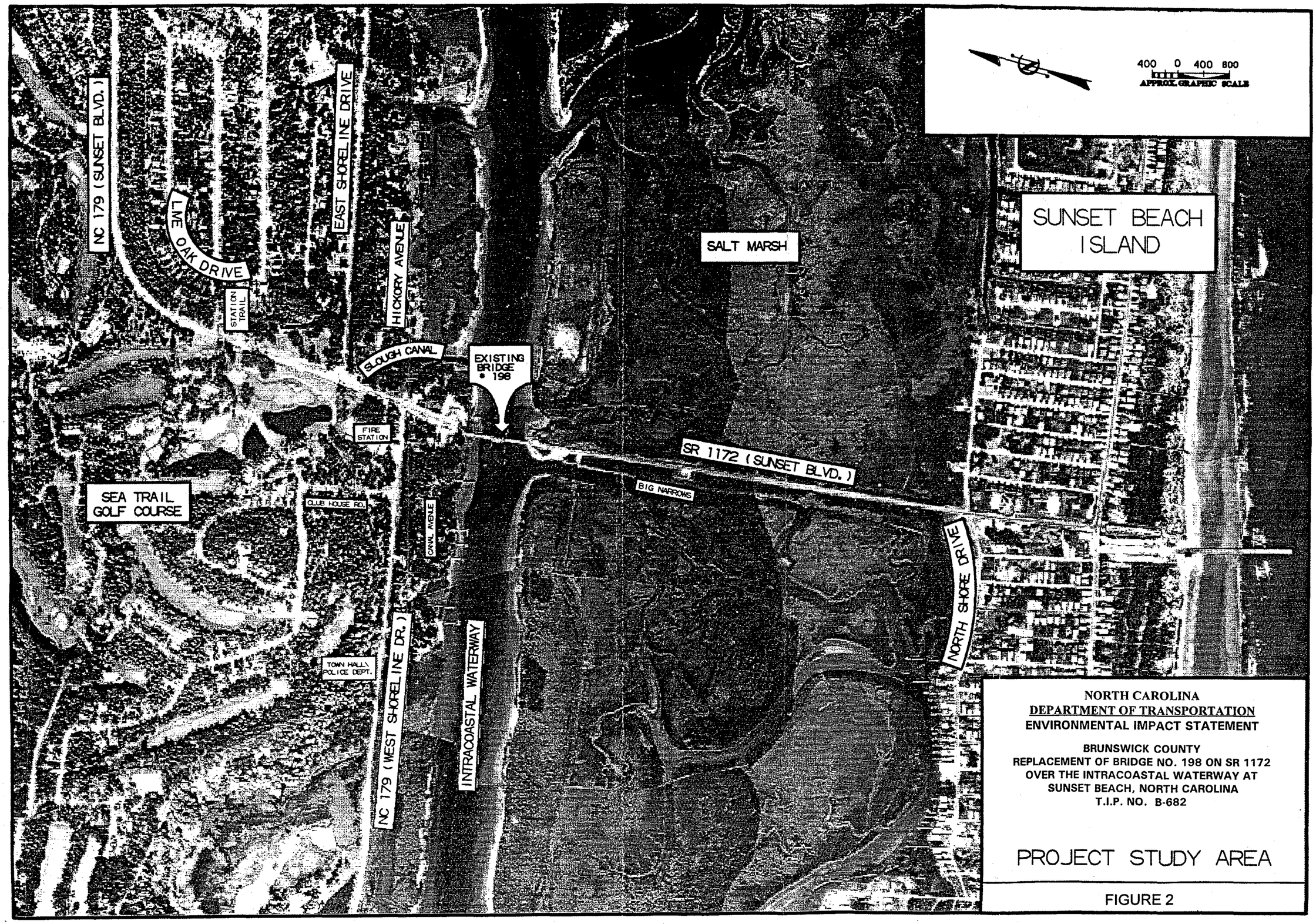
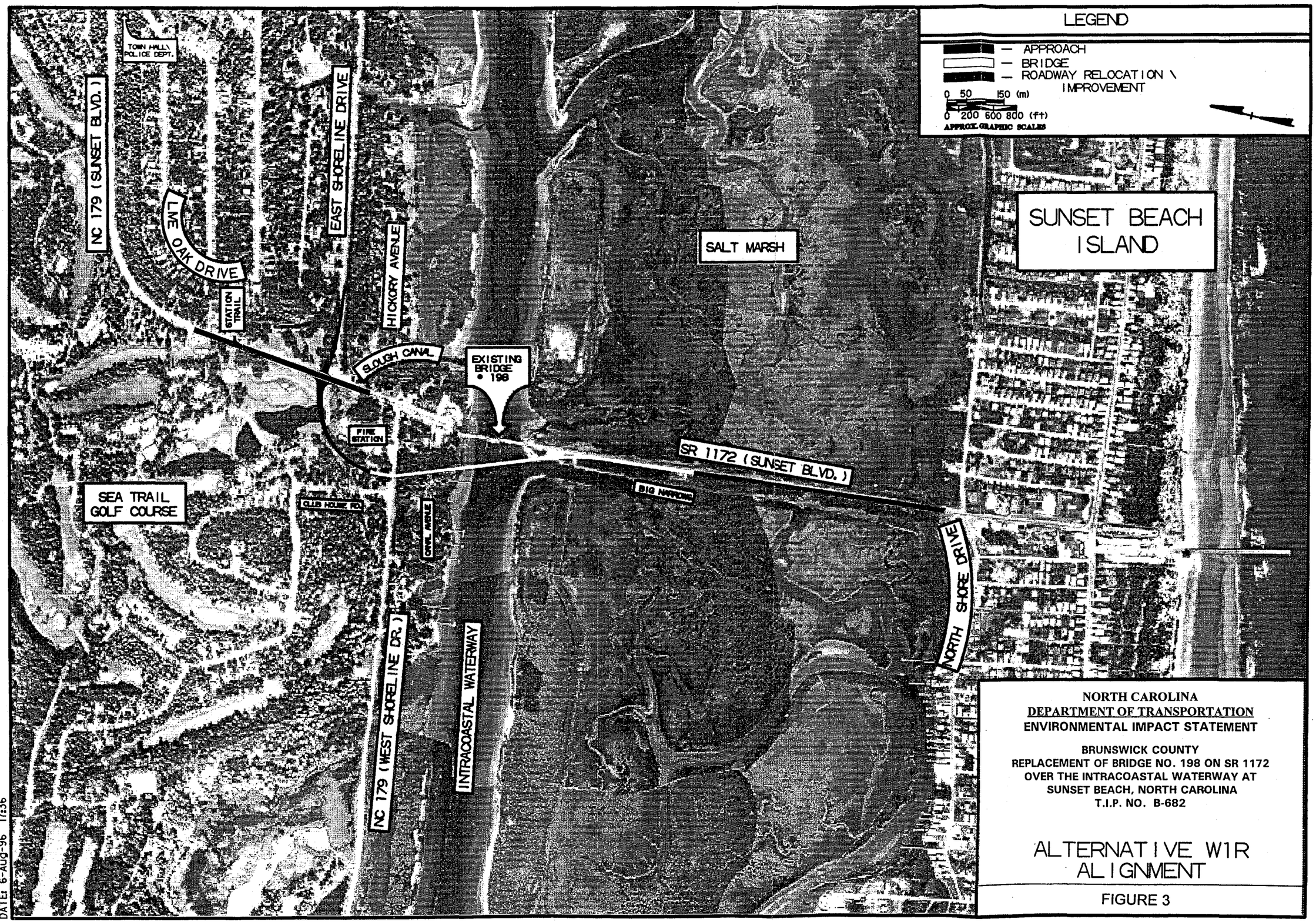


NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL IMPACT STATEMENT

BRUNSWICK COUNTY
REPLACEMENT OF BRIDGE NO. 198 ON SR 1172
OVER THE INTRACOASTAL WATERWAY AT
SUNSET BEACH, NORTH CAROLINA
T.I.P. NO. B-682

PROJECT STUDY AREA

FIGURE 2



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL IMPACT STATEMENT

BRUNSWICK COUNTY
REPLACEMENT OF BRIDGE NO. 198 ON SR 1172
OVER THE INTRACOASTAL WATERWAY AT
SUNSET BEACH, NORTH CAROLINA
T.I.P. NO. B-682

ALTERNATIVE W1R
ALIGNMENT

FIGURE 3

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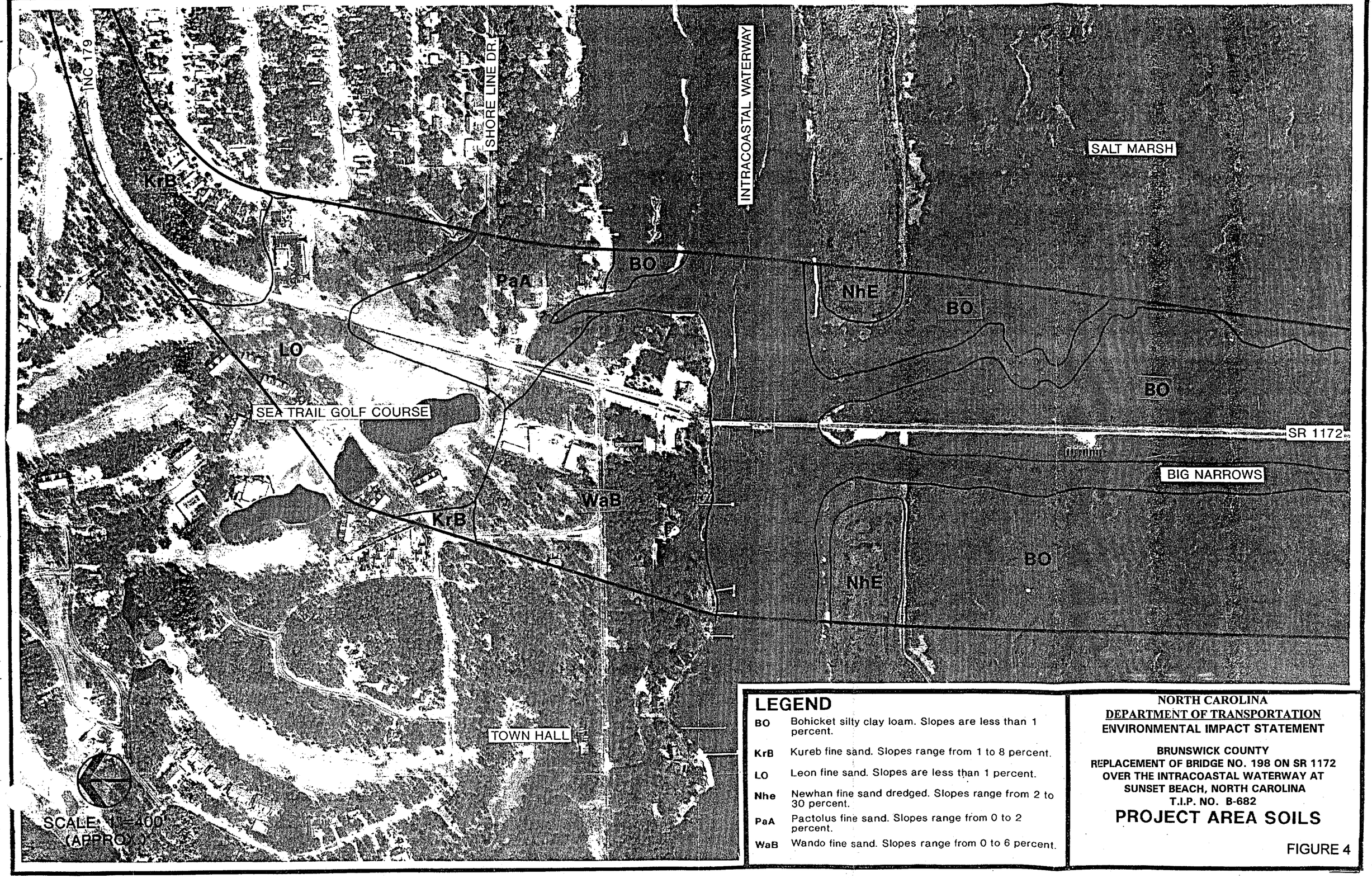

LEGEND

BO	Bohicket silty clay loam. Slopes are less than 1 percent.
KrB	Kureb fine sand. Slopes range from 1 to 8 percent.
LO	Leon fine sand. Slopes are less than 1 percent.
Nhe	Newhan fine sand dredged. Slopes range from 2 to 30 percent.
PaA	Pactolus fine sand. Slopes range from 0 to 2 percent.
WaB	Wando fine sand. Slopes range from 0 to 6 percent.

NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL IMPACT STATEMENT

BRUNSWICK COUNTY
REPLACEMENT OF BRIDGE NO. 198 ON SR 1172
OVER THE INTRACOASTAL WATERWAY AT
SUNSET BEACH, NORTH CAROLINA
T.I.P. NO. B-682

PROJECT AREA SOILS

FIGURE 4

CONCEPTUAL MITIGATION PLAN

BRUNSWICK COUNTY
REPLACEMENT OF BRIDGE NO. 198 ON SR 1172
OVER THE ATLANTIC INTRACOASTAL WATERWAY
AT
SUNSET BEACH, NORTH CAROLINA

Federal-Aid Project No. BRS-1813(1)
State Project No. 8.2230101
TIP No. B-682

PREPARED FOR:

PLANNING AND ENVIRONMENTAL BRANCH
NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

PREPARED BY:

GREINER, INC.
RALEIGH, NORTH CAROLINA

June 1997

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I. INTRODUCTION

A. Project Description and Need

The proposed action is the replacement of Bridge No. 198 on Secondary Road 1172 (SR 1172) in Brunswick County, North Carolina. Bridge No. 198 spans the Atlantic Intracoastal Waterway (AIWW) and connects the island portion of the Town of Sunset Beach with the mainland portion of the town.

This bridge replacement is identified as Project Number B-682 in the North Carolina Department of Transportation's (NCDOT) 1996-2002 Transportation Improvement Program (TIP). Project B-682 is programmed in the TIP for planning and environmental studies. A schedule for design, right of way, and construction has not been established in the TIP since Project B-682 is the subject of a current US District Court case.

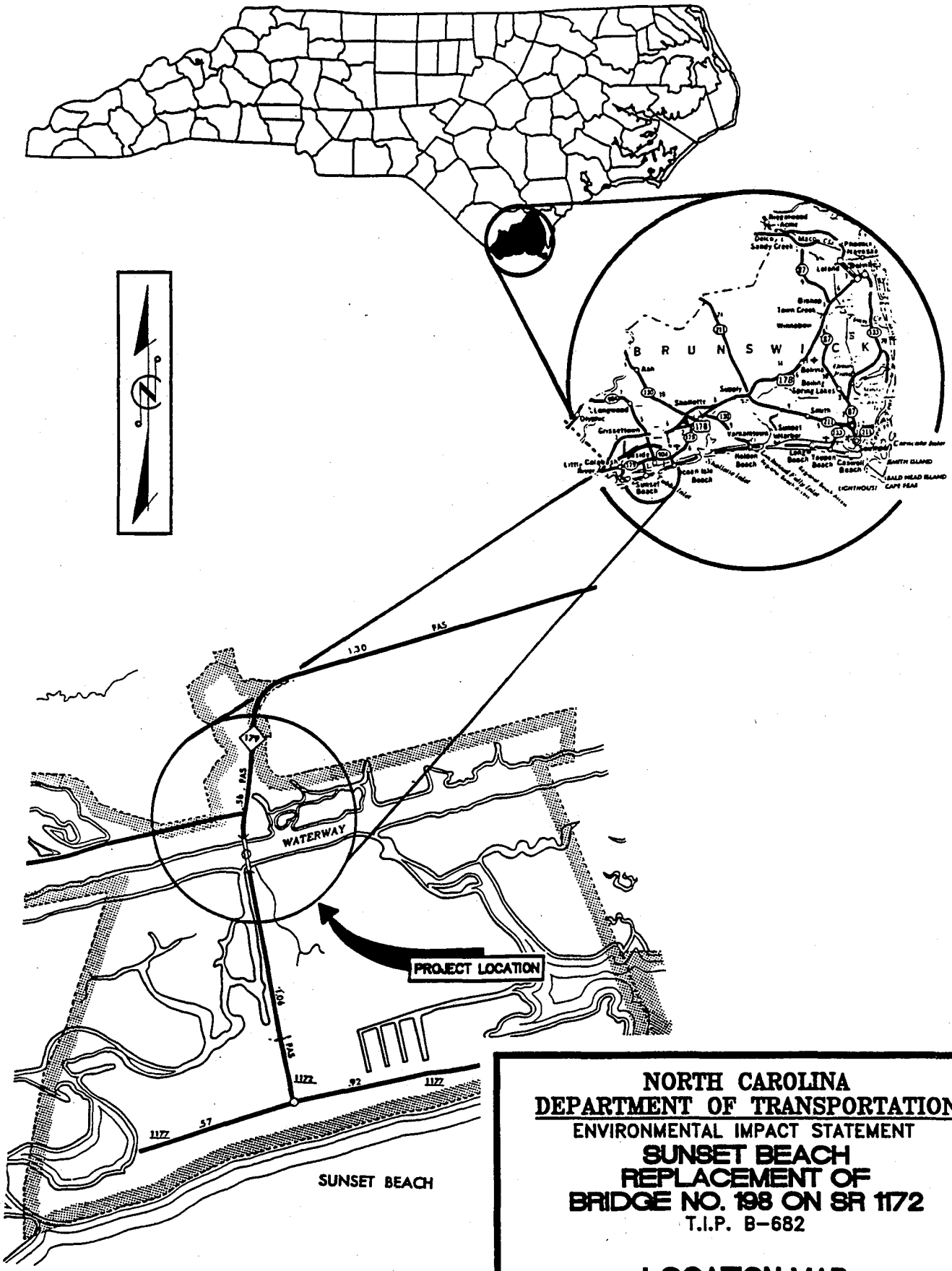
In February 1994, the existing bridge was inspected and determined to be in poor condition. The bridge was given a sufficiency rating of 4.0 on a scale of 0 to 100, with 100 being perfect condition. The purpose of the project is to replace the structurally deficient and functionally obsolete existing bridge. In general, functionally obsolete bridges are those which are narrow, have inadequate underclearances, have insufficient load-carrying capacity, or are poorly aligned with the roadway and can no longer adequately service current traffic. Structurally deficient bridges are those which are in relatively poor condition or have insufficient load-carrying capacity which may be due to original design or to deterioration.

The existing Sunset Beach bridge is a single-lane, floating steel-barge, swing-span draw bridge, with fixed wooden approach spans, which is often referred to as a pontoon bridge. Since the bridge provides only a few feet of vertical clearance under the approach spans, virtually all waterway traffic (except small john boats) is blocked when the bridge is closed to allow roadway traffic to cross.

Replacement of the existing pontoon bridge with a new structure would provide a more reliable means of transportation between the island and the mainland and would offer a greater degree of public safety by improving emergency response time and emergency evacuation procedures. Furthermore, a new facility would enhance vehicular operations on SR 1172 and watercraft operations on the Intracoastal Waterway.

B. Study Area

The location of the project in relation to the state of North Carolina is presented in Figure 1. Figure 2 shows the project study area, which is located in the Town of Sunset Beach, Brunswick County, in the extreme southeastern part of North Carolina. The general study



NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION
ENVIRONMENTAL IMPACT STATEMENT
SUNSET BEACH
REPLACEMENT OF
BRIDGE NO. 198 ON SR 1172
T.I.P. B-682

LOCATION MAP

FIGURE 1

area includes the area around the existing bridge and SR 1172 that is bounded by North Shore Drive on the island portion of Sunset Beach and Station Trail on the mainland.

Ocean Isle Beach is the next developed beach up the coast from Sunset Beach. Down the coast, the next developed beach is Cherry Grove Beach, South Carolina. The mainland towns of Seaside (up the coast) and Calabash (down the coast) are the towns adjacent to Sunset Beach. The largest municipality in the area is Shallotte, located on US 17, northeast of Sunset Beach.

C. Methodology

Field surveys were undertaken by project team members to evaluate existing plant communities and to determine existing conditions. Additionally, project team members reviewed black and white, color and infrared aerial photography; pre-development (circa 1950) and current US Geological Survey topographic mapping; US Fish and Wildlife Service National Wetland Inventory Maps; and the Natural Resource Conservation Service soil survey for Brunswick County dated 1986. Subsequent to the selection of a Preferred Alternative, site reviews and wetland boundary delineations were undertaken by NCDOT biologists.

A limited number of wetland community types are found in the project study area. They include nonriverine hardwood forest, salt marsh, salt scrub, and freshwater lake fringe. Surface waters, including the Atlantic Intracoastal Waterway, tidal creeks and a small golf course impoundment, are also found within the study area.

Alternative W1R, depicted on Figure 3, involves the construction of a high-level, fixed span bridge over the AIWW, providing a vertical clearance of 19.8 meters (65 feet) above mean high tide. In addition to new bridge construction, improvements to NC 179 and mainland and causeway portions of SR 1172, and minor realignment of East Shoreline Drive, will be made. The island causeway will be raised approximately 13 centimeters (5 inches) to reduce flood overtopping that periodically occurs.

Based on the preliminary design drawings for Alternative W1R, wetland impacts will result from dredging for construction barge access on the mainland, temporary and permanent fill, and shading. Two types of wetlands will be impacted by the preferred alternative: salt marsh and freshwater lake fringe. Salt marshes occur extensively between the mainland and barrier island along the AIWW and SR 1172 causeway to the island. Freshwater lake fringe occurs along the perimeter of a small impoundment located on a mainland golf course.

Tables 1 and 2 provide estimates of natural resource impacts and impacts to waters of the United States, respectively. As shown in these tables, Alternative W1R will permanently impact 0.25 hectare (0.63 acre) of salt marsh community. Approximately 1.73 hectares

TABLE 1

POTENTIAL NATURAL RESOURCE IMPACTS

NATURAL RESOURCE	PREFERRED HABITAT FOR PROTECTED SPECIES	TYPE OF IMPACT[1]	ALT. W1R hectares (acres)[2]	ALT. W1 hectares (acres)[2]	ALT. C1 hectares (acres)[2]	ALT. C4 hectares (acres)[2]	ALT. C3R hectares (acres)[2]
Salt Marsh	peregrine falcon, bald eagle, wood stork	Dredge	perm. 0.02 (0.06)	perm. 0.15 (0.37)	0	0	0
		Fill	perm. 0.14 (0.35) temp. 1.73 (4.28)	perm. 0.08 (0.20) temp. 0.05 (0.11)	perm. 0.16 (0.39) temp. 0.08 (0.20)	perm. 0.27 (0.67)	0
		Shading [3]	perm. 0.09 (0.22)	perm. 0.08 (0.21)	perm. 0.21 (0.51)	perm. 0.03 (0.08)	0
Surface Water	peregrine falcon, bald eagle, wood stork, loggerhead sea turtle, green sea turtle, leatherback sea turtle, Kemp's ridley sea turtle, shortnose sturgeon, West Indian manatee	Dredge	perm. 0.53 (1.30)	perm. 1.01 (2.49)	0	0	perm. 0.10 (0.24)
		Fill	perm. 0.11 (0.26)	perm. 0.21 (0.53)	perm. 0.07 (0.17)	perm. 0.07 (0.17)	0
		Shading [3]	perm. 0.22 (0.54) temp. 0.02 (0.06)	ND	ND	ND	ND
Nonriverine Wet Hardwood Forest		Fill	0	0	0.11 (0.27)	0	0
Coastal Fringe Evergreen Forest	bald eagle	Fill	perm. 0.63 (1.55)	perm. 0.69 (1.70)	perm. 0.64 (1.58)	perm. 0.18 (0.44)	0
		Clearing	perm. 0.34 (0.85)	perm. 0.34 (0.85)	perm. 0.23 (0.56)	perm. 0.02 (0.04)	0
Man-Dominated Area		Fill	perm. 3.30 (8.15)	perm. 2.70 (6.66) temp. 0.10 (0.25)	perm 2.81 (6.95) temp. 0.05 (0.13)	perm. 2.47 (6.10)	0
		Clearing	perm. 0.04 (0.11)	perm. 0.06 (0.16)	perm. 0.21 (0.52)	perm. 0.14 (0.35)	0
		Excavation [4]	perm. 0.66 (1.64)	perm. 0.66 (1.64)	perm. 0.66 (1.64)	0	0
Total Area (including man-dominated)		Dredge	perm. 0.55 (1.36)	perm. 1.16 (2.86)	0	0	perm. 0.10 (0.24)
		Fill	perm. 4.17 (10.31) temp. 1.73 (4.28)	perm. 3.68 (9.09) temp. 0.15 (0.36)	perm. 3.79 (9.36) temp. 0.13 (0.33)	perm. 2.99 (7.38)	0
		Shading [3]	perm. 0.31 (0.76) temp. 0.02 (0.06)	perm. 0.08 (0.21)	perm. 0.21 (0.51)	perm. 0.03 (0.08)	0
		Clearing	perm. 0.39 (0.96)	perm. 0.41 (1.01)	perm. 0.44 (1.08)	perm. 0.16 (0.39)	0
		Excavation [4]	perm. 0.66 (1.64)	perm. 0.66 (1.64)	perm. 0.66 (1.64)	0	0
		TOTAL	**perm. 6.08 (15.03) temp. 1.76 (4.34)**	**perm. 5.99 (14.81) temp. 0.15 (0.36)**	**perm. 5.10 (12.59) temp. 0.13 (0.33)**	**perm. 3.18 (7.85)**	**perm. 0.10 (0.24)**

TABLE 1 (Continued)

POTENTIAL NATURAL RESOURCE IMPACTS

NATURAL RESOURCE	PREFERRED HABITAT FOR PROTECTED SPECIES	TYPE OF IMPACT	ALT. W1R hectares (acres)*	ALT. W1 hectares (acres)*	ALT. C1 hectares (acres)*	ALT. C4 hectares (acres)*	ALT. C3R hectares (acres)*
Total Area (less man-dominated)		Dredge	perm. 0.55 (1.36)	perm. 1.16 (2.86)	0	0	perm. 0.24
		Fill	perm. 0.87 (2.16) temp. 1.73 (4.28)	perm. 0.98 (2.43) temp. 0.04 (0.11)	perm.0.98 (2.41) temp. 0.08 (0.20)	perm. 0.52 (1.28)	0
		Shading [3]	perm. 0.31 (0.76) temp. 0.02 (0.06)	perm. 0.08 (0.21)	perm. 0.21 (0.51)	perm. 0.03 (0.08)	0
		Clearing	perm. 0.34 (0.85)	perm. 0.34 (0.85)	perm. 0.23 (0.56)	perm. 0.02 (0.04)	0
		TOTAL	**perm. 2.08 (5.13)** **temp. 1.76 (4.34)**	**perm. 2.57 (6.35)** **temp. 0.04 (0.11)**	**perm. 1.41 (3.48)** **temp. 0.08 (0.20)**	**perm. 0.56 (1.38)**	**perm. 0.10 (0.24)**

Notes: [1]*Dredge* impacts refer to the areal extent of surface water bottom and wetlands that would be disturbed by clamshell and bucket dredging activities.

Fill impacts refer to the areal extent that would be covered by borrow material necessary to increase the elevation of the land.

Temporary Fill impacts refer to areal extent of fill needed for the temporary staging area and work bridge, and for the temporary detour road for vehicular traffic. Although the area under the temporary work bridge would be impacted only by temporary, driven piles and shading from the structure, this area was assumed to be affected by fill for conservative impact predictions. Temporary fill material would be removed and deposited on upland areas chosen by the contractor after construction is complete.

Shading impacts refer to the areas located directly under the proposed bridge structure that would be affected by shade from the structure but by no other direct (dredge, fill, clearing, or excavation) impacts.

Temporary Shading impacts refer to the areas affected by shade from the temporary work bridge that would be removed upon completion of construction activities outside of the period between. It should be noted that some of the area included in temporary fill would actually be only temporary shading impacts; however, for conservative estimates, it was assumed that this area would be affected by temporary fill.

Clearing impacts refer to the areal extent that would be cleared of trees and brush in preparation for construction and/or necessary access by construction equipment and personnel. Areas within the construction right-of-way and staging areas would be allowed to revegetate naturally after construction is complete. Although not included in the totals, clearing may also be needed for the temporary construction staging areas on the mainland. Because locations of staging areas on the mainland will be chosen during final design by the contractor, no attempts to estimate any necessary clearing acreage for these areas was made.

Excavation applies only to the removal of the existing causeway on the island to allow this area to revert to salt marsh.

[2]Area was calculated based on the typical sections and preliminary plan views for each alternative. Areas calculated for Alternative W1R are based on the September 1996 Wetland Delineation Report for the Proposed Sunset Beach Bridge, Brunswick County; TIP # B-682; State Work # 8.2230101. (NCDOT, 1996c). "ND" denotes that the estimates were not determined.

[3]Shading impacts were calculated based on the width(s) of the proposed bridge alternatives and width of temporary work bridge.

[4]Excavation quantities are based on the area of causeway that may be removed for salt marsh restoration.

TABLE 2

Impacts to Waters of the United States

Wetlands			Surface Waters		
Sites	**Permanent**	**Temporary**	**Sites**	**Permanent**	**Temporary**
Fill			Fill		
2	0.02		**1***	**0.14**	
3	0.02		2	0.04	
4	0.01		3	0.04	
5	0.01		4	0.04	
6	0.05		Shade		
7	0.12		S1	0.50	
8	0.01		S2	0.03	
9	0.06		S3	0.01	
10	0.02		WBe		0.06
11	0.02		Dredge	1.30	
12*	**0.01**				
Ta		0.72			
Tb		0.74			
WBa		0.59			
WBb		0.68			
WBc		1.08			
WBd		0.47			
Shade					
1	0.03				
S1	0.01				
S2	0.04				
S3	0.05				
S4	0.06				
S5	0.03				
Dredge	0.06				
Total Imp.	**0.63**	**4.28**		**2.10**	**0.06**

***Note:** All sites are associated with impacts likely to occur in estuarine habitats with the exception of sites 12 (wetland site) and 1 (surface water site). Sites 12 and 1 are associated with the golf course pond on the mainland side of the proposed project.

(4.28 acres) of salt marsh will be temporarily impacted by this alternative. Due to size and location, impacts to the freshwater lake fringe were not evaluated in detail.

It is the intent of the NCDOT to mitigate for the permanent loss of wetlands that will result from the preferred alternative. Wetland areas temporarily impacted during project construction will be monitored to insure their recovery. Consequently, the project study area was reviewed for potential sites for use in mitigating the permanent loss of 0.25 hectare (0.63 acre) of salt marsh community.

Because wetland losses are generally limited to salt marsh community, the search for mitigation sites efforts was directed toward the tidal salt marsh community in the immediate project vicinity. After construction of the project is complete, a portion of the existing island causeway will become abandoned. It should be further noted that the entire area was historically (prior to development and construction of the island causeway) salt marsh community. [The island causeway was constructed during the 1950s from dredged salt marsh material which resulted in the creation of what is currently identified as Big Narrows Channel. Historically, Big Narrows Channel traversed the salt marsh in the area now occupied by the causeway.]

Consequently, restoration of the salt marsh community by removal of the abandoned causeway became the focus of the project mitigation efforts.

II. EXISTING CONDITIONS

For the purpose of the conceptual mitigation plan, this report focuses on the impacted salt marsh community and the proposed mitigation site, which consists of the abandoned portion of the island causeway.

A. Topography & Soils

Brunswick County is located along the southern boundary of the Tidewater Region of the Coastal Plain. The topography is characterized by a relatively flat plain, which slopes gently southeastwardly and is broken by low escarpments adjacent to stream valleys. Elevations range from sea level to approximately 7.6 meters (25 feet).

As depicted in Figure 4, there are six soil types found with the project study area. These include: Kureb fine sand; Leon fine sand; Pactolus fine sand; Wando fine sand; Bohicket silty clay loam; and Newhan fine sand dredged. With the exception of Newhan fine sand dredged, all of these soil types fall within the Alternative W1R construction limits. Two of these soil types, Leon fine sand and Bohicket silty clay loam, are hydric soils. These soils are poorly drained with high water tables at or near the surface for relatively long durations (USDA 1986). Table 3 below describes the hydric soils found within the project area.

TABLE 3

Map Unit Symbol	Map Unit Name	Soil Description
Lo	Leon fine sand	Nearly level, poorly drained soil. The seasonal high water table is at or near the surface in interstream areas and depressions in undulating areas.
BO	Bohicket silty clay loam	Nearly level, very poorly drained soil. The water table fluctuates with the rise and fall of the daily tides on tidal flats.

Leon fine sand is found on the mainland while the area surrounding the island causeway consists of Bohicket silty clay loam.

B. Water Resources & Hydrology

With the exception of the freshwater golf course impoundment, the waters in the project area, including the AIWW and adjacent tidal creeks and salt marsh communities, are classified as Tidal Salt Waters Class SA: shellfishing for market purposes, primary recreation, aquatic life propagation and survival, fishing, wildlife, and secondary recreation. Tidal surface waters classified as Class SA waters carry a supplemental classification of High Quality Waters (HQW) by the state of North Carolina.

The AIWW is a dredged channel maintained for commercial and recreational maritime traffic. Big Narrows Channel is also a dredged channel, though not maintained for navigation purposes. The remainder of the area consists generally of salt marshes with shallow flushing channels and streams. The entire area between the mainland and the barrier island and surrounding the island causeway are regularly flooded as a result of tidal influences .

Flooding at Sunset Beach is associated with tropical storms and hurricanes. Periodically, however, tidal fluctuations result in an overtopping of the causeway for short periods of time.

C. Plant Communities

All of the impacted wetland areas are salt marsh communities, which are estuarine communities dominated by smooth cordgrass (*Spartina alterniflora*). The island causeway consists of compacted material originating from dredged salt marsh spoil. The pavement

and soil shoulders extend to the top of the slope. A variety of grasses occur in isolated patches along the causeway slopes leading down to the salt marsh. One area of the causeway, now occupied by the boat ramp, has been periodically "resurfaced" with marl.

D. Proposed Mitigation

Because the proposed project is not currently listed in the State TIP, it is unclear when the B-682 will be constructed if approved. Consequently, mitigation details as discussed in this document and in the Final EIS, of which this Mitigation Plan is part, may change in response to unforseen regulatory changes. Nevertheless, any change in the Mitigation Plan will be made in accordance with applicable regulatory requirements and in coordination with interested agencies.

As previously mentioned, wetland mitigation efforts will focus on the restoration of the abandoned island causeway to historical salt marsh community. Restoration of the existing causeway to salt marsh will help ameliorate potential impacts from necessary benthic disturbance by allowing the former causeway to regain its wetland functions, which will be beneficial to the PNAs of the Intracoastal Waterway. All of the causeway area within NCDOT right of way will be restored accordingly. There are a few small upland areas in the vicinity of the SR 1172 causeway that do not fall within NCDOT right of way. If feasible, these areas will be acquired and restored as well.

The successful restoration of the area will be dependent upon: 1) the removal of the compacted dredge material, soil, pavement and debris that currently exists; 2) a properly prepared surface elevation that is conducive to salt marsh plant survival; and 3) monitoring of mitigation site success and remediation of failure as necessary.

As final design progresses, it will become necessary to determine the depth of the causeway material, and to develop a topographic surface map of the surrounding salt marsh community. The causeway material must then be removed and the site prepared consistent with the surface elevations of the adjoining tidal salt marsh. Excavated material from the causeway will be deposited in an approved upland site. For the purposes of this report, a depth of 0.33 meter (1 foot) is estimated. If necessary, the site surface should then be roughened following the removal of the causeway material as it will likely be extremely compacted. Backfilling the site with suitable soil material may also be necessary.

Prior to the time of planting the restoration and other mitigation sites, reference plots will be established in existing, adjacent salt marsh communities to determine vegetative diversity and density. The purpose of these plots will be to determine baseline conditions against which mitigation success can be measured.

A plan will then be developed to revegetate all sites (reference plots, restoration area, and mitigation areas) with a species mix similar to the reference plot. Revegetation with smooth cordgrass is anticipated. Consideration shall be given to planting this species as tuber/rhizomes on 1-meter (3-foot) centers.

After planting the reference plots, restoration area, and the other mitigation areas, sites will be monitored annually at growing season end (typically September or October) for three consecutive years for the purposes of determining the success of mitigation plantings. The success of the mitigation sites will be based on the measured variables in the sample plots falling within 25% of those of the reference plots at the end of these 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.

It is estimated that approximately 0.66 hectare (1.64 acres) of area will be available for restoration following the removal of the abandoned portion of the existing causeway. As described in Section I.C. of this report, Alternative W1R will permanently impact 0.25 hectare (0.63 acre) of salt marsh community, for which mitigation is currently being considered. This would result in a wetland restoration to wetland impact ratio of about 2.6:1. Furthermore, removal of the abandoned portion of the causeway will restore, at least partially, hydrologic connectivity between the salt marsh communities presently located on either side of the causeway. This would mirror the historical hydrological characteristics that were occurring prior to the construction of the causeway. More importantly, restoration of the these areas will allow the former causeway to regain its wetland functions, providing benefits to the PNAs of the Intracoastal Waterway as discussed above.

Based on mitigation costs for other NCDOT projects and the acreage involved, this mitigation plan appears to be reasonable, feasible, and practicable.

III. OTHER CONSIDERATIONS

A. Restoration of Temporarily Impacted Wetland Areas

In order to construct the new bridge, a temporary vehicular detour would be needed as well as a temporary staging area/haul road and temporary work bridge. The temporary detour for vehicular traffic would be constructed with fill and located in the salt marsh on the eastern side of the existing causeway.

The temporary work area will be placed on the west side of the causeway, between the causeway and Big Narrows Channel. The staging area/haul road will consist of the placement of fill confined within temporary sheet piling. The work bridge will consist of wooden piling substructure with a timber superstructure.

Impacts to the salt marsh community adjacent to the causeway will occur as a result of the temporary placement of fill for the temporary detour, staging area/haul road and work bridge. For a conservative estimate, it was assumed that all area under the temporary work bridge (0.63 hectares [1.55 acres]) would be affected by temporary fill. This area, would actually be affected only by temporary, driven piles and shading from the temporary structure. Assuming conservatively that all of this area would be affected by temporary fill, a total of approximately 1.73 hectares (4.28 acres) of salt marsh would be impacted by temporary fill for the construction of a temporary detour, staging area/haul road, and work bridge.

Where practicable, the NCDOT will place fill material on mats to minimize disruption to the salt marsh vegetation. After use, all temporary fill will be excavated and deposited in an approved upland site. Upon removal of the temporary fill material, revegetation with smooth cordgrass, or other plant species as identified through the reference sites, may be needed to prevent intrusion by reeds (*Phragmites* sp.).

For the purposes of determining the restoration success of temporarily impacted areas, annual monitoring of affected sites will be conducted at growing season end for three consecutive years in accordance with the protocol outlined in the Monitoring Plan for the restoration and mitigation activities for this project. Should intrusion by *Phragmites* sp. be evident from these monitoring results, NCDOT will confer with the appropriate regulatory agencies to determine an appropriate plan of remediation to combat this succession.

B. Freshwater Lake Fringe Impacts

As mentioned previously, a small segment of freshwater lake fringe will be impacted by the fill area that traverses the south side of the small golf course impoundment on the mainland. Due to the type, size and location of this impact, specific mitigation measures

are not discussed. However, it should be noted that a new fringe area will occur, although somewhat smaller in size, where the new fill slope interfaces with the ponded surface water. If practicable, NCDOT will develop a wetland fringe shelf during project construction to offset the impacts to the maximum extent practicable.

C. Impacts to the Coastal Fringe Evergreen Forest

Throughout the course of the project study, concern has been expressed by some agency representatives with regard to impacts to the coastal fringe evergreen forest community located on the mainland. The expression of concern was led by representatives of the N.C. Natural Heritage Program.

The coastal fringe evergreen forest is generally a mesic forest located on flat to low hills near the mainland coast. The canopy is dominated by loblolly pine (*Pinus taeda*), live oak (*Quercus virginiana*), and laurel oak (*Q. laurafolia*). Subdominant species include southern red oak (*Q. falcata*), pignut hickory (*Carva glabra*), water oak (*Q. nigra*), and longleaf pine (*P. palustris*). The understory is dominated by yaupon holly (*Ilex vomitoria*), sassafras (*Sassafras albidum*), and red bay (*Persea borbonia*). Common associates identified include wax myrtle (*Myrica cerifera*), red cedar (*Juniperus virginiana*), red maple (*Acer rubrum*), sweetgum (*Liquidambar styraciflua*), and sweetbay magnolia (*Magnolia virginiana*). Ground cover is sparse and low in diversity; however, a few vines such as greenbrier (*Smilax* sp.) and wild grape (*Vitis* sp.) were observed.

Admittedly, the integrity of the coastal fringe evergreen forest community in the project area has been compromised by the clearing of understory and development pressures taking place in the Town of Sunset Beach. Agency representatives have concurred with this observation as well.

A total of 0.97 hectares (2.4 acres) of impact are projected to this community with the construction of Alternative W1R. A majority of the impacts to this community occur between the AIWW and West Shoreline Drive (NC 179) where the new structure is proposed to overpass Canal Avenue and West Shoreline Drive (NC 179). Construction impacts will result from clearing for the construction of pier footings, the bridge superstructure, and construction right of way. Additional long term impacts will result from shading by the new structure. Furthermore, an area west of and adjacent to the alignment, located within existing NCDOT right of way, is proposed to serve as a mainland construction staging area and potential landing for barge construction operations.

The availability of areas that can be used for construction staging purposes is limited, and impacts to the coastal fringe evergreen forest community for these purposes may be unavoidable. However, NCDOT will minimize clearing of this community type to the greatest degree practicable. Possible opportunities for preservation and/or enhancement

of this community type exist in areas within and adjacent to existing and proposed NCDOT's right-of-way limits.

The NCDOT will coordinate with the NC Natural Heritage Program and NC Wildlife Resources Commission during the preparation of final and detailed mitigation plans.

IV. References

US Department of Agriculture (USDA), 1986. Soil Surveys of Brunswick County, North Carolina.