FINAL PRELIMINARY ENGINEERING REPORT

WITHLACOOCHEE RIVER BRIDGE REPLACEMENT

ON S.R. 700 IN PASCO COUNTY, FLORIDA

WPI No.: 7115954
State Project No.: 14080-3506
Bridge No.: 140026

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for

FLORIDA DEPARTMENT OF TRANSPORTATION

May 31, 1989

Daniel T. [illegible]
5/31/89

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EXECUTIVE SUMMARY

Three viable alternative alignments were identified and analyzed for the replacement of the SR 700 (US 98) bridge over the Withlacoochee River: eastern and western alignments adjacent to the existing bridge and replacement on the existing alignment. Based on public input and the evaluation of impacts to regional and community development, conservation of natural resources, public facilities and services, and total construction costs it is recommended that the bridge be replaced on the existing alignment. Traffic during construction should be maintained by a route detour due to the close proximity of SR 35 (US 301). The additional 1.5 miles travelled by through traffic on the route detour is not significant. A temporary detour bridge at the site is not recommended because of the economic and environmental impacts associated with the construction and demolition of the structure.

The Location Hydraulic Study has determined that a length of 245 feet is appropriate for the replacement bridge. Due to the history of flooding on the Withlacoochee River documented in the Location Hydraulic Study, it is recommended that the proposed bridge be constructed no lower than the existing bridge. Matching the existing low member elevation would provide a structure that meets current desirable clearance criteria above the design flood.

1. INTRODUCTION

1.1 Purpose. The purpose of this Preliminary Engineering Report is to document the viable alternatives for the replacement of the SR 700 (US 98) bridge over the Withlacoochee River in Pasco County, Florida. The report includes a discussion of the existing conditions, design criteria, description and evaluation of alternatives, input from individuals during the public involvement process, and concludes with a recommended location and length of the replacement bridge.

1.2 Need for Improvement. The existing roadway width of 28 feet is substandard. It needs a minimum width between barrier rails of 44 feet to accommodate two 12-foot travel lanes with 10-foot shoulders. The live load used in the original design (H-15) of the bridge is inadequate. The bridge should be improved so it can support a standard live load based on todays standards for a typical bridge on a rural principal arterial road. It would be desirable for the bridge to have an estimated remaining live of 40 years.

1.3 Project Description. The project entails identifying and evaluating alternatives for the replacement of the SR 700 (US 98) bridge (Bridge No. 140026) over the

Withlacoochee River. The existing bridge is located approximately 7 miles north of Dade City in Pasco County at mile post 1.62 (see Figure 1-1).

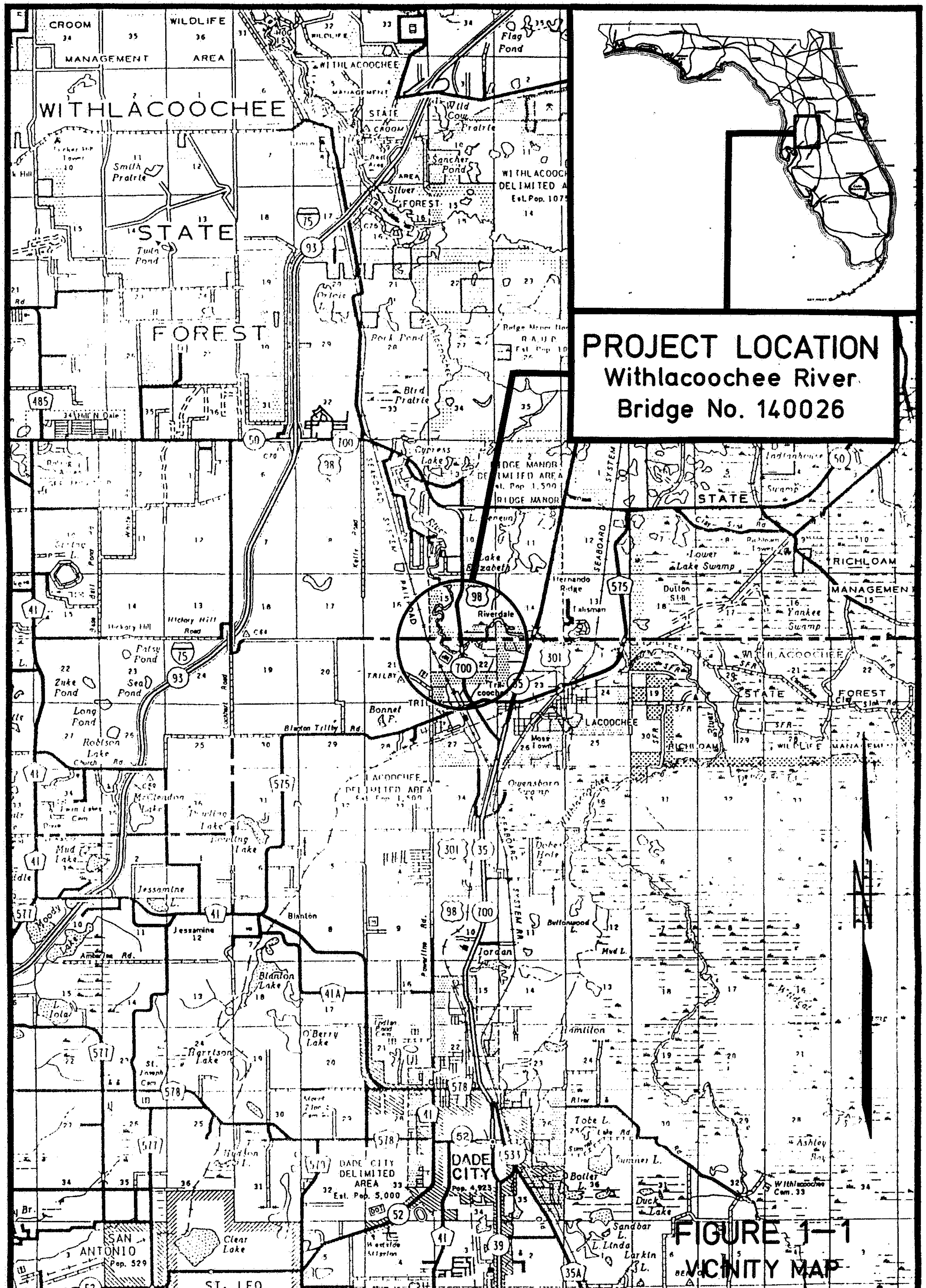


FIGURE 1-1
VICINITY MAP

2. EXISTING CONDITIONS

The following chapter discusses the existing bridge features, roadway characteristics, and environmental characteristics of the surrounding area.

2.1 Existing Bridge

2.1.1 Type of Structure: The substructure consists of pile bents installed perpendicular to the centerline of the roadway. The end bents have seven prestressed concrete piles, 18" square, spaced at 6'-0" on center. The intermediate bents have four prestressed concrete piles at 8'-0" on center. The pile caps are cast in place concrete, 2'-7" high x 2'-8" deep. The piles in bents 3 and 4 adjacent to the river channel have been repaired with grout filled fiberglass jackets. The September 3, 1987, Underwater Bridge Inspection Report indicated the jackets remain "voided" with numerous "hollow sounding" areas present on each jacket. The depth of penetration of the existing piles is unknown. Original pile driving records were not available for this structure.

The superstructure consists of four 21-inch deep wide flange steel beams spaced at 8'-0" on center. On top of the beams is a seven-inch deep concrete deck composite with the steel beams.

2.1.2 Condition (Structure Rating and Year of Construction): The July 29, 1987, Bridge Inspection Report lists the following items in the superstructure that have been satisfactorily repaired: 1) all 56 bearing pads have been replaced, 2) the structural steel has been painted, 3) elastomeric compression seals have been installed in the expansion joints, and 4) both approach slabs have been overlayed with asphalt.

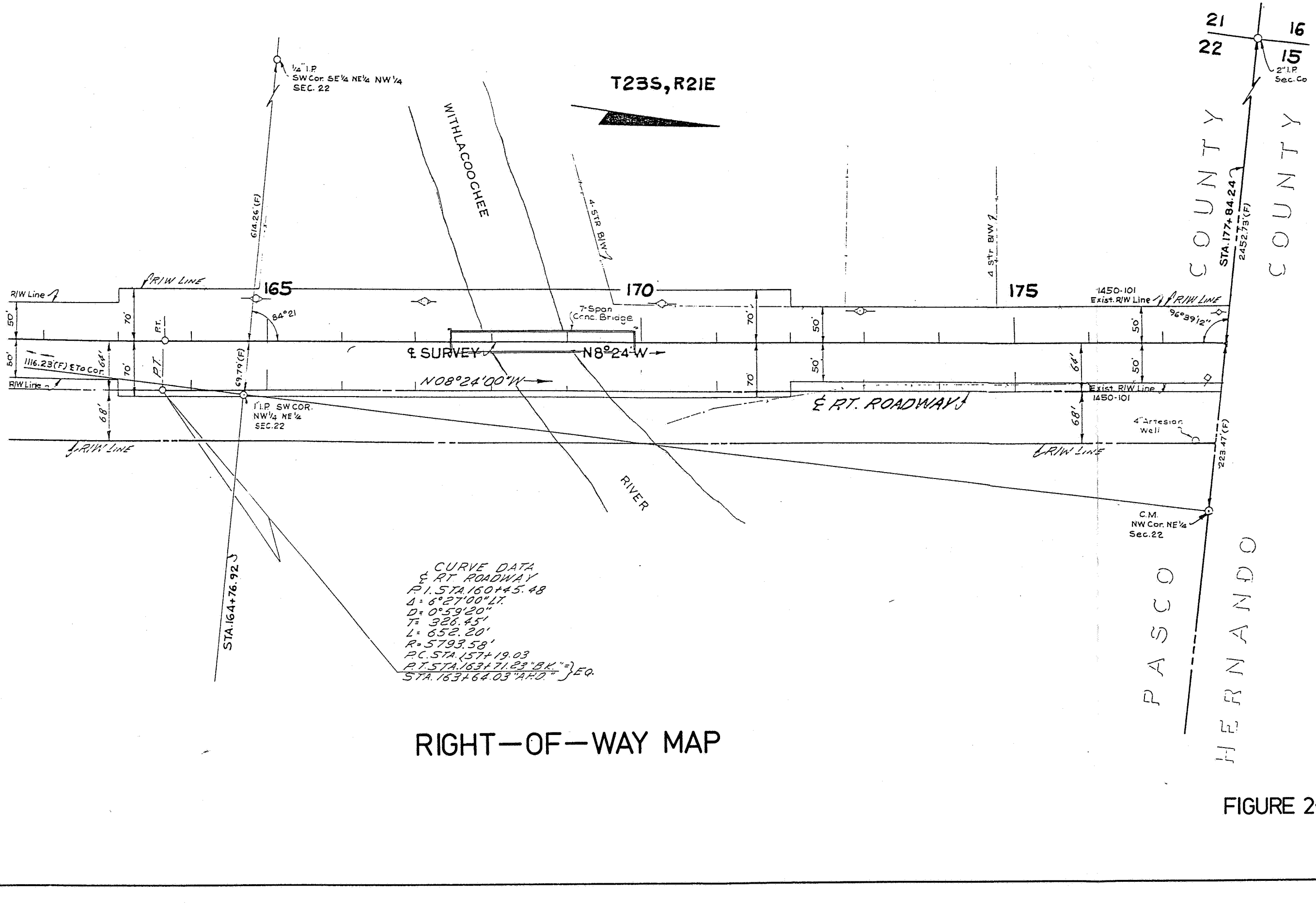
The Structure Inventory and Appraisal of August 31, 1987, describes the condition of the bridge deck as fair (rating 6), the superstructure as generally good (rating 7), the substructure as generally fair (rating 5), and the channel and channel protection as good (rating 8). The operating rating of the structure is H32. The inventory rating of the structure is H19. The original design was based on an H-15 live load. The overall

sufficiency rating of the structure is 65.7. The bridge was constructed in 1951.

2.1.3 Horizontal and Vertical Alignment: The centerline of the existing bridge is offset 31 feet west of the centerline of the 202-foot wide right-of-way (see Figure 2-1). The existing cross-section of the bridge consists of two twelve-foot lanes with two-foot shoulders for a total roadway width of 28 feet. Nine-inch high curbs (2'-6" wide) separate the roadway from the concrete handrail. The overall width of the concrete deck is 35 feet. The bridge is on a tangent section of the roadway with a 0.0% grade. The approaches to the bridge are on approximately 15-foot high fill sections. An aerial view of the site is shown in Figure 2-2.

2.1.4 Span Arrangement: The bridge has seven simply supported spans which are 35 feet long for a total length of 245 feet.

2.1.5 Channel Data: The Withlacoochee River channel is approximately eight feet deep and 90 feet wide at the bridge. The channel banks are steep and well defined. The Withlacoochee



RIGHT—OF—WAY MAP

FIGURE 2—1


EXISTING CONDITIONS
L E G E N D
COUNTY LINE
EXIST. R/W LINE
FLOOD PLAIN (100 YR.)
OVERHEAD ELECTRIC
POWER POLE
OVERHEAD TELEPHONE
TELEPHONE POLE
UNDERGROUND TELEPHONE
TELEPHONE BOX
RESIDENTIAL DWELLING
COUNTY
COUNTY
PETERSON PARK
P.T. STA. 13+64.03
1°00' CURVE LEFT
N 08°24' W
To Brooksville
S.R. 700 (U.S. 98)
50
PRIVATE CAMPGROUND
RESIDENTIAL DWELLING
River
PASCO
HERNANDO
W.P.I. No. 7115954
BRIDGE No. 140026
S.R. 700 (U.S. 700)
Withlacoochee River
Approx. Scale 1" = 200'

FIGURE 2—2


S.R. 700 (U.S. 98)
N 01°57' W
To Dade City
1°00' CURVE LEFT
P.T. STA. 163+64.03
PETERSON PARK
RESIDENTIAL DWELLING
N 08°24' W
PRIVATE CAMPGROUND
RESIDENTIAL DWELLING
River
CURVE DATA
P.I. STA. 160+41.87
= 06°27' Lt.
D = 1°00'
T = 322.84'
L = 645.00'
R = 5729.58'
P.C. STA. 157+19.03
P.T. STA. 163+64.03

River is considered a navigable waterway to mile marker 85 according to a public notice from the U.S. Coast Guard dated August 31, 1983. The SR 700 bridge is located at mile marker 89 which is outside of the area of the river which is considered navigable.

2.1.6 Bridge Openings: The bridge does not have a moveable span.

2.1.7 Ship Impact Data: The Withlacoochee River is not navigable at this location, therefore, no ships will impact the structure.

2.1.8 Bridge Drainage System: The drainage system on the existing bridge consists of scuppers spaced on 8'-9" centers along both gutterlines of the bridge. The scuppers drain directly into the river and overbank areas.

2.2 Existing Roadway Characteristics

2.2.1 Functional Classification: SR 700 (US 98) in this area is classified as Principal Arterial Rural.

2.2.2 Typical Section: The existing roadway cross section consists of two 12-foot travel lanes with 8-foot grass shoulders.

2.2.3 Pedestrian and Bicycle Facilities: There are no pedestrian or bicycle facilities on SR 700 near the bridge.

2.2.4 Right-of-Way: SR 700 has 202 feet of right-of-way at the bridge. The centerline of the roadway is offset 31 feet to the west of the centerline of the 202-foot wide right-of-way. The existing roadway in Hernando County (800 feet north of the bridge) is centered in 100 feet of right-of-way.

2.2.5 Horizontal Alignment: The bridge is located on a tangent section of the roadway. The roadway alignment is depicted in Figure 2-2. The existing 645-foot long one degree horizontal curve located approximately 400' south of the existing structure is not superelevated. Based on current AASHTO criteria, this corresponds with a design speed of 40 m.p.h. rendering the roadway

alignment substandard for a road with a posted speed limit of 55 m.p.h.

2.2.6 Vertical Alignment: The approaches to the bridge are located on approximately 15-foot high fill sections. Both the north and south approach roadways have a 0.0% grade. The 2.4 foot rise in profile grade at the existing structure is accomplished through a series of 300-foot long vertical curves located adjacent to each end of the structure (See Figure 4-3). Based on current design criteria for minimum length of vertical curves the existing vertical alignment satisfies the requirements for a design speed of 50 mph.

2.2.7 Drainage: Swale drainage is utilized for the roadway.

2.2.8 Geotechnical Data: Geotechnical Data is included in Appendix A.

2.2.9 Accident Data: Data was reviewed for accidents in the vicinity of SR 700 over the Withlacoochee River. No accidents occurred in this area during the period from 1986 to 1987. There were two accidents reported in

1985 involving vehicles travelling south on SR 700.

The first accident occurred on Thursday, March 21, 1985, at 7:00 A.M. and involved two vehicles. The accident was a rear end collision of a motor vehicle with another motor vehicle in transit. The road surface was slippery due to rain. The location of the accident was not at an intersection, railroad crossing, or bridge or in a location where vision was obscured. There were two injuries but there was no property damage other than the vehicles involved.

The second accident occurred on Tuesday, August 6, 1985, at 4:00 P.M. and involved one vehicle. The vehicle ran off the road and into water in addition to hitting a tree. The road surface was wet due to rain. The location of the accident was at an intersection. Visual conditions were obscured due to the inclement weather. One person was injured but there was no property damage other than the vehicle involved.

Although both accidents occurred near the bridge (mile post 1.560 and 1.618), no conclusive information is contained in the accident reports to indicate the bridge was a contributing factor.

2.2.10 Traffic Signals, Locations and Intersection Design: There are no traffic signals or intersections near the Withlacoochee River Bridge. The nearest intersections with through roads are 2.1 miles north of the bridge at SR 50 and 0.9 mile south at CR 575. The entrance to the private campground in the southeast quadrant of the site is approximately 450 feet south of the bridge on the east side of the road. The entrance to the public roadside park in the southwest quadrant of the site is approximately 250 feet south of the bridge on the west side of the road. There are three driveway turnouts to the north of the bridge within 500 feet of the end of the bridge.

2.2.11 Lighting: There is no roadway lighting on or near the bridge.

2.2.12 Utilities: There are no utilities attached to the bridge. There is a major overhead 14.4 KV electrical power transmission line owned by the Withlacoochee Electric Coop, Inc. that parallels the bridge, approximately 50 feet to the west of the centerline of the bridge. There is also an overhead 600 pair (600/24 STALP-2) telephone cable owned by United Telephone System that terminates at underground connections on both sides of the bridge. The cable is located approximately 55 feet west of the centerline of the bridge.

2.2.13 Structural and Operational Conditions: The asphaltic concrete roadway pavement in the vicinity of the bridge shows signs of deterioration with alligator cracking in some areas. The roadway is currently posted with a 55 m.p.h. speed limit. Passing is allowed in both directions on the roadway at the bridge.

2.3 Existing Environmental Characteristics

2.3.1 Land Use Data: The land around the bridge is rural in nature consisting of undeveloped land, agricultural operations, recreational facilities and scattered residential development. A residence is located 300 feet northwest of the end of the bridge and another residence is located 350 feet northeast of the bridge. The only commercial activity observed on SR 700 (US 98) between SR 50 and CR 575 was a privately-owned campground located southeast of the bridge. The Florida Department of Natural Resources maintains a public roadside park adjacent to the river in the southwest quadrant of the project site. The Pasco County Development Services Department indicates that the County's Comprehensive Plan currently designates the land around the bridge as R-3 which allows residential development at a density of up to three dwelling units per acre.

2.3.2 Cultural Features and Community Services: There are no cultural features near the bridge. A public park is located southwest

of the bridge. The Hernando County School District utilizes the bridge for one of its school bus routes to pick up students who reside in Pasco County but attend school in Hernando County. No private schools utilize the bridge for their bus routes. The Pasco County School District does not have any school bus routes that cross the Withlacoochee River in this area.

2.3.3 Natural and Biological Features: The Withlacoochee River channel is approximately 90 feet wide and eight feet deep at the bridge. The channel banks are steep and well defined. The Withlacoochee River has been identified as a candidate for the Outstanding Florida Water (OFW) classification. A listing of flora obtained during wetland delineation at the bridge site includes Red Maple, Pennyworth, Bog Rushes, Water Tupelo, Knot Grass, Swamp Laurel Oak, Dwarf Palmetto, Willow, and Bald Cypress (See Appendix B).

The wetlands on both sides of the structure are classified as riverine, emergent (non

persistent), palustrine scrub shrub, and palustrine forested.

A Preliminary soils investigation has been performed by Jammal & Associates, Inc. and is included in Appendix A. Additional existing soils information obtained from the Soil Conservation Service publication for Pasco County identifies the soils in the vicinity of the bridge as Pomello. The unified Soil classifications include SP and SP-SM near the surface and SP-SM, SM and SP to approximately seven feet deep. The corresponding AASHTO soil classifications are A-3 near the surface and A-3 and A-2-4 to approximately seven feet deep.

3. TRAFFIC

3.1 Existing Traffic Volumes. The Florida Department of Transportation (FDOT) has indicated that the 1987 traffic volume on the bridge was 5,501 Average Annual Daily Traffic (AADT). The peak hour (K factor) was 10.65%, the directional split (D factor) was 55.52%, the 24 hour percentage of trucks (T factor) was 10.75%, and design hour percentage of trucks was 5.38%.

3.2 Traffic Volume Projections. The FDOT has projected future traffic on SR 700 between SR 35 and the Hernando County Line as follows:

Year	SR 35 to Hernando County Line
1995	6,969 AADT
2000	8,078 AADT
2010	10,857 AADT

The FDOT assumes that the K, D and T factors will remain the same as the 1987 percentages.

3.3 Level-of-Service. A level-of-service analysis was conducted for 1987, 1995, 2000 and 2010 utilizing the roadway data in Sections 2.2.1 and 2.2.2 (i.e. classifications, number of lanes, type of facility), the

existing and projected traffic volumes from Section 3.2, and the 1985 Highway Capacity Manual.

The highway capacity analysis utilizing the manual indicates that this two-lane rural principal arterial has a capacity of 22,590 AADT with a level-of-service C maximum volume of 14,452. The projected volumes for the bridge indicate a future level-of-service of slightly below C. The existing level-of-service is above B.

4. DESIGN CRITERIA

4.1 Introduction

Design criteria utilized to establish and evaluate alternatives for the replacement of the Withlacoochee River bridge included four general categories: Hydraulic Design, Roadway Design, Bridge Design, and Environmental Design. A summary of applicable criteria is shown in Table 4.1.

4.2 Hydraulic Information

A bridge Location Hydraulic Study was performed for the replacement of the SR 700 (US 98) Withlacoochee River bridge (see Appendix C). The purpose of this study was to determine a recommended structure length and low member elevation for the replacement bridge.

A 115 foot structure which causes a one foot rise in backwater for the 100-year flood was analyzed. A 245 foot structure which causes no decrease in the flood carrying capacity of the river was also analyzed. The low member elevation of both structures was set at elevation 71.6 feet in order to match the existing bridge low member elevation.

S.R. 700/ U.S. 98 OVER THE WITHLACOOCHEE RIVER
PROJECT DESIGN CRITERIA

DESIGN ELEMENT	DESIGN VALUE		SOURCE
ROADWAY	DESIGN SPEED	– 70 M.P.H. (55 M.P.H. POSTED)	FDOT ROADWAY DESIGN STANDARDS (1988)
	TEMPORARY DETOUR STRUCTURE DESIGN SPEED (IF REQUIRED)	– 20 M.P.H. (MAX) BELOW POSTED SPEED	FDOT ROADWAY DESIGN STANDARDS (1988)
	APPROACH ROADWAY TYPICAL SECTION	–2–12' TRAVEL LANES WITH 10' SHOULDERS (4' PAVED)	FDOT GREEN BOOK (1986)
	AVERAGE ANNUAL DAILY TRAFFIC	– 1987: 5,501 2010(PROJ): 10,857	FDOT BUREAU OF ROADWAY DESIGN
BRIDGE STRUCTURAL	DESIGN LIVE LOAD	– HS20–44	FDOT STRUCTURES DESIGN GUIDELINES
	DESIGN METHOD	– LOAD FACTOR DESIGN EXCEPT PRESTRESSED COMPONENTS BY SERVICE LOAD DESIGN	FDOT STRUCTURES DESIGN GUIDELINES AND AASHTO STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES (1983) WITH ADDENDA
	TYPICAL SECTION	– 44' CLEAR DECK WIDTH WITH TRAFFIC RAILING (2–12' LANES WITH 10' SHOULDERS – MINIMUM)	FDOT STRUCTURES DESIGN GUIDELINES
HYDRAULIC	VERTICAL CLEARANCE	– 2' LOW MEMBER CLEARANCE ABOVE 25 YEAR FLOOD 3' DESIRABLE CLEARANCE 2' TO 3' LOW MEMBER CLEARANCE ABOVE 50 YEAR FLOOD	SWFWMD FDOT DISTRICT 7 FDOT DRAINAGE MANUAL (1987)
	HORIZONTAL CLEARANCE	– 25' BETWEEN BENTS (MINIMUM)	SWFWMD
	BENT OR PIER SPACING	– NO BENTS OR PIERS IN CENTER OF CHANNEL	SWFWMD
	ALIGNMENT	– BENTS TO BE PARALLEL WITH NORMAL FLOW	SWFWMD
	MAXIMUM AVERAGE FLOW VELOCITY	– 2.5 FPS: (25 YEAR FLOOD)	SWFWMD
	MAXIMUM HEAD LOSS	– 0.10 FEET AT LIMIT OF UPSTREAM OR PROPERTY BOUNDARY OR RIGHT–OF–WAY (25 YEAR FLOOD)	SWFWMD
	DESIGN FLOW	– 25 YEAR FLOOD 50 YEAR FLOOD	SWFWMD FDOT DRAINAGE MANUAL
ENVIRONMENTAL/ PERMITTING	ENVIRONMENTAL CLASSIFICATION	– SUBSTRUCTURE: NON–CORROSIVE (SLIGHTLY AGGRESSIVE) SUPERSTRUCTURE: NON–CORROSIVE (SLIGHTLY AGGRESSIVE) LOCATION: INLAND	GEOTECHNICAL SUBCONSULTANT
	CONSTRUCTION PERMITS REQUIRED*	1.) EASEMENT/LEASE 2.) DREDGE AND FILL 3.) WATER QUALITY (EXEMPTION)	DEPARTMENT OF NATURAL RESOURCES DEPARTMENT OF ENVIRONMENTAL REGULATION & THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT THE SOUTHWEST FLORIDA WATER MANAGEMENT DISTRICT
	*AS INDICATED BY THE BRIDGE PROGRAM GENERAL CONSULTANT		

TABLE 4.1

The FHWA's WSPRO computer program was used to determine potential water stages and flow velocities for the 25-year, 50-year and 100-year floods for the alternative replacement structures. Discharge rates for the Trilby stream gage, which is located 1.53 miles upstream of the SR 700 (US 98) crossing, were used in conjunction with USGS regression equations in order to determine design discharge rates at the project site. Starting water surface elevations were taken from the SWFWMD report Flood-Plain Information on the Withlacoochee River. A summary of discharge, average flow velocity through the structure, and water surface elevation 250 feet upstream of the structure, for the no structure condition, the existing structure, and the replacement alternative structures is shown in Table 4.2.

In order to determine the recommended replacement bridge length, a subjective analysis of the risks engendered by each design alternative was performed. Criteria used to evaluate the potential risk of each alternative due to flooding included structural damage, roadway damage, upstream damage, wetland impacts and floodplain impacts. Based on this analysis it was determined that due to encroachment on a regulated floodway, the increased risks of upstream flood damages, and the greater wetland and floodplain

SUMMARY OF HYDRAULIC ANALYSIS

WITHLACOOCHEE RIVER AT S.R. 700/ U.S. 98

FLOOD FREQUENCY	Q (c.f.s.)	NO STRUCTURE CONDITION		EXISTING 245' STRUCTURE		115' STRUCTURE ALTERNATIVE		245' STRUCTURE ALTERNATIVE	
		VELOCITY (ft./sec.)	*W.S.E. (ft. NGVD)	VELOCITY (ft./sec.)	*W.S.E. (ft. NGVD)	VELOCITY (ft./sec.)	*W.S.E. (ft. NGVD)	VELOCITY (ft./sec.)	*W.S.E. (ft. NGVD)
25 YEAR	5723	1.22	65.96	2.00	65.99	4.80	66.57	2.00	65.99
50 YEAR DESIGN FLOOD	7288	1.30	67.26	2.31	67.31	5.49	68.11	2.31	67.31
100 YEAR BASE FLOOD	9115	1.36	68.57	2.63	68.64	6.21	69.56	2.63	68.64

*W.S.E. — WATER SURFACE ELEVATION
250' UPSTREAM OF THE
EXISTING/PROPOSED STRUCTURE ;
ALL OTHER DATA AT THE STRUCTURE

NOTE: For detailed output see APPENDIX.

TABLE 4.2

impacts associated with the 115-foot replacement structure, this structure was not a viable alternative.

The 245-foot replacement structure was recommended. No reduction in hydraulic performance was realized from the recommended replacement structure. Water surface elevations were not expected to increase as a result of the proposed structure. Pursuant to minor wetland mitigation and floodplain storage compensation, adverse impacts on natural and beneficial floodplain values were not anticipated. There was no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it was determined that this encroachment was not significant.

4.3 Roadway Design

4.3.1 Design Standards: Design standards contained in AASHTO's A Policy on Geometric Design of Highways and Streets, FDOT Standard Specifications, and the FDOT Manual of Uniform Minimum Standards for Design, Construction and Maintenance for Streets and Highways were used to establish minimum criteria for evaluating alternatives.

The following design parameters were considered:

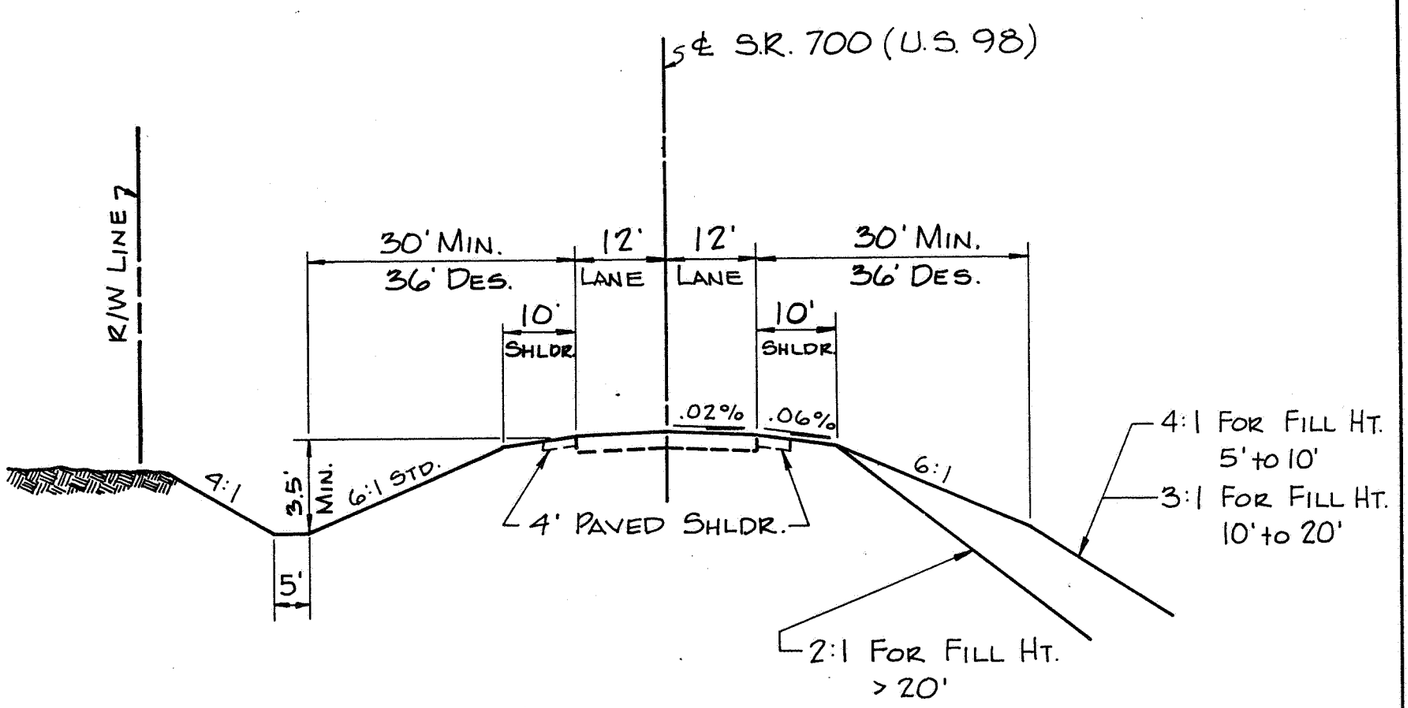
Cross Section
Design Speed
Horizontal and Vertical Alignment
Drainage

4.3.2 Cross Section: Based on the level-of-service analysis discussed in Section 3.3 it was determined that a two-lane roadway section provided level-of-service of slightly below "C" for design traffic volumes in 2010 at the project site.

The proposed typical roadway section consists of two, 12-foot travel lanes with 10-foot shoulders (four-foot paved). Roadway embankment slopes vary between 6:1 and 2:1 depending on fill height (see Figure 4-1).

4.3.3 Design Speed: Due to the relatively linear and level nature of the adjacent roadway sections, a design speed of 70 miles per hour was selected for use in setting alternative horizontal and vertical alignments.

S.R. 700 (U.S. 98) OVER THE WITHLACOOCHEE RIVER



PROPOSED
TYPICAL ROADWAY SECTION
N.T.S.

FIGURE 4-1

4.3.4 Horizontal and Vertical Alignment: The existing one degree curve approximately 400 feet south of the Withlacoochee River bridge was analyzed using a design speed of 70 m.p.h. and the corresponding required values of passing and stopping sight distance of 2500 feet and 850 feet respectively. Based on this analysis it was determined that adequate passing sight distance was provided for travel in either direction within the limits of this curve.

The existing one degree curve has no superelevation. AASHTO criteria for a one degree curve with design speed of 70 mph requires a superelevation rate of 0.37 foot per foot with minimum length of runoff equal to 170 feet.

4.3.5 Drainage: Roadway stormwater runoff will be collected in swales adjacent to the alignment and will drain directly into the Withlacoochee River. Stormwater retention facilities are not anticipated for this project (See Section 4.5).

4.4 Bridge Design

4.4.1 Design Criteria: The following design criteria were used in the development of alternatives.

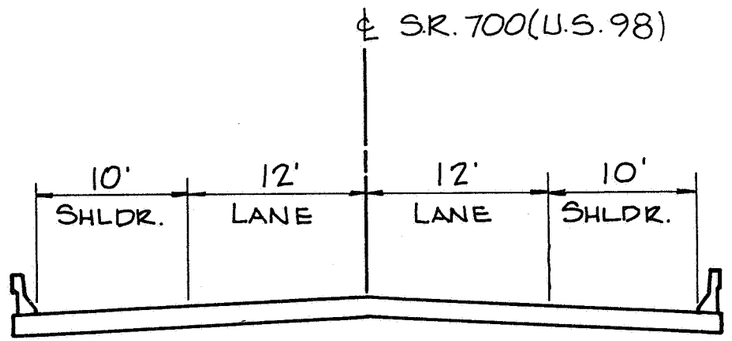
Live Load
Structures Standards & Specifications
Typical Section
Vertical Alignment
Material Environment Class
Aesthetic Design Policy
Drainage

4.4.2 Live Load: The design live load for the proposed structure is HS 20-44.

4.4.3 Structures Standards: All structures will be designed in accordance with the latest standards and specifications adopted by the Florida Department of Transportation Bureau of Structures Design and AASHTO Standard Specifications for Highway Bridges with addenda.

4.4.4 Typical Section: The typical section consists of two 12-foot travel lanes with 10-foot shoulders and standard 1'-6 1/2" barrier rails (see Figure 4-2). According to the FDOT Structures Design Guidelines bridge shoulders should match the approach roadway shoulders. Ten foot shoulders are desirable for a two lane rural highway, (FDOT Greenbook, Table III-8), and are recommended for this project. The typical section will have an overall width of 47'-1". The Pasco County Comprehensive Plan does not recommend pedestrian or bicycle facilities on SR 700 at this location. No provisions are proposed for bicycles or pedestrians at this structure.

Superstructure types considered viable for this project include cast in place concrete decks composite with precast concrete AASHTO Type II or Type III beams or rolled steel beams, cast in place concrete flat slabs, or prestressed concrete planks post-tensioned transversely. Superstructure depths vary from approximately 2 to 5 feet.



TYPICAL BRIDGE SECTION

N.T.S.

S.R. 700 (U.S. 98) BRIDGE OVER
THE WITHLACOOCHEE RIVER

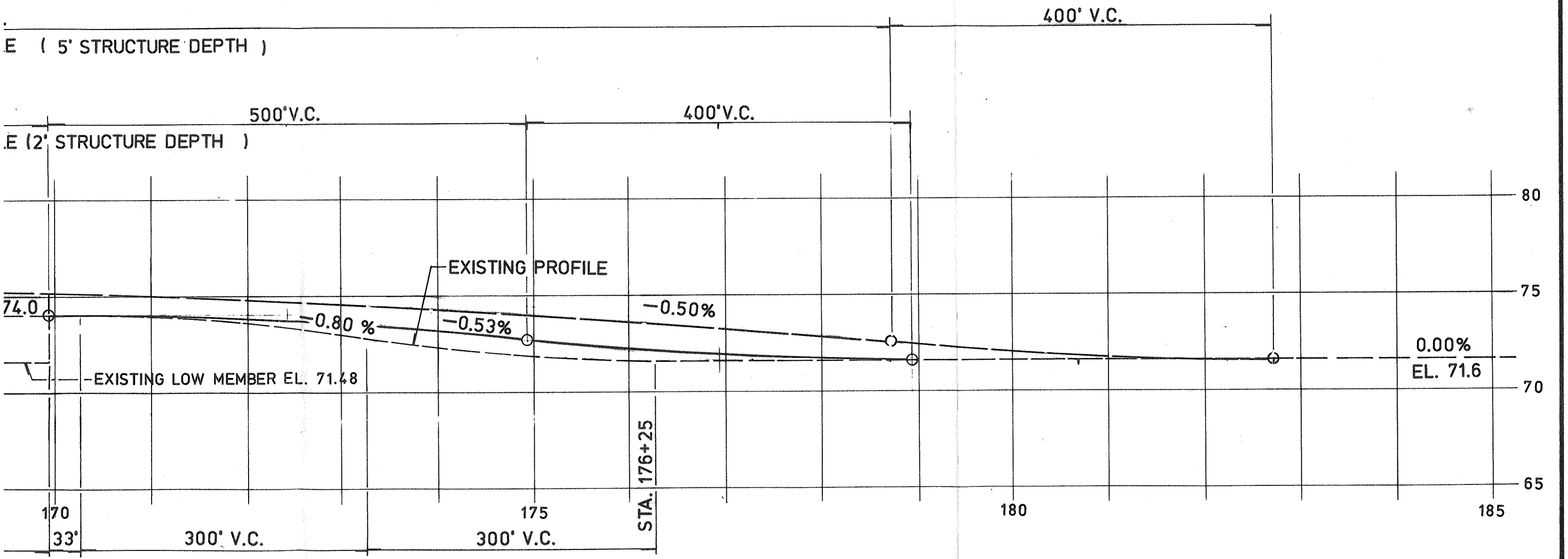
FIGURE 4—2

4.4.5 Vertical Alignment: The proposed alternatives incorporate vertical geometry that will provide a low bridge member elevation no less than what presently exists. Profile grade elevations at the centerline of the structure vary for the superstructure types previously mentioned. The 2-foot deep structure would require revising the existing roadway profile to a point approximately 850' either side of the center of the bridge in order to provide passing sight distance for a 70 mph design speed. The 5-foot deep superstructure would require raising the profile at the bridge approximately 2 feet and would require revising the existing roadway profile to a point approximately 1400 feet either side of the center of the bridge. See Figure 4-3 for the alternative vertical alignments.

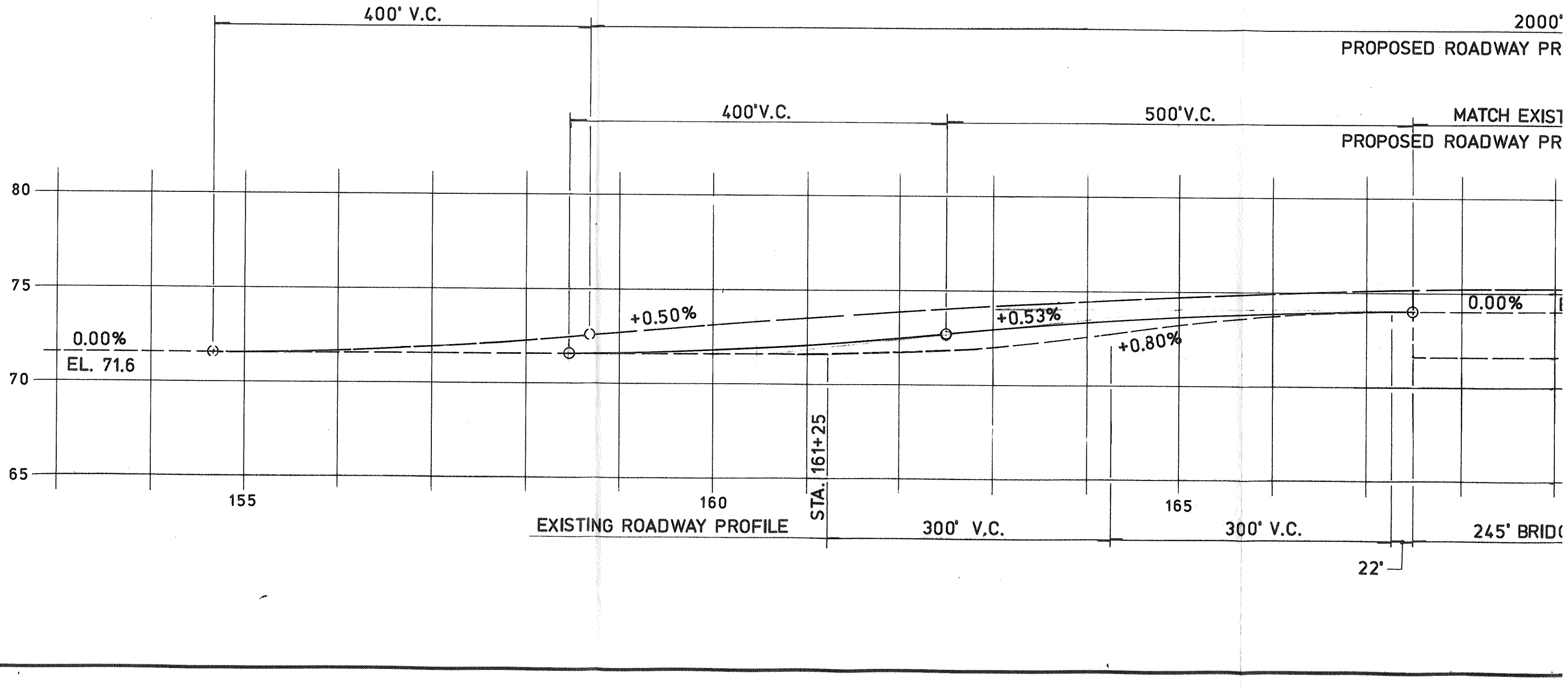
4.4.6 Geotechnical Investigation: A preliminary geotechnical investigation was conducted by Jammal and Associates and is included in Appendix A. Results of environmental testing by Jammal and Associates at the project site indicate both the superstructure and sub-

FIGURE 4—3

. ALIGNMENTS
LACOOCHEE RIVER



PROPOSED VERTI
S.R. 700 OVER THE W



structure are located in non-corrosive (Slightly Aggressive) environments (see Appendix A). The site is further identified as inland. These results indicate the use of Class II concrete for cast-in-place applications, Class III concrete for prestressed concrete members, and plain black reinforcing steel is appropriate.

4.4.7 Aesthetic Design Policy: Aesthetics were a concern for this project since the bridge is located in a primarily recreational area and the substructure will be viewed by hikers walking below the bridge along the Withlacoochee River. Structure types were identified that would reduce the number of bents required, thus reducing the impact the bridge would have on the natural environment. All alternatives consist of basic structural components and straight lines so as not to draw attention to the bridge itself. All of the alternatives considered comply with the FDOT's aesthetic design guidelines.

4.4.8 Drainage: Drainage of stormwater from the bridge will comply with criteria established by the appropriate jurisdictional agency. It is anticipated that stormwater will drain

directly from the bridge to the Withlacoochee River through scuppers (See Section 4.5).

4.5 Environmental Permitting Considerations

The boundaries of the wetland areas were established on September 7, 1988, in accordance with the Florida Department of Environmental Regulation (DER) methodologies (see Appendix B). The field information will be utilized to obtain an easement/lease from the Department of Natural Resources (DNR) and a dredge and fill permit from the DER and the Corps of Engineers. At this time preliminary contact with the Southwest Florida Water Management District (SWFWMD) indicates that an exemption for water quality will be sought and issued.

5. DESCRIPTION OF ALTERNATIVES

Three alternative alignments were identified for the replacement of the SR 700 bridge over the Withlacoochee River and are shown in Figure 5-1.

5.1 No Project Alternative

The no project alternative would involve leaving the structure in place as it presently exists.

5.2 Replacement Bridge on Western Alignment

This alternative consists of a replacement bridge approximately 245 feet long located west of the existing bridge (see Figure 5-2). The centerline of the new bridge would be approximately 45 feet from the centerline of the existing bridge. The proposed alignment would tie into the existing roadway approximately 2000 feet north and 1800 feet south of the center of the existing bridge. The north connection would be accomplished through the use of fifteen minute reverse curves. These curves would require no superelevation for the seventy mile per hour design speed. The south connection would be accomplished through the use of a one degree curve.


ALTERNATIVE ALIGNMENTS
LEGEND
EXISTING ALIGNMENT
EASTERN ALIGNMENT
WESTERN ALIGNMENT
HILLSBOROUGH COUNTY
PASCO
HERNANDO
W.P.I. No. 4115954
PROJECT No. 140026
S.R. 700 (U.S. 700)
Approx. Scale 1" = 200'

FIGURE 6-1


PASCO

STATE PROJ. NO.	SHEET NO.

WITHLACOOCHEE RIVER

PROP. R/W LINE

EXIST. R/W LINE

℄ WESTERN ALIGNMENT

60'

70'

150'

45'

132'

164 165 166 167 168 169 170 171 172 173 174

U.S. 98

D.E.R. JURISDICTION LINE

D.E.R. JURISDICTION LINE

℄ EXIST. R/W LINE

RIVER

100 0 50 100

scale feet

FIGURE 5—2

S.R. 700 (U.S. 98)
OVER THE
WITHLACOOCHEE RIVER

PASCO COUNTY

WESTERN ALIGNMENT ALTERNATIVE

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	D.L.H.	1-89	DRAWN BY	R.S.T.	1-89
CHECKED BY	D.T.M.	1-89	CHECKED BY	D.L.H.	1-89

SUPERVISED BY D.T. MAXEY

FLORIDA DEPARTMENT OF TRANSPORTATION

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DATE

This curve would tie into the existing tangent alignment approximately 300 feet south of the P.C. of the existing one degree curve.

Superelevation rates of 3.7 percent with superelevation runoff lengths of 170 feet would be used in conjunction with this curve.

The proposed vertical alignments at the replacement structure are shown in Figure 4-3. These vertical alignments will accommodate the superstructure types identified in Section 4.4.4.

This alignment would allow the existing structure to be used for maintenance of traffic during construction.

5.3 Replacement Bridge on Eastern Alignment

This alternative consists of a replacement bridge approximately 245 feet long located east of the existing bridge (see Figure 5-3). The centerline of the new bridge would be approximately 45 feet from the centerline of the existing bridge. The proposed alignment would tie into the existing roadway approximately 2000 feet north and 1800 feet south of the center of the existing bridge. The north connection would be accomplished through the use of fifteen minute

STATE PROJ. NO.	SHEET NO

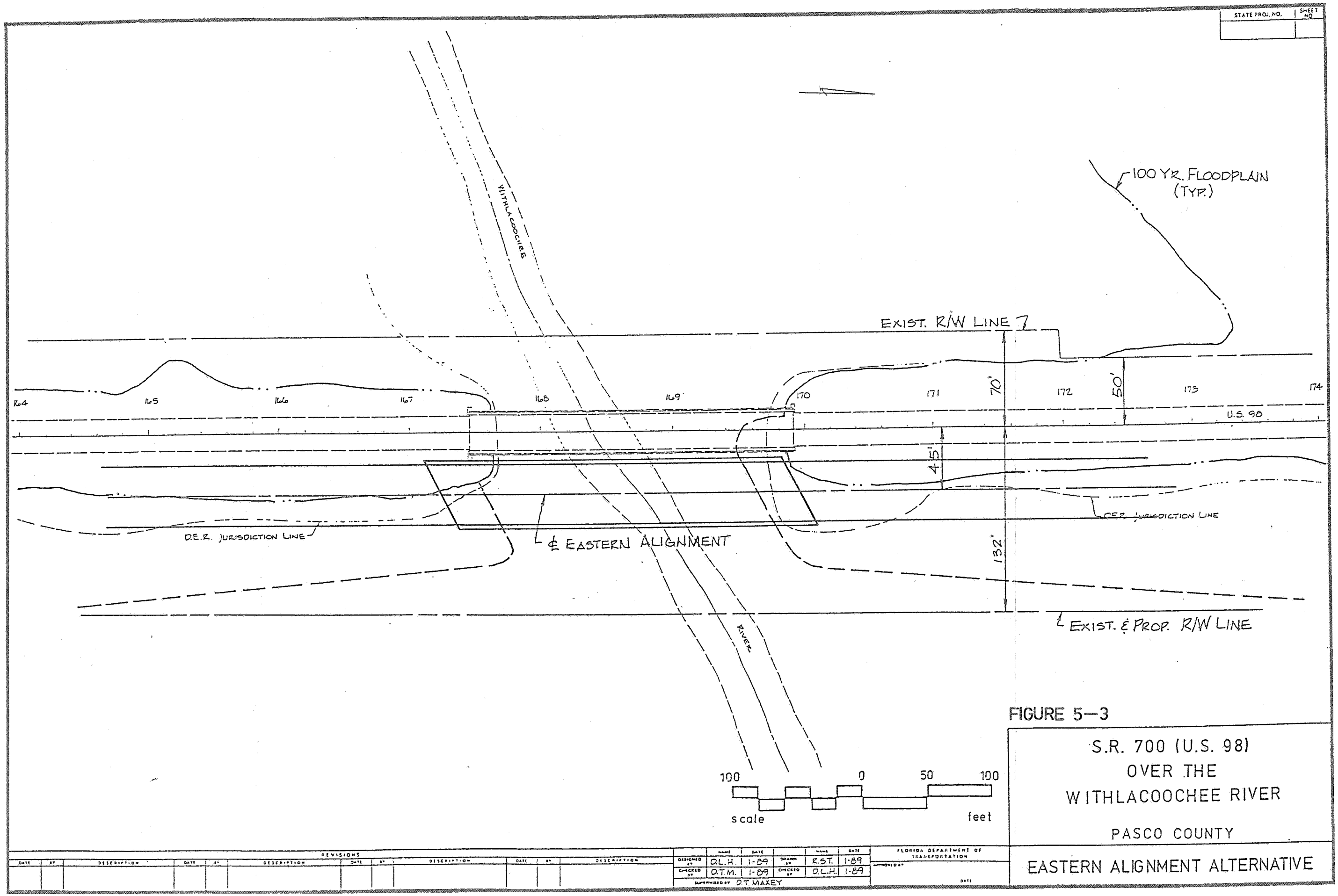

FIGURE 5—3

S.R. 700 (U.S. 98)
OVER THE
WITHLACOOCHEE RIVER

PASCO COUNTY

EASTERN ALIGNMENT ALTERNATIVE

REVISIONS															
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION				

	NAME	DATE		NAME	DATE
DESIGNED BY	D.L.H.	1-89	DRAWN BY	R.S.T.	1-89
CHECKED BY	D.T.M.	1-89	CHECKED BY	D.L.H.	1-89

SUPERVISED BY D.T. MAXEY

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reverse curves. These curves would require no superelevation for the seventy mile per hour design speed. The south connection would be accomplished through the use of a two degree curve.

This curve would tie into the extension of the existing back tangent approximately 400 feet north of the P.C. of the existing one degree curve.

Superelevation rates of 7 percent with superelevation runoff lengths of 270 feet would be used in conjunction with this curve.

The proposed vertical alignments are shown in Figure 4-3. These vertical alignments will accommodate the superstructure types identified in Section 4.4.4.

This alignment would allow the existing structure to be used for maintenance of traffic during construction.

5.4 Replacement Bridge on Existing Alignment

This alternative consists of a replacement bridge approximately 245 feet long located on the existing bridge alignment (see Figure 5-4). This alignment would tie into the existing roadway between 1000 and 1400 feet north and south of the center of the existing

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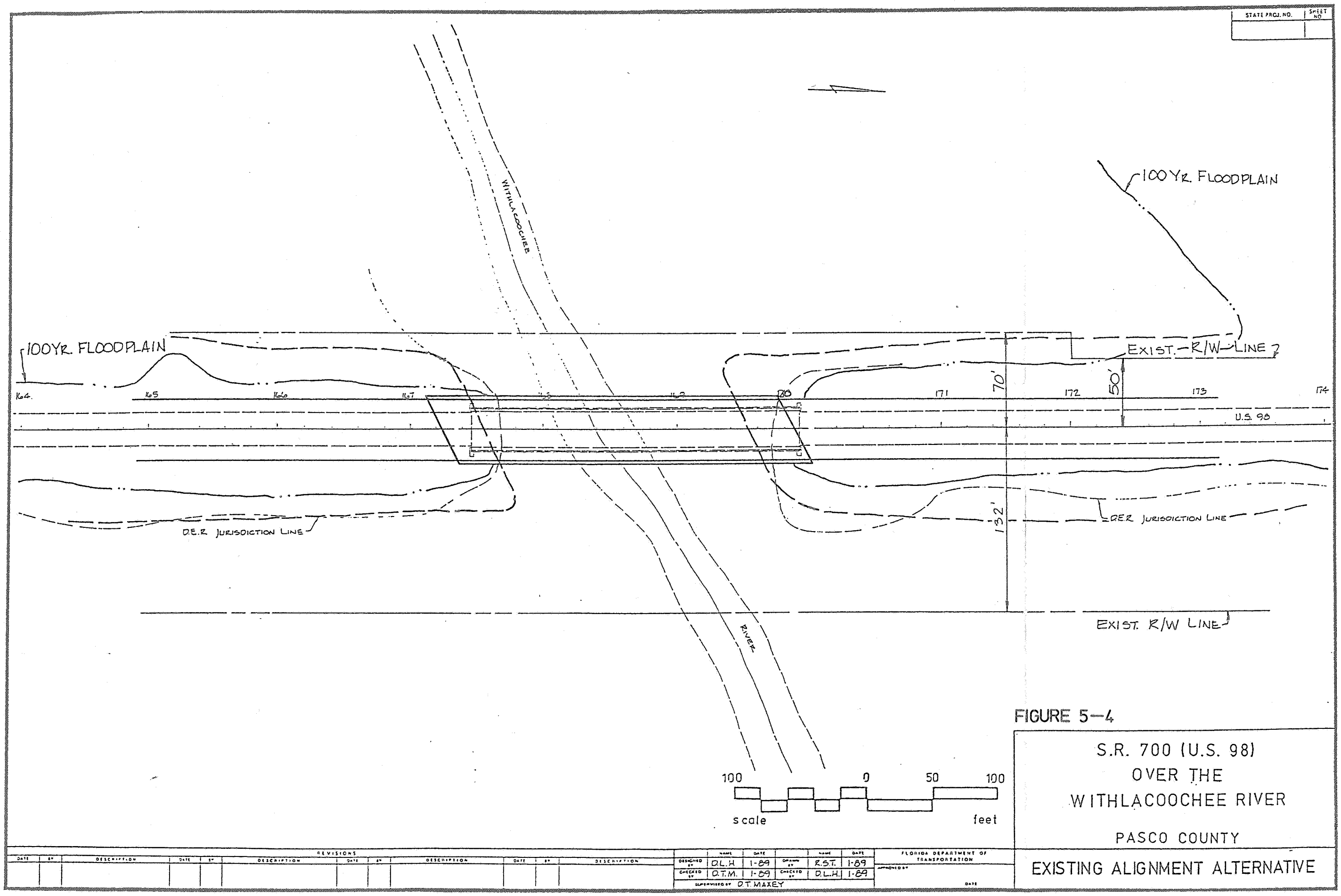

FIGURE 5–4

S.R. 700 (U.S. 98)
OVER THE
WITHLACOOCHEE RIVER

PASCO COUNTY

EXISTING ALIGNMENT ALTERNATIVE

REVISIONS													
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION		

	NAME	DATE		NAME	DATE
DESIGNED BY	D.L.H.	1-89	DRAWN BY	R.S.T.	1-89
CHECKED BY	D.T.M.	1-89	CHECKED BY	D.L.H.	1-89

SUPERVISED BY D.T. MAXEY

FLORIDA DEPARTMENT OF TRANSPORTATION

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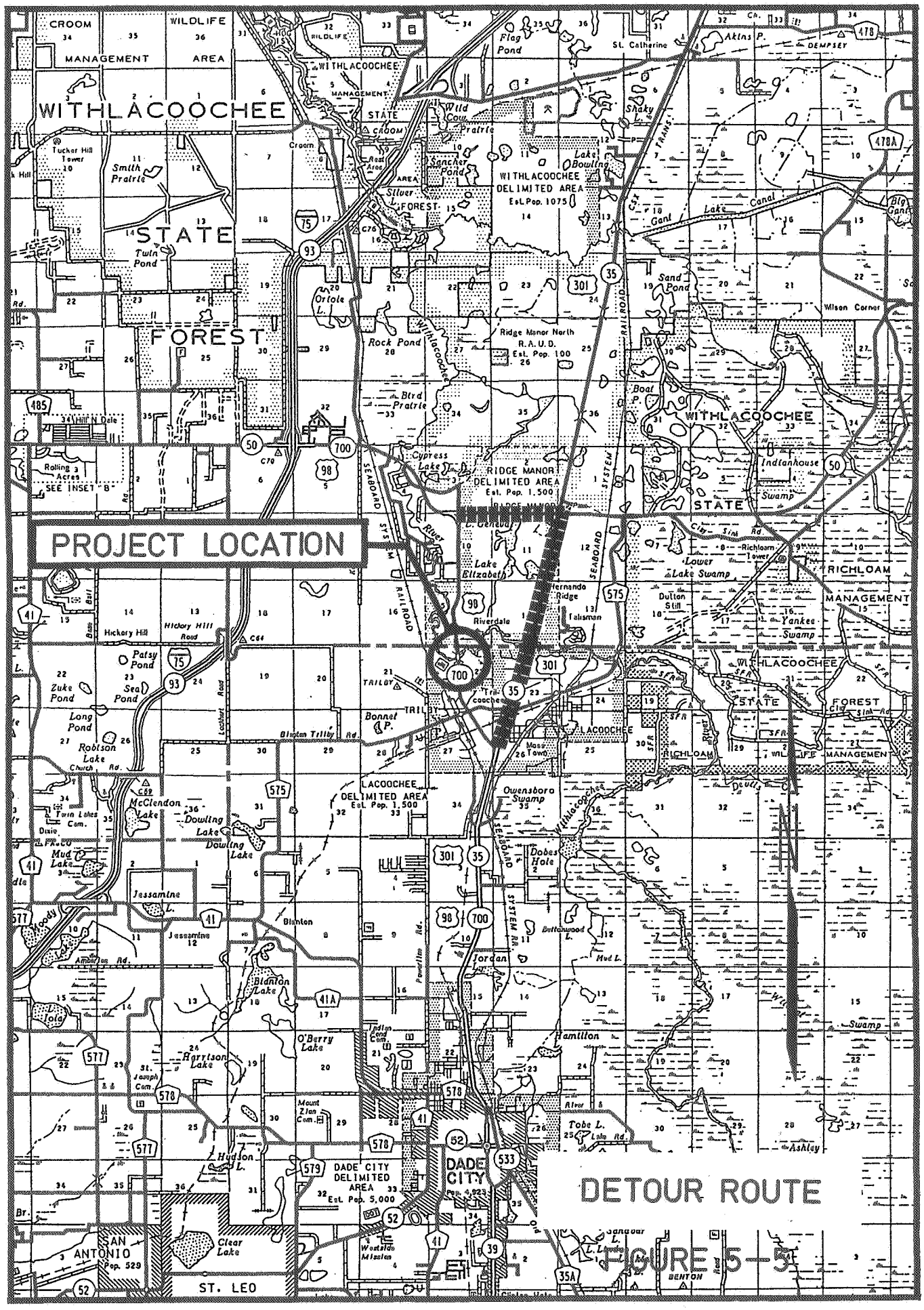
DATE

bridge depending on the depth of structure. Using the two foot structure depth would allow the existing approach roadways to remain. Necessary changes in vertical alignment due to the substandard 300-foot long crest and sag vertical curves at the approaches could be accomplished by using overbuild during resurfacing of the approach roadways. The existing one degree horizontal curve south of the existing structure utilizes no superelevation. Based on current AASHTO criteria this corresponds with a design speed of 40 m.p.h. Necessary changes to the superelevation in this curve could also be accomplished with overbuild during resurfacing. The proposed range of vertical alignments are shown in Figure 4-3.

Replacing the bridge on the existing alignment would require incorporation of one of the following maintenance of traffic (MOT) alternatives.

5.4.1 Detour Utilizing Existing State Roads (MOT 1): The proposed detour would begin approximately 2.1 miles north of the bridge at the intersection of SR 700 and SR 50 (see Figure 5-5). From this intersection, the route would follow SR 50 east for 1.5 miles to SR 35, and SR 35 south 3.7 miles to the merger with SR 700 resulting in an increase of


PROJECT LOCATION
DETOUR ROUTE
WITHLACOOCHEE
STATE
FOREST
CROOM
WILDLIFE
MANAGEMENT
AREA
WITHLACOOCHEE DELIMITED AREA
Est. Pop. 1075
RIDGE MANOR DELIMITED AREA
Est. Pop. 1,500
RIDGE MANOR NORTH R.A.U.D.
Est. Pop. 100
LACOOCHEE DELIMITED AREA
Est. Pop. 1,500
DADE CITY DELIMITED AREA
Est. Pop. 5,000
DADE CITY
Pop. 4,823
SAN ANTONIO
Pop. 529
ST. LEO
TRILBY
RICHLOAM
MANAGEMENT
AREA
SEE INSET "B"
Rolling 3 Acres
Tucker Hill Tower
Smith Prairie
Twin Pond
Ortole L.
Rock Pond
Bird Prairie
Cypress Lake
Lake Elizabeth
Hernando Ridge
Riverdale
Talisman
Hickory Hill
Patsy Pond
Zuke Pond
Sea Pond
Long Pond
Robtson Lake
McClendon Lake
Dowling Lake
Mud Lake
Jessamine L.
Blanton
Blanton Lake
Iola
O'Berry Lake
Harrison Lake
Hudson L.
Clear Lake
Flag Pond
Wild Cow Prairie
Sanchez Pond
Silver L.
Lake Bowling
Gant Lake Canal
Sand Pond
Boat P.
Indianhouse
Swamp
Lake Swamp
Yankee Swamp
Owensboro Swamp
Dobes Hole
Buttonwood L.
Jordan
Hamilton
Tobe L.
Ashley
Wilson Corner
Richloam Tower
Dutton Still
Moss Town
Bonnet P.
Mt. Zion Cem.
St. Joseph Cem.
Indian Cemetery
Old Wesleyan Mission
Withlacoochee River
Withlacoochee
Seaboard System R.R.
Railroad
Hickory Hill Road
Trilby Rd.
Church Rd.
Dixie
Twin Lakes Cem.
Powelltown Rd.
Lake Rd.
City Sink Rd.
Old
FIGURE 5-5

approximately 1.5 miles for through traffic on SR 700. The total detour length for local traffic travelling from one side of the bridge to the other is 8.9 miles. The design speed of the detour will be the posted speed limits along the proposed route.

5.4.2 Detour Utilizing One Lane Temporary Detour Structure (MOT 2): The temporary bridge structure alternative would utilize a prefabricated superstructure (stockpiled by FDOT in Orlando approximately 60 miles to the east) on temporary timber bents adjacent to the existing bridge (see Figure 5-6). The existing bridge is offset in the 202-foot right-of-way (see Figure 2-1) which indicates a temporary construction easement would not be required for the proposed eastern detour alignment. A one lane temporary structure would require signalization. The approximate length of the temporary detour structure is 150 feet. This length was established by providing a structure that would span the main channel of the river. A design speed 10 m.p.h. below the posted speed limit of 55 m.p.h. would be anticipated for the temporary detour structure and approaches.

STATE PROJ. NO.	SHEET NO

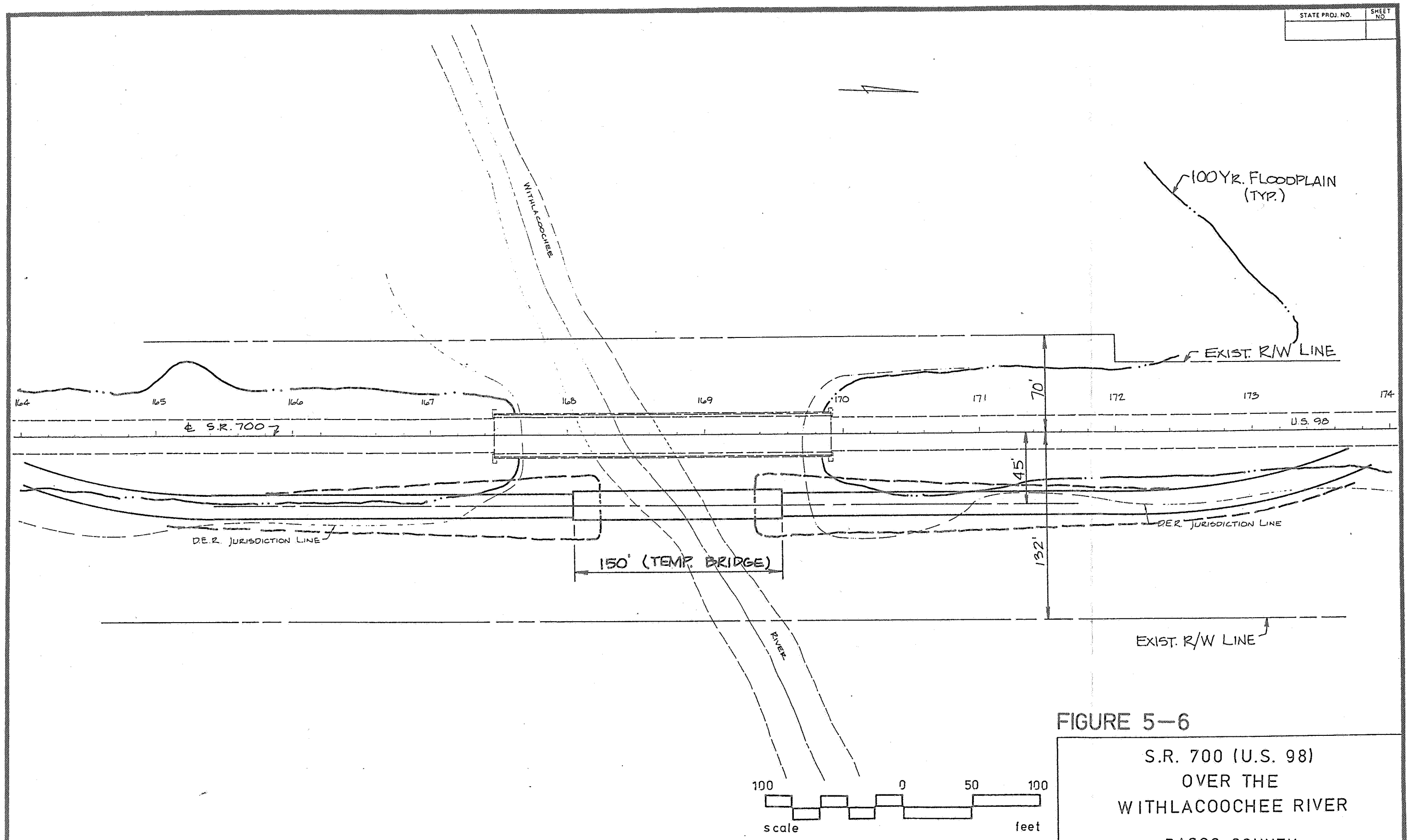


FIGURE 5–6

S.R. 700 (U.S. 98)
OVER THE
WITHLACOOCHEE RIVER

PASCO COUNTY

ONE LANE TEMPORARY DETOUR

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	D.L.H.	1-89	DRAWN BY	R.S.T.	1-89
CHECKED BY	D.T.M.	1-89	CHECKED BY	D.L.H.	1-89

SUPERVISED BY D.T. MAXEY

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DATE

5.4.3 Detour Utilizing Two Lane Detour Structure (MOT 3): This MOT plan is similar to the one lane temporary detour except that this alternative would allow one lane of traffic in each direction and would not require signalization (see Figure 5-7). The wider structure would not require a temporary construction easement.

A design speed of 10 m.p.h. below the posted speed limit of 55 m.p.h. would be necessary for the two lane detour structure. A 20 m.p.h. reduction in the posted speed is the maximum allowed without FDOT Authorization.

5.4.4 One Lane Phased Construction (MOT 4): This alternative would have one lane of traffic on approximately one half of the existing bridge while the other half is being removed and replaced. Traffic would be switched to the new portion upon completion and the remaining part of the existing structure would be removed and replaced. Signalization would be required to regulate two-way traffic on one lane. A typical section depicting each phase of construction is shown in Figure 5-8.

STATE PROJ. NO.	SHEET NO.

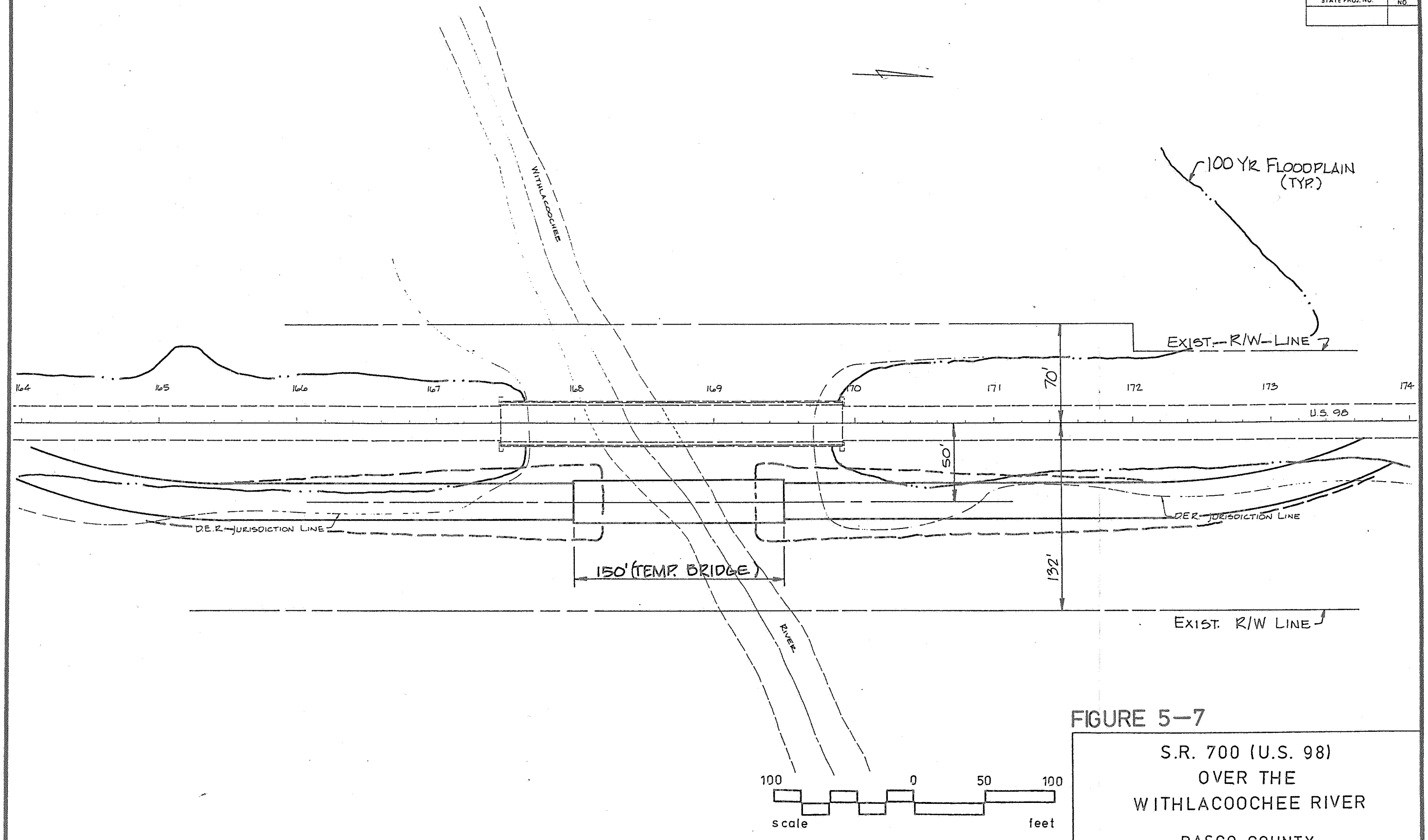

FIGURE 5-7

S.R. 700 (U.S. 98)
OVER THE
WITHLACOOCHEE RIVER

PASCO COUNTY

TWO LANE TEMPORARY DETOUR

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	D.L.H.	1-89	DRAWN BY	R.S.T.	1-89
CHECKED BY	D.T.M.	1-89	CHECKED BY	D.L.H.	1-89

SUPERVISED BY D.T. MAXEY

FLORIDA DEPARTMENT OF TRANSPORTATION

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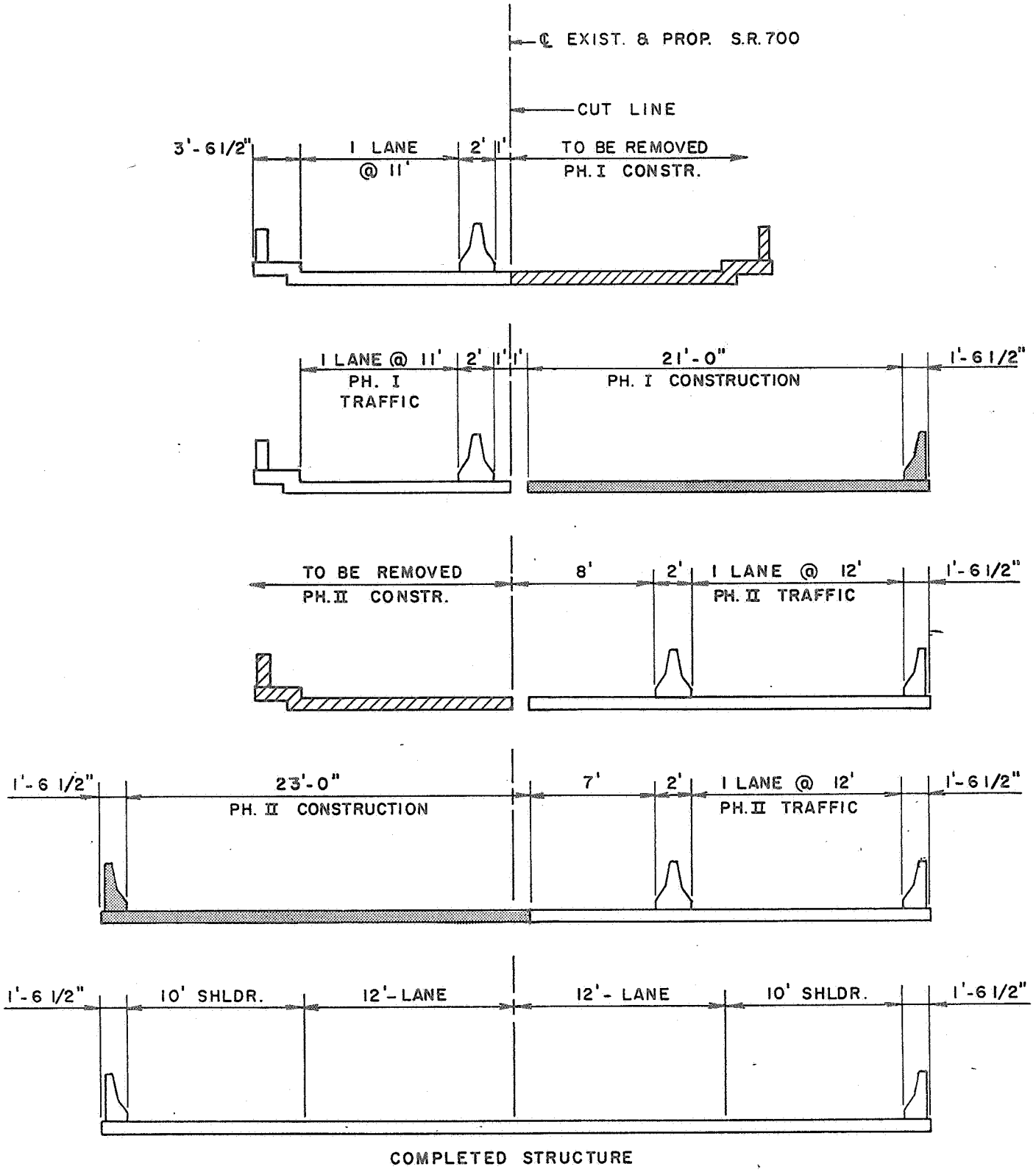

FIGURE 5-8

S.R. 700 (U.S. 98) over the WITHLACOOCHEE RIVER
PASCO COUNTY

ONE LANE PHASED CONSTRUCTION SEQUENCE (MOT 4)

5.4.5 One Lane Phased and One Lane Detour Structure (MOT 5): This scheme would allow for two lanes of traffic and would make signalization unnecessary. One lane of traffic would be carried on a one lane temporary detour structure as outlined in Section 5.4.2, and the other lane would be as outlined for the one lane phased construction alternative described in Section 5.4.4.

6. EVALUATION OF ALTERNATIVES

6.1 General

An analysis of the alternatives presented in Section 5 was conducted to qualitatively and quantitatively evaluate the various impacts of each alternative. The analysis was performed for the three basic alternatives: Western Alignment, Eastern Alignment, and Existing Alignment. Five maintenance of traffic options were analyzed under the Existing Alignment alternative.

6.2 No Project Alternative

The No Project Alternative was not analyzed because it does not provide a viable long-term solution to the existing situation for the following reasons: 1) the 2-foot shoulders on the bridge are substandard, 2) the H-15 live load utilized in the original design is substandard, 3) the raised concrete curb and concrete handrail is substandard for design speeds of 70 m.p.h., and 4) the substructure may require additional rehabilitation in the future according to the Bridge Inspection Report dated July 29, 1987.

According to Chapter VII of AASHTO's Policy on Geometric Design of Highways and Streets (1984) bridges should be considered for ultimate widening or replacement if they do not provide at least 3-feet clearance on each side or are not capable of supporting HS-20 loadings. Widening of this structure is not viable due to strengthening requirements for the existing bridge. The existing steel beams have cover plates welded to the bottom flanges and for this reason, additional cover plates could not be added to the most efficient location on the beam. Also, the existing structure would require replacement in the year 2001.

Additional information in Chapter IV of the same reference indicates curbed sidewalks as present on the existing structure should not be used adjacent to traffic where design speeds exceed 50 m.p.h.

6.3 Comparison of Alternative Alignments

6.3.1 Process: The Western Alignment, Eastern Alignment, and Existing Alignment Alternatives were analyzed quantitatively and qualitatively based on a number of criteria. These criteria or comparison factors represent the important engineering,

socioeconomic, construction cost, and environmental factors that need to be considered for each alternative.

6.3.2 Comparison Factors: The various criteria used to analyze the alternatives are identified in Table 6.1 as comparison factors. Table 6.1 summarizes the quantitative analyses of the impacts of each alternative based on the various comparison factors. Quantity estimates reflect requirements for a 5-foot deep superstructure for comparative purposes on the proposed alternative alignments. Comparison factors were grouped into the classifications of regional and community development, conservation of natural resources, public facilities and services, impacts during construction, and construction costs. The impact of each alternative of the various comparison factors is discussed in Sections 6.4 thru 6.9.

6.4 Regional and Community Development

6.4.1 Displacement: Displacement was analyzed in terms of the number of families that would be displaced and have to be relocated. No displacements or acquisition of existing

TABLE 6.1
ALTERNATIVE ALIGNMENT COMPARISON DATA
WITHLACOOCHEE RIVER BRIDGE REPLACEMENT

COMPARISON FACTORS		WEST ALIGN.	EAST ALIGN.	EXISTING ALIGNMENT MOT 1	MOT 2	MOT 3	MOT 4	MOT 5
REGIONAL & COMMUNITY DEVELOPEMENT	PARKLAND TAKEN (AC)	0.3	0	0	0	0	0	0
	REQUIRED R.O.W. (AC)	3.7	0.5	0.7	0.7	0.7	0.7	0.7
CONSERVATION OF NATURAL RESOURCES	WOODLANDS TAKEN (AC)	1.1	3.0	0.9	0.9	0.9	0.9	0.9
	WETLANDS IMPACT (AC)	0.3	0.9	0.2	0.2	0.2	0.2	0.2
	FLOODPLAIN ENCROACH (CY)	12200	4500	2800	2800	2800	2800	2800
PUBLIC FAC. & SERVICES	RELOCATE UTILITIES(EA)	2	0	0	0	0	0	0
IMPACTS DURING CONSTRUCTION (TEMPORARY)	LENGTH OF DETOUR (MI)	0	0	1.5	0	0	0	0
	CONSTRUCTION TIME (MO)	9	9	9	14	15	13	18
	USER COST ($x1000)	---	---	1150	--	--	--	--
	WETLANDS IMPACT (AC)	0	0	0	0.3	0.4	0	0.3
	FLOODPLAIN ENCROACH (CY)	0	0	0	700	1100	0	700
	RELOCATE UTILITIES(EA)	0	0	0	0	0	0	0
	SCHOOL BUS DETOUR (MI)	0	0	10	0	0	0	0
CONSTRUCTION COSTS	ROADWAY ($x1000)	384	323	177	177	177	177	177
	STRUCTURE ($x1000)	506	506	506	506	506	632	632
	R.O.W.* ($x1000)	58	68	21	21	21	21	21
	M.O.T. ($x1000)	25	25	25	125	162	36	130
	TOTAL ($x1000)	973	922	729	829	866	866	960

* INCLUDES WETLAND MITIGATION COSTS

residences would be required for any of the alignment alternatives.

6.4.2 Parklands Taken: The amount of public parklands required due to additional right-of-way requirements for each alternative was estimated. The western alignment alternative would require the acquisition of approximately 0.3 acre of Peterson Park. The eastern and existing alignment alternatives would not require the acquisition of any parklands.

6.4.3 Right-of-Way Required: The amount of right-of-way required for each alternative was estimated. Approximately 70 feet of right-of-way on each side of the proposed centerline of SR 35 is required in order to meet current FDOT slope criteria (see Typical Section in Figure 4-1). Right-of-way acquisition could be minimized by utilizing 2:1 embankment slopes and guardrail along both sides of the approach roadways, however for the purpose of this comparison it was assumed that current FDOT slope criteria would be utilized.

Included in right-of-way costs in Table 6.1 are wetland mitigation costs (see Section 6.5.2). A 2:1 ratio was assumed for estimating purposes should mitigation be required for wetlands that will be permanently impacted. No suitable sites for mitigation are located within the existing right-of-way adjacent to the SR 700 structure and, therefore, property acquisition would be necessary.

6.4.3.1 Western Alignment R.O.W.: The Western Alignment would require the acquisition of approximately 3.7 acres of land parallel to the existing right-of-way which includes approximately 0.3 acre of Peterson Park.

6.4.3.2 Eastern Alignment R.O.W.: The Eastern Alignment would require the acquisition of approximately 0.5 acre of land in Hernando County where the existing right-of-way is 100 feet wide.

6.4.3.3 Existing Alignment R.O.W.: Approximately 0.7 acre of additional right-of-way is

required under this alternative in Hernando County.

6.5 Conservation of Natural Resources

6.5.1 Woodlands Taken: This comparative factor indicates the acreage of woodland clearing that will be required to accomplish each alternative.

6.5.1.1 Western Alignment: The Western Alignment would require clearing approximately 1.1 acres of woodlands adjacent to the existing roadway.

6.5.1.2 Eastern Alignment: The Eastern Alignment would require clearing approximately 3.0 acres of woodlands adjacent to the existing roadway.

6.5.1.3 Existing Alignment: This Alternative would require the clearing of 0.9 acre of woodlands north and south of the bridge to provide the required clear zone and swale drainage for the proposed roadway typical section. The MOT alternatives that require temporary

detour structures would not require any additional woodland clearing.

6.5.2 Wetlands Impact: This criterion measures the number of wetland acres permanently impacted due to filling operations within the boundaries delineated in accordance with DER methodologies.

Potential sites for mitigating impacted wetlands were identified should mitigation be required. An acceptable off-site area within the Withlacoochee River Drainage Basin in Hernando County adjacent to the SR 35 structure over the Little Withlacoochee River was chosen because land costs are lower and fewer residents would be affected. In addition, this site is adjacent to a bridge that will be replaced in approximately the same time period as the SR 700 bridge. Mitigation requirements for both sites could be combined as required to reduce costs associated with wetland mitigation.

6.5.2.1 Western Alignment: Fill material required for the approach embankments would be placed on 0.3 acre of

delineated wetlands. Approximately 0.6 acre of land would be required for mitigation purposes.

6.5.2.2 Eastern Alignment: Fill material required for the approaches would be placed on approximately 0.9 acre of delineated wetlands. Approximately 1.8 acres of land would be required for mitigation purposes.

6.5.2.3 Existing Alignment: Each of the maintenance of traffic plans under this alternative would permanently impact 0.2 acre of wetlands. Approximately 0.4 acre of land would be required for mitigation purposes.

6.5.3 Floodplain Encroachment: The cubic yardage of fill required below the 100-year flood elevation for each alternative was computed for comparison.

6.5.3.1 Western Alignment: This alignment would require approximately 12,200 cubic yards of embankment material to be placed within the 100-year floodplain.

6.5.3.2 Eastern Alignment: This alternative would require approximately 4,500 cubic yards of embankment material to be placed within the 100-year floodplain.

6.5.3.3 Existing Alignment: The replacement of the structure on the existing alignment would require 2,800 cubic yards of fill within the 100-year floodplain.

6.6 Public Facilities & Services

6.6.1 Utility Relocation: The extent of utility relocations was determined for each alternative.

6.6.1.1 Western Alignment: This alignment would require the relocation of the existing power line and telephone cable on the west side of SR 700.

6.6.1.2 Eastern Alignment: No utilities would be affected with the Eastern Alignment Alternative.

6.6.1.3 Existing Alignment: None of the maintenance of traffic plans under this

alternative would require any permanent utility relocation.

6.7 Impacts During Construction

6.7.1 Length of Detour/Traffic Operations: Impacts to traffic flows were addressed and the length in miles for traffic detour routes was calculated for each alternative.

6.7.1.1 Western Alignment: The western alignment alternative would be constructed while maintaining traffic on SR 700 on the existing alignment. Therefore, no detour would be required at or around the project site. Minor disruptions would occur where the new roadway alignment ties back into the existing alignment during construction. Upon completion of the new structure and roadway approach work, traffic would be shifted from the existing to the new alignment and demolition of the existing structure would begin. Public safety would not be a primary concern since traffic would not be maintained for

extended periods within construction areas.

6.7.1.2 Eastern Alignment: Impacts due this alternative would be similar to those of the Western Alignment.

6.7.1.3 Existing Alignment: Maintenance of Traffic Plan 1 (MOT 1) would require a 1.5-mile detour for through traffic on SR 700. The other 4 MOT Plans would not require an off-site route detour but impacts to traffic would be as follows:

MOT 2 - Normal traffic flows would experience delays due to the signalization of the one-lane temporary detour structure.

MOT 3 - Normal traffic flows would experience marginal delays due to reduced speeds within the construction zone.

MOT 4 - Normal traffic flows would experience delays due to signalization. Safety to motorists and construction

workers would be a concern due to the close proximity of traffic to construction activities.

MOT 5 - Normal traffic flows would experience marginal delays due to reduced speed within the construction zone. Safety concerns would be similar to those for MOT 4.

6.7.2 Construction Time: The amount of time in months to construct a new bridge and associated roadway realignment was estimated for each of the alternatives.

6.7.2.1 Western Alignment: The construction time estimate for this alternative would be 9 months. This includes 2 months to demolish the existing bridge and 7 months to build the new bridge.

6.7.2.2 Eastern Alignment: This alternative would require 9 months (similar to the Western Alignment) for construction.

6.7.2.3 Existing Alignment: The number of months to construct a new bridge was calculated

for the existing alignment based on each of the maintenance of traffic plans.

MOT 1 - MOT 1 would require 2 months for demolition of the existing bridge and 7 months for construction of the new bridge.

MOT 2 - MOT 2 would require 14 months for construction. Approximately 3 months would be required for construction of the temporary bridge and approaches, 2 months to demolish the existing bridge, 7 months to build the proposed structure, and approximately 2 months to demolish the temporary bridge and approaches.

MOT 3 - An additional month more than MOT 2 was estimated due to the wider temporary bridge.

MOT 4 - This alternative would require 13 months for construction due to construction phasing requirements.

ct: The acreage of wetlands mpacted during construction was r each alternative.

Alignment: The Western Alignment ot require temporary fill in areas during construction.

Alignment: The Eastern Alignment ot require temporary fill in areas during construction.

Alignment: The wetland impacts Existing Alignment alternative among the 5 maintenance of plans. MOT Plans 1 and 4 would porarily impact any wetland MOT Plans 2 and 5 were each ed to cause an impact on 0.3 wetlands due to filling opera- equired for the construction of orary structures. MOT Plan 3 equire 0.4 acre of fill in areas.

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6.7.3.2 Ea
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6.7.3.3 Ex
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6.7.5 Floodplain Encroachment: The cubic yardage of fill which would temporarily encroach on the floodplain during construction was computed for each alternative.

6.7.5.1 Western Alignment: This alternative would not require any temporary fill to encroach on the floodplain during construction.

6.7.5.2 Eastern Alignment: No temporary fill would be required under this alternative.

6.7.5.3 Existing Alignment: Temporary fill would be required under some of the Maintenance of Traffic Plan Alternatives for the Existing Alignment Alternative.

MOT 1 - This MOT Plan would not require temporary encroachment on the floodplain.

MOT 2 - MOT 2 would require 700 cubic yards of fill in the floodplain during construction.

MOT 3 - The MOT 3 alternative would require 1,100 cubic yards of fill to encroach on the floodplain during construction.

MOT 4 - MOT 4 would not require any fill in the floodplain during construction.

MOT 5 - MOT 5 would require 700 cubic yards of fill to encroach on the floodplain during construction.

6.7.6 Relocation of Utilities: No utilities would have to be temporarily relocated during construction for any of the alternative alignments.

6.7.7 School Bus Detour: The number of miles required for school bus detour routes during construction was calculated for each alternative.

6.7.7.1 Western Alignment: This alternative would not require a detour in the existing school bus route during construction.

6.7.7.2 Eastern Alignment: The Eastern Alignment alternative would not require a school bus detour.

6.7.7.3 Existing Alignment: Under the various maintenance of traffic plans for the existing alignment alternative, only MOT 1 would require a school bus detour. The length of this detour would be 10 miles per trip. This length was approximated by assuming the detour would begin and end at the intersection of SR 50 and SR 700 and would follow the proposed detour route for MOT 1 to the south side of the bridge. The distance is the additional miles of travel required as compared to the present SR 700 route. The Hernando County School System was contacted concerning the school bus detour route. Mr. Mark Tallant, Supervisor for the Hernando County School System (PH. 904-796-6191), indicated that the school bus that utilizes the bridge could be easily routed to SR 35 (US 301).

6.7.7.2 Eastern Alignment: The Eastern Alignment alternative would not require a school bus detour.

6.7.7.3 Existing Alignment: Under the various maintenance of traffic plans for the existing alignment alternative, only MOT 1 would require a school bus detour. The length of this detour would be 10 miles per trip. This length was approximated by assuming the detour would begin and end at the intersection of SR 50 and SR 700 and would follow the proposed detour route for MOT 1 to the south side of the bridge. The distance is the additional miles of travel required as compared to the present SR 700 route. The Hernando County School System was contacted concerning the school bus detour route. Mr. Mark Tallant, Supervisor for the Hernando County School System (PH. 904-796-6191), indicated that the school bus that utilizes the bridge could be easily routed to SR 35 (US 301).

6.7.8 Turnout Modifications: All existing driveway turnouts will be reconstructed as necessary for connection to the proposed alignment. This may require construction activities outside right-of-way limits to obtain driveway slopes in accordance with FDOT criteria.

6.8 Construction Costs

Roadway, structure, right-of-way, and maintenance of traffic costs were estimated for each alternative (see Appendix D for computations).

6.8.1 Roadway: The roadway construction costs for each of the alternatives were estimated. The costs include clearing and grubbing, earthwork, asphalt paving and base, and guardrails.

6.8.1.1 Western Alignment: The Western Alignment would incur $384,000 in roadway construction costs. Additional fill requirements results in higher roadway costs for the Western Alignment.

6.8.1.2 Eastern Alignment: Roadway construction costs for the Eastern Alignment would be $323,000.

6.8.1.3 Existing Alignment: Roadway construction costs for the Existing Alignment were estimated at $177,000 under each of the maintenance of traffic plans.

6.8.2 Structure: The cost of the new bridge structure was determined for each alternative. The cost is based on a 245-foot long bridge and demolition of the existing bridge.

6.8.2.1 Western Alignment: The Western Alignment would require $506,000 in structure costs.

6.8.2.2 Eastern Alignment: The required structure under the Eastern Alignment alternative would cost $506,000.

6.8.2.3 Existing Alignment: The structure cost was calculated for each of the maintenance of traffic plans.

MOT 1 - MOT 1 would incur $506,000 in bridge construction costs.

MOT 2 - This MOT would entail $506,000 in bridge construction costs.

MOT 3 - MOT 3 would require $506,000 in bridge construction costs.

MOT 4 - This alternative MOT would cost $632,000 for bridge construction costs. The increase over the cost of MOT 1, 2, & 3 is due to the construction phasing requirements.

MOT 5 - This MOT would require $632,000 in bridge construction costs.

6.8.3 Right-of-Way: The right-of-way costs for each alternative were estimated based on a $10,000 per acre land cost. Wetland mitigation costs are also included and are based on a $30,000 per acre mitigation cost plus a $5,000 per acre land cost at the SR 35 over the Little Withlacoochee River site in Hernando County.

6.8.3.1 Western Alignment: The Western Alignment would incur $37,000 in right-of-way acquisition costs to acquire 3.7 acres of land. Mitigation costs would be $21,000.

6.8.3.2 Eastern Alignment: The Eastern Alignment would require $5,000 for right-of-way acquisition to acquire 0.5 acre of land. Mitigation costs would be $63,000.

6.8.3.3 Existing Alignment: Right-of-way acquisition for each of the maintenance of traffic plans considered under this alternative would cost $7,000. Mitigation costs would be $14,000.

6.8.4 Maintenance of Traffic (MOT): The costs involved in the various MOT Plans for each alternative were estimated and include costs associated with placing and removing temporary embankment and temporary detour structures, temporary pavement and base, temporary construction easements, traffic control through construction zones, and signalization.

6.8.4.1 Western Alignment: MOT for the Western Alignment would cost $25,000 for traffic control.

6.8.4.2 Eastern Alignment: The MOT for the Eastern Alignment would incur $25,000 in traffic control costs.

6.8.4.3 Existing Alignment: The costs involved in each of the MOTs considered for this alternative were computed.

MOT 1 - This MOT Plan would cost $25,000 for traffic control along the route detour.

MOT 2 - MOT 2 would incur $125,000 in implementation expenses associated with the one lane signalized temporary detour structure.

MOT 3 - This MOT alternative would cost $37,000 more than MOT 2 due to the wider temporary bridge and additional approach construction.

MOT 4 - MOT 4 would incur $36,000 in traffic control expenses.

MOT 5 - The MOT 5 alternative would incur $130,000 for implementation. Traffic control expenses would be higher than MOT 2, but signalization would not be required.

6.8.5 Total Construction Costs: The total construction costs for each alternative were summed based on the costs determined in Sections 6.8.1 through 6.8.4 and are shown in Table 6.1. The least cost alternative is the replacement of the bridge on the existing alignment with MOT 1. Replacement of the bridge on the existing alignment with MOT 2 is the next least cost alternative costing approximately $100,000 more to construct. The remaining alternatives all exceed $850,000 in total construction costs.

7. EVALUATION SUMMARY

The purpose of this study is to determine an alignment and bridge length required to replace the existing SR 700 (US 98) bridge over the Withlacoochee River. A bridge length of 245 feet was recommended in the Location Hydraulics Study. A summary of which alternative alignment would have the least adverse impact on regional and community development, conservation of natural resources, public facilities and service, temporary impacts during construction, and total construction costs is presented below.

- Existing alignment, western alignment, and eastern alignment would require no displacements.

- Existing alignment and eastern alignment would not require the acquisition of any public parklands. Western alignment would require the acquisition of approximately 0.3 acre of public parklands.

- Existing alignment and eastern alignment would require the same relative amount of right-of-way acquisition. Western alignment would require the maximum amount of right-of-way acquisition of all alignment alternatives.

- Existing alignment would require removal of the least amount of woodlands.

- Existing alignment and western alignment would have the least adverse impact to the wetlands.

- Existing alignment would require the least floodplain encroachment.

- Existing alignment and eastern alignment would not require any utility relocation while the western alignment would.

- Western and eastern alignments would have the least adverse impact during construction to the public utilizing SR 700.

- Existing alignment with the route detour maintenance of traffic option, western alignment, and eastern alignment would require the least amount of time to construct.

- Existing alignment with the route detour maintenance of traffic option would have the least total construction cost and the highest user cost. Existing alignment with the one lane temporary detour structure is the next least cost alternative and the one lane phased maintenance of traffic option is the third least cost alternative.

8. PUBLIC INVOLVEMENT MEETING

On April 6, 1989, a public involvement meeting was conducted in Dade City, Florida, to inform the public of the alternative alignments, maintenance of traffic options, and impacts associated with the replacement of the SR 700 structure over the Withlacoochee River. Comments were made by the owner of the private campground in the southeast quadrant of the bridge site and the owner of the residence in the northeast quadrant of the bridge site.

Both owners disputed the location of the right-of-way boundary shown as 132 feet east of the centerline of the existing roadway. They said their property surveys do not indicate the wide right-of-way as shown on the existing right-of-way maps. They requested that we investigate this discrepancy further.

The remainder of the comments were made by the owner of the campground.

The first comment was related to the proposed detour route. He said US 98 (SR 700) in this area is a narrow, residential road with high volumes of heavy trucks. Due to the presence of children and pedestrians, US 98 should be permanently relocated by new signage to the present US 301 (SR 35) location to the east. By moving heavy trucks to US 301 (SR

35) the existing bridge on US 98 (SR 700) could remain to carry lighter vehicles which would save taxpayers dollars.

The next comments were related to the environment and his business. He said the environment is his foremost concern. The Withlacoochee is a "jewel" and one of the few scenic canoe trails in Florida. His living is earned on the river which he wishes to remain as a clean, pristine, navigable waterway. The existing wildlife and ecology is very important. He said closing the SR 700 bridge during construction would impact his business unfavorably, but would prefer closing the bridge rather than building the temporary detour structure. He stated the park in the southwest quadrant is the only location for a construction staging area (vans, equipment, etc.) unless an agreement is made with adjacent property owners. He said the park is nothing more than a garbage dump. There are no restrooms and undesirables such as "drunks" and "potheads" frequent the park. He inquired why we were proposing to obtain private property when this "undesirable" park area is available.

The closing comments were related to his campground business. He requested that the FDOT approve signage to indicate the direction to his business along the detour route. He stated that his business is year-round and customers not familiar with the area could be confused upon exiting I-75 to the west. He said he could live with the inconvenience

for one winter and hopefully there would be no construction activities at night. He requested that the river be accessible during construction and that no closures be allowed. He said canoes could be carried through one of the open spans of the structure.

9. RECOMMENDATIONS

Based on the evaluation of alternatives and the input from the public meeting, it is recommended that the Existing Alignment in combination with the route detour be retained for further development. The Existing Alignment alternative would require the least (if any) amount of right-of-way acquisition, would have the least disruption to the existing environment, and would result in the least construction time and cost. Temporary detour structures are not recommended due to the additional time, expense, and impacts to the environment required for their construction. Phasing construction to allow one lane to remain open is not justified with the easily accessible SR 35 (US 301) to the east of SR 700. Also, only 1.5 miles additional travel for through traffic is required for the proposed detour route and property and business owners on SR 700 do not object to the closure.

A bridge length of 245 feet was recommended in the Location Hydraulics Study. The existing bridge provides approximately 4 feet of clearance above the design flood. Due to the history of flooding along the Withlacoochee river, it is recommended that the proposed structure be no lower than what presently exists.

APPENDIX A

JAMMAL & ASSOCIATES, INC. Consulting Engineers

September 30, 1988
Project No. 88-02128

TO: Harland Bartholomew & Associates
4417 Beach Boulevard, Suite 400
Jacksonville, Florida 32207

Attention: Mr. Daniel T. Maxey, P.E.

SUBJECT: Phase I - Preliminary Investigation (Revised)
Proposed Replacement Bridge and Approaches on
State Road 700 over Withlacoochee River,
Pasco County, Florida
WPI No. 7115954

Dear Mr. Maxey:

As requested, we have completed Phase I: Preliminary Investigation for the subject bridge replacement. Presentations of geologic information, assessment of the condition of the existing bridge and surrounding environment, proposed field exploration, any anticipated problems regarding soils and foundation aspects of the planned construction, and preliminary foundation alternatives are included in this report. This preliminary study was completed in accordance with our revised proposal dated April 13, 1988.

PROJECT DESCRIPTION

The existing bridge on State Road 700 is planned for a replacement since the bridge is structurally deficient, as indicated in the Project Concept Report. The bridge is 245 feet in length with seven spans at 35 feet each. The proposed replacement is a two-lane, low-level structure on the existing alignment. We understand from Sverdrup Corporation comments that stormwater management facilities are not anticipated.

FIELD RECONNAISSANCE

A field reconnaissance investigation was completed on July 20, 1988 by C. Determan, of our staff. The investigation aided us in locating proposed borings, deciding types of equipment suitable, and becoming familiar with the condition of the bridge, rivers, and surrounding vegetation.

The bridge over the Withlacoochee River on State Road 700 is a narrow bridge with narrow shoulders, and with moderate to heavy travel including trucks. On the south side of the bridge were two campground sites, which could allow access near the bridge with removal of some vegetation. The embankment slopes are fairly steep with a grass covering. Thick vegetation is found on both sides of the river.

GEOLOGIC DESCRIPTION

The general near-surface geology of Pasco County is dominated by the Suwannee Limestone, which was initially named for the yellowish limestone exposed along the Suwannee River. The Suwannee limestone, Oligocene age, overlies the Ocala formation and underlies the post-Oligocene deposits. Post-Oligocene deposits generally consists of a sand, silty sand and clay. Our literature research for geologic information included review of Geologic Bulletins for the appropriate county, and consulting with members of our staff who are familiar with the geology in the area.

No pile driving data was found for the existing bridge. Based on previous borings provided by Sverdrup Corporation, our field exploration for the proposed replacement bridge is expected to encounter sands and clays 30 to 40 feet in thickness, overlying the Suwannee Limestone, which could have a thickness of up to 200 feet. The Ocala limestone underlies the Suwannee limestone in this area.

PRELIMINARY FOUNDATION ALTERNATIVES

Based on our geologic literature search and experience with this area and the proposed construction, we expect a deep foundation system will be most appropriate for the proposed construction. Peak stream flow or scour conditions may preclude use of a shallow foundation system. Foundation types considered to be most appropriate are prestressed concrete piles and drilled shafts extending to the limestone. If the limestone encountered is hard, an H-pile could be considered , as well as higher capacity drilled shafts. The size and depth of pile will be analyzed further after subsurface conditions are known. The size and depth of pile will be analyzed further after subsurface conditions are known.

PROPOSED FIELD EXPLORATION

The proposed test and auger borings are shown on Sheet 1. The number of borings for the structure was specified by Mr. John Larson of Sverdrup Corporation. The location of the test borings are planned approximately 100 feet apart along the centerline for the bridge. The borings are planned to alternate left and right of the alignment of the bridge wherever the area is accessible.

The borings will be drilled by a track-mounted bombadier equipment obtaining SPT samples every 5 feet, and be advanced into the limestone a minimum of 10 feet. Up to 10 feet of coring may be performed in one boring. Two (2) auger borings will be drilled to a depth of approximately 20 feet in the approaches. Soil samples will be transported to our soils lab and visually classified. Lab analysis will consist of moisture content, grain-size, hydrometer, Atterberg limits, unit weight, consolidation, environmental tests, and triaxial tests as appropriate. In addition the roadway soil survey will include up to four (4) Limestone Bearing Ratio (LBR) and two (2) pavement cores.

Stormwater retention facilities are not anticipated. We assume these will be verified prior to mobilization for the field investigation. Up to four borings to depths of 20 feet and two field borehole permeability tests are budgeted for this evaluation, if necessary.

After the Phase II investigation, we will provide detailed foundation evaluations and recommendations. We appreciate the opportunity to provide our services on this project. If you have any questions or comments regarding the contents of this report, please contact us at your convenience.

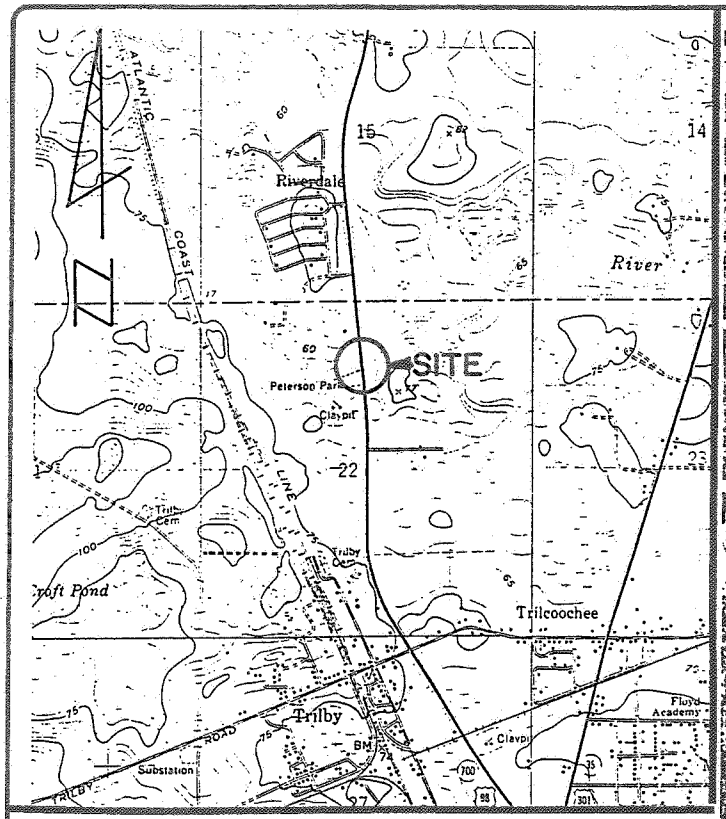
Sincerely,

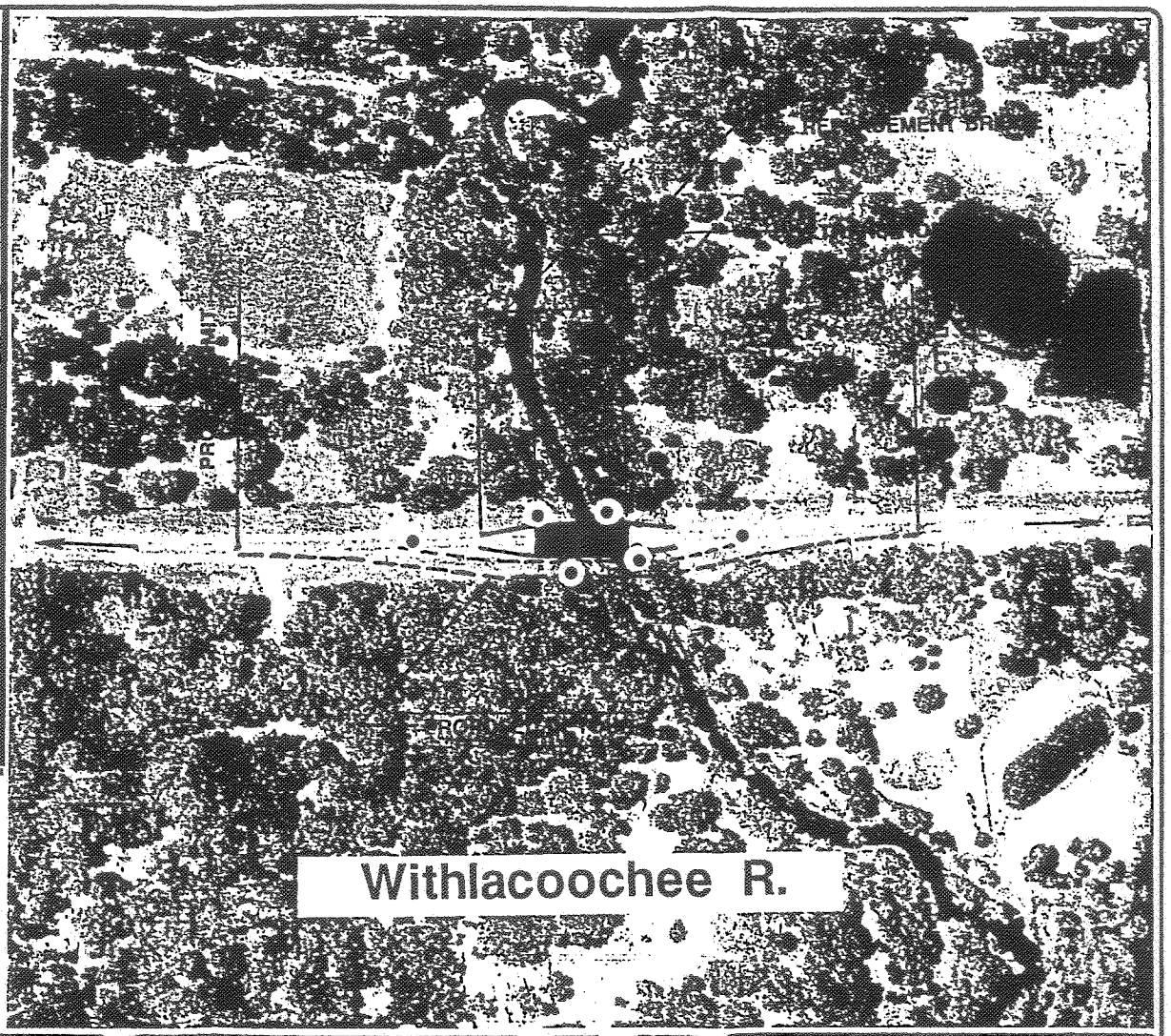
JAMMAL & ASSOCIATES, INC.

Constance A. Determan, E.I.
Associate Engineer

Jay W. Casper, P.E.
Senior Project Engineer
Fl. Registration No. 36330

Attachment (Sheet 1B)
CAD/RLG:tdb
4629L





REFERENCE: U.S.G.S. "LACHOOCHEE, FLORIDA" QUADRANGLE MAP
SECTION:22
TOWNSHIP:23 SOUTH
RANGE:21 EAST
ISSUE:1960
SCALE:1"=2000'

● PROPOSED BORING LOCATION

DRAWN:	FNI
CHKD:	CAD
APPVD:	JWC
SCALE:	

Preliminary Investigation
PROPOSED
BRIDGE REPLACEMENT W.P.I. 7115954
U.S. Highway over the
Withlacoochee River

JAMMAL & ASSOCIATES, INC. Consulting Engineers

DATE 8-5-88	PROJ NO. 88-02128	SHEET: 1B

JAMMAL & ASSOCIATES, INC. Consulting Engineers

November 7, 1988
Project No. 88-02128

TO: Harland Bartholomew & Associates
4417 Beach Boulevard, Suite 400
Jacksonville, Florida 32207

Attention: Mr. David T. Maxey

SUBJECT: Deep Foundation Capacity Estimates,
Bridges over Withlacoochee River
and Little Withlacoochee River

State Project Nos. 08030-3506 & 14080-3506
Work Program Nos. 7112104 & 7115954

Dear Mr. Maxey:

As requested, we are providing for you estimates on deep foundation capacities for the above mentioned projects. Specifically, we are referring to 18 inch square precast concrete piles and a 2 foot diameter drilled shafts. As you know, the information on which these capacities were derived has not been verified and would need to be adjusted once subsurface parameters are known.

It is our preliminary opinion that an 18 inch precast concrete pile driven into rock a sufficient distance would be capable of developing sufficient resistance to carry compression loads on the order of 75 tons. In addition, we estimate 2 and 3 foot diameter drilled shafts, socketed into the rock about 10 feet would be capable of developing load carrying capacities on the order of 80 to 150 tons, respectively. The capacities above are allowable loads.

We trust that this information meets your current needs. Should you have any questions, please contact our office.

Sincerely,

JAMMAL & ASSOCIATES, INC.

Richard P. Lundberg, E.I.
Associate Engineer

Jay W. Casper, P.E.
Senior Project Manager
Fl. Registration No. 36330

RPL/JWC:tdb
4720L

JAMMAL & ASSOCIATES, INC. Consulting Engineers

September 30, 1988
Project No. 88-02128

TO: Harland Bartholomew & Associates
4417 Beach Boulevard, Suite 400
Jacksonville, Florida 32207

Attention: Mr. Daniel T. Maxey, P.E.

SUBJECT: Environmental Test Results
Bridges at Little Withlacoochee
S.R. 35 and Withlacoochee S.R. 700,
W.P.I No. 7112104 and 7115954

Dear Mr. Maxey:

Contained herein are the results of the environmental testing performed on water samples collected on July 20, 1988 at the referenced project. In addition, the structures have been assigned an environmental classification based on FDOT's Structures Design Guidelines.

Bridge on S.R. 35 over Little Withlacoochee, W.P.I No. 7112104

pH	- 6.85
Resistivity (ohm-cm)	- 5656
Sulfate (ppm)	- <1
Cloride (ppm)	- 10

Substructure: Non-corrosive (Slightly Aggressive)

Superstructure: Non-corrosive (Slightly Aggressive)

Location: Inland

Bridge on S.R. 700 over Withlacoochee, W.P.I No. 7115954

pH	- 7.2
Resistivity (ohm-cm)	- 6060
Sulfate (ppm)	- 5.7
Cloride (ppm)	- 25

Substructure: Non-corrosive (Slightly Aggressive)

Superstructure: Non-corrosive (Slightly Aggressive)

Location: Inland

We trust that this information will be sufficient for your current need. If you should have any questions, please contact us.

Sincerely,

JAMMAL & ASSOCIATES, INC.

Richard P. Lundberg, E.I.
Associate Engineer

Jay W. Casper, P.E.
Senior Geotechnical Engineer
Fl. Registration No. 36330

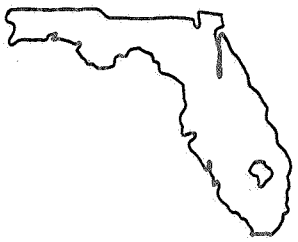
RPL/JWC:srm
2001S

APPENDIX B

Memo

Bridge Program General Consultant
Florida Department of Transportation

Sverdrup CORPORATION



TO: File

FROM: D.C. Smith

DATE: October 10, 1988

SUBJECT: Wetland Delineation
US 98/Withlacoochee River
WPI No. 7115954

As with WPI No. 7112104 memorandum (same date), DCS met with the surveyors at the project site to clarify the location of wetland delineation flags placed by C.L. Cash on September 7, 1988 (see attached Figure 1). The wetland areas lie between the lines indicated and extend east and west, away from the project impact area. Due to extremely high water, the main river channel could not be identified.

The dominant plant species were:

Acer rubrum	Red maple
Hydrocotyle spp.	Pennywort
Juncus spp.	Bog rushes
Nyssa aquatica	Water tupelo
Paspalum distichum	Knot grass
Quercus laurifolia	Swamp laurel oak
Sabal minor	Dwarf palmetto
Salix spp.	Willow
Taxodium distichum	Bald cypress

The wetlands on both sides of the structure are classified as riverine, emergent (nonpersistent), palustrine scrub shrub and palustrine forested wetlands that were temporarily flooded. The area may include riverine, emergent persistent and/or aquatic bed areas, but these could not be identified due to the extremely high flows.

Attachment

DCS/ahd

DISTRIBUTION: S.A. Nichols; Daniel Maxey, HBA.

FILE: 715954, 325, 1400

1203 Governor's Square Blvd., Suite 300, Tallahassee, FL 32301 • Telephone (904) 877-8500

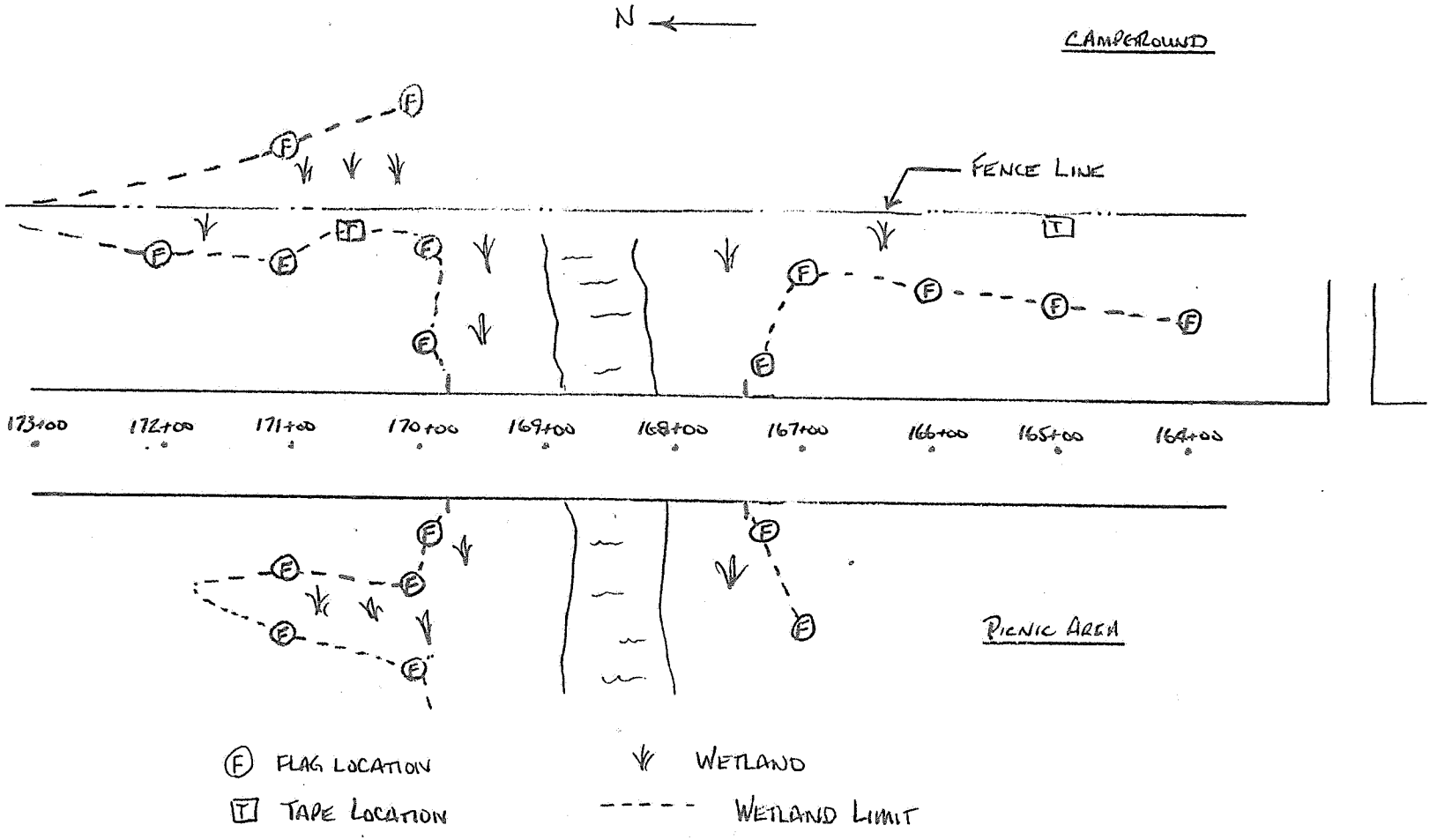


FIGURE 1. WITHLACOOCHEE RIVER - WETLAND DELINEATION

NOT TO SCALE

APPENDIX C

LOCATION HYDRAULIC STUDY
WITHLACOOCHEE RIVER BRIDGE REPLACEMENT
ON S.R. 700 PASCO COUNTY, FLORIDA

WPI No.: 7115954

State Project No.: 14080-3506

Bridge No.: 140026

prepared by

HARLAND BARTHOLOMEW & ASSOCIATES, INC.

for

FLORIDA DEPARTMENT OF TRANSPORTATION

April, 1989

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

LIST OF TABLES

EXECUTIVE SUMMARY

The purpose of this study is to analyze alternatives for replacement of the existing SR 700 (US 98) Withlacoochee River Bridge. The analyses presented in this study will be used to determine a recommended structure length and low member elevation for the replacement structure. Other factors are involved in the ultimate selection of the recommended alternative and are presented in the Preliminary Engineering Report.

The "Green Swamp Report" prepared by the Southwest Florida Water Management District, indicates that the Withlacoochee River is subject to flooding. No significant flood control construction projects currently exist or are planned for the river. The existing bridge abutments are located at the floodway boundary as defined by the Federal Emergency Management Agency's (FEMA) Floodway boundary map.

A 115 foot and a 245 foot structure were analyzed for replacement of the existing bridge. The 245 foot structure, with a low member elevation set at elevation 71.60 feet, was recommended as the replacement structure. This structure caused a 0.07 foot rise in the water surface elevation for the 100-year flood when compared to the no structure condition. Hazardous flood velocities are not produced by the recommended replacement structure. No adverse environmental impacts will be experienced and no significant change in flood hazards are anticipated.

PRELIMINARY INFORMATION

A. GENERAL SITE LOCATION

Highway Description and Topography

The SR 700 (US 98) bridge over the Withlacoochee River is located approximately 15 miles west of Brooksville, Florida and approximately 34 miles northeast of Tampa, Florida. (See Figure-1).

The existing bridge was constructed in 1951 and consists of seven 35 foot simply supported spans comprising a total length of 245 feet. (See Figure-2). The bridge is supported by pile bents consisting of prestressed concrete piles and cast in place concrete pile caps. The existing bridge cross section consists of a 28 foot clear roadway with 9" curbs (2'-6" wide) separating the roadway from the concrete handrail. The approach roadway cross section consists of two 12 foot travel lanes with 8 foot grass shoulders on an approximately 15 foot high embankment. Both the roadway and bridge are offset 31 feet from the centerline of the 202 foot wide right-of-way.

The headwaters of the Withlacoochee River are located in the Green Swamp in Polk County, approximately 40 miles upstream from the SR 700 (US 98) crossing. From its origin, the Withlacoochee

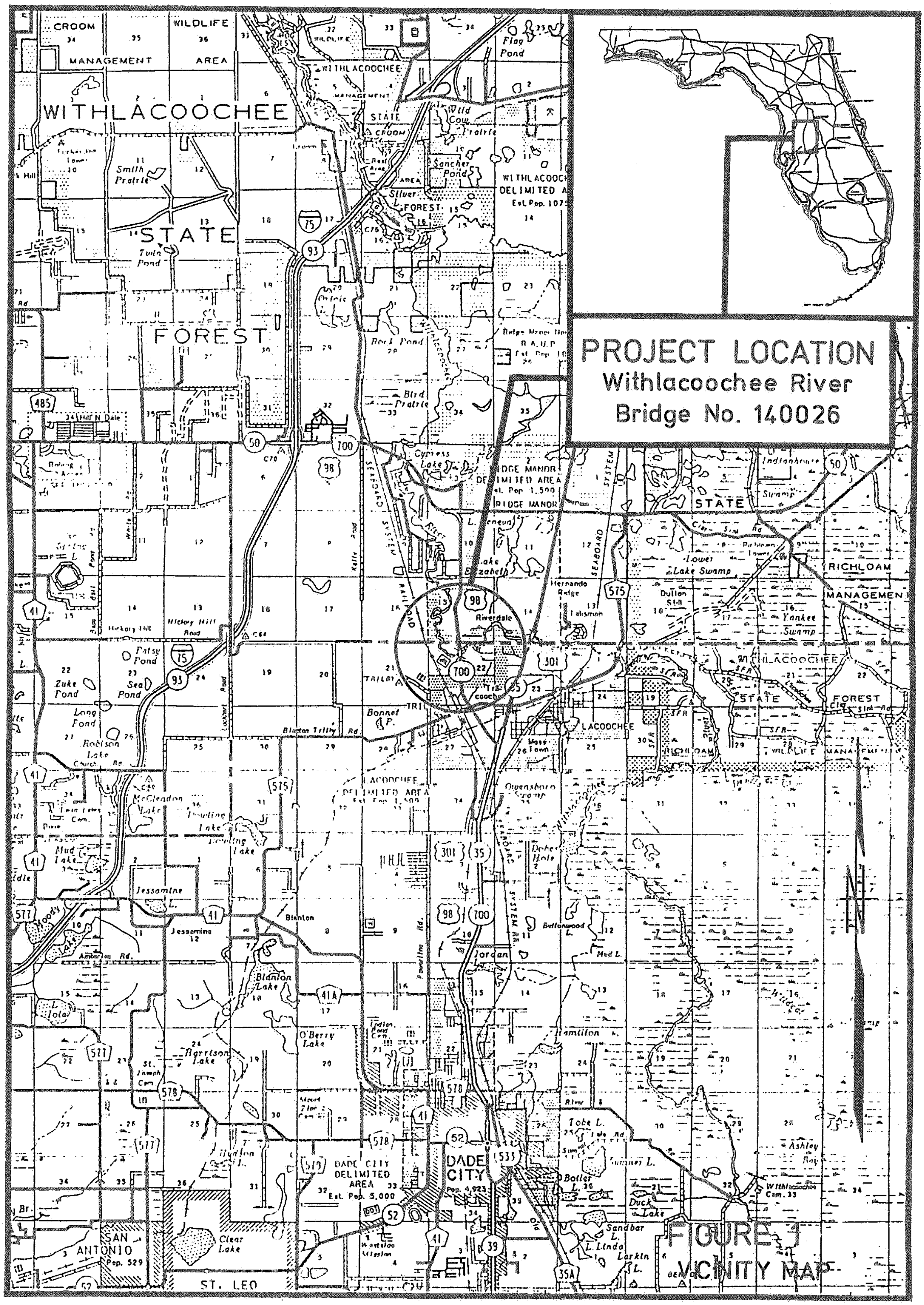
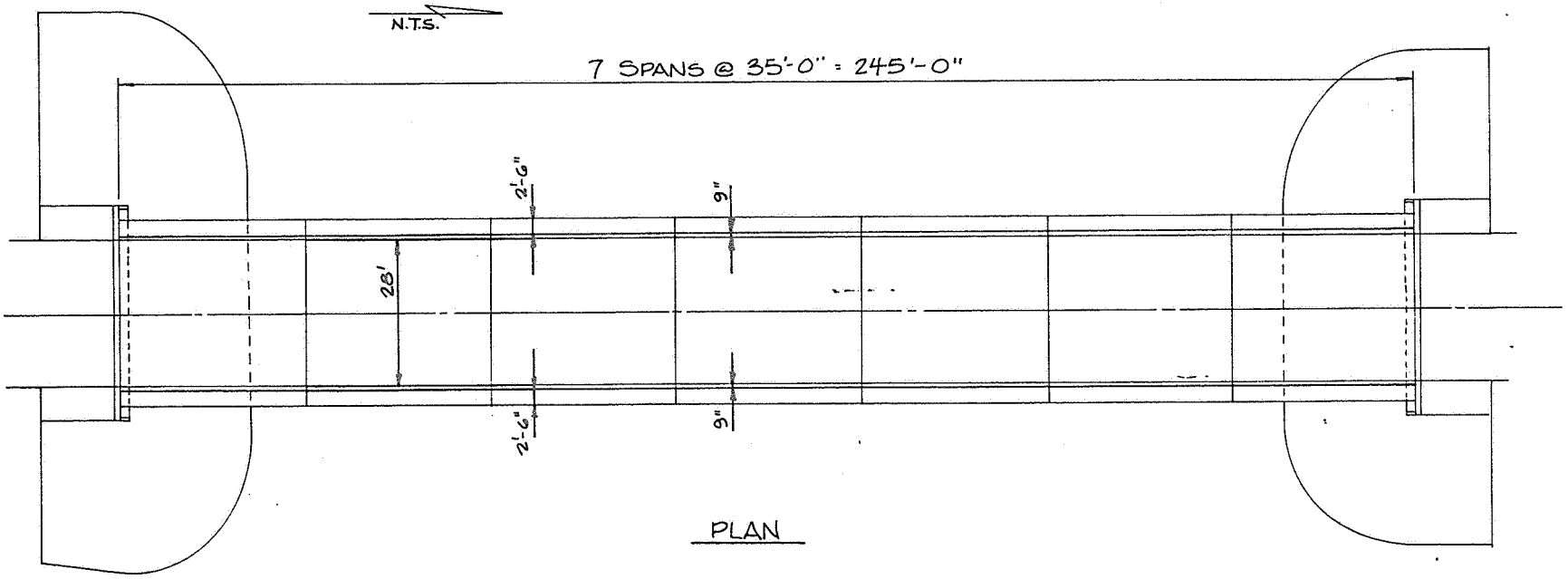
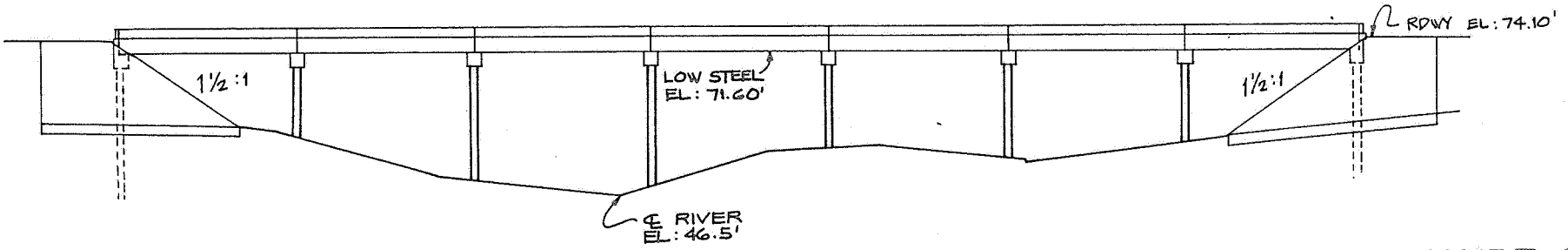


FIGURE 1
VICINITY MAP



PLAN



ELEVATION

FIGURE 2

EXISTING CONDITIONS

S.R. 700 OVER
THE
WITHLACOOCHEE RIVER
PASCO CO.

River flows approximately 160 miles in a northwesterly direction to its confluence with the Gulf of Mexico near Yankeetown at the Citrus County-Levy County border.

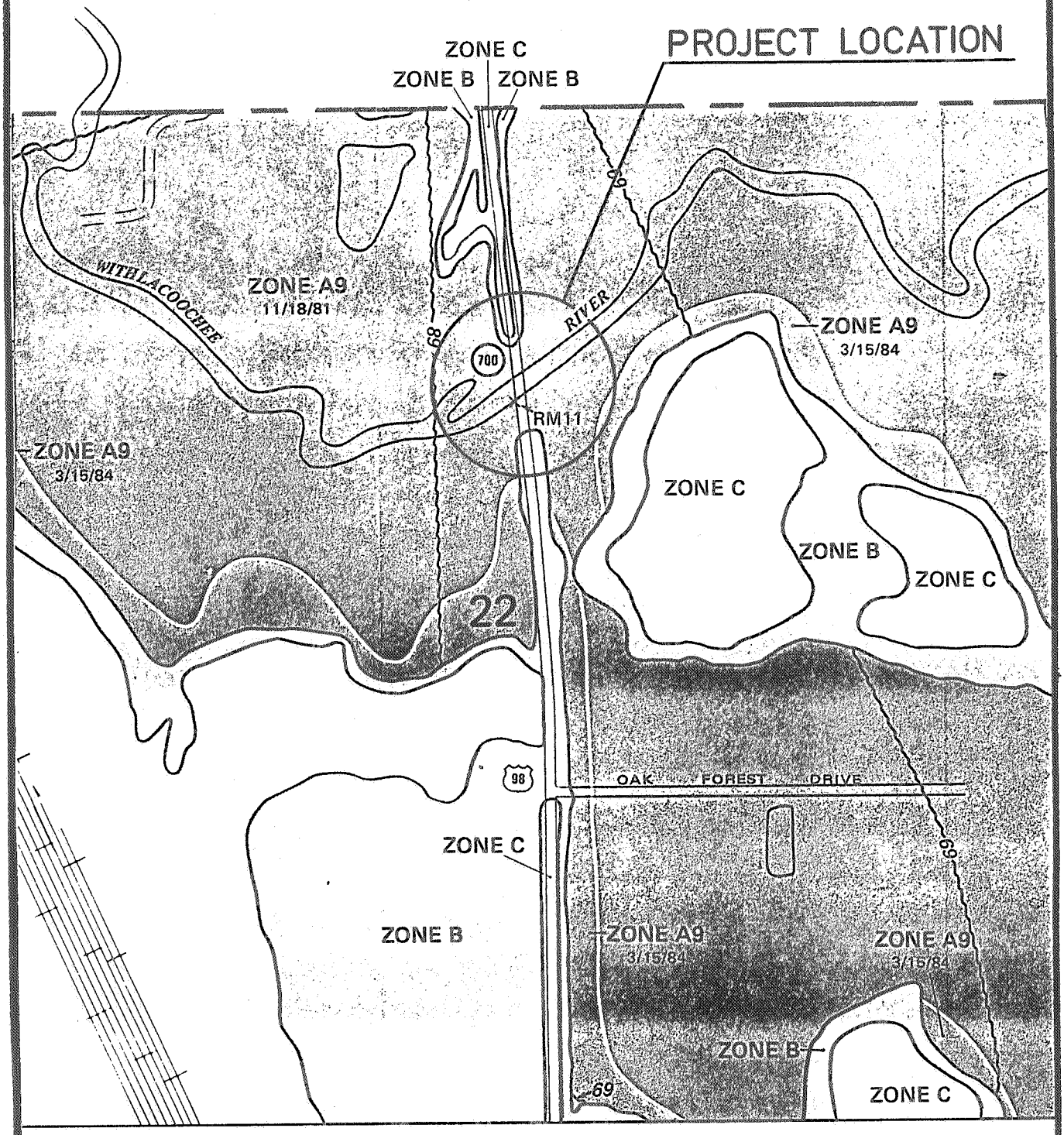
B. POTENTIAL SITE PROBLEMS

Land Use

The majority of the land within the watershed is undeveloped. Areas which are developed consist mainly of crop land, pasture land and some citrus groves. Some commercial forestry activities also take place in the project area. The land immediately surrounding the project site is primarily recreational and residential. A public park is located in the southwest quadrant. The southeast quadrant is developed as a campground and the northwest and northeast quadrants have been developed as private residences. There are no signs of boating activity on the river in this area. At the present time no significant development has taken place within the project area which would affect the peak rate or volume of stormwater runoff.

The Withlacoochee River bridge is located in Flood Zone A9 according to Federal Emergency Management Agency's (FEMA) Flood Insurance Rate Map (FIRM) for Pasco County, panel number 102 of 500, dated March 15, 1984. (See Figure-3). Flood Zone A9 is defined as the area of the 100-year flood with base flood elevations and flood hazard factors determined. The associated

FLOOD INSURANCE RATE MAP
PASCO COUNTY, FLORIDA
PANEL 102 OF 500



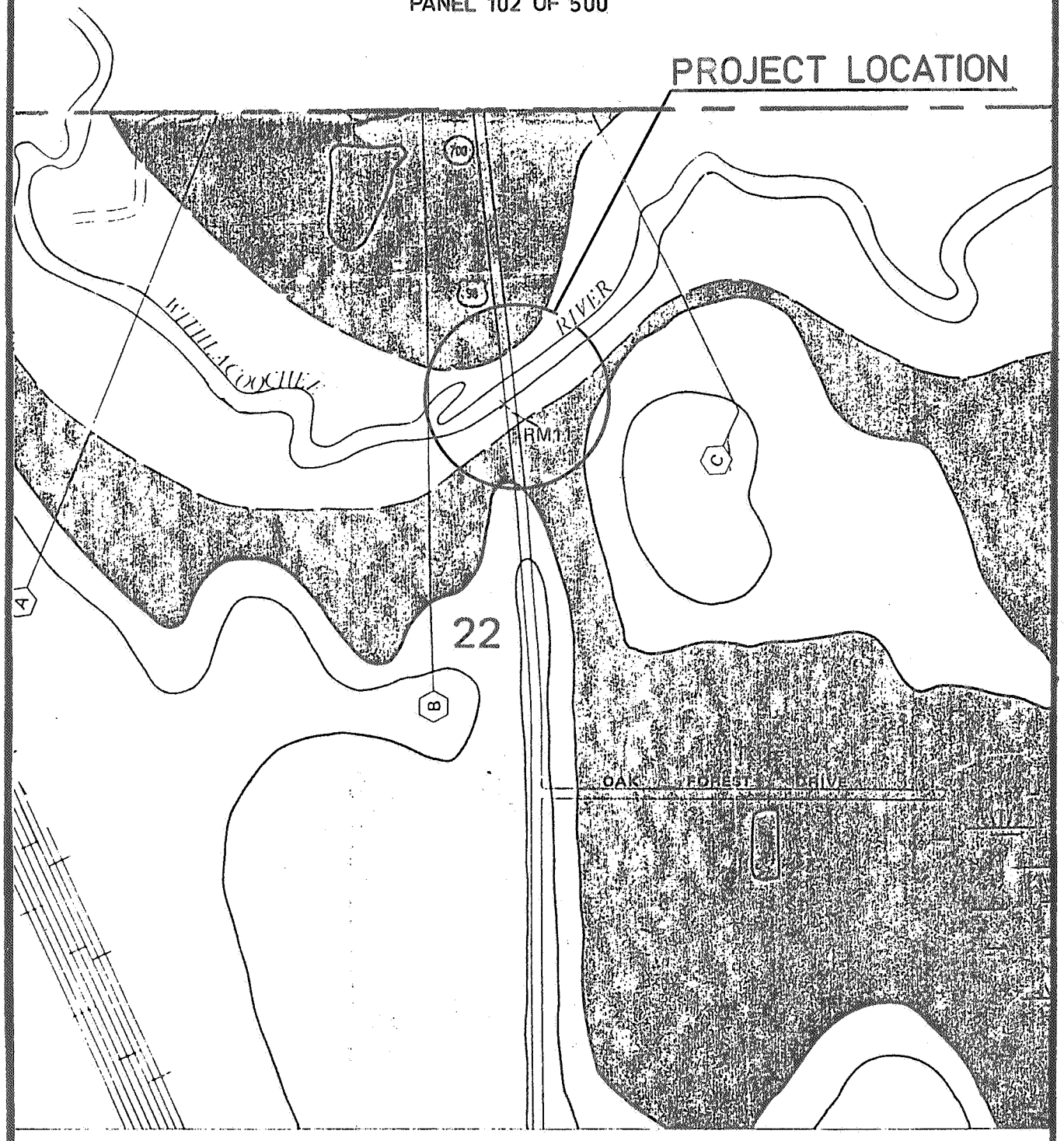
FLOOD ZONE DELINEATION

FIGURE 3

Flood Hazard Factors (FHF) for zone A9 is 045. The FHF for a reach is the average weighted difference between the 10-year and the 100-year flood water surface elevations expressed to the nearest one-half foot, and shown as a three digit code. The FHF is used to correlate flood information with insurance rate tables. Correlation between property damages from floods and their assigned FHFs are used to set actuarial insurance premium rate tables based on FHFs from 005 to 200.

Encroachment on flood plains, such as fill, reduces the floodcarrying capacity, increases the flood heights of streams and increases flood hazards in areas beyond the encroachment itself. One aspect of flood-plain management involves balancing the economic gain from flood-plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood-plain management. Under this concept the 100-year flood is divided into a floodway and floodway fringe. The floodway is the channel of a stream plus any adjacent flood-plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 foot, provided that hazardous velocities are not produced. From the FEMA Floodway Map for Pasco County, Florida (See Figure-4), the limits of the 100-year floodway at the SR 700 (US 98) bridge were located at the existing bridge abutments.

FLOOD BOUNDARY AND FLOODWAY MAP
PASCO COUNTY, FLORIDA
PANEL 102 OF 500



FLOODWAY LIMITS

FIGURE 4

Environmental Impacts

The SR 700 (US 98) crossing of the Withlacoochee River is located approximately 2.5 miles west of the Withlacoochee State Forest. Wetlands have been delineated in accordance with Department of Environmental Regulation (DER) criteria at the project site. (See Figure-5). Shortening the existing structure or raising the profile grade of the existing structure would require placing fill material in wetlands. Any impacts to wetlands would require review by the Corps of Engineers (COE), and the Southwest Florida Water Management District (SWFWMD). Mitigation of impacted wetlands would be required with mitigation ratios ranging from 2:1 to 5:1, depending on the value of the existing wetlands impacted. Exact ratios would be determined by the reviewing agencies listed above. (DER, COE, SWFWMD), however a 2:1 ratio is anticipated.

Channel Stability

No channel erosion or scour was noted at the project site. The existing structure has 1.5:1 sand cement rip-rap abutments. no evidence of local scour at the bridge abutments or piles was observed. Bridge maintenance reports indicate that the "channel and channel protection" at this site are in good condition with no repairs needed.

STATE PROJ. NO.	SHEET NO.

FLOODWAY BOUNDARY (TYP.)

WITHLACOOCHEE RIVER

WETLANDS

100 YR. FLOODPLAIN (TYP.)

164 165 166 167 168 169 170 171 172 173 174

U.S. 98

D.E.R. JURISDICTION LINE

D.E.R. JURISDICTION LINE

RIVER

WETLANDS

100 0 50 100

scale feet

FIGURE 5

S.R. 700 (U.S. 98)
OVER THE
WITHLACOOCHEE RIVER

PASCO COUNTY

WETLANDS DELINEATION

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	D.L.H.	1-89	DRAWN BY	R.S.T.	1-89
CHECKED BY	D.T.M.	1-89	CHECKED BY	D.L.H.	1-89
SUPERVISED BY D.T. MAXEY					

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY

DATE

Potential Water Stages

The Withlacoochee River is not tidally influenced at the SR 700 (US 98) crossing. No significant flood control projects currently exist along the river. A United States Geological Survey (USGS) stream gage is located at the SR 35 (US 301) bridge in Trilby, Florida 1.53 miles upstream of the SR 700 (US 98) crossing. This stream gage has been present since February, 1930. The datum of this gage is 49.27 feet above National Geodetic Vertical Datum (NGVD). Data from the gage is published in "Water Resources Data, Florida, Water Year 1987" by the USGS. The average discharge recorded at the gage, for the last 57 years was 350 cfs. The maximum recorded discharge was 8840 cfs and occurred on June 21, 1934. This flood produced a maximum water surface elevation of 69.77 feet at the Trilby stream gage. The minimum recorded discharge was 6.2 cfs and occurred on June 6, 1985. The maximum discharge in 1987 (the last year of published data) occurred on April 6 and April 7 with a flow rate of 3290 cfs. This flood produced a maximum water surface elevation of 64.79 feet. The minimum discharge for 1987 occurred on November 29 and November 30 with a flow rate of 46 cfs.

Bridge Design Criteria & Clearances

Minimum criteria for bridge design as established by FDOT are:

Vertical Clearance : 2 to 3 feet above the design flood.

		Additionally, FDOT District 7 has requested that 3 feet of clearance be provided if feasible.
Horizontal Clearance	:	Should comply with Water Management District requirements.
Average Flow Velocity	:	2.0 to 3.0 feet per second for design flood conditions is typical at most bridge locations. The use of rip-rap or bank protection should be considered if the average velocity exceeds 3.0 feet per second.
Design Flow	:	50 year flood flow for high use or essential highways.

Minimum criteria for bridge design as established by SWFWMD are:

Vertical Clearance	:	Two feet above the 25-year flood.
Horizontal Clearance	:	25 feet between bents.
Bent Spacing	:	No bents in the center of

		the channel.
Alignment	:	Bents to be parallel with normal flow (not flood flow).
Max. Avg. Flow Velocity	:	2.5 feet per second for the 25-year storm.
Max. Head Loss	:	0.10 feet at limit of the upstream or property boundary or right-of-way.
Design Flow	:	25-year flood flow from stream flow records or if stream gage records are not available, use the flow from the watershed resulting from a 25-year, 24-hour storm.
Additional Criteria	:	SWFWMD will not permit any activity which will restrict or alter the rate of flow of a stream or other watercourse within the flood-plain of a 25-year flood unless the land is owned, leased or otherwise controlled by the applicant.

The Little Withlacoochee River is not classified by the U.S. Coast Guard as a navigable river, therefore U.S. Coast Guard design criteria is not applicable to this project.

FINAL DESIGN DATA

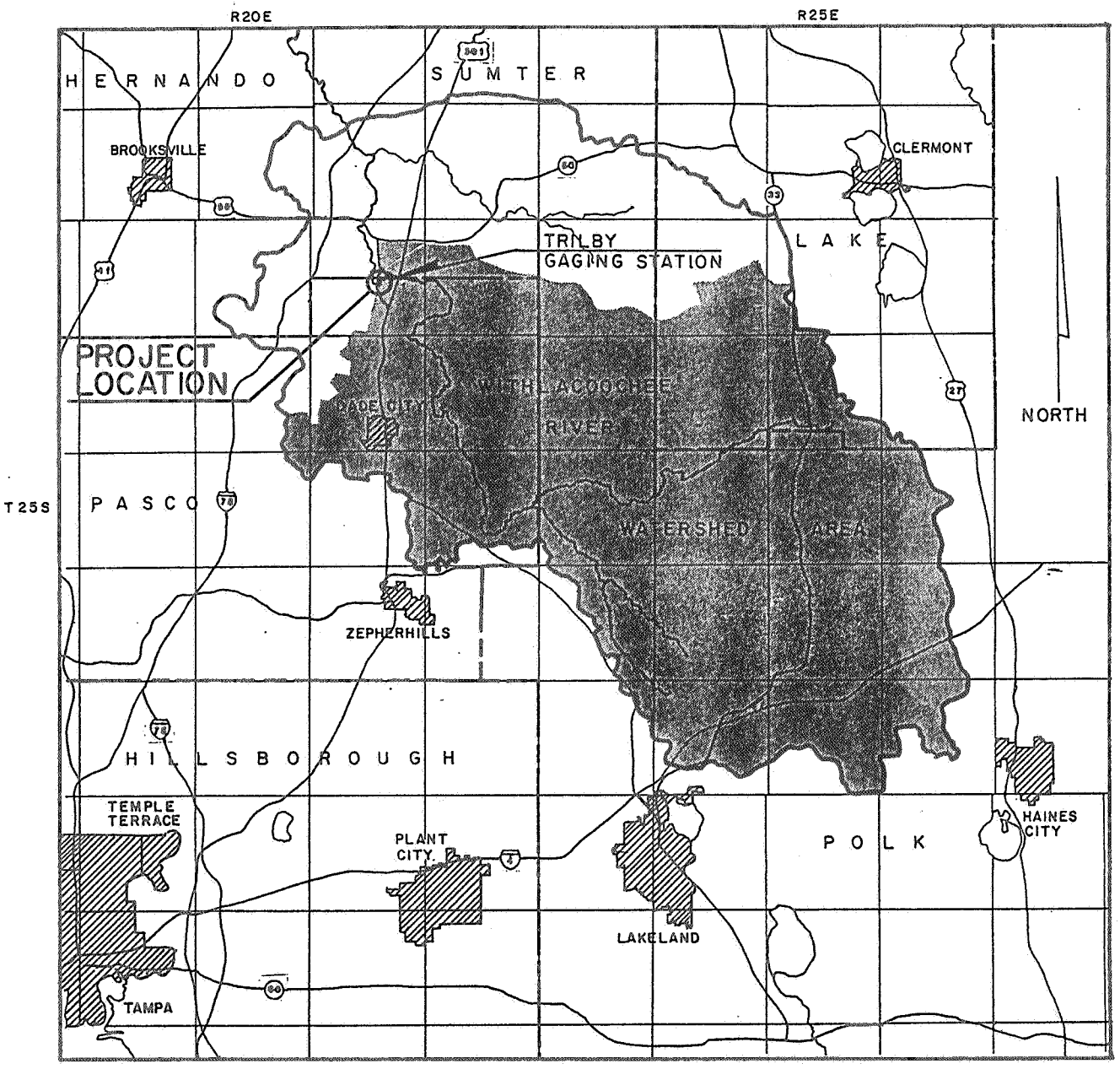
A. INVENTORY OF EXISTING CROSSING

Location in Relation to Crossing

The SR 700 (US 98) bridge over the Withlacoochee River is a 245 foot structure. The river runs at a 65 skew to the roadway and at normal depths the channel is located left of center of the structure (See Figure-5).

Determination of Drainage Area

A USGS stream gage is located at the SR 35 (US 301) bridge in Trilby, Florida (Gage No. 02312000). This gage is located 1.53 miles upstream of the SR 700 (US 98) crossing. According to the "Water Resources Data, Florida, Water Year 1987", the drainage area associated with the Trilby stream gage is 570 square miles. This stream gage has been in place since 1928. An additional 4 square mile drainage area has been estimated between the gage at Trilby and the SR 700 (US 98) crossing. Therefore, the drainage area of the watershed at the SR 700 (US 98) bridge is approximately 574 square miles. (See Figure-6).



WATERSHED AREA

FIGURE 6

Physical Data on Structure

The existing bridge has 7 spans at 35 feet each for a total length of 245 feet. The substructure consists of pile bents perpendicular to the roadway. The end bents have 7 prestressed 18" x 18" concrete piles spaced at 6'-0" on center and the intermediate bents have 4 prestressed concrete piles at 8'-0" on center. The pile caps are cast in place concrete, 2'-7" high x 2'-8" deep. The superstructure consists of four 21" deep wide flange steel beams spaced at 8'-0" on center. On top of the beams is a 7" concrete deck.

The drainage system on the existing bridge consists of scuppers spaced on 8'-9" centers along both gutterlines of the bridge. The scuppers drain directly into the river and overbank areas.

Flood History

The flood-plain of the Withlacoochee River is subject to flooding during high water stages and has been subject to several major floods according to FIS for Hernando and Pasco Counties. The FIS for Hernando County reports that floods caused significant damage along the Withlacoochee River in 1934, 1950 and 1960. USGS gage information indicates that the 1934 and 1950 storms had a magnitude that would occur on the average once in 75 and 60 years respectively. The FIS for Pasco County documents that the 1934 storm caused considerable damage to bridges, highways and

railroad embankments in the Withlacoochee River basin in eastern Pasco County. In March, 1960 thunderstorms and heavy rainfall averaging more than 10 inches over a 10,000 square mile area in central Florida resulted in extensive damage in the Withlacoochee basin in eastern Pasco County. This storm caused damage to residential and agricultural lands and to transportation facilities.

In response to extensive flooding in the Withlacoochee River basin, the Army Corps of Engineers (COE), in 1967, proposed the Four River Basins project which delivered specific designs for levees and structures needed for construction of permanent conservation pools. SWFWMD secured flooding rights from the State Division of Forestry for lands within the proposed conservation pools. However, the 1972 "Green Swamp Environmental Statement" prepared by SWFWMD, found the Four River Basins project too disruptive environmentally and recommended the substitution of temporary flood detention areas for the permanent conservation pools. The loss of the benefits derived from the construction of permanent conservation pools jeopardized the economic justification of the COE's participation in the project. In 1979, SWFWMD began studying new alternatives that were less disruptive environmentally to the Withlacoochee River basin. Changes included the substitution of temporary flood detention areas for permanent conservation pools, and the relocation of dikes and levees to less disruptive sites. The findings of SWFWMD were published in 1982 in the "Green Swamp Report". The

report recommended that none of the five flood control alternatives studied be built due to economic considerations.

Evaluation of Hydraulic Adequacy of Structure

The existing structure does not meet current FDOT roadway width standards. In addition, it was designed using an H-15 live load which is substandard for this highway.

No flooding has been directly attributed to the existing structure. For the base flood, the water surface elevation was 68.64 (ft. m.s.l.) 250' upstream of the existing structure, with a velocity through the bridge of 2.63 feet per second. The upstream water surface elevation and the velocity of the river through the bridge was determined using the FHWA program WSPRO. See Appendix for the input/output.

B. SELECTION OF DESIGN FLOOD

Importance to Highway System

For the purpose of this study SR 700 (US 98) has been classified as a high use or essential highway. The design storm for a roadway categorized as high use or essential highway is the 50-year flood according to the FDOT Drainage Manual.

Conveyance of 100-Year (Base) Flood

The base flood does not overtop the SR 700 (US 98) bridge according to flood profiles of the Withlacoochee River in the FIS for Pasco County. (See Figure-7). The existing structure currently causes approximately 0.07' of rise in the water surface elevation, 250 feet upstream of the existing structure when compared to the water surface elevation for the no structure condition, for the 100-year flood. The rise in backwater was determined using WSPRO. See Appendix for the input/output.

C. HYDROLOGIC ANALYSIS

Site Review

A site review of the project area was performed on October 21, 1988 by section consultant personnel. This visit occurred approximately one month after a significant flood. Highwater marks established by survey personnel were used to approximate the return frequency of this storm. The observed high water mark at elevation (62.60 ft. USC&GS) was used in conjunction with flood stage information taken from the SWFWMD report to interpolate the approximate return frequency of this storm of 7 years.

No evidence of erosion or general scour was observed within the channel or overbank areas and no evidence of local scour at the

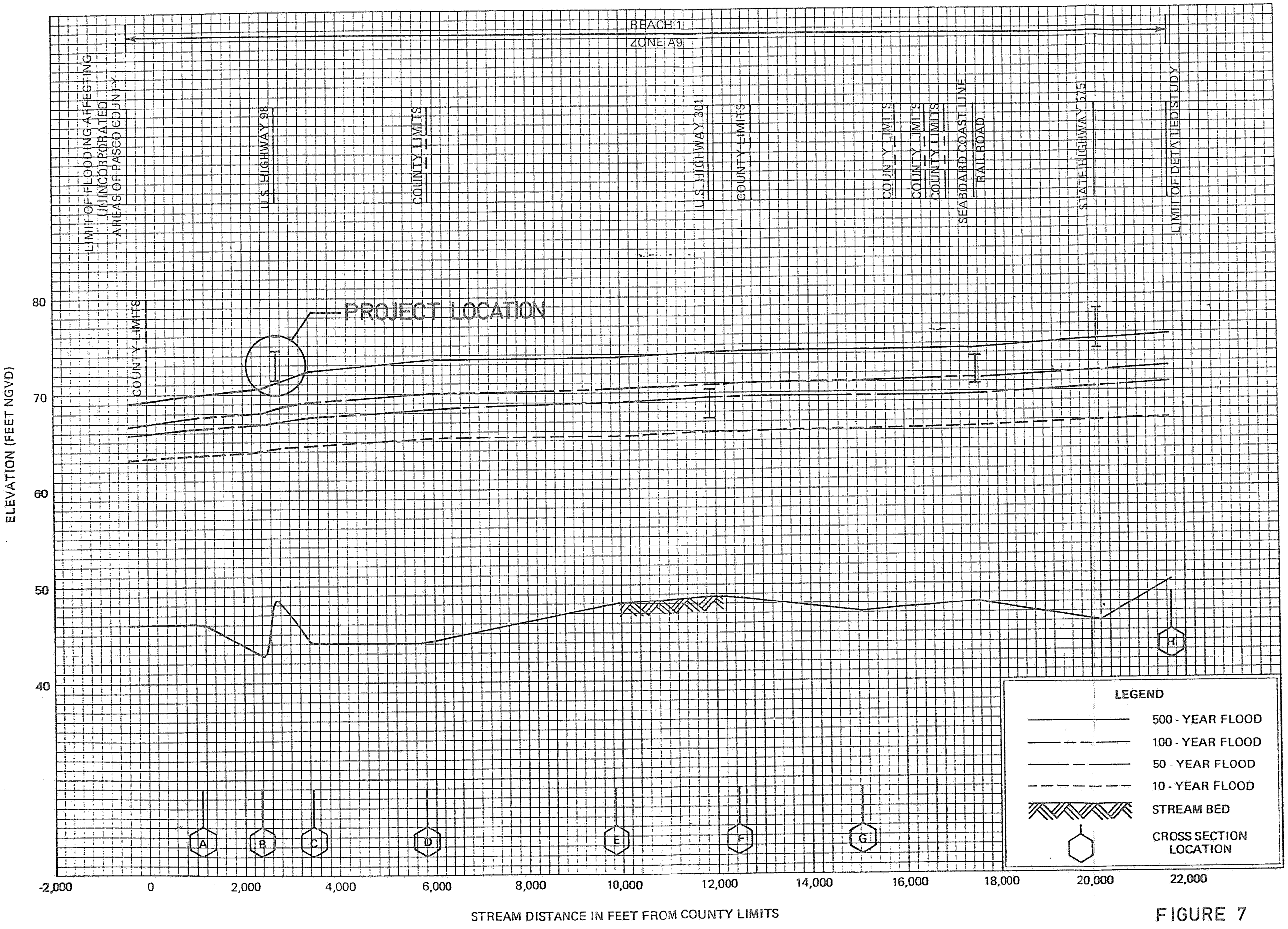


FIGURE 7

FLOOD PROFILES

WITHLACOOCHEE RIVER

FEDERAL EMERGENCY MANAGEMENT AGENCY

PASCO COUNTY, FL
(UNINCORPORATED AREAS)

06P

bridge abutments or piles was observed.

The river channel consisted of a well defined, relatively wide and deep cross section with wide, flat overbank areas. The overbank areas were covered with grass and thick vegetation. No evidence of recent improvements or maintenance operations to the river channel or overbank areas was observed. No recent development within the immediate project area was noted.

Interviews with Persons Providing Flood History Data

No persons were interviewed for this study. All information concerning flood history was taken from government published reports.

Review of Available Flood Records

Flood records and information were obtained from four sources: Flood Insurance Study (FIS) for Pasco County by FEMA; "Flood-Plain Information on the Withlacoochee River from Nobleton at SR 476 to Cumpressco at SR 471" by SWFWMD; "Water Resources Data, Florida, Water Year 1987" by USGS; and "Technique for Estimating Magnitude and Frequency of Floods on Natural-Flow Streams in Florida" by USGS, 1982.

Review of Available Stream Gage Data

The Trilby, Florida stream gage (No. 03100208) is owned and operated by the USGS. This gage is on the right bank of the Withlacoochee River at the downstream side of the SR 35 (US 301) bridge. Pertinent stream gage data is shown in the following table.

Withlacoochee River at Trilby, FL (No. 03100208)

Drainage Area	- 570 sq. mil. approximately
Period of Record	- February, 1930 to present
Datum of Gage	- 49.27 above NGVD, 1929
Average Discharge	- 56 years 352 cfs
Maximum Discharge	- 8840 cfs (6/21/34) gage height 20.5 ft.
Minimum Discharge	- 6.2 cfs (6/6/85) gage height 0.54 ft.

Evaluation of Potential Watershed Basin Changes

The "Green Swamp Report" by SWFWMD has documented that no flood control projects have been economically justified for the Withlacoochee River basin on the basis of flood damages prevented alone. In addition, no "structural" flood control measures are viable based on engineering, environmental and economic conclusions.

Although structural and non-structural project alternatives are

not justified for flood control, the "Green Swamp Report" recommends continual land ownership and future land acquisition within the Withlacoochee River basin under the Save Or Rivers Five-Year program. This non-structural management strategy meets the requirements of the Save Our Rivers program by providing: natural flood control water detention, preservation and/or restoration of natural systems, water conveyance, water quality enhancement, recharge, recreation and potable water supply.

Implementation of this "non-structural" alternative will have no significant impact on the potential for flooding within the Withlacoochee River basin.

Determination of Design Discharge

Discharge rates have been documented in the FEMA "Flood Insurance Study (FIS), Pasco County, Florida" for the Trilby stream gage. They are:

DESIGN STORM	DISCHARGE
25-year	5700 cfs *
50-year	7260 cfs
100-year	9080 cfs

* The discharge values for the 25-year flood was taken from the DISCHARGE vs. PROBABILITY OF ANNUAL EXCEEDANCE graph for the Withlacoochee River at Trilby. (See Figure-8).

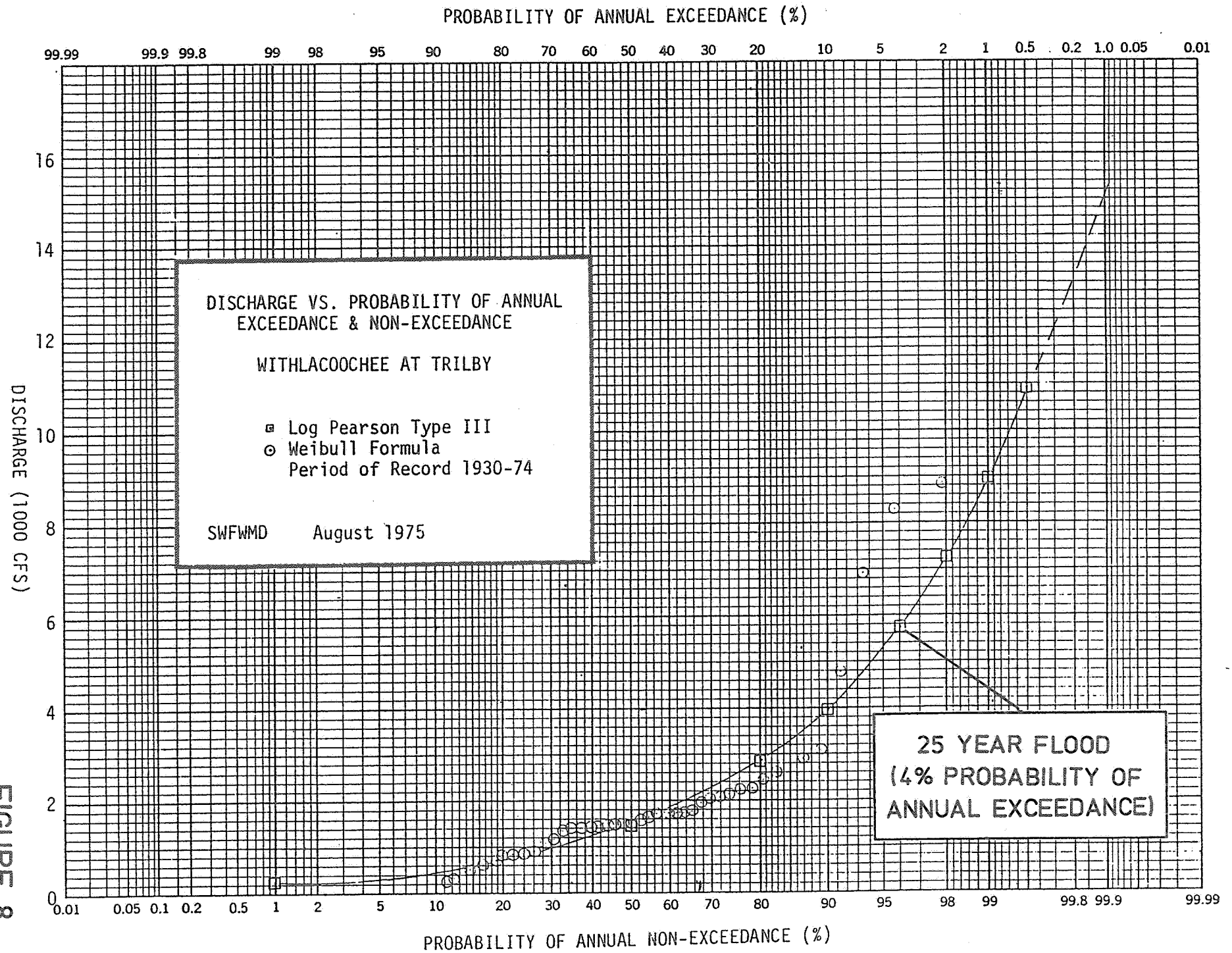

PROBABILITY OF ANNUAL EXCEEDANCE (%)
99.99 99.9 99.8 99 98 95 90 80 70 60 50 40 30 20 10 5 2 1 0.5 0.2 1.0 0.05 0.01
DISCHARGE (1000 CFS)
0 2 4 6 8 10 12 14 16
DISCHARGE VS. PROBABILITY OF ANNUAL EXCEEDANCE & NON-EXCEEDANCE
WITHLACOOCHEE AT TRILBY
Log Pearson Type III
Weibull Formula
Period of Record 1930-74
SWFWMD August 1975
25 YEAR FLOOD
(4% PROBABILITY OF
ANNUAL EXCEEDANCE)
0.01 0.05 0.1 0.2 0.5 1 2 5 10 20 30 40 50 60 70 80 90 95 98 99 99.8 99.9 99.99
PROBABILITY OF ANNUAL NON-EXCEEDANCE (%)

FIGURE 8

The SR 700 (US 98) crossing is 8075 feet downstream of the stream gage at Trilby. The additional drainage area between the Trilby gage and the SR 700 (US 98) crossing is approximately 4 square miles. The USGS regression equation for Region B and regression equation constants taken from the "Technique for Estimating Magnitude and Frequency of Floods on Natural-Flow Streams in Florida" were used to obtain discharges at the SR 700 (US 98) crossing. Flood discharges at the crossing were obtained using the equation:

$$Q_{site} = Q_{known} \left(\frac{\text{Area of Site}}{\text{Area Known}} \right)^{B1}$$

Where

B1, (25-yr.) = 0.570

B1, (50-yr.) = 0.556

B1, (100-yr.) = 0.543

The discharge values at the SR 700 (US 98) crossing were:

DESIGN STORM	DISCHARGE
25-year	5723 cfs
50-year	7288 cfs
100-year	9115 cfs

Determination of Design Flood Stage

The SWFWMD report "Flood-Plain Information on the Withlacoochee River" has documented water surface elevations for several design storms at the SR 700 (US 98) crossing. They are:

DESIGN STORM	ELEVATION (ft. m.s.l.)
25-year	65.9
50-year	67.2
100-year	68.5

These elevations correspond with the water surface profile for the Withlacoochee River presented in the "Flood Insurance Study (FIS), Pasco County". (See Figure-7).

D. BRIDGE REPLACEMENT OPTIONS

A 115 foot long bridge which causes a one foot rise in backwater for the base flood was analyzed. The low member elevation of this structure was set at 71.6' to match that of the existing structure and to meet vertical clearance requirements.

A 245 foot long bridge which causes no decrease in the flood carrying capacity of the river was also analyzed. The low member elevation of this structure was also set at 71.6'.

E. HYDRAULIC ANALYSIS

Federal Highway Administration (FHWA) policy on design of flood-plain encroachments is to consider all impacts of encroachment alternatives on the flood-plain. WSPRO, a digital model for water surface profile computations, was developed by the USGS for FHWA to meet these needs. The WSPRO model was used to analyze the proposed replacement structure alternatives for the 25, 50 and 100-year floods.

Three cross sections of the Withlacoochee River were estimated using SWFWMD's aerial contour map, Range 21 East, Township 23 South, Section 22, dated May 1973. The accuracy of the SWFWMD map conforms with the U.S. national map accuracy standards. Elevations on the SWFWMD map were based on USC&GS datum. The cross sections were taken 250 feet upstream of the existing crossing and 250 feet downstream of the existing structure and directly under the SR 700 (US 98) bridge. These cross sections were supplemented with survey information of the existing channel. The survey datum (USC&GS) was verified. Flood information in the Flood Insurance Study for Pasco County was based on NGVD. Flood stage information in the "Flood-Plain Information on the Withlacoochee River" by SWFWMD was based on mean sea level (m.s.l.). Both NGVD and mean sea level are equivalent to USC&GS datum.

Each cross section was divided into three flow subareas; left overbank, channel, and right overbank, so that a Manning "n" value could be assigned to the cross sectional flow. For the left and right overbank flow subareas, a roughness coefficient of 0.18 was assumed over the entire depth of flow. For the channel flow subarea, a roughness coefficient of 0.07 was assumed for flow depths in the channel. These "n" values were based on aerial photography and field observations of the stream and flood-plain areas and correspond with values used in the FIS for Pasco County.

The WSPRO model was used to analyze the existing structure as well as the proposed replacement alternatives. Results were compared to the no structure condition for each of the return frequency storms mentioned previously.

Detailed input and output data for each WSPRO run are contained in the Appendix. A summary of discharge, average flow, velocity through the structure and water surface elevation 250' upstream of the structure, for the no structure condition, the existing structure and the proposed replacement structures is shown in Table-1.

SUMMARY OF HYDRAULIC ANALYSIS

WITHLACOOCHEE RIVER AT S.R. 700/ U.S. 98

FLOOD FREQUENCY	Q (c.f.s.)	NO STRUCTURE CONDITION		EXISTING 245' STRUCTURE		115' STRUCTURE ALTERNATIVE		245' STRUCTURE ALTERNATIVE	
		VELOCITY (ft./sec.)	*W.S.E. (ft. NGVD)	VELOCITY (ft./sec.)	*W.S.E. (ft. NGVD)	VELOCITY (ft./sec.)	*W.S.E. (ft. NGVD)	VELOCITY (ft./sec.)	*W.S.E. (ft. NGVD)
25 YEAR	5723	1.22	65.96	2.00	65.99	4.80	66.57	2.00	65.99
50 YEAR DESIGN FLOOD	7288	1.30	67.26	2.31	67.31	5.49	68.11	2.31	67.31
100 YEAR BASE FLOOD	9115	1.36	68.57	2.63	68.64	6.21	69.56	2.63	68.64

*W.S.E. — WATER SURFACE ELEVATION
250' UPSTREAM OF THE
EXISTING/PROPOSED STRUCTURE ;
ALL OTHER DATA AT THE STRUCTURE

NOTE: For detailed output see APPENDIX.

TABLE 1

F. RISK ASSESSMENT

In order to determine the recommended replacement structure, a subjective analysis of the risks engendered by each design alternative was performed. Criteria used to evaluate the potential risk of each alternative due to flooding included structural damage, roadway damage, upstream damage, wetland impacts and flood-plain impacts. The compliance of each alternative with local regulatory requirements was also evaluated.

Structural Damage

The low member elevation of both proposed alternatives was set at elevation 71.6 in order to match that of the existing structure and to comply with the 3 foot desirable vertical clearance criteria. As a result the risk of structural damage due to floating debris during flood stages was determined to be minimal for both alternatives.

Design flood and base flood average flow velocities through the 245 foot bridge are 2.31 feet per second and 2.63 feet per second respectively. These velocities do not exceed those produced by the existing structure and are not considered to be excessive. The existing structure exhibits no evidence of general or local scour, therefore, it was determined that special protective measures would not be required for the 245 foot structure and that the potential for structural damage due to scour was low.

Design flood and base flood average flow velocities through the 115 foot bridge are 5.49 feet per second and 6.21 feet per second respectively. These velocities are more than 2 times those produced by the existing structure. Preliminary soil investigations indicate that soils in the project area consist of sand, silty sand and clay. Allowable flow velocities for unprotected channels of these soil types typically range from 1.5 feet per second to 3.5 feet per second (reference Table 7-1, Chapter 7 FDOT Drainage Manual), indicating the need for protective channel linings both upstream and downstream of the 115 foot bridge.

Roadway Damage

Chapter 6 of the FDOT Drainage Manual recommends a minimum 1 to 2 foot clearance between the roadway base and the design high water elevations for high use or essential roadway facilities. The minimum roadway elevation within the limits of the river valley section is approximately 74.1 feet. Assuming a total pavement and base thickness of 1 foot, the following clearances are provided by each alternative:

	115′ Structure	245′ Structure
50 yr. storm base clearance	5.00′	5.80′
100 yr. storm base clearance	3.50′	4.60′

Based on these clearances, the risk of roadway pavement damage due to flooding was determined to be minimal for both alternatives.

The 100-year flood is conveyed by both structures without overtopping the roadway, therefore, it was determined that the risk of loss of roadway service due to flooding was minimal for both alternatives.

Upstream Damage

Encroachment on the flood-plains, such as fill, reduces the flood carrying capacity, increases the flood heights of streams and increases flood hazards in areas beyond the encroachment itself. Any encroachment inside the 100-year flood-plain would require mitigation. One aspect of flood-plain management involves balancing the economic gain from flood-plain development against the resulting increase in flood hazard. For purposes of the National Flood Insurance Program, the concept of a floodway is used as a tool to assist local communities in this aspect of flood-plain management. Under this concept, the 100-year flood is divided into a floodway and a floodway fringe. The floodway is the channel of a stream plus any adjacent flood-plain areas that must be kept free of encroachment in order that the 100-year flood may be carried without substantial increases in flood heights. Minimum standards of FEMA limit such increases in flood heights to 1.0 feet, provided that hazardous velocities are not

produced. Floodway limits have been established for the Withlacoochee River and correspond with the existing bridge abutment locations (See Figure 4). Any structure with a span length less than that of the existing structure would encroach on the regulated floodway and increase the risk of flood hazard upstream of the project area.

A private residence is located in the northeast quadrant of the project site approximately 200 feet upstream of the existing bridge. Based on survey data and SWFWMD topographic maps, it was determined that the approximate floor elevation of this residence is 64.0 feet.

The 100 year flood elevation determined using WSPRO upstream of the existing structure is 68.64 feet.

The proposed 245 foot structure causes no additional backwater over that caused by the existing structure, and therefore, causes no increase in flood risks to this residence.

The 115 foot structure causes an increase in backwater of 0.93 feet over that of the existing structure for the 100 year storm. This increase results in a water surface elevation of 69.56 feet upstream of the structure. This increase in backwater causes a significant increase in flood risks to this residence and may require relocation of the residence or significant flood control and flood proofing measures.

Wetland Impacts

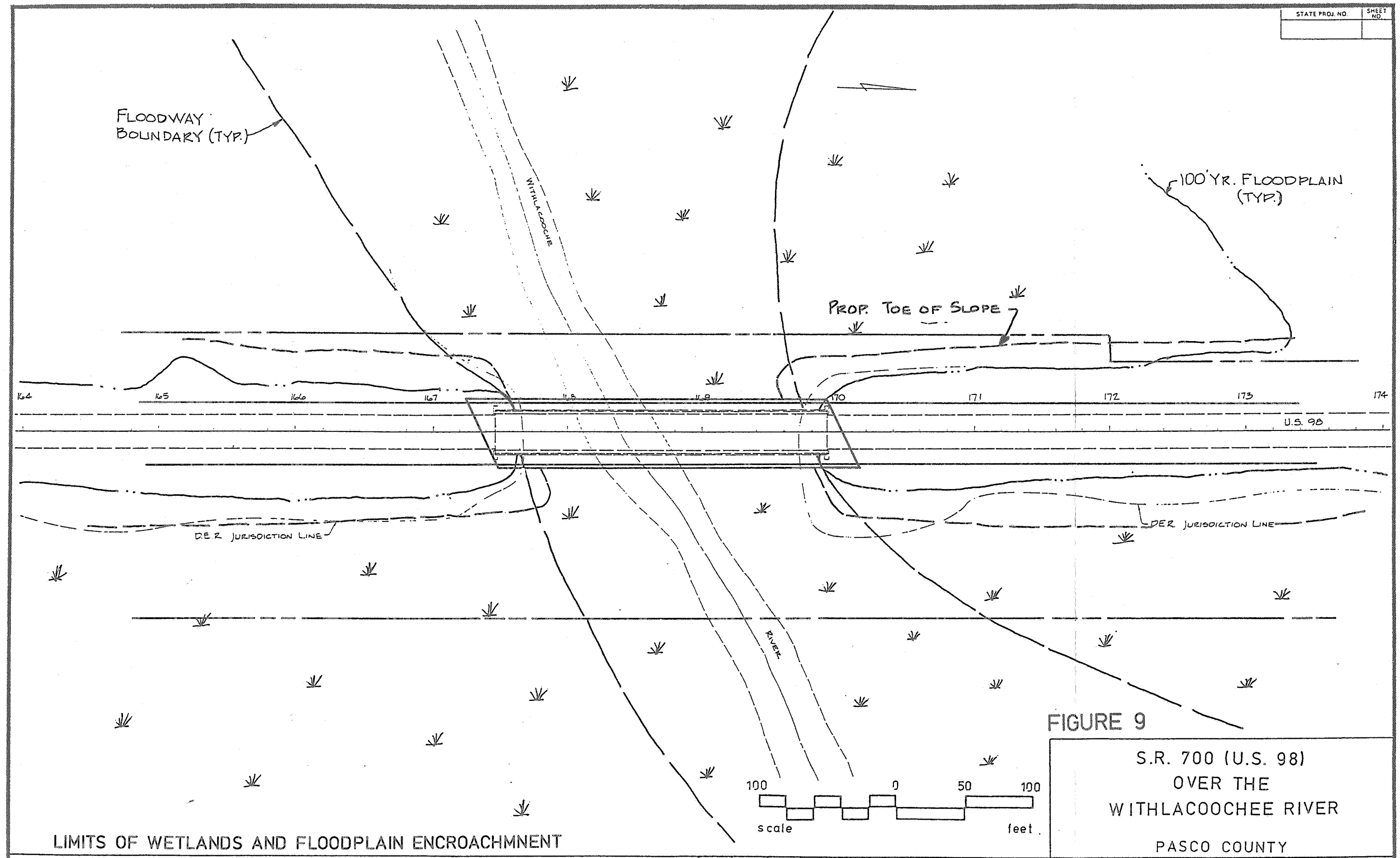
Wetlands have been delineated in accordance with DER criteria at the project site (See Figure-5). Shortening the existing structure, raising the profile grade or flattening the roadway embankment slopes would require placing fill material in the wetlands. The approximate limits of wetland encroachment for both alternatives is shown in Figures 9 and 10. The potential for additional wetland impacts due to roadway alignment shifts exists, however the relative amount of impact associated with each alternative bridge length will remain unchanged regardless of the alignment selected.

The 245 foot structure requires the placement of fill on approximately 0.2 acres of wetland area. This fill is the result of conformance with current FDOT slope criteria.

The 115 foot structure requires the placement of fill on approximately 0.5 acres of wetland area. This fill is the result of conformance with current FDOT slope criteria and lengthening of the roadway embankments.

Both structure alternatives will require mitigation to compensate for the loss of wetlands.

STATE PROJ. NO.	SHEET NO.



LIMITS OF WETLANDS AND FLOODPLAIN ENCROACHMNENT

FIGURE 9

S.R. 700 (U.S. 98)
OVER THE
WITHLACOOCHEE RIVER

PASCO COUNTY

245' BRIDGE

REVISIONS											
DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	D.L.H.	1-89	DRAWN BY	R.S.T.	1-89
CHECKED BY	D.T.M.	1-89	CHECKED BY	D.L.H.	1-89

SUPERVISED BY D.T. MAXEY

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY

DATE

STATE PROJ. NO.	SHEET NO.

FLOODWAY BOUNDARY (TYP.)

WITHLACOOCHEE

100 YR. FLOODPLAIN (TYP.)

PROP. TOE OF SLOPE

164 165 166 167 168 169 170 171 172 173 174

U.S. 98

D.E.R. JURISDICTION LINE

D.E.R. JURISDICTION LINE

RIVER

100 0 50 100

scale feet

LIMITS OF WETLANDS AND FLOODPLAIN ENCROACHMENT

FIGURE 10

S.R. 700 (U.S. 98)
OVER THE
WITHLACOOCHEE RIVER

PASCO COUNTY

115' BRIDGE

REVISIONS

DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION	DATE	BY	DESCRIPTION

	NAME	DATE		NAME	DATE
DESIGNED BY	D.L.H.	1-89	DRAWN BY	R.S.T.	1-89
CHECKED BY	D.T.M.	1-89	CHECKED BY	D.L.H.	1-89

SUPERVISED BY D.T. MAXEY

FLORIDA DEPARTMENT OF TRANSPORTATION

APPROVED BY

DATE

Flood-Plain Impacts

The 100-year flood elevation at the project site is approximately 68.52 feet. The limits of the 100-year flood-plain is shown in Figure-3.

Shortening the existing structure raising the profile grade or flattening the roadway embankment slopes would require placing fill material below the 100-year flood elevation.

The approximate limits of fill material placed below the 100-year flood elevation are shown in Figures 9 and 10. The approximate volume of fill placed below the 100-year flood-plain was calculated by multiplying this area by the average difference between the existing ground elevation and the 100-year flood elevation.

The 245 foot and 115 foot structures require the placement of approximately 2,800 cubic yards and 7,100 cubic yards, respectively, of fill below the 100-year flood-plain elevation.

Both alternatives would require that compensating flood-plain storage be provided.

Compliance with Local Regulatory Requirements

Pursuant to the wetland mitigation and compensating flood-plain storage requirement mentioned previously, the 245 foot replacement structure meets all applicable FDOT and SWFWMD bridge design criteria.

The 115 foot replacement structure produces a flow velocity of 4.80 feet per second through the structure for the 25-year storm which exceeds the maximum allowable rate established by SWFWMD of 2.5 feet per second. In addition this alternative is not consistent with SWFWMD "non structural" flood control measures proposed for the Withlacoochee River basin under the Save Our Rivers program which call for continued land ownership and future land acquisition within the Withlacoochee River basin.

G. RECOMMENDATIONS

Due to the encroachment on the regulated floodway, increased risks of upstream flood damages, the potential for destruction of private property and the greater wetland and flood-plain impacts associated with the 115 foot replacement structure, it was determined that this replacement structure is not a viable alternative.

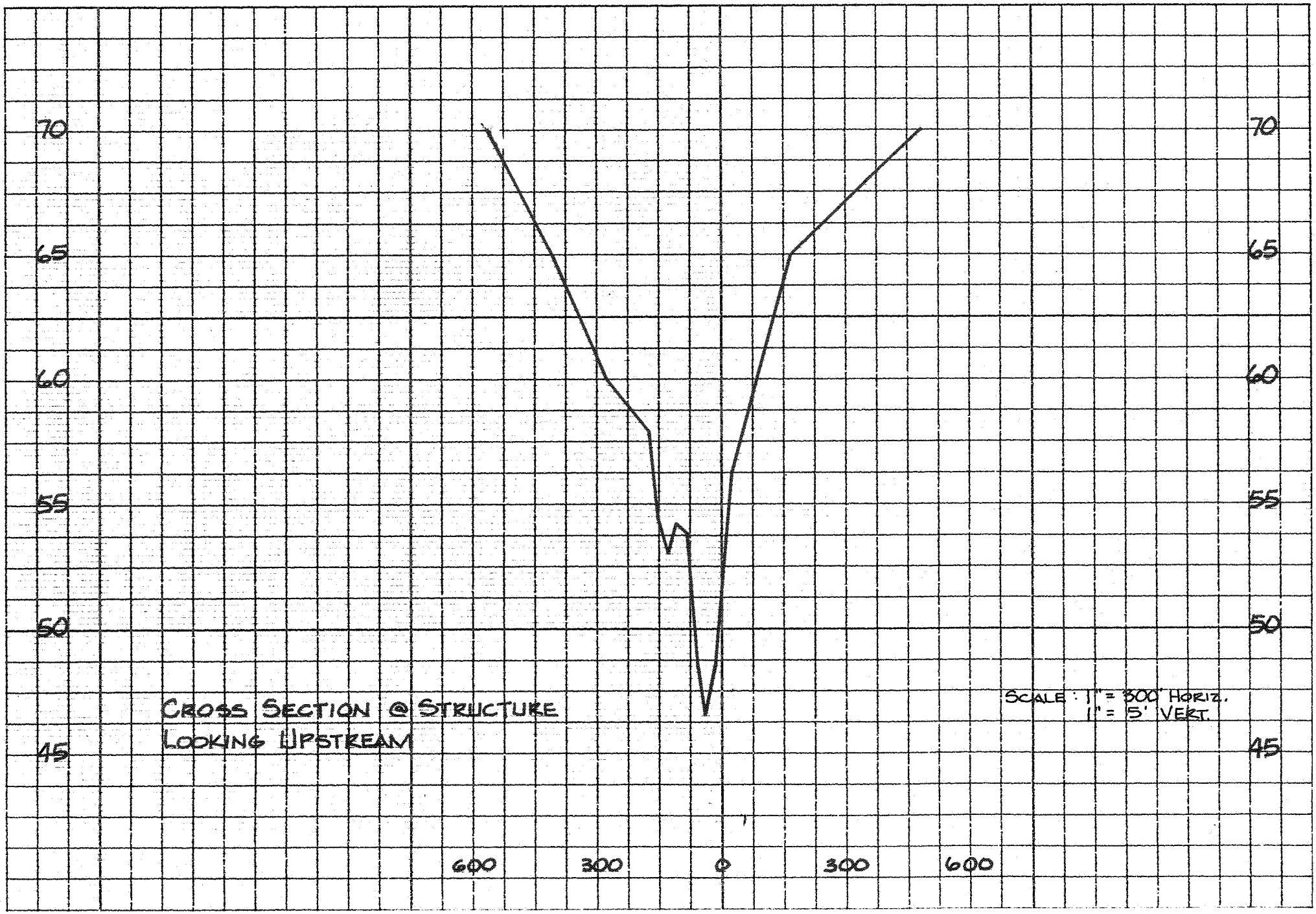
The 245 foot structure is the recommended replacement. No reduction in hydraulic performance will be realized from the recommended replacement structure. In addition, it is recommended that bents be constructed parallel to normal flow. Water surface elevations are not expected to increase as a result of the proposed structure. Pursuant to required wetland mitigation and flood-plain storage compensation adverse impacts on natural and beneficial flood-plain values are not anticipated. There will be no significant change in the potential for interruption or termination of emergency service or emergency evacuation routes. Therefore, it has been determined that this encroachment is not significant.

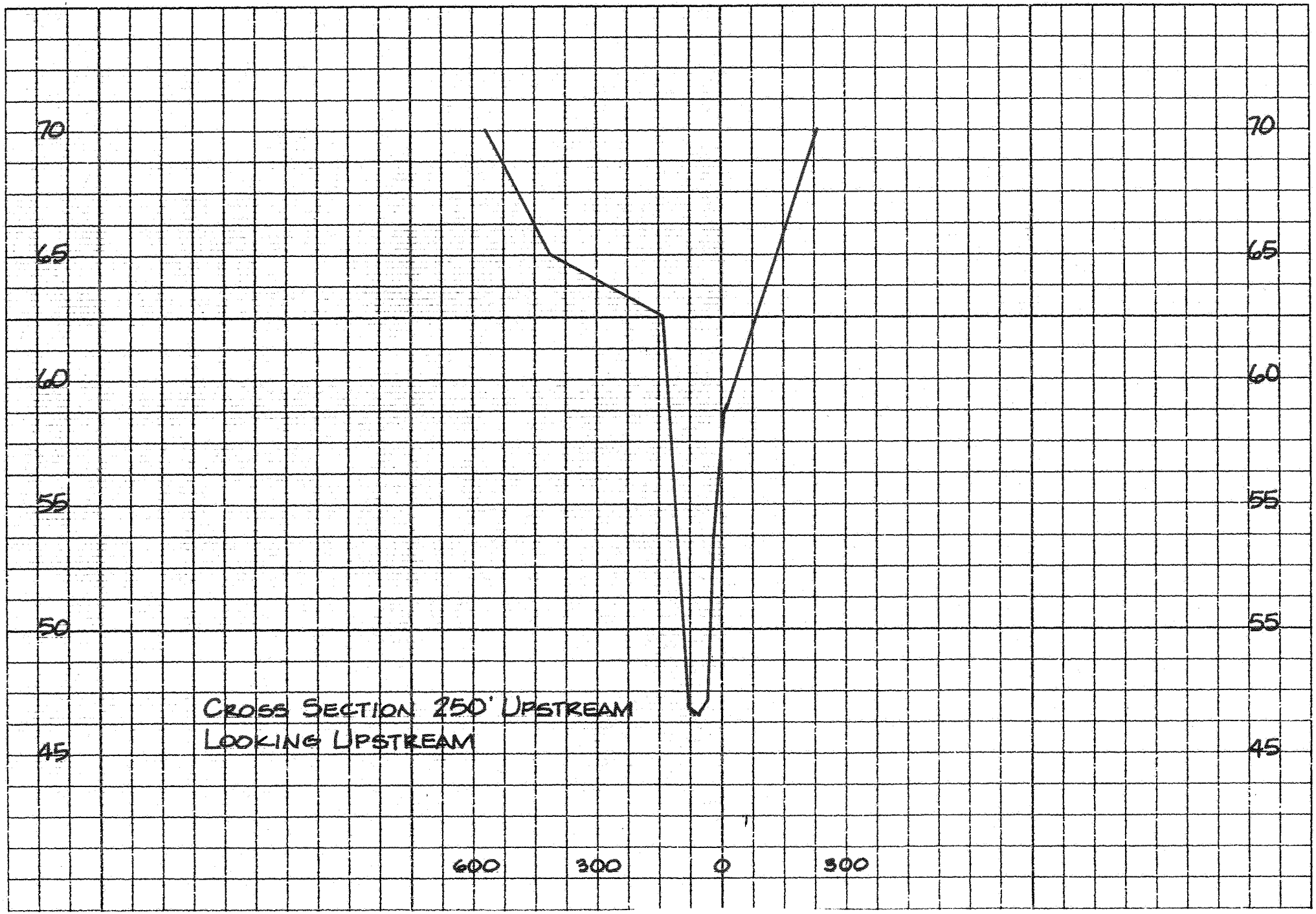
APPENDIX

CROSS SECTIONS


CROSS SECTION LAYOUT
LEGEND
CROSS SECTION LOCATION
COUNTY
COUNTY
To Brooksville
S.R. 700 (U.S. 98)
PASCO
HERNANDO
W.P.I. No. 0115954
BRIDGE No. 140026
S.R. 700 (U.S. 301)
Withlacoochee River
Approx. Scale 1"=200'


70
65
60
55
50
45
70
65
60
1500
1200
900
600
300
0
300
600
900
CROSS SECTION 250' DOWNSTREAM
LOOKING UPSTREAM
SCALE: 1" = 300' HORIZ.
1" = 5' VERT.


70
65
60
55
50
45
70
65
60
55
50
45
600
300
0
300
600
CROSS SECTION @ STRUCTURE
LOOKING UPSTREAM
SCALE: 1" = 300' HORIZ.
1" = 5' VERT.



CROSS SECTION 250' UPSTREAM
LOOKING UPSTREAM

WSPRO INPUT/OUTPUT

WSPRO INPUT

EXISTING & PROPOSED 245' BRIDGE

```
T1          WITHLACOOCHEE RIVER
T2          FDOT/SVERDRUP CORP BRIDGE REPLACEMENT
T3              "BACKWATER CAUSED BY THE EXISTING STRUCTURE
*                BASED ON THE NO STRUCTURE CONDITION"
*
*
*
*           25 YR FLOOD , 50 YR FLOOD , 100 YR FLOOD
*
*
Q           5723,7288,9115
*
*
WS          65.86,67.16,68.46
*
*
*
XS    1250 0
*
*           X-section  250 feet downstream of the existing structure
*
*
*
*
GR          -1300,70  -970,65  -730,65  -560,65  -350,60   -310,55
GR          -150,51.6  -125,51.3  -100,51.7  -75,53.7  -55,44.4  -43,44.5
GR          -28,46.2  0,54.8  25,54.6  50,56.0  74,60.6  100,61.8
GR          390,65  680,65  830,65  900,70
SA          -170,0
N           .18,.07,.18
*
*
*
*
*
*
XS    1500 250
*
*           X-section at the existing structure
*
*
*
*
GR          -550,70  -400,65  -270,60  -165,58.0  -150,54.9  -125,53.1
GR          -100,54.4  -75,53.8  -52,48.3  -37,46.5  -8,48.6  0,50.8
GR          29,56.3  100,60  170,65  500,70
SA          -150,20
N           .18,.07,.18
*
*
*
*
*
*
BR    1501 250
*
*           Existing bridge information
*
*              length                        -    245.0      feet
*              width                         -     35.0       "
*              super structure depth         -      2.5       "
*              roadway elevation             -     74.1  (ft. m.s.l.)
*              abutment slope                -   1.5 to 1
*
SA          -150,20
```

```
N           .18,.07,.18
BL 0        245,-168,28
CD          3,35,1.5,74.1
BD          2.5,74.1
AB          1.5
PW          48,3 54,9 71.6,9
*
*
*
*
*
*
*
*
AS    1750 500
*
*           X-section  250 feet upstream of the existing structure
*
*
*
*
GR          -580,70  -420,65  -150,62.6  -115,53.9  -100,53.6  -83,46.9
GR          -60,46.7  -40.6,47.3  -22.4,53.4  0,58.1  25,60  130,65  235,70
SA          -120,-10
N           .18,.07,.18
EX
ER
```

WSPRO INPUT

PROPOSED 115′ BRIDGE

```
T1          WITHLACOOCHEE RIVER
T2          FDOT/SVERDRUP CORP BRIDGE REPLACEMENT
T3              "BACKWATER CAUSED BY THE PROPOSED STRUCTURE
*                  BASED ON THE NO STRUCTURE CONDITION"
*
*
*
*           25 YR FLOOD , 50 YR FLOOD , 100 YR FLOOD
*
*
Q           5723,7288,9115
*
*
WS          65.86,67.16,68.46
*
*
*
XS    1250 0
*           X-section  250 feet downstream of the structure
*
*
*
*
GR          -1300,70  -970,65  -730,65  -560,65  -350,60   -310,55
GR          -150,51.6  -125,51.3  -100,51.7  -75,53.7  -55,44.4  -43,44.5
GR          -28,46.2  0,54.8  25,54.6  50,56.0  74,60.6  100,61.8
GR          390,65  680,65  830,65  900,70
SA          -170,0
N           .18,.07,.18
*
*
*
*
*
*
XS    1500 250
*
*           X-section at the structure
*
*
*
*
GR          -550,70  -400,65  -270,60  -165,58.0  -150,54.9  -125,53.1
GR          -100,54.4  -75,53.8  -52,48.3  -37,46.5  -8,48.6  0,50.8
GR          29,56.3  100,60  170,65  500,70
SA          -150,20
N           .18,.07,.18
*
*
*
*
*
*
BR    1501 250
*
*           Proposed bridge information
*
*              length                      -     115.0      feet
*              width                       -      47.0       "
*              super structure depth       -       5.3       "
*              roadway elevation           -      75.5  (ft. m.s.l.)
*              abutment slope              -   1.5 to 1
*
SA          -150,20
N           .18,.07,.18
```

```
BL 0        115,-10,10
CD          3,47,1.5,75.5
BD          5.3,75.5
AB          1.5
*
*
*
*
*
*
*
*
AS    1750 500
*
*           X-section  250 feet upstream of the structure
*
*
*
*
GR          -580,70  -420,65  -150,62.6  -115,53.9  -100,53.6  -83,46.9
GR          -60,46.7  -40.6,47.3  -22.4,53.4  0,58.1  25,60  130,65  235,70
SA          -120,-10
N           .18,.07,.18
EX
ER
```

WSPRO OUTPUT

EXISTING & PROPOSED 245' BRIDGE

```
+++ BEGINNING PROFILE CALCULATIONS --      3


1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 P123186            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         WITHLACOOCHEE RIVER
         FDOT/SVERDRUP CORP BRIDGE REPLACEMENT
             "BACKWATER CAUSED BY THE EXISTING STRUCTURE
            *** RUN DATE & TIME: 03-02-89  09:39

  XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS       Q     WSEI
        SRD    FLEN     REW         K  ALPH     HO      ERR      FR#     VEL

 1250 :XS    ****** -1027.     7748.    .04 *****    65.90    53.46    5723.    65.8(
         0. ******   842.   439409.   4.29 ***** *******      .13      .74

 1500 :FV      250.  -427.     4673.    .05    .05    65.96 *******    5723.    65.9(
       250.    250.   230.   356164.  2.32    .01      .00      .12    1.22
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

 1750 :AS      250.  -451.     3184.    .12    .09    66.08 *******    5723.    65.9(
       500.    250.   150.   254834.  2.45    .03      .00      .22    1.80
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

             <<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

  XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS       Q     WSEI
        SRD    FLEN     REW         K  ALPH     HO      ERR      FR#     VEL

 1501 :BR      250.  -183.     2861.    .06    .08    65.99    55.04    5723.    65.9:
       250.    250.    45.   317873.  1.03    .01      .00      .10    2.00

      TYPE PPCD FLOW       C     P/A     LSEL    BLEN   XLAB    XRAB
        3.    0.    1.    .986    .050   71.60    245.  -171.     31.

  XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS       Q     WSEI
        SRD    FLEN     REW         K  ALPH     HO      ERR      FR#     VEL

 1750 :AS      215.  -452.     3204.    .12    .11    66.11    54.29    5723.    65.9:
       500.    221.   151.   256035.  2.47    .02      .00      .21    1.79

        M(G)    M(K)        KQ    XLKQ    XRKQ     OTEL
        .621    .033   247563.  -192.     30.     65.88

                     <<<<<END OF BRIDGE COMPUTATIONS>>>>>
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 P123186            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         WITHLACOOCHEE RIVER
         FDOT/SVERDRUP CORP BRIDGE REPLACEMENT
             "BACKWATER CAUSED BY THE EXISTING STRUCTURE
            *** RUN DATE & TIME: 03-02-89  09:39

  XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS       Q     WSE.
        SRD    FLEN     REW         K  ALPH     HO      ERR      FR#     VEL

 1250 :XS    ****** -1113.    10245.    .04 *****    67.20    54.10    7288.    67.1(
         0. ******   860.   556207.   4.72 ***** *******      .12      .71

 1500 :FV      250.  -466.     5606.    .07    .06    67.27 *******    7288.    67.2(
       250.    250.   315.   422536.  2.59    .02      .00      .14    1.30
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>
```

```
1750 :AS      250.   -492.     4014.    .15    .10    67.41 *******    7288.    67.2
       500.   250.    178.   305383.   2.88    .04      .00      .22    1.82
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

              <<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

 XSID:CODE    SRDL     LEW       AREA     VHD     HF       EGL      CRWS        Q      WSE
        SRD   FLEN     REW          K   ALPH     HO       ERR       FR#      VEL

1501 :BR      250.   -184.     3160.    .09    .08    67.31    55.63    7288.    67.2
       250.   250.     47.   368566.   1.06    .03      .00      .11    2.31

     TYPE PPCD FLOW       C     P/A     LSEL    BLEN    XLAB    XRAB
        3.    0.   1.    .969    .049   71.60    245.   -171.    31.

 XSID:CODE    SRDL     LEW       AREA     VHD     HF       EGL      CRWS        Q      WSE
        SRD   FLEN     REW          K   ALPH     HO       ERR       FR#      VEL

1750 :AS      215.   -494.     4047.    .15    .13    67.46    55.22    7288.    67.3
       500.   221.    179.   307444.   2.89    .02      .00      .22    1.80

       M(G)   M(K)        KQ    XLKQ    XRKQ     OTEL
       .654   .064   287902.   -193.     32.     67.19

                     <<<<<END OF BRIDGE COMPUTATIONS>>>>>

1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 P123186             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         WITHLACOOCHEE RIVER
         FDOT/SVERDRUP CORP BRIDGE REPLACEMENT
             "BACKWATER CAUSED BY THE EXISTING STRUCTURE
            *** RUN DATE & TIME: 03-02-89  09:39

 XSID:CODE    SRDL     LEW       AREA     VHD     HF       EGL      CRWS        Q      WSE
        SRD   FLEN     REW          K   ALPH     HO       ERR       FR#      VEL

1250 :XS    ****** -1198.    12878.    .04 *****    68.50    54.73    9115.    68.4
         0. ******   878.   692515.   4.85 ***** *******      .11      .71

1500 :FV      250.   -505.     6700.    .08    .06    68.58 *******    9115.    68.5
       250.   250.    401.   498398.   2.87    .02      .00      .15    1.36
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

1750 :AS      250.   -534.     4932.    .17    .11    68.74 *******    9115.    68.5
       500.   250.    205.   362990.   3.23    .04      .00      .23    1.85
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

              <<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

 XSID:CODE    SRDL     LEW       AREA     VHD     HF       EGL      CRWS        Q      WSE
        SRD   FLEN     REW          K   ALPH     HO       ERR       FR#      VEL

1501 :BR      250.   -186.     3463.    .12    .09    68.64    56.28    9115.    68.5
       250.   250.     49.   422286.   1.11    .05      .00      .13    2.63

     TYPE PPCD FLOW       C     P/A     LSEL    BLEN    XLAB    XRAB
        3.    0.   1.    .951    .048   71.60    245.   -171.    31.

 XSID:CODE    SRDL     LEW       AREA     VHD     HF       EGL      CRWS        Q      WSE
        SRD   FLEN     REW          K   ALPH     HO       ERR       FR#      VEL

1750 :AS      215.   -537.     4987.    .17    .15    68.81    56.14    9115.    68.6
       500.   223.    206.   366467.   3.25    .02      .00      .22    1.83
```

M(G)	M(K)	KQ	XLKQ	XRKQ	OTEL
.681	.095	331556.	-194.	34.	68.51

<<<<<END OF BRIDGE COMPUTATIONS>>>>>

ER

1 NORMAL END OF WSPRO EXECUTION.

WSPRO OUTPUT

PROPOSED 115' BRIDGE

```
+++ BEGINNING PROFILE CALCULATIONS --      3


1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 P123186            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         WITHLACOOCHEE RIVER
         FDOT/SVERDRUP CORP BRIDGE REPLACEMENT
             "BACKWATER CAUSED BY THE PROPOSED STRUCTURE
            *** RUN DATE & TIME: 03-02-89  09:47

  XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q     WSE
        SRD    FLEN     REW         K   ALPH     HO      ERR      FR#      VEL

 1250 :XS    ****** -1027.     7748.    .04 *****   65.90    53.46    5723.    65.8
         0. ******   842.   439409.   4.29 ***** *******      .13      .74

 1500 :FV      250.  -427.     4673.    .05    .05   65.96 *******    5723.    65.9
       250.    250.   230.   356164.   2.32    .01     .00      .12     1.22
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

 1750 :AS      250.  -451.     3184.    .12    .09   66.08 *******    5723.    65.9
       500.    250.   150.   254834.   2.45    .03     .00      .22     1.80
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

              <<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

  XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q     WSE
        SRD    FLEN     REW         K   ALPH     HO      ERR      FR#      VEL

 1501 :BR      250.    -54.     1192.    .38    .16   66.32    57.34    5723.    65.9
       250.    250.     48.   117317.   1.05    .26     .01      .25     4.80

      TYPE PPCD FLOW       C     P/A     LSEL    BLEN    XLAB    XRAB
        3. ****   1.    .975 ******    70.20     115.   -26.     34.

  XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q     WSE
        SRD    FLEN     REW         K   ALPH     HO      ERR      FR#      VEL

 1750 :AS      203.  -470.     3563.    .11    .22   66.68    54.29    5723.    66.5
       500.    219.   163.   277743.   2.66    .14     .02      .19     1.61

        M(G)   M(K)        KQ    XLKQ    XRKQ     OTEL
        .830    .248  208316.    -94.     -6.     66.49

                     <<<<<END OF BRIDGE COMPUTATIONS>>>>>
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 P123186            MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

         WITHLACOOCHEE RIVER
         FDOT/SVERDRUP CORP BRIDGE REPLACEMENT
             "BACKWATER CAUSED BY THE PROPOSED STRUCTURE
            *** RUN DATE & TIME: 03-02-89  09:47

  XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q     WSE
        SRD    FLEN     REW         K   ALPH     HO      ERR      FR#      VEL

 1250 :XS    ****** -1113.    10245.    .04 *****   67.20    54.10    7288.    67.1
         0. ******   860.   556207.   4.72 ***** *******      .12      .71

 1500 :FV      250.  -466.     5606.    .07    .06   67.27 *******    7288.    67.2
       250.    250.   315.   422536.   2.59    .02     .00      .14     1.30
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>
```

```
1750 :AS      250.   -492.     4014.    .15    .10    67.41 *******    7288.    67.2
       500.   250.    178.   305383.   2.88    .04      .00      .22     1.82
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

              <<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

 XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q      WSE
       SRD    FLEN     REW         K   ALPH     HO      ERR      FR#      VEL

1501 :BR      250.    -56.     1327.    .58    .18    67.82    58.49    7288.    67.2
       250.   250.     50.   135339.   1.24    .44      .00      .31     5.49

     TYPE PPCD FLOW       C     P/A     LSEL    BLEN    XLAB    XRAB
       3. ****   1.    .897 ******    70.20    115.    -26.     34.

 XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q      WSE
       SRD    FLEN     REW         K   ALPH     HO      ERR      FR#      VEL

1750 :AS      203.   -520.     4602.    .12    .25    68.24    55.22    7288.    68.1
       500.   219.    195.   342115.   3.12    .17      .00      .19     1.58

       M(G)   M(K)        KQ    XLKQ    XRKQ     OTEL
       .842   .283   245110.    -96.     -5.     68.02

                     <<<<<END OF BRIDGE COMPUTATIONS>>>>>
1
 WSPRO          FEDERAL HIGHWAY ADMINISTRATION - U. S. GEOLOGICAL SURVEY
 P123186             MODEL  FOR  WATER-SURFACE  PROFILE  COMPUTATIONS

          WITHLACOOCHEE RIVER
          FDOT/SVERDRUP CORP BRIDGE REPLACEMENT
              "BACKWATER CAUSED BY THE PROPOSED STRUCTURE
             *** RUN DATE & TIME: 03-02-89  09:47

 XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q      WSE
       SRD    FLEN     REW         K   ALPH     HO      ERR      FR#      VEL

1250 :XS    ****** -1198.    12878.    .04 *****    68.50    54.73    9115.    68.4
         0. ******   878.   692515.   4.85 ***** *******      .11      .71

1500 :FV      250.   -505.     6700.    .08    .06    68.58 *******    9115.    68.5
       250.   250.    401.   498398.   2.87    .02      .00      .15     1.36
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

1750 :AS      250.   -534.     4932.    .17    .11    68.74 *******    9115.    68.5
       500.   250.    205.   362990.   3.23    .04      .00      .23     1.85
          <<<<<THE ABOVE RESULTS REFLECT "NORMAL" (UNCONSTRICTED) FLOW>>>>>

              <<<<<RESULTS REFLECTING THE CONSTRICTED FLOW FOLLOW>>>>>

 XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q      WSE
       SRD    FLEN     REW         K   ALPH     HO      ERR      FR#      VEL

1501 :BR      250.    -58.     1468.    .68    .19    69.22    59.71    9115.    68.5
       250.   250.     52.   154817.   1.14    .53      .00      .32     6.21

     TYPE PPCD FLOW       C     P/A     LSEL    BLEN    XLAB    XRAB
       3. ****   1.    .938 ******    70.20    115.    -26.     34.

 XSID:CODE    SRDL     LEW      AREA    VHD     HF      EGL     CRWS        Q      WSE
       SRD    FLEN     REW         K   ALPH     HO      ERR      FR#      VEL

1750 :AS      203.   -566.     5695.    .14    .29    69.70    56.14    9115.    69.5
       500.   221.    226.   411938.   3.46    .19      .00      .20     1.60
```

M(G)	M(K)	KQ	XLKQ	XRKQ	OTEL
.851	.314	282492.	-98.	-4.	69.46

<<<<<END OF BRIDGE COMPUTATIONS>>>>>

ER

1 NORMAL END OF WSPRO EXECUTION.

APPENDIX D

Harland Bartholomew & Associates, Inc.

SUBJECT WITHLACOOCHEE ROADWAY QTY'S. (APPROXIMATE) JOB NO. H5677.21

SHEET NO. 1 OF

MADE BY DLH DATE 2/23/89 CHECKED BY DTM DATE 3/2/89

EXISTING ALIGN ALT.

NEW RDWY 1400'(±) FROM ℄ BR. (N + S)

(ASSUME SYMMETRICAL @ EA. SIDE OF BR.)

	EXC. (S.F.)	FILL (S.F.)
STA 154+70	—	32
161+00	80	12
166+00	46	168
167+46	40	225

EXC., $V = 2\left[\left(\frac{80}{2}\right)(630) + \left(\frac{80+46}{2}\right)(500) + \left(\frac{46+40}{2}\right)(146)\right]$

$= 125,396$ cf $= 4665$ C.Y.

FILL, (ASSUME ½ EXC. CAN BE USED FOR FILL)

$V = 2\left[\left(\frac{32+12}{2}\right)(630) + \left(\frac{12+168}{2}\right)(500) + \left(\frac{168+225}{2}\right)(146)\right]$

$= 175,098$ cf $= 6485$ CY $- \frac{4665}{2} = 4153$ CY

BASE, $A = (2800-245)(44)(1/9) = 12,491$ SY

ASPHALT, $A = (2800-245)(24)(1/9) = 6,813$ SY

WOODLANDS TAKEN, (CLEARING) $A = 600(30) + 2000(10) = 38,000$ ☐ $= .9$ AC

RDWY COST = 4665 CY ($3.25/CY) + 4153 CY ($5.6/CY) + 12,491 SY ($4.35/SY)
+ 6813 SY ($9.8/SY) + 0.9 AC ($6000/AC) + $12,000 (GUARDRAIL) = $176,921

REQ'D. R.O.W., $A = (710)(20) + (350)(40) = 28,200$ ☐ $= .65$ AC

R.O.W. COST = .65 AC ($10,000/AC) = $6500

WESTERN ALIGN. ALT.

NEW RDWY 1800' S(±) 2000' N(±) (FROM ℄ BR.)

(ASSUME SYMMETRICAL @ EA. SIDE OF BR.)

	EXC. (S.F.)	FILL (S.F.)
STA 149+70	—	32
161+00	189	207
166+00	328	607
167+46	443	941

EXC., $V = 2\left[\left(\frac{189}{2}\right)(1130) + \left(\frac{328+189}{2}\right)(500) + \left(\frac{328+443}{2}\right)(146)\right]$

$= 584,636 \text{ cf} = 21,653 \text{ CY}$

FILL, (ASSUME ½ EXC. CAN BE USED FOR FILL)

$V = 2\left[\left(\frac{32+207}{2}\right)(1130) + \left(\frac{207+607}{2}\right)(500) + \left(\frac{607+941}{2}\right)(146)\right]$

$= 903,078 \text{ cf} = 33,447 \text{ CY} - \frac{21,653}{2} = 22,621 \text{ CY}$

BASE, $A = (3800-245)(44)(1/9) = 17,380 \text{ SY}$

ASPHALT, $A = (3800-245)(24)(1/9) = 9480 \text{ SY}$

WOODLANDS TAKEN (CLEARING), $A = 600(60) + 200(50) = 46000 \text{ ф} = 1.1 \text{ AC}$

RDWY. COST = 21,653 CY ($3.25/CY) + 22,621 CY ($5.6/CY) + 17,380 SY ($4.35/SY)

+ 9480 SY ($9.8/SY) + 1.1 AC ($6000/AC) + $12000 (GUARDRAIL) = $384,157

ADDT'L. R.O.W., $A = 600(20) + \frac{1}{2}(540)(70) + 1000(60) + 600(80) + \frac{1}{2}(600)(40) + 460(20) = 160,100 \text{ ф} = 3.7 \text{ AC}$

R.O.W. COST = 3.7 AC ($10,000/AC) = $37,000

EASTERN ALIGN. ALT.

NEW RDWY 1800' S, 2000' N (FROM ℄ BR.)

(ASSUME SYMMETRICAL @ EA. SIDE OF BR.)

	EXC. (S.F.)	FILL (S.F.)
STA 149+70	—	32
161+00	147	125
166+00	369	359
167+46	324	606

EXC., $V \simeq 2\left[\left(\frac{147}{2}\right)(1130) + \left(\frac{147+369}{2}\right)(500) + \left(\frac{369+324}{2}\right)(146)\right]$

$= 525,288 \text{ cf} = 19,455 \text{ C.Y.}$

FILL, (ASSUME ½ EXC. CAN BE USED FOR FILL)

$V \simeq 2\left[\left(\frac{32+125}{2}\right)(1130) + \left(\frac{125+359}{2}\right)(500) + \left(\frac{359+606}{2}\right)(146)\right]$

$= 560,300 \text{ CF} = 20,752 \text{ CY} - \frac{19,455}{2} = 11,024 \text{ CY.}$

BASE, $A = (3800-245)(44)(1/9) = 17,380 \text{ SY}$

ASPHALT, $A = (3800-245)(24)(1/9) = 9480 \text{ SY}$

WOODLANDS TAKEN (CLEARING), $A = 550(45) + 900(30) + 1550(50) = 129,250 \text{ ℄} = 3.0 \text{ AC}$

RDWY COST = 19,455 CY ($3.25/CY) + 11,024 CY ($5.6/CY) + 17,380 SY ($4.35/SY) + 9480 SY ($9.8/SY) + 3.0 AC ($6000/AC) + $12000 (GUARDRAIL) = $323,470

ADDTL. R.O.W., $A = 1140(20) + \frac{1}{2}(60)(20) = 23,400 \text{ ℄} = .54 \text{ AC}$

R.O.W. COST = .54 AC ($10,500/AC) = $5400

STRUCT. COST,

NEW STRUCT = 245'(47')($35/SF) = $403,025

DEMOLITION = 245'(38.17')($11/SF) = $102,870

(SHOULD BE 35.1') ✓ OK

$505,895

INCREASE BY 25% FOR PHASED CONST.

COST = 1.25(505,895) = $632,369

CONST. TIME (BY FDOT METHODS)

STRUCT., 5 BENTS, 4 SPANS (OVER WATER)

INDEX, MOBILIZATION = 45

BENTS = 5(4) = 20

SPANS = 4(11) = 44

DEMOBE = 5

114

∴ WORKING DAYS = 155.

ASSUME 22 W.D. PER MONTH, $\frac{155}{22}$ = 7.0 MO

FOR PHASED CONST., INDEX = 2(114) = 228

∴ WORKING DAYS = 238, $\frac{238}{22}$ = 10.8, SAY 11 MOS.

FOR TEMP BR. USE 5 MOS.

ASSUME 2 MOS FOR DEMO

TEMP. DETOUR STRUCT. (USE EAST. ALIGN ⇒ NO ADDT'L. R.O.W. REQ'D.)

ONE LANE, (FOR STRUCT. ASSUME $130/LF)

BR. L = 150', DETOUR = 1800' (±)

FILL, STA 165+00, A = 22 ⌀ ; 167+46, A = 169 ⌀

$V = 2\left[\left(\frac{22}{2}\right)(500) + \left(\frac{22+169}{2}\right)(250) + (169)(75)\right]\left(\frac{1}{27}\right) = 3{,}112$ CY

TEMP. PAVING + BASE, $A = (1800-150)(18)\left(\frac{1}{9}\right) = 3300$ SY

COST = 150' ($130/1) + 3112 CY ($10/CY) + 3300 SY ($9.2/SY) = $80,980

└ PLACE + RMV.

TWO LANE, (FOR STRUCT. ASSUME $180/LF)

FILL, STA 165+00, A = 39 ⌀ ; 167+46, A = 240 ⌀

$V = 2\left[\left(\frac{39}{2}\right)(500) + \left(\frac{39+240}{2}\right)(250) + (240)(75)\right]\left(\frac{1}{27}\right) = 4639$ CY

PAVING + BASE, $A = (1800-150)(28)\left(\frac{1}{9}\right) = 5133$ SY

COST = 150' ($180/1) + 4639 CY ($10/CY) + 5133 SY ($9.2/SY) = $120,614

Harland Bartholomew & Associates, Inc.

SUBJECT WITHLACOOCHEE JOB NO. HS77.21
MAINT. OF TRAFFIC (APPROXIMATE SHEET NO. 6 OF
MADE BY DLH DATE 2/23/89 CHECKED BY DTM DATE 3/2/89

M.O.T. COSTS (ASSUME $125/WORKING DAY)

MOT 1 = (9 MO) (22 DA/MO) ($125/DA) = $ 24,750

MOT 2 = (14 MO) (22) (125) + $6000 + $80,980 = $ 125,480
SIGNALS ↑ ↑ TEMP. BR.

MOT 3 = (15 MO) (22) (125) + $120,614 = $ 161,864
TEMP. BR. ↑

MOT 4 = (13 MO) (22) (125) = $ 35,750

MOT 5 = (18 MO) (22) (125) + $80,980 = $ 130,480

USER COSTS FOR DETOUR ROUTE,

COST = (6969 VEH/DA) (275 DA) (1.5 MI/VEH) ($.40/MI) = $ 1,149,885
(1995) ↑