



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

BEVERLY EAVES PERDUE
GOVERNOR

EUGENE A. CONTI, JR.
SECRETARY

June 21, 2012

Commander, Fifth Coast Guard District (dpb)
Federal Building
431 Crawford Street
Portsmouth, VA 23704-5004

ATTN: Mr. Waverly Gregory
Chief, Bridge Administration

Dear Sir:

Subject: **US Coast Guard Permit Application** for the proposed replacement of the Herbert C. Bonner Bridge across Oregon Inlet on NC 12 from Hatteras Island to Bodie Island, Dare County, Federal Aid Projects BRNHF-0012 (48) and BRNHF-0012 (36), TIP B-2500 Phase I. WBS 32635.1.4.

Application is hereby made by the North Carolina Department of Transportation (NCDOT) for approval by the Commandant, U.S. Coast Guard, to replace the existing Herbert C. Bonner Bridge (Bonner Bridge) and related approaches with a parallel bridge to the west of the existing bridge. This application involves replacement of the 2.44 mile Bonner Bridge over the Oregon Inlet and the related approaches with a 2.8 mile parallel fixed bridge and 0.75 mile of roadway tie-ins to NC 12. The proposed 2.8 mile bridge will carry the two lane highway with a clear roadway width of 40 feet from rail to rail, except for approximately 330 feet at the southern end of the bridge where the width increases to 52 feet to accommodate a left turn lane. The existing bridge will be removed upon completion of the proposed bridge, except for a 1050-foot portion at the southern end to be retained as a fishing pier. The total project length is 3.55 miles. The current schedule indicates the start of bridge construction in January 2013, with completion of all construction and demolition activities in February 2016.

As identified in the Federal Highway Administration's Record of Decision (ROD), the proposed Project (B-2500, for which the "Parallel Bridge Corridor with NC 12 Transportation Management Plan" is the Selected Alternative) involves multiple phases. The replacement of the Bonner Bridge is Phase I of the overall Project. Future phases involve the section of NC 12 between the community of Rodanthe and Oregon Inlet, a section of roadway that is at risk because of shoreline erosion. The overall Project will provide a long-term approach to minimizing that risk through 2060.

MAILING ADDRESS:
NC DEPARTMENT OF TRANSPORTATION
PROJECT DEVELOPMENT AND ENVIRONMENTAL ANALYSIS
1598 MAIL SERVICE CENTER
RALEIGH NC 27699-1598

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FAX: 919-212-5785

WEBSITE: WWW.NCDOT.ORG

LOCATION:
1020 BIRCH RIDGE DRIVE
RALEIGH NC 27610-4328

Applicant Information

Gregory Thorpe (c/o Michael Turchy), NCDOT
1598 Mail Service Center
Raleigh, NC 27699-1598
919-707-6157
maturchy@ncdot.gov

Proposed Bridge

The lead federal agency for environmental review will be the Federal Highway Administration (FHWA), North Carolina Division. The bridge will span the Oregon Inlet and will be located at the entrance to Pamlico Sound. The latitude and longitude at the centerline of the navigation channel is 35° 46.4' N / 75° 31.9' W. The bridge will be located between Hatteras Island and Bodie Island in Dare County, NC.

Project Description

The proposed bridge will be comprised of 82 spans. Two types of superstructure will be used. For 11,250 feet of the bridge, Florida I-Beam girders will be used. For the remaining 3,550 feet, which includes the navigation zone, pre-cast, post-tensioned segmental box girders will be used.

The span arrangement near the navigation zone includes eleven spans: nine 350 foot spans with one 200 foot span to either side. The central seven 350 foot spans comprise the 2,450 foot navigation zone. Those seven spans will be designated for navigation, and will have horizontal clearances of greater than 275 feet. The eleven spans in and adjacent to the navigation zone will have 70 foot vertical clearance as requested by the USACE Wilmington District via letter dated September 18, 2008. The vertical clearance at the center of each span will be approximately 80 feet. The central seven spans will be wired for transferrable navigation lights. Lighting Plans have been submitted under a separate cover sheet.

Pile bents will be used for the approach spans. The pile bents will use either three or four 54 inch diameter cylinder piles. The transition span superstructures are supported by two column bents on pile caps founded on multiple 36 inch square piles. The navigation span is supported by single columns on pile caps founded on multiple 36 inch piles.

The proposed bridge has been designed to withstand impacts from the largest vessel expected to transit Oregon Inlet, the Hopper Dredge Atchafalaya, as specified by the USACE. The proposed bridge will not have a fender system beneath the bridge. A fender system is not proposed due to the increased horizontal clearance of the new bridge. Instead, pile caps in the navigation zone will be protected by a non-sparking, non-timber material; specifically HDPE plastic lumber. An attached detail is included on Sheet 22 of the Bridge Plans.

The existing bridge was built in 1962 and is 2.44 miles long, with a navigation span providing 66 feet of vertical clearance above mean high tide and 130 feet of horizontal clearance between fenders. A 17 foot under clearance at mean sea level is typical for the north and south approaches. The roadway has a 28 foot clear roadway with two 12 foot lanes and two feet of lateral clearance on each side. The total outside width of the bridge is 33.4 feet, including the 2.6 foot wide bridge rails on both sides of the bridge.

Project Purpose and Need

The Herbert C. Bonner Bridge was built in 1962 and is approaching the end of its reasonable service life. Bonner Bridge is a part of NC 12 and serves as the only highway connection between Hatteras Island and Bodie Island. The replacement structure that is the subject of this application (herein referred to as “Phase I” of B-2500) will serve the same function. As identified in the Record of Decision (ROD), the purposes of the proposed Project (B-2500, for which the “Parallel Bridge Corridor with NC 12 Transportation Management Plan” is the Selected Alternative) are to:

- Provide a new means of access from Bodie Island to Hatteras Island for its residents, businesses, services, and tourists prior to the end of Bonner Bridge’s service life.
- Provide a replacement crossing that takes into account natural channel migration expected through year 2050 and provides the flexibility to let the channel move.
- Provide a replacement crossing that will not be endangered by shoreline movement through year 2050.

Additional detailed information is available in the NEPA documentation which has been provided in CD format and attached to this application.

Estimated Cost

The estimated cost of the proposed bridge replacement is approximately \$216 million which includes the required vertical and horizontal navigational clearances. Construction of a low level bridge on the same alignment with only sufficient clearance to pass high water is not a viable option as it does not meet the intended purpose and need.

Funding

Federal funds will be utilized for this project. Construction of the bridge is listed in the NCDOT’s State Transportation Improvement Program (STIP). STIP B-2500 (Phase I) involves the replacement of the existing Bonner Bridge and related approaches and the demolition of the existing Bonner Bridge in Dare County, which connects Hatteras Island to the mainland of North Carolina via NC 12.

Legal Authority

Legal authority for the bridge is found in the General Bridge Act of 1946, as amended.

Navigation Dimensions

- The minimum vertical clearance in and adjacent to the navigation zone is 70 feet above Mean High Water (MHW).
- The minimum horizontal clearance in the navigation zone is greater than 275 feet at each of the seven spans in the 2,450 feet Navigation Zone.
- The length of bridge from approach-to-approach is 14,800 feet.
- The width of the bridge at its widest point (out-to-out) is 54 feet- 7 inches at the southern approach. The majority of the bridge width is 42 feet - 7 inches.

- The project depth of the waterway at the appropriate elevation/datum is 14 feet at MLW.
- The width of the waterway at the project site is approximately 1,750 feet.

Waterway Characteristics, and Usage, and Navigation Impacts

- There is one marina, the Oregon Inlet Fishing Center, within three miles of Oregon Inlet. The management staff of the Center was contacted during preparation of the assessment, this individual was a representative of the commercial fishing operators in Wanchese and Manteo approximately seven miles to the north. There are no other facilities within 3 miles of the bridge.
- The Inlet is approximately 0.33 mile wide at the entrance.
- Waterway depths at the proposed bridge location are extremely variable, which is the source of existing navigation problems. The existing dredge channel project is 14 feet with a 3 foot overdredge allowance.
- USCG boats are based at Station Oregon Inlet and at Wanchese. USACE survey vessels are based in Wanchese. They are subject to the same navigation challenges as commercial and recreational vessels and will reap the same benefits from the new bridge design.
- The Oregon Inlet Channel is a federally-maintained project with maintenance managed by the USACE.
- The recreational fleet in the area consists primarily of small trailer-launched boats. No specific numbers are available. Due to their small sizes and mobility, those vessels are less affected by present shoaling conditions than are larger commercial vessels.
- Commercial traffic is almost exclusively commercial and sport fishing. Navigability conditions for those vessels will be greatly improved with the project. No disadvantages for commercial traffic have been found.
- The new bridge will not block access to the waterway for any vessel presently using local facilities. To the contrary, the larger navigation zone and clearances will greatly enhance access for the existing fleet and will allow larger vessels than at present to pass the bridge if water depth allows.
- The only practical alternate route available for use by vessels unable to pass the proposed bridge is via the Atlantic Intracoastal Waterway to Beaufort, NC more than 100 miles to the south. That will not change with this project.
- The bridge will not prohibit the entry of any vessels to local harbors of safe refuge. To the contrary, vessels will be able to enter under a greater range of conditions than at present.
- The proposed bridge will not be located within one-half mile of a bend in the waterway. Existing channels include turns from the entrance channel, but they do not adversely affect navigation or hamper visibility.
- There are no factors located within one-half mile of the proposed bridge which would create hazardous passage through the proposed structure.
- Local hydraulic conditions will be greatly improved as a result of the much larger navigation zone that is part of the project.
- The new bridge will allow for much improved navigation conditions that will allow vessels to transit under a wider range of environmental conditions than at present.

- Guide Clearances have not been established for the waterway and clearance gauges have not been provided on the existing bridge. In light of the increased clearances proposed for the new structure, there is nothing to indicate that gauges are necessary.
- No other factors have been identified as necessary for the safe, efficient passage of vessels through the proposed bridge.
- There are no adverse impacts to navigation as a result of the proposed bridge design. To the contrary, the bridge design will greatly improve navigation conditions. As a result, it can be anticipated that at least some of the vessels which have been forced to relocate to more accessible ports will be returned to facilities in the project area. Likewise, it can be anticipated that some facilities that have closed due to access limitations will be reactivated once their vessels can again reach the facilities.

In summary, the proposed bridge will provide greater horizontal and vertical navigation clearances than the existing bridge: greater than 275 feet horizontal and 70 feet vertical as compared to 130 feet horizontal and 66 feet vertical. Those clearances will be provided at each of the seven navigation spans as compared to the single span of the existing bridge. Navigability will be substantially improved with no adverse impacts to existing or anticipated marine operations.

Existing Bridge

The existing bridge is known as the Herbert C. Bonner Bridge (NCDOT Bridge No. 11). It is a fixed highway bridge located on the northern portion of Hatteras Island and the southern portion of Bodie Island in Dare County, NC. The latitude and longitude at centerline of the bridge is 35° 46' N / 75° 32' W, providing 66 feet of vertical clearance above mean high tide and 130 feet horizontal clearance between fenders. NCDOT owns the existing bridge.

Construction Methodology

Bridge Construction

All bridge construction will be performed from land, barges or temporary work platform (trestles). The existing bridge will remain open for vehicle traffic during the construction. The existing navigation area will remain open for vessel traffic during the construction. The construction contract will address marine traffic management in detail and the Contractor will be made responsible for coordinating vessel traffic:

The Contractor will be required to provide personnel and equipment necessary to monitor vessel traffic communications by radio and cell phone to facilitate coordination with vessel operators and the USCG and to provide information on construction activity near the bridge when so requested. The Contractor will make routine daily reports and as-needed reports to local Coast Guard offices (Sector North Carolina and Station Oregon Inlet) on the status of activities that could disrupt marine traffic or block the waterway.

The Contractor will be required to station personnel on shore and in boats when needed to actively manage traffic when unsafe conditions exist such as during lifting of materials over the waterway or other activities that could pose a hazard for marine operators near the bridge. It is also expected that the contractor will be required to mark all equipment and work areas in or

adjacent to the waterway so as to maximize their visibility during day or night hours and at any time when visibility is hampered due to environmental conditions.

It is anticipated that waterway impact information will be made available to maritime interests by the USCG through both published and broadcast Notices to Mariners (NTM/BNTM) on a regular basis and as needed. It is also anticipated that the Project Team will use local outreach activities to inform waterway users of the anticipated scope and duration of scheduled and anticipated waterway disruptions.

We currently anticipate the bridge construction sequence will require the removal of portions of the existing bridge's fender system prior to completion of the new bridge. The early partial removal of fenders would be necessary to allow for construction access on the water, as well as to minimize the potential for scour problems due to the close proximity of the two foundations prior to demolition of the existing bridge. If the Contractor removes portions of the existing protective structures, the USCG will be informed in advance so that notices can be published.

The USCG will be advised in advance of any activity that will result in blockage of the channel. Any equipment, including work barges or temporary structures, placed in or near the existing channel or navigation span will be marked as obstructions in accordance with 33 CFR Part 64.

Substructure Removal/Bridge Demolition

Demolition of the existing bridge will not be started until the new bridge is completed. Marine traffic management during demolition will be handled in the same manner as during construction of the new bridge. Demolition is expected to take less than 12 months and will comply with the USACE preference to first demolish the existing bridge within the proposed navigation zone. This will minimize the need for continued dredging of the existing channel. The contractor will employ proven demolition techniques to minimize impacts to the environment from demolition activities. The specific approach to demolition is broken up between approach spans, navigable spans, and disposal.

Bridge demolition at the low-level approach spans at the northern end of the project will be performed from work trestle and the remainder of bridge demolition at navigation spans and all other spans will be carried out via barge. The 1,050 feet of the existing bridge connected to Hatteras Island will be retained as a fishing pier. The fishing pier will include bents 187 through 203. During demolition of the existing bridge all piles and other structures in the waterway will be removed. The existing bridge piles in open water will be removed completely and piles located in SAV and wetland marsh areas will be cutoff at the mudline. Specifically, piles at bents 7 through 87 will be cut at the mudline so environmental impacts will be reduced to the maximum extent practicable. Upland piles from bents 1 through 5 will be cut at ground level.

Once removed from the structure, bridge elements will be appropriately sized and loaded onto a barge, awaiting transport to the artificial reef sites. The project staging area will be utilized to temporarily store bridge elements when awaiting barge transport. Bridge demolition materials will be barged to four off shore reef sites that have been designated as disposal sites for all acceptable demolition debris. All four sites are located in the Atlantic Ocean to the east of the Bonner Bridge. The closest reef site, AR-160, is in State waters and will receive approximately

55% of the materials. The other three sites, AR-130, AR-140 and AR-145, are in Federal waters and will each receive 15% of the materials. Lat/Long (ddm) locations are as follows:

- AR-160 35° 43.888' N/ 75° 26.771 W
- AR-145 35° 54.017' N/ 75° 23.883 W
- AR-140 35° 56.741' N/ 75° 31.781 W
- AR-130 36° 00.192' N/ 75° 31.800 W

NCDMF will oversee the reef disposal activities which will begin April 2015 and end February 2016.

Agency Jurisdiction

The U.S. Army Corps of Engineers (USACE) must approve this project under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act. The NC Division of Coastal Management (NCDCM) must approve this project under the Coastal Area Management Act. NCDOT will obtain NCDCM's Coastal Area Management Act (CAMA) Major Development Permit and will not need a formal Coastal Zone Management Act (CZM) consistency statement since their determination will be stated in the Major Development Permit. The N.C. Division of Water Quality must approve this project under Section 401 of the Clean Water Act. The NCDOT has submitted a Joint Permit Application for both State and Federal Permits and will forward permits to your office once they are obtained. In addition, Special Use Permits will be necessary for temporary use of federal lands owned and managed by the National Park Service and U.S. Fish and Wildlife Service.

Summary of Environmental Analysis

The lead federal agency for NEPA is the Federal Highway Administration and the lead State agency is the NCDOT. In depth environmental evaluations have been completed over the past two decades and are documented in agency records maintained by the FHWA and the NCDOT. These documents are enclosed as a CD within the application.

These major environmental documents were prepared with USCG and USACE as cooperating agencies:

- 1993 Draft Environmental Impact Statement (DEIS)
- 2005 Supplemental DEIS (SDEIS)
- 2007 Supplement to the 2005 SDEIS
- 2008 Final Environmental Impact Statement (FEIS) (FHWA/NCDOT)
- 2010 Environmental Assessment (FHWA/NCDOT)

The scopes of those documents are discussed in the Record of Decision (ROD) dated December 2010. The FEIS and EA provide all of the required information described in the Application Guide.

The NCDOT analyzed the potential environmental impacts of the project in the multiple environmental documents listed above. The FHWA determined the impacts of the proposed bridge and the ROD outlines these impacts in Table 2 (pg. 20). FHWA determined that the implementation of the Selected Alternative as described in the ROD is in the best overall public interest. The names of the property owners are included with this application.

Please initiate review of the proposed project for authorization under a U.S. Coast Guard Permit. It is requested that any correspondence from your office regarding this project include the NCDOT TIP Number (B-2500). If you have any questions or need additional information, please contact Michael Turchy at 919-707-6157 or maturchy@ncdot.gov.

Sincerely,

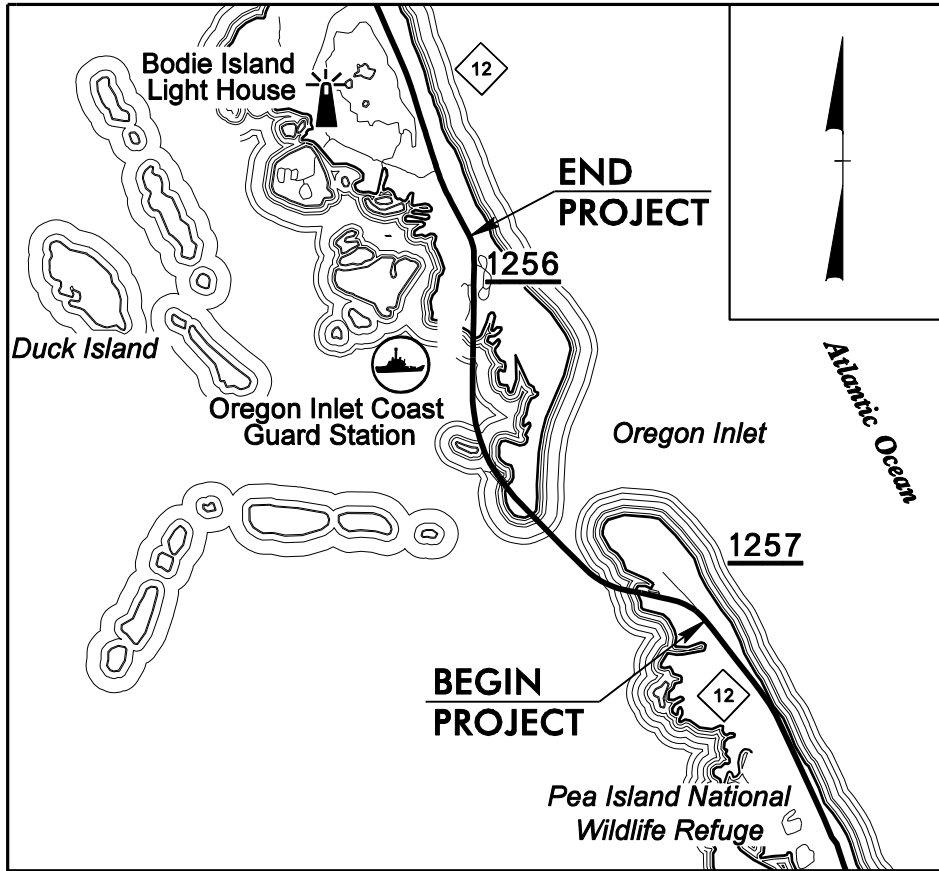


Gregory J. Thorpe, Ph.D., Manager
Project Development and Environmental Analysis Unit

- Enclosures:
- (1) Two copies of a Vicinity map and Bridge Plans (Sheets 1- 21)
 - (2) Bridge protective system detail (Sheet 22)
 - (3) Property owners within one-half mile of the bridge
 - (4) USACE Wilmington District letter, September 18, 2008
 - (5) Vessel Traffic Impact Assessment
 - (6) Sec. 404/Sec. 10/Sec. 401 WQ/CAMA Application
 - (7) One CD copy of environmental documents

cc w/o attachments:

Tracey Wheeler, USACE Washington Regulatory Field Office



VESSEL COLLISION LOADS

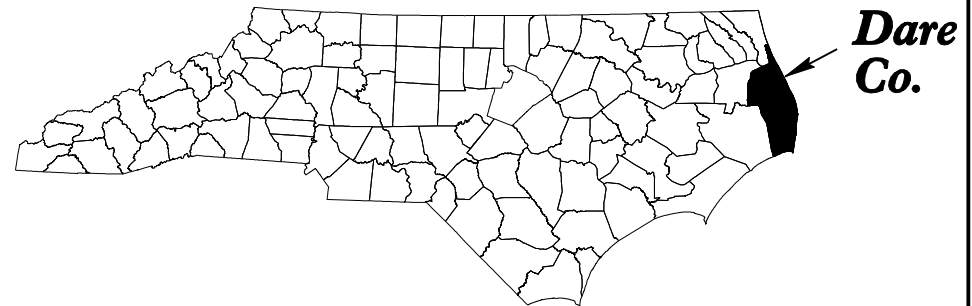
VESSEL COLLISION FORCES SHALL BE AS SHOWN BELOW FOR THE GIVEN LOAD/SCOUR CASE. LOAD COMBINATION FOR VESSEL COLLISION SHALL BE PER THE AASHTO LFRD BRIDGE DESIGN SPECIFICATIONS FOR THE EXTREME EVENT II LIMIT STATE.

LOAD/SCOUR CASE (1) = DESIGN VESSEL WITH AMBIENT BED ELEVATION ($\frac{1}{2}$ LONG TERM SCOUR)

LOAD/SCOUR CASE (2) = MINIMUM IMPACT VESSEL WITH $\frac{1}{2}$ OF 100 YEAR SCOUR

DESIGN VESSEL = USACE DREDGE ATCHAFALAYA (1000 TONNE) OWNED BY STERLING EQUIPMENT, INC. OF QUINCY, MA.

MINIMUM IMPACT VESSEL = 35' X 195' EMPTY HOPPER BARGE (181.4 TONNE)



State of North Carolina

REPLACES BRIDGE NO. 11

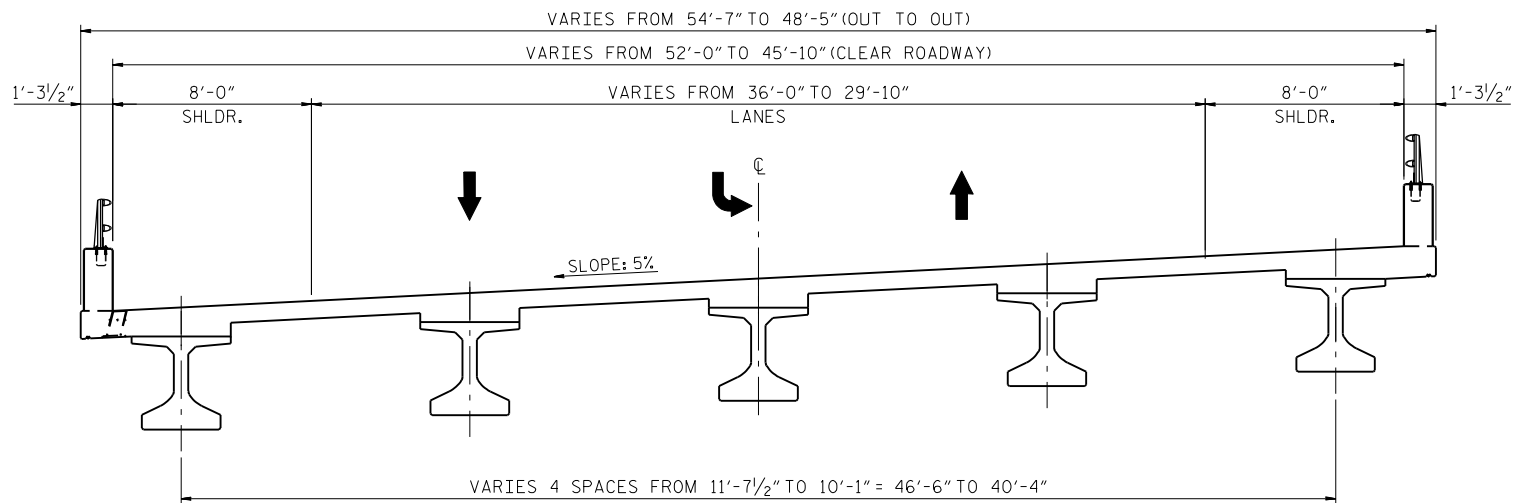
JUNE 4, 2012

SHEET 1 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

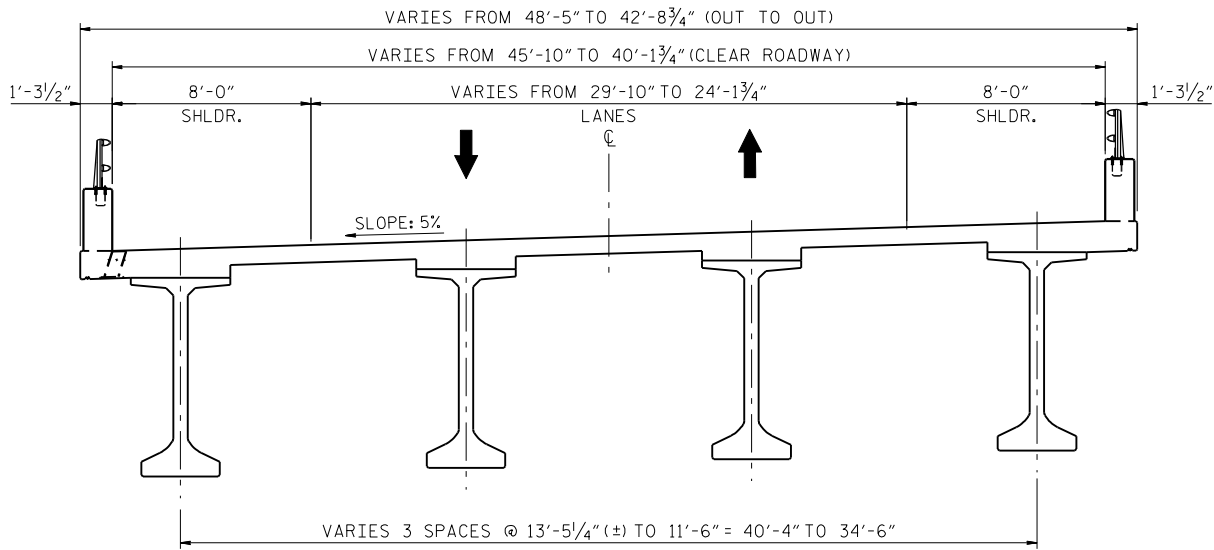


TYPICAL SECTION SPANS 1 & 2

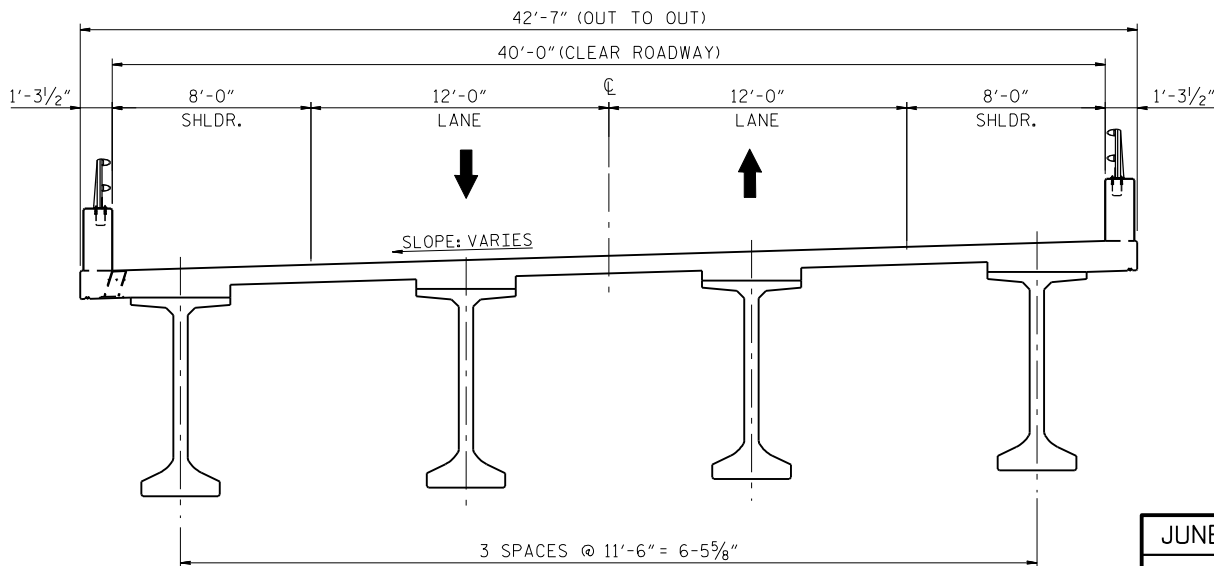


NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

JUNE 4, 2012	SHEET 2 OF 22
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH	
DARE COUNTY PROPOSED BRIDGE ON NEW LOCATION OF NC 12 OVER THE OREGON INLET BETWEEN RODANTHE AND NAGS HEAD 0.5 MILES WEST OF THE ATLANTIC OCEAN	
STATE PROJECT NO.: B-2500 (PHASE I)	



TYPICAL SECTION SPAN 3

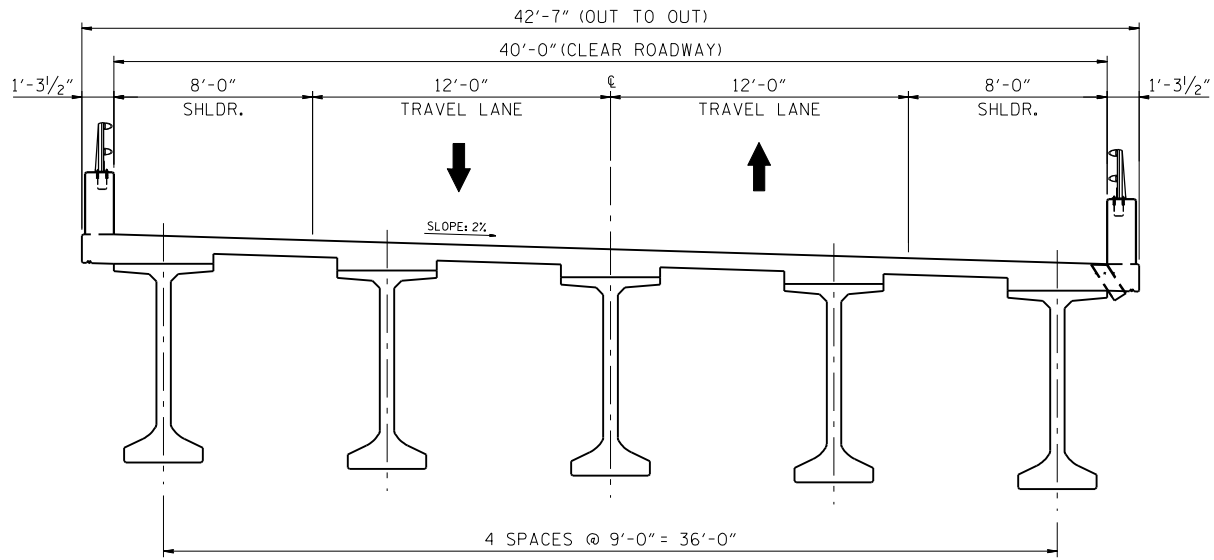


TYPICAL SECTION SPAN 4-6

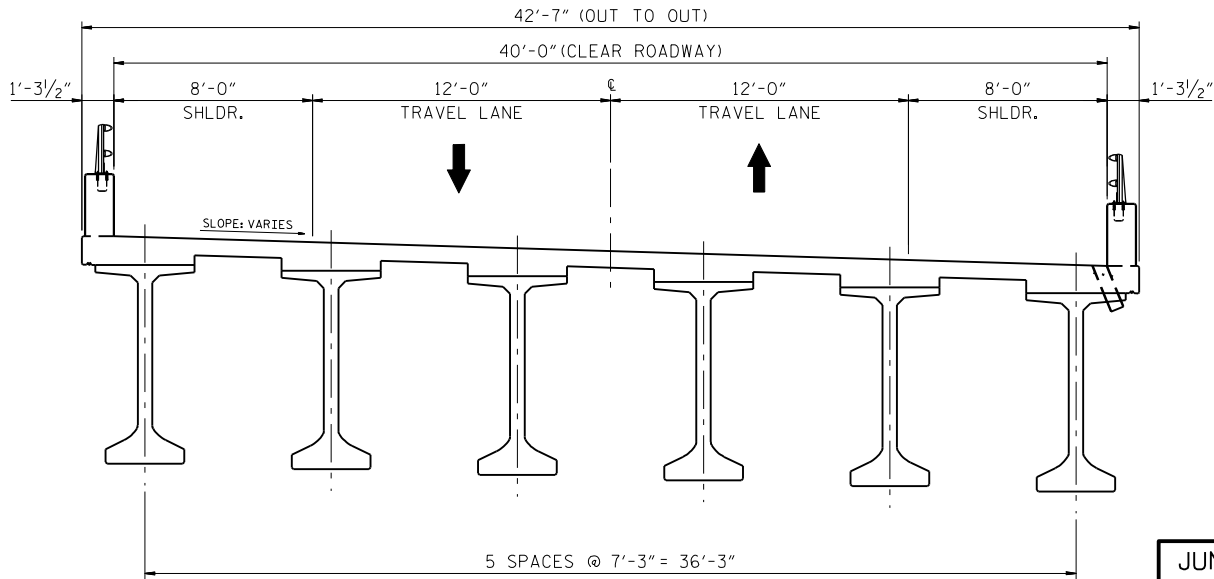


NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

JUNE 4, 2012	SHEET 3 OF 22
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH	
DARE COUNTY PROPOSED BRIDGE ON NEW LOCATION OF NC 12 OVER THE OREGON INLET BETWEEN RODANTHE AND NAGS HEAD 0.5 MILES WEST OF THE ATLANTIC OCEAN	
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TYPICAL SECTION SPANS 7-13

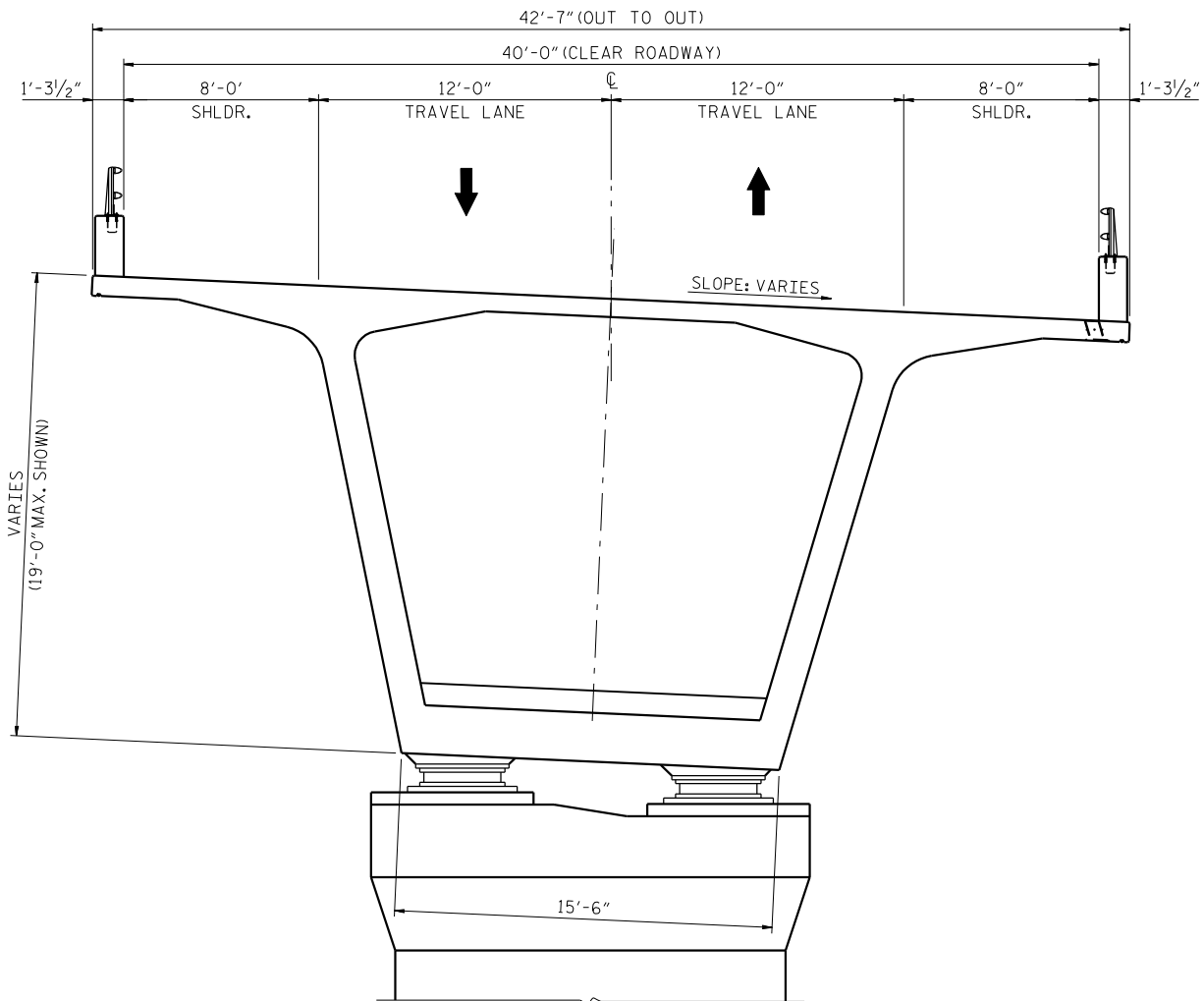


TYPICAL SECTION SPANS 14-18



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JUNE 4, 2012	SHEET 4 OF 22
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH	
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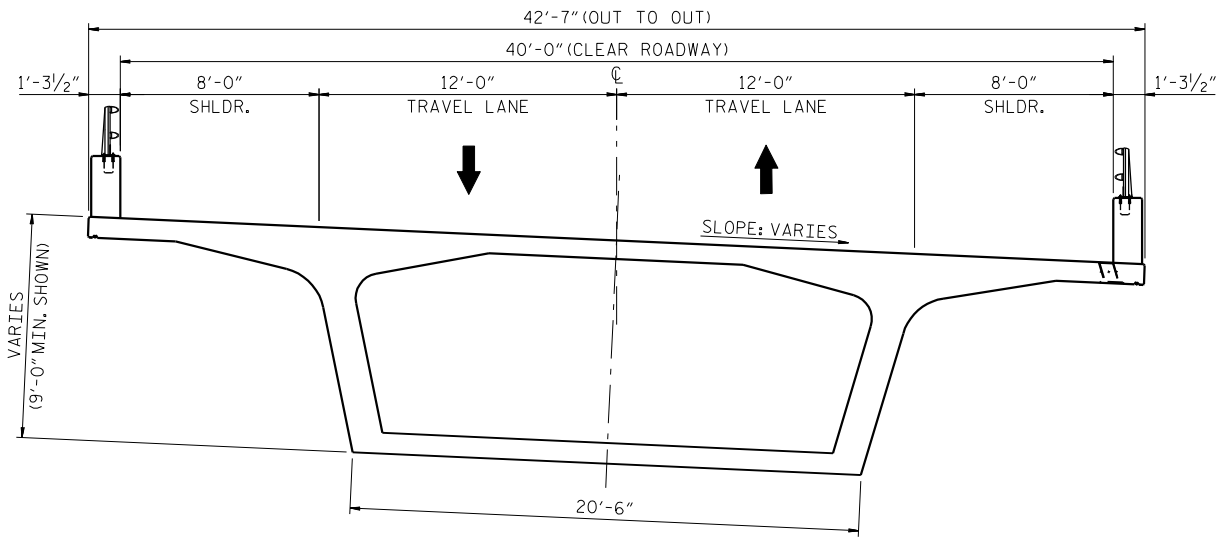


TYPICAL SECTION SPANS 19-29
(MAXIMUM DEPTH SECTION SHOWN)



NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

JUNE 4, 2012	SHEET 5 OF 22
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH	
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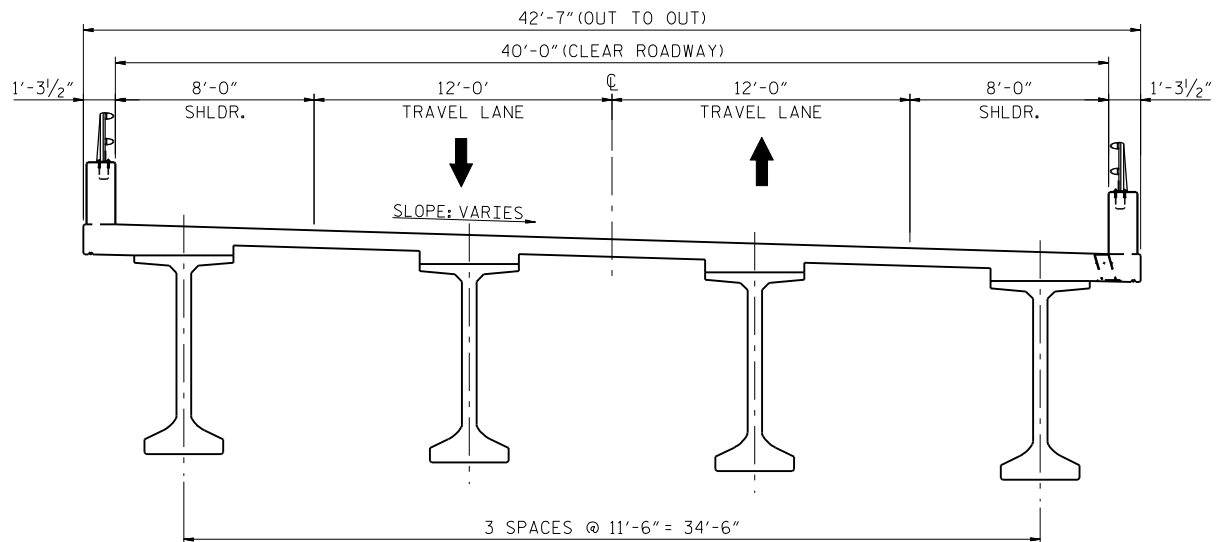


TYPICAL SECTION SPANS 19-29
(MINIMUM DEPTH SECTION SHOWN)

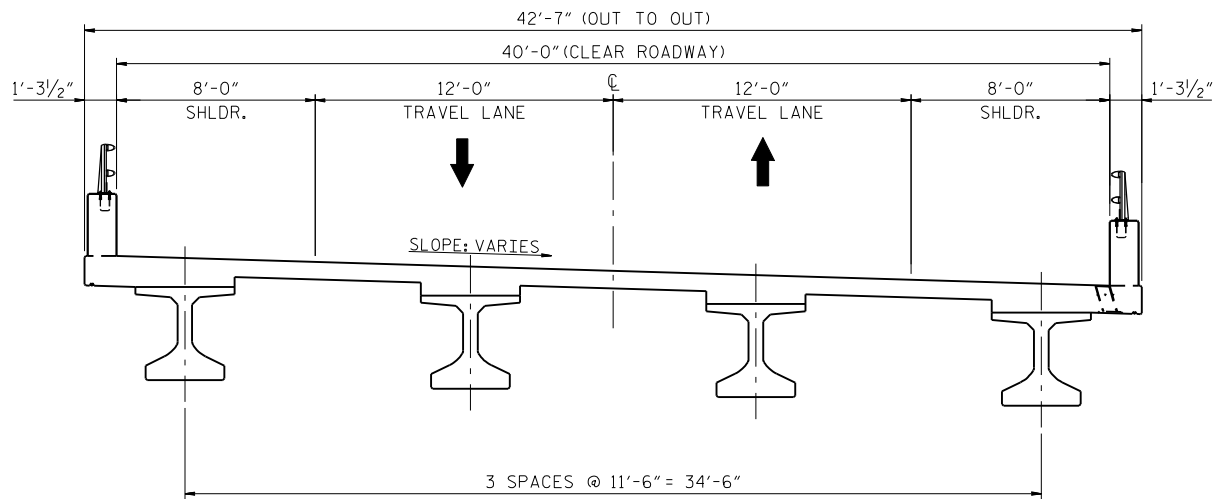


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JUNE 4, 2012	SHEET 6 OF 22
STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION RALEIGH	
DARE COUNTY PROPOSED BRIDGE ON NEW LOCATION OF NC 12 OVER THE OREGON INLET BETWEEN RODANTHE AND NAGS HEAD 0.5 MILES WEST OF THE ATLANTIC OCEAN	
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TYPICAL SECTION SPANS 30-80



TYPICAL SECTION SPANS 81 & 82



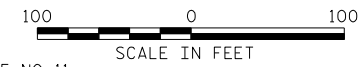
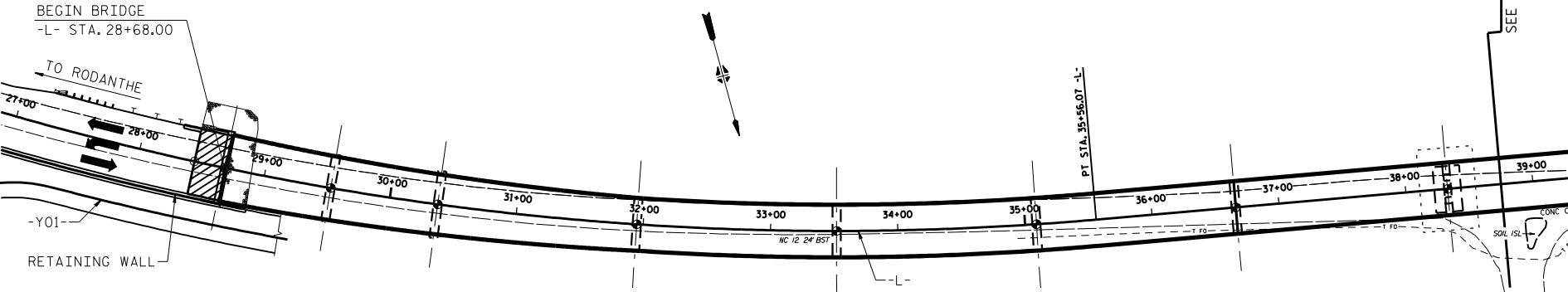
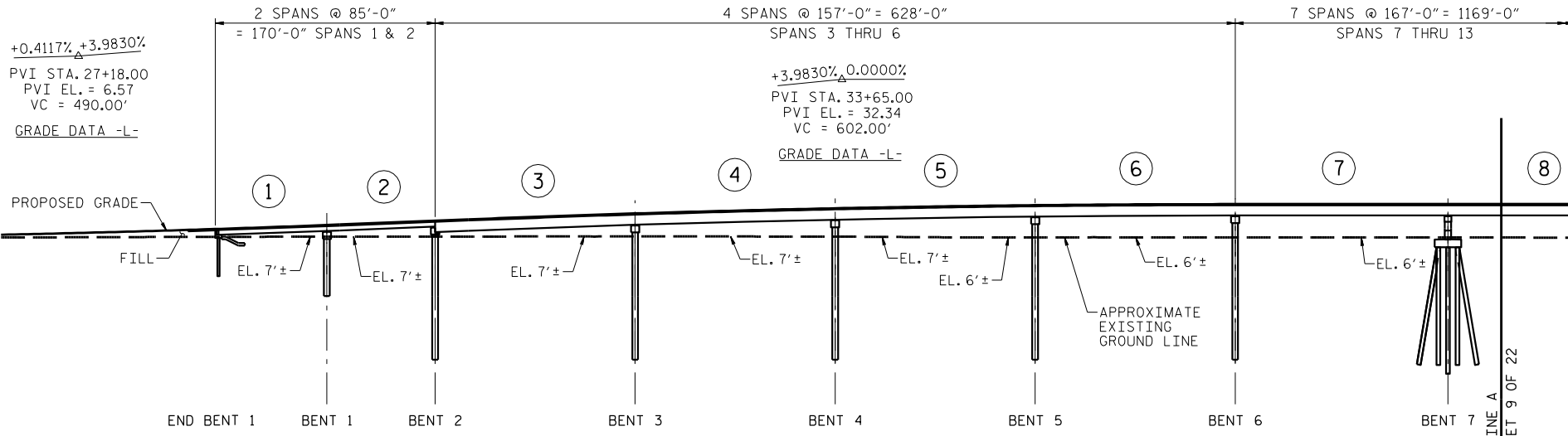
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JUNE 4, 2012 SHEET 7 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)



REPLACES BRIDGE NO. 11
 JUNE 4, 2012 SHEET 8 OF 22

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DARE COUNTY
 PROPOSED BRIDGE ON NEW LOCATION OF NC 12
 OVER THE OREGON INLET
 BETWEEN RODANTHE AND NAGS HEAD
 0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

HORIZONTAL
 CURVE DATA -L-

PI STA 27+27.13
 $\Delta = 42^\circ 32' 29.0''$ (LT)
 $D = 2^\circ 26' 28.4''$
 $L = 1,742.62'$
 $T = 913.67'$
 $R = 2,347.00'$

NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

7 SPANS @ 167'-0" = 1169'-0"
SPANS 7 THRU 13

5 SPANS @ 182'-0" =
910'-0" SPANS 14 THRU 18

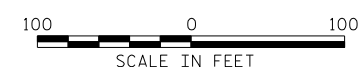
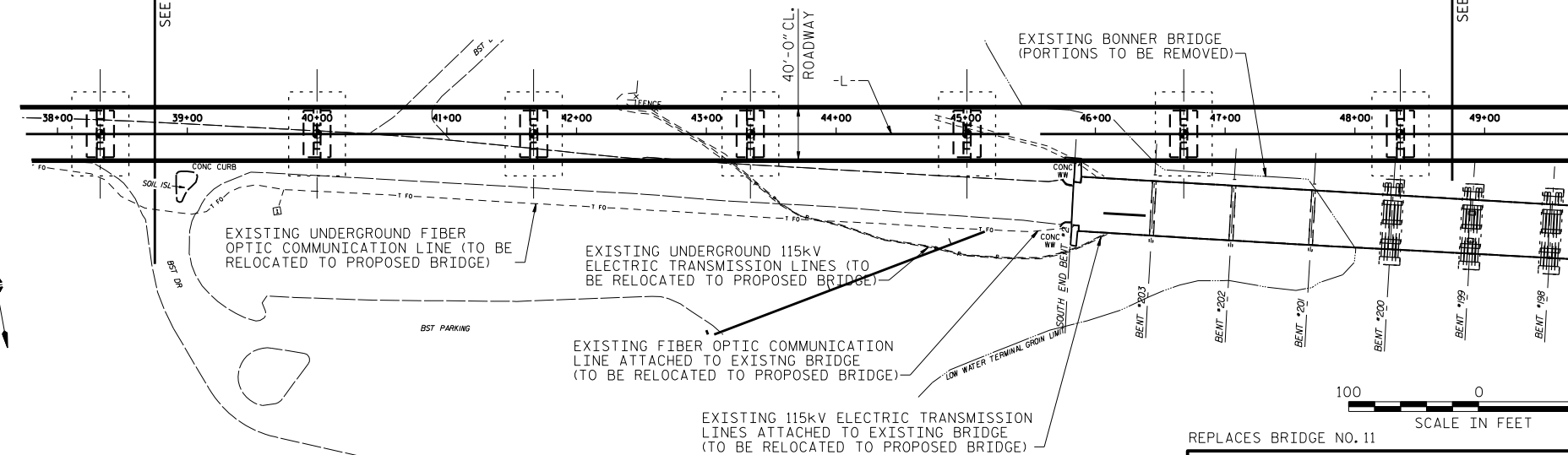
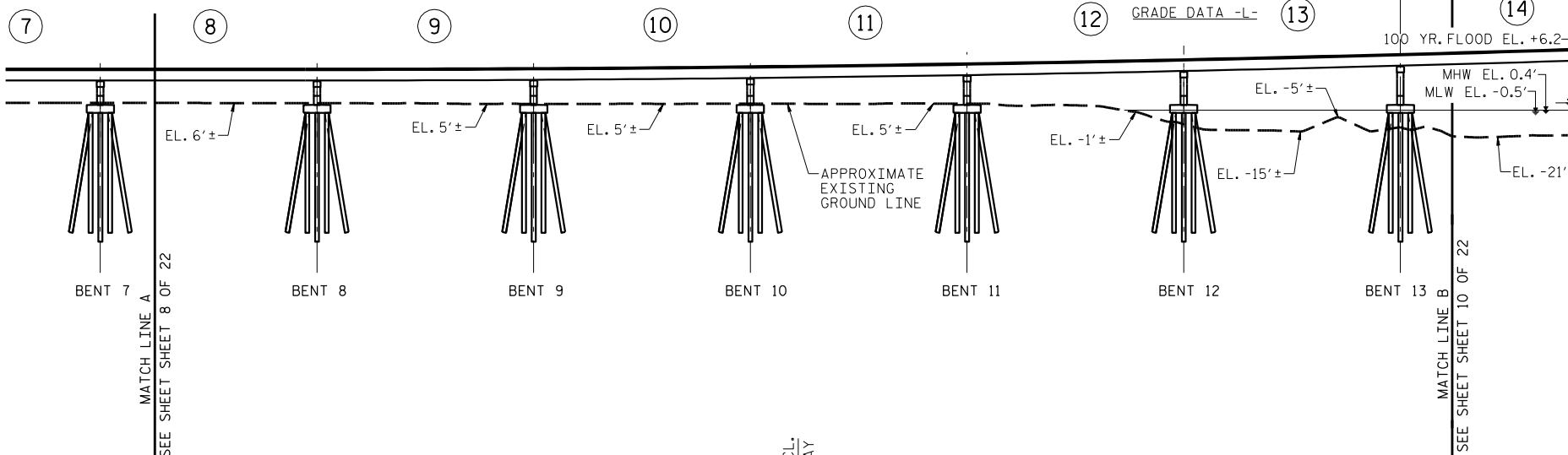
0.0000% +4.9966%

PVI STA. 47+73.00
PVI EL. = 32.34
VC = 1564.00'

GRADE DATA -L-

100 YR. FLOOD EL. +6.2'

MHW EL. 0.4'
MLW EL. -0.5'



REPLACES BRIDGE NO. 11

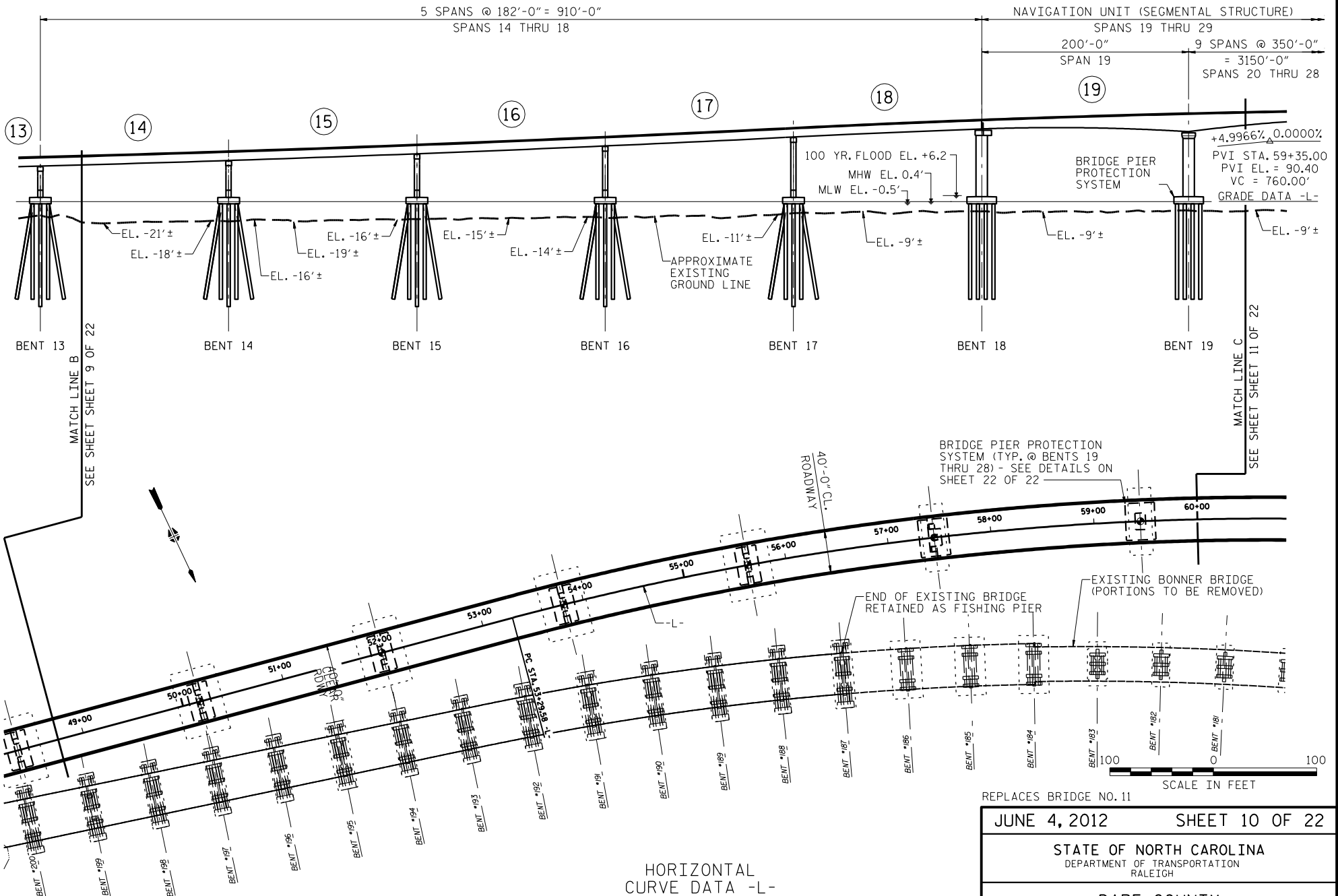
JUNE 4, 2012 SHEET 9 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS



NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

HORIZONTAL CURVE DATA -L-

PI STA 62+28.30
 $\Delta = 35^\circ 24' 44.6''$ (RT)
 $D = 2^\circ 02' 07.3''$
 $L = 1,739.85'$
 $T = 898.72'$
 $R = 2,815.00'$

REPLACES BRIDGE NO. 11

JUNE 4, 2012 SHEET 10 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

NAVIGATION UNIT (SEGMENTAL STRUCTURE)

SPANS 19 THRU 29

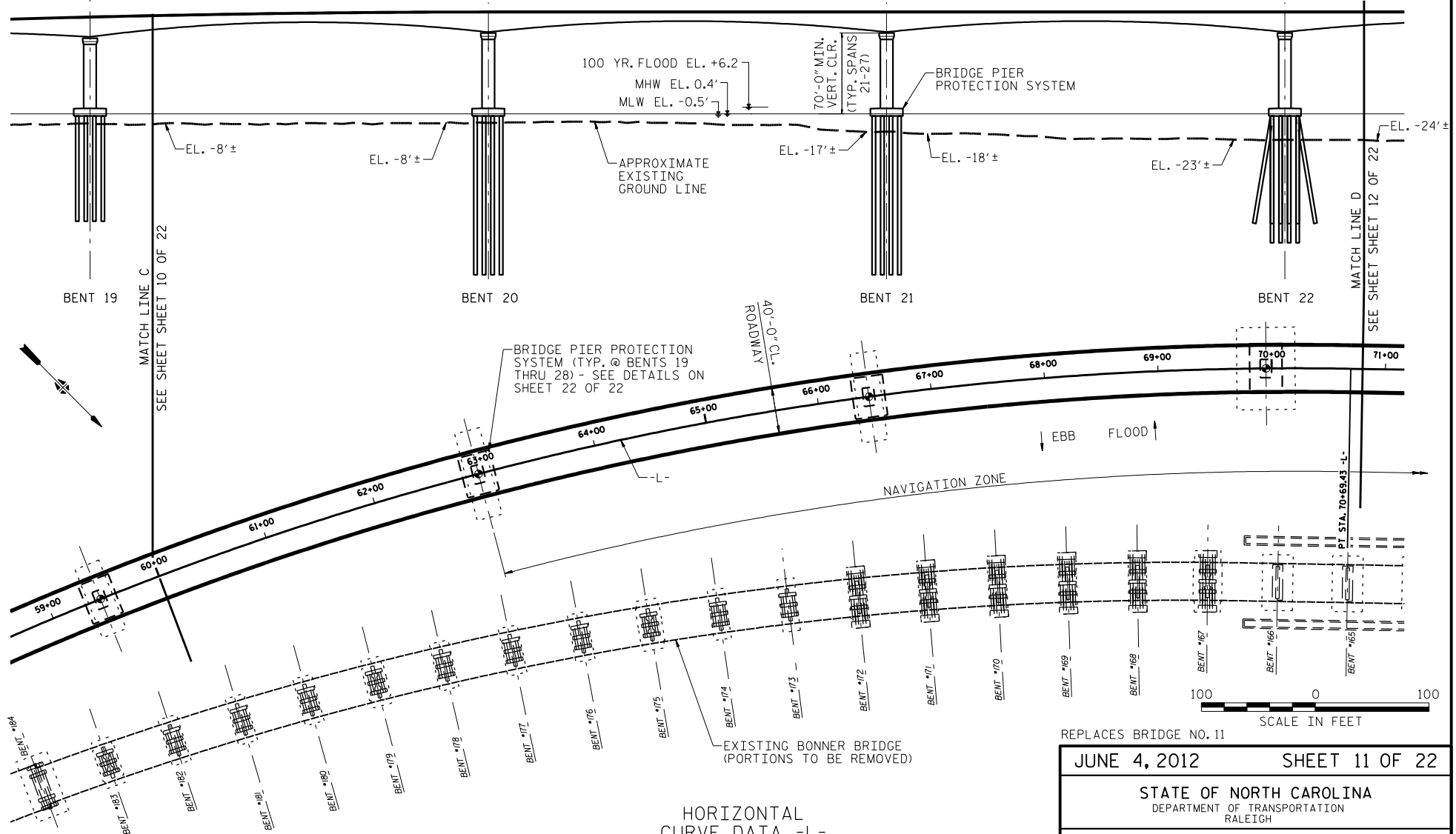
9 SPANS @ 350'-0" = 3150'-0"

SPANS 20 THRU 28

200'-0"
SPAN 19

+4.9966% 0.0000%
PVI STA. 59+35.00
PVI EL. = 90.40
VC = 760.00'
GRADE DATA -L-

(19) (20) (21) (22) (23)



HORIZONTAL
CURVE DATA -L-

PI STA 62+28.30
 $\Delta = 35^\circ 24' 44.6''$ (RT)
 $D = 2^\circ 02' 07.3''$
 $L = 1,739.85'$
 $T = 898.72'$
 $R = 2,815.00'$

NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

REPLACES BRIDGE NO. 11

JUNE 4, 2012 SHEET 11 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

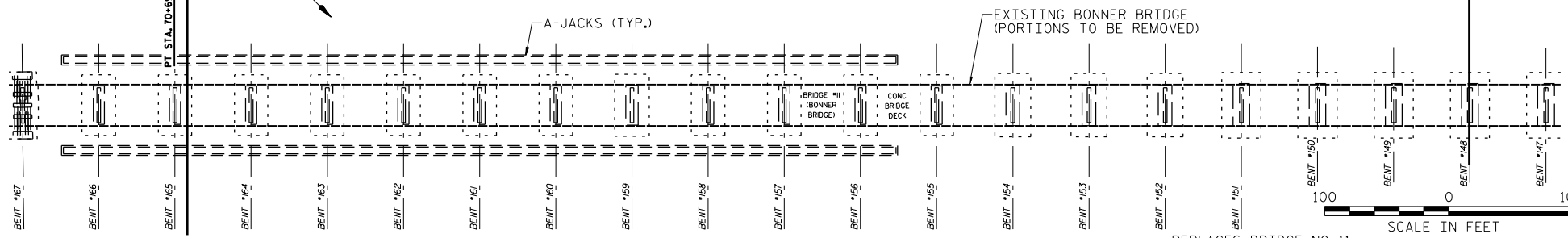
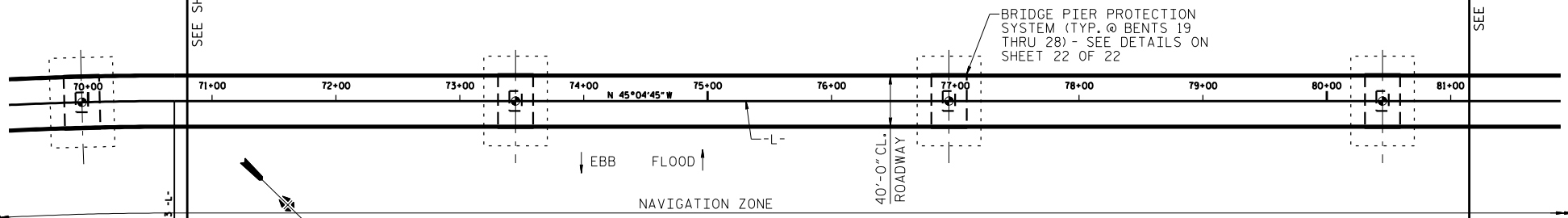
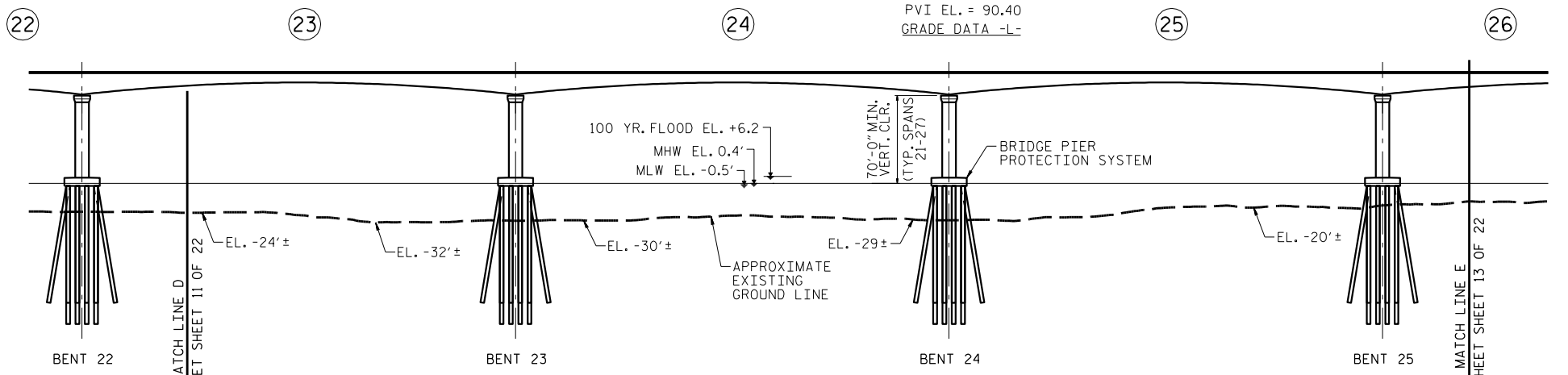
NAVIGATION UNIT (SEGMENTAL STRUCTURE)

SPANS 19 THRU 29

9 SPANS @ 350'-0" = 3150'-0"

SPANS 20 THRU 28

0.0000%
PVI EL. = 90.40
GRADE DATA -L-



REPLACES BRIDGE NO. 11

JUNE 4, 2012 SHEET 12 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

NAVIGATION UNIT (SEGMENTAL STRUCTURE)

SPANS 19 THRU 29

9 SPANS @ 350'-0" = 3150'-0"

SPANS 20 THRU 28

200'-0"

SPAN 29

0.0000% Δ -4.9991%

PVI STA. 91+45.00

PVI EL. = 90.40

VC = 760.00'

GRADE DATA -L-

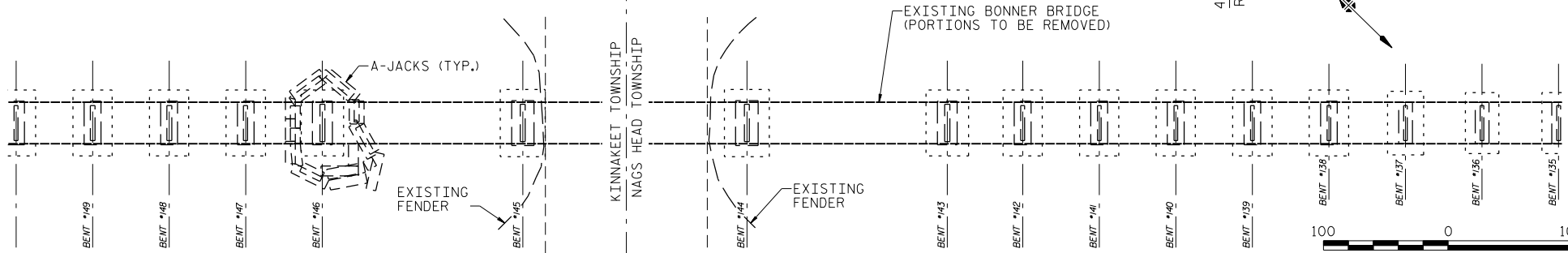
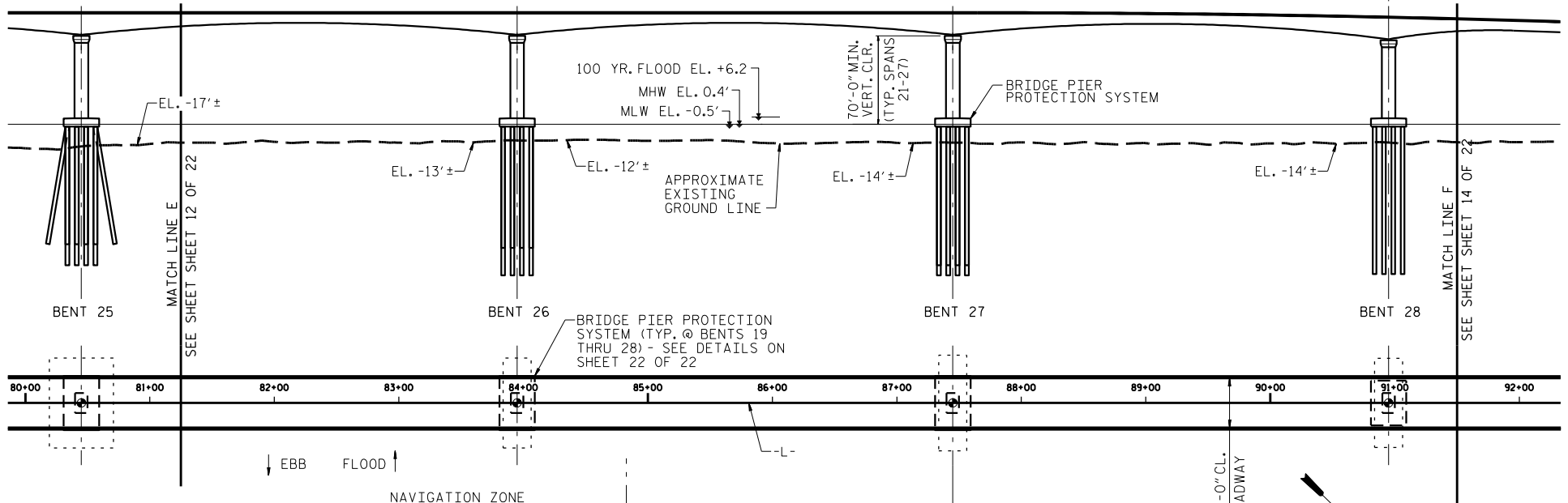
(25)

(26)

(27)

(28)

(29)



NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

REPLACES BRIDGE NO. 11

JUNE 4, 2012 SHEET 13 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

NAVIGATION UNIT (SEGMENTAL STRUCTURE)

6 SPANS @ 160'-10" = 965'-0"

SPANS 19 THRU 29

SPANS 30 THRU 35

9 SPANS @ 350'-0" = 3150'-0"
SPANS 20 THRU 28

200'-0"

SPAN 29

0.0000% Δ -4.9991%

PVI STA. 91+45.00

PVI EL. = 90.40

VC = 760.00'

GRADE DATA -L-

(28)

(29)

(30)

(31)

(32)

(33)

(34)

(35)

(36)

BRIDGE PIER PROTECTION SYSTEM

100 YR. FLOOD EL. +6.2
MHW EL. 0.4'
MLW EL. -0.5'

EL. -14'±

EL. -15'±

EL. -14'±

EL. -14'±

EL. -17'±
APPROXIMATE EXISTING GROUND LINE

EL. -18'±

BENT 28

BENT 29

BENT 30

BENT 31

BENT 32

BENT 33

BENT 34

BENT 35

MATCH LINE F
SEE SHEET 13 OF 22

MATCH LINE G
SEE SHEET 15 OF 22

BRIDGE PIER PROTECTION SYSTEM (TYP. @ BENTS 19 THRU 28) - SEE DETAILS ON SHEET 22 OF 22

EXISTING BONNER BRIDGE (PORTIONS TO BE REMOVED)

40'-0" CL. ROADWAY

PC STA. 102+46.84 -L-

BENT #17

BENT #16

BENT #15

BENT #14

BENT #13

BENT #12

BENT #11

BENT #10

BENT #9

BENT G

BENT F

BENT E

BENT D

BENT C

BENT B

BENT A

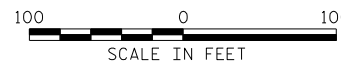
BENT #23

BENT #22

BENT #21

BENT #20

BENT #19



SCALE IN FEET

REPLACES BRIDGE NO. 11

JUNE 4, 2012

SHEET 14 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY

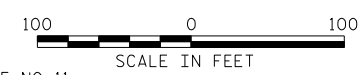
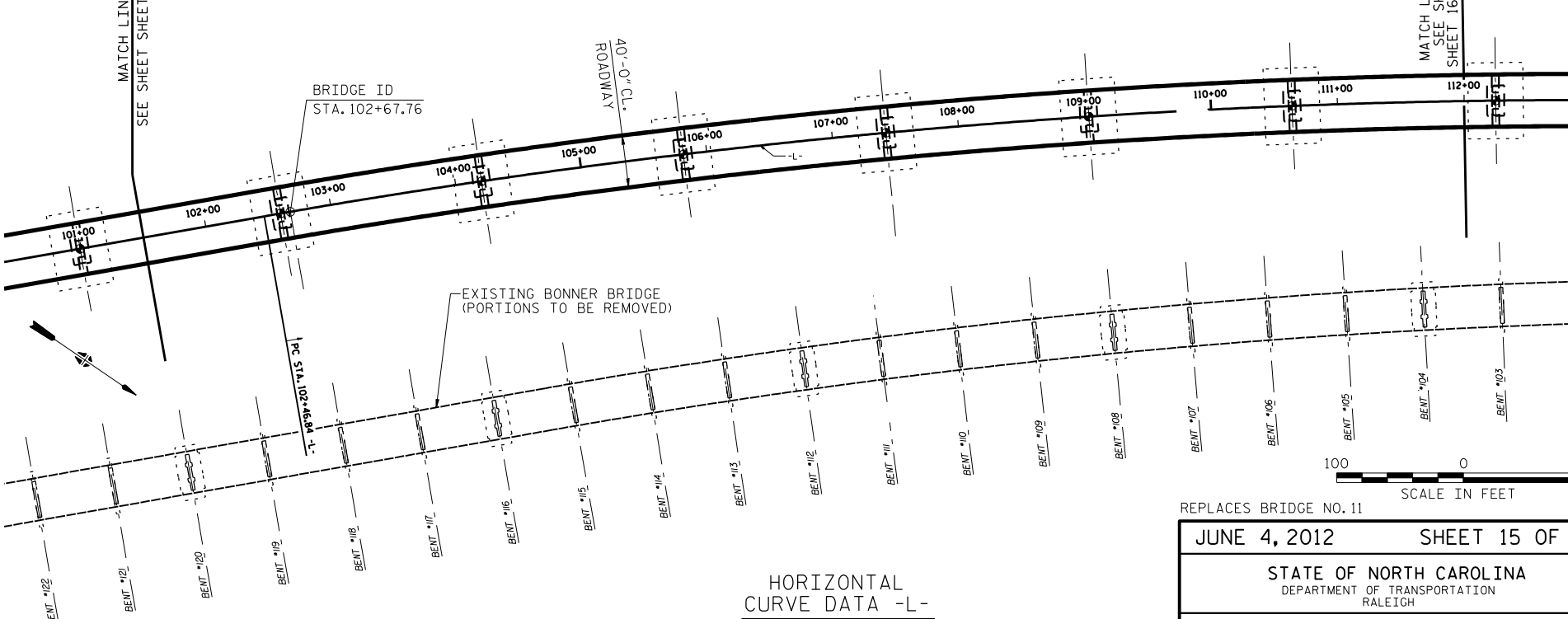
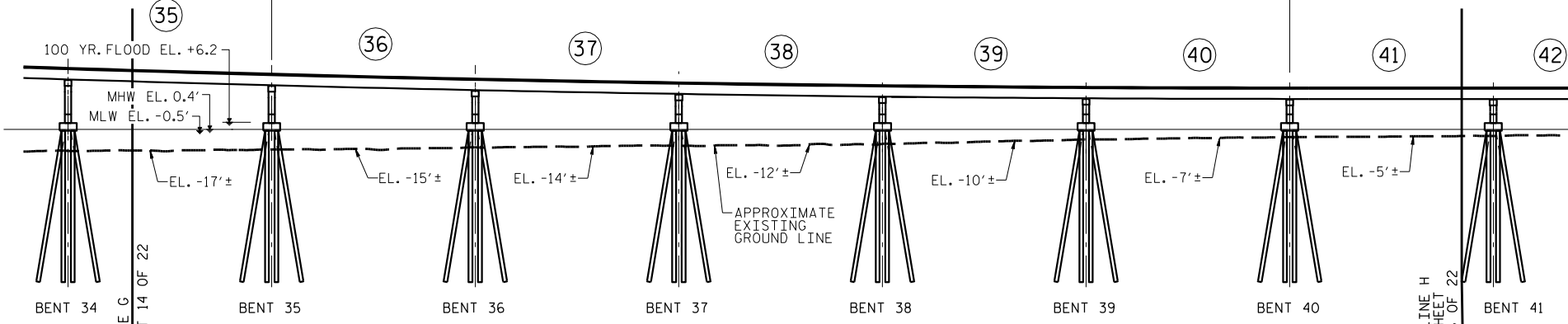
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

6 SPANS @ 160'-10" = 965'-0" SPANS 30 TO 35
 5 SPANS @ 160'-10" = 804'-2" SPANS 36 TO 40
 5 SPANS @ 160'-10" = 804'-2" SPANS 41 TO 45

-4.9991% 0.0000%
 PVI STA. 103+02.00
 PVI EL. = 32.56
 VC = 1554.00'
 GRADE DATA -L-



NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

HORIZONTAL CURVE DATA -L-

PI STA 128+03.63
 $\Delta = 45^\circ 49' 07.9''$ (RT)
 $D = 0^\circ 56' 49.3''$
 $L = 4,838.13'$
 $T = 2,556.79'$
 $R = 6,050.00'$

REPLACES BRIDGE NO. 11

JUNE 4, 2012 SHEET 15 OF 22

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DARE COUNTY

PROPOSED BRIDGE ON NEW LOCATION OF NC 12
 OVER THE OREGON INLET
 BETWEEN RODANTHE AND NAGS HEAD
 0.5 MILES WEST OF THE ATLANTIC OCEAN

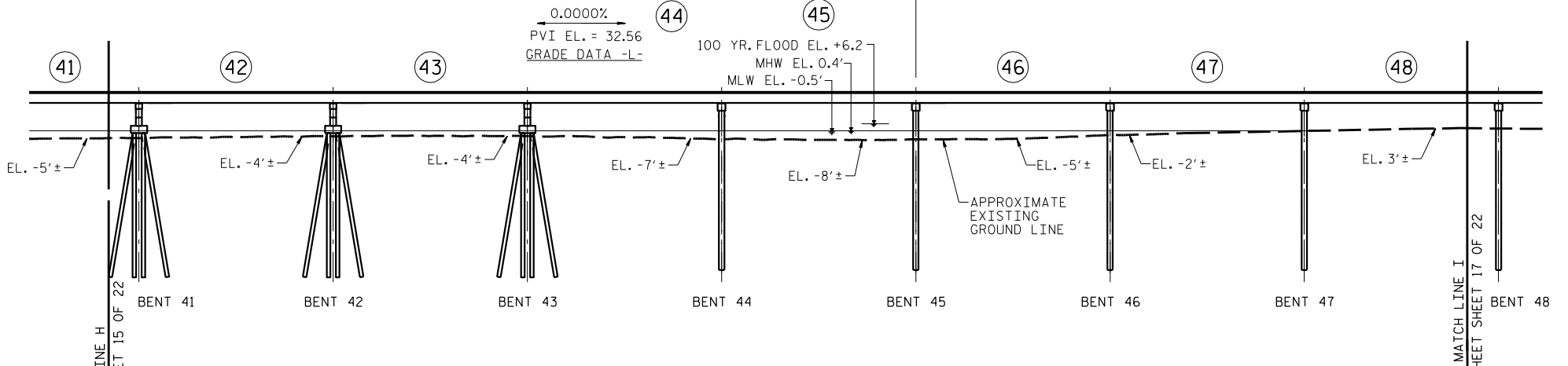
STATE PROJECT NO.: B-2500 (PHASE I)

5 SPANS @ 160'-10" = 804'-2"
SPANS 41 THRU 45

6 SPANS @ 160'-10" = 965'-0"
SPANS 46 THRU 51

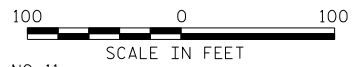
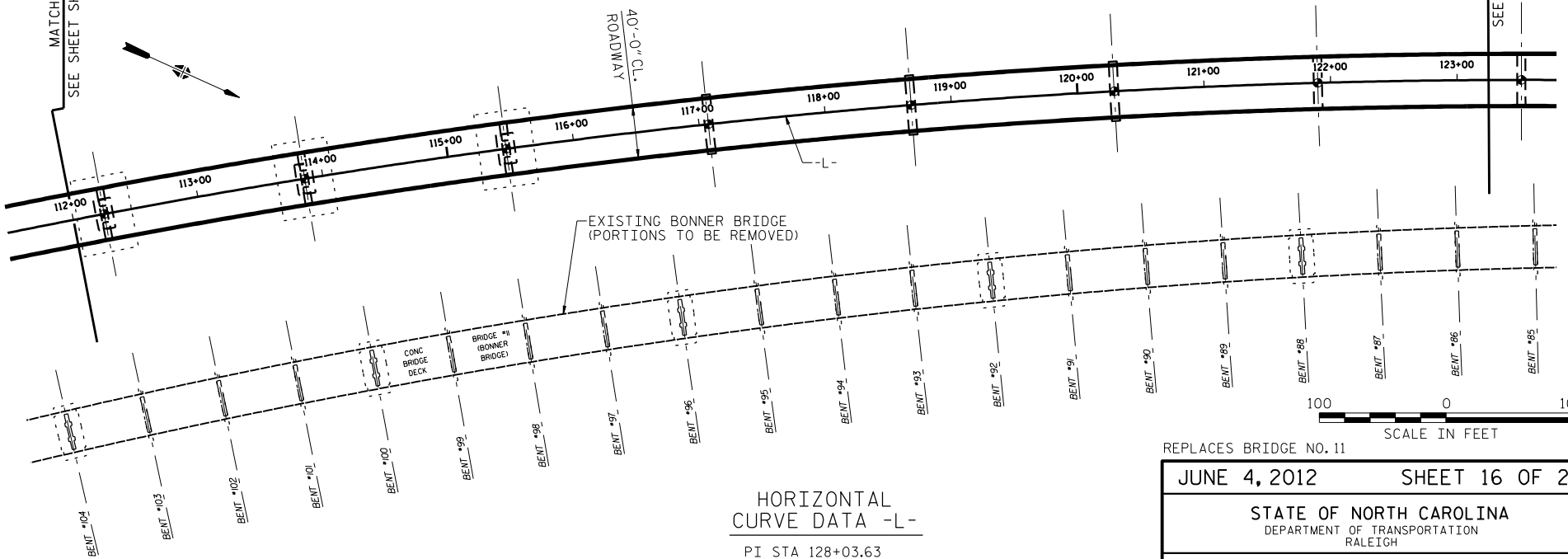
0.0000%
PVI EL. = 32.56
GRADE DATA -L-

100 YR. FLOOD EL. +6.2
MHW EL. 0.4'
MLW EL. -0.5'



MATCH LINE H
SEE SHEET 15 OF 22

MATCH LINE I
SEE SHEET 17 OF 22



REPLACES BRIDGE NO. 11

JUNE 4, 2012 SHEET 16 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

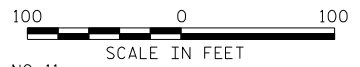
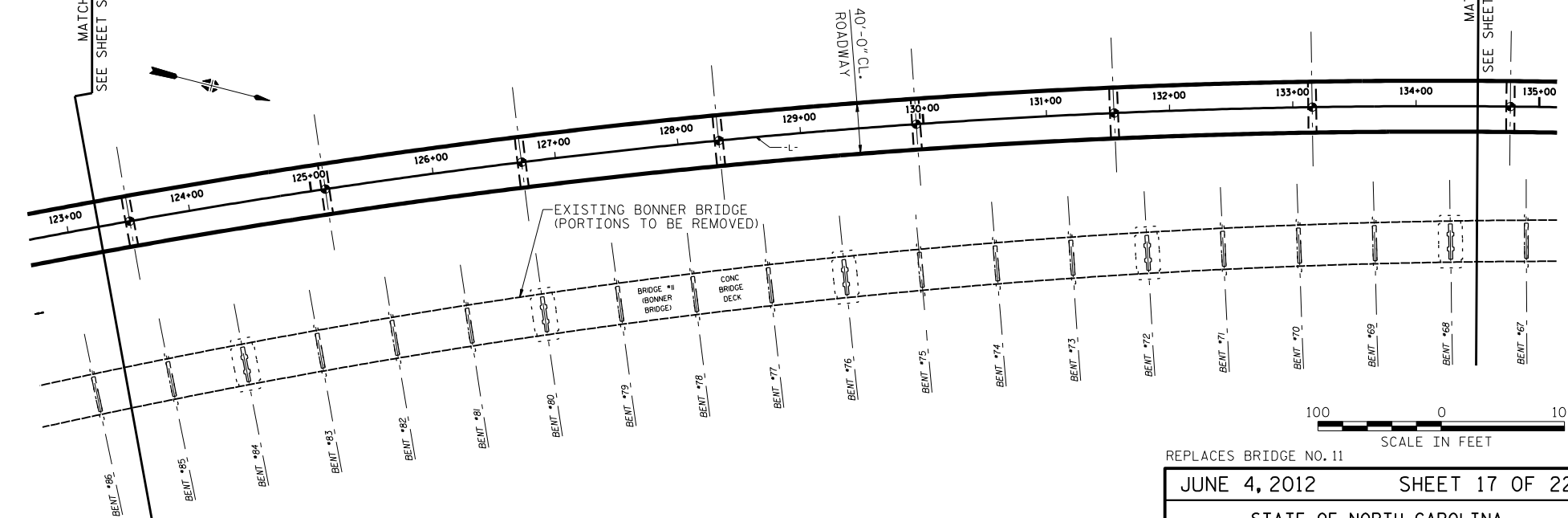
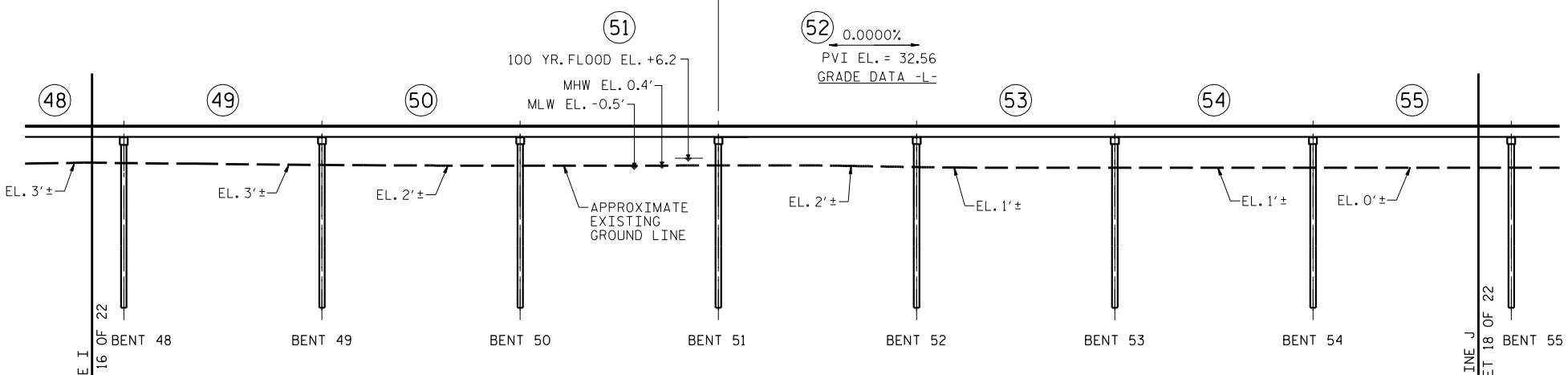
STATE PROJECT NO.: B-2500 (PHASE I)

HORIZONTAL
CURVE DATA -L-

PI STA 128+03.63
 $\Delta = 45^\circ 49' 07.9''$ (RT)
 $D = 0^\circ 56' 49.3''$
 $L = 4,838.13'$
 $T = 2,556.79'$
 $R = 6,050.00'$

NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

6 SPANS @ 160'-10" = 965'-0" SPANS 46 THRU 51 6 SPANS @ 160'-10" = 965'-0" SPANS 52 THRU 57



NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

HORIZONTAL CURVE DATA -L-

PI STA 128+03.63
 $\Delta = 45^\circ 49' 07.9''$ (RT)
 $D = 0^\circ 56' 49.3''$
 $L = 4,838.13'$
 $T = 2,556.79'$
 $R = 6,050.00'$

REPLACES BRIDGE NO. 11

JUNE 4, 2012 SHEET 17 OF 22

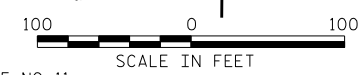
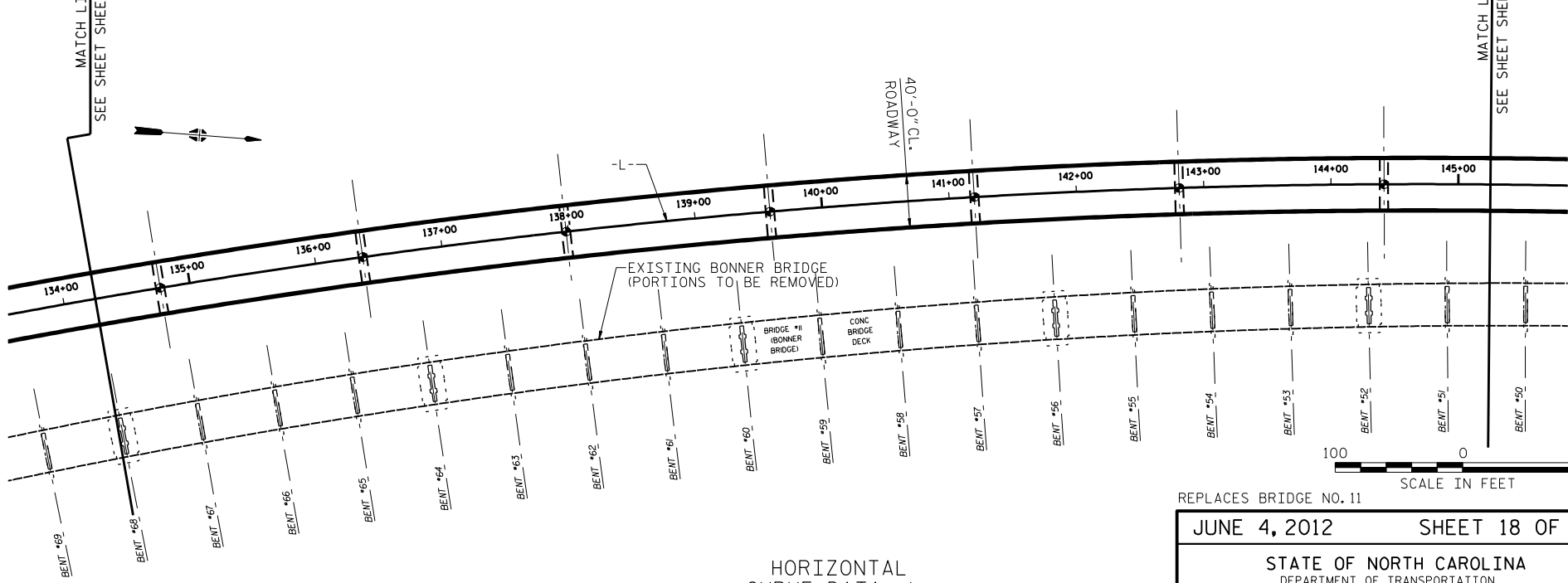
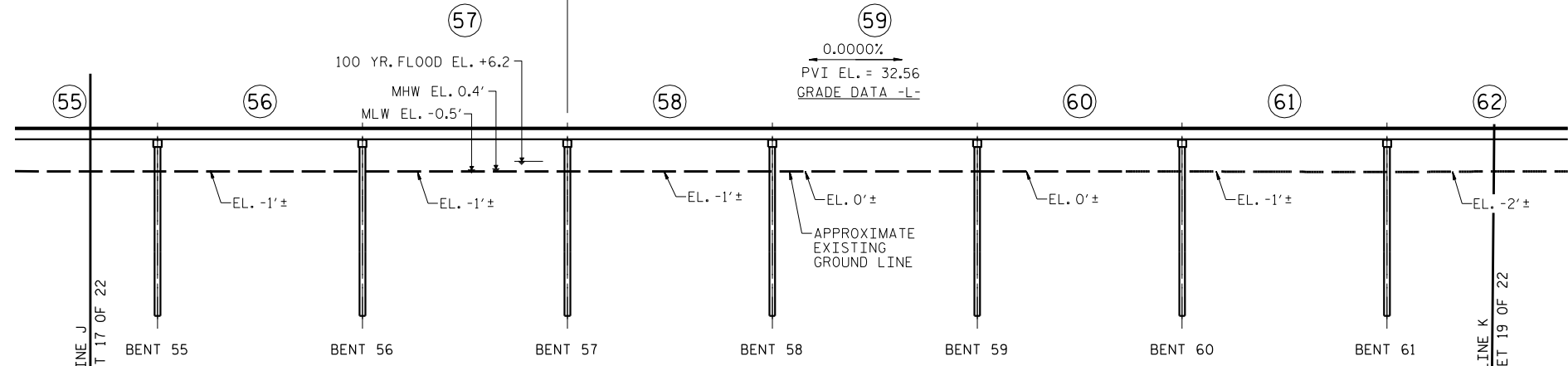
STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DARE COUNTY
 PROPOSED BRIDGE ON NEW LOCATION OF NC 12
 OVER THE OREGON INLET
 BETWEEN RODANTHE AND NAGS HEAD
 0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

6 SPANS @ 160'-10" = 965'-0"
SPANS 52 THRU 57

6 SPANS @ 160'-10" = 965'-0"
SPANS 58 THRU 63



NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

HORIZONTAL CURVE DATA -L-

PI STA 128+03.63
 $\Delta = 45^\circ 49' 07.9''$ (RT)
 $D = 0^\circ 56' 49.3''$
 $L = 4,838.13'$
 $T = 2,556.79'$
 $R = 6,050.00'$

REPLACES BRIDGE NO. 11

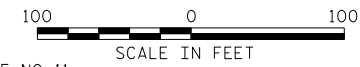
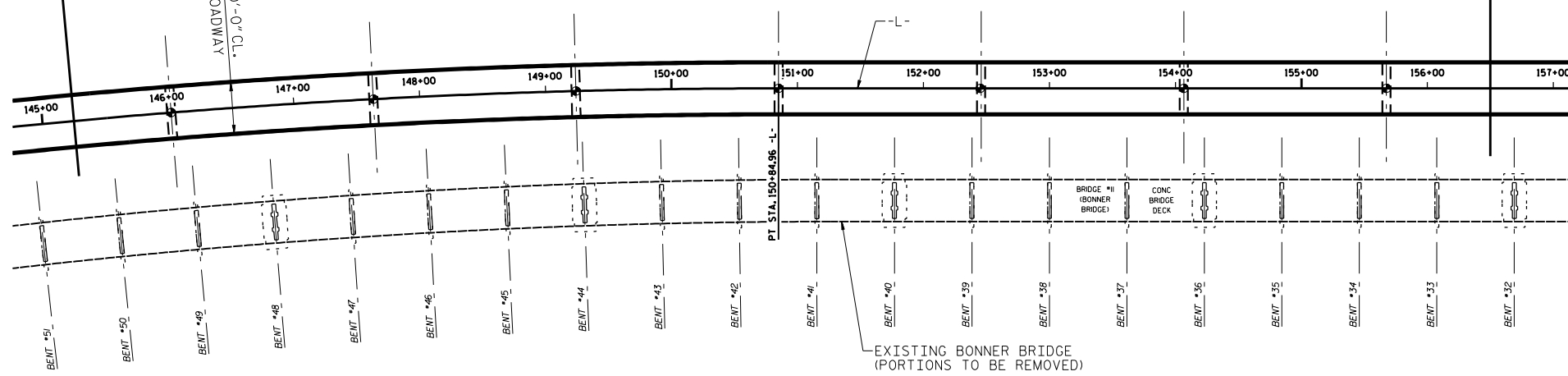
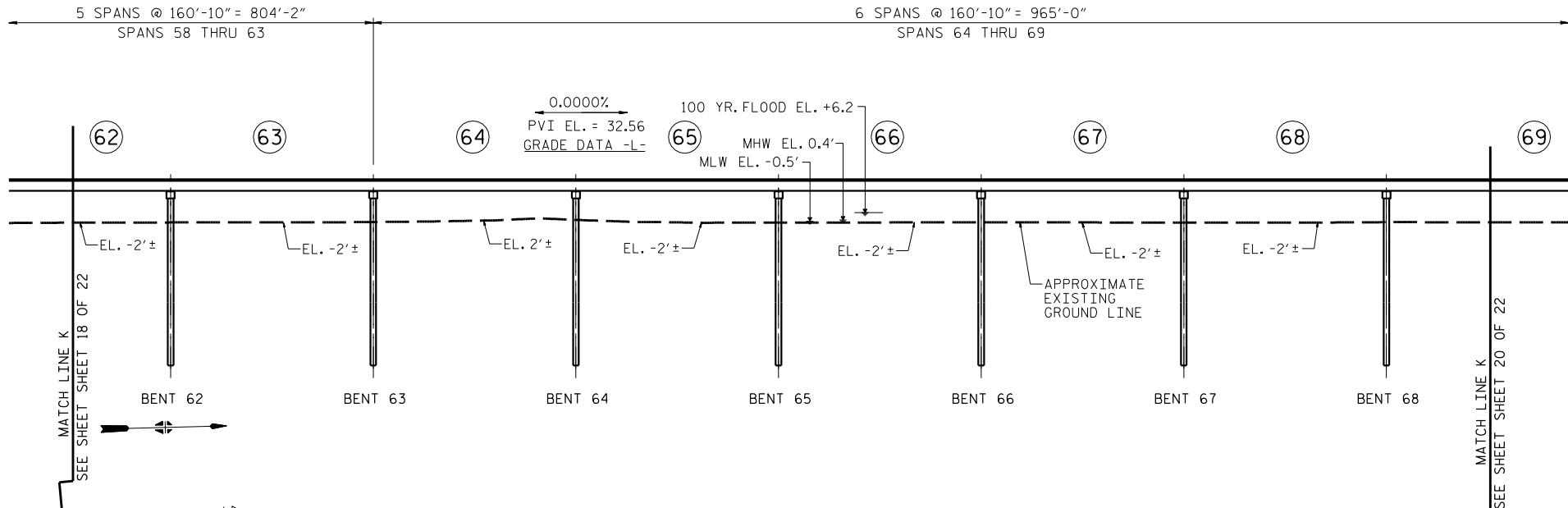
JUNE 4, 2012 SHEET 18 OF 22

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

DARE COUNTY

PROPOSED BRIDGE ON NEW LOCATION OF NC 12
 OVER THE OREGON INLET
 BETWEEN RODANTHE AND NAGS HEAD
 0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)



REPLACES BRIDGE NO. 11
 JUNE 4, 2012 SHEET 19 OF 22

NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

HORIZONTAL CURVE DATA -L-

PI STA 128+03.63
 $\Delta = 45^\circ 49' 07.9''$ (RT)
 $D = 0^\circ 56' 49.3''$
 $L = 4,838.13'$
 $T = 2,556.79'$
 $R = 6,050.00'$

STATE OF NORTH CAROLINA
 DEPARTMENT OF TRANSPORTATION
 RALEIGH

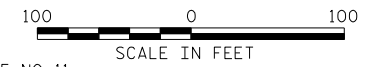
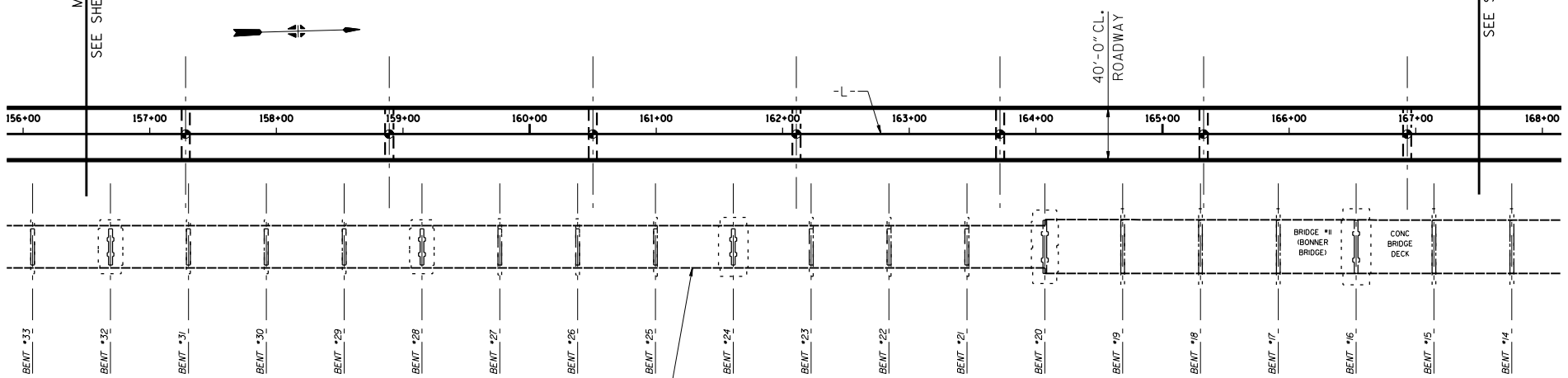
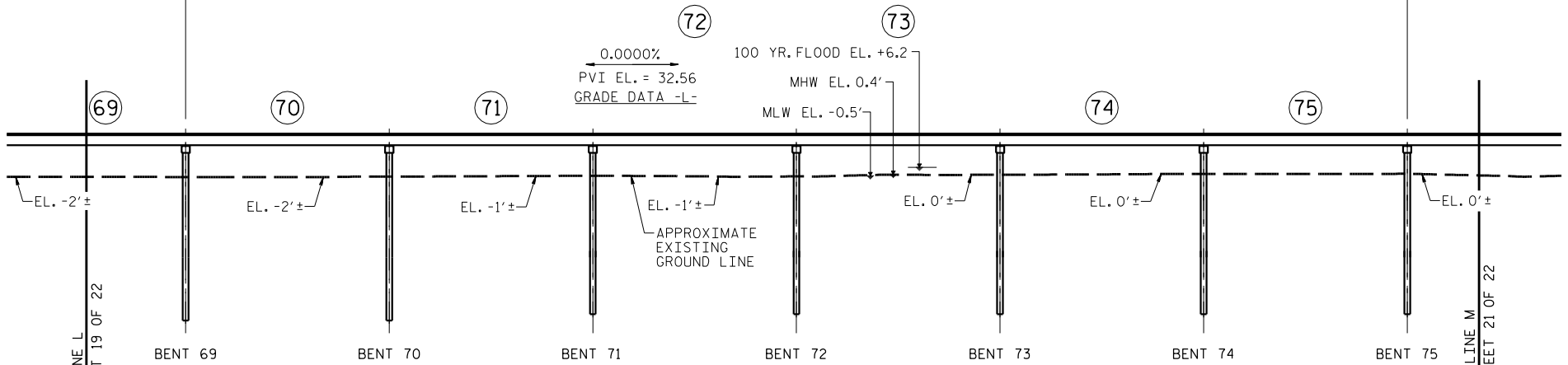
DARE COUNTY
 PROPOSED BRIDGE ON NEW LOCATION OF NC 12
 OVER THE OREGON INLET
 BETWEEN RODANTHE AND NAGS HEAD
 0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

6 SPANS @
160'-10" = 965'-0"
SPANS 64 THRU 69

6 SPANS @ 160'-10" = 965'-0"
SPANS 70 THRU 75

6 SPANS @
160'-10" = 965'-0"
SPANS 76 THRU 80



REPLACES BRIDGE NO. 11

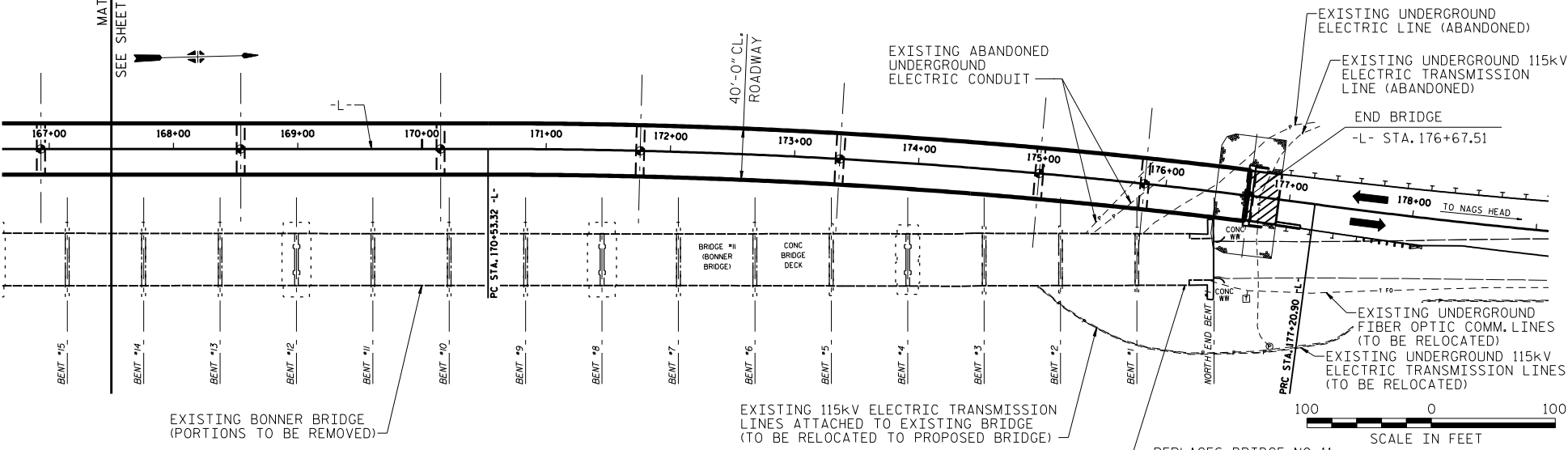
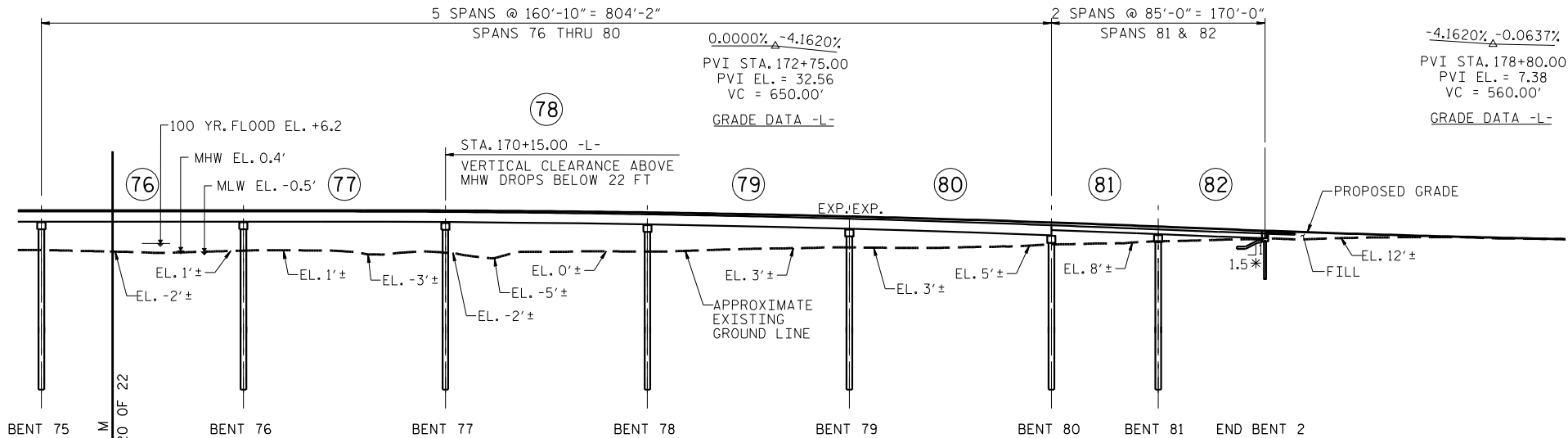
JUNE 4, 2012 SHEET 20 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY
PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS



HORIZONTAL
CURVE DATA -L-

PI STA 173+87.60
 $\Delta = 7^\circ 38' 59.6''$ (RT)
 $D = 1^\circ 08' 45.3''$
 $L = 667.58'$
 $T = 334.29'$
 $R = 5,000.00'$

NOTE: THIS BRIDGE HAS BEEN DESIGNED IN ACCORDANCE WITH THE REQUIREMENTS OF AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, INCLUDING REQUIREMENTS FOR VESSEL COLLISION. SEE SHEET 1 FOR DESIGN LOADS

REPLACES BRIDGE NO. 11

JUNE 4, 2012 SHEET 21 OF 22

STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
RALEIGH

DARE COUNTY

PROPOSED BRIDGE ON NEW LOCATION OF NC 12
OVER THE OREGON INLET
BETWEEN RODANTHE AND NAGS HEAD
0.5 MILES WEST OF THE ATLANTIC OCEAN

STATE PROJECT NO.: B-2500 (PHASE I)

PROPERTY OWNERS

NAMES AND ADDRESSES

NAMES	ADDRESSES
US GOVERNMENT	PEA ISLAND NATIONAL WILDLIFE REFUGE P.O. BOX 1969 MANTEO, NC 27954
STATE OF NORTH CAROLINA	NA
US GOVERNMENT	CAPE HATTERAS NATIONAL SEASHORE 1401 NATIONAL PARK DR. MANTEO, NC 27954
STATE OF NORTH CAROLINA	NA

In Correspondence Folder



REPLY TO
ATTENTION OF:

DEPARTMENT OF THE ARMY
WILMINGTON DISTRICT, CORPS OF ENGINEERS
P.O. BOX 1890
WILMINGTON, NORTH CAROLINA 28402-1890

September 18, 2008

Project Management Branch

Mr. Lyndo Tippet
Secretary of Transportation
North Carolina Department of Transportation
1501 Mail Service Center
Raleigh, North Carolina 27699

Dear Secretary Tippet:

Recently, members of my staff have been in coordination with North Carolina Department of Transportation (NCDOT) concerning navigation requirements for the new Oregon Inlet Bridge. The bridge spans the federally authorized navigation channel at Oregon Inlet, which the Wilmington District is responsible for maintaining. This response confirms and clarifies our assessment and recommendations related to these requirements.

The Wilmington District has determined that the following constraints must be incorporated into design of the replacement bridge to provide a reasonable assurance that safe navigation can be maintained through Oregon Inlet over the structure's 50-year design life. Please refer to the enclosure for location of features described below.

1) The terminal groin must remain in place to stabilize the existing location of Oregon Inlet. Removal of the terminal groin would allow Oregon Inlet to resume its historic southerly migration and place the southern bridge abutment in danger of being exposed due to erosion of the northern tip of Pea Island. We are not able to identify a Navigation Zone (multiple navigation spans) to NCDOT if the terminal groin does not remain in place because the deep water through the inlet would likely migrate to a location south of the southern bridge abutment. The Wilmington District strongly recommends that the terminal groin remain in place as an essential feature of the new Oregon Inlet Bridge.

2) The design vessel for the replacement bridge should be the Hopper Dredge Atchafalaya, which is owned and operated by B+B Dredging, Portsmouth, VA. Design characteristics of the bridge should account for safe navigation of the Atchafalaya through the Navigation Zone and impact analysis of the Atchafalaya to the bridge in the absence of a navigation fender system. Specifications of the vessel include: Height: 65-ft, Length: 197-ft, Width: 87-ft, Gross Tons: 760. The height of each navigation span should be 70-ft mean high water (MHW), or 70.38-ft NAVD88, to account for tide and wave fluctuations.

3) Prior to the installation of the Herbert C. Bonner Bridge, Davis Slough was a deep water channel west of Oregon Inlet. Following NCDOT's installation of the Bonner Bridge, Range 1 of the existing navigation channel became the prevailing deep water west of Oregon Inlet. The existing Bonner Bridge sub-structure acts as a flow restrictor in Davis Slough and helps prevent the shifting of deep water channels within the inlet. If the existing sub-structure were removed or replaced with

*Add to
Structures
SOW →*

less restrictive sub-structure, it is likely that Davis Slough would again become the prevailing deep water channel. Based on the above information, and assuming the terminal groin remains in place, two options for Navigation Zones are provided below.

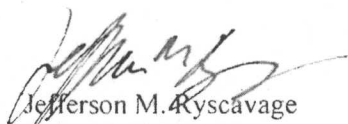
a) 2,400 ft Navigation Zone from Station 21+00 through 45+00. Under this Navigation Zone alignment, approximately 1,200 ft of the existing bridge (as shown on the enclosed pdf file), or similar submerged sub-structure, must remain in-place to prevent Davis Slough from becoming the prevailing interior channel. Without this "Training Structure" it is likely that Davis Slough would become the prevailing channel and the 2,400 ft Navigation Zone would be rendered useless to vessel traffic for the remaining life of the bridge.

b) 4,500 ft Navigation Zone from Station 00+00 through 45+00. Under this Navigation Zone configuration, no Training Structure would be required. However, the Navigation Zone must be located from Station 00+00 through 45+00 (i.e. a vertical clearance of 70-ft MHW must be maintained from Station 00+00 through 45+00).

My staff has recently attended several coordination meetings relating to the new Oregon Inlet Bridge with the following agencies: NCDOT, U.S. Fish and Wildlife Service (USFWS), Federal Highway Administration and U.S. Coast Guard. During these coordination meetings representatives of NCDOT have indicated that the new Oregon Inlet Bridge might be constructed prior to applying for the U.S. Fish and Wildlife Special Use Permit (SUP) which would allow the Terminal Groin to remain in place. The Wilmington District is concerned that under this course of action, the possibility exists that USFWS might deny the SUP application. It is the opinion of my office that without the terminal groin in place, Oregon Inlet will continue its migration to the south and render the constructed Navigation Zone useless and most likely jeopardize the structural integrity of the newly constructed southern bridge abutment. Therefore, if NCDOT decides to wait for the new bridge to be constructed prior to applying for the USFWS SUP, we would request that NCDOT provide us a plan that ensures deep water will remain beneath the constructed navigation zone.

I would like to thank you for the ongoing coordination with the Wilmington District on this issue. Coordination between the Wilmington District and NCDOT is essential and will surely benefit the users of both land and water highways we are tasked with constructing and maintaining. If you have any questions, please feel free to contact me.

Sincerely,


Jefferson M. Ryscavage
Colonel, U.S. Army
District Commander

Enclosure

CF:

Honorable Richard Burr
United States Senate
217 Russell Senate Office Building
Washington, DC 20510

Honorable Elizabeth Dole
United States Senate
120 Russell Senate Office Building
Washington, DC 20510

Honorable Walter B. Jones, Jr.
United States House of Representatives
2333 Rayburn House Office Building
Washington, DC 20515

BG Joseph Schrodel
Commander, South Atlantic Division
US Army Corps of Engineers
60 Forsyth Street, Rm 10M15
Atlanta, GA 30303

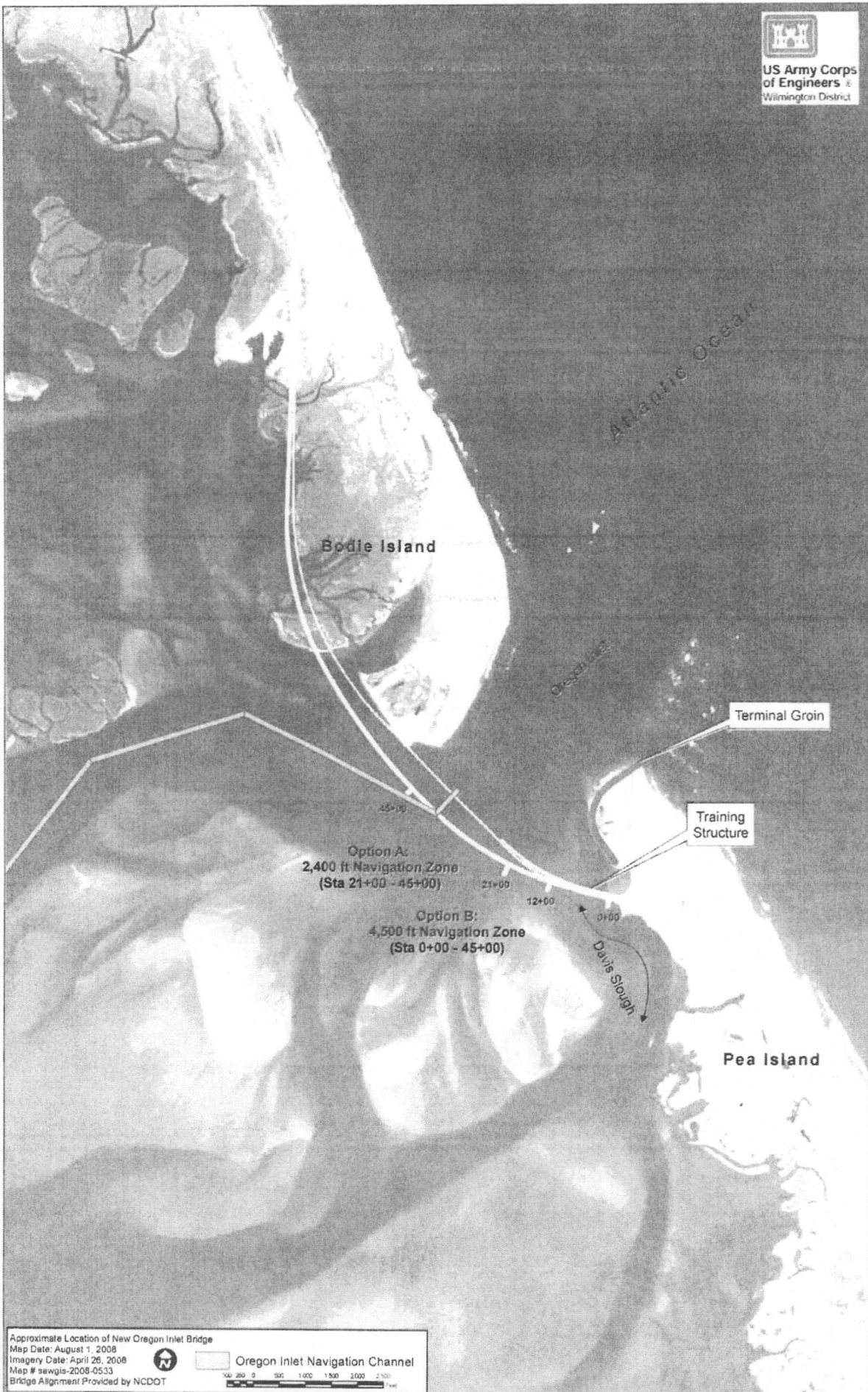
Mr. Tom Reeder, Director
Division of Water Resources
North Carolina Department of Environment,
and Natural Resources
Post Office Box 27687
Raleigh, North Carolina 27611-7687

Mr. Mike Bryant
U.S. Fish and Wildlife Service
Alligator River National Wildlife Refuge
Post Office Box 1969
Manteo, North Carolina 27954

Mr. Michael Murray
U.S. Department of the Interior
National Park Service
Outer Banks Group
1401 National Park Drive
Manteo, North Carolina 27954



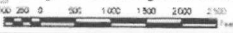
US Army Corps
of Engineers
Wilmington District



Approximate Location of New Oregon Inlet Bridge
Map Date: August 1, 2008
Imagery Date: April 26, 2008
Map # sewgis-2008-0533
Bridge Alignment Provided by NCDOT

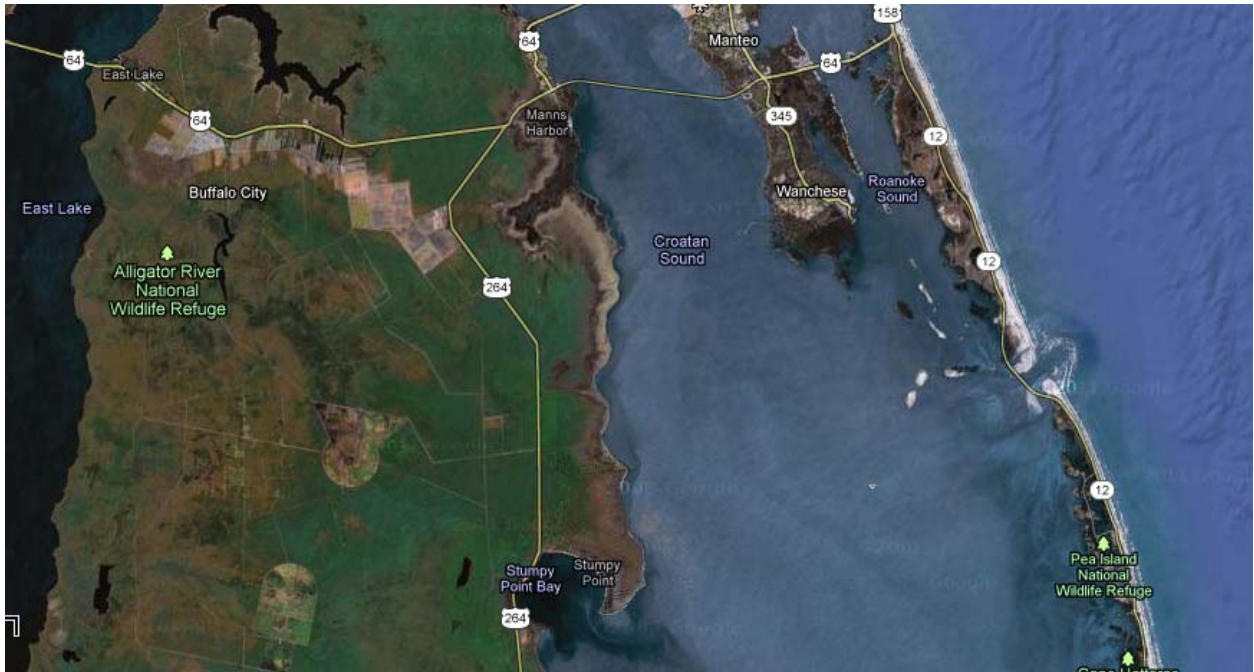


Oregon Inlet Navigation Channel



REPLACEMENT OF THE
HERBERT C. BONNER BRIDGE
AT OREGON INLET, NC

MARINE TRAFFIC ASSESSMENT



PREPARED FOR

HDR ENGINEERING, INC.

BY

RODINO, INC.



APRIL 24, 2012

**REPLACEMENT OF THE HERBERT C. BONNER BRIDGE AT OREGON INLET, NC
MARINE TRAFFIC ASSESSMENT**

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1. USACE Wilmington District Project Area Channel Map
2. Bonner Bridge Project Area

REPLACEMENT OF THE HERBERT C. BONNER BRIDGE AT OREGON INLET, NC

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EXECUTIVE SUMMARY

The State of North Carolina has completed its planning for replacement of the existing Herbert C. Bonner Bridge crossing Oregon Inlet in the Outer Banks region of North Carolina at Dare County. The new bridge, an element of state highway NC 12 will be constructed adjacent to the existing bridge after which the majority of the existing bridge will be removed.

The construction is necessitated by several factors, including deterioration of the existing structure and shifting of coastline features at the site that severely hamper navigation and threaten the long-term viability of commercial and recreational vessel operations in the area. Continuous and unpredictable shoaling causes the channel to shift and often to close as environmental conditions change resulting in severe limitations on the sizes of vessels that can pass the channel at any given time. As a result, many of the commercial fishing vessels in the local fleets have been relocated to other ports and the remaining fleets have suffered severe impacts to their operations. Sport fishing, recreational, and government operations — including those of U.S. Coast Guard and U.S. Army Corps of Engineers units in the area — also suffer from the navigation constraints.

Oregon Inlet and the adjoining sounds are navigable waters of the United States. Construction of a new bridge or causeway or reconstruction or modification of an existing bridge or causeway crossing navigable waters of the United States is subject to issuance of a Bridge Permit by the U.S. Coast Guard (USCG). The location of the bridge, its alignment relative to the navigation channel, and its horizontal and vertical navigation clearances are subject to approval as part of the permitting process. The USCG's primary role is to ensure that the bridge is designed and constructed in such a way that the reasonable needs of navigation are met.

The USCG also considers potential environmental impacts associated with constructing a new bridge and the potential impact that the construction and operation of the bridge would have on marine traffic. The environmental requirements for issuance of a Bridge Permit typically are satisfied by way of an Environmental Impact Statement (EIS) undertaken, as in this case by an EIS and an EA, by the project owner with the USCG as a cooperating agency. Other requirements for issuance of a bridge permit must be satisfied during the permitting process. One of those is an assessment of how the project might impact marine traffic and waterway operations.

As designed, the new bridge will substantially increase the size of the navigation zone at the bridge. It will provide multiple spans suitable for navigation, rather than one span as with the existing bridge, and each of those spans will have horizontal and vertical navigation clearances greater than those of the existing navigation span. The design will allow vessels to pass the

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bridge under a wider range of conditions than at present as the channel shifts by moving the navigation path to the span that has the deepest water at the time. The design clearances meet or exceed those requested by waterway users and the U.S. Army Corps of Engineers whose dredges, which maintain the channel, are the largest vessels that operate at Oregon Inlet.

The new bridge will greatly improve navigation conditions at Oregon Inlet and could open the way for the larger vessels that left the area due to deteriorating channel conditions to return to their local bases.

I. PROJECT BACKGROUND

The Herbert C. Bonner Bridge (Bonner Bridge) crosses Oregon Inlet, a navigable water of the United States, in Dare County, NC. Built in 1962, it is part of NC 12 and provides the only highway connection between Hatteras Island and mainland North Carolina.

The State of North Carolina has determined that the bridge is a necessary part of the state highway system and that the condition of the bridge dictates that it be replaced. Planning for that replacement by the North Carolina Department of Transportation (NCDOT project number TIP B-2500) is essentially complete with construction of a new bridge at the same site expected to begin in late 2012 and be completed in spring 2015. A major portion of the existing bridge will be removed between 2015 and 2016 and 1,050 feet of the bridge on Hatteras Island will be retained as a recreational fishing pier.

Planning for replacement of the bridge includes addressing present conditions that hamper navigation through the inlet in way of the single existing protected navigation span. Continuous, unpredictable shoaling and shifting of the channel severely limit the ability of commercial or recreational vessels to transit through the inlet in that location. As a result, vessel operators frequently attempt to navigate under the bridge at other locations. In almost all cases, the shoaling and highly variable currents create very challenging navigation conditions that often result in vessels grounding on the shoals or alliding with the bridge structure.

II. GENERAL INFORMATION

1. Existing Bridge

The existing bridge has a single protected navigation span with a horizontal clearance of 130 feet and a vertical clearance of 66 feet. Those clearances are adequate for safe navigation of all of the commercial and recreational vessels that have traditionally operated in the area. An adjacent span has a horizontal clearance of 90 feet (vertical clearance was not specified in the report). Bridge approaches have vertical clearances of 17 feet (horizontal clearances were not specified). Clearances, however, are not the limiting factors for navigation.

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The depth of the channel under the navigation span at any given time is the controlling factor, and that depth changes dramatically over even short periods of time in spite of nearly continuous dredging undertaken by the U.S. Army Corps of Engineers (USACE) to try to keep the channel open.

Depending on where deeper water can be found, some vessel operators transit under the bridge at other locations where the vertical clearance is on the order of 20 feet or less and protective fendering is not installed. Such transits are not always successful; groundings and allisions are frequent occurrences.

2. Replacement of the Existing Bridge

NCDOT's project information on the agency's web site includes this statement of purpose: "Provide a replacement crossing that takes into account natural channel migration expected through year 2050 and provides the flexibility to let the channel move. Provide a replacement crossing that will not be endangered by shoreline movement through year 2050."

Because it crosses a navigable waterway, replacement of the bridge is subject to issuance of a Bridge Permit by the U.S. Coast Guard (USCG) under the authority of Section 9 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403) as amended, the General Bridge Act of 1946, and other statutes. The purposes of the legislation are to preserve the public right of navigation and to prevent interference with interstate and foreign commerce. Associated regulatory requirements are in Title 33, Code of Federal Regulations (33 CFR) Subchapter J – Bridges, with permitting addressed in Parts 114 and 115.

The USCG responsibilities include approving the locations and plans for bridges and causeways over navigable waterways. The overarching responsibility is to provide for the reasonable needs of navigation.

In the case of the Bonner Bridge, the USCG process is streamlined by the bridge being a state project. In such cases, authority for construction is presumed without the need to provide proof of that authority. In addition, an Environmental Impact Statement (EIS) has already been completed and the USCG was a Cooperating Agency in the EIS process.

3. USCG Bridge Permit

The USCG publishes guidance on the permitting process in the Bridge Permit Application Guide (Commandant Publication P16591.3C) which was revised and republished on October 17, 2011. The Guide describes the information that the USCG will consider in issuing a permit for a new bridge. Among the issues considered are the potential effects of the project on navigation.

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A comprehensive discussion of the USCG's bridge permitting process, including the Guide and related information, is available via the Internet on the USCG's Bridge Administration web site: http://www.uscg.mil/hq/cg5/cg551/BPAG_Page.asp.

The Guide was revised in October 2011 and now includes a much more detailed list of the information that must be provided with a Bridge Permit application. The required information includes a marine traffic impact assessment.

4. Navigation Clearances

In many cases, the USCG has established minimum horizontal and vertical navigation clearances for individual bridges crossing navigable waterways. Those clearances are published in a Clearance Guide that is available on the USCG web site.

Minimum clearances have not been established for the Bonner Bridge, thus it is up to the bridge owner and designer to propose horizontal and vertical clearances for the new structure.

III. PROJECT RESEARCH

This marine traffic assessment was undertaken to update the information that had been developed very early in the bridge replacement planning, mostly in 1995 and 1996. The primary objectives are (1) to consider marine traffic issues in respect to the design parameters for the replacement bridge, and (2) to consider whether any of the information resulting from the assessment could impact the proposed design or construction plans.

1. General Research Activities

Research into the project plans and needs relative to assessing potential impacts on marine traffic included these major actions:

- a. Reviewing current and historical project information available in HDR project files, including the marine traffic information contained in reports by Parsons Brinckerhoff and others dating as far back as 1995.
- b. Reviewing the material available on the NCDOT web site relative to the project, including the Final EIS and related material.
- c. Reviewing the USCG's revised Bridge Permit Application Guide and the listing of information that is to be submitted with the application relative to marine traffic impacts.
- d. Identifying the USCG offices with jurisdiction over Bridge Permitting and vessel operations in the project area and obtaining pertinent information from key personnel.
- e. Reviewing navigation charts and related information, including:
 - NOAA Chart 12204 Currituck Beach Light to Wimble Shoals
 - NOAA Chart 12205 FOLIO SMALL-CRAFT CHART Cape Henry to Pamlico Sound,

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Including Albemarle Sd.; Rudee Heights

- United States Coast Pilot 4, Atlantic Coast: Cape Henry to Key West (2011)
 - Various channel maps and other graphics available on the web site of the USACE Wilmington District
 - Maps and graphics available on the web site of the NCDOT
 - Maps and Graphics available on the web site of the Cape Hatteras National Seashore
 - Aerial photographs with annotations available via Google Earth
- Some of those materials, along with a wide range of very similar materials, are already included in the project records.

- f. Identifying marine-related facilities within 3 miles of the project site and the types of vessel traffic associated with them and contacting key individuals.
- g. Reviewing information available on the web site of the Dare County Oregon Inlet and Waterways Commission which was created by the Dare County Board of Commissioners in 1983 to oversee county dredging projects and waterways related issues; primarily economic data.
- h. Reviewing information available to the public via Internet searches and general information web sites such as OuterBanksVoice.com.
- i. Contacting local people with knowledge of the project and the area.

2. Persons Contacted

a. Fifth Coast Guard District Bridge Branch, CCGD5 (dpb), Portsmouth, VA

Mr. Jim Rousseau, Project Officer for the Bonner Bridge project (757-398-6629)
11/21/11; 12/13/11

- Confirmed that under the new guidelines, USCG is asking for more information to be provided with the application than in the past
- Evaluations of vessel traffic analyses and navigation impact assessments can be reviewed earlier in the process
- The new procedures should shorten the overall permitting timeframe
- Very familiar with the project and its history
- CCGD5 does not have a database of local issues related to the project
- CCGD5 does not have a database of record of the allision history at the bridge; some information on specific incidents is available on line and some will be available from USCG Sector Wilmington

b. Coast Guard Sector Wilmington, NC

CDR Steve McGee, Chief, Prevention Branch (910-772-2225)
12/14/11

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- Sector Wilmington is USCG operational command with oversight of the project area
- Sector field units in the project area are Station Oregon Inlet, located near the Oregon Inlet Bridge and an Aids to Navigation Team at Wanchese
- USCG vessels range from 26' to 55' and face the same navigation challenges as commercial and recreational vessels
- USACE survey boats based at Wanchese face the same challenges
- Largest group of waterway users are the commercial fishing vessels; no other commercial operations (towing industry, etc.) in the area; largest vessels are on the order of 100' long
- Sport fishing and recreational boats are the other major user group
- Several small yards in the Wanchese-Manteo building commercial fishing and sport fishing boats up to about the 60' classes
- Long history of navigation problems at the inlet due to channel conditions
- On two occasions in recent years, most recently spring 2011, the USCG Sector Commander/ Captain of the Port (COTP) considered establishing a Regulated Navigation Area (RNA) to restrict vessel operations due to extreme shoaling conditions; in both cases conditions improved before action was necessary.
- Most of the larger commercial fishing vessels have been relocated to Virginia; after steady and substantial growth in fishing activity and fleet size in the mid-2000s, the fleet size and number of active fishing operations in the area has fallen to a level equivalent to that in the mid-1990s but with smaller vessels; the change in fleet size in the past two years has been "dramatic"
- Allisions are frequent and the rate is high; probably much higher than the number of incidents reported by vessel operators; generally allisions involve only minor damage to vessels
- Allisions occur at both the protected navigation span and adjacent spans as vessel operators look for clear paths under the bridge
- Current, typically 5 – 7 knots and higher under some conditions is a major factor
- Navigation problems are exacerbated during ebb tide conditions
- Shoaling on the north side of the inlet most strongly affects the direction of current flow which in turn dictates the orientation of a vessel relative to the channel; vessels often end up "crabbing" at an extremely angle which adversely affects maneuverability
- Shoaling inside the bridge necessitates extreme turns in rapid succession to avoid bars and shoals that build up very quickly and then shift quickly

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c. Oregon Inlet Fishing Center, NC

Ms. Affie Machie (pronounced “macy”), Assistant Manager (252-441-6301)

12/13/11

- The Center is a concession of the Cape Hatteras National Seashore
- Located approximately 2 miles north of Oregon Inlet near the Oregon Inlet Bridge, it is the only marina within 3 miles of the project site (the USCG requires that operations within 3 miles of the project be evaluated)
- There are several other marinas in the Wanchese and Manteo areas
- Boats operating from all of them are generally of the same types and sizes, with these being typical:
 - 27' inshore sport-fishing vessels
 - 34' - 45' near-shore sport-fishing vessels
 - 45' - 60' offshore sport-fishing vessels
- The inshore boats operate primarily in the sounds and are not dependent on passage through Oregon Inlet
- Operations of the larger vessels are constrained by shoaling conditions
- Vessel operations are adversely affected by the shoaling; vessel and marina operators support the bridge replacement project
- Recommended the OuterBanksVoice.com web site as a source of local comments on the bridge project
- Provided a point of contact for commercial fishing operators in the area

Ms. Minta Meekins, Manager (252-441-6301)

12/22/11

- Approximately 45 commercial boats operate out of that marina
- A total of approximately 200 boats operate from all of the marinas in the area
- The overall number of boats is larger than in past years; however, many of those are smaller, outboard-motor-propelled vessels

d. Moon Tillett Fish Company

Mr. Billy Tillett, Co-Owner (252-473-2323)

12/14/11

One of the three largest commercial fishing operators in the region; all three are based in Wanchese. Other operators are based in Wanchese and Manteo. All are on the order of 6 to 7 miles north of Oregon Inlet.

- Local fleets consist of a mix of gill net / long-line fishing vessels and trawlers

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- Gill-net/long-line boats range in length from 30' to 50', with most approximately 40' long; drafts typically are 4'-5' light, as much as 7' loaded; typically go out and return daily except when shoaling conditions are extreme
- The larger boats that used to operate in the area (as described in previous project reports) have moved to Virginia due to the shoaling problems; some operators have shifted their entire fleets out of the area
- Trawlers remaining generally are 70' – 100' long; drafts vary with design, generally are 7'-12' light and 11'-13' loaded; the difference in draft between light and loaded conditions is less for the larger boats than for the smaller ones
- Vessel operators never know from day to day if the boats can get out of port or back in via Oregon Inlet
- Shoaling creates many restrictions for the larger boats; shallower water means boats have to be lightly loaded to reduce draft; reduced cargo tonnage in relation to trip time and expense
- The only alternative route to sea is to run the AIWW to Beaufort; long, difficult transit; round trip distance is on the order of 230 miles and takes about 24 hours
- Length of outriggers and their position during transit determines the effective width and height of a commercial fishing vessel during transit; outriggers typically are in the up position during transit; small vessels, overall height approximately 55'; larger boats, 65' – 75' is typical, especially with extensions in place when shrimping
- His boat is 84' long; drafts 8.5' - 9' light, 11' - 12' loaded; with extensions in place and outriggers down, overall width is ~ 140'
- Commercial fishing operators support the project
- The proposed vertical clearance of 70 feet is adequate
- The proposed horizontal clearance of greater than 275 feet is better than what is there now, but vessel operators would like to see it even wider
- Navigation challenges at present are significant; changes in channel alignment and shoaling inside the bridge are the greatest concern; with each change, vessel operators have to run in areas that they have not run in before, currents are different each time
- Constantly changing conditions are more than some of operators care to put up with; not knowing from day to day if they will be able to operate is why so many have moved north

IV. FINDINGS

1. General

With respect the historical records and project documents, specific information on vessel traffic issues is rather limited. While it is clear that one of the project goals is improving

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navigation access for vessel operators in the area, the EIS and related materials do not address vessel traffic specifically.

Reports prepared by Parsons Brinckerhoff in the mid-1990s do address navigation and vessel traffic issues. It appears that the navigation conditions described in those earlier reports were not as restrictive as at present and that the local commercial fishing fleets had more and larger vessels than at present.

Other than the worsening navigation conditions and changes in fleet make-up, conditions at present are essentially the same as those previously documented.

There is no indication that the new bridge would result in new maritime business for the project area. There is, however, reason to believe that the larger commercial fishing vessels that have been relocated to other ports will return to their operating bases in the Wanchese-Manteo area once the navigation situation improves.

2. Existing Navigation Channel

A Federal project authorizing a navigation channel through Oregon Inlet to be maintained by the USACE was established in 1950. The authorization provided for the 400-foot wide, 14-foot deep Oregon Inlet Channel as well as ancillary channels leading from inside the inlet to Pamlico Sound, Roanoke Sound, and the Wanchese and Manteo areas. In spite of an extremely ambitious dredging program pursued by the USACE, the channel constantly and unpredictably shifts and shoals, severely hampering navigation.

The Atlantic Intracoastal Waterway (AIWW), which runs north-south from Norfolk, VA to Miami, FL, crosses Albemarle Sound north on the project area. It follows the Alligator River on the west side of Dare County to the Alligator-Pungo Land Cut and eventually to Beaufort Inlet approximately 100 miles south of the project area. The AIWW has a project depth of 12 feet and a project width of not less than 90 feet along its length and provides the only alternate route to sea from Oregon Inlet.

3. Currents

The Coast Pilot notes that tidal currents in the inlet area are reported to be on the order of 5 knots most of the time, increasing to 6 to 8 knots with southeasterly winds.

Current direction and velocity sometimes require that vessels transit at speeds up to 10 knots through the water to maintain steering control. Current is the element that most affects navigation.

The sources contacted indicate that current direction and velocity in the vicinity of the inlet and the existing navigation span are highly variable and generally unpredictable. The current reportedly changes not only with wind and sea conditions but also with the

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constantly changing shoaling conditions. Navigation reportedly is more challenging on an ebb tide than on a flood.

4. Existing Bridge

The protected navigation span of the existing bridge has a horizontal clearance of 130 feet and a vertical clearance of 66 feet. An adjacent span has a width of 90 feet; other spans have varying widths and heights.

USACE correspondence (described in detail below) in the past noted that the 66-foot clearance necessitated that the masts on some of the dredges be lowered in order for the dredges to pass the bridge. The largest dredge in use at present has a height of 65 feet, about equal to the existing vertical clearance of 66 feet, which poses challenges to passing under the bridge under some environmental conditions.

There is nothing in the record to indicate that waterway users other than the USACE have found the existing clearances to be inadequate when the channel is passable. There is no record that the USCG has determined that the existing clearances are inadequate for navigation or that the bridge — again, when the channel is passable — presents an unacceptable impediment to navigation.

5. Vessel Traffic

Vessel traffic consists of commercial fishing, sport fishing, and recreational vessels up to approximately 100 feet long. There are no commercial towing or marine industrial operations in the project area.

The numbers of vessels operating in the project area, especially commercial fishing vessels, are lower than in past years due to the worsening shoaling conditions. The size of the commercial fishing fleet has declined substantially in the past two years alone as the larger vessels have been moved to ports in Virginia. In addition, the remaining vessels often must operate at reduced drafts which limits the weight of fish they can carry on a given voyage.

Vessel drafts for the current fleet range from 4 feet to as much as 13 feet depending on vessel size and loading condition. If it were not for the continuous and unpredictable shoaling, all of those vessels could operate at will in the 14-foot project depth channel.

The largest vessels operating near the bridge are self-propelled hopper dredges engaged by the USACE for maintenance of the channel. The largest dredge presently engaged at Oregon Inlet is 197 feet long, 47 feet wide, with a maximum draft of 14.3 feet. Its air draft, i.e. height above the waterline, is 65 feet, nearly the same as the 66-foot vertical clearance of the existing navigation span, which could impose restrictions on passing the bridge under some conditions. That vessel is being used as the design vessel for certain aspects of the replacement bridge design. A number of smaller dredges, including non-self-propelled

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pipeline dredges, are also employed. The non-self-propelled dredges are attended by tugs with typical lengths of 50 feet and beams of 16 feet. Other vessels working with the dredges such as work barges have dimensions that fall between those of the dredges and the tugs.

6. Allision History

There is no readily quantifiable allision history for the Bonner Bridge. Commercial towing vessels do not operate in the Oregon Inlet so the bridge was not included in the *Coast Guard – AWO [The American Waterways Operators] Bridge Allision Work Group Report (May 21, 2003)*. The Fifth Coast Guard District Bridge Branch does not maintain a database of bridge allision reports.

The USCG Sector Wilmington office does maintain records of bridge allisions that are reported, but there is no searchable database and the USCG staff believes that only a relatively small percentage of allision incidents (on the order of 25% - 30%) are reported by vessel owners. Anecdotal evidence indicates that the frequency of allisions is high, especially when the navigation span is not passable and vessel operators look for alternate paths. That evidence also indicates that the magnitude of the damage to boats involved and to the bridge structure is minor.

7. Recommended Navigation Clearances

Correspondence from the USACE and the USCG addressing navigation clearances for the replacement bridge was found in several places in the project files.

- a. In a letter dated July 19, 1990, the USACE Chief of Navigation for the Wilmington District addressed the clearances necessary to allow dredges to pass the bridge. He stated the minimum vertical clearance necessary is 75 feet and the minimum horizontal clearance is 200 feet (75'V, 200'H).
- b. In a letter dated October 18, 1990, the USACE noted that the hopper dredges that maintain the Oregon Inlet channel can pass under the existing 66-foot navigation span only if they lower sections of their masts and that ocean-certified pipeline dredges cannot pass under the span because of the height of their spuds. The largest hopper dredge, NORTHERLY ISLAND (length 205 feet, beam 48 feet) was the design vessel used for the project at that time.
- c. In a letter dated November 26, 1996 the Chief of the USCG Bridge Administration Section for the Fifth Coast Guard District stated that the USCG had determined that clearances of 200 feet horizontal and 75 feet vertical would accommodate current and future navigation needs.
- d. The same clearances are addressed in the EIS where the discussion of the Preferred Alternative similarly notes that those clearances would satisfy project criteria for navigation.

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- e. Material in the PB reports and elsewhere in the project file indicates that the replacement bridge would provide those clearances, i.e. 200 feet horizontal and 75 feet vertical.
- f. Information provided by NCDOT during the course of this assessment shows that the USACE subsequently revised its determination of the minimum required navigation clearances. A USACE Wilmington District letter dated September 18, 2008 noted that the height of each navigation span should be 70 feet above Mean High Water. That change was predicated on identification of a different design vessel. The dredge ATCHAFALAYA with dimensions of 197 feet by 47 feet is smaller than the original design vessel and has a height of 65 feet. The requested vertical clearance of 70 feet includes an allowance for wind and wave action.
- g. No other correspondence from USACE, USCG, or NCDOT addressing minimum clearances was found in the available files.
- h. The final design parameters for the new bridge are stated in this excerpt from the Project Details section of the NCDOT Final Request for Proposals dated June 7, 2011:

“The Department has coordinated with the USACE and the USCG in the determination of the navigation zone required for this bridge as noted herein. A minimum 2400 ft. long navigation zone shall be provided along the Design-Build Team's alignment and shall be as depicted on the USACE Oregon Inlet Map dated April 1, 2011 provided by the Department. Throughout this navigation zone, the bridge shall be designed and constructed to provide minimum 200 ft. horizontal clearances and 70 feet vertical clearance above Mean High Water (MHW). Upon establishment of final alignment and grade, the Design-Build Team shall obtain concurrence from the USACE that the provided navigation zone is consistent with that shown on the aforementioned map. For spans in non-navigational zones, the vertical clearance shall be 22 feet above MHW except at both ends of the structure...”

8. New Bridge Location

The new bridge will be located just inshore of the existing bridge. The new structure will be approximately 45 feet west of the existing bridge at Hatteras Island to the south and approximately 75 feet west at Bodie Island, with a maximum distance of 190 feet to the west in the Oregon Inlet.

9. Proposed New Bridge Dimensions

The design parameters for the new bridge meet or exceed the minimum dimensions specified by NCDOT.

The new bridge will have a total length of approximately 14,800 feet with a navigation zone of 2,450 feet. Natural water depths in the navigation zone are expected to range from 12

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feet to 14 feet at Mean High Water (MHW) based on the approximate existing ground line. The datum reference for MHW is +0.4 feet; for Mean Low Water (MLW) it is -0.5 feet.

There will be seven spans within the navigation zone, each with dimensions of 350 feet center-to-center for the bents (transverse support frames) and piers. The horizontal navigation clearance will be greater than 275 feet at each span. The multiple spans will allow vessel traffic to shift within the navigation zone as the channel shifts and the deep water location changes. The design also will provide navigation lighting that can readily be moved to mark the individual span that is best suited for navigation at any given time.

The minimum vertical clearance to the superstructure low chord will be 70 feet referenced to MHW.

V. MARINE TRAFFIC ASSESSMENT

The U.S. Coast Guard now requires that the application for a Bridge Permit include specific information on the nature of marine activities in the project area and how those activities will be affected by the project. The information that must be considered includes length of the bridge, vertical and horizontal clearances, waterway characteristics, waterway usage, and potential long term navigational impacts.

1. Required Elements of the Assessment

The USCG Bridge Permit Application Guide lists a number of issues to be addressed in the application. Those issues and a brief statement of their applicability to the marine traffic assessment for the Bonner Bridge project follow. Certain issues are discussed in more detail later in this report.

- a. *The name and contact information for marine facilities within a 3-mile radius of the project: public boat ramps, marinas, major docking facilities, boat repair facilities, etc.* This information is included in the assessment. There is just one marina within 3 miles of Oregon Inlet.
- b. *The approximate width of the waterway at the proposed bridge location (bank to bank, shoreline to shoreline, etc.).* In this case, the effective width of the waterway is the 2,450-foot navigation zone.
- c. *The depths of the waterway at the proposed bridge location in and around the navigation channel.* This information is already in the record; depths within the navigation zone are expected to be 6 feet to 31 feet, with 12 feet to 15 feet at the current active span on the existing bridge. Enhancing navigability by overcoming depth limitations associated with extreme and unpredictable shoaling is a major objective of the project.
- d. *A description of vessels on the waterway that are engaged in emergency operations, national defense activities, or channel maintenance, and any potential impacts to their operation.* USCG boats are based at Station Oregon Inlet and at Wanchese.

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USACE survey vessels are based in Wanchese. They are subject to the same navigation challenges as commercial and recreational vessels and will enjoy the same benefits as other vessels when navigation conditions are improved.

- e. *Information regarding whether the Corps of Engineers has completed or plans to complete a federal navigation project on this waterway.* The Oregon Inlet Channel is a Federally-maintained project.
- f. *A description of the present and prospective recreational navigation on the waterway, indicating whether the proposed project will have an impact on the safe, efficient movement of any segment of the present or prospective recreational fleet operating on the waterway.* The recreational fleet consists primarily of small trailer-launched boats. No specific numbers are available. Due to their small sizes and mobility, those vessels are less affected by present shoaling conditions than are larger commercial vessels.
- g. *A description of the present and prospective commercial navigation and the cargoes moved on the waterway, indicating whether the proposed project will have an impact on the safe, efficient movement of any segment of the present or prospective commercial fleet operating on the waterway.* Commercial traffic is almost exclusively related to commercial and sport fishing. Navigability conditions for those vessels will be greatly improved with the project.
- h. *Whether the proposed bridge will block access of any vessel presently using local service facilities.* The new bridge will not block any access. To the contrary, it will greatly enhance access for the existing fleet and allow for larger vessels than at present to pass the bridge if water depth allows.
- i. *Whether alternate routes bypassing the proposed bridge are available for use by vessels unable to pass the proposed bridge.* The only practicable alternate route, as at present, is via the Atlantic Intracoastal Waterway to Beaufort, NC more than 100 miles to the south. Ocean access north of the inlet via the AIWW is a much longer trip.
- j. *A description of any local harbor, indicating whether the bridge will prohibit the entry of any vessels to the local harbor refuge.* There are no such restrictions with the project. To the contrary, the range of conditions under which vessels can pass the bridge will be greatly increased.
- k. *Whether the proposed bridge will be located within one-half mile of a bend in the waterway.* This condition does not apply to the project area.
- l. *Whether there are factors located within one-half mile of the proposed bridge which would create hazardous passage through the proposed structure and a description of each factor.* There are no such factors.
- m. *Whether local hydraulic conditions increase the hazard of passage through the proposed bridge and a description of these conditions.* Compensating for local hydraulic conditions is one of the driving forces behind the project. The effects of

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variable flow and current conditions will be greatly reduced by the much larger navigation zone that is part of the project.

- n. *Whether atmospheric conditions increase the hazard of passage through the proposed bridge and a description of these conditions.* Such is not the case. The new bridge will allow for much improved navigation conditions that will allow vessels to transit under a wider range of environmental conditions than at present.
- o. *A description of guide clearances established for the waterway, if applicable. If not, indicate whether clearance gauges are needed and why.* Guide Clearances have not been established for the waterway and are not necessary. Clearance gauges are not necessary. The new bridge clearances will be greater than at present.
- p. *A description of any other factors considered necessary for the safe, efficient passage of vessels through the proposed bridge.* None have been identified by any waterway user or regulatory body.
- q. *A description of the impacts to navigation caused or which could be reasonably caused by the proposed bridge including but not limited to proposed construction methodology and any proposed mitigation to all unavoidable impacts to navigation.* There are no adverse impacts. To the contrary, the bridge design will greatly improve navigation conditions. As a result, it can be anticipated that at least some of the vessels which have been forced to relocate to more accessible ports will be returned to facilities in the project area. Likewise, it can be anticipated that some facilities that have closed due to access limitations will be reactivated once their vessels can again reach port.

Overall, the marine traffic assessment for this project is straightforward due to the limited nature of vessel operations in the project area and the long history of project planning and assessment. In addition, there is no question that a key objective of the project is to expand the navigation zone in such a way that the current and historical fleet vessels will be able to pass under all reasonable operating conditions.

2. Navigation in the Project Area

Marine traffic in the area consists of commercial fishing, sport fishing, and recreational vessels and the dredging equipment that maintains the channel.

There is nothing in the project history that indicates that the volume of vessel traffic was a hindrance to navigation in the area. Generally, even relatively large numbers of small vessels can operate effectively in such areas without conflict because of the variations in their operating schedules, ease of coordination, short transit distances, and other factors. In addition, the volume of marine traffic at present is significantly lower than in past years.

Navigation is influenced primarily by the condition of the Oregon Inlet Channel. The extreme shoaling and continuously changing channel and current conditions present the

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only serious impediment to navigation. The presence of a single protected navigation span with sufficient height for large vessels is the major limiting factor as the channel shifts.

3. Minimum Recommended Clearances Provided or Exceeded

The minimum clearances requested by the USACE and specified by NCDOT in its request for project proposals are 200 feet horizontal and 70 feet vertical through a navigation zone of at least 2,400 feet. All of those minimums are met or exceeded in the bridge design:

- a. The navigation zone will be 2,450 feet.
- b. There will be 7 spans suitable for navigation, each with horizontal and vertical clearances of greater than 275 feet and 70 feet, respectively.
- c. The design will facilitate navigation under a wider range of conditions than at present for the full range of vessels that currently or in the past have used Oregon Inlet.
- d. Assuming that water depths are adequate and environmental conditions (wind, current, etc.) are suitable, the greater than 275-foot horizontal clearance could allow for two-way traffic for many of the vessels that operate in the area

4. Alternatives Analysis Not Undertaken

No evaluation of potential alternatives to the proposed design was undertaken, nor is such considered necessary for this assessment. Alternative designs were addressed in the EIS and review processes.

5. Impacts on navigation

Compared to the existing bridge and navigation conditions, the replacement bridge design provides several positive impacts:

- a. Larger effective navigation zone.
- b. Multiple spans that will accommodate traffic as the channel location shifts.
- c. Greater horizontal and vertical clearances with those clearances provided at all seven spans.
- d. Greater flexibility in maintenance dredging activities.

No potential negative impacts have been identified.

The new bridge will enhance the navigability of Oregon Inlet and will eliminate the existing constraints on navigation that result from the combination of a relatively small navigation zone, a single navigation span, and continuously changing channel conditions.

6. No Impacts on the Design

The marine traffic and navigation assessments did not identify any issues that would indicate that changes in the bridge design are necessary.

VI. MARINE TRAFFIC MANAGEMENT DURING CONSTRUCTION AND DEMOLITION

Other than bridge design, the issue that will get the most attention will be management of the construction and demolition in such a way that adverse impacts on marine traffic are minimized. It is to be expected that the USCG will require that the construction process and schedule be planned, coordinated, and managed so that the impacts on marine traffic are known to waterway users and marine interests in advance and that navigation is not unreasonably restricted. Similar actions will be necessary when demolition of the existing bridge is undertaken.

Marine constructors routinely coordinate with local USCG field commanders to develop procedures for traffic management, coordination of notices to waterway users, public outreach activities, and waterway issues in general. USCG Sector Wilmington and its sub-unit at USCG Station Oregon Inlet will have operational oversight for the project area.

1. Vessel Traffic Management

Vessel traffic management typically is handled by the bridge constructor directly or through a third party contracted for that purpose. Traffic management activities should include early and continuous coordination with the local USCG operational commands so that critical information can be published in Notices to Mariners and, when appropriate, in local information broadcasts.

The constructor should plan on having personnel available at the project site to communicate with approaching vessels and to facilitate moving equipment when necessary to allow vessels to pass. This will necessitate advance planning on matters such as radio frequencies to be used and telephone numbers for receipt of inquiries.

2. Proximity to the Existing Bridge

The greatest challenge to navigation during the life of the project will stem from the new bridge being constructed in close proximity to the existing bridge. The new structure will be approximately 45 feet west of the existing bridge at Hatteras Island to the south and approximately 75 feet west at Bodie Island, with a maximum distance of 190 feet to the west in the Oregon Inlet.

In addition to the usual factors affecting navigation, vessel operators will have to consider the nature of work in progress, the locations of construction equipment in the waterway, and eventually the existence of two sets of bridge structures being in place for some period

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of time when planning their transits. This situation emphasizes the need for early and continuing communications between the constructor and the marine community.

3. Temporary Closures of the Waterway

Oregon Inlet is a navigable water of the United States as defined in various statutes. Once a waterway is determined to be navigable, the definition is permanent unless specific agency action is taken to change the classification. Temporary closure of the waterway due to shoaling, lack of maintenance dredging, other blockage, or USCG regulatory action does not change the classification.

Waterways rarely are "closed" to navigation by fiat, and when they are the closure usually is temporary and for cause. If it's a Federal channel, as at Oregon Inlet, only the USCG (in the vast majority of cases) acting under Captain of the Port authority can close it for navigation purposes.

The USCG Sector Commander/Captain of the Port (COTP) at Wilmington has considered closing the Oregon Inlet Channel to navigation twice in recent years, both times due to extreme shoaling. The most recent event was in spring 2011. In both cases the closure was to be effected through establishment of a Regulated Navigation Area (RNA) wherein individual vessel operators would have had to obtain specific USCG COTP authorization for transit through the regulated area. In both cases, the shoaling conditions changed quickly, eliminating the need for USCG action.

It is important to note that in most cases, vessels — whether commercial or private — are not required to operate only in designated or maintained channels. Channels are provided to facilitate navigation and give the vessel operator some assurance that a certain depth of water is available. Only in areas where specific regulatory provisions such as Traffic Separation Schemes or RNAs are in place are vessels required to operate within defined lanes. Vessel operators at Oregon Inlet who choose to pass under the Bonner Bridge at locations other than the protected navigation span may do so at will; however, they retain full responsibility for the safety of their vessels, crews, passengers, and public and private property that could be impacted by their actions. The USCG COTP authority extends to all waters within the project area, so a RNA could, if necessary, prohibit any vessel from attempting passage anywhere within the project area unless specific approval is obtained in advance.

It is reasonable to expect that the USCG COTP may find occasion to restrict marine traffic at the project site during the course of construction and demolition. Temporary closures or other measures can be implemented as needed to address specific navigation conditions and also to facilitate work at the site when circumstances warrant.

It also is reasonable to expect that the USCG COTP will establish a RNA, mostly likely in the form of a Safety Zone, as a step toward avoiding adverse interactions between normal waterway activities and construction operations. A Safety Zone rule provides a mechanism

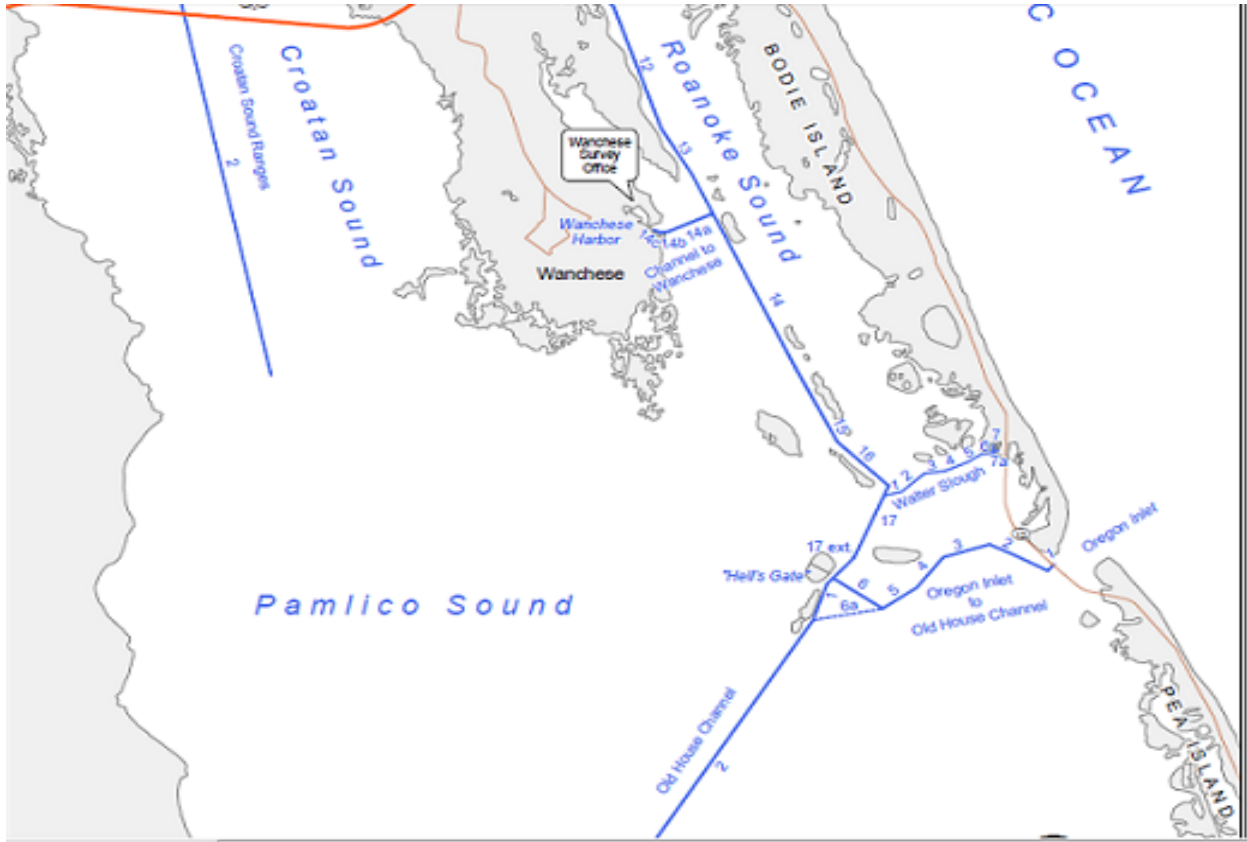
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for facilitating public awareness of unusual activities on the waterway as well as a tool for enforcing navigation safety measures.

VII. CONCLUSION

The marine traffic assessment for the Bonner Bridge shows that the new bridge as designed will provide for significantly improved navigation conditions at Oregon Inlet. The new bridge will provide for a much larger navigation zone, multiple spans to allow navigation to continue as shoaling occurs and the channel shifts, and greater navigation clearances at each span than at the present bridge. The new bridge will support current and historical levels of commercial vessel operations and reasonably predicted future vessel activities. There will be temporary impacts on navigation during the construction phase and later during demolition of the existing bridge, but those can be effectively managed and mitigated through public outreach and local coordination. There are no long-term negative impacts associated with replacement of the bridge.

ATTACHMENT 1: USACE WILMINGTON DISTRICT PROJECT AREA CHANNEL MAP



ATTACHMENT 2: BONNER BRIDGE PROJECT AREA

