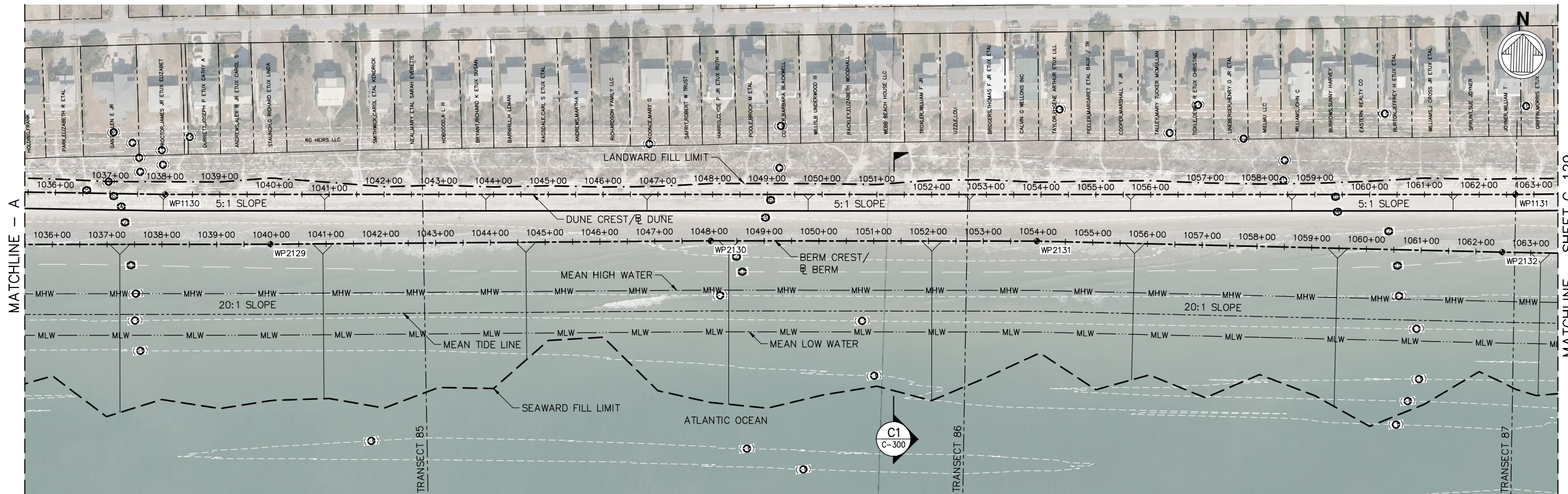
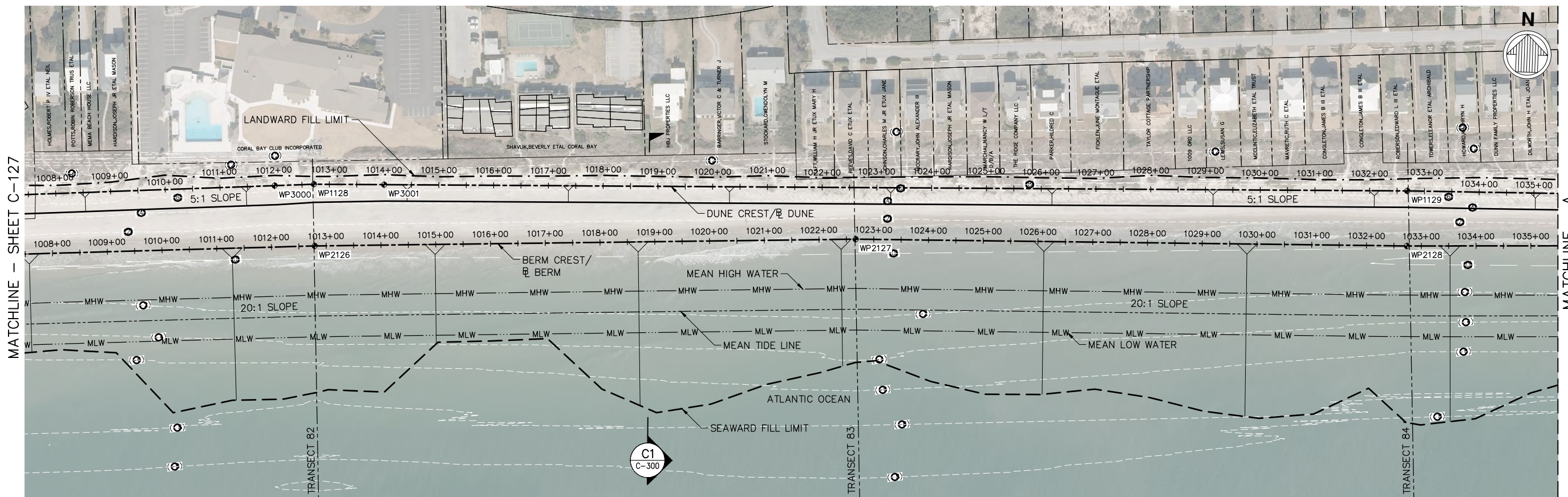
meffatt & nichol NC FIRM LICENSE No. F-0105

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

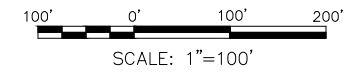


Sheet Reference No.
C-127
Sheet 26 of 66

File: G:\RA\10611\0500_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.



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

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

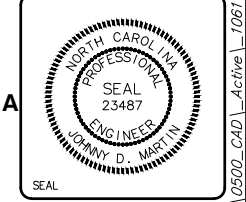
**BEACH RENOURISHMENT PLAN -
SHEET 19 OF 20**

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" = (D SHEET)

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

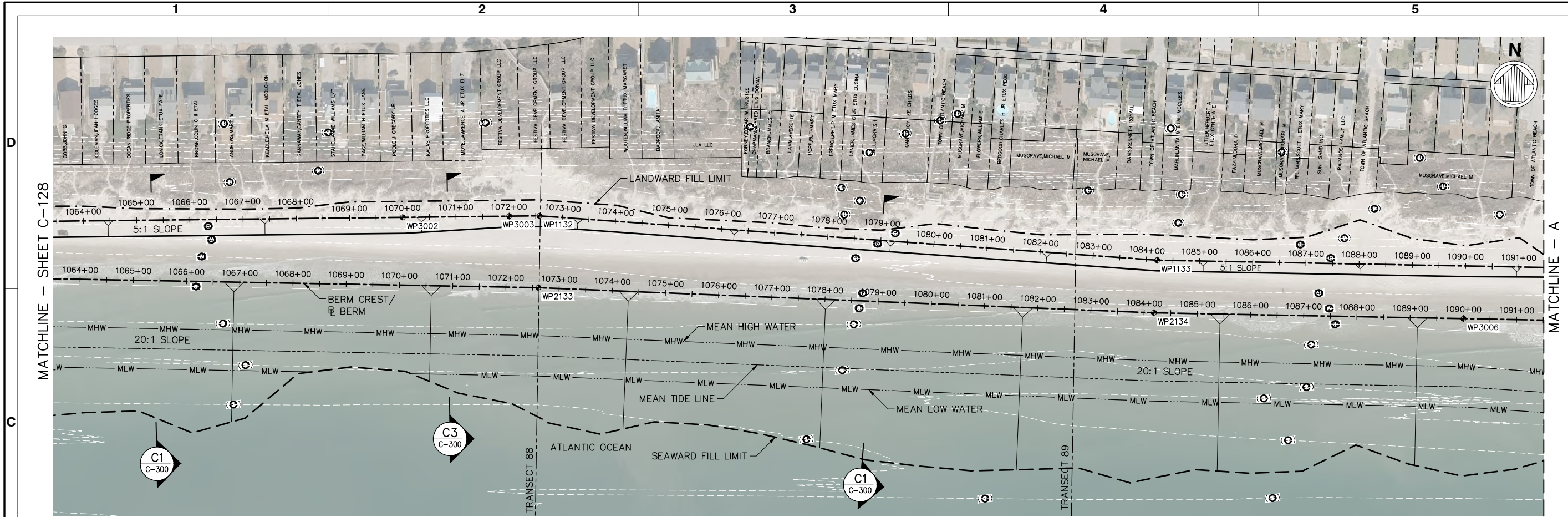
meffatt & nichol NC FIRM LICENSE No. F-0105

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

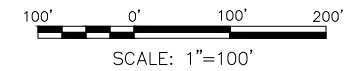


Sheet Reference No.
C-128
Sheet 27 of 66

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.



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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**

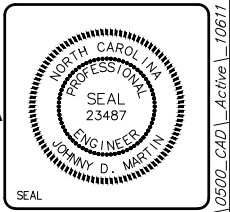
**BEACH RENOURISHMENT PLAN -
SHEET 20 OF 20**

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" (D SHEET)

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

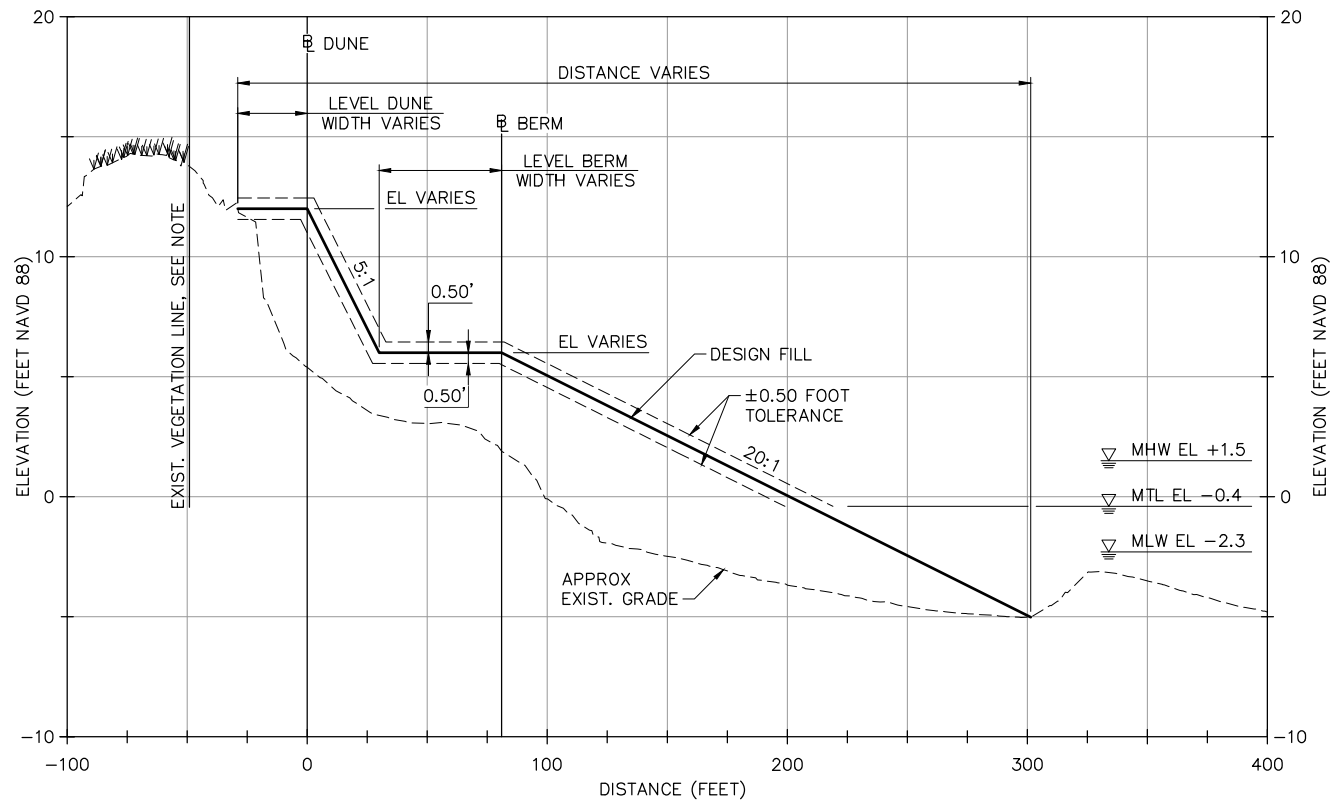
NC FIRM LICENSE No. F-0105

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



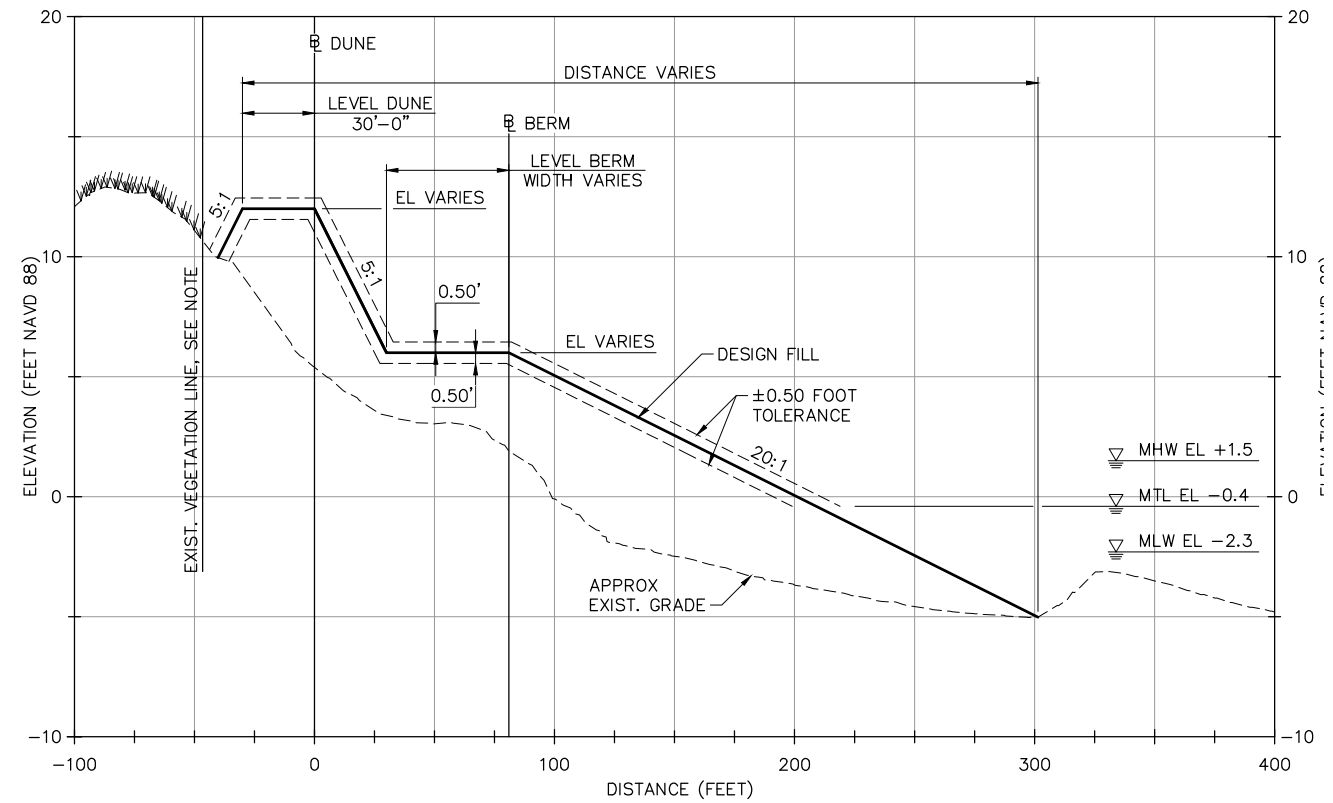
Sheet Reference No.
C-129
Sheet 28 of 66

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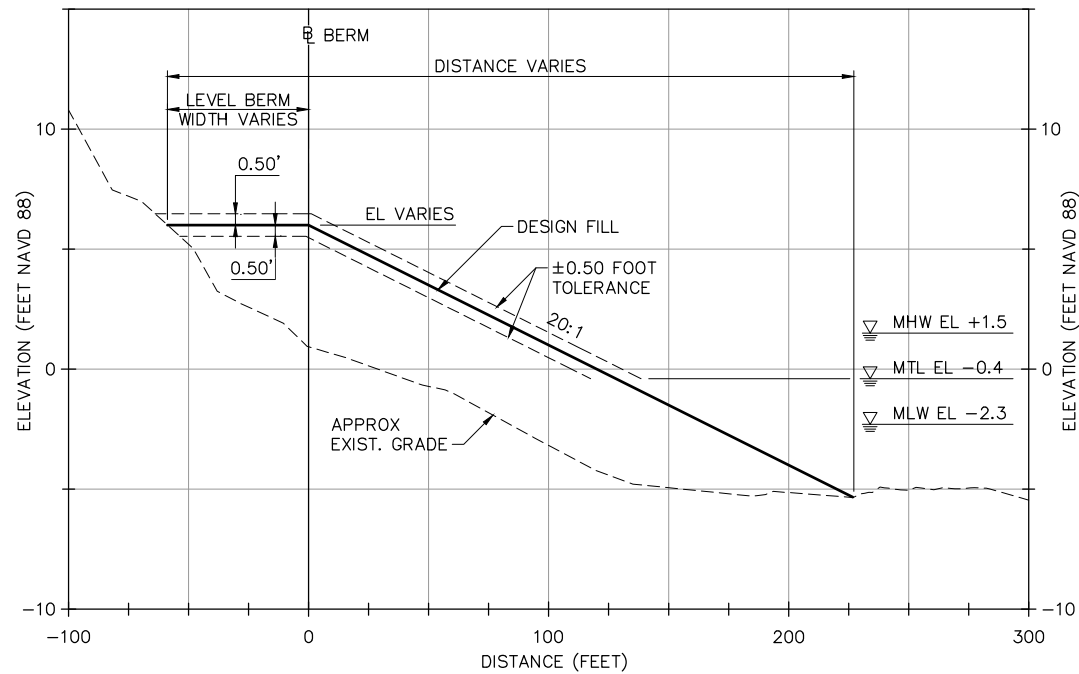
NOTE:
FIELD FIT THE LANDWARD DUNE CREST TIE IN, IF ELEVATION OF THE EXISTING VEGETATION LINE IS HIGHER THAN THE FINAL ELEVATION OF THE DUNE CREST DESIGN, THE DUNE CREST WILL BE CONSTRUCTED TO TIE IN AT THE ELEVATION OF THE CONSTRUCTED DUNE CREST. IF ELEVATION OF THE EXISTING VEGETATION LINE IS LOWER 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'

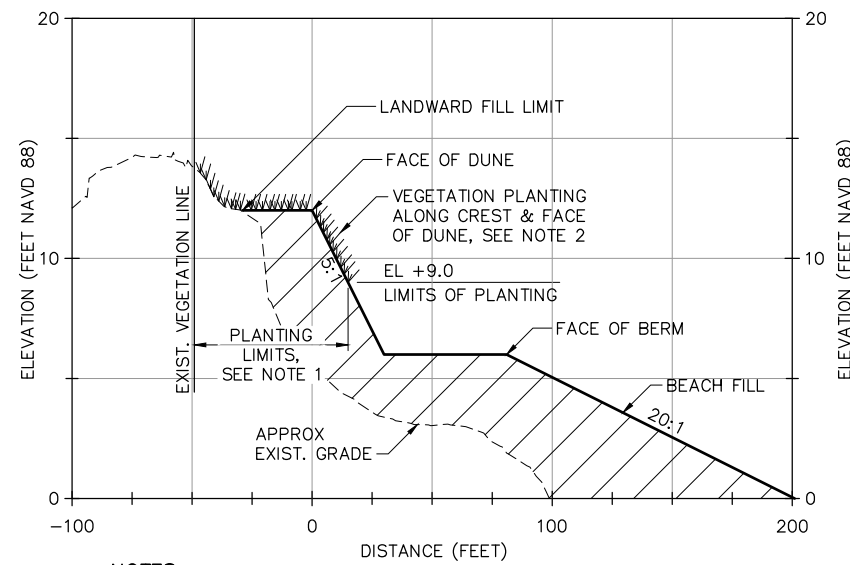


NOTE:
FIELD FIT THE LANDWARD DUNE CREST TIE IN, IF ELEVATION OF THE EXISTING VEGETATION LINE IS HIGHER THAN THE FINAL ELEVATION OF THE DUNE CREST DESIGN, THE DUNE CREST WILL BE CONSTRUCTED TO TIE IN AT THE ELEVATION OF THE CONSTRUCTED DUNE CREST. IF ELEVATION OF THE EXISTING VEGETATION LINE IS LOWER 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'

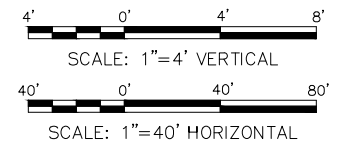


A1 BERM BEACH NOURISHMENT FILL TOLERANCE SECTION
C-300 SCALE: 1"=40'



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	BID DOCUMENTS

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

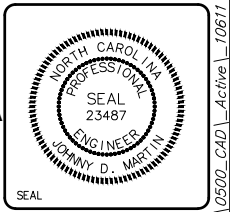
BEACH NOURISHMENT TYPICAL
SECTIONS

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

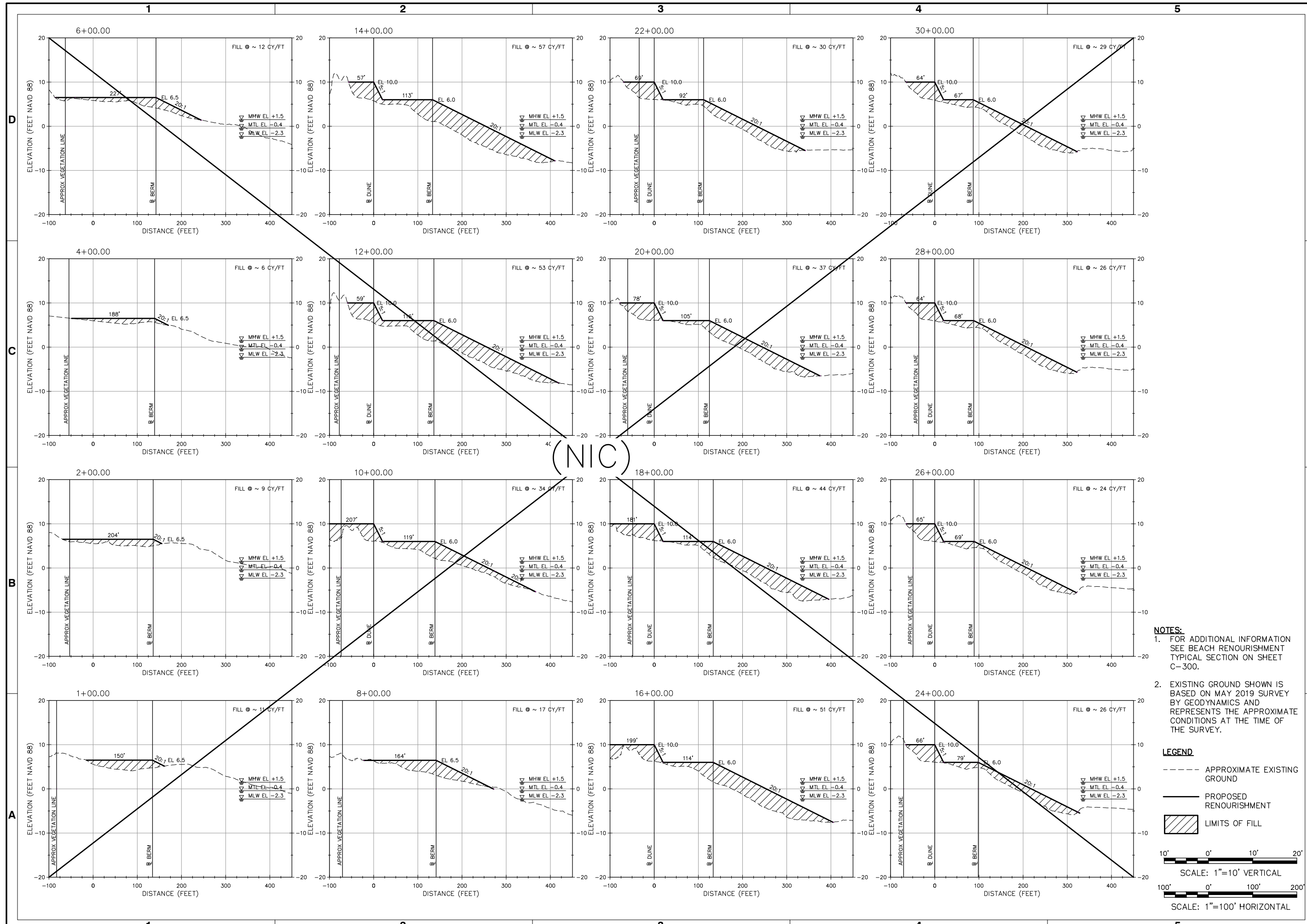
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

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:

- 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**

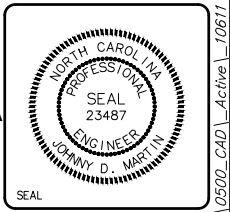
**RENOURISHMENT SECTIONS
SHEET 1 OF 35**

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	Submitted by: JDM	Submitted by: MOFFATT & NICHOL	

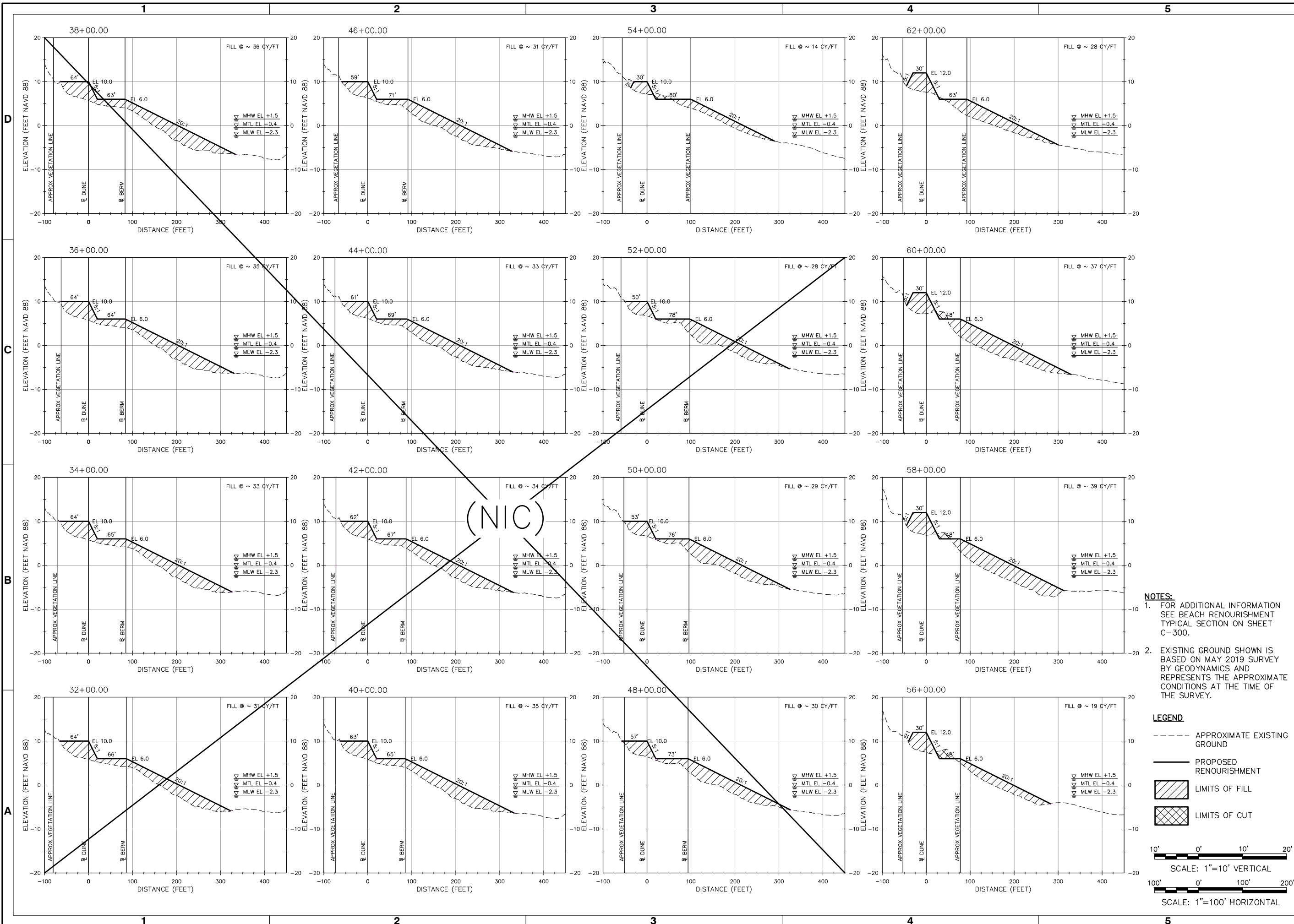
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

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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- 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

10' 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**

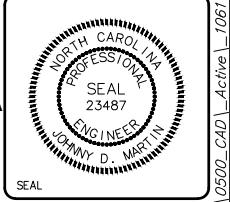
**RENOURISHMENT SECTIONS
SHEET 2 OF 35**

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

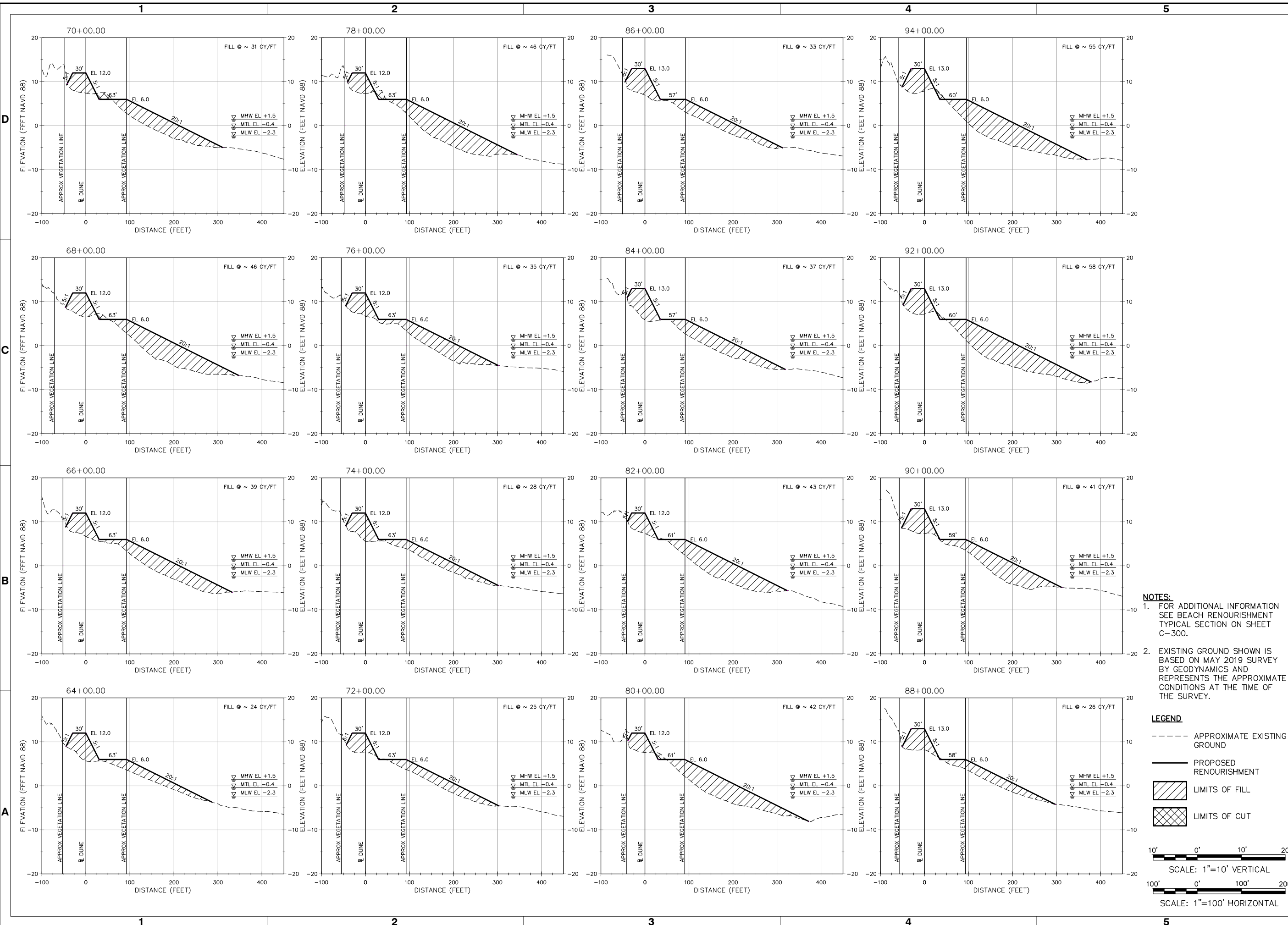
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

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\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 BIFORD



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**

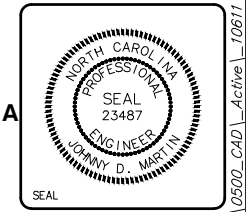
**RENOURISHMENT SECTIONS
SHEET 3 OF 35**

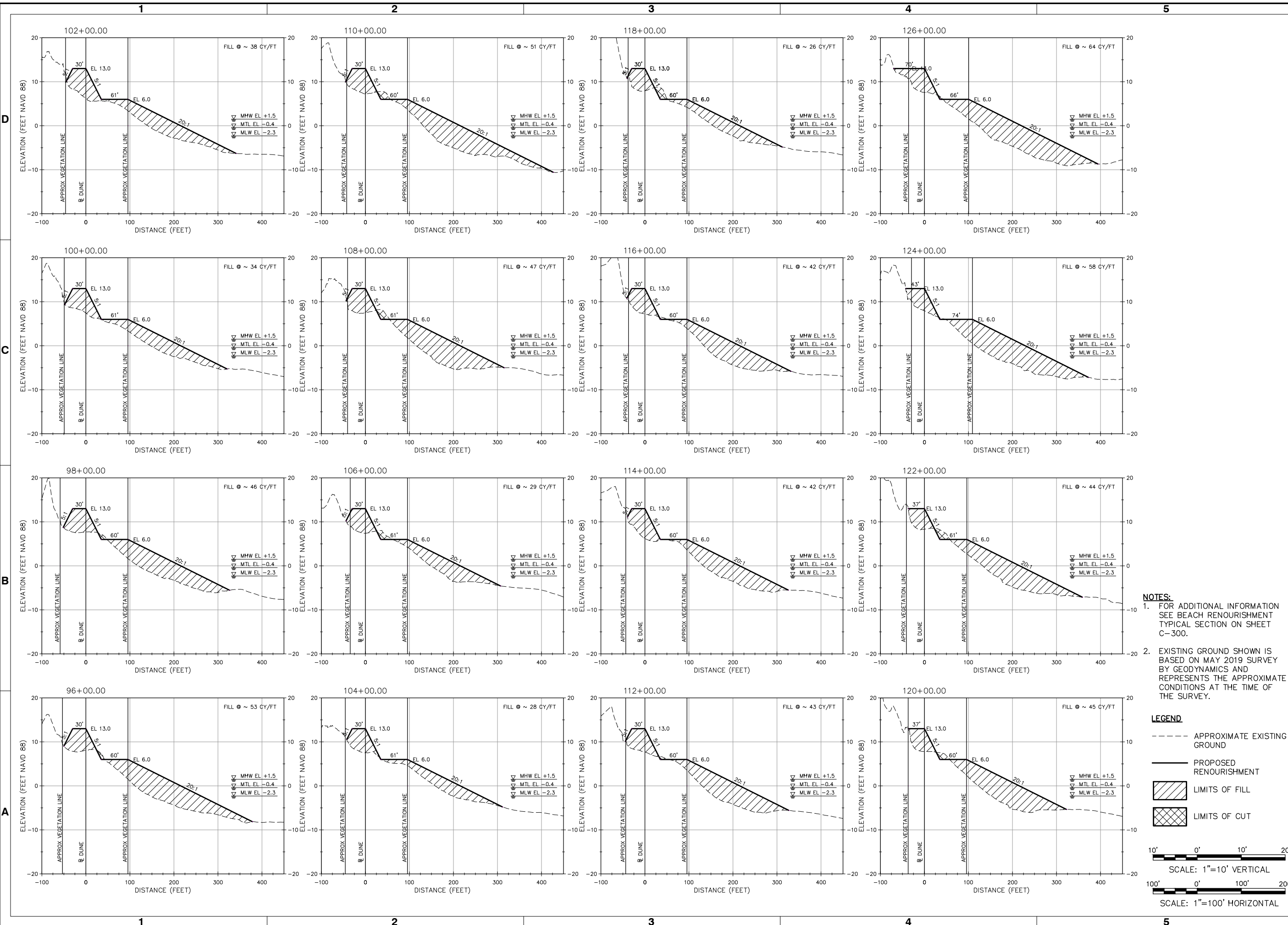
Designed by: NCY	Date: AUGUST 2019	Rev. 1
Drawn by: BDF	Checked by: SRM	M&N Project No. 10611
Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Drawing code: Drawing Scale: Plot scale: 1:1 (D SHEET)

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

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

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

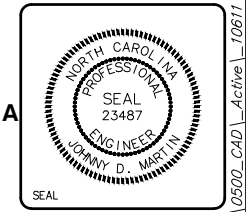
**RENOURISHMENT SECTIONS
 SHEET 4 OF 35**

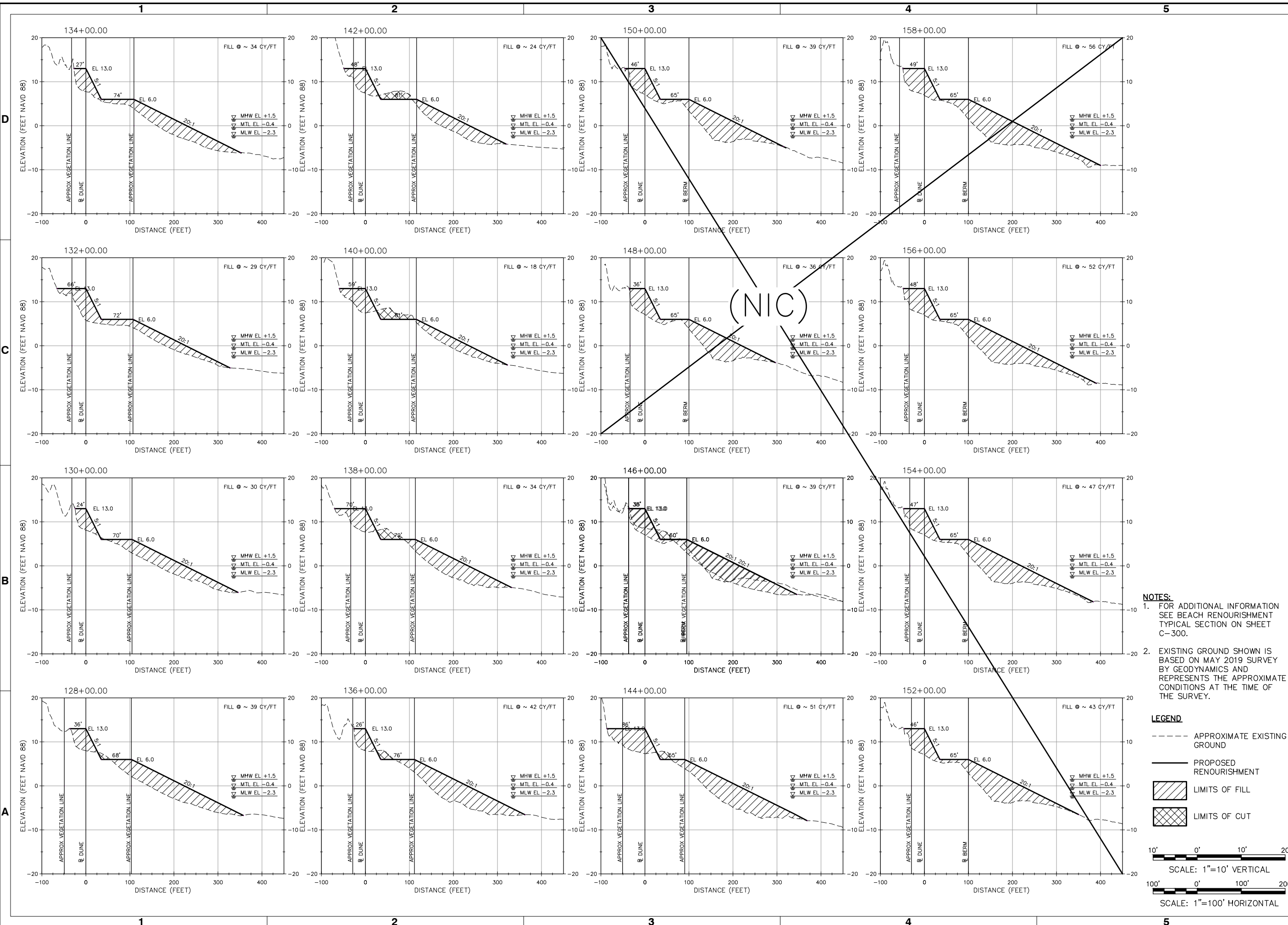
Designed by: NCY	Drawn by: BDF	Checked by: SRM	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL	Plot scale: 1:1 (D SHEET)
Date: AUGUST 2019	M&N Project No. 10611	Drawing code:	Drawing Scale:		

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

moffatt & 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
- [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**

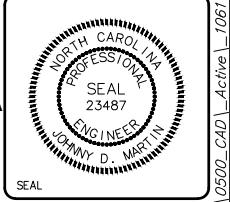
**RENOURISHMENT SECTIONS
SHEET 5 OF 35**

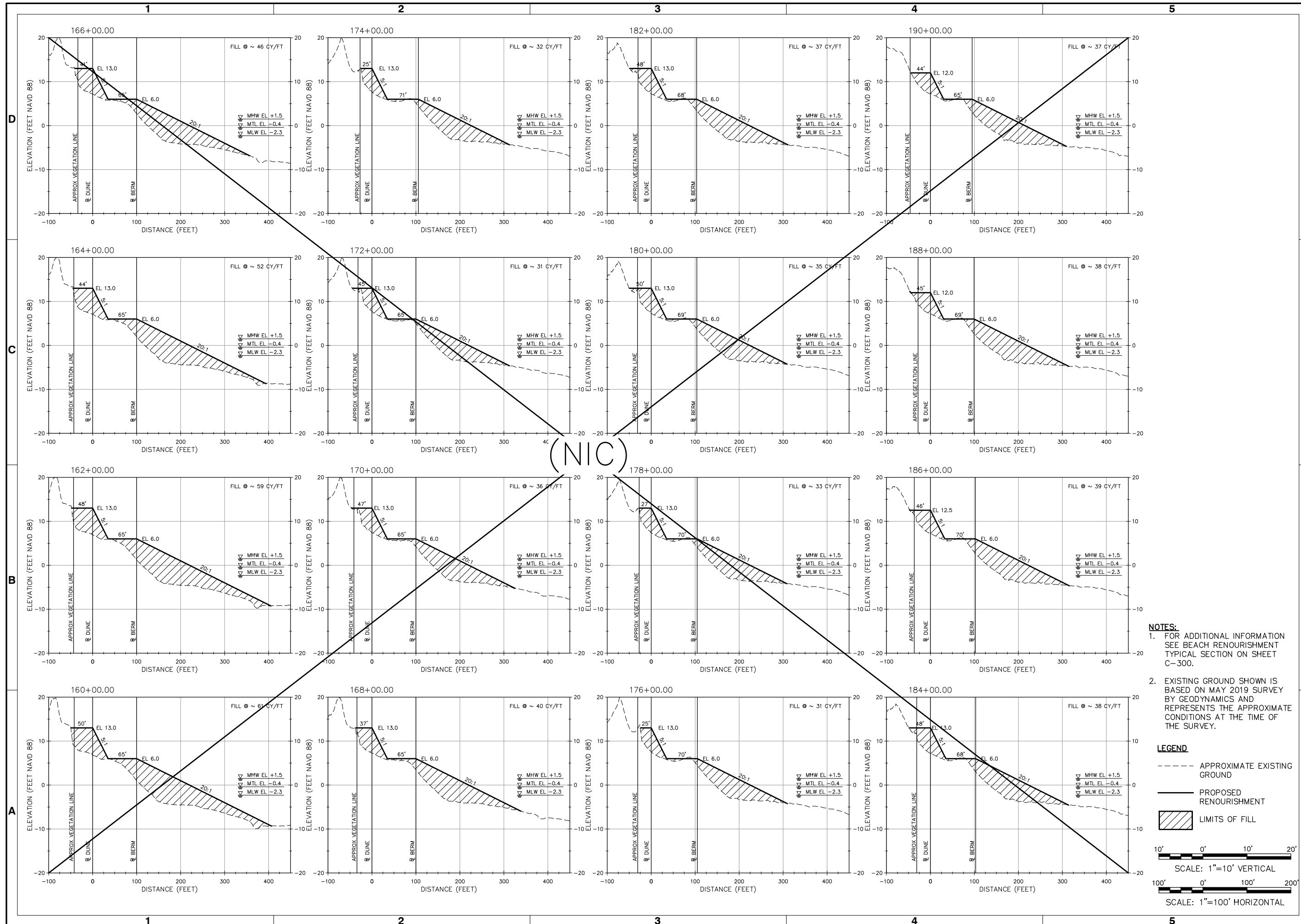
Designed by: NCY	Checked by: BDF	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019	M&N Project No. 10611	Drawing code:	Drawing Scale: Plot scale: 1:1 (D SHEET)

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





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**

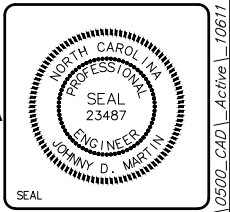
**RENOURISHMENT SECTIONS
SHEET 6 OF 35**

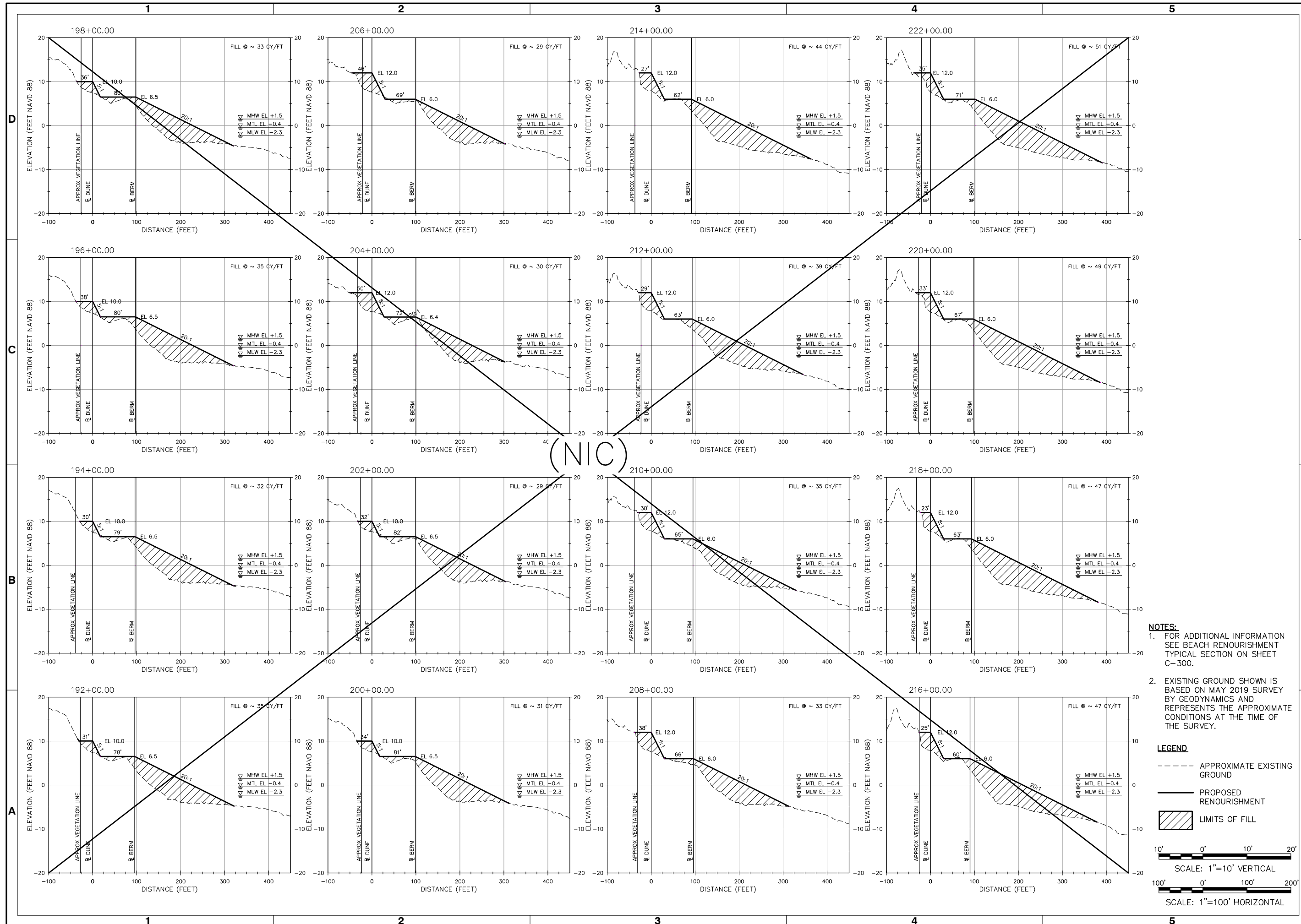
Designed by: NCY	Date: AUGUST 2019	MAN Project No. 10611	Drawing code:	Drawing Scale: As Shown
Dwn by: BDF	Chk by: SRM	Submitted by: JDM	Submitted by: MOFFATT & NICHOL	Plot scale: 1:1 (D SHEET)

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

moffatt & nichol NC FIRM LICENSE No. F-0105

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





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

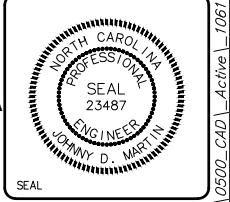
**POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA**

**RENOURISHMENT SECTIONS
SHEET 7 OF 35**

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

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

NC FIRM LICENSE No. F-0105



NOTES:

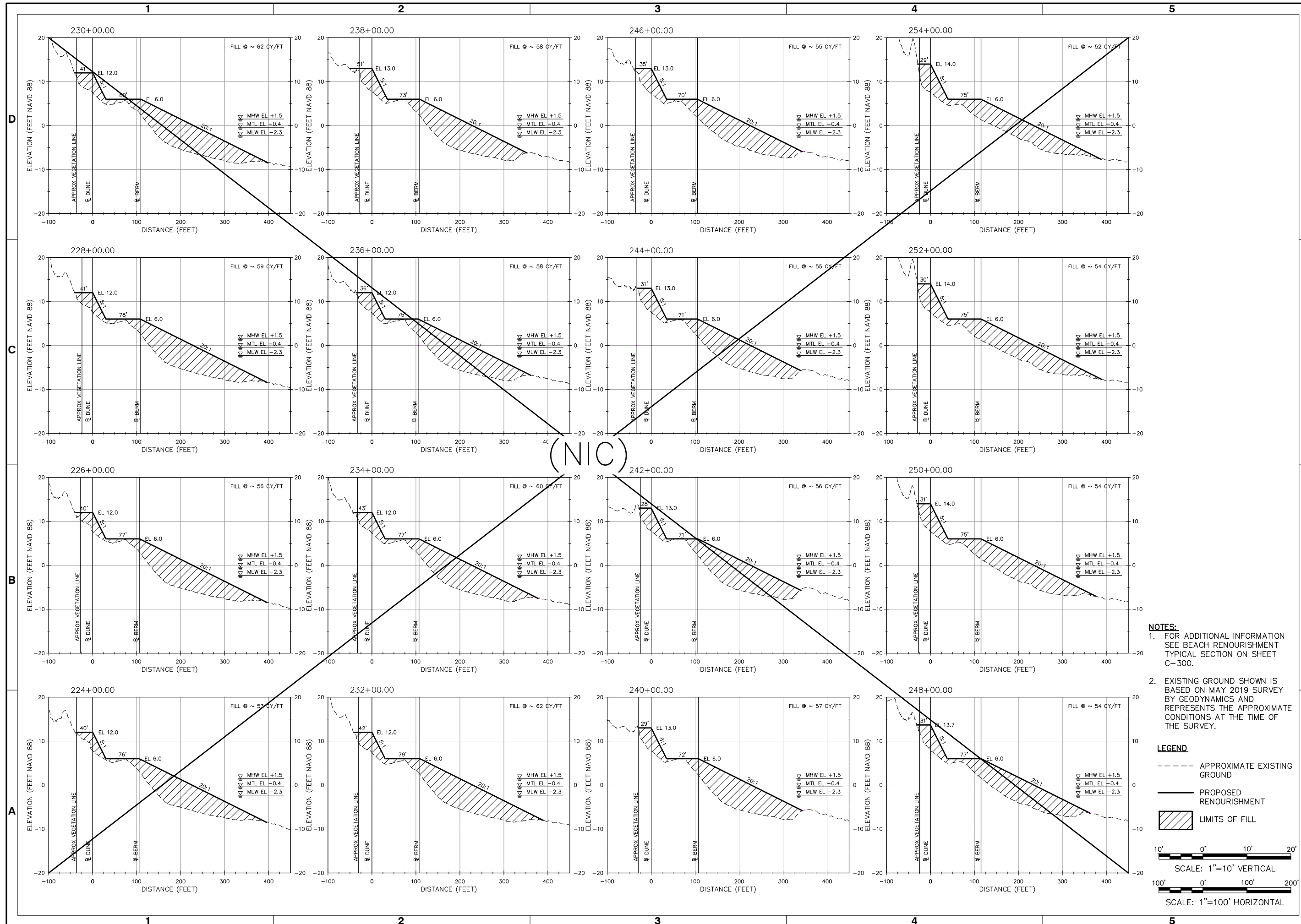
- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
- EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

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

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

File: G:\1\RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-307_Plotfiled: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 8/16/2019 3:58 PM by BFOR



(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**

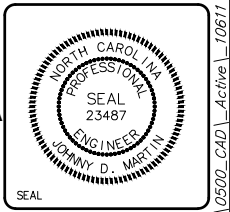
**RENOURISHMENT SECTIONS
SHEET 8 OF 35**

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: 1:1 (D SHEET)

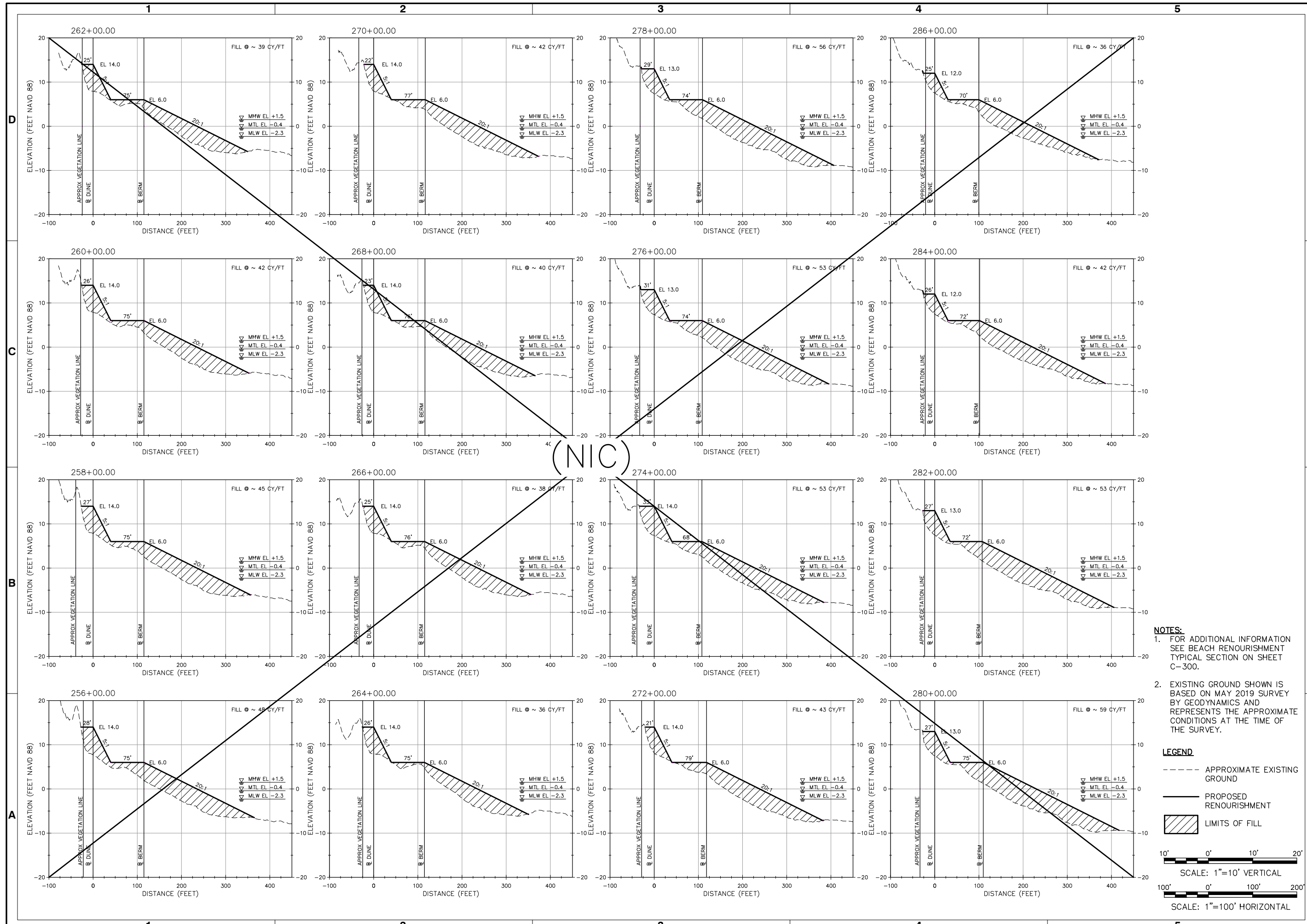
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



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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

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

Rev.	Date	Description
0	08/19/19	JM

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

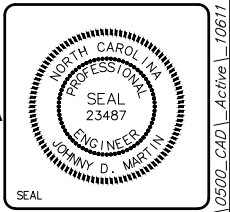
**RENOURISHMENT SECTIONS
SHEET 9 OF 35**

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

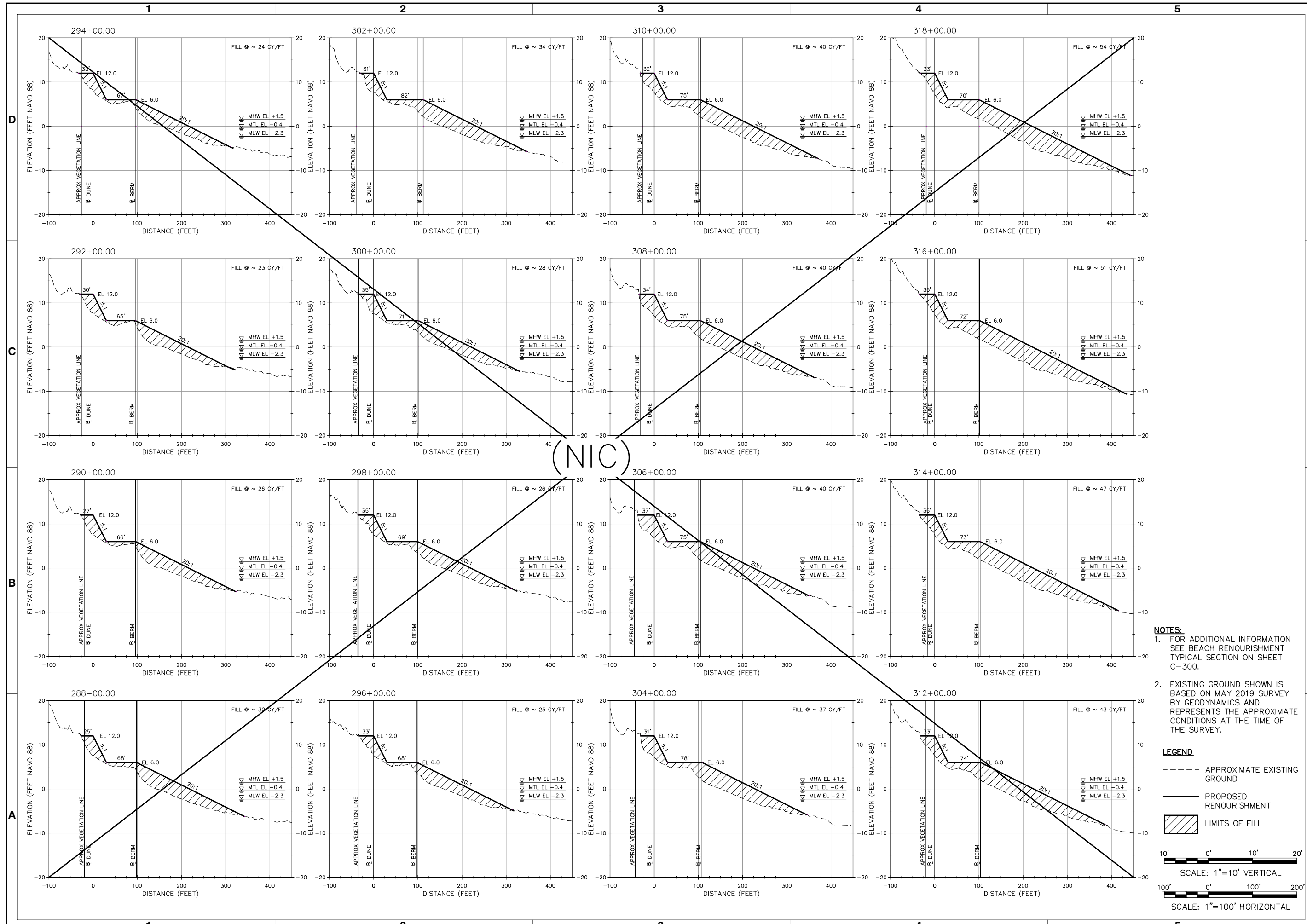
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



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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**

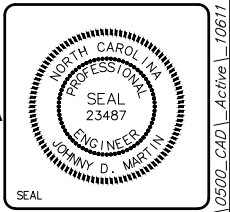
**RENOURISHMENT SECTIONS
SHEET 10 OF 35**

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

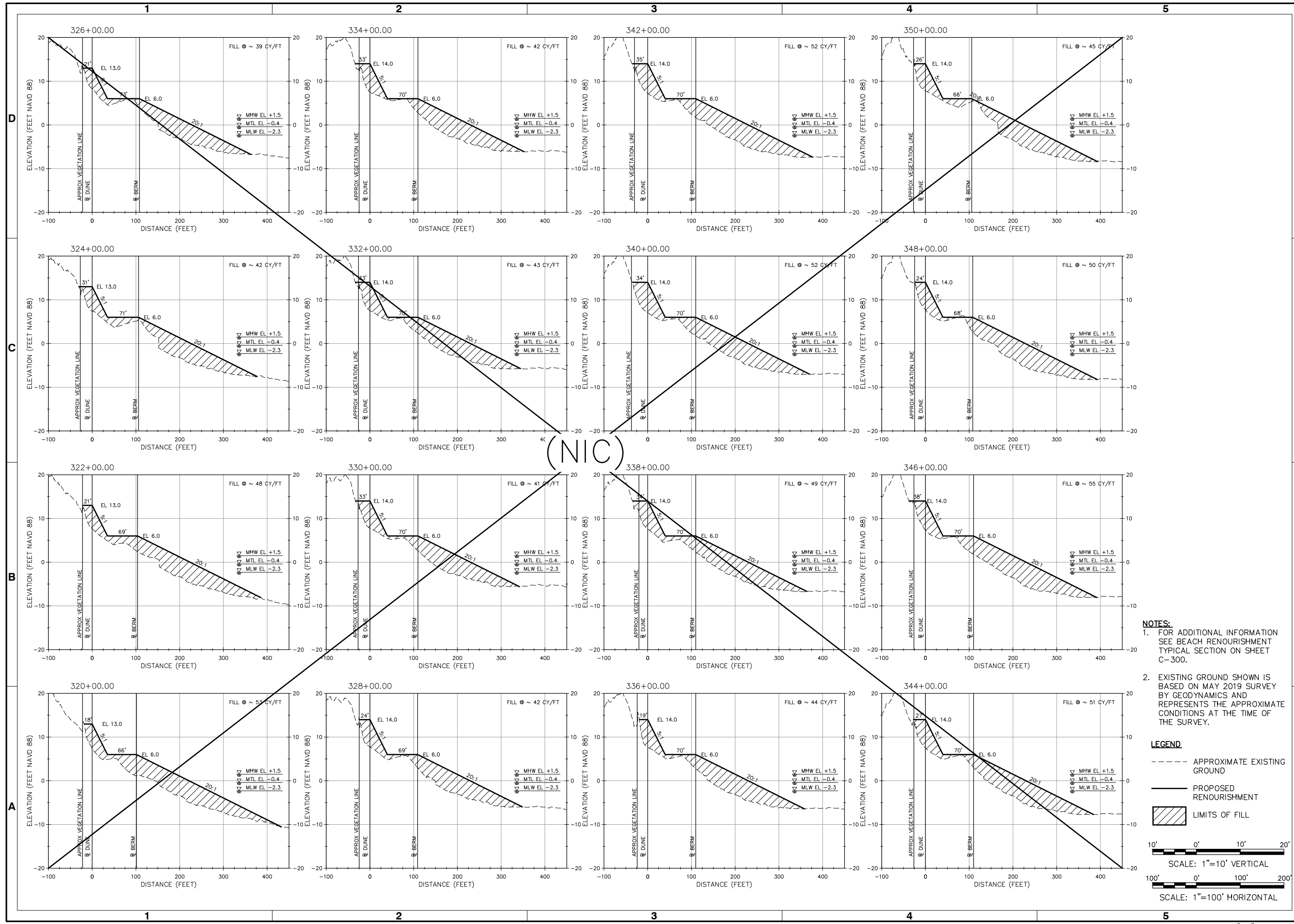
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-781-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1\RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-310; Plotted: 2/14/2020 10:33 AM by FORD, BRIAN; Saved: 8/16/2019 5:58 PM by BFORD



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	By	Description
0	08/19/19	JM	BID DOCUMENTS

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

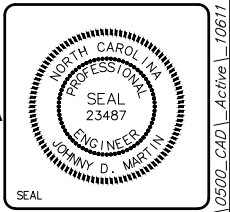
**RENOURISHMENT SECTIONS
SHEET 11 OF 35**

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

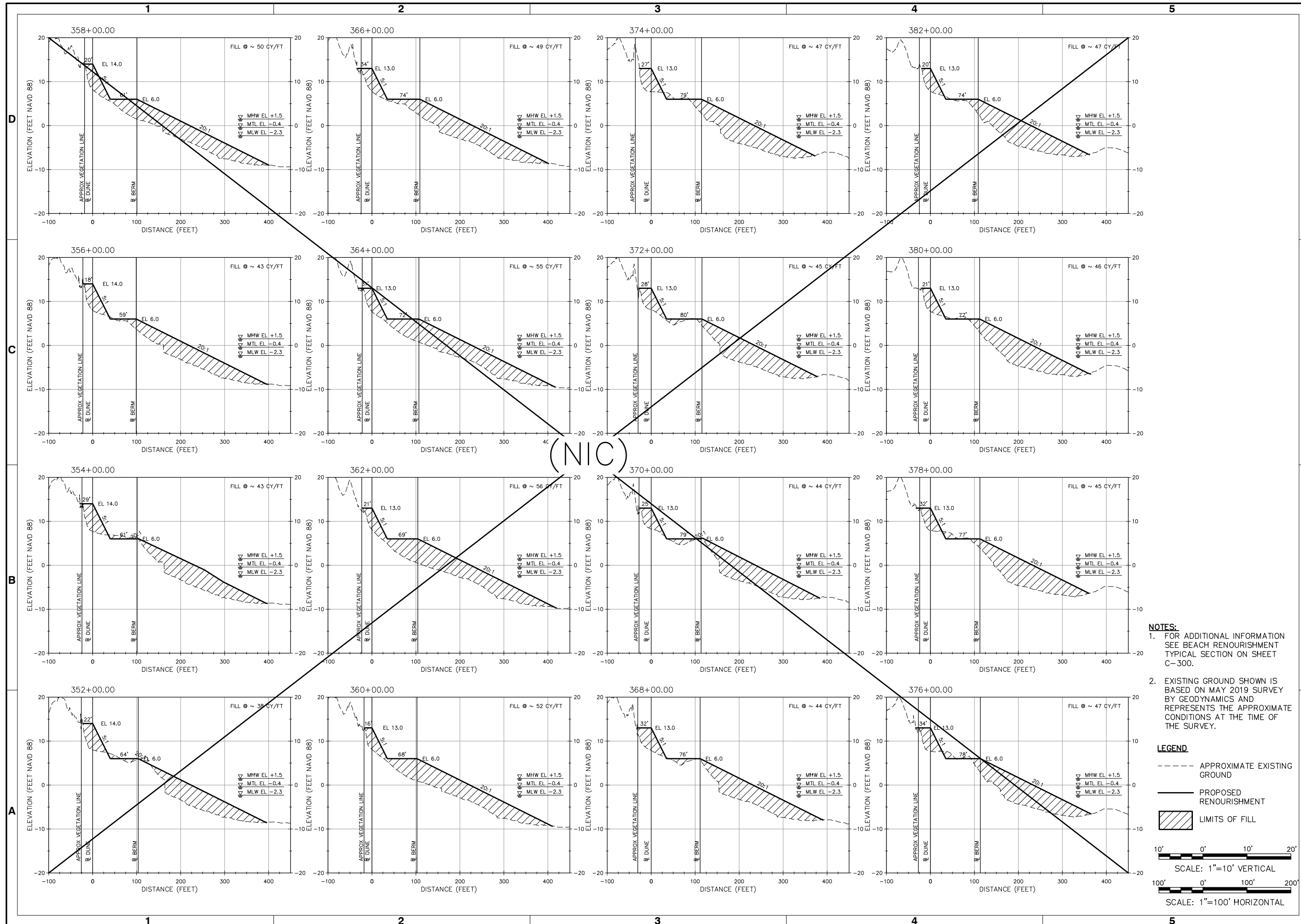
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

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-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**

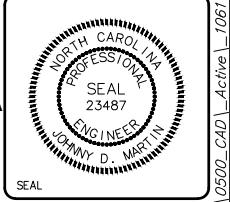
**RENOURISHMENT SECTIONS
 SHEET 12 OF 35**

Designed by: NCY	Date: AUGUST 2019	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)

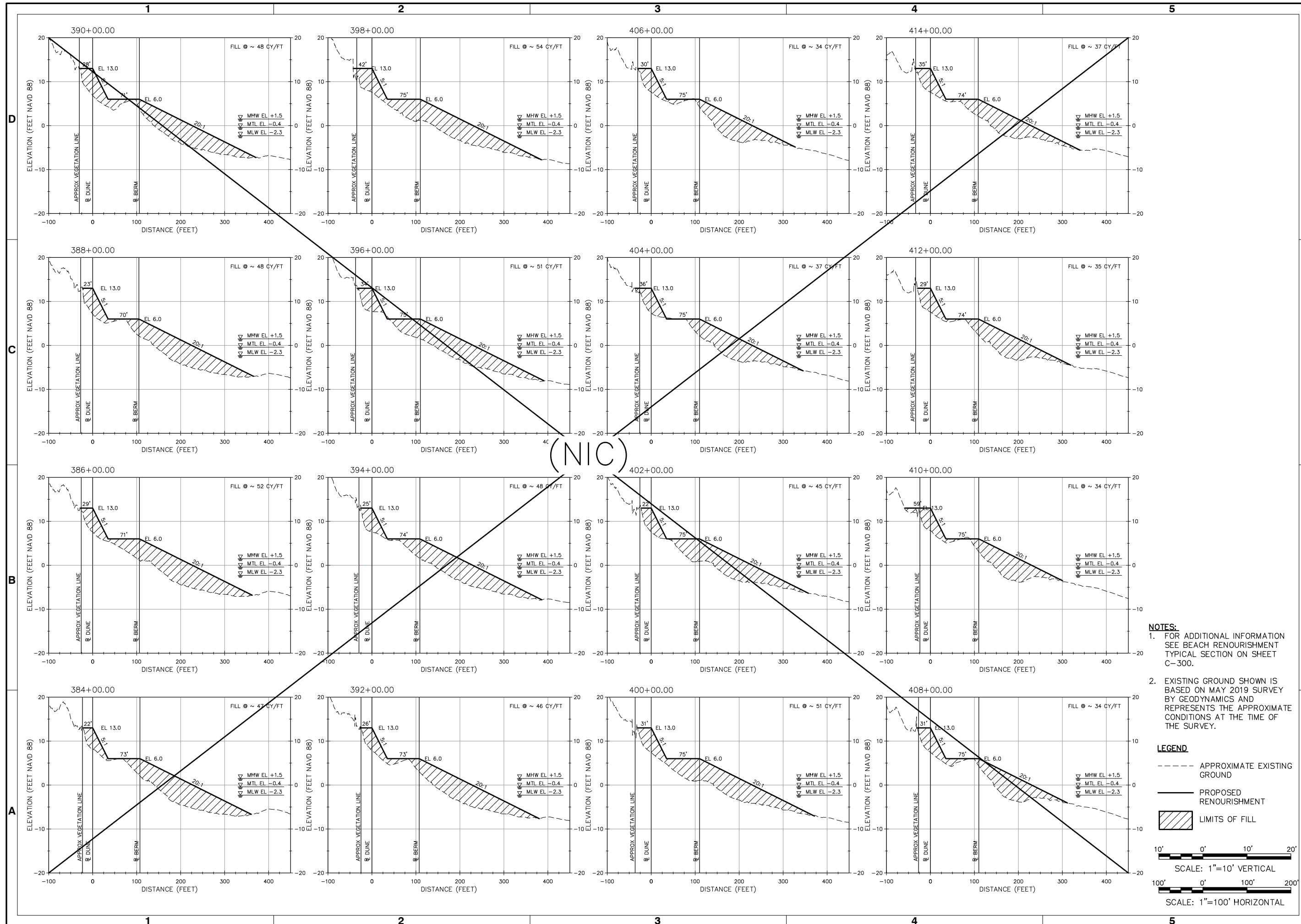
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

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\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:
 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	By	Description
0	08/19/19	JM	BID DOCUMENTS

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

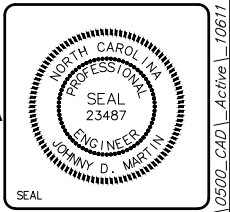
**RENOURISHMENT SECTIONS
 SHEET 13 OF 35**

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

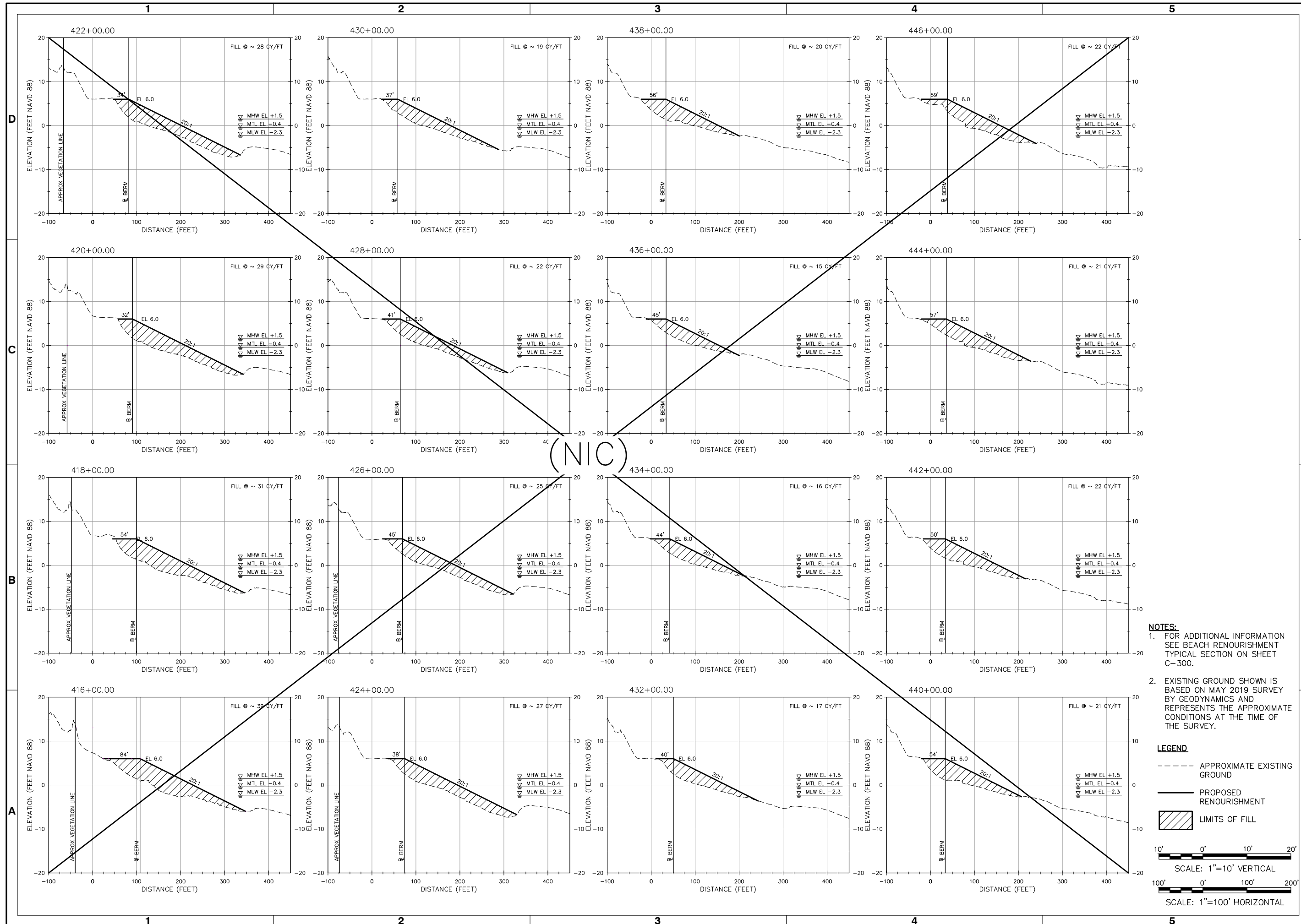
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

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-313; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BRFORD



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

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**

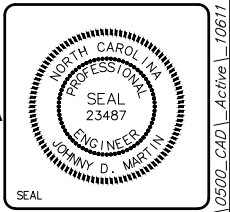
**RENOURISHMENT SECTIONS
 SHEET 14 OF 35**

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

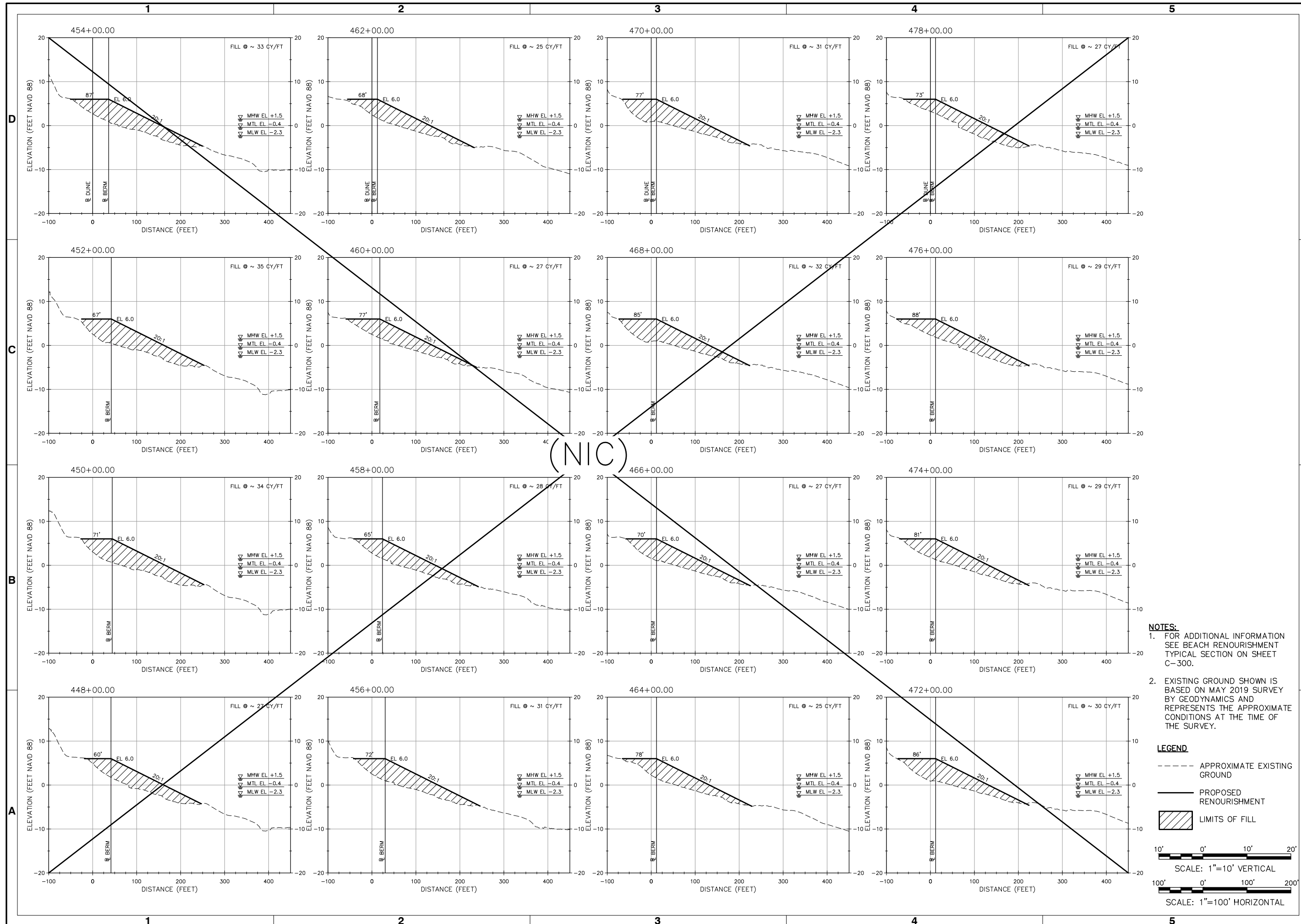
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

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-314
 Sheet 43 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

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**

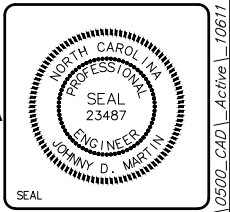
**RENOURISHMENT SECTIONS
SHEET 15 OF 35**

Designed by: NCY	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:		

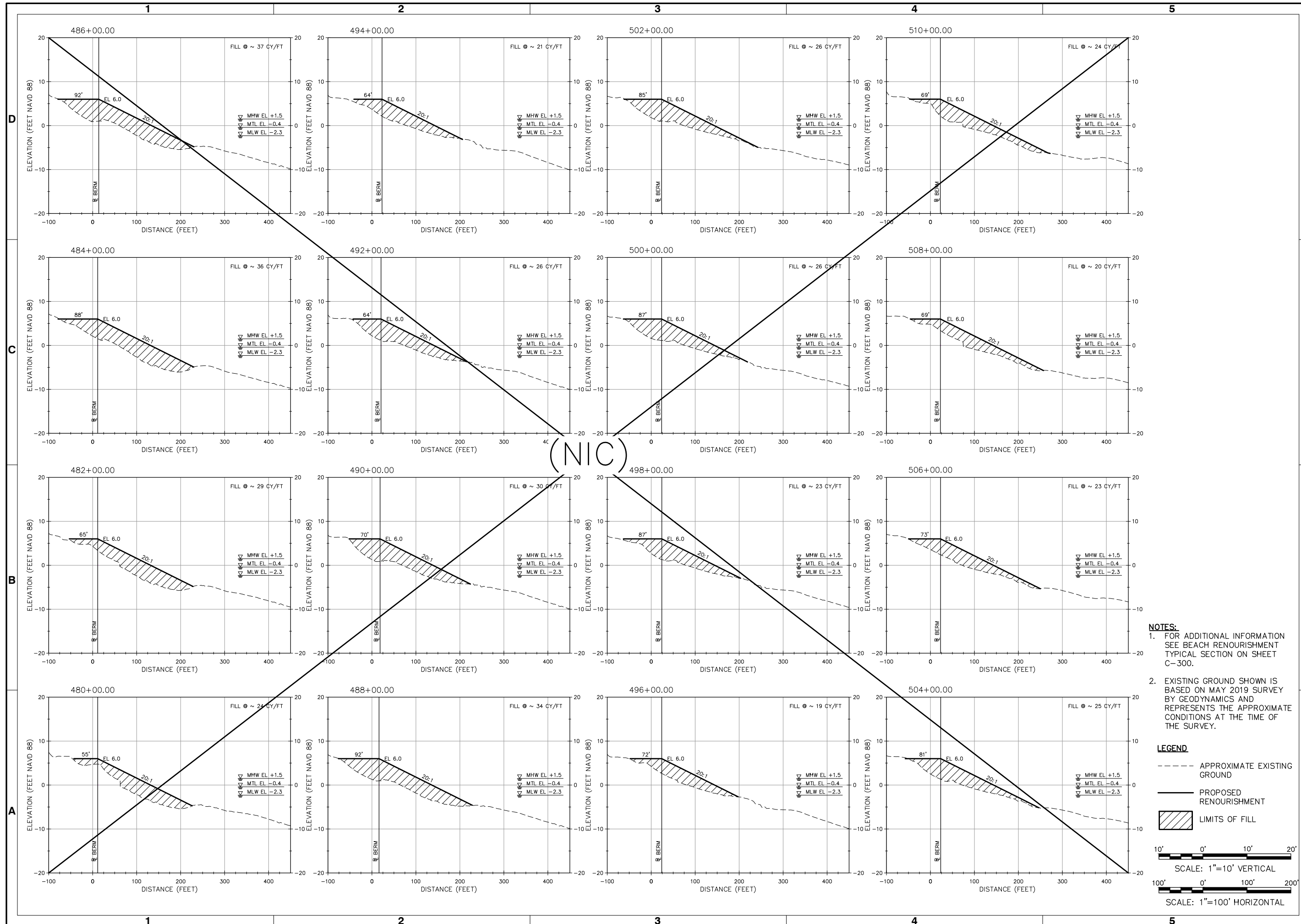
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
319-761-4626

moffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-315; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD



(NIC)

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

LEGEND
 - - - - - APPROXIMATE EXISTING GROUND
 ——— PROPOSED RENOURISHMENT
 [Hatched Box] 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**

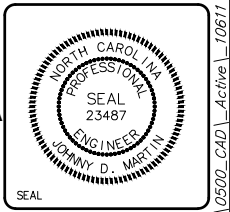
**RENOURISHMENT SECTIONS
 SHEET 16 OF 35**

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

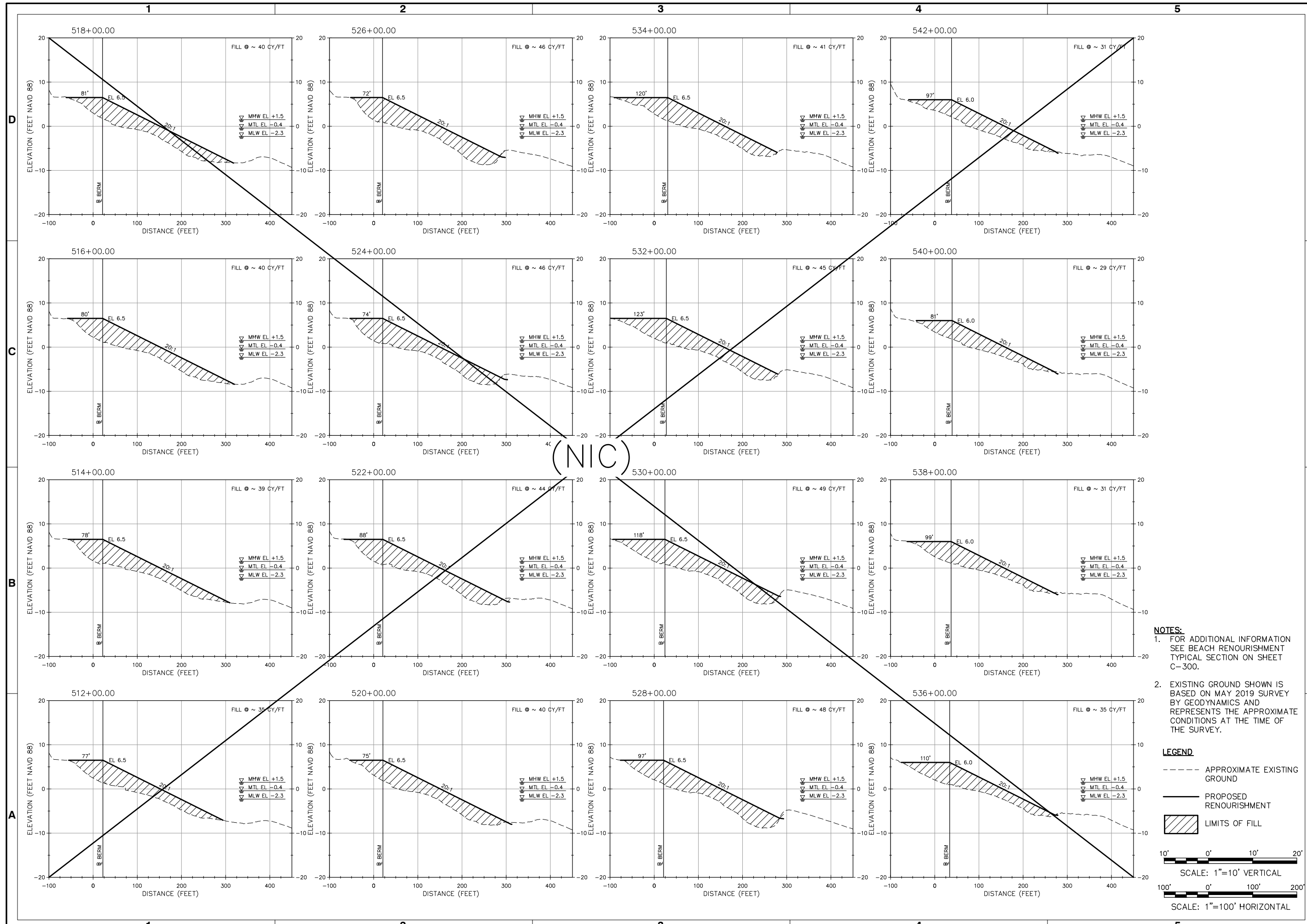
meffatt & nichol NC FIRM LICENSE No. F-0105

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



Sheet Reference No.
C-316
 Sheet 45 of 66

File: G:\1RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-316; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFFORD



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	By	Description
0	08/19/19	JM	BID DOCUMENTS

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

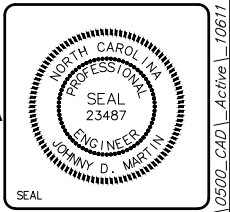
**RENOURISHMENT SECTIONS
 SHEET 17 OF 35**

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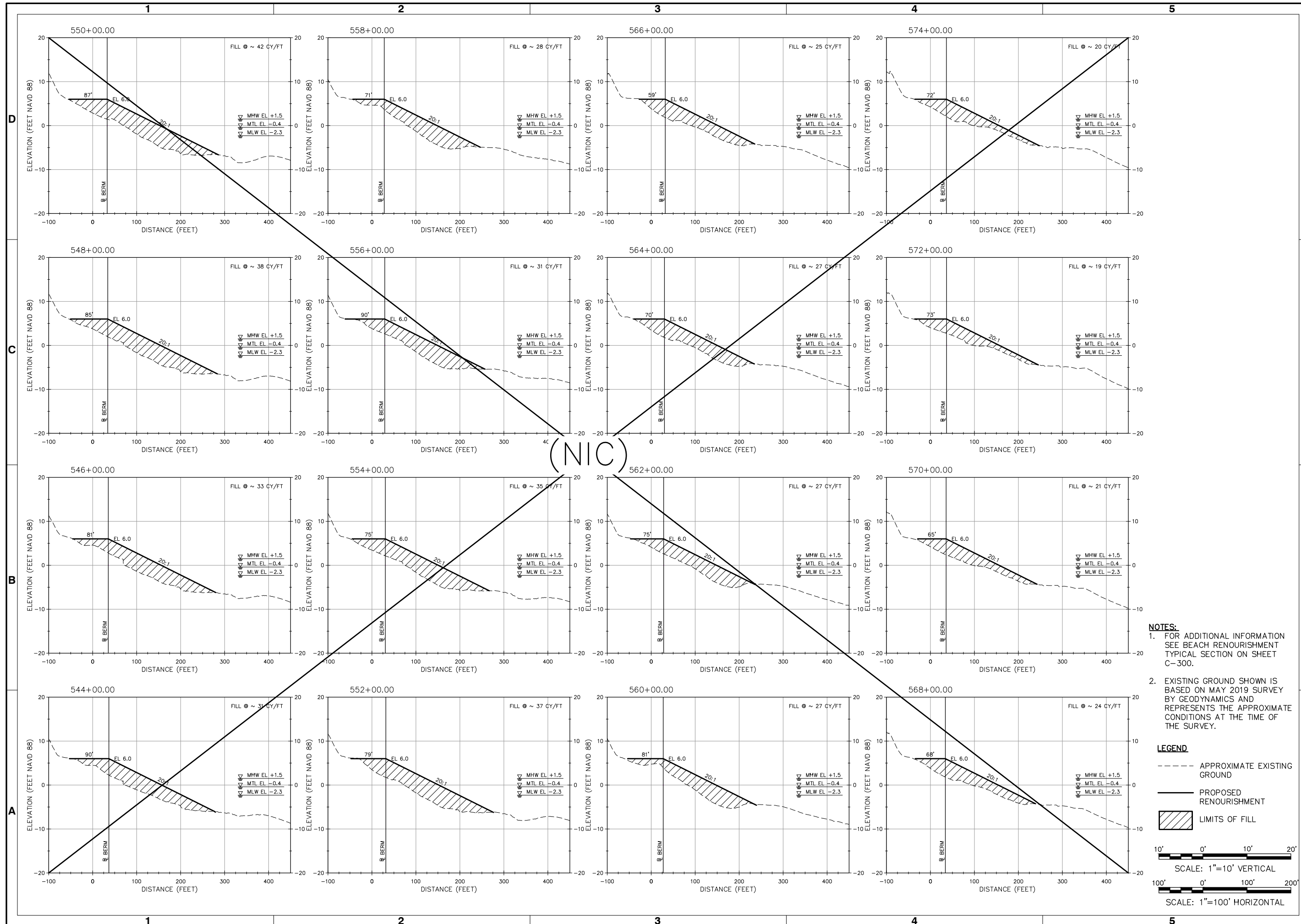
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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



File: G:\1RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-317; Plotted: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 8/16/2019 5:57 PM by BFORD



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**

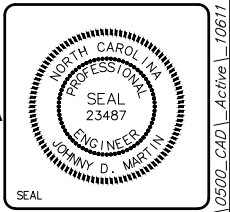
**RENOURISHMENT SECTIONS
SHEET 18 OF 35**

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

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

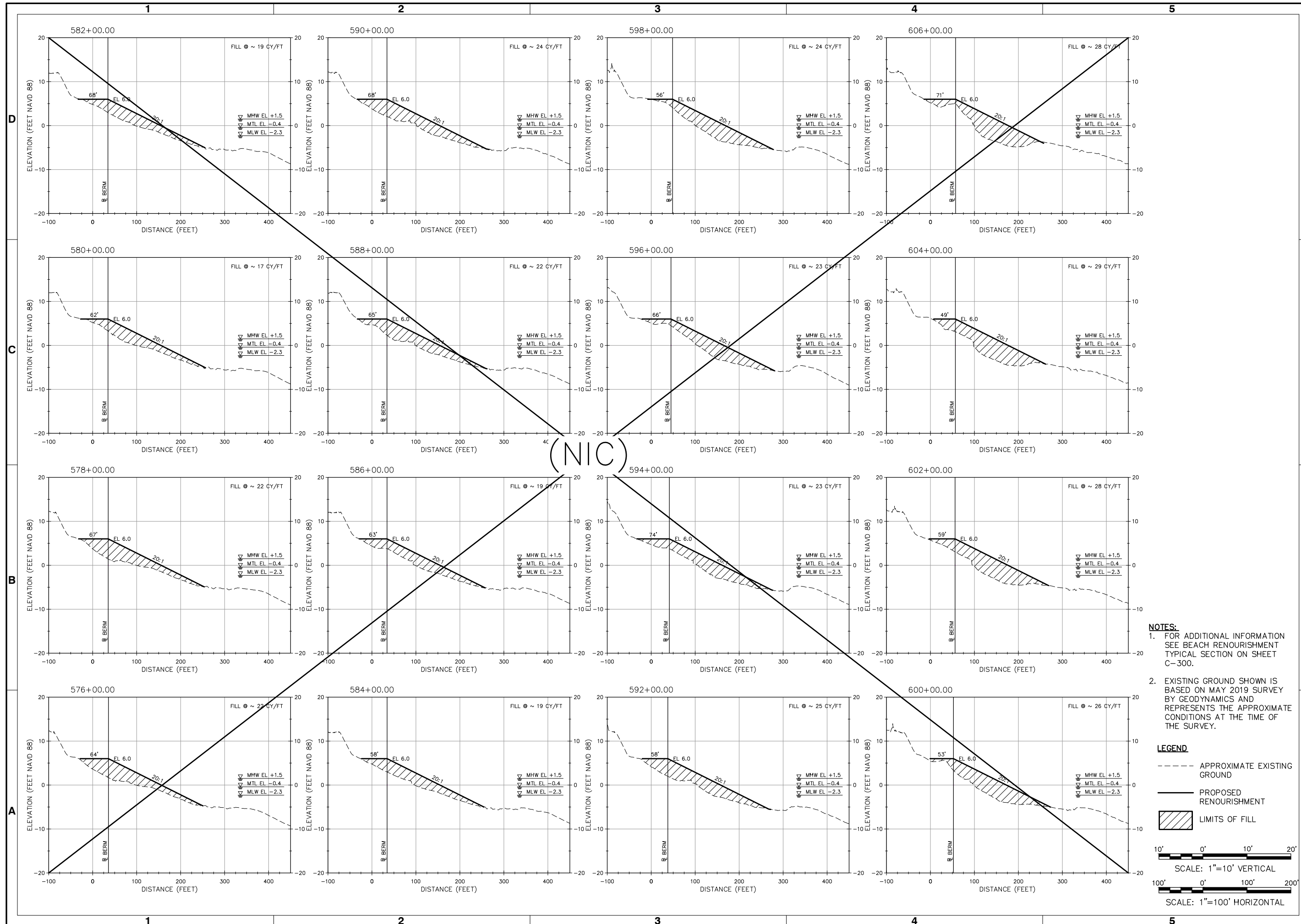
moffatt & nichol NC FIRM LICENSE No. F-0105

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



Sheet Reference No.
C-318
Sheet 47 of 66

File: G:\1RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-318; 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	Description
0	08/19/19	BID DOCUMENTS

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

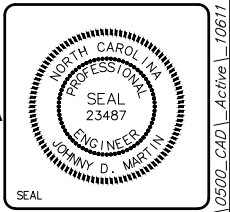
**RENOURISHMENT SECTIONS
SHEET 19 OF 35**

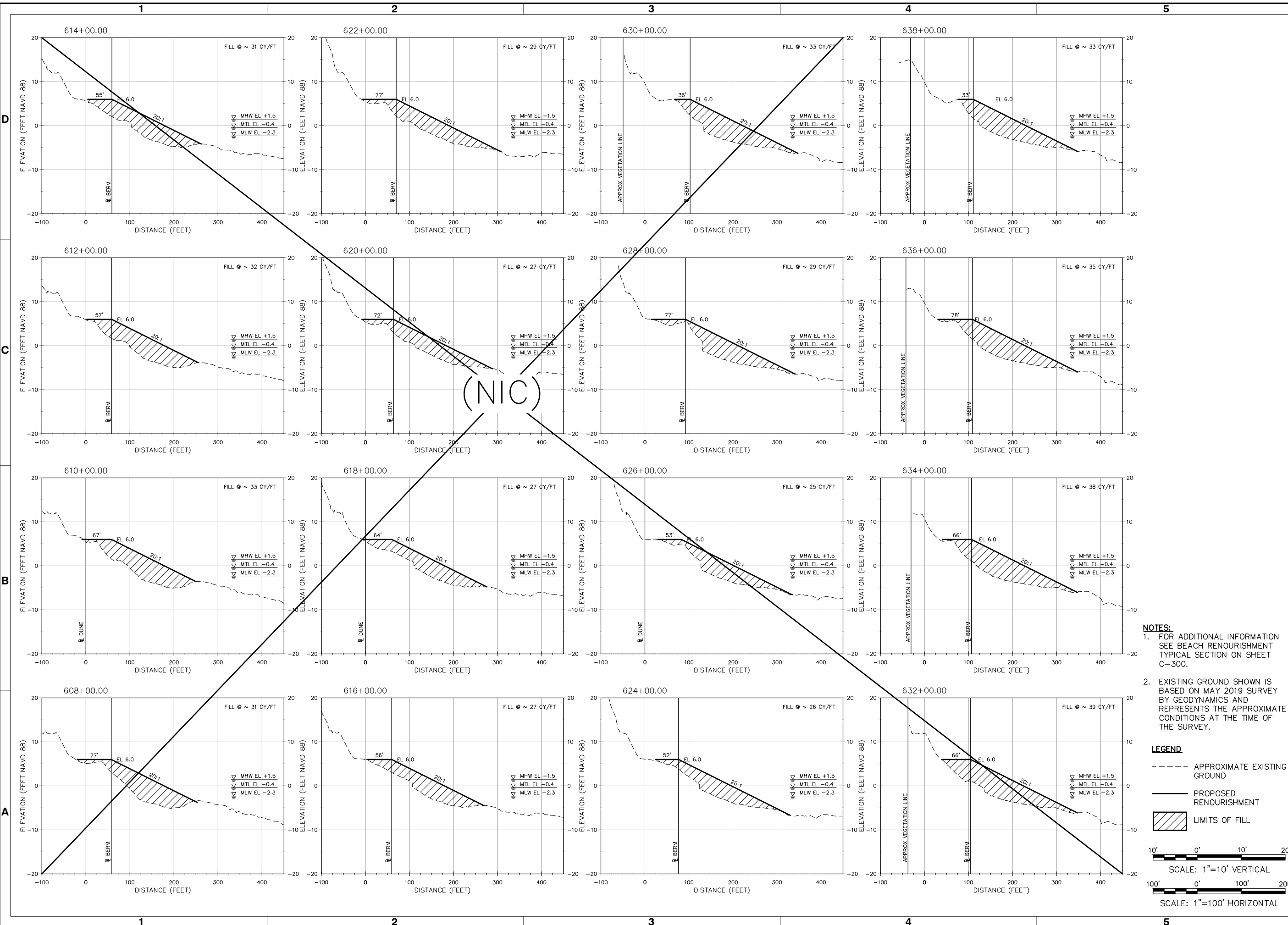
Designed by: NCY	Checked by: BDF	Reviewed by: JDM	Submitted by: MOFFATT & NICHOL
Date: AUGUST 2019	MAN Project No. 10611	Drawing code:	Drawing Scale: Plot scale: 1:1 (D SHEET)

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





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

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

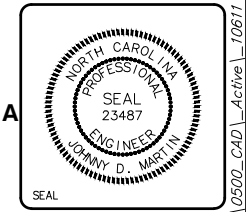
**RENOURISHMENT SECTIONS
SHEET 20 OF 35**

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	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



Sheet Reference No.
C-320
Sheet 49 of 66

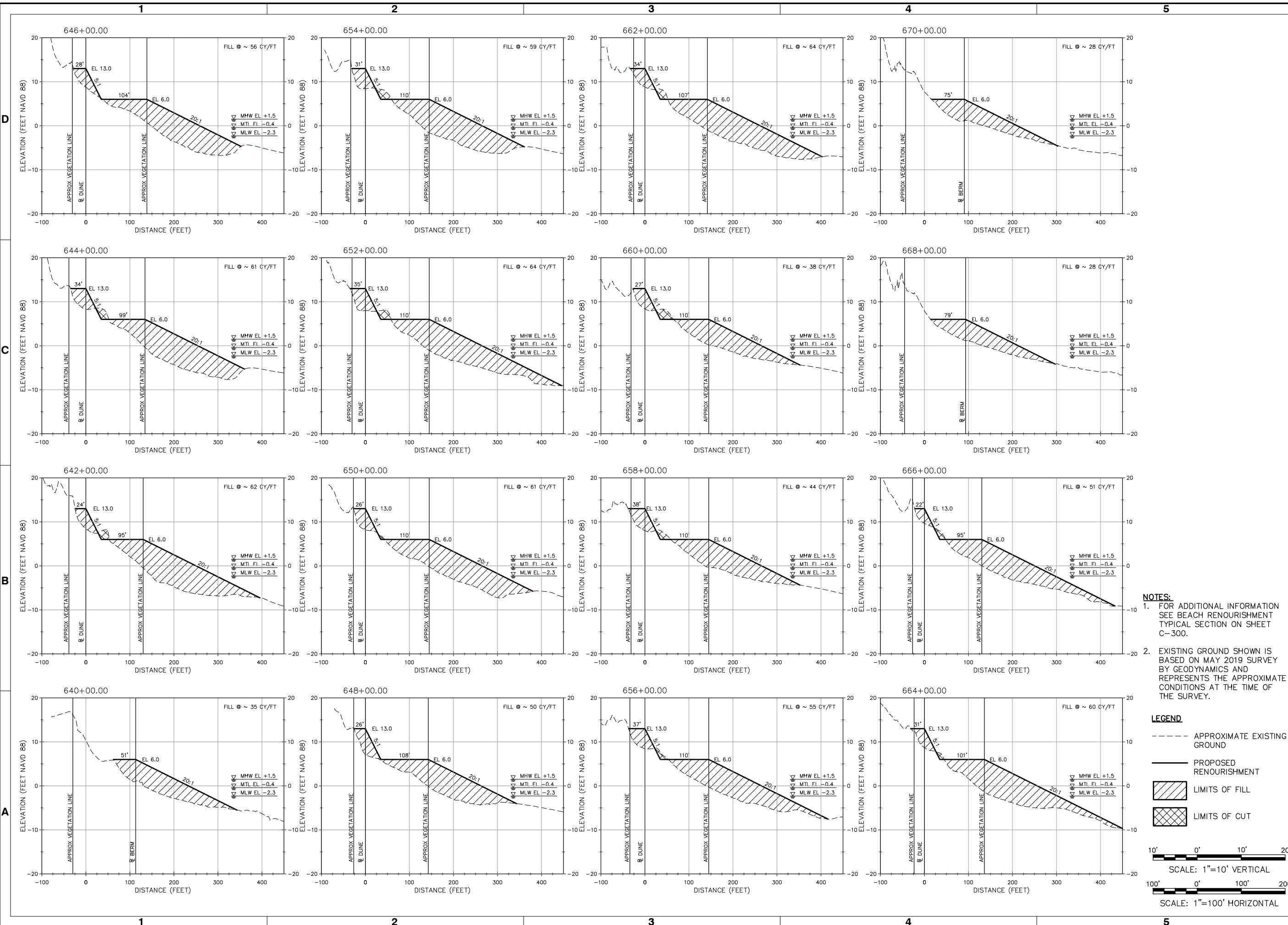
- NOTES:**
- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
 - EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

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

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

File: G:\1\RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-320_Plotfiled: 2/14/2020 10:34 AM by FORD, BRIAN; Saved: 2/14/2020 9:46 AM by BIFORD



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.	1	Date	AUGUST 2019
Design	NCV	Drawn	BDF
Checked	SRM	Reviewed	JDM
Submitted	MOFFATT & NICHOIL	Project No.	10611
Drawn	BDF	Drawn Scale	As Shown
Checked	SRM	Project No.	10611
Reviewed	JDM	Drawn Code	
Submitted	MOFFATT & NICHOIL	Project No.	10611
Drawn	BDF	Project No.	10611
Checked	SRM	Project No.	10611
Reviewed	JDM	Project No.	10611
Submitted	MOFFATT & NICHOIL	Project No.	10611

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

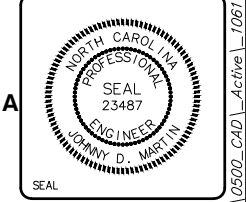
**RENOURISHMENT SECTIONS
 SHEET 21 OF 35**

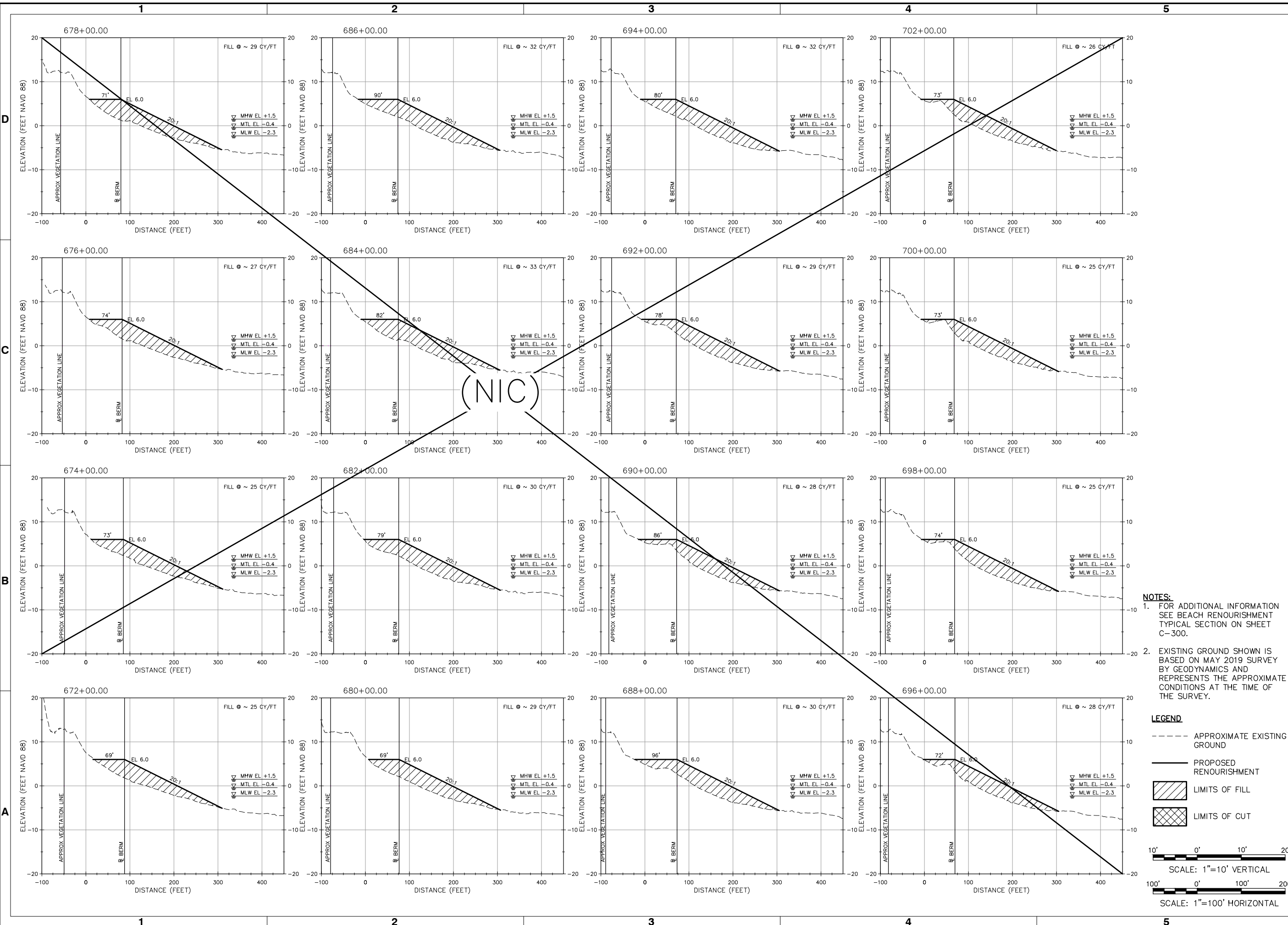
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

meffatt & nichoil NC FIRM LICENSE No. F-0105

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

DATE: AUGUST 2019
 DRAWN BY: BDF
 CHECKED BY: SRM
 REVIEWED BY: JDM
 SUBMITTED BY: MOFFATT & NICHOIL





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**

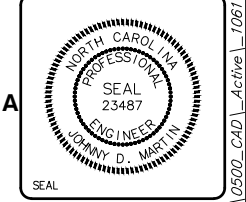
**RENOURISHMENT SECTIONS
SHEET 22 OF 35**

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

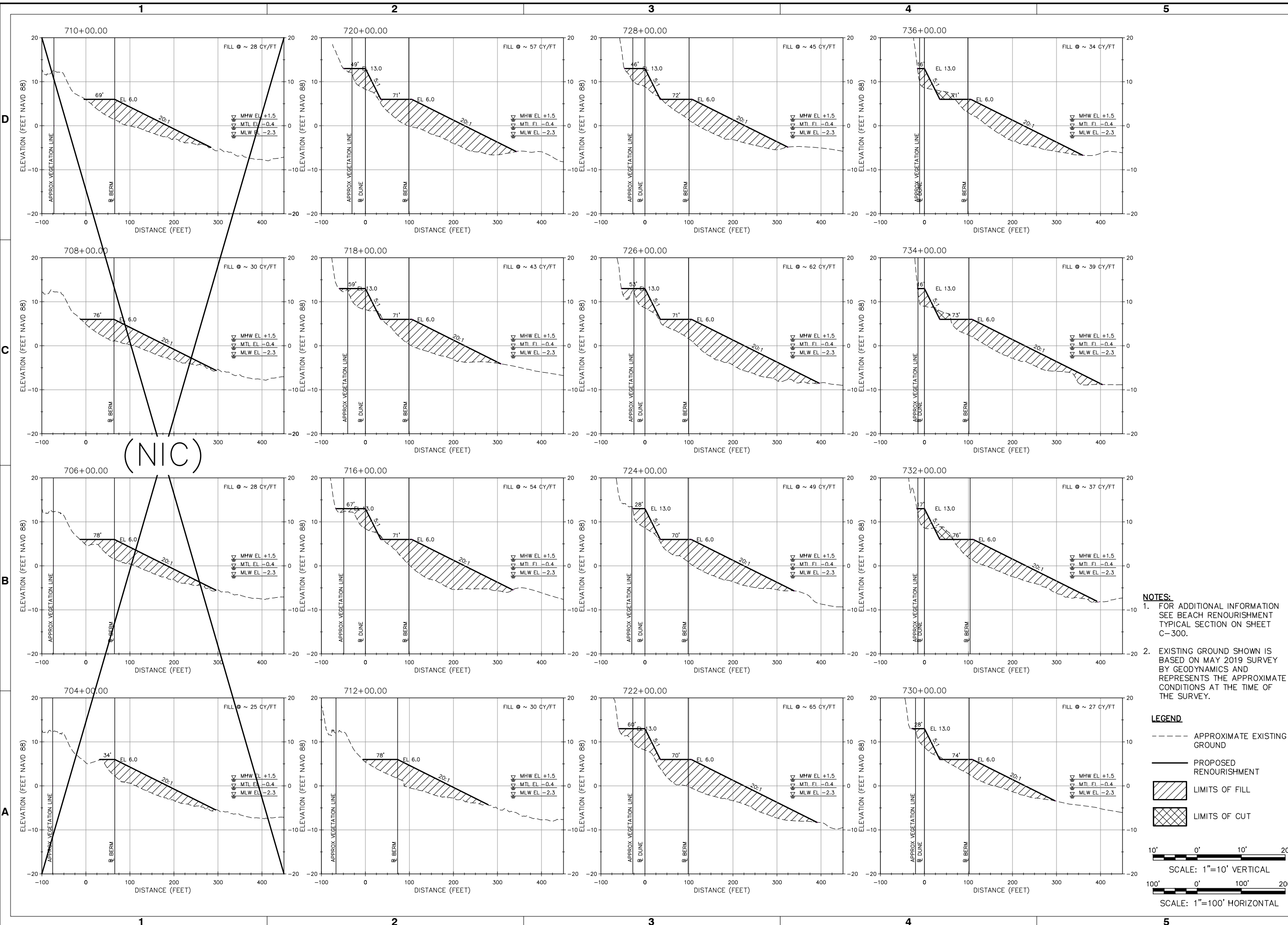
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

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\0500-CAD-Active-10611 Bouge Banks 2020\1061100C-322; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:55 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

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

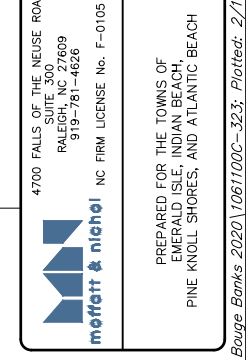
100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

Rev.	1	Date	AUGUST 2019
Design	NCV	Drawn	BDF
Checked	SRM	Reviewed	JDM
Submitted	MOFFATT & NICHOIL	Plot scale	1:1 (D SHEET)
MAN Project No.	10611	Drawing code	
PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM	
BID DOCUMENTS	08/19/19	JM	
Mark		Date	Apr

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

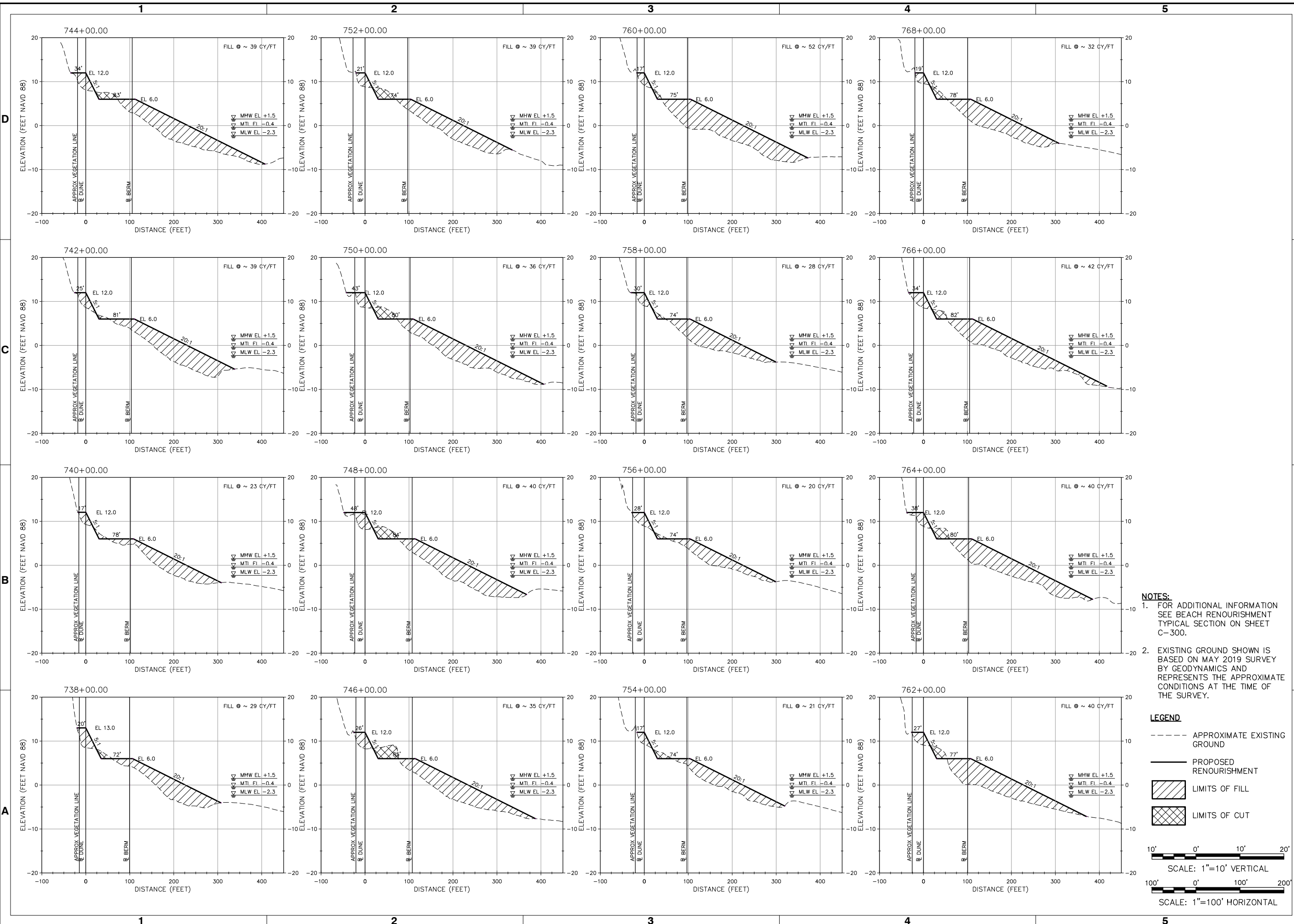
**RENOURISHMENT SECTIONS
SHEET 23 OF 35**

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



Sheet Reference No.
C-323
Sheet 52 of 66

File: G:\1RA\10611\0500_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

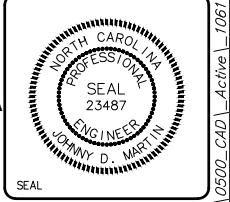


Rev.	Date	Description
1	02/14/20	PRE-CONSTRUCTION DESIGN REVISION
0	08/19/19	BID DOCUMENTS

**POST-FLORENCE RENOURISHMENT
 PROJECT PHASE 2
 CARTERET COUNTY, NORTH CAROLINA**
**RENOURISHMENT SECTIONS
 SHEET 24 OF 35**

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

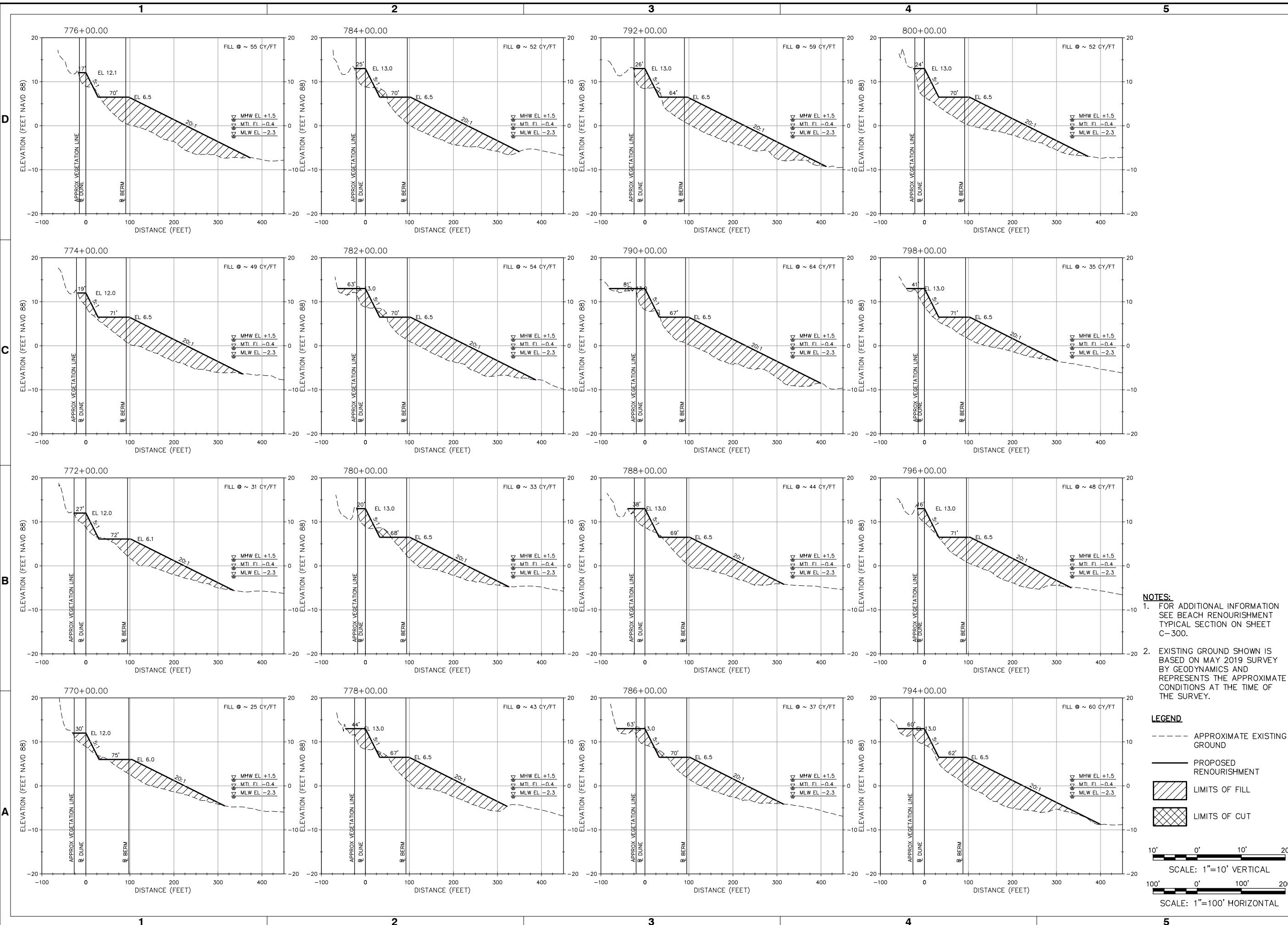


Sheet Reference No.
C-324
 Sheet 53 of 66

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
 [Diagonal Lines] LIMITS OF FILL
 [Cross-hatch] LIMITS OF CUT
 10' 0' 10' 20'
 SCALE: 1"=10' VERTICAL
 100' 0' 100' 200'
 SCALE: 1"=100' HORIZONTAL

File: G:\1RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-324.dwg Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:45 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
- [Hatched] LIMITS OF FILL
- [Cross-hatched] LIMITS OF CUT

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

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

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

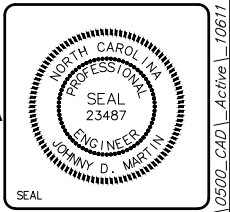
**RENOURISHMENT SECTIONS
SHEET 25 OF 35**

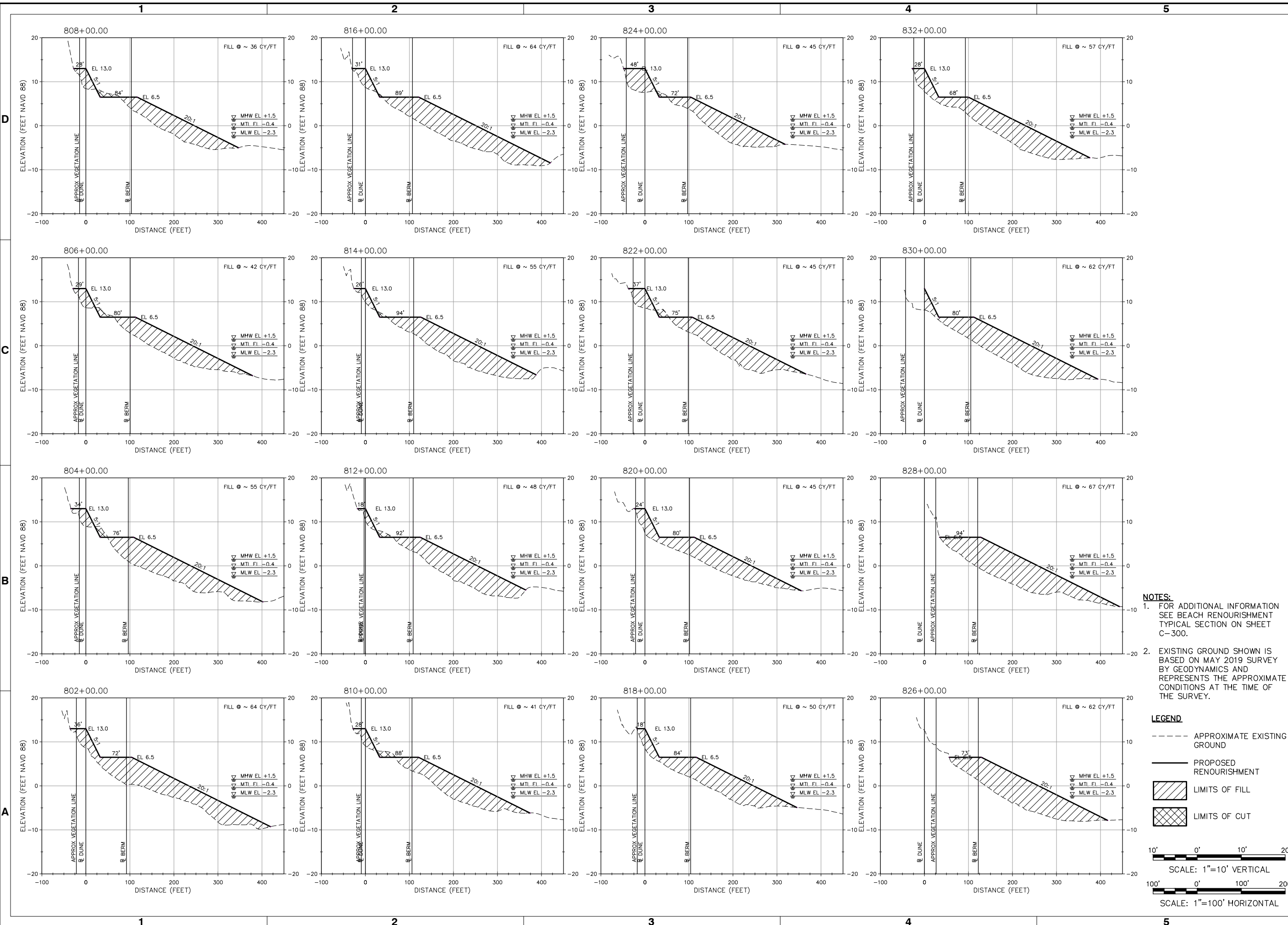
Designed by:	NCV	Checked by:	BDF	Reviewed by:	JDM	Submitted by:	MOFFATT & NICHOL	Plot scale: 1:1 (D SHEET)
Date:	AUGUST 2019	M&N Project No.:	10611	Drawing code:		Drawing Scale:		

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





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)
M&N Project No. 10611		Drawing Code:	
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		SEAL JOHNNY D. MARTIN ENGINEER NORTH CAROLINA PROFESSIONAL 23487	

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

**RENOURISHMENT SECTIONS
SHEET 26 OF 35**

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

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

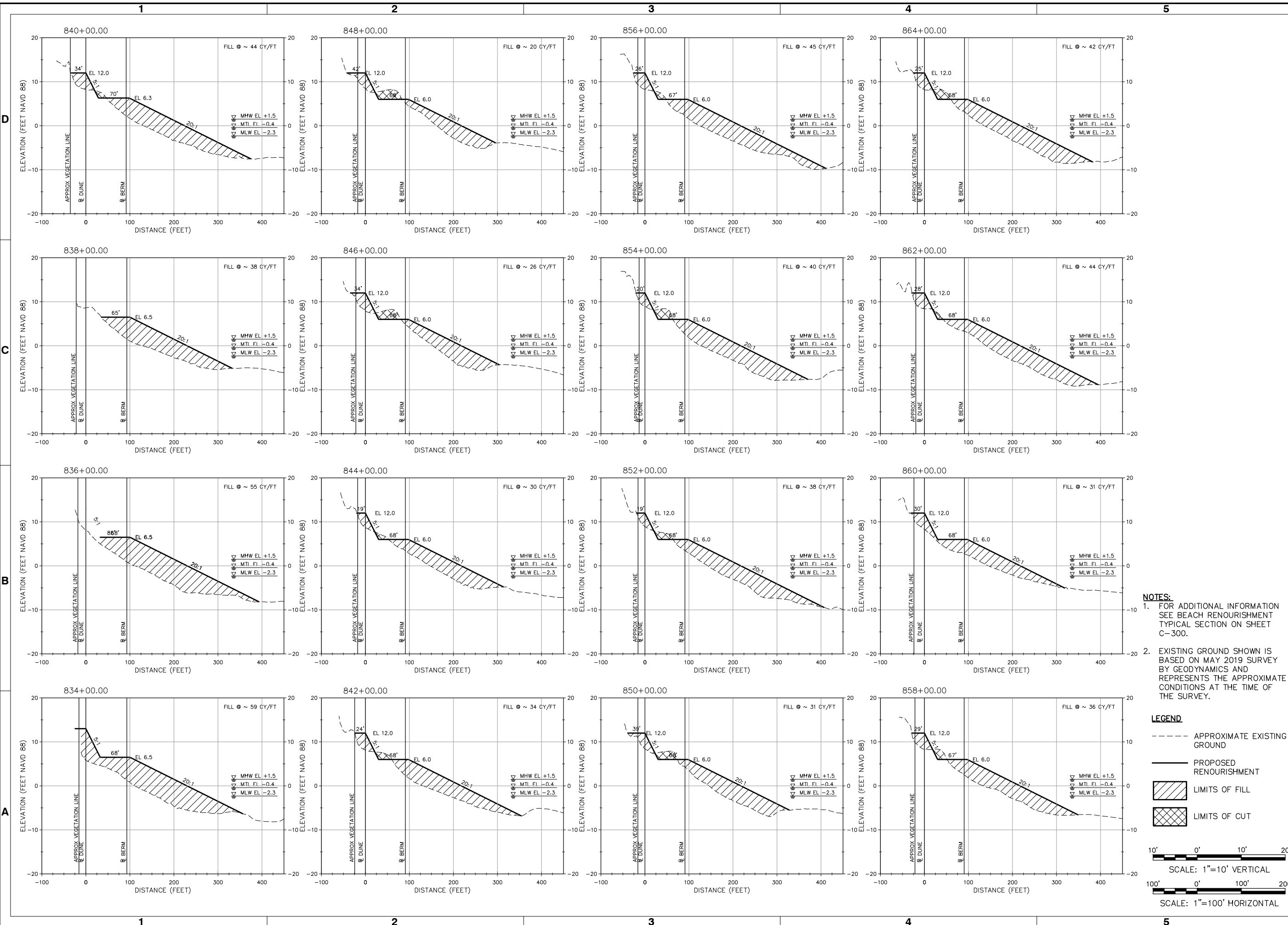
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & nichol NC FIRM LICENSE No. F-0105

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

SEAL
JOHNNY D. MARTIN
ENGINEER
NORTH CAROLINA
PROFESSIONAL
23487

Sheet Reference No.
C-326
Sheet 55 of 66



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

LEGEND

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

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**

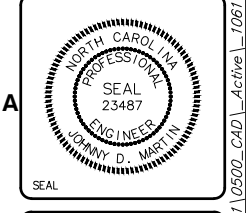
**RENOURISHMENT SECTIONS
 SHEET 27 OF 35**

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

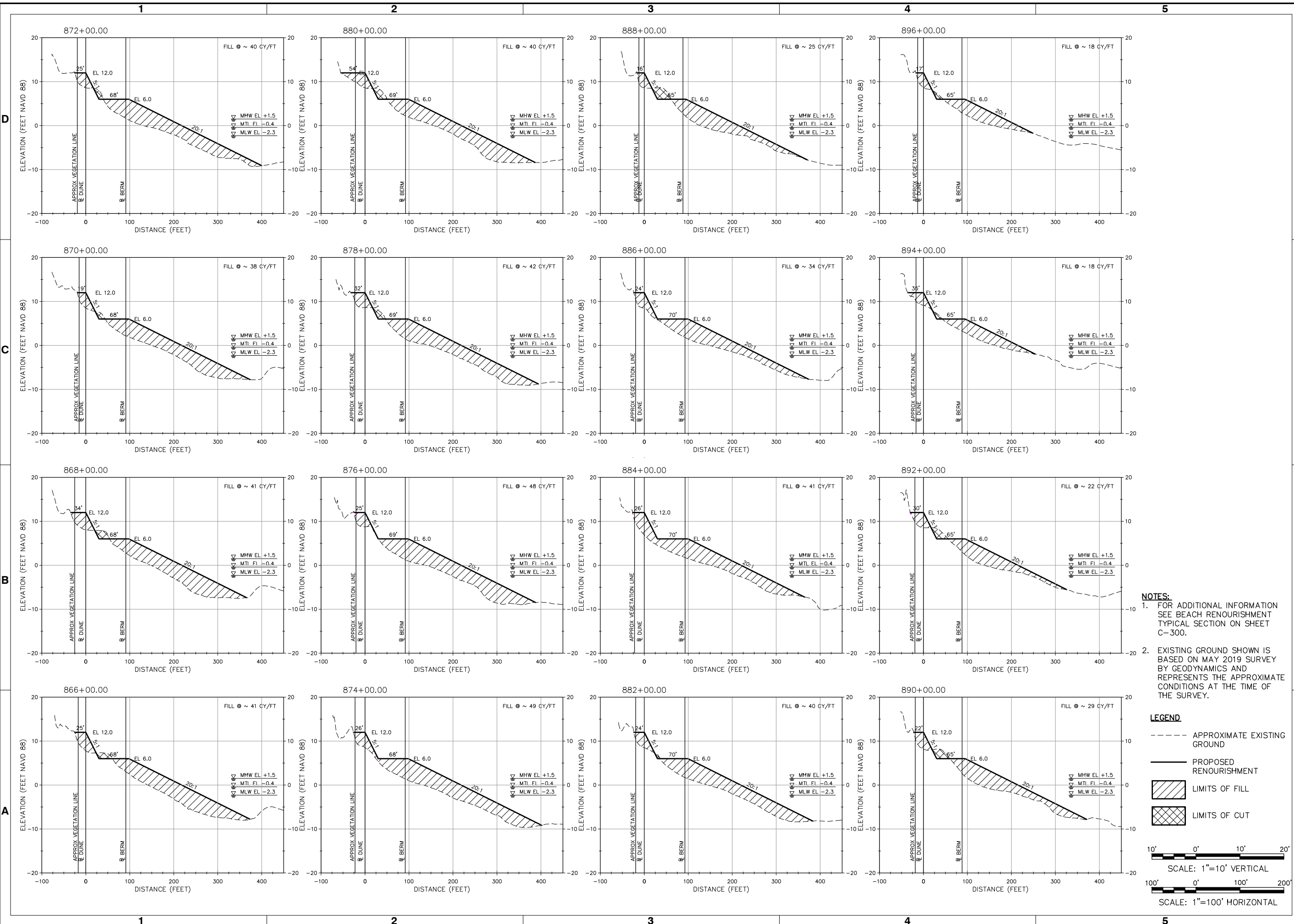
4700 FALLS OF THE NEUSE ROAD
 SUITE 300
 RALEIGH, NC 27609
 919-781-4626

moffatt & nichoil 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-327; Plotted: 2/14/2020 10:35 AM by FORD, BRIAN; Saved: 2/14/2020 9:44 AM by BFOR



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

LEGEND

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

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

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

Rev.	1	
Date:	AUGUST 2019	
Designed by:	NCY	
Drawn by:	BDF	
Checked by:	SRM	
Reviewed by:	JDM	
Submitted by:	MOFFATT & NICHOL	
Drawing Scale:	Plot scale: 1:1 (D SHEET)	
M&N Project No.:	10611	
Drawing code:		
PRE-CONSTRUCTION DESIGN REVISION	02/14/20	JM
BID DOCUMENTS	08/19/19	JM
Mark		

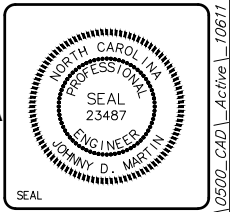
**POST-FLORENCE RENOURISHMENT
 PROJECT PHASE 2
 CARTERET COUNTY, NORTH CAROLINA**

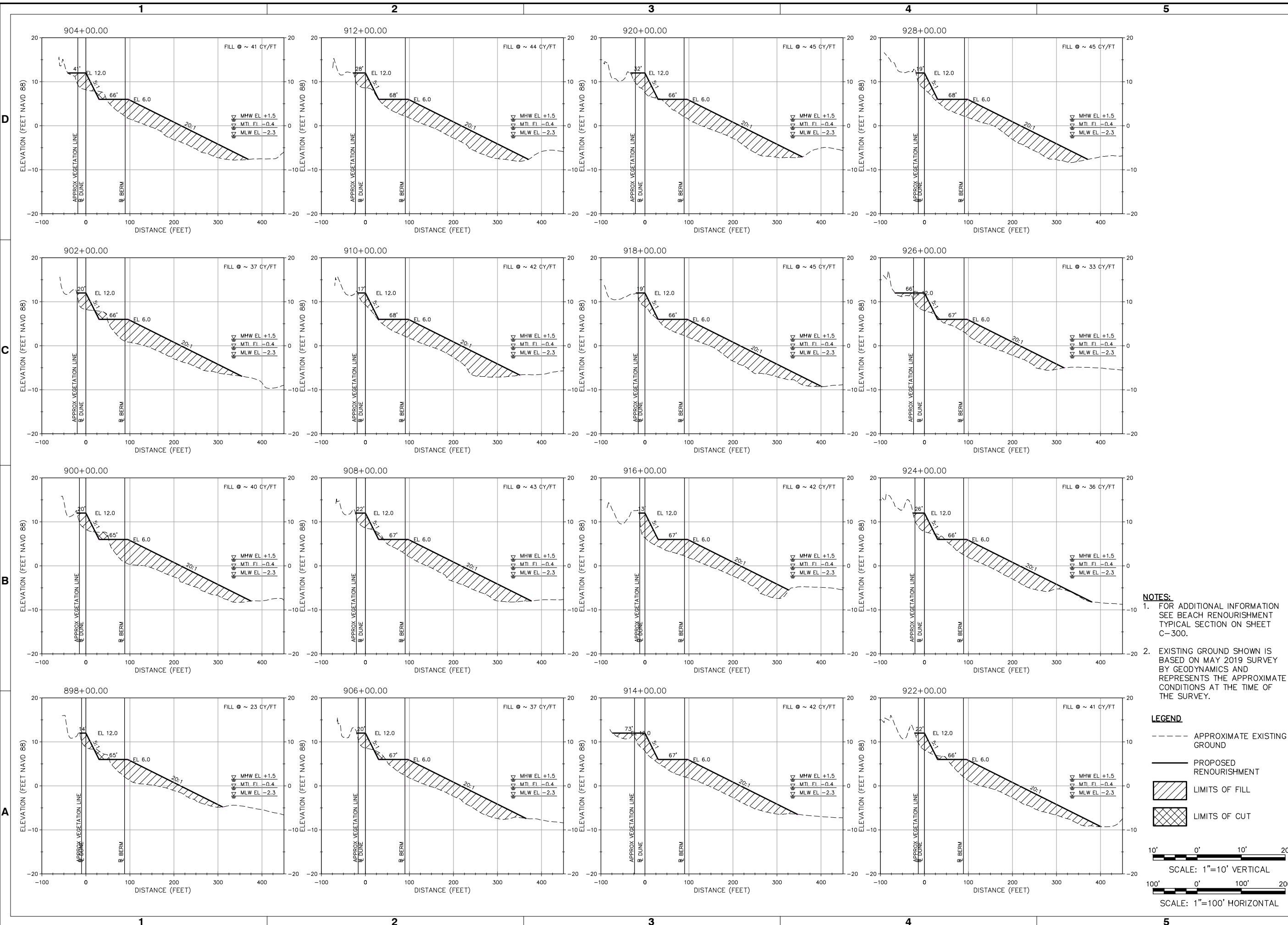
**RENOURISHMENT SECTIONS
 SHEET 28 OF 35**

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

meffatt & nichol NC FIRM LICENSE No. F-0105

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





Rev.	1	Date	AUGUST 2019
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:	
4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4626		4700 FALLS OF THE NEUSE ROAD SUITE 300 RALEIGH, NC 27609 919-781-4626	
NC FIRM LICENSE No. F-0105		NC FIRM LICENSE No. F-0105	
MEFFATT & NICHOL		MEFFATT & NICHOL	
PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH		PREPARED FOR THE TOWNS OF EMERALD ISLE, INDIAN BEACH, PINE KNOLL SHORES, AND ATLANTIC BEACH	

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

**RENOURISHMENT SECTIONS
SHEET 29 OF 35**

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

- 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

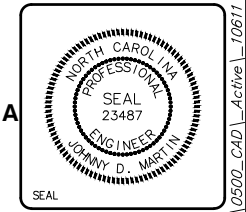
100' 0' 100' 200'
SCALE: 1"=100' HORIZONTAL

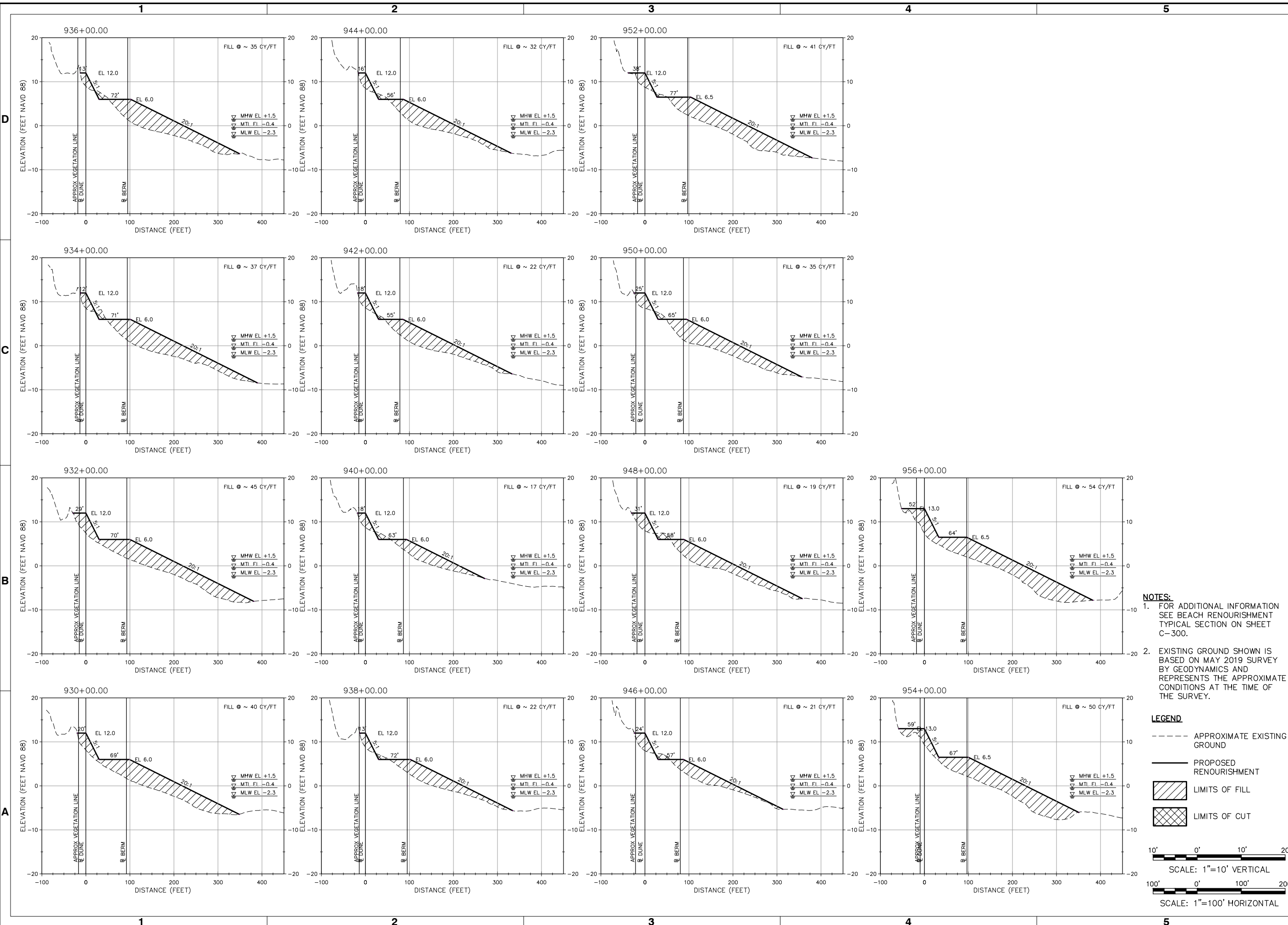
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

NC FIRM LICENSE No. F-0105

MEFFATT & NICHOL

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





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

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

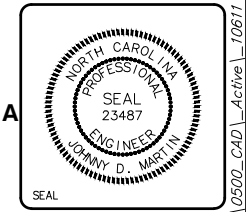
**RENOURISHMENT SECTIONS
SHEET 30 OF 35**

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: 1:1 (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-330
Sheet 59 of 66

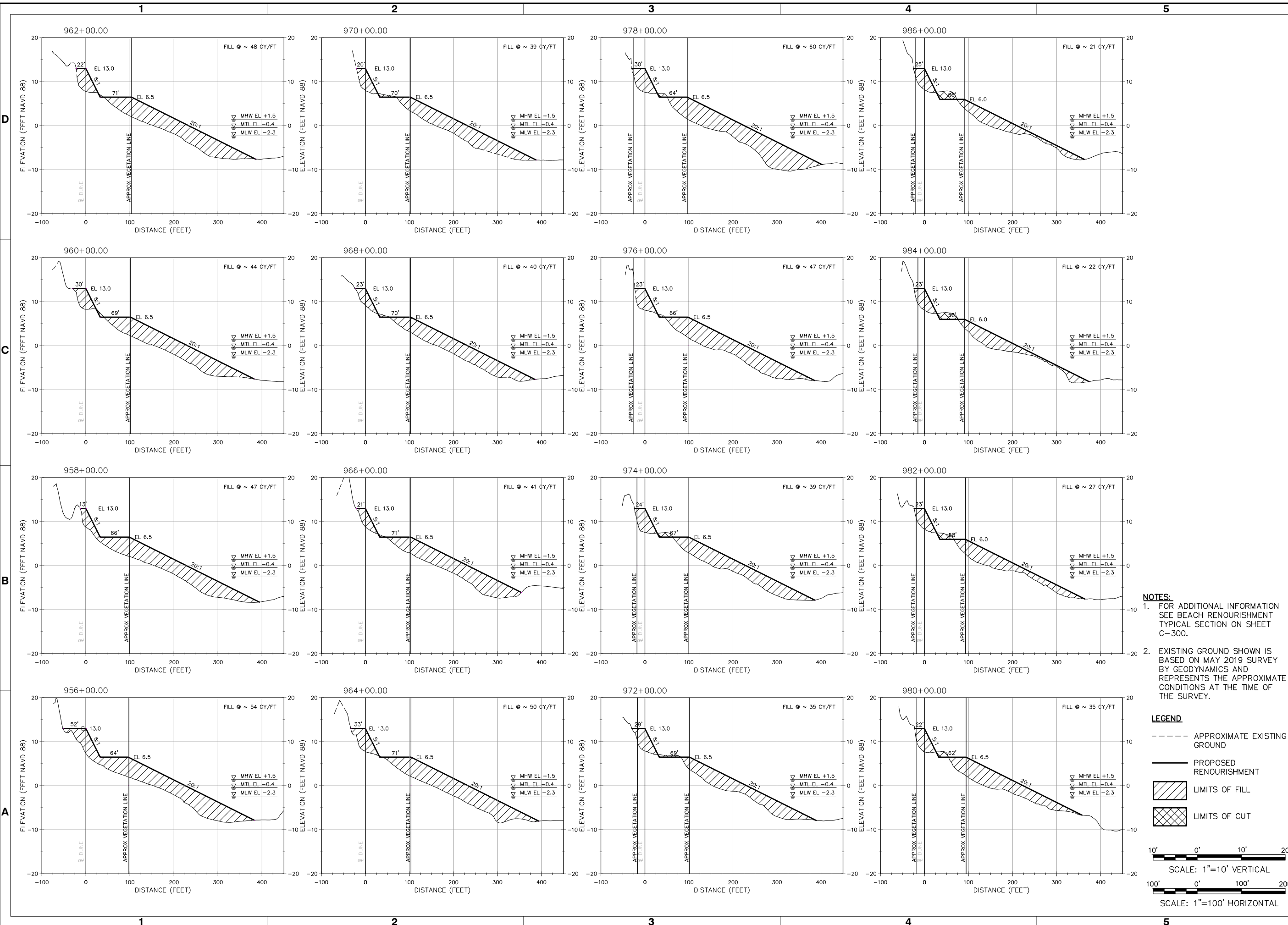
NOTES:

- 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:

- 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

Rev.	1	Date	JANUARY 2020
Design	NCV	Drawn	BDF
Checked	SRM	Reviewed	JDM
Submitted	MOFFATT & NICHOL	Project	10611
Mark	0	Description	PRE-CONSTRUCTION DESIGN REVISION
Mark	1	Description	BID DOCUMENTS
Mark	0	Description	

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

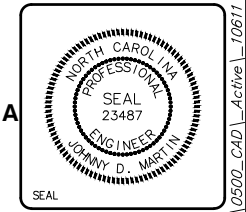
**RENOURISHMENT SECTIONS
SHEET 31 OF 35**

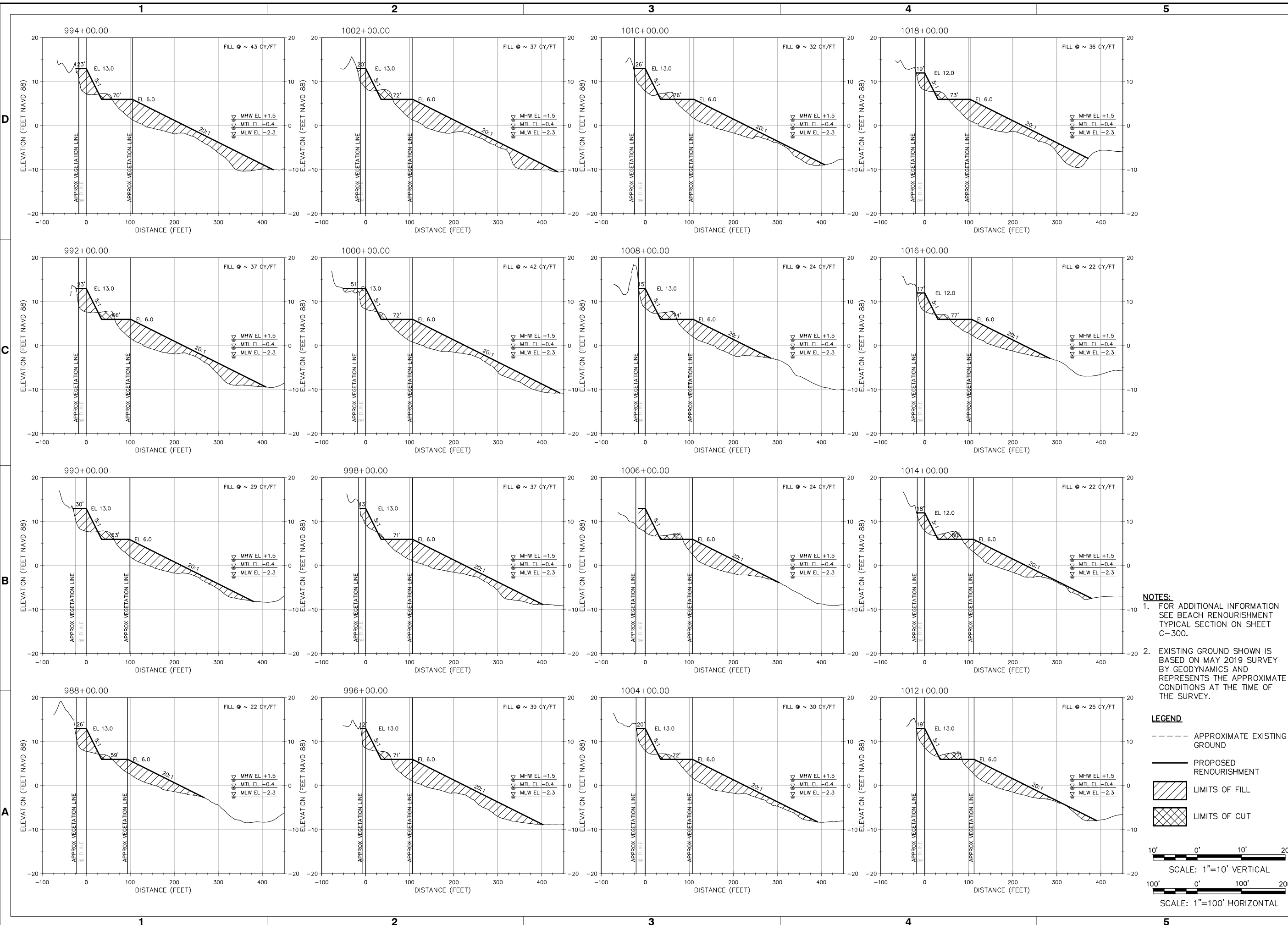
Designed by:	NCV	Drawn by:	BDF	Checked by:	SRM	Reviewed by:	JDM	Submitted by:	MOFFATT & NICHOL
Date:	JANUARY 2020	Project No.:	10611	Drawing code:		Drawing Scale:	As Shown	Plot scale:	1:1 (0 SHEET)

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





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

10' 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**

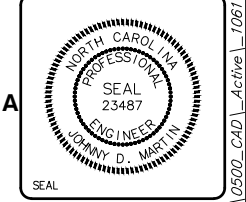
**RENOURISHMENT SECTIONS
SHEET 32 OF 35**

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

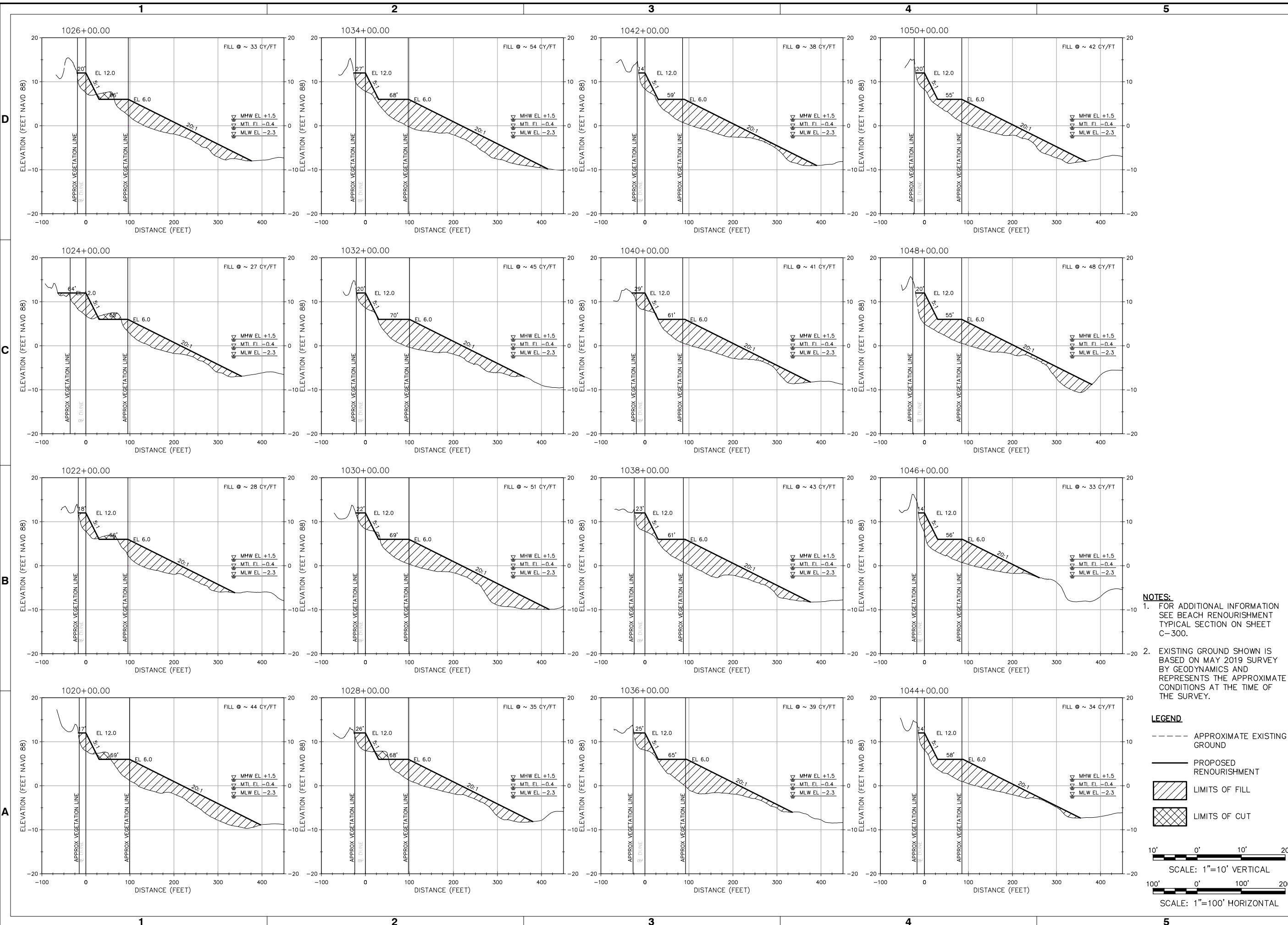
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

meffatt & 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-332
Sheet 61 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
- ▩ LIMITS OF CUT

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

100' 0' 100' 200'
SCALE: 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	
Drawing Code		SRM	
Description		PRE-CONSTRUCTION DESIGN REVISION 02/14/20 JDM	
Mark		0	
Date		08/19/19 JDM	

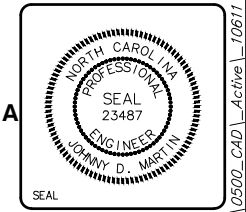
**POST-FLORENCE RENOURISHMENT
PROJECT PHASE 2
CARTERET COUNTY, NORTH CAROLINA**

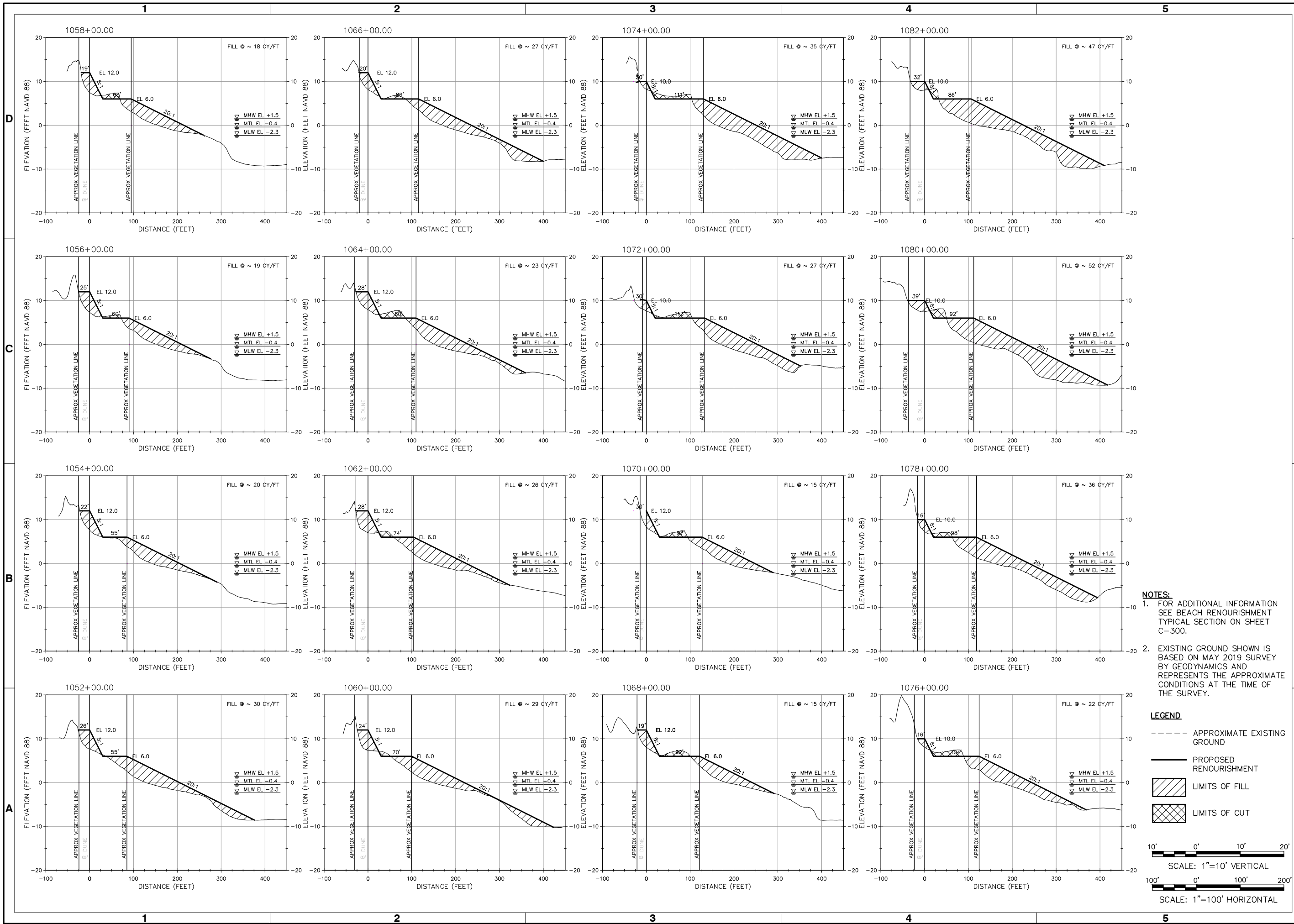
**RENOURISHMENT SECTIONS
SHEET 33 OF 35**

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

meffatt & nichol NC FIRM LICENSE No. F-0105

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

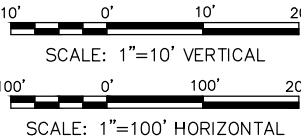




- NOTES:**
- FOR ADDITIONAL INFORMATION SEE BEACH RENOURISHMENT TYPICAL SECTION ON SHEET C-300.
 - EXISTING GROUND SHOWN IS BASED ON MAY 2019 SURVEY BY GEODYNAMICS AND REPRESENTS THE APPROXIMATE CONDITIONS AT THE TIME OF THE SURVEY.

LEGEND

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



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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**

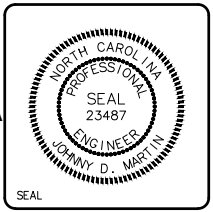
**RENOURISHMENT SECTIONS
SHEET 34 OF 35**

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

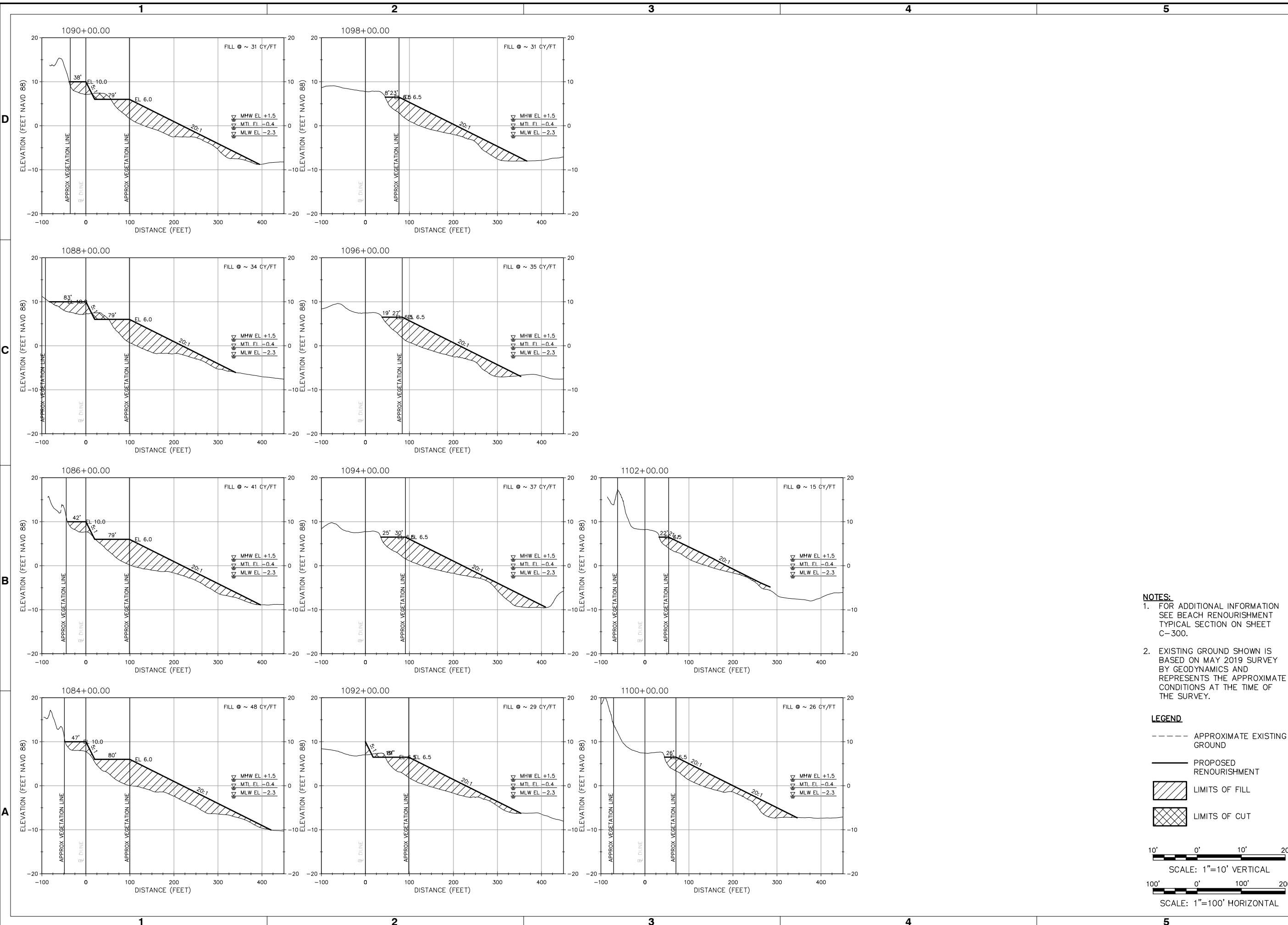
4700 FALLS OF THE NEUSE ROAD
SUITE 300
RALEIGH, NC 27609
919-781-4626

moffatt & nichoil 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-334
Sheet 63 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
- ▩ LIMITS OF CUT

10' 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**

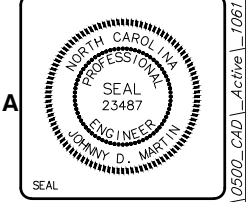
**RENOURISHMENT SECTIONS
 SHEET 35 OF 35**

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

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

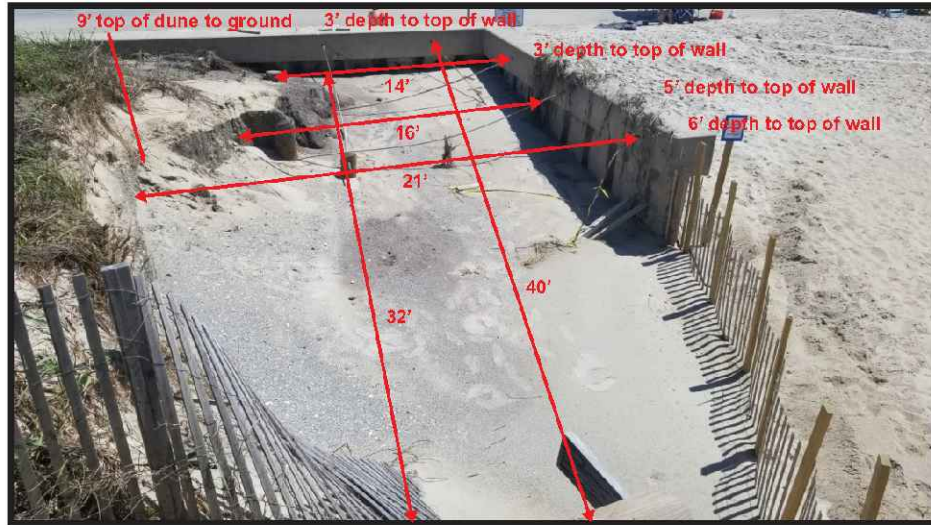
meffatt & nichol NC FIRM LICENSE No. F-0105

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



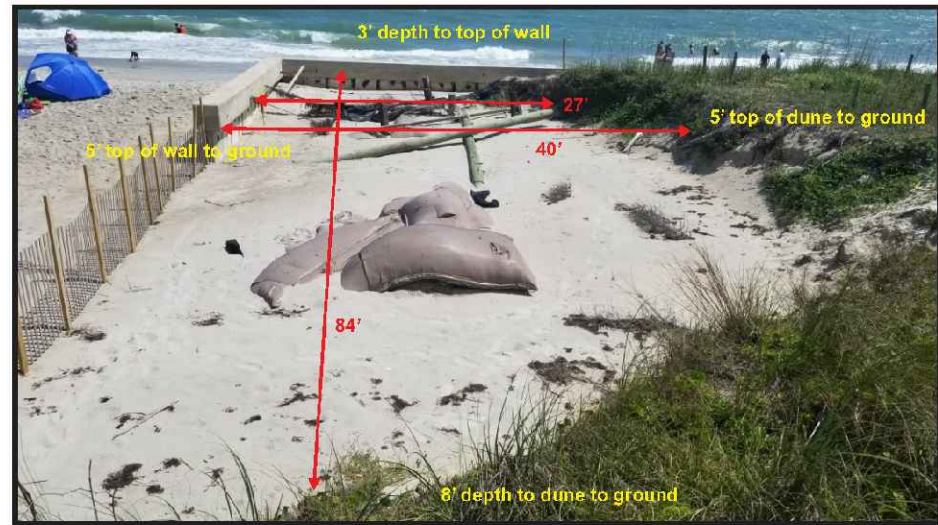
Sheet Reference No.
C-335
 Sheet 64 of 66

File: G:\1RA\10611\0500_CAD_Active\10611 Bouge Banks 2020\1061100C-335; Plotted: 2/14/2020 10:36 AM by FORD, BRIAN; Saved: 2/11/2020 4:04 PM by BFORD



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

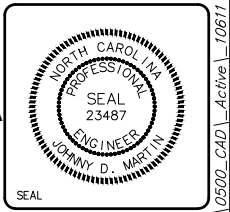
Designed by:	NCV	Checked by:	SRM	Date:	AUGUST 2019
Dwn by:	BDF	Rev. by:	JDM	M&N Project No.:	10611
Submitted by:	MOFFATT & NICHOL	Drawing code:		Drawing Scale:	Plot scale: 1:1 (D SHEET)

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

2/14/2020 10:36 AM by FORD, BRIAN; Saved: 8/19/2019 1:28 PM by BCFORD



Sheet Reference No.
C-501
Sheet 65 of 66

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

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

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

BERM WORK POINT TABLE			
WORK POINT	ELEVATION	NORTHING	EASTING
2070	6.00	344470.47	2621321.05
2071	6.50	344877.99	2623255.65
2072	6.00	345099.73	2624455.63
2073	6.00	345487.58	2626322.16
2074	6.00	345737.82	2627558.33
2075	6.00	345932.20	2628464.86
2076	6.00	346128.84	2629379.39
2077	6.00	346363.43	2630581.85
2078	6.00	346709.22	2632215.81
2079	6.00	346844.56	2632960.95
2080	6.00	346898.86	2633303.52
2081	0.00	347123.25	2634483.09
2082	6.00	347240.14	2635184.02
2083	6.00	347459.79	2636350.24
2084	6.00	347574.83	2636877.76
2085	6.00	348436.45	2641557.90
2086	6.00	348456.98	2641770.39
2087	6.00	348619.75	2642593.98
2088	6.00	348720.83	2643125.94
2089	6.00	348839.93	2643768.61
2090	6.00	349029.53	2644957.92
2091	6.00	349092.64	2645294.32
2092	6.00	349310.14	2646675.05
2093	6.50	349469.61	2647589.69
2094	6.50	349566.25	2648256.18
2095	6.50	349652.96	2648850.44
2096	6.50	349753.09	2649441.46
2097	6.50	349856.90	2650149.85
2098	6.50	349929.94	2650628.41
2099	6.50	350026.74	2651372.04
2100	6.50	350188.39	2652409.90
2101	6.50	350183.22	2652574.10
2102	6.50	350220.00	2652918.25
2103	6.44	350301.28	2653100.65
2104	6.50	350370.21	2653823.86
2105	6.18	350429.98	2654077.09
2106	6.00	350485.87	2654374.98
2107	6.00	350594.76	2655083.76
2108	6.00	350709.44	2655990.73
2109	6.00	350767.56	2656314.68
2110	6.00	350870.52	2657147.59
2111	6.00	351056.85	2658535.11
2112	6.00	351086.16	2658733.08
2113	6.00	351189.90	2659579.22
2114	6.00	351337.64	2660998.49
2115	6.00	351406.24	2661715.92
2116	6.00	351453.3	

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: *[Signature]*
Chairman of the Board

Attest:

Jennette Reese
County Clerk

TOWN OF ATLANTIC BEACH

By: *[Signature]*
Mayor

Attest:

Kelly J. Cipras
Town Clerk

TOWN OF PINE KNOLL SHORES

By: *[Signature]*
Mayor

Attest:

Janet H. Thomas
Town Clerk

TOWN OF INDIAN BEACH

By: *[Signature]*
Mayor

Attest:

Ronda Lambert
Town Clerk

TOWN OF EMERALD ISLE

By: *[Signature]*
Mayor

Attest:

[Signature]
Town Clerk