PROJECT COMMITMENTS

T.I.P. Number B-2500 Phase I
Replacement of the Herbert C. Bonner Bridge (Bridge No. 11) on NC 12 over Oregon Inlet
Dare County
Federal-Aid No. BRS-2358(15)
WBS Element 32635.1.3

and

T.I.P. Number B-2500 AB (Phase II)
Short Term Improvements on NC 12 over New Inlet Breach – Pea Island
Dare County

and

T.I.P. Number B-2500 (Phase IIb)
Long Term Improvements on NC 12 in Rodanthe
Dare County

This sheet only contains commitments up to the 404, 401, and CAMA Permit. Additional Project Commitments will be added upon the issuance of the Pea Island National Wildlife Refuge Special Use Permit, Cape Hatteras National Seashore Special Use Permit, and the US Coast Guard Permit.

COMMITMENTS FROM PROJECT DEVELOPMENT AND DESIGN

The following text lists the Project Commitments for the Bonner Bridge Replacement Project:

Commitments 7, 20, 25, and 26 were revised in association with Phase IIa studies.
Commitments 25 and 26, as the result of the revision of the 2008 BO resulting from a re-initiation of Formal Section 7 Consultation with USFWS.
Commitment 29 was added as a result of agreements made at Concurrence Point 4A.
Commitments 30 and 31 were added to mitigate Pea Island National Wildlife Refuge facility impacts.

All other commitments developed during the project development and design process are the same as presented in the 2010 and 2016 ROD.

Highway Design Branch and Technical Services Division

1. **(Phase 1)** Navigation Span Location. One navigation zone will be built to serve boats passing through Oregon Inlet. The location of the zone will be determined in coordination with the US Army Corps of Engineers (USACE).

2. Bicycle Accommodations. The Cape Hatteras National Seashore (Seashore) management plan supports the use of bicycles along NC 12. All bridges associated with the detailed study alternatives (including the Selected Alternative[s]) will have 8-foot (2.4-meter) wide shoulders that will be safer for bicycle and pedestrian traffic than Bonner Bridge's 2-foot (0.6-meter) wide shoulders. In addition, a bicycle- safe bridge rail on the bridges also will provide increased safety for bicyclists. New roadway will have 4-foot (1.2-meter) paved shoulders, which will be safer for use by bicycle and pedestrian traffic than the existing NC 12's unpaved shoulders.

Highway Design Branch and Division 1

3. Use of Work Bridges. During construction of the project, steps taken to minimize turbidity (when possible and practicable) will include the use of work bridges (rather than barges, which would require dredging) for movement of construction equipment in shallow areas where submerged aquatic vegetation (SAV) is present. If SAV is in waters deep enough to float a barge without dredging, the use of a work bridge will not be necessary. Work bridges also will be used to carry construction equipment over intertidal marsh areas (black needlerush and smooth cordgrass). Dredging generally will only be used in depths less than 6 feet (1.8 meters) where SAV is not present. Work bridges will be used to cross SAVs. Neither dredging nor haul roads will be used in SAVs.

4. Sedimentation and Erosion Control. All waters in the project area are classified as SA waters (Class A salt waters) with a supplemental classification of High Quality Waters (HQW). The most stringent application of the Best Management Practices (BMPs) is expected where highway projects affect receiving waters of special designation, such as HQW. Also, impacts to adjacent areas of SAV and/or wetlands should be minimized. Therefore, sedimentation and erosion control measures shall adhere to the Design Standards in Sensitive Watersheds [15A NCAC 04B.0124 (b)- (e)]. Prior to construction, the design-build contractor will submit the proposed sediment and erosion control plans for each stage of construction to the North Carolina Department of Transportation (NCDOT) and permitting agencies for review.

5. Pile Placement. Bridge piles in open water will be jetted to the tip elevation (depth of the tip of the pile). Bridge piles over land will be jetted or driven. Potential damage to wetlands, SAV, and Oregon Inlet from jetting spoils will be minimized to the extent practicable.

6. **(Phase I)** Use of Bridge Demolition Debris for an Artificial Reef. NCDOT will work with the North Carolina Department of Environment and Natural Resources, Division of Marine Fisheries (NCDENR-DMF) to accommodate this desire during demolition planning. Coordination also will be conducted with the National Marine Fisheries Service (NMFS) in association with their regulation of several protected species.

7. **(Phase I)** Oregon Inlet Fishing Access (revised). This commitment was revised as a result of ongoing Section 7 coordination with NMFS. NCDOT will install "no fishing" signs to not allow fishing on the catwalks during construction to satisfy NMFS concerns, and for safety reasons. If and when a decision is made to allow fishing on the remnant of the existing Bonner Bridge, FHWA will initiate Section 7 consultation with NMFS prior to the "no fishing" signs being removed.

Highway Design Branch, Project Development and Environmental Analysis Unit [now Environmental Analysis Unit], and Division 1

8. Design Coordination. NCDOT will invite NPS and USFWS, as well as the other agencies represented on the project's National Environmental Policy Act/Section 404 of the Clean Water Act (NEPA/Section 404) Merger Team (a full list of agencies on the Merger Team is shown on page 8-6 of the 2008 FEIS), to participate in the development of project design and mitigation strategies as a part of the permit application process for each phase of the project.

9. **(Phase I)** Dredging. To avoid construction impacts to protected turtles, NCDOT's contractor will use pipeline or clamshell dredging. A hopper dredge will not be used for bridge construction or Bonner Bridge demolition.

10. **(Phase I)** Disposal of Dredged Material. Prior to construction, during the permit preparation process, FHWA and NCDOT will work with appropriate environmental resource and regulatory agencies to identify the characteristics of dredged material from bridge construction in open water and develop a disposal plan that will minimize harm to natural resources. The appropriate location for dredged material disposal will be determined based on the character of the materials dredged, the availability of disposal sites, and coastal conditions near the time of construction. In addition, as noted in Commitment 25c, the terms and conditions outlined in the Biological and Conference Opinions (USFWS, 2008) related to piping plovers specify that "all dredge spoil excavated for construction barge access must be used to augment either existing dredge-material islands or to create new dredge-material islands for use by foraging plovers. This must be accomplished as per the specifications of the North Carolina Wildlife Resources Commission."

11. Night-time Construction. Because construction activities could occur 24-hours-a- day, construction areas could be lit to daylight conditions at night. NCDOT will work with NCDENR-DMF, NMFS, NPS, and USFWS to determine other areas near project construction where night lighting will need to be avoided or limited. Night lighting also will not be used close to areas where people sleep, including the campground at the northern end of the project area and the Rodanthe area at the southern end. Night lighting also will meet the requirements specified to protect sea turtles contained within Commitment 26.a.

12. Manatee Protection. Construction contracts will require compliance with USFWS's Guidelines for Avoiding Impacts to the West Indian Manatee: Precautionary Measures for Construction Activities in North Carolina Waters (June 2003).

13. Sea Turtle and Smalltooth Sawfish Protection. NCDOT will comply with NMFS's March 23, 2006, Sea Turtle and Smalltooth Sawfish Construction Conditions (NMFS, 2006) that restrict in-water construction-related activities when these protected species are observed in the project area. However, NMFS and NCDOT agree that bridge construction or demolition activities do not need to stop when a protected species is sighted in the proximity of construction if the construction activities are not in the water. The in-water moratorium prohibits pile installation and removal and activities associated with bridge construction and demolition when listed species are present in the water, but does not restrict terrestrial activity.

14. **(Phase I)** Terminal Groin Removal. NCDOT will apply for a permit to retain the groin to protect the south end of the Oregon Inlet bridge. Construction will not be authorized by FHWA prior to issuance of the terminal groin permit.

    The permit to retain the terminal groin was received from USFWS on August 9, 2012.

15. Archaeological Resources Discovered During Construction. If any historic archaeological resources (e.g., historic watercraft) are encountered in the area west of Bodie Island during construction, construction work affecting the resource will cease immediately until the resource can be identified and assessed for National Register of Historic Places eligibility.

16. Construction of Future Phases. In phasing the construction of the Parallel Bridge Corridor alternatives (including the Selected Alternative[s]), it is NCDOT′s intent to place a high priority on the monitoring and need for implementation of improvements in the three potential hot spot areas. This intent recognizes the need to build in the Rodanthe 'S' Curves, Sandbag Area, and Canal Zone hot spots. Final phasing decisions will be developed through interagency collaboration and under the requirements of NEPA as project area conditions warrant.

17. Monitoring Program. NCDOT considers the 2060 high erosion shoreline a reasonable assumption for current planning purposes, but also recognizes that decisions related to implementation of future phases and the specific location of future phases will likely need to evolve with actual geomorphological change relative to the NC 12 easement. With this in mind, NCDOT will implement a monitoring and vulnerability forecasting program on Hatteras Island in the project area, as described in Section 3.3.2 of the 2010 ROD.

18. Breach Response-Related Data Gathering Program. Recognizing the possibility that a breach could occur at the southern part of the Refuge prior to completion of Phase II and that four other locations exist in the project area that are geologically susceptible to a breach, NCDOT will conduct a breach response-related data gathering program focusing on the southern end of the Refuge.

19. Reduce the Potential Impacts from NC 12 Maintenance Prior to the Completion of Each Phase. Recognizing that storm-related NC 12 maintenance will occur before completion of future phases, particularly before the implementation of improvements in the three hot spot areas, NCDOT will continue to work with the Refuge to reduce potential impacts to the Refuge and NC 12 resulting from NC 12 storm-related maintenance.

20. Atlantic and Shortnose Sturgeon (revised). Conservation measures to protect shortnose sturgeon will include no hopper dredging and measures to minimize habitat degradation. Such measures will include Best Management Practices (BMPs) involving use, storage, and disposal of construction/demolition materials to minimize short-term turbidity or water quality degradation during over-water construction in Oregon Inlet and during periodic maintenance. Construction and demolition activities associated with Phase I of the project will be completed as quickly as possible in order to minimize deterring spawning sturgeon from entering Oregon Inlet. In addition, the project will incorporate BMPs to reduce habitat degradation from stormwater runoff pollution. The same conservation measures will be applied to the Atlantic sturgeon.

Highway Design Branch, Project Development and Environmental Analysis Unit [now Environmental Analysis Unit], Division 1, Right-of-Way Branch, and Technical Services Division

21. Utilities. Project development and construction activities will be coordinated with utility providers in the project area in order to prevent interruption of local utility services. The following utility providers currently serve the project area: Dare County (water service); Sprint Communications (telephone service); Charter Communications (cable television service); and Cape Hatteras Electric Membership Association (electric power service).

Highway Design Branch, Project Development and Environmental Analysis Unit [now Environmental Analysis Unit], Division 1, and Geotechnical Unit

22. Use of Explosives During Construction. The use of explosives during construction is not anticipated. If explosives were needed to remove Bonner Bridge's piles, NCDOT will coordinate with the appropriate environmental resource and regulatory agencies to develop a blasting program that will minimize adverse effects to the natural environment.

Project Development and Environmental Analysis Unit [now Environmental Analysis Unit]

23. Programmatic Agreement. As per the requirements of Section 106 of the National Historic Preservation Act of 1966, FHWA, the North Carolina State Historic Preservation Officer (SHPO), the Advisory Council on Historic Preservation (ACHP), and NCDOT, along with the consulting parties (Dare County, the North Carolina Aquarium Society, USFWS, NPS, and the Chicamacomico Historical Association), developed a Programmatic Agreement (PA) stipulating measures that FHWA will ensure are carried out during the design and construction of the Selected Alternative to mitigate adverse impacts to the historic cultural resources. The final PA (see Appendix D of the Phase IIa EA) was signed by the signatory agencies on November 15, 2010 and amended in August 2013 (see Appendix E of the B-2500 A ROD). NCDOT will carry out the stipulations in this agreement.

24. Seabeach Amaranth. Since the favored habitat of the seabeach amaranth is highly ephemeral, a survey of the project area will be conducted for the habitat of this species at least one year prior to initiating bridge construction activities. It will occur as needed for each construction phase.

Highway Design Branch, Project Development and Environmental Analysis Unit [now Environmental Analysis Unit], Division 1, and Bridge Management Unit

25. Piping Plover (revised). NCDOT will implement the following nondiscretionary measures that include the terms and conditions outlined in the Biological and Conference Opinions (USFWS, 2008):

    a. All construction equipment and personnel must avoid all bird closure areas within the Seashore and Refuge.

All future routine maintenance activities of bridge structures that will occur within or adjacent to current or future plover nesting areas must occur outside the nesting season (April 1 to July 15).

All future repair work on bridge structures that will occur within or adjacent to current or future plover nesting areas must occur outside the nesting season (April 1 to July 15) unless emergency or human safety considerations require otherwise. In this event, the area must be surveyed for nesting plovers and avoided to the extent possible.

b. During the construction of Phases II, III and IV of the Phased Approach/Rodanthe Bridge Alternative (if it is implemented under the NC 12 Transportation Management Plan [Selected Alternative]), keep all construction equipment and activity within the existing right-of-way unless granted approval by the US Fish and Wildlife Service through a revised protected species Biological Opinion. Do not moor any construction barges within 300 feet (91.4 meters) of the following islands: Green Island, Wells Island, Parnell Island, Island MN, Island C, the small unnamed island immediately east of Island C, Island D, and Island G (see Figure 1 in the Biological and Conference Opinions in Appendix E of the 2008 FEIS).

c. All dredge spoil excavated for construction barge access must be used to augment either existing dredge-material islands or to create new dredge-material islands for use by foraging plovers. This must be accomplished as per the specifications of the North Carolina Wildlife Resources Commission. If the dredge material is used outside the current defined action area, the action area is assumed to be expanded to cover the beneficial placement of the material.

d. To the maximum extent practical, while ensuring the safety of the traveling public, limit or avoid the use of road signs or other potential predator perches adjacent to plover nesting or foraging areas. Where signs or other structures are necessary, determine if alternative designs would be less conducive for perching on by avian predators (gulls, crows, grackles, hawks, etc.). For example, minimize or avoid the use of large cantilever signs in favor of smaller and shorter designs.

26. Sea Turtles (green sea turtle, leatherback sea turtle, and loggerhead sea turtle) (revised). NCDOT will implement the following nondiscretionary measures that include the terms and conditions outlined in the Biological and Conference Opinions (USFWS, 2008):

a. All construction equipment and personnel must avoid all marked sea turtle nests. Construction material and equipment staging areas must not be located seaward of the artificial dune. All future routine maintenance activities of bridge structures that will occur within or adjacent to current or future sea turtle nesting habitat, and which will require vehicles or equipment on the beach or the use of night lighting (excluding navigation lights required by the US Coast Guard), must occur outside the nesting season (May 1 to November 15).

All future repair work of bridge structures that will occur within or adjacent to current or future sea turtle nesting habitat, and which will require vehicles or equipment on the beach or the use of night lighting (excluding navigation lights required by the US Coast Guard) must occur outside the nesting season (May 1 to November 15) unless emergency or human safety considerations require otherwise. In this event, the area must be surveyed for sea turtle nests and avoided to the extent possible.

b. Provide an opportunity for USFWS or a USFWS designee to educate construction contractor managers, supervisors, foremen and other key personnel and resident NCDOT personnel with oversight duties (division engineer, resident engineer, division environmental officer, etc.) as to adverse effects of artificial lighting on nesting sea turtles and hatchlings, and to the importance of minimizing those effects.

c. During turtle nesting season (May 1 to November 15), use the minimum number and the lowest wattage lights that are necessary for construction. During turtle nesting season, portable construction lighting must be amber- colored LED lights with a predominant wavelength of approximately 650 nanometers (preferred) or low pressure sodium-vapor type (with USFWS approval). During turtle nesting season, utilize directional shields on all portable construction lights, and avoid directly illuminating the turtle nesting beach at night. During turtle nesting season, all portable construction lights must be mounted as low to the ground as possible. During turtle nesting season, turn off all lights when not needed.

d. For Phases II, III, and IV if developed as defined by the Phased Approach/ Rodanthe Bridge Alternative (if it is implemented under the NC 12 Transportation Management Plan [Selected]), on the ocean side, design the bridge structure in a manner which will shield the beach on the east side from direct light emanating from passenger vehicle headlights. For the small portion of Phase I over land on Hatteras Island, retrofit the bridge structure at the time that Phase II connects with Phase I. The specific design of the bridge will be developed in consultation with USFWS prior to re-evaluation of the environmental document for Phase II.

e. Avoid retrofitting the bridges and approach roads with permanent light fixtures in the future (excluding navigation lights required by the US Coast Guard).

In addition, NCDOT does not anticipate the use of explosives during construction or demolition of the existing bridge. NCDOT's contractor will use pipeline or clamshell dredging, rather than a hopper dredge to minimize effects to sea turtles. No permanent light fixtures will be installed on the bridge or the approaches (with the exception of navigation lights as required by the US Coast Guard).

26a. **(Phase IIb)** Sea Turtles and Atlantic Sturgeon in Pamlico Sound. NCDOT will implement the construction conditions for Phase IIb contained in the December 13, 2016 letter from NMFS. NCDOT will ensure the use of NCDOT's BMPs for soil and erosion control (see Commitment 4), and develop a spill prevention and pollution control plan to minimize impacts to wetlands, seagrasses, and the waters of Pamlico Sound. Turbidity curtains will be deployed around each bridge bent as the substructures are constructed. A "ramp-up" method will be used to initiate impact diving of piles. The "ramp-up" method involves slowly increasing the power of the impact hammer, and the noise it produces, over a period of time (between 5 and 20 minutes) to give marine species an opportunity to leave the work area. NCDOT will maintain a year-round restriction on in-water pile driving between 9:00 PM and 8:00 AM, so that no in-water pile driving occurs during at least 11 hours per night. NCDOT will require the use of noise reduction measures (either bubble curtains or isolating casings) during the impact driving of 54-inch diameter cylindrical piles (if they are use).

ROD # 27 Rufa Red Knot. NCDOT will implement the following nondiscretionary measures that include the terms and conditions outlined in the amended Biological and Conference Opinions (USFWS, 2015):

a. To the extent possible, keep all construction equipment and activity within the existing right-of-way. Avoid staging equipment or material on the beach or adjacent to inlets.

b. To the maximum extent practical, while ensuring the safety of the traveling public, limit or avoid the use of road signs or other potential predator perches adjacent to red knot roosting or foraging areas. Where signs other structures, are necessary, determine if alternative designs would be less conducive for perching on by avian predators (gulls, crows, hawks, etc). For example, minimize or avoid the use of large cantilever signs in favor of small and shorter designs.

Photogrammetry Unit and Project Development and Environmental Analysis Unit [now Environmental Analysis Unit]

28. Submerged Aquatic Vegetation (SAV) Survey. The dynamic nature of the area around Oregon Inlet and the new Pea Island inlet (closed as of May 2013) results in ephemeral habitats, particularly in shallow water and shoreline areas. Consequently, NCDOT will obtain new SAV information for use by the contractor in construction access planning. All surveys for SAV in the vicinity of Oregon Inlet will follow protocols endorsed by the National Oceanic and Atmospheric Administration (NOAA) Fisheries.

Project Development and Environmental Analysis Unit [now Environmental Analysis Unit]

29. Section 4(f). If a later phase of the Parallel Bridge Corridor with NC 12 Transportation Management Plan Alternative (Selected) requires the use of a Section 4(f) property, then FHWA will complete an additional Section 4(f) analysis prior to FHWA's approval of the later phase. The 2009 Revised Final Section 4(f) Evaluation will be reviewed to verify the status of Section 4(f) resources, the effects(s) from the proposed response strategies on the Section 4(f) resource, "use" determinations, and, if necessary, a revised least overall harm analysis.

Project Development and Environmental Analysis Unit [now Environmental Analysis Unit] and Division 1

30. Storage Shed Use During Construction (new). As agreed at Concurrence Point 4A, NCDOT commits to maintaining the ability of Refuge staff to access and use all Refuge facilities during construction of Phase IIa, including the small storage shed located near the planned intake for the third jetting water source.

31. Replacement of Public Parking Lot near Pea Island Inlet (new). Upon completion of construction, the parking lot on the east side of NC 12 will be removed by NCDOT, along with all construction materials, including concrete, asphalt, contaminated soils, and any other material not naturally belonging on the site. NCDOT will construct a replacement parking lot at a new site near the northern terminus of the Phase IIb project per the direction of the USFWS. The site will be selected by the Refuge manager with input from NCDOT upon completion of the Phase IIb project. Upon project completion, the maintenance of the parking lot will be the responsibility of the Refuge.

32. Boat Ramp, Associated Parking, and Access to Them (new). The existing parking lot (New Inlet Parking Lot) and primitive boat access point on the west side of NC 12 will be fully restored upon completion of construction and an access road similar to the one for the parking lot at the Bonner Bridge will be constructed from the southern terminus of the Phase II~~b~~ a bridge to the New Inlet Parking Lot within the existing easement to the greatest extent possible. In order to minimize wetland impacts while providing safe ingress and egress from the boat access drive, NCDOT will construct a turnaround on the east side of the existing easement, as well as a small area outside the easement on the west side of the existing easement. Upon project completion, the maintenance of the driveway and turnaround will be the responsibility of USFWS.

33. **(Phase IIb)** Pappy Lane Wreck Remains. The remains of a large iron vessel (Pappy Lane Wreck) are in Pamlico Sound immediately west of Rodanthe. The wreck is eligible for inclusion in the National Register of Historic Places under Criterion D and does not warrant preservation in place. Therefore, FHWA and NCDOT will develop a data recovery program for approval by SHPO in accordance with the stipulations of the PA. The data recovery program will be implemented prior to January 2018.

34. **(Phase IIb)** Identification of Graves in Rodanthe Cemetery South of Pappy Lane. NCDOT will conduct research and field surveys to determine precisely where graves are located in the cemetery to ensure no unmarked graves are unintentionally disturbed.

35. Stormwater Management Plan. To minimize the potential impact of project pollutants, post-construction stormwater control measure would be implemented according to the Post-Construction Stormwater Program (PCSP), including a stormwater management plan developed in association with NCDEQ-DWR and other state and federal environmental resource and regulatory agencies during final bridge design and in the process of obtaining related permits.

COMMITMENTS FROM PERMITTING

B-2500AB

Conditions from 404 Permit issued July 2, 2015:

Division 1 Construction

Upon project completion, all temporary fills must be removed and impact areas returned to preconstruction elevations.

Conditions from CAMA Permit issued July 28, 2015:

Division 1 Construction

In accordance with T15A:07H.0306(k), the authorized structures shall be relocated or dismantled when they become imminently threatened by changes in shoreline configuration. The structures shall be relocated or dismantled within two years of the time when they become imminently threatened, and in any case upon their collapse or subsidence. However, if natural shoreline recovery or beach renourishment takes place within two years of the time the structures become imminently threatened, so that the structures are no longer imminently threatened, then they need not be relocated or dismantled at that time. This condition shall not affect the permit holder's right to seek authorization of temporary protective measures allowed under Rule T15A:07H.0308(a)(2).

In accordance with G.S. 113A-115.l(b)(i) and l5A NCAC 07H .0308(a)(l)(H), this major modification authorizes scour protection stones and sheet pile retaining walls that are expressly depicted on the attached workplan drawings. These scour protection stones and sheet pile retaining walls shall be removed in their entirety once they are no longer necessary.

The placement of scour protection stone around the bridge abutments, and the placement of rock rip rap at the base of the concrete sheet pile walls, shall be limited to the areas indicated on the attached workplan drawings. The scour protection stone and rock riprap shall be free from loose dirt or any pollutant except in trace quantities.

In accordance with the permittee 's e-mail dated 6/29/15, the permittee may retain the existing steel sheeting at both existing temporary bridge abutment8 as well as the existing rock/slope-stabilization sandbags at the south abutment for protective engineering purposes. The existing steel sheeting, rock, and slope-stabilization sandbags shall be removed if and when the new temporary bridge authorized by this Major Modification is removed in the future. However, if the permittee or DCM determine that the existing steel sheeting, rock, and/or slope-stabilization sandbags have become an obstruction before the new temporary bridge authorized by this Major Modification is removed, then the permittee shall coordinate with DCM to examine removal options under a quicker timeframe.

With the exception of the structures specifically stated in Conditions No. 4 and 5 of this Major 1 .. Modification, upon completion of the work authorized by this Major Modification, all temporary structures and all remnant existing structures shall be removed in their entirety and disposed of at an I approved high ground location as soon as practicable.

In accordance with commitments made by the permittee, the development that was previously but no i longer authorized for B-2500 Phase IIA by DCM in modifications of CAMA Permit No 106-12 on f 4/26/13, 10/17/13, and 4/22114, will be removed and restored to natural elevations prior to the completion of TIP No. B-2500AB.

If the Pea Island Breach Site is closed and surface water is not present, timber mats may be used within the same footprint as the area that is approved on the attached workplan drawings for temporary work bridges.

All equipment and associated materials, including any timber mats, located within the Pea Island Breach Site shall be removed within 12 hours of receiving a weather forecast that suggests the Pea Island Breach Site may become inundated with water from the ocean or sound.

Storage of equipment and materials within the Pea Island Breach Site shall be limited to only those items that will be used readily and only for the current tasks at hand.

The permittee shall coordinate with the United States Fish and Wildlife Service (USFWS) staff to determine the specific location of the Site 17 jetting water intake pump and associated piping. DCM shall be notified in writing upon selection of the final location of the Site 17 jetting water intake site.

The permittee shall exercise all available precautions to ensure that the authorized jetting water intake structures and associated equipment do not pose a hazard to navigation.

The jetting water intake piping shall be attached to temporary wooden stakes with guy lines to limit pipe swing in order to ensure the authorized piping does not pose a hazard to navigation. The piping shall also be marked with floating buoys at every 100 ft to clearly identify it in the water.

Jetting intake screens shall be installed to minimize impacts to fish species. The intake screens shall be inspected and serviced daily during periods when jetting operations are taking place

The jetting water intake pumps shall not be operated if adjacent water levels fall 2.0 feet below the normal water level elevation.

The permittee shall continue to coordinate with appropriate resource agencies to identify and implement additional practicable methods to minimize impacts to fish species from the water intakes during jetting.

In accordance with commitments made by the permittee, all jetting that occurs within the Pea Island Breach Site will occur at ebb tide.

In accordance with commitments made by the permittee, all jetting spoils shall be disposed of within the 100-foot transportation easement within the Pea Island National Wildlife Refuge (PINWR) unless the PINWR accepts the material for Refuge use. Jetting spoils may also be disposed of at an approved upland disposal site.

All reasonable efforts shall be made to contain jetting spoils and keep them from entering wetlands or areas containing submerged aquatic vegetation.

Pilings from the existing temporary bridge and any temporary work bridges shall be removed in their entirety, except that in the event that a bridge piling breaks during removal and cannot be removed in its entirety, DCM shall be notified to determine an appropriate course of action.

According to the permittee, three existing test piles were previously installed during geotechnical investigations, and were designed to remain as permanent features of TIP No. B-2500 Phase IIA. Due to the depth and size of these three existing test piles, as well as safety concerns to the traveling public and practicability, the permittee has stated that these three existing test piles cannot be removed in their entirety at this time. Therefore, in accordance with commitments made by the permittee, the permittee shall cut the piles 1-foot below ground or deeper if groundwater allows. At some point in the future, if the permittee or DCM determines that the remaining portions of the piles have become an obstruction, the permittee shall coordinate with DCM to examine removal options of the exposed portions.

The permittee shall include the N.C. Wildlife Resources Commission (WRC) when it works with other appropriate resource agencies to determine other areas near project construction where night lighting will need to be avoided or limited, as committed to by the permittee in Project Commitment #11 of the Environmental Assessment dated 2/12/13.

This Major Modification shall be attached to the original of Permit No. 106-12, which was issued on 9/19/12, and copies of all documents shall be readily available on site when a Division representative inspects the project for compliance.

The permittee shall provide the public with adequate notice that access to the existing public boat ramp and public parking lot approximately 3,100 feet south of the Pea Island Breach Site will be closed during construction. The notice shall include an estimate of the amount of time that access to the public boat ramp will be closed.

The new temporary bridge shall maintain the present height of the existing temporary bridge, approximately 15 feet above the mean high water elevation.

PDEA Natural Environment Section [now Environmental Analysis Unit]

Due to the possibility that compaction due to temporary roadway fill, jetting intake pumps and pipes, hand clearing, and/or other site alterations might prevent the temporary Coastal Wetland impact areas from re-attaining pre-project functions, the permittee shall provide an annual update on the Coastal Wetland areas temporarily impacted by the TIP No. B-2500 Phase IIA and TIP No. B-2500AB projects. This annual update shall consist of photographs and a brief written report on the progress of these temporarily impacted areas in re-attaining their pre-project functions. Within three years after completion of TIP No. B-2500AB, the permittee shall hold an agency field meeting with DCM to determine if the Coastal Wetland areas temporarily impacted by this project have re-attained pre-project functions. If at the end of three years DCM determines that the Coastal Wetland areas temporarily impacted by the project have not re-attained pre-project functions, DCM will determine whether compensatory mitigation shall be required.

Division 1 Construction Unit and PDEA Natural Environment Section [now Environmental Analysis Unit]

In accordance with commitments made by the permittee, the discretionary measures for the piping plover and three species of sea turtles that include the terms and conditions outlined in the July 10, 2008 USFWS Biological and Conference Opinions shall be implemented. Those conditions are listed below:

Avoid disturbing nesting piping plovers.

To the extent possible, avoid disturbing foraging and roosting plovers.

To minimize the effect of harassment on foraging plovers, provide alternative foraging areas.

Avoid or minimize opportunities for avian predator perches.

Avoid disturbing nesting sea turtles, nests and hatchlings.

Educate construction contractors and pertinent NCDOT staff as to the adverse effects of artificial lighting on sea turtles.

Minimize the effects of construction lighting on nesting sea turtles and hatchlings.

Minimize the effects of vehicle headlights from the completed bridge.

Avoid permanent light fixtures.

All construction equipment and personnel must avoid all marked sea turtle nests.

PDEA Natural Environment Section [now Environmental Analysis Unit]

This Major Modification shall be attached to the original of Permit No. 106-12, which was issued on 9/19/12, and copies of all documents shall be readily available on site when a Division representative inspects the project for compliance.

Conditions from Pea Island National Wildlife Refuge Special Use Permit accepted September 27, 2013 and modified on July 16, 2015:

Division 1 Construction Unit

The Refuge Manager should be contacted immediately at (252) 473-1131 upon discovery of any wildfire, or any leak, spill, or break in a pipeline, power line, canal, or dike, or any other accident or incident that has the potential to have an adverse impact on the soil, wildlife, or plants in the area. Any unusual wildlife sightings or suspected illegal activities should be reported to the Refuge Manager.

The effective dates of this permit include the period from September 16, 2013 through December 31, 2017. If it should become necessary to extend the effective period, a request for extension should be submitted no less than 5 days in advance. The Refuge Manager or designee shall be notified no less than 3 days prior to commencement of activities on the Refuge.

Activities authorized through this permit include reasonable and prudent work within the existing North Carolina Department of Transportation (NCDOT) ROW for the existing NC Highway 12 and those areas identified in pre-construction drawings as temporary easement areas for the purpose of maintaining safe traffic flow while preparing for and construction of a concrete replacement bridge to replace the temporary steel bridge.

Care shall be taken so as to avoid harm to wildlife and fisheries resources, including their habitats.

Temporary work outside of the existing NC 12 ROW as described in project plans reviewed by the Refuge Manager is authorized to the extent necessary to complete construction of the replacement bridge and restoration of NC 12 in a safe and effective manner. This authorization is conditional upon full restoration of affected areas is completed to the satisfaction of the Refuge Manager or designee. Prior consultation with the Refuge Manager or designee is required for any additional temporary work outside of the existing ROW and not shown on the pre-construction drawings.

Special Use Permit 2013-003 is limited to the specific request for sufficient temporary easement for bridge construction at the "Pea Island Inlet" site

> The land being used must be fully restored, i.e., the property must be returned to a condition which is at least as good as that which existed prior to the project; and
>
> There must be documented agreement of the official(s) with jurisdiction over the Section 4(f) resource regarding the above conditions.

Special Use Permit 2013-003 shall be invalidated in the event of failure by NCDOT or FHWA to satisfactorily complete the environmental administrative record for compliance with full disclosure and permitting requirements.

In the event of bird or turtle nesting activity within or adjacent to the project area as determined by the Refuge Manager NCDOT shall work with the contractor and incorporate remedial measures as recommended by USFWS to minimize or eliminate lighting, noise, or construction and associated activities. NCDOT shall be responsible for monitoring nesting activity as determined necessary by the Refuge Manager. Any and all temporary easement, staging, or other work areas on the Refuge shall be sloped, contoured, and re-vegetated to pre-work conditions or to the satisfaction of the Refuge Manager.

Upon completion of construction, NCDOT shall address the issue of public access in the vicinity of New Inlet through the following measures:

> The existing parking lot on the east side of the NC Highway 12 and closest to Pea Island (New) Inlet shall be fully removed along with all construction materials, including concrete, asphalt, contaminated soils, and any other material not naturally belonging on the site. A replacement parking lot shall be constructed and the kiosk shall be relocated/ reconstructed at a new site near the northern terminus of the Phase IIb bridge. The site will be selected by the Refuge Manager with input from NCDOT upon completion of the Phase IIb bridge.

The existing parking lot (New Inlet Parking Lot) and primitive boat access point on the west side of NC Highway 12 shall be fully restored upon completion of construction and an access drive similar to the one for the parking lot at the Bonner Bridge shall be constructed from the southern terminus of the new bridge to the New Inlet Parking Lot within the existing easement to the greatest extent possible. In order to minimize wetland impacts while providing safe ingress and egress from the boat access drive, NCDOT will be allowed to construct a turnaround on the east side of the existing easement, as well as a small area outside the easement on the west side of the existing easement, as depicted on Exhibit 1. Upon project completion, the maintenance of the driveway and turnaround will be the responsibility of USFWS.

Permittee is responsible for removing any and all construction debris, materials, and equipment from the Refuge to the satisfaction of the Refuge Manager.

The only allowable use in the additional TCE is solely for the purpose of constructing the Phase IIAB Bridge.

COMMITMENTS FROM PERMITTING

B-2500 II B

Interim Project Commitments

This sheet only contains commitments from the 404, 401, and CAMA Permit. Additional Project Commitments will be added upon the issuance of the Pea Island National Wildlife Refuge Special Use Permit, Cape Hatteras National Seashore Special Use Permit, and the US Coast Guard Permit.

Environmental Analysis Unit

404 Permit (6/22/2018), Condition 24
In order to compensate for impacts associated with this permit, mitigation shall be provided in accordance with the provisions outlined on the most recent version of the attached Compensatory Mitigation Responsibility Transfer Form. The requirements of this form, including any special conditions listed on this form, are hereby incorporated as special conditions of this permit authorization.

The unavoidable jurisdictional wetland impacts will be offset by wetland mitigation at the Bodie Island Lighthouse Pond. This site was identified by the NPS as the highest priority from multiple options considered in the DEIS. The mitigation includes the rehabilitation of the marsh community through control of Phragmites sp. at the Bodie Island Lighthouse Pond via aerial herbicide treatments and vegetative controlled burns and development of a long-term management plan. NCDOT will debit the site at a 5:1 ratio for the unavoidable jurisdictional wetland impacts. The final mitigation plan was provided as an attachment to the permit application. To address concerns about future success and monitoring of the Bodie Island Lighthouse Pond site, NCDOT will reserve riparian wetland mitigation credits from the Ballance Farm Mitigation Site at a ratio of 2:1 for unavoidable jurisdictional wetland impacts. These credits will be held in abeyance until monitoring is complete and the Corps determines that success criteria has been achieved at the Bodie Island Lighthouse Pond site. At that time, NCDOT will request approval from the Corps (in consultation with the other agencies) to release the Balance Farm Mitigation Site credits.

The Ballance Farm Site is located in Currituck County within the USGS hydrologic unit 03010205 of the Pasquotank River. NCDOT acquired the site to mitigate for unavoidable, jurisdictional impacts associated with TIP R-2228. Monitoring requirements were performed from 1999 to 2003 and the site was closed out in 2007.

The applicant will also be required to mitigate for the loss of Essential Fish Habitat (EFH) by restoration of SAV as outlined in the "Monitoring Plan for Determination of SAV Impact for Mitigation" which was approved by the Merger Team on September 13, 2017.

Division 1

401 Permit (6/11/2018), Condition 1
In the event of severe weather, the NCDOT and its contractors shall make every reasonable attempt to secure equipment and supplies such that oil, greases, hydraulic fluids, supplies, etc. will not become potential contaminants to surface waters or other natural resource. [I5A NCAC 02H.0506(b)(2) and (b)(3)].

401 Permit (6/11/2018), Condition 2
The primary and secondary containment measures used to contain the jetting spoils shall be installed as described in the application and properly maintained to prevent the loss of spoil material into the adjacent waters. Any noticeable loss of spoil material beyond the secondary containment measure shall be reported to NCDWR within 24 hours. [I5A NCAC 02H.0506(b)(2)(3)].

401 Permit (6/11/2018), Condition 3
Removal of jetting spoils shall be conducted in a manner that does not violate water quality standards. Spoil material shall be located to an approved upland area. [I5A NCAC 02H.0506(b)(2)(3)]

401 Permit (6/11/2018), Condition 4
Due to the possibility that compaction and/or other site alterations might prevent the temporary wetland impact area from re-attaining jurisdictional wetland status; the permittee shall provide an update on the wetland areas temporarily impacted at Site 2. This update shall be conducted two growing seasons after completion of the work at Site 2 and shall consist of photographs and a brief report on the progress of the areas in re-attaining wetland jurisdictional status. Upon submission of this update to the NCDWR, the permittee shall schedule an agency field meeting with the NCDWR to determine if the wetland areas temporarily impacted by this project have re-attained jurisdictional wetland status. If the wetland areas temporarily impacted by this project have not re-attained jurisdictional wetland status, the NCDWR shall determine if compensatory wetland mitigation is to be required. [I5A NCAC 02H.0506(c)(2)].

CAMA Permit (6/11/2018), Condition 2
Nothing in this permit authorizes any activity that has not received approval from the National Park Service (NPS) and the U.S. Fish and Wildlife Service (USFWS) for work within the Cape Hatteras National Seashore and Pea Island National Wildlife Refuge. The proposed work shall not commence until the permittee has been issued Special Use Permits from the NPS and the USFWS, if required, and a copy of the Special Use Permits are received by DCM.

CAMA Permit (6/11/2018), Condition 6
In accordance with commitments made by the permittee, all sandbags and associated geotextile fabrics shall be removed in their entirety along the existing NC 12 corridor between the proposed parking area just north of the bridge, south to the Pea Island National Wildlife Refuge/Rodanthe boundary.

CAMA Permit (6/11/2018), Condition 18
The permittee shall arrange a site visit for the DCM Fisheries Resource Specialist and the DCM Transportation Field Representative to observe the ongoing construction over open waters, including jetting for pile placement and the effectiveness of the primary containment areas.

CAMA Permit (6/11/2018), Condition 19
The installation and removal of the piles for the new bridge and temporary advancing rail system shall be accomplished by jetting, pile driving, and/or the use of a vibratory hammer, as specified in the permit application. Should the permittee and/or its contractor desire to utilize another type of pile installation, such as drilled shaft construction, additional authorization from DCM shall be required.

CAMA Permit (6/11/2018), Condition 20
In accordance with commitments made by the permittee, screens will be utilized to prevent plant or animal life from flowing into the jetting water wells.

CAMA Permit (6/11/2018), Condition 22
The permittee shall continue to coordinate with the DCM Fisheries Resources Specialist and other appropriate resource agencies to identify and implement additional practicable methods to minimize impacts to aquatic species from the water intakes during jetting.

CAMA Permit (6/11/2018), Condition 23
As soon as practicable after they are no longer needed, pilings in open water from the temporary advancing rail system shall be removed in their entirety, except that in the event that a piling breaks during removal and cannot be removed in its entirety, it may be cut off flush with the bed of the water body, and DCM shall be notified of each occurrence within one working day.

CAMA Permit (6/11/2018), Condition 25
According to the permit application, the design of containment systems within wetlands and uplands was not finalized at the time of application, and may vary due to constraints such as shorelines. Prior to installation of pilings in Coastal Wetlands, the permittee shall submit workplan drawings and a narrative to DCM depicting the proposed jetting spoil containment system for review and approval.

CAMA Permit (6/11/2018), Condition 26
In accordance with commitments made by the permittee, prior to the use of each primary containment system, plastic geogrid matting will be placed on the existing Sound bottom within the primary containment system.

CAMA Permit (6/11/2018), Condition 28
The permittee shall conduct regular inspections and maintenance of the containment systems to ensure they are working as expected. If measurable sediment is found within the secondary containment areas, or outside of the containment system, or if turbid water is found to have passed the secondary containment system, then operations at that location will be stopped, the permittee shall immediately contact the DCM Transportation Field Representative, and shall implement measures to improve the containment system as required for the system to perform as intended, including removing any material that is outside of permitted areas. The jetting operation shall only resume upon approval of DCM.

CAMA Permit (6/11/2018), Condition 29
If the permittee determines that modifications to the containment systems are necessary, then the permittee shall submit workplan drawings and a narrative to DCM depicting the proposed modifications, and shall receive approval from DCM prior to implementing the modifications.

CAMA Permit (6/11/2018), Condition 30
During removal of the jetting spoil from the containment areas, the spoils shall be removed down to the original Sound bottom, as indicated by the geogrid matting, with the least amount of disturbance practicable to the Sound bottom and any surviving SAV plants. After the jetting spoils have been adequately removed, each containment system shall be removed in its entirety as soon as practicable when it is no longer needed.

CAMA Permit (6/11/2018), Condition 31
During removal of jetting spoil from the containment systems, caution should be exercised with floating skiffs or other similar devices to ensure minimal damage to the Sound bottom, and to ensure that temporary impacts to shallow water habitat are avoided and minimized to the maximum extent practicable.

CAMA Permit (6/11/2018), Condition 32
Overflow lines that are used to release excess water from the dump trucks or other vehicles during removal of the jetting spoil material shall be placed so that the water only runs back into the primary containment systems.

CAMA Permit (6/11/2018), Condition 33
Dump trucks or other vehicles that are used to transport jetting spoil material that is removed from the containment systems shall be water tight during transport.

CAMA Permit (6/11/2018), Condition 34
The permittee shall provide DCM with workplan drawing(s) depicting the location(s) of any temporary stockpiles within the project area prior to their use. Temporary spoil stockpiles within the project area shall not be located within wetlands or waters of the State.

CAMA Permit (6/11/2018), Condition 39
The permittee shall provide the DCM Fisheries Resource Specialist and the DCM Transportation Field Representative with an opportunity to participate during planned SAV monitoring activities.

CAMA Permit (6/11/2018), Condition 40
Any significant depressions in the Sound bottom created by jetting water intakes or temporary hollow steel piles of the advancing rail system shall be filled with native substrate material to approximate their pre-project contours and elevations as soon as practicable.

CAMA Permit (6/11/2018), Condition 43
Construction mats shall be utilized to support equipment within wetland areas to minimize temporary wetland impacts. These mats shall be removed immediately following project completion.

CAMA Permit (6/11/2018), Condition 45
Due to the possibility that compaction, mechanized clearing, hand clearing, and/or other site alterations might prevent the temporary Coastal Wetland impact areas from re-attaining pre-project functions, the permittee shall provide an annual update on the Coastal Wetland areas temporarily impacted by this project. This annual update shall consist of photographs and a brief written report on the progress of these temporarily impacted areas in re-attaining their pre-project functions. Within three years after project completion, the permittee shall hold an agency field meeting with DCM to determine if the Coastal Wetland areas temporarily impacted by this project have re-attained pre-project functions. If at the end of three years DCM determines that the Coastal Wetland areas temporarily impacted by the project have not re-attained pre-project functions, DCM will determine whether compensatory mitigation shall be required.

DEPARTMENT OF THE ARMY PERMIT

Permittee **NORTH CAROLINA DEPARTMENT OF TRANSPORTATION**
ATTN: MR. PHILIP S. HARRIS III, P.E., C.P.M.

Permit No. **SAW-2012-01153**

Issuing Office **CESAW-RG-W**

NOTE: The term "you" and its derivatives, as used in this permit, means the permittee or any future transferee. The term "this office" refers to the appropriate district or division office of the Corps of Engineers having jurisdiction over the permitted activity or the appropriate official of that office acting under the authority of the commanding officer.

You are authorized to perform work in accordance with the terms and conditions specified below.

Project Description: **The applicant proposes to construct a 2.8 mile long typical road corridor on a new alignment starting within the Pea Island National Wildlife Refuge (Refuge) along NC 12 approximately 1.8 miles north of the town of Rodanthe. The new alignment will run south as a bridge over the Pamlico Sound for 2.46 miles before reconnection with NC 12 at America Drive in the town of Rodanthe in Dare County, North Carolina.**

Project Location: **The site location follows a new alignment from NC 12 approximately 1.8 miles north of the town of Rodanthe and enters the Pamlico Sound as a bridge for 2.46 miles before it reconnects to NC 12 in the town of Rodanthe at America Drive, in Dare County, North Carolina.**

Permit Conditions:

General Conditions:

1. The time limit for completing the work authorized ends on **December 31, 2023.** If you find that you need more time to complete the authorized activity, submit your request for a time extension to this office for consideration at least one month before the above date is reached.

2. You must maintain the activity authorized by this permit in good condition and in conformance with the terms and conditions of this permit. You are not relieved of this requirement if you abandon the permitted activity, although you may make a good faith transfer to a third party in compliance with General Condition 4 below. Should you wish to cease to maintain the authorized activity or should you desire to abandon it without a good faith transfer, you must obtain a modification of this permit from this office, which may require restoration of the area.

3. If you discover any previously unknown historic or archeological remains while accomplishing the activity authorized by this permit, you must immediately notify this office of what you have found. We will initiate the Federal and state coordination required to determine if the remains warrant a recovery effort or if the site is eligible for listing in the National Register of Historic Places.

4. If you sell the property associated with this permit, you must obtain the signature of the new owner in the space provided and forward a copy of the permit to this office to validate the transfer of this authorization.

5. If a conditioned water quality certification has been issued for your project, you must comply with the conditions specified in the certification as special conditions to this permit. For your convenience, a copy of the certification is attached if it contains such conditions.

6. You must allow representatives from this office to inspect the authorized activity at any time deemed necessary to ensure that it is being or has been accomplished in accordance with the terms and conditions of your permit,

Special Conditions:

SEE ATTACHED SPECIAL CONDITIONS

Further Information:

1. Congressional Authorities: You have been authorized to undertake the activity described above pursuant to:

( ) Section 10 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403).

(X) Section 404 of the Clean Water Act (33 U.S.C. 1344).

( ) Section 103 of the Marine Protection, Research and Sanctuaries Act of 1972 (33 U.S.C. 1413).

2. Limits of this authorization.

a. This permit does not obviate the need to obtain other Federal, state, or local authorizations required by law.

b. This permit does not grant any property rights or exclusive privileges.

c. This permit does not authorize any injury to the property or rights of others.

d. This permit does not authorize interference with any existing or proposed Federal project.

3. Limits of Federal Liability. In issuing this permit, the Federal Government does not assume any liability for the following:

a. Damages to the permitted project or uses thereof as a result of other permitted or unpermitted activities or from natural causes.

b. Damages to the permitted project or uses thereof as a result of current or future activities undertaken by or on behalf of the United States in the public interest.

c. Damages to persons, property, or to other permitted or unpermitted activities or structures caused by the activity authorized by this permit.

d. Design or construction deficiencies associated with the permitted work.

e. Damage claims associated with any future modification, suspension, or revocation of this permit.

4. Reliance on Applicant's Data: The determination of this office that issuance of this permit is not contrary to the public interest was made in reliance on the information you provided.

5. Reevaluation of Permit Decision. This office may reevaluate its decision on this permit at any time the circumstances warrant. Circumstances that could require a reevaluation include, but are not limited to, the following:

a. You fail to comply with the terms and conditions of this permit.

b. The information provided by you in support of your permit application proves to have been false, incomplete, or inaccurate (See 4 above).

c. Significant new information surfaces which this office did not consider in reaching the original public interest decision.

Such a reevaluation may result in a determination that it is appropriate to use the suspension, modification, and revocation procedures contained in 33 CFR 325.7 or enforcement procedures such as those contained in 33 CFR 326.4 and 326.5. The referenced enforcement procedures provide for the issuance of an administrative order requiring you to comply with the terms and conditions of your permit and for the initiation of legal action where appropriate. You will be required to pay for any corrective measures ordered by this office, and if you fail to comply with such directive, this office may in certain situations (such as those specified in 33 CFR 209.170) accomplish the corrective measures by contract or otherwise and bill you for the cost.

6. Extensions. General condition 1 establishes a time limit for the completion of the activity authorized by this permit, Unless there are circumstances requiring either a prompt completion of the authorized activity or a reevaluation of the public interest decision, the Corps will normally give favorable consideration to a request for an extension of this time limit.

Your signature below, as permittee, indicates that you accept and agree to comply with the terms and conditions of this permit.

(PERMITTEE) **NC DEPARTMENT OF TRANSPORTATION**
ATTN: MR. PHILIP S. HARRIS III, P.E., C.P.M.

06/22/2018
(DATE)

This permit becomes effective when the Federal official, designated to act for the Secretary of the Army, has signed below.

(DISTRICT COMMANDER) **ROBERT J. CLARK, COLONEL**

22 June 2018
(DATE)

When the structures or work authorized by this permit are still in existence at the time the property is transferred, the terms and conditions of this permit will continue to be binding on the new owner(s) of the property. To validate the transfer of this permit and the associated liabilities associated with compliance with its terms and conditions, have the transferee sign and date below.

(TRANSFEREE)

(DATE)

*U.S. GOVERNMENT PRINTING OFFICE: 1986 - 717-425

SPECIAL CONDITIONS
ACTION ID: SAW-2012-01153
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION TIP B-2500B
CONSTRUCTION OF THE RODANTHE BREACH LONG-TERM IMPROVEMENTS, BONNER BRIDGE REPLACEMENT PROJECT PHASE IIB
IN DARE COUNTY, NORTH CAROLINA

Work Limits

1. CONSTRUCTION PLANS: All work authorized by this permit must be performed in strict compliance with the attached plans dated February 1, 2018, and revision information submitted 6/1/2018, which are a part of this permit. Any modification to these plans must be approved by the US Army Corps of Engineers (Corps) prior to implementation.

2. UNAUTHORIZED DREDGE OR FILL: Except as authorized by this permit or any Corps approved modification to this permit, no excavation, fill or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, within waters or wetlands. This permit does not authorize temporary placement or double handling of excavated or fill material within waters or wetlands outside the permitted area. This prohibition applies to all borrow and fill activities connected with this project.

3. MAINTAIN CIRCULATION AND FLOW OF WATERS: Except as specified in the plans attached to this permit, no excavation, fill or mechanized land-clearing activities shall take place at any time in the construction or maintenance of this project, in such a manner as to impair normal flows and circulation patterns within waters or wetlands or to reduce the reach of waters or wetlands.

4. DEVIATION FROM PERMITTED PLANS: The permittee shall ensure that the construction design plans for this project do not deviate from the permit plans attached to this authorization. Written verification shall be provided that the final construction drawings comply with the attached permit drawings prior to any active construction in waters of the United States, including wetlands. Any deviation in the construction design plans will be brought to the attention of the Corps of Engineers, Mr. Kyle Barnes of the Washington Regulatory Field Office prior to any active construction in waters or wetlands.

5. PRECONSTRUCTION MEETING: The Permittee shall schedule an onsite preconstruction meeting between its representatives, the contractor's representatives and the appropriate Corps of Engineers Project Manager prior to undertaking any work within jurisdictional waters and wetlands to

ensure that there is a mutual understanding of all terms and conditions contained within the Department of the Army permit. The Permittee shall notify the Corps of Engineers Project Manager a minimum of thirty (30) days in advance of the scheduled meeting in order to provide that individual with ample opportunity to schedule and participate in the required meeting.

6. BORROW AND WASTE: To ensure that all borrow and waste activities occur on high ground and do not result in the degradation of adjacent wetlands and streams, except as authorized by this permit, the permittee shall require its contractors and/or agents to identify all areas to be used to borrow material, or to dispose of dredged, fill, or waste material. The permittee shall provide the Corps with appropriate maps indicating the locations of proposed borrow or waste sites as soon as the permittee has that information. The permittee will coordinate with the Corps before approving any borrow or waste sites that are within 400 feet of any streams or wetlands.

Related Laws

7. WATER CONTAMINATION: All mechanized equipment will be regularly inspected and maintained to prevent contamination of waters and wetlands from fuels, lubricants, hydraulic fluids, or other toxic materials. In the event of a spill of petroleum products or any other hazardous waste, the permittee shall immediately report it to the N.C. Division of Water Resources at (919) 707-8787 or (919) 858-0368 and provisions of the North Carolina Oil Pollution and Hazardous Substances Control Act will be followed.

8. The Permittee shall fully abide by all conditions of the CAMA Major Development Permit No. 106-12, dated June 11, 2018, issued by the North Carolina Division of Coastal Management, which are incorporated herein by reference.

SPECIAL CONDITIONS
ACTION ID: SAW-2012-01153
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION TIP B-2500B
CONSTRUCTION OF THE RODANTHE BREACH LONG-TERM IMPROVEMENTS, BONNER BRIDGE REPLACEMENT PROJECT PHASE IIB
IN DARE COUNTY, NORTH CAROLINA

Project Maintenance

9. NOTIFICATION OF CONSTRUCTION COMMENCEMENT AND COMPLETION: The permittee shall advise the Corps in writing prior to beginning the work authorized by this permit and again upon completion of the work authorized by this permit.

10. PERMIT DISTRIBUTION: The permittee shall require its contractors and/or agents to comply with the terms and conditions of this permit in the construction and maintenance of this project, and shall provide each of its contractors and/or agents associated with the construction or maintenance of this project with a copy of this permit. A copy of this permit, including all conditions, shall be available at the project site during construction and maintenance of this project.

    Prior to construction within any jurisdictional areas, the permittee must correctly install silt fencing (with or without safety fencing) parallel with the construction corridor, on both sides of the jurisdictional crossing. This barrier is to serve both as an erosion control measure and a visual identifier of the limits of construction within any jurisdictional area. The permittee must maintain the fencing, at minimum, until the wetlands have re-vegetated and stabilized.

11. PERMIT REVOCATION: The permittee, upon receipt of a notice of revocation of this permit or upon its expiration before completion of the work will, without expense to the United States and in such time and manner as the Secretary of the Army or his authorized representative may direct, restore the water or wetland to its pre-project condition.

12. CLEAN FILL: Unless otherwise authorized by this permit, all fill material placed in waters or wetlands shall be generated from an upland source and will be clean and free of any pollutants except in trace quantities. Metal products, organic materials (including debris from land clearing activities), or unsightly debris will not be used. Soils used for fill shall not be contaminated with any toxic substance in concentrations governed by Section 307 of the Clean Water Act.

SPECIAL CONDITIONS
ACTION ID: SAW-2012-01153
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION TIP B-2500B
CONSTRUCTION OF THE RODANTHE BREACH LONG-TERM IMPROVEMENTS, BONNER BRIDGE REPLACEMENT PROJECT PHASE IIB
IN DARE COUNTY, NORTH CAROLINA

13. SILT-FENCING: The permittee shall employ all sedimentation and erosion control measures necessary to prevent an increase in sedimentation or turbidity within waters and wetlands outside the permit area. This shall include, but is not limited to, the immediate installation of silt fencing or similar appropriate devices around all areas subject to soil disturbance or the movement of earthen fill, and the immediate stabilization of all disturbed areas. Additionally, the project must remain in full compliance with all aspects of the Sedimentation Pollution Control Act of 1973 (North Carolina General Statutes Chapter 113A Article 4). Fescue will not be planted within wetland areas.

14. EROSION CONTROL MEASURES IN JURISDICTIONAL WATERS:

A. During the clearing phase of the project, heavy equipment must not be operated in surface waters or stream channels. Temporary stream crossings will be used to access the opposite sides of stream channels. All temporary diversion channels and stream crossings will be constructed of non-erodible materials. Grubbing of riparian vegetation will not occur until immediately before construction begins on a given segment of stream channel.

B. No fill or excavation impacts for the purposes of sedimentation and erosion control shall occur within jurisdictional waters, including wetlands, unless the impacts are included on the plan drawings and specifically authorized by this permit.

C. The permittee shall remove all sediment and erosion control measures placed in wetlands or waters, and shall restore natural grades in those areas, prior to project completion.

15. PROHIBITION ON CONCRETE: The permittee shall take measures to prevent live or fresh concrete, including bags of uncured concrete, from coming into contact with any water in or entering into waters of the United States. Water inside coffer dams or casings that has been in contact with concrete shall only be returned to waters of the United States when it no longer poses a threat to aquatic organisms (i.e. concrete is set and cured).

SPECIAL CONDITIONS
ACTION ID: SAW-2012-01153
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION TIP B-2500B
CONSTRUCTION OF THE RODANTHE BREACH LONG-TERM IMPROVEMENTS, BONNER BRIDGE REPLACEMENT PROJECT PHASE IIB IN DARE COUNTY, NORTH CAROLINA

16. INSTALLATION OF CULVERTS: Unless otherwise requested in the applicant's application and depicted on the approved work plans, culverts greater than 48 inches in diameter will be buried at least one foot below the bed of the stream. Culverts 48 inches in diameter and less shall be buried or placed on the stream bed as practicable and appropriate to maintain aquatic passage, and every effort shall be made to maintain existing channel slope. The bottom of the culvert must be placed at a depth below the natural stream bottom to provide for passage during drought or low flow conditions. Destabilizing the channel and head cutting upstream should be considered in the placement of the culvert.

17. AQUATIC PASSAGE: Measures will be included in the construction/installation that will promote the safe passage of fish and other aquatic organisms. The dimension, pattern, and profile of the stream above and below a pipe or culvert should not be modified by widening the stream channel or by reducing the depth of the stream in connection with the construction activity. The width, height, and gradient of a proposed opening should be such as to pass the average historical low flow and spring flow without adversely altering flow velocity. Spring flow should be determined from gauge data, if available. In the absence of such data, bankfull flow can be used as a comparable level.

ESA

18. THREATENED AND ENDANGERED SPECIES: All necessary precautions and measures will be implemented so that any activity will not kill, injure, capture, harass, or otherwise harm any protected federally listed species. While accomplishing the authorized work, if the permittee discovers or observes a damaged or hurt listed endangered or threatened species, the District Engineer will be immediately notified to initiate the required Federal coordination.

19. NORTHERN LONG-EARED BAT: This Corps permit does not authorize you to take a threatened or endangered species, in particular, the Northern Long-eared Bat (NLEB) (*Myotis septentrionalis*). In order to legally take a listed species, you must have separate authorization under

the Endangered Species Act (ESA) (e.g., a Biological Opinion (BO) under the ESA, Section 7, with "incidental take" provisions with which you must comply). The U.S. Fish and Wildlife Service's (USFWS's) Programmatic BO titled "Northern Long-eared Bat (NLEB) Programmatic Biological Opinion for North Carolina Department of Transportation (NCDOT) Activities in Eastern North Carolina (Divisions 1-8)," dated March 25, 2015, and adopted on May 4, 2015, contains mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that are specified in the BO. Your authorization under this Corps permit is conditioned upon your compliance with all the mandatory terms and conditions (incorporated by reference into this permit) associated with incidental take of the BO. Failure to comply with the terms and conditions associated with incidental take of the BO, where a take of the listed species occurs, would constitute an unauthorized take, and would also constitute non-compliance with your Corps permit. The USFWS is the appropriate authority to determine compliance with the terms and conditions of its BO and with the ESA.

Section 106

20. UNKNOWN CULTURAL RESOURCES: While accomplishing the authorized work, if the permittee discovers any previously unknown cultural resources, the District Engineer will be immediately notified so that required coordination can be initiated with the North Carolina Division of Cultural Resources.

    The Permittee shall fully implement the Programmatic Agreement (PA) between the Permittee and the State Historic Preservation Office (SHPO), Advisory Council on Historic Preservation (ACHP), and Federal Highway Administration (FHWA) that was signed November 10, 2010 as a result of impacts within the Pea Island National Wildlife Refuge (PINWR).

Enforcement

21. REPORTING ADDRESS: All reports, documentation and correspondence required by the conditions of this permit shall be submitted to the following address: U.S. Army Corps of Engineers, Regulatory Division, Washington

Regulatory Field Office, c/o Mr. Kyle Barnes, 2407 West 5th Street, Washington, North Carolina 27889, and by telephone at: 910-251-4584. The Permittee shall reference the following permit number, SAW-2012-01153, on all submittals.

22. REPORTING VIOLATIONS OF THE CLEAN WATER ACT AND RIVERS AND HARBORS ACT: Violation of these conditions or violation of Section 404 of the Clean Water Act or Section 10 of the Rivers and Harbors Act must be reported in writing to the Wilmington District U.S. Army Corps of Engineers within 24 hours of the permittee's discovery of the violation.

23. COMPLIANCE INSPECTION: A representative of the Corps of Engineers will periodically and randomly inspect the work for compliance with these conditions. Deviations from these procedures may result in an administrative financial penalty and/or directive to cease work until the problem is resolved to the satisfaction of the Corps.

Compensatory Mitigation

24. In order to compensate for impacts associated with this permit, mitigation shall be provided in accordance with the provisions outlined on the most recent version of the attached Compensatory Mitigation Responsibility Transfer Form. The requirements of this form, including any special conditions listed on this form, are hereby incorporated as special conditions of this permit authorization.

    The unavoidable jurisdictional wetland impacts will be offset by wetland mitigation at the Bodie Island Lighthouse Pond. This site was identified by the NPS as the highest priority from multiple options considered in the DEIS. The mitigation includes the rehabilitation of the marsh community through control of Phragmites sp. at the Bodie Island Lighthouse Pond via aerial herbicide treatments and vegetative controlled burns and development of a long-term management plan. NCDOT will debit the site at a 5:1 ratio for the unavoidable jurisdictional wetland impacts. The final mitigation plan was provided as an attachment to the permit application.

SPECIAL CONDITIONS
ACTION ID: SAW-2012-01153
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION TIP B-2500B
CONSTRUCTION OF THE RODANTHE BREACH LONG-TERM IMPROVEMENTS, BONNER BRIDGE REPLACEMENT PROJECT PHASE IIB IN DARE COUNTY, NORTH CAROLINA

To address concerns about future success and monitoring of the Bodie Island Lighthouse Pond site, NCDOT will reserve riparian wetland mitigation credits from the Ballance Farm Mitigation Site at a ratio of 2:1 for unavoidable jurisdictional wetland impacts. These credits will be held in abeyance until monitoring is complete and the Corps determines that success criteria has been achieved at the Bodie Island Lighthouse Pond site. At that time, NCDOT will request approval from the Corps (in consultation with the other agencies) to release the Balance Farm Mitigation Site credits.

The Ballance Farm Site is located in Currituck County within the USGS hydrologic unit 03010205 of the Pasquotank River. NCDOT acquired the site to mitigate for unavoidable, jurisdictional impacts associated with TIP R-2228. Monitoring requirements were performed from 1999 to 2003 and the site was closed out in 2007.

The applicant will also be required to mitigate for the loss of Essential Fish Habitat (EFH) by restoration of SAV as outlined in the "North Carolina Department of Transportation NC 12 – Rodanthe Breach Long-Term Improvements Bonner Bridge Replacement Project Phase IIB SAV Mitigation and Monitoring Plan" which was submitted with the permit application.

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

June 25, 2018

Regulatory Division/1200A

Action ID No. SAW-2012-01153

Mr. Philip S. Harris III, P.E., C.P.M.
Natural Environment Section Head
North Carolina Department of Transportation
Division of Highways
1598 Mail Service Center
Raleigh, North Carolina 27699-1598

Dear Mr. Harris:

Reference the Department of the Army (DA) permit dated June 22, 2018, to Mr. Philip S. Harris, of the North Carolina Department of Transportation (NCDOT) for impacts associated with the transportation project identified as B-2500B, (Phase IIb). The 2.8 mile project includes a portion starting within the Pea Island National Wildlife Refuge (Refuge) along NC 12 approximately 1.8 miles north of the town of Rodanthe. In addition, a new alignment section will run south as a bridge over the Pamlico Sound for 2.46 miles before reconnection with NC 12 at America Drive in the town of Rodanthe in Dare County, North Carolina.

Total impacts authorized by the permit include Section 404 resources and Division of Coastal Management jurisdictional areas total 0.33 acre of permanent wetland impacts, 1.49 acres of temporary wetland impacts, 0.09 acre of mechanized clearing, 0.46 acre of hand clearing, 0.11 acre of permanent surface water impacts, 10.07 acres of temporary surface water impacts, 2.57 acres of permanent submerged aquatic vegetation (SAV) impacts, and 3.07 acres of temporary SAV impacts. The unavoidable jurisdictional wetland impacts will be offset by wetland mitigation at the Bodie Island Lighthouse Pond. To ensure future success and monitoring of the Bodie Island Lighthouse Pond site, NCDOT will reserve and hold in abeyance riparian wetland mitigation credits from the Ballance Farm Mitigation Site at a ratio of 2:1 for unavoidable jurisdictional wetland impacts. In addition, NCDOT has developed the "North Carolina Department of Transportation NC 12 – Rodanthe Breach Long-Term Improvements Bonner Bridge Replacement Project Phase IIb SAV Mitigation and Monitoring Plan" to address the loss of SAV habitat.

Also reference the July 10th, 2008, United States Fish and Wildlife Service (USFWS) biological and conference opinion concerning threatened and endangered species on this project. This opinion was followed by a letter from the USFWS dated August 14, 2014, modifying the

Sea Turtle Term and Condition #3 concerning appropriate lighting during turtle nesting season. The last referenced document is a February 9th, 2015, addendum to the biological and conference opinion completed for the inclusion of the rufa red knot (*Calidris canutus rufa*). Even though the NCDOT permit application agreed to all terms and conditions within these three documents, the DA permit was not formally conditioned against these commitments. Therefore, a permit modification is warranted. Recent interagency discussions find that NCDOT is agreeable with this modification.

Subsequently, the following special conditions regarding the Endangered Species Act are hereby incorporated into the permit:

25. MANATEE CONDITION: In order to further protect the endangered West Indian Manatee, (*Trichechus manatus*), the applicant must implement the U.S. Fish and Wildlife Service's Manatee Guidelines, and strictly adhere to all requirements therein. The guidelines can be found at http://www.fws.gov/nc-es/mammal/manatee_guidelines.pdf.

26. BIOLOGICAL/CONFERENCE OPINION: This Corps permit does not authorize you to take an endangered species, in particular the piping plover (*Charadrius melodus*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), leatherback sea turtle (*Dermochelys coriacea*), rufa red knot, or critical habitat for the wintering piping plover. In order to legally take a listed species, you must have separate authorization under the Endangered Species Act (ESA) (e.g., an ESA Section 10 permit, or a BO under ESA Section 7, with "incidental take" provisions with which you must comply). The enclosed U.S. Fish and Wildlife Service Biological and Conference Opinion (BO), addendum to the BO, and 2014 letter (all are attached) contain mandatory terms and conditions to implement the reasonable and prudent measures that are associated with "incidental take" that is also specified in the documents. Your authorization under this Corps permit is conditional upon your compliance with all of the mandatory terms and conditions associated with incidental take of the attached BO, addendum to the BO, and 2014 letter, which terms and conditions are incorporated by reference in this permit. Failure to comply with the terms and conditions associated with incidental take of these documents, where a take of the listed species occurs, would constitute an unauthorized take, and it would also constitute non-compliance with your Corps permit. The U.S. Fish and Wildlife Service is the appropriate authority to determine compliance with the terms and conditions of its BO, and with the ESA.

All other conditions of the permit, including the permit expiration date of December 31, 2023, remain in effect as written. Should you have questions, please contact Mr. Monte Matthews at telephone (919) 554-4884, Extension 31or Mr. Kyle Barnes at (910) 251-4584.

FOR THE COMMANDER

for/ Monte Matthews

Robert J. Clark
Colonel, U.S. Army
District Commander

Enclosures

Copy Furnished (with enclosures):

Chief, Source Data Unit
NOAA/National Ocean Service
Attn: Sharon Tear N/C S261
1315 East-West Hwy., Rm 7316
Silver Spring, Maryland 20910-3282

Mr. Kenneth Riley, Ph.D.
Habitat Conservation Division
National Marine Fisheries Service Southeast Region
101 Pivers Island Road
Beaufort, North Carolina 28516

Mr. Pete Benjamin
U.S. Fish and Wildlife Service
Raleigh Ecological Service Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
69 DARLINGTON AVENUE
WILMINGTON, NORTH CAROLINA 28403-1343

January 2, 2019

Regulatory Division/1200A

Action ID No. SAW-2012-01153

North Carolina Department of Transportation (NCDOT)
Attn: Mr. Philip S Harris III
1598 Mail Service Center
Raleigh, North Carolina 27699

Dear Mr. Harris:

Reference the Department of the Army (DA) permit dated June 22, 2018, issued to the North Carolina Department of Transportation (NCDOT) for impacts associated with the construction of a 2.8 mile typical road corridor on a new alignment starting within the Pea Island National Wildlife Refuge (Refuge) along NC 12 approximately 1.8 miles north of the town of Rodanthe. The new alignment will run south as a bridge over the Pamlico Sound for 2.46 miles before reconnection with NC 12 at America Drive in the town of Rodanthe in Dare County, North Carolina, TIP Project B-2500B (Phase IIb). The project area contains the Pamlico Sound, Oregon Inlet, and Motts Creek and adjacent wetlands in the Pasquotank River Basin (8-Digit Cataloging Unit 03010205).

Also reference your permit modification request letter and attachments received September 28, 2018, proposing the following:

- bridge pile reduction,
- changes to the footprint of the advancing rail system,
- addition of temporary matting for the jetting intake pipe, and
- finalized utility impacts.

In addition, a clarification of the mechanized clearing impact at Site 2 is noted below.
This permit modification request includes revised permit drawings, utility drawings and impact summary tables. Modification details of these four items are described below:

1) Bridge Pile Reduction - Sites 3A, 3B, 3C

The current permit has a bridge with 3-pile bents and a 4-pile bent at approximately every fourth bent. Further minimization has resulted such that every bent is now a 3-pile bent. This revision eliminates a pile at 25 locations.

Impact Revisions: Permanent fill in surface waters is reduced by 0.02 acre (from 0.11 to 0.09 acre). Temporary fill in surface waters is reduced by 0.29 acre (from 10.07 to 9.78 acre). Note that the SAV mitigation plan and values (and recent SAV re-location) were correctly calculated under the 3-pile configuration. Therefore, this reduction will not result in a modification to SAV impacts or the SAV mitigation plan.

2) Advancing Rail System – Sites 3A, 3B, 3C

The final design of the advancing rail system has slightly changed since the design phase. While this reconfiguration will reduce the overall footprint of the Advancing Rail System, some impact types (such as hand- clearing) may have increased.

Impact Revisions: The edges of the support structure are now closer to the edges of right-of-way. Additionally, clearing logistics have revealed it is not plausible to limit hand clearing to solely the structure supports. As such, hand clearing has been widened to reach from right-of-way to right-of-way. Hand clearing impacts have increased by 0.42 acre (from 0.46 to 0.88), by way of Site 3A showing an increase of 0.21 (from 0.21 to 0.42); and Site 3C showing an increase of 0.22 (from 0.24 to 0.46).

CAMA/404 Breakdown: The 0.42 acre increase consists of 0.32 acre in 404, and 0.10 acre in CAMA wetlands.

Temporary fill in wetlands: The advancing rail system support structure was modified at the southern end of the project (at Site 3A) in Rodanthe to avoid a cemetery. This caused the support structure to be moved, and an additional support to be added at the north end of the project (Site 3C). Therefore, temporary fill in wetlands has increased by a total of 0.14 acre. Specifically at Site 3A showing an increase of 0.03 (from 0.31 to 0.34 acre), and Site 3C showing an increase of 0.11 (from 0.38 to 0.49 acre).

CAMA/404 Breakdown: The 0.14 acre increase consists of 0.07 acre in Section 404 wetlands, and 0.06 acre in CAMA wetlands.

Temporary fill in surface waters: Decreased by 0.2 acre (from 5.95 to 5.75 acre).

3) Temporary Matting for Jetting Intake Activities – Site 3C

In an effort to minimize impacts/ disturbance to wetlands, temporary mats will be used during the installation and removal of the jetting intake pump, hose, and related equipment.

Temporary fill in surface waters: This impact will result in 0.09 acre of temporary fill in wetlands.

CAMA/404 Breakdown: The 0.09 acre increase consists of 0.07 acre in 404, and 0.02 acre in CAMA wetlands.

4) Utility Relocations - New Utility Site 4

As the Utility Relocation has been finalized by Cape Hatteras Electrical Cooperative (CHEC), the details of this relocation, including impacts to Jurisdictional Resources have become available. Temporary Impacts to wetlands are necessary to temporarily relocate the high voltage transmission lines to accommodate safe bridge construction. Wetlands would be hand cleared and depending on site conditions, temporary mats will be used to support vehicular equipment.

The relocation is anticipated to take five days to complete at which point all temporary fill will be removed. Once bridge construction is complete, the lines will be returned to their original location, which will take another five days to complete. Utility Impact Site (Site 4) has been created and included on the attached Utility Permit Drawings.

Temporary Wetland Impacts: This activity will result in 0.6 acre of temporary impacts to wetlands.

CAMA/404 Breakdown: This 0.6 acre will occur in 404 wetlands only.

Utility Note at Site 3A: 0.01 acre of temporary utility impact was replaced by Advancing Rail System temporary impact once the rail layout was changed.

SAV Impacts: The reconfiguration of the Advancing Rail System reduces the temporary impacts to SAV by 0.20 acre. Reducing every 4th bent on the bridge to the 3-pile configuration reduces permanent impacts to SAV by 0.05 acre. As previously indicated, the SAV mitigation plan and values (and recent SAV re-location) were correctly calculated under the 3 bent configuration. Therefore, this reduction will not result in a modification to the SAV mitigation plan.

For clarity, there have been no changes to permanent fill in 404 or CAMA wetlands. Therefore, no changes to project mitigation are proposed. The impacts to jurisdictional resources described above are summarized in the tables below.

Table 1. Impact Changes Breakdown by Site and Wetland Type (acre).Black text displays permitted impacts/red text displays modification values

Permit Site	Wetland Impacts			Surface Water	
	Temporary	Temporary	Hand	Perm	Temp
1	0.06	*(404*	- -	- -	- -
2	0.68	*(404*	- -	- -	- -
3A	0.27 + 0.03 = 0.3 (ARS) 0.06 – 0.01 = 0.05 (U)	0.03 + 0.01 = 0.04 (ARS)	0.21 + 0.21 = 0.42	- -	- -
3B	- -	- -	- -	0.11 – 0.02 = 0.09	4.12 – 0.09 = 4.03 (PCA) 5.95 – 0.2 = 5.75 (ARS)
3C	0.27 + 0.01 = 0.28(ARS) - - + 0.07 = 0.07(TM)	0.11 + 0.01 = 0.12(ARS) - - + 0.02 = 0.02(TM)	0.24 + 0.22 = 0.46	- -	- -
4*	- - + 0.6 = 0.6 (U)	*(404 wetland)*	- -	- -	- -
TOTAL	**1.34 + 0.7 = 2.04**	**0.14 + 0.04 =**	**0.46 + 0.42 =**	**0.11 – 0.02**	**10.07 – 0.29 =**
	1.48 + 0.74 = 2.22				

ARS = Advancing Rail System Containment Area
U = Utility Impacts
TM = Temporary Matting
PCA = Primary

* Wetland biotic communities at Site 4 include: salt shrub/ grassland, salt grassland, maritime shrub thicket, maritime shrub/ grassland.

Table 2. Summary of Total Project Impacts (acre)

Impact	Previous	Increase/decreas	New Impact
Permanent Wetland (404 and [illegible]	0.42 (by way of 0.33 fill, 0.09 mechanized clearing)	*no change*	0.42 *no change*
Hand Clearing	0.46	**+ 0.42**	**0.88**
Temporary Wetland	1.48	**+ 0.74**	**2.22**
Permanent Surface Water	0.11	**- 0.02**	**0.09**
Temporary Surface	10.07	**- 0.29**	**9.78**

Following evaluation of the information submitted in your modification request, the U.S. Army Corps of Engineers, Wilmington District (Corps) has determined that it is appropriate and reasonable, is not contrary to the public interest, and no public notice is required for this modification. Should you have questions, please contact Mr. Kyle Barnes, Washington Regulatory Field Office at telephone (910) 251-4584, or at kyle.w.barnes@usace.army.mil.

FOR THE COMMANDER

Robert J. Clark
Colonel, U.S. Army
District Commander

Copies Furnished without Attachment:

Mr. Gary Jordan
U.S. Fish and Wildlife Services
Fish and Wildlife Enhancement
Post Office Box 33726
Raleigh, North Carolina 28516

Ms. Amanetta Somerville
U.S. Environmental Protection Agency
Region 4 NEPA Program Office
61 Forsyth Street, SW
Atlanta, Georgia 30303

Mr. Travis Wilson
North Carolina Wildlife Resources Commission
1718 Hwy 56 West
Creedmoor, North Carolina 27522

Ms. Cathy Brittingham
Transportation Project Coordinator
North Carolina Division of Coastal Management
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

Mr. Greg Daisy
North Carolina Division of Coastal Management
401 South Griffin Street, Suite 300
Elizabeth City, North Carolina 27909

Mr. Garcy Ward
North Carolina Division of Water Resources
943 Washington Square Mall
Washington, North Carolina 27889

Ms. Twyla Cheatwood
Fisheries Biologist
NOAA Fisheries Service, Southeast Region
Habitat Conservation Division
101 Pivers Island Road
Beaufort, North Carolina 28516-9722

Environmental Quality

ROY COOPER
Governor

MICHAEL S. REGAN
Secretary

LINDA CULPEPPER
Interim Director

June 11, 2018

Mr. Philip S. Harris, III, P.E., CPM
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina, 27699-1598

Subject: 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS for the proposed Rodanthe Breach Long-Term Improvements, Bonner Bridge Replacement Project Phase IIB in Dare County, Federal Aid Project No. BRNHF-0012(56), TIP B-2500B.
NCDWR Project No. 20180114

Dear Mr. Harris:

Attached hereto is a copy of Certification No. 004161 issued to The North Carolina Department of Transportation (NCDOT) dated June11, 2018.

If we can be of further assistance, do not hesitate to contact us.

Sincerely,

Linda Culpepper, Interim Director
Division of Water Resources

Attachments

Electronic copy only distribution:
Kyle Barnes, US Army Corps of Engineers, Washington Field Office
Clay Willis, Division 1 Environmental Officer
Chris Rivenbark, NC Department of Transportation
Chris Militscher, US Environmental Protection Agency
Gary Jordan, US Fish and Wildlife Service
Travis Wilson, NC Wildlife Resources Commission
Greg Daisey, NC Division of Coastal Management
Cathy Brittingham, NC Division of Coastal Management
Garcy Ward, NC Division of Water Resources, Washington Regional Office
File Copy

401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS

THIS CERTIFICATION is issued in conformity with the requirements of Section 401 Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Resources (NCDWR) Regulations in 15 NCAC 2H .0500. This certification authorizes the NCDOT to impact 2.38 acres of jurisdictional wetlands and 10.18 acres of surface waters in Dare County. The project shall be constructed pursuant to the application dated received January 22, 2018 and revised applications received February 16, 2018 and June 1, 2018. The authorized impacts are as described below:

Wetland Impacts in the Pasquotank River Basin

Site	Fill (ac)	Fill (temporary) (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Total Wetland Impact (ac)
1	--	0.03	0.01	--	0.04
1 - utility	--	0.03	--	--	0.03
2	0.25	0.68	0.06	--	0.99
3A	0.04	0.31	0.02	0.21	0.58
3A - utility	0.04	0.06	--	--	0.10
3C	<0.01	0.38	--	0.24	0.62
Total	0.33	1.49*	0.09	0.45**	2.36

Total Wetland Impact for Project: 2.38 (rounded total).

* includes 0.15 acres of coastal wetlands

** includes 0.11 acres of coastal wetlands

Open Water Impacts in the Pasquotank River Basin

Site	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
3B	0.11	10.07	10.18

Total Open Water Impact for Project: 10.18 acres.

Submerged Aquatic Vegetation (SAV) Impacts in the Pasquotank River Basin

Site	Permanent Impacts (ac)	Temporary Impacts (ac)	Total Impacts (ac)
3B	2.57	3.07	5.64

Total SAV impacts for project: 5.64 acres.

The application provides adequate assurance that the discharge of fill material into wetlands and waters of the Pasquotank River Basin in conjunction with the proposed development will not result in a violation of applicable Water Quality Standards and discharge guidelines. Therefore, the State of North Carolina certifies that this activity will not violate the applicable portions of Sections 301, 302, 303, 306, 307 of PL 92-500 and PL 95-217 if conducted in accordance with the application and conditions hereinafter set forth.

This approval is only valid for the purpose and design that you submitted in your application dated received January 22, 2018 and revised applications received February 16, 2018 and June 1, 2018. Should your project change, you are required to notify the NCDWR and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter, and is thereby responsible for complying with all the conditions. If any additional wetland impacts, or stream impacts, for this project (now or in the future) exceed one acre or 150 linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations. This Certification shall expire on the same day as the expiration date of the corresponding Corps of Engineers Permit.

Condition(s) of Certification:

Project Specific Conditions

1. In the event of severe weather, the NCDOT and its contractors shall make every reasonable attempt to secure equipment and supplies such that oil, greases, hydraulic fluids, supplies, etc. will not become potential contaminants to surface waters or other natural resource. [15A NCAC 02H.0506(b)(2) and (b)(3)]

2. The primary and secondary containment measures used to contain the jetting spoils shall be installed as described in the application and properly maintained to prevent the loss of spoil material into the adjacent waters. Any noticeable loss of spoil material beyond the secondary containment measure shall be reported to NCDWR within 24 hours. [15A NCAC 02H.0506(b)(2)(3)]

3. Removal of jetting spoils shall be conducted in a manner that does not violate water quality standards. Spoil material shall be located to an approved upland area. [15A NCAC 02H.0506(b)(2)(3)]

4. Due to the possibility that compaction and/or other site alterations might prevent the temporary wetland impact area from re-attaining jurisdictional wetland status; the permittee shall provide an update on the wetland areas temporarily impacted at Site 2. This update shall be conducted two growing seasons after completion of the work at Site 2 and shall consist of photographs and a brief report on the progress of the areas in re-attaining wetland jurisdictional status. Upon submission of this update to the NCDWR, the permittee shall schedule an agency field meeting with the NCDWR to determine if the wetland areas temporarily impacted by this project have re-attained jurisdictional wetland status. If the wetland areas temporarily impacted by this project have not re-attained jurisdictional wetland status, the NCDWR shall determine if compensatory wetland mitigation is to be required. [15A NCAC 02H.0506(c)(2)]

General Conditions

5. The issuance of this certification does not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances that may be imposed by other government agencies (i.e. local, state, and federal) having jurisdiction, including but not limited to applicable buffer rules, stormwater management rules, soil erosion and sedimentation control requirements, etc.

6. NCDOT shall be in compliance with the NPDES Permit No. NCS00250 issued to the NCDOT, including the applicable requirements of the NCG01000. Please note the extra protections for the sensitive watersheds.

7. The Permittee shall ensure that the final design drawings adhere to the permit and to the permit drawings submitted for approval. [15A NCAC 02H .0507(c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

8. If concrete is used during construction, a dry work area shall be maintained to prevent direct contact between curing concrete and stream water. Water that inadvertently contacts uncured concrete shall not be discharged to surface waters due to the potential for elevated pH and possible aquatic life and fish kills. [15A NCAC 02B.0200]

9. The outside buffer, wetland or water boundary located within the construction corridor approved by this authorization shall be clearly marked by highly visible fencing prior to any land disturbing activities. Impacts to areas within the fencing are prohibited unless otherwise authorized by this certification. [15A NCAC 02H.0501 and .0502]

10. During the construction of the project, no staging of equipment of any kind is permitted in waters of the U.S., or protected riparian buffers. [15A NCAC 02H.0506(b)(2)]

11. There shall be no excavation from, or waste disposal into, jurisdictional wetlands or waters associated with this permit without appropriate modification. Should waste or borrow sites, or access roads to waste or borrow sites, be located in wetlands or streams, compensatory mitigation will be required since that is a direct impact from road construction activities. [15A NCAC 02H.0506(b)(3) and (c)(3)]

12. All fill slopes located in jurisdictional wetlands shall be placed at slopes no flatter than 3:1, unless otherwise authorized by this certification. [15A NCAC 02H.0506(b)(2)]

13. All mechanized equipment operated near surface waters must be regularly inspected and maintained to prevent contamination of stream waters from fuels, lubricants, hydraulic fluids, or other toxic materials. [15A NCAC 02H.0506(b)(3)]

14. The permittee shall use /Design Standards in Sensitive Watersheds/(15A NCAC 4B.0124[a]-[e]) in areas draining to HQW waters. However, due to the size of the project, the NCDOT shall not be required to meet 15A NCAC 4B .0124(a) regarding the maximum amount of uncovered acres.

15. When applicable, all construction activities shall be performed and maintained in full compliance with G.S. Chapter 113A Article 4 (Sediment and Pollution Control Act of 1973). Regardless of applicability of the Sediment and Pollution Control Act, all projects shall incorporate appropriate Best Management Practices for the control of sediment and erosion so that no violations of state water quality standards, statutes, or rules occur. [15A NCAC 02H .0506{b)(3) and (c)(3) and 15A NCAC 02B .0200]

    a. Design, installation, operation, and maintenance of all sediment and erosion control measures shall be equal to or exceed the requirements specified in the most recent version of the *North Carolina Sediment and Erosion Control Manual,* or for linear transportation projects, the *NCDOT Sediment and Erosion Control Manual.*
    b. All devices shall be maintained on all construction sites, borrow sites, and waste pile (spoil) sites, including contractor-owned or leased borrow pits associated with the project. Sufficient materials required for stabilization and/or repair of erosion control measures and stormwater routing and treatment shall be on site at all times.
    c. For borrow pit sites, the erosion and sediment control measures shall be designed, installed, operated, and maintained in accordance with the most recent version of the *North Carolina Surface Mining Manual.* Reclamation measures and implementation shall comply with the reclamation in accordance with the requirements of the Sedimentation Pollution Control Act and the Mining Act of 1971.
    d. If the project occurs in waters or watersheds classified as Primary Nursery Areas (PNAs), SA, WS-1, WS-11, High Quality Waters (HQW), or Outstanding Resource Waters (ORW), then the sedimentation and erosion control designs shall comply with the requirements set forth in 15A NCAC 04B .0124, *Design Standards in Sensitive Watershed.* [15A NCAC 02H.0506(b)(3) and (c)(3); GC 4135]

16. Erosion control matting in riparian areas shall not contain a nylon mesh grid which can impinge and entrap small animals. Matting should be secured in place by staples, stakes, or wherever possible live stakes of native trees. Riparian areas are defined as a distance 25 feet from top of stream bank. [15A NCAC 02B.0201]

17. If placement of sediment and erosion control devices in wetlands and waters is unavoidable, then design and placement of temporary erosion control measures shall not be conducted in a manner that may result in dis-equilibrium of wetlands, stream beds, or banks, adjacent to or upstream and downstream of the above structures. All sediment and erosion control devices shall be removed from wetlands and waters and the natural grade restored within two (2) months of the date that the Division of Energy, Mining and Land Resources (DEMLR) or locally delegated program has released the specific area within the project. [15A NCAC 02H.0506(b)(3) and (c)(3)]

18. No drill slurry or water that has been in contact with uncured concrete shall be allowed to enter surface waters. This water shall be captured, treated, and disposed of properly. [15A NCAC 02H .0506(b)(3)]

19. All bridge construction shall be performed from the existing bridge, temporary work bridges, temporary causeways, or floating or sunken barges. If work conditions require barges, they shall be floated into position and then sunk. The barges shall not be sunk and then dragged into position. Under no circumstances should barges be dragged along the bottom of the surface water. [15A NCAC 02H .0506(b)(3)]

20. A turbidity curtain will be installed if driving or drilling activities occur within the channel, on the bank, or within 5 feet of the top of bank. This condition can be waived with prior approval from the NCDWR. [15A NCAC 02H .0506(b)(3)]

21. The post-construction removal of any temporary bridge structures must return the project site to its preconstruction contours and elevations. The impacted areas shall be revegetated with appropriate native species. [15A NCAC 02H .0506(b)(2)

22. Native riparian vegetation must be reestablished in the riparian areas within the construction limits of the project by the end of the growing season following completion of construction. [15A NCAC 02B.0506(b)(2)]

23. Tall fescue shall not be used in the establishment of temporary or permanent groundcover within riparian areas. For the establishment of permanent herbaceous cover, erosion control matting shall be used in conjunction with an appropriate native seed mix on disturbed soils within the riparian area and on disturbed steep slopes with the following exception. Erosion control matting is not necessary if the area is contained by perimeter erosion control devices such as silt fence, temporary sediment ditches, basins, etc. Matting should be secured in place with staples, stakes, or wherever possible, live stakes of native trees. Erosion control matting placed in riparian areas shall not contain a nylon mesh grid, which can impinge and entrap small animals. For the establishment of temporary groundcover within riparian areas, hydroseeding along with wood or cellulose based hydro mulch applied from a fertilizer- and limestone-free tank is allowable at the appropriate rate in conjunction with the erosion control measures. Discharging hydroseed mixtures and wood or cellulose mulch into surface waters in prohibited. Riparian areas are defined as a distance of 25 feet landward from top of stream bank.

24. Discharging hydroseed mixtures and washing out hydroseeders and other equipment in or adjacent to surface waters is prohibited. [15A NCAC 02H.0506(b)(3)]

25. The permittee and its authorized agents shall conduct its activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act) and any other appropriate requirements of State and Federal law. If the NCDWR determines that such standards or laws are not being met (including the failure to sustain a designated or achieved use) or that State or federal law is being violated, or that further conditions are necessary to assure compliance, the NCDWR may reevaluate and modify this certification. [15A NCAC 02B.0200]

26. The Permittee shall report any violations of this certification to the Division of Water Resources within 24 hours of discovery. [15A NCAC 02B.0506(b)(2)]

27. Upon completion of the project (including any impacts at associated borrow or waste sites), the NCDOT Division Engineer shall complete and return the enclosed "Certification of Completion Form" to notify the NCDWR when all work included in the 401 Certification has been completed. [15A NCAC 02H.0502(f)]

28. A copy of this Water Quality Certification shall be maintained on the construction site at all times. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager. [15A NCAC 02H .0507(c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. This Certification shall become null and void unless the above conditions are made conditions of the Federal 404 and/or Coastal Area Management Act Permit. This Certification shall expire upon the expiration of the 404 or CAMA permit.

If you wish to contest any statement in the attached Certification you must file a petition for an administrative hearing. You may obtain the petition form from the office of Administrative hearings. You must file the petition with the office of Administrative Hearings within sixty (60) days of receipt of this notice. A petition is considered filed when it is received in the office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00am and 5:00pm, except for official state holidays. The original and one (1) copy of the petition must be filed with the Office of Administrative Hearings.
The petition may be faxed-provided the original and one copy of the document is received by the Office of Administrative Hearings within five (5) business days following the faxed transmission.
The mailing address for the Office of Administrative Hearings is:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Telephone: (919) 431-3000, Facsimile: (919) 431-3100

A copy of the petition must also be served on DEQ as follows:

Mr. Bill F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center

This the 11th day of June 2018

DIVISION OF WATER RESOURCES

Linda Culpepper, Interim Director

WQC No. 004161

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Interim Director

NORTH CAROLINA
Environmental Quality

December 17, 2018

Mr. Philip S. Harris, III, P.E., CPM
Natural Environment Section Head
Project Development and Environmental Analysis
North Carolina Department of Transportation
1598 Mail Service Center
Raleigh, North Carolina, 27699-1598

Subject: Modification of 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS for the proposed Rodanthe Breach Long-Term Improvements, Bonner Bridge Replacement Project Phase 11B in Dare County, Federal Aid Project No. BRNHF-0012(56),
TIP B-2500B.
NCDWR Project No. 20180114 v.2

Dear Mr. Harris:

Attached hereto is a modification of Certification No. 004161 issued to The North Carolina Department of Transportation (NCDOT) dated December 17, 2018.

If we can be of further assistance, do not hesitate to contact us.

Sincerely,

Linda Culpepper, Director
Division of Water Resources

Attachments

Electronic copy only distribution:
Kyle Barnes, US Army Corps of Engineers, Washington Field Office
Paul Williams, NCDOT Division 1
Chris Rivenbark, NC Department of Transportation
Greg Daisey, NC Division of Coastal Management
Cathy Brittingham, NC Division of Coastal Management
Garcy Ward, NC Division of Water Resources, Washington Regional Office
File Copy

Modification to the 401 Water Quality Certification Pursuant to Section 401 of the Federal Clean Water Act with ADDITIONAL CONDITIONS

THIS CERTIFICATION is issued in conformity with the requirements of Section 401 Public Laws 92-500 and 95-217 of the United States and subject to the North Carolina Division of Water Resources (NCDWR) Regulations in 15 NCAC 2H .0500. This certification authorizes the NCDOT to impact an additional 1.17 acres of jurisdictional wetlands in Dare County. The project shall be constructed pursuant to the modification dated received November 2, 2018. The authorized impacts are as described below:

Wetland Impacts in the Pasquotank River Basin

Site	Fill (ac)	Fill (temporary) (ac)	Mechanized Clearing (ac)	Hand Clearing (ac)	Total Wetland Impact (ac)
3A original impacts	0.04	0.31	0.02	0.21	0.58
additional impacts at Site 3A with this approval	--	**0.03**	--	**0.21**	**0.24**
3A utility original impacts	0.04	0.06	--	--	0.10
additional impacts at Site 3A utility	--	**-0.01**	--	--	**-0.01**
3C original impacts	<0.01	0.38	--	0.24	0.62
additional impacts at Site 3C with this approval	--	**0.11**	--	**0.22**	**0.33**
Site 4 utility new	--	--	--	**0.6**	**0.6**
Total	0.08	0.88	0.02	1.48	2.46*

Total Wetland Impacts at Sites 3A, 3C, and4: 2.46 (rounded total).
* includes 0.18 acres of temporary coastal wetland impacts

Open Water Impacts in the Pasquotank River Basin

Site	Permanent Fill in Open Waters (ac)	Temporary Fill in Open Waters (ac)	Total Fill in Open Waters (ac)
3B original impacts	0.11	10.07	10.18
reduced impacts at Site 3B with this approval	-0.02	-0.29	-0.31
Total	0.09	9.78	9.87

Total Open Water Impact for Project: 9.87 acres.

Submerged Aquatic Vegetation (SAV) Impacts in the Pasquotank River Basin

Site	Permanent Impacts (ac)	Temporary Impacts (ac)	Total Impacts (ac)
3B	2.57	3.07	5.64
reduced impacts at Site 3B with this approval	-0.05	-0.20	-0.25
Total	2.52	2.87	5.39

Total SAV impacts for project: 5.39 acres.

The application provides adequate assurance that the discharge of fill material into wetlands and waters of the Pasquotank River Basin in conjunction with the proposed development will not result in a violation of applicable Water Quality Standards and discharge guidelines. Therefore, the State of North Carolina certifies that this activity will not violate the applicable portions of Sections 301, 302, 303, 306, 307 of PL 92-500 and PL 95-217 if conducted in accordance with the application and conditions hereinafter set forth.

This approval is only valid for the purpose and design that you submitted in your modified application dated received November 2, 2018. All the authorized activities and conditions of certification associated with the original Water Quality Certification dated June 11, 2018 still apply except where superseded by this certification. Should your project change, you are required to notify the NCDWR and submit a new application. If the property is sold, the new owner must be given a copy of this Certification and approval letter and is thereby responsible for complying with all the conditions. If any additional wetland impacts, or stream impacts, for this project (now or in the future) exceed one acre or 150 linear feet, respectively, additional compensatory mitigation may be required as described in 15A NCAC 2H .0506 (h) (6) and (7). For this approval to remain valid, you are required to comply with all the conditions listed below. In addition, you should obtain all other federal, state or local permits before proceeding with your project including (but not limited to) Sediment and Erosion control, Coastal Stormwater, Non-discharge and Water Supply watershed regulations. This Certification shall expire on the same day as the expiration date of the corresponding Corps of Engineers Permit.

Condition(s) of Certification:

1. This modification is applicable only to the additional proposed activities. All of the authorized activities and conditions of certification associated with the original Water Quality Certification dated June 11, 2018 still apply except where superseded by this certification.

2. The permittee and its authorized agents shall conduct its activities in a manner consistent with State water quality standards (including any requirements resulting from compliance with §303(d) of the Clean Water Act) and any other appropriate requirements of State and Federal law. If the NCDWR determines that such standards or laws are not being met (including the failure to sustain a designated or achieved use) or that State or federal law is being violated, or that further conditions are necessary to assure compliance, the NCDWR may reevaluate and modify this certification. [15A NCAC 02B.0200]

3. The Permittee shall report any violations of this certification to the Division of Water Resources within 24 hours of discovery. [15A NCAC 02B.0506(b)(2)]

4. A copy of this Water Quality Certification shall be maintained on the construction site at all times. In addition, the Water Quality Certification and all subsequent modifications, if any, shall be maintained with the Division Engineer and the on-site project manager. [15A NCAC 02H .0507(c) and 15A NCAC 02H .0506 (b)(2) and (c)(2)]

Violations of any condition herein set forth may result in revocation of this Certification and may result in criminal and/or civil penalties. This Certification shall become null and void unless the above conditions are made conditions of the Federal 404 and/or Coastal Area Management Act Permit. This Certification shall expire upon the expiration of the 404 or CAMA permit.

If you wish to contest any statement in the attached Certification you must file a petition for an administrative hearing. You may obtain the petition form from the office of Administrative hearings. You must file the petition with the office of Administrative Hearings within sixty (60) days of receipt of this notice. A petition is considered filed when it is received in the office of Administrative Hearings during normal office hours. The Office of Administrative Hearings accepts filings Monday through Friday between the hours of 8:00am and 5:00pm, except for official state holidays. The original and one (1) copy of the petition must be filed with the Office of Administrative Hearings. The petition may be faxed provided the original and one copy of the document is received by the Office of Administrative Hearings within five (5) business days following the faxed transmission. The mailing address for the Office of Administrative Hearings is:

Office of Administrative Hearings
6714 Mail Service Center
Raleigh, NC 27699-6714
Telephone: (919) 431-3000, Facsimile: (919) 431-3100

A copy of the petition must also be served on DEQ as follows:

Mr. Bill F. Lane, General Counsel
Department of Environmental Quality
1601 Mail Service Center

This the 17th day of December 2018

DIVISION OF WATER RESOURCES

Linda Culpepper, Director

WQC No. 004161

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
LINDA CULPEPPER
Interim Director

NORTH CAROLINA
Environmental Quality

NCDWR Project No.: _____ **County:** _____

Applicant: _____

Project Name: _____

Date of Issuance of 401 Water Quality Certification: _____

Certificate of Completion
Upon completion of all work approved within the 401 Water Quality Certification or applicable Buffer Rules, and any subsequent modifications, the applicant is required to return this certificate to the 401 Transportation Permitting Unit, North Carolina Division of Water Resources, 1617 Mail Service Center, Raleigh, NC, 27699-1617. This form may be returned to NCDWR by the applicant, the applicant's authorized agent, or the project engineer. It is not necessary to send certificates from all of these.

Applicant's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

Agent's Certification

I, _____, hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature: _____ Date: _____

Engineer's Certification

_____ Partial _____ Final

I, _____, as a duly registered Professional Engineer in the State of North Carolina, having been authorized to observe (periodically, weekly, full time) the construction of the project, for the Permittee hereby state that, to the best of my abilities, due care and diligence was used in the observation of the construction such that the construction was observed to be built within substantial compliance and intent of the 401 Water Quality Certification and Buffer Rules, the approved plans and specifications, and other supporting materials.

Signature _____ Registration No. _____ Date _____

Permit Class
MODIFICATION/MAJOR

Permit Number
106-12

STATE OF NORTH CAROLINA
Department of Environmental Quality
and
Coastal Resources Commission

Permit

for

_X_ Major Development in an Area of Environmental Concern pursuant to NCGS 113A-118

_X_ Excavation and/or filling pursuant to NCGS 113-229

Issued to **N.C. Department of Transportation, 1598 Mail Service Center, Raleigh, NC 27699-1598**

Authorizing development in Dare County at Atlantic Ocean and Pamlico Sound on NC Highway 12 near Rodanthe , as requested in the permittee's application dated 2/15/18, including the attached AEC Hazard Notice dated 2/12/18, & the attached workplan drawings (88) described in Condition No. 1 below.

This permit, issued on **June 11, 2018** , is subject to compliance with the application (where consistent with the permit), all applicable regulations, special conditions and notes set forth below. Any violation of these terms may be subject to fines, imprisonment or civil action; or may cause the permit to be null and void.

TIP No. B-2500, Phase IIB, Rodanthe Bridge in the Pamlico Sound

1) All work authorized by this permit shall be carried out in accordance with the following attached workplan drawings, except as modified herein:

Wetland and Stream Impacts and Jurisdictional Impacts for Utilities (47): 44 dated 1/22/18, 2 dated 2/1/18, and 1 dated 11/21/17.

Roadway Plans (30): 22 dated 12/21/17, 3 dated 12/22/17, and 5 dated 5/31/18.

Other Drawings (11): 2 dated December 2017, 1 dated October 2017, 4 dated received 2/16/18, 2 dated 9/29/16, 1 dated 7/5/17, and 1 dated 5/31/18.

(See attached sheets for Additional Conditions)

This permit action may be appealed by the permittee or other qualified persons within twenty (20) days of the issuing date.

This permit must be accessible on-site to Department personnel when the project is inspected for compliance.

Any maintenance work or project modification not covered hereunder requires further Division approval.

All work must cease when the permit expires on

No expiration date, pursuant to GS 136-44.7B

In issuing this permit, the State of North Carolina agrees that your project is consistent with the North Carolina Coastal Management Program.

Signed by the authority of the Secretary of DEQ and the Chairman of the Coastal Resources Commission.

Douglas V Huggett - for

Braxton C. Davis, Director
Division of Coastal Management

This permit and its conditions are hereby accepted.

Signature of Permittee

ADDITIONAL CONDITIONS

NOTE: The North Carolina Department of Transportation (NCDOT) project TIP No. B-2500 authorized by this permit extends for approximately 15 miles from the southern end of Bodie Island to the community of Rodanthe. This permit only authorizes construction of Phase IIB of the TIP No. B-2500 project. Prior to initiating any construction on the remaining phases of this project, the permittee must receive additional authorization from the N.C. Division of Coastal Management (DCM).

NOTE: The specific development being permitted does not preclude the remainder of the B-2500 project being built in the Pamlico Sound provided that future development will be constructed in a way that avoids and minimizes impacts to AECs.

2) Nothing in this permit authorizes any activity that has not received approval from the National Park Service (NPS) and the U.S. Fish and Wildlife Service (USFWS) for work within the Cape Hatteras National Seashore and Pea Island National Wildlife Refuge. The proposed work shall not commence until the permittee has been issued Special Use Permits from the NPS and the USFWS, if required, and a copy of the Special Use Permits are received by DCM.

3) Unless specifically altered herein, any mitigative measures or environmental commitments specifically made by the permittee in the CAMA permit application, the NEPA/404 Merger Process, and/or the Project Commitments contained within the Record of Decision dated December 2016, shall be implemented, regardless of whether or not such commitments are addressed by individual conditions of this permit.

4) Prior to the initiation of construction within the Ocean Hazard Area of Environmental Concern (AEC), the permittee shall stake, and a representative of DCM shall approve, the first line of stable, natural vegetation and the corresponding setbacks. All development authorized by this Major Modification shall be located landward of the appropriate setback lines. These setback determinations shall replace those done at the time the permit application was processed and approved. Construction shall begin within sixty days of this determination or the measurement is void and shall be re-established. In the case of a major shoreline change within that period, a new setback determination shall be required before construction begins.

5) In accordance with T15A:07H.0306(k), the authorized structures shall be relocated or dismantled when they become imminently threatened by changes in shoreline configuration. The structures shall be relocated or dismantled within two years of the time when they become imminently threatened, and in any case upon their collapse or subsidence. However, if natural shoreline recovery or beach re-nourishment takes place within two years of the time the structures become imminently threatened, so that the structures are no longer imminently threatened, then they need not be relocated or dismantled at that time. This condition shall not affect the permit holder's right to seek authorization of temporary protective measures allowed under Rule T15A:07H.0308(a)(2).

6) In accordance with commitments made by the permittee, all sandbags and associated geotextile fabrics shall be removed in their entirety along the existing NC 12 corridor between the proposed parking area just north of the bridge, south to the Pea Island National Wildlife Refuge/Rodanthe boundary.

ADDITIONAL CONDITIONS

7) The temporary placement and double handling of any excavated or fill material within waters or vegetated wetlands is not authorized, with the exception of the temporary fill generated by the jetting operation, and the temporary advancing rail system.

8) No excavation or filling shall take place at any time in any vegetated wetlands or surrounding waters outside of the alignment of the areas indicated on the attached workplan drawings, without permit modification.

9) Material excavated from the project site may be used in fill areas associated with the project once properly dewatered. Otherwise, the material shall be removed from the site and taken to a high ground location.

10) All excavated materials shall be confined to high ground areas and landward of regularly or irregularly flooded wetlands behind adequate dikes or other retaining structures to prevent spillover of solids into any wetlands or surrounding waters. This condition shall not apply to the authorized jetting spoil.

11) Dredging in any manner, including "kicking" with boat propellers is not authorized without permit modification. This condition shall not apply to the authorized jetting activities.

12) All fill material shall be clean and free of any pollutants except in trace quantities.

13) Construction staging areas shall not be located in wetlands or Waters of the State.

14) All materials and debris associated with the removal and/or construction of the new bridge, temporary advancing rail system, pipes, sandbags, asphalt, and other existing structures within the Right-of-Way and associated materials, shall not enter wetlands or Waters of the State, even temporarily. Any such material shall be disposed of at an approved upland site or shall be recycled in an environmentally appropriate manner provided appropriate authorizations from any relevant state, federal, or local authorities are obtained.

15) The retaining walls for abutment fill shall be structurally tight so as to prevent seepage of fill materials through the structure, and the retaining walls for abutment fill shall be in place prior to any backfilling activities.

16) All backfill material shall be obtained from a high ground source. No unconfined backfill shall be discharged into wetlands or Waters of the State.

17) The placement of riprap shall be limited to the areas indicated on the attached workplan drawings. The riprap material shall be free from loose dirt or any pollutant except in trace quantities.

Installation and Removal of Piles and Jetting Spoil Containment System

18) The permittee shall arrange a site visit for the DCM Fisheries Resource Specialist and the DCM Transportation Field Representative to observe the ongoing construction over open waters, including jetting for pile placement and the effectiveness of the primary containment areas.

ADDITIONAL CONDITIONS

19) The installation and removal of the piles for the new bridge and temporary advancing rail system shall be accomplished by jetting, pile driving, and/or the use of a vibratory hammer, as specified in the permit application. Should the permittee and/or its contractor desire to utilize another type of pile installation, such as drilled shaft construction, additional authorization from DCM shall be required.

20) In accordance with commitments made by the permittee, screens will be utilized to prevent plant or animal life from flowing into the jetting water wells.

21) Jetting intake screens shall be inspected and serviced daily during periods when jetting operations are taking place.

22) The permittee shall continue to coordinate with the DCM Fisheries Resources Specialist and other appropriate resource agencies to identify and implement additional practicable methods to minimize impacts to aquatic species from the water intakes during jetting.

23) As soon as practicable after they are no longer needed, pilings in open water from the temporary advancing rail system shall be removed in their entirety, except that in the event that a piling breaks during removal and cannot be removed in its entirety, it may be cut off flush with the bed of the water body, and DCM shall be notified of each occurrence within one working day.

24) In accordance with commitments made by the permittee, multiple containment systems comprising a primary containment area and a secondary containment area shall be used to capture and contain the jetting effluent.

25) According to the permit application, the design of containment systems within wetlands and uplands was not finalized at the time of application, and may vary due to constraints such as shorelines. Prior to installation of pilings in Coastal Wetlands, the permittee shall submit workplan drawings and a narrative to DCM depicting the proposed jetting spoil containment system for review and approval.

26) In accordance with commitments made by the permittee, prior to the use of each primary containment system, plastic geogrid matting will be placed on the existing Sound bottom within the primary containment system.

27) The permittee shall implement all practicable means and methods to contain the jetting spoils within the permitted impact areas, and to prevent the jetting spoils from escaping the containment systems, including during storm events.

28) The permittee shall conduct regular inspections and maintenance of the containment systems to ensure they are working as expected. If measurable sediment is found within the secondary containment areas, or outside of the containment system, or if turbid water is found to have passed the secondary containment system, then operations at that location will be stopped, the permittee shall immediately contact the DCM Transportation Field Representative, and shall implement measures to improve the containment system as required for the system to perform as intended, including removing any material that is outside of permitted areas. The jetting operation shall only resume upon approval of DCM.

ADDITIONAL CONDITIONS

29) If the permittee determines that modifications to the containment systems are necessary, then the permittee shall submit workplan drawings and a narrative to DCM depicting the proposed modifications, and shall receive approval from DCM prior to implementing the modifications.

30) During removal of the jetting spoil from the containment areas, the spoils shall be removed down to the original Sound bottom, as indicated by the geogrid matting, with the least amount of disturbance practicable to the Sound bottom and any surviving SAV plants. After the jetting spoils have been adequately removed, each containment system shall be removed in its entirety as soon as practicable when it is no longer needed.

31) During removal of jetting spoil from the containment systems, caution should be exercised with floating skiffs or other similar devices to ensure minimal damage to the Sound bottom, and to ensure that temporary impacts to shallow water habitat are avoided and minimized to the maximum extent practicable.

32) Overflow lines that are used to release excess water from the dump trucks or other vehicles during removal of the jetting spoil material shall be placed so that the water only runs back into the primary containment systems.

33) Dump trucks or other vehicles that are used to transport jetting spoil material that is removed from the containment systems shall be water tight during transport.

34) The permittee shall provide DCM with workplan drawing(s) depicting the location(s) of any temporary stockpiles within the project area prior to their use. Temporary spoil stockpiles within the project area shall not be located within wetlands or waters of the State.

Utility Impacts

NOTE: The construction of the new bridge will also require the relocation of electric, telecommunications, and water utility lines with associated hand and mechanized clearing. Wetland impacts resulting from the utility relocations have been included in the total wetland and stream impacts for this project.

35) Any relocation of utility lines that is not already depicted on the attached work plan drawings shall require approval by DCM, either under the authority of this permit, or by the utility company obtaining separate authorization.

36) In accordance with commitments made by the permittee, utilities placed within the bridge superstructure shall be installed above the low chord (17 feet).

NOTE: Engineered plans showing all water system modifications and additions must be submitted to the Public Water Supply Section for review and approval prior to commencing work.

ADDITIONAL CONDITIONS

Impacts to Wetlands and Waters of the State and Mitigation

NOTE: This project will permanently impact approximately 0.33 acres of 404 wetlands due to fill and approximately 0.09 acres of 404 wetlands due to mechanized clearing. This project will temporarily impact approximately 1.49 acres of 404 wetlands due to fill and approximately 0.35 acres of 404 wetlands due to hand clearing.

NOTE: This project will permanently impact approximately 436 square feet of Coastal Wetlands due to fill from the bridge bents. This project will temporarily impact approximately 0.11 acres of Coastal Wetlands due to hand clearing, and approximately 0.16 acres of Coastal Wetlands due to temporary fill.

NOTE: In accordance with commitments made by the permittee, compensatory mitigation for permanent impacts to 404 wetlands associated with the authorized project shall be provided by the permittee at the Bodie Island Lighthouse Pond Mitigation Site.

NOTE: This project will permanently impact approximately 0.11 acres of surface waters due to fill from bridge bents. This project will temporarily impact approximately 10.07 acres of surface waters (5.95 acres of temporary fill for the advancing rail system, and 4.12 acres of temporary fill for the primary containment areas.) Within these same surface water impact areas, it is estimated that there will be approximately 2.57 acres of permanent impacts to SAV beds due to the footprint of the primary containment areas, approximately 0.06 acres of permanent impacts to SAV beds due to the footprint of permanent bridge piles, and approximately 3.07 acres of temporary impacts to SAV areas due to shading.

37) Unless specifically altered herein, compensatory mitigation for permanent impacts to SAV beds, and monitoring of SAV impacts, shall be conducted in accordance with the mitigation plan dated January 2018, "North Carolina Department of Transportation NC 12 – Rodanthe Breach Long-Term Improvements Bonner Bridge Replacement Project Phase IIB SAV Mitigation and Monitoring Plan". Any changes to the mitigation plan authorized by this CAMA permit shall require additional authorization from DCM.

38) Unless specifically altered herein, SAV plants that will be permanently impacted due to the footprint of the permanent bridge piles shall be relocated in accordance with the "Plan for Relocation of Seagrass for Rodanthe Bridge SAV Mitigation" dated as received on June 11, 2018.

39) The permittee shall provide the DCM Fisheries Resource Specialist and the DCM Transportation Field Representative with an opportunity to participate during planned SAV monitoring activities.

40) Any significant depressions in the Sound bottom created by jetting water intakes or temporary hollow steel piles of the advancing rail system shall be filled with native substrate material to approximate their pre-project contours and elevations as soon as practicable.

41) There shall be no clearing or grubbing of wetlands outside of the areas indicated on the attached workplan drawings without prior approval from DCM.

ADDITIONAL CONDITIONS

42) Wetlands to be temporarily impacted by hand clearing shall not be grubbed.

43) Construction mats shall be utilized to support equipment within wetland areas to minimize temporary wetland impacts. These mats shall be removed immediately following project completion.

44) The permittee shall minimize the need to cross wetlands in transporting equipment for hand clearing operations to the maximum extent practicable.

45) Due to the possibility that compaction, mechanized clearing, hand clearing, and/or other site alterations might prevent the temporary Coastal Wetland impact areas from re-attaining pre-project functions, the permittee shall provide an annual update on the Coastal Wetland areas temporarily impacted by this project. This annual update shall consist of photographs and a brief written report on the progress of these temporarily impacted areas in re-attaining their pre-project functions. Within three years after project completion, the permittee shall hold an agency field meeting with DCM to determine if the Coastal Wetland areas temporarily impacted by this project have re-attained pre-project functions. If at the end of three years DCM determines that the Coastal Wetland areas temporarily impacted by the project have not re-attained pre-project functions, DCM will determine whether compensatory mitigation shall be required.

Sedimentation and Erosion Control

46) This project shall conform to all requirements of the N.C. Sedimentation Pollution Control Act and NCDOT's Memorandum of Agreement with the Division of Energy, Mineral and Land Resources.

Historical and Cultural Resource Protection

47) The permittee shall implement all practicable measures to ensure the Pappy's Lane Shipwreck resource is not damaged, including but not necessarily limited to, the measures listed in the NCDOT e-mail dated May 3, 2018.

48) In accordance with Project Commitments made within the Record of Decision dated December 2016, if any archaeological resources are encountered during construction, construction work affecting the resource will cease immediately until the resource can be identified and assessed for National Register of Historic Places Eligibility.

General

49) No attempt shall be made by the permittee to prevent the use by the public of all navigable waters at or adjacent to the authorized work following completion of construction and demolition activities.

ADDITIONAL CONDITIONS

50) During bridge construction, the permittee shall make every attempt to not impede navigation in the project vicinity. If this is not possible, then adequate notice shall be provided to the public that navigation will be limited during construction. The notice shall include an estimate of the amount of time that the limited navigation will occur.

51) The permittee shall install and maintain, at its expense, any signal lights and signals prescribed by the U.S. Coast Guard, through regulations or otherwise, on the authorized facilities. For further information, the permittee should contact the U.S. Coast Guard Marine Safety Office at (910) 772-2191.

52) The permittee shall exercise all available precautions in the day-to-day operations of the facility to prevent waste from entering the adjacent waters and wetlands.

53) If it is determined that additional permanent and/or temporary impacts are necessary that are not shown on the attached workplan drawings or described in the authorized permit application, a permit modification and/or additional authorization from DCM shall be required. In addition, any changes in the approved plan may also require a permit modification and/or additional authorization from DCM. The permittee shall contact a representative of DCM prior to commencement of any such activity for this determination and any permit modification.

54) The permittee and/or his contractor shall contact the DCM Transportation Project Field Representative in Elizabeth City at (252) 264-3901 to request a pre-construction conference prior to project initiation.

55) Development authorized by this permit shall only be conducted on lands owned by the NCDOT and/or its Right-of-Ways and/or easements.

56) All construction access shall be through the use of the authorized temporary advancing rail system, the partially constructed new bridge, floating skiffs or similar floating devices, or existing high ground areas.

57) Uncured concrete shall not be allowed to contact waters of the State or water that will enter waters of the State.

58) The N.C. Division of Water Resources (DWR) authorized the proposed project on 6/11/18 (DWR Project No. 20180114) under Individual Water Quality Certification No. 004161. Any violation of the Certification approved by DWR shall be considered a violation of this CAMA permit.

NOTE: The U.S. Army Corps of Engineers is reviewing this project as an Individual Permit (Action ID No. SAW-2012-01153).

NOTE: This permit does not eliminate the need to obtain any additional state, federal or local permits, approvals or authorizations that may be required.

NOTE: An application processing fee of $475 was received by DCM for this project. This fee also satisfied the Section 401 application processing fee requirements of the Division of Water Resources.

ROY COOPER
Governor
MICHAEL S. REGAN
Secretary
BRAXTON C. DAVIS
Director

NORTH CAROLINA
Environmental Quality

July 19, 2018

Kathy Herring
Environmental Analysis Unit
N.C. Department of Transportation
1598 Mail Service Center
Raleigh, NC 27699-1598

RE: Letter of Authorization, Revision to Plan for Relocation of Seagrass for Rodanthe Bridge SAV Mitigation, TIP B-2500IIB, Dare County, CAMA Major Permit No. 106-12.

Dear Ms. Herring:

This letter is in response to a request from the N.C. Department of Transportation (NCDOT) for a change in the SAV relocation plan for the above referenced project. The request was submitted by NCDOT in an e-mail dated July 5, 2018, including an "Update on Rodanthe Bridge Seagrass Relocation Effort", and one (1) drawing dated June 8, 2018. NCDOT is requesting to relocate the remainder of the grass to be harvested from the permanent bridge piling areas to areas near the Rodanthe alignment instead of relocating it to the previously approved areas near the existing Bonner Bridge wavebreak structure that was constructed in January 2017 near the Oregon Inlet.

This request is relevant to Condition No. 38 of the Major Modification to CAMA Permit No. 106-12 issued on 6/11/18, which states that: Unless specifically altered herein, SAV plants that will be permanently impacted due to the footprint of the permanent bridge piles shall be relocated in accordance with the "Plan for Relocation of Seagrass for Rodanthe Bridge SAV Mitigation" dated as received on June 11, 2018.

This Letter of Authorization conveys the determination of the N.C. Division of Coastal Management (DCM) that the change as described in your e-mail dated July 5, 2018 is consistent with existing State rules and regulations and is in keeping with the original purpose and intent of CAMA Major Permit No. 106-12. In addition to the commitments made within the "Update on Rodanthe Bridge Seagrass Relocation Effort" received on July 5, 2018, and in accordance with the "Plan for Relocation of Seagrass for Rodanthe Bridge SAV Mitigation" received on June 11, 2018, NCDOT shall provide pictures to the agencies showing the location of the areas where transplanting will occur before and after relocation.

This Letter shall be attached to the original of CAMA Permit No. 106-12, which was issued on September 19, 2012, as well as all subsequent modifications, and copies of all documents shall be readily available on site when a DCM representative inspects the project for compliance. All conditions and stipulations of the active permit remain in force unless altered herein. This approval does not eliminate the need to obtain any additional permits, approvals, or authorizations that may be required.

Please contact Greg Daisey at (252) 207-3656 if you have any questions or concerns.

Sincerely,

Doug Huggett
Major Permits Manager

cc: Chris Rivenbark, NCDOT
Paul Williams, NCDOT
Kyle Barnes, USACE
Garcy Ward, DWR
Fritz Rohde, NMFS
Shane Staples, DCM
Travis Wilson, WRC
Greg Daisey, DCM

North Carolina Department of Environmental Quality | Division of Coastal Management
Morehead City Office | 400 Commerce Avenue | Morehead City, North Carolina 28557
252.808.2808

Turchy, Michael A

From: Brittingham, Cathy
Sent: Thursday, May 3, 2018 1:17 PM
To: Rivenbark, Chris; Turchy, Michael A
Cc: Daisey, Greg
Subject: RE: B-2500IIB Pappy's Lane Wreck

Thank you!

Cathy Brittingham, Transportation Project Coordinator
N.C. Division of Coastal Management
(919) 707-9149 phone
cathy.brittingham@ncdenr.gov

Mailing Address:
c/o DWR Wetlands Unit
1617 Mail Service Center
Raleigh, NC 27699-1617

Physical Address:
512 North Salisbury Street
Archdale Building
12th Floor, Room 1204G
Raleigh, NC 27604

From: Rivenbark, Chris
Sent: Thursday, May 03, 2018 1:11 PM
To: Brittingham, Cathy <cathy.brittingham@ncdenr.gov>; Turchy, Michael A <maturchy@ncdot.gov>
Cc: Daisey, Greg <Greg.Daisey@ncdenr.gov>
Subject: RE: B-2500IIB Pappy's Lane Wreck

Cathy and Greg,
Please find below our reply to your question regarding the Pappy's Lane Wreck in relation to the review of the Dare County CAMA Land Use Plan and the language regarding cultural resources therein.

"The Dare County Board of Commissioners supports the protection of structures, lands, and artifacts that have been identified by the NC Department of Cultural Resources, Division of Archives and History, as archaeologically or historically significant. On a case-by-case basis individual protection/management strategies should be implemented to ensure archaeological and/or historical resources are not destroyed."

It is important to note that per the attached letter from the NC State Historic Preservation Office made pursuant to Section 106 of the National Historic Preservation Act, the proposal by Dr. Nathan Richards of the UNC Coastal Studies Institute, "lays out a plan designed to serve as mitigation against the potential loss of information in the event of construction impact to the National Register of Historic Places – eligible property referred to as the Pappy's Lane Shipwreck in Pamlico Sound." The letter also states, "Our office concurs that this is an adequate and proper course of action toward the purpose of collecting enough data prior to the

initiation of the bridge construction to ultimately complete a full assessment of the Pappy's Lane Shipwreck archaeological site. We agree that the research, when completed, will provide adequate data recovery and public outreach to mitigate the impact of bridge construction on the integrity of the resource."

Additionally, the NCDOT has implemented the following to continue avoidance of the site:

1. In April 2018, Flatiron re-surveyed the wreckage to confirm surveys remain accurate and the latest construction plans avoid impact to the resource.
2. Specialty spans for the temporary rail system have been designed to ensure that the temporary pilings maintain a minimum 4' clearance to the wreckage.
3. The installation techniques for the temporary rail system pilings nearest to the wreck, will be installed in a manner to minimize disturbance to the wreckage – They will be vibrated as far as practical, and then driven as necessary to reach bearing specifications.
4. Spoil containment systems (both primary and secondary) for the permanent piling operations will be placed so that they do not envelope the wreckage in order to prevent any accumulation on or around the wreckage.
5. Though the wreckage is clearly visible, buoys or flagging, as appropriate, will be used to increase the visibility of the wreckage.
6. The Environmental Compliance Management Plan, which will be reviewed and distributed to construction personnel as part of the orientation, will have a section devoted to the wreckage, its importance, the construction methods that will be employed to avoid impacts, and a contact number for individuals to call with any questions.

Please let us know if you have any additional questions.

Chris Rivenbark
NCDOT- Environmental Analysis Unit
(919) 707-6152

From: Brittingham, Cathy
Sent: Wednesday, May 02, 2018 11:24 AM
To: Rivenbark, Chris <crivenbark@ncdot.gov>; Turchy, Michael A <maturchy@ncdot.gov>
Cc: Daisey, Greg <Greg.Daisey@ncdenr.gov>
Subject: B-2500IIB Pappy's Lane Wreck

Hi Chris and Michael,

The DCM District Planner raised this question about the Pappy's Lane Wreck related to her review of the Dare County CAMA Land Use Plan: "What is the protection/management strategy to ensure the resource is not destroyed?" Here is an excerpt of the relevant Dare County CAMA Land Use Plan Policy:

HISTORIC RESOURCES

Land Use Compatibility:

Archaeological/Historic Resources

Policy LUC #15, Page 159.

> "The Dare County Board of Commissioners supports the protection of structures, lands, and artifacts that have been identified by the NC Department of Cultural Resources, Division of Archives and History, as archaeologically or historically significant. On a case-by-case basis individual protection/management strategies should be implemented to ensure archaeological and/or historical resources are not destroyed."

I was able to provide the DCM District Planner with background information about the data recovery program, and NCDOT coordination with SHPO. However, there is a need for clarification about whether the Pappy's Lane Wreck will be completely avoided during construction. The workplan drawings show the bridge spanning the wreck, but I do not believe there is any detail showing specifically what construction techniques will occur around the Wreck. Would NCDOT please provide DCM with a description of any individual protection/management strategies that will be implemented to ensure archaeological and/or historical resources are not destroyed (ex. no bridge pilings or infrastructure placed in the Wreck, no primary or secondary containment structures placed around the Wreck, buoys placed around the Wreck, education to workers about the Wreck, etc.)

Sincerely,

Cathy

Cathy Brittingham, Transportation Project Coordinator
N.C. Division of Coastal Management
(919) 707-9149 phone
cathy.brittingham@ncdenr.gov

Mailing Address: :
c/o DWR Wetlands Unit
1617 Mail Service Center
Raleigh, NC 27699-1617

Physical Address:
512 North Salisbury Street
Archdale Building
12th Floor, Room 1204G
Raleigh, NC 27604

Please visit https://deq.nc.gov/about/divisions/coastal-management/ for more information about the N.C. Division of Coastal Management.

Permit Class
MODIFICATION/MINOR

Permit Number
106-12

STATE OF NORTH CAROLINA
Department of Environmental Quality
and
Coastal Resources Commission

Permit

for

_X_ Major Development in an Area of Environmental Concern pursuant to NCGS 113A-118

_X_ Excavation and/or filling pursuant to NCGS 113-229

Issued to **N.C. Department of Transportation, 1598 Mail Service Center, Raleigh, NC 27699-1598**

Authorizing development in Dare County at Atlantic Ocean and Pamlico Sound on NC Highway 12 near Rodanthe , as requested in the permittee's application dated 9/28/18, including the attached workplan drawings (33): 27 dated 9/14/18, and 6 dated 9/12/18.

This permit, issued on **12/21/18** , is subject to compliance with the application (where consistent with the permit), all applicable regulations, special conditions and notes set forth below. Any violation of these terms may be subject to fines, imprisonment or civil action; or may cause the permit to be null and void.

1) Unless specifically altered herein, this Minor Modification authorizes the following changes for TIP B-2500 Phase IIB: (a) elimination of 25 permanent bridge piles (one at each of 25 bents), (b) changes to the footprint of the advancing rail system, (c) addition of temporary mats to minimize impacts to wetlands during the installation and removal of jetting intake pipes, and (d) addition of Utility Impact Site 4 at the northern end of the project for temporary relocation of high voltage transmission lines, all as depicted on the attached workplan drawings.

NOTE: The specific development being permitted does not preclude the remainder of the B-2500 project being built in the Pamlico Sound provided that future development will be constructed in a way that avoids and minimizes impacts to AECs.

(See attached sheets for Additional Conditions)

This permit action may be appealed by the permittee or other qualified persons within twenty (20) days of the issuing date.

This permit must be accessible on-site to Department personnel when the project is inspected for compliance.

Any maintenance work or project modification not covered hereunder requires further Division approval.

All work must cease when the permit expires on

No expiration date, pursuant to GS 136-44.7B

In issuing this permit, the State of North Carolina agrees that your project is consistent with the North Carolina Coastal Management Program.

Signed by the authority of the Secretary of DEQ and the Chairman of the Coastal Resources Commission.

Douglas V Huggett for

Braxton C. Davis, Director
Division of Coastal Management

This permit and its conditions are hereby accepted.

Signature of Permittee

ADDITIONAL CONDITIONS

2) Nothing in this permit authorizes any activity that has not received approval from the National Park Service (NPS) and the U.S. Fish and Wildlife Service (USFWS) for work within the Cape Hatteras National Seashore and Pea Island National Wildlife Refuge. The proposed work shall not commence until the permittee has been issued Special Use Permits from the NPS and the USFWS, if required, and a copy of the Special Use Permits are received by the N.C. Division of Coastal Management (DCM).

3) Unless specifically altered herein, any mitigative measures or environmental commitments specifically made by the permittee in the Coastal Area Management Act (CAMA) permit application, the NEPA/404 Merger Process, and/or the Project Commitments contained within the Record of Decision dated December 2016, shall be implemented, regardless of whether or not such commitments are addressed by individual conditions of this permit.

4) According to the permit application, the design of containment systems within wetlands and uplands was not finalized at the time of application, and may vary due to constraints such as shorelines. Prior to installation of pilings in Coastal Wetlands, the permittee shall submit workplan drawings and a narrative to DCM depicting the proposed jetting spoil containment system for review and approval.

5) No excavation or filling shall take place at any time in any vegetated wetlands or surrounding waters outside of the alignment of the areas indicated on the attached workplan drawings, without permit modification.

6) Construction staging areas shall be located only in upland areas, and not in wetlands or waters of the State.

Utility Impacts

NOTE: This Minor Modification authorizes updated information regarding the temporary relocation of a high voltage transmission line to accommodate safe bridge construction. Wetland impacts resulting from the utility relocations have been included in the total wetland and stream impacts for this project.

7) Any relocation of utility lines that is not depicted on the authorized work plan drawings, or described within the permit application, shall require approval by DCM, either under the authority of this permit, or by the utility company obtaining separate authorization.

8) The permittee shall remove all of the temporary utility poles for temporary relocation of the high voltage transmission line immediately after they are no longer needed, or within 30 days of written notification from DCM, whichever comes first. As soon as practicable, the areas temporarily impacted by the temporary relocation of the high voltage transmission line shall be restored to pre-project conditions.

9) Construction mats shall be utilized to support equipment within wetland areas to minimize temporary wetland impacts during utility relocations. These mats shall be removed immediately following project completion.

ADDITIONAL CONDITIONS

Impacts to Wetlands and Waters of the State and Mitigation

10) The activities authorized by this Minor Modification shall not result in any new permanent impacts to wetlands or waters of the State, without permit modification.

NOTE: This minor modification will reduce permanent fill in surface waters by 0.02 acres and reduce temporary fill in surface waters by 0.29 acres at Sites 3A, 3B, and 3C due to bridge pile reduction. Changes to the advancing rail system will increase temporary hand clearing impacts by 0.42 acres with 0.10 acres in Coastal Wetlands, increase temporary fill in wetlands by 0.14 acres with 0.06 acres in Coastal Wetlands, and decrease temporary fill in surface waters by 0.02 acres at Sites 3A, 3B, and 3C. The addition of temporary matting for jetting intake activities at Site 3C will result in an increase of 0.09 acres with 0.02 acres in Coastal Wetlands of temporary fill in wetlands. The temporary relocation of utilities at Site 4 will result in 0.60 acres of temporary impacts to wetlands due to hand clearing/matting (no Coastal Wetlands). The reconfiguration of the Advancing Rail System reduces temporary impacts to SAV by 0.20 acres and bridge pile reduction reduces permanent impacts to SAV by 0.05 acres.

11) Any significant depressions in the Sound bottom created by jetting water intakes or temporary hollow steel piles of the advancing rail system shall be filled with native substrate material to approximate their pre-project contours and elevations as soon as practicable.

12) There shall be no clearing or grubbing of wetlands outside of the areas indicated on the attached workplan drawings without prior approval from DCM.

13) Wetlands to be temporarily impacted by hand clearing shall not be grubbed.

14) The permittee shall minimize the need to cross wetlands in transporting equipment for hand clearing operations to the maximum extent practicable.

15) The permittee shall implement appropriate measures, including but not necessarily limited to, appropriate cleaning of equipment prior to its arrival on the project site in order to prevent the introduction of invasive species such as *Phragmites* into the project area.

16) Due to the possibility that compaction, mechanized clearing, hand clearing, and/or other site alterations might prevent the temporary Coastal Wetland impact areas from re-attaining pre-project functions, the permittee shall provide an annual update on the Coastal Wetland areas temporarily impacted by this project. This annual update shall consist of photographs and a brief written report on the progress of these temporarily impacted areas in re-attaining their pre-project functions. Within three years after project completion, the permittee shall hold an agency field meeting with DCM to determine if the Coastal Wetland areas temporarily impacted by this project have re-attained pre-project functions. If at the end of three years DCM determines that the Coastal Wetland areas temporarily impacted by the project have not re-attained pre-project functions, DCM will determine whether compensatory mitigation shall be required.

ADDITIONAL CONDITIONS

General

17) If it is determined that additional permanent and/or temporary impacts are necessary that are not shown on the attached workplan drawings or described in the authorized permit application, a permit modification and/or additional authorization from DCM shall be required. In addition, any changes in the approved plan may also require a permit modification and/or additional authorization from DCM. The permittee shall contact a representative of DCM prior to commencement of any such activity for this determination and any permit modification.

18) The permittee and/or his contractor shall contact the DCM Transportation Project Field Representative in Elizabeth City at (252) 264-3901 to request a pre-construction conference prior to project initiation.

19) Development authorized by this permit shall only be conducted on lands owned by the NCDOT and/or its Right-of-Ways and/or easements.

20) The N.C. Division of Water Resources (DWR) authorized the proposed project on 12/17/18 (DWR Project No. 20180114 v.2) under Individual Water Quality Certification No. 004161. Any violation of the Certification approved by DWR shall be considered a violation of this CAMA permit.

NOTE: The U.S. Army Corps of Engineers has assigned the proposed project COE Action ID No. SAW-2012-1153.

NOTE: This permit does not eliminate the need to obtain any additional state, federal or local permits, approvals or authorizations that may be required. This includes any permits or other approvals that may be required from the U.S. Army Corps of Engineers.

21) All conditions and stipulations of the active permit remain in force under this Minor Modification unless specifically altered herein.

22) This Minor Modification shall be attached to the Major Modification for TIP B-2500 Phase IIB which was issued on 6/11/18, and the Letter of Authorization dated 7/19/18, and copies of all documents shall be readily available on site when a Division representative inspects the project for compliance.

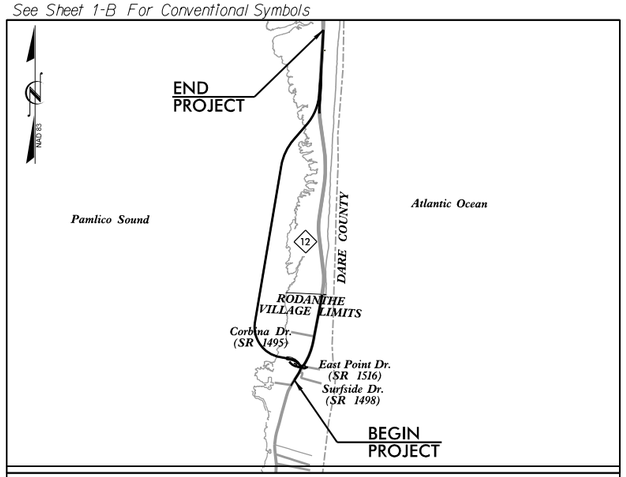
NOTE: A minor modification application processing fee of $100 was received by DCM for this project.

09/08/99

TIP PROJECT: B-2500B

CONTRACT: C203474

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP (NTS)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DARE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-2500B	1	
STATE PROJ. NO.	F. A. PROJ. NO.	DESCRIPTION	
32635.3.FR7	BRNHF-0012(56)		

LOCATION: *NC 12 – RODANTHE BREACH LONG TERM IMPROVEMENTS (PHASE IIB)*

TYPE OF WORK: *GRADING, DRAINAGE, PAVING, SIGNING & STRUCTURES*

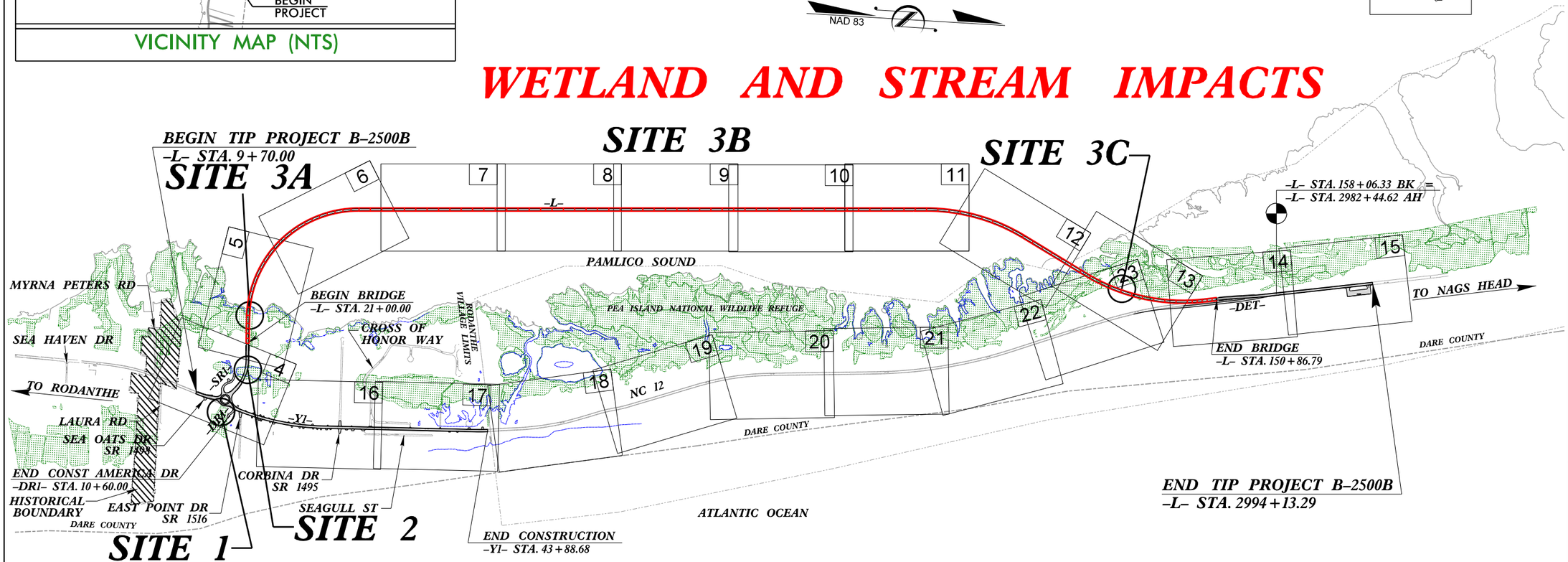
REVISED 2/1/2018
REVISED 2/15/2018

PERMIT DRAWING
SHEET 1 OF 44

ENGLISH

NAD 83

WETLAND AND STREAM IMPACTS



THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON PLANS.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2017 = 9,800

ADT 2037 = 14,200

V = 40 /60 MPH

FUNC. CLASSIFICATION = RURAL COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-2500B.....0.572 mi
LENGTH STRUCTURE TIP PROJECT B-2500B.....2.460 mi
TOTAL LENGTH TIP PROJECT B-2500B.....3.032 mi

NCDOT CONTACT

K. Zak Hamidi, P.E.
PROJECT ENGINEER – DESIGN-BUILD GROUP

PLANS PREPARED BY:

RK&K — RUMMEL, KLEPPER & KAHL, LLP, 900 RIDGEFIELD DRIVE, SUITE 350, RALEIGH, NORTH CAROLINA 27609, NC LICENSE NO. F-0112

FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

FLATIRON

2012 STANDARD SPECIFICATIONS

LETTING DATE:
JANUARY 25, 2017

B. Keith Skinner, P.E.
PROJECT ENGINEER

Brandon J. McInnis, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

This document originally issued and sealed by Matthew L. Cook 27434 on 12-21-17. This medium shall not be considered a certified document.

P.E.

SIGNATURE:

ROADWAY DESIGN ENGINEER

This document originally issued and sealed by Brandon J. McInnis 29470 on 12-21-17. This medium shall not be considered a certified document.

P.E.

SIGNATURE:

STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

2/15/2018
R:\Hydraulics\PERMITS_Environmental\Drawings\4C\B2500B_Hyd_prm_tsh.dgn
FKeys

8/17/99

REVISED 2/1/2018

PERMIT DRAWING SHEET 2 OF 44

50 25 0 50 100
SCALE

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGLISH

NAD 83

MATCHLINE -L- STA. 20+00 SEE SHEET 5

MATCHLINE -Y1- STA. 17+00 SEE SHEET 16

CAMA WETLAND

SITE 2

SITE 1

BEGIN TIP PROJECT B-2500B
-L- POT Sta. 9+70.00

BEGIN CONSTRUCTION
-DRI- POT Sta. 10+60.00

END CONSTRUCTION
-SRI- POT Sta. 13+90.00

-SRI- POT Sta. 14+10.95
-SRI- PT Sta. 13+64.42
-SRI- PRC Sta. 12+39.81
-SRI- PC Sta. 10+88.91
-L- PC Sta. 9+92.40
-L- PT Sta. 12+20.02
-RAB- PC Sta. 10+00.00 =
-RAB- POC Sta. 13+75.42
-L- PC Sta. 15+05.07
-L- PT Sta. 18+87.17
-SRI- POT Sta. 10+00.00=
-Y1- POT Sta. 11+49.51 =
-L- POT Sta. 13+33.87
-Y1- PC Sta. 12+81.77
-DRI- POT Sta. 12+13.81=
-L- POC Sta. 13+13.08
-Y1- PCC Sta. 13+50.75
-DRI- PT Sta. 11+95.22
-DRI- PC Sta. 10+63.31
-DRI- PRC Sta. 11+14.59

S 87° 29' 07.9" W
S 84° 34' 01.5" W
N 18° 32' 56.4" E
N 4° 13' 01.8" E
S 67° 49' 29.5" W
N 38° 28' 09.4" E
N 58° 15' 47.9" W
S 86° 04' 08.4" W
N 46° 13' 42.9" W

RETAIN 12" HDPE
REMOVE DI & 30" PIPE
REMOVE 15" RCP
REMOVE 24" RCP
REMOVE PIPE
TB 2GI-D STEEL F&G
PROP WW FENCE
PROP CHAIN LINK FENCE
LATERAL BASE DITCH SEE DETAIL A
PED AS PER UTILITY RECORD NOT LOCATED IN FIELD
PED AS PER UTILITY RECORD LOCATED IN FIELD
POND AS PER UTILITY RECORD LOCATED IN FIELD

DITCH @ WETLAND
-Y1- 11+92 RT
Q10=14.1 CFS
V10=0.9 FT/S

-Y1- STA. 14+10 TO STA. 29+40 LT
CLEANOUT ROADSIDE DITCHES AND EXISTING DRIVE PIPES AS NEEDED. REPLACE DRIVE PIPES THAT APPEAR TO BE IN POOR CONDITION AND ARE NOT FUNCTIONING PROPERLY

DETAIL A
LATERAL BASE DITCH
(Not to Scale)
Natural Ground
Min. D= 2.0 Ft.
B= 4.0 Ft.
b= 5.0 Ft.
-Y1- STA. 11+92 TO STA. 13+39 RT
-Y1- STA. 13+50 TO STA. 14+10 LT

- F F DENOTES FILL IN WETLAND
- DENOTES TEMPORARY FILL IN WETLAND
- DENOTES MECHANIZED CLEARING
- LAYDOWN YARD BOUNDARY

FOR -L- PROFILE SEE SHT.24
FOR -Y1- PROFILE SEE SHT.30
FOR -RAB- PROFILE SEE SHT.30
FOR -DRI- PROFILE SEE SHT.31
FOR -SRI- PROFILE SEE SHT.31

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99

REVISED 2/1/2018

PERMIT DRAWING SHEET 3 OF 44

SCALE 50 25 0 50 100

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGLISH

NAD 83

CAMA WETLAND

MATCHLINE -L- STA. 20+00 SEE SHEET 5

SITE 2

-L- PT Sta. 18+87.17

S 87° 29' 07.9" W

RETAIN 12" HDPE

REMOVE DI & 30' PIPE

-SRI- POT Sta. 14+10.95

S 84° 34' 01.5" W

RETAIN

PROP WW FENCE

END CONSTRUCTION -SRI- POT Sta. 13+90.00

-SRI- PT Sta. 13+64.42

-SRI- PRC Sta. 12+39.81

-L- PC Sta. 15+05.07

-SRI- POT Sta. 10+00.00= -YI- POT Sta. 11+49.51 = -L- POT Sta. 13+33.87

-SRI- PC Sta. 10+88.91

-YI- PC Sta. 12+81.77

-RAB- PC Sta. 10+00.00 =
-RAB- POC Sta. 13+75.42

-DRI- POT Sta. 12+13.81=
-YI- POC Sta. 13+13.08

-L- PT Sta. 12+20.02

-YI- PCC Sta. 13+50.75

BEGIN TIP PROJECT B-2500B
-L- POT Sta. 9+70.00

N 18° 32' 56.4" E

N 45° 13' 42.3" W

N 4° 13' 01.8" E

S 67° 49' 29.5" W

N 38° 26' 09.4" E

N 58° 15' 47.9" W

S 86° 04' 08.4" W

PUE

-DRI- POT Sta. 11+95.22

-DRI- PC Sta. 10+63.31

-DRI- PRC Sta. 11+14.59

BEGIN CONSTRUCTION -DRI- POT Sta. 10+60.00

-DRI- POT Sta. 10+00.00

SITE 1

MATCHLINE -Y1- STA. 17+00 SEE SHEET 16

MAC AND MARILYN MIDGETT, LLC

H. P. BECK

HORATIO T. BECK

JOSEPH M. MIDGETT

JOSEPH M. MIDGETT, JR

JOHN M. DIMIG

DAVID C. VOLLMER

FRANCES W FARRISH

RANDALL S. ZIMMER

AUBREY E. HARVEY III

FRANK J. MEEKINS, HEIRS

SCOTT T. CALDWELL

JAMES P. CULLEN

TODD W. PHILLIPS

RELATIVE PROPERTIES, LLC C/O LEIGH ANN SMITH

FEDERAL NATIONAL MORTGAGE ASSOC

CHICAMACOMICO HISTORICAL ASSOCIATION, INC

DITCH @ WETLAND
-Y1- 11+92 RT
Q10=14.1 CFS
V10=0.9 FT/S

DETAIL A
LATERAL BASE DITCH
(Not to Scale)

Min. D= 2.0 Ft.
B= 4.0 Ft.
b= 5.0 Ft.

-Y1- STA. 11+92 TO STA. 13+39 RT
-Y1- STA. 13+50 TO STA. 14+10 LT

-Y1- STA. 14+10 TO STA. 29+40 LT CLEANOUT ROADSIDE DITCHES AND EXISTING DRIVE PIPES AS NEEDED. REPLACE DRIVE PIPES THAT APPEAR TO BE IN POOR CONDITION AND ARE NOT FUNCTIONING PROPERLY.

DENOTES FILL IN WETLAND

DENOTES TEMPORARY FILL IN WETLAND

DENOTES MECHANIZED CLEARING

LAYDOWN YARD BOUNDARY

FOR -L- PROFILE SEE SHT.24
FOR -Y1- PROFILE SEE SHT.30
FOR -RAB- PROFILE SEE SHT.30
FOR -DRI- PROFILE SEE SHT.31
FOR -SRI- PROFILE SEE SHT.31

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
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2/1/2018
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Ekeen

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-2500B	X-1

SITE 1

PERMIT DRAWING
SHEET 4 OF 44

Drawing Date: 1/22/2018

ENGLISH

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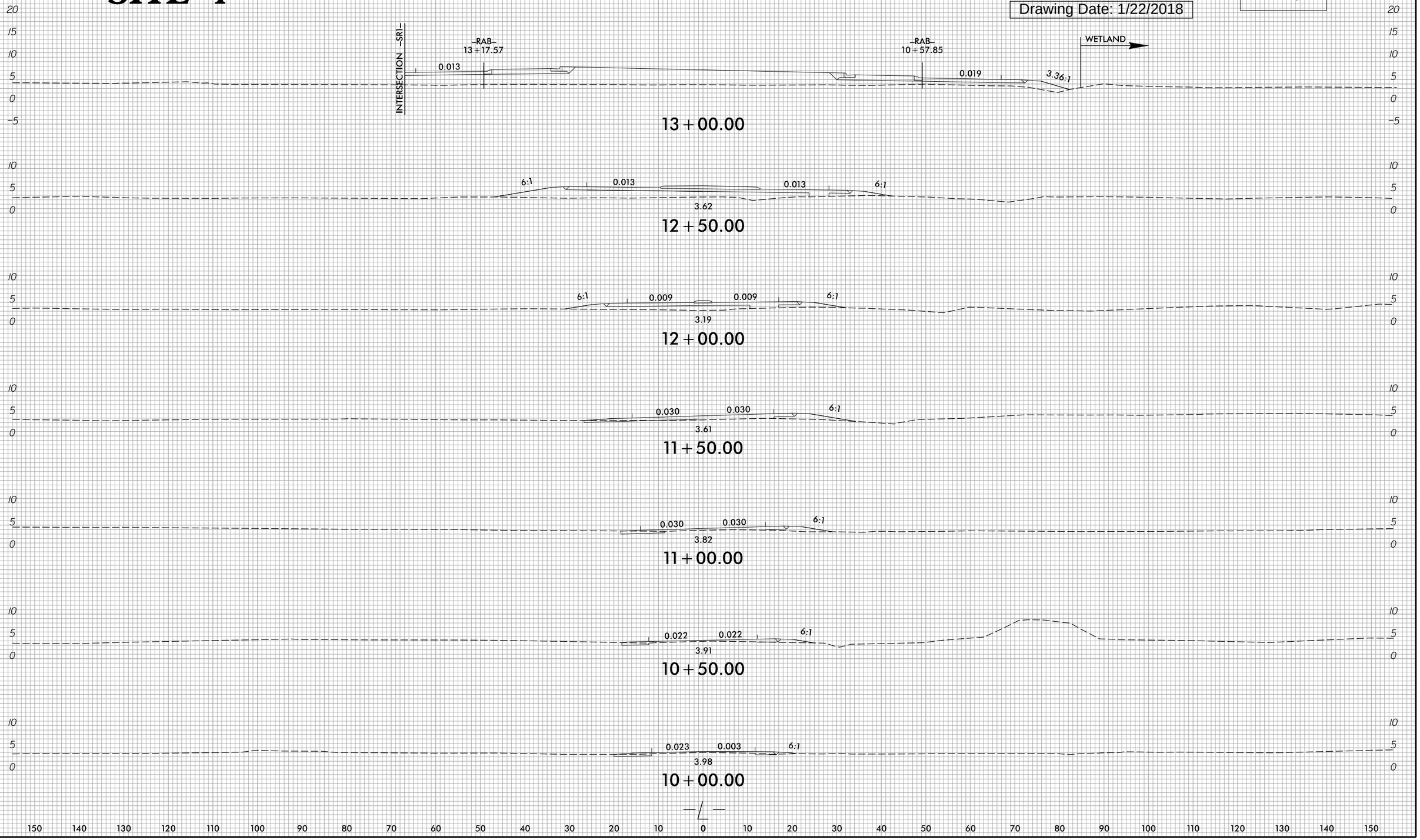

11/2/2017
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6/23/16

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	B-2500B	X-3

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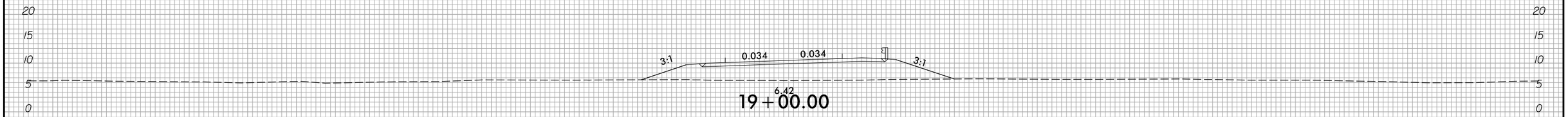
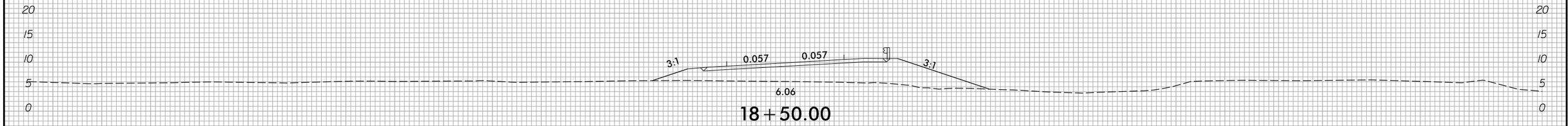
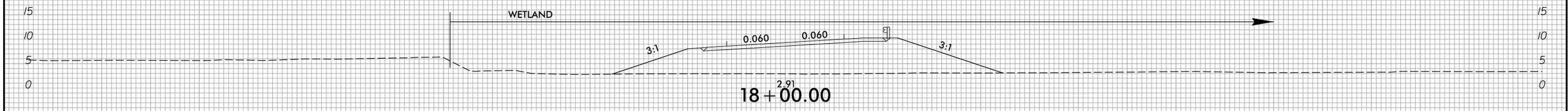
SITE 2

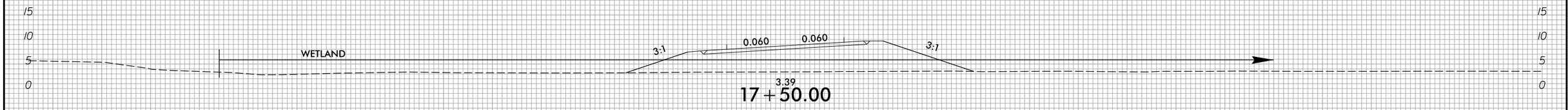
PERMIT DRAWING
SHEET 5 OF 44
Drawing Date: 1/22/2018

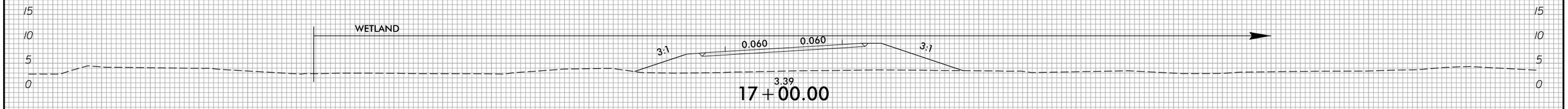
ENGLISH

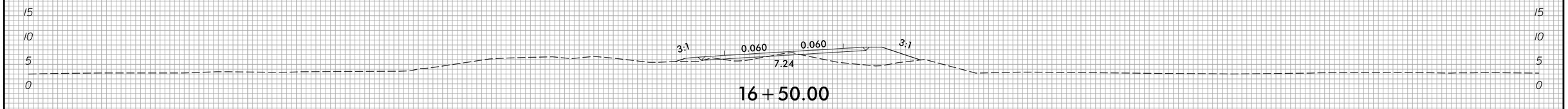












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11/21/2017
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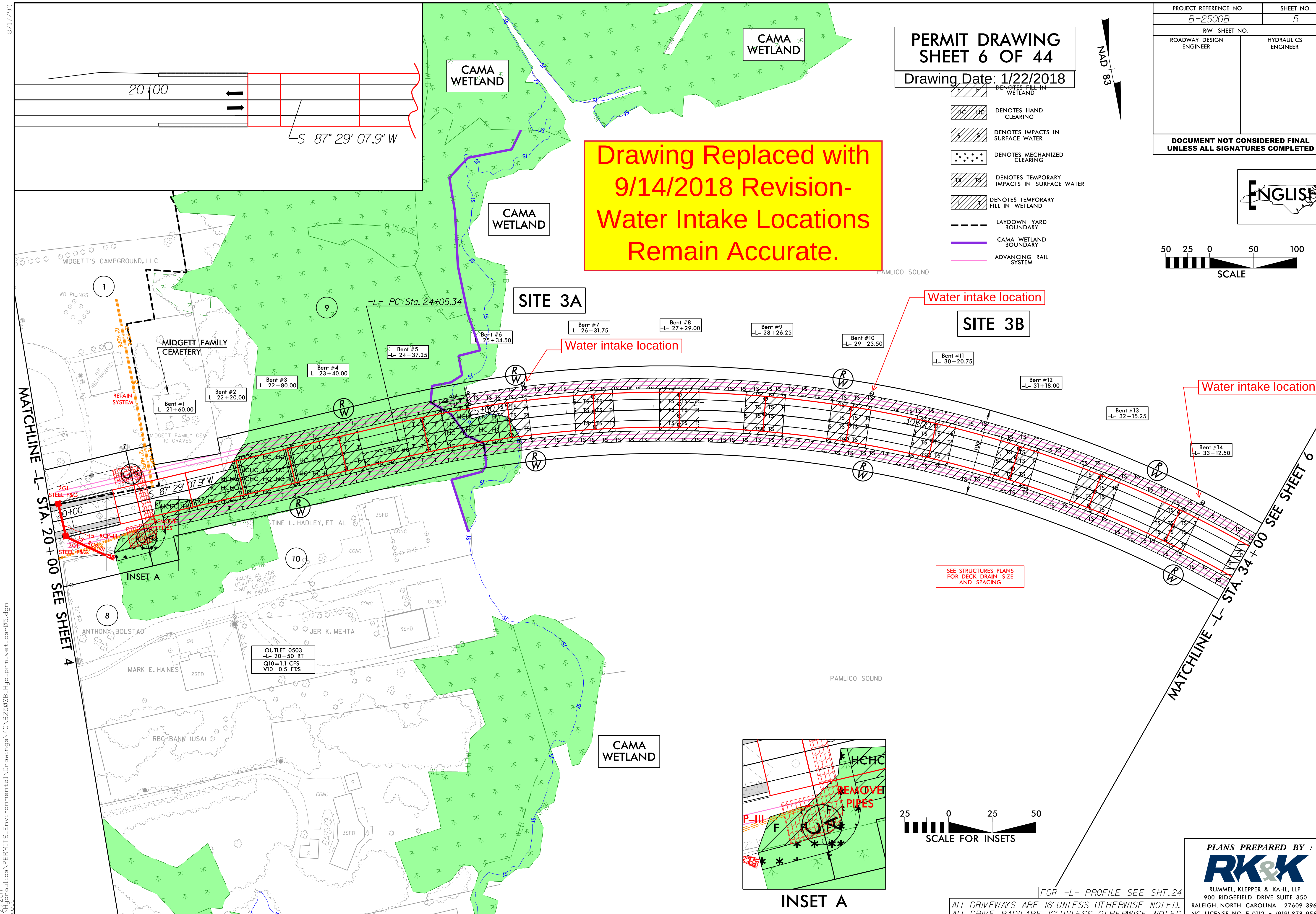
PROJECT REFERENCE NO. B-2500B
SHEET NO. 5
PERMIT DRAWING
SHEET 6 OF 44
Drawing Date: 1/22/2018
Drawing Replaced with 9/14/2018 Revision- Water Intake Locations Remain Accurate.
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES TEMPORARY FILL IN WETLAND
LAYDOWN YARD BOUNDARY
CAMA WETLAND BOUNDARY
ADVANCING RAIL SYSTEM
CAMA WETLAND
SITE 3A
SITE 3B
Water intake location
Water intake location
Water intake location
MIDGETT FAMILY CEMETERY
MIDGETT'S CAMPGROUND, LLC
ANTHONY BOLSTAD
MARK E. HAINES
RBC BANK (USA)
JER K. MEHTA
PAMLICO SOUND
INSET A
MATCHLINE -L- STA. 20+00 SEE SHEET 4
MATCHLINE -L- STA. 34+00 SEE SHEET 6
SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING
OUTLET 0503 -L- 20+50 RT Q10=1.1 CFS V10=0.5 FPS
SCALE
SCALE FOR INSETS
FOR -L- PROFILE SEE SHT.24
ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.
PLANS PREPARED BY: RK&K
RUMMEL, KLEPPER & KAHL, LLP
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REVISED 9/14/2018

PERMIT DRAWING
SHEET 6 OF 44

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83

ENGLISH

DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES TEMPORARY FILL IN WETLAND
LAYDOWN YARD BOUNDARY
CAMA WETLAND BOUNDARY
ADVANCING RAIL SYSTEM

50 25 0 50 100
SCALE

CAMA WETLAND

SITE 3A

SITE 3B

-L- PC Sta. 24+05.34

MIDGETT FAMILY CEMETERY

RETAIN SYSTEM

Bent #1 -L- 21+60.00
Bent #2 -L- 22+20.00
Bent #3 -L- 22+80.00
Bent #4 -L- 23+40.00
Bent #5 -L- 24+37.25
Bent #6 -L- 25+34.50
Bent #7 -L- 26+31.75
Bent #8 -L- 27+29.00
Bent #9 -L- 28+26.25
Bent #10 -L- 29+23.50
Bent #11 -L- 30+20.75
Bent #12 -L- 31+18.00
Bent #13 -L- 32+15.25
Bent #14 -L- 33+12.50

S 87° 29' 07.9" W

20+00

2CI STEEL T&G

15" RCP III

INSET A

OUTLET 0503
-L- 20+50 RT
Q10 = 1.1 CFS
V10 = 0.5 FPS

MATCHLINE -L- STA. 20+00 SEE SHEET 4

MATCHLINE -L- STA. 34+00 SEE SHEET 6

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

REMOVE PIPES

P-III

INSET A

25 0 25 50
SCALE FOR INSETS

FOR -L- PROFILE SEE SHT. 24

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING SHEET 7 OF 44

Drawing Date: 1/22/2018

NAD 83

Drawing Replaced with 9/14/2018 Revision

F F DENOTES FILL IN WETLAND
HC HC DENOTES HAND CLEARING
S S DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER
T T DENOTES TEMPORARY FILL IN WETLAND
LAYDOWN YARD BOUNDARY
CAMA WETLAND BOUNDARY
ADVANCING RAIL SYSTEM

50 25 0 50 100
SCALE

ENGLISH

CAMA WETLAND

SITE 3A

SITE 3B

PAMLICO SOUND

-L- PC Sta. 24+05.34

Bent #1 -L- 21+60.00
Bent #2 -L- 22+20.00
Bent #3 -L- 22+80.00
Bent #4 -L- 23+40.00
Bent #5 -L- 24+37.25
Bent #6 -L- 25+34.50
Bent #7 -L- 26+31.75
Bent #8 -L- 27+29.00
Bent #9 -L- 28+26.25
Bent #10 -L- 29+23.50
Bent #11 -L- 30+20.75
Bent #12 -L- 31+18.00
Bent #13 -L- 32+15.25
Bent #14 -L- 33+12.50

MIDGETT FAMILY CEMETERY

RETAIN SYSTEM

2GI STEEL F&G

15" RCP III

S 87° 29' 07.9" W

20+00

MATCHLINE -L- STA. 20+00 SEE SHEET 4

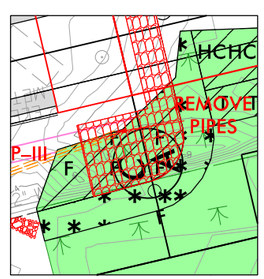
MATCHLINE -L- STA. 34+00 SEE SHEET 6

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

INSET A

OUTLET 0503
-L- 20+50 RT
Q10=1.1 CFS
V10=0.5 FT/S

CAMA WETLAND



INSET A

25 0 25 50
SCALE FOR INSETS

FOR -L- PROFILE SEE SHT.24

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

PLANS PREPARED BY :
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PERMIT DRAWING
SHEET 7 OF 44

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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ENGLISH

DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES MECHANIZED CLEARING
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES TEMPORARY FILL IN WETLAND
LAYDOWN YARD BOUNDARY
CAMA WETLAND BOUNDARY
ADVANCING RAIL SYSTEM

50 25 0 50 100
SCALE

CAMA WETLAND

20+00

S 87° 29' 07.9" W

-L- PC Sta. 24+05.34

SITE 3A

SITE 3B

Bent #1 -L- 21+60.00
Bent #2 -L- 22+20.00
Bent #3 -L- 22+80.00
Bent #4 -L- 23+40.00
Bent #5 -L- 24+37.25
Bent #6 -L- 25+34.50
Bent #7 -L- 26+31.75
Bent #8 -L- 27+29.00
Bent #9 -L- 28+26.25
Bent #10 -L- 29+23.50
Bent #11 -L- 30+20.75
Bent #12 -L- 31+18.00
Bent #13 -L- 32+15.25
Bent #14 -L- 33+12.50

MIDGETT FAMILY CEMETERY

RETAIN SYSTEM

MATCHLINE -L- STA. 20+00 SEE SHEET 4

MATCHLINE -L- STA. 34+00 SEE SHEET 6

2CI STEEL F&G

7GI STEEL F&G

15" RCP III

REMOVE PIPES

INSET A

OUTLET 0503
-L- 20+50 RT
Q10=1.1 CFS
V10=0.5 FPS

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

25 0 25 50
SCALE FOR INSETS

FOR -L- PROFILE SEE SHT. 24

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

PLANS PREPARED BY :
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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING SHEET 8 OF 44

Drawing Date: 1/22/2018

NAD 83

Drawing Replaced with 9/14/2018 Revision

SITE 3A

SITE 3B

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

CAMA WETLAND BOUNDARY

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

50 25 0 50 100

SCALE

ENGLISH

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

PAMLICO SOUND

PAMLICO SOUND

MIDGETT'S CAMPGROUND, LLC

MIDGETT FAMILY CEMETERY

MIDGETT FAMILY CEM 10 GRAVES

ANTHONY BOLSTAD

JER K. MEHTA

MARK E. HAINES

RBC BANK (USA)

CHRISTINE L. HADLEY, ET AL

-L- PC Sta. 24+05.34

Bent #1 -L- 21+60.00

Bent #2 -L- 22+20.00

Bent #3 -L- 22+80.00

Bent #4 -L- 23+40.00

Bent #5 -L- 24+37.25

Bent #6 -L- 25+34.50

Bent #7 -L- 26+31.75

Bent #8 -L- 27+29.00

Bent #9 -L- 28+26.25

Bent #10 -L- 29+23.50

Bent #11 -L- 30+20.75

Bent #12 -L- 31+18.00

Bent #13 -L- 32+15.25

Bent #14 -L- 33+12.50

25+00

20+00

S 87° 29' 07.9" W

S 87° 29' 07.9" W

20+00

MATCHLINE -L- STA. 20+00 SEE SHEET 4

MATCHLINE -L- STA. 34+00 SEE SHEET 6

RETAIN SYSTEM

REMOVE EXIST PIPES

2GI STEEL F&G

15" RCP-III

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT.24

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

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Ekang

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SHEET 8 OF 44

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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DCM-RALEIGH

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ENGLISH

PERMANENT IMPACTS TO SAV
TEMPORARY IMPACTS TO SAV
CAMA WETLAND BOUNDARY
ADVANCING RAIL SYSTEM
SUBMERGED AQUATIC VEGETATION

50 25 0 50 100
SCALE

SITE 3A

SITE 3B

CAMA WETLAND

MIDGETT FAMILY CEMETERY

-L- PC Sta. 24+05.34

Bent #1 -L- 21+60.00
Bent #2 -L- 22+20.00
Bent #3 -L- 22+80.00
Bent #4 -L- 23+40.00
Bent #5 -L- 24+37.25
Bent #6 -L- 25+34.50
Bent #7 -L- 26+31.75
Bent #8 -L- 27+29.00
Bent #9 -L- 28+26.25
Bent #10 -L- 29+23.50
Bent #11 -L- 30+20.75
Bent #12 -L- 31+18.00
Bent #13 -L- 32+15.25
Bent #14 -L- 33+12.50

RETAIN SYSTEM

REMOVE PIPES

2GI STEEL T&G

1GI STEEL T&G

15" RCP III

MATCHLINE -L- STA. 20+00 SEE SHEET 4

MATCHLINE -L- STA. 34+00 SEE SHEET 6

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 24

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

PLANS PREPARED BY :
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-L-

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	24
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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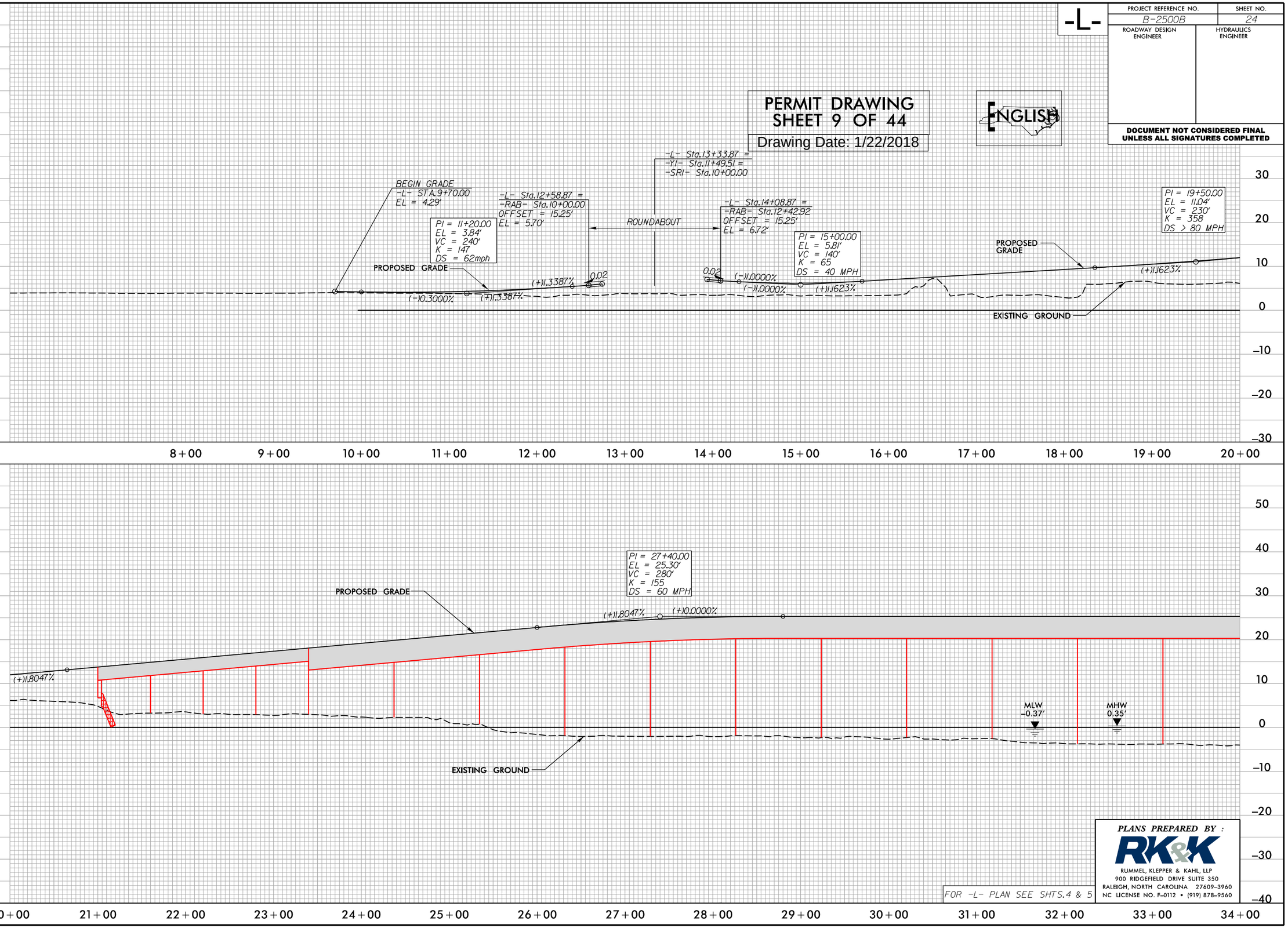
PERMIT DRAWING
SHEET 9 OF 44
Drawing Date: 1/22/2018

ENGLISH



FOR -L- PLAN SEE SHTS.4 & 5

PLANS PREPARED BY :
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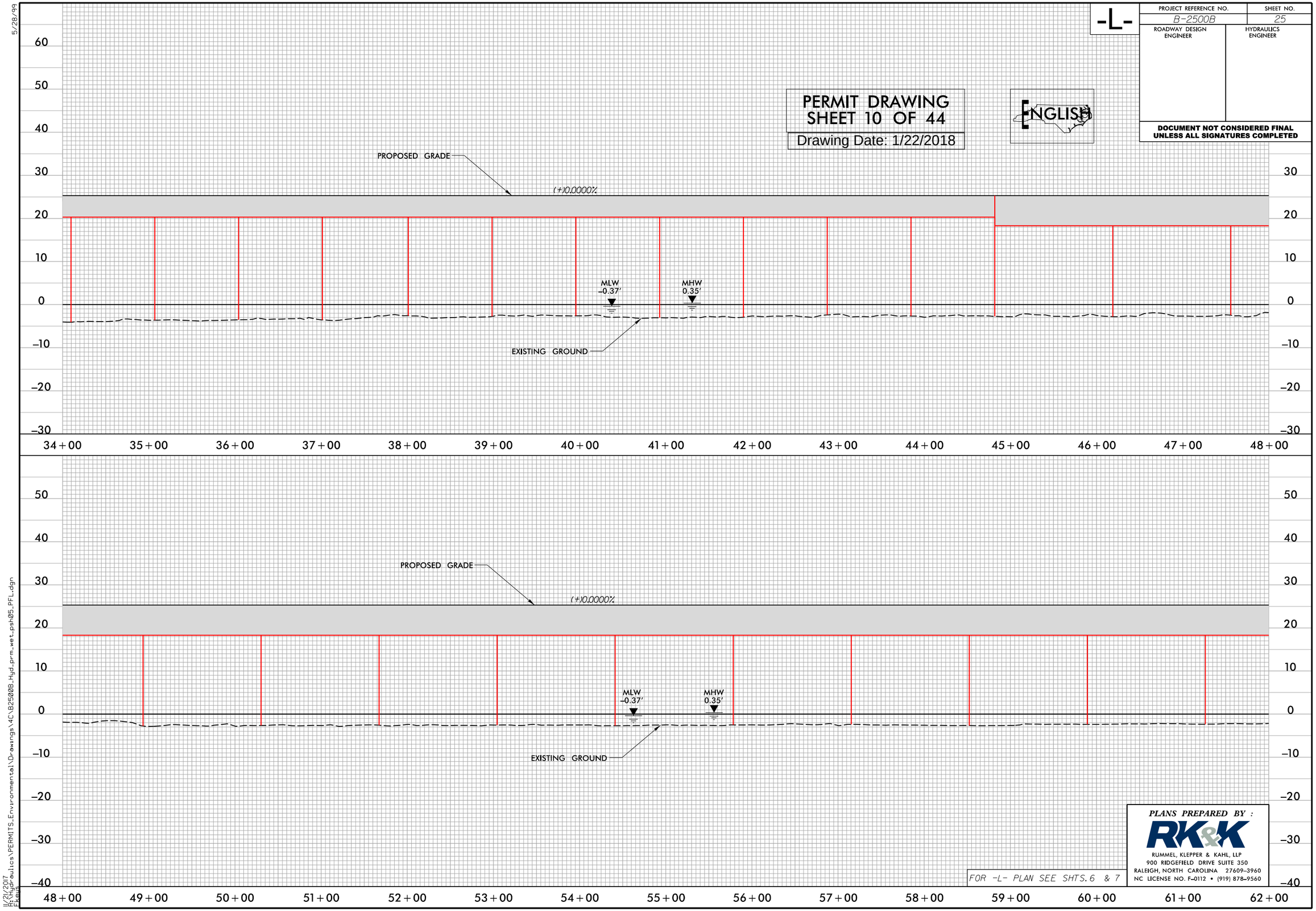
-L-

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 10 OF 44
Drawing Date: 1/22/2018

ENGLISH



FOR -L- PLAN SEE SHTS. 6 & 7

PLANS PREPARED BY :

RK&K

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FKelly

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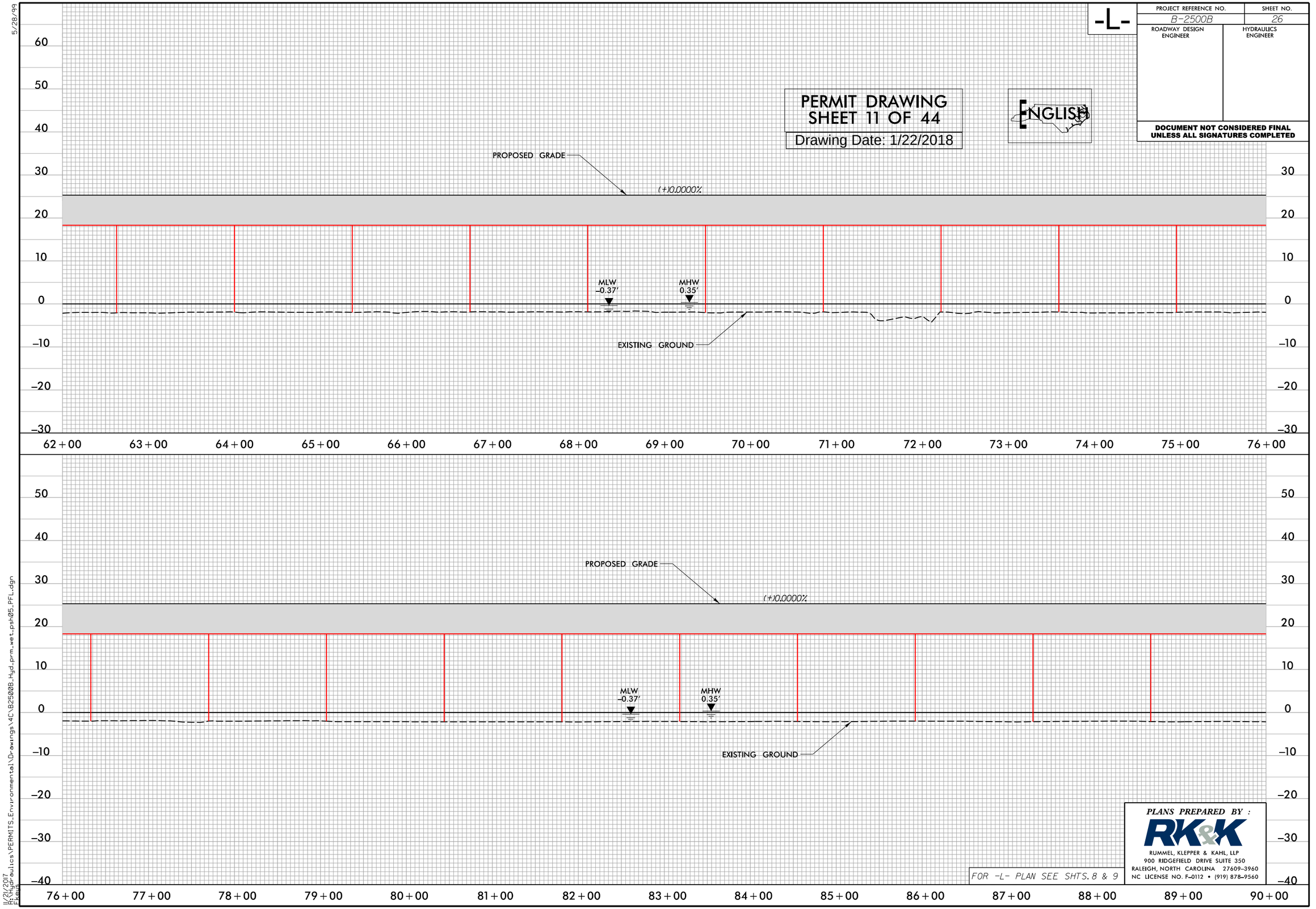
-L-

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	26
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 11 OF 44
Drawing Date: 1/22/2018

ENGLISH



FOR -L- PLAN SEE SHTS. 8 & 9

PLANS PREPARED BY :

RK&K

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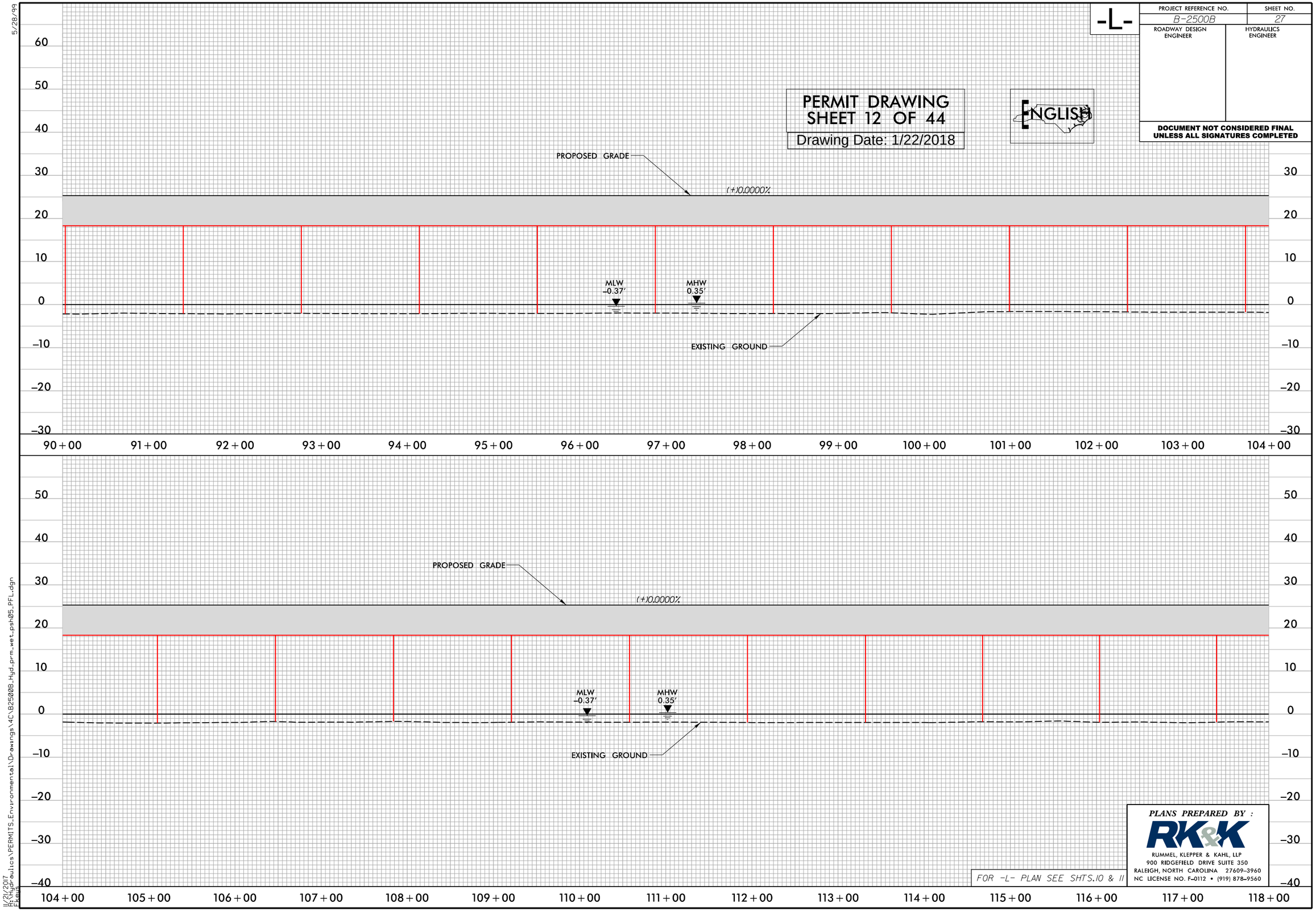
-L-

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	27
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 12 OF 44
Drawing Date: 1/22/2018

ENGLISH



FOR -L- PLAN SEE SHTS.10 & 11

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-L-

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	28
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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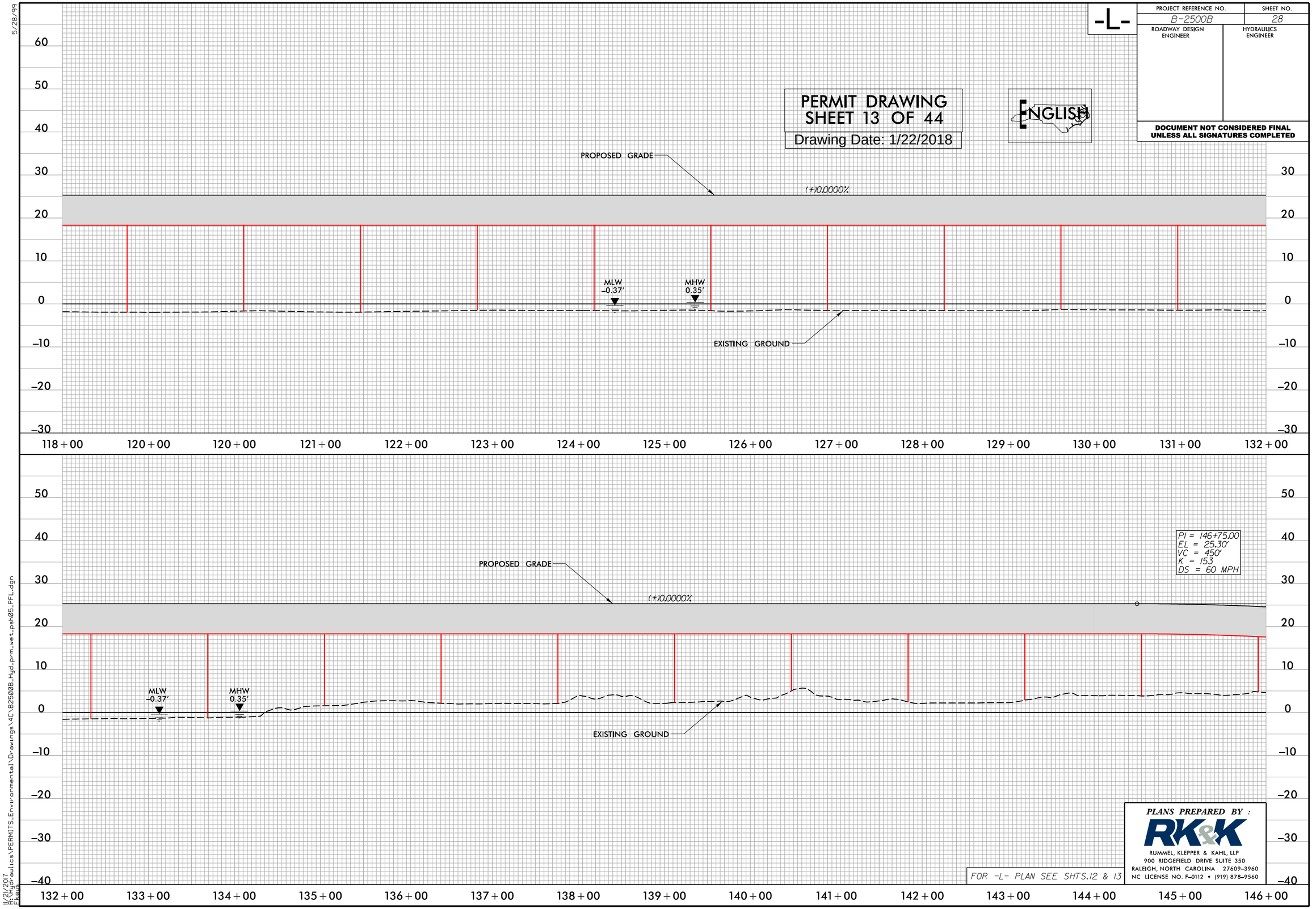
PERMIT DRAWING
SHEET 13 OF 44
Drawing Date: 1/22/2018

ENGLISH



FOR -L- PLAN SEE SHTS.12 & 13

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-L-

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	29
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING
SHEET 14 OF 44
Drawing Date: 1/22/2018

ENGLISH

PI = 146+75.00
EL = 25.30'
VC = 450'
K = 153
DS = 60 MPH

(+)0.0000%

(−)2.9345%

PROPOSED RETAINING WALL

PROPOSED GRADE

EXISTING GROUND

PI = 153+90.00
EL = 4.32'
VC = 440'
K = 136
DS = 60 MPH

(−)2.9345%

(+)0.3000%

-L- STA.158+06.33 BK =
-L- STA.2982+44.62 AH
EL = 5.48'

(+)0.3000%

PI = 2982+60.00
EL = 5.61'
VC = 180'
K = 300
DS = 74 MPH

(−)0.3000%

60 50 40 30 20 10 0 –10 –20 –30

146+00 147+00 148+00 149+00 150+00 151+00 152+00 153+00 154+00 155+00 156+00 157+00 158+00 2983+00 2984+00

40 30 20 10 0 –10 –20 –30 –40 –50

2984+00 2985+00 2986+00 2987+00 2988+00 2989+00 2990+00 2991+00 2992+00 2993+00 2994+00 2995+00 2996+00 2997+00 2998+00

PI = 2986+80.00
EL = 4.35'
VC = 180'
K = 291
DS > 80 MPH

(−)0.3000%

(+)0.3192%

PI = 2989+60.00
EL = 5.25'
VC = 180'
K = 291
DS = 73 MPH

(+)0.3192%

(−)0.3002%

PROPOSED GRADE

EXISTING GROUND

(+)0.0061%

BEGIN SPECIAL LATERAL V DITCH RT.
-L- 2990+50.00
EL=2.82

PI = 2992+62
EL = 4.62

(−)0.0075%

END GRADE
-L- STA.2994+13.29
EL = 3.89'

END SPECIAL LATERAL V DITCH RT.
-L- 2994+00.00
EL=2.94

FOR -L- PLAN SEE SHTS.14 & 15

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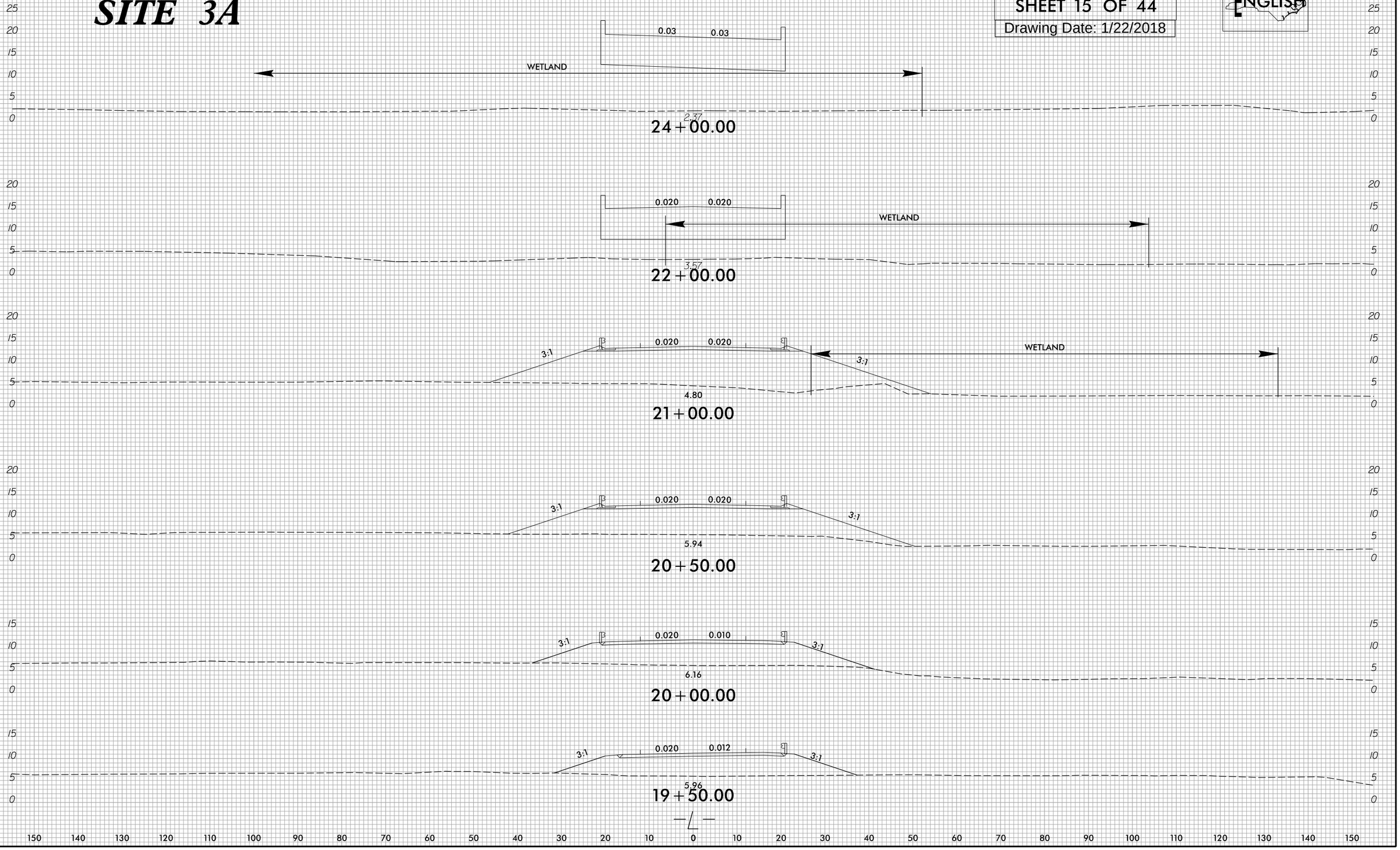
6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-2500B	X-4

SITE 3A

PERMIT DRAWING
SHEET 15 OF 44
Drawing Date: 1/22/2018

ENGLISH



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B-2500B	6
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PERMIT DRAWING SHEET 16 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision - Water Intake Locations Remain Valid.

NAD 83

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

SITE 3B

Water intake location

Water intake location

Water intake location

PAMLICO SOUND

Bent #15 -L- 34+09.75
Bent #16 -L- 35+07.00
Bent #17 -L- 36+04.25
Bent #18 -L- 37+01.50
Bent #19 -L- 38+01.25
Bent #20 -L- 38+98.50
Bent #21 -L- 39+95.75
Bent #22 -L- 40+93.00
Bent #23 -L- 41+90.25
Bent #24 -L- 42+87.50
Bent #25 -L- 43+84.75
Bent #26 -L- 44+82.00
Bent #27 -L- 46+19.00
Bent #28 -L- 47+56.00

-L- PT Sta. 44+71.48

N 3°30'20" W

SUNKEN BARGE

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

MATCHLINE -L- STA. 34+00 SEE SHEET 5

MATCHLINE -L- STA. 48+00 SEE SHEET 7

FOR -L- PROFILE SEE SHT.25

PLANS PREPARED BY :
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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	6
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
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SHEET 16 OF 44

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NAD 83

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

Bent #15 -L- 34+09.75
Bent #16 -L- 35+07.00
Bent #17 -L- 36+04.75
Bent #18 -L- 37+01.50
Bent #19 -L- 38+01.25
Bent #20 -L- 38+98.50
Bent #21 -L- 39+95.75
Bent #22 -L- 40+93.00
Bent #23 -L- 41+90.25
Bent #24 -L- 42+87.50
Bent #25 -L- 43+84.75
-L- PT Sta. 44+71.48
Bent #26 -L- 44+82.00
Bent #27 -L- 46+19.00
Bent #28 -L- 47+56.00

MATCHLINE -L- STA. 34+00 SEE SHEET 5

MATCHLINE -L- STA. 48+00 SEE SHEET 7

SUNKEN BARGE

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 25

PLANS PREPARED BY :

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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING SHEET 17 OF 44

Drawing Replaced with 9/14/2018 Revision

NAD 83

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

SITE 3B

PAMLICO SOUND

Bent #15 –L– 34+09.75
Bent #16 –L– 35+07.00
Bent #17 –L– 36+04.25
Bent #18 –L– 37+01.50
Bent #19 –L– 38+01.25
Bent #20 –L– 38+98.50
Bent #21 –L– 39+95.75
Bent #22 –L– 40+93.00
Bent #23 –L– 41+90.25
Bent #24 –L– 42+87.50
Bent #25 –L– 43+84.75
Bent #26 –L– 44+82.00
Bent #27 –L– 46+19.00
Bent #28 –L– 47+56.00

–L– PT Sta. 44+71.48

N 3° 30' 20.06" W
272.00'

100'

SUNKEN BARGE

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

MATCHLINE –L– STA. 34+00 SEE SHEET 5

MATCHLINE –L– STA. 48+00 SEE SHEET 7

PAMLICO SOUND

FOR –L– PROFILE SEE SHT.25

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B-2500B	6
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SHEET 17 OF 44

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NAD 83

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

SITE 3B

50 25 0 50 100
SCALE

PAMLICO SOUND

MATCHLINE -L- STA. 34+00 SEE SHEET 5

Bent #15 -L- 34+09.75
Bent #16 -L- 35+07.00
Bent #17 -L- 36+04.25
Bent #18 -L- 37+01.50
Bent #19 -L- 38+01.25
Bent #20 -L- 38+98.50
Bent #21 -L- 39+95.75
Bent #22 -L- 40+93.00
Bent #23 -L- 41+90.25
Bent #24 -L- 42+87.50
Bent #25 -L- 43+84.75
-L- PT Sta. 44+71.48
Bent #26 -L- 44+82.00
Bent #27 -L- 46+19.00
Bent #28 -L- 47+56.00

SUNKEN BARGE

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

MATCHLINE -L- STA. 48+00 SEE SHEET 7

FOR -L- PROFILE SEE SHT. 25

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Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

NAD 83

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 34+00 SEE SHEET 5

Bent #15 -L- 34+09.75
Bent #16 -L- 35+07.00
Bent #17 -L- 36+04.25
Bent #18 -L- 37+01.50
Bent #19 -L- 38+01.25
Bent #20 -L- 38+98.50
Bent #21 -L- 39+95.75
Bent #22 -L- 40+93.00
Bent #23 -L- 41+90.25
Bent #24 -L- 42+87.50
Bent #25 -L- 43+84.75
Bent #26 -L- 44+82.00
Bent #27 -L- 46+19.00
Bent #28 -L- 47+56.00

-L- PT Sta. 44+71.48

SUNKEN BOAT

SUNKEN BARGE

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

N 5-30-29 W

PAMLICO SOUND

MATCHLINE -L- STA. 48+00 SEE SHEET 7

FOR -L- PROFILE SEE SHT.25

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SHEET 18 OF 44

PROJECT REFERENCE NO.	SHEET NO.
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NAD 83

PERMANENT IMPACTS TO SAV
TEMPORARY IMPACTS TO SAV
ADVANCING RAIL SYSTEM
SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100
SCALE

SITE 3B

PAMLICO SOUND

Bent #15 -L- 34+09.75
Bent #16 -L- 35+07.00
Bent #17 -L- 36+04.25
Bent #18 -L- 37+01.50
Bent #19 -L- 38+01.25
Bent #20 -L- 38+98.50
Bent #21 -L- 39+95.75
Bent #22 -L- 40+93.00
Bent #23 -L- 41+90.25
Bent #24 -L- 42+87.50
Bent #25 -L- 43+84.75
Bent #26 -L- 44+82.00
Bent #27 -L- 46+19.00
Bent #28 -L- 47+56.00

-L- PT Sta. 44+71.48

MATCHLINE -L- STA. 34+00 SEE SHEET 5

MATCHLINE -L- STA. 48+00 SEE SHEET 7

SUNKEN BARGE

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 25

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SHEET 19 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision - Water Intake Locations Remain Valid

NAD 83

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

Water intake location

Water intake location

Water intake location

Bent #29 –L– 48+93.00
Bent #30 –L– 50+30.00
Bent #31 –L– 51+67.00
Bent #32 –L– 53+04.00
Bent #33 –L– 54+41.00
Bent #34 –L– 55+78.00
Bent #35 –L– 57+15.00
Bent #36 –L– 58+52.00
Bent #37 –L– 59+89.00
Bent #38 –L– 51+26.00

50+00
55+00
60+00
S 30° 20.9" W
–L–

PAMLICO SOUND

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

MATCHLINE –L– STA. 48+00 SEE SHEET 6

MATCHLINE –L– STA. 62+00 SEE SHEET 8

FOR –L– PROFILE SEE SHT. 25

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NAD 83

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE –L– STA. 48+00 SEE SHEET 6

MATCHLINE –L– STA. 62+00 SEE SHEET 8

Bent #29 –L– 48+93.00
Bent #30 –L– 50+30.00
Bent #31 –L– 51+67.00
Bent #32 –L– 53+04.60
Bent #33 –L– 54+41.00
Bent #34 –L– 55+78.00
Bent #35 –L– 57+15.00
Bent #36 –L– 58+52.00
Bent #37 –L– 59+89.00
Bent #38 –L– 61+26.00

50+00
55+00
60+00

N 30° 30' 39" W

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR –L– PROFILE SEE SHT. 25

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Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

NAD 83

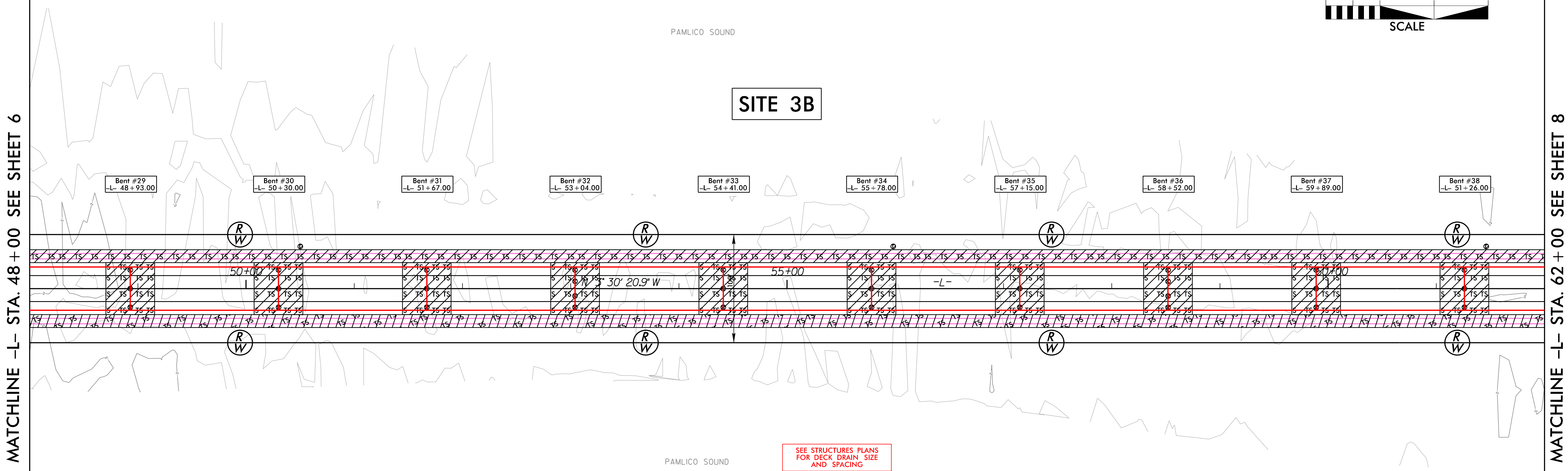
DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

SCALE: 50 25 0 50 100



FOR -L- PROFILE SEE SHT. 25

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SHEET 20 OF 44

NAD 83

PROJECT REFERENCE NO.	SHEET NO.
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DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

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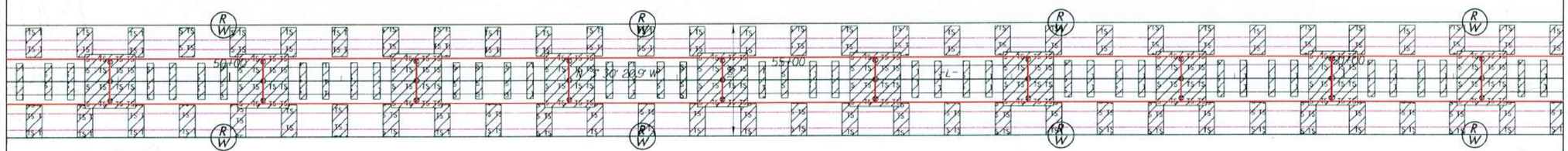
50 25 0 50 100

SCALE

SITE 3B

MATCHLINE -L- STA. 48+00 SEE SHEET 6

MATCHLINE -L- STA. 62+00 SEE SHEET 8



SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 25

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PERMIT DRAWING SHEET 21 OF 44

Drawing Date: 1/22/2018

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NAD 83

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100

SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE –L– STA. 48+00 SEE SHEET 6

MATCHLINE –L– STA. 62+00 SEE SHEET 8

Bent #29 –L– 48+93.00

Bent #30 –L– 50+30.00

Bent #31 –L– 51+67.00

Bent #32 –L– 53+04.00

Bent #33 –L– 54+41.00

Bent #34 –L– 55+78.00

Bent #35 –L– 57+15.00

Bent #36 –L– 58+52.00

Bent #37 –L– 59+89.00

Bent #38 –L– 51+26.00

50+00

55+00

60+00

N 30° 20.9" W

PAMLICO SOUND

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR –L– PROFILE SEE SHT.25

PLANS PREPARED BY :

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SHEET 21 OF 44

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PERMANENT IMPACTS TO SAV
TEMPORARY IMPACTS TO SAV
ADVANCING RAIL SYSTEM
SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100
SCALE

SITE 3B

MATCHLINE -L- STA. 48+00 SEE SHEET 6

MATCHLINE -L- STA. 62+00 SEE SHEET 8

Bent #29 -L- 48+93.00
Bent #30 -L- 50+30.00
Bent #31 -L- 51+67.00
Bent #32 -L- 53+04.00
Bent #33 -L- 54+41.00
Bent #34 -L- 55+78.00
Bent #35 -L- 57+15.00
Bent #36 -L- 58+52.00
Bent #37 -L- 59+89.00
Bent #38 -L- 61+26.00

50'+00
20.9' M
50'+00
50'+00

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 25

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PERMIT DRAWING
SHEET 22 OF 44
Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision - Water Intake Location Remains Valid

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

Water intake location

Bent #39 -L- 62+63.00
Bent #40 -L- 64+00.00
Bent #41 -L- 65+37.00
Bent #42 -L- 66+74.00
Bent #43 -L- 68+11.00
Bent #44 -L- 69+48.00
Bent #45 -L- 70+85.00
Bent #46 -L- 72+22.00
Bent #47 -L- 73+59.00
Bent #48 -L- 74+96.00

65+00

N 3° 30' 20.9" W

100'

70+00

PAMLICO SOUND

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

MATCHLINE -L- STA. 62+00 SEE SHEET 7

MATCHLINE -L- STA. 76+00 SEE SHEET 9

FOR -L- PROFILE SEE SHT. 26

PLANS PREPARED BY :

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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REVISED 09/14/2018

NAD 83

PERMIT DRAWING
SHEET 22 OF 44

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DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 62+00 SEE SHEET 7

MATCHLINE -L- STA. 76+00 SEE SHEET 9

Bent #39 -L- 62+63.00
Bent #40 -L- 64+00.00
Bent #41 -L- 65+37.00
Bent #42 -L- 66+74.00
Bent #43 -L- 68+11.00
Bent #44 -L- 69+48.00
Bent #45 -L- 70+85.00
Bent #46 -L- 72+22.00
Bent #47 -L- 73+59.00
Bent #48 -L- 74+96.00

65.00'

N 3° 30' 20" W

70.00'

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 26

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PERMIT DRAWING SHEET 23 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 62+00 SEE SHEET 7

MATCHLINE -L- STA. 76+00 SEE SHEET 9

Bent #39 -L- 62+63.00
Bent #40 -L- 64+00.00
Bent #41 -L- 65+37.00
Bent #42 -L- 66+74.00
Bent #43 -L- 68+11.00
Bent #44 -L- 69+48.00
Bent #45 -L- 70+85.00
Bent #46 -L- 72+22.00
Bent #47 -L- 73+59.00
Bent #48 -L- 74+96.00

65+00
N 3° 30' 20.9" W
100'
70+00
75+00

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

FOR -L- PROFILE SEE SHT.26

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING
SHEET 23 OF 44

NAD 83

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

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ENGLISH

50 25 0 50 100

SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 62+00 SEE SHEET 7

MATCHLINE -L- STA. 76+00 SEE SHEET 9

Bent #39 -L- 62+63.00

Bent #40 -L- 64+00.00

Bent #41 -L- 65+37.00

Bent #42 -L- 66+74.00

Bent #43 -L- 68+11.06

Bent #44 -L- 69+48.00

Bent #45 -L- 70+85.00

Bent #46 -L- 72+22.00

Bent #47 -L- 73+59.00

Bent #48 -L- 74+96.00

RW

N 3° 30' 20" W

85.00'

70.00'

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 26

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83

PERMIT DRAWING
SHEET 24 OF 44
Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 62+00 SEE SHEET 7

MATCHLINE -L- STA. 76+00 SEE SHEET 9

Bent #39 -L- 62+63.00
Bent #40 -L- 64+00.00
Bent #41 -L- 65+37.00
Bent #42 -L- 66+74.00
Bent #43 -L- 68+11.00
Bent #44 -L- 69+48.00
Bent #45 -L- 70+85.00
Bent #46 -L- 72+22.00
Bent #47 -L- 73+59.00
Bent #48 -L- 74+96.00

65+00
N 3° 30' 20.9" W
70+00
75+00
100'

PAMLICO SOUND

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT.26

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	8
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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SHEET 24 OF 44

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PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 62+00 SEE SHEET 7

MATCHLINE -L- STA. 76+00 SEE SHEET 9

Bent #39 -L- 62+63.00

Bent #40 -L- 64+00.00

Bent #41 -L- 65+37.00

Bent #42 -L- 66+74.00

Bent #43 -L- 68+11.06

Bent #44 -L- 69+48.00

Bent #45 -L- 70+85.00

Bent #46 -L- 72+22.00

Bent #47 -L- 73+59.00

Bent #48 -L- 74+96.00

65+00 -L-

N 3° 30' 20.9" W

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 26

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PERMIT DRAWING SHEET 25 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision - Water Intake Locations Remain Valid.

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

Water intake location

Water intake location

Water intake location

MATCHLINE -L- STA. 76+00 SEE SHEET 8

MATCHLINE -L- STA. 90+00 SEE SHEET 10

Bent #49 -L- 76+33.00

Bent #50 -L- 77+70.00

Bent #51 -L- 79+07.00

Bent #52 -L- 80+44.00

Bent #53 -L- 81+81.00

Bent #54 -L- 83+18.00

Bent #55 -L- 84+55.00

Bent #56 -L- 85+92.00

Bent #57 -L- 87+29.00

Bent #58 -L- 88+66.00

80+00

N 3° 30' 20.9" W

-L-

85+00

90+00

100'

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

FOR -L- PROFILE SEE SHT.26

PLANS PREPARED BY :

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83

REVISED 09/14/2018

PERMIT DRAWING
SHEET 25 OF 44

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

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50 25 0 50 100
SCALE

SITE 3B

MATCHLINE -L- STA. 76+00 SEE SHEET 8

MATCHLINE -L- STA. 90+00 SEE SHEET 10

Bent #49 -L- 76+33.00
Bent #50 -L- 77+70.00
Bent #51 -L- 79+07.00
Bent #52 -L- 80+44.00
Bent #53 -L- 81+81.00
Bent #54 -L- 83+18.00
Bent #55 -L- 84+55.00
Bent #56 -L- 85+92.00
Bent #57 -L- 87+29.00
Bent #58 -L- 88+66.00

80+00
85+00
90+00
N 13° 30' 28" W

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 26

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PERMIT DRAWING SHEET 26 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 76+00 SEE SHEET 8

MATCHLINE -L- STA. 90+00 SEE SHEET 10

Bent #49 -L- 76+33.00
Bent #50 -L- 77+70.00
Bent #51 -L- 79+07.00
Bent #52 -L- 80+44.00
Bent #53 -L- 81+81.00
Bent #54 -L- 83+18.00
Bent #55 -L- 84+55.00
Bent #56 -L- 85+92.00
Bent #57 -L- 87+29.00
Bent #58 -L- 88+66.00

80+00
N 3° 30' 20.9" W
-L-
85+00
90+00
100'

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

FOR -L- PROFILE SEE SHT.26

PLANS PREPARED BY :

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	9
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83

REVISED 09/14/2018

PERMIT DRAWING
SHEET 26 OF 44

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

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SCALE

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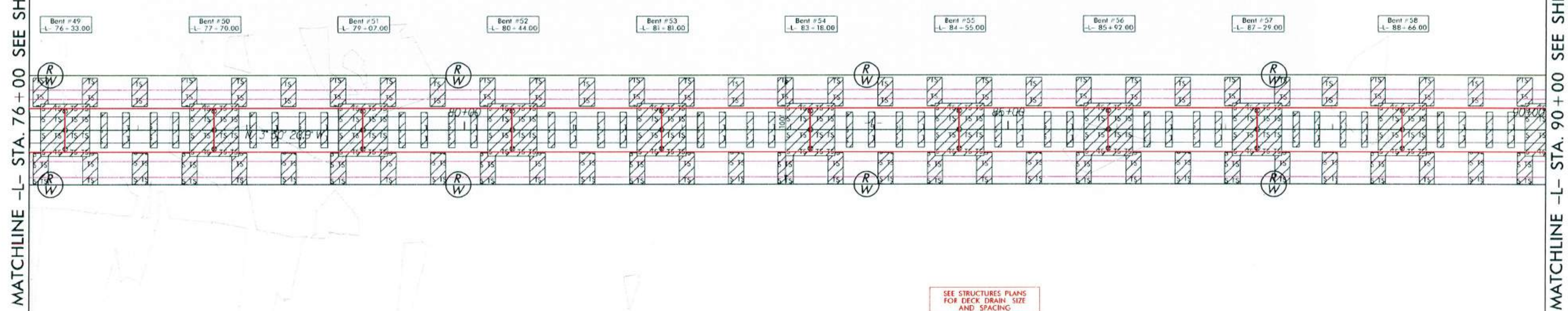
SITE 3B



SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT.26

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B-2500B	9
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NAD 83

PERMIT DRAWING SHEET 27 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

50 25 0 50 100

SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 76+00 SEE SHEET 8

MATCHLINE -L- STA. 90+00 SEE SHEET 10

Bent #49 -L- 76+33.00 | Bent #50 -L- 77+70.00 | Bent #51 -L- 79+07.00 | Bent #52 -L- 80+44.00 | Bent #53 -L- 81+81.00 | Bent #54 -L- 83+18.00 | Bent #55 -L- 84+55.00 | Bent #56 -L- 85+92.00 | Bent #57 -L- 87+29.00 | Bent #58 -L- 88+66.00

80+00 | 85+00 | 90+00

N 3°30'20"W

-L-

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

FOR -L- PROFILE SEE SHT.26

PLANS PREPARED BY :

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	9
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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REVISED 09/14/2018

PERMIT DRAWING
SHEET 27 OF 44

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PERMANENT IMPACTS TO SAV
TEMPORARY IMPACTS TO SAV
ADVANCING RAIL SYSTEM
SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100
SCALE

SITE 3B

MATCHLINE -L- STA. 76+00 SEE SHEET 8

MATCHLINE -L- STA. 90+00 SEE SHEET 10

Bent #49 -L- 76+33.00
Bent #50 -L- 77+70.00
Bent #51 -L- 79+07.00
Bent #52 -L- 80+44.00
Bent #53 -L- 81+81.00
Bent #54 -L- 83+18.00
Bent #55 -L- 84+55.00
Bent #56 -L- 85+92.00
Bent #57 -L- 87+29.00
Bent #58 -L- 88+66.00

N 3°30'00"W

85+00

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR "L" PROFILE SEE SHT. 26

PLANS PREPARED BY :
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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83

PERMIT DRAWING SHEET 28 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision - Water Intake Locations Remain Valid.

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

Water intake location

Water intake location

Bent #59 -L- 90+03.00
Bent #60 -L- 91+40.00
Bent #61 -L- 92+77.00
Bent #62 -L- 94+14.00
Bent #63 -L- 95+51.00
Bent #64 -L- 96+88.00
Bent #65 -L- 98+25.00
Bent #66 -L- 99+62.00
Bent #67 -L- 100+99.00
Bent #68 -L- 102+36.00
Bent #69 -L- 103+73.00

90+00
95+00
100+00

N 3° 30' 20.9" W

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

MATCHLINE -L- STA. 90+00 SEE SHEET 9

MATCHLINE -L- STA. 104+00 SEE SHEET 11

FOR -L- PROFILE SEE SHT.27

PLANS PREPARED BY :

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

REVISED 09/14/2018

PERMIT DRAWING
SHEET 28 OF 44

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

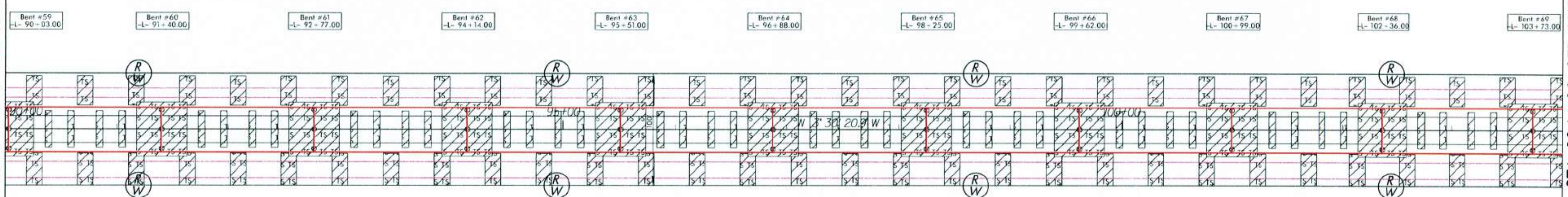
ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 90+00 SEE SHEET 9



MATCHLINE -L- STA. 104+00 SEE SHEET 11

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

FOR -L- PROFILE SEE SHT. 27

PLANS PREPARED BY :
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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	10
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PERMIT DRAWING SHEET 29 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 90+00 SEE SHEET 9

MATCHLINE -L- STA. 104+00 SEE SHEET 11

Bent #59 -L- 90+03.00
Bent #60 -L- 91+40.00
Bent #61 -L- 92+77.00
Bent #62 -L- 94+14.00
Bent #63 -L- 95+51.00
Bent #64 -L- 96+88.00
Bent #65 -L- 98+25.00
Bent #66 -L- 99+62.00
Bent #67 -L- 100+99.00
Bent #68 -L- 102+36.00
Bent #69 -L- 103+73.00

90+00
95+00
100+00
109'
W 3° 30' 20.9" W

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

FOR -L- PROFILE SEE SHT.27

PLANS PREPARED BY :

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	10
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83

REVISED 09/14/2018

PERMIT DRAWING
SHEET 29 OF 44

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DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

SITE 3B

MATCHLINE -L- STA. 90+00 SEE SHEET 9

MATCHLINE -L- STA. 104+00 SEE SHEET 11

Bent #59 -L- 90+03.00
Bent #60 -L- 91+40.00
Bent #61 -L- 92+77.00
Bent #62 -L- 94+14.00
Bent #63 -L- 95+51.00
Bent #64 -L- 96+88.00
Bent #65 -L- 98+25.00
Bent #66 -L- 99+62.00
Bent #67 -L- 100+99.00
Bent #68 -L- 102+36.00
Bent #69 -L- 103+73.00

90'-00"
95'-00"
100'-00"

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 27

PLANS PREPARED BY :
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NAD 83

PERMIT DRAWING SHEET 30 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

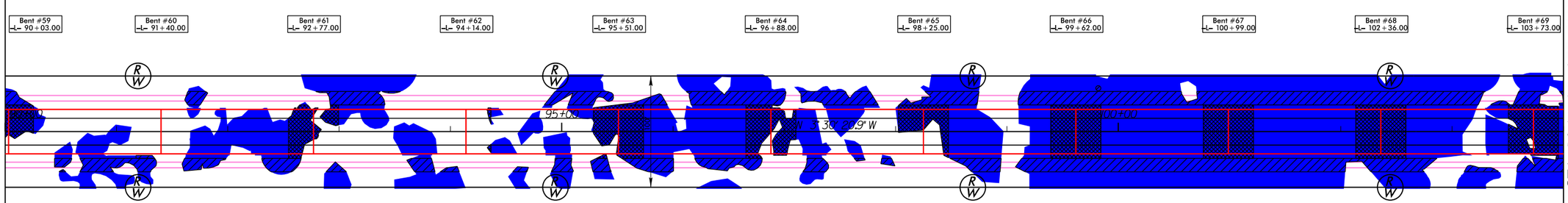
50 25 0 50 100

SCALE

PAMLICO SOUND

SITE 3B

MATCHLINE -L- STA. 90+00 SEE SHEET 9



SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

MATCHLINE -L- STA. 104+00 SEE SHEET 11

FOR -L- PROFILE SEE SHT. 27

PLANS PREPARED BY :
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SHEET 30 OF 44

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PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

Bent #59 -L- 96+03.00
Bent #60 -L- 91+40.00
Bent #61 -L- 92+77.00
Bent #62 -L- 94+14.00
Bent #63 -L- 95+51.00
Bent #64 -L- 96+88.00
Bent #65 -L- 98+25.00
Bent #66 -L- 99+62.00
Bent #67 -L- 100+99.00
Bent #68 -L- 102+36.00
Bent #69 -L- 103+73.00

95+0

30 9' W

MATCHLINE -L- STA. 90+00 SEE SHEET 9

MATCHLINE -L- STA. 104+00 SEE SHEET 11

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 27

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NAD 83

PERMIT DRAWING SHEET 31 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision - Water Intake Locations Remain Valid

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

Water intake location

Water intake location

Water intake location

-L- PC Sta. 113+35.97

Bent #70 -L- 105+10.00

Bent #71 -L- 106+47.00

Bent #72 -L- 107+84.00

Bent #73 -L- 109+21.00

Bent #74 -L- 110+58.00

Bent #75 -L- 111+95.00

Bent #76 -L- 113+32.00

Bent #77 -L- 114+67.79

Bent #78 -L- 116+03.58

Bent #79 -L- 117+39.38

105+00

N 3° 30' 20" W

100'

110+00

28'

52.24'

115+00

R/W

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

MATCHLINE -L- STA. 104+00 SEE SHEET 10

MATCHLINE -L- STA. 118+00 SEE SHEET 12

FOR -L- PROFILE SEE SHT.27

PLANS PREPARED BY :

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11/21/2017
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B-2500B	11
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMIT DRAWING
SHEET 31 OF 44

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DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

-L- PC Sta. 113+35.97

Bent #70 -L- 105+10.00
Bent #71 -L- 106+47.00
Bent #72 -L- 107+84.00
Bent #73 -L- 109+21.00
Bent #74 -L- 110+58.00
Bent #75 -L- 111+95.00
Bent #76 -L- 113+32.00
Bent #77 -L- 114+67.79
Bent #78 -L- 116+03.58
Bent #79 -L- 117+39.38

N 3°30'40" W

110'±00

28' TYP.

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

MATCHLINE -L- STA. 104+00 SEE SHEET 10

MATCHLINE -L- STA. 118+00 SEE SHEET 12

FOR -L- PROFILE SEE SHT. 27

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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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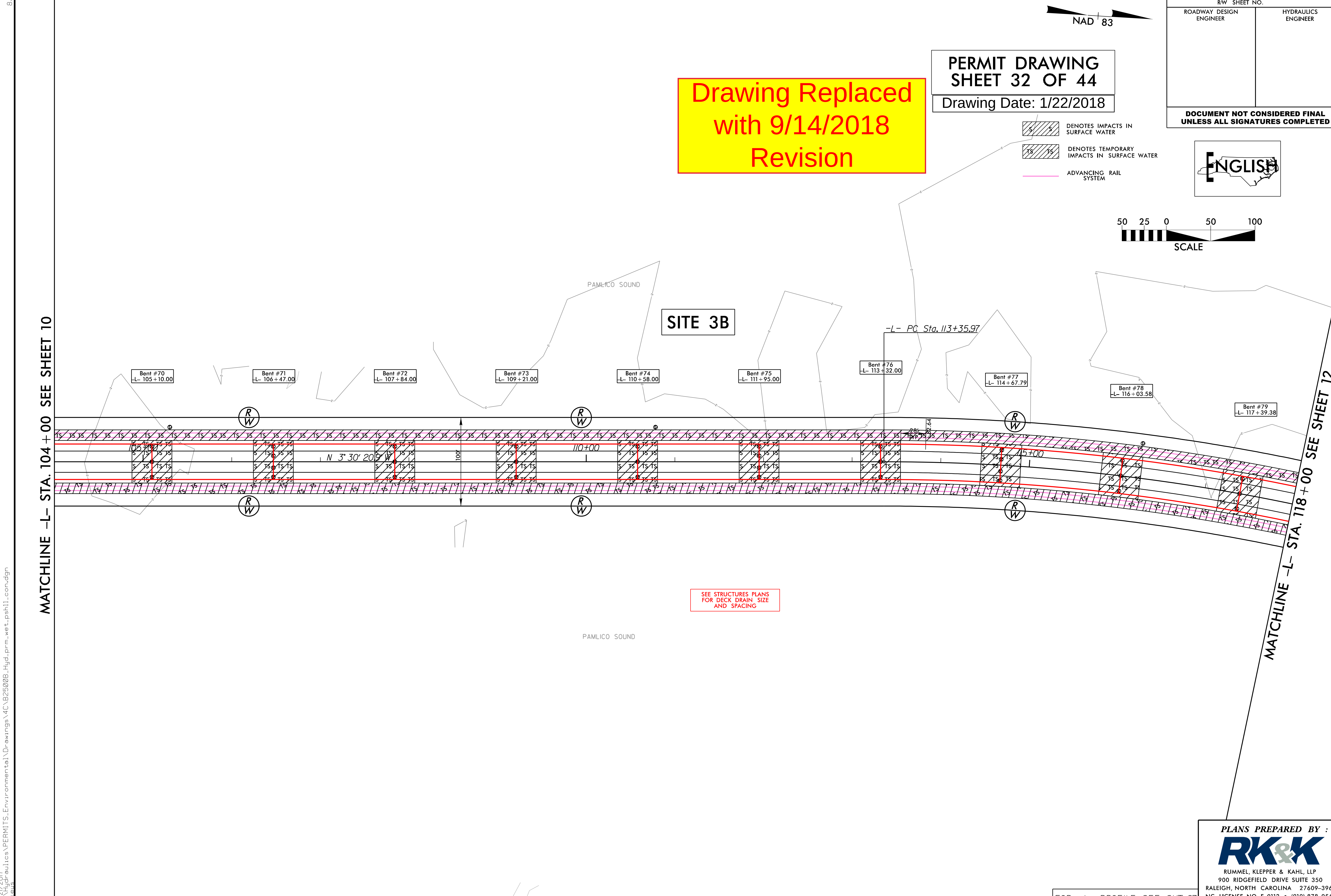
PERMIT DRAWING SHEET 32 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision



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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83

REVISED 09/14/2018

PERMIT DRAWING
SHEET 32 OF 44

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SEP 28 2018

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DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100

SCALE

MATCHLINE -L- STA. 104+00 SEE SHEET 10

MATCHLINE -L- STA. 118+00 SEE SHEET 12

SITE 3B

-L- PC Sta. 113+35.97

Bent #70 -L- 105+10.00

Bent #71 -L- 106+47.00

Bent #72 -L- 107+84.00

Bent #73 -L- 109+21.00

Bent #74 -L- 110+58.00

Bent #75 -L- 111+95.00

Bent #76 -L- 113+32.00

Bent #77 -L- 114+67.79

Bent #78 -L- 116+03.58

Bent #79 -L- 117+39.38

105.00'

N 33°30'00" W

110.00'

110.00'

28' TYP.

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

FOR -L- PROFILE SEE SHT. 27

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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

PERMIT DRAWING
SHEET 33 OF 44
Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

50 25 0 50 100
SCALE

PAMLICO SOUND

SITE 3B

-L- PC Sta. 113+35.97

Bent #70 -L- 105+10.00
Bent #71 -L- 106+47.00
Bent #72 -L- 107+84.00
Bent #73 -L- 109+21.00
Bent #74 -L- 110+58.00
Bent #75 -L- 111+95.00
Bent #76 -L- 113+32.00
Bent #77 -L- 114+67.79
Bent #78 -L- 116+03.58
Bent #79 -L- 117+39.38

105+00
N 3° 30' 20.9" W
300'
110+00
82.64'
115+00

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

MATCHLINE -L- STA. 104+00 SEE SHEET 10

MATCHLINE -L- STA. 118+00 SEE SHEET 12

FOR -L- PROFILE SEE SHT.27

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REVISED 09/14/2018

PERMIT DRAWING
SHEET 33 OF 44

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	11
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100

SCALE

PAMLICO SOUND

SITE 3B

-L- PC Sta. 113+35.97

Bent #70 -L- 105+10.00

Bent #71 -L- 106+47.00

Bent #72 -L- 107+84.00

Bent #73 -L- 109+21.00

Bent #74 -L- 110+58.00

Bent #75 -L- 111+95.00

Bent #76 -L- 113+32.00

Bent #77 -L- 114+67.79

Bent #78 -L- 116+03.58

Bent #79 -L- 117+39.38

N 3° 30' 30.9" W

100'

100'

100'

82.54'

115+00

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

MATCHLINE -L- STA. 104+00 SEE SHEET 10

MATCHLINE -L- STA. 118+00 SEE SHEET 12

FOR -L- PROFILE SEE SHT. 27

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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	12
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83

PERMIT DRAWING SHEET 34 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision - Water Intake Locations Remain Valid.

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

SCALE 50 25 0 50 100

SITE 3B

PAMLICO SOUND

-L- PT Sta. 125+65.42

Water intake location

Bent #80 -L- 118+75.17

Bent #81 -L- 120+10.96

Bent #82 -L- 121+46.75

Bent #83 -L- 122+82.54

Bent #84 -L- 124+18.33

Bent #85 -L- 125+54.13

Bent #86 -L- 126+89.92

Bent #87 -L- 128+25.71

Bent #88 -L- 129+61.50

Bent #89 -L- 120+97.29

125+00

130+00

N 27° 48' 07.5" E

28'

MATCHLINE -L- STA. 118+00 SEE SHEET 11

MATCHLINE -L- STA. 132+00 SEE SHEET 13

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

SHORELINE

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

FOR -L- PROFILE SEE SHT.28

PLANS PREPARED BY :

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PROJECT REFERENCE NO.	SHEET NO.
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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SEP 28 2018
DCM-RALEIGH

NAD 83

REVISED 09/14/2018

PERMIT DRAWING
SHEET 34 OF 44

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

SITE 3B

-L- PT Sta. 125+65.42

50 25 0 50 100
SCALE

Bent #80 -L- 118 + 75.17

Bent #81 -L- 120 + 10.96

Bent #82 -L- 121 + 46.75

Bent #83 -L- 122 + 82.54

Bent #84 -L- 124 + 18.33

Bent #85 -L- 125 + 54.13

Bent #86 -L- 126 + 89.92

Bent #87 -L- 128 + 25.71

Bent #88 -L- 129 + 61.50

Bent #89 -L- 130 + 97.29

N 27° 48' 02.5" E

MATCHLINE -L- STA. 118+00 SEE SHEET 11

MATCHLINE -L- STA. 132+00 SEE SHEET 13

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

FOR -L- PROFILE SEE SHT. 28

PLANS PREPARED BY :

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PROJECT REFERENCE NO.	SHEET NO.
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ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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Drawing Replaced with 9/14/2018 Revision

PERMIT DRAWING SHEET 35 OF 44

Drawing Date: 1/22/2018

NAD 83

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

SITE 3B

50 25 0 50 100
SCALE

PAMLICO SOUND

-L- PT Sta. 125+65.42

Bent #80 -L- 118+75.17
Bent #81 -L- 120+10.96
Bent #82 -L- 121+46.75
Bent #83 -L- 122+82.54
Bent #84 -L- 124+18.33
Bent #85 -L- 125+54.13
Bent #86 -L- 126+89.92
Bent #87 -L- 128+25.71
Bent #88 -L- 129+61.50
Bent #89 -L- 120+97.29

125+00
130+00
N 27° 48' 07.5" E
28'
-L-
PE

MATCHLINE -L- STA. 118+00 SEE SHEET 11

MATCHLINE -L- STA. 132+00 SEE SHEET 13

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

SHORELINE

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

FOR -L- PROFILE SEE SHT.28

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PERMIT DRAWING
SHEET 35 OF 44

NAD 83

DENOTES IMPACTS IN SURFACE WATER

DENOTES TEMPORARY IMPACTS IN SURFACE WATER

ADVANCING RAIL SYSTEM

ENGLISH

SITE 3B

-L- PT Sta. 125+65.42

50 25 0 50 100
SCALE

Bent #80 -L- 118 + 75.17
Bent #81 -L- 120 + 10.96
Bent #82 -L- 121 + 46.75
Bent #83 -L- 122 + 82.54
Bent #84 -L- 124 + 18.33
Bent #85 -L- 125 + 54.13
Bent #86 -L- 126 + 89.92
Bent #87 -L- 128 + 25.71
Bent #88 -L- 129 + 61.50
Bent #89 -L- 130 + 97.29

N 27° 48' 02.5" E

MATCHLINE -L- STA. 118+00 SEE SHEET 11

MATCHLINE -L- STA. 132+00 SEE SHEET 13

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

FOR -L- PROFILE SEE SHT. 25

PLANS PREPARED BY :

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Drawing Replaced with 9/14/2018 Revision

PERMIT DRAWING SHEET 36 OF 44

Drawing Date: 1/22/2018

NAD 83

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100

SCALE

SITE 3B

PAMLICO SOUND

-L- PT Sta. 125+65.42

Bent #80 -L- 118+75.17

Bent #81 -L- 120+10.96

Bent #82 -L- 121+46.75

Bent #83 -L- 122+82.54

Bent #84 -L- 124+18.33

Bent #85 -L- 125+54.13

Bent #86 -L- 126+89.92

Bent #87 -L- 128+25.71

Bent #88 -L- 129+61.50

Bent #89 -L- 120+97.29

MATCHLINE -L- STA. 118+00 SEE SHEET 11

MATCHLINE -L- STA. 132+00 SEE SHEET 13

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

PAMLICO SOUND

SHORELINE

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

WLB

WLL

SAV

FOR -L- PROFILE SEE SHT.28

PLANS PREPARED BY :

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PROJECT REFERENCE NO.	SHEET NO.
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R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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NAD 83

REVISED 09/14/2018

PERMIT DRAWING
SHEET 36 OF 44

RECEIVED
SEP 28 2018
DCM-RALEIGH

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

ENGLISH

50 25 0 50 100
SCALE

SITE 3B

-L- PT Sta. 125+65.42

Bent #80 -L- 118 + 75.17

Bent #81 -L- 120 + 10.96

Bent #82 -L- 121 + 46.75

Bent #83 -L- 122 + 82.54

Bent #84 -L- 124 + 18.33

Bent #85 -L- 125 + 54.13

Bent #86 -L- 126 + 89.92

Bent #87 -L- 128 + 25.71

Bent #88 -L- 129 + 61.50

Bent #89 -L- 120 + 97.29

MATCHLINE -L- STA. 118 + 00 SEE SHEET 11

MATCHLINE -L- STA. 132 + 00 SEE SHEET 13

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

FOR -L- PROFILE SEE SHT. 28

PLANS PREPARED BY :

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8/17/99

PERMIT DRAWING
SHEET 37 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision - Water Intake Location Remains Valid.

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

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F F DENOTES FILL IN WETLAND

HC HC DENOTES HAND CLEARING

S S DENOTES IMPACTS IN SURFACE WATER

TS TS DENOTES TEMPORARY IMPACTS IN SURFACE WATER

T T DENOTES TEMPORARY FILL IN WETLAND

CAMA WETLAND BOUNDARY

ADVANCING RAIL SYSTEM

PAMLICO SOUND

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

NAD 83

ENGLISH

50 25 0 50 100
SCALE

MATCHLINE -L- STA. 146+00 SEE SHEET 14

SITE 3B

SITE 3C

Water intake location

-L- PC Sta. 134+41.13

Bent #90 -L- 132+33.08

Bent #91 -L- 133+68.88

Bent #92 -L- 135+04.67

Bent #93 -L- 136+40.46

Bent #94 -L- 137+76.25

Bent #95 -L- 139+12.04

Bent #96 -L- 140+47.83

Bent #97 -L- 141+83.63

Bent #98 -L- 143+19.42

Bent #99 -L- 144+55.21

Bent #100 -L- 145+91.00

+41.13 50'

+41.13 50'

+69.23 50'

N 27° 48' 07" E 135.00'

28' TYP.

40+00

100'

145+00

15+00

10+00

-DET- PRC Sta. 14+88.65

-DET- PC Sta. 10+00.00

-DET-

TUE

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

UNITED STATES OF AMERICA

ATLANTIC OCEAN

MATCHLINE SEE SHEET 23

MATCHLINE -L- STA. 132+00 SEE SHEET 12

-L-
PI Sta 142+11.31
△ = 37° 38' 12.9" (LT)
D = 2° 32' 06.8"
L = 1,484.57'
T = 770.18'
R = 2,260.00'
V = 60 mph
SE = .05

FOR -L- PROFILE SEE SHT. 28
FOR -DET- PLAN SEE SHT. 28-I

PLANS PREPARED BY :

RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
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ksmith

REVISED 09/14/2018

PERMIT DRAWING
SHEET 37 OF 44

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES TEMPORARY FILL IN WETLAND
CAMA WETLAND BOUNDARY
ADVANCING RAIL SYSTEM

ENGLISH

50 25 0 50 100
SCALE

CONSTRUCTION REVISION: DATE: 5/23/2018 - REVISED TEMPORARY ON-SITE DETOUR, TEMPORARY EASEMENT, AND MATCH LINES.

MATCHLINE -L- STA. 132+00 SEE SHEET 12

MATCHLINE -L- STA. 146+00 SEE SHEET 14

CAMA WETLAND

SITE 3C

SITE 3B

RECEIVED
SEP 28 2018
DCM-RALEIGH

-L- PC Sta. 134+41.13

Bent #90 -L- 132+33.08
Bent #91 -L- 133+68.88
Bent #92 -L- 135+04.67
Bent #93 -L- 136+40.46
Bent #94 -L- 137+76.25
Bent #95 -L- 139+12.04
Bent #96 -L- 140+47.83
Bent #97 -L- 141+83.63
Bent #98 -L- 143+19.42
Bent #99 -L- 144+55.21
Bent #100 -L- 145+91.00

41.13 50'
27.48'
41.13 50'
69.23 50'

140+00
145+00
15+00

-DET_REV- PRC Sta. 16+60.28

TUE
TUE
TUE

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

BEGIN CONSTRUCTION
-DET_REV- PC Sta. 10+00.00

MATCHLINE SEE SHEET 23

-L-
PI Sta. 142+11.31
Δ = 37° 38' 12.9" (LT)
D = 2° 32' 06.8"
L = 1,484.57'
T = 770.18'
R = 2,260.00'
V = 60 mph
SE = .05

FOR -L- PROFILE SEE SHT. 28
FOR -DET_REV- PLAN SEE SHT. 28-1

PLANS PREPARED BY :
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8/17/99

PERMIT DRAWING SHEET 38 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

- F F — DENOTES FILL IN WETLAND
- HC HC — DENOTES HAND CLEARING
- S S — DENOTES IMPACTS IN SURFACE WATER
- TS TS — DENOTES TEMPORARY IMPACTS IN SURFACE WATER
- T T — DENOTES TEMPORARY FILL IN WETLAND
- CAMA WETLAND BOUNDARY
- ADVANCING RAIL SYSTEM

PAMLICO SOUND

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

SITE 3C

SITE 3B

SITE 3D

NAD 83

ENGLISH

50 25 0 50 100
SCALE

MATCHLINE -L- STA. 132+00 SEE SHEET 12

MATCHLINE -L- STA. 146+00 SEE SHEET 14

MATCHLINE SEE SHEET 23

-L- PC Sta. 134+41.13

-DET- PRC Sta. 14+88.65

-DET- PC Sta. 10+00.00

Bent #90 -L- 132+33.08
Bent #91 -L- 133+68.88
Bent #92 -L- 135+04.67
Bent #93 -L- 136+40.46
Bent #94 -L- 137+76.25
Bent #95 -L- 139+12.04
Bent #96 -L- 140+47.83
Bent #97 -L- 141+83.63
Bent #98 -L- 143+19.42
Bent #99 -L- 144+55.21
Bent #100 -L- 145+91.00

+41.13 50'
+69.23 50'

N 27° 48' 07" E 135.00'

140+00

145+00

15+00

10+00

200'

28' TYP.

PE

TUE

-DET-

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

UNITED STATES OF AMERICA

ATLANTIC OCEAN

-L-
PI Sta 142+11.31
△ = 37° 38' 12.9" (LT)
D = 2° 32' 06.8"
L = 1,484.57'
T = 770.18'
R = 2,260.00'
V = 60 mph
SE = .05

FOR -L- PROFILE SEE SHT.28
FOR -DET- PLAN SEE SHT.28-I

PLANS PREPARED BY :
RK&K
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RALEIGH, NORTH CAROLINA 27609-3960
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REVISED 09/14/2018

PERMIT DRAWING
SHEET 38 OF 44

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	13
RW. SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

ENGLISH

DENOTES FILL IN WETLAND
DENOTES HAND CLEARING
DENOTES IMPACTS IN SURFACE WATER
DENOTES TEMPORARY IMPACTS IN SURFACE WATER
DENOTES TEMPORARY FILL IN WETLAND
CAMA WETLAND BOUNDARY
ADVANCING RAIL SYSTEM

PAMLICO SOUND

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

NAD 83

50 25 0 50 100
SCALE

SITE 3C

SITE 3B

RECEIVED
SEP 28 2018
DCM-RALEIGH

MATCHLINE -L- STA. 132+00 SEE SHEET 12

MATCHLINE -L- STA. 146+00 SEE SHEET 14

-L- PC Sta. 134+41.13

Bent #90 -L- 132+33.08
Bent #91 -L- 133+68.88
Bent #92 -L- 135+04.67
Bent #93 -L- 136+40.46
Bent #94 -L- 137+76.25
Bent #95 -L- 139+12.04
Bent #96 -L- 140+47.83
Bent #97 -L- 141+83.63
Bent #98 -L- 143+19.42
Bent #99 -L- 144+55.21
Bent #100 -L- 145+91.00

41.13 50'
+41.13 50'
27.48'
40+00
15+00
145+00
+69.23 50'

-DET_REV- PRC Sta. 16+60.28

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

TUE

BEGIN CONSTRUCTION
-DET_REV- PC Sta. 10+00.00

MATCHLINE SEE SHEET 23

-L-
PI Sta 142+11.31
Δ = 37° 38' 12.9" (LT)
D = 2° 32' 06.8"
L = 1,484.57'
T = 770.18'
R = 2,260.00'
V = 60 mph
SE = .05

FOR -L- PROFILE SEE SHT. 28
FOR -DET_REV- PLAN SEE SHT. 28-1

PLANS PREPARED BY :
RK&K
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900 RIDGEFIELD DRIVE SUITE 350
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CONSTRUCTION REVISION: DATE: 5/23/2018 - REVISED TEMPORARY ON-SITE DETOUR, TEMPORARY EASEMENT, AND MATCH LINES.

8/17/99

PERMIT DRAWING SHEET 39 OF 44

Drawing Date: 1/22/2018

Drawing Replaced with 9/14/2018 Revision

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMANENT IMPACTS TO SAV
TEMPORARY IMPACTS TO SAV
CAMA WETLAND BOUNDARY
ADVANCING RAIL SYSTEM
SUBMERGED AQUATIC VEGETATION

PAMLICO SOUND

CAMA WETLAND

SITE 3C

SITE 3B

MATCHLINE -L- STA. 132+00 SEE SHEET 12

MATCHLINE -L- STA. 146+00 SEE SHEET 14

MATCHLINE SEE SHEET 23

-L- PC Sta. 134+41.13

-DET- PRC Sta. 14+88.65

-DET- PC Sta. 10+00.00

Bent #90 -L- 132+33.08
Bent #91 -L- 133+68.88
Bent #92 -L- 135+04.67
Bent #93 -L- 136+40.46
Bent #94 -L- 137+76.25
Bent #95 -L- 139+12.04
Bent #96 -L- 140+47.83
Bent #97 -L- 141+83.63
Bent #98 -L- 143+19.42
Bent #99 -L- 144+55.21
Bent #100 -L- 145+91.00

+41.13 50'
+87.80 28' TYP.
+69.23 50'

135+00
140+00
145+00
10+00
100'
150'

N 27° 45' 07.5" E

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

UNITED STATES OF AMERICA

ATLANTIC OCEAN

NAD 83

ENGLISH

SCALE 50 25 0 50 100

-L-
PI Sta 142+11.31
△ = 37° 38' 12.9" (LT)
D = 2° 32' 06.8"
L = 1,484.57'
T = 770.18'
R = 2,260.00'
V = 60 mph
SE = .05

FOR -L- PROFILE SEE SHT. 28
FOR -DET- PLAN SEE SHT. 28-I

PLANS PREPARED BY :

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RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

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11/2/2017
Kleinfelter

REVISED 09/14/2018

PERMIT DRAWING
SHEET 39 OF 44

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	13
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMANENT IMPACTS TO SAV

TEMPORARY IMPACTS TO SAV

CAMA WETLAND BOUNDARY

ADVANCING RAIL SYSTEM

SUBMERGED AQUATIC VEGETATION

FAMLICO SOUND

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

SITE 3C

SITE 3B

RECEIVED
SEP 28 2018
DCM-RALEIGH

NAD 83

ENGLISH

50 25 0 50 100
SCALE

MATCHLINE -L- STA. 146+00 SEE SHEET 14

MATCHLINE -L- STA. 132+00 SEE SHEET 12

-L- PC Sta. 134+41.13

Bent #90 -L- 132+33.08

Bent #91 -L- 133+68.88

Bent #92 -L- 135+04.67

Bent #93 -L- 136+40.46

Bent #94 -L- 137+76.25

Bent #95 -L- 139+12.04

Bent #96 -L- 140+47.83

Bent #97 -L- 141+83.63

Bent #98 -L- 143+19.42

Bent #99 -L- 144+55.21

Bent #100 -L- 145+91.00

41.13 50'

+41.13 50'

28' TYP. 87.80

97.5'

135+00

140+00

145+00

15+00

69.23 50'

-DET_REV- PRC Sta. 16+60.28

-DET_REV-

TUE

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

BEGIN CONSTRUCTION
-DET_REV- PC Sta. 10+00.00

MATCHLINE SEE SHEET 23

FOR -L- PROFILE SEE SHT. 2B
FOR -DET_REV- PLAN SEE SHT. 2B-1

-L-
PI Sta 142+11.31
Δ = 37° 38' 12.9" (LT)
D = 2° 32' 06.8"
L = 1,484.57'
T = 770.18'
R = 2,260.00'
V = 60 mph
SE = .05

PLANS PREPARED BY :

RK&K

RUMMEL KLEPPER & KAHL LLP
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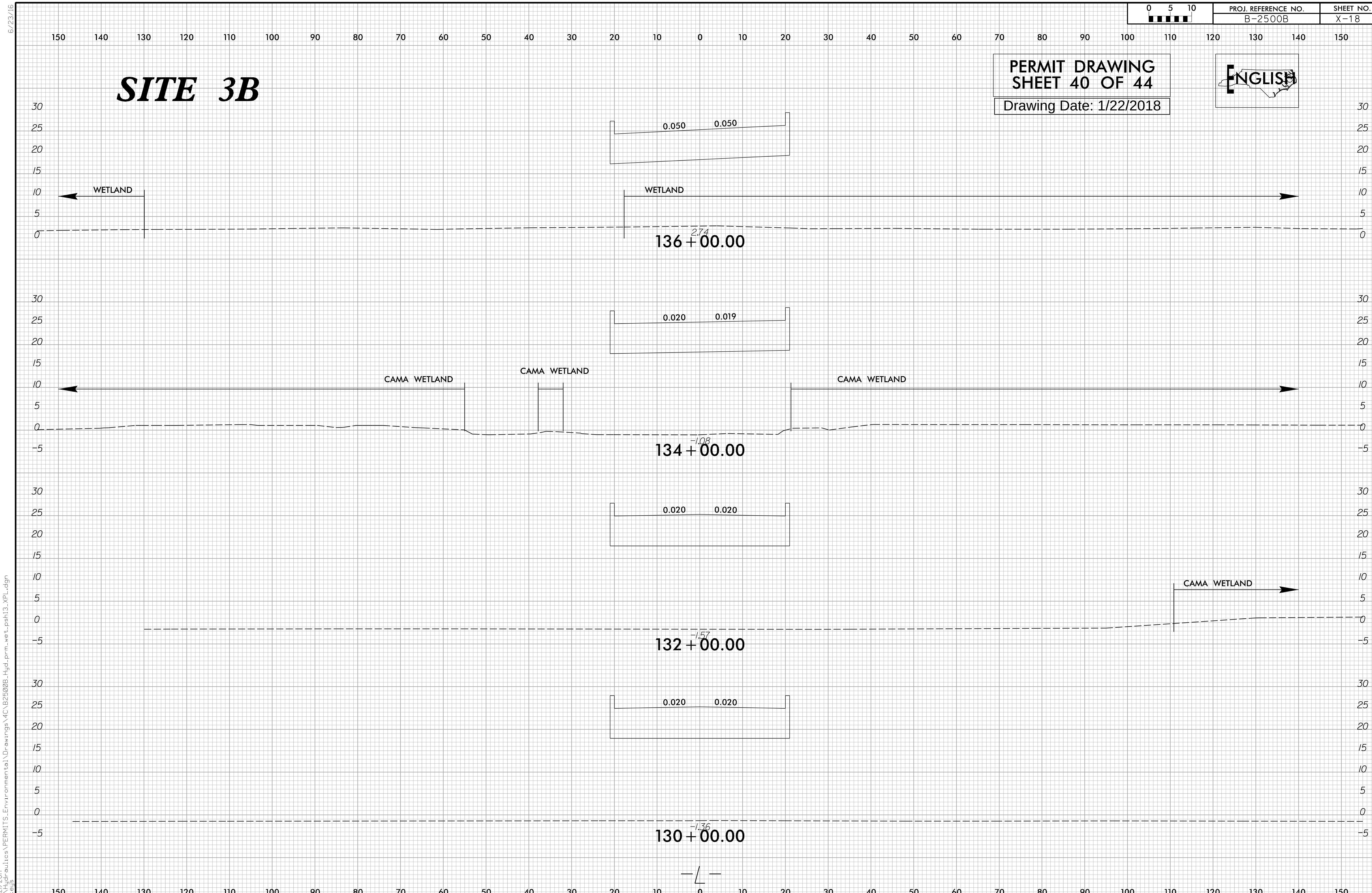
RALEIGH, NORTH CAROLINA 27609-3560
NC LICENSE NO. F-0112 • (919) 878-9560

CONSTRUCTION REVISION: DATE: 5/23/2018 - REVISED TEMPORARY ON-SITE DETOUR, TEMPORARY EASEMENT, AND MATCH LINES.



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11/21/2017
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6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-2500B	X-19

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

SITE 3B

PERMIT DRAWING
SHEET 41 OF 44

Drawing Date: 1/22/2018

ENGLISH

30 25 20 15 10 5 0

0.050 0.050

WETLAND

3.92

144+00.00

30 25 20 15 10 5 0

0.050 0.050

WETLAND

2.15

142+00.00

30 25 20 15 10 5 0

0.050 0.050

WETLAND

3.56

140+00.00

30 25 20 15 10 5 0

0.050 0.050

WETLAND

3.99

138+00.00

—℄—

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

11/21/2017
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Kegg

8/17/99

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 42 OF 44

REVISED 2/1/2018

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2/1/2018
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PLANS PREPARED BY :

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900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	

R/W SHEET NO.

ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

PERMIT DRAWING
SHEET 43 OF 44

REVISED 2/1/2018

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PLANS PREPARED BY :

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RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99

2/1/2018
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Drawing Replaced with 9/14/2018 Revision

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	-L- 13+00 RT	ROADWAY FILL		0.03		0.01						
2	-L- 17+62	36" RCP-V EQUALIZER, ROADWAY FILL, LAYDOWN YARD	0.25	0.68		0.06						
3A	-L- 20+60 - 25+45	BRIDGE - 4 SPANS @ 60' 15-24" C.S. & 4 SPANS @ 97'-3" 4-45" F.I.B.s	0.04	0.31		0.02	0.21					
3B	-L- 25+45 - 133+17	BRIDGE AND ADVANCING RAIL SYSTEM						0.11	10.07			
3C	-L- 133+17 - 143+95	BRIDGE - 9 SPANS @ 135'-8" 4-72" F.I.B.s	< 0.01	0.38			0.24					
TOTALS*:			0.29	1.40		0.09	0.46	0.11	10.07			

*Rounded totals are sum of actual impacts

NOTES:

SAV IMPACTS: 2.57AC PERM. IMPACT; 3.07AC TEMP. IMPACT

REVISED 2/1/2018

CAMA vs 404 Wetland Impacts
Perm. Fill in CAMA Wetlands = 0ac
Perm. Fill in 404 Wetlands = 0.29ac
Temp. Fill in CAMA Wetlands = 0.15ac
Temp. Fill in 404 Wetlands = 1.25ac
Mech. Clearing in CAMA Wetlands = 0ac
Mech. Clearing in 404 Wetlands = 0.09ac
Hand Clearing in CAMA Wetlands = 0.11ac
Hand Clearing in 404 Wetlands = 0.35ac

Bent Impacts	
Proposed Bridge	**Advancing Rail System**
Perm. Fill in CAMA Wetlands = <0.01ac	Temp. Fill in CAMA Wetlands = 0.08ac
Perm. Fill in 404 Wetlands = 0.02ac	Temp. Fill in 404 Wetlands = 0.32ac
Temp. Fill in CAMA Wetlands = 0.08ac	Temp. Fill in Surface Water = 5.95ac
Temp. Fill in 404 Wetlands = 0.20ac	
Perm. Fill in Surface Water = 0.11ac	
Temp. Fill in Surface Water = 4.12ac	

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
FEBRUARY 2018
DARE
B-2500B
32635.3.FR7

SHEET 44 OF 44

WETLAND AND SURACE WATER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	WETLAND IMPACTS: Temp. Fill In Wetlands (ac)	WETLAND IMPACTS: Excavation in Wetlands (ac)	WETLAND IMPACTS: Mechanized Clearing in Wetlands (ac)	WETLAND IMPACTS: Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	SURFACE WATER IMPACTS: Temp. SW impacts (ac)	SURFACE WATER IMPACTS: Existing Channel Impacts Permanent (ft)	SURFACE WATER IMPACTS: Existing Channel Impacts Temp. (ft)	SURFACE WATER IMPACTS: Natural Stream Design (ft)
1	-L- 13+00 RT	ROADWAY FILL		0.03		0.01						
2	-L- 17+62	36" RCP-V EQUALIZER, ROADWAY FILL, LAYDOWN YARD	0.25	0.68		0.06						
3A	-L- 20+60 - 25+45	BRIDGE - 4 SPANS @ 60' 15-24" C.S. & 4 SPANS @ 97'-3" 4-45" F.I.B.s	0.04	0.34		0.02	0.42					
3B	-L- 25+45 - 133+17	BRIDGE AND ADVANCING RAIL SYSTEM						0.09	9.78			
3C	-L- 133+17 - 143+95	BRIDGE - 9 SPANS @ 135'-8" 4-72" F.I.B.s	< 0.01	0.49			0.46					
TOTALS*:			0.29	1.54		0.09	0.88	0.09	9.78			

*Rounded totals are sum of actual impacts

NOTES:

SAV IMPACTS: 2.52AC PERM. IMPACT; 2.87AC TEMP. IMPACT

REVISED 2/1/2018, 9/14/18

CAMA vs 404 Wetland Impacts
Perm. Fill in CAMA Wetlands = <0.01ac
Perm. Fill in 404 Wetlands = 0.29ac
Temp. Fill in CAMA Wetlands = 0.20ac
Temp. Fill in 404 Wetlands = 1.33ac
Mech. Clearing in CAMA Wetlands = 0ac
Mech. Clearing in 404 Wetlands = 0.09ac
Hand Clearing in CAMA Wetlands = 0.21ac
Hand Clearing in 404 Wetlands = 0.66ac

Bent Impacts	
Proposed Bridge	**Advancing Rail System**
Perm. Fill in CAMA Wetlands = <0.01ac	Temp. Fill in CAMA Wetlands = 0.12ac
Perm. Fill in 404 Wetlands = 0.01ac	Temp. Fill in 404 Wetlands = 0.42ac
Temp. Fill in CAMA Wetlands = 0.08ac	Temp. Fill in Surface Wate = 5.75ac
Temp. Fill in 404 Wetlands = 0.21ac	
Perm. Fill in Surface Water = 0.09ac	
Temp. Fill in Surface Water = 4.03ac	

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
FEBRUARY 2018
DARE
B-2500B
32635.3.FR7

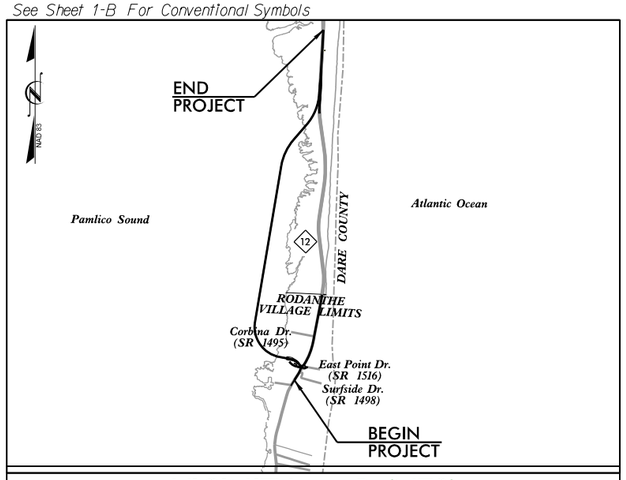
SHEET 44 OF 44

09/08/99

TIP PROJECT: B-2500B

CONTRACT: C203474

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP (NTS)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DARE COUNTY

STATE	STATE PROJECT REFERENCE NO.	SHEET NO.	TOTAL SHEETS
N.C.	B-2500B	1	
STATE PROJ. NO.	F.A. PROJ. NO.	DESCRIPTION	
32635.3.FR7	BRNHF-0012(56)		

LOCATION: NC 12 – RODANTHE BREACH LONG TERM IMPROVEMENTS (PHASE IIB)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNING & STRUCTURES

UTILITY PERMIT DRAWING SHEET 1 OF 9

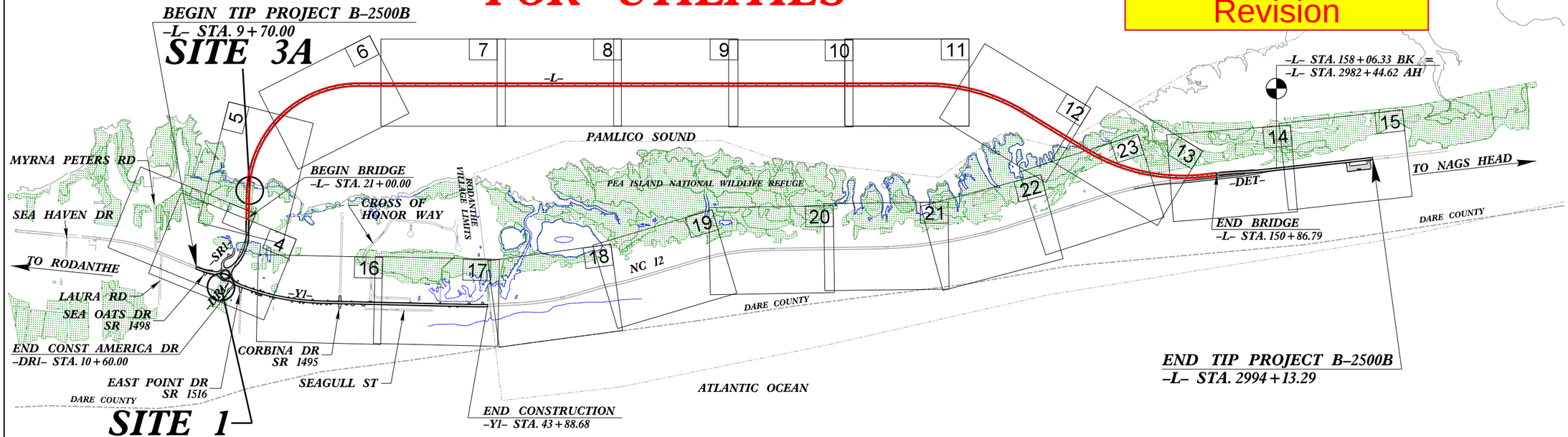
Drawing Date: 1/22/2018

ENGLISH

NAD 83

JURISDICTIONAL IMPACTS FOR UTILITIES

Drawing Replaced with 9/14/2018 Revision



THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON PLANS.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2017 = 9,800

ADT 2037 = 14,200

V = 40 /60 MPH

FUNC. CLASSIFICATION = RURAL COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-2500B.....0.572 mi
LENGTH STRUCTURE TIP PROJECT B-2500B.....2.460 mi
TOTAL LENGTH TIP PROJECT B-2500B.....3.032 mi

NCDOT CONTACT

K. Zak Hamidi, P.E.
PROJECT ENGINEER – DESIGN-BUILD GROUP

PLANS PREPARED BY:

RK&K — RUMMEL, KLEPPER & KAHL, LLP, 900 RIDGEFIELD DRIVE, SUITE 350, RALEIGH, NORTH CAROLINA 27609, NC LICENSE NO. F-0112

FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

FLATIRON

2012 STANDARD SPECIFICATIONS

LETTING DATE:
JANUARY 25, 2017

B. Keith Skinner, P.E.
PROJECT ENGINEER

Brandon J. McInnis, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER

SIGNATURE: P.E.

ROADWAY DESIGN ENGINEER

SIGNATURE: P.E.

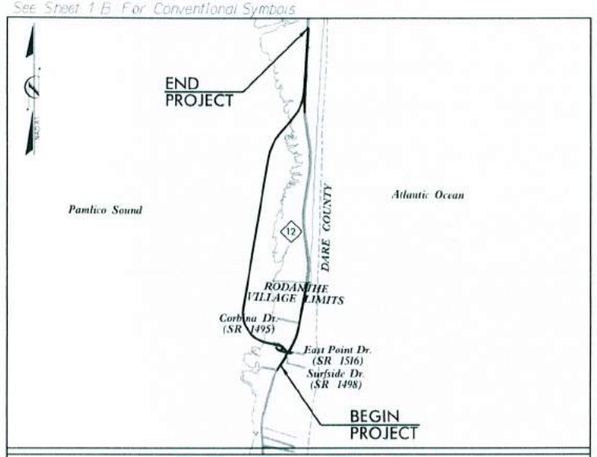
STATE OF NORTH CAROLINA • DEPARTMENT OF TRANSPORTATION •

11/2/2017
R:\Hydraulics\PERMITS_Environmental\Drawings\4C\Utilities\B2500B_UtilPermit_tsh.dgn
FKeys

TIP PROJECT: B-2500B

CONTRACT: C203474

See Sheet 1-A For Index of Sheets
See Sheet 1-B For Conventional Symbols



VICINITY MAP (NTS)

STATE OF NORTH CAROLINA
DIVISION OF HIGHWAYS

DARE COUNTY

RECEIVED
SEP 28 2018
DCM-RALEIGH

STATE	STATE PROJECT REFERENCE NO	SHEET NO	TOTAL SHEETS
N.C.	B-2500B	1	
STATE PROJ NO.	F. A. PROJ NO.	DESCRIPTION	
32635.3.FR7	BRNHF-0012(56)		

LOCATION: NC 12 – RODANTHE BREACH LONG TERM IMPROVEMENTS (PHASE IIB)

TYPE OF WORK: GRADING, DRAINAGE, PAVING, SIGNING & STRUCTURES

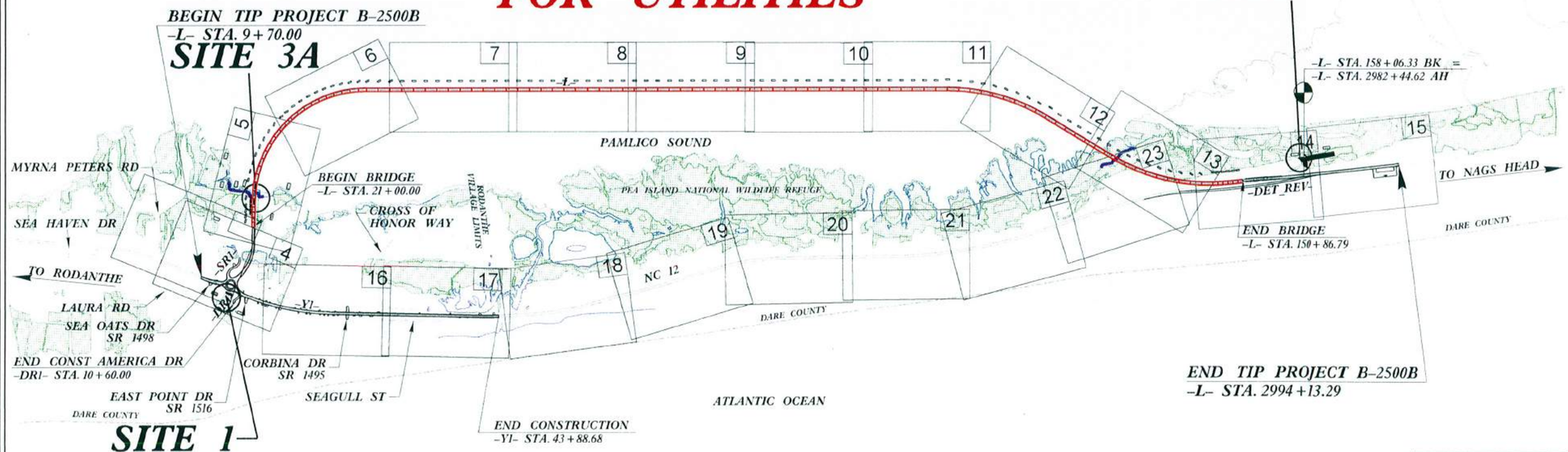
UTILITY PERMIT DRAWING SHEET 1 OF 12

PERMIT MODIFICATION 09/14/2018

ENGLISH

NAD 83

JURISDICTIONAL IMPACTS FOR UTILITIES



THIS IS A PARTIAL CONTROLLED-ACCESS PROJECT WITH ACCESS BEING LIMITED TO POINTS AS SHOWN ON PLANS.

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

GRAPHIC SCALES

PLANS: 50 25 0 50 100

PROFILE (HORIZONTAL): 50 25 0 50 100

PROFILE (VERTICAL): 10 5 0 10 20

DESIGN DATA

ADT 2017 = 9,800

ADT 2037 = 14,200

V = 40 /60 MPH

FUNC. CLASSIFICATION = RURAL COLLECTOR

PROJECT LENGTH

LENGTH ROADWAY TIP PROJECT B-2500B.....0.572 mi
LENGTH STRUCTURE TIP PROJECT B-2500B.....2.460 mi
TOTAL LENGTH TIP PROJECT B-2500B.....3.032 mi

NCDOT CONTACT

K. Zak Hamidi, P.E.
PROJECT ENGINEER - DESIGN-BUILD GROUP

PLANS PREPARED BY:

RK&K — RUMMEL KLEPPER & KAHL, LLP, 900 RIDGEFIELD DRIVE, SUITE 206, RALEIGH, NORTH CAROLINA 27609, NC LICENSE NO. C-0170

FLATIRON

FOR NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

2012 STANDARD SPECIFICATIONS

LETTING DATE: JANUARY 25, 2017

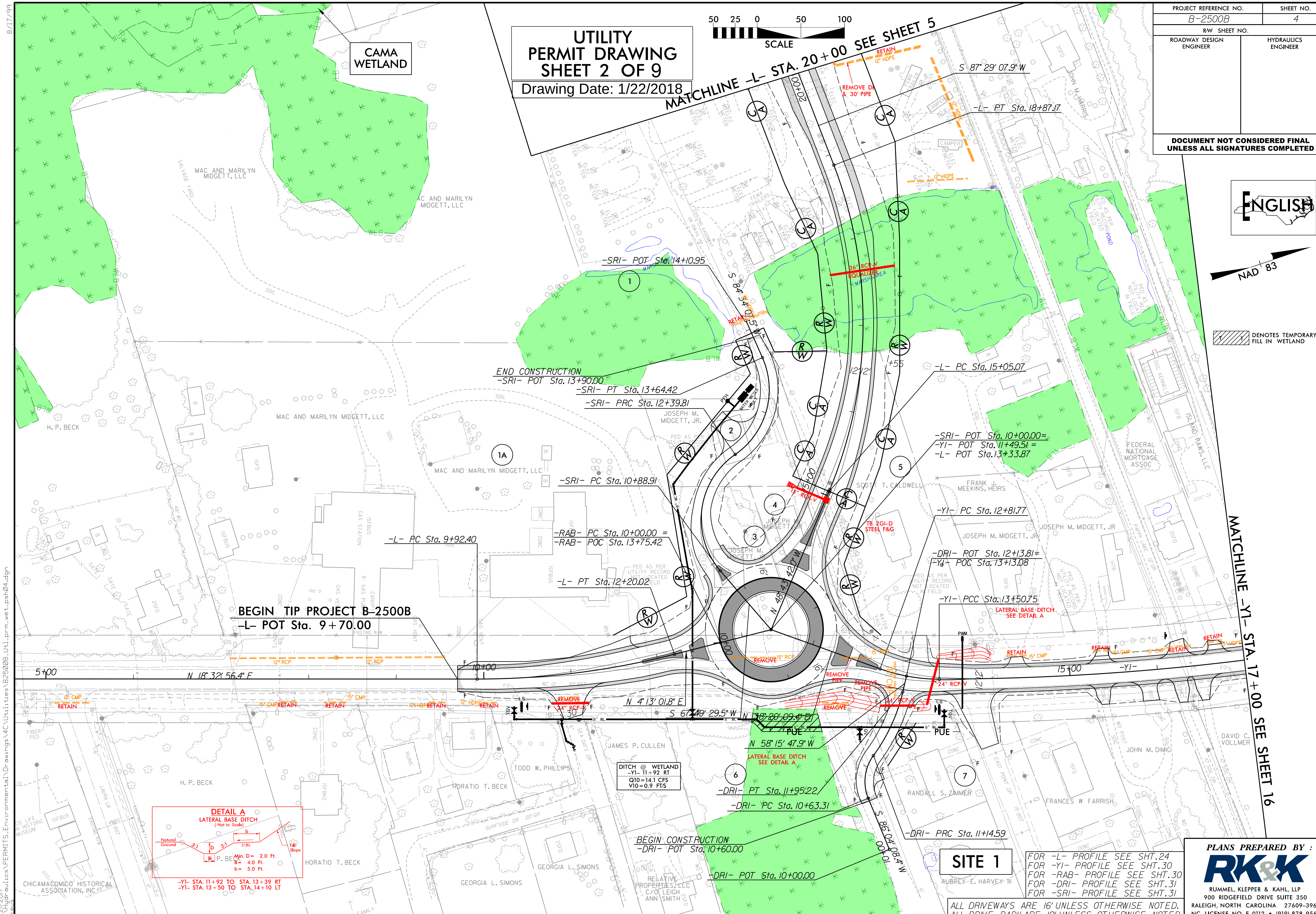
B. Keith Skinner, P.E.
PROJECT ENGINEER

Brandon J. McInnis, P.E.
PROJECT DESIGN ENGINEER

HYDRAULICS ENGINEER
SIGNATURE P.E.

ROADWAY DESIGN ENGINEER
SIGNATURE P.E.

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION



UTILITY PERMIT DRAWING SHEET 2 OF 9
Drawing Date: 1/22/2018
PROJECT REFERENCE NO.
SHEET NO.
B-2500B
4
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
CAMA WETLAND
MATCHLINE -L- STA. 20+00 SEE SHEET 5
MATCHLINE -Y1- STA. 17+00 SEE SHEET 16
SCALE
NAD 83
DENOTES TEMPORARY FILL IN WETLAND
BEGIN TIP PROJECT B-2500B
-L- POT Sta. 9+70.00
END CONSTRUCTION
-SRI- POT Sta. 13+90.00
-SRI- POT Sta. 14+10.95
-SRI- PT Sta. 13+64.42
-SRI- PRC Sta. 12+39.81
-SRI- PC Sta. 10+88.91
-L- PC Sta. 9+92.40
-RAB- PC Sta. 10+00.00 =
-RAB- POC Sta. 13+75.42
-L- PT Sta. 12+20.02
-L- PT Sta. 18+87.17
-L- PC Sta. 15+05.07
-SRI- POT Sta. 10+00.00=
-Y1- POT Sta. 11+49.51 =
-L- POT Sta. 13+33.87
-Y1- PC Sta. 12+81.77
-DRI- POT Sta. 12+13.81=
-Y1- POC Sta. 13+13.08
-Y1- PCC Sta. 13+50.75
-DRI- PT Sta. 11+95.22
-DRI- PC Sta. 10+63.31
-DRI- PRC Sta. 11+14.59
BEGIN CONSTRUCTION
-DRI- POT Sta. 10+60.00
-DRI- POT Sta. 10+00.00
S 87° 29' 07.9" W
N 18° 32' 56.4" E
N 4° 13' 01.8" E
S 67° 48' 29.5" W
N 58° 15' 47.9" W
LATERAL BASE DITCH SEE DETAIL A
DITCH @ WETLAND
-Y1- 11+92 RT
Q10=14.1 CFS
V10=0.9 FT/S
DETAIL A
LATERAL BASE DITCH
(Not to Scale)
Min. D= 2.0 Ft.
B= 4.0 Ft.
b= 5.0 Ft.
-Y1- STA. 11+92 TO STA. 13+39 RT
-Y1- STA. 13+50 TO STA. 14+10 LT
SITE 1
FOR -L- PROFILE SEE SHT.24
FOR -Y1- PROFILE SEE SHT.30
FOR -RAB- PROFILE SEE SHT.30
FOR -DRI- PROFILE SEE SHT.31
FOR -SRI- PROFILE SEE SHT.31
ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.
PLANS PREPARED BY:
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560
MAC AND MARILYN MIDGETT, LLC
JOSEPH M. MIDGETT, JR.
SCOTT T. CALDWELL
FRANK J. MEEKINS, HEIRS
FEDERAL NATIONAL MORTGAGE ASSOC
H. P. BECK
JAMES P. CULLEN
TODD W. PHILLIPS
HORATIO T. BECK
GEORGIA L. SIMONS
RANDALL S. ZIMMER
FRANCES W. FARRISH
JOHN M. DIMIG
DAVID C. VOLLMER
AUBREY E. HARVEY III
CHICAMACOMICO HISTORICAL ASSOCIATION, INC.
RELATIVE PROPERTIES, LLC C/O LEIGH ANN SMITH
8/17/99

8/17/99

UTILITY PERMIT DRAWING SHEET 3 OF 9

Drawing Date: 1/22/2018

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	4
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

SCALE 50 25 0 50 100

ENGLISH

NAD 83

DENOTES TEMPORARY FILL IN WETLAND

CAMA WETLAND

MATCHLINE -L- STA. 20+00 SEE SHEET 5

MATCHLINE -Y1- STA. 17+00 SEE SHEET 16

BEGIN TIP PROJECT B-2500B
-L- POT Sta. 9+70.00

-L- PC Sta. 9+92.40

-L- PT Sta. 12+20.02

-L- PT Sta. 18+87.17

-L- PC Sta. 15+05.07

-SRI- POT Sta. 14+10.95

END CONSTRUCTION
-SRI- POT Sta. 13+90.00
-SRI- PT Sta. 13+64.42
-SRI- PRC Sta. 12+39.81

-SRI- PC Sta. 10+88.91

-SRI- POT Sta. 10+00.00=
-Y1- POT Sta. 11+49.51 =
-L- POT Sta. 13+33.87

-RAB- PC Sta. 10+00.00 =
-RAB- POC Sta. 13+75.42

-Y1- PC Sta. 12+81.77

-DRI- POT Sta. 12+13.81=
-Y1- POC Sta. 13+13.08

-Y1- PCC Sta. 13+50.75

-DRI- PT Sta. 11+95.22

-DRI- PC Sta. 10+63.31

-DRI- PRC Sta. 11+14.59

BEGIN CONSTRUCTION
-DRI- POT Sta. 10+60.00

-DRI- POT Sta. 10+00.00

S 87° 29' 07.9" W

S 84° 34' 05" W

N 18° 32' 56.4" E

N 4° 13' 01.8" E

S 67° 49' 29.5" W

N 58° 20' 09.4" W

N 58° 15' 47.9" W

S 86° 04' 08.4" W

N 45° 13' 42" W

DETAIL A
LATERAL BASE DITCH
(Not to Scale)

-Y1- STA. 11+92 TO STA. 13+39 RT
-Y1- STA. 13+50 TO STA. 14+10 LT

DITCH @ WETLAND
-Y1- 11+92 RT
Q10=14.1 CFS
V10=0.9 FT/S

SITE 1

FOR -L- PROFILE SEE SHT.24
FOR -Y1- PROFILE SEE SHT.30
FOR -RAB- PROFILE SEE SHT.30
FOR -DRI- PROFILE SEE SHT.31
FOR -SRI- PROFILE SEE SHT.31

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

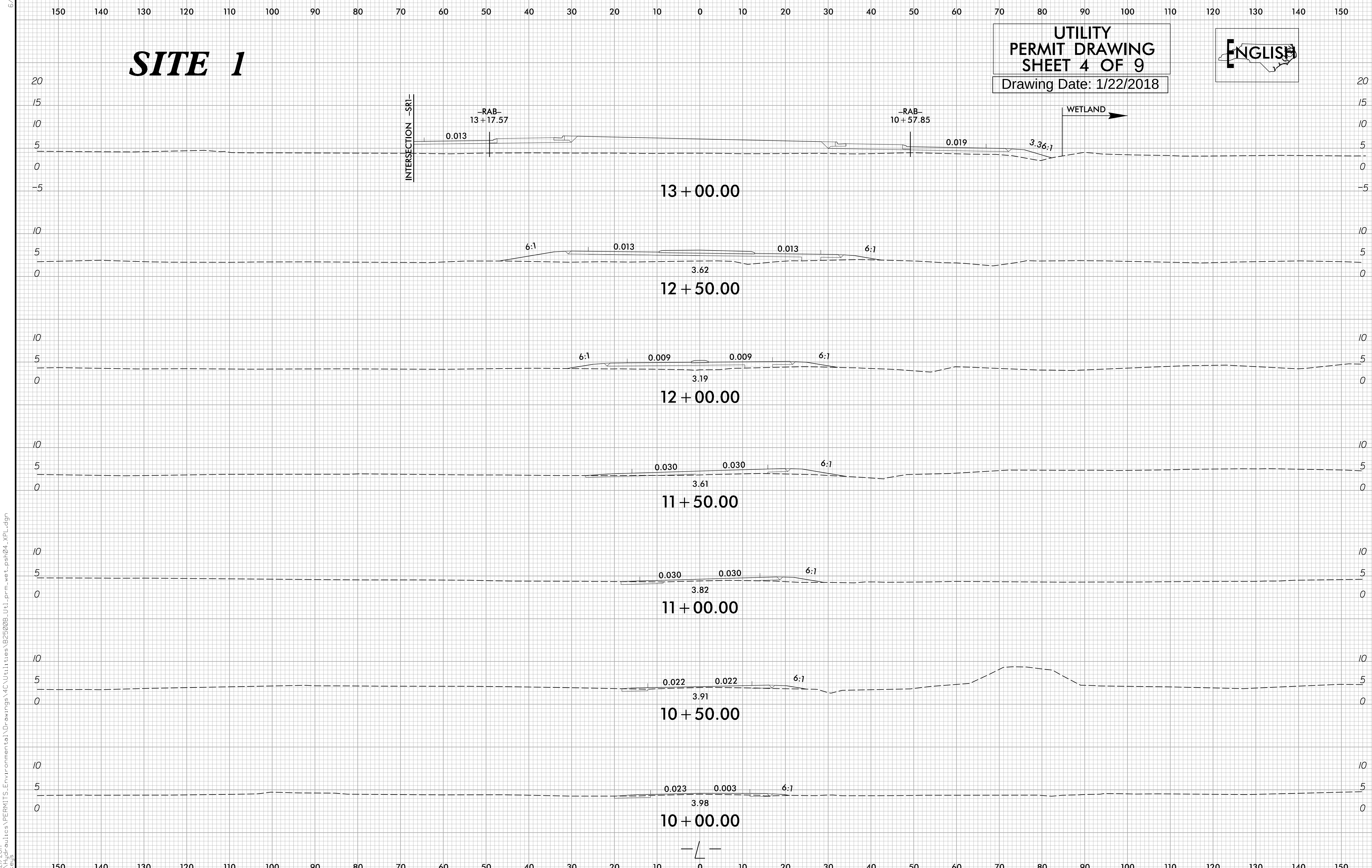
PROJ. REFERENCE NO.	SHEET NO.
B-2500B	X-1

SITE 1

UTILITY PERMIT DRAWING SHEET 4 OF 9

Drawing Date: 1/22/2018

ENGLISH



6/23/16

11/21/2017
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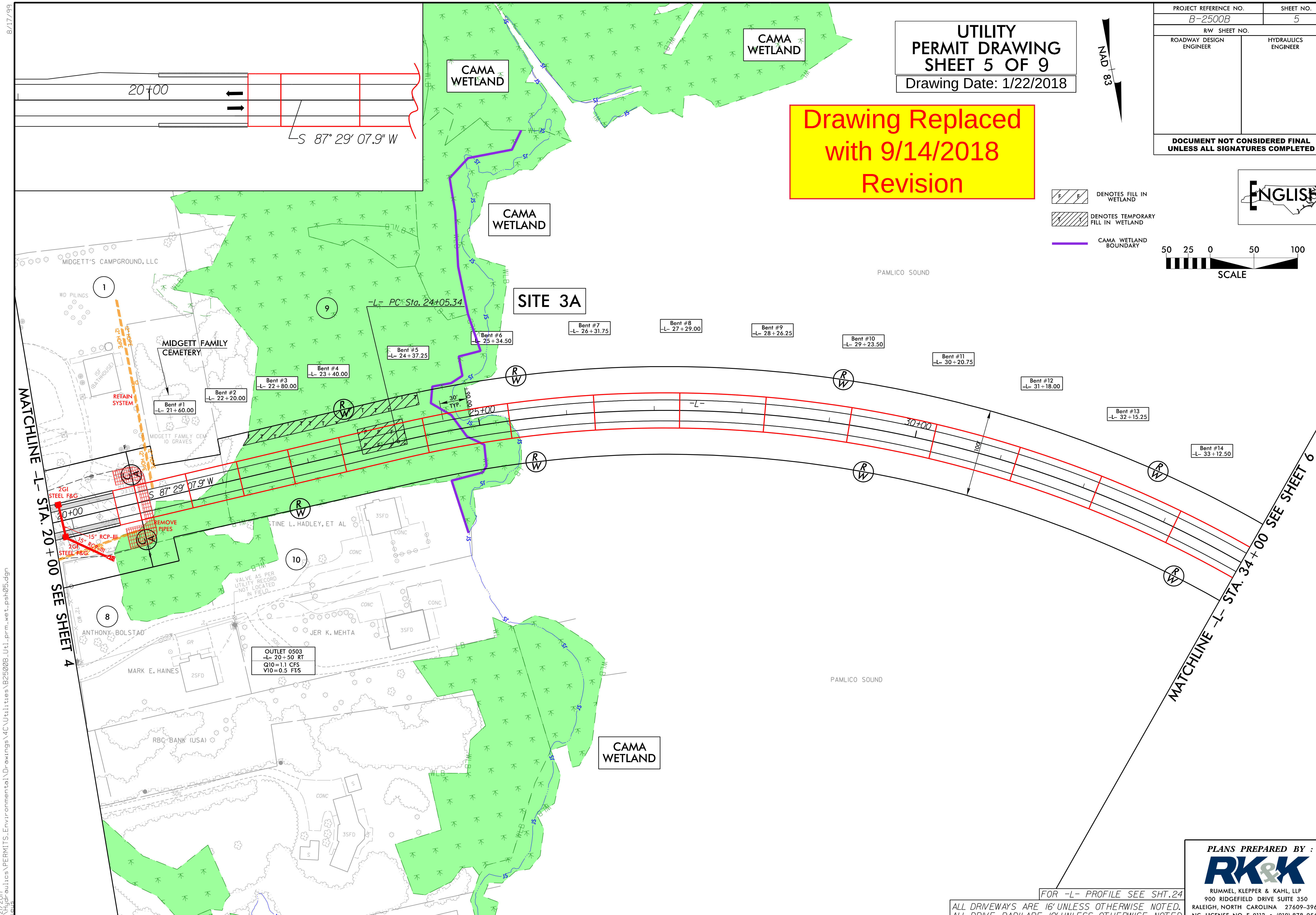
PROJECT REFERENCE NO.
B-2500B
SHEET NO.
5
R/W SHEET NO.
ROADWAY DESIGN ENGINEER
HYDRAULICS ENGINEER
DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED
UTILITY PERMIT DRAWING SHEET 5 OF 9
Drawing Date: 1/22/2018
Drawing Replaced with 9/14/2018 Revision
NAD 83
ENGLISH
DENOTES FILL IN WETLAND
DENOTES TEMPORARY FILL IN WETLAND
CAMA WETLAND BOUNDARY
50 25 0 50 100
SCALE
CAMA WETLAND
CAMA WETLAND
CAMA WETLAND
CAMA WETLAND
SITE 3A
PAMLICO SOUND
PAMLICO SOUND
20+00
S 87° 29' 07.9" W
-L- PC Sta. 24+05.34
MIDGETT'S CAMPGROUND, LLC
MIDGETT FAMILY CEMETERY
RETAIN SYSTEM
REMOVE PIPES
Bent #1 -L- 21+60.00
Bent #2 -L- 22+20.00
Bent #3 -L- 22+80.00
Bent #4 -L- 23+40.00
Bent #5 -L- 24+37.25
Bent #6 -L- 25+34.50
Bent #7 -L- 26+31.75
Bent #8 -L- 27+29.00
Bent #9 -L- 28+26.25
Bent #10 -L- 29+23.50
Bent #11 -L- 30+20.75
Bent #12 -L- 31+18.00
Bent #13 -L- 32+15.25
Bent #14 -L- 33+12.50
25+00
30+00
30' TYP.
MATCHLINE -L- STA. 20+00 SEE SHEET 4
MATCHLINE -L- STA. 34+00 SEE SHEET 6
ANTHONY BOLSTAD
MARK E. HAINES
RBC BANK (USA)
JER K. MEHTA
OUTLET 0503 -L- 20+50 RT Q10=1.1 CFS V10=0.5 FT/S
FOR -L- PROFILE SEE SHT.24
ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.
PLANS PREPARED BY:
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

UTILITY PERMIT DRAWING SHEET 5 OF 12

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	Permit Modification 9/14/18

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

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SEP 28 2018
DCM-RALEIGH

NAD 83

ENGLISH

DENOTES FILL IN WETLAND
DENOTES TEMPORARY FILL IN WETLAND
CAMA WETLAND BOUNDARY

50 25 0 50 100
SCALE

CAMA WETLAND
CAMA WETLAND
CAMA WETLAND
CAMA WETLAND

SITE 3A

20+00
S 87° 29' 07.9" W

-L- PC Sta. 24+05.34

MIDGETT FAMILY CEMETERY

RETAIN SYSTEM

Bent #1 -L- 21+60.00
Bent #2 -L- 22+20.00
Bent #3 -L- 22+80.00
Bent #4 -L- 23+40.00
Bent #5 -L- 24+37.25
Bent #6 -L- 25+34.50
Bent #7 -L- 26+31.75
Bent #8 -L- 27+29.00
Bent #9 -L- 28+26.25
Bent #10 -L- 29+23.50
Bent #11 -L- 30+20.75
Bent #12 -L- 31+18.00
Bent #13 -L- 32+15.25
Bent #14 -L- 33+12.50

25+00
30+00
-L-
30' TYP.

2GI STEEL F&G
20+00
REMOVE EXIST. PIPES
15" RCP-III
2GI STEEL F&G

OUTLET 0503
-L- 20+50 RT
Q10=1.1 CFS
V10=0.5 FPS

MATCHLINE -L- STA. 20+00 SEE SHEET 4

MATCHLINE -L- STA. 34+00 SEE SHEET 6

FOR -L- PROFILE SEE SHT. 24

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
ALL DRIVE RADII ARE 10' UNLESS OTHERWISE NOTED.

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

8/17/99

UTILITY PERMIT DRAWING SHEET 6 OF 9

Drawing Date: 1/22/2018

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

Drawing Replaced with 9/14/2018 Revision

ENGLISH

DENOTES FILL IN WETLAND

DENOTES TEMPORARY FILL IN WETLAND

CAMA WETLAND BOUNDARY

50 25 0 50 100
SCALE

SITE 3A

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

CAMA WETLAND

PAMLICO SOUND

PAMLICO SOUND

MIDGETT'S CAMPGROUND, LLC

MIDGETT FAMILY CEMETERY

MIDGETT FAMILY CEM ID GRAVES

ANTHONY BOLSTAD

MARK E. HAINES

RBC BANK (USA)

CHRISTINE K. HADLEY, ET AL

JER K. MEHTA

-L- PC Sta. 24+05.34

Bent #1 -L- 21+60.00
Bent #2 -L- 22+20.00
Bent #3 -L- 22+80.00
Bent #4 -L- 23+40.00
Bent #5 -L- 24+37.25
Bent #6 -L- 25+34.50
Bent #7 -L- 26+31.75
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Bent #10 -L- 29+23.50
Bent #11 -L- 30+20.75
Bent #12 -L- 31+18.00
Bent #13 -L- 32+15.25
Bent #14 -L- 33+12.50

25+00

30+00

20+00

S 87° 29' 07.9" W

S 87° 29' 07.9" W

30' TYP.

100'

RETAIN SYSTEM

2GI STEEL F&G

REMOVE PIPES

15" RCP-III

2GI RCP-III STEEL F&G

OUTLET 0503
-L- 20+50 RT
Q10=1.1 CFS
V10=0.5 FT/S

MATCHLINE -L- STA. 20+00 SEE SHEET 4

MATCHLINE -L- STA. 34+00 SEE SHEET 6

FOR -L- PROFILE SEE SHT.24

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
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PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

UTILITY PERMIT DRAWING SHEET 6 OF 12

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	5
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	Permit Modification 9/14/18

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

RECEIVED
SEP 28 2018
DCM-RALEIGH

NAD 83

ENGLISH

DENOTES FILL IN WETLAND
DENOTES TEMPORARY FILL IN WETLAND
CAMA WETLAND BOUNDARY

50 25 0 50 100
SCALE

CAMA WETLAND
CAMA WETLAND
CAMA WETLAND
CAMA WETLAND

SITE 3A

-L- PC Sta. 24+05.34

MIDGETT FAMILY CEMETERY

RETAIN SYSTEM

Bent #1 -L- 21+60.00
Bent #2 -L- 22+70.00
Bent #3 -L- 22+80.00
Bent #4 -L- 23+40.00
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Bent #6 -L- 25+34.50
Bent #7 -L- 26+31.75
Bent #8 -L- 27+29.00
Bent #9 -L- 28+26.25
Bent #10 -L- 29+23.50
Bent #11 -L- 30+20.75
Bent #12 -L- 31+18.00
Bent #13 -L- 32+15.25
Bent #14 -L- 33+12.50

25+00
30+00
-L-
30' TYP.
50'

20+00
S 87° 29' 07.9" W
2GI STEEL F&G
REMOVE PIPES
15" RCP-III
15" RCP-III
2GI STEEL F&G

OUTLET 0503
-L- 20+50 RT
Q10=1.1 CFS
V10=0.5 FPS

MATCHLINE -L- STA. 20+00 SEE SHEET 4

MATCHLINE -L- STA. 34+00 SEE SHEET 6

FOR -L- PROFILE SEE SHT. 24

ALL DRIVEWAYS ARE 16' UNLESS OTHERWISE NOTED.
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PLANS PREPARED BY :
RK&K
RUMMEL KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

5/28/99

-L-

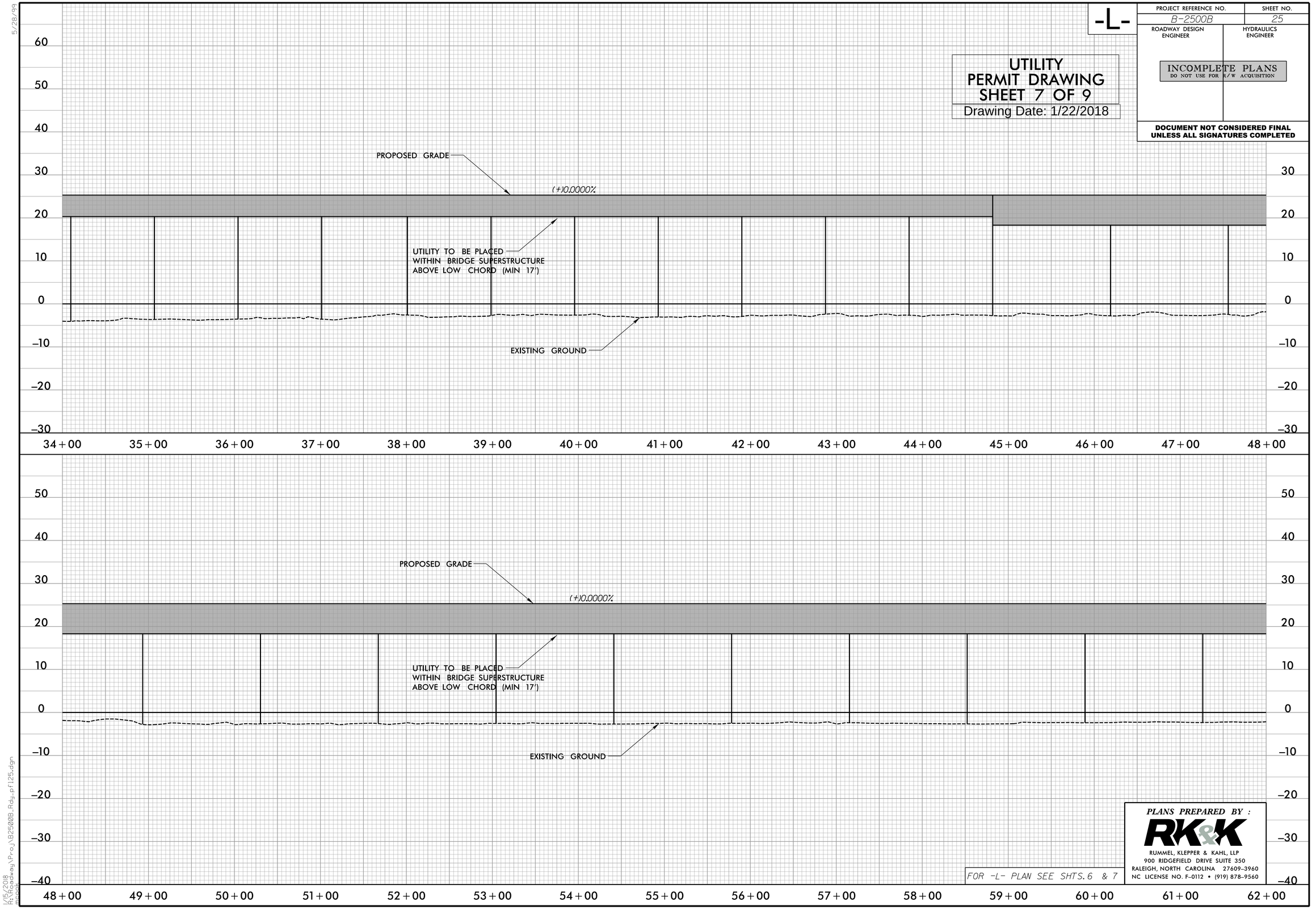
PROJECT REFERENCE NO.	SHEET NO.
B-2500B	25
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

INCOMPLETE PLANS
DO NOT USE FOR R/W ACQUISITION

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

UTILITY PERMIT DRAWING SHEET 7 OF 9

Drawing Date: 1/22/2018



FOR -L- PLAN SEE SHTS. 6 & 7

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

1/25/2018
K:\Roadway\Proj\B2500B_Rdy_pl25.dgn
mpark

6/23/16

0 5 10	PROJ. REFERENCE NO.	SHEET NO.
	B-2500B	X-4

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

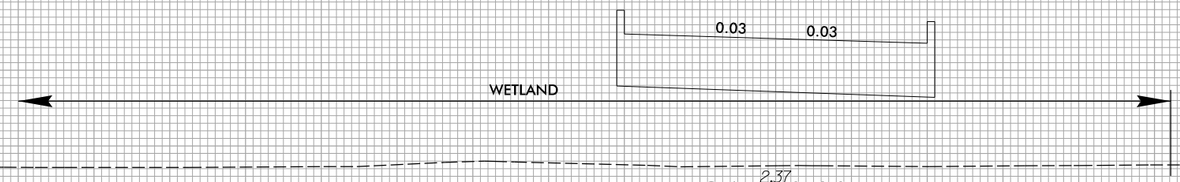
SITE 3A

UTILITY PERMIT DRAWING SHEET 8 OF 9

Drawing Date: 1/22/2018

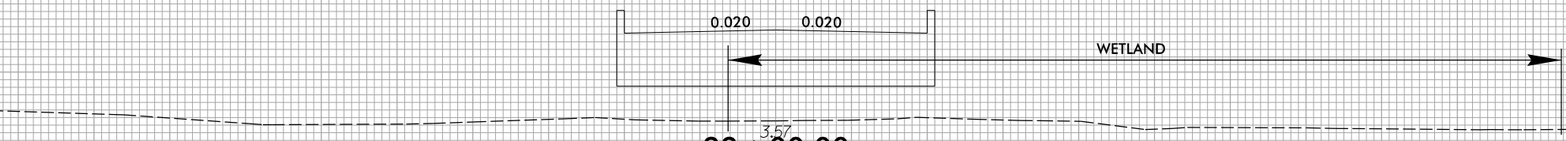
ENGLISH

25 20 15 10 5 0



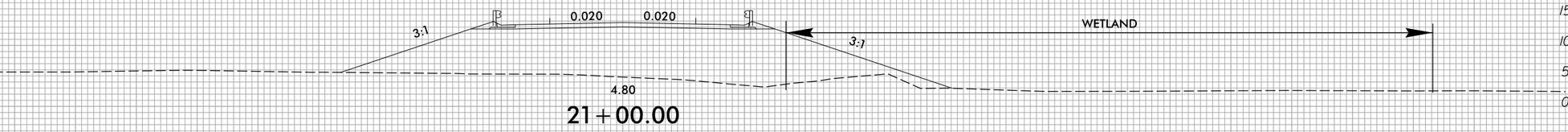
24+00.00

20 15 10 5 0



22+00.00

20 15 10 5 0



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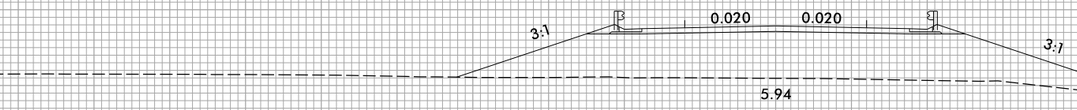

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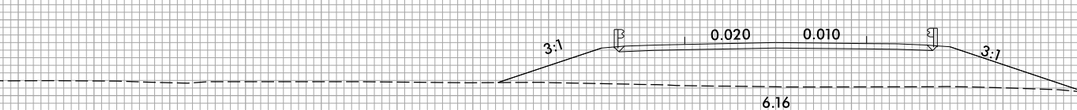
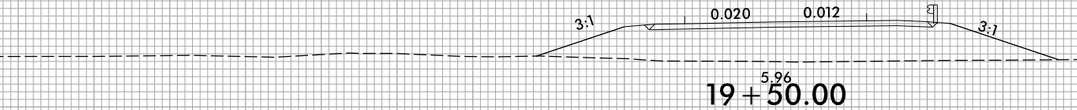


20+00.00

15 10 5 0



19+50.00

150 140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140 150

11/21/2017
K:\Hydraulics\PERMITS_Environmental\Drawings\4C\Utilities\B2500B_Util_prm_wet_psh05_XPL.dgn
Kiesa

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	Permit Modification 9/14/18

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

SITE 4

-L- STA. 146+00 SEE SHEET 13

MATCHLINE -L- STA. 2984+00 SEE SHEET 15

Bent #101 -L- 147 + 26.79
Bent #102 -L- 147 + 86.79
Bent #103 -L- 148 + 46.79
Bent #104 -L- 149 + 06.79
Bent #105 -L- 149 + 66.79
Bent #106 -L- 150 + 26.79

-L- PT Sta. 149+25.70

N 9° 50' 05.5" W

-L- PC Sta. 151+23.96

PROP RETAINING WALL

-L- PRC Sta. 153+99.40

-L- PT Sta. 156+75.92

EQUATION:
-L- Sta 158+06.33 BK =
-L- Sta 298214.62 AH

N 9° 51' 01.8" W

150+00

155+00

25+00

20+00

2GI STEEL F&G

15" RCP-III

-DET_REV-

-DET_REV- PT Sta. 20+17.76

-DET_REV- PC Sta. 24+03.12

-DET_REV- PRC Sta. 29+58.04

RECEIVED
SEP 28 2018
DCM-RALEIGH

DENOTES TEMPORARY FILL IN WETLAND

50 25 0 50 100
SCALE

ENGLISH

UTILITY PERMIT DRAWING
SHEET 8 OF 12

PLANS PREPARED BY :
RK&K
RUMMEL KLEPPER & KAHL LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	14
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	Permit Modification 9/14/18

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

SITE 4

MATCHLINE -L- STA. 146+00 SEE SHEET 13

MATCHLINE -L- STA. 2984+00 SEE SHEET 15

150+00

Bent #101 -L- 147 + 26.79
Bent #102 -L- 147 + 86.79
Bent #103 -L- 148 + 46.79
Bent #104 -L- 149 + 06.79
Bent #105 -L- 149 + 66.79
Bent #106 -L- 150 + 26.79

-L- PT Sta. 149+25.70

N 9° 50' 05.5" W

-L- PC Sta. 151+23.96

PROP RETAINING WALL

-L- PRC Sta. 153+99.40

-L- PT Sta. 156+75.92

EQUATION:
-L- Sta 158+06.33 BK =
-L- Sta 298214.62 AH

150+00

155+00

N 9° 51' 01.8" W

2GI STEEL F&G

15" RCP-III

25+00

20+00

N 9° 50' 05.5" W

-DET_REV-

-DET_REV- PT Sta. 20+17.76

-DET_REV- PC Sta. 24+03.12

-DET_REV- PRC Sta. 29+58.04

RECEIVED
SEP 28 2018
DCM-RALEIGH

DENOTES TEMPORARY FILL IN WETLAND

50 25 0 50 100
SCALE

ENGLISH

UTILITY PERMIT DRAWING
SHEET 9 OF 12

PLANS PREPARED BY :
RK&K
RUMMEL KLEPPER & KAHL LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	Permit Modification 9/14/18

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

NAD 83

REVISIONS

CONSTRUCTION REVISION: DATE: 5/23/2018 - REVISED TEMPORARY ON-SITE DETOUR.

SITE 4

UNITED STATES OF AMERICA

MATCHLINE -L- STA. 2984+00 SEE SHEET 14

END TIP PROJECT B-2500B
-L- STA. 2994+13.29

2985+00 -L- 2990+00 2995+00

N 9° 51' 01.8" W

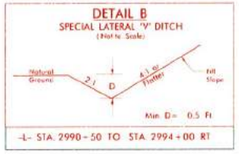
END CONSTRUCTION
-DET_REV- PT Sta. 34+20.70=
-L- POT Sta. 2986+66.93

15" RCP-V

KIOSK

SPECIAL LATERAL V DITCH
SEE DETAIL B

DETAIL B
SPECIAL LATERAL "V" DITCH
(Not to Scale)



Min. D= 0.5 Ft

-L- STA. 2990+50 TO STA. 2994+00 RT

RECEIVED
SEP 28 2018
DCM-RALEIGH

DENOTES TEMPORARY FILL IN WETLAND

50 25 0 50 100
SCALE

ENGLISH

UTILITY
PERMIT DRAWING
SHEET 10 OF 12

PLANS PREPARED BY :
RK&K
RUMMEL KLEPPER & KAHL LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	15
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER
	Permit Modification 9/14/18

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

REVISIONS

CONSTRUCTION REVISION: DATE: 5/23/2018 - REVISED TEMPORARY ON-SITE DETOUR.

NAD 83

SITE 4

MATCHLINE -L- STA. 2984+00 SEE SHEET 14

2985+00 -L- 2990+00 2995+00

N 9°51'01.8" W

END CONSTRUCTION
-DET_REV- PT Sta. 34+20.70=
-L- POT Sta. 2986+66.93

END TIP PROJECT B-2500B
-L- STA. 2994+13.29

15" RCP-V

KIOSK

ADA

SPECIAL LATERAL V DITCH
SEE DETAIL B

DETAIL B
SPECIAL LATERAL 'V' DITCH
(Not to Scale)

Natural Ground 2:1 D 4:1 or Flatter Fill Slope

Min. D= 0.5 Ft

-L- STA. 2990+50 TO STA. 2994+00 RT

RECEIVED
SEP 28 2018
DCM-RALEIGH

DENOTES TEMPORARY FILL IN WETLAND

50 25 0 50 100
SCALE

UTILITY PERMIT DRAWING
SHEET 11 OF 12

ENGLISH

PLANS PREPARED BY :

RK&K
RUMMEL KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

Drawing Replaced with
9/14/2018 Revision

WETLAND AND SURACE WATER IMPACTS SUMMARY

			WETLAND IMPACTS					SURFACE WATER IMPACTS				
Site No.	Station (From/To)	Structure Size / Type	Permanent Fill In Wetlands (ac)	Temp. Fill In Wetlands (ac)	Excavation in Wetlands (ac)	Mechanized Clearing in Wetlands (ac)	Hand Clearing in Wetlands (ac)	Permanent SW impacts (ac)	Temp. SW impacts (ac)	Existing Channel Impacts Permanent (ft)	Existing Channel Impacts Temp. (ft)	Natural Stream Design (ft)
1	-L- 13+00 RT	8" WATER LINE		0.03								
3A	-L- 24 +27	UTILITIES ON BRIDGE	0.04	0.06								
TOTALS*:			0.04	0.10								

*Rounded totals are sum of actual impacts

NOTES:

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
DECEMBER 2017
DARE
B-2500B
32635.3.FR7

Revised 2016 09 09

WETLAND AND SURACE WATER IMPACTS SUMMARY

Site No.	Station (From/To)	Structure Size / Type	WETLAND IMPACTS: Permanent Fill In Wetlands (ac)	WETLAND IMPACTS: Temp. Fill In Wetlands (ac)	WETLAND IMPACTS: Excavation in Wetlands (ac)	WETLAND IMPACTS: Mechanized Clearing in Wetlands (ac)	WETLAND IMPACTS: Hand Clearing in Wetlands (ac)	SURFACE WATER IMPACTS: Permanent SW impacts (ac)	SURFACE WATER IMPACTS: Temp. SW impacts (ac)	SURFACE WATER IMPACTS: Existing Channel Impacts Permanent (ft)	SURFACE WATER IMPACTS: Existing Channel Impacts Temp. (ft)	SURFACE WATER IMPACTS: Natural Stream Design (ft)
1	-L- 13+00 RT	8" WATER LINE		0.03								
3A	-L- 24 +27	UTILITIES ON BRIDGE	0.04	0.05								
4	-L- 2982+75 LT	UTILITY RELOCATION		0.60								
TOTALS*:			0.04	0.67								

*Rounded totals are sum of actual impacts

NOTES:

PERMIT MODIFICATION 08/08/2018, 09/14/2018

NC DEPARTMENT OF TRANSPORTATION
DIVISION OF HIGHWAYS
DECEMBER 2017
DARE
B-2500B
32635.3.FR7
SHEET 12 OF 12

Revised 2016 09 09

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	13
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 29470 ENGINEER BRANDON J. McINNIS
DocuSigned by: Brandon J. McInnis 209EE...
5/24/2018

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 27434 ENGINEER MATTHEW L. COOK
DocuSigned by: Matthew L. Cook
5/23/2018

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Revised 5-31-2018

REVISIONS

CONSTRUCTION REVISION: DATE: 5/23/2018 - REVISED TEMPORARY ON-SITE DETOUR, TEMPORARY EASEMENT, AND MATCH LINES.

8/17/99

MATCHLINE -L- STA. 132+00 SEE SHEET 12

MATCHLINE -L- STA. 146+00 SEE SHEET 14

MATCHLINE SEE SHEET 23

NAD 83

PAMLICO SOUND

ATLANTIC OCEAN

UNITED STATES OF AMERICA

-L- PC Sta. 134+41.13

+41.13 50'

135+00

140+00

145+00

150+00

N 27° 48' 07.5" E

40' 12' 12' 02 01 00 01 02 03 04 05

28' TYP.

+87.80

S 70°24'58" E 922.02'

-L-

-DET_REV-

-DET_REV- PRC Sta. 16+60.28

+75.00 180'

+69.23 50'

+45.00 143.24'

+70.00 129.14' TUE

+65.00 126.67'

+30.00 125' TUE

+30.00 151.11'

+70.00 184.58'

+85.00 172.39' TUE

-BL- 30

+00.00 225.84'

+15.00 242', 275'

+50.00 240', 275'

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

BEGIN CONSTRUCTION
-DET_REV- PC Sta. 10+00.00

-L-
PI Sta 142+11.31
△ = 37° 38' 12.9" (LT)
D = 2° 32' 06.8"
L = 1,484.57'
T = 770.18'
R = 2,260.00'
V = 60 mph
SE = .05

PAVEMENT REMOVAL

FOR -L- PROFILE SEE SHT. 28
FOR -DET_REV- PLAN SEE SHT. 28-1

PLANS PREPARED BY :

RK&K

RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

5/23/2018
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PROJECT REFERENCE NO.	SHEET NO.
B-2500B	14
R/W SHEET NO.	

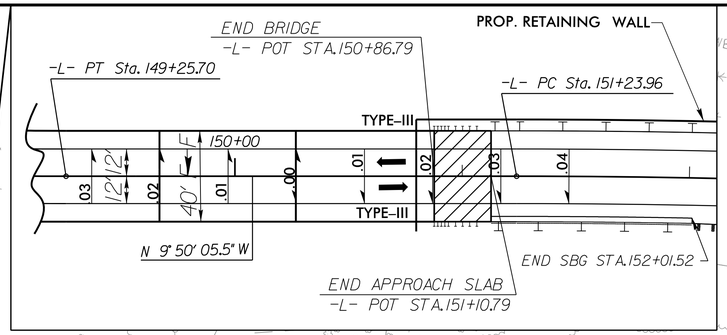
ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 29470 ENGINEER BRANDON J. MCINNIS
5/24/2018
DocuSigned by: Brandon J. McInnis 209EEC...

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 27434 ENGINEER MATTHEW L. COOK
5/23/2018
DocuSigned by: Matthew L. Cook

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Revised 5-31-2018

REVISIONS
8/17/99
CONSTRUCTION REVISION: DATE: 5/23/2018 - REVISED TEMPORARY ON-SITE DETOUR AND TEMPORARY EASEMENT.



NAD 83

MATCHLINE -L- STA. 146+00 SEE SHEET 13

MATCHLINE -L- STA. 2984+00 SEE SHEET 15

UNITED STATES OF AMERICA

-L- PT Sta. 156+75.92

EQUATION:
-L- Sta 158+06.33 BK =
-L- Sta 2982+44.62 AH

-L- PT Sta. 149+25.70

N 9° 50' 05.5" W

-L- PC Sta. 151+23.96

PROP. RETAINING WALL

GUARDRAIL AT THE RETAINING WALL LOCATION USE 8' POSTS

-L- PRC Sta. 153+99.40

GRAU 350 8:1

2GI STEEL F&G

15" RCP-III
2 TONS CL B RIPRAP
W/ SY GEO FAB

-DET_REV- PT Sta. 20+17.76

-DET_REV- PC Sta. 24+03.12

-DET_REV- PRC Sta. 29+58.04

SEE STRUCTURES PLANS FOR DECK DRAIN SIZE AND SPACING

50' POWER LINE EASEMENT

ATLANTIC OCEAN

-L-		
PI Sta 142+11.31	PI Sta 152+61.73	PI Sta 155+37.72
△ = 37° 38' 12.9" (LT)	△ = 3° 56' 43.1" (RT)	△ = 3° 57' 39.5" (LT)
D = 2° 32' 06.8"	D = 1° 25' 56.6"	D = 1° 25' 56.6"
L = 1,484.57'	L = 275.43'	L = 276.53'
T = 770.18'	T = 137.77'	T = 138.32'
R = 2,260.00'	R = 4,000.00'	R = 4,000.00'
V = 60 mph	V = 60 mph	V = 60 mph
SE = .05	SE = .04	SE = .04

PAVEMENT REMOVAL

FOR -L- PROFILE SEE SHT.29
FOR -DET_REV- PLAN SEE SHTS.2B-1 & 2B-2

PLANS PREPARED BY :

RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

5/23/2018
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ekavis

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	23
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 29470 ENGINEER BRANDON J. McINNIS
5/24/2018
DocuSigned by: Brandon J. McInnis

HYDRAULICS ENGINEER
NORTH CAROLINA PROFESSIONAL SEAL 27434 ENGINEER MATTHEW L. COOK
5/23/2018
DocuSigned by: Matthew L. Cook

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Revised 5-31-2018

NAD 83

REVISIONS

8/17/99

CONSTRUCTION REVISION: DATE: 5/23/2018 – REVISED MATCH LINE.

MATCHLINE SEE SHEET 22

MATCHLINE SEE SHEET 13

11
UNITED STATES OF AMERICA

50' POWER LINE EASEMENT

11
UNITED STATES OF AMERICA

-BL- 29

EXIST R/W

EXIST R/W

11
UNITED STATES OF AMERICA

PAVEMENT REMOVAL

PLANS PREPARED BY :
RK&K
RUMMEL, KLEPPER & KAHL, LLP
900 RIDGEFIELD DRIVE SUITE 350
RALEIGH, NORTH CAROLINA 27609-3960
NC LICENSE NO. F-0112 • (919) 878-9560

5/23/2018
R:\Roadway\Proj\B2500B_Rdy_psht23.dgn
FLEWELLEN

DETAIL OF ON-SITE DETOUR FOR NC 12

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	2B-1
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 29470 ENGINEER BRANDON J. McINNIS — 5/24/2018
DocuSigned by: Brandon J. McInnis

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 27434 ENGINEER MATTHEW L. COOK — 5/23/2018
DocuSigned by: Matthew L. Cook

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Revised 5-31-2018

REVISIONS

CONSTRUCTION REVISION: DATE: 5/23/2018 – REVISED TEMPORARY ON-SITE DETOUR, TEMPORARY EASEMENT, AND MATCH LINES.

8/17/99

NAD 83

-L- PT Sta. 149+25.70

MATCHLINE -DET_REV- STA. 23+(
SEE SHEET 2B-2

BEGIN CONSTRUCTION
-DET_REV- PC Sta. 10+00.00

-DET_REV- PRC Sta. 16+60.28

-DET_REV- PT Sta. 20+17.76

N 9° 50' 05.5" W

MAINTAIN ROADSIDE DITCHES DURING THE DETOUR PHASE OF CONSTRUCTION

-DET_REV-	
PI Sta 13+31.58	PI Sta 18+39.10
Δ = 13° 05' 25.3" (RT)	Δ = 4° 01' 40.9" (LT)
D = 1° 58' 57.2"	D = 1° 07' 36.3"
L = 660.28'	L = 357.49'
T = 331.58'	T = 178.82'
R = 2,890.00'	R = 5,085.00'
V = 55 mph	V = 55 mph
SE = SEE PLANS	SE = .03

FOR -L- PLAN SEE SHTS. 13 & 14

BEGIN GRADE
-DET- STA. 13+54.77
EL = 5.38'

PROPOSED GRADE

EXISTING GROUND

PI = 17+00.00
EL = 3.49'
VC = 300'
K = 295
DS > 80 MPH

PI = 20+25.00
EL = 5.00'
VC = 300'
K = 1807
DS > 80 MPH

(-)0.5500%
(+)0.4660%
(+)0.4660%
(+)0.3000%

30 20 10 0 –10 –20 –30

10+00 11+00 12+00 13+00 14+00 15+00 16+00 17+00 18+00 19+00 20+00 21+00 22+00 23+00

5/23/2018
R:\Roadway\Proj\B2500B_Rdy_pshB2B_1.dgn
FLeonard

8/17/99

REVISIONS

CONSTRUCTION REVISION: DATE: 5/23/2018 - REVISED TEMPORARY ON-SITE DETOUR, TEMPORARY EASEMENT, AND MATCH LINES.

DETAIL OF ON-SITE DETOUR FOR NC 12

PROJECT REFERENCE NO.	SHEET NO.
B-2500B	2B-2
R/W SHEET NO.	

ROADWAY DESIGN ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 29470 ENGINEER BRANDON J. McINNIS — 5/24/2018
DocuSigned by: Brandon J. McInnis 209EB

HYDRAULICS ENGINEER — NORTH CAROLINA PROFESSIONAL SEAL 27434 ENGINEER MATTHEW L. COOK — 5/23/2018
DocuSigned by: Matthew L. Cook

DOCUMENT NOT CONSIDERED FINAL UNLESS ALL SIGNATURES COMPLETED

Revised 5-31-2018

MATCHLINE -DET REV- STA. 23+00 SEE SHEET 2B-1

UNITED STATES OF AMERICA

NAD 83

-L- PT Sta. 156+75.92

EQUATION:
-L- Sta 158+06.33 BK =
-L- Sta 2982+44.62 AH

-L- PC Sta. 151+23.96

-L- PRC Sta. 153+99.40

-L- 155+00

2985+00

25+00

-DET_REV-

-DET_REV- PC Sta. 24+03.12

-DET_REV- PRC Sta. 29+58.04

END CONSTRUCTION
-DET_REV- PT Sta. 34+20.70=
-L- POT Sta. 2986+66.93

MAINTAIN ROADSIDE DITCHES DURING THE DETOUR PHASE OF CONSTRUCTION

-DET_REV-	
PI Sta 26+80.86	PI Sta 31+89.60
△ = 6° 19' 38.1" (LT)	△ = 6° 18' 41.8" (RT)
D = 1° 08' 24.8"	D = 1° 21' 51.1"
L = 554.92'	L = 462.66'
T = 277.74'	T = 231.57'
R = 5,025.00'	R = 4,200.00'
V = 55 mph	V = 55 mph
SE = SEE PLANS	SE = SEE PLANS

FOR -L- PLAN SEE SHTS.14 & 15

PI = 25+00.00
EL = 6.43'
VC = 300'
K = 414
DS > 80 MPH

PI = 29+50.00
EL = 4.51'
VC = 150'
K = 448
DS > 80 MPH

PROPOSED GRADE

(+)0.3000%

(−)0.4245%

(−)0.4245%

(−)0.0900%

END GRADE
-DET- STA. 31+27.49
EL = 4.36'

EXISTING GROUND

30 20 10 0 −10 −20 −30

23+00 24+00 25+00 26+00 27+00 28+00 29+00 30+00 31+00 32+00

5/23/2018
R:\Roadway\Proj\B2500B_Rdy_psht02B_2.dgn
Ekeys

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Raleigh Field Office
Post Office Box 33726
Raleigh, North Carolina 27636-3726

July 10, 2008

John F. Sullivan, III, P.E.
Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, North Carolina 27601

Dear Mr. Sullivan:

This transmits the U.S. Fish and Wildlife Service (USFWS) Raleigh Field Office's biological and conference opinions based on our review of the proposed replacement of the Herbert C. Bonner Bridge (Bridge No. 11 over Oregon Inlet) in Dare County, North Carolina (TIP No. B-2500). These opinions assess the effects of the project on the piping plover (*Charadrius melodus*), loggerhead sea turtle (*Caretta caretta*), green sea turtle (*Chelonia mydas*), and leatherback sea turtle (*Dermochelys coriacea*), and proposed critical habitat for wintering piping plovers. These opinions are provided in accordance with section 7(a)(2) of the Endangered Species Act of 1973 (ESA), as amended (16 U.S.C. 1531 *et seq.*). This document addresses the requirements of the ESA but does not address other environmental statutes such as the National Environmental Policy Act or Fish and Wildlife Coordination Act. Your March 5, 2008 request for formal consultation was received on March 6, 2008.

Since the proposed project is a multi-phased project which will be staggered over more than 24 years, and since final designs for each phase are not yet developed, the USFWS plans to proceed with a form of a programmatic consultation known as an appended consultation. In this appended programmatic consultation, the USFWS has conducted the required analysis of the entire project based on what is known at the present time, and one programmatic biological and conference opinion has been developed for the overall project. In the following opinions we have determined that the project is not likely to jeopardize the continued existence of the piping plover, loggerhead sea turtle, green sea turtle, and leatherback sea turtle, and is not likely to destroy or adversely modify proposed critical habitat for wintering piping plovers. The USFWS has issued incidental take for these species which reflect the maximum potential take for the entire project over the proposed extended timeframe of the project.

As additional design information is developed for subsequent phases of the project, this information must be provided to us so that it may be appended to the existing biological opinion. The USFWS will then analyze the new information for each subsequent phase of the project to insure that the take associated with each future phase, cumulatively, does not exceed the maximum amount of take authorized in the incidental take statement included in this biological opinion. If the scope of future phases of the project should differ significantly from the

conceptual design information, or if the cumulative amount of take should exceed that authorized, then consultation will need to be reinitiated. The reasonable and prudent measures, and associated terms and conditions, contained within this biological opinion apply to the overall project; however, as designs for subsequent phases are developed, additional reasonable and prudent measures may be necessary to minimize the level of take.

If you have any questions concerning this biological opinion, please contact me at (919) 856-4520 (Ext. 11).

Sincerely,

Pete Benjamin
Field Supervisor

Attachment

cc: Ken Graham, USFWS, Atlanta, GA
Ann Hecht, USFWS, Sudbury, MA
Sandy MacPherson, USFWS, Jacksonville, FL
Mike Bryant, USFWS, Manteo, NC
Bill Biddlecome, USACE, Washington, NC
Greg Thorpe, NCDOT, Raleigh, NC
Logan Williams, NCDOT, Raleigh, NC
Clay Willis, NCDOT, Edenton, NC
David Harris, NCDOT, Raleigh, NC
Chris Militscher, USEPA, Raleigh, NC
Travis Wilson, NCWRC, Creedmoor, NC
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The following opinions are based on information provided in the March 2008 biological assessment (BA)(FHWA and NCDOT 2008a), the April 8, 2008 addendum to the BA (FHWA and NCDOT 2008b, *in litt.*), the *Supplement to the 2005 Supplemental Draft Environmental Impact Statement and Draft Section 4(f) Evaluation* (SSDEIS)(FHWA and NCDOT 2007), meetings, telephone conversations, emails, field investigations, and other sources of information. A complete administrative record of this consultation is on file at this office.

CONSULTATION HISTORY

1997 – The Federal Highway Administration (FHWA) initiates formal consultation on an earlier version of the proposed project.

1998 – After several months of discussions between the USFWS and the North Carolina Department of Transportation (NCDOT), both parties agreed that formal consultation was premature.

December 12, 2007 – The USFWS met with FHWA and NCDOT to discuss the preparation of a BA.

March 6, 2008 – The USFWS received a letter from the FHWA, dated March 5, 2008, with the attached BA, requesting formal consultation for the replacement of the Herbert C. Bonner Bridge.

March 13, 2008 – The USFWS sent a letter to FHWA stating that all information required for initiation of consultation was either included with their March 5, 2008 letter or was otherwise available.

April 9, 2008 – The USFWS received an addendum to the BA dated April 8, 2008. The addendum clarified several issues and provided revised Figures 1 and 4.

June 4, 2008 – The USFWS provided the FHWA and NCDOT with a draft biological opinion.

June 11, 2008 – The USFWS met with the FHWA and NCDOT to discuss the draft biological opinion and reasonable and prudent measures.

July 9, 2008 – The USFWS met with NCDOT to discuss the draft reasonable and prudent measures.

BIOLOGICAL AND CONFERENCE OPINIONS

I. DESCRIPTION OF PROPOSED ACTION

The existing Bonner Bridge is a two-lane bridge that takes NC 12 across Oregon Inlet and connects Bodie Island with Hatteras Island in Dare County, North Carolina. Bonner Bridge is 2.4 miles long and is located at the northern end of the action area. Existing NC 12 within the

action area is a two-lane paved road extending southward from the southern end of the bridge for approximately 13.5 miles to the southern project terminus at Rodanthe. The total length of the project from the north terminus to the south terminus is 16.1 miles long. However, construction will only occur along approximately 14.0 miles. The proposed action, known as the Phased Approach/Rodanthe Bridge Alternative, is a four-phased project which includes the following:

- Phase I – replace the existing Bonner Bridge with a new 2.6 mile long bridge slightly to the west of the existing bridge – approximate construction timeframe 2009-2013
- Phase II – elevate approximately 5.6 miles of NC 12 onto three bridges – to begin approximately 2013-2015
- Phase III – elevate approximately 1.9 miles of NC 12 onto one bridge – to begin approximately 2019-2020
- Phase IV – elevate approximately 2.6 miles of NC 12 onto two bridges – to begin approximately 2029-2030

On Hatteras Island, NCDOT asserts that construction will be confined to the existing NC 12 right-of-way. A more detailed project description of the Phased Approach/Rodanthe Bridge Alternative can be found in Section 2.2 of the SSDEIS (FHWA and NCDOT 2007).

The timing of the construction of Phases II to IV is based on assumptions corresponding to forecast shoreline erosion trends and maintaining minimum 230-foot buffer distance between the existing NC 12 edge of pavement and the active shoreline. These assumptions are based on worst-case scenario modeling of shoreline erosion and the location and likelihood of future breaches on Hatteras Island. Since these are forecasts only, the exact timing and scope of each phase could change based on the reality of future shoreline erosion. As such, project descriptions of Phases II, III and IV should be viewed as approximations. The USFWS suspects that one substantial hurricane in the interim could dramatically change the predictions of worst-case scenario modeling. Although Phases II to IV will initially be built over land ostensibly within existing NCDOT right-of-way, based on shoreline erosion models, up to 8.0 miles of the bridges may ultimately be in open water by 2060.

Action Area

The action area lies within the North Carolina Outer Banks and is comprised of a dynamic barrier island system formed by wind and wave action. The barrier islands that make up the Outer Banks are sand ridges with underlying layers of limestone, sand, and clay. The action area extends from Rodanthe on Hatteras Island north to the southern end of Bodie Island and includes that portion of Hatteras Island (from the east to west shore), the area of the Atlantic Ocean one-half mile east of the Hatteras Island shoreline, portions of Oregon Inlet, and the southern tip of Bodie Island. It passes through the Cape Hatteras National Seashore (CAHA) and encompasses the Pea Island National Wildlife Refuge (PINWR). Though largely undeveloped, most of the action area consists of natural vegetation communities that have been influenced by past and present human disturbances. The construction and maintenance of an artificial sand berm along the seaward side of NC 12 has significantly interrupted the natural barrier island ecosystem processes (e.g. limiting overwash and disrupting island migration).

Conservation Measures

Conservation measures represent actions, pledged in the project description, that the action agency will implement to minimize the effects of the proposed action and further the recovery of the species under review. Such measures should be closely related to the action and should be achievable within the authority of the action agency. Since conservation measures are part of the proposed action, their implementation is required under the terms of the consultation. The FHWA and NCDOT have proposed the following conservation measures.

- The Phased Approach/Rodanthe Bridge Alternative will allow natural shoreline migration and the formation of new inlet habitats to occur.
- The project will incorporate the most current BMPs to reduce habitat degradation from stormwater runoff pollution.
- Phase I of the project will be built at least 125 feet farther west of the Bonner Bridge and currently occupied piping plover habitat.
- NCDOT does not anticipate the use of explosives during construction or demolition of the existing bridge.
- The NCDOT contractor will use pipeline or clamshell dredging, rather than a hopper dredge to minimize effects to sea turtles.
- No permanent light fixtures will be installed on the bridge or the approaches (with the exception of navigation lights as required by the U.S. Coast Guard).
- Seabeach amaranth surveys will be conducted at least one year prior to initiating bridge construction activities.
- Temporary facilities such as haul roads that affect proposed critical habitat will be removed as soon as possible.

II. STATUS OF THE SPECIES/CRITICAL HABITAT

A. Species/critical habitat description

Piping plover

The piping plover is a small, pale-colored shorebird, about seven inches long with a wingspan of about 15 inches (Palmer 1967). On January 10, 1986, the piping plover was listed as endangered in the Great Lakes watershed and threatened elsewhere within its range, including migratory routes outside of the Great Lakes watershed and wintering grounds (USFWS 1985). Piping plovers were listed principally because of habitat destruction and degradation, predation, and human disturbance. Protection of the species under the ESA reflects the species' precarious status range-wide. Three separate breeding populations have been identified, each with its own recovery criteria: the Northern Great Plains (threatened), the Great Lakes (endangered), and the Atlantic Coast (threatened). The piping plover winters in coastal areas of the U.S. from North Carolina to Texas, and along the coast of eastern Mexico and on Caribbean islands from Barbados to Cuba and the Bahamas (Elliott-Smith and Haig 2004). Information from

observation of color-banded piping plovers indicates that the winter ranges of the breeding populations overlap to a significant degree.

The recovery objective for the Great Lakes population includes:

> at least 150 pairs (300 individuals), for at least five consecutive years, with at least 100 breeding pairs (200 individuals) in Michigan and 50 breeding pairs (100 individuals) distributed among sites in other Great Lakes states; five-year average fecundity is within the range of 1.5-2.0 fledglings per pair, per year, across the breeding distribution, and ten-year population projections indicate the population is stable or continuing to grow above the recovery goal; ensure protection and long-term maintenance of essential breeding and wintering habitat, sufficient in quantity, quality, and distribution to support the recovery goal of 150 pairs (300 individuals); genetic diversity within the population is deemed adequate for population persistence and can be maintained over the long-term; and, agreements and funding mechanisms are in place for long-term protection and management activities in essential breeding and wintering habitat (USFWS 2003).

The recovery objective for the northern Great Plains population includes:

> sustaining 2,300 pairs of birds for at least 15 years, meeting recovery objectives for birds in prairie Canada, and providing long term protection of essential breeding and wintering habitat.

The recovery objective for the Atlantic Coast population includes:

> verification of the adequacy of a 2,000-pair population of piping plovers to maintain heterozygosity and allelic diversity over the long term; achieve five-year average productivity of 1.5 fledged chicks per pair in each of the four recovery units; institute long-term agreements among cooperating agencies, landowners, and conservation organizations to assure protection and management sufficient to maintain the target populations in each recovery unit and average productivity; and, ensure long-term maintenance of wintering habitat, sufficient in quantity, quality, and distribution to maintain survival rates for a 2,000-pair population (USFWS 1996).

The recovery plan for the Atlantic Coast population of the piping plover (USFWS 1996) delineates four recovery units within the population: Atlantic Canada, New England, New York-New Jersey, and Southern (Delaware, Maryland, Virginia, and North Carolina). Extensive efforts to observe and report sightings of greater than 1,400 Atlantic Coast piping plovers color-banded in Virginia, Maryland, Massachusetts, and five Eastern Canadian provinces between 1985 and 2003 have documented many inter-year movements among sites within recovery units, but few records of plovers breeding outside the recovery unit where they were banded (Loegering 1992, Cross 1996, USFWS 1996, Amirault et al. 2005), supporting the premise that immigration and emigration have relatively little influence on abundance trends at the scale of the recovery unit.

Recovery criteria established within the recovery plan defined population and productivity goals for each recovery unit, as well as for the population as a whole. The recovery objective for the Atlantic Coast population is to increase and maintain for five years a total of 2,000 breeding pairs, distributed among the four recovery units – Atlantic Canada, 400 pairs; New England, 625

pairs; New York-New Jersey, 575 pairs; and, Southern, 400 pairs. Attainment of these goals for each recovery unit is an integral part of a piping plover recovery strategy that seeks to reduce the probability of extinction for a population with low rates of inter-regional dispersal by: (1) contributing to the population total, (2) reducing vulnerability to environmental variation (including catastrophes such as hurricanes, oil spills, or disease), (3) increasing likelihood of genetic interchange among subpopulations, and (4) promoting re-colonization of any sites that experience declines or local extirpations due to low productivity or temporary habitat succession. The plan further states: "A premise of this plan is that the overall security of the Atlantic Coast piping plover population is profoundly dependent upon attainment and maintenance of the minimum population levels for the four recovery units. Any appreciable reduction in the likelihood of survival of a recovery unit will also reduce the probability of persistence of the entire population."

The USFWS has designated critical habitat for the piping plover on three occasions. Two of these designations protected different breeding populations of the piping plover. Critical habitat for the Great Lakes breeding population was designated May 7, 2001 (USFWS 2001a), and critical habitat for the northern Great Plains breeding population was designated September 11, 2002 (USFWS 2002). The USFWS designated critical habitat for wintering piping plovers on July 10, 2001 (USFWS 2001b). Wintering piping plovers may include individuals from the Great Lakes and northern Great Plains breeding populations as well as birds that nest along the Atlantic coast. The three separate designations of piping plover critical habitat demonstrate the diversity of constituent elements among the two breeding populations and wintering piping plovers.

Designated critical habitat for wintering piping plovers originally included approximately 1,798 miles of mapped shoreline and 165,211 acres of mapped area along the coasts of North Carolina, South Carolina, Georgia, Florida, Alabama, Mississippi, Louisiana, and Texas.

The primary constituent elements for piping plover wintering habitat are those biological and physical features that are essential to the conservation of the species. These areas typically include those coastal areas that support intertidal beaches and flats and associated dune systems and flats above annual high tide (USFWS 2001b). Primary constituent elements of wintering piping plover critical habitat include sand or mud flats or both with no or sparse emergent vegetation. Adjacent unvegetated or sparsely vegetated sand, mud, or algal flats above high tide are also important, especially for roosting piping plovers (USFWS 2001b). The units designated as critical habitat are those areas that have consistent use by piping plovers and that best meet the biological needs of the species. The amount of wintering habitat included in the designation appears sufficient to support future recovered populations, and the existence of this habitat is essential to the conservation of the species. Additional information on each specific unit included in the designation can be found at 66 Federal Register 36038 (USFWS 2001b).

Since the designation of wintering critical habitat, four units in North Carolina were vacated and remanded back to the USFWS for reconsideration by Court order (Cape Hatteras Access Preservation Alliance v. U.S. Department of Interior (344 F. Supp. 2d 108 (D.D.C. 2004)). The four critical habitat units vacated were NC-1, NC-2, NC-4, and NC-5, and all occurred within CAHA. On June 12, 2006, the USFWS proposed to amend and re-designate these four units as

critical habitat for wintering piping plover (USFWS 2006a). These units encompass the primary constituent elements found at Bodie Island Spit, Cape Point, Hatteras Spit and Ocracoke Spit within CAHA. On May 15, 2008, the USFWS proposed a revised designation of critical habitat which would add areas to units NC-1 and NC-4 (USFWS 2008d).

Loggerhead sea turtle

The loggerhead sea turtle, listed as a threatened species on July 28, 1978 (NMFS and USFWS 1978), inhabits the continental shelves and estuarine environments along the margins of the Atlantic, Pacific, and Indian Oceans. Loggerhead turtles nest within the continental U.S. from Louisiana to Virginia. Major nesting concentrations are found on the coastal islands of North Carolina, South Carolina, and Georgia, and on the Atlantic and Gulf coasts of Florida (Hopkins and Richardson 1984).

Adults and sub-adults have a reddish-brown carapace (top of shell). Scales on the top and sides of the head and top of the flippers are also reddish-brown, but have yellow borders. The neck, shoulders and limb bases are dull brown on top and medium yellow on the sides and bottom. The plastron (underside of shell) is also medium yellow. Adult average size is 36 inches straight carapace length; average weight is 253 pounds. Hatchlings are dull brown in color. Average size at hatching is 1.8 inches long; average weight is 0.7 ounces. Mating takes place from late March to early June, and eggs are laid throughout the summer (NMFS and USFWS 1991b).

The recovery objectives for the southeastern U.S. population of the loggerhead turtle (NMFS and USFWS 1991b) include:

> over a period of 25 years, the adult female population in Florida is increasing, and in North Carolina, South Carolina, and Georgia nesting numbers are returning to pre-listing levels. For North Carolina, that equates to 800 nests per year. For South Carolina and Georgia nesting numbers must be 10,000 and 2,000 nests per year, respectively. These above conditions must be met with data from standardized surveys which will continue for at least five years after recovery. Furthermore, at least 25 percent of all available nesting beaches must be in public ownership, distributed over the entire nesting range and encompassing at least 50 percent of the nesting activity within each state. In addition, all priority one tasks identified in the recovery plan must be successfully implemented (NMFS and USFWS 1991b).

No critical habitat has been designated for the loggerhead turtle. However, on March 5, 2008, the National Marine Fisheries Service (NMFS) announced a 90-day finding for a petition to reclassify loggerhead turtles in the western North Atlantic Ocean as a Distinct Population Segment with endangered status and designate critical habitat (NMFS 2008).

Green sea turtle

The green sea turtle was federally listed as a protected species on July 28, 1978 (NMFS and USFWS 1978). Breeding populations of the green turtle in Florida and along the Pacific Coast of Mexico are listed as endangered; all other populations are listed as threatened. The green turtle has a worldwide distribution in tropical and subtropical waters. Major green turtle nesting

colonies in the Atlantic occur on Ascension Island, Aves Island, Costa Rica, Suriname, and Trindade Island, Brazil.

Adult green turtles may reach a size of 39 inches in length and weigh 397 pounds. The carapace is smooth and is gray, green, brown, and black. The plastron is yellowish white. Hatchlings weigh about 0.9 ounces and are about two inches long. Hatchlings are black on top and white on the bottom (NMFS and USFWS 1991a).

Within the U.S., green turtles nest in small numbers in the U.S. Virgin Islands and Puerto Rico, and in larger numbers along the east coast of Florida, particularly in Brevard, Indian River, St. Lucie, Martin, Palm Beach, and Broward Counties (NMFS and USFWS 1991a). Nesting also has been documented along the Gulf coast of Florida from Escambia County through Franklin County in Northwest Florida and from Pinellas County through Collier County in Southwest Florida (FFWCC 2006b). Green turtles have been known to nest in Georgia, but only on rare occasions (GDNR 2004). The green turtle also nests sporadically in North Carolina and South Carolina (Woodson and Webster 1999, South Atlantic Fishery Management Council 2008).

Recovery objectives for the U.S. population of the green turtle (NMFS and USFWS 1991a) include:

> over a period of 25 years, that the level of nesting in Florida has increased to an average of 5,000 nests per year for at least six years where nesting data are based on standardized surveys; at least 25 percent of all available nesting beaches is in public ownership and encompasses at least 50 percent of the nesting activity; and a reduction in stage class mortality is reflected in higher counts of individuals on foraging grounds. In addition, all priority one tasks identified in the recovery plan must be successfully implemented (NMFS and USFWS 1991a).

Critical habitat for the green sea turtle has been designated for the water surrounding Culebra Island, Puerto Rico and its outlying keys.

Leatherback sea turtle

The leatherback sea turtle, listed as an endangered species on June 2, 1970 (USFWS 1970), nests on shores of the Atlantic, Pacific, and Indian Oceans. Non-breeding animals have been recorded as far north as the British Isles and the Maritime Provinces of Canada and as far south as Argentina and the Cape of Good Hope (Pritchard 1992). Nesting grounds are distributed circumglobally, with the Pacific Coast of Mexico once supporting the world's largest known concentration of nesting leatherbacks (Pritchard 1982). The largest nesting colonies in the wider Caribbean region are found in Suriname/French Guiana, Trinidad, Costa Rica, Panama, Colombia, and Guyana (NMFS and USFWS 1992; National Research Council 1990; Troëng et al. 2004).

The leatherback is the largest living turtle, and is so distinctive as to be placed in a separate taxonomic family, Dermochelyidae. The carapace is distinguished by a rubber-like texture, about 1.6 inches thick, and made primarily of tough, oil-saturated connective tissue. No sharp angle is formed between the carapace and the plastron, resulting in the animal being somewhat

barrel-shaped. The average curved carapace length for adult turtles is 61 inches and weight ranges from 441 to 1,543 pounds. Hatchlings are mostly black on top and are covered with tiny scales; the flippers are edged in white, and rows of white scales appear as stripes along the length of the back. Hatchlings average 2.4 inches long and 1.6 ounces in weight. In the adult, the skin is black and scaleless. The undersurface is mottled pinkish-white and black. The front flippers are proportionally longer than in any other sea turtle, and may span 106 inches in an adult. In both adults and hatchlings, the upper jaw bears two tooth-like projections (NMFS and USFWS 1992).

The leatherback regularly nests in Puerto Rico, the U.S. Virgin Islands, and along the Atlantic coast of Florida (NMFS and USFWS 1992). Leatherback turtles have been known to nest in Georgia, South Carolina, and North Carolina, but only on rare occasions (Rabon et al. 2003, GDNR 2004). Leatherback nesting also has been reported on the northwest coast of Florida (LeBuff 1990.

The recovery objective for U.S. population of the leatherback turtle include:

> when the adult female population increases over the next 25 years, as evidenced by a statistically significant trend in the number of nests at Culebra, Puerto Rico, St. Croix, U.S. Virgin Islands, and along the east coast of Florida, and nesting habitat encompassing at least 75 percent of nesting activity in the U.S. Virgin Islands, Puerto Rico, and Florida is in public ownership. In addition, all priority one tasks identified in the recovery plan must be successfully implemented (NMFS and USFWS 1992).

Critical habitat has been designated for the leatherback sea turtle in the U.S. Virgin Islands.

B. Life History

Piping plover

Piping plover breeding activity begins in mid-March when birds begin returning to their nesting areas (Coutu et al. 1990, Cross 1990, Goldin et al. 1990, MacIvor 1990, Hake 1993). Males establish and defend territories and court females (Cairns 1982). Piping plovers are monogamous, but usually shift mates between years (Wilcox 1959, Haig and Oring 1988, MacIvor 1990) and less frequently between nesting attempts in a given year (Haig and Oring 1988, MacIvor 1990, Strauss 1990). Plovers may begin breeding as early as one year of age (MacIvor 1990, Haig 1992); however, the percentage of birds that breed in their first adult year is unknown. Observations suggest that this species exhibits a high degree of nest site fidelity (Wilcox 1959, Haig 1985, Haig and Oring 1988).

Piping plover nests can be found above the high tide line on coastal beaches, on sand flats at the ends of sand spits and barrier islands, on gently sloping foredunes, in blowout areas behind primary dunes, and in washover areas cut into or between dunes. The birds may also nest on areas where suitable dredge material has been deposited. Nest sites are shallow, scraped depressions in substrates ranging from fine-grained sand to mixtures of sand and pebbles, shells or cobble (Bent 1929, Burger 1987a, Cairns 1982, Patterson 1988, MacIvor 1990, Strauss 1990, Flemming et al. 1992). Nests are usually found in areas with little or no vegetation; although, on

occasion, piping plovers will nest under stands of American beachgrass or other vegetation (Patterson 1988, MacIvor 1990, Flemming et al. 1992). Plover nests may be very difficult to detect, especially during the 6 to 7 day egg-laying phase when the birds generally do not incubate (Goldin 1994).

Eggs may be present on the beach from early April through late July. Clutch size for an initial nest attempt is usually four eggs, one laid every other day. Eggs are pyriform in shape, and variable buff to greenish brown in color, marked with black or brown spots. The incubation period usually lasts 27 to 28 days. Full-time incubation usually begins with the completion of the clutch and is shared equally by both sexes (Wilcox 1959, Cairns 1977, MacIvor 1990). Eggs in a clutch usually hatch within 4 to 8 hours of each other, although the hatching period of one or more eggs may be delayed by up to 48 hours (Cairns 1977, Wolcott and Wolcott 1999).

Piping plovers generally fledge only a single brood per season, but may renest several times if previous nests are lost. Chicks are precocial (Wilcox 1959, Cairns 1982). They may move hundreds of yards from the nest site during their first week of life (see Table 1 in USFWS 1996), and chicks may increase their foraging range up to 3,000 feet before they fledge (Loegering 1992). Chicks remain together with one or both parents until they fledge at 25 to 35 days of age. Depending on date of hatching, flightless chicks may be present from mid-May until late August, although most fledge by the end of July (Patterson 1988, Goldin et al. 1990, MacIvor 1990, Howard et al. 1993).

Cryptic coloration is a primary defense mechanism for this species; nests, adults, and chicks all blend in with their typical beach surroundings. Chicks sometimes respond to vehicles and/or pedestrians by crouching and remaining motionless (Cairns 1977, Tull 1984, Goldin 1993b, Hoopes 1993). Adult piping plovers also respond to intruders (avian and mammalian) in their territories by displaying a variety of distraction behaviors, including squatting, false brooding, running, and injury feigning. Distraction displays may occur at any time during the breeding season but are most frequent and intense around the time of hatching (Cairns 1977).

Plovers feed on invertebrates such as marine worms, fly larvae, beetles, crustaceans, and mollusks (Bent 1929, Cairns 1977, Nicholls 1989). Important feeding areas include intertidal portions of ocean beaches, washover areas, mudflats, sand flats, wrack lines, sparse vegetation, and shorelines of coastal ponds, lagoons, or salt marshes (Gibbs 1986, Coutu et al. 1990, Hoopes et al. 1992, Loegering 1992, Goldin 1993a, Elias-Gerken 1994). Studies have shown that the relative importance of various feeding habitat types may vary by site (Gibbs 1986, Coutu et al. 1990, McConnaughey et al. 1990, Loegering 1992, Goldin 1993a, Hoopes 1993, Elias-Gerken 1994) and by stage in the breeding cycle (Cross 1990). Adults and chicks on a given site may use different feeding habitats in varying proportion (Goldin et al. 1990). Feeding activities of chicks are particularly important to their survival. Most time budget studies reveal that chicks spend a high proportion of their time feeding. Cairns (1977) found that piping plover chicks typically tripled their weight during the first two weeks post-hatching; chicks that failed to achieve at least 60 percent of this weight gain by the twelfth day were unlikely to survive.

During courtship, nesting, and brood rearing, feeding territories are generally contiguous to nesting territories (Cairns 1977), although instances where brood-rearing areas are widely

separated from nesting territories are common. Feeding activities of both adults and chicks may occur during all hours of the day and night (Staine and Burger 1994), and at all stages in the tidal cycle (Goldin 1993a, Hoopes 1993).

Both spring and fall migration routes of Atlantic Coast breeders are believed to occur primarily within a narrow zone along the Atlantic Coast (USFWS 1996). Some mid-continent breeders travel up or down the Atlantic Coast before or after their overland movements (Stucker and Cuthbert 2006). Use of inland stopovers during migration is also documented (Pompei and Cuthbert 2004). The pattern of both fall and spring counts at many Atlantic Coast sites demonstrates that many piping plovers make intermediate stopovers lasting from a few days up to one month during their migrations (NPS 2003, Noel et al. 2005, Stucker and Cuthbert 2006). In addition, this species exhibits a high degree of both intra- and inter-annual wintering site fidelity (Drake et. al. 2001, Noel et al. 2005, Stucker and Cuthbert 2006).

A growing body of information shows that overwash-created and -perpetuated habitats, including accessible bayside flats, unstabilized and recently bealed inlets, and moist sparsely vegetated barrier flats are especially important to piping plover productivity and carrying capacity in the New York-New Jersey and Southern recovery units.

In New Jersey, Burger (1994) studied piping plover foraging behavior and habitat use at three sites that offered the birds: ocean, dune, and backbay habitats. The primary focus of the study was on the effect of human disturbance on habitat selection, and it found that both habitat selection and foraging behavior correlated inversely with the number of people present. In the absence of people on an unstabilized beach, plovers fed in ocean and bayside habitats in preference to the dunes.

Loegering and Fraser (1995) found that chicks on Assateague Island, Maryland that were able to reach bay beaches and the island interior had significantly higher fledgling rates than those that foraged solely on the ocean beach. Higher foraging rates, percentage of time spent foraging, and abundance of terrestrial arthropods on the bay beach and interior island habitats supported their hypothesis that foraging resources in interior and bayside habitats are key to reproductive rates on that site. Their management recommendations stressed the importance of sparsely vegetated cross-island access routes maintained by overwash, and the need to restrict or mitigate activities that reduce natural disturbance during storms.

Dramatic increases in plover productivity and breeding population on Assateague since the 1991-1992 advent of large overwash events corroborate Loegering and Fraser's conclusions. Piping plover productivity, which had averaged 0.77 chicks per pair during the five years before the overwash, averaged 1.67 chicks/pair in 1992-96. The nesting population on the northern five miles of the island also grew rapidly, doubling by 1995 and tripling by 1996, when 61 pairs nested there (MacIvor 1996). Habitat use is primarily on the interior and bayside.

In Virginia, Watts et al. (1996) found that piping plovers nesting on 13 barrier islands between 1986 and 1988 were not evenly distributed along the islands. Beach segments used by plovers had wider and more heterogeneous beaches, fewer stable dunes, greater open access to bayside

foraging areas, and proximity to mudflats. They note that characteristics of beaches selected by plovers are maintained by frequent storm disturbance.

At Cape Lookout National Seashore in North Carolina, 13 to 45 pairs of plovers have nested on North and South Core Banks each year since 1992 (NPS 2007d). While these unstabilized barrier islands total 44 miles long, nesting distribution is patchy, with all nests clustered on the dynamic ends of the barrier islands, recently closed and sparsely vegetated "old inlets," expansive barrier mudflats, or new ocean-to-bay overwashes. During a 1990 study, 96 percent of brood observations were on bay tidal flats, even though broods had access to both bay and ocean beach habitats (McConnaughey et al. 1990).

At CAHA, distribution of nesting piping plovers is also "clumped," with nesting areas characterized by a wide beach, relatively flat intertidal zone, brackish ponds, and temporary pools formed by rainwater and overwash (Coutu et al. 1990).

Notwithstanding the importance of bayside (soundside) flats, ephemeral pools, and sparsely vegetated barrier flats for piping plover nest site selection and chick foraging, ocean intertidal zones are also used by chicks of all ages. For example, between 1993 and 1996 on the Maryland end of Assateague Island, four to 12 percent of annual observations of plover broods occurred on the ocean beach (NPS and Maryland DNR 1993-1996). A three-year study of piping plover chick foraging activity at six sites on four Virginia barrier islands (Cross and Terwilliger 2000) documented chick use of the ocean intertidal zone at three of six study sites. Intensive observations at Chincoteague National Wildlife Refuge Overwash Zone in 2004, where chicks had unimpeded access to a large undisturbed bayside flat, documented occasional visits to the ocean intertidal zone by six of eleven broods ranging in age from one to 24 days (Hecht 2004, *in litt.*).

Wintering and migrating piping plovers on the Atlantic Coast are generally found at the accreting ends of barrier islands, along sandy peninsulas, and near coastal inlets. Wintering piping plovers appear to prefer sand flats adjacent to inlets or passes, sandy mud flats along prograding spits (areas where the land rises with respect to the water level), and overwash areas as foraging habitats. These substrate types may have a richer infauna than the foreshore of high energy beaches and often attract large numbers of shorebirds. Roosting plovers are generally found along inlet and adjacent ocean and estuarine shorelines and their associated berms and on nearby exposed tidal flats (Nicholls and Baldassarre 1990). Since tidal conditions and weather often cause plovers to move among habitat patches, diverse habitat patches may be especially important to plovers and may concentrate wintering piping plovers when roosting and feeding areas are adjacent (Johnson and Baldassarre 1988, Nicholls and Baldassarre 1990, Drake et al. 2001). Wintering plovers with small home ranges which contain safe roosts and abundant food should experience low commuting costs, and would be expected to have higher survival (Drake et al. 2001).

Cohen et al. (in press) conducted a study on wintering piping plovers at and near the Oregon Inlet during the winter of 2005/2006. They found that all plover habitat use fell into one of three habitat zones: ocean beach, sound beach, and sound island (dredged material, shoal, and other marsh and mudflat/sandflat islands). In the study, plovers were more likely to use sound islands

than ocean beach or sound beach when the intertidal area of sound islands was exposed during low tide. Plovers using ocean beach spent less time foraging (18%) than when on sound beaches (88%) and sound islands (83%).

Factors affecting the piping plover during its life cycle

Predation has been identified as a major factor limiting piping plover reproductive success at many Atlantic Coast sites (Burger 1987a, MacIvor 1990, Cross 1991, Patterson et al. 1991, Elias-Gerken, 1994). As with other limiting factors, the nature and severity of predation is highly site specific. Predators of piping plover eggs and chicks include foxes, skunks, raccoons, rats, opossums, crows, gulls, grackles, American kestrels, domestic and feral dogs and cats, and ghost crabs.

Substantial evidence exists that human activities are affecting types, numbers, and activity patterns of predators, thereby exacerbating natural predation. Non-native species such as feral cats and rats are considered significant predators at some sites (Goldin et al. 1990, Post 1991). Humans have also indirectly influenced predator populations by abetting the expansions in the populations and/or range of other species such as gulls (Drury 1973). Strauss (1990) found that the density of fox tracks on a beach area was higher during periods of more intensive human use.

Predation and nest abandonment because of predators have been implicated as a cause of low reproductive success (Cooper 1990, Coutu et al. 1990, Kuklinski et al. 1996). Predator trails (of foxes, dogs, and cats) have been seen around areas of the last known location of piping plover chicks. Predatory birds also are relatively common during their fall and spring migration along the Atlantic Ocean coastline, and there is a possibility they may occasionally take plovers.

Piping plover habitats (breeding and non-breeding) are dependent on natural forces of creation and renewal. However, storms and severe cold weather are believed to take their toll on plovers. After an intense snowstorm swept the entire North Carolina coast in late December 1989, high mortality of many coastal bird species was noted (Fussell 1990). Piping plover numbers decreased significantly from about 30 to 40 birds down to 15 birds. While no dead piping plovers were found, circumstantial evidence suggests that much of the decrease was mortality (Fussell 1990). Hurricanes may also result in direct mortality or habitat loss, and if piping plover numbers are low enough or if total remaining habitat is sparse relative to historical levels, population responses may be impaired even through short-term habitat losses. Wilkinson and Spinks (1994) suggest that, in addition to the unusually harsh December 1989 weather, low plover numbers seen in South Carolina in January 1990 (11 birds, compared with more than 50 during the same time period in 1991 to 1993) may have been influenced by effects on habitat and food availability caused by Hurricane Hugo in September 1989. Hurricane Elena struck the Alabama coast in September 1985 and subsequent surveys noted a reduction of intertidal foraging habitat on Dauphin and Little Dauphin Islands (Johnson and Baldassarre 1988). Birds were observed foraging at Sand Island, a site that was used little prior to the hurricane.

Unrestricted use of motorized vehicles on beaches is a serious threat to piping plovers and their habitats. Vehicles can crush eggs (Wilcox 1959, Tull 1984, Burger 1987b, Patterson et al. 1991, Shaffer and Laporte 1992) as well as adults and chicks. However, the mobility of newly hatched

chicks and adults does not lessen the susceptibility to mortality by vehicles. For example, in Massachusetts and New York, biologists documented 14 incidents in which 18 chicks and two adults were killed by vehicles between 1989 and 1993 (Melvin et al. 1994). Goldin (1993b) compiled records of 34 chick mortalities (30 on the Atlantic Coast and four on the northern Great Plains) due to vehicles. Biologists that monitor and manage piping plovers believe that many more chicks are killed by insufficiently-managed vehicles than are found and reported (Melvin et al. 1994). Beaches used by vehicles during nesting and brood-rearing periods generally have fewer breeding plovers than available nesting and feeding habitat can support. In contrast, plover abundance and productivity has increased on beaches where vehicle restrictions during chick-rearing periods have been combined with protection of nests from predators (Goldin 1993b).

Typical behaviors of piping plover chicks increase their vulnerability to vehicles. Chicks frequently move between the upper berm or foredune and feeding habitats in the wrack line and intertidal zone. These movements place chicks in the paths of vehicles driving along the berm or through the intertidal zone. Chicks stand in, walk, and run along tire ruts, and sometimes have difficulty crossing deep ruts or climbing out of them (Strauss 1990, Eddings 1991, Howard et al. 1993). Chicks sometimes stand motionless or crouch as vehicles pass by, or do not move quickly enough to get out of the way (Tull 1984, Hoopes et al. 1992, Goldin 1993b).

Vehicles also significantly degrade piping plover habitat or disrupt normal behavior patterns. They may harm or harass plovers by crushing wrack into the sand and making it unavailable as cover or a foraging substrate (Hoopes et al. 1992, Goldin 1993b), by creating ruts that can trap or impede movements of chicks (Jacobs 1988, *in litt.*), and by preventing plovers from using habitat that is otherwise suitable (MacIvor 1990, Strauss 1990, Hoopes et al. 1992, Goldin 1993b, Hoopes 1994). Zonick (2000) found that ORV density negatively correlated with abundance of roosting, nonbreeding plovers on the ocean beach in Texas. Studies elsewhere (e.g. Wheeler 1979) demonstrate adverse effects of ORV driving on soundside beaches on the abundance of infauna essential to piping plover foraging requirements.

Lighting may also negatively affect piping plovers. While the extent that artificial lighting (including vehicle lights) affects piping plovers is unknown, there is evidence that American oystercatcher (*Haematopus palliatus*) chicks and adults are attracted to vehicle headlights and may move toward areas of ORV activity. During a 2005 study at Cape Lookout National Seashore, adult and chick oystercatchers were observed running or flying directly into the headlights of oncoming vehicles, and two two-day old oystercatcher chicks were run over by an all-terrain vehicle after being observed foraging with the adults near the high tide line at night (Simons et al. 2005).

Pedestrian and non-motorized recreational activities can be a source of both direct mortality and harassment of piping plovers. There are a number of potential sources for pedestrians on the beach, including those individuals driving and subsequently parking on the beach, those originating from off-beach parking areas (hotels, motels, commercial facilities, beachside parks, etc.), and those from beachfront and nearby residences.

Pedestrians on beaches may crush eggs (Burger 1987b, Shaffer and Laporte 1992, NPS 1993), or flush plovers from nests exposing their eggs to predators. Concentrations of pedestrians may also deter piping plovers from using otherwise suitable habitat. Ninety-five percent of Massachusetts plovers (n = 209) observed by Hoopes (1993) were found in areas that contained less than one person per 2 acres of beach. Elias-Gerken (1994) found that piping plovers on Jones Beach Island, New York, selected beachfront that had less pedestrian disturbance. Sections of beach at Trustom Pond National Wildlife Refuge in Rhode Island were colonized by piping plovers within two seasons of their closure to heavy pedestrian recreation. Burger (1991, 1994) found that the presence of people at several New Jersey sites caused plovers to shift their habitat use away from the ocean front to interior and bayside habitats; the time plovers devoted to foraging decreased and the time spent alert increased when more people were present. Burger (1991) also found that when plover chicks and adults were exposed to the same number of people, the chicks spent less time foraging and more time crouching, running away from people, and being alert than did the adults.

Pedestrians may flush incubating plovers from nests, exposing eggs to excessive temperatures. Repeated exposure of shorebird eggs on hot days may cause overheating, killing the embryos (Bergstrom 1989); excessive cooling may kill embryos or retard their development, delaying hatching dates (Welty 1982). Pedestrians can also displace unfledged chicks (Strauss 1990, Burger 1991, Hoopes et al. 1992, Loegering 1992, Goldin 1993b), forcing them out of preferred habitats, decreasing available foraging time, and causing expenditure of energy.

Fireworks are highly disturbing to piping plovers (Howard et al. 1993). Plovers are also intolerant of kites, particularly as compared to pedestrians, dogs, and vehicles; biologists believe this may be because plovers perceive kites as potential avian predators (Hoopes et al. 1992).

Noncompliant pet owners who allow their dogs off leash have the potential to flush piping plovers and these flushing events may be more prolonged than those associated with pedestrians or pedestrians with dogs on leash. Unleashed dogs may chase plovers (McConnaughey et al. 1990), destroy nests (Hoopes et al. 1992), and kill chicks (Cairns and McLaren 1980, Boyagian 1994, *in litt.*).

Demographic models for piping plovers indicate that even small declines in adult and juvenile survival rates will cause very substantial increases in extinction risk (Melvin and Gibbs 1994, Larson et al. 2000, Wemmer et al. 2001, Calvert et al. 2006). Furthermore, insufficient protection of non-breeding piping plovers has the potential to quickly undermine the progress toward recovery achieved at breeding sites. For example, a banding study conducted between 1998 and 2004 in Atlantic Canada found lower return rates of juvenile (first year) birds to the breeding grounds than was documented for Massachusetts (Melvin and Gibbs 1994), Maryland (Loegering 1992), and Virginia (Cross 1996) breeding populations in the mid-1980s and very early 1990s. This is consistent with failure of the Atlantic Canada population to increase abundance despite very high productivity (relative to other breeding populations) and extremely low rates of dispersal to the U.S. (Calvert et al. 2006). This suggests that maximizing productivity does not ensure population increases; management must focus simultaneously on all sources of stress on the population within management control.

Loggerhead sea turtle

Loggerheads are known to nest on average about four times within a nesting season, ranging from one to seven times (Talbert et al. 1980, Lenarz et al. 1981, Richardson and Richardson 1982, Murphy and Hopkins 1984). The interval between nesting varies around a mean of about 14 days (Dodd 1988). Mean clutch size varies from about 100 to 126 eggs per nest along the southeastern U.S. coast (NMFS and USFWS 1991b). The loggerhead returns at intervals of two to three years, but the number can vary from one to seven years (Dodd 1988). Age at sexual maturity is likely to be greater than 30 years (Snover 2002).

Green sea turtle

Green turtles deposit from one to nine clutches within a nesting season, but the overall average is about 3.3. The interval between nesting varies around a mean of about 13 days (Hirth 1997). Mean clutch size varies widely among populations. Average clutch size reported for Florida was 136 eggs in 130 clutches (Witherington and Ehrhart 1989). Only occasionally do females produce clutches in successive years. Usually two to four years intervene between breeding seasons (NMFS and USFWS 1991a). Age at sexual maturity is believed to be 20 to 50 years (Hirth 1997).

Leatherback sea turtle

Leatherbacks nest an average of five to seven times within a nesting season, with an observed maximum of 11 (NMFS and USFWS 1992). The interval between nesting is about nine to ten days. Clutch size averages 101 eggs on Hutchinson Island, Florida (Martin 1992). Most leatherbacks return at two to three-year intervals based on data from the Sandy Point National Wildlife Refuge, St. Croix, U.S. Virgin Islands (McDonald and Dutton 1996). Leatherbacks are believed to reach sexual maturity in six to ten years (Zug and Parham 1996).

Factors affecting sea turtles during portions of their life cycle

Artificial lighting is one of the most significant impacts on sea turtle survival, especially of post-emergent hatchlings (Mann 1977, Ehrhart and Witherington 1987, Witherington 1992). Visual cues are the primary sea-finding mechanism for hatchlings (Mrosovsky and Carr 1967, Mrosovsky and Shettleworth 1968, Dickerson and Nelson 1989, Witherington and Bjorndal 1991). Hatchlings show a tropotactic response to light upon emergence, so any visual stimulus in the field of vision has some effect on the direction chosen by the hatchlings (Mrosovsky 1970). Hatchlings instinctively orient to the brightest horizon, which, in the absence of artificial lights, is usually the ocean horizon. It is possible to attract hatchlings out of the surf with a bright light, demonstrating the importance of light stimulus in hatchling behavior (Carr and Ogren 1960, Ehrhart and Witherington 1987).

Artificial lighting cues can cause misorientation (hatchlings travel along a consistent course toward a light source) or disorientation (hatchlings are not able to set a particular course and wander aimlessly) (Philibosian 1976, Mann 1977, Witherington 1990). Hatchlings are frequently attracted to point source lights on buildings and roadways in urban areas (McFarlane

1963, Philibosian 1976, Mann 1978, Witherington 1992). Urban areas may also have a non-point source nighttime glow which may disorient hatchlings from otherwise dark sections of beach (Witherington 1993, Tuxbury and Salmon 2005). Light intensities from sky measurements taken on the beach can be higher than the ocean horizon (Salmon et al. 1995a).

Once disoriented, turtles often enter conflicting light environments as they head landward. As hatchlings approach buildings and roads, they encounter obstacles that may screen the source of artificial light (Salmon et al. 1995b). They may then re-orient themselves correctly toward the ocean or continue along the obstruction (e.g. seawall, deep ruts, buildings) until they can see the original or perhaps another source of artificial light. If the obstructions are high enough and continuous enough to prevent the hatchlings from leaving the beach, the lightening sky as sunrise approaches often becomes a dominant influence and attracts the hatchlings to the surf. Mann (1977) also found that most turtles in artificial light-dominated areas oriented correctly on brightly moonlit nights. On moonless nights, hatchlings were more easily disoriented by artificial lights.

The correlation between level of light-caused disruption and survivorship has not, however, been identified. It has been demonstrated that there are relative degrees of sub-lethal and lethal effects, ranging from mild misorientation of a few hatchlings to strong disorientation of a whole clutch resulting in mortality for many hatchlings (Salmon et al. 1995a, Witherington et al. 1996).

Both Mann (1977) and Ehrhart and Witherington (1987) found high mortality in the emergences where the majority of the hatchlings were strongly disoriented. If the hatchlings do not manage to enter the surf, they may enter the vehicle corridor where they are subject to being run over, trapped in tire ruts and become vulnerable to predators, or become irretrievably lost from finding their way to the surf. The protracted wanderings of disoriented hatchlings also lengthens the time they are susceptible to predation from raccoons, ghost crabs, seabirds, fish crows, night herons and possibly dogs and cats. The prolonged exposure can exhaust and/or dehydrate the turtles to the point of death or limit their chance of survival once in the water. Weakened hatchlings that eventually reach the water may be more vulnerable to marine predators, which are abundant in nearshore waters (Wyneken et al. 1994).

Research has also documented significant reduction in sea turtle nesting activity on beaches illuminated with artificial lights (Witherington 1992). Lights may deter females from coming ashore to nest or disorient females trying to return to the surf after a nesting event. However, artificial lighting does not appear to be as problematic for nesting adult female sea turtles as compared to hatchlings. They seem to use a straight-ahead method to select a nest site. They do not appear to be affected as much by artificial lights along the beach as they are by bright lights immediately in front of them upon emerging from the surf (Salmon et al. 1995b, Witherington 1992). Distant point sources and urban glow are more likely to affect hatchlings than adult females (Salmon et al. 1995b). The effects of lights on the female's decision of where to emerge remain unknown.

Hurricanes and other storms during late summer and fall on the east coast of the U.S. create conditions that often result in beach erosion and the subsequent loss of sea turtle nests. Nests may be washed out or inundated long enough to result in egg mortality. In the last several years,

numerous hurricanes and tropical storms have resulted in substantial impacts to the coastal environment along most of the eastern United States. Erosion resulted in a reduction of beach profile in some areas and an accretion of sand in others. High tides and storm surges from these tropical systems overwashed, washed out, buried, or inundated sea turtle nests. Due to nesting chronology, most of the nests lost to storm events will be loggerhead and a few green sea turtle nests. Leatherback sea turtles typically nest earlier in the season and most, if not all, nests have hatched prior to the peak of the tropical storm season.

The use of ORVs on sea turtle nesting beaches can adversely affect the egg, hatchling, and nesting life stages of sea turtles. Vehicles can directly impact sea turtles by running over nesting females and hatchlings making their way to the ocean; crushing nests; deterring females from nesting and approaching nesting beaches; and changing the beach profile and nesting habitat (e.g., compacting sand and making nest excavation difficult, producing ruts in the sand that trap hatchlings, and creating escarpments that prevent females from accessing the beach). Vehicles on beaches, especially during night hours, run the risk of striking adult females emerging on the beach to nest or hatchlings making their way towards the surf after emerging from the nest (National Research Council 1990).

Driving on dune systems alters beach habitat for turtle nesting. Vehicles change the character of the beach profile (Hosier and Eaton 1980), thus increasing the chance of unsuitable nesting habitat for turtles and reducing the number of nests laid and/or hatchlings produced. Erosion can increase in areas with vehicular traffic (National Research Council 1990), which can create escarpments that prevent females from reaching the nesting area of the beach or act as obstacles to hatchlings trying to reach the ocean.

Ruts caused by ORVs reduce the number of hatchlings that make it to the ocean (Lamont et al. 2002). The ruts act as barriers which trap hatchlings making them prone to desiccation and predation. Live and desiccated turtles have been observed in deep vehicle ruts (LeBuff 1990). The ruts can also act as pathways, leading hatchlings away from the ocean. Apparently, hatchlings become diverted not necessarily because they cannot physically climb out of the rut (Arianoutsou 1988, Hughes and Caine 1994), but because the sides of the track cast a shadow and the hatchlings lose their line of sight to the ocean horizon (Mann 1977). If hatchlings are detoured along vehicle ruts, they are at greater risk to vehicles, predators, fatigue, and desiccation. However, hatchling turtles also have a greater probability of overturning when they have to maneuver over ruts in the sand (Hosier 1981; Hosier et al. 1981), which can expose them to desiccation and predation. At least two studies have confirmed hatchling disorientation by vehicular ruts (Cox et al. 1994, Hosier et al. 1981).

Sand compaction resulting from ORVs may increase the length of time required for female sea turtles to excavate nests. If sediments become too compacted, a female turtle may have difficulty excavating an egg chamber of adequate depth or dimensions (Raymond 1984, Ryder 1990, Carthy 1994). Compression of sand by vehicles also causes reduced hatching success of loggerhead turtle nests (Mann 1977). Nesting areas with vehicle traffic have a lower hatchling emergence due to egg chamber cave-ins, making it harder for hatched turtles to emerge to the surface (Mann 1977). Mortality while hatching out of eggs is also higher on beaches open to public access than beaches with restricted access (Kudo et. al. 2003).

Pedestrian traffic on the beach can have a wide variety of adverse affects on sea turtles. People often walk on beaches at night seeking encounters with nesting female sea turtles. These interactions can interfere with the successful excavation of a nest chamber and/or deposition of eggs and may result in abandonment of nesting attempts (McFarlane 1963, Johnson et al. 1996). Once a turtle leaves the beach, she may return to the same location or select a new site later that night or the following night. However, repeated interruption of nesting may cause a turtle to construct her nest in a sub-optimal incubation environment, postpone nesting for several days, prompt movement many miles from the original chosen nesting site, or cause the turtle to shed her eggs at sea (Murphy 1985). Studies of pedestrian impacts on loggerhead sea turtle nests in Japan have shown that beaches with full pedestrian access have significantly lower emergence success, compared to nests laid on beaches with restricted pedestrian access (Kudo et al. 2003). The full extent to which nighttime beach use by humans may affect sea turtles is not known.

Increased pedestrian use increases the amount of trash left behind on the beach. This waste becomes a threat to hatchlings and adult turtles on the beach and in the water. Sea turtles ingest waste products, especially plastics, due to their resemblance to jellyfish, a turtle food source (National Research Council 1990). Bugoni et al. (2001) found as much as 60 percent of the turtles investigated had ingested marine debris. Beach trash can also impede the movement of hatchlings to the ocean.

Dogs running freely on beaches have been identified as potential predators of eggs, hatchlings and even adult sea turtles (Dodd 1988, Santos and Godfrey 2001).

C. Population dynamics

Piping plover

Great Lakes Population

The Great Lakes plovers once nested on Great Lakes beaches in Illinois, Indiana, Michigan, Minnesota, New York, Ohio, Pennsylvania, Wisconsin, and Ontario. Russell (1983) reviewed historical records to estimate the pre-settlement populations of the plover throughout this range. While estimates may be high for some Great Lakes states, no other historic estimates are available. Total population estimates ranged from 492 to 682 breeding pairs in the Great Lakes region; Michigan alone may have had the most with as many as 215 pairs. When listed, the Great Lakes population numbered only 17 known breeding pairs that nested in northern Michigan. Gradual increases in this population have been documented since listing and these birds are now known to have expanded to the south and west (USFWS 2003). Twenty-nine breeding pairs were observed in 2001 (Ferland and Haig 2002). As of 2007, there were an estimated 63 nesting pairs (Dingledine 2008, *in litt.*).

Great Lakes piping plovers nest on wide, flat, open, sandy or cobble shoreline with very little grass or other vegetation. Reproduction is adversely affected by human disturbance of nesting areas and predation by foxes, gulls, crows and other avian species. Shoreline development, such

as the construction of marinas, breakwaters, and other navigation structures, has adversely affected nesting and brood rearing.

Northern Great Plains Population

The Northern Great Plains plover breeds from Alberta to Manitoba, Canada and south to Nebraska; although some nesting has recently occurred in Oklahoma. Currently the most westerly breeding piping plovers in the United States occur in Montana and Colorado.

Nesting occurs on sand flats or bare shorelines of rivers and lakes, including sandbar islands in the upper Missouri River system, and patches of sand, gravel, or pebbly-mud on the alkali lakes of the northern Great Plains. Breeding surveys in the early 1980s reported 2,137 to 2,684 adult plovers in the northern Great Plains/Prairie region (Haig and Oring 1985). In 1991, 2,032 adult plovers were observed in the U.S. portion of the northern Great Plains (Haig and Plissner 1993). The number declined to 1,599 in 1996 (Plissner and Haig 1997), a reduction of 21 percent from 1991. Part of this reduction may be an artifact of increased numbers of plovers nesting in Canada in 1996 due to high water levels in the U.S. (Plissner and Haig 1997). Overall in both the U.S. and Canadian portion of the northern Great Plains, 3,469 adult piping plovers were observed in 1991; 3,286 were observed in 1996; and 2,953 were observed in 2001 (Ferland and Haig 2002). The 2001 figure includes 1,291 breeding pairs.

The decline of piping plovers on rivers in the Northern Great Plains has been largely attributed to the loss of sandbar island habitat and forage base due to dam construction and operation. While piping plovers do nest on shorelines of reservoirs created by the dams, reproductive success is often low and reservoir habitat is not available in many years due to high water levels or vegetation. Dams operated with steady constant flows allow vegetation to grow on potential nesting islands, making these sites unsuitable for nesting. Population declines in alkali wetlands are attributed to wetland drainage, contaminants, and predation.

Atlantic Coast Population

The Atlantic Coast piping plover breeds on coastal beaches from Newfoundland and southeastern Quebec to North Carolina. Historical population trends for the Atlantic Coast piping plover have been reconstructed from scattered, largely qualitative records. Nineteenth-century naturalists, such as Audubon and Wilson, described the piping plover as a common summer resident on Atlantic Coast beaches (Haig and Oring 1987). However, by the beginning of the 20th Century, egg collecting and uncontrolled hunting, primarily for the millinery trade, had greatly reduced the population, and in some areas along the Atlantic Coast, the piping plover was close to extirpation. Following passage of the Migratory Bird Treaty Act (40 Stat. 775; 16 U.S.C. 703-712) in 1918, and changes in the fashion industry that no longer exploited wild birds for feathers, piping plover numbers recovered to some extent (Haig and Oring 1985).

Available data suggest that the most recent population decline began in the late 1940s or early 1950s (Haig and Oring 1985). Reports of local or statewide declines between 1950 and 1985 are numerous, and many are summarized by Cairns and McLaren (1980) and Haig and Oring (1985). While Wilcox (1939) estimated more than 500 pairs of piping plovers on Long Island, New

York, the 1989 population estimate was 191 pairs (see Table 4, USFWS 1996). There was little focus on gathering quantitative data on piping plovers in Massachusetts through the late 1960s because the species was commonly observed and presumed to be secure. However, numbers of piping plover breeding pairs declined 50 to 100 percent at seven Massachusetts sites between the early 1970s and 1984 (Griffin and Melvin 1984). Piping plover surveys in the early years of the recovery effort found that counts of these cryptically colored birds sometimes went up with increased census effort, suggesting that some historic counts of piping plovers by one or a few observers may have underestimated the piping plover population. Thus, the magnitude of the species decline may have been more severe than available numbers imply.

The Atlantic Coast population has increased from 790 pairs since listing to a preliminary estimate of 1,887 pairs in 2007 (USFWS 2008a)(final 2006 estimate of 1,749 pairs, USFWS 2006b). Population growth has been greatest in the New England and New York-New Jersey recovery units, with a more modest and recent increase in the Southern unit and an even smaller increase in Atlantic Canada. Periodic rapid declines in abundance of breeding pairs at the level of the recovery unit, including a 68 percent decline in the southern half of the Virginia barrier island chain and North Carolina between 1995 and 2001, illustrate continued population vulnerability. As of 2007, the Southern recovery unit had 333 nesting pairs (USFWS 2008a). The abundance objectives for the Atlantic Coast population and the Southern recovery unit are 2,000 and 400 breeding pairs, respectively, and must be sustained for five years (USFWS 1996).

Species as a whole

The 2001 International Piping Plover Breeding Census resulted in 2,747 breeding pairs distributed across all three breeding populations (Ferland and Haig 2002). Total population numbers have fluctuated over time with some areas experiencing increases and others decreases.

Loggerhead sea turtle

From 1989 to 1998, total estimated loggerhead nesting in the southeastern U.S. ranged from approximately 53,000 to 92,000 nests per year, with well over 90% of the nests occurring in Florida (Turtle Expert Working Group 2000). In 1998, 85,988 nests were documented in Florida alone. However, that number had declined to 49,776 nests in 2006 (FFWCC 2006a). An analysis of nesting data from the Florida Index Nesting Beach Survey (INBS) Program from 1989 to 2007, a more consistent and accurate index survey that includes a subset of the total Florida beach length, showed an overall decrease in loggerhead nesting of 37% (FFWCC 2007).

Standardized monitoring of nearly all ocean-facing beaches in North Carolina was implemented in the mid-1990s. Data collected to date on annual numbers of nests in North Carolina are insufficient to detect a trend. An analysis of a longer-term dataset available for several nesting beaches in the southern reach of North Carolina showed that there was no increasing or decreasing trend in annual nest numbers (Hawkes et al. 2005). Additional, long-term nesting data are needed to determine whether current declines in nesting are part of the inherent variability in sea turtle nesting patterns or the result of other factors.

From a global perspective, the southeastern U.S. nesting aggregation is of importance to the survival of the species and is second in size only to that which nests on islands in the Arabian Sea off Oman (Ross 1982, Ehrhart 1989, NMFS and USFWS 1991b). The status of the Oman loggerhead nesting population, reported to be the largest in the world (Ross 1979), is uncertain because of the lack of long-term standardized nesting or foraging ground surveys and its vulnerability to increasing development pressures near major nesting beaches and threats from fisheries interactions on foraging grounds and migration routes (Possardt 2005, *in litt.*). The loggerhead nesting aggregations in Oman, the southeastern U.S., and Australia have been estimated to account for about 88 percent of nesting worldwide (NMFS and USFWS 1991b).

Green sea turtle

Based on an analysis of 46 green turtle nesting concentrations worldwide, approximately 109,000 to 151,000 females nest annually (NMFS and USFWS 2007a). However, this is a crude estimate since not all nesting sites are included, and some data are not fully verifiable. Since 1989, approximately 579 to 9,642 green turtles have annually nested in Florida, with the all-time high number occurring in 2005 (FFWCC 2006a). Green turtles sporadically nest in North Carolina, South Carolina and Georgia in small numbers. In 2007, 15 green turtles nests were observed in North Carolina (SCDNR 2007). In the U.S. Pacific, over 90 percent of nesting throughout the Hawaiian archipelago occurs at the French Frigate Shoals, where about 200 to 700 females nest each year (NMFS and USFWS 1998). Elsewhere in the U.S. Pacific, nesting takes place at scattered locations in the Commonwealth of the Northern Marianas, Guam, and American Samoa. In the western Pacific, the largest green turtle nesting aggregation in the world occurs on Raine Island, Australia, where tens of thousands of females nest nightly in an average nesting season (Limpus et al. 1993). In the Indian Ocean, major nesting beaches occur in Oman where 30,000 females are reported to nest annually (Ross and Barwani 1995).

Leatherback sea turtle

Pritchard (1982) estimated 115,000 female leatherback turtles worldwide, of which 60% nested along the Pacific coast of Mexico. Spotila et al. (1996) later estimated that only 34,500 females (with confidence limits of 26,200 to 42,900) remained worldwide. The most recent population size estimate for North America alone is from 34,000 to 94,000 adult leatherbacks (Turtle Expert Working Group 2007). A dramatic drop in nesting numbers has been recorded on major nesting beaches along the Pacific Ocean, although a sizeable nesting population exists in Papua-Indonesia (Dutton et al. 2007, Hitipeuw et al. 2007). Severe declines in leatherback nesting have occurred over the last two decades along the Pacific coasts of Mexico and Costa Rica (Spotila et al. 2000). The Pacific Mexican leatherback nesting population, once considered to be the world's largest leatherback nesting population (historically estimated to be 65 percent of worldwide population), is now less than one percent of its estimated size in 1980 (Pritchard 1982, Sarti Martinez et al. 2007). The Malaysian nesting population has collapsed and is near extirpation (Chan and Liew 1996). In the Atlantic Ocean, overall, there appears to be an increasing or stable population trend in all regions except the Western Caribbean and West Africa (for the latter, no long-term data are available)(Turtle Expert Working Group 2007).

The largest nesting populations at present occur in the western Atlantic Ocean in Trinidad and Suriname/French Guiana (4,500 to 7,500 females nesting/year) and in the eastern Atlantic Ocean in Gabon (Billes et al. 2000). In the U.S., most nesting occurs in Florida, U.S. Virgin Islands and Puerto Rico. From 1989 to 2006, 98 to 935 nests were observed in Florida (FFWCC 2006a). An analysis of the Florida Index Nesting Beach Survey shows an overall increase in leatherback nesting from 1989 to 2006 (FFWCC 2007). The U.S. Virgin Islands and Puerto Rico nesting populations also appear to be increasing (Dutton et al. 2005, Turtle Expert Working Group 2007). Leatherback nesting is low in number and sporadic in North Carolina. In 2007, 10 leatherbacks nested in North Carolina (SCDNR 2007)

D. Status and distribution

Piping plover

Populations of piping plovers have declined from historic numbers. Unregulated hunting drove plovers to near extinction in the early 1900s, but protective legislation resulted in population recovery by the mid-1920s. However, piping plover numbers declined again in the 1940s and 1950s due to shoreline development. River flow alteration, channelization, and reservoir construction also contributed to declines during this period.

The endangered Great Lakes population is at a low level. From an all-time low of 12 nesting pairs in 1990, the population has increased to an estimated 63 nesting pairs in 2007 (Dingledine 2008, *in litt.*). During this period most nesting occurred in Michigan, but recently, as many as five pairs have nested along the Lake Superior shoreline in Wisconsin. Also, in 2007 the first successful nesting pair in over 30 years was recorded in the Great Lakes region of Ontario, Canada (Dingledine 2008, *in litt.*).

The Northern Great Plains breeding population continues to decline. Overall, there were an estimated 1,291 northern Great Plains nesting pairs in the U.S. and Canada in 2001. Current estimates of piping plover survival rates are limited, but most mortality was thought to occur during migration or on wintering grounds (Root et al. 1992). The decline of this population has been attributed to the construction of reservoirs that result in the loss of sandbar habitat.

The Atlantic Coast breeding population has experienced an overall increase since listing, but these increases are regionally variable with some areas continuing to experience periodic population declines (USFWS 2008b). The Atlantic Coast population of piping plovers has increased from 790 nesting pairs in 1986 to a preliminary estimate of 1,887 nesting pairs in 2007 (USFWS 2008a). However, the increase is unevenly distributed (with most pairs occurring in New England and New York-New Jersey). Growth of the Atlantic Coast population has followed intensive, expensive, and sustained protection of breeding pairs by USFWS, Canadian Wildlife Service, state, and provincial wildlife agencies; federal, state, municipal, and private landowners; non-government organizations, academic organizations, and interested individuals.

Much of the plover's historic habitat along the Atlantic Coast has already been destroyed or permanently degraded by development and human use. The construction of houses and commercial buildings on and adjacent to barrier beaches directly removes plover habitat and

results in increased human disturbance. Additional disturbance comes in the form of recreational use of beach habitats. While legal restrictions on coastal development may slow the future pace of physical habitat destruction, the trend in habitat availability for this species is inexorably downward. Furthermore, habitat availability for the species is compromised by the ever increasing human access to, and recreational use of, these coastal habitats. The decrease in habitat availability, especially with regard to the dynamic nature of these coastal areas, may force birds to nest in suboptimal habitats, the effects of which could manifest itself in poor future reproductive success.

The decrease in the functional suitability of the plover's habitat due to accelerating recreational activity on the Atlantic Coast may impact productivity. Functional habitat loss occurs when suitable nesting sites are made unusable because high human and/or animal use precludes the birds from successfully nesting. Population growth along both the U.S. and Canadian coasts fosters an ever increasing demand for beach recreation. In 2004, about 30 percent of the U.S. Atlantic Coast population of piping plovers nested on federally owned beaches where some protection is afforded under section 7 of the ESA. The remaining 70 percent of the birds nested on state, town, or privately-owned beaches where plover managers are implementing protections in the face of increasing disturbance from recreation and development. Unfortunately for the piping plover, recreational activities and public use of federally owned beaches have also increased. Pressure on Atlantic Coast beach habitat from development and human disturbance continues (USFWS 1996).

Piping plovers winter in coastal areas of the U.S. from North Carolina to Texas and in portions of Mexico and the Caribbean. Birds from the three breeding populations overlap in their use of wintering habitat. In 2001, 2,389 piping plovers, accounting for approximately 40 percent of the known breeding birds recorded during a breeding census were located during a winter census (Haig et al. 2005). While only 16 percent of all nonbreeding birds counted during the 2001 census were found on the Atlantic Coast, observations of banded migrating and wintering piping plovers from the Great Lakes and Atlantic Canada breeding populations were heavily concentrated on the southern U.S. Atlantic Coast (Amirault et al. 2005, Stucker and Cuthbert 2006). The status of wintering piping plovers is difficult to assess, but threats to piping plover wintering habitat identified by the USFWS during its designation of critical habitat continue to affect the species. Unregulated motorized and pedestrian recreational use, inlet and shoreline stabilization projects, beach maintenance and nourishment, and pollution affect most wintering areas. Conservation efforts at some locations have likely resulted in the enhancement of wintering habitat.

We are aware of the following site-specific conditions that affect the status of several wintering piping plover habitats, including critical habitat units. In Texas, one critical habitat unit was afforded greater protection due to the acquisition of adjacent upland properties by the local Audubon chapter. In another unit in Texas, vehicles were removed from a portion of the beach, thus decreasing the likelihood of automobile disturbance to plovers. In Florida, land acquisition has been initiated within portions of one critical habitat unit in the panhandle. The USFWS remains in a contractual agreement with the U.S. Department of Agriculture for predator control within limited coastal areas in the panhandle, including portions of some critical habitat units. Continued removal of potential terrestrial predators is likely to enhance survivorship of wintering

piping plovers. In North Carolina, one critical habitat unit was afforded greater protection when the local Audubon chapter agreed to manage the area specifically for piping plovers and other shorebirds following the relocation of the nearby inlet channel.

Loggerhead sea turtle

Genetic research involving analysis of mitochondrial DNA has identified five different loggerhead subpopulations/nesting aggregations in the western North Atlantic:

- Northern subpopulation occurring from North Carolina to around Cape Canaveral, Florida (about 29° N.);
- South Florida subpopulation occurring from about 29°N on Florida's east coast to Sarasota on Florida's west coast;
- Dry Tortugas, Florida, subpopulation;
- Northwest Florida subpopulation occurring at Eglin Air Force Base and the beaches near Panama City; and
- Yucatán subpopulation occurring on the eastern Yucatán Peninsula, Mexico.

These data indicate that maternally based gene flow between these five regions is very low. If nesting females are extirpated from one of these regions, regional dispersal will not be sufficient to rapidly replenish the depleted nesting subpopulation (Bowen 1995, *in litt*; Bowen et al. 1993; Encalada et al. 1998; Pearce 2001).

The Northern subpopulation has declined substantially since the early 1970s. Standardized ground surveys of 11 North Carolina, South Carolina and Georgia nesting beaches showed a significant declining trend of 1.9% annually from 1983 to 2005 (NMFS and USFWS 2007b). Nest totals from aerial surveys conducted by the South Carolina Department of Natural Resources showed a 3.1% annual decline from 1980 to 2002 (NMFS and USFWS 2007b). Although long-term data are not available for all beaches in North Carolina, an analysis of annual nest totals on beaches in the southern part of NC showed no discernable increasing or decreasing trend (Hawkes et al. 2005).

An analysis of nesting data from the Florida Index Nesting Beach Survey (INBS) Program from 1989 to 2007 showed an overall decrease in loggerhead nesting of 37% (FFWCC 2007). The Florida Panhandle subpopulation shows a significant declining trend of 6.8% annually from 1995 to 2005 (NMFS and USFWS 2007b).

Current threats include loss or degradation of nesting habitat from coastal development and beach armoring; confusion of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; disease; and incidental take from channel dredging and commercial trawling, longline, and gill net fisheries. There is particular concern about the extensive incidental take of juvenile loggerheads in the eastern Atlantic by longline fishing vessels from several countries (Lutcavage et al. 1997, Lewison et al. 2004).

Green sea turtle

Total population estimates for the green turtle are unavailable, and trends based on nesting data are difficult to assess because of large annual fluctuations in numbers of nesting females. Some nesting localities appear to be stable or increasing, while others appear to be declining. Trend data are unavailable for many locations (NMFS and USFWS 2007a). The endangered Florida nesting population appears to have increased from 1989 to 2006. This may partially be due to increased protections through state legislation in Florida (NMFS and USFWS 2007a).

A major factor contributing to the green turtle's decline worldwide has been commercial harvest for eggs and food. Fibropapillomatosis, a disease of sea turtles characterized by the development of multiple tumors on the skin and internal organs, is also a mortality factor and has seriously impacted green turtle populations in Florida, Brazil, Hawaii, and other parts of the world. The tumors interfere with swimming, eating, breathing, vision, and reproduction. Heavy tumor burdens are fatal to the turtles (Herbst 1994). Other threats include loss or degradation of nesting habitat from coastal development and beach armoring; confusion of hatchlings by beachfront lighting; excessive nest predation by native and non-native predators; degradation of foraging habitat; marine pollution and debris; watercraft strikes; and incidental take from channel dredging and commercial fishing operations (Lutcavage et al. 1997).

Leatherback sea turtle

Leatherbacks are less common in the Indian Ocean and in very low numbers in the western Pacific Ocean. The East Pacific and Malaysia leatherback populations have collapsed. Using an age-based demographic model, Spotila et al. (1996) determined that leatherback populations in the Indian Ocean and western Pacific Ocean cannot withstand even moderate levels of adult mortality. They concluded that leatherbacks are on the road to extinction and further population declines can be expected unless action is taken to reduce adult mortality and increase survival of eggs and hatchlings. The largest populations are in the Atlantic Ocean, in Suriname/French Guiana, Gabon, Trinidad and Costa Rica/Panama (Troëng et al. 2004). The North Atlantic population is estimated at 34,000 to 94,000 adults (Turtle Expert Working Group 2007) and appears stable.

The crash of the Pacific leatherback population is believed primarily to be the result of exploitation by humans for the eggs and meat, as well as incidental take in numerous commercial fisheries of the Pacific (Chan and Liew 1996, Spotila et al. 2000). Other factors threatening leatherbacks globally include loss or degradation of nesting habitat from coastal development, confusion of hatchlings by beachfront lighting, excessive nest predation by native and non-native predators, degradation of foraging habitat, marine pollution and debris, and watercraft strikes (Lutcavage et al. 1997).

E. Analysis of the species/critical habitat likely to be affected

Piping plovers

Piping plovers from the Atlantic Coast population are the focus of these biological and conference opinions when referencing breeding birds. Since recovery units have been established in an approved recovery plan for the piping plover (USFWS 1996), these biological and conference opinions will also consider the effects of the proposed project on plovers in the Southern recovery unit. Piping plovers from all three breeding populations are referenced when discussing effects of the proposed action on migrating and wintering plovers. The proposed action has the potential to adversely affect nesting and non-nesting adults, eggs, chicks, and juveniles during the nesting season, and adults and juveniles during the migrating and wintering seasons within the proposed project area

Sea turtles - all species

The proposed action has the potential to adversely affect nesting females, eggs, hatchlings, and post-hatchling washbacks within the action area. The effects of the proposed action on sea turtles will be considered further in the remaining sections of these biological and conference opinions. For loggerhead turtles, specifically, the focus of these biological and conference opinions will consider the effects of the proposed action on nesting loggerheads from North Carolina and the Northern subpopulation, as well as the southeastern U.S. population as a whole.

Other Species

In addition to the four species and proposed critical habitat that are the subject of this formal consultation and conference, the FHWA has determined that, based on lack of habitat, the project will have no effect on the red-cockaded woodpecker (*Picoides borealis*) and red wolf (*Canis rufus*). We concur with these determinations. Also, the FHWA has determined that the project may affect, but is not likely to adversely affect the roseate tern (*Sterna dougallii*), West Indian manatee (*Trichechus manatus*) and seabeach amaranth (*Amaranthus pumilus*). Based on available information, the USFWS concurs with these determinations. The hawksbill sea turtle (*Eretmochelys imbricata*) and Kemp's ridley sea turtle (*Lepidochelys kempii*) do not normally nest in North Carolina, but occur in waters off the North Carolina coast. These two turtle species, along with the shortnose sturgeon (*Acipenser brevirostrum*), fall within the purview of the NMFS. The species discussed in this paragraph will not be considered further in this consultation.

III. ENVIRONMENTAL BASELINE

Under section 7(a)(2) of the ESA, when considering the "effects of the action" on federally listed species, the USFWS is required to take into consideration the environmental baseline. The environmental baseline includes past and ongoing natural factors and the past and present impacts of all federal, state, or private actions and other activities in the action area (50 CFR 402.02), including federal actions in the area that have already undergone section 7 consultation.

and the impacts of state or private actions which are contemporaneous with the consultation in process.

A. Status of the Species Within the Action Area

Piping Plover

Piping plover habitat within the action area occurs within an area affected by dynamic coastal processes and ongoing human uses. Suitable piping plover habitat appears to be present at and near Oregon Inlet, Green Island and along the ocean shoreline. Along the existing NC 12, artificial berms are constructed and maintained to protect NC 12 from rising high tide lines and erosion. The longshore transport of sediments continues to operate, but not the cross-island transport that maintains optimal piping plover habitat. This may result in the species currently concentrating near Oregon Inlet.

There is minimal piping plover breeding activity within the action area. Breeding activity has only been observed along both sides of Oregon Inlet. One breeding pair has been recorded at Bodie Island Spit on the north side of Oregon Inlet during five out of the last ten years (2001, 2002, 2004, 2006 and 2007)(Cameron 2008a, *in litt.*; NCWRC 2008b). During this same timeframe, one nest was observed in each of the years 2001, 2002, 2004 and 2007. In 2007, three chicks hatched, and one fledged, from a nest on Bodie Island Spit approximately 1700 feet northeast of the existing Bonner Bridge (NPS 2007a, NPS 2007b). One or two breeding pairs were observed on the south side of Oregon Inlet on PINWR during each of the years from 1998 to 2003 (Cameron 2008a, *in litt.*; NCWRC 2008b), with one nest being observed in 2001 and 2002 (Sue Cameron, NCWRC waterbird biologist, pers. comm. March 24, 2008). Vegetation succession on the south side of Oregon Inlet has reduced favorable nesting habitat there. In 2007, the action area accounted for only 1.6% of piping plover breeding activity within North Carolina (one out of 61 breeding pairs)(Cameron 2008b, *in. litt.*; NCWRC 2008c).

The number of piping plovers within the action area during the winter or migration is more difficult to assess. Regular surveys have not been conducted for non-breeding (including migrating and overwintering) plovers. However, non-breeding piping plovers have been observed within the action area, primarily at Bodie Island Spit (Cameron 2008, *in litt.*; NCWRC 2008a, NPS 2007a, NPS 2006b). Cohen et al. (in press) found that wintering plovers used ocean beach, sound beach and sound islands near Oregon Inlet. They estimated a minimum total wintering population of 11 birds in the vicinity of Oregon Inlet (including Green Island) during the winter of 2006/2007.

Proposed critical habitat for wintering piping plovers, Unit NC-1 Oregon Inlet, lies within the action area (USFWS 2008d). This unit contains a mix of intertidal beach and sand and/or mud flats (between annual low tide and annual high tide) with no or very sparse emergent vegetation, and adjacent areas of unvegetated or sparsely vegetated dune systems and sand and/or mud flats above annual high tide. Unit NC-1 is the northernmost critical habitat unit proposed within the wintering range of the piping plover. Consistent use by wintering plovers has been reported at Oregon Inlet dating from the mid-1960s. As many as 39 plovers have been reported from single day surveys during the fall migration (NCWRC 2008a). Cohen et al. (in press) reported

wintering birds using portions of the proposed Unit NC-1. Recent surveys have also recorded use of proposed Unit NC-1 by at least one banded piping plover from the endangered Great Lakes breeding population, with at least nine other birds recorded at other sites within the Dare County portion of the Outer Banks (Stucker and Cuthbert 2006). Until recently, limited banding has been done in the Great Plains population, so it is uncertain whether or to what extent birds from this population winter in this unit.

Loggerhead sea turtle

Loggerhead turtles usually nest from late April or early May through mid-September (Meylan et al. 1995). From 1996 to 2006, there were a total 126 loggerhead nests observed within the action area, averaging 11.5 nests per year (Godfrey 2008, *in litt.*).

Green sea turtle

Green turtles usually nest from late May or early June to early or mid-September (Woodson and Webster 1999). From 1996 to 2006, there were 5 or 6 green turtle nests observed within the action area, averaging 0.5 nests per year (Godfrey 2008, *in litt.*; USFWS 2008c, *in litt.*).

Leatherback sea turtle

Nesting by leatherback turtles is rare in North Carolina, with only 10 nests documented statewide in 2007 (SCDNR 2007). From 1996 to 2006, no leatherback nests were documented within the action area (Godfrey 2008, *in litt.*).

Summary of the status of sea turtles at within the action area

From 2000 to 2006, the extent of sea turtle nesting within the action area annually represented 0.9 to 2.3% of total sea turtle nesting in North Carolina (Godfrey 2008, *in litt.*; NPS 2007c). Although the USFWS recognizes sea turtles can occur and will nest within the action area, the total number of turtle nests potentially affected is relatively small when compared to the recovery and survival needs of each species.

B. Factors affecting species environment within the action area

A number of ongoing anthropogenic and natural factors may affect the species addressed in these biological and conference opinions. Many of these effects have not been evaluated with respect to biological impacts on the species. In addition, some are interrelated and the effects of one cannot be separated from others. Known or suspected factors affecting the species addressed in these biological and conference opinions are discussed below.

Manteo (Shallowbag) Bay Project

The Army Corps of Engineers (COE) completed formal consultation, pursuant to section 7 of the ESA, with the USFWS in December 1990 for maintenance dredging at Oregon Inlet that would place about 1.5 million cubic yards of dredged sediments per year on the ocean beaches at

PINWR. The COE subsequently reinitiated consultation four times, with the USFWS subsequently providing amendments to the original biological opinion on July 12, 1991; August 1, 2001; June 11, 2002; and May 22, 2008. The June 2002 amendment addressed the modification of the inlet dredging to include the removal of 1.3 to 1.8 million cubic yards of sediments from the inlet and the southern end of Bodie Island spit and disposal of the material on the beaches of PINWR. The biological opinion allowed incidental take of up to one sea turtle nest. This take could take the form of burial or crushing of a nest, or inhibition of nesting due to beach disturbance or scarp formation associated with the placement of dredge material on the beach.

Terminal Groin

Oregon Inlet is part of a migrating barrier island system. Oregon Inlet is migrating south-southwest and historically was eroding the north end of Hatteras Island. In order to protect the Bonner Bridge, the NCDOT completed the construction of a terminal groin on the north end of Hatteras Island in 1991. This structure armored the north shore of Hatteras Island and ended the migration of the north end of the island. As a result, the natural barrier island processes which create piping plover habitat have stopped at the south side of Oregon Inlet. Furthermore, armoring the shore has resulted in increased vegetation coverage and succession which reduces the quantity and quality of piping plover habitat.

Sand Berm Construction

The NCDOT regularly reconstructs the sand berms along portions of NC 12 in PINWR and CAHA. The project varies in scale and scope, but typically entails placing sand that has washed or blown from the seaward dune onto the road back into the footprint of the seaward dune, and is intended to maintain access along NC Highway 12. Typically, the federal nexus for these projects are the required special use permits issued by PINWR and CAHA. Before a special use permit can be issued, the appropriate office must first consult with the USFWS's Raleigh Field Office under the provisions of the ESA.

The sand berm construction occurs in areas potentially used by piping plovers for foraging. Anticipated impacts of sand berm construction on piping plovers include:

- harassment in the form of disturbing foraging, migrating or wintering birds;
- preclusion of cross-island transport processes that form and maintain optimal habitat; and,
- destruction of foraging habitat.

Sand berm construction also occurs in areas used by sea turtles for nesting. Anticipated impacts of sand berm construction on sea turtles include:

- destruction of sea turtle nests and deposited eggs that may have been missed by a nest survey and egg relocation program;
- reduced hatching success due to egg mortality during relocation and adverse conditions at the relocation site;

- harassment in the form of disturbing or interfering with female sea turtles attempting to nest within the construction area or adjacent beaches as a result of construction activities;
- disorientation of hatchling sea turtles on beaches adjacent to the construction area as they emerge from nests and crawl to the water because of project lighting; and
- limiting the width of the nesting beach.

Lighting

The extent that lighting affects piping plovers is unknown. However, there is evidence that American oystercatcher (*Haematopus palliatus*) chicks and adults are attracted to vehicle headlights and may move toward areas of ORV activity. During a 2005 study at Cape Lookout National Seashore, adult and chick oystercatchers were observed running or flying directly into the headlights of oncoming vehicles, and two two-day old oystercatcher chicks were run over by an all-terrain vehicle after being observed foraging with the adults near the high tide line at night (Simons et al. 2005). ORV driving is prohibited within most of the action area, being limited to the northernmost portion of the action area on the southern end of Bodie Island at Oregon Inlet, and approximately 1.1 miles of beach southward from the southern boundary of PINWR.

Although extensive monitoring of the effects of lighting on sea turtles has not been conducted within the action area, the southern end of the action may be affected by light originating from the village of Rodanthe.

Predation

Predation of piping plovers has not been directly observed within the action area, but predation and nest abandonment because of predators have been implicated as a cause of low reproductive success at CAHA (Cooper 1990, Coutu et al. 1990, Kuklinski et al. 1996). Mammalian and avian predators are relatively common within the action area. Red foxes (*Vulpes vulpes*) are relatively recent arrivals within the action area. Red foxes were first observed within CAHA on Bodie Island in 1996 and on Hatteras Island in 2000 (NPS 2001). Due to the presence of tracks, red foxes are suspected in disappearances of piping plovers and nest abandoning. Predation of sea turtle nests and hatchlings at CAHA has been documented. Red foxes and ghost crabs (*Ocypode* spp.) have been known to depredate sea turtle nests (NPS 2007c).

Stochastic (Random) Events

The impacts of tropical storms and associated coastal erosion on piping plovers within the action area have not been assessed. However, such events have the potential to destroy nests. Extremely cold temperatures may also adversely affect wintering birds.

High tides and storm surges from tropical weather systems can overwash, wash out, or inundate sea turtle nests. In the last several years, hurricanes and tropical storms have resulted in substantial impacts to the coastal environment along the action area. Erosion resulted in a reduction of beach profile in some areas and an accretion of sand in others. In the last ten years

(1998 to 2007), zero to nine sea turtle nests per year were lost within PINWR to storms and inundation (USFWS 2008c).

Habitat Management and Protection

With the exception of the southern terminus of the action area near Rodanthe, the coastline of the action area is under public ownership, either as CAHA or PINWR. Public ownership confers some conservation benefit to listed species, but land use decisions by the government agencies managing these lands ultimately determines the extent of conservation value these areas will have for threatened or endangered species.

In all cases, public ownership removes some threats that might otherwise be present if the properties were owned by private landowners and subsequently developed according to existing zoning regulations. In most cases, public ownership precludes the need for coastal armoring or beach nourishment, since these activities on public lands are rarely deemed appropriate (but see **Manteo Bay Project** section above). Thus, adverse effects to sea turtles and piping plovers associated with these activities are avoided or minimized on public lands. Public ownership also minimizes the likelihood that light pollution from homes and other development will become a significant problem since no commercial and residential development will occur on public lands. Therefore, along the shoreline of public parcels, disorientation of adult or hatchling sea turtles or piping plovers due to artificial lighting of homes or businesses will have been avoided or greatly reduced with public ownership.

Vehicle Use on the Beach

Oregon Inlet is one of the first beach access points for ORVs within CAHA when traveling from the developed coastal communities of Nags Head, Kill Devil Hills, Kitty Hawk, and Manteo. As such, the inlet spit is a popular area for ORV users to congregate. A recent visitor use study of the park reported that Oregon Inlet is the second most popular ORV use area in the park (Vogelsong 2003). As a result, sandy beach and mud and sand flat habitat being proposed as critical habitat in this unit may require special management considerations or protection. The Bodie Island Spit and an approximately 1.1 mile section of beach south of the southern boundary of PINWR are the only portions of the action area where vehicles are allowed on the beach.

Vehicles can significantly degrade piping plover habitat and disrupt normal behavior patterns of the birds. ORV users routinely violate bird closure areas (NPS 2006a, NPS 2007a). While there are no records of plover mortality at Oregon Inlet due to vehicles or tire ruts, the prospects of finding a dead, small, sand-colored bird or chick is unlikely. During the winter of 2005/2006, Cohen et al. (in press) found that when piping plovers used ocean beach habitat at Oregon Inlet, plovers were far more likely to use the PINWR side of Oregon Inlet (96% of the time; no ORV use) than the Bodie Island side (4% of the time). The lesser use of the Bodie Island side coincides with the ORV use there. They also found that piping plovers commonly roosted on the PINWR side, but only rarely roosted on the Bodie Island side, despite the fact that the Bodie Island side was closer to their foraging sites. They recommended controlled management experiments to determine if recreational disturbance drives roost site selection at Oregon Inlet, and if control of disturbance might lead to increased use of the northern beach as a roost area.

As a result of a recent lawsuit in federal court, a settlement was agreed upon that would increase protection for breeding plovers within CAHA. Terms of the consent decree will result in buffers being established during portions of the spring and summer around bird breeding and nesting areas, including creating a 1000 meter vehicle perimeter around piping plover chicks until they have fledged (NPS 2008b).

The use of ORVs on sea turtle nesting beaches can adversely affect the egg, hatchling, and nesting life stages of sea turtles. There are no specific records of vehicles colliding with nesting turtles or hatchlings within the action area, but the potential exists since ORV users have been reported to violate closed areas (NPS 2007c). Impacts from vehicles running over sea turtle nests have been reported at other locations within CAHA (NPS 2007c).

Vehicular ruts create obstacles for sea turtle hatchlings moving from the nest to the ocean. Possible mortality of hatchlings can occur due to being trapped in tire ruts. In addition, indirect effects may occur from weakened individuals dying at sea or made more vulnerable to predators. CAHA implements measures (including closures around known nests) to manage these effects. Another potential indirect effect of vehicular traffic is compaction of beach sediments under the weight of vehicles, thus creating suboptimal nesting habitat conditions.

Pedestrian Use of the Beach

Though no statistics exist to quantify the amount of pedestrian traffic on the beaches within the action area, evidence exist that people walking on the beach affects nesting and wintering piping plovers and nesting sea turtles and their nests, eggs, and hatchlings. Closure areas are established to protect plovers and sea turtles, but pedestrians sometimes violate these (NPS 2008a, NPS 2007a, NPS 2007c). Pedestrians have been documented harassing nesting sea turtles within CAHA (e.g. crowding around nesting turtle and taking flash photographs) and digging within turtle nests (NPS 2007c). Pedestrian use is allowed day and night within CAHA, but only during the day within PINWR.

Dog Use on the Beach

Dogs on a leash are allowed within both CAHA and PINWR, except in designated areas where no dogs are allowed. However, violations occur and enforcement is difficult because of the limited number of NPS and USFWS staff. Dogs running freely on beaches are potential predators of piping plover eggs and chicks, and can harass nesting, migrating or wintering adults. Dogs are also potential predators of sea turtle eggs, hatchlings, and even adult sea turtles. Unleashed dogs have been observed digging into nests. However, the extent of the effects from these actions to plovers and sea turtles within the action area is unknown.

IV. EFFECTS OF THE ACTION

Under section 7(a)(2) of the Act, "effects of the action" refers to the direct and indirect effects of an action on the species or critical habitat, together with the effects of other activities that are

interrelated or interdependent with that action. The federal agency is responsible for analyzing these effects. The effects of the proposed action are added to the environmental baseline to determine the future baseline, which serves as the basis for the determination in these biological and conference opinions. Should the effects of the federal action result in a situation that would jeopardize the continued existence of the species, we may propose reasonable and prudent alternatives that the federal agency can take to avoid a violation of section 7(a)(2). The discussion that follows is our evaluation of the anticipated direct and indirect effects of the proposed project. Indirect effects are those caused by the proposed action that occur later in time but are still reasonably certain to occur (50 CFR 402.02).

A. Factors to be considered

Piping plovers

Proximity of the action: The proposed action occurs within the nesting range of the Atlantic Coast piping plover breeding population. Since recovery units have been established in an approved recovery plan, these biological and conference opinions consider the effects of the proposed project on plovers in the Southern recovery unit, as well as the Atlantic Coast population and the entire species. The proposed action also occurs within the migrating and overwintering range of all three breeding populations of the piping plover. Additionally, the proposed action would occur within one proposed critical habitat unit for wintering plovers.

Distribution: The expected disturbance from the proposed action is likely to occur throughout the action area, but in a staggered manner over time.

Timing: The proposed action will occur throughout the year. Specifically, the proposed action will occur during the breeding, migrating and wintering seasons of the piping plover.

Nature of the effect: The project may affect breeding, nesting, migrating, roosting, or foraging activities of piping plovers. This may take the form of habitat loss, new habitat creation, preclusion of habitat utilization, harassment/disturbance resulting in behavior modification, and mortality in the form of egg, chick or adult death. Also considered are the potential effects on the primary constituent elements within one proposed critical habitat unit.

Duration/Disturbance frequency: The proposed project will be built in four phases, with Phase I beginning in 2009 and Phase IV beginning approximately 2029 or 2030. Each phase will involve 3 – 3.5 years of construction. The construction of each phase will be continuous from start to finish, operating year-round. Therefore, construction will be staggered over an approximately 25 year time span, with gaps of no construction between each phase. Each phase will only affect a portion of the action area at any one time.

The phasing of the construction of Phases II to IV is based on assumptions corresponding to forecast shoreline erosion trends and maintaining minimum 230-foot buffer distance between the existing NC 12 edge of pavement and the active shoreline. These assumptions are based on worst-case scenario modeling of shoreline erosion and the location and likelihood of future breaches on Hatteras Island. Since these are forecasts only, the exact timing and scope of each

phase could change based on the reality of future shoreline erosion. As such, the duration of the construction should be viewed as an approximation. Since piping plovers may be present throughout the year, plovers could be affected at any time during any of the phases or during subsequent maintenance of the facility.

Although construction activity will be a temporary affect, the new structures will permanently alter the habitat for piping plovers, although not necessarily all negatively in the long-term. Natural barrier island processes, which are currently precluded along much of the action area by the maintenance of NC 12, will be allowed to resume to an extent. Also, maintenance of the facility will be an ongoing activity on both a periodic and as-needed basis.

Disturbance intensity: Although the potential for disturbance to the piping plovers throughout the action area is high, the intensity of the disturbance is only expected to be high at and near Oregon Inlet. The rest of the action area currently has relatively little use by plovers. Therefore, Phase I has the greatest potential to affect plovers. The intensity of disturbance will likely be greatest for nesting piping plovers (April 1 through August 31) since they are tied to a point on the landscape with a nest, or when rearing young that have not yet fledged. However, relatively little nesting occurs within the action area. The intensity of disturbance may also be high for wintering plovers at Oregon Inlet. However, the small loss of proposed critical wintering habitat will likely have a discountable effect.

Disturbance severity: Although Phase I has the potential to affect nesting piping plovers, the severity of the affect, considering all the Atlantic Coast nesting, is relatively minor. Impacts to wintering plovers are of particular concern for the endangered Great Lakes breeding population. At least one individually identifiable Great Lakes piping plover has been observed at Oregon Inlet (Stucker and Cuthbert 2006).

Sea turtles – all species

Proximity of the action: The proposed action occurs within the northern nesting range of the loggerhead, green, and leatherback sea turtles. Specifically, the proposed action occurs within the range of the Northern subpopulation of the loggerhead turtle.

Distribution: The expected disturbance from the proposed action is likely to occur on all ocean facing beaches throughout the action area.

Timing: The proposed action will occur throughout the year. Any effects to sea turtles are expected to occur primarily during the sea turtle nesting and hatching seasons from May 1 through November 15. The greatest effects may occur at night from construction lighting and lights from vehicles traveling on the finished facility.

Nature of the effect: The project may affect nesting sea turtles, eggs, and hatchlings. This may take the form of habitat alteration, new habitat formation, preclusion of habitat utilization, harassment/disturbance resulting in behavior modification, and mortality in the form of egg, hatchling or adult death. Based on nesting records for the last ten years, we expect

approximately 96% of all effects to sea turtles will involve loggerhead sea turtles and 4% will involve green and leatherback sea turtles.

Duration/ Disturbance frequency: The duration/disturbance frequency to sea turtles is similar to that described above for piping plovers; except that the effects will primary occur during nesting and hatching seasons from May 1 through November 15.

Disturbance intensity: The potential for disturbance to the sea turtle populations throughout the action area is highest for possible effects of construction lighting at night and lights from vehicles traveling on the finished facility.

Disturbance severity: Since nearly all the sea turtle nesting that occurs within the action area is by loggerheads, the severity of the disturbance to green and leatherback turtles is expected to be minimal. However, the effects to loggerheads could lessen the contribution of those turtles to the recovery goal for the northern nesting subpopulation of loggerheads. However, this may be balanced by possible habitat creation resulting from allowing natural barrier island processes to occur within more of the action area.

B. Analysis for effects of the action

Beneficial effects:

Since NCDOT maintains an artificial berm along the seaward side of NC 12 through most of the project area, natural barrier island processes such as ocean overwash, island migration and inlet formation have been mostly precluded, thus severely limiting the formation of new habitat for piping plovers. Elevating most of NC 12 onto a bridge will allow for the maintenance of the artificial berm to be discontinued, thus allowing the natural barrier island processes to resume. Ocean overwash and possible new inlets would likely create new potential habitat for plovers. Eventually, westward migration of the island would result in some portion of the bridges to be in the ocean eastward of the beach.

Similarly, elevating NC 12 onto bridges may potentially improve sea turtle nesting habitat. Currently, most of the beach along the seaward side of NC 12 is narrow, steep and subject to high wave energy. The potential nesting area is constrained to a narrow width along much of the action area by the artificial berm along NC 12. Elevating most of NC 12 onto bridges would allow the natural barrier island processes to widen the beach area available for nesting; however, as portions of the beach migrate westward underneath the bridge, some of the beach may not be suitable nesting habitat for some period of time as it would be underneath the bridge and subject to shading effects (thus affecting hatching and sex ratios). Eventually, portions of the beach would migrate westward beyond the bridge and potentially provide suitable nesting habitat. Turtles would have to crawl or swim between bridge piles in order to utilize the newly widened beach. The effect that the bridge piles would have on emerging sea turtles is expected to be minimal. Bouchard et al. (1998) found that simulated piles did not totally preclude nesting activity of loggerhead and green sea turtles at Melbourne Beach, Florida, but did reduce nesting in an area with piles on the beach by 41%. However, the simulated piles used in the study were

spaced 17 feet apart, whereas the piles for the Phase II, III and IV bridges will be 100-120 feet apart. This wider distance would likely have a much lesser affect on nesting activity.

Piping plover

Direct effects:

The most quantifiable effect on piping plovers pertains to breeding. The only nesting activity recorded within the action area has occurred at Oregon Inlet. Although no breeding pairs have been observed at the north end of Hatteras Island near the Inlet since 2003 (Cameron 2008a, *in litt.*; NCWRC 2008b), and habitat quality for nesting has declined in recent years due to vegetation encroachment, habitat quality can improve quickly with severe storms, so the site still has the potential for nesting activity. At the Bodie Island Spit, a single nest in each of the years 2001, 2002, 2004 and 2007 has been observed >0.25 mile east of the existing Bonner Bridge (NPS 2007b). The new bridge will be constructed 125-500 feet farther west of the existing bridge, thus farther from the known nesting sites. However, demolition of the old bridge will require the presence of heavy equipment and noise ~0.25 mile from the known nesting area. Although it is unlikely that any nesting habitat would be physically disturbed, it is possible that the presence of construction equipment, construction activity and associated noise may preclude or disrupt breeding behaviors, including courtship, egg laying, incubation, and chick rearing on part or all of Bodie Island Spit or the northern end of Hatteras Island for some portion of the construction of Phase I and demolition of the existing Bonner Bridge. In addition, the northern end of Phase II may have similar effects to the potential nesting area on the north end of Hatteras Island. These effects will be temporary, covering a subset of each of the estimated 3-3.5 year construction timeframes for Phases I and II. However, it is uncertain that any breeding pairs would be precluded from nesting. Anecdotal evidence implies that some or all of the preferred nesting sites may be sufficiently distant from the work zones to avoid disturbance effects. Phases III and IV will not be located near any currently suitable plover nesting habitat.

Due to fill and pile placement in Phase I, there will be a direct loss of <0.1 acre of beach that is potential foraging and roosting habitat. It is not anticipated that the presence of the completed new bridge will preclude piping plovers from foraging since plovers currently forage at the existing Bonner Bridge. Phases II, III and IV will not result in the direct loss of any current foraging or roosting habitat.

Perhaps the most likely and most widespread, but the least quantifiable, direct effect is disturbance and/or flushing of foraging or roosting plovers during the construction of each of the phases. The presence of heavy equipment, construction activity and associated noise will be in close proximity to potential foraging and roosting habitat. Phase I and the northern end of Phase II have the greatest likelihood of disturbing foraging or roosting plovers and/or precluding foraging/roosting habitat from being used on portions of Bodie Island Spit and the north end of Hatteras Island. Also, Phase I comes within 0.3 mile of soundside ephemeral intertidal shoals or flats that are used by foraging plovers. The rest of Phase II and all of Phases III and IV have the potential to effect foraging or roosting plovers, however these phases are located adjacent to portions of the action area that currently have less foraging/roosting activity. This effect will be

temporary and staggered over time and location, lasting for some subset of the estimated 3-3.5 year construction timeframe for each phase.

The biological effects of disturbance to foraging or roosting plovers are difficult to quantify. In general, however, we know that plovers require food and shelter. Any actions that limit their ability to feed or shelter probably have adverse effects on individual birds because flushed birds expend energy to avoid disturbance (Stillman et al. 2007). The degree that piping plovers are adversely affected depends largely on how much time they are precluded from feeding or sheltering in relation to the amount of time they would feed or shelter if they were not flushed. To evaluate the biological effects of flushing, the identity of individual piping plovers would have to be known and the amount and extent of flushing would need to be documented consistently over time for each bird. Furthermore, these individual birds would need to be followed throughout the year to determine if their survival rates or nesting success were lower than other birds not subjected to flushing. Given there are other factors that affect the survival or reproductive success of piping plovers (predation, weather, food availability and quality, etc.) it would be difficult to isolate the effects of flushing. A large number of individual birds would have to be studied over a relatively long period in order to attempt to quantify the effects of flushing. We are aware of no such long term and statistically robust studies.

Effects to proposed critical habitat:

Proposed critical habitat Unit NC-1 currently supports the primary constituent elements essential for the conservation of the species and does support consistent use by wintering piping plovers. Although the new bridge in Phase I will cross through approximately 1700 feet of proposed critical habitat on Bodie Island, the direct loss to fill and pile placement is <0.1 acre. The existing Bonner Bridge crosses through approximately 3680 feet of proposed critical habitat on Bodie Island, but is not part of the proposed critical habitat. The demolition of the existing bridge and the construction of the new bridge will likely have temporary direct effects to primary constituent elements (e.g. haul roads, ruts, hydrological effects, etc.). After construction and demolition are completed, all temporary structures will be removed and the habitat restored to pre-disturbance conditions. Therefore, the effect will be short-term (i.e. considerably less than the estimated 3.5 years for completion of Phase I). A portion of Phase II on Hatteras Island will occur adjacent to proposed critical habitat, but not within it.

Interrelated and interdependent effects:

The effects of the action under consultation are analyzed together with the effects of other activities that are interrelated to, or interdependent with, that action. An interrelated activity is an activity that is part of the proposed action and depends on the proposed action for justification. An interdependent activity is an activity that has no independent utility apart from the action under consultation.

Periodic bridge maintenance or repair activities may require the presence of inspectors and equipment to operate in the vicinity of potential piping plover habitat, thus causing disturbance to foraging/roosting plovers or precluding the use of habitat. These effects are difficult to

quantify. Disturbance from human recreation is already present, and thus the effect of maintenance and repair work would be additive to an existing level of disturbance.

In addition, the maintenance or repair activities may have temporary effects to the primary constituent elements of the proposed critical habitat. However, these effects would likely be short in duration since all disturbed areas would be restored to pre-disturbance conditions once the maintenance or repair is completed.

Indirect effects:

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. If, by the elevation of much of NC 12 onto bridges and allowing natural barrier island processes to resume, new piping plover habitat is created in the future (see **Beneficial Effects** above), new conditions will exist for indirect effects. These indirect effects will be identical to the direct effects described above (i.e. effects on nesting, disturbance/flushing of foraging/roosting plovers, and precluding habitat use) during maintenance or repair activities; however, they will be to plovers using habitat that does not currently exist. If new piping plover habitat is created, portions of the beach will eventually move westward underneath the new bridges. The effect of having a bridge immediately overhead or adjacent to potential nesting habitat is unknown. Foraging under or adjacent to bridges is not expected to preclude foraging since plovers currently forage adjacent to the existing Bonner Bridge.

Depending on final design of each bridge, the new bridges could provide perches for predators (e.g. gulls, crows, etc.) that may prey on piping plover adults, chicks or eggs. However, these predators currently fly over piping plover habitat, so the extent of any additional effect would be difficult to determine.

Sea Turtles - All Species

Direct effects:

None of the project will be built within existing sea turtle nesting habitat; therefore, there will be no direct loss of turtle nesting habitat. However, all four phases will be built in close proximity to turtle nesting beaches. The greatest potential direct effects will likely be those caused by the use of construction lighting.

The USFWS recognizes that lights have the potential to disorient both hatchlings and nesting females. Artificial lighting can cause misorientation or disorientation (Philibosian 1976, Mann 1977, Witherington 1990). Misorientation can result in fatigue, dehydration, and increased likelihood of predation (Witherington et al. 1996). The correlation between level of light-caused disruption and survivorship has not, however, been identified. It has been demonstrated that there are relative degrees of sub-lethal and lethal effects (Salmon et al. 1995a; Witherington et al. 1996).

The effects of construction lighting will be temporary and staggered over space and time as each of the four phases is built. The effect will be year-round during the 3-3.5 year construction

timeframe for each phase, with periods of no effect between each phase. There will be no permanent lighting on bridge.

Other possible direct effects include disturbance of nesting females from noise or vibration from construction equipment. These effects would also be temporary and staggered over space and time.

Interrelated and interdependent effects:

Periodic bridge maintenance or repair activities may require the presence of inspectors and equipment to operate in the vicinity of potential sea turtle nesting habitat, thus causing disturbance to nesting females or emerging hatchlings, or precluding the use of nesting habitat. It is assumed that maintenance or repair activities would not occur at night, therefore minimizing the level of effects. When, in the future, portions of the beach migrate west of the bridge and sea turtle nesting beach is adjacent to the bridge, any vehicles or equipment driving on the beach for maintenance or repair activities could run over undetected turtle nests.

Indirect effects:

If, by the elevation of much of NC 12 onto bridges and allowing natural barrier island processes to resume, new sea turtle nesting habitat is created in the future, or if existing sea turtle nesting beach is widened and improved in quality (see **Beneficial Effects** above), new conditions will exist for indirect effects. Sea turtle nesting beach is currently limited in width by the artificial berm along the seaward side of NC 12. In Phases II, III and IV, the berm will be incrementally eliminated, and sea turtles may nest farther inland on the newly widened beach. This may result in sea turtles nesting near, under or beyond the new bridges. The presence of bridge piles and bridge superstructure overhead will alter light levels, beach morphology, and sand characteristics. It is important to note that the following indirect effect would occur to sea turtle nesting habitat that does not currently exist, but would be expected to exist sometime in the future.

From 2020 to 2060, it is estimated that up to 1.8 miles of NC 12 will be over dry beach at any one time, shading up to 9.5 acres of potential turtle nesting habitat. Shading would provide overall less desirable nesting conditions since beach sands shaded by the bridge would be expected to have a lower temperature. Temperature is negatively correlated with egg development time, so eggs under the bridge may display increased incubation time thus potentially exposing them to increased threats (e.g. predation, tidal inundation). Temperature also strongly determines gender of the hatchlings (Yntema and Mrosovsky 1982, Standora and Spotila 1985). Higher temperatures produce females, while lower temperatures produce males. Therefore beach shading by the bridge may alter the sex ratio of hatchlings. Since most nesting females emerge from the ocean at night, females may not be aware they are nesting underneath a bridge. These effects would be temporary since the beach would be expected to continue migrating westward.

As beach migration continues westward, portions of the nesting beach will eventually be located landward of the bridges. Turtles would have to crawl or swim between bridge piles in order to

utilize the newly widened beach. Over the life of the project, up to 3.3 miles of beach could have piles at any one time, thus potentially causing some level of deterrent to nesting. The effect that the bridge piles would have on emerging sea turtles is expected to be minimal. Bouchard et al. (1998) found that simulated piles did not totally preclude nesting activity of loggerhead and green sea turtles at Melbourne Beach, Florida, but did reduce nesting in an area with piles on the beach by 41%. However, the simulated piles used in the study were spaced 17 feet apart, whereas the piles for the Phase II, III and IV bridges will be 100-120 feet apart. This wider distance would likely have a much lesser affect on nesting activity. Again, this effect would be on nesting habitat that does not currently exist.

As portions of the beach migrate westward of the bridge, some bridge piles will be located within the nearshore waters. These bridge piles may attract and concentrate predatory fish. Predation on turtle hatchlings can be high in nearshore waters (Stancyk 1982, Wyneken and Salmon 1996). However, with bridge bents spaced 100-120 feet apart, increased predation due to the presence of bridge piles will likely be minimal.

Another indirect effect is that of vehicle lights traveling on the finished bridges. It is unknown whether vehicle lights moving parallel to the beach would discourage the emergence of nesting females. It is also unknown whether vehicle lights would misorient or disorient turtle hatchlings. Vehicle lights would not be a stationary source of light and would vary with differing levels of traffic. However, a higher traffic volume would likely occur during the summer tourist season, which overlaps with turtle nesting season. The height of the bridges and height of bridge barriers may mitigate some of the negative effects.

C. Species' response to proposed action

Piping plover

Numbers of individuals/populations in the action area affected: One breeding pair has been recorded at Bodie Island Spit on the north side of Oregon Inlet during five out of the last ten years (2001, 2002, 2004, 2006 and 2007)(Cameron 2008a, *in litt.*; NCWRC 2008b). During this same timeframe, one nest was observed in each of the years 2001, 2002, 2004 and 2007. In 2007, three chicks hatched, and one fledged, from a nest on Bodie Island Spit approximately 1700 feet northeast of the existing Bonner Bridge (NPS 2007a, NPS 2007b). One or two breeding pairs were observed on the south side of Oregon Inlet on PINWR during each of the years from 1998 to 2003 (Cameron 2008a, *in litt.*; NCWRC 2008b), with one nest being observed in 2001 and 2002 (Sue Cameron, NCWRC waterbird biologist, pers. comm. March 24, 2008). In 2007, the action area accounted for only 1.6% of piping plover breeding activity within North Carolina (one out of 61 breeding pairs)(Cameron 2008b, *in. litt.*; NCWRC 2008c). Overall, 0-3 breeding pairs have been observed in the action area for each of the last ten years.

The number of piping plovers within the action area during the winter or migration is more difficult to assess. Regular surveys have not been conducted for non-breeding (including migrating and overwintering) plovers. Cohen et al. (in press) estimated a minimum total wintering population of 11 birds in the vicinity of Oregon Inlet (including Green Island) during the winter of 2006/2007. As many as 39 piping plovers have been reported from single day

surveys during the fall migration at Bodie Island Spit, and as many as 41 plovers have been reported from single day Christmas Bird Counts at Oregon Inlet (NCWRC 2008a).

The total amount of proposed critical habitat to be permanently lost is <0.1 acre. An unknown acreage (though likely small amount) of proposed critical habitat will be temporarily affected during the construction phase.

Sensitivity to change: Piping plovers are sensitive to negative impacts during the breeding and non-breeding periods. Plovers may be deterred from nesting in given area where disturbance occurs. Sensitivity to change for non-breeding birds is difficult to assess. However, effects could be more detrimental for non-breeding plovers from the endangered Great Lakes population. Stucker and Cuthbert (2006) recorded at least one identifiable individual from the Great Lakes population wintering at Oregon Inlet, with at least nine other individuals of that population observed within CAHA outside the action area.

Resilience: Unless new inlets form within the action area, the breeding population of piping plovers is likely to remain low. However, elevating much of NC 12 onto bridges would allow natural barrier island processes to resume, potentially creating new inlets and plover habitat. Piping plover productivity has historically been low in all of North Carolina (NCWRC 2008c). However, improved protective measures and substantial decreases in disturbance to promote nesting opportunities and protect established nests and chicks could increase productivity.

The proposed critical wintering habitat within the action area is highly dynamic and resilient. Temporary disturbances will be unrecognizable in a short time.

Recovery rate: Piping plover habitat is inherently dynamic and carrying capacity fluctuates accordingly. The breeding population within the action has varied from zero to three pairs over the last ten years. At these low population levels, extirpation may occur for any number of reasons, including factors unrelated to the proposed action. While the specific recovery rate of piping plovers within the action area is unknown, the recovery rate is expected to be moderate if the birds are protected from all stressors. For example, several areas within the Atlantic Coast breeding population quadrupled their population size in as few as five years (USFWS 1996).

The specific effects of disturbance on non-breeding plovers are less well understood. However, reduced ability to rest and decreased food abundance could reduce survivorship of migrating and wintering birds. Demographic models for piping plovers, including two Atlantic Coast studies (Melvin and Gibbs 1994, Amirault et al. 2005), show that even small declines in adult and juvenile survival rates will cause substantial increases in extinction risk.

Other than the minimal amount of proposed critical habitat that would be permanently lost, the primary constituent elements within temporarily affected proposed critical habitat would recover very quickly after project construction ends.

Sea turtles – all species

Numbers of individuals/populations in the action area affected: From 1996 to 2006, there were a total 126 loggerhead nests observed within the action area, averaging 11.5 nests per year. From 1996 to 2006, there were 5 or 6 green turtle nests observed within the action area, averaging 0.5 nests per year. From 1996 to 2006, there were no leatherback turtle nests observed (Godfrey 2008, *in litt.*; USFWS 2008c, *in litt.*). From 2000 to 2006, the extent of sea turtle nesting within the action area annually represented 0.9 to 2.3% of total sea turtle nesting in North Carolina (Godfrey 2008, *in litt.*; NPS 2007c).

Sensitivity to change: Sea turtles are relatively sensitive to changes in the nesting environment, especially artificial light. There is high potential for nesting females and hatchlings to be misoriented or disoriented by construction lighting and possibly vehicle lights from the finished bridges. Sea turtle eggs are also sensitive to the nesting environment. The sex of an embryonic sea turtle is determined by the temperature of the nest environment. Shading effects on beach that has migrated underneath the bridges may change the nest environment by lowering sand temperature and changing the sex ratio.

Resilience: If fewer sea turtle hatchlings reach the ocean after hatching due to misorientation or disorientation from artificial light, fewer females will then return to nest at that location in the future. Also, loggerhead nests on North Carolina beaches (and in the Northern subpopulation) produce a greater proportion of males than do beaches in the southern part of the species' range. A reduction in the number of males contributed to the greater population may have adverse affects on future reproduction in the population. However, the extent of this effect is unknown.

Recovery rate: In general, the recovery rate of sea turtles is slow. Sea turtles reach sexual maturity at different ages depending on the species. Leatherback turtles can reach sexual maturity as early as six or seven years of age. However, loggerhead and green sea turtles do not reach sexual maturity until 20 to 50 years of age. If there is a reduction in the number of nests laid within the action area, and a subsequent reduction in the number of hatchlings produced, it may take decades before those hatchlings are contributing reproductively to the population.

V. CUMULATIVE EFFECTS

Cumulative effects include the effects of future state, local, or private actions that are reasonably certain to occur in the action area considered in these biological and conference opinions. Future Federal actions that are unrelated to the proposed action are not considered in this section because they require separate consultation pursuant to section 7 of the ESA.

Any maintenance activities on existing NC 12 that are conducted entirely within the NCDOT right-of-way do not have any federal nexus. These activities are most likely to occur after storm events in which sand is blown or washed over the road. Removal of the sand and reconstruction of the existing artificial berm would not be conducted within either piping plover or sea turtle habitat; however, the activities would be immediately adjacent to potential habitat. Disturbance from presence of heavy equipment, noise and vibration may flush piping plovers and preclude

foraging, roosting or nesting. This disturbance may also disturb nesting female sea turtles. Lights from construction equipment may misorient or disorient sea turtle hatchlings. These effects would be expected to be short in duration for each maintenance event, but have historically occurred several times a year. As portions of NC 12 are elevated onto bridges in Phases II, III and IV, these types of maintenance events would decrease.

The relocation of the former Oregon Inlet US Coast Guard Station may also have a similar short-term effect on piping plovers and sea turtles. However, this would be a one-time event.

VI. CONCLUSION

After reviewing the current status of the piping plover, loggerhead sea turtle, green sea turtle and leatherback sea turtle; the environmental baseline for the action area; and all effects of the proposed project, it is the USFWS's biological and conference opinion that the proposed replacement of the Bonner Bridge and subsequent phases of elevating portions of NC 12 onto bridges (TIP No. B-2500), as proposed, is not likely to jeopardize the continued existence of these species, and is not likely to destroy or adversely modify proposed critical wintering habitat for piping plover. No critical habitat has been designated for the loggerhead sea turtle; therefore, none will be affected. Critical habitat has been designated for the green sea turtle in Puerto Rico, and critical habitat has been designated for the leatherback sea turtle in the U.S. Virgin Islands; however, this action does not affect these areas and no destruction or adverse modification of that critical habitat is anticipated.

This non-jeopardy opinion is based, in part, on the following facts:

Piping plover

The Atlantic Coast nesting population of piping plover is a component of the entity listed as threatened which encompasses all breeding piping plovers except the Great Lakes breeding population. The Atlantic Coast population has increased from 790 pairs since listing to a preliminary estimation of 1,887 pairs in 2007 (USFWS 2008a). While the Great Plains populations experienced a decline of about 13 percent between 1991 and 2001, the overall status of the listed entity is likely to be increasing. The Southern recovery unit has gained 163 pairs since listing. As of 2007, the Southern recovery unit had 333 breeding pairs (USFWS 2008a). The abundance component of the recovery objective for the Atlantic Coast population and the Southern recovery unit is 2,000 and 400 breeding pairs, respectively (USFWS 1996).

The current number of breeding pairs using the action area (0-3 in the past ten years) is only a small part of the breeding population of the Southern recovery unit and the overall Atlantic Coast breeding population. In an unlikely worst case scenario, up to three breeding pairs could be precluded from nesting. However, it is uncertain that any breeding pairs would be precluded from nesting. Some or all of the preferred nesting sites may be sufficiently distant from the work zones to avoid disturbance effects.

The current number of piping plovers using the action area during migration and winter is significant, and the action area is an important migratory stopover site and over winter destination. Although the action area is relatively large, the adverse affects due to disturbance from construction will be staggered over space and time; therefore, only portions of the action area will see disturbance at any one time. The effects may contribute to a lessening of survivorship; however, this would be extremely difficult to determine.

Although uncertain, the project may have significant beneficial effects for piping plovers. As Phases II, III, and IV are constructed; the artificial berm along existing NC 12 will no longer be maintained, thus allowing natural barrier island processes such as island overwash, island migration and inlet formation to resume. At some point new habitat may be created for breeding, migrating, and wintering plovers via these natural processes.

Sea turtles

From 2000 to 2006, the extent of sea turtle nesting within the action area annually represented 0.9 to 2.3% of total sea turtle nesting in North Carolina (Godfrey 2008, *in litt.*; NPS 2007c). Over the past ten years, the action area averaged only 11.5 loggerhead nests and 0.5 green turtle nests per year. No leatherback turtles have been observed to nest within the action area (Godfrey 2008, *in litt.*). For loggerheads, the number represents only a miniscule contribution to the Northern subpopulation.

Other than the chance of a future maintenance or repair activity crushing an undetected nest, it is unlikely that any sea turtle nests will be directly lost. The most likely effect involves artificial lighting affecting nesting females and hatchlings during project construction. The total extent of this effect is unknown. However, artificial light from construction will be temporary and staggered throughout the action area over space and time. There will be no permanent light fixtures on the bridge. The permanent effect of vehicle lights traveling parallel to the beach is unknown. Other causes of disturbance due to construction will also be temporary.

Though uncertain, the project may have significant beneficial effects for nesting sea turtles. As Phases II, III, and IV are constructed; the artificial berm along existing NC 12 will no longer be maintained, thus allowing natural barrier island processes such as island overwash and island migration to resume. The existing beach along much of the action area is narrow, steep and subject to high energy wave action. With the elimination of the artificial berm along NC 12, the beach will widen and flatten out. Although the quality of the widened beach habitat may not be ideal for some period of time (i.e. while the bridge is overhead), and the permanent effects of vehicle lights overhead are unknown, there is the potential to eventually provide additional beach nesting opportunities where nests are less likely to be destroyed due to inundation and severe wave action.

Proposed species/critical habitat

The one proposed critical habitat unit for wintering piping plovers within the action area will continue to support primary constituent elements essential for the conservation of the species. The total permanent loss of proposed critical habitat will be <0.1 acre. Due to the dynamic

nature of the primary constituent elements, all temporary effects to the proposed unit will be indiscernible soon after construction is completed. For this reason it is our conference opinion that the proposed action is not likely to destroy or adversely modify proposed critical habitat.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to Section 4(d) of the ESA prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the USFWS to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding or sheltering. Harass is defined by the USFWS as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the FHWA so that they may become binding conditions of any grant or permit issued to the NCDOT, as appropriate, for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the FHWA (1) fails to assume and implement the terms and conditions or (2) fails to require the NCDOT to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the FHWA or the NCDOT must report the progress of the action and any impact on the species to the USFWS.

Amount or Extent of Take Anticipated

Piping plovers

- Breeding piping plovers: The USFWS expects incidental take of breeding plovers will be difficult to detect. The take would be the lost potential for nesting due to disturbance of breeding pairs at the nesting sites from nearby construction activity. It would be impossible to determine whether the lack of nesting or the absence of breeding pairs was due to the project or some other unrelated factor. It would only be possible to infer that the project directly caused the loss of a nest if an established nest was abandoned at the time construction began in the vicinity. Also, plover nests are cryptic and easily overlooked. However, this undetected level of take may occur near Oregon Inlet at historical nesting locations. Based on historical nesting data, the maximum level of incidental take is three breeding pairs per year precluded from nesting or caused to abandon nests during

construction for Phases I and II during each nesting season (i.e. April 1 to July 15) and the harassment of the associated breeding pairs.

- Migrating and wintering piping plovers: The USFWS expects incidental take of non-breeding plovers will be difficult to detect for the following reasons: sub-lethal effects are not easily determined; harassment which contributes to lessened survivorship may only be apparent on the breeding grounds the following year; and dead plovers may not be detectible. However, take of all migrating and wintering plovers throughout the extent of suitable habitat within the action area can be anticipated in all four phases of the project by the disturbance of feeding or roosting plovers from nearby construction activity.

Sea turtles - all species

The USFWS expects incidental take of all species of sea turtles will be difficult to detect for the following reasons:

- the turtles nest primarily at night and all nests are not found because (a) natural factors, such as rainfall, wind, and tides may obscure crawls and (b) human-caused factors, such as pedestrian and vehicular traffic, may obscure crawls;
- the total number of hatchlings per undiscovered nest is unknown;
- an unknown number of females may avoid the project beach and be forced to nest in a less than optimal area; and
- lights may misdirect an unknown number of hatchlings and cause death

However, take of all sea turtles throughout the extent of nesting habitat within the action area can be anticipated in all four phases of the project by harm or harassment due to the effects of artificial light and disturbance from construction and future maintenance and repair activities on nesting females and hatchlings. Also, as portions of the beach migrate westward, take of all undetected nests throughout the extent of the nesting habitat can be anticipated from future maintenance or repair activities that may crush undetected nests. Finally, as portions of the beach migrate westward, take of all nesting sea turtles throughout the extent of nesting habitat within the action area can be anticipated from reduced nesting by females deterred by bridge piles on the beach and by shading effects on sex ratios of eggs in nests constructed underneath the bridges.

Effect of the Take

In the accompanying biological and conference opinions, the USFWS determined that this level of anticipated take is not likely to result in jeopardy to the species, or destruction or adverse modification of designated or proposed critical habitat.

Reasonable and Prudent Measures

The USFWS believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the piping plover, loggerhead sea turtle, green sea turtle, and

leatherback sea turtle. These nondiscretionary measures include, but are not limited to, the terms and conditions outlined in this biological and conference opinion.

Piping plover

1. Avoid disturbing nesting piping plovers.

2. To the extent possible, avoid disturbing foraging and roosting plovers.

3. To minimize the effect of harassment on foraging plovers, provide alternative foraging areas.

4. Avoid or minimize opportunities for avian predator perches.

Sea turtles – all species

1. Avoid disturbing nesting sea turtles, nests and hatchlings.

2. Educate construction contractors and pertinent NCDOT staff as to the adverse effects of artificial lighting on sea turtles.

3. Minimize the effects of construction lighting on nesting sea turtles and hatchlings.

4. Minimize the effects of vehicle headlights from the completed bridge.

5. Avoid permanent light fixtures.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the NCDOT must comply with the following terms and conditions, which implement the reasonable and prudent measures described previously. These terms and conditions are nondiscretionary.

Piping plover

1. All construction equipment and personnel must avoid all bird closure areas within CAHA and PINWR.

   All future routine maintenance activities of bridge structures that would occur within or adjacent to current or future plover nesting areas must occur outside the nesting season (April 1 – July 15).

   All future repair work on bridge structures that would occur within or adjacent to current or future plover nesting areas must occur outside the nesting season (April 1 – July 15) unless emergency or human safety considerations require otherwise. In this event, the area must be surveyed for nesting plovers and avoided to the extent possible.

2. During the construction of Phases II, III and IV, keep all construction equipment and activity within the existing right-of-way.

   Do not moor any construction barges within 300 feet of the following islands: Green Island, Wells Island, Parnell Island, Island MN, Island C, the small unnamed island immediately east of Island C, Island D, and Island G (see figure 1).

3. All dredge spoil excavated for construction barge access must be used to augment either existing dredge-material islands or to create new dredge-material islands for use by foraging plovers. This must be accomplished as per the specifications of the North Carolina Wildlife Resources Commission. The point of contact is Sue Cameron at 910-325-3602. If the dredge material is used outside the current defined action area, the action area is assumed to be expanded to cover the beneficial placement of the material.

4. To the maximum extent practical, while ensuring the safety of the traveling public, limit or avoid the use of road signs or other potential predator perches adjacent to plover nesting or foraging areas. Where signs or other structures are necessary, determine if alternative designs would be less conducive for perching on by avian predators (gulls, crows, grackles, hawks, etc.). For example, minimize or avoid the use of large cantilever signs in favor of smaller and shorter designs.

Sea turtles – all species

1. All construction equipment and personnel must avoid all marked sea turtle nests.

   Construction material and equipment staging areas must not be located seaward of the artificial dune.

   All future routine maintenance activities of bridge structures that would occur within or adjacent to current or future sea turtle nesting habitat, and which would require vehicles or equipment on the beach or the use of night lighting (excluding navigation lights required by the U.S. Coast Guard), must occur outside the nesting season (May 1 – November 15).

   All future repair work of bridge structures that would occur within or adjacent to current or future sea turtle nesting habitat, and which would require vehicles or equipment on the beach or the use of night lighting (excluding navigation lights required by the U.S. Coast Guard) must occur outside the nesting season (May 1 – November 15) unless emergency or human safety considerations require otherwise. In this event, the area must be surveyed for sea turtle nests and avoided to the extent possible.

2. Provide an opportunity for the USFWS or an USFWS designee to educate construction contractor managers, supervisors, foremen and other key personnel and resident NCDOT personnel with oversight duties (division engineer, resident engineer, division

environmental officer, etc.) as to adverse effects of artificial lighting on nesting sea turtles and hatchlings, and to the importance of minimizing those effects.

3. During turtle nesting season (May 1 – November 15), use the minimum number and the lowest wattage lights that are necessary for construction.

   During turtle nesting season, portable construction lighting must be of the low-pressure sodium-vapor type.

   During turtle nesting season, utilize directional shields on all portable construction lights, and avoid directly illuminating the turtle nesting beach at night.

   During turtle nesting season, all portable construction lights must be mounted as low to the ground as possible.

   During turtle nesting season, turn off all lights when not needed.

4. For Phases II, III and IV, on the ocean side, design the bridge structure in a manner which will shield the beach on the east side from direct light emanating from passenger vehicle headlights. For the small portion of Phase I over land on Hatteras Island, retrofit the bridge structure at the time that Phase II connects with Phase I. The specific design of the bridge will be developed in consultation with the USFWS prior to re-evaluation of the environmental document for Phase II.

5. Avoid retrofitting the bridges and approach roads with permanent light fixtures in the future (excluding navigation lights required by the U.S. Coast Guard).

Coordination of Incidental Take Statements with Other Laws, Regulations, and Policies

The USFWS will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 USC § 703-712), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs federal agencies to use their authorities to further the purposes of the ESA by carrying out conservation programs for the benefit of endangered and threatened species. The following conservation recommendations are discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or proposed critical habitat, to help implement recovery plans, or to develop information.

Piping plovers

The FHWA and/or NCDOT could contribute funding to the current CAHA predator removal program or any future PINWR predator removal program.

The pond located behind the terminal groin at the north end of Hatteras Island has historically provided foraging habitat for plovers whenever NCDOT has mined sand from it. The NCDOT could continue to utilize this pond as a source of sand for construction/maintenance purposes. The NCDOT could remove the sand such that the elevation and shape of the mined area is restored to a moist/wet sand habitat conducive to plover foraging. This should be coordinated with the PINWR. The point of contact is Dennis Stewart at 252-473-1131 ext. 231.

Sea turtles – all species

The FHWA and/or NCDOT could contribute funding to the Network for Endangered Sea Turtles (N.E.S.T.), a nonprofit organization dedicated to the preservation and protection of sea turtle habitat in the Outer Banks from the Virginia border to Oregon Inlet. N.E.S.T. monitors this area for nesting activity.

In order for the USFWS to be kept informed of actions minimizing or avoiding adverse effects or benefiting listed species or their habitats, we request notification of the implementation of any conservation recommendations.

REINITIATION/CLOSING STATEMENT

This concludes formal consultation on the action outlined in your March 5, 2008 request for formal consultation. As provided in 50 CFR section 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

You may ask the USFWS to confirm the conference opinion as a biological opinion issued through formal consultation, if the critical habitat is designated. The request must be in writing. If the USFWS reviews the proposed action and finds that there have been no significant changes in the action as planned or information used during the conference, the USFWS will confirm the conference opinion as a biological opinion on the project and no further section 7 consultation will be necessary.

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United States Department of the Interior

FISH AND WILDLIFE SERVICE
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February 9, 2015

John F. Sullivan, III, P.E.
Federal Highway Administration
310 New Bern Avenue, Suite 410
Raleigh, North Carolina 27601

Dear Mr. Sullivan:

The U.S. Fish and Wildlife Service (Service) has received your January 5, 2015 request for reinitiation of formal consultation under Section 7 of the Endangered Species Act (ESA) for the NC 12 Replacement of Herbert C. Bonner Bridge over Oregon Inlet (Parallel Bridge Corridor with NC 12 Transportation Management Plan Alternative) in Dare County, North Carolina (TIP No. B-2500). The need for reinitiation of Section 7 consultation arises from the recent listing of the rufa red knot (*Calidris canutus rufa*) as a federally threatened species. The following document should be considered an addendum to the previous Biological Opinion issued on July 10, 2008. This addendum is provided in accordance with section 7(a)(2) of the ESA of 1973, as amended (16 U.S.C. 1531 *et seq.*). Your letter and the accompanying Technical Memorandum dated December 2014 were received on January 12, 2015.

If you have any questions concerning this addendum to the Biological Opinion, please contact Mr. Gary Jordan at (919) 856-4520 (Ext. 32).

Sincerely,

Pete Benjamin
Field Supervisor

Electronic copy:

Ron Lucas, FHWA, Raleigh, NC
Wendy Walsh, USFWS, Pleasantville, NJ
Dennis Stewart, USFWS, Manteo, NC
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Cynthia Van Der Wiele, USEPA, Raleigh, NC
Travis Wilson, NCWRC, Creedmoor, NC

The following addendum to the Biological Opinion is based on information provided in the March 2008 biological assessment (FHWA and NCDOT 2008a), *Supplement to the 2005 Supplemental Draft Environmental Impact Statement and Draft Section 4(f) Evaluation* **(**FHWA and NCDOT 2007**)**, *Final Environmental Impact Statement and Section 4(f) Evaluation* (FHWA and NCDOT 2008b), *Environmental Assessment for the NC 12 Replacement of Herbert C. Bonner Bridge* (FHWA and NCDOT 2010a), *Record of Decision for NC 12 Replacement of Herbert C. Bonner Bridge* (FWHA and NCDOT 2010b), *Record of Decision for NC 12 – Pea Island Long-Term Improvements for Bonner Bridge Replacement Project Phase IIa* (FHWA and NCDOT 2013a), *Environmental Assessment and Section 4(f) Evaluation for NC 12 – Rodanthe Breach Long-Term Improvements, Bonner Bridge Replacement Project Phase IIb* (FHWA and NCDOT 2013b), *Technical Memorandum on the Effects of Parallel Bridge Corridor with NC 12 Transportation Management Plan Alternative for NC 12 Replacement of Herbert C. Bonner Bridge* (FWHA and NCDOT 2014), meetings, telephone conversations, emails, field investigations, and other sources of information. A complete administrative record of this consultation is on file at this office. **This addendum to the Biological Opinion pertains to the federally threatened rufa red knot only**.

CONSULTATION HISTORY (Since July 10, 2008)

July 10, 2008 – The Service issued a Biological Opinion for all phases of the project.

January 10, 2013 – The FHWA reinitiated formal consultation due to availability of more detailed design information and minor design modifications.

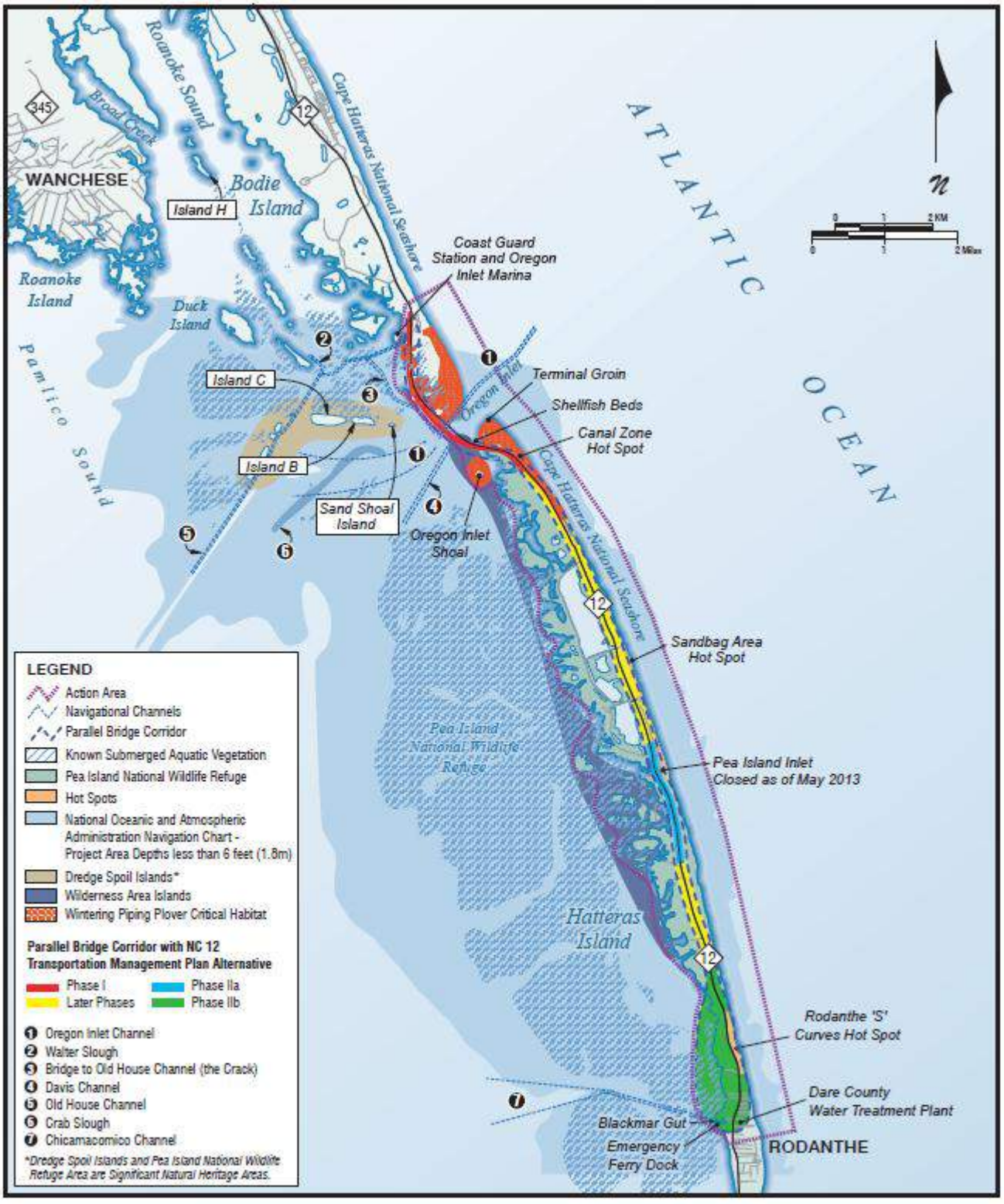
January 22, 2013 – The Service reevaluated the Biological Opinion and made minor revisions in the Terms and Conditions.

May 9, 2013 – The FHWA reinitiated formal consultation due to availability of more detailed design information for Phase IIa of the project.

May 17, 2013 – The Service reevaluated the Biological Opinion and made minor revisions in the Terms and Conditions.

August 14, 2014 – The Service made a minor revision in the Terms and Conditions of the Biological Opinion.

January 12, 2015 – The Service received a letter from FHWA dated January 5, 2015, requesting reinitiation of formal consultation due to the listing of the rufa red knot as a federally threatened species.



BIOLOGICAL ASSESSMENT ACTION AREA AND NATURAL RESOURCE-RELATED FEATURES

Figure 1

ADDENDUM TO BIOLOGICAL OPINION

I. DESCRIPTION OF PROPOSED ACTION

See the July 10, 2008 Biological Opinion. Design changes since 2008 are summarized on pages 8-11 of FHWA and NCDOT (2014). Additional details can be found in the aforementioned National Environmental Policy Act documents.

Action Area

See the July 10, 2008 Biological Opinion for a description of the action area (also see Figure 1 on previous page). Since the 2008 Biological Opinion, the action area was affected by Hurricane Irene in August 2011, Hurricane Sandy in October 2012, and Hurricane Arthur in July 2014. Hurricane Irene breached NC 12 at two locations – in northern Rodanthe and within Pea Island National Wildlife Refuge (PINWR) approximately six miles south of Oregon Inlet (creating the new Pea Island Inlet, a.k.a. New Inlet). The North Carolina Department of Transportation (NCDOT) repaired NC 12 at Rodanthe by filling the breach with sand within the existing right-of-way. The NCDOT repaired the Pea Island breach by constructing a temporary bridge over the Pea Island Inlet. Hurricane Sandy did not substantially change the action area. In 2013 the Pea Island Inlet closed as a result of naturally occurring coastal processes. In July 2014, Hurricane Arthur reopened the Pea Island Inlet; however, flow has subsequently been reduced to limited sheet flow overwash during high tide. Construction began on Phase IIa to replace the temporary bridge over Pea Island Inlet with a permanent bridge in March 2014, but work has been temporarily suspended. To protect NC 12 from encroaching beach erosion, NCDOT completed a 2.3 mile beach nourishment project from Rodanthe northward into PINWR during summer 2014.

Conservation Measures

See the July 10, 2008 Biological Opinion.

II. STATUS OF THE SPECIES/CRITICAL HABITAT

The rufa red knot was listed as a federally threatened species on December 11, 2014. Critical habitat has not yet been designated for the species. See USFWS (2013a) and USFWS (2014) for a current status of the species.

III. ENVIRONMENTAL BASELINE

A. Status of the Species Within the Action Area

Red knot habitat within the action area occurs within an area affected by dynamic coastal processes and ongoing human uses. Suitable red knot habitat appears to be present at and near

Oregon Inlet, Pea Island Inlet, and along the ocean shoreline. Since red knots do not breed in North Carolina, only seasonal foraging and roosting habitat is present within the action area.

Although red knots may be present in coastal North Carolina in every month of the year, the greatest numbers are usually recorded during the spring migration in May and June. The lowest recorded numbers usually occur from January to March (Dinsmore et al. 1998).

Given the transient presence of the species, the number of red knots occurring within the action area during migration or during winter is difficult to assess. From multiple bird surveys in 2013 from February 19 to December 18, NCDOT biologists only observed 33 red knots within the action area (NCDOT 2013). Of the 33 red knots observed during 2013, 30 were observed approximately ¼ mile north of Pea Island Inlet on December 18 (K. Herring, NCDOT biologist, personal communication, December 20, 2013). From multiple bird surveys in 2014 from February 18 to December 11, NCDOT biologists observed 72 red knots within the action area (NCDOT 2014). Most of the red knots observed in 2014 occurred on the beach between Oregon Inlet and Pea Island Inlet. Given the significant amount of survey effort expended, observing only 33 and 72 red knots in 2013 and 2014, respectively, appears to indicate relatively low use of the action area by red knots.

No critical habitat has been designated or proposed within the action area for the rufa red knot.

B. Factors affecting species environment within the action area

See the July 10, 2008 Biological Opinion. With the exception of factors affecting nesting, the factors affecting piping plovers (*Charadrius melodus*) described in the Biological Opinion apply to the red knot.

IV. EFFECTS OF THE ACTION

A. Factors to be considered

Proximity of the action: Rufa red knots travel between their wintering grounds (Tierra del Fuego, northern Brazil, the Caribbean, and U.S. coastal areas from Texas to North Carolina) and their breeding grounds in the central Canadian Artic (USFWS 2013b). This action will occur within the range of wintering red knots and within a potential stopover area for migrating red knots. However, when compared to seven other locations along the U.S. East Coast, the Outer Banks (which contains the action area) ranked last in regional importance for red knots (Dinsmore et al. 1998). Red knot observations in North Carolina are generally more numerous in the southern half of the coast, which is outside of the action area (Carolina Bird Club 2014).

Distribution: The expected disturbance from the proposed action is likely to occur throughout the action area, but in a staggered manner over time.

Timing: The proposed action may occur throughout the year. Specifically, the proposed action will occur during the migrating and wintering seasons of the rufa red knot.

Nature of the effect: The project may affect migrating, roosting, or foraging activities of red knots. This may take the form of habitat loss, new habitat creation, temporary preclusion of habitat utilization, and harassment/disturbance resulting in behavior modification. Direct lethal effects are not expected.

Duration/Disturbance frequency: The proposed project will be built in at least four phases, with Phase IIa construction already initiated. Phase I was originally intended to have already begun but has been delayed due to litigation. Future phases do not have start dates determined but could be staggered over 25 or more years. Each phase is expected to involve 3-3.5 years of construction. Construction is anticipated to occur year-round. Each phase will only affect a portion of the action area at any one time.

With the exception of Phase I (bridge over Oregon Inlet), the future phasing of the construction is based on assumptions corresponding to forecast shoreline erosion trends and maintaining minimum 230-foot buffer distance between the existing NC 12 edge of pavement and the active shoreline. These assumptions are based on worst-case scenario modeling of shoreline erosion and the location and likelihood of future breaches on Hatteras Island. Since these are forecasts only, the exact timing and scope of each phase could change based on the reality of future shoreline erosion. As such, the duration of the construction should be viewed as an approximation. Since red knots may be present throughout the year, red knots could be affected at any time during any of the phases or during subsequent maintenance of the facilities.

Although construction activity will be a temporary effect, the new structures will permanently alter the habitat for red knots, although not necessarily all negatively in the long-term. Natural barrier island processes, which are currently precluded along much of the action area by the maintenance of NC 12, could be allowed to resume to an extent with the construction of bridges if no associated dune construction occurs. Also, maintenance of the facility will be an ongoing activity on both a periodic and as-needed basis.

Disturbance intensity: Although there is potential for temporary disturbances to the red knot throughout the action area, the intensity of the disturbance would likely be highest between Oregon Inlet and Pea Island Inlet. It is believed that the rest of the action area currently has minimal or no use by red knots.

Disturbance severity: Given the relatively low occurrence rate of red knots within the action area, and given the fact that construction activities will only affect a small portion of the total amount of potential foraging and roosting habitat available within the action area at any one time, the disturbance severity is expected to be minimal.

B. Analysis for effects of the action

Beneficial effects:

Since NCDOT maintains an artificial berm along the seaward side of NC 12 through most of the project area, natural barrier island processes such as ocean overwash, island migration, and inlet

formation have been mostly precluded, thus severely limiting the formation of new habitat for red knots. If selected alternatives elevate much of NC 12 onto bridges, the maintenance of the artificial berm may be discontinued, thus allowing the natural barrier island processes to resume. Ocean overwash and possible new inlets would likely create new potential habitat for red knots. Eventually, westward migration of the island would result in some portion of the bridges to be in the ocean eastward of the beach.

Direct effects:

Due to fill and pile placement in Phase I, there will be a direct loss of <0.1 acre of beach that is potential foraging and roosting habitat. It is not anticipated that the presence of the completed Bonner Bridge replacement will preclude red knots from foraging in the locations where they are currently observed foraging. Depending upon the alternatives selected for future phases, and depending upon whether a beach nourishment component is included in the final designs, future phases may result in the direct loss of potential foraging or roosting habitat. The effects analysis of those future phases will be revisited as more detailed project designs become available.

Perhaps the most likely and most widespread, but the least quantifiable, direct effect is disturbance and/or flushing of foraging or roosting red knots during the construction of each of the phases. The presence of heavy equipment, construction activity, and associated noise will be in close proximity to potential foraging and roosting habitat. This effect will be temporary and staggered over time and location, lasting for some subset of the estimated 3-3.5 year construction timeframe for each phase.

The biological effects of disturbance to foraging or roosting red knots are difficult to quantify. In general, however, we know that red knots require food and shelter. Any actions that limit their ability to feed or shelter probably have adverse effects on individual birds because flushed birds expend energy to avoid disturbance (Stillman et al. 2007). The degree that red knots are adversely affected depends largely on how much time they are precluded from feeding or sheltering in relation to the amount of time they would feed or shelter if they were not flushed. To evaluate the biological effects of flushing, the identity of individual red knots would have to be known and the amount and extent of flushing would need to be documented consistently over time for each bird. Furthermore, these individual birds would need to be followed throughout the year to determine if their survival rates or nesting success were lower than other birds not subjected to flushing. Given there are other factors that affect the survival or reproductive success of red knots (predation, weather, food availability and quality, etc.) it would be difficult to isolate the effects of flushing. A large number of individual birds would have to be studied over a relatively long period in order to attempt to quantify the effects of flushing. We are aware of no such long term and statistically robust studies.

Interrelated and interdependent effects:

Periodic bridge maintenance or repair activities may require the presence of inspectors and equipment to operate in the vicinity of potential red knot habitat, thus causing disturbance to foraging/roosting red knots or precluding the use of habitat. These effects are difficult to

quantify. Disturbance from human recreation is already present, and thus the effect of maintenance and repair work would be additive to an existing level of disturbance.

Indirect effects:

Indirect effects are caused by or result from the proposed action, are later in time, and are reasonably certain to occur. For future phases, if alternatives are selected which elevate much of NC 12 onto bridges without associated dune construction, natural barrier island processes may resume and thus create new red knot habitat in the future. This new habitat could create new conditions for indirect effects. These indirect effects will be identical to the direct effects described above (i.e. disturbance/flushing of foraging/roosting red knots and precluding habitat use) during maintenance or repair activities; however, they will be to red knots using habitat that does not currently exist. If new red knot habitat is created, portions of the beach will eventually move westward underneath the new bridges. It is unknown if the presence of elevated bridges would preclude red knot foraging adjacent to those bridges.

Depending on final design of each bridge, the new bridges could provide perches for avian predators (e.g. gulls, hawks, etc.) that may prey on red knots. However, these predators currently occur within the action area, so the extent of any additional effect would be difficult to determine.

C. Species' response to proposed action

Numbers of individuals/populations in the action area affected: Given the transient nature of the species in North Carolina, the number of red knots within the action area at any given time during the winter or during migration is difficult to assess. In multiple survey efforts, NCDOT biologists only observed 33 red knots in 2013 and 72 red knots in 2014 (NCDOT 2013, NCDOT 2014) within the action area. Nearly all the 2013 observations occurred in December. The 2014 observations occurred May-July, September-October, and in December.

Sensitivity to change: Sensitivity to change for transient migrating or wintering birds is difficult to assess. Given the apparent low-level use of the action area by red knots and the abundance of better quality habitat in other coastal areas of North Carolina, sensitivity to change within the action area is likely not measureable.

Resilience: Since most of the adverse effects will occur as temporary harassment to transient red knots within portions of the action area staggered over time, the species resilience to the effects will likely be high.

Recovery rate: The specific effects of disturbance on non-breeding red knots are not well understood. However, reduced ability to rest and decreased food intake could reduce survivorship of migrating and wintering birds. In Florida, researchers concluded that the greatest threat to wintering red knots was chronic disturbance, thus affecting the ability of the birds to maintain sufficient weight (Niles et al. 2006, Niles et al. 2008, and Niles 2009). Given the relatively low-level of use by red knots in the action area, it is unknown if the disturbance generated from the action will be significant.

V. CUMULATIVE EFFECTS

See the July 10, 2008 Biological Opinion. The cumulative effects assessed for the piping plover would apply to red knots.

VI. CONCLUSION

After reviewing the current status of the rufa red knot, the environmental baseline for the action area, and all effects of the proposed project, it is the Service's biological opinion that the proposed NC 12 Replacement of Herbert C. Bonner Bridge over Oregon Inlet (Parallel Bridge Corridor with NC 12 Transportation Management Plan Alternative) (TIP No. B-2500), as proposed, is not likely to jeopardize the continued existence of the rufa red knot. No critical habitat has been designated for the rufa red knot; therefore, none will be affected.

This non-jeopardy opinion is based on the following rationale:

1. Based on multiple survey efforts in 2013 and 2014, the action area sees a relatively low level of red knot use. Red knots are transients in North Carolina. Dinsmore et al. (1998) found that, when compared to other U.S. East Coast locations, the Outer Banks of North Carolina ranked last in regional importance for red knots.

2. Most of the adverse effects will be temporary in nature and will be in the form of harassment. Although disturbance to foraging and roosting red knots may contribute to a lessening of survivorship, this would be extremely difficult to determine. Direct lethal effects are not anticipated.

3. The adverse effects will be staggered over space and time; therefore, only portions of the action area will have the potential for adverse effects at any one time.

INCIDENTAL TAKE STATEMENT

Section 9 of the ESA and federal regulations pursuant to Section 4(d) of the ESA prohibit the taking of endangered and threatened species, respectively, without special exemption. Take is defined as to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or attempt to engage in any such conduct. Harm is further defined by the Service to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing essential behavioral patterns such as breeding, feeding or sheltering. Harass is defined by the Service as intentional or negligent actions that create the likelihood of injury to listed species to such an extent as to significantly disrupt normal behavior patterns which include, but are not limited to, breeding, feeding or sheltering. Incidental take is defined as take that is incidental to, and not the purpose of, the carrying out of an otherwise lawful activity. Under the terms of Section 7(b)(4) and Section 7(o)(2), taking that is incidental to and not intended as part of the agency action is not considered to be prohibited taking under the ESA provided that such taking is in compliance with the terms and conditions of this Incidental Take Statement.

The measures described below are non-discretionary, and must be undertaken by the FHWA so that they may become binding conditions of any grant or permit issued to the NCDOT, as appropriate, for the exemption in section 7(o)(2) to apply. The FHWA has a continuing duty to regulate the activity covered by this Incidental Take Statement. If the FHWA (1) fails to assume and implement the terms and conditions or (2) fails to require the NCDOT to adhere to the terms and conditions of the Incidental Take Statement through enforceable terms that are added to the permit or grant document, the protective coverage of section 7(o)(2) may lapse. To monitor the impact of incidental take, the FHWA or the NCDOT must report the progress of the action and any impact on the species to the Service.

Amount or Extent of Take Anticipated

The Service expects incidental take of migrating or wintering rufa red knots will be difficult to detect for the following reasons: sub-lethal effects are not easily determined, harassment which contributes to lessened survivorship may only be apparent on the breeding grounds the following year, and dead red knots may not be detectible. However, take of all migrating and wintering red knots throughout the extent of suitable habitat within the action area can be anticipated in all phases of the project by the disturbance of foraging or roosting red knots from nearby construction activity.

Effect of the Take

In the accompanying addendum to the July 10, 2008 Biological Opinion, the Service determined that this level of anticipated take is not likely to result in jeopardy to the species, or destruction or adverse modification of designated or proposed critical habitat.

Reasonable and Prudent Measures

The Service believes the following reasonable and prudent measures are necessary and appropriate to minimize take of the rufa red knot. These nondiscretionary measures include, but are not limited to, the terms and conditions outlined in this addendum to the July 10, 2008 Biological Opinion.

1. To the extent possible, avoid disturbing foraging and roosting red knots.

2. Avoid or minimize opportunities for avian predator perches.

Terms and Conditions

In order to be exempt from the prohibitions of section 9 of the ESA, the NCDOT must comply with the following terms and conditions, which implement the reasonable and prudent measures described previously. These terms and conditions are nondiscretionary.

1. To the extent possible, keep all construction equipment and activity within the existing right-of-way. Avoid staging equipment or materials on the beach or adjacent to inlets.

2. To the maximum extent practical, while ensuring the safety of the traveling public, limit or avoid the use of road signs or other potential predator perches adjacent to red knot roosting or foraging areas. Where signs or other structures are necessary, determine if alternative designs would be less conducive for perching on by avian predators (gulls, crows, hawks, etc.). For example, minimize or avoid the use of large cantilever signs in favor of smaller and shorter designs.

Coordination of Incidental Take Statements with Other Laws, Regulations, and Policies

The Service will not refer the incidental take of any migratory bird for prosecution under the Migratory Bird Treaty Act of 1918, as amended (16 USC § 703-712), if such take is in compliance with the terms and conditions (including amount and/or number) specified herein.

CONSERVATION RECOMMENDATIONS

See July 10, 2008 Biological Opinion.

REINITIATION/CLOSING STATEMENT

This concludes formal consultation on the action outlined in your January 5, 2015 request for reinitiation of formal consultation. As provided in 50 CFR section 402.16, reinitiation of formal consultation is required where discretionary federal agency involvement or control over the action has been retained (or is authorized by law) and if: (1) the amount or extent of incidental take is exceeded; (2) new information reveals effects of the agency action that may affect listed species or critical habitat in a manner or to an extent not considered in this opinion; (3) the agency action is subsequently modified in a manner that causes an effect to the listed species or critical habitat not considered in this opinion; or (4) a new species is listed or critical habitat designated that may be affected by the action. In instances where the amount or extent of incidental take is exceeded, any operations causing such take must cease pending reinitiation.

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North Carolina Department of Transportation

NC 12 – Rodanthe Breach Long-Term Improvements

Bonner Bridge Replacement Project Phase IIB

SAV Mitigation and Monitoring Plan

January 2018

TIP Project No. B-2500

Dare County

TABLE OF CONTENTS

1.0 INTRODUCTION AND BACKGROUND

The Bonner Bridge Replacement Project Phase IIb is the long-term solution at the northern Rodanthe breach area, which includes the Rodanthe 'S' Curves Hot Spot, a section of NC 12 that was extensively damaged by Hurricane Irene in August 2011. The Phase IIb project area extends for a distance of 2.6 miles from a point approximately 1.8 miles north of the southern boundary of the Pea Island National Wildlife Refuge (the Refuge) to approximately 170 feet north of Myrna Peters Road (SR 1492) in Rodanthe.

Phase IIb is one part of the Parallel Bridge Corridor with NC 12 Transportation Management Plan Alternative (PBC/TMP Alternative), which is the Selected Alternative for the Bonner Bridge Replacement Project. The Bonner Bridge Replacement Project, including its multiple phases, is included in the State Transportation Improvement Program (STIP) as STIP Project Nos. B-2500, B-2500A, and B-2500B. (Figure 1.)

The project study area is centered along the proposed bridge alignment, located in and adjacent to Pamlico Sound, west of the Town of Rodanthe in Dare County (Figure 2). The proposed bridge is approximately 13,000 linear feet in length and 40 to 52 feet in width, occupying approximately 12.6 acres. Approximately 10,900 linear feet of the proposed bridge is located over the open waters of Pamlico Sound occupying a total of 10.6 acres.

Within the open-water section of the project study area, water depths range from the shoreline to greater than 4 feet in the vicinity of the visible ship remains located near the southern terminus of the project study area. The substrate within this section consists of sand, with no areas of hard bottom noted. The majority of the habitat in the alignment consists of void to sparse seagrass areas in very shallow water (< 2ft) (Figure 3).

High salinity estuarine Submerged Aquatic Vegetation (SAV) species that occur in the project area include eelgrass (Zostera marina) and shoalgrass (Halodule wrightii). Eelgrass is a temperate species at the southern limit of its Atlantic range in North Carolina. In contrast, shoalgrass is a tropical species that reaches its northernmost extent in the state. Widgeon grass (Ruppia maritima) grows best in moderate salinity but has a wide salinity range. The co-occurrence of these three SAV species is unique to North Carolina, resulting in high coverage of shallow bottom area in North Carolina's estuaries, both spatially and temporally (Ferguson and Wood 1994).

Based on aerial photography and studies conducted by NCDOT, SAV coverage has remained fairly consistent within the open-water 10.6 acre section of the project study area for the last 5 years at approximately 6 acres.

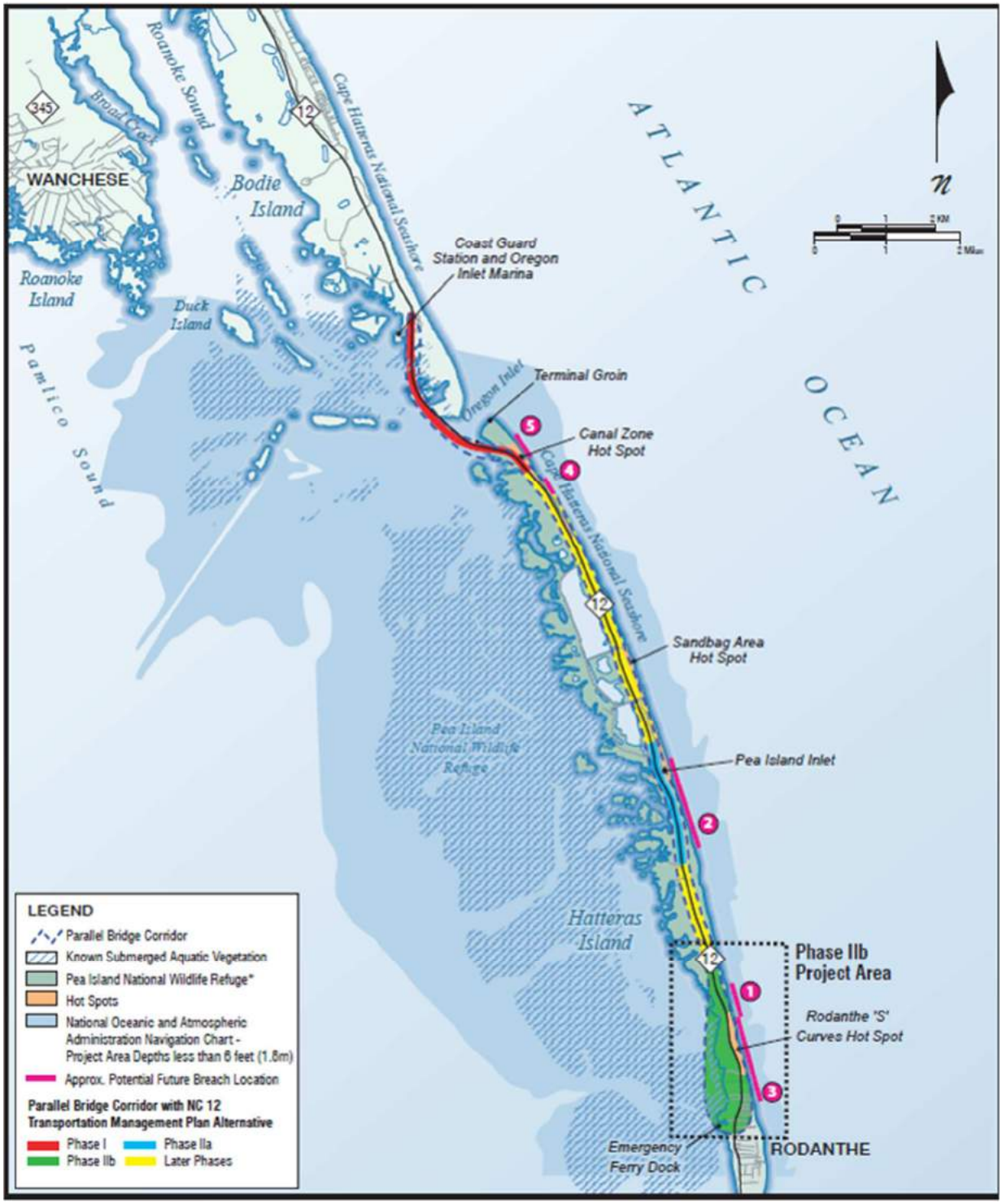

FIGURE 1. OVERVIEW OF STUDY AREA

FIGURE 2. PROJECT STUDY AREA

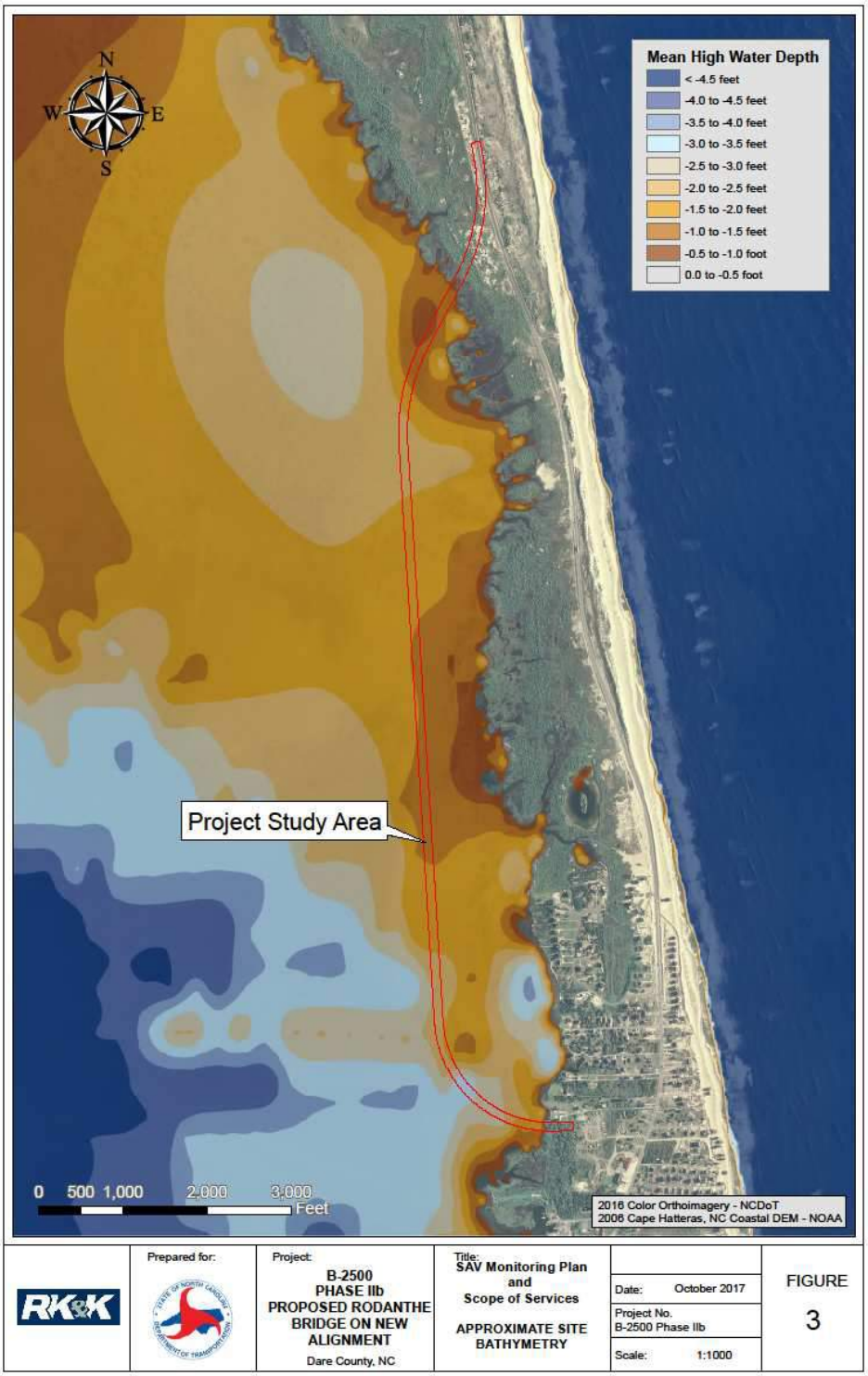

FIGURE 3. BATHYMETRY

2.0 BRIDGE CONSTRUCTION AND IMPACT SUMMARY

The bridge on the project will be 2.46 miles long with 107 spans and a low chord 17' above mean high water. The bridge will essentially run parallel to existing NC 12 and is approximately 1900' to the west of existing NC 12 on the north end and approximately 2600' from existing NC 12 on the south end. Construction of the south end will begin first, with construction of the north end to begin following relocation of a power line utility. The primary pile configuration for the permanent bridge will be three or four, 54" cylinder piles. Approximately 75% of the bents configurations will be three, 54" cylinder piles per bent and the remainder 25% of the bent configurations will be four, 54" cylinder piles per bent. To further minimize impacts to SAV the contractor has removed the plan for footings. There will be no pile footings within the Pamlico Sound. The permanent bridge piles will be installed by a water jetting method with spoils containment around each bent.

The bridge will be constructed utilizing an advancing rail system that will allow for bridge construction in place. As the rail system advances, temporary hollow steel piles will be driven into place and subsequently removed to accommodate bridge construction advancement. It will run along both sides of the bridge. Temporary SAV impacts will be the result of the advancing rail temporary piles along with temporary forms/templates utilized for the construction of bridge support structures.

The system will have an open grate to allow for sunlight to minimize impacts to SAV. Cranes will run along the rail system and be used for construction. The rail system will be approximately 1300' in length at each end. Each span of the rail system will be in place for approximately 4 months prior to being moved forward, which is what allows the rail system to be limited to the 1300' length on each end.

2.1 SPOILS CONTAINMENT

During placement of the permanent bridge piles by jetting, spoils will be generated. These spoils will be contained within a containment area around each bent (approximately 2160 sq. feet) and will consist of a primary and a secondary containment area.

2.1.1 PRIMARY CONTAINMENT AREA

The primary containment system will be a 48' X 45' area around each bent. This containment area will be in place for six to eight months until the permanent bridge deck has progressed to the extent that it can be used to remove spoils. Prior to placement of the primary containment area, plastic geogrid matting will be placed on the existing ground line to delineate between original sound bottom and temporary sand spoils. The spoils will be removed down to this temporary grid.

The distribution of spoils in the primary containment area will be variable. The average depth of spoils is estimated at 1.5 feet within each 48' X 45' area.

2.1.2 SECONDARY CONTAINMENT AREA

The secondary containment area will consist of an anchored turbidity curtain located around each primary containment area (bent line).

The secondary containment area will serve two purposes:

1) As water is filtered out of the primary containment area, the secondary area will allow any of the suspended fine sand particles to settle out.
2) If a failure of the primary area were to occur, the secondary containment area will be in place to prevent further spread of sediment into the Pamlico Sound.

This area will allow any fines to settle out, however, no measurable amount of sediment is expected to accumulate in this area.

2.2 IMPACT SUMMARY AND PROJECT AREA HABITAT QUALITY

Based on preliminary design, the bridge piles of the constructed permanent bridge would result in approximately 0.06 acres of permanent impacts to SAV beds. The impacts of all other SAV are unknown at this time due to their temporal nature.

There is the potential for 2.57 acres of permanent impact to SAV beds from the primary spoils containment area. Shading within the 10.6 acres of open water section of the project area may affect approximately 6 acres of SAV beds. This area is inclusive of the permanent and temporary impact areas. The impact from shading may be less or more than the total area of SAV beds directly under the dripline of the bridge due to the height of the bridge (17ft), its North-South orientation, and the dynamic nature of SAV habitat. The shading affect area encompasses all other impact areas.

Type of Impact	***Acres Affected***
Shading	$\geq$ 6.0
Permanent bridge piles	0.06
Primary Containment Area	2.57
Secondary Containment Area	0*

* ***No measureable amount of sediment is expected to accumulate in the secondary spoils area.***

The final preferred alternative for the B-2500 Phase IIB was chosen primarily because it is located in a less productive habitat area of the Pamlico Sound (very shallow, near shore with mostly sparse to patchy seagrass). There is very little cover and foraging area for organisms in this sparsely covered, shallow water environment. Large portions of this shallow area are also subject to becoming exposed and dry from high wind events, further limiting the availability for animal utilization.

The SAV habitat that is impacted by the Phase IIB footprint is very small compared to the remainder of SAV habitat of Pamlico Sound in the project area. The surrounding un-impacted habitat for animal utilization will provide adequate forage and nursery areas and so will avoid long-term impacts to faunal resources. Additionally the project will not hinder the ability of any aquatic species to access and utilize habitat adjacent to the project area.

2.2.1 SHADING IMPACTS

The relationship of light availability to growth and health of submerged aquatic vegetation has been long studied. Understanding of this relationship continues to evolve with application of new techniques that better describe the physiological responses of these plants. However, most studies of light / SAV relationships have been directed at impacts associated with degradation of water bodies, such as those associated with nutrient and sediment loading. Fewer studies have been directed at the influence of light limitation associated with light interception by structures.

Light limitation associated with interception is a more straightforward phenomenon as there are not issues such as those arising with changes in optical water quality and selective spectral attenuation driven by various combinations of changing suspended solids, chl *a* (e.g., nutrient-related) and colored dissolved organic matter in the water column. Thus, this assessment may be approached with conventional shading assessments associated with structures in general.

There are two basic needs to understand the effect of structures on SAV abundance and distribution.

1. Review of the literature to understand the extent and information content regarding light interception effects on SAV.
2. Development of a decision tool that predicts the impact footprint of a structure based on the literature review information and:
    a. Height
    b. Width
    c. Orientation
    d. Latitude
    e. Water depth
    f. SAV species

3.0 PROPOSED MITIGATION PLAN DEVEOPMENT

During a June 8, 2017 presentation to the Merger Team, NCDOT had proposed to monitor all impact areas in the ROW of Phase IIB for 5 years post construction to determine the final permanent SAV impact acreage and mitigate at a 1:1 ratio for that amount at the end of monitoring using the best available mitigation science including results of the Phase I monitoring study.

However, later in 2017, the construction firm determined that the construction and spoils handling methods presented to the Merger Team at Concurrence Point 4C could not be utilized. The revised construction methods would require that jetting spoils from each bent be held in a 48' by 45' containment area for up to 8 months as stated in Section 2.1.1. These construction methodology changes led to further discussions concerning the distinction between determining permanent and temporary impacts to seagrass. Based on these discussions, and to expedite the permitting process, NCDOT agreed to mitigate for the 2.57 acres of SAV within the primary containment areas as permanent impacts at a 2:1 ratio.

4.0 PROPOSED MITIGATION AND MONITORING PLAN

The NCDOT will immediately provide compensatory mitigate for the 0.06 acres of permanently impacted seagrass in the footprint of the permanent bridge pilings by relocating this grass to areas of existing grass. This location will be determined in coordination with the appropriate agency representative(s).

Compensatory mitigation, at a 2:1 ratio, for the SAV within the primary containment areas will be implemented once monitoring for the current Phase I SAV mitigation pilot project is completed to the satisfaction of the US Army Corps of Engineers and Division of Coastal Management. This mitigation plan shall use the best available SAV mitigation science at that time, including results and lessons learned from the Phase I SAV pilot project.

The NCDOT will monitor shading impacts from the bridge during construction and for 5 years post construction. Any shading impacts to SAV that are determined by the NEPA/404 Project Team to be permanent impacts shall be mitigated at a 1:1 ratio, using the best science available at the end of the 5-year shade monitoring and study.

4.1 MONITORING

Bridge construction is estimated at two years. Thus, the proposed shading impact monitoring plan will be conducted in two phases for seven total monitoring years (MY). Phase 1 – Will occur during bridge construction for monitoring of shading impacts for two years (MY1 and MY2). Phase 2 – will occur post-construction and will monitor the entire study area for five years (MY3, MY4, MY5, MY6 and MY7).

4.1.1 PRECONSTRUCTION

Collect baseline data during the growing season within the ROW to include SAV presence/absence, present cover, and species composition and distribution.

4.1.2 DURING AND POST CONSTRUCTION

Monitoring of the shading impacts will begin as soon as portions of the bridge are competed. Monitoring of shading impacts will occur throughout the entire ROW and consists of the following metrics:

- GIS analysis of aerial photography to delineate changes to SAV beds as compared to pre-construction baseline
- Ground truthing of GIS assessment. This will include a DGPS located delineation of changes to the aerial GIS-based assessment and exclude areas discovered to not be composed of live SAV (e.g., detritus)
- Seagrass species percent cover and composition/distribution via random quadrat analysis
- Monitoring of the shadow produced by the structure, targeting areas where the shadow passes through seagrass cover
- Measurement of photosynthetically active radiation (PAR) reaching the water surface at fixed grids
- Comparison of pre and post construction data sets

This plan may be adjusted as necessary to address construction schedule and methods. An annual report will be submitted, as well as a final report at the end of the monitoring period.

4.1.3. SHADING TOOL

NCDOT proposes to create a portable, decision tool that allows us to input a structure's geometry (e.g., height, width, orientation etc.) and scenario (e.g., depth, plant species, etc.) data to derive an expected seafloor effect area and degree of reduced SAV abundance (e.g., biomass, cover) based on those geometries plus assignation of light attenuation through the water column. Additionally, this tool will be transportable and of use to the State in other over-water structures as they occur.

The combination of the review, Shading Decision Support Tool and field verification will result in both predicted and observed areas of influence from the Rodanthe bridge development prior to its construction and through construction that can guide and verify any shading impacts to SAV arising from its construction.

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