



US Army Corps  
of Engineers  
Charleston District

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**Reconnaissance Report**  
**Section 107 (Small Navigation Project)**

**Atlantic Intracoastal Waterway**  
**City of Beaufort & Beaufort County**  
**South Carolina**

**Realignment of the AIWW**  
**at S.C. Highway 21 (Woods Memorial Bridge)**  
**Between City of Beaufort and Lady's Island**

**DRAFT**

**March 1994**

## SYLLABUS

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This reconnaissance report has been prepared under the authority contained in Section 107 (small navigation projects) of the River and Harbor Act of 1968, as amended, to determine if there is Federal interest and justification in relocating the Atlantic Intracoastal Waterway (AIWW) to accommodate a new fixed span bridge to replace the Woods Memorial Bridge on U.S. Highway 21. Information compiled during this study is preliminary in nature and of the level of detail adequate for reconnaissance for continued Federal involvement.

The City of Beaufort and Beaufort County are evaluating options for decreasing downtown vehicular congestion caused by the opening of the Woods Memorial Bridge for AIWW traffic. Replacing the bridge with a new fixed span bridge is one of the options. A request, by letter dated March 01, 1993 (see Attachment A), was submitted to the Corps of Engineers by the City of Beaufort to study relocating the Beaufort River channel to accommodate a fixed span bridge between downtown Beaufort and Lady's Island. The City's main concern was insuring that the ramp for the fixed span bridge be started at the same location as the existing bridge.

This report shows that the channel relocation could remain in the natural deep area of the Beaufort River. The bridge design assumptions in this study are based on general bridge design criteria provided by the S.C. Department of Transportation and in accordance with Corps' design requirements. There would be no cost to the Federal government for construction or maintenance to implement this plan. Therefore, the plan is justified. Future study and coordination with the S.C. Department of Transportation during preliminary design of the bridge would confirm whether the report's determined location of the channel is accurate, the magnitude of Federal interest and a justified plan.

Rick L. Bousquet  
727-4549

## TABLE OF CONTENTS

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<u>Topic</u>	<u>Page No.</u>
Study Authority . . . . .	1
Study Purpose and Scope . . . . .	1
Study Area Description . . . . .	2
Plan Formulation . . . . .	2
Alternative Plans . . . . .	3
Engineering/Design . . . . .	4
Economical Evaluation . . . . .	5
Real Estate Evaluation . . . . .	5
Environmental Evaluation . . . . .	5
Conclusions . . . . .	6
Recommendations . . . . .	6

### List of Figures

<u>Figure No.</u>	<u>Page No.</u>
1. Study Area Map . . . . .	F1
2. Proposed Bridge & AIWW Channel Alignment . . . . .	F2
3. Existing River Depths . . . . .	F3

### List of Attachments

<u>Attachment</u>	<u>Page No.</u>
A. Sponsor's Letter of Request . . . . .	A1

## **STUDY AUTHORITY**

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This reconnaissance report has been prepared under the authority contained in Section 107 of the River and Harbor Act of 1968, as amended, to determine if there is Federal interest and justification in relocating the Atlantic Intracoastal Waterway (AIWW) channel to accommodate a new fixed span bridge. This new bridge would replace the Woods Memorial Bridge on U.S. Highway 21. A request, by letter dated March 01, 1993 (see Attachment A), was submitted to the Corps of Engineers by the City of Beaufort to study relocating the Beaufort River channel to accommodate this fixed span bridge between downtown Beaufort and Lady's Island.

## **STUDY PURPOSE AND SCOPE**

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The purpose of this report is to evaluate how the alignment of the Atlantic Intracoastal Waterway (AIWW) would be affected by the construction of a new fixed span bridge replacing the Woods Memorial bridge at U.S. Highway 21.

The City of Beaufort and Beaufort County are evaluating options for relieving traffic congestion as a result of bridge openings at Highway 21, where it crosses the AIWW. One of the options is to build a fixed span bridge to replace the swingspan Woods Memorial Bridge. A concern of the city is the location of the end of the bridge and how it lands traffic into the downtown business and historic district. If the bridge is built using the current location of the AIWW channel in the Beaufort River, the off ramp of the bridge would be located several blocks into the downtown area. Local businesses are concerned that traffic will be directed away from the business district. Also, there are concerns that property located next to the ramp would decrease in value. There is also a concern that a ramp running through the city is not to the benefit of urban development.

Therefore, the Corps has been asked to evaluate the option of relocating the AIWW channel to accommodate a new fixed span bridge.

## **STUDY AREA DESCRIPTION**

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The area covered under this study involves the Beaufort River Channel of the Atlantic Intracoastal Waterway (AIWW). This portion of the AIWW is bordered by the City of Beaufort and Lady's Island. See Figure 1, Study Area Map. S.C. State Highway 21 crosses the AIWW channel linking the downtown business district of Beaufort, through Lady's Island, to the outlying islands of St Helena, Hunting and Fripp. The City of Beaufort and these islands of Beaufort County are developing at a very quick pace. The AIWW channel is maintenance free and in alignment with the natural flow of the river.

The Woods Memorial Bridge, at the AIWW and Highway 21, is a swingspan bridge which allows commercial and recreational traffic to move up and down the AIWW. When the bridge is open, the link between the outlying islands and downtown Beaufort is closed, causing delays and congestion on both sides of the bridge. A fixed span bridge is possibly an option to relieving the congestion problem. The location of the fixed span bridge has not been determined by the S.C. Department of Transportation.

## **PLAN FORMULATION**

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This study involved the evaluation of how a fixed span bridge would affect the alignment of the AIWW channel in the Beaufort River. In order to accomplish this study, a general design for the new bridge would have to be determined and coordinated with the location of the channel. Since there has been no preliminary design work done on a fixed span bridge in the study area, design criteria for a typical fixed span bridge were obtained from the S.C. Department of Transportation. This criteria was coordinated with the Coast Guard and Corps of Engineers for minimum widths and heights of the bridge opening for the channel. For this study, the bridge design is preliminary and general.

Once a basic design of the bridge was determined, it was placed over the layout of the channel. A survey of the depths of the river was also coordinated with the channel and the bridge design. At this point it was determined that the channel would have to be moved closer to the marsh banks of Lady's Island. However, with a few changes to the turns in the channel, it was determined that the channel layout could still remain in the deep water of the river.

This determination meant that the channel would stay in the natural course of the river and remain maintenance free. With this design, the physical change in the channel would not change the flow of the river or affect the surrounding marsh lands.

## ALTERNATIVE PLANS

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The County of Beaufort and the City of Beaufort are considering a number of alternatives to relieving congestion in the study area. Other alternatives involve redirecting traffic to other bridges in the area or locating a fixed span bridge at some other point over the Beaufort River. For this study, the Corps only considered the alternative of relocating the AIWW channel to accommodate a bridge replacing the Woods Memorial Bridge. The determination that the relocation of the channel would keep it in the deep water of the river, resulted in no further requirements to consider other alternatives.

## ENGINEERING/DESIGN

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The following design criteria were used to evaluate the relocation of the Atlantic Intracoastal Waterway (AIWW) where Highway 21 crosses the AIWW adjacent to the City of Beaufort.

The city desires that any new bridge will have a starting elevation the same as that which currently exists at the Woods Memorial Bridge (WMB). This elevation is approximately elevation 10.0 feet NGVD. This elevation was determined using the elevations of tidal bench marks which are located in the top of the concrete and shell composite seawall on the east side of the WMB. The top of the roadway and the top of the composite seawall are approximately the same. The second design criterion used was the maximum rate of rise for the new bridge. The rate of rise, as required by the S.C. Department of Transportation, is 5.0 feet every 100 feet. Minimum vertical clearance was the third design criterion used. Minimum vertical clearance is 65.0 feet, measured from the water surface at mean high water to the bottom of the lowest portion of the new bridge. Mean high water at the WMB is approximately 3.9 feet NGVD. Therefore, the minimum elevation of the proposed new bridge as it crosses the AIWW would be approximately 69.0 feet NGVD.

*Should read  
Maximum Rate  
of Rise or % of  
grade allowed  
Recommended*

The S.C. Department of Transportation indicated that the typical design of a new bridge would require that the apex of the bridge be located 1500 feet horizontally from the starting point of the incline.

A proposed new bridge alignment and a proposed new AIWW channel were designed and are shown on Figure 2. The proposed new road alignment exits the City of Beaufort and touches down on Ladies Island at approximately the same location as the existing WMB. The new channel alignment is approximately 200.0 feet south of the existing channel alignment where the centerline of the proposed new bridge crosses the proposed new channel. The proposed new channel alignment would not require any new or maintenance dredging. Existing depths are shown on Figure 3.

The new channel alignment has more bends and will be more difficult to navigate. There is also potential for more damage to the new bridge's fender system. Therefore, a minimum horizontal clearance of 150 feet is recommended where the proposed new bridge centerline crosses the proposed new channel alignment.

The bathymetric survey was the only field data which was used for this study. All measurements are scaled and were taken from existing dredging maps. Detailed field data consisting of exact horizontal and vertical measurements will be required before initiation of final design.

## **ECONOMIC EVALUATION**

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As the economic evaluation portion of the study was proceeding, it was determined that the relocation of the channel would not require construction, real estate acquisition, dredging or involve any kind of operations or maintenance costs. From this determination it was realized that the benefits gained by relocating the channel would exceed the cost of relocating the channel. Thus, there would be Federal interest and justification in relocating the channel in line with the proposed new bridge alignment.

The delay costs resulting from bridge openings and navigational accidents had been completed at the time the above determination was made. No further economic evaluation was necessary.

The total delay costs resulting from both bridge openings and navigation accidents for adults, children, and commercial vehicles are \$31,950, \$2,180, and \$54,680 respectively. Thus, the total yearly delay costs are \$88,810.

## **REAL ESTATE EVALUATION**

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The real estate evaluation was not necessary due to the determination that the new channel alignment would remain inside the deep water of the Beaufort River. The requirements of real estate acquisition for new AIWW channel lands or for a disposal site are not required by the proposed location of the new bridge and channel.

## **ENVIRONMENTAL EVALUATION**

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As a result of the study, it was determined that the environment of the study area would not be affected by moving of the channel closer to Lady's Island. Prior to this determination, there were a number of environmental concerns. One such concern was the marsh which borders the river throughout the study area. The affects of cutting through established marsh land to relocate the AIWW channel would be an issue that would involve further investigation. Also, redirecting a maintenance free channel into an area that requires dredging on a regular basis would be an environmental issue. Locating a dredge material disposal site and a site for mitigation of marsh would be environmental concerns, as well.

However, since the relocation of the channel remained in the deep water of the Beaufort River, there were no changes in the environment of the study area. (The affects of a new bridge on the environment of the study area were not evaluated in this study.)



## **CONCLUSIONS**

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Based on the investigations conducted during this reconnaissance study, there is sufficient justification for initiation of a feasibility study for the realignment of the AIWW channel at S.C. Highway 21, between the City of Beaufort and Lady's Island.

However, a thorough and complete feasibility evaluation can not be conducted until a fixed span bridge design is initiated. The feasibility study should not be started until a more defined preliminary design of the bridge is completed by the S.C. Department of Transportation. Coordination with the state and local officials will be crucial in determining whether Federal interest and justification for a Federal project exists.

It is concluded that a feasibility study could be completed for less than \$40,000, so no cost sharing would be required for that phase.

## **RECOMMENDATIONS**

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It is concluded that this reconnaissance study is favorable and that it supports further study. The local sponsor has been appraised of these findings and is supportive. Therefore, it is recommended that this report be approved. It is also recommended that a Detailed Project Report not be initiated until such time that the preliminary design of a replacement bridge is developed.

# Study Area Map

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Figure 1



## Proposed Bridge & AIWW Channel Alignment

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Figure 2



# BEAUFORT

## LEGEND

- ☒ CENTERLINE(S)
- P.C. POINT OF CURVATURE
- P.I. POINT OF INTERSECTION
- P.T. POINT OF TANGENCY
- ==== EXISTING CHANNEL
- PROPOSED CHANNEL

## COORDINATES

- ① N-216469.70 E-2103769.33
- ② N-215916.49 E-2102664.53
- ③ N-215955.24 E-2101278.84
- ④ N-216184.62 E-2100142.93

CURVE DATA NO. 1  
 BEGIN OF PROJECT  
 P.C. = 0+00  
 = ☒ CARTERET STREET  
 N-217642.51  
 E-2101783.21  
 P.I. = 2+20.00  
 = INTERSECTION OF ☒ OF  
 BAY ST. AND CARTERET ST.  
 N-217422.51  
 E-2101783.21  
 P.T. = 4+38.255  
 $\Delta = 12^{\circ}-30'-00''$   
 L = 438.26'  
 D =  $2^{\circ}-51'-08''$   
 T = 220'  
 R = 2008.81'

CURVE DATA NO. 2  
 P.C. = 4+38.255  
 N-217207.72  
 E-2101735.59  
 P.I. = 14+18.26  
 N-216251.42  
 E-2101521.40  
 P.T. = 22+96.48  
 $\Delta = 45^{\circ}-00'-00''$   
 L = 1858.22'  
 D =  $2^{\circ}-25'-18''$   
 T = 980'  
 R = 2365.93'

☒ OF PROPOSED NEW  
 BRIDGE

☒ OF EXISTING  
 CHANNEL

TIE IN POINT OF  
 PROPOSED CHANNEL  
 TO EXISTING CHANNEL  
 N-216615.41  
 E-2103866.72

☒ OF PROPOSED NEW  
 CHANNEL

EXISTING  
 SWING BRIDGE  
 HOR. CL. 90 FT  
 VERT. CL. 30 FT

## NOTES:

1. POINT OF TANGENCY OF FIRST CURVE IS POINT OF CURVATURE FOR SECOND CURVE.
2. COORDINATES ARE NAD27.

PROPOSED CHANNEL FOR  
 WOOD MEMORIAL BRIDGE  
 REPLACEMENT

BEAUFORT, S.C.

SCALE: 1"=500' DATE: JAN. 3, 1

500 250 0 500 1000 FT  
 SCALE: 1"=500'

END = 32+16.48  
 N-214647.16  
 E-2102539.43

\*- [ ] BE FULL SIZE INSERT TO FINAL STUDY REPORT

## Existing River Depths

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Figure 3



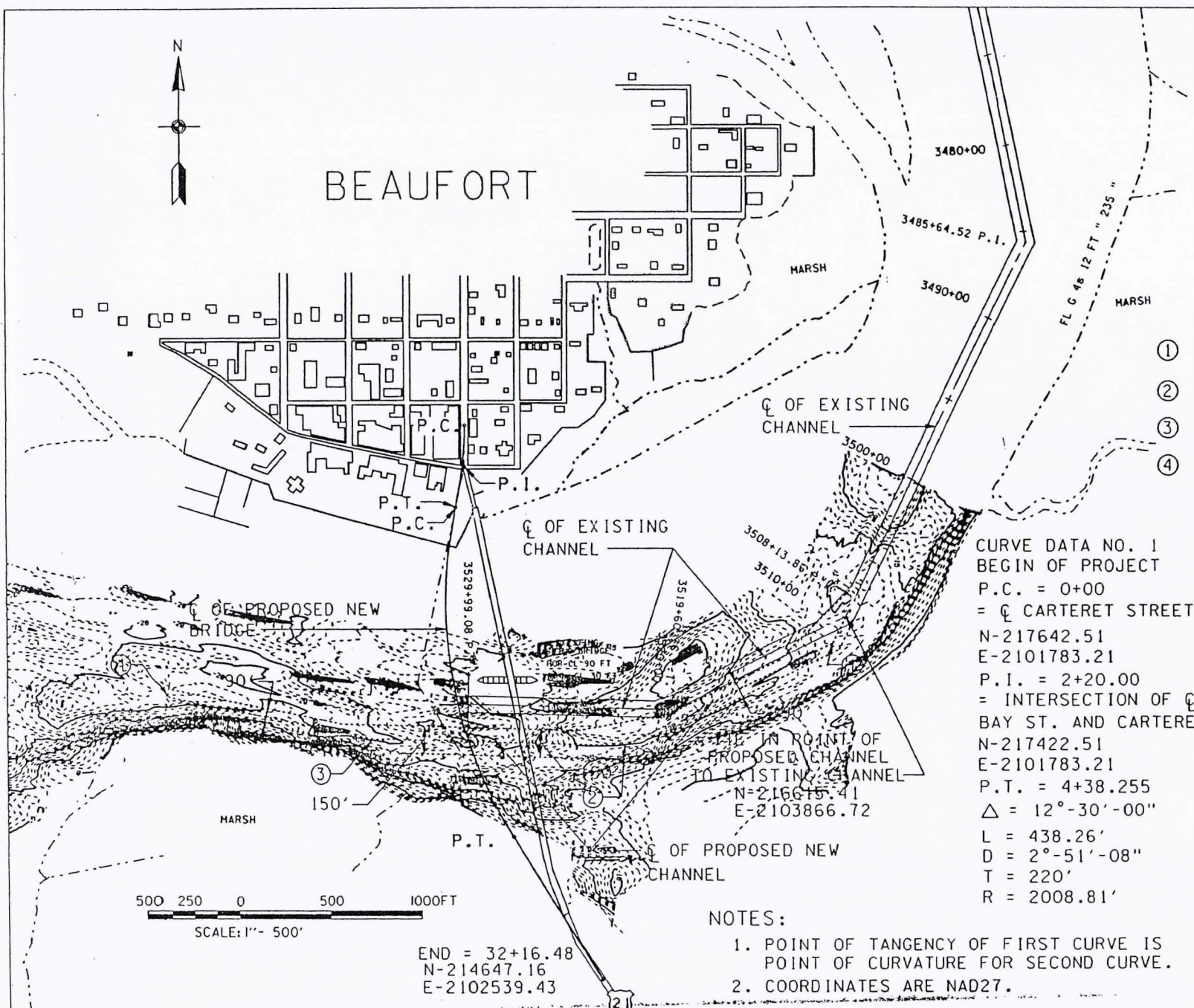
# BEAUFORT

## LEGEND

- ☉ CENTERLINE(S)
- P.C. POINT OF CURVATURE
- P.I. POINT OF INTERSECT
- P.T. POINT OF TANGENCY
- ==== EXISTING CHANNEL
- PROPOSED CHANNEL

## COORDINATES

- ① N-216469.70 E-2103769.33
- ② N-215916.49 E-2102664.53
- ③ N-215955.24 E-2101278.84
- ④ N-216184.62 E-2100142.93



CURVE DATA NO. 1  
 BEGIN OF PROJECT  
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 = ☉ CARTERET STREET  
 N-217642.51  
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 P.I. = 2+20.00  
 = INTERSECTION OF ☉ OF  
 BAY ST. AND CARTERET ST.  
 N-217422.51  
 E-2101783.21  
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 N-217207.72  
 E-2101735.59  
 P.I. = 14+18.26  
 N-216251.42  
 E-2101521.40  
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PROPOSED CHANNEL FOR  
 WOOD MEMORIAL BRIDGE  
 REPLACEMENT

BEAUFORT, S.C.

END = 32+16.48  
 N-214647.16  
 E-2102539.43

TO BE FULL SIZE INSERT IN FINAL STUDY REPORT

## **Sponsor's Letter of Request**

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**Attachment A**





CITY OF BEAUFORT  
POST OFFICE DRAWER 1167  
BEAUFORT, SOUTH CAROLINA, 29901  
803-525-7070  
FAX NO. (803) 525-7013

March 1, 1993

District Engineer  
U.S. Army Engineer District, Charleston  
Post Office Box 919  
Charleston, SC 29402

Dear Sir:

In accordance with the provisions of Section 111 of the River and Harbor Act of 1968, as amended, which authorizes the federal government to initiate investigations and studies in the interest of mitigation of shore damage attributable to navigation works, the City of Beaufort, SC in cooperation and coordination with the County Council of Beaufort County, hereby makes formal application for a study of the Beaufort River channel at U.S. Highway 21 in the City of Beaufort and Beaufort County, SC between the City of Beaufort and Lady's Island.

At this time the City of Beaufort/Beaufort County is requesting that a reconnaissance study be conducted to determine if this would be a viable project. This request is asking that it be treated as a Continuing Authorities Program Project.

If the First Phase determines through analysis based on sound engineering and economic principals clearly demonstrates the feasibility of the proposed work, the City of Beaufort and/or Beaufort County shall present such findings to their respective governing bodies (Beaufort City Council and Beaufort County Council) for action on continuing with Phase Two.

It is the understanding of the local governments that cost sharing is not required for a study for a navigation improvement to the inland waterway system. The Beaufort River is on the inland waterway system.

The City of Beaufort City Council and the County Council of Beaufort County are in a position to provide the following local cooperation and participation in the requested inland waterway system Phase One study:

Assistance from the Beaufort Area Transportation Systems  
(BATS) Policy Committee

District Engineer  
March 1, 1993  
Page 2

Assistance from various departments of local government which can supply numerous data materials such as maps, demographics, etc.

Setting up local meetings and/or public hearings.

Cooperation with other local and state agencies.

Sincerely,

A handwritten signature in cursive script that reads "Gary M. Cannon". The signature is written in black ink and is positioned above the typed name.

Gary M. Cannon  
City Manager

GMC/dm