



STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

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GARLAND B. GARRETT JR.
SECRETARY

November 8, 1995

Mr. Charles Jones
N. C. Division of Coastal Management
P. O. Box 769
Morehead City, North Carolina 28557

Dear Mr. Jones:

Subject: Carteret County, Extension of Bridges Street between Arendell Street and NC 24,
in Morehead City; TIP No. U-2226, State Project No. 9.8022831

The North Carolina Department of Transportation proposes to extend Bridges Street (2.9 miles) in Morehead City between Arendell Street and Country Club Road east of NC 42 (see enclosed site map). This new four lane 52 foot roadway will be adjacent to the North side of the Atlantic and East Carolina Railroad.

Find enclosed a copy of the CAMA Permit application, drawings, proposed Mitigation Plan and copy of the fee check for the above referenced project. As the application indicates, the project will result in impacts to 2.84 acres of wetlands and 0.22 acres of surface waters at six sites along the current alignment. The impacts to wetlands include 1.02 acres of brackish marsh (sites III and V) which are adjacent to two tributaries of Peletier Creek and 1.82 acres of bottomland hardwood forest. The drainage of this creek is to the south under US 70 eventually discharging into Bogue Sound.

Construction of bridges at Sites III and V was evaluated. It was determined that this alternative would add an additional 1.2 million dollars to the project. Therefore, it was concluded that bridging of these sites would not be economically feasible.

As a result of the above mentioned unavoidable impacts, NCDOT is proposing mitigation on two intertidal islands within Bogue Sound to compensate for these impacts. The proposed mitigation areas are located approximately 3,500 feet south of the terminus of the project. The



enclosed mitigation plans discusses our proposal to plant approximately 6 acres of these two islands with smooth cordgrass (Spartina alterniflora).

As a result, NCDOT is requesting that the proposed work be authorized under a Coastal Area Management (CAMA) Permit. By copy of this letter we are requesting a review and issuance of a 401 Water Quality Certification from the NC Division of Environmental Management and Section 404 and Section 10 Permits from the US Army Corps of Engineers. If you have any questions regarding this request, please do not hesitate to call Scott P. Gottfried at 919-733-3141, Ext. 307.

Sincerely,



H. Franklin Vick, P.E., Manager
Planning and Environmental Branch

HFV/plr

Enclosures

cc: Mr. Scott McClendon, COE
Mr. John Dorney, DEM
Mr. Don Morton, PE, Highway Design Branch
Mr. A. L. Hankins, PE, Hydraulics
Mr. John Smith, PE Structure Design
Mr. Rick Shirley, Division 2 Division Engineer

Mitigation Plan

North Carolina Department of Transportation
Raleigh, North Carolina
Bridges Street Extension, Morehead City
TIP Project Number U-2226
Carteret County

Prepared By:
Permits and Wetland Mitigation Unit
Planning and Environmental Branch

November, 1995

1.0 INTRODUCTION

1.1 Description of Proposed Project

The North Carolina Department of Transportation (NCDOT) proposes to extend Bridges Street (SR1176) in Morehead City from near its present intersection with Arendell Street (US 70) west-northwestward to the intersection of NC 24. The cross-section of the proposed project is a four lane, 52-foot wide roadway with curb and gutter on both sides; its length is approximately 2.9 miles. The alignment of the project is north of and generally parallel to the tracks of the Atlantic and East Carolina Railroad (formerly the North Carolina Railroad). The environmental impacts of the project were reviewed in the Natural Resource Technical Report (NCDOT 1990) and the State Environmental Assessment (NCDOT 1991). These documents addressed several alternate corridors, including a no-build option. A Finding of No Significant Impact for the proposed project was issued in 1994 (NCDOT 1994).

1.2 Methodology

Natural communities and anthropological resources of the preferred corridor (Alternate 2) were inventoried during site visits in the spring of 1990 by NCDOT personnel (NCDOT 1990). Additional investigations of the site were conducted through a search of the literature and other pertinent resources. Wetlands were delineated using the parameters provided in the "Corps of Engineers Wetland Delineation Manual (87 Manual)" (DOA 1987). This delineation was verified by the US Army Corps of Engineers in August, 1994.

During the summer and fall of 1993, NCDOT and Division of Coastal Management (DCM) personnel initiated a search for potential wetland mitigation sites to compensate for unavoidable impacts to existing wetlands resulting from the proposed project. The initial suggestion was to plant smooth cordgrass on two islands in Bogue Sound. However, other mitigation measures were discussed and investigated, including expansion of the impacted marsh, excluding horses from and revegetating portions of Shackelford Banks, or restoring portions of the Open Grounds Farm. After evaluation of these and other measures, DCM and NCDOT personnel agreed on a plan to expand an area of intertidal salt marsh on unvegetated portions of two islands in Bogue Sound to mitigate the proposed project's wetland impacts (Figures 1, 2A, and 2B).

2.0 Impacted Wetland Resources

A total of 2.84 acres of wetlands and 0.22 acres of surface waters will be impacted by the construction of the Bridges Street Extension. The impacted wetlands consist of 1.02 acres of brackish marsh dominated by black needlerush (*Juncus roemerianus*). Other species present in lesser amounts are giant cordgrass (*Spartina cynosuroides*), saw grass (*Cladium jamaicense*), cat-tail (*Typha latifolia*), and saltmeadow cordgrass (*Spartina patens*). Under the wetland classification system utilized by the United States Fish and Wildlife Service (Cowardin *et al.* 1979), this habitat is classified as E2EM1P (Estuarine Intertidal Emergent Persistent Irregularly

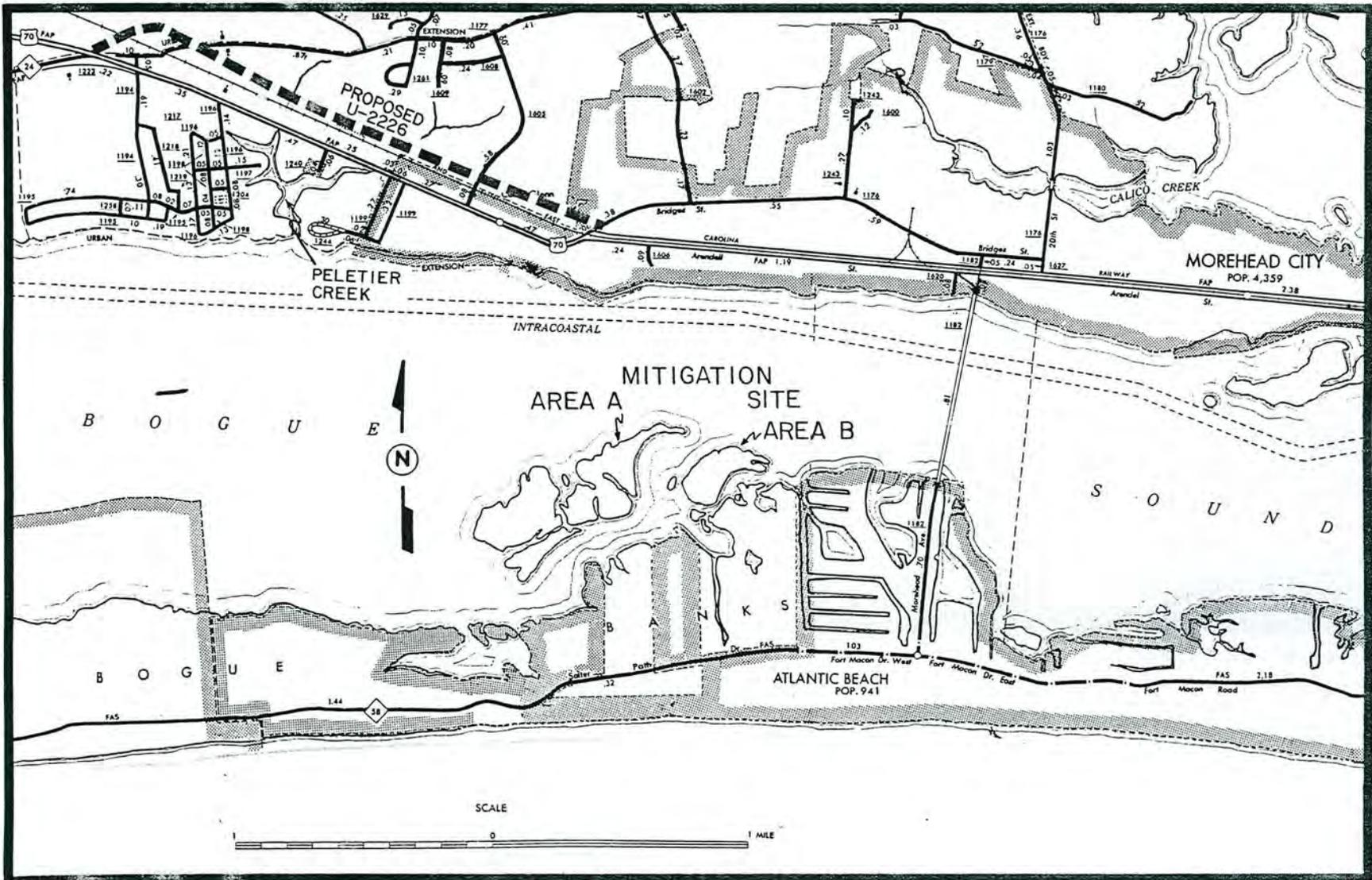


Figure 1. Location of Mitigation Site for TIP Project Number U-2226, Carteret County

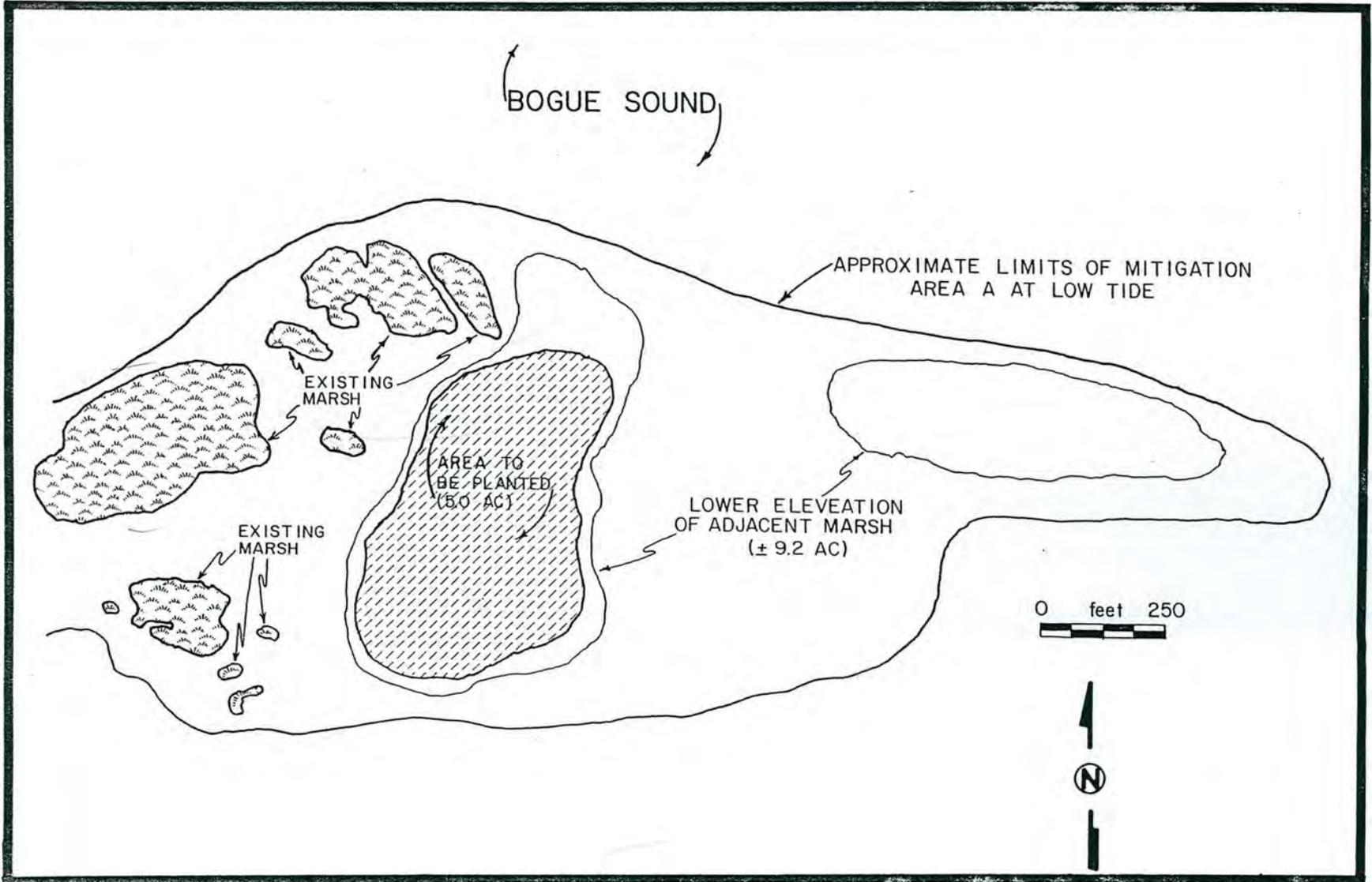


Figure 2A. Mitigation Area A for TIP Project Number U-2226, Carteret County

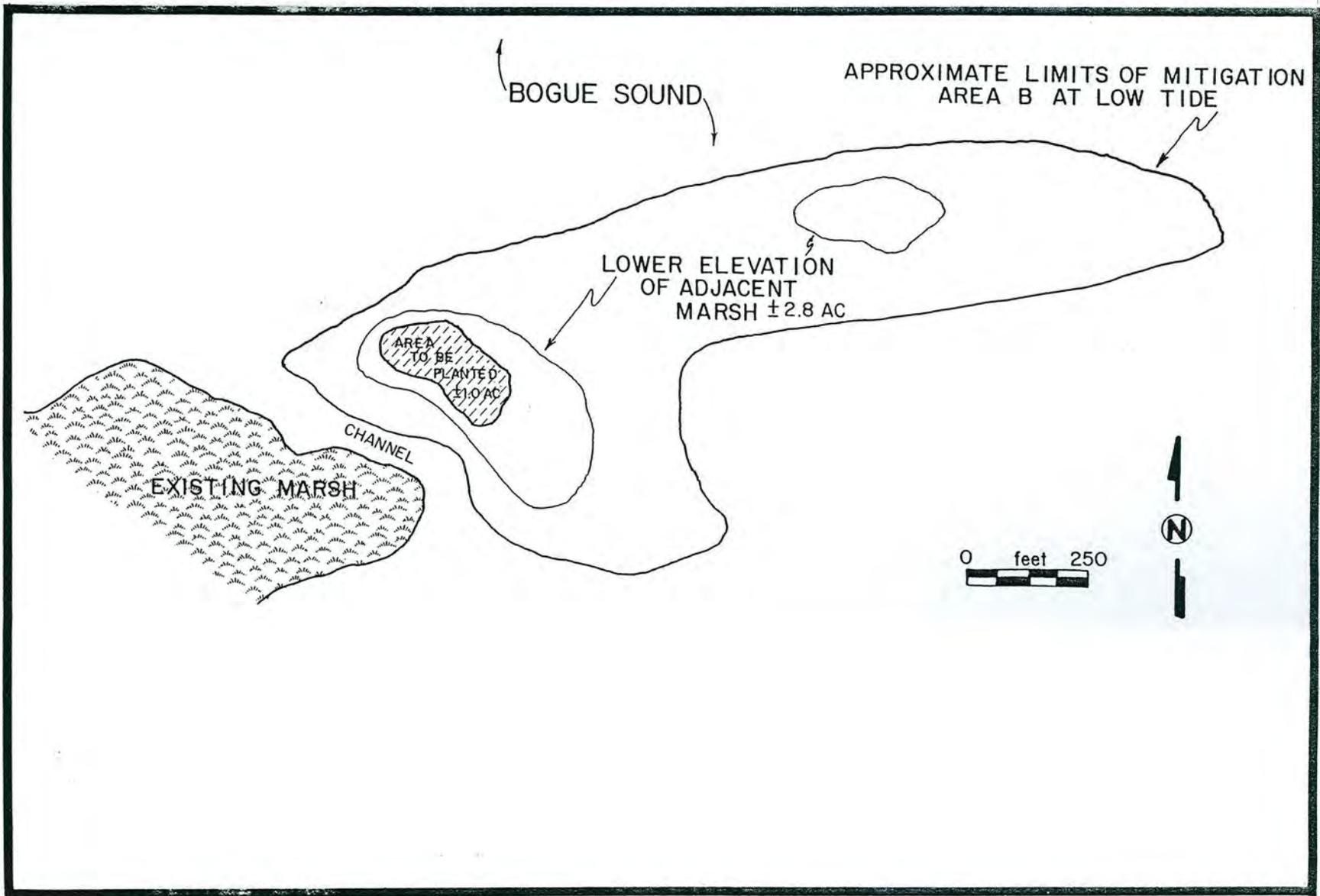


Figure 2B. Mitigation Area B for TIP Project Number U-2226, Carteret County

Flooded). This wetland type occurs in two locations immediately north of the railroad tracks adjacent to the two streams that converge to form Peletier Creek.

Impacts to bottomland hardwood forest wetlands (Cowardin types PFO1/4A and PFO7/4B, Palustrine Broad-Leaved Deciduous/Needle-Leaved Evergreen/Evergreen, Temporarily Flooded,Saturated) are 1.82 acres. This community occurs at five sites along the proposed project corridor, varying in size from 0.03 to 0.67 acres. Dominant canopy species are red maple (*Acer rubrum*), sweet gum (*Liquidambar styraciflua*), swamp black gum (*Nyssa sylvatica* var. *biflora*), loblolly pine (*Pinus taeda*), water oak (*Quercus nigra*), and red bay (*Persea borbonia*). Important understory, shrub, and herbaceous components include many of the species present in the canopy along with Virginia chain fern (*Woodwardia virginica*), sensitive fern (*Onoclea sensibilis*), paw-paw (*Asimina triloba*), jack-in-the-pulpit (*Arisaema triphyllum*), lizard's tail (*Saururus cernuus*), and giant cane (*Arundinaria gigantea*).

3.0 Mitigation Site

As suggested by personnel of DCM, establishment of salt marsh by planting smooth cordgrass (*Spartina alterniflora*) on the intertidal portions of two islands (Areas A and B, Figures 2A and 2B) in Bogue Sound is proposed as compensatory mitigation for unavoidable impacts wetlands as a result of TIP Project U-2226. The proposed islands approximately 3,500 feet south of Morehead City and approximately 4,000 feet west of the bridge connecting Morehead City and Atlantic Beach (SR 1182). The total area proposed for planting is approximately six acres. The actual acreage will depend on the areas of the islands that lie within the elevation range for smooth cordgrass survival and growth. The locations of the two islands and the areas proposed for planting are shown on Figure 1.

3.1 Preliminary Studies

3.1.1 Island Dynamics

NCDOT personnel contacted Dr. Edgar W. Garbisch of Environmental Concerns, Inc., to discuss environmental factors that needed to be evaluated prior to planting smooth cordgrass. One of the primary factors identified was the long-term stability of the soil surface, that is, whether the surface is rising or falling. As a result of this information, NCDOT personnel designed and conducted a study to evaluate this factor by measuring the elevation of the soil surface using reference elevations.

Before recording the surface elevations, 38 1-inch diameter plastic pipes were driven into the soil in unvegetated portions of the mitigation site until they were firmly set. Each pipe was then cut off so that approximately three feet projected above the surface to provide a stable reference elevation for determining the soil elevation. Readings consisted of placing a rigid straight edge on the soil at the base of each pipe at several angles and recording the distances from the top of the pipe to the straight edge during portions of the tidal cycle when the islands were above the elevation of the water. By this method, the scoured hole that developed at the base of each pipe was ignored and an average measurement was obtained. Reference elevations

of the areas proposed for planting were taken from April 4, 1994, through January 12, 1995 (Table 1).

The results of the readings indicate that both islands are elevationally stable. Although some of the points were destroyed or obviously tampered with during the study, the corrected data indicates that the larger island (Area A) increased in elevation by 0.15 inch and the smaller island (Area B) decreased in elevation by 0.19 inch. These changes were considered insignificant and it was concluded that both islands were stable.

3.1.2 Elevations of Proposed Planting Areas

An additional factor affecting the establishment and growth of smooth cordgrass is the elevation (relative to the tidal range) of the proposed planting area. Smooth cordgrass generally grows between the elevations of mean tide and mean high tide, although exposure to wave action can affect the actual elevation range. In the Bogue Sound area of North Carolina, the range of these elevations is approximately 1.5 feet. On February 28, 1995, a second study was conducted by NCDOT personnel to determine how much of the unvegetated portions of the two islands falls within this range.

Wire flag stakes were placed around the proposed mitigation areas at the edge of the water when the tide fell to the elevation of the lower limit of nearby existing smooth cordgrass. After the areas proposed for planting were delineated, they were measured by standard techniques (coordinate determinations by stadia distances and azimuths) with standard survey equipment. The areas suitable for planting were then calculated using a survey program on a computer.

The results of this study revealed there are two portions of each island above the elevation of the lower limit of adjacent stands of smooth cordgrass. These have a combined area of approximately 12 acres and are depicted on Figures 2A and 2B. However, portions of these areas are only slightly higher (4-6 inches) than the lower elevation of adjacent stands of smooth cordgrass and may be only marginally suitable for its establishment. NCDOT personnel contacted Dr. Stephen Broome, Professor of Soil Science at North Carolina State University, to obtain his recommendation on how much of the area should be planted. After visiting the proposed mitigation site, he suggested planting only the highest portions of the 12 acres to increase the chance for successful establishment of smooth cordgrass. The total area identified as being most suitable for planting was reduced to approximately six acres. This includes five acres on Area A and one acre on Area B (Figures 2A and 2B).

3.2 Mitigation Site Existing Conditions

3.2.1 Soils

The soils of the mitigation site are Carteret sand, which is described in the soil survey for Carteret County as very poorly drained and nearly level (USDA 1987). This soil typically occurs in the intertidal zone on the sound side of the Outer Banks at elevations below 1 foot (mwl). The

Area A
(Large Island)

Height from Top of Pipe to Estimated Surface
of the Sand (in Inches) for the Given Dates

| Point Number | Date | | | | | | | |
|--------------|---------|------------|---------------|---------|----------|----------|---------|----|
| | 4/19/94 | 6/21/94 | 8/3/94 | 9/20/94 | 10/17/94 | 11/21/94 | 1/12/95 | |
| 11 | 15 | 15 | Point Missing | | | | | |
| 12 | 24 | 23 | 23 | 24 | 23 | 23 | 22 | |
| 13 | 24 | 12 | 24 | 23 | 23 | 25 | 22 | |
| 14 | 20 | 17 | 17 | 18 | 18 | 17 | 18 | |
| 15 | 30 | 31 | 29 | 28 | 28 | 28 | 28 | |
| 16 | 16 | 28 | 28 | 31 | 31 | 32 | 31 | |
| 17 | 24 | 24 | 30 | 30 | 28 | 31 | 27 | |
| 18 | 21 | 20 | 20 | 22 | 22 | 25 | 23 | |
| 19 | 29 | 27 | 27 | 26 | 30 | 31 | 29 | |
| 20 | 25 | 13 | 23 | 23 | 25 | 27 | 24 | |
| 21 | 20 | 20 | 21 | 21 | 21 | 22 | 21 | |
| 22 | 21 | 22 | 25 | 26 | 27 | 28 | 26 | |
| 23 | 21 | 24 | 26 | 24 | 25 | 28 | 27 | |
| 24 | 12 | 10 | Missing | | | | | |
| 25 | 23 | 21 | 18 | 18 | 24 | 25 | 24 | |
| 26 | 20 | 19 | 14 | | 46 | 45 | 42 | |
| 27 | 23 | 21 | 22 | Missing | | | | |
| 28 | 20 | Missing | 21 | | | | 25 | |
| 29 | 21 | Point Lost | | | | | | 21 |
| 30 | 24 | Missing | 18 | Missing | | | | |
| 31 | 23 | Missing | 16 | Missing | | | | |

Changes in Elevation (in Inches)

| Period | Period | | | | | | Average Change |
|--------|----------|----------|----------|---------|---------|---------|----------------|
| | Apr-June | June-Aug | Aug-Sept | Sep-Oct | Oct-Nov | Nov-Jan | |
| 0 | | | | | | | 0.0 |
| 1 | 0 | -1 | 1 | 0 | 1 | | 0.3 |
| Error | Error | 1 | 0 | -2 | 3 | | 0.5 |
| 3 | 0 | -1 | 0 | 1 | -1 | | 0.3 |
| -1 | 2 | 1 | 0 | 0 | 0 | | 0.3 |
| Error | 0 | -3 | 0 | -1 | 1 | | -0.6 |
| 0 | -6 | 0 | 2 | -3 | 4 | | -0.5 |
| 1 | 0 | -2 | 0 | -3 | 2 | | -0.3 |
| 2 | 0 | 1 | -4 | -1 | 2 | | 0.0 |
| Error | Error | 0 | -2 | -2 | 3 | | -0.3 |
| 0 | -1 | 0 | 0 | -1 | 1 | | -0.2 |
| -1 | -3 | -1 | -1 | -1 | 2 | | -0.8 |
| -3 | -2 | 2 | -1 | -3 | 1 | | -1.0 |
| 2 | | | | | | | 2.0 |
| 2 | 3 | 0 | -6 | -1 | 1 | | -0.2 |
| 1 | 5 | | Error | | | | 3.0 |
| 2 | -1 | | | | | | 0.5 |
| 0 | Error | | | | | | 0.0 |
| 0 | | | | | | | 0.0 |
| 0 | Error | | | | | | 0.0 |
| 0 | Error | | | | | | 0.0 |

Overall Average 0.15

Area B
(Small Island)

Height from Top of Pipe to Estimated Surface
of the Sand (in Inches) for the Given Dates

| Point Number | Date | | | | | | | |
|--------------|---------|---------|---------|------------|----------|----------|---------|--|
| | 4/19/94 | 6/21/94 | 8/3/94 | 9/20/94 | 10/17/94 | 11/21/94 | 1/12/95 | |
| 32 | 12 | 13 | 10 | Missing | | | | |
| 33 | 22 | 36 | 36 | 38 | 37 | 37 | 35 | |
| 34 | 20 | 22 | 15 | 18 | | 20 | | |
| 35 | 21 | 18 | 21 | 21 | 19 | | 22 | |
| 36 | 19 | 18 | 18 | 19 | 19 | 26 | | |
| 37 | 25 | 24 | 28 | 32 | 25 | 30 | 22 | |
| 38 | 23 | 24 | 26 | 29 | 27 | 25 | 26 | |
| 39 | 24 | | 22 | 24 | 22 | 23 | 23 | |
| 40 | 22 | 21 | 21 | 22 | 22 | 22 | 22 | |
| 41 | 20 | 23 | 23 | 21 | 22 | | 21 | |
| 42 | 23 | 20 | 26 | Point Lost | | 17 | | |
| 43 | 13 | 17 | 16 | 18 | 15 | | 17 | |
| 44 | 18 | Missing | | | | | | |
| 45 | 15 | 15 | Missing | | | | | |
| 46 | 13 | 13 | Missing | | | | | |
| 47 | 22 | Missing | | | | | | |
| 48 | 14 | 14 | 15 | Missing | | | | |

| Period | Period | | | | | | Average Change |
|--------|----------|----------|----------|---------|---------|---------|----------------|
| | Apr-June | June-Aug | Aug-Sept | Sep-Oct | Oct-Nov | Nov-Jan | |
| -1 | 3 | | | | | | 1.0 |
| Error | 0 | -2 | 1 | 0 | 2 | | 0.2 |
| -2 | 7 | -3 | 0 | | | | 0.5 |
| 3 | -3 | | 2 | | | | 0.7 |
| 1 | 0 | -1 | 0 | -7 | | | -1.4 |
| 1 | -4 | -4 | 7 | -5 | 8 | | 0.5 |
| -1 | -2 | -3 | 2 | 2 | -1 | | -0.5 |
| | Error | -2 | 2 | -1 | 0 | | -0.3 |
| 1 | 0 | -1 | 0 | 0 | 0 | | 0.0 |
| -3 | 0 | 2 | -1 | | | | -0.5 |
| 3 | -6 | | | | | | -1.5 |
| -4 | 1 | -2 | 3 | | | | -0.5 |
| | | | | | | | |
| 0 | | | | | | | 0.0 |
| 0 | | | | | | | 0.0 |
| | | | | | | | |
| | | | | | | | |
| | -1 | | | | | | -1.0 |

Overall Average -0.19

Table 1. Reference Elevations of Mitigation Areas A and B, April 4, 1994 - January 12, 1995

water table is at or near the surface continuously, and the soil is flooded daily by ocean tides. Salt concentration is 25 to 30 parts per thousand, and the dominant vegetation is smooth cordgrass.

3.2.2 Vegetation

As described previously, the majority of the proposed mitigation area is currently unvegetated. On Area A (the larger island, Figure 2A), a few scattered individual seedlings and/or culms emerging from smooth cordgrass rhizomes occur at the western end of the area proposed for planting. Area B (Figure 2B) is totally unvegetated and is separated from adjacent areas of existing smooth cordgrass by a 4-to-5 foot deep channel.

3.2.3 Jurisdictional Wetlands

Under the wetland classification system utilized by the United States Fish and Wildlife Service (Cowardin *et al* 1979), the mitigation site is classified as wetland type E2US2N (Estuarine Intertidal Unconsolidated Shore Sand Regularly Flooded). This classification of habitat is described as sand flats usually derived from beach overwash and thus located leeward of barrier islands; exposed during low tides. Portions of the site may contain unconsolidated dredged material from the adjacent Intercoastal Waterway and thus would be classified as E2US3P (Estuarine Intertidal Unconsolidated Shore Mud Irregularly Flooded, NCDNRCD, 1988), although there is no visual indication of past dredge spoil disposal on the mitigation site.

3.2.4 Ownership

According to the Carteret County tax records and property maps, Area A is owned by NCDOT. Area B, although not owned by NCDOT, is under the ownership by the State of North Carolina by virtue of being below mean high tide.

4.0 Mitigation Plan

4.1 Hydrological Restoration

Because both Areas A and B are below the elevation of mean high tide, no hydrological restoration is proposed or needed. As described by the Soil Survey for Carteret County (USDA 1987), the water table is at or near the surface continuously.

4.2 Plant Community Establishment

Approximately six acres of the mitigation area (Five acres of Area A and one acre of Area B) will be planted with smooth cordgrass (*Spartina alterniflora*) during the spring of 1996. Local plant material will be utilized and planted on a 2'x2' grid spacing, resulting in a density of 10,890 plants per acre. Depending on availability, planting material will be either greenhouse-grown from seed or collected from existing marshes in the region. A slow release fertilizer will be applied to

each plant at the time of planting to enhance growth and survival. Areas planted will be restricted to those where smooth cordgrass has not become naturally established.

5.0 Monitoring Plan

5.1 Hydrological Monitoring

No hydrological monitoring is proposed because no hydrological restoration is proposed.

5.2 Vegetation Monitoring

5.2.1 Reference System Plots

Prior to the time of planting the mitigation site, reference plots will be established in existing, adjacent stands of smooth cordgrass. The purpose of these plots will be to determine baseline conditions for the success of smooth cordgrass in the area.

NCDOT will utilize qualified consultants to determine the number of plots required and the environmental variables to be measured, such as density, height, and biomass. Other variables possibly to be measured are elevation, soil conditions, and exposure to wave action. The variables to be measured will be determined after consultation with appropriate resource and regulatory agencies and the consultant(s).

5.2.2 Mitigation Site Plots

Sample plots will be placed within the planted areas of both areas of the mitigation site to evaluate the results. The variables measured in the reference plots will also be measured in these plots. The precise number and locations of these plots will be determined after consultation with appropriate resource and regulatory agencies and the consultant(s). The sample plots will be monitored during late summer each year for three years after planting.

5.2.3 Success Criteria

The success of the mitigation site will be based on the measured variables in the sample plots falling within 25% of those of the reference plots at the end of three growing seasons. If the success criteria are not met, then NCDOT personnel will confer with appropriate resource and regulatory agencies to develop an appropriate plan of remediation, if needed.

6.0 Report Preparation and Submittal

An annual report for the mitigation area, including photographs, will be prepared each fall after field monitoring activities are completed. Copies of this report will be submitted to the appropriate resource and regulatory agencies by January 31 of the following year for three years after planting the mitigation site.

7.0 Dispensation of Property

No dispensation of the mitigation site is proposed. The proposed mitigation areas of both islands are below mean high tide and are thus not subject to private ownership, development, or predicted man-induced disturbances.

8.0 References Cited

- Cowardin, L. M., V. Carter, F. C. Golet, and Edward T. Laroe. 1979. Classification of Wetland and Deepwater Habitats of the United States. Fish and Wildlife Service, U. S. Department of Interior.
- Department of the Army (DOA). 1987. Corps of Engineers Wetland Delineation Manual. Tech. Rpt. Y-87-1, Waterways Experiment Station, COE, Vicksburg, Mississippi.
- North Carolina Department of Natural Resources and Community Development (NCDNRCD). 1988. National Wetlands Inventory. Notes to Users. 8pp. Unpublished notes.
- North Carolina Department of Transportation (NCDOT). 1990. Natural Resource Technical Report U-2226. Westward Extension of Bridges Street (SR 1176). TIP Project # U-2226, State Project Number 9.8022831, October 22, 1990. 24 pp.
- North Carolina Department of Transportation (NCDOT). 1991. State Environmental Assessment. Morehead City, Bridges Street Extension Between Arendell Street and NC 24, Carteret County. 39 pp. plus Appendices.
- North Carolina Department of Transportation (NCDOT). 1994. Administrative Action. Finding of No Significant Impact. Morehead City, Bridges Street Extension from Arendell Street to NC 24, Carteret County, State Project 9.8022831, TIP # U-2226. 12 pp. plus Figures, Tables, and Appendix.
- Page, R. W. and L. S. Wilcher. 1990. Memorandum of Agreement Between EPA and the DOE Concerning the Determination of Mitigation Under the Clean Water Act, Section 404(b)(1) Guidelines. Washington, DC.
- U. S. Department of Agriculture (USDA). 1987. Soil Survey of Carteret County, North Carolina, USDA Natural Resource Conservation Service.