



## Beckett Bridge

Project Development & Environment (PD&E) Study

from Chesapeake Drive to Forest Avenue  
Tarpon Springs, Pinellas County, FL



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# Location Hydraulic Report

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## 1.0 INTRODUCTION

Pinellas County, in coordination with the Florida Department of Transportation (FDOT) District Seven, is conducting a Project Development and Environment (PD&E) Study to evaluate alternatives to remove, rehabilitate or replace the existing Beckett Bridge (Bridge no. 154000) in Tarpon Springs, Pinellas County, Florida.

This Location Hydraulics Report was prepared as part of the Beckett Bridge PD&E Study. Protection of floodplains and floodways are required by Executive Order 11988 “Floodplain Management”, USDOT Order 5650.2, “Floodplain Management Protection”, and Federal-Aid Policy Guide 23 CFR 650A. The intent of these regulations is to avoid or minimize highway encroachments within the 100 year (base) floodplains, where practicable, and to avoid supporting land use development which is incompatible with floodplain values. Where encroachment is unavoidable, the regulations require appropriate measures to minimize impacts.

The existing bridge was originally constructed in 1924 as a timber structure with a steel movable span. The fixed timber approach spans were replaced with concrete approach spans in 1956. The bridge is considered historic, and is the only highway single-leaf rolling-lift bascule bridge remaining in Florida. Major repairs were performed in 1979, 1998 and in 2011. Major rehabilitation or replacement of the bridge is needed to keep the bridge open and operating efficiently.

The project limits extend along Riverside Drive from Chesapeake Drive across Whitcomb Bayou to Forest Avenue, a distance of approximately 0.3 mile (see **Figure 1**, Project Location.). The existing two-lane bridge connects areas west and north of the Bayou to downtown Tarpon Springs. The bridge is also located on a popular route for access to Fred Howard Park, a Pinellas County park located approximately 3.1 miles west on the Gulf of Mexico. Riverside Drive/North Spring Boulevard is an extension of Tarpon Avenue, which is a designated evacuation route. Beckett Bridge provides access to major north/south arterials including Alternate US 19 and US 19 for coastal residents during hurricane evacuation. The bridge also provides access for emergency vehicles, including police, ambulance and fire.



Figure 1 – Project Location

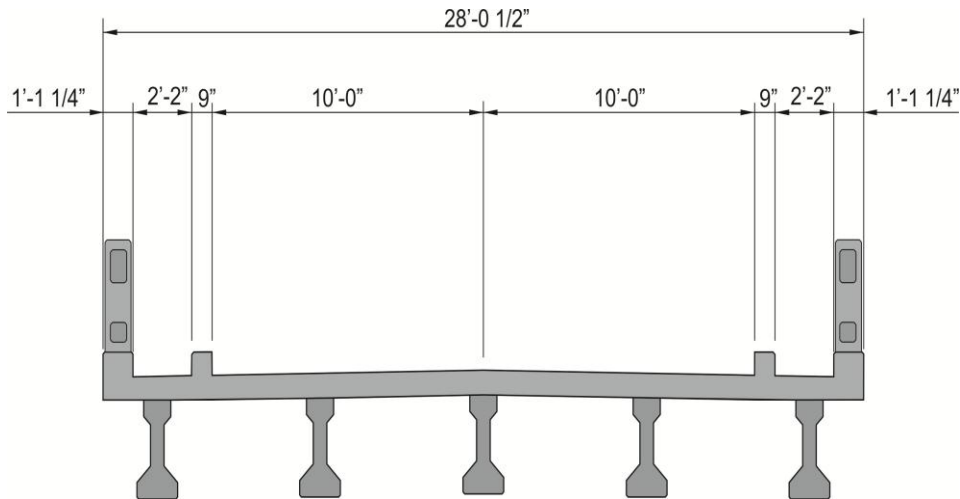
Beckett Bridge is owned and operated by Pinellas County. A bridge tender is only present when required to open the drawbridge for a vessel, there are no full-time bridge tenders. US Coast Guard drawbridge opening regulations (33CFR117.341) states that “The draw of the Beckett Bridge, mile 0.5, at Tarpon Springs, Florida shall open on signal at least two hours’ notice is given.” Whitcomb Bayou connects to the Gulf of Mexico via the Anclote River to the north. Boats docked along Whitcomb, Spring and Minetta Bayous, and along artificial canals which connect to the southeastern portion of the Whitcomb Bayou, must pass the Beckett Bridge to access the Gulf of Mexico.

### 1.1 PROJECT NEED

The bridge is considered functionally obsolete. This designation is based primarily on the substandard clear roadway width of only 20 feet and substandard roadway safety features. The existing typical section consists of one, 10-foot wide travel lane in each direction and 2-foot 2-inch-wide sidewalks separated by a curb on both sides of the bridge (see **Figure 2 – Existing Bridge Typical Section**).



Minimum required lane and shoulder widths prescribed by the American Association of State Highway and Transportation Officials (AASHTO) are not met. The sidewalks on the bridge are narrow and do not meet current accessibility requirements established by the Americans with Disabilities Act (ADA). The bridge railings do not meet current standards for pedestrian safety or geometric and crash testing safety standards for vehicles. Approach guardrail and transitions and end treatments also do not meet current safety standards.



**Figure 2 – Existing Bridge Typical Section**

According to recent (10/27/09) FDOT inspection reports, the existing bridge has an overall Structure Inventory and Appraisal Sufficiency Rating of 44.9 out of 100. (Sufficiency ratings are a method of evaluating highway bridges by calculating a numeric value between 0 and 100, indicative of bridge sufficiency to remain in service). Bridges with a sufficiency rating less than 50 are eligible for federal replacement funds.

Although the bridge is not considered Structurally Deficient, the bridge has a substandard load carrying capacity requiring weight restrictions. The bridge is currently posted for legal loads limited to 2-ton Single Unit Trucks and 15-ton Combination Trucks. Repairs in 1979 and 1988 included installation of crutch bents due to settlement and lateral stability concerns. Repairs in 2011 were performed to correct issues with the operating machinery and bascule leaf alignment.

The existing vertical clearance at the fenders is six feet. The tip of the bascule leaf overhangs

the fender with the leaf fully raised and does not provide unlimited vertical clearance between the fenders. The existing horizontal clearance between the fenders is 25 feet.

## 1.2 ALTERNATIVES CONSIDERED

The following alternatives will be evaluated during the study:

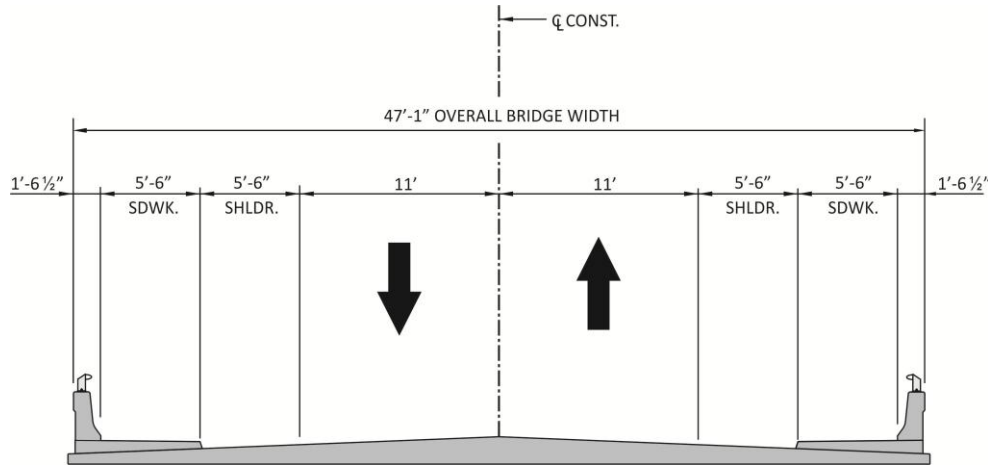
- No-Build - Maintain Existing Bridge
- No-Build - Remove Existing Bridge (includes alternate routing of traffic)
- Rehabilitation of the Existing Bridge
- Replace with a new Movable Bridge
- Replace with a new Fixed Bridge

The “No-Build” alternative includes only routine maintenance to keep the bridge open to traffic until safety issues would require it to be closed. Evaluation of future improvements would occur at a later date. The “No Build with Removal of the Existing Bridge” would result in routine maintenance in the near future with the intent to demolish the bridge when it is no longer safe for traffic, with no plans to replace it with a new one. All bridge replacement alternatives considered will be constructed in approximately the same location as the existing bridge to minimize impacts.

Alternate corridors for bridge location will not be evaluated due to the extent of development in the vicinity of the existing bridge. Capacity improvements will not be considered. The complete removal alternative will examine alternative traffic routes and potential impacts to the community and on traffic operations.

## 1.3 PREFERRED ALTERNATIVE

The proposed bridge typical section has a total out-to-out width of 47 feet 1 inch as shown in **Figure 3**. The typical section includes two, 11-foot wide travel lanes with 5.5-foot shoulders that can function as undesignated bicycle lanes. Sidewalks, 5.5 feet wide, are proposed on both sides of the bridge. Proposed sections on the roadway approaches were developed to avoid acquisition of additional right-of-way.



**Figure 3 – Proposed Bridge Typical Section**

## 2.0 DATA COLLECTION

For completion of the review of the existing hydraulics within the project corridor, data from many diverse sources was obtained. Data included geographic information system (GIS) coverages for roadways, Federal Emergency Management Agency (FEMA) flood studies, Southwest Florida Water Management District (SWFWMD) coverages for wetlands, surface water bodies and land use, and County-generated coverages for topography. A list of the data collected and their source(s) is presented in **Table 1**.

**Table 1: List of Data Collected**

Data	Source	Agency
GIS Base Layers, such as county boundaries, highways, roadways, etc.	Florida Geographic Data Library	Florida Department of Transportation (FDOT)
FEMA Flood Plain Maps	Florida Geographic Data Library	FEMA
Hydrology GIS layers, such as surface water, wetlands	Florida Geographic Data Library	SWFWMD
Land Use Maps	Florida Geographic Data Library	SWFWMD
Topographic information	Pinellas County	Pinellas County
Soil Survey maps	Florida Geographic Data Library	Natural Resources Conservation Service (NRCS)
Surface Drainage Basins	Florida Geographic Data Library	SWFWMD
Digital Orthophotography – DOQQ	United States Geologic Survey (USGS)	USGS
Aerial Photographs	Pinellas County	Pinellas County
Parcels	Pinellas County	Pinellas County



## 3.0 EXISTING CONDITIONS

### 3.1 SOILS

A review of the United States Department of Agriculture (USDA), Natural Resources Conservation Service (NRCS) Soil Survey of Pinellas County, Florida (1983) and the NRCS Web Soil Survey (WSS) indicate that the principal soil units within the project limits are:

*Astatula Soils and Urban Land, 0 to 5 percent slopes (4)* – This soil complex is excessively drained generally and is found on broad ridges and the lower coastal plain. The Urban land portion of this soil type consists of residential developments, commercial buildings, streets, parking lots, and other types of impervious ground cover. This soil complex has a very low water capacity and the depth of the seasonal high water table is more than 6 feet below the surface.

*Matlacha and St. Augustine Soils and Urban Land (16)* – This soil complex is somewhat poorly drained and is generally found on low ridges and the lower coastal plain. The available water capacity is low and the depth of the seasonal high water table is 1.5 to 3 feet below the surface from June through October.

*Tavares Soils and Urban Land, 0 to 5 percent slopes (29)* – This soil complex is moderately well-drained and occurs on knolls, low ridges and along the lower coastal plain. The available water capacity is very low and the depth of the seasonal high water table is 3.5 to 6 feet below the surface from June through December.

*Water (99)* – This classification is not a soil description, but is shown by the *Soil Survey of Pinellas County* to cover a portion of the project study area including Whitcomb Bayou.

### 3.2 LAND USE

A combination of aerial photography, GIS FLUCCS data and field inspections were utilized to determine land use in the project corridor. The project study area currently consists of a mixture of transportation, residential, recreational, governmental, and open water habitat/land use types.

Six upland and three wetland/surface water land use classifications are located within the



project study area. A brief description of each upland and wetland land use or habitat type found within the project study area is provided below.

### 3.2.1 Uplands

#### *Residential, Medium Density*

**FLUCFCS: 120**

Residential, medium density areas consist of residential housing with two to five dwelling units per acre. Within the project study area, this category includes residential houses with some empty lots throughout the project study area located on each side of the bayou. Residential, medium density areas comprise 20.37 acres of the total project study area.

The type and acreage of each vegetative cover/land use within the project study area is summarized in **Table 2**.

**Table 2: Vegetated Cover/Land Use Acres within the Project Study Area**

Habitat Type	FLUCFCS Code	FWS Classification	Acres Within Project Study Area
<i>Uplands</i>			
Residential, Medium Density	120	NA	20.37
Residential, High Density	130	NA	3.86
Commercial and services	140	NA	0.14
Industrial	150	NA	0.87
Marinas and Fish Camps	184	NA	1.89
Roads and Highways	814	NA	1.34
<i>Wetlands/Surface Waters</i>			
Bays and Estuaries	540	E2UB3	10.38
Mangrove Swamps	612	E2SS3	0.12
Oyster Bars	654	E2RF2	0.17
<b>Subtotal for Uplands</b>			<b>28.48</b>
<b>Subtotal for Wetlands/Surface Waters</b>			<b>10.67</b>
<b>Total</b>			<b>39.15</b>

#### *Residential, High Density*

**FLUCFCS: 130**

Residential, high density areas consist of residential housing with six units per acre or more and/or multiple dwelling housing units such as apartments or condominiums. Within the project study area, this category includes residential houses and an RV/mobile home park (Bayshore Park) located south of the bridge and west of the bayou. Residential, high density areas comprise 3.86 acres of the total project study area.

**Commercial and Services****FLUCFCS: 140**

Commercial areas are predominantly associated with the distribution of products and services and include all secondary structures associated with an enterprise in addition to the main building including sheds, warehouses, offices, driveways, and parking lots. Within the project area, this land use type consists of a portion of the Tarpon Bayou Center, a nursing home located on the west side of Chesapeake Drive approximately 0.05 mile north of Riverside Drive. Commercial and services comprise 0.14 acre of the total project study area.

**Industrial****FLUCFCS: 150**

Industrial areas include those land uses where manufacturing, assembly or processing of materials and products are accomplished. Within the project area, this land use type consists of a portion of the Stamas Yacht Boat Repair and Restoration which is located on the west side of Pampas Avenue approximately 0.10 mile north of North Spring Boulevard. Industrial areas comprise 0.87 acre of the total project area.

**Marinas and Fish Camps****FLUCFCS: 184**

Marinas and fish camps include associated buildings, parking lots, and landscape. Within the project area, this category includes the Tarpon Springs Yacht Club located on the east end of the project area north of North Spring Boulevard. The marina comprises 1.89 acres of the total project area.

**Roads and Highways****FLUCFCS: 814**

Roads and highways refer to facilities that are used for the movement of people and goods and encompasses all areas used for right-of-way including pavement, medians, and buffers. Within the project study area, this land use consists of Riverside Drive/North Spring Boulevard between Chesapeake Drive and Forest Avenue. Roads and highways comprise 1.34 acres of the total project study area.

### 3.2.2 Wetland/Surface Waters

#### *Bays and Estuaries*

**FLUCFCS:** 540

**FWS:** E2UB3 (*Estuarine, Intertidal, Unconsolidated Bottom, Mud*)

Bays and estuaries are tidally influenced inlets or large bodies of water that extend from the ocean into the land mass of Florida. Within the project study area, this category includes 10.67 acres of Whitcomb Bayou.

#### *Mangrove Swamps*

**FLUCFCS:** 612

**FWS:** E2SS3 (*Estuarine, Intertidal, Scrub-Shrub, Broad-Leaved Evergreen*)

Mangrove swamps are typically coastal hardwood swamps where red mangrove (*Rhizophora mangle*) and/or black mangroves (*Avicennia germinans*) are pure or predominant. White mangroves (*Laguncularia racemosa*) are also typically found within these swamps. Within the project study area, mangrove stands are dominated by black mangrove, white mangrove, red mangrove, saltweed (*Phloxerus vermicularis*), and marsh elder (*Iva frutescens*). Mangroves were observed on the west end of Beckett Bridge, north and south of the existing roadway. In addition, mangroves and associated species were observed along Whitcomb Bayou on the south side of North Spring Boulevard. The mangroves in this area are trimmed and maintained. Mangrove swamps comprise 0.12 acre of the total project study area.

#### *Oyster Bars*

**FLUCFCS:** 654

**FWS:** E2RF2 (*Estuarine, Intertidal, Reef, Mollusk*)

Barnacles (*Balanus* sp.) and oysters (*Crassostrea virginica*) were observed attached to the bridge pilings, seawall face, and pieces of debris on the bottom of the bayou. An accumulation of oysters was observed under the east and west ends of Beckett Bridge. Oyster bars comprise 0.17 acre of the total project study area.

### 3.3 EXISTING PROJECT DRAINAGE BASINS

The existing drainage patterns and basin limits have been approximated based on aerial photographs and topographic maps. The existing drainage system within the project limits is predominantly sheet flow along the Riverside Drive roadway to Minnetta Bayou/ Spring Bayou which outfall to the Anclote River. The existing Beckett Bridge discharges directly to the Minnetta Bayou/ Spring Bayou via scuppers and at the bridge approaches. Currently there are

no existing stormwater management facilities located in the area along the Beckett Bridge project limits.

### **3.4 CROSS DRAINS AND BRIDGES**

No existing cross drains were identified within the project limits. As previously discussed, the existing Beckett Bridge was originally constructed in 1924 as a timber structure with a steel movable span. The fixed timber approach spans were replaced with concrete approach spans in 1956. The existing vertical clearance at the fenders is six feet. The existing horizontal clearance between the fenders is 25 feet.

### **3.5 FLOODPLAINS AND FLOODWAYS**

The Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRMs) Panel 12103C00196 (September 2003) was evaluated for this study. A review of this FIRM map reveals regulatory floodplains within the project limits. Base Flood Elevations (BFEs) have been established for Minnetta Bayou/ Spring Bayou of elevation 10.00 feet. The portions of the FEMA flood map used for this analysis are presented in Appendix A. These BFEs are associated with coastal tidal surge conditions.

### **3.6 FLOODING PROBLEMS**

Pinellas County and City of Tarpon Springs maintenance personnel were contacted to acquire information related to past problems due to flooding along the project corridor. According to the City, shallow flooding of Riverside Drive near Chesapeake Avenue was reported due to inadequate secondary drainage systems. No overtopping of the existing bridge was reported.

## **4.0 PROPOSED CONDITIONS**

### **4.1 CRITERIA AND METHODOLOGY**

If a replacement bridge is selected as the Preferred Alternative, stormwater runoff from the proposed project is subject to regulation by the Southwest Florida Water Management District (SWFWMD) in accordance with Chapter 40D-4 FAC 40, Environmental Resources Permits.

No change in the impervious areas within the project limits will occur for either “No Build”



alternative or for the Rehabilitation Alternative. No change to the typical section is proposed for these alternatives and no changes to the existing drainage system will be made. Accordingly, it is not anticipated that SWFWMD will require any additional stormwater treatment.

If a build alternative is selected, a new bridge will be constructed on approximately the same alignment as the existing bridge. The project may qualify for a Noticed General Permit, provided wetland impacts are below minimum thresholds and all other requirements for this permit are met. If a Noticed General Permit is applicable to the proposed project, SWFWMD may not require treatment of stormwater runoff from the bridge. If a Standard General Permit is required, all directly connected impervious areas may be required to be treated. Since a formal determination by SWFWMD concerning the type of permit required will not be made until an Environmental Resource Permit application is submitted in the design phase, it will be assumed that treatment of all impervious is required for conceptual drainage design during the PD&E phase. As part of the PD&E study a conceptual drainage design will be prepared for the project.

During the design phase, the proposed drainage system for this project will be designed in accordance with the FDOT and Pinellas County drainage standards and procedures to carry stormwater runoff away from the roadway in the natural flow directions of that particular basin. The proposed modifications to the existing Riverside Drive with the preferred alternative, will involve modifications to the existing lanes and sidewalks. Curb and gutter with inlets will be added to the roadway. No roadway modifications outside of the existing ROW are proposed for the project.

#### **4.2 FLOODPLAIN ENCROACHMENT AND COMPENSATION**

The bridge replacement alternatives considered will be constructed in approximately the same locations as the existing bridge to minimize impacts. There are no existing or proposed cross drains within the project limits.

The proposed structure will be hydraulically equivalent to or greater than the existing structure, and backwater surface elevations are not expected to increase. As a result, the project will not affect existing flood heights or floodplain limits. The project will not result in substantial adverse environmental impacts. There will not be 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.

A Bridge Hydraulic Report will be prepared during the project design phase.

It is anticipated that the proposed improvements to the Beckett Bridge should be completed within the existing ROW. If this is the case for the Preferred Alternative no further encroachment into established flood zones outside of the existing ROW will occur. If there are floodplain encroachments for the bridge they will mainly involve modifications at the approaches to the bridges as well as incidental encroachments due to bridge modification or replacement activities, where applicable. Since the existing flood zones are associated with coastal surge, compensation for the floodplain impacts is not anticipated to be required by the regulatory agencies.

### **4.3 PROJECT CLASSIFICATION**

In accordance with the requirements set forth in 23 CFR 650A, the project corridor was evaluated to determine the effects, if any, of the proposed alternatives on the hydrology and hydraulics of the area. Hydraulic improvements required as part of the bridge and roadway project are divided into categories based on the type of hydraulic improvement proposed and the estimated floodplain effects.

- Within the project corridor, the improvements to the existing Riverside Drive and Beckett Bridge represent transverse encroachments on the floodplain. This encroachment should remain at existing levels for all proposed alternatives.
- Interruption of emergency services and emergency evacuation routes due to roadway flooding should not be changed from existing levels.
- Cut and fill activities required as part of the roadway improvements are not expected to significantly impact the fauna, flora, and open space environments along the corridor.
- Additionally, local groundwater and surface water systems, flow patterns, and water quality will experience no significant impacts.

Under the categorization scheme mentioned above, the potential impacts from the Beckett Bridge replacement were classified as Category 5.

#### **4.4 PROJECTS ON EXISTING ALIGNMENT INVOLVING REPLACEMENT OF DRAINAGE STRUCTURES IN HEAVILY URBANIZED FLOODPLAINS**

These projects include work in flood sensitive, heavily urbanized floodplains, where the conditions of flooding are largely attributable to the low lying terrain. The work does not include those replacement structures that will reduce the hydraulic performance of existing facilities or a change in the profile grade when the existing grade is overtopped by an event below the 100 year storm. Replacement drainage structures are limited to hydraulically equivalent structures in most instances.

“Replacement drainage structures for this project are limited to hydraulically equivalent structures. The limitations to the hydraulic equivalency being proposed are basically due to restrictions imposed by the geometrics of design, existing development, cost feasibility, or practicability. An alternative encroachment location is not considered in this category since it defeats the project purpose or is economically unfeasible. Since flooding conditions in the project area are inherent in the topography or are a result of other outside contributing sources, and there is no practical alternative to totally eradicate flood impacts or even reduce them in any significant amount, existing flooding will continue, but not be increased. The proposed structure will be hydraulically equivalent to or greater than the existing structure, and backwater surface elevations are not expected to increase. As a result, the project will not affect existing flood heights or floodplains limits. This project will not result in any new or increased adverse environment impacts. 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.”

### **5.0 REGULATORY AGENCY COORDINATION**

#### **5.1 LOCAL AGENCIES**

Pinellas County and the City of Tarpon Springs are the local agencies with jurisdiction for portions of the project corridor for the proposed improvements to Beckett Bridge.



Coordination with these agencies will be required during preliminary and final design.

## **5.2 STATE AGENCIES**

The state agencies involved in the permitting process for the Beckett Bridge would be the Florida Department of Environmental Protection (FDEP) and the Southwest Florida Water Management District (SWFWMD). Permits would be required for all dredge and fill work within, or areas connected to, Waters of the State (Chapter 17-4.23, FAC). The FDEP has delegated most dredge and fill permitting responsibility within Pinellas County to the SWFWMD via the Environmental Resource Permit (ERP) process. Stormwater systems will be permitted through the SWFWMD in accordance with Chapter 40D-4 FAC, which requires that stormwater management systems meet the SWFWMD design criteria. Specifically, stormwater management systems should provide water quality treatment, peak discharge attenuation, and adequate drainage. The project corridor lies adjacent to wetland areas that must be considered in the design of the stormwater system.

## **5.3 FEDERAL AGENCIES**

Federal agencies which may require permits for the proposed Beckett Bridge improvements are the U.S. Coast Guard, U.S. Army Corps of Engineers (ACOE), U.S. Environmental Protection Agency (USEPA), and FEMA. The ACOE would be involved in permitting dredge and fill activities in the waters of the United States. In Florida, the National Pollutant Discharge Elimination System (NPDES) permit process is administered by the FDEP for stormwater discharges into Waters of the United States.

## **6.0 CONCLUSION**

A number of alternatives were evaluated as part of the study. Any of the alternatives selected should not adversely affect the hydrology and hydraulics of the surrounding area. The existing flood zones are associated with tidal flooding and should not change because of the replacement. The proposed project will not significantly change the risks or damages associated with roadway flooding or cause an interruption of emergency services and evacuation of the community. The proposed Beckett Bridge alternatives will perform hydraulically in a manner equal to or greater than the existing bridge structure.

## 7.0 REFERENCES

Federal Emergency Management Agency, Flood Insurance Rate Maps for Pinellas County (unincorporated), Florida.

Florida Department of Transportation, Drainage Manual, 2012.

Florida Department of Transportation, Culvert Handbook, 2004.

Florida Department of Transportation, PD&E Manual, Part 2, Chapter 24 – Floodplains, April 22, 1998

Southwest Florida Water Management District, Environmental Resource Permitting Information Manual, 2004.

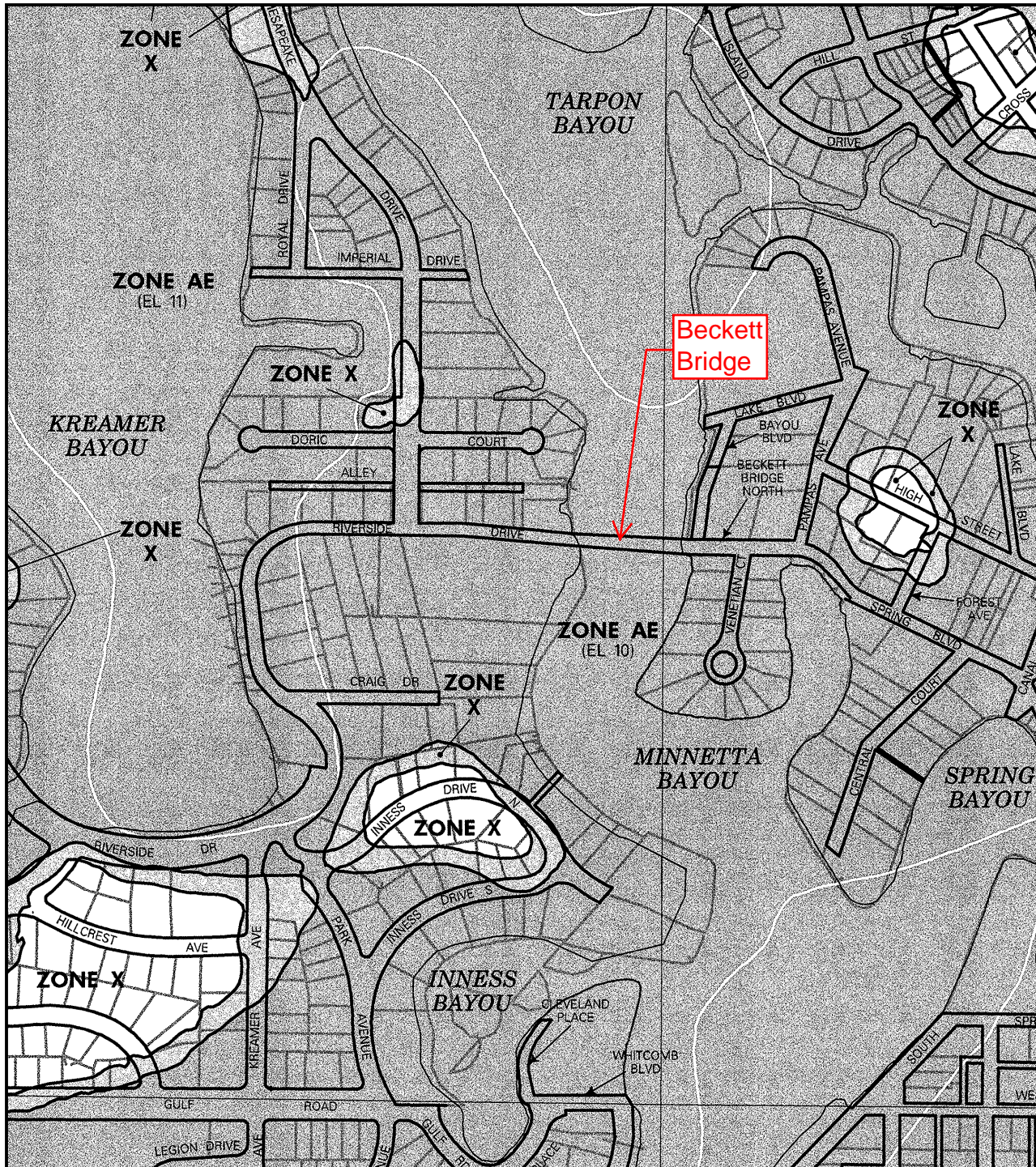
United States Department of Agriculture, Soil Survey of Pinellas County; Florida, October 1990.



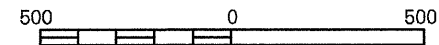
# APPENDIX A

## *FEMA Map*





APPROXIMATE SCALE



**NATIONAL FLOOD INSURANCE PROGRAM**

**FIRM  
FLOOD INSURANCE RATE MAP  
PINELLAS COUNTY,  
FLORIDA  
AND INCORPORATED AREAS**

**PANEL 19 OF 327**

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
PINELLAS COUNTY	126139	0019	G
TARPON SPRINGS, CITY OF	120259	0019	G

Notice to User: The MAP NUMBER shown below should be used when placing map orders; the COMMUNITY NUMBER shown above should be used on insurance applications for the subject community.

**MAP NUMBER  
12103C0019G**

**EFFECTIVE DATE:  
SEPTEMBER 3, 2003**



Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at [www.msc.fema.gov](http://www.msc.fema.gov)